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MD290 Series
General-Purpose AC Drive

User Guide

Industrial Automation | Intelligent Elevator | New Energy Vehicle | Industrial Robot | Rail Transit

Data code 19012248B06

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Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

Introduction

The MD290 series AC drive is a general-purpose AC drive designed to control and regulate the speed of asynchronous motors. It can be used to drive automated production equipment in various industries, such as textile, paper making, wire drawing, machine tool, packaging, food, fan, and water pump.

This guide describes product selection, mechanical design, electrical design, installation and operation, function application, communication configuration, troubleshooting, and product certifications and standards.

Revision History

Revision date	Document version	Description
July 2025	B06	**Software version:** • This guide corresponds to the firmware code of 03020452, version label of F7-10=U29.12/F7-11=U29.24/F7-15=000.00/F7-16=000.00, and version of A13.03. **Modified the following content:** • Added T13 model caution labels in *" Fundamental Safety Instructions" on page 21*. • Added *" Transparent Protective Cover" on page 490*.
April 2025	B05	• Updated *" Front Cover" on page 1*, *" Preface" on page 2*, and *" Back Cover" on page 860*. • Updated the MD290-2S0.7GB model to MD290-2S0.75GB mode in the following sections: ■ *" Product Models" on page 29* ■ *"4.1 Electrical Specifications" on page 52* ■ *"5.3.2.4 Cabinet Heat Dissipation" on page 96* ■ *"5.6.3.2 Dimensions and Cable Selection for Main Circuit Terminals" on page 150* ■ *"10.3.1 Fuse, Contactor, and Circuit Breaker" on page 427* ■ *"10.3.3 EMC filter" on page 445* ■ *"10.3.5 Braking Component" on page 460* ■ *"10.3.7 Output Reactors" on page 470* • Updated the overload capacity of P-type model to "60s at 130% of the rated current" in *"4.1 Electrical Specifications" on page 52*. • Updated the electrical connection diagram of the T13 model in *"5.6.1 Electrical Connection" on page 141*. • Updated the status word definition of communication address 3000H in *"11.1.1 Introduction to Parameters" on page 496* and *"11.1.4 Parameter Address Representation Rules" on page 504*. • Updated the value range of FD-00 in *"11.1.5 Descriptions of Communication Parameters in Group FD" on page 508*. • Updated the parameter group. This guide corresponds to the firmware code of 03020452, version label of F7-10 = U29.12/F7-11 = U29.24/F7-15 = 000.00/F7-16 = 000.00, and version of A13.03.

Date	Document version	Description
August 2024	B04	• Updated *" Front Cover" on page 1*, *" Preface" on page 2*, and *" Back Cover" on page 860*. • Updated the system connection diagram in *"1.3 System Connection" on page 33*. • Updated the overload capability description and added the protection category "Class I" in *"4.1 Electrical Specifications" on page 52*. • Updated *"4.2 Technical Specifications" on page 64*. Updated the description of the frequency source. Update the output terminal from one DO terminal to one AO terminal. Updated vibration specifications. Added the technical specifications of "Shock". • Updated the description "AI2 supports voltage input of 0 V to 10 V or current input of 0 mA to 20 mA" in the standard wiring diagram in *"5.6.1 Electrical Connection" on page 141*. • Updated the parameter modification diagram in *"6.1.3 Parameter Settings" on page 228*. • Updated the parameter view diagram in *"6.1.4 Parameter Viewing" on page 229*. • Deleted the description of Modbus TCP in *"7.1.1.3 Setting Operation Commands Through Communication" on page 244*. • Updated the diagram "Binding between running commands and frequency reference channels" in *"7.1.2.11 Binding of Running Commands to Frequency References" on page 270*. • Updated AI2 typical curves in *"7.3.4 AI Terminals" on page 288*. • Updated step 1 descriptions of the application example in *"7.1.2.7 Setting Main Frequency Through PID" on page 260*.

Date	Document version	Description
August 2024	B04	• Updated the description "When the actual length (FB-06) is greater than or equal to the set length (FB-05)" in *"7.5.8 Fixed Length Control Function" on page 322*. • Updated *"8.2 List of fault codes" on page 359*. Deleted the description of FVC and SVC. Added fault code Err25. Updated the cause "braking unit is shoot-through" for fault code Err62. • Updated address 2000H command function from "0006: Decelerate to stop" to "0006: Stop according to the stop mode set in F6-10" in *"11.1.4 Parameter Address Representation Rules" on page 504*. • Updated the cable selection guide table in *"5.6.3.2 Dimensions and Cable Selection for Main Circuit Terminals" on page 150*. • Updated the selection of the fuse, contactor, and circuit breaker in *"10.3.1 Fuse, Contactor, and Circuit Breaker" on page 427*. • Added the grid type in the electrical specification table in *"4.1 Electrical Specifications" on page 52*. • Added a description under the control cable specification table in *"5.6.4.2 Wiring Descriptions of Control Circuit Terminals" on page 187*. • Changed jumper J7/J5 to jumper J9 in "AI2 wiring" in *"5.6.4.2 Wiring Descriptions of Control Circuit Terminals" on page 187*. • Changed descriptions related to cable routing. • Corrected the document format and expression. • Deleted MD38TX2 from *"10.1 Option List" on page 404*. • Updated the type of the cable connected to BP, +, and - terminals in the system composition diagram in *"1.3 System Connection" on page 33*. • Deleted content related to "Torque control".
June 2024	B04	• Updated *" F0-00" on page 577*. ■ Changed the default value of F0-15 to "3 to 6". ■ Deleted F3-34 and F3-35. ■ Updated the value of setting description of F4-00. ■ Updated F5-01 and added DO1 setting description. ■ Updated F6-07 and added the note "Flying start does not apply to dynamic S-curve acceleration/deceleration mode". • Updated *" Parameter List" on page 512*. ■ Updated the change mode of F0-15 to "F0-15 varies with the model". ■ Deleted F3-34 and F3-35.

Date	Document version	Description
December 2023	B03	• Updated *" Front Cover" on page 1*, *" Back Cover" on page 860*, and *" Preface" on page 2*. • Deleted "Expansion card list" section. • Updated the section name in *"10.5 Expansion Card" on page 489* and added a hyperlink to *"10.1 Option List" on page 404*. • Updated *"5.3.6.1 Removing the Cover" on page 111* and deleted the PG card description and illustration. • Updated *"5.4.3 Heat Dissipation Design" on page 125* and added the description "Cabinets with fans on the top are compared to those without fans on the top. The number of fans in the following table is the number of fans that come with the AC drive". • Updated *"5.4.5.1 Removing the Cover" on page 133* and deleted the PG card description. • Updated *"5.6.1 Electrical Connection" on page 141* and updated the standard wiring diagram (single-phase 200 V to 240 V) in Figure 5-58 and the descriptions of J9 and J10 in Figure 5-59. • Updated *"7.1.1.3 Setting Operation Commands Through Communication" on page 244* and deleted descriptions of Ethernet/IP. • Updated *"7.6.5 Motor Overload Protection" on page 328* and updated Figure 7-63 protection inverse time lag curve. • Updated the section name in *"10.5 Expansion Card" on page 489* and added a hyperlink to *"10.1 Option List" on page 404*. • Updated *" Parameter List" on page 512* and added "Groups F and A: standard function parameters" and "Group U: monitoring function parameters". Changed the parameter modification descriptions to the following: ■ Stop: Parameters can be changed only when the drive is in the stop state. ■ Unchangeable: Parameters cannot be modified, including parameters for monitoring, parameters that are not provided to customers, or fixed parameters. ■ Real-time: Parameters can be changed at any time. This guide corresponds to the firmware code of 03020452, version label of F7-10 = U29.12/F7-11 = U29.25/F7-15 = 000.00/F7-16 = 000.00, and version of A12.

Date	Document version	Description
October 2023	B02	• Updated *" Product Models" on page 29* and changed "MD290-2T11G/15P(B)-T" to "MD290-2T11G/15P(B)". • Updated *"4.1 Electrical Specifications" on page 52*. Updated the protection rating of T13 models to IP20, updated the air exhaust capacity of 220P, 250P, 280P, and 315P models, and updated the protection rating of 200-450G and 220-500P models to IP20. • Updated *"5.1.3.1 Tools for Mechanical Installation" on page 75* and added the screw model and precautions. • Updated *"5.3.2.4 Cabinet Heat Dissipation" on page 96* and *"10.3.2 AC Input Reactor" on page 434* and deleted MD290-2T11G/15P(B)-T. • Updated *"5.6.3.2 Dimensions and Cable Selection for Main Circuit Terminals" on page 150* and updated figure 5-68 Dimensions of main circuit terminals for T2 models (single-phase 200 V to 240 V). • Updated *"5.6.1 Electrical Connection" on page 141* and updated the descriptions of J9 and J10 in the standard wiring diagram (three-phase 380 V to 480 V/three-phase 200 V to 240 V). • Added *"6.1.5 Quick Parameter View" on page 230*. • Updated *"6.1.8 Driving the Motor with the Operating Panel" on page 234* and updated the setting range of F1-00 in Table 6-7 Motor parameter description. • Updated communication descriptions to the following in *"7.1.2.8 Setting the Main Frequency Through Communication" on page 264*: There is no need to switch between CANopen communication and CANlink communication. Ensure that F0-28 is set to 1 and the expansion card is used correctly. The baud rate of CANopen communication does not need to be set by software. It is determined by the DIP switch of the expansion card. The baud rate of CANlink communication is set by the thousands place of FD-00. The local address is set by FD-02. • Updated *"7.1.3.1 Start Mode" on page 272* and deleted "This mode is valid only in the vector control mode". • Updated *"7.2.1 Motor Auto-tuning" on page 279* and deleted "Step 3: Input encoder parameters (F1-27, F1-28, and F1-30)" for auto-tuning on all parameters of asynchronous motors in dynamic mode in Table 7-7.

Date	Document version	Description
October 2023	B02	• Updated *"7.2.4 Motor Auto-tuning" on page 283* and deleted the description of "If there is an encoder, enter the encoder parameters (F1-27, F1-28, and F1-30)". • Added *"7.5.1 Linear speed" on page 298* and added F8-56, F8-58, and F8-59. • Updated *"7.1.2.5 Setting the Main Frequency by Multi-reference" on page 258* and changed "When (DI2, DI4, DI7, DI8) = (0, 0, 1, 0)" to "When (DI8, DI7, DI4, DI2) = (0, 0, 1, 0)" in figure 7-18 multi-reference setting and application example. • Updated *"7.7 Monitoring" on page 338*. Updated the unit of U0-76, updated the unit, name, and calculation formula (Cumulative power consumption = U0-77 x 1000+ U0-76) of U0-77, and added the description of "For example, if U0-77 is 26 and U0-76 is 769.1, the total power consumption of the MD290 is 26769.1 degrees". Updated the relationship between U0-00 and U0-19. • Updated the description of FP-01 in *"7.8.3 Data Backup and Restoration" on page 351*. • Updated *"10.1 Option List" on page 404*, updated the description of MD38IO1, and added MD-SI-DP2, MD520IO1, and MD38TX2. • Updated *"10.5 Expansion Card" on page 489*, added MD-SI-DP2, MD520IO1, and MD38TX2, and updated MD38IO1.

Date	Document version	Description
October 2023	B02	• Updated *"10.3.3 EMC filter" on page 445*. Updated "Reactor" to "Filter" in Table 10-20 Dimensions of FN 2090 series filters (8-12 A) (unit: mm). • Changed "MDBU-200-B=1" to "MDBUN-200-T=0" in *"10.3.5 Braking Component" on page 460*. • Changed "MD500" to "MD290" in *"10.3.7 Output Reactors" on page 470*. • Added the description of "It takes about 15 ms to read and write a parameter per time. Frequent operations on the EEPROM may cause data interaction (read-write) failure" and added the description of H1000 in *"11.1.4 Parameter Address Representation Rules" on page 504*. Updated 1012H parameter description to "PLC stage". • Added *" F0-00" on page 577*. • Updated *" Parameter List" on page 512*. This guide corresponds to the firmware code of 03020452, version label of F7-10 = U29.12/F7-11 = U29.25/F7-15 = 000.00/F7-16 = 000.00, and version of A12.

Date	Document version	Description
September 2022	B01	• Updated the preface and fundamental safety instructions. • Updated 1.3 System Connection Diagram. • Updated the I/O terminal description and P-type motor overload coefficient in 4 Technical Data. • Deleted the T9 model descriptions from 5.4.3 Heat Dissipation Design. • Added the main circuit terminal dimensions of T13 models and updated the cable selection data in 5.6.3.2 Main Circuit Terminal Dimensions and Recommended Cable Selection. • Added the example of "Connect the DO to the external controller in section 5.6.4.2 Wiring of Control Circuit Terminals. • Deleted the supplementary description from 5.6.6.4 PROFINET Wiring. • Deleted 5.8.1 Leakage Current Suppression. • Updated the parameter in 7 Function Application. • Added descriptions of installation bases for MD-SI-DP1, MD500-PN2, and MDKE9 in 10.1 Option List. • Updated the MD500-AZJ-A1T1 and MD500-AZJ-A1T2 mounting bracket and hole dimension in 10.2.1 Through-Hole Mounting Bracket. • Added dimension information of 80 A AC input reactors in 10.3.2 AC Input Reactor. • Added Schaffner filters for 200P to 800P models (three-phase 380 V to 480 V) in 10.3.3 EMC Filter. • Updated the installation dimension table of 124 A to 1100 A output reactors in 10.3.7 Output Reactor. • Added MD-SI-DP1 and MD500-PN2 in 10.5 Expansion Cards. • Added the chapter 11 Certification and Conformity. • Added the description of communication setting value H1000 in "6.4 Parameter Address Designation Rules". • Updated "13 Parameter List". • Made minor corrections.
December 2020	B00	• Added information on single-phase 220 V models, which is updated in the following sections: • 1.2 Nameplate and Model: Added the single-phase 220 V model description. • 5 Technical Data: Added electrical parameters of single-phase 220 V models. • 11 Specifications and Models: Added data for single-phase 220 V models. (Note: Single-phase 220 V models refer to MD290-2S0.4GB to MD290-2S3.0GB models). • Added content of T13 models.

Date	Document version	Description
April 2020	A04	• Updated the minimum unit and communication address of the communication expansion card in section C.2 Monitoring Parameters. • Updated the description of AO2-GND input signal characteristics in section 5.9.2 Analog Output.
November 2019	A03	• Added three-phase 200 V to 240 V models, which are updated in the following sections: • 3.1.3 Backplate Mounting and Through-Hole Mounting • 3.2.3 Main Circuit Terminal Layout and Dimensions • 7.3.2 Quantity of Cooling Fans • 8 Specifications and Model Selection (Note: The three-phase 200 V to 240 V models refer to the MD290-2T0.4G/0.7PB to MD290-2T55G/75P models.) • Added UL-certified cable specifications in 8.6 Selection Guide for Cables, Circuit Breakers, and Contactors. • Added PROFINET and EtherCAT expansion cards in Appendix A Optional Cards. • Added peripheral component selection data, which is updated in the following sections: 8.3 Through-hole Mounting Bracket and Mounting Hole Dimensions (Option) 8.4 Dimensions of the Bottom Mounting Bracket 8.6 Selection of the AC Input Reactor 8.7 Selection of the EMC Filter 8.10 Selection of the DV/DT Reactor 8.11 Selection of the Output Magnetic Ring
December 2018	A02	• Added 0.4 kW to 18.5 kW low-power models, which are updated in the following sections: 1.1 Nameplate and Model 1.2 Components 3.1.3 Backplate Mounting and Through-Hole Mounting 3.2.2 Function Descriptions and Precautions of Main Circuit Terminals 7.3.2 Quantity of Cooling Fans 8 Specifications and Model Selection • Updated the braking component selection data in section 8.5.3 Braking Component Selection Guidance. • Added the MD38IO3 expansion card and PROFINET communication expansion card in section 8.3 Options List. • Added the setting range and default values for F9-17 to F9-44 in section C.1 Basic Function Parameter List. • Updated the preface. • Updated the logo
June 2017	A01	Added 9 Parameters.
May 2014	V0.0	First release.

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Fundamental Safety Instructions

Safety Precautions

- This chapter presents essential safety instructions for a proper use of the equipment. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to observe the safety precautions may result in serious injuries or death of personnel or device damage.
- "Danger", "Warning", and "Caution" items in this guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
- Use this product in an environment that complies with the design specifications. Malfunction or component damage caused by improper usage is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

Safety Levels and Definitions



Indicates that failure to comply with the notice can result in death or severe personal injuries.



Indicates that failure to comply with the notice may result in death or severe personal injury.



Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

General Safety Instructions

- Drawings in the guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.
- Operators must take mechanical precautions to protect personal safety and wear protective equipment, such as anti-smashing shoes, safety clothing, safety glasses, protective gloves, and protective sleeves.

Unpacking
 • Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking. • Do not install the equipment if you find water seepage or missing or damaged components upon unpacking. • Do not install the equipment if you find the packing list does not conform to the equipment you received.
 • Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking. • Unpack the package in sequence. Do not hit the package violently. • Check whether there is damage, rust, or signs of bumping on the surface of the equipment and equipment accessories before unpacking. • Check whether the package contents are consistent with the packing list before unpacking.

Storage and Transportation



- Large-scale or heavy equipment must be handled by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injuries or equipment damage.
- Before hoisting the equipment, ensure that components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage.
- Do not stand or stay below the equipment when it is being hoisted.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.



- Handle the product with care and mind your steps to prevent personal injuries or product damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in personal injuries.
- Store and transport the equipment strictly based on the requirements. Failure to comply may result in equipment damage.
- Do not store or transport the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the product for more than 3 months. When the product needs to be stored for an extended period, take more strict protection and necessary inspection.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Do not transport the equipment with other devices or materials that may harm or have negative impacts on the equipment.

Installation



- Installation must be carried out by skilled personnel who have undergone specialized electrical training and possess comprehensive electrical expertise. Non-professionals are not allowed to install the equipment.



- Read through the guide and safety precautions before installation.
- Do not install the equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not retrofit the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction.
- Install the product on an incombustible object such as metal and do not touch or attach the product to combustibles. Failure to comply can result in fire accident.



- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.
- Resonance may occur when the equipment operating at a constant speed switches to variable speed operations. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring



- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Before wiring, cut off all the power supplies of the equipment. Wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. Measure the direct voltage of the main circuit and ensure that the voltage is within the safety range. Failure to comply will result in an electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply will result in an electric shock.
- Ensure the equipment is grounded properly. Failure to comply can result in electric shock.



- Do not connect the input power supply to the output end of the equipment. Failure to comply can result in equipment damage or even fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Tighten the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may result in overheat, damage to the connecting parts, or a fire.
- After wiring, make sure that no screws are fallen and cables are exposed in the equipment. Failure to comply may result in an electric shock or equipment damage.



- During wiring, follow the proper electrostatic discharge (ESD) procedures, and wear an antistatic wrist strap. Failure to comply will result in damage to the device or internal product circuits.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding. Failure to comply can result in equipment malfunction.

Power-On



- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before power-on to prevent equipment damage or a fire.
- After power-on, do not open the cabinet door or protective cover of the equipment, touch any terminal, or disassemble any unit or component of the equipment. Failure to comply will result in an electric shock.



- Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in personal injuries or equipment damage.
- Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may result in a fire. Failure to comply may result in fire accident.
- Before powering on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injuries.

Operation



- The equipment must be operated only by professionals. Failure to comply can result in death or personal injuries.
- During operation, do not touch any connecting terminals or disassemble any component of the equipment. Failure to comply can result in electric shock.



- Do not touch the equipment enclosure, fan, or resistor with bare hands. Failure to comply may result in burns.
- During operation, prevent metal or other objects from falling into the equipment. Failure to comply may result in fire or equipment damage.

Maintenance



- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply can result in electric shock.
- Before maintenance, disconnect all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- When a permanent magnet motor is used, do not touch the motor terminals immediately after power-off because the motor terminals can generate induced voltage during rotation even after the equipment is powered off. Failure to comply can result in electric shock.



- Perform routine and periodic inspection and maintenance on the equipment in accordance with maintenance requirements and keep a record.

Repair



- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Do not perform maintenance on the equipment with power on. Failure to comply can result in electric shock.
- Before inspection and maintenance, disconnect all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.



- Submit a request for repair services in accordance with the product warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage circuit breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injuries, or equipment damage.
- Troubleshooting and repair must be performed by professionals in accordance with the repair instructions, with repair records kept properly.
- Replace quick-wear parts of the equipment in accordance with the replacement instructions.
- Do not operate on damaged equipment. Failure to comply may result in death, personal injuries, or equipment damage.
- After the equipment is replaced, check the wiring and set parameters again.

Disposal
WARNING • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in death, personal injuries, or property damage. • Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Safety Labels

For safe operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. See the following table for description of the safety labels.

Safety Label		Description
T1 to T12 models		• Read through the safety instructions before operating the equipment. Failure to comply may result in death, personal injury, or equipment damage. • Do not touch the terminals or remove the cover with power ON or within 10 min after power-off. Failure to comply will result in electric shock.
T13 models		• Read through the safety instructions before operating the equipment. Failure to comply may result in death, personal injury, or equipment damage. • Do not touch the terminals or remove the cover with power ON or within 15 min after power-off. Failure to comply will result in electric shock.

Product Models

The following table lists mapping between the product model and structure.

Table –1 Mapping between product models and structures

Structure	Model (three-phase 380 V to 480 V)	Model (three-phase 200 V to 240 V)	Model (single-phase 200 V to 240 V)
T1	MD290T0.4G/0.7PB MD290T0.7G/1.1PB MD290T1.1G/1.5PB MD290T1.5G/2.2PB MD290T2.2G/3.0PB MD290T3.0G/3.7PB	MD290-2T0.4G/0.7PB MD290-2T0.7G/1.1PB MD290-2T1.1G/1.5PB MD290-2T1.5G/2.2PB	-
T2	MD290T3.7G/5.5PB MD290T5.5G/7.5PB	MD290-2T2.2G/3.7PB MD290-2T3.7G/5.5PB	MD290-2S0.4GB MD290-2S0.75GB MD290-2S1.5GB MD290-2S2.2GB MD290-2S3.0GB
T3	MD290T7.5G/11PB MD290T11G/15PB	MD290-2T5.5G/7.5PB	-
T4	MD290T15G/18.5PB	MD290-2T7.5G/11PB	-
T5 (without the DC reactor)	MD290T18.5G/22P(B) MD290T22G/30P(B)	MD290-2T11G/15P(B)	-
T5 (with the DC reactor)	MD290T18.5G/22P(B)-T MD290T22G/30P(B)-T	MD290-2T11G/15P(B)	-
T6	MD290T30G/37P(B) MD290T37G/45P(B)	MD290-2T15G/18.5P(B) MD290-2T18.5G/22P(B)	-
T7	MD290T45G/55P(B) MD290T55G/75P(B)	MD290-2T22G/30P(B) MD290-2T30G/37P(B)	-
T8	MD290T75G/90P(B) MD290T90G/110P MD290T110G/132P	MD290-2T37G/45P(B) MD290-2T45G/55P MD290-2T55G/75P	-
T9	MD290T132G/160P MD290T160G/200P	-	-
T10 (without the AC output reactor)	MD290T200G MD290T220P MD290T250P MD290T220G MD290T280P	-	-
T10 (with the AC output reactor)	MD290T200G-L MD290T220P-L MD290T250P-L MD290T220G-L MD290T280P-L	-	-
T11 (without the AC output reactor)	MD290T250G MD290T315P MD290T280G MD290T355P	-	-

Structure	Model (three-phase 380 V to 480 V)	Model (three-phase 200 V to 240 V)	Model (single-phase 200 V to 240 V)
T11 (with the AC output reactor)	MD290T250G-L MD290T315P-L MD290T280G-L MD290T355P-L	-	-
T12 (without the AC output reactor)	MD290T315G MD290T400P MD290T355G MD290T450P MD290T400G MD290T500P MD290T450G	-	-
T12 (with the AC output reactor)	MD290T315G-L MD290T400P-L MD290T355G-L MD290T450P-L MD290T400G-L MD290T500P-L MD290T450G-L	-	-
T13 (with the auxiliary power distribution cabinet)	MD290T500G-A MD290T560G-A MD290T630G-A MD290T560P-A MD290T630P-A MD290T710P-A MD290T800P-A	-	-
T13 (without the auxiliary power distribution cabinet)	MD290T500G MD290T560G MD290T630G MD290T560P MD290T630P MD290T710P MD290T800P	-	-

1 Product Information

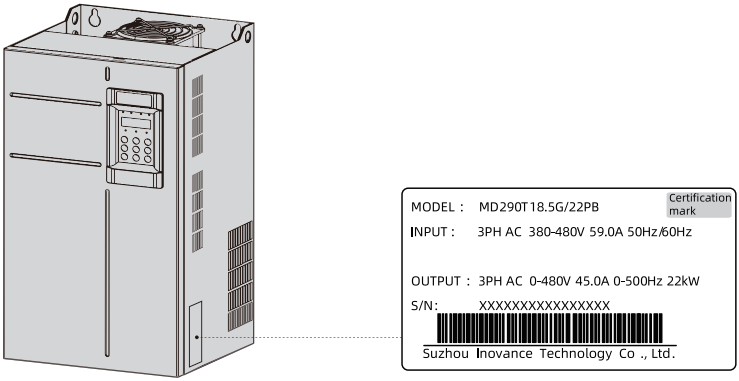
1.1 Product Features

The MD290 is a general-purpose AC drive mainly used for controlling and adjusting the speed of asynchronous motors. It features stable performance and abundant functions, including user programming, software monitoring, and communication bus. It is applicable to drive automated production equipment in various industries, such as the textile, papermaking, wire drawing, machine tool, packaging, food, fan, and water pump industries.



Figure 1-1 Product appearance

1.2 Nameplate and Model



MD290 ① T ② 18.5 ③ G/22 ④ P ⑤ B ⑥ ⑦

① **Product series** MD290: MD290 series AC drive	⑤ **Applicable motor type** P: Fan and water pump
② **Voltage class** T: Three-Phase 380 V to 480 V 2T: Three-phase 200 V to 240 V 2S: Single-phase 200 V to 240 V	
③ **Power rating** 0.4 0.4 kW … … 630 630 kW	⑥ **Braking unit** Null: See the note below. -B: with the braking unit
④ **Applicable motor type** G: General type	⑦ **Reactor** Null: See the note below. -L: with the AC output reactor; applicable to MD290T200G-L to MD290T450G-L models, and MD290T220P-L to MD290T500P-L models -T: with the DC reactor; applicable to MD290T18.5G/22P to MD290T22G/30P models -A: with the auxiliary power distribution cabinet; applicable to MD290T500G(-A) to MD290T630G(-A) models, and MD290T560P(-A) to MD290T800P(-A) models

Figure 1-2 Nameplate and naming rules

Note

- Single-phase 200 V to 240 V: DC reactors are not supported. Three-phase 380 V to 480 V: DC reactors are standard for 30G/37P models and above; DC reactors are optional for 18.5G/22P to 22G/30P models; DC reactors are not supported for 15G/18.5P models and below. Three-phase 200 V to 240 V: DC reactors are standard for 15G/18.5P models and above; DC reactors are optional for 11G/15P models; DC reactors are not supported for 7.5G/11P models and below.
- Single-phase 200 V to 240 V: Braking units are supported as standard. Three-phase 380 V to 480 V: Braking units are standard for 0.4G/0.7P to 15G/18.5P models; Braking units are optional for 18.5G/22P to 75G/90P models. Three-phase 200 V to 240 V: Braking units are standard for 0.4G/0.7P to 7.5G/11P models; Braking units are optional for 11G/15P to 37G/45P models.
- The preceding nameplate is for reference only. Actual nameplates may vary.

1.3 System Connection

When the AC drive is used to control asynchronous motors, you must install a variety of electrical devices on the input and output sides of the AC drive to ensure system safety and stability. The following figure shows the system composition.

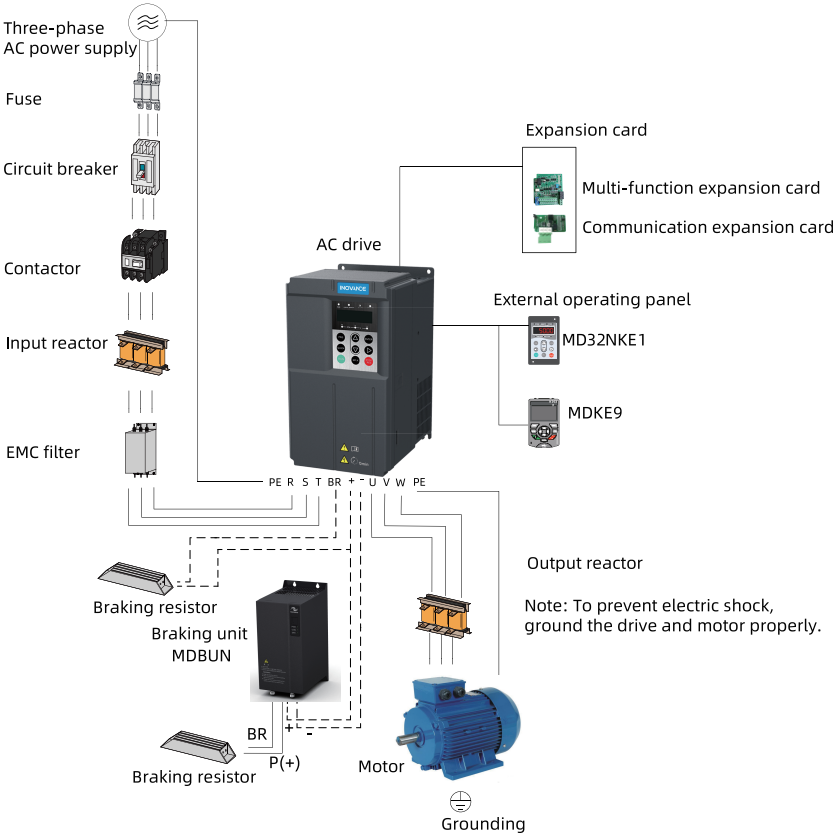


Figure 1-3 System composition

Table 1–1 Descriptions of peripheral electrical components for the AC drive

Name	Description
Fuse	It protects downstream semiconductor components in case of short circuit.
Circuit breaker	It is installed between the power supply and the AC drive input side. Circuit breaker for protection against short circuit: When overcurrent occurs on downstream devices, it cuts off the power supply to prevent incidents. Earth leakage circuit breaker (ELCB): The AC drive may generate high-frequency leakage current during running. To prevent electric shock or even a fire, install a proper ELCB based on actual applications.
Solenoid contactor	Do not power on/off the AC drive frequently through the contactor (the ON/OFF interval must be at least 1 hour) or start the drive directly through the contactor.
Input reactor	It provides the following functions: Improves the power factor on the input side. Eliminates high-order harmonics on the input side effectively and prevents damage to other devices caused by the distortion of voltage waveform. Eliminates input current unbalance caused by inter-phase unbalance.

Name	Description
EMC filter	It reduces the conduction and radiation interference generated by the AC drive to external devices. In addition, it decreases conduction interference flowing from the power supply to the AC drive and improves the anti-interference capacity of the AC drive.
Simple filter	It reduces the conduction and radiation interference generated by the AC drive to external devices.
Braking resistor	For AC drive models with the name containing letter B, the braking resistor is optional. The braking resistor consumes regenerative energy generated during motor deceleration.
Braking unit	For AC drive models with the name excluding letter B, use the MDBUN series braking unit of Inovance and the recommended resistor. The braking unit consumes regenerative energy generated during motor deceleration.
Active front end (AFE) unit	An AFE is an optional unit used to feed the energy generated by the motor during braking back to the power grid. With the AFE installed, the braking unit and braking resistor are not required, which reduces heat emission. Inovance AFE units feature energy saving, low noise, low harmonics pollution, and high power factor.
DC reactor	It provides the following functions: Improves the power factor on the input side. Improves the overall efficiency and thermal stability of the AC drive. Eliminates the impact of high-order harmonics on the input side of the AC drive and reduces external conduction and radiation interference.
Output reactor	Generally, the AC drive generates much high-order harmonics on the output side. When a motor is far away from the AC drive, much distributed capacitance exists in the circuit. Certain harmonics may cause resonance in the circuit, which brings the following adverse effects: 1. Degrades the motor insulation performance and damages the motor in the long run. 2. Generates large leakage current and causes frequent AC drive protection trips. The output reactor can protect motor insulation and reduce bearing current.
Magnetic ring and ferrite clamp	When installed on the input side, the magnetic ring can suppress the noise in the input power supply system of the drive. When installed on the output side, the magnetic ring can suppress interference generated by the AC drive to external devices and reduce the bearing current.
Motor	Use a proper motor.
External operating panel	External LED operating panel MD32NKE1 and LCD operating panel MDKE9 are supported.

Note

The preceding figure showing the AC drive connection is only for your reference. For selection of electrical peripherals, see "Options".

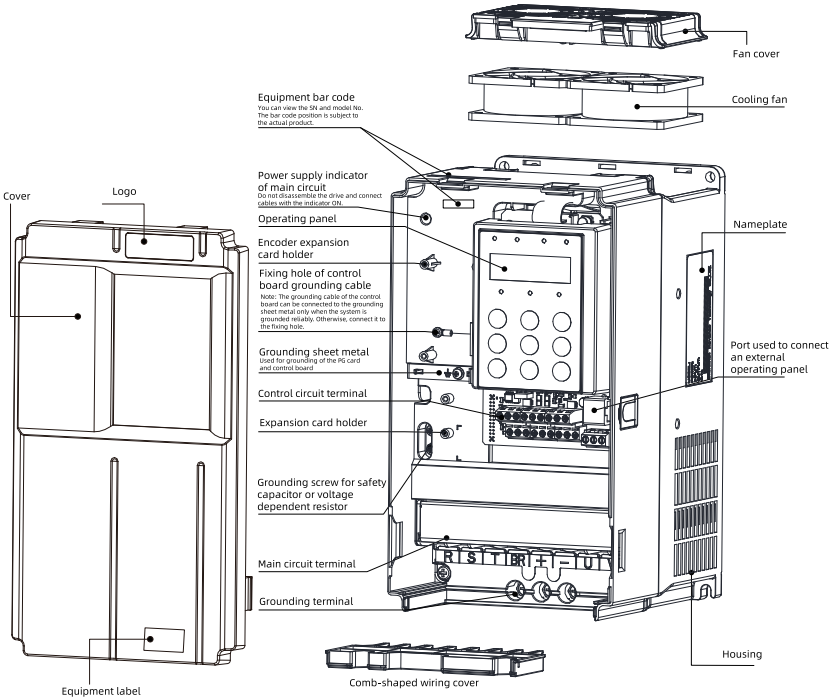
2 Components

2.1 Overview

The AC drive supports the following structures:

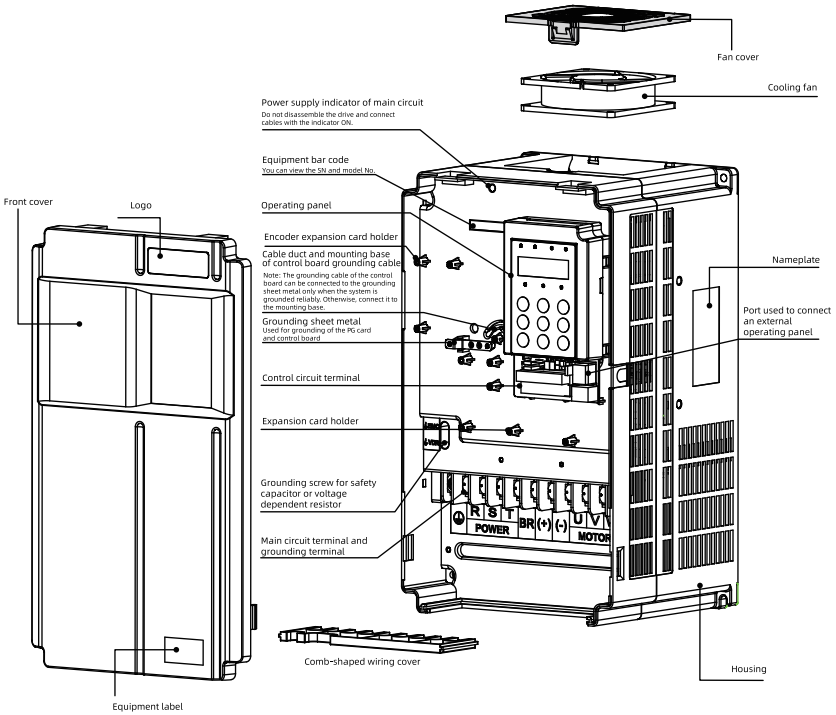
- Plastic structure for T1 to T6 models
- Sheet metal structure for T7 to T13 models

2.2 Components of T1 to T6 Models



Label		Description
⚠	📖	Caution! Please read and understand the user guide before installation and operation.
⚠	10min	Danger! Do not remove the cover during power-on or within 10 minutes after power-off.

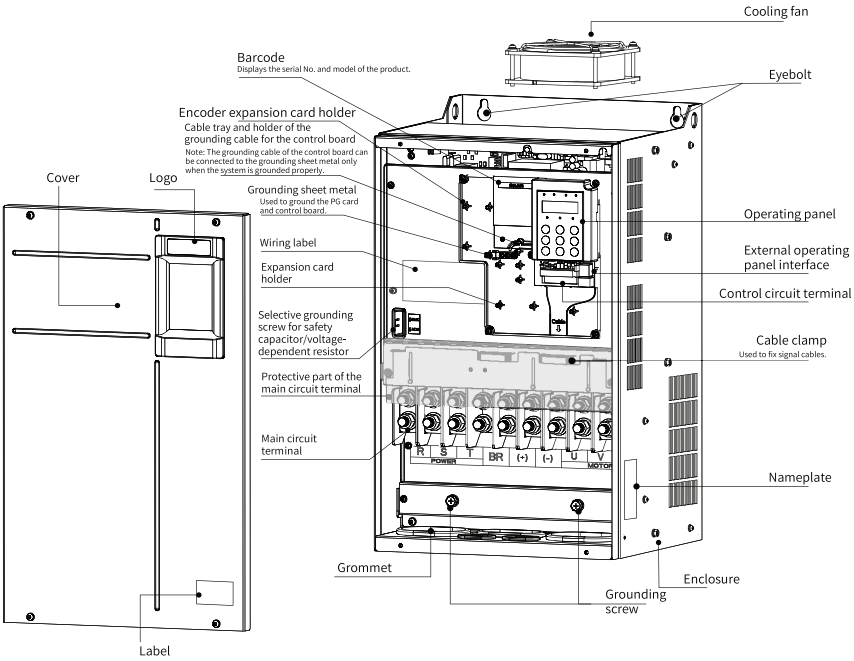
Figure 2-1 Components of T1 to T4 models



Label		Description
⚠	📖	Caution! Please read and understand the user guide before installation and operation.
⚠	10min	Danger! Do not remove the cover during power-on or within 10 minutes after power-off.

Figure 2-2 Components of T5 and T6 models

2.3 Components of T7 to T9 Models



Label	Description
	Read through the user guide before installation and operation.
10min	Do not remove the upper cover with power on or within 10 min after power-off.

Figure 2-3 Components of T7 to T9 models

Note

The quantity and position of cooling fans vary with the drive models.

- T7 models have one top-mounted cooling fan.
- T8 models have two top-mounted cooling fans.
- T9 models have two bottom-mounted cooling fans.

2.4 Components of T10 to T12 Models

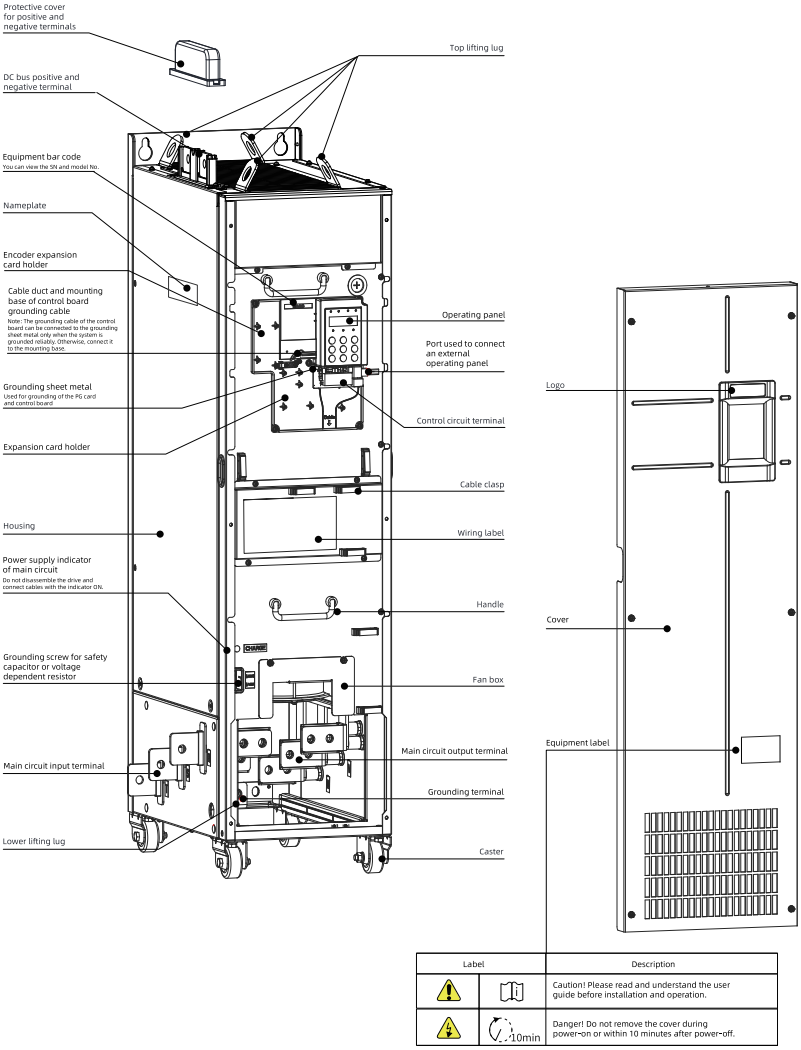


Figure 2-4 Components of T10 to T12 models (without AC output reactors)

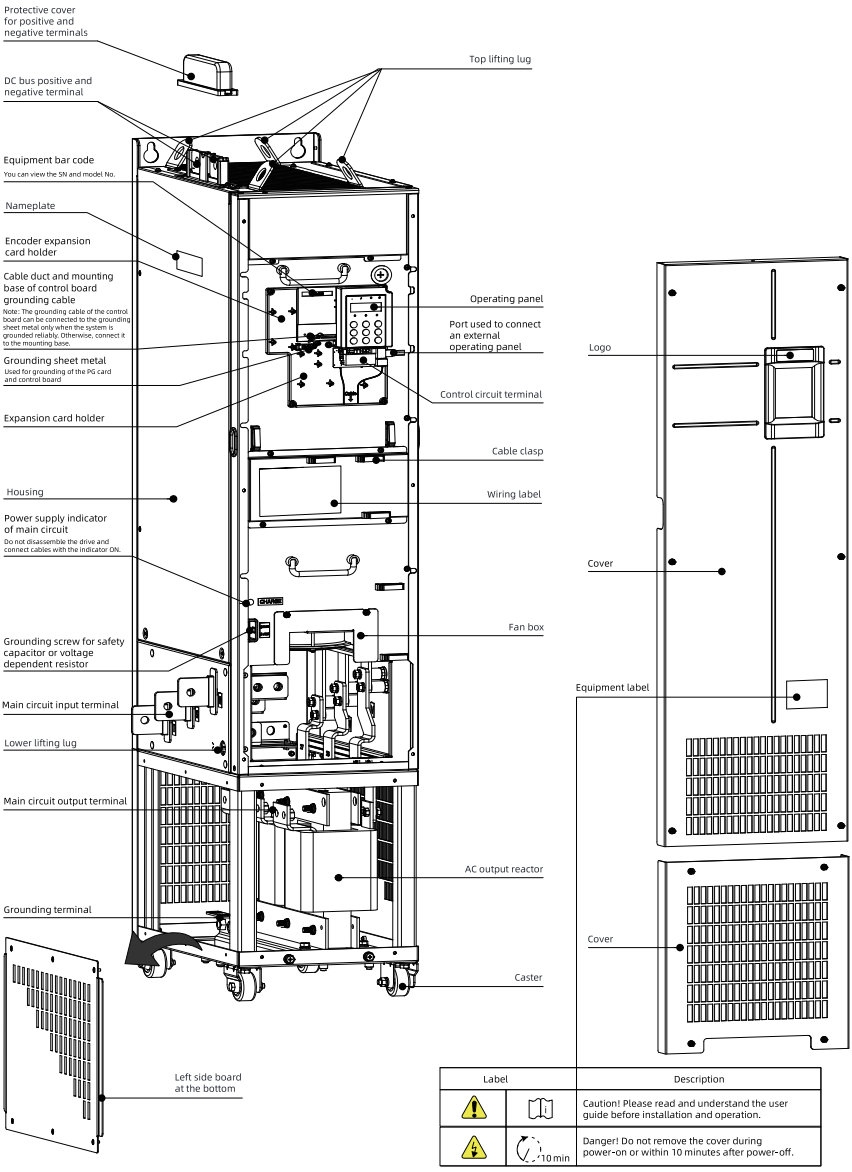


Figure 2-5 Components of T10 to T12 models (with AC output reactors)

2.5 Components of T13 Models

T13 models come with two types of structures: standard cabinet and standard cabinet with an auxiliary power distribution cabinet. For components of each structure, see *"Figure 2-6 Components of the standard cabinet" on page 41* and *"Figure 2-7 Components of the standard cabinet with an auxiliary power distribution cabinet" on page 41*.

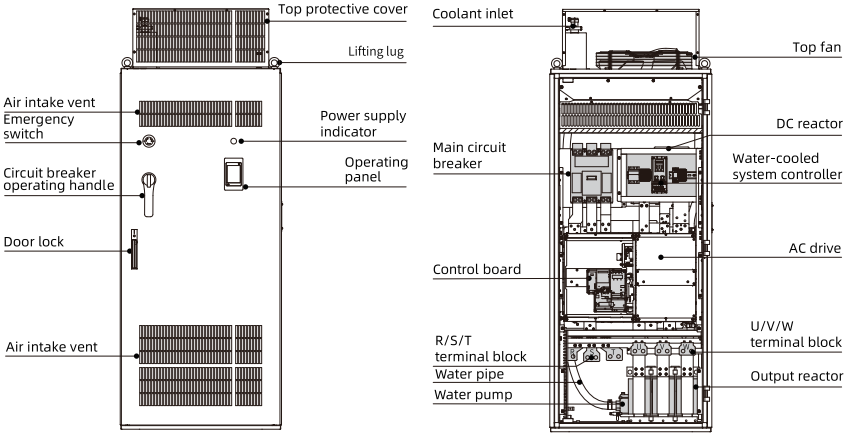


Figure 2-6 Components of the standard cabinet

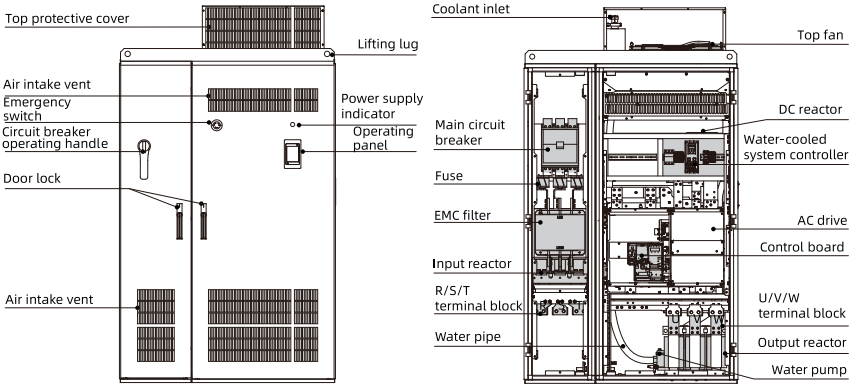


Figure 2-7 Components of the standard cabinet with an auxiliary power distribution cabinet

Note

The T13 model cabinet contains two drain pipes of different lengths. The longer one is the drain pipe connected to the top water tray, while the shorter one is the drain pipe of the water pump for the water cooling system. Both drain pipes can be coiled at the bottom of the cabinet.

3 Dimensions

3.1 Dimensions of T1 to T9 Models

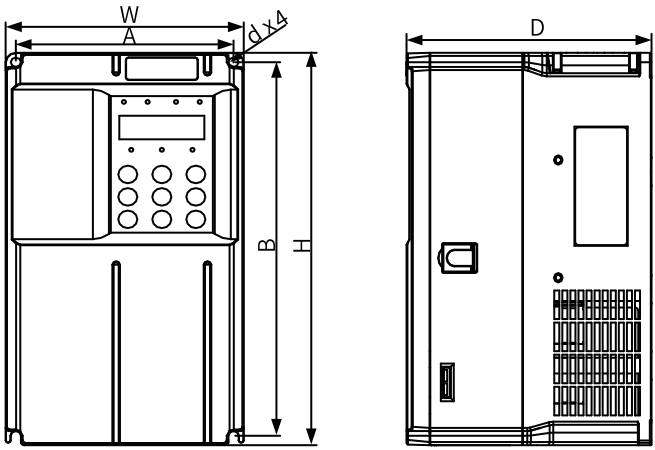


Figure 3-1 Outline and installation dimensions (unit: mm) of T1 to T4 models

Table 3–1 Outline dimensions and mounting hole dimensions of T1 to T4 models

Structure	Mounting hole dimension mm (in.)		Overall dimension mm (in.)				Mounting hole diameter mm (in.)	Weight kg (lb)
	A	B	H	H1	W	D	d	
T1	119 (4.7)	189 (7.5)	200 (7.9)	-	130 (5.1)	152 (6.0)	Φ5 (0.2)	1.6 (3.5)
T2	119 (4.7)	189 (7.5)	200 (7.9)	-	130 (5.1)	162 (6.4)	Φ5 (0.2)	2.0 (4.4)
T3	128 (5.0)	238 (9.4)	250 (9.9)	-	140 (5.5)	170 (6.7)	Φ6 (0.2)	3.3 (7.3)
T4	166 (6.5)	266 (10.5)	280 (11.0)	-	180 (7.1)	170 (6.7)	Φ6 (0.2)	4.3 (9.5)

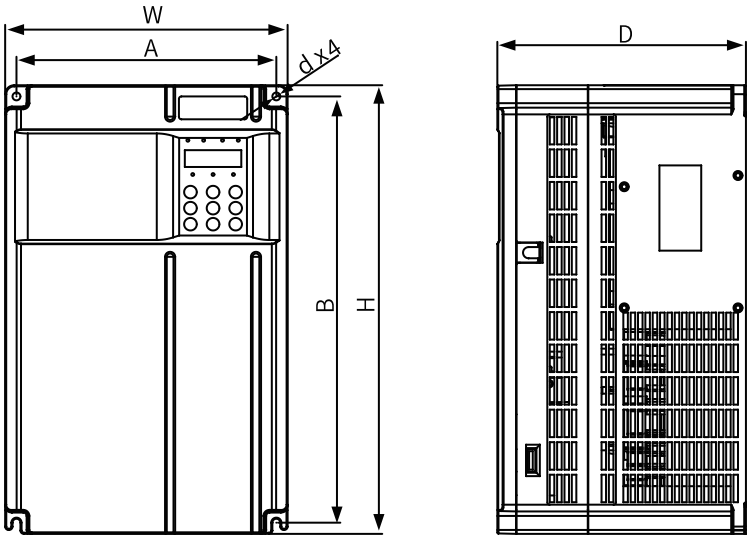


Figure 3-2 Outline and installation dimensions (unit: mm) of T5 to T6 models

Table 3–2 Outline dimensions and mounting hole dimensions of T5 and T6 models

Structure	Mounting hole dimension mm (in.)		Overall dimension mm (in.)				Mounting hole diameter mm (in.)	Weight kg (lb)
	A	B	H	H1	W	D	d	
T5 (without the DC reactor)	195 (7.7)	335 (13.2)	350 (13.8)	-	210 (8.3)	192 (7.6)	Φ6 (0.2)	7.6 (16.8)
T5 (with the DC reactor)	195 (7.7)	335 (13.2)	350 (13.8)	-	210 (8.3)	192 (7.6)	Φ6 (0.2)	10.0 (22.0)
T6	230 (9.1)	380 (15.0)	400 (15.8)	-	250 (9.9)	220 (8.7)	Φ7 (0.3)	17.5 (38.6)

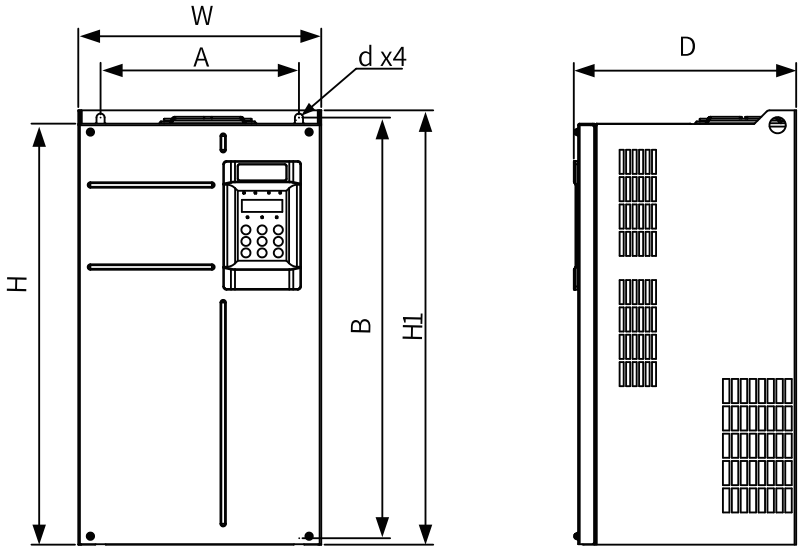


Figure 3-3 Outline and installation dimensions (unit: mm) of T7 to T9 models

Table 3–3 Outline dimensions and mounting hole dimensions of T7 and T9 models

Structure	Mounting hole dimension mm (in.)		Overall dimension mm (in.)				Mounting hole diameter mm (in.)	Weight kg (lb)
	A	B	H	H1	W	D	d	
T7	245 (9.7)	523 (20.6)	525 (20.7)	542 (21.4)	300 (11.8)	275 (10.8)	Φ10 (0.4)	35 (77.2)
T8	270 (10.6)	560 (22.1)	554 (21.8)	580 (22.9)	338 (13.3)	315 (12.4)	Φ10 (0.4)	51.5 (113.5)
T9	320 (12.6)	890 (35.1)	874 (34.4)	915 (36.1)	400 (15.8)	320 (12.6)	Φ10 (0.4)	85 (187.4)

3.2 Dimensions of T10 to T12 Models (Without AC Output Reactor)

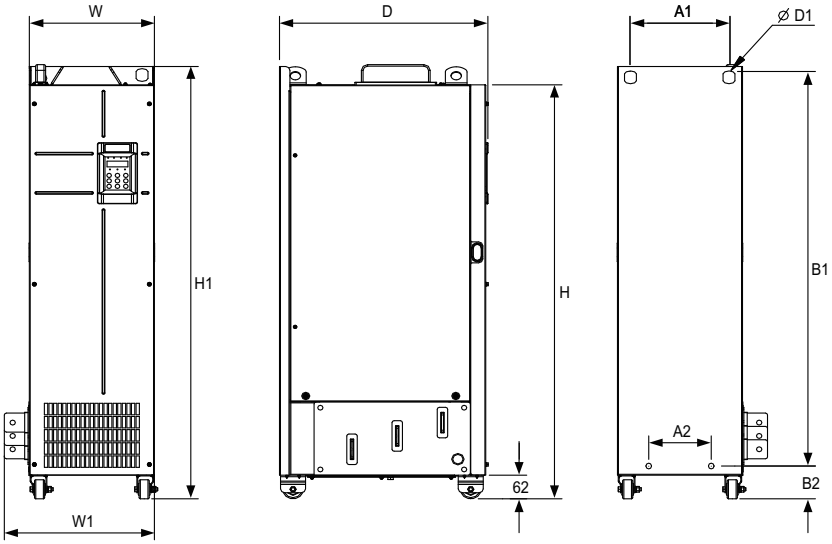


Figure 3-4 Outline dimensions and mounting dimensions (unit: mm) of T10 to T12 models (without AC output reactor)

Table 3–4 Outline dimensions and mounting dimensions of T10 to T12 models (without AC output reactor)

Structure	Mounting dimension mm (in.)				Overall dimension mm (in.)					Mounting hole diameter mm (in.)	Weight kg (lb)
	A1	A2	B1	B2	H	H1	W	W1	D	D1	
T10	240 (9.5)	150 (5.9)	1035 (40.8)	86 (3.4)	1086 (42.8)	1134 (44.7)	300 (11.8)	360 (14.2)	500 (19.7)	Φ13 (0.5)	110 (242.5)
T11	225 (8.9)	185 (7.3)	1175 (46.3)	97 (3.8)	1248 (49.2)	1284 (50.6)	330 (13.0)	390 (15.4)	545 (21.5)	Φ13 (0.5)	155 (341.7)
T12	240 (9.5)	200 (7.9)	1280 (50.4)	101 (4.0)	1355 (53.4)	1405 (55.4)	340 (13.4)	400 (15.8)	545 (21.5)	Φ16 (0.6)	185 (407.9)

3.3 Dimensions of T10 to T12 Models (with AC Output Reactor)

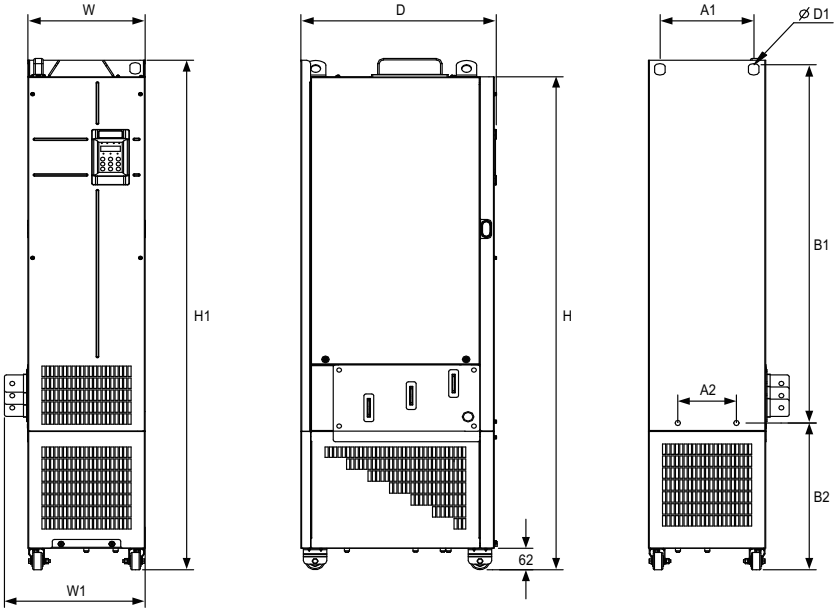


Figure 3-5 Outline dimensions and mounting dimensions (unit: mm) of T10 to T12 models (with AC output reactors)

Table 3–5 Outline dimensions and mounting dimensions of T10 to T12 models (with AC output reactor)

Structure	Mounting hole diameter mm (in.)				Overall dimension mm (in.)					Mounting hole diameter mm (in.)	Weight kg (lb)
	A1	A2	B1	B2	H	H1	W	W1	D	D1	
T10	240 (9.5)	150 (5.9)	1035 (40.8)	424 (16.7)	1424 (56.1)	1472 (58.0)	300 (11.8)	360 (14.2)	500 (19.7)	Φ13 (0.5)	160 (352.7)
T11	225 (8.9)	185 (7.3)	1175 (46.3)	435 (17.1)	1586 (62.5)	1622 (63.9)	330 (13.0)	390 (15.4)	545 (21.5)	Φ13 (0.5)	215 (474.0)
T12	240 (9.5)	200 (7.9)	1280 (50.4)	432 (17.0)	1683 (66.3)	1733 (68.3)	340 (13.4)	400 (15.8)	545 (21.5)	Φ16 (0.6)	245 (540.1)

3.4 Dimensions of T13 Models (Without Auxiliary Power Distribution Cabinet)

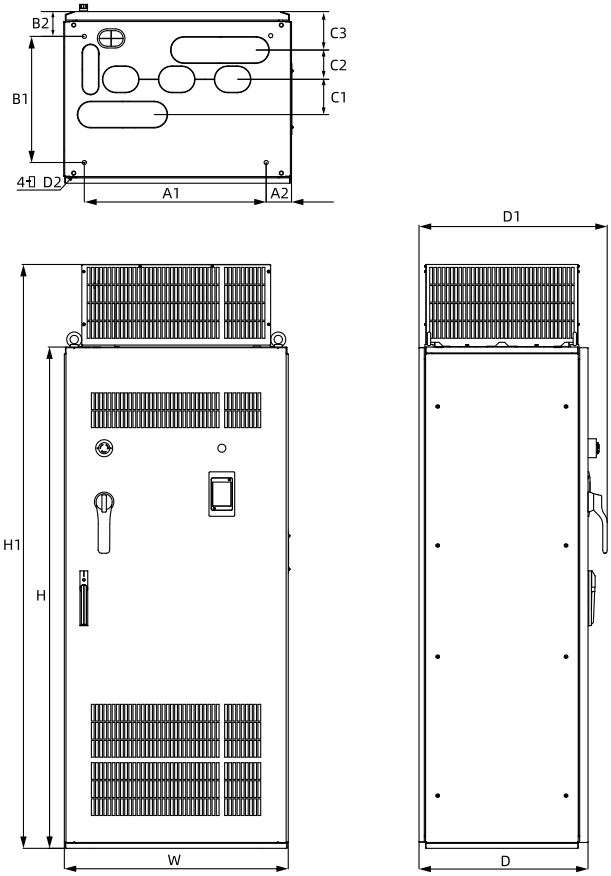


Figure 3-6 Outline dimensions and mounting dimensions (unit: mm) of T13 models (without auxiliary power distribution cabinet)

Table 3–6 Outline dimensions and mounting dimensions of T13 models (without auxiliary power distribution cabinet)

Structure	Mounting hole diameter mm (in.)							Overall dimension mm (in.)					Mounting hole diameter mm (in.)	Weight kg (lb)
	A1	A2	B1	B2	C1	C2	C3	H	H1	W	D	D1	D2	
T13	660 (26.0)	73.5 (2.9)	450 (17.7)	85 (3.3)	125 (4.9)	104 (4.1)	136 (5.4)	1800 (70.9)	2100 (82.7)	805 (31.7)	610 (24.0)	680 (26.8)	15 (0.6)	530 (1168.4)

3.5 Dimensions of T13 Models (with Auxiliary Power Distribution Cabinet)

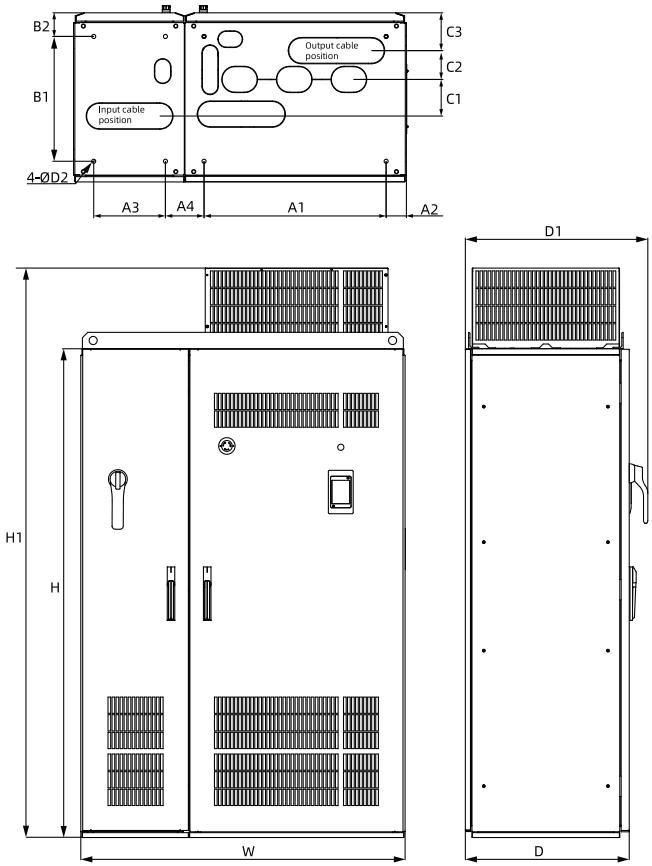


Figure 3-7 Outline dimensions and mounting dimensions (unit: mm) of T13 models (with auxiliary power distribution cabinet)

Table 3–7 Outline dimensions and mounting dimensions of T13 models (with auxiliary power distribution cabinet)

Structure	Mounting hole dimension mm (in.)									Overall dimension mm (in.)					Mounting hole diameter mm (in.)	Weight kg (lb)
	A1	A2	A3	A4	B1	B2	C1	C2	C3	H	H1	W	D	D1	D2	
T13	660 (26.0)	73.5 (2.9)	260 (10.2)	140 (5.5)	450 (17.7)	85 (3.3)	132 (5.2)	104 (4.1)	136 (5.4)	1800 (70.9)	2100 (82.7)	1205 (47.5)	610 (24.0)	680 (26.8)	15 (0.6)	730 (1609.4)

4 Technical data

4.1 Electrical Specifications

Note

In the following tables, the rated power of the AC drive is measured under the following conditions:

- For three-phase 380 V to 480 V models, the rated power is measured at the input voltage of 440 VAC.
- For three-phase 200 V to 240 V models, the rated power is measured at the input voltage of 220 VAC.
- For single-phase 200 V to 240 V models, the rated power is measured at the input voltage of 220 VAC.

Single-phase 200 V to 240 V

Table 4–1 Electrical specifications (single-phase 200 V to 240 V)

Item		Specifications				
Model		MD290-2S0.4GB	MD290-2S0.75GB	MD290-2S1.5GB	MD290-2S2.2GB	MD290-2S3.0GB
Structure		T2				
Output	Applicable motor capacity (kW)	0.4	0.75	1.5	2.2	3.0
	Rated output current (A)	2.3	4.0	7.0	9.6	12
	Output voltage	Three-phase 0 V to 240 V (subject to the input voltage)				
	Maximum output frequency	500 Hz (modified through parameters)				
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)				
	Overload capacity	60s at 150% of the rated current				

Item		Specifications				
Input	Rated input current (A)	5.4	8.2	14	23	27
	Rated voltage and frequency	Single-phase 200 VAC to 240 VAC, 50/60 Hz				
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC				
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz				
	Capacity of power supply (kVA)	1.4	2.2	3.7	6.0	7.2
Heat dissipation design	Thermal design power (kW)	0.043	0.065	0.097	0.121	0.152
	Air exhaust volume (CFM)	20	20	20	20	20
Overvoltage category		OVCIII				
Pollution degree		PD2				
Protection class		Class I				
IP rating		IP20 (open type, applicable to IEC products)				
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)				

Three-phase 380 V to 480 V

Table 4–2 Electrical specifications (three-phase 380 V to 480 V)

Item		Specification											
Model		MD290T0.4G/0.7PB		MD290T0.7G/1.1PB		MD290T1.1G/1.5PB		MD290T1.5G/2.2PB		MD290T2.2G/3.0PB		MD290T3.0G/3.7PB	
Structure		T1											
Output	Applicable motor capacity (kW)	0.4	0.75	0.75	1.1	1.1	1.5	1.5	2.2	2.2	3.0	3.0	3.7
	Rated output current (A)	1.5	2.1	2.1	3.1	3.1	3.8	3.8	5.1	5.1	7.2	7.2	9.0
	Output voltage	Three-phase 0 V to input voltage											
	Maximum output frequency	500 Hz (modified through parameters)											
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)											
	Overload capacity	G-type model: 60s at 150% of the rated current P-type model: 60s at 130% of the rated current											

Item		Specification											
Input	Rated input current (A)	1.8	2.5	2.4	3.7	3.7	4.6	4.6	6.4	6.3	9.1	9	11.3
	Rated voltage and frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz											
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC											
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz											
	Capacity of power supply (kVA)	2	2.3	2.8	3.4	4.1	4.2	5	5.9	6.7	8.3	9.5	10.4
Heat dissipation design	Thermal design power (kW)	0.039	0.048	0.046	0.06	0.057	0.068	0.068	0.088	0.081	0.112	0.109	0.14
	Air exhaust volume (CFM)	-	-	-	-	-	-	9	9	9	9	9	9
Overvoltage category		OVCIII											
Pollution degree		PD2											
Protection class		Class I											
IP rating		IP20 (open type, applicable to IEC products) Type 1 (enclosed type, applicable to UL-certified products)											
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)											

Table 4–3 Electrical specifications (three-phase 380 V to 480 V)

Item		Specification									
Model		MD290T3.7G/5.5PB		MD290T5.5G/7.5PB		MD290T7.5G/11PB		MD290T11G/15PB		MD290T15G/18.5PB	
Structure		T2				T3				T4	
Output	Applicable motor capacity (kW)	3.7	5.5	5.5	7.5	7.5	11	11	15	15	18.5
	Rated output current (A)	9	13	13	17	17	25	25	32	32	37
	Output voltage	Three-phase 0 V to input voltage									
	Maximum output frequency	500 Hz (modified through parameters)									
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)									
	Overload capacity	G-type model: 60s at 150% of the rated current P-type model: 60s at 130% of the rated current									

Item		Specification									
Input	Rated input current (A)	11.4	15.9	16.7	22.4	21.9	32.9	32.2	39.7	41.3	44
	Rated voltage and frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz									
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC									
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz									
	Capacity of power supply (kVA)	12	15.5	17.5	20.5	22.8	30.2	33.4	38.2	42.8	44.4
Heat dissipation design	Thermal design power (kW)	0.138	0.207	0.201	0.273	0.24	0.388	0.355	0.491	0.454	0.561
	Air exhaust volume (CFM)	20	20	24	24	30	30	40	40	42	42
Overvoltage category		OVCIII									
Pollution degree		PD2									
Protection class		Class I									
IP rating		IP20 (open type, applicable to IEC products) Type 1 (enclosed type, applicable to UL-certified products)									
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)									

Table 4–4 Electrical specifications (three-phase 380 V to 480 V)

Item		Specification											
Model		MD290T18.5G/22P(B)		MD290T22G/30P(B)		MD290T18.5G/22P(B)-T		MD290T22G/30P(B)-T		MD290T30G/37P(B)		MD290T37G/45P(B)	
Structure		T5								T6			
Output	Applicable motor capacity (kW)	18.5	22	22	30	18.5	22	22	30	30	37	37	45
	Rated output current (A)	37	45	45	60	37	45	45	60	60	75	75	91
	Output voltage	Three-phase 0 V to input voltage											
	Maximum output frequency	500 Hz (modified through parameters)											
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)											
	Overload capacity	G-type model: 60s at 150% of the rated current P-type model: 60s at 130% of the rated current											

Item		Specification											
Input	Rated input current (A)	49.5	59	59	65.8	43.4	51.3	51.3	65.8	57	71	69	86
	Rated voltage and frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz											
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC											
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz											
	Capacity of power supply (kVA)	45	54	54	60	45	54	54	60	52	65	63	79
Heat dissipation design	Thermal design power (kW)	0.478	0.616	0.551	0.76	0.478	0.616	0.551	0.76	0.694	0.85	0.815	1.04
	Air exhaust volume (CFM)	51.9	51.9	57.4	57.4	51.9	51.9	57.4	57.4	118.5	118.5	118.5	118.5
Overvoltage category		OVCIII											
Pollution degree		PD2											
Protection class		Class I											
IP rating		IP20 (open type, applicable to IEC products) Type 1 (enclosed type, applicable to UL-certified products)											
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)											

Table 4–5 Electrical specifications (three-phase 380 V to 480 V)

Item		Specification													
Model		MD290T45G/55P(B)		MD290T55G/75P(B)		MD290T75G/90P(B)		MD290T90G/110P		MD290T110G/132P		MD290T132G/160P		MD290T160G/200P	
Structure		T7				T8						T9			
Output	Applicable motor capacity (kW)	45	55	55	75	75	90	90	110	110	132	132	160	160	200
	Rated output current (A)	91	112	112	150	150	176	176	210	210	253	253	304	304	377
	Output voltage	Three-phase 0 V to input voltage													
	Maximum output frequency	500 Hz (modified through parameters)													
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)						0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)							
	Overload capacity	G-type model: 60s at 150% of the rated current P-type model: 60s at 130% of the rated current													

Item		Specification													
Input	Rated input current (A)	89	111	106	143	139	167	164	198	196	239	240	295	287	359
	Rated voltage and frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz													
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC													
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz													
	Capacity of power supply (kVA)	81	102	97	131	127	153	150	181	179	219	220	270	263	328
Heat dissipation design	Thermal design power (kW)	1.01	1.22	1.21	1.61	1.57	1.91	1.81	2.22	2.14	2.67	2.85	3.61	3.56	4.68
	Air exhaust volume (CFM)	122.2	122.2	122.2	122.2	218.6	218.6	287.2	287.2	354.2	354.2	547	547	627	627
Overvoltage category		OVCIII													
Pollution degree		PD2													
Protection class		Class I													
IP rating		IP20 (open type, applicable to IEC products)													
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)													

Table 4–6 Electrical specifications (three-phase 380 V to 480 V)

Item		Specification								
Model		MD290T200G(-L)	MD290T220P(-L)	MD290T250P(-L)	MD290T220G(-L)	MD290T280P(-L)	MD290T250G(-L)	MD290T315P(-L)	MD290T280G(-L)	MD290T355P(-L)
Structure		T10					T11			
Output	Applicable motor capacity (kW)	200	220	250	220	280	250	315	280	355
	Rated output current (A)	377	426	465	426	520	465	585	520	650
	Output voltage	Three-phase 0 V to input voltage								
	Maximum output frequency	500 Hz (modified through parameters)								
	Carrier frequency	0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)								
	Overload capacity	G-type mode: 60s at 150% of the rated current (MD290T450G: 60s at 130% of the rated current) P-type model: 60s at 130% of the rated current								

Item		Specification								
Input	Rated input current (A)	365	410	456	410	507	441	559	495	624
	Rated voltage and frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz								
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC								
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz								
	Capacity of power supply (kVA)	334	375	417	375	464	404	511	453	571
Heat dissipation design	Thermal design power (kW)	4.15	5.27	5.74	4.55	6.63	5.06	7.14	5.33	7.52
	Air exhaust volume (CFM)	638.4	638.4	638.4	722.5	722.5	789.4	789.4	882	645
Overvoltage category		OVCIII								
Pollution degree		PD2								
Protection class		Class I								
IP rating		IP20 (open type, applicable to IEC products)								
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)								

Table 4–7 Electrical specifications (three-phase 380 V to 480 V)

Item		Specification						
Model		MD290 T315G(-L)	MD290 T400P(-L)	MD290 T355G(-L)	MD290 T450P(-L)	MD290 T400G(-L)	MD290 T500P(-L)	MD290 T450G(-L)
Structure		T12						
Output	Applicable motor capacity (kW)	315	400	355	450	400	500	450
	Rated output current (A)	585	725	650	820	725	880	820
	Output voltage	Three-phase 0 V to input voltage						
	Maximum output frequency	500 Hz (modified through parameters)						
	Carrier frequency	0.8 kHz to 6.0 kHz (automatically adjusted according to the load characteristics)						
	Overload capacity	G-type mode: 60s at 150% of the rated current (MD290T450G: 60s at 130% of the rated current) P-type model: 60s at 130% of the rated current						

Item		Specification						
Input	Rated input current (A)	565	708	617	782	687	840	782
	Rated voltage and frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz						
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC						
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz						
	Capacity of power supply (kVA)	517	647	565	715	629	768	716
Heat dissipation design	Thermal design power (kW)	5.69	8.62	6.31	8.97	6.91	9.6	7.54
	Air exhaust volume (CFM)	645	860	860	860	860	860	860
Overvoltage category		OVCIII						
Pollution degree		PD2						
Protection class		Class I						
IP rating		IP20 (open type, applicable to IEC products)						
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)						

Table 4–8 Electrical specifications (three-phase 380 V to 480 V)

Item		Specification						
Model		MD290 T500G(-A)	MD290 T560G(-A)	MD290 T630G(-A)	MD290 T560P(-A)	MD290 T630P(-A)	MD290 T710P(-A)	MD290 T800P(-A)
Structure		T13						
Output	Applicable motor capacity (kW)	500	560	630	560	630	710	800
	Rated output current (A)	900	1020	1120	1020	1120	1260	1460
	Output voltage	Three-phase 0 V to input voltage						
	Maximum output frequency	500 Hz (modified through parameters)						
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)						
	Overload capacity	60s at 150% of the rated current			60s at 130% of the rated current			

Item		Specification						
Input	Rated input current (A)	838.1	949.6	1043.5	946.3	1041.0	1170.9	1301.5
	Rated voltage and frequency	Three-phase 380 VAC to 480 VAC, 50/60 Hz						
	Allowable voltage fluctuation range	-15% to +10%, or 323 VAC to 528 VAC						
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz						
	Capacity of power supply (kVA)	766.0	868.0	957.0	865.0	852.0	1071.0	1244.0
Heat dissipation design	Thermal design power (kW)	9.94	10.4	11.5	12.0	13.2	13.6	16.5
	Air exhaust volume (CFM)	2200	2200	2200	2200	2200	2200	2400
Overvoltage category		OVCIII						
Pollution degree		PD2						
Protection class		Class I						
IP rating		IP20						
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)						

Three-phase 200 V to 240 V

Table 4–9 Electrical specifications (three-phase 200 V to 240 V)

Item		Specification											
Model		MD290-2T0.4G/0.7PB		MD290-2T0.7G/1.1PB		MD290-2T1.1G/1.5PB		MD290-2T1.5G/2.2PB		MD290-2T2.2G/3.7PB		MD290-2T3.7G/5.5PB	
Structure		T1								T2			
Output	Applicable motor capacity (kW)	0.4	0.75	0.75	1.1	1.1	1.5	1.5	2.2	2.2	3.7	3.7	5.5
	Rated output current (A)	2.1	3.1	3.8	5.1	5.1	7.2	7.2	9	9	13	13	17
	Output voltage	Three-phase 0 V to input voltage											
	Maximum output frequency	500 Hz (modified through parameters)											
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)											
	Overload capacity	G-type model: 60s at 150% of the rated current P-type model: 60s at 130% of the rated current											

Item		Specification											
Input	Rated input current (A)	2.4	3.7	4.6	6.4	6.3	9.1	9	11.3	11.4	15.9	16.7	22.4
	Rated voltage and frequency	Three-phase 200 VAC to 240 VAC, 50/60 Hz											
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC											
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz											
	Capacity of power supply (kVA)	1.1	1.7	2.1	2.9	2.9	4.2	4.1	5.2	5.2	7.3	7.6	10.2
Heat dissipation design	Thermal design power (kW)	0.046	0.06	0.068	0.088	0.081	0.112	0.109	0.14	0.138	0.207	0.201	0.273
	Exhaust air volume (CFM)	-	-	9	9	9	9	9	9	20	20	24	24
Overvoltage category		OVCIII											
Pollution degree		PD2											
Protection class		Class I											
IP rating		IP20 (open type, applicable to IEC products) Type 1 (enclosed type, applicable to UL-certified products)											
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)											

Table 4–10 Electrical specifications (three-phase 200 V to 240 V)

Item		Specification											
Model		MD290-2T5.5G/7.5PB		MD290-2T7.5G/11PB		MD290-2T11G/15P(B)		MD290-2T11G/15P(B)-T		MD290-2T15G/18.5P(B)		MD290-2T18.5G/22P(B)	
Structure		T3		T4		T5				T6			
Output	Applicable motor capacity (kW)	5.5	7.5	7.5	11	11	15	11	15	15	18.5	18.5	22
	Rated output current (A)	25	32	32	37	45	60	45	60	60	75	75	91
	Output voltage	Three-phase 0 V to input voltage											
	Maximum output frequency	500 Hz (modified through parameters)											
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)											
	Overload capacity	G-type model: 60s at 150% of the rated current P-type model: 60s at 130% of the rated current											

Item		Specification											
Input	Rated input current (A)	32.2	39.7	41.3	44	59	65.8	51.3	65.8	57	71	69	86
	Rated voltage and frequency	Three-phase 200 VAC to 240 VAC, 50/60 Hz											
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC											
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz											
	Capacity of power supply (kVA)	14.7	18.2	18.9	20.1	27	30.1	27	30.1	26.1	32.5	31.6	39.3
Heat dissipation design	Thermal design power (kW)	0.355	0.491	0.454	0.561	0.551	0.76	0.551	0.76	0.694	0.85	0.815	1.04
	Exhaust air volume (CFM)	40	40	42	42	57.4	57.4	57.4	57.4	118.5	118.5	118.5	118.5
Overvoltage category		OVCIII											
Pollution degree		PD2											
Protection class		Class I											
IP rating		IP20 (open type, applicable to IEC products) Type 1 (enclosed type, applicable to UL-certified products)											
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)											

Table 4–11 Electrical specifications (three-phase 200 V to 240 V)

Item		Specification									
Model		MD290-2T22G/30P(B)		MD290-2T30G/37P(B)		MD290-2T37G/45P(B)		MD290-2T45G/55P		MD290-2T55G/75P	
Structure		T7				T8					
Output	Applicable motor capacity (kW)	22	30	30	37	37	45	45	55	55	75
	Rated output current (A)	91	112	112	150	150	176	176	210	210	253
	Output voltage	Three-phase 0 V to input voltage									
	Maximum output frequency	500 Hz (modified through parameters)									
	Carrier frequency	0.8 kHz to 8.0 kHz (automatically adjusted according to the load characteristics)									
	Overload capacity	G-type model: 60s at 150% of the rated current P-type model: 60s at 130% of the rated current									

Item		Specification									
Input	Rated input current (A)	89	111	106	143	139	167	164	198	196	239
	Rated voltage and frequency	Three-phase 200 VAC to 240 VAC, 50/60 Hz									
	Allowable voltage fluctuation range	-15% to +10%, or 170 VAC to 264 VAC									
	Allowable frequency fluctuation range	±5%, or 47.5 Hz to 63 Hz									
	Capacity of power supply (kVA)	40.7	50.8	48.5	65.4	63.6	76.4	75	90.5	89.6	109.3
Heat dissipation design	Thermal design power (kW)	1.01	1.22	1.21	1.61	1.57	1.91	1.81	2.22	2.14	2.67
	Exhaust air volume (CFM)	122.2	122.2	122.2	122.2	218.6	218.6	287.2	287.2	354.2	354.2
Overvoltage category		OVCIII									
Pollution degree		PD2									
Protection class		Class I									
IP rating		IP20 (open type, applicable to IEC products)									
Grid type		TN-S, TN-C, TN-C-S, TT/IT (non-angular grounding)									

4.2 Technical Specifications

Table 4–12 Technical specifications of the drive

Item		Technical specification
Basic function	Input frequency resolution	Digital setting: 0.01 Hz Analog setting: maximum frequency x 0.025%.
	Control mode	V/f control
	Torque boost	Automatic torque boost; manual torque boost: 0.1 % to 30.0%
	V/f curve	Four modes: V/f line, multi-point V/f curve, V/f fully-decoupled mode, and V/f half-decoupled mode
	Acceleration/ Deceleration curve	Straight-line or S-curve acceleration/deceleration Four groups of acceleration/deceleration time ranging from 0.0 to 6500.0s
	DC braking	Starting frequency of DC braking: 0.00 Hz to the maximum frequency Braking time: 0.0s to 36.0s. Braking current: 0.0% to 100.0%
	Jog control	Jog frequency: 0.00 Hz to maximum frequency; Jog acceleration/ deceleration time: 0.0s to 6500.0s
	Simple PLC and multi-reference running	The AC drive supports up to 16 speeds through the built-in PLC function or control terminals.
	Built-in PID	The PID function facilitates the implementation of the closed-loop process control system.
	Automatic voltage regulation (AVR)	When the grid voltage changes, the output voltage keeps constant automatically.
	Overvoltage/Overcurrent stall control	This function limits the current and voltage automatically during operation to prevent frequent tripping caused by overvoltage/overcurrent.
	Quick current limit	The function minimizes the occurrence of overcurrent to ensure normal operation of the AC drive.
	Current limiting and control	The function automatically limits the current during running to prevent frequent tripping caused by overcurrent.

Item		Technical specification
Customized function	Power dip ride-through	Load regenerative energy compensates for voltage reduction during instantaneous power failure, allowing the AC drive to continue operating for a short time.
	Quick current limit	This function prevents frequent overcurrent faults.
	Virtual DI/DO	Five groups of virtual DIs/DOs are supported to implement simple logic control.
	Timing control	Time range: 0.0 minute to 6500.0 minutes
	Motor switchover	Two groups of motor parameters are supported, allowing switchover between two motors.
	Multiple field buses	Six field buses are supported, including Modbus, PROFIBUS DP, CANlink, CANopen, PROFINET, and EtherCAT.
	Motor overtemperature protection	The AI3 on the optional I/O expansion card 1 can receive the inputs from the motor temperature sensor (PT100, PT1000).
	User programmable function	The optional user-programmable card can implement secondary development, and the programming mode is compatible with Inovance's PLCs.
	Powerful software	The software supports operations on drive parameters and the virtual oscilloscope function. You can monitor the internal state of the AC drive through the virtual oscilloscope.

Item		Technical specification
Run	Operation command sources	Operating panel, control terminal, and serial communication port are available, which can be switched over in a variety of ways.
	Frequency sources	There are ten frequency sources in total, including digital setting (retentive/non-retentive at power failure), analog setting (AI1, AI2, or AI3), pulse input (DI5), multi-reference, simple PLC, PID, and communication setting. The sources can be switched over in various ways.
	Auxiliary frequency source	The drive supports 10 auxiliary frequency reference sources. It can implement fine tuning of the auxiliary frequency and frequency synthesis.
	Input terminal	Standard: Five DI terminals, one of which supports high-speed pulse input up to 100 kHz. Two AIs. One supports only voltage input of 0 V to 10 V, and the other one supports voltage input of 0 V to 10 V or current input of 0 mA to 20 mA. Expansion capability: Five DIs One AI, supporting voltage input of -10 V to +10 V and PT100/PT1000 input
	Output terminal	Standard: One high-speed pulse output terminal (open-collector) for square-wave signal output in the frequency range 0 to 100 kHz One DO One relay output terminal One AO, supporting current output of 0 mA to 20 mA or voltage output of 0 V to 10 V Expansion capability: One DO One relay output terminal One AO, supporting current output of 0 mA to 20 mA or voltage output of 0 V to 10 V
Display and operating panel	LED display	The LED displays parameters.
	LCD display	Optional and two languages (Chinese or English) available
	Parameter copy	It allows quick parameter copy through the LCD operating panel (optional).
	Key locking and function selection	The function can be used to lock certain or all keys and limit the availability of some keys to prevent accidental operation.

Item		Technical specification
Protection functions	Phase loss protection	Input/Output phase loss protection
	Instantaneous overcurrent protection	The AC drive stops when the current exceeds 250% of the rated output current.
	Overvoltage protection	The AC drive stops when the main circuit DC voltage exceeds the value set by A5-09.
	Undervoltage protection	The AC drive stops when the main circuit DC voltage exceeds the value set by A5-06.
	Over-temperature protection	Protection is triggered when the inverter bridge gets overheated.
	Overload protection	For P models, the drive stops 60s after operating at 110% of the rated current. For G models, the drive stops 60s after operating at 150% of the rated current.
	Overcurrent protection	The AC drive stops when the current exceeds 2.5 times the rated current.
	Braking protection	Braking unit overload protection and braking resistor short-circuit protection
	Short circuit protection	Output phase-to-phase short circuit protection and output phase-to-ground short circuit protection
Environment	Operating location	Indoors without direct sunlight, dust, corrosive gas, combustible gas, oil mist, water vapor, drip, or salt
	Altitude	Derating is not required for altitudes below 1000 m. For altitudes between 1000 m and 3000 m, derate 1% for every additional 100 m. The maximum altitude is 3000 m. Note: For AC drives of 0.4 kW to 3 kW, the maximum altitude is 2000 m. If the AC drive is intended to be used in a place higher than 2000 m, contact Inovance.
	Ambient temperature	-10℃ to +40℃. For temperatures above 40℃, derate 1.5% for every additional 1℃. The maximum ambient temperature is 50℃.
	Relative humidity	Less than 95% RH, non-condensing
	Vibration	• Application scenario: Tested according to IEC 60068-2-6 Amplitude at 5 Hz to 8.4 Hz: 3.5 mm; acceleration at 8.4 Hz to 200 Hz: 1 g; 10 cycles/axis • Transportation scenario: Tested according to IEC 60068-2-64 Power spectrum density at 5 Hz to 100 Hz: 0.01 g^2/Hz; Grms: 1.14 g
	Shock	Operation/Transportation scenario: Tested according to IEC 60068-2-27 Gravitational acceleration: 15 g; pulse width; 11 ms, 18 times in each of X/Y/Z-axis
	Storage temperature	-20℃ to +60℃
	Pollution degree	PD2
	Overvoltage category	OVCIII

5 Installation and Wiring

5.1 Installation Preparations

5.1.1 Installation Flowchart

T1 to T9 models

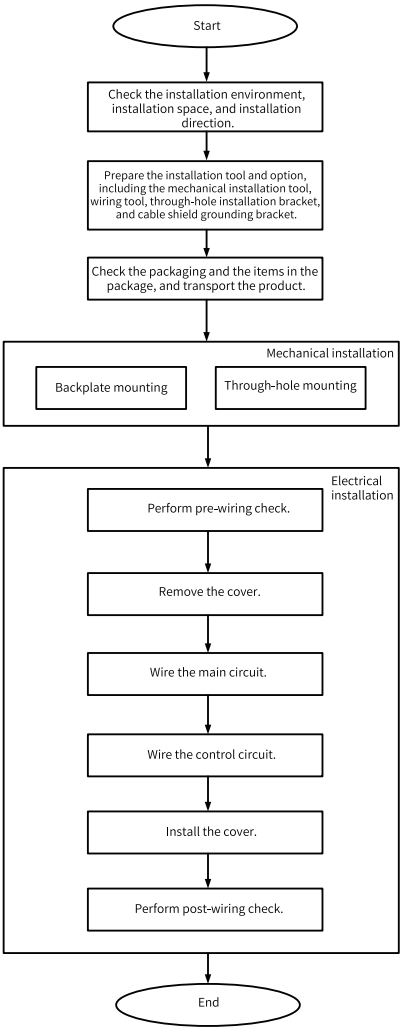


Figure 5-1 General installation process (T1 to T9 models)

T10 to T12 models

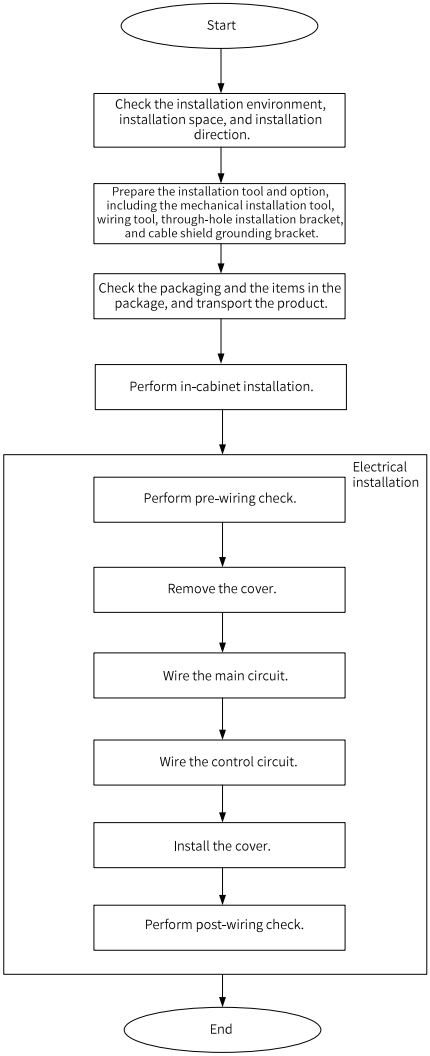


Figure 5-2 General installation process (T10 to T12 models)

T13 models

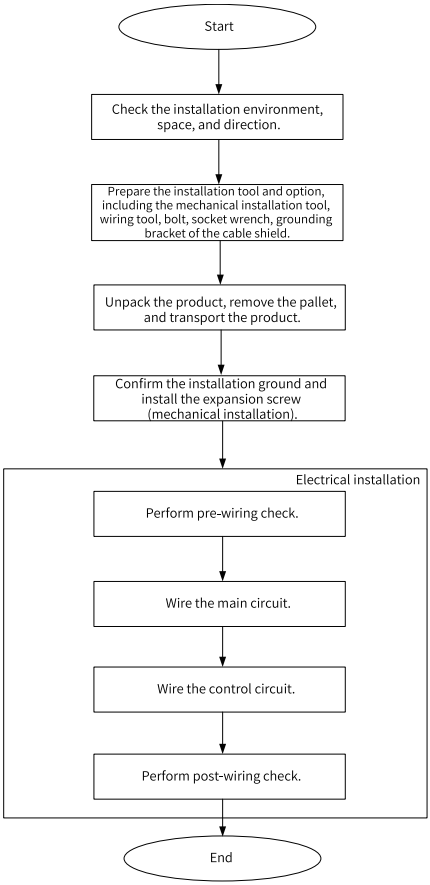


Figure 5-3 General installation process (T13 models)

5.1.2 Installation Site Inspection

5.1.2.1 Installation Environment

To maximum the product performance and ensure long-term use, install the drive in an environment meeting the following requirements.

Table 5–1 Environment requirements

Environment	Condition
Installation location	Indoor
Grid overvoltage	OVC III

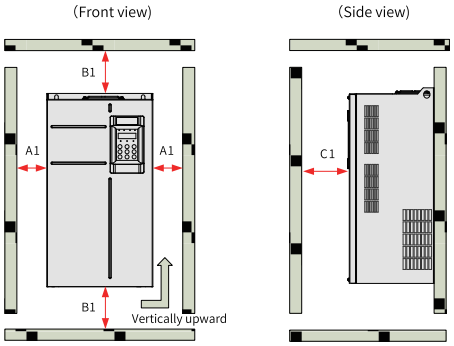
Environment	Condition
Temperature	Installation/Ambient temperature: -10°C to +50°C. When the temperature ranges from -10°C to +40°C, no derating is required. For temperature above 40°C, derate 1.5% for every additional 1°C. Storage/Transportation temperature: -20°C to +60°C. • For better reliability, use the AC drive in places without drastic temperature changes. • When installing the drive into an enclosed environment such as a control cabinet, use a cooling fan or air conditioner to keep the temperature of the inlet air below 50°C. Failure to comply will result in over-temperature or a fire. • Install the drive on a flame-retardant surface, with sufficient clearance reserved for heat dissipation. • Take measures to prevent the drive from being frozen.
Humidity	Storage/Ambient humidity: ≤ 95% RH, non-condensing
Environment	Pollution degree 2 or below Install the drive in a location that meets the following requirements: • Free from direct sunlight, dust, corrosive gas, combustible or explosive gas, oil mist, water vapor, drip, or salt • Insusceptible to vibration (away from equipment that may generate strong vibration, such as a punch press) • Free from unwanted objects such as metallic dust, oil, and water that may enter the AC drive • Free from radioactive substances, combustible materials, harmful gases and liquids, and salt corrosion • Away from combustible materials such as wood
Altitude	• 1000 m and below: derating is not required. • > 1000 m: derate 1% for every additional 100 m For 0.4 kW to 3 kW models, the maximum altitude is 2000 m; for altitudes above 2000 m, contact Inovance. For models with the power higher than 3 kW, the maximum altitude is 3000 m; for altitudes above 3000 m, contact Inovance.
Vibration resistance	• For transportation in the package: compliant with class 2M3 in EN 60721-3-2 • For installation with the package removed: compliant with ISTA 1H

5.1.2.2 Installation Clearance

Reserve sufficient clearance according to the power rating of the AC drive.

T1 to T9 models

- Installing one drive

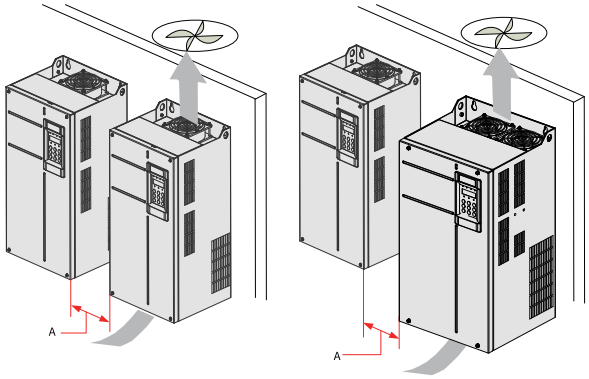


Installation clearance requirement

Power (kW)	Dimension (mm)		
0.4 -15	A1≥10	B1≥100	C1≥40
18.5 - 22	A1≥10	B1≥200	C1≥40
30 -37	A1≥50	B1≥200	C1≥40
45 - 160	A1≥50	B1≥300	C1≥40

Figure 5-4 Clearance for installing one AC drive (T1 to T9 models)

- Installing multiple drives
  The AC drive dissipates heat from bottom to top. When multiple AC drives are required to work together, install them side by side. Keep their tops level with each other, especially for those of different sizes.



Installation clearance requirement

Power (kW)	Dimension (mm)
0.4 -15	A≥10
18.5 - 22	A≥10
30 -37	A≥50
45 - 160	A≥50

Figure 5-5 Installing multiple AC drives (T1 to T9 models) side by side

- Dual-row installation
  If one drive needs to be installed above another one, install an air guide plate, as shown in *"Figure 5-6 Dual-row installation" on page 73*. This can prevent the drive in the lower row from heating that in the upper row, causing overheat or overload faults.

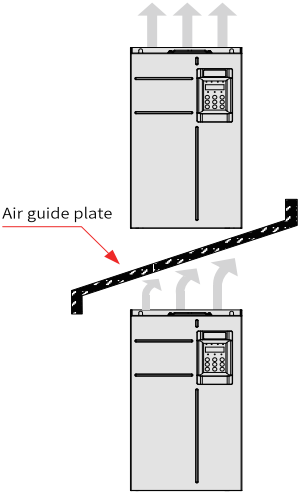
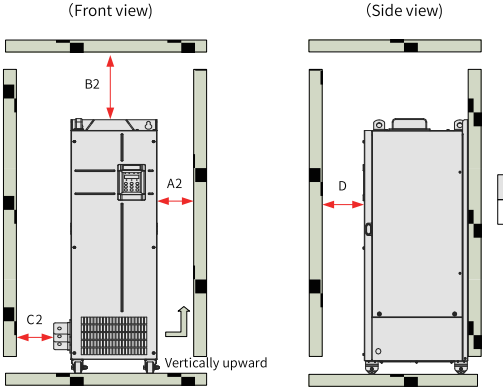


Figure 5-6 Dual-row installation

T10 to T12 Models



Installation clearance requirement

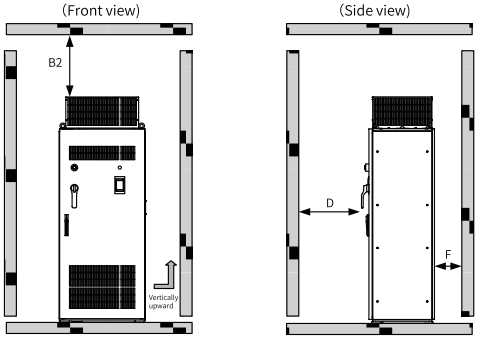
Power (kW)	Dimension (mm)			
200-450	A2≥10	B2≥250	C2≥20	D≥20

Figure 5-7 Requirements on installation clearance

Note

T10 to T12 models can only be installed individually inside the cabinet. For installation needs, contact Inovance.

T13 models



Installation clearance requirement

Power (kW)	Dimension (mm)		
500-630	B2≥250	D≥800	F≥100

Figure 5-8 Installation space requirements

5.1.2.3 Installation Direction

Install the AC drive vertically upright only, as shown in *"Figure 5-10 " on page 75* . Do not lie down the AC drive horizontally or by its side, or install it in the upside-down direction.

If the AC drive needs to be placed vertically, avoid stressing the sides of the drive or placing it on an inclined surface. If the tilt angle exceeds 5°, the drive is likely to tip over or fall due to its heavy weight (nearly 200 kg) and large size.

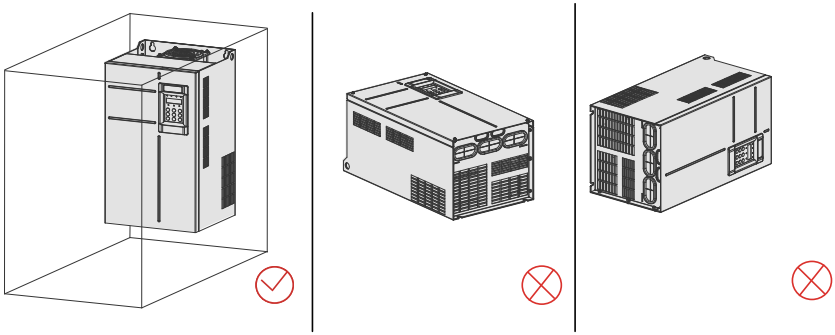


Figure 5-9 Installation direction (T1 to T9 models)

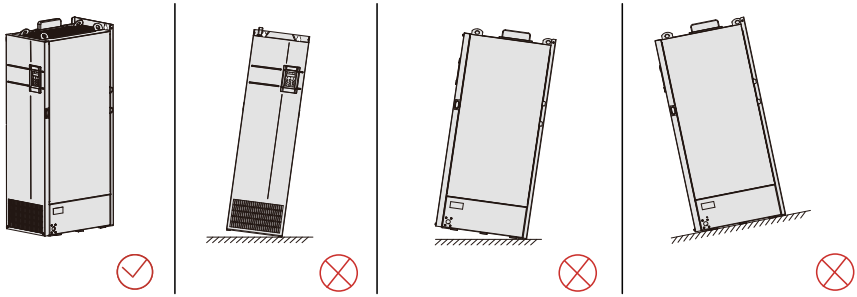


Figure 5-10 Installation direction (T10 to T12 models)

5.1.3 Installation Tools

5.1.3.1 Tools for Mechanical Installation

T1 to T9 models

"Table 5-2 Tools for mechanical installation" on page 75 lists the tools for mechanical installation.

Table 5–2 Tools for mechanical installation

Tool	Description
Electric drill with an appropriate drilling bits	It is used to drill mounting holes on the mounting surface.
Nut wrench or socket wrench	It is used to tighten or loosen screws. The following specifications are required: #13, #16, and #18.
Phillips screwdriver and straight screwdriver (2.5 mm to 6 mm)	It is used to tighten or loosen screws.
Torque wrench	It is used to tighten or loosen screws.
Crowbar	It is used to pry off the cover to facilitate installation.
Crane	It is used to lift the equipment.
Tape measure	It is used to measure the installation dimensions of the equipment.
Gloves	They are used to prevent static electricity during mechanical installation.
Bottom mounting bracket (standard)	It is used to fix the AC drive in the cabinet.
Guide rail (optional)	They are connected to the bottom mounting bracket, enabling you to gently push the AC drive into the cabinet along the guide rails.
Screw	It is used to fix the equipment to the mounting surface.

"Table 5-3 Specifications and quantity of screws" on page 76 lists the specifications and quantity of screws required for mechanical installation.

Table 5-3 Specifications and quantity of screws

Structure	Backplate mounting Used to fix the drive onto the wall		Through-hole mounting Used to fix the drive to the backplate of the control cabinet.	
	Quantity (PCS)	Screw specification	Quantity (PCS)	Screw specification
T1	4	M4	4	M4
T2	4	M4	4	M4
T3	4	M5	4	M5
T4	4	M5	4	M5
T5 (without the DC reactor)	4	M5	4	M5
T5 (with the DC reactor)	4	M5	4	M5
T6	4	M6	4	M6
T7	4	M8	4	M8
T8	4	M8	4	M8
T9	4	M8	4	M8

T10 to T12 models

"Table 5-2 Tools for mechanical installation" on page 75 lists the tools for mechanical installation.

"Table 5-4 Specifications and quantity of screws" on page 76 lists the specifications and quantity of screws required for mechanical installation.

Table 5-4 Specifications and quantity of screws

Structure	Backplate mounting Used to fix the drive onto the wall		Through-hole mounting Used to fix the drive to the backplate of the control cabinet.	
	Quantity (PCS)	Screw specification	Quantity (PCS)	Screw specification
T10 (without the AC output reactor)	4	M10	Not supported	Not supported
T10 (with the AC output reactor)	4	M10	Not supported	Not supported
T11 (without the AC output reactor)	4	M10	Not supported	Not supported

Structure	Backplate mounting Used to fix the drive onto the wall		Through-hole mounting Used to fix the drive to the backplate of the control cabinet.	
	Quantity (PCS)	Screw specification	Quantity (PCS)	Screw specification
T11 (with the AC output reactor)	4	M10	Not supported	Not supported
T12 (without the AC output reactor)	4	M12	Not supported	Not supported
T12 (with the AC output reactor)	4	M12	Not supported	Not supported

T13 models

"Table 5-5 Tools for mechanical installation" on page 77 lists the mechanical installation tools.

Table 5-5 Tools for mechanical installation

Tool	Description
Wrench or socket wrench (18 mm)	It is used to tighten or loosen screws.
Phillips screwdriver and straight screwdriver (2.5 mm to 6 mm)	It is used to tighten or loosen screws.
Torque wrench (torque above 100 N·m)	It is used to tighten or loosen screws.
Electric drill with an appropriate drilling bit	It is used to drill holes on the floor or steel plates for fastening the cabinet.
Crowbar	It is used to pry off the cover to facilitate installation.
Crane	It is used to lift the equipment.
Tape measure	It is used to measure the installation dimensions of the equipment.
Gloves	They are used to prevent static electricity during mechanical installation.

Table 5–6 Specifications and quantity of screws

Structure	Backplate mounting Used to fix the drive onto the wall		Through-hole mounting Used to fix the drive to the backplate of the control cabinet.	
	Quantity (PCS)	Screw model	Quantity (PCS)	Screw model
T13 (with the auxiliary power distribution cabinet)	8	M12	Not supported	Not supported
T13 (without the auxiliary power distribution cabinet)	4	M12	Not supported	Not supported

CAUTION

Select the screw with correct specifications; otherwise, improper installation may occur.

5.1.3.2 Tools for Wiring

When wiring the main circuit terminal, select an appropriate installation tool based on the terminal size. *"Table 5-7 Tools for wiring the main circuit terminal" on page 78* lists the tools for wiring the main circuit terminal.

Table 5–7 Tools for wiring the main circuit terminal

Model	Recommended fastener	Tool
T1 to T2	M4 SEMS screw	Phillips screwdriver (#3 slot)
T3 to T4	M5 SEMS screw	Phillips screwdriver (#3 slot)
T5 to T6	M6 SEMS screw	Phillips screwdriver (#3 slot)
T7	M8 nut, spring washer, and flat washer	Socket wrench (#13)
T8 to T9	M12 nut, spring washer, and flat washer	Socket wrench (#19) and socket wrench extension bar (150 mm)
T10 to T11	M12 bolt, spring washer, and flat washer	Socket wrench (#19) and socket wrench extension bar (250 mm)

Model	Recommended fastener	Tool
T12	M16 bolt, spring washer, and flat washer	Socket wrench (#24) and socket wrench extension bar (250 mm)
T13	M12 bolt, spring washer, and flat washer	Socket wrench (#24) and socket wrench extension bar (250 mm)

5.2 Unpacking, Storage, and Handling

5.2.1 Storage

- The drive must be stored in a clean and dry room, where the temperature ranges from -20°C and +60°C and temperature change rate is smaller than 1°C/min.
- If the drive needs to be stored for a long period of time, cover it up or take similar measures to prevent the drive from being polluted or affected by the surrounding environment.
- Try to store the system with the original packing carton box.
- Do not expose the equipment to environments with moisture, high temperatures, or direct sunlight for a long time.
- The electrolytic capacitor can deteriorate after long-term storage. Therefore, switch on the drive once for at least 5 hours every 6 months. After switch-on, increase the input voltage slowly to the rated value by using a voltage regulator. Contact Inovance for technical support if necessary.

5.2.2 Transportation Before Unpacking

T1 to T12 models

Precautions for transportation of T1 to T12 models:

- T1 to T6 models are small and light and therefore can be handled manually. T7 to T12 models, however, must be transported with an appropriate lifting tool.
- Fix the drive to a wooden pallet when handling with a forklift. When handling the drive with a crane, fix the drive to the pallet and lift them together, as shown below.

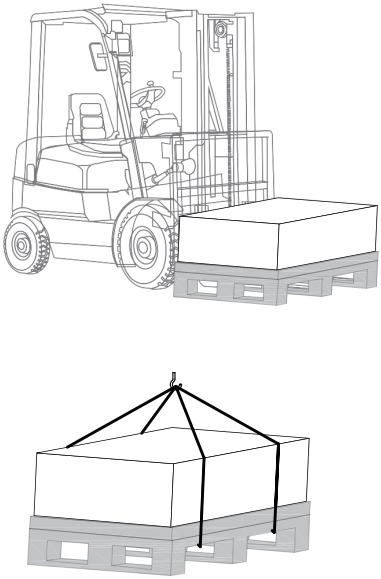


Figure 5-11 Lifting the drive

- T9 to T12 models are heavy with a high center of gravity. Therefore, avoid placing them on an inclined surface with an angle greater than 5 degrees. The drive must be placed on a flat and firm ground that can bear the weight of the drive.
- Transport the AC drive only when it is upright as indicated on the packaging box, as shown in the following figure. Never turn it upside down or place it on its side.

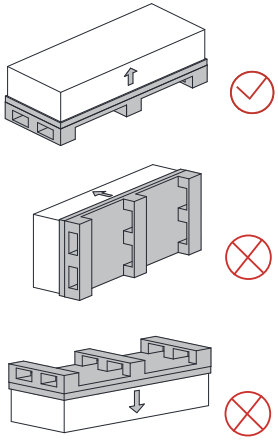


Figure 5-12 Placing the drive

T13 models

Precautions for transportation of T13 models:

- The AC drive is heavy with a high center of gravity. Therefore, avoid placing it on an inclined surface with an angle greater than 5 degrees. The drive must be placed on a flat and firm ground that can bear the weight of the drive.
- The equipment must be transported in the upright position as indicated on the packaging box. Never turn it upside down or place it on its side.

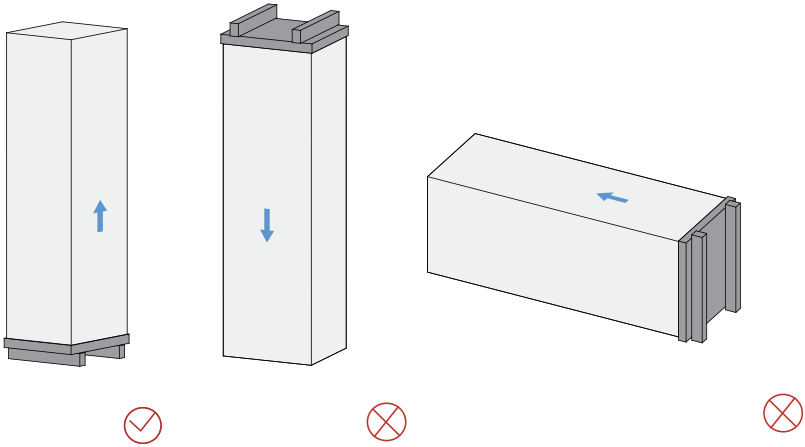


Figure 5-13 Upright position of the cabinet

- Suitable hoisting gear operated by trained personnel is required due to the heavy weight of the cabinet.
- Where applicable, use a forklift and a crane that have a carrying capacity greater than the cabinet weight to transport the cabinet.
- The cabinet must be carried on a wooden pallet when transported with the forklift. Do not remove the cabinet from the pallet if the cabinet needs to be transported. Adjust the spacing between the forks to a distance greater than half the length of the cabinet.
- Considering the weight and length of the cabinet, use the lifting beam fixed at the top of the cabinet and the wooden pallet at the bottom of the cabinet to help lift the cabinet. The lifting strap of the hoist must pass through the pallet under the cabinet, with the relief height less than or equal to 0.3 m.
- The hydraulic vehicle must not move for a long distance or on the slop road.
- When being moved, the equipment must be held by persons from the left and right.

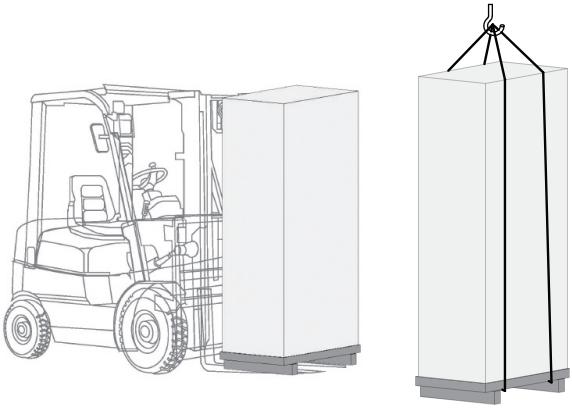


Figure 5-14 Transportation before unpacking

5.2.3 Package Check

When receiving goods from the shipping company, check that you have received all the items specified on the delivery note. Notify the shipping company immediately of any missing components or damage. Contact Inovance technical support or local agent if necessary.

AC drives of different structural dimensions are different in size and weight, and hence are packed in different methods with different components incorporated.

CAUTION

The electrical safety performance of the drive may be affected if it is damaged during transportation. Perform professional high-voltage test on the drive before connection.

Packing list for T1 to T9 models

- T1 and T6 models are packed using cartons.
- T7 to T9 models are packed using cartons and plywood pallets.

The following figure shows the packing list.

- Packing list for T1 to T6 models

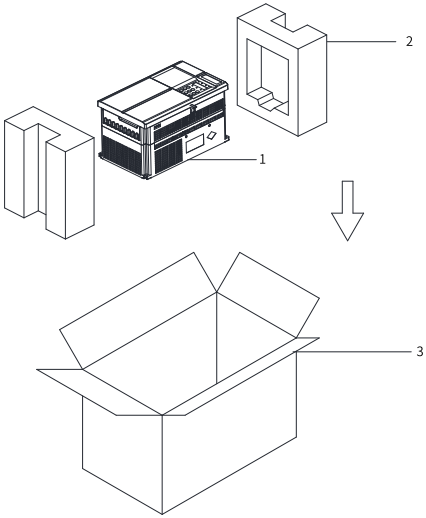


Figure 5-15 Packing list for T1 to T6 models

No.	Name
1	AC drive
2	Cushion
3	Carton

- Packing list for T7 to T9 models

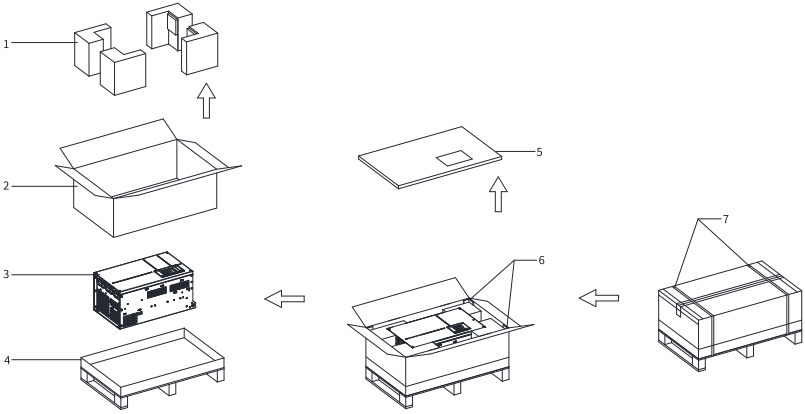


Figure 5-16 Packing list for T7 to T9 models

No.	Name
1	Cushion
2	Carton

No.	Name
3	AC drive
4	Plywood pallet
5	Honeycomb cardboard
6	Paper corner protector
7	Strapping band

Packing list for T10 to T12 models

- T10 to T11 models are packed using cartons and plywood pallets.
- T12 models are packed using wooden crates.

The following figure shows the packing list.

- Packing list for T10 models

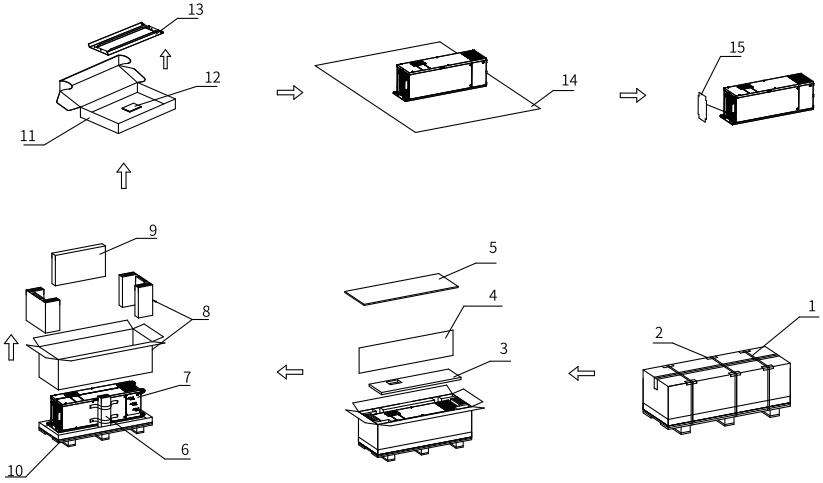


Figure 5-17 Packing list for T10 models

No.	Name
1	Packing strap
2	Paper corner protector
3	Honeycomb cardboard
4	Corrugated cardboard
5	Wooden board
6	Paper column
7	AC drive
8	Carton
9	Bracket box
10	Wooden pallet
11	Carton

No.	Name
12	User guide
13	Bracket
14	Plastic bag
15	Corrugated cardboard

- Packing list for T11 models

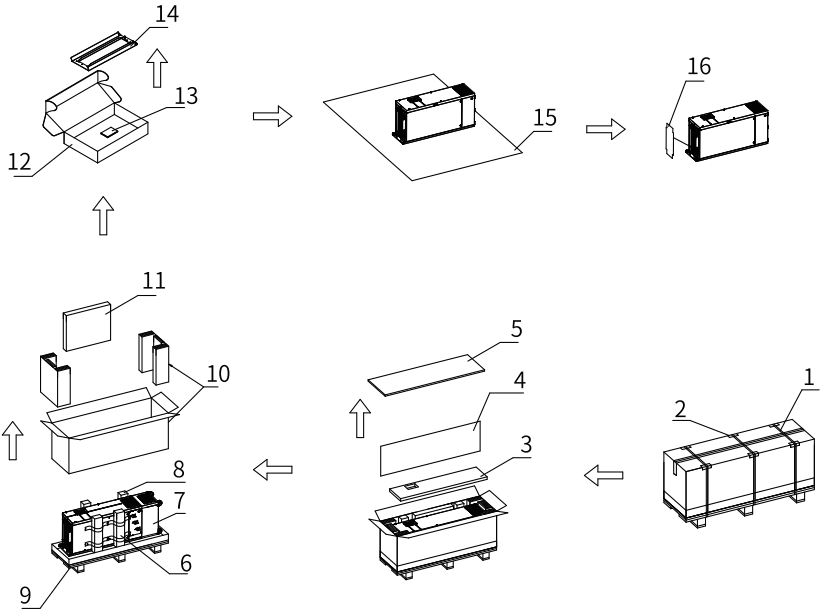


Figure 5-18 Packing list for T11 models

No.	Name
1	Packing strap
2	Paper corner protector
3	Honeycomb cardboard
4	Corrugated cardboard
5	Wooden board
6	Paper column
7	AC drive
8	Paper column
9	Wooden pallet
10	Carton
11	Bracket box
12	Carton
13	User guide

No.	Name
14	Bracket
15	Plastic bag
16	Corrugated cardboard

- Packing list for T12 models

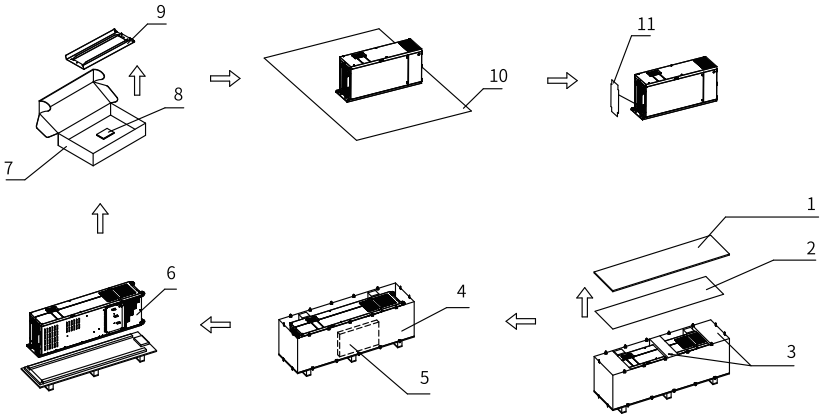


Figure 5-19 Packing list for T12 models

No.	Name
1	Top cover
2	Corrugated cardboard
3	Expanded polyethylene foam
4	Wooden crate
5	Bracket box
6	AC drive
7	Carton
8	User guide
9	Bracket
10	Plastic bag
11	Corrugated cardboard

Packing list for T13 models

T13 models are provided with a standard cabinet or a cabinet with an auxiliary power distribution cabinet. For the two types of cabinets, the following components are packed.

- Packing list for T13 models provided with a standard cabinet

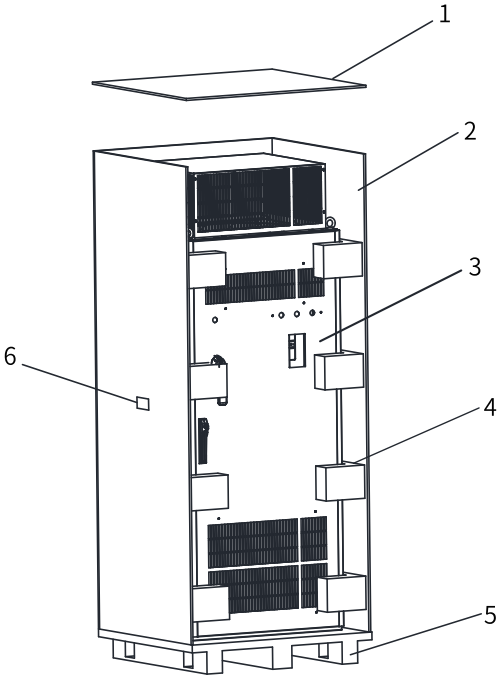


Figure 5-20 Packing list for T13 models provided with a standard cabinet

No.	Name
1	Top cover
2	Wooden crate
3	Product
4	Expanded polyethylene foam
5	Base
6	Anti-inclination label

- Packing list for T13 models provided with a cabinet with an auxiliary power distribution cabinet

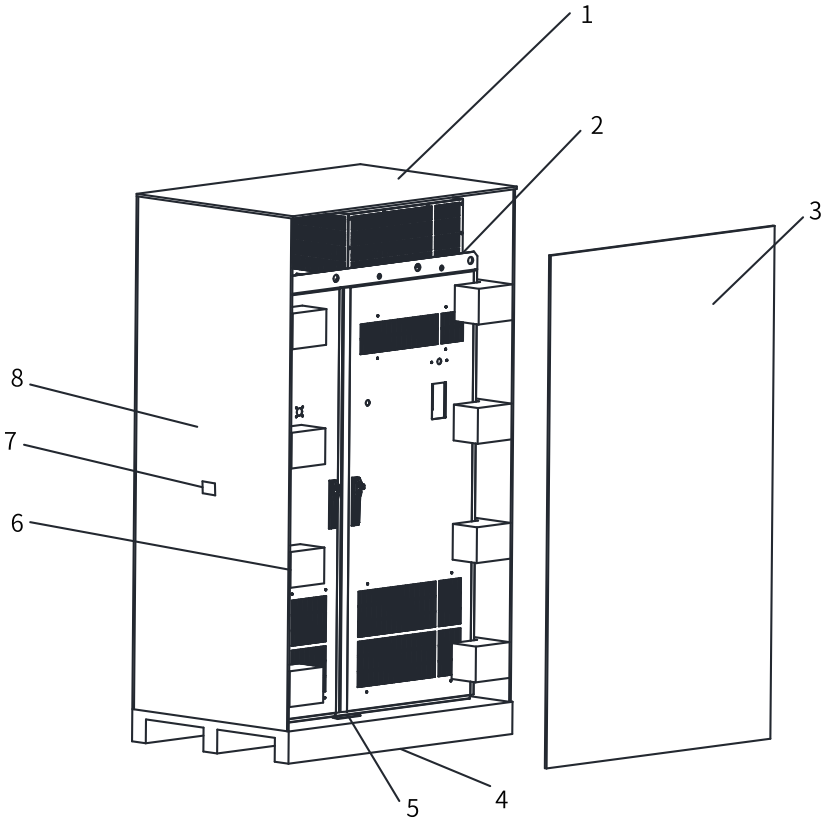


Figure 5-21 Packing list for T13 models provided with a cabinet with an auxiliary power distribution cabinet

No.	Name
1	Top cover
2	AC drive
3	Front panel
4	Base
5	Plywood
6	Expanded polyethylene foam
7	Anti-inclination label
8	Side panel

5.2.4 Unpacking

T1 to T12 models

Related documents and accessories are placed in different partitions in the carton. To unpack the carton, follow these steps:

1. Remove all the straps and ties and open the cover of the carton.
2. Remove all filler materials.
3. Take out the AC drive.
4. Cut and remove the plastic wrap around the AC drive.
5. Check that the drive is not damaged.
6. Dispose of or recycle the packing material according to local regulations.

T13 models

1. During unpacking, put the crowbar into the crate as short as possible to avoid damaging the equipment. Exercise caution to avoid injury by iron nails.
2. When removing the packing materials such as plastic film, do not use sharp tool to avoid scratching the equipment.
3. Place a well-packaged product in an open and flat workshop and use an iron crowbar to pry off the wooden crate carefully. Then, remove the cover and the side and end plates.

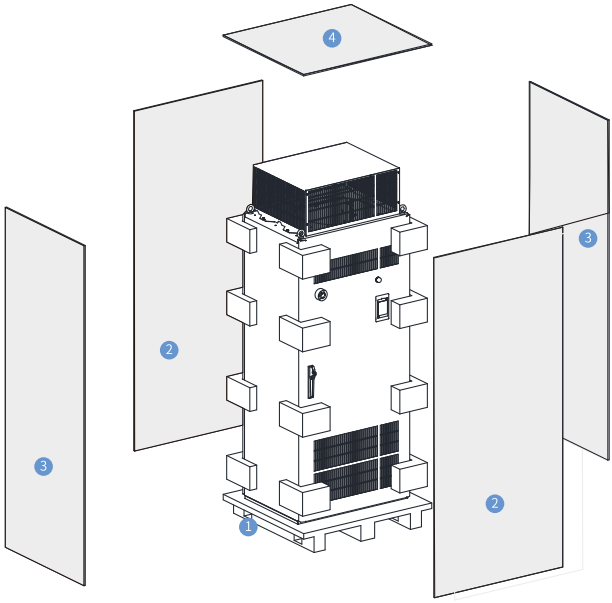


Figure 5-22 Unpacking the AC drive

Note

Dispose of the packaging materials in accordance with applicable local regulations.

5.2.5 Handling and Hoisting After Unpacking

T1 to T6 models are small and light and therefore can be handled manually. T7 to T13 models, however, must be transported with an appropriate lifting tool.

Drive weight	Personnel required for handling
< 15 kg	1
≥ 15 kg	2, with proper lifting device

Precautions for handling and hoisting:

- Comply with local regulations when handling the AC drive.
- Avoid handling the AC drive by directly holding its upper cover or enclosure. Before handling, check that all screws have been tightened. Failure to comply may result in AC drive fall-off, causing personal injury.
- For T10 to T12 models, when fastening the AC drive, ensure that the four mounting holes on the back of the AC drive are securely connected to the fixing beam.
- Make the equipment in the vertical position before hoisting and handling.
- Ensure that the load capacity of the crane for transportation is larger than the weight of the equipment.
- Ensure that the upper cover, terminals, and other components of the AC drive are secured firmly with screws before vertical lifting. Failure to comply may result in physical injuries due to fall-off of the drive.
- When lifting the AC drive with the lifting rope, avoid subjecting the AC drive to excessive vibration or impact. Failure to comply may result in physical injuries due to fall-off of the drive.
- When lifting the AC drive with the lifting rope, do not turn the AC drive over or leave it suspended for long time. Failure to comply may result in physical injuries due to fall-off of the drive.

T1 to T9 models

To lift T1 to T9 models, do as follows:

1. Hook the lifting rope to the two auxiliary lifting lugs at the top of the drive.
   It is recommended that the lifting angle be greater than 45 degrees and the height fluctuation be no greater than 0.3 m.

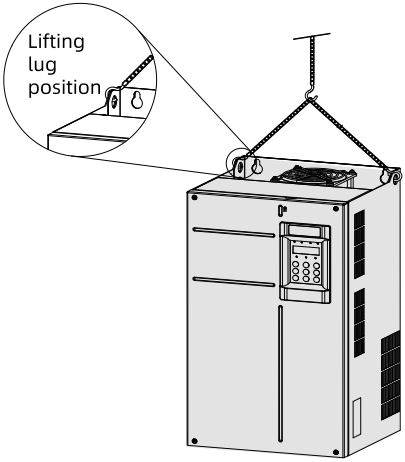


Figure 5-23 Lifting the AC drive

2. Roll up the lifting rope slowly with a crane. After the lifting rope is fully stressed, lift the drive up.
3. Lower the drive down slowly, with a pause at a certain height midway, then continue until the drive reaches the ground or mounting surface. Finally, install the drive to the control cabinet.

T10 to T12 models

To lift T10 to T12 models, do as follows:

1. Hook the lifting lugs at the top of the drive and the lifting holes at the bottom of the drive, take out the AC drive from the packing box, and lay it flat on the floor.
   Ensure that there is no stress on the positive and negative bus terminals.

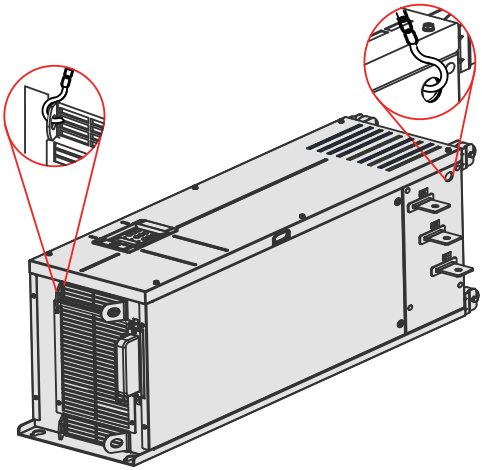


Figure 5-24 Lifting the AC drive

2. Hook the lifting rope to the lifting lugs diagonally placed at the top of the AC drive, slowly place the AC drive upright, and install it to the cabinet.

CAUTION

If the AC drive needs to be placed in an upright position, ensure the tilt angle of the place that holds the drive does not exceed 5°. Failure to comply may lead to rollover of the drive due to its heavy weight (nearly 200 kg) and large size.

T13 models

1. Before installation, remove the fixing screws from the four corners of the transportation pallet and the cabinet, and remove the pallet.

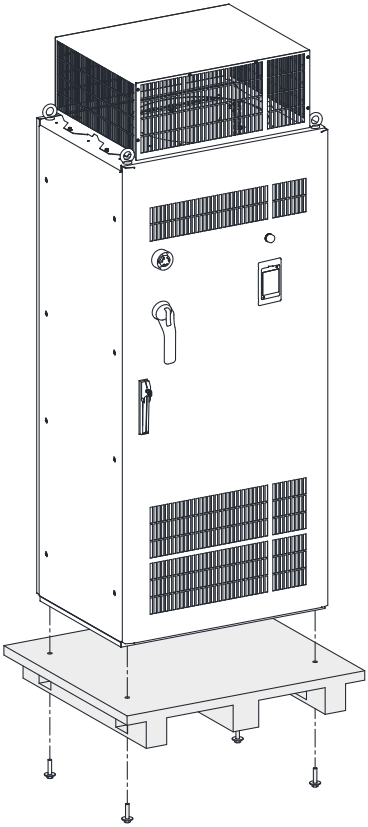


Figure 5-25 Unloading the cabinet from the pallet

2. Transport the cabinet with a crane whose carrying capacity is greater than the cabinet weight.
3. Lift the cabinet through the auxiliary lifting holes or lifting lugs at the top of the cabinet, with the relief height lower than or equal to 0.3 m.
4. Ensure that the cabinet has been locked before moving.
5. The cabinet must be held by hands on the left and right sides during movement.

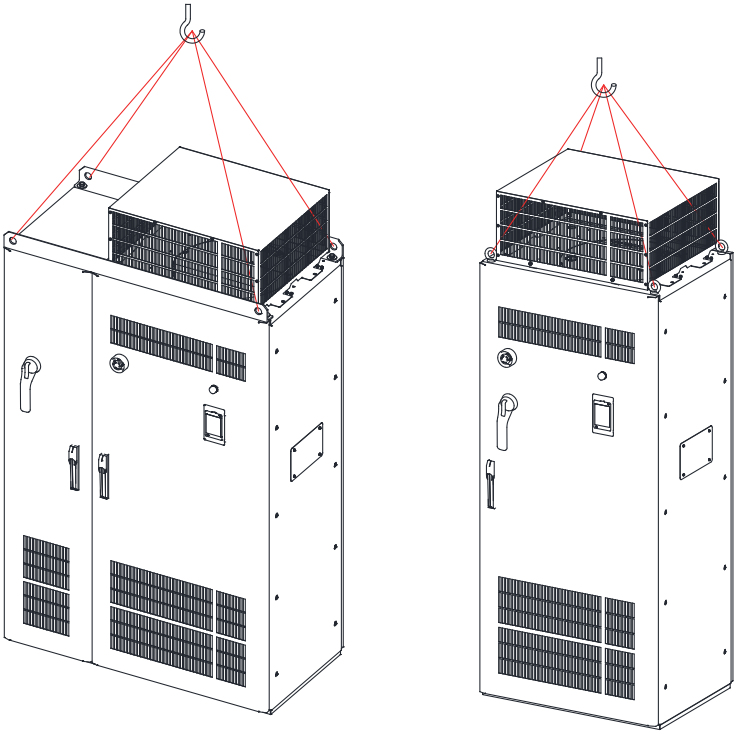


Figure 5-26 Transportation after unpacking

5.3 Mechanical Installation (T1 to T9 Models)

5.3.1 Installation Method

T1 to T9 models support backplate mounting and through-hole mounting.

5.3.2 Cabinet Design

5.3.2.1 Overview

Before installing the AC drive in the cabinet, design the cabinet to ensure sufficient clearances for installation and heat dissipation. Take the following factors into consideration:

- Cabinet clearance requirement
- Mounting backplate
- Cabinet heat dissipation

5.3.2.2 In-Cabinet Clearance

For T1 to T9 models, multi-layer installation is recommended. That is, install one AC drive above another. The following table lists the minimum clearance between the upper and lower AC drives. Install an air guide plate above each AC drive except the top one.

Table 5–8 Minimum clearance for multi-layer installation

Item	T1 to T4	T5	T6	T7 to T9
S1	≥ 100 mm	≥ 200 mm	≥ 200 mm	≥ 300 mm
S2	≥ 100 mm	≥ 200 mm	≥ 200 mm	≥ 300 mm
...	≥ 100 mm	≥ 200 mm	≥ 200 mm	≥ 300 mm
Sn	≥ 100 mm	≥ 200 mm	≥ 200 mm	≥ 300 mm

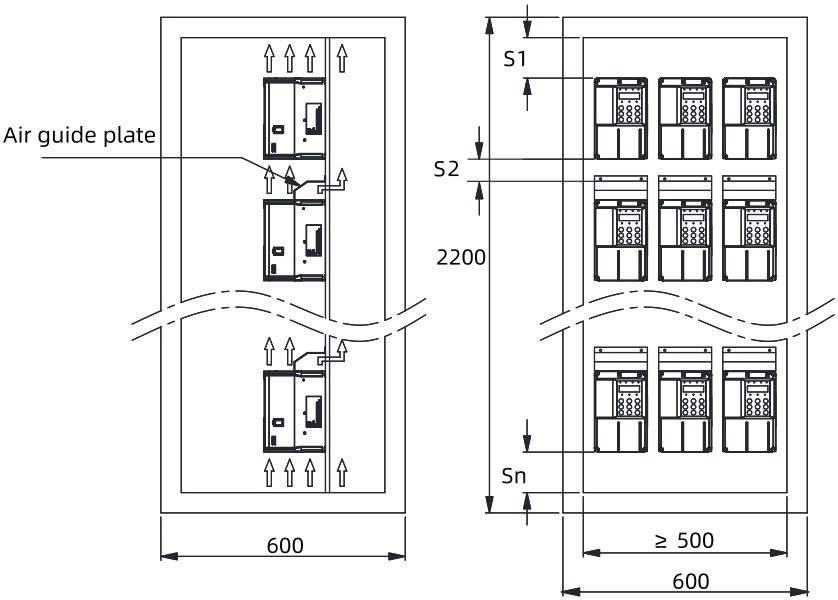


Figure 5-27 Minimum clearance (mm) for multi-layer installation

Note

When installing a fan, ensure that the fan can exhaust hot air in the cabinet to the outside. Failure to comply may cause accumulation of hot air, leading to over-temperature or damage to the drive. Ensure that the distance between the top cover of the air outlet and the fan outlet is at least 200 mm. Otherwise, the fan cooling performance may deteriorate.

5.3.2.3 Mounting Backplate Requirements

Requirements of backplate thickness, dimensions, and stiffness

To avoid damage to the AC drive during transportation and ensure proper operation of the AC drive, use a mounting plate with excellent stiffness and strength performance, and a thickness of at least 2 mm. Reinforce the backplate where appropriate. For example, weld a lateral reinforcing beam on the back of the backplate, as shown in the following figure.

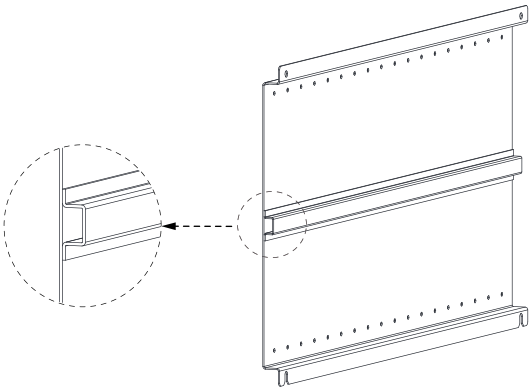


Figure 5-28 Welding a lateral reinforcing beam on the back of the backplate

Requirement on the mounting holes

- You can drill mounting holes on the backplate in advance. For detailed mounting hole dimensions, see *"3.1 Dimensions of T1 to T9 Models" on page 43*.
- To avoid damage to the AC drive during transportation, fix the drive to the mounting backplate by using screws. In addition, use self-clinching nuts or independent nuts on the back of the backplate to enhance screw-thread fitting and fastening effect.

5.3.2.4 Cabinet Heat Dissipation

Heat dissipation design of the cabinet door

The AC drive is forcibly cooled by a built-in fan. To ensure that enough cooling air enters the cabinet, open an air inlet with an appropriate size on the cabinet door.

The air flows from bottom to top after being heated. Therefore, the cabinet air inlet must be at least 50 mm lower than the air inlet of the drive, as shown below.

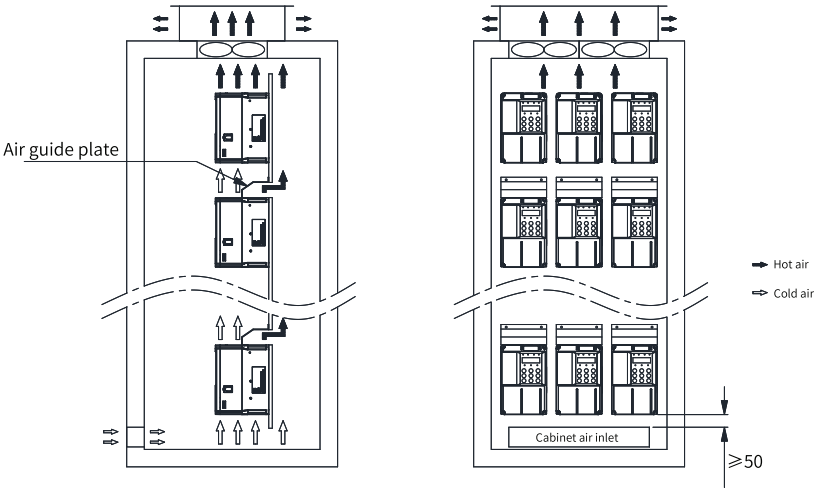


Figure 5-29 Position of the cabinet air inlet

CAUTION

Where multiple AC drives are installed in one cabinet, if the fan blows air into the air inlet from the outside, air distribution for the drives in the cabinet will be affected, resulting in poor cooling performance. Therefore, do not install a fan at the air inlet of the cabinet to blow air into the cabinet.

The following table describes the minimum effective ventilation area of the cabinet air inlet after the drive is installed in the cabinet.

Table 5–9 Minimum ventilation area of the cabinet air inlet (three-phase 380 V to 480 V)

Model	Minimum effective area of the cabinet air inlet (cm^2)
MD290T0.4G/0.7PB MD290T0.7G/1.1PB MD290T1.1G/1.5PB MD290T1.5G/2.2PB MD290T2.2G/3.0PB MD290T3.0G/3.7PB	20
MD290T3.7G/5.5PB MD290T5.5G/7.5PB	25
MD290T7.5G/11PB	

Model	Minimum effective area of the cabinet air inlet (cm^2)
MD290T11G/15PB	50
MD290T15G/18.5PB	
MD290T18.5G/22P(B) MD290T22G/30P(B) MD290T18.5G/22P(B)-T MD290T22G/30P(B)-T	60
MD290T30G/37P(B) MD290T37G/45P(B) MD290T45G/55P(B) MD290T55G/75P(B)	102
MD290T75G/90P(B) MD290T90G/110P MD290T110G/132P	204
MD290T132G/160P MD290T160G/200P	318

Table 5–10 Minimum ventilation area of the cabinet air inlet (three-phase 200 V to 240 V)

Model	Minimum effective area of the cabinet air inlet (cm^2)
MD290-2T0.4G/0.7PB MD290-2T0.7G/1.1PB MD290-2T1.1G/1.5PB MD290-2T1.5G/2.2PB	20
MD290-2T2.2G/3.7PB MD290-2T3.7G/5.5PB	25
MD290-2T5.5G/7.5PB	
MD290-2T7.5G/11PB	50
MD290-2T11G/15P(B)	60
MD290-2T15G/18.5P(B) MD290-2T18.5G/22P(B) MD290-2T22G/30P(B) MD290-2T30G/37P(B)	102
MD290-2T37G/45P(B) MD290-2T45G/55P MD290-2T55G/75P	204

Table 5–11 Minimum ventilation area of the cabinet air inlet (single-phase 200 V to 240 V)

Model	Minimum effective area of the cabinet air inlet (cm^2)
MD290-2S0.4GB MD290-2S0.75GB MD290-2S1.5GB MD290-2S2.2GB MD290-2S3.0GB	25

The preceding table applies to situations where only one AC drive is mounted in the cabinet. For a cabinet containing multiple AC drives, calculate the total ventilation area by adding the ventilation area of each drive according to the table. For example, if eight T3 models (7.5 kW), two T5 models, and one T9 model are placed inside the cabinet, the minimum effective ventilation area of the cabinet air inlet is 8 x 25 + 2 x 60 + 1 x 318 = 638 cm^2.

If a filter screen is installed at the air inlet, the air inlet resistance will rise significantly. In this case, the air inlet area must be increased to 1.2 to 1.5 times the value indicated in the table.

The effective area in the preceding table refers to the actual through-hole area of an opening. The effective area is calculated by the following formula: opening area x opening rate.

Top air outlet design

To ensure sufficient heat dissipation of the drive, hot air in the cabinet must be exhausted to the outside. The passive or active exhaust mode can be adopted.

1. Passive exhaust

   The air flows from bottom to top after being heated. In this mode, the hot air discharged by the drive is exhausted to the outside from the air outlet at the top of the cabinet.

   This may cause accumulated hot air at the top of the cabinet, rising the air pressure in this region. In addition, the air pressure at the cabinet air inlet becomes low due to suction of the fan for the AC drive. Therefore, there is an air pressure difference between the air outlet and air inlet of the cabinet to form an air flow in the cabinet. The air flow forces hot air at the air outlet to flow towards the air inlet so that it is absorbed into the drive again, causing a great temperature rise and an adverse effect on the performance of the drive.

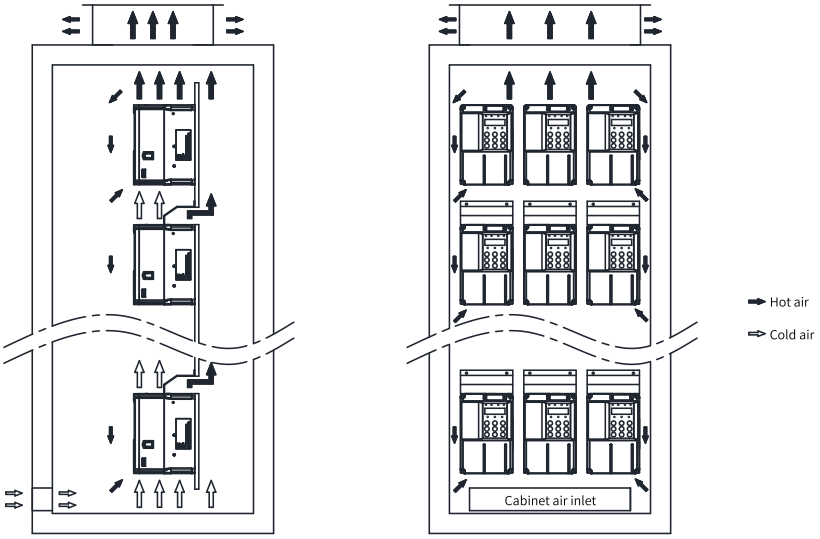


Figure 5-30 Hot air backflow in the passive exhaust mode (without isolation devices)

For cabinets that adopt the passive exhaust mode, use an isolation device to prevent hot air backflow, as shown below. An isolation device can be a plate or an exhaust duct.

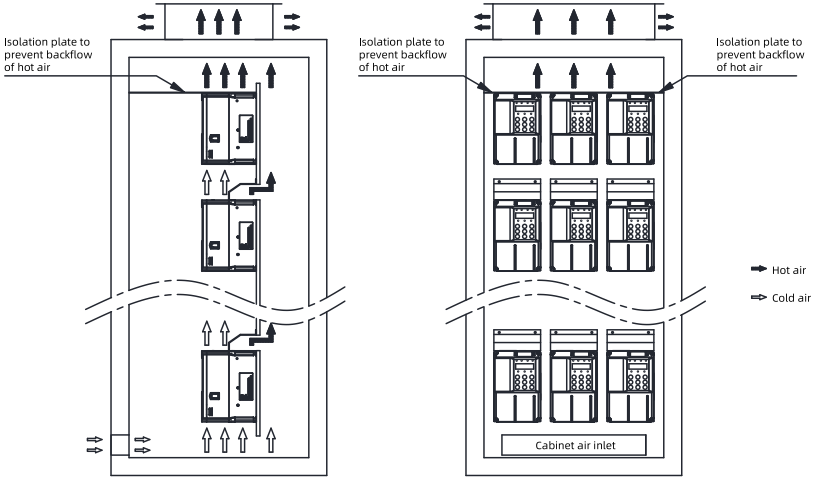


Figure 5-31 Hot air backflow in the passive exhaust mode (with isolation devices)

The temperature at the air outlet of the drive is higher than that at the air inlet and the density at the air outlet is lower than that at the air inlet. To ensure that hot air in the cabinet can be exhausted to the outside, the minimum effective ventilation areas of

the cabinet air outlet must meet the requirements in the following table when the passive exhaust mode is used.

Table 5–12 Minimum ventilation area of the cabinet air outlet in passive exhaust mode (three-phase 380 V to 480 V)

Model	Minimum effective area of the cabinet air output in passive exhaust mode (cm^2)
MD290T0.4G/0.7PB MD290T0.7G/1.1PB MD290T1.1G/1.5PB MD290T1.5G/2.2PB MD290T2.2G/3.0PB MD290T3.0G/3.7PB	32
MD290T3.7G/5.5PB MD290T5.5G/7.5PB	40
MD290T7.5G/11PB	
MD290T11G/15PB	80
MD290T15G/18.5PB	
MD290T18.5G/22P(B) MD290T22G/30P(B) MD290T18.5G/22P(B)-T MD290T22G/30P(B)-T	96
MD290T30G/37P(B) MD290T37G/45P(B) MD290T45G/55P(B) MD290T55G/75P(B)	163
MD290T75G/90P(B) MD290T90G/110P MD290T110G/132P	326
MD290T132G/160P MD290T160G/200P	509

Table 5–13 Minimum ventilation area of the cabinet air outlet in passive exhaust mode (three-phase 200 V to 240 V)

Model	Minimum effective area of the cabinet air output in passive exhaust mode (cm^2)
MD290-2T0.4G/0.7PB MD290-2T0.7G/1.1PB MD290-2T1.1G/1.5PB MD290-2T1.5G/2.2PB	32
MD290-2T2.2G/3.7PB MD290-2T3.7G/5.5PB	40
MD290-2T5.5G/7.5PB	
MD290-2T7.5G/11PB	80
MD290-2T11G/15P(B)	96

Model	Minimum effective area of the cabinet air output in passive exhaust mode (cm^2)
MD290-2T15G/18.5P(B) MD290-2T18.5G/22P(B) MD290-2T22G/30P(B) MD290-2T30G/37P(B)	163
MD290-2T37G/45P(B) MD290-2T45G/55P MD290-2T55G/75P	326

Table 5–14 Minimum ventilation area of the cabinet air outlet in passive exhaust mode (single-phase 200 V to 240 V)

Model	Minimum effective area of the cabinet air output in passive exhaust mode (cm^2)
MD290-2S0.4GB MD290-2S0.75GB MD290-2S1.5GB MD290-2S2.2GB MD290-2S3.0GB	40

The preceding table applies to situations where only one AC drive is mounted in the cabinet. For a cabinet containing multiple AC drives, calculate the total ventilation outlet area by adding the ventilation area of each drive according to the table.

If a filter screen is installed at the air outlet, the air outlet resistance will rise significantly. In this case, the air outlet area must be increased to 1.2 to 1.5 times the value indicated in the table.

The ventilation area in the preceding tables refers to the actual through-hole area of the opening. The ventilation area is calculated by the following: opening area x opening rate.

2. Active exhaust

In the active air exhaust mode, a fan is installed on the top of the cabinet to draw hot air out of the cabinet. Active ventilation is commonly used.

To ensure that the hot air can be exhausted to the outside, the total air volume of the fan cannot be smaller than that of all drives in the cabinet. The cooling air volume required by the drive is listed in the following tables.

Table 5–15 Cooling air volume (three-phase 380 V to 480 V)

Model	Cooling air flow (CFM)
MD290T0.4G/0.7PB MD290T0.7G/1.1PB MD290T1.1G/1.5PB	/
MD290T1.5G/2.2PB MD290T2.2G/3.0PB MD290T3.0G/3.7PB	11

Model	Cooling air flow (CFM)
MD290T3.7G/5.5PB	20
MD290T5.5G/7.5PB	24
MD290T7.5G/11PB	29
MD290T11G/15PB MD290T15G/18.5PB	50
MD290T18.5G/22P(B) MD290T18.5G/22P(B)-T	52
MD290T22G/30P(B) MD290T22G/30P(B)-T	58
MD290T30G/37P(B)	130
MD290T37G/45P(B)	102
MD290T45G/55P(B) MD290T55G/75P(B)	125
MD290T75G/90P(B) MD290T90G/110P	225
MD290T110G/132P	350
MD290T132G/160P	541
MD290T160G/200P	620
Note: 1 CFM = 0.02832 m^3/min	

Table 5–16 Cooling air volume (three-phase 200 V to 240 V)

Model	Cooling air flow (CFM)
MD290-2T0.4G/0.7PB MD290-2T0.7G/1.1PB	/
MD290-2T1.1G/1.5PB MD290-2T1.5G/2.2PB	11
MD290-2T2.2G/3.7PB	20
MD290-2T3.7G/5.5PB	24
MD290-2T5.5G/7.5PB	29
MD290-2T7.5G/11PB	50
MD290-2T11G/15P(B)	52
MD290-2T15G/18.5P(B)	130
MD290-2T18.5G/22P(B)	102
MD290-2T22G/30P(B) MD290-2T30G/37P(B)	125
MD290-2T37G/45P(B) MD290-2T45G/55P	225
MD290-2T55G/75P	350
Note: 1 CFM = 0.02832 m^3/min	

Table 5–17 Cooling air volume (single-phase 200 V to 240 V)

Model	Cooling air flow (CFM)
MD290-2S0.4GB MD290-2S0.75GB MD290-2S1.5GB	20
MD290-2S2.2GB MD290-2S3.0GB	24
Note: 1 CFM = 0.02832 m^3/min	

Cabinet fan design

To select the fan for the cabinet, do as follows:

1. Calculate the sum of the cooling air volume required by all AC drives based on *"Table 5-17 Cooling air volume (single-phase 200 V to 240 V)" on page 104*.
2. Determine the maximum air volume (Qmax) of the cabinet fan.
3. Determine the specification and quantity of the fan based on the maximum air volume (Qmax).

In which:

Maximum air volume of the cabinet = 1.3 to 1.5 x Sum of the cooling air volume

Maximum air volume of the cabinet = 1.6 to 2.2 x Sum of the cooling air volume (When mesh filters, shutters, or similar are installed at the cabinet air outlet.)

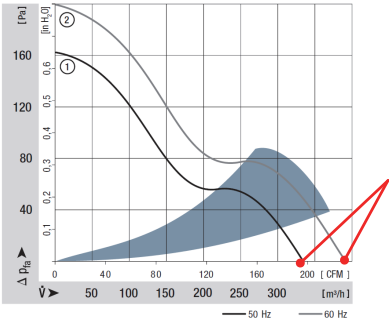
Note

The air volume of the selected fan cannot be lower than the maximum air volume Qmax. When an individual fan cannot deliver the required air volume, connect multiple fans in parallel.

The following figure shows typical air flow of fans.

Air flow	Air flow	Nominal voltage	Frequency	Sound pressure level	Sound power level	Sintec sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L_{10} at 40 °C at T_{max}		Curve
m^3/h	CFM	V	Hz	dB(A)	Bel(A)	□/■	Watts	RPM	°C	Hours	Hours	
320	188,3	**230**	**50**	51	6,4	■	27,0	2 800	-25...+55	60 000 / 32 000		1
380	223,6	**115**	**60**	56	6,8	■	28,0	3 350	-25...+65	55 000 / 18 000		2

Maximum air flow of the fan (Qmax)



Maximum air flow of the fan (Qmax)

Figure 5-32 Q_{max} of a system fan

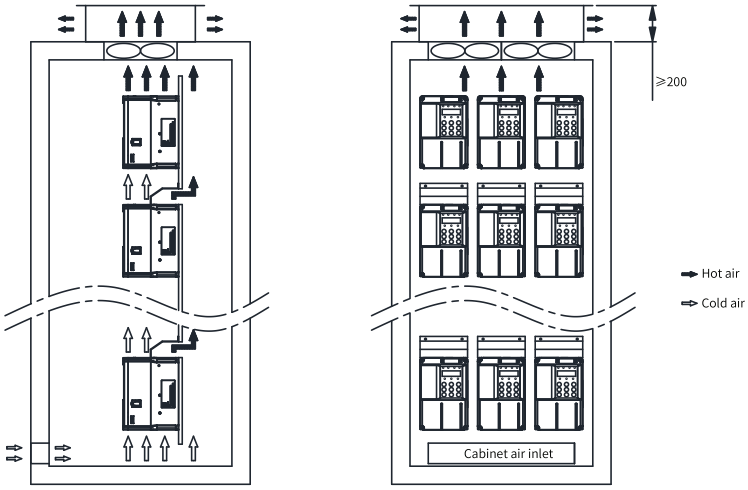


Figure 5-33 Cabinet ventilation system

CAUTION

Install the fan in the correct air exhaust direction to ensure that air flows from inside to outside of the cabinet. Otherwise, hot air cannot be exhausted and the drive may be overheated or damaged.

The distance between the top cover of the air outlet and the fan outlet must be at least 200 mm to improve the fan cooling performance.

5.3.3 Pre-installation Precautions

- Ensure the installation location is sturdy enough to bear the mechanical strength of the drive.
- Cover the top of the AC drive with a piece of cloth or paper during installation to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment. Failure to comply may cause malfunction of the AC drive. After installation is done, remove the cloth or paper. Failure to comply may degrade ventilation and result in unexpected overtemperature.
- Reserve sufficient clearance for heat dissipation, including heat dissipation of other components in the cabinet. For details, see "Installing one drive" in *"5.1.2.2 Installation Clearance" on page 71*.
- Install the drive vertically upward to facilitate heat dissipation. To install multiple drives in one cabinet, arrange them side by side. When multiple drives need to be installed one above another, install an air guide plate between drives. For details, see "Installing drives one above another" in *"5.1.2.2 Installation Clearance" on page 71*.
- The mounting bracket (if needed) must be made of incombustible materials.
- In environments with metal dust, use an enclosed cabinet that can completely isolate the drive from the metal dust. In this case, ensure the maximum possible space in the cabinet and install cooling devices outside the cabinet.
- Tighten all screws properly with specified tightening torque. Failure to comply may result in an electric shock or fire.
- Keep combustibles and explosives away from the device.

5.3.4 Backplate Mounting

For backplate mounting, fasten all nuts, instead of only the two nuts on the top of the AC drive. Otherwise, the drive may fall off due to uneven force during long-time running.

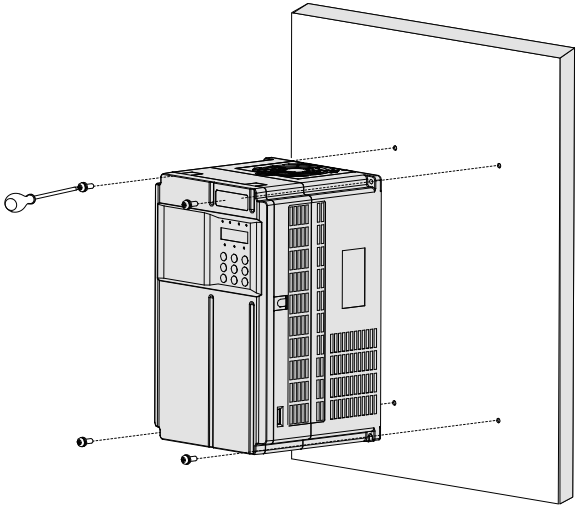


Figure 5-34 Backplate mounting of T1 to T6 models

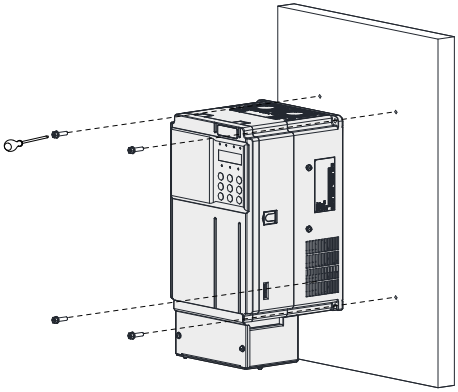


Figure 5-35 Backplate mounting (T1 to T6 models, with conduit boxes)

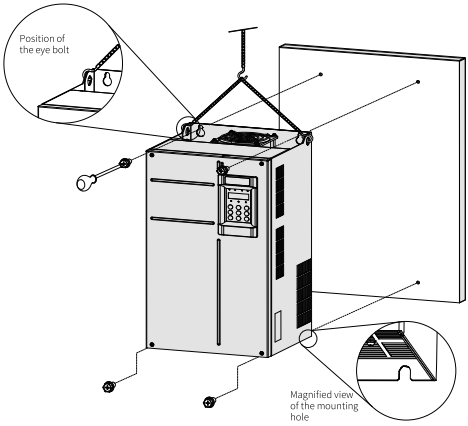
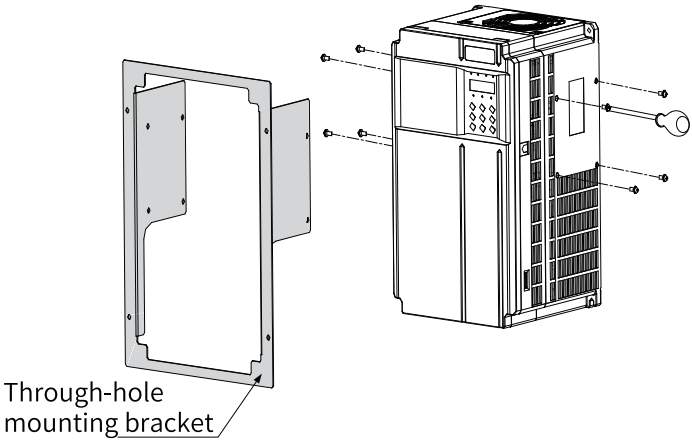


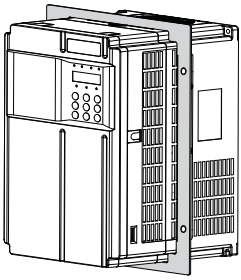
Figure 5-36 Backplate mounting of T7 to T9 models

5.3.5 Through-Hole Mounting

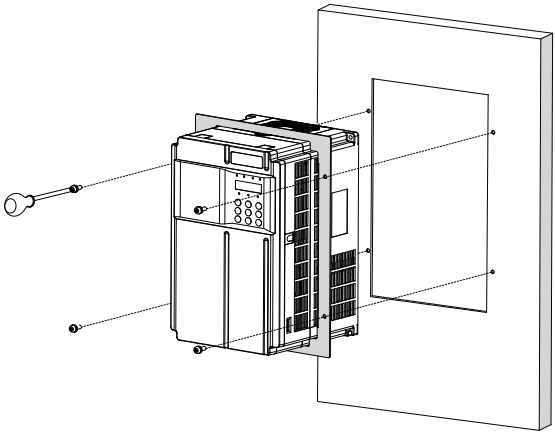
1. T1 to T6 models
   a. Install the AC drive through the mounting bracket, and then fix the screws at both sides of the bracket.



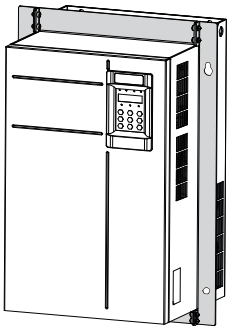
The following figure shows an AC drive with a bracket mounted.



b. Fix the AC drive with the bracket on the backplate of the control cabinet.

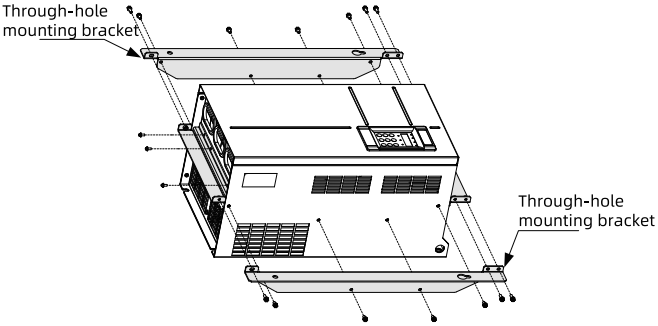


The following figure shows what it looks like when through-hole mounting is done.

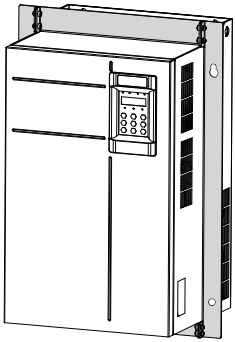


2. T7 to T9 models

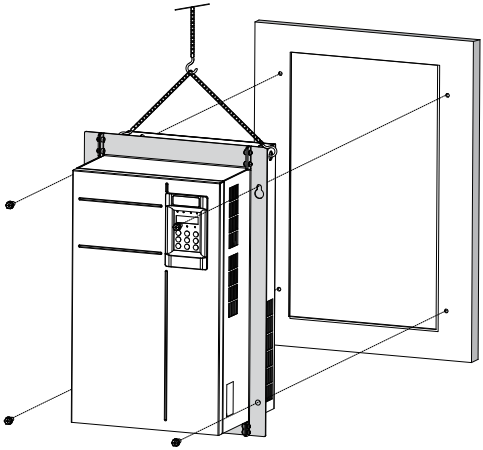
a. Fix the through-hole mounting bracket from both sides of the enclosure.



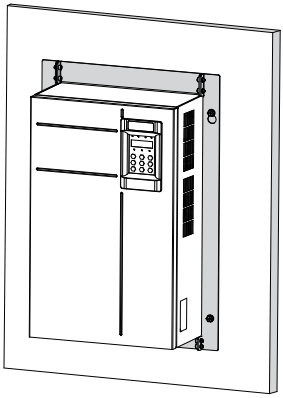
The following figure shows an AC drive with brackets mounted.



b. Fix the AC drive on the backplate of the control cabinet from the front.



The following figure shows what it looks like when through-hole mounting is done.



5.3.6 Cover Removal and Installation

5.3.6.1 Removing the Cover

During wiring of the control circuit, if the jumper or function expansion card is involved, remove the cover first. When removing the cover, hold the cover with your hands and carefully lift the lower part of the cover to prevent it from falling off. Failure to comply can result in equipment damage or personal injury.

Prerequisites

Before removing the cover, ensure that the device has been powered off for more than 10 minutes.

Context

The following figure shows the positions of the control board, jumper, and expansion card after the cover is removed.

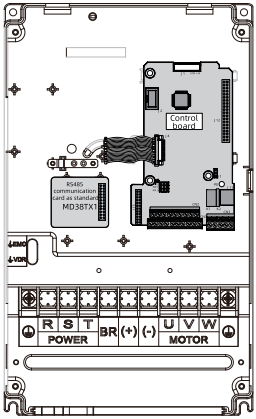
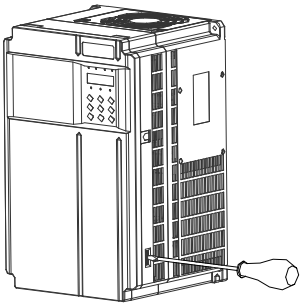
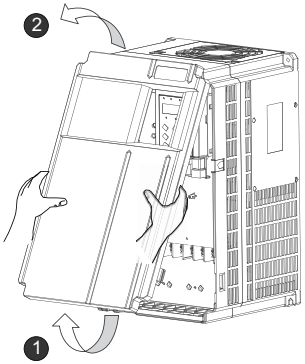


Figure 5-37 Control board position

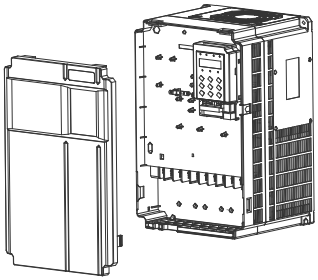
1. To remove the cover of T1 to T6 models, do the following:
   a. Use a tool to push the snap-fit joints inwards at both sides of the drive to release the cover.



   b. Hold the cover with your hands, lift the lower part of the cover (as shown in ①), push the cover upward, and lift the upper part of the cover (as shown in ②).

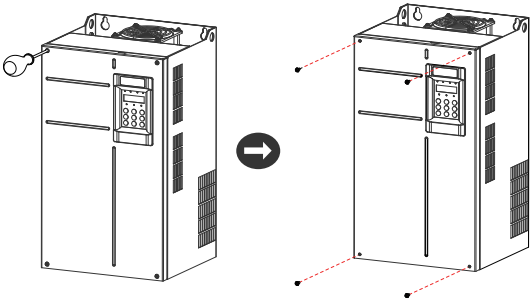


   The following figure shows the drive without the cover.

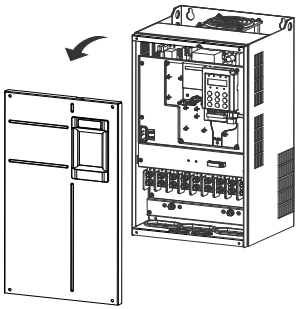


2. Remove the cover for T7 to T9 models.

a. Release the four fixing screws on the cover with a screwdriver.



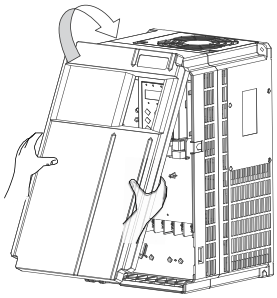
b. Hold the cover with both hands and lift it up in the direction indicated by the arrow.



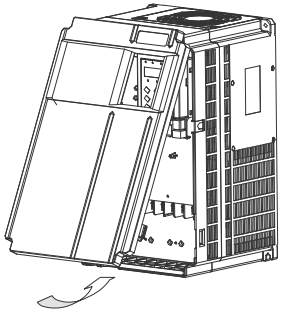
5.3.6.2 Installing the Cover

You need to remove the front cover before connecting the main circuit and control circuit cables. After wiring is done, re-install the cover.

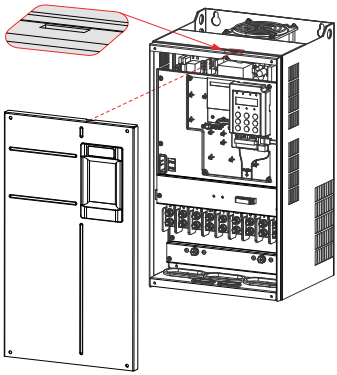
1. Install the cover for T1 to T6 models.
   a. Hold the cover with both hands and insert the snap-fit joint on the upper edge of the cover into the hole in the drive.



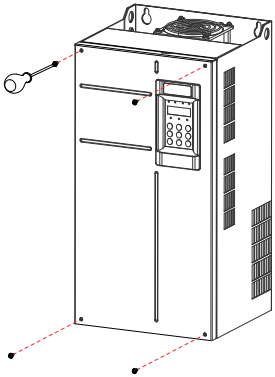
b. Align the cover and push down the lower part of the cover by the arrow direction.



2. Install the cover for T7 to T9 models.
   a. Hold the cover with both hands, align the cover with the upper edge snap-fit joint on the chassis and push it in place as shown in the following figure.



b. Install the four fixing screws with a screwdriver.

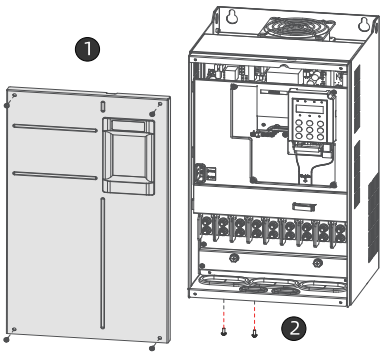
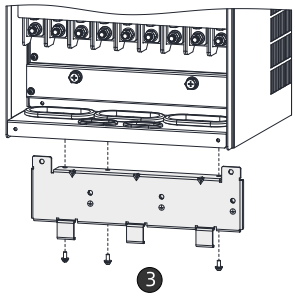
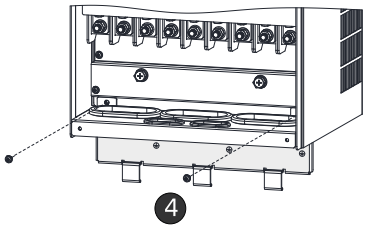


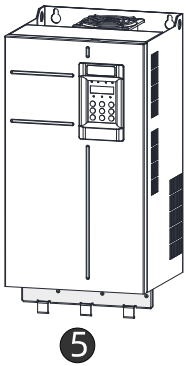
5.3.7 Installation of Cable Shield Grounding Bracket

The grounding bracket of the cable shield is optional and needs to be purchased separately (applicable to T9 models and below).

Installation

Table 5–18 Procedure of installing the cable shield grounding bracket

No.	Step	Picture
1	Remove the cover as shown in ①. Remove the two M4x12 SEMS screws on the air inlet plate, as shown in ②.	
2	Place the ground bracket of the cable shield on the chassis, and fasten the bracket with three M4 x 12 SEMS screws at the positions shown in ③.	
3	Tighten two M4x12 SEMS screws at the positions shown in ④.	

No.	Step	Picture
4	Install the cover.	

Wiring

Use shielded cables for motor output cables. Strip the cable to expose the shield, crimp the shield to the wire ferrule slot of the bracket with the wire ferrule, and crimp the lead wire of the shield to the PE terminal, as shown below. The grounding bracket of the cable shield is provided with wire ferrule slots. Cover the exposed shield with the insulation tape above the wire ferrule. The following figure shows the wiring.

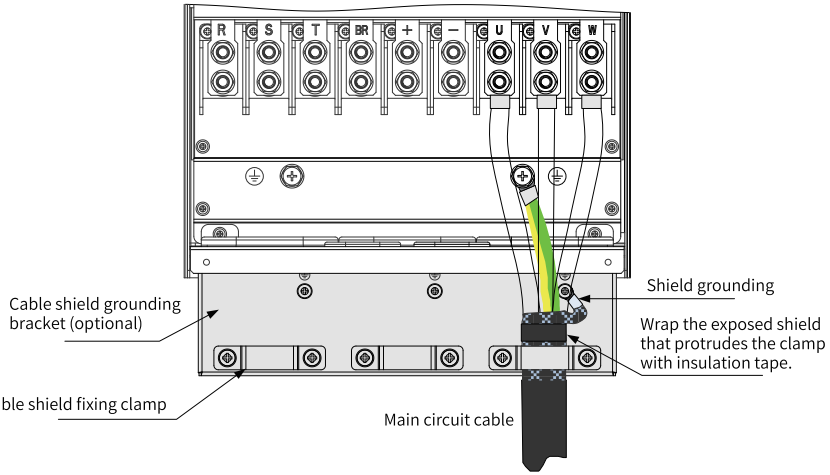


Figure 5-38 Wiring of the cable shield

5.3.8 Conduit Box Installation

Context

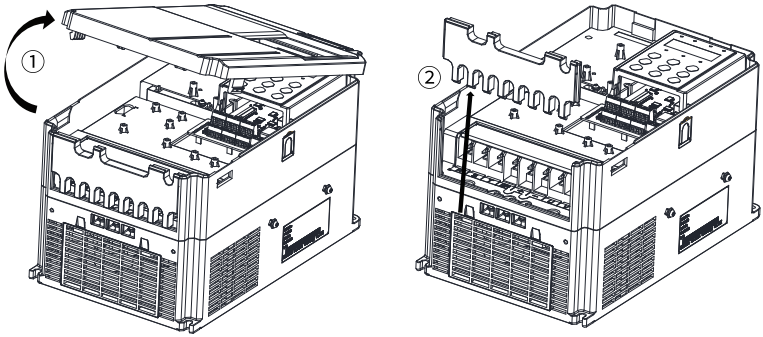
- Models requiring UL Type 1 enclosures are equipped with conduit boxes.

- The conduit box is optional and needs to be purchased (applicable to T6 models and models below T6). The following steps and figures show how to install the conduit box for T1 to T4 models and for T5 to T6 models, respectively.

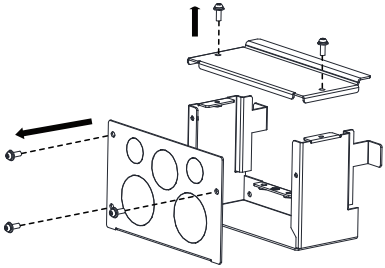
Operating procedure:

T1 to T4 models

1. Lift the upper cover of the AC drive (①) to remove it, and then remove the wire slot plate (②).



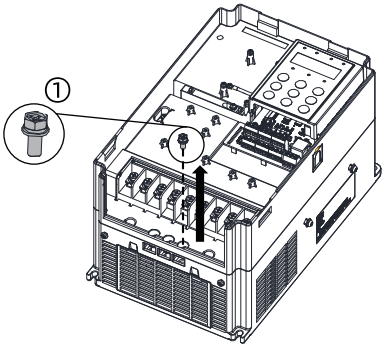
2. Remove the five M4 x 10 SEMS screws from the conduit box.



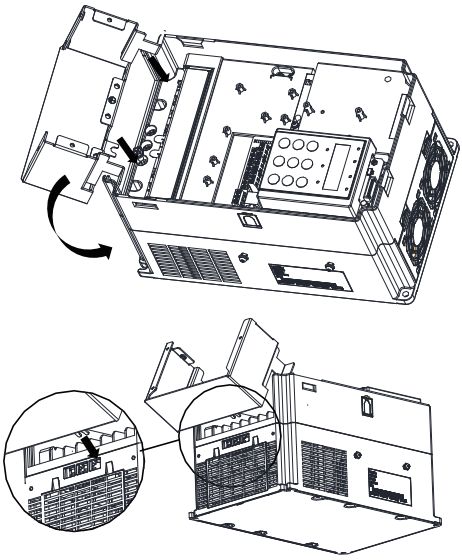
3. Remove the screw in position ①.

Note

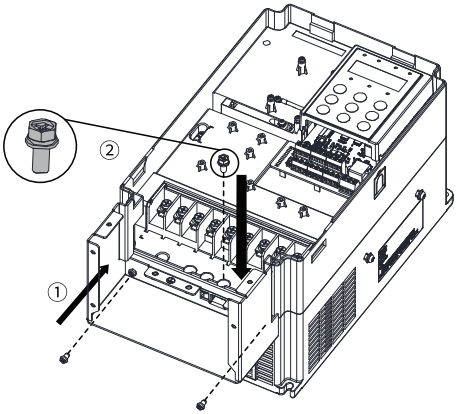
The number of the screws to be fastened at position ② varies with models. One screw is required for T1 to T4 models, two for T5 models, and four for T6 models. The screws are delivered with the conduit box and are fastened in the same way.



4. Install the conduit box to the place of the drive from top to bottom.



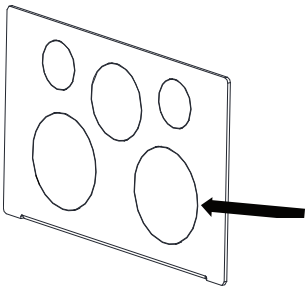
5. Tighten the two screws in position ①, and tighten the one self-tapping screws in position ②.



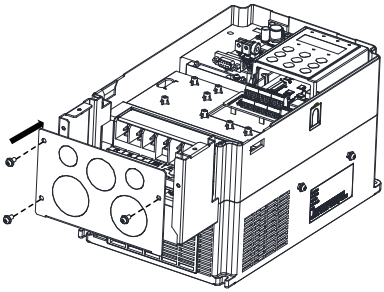
Note

The number of the screws to be fastened at position ② varies with models. One screw is required for T1 to T4 models, two for T5 models, and four for T6 models. The screws are delivered with the conduit box and are fastened in the same way.

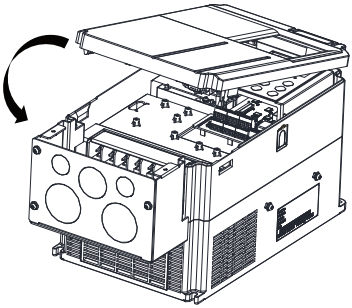
6. Knock off the threaded hole cover on the wire slot plate and install cables and bellows joints.



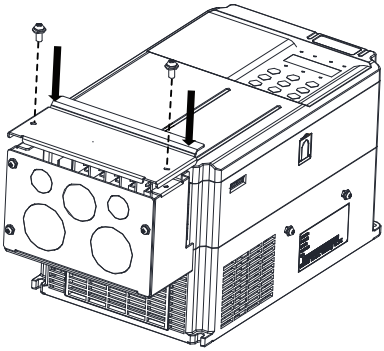
7. Use three SEMS screws to install the wire slot plate to the conduit box.
   Note: M4 x 10 SEMS screws are used.



8. Install the upper cover of the drive.

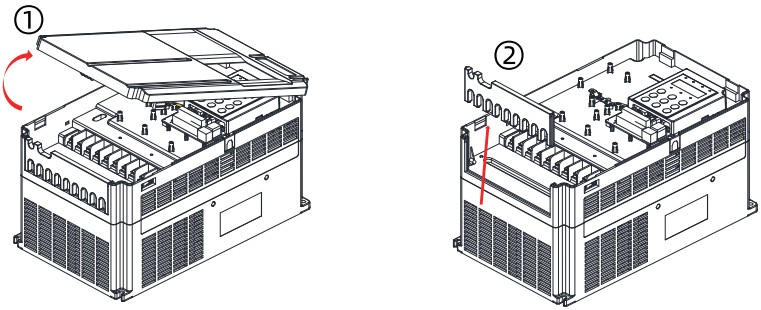


9. Use two SEMS screws to mount the upper cover of the wire slot plate to the conduit box.
   Note: M4 x 10 SEMS screws are used.

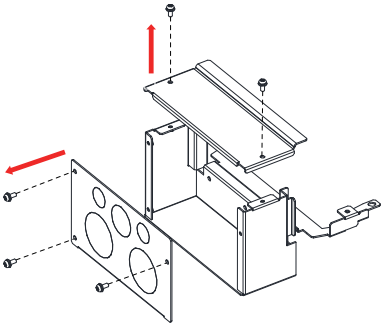


T5 to T6 Models

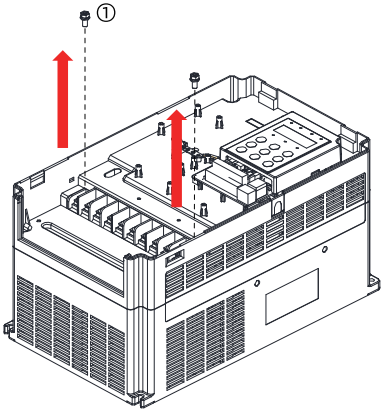
1. Lift the upper cover of the AC drive (①) to remove it, and then remove the wire slot plate (②).



2. Remove the five M4 x 10 SEMS screws from the conduit box.



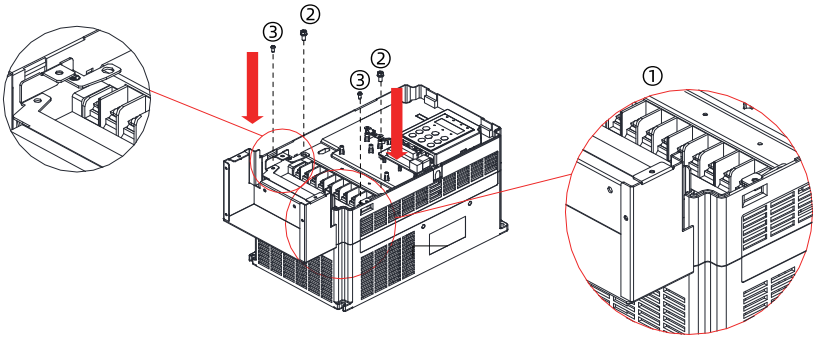
3. Remove the two screws in position ①.



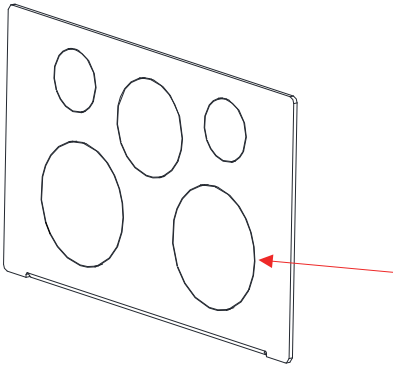
4. Install the conduit box to the place of the drive from top to bottom (①), tighten the two screws in position ②, and tighten the two M4 x 8 self-tapping screws in position ③.

Note

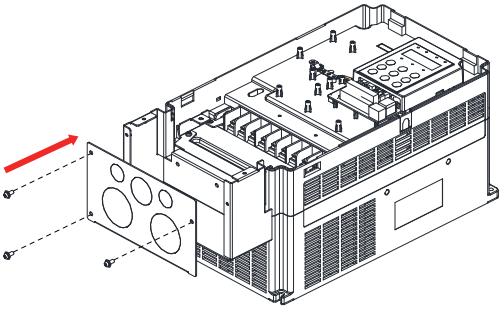
- The screws at position ② are the screws that have been removed at position ① in step 3.
- The number of the screws to be fastened at position ③ varies with models. Two screws are required for T5 models, and four for T6 models. The screws are delivered with the conduit box and are fastened in the same way.



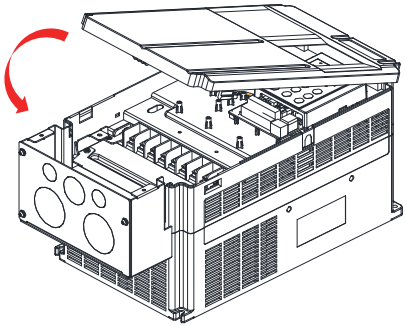
5. Knock off the threaded hole cover on the wire slot plate and install cables and bellows joints.



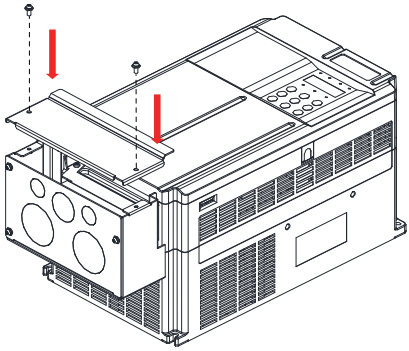
6. Use three M4 x 10 SEMS screws to mount the wire slot plate to the conduit box.



7. Install the upper cover of the drive.



8. Use two M4 x 10 SEMS screws to mount the upper cover of the wire slot plate to the conduit box.



5.4 Mechanical Installation (T10 to T12 Models)

5.4.1 Installation Method

T10 to T12 models can be installed in a cabinet.

5.4.2 Pre-installation Precautions

- Before installing the AC drive, install the bottom mounting bracket and mounting guide rail in the cabinet, prepare mounting beams used for fixing the drive, and reserve fixing holes on the mounting beam. Reserve sufficient space for connecting the side copper busbar inside the cabinet.
- Use the guide rails and the four casters of the AC drive to move the AC drive into or out of the cabinet. Align the casters with the guide rails before a push or pull operation. To ensure safety, arrange two persons to pull or push the AC drive together.
- Reserve sufficient clearance for heat dissipation, including heat dissipation of other equipment in the cabinet.

- To push the AC drive into or pull it out of the cabinet, arrange two persons to work together. After pushing the AC drive into the cabinet, remove the cardboard from the air outlet of the cabinet to avoid over-temperature caused by failure to exhaust hot air.
- Install an air deflector at the top of the cabinet to avoid circulation of hot air inside the cabinet. Prepare air inlets at the lower part of the cabinet door.
- The cabinet is 2200 mm x 800 mm x 600 mm (including a ventilation top cover with the height of 200 mm). The cabinet needs to be installed on a base that is 100 mm in height.
- When the drive is installed in an enclosed environment, such as a cabinet or casing box, use a cooling fan or air conditioner to keep the temperature of the air taken in below 50℃. Failure to comply will result in overheat or fire.
- Cover the top of the AC drive with a piece of cloth or paper during installation to prevent unwanted objects such as metal chippings, oil, and water from falling into the drive. Failure to comply may cause malfunction of the AC drive. After installation is done, remove the cloth or paper. Failure to comply may degrade ventilation and result in unexpected overtemperature.
- The mounting bracket (if needed) must be made of incombustible materials.
- In environments with metal dust, use an enclosed cabinet that can completely isolate the drive from the metal dust. In this case, ensure the maximum possible space in the cabinet and install cooling devices outside the cabinet.
- Tighten all screws properly with specified tightening torque. Failure to comply may result in an electric shock or fire.
- Keep combustibles and explosives away from the device.

5.4.3 Heat Dissipation Design

When installing T10 to T12 models in a cabinet, reserve sufficient space for heat dissipation. Cabinets supporting passive exhaust has no fan on the top.

Note

Cabinets with fans on the top are compared to those without fans on the top. The number of fans in the following table is the number of fans that come with the AC drive.

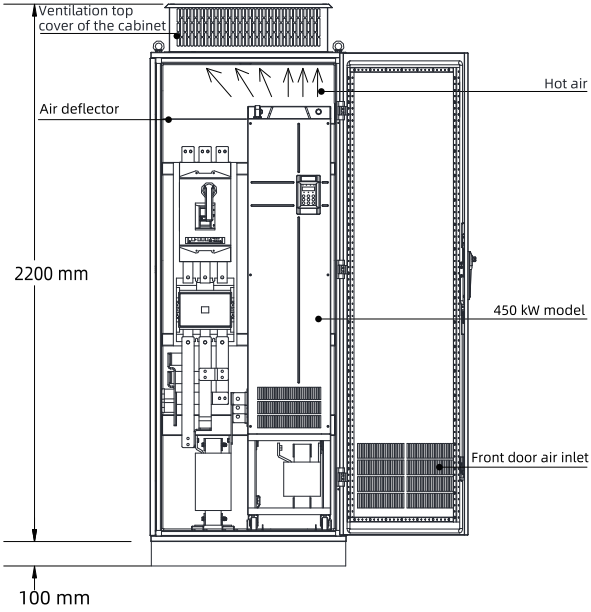


Figure 5-39 Passive-ventilated cabinet

Table 5–19 Specifications of cabinets supporting passive exhaust

Model	Quantity of fans	Total air volume at operating point (CFM)	Effective area of the cabinet air inlet (mm^2)	Effective area of the cabinet air outlet (mm^2)
MD290T200G MD290T220P MD290T250P MD290T200G-L MD290T220P-L MD290T250P-L	2	586	31809	50894
MD290T220G MD290T280P MD290T220G-L MD290T280P-L	2	722	31809	50894
MD290T250G MD290T315P MD290T250G-L MD290T315P-L	3	789	47713	76341
MD290T280G MD290T355P MD290T280G-L MD290T355P-L	3	882	47713	76341

Model	Quantity of fans	Total air volume at operating point (CFM)	Effective area of the cabinet air inlet (mm^2)	Effective area of the cabinet air outlet (mm^2)
MD290T315G MD290T400P MD290T315G-L MD290T400P-L	3	644	47713	76341
MD290T355G MD290T450P MD290T355G-L MD290T450P-L	3	796	47713	76341
MD290T400G MD290T500P MD290T400G-L MD290T500P-L	3	796	47713	76341
MD290T450G MD290T450G-L	3	796	47713	76341

Note

- CFM = 0.0283 m^3/min
- "Effective area" indicates the through-hole area.

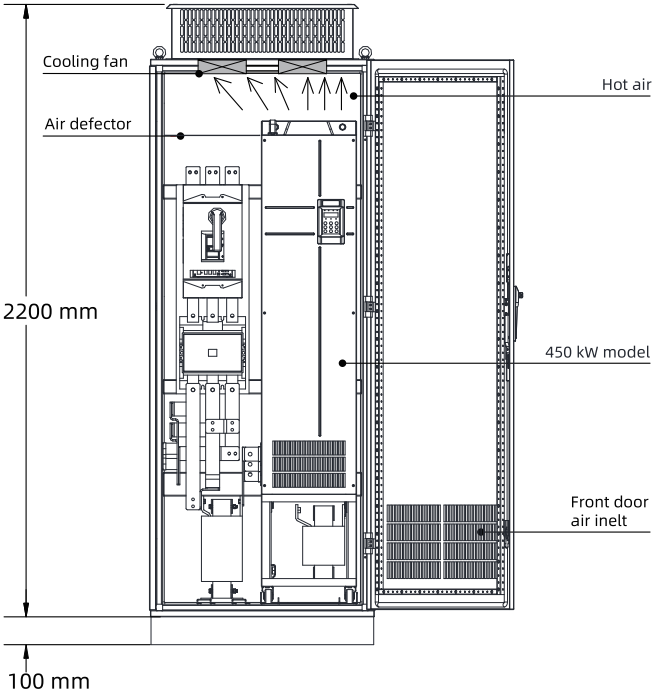


Figure 5-40 Cabinet with top-mounted fans

Table 5–20 Heat dissipation specifications for the cabinet with top-mounted fan

Model	Quantity of fans	Total air volume at operating point (CFM)	Effective area of the cabinet air inlet (mm^2)	Max. air volume required by fan (CFM)	Effective area of the cabinet air outlet (mm^2)
MD290T200G MD290T220P MD290T250P MD290T200G-L MD290T220P-L MD290T250P-L	2	586	31809	703	
MD290T220G MD290T280P MD290T220G-L MD290T280P-L	2	722	31809	866	
MD290T250G MD290T315P MD290T250G-L MD290T315P-L	3	789	47713	947	
MD290T280G MD290T355P MD290T280G-L MD290T355P-L	3	882	47713	1058	
MD290T315G MD290T400P MD290T315G-L MD290T400P-L	3	644	47713	773	
MD290T355G MD290T450P MD290T355G-L MD290T450P-L	3	796	47713	955	
MD290T400G MD290T500P MD290T400G-L MD290T500P-L	3	796	47713	955	
MD290T450G MD290T450G-L	3	796	47713	955	

Note

- CFM = 0.0283 m^3/min
- "Effective area" indicates the through-hole area.

As shown in the following figure, the heat dissipation duct of the drive must be isolated in the cabinet to prevent the hot air from circulating in the cabinet. Use an air deflector for isolation to ensure that the hot air of the drive can be exhausted from the heat dissipation hole on the top of the cabinet.

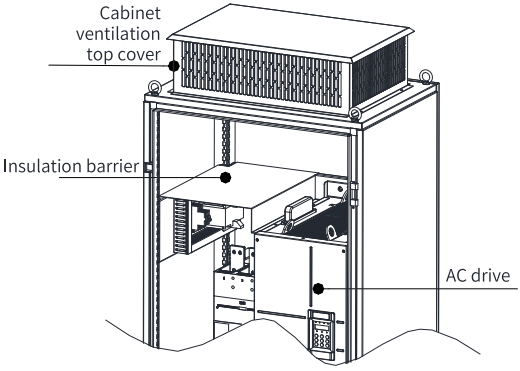


Figure 5-41 Air deflector in the cabinet

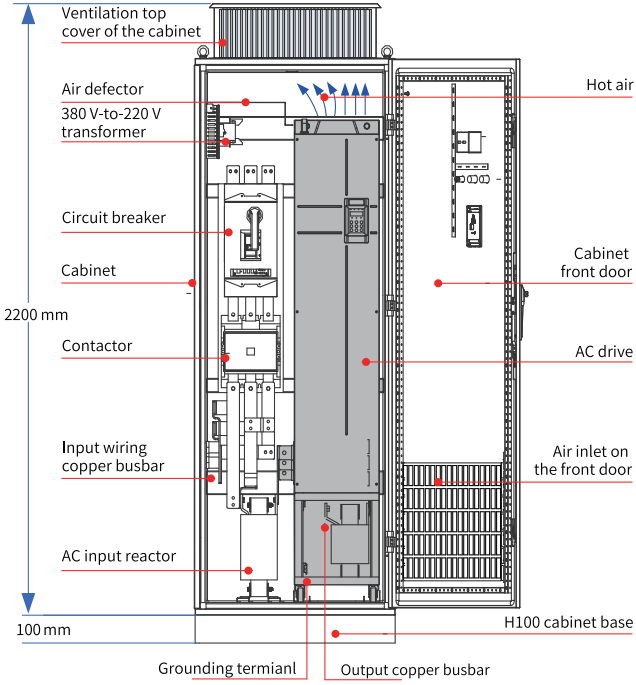


Figure 5-42 Recommended cabinet layout of T12 models

5.4.4 Installation Within the Cabinet

Procedure

1. In the nine-fold profile cabinet (PS cabinet), install the mounting beam for fixing the AC drive and reserve fixed holes.

"Figure 5-43 " on page 130 shows the cross sectional area of the nine-fold profile.

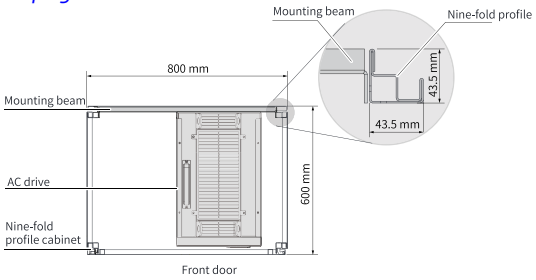


Figure 5-43 Top view of the cabinet for T11 and T12 models

To install T11 to T12 models into the nine-fold profile cabinet with the depth of 600 mm, bend the back mounting board inwards (not required for the cabinet with the depth of 800 mm), as shown in *"Figure 5-44 " on page 130* . However, if the cabinet with the depth of 600 mm has both front and back doors, the AC drive cannot be installed in this kind of cabinet. Instead, install the AC drive into the cabinet with the depth of 800 mm.

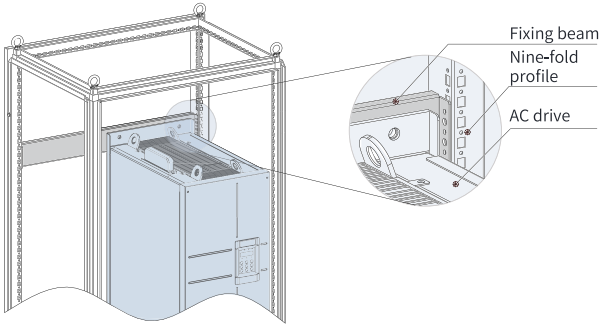


Figure 5-44 3D drawing of the cabinet for T11 and T12 models

2. Fix the bottom mounting bracket in the nine-fold profile cabinet.
   Fix the mounting bracket to the base of the nine-fold profile cabinet by using six M5 self-tapping screws, as shown in *"Figure 5-45 " on page 131* .

Note

Drill holes for the mounting bracket and assemble the bracket on site if the cabinet is not a nine-fold profile one.

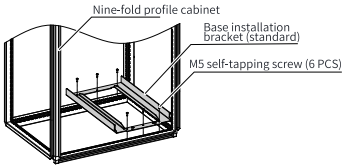


Figure 5-45 Installing the bottom mounting bracket

3. Assemble the guide rails (model: MD500-AZJ-A3T10) and mount the guide rail assembly to the cabinet.
   a. Assemble the guide rail, as shown in *"Figure 5-46 " on page 131* .

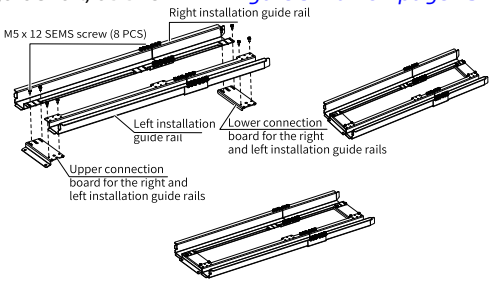


Figure 5-46 Assembling guide rails

   b. Align the two round holes at the front end of the guide rail with the screws of the mounting bracket, and then lock the guide rail to the cabinet with two M6 nuts, as shown in *"Figure 5-47 " on page 131* .

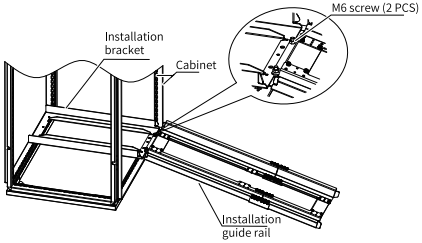


Figure 5-47 Mounting the guide rails into the cabinet

4. Remove the cover from the AC drive.
   For details, see the section of removing the front cover. After the cover is removed, the auxiliary handle will be exposed.
5. Align the casters of the AC drive with the guide rails and gently push the AC drive into the cabinet.
   During the push-in or pull-out process, use the auxiliary strap to prevent the drive from toppling over. It is recommended that two people work together.

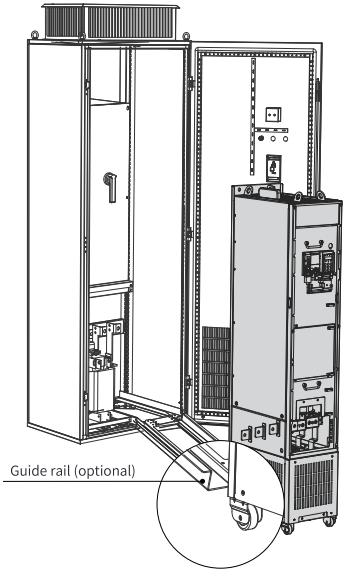


Figure 5-48 Aligning the AC drive caster with the guide rail

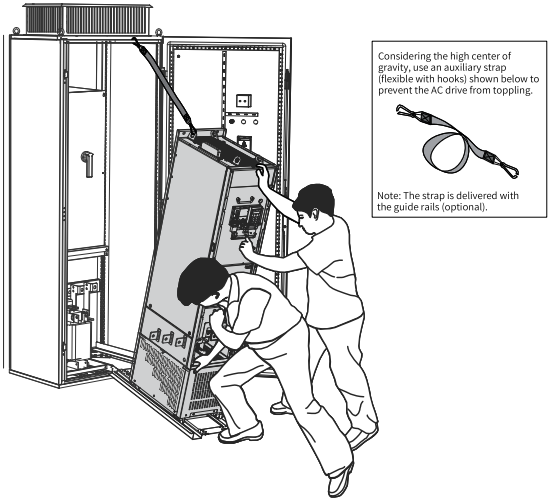


Figure 5-49 Pushing the drive into the cabinet

6. Remove the auxiliary strap, install the four screws on the back of the AC drive to fix it to the beam in the cabinet.

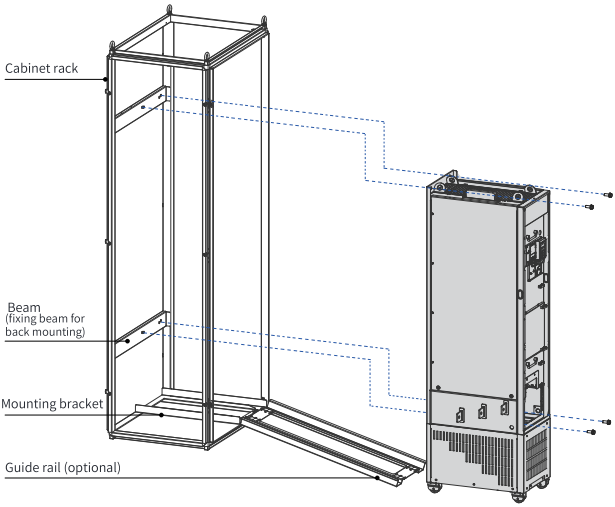


Figure 5-50 Installing the AC drive to the beam

7. After installation is done, remove the guide rail.
8. Remove the air duct damper at the top of the AC drive. The air duct damper is used to prevent foreign objects such as screws from falling into the air filter during installation of the AC drive into the cabinet.

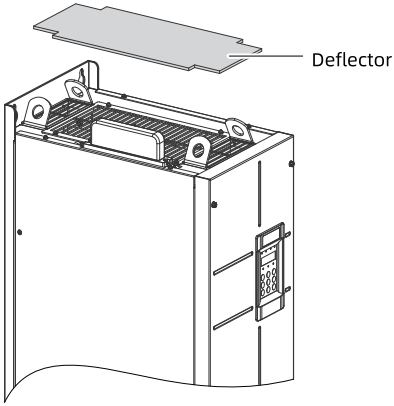


Figure 5-51 Removing the air duct damper

5.4.5 Cover Removal and Installation

5.4.5.1 Removing the Cover

During wiring of the control circuit, if the jumper or function expansion card is involved, remove the cover first. When removing the cover, hold the cover with your

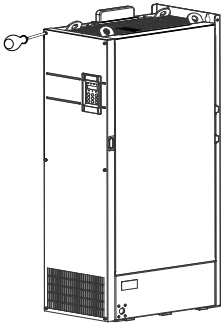
hands and carefully lift the lower part of the cover to prevent it from falling off. Failure to comply can result in equipment damage or personal injury.

Prerequisites

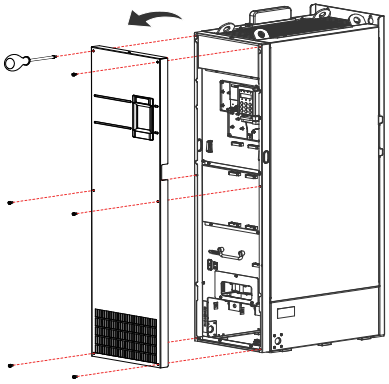
Before removing the cover, ensure that the machine has been powered off for over 10 minutes.

Procedure

1. Use a screwdriver to remove the six fixing screws on the cover.



2. Hold the cover with both hands, and lift it up in the direction indicated by the arrow to remove it.

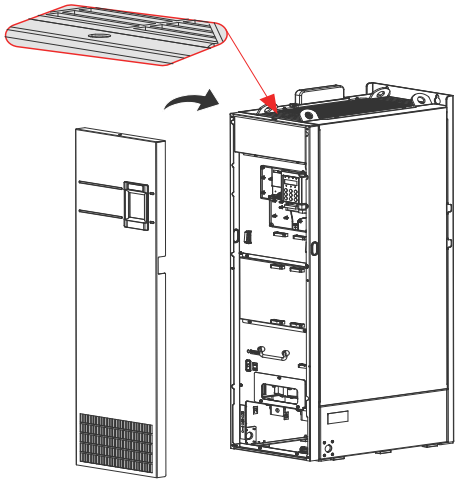


5.4.5.2 Installing the Cover

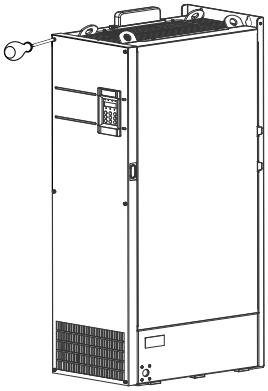
You need to remove the front cover before connecting the main circuit and control circuit cables. After wiring is done, re-install the cover.

Procedure

1. Hold the cover with both hands, align the upper edge of the cover with the upper edge snap-fit joint on the chassis, and snap them together, as shown in the following figure. Then align the six screw mounting holes in the cover with the cover fixing holes in the chassis and press them tightly against each other.



2. Install six fixing screws into the holes with a screwdriver to fasten the cover.



5.5 Mechanical Installation (T13 Models)

5.5.1 Installation Mode

T13 models are cabinet-type AC drives that should be vertically mounted on the floor. Multiple cabinets can be installed in parallel.

5.5.2 Pre-installation Precautions

- Reserve sufficient clearance for heat dissipation, including the heat dissipation of other devices around the AC drive.
- Cover the top of the AC drive with a piece of cloth or paper during installation to prevent unwanted objects such as metal chippings, oil, and water from falling into the drive. Failure to comply may cause malfunction of the AC drive. After installation is done, remove the cloth or paper. Failure to comply may degrade ventilation and result in unexpected heat.
- Tighten all screws with the specified tightening torque. Failure to comply may result in electric shock or fire.
- Keep combustible and explosive materials away from the AC drive.

5.5.3 Requirements on Ground Levelness

1. The installation base must be level and firm enough to bear the weight of the cabinet.
2. Use the door lock in a proper way to open and close the cabinet unit.
3. Ensure there is no gap between the cabinet and the ground when cabinets are connected side by side. For any inevitable gap (shown by ①), use a pad (shown by ②) to level the cabinet, and use proper fillings (for example, fireproof mud) to fill the gap.

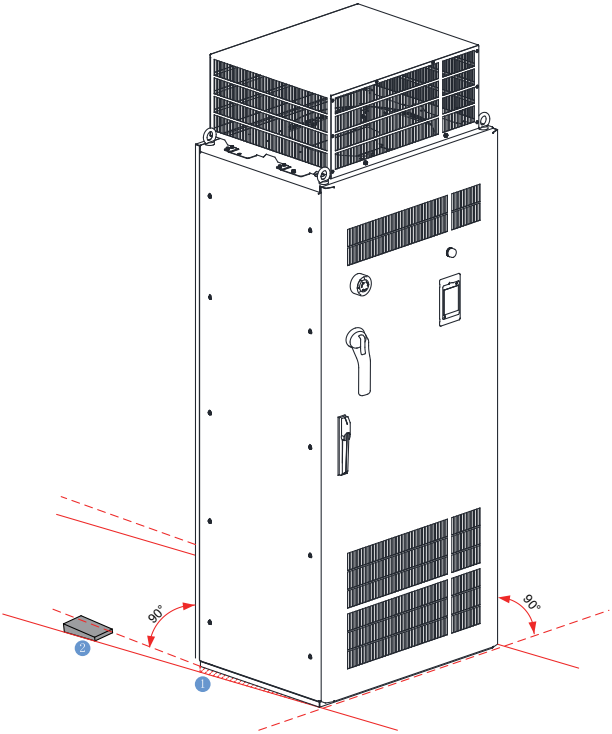


Figure 5-52 Ground requirements

5.5.4 Expansion Screw Installation

To install the cabinet on a cement floor, embed expansion nuts in advance in the floor at positions corresponding to the fixing holes of the cabinet for fixing the cabinet.

The following figure shows the steps of installing expansion screws, where ❶ indicates an expansion screw, ❷ indicates the cabinet, and ❸ indicates an M12 bolt.

1. Drill a hole for the expansion screw. The hole diameter shall be slightly smaller than the maximum outer diameter of the screw, and the hole depth shall be greater than the expansion screw length. The expansion screw must be vertical to the ground, as shown by Step 1 in the following figure.
2. The expansion screw consists of a bolt spring enclosure and a screw part. Use a hammer to knock the expansion screw into the hole and ensure that the screw head is below the ground surface, as shown by Step 2 in the following figure.
3. After placing the cabinet in the required position, fasten it with M12 bolts. The expansion screw stem will be pulled up, making the spring shell deform to fasten the cabinet, as shown in Step 3.

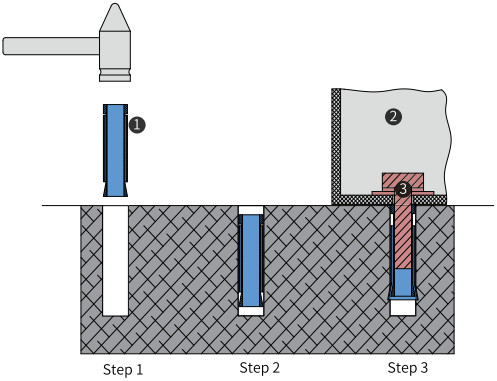


Figure 5-53 Installing an expansion screw

5.5.5 Requirements on foundation

- Separate high-voltage cables from low-voltage cables by using different brackets. If they cannot be separated, lay low-voltage cables in fully-enclosed metal ducts.
- The cable tray must be made of non-flammable materials and must be smooth, damp-proof, dust-proof, and rat-proof.
- During foundation design, take the following factors into consideration: sufficient space in front of the cabinet for inspection, and wiring and cabling of power supply cables, actuating motor cables, and system control cables. The cabinet comes with a cable tray or cable guide. Separate power cables from signal cables. Failure to comply will affect the operation of the AC drive. The following figure shows the routing and related requirements.

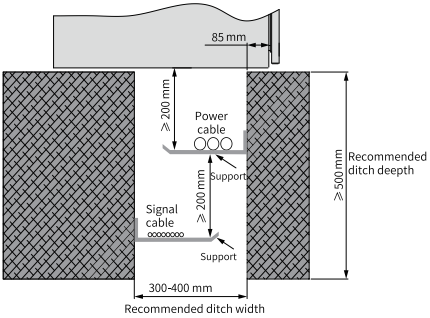
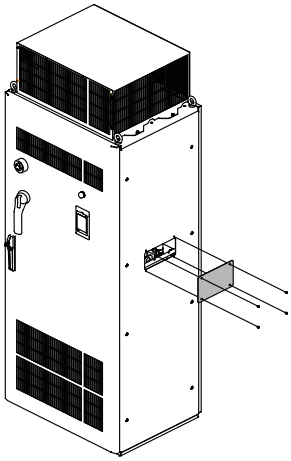


Figure 5-54 Foundation layout

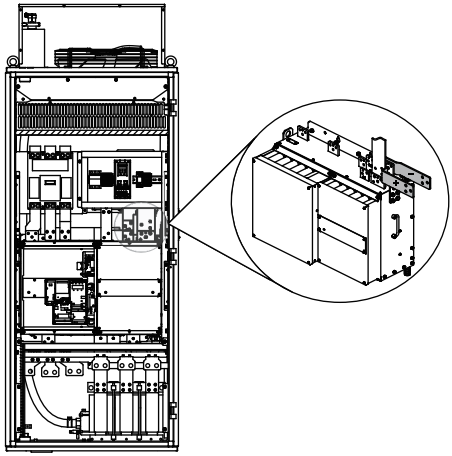
5.5.6 External Braking Unit Installation

Procedure

1. Remove the lateral closure plate of the cabinet.



2. Open the cabinet door and mount the adapter busbar for the external braking unit, as shown in the following figure.



3. Connect the AC drive to the external braking unit.

Note

The number of braking units required is based on actual application needs. Use the parallel connection mode in case multiple units. The following diagram takes one braking unit as an example.

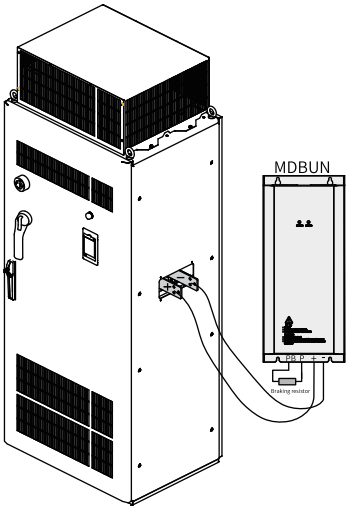


Figure 5-55 Connecting the AC drive to the external braking unit

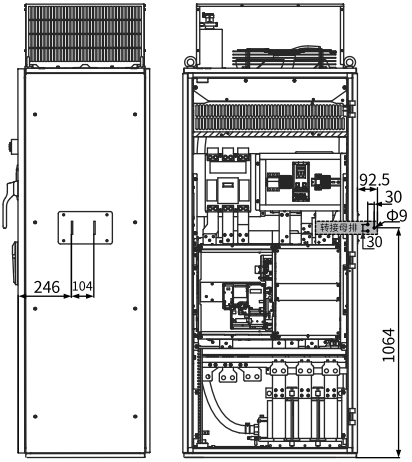


Figure 5-56 Dimensions of the position for installing the adapter busbar (unit: mm)

5.5.7 Checklist for Mechanical Installation

If the option in the following table is included in the delivery, check the box in the right column. After installation, inspect the following items and tick the corresponding check-boxes for confirmation.

Table 5-21 Checklist for mechanical installation

Item	Operation	Compliance	Checked
1	Check the anti-tilt label.	☐	☐
2	Check that the packing box is intact and dry.	☐	☐
3	Check that the load-bearing capacity of the floor and the environment meet the installation requirements. For details, see *"5.5.3 Requirements on Ground Levelness" on page 136* and *"5.1.2.1 Installation Environment" on page 70*.	☐	☐
4	Check that the ceiling height meets the minimum requirements (for smooth ventilation). There is sufficient space for air inlet and outlet without obstruction. Sufficient space is reserved for safe passing when the cabinet door is opened. For details, see *"5.1.2.2 Installation Clearance" on page 71*.	☐	☐
5	The cabinet enclosure is free of deformation, paint peeling, cracks, and other defects. The inside of the cabinet is free of water stains and other defects.	☐	☐
6	Check that the accessories (user guide and options) in the cabinet are complete.	☐	☐
7	The wooden pallet is removed before the cabinet is placed at the final installation site. For details, see *"5.2.4 Unpacking" on page 89*.	☐	☐
8	Install the cabinet to the pre-designed anchor point as required.	☐	☐
9	Install all contact protective devices (protection plates) inside and outside the cabinet before commissioning.	☐	☐

5.6 Electrical Installation

5.6.1 Electrical Connection

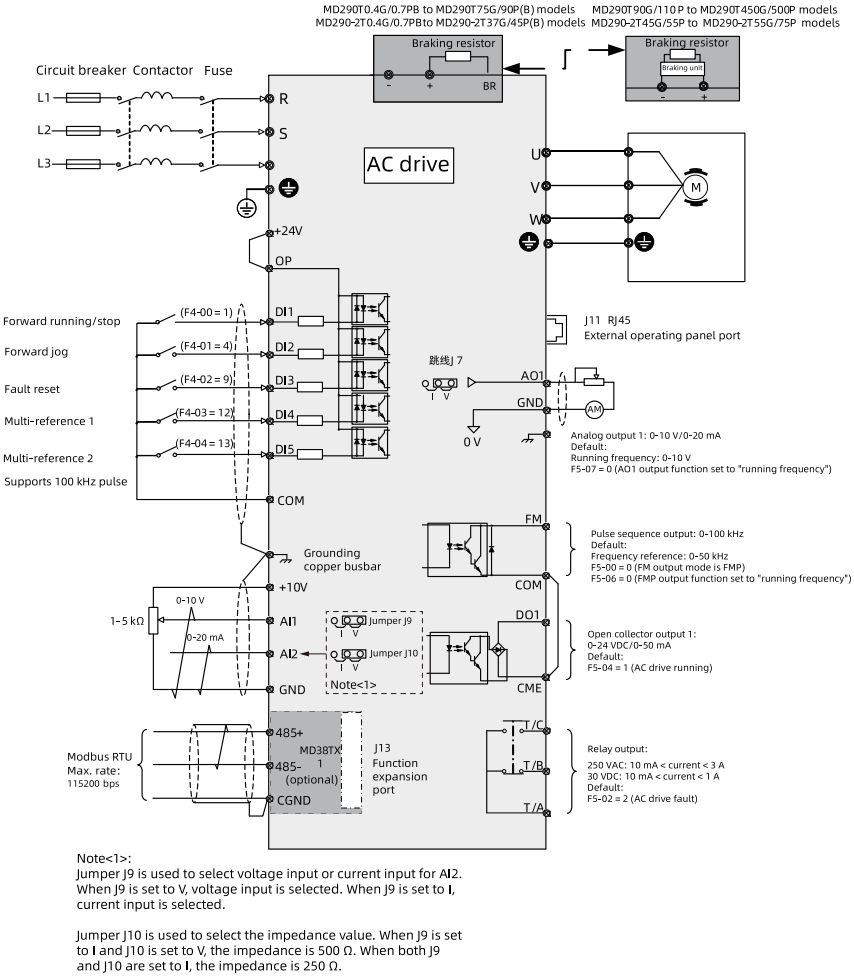
T1 to T12 models

"Figure 5-59 Standard wiring diagram" on page 144 shows a typical wiring method.

Note

The wiring part marked by the double-headed arrow differs among three-phase 380 V to 480 V MD290T0.4G/0.7PB to MD290T75G/90P(B), MD290T90G/110P to MD290T160G/200P, MD290T200G to MD290T450G, and MD290T220P to MD290T500P.

The wiring part marked by the double-headed arrow differs among three-phase 200 V to 240 V MD290- 2T0.4G/0.7PB to MD290-2T37G/45P(B), and MD290-2T45G/55P and above.



Note<1>:
Jumper J9 is used to select voltage input or current input for AI2. When J9 is set to V, voltage input is selected. When J9 is set to **I**, current input is selected.

Jumper J10 is used to select the impedance value. When J9 is set to **I** and J10 is set to V, the impedance is 500 Ω. When both J9 and J10 are set to **I**, the impedance is 250 Ω.

Figure 5-57 Standard wiring (three-phase 380 V to 480 V/200 V to 240 V)

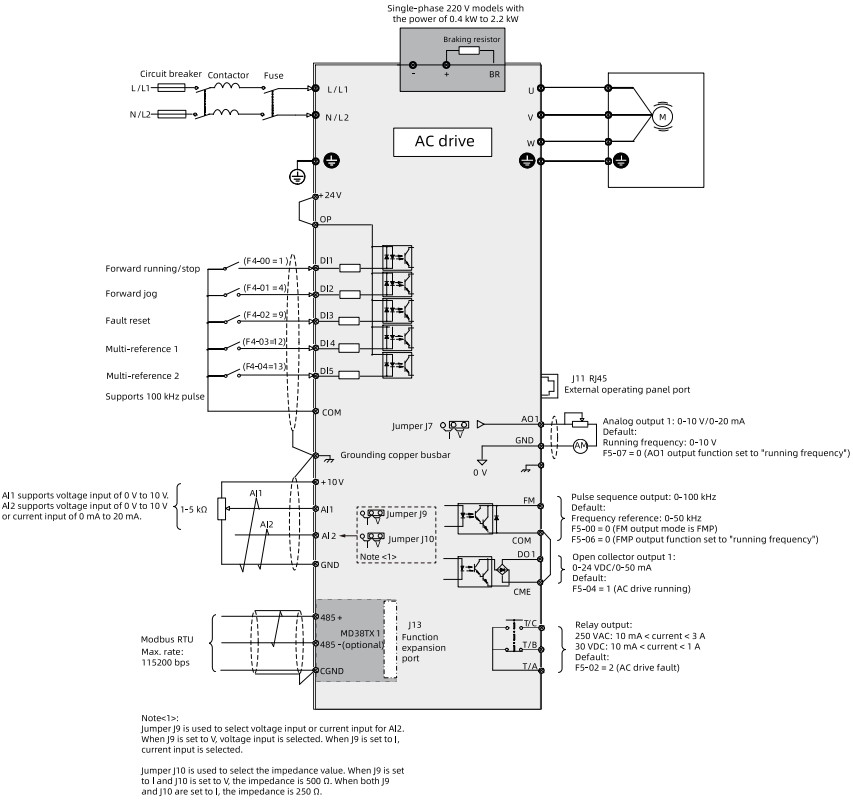
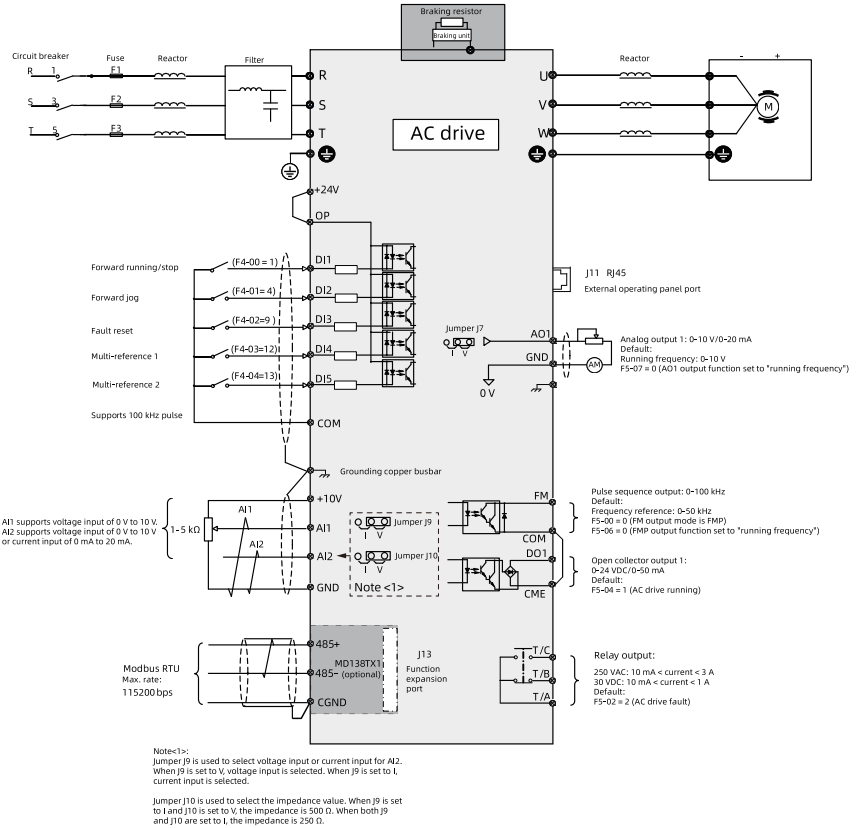


Figure 5-58 Standard wiring (single-phase 200 V to 240 V)

T13 models

"Figure 5-59 Standard wiring diagram" on page 144 shows the standard wiring of the cabinet, and *"Figure 5-60 Electrical connection in the cabinet (T13)" on page 145* shows the electrical connection in the cabinet.



Note<1>:
Jumper J9 is used to select voltage input or current input for AI2. When J9 is set to V, voltage input is selected. When J9 is set to I, current input is selected.

Jumper J10 is used to select the impedance value. When J9 is set to I and J10 is set to V, the impedance is 500 Ω. When both J9 and J10 are set to I, the impedance is 250 Ω.

Figure 5-59 Standard wiring diagram

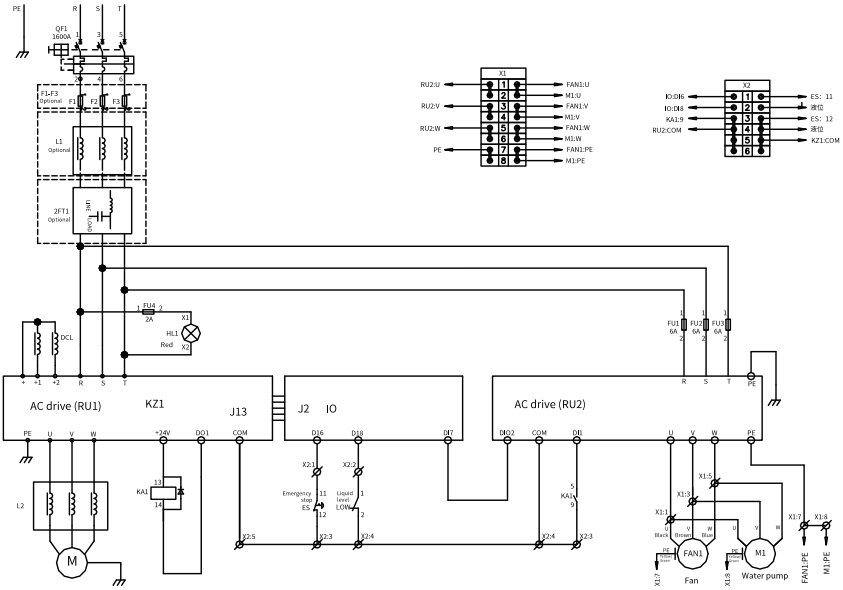


Figure 5-60 Electrical connection in the cabinet (T13)

5.6.2 Inspection Before Wiring

T1 to T12 models

- Never wire the drive with power on, and keep all circuit breakers in the OFF state. Failure to comply will result in an electric shock.
- After disconnecting the input and output power supplies, wait for at least 10 minutes until the bus voltage is lower than 36 V and the power indicator is off before further operation.
- Ensure that the motors, cabinets, and other components are installed and connected in accordance with the recognized technical rules of the country and the region. Special attention must be paid to regulations concerning cable dimensions, fuses, grounding, open circuit, isolation, and overcurrent protection.
- If the fuse in a branch circuit trips, the fault current may have been disconnected. To reduce the risk of fire or electric shock, perform inspection on the conductive parts and other components in the unit and replace damaged parts. After a fuse trips, identify and rectify the cause of the tripping.

T13 models

- The cabinet unit operates under high voltages. All the wiring work can be performed only after the cabinet unit is powered off with voltage fully discharged.
- The cabinet can be operated only by qualified professionals.

- Take caution when operating the equipment that disconnected from the power supply as external supply voltage may still be present. The main circuit and control circuit terminals may be live even when the motor is in the stop state.
- After disconnecting the input and output power supplies, wait for at least 15 minutes until the bus voltage is lower than 36 V and the power indicator is off before further operation.
- Ensure that the motors, cabinets, and other components are installed and connected in accordance with the recognized technical rules of the country and the region. Special attention must be paid to regulations concerning cable dimensions, fuses, grounding, open circuit, isolation, and overcurrent protection.
- If the fuse in a branch circuit trips, the fault current may have been disconnected. To reduce the risk of fire and electric shocks, check the conductive parts and other components of the cabinet and replace the damaged ones. After a fuse trips, identify and rectify the cause of the tripping.

5.6.3 Main Circuit Wiring

5.6.3.1 Descriptions of Main Circuit Terminals

T1 to T9 models

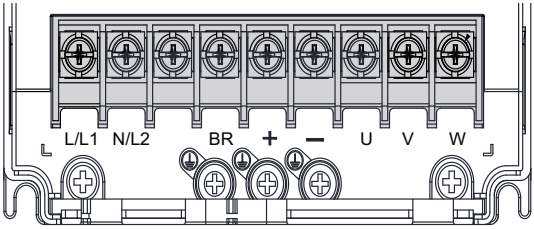


Figure 5-61 Layout of main circuit terminals for T2 models (single-phase 200 V to 240 V)

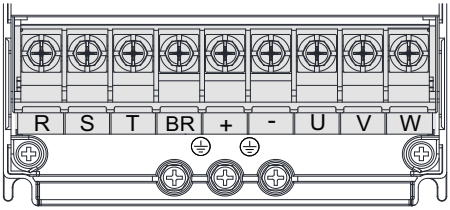


Figure 5-62 Layout of main circuit terminals for T1 and T4 models (three-phase 380 V to 480 V/200 V to 240 V)

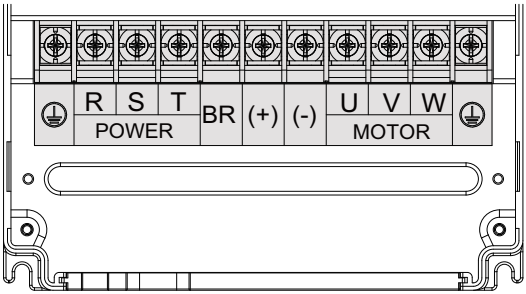


Figure 5-63 Layout of main circuit terminals for T5 and T8 models (three-phase 380 V to 480 V/200 V to 240 V)

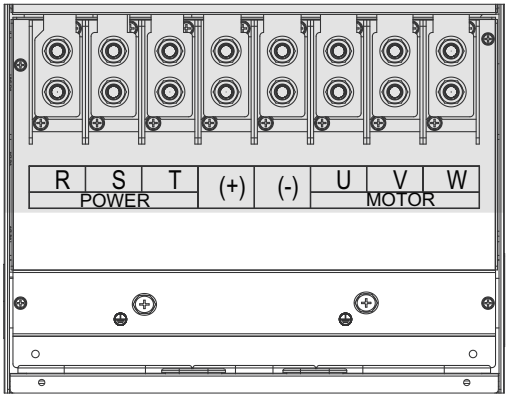


Figure 5-64 Layout of main circuit terminals for T9 models (three-phase 380 V to 480 V)

Table 5–22 Descriptions of main circuit terminals

Mark	Name	Function
R, S, T	Input terminals of three-phase power supply	Connected to the three-phase AC input power supply.
(+), (-)	Positive and negative terminals of the DC bus	Common DC busbar input; connected to the external braking unit of T9 models and above.
(+), BR	Braking resistor connection terminals	Connected to the braking resistor of T8 models and below.
U, V, W	Output terminals	Connected the three-phase motor.
⏚	Grounding terminal (PE)	Used for protective grounding.

T10 to T12 models

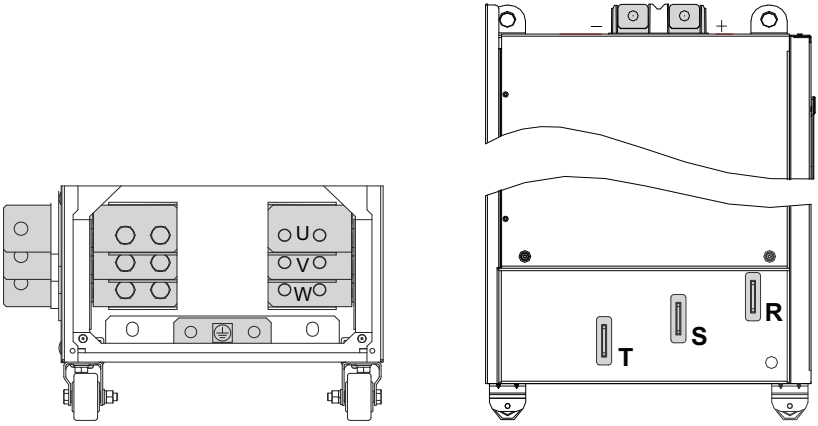


Figure 5-65 Layout of main circuit terminals for T10 to T12 models (three-phase 380 V to 480 V)

Table 5–23 Descriptions of main circuit terminals

Mark	Name	Function
R, S, T	Input terminals of three-phase power supply	Connected to the three-phase AC input power supply.
+ and -	Positive and negative terminals of the DC bus	Common DC busbar input; connected to an external braking unit.
U, V, W	AC drive output terminals	Connected the three-phase motor.
⏚	Grounding terminal (PE)	Used for protective grounding.

T13 models

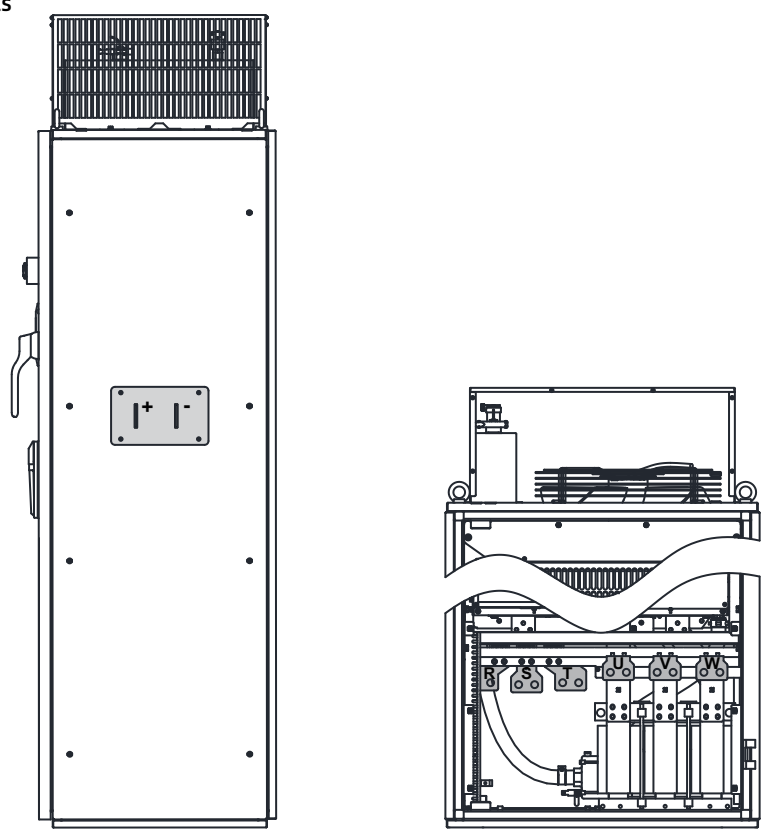


Figure 5-66 Layout of main circuit terminals for T13 models (three-phase 380 V to 480 V)

Table 5–24 Descriptions of main circuit terminals

Mark	Name	Function
R, S, T	Input terminals of three-phase power supply	Connected to the three-phase AC input power supply.
+ and -	Positive and negative terminals of the DC bus	Common DC busbar input; connected to an external braking unit.
U, V, W	AC drive output terminals	Connected the three-phase motor.
⏚	Grounding terminal (PE)	Used for protective grounding.

5.6.3.2 Dimensions and Cable Selection for Main Circuit Terminals

Main circuit terminal dimensions (mm)

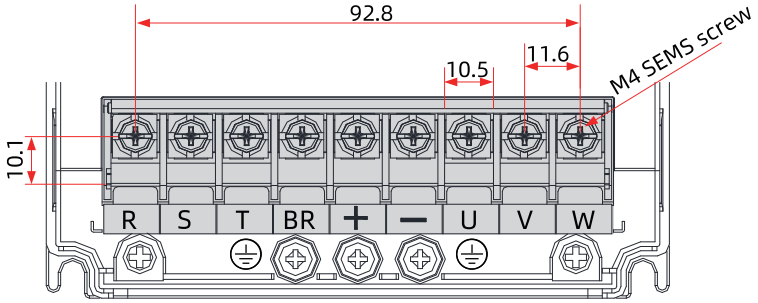


Figure 5-67 Dimensions of main circuit terminals for T1 and T2 models (three-phase 380 V to 480 V/200 V to 240 V)

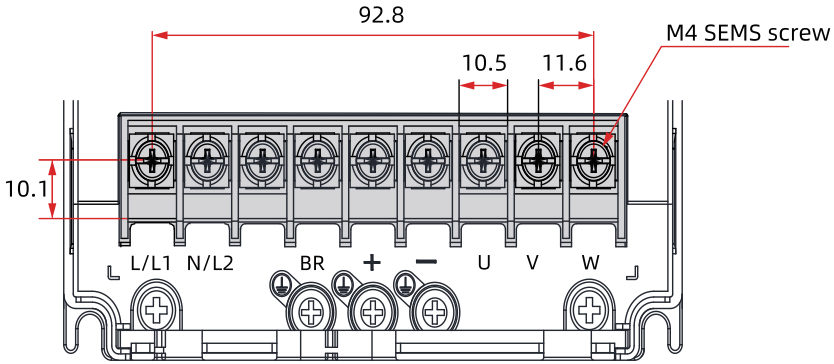


Figure 5-68 Dimensions of main circuit terminals for T2 models (single-phase 200 V to 240 V)

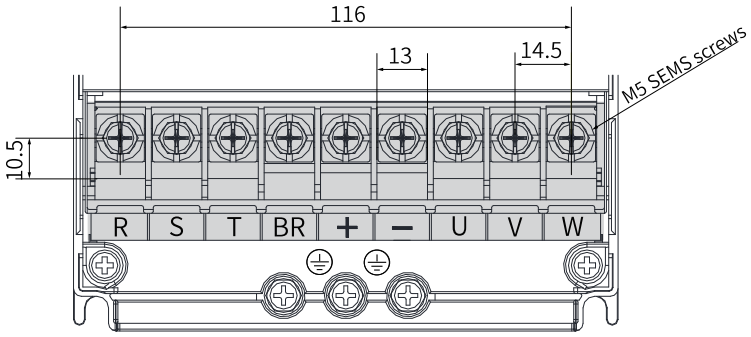


Figure 5-69 Dimensions of main circuit terminals for T3 models (three-phase 380 V to 480 V/ 200 V to 240 V)

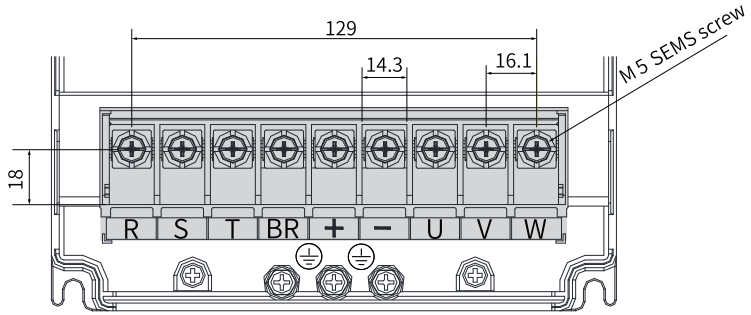


Figure 5-70 Dimensions of main circuit terminals for T4 models (three-phase 380 V to 480 V/ 200 V to 240 V)

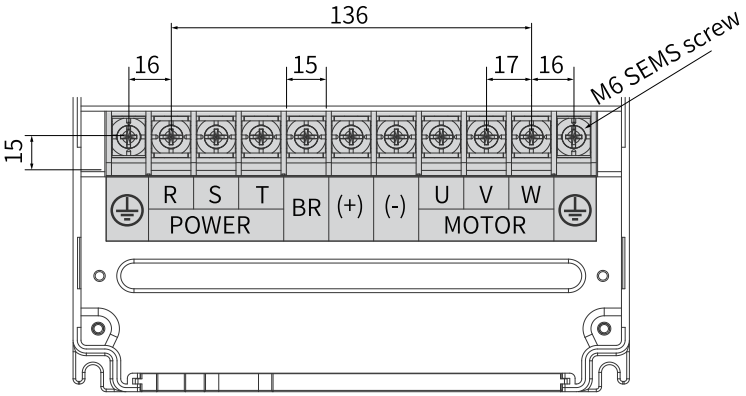


Figure 5-71 Dimensions of main circuit terminals for T5 models (three-phase 380 V to 480 V/ 200 V to 240 V)

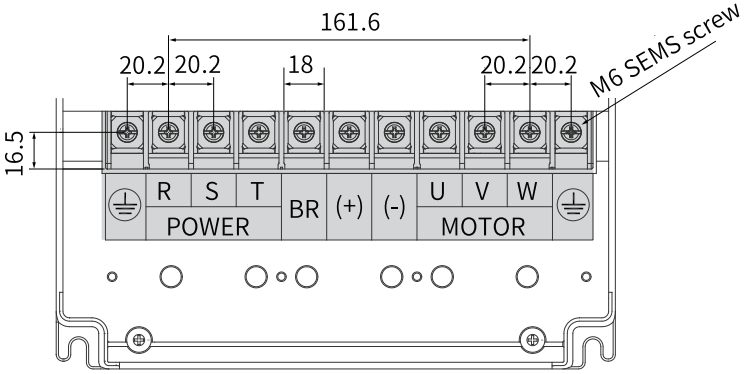


Figure 5-72 Dimensions of main circuit terminals for T6 models (three-phase 380 V to 480 V/ 200 V to 240 V)

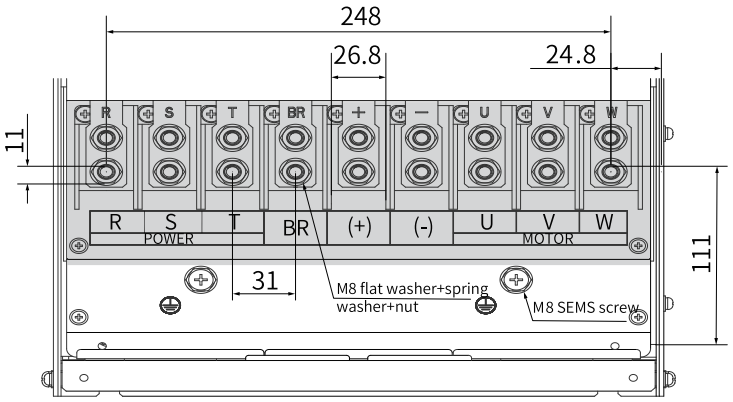


Figure 5-73 Dimensions of main circuit terminals for T7 models (three-phase 380 V to 480 V/ 200 V to 240 V)

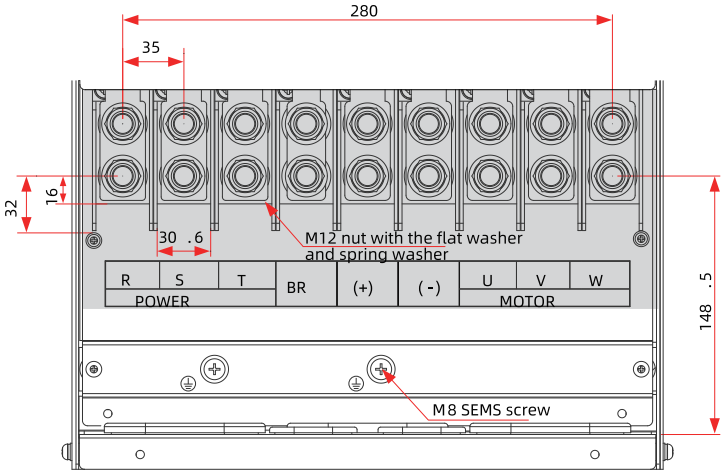


Figure 5-74 Dimensions of main circuit terminals for T8 models (three-phase 380 V to 480 V/ 200 V to 240 V)

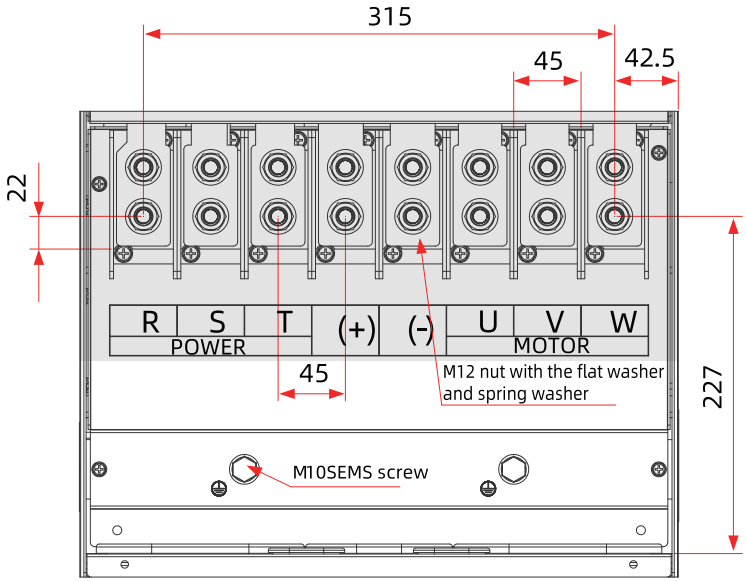


Figure 5-75 Dimensions of main circuit terminals for T9 models (three-phase 380 V to 480 V)

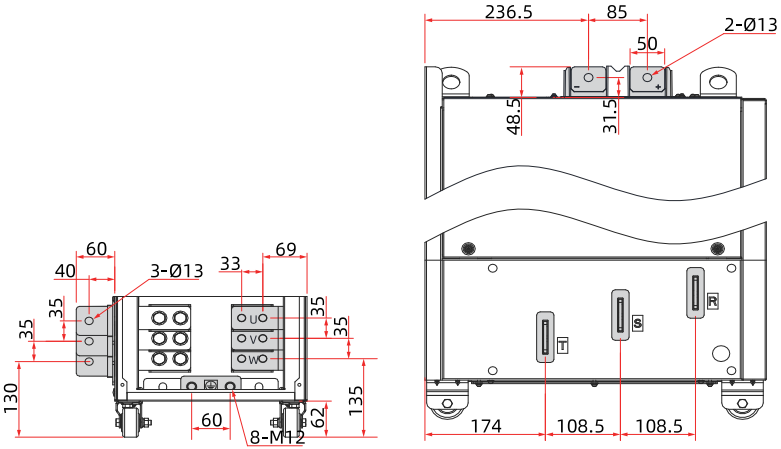


Figure 5-76 Dimensions of main circuit terminal for T10 models (without output reactors, three-phase 380 V to 480 V)

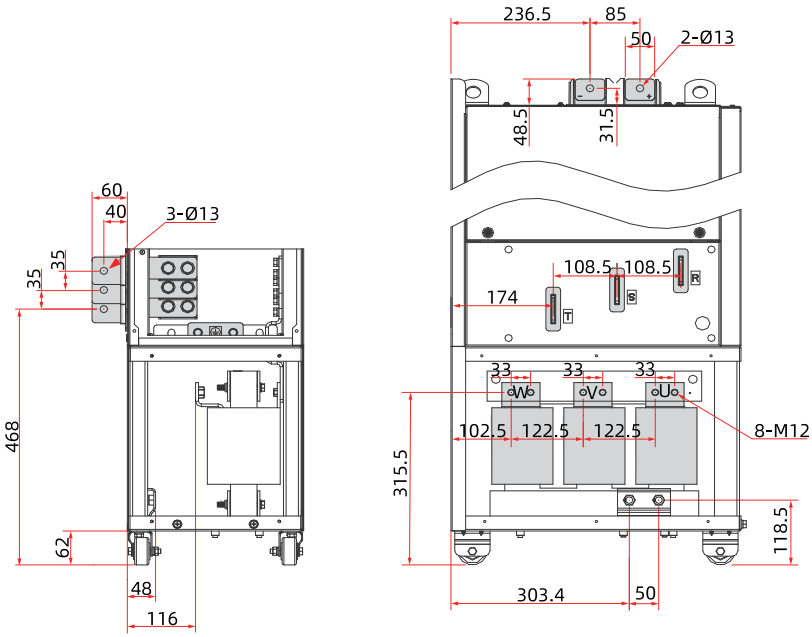


Figure 5-77 Dimensions of main circuit terminals for T10 models (with output reactors, three-phase 380 V to 480 V)

The side copper busbars in the preceding figures can be removed if necessary. The following figure shows the dimensions of the main circuit terminals without the side copper busbars.

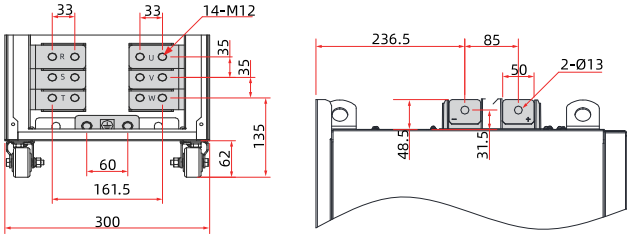


Figure 5-78 Dimensions of main circuit terminals for T10 models (without copper busbars or output reactors, three-phase 380 V to 480 V)

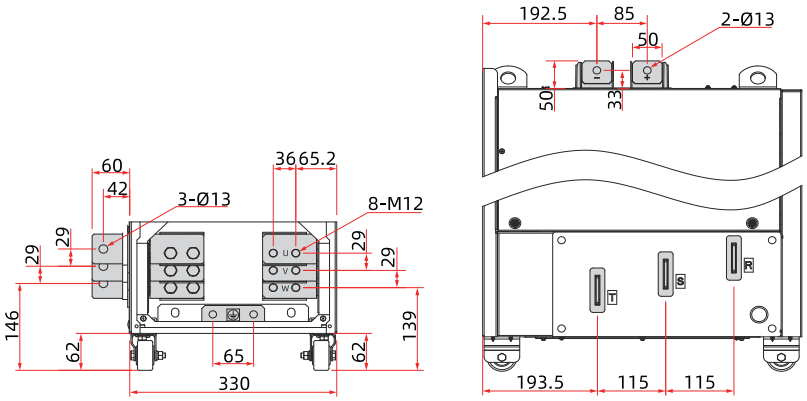


Figure 5-79 Dimensions of main circuit terminal for T11 models (without output reactors, three-phase 380 V to 480 V)

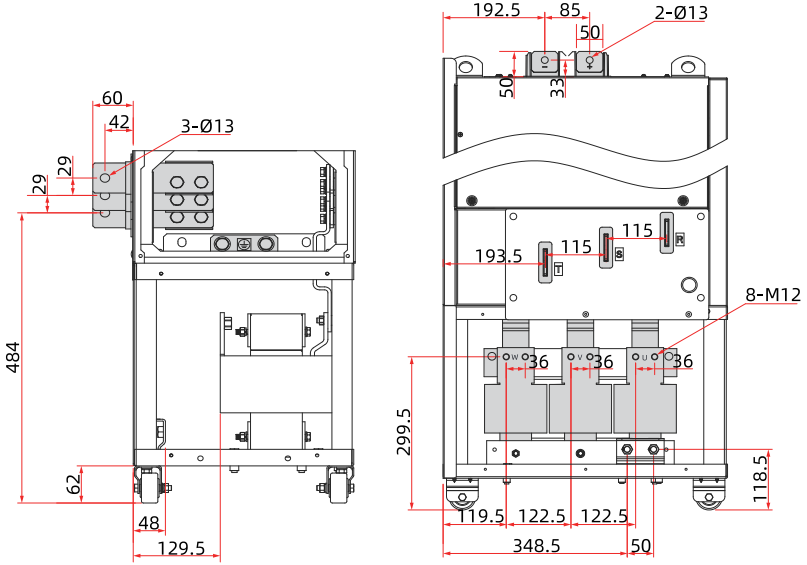


Figure 5-80 Dimensions of main circuit terminals for T11 models (with output reactors, three-phase 380 V to 480 V)

The side copper busbars in the preceding figures can be removed if necessary. The following figure shows the dimensions of the main circuit terminals without the side copper busbars.

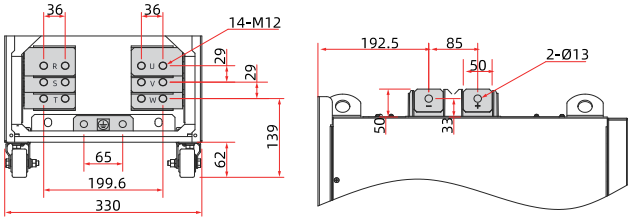


Figure 5-81 Dimensions of main circuit terminals for T11 models (without copper busbars or output reactors, three-phase 380 V to 480 V)

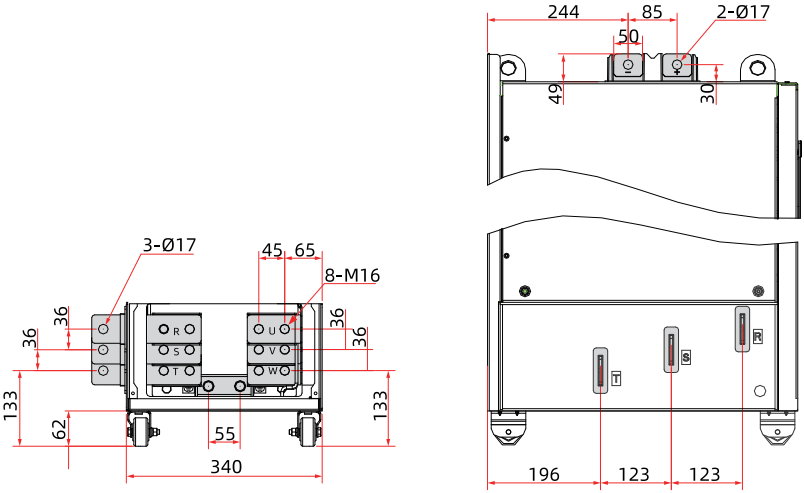


Figure 5-82 Dimensions of main circuit terminal for T12 models (without output reactors, three-phase 380 V to 480 V)

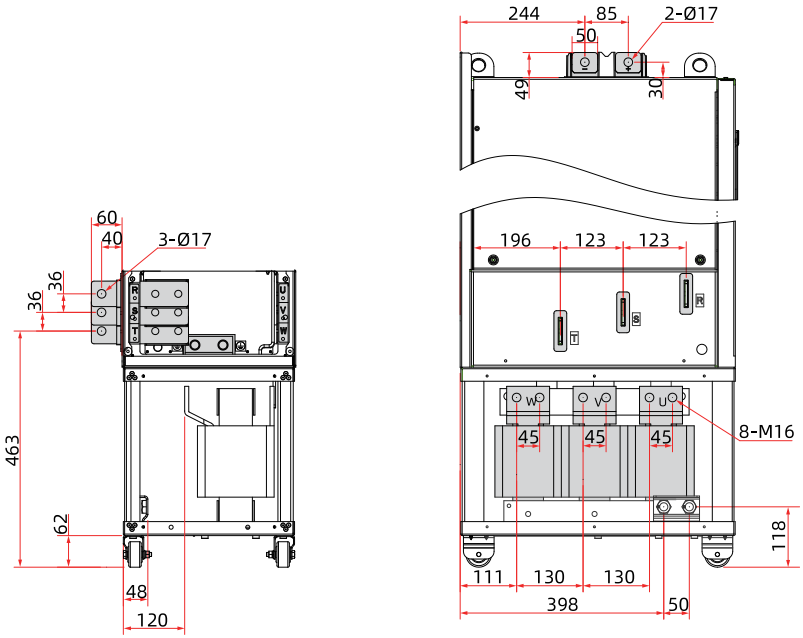


Figure 5-83 Dimensions of main circuit terminals for T12 models (with output reactors, three-phase 380 V to 480 V)

The side copper busbars in the preceding figures can be removed if necessary. The following figure shows the dimensions of the main circuit terminals without the side copper busbars.

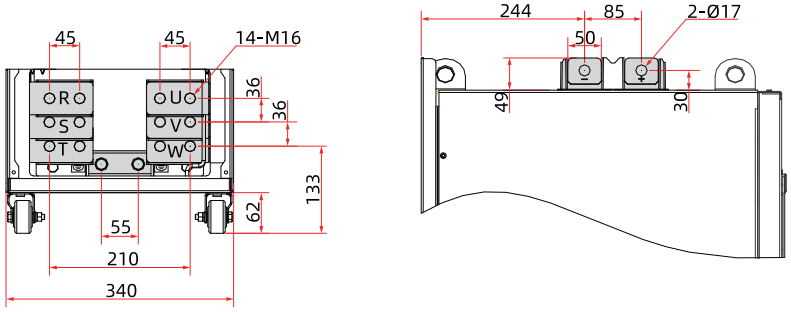


Figure 5-84 Dimensions of main circuit terminals for T12 models (without copper busbars or output reactors, three-phase 380 V to 480 V)

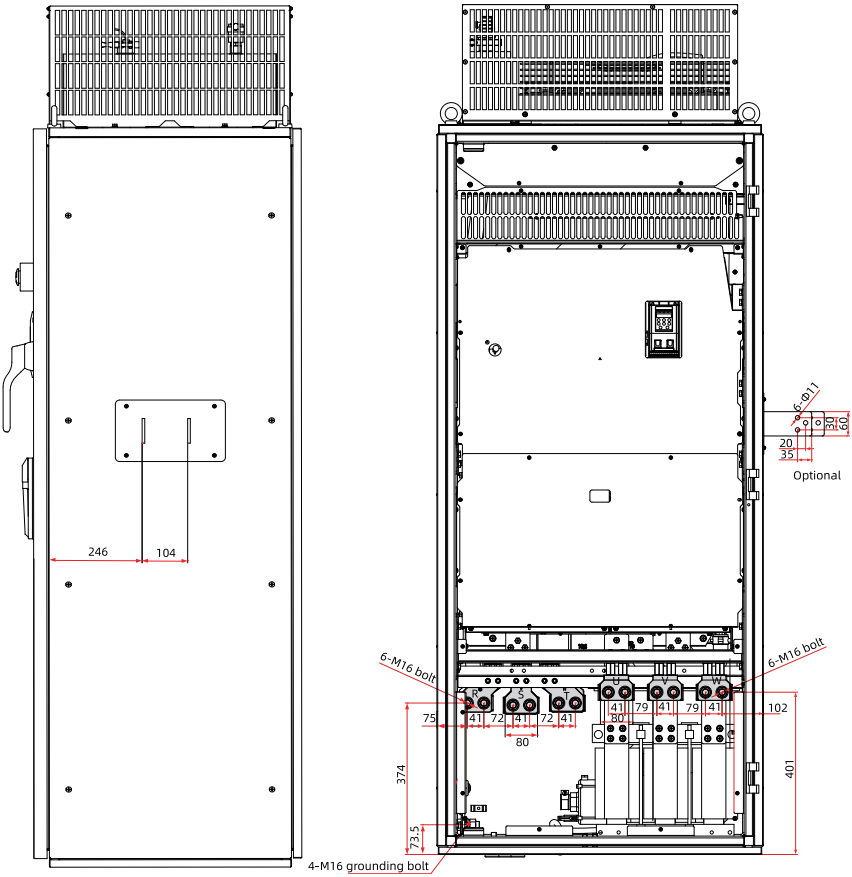


Figure 5-85 Dimensions of main circuit terminals for T13 models (without auxiliary power distribution cabinets, three-phase 380 V to 480 V)

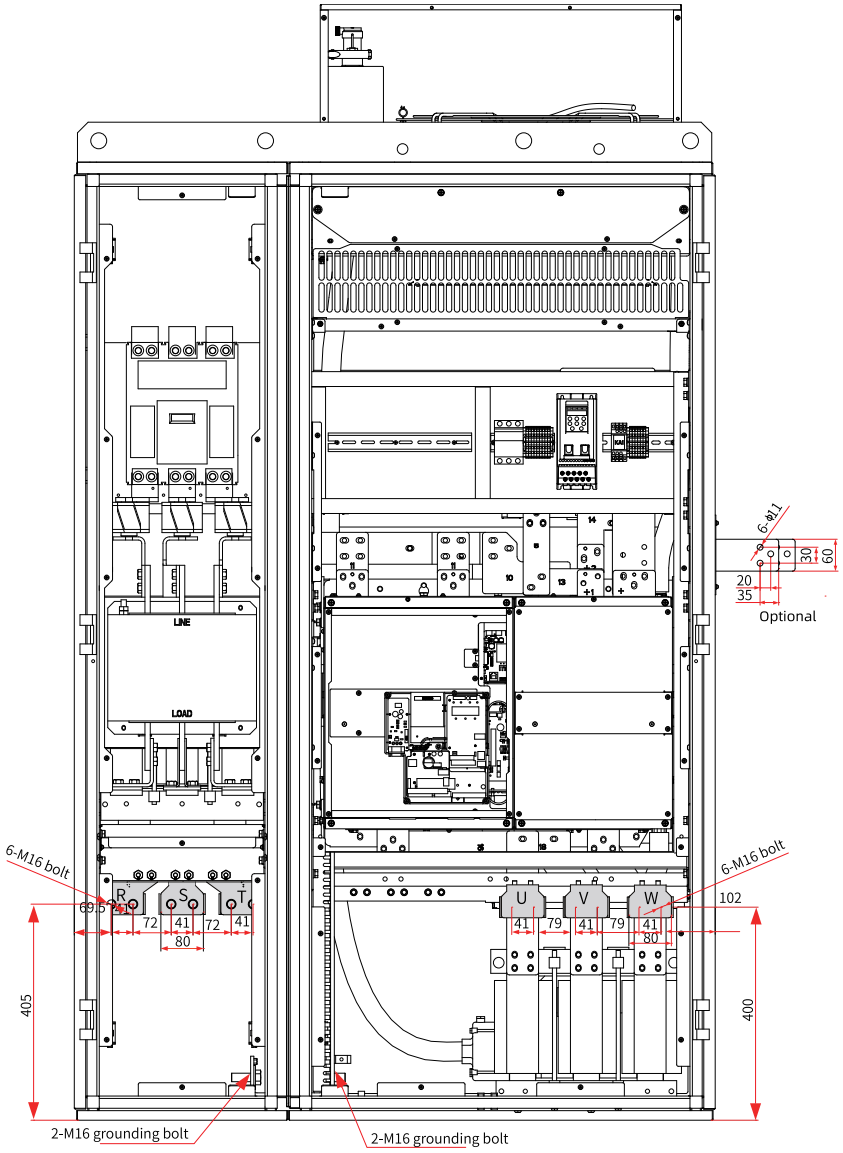


Figure 5-86 Dimensions of main circuit terminals for T13 models (with auxiliary power distribution cabinets, three-phase 380 V to 480 V)

Recommended cable

Table 5–25 Cable selection (single-phase 200 V to 240 V)

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (mm^2)<1>	Recommended terminal model	Recommended cable (mm^2)<1>	Recommended terminal model				
T2	MD290-2S0.4GB	5.4	2.3	3 x 0.75	TNR1.25-4	0.75	TNR1.25-4	8	10.5	M4	1.2 (10.6)
	MD290-2S0.75GB	8.2	4	3 x 1.5	TNR1.25-4	1.5	TNR1.25-4	8	10.5		
	MD290-2S1.5GB	14	7	3 x 2.5	TNR2-4	2.5	TNR2-4	8.5	10.5		
	MD290-2S2.2GB	23	9.6	3 x 4.0	TNR3.5-4	4.0	TNR3.5-4	9.5	10.5		
	MD290-2S3.0GB	27	12	3 x 6.0	TNR5.5-4	6.0	TNR5.5-4	9.5	10.5		

Note

[1]: Applicable to the standards in China. 3 x 10 indicates one three-conductor cable with a cross sectional area of 10 mm^2; 3x150 indicates one three-conductor cables with a cross sectional area of 150 mm^2. The preceding recommended terminals are TNR series from Suzhou Yuanli.

Note:

1. Observe national or regional regulations during selection. The recommended values in the preceding table are based on the following conditions:

- Cables with PVC insulation and copper conductor
- Cables with maximum surface temperature not exceeding 70°C at an ambient temperature of 40°C (Note: When the ambient temperature exceeds 40°C, contact Inovance.)
- Cable installation type E applied (See IEC60204-1.)

2. If conditions vary, select the cable model according to actual conditions.

Table 5–26 Cable selection (single-phase 200 V to 240 V) (with UL certification)

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (AWG)[2]	Recommended terminal model	Recommended cable (AWG)[2]	Recommended terminal model				
T2	MD290-2S0.4GB	5.4	2.3	14	TLK2.5-4	14	TLK2.5-4	7.5	10.2	M4	1.2 (10.6)
	MD290-2S0.75GB	8.2	4	14	TLK2.5-4	14	TLK2.5-4	7.5	10.2		
	MD290-2S1.5GB	14	7	12	TLK4-4	12	TLK4-4	8.5	10.2		
	MD290-2S2.2GB	23	9.6	10	RNBL5-4	10	RNBL5-4	9.5	10.2		
	MD290-2S3.0GB	27	12	8	RNBS8-4	8	RNBS8-4	8	10.2		

Note

[2]: Applicable to AWG standards; 14 represents 14AWG and 12 represents 12AWG. The preceding recommended terminals are TLK and RNB series terminals from KST.

Note:

1. Observe national or regional regulations during selection. The recommended values in the preceding table are based on the following conditions:

- Cables with PVC insulation and copper conductor
- Cables with maximum surface temperature not exceeding 75°C at an ambient temperature of 40°C (Note: When the ambient temperature exceeds 40°C, contact Inovance.)
- Cable installation type E applied (See IEC60204-1.)

2. The recommended cables must meet requirements for 125% overload.

3. If conditions vary, select the cable model according to actual conditions.

Table 5-27 Cable selection (three-phase 380 V to 480 V)

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (mm^2)<1>	Recommended terminal model	Recommended cable (mm^2)<1>	Recommended terminal model				
T1	MD290T0.4G/0.7PB	1.8 2.5	1.5 2.1	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	8	10.5	M4	1.2 (10.6)
	MD290T0.7G/1.1PB	2.4 3.7	2.1 3.1	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4				
	MD290T1.1G/1.5PB	3.7 4.6	3.1 3.8	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4				
	MD290T1.5G/2.2PB	4.6 6.4	3.8 5.1	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4				
	MD290T2.2G/3.0PB	6.3 9.1	5.1 7.2	3 x1	TNR1.25-4	1	TNR1.25-4				
	MD290T3.0G/3.7PB	9.0 11.3	7.2 9.0	3 x 1.5	TNR1.25-4	1.5	TNR1.25-4				
T2	MD290T3.7G/5.5PB	11.4 15.9	9.0 13.0	3 x 2.5	TNR2-4	2.5	TNR2-4	8.5			
	MD290T5.5G/7.5PB	16.7 22.4	13.0 17.0	3 x 4	TNR3.5-5	4	TNR3.5-4	9.5			
T3	MD290T7.5G/11PB	21.9 32.9	17.0 25.0	3 x 6	TNR5.5-5	6	TNR5.5-5	9.5	13	M5	2.8 (24.8)
	MD290T11G/15PB	32.2 39.7	25.0 32.0	3 x 10	TNR8-5	10	TNR8-5	12			
T4	MD290T15G/18.5PB	41.3 44.0	32.0 37.0	3 x 10	TNR8-5	10	TNR8-5	12	14.3		
T5	MD290T18.5G/22P(B)	49.5 59.0	37.0 45.0	3 x 16	GTNR16-6	16	GTNR16-6	12.4	15	M6	4.8 (42.5)
	MD290T18.5G/22P(B)-T	43.4 51.3	37.0 45.0	3 x 16	GTNR16-6	16	GTNR16-6				
	MD290T22G/30P(B)	59.0 65.8	45.0 60.0	3 x 25	GTNR25-6	16	GTNR16-6	14			
	MD290T22G/30P(B)-T	51.3 65.8	45.0 60.0	3 x 25	GTNR25-6	16	GTNR16-6				
T6	MD290T30G/37P(B)	57.0 71.0	60.0 75.0	3 x 25	GTNR25-6	16	GTNR16-6	14	18		
	MD290T37G/45P(B)	69.0 86.0	75.0 91.0	3 x 35	GTNR35-6	16	GTNR16-6	16.5			
T7	MD290T45G/55P(B)	89.0 111.0	91.0 112.0	3 x 50	GTNR50-8	25	GTNR25-8	18	26.8	M8	13.0 (115.2)
	MD290T55G/75P(B)	106.0 143.0	112.0 150.0	3 x 70	GTNR70-8	35	GTNR35-8	21.8		M8	

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (mm^2)<1>	Recommended terminal model	Recommended cable (mm^2)<1>	Recommended terminal model				
T8	MD290T75G/90P(B)	139.0 167.0	150.0 176.0	3 x 95	GTNR95-12	50	GTNR50-8	25	30.6	M12 (main power) M8 (grounding)	35.0 (310.1) 13.0 (115.2)
	MD290T90G/110P	164.0 198.0	176.0 210.0	3 x 120	GTNR120-12	70	GTNR70-8	28.4			
	MD290T110G/132P	196.0 239.0	210.0 253.0	3 x 150	GTNR150-12	95	GTNR95-8	30			
T9	MD290T132G/160P	240.0 295.0	253.0 304.0	3 x 185	BC185-12	95	BC95-10	33.5	40	M12 (main power) M10 (grounding)	35.0 (310.1) 20 (117)
	MD290T160G/200P	287.0 359.0	304.0 377.0	2 x (3 x 120)	BC120-12	120	BC120-10	27.2			
T10	MD290T200G(-L)	365.0	377.0	2 x (3 x 150)	BC150-12	150	BC150-12	30	33	M12	35.0 (310.1)
	MD290T220P(-L)	410.0	426.0							M12	
	MD290T220G(-L)	410.0	426.0	2 x (3 x 150)	BC150-12	150		30		M12	
	MD290T250P(-L)	456.0	465.0							M12	
	MD290T280P(-L)*	507.0	520.0	3 x (3 x 120)	BC120-12	185		27.2		M12	
T11	MD290T250G(-L)*	441.0	465.0	4 x (3 x 120)	BC120-12	185	BC185-12	27.2	36	M12	
	MD290T280G(-L)*	495.0	520.0	3 x (3 x 150)	BC150-12	2 x 120	BC120-12	27.2		M12	
	MD290T315P(-L)*	559.0	585.0							M12	
	MD290T355P(-L)*	624.0	650.0	3 x (3 x 185)	BC185-12	2x150	BC150-12	30		M12	
T12	MD290T315G(-L)*	565.0	585.0	3 x (3 x 185)	BC185-16	2x150	BC150-16	30	45	M16	85.0 (753.1)
	MD290T355G(-L)*	617.0	650.0	3 x (3 x 240)	BC240-16	2x185	BC185-16	37.7		M16	
	MD290T400P(-L)*	708.0	725.0							M16	
	MD290T400G(-L)*	687.0	725.0	3 x (3 x 240)	BC240-16	2x185	BC185-16			M16	
	MD290T450P(-L)*	782.0	820.0							M16	
	MD290T450G(-L)*	782.0	820.0	3 x (3 x 300)	BC300-16	2x240	BC240-16	41		M16	
	MD290T500P(-L)*	840.0	880.0							M16	

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (mm^2)<1>	Recommended terminal model	Recommended cable (mm^2)<1>	Recommended terminal model				
T13	MD290T500G(-A)*	838.1	900.0	4 x (3 x 240)	BC240-16	2 x 240	BC240-16	37.7	41	M16	85.0 (753.1)
	MD290T560P(-A)*	946.3	1020.0							M16	
	MD290T560G(-A)*	949.6	1020.0	4 x (3 x 240)	BC240-16	2x240	BC240-16	37.7		M16	
	MD290T630P(-A)*	1041.0	1120.0							M16	
	MD290T630G(-A)*	1043.5	1120.0	4 x (3 x 300)	BC300-16	2 x 300	BC300-16	41		M16	
	MD290T710P(-A)*	1170.9	1260.0							M16	
	MD290T800P(-A)*	1301.5	1460.0	6x (3x 240)	BC240-16	3 x 240	BC240-16	37.7		M16	

Note

[1]: Applicable to the standards in China. 3 x 10 indicates one three-conductor cable with a cross sectional area of 10 mm^2; 2x (3x120) indicates two three-conductor cables with a cross sectional area of 120 mm^2. The preceding recommended terminals are TNR series, GTNR series, and BC series from Suzhou Yuanli.

Note:

1. Observe national or regional regulations during selection. The recommended values in the preceding table are based on the following conditions:

- Cables with PVC insulation and copper conductor
- Cables with maximum surface temperature not exceeding 70℃ at an ambient temperature of 40℃ (Note: When the ambient temperature exceeds 40℃, contact Inovance.)
- Cable installation type E applied (See IEC60204-1.)

2. The cables with the asterisk mark (*) must be connected through the copper busbar.

3. If conditions vary, select the cable model according to actual conditions.

Table 5–28 Cable selection (three-phase 380 V to 480 V) (with UL certification)

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (AWG/kcmil)[2]	Recommended terminal model	Recommended cable (AWG/kcmil)[2]	Recommended terminal model				
T1	MD290T0.4G/0.7PB	1.8 2.5	1.5 2.1	14	TLK2.5-4	14	TLK2.5-4	7.5	10.5	M4	1.2 (10.6)
	MD290T0.7G/1.1PB	2.4 3.7	2.1 3.1	14	TLK2.5-4	14	TLK2.5-4	7.5			
	MD290T1.1G/1.5PB	3.7 4.6	3.1 3.8	14	TLK2.5-4	14	TLK2.5-4	7.5			
	MD290T1.5G/2.2PB	4.6 6.4	3.8 5.1	14	TLK2.5-4	14	TLK2.5-4	7.5			
	MD290T2.2G/3.0PB	6.3 9.1	5.1 7.2	14	TLK2.5-4	14	TLK2.5-4	7.5			
	MD290T3.0G/3.7PB	9.0 11.3	7.2 9.0	14	TLK2.5-4	14	TLK2.5-4	7.5			
T2	MD290T3.7G/5.5PB	11.4 15.9	9.0 13.0	12	TLK4-4	12	TLK6-4	9			
	MD290T5.5G/7.5PB	16.7 22.4	13.0 17.0	10	TLK6-4	10	TLK6-4	10			
T3	MD290T7.5G/11PB	21.9 32.9	17.0 25.0	8	TLK10-5	8	TLK10-5	12	13	M5	2.8 (24.8)
	MD290T11G/15PB	32.2 39.7	25.0 32.0	8	TLK10-5	8	TLK10-5	12			
T4	MD290T15G/18.5PB	41.3 44.0	32.0 37.0	6	TLK16-5	6	TLK16-5	12	14.3		
T5	MD290T18.5G/22P(B)	49.5 59.0	37.0 45.0	4	TLK25-6	6	TLK16-6	14	15	M6	4.8 (42.5)
	MD290T18.5G/22P(B)-T	43.4 51.3	37.0 45.0	4	TLK25-6	6	TLK16-6	14			
	MD290T22G/30P(B)	59.0 65.8	45.0 60.0	4	TLK25-6	6	TLK16-6	14			
	MD290T22G/30P(B)-T	51.3 65.8	45.0 60.0	4	TLK25-6	6	TLK16-6	14			
T6	MD290T30G/37P(B)	57.0 71.0	60.0 75.0	2	TLK35-6	4	TLK25-6	17	18		
	MD290T37G/45P(B)	69.0 86.0	75.0 91.0	2	TLK35-6	4	TLK25-6	17			

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (AWG/kcmil)[2]	Recommended terminal model	Recommended cable (AWG/kcmil)[2]	Recommended terminal model				
T7	MD290T45G/55P(B)	89.0 111.0	91.0 112.0	1/0	TLK50-8	2	TLK35-8	20	26.8	M8	13.0 (115.2)
	MD290T55G/75P(B)	106.0 143.0	112.0 150.0	3/0	TLK95-8	1/0	TLK50-8	26		M8	
T8	MD290T75G/90P(B)	139.0 167.0	150.0 176.0	4/0	TLK120-12	2/0	TLK70-8	28	30.6	M12 (main power) M8 (grounding)	35.0 (310.1) 13.0 (115.2)
	MD290T90G/110P	164.0 198.0	176.0 210.0	300 kcmil	SQNBS150-12	3/0	TLK95-8	22			
	MD290T110G/132P	196.0 239.0	210.0 253.0	2 x 3/0	TLK95-12	4/0	TLK120-8	26			
T9	MD290T132G/160P	240.0 295.0	253.0 304.0	500 kcmil	SQNBS250-12	300 kcmil	SQNBS150-10	36	40	M12 (main power) M10 (grounding)	35.0 (310.1) 20.0 (117.0)
	MD290T160G/200P*	287.0 359.0	304.0 377.0	2 x 300 kcmil	SQNBS150-12	300 kcmil	SQNBS150-10	22			

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (AWG/kcmil)[2]	Recommended terminal model	Recommended cable (AWG/kcmil)[2]	Recommended terminal model				
T10	MD290T200G(-L)	365.0	377.0	2 x 350kcmil	SQNB S180-12	350kcmil	SQNB S180-12	30	33	M12	35.0 (310.1)
	MD290T220P(-L)	410.0	426.0								
	MD290T220G(-L)	410.0	426.0	2 x 400 kcmil	SQNB S250-12	400kcmil	SQNB S250-12	36			
	MD290T250P(-L)	456.0	465.0								
	MD290T280P(-L)	507.0	520.0	2 x 500 kcmil	SQNB S250-12	500kcmil	SQNB S250-12	36			
T11	MD290T250G(-L)	441.0	465.0	2 x 500 kcmil	SQNB S250-12	500kcmil	SQNB S250-12	36	36		
	MD290T280G(-L)	495.0	520.0								
	MD290T315P(-L)*	559.0	585.0	4 x 250 kcmil	SQNB S150-12	2 x 250 kcmil	SQNB S150-12	22			
	MD290T355P(-L)*	624.0	650.0	4 x 300 kcmil	SQNB S150-12	2 x 300 kcmil	SQNB S150-12	22			
T12	MD290T315G(-L)*	565.0	585.0	4 x 300 kcmil	SQNB S150-12	2 x 300 kcmil	SQNB S150-12	22	45	M16	85.0 (753.1)
	MD290T355G(-L)*	617.0	650.0	4 x 350 kcmil	TLK185-16	2 x 350 kcmil	TLK185-16	35			
	MD290T400P(-L)*	708.0	725.0								
	MD290T400G(-L)*	687.0	725.0	4 x 400 kcmil	TLK240-16	2 x 400 kcmil	TLK240-16	39			
	MD290T450P(-L)*	782.0	820.0								
	MD290T450G(-L)*	782.0	820.0	4 x 500 kcmil	TLK300-16	2 x 500 kcmil	TLK300-16	43			
	MD290T500P(-L)*	840.0	880.0								

Note

[2]: Applicable to AWG standards, in which 8 represents 8AWG, 1/0 represents 0AWG, 3/0 represents 000AWG, and 4/0 represents 0000AWG; 2 x 300 kcmil represents two 300 kcmil cables. The preceding recommended terminals are TLK and SQNBS series terminals from KST.

Note:

1. Observe national or regional regulations during selection. The recommended values in the preceding table are based on the following conditions:

- Cables with PVC insulation and copper conductor
- Cables with maximum surface temperature not exceeding 75°C at an ambient temperature of 40°C (Note: When the ambient temperature exceeds 40°C, contact Inovance.)
- Cable installation type E applied (See IEC60204-1.)

2. The recommended cables must meet requirements for 125% overload.

3. The cables with the asterisk mark (*) must be connected through the copper busbar.

4. If conditions vary, select the cable model according to actual conditions.

Table 5–29 Cable selection (three-phase 200 V to 240 V)

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (mm^2)<1>	Recommended terminal model	Recommended cable (mm^2)<1>	Recommended terminal model				
T1	MD290-2T0.4G/0.7PB	2.4 3.7	2.1 3.1	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	8	10.5	M4	1.2 (10.6)
	MD290-2T0.7G/1.1PB	4.6 6.4	3.8 5.1	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	9			
	MD290-2T1.1G/1.5PB	6.3 9.1	5.1 7.2	3 x 0.75	TNR0.75-4	0.75	TNR0.75-4	10			
	MD290-2T1.5G/2.2PB	9.0 11.3	7.2 9.0	3 x 1.5	TNR1.25-4	1.5	TNR1.25-4	11			
T2	MD290-2T2.2G/3.7PB	11.4 15.9	9.0 13.0	3 x 2.5	TNR2-4	2.5	TNR2-4	8.5			
	MD290-2T3.7G/5.5PB	16.7 22.4	13.0 17.0	3 x 4	TNR3.5-5	4	TNR3.5-4	9.5			2.8 (24.8)
T3	MD290-2T5.5G/7.5PB	32.2 39.7	25.0 32.0	3 x 10	TNR8-5	10	TNR8-5	12	13	M5	
T4	MD290-2T7.5G/11PB	41.3 44.0	32.0 37.0	3 x 10	TNR8-5	10	TNR8-5	12	14.3	M5	
T5	MD290-2T11G/15P(B)	59.0 65.8	45.0 60.0	3 x 16	GTNR16-6	16	GTNR16-6	12.4	15	M6	4.8 (42.5)
	MD290-2T11G/15P(B)-T	51.3 65.8	45.0 60.0	3 x 16	GTNR16-6	16	GTNR16-6	12.4	15	M6	
T6	MD290-2T15G/18.5P(B)	57.0 71.0	60.0 75.0	3 x 25	GTNR25-6	16	GTNR16-6	14	18	M6	
	MD290-2T18.5G/22P(B)	69.0 86.0	75.0 91.0	3 x 35	GTNR35-6	16	GTNR16-6	16.5	18	M6	
T7	MD290-2T22G/30P(B)	89.0 111.0	91.0 112.0	3 x 50	GTNR50-8	25	GTNR25-8	18	26.8	M8	13.0 (115.2)
	MD290-2T30G/37P(B)	106.0 143.0	112.0 150.0	3 x 70	GTNR70-8	35	GTNR35-8	21.8	26.8	M8	

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (mm^2)<1>	Recommended terminal model	Recommended cable (mm^2)<1>	Recommended terminal model				
T8	MD290-2T37G/45P(B)	139.0 167.0	150.0 176.0	3 x 95	GTNR95-12	50	GTNR50-8	25	30.6	M12 (main power) M8 (grounding)	35.0 (310.1) 13.0 (115.2)
	MD290-2T45G/55P	164.0 198.0	176.0 210.0	3 x 120	GTNR120-12	70	GTNR70-8	28.4	30.6		
	MD290-2T55G/75P	196.0 239.0	210.0 253.0	3 x 150	GTNR150-12	95	GTNR95-8	30.5	30.6		

Note

[1]: Applicable to the standards in China. 3 x 10 indicates one three-conductor cable with a cross sectional area of 10 mm^2; 3x150 indicates one three-conductor cables with a cross sectional area of 150 mm^2. The preceding recommended terminals are TNR series, GTNR series, and BC series from Suzhou Yuanli.

Note:

1. Observe national or regional regulations during selection. The recommended values in the preceding table are based on the following conditions:

- Cables with PVC insulation and copper conductor
- Cables with maximum surface temperature not exceeding 70℃ at an ambient temperature of 40℃ (Note: When the ambient temperature exceeds 40℃, contact Inovance.)
- Cable installation type E applied (See IEC60204-1.)

2. If conditions vary, select the cable model according to actual conditions.

Table 5–30 Cable selection (three-phase 200 V to 240 V, with UL certification)

Structure	Model	Rated input current (A)	Rated output current (A)	RST/UVW		Grounding cable		RST/UVW terminal width (mm)	Drive terminal width (mm)	Screw specification	Tightening torque N·m (lb.in)
				Recommended cable (AWG/kcmil)<2>	Recommended terminal model	Recommended cable (AWG/kcmil)<2>	Recommended terminal model				
T1	MD290-2T0.4G/0.7PB	2.4 3.7	2.1 3.1	14	TLK2.5-4	14	TLK2.5-4	7.5	10.5	M4	1.2 (10.6)
	MD290-2T0.7G/1.1PB	4.6 6.4	3.8 5.1								
	MD290-2T1.1G/1.5PB	6.3 9.1	5.1 7.2								
	MD290-2T1.5G/2.2PB	9.0 11.3	7.2 9.0								
T2	MD290-2T2.2G/3.7PB	11.4 15.9	9.0 13.0	12	TLK4-4	12	TLK4-4	8.5			
	MD290-2T3.7G/5.5PB	16.7 22.4	13.0 17.0	10	TLK6-4	10	TLK6-4	10			2.8 (24.8)
T3	MD290-2T5.5G/7.5PB	32.2 39.7	25.0 32.0	8	TLK10-5	8	TLK10-5	12	13	M5	
T4	MD290-2T7.5G/11PB	41.3 44.0	32.0 37.0	6	TLK16-5	6	TLK16-5	12	14.3	M5	
T5	MD290-2T11G/15P(B)	59.0 65.8	45.0 60.0	4	TLK25-6	4	TLK25-6	14	15	M6	4.8 (42.5)
	MD290-2T11G/15P(B)-T	51.3 65.8	45.0 60.0	4	TLK25-6	4	TLK25-6	14	15	M6	
T6	MD290-2T15G/18.5P(B)	57.0 71.0	60.0 75.0	2	TLK35-6	4	TLK25-6	17	18	M6	
	MD290-2T18.5G/22P(B)	69.0 86.0	75.0 91.0	2	TLK35-6	4	TLK25-6	17	18	M6	
T7	MD290-2T22G/30P(B)	89.0 111.0	91.0 112.0	1/0	TLK50-8	2	TLK35-8	20	26.8	M8	13.0 (115.2)
	MD290-2T30G/37P(B)	106.0 143.0	112.0 150.0	3/0	TLK95-8	1/0	TLK50-8	26	26.8	M8	
T8	MD290-2T37G/45P(B)	139.0 167.0	150.0 176.0	4/0	TLK120-12	3/0	TLK95-8	28	30.6	M12 (main power) M8 (grounding)	35.0 (310.1) 13.0 (115.2)
	MD290-2T45G/55P	164.0 198.0	176.0 210.0	300 kcmil	SQNBS150-12	3/0	TLK95-8	22	30.6		
	MD290-2T55G/75P	196.0 239.0	210.0 253.0	2 x 3/0	TLK95-12	3/0	TLK95-8	26	30.6		

Note

[2]: Applicable to the standards in China. 3 x 10 indicates one three-conductor cable with a cross sectional area of 10 mm^2; 3x150 indicates one three-conductor cables with a cross sectional area of 150 mm^2. The preceding recommended terminals are TNR series, GTNR series, and BC series from Suzhou Yuanli.

Note:

1. Observe national or regional regulations during selection. The recommended values in the preceding table are based on the following conditions:

- Cables with PVC insulation and copper conductor
- Cables with maximum surface temperature not exceeding 70°C at an ambient temperature of 40°C (Note: When the ambient temperature exceeds 40°C, contact Inovance.)
- Cable installation type E applied (See IEC60204-1.)

2. If conditions vary, select the cable model according to actual conditions.

Recommended cable lug

The following table describes the GTNR and BC series cable lugs of Suzhou Yuanli.

Table 5–31 Appearance of cable lugs

Series	Appearance
GTNR series	
TNR series	
BC series	

The following table describes recommended lugs, namely, the TNR, GTNR, and BC series lugs of Suzhou Yuanli. The lugs with UL certifications are TLK and SQNBS series lugs of KST.

Table 5–32 Appearances, models, and dimensions of TNR series lugs (unit: mm)

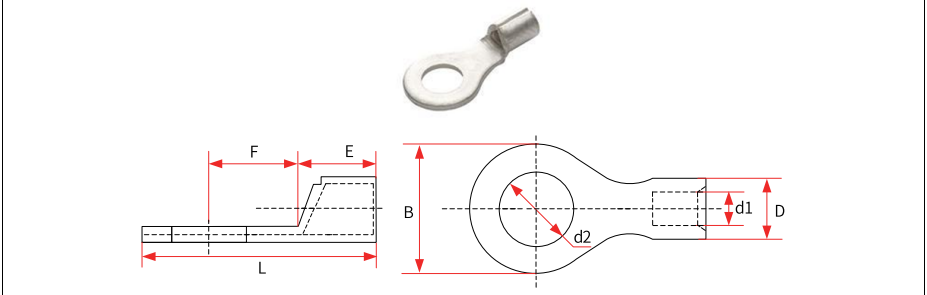
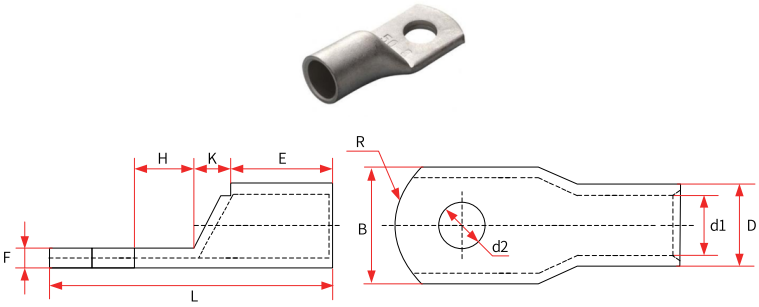
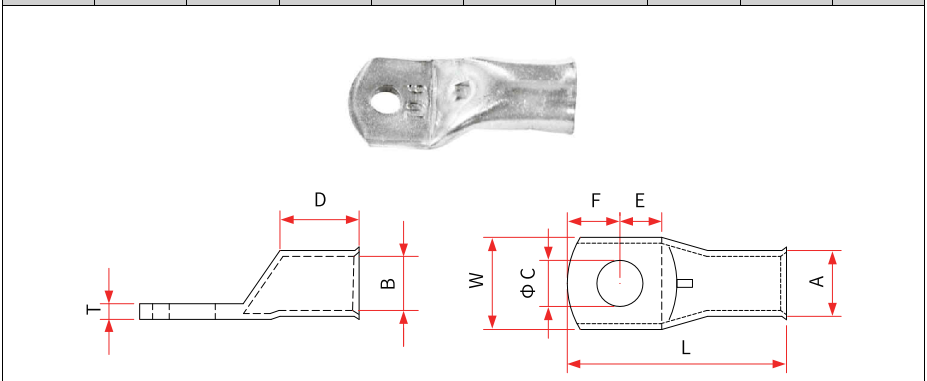
Model	Cable specification		D	d1	E	F	B	d2	L	Current (A)	Crimping tool
	AWG/ MCM	mm^2									
											
TNR0.75-4	22–16	0.25-1.0	2.8	1.3	4.5	6.6	8.0	4.3	15.0	10	RYO-8 AK-1M
TNR1.25-4	22–16	0.25-1.65	3.4	1.7	4.5	7.3	8	5.3	15.8	19	

Table 5–33 Appearances, models, and dimensions of GTNR series lugs (unit: mm)

Model	D	d1	E	H	K	B	d2	F	L	R	Crimping tool
											
GTNR1.5-5	4.0	2.2	5.0	5.0	2.0	8.0	5.3	1.0	16.0	5	
GTNR2.5-4	4.5	2.9	7.0	5.0	2.0	8.0	4.3	1.0	18.0	5	
GTNR2.5-5	4.5	2.9	7.0	6.0	2.0	8.0	5.3	1.0	20.0	7	
GTNR2.5-6	4.5	2.9	7.0	6.0	2.0	10.2	6.4	0.8	20.0	7	
GTNR4-5	5.2	3.6	7.0	6.0	2.0	10.0	5.3	1.0	20.0	7	RYO-8
GTNR4-6	5.2	3.6	7.0	6.0	2.0	10.0	6.4	1.0	20.0	7	YYT-8
GTNR6-5	6.0	4.2	9.0	6.0	3.0	10.0	5.3	1.2	23.0	7	RYO-14
GTNR6-6	6.0	4.2	9.0	7.5	3.0	10.0	6.4	1.2	26.0	7	
GTNR6-8	6.0	4.2	9.0	7.5	3.0	12.0	8.4	1.0	26.0	7	
GTNR10-6	7.0	5.0	9.0	8.0	3.5	12.4	6.4	1.3	26.5	7	
GTNR10-8	7.0	5.0	9.0	8.0	3.5	12.4	8.4	1.3	27.5	7	
GTNR16-6	7.8	5.8	12.0	8.0	4.0	12.4	6.4	1.3	31.0	7	
GTNR16-8	7.8	5.8	12.0	8.0	4.0	12.4	8.4	1.3	31.0	7	
GTNR25-6	9.5	7.5	12.0	8.0	4.5	14.0	6.4	2.0	32.0	10	
GTNR25-8	9.5	7.5	12.0	9.0	4.5	15.5	8.4	1.6	34.0	10	CT-38
GTNR25-10	9.5	7.5	12.0	10.5	4.5	17.5	10.5	1.4	37.0	10	CT-100
GTNR35-6	11.4	8.6	15.0	9.0	5.0	15.5	6.4	2.8	38.0	10	
GTNR35-8	11.4	8.6	15.0	9.0	5.0	15.5	8.4	2.8	38.0	10	
GTNR35-10	11.4	8.6	15.0	10.5	5.0	17.5	10.5	2.5	40.5	10	
GTNR50-8	12.6	9.6	16.0	11.0	6.0	18.0	8.4	2.8	43.5	10	
GTNR50-10	12.6	9.6	16.0	11.0	6.0	18.0	10.5	2.8	43.5	10	
GTNR70-8	15.0	12.0	18.0	13.0	7.0	21.0	8.4	2.8	50.0	14	
GTNR70-10	15.0	12.0	18.0	13.0	7.0	21.0	10.5	2.8	50.0	14	CT-100
GTNR70-12	15.0	12.0	18.0	13.0	7.0	21.0	13.0	2.8	50.0	14	
GTNR95-10	17.4	13.5	20.0	13.0	9.0	25.0	10.5	3.9	55.0	14	
GTNR95-12	17.4	13.5	20.0	13.0	9.0	25.0	13.0	3.9	55.0	14	

Model	D	d1	E	H	K	B	d2	F	L	R	Crimping tool
GTNR120-12	19.8	15.0	22.0	14.0	10.0	28.0	13.0	4.7	60.0	16	RYC-150
GTNR120-16	19.8	15.0	22.0	16.0	10.0	28.0	17.0	4.7	64.0	16	
GTNR150-12	21.2	16.5	26.0	16.0	11.0	30.0	13.0	4.7	69.0	24	
GTNR150-16	21.2	16.5	26.0	16.0	11.0	30.0	17.0	4.7	69.0	24	
GTNR185-16	23.5	18.5	32.0	17.0	12.0	34.0	17.0	5.0	78.0	24	
GTNR240-16	26.5	21.5	38.0	20.0	14.0	38.0	17.0	5.5	92.0	24	
GTNR240-20	26.5	21.5	38.0	20.0	14.0	38.0	21.0	5.5	92.0	24	

Table 5–34 Appearances, models, and dimensions of BC series lugs (unit: mm)

Model	A	B	W	E	D	L	T	C	F
									
120-8	19.0	15.0	27.2	16.5	27.0	73.0	4.0	8.5	16.5
120-10								10.5	
120-12								12.8	
120-14								14.7	
120-16								16.7	
120-20				18.8				20.7	14.3
150-8	21.0	16.5	30.0	16.5	27.0	78.0	4.5	8.5	16.5
150-10								10.5	
150-12								12.8	
150-14								14.7	
150-16								16.7	
150-20				18.8				20.7	14.3

Model	A	B	W	E	D	L	T	C	F
185-10	23	18.5	33.5	16.5	30	82	4.5	10.5	16.5
185-12								12.8	
185-14								14.7	
185-16								16.7	
185-20				18.8				20.7	14.3
240-10	26	21	37.7	18.0	32.0	88.0	5.0	10.5	17.0
240-12								12.8	
240-14								14.7	
240-16								16.7	
240-20								20.7	
300-10	28.0	23.0	41.0	18.0	37.0	97.0	5.0	10.5	17.0
300-12								12.8	
300-14								14.7	
300-16								16.7	
300-20								20.7	

5.6.3.3 Wiring Descriptions of Main Circuit Terminals

The following section describes the requirements for the wiring of main circuit terminals. For requirements on the selection, routing, and wiring of main circuit cables, see *"5.6.3.4 Wiring Requirements of the Main Circuit" on page 179Requirements on Wiring of Main Circuit Cables*.

To prevent accidents caused by short circuit, install a fuse on the input side of the drive. For requirements of fuses on the input side and recommended fuse models, see "Compliance with the LVD" in the *General-Purpose AC Drive Hardware Guide*.

Input power supply terminals R, S, and T/L1 and L2

- The cable connection on the input side of the drive has no requirements on the phase sequence.
- The specification and installation method of external main circuit cables must comply with the local regulations and related IEC standards.
- Use proper copper conductors for main circuit cables according to the recommended values.

DC bus terminals (+) and (-)

- After the drive is switched off, DC bus terminals (+) and (-) have residual voltage. After the CHARGE indicator goes off, wait at least 10 minutes before operating the drive. Failure to comply will result in electric shock.
- When wiring an external braking component for a model with the power of 90 kW or above, ensure correct polarity (+)/(-). Failure to comply will result in damage to the AC drive and braking components or even fire.
- The cable length of the braking unit cannot exceed 10 m. Use twisted pair cables or closely-paired cables for parallel connection.

- Avoid connecting the braking resistor directly to the DC bus. Failure to comply will result in damage to the AC drive or even fire.

U, V, and W terminals on the output side

- The specification and installation method of external main circuit cables must comply with the local regulations and related IEC standards.
- Use copper lead cables with appropriate dimensions for main circuit cables.
- Do not connect any capacitor or surge protection device at the output side. Failure to comply will result in malfunction or even damage to the AC drive.
- An excessively long motor cable may result in electrical resonance due to the distributed capacitance. The generated electrical resonance may cause damage to motor insulation or high leakage current, triggering the overcurrent protection mechanism of the AC drive. When using a motor cable longer than 100 m, install an AC output reactor close to the AC drive.

Grounding terminal (PE)

For grounding requirements, see "5.6.5 Grounding".

Wiring example (T13 models)

The following figure illustrates the wiring of main circuit terminals and grounding (PE) terminals of T13 models. For requirements and recommendations of main circuit routing, see *"5.6.4.4 Cable Routing Requirements" on page 197* and *"5.6.4.5 Routing Recommendations" on page 197*.

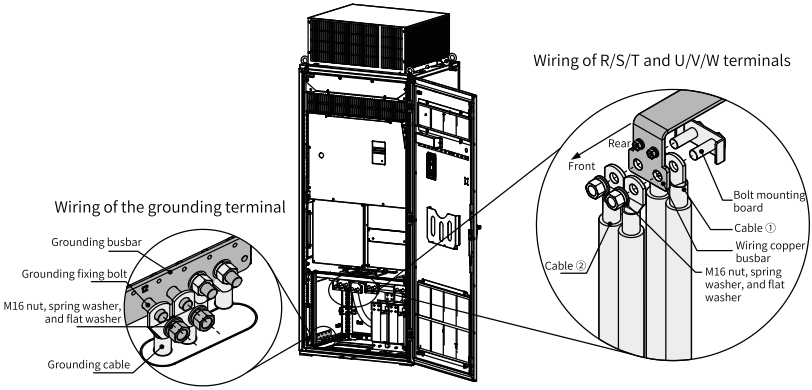


Figure 5-87 Wiring of main circuit terminals and grounding (PE) terminals



To prevent mice and insects from entering the cabinet and causing damage to the AC drive, use sealing materials such as fireproof mud to seal the cable inlet/outlet holes after wiring the main power terminal and grounding (PE) terminal.

5.6.3.4 Wiring Requirements of the Main Circuit

Wiring requirements of the main circuit

- Terminals BR, (-), and (+) are used to connect options. Avoid connecting these terminals to an AC power supply.
- To protect the main circuit, separate it from all surfaces that may come into contact with it and provide covers as required.
- The control circuit is a safety extra-low voltage (SELV) circuit, which must be isolated from other circuits through reinforced insulation. Make sure that the control circuit is connected to an external SELV circuit.
- Prevent foreign matters from entering the wiring part of the terminal block.
- Do not solder the twisted conductors.
- The tightening torque may vary with terminals. Tighten terminal screws with the specified tightening torque. You can use the torque screwdriver, ratchet, or wrench.
- When using an electric screwdriver to tighten terminal screws, set a low speed to prevent damage to the terminal screws.
- Tighten the terminal screws at an angle within 5 degrees. Failure to comply may result in screw damage.

Power cable selection requirements

For selection of power cables, follow national or regional regulations. Select IEC cables according to the following requirements:

- Compliant with EN 60204-1 and IEC 60364-5-52 standards
- PVC insulated cables with copper conductors
- Cables with maximum surface temperature not exceeding 70°C at an ambient temperature of 40°C (Note: When the ambient temperature exceeds 40°C, contact Inovance.)
- Symmetrical cable with the copper-braided shield

Note

If the recommended cables for peripheral equipment or options are not suitable for the product, contact Inovance.

Use shielded cables to comply with the EMC requirements. The shielded cables are divided into three-conductor cables and four-conductor cables, as shown below. If the conductivity of the three-conductor cable shield cannot meet requirements, add an additional PE cable. Alternatively, use a four-conductor cable with one conductor as the PE cable. The shield of the shielded cable is comprised of coaxial cooper braids to suppress radio frequency interference. To enhance the shielding performance and conductivity, the braided density of the shield must be greater than 90%.

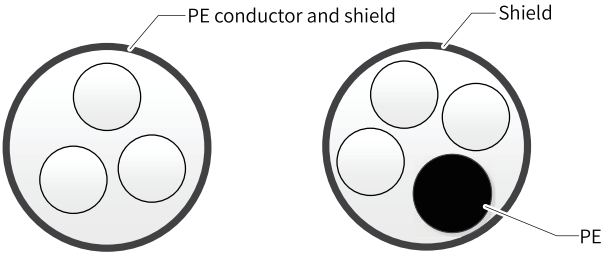


Figure 5-88 Recommended power cable

Requirements on main circuit routing

The power supply input cable of the AC drive and motor cable can generate strong electromagnetic interference. To avoid electromagnetic interference caused by long-distance parallel coupling between the strong disturbing cable and control circuit cable, ensure a distance longer than 30 cm between main circuit cables and signal cables when cabling. Main circuit cables include the input R/S/T cable, output U/V/W cable, DC bus, and braking cable. Signal cables include the I/O signal cable and communication cable.

Cable ducts must be in good connection and well grounded. Use aluminum cable ducts to ensure equipotentiality of the device. Connect the filter, AC drive, and motor to the system (machines or devices) properly. Protect all connections with spray coating and ensure good contact of conductive metal.

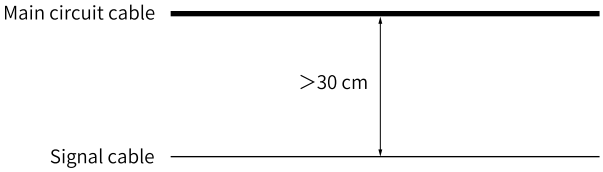


Figure 5-89 Cable layout

Wiring in an IT or delta grid system

Before wiring in an IT or delta grid system, disconnect the EMC screw and VDR screw. Failure to comply will result in damage to the AC drive or even personal injury.

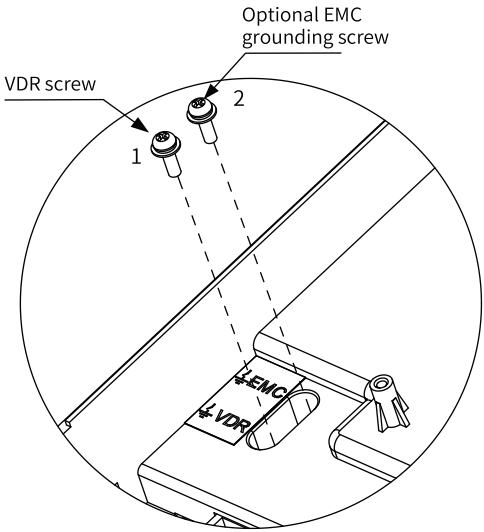


Figure 5-90 Disconnecting the EMC screw and VDR screw

Motor cable shield requirements

Use shielded cables as motor output cables. Strip the cable to expose the shield, crimp the shield to the wire ferrule slot of the bracket with the wire ferrule, and crimp the drain wire of the shield to the PE terminal, as shown below. The following figure shows the shield wiring.

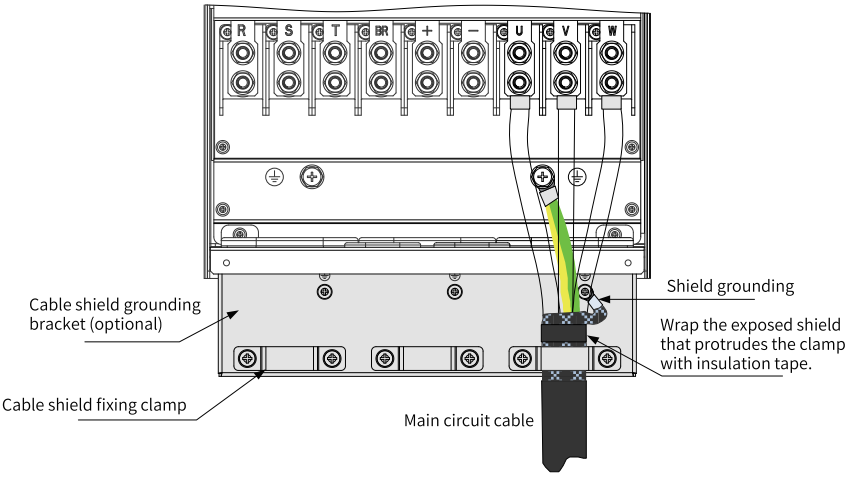


Figure 5-91 Wiring of the shield

Keep the drain wire of the motor cable shield as short as possible, with its width (b in the following figure) no shorter than 1/5 of its length (a in the following figure).

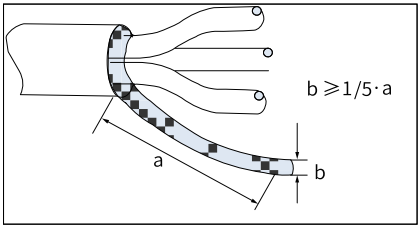


Figure 5-92 Drain wire of the motor cable shield

Motor cable length requirements

During operation of the AC drive, the quick on-off of the power switching transistor can lead to excessively large dU/dt on the output side. A long motor cable may result in excessive voltage stress on the motor winding, causing insulation breakdown. Use motors that comply with technical specifications in IEC60034-25 IVIC B or motors with high voltage resistance. In addition, when the cable length increases, the distributed capacitance of the cable increases linearly, resulting in high harmonic current.

When the length of the motor cable is longer than the maximum length recommended in the following table, install an output reactor on the output side of the AC drive, or use a motor conforming to IEC60034-25 IVIC B. The output reactor can reduce the voltage stress on the motor winding.

Table 5–35 Requirement for output reactor based on cable length and motor types

Drive rated power (kW)	Maximum cable length of common asynchronous motor (m)	IEC60034-25 IVIC B Compliance	Common asynchronous induction motor
0.4 to 3.7	50	Not required	Required
5.5	70	Not required	Required
7.5	100	Not required	Required
11	110	Not required	Required
15	125	Not required	Required
18.5	135	Not required	Required
22	150	Not required	Required
≥ 30	150	Not required	Required

5.6.3.5 Protection Requirements

Requirements for protection of main circuit cables

Use the heat-shrinkable tube to wrap the copper tube of the main circuit cable terminal and the cable conductor and ensure the conductor is completely wrapped, as shown in *"Figure 5-93 Cable conductor with the heat-shrinkable tube" on page 183*.

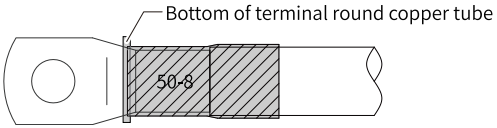


Figure 5-93 Cable conductor with the heat-shrinkable tube

Requirements on upstream protection device

- Install proper protection devices on the power supply input side to provide isolation functions and functions against overcurrent and short circuit.
- When selecting the protective devices, take the main circuit cable current capacity, system overload capacity, and short circuit capacity of upstream power distribution into account. The recommended values in the selection guide of peripheral components apply to most of applications.

5.6.4 Control Circuit Wiring

5.6.4.1 Description of Control Circuit Terminals

"Figure 5-94 Layout of control circuit terminals" on page 184 shows the layout of control circuit terminals.

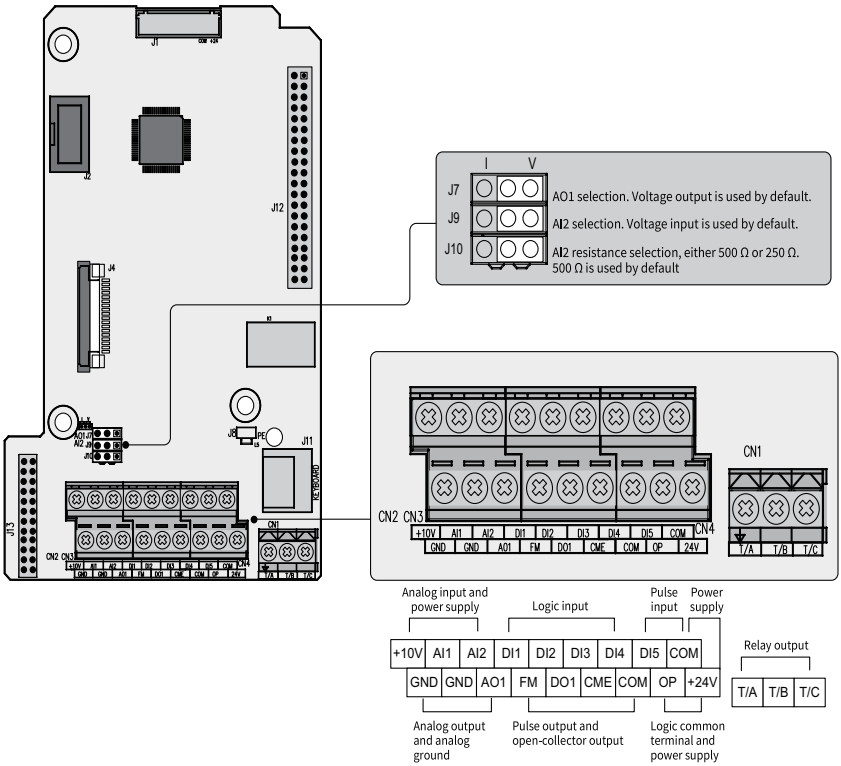


Figure 5-94 Layout of control circuit terminals

Table 5–36 Description of control terminal functions

Category	Terminal mark	Terminal name	**Function description**
Power supply	+10V-GND	External +10 V power supply	The terminal is used to provide +10 V power supply to an external unit with the maximum output current of 10 mA. Generally, it is used to power an external potentiometer with resistance ranging from 1 kΩ to 5 kΩ.
	+24V-COM	External +24 V power supply	The terminal is used to provide +24 V power supply to external devices. Generally, it is used to power the DIs/DOs and external sensor. The maximum output current is 200 mA[Note 1].
	OP	Input terminal for external power supply	It is connected to +24V by default. When DI1 to DI5 are driven by external signals, OP must be disconnected from +24 V and connected to the external power supply.
Analog input (AI)	AI1-GND	AI1	Input voltage range: 0 VDC to 10 VDC Input impedance: 22 kΩ
	AI2-GND	AI2	Input range: 0 VDC to 10 VDC/0 mA to 20 mA (determined by jumper J9 on the control board) Input impedance: 22 kΩ for voltage input and 500 Ω or 250 Ω for current input, as defined by J10 upon current input (Note 2)
Digital input (DI)	DI1- OP	DI1	Photocoupler isolation, compatible with dual-polarity input. Input impedance: 1.39 kΩ Operating voltage range: 9 V to 30 V
	DI2- OP	DI2	
	DI3- OP	DI3	
	DI4- OP	DI4	
	DI5- OP	High-speed pulse input terminal	Besides features of DI1 to DI4, it can also be used for high-speed pulse input. Maximum input frequency: 100 kHz Input impedance: 1.03 kΩ
Analog output	AO1-GND	Analog output 1	The jumper J7 on the control board determines whether current output or voltage output is used. Output voltage range: 0 V to 10 V Output current range: 0 mA to 20 mA

Category	Terminal mark	Terminal name	**Function description**
Digital output	DO1-CME	Digital output 1	Optocoupler isolation; dual-polarity open collector output Output voltage range: 0 V to +24 V Output current range: 0 mA to 50 mA Note: The digital output ground CME and digital input ground COM are internally insulated, but are shorted externally by jumper as the factory settings. In this case, DO1 is driven by +24V by default. To drive DO1 by external power supply, remove the jumper between CME and COM.
	FM-COM	High-speed pulse output	It is defined by parameter F5-00 (FM terminal output mode). When the terminal is used as high-speed pulse output, the maximum frequency can be up to 100 kHz. When it is used as open collector output, specifications are the same as DO1.
Relay output	T/A-T/B	NC terminal	Driving capacity of the contact: 250 VAC, 3 A, COSΦ=0.4 30 VDC, 1 A
	T/A-T/C	NO terminal	
Auxiliary interface	J13	Function expansion card interface	A 28-conductor terminal, which interfaces to optional cards (I/O extension cards, PLC cards, and various bus cards)
	J11	External operating panel interface	External operating panel
Jumper	J7	AO1 output selection	Voltage output (default) or current output available
	J9	AI2 input selection	Voltage input (default) or current input available
	J10	AI2 input impedance selection	500 Ω (default) or 250 Ω available

Note

- [Note 1]: If the ambient temperature exceeds 23℃, the output current must be derated by 1.8 mA for every additional 1℃. The maximum output current is 170 mA at 40℃. When OP and 24V are shorted, the maximum output current is calculated by the following formula: 170 mA minus current over the DI.
- [Note 2]: Based on the maximum output voltage of the signal source, select impedance of 500 Ω or 250 Ω. For example, if 500 Ω is selected, the maximum output voltage cannot be lower than 10 V so that AI2 can measure 20 mA current.

5.6.4.2 Wiring Descriptions of Control Circuit Terminals

AI1 wiring

Weak analog voltage signals are prone to suffer external interference. Therefore, a shielded cable is required, and the wiring distance must be as short as possible (no longer than 20 m), as shown in *"Figure 5-95 Wiring AI" on page 187*. In scenarios where analog signals experience severe external interference, install a filter capacitor or a ferrite core on the analog signal source, as shown in *"Figure 5-96 Grounding the shield of the AI terminal" on page 188*. Connect the lead wire of the AI shield to the PE terminal of the AC drive.

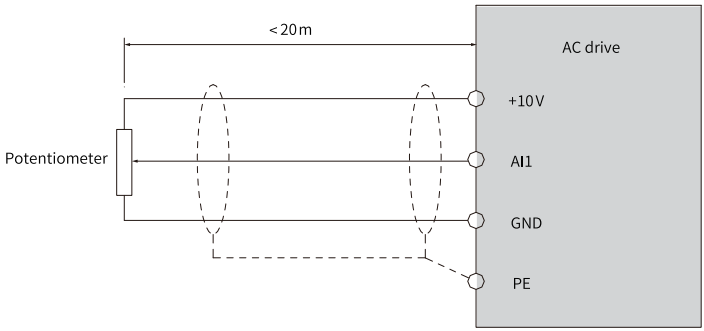


Figure 5-95 Wiring AI

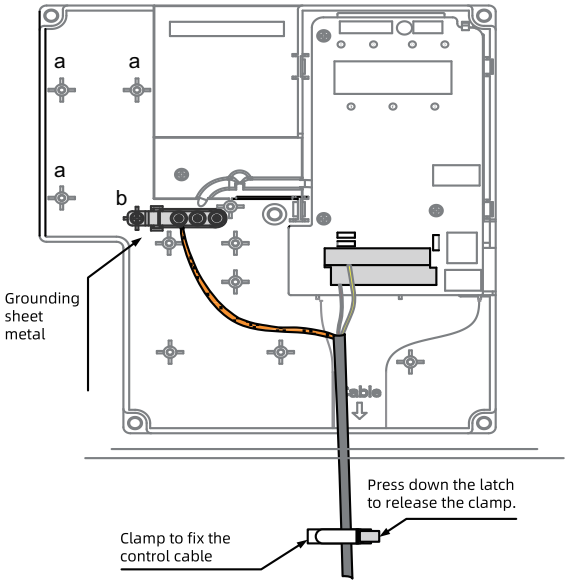
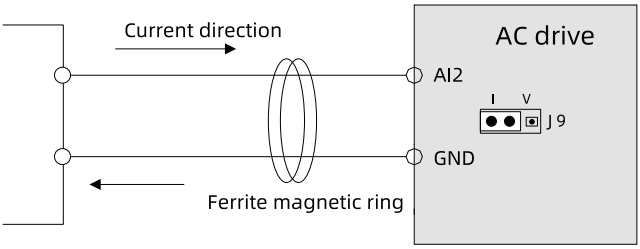


Figure 5-96 Grounding the shield of the AI terminal

AI2 wiring

- If the AI2 is to be used for voltage signal input, wire it in the same way as that for the AI1.
- When AI2 is to be used for current signal input, the current flows to AI2 and flows from GND. The jumper J9 is set to "I" at the same time.



Make the cable pass through the ferrite magnetic ring or wind the cable through the ring for two or three turns in the same direction.

Figure 5-97 AI2 wiring

Wiring of DI1 to DI5

- Sink wiring mode

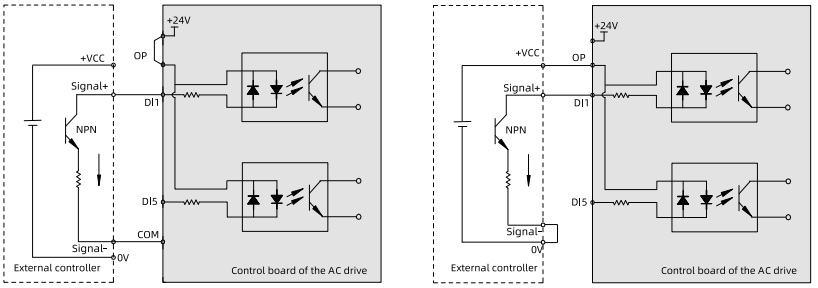


Figure 5-98 Sink wiring mode

If an 24 V internal power supply of the drive is used, short OP and +24V of the drive and connect COM of the drive to the corresponding DI terminal through the controller contact.

If an external 24 V power supply is used, remove the jumper between +24V and OP, connect the 24 V positive electrode of the external power supply to the OP terminal of the drive, and connect the 0V terminal of the external power supply to the corresponding DI of the drive through the controller contact.

In the mode, the DIs of different AC drives cannot be connected in parallel. Otherwise, the DI may malfunction. If DIs of different AC drives must be connected in parallel, connect the anode of a diode to the DI in series and the diode needs to satisfy the following requirement: IF > 40 mA and VR > 40 V, as shown in *"Figure 5-99 Parallel connection of DIs of multiple drives in the sink mode" on page 190*.

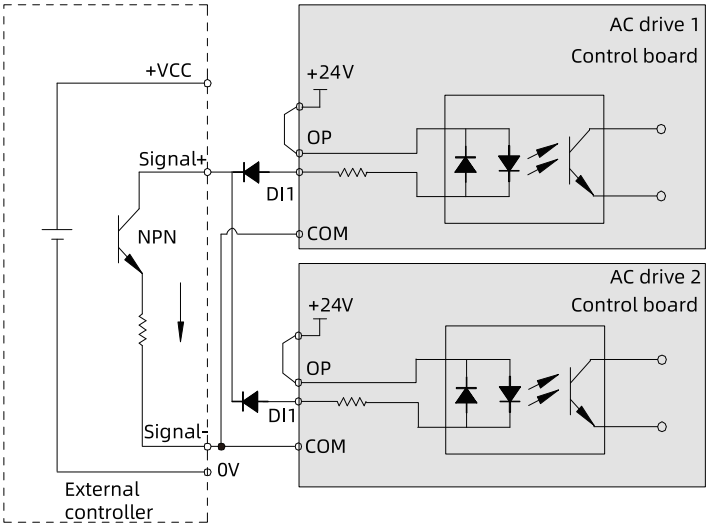


Figure 5-99 Parallel connection of DIs of multiple drives in the sink mode

- Source wiring mode

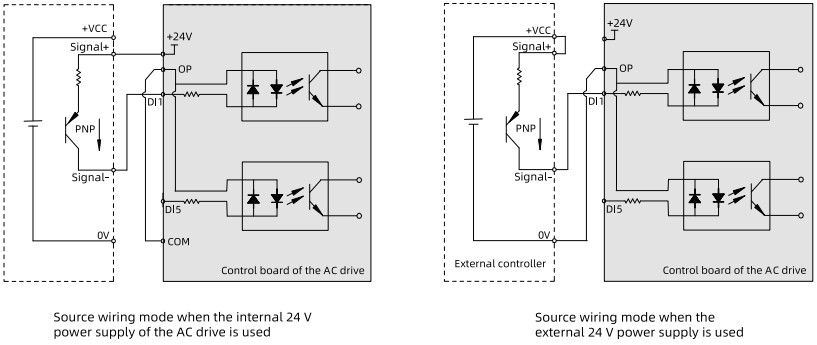


Figure 5-100 Source wiring mode

- To use an internal 24 V power supply of the drive, remove the jumper between the +24V and the OP terminals, connect the OP terminal to the COM terminal, and connect the +24V terminal of the internal power supply to the corresponding DI through the external controller contact.
- To use an external power supply, remove the jumper between the +24V and the OP terminals, connect the OP terminal of the drive to the 0V terminal of the external power supply, and connect the 24 V positive electrode of the external power supply to the corresponding DI through the external controller contact.

Wiring high-speed input terminal DI5

When DI5 is used for high-speed pulse input, the allowed maximum frequency is 100 kHz.

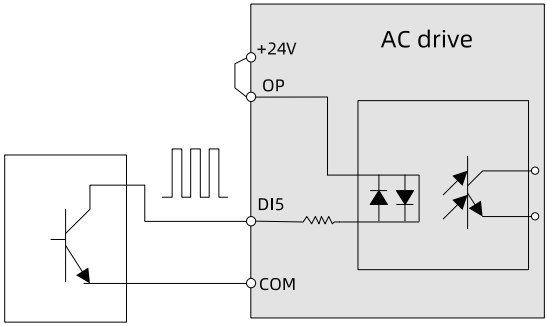


Figure 5-101 High-speed pulse input terminal DI5

Wiring of DO1

When the DO needs to drive a relay, connect a snubber diode on both sides of the relay coil. Otherwise, the 24 V DC power supply may be damaged. Select the proper relay type. The drive capacity of the DO output is not larger than 50 mA. Therefore, the resistance of the relay coil must be within the proper range (not less than 480 Ω).

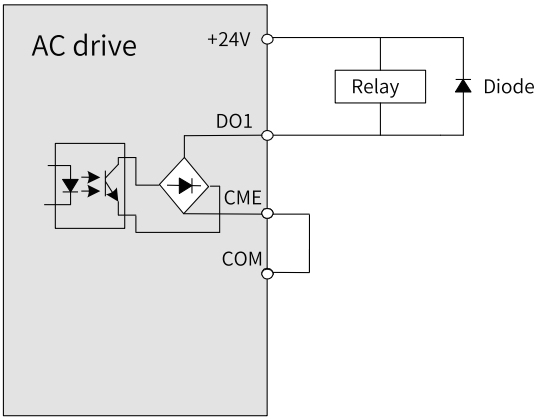


Figure 5-102 Wiring between DO and relay

Note

- Connect the snubber diode with the polarity placed correctly. Otherwise, the 24 VDC power supply will be damaged upon the DO output.
- The digital output ground CME and digital input ground COM are internally insulated, but are shorted externally by jumper as the factory settings. In this case, DO1 is driven by +24V by default. To drive DO1 by external power supply, remove the jumper between CME and COM.

DO1: Photocoupler isolation and bipolar open collector output

Output voltage range: 0 V to 24 V

Output current range: 0 mA to 50 mA

DO1 supports bipolar output. The following wiring methods are available.

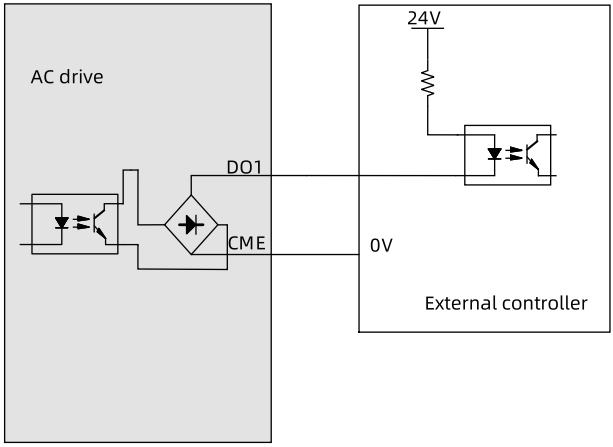


Figure 5-103 DO connecting to external controller 1

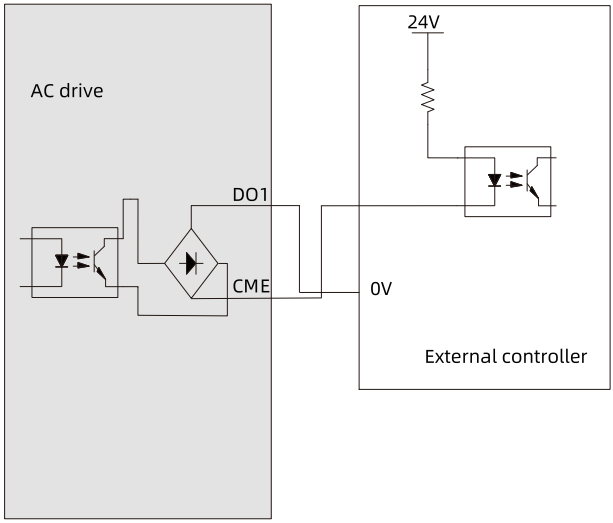


Figure 5-104 DO connecting to external controller 2

Wiring of the high-speed digital output terminal FM

When the FM terminal is used for FMP continuous pulse output, the allowed maximum frequency is 100 kHz.

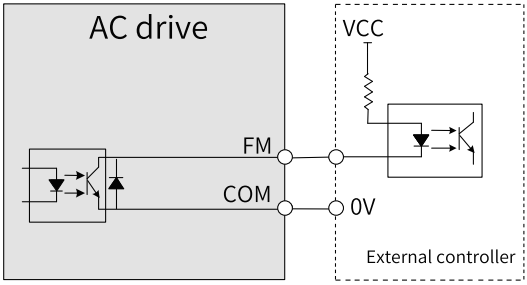


Figure 5-105 Wiring of the high-speed digital output terminal

Wiring of the relay output terminal

The inductive load (relay, contactor, and motor) causes voltage peak after the current is disconnected. To minimize the interference at cutoff, use a voltage dependent resistor (VDR) at the relay contact for protection and install absorption circuits such as VDRs, RC absorption circuits, and diodes on the inductive load, as shown in *"Figure 5-106 Anti-interference treatment for relay output terminals" on page 194*.

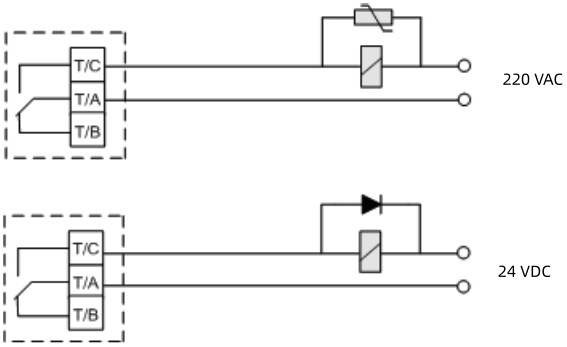


Figure 5-106 Anti-interference treatment for relay output terminals

Note

The power supply connected with the control circuit must use class 2 power supply; otherwise, the operation performance of the AC drive will be degraded.

Requirements on tubular terminals

Use tubular terminals with insulation sheath. Keep the exposed conductor of a single-conductor or twisted-pair cable no longer than 6 mm, as shown in *"Figure 5-107 Requirements on tubular terminals of the control circuit cable" on page 194*.

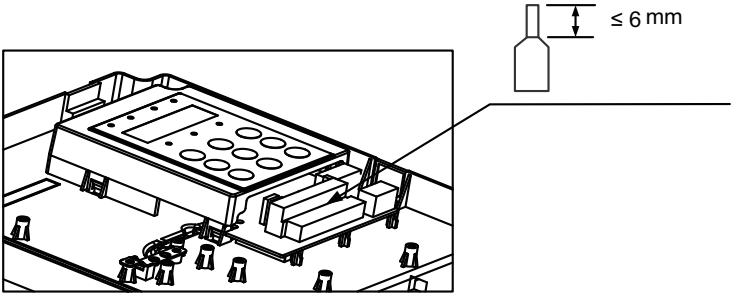


Figure 5-107 Requirements on tubular terminals of the control circuit cable

Table 5–37 Control circuit cable specifications

Single-conductor cable mm² (AWG)	Twisted pair cable mm² (AWG)	Tightening torque (N•m)
0.2 to 0.75 (18AWG to 24AWG)		0.565

Note

For the one-conductor cable, the AWG specification must be higher than or equal to 18AWG. For non-shielded twisted pair cables, the AWG specification must be higher than or equal to 20AWG. If the cable is comprised of more than three conductors, the AWG specification must be higher than or equal to 24AWG.

Wiring for connecting an external operating panel

To use an external operating panel, connect one end of the connecting cable to the RJ45 port of the AC drive, and lead the other end of the cable from either side of the AC drive, as shown in *"Figure 5-108 Wiring for connecting an external operating panel" on page 195*.

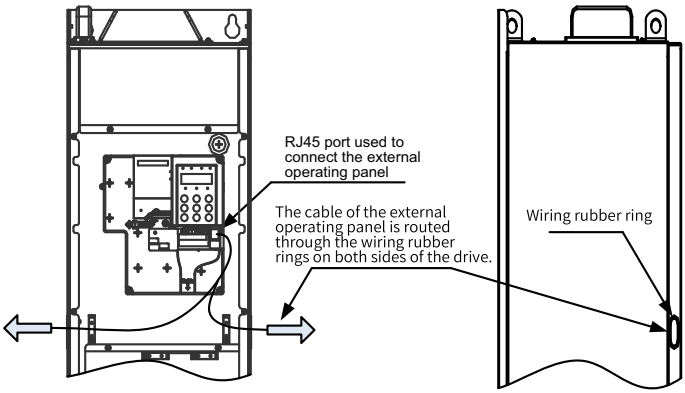


Figure 5-108 Wiring for connecting an external operating panel

5.6.4.3 Wiring Requirements of Control Circuit

Note

Wire the control circuit cable according to EN 60204-1.

Selection requirements

To ensure that the control circuit will not be interfered by peripheries, use shielded cables with the shield for signal cables, and connect both ends of the shield to the drive 360 degrees with the shield bracket. Use separate shielded cables for different analog signals. It is recommended to use shielded twisted pair (STP) cables for digital signals.

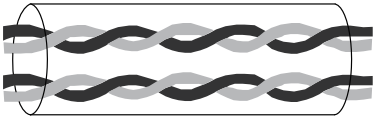


Figure 5-109 Shielded twisted pair cable

Requirements on shield grounding for analog terminals

Weak analog voltage signals are prone to suffer external interference. Therefore, a shielded cable is required, and the wiring distance must be as short as possible (no longer than 20 m). In applications where certain analog signals are subject to severe interference, install a filter capacitor or ferrite core on the analog signal source side.

- Use the shielded cable together with the shield grounding bracket (option) to ground the shield in 360°.
- Minimize the length of the drain wire of the shield. Fasten the drain wire to the standard grounding copper busbar of the AC drive by using screws. The following figure shows the grounding.

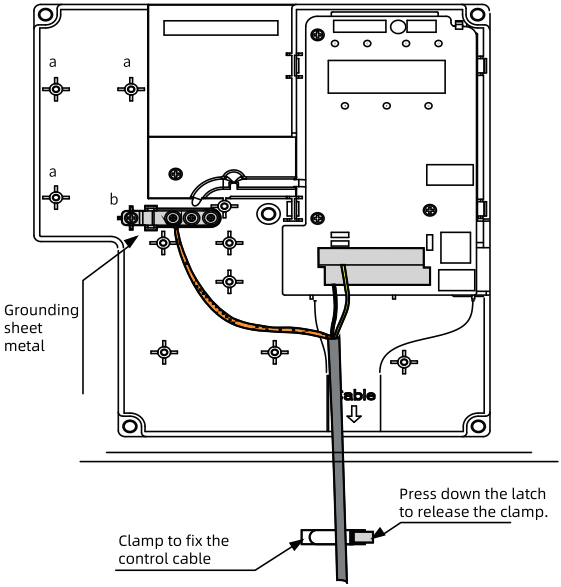


Figure 5-110 Grounding the shield of the AI terminal

Requirements on wiring of I/O signal cables

- I/O signals include analog input (AI) signals, analog output (AO) signals, digital input (DI) signals, digital output (DO) signals, and relay output signals. Before wiring the I/O terminal, disconnect the main power supply and ensure that the danger indicator on the AC drive is off.

- To avoid interference to the I/O signals, separate the I/O signal cables at least 30 cm from the main circuit cables (R, S, and T cables and U, V, and W cables) and other power cables (or power supply cables).
- Route relay output cables and other I/O signal cables through different routes with a clearance of at least 30 cm. Failure to comply will result in malfunction of the drive and the machine.

5.6.4.4 Cable Routing Requirements

- Route signal cables and power cables through different routes.
  When analog signals are used for remote control on the cabinet module, separate signal cables from high-voltage circuits (power supply input, inverter output, and braking resistor cables) by a distance of above 50 cm. This can reduce interference from the AC drive and other equipment to analog signals. This requirement must be met even inside the control cabinet module.
- Requirements on analog control signal cables
  Use shielded twisted pair cables for the analog control signal cables. Minimize the length of the stripped part of the cable (about 5-7 mm) and wrap the shield with the insulation tape to prevent the shield from coming into contact with other equipment and incurring interference.
- Requirement on motor cables
  Use shielded cables for motor cables. Minimize the distance between the cabinet module and the motor, and route the motor cables separately from other cables. Also, avoid long-distance parallel routing of the motor cables and other cables to reduce electromagnetic interference caused by rapid changes in the output voltage of the AC drive.
- Requirement on power cables
  Use shielded cables for power cables, or shield all the cables from the cabinet module to the motor by using conduits.
- Requirements on control cables and power supply cables
  If the power supply cables and control cables must be cross-connected, make them be cross-connected at 90 degrees.

5.6.4.5 Routing Recommendations

Routing disturbing cables and sensitive cables

Route cables that transmit different types of signals through different routes. Separate the disturbing cables from sensitive cables by a distance of at least 30 cm. When two types of cables must be intersected, the intersection angle must be 90 degrees to avoid interference, as shown in the following figure.

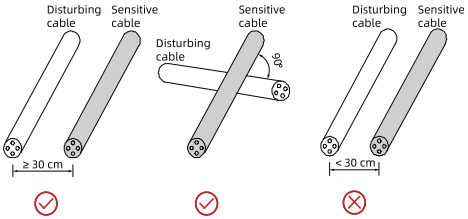


Figure 5-111 Routing of disturbing cables and sensitive cables

Routing cables that transmit different types of signals

Route cables that transmit different types of signals through different routes and separate different types of signals with equipotential signals. When routing cables that transmit the same type of signals, lay equipotential signal cables to the outer layers and lay equipotential bondings as many as possible in the middle if possible, as shown in the following figure.

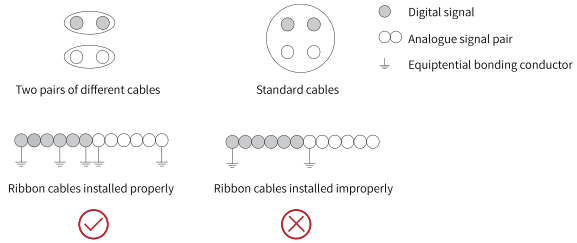


Figure 5-112 Routing cables that transmit different types of signals

Routing multi-conductor cables

For multi-conductor cables, it is recommended that one cable transmits one type of signals. If one cable is used to transmit different types of signals, use the cable with conductors shielded, as shown in the following figure.

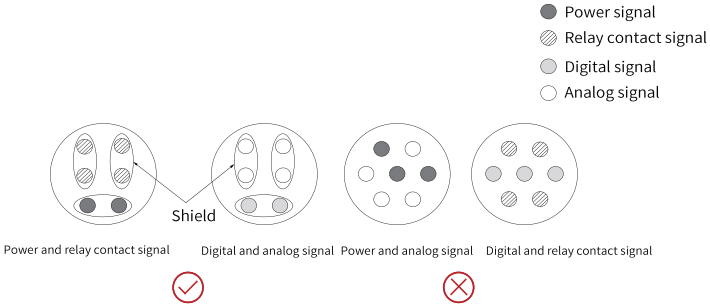


Figure 5-113 Routing of multi-conductor cables

If certain conductors in a multi-conductor cable are reserved or unused, connect these conductors to the equipotential bondings, as shown below.

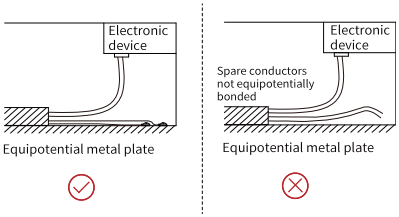


Figure 5-114 Handling reserved or unused conductors of multi-conductor cables

Requirements on the wiring loop area

For cables that transmit low-level sensor signals and shared cables that transmit relay signals, lay them close to each other to avoid large loop area. Use twisted pair cables for analog signals. Lay digital signal cables close to each other.

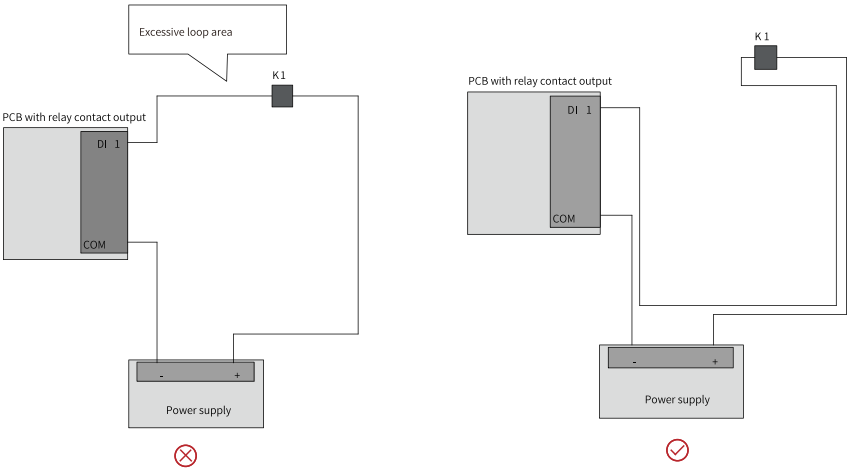


Figure 5-115 Recommended wiring loop area

Laying multiple types of cables

For cables of different types, route the cables along the equipotential metal plate. Separating different types of cables or separating cables in the same metal (zinc-iron or stainless steel) duct with metal separators can enhance the internal EMC performance.

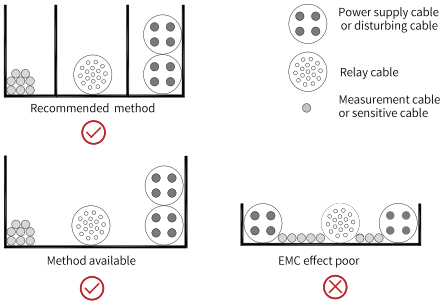


Figure 5-116 Laying multiple types of cables

Requirements on handing of shielded cables

Minimize the unshielded part of the shielded cable, and connect the shield to the nearest PE terminal. If the unshielded part is too long, the conductor may be prone to signal interference, especially the encoder signals.

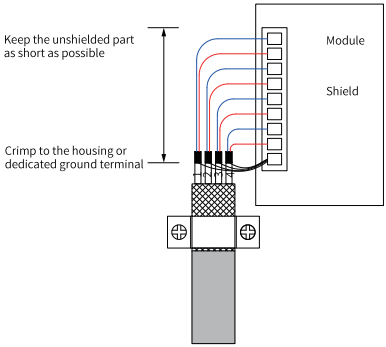


Figure 5-117 Requirements on shielded cable

5.6.5 Grounding

5.6.5.1 Grounding Requirement

Observe the following requirements to ensure proper grounding of the product.

CAUTION

1. Ground the grounding terminal to avoid electric shock. Follow the relevant electrical regulations of specific countries or regions on the grounding method.
2. To prevent electric shock, ensure the protective grounding conductor complies with technical specifications and local safety standards. Keep the grounding cable as short as possible.
3. In any case, the cross-sectional area of each protective grounding conductor that does not form part of the power cable or cable jacket cannot be lower than 2.5 mm^2.
4. The leakage current of an individual drive cannot exceed 3.5 mA AC or 10 mA DC. You only need to configure one protective grounding conductor of the same specification as the phase cable.
5. When using multiple devices, follow the instructions of grounding all devices. Incorrect grounding can result in malfunction of devices.

5.6.5.2 Grounding a Single Device

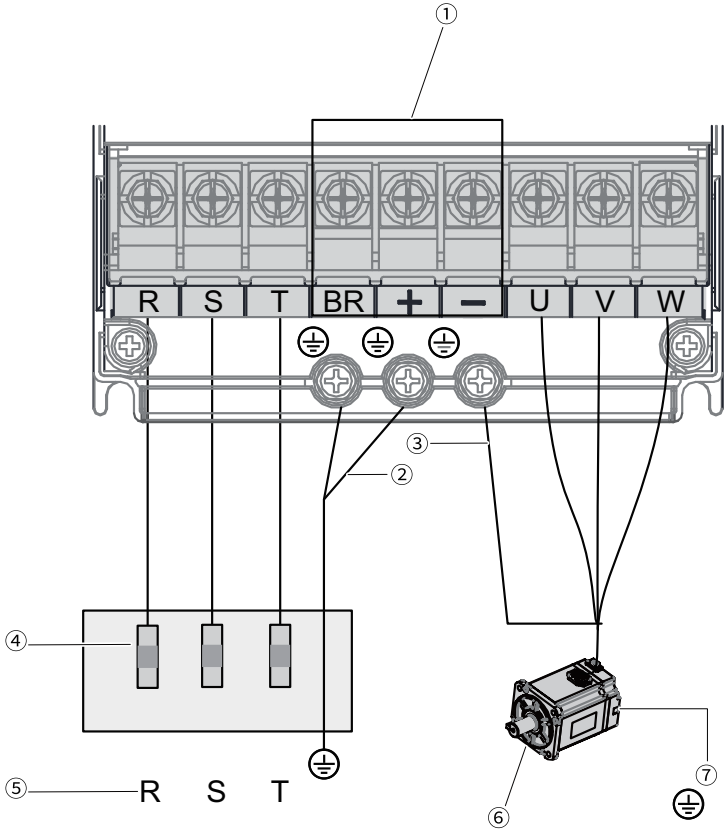


Figure 5-118 Main circuit grounding

Table 5–38 Grounding description of the main circuit

No.	Description
①	Avoid grounding the DC bus terminal and braking resistor terminal.
②	Connect the PE terminal on the input power supply side to the PE terminal on the input side of the AC drive.
③	Connect the output PE terminal of the AC drive to the output cable shield of the motor.
④	Input protection (fuse or circuit breaker). Connect the lower end of the fuse to the filter.
⑤	Input power supply
⑥	Three-phase motor
⑦	Ground the motor enclosure.

Note

The layout of main circuit terminals varies with different models.

5.6.5.3 Grounding Multiple Devices

The grounding diagram for side-by-side installation of multiple drives is shown below.

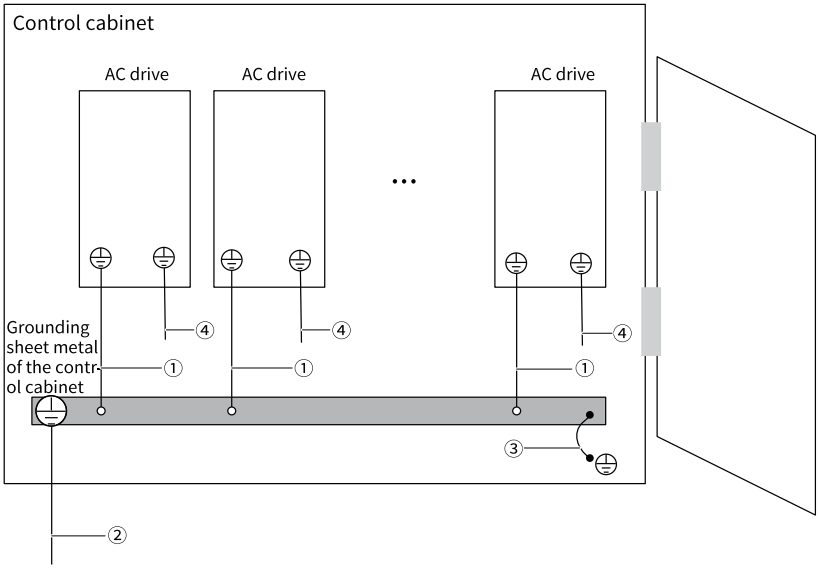


Figure 5-119 Grounding of paralleled drives

Table 5–39 Description for grounding of paralleled drives

No.	Description
①	Connect the main circuit input PE terminal to the grounding sheet metal of the control cabinet through the protective grounding conductor.
②	Connect the PE cable on the input power supply end to the grounding sheet metal of the control cabinet.
③	Connect the grounding sheet metal of the control cabinet to the metal enclosure of the control cabinet through the protective grounding conductor.
④	Connect the motor output cable shield to the output PE terminal of the drive.

5.6.5.4 Grounding the Cabinet System

The cost-effective method of suppressing interference in a cabinet is to isolate the interference source from the equipment that may be interfered with. Divide a cabinet into multiple EMC compartments or use multiple cabinets based on the intensity of interference sources, and install each device in accordance with the following wiring principles.

Table 5–40 Wiring requirements

No.	Wiring Requirement
1	Install the control devices and drive devices into two separate cabinets.
2	Use grounding cables with a cross-sectional area of at least 16 mm^2 to connect different cabinets, therefore realizing equipotential between the cabinets.
3	Place the devices in different areas in the cabinet according to the device signal strength.
4	Carry out equipotential bonding for the devices in different areas of the cabinet.
5	Shield all communication (for example, RS485) and signal cables leading from the electrical cabinet.
6	Install the power supply input filter close to the cabinet input interface.
7	Spray each grounding point in the cabinet.

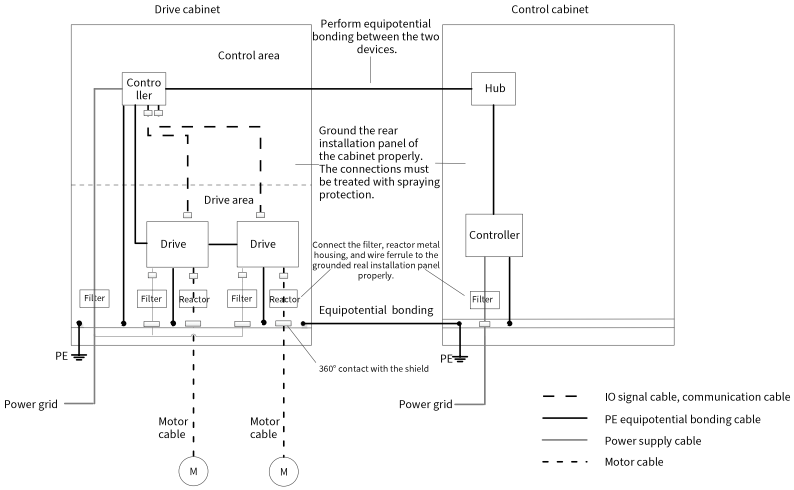


Figure 5-120 Recommended wiring for the cabinet system

5.6.6 Communication Connection

5.6.6.1 RS485 Communication Wiring

RS485 communication with the PLC

Use a three-conductor shielded cable as the RS485 bus to connect to 485+, 485-, and CGND terminals of the AC drive. Use the twisted pair cable to connect to the 485+ and 485- terminals and use the other cable to connect to the RS485 reference ground terminal CGND. Connect the shield to the equipment ground. Connect a 120 Ω termination resistor at each end of the bus to prevent RS485 signal reflection. The following table specifies the cable pin for the communication between the AC drive and PLC.

Table 5–41 Cable pin for communication between the AC drive and PLC

AC drive			PLC		
Communication type	Signal name	Function description	Communication type	Signal name	Function description
RS485	485+	RS485 signal (positive)	RS485	485+	RS485 signal (positive)
	485-	RS485 signal (negative)		485-	RS485 signal (negative)
	CGND	Signal reference ground		CGND	Signal reference ground
-	PE (shield)	Enclosure	-	PE (shield)	Enclosure

RS485 communication for connections of multiple AC drives in parallel

The following table specifies the cable pin for connections of multiple AC drives in parallel in RS485 communication networking.

Table 5–42 Cable pin for parallel communication of multiple AC drives in parallel

AC drive (side A)			AC drive (side B)		
Communication type	Signal name	Function description	Communication type	Signal name	Function description
RS485	485+	RS485 signal (positive)	RS485	485+	RS485 signal (positive)
	485-	RS485 signal (negative)		485-	RS485 signal (negative)
	CGND	Signal reference ground		CGND	Signal reference ground
-	PE (shield)	Enclosure	-	PE (shield)	Enclosure

Networking

Use the daisy chain connection for the RS485 bus in case of a large number of nodes, as shown in the following figure. Connect the RS485 signal reference ground of all nodes (up to 128 nodes) together.

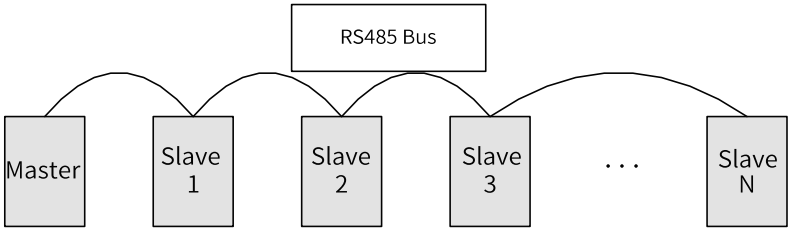


Figure 5-121 Daisy chain connection mode

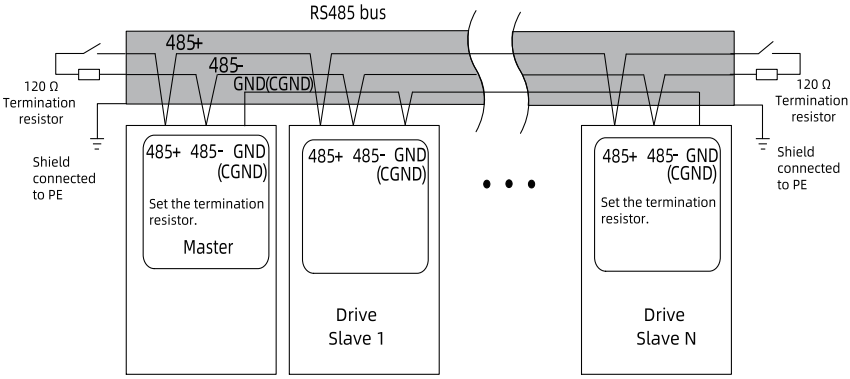


Figure 5-122 RS485 bus topology

The following table lists the maximum number of nodes and transmission distance supported by the standard RS485 circuit at different transmission rates.

Table 5–43 Transmission distance and number of nodes

Transmission distance (m)	Rate (kbps)	Number of nodes	Cable specification
100	115.2	128	26AWG
1000	19.2	128	26AWG

5.6.6.2 CAN Communication Wiring

CAN communication with the PLC

Use a three-conductor shielded cable for the CAN bus to connect to the CANH, CANL, and CGND terminals of the AC drive. Use one twisted pair cable to connect to the CANH and

CANL terminals and use the other cable to connect to the CAN reference ground CGND. Connect the shield to the equipment ground. Connect a 120 Ω termination resistor at each end of the bus to prevent RS485 signal reflection.

The following table specifies the cable pin for the CAN communication between the AC drive and PLC.

Table 5–44 Cable pin for the communication between the AC drive and PLC

AC drive			PLC		
Communication type	Signal name	Function description	Communication type	Signal Name	Function description
CAN	CANH	CAN signal (positive)	CAN	CANH	CAN signal (positive)
	CANL	CAN signal (negative)		CANL	CAN signal (negative)
	CGND	Signal reference ground		CGND	Signal reference ground
-	PE (shield)	Enclosure	-	PE (shield)	Enclosure

CAN communication for connections of multiple AC drives in parallel

The following table specifies the cable pin for connections of multiple AC drives in parallel in CAN communication networking.

Table 5–45 Cable pin for connections of multiple AC drives in parallel

AC drive (side A)			AC drive (side B)		
Communication type	Signal name	Function description	Communication type	Signal name	Function description
CAN	CANH	CAN signal (positive)	CAN	CANH	CAN signal (positive)
	CANL	CAN signal (negative)		CANL	CAN signal (negative)
	CGND	Signal reference ground		CGND	Signal reference ground
-	PE (shield)	Enclosure	-	PE (shield)	Enclosure

Networking

Use the daisy chain mode for the CAN bus, as shown in the following figure. Use shielded twisted pair cables for the CAN bus, and use twisted pair cables to connect CANH and CANL terminals. Connect a 120 Ω termination resistor at each end of the bus to prevent signal reflection. Connect the CAN signal reference ground of all the nodes (up to 64 nodes) together.

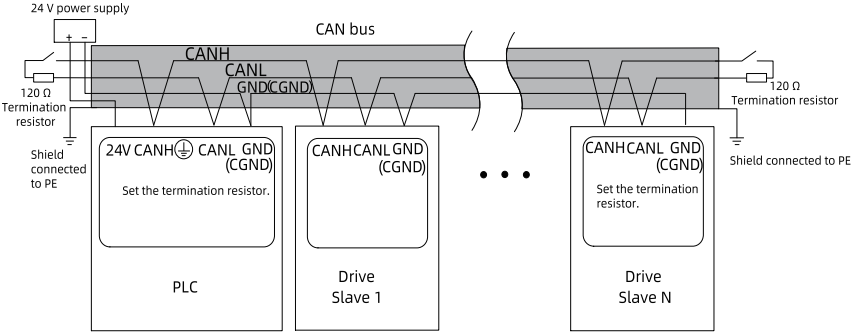


Figure 5-123 CAN bus topology

The transmission distance of the CAN bus is directly related to the baud rate and the communication cable. The following table describes the relationship between the maximum bus length and the baud rate.

Table 5–46 Transmission distance and baud rate

Transmission distance (m)	Rate (kbps)	Number of nodes	Cable specification
25	1024	64	24AWG
95	500	64	22AWG
560	100	64	20AWG
1100	50	64	18AWG

5.6.6.3 Wiring of EtherCAT Communication

The EtherCAT bus adopts standard RJ45 network port and standard RJ45 connector. Use Cat 5e shielded twisted pairs and injection cables with iron housing. According to FastEthernet, when an EtherCAT bus is used, the length of the cable between the devices cannot exceed 100 m. Otherwise, the signal will be attenuated, affecting communication.

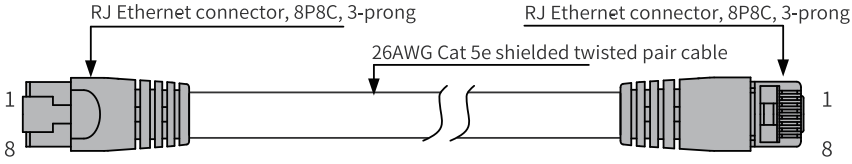


Figure 5-124 Requirement on the EtherCAT cable

Shielded twisted pairs are used as the EtherCAT bus for network data transmission. Cables with the following specifications are recommended.

Table 5–47 EtherCAT cable specifications

Item	Specification
Cable type	Flexible crossover cable, S-FTP, Cat 5e
Standards compliance	EIA/TIA568A, EN 50173, ISO/IEC 11801 EIA/TI Abulletin TSB, EIA/TIA SB40-A&TSB36
Cross sectional area	26AWG
Conductor type	Twisted pair
Number of pairs	4

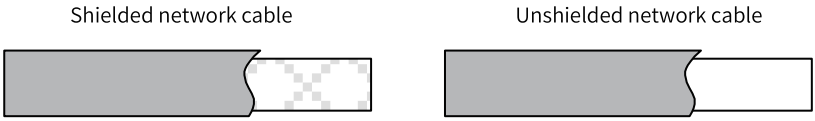


Figure 5-125 Shielded network cable

To connect the RJ45 network cable, hold the RJ45 connector of the cable and insert it into the RJ45 port of the communication module until you hear a "click" sound. To remove the RJ45 network cable, press down the clip of the RJ45 connector, and then pull it out along the direction parallel with the module.

Fix the cables to a place near one side of the device before EtherCAT communication. This prevents the communication cable from being affected by other tension to ensure communication stability.

5.6.6.4 PROFINET Communication Wiring

After communication between the MD500-PN1/MD500-PN2 card and the AC drive is implemented, connect the AC drive to the PROFINET master station and configure related parameters. This can implement communication between the MD500-PN1/MD500-PN2 card and the PROFINET master station, thereby implementing AC drive networking.

PROFINET supports multiple types of topologies including the bus type, star type, and tree type. Multiple types of networking can be achieved through the switch.

Two ports on the AC drive can be used to realize ring topology or linear topology. Connect the cable to only one of the two ports. The cable between two nodes is no longer than 100 m in length.

5.6.7 Post-wiring Inspection

After wiring is done, check the items in the following checklist.

Table 5–48 Wiring checklist

Item	Description	Compliance
1	Power supply input cables are connected to R, S, and T terminals.	□
2	Motor input cables are connected to the U, V, and W terminals.	□
3	The cross-sectional area of the main circuit cables meet the requirements.	□
4	The heat-shrinkable tubes have been applied to the main circuit terminal copper tubes and fully cover the cable conductor of the main circuit.	□
5	The motor output cable does not exceed 50 m. If yes, reduce the carrier frequency through F0-15.	□
6	The grounding cable is connected properly.	□
7	The output terminals and control signal cable terminals are connected properly.	□
8	The braking resistor and braking unit (if used) are correctly connected. The resistance is proper.	□
9	The control circuit signal cables are shielded twisted pair cables.	□
10	Optional cards are connected correctly.	□
11	Control circuit cables and main circuit cables are routed through different routes.	□

5.7 Installation Requirements on Options

5.7.1 Input reactor

Installing the input reactor on the input side of the AC drive can improve the input power factor, suppress the high harmonics of the input current of the AC drive, and reduce external conduction and radiation interference. The AC input reactor is an option. In applications where harmonics need to be suppressed, install an external AC input reactor to meet requirements of the EN IEC 6100032/12 standard.

If an AC input reactor is required, ensure that sufficient installation space is reserved in the cabinet.

5.7.2 Output Reactors

With an output reactor installed on the output side of the drive, the excessive dV/dt can be reduced. This can reduce the voltage stress on the motor winding to protect it, lower the motor temperature, and prolong the service life of the motor.

5.7.3 Fuse, Contactor, and Circuit Breaker



When the fuse is damaged or the circuit breaker trips, do not immediately energize the product or operate the peripheral equipment. Wait at least for the time specified on the warning label. Failure to comply will result in personal injury and equipment damage.

To comply with IEC/EN 61800-5-1 and UL 61800-5-1 standards, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by short circuit in the internal circuit.

5.7.4 EMC filter

The optional EMC filter can meet the EN IEC 61800-3 C2 emission requirements. For details on the model and dimensions, refer to the EMC filter selection in "Peripheral Electrical Components". Install the EMC filter according to the following requirements:

- Install the EMC filter close to the input terminals, and keep the connection cable shorter than 30 cm.
- Connect the grounding terminal of the EMC filter to that of the AC drive, and install the EMC filter and the AC drive on the same conductive installation surface, which is connected to the main ground of the cabinet.
- Connect the LINE terminal of the EMC filter to the power grid, and the LOAD terminal to the AC drive.

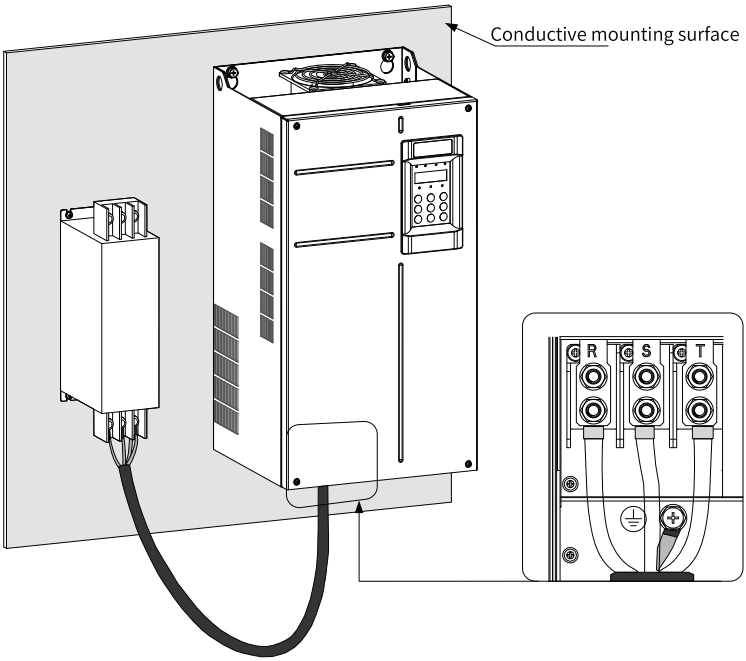


Figure 5-126 Installing an EMC filter

5.7.5 Simple Filter

When no standard EMC filter is installed, a simple filter (capacitor box) can also be used to suppress the RF electromagnetic noise generated from the power grid and the AC drive during operation. The simple filter must be grounded securely and the cable between the filter and AC drive must be shorter than 30 cm.

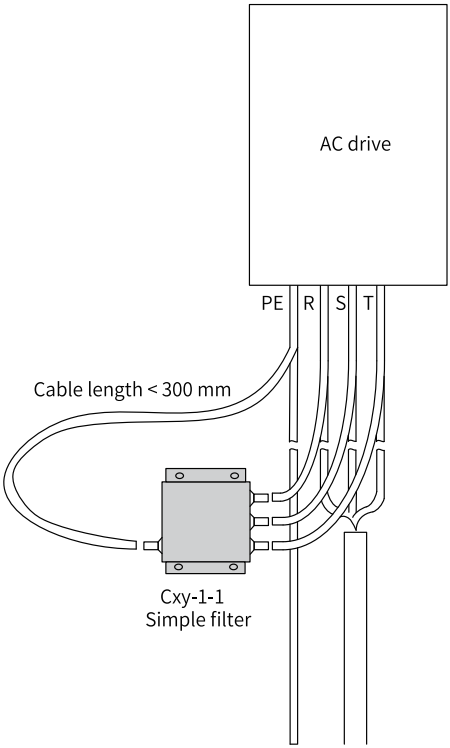


Figure 5-127 Simple filter installation

5.7.6 Magnetic Ring and Ferrite Clamp

The magnetic ring can be used on the input or output side of the AC drive. Install it as close to the AC drive as possible. When installed on the input side, the magnetic ring can suppress the noise in the input power supply system of the drive. When installed on the output side, the magnetic ring can suppress interference generated by the AC drive to external devices and reduce the bearing current.

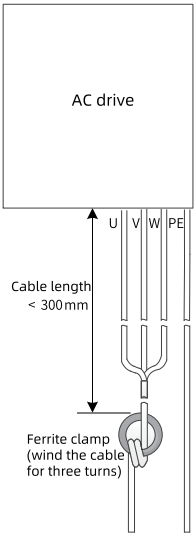


Figure 5-128 Installing the magnetic ring

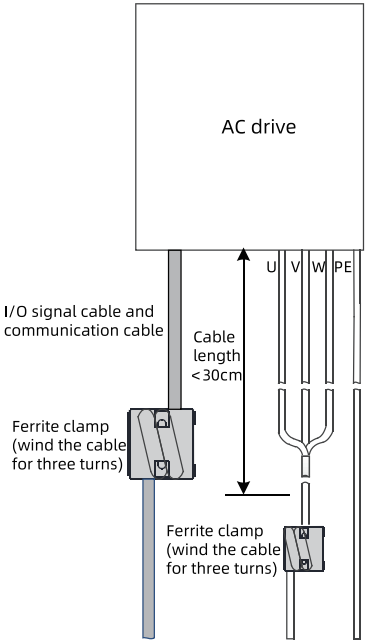


Figure 5-129 Installing the ferrite clamp

Note

The R/S/T or U/V/W cables must pass through the same magnetic ring to suppress the common mode noise.

5.8 Solutions to Common EMC Problems

5.8.1 Residual Current Device Malfunction

When the residual current device (RCD) malfunctions, perform troubleshooting according to the following table.

Table 5-49 Solution for leakage current

Tripping	Possible cause	Solution
Trip upon power-on	The anti-interference performance of the RCD is poor.	1. Use a RCD of a recommended brand. 2. Use a RCD with a higher tripping current. 3. Move the unbalanced load to the front end of the RCD. 4. Remove the EMC screw or disconnect the grounding terminal of the external EMC filter to reduce the capacitance of the input end to the ground.
	The action current of the RCD is too low.	
	Unbalanced load is connected to the rear end of the RCD.	
	The capacitance to the ground at the front end of the AC drive is large.	
Trip during operation	The anti-interference performance of the RCD is poor.	1. Use a RCD of a recommended brand. 2. For an individual AC drive, tighten the EMC screw. For multiple AC drives, disconnect the optional EMC grounding screw, as shown in *"Figure 5-130 Disconnecting the optional EMC grounding screw" on page 217*. 3. Install a simple filter on the input side of the drive, and wind the LN/RST cables through a magnetic ring near the RCD, as shown in *"Figure 5-131 Installing a simple filter and magnetic ring on the input side" on page 217*. 4. Use a RCD with a higher rated tripping current. 5. Reduce the carrier frequency without compromising performance. 6. Use shorter motor cables.
	The tripping current of the RCD is excessively low.	
	Unbalanced load is connected to the rear end of the RCD.	
	For motor cables and the motor, the distributed capacitance to ground is too high.	

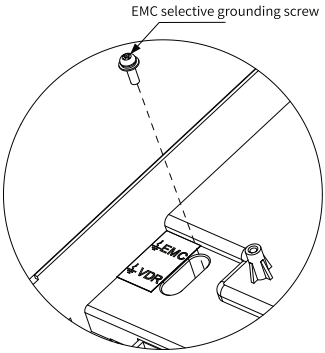


Figure 5-130 Disconnecting the optional EMC grounding screw

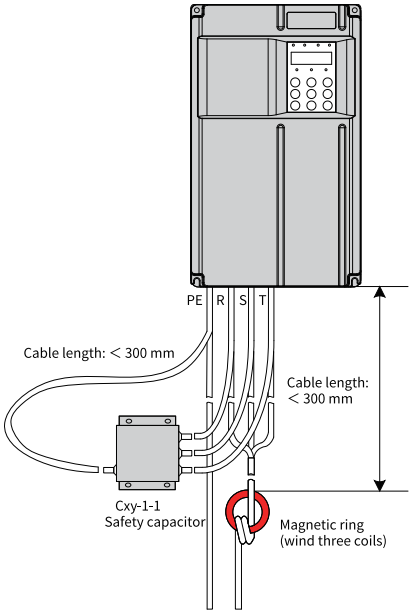


Figure 5-131 Installing a simple filter and magnetic ring on the input side

5.8.2 Harmonic Suppression

To suppress high-order harmonics of the drive and improve the power factor, install an input reactor on the input side of the AC drive to meet standard requirements.

5.8.3 Control Circuit Interference

5.8.3.1 High-Speed Pulse Interference

In the case of interference, take the following rectification measures.

Step	Solution
1	Use shielded twisted pair cables and ground the cables at both ends.
2	Connect the PE terminal of the AC drive to the motor housing.
3	Connect the PE terminal of the AC drive to that of the power grid.
4	Add an equipotential bonding grounding cable between the host controller and the AC drive.
5	Separate signal cables from power cables with a distance of at least 30 cm.
6	Add a ferrite clamp to the signal cable, or add a magnetic ring and wind the signal cable through the magnetic ring for one to two turns.
7	Install a magnetic ring to the U, V, and W output cables at the drive side and wind the cables through the magnetic ring for two to four turns.
8	Use a shielded power cable and properly ground its shield.

5.8.3.2 Common I/O Signal Interference

The drive generates strong interference during operation, which may interfere with other devices due to improper wiring or grounding. When the drive interferes with or is interfered by other devices, adopt the following measures.

Procedure	Solution
1	Use shielded cables as I/O signal cables and connect the shield to the PE terminal.
2	Connect the PE terminal of the motor to that of the drive, and connect the PE terminal of the drive to that of the power grid.
3	Add an equipotential bonding grounding cable between the host controller and the AC drive.
4	Install a magnetic ring to the U, V, and W output cables at the drive side and wind the cables through the magnetic ring for two to four turns.
5	Increase the filtering capacitance of the low-speed DI. The recommended maximum value is 0.1 uF.
6	Increase the filtering capacitance of the AI. The recommended maximum value is 0.22 uF.

Procedure	Solution
7	Install a ferrite clamp or a magnetic ring to the signal cable and wind the signal cable through the magnetic ring for one to two turns.
8	Use a shielded power cable and properly ground its shield.

5.8.4 Communication Interference

5.8.4.1 RS485 and CAN Communication Interference

In the case of interference, take the following rectification measures.

Step	Solution
1	Install a 120 Ω termination resistor at both ends of the bus.
2	Use multi-conductor shielded twisted pair cables and ground the shield at both ends.
3	Separate communication cables from power cables with a distance of at least 30 cm.
4	Adopt the daisy chain mode for multi-node communication.
5	For multi-node communication, add an equipotential bonding grounding cable between nodes.
6	Add a ferrite clamp at both ends of the communication cable or add a magnetic ring at both ends of the communication cable and wind the communication cable through the magnetic ring for one to two turns.
7	Install a magnetic ring to the U, V, and W output cables at the drive side and wind the cables through the magnetic ring for two to four turns.
8	Use a shielded power cable and properly ground its shield.

6 Commissioning and Trial Run

6.1 LED Operating Panel

6.1.1 Operating Panel

Components

The LED operating panel is used for viewing the operating status, setting parameters, and viewing fault information. The following figure shows the operating panel.

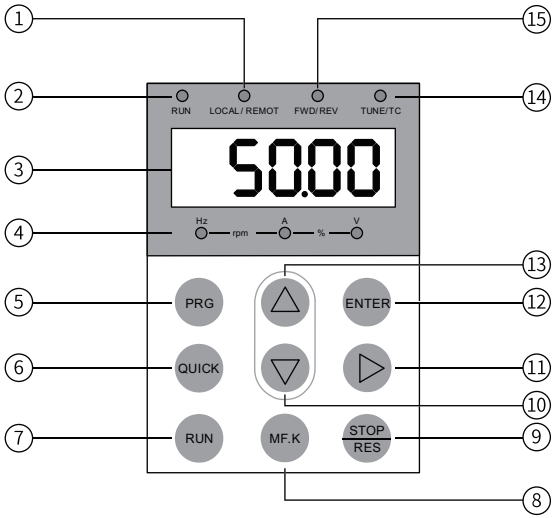


Figure 6-1 Components

Table 6–1 Description of the operating panel

No.	Part name	No.	Part name
1	Command source indicator	9	Stop/Reset key
2	Running state indicator	10	DOWN key
3	Data display area	11	Shift key
4	Unit indicator	12	ENTER key
5	Programming key	13	UP key
6	Menu key	14	Auto-tuning/Fault indicator
7	RUN key	15	Forward/Reverse run indicator
8	Multi-function key	-	-

Keys

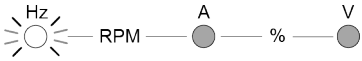
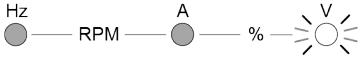
Table 6–2 Descriptions of keys

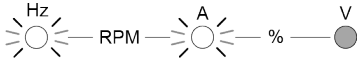
Key	Name	Function
PRG	Programming key	Return to the previous interface; Enter the level-1 menu.
ENTER	ENTER key	Enter the next interface; Confirm the mode, parameter, and value.
△	UP key	Increase the parameter number and setpoint.
▽	DOWN key	Decrease the parameter number and setpoint.
▷	Shift key	Shift the displayed parameter to the left cyclically; Shift the modified bit of the parameter code or value to the left.
RUN	RUN key	In the operating panel control mode, press the key to operate the drive.
STOP/RES	Stop/Reset key	Stop the drive during operation or reset the drive upon fault/alarm.
MF.K	Multi-function key	Switch functions according to the setting of F7-01.
QUICK	Menu key	Switch menu modes according to the setting of FP-03 (One menu mode applies by default).

State indicator

 in the following table indicates ON; ● indicates OFF;  indicates flashing.

Table 6–3 Descriptions of indicators

Indicator status		Description
RUN Running state indicator		OFF: Stop
		ON: Running
LOCAL/REMOT Command source indicator		OFF: Operating panel control
		ON: Terminal control
		Flashing: Communication control
FWD/REV Forward/Reverse run indicator		OFF: Forward run
		ON: Reverse run
TUNE/TC Auto-tuning/Fault indicator		OFF: Operating normally
		ON: Reserved
		Flashing slowly (flashing once per second): Auto-tuning state
		Flashing quickly (flashing four times per second): Faulty state
		Frequency unit: Hz
		Current unit: A
		Voltage unit: V

Indicator status	Description
	Speed unit: rpm
	Percentage: %

LED display

The operating panel provides 5-digit LED display to indicate the frequency reference, output frequency, various monitoring data, and fault codes.

Table 6-4 LED display and actual data

LED display	Actual Data	Display	Actual Data	Display	Actual Data	Display	Actual Data
0	0	6	6	C	C	n	N
1	1	7	7	c	c	P	P
2	2	8	8	d	D	r	R
3	3	9	9	E	E	t	T
4	4	A	A	F	F	u	u
5	5, S	b	B	L	L	U	U

6.1.2 Related Parameters

Table 6–5 Parameters related to the operating panel

Parameter code	Parameter name	Default	Value range	Description
F7-01	MF.K key function	0	0: MF.K key disabled 1: Switchover between operating panel control and remote control (terminal or communication) 2: Switchover between forward and reverse run 3: Forward jog 4: Reverse jog	The MF.K key is a multi-functional key. This parameter is used to set the function of the MF.K key. 0: MF.K key disabled The MF.K key is invalid. 1: Switchover between operating panel control and remote command control (terminal or communication) If F0-02 is set to 0 (operating panel), the MF.K key is invalid. If F0-02 is set to 1 (terminal), the MF.K key is used for switchover between terminal control and operating panel control. If F0-02 is set to 2 (communication), the MF.K key is used for switchover between communication control and operating panel control. 2: Switchover between forward and reverse run You can change the direction of the frequency reference by using the MF.K key. This function is valid only when the command source is set to the operating panel. 3: Forward jog You can perform forward jog by using the MF.K key. This function is valid only when the command source is set to the operating panel. 4: Reverse jog You can perform reverse jog by using the MF.K key. This function is valid only when the command source is set to the operating panel.
F7-02	STOP/RES key function	0	0: STOP/RESET key enabled only in operating panel control mode 1: STOP/RES key enabled in any control mode	The STOP/RES key on the operating panel is used to stop/reset the AC drive. This parameter is used to set the function of the key. 0: STOP/RESET key enabled only in operating panel control The STOP/RES key is valid only in the operating panel control mode. 1: STOP/RESET key enabled in any control mode The STOP/RES key is valid in any control mode.

Parameter code	Parameter name	Default	Value range	Description
F7-03	Parameter 1 displayed on LED operating panel during operation	31	Bit 0: Running frequency (Hz) Bit 1: Frequency reference (Hz) Bit 2: Bus voltage (V) Bit 3: Output voltage (V) Bit 4: Output current (A) Bit 5: Output power (kW) Bit 6: Output torque (%) Bit 7: DI status Bit 8: DO status Bit 9: AI1 voltage (V) Bit 10: AI2 voltage (V) Bit 11: AI3 voltage (V) Bit 12: Counting value Bit 13: Length value Bit 14: Load speed Bit 15: PID reference	If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting the binary number to a hexadecimal number, set this parameter to the hexadecimal number. 1. This parameter defines parameters displayed on the LED operating panel during operation. 2. You can view the parameters corresponding to each bit by pressing the left and right shift keys. 3. When the bit value is 1, the parameter is displayed. When the bit value is 0, the parameter is not displayed. 4. Each parameter is displayed in the hexadecimal. For example, if you need to display the bus voltage, output power, and PID reference during operation, set bit 2, bit 5, and bit 15 to 1 (namely, 1000 0000 0010 0100). Convert the binary data to the hexadecimal equivalent 8024 and then set this parameter to 8024.

Parameter code	Parameter name	Default	Value range	Description
F7-04	Parameter 2 displayed on LED operating panel during operation	0	Bit 0: PID feedback Bit 1: PLC stage Bit 2: Pulse input reference (kHz) Bit 3: Operation frequency 2 (Hz) Bit 4: Remaining operating time Bit 5: AI1 voltage before correction (V) Bit 6: AI2 voltage before correction (V) Bit 7: AI3 voltage before correction (V) Bit 8: Motor speed Bit 9: Current power-on time (h) Bit 10: Current running time (min) Bit 11: Pulse input frequency (Hz) Bit 12: Communication setting value Bit 13: Encoder feedback speed (Hz) Bit 14: Main frequency X display (Hz) Bit 15: Auxiliary frequency Y display (Hz)	If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting the binary number to a hexadecimal number, set F7-04 to the hexadecimal number. 1. This parameter defines parameters displayed on the LED operating panel during operation. 2. You can view the parameters corresponding to each bit by pressing the left and right shift keys. 3. When the bit value is 1, parameters are displayed. When the bit value is 0, parameters are not displayed. 4. Each parameter is displayed in the hexadecimal. For example, if you need to display the remaining running time, current power-on time, and main frequency X during operation, set bit 4, bit 9, and bit 14 to 1 (namely, 0100 0010 0001 0000). Convert the binary data to the hexadecimal equivalent 4210 and then set this parameter to 4210.

Parameter code	Parameter name	Default	Value range	Description
F7-05	Parameter displayed on the LED operating panel at stop	51	Bit 0: Frequency reference (Hz) Bit 1: Bus voltage (V) Bit 2: DI input status Bit 3: DO output status Bit 4: AI1 voltage (V) Bit 5: AI2 voltage (V) Bit 6: AI3 voltage (V) Bit 7: Count value Bit 8: Length value Bit 9: PLC stage Bit 10: Load speed Bit 11: PID reference Bit 12: Pulse input reference (kHz)	If a parameter needs to be displayed when the AC drive stops, set its corresponding bit to 1. After converting the binary number to a hexadecimal number, set F7-05 to the hexadecimal number. 1. This parameter defines the parameters displayed on the LED operating panel at stop. 2. You can view the parameters corresponding to each bit by pressing the left and right shift keys. 3. When the bit value is 1, parameters are displayed. When the bit value is 0, parameters are not displayed. 4. Each parameter is displayed in the hexadecimal. For example, if you need to display the DI status, AI3 voltage (V), and pulse input frequency (kHz) at stop, set bit 2, bit 6, and bit 12 to 1 (namely, 0001 0000 0100 0100). Convert the binary data to the hexadecimal equivalent 1044 and then set this parameter to 1044.
FP-01	Parameters initialization	0	0: No operation 1: Restore to factory settings 1 (Motor parameters, encoder PPR, and maximum frequency are not restored to default settings) 2: Clear records 4: Back up current user parameters 501: Restore user backup parameters	This parameter is used to set the action upon parameter initialization of the drive. 0: No operation. The AC drive does not perform any operation. 1: Restore to factory settings 1. Most of the drive parameters are restored to the factory settings, except motor parameters, F0-22 (Decimal places of frequency reference), fault records, F7-09 (Cumulative operating time), F7-13 (Cumulative power-on time), F7-14 (Cumulative power consumption), and F7-07 (Heatsink temperature of inverter). 2: Clear records. The fault records, F7-09 (Cumulative operating time), F7-13 (Cumulative power-on time), and F7-14 (Cumulative power consumption) are cleared. 4: Back up current user parameters. The current parameter settings are backed up. 501: Restore user backup parameters. Parameters backed up by setting FP-01 to 4 are restored.

Parameter code	Parameter name	Default	Value range	Description
FP-02	Parameter display	11	Ones: Parameter group U display 0: Not displayed 1: Displayed Tens: Parameter group A display 0: Not displayed 1: Displayed	This parameter is used to determine whether parameters in groups U and A are displayed on the operating panel.
FP-03	Customized parameter group display	0	Ones: Display of user-defined parameter group 0: Not displayed 1: Displayed Tens: Display of user-modified parameter group 0: Not displayed 1: Displayed	The ones place or tens place of the parameter is used to determine whether the user-defined parameter group or the user-modified parameter group is displayed on the operating panel.

6.1.3 Parameter Settings

The operating panel provides three levels of menus for parameter settings. After entering a menu at a level, press  ,  and  for setting a display bit that is flashing. The three levels of menus are described as follows:

- Level-1 menu: parameter groups
- Level-2 menu: parameters
- Level-3 menu: parameter values

For example, to change the value of F3-02 from 10.00 Hz to 15.00 Hz, perform settings according to the following figure.

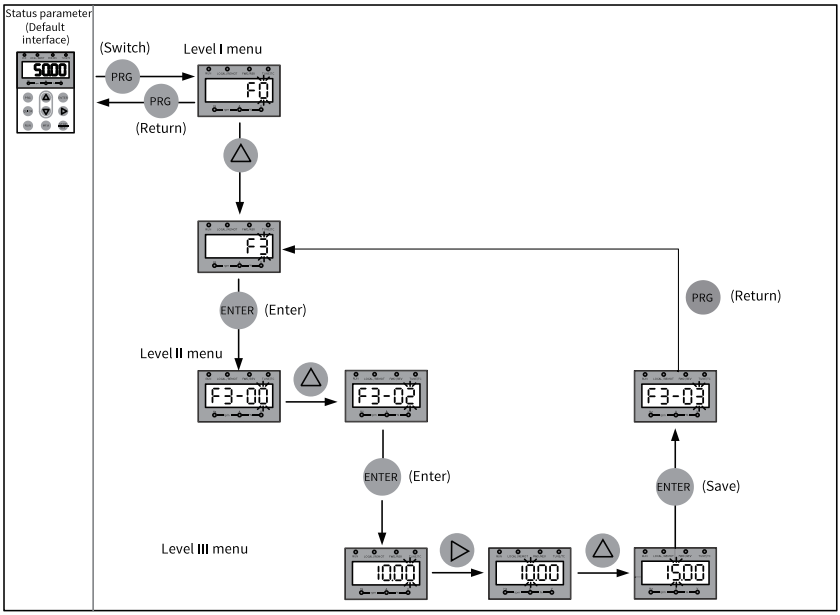


Figure 6-2 Modifying a parameter

Press PRG or ENTER to return to a level-2 menu when operating a level-3 menu. The difference between the two keys is as follows:

1. After you press ENTER, the system saves the parameter settings and then goes back to level-2 menu and shifts to the next parameter.
2. Pressing PRG to return to level-2 menu corresponding to the current parameter without saving the current parameter setting.

If a parameter does not have a blinking bit in level-3 menu, the parameter cannot be modified. The reasons include the following:

1. The parameter is an unmodifiable parameter, such as the product type, actual measurement, and operation log.
2. The parameter is unmodifiable when the drive is running. In this case, to modify the parameter, stop the drive first.

6.1.4 Parameter Viewing

The following figure shows the operation flowchart.

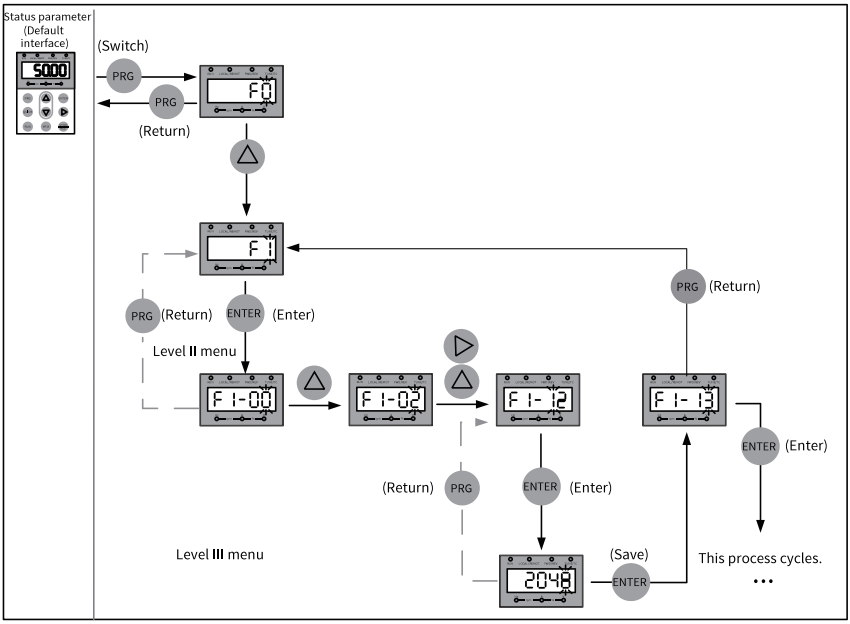


Figure 6-3 Operating process for parameter viewing

6.1.5 Quick Parameter View

Due to a large number of drive parameters, you can use the following methods for quick view:

- You can add up to 30 commonly-used parameters to a group and determine whether to display the parameters through parameters in group FE.
- The drive automatically lists the modified parameters for view.

You can view the following types of parameters.

Parameter display mode	Display code
Parameter	-bASE
User-defined parameter	-USEr
User-modified parameter	--C--

Press the QUICK key on the operating panel to switch display of the three types of parameters. After entering parameter groups, you can view or modify parameters in the same way as described in the operating panel operation section.

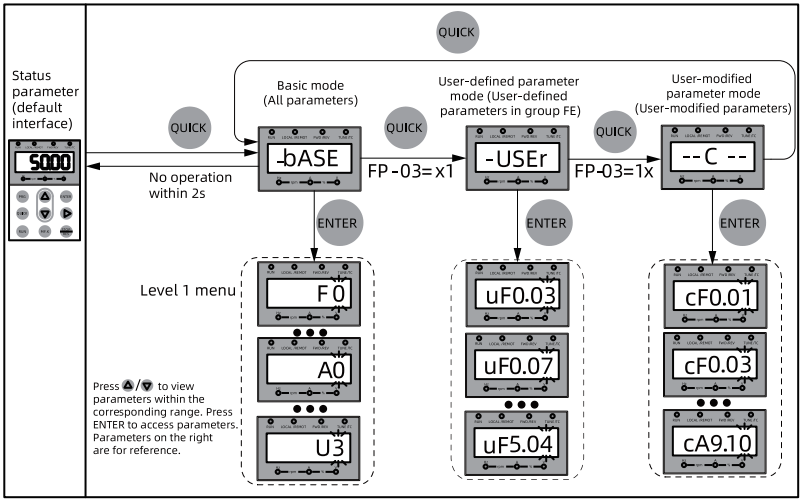


Figure 6-4 Quick parameter view

FP-03 is used to determine whether the user-defined parameter group and user-modified parameter group are displayed.

Parameter code	Parameter name	Default	Value range	Description
FP-03	Customized parameter group display	0	Ones: Display of user-defined parameter group 0: Not displayed 1: Displayed Tens: Display of user-modified parameter group 0: Not displayed 1: Displayed	The ones place or tens place of the parameter is used to determine whether the user-defined parameter group or the user-modified parameter group is displayed on the operating panel.

-bASE Basic parameter group:

Basic parameters include all parameters of the drive. The level 1 menu is displayed when you enter the basic parameter group. You can query or modify the parameters as described before.

-USEr User-defined parameter group:

The user-defined menu helps you to view and modify commonly used parameters quickly. The parameter in the user-defined menu is displayed in the form of "uXX.XX" (such as uF3.02, indicating F3-02). You can modify parameters in the user-defined menu in the same way as that in the common editing state. The level 2 menu applies when you enter the user-defined parameter group.

You can only add parameters in group FE to the user-defined menu. When F0.00 is set, no parameter has been selected. Up to 30 parameters can be selected. If "NULL" is displayed when you enter the menu, the user-defined menu is null.

A total of 16 commonly used parameters are pre-saved in the user-defined menu, as listed in the following table.

Table 6–6 Commonly-used parameters in the user-defined menu

Parameter code	Parameter name	Parameter code	Parameter name
F0-01	Motor 1 control mode	F0-02	Command source
F0-03	Selection of main frequency source X	F0-07	Frequency superposition selection
F0-08	Preset frequency	F0-17	Acceleration time 1
F0-18	Deceleration time 1	F3-00	V/f curve setting
F3-01	Torque boost	F4-00	DI1 function selection
F4-01	DI2 function selection	F4-02	DI3 function selection
F5-04	DO1 output function selection	F5-07	AO1 output function selection
F6-00	Startup mode	F6-10	Stop mode

You can edit the user-defined menu based on actual requirements.

--C-- User-modified parameter group:

In the user-modified menu, only the parameters that are modified to non-default values are displayed. The menu is generated by the AC drive automatically for quick view. The level 2 menu applies when you enter the user-modified parameter group.

6.1.6 Display of Status Parameters

When the AC drive is running, press  to view the status parameters. By default, the following status parameters are displayed: operating frequency, frequency reference, bus voltage, output voltage, and output current. To view more status parameters, see descriptions of F7-03 and F7-04 in "Related Parameters".

In the stop state, press  to view the status parameters. The following status parameters are displayed by default: frequency reference, bus voltage, AI1 voltage, AI2 voltage, AI3 voltage, and speed reference. For more status parameters, see descriptions of F7-05 in "Related Parameters".

6.1.7 MF.K Multi-functional Key

The 

key on the operating panel is a multi-functional key. Its function can be set using F7-01. In the stop or running state, you can press the key for control mode switchover, and switchover between forward run and reverse run, and forward/reverse jog.

Table 6–7 MF.K key parameter descriptions

Parameter code	Parameter name	Default	Value range	Description
F7-01	MF.K key function	0	0: MF.K key disabled 1: Switchover between operating panel control and remote control (terminal or communication) 2: Switchover between forward run and reverse run 3: Forward jog 4: Reverse jog	The MF.K key is a multi-functional key. This parameter is used to set the function of the MF.K key. 0: MF.K key disabled. This key has no function. 1: Switchover between operating panel control and remote control terminal or communication). When F0-02 is set to 0 (operating panel), the MF.K key does not work. When F0-02 is set to 1 (terminal), the MF.K key is used for switchover between terminal control and operating panel control. When F0-02 is set to 2 (communication), the MF.K key is used for switchover between the communication control and operating panel control. 2: Switchover between forward run and reverse run. The MF.K key is used for changing the direction of the frequency reference. This function is valid only when the command source is set to the operating panel. 3: Forward jog. The MF.K key is used for enabling forward jog (FJOG). This function is valid only when the command source is set to the operating panel. 4: Reverse jog. The MF.K key is used for enabling reverse jog (RJOG). This function is valid only when the command source is set to operating panel.

6.1.8 Driving the Motor with the Operating Panel

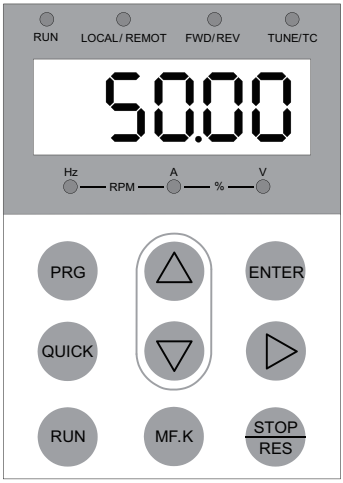
You can press MF.K on the operating panel to enable the motor to jog forwardly or reversely, and press RUN or STOP/RES to start or stop the motor.

Procedure

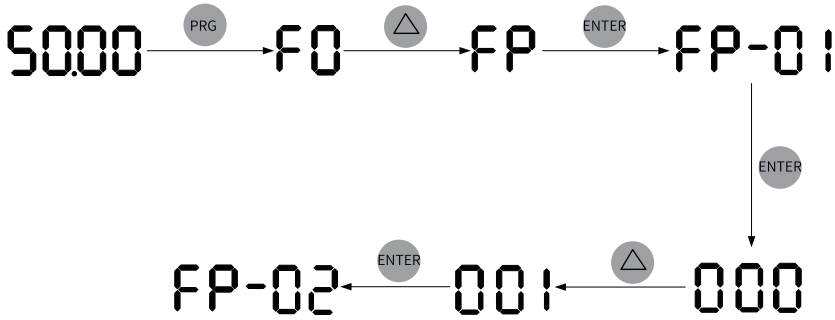
1. Perform check before power-on.

Check the installation and wiring according to the installation guide. For details, see the description of the inspection before power-on section.

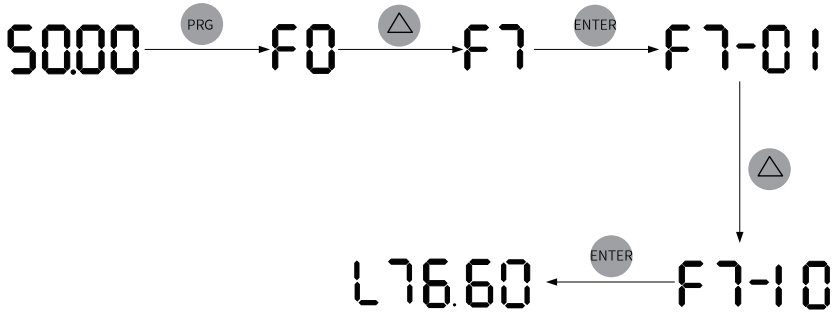
2. Press the power switch to power on the AC drive.
3. Check that 50.00 is displayed on the operating panel, which indicates successful power-on.



4. Set FP-01 to 001 and restore all parameters to default values. The operation example is shown in the following figure.



5. Check the value of F7-10, which indicates the software version.



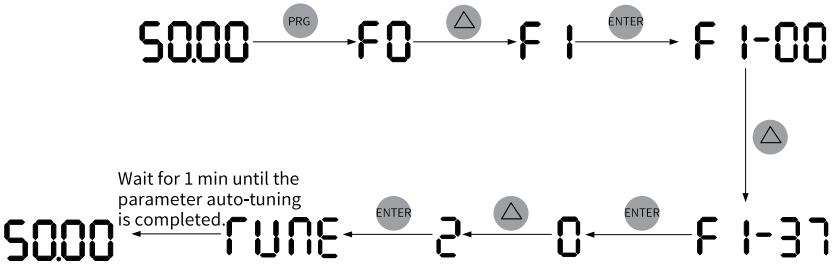
6. Set motor parameters in group F1 according to the motor nameplate.

Table 6–8 Motor parameters

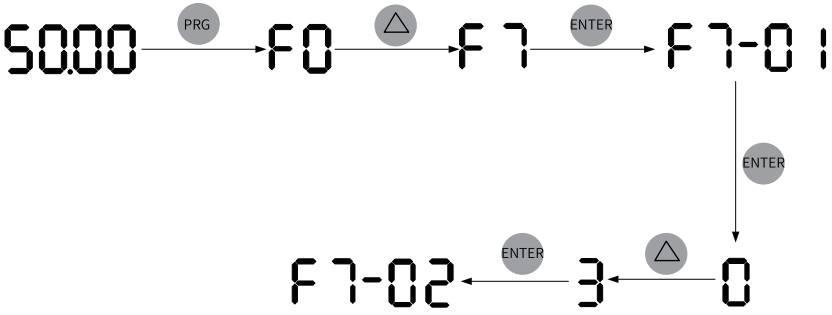
Parameter code	Parameter name	Default	Value range	Description	Value
F1-00	Motor type	0	0: Common asynchronous motor 1: Variable frequency asynchronous motor	This parameter is used to set the motor type. 0: Common asynchronous motor. A common asynchronous motor is suitable for applications with normal voltage but often full load. 1: Variable frequency asynchronous motor. A variable frequency motor can adjust its frequency and speed according to the load. When the voltage is low, the variable frequency motor can reduce the frequency for a reliable start. When the load is light, it can reduce the frequency, speed, and current to save energy.	0
F1-01	Rated motor power	Model dependent	0.1 kW to 1000.0 kW	This parameter indicates the power of the motor during normal operation. Its value is the product of the rated motor voltage multiplied by the rated motor current. Select a motor with a proper power rating on the premise that the motor can meet the requirements of mechanical load. Take the motor heat dissipation, allowable overload capacity, and starting capacity into account.	3.7 kW
F1-02	Rated motor voltage	Model dependent	1 V to 2000 V	The rated motor voltage indicates the voltage of the motor during normal operation, which usually refers to the line voltage.	380 V
F1-03	Rated motor current	Model dependent	0.01 A to 655.35 A (AC drive power ≤ 55 kW) 0.1 A to 6553.5 A (AC drive power > 55 kW)	The rated motor current indicates the current of the motor during normal operation, which usually refers to the line current.	9.00 A

Parameter code	Parameter name	Default	Value range	Description	Value
F1-04	Rated motor frequency	Model dependent	0.01 Hz to F0-10	The rated motor frequency indicates the frequency of the power supply connected to the stator winding under the rated operation conditions of the motor.	50.00 Hz
F1-05	Rated motor speed	Model dependent	1 rpm to 65535 rpm	The rated motor speed indicates the speed (in the unit of rpm) of the rotor under the rated operating conditions.	1460 rpm

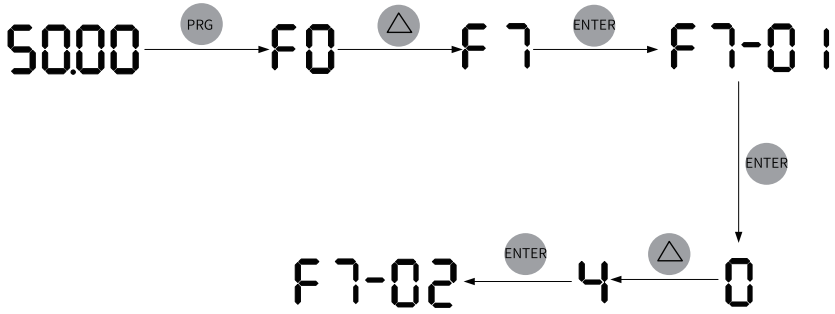
7. Set F1-37 to 2, and press ENTER to confirm. The operating panel displays  . Press the **RUN** key on the operating panel for more than three seconds to start motor auto-tuning. The RUN indicator is steady on, the TUNE/TC indicator blinks, and the AC drive energizes the motor. After about 1 minute, the panel displays 50.00, indicating that auto-tuning is complete.



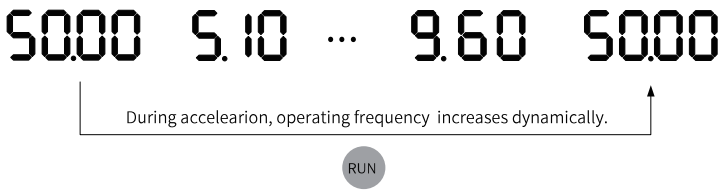
8. Set F7-01 to 3, and then press MF.K to enable the motor to jog forwardly.



9. Set F7-01 to 4, and then press MF.K to enable the motor to jog reversely.



10. Press RUN to start the motor. The motor shaft starts to rotate and accelerate, and the operating panel displays the current running frequency, as shown in the following figure. After acceleration is completed, the displayed frequency is 50.00. Press this key to switch the displayed status parameter.



11. Press STOP/RES. The motor will decelerate to stop.

6.2 Commissioning Process

6.2.1 Basic Commissioning Flowchart

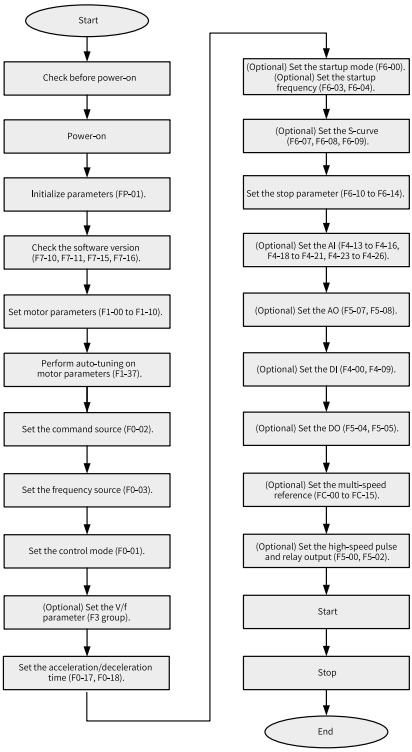


Figure 6-5 Basic commissioning flowchart

Table 6–9 Basic commissioning flowchart

No.	Step	Related Parameters
1	Check before power-on	/
2	Power-on	/
3	Parameter initialization	FP-01
4	View the software version.	F7-10, F7-11, F7-15, F7-16
5	Set motor parameters.	F1-00 to F1-05 and F1-06 to F1-10 (for asynchronous motor)
6	Set the control mode.	F0-01
7	Motor auto-tuning	F1-37
8	Set the command source.	F0-02
9	Select the frequency source.	F0-03
10	(Optional) Set V/f parameters.	F3 group
11	Set the acceleration and deceleration time.	F0-17, F0-18
12	(Optional) Set the startup mode.	F6-00
13	(Optional) Set the startup frequency.	F6-03, F6-04
14	(Optional) Set the S-curve.	F6-07, F6-08, F6-09
15	Set the stop parameters.	F6-10 to F6-14
16	(Optional) Set the AI.	F4-13 to F4-16, F4-18 to F4-21, F4-23 to F4-26
17	(Optional) Set the AO.	F5-07, F5-08
18	(Optional) Set the DI.	F4-00 to F4-09
19	(Optional) Set the DO.	F5-04
20	(Optional) Set the multi-reference.	FC-00 to FC-15
21	(Optional) Set the relay output.	F5-00, F5-01, F5-02
22	Start	/
23	Stop	/

6.2.2 Commissioning Flowchart in V/f Control Mode

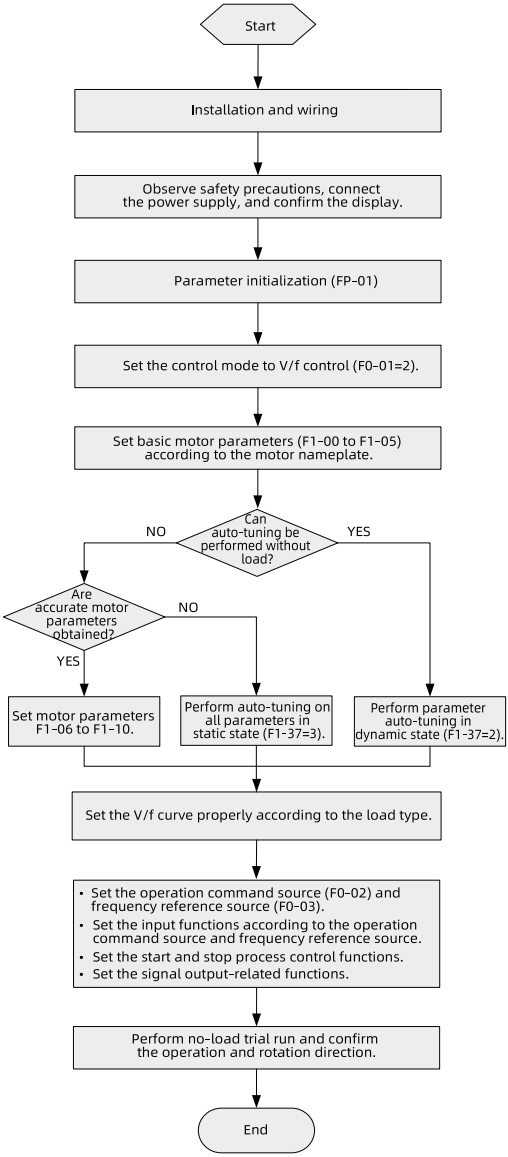


Figure 6-6 Commissioning flowchart in V/f control

7 Function Application

7.1 Drive Configuration

7.1.1 Operation Command Setting

7.1.1.1 Running Command Setting Source

Operation commands are used to control start, stop, forward run, reverse run, and jog of the AC drive. Three operation command sources are available: operating panel, terminals, and communication. Select the operation command input mode through F0-02.

Parameter code	Parameter name	Default	Value range	Description
F0-02	Command source	0	0: Operating panel 1: Terminal 2: Communication	This parameter is used to select the input channel of the AC drive control commands, such as run, stop, forward run, reverse run and jog operation. 0: Operating panel. Operation commands are input by using the RUN, STOP/RES, and MF.K keys on the operating panel. It is applicable to initial commissioning. 1: Terminal. Operation commands are input through the DIs of the AC drive. The DI can be assigned with different functions such as start/stop, forward/reverse run, jog, two-wire/three-wire mode, and multi-reference (independent from each other). This mode is suitable for most applications. 2: Communication. Operation commands are input through remote communication with the communication address of 0x7310 or 0x1000 in general. The AC drive must be equipped with a communication card to communicate with the host controller. The communication address for Modbus RTU and CANlink communication is 0x2000 and that for CANopen communication is 0x2073-12. The related parameter is U3-17.

7.1.1.2 Setting Operating Commands Through the Operating Panel

Set F0-02 to 0 and use 

and 

on the operating panel to start and stop the AC drive.

- Press 

to start the AC drive. The RUN indicator becomes ON.

- When the AC drive is running, press STOP RES to stop the AC drive (the RUN indicator is off).

7.1.1.3 Setting Operation Commands Through Communication

You can set F0-02 to 2 to select communication as the command source for controlling start/stop of the AC drive.

The AC drive supports communication with the host controller through six communication protocols: RS485, CANlink, CANopen, PROFIBUS DP, EtherCAT, and ROFINET. Only one communication protocol is supported at a time. To enable the drive to communicate with the host controller, you must install a communication card. The AC drive supports eight optional communication cards. If RS485, CANopen, PROFIBUS DP, PROFINET, or EtherCAT is used, set parameters in FD group and select the corresponding serial communication protocol. Modbus and CANlink communication is always valid.

When running commands are given through communication, the host controller needs to send write commands to the AC drive. This part takes the Modbus protocol as an example to describe the process of sending running commands through communication.

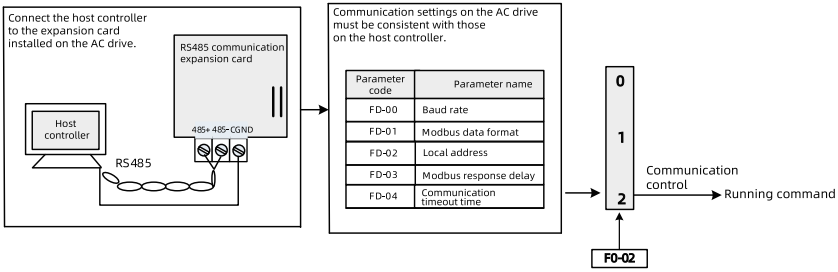


Figure 7-1 Sending running commands through communication

To make the AC drive run in the reverse direction, the host controller sends the write command 01 06 20 00 00 02 03 CB. The following table describes the definition of each byte. The command is in hexadecimal format. For other communication addresses and control commands, see "Appendix B: Communication Data Address Definition and Modbus Protocol".

Command	Definition
01H (configurable)	AC drive address
06H	Write command
2000H	Communication address of the control command

Command	Definition
02H (reverse run)	Control command
03CBH	CRC check

The following table describes the relationship between master commands and slave responses.

Command from the Master		Response from the slave	
ADDR	01H	ADDR	01H
CMD	06H	CMD	06H
High-order bits of parameter address	20H	High-order bits of parameter address	20H
Low-order bit of parameter address	00H	Low-order bit of parameter address	00H
High-order bit of data content	00H	High-order bit of data content	00H
Low-order bit of data content	02H	Low-order bit of data content	02H
CRC high-order bit	03H	CRC high-order bit	03H
CRC low-order bit	CBH	CRC low-order Bit	CBH

7.1.1.4 Setting Operation Commands Through Terminals

After setting F0-02 to 1, you can control the startup and stop of the AC drive through terminals.

F4-11 is used to set the terminal control mode. Four terminal control modes are available, including two-wire mode 1, two-wire mode 2, three-wire mode 1, and three-wire mode 2.

Parameter code	Parameter name	Default	Value range	Description
F4-11	Terminal command mode	0	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2	This parameter defines the mode in which the AC drive is controlled by external terminals.

You can use multi-functional input terminals DI1 to DI10 as external input terminals. Set parameters F4-00 to F4-09 to select functions for DI1 to DI10. For details about function definitions, see F4-00 (DI1) to F4-09 (DI10) descriptions in parameter list section.

Two-wire mode 1

Set F4-11 to 0 to select two-wire mode 1, which is the most commonly used mode.

For example, DI1 is allocated with forward running and DI2 is allocated with reverse running. Connect the forward running switch to DI1 and the reverse running switch to DI2.

Related Parameters	Parameter name	Value range	Function description
F4-11	Terminal command mode	0	Two-wire mode 1
F4-00	DI1 function selection	1	Forward run (FWD)
F4-01	DI2 function selection	2	Reverse run (REV)

When SW1 is closed and SW2 is open, the motor rotates in the forward direction. When SW1 is open and SW2 is closed, the motor rotates in the reverse direction. When SW1 and SW2 are both open or closed, the motor stops. See the figure below.

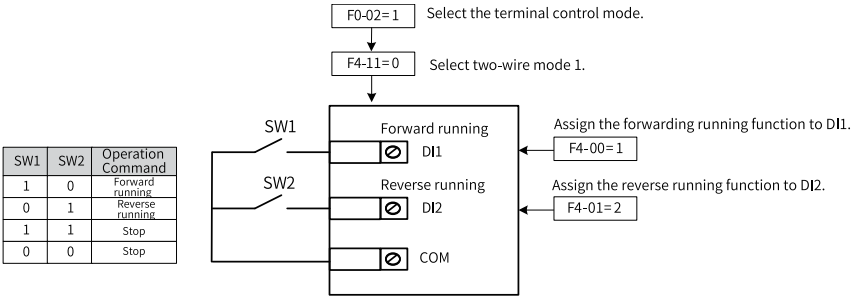


Figure 7-2 Wiring and parameter settings for two-wire mode 1

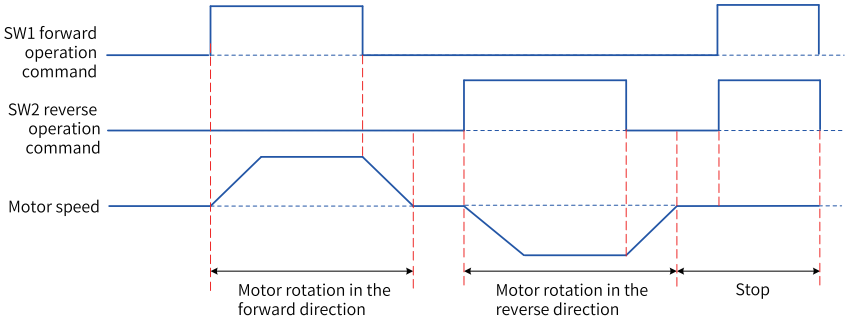


Figure 7-3 Time sequence (normal) for two-wire mode 1

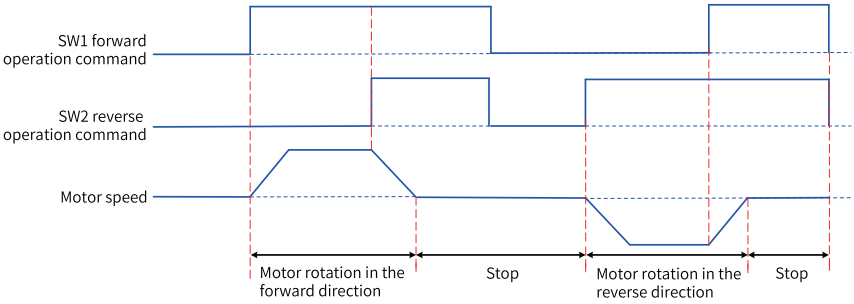


Figure 7-4 Time sequence (abnormal) for two-wire mode 1

Two-wire mode 2

For example, DI1 is allocated with the operation function, and DI2 is allocated with the forward and reverse running function. Set the parameters as follows.

Related Parameters	Parameter name	Value range	Function description
F4-11	Terminal command mode	1	Two-wire mode 2
F4-00	DI1 function selection	1	Operation command
F4-01	DI2 function selection	2	Forward/Reverse run direction

When SW1 is closed, the motor starts to run. When SW2 is open, the motor runs in the forward direction. When SW2 is closed, the motor runs in the reverse direction. When SW1 is open, the motor does not run regardless of the status of SW2. See the figure below.

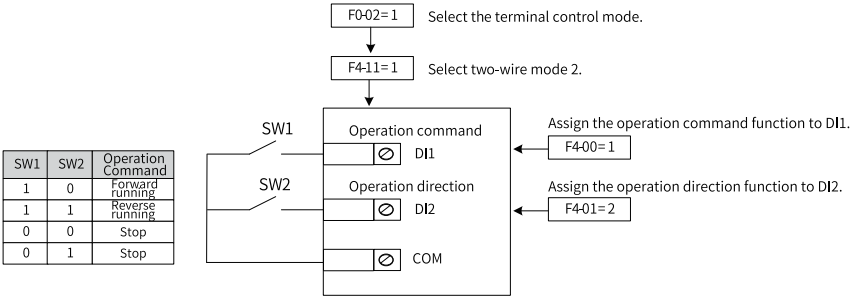


Figure 7-5 Wiring and parameter settings for two-wire mode 2

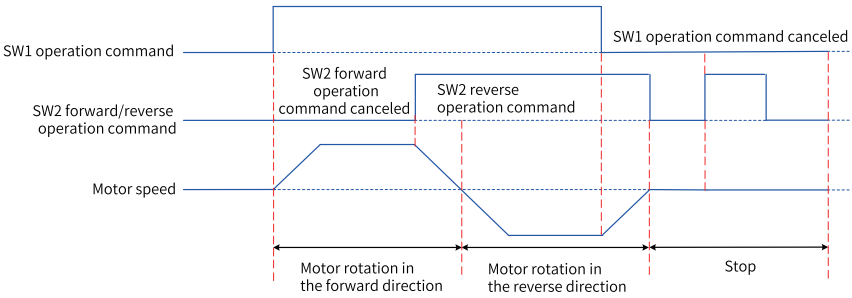


Figure 7-6 Time sequence for two-wire mode 2

Three-wire mode 1

For example, DI3 is allocated with the three-wire operation control function, DI1 is allocated with the forward running function, and DI2 is allocated with the reverse running function. In this control mode, keys are required to function as the start/stop switch. Connect the forward running key, reverse running key, and start/stop key to DI1, DI2, and DI3, respectively. The parameters are set as follows.

Related Parameters	Parameter name	Value range	Function description
F4-11	Terminal command mode	2	Three-wire mode 1
F4-00	DI1 function selection	1	Forward run (FWD)
F4-01	DI2 function selection	2	Reverse run (REV)
F4-02	DI3 function selection	3	Three-wire control

SW3 is a normally closed (NC) button, whereas SW1 and SW2 are normally open (NO) buttons. When SW3 is closed, the AC drive rotates in forward direction after you press SW1 and in reverse direction after you press SW2. The AC drive stops at the moment when SW3 becomes open. SW3 must remain closed during normal start and running. Commands from SW1 or SW2 take effect once SW1 or SW2 is closed at the rising edge.

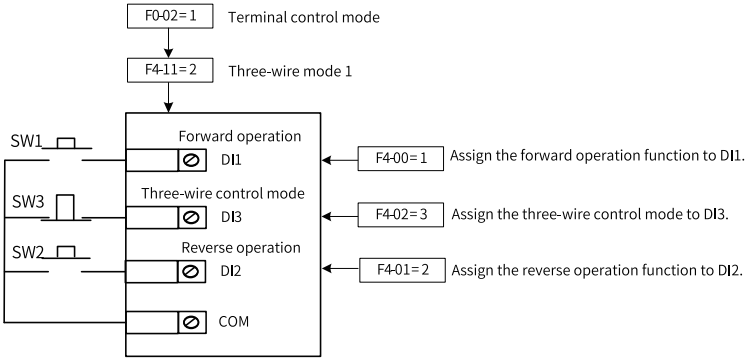


Figure 7-7 Wiring and parameter settings for three-wire mode 1

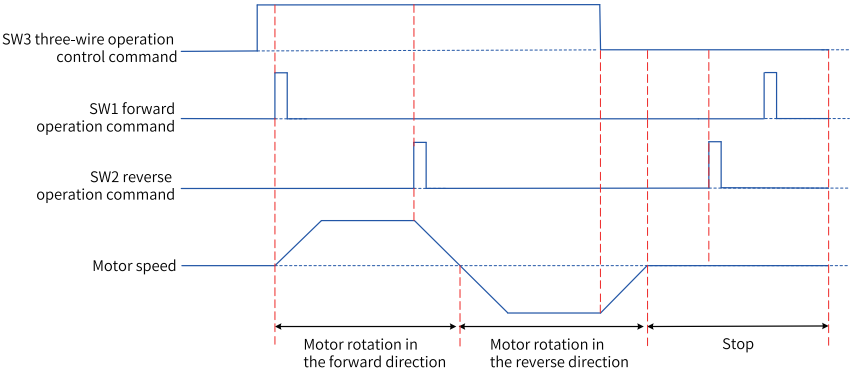


Figure 7-8 Time sequence for three-wire mode 1

Three-wire mode 2

For example, DI3 is allocated with the three-wire control function, DI1 is allocated with the operation function, and DI2 is allocated with the forward/reverse running function. Connect the start/stop key to the DI3, the running enabling key to the DI1, and the forward/reverse run key to the DI2. The parameters are set as follows.

Related Parameters	Parameter name	Value range	Function description
F4-11	Terminal command mode	3	Three-wire mode 2
F4-00	DI1 function selection	1	Operation command
F4-01	DI2 function selection	2	Forward/reverse running direction
F4-02	DI3 function selection	3	Three-wire control

When SW3 is closed, the AC drive starts to run after you press SW1. If SW2 is open, the drive rotates in the forward direction. If SW2 is closed, the drive rotates in the reverse direction. The drive stops immediately at the moment when SW3 becomes open. SW3 must remain closed during normal start and running. Commands from SW1 take effect once SW1 is closed at the rising edge.

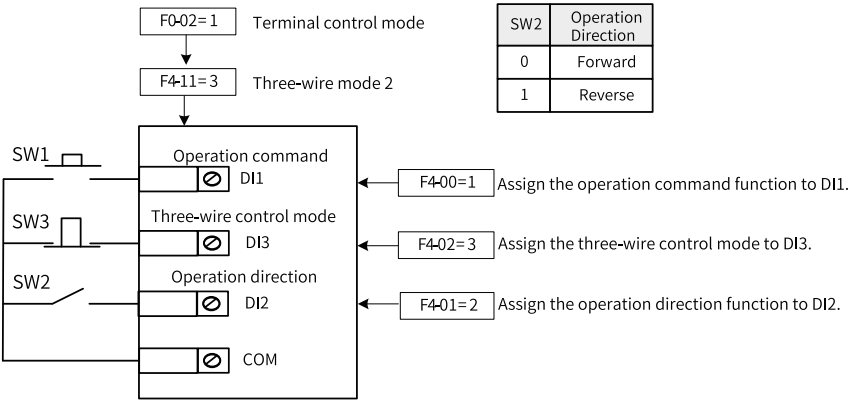


Figure 7-9 Wiring and parameter settings for three-wire mode 2

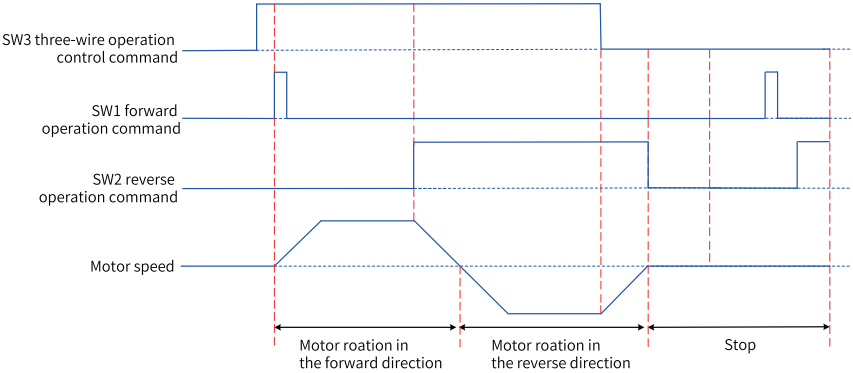


Figure 7-10 Time sequence for three-wire mode 2

7.1.2 Frequency Reference Source Settings

7.1.2.1 Frequency Reference Source Selection

The AC drive supports three frequency reference sources, including main frequency reference, auxiliary frequency reference, and main and auxiliary frequency superposition.

7.1.2.2 Selecting Source for Main Frequency Reference

There are ten main frequency reference sources in total, including digital setting (non-retentive at power failure), digital setting (retentive at power failure), AI1, AI2, AI3, pulse input, multi-reference, simple PLC, PID, and communication setting. You can set F0-03 to a value ranging from 0 to 9 to define the source.

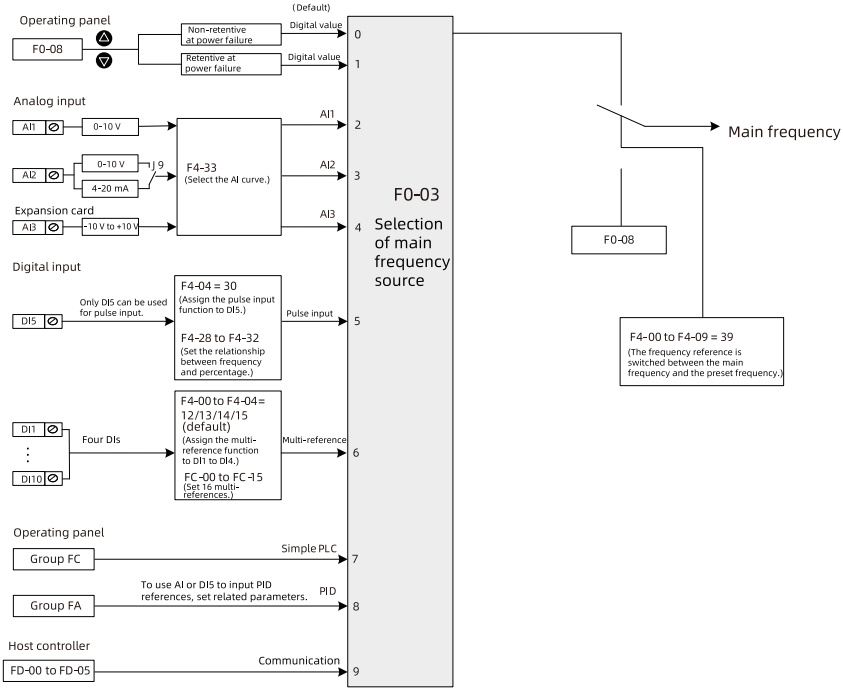


Figure 7-11 Main frequency source selection

Parameter code	Parameter name	Value range	Default
F0-03	Selection of main frequency source X	0: Digital setting (preset frequency F0-08, which can be changed by UP/DOWN keys; non-retentive upon power failure) 1: Digital setting (preset frequency F0-08, which can be changed by UP/DOWN keys; retentive upon power failure) 2: AI1 3: AI2 4: AI3 5: Pulse (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication	0

7.1.2.3 Setting the Main Frequency Through Operating Panel

There are two situations for setting the main frequency through the operating panel.

- F0-03 = 0 (non-retentive at power failure): When the AC drive is powered on again after stop or power failure, the frequency reference is restored to the preset frequency (F0-08). The preset frequency (F0-08) can be changed through  and  on the operating panel or by terminal functioning as the UP and DOWN keys. When the AC drive stops, the changed frequency will be reset.
- F0-03 = 1 (retentive at power failure): When the AC drive is powered on again after stop or power failure, the preset frequency is restored to the value memorized at the moment of the last power failure. The preset frequency (F0-08) can be changed through  and  on the operating panel or by terminal functioning as the UP and DOWN keys. When the AC drive stops, the changed frequency will be retained.
  Example: F0-08 (Preset frequency) is set to 40 Hz. Adjust the value of F0-08 to 45 Hz through  on the keypad. If F0-23 is set to 0 (non-retentive at power failure), the frequency is restored to 40 Hz (value of F0-08) after the AC drive stops. If F0-23 is set to 1 (retentive at power failure), the frequency is still 45 Hz after the AC drive stops.

Note

Note that F0-23 (Retention of digital-set frequency at stop) differs from F0-03. F0-23 determines whether the changed frequency is retained when the AC drive stops. F0-23 is related to the stop state, rather than power failures.

Related parameter

Parameter	Name	Default	Value range
F0-08	Preset frequency	50.00 Hz	0.00 Hz to maximum frequency (F0-10)
F0-10	Maximum frequency	50.00 Hz	50.00 Hz to 500.00 Hz

Parameter	Name	Default	Value range
F0-23	Retention of digit-set frequency upon stop	0	0: Non-retentive 1: Retentive

7.1.2.4 Setting Main Frequency Through AI

When the main frequency is to be set through the AI, AI1, AI2, or AI3 can be selected. When F0-03 is set to 2, AI1 is used as the main frequency reference source; when F0-03 is set to 3, AI2 is used as the main frequency reference source; when F0-03 is set to 4, AI3 is used as the main frequency reference source.

When the AI is used as the frequency source, each AI supports five types of AI curves. Therefore, this section first describes the setting of AI curves, and then introduces how to select corresponding AI curves for AIs. Follow the steps below to set AI curves.

Setting procedure	Related Parameters	Description
Step 1: Set the AI curve. Set the relationship between AI voltage/current inputs and the set values.	F4-13 to F4-16	Curve 1 setting
	F4-18 to F4-21	Curve 2 setting
	F4-23 to F4-27	Curve 3 setting
	A6-00 to A6-07	Curve 4 setting
	A6-08 to A6-15	Curve 5 setting
	F4-34	This parameter is used to set the value when the AI value is lower than the minimum input. When the frequency is set through the AI, voltage/current input 100% corresponds to the maximum frequency F0-10.
	F4-33	This parameter is used to select the AI curve. You can select any AI curve for an AI. The default value 321 of F4-33 is used. Select curve 1, curve 2, and curve 3 for AI1, AI2, and AI3, respectively.
Step 2: Select an AI curve for the AI. Select the AI curve and set the filter time.	F4-17, F4-22, F4-27	Filter time of AI1, AI2, and AI3
Step 3: Select the AI as the frequency reference source. Select the AI for setting the frequency reference based on terminal characteristics.	F0-03 (Main frequency source)	F0-03 = 2 AI1 is used.
		F0-03 = 3 AI2 is used. Select the input mode (voltage or current) using jumper cap J9 on the control board.
		F0-03 = 4 AI3 is used.

AI curve setting methods

There are five types of AI curves in total. Curves 1, 2, and 3 are 2-point curves, with relevant parameters being F4-13 to F4-27. Curves 4 and 5 are four-point curves and their relevant parameters are in group A6. To set an AI curve, you need to set the relationship between the AI voltage (or AI current) and the corresponding setting.

In the following example, AI curve 1 is set through F4-13 to F4-16.

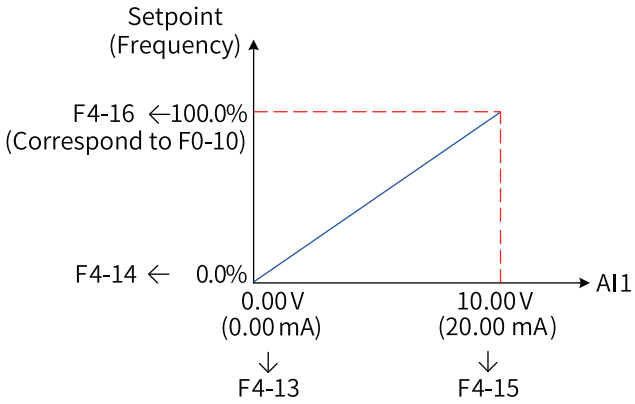


Figure 7-12 Setting AI curve 1

When the AI is used as the frequency setting source, the voltage/current input 100% corresponds to the value of F0-10 (maximum frequency). When the current input mode is selected for the AI, current of 1 mA corresponds to voltage of 0.5 V, and current of 0 mA to 20 mA corresponds to voltage of 0 V to +10 V.

Curve 2 and curve 3 are set in a similar way as curve 1. F4-18 to F4-21 are used to set curve 2. F4-23 to F4-26 are used to set curve 3.

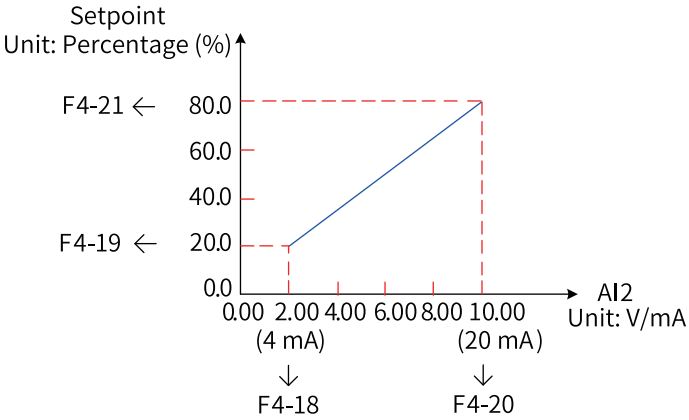


Figure 7-13 Setting AI curve 2

The function of curve 4 and curve 5 is similar to that of curve 1 to curve 3, but curve 1 to curve 3 are straight lines, and curve 4 and curve 5 are 4-point curves.

When setting curve 4 and curve 5, the minimum input voltage, inflection point 1 voltage, inflection point 2 voltage, and maximum input voltage must be increased in ascending order. A6-00 to A6-07 are used to set curve 4. A6-08 to A6-15 are used to set curve 5.

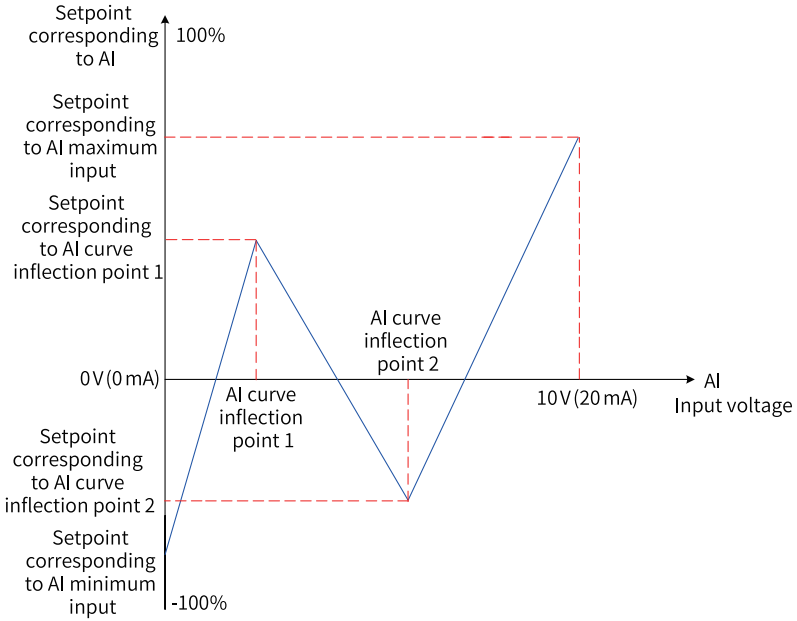


Figure 7-14 Schematic diagram for curve 4 and curve 5

AI curve selection

The AI curves corresponding to AI1, AI2 and AI3 are selected by the ones place, ten place, and hundreds place of F4-33 respectively. Any one of the five kinds of curves can be selected for the three terminals.

The longer the AI input filter time, the stronger the anti-interference capability, but the slower the adjustment response. The shorter the filter time, the quicker the adjustment response, but the weaker the anti-interference capability. If the analog signal is prone to interference, increase the filter time to stabilize the detected analog signal. However, increasing the filter time will slow the response speed of analog detection. Set the filter time properly based on actual conditions.

Selecting AI as frequency reference source

The control board provides two AI terminals AI1 and AI2), and the optional I/O expansion card provides another AI terminal AI3. AI1 supports voltage input of 0 V to 10 V. AI2 supports voltage input of 0 V to 10 V or current input of 0 mA to 20 mA, which can be selected by jumper J9 on the control board (For detailed operations, see chapter 5

Installation and Wiring). AI3 supports bipolar voltage input of -10 V to +10 V. The following describes the setting of each AI used as the main frequency reference source.

For example, assume that curve 1 is selected for AI1 (the ones place of F4-33 is set to 1) and voltage-type AI1 is used as the main frequency reference source. To make input voltage of 2 V to 10 V be mapped to frequency of 10 Hz to 40 Hz, set as follows.

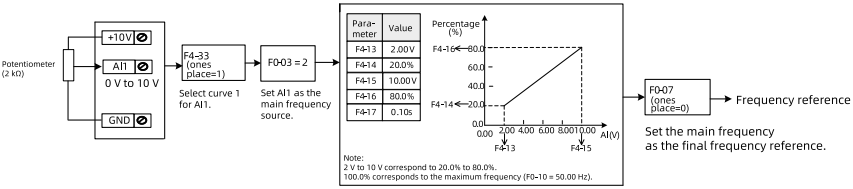


Figure 7-15 Parameter settings for voltage-type AI1 to be used as the main frequency reference source

AI2 supports analog voltage input (0 V to 10 V) or analog current input (0 mA to 20 mA).

When AI2 is used for analog current input, input current of 0 mA to 20 mA corresponds to input voltage of 0 V to 10 V. If the input current ranges from 4 mA to 20 mA, current of 4 mA corresponds to voltage of 2 V, and current of 20 mA corresponds to voltage of 10 V.

For example, assume that curve 2 is selected for AI2 (the tens place of F4-33 is set to 2) and current-type AI2 is used as the main frequency reference source. To make input current of 4 mA to 20 mA be mapped to frequency of 0 Hz to 50 Hz, set as follows.

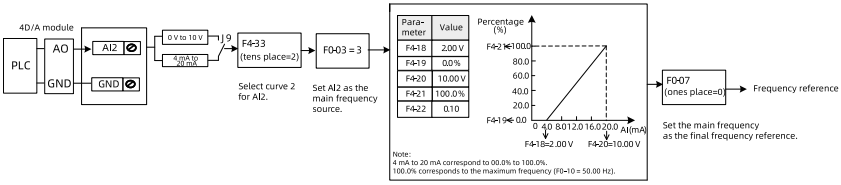


Figure 7-16 Parameter settings for current-type AI2 to be used as the main frequency reference source

For example, assume that curve 3 is selected for AI3 (the hundreds place of F4-33 is set to 3) and voltage-type AI3 is used as the main frequency reference source. To make input voltage of 2 V to 10 V be mapped to frequency of 10 Hz to 50 Hz, set as follows.

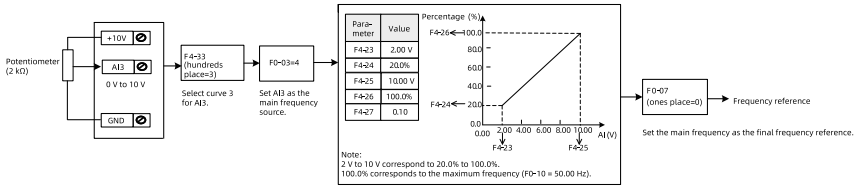


Figure 7-17 Parameter setting for voltage-type AI3 to be used as main frequency reference source

7.1.2.5 Setting the Main Frequency by Multi-reference

This mode is suitable for applications where the operating frequency of the drive does not require continuous adjustment, and only several frequency values need to be used.

The drive supports up to 16 frequency references in multi-reference operation mode, which can be set through combinations of input signals from the four DI terminals. You can also use fewer than four DI terminals as the multi-reference source. In this case, missing digits are populated with 0. The parameters of multi-reference 0 to multi-reference 15 are FC-00 to FC-15. Multi-reference 0 is set through FC-51.

Except for the main frequency source, the multi-reference can also act as the voltage source in V/f decoupled mode and the setting source for process PID.

Table 7–1 Relationship between the number of multi-references and the number of DIs

Number of multi-references	Number of DI terminals
Two multi-references	One DI terminal K1
Three to four multi-references	Two DI terminals K1 and K2
Five to eight multi-references	Three DI terminals K1, K2, and K3
Nine to sixteen multi-references	Four DI terminals K1, K2, K3, and K4

Example

1. When F0-03 is set to 6, multi-reference is selected as the main frequency reference source.
2. Assume that DI2, DI4, DI7, and DI8 are selected as the signal input terminals for the multi-reference. Assign F4-01, F4-03, and F4-06. F4-07 with functions 12 to 15, respectively to specify multi-reference input terminals 1 to 4.

In the following figure, DI2, DI4, DI7, and DI8 are used as the multi-frequency input terminals, which form a four-bit binary number. The state combinations of these terminals represent different frequencies. When values of DI8, DI7, DI4, and DI2 are 0, 0,

1, and 0, the frequency set through FC-02 is selected. For details, see *"Table 7-1 " on page 258*. The target operating frequency is automatically calculated from "FC-02 x F0-10".

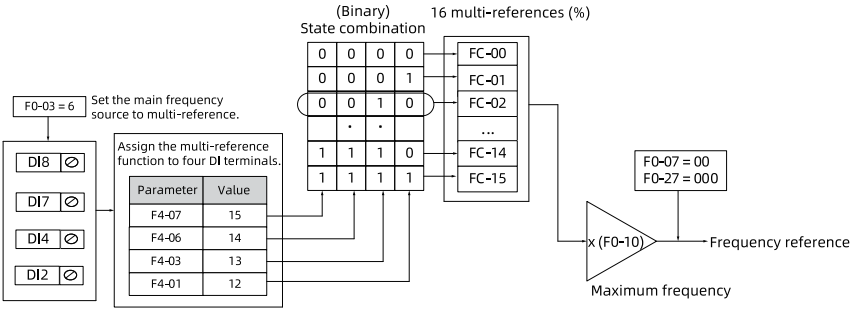


Figure 7-18 Multi-reference setting

The four multi-reference terminals can make up 16 state combinations, corresponding to 16 frequency reference values, The following table lists the details.

Table 7–2 Description of multi-reference function

K4	K3	K2	K1	Reference	Parameter
OFF	OFF	OFF	OFF	Multi-reference 0	FC-00 (FC-51 = 0)
OFF	OFF	OFF	ON	Multi-reference 1	FC-01
OFF	OFF	ON	OFF	Multi-reference 2	FC-02
OFF	OFF	ON	ON	Multi-reference 3	FC-03
OFF	ON	OFF	OFF	Multi-reference 4	FC-04
OFF	ON	OFF	ON	Multi-reference 5	FC-05
OFF	ON	ON	OFF	Multi-reference 6	FC-06
OFF	ON	ON	ON	Multi-reference 7	FC-07
ON	OFF	OFF	OFF	Multi-reference 8	FC-08
ON	OFF	OFF	ON	Multi-reference 9	FC-09
ON	OFF	ON	OFF	Multi-reference 10	FC-10
ON	OFF	ON	ON	Multi-reference 11	FC-11
ON	ON	OFF	OFF	Multi-reference 12	FC-12

K4	K3	K2	K1	Reference	Parameter
ON	ON	OFF	ON	Multi-reference 13	FC-13
ON	ON	ON	OFF	Multi-reference 14	FC-14
ON	ON	ON	ON	Multi-reference 15	FC-15

7.1.2.6 Setting Main Frequency Through Simple PLC

1: Set F0-03 to 7 to select simple PLC as the main frequency source.

2: Set parameters FC-00 to FC-15 and FC-18 to FC-49 to define the running time and acceleration/deceleration time for each multi-speed reference.

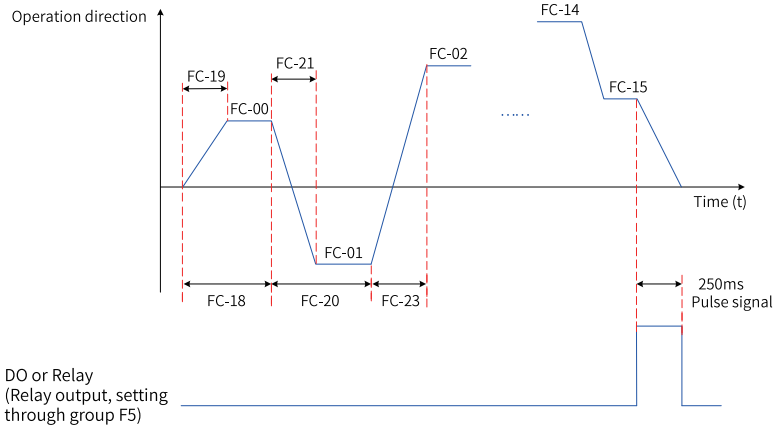


Figure 7-19 Use of simple PLC as the main frequency source

3: Set FC-16 to select the simple PLC running mode.

4: Set FC-17 to determine whether to retain the PLC running stage and running frequency upon a power failure or stop.

7.1.2.7 Setting Main Frequency Through PID

As a general process control method, PID control is a closed-loop mechanism in which each controlled variable is stabilized at the target level. This is implemented through proportional, integral, and differential calculation of the difference between the feedback signal and the target signal of the controlled variable and through adjustment of the AC drive output frequency. The PID-controlled output is used as the running frequency. The PID control is generally used for field process closed-loop control, such as constant pressure closed-loop control and constant tension closed-loop control.

- Proportional gain Kp: When there is a deviation between the PID input and output, the PID regulator adjusts the output to reduce the deviation of the controlled variable. The deviation reduction speed depends on the proportionality coefficient Kp. A greater Kp value means faster deviation reduction but causes oscillation, especially in the case of long hysteresis. A smaller Kp value means lower probability of oscillation but leads to slow adjustment. (A proportional gain of 100.0 indicates that when the deviation between PID feedback and PID reference is 100.0%, the PID regulator regulates the output frequency reference at the amplitude of the maximum frequency.)
- Integral time Ti: Ti determines the integral regulation intensity of the PID regulator. The shorter the integral time, the greater the adjustment intensity. (When the deviation between PID feedback and PID reference is 100.0%, the integral regulator performs continuous regulation within the time. The regulation amount reaches the maximum frequency.)
- Differential time Td: Td determines the regulation intensity of the PID regulator on the deviation change. Longer differential time indicates greater adjustment intensity. (Differential time indicates the time within which the feedback change reaches 100.0%. The regulation amount reaches the maximum frequency.)

Example

Step 1: Set F0-03 or F0-04 to 8 to select PID as the main frequency reference input source and auxiliary frequency input source.

Step 2: Set FA-00 to select a source of PID target reference. If FA-00 is set to 0, set FA-01 (digital setting of PID). The value 100% of this parameter corresponds to the maximum value of PID feedback.

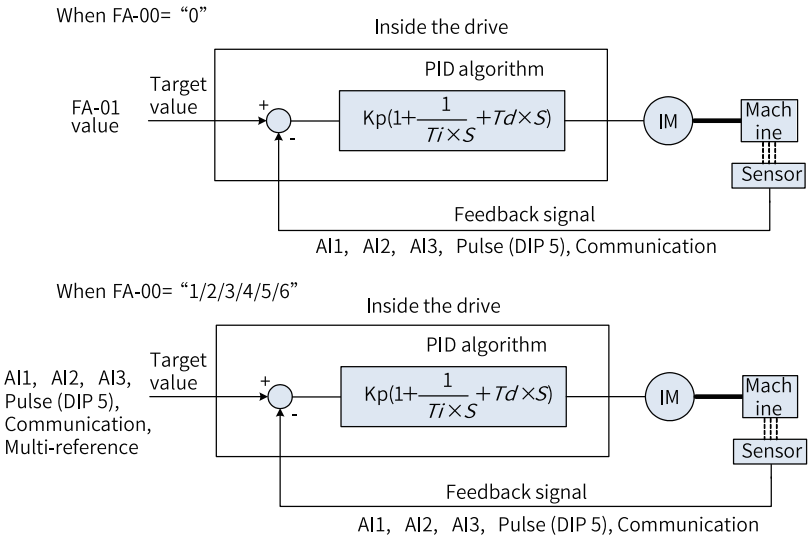


Figure 7-20 Principle of process PID control

Step 3: Set FA-02 to select a PID feedback source.

Step 4: Set FA-03 to select a PID action direction.

The following figure shows the logic of process PID control parameter configuration.

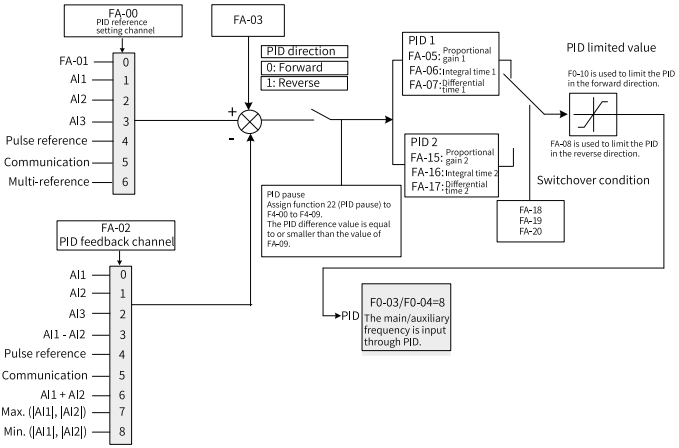


Figure 7-21 Parameter settings for process PID control

The upper and lower limits and range of the frequency output when the PID is used as the main frequency source are described as follows (for example, when the frequency source is only PID or main frequency + PID).

The reverse cut-off frequency is 0 or reverse running is prohibited (any one of the following three situations).

① FA-08 = 0, F8-13 = 0; ② FA-08 = 0, F8-13 = 1; ③ FA-08 ≠ 0, F8-13 = 1

Output upper limit = Frequency upper limit

Output lower limit = Frequency lower limit

Output range = Frequency lower limit to frequency upper limit (F0-14 to F0-12)

The reverse cut-off frequency is non-zero and reverse running is allowed (FA-08 ≠ 0, F8-13 = 0).

Output upper limit = +Frequency upper limit; Output lower limit = -Reverse cut-off frequency

Output range = -Reverse cut-off frequency to +Frequency upper limit (-FA-08 to +F0-12)

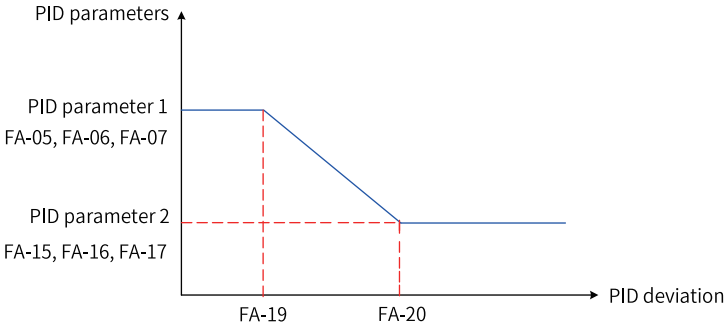


Figure 7-22 PID parameter switchover

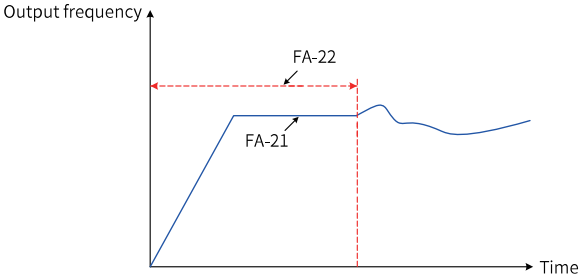


Figure 7-23 PID initial value

7.1.2.8 Setting the Main Frequency Through Communication

The drive supports five communication protocols, including Modbus, PROFIBUS DP, CANlink, PROFINET, and EtherCAT.

- To use PROFIBUS DP, PROFINET, and EtherCAT for communication, set FD-00 to 9 and FD-01 to 3.
- There is no need to switch between CANopen communication and CANlink communication. Ensure that F0-28 is set to 1 and the expansion card is used correctly.
- The baud rate of CANopen communication does not need to be set by software. It is determined by the DIP switch of the expansion card.
- The baud rate of CANlink communication is set by the thousands place of FD-00.
- When Modbus is used for communication, set FD-00 (Baud rate), FD-01 (Data format), and FD-02 (Local address).
- The local address is set by FD-02.

Example

Step 1: Set F0-03 to 9 to select communication as the main frequency source.

Step 2: Use the host controller to send a write command to the drive.

The following section describes how to set the main frequency through Modbus communication. For example, to set the frequency reference to 10000 through communication, send the write command 01 06 10 00 27 10 97 36.

The following table describes the definition of each byte.

Byte	Description
01H (configurable)	AC drive address
06H	Write command
1000H	Frequency reference address
2710H (10000 in decimal)	Target frequency
9736H	CRC check

Similarly, to set the frequency reference to -10000 through communication, send the write command 01 06 10 00 D8 F0 D7 4E. In the command, D8F0 is the low-order four bits of the hexadecimal number converted from -10000.

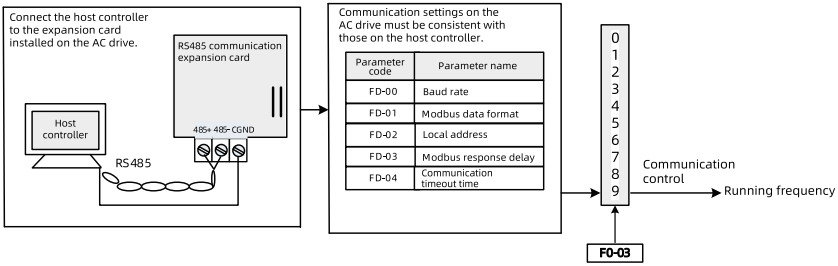


Figure 7-24 Parameters used to set the main frequency through communication

Table 7–3 Relationship between master commands and slave responses

Command from the Master		Response from the slave	
ADDR	01H	ADDR	01H
CMD	06H	CMD	06H
High-order bits of parameter address	10H	High-order bits of parameter address	10H
Low-order bit of parameter address	00H	Low-order bit of parameter address	00H
High-order bit of data content	27H	High-order bit of data content	27H
Low-order bit of data content	10H	Low-order bit of data content	10H
CRC high-order bit	97H	CRC high-order bit	97H
CRC low-order bit	36H	CRC low-order bit	36H

The range of frequency reference set through communication is -10000 to +10000 (decimal), corresponding to -100.00% to +100.00%. -100.00% corresponds to the negative maximum frequency and +100.00% corresponds the maximum frequency. Assume that F0-10 (maximum frequency) is set to 50 Hz. If the frequency reference in the write command is 2710H, which is equivalent to 10000 in the decimal format, the actual written frequency reference is 50 Hz (50 x 100%).

7.1.2.9 Selecting a Source for Auxiliary Frequency Reference

There are ten auxiliary frequency sources in total, including digital setting (non-retentive at power failure), digital setting (retentive at power failure), AI1, AI2, A3, pulse input, multi-reference, simple PLC, PID, and communication setting. You can set F0-04 to a value ranging from 0 to 9 to define the source.

When the auxiliary frequency reference is used as a separate frequency reference source, it is set in the same way as the main frequency reference. The following figure shows the logic block diagram. The auxiliary frequency reference can also be used together with

the main frequency reference for frequency setting. For details, see "Selecting a Source for Main Frequency and Auxiliary Frequency Superposition".

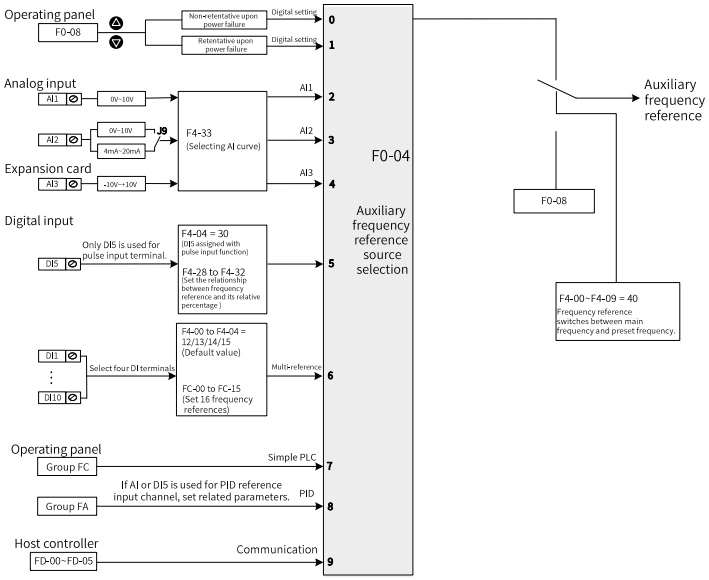


Figure 7-25 Auxiliary frequency reference source selection

Parameter	Name	Value range	Default
F0-04	Auxiliary frequency Y source	0: Digital setting (preset frequency F0-08 that can be changed through UP or DOWN key, non-retentive upon power failure) 1: Digital setting (preset frequency F0-08 that can be changed through UP or DOWN key, retentive upon power failure) 2: AI1 3: AI2 4: AI3 5: Pulse reference (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting	0

7.1.2.10 Selecting Source of Main Frequency and Auxiliary Frequency Superposition

The main and auxiliary frequency reference superposition means that the frequency is set through superposition of the main and auxiliary frequency references. The relationship between the target frequency and the main and auxiliary frequencies is set in F0-07, which is described as follows.

Table 7–4 Relationship between target frequency and main and auxiliary frequencies

No.	Relationship between target frequency and main and auxiliary frequencies	
1	Main frequency	The main frequency reference is used as the target frequency source directly.
2	Auxiliary frequency source	The auxiliary frequency reference is used as the target frequency source directly.
3	Main and auxiliary frequency operation	Four operations are supported, including main frequency + auxiliary frequency, main frequency - auxiliary frequency, max. (main frequency, auxiliary frequency), and min. (main frequency, auxiliary frequency).
4	Frequency switchover	You can use the DI to select any of the preceding three frequency sources. In this case, allocate function 18 (frequency reference switchover) to the DI.

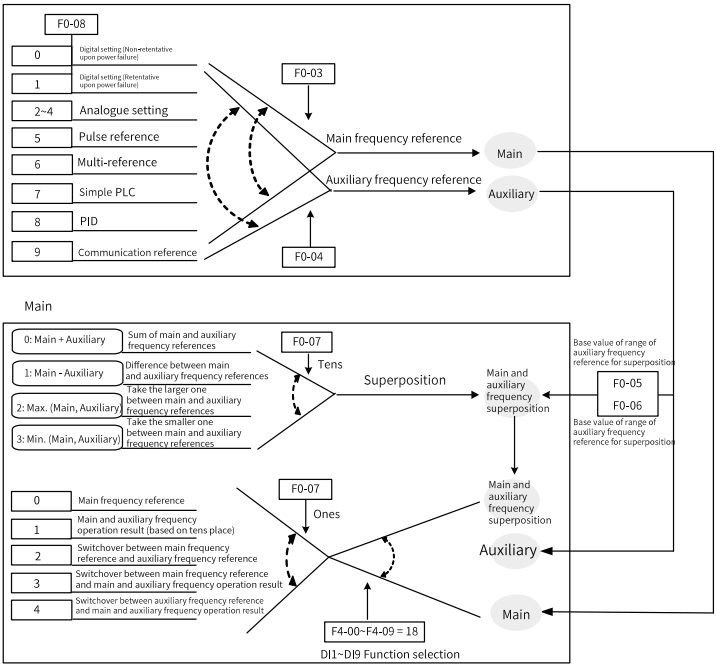


Figure 7-26 Main and auxiliary frequency superposition

Parameter code	Parameter name	Default	Value range
F0-07	Frequency superposition selection	00	Ones: Frequency reference selection 0: Main frequency X 1: Main and auxiliary frequency operation result (based on tens place) 2: Switchover between the main frequency X and the auxiliary frequency Y 3: Switchover between the main frequency X and the main and auxiliary frequency operation result 4: Switchover between the auxiliary frequency Y and the main and auxiliary frequency operation result Tens: Main and auxiliary frequency operation 0: Main frequency + auxiliary frequency 1: Main frequency - auxiliary frequency 2: Max. (main frequency, auxiliary frequency) 3: Min. (main frequency, auxiliary frequency)
F0-05	Base value of auxiliary frequency Y range upon superposition	0	0: Relative to the maximum frequency 1: Relative to main frequency X
F0-06	Range of auxiliary frequency Y upon superposition	100%	0% to 150%

When the main and auxiliary frequency references are used together to set the frequency, pay attention to the following aspects:

1. If the auxiliary frequency reference is digital setting, the preset frequency (F0-08) does not take effect. You can directly adjust the set main frequency by pressing the UP/DOWN key on the operating panel by the multi-functional input terminal functioning as the UP/DOWN key.
2. If the auxiliary frequency reference is set through AIs (AI1, AI2, or AI3) or input pulse, 100% of the input corresponds to the range of the auxiliary frequency (set by F0-05 and F0-06).
3. To avoid confusion, do not set the same input channel for the main and auxiliary frequency references (that is, F0-03 and F0-04 cannot be set to the same value).
4. Superposition of the main frequency and the auxiliary frequency can be used for closed-loop speed control. For example, use the main frequency to set the required frequency and the auxiliary frequency for automatic adjustment. In addition, with external DI signals, the required closed-loop control can be implemented.

7.1.2.11 Binding of Running Commands to Frequency References

By setting F0-27, you can set an independent frequency reference for each running command. The running command sources can be bound to different frequency reference channels. This function defines the binding combinations between three running command sources and nine frequency reference channels.

When the specified command source (F0-02) is bound to a frequency reference channel (corresponding place of F0-27), the frequency set by F0-03 is invalid and is determined by F0-27.

The following figure shows the binding between running commands and frequency reference channels.

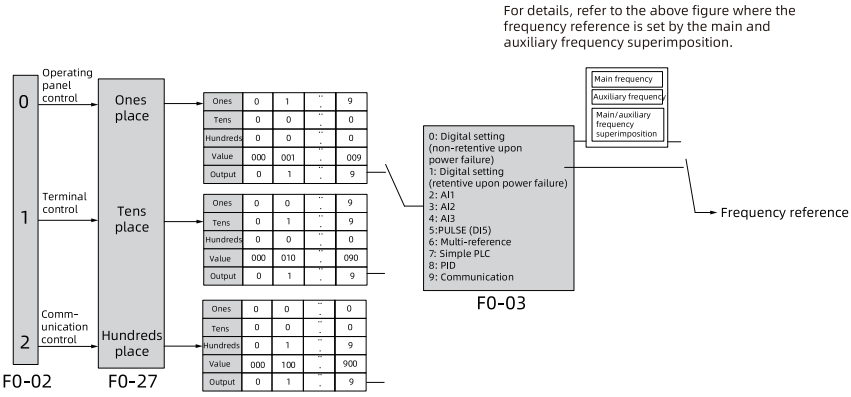


Figure 7-27 Binding between running commands and frequency reference channels

Note

In *"Figure 7-27 " on page 270* , the value of F0-02 determines which bit of F0-27 is active, which determines the value (0 to 9) of F0-03.

Parameter code	Parameter name	Default	Value range
F0-27	Bind command source to frequency source	000	Ones: Bind the command source of the operating panel to the frequency source 0: Unbound 1: Digital setting frequency 2: AI1 3: AI2 4: AI3 5: Pulse (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication Tens: Bind the command source of the terminal to the frequency source Hundreds: Bind the command source of the terminal to the frequency source

7.1.2.12 Frequency Reference Limit

Frequency upper limit defines the maximum operating frequency of motors. Maximum frequency defines the maximum output frequency of motors.

Frequency upper limit reference source defines the source of the frequency upper limit reference.

Upper limit frequency offset: used to set the offset of the frequency upper limit.

Related parameters: F0-10 to F0-13

7.1.2.13 Running Mode When Frequency Is Below Lower Limit

Frequency lower limit indicates the minimum frequency at which the motor is allowed to run.

If the frequency reference of the AC drive is lower than the frequency lower limit (F0-14), you need to set F8-14 to further specify the corresponding action of the AC drive, Three actions are supported: run at frequency lower limit, stop, and run at zero speed.

- 0: Run at frequency lower limit
  If the running frequency is below the frequency lower limit, the AC drive runs at the frequency lower limit.
- 1: Stop
  If the running frequency is below the frequency lower limit, the AC drive stops.
- 2: Run at zero speed

If the running frequency is below the frequency lower limit, the AC drive runs at zero speed.

Parameter code	Parameter name	Default	Value range	Description
F8-14	Running mode when frequency reference < lower limit	0	0: Run at frequency lower limit 1: Stop 2: Run at zero speed	-

7.1.3 Start and Stop Setting

7.1.3.1 Start Mode

The drive supports two start modes: direct start and flying start. Set F6-00 to select the start mode of the drive.

Direct start

The direct start mode (F6-00 = 0) applies to most of loads.

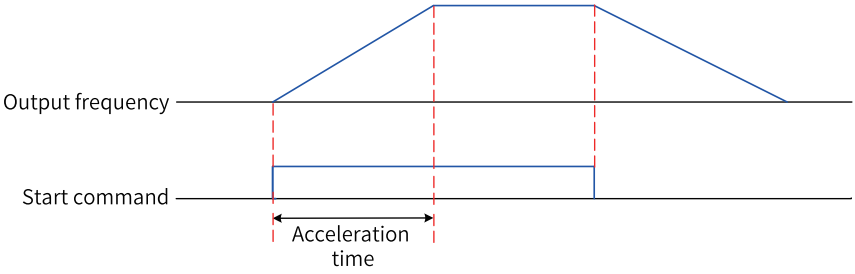


Figure 7-28 Direct start time sequence

The setting of starting frequency before start applies to lifting loads, such as elevators and cranes.

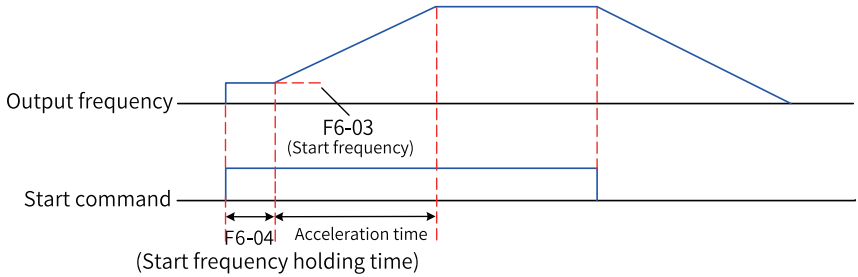


Figure 7-29 Time sequence for start with the starting frequency set

The setting of DC braking time at startup before start applies to applications where the motor may rotate at start.

If the DC braking time at startup is set to 0, the drive starts operating at the starting frequency. If the DC braking time is not 0, the drive performs DC braking first and then start at the starting frequency. This mode is applicable to small-inertia loads and applications where the motor may rotate at start.

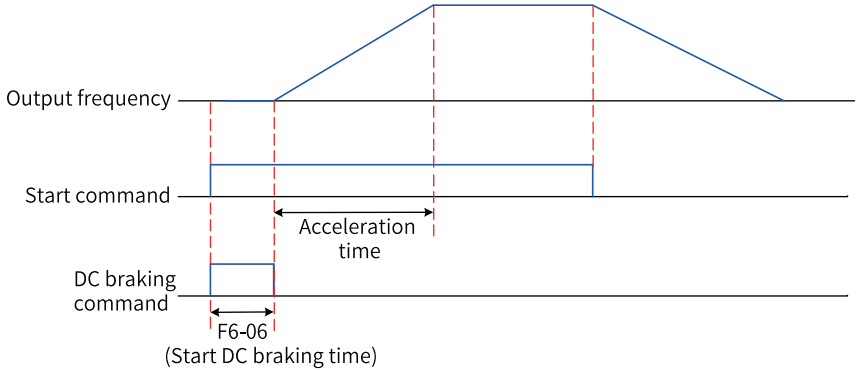


Figure 7-30 Time sequence for start with DC braking

Start with DC braking is suitable for loads such as elevators and cranes. Start with startup frequency is suitable for driving equipment that requires starting torque, such as cement mixers. The following figure describes the frequency curve during start.

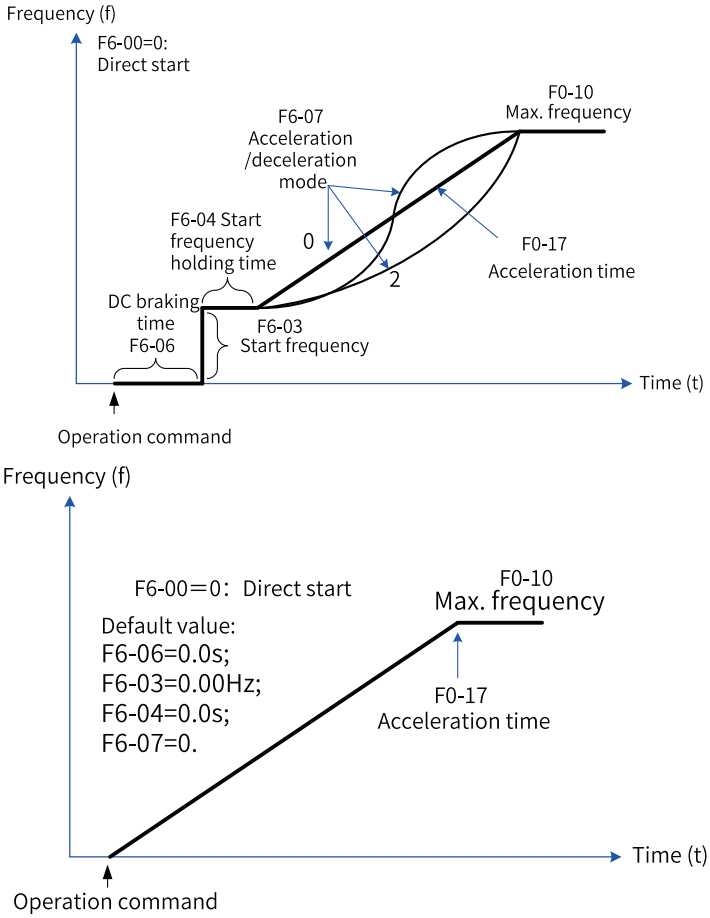


Figure 7-31 Direct start

Flying start

When F6-00 is set to 1, the drive uses the flying start mode. In this mode, the drive first determines the motor rotation speed and direction, and then starts at the detected frequency of the motor. This mode is applicable to applications where the drive is used to drive large-inertia machinery loads.

If the load motor is still rotating due to inertia when the drive needs a restart, using flying start can prevent overcurrent upon start. The following figure describes the frequency curve during start.

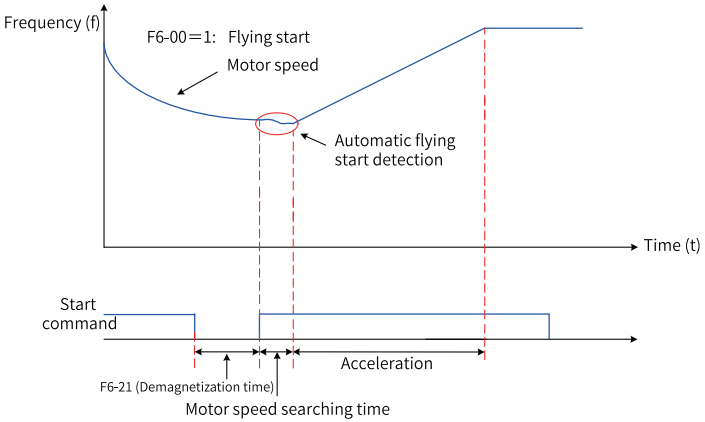


Figure 7-32 Flying start

Note

Use flying start to start a motor that is rotating at a high speed. This function takes effect only if the acceleration/deceleration mode is linear acceleration/deceleration (F6-07 = 0).

7.1.3.2 Start Frequency

A proper start frequency is required to ensure the motor torque at start. To set up sufficient flux during startup, hold the start frequency for a period of time.

The start frequency (F6-03) is not restricted by the frequency lower limit. But if the frequency reference is lower than the start frequency, the AC drive will not start but stay in the standby status.

During switchover between forward running and reverse running, F6-04 is invalid. The start frequency holding time is not included in the acceleration time, but included in the running time of the simple PLC.

7.1.3.3 Stop Mode

Two stop modes are available for the AC drive: decelerate to stop and coast to stop. You can set F6-10 to select a stop mode for the AC drive.

Decelerate to stop

When F6-10 is set to 0, the drive decelerates to stop. After the stop command is input, the drive decreases the output frequency based on the deceleration time and stops when the frequency declines to 0.

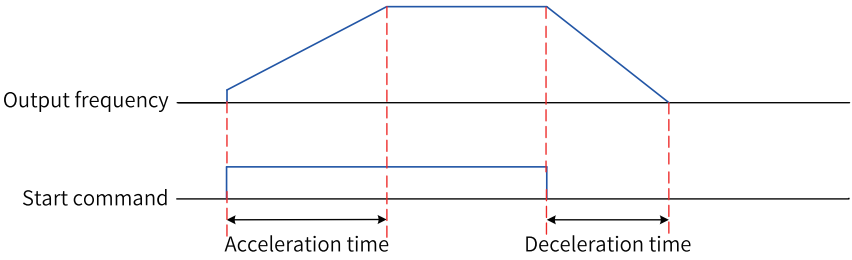


Figure 7-33 Time sequence for decelerate to stop

Coast to stop

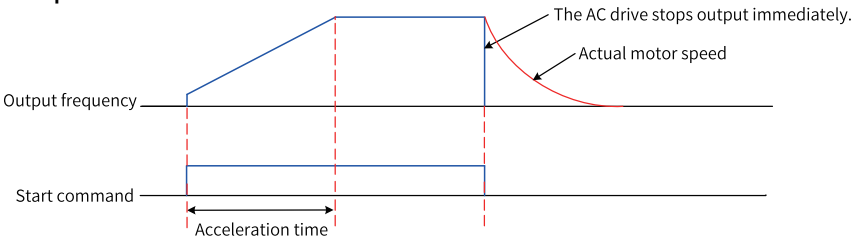


Figure 7-34 Time sequence for coast to stop

7.1.3.4 DC Braking at Stop

You can select whether to enable the DC braking function at the end segment through F6-11 to F6-14.

To use DC braking, there are four parameters including F6-11 (Start frequency of DC braking at stop), F6-12 (DC braking waiting time at stop), F6-13 (DC braking current at stop), F6-14 (DC braking time at stop).

When the running frequency decreases to the value set by F6-11, the AC drive stops output for a period set by F6-12 and then starts DC braking. This prevents faults such as overcurrent caused by DC braking at a high speed.

The base value of F6-13 varies depending on the following two conditions:

1. 1. When the rated current of the motor is lower than or equal to 80% of the rated current of the AC drive, the rated motor current is used as the percentage base value.
2. 2. When the rated current of the motor is greater than 80% of the rated current of the AC drive, 80% of the rated current of the AC drive is used as the percentage base value.

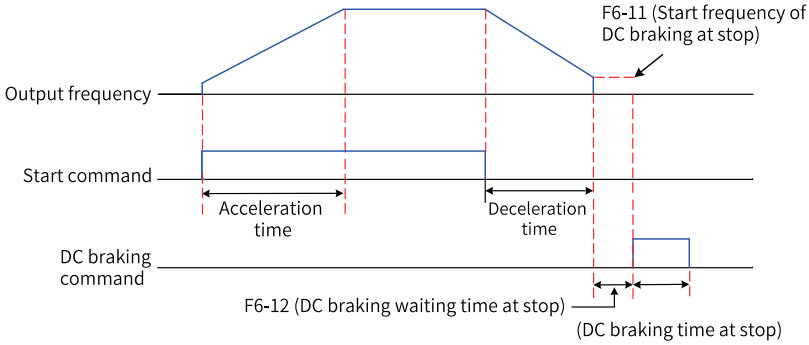


Figure 7-35 Time sequence of DC braking at stop

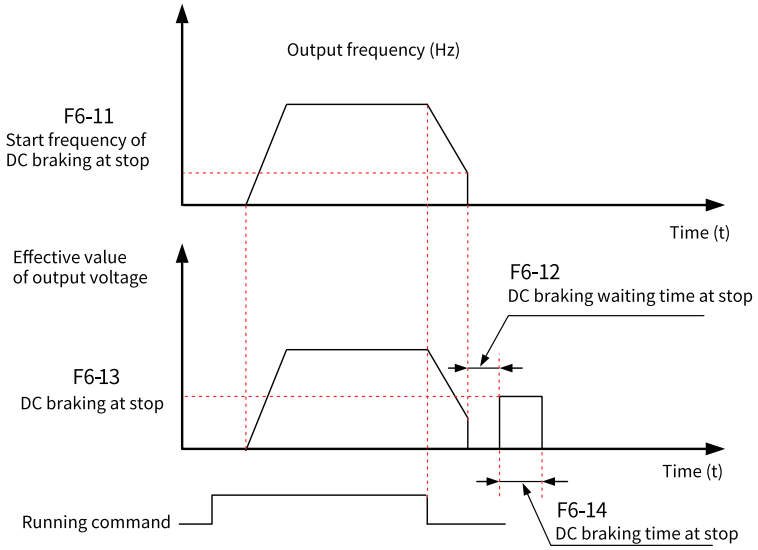


Figure 7-36 DC braking at stop

7.1.3.5 Acceleration/Deceleration Time Setting

The acceleration time indicates the time required for the AC drive to accelerate from 0 Hz to F0-25 (base frequency for acceleration/deceleration time). The deceleration time indicates the time required for the AC drive to decelerate from F0-25 (base frequency for acceleration/deceleration time) to 0 Hz.

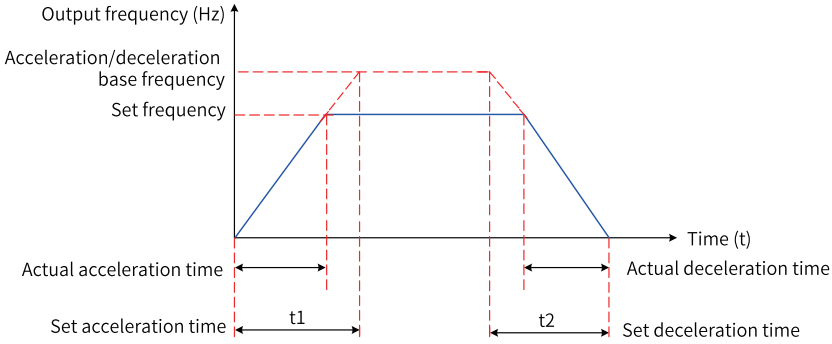


Figure 7-37 Acceleration/Deceleration time

The AC drive provides four groups of acceleration/deceleration time, which can be selected by using the DI assigned with functions 16 and 17. The acceleration/deceleration time is defined by the following parameters:

Group 1: F0-17, F0-18

Group 2: F8-03, F8-04

Group 3: F8-05, F8-06

Group 4: F8-07, F8-08

Example

The following example uses DI7 and DI8 as the input switchover terminals to describe how to set the acceleration/deceleration time.

1. Set F4-06 and F4-07 to select DI7 and DI8 for switchover.

Parameter code	Parameter name	Value	Function description
F4-06	DI7 function selection	16	Acceleration/ deceleration time selection terminal 1
F4-07	DI8 function selection	17	Acceleration/ deceleration time selection terminal 2

2. Set the corresponding acceleration/deceleration time through parameters.

DI8 state	DI7 state	Acceleration/Deceleration time
OFF	OFF	Group 1: F0-17, F0-18 (Acceleration time 1)
OFF	ON	Group 2: F8-03, F8-04 (Acceleration time 2. For details, see F0-17 and F0-18.)
ON	OFF	Group 3: F8-05, F8-06 (Acceleration time 3. For details, see F0-17 and F0-18.)
ON	ON	Group 4: F8-07, F8-08 (Acceleration time 4. For details, see F0-17 and F0-18.)

3. Set F0-19 (acceleration/deceleration time unit). Note that when this parameter is modified, the decimal places of the four groups of acceleration/deceleration time will change, and the corresponding acceleration/deceleration time will also change.
4. Set F6-07 (acceleration/deceleration mode) to select the frequency change mode during the start and stop process of the AC drive.
   - 0: The output frequency increases or decreases linearly.
   - 1: The output frequency increases or decreases following the S-curve when the target frequency is fixed. Details must be set through F6-08 and F6-09. This mode is suitable for applications requiring smooth start or stop, such as elevators and conveyors.
   - 2: The output frequency increases or decreases following the S-curve in real time when the target frequency changes. Details must be set through F6-08 and F6-09. This mode is applicable to applications requiring supreme comfort and quick response in real time.
5. Set F6-08 and F6-09 to select the time proportion of S-curve start segment and time proportion of S-curve end segment. The following condition must be met: F6-08 + F6-09 ≤ 100.0%

7.2 Motor Configuration

7.2.1 Motor Auto-tuning

Motor auto-tuning is the process by which the AC drive obtains the parameters of the controlled motor.

There are three motor auto-tuning modes, as shown in the following table (set by F1-37).

Table 7–5 Motor auto-tuning mode

Auto-tuning mode	Characteristics	Application scenario	Auto-tuning effect
Auto-tuning of some asynchronous motor parameters in static state	Only some motor parameters are auto-tuned, such as the stator resistance, rotor resistance, and leakage inductance.	This mode applies to scenarios where the motor cannot be disconnected from the load and auto-tuning in the dynamic state is not allowed.	Acceptable
Auto-tuning of all asynchronous motor parameters in dynamic state	All motor parameters are tuned.	This mode applies to scenarios where the motor can be disconnected from the load.	Optimal
Auto-tuning of all asynchronous motor parameters in static state	All motor parameters are tuned.	This mode applies to scenarios where the motor cannot be disconnected from the load and auto-tuning in the dynamic state is not allowed.	Good

Except for the preceding three motor auto-tuning modes, the motor parameters can also be manually input.

You can perform motor auto-tuning either through commands from the operating panel or communication commands. Select the operation command source through F0-02.

The PKW areas of the Modbus, PROFIBUS DP, and CANopen support auto-tuning through communication, whereas their PZD areas do not support auto-tuning through communication. To perform auto-tuning through communication, set F1-37/A2-37 and then write operation commands.

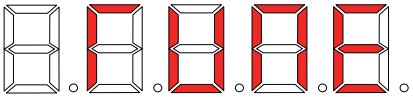
Example:

Parameters of motor 1 (F0-24 = 0, motor parameter group 1) are used to describe the motor auto-tuning mode. If you need to perform auto-tuning on motor 2, set F0-24 to 1 (motor parameter group 2) first. The auto-tuning mode for motor 2 is similar to that for motor 1. Parameters of motor 2 are those in A2 group.

- Auto-tuning of some asynchronous motor parameters in static state

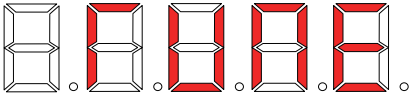
Table 7–6 Auto-tuning of some asynchronous motor parameters in static state

Method	Description
Step 1	Power on the drive, and then set F0-02 to 0 to select the operating panel as the command source.
Step 2	Input motor nameplate parameters (F1-00 to F1-05) correctly.

Method	Description
Step 3	Set F1-37 to 1 (auto-tuning of some asynchronous motor parameters in static state), and press ENTER. The following information is displayed on the operating panel: 
Step 4	Press RUN on the operating panel. The motor does not rotate but gets energized. The RUN indicator becomes ON. If the preceding display disappears and the operating panel returns to the normal parameter display state, auto-tuning is done. The values of F1-06 to F1-08 will be computed by the AC drive automatically.

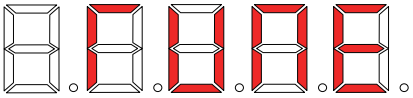
- Auto-tuning of all asynchronous motor parameters in dynamic state
  If the motor has a constant output or is used for high-precision applications, disconnect the motor from the load before implementing all parameter auto-tuning in dynamic state to achieve the best auto-tuning effect.

  Table 7–7 Auto-tuning of all asynchronous motor parameters in dynamic state

Method	Description
Step 1	Power on the drive, and then set F0-02 = 0 to select the operating panel as the command source.
Step 2	Input motor nameplate parameters (F1-00 to F1-05) correctly.
Step 3	Set F1-37 to 2 (Auto-tuning of all asynchronous motor parameters in dynamic state). Press ENTER on the operating panel. The following information is displayed on the operating panel: 
Step 4	Press RUN on the operating panel. The AC drive drives motor to accelerate/decelerate and run in forward/reverse direction. The RUN indicates becomes ON and auto-tuning lasts for a period. If the preceding display disappears and the operating panel returns to the normal parameter display state, auto-tuning is done. Parameters F1-06 to F1-10 and F1-30 are auto-tuned.

- Auto-tuning of all asynchronous motor parameters in static state
  If the motor cannot be disconnected from the load, use the mode of auto-tuning of all asynchronous motor parameters in static state.

Table 7–8 Auto-tuning of all asynchronous motor parameters in static state

Method	Description
Step 1	Power on the drive, and then set F0-02 = 0 to select the operating panel as the command source.
Step 2	Input motor nameplate parameters (F1-00 to F1-05) correctly.
Step 3	Set F1-37 to 3 (Auto-tuning of all asynchronous motor parameters in static state). Press ENTER on the operating panel. The following information is displayed on the operating panel: 
Step 4	Press RUN on the operating panel. The motor does not rotate but gets energized. The RUN indicator becomes ON. If the preceding display disappears and the operating panel returns to the normal parameter display state, auto-tuning is done. The values of F1-06 to F1-10 will be computed by the AC drive automatically.

7.2.2 Motor 2 Parameters

The drive supports the switchover between motor 1 parameters and motor 2 parameters. Motor 1 parameters correspond to group F1, and motor 2 parameters correspond to group A2. You can select the required motor parameter group in the following two methods:

- Set F0-24 to select the motor parameter group. Set F0-24 to 0 or 1 to select motor parameter group 1 or 2, respectively.
- Select the currently valid motor parameter group through the DI. Allocate function 41 (Motor selection terminal 1) to any one of DI1 to DI10 (F4-00 to F4-09). If the DI is inactive, motor parameter group 1 is selected. If the DI is active, motor parameter group 2 is selected.

If any terminal (F4-00 to F4-09) is assigned with function 41 (motor selection terminal 1), the DI is used to determine which motor parameter group is selected. In this case, the setting of F0-24 is invalid. When no terminal (F4-00 to F4-09) is assigned with function 41 (motor selection terminal 1), the motor parameter group is determined by F0-24.

During running, switchover between two groups of motor parameters is prohibited. To switch parameter groups, stop the AC drive first. Otherwise, the drive detects Err41.

7.2.3 Motor Control Mode Selection

Set the motor control mode through F0-01. When F0-01 is set to 2, the V/f control mode (speed open loop control) is selected.

This mode is applicable scenarios without high requirements on the load or scenarios where one drive is used to drive multiple motors such as fans and pumps.

7.2.4 Motor Auto-tuning

The process that the AC drive obtains the internal electrical parameters of the controlled motor is called motor auto-tuning. Motor parameter auto-tuning includes the following methods: parameter auto-tuning in dynamic state, parameter auto-tuning in static state, and manual parameter input. Set auto-tuning in dynamic state or in static state through F1-37.

The following table describes the applicable scenarios and tuning effects of different auto-tuning modes.

Table 7–9 Auto-tuning mode

Auto-tuning mode	Application scenario	Auto-tuning effect
Auto-tuning of all asynchronous motor parameters in dynamic state (without load) F1-37 = 2	Applicable to scenarios where the motor can be disconnected from the load easily.	Optimal
Auto-tuning of all asynchronous motor parameters in dynamic state (with load) F1-37 = 2	Applicable to scenarios where the motor cannot be disconnected from the load easily and the motor must run with load. Note: Too heavy load will affect the accuracy of auto-tuned parameters. The motor load includes mechanical load and friction.	The lighter the load, the more accurate the auto-tuned parameters.
Auto-tuning of some asynchronous motor parameters in static state F1-37 = 1	Applicable to scenarios where the motor cannot be disconnected from the load and auto-tuning in dynamic state is not allowed.	Acceptable

Auto-tuning mode	Application scenario	Auto-tuning effect
Auto-tuning of all asynchronous motor parameters in static state F1-37 = 3	Applicable to scenarios where the motor cannot be disconnected from the load and auto-tuning in dynamic state is not allowed. This mode is recommended for auto-tuning in static state.	Good
Manual parameter input	Applicable to scenarios where the motor cannot be disconnected from the application system. Copy the auto-tuned motor parameters of the motor to F1-00 to F1-10 of another motor with the same model.	Good

Note

F1-15 can be set to 0 and 1, representing two different rotor resistance and leakage inductance auto-tuning solutions. Option 0 is the default and option 1 is applicable to motors from European and American brands such as Siemens, ABB, SEW, and Nord. Leakage inductance of the motors has significant non-linear characteristics. If 0 is set, the auto-tuned leakage inductance (F1-08) will be large. In actual applications, if the motor in the vector control mode runs improperly after parameter auto-tuning with F1-15 set to 0, change F1-15 to 1 and perform auto-tuning again.

Example

The following section takes motor 1 as an example to describe how to perform motor auto-tuning. Motor 2 can be auto-tuned in the same way as motor 1 with parameters changed.

Perform motor auto-tuning as follows.

1. If the motor can be disconnected from the load, disconnect the power supply, and then disconnect the load from the motor to let the motor rotate without load.
2. After power-on, set the operating panel as the drive command source (F0-02).
3. Input the motor nameplate parameters (such as F1-00 to F1-05) correctly and input the following parameters based on the motor selected.

Motor	Parameter
Motor 1	F1-00: Motor type selection F1-01: Rated motor power F1-02: Rated motor voltage F1-03: Rated motor current F1-04: Rated motor frequency F1-05: Rated motor speed
Motor 2	A2-00 to A2-05: Same as above

4. If the motor is an asynchronous motor, set F1-37 (A2-37 in case of motor 2) to 2 and press the ENTER key. In this case, the operating panel displays "TUNE", as shown below.



Next, press the RUN key on the operating panel, and then the motor starts to accelerate/decelerate and run forwardly/reversely, with the RUN indicator turned on. The auto-tuning process lasts for about two minutes. When the preceding information disappears from the operating panel, the normal parameter display state applies, indicating that parameter auto-tuning is done.

After auto-tuning is done, the following motor parameters are calculated automatically.

Motor selection	Parameter
Motor 1	F1-06: Stator resistance of asynchronous motor F1-07: Rotor resistance of asynchronous motor F1-08: Leakage inductance of asynchronous motor F1-09: Mutual inductance of asynchronous motor F1-10: No-load current of asynchronous motor
Motor 2	A2-06 to A2-10 have the same definitions as F1-06 to F1-10.

If the motor cannot be disconnected from the load, set F1-37 (for motor 1) or A2-37 (for motor 2) to 3 and then press the RUN key on the operating panel to start motor auto-tuning.

7.3 Control Terminal

7.3.1 DI/DO

DI functions

The drive provides five multi-functional DIs, among which DI5 can be used as the high-speed pulse input terminal. If more DI terminals are required, you can install an I/O expansion card or a programmable multi-functional expansion card. The I/O expansion card provides three DI terminals (DI6 to DI8), and the programmable multi-functional

expansion card provides five DI terminals (DI6 to DI10). You can select any DI function for each DI terminal.

To select a function for a DI, set F4-00 to F4-39.

DO functions

The drive provides one multi-functional digital output terminal (DO1), one multi-functional relay output terminal (TA/TB/TC) and one FM terminal. FM and DO1 are transistor output that is used to drive 24 VDC low-voltage circuit; TA/TB/TC is relay output that is used to drive 250 VAC control circuit.

If more input/output terminals are required, configure optional I/O expansion modules. For example, the MD38IO1 provides one multi-function relay output terminal (PA/PB/PC) and one multi-function digital output terminal (DO2).

The standard DO and optional DO are described in the following table.

Table 7–10 DO terminal list

Port name	Parameter	Output characteristics
FM-COM	F5-06 (F5-00 = 0)	Transistor, high-speed pulse output of 10 Hz to 100 kHz; driving capacity: 24 VDC, 50 mA
	F5-01 (F5-00 = 1)	Transistor; driving capacity: 24 VDC, 50 mA
TA-TB-TC	F5-02	Relay; driving capacity: 250 VAC, 3 A
PA-PB-PC	F5-03	Expansion card, relay; driving capacity: 250 VDC, 3 A
DO1-CME	F5-04	Transistor; driving capacity: 24 VDC, 50 mA
DO2-CME	F5-05	Expansion card, transistor; driving capacity: 24 VDC, 50 mA

Table 7–11 List of multi-functional relay output terminals (TA/TB/TC) and FM terminals

Port name	Parameter	Output characteristics
FM-COM	F5-06 (F5-00 = 0)	Transistor, high-speed pulse output of 10 Hz to 100 kHz; driving capacity: 24 VDC, 50 mA
TA-TB-TC	F5-02	Relay; driving capacity: 250 VAC, 3 A
PA-PB-PC	F5-03	Expansion card, relay; driving capacity: 250 VDC, 3 A
DO1-CME	F5-04	Transistor; driving capacity: 24 VDC, 50 mA
DO2-CME	F5-05	Expansion card, transistor; driving capacity: 24 VDC, 50 mA

The DO terminals can be used to indicate the working status and alarms of the AC drive. Parameters F5-01 to F5-05 and F5-17 to F5-22 are used to define the functions of the DO terminals. You can set about 40 kinds of functions to fulfill specific automatic control requirements.

7.3.2 VDI Terminal

The virtual digital input terminals (VDIs), which can be used for multi-functional digital inputs, have the similar functions as the DIs on the control board.

You can select functions for VDI terminals by setting A1-00 to A1-04. VDI1 to VDI5 can be used as multi-functional DIs. The settings of A1-00 to A1-04 to values of 0 to 52 are the same as the settings for common DIs. Values 53 to 59 of A1-00 to A1-04 are reserved. The VDI state can be set in two modes, which is selected by A1-05.

- 0: The VDI state is determined by the state of the corresponding VDO and VDIx is bound to VDOx (x ranges from 1 to 5).
- 1: The VDIx (x ranges from 1 to 5) state is set by the ones to ten thousands places of this parameter.

A1-06 is used to set the VDI state.

Example

The following examples show how to use VDIs.

- Example 1: When A1-05 (VDI state setting mode) is set to 00000 (indicating that VDI state is determined by VDO state), the following function needs to be implemented: The AC drive reports an alarm and stops when AI1 input exceeds the upper limit or lower limit. Do as follows.

Step	Setting
1	Set A1-00 (VDI1 function selection) to 44 (User-defined fault 1).
2	Set A1-05 to 00000 to make VDI1 state be determined by VDO1.
3	Set A1-11 (VDO1 function selection) to 31 (AI1 input limit exceeded).

When AI1 input exceeds the upper/lower limit, VDO1 output becomes ON. In this case, VDI1 is active. The drive reports Err27 after receiving user-defined fault 1 through VDI1 and then stops.

- Example 2: When A1-05 (VDI state setting mode) is set to 11111 (indicating that the VDI state is determined by A1-06), the following function needs to be implemented: The AC drive automatically enters the operating state after power-on. Do as follows.

Step	Setting
1	1. Set A1-00 (VDI1 function selection) to 1 (Forward run (FWD)).
2	Set A1-05 (VDI state setting mode) is set to 11111 to make the VDI1 state be determined by parameter.

Step	Setting
3	Set A1-06 (VDI state setting) to 11111, indicating that the VDI1 is valid.
4	Set F0-02 (Command source) to 1 (Terminal).
5	Set F8-18 (Protection upon start) to 0 (Disable).

When initialization is done after power-on, VDI1 is detected to be active and the terminal is assigned with the forward run function. This means that the drive receives the forward run command from the terminal. Therefore, the drive starts to run in the forward direction.

7.3.3 Virtual Digital Output Terminal Functions

The virtual digital output (VDO) functions are similar to the DO functions on the control board. The VDO can be used together with the virtual digital input (VDIx) to implement some simple logic control.

VDO and VDI can be used together to achieve flexible control. For detailed examples, see the VDI section.

Related parameters: A1-11 to A1-21.

7.3.4 AI Terminals

The AC drive provides two multi-functional AI terminals (AI1 and AI2) by default. If more input terminals are required, configure optional I/O expansion cards. For example, the MD38IO1 expansion card can provide one AI terminal (AI3).

Table 7–12 AI terminal descriptions

Terminal	Name	Type	Input range	Input impedance
AI1-GND	AI terminal 1 on the control board	Voltage type	0 VDC to 10 VDC	22 kΩ
AI2-GND	AI terminal 2 on the control board	Voltage type[1]	0 VDC to 10 VDC	22 kΩ
		Current type[1]	0 mA to 20 mA	The impedance 500 Ω or 250 Ω can be selected through J10.
AI3-GND	AI terminal on the I/O expansion card	Voltage type	-10 VDC to +10 VDC	-

[1]: You can select voltage input or current input through J9 jumper cap on the control board.

When an AI is used as an DI, the AI state is high level if the input voltage of the AI is higher than 7 V and is low level if the input voltage of the AI is lower than 3 V. The AI is in hysteresis state if the input voltage ranges from 3 V and 7 V. Relationship between AI input voltages and DI states

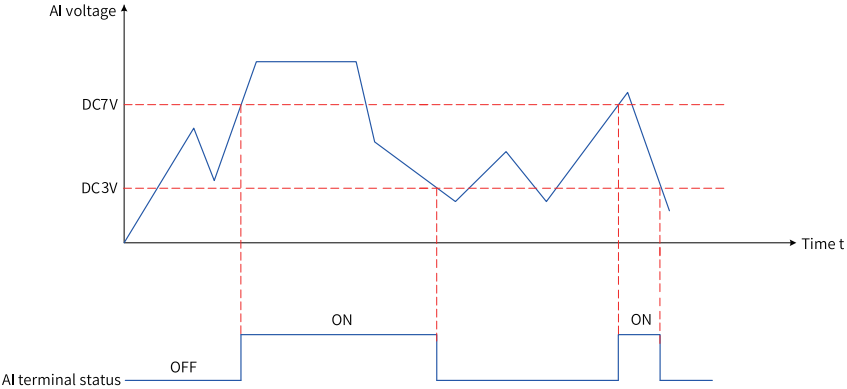


Figure 7-38 Relationship between AI input voltages and DI states

Table 7–13 Procedure for setting the AI as the frequency reference

Setting procedure	Related Parameters	Description	
AI selection: Select the AI for setting the frequency reference based on terminal characteristics.	F0-03	F0-03 = 2	AI1 is used.
		F0-03 = 3	AI2 is used.
		F0-03 = 4	AI3 is used.
Curve between AI voltage[1] and frequency: Select any of the five curves.	F4-33	Generally, F4-33 is set to the default value 321. That is, AI1 uses curve 1, AI2 uses curve 2, and AI3 uses curve 3.	
Curve between AI voltage[1] and frequency: Set the relationship between AI voltage inputs and the set values.	F4-13 to F4-16 [2]	Curve 1 setting	Typical curve [3]
	F4-18 to F4-21	Curve 2 setting	Typical curve [4]
	F4-23 to F4-27	Curve 3 setting	Typical curve [5]
	A6-00 to A6-07	Curve 4 setting	
	A6-08 to A6-15	Curve 5 setting	
	F4-34	Selection when AI value < minimum input value[2]	
	F0-10	When the AI is used as the frequency reference source, the value 100% of the voltage/current input corresponds to the value of F0-10 (Maximum frequency).	

Setting procedure	Related Parameters	Description
AI filter time	F4-17	The default value is 0.1s. Set this parameter to balance the response speed and anti-interference capability. If quick response is required, reduce the setpoint of F4-17. If the interference on site is strong, increase the setpoint of F4-17.

[1] For the current-type AI curve, 1 mA current corresponds to 0.5 V voltage. That is, 20 mA corresponds to 10 V.

[2] When the analog input voltage exceeds the maximum value (F4-15), the maximum value is used as the analog input voltage. When the analog input voltage is less than the minimum value (F4-13), the value (minimum input value or 0.0%) of F4-34 (selection when AI value < minimum input value) is used as the analog input voltage.

[3] The typical curve of AI1 is shown in the following figure.

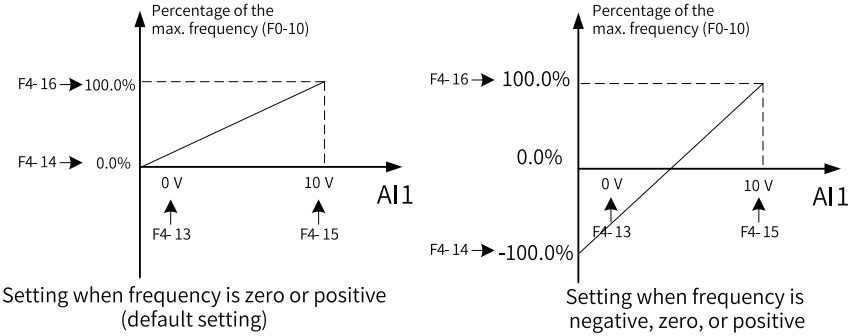


Figure 7-39 Typical curve of AI1

[4] The typical curve of AI2 for voltage input is consistent with that of AI1. When AI2 is used for current input, set 4 mA to 20 mA, which corresponds to 0 Hz to 50 Hz or -50 Hz to 50 Hz.

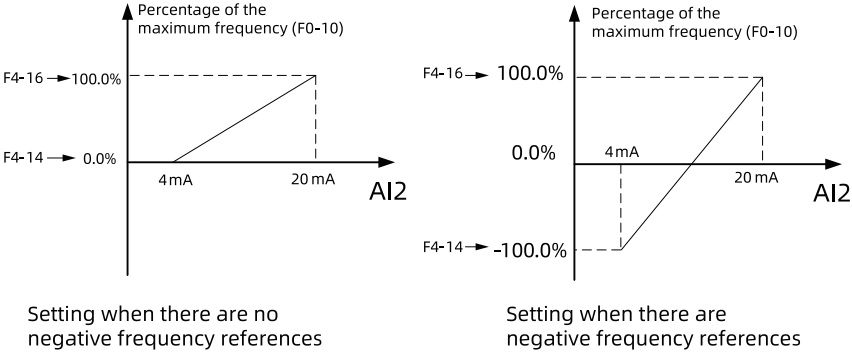


Figure 7-40 Typical curve of AI2

[5] The typical curve of AI3 is shown in the following figure. The corresponding relations in the following two setting methods are the same in the voltage range from 0 V to 10 V. However, when the negative voltage is input, the voltage will be limited to 0 V (F4-24) in the setting method shown in the left figure.

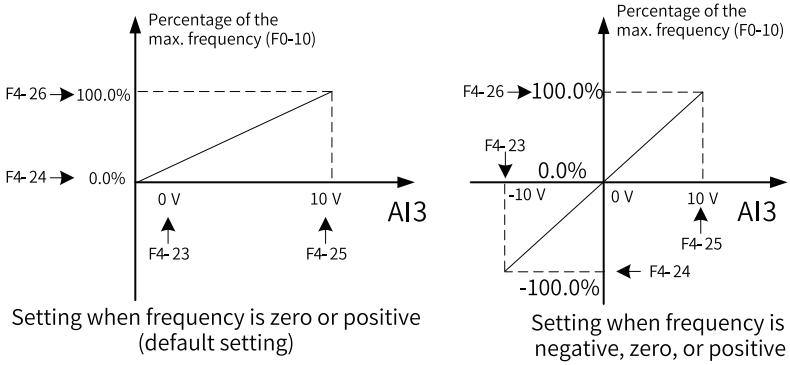


Figure 7-41 Typical curve of AI3

Related parameters: A1-07 to A1-10.

7.3.5 AO Terminals

The drive provides one AO terminal (AO1) by default. If more output terminals are required, configure optional expansion I/O cards. For example, the MD38IO1 expansion card can provide one AO terminal (AO2).

AO1 and AO2 can be used to indicate the internal running parameters in analog mode. The attribute of the parameter indicated can be defined by F5-07 (AO1 function selection) and F5-08 (AO1 function selection).

The AO output curve can be used to correct zero offset of analog output and the output amplitude offset, as shown below. If "b" represents the zero offset, "k" represents the gain, "Y" represents the actual output, and "X" represents the standard output, the actual output is: Y = kX + b.

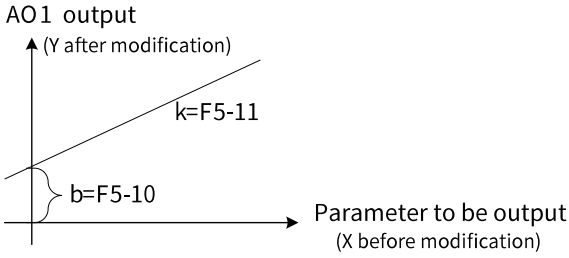
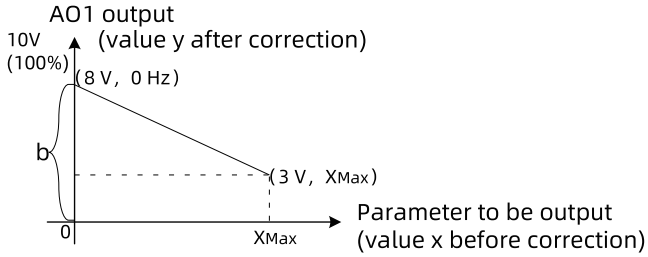


Figure 7-42 AO signal correction characteristic curve

The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA), and the zero offset = zero offset coefficient x 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 V to 10 V (or 0 mA to 20 mA) without zero offset or gain correction.

For example, assume that the AO terminal outputs the running frequency. If the actual output needs to be 8 V (or 16 mA) at the frequency of 0 Hz, set the zero offset to 80%, as shown below. If the actual output needs to be 3 V (or 6 mA) at the maximum frequency, set the gain to -0.50, as shown below.



Zero offset b = y - kx = y (x = 0) = 8 V Zero offset coefficient 100% corresponds to 10 V. When b = 8 V, zero offset coefficient = 8 V/10 V x 100% = 80%.

k = (y - b)/x = (Actual output - zero offset)/Standard output = (3 V - 8 V)/10 V = -0.5

Figure 7-43 Output with zero offset or gain

Related parameters

F5-07 to F5-08, F5-10 to F5-13

The preceding parameters are used to rectify the zero drift of analog output and the deviation of output amplitude. They can also be used to customize AO output curves.

Example

Assume that the AO terminal outputs the running frequency, and the corrected output needs to be 8 V when frequency is 0 Hz and 4 V when frequency is 40 Hz. Then you can set F5-11 to -0.5 and set F5-10 to 80%.

The analog output 0 V to 10 V corresponds to 0% to 100%. When the AO2 is set to function 1 (frequency), and the drive frequency is set to 50% of the maximum frequency, the output voltage of the AO2 is 5 V (50% x 10 V).

The following is an example of how to calculate AO zero offset coefficient (F5-10 or F5-12) and AO gain (F5-11 or F5-10).

Assume that the AO outputs the operating frequency. The rectified output needs to be 8 V (Y1) when the frequency is 0 Hz (X1) and 4 V (Y2) when the frequency is 40 Hz (X2).

Formula for calculating the gain:

$$K = \frac{(Y1 - Y2) \times Xmax}{(X1 - X2) \times Ymax}$$

Formula for calculating zero offset coefficient:

$$b = \frac{(X1 \times Y2) - (X2 \times Y1)}{(X1 - X2) \times Ymax} \times 100\%$$

Xmax is the maximum output frequency 50 Hz (assume that the maximum frequency F0-10 is 50 Hz). Ymax is the voltage and the value is 10 V. Then you can set F5-11 to -0.5 and set F5-10 to 80%.

Table 7–14 Relationship between analog output signal types and corresponding maximum values (Ymax)

Analog output signal type	Corresponding max. value (Ymax)
Voltage	10 V
Current	20 mA

Table 7–15 Relationship between analog output content and corresponding maximum values (Xmax)

Analog output content	Corresponding max. value (Xmax)
Operating frequency	Maximum output frequency
Frequency reference	Maximum output frequency
Output current	2 x Rated motor current
Output torque (absolute value)	2 x Rated motor torque
Output power	2 x Rated power
Output voltage	1.2 x Rated drive voltage
Pulse input	100.00 kHz
AI1	10 V

Analog output content	Corresponding max. value (Xmax)
AI2	10 V or 20 mA
AI3	10 V
Length	Maximum set length
Counting value	Maximum counting value
Communication setting	100.0%
Motor speed	Speed at the maximum output frequency
Output current	1000.0 A
Output voltage	1000.0 V
Actual value of output torque	2 x Rated motor torque

7.3.6 Digital Pulse Input (DI5)

The frequency is set by DI5 (high-speed pulse). The signal specifications set by pulse are 9 V to 30 V (voltage) and 0 kHz to 100 kHz (frequency).

Table 7–16 Procedure when the digital pulse input terminal (DI5) is used as the frequency source

Setting procedure	Related Parameters	Description
Set the digital pulse input terminal (DI5) as the frequency source.	F0-03, F4-04	Set F0-03 to 5 to select "Pulse setting (DI5)" as the main frequency source. Set F4-04 to 30 to assign DI5 with the "Pulse frequency input" function.
Set the curve representing the relationship between the pulse frequency and the frequency reference.	F4-28 to F4-31	Typical curve [1]
Set the maximum frequency.	F0-10	When the digital pulse input terminal is used as the frequency source, the percentage 100.0% corresponds to the maximum frequency F0-10.
Set the filter time of the frequency reference.	F4-32	Set the filter time of the frequency reference.

[1]: The following figure shows the curve when digital pulse input is used as the frequency reference.

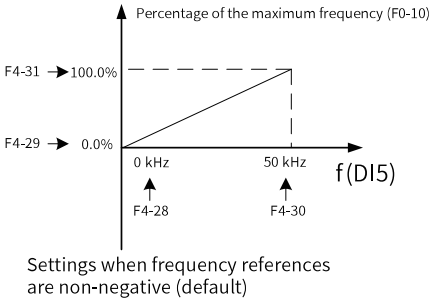


Figure 7-44 Typical set curve when DI5 is used as the frequency source

7.3.7 Pulse Output Terminal (FM)

The FM (pulse output) 0 kHz to 100 kHz corresponds to 0% to 100%. When the FM output function is set to 1 (frequency setting), the drive frequency is set to 50% of the maximum frequency, and F5-09 is set to 100 kHz, the output frequency of the FM terminal is 50 kHz (50% x 100 kHz). When the FM terminal is used for pulse output, F5-09 is used to set the maximum frequency of the output pulse.

Related parameters

F5-00, F5-06, F5-09

7.4 Control Performance

7.4.1 Overcurrent Control

Overcurrent stall

If the current exceeds the overcurrent stall action current of during acceleration, deceleration, and operation at a constant speed, the overcurrent control function suppresses the current. When the current exceeds the overcurrent stall action current, the output frequency decreases. After the current falls below the overcurrent stall threshold, the output frequency increases to the target frequency, which prolongs the actual acceleration time automatically. If the actual acceleration time cannot meet the requirements, increase the overcurrent stall action current.

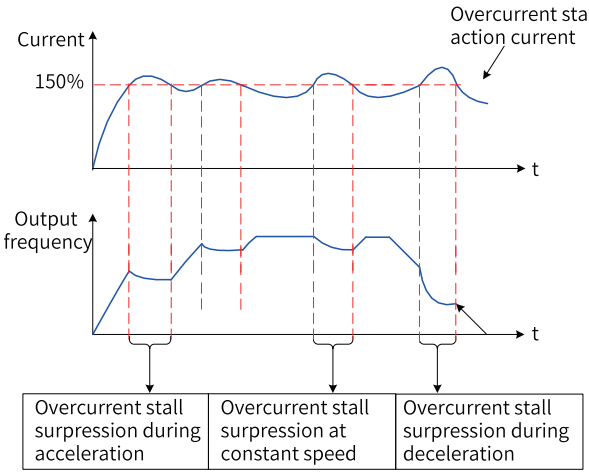


Figure 7-45 Overcurrent stall action

Overcurrent stall at multiplied rated frequency

In some scenarios with high running frequency, multiple magnetic weakening, and large load inertia such as centrifuges, the output frequency of the AC drive is higher than the rated frequency, and the motor drive current is small. If the overcurrent stall action current is set to the same as the overcurrent stall action current during running at a lower frequency, the motor speed will drop dramatically, affecting the motor running characteristics. This function improves the acceleration performance of the motor and prevents motor stall by reducing the stall action current during operation at the high frequency.

"Overcurrent stall prevention current when the running frequency is higher than the rated frequency = (fs/fn) x k x LimitCur"

In the preceding formula, fs represents the operating frequency, fn represents the rated motor frequency, k represents F3-21 (Current compensation coefficient for overcurrent stall action at multiplied rated frequency), and LimitCur represents F3-18 (Overcurrent stall action current in V/f mode).

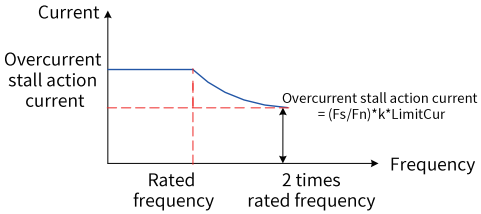


Figure 7-46 Overcurrent stall action at multiplied rated frequency

Note

When the motor power is above 55 kW and the carrier frequency is below 2 kHz, reduce the overcurrent stall action current (F3-18) to avoid insufficient torque due to activation of the pulse-by-pulse current limit function.

Related Parameters

F3-18 to F3-21

7.4.2 Overvoltage Control

If the bus voltage exceeds the overvoltage stall action voltage, the actual motor speed is higher than the motor speed corresponding to the output frequency of the AC drive and the motor is in the generating state. To protect the system security and avoid tripping protection, the overvoltage stall protection function can be enabled. This reduces the output frequency and extends the actual deceleration time. If the actual deceleration time cannot meet the requirements, the over-excitation gain can be appropriately increased.

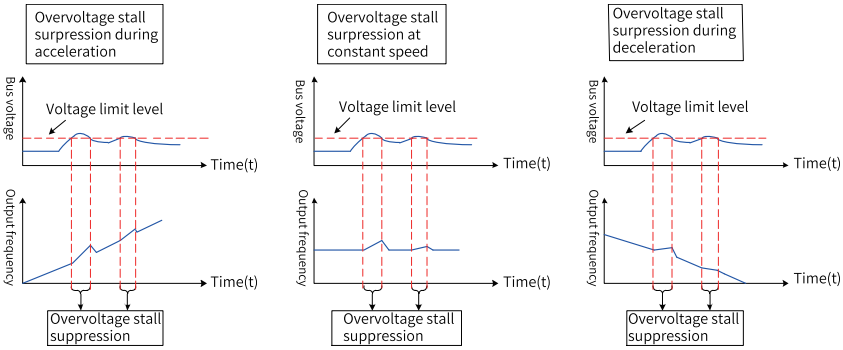


Figure 7-47 Overvoltage stall action

Related parameters

F3-10, F3-11, F3-22 to F3-26, and F9-08

Observe the following notice when using a braking resistor, braking unit, or energy feedback unit:

- Set F3-10 (V/f over-excitation gain) to 0. Otherwise, too large current may occur during drive running.
- Set F3-23 (V/f overvoltage stall) to 0. Otherwise, the deceleration time may be extended.

7.5 Application Control

7.5.1 Linear speed

Parameter code	Parameter name	Default	Value range	Description
F8-56	Per unit linear speed corresponding to the frequency upper limit (F0-12)	50.00 m/s	1.00 m/s to 655.35 m/s	-
F8-58	Data processing mode written through 0X7310 (U3-16)	0	0 to 2	0: Write frequency 1: Write PPR 2: Write linear speed
F8-59	Display of U0-14	0	0 to 2	0: Load speed 1: Linear speed mode 1 2: Linear speed mode 2

- Write linear speed
  The linear speed writing function is for per unitization based on F0-12 (Frequency upper limit). In other words, set F8-56 to the upper linear speed corresponding to the frequency upper limit.

  Take the default value (F0-12 = 50.00 Hz and F8-56 = 50.00 m/s) as an example. The upper frequency of the AC drive is 50.00 Hz, and the linear speed corresponding to the upper frequency is 50.00 m/s. The data frame for writing the linear speed 30.00 m/s through 485 communication is 01 06 73 10 0B B8 95 C9.

  01 is the station number of the AC drive, 06 is the write instruction, 73 10 is the address for writing the linear speed, 0B B8 is a hexadecimal value converted from 3000 (line speed 30.00 m/s), and 95 C9 is the CRC check bit.

- Linear speed display during operation
  Set F7-03 to display parameters on the LED operating panel during AC drive operation. For example, set F7-03 to H.401F to display the load speed (bit 14) on the operating panel.

  When F8-59 is set to 0, the original logic is retained (load speed display). When F8-59 is set to 1, the current linear speed is displayed. The ones place of F7-12 is used to set the number of decimal places (0 to 2) of the linear speed. When F8-59 is set to 2, the

number of 100 times the linear speed is displayed. The number of decimal places for the linear speed is fixed to 0 and cannot be set by any parameter.

- Set linear speed display at stop
  U0-75 is used as the set linear speed display channel and is used to add the linear speed to bit 13 of F7-05.

  F7-05 is set to H.0033 by default. After F7-05 is modified to H.2033, the set linear speed is displayed at stop.

  When the drive is stopped, press the right key on the operating panel to switch the value displayed. When the Hz and A indicators are both ON, the linear speed is displayed. U0-75 cannot be used to set the number of decimal places. By default, two decimal places are displayed. When F8-59 is set to 2, U0-75 is displayed as 100 times the set linear speed, that is, the value written through communication. For example, U0-75 is displayed as 3000 for the linear speed 30.00 m/s.

Note

Setting F8-58 to 0 or 1 can be used to write the frequency or speed to 7310H respectively. To write -10 Hz, set F8-58 to 0 and write the data frame 01 06 73 10 FC 18 D3 81. To write 150 rpm, set F8-58 to 1 and write the data frame 01 06 73 10 00 96 12 E5.

7.5.2 Jog

In some applications, the AC drive needs to run at a low speed temporarily to facilitate equipment testing. In this case, jogging applies. If jogging is adopted, F6-00 must be set to 0 (direct start) and F6-10 must be set to 0 (decelerate to stop). The following figure shows the relationship between the output frequency and acceleration/deceleration time during jog running.

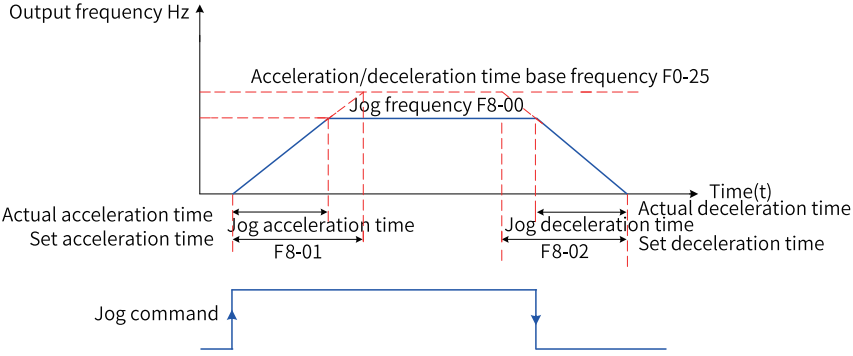


Figure 7-48 Schematic diagram of jog running

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F0-02	Command source	0	0: Operating panel 1: Terminal 2: Communication	This parameter is used to select the input channel of the AC drive control commands, such as run, stop, forward run, reverse run and jog operation. 0: Operating panel Operation commands are input using the RUN, STOP/RES, and MF.K keys on the operating panel. This mode is suitable for initial commissioning. 1: Terminal Operation commands are input using the DI of the AC drive. The DI can be assigned with different functions such as start/stop, forward/reverse run, jog, two-wire/three-wire mode, and multi-reference (independent from each other). This mode is suitable for most applications. 2: Communication Operation commands are input through remote communication with the communication address of 0x7310 or 0x1000 in general. The AC drive must be equipped with a communication card to communicate with the host controller. The communication address for Modbus RTU and CANlink communication is 0x2000 and that for PROFIBUS DP, CANopen, PROFINET, and EtherCAT communication is 0x2073-12. The related parameter is U3-17. This mode applies to remote control or centralized control of multiple equipment.
F0-25	Base frequency for acceleration/deceleration time	1	0: Maximum frequency (F0-10) 1: Frequency reference 2: 100 Hz	This parameter specifies the base frequency for the acceleration/deceleration time. It is used as the target frequency during acceleration and the starting frequency during deceleration.

Parameter code	Parameter name	Default	Value range	Description
F7-01	MF.K key function	0	0: MF.K key disabled 1: Switchover between operating panel control and remote control (terminal or communication) 2: Switchover between forward and reverse run 3: Forward jog 4: Reverse jog	This parameter is used to select the MF.K key function. 0: MF.K key disabled The MF.K key has no function. 1: 1: Switchover between operating panel control and remote control (terminal or communication) When F0-02 is set to 0 (operating panel), the MF.K key does not work. When F0-02 is set to 1 (terminal), the MF.K key is used for switchover between terminal control and operating panel control. When F0-02 is set to 2 (communication), the MF.K key is used for switchover between the communication control and operating panel control. 2: Switchover between forward and reverse run Pressing the MF.K key changes the direction of the frequency reference. This function is valid only when the command source is set to the operating panel. 3: Forward jog Pressing the MF.K key implements forward jog (FJOG). This function is valid only when the command source is set to the operating panel. 4: Reverse jog Pressing the MF.K key implements reverse jog (RJOG). This function is valid only when the command source is set to the operating panel.
F8-00	Jog frequency	2.00 Hz	0 to F0-10 (Maximum frequency)	This parameter indicates the operating frequency of the drive in the jog mode.
F8-01	Jog acceleration time	20.0 s	0.0 to 6500.0	This parameter defines the acceleration time of the AC drive in the jog mode.
F8-02	Jog deceleration time	20.0 s	0.0 to 6500.0	This parameter defines the deceleration time of the AC drive in the jog mode.

Parameter code	Parameter name	Default	Value range	Description
F8-13	Reverse running prohibition	0	0: Reverse running allowed 1: Reverse running inhibited	When F8-13 is valid, the motor runs at zero frequency after a reverse command is input to the AC drive.
F8-27	Jog control through terminal with priority	0	0: Invalid 1: Valid	-

Example

The following section introduces how to set parameters related to jogging when the operating panel is used as the jogging command source.

Table 7–17 Parameter settings for jogging set by operation panel

Step	Forward jogging	Reverse jogging
1	Set F7-01 to 3 to select forward jogging for the MF.K key.	Set F7-01 to 4 to select reverse jogging for the MF.K key. Set F8-13 to 0 to allow reverse running.
2	Set F0-02 to 0 to select the operating panel as the command source.	Set F0-02 to 0 to select the operating panel as the command source.
3	Set F8-00 (jog frequency), F8-01 (jog acceleration time), and F8-02 (jog deceleration time) properly.	Set F8-00 (jog frequency), F8-01 (jog acceleration time), and F8-02 (jog deceleration time) properly.
4	In the stop status, when the MF.K key is pressed down, the AC drive starts to jog in the forward direction. When the MF.K key is released, the AC drive decelerates to stop.	In the stop status, when the MF.K key is pressed down, the AC drive starts to jog in the reverse direction. When the MF.K key is released, the AC drive decelerates to stop.

7.5.3 Master/Slave Control

Flexible connection

The master/slave control mode is designed for multi-drive applications where a system is driven by multiple AC drives and the motor shafts are coupled by gears, chains, or conveyor belts. It enables even allocation of loads on the drive units. The external control signals are connected only to the master that controls the slaves through serial communication.

The master must be in the speed control mode and the slaves follow the speed reference of the master. The following figure describes the flexible connection in the master/slave control mode.

When motor shafts of the master and slave are connected flexibly, the slave must work in the speed control mode because slight speed difference among drive units is allowed. When the master and slaves are in the speed control mode, droop control must apply.

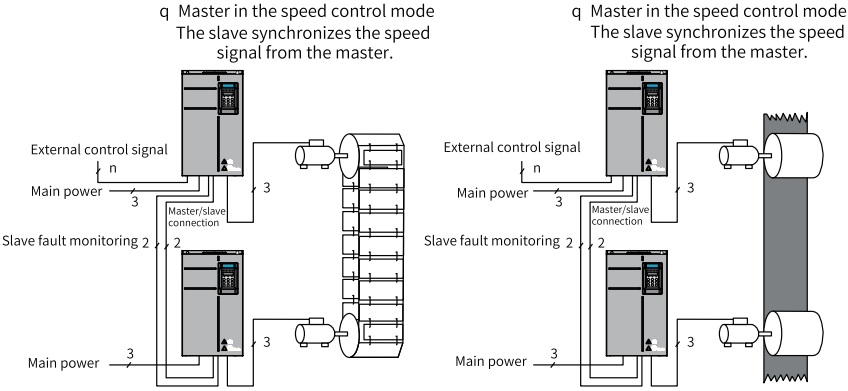


Figure 7-49 Flexible connection in the master/slave control mode

Master/slave connection

To avoid control conflict, all drive units connected to the same machinery must receive the external control signals only through the master. When wiring the master and slaves, connect all external control signal cables only to the master, and never using the operating panel or field bus system to control the slaves, as shown below.

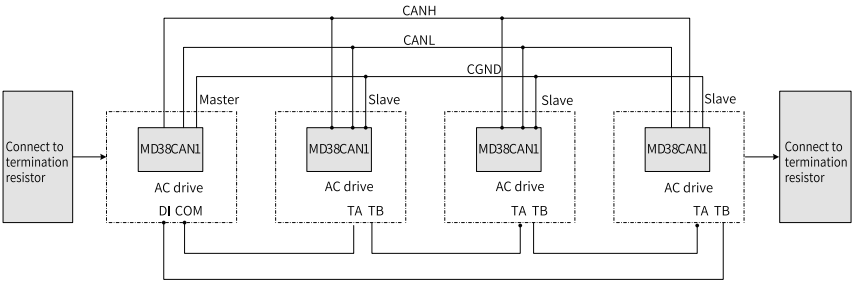


Figure 7-50 Connections between the master and slave

When a slave becomes faulty, the fault information is sent to the master in one of the following ways. When the slave stops due to a fault, the master stops running.

1. The relay is used for slave fault feedback.
2. The faulty slave sends the fault information to the master through communication after the tens place of A8-02 is set to 1.

Droop control

F8-15 is used for droop control. The droop control function allows slight speed difference between the master and slaves to avoid conflict between them. The droop control value needs to be adjusted only when both the master and the slave are in the speed control mode. A proper droop control value is gradually obtained during drive running. Do not set F8-15 to a very large value. Otherwise, steady speed will decline obviously when the load is large. You must set F8-15 for both the master and the slave.

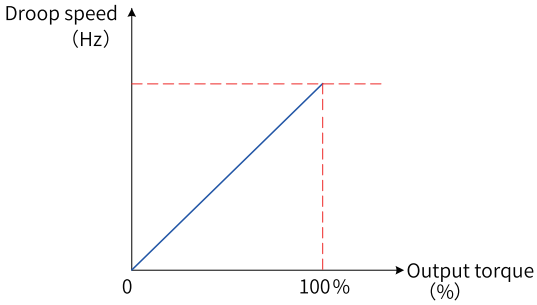


Figure 7-51 Relationship between droop speed and output torque

Droop speed = Synchronous frequency x output torque x (F8-15/10)

For example, if F8-15 is set to 1.00, the synchronous frequency is 50 Hz, and the output torque is 50%, the actual frequency of the AC drive is 47.5 Hz, which is calculated by 50 Hz - 50 Hz x 50% x (1.00/10).

Related parameters

A8-00 to A8-07

Example

The following section describes parameter settings for flexible connections.

- Flexible connection

Table 7-18 Parameter settings for the master in the speed control mode

Parameter code	Parameter name	Value range	Value	Adjustment Required
FD-00	Baud rate	0000 to 6009	Setpoint of the thousands place Same value for the master and slave	No
A8-00	Point-to-point communication	0 to 1	1	No
A8-01	Master/Slave selection	0 to 1	0	No
F0-10	Maximum frequency	50.00 Hz to 500.00 Hz	50.00 Hz (Same value for the master and slave)	No
F8-15	Droop control	0.00 Hz to 10.00 Hz	1.00 Hz	Yes
F0-17	Acceleration time 1	0.00s to 650.00s (F0-19 = 2) 0.0s to 6500.0s (F0-19 = 1) 0s to 65000s (F0-19 = 0)	Same value for the master and slave	No
F0-18	Deceleration time 1		Same value for the master and slave	No

Table 7-19 Parameter settings for the slave in the speed control mode

Parameter code	Parameter name	Value range	Value	Adjustment Required
FD-00	Baud rate	0000 to 6009	Setpoint of the thousands place Same value for the master and slave	No
A8-00	Point-to-point communication	0 to 1	1	No
A8-01	Master/Slave selection	0 to 1	1	No
A8-02	Selection of action of the slave	0-111	Ones: 1 Tens: 1 Hundreds: 1	Not supported

Parameter code	Parameter name	Value range	Value	Adjustment Required
A8-03	Function selection for data received by the slave	0: Running frequency of master 1: Target frequency of master	0	No
F0-02	Command source	0 to 2	2	No
F0-03	Selection of main frequency source X	0-9	9	No
F0-10	Maximum frequency	50.00 Hz to 500.00 Hz	50.00 Hz (Same value for the master and slave)	No
F0-17	Acceleration time 1	0.00s to 650.00s (F0-19 = 2) 0.0s to 6500.0s (F0-19 = 1) 0s to 65000s (F0-19 = 0)	Same value for the master and slave	No
F0-18	Deceleration time 1		Same value for the master and slave	No
F8-15	Droop control	0.00 Hz to 10.00 Hz	1.00 Hz	Yes
FD-02	Local address	0: Broadcast address 1 to 247 (valid for Modbus, PROFIBUS DP, CANlink, PROFINET, and EtherCAT communication)	1	No

7.5.4 Frequency Detection

7.5.4.1 Multi-reference

If multi-reference is selected as the frequency reference source, frequency references are input through different state combinations of the DIs.

Table 7–20 Using multi-reference as the frequency reference source

Step	Related Parameters	Description
Step 1: Select multi-reference as the frequency reference source.	F0-03	F0-03 = 6
Step 2: Determine the number of multi-references.	/	A total of 16 multi-references are supported, which requires four DIs. The relationship between the number of multi-references and the number of DIs is as follows: 2 multi-references: One DI (K1) 3-4 multi-references: Two DIs (K1 and K2) 5 to 8 references: three DI terminals K1, K2, and K3 9 to 16 references: four DI terminals K1, K2, K3, and K4
Step 3: Assign the multi-reference function to the DI.	F4-00 to F4-09	Multi-reference terminal K1: Assign function 12 to K1.
		Multi-reference terminal K2: Assign function 13 to K2.
		Multi-reference terminal K3: Assign function 14 to K3.
		Multi-reference terminal K4: Assign function 15 to K4.
Step 4: Set the frequency for each multi-reference[Note].	FC-00 to FC-15	The frequency corresponding to each reference is set to a percentage value. 100% corresponds to the maximum frequency (F0-10).
	F0-10	If the frequency reference source is set multi-reference, the value 100% of FC-00 to FC-15 corresponds to the value of F0-10 (Maximum frequency).

Note: The four multi-reference terminals can make up 16 state combinations, corresponding to 16 frequency reference values. For details, see the following table.

Table 7–21 State combinations of the four multi-reference terminals

K4	K3	K2	K1	Reference	Percentage to maximum frequency
OFF	OFF	OFF	OFF	Multi-reference 0	FC-00
OFF	OFF	OFF	ON	Multi-reference 1	FC-01

K4	K3	K2	K1	Reference	Percentage to maximum frequency
OFF	OFF	ON	OFF	Multi-reference 2	FC-02
OFF	OFF	ON	ON	Multi-reference 3	FC-03
OFF	ON	OFF	OFF	Multi-reference 4	FC-04
OFF	ON	OFF	ON	Multi-reference 5	FC-05
OFF	ON	ON	OFF	Multi-reference 6	FC-06
OFF	ON	ON	ON	Multi-reference 7	FC-07
ON	OFF	OFF	OFF	Multi-reference 8	FC-08
ON	OFF	OFF	ON	Multi-reference 9	FC-09
ON	OFF	ON	OFF	Multi-reference 10	FC-10
ON	OFF	ON	ON	Multi-reference 11	FC-11
ON	ON	OFF	OFF	Multi-reference 12	FC-12
ON	ON	OFF	ON	Multi-reference 13	FC-13
ON	ON	ON	OFF	Multi-reference 14	FC-14
ON	ON	ON	ON	Multi-reference 15	FC-15

7.5.4.2 Frequency Detection (FDT)

This function sets the detection value of the output frequency as well as the hysteresis value upon output cancellation. The hysteresis value is valid only during deceleration. Hysteresis does not occur in detection during acceleration. The following figure shows the frequency detection function.

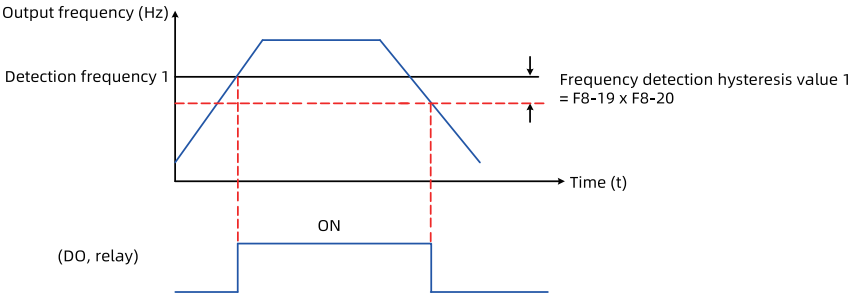


Figure 7-52 Parameters related to frequency detection

Table 7–22 Parameters related to frequency detection

Parameter code	Parameter name	Default	Value range	Description
F8-19	Detection frequency 1	50.00 Hz	0 to F0-10 (Maximum frequency)	When the running frequency is higher than the detection frequency (FDT1), the DO terminal outputs an active signal. When the running frequency is lower than the result of the detection frequency (FDT1) minus the frequency detection hysteresis value (FDT1), the DO terminal outputs an inactive signal. The valid range is from 0.00 Hz to F0-10 (maximum frequency).
F8-20	Frequency detection hysteresis rate 1	5.0%	0.0% to 100.0%	The frequency detection hysteresis value (FDT1) is the result of F8-19 multiplied by F8-20. When the running frequency is higher than F8-19, the DO outputs an active signal. When the running frequency is lower than a specific value (F8-19 - F8-19 x F8-20), the DO outputs an inactive signal.

Parameter code	Parameter name	Default	Value range	Description
F8-28	Detection frequency 2	50.00 Hz	0 to F0-10 (Maximum frequency)	When the running frequency is higher than the detection frequency (FDT2), the DO terminal outputs an active signal. When the running frequency is lower than the result of the detection frequency (FDT2) minus the frequency detection hysteresis value (FDT2), the DO terminal outputs an inactive signal. The valid range is from 0.00 Hz to F0-10 (maximum frequency).
F8-29	Frequency detection hysteresis rate 2	5.0%	0.0% to 100.0%	The frequency detection hysteresis value (FDT2) is the result of F8-28 multiplied by F8-29. When the operating frequency is higher than F8-28, the DO outputs an active signal. When the operating frequency is lower than a specific value (F8-28 - F8-28 x F8-29), the DO outputs an inactive signal.

7.5.4.3 Jump Frequency

The jump frequency enables the AC drive to avoid mechanical resonance points of the load. The drive can be set with two jump frequencies. If both the two frequencies are set to 0, the jump frequency function is disabled.

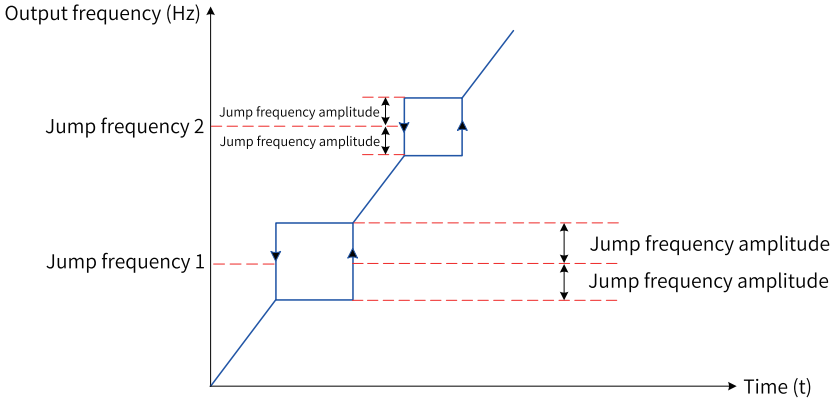


Figure 7-53 Jump frequency

As shown in the preceding figure, when the running frequency approaches the jump frequency during acceleration, the AC drive runs at the current frequency for a period and then skips over the jump frequency. The jump range is twice the value of F8-11 (jump frequency amplitude).

When the running frequency approaches the jump frequency during deceleration, the AC drive runs at the current frequency for a period and then skips over the jump frequency. The jump range is twice the value of F8-11 (jump frequency amplitude).

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-09	Jump frequency 1	0.00 Hz	0.00 to F0-10 (Maximum frequency)	The jump frequency enables the AC drive to avoid mechanical resonance points of the load. This parameter defines the first jump frequency. If it is set to 0, the first jump frequency function is disabled.
F8-10	Jump frequency 2	0.00 Hz	0.00 to F0-10 (Maximum frequency)	The jump frequency enables the AC drive to avoid mechanical resonance points of the load. This parameter defines the second jump frequency. If it is set to 0, the second jump frequency function is canceled.

Parameter code	Parameter name	Default	Value range	Description
F8-11	Jump frequency amplitude	0.00 Hz	0.00 Hz to 5.00 Hz	When the running frequency approaches the jump frequency during acceleration, the AC drive runs at the current frequency for a period and then skips over the jump frequency. The jump range is twice the value of F8-11 (jump frequency amplitude). When the running frequency approaches the jump frequency during deceleration, the AC drive runs at the current frequency for a period and then skips over the jump frequency. The jump range is twice the value of F8-11 (jump frequency amplitude).
F8-22	Jump frequency state during acceleration/ deceleration	0	0: Invalid 1: Valid	This parameter is used to enable or disable the jump frequency function during acceleration/deceleration. 0: Invalid When it is disabled, the drive continues to run at the running frequency when the running frequency is near the jump frequency during acceleration and deceleration. 1: Valid When it is enabled, the AC drive skips over the jump frequency when the running frequency is near the jump frequency during acceleration and deceleration. The jump range is twice the value of F8-11 (jump frequency amplitude).

7.5.4.4 Reverse Frequency Inhibition

F8-13 is used to set whether reverse frequency inhibition is enabled, as shown in the following figure.

F0-09 defines the running direction of the motor. You can change the rotation direction of the motor by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of the motor's U, V, W wires.

Note

The motor will resume rotating in the original direction after parameter initialization. Do not use this function in applications where changing the motor direction is prohibited after system commissioning is completed.

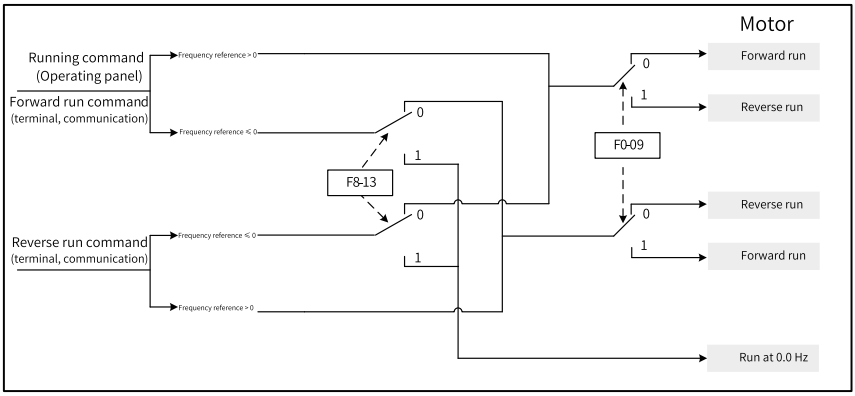


Figure 7-54 Reverse frequency inhibition

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-13	Reverse Frequency Inhibition	0	0: Reverse run allowed 1: Reverse run prohibited	When F8-13 is set to 1, the motor runs at zero frequency after a reverse running command is input to the AC drive.
F0-09	Running direction	0	0: Default direction 1: Opposite to the default direction	You can change the rotation direction of the motor by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of the U, V, and W wires of the motor.

7.5.4.5 Frequency Detection Amplitude

F8-21 defines the frequency detection amplitude. The following figure shows the time sequence diagram of the frequency detection range.

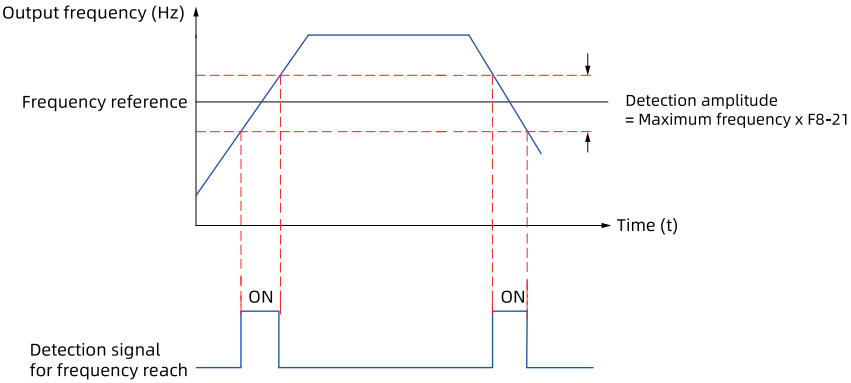


Figure 7-55 Time sequence of the frequency detection range

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-21	Frequency detection amplitude	0.00%	0.0% to 100.0%	Frequency detection amplitude value = F8-21 (Frequency detection amplitude) x F0-10 (Maximum frequency) The DO outputs an active signal when the running frequency of the AC drive is in the specific range (frequency reference ± F0-10 x F8-21).

7.5.4.6 Acceleration/Deceleration Time Switchover Frequency

This function enables selection of different acceleration/deceleration time based on the running frequency during running of the AC drive.

The following figure shows the schematic diagram of acceleration/deceleration time switchover. During acceleration, if the running frequency is lower than the value of F8-25, acceleration time 2 is selected. If the running frequency is higher than the value of F8-25, acceleration time 1 is selected. During deceleration, if the running frequency is higher than the value of F8-26, deceleration time 1 is selected. If the running frequency is lower than the value of F8-26, deceleration time 2 is selected.

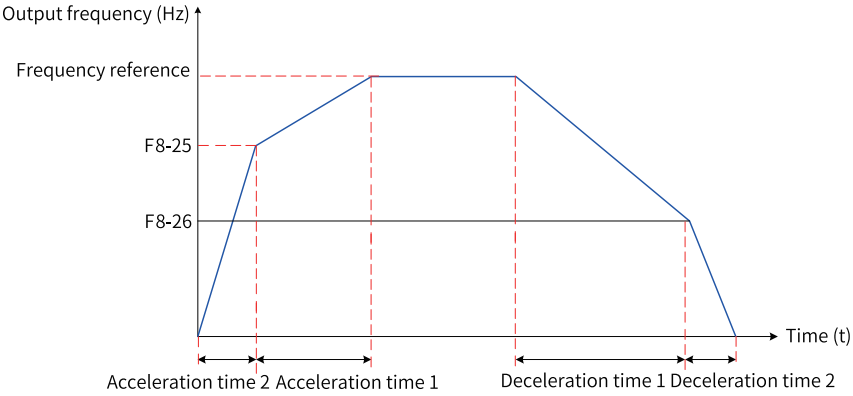


Figure 7-56 Acceleration/Deceleration time switchover

This function is valid only when the DI is not assigned with function 16 (acceleration/deceleration time selection terminal 1) or 17 (acceleration/deceleration time selection terminal 2).

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-25	Switchover frequency between acceleration time 1 and acceleration time 2	0.00 Hz	0 Hz to maximum frequency (F0-10)	This parameter is used to switch the acceleration/deceleration time based on the operating frequency range when the AC drive is running. This function is valid only when the DI is not assigned with function 16 (acceleration/deceleration time selection terminal 1) or 17 (acceleration/deceleration time selection terminal 2). The setting range is from 0.00 Hz to F0-10 (Maximum frequency).
F8-26	Switchover frequency between deceleration time 1 and deceleration time 2	0.00 Hz	0 Hz to maximum frequency (F0-10)	

7.5.4.7 Detection Frequency

When the running frequency of the AC drive is within the frequency detection range (F8-30 - F8-31 x F0-10 to F8-30 + F8-31 x F0-10, or F8-32 - F8-33 x F0-10 to F8-32 + F8-33 x F0-10), the DO outputs an active signal.

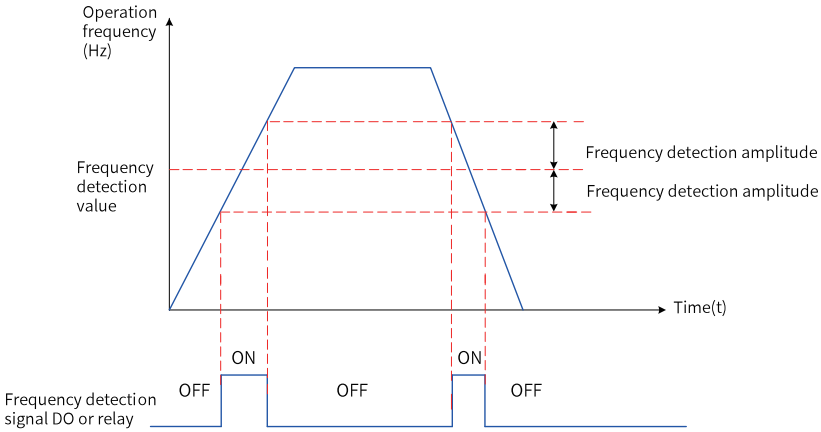


Figure 7-57 Detection frequency

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-30	Base value 1 of frequency detection	50.00 Hz	0 Hz to maximum frequency (F0-10)	When the running frequency of the AC drive is within the frequency detection range, the DO terminal outputs an active signal. The valid range is from 0.00 Hz to F0-10 (maximum frequency).
F8-31	Frequency detection amplitude 1	0.0%	0.0% to 100.0%	Frequency detection amplitude value 1 = F0-10 (maximum frequency) x F8-31; Frequency detection range: F8-30 - F8-31 x F0-10 to F8-30 + F8-31 x F0-10
F8-32	Base value 2 of frequency detection	50.00 Hz	0 Hz to maximum frequency (F0-10)	When the running frequency of the AC drive is within the frequency detection range, the DO terminal outputs an active signal. The valid range is from 0.00 Hz to F0-10 (maximum frequency).
F8-33	Frequency detection amplitude 2	0.0%	0.0% to 100.0%	Frequency detection amplitude value 2 = F0-10 (Maximum frequency) x F8-33; Frequency detection range = F8-32 - F8-33 x F0-10 to F8-32 + F8-33 x F0-10

7.5.5 Current Detection

7.5.5.1 Zero Current Detection

The DO outputs an active signal when the output current of the AC drive remains at or below the zero current detection level (F8-34) for a period greater than the value of F8-35 (Zero current detection delay).

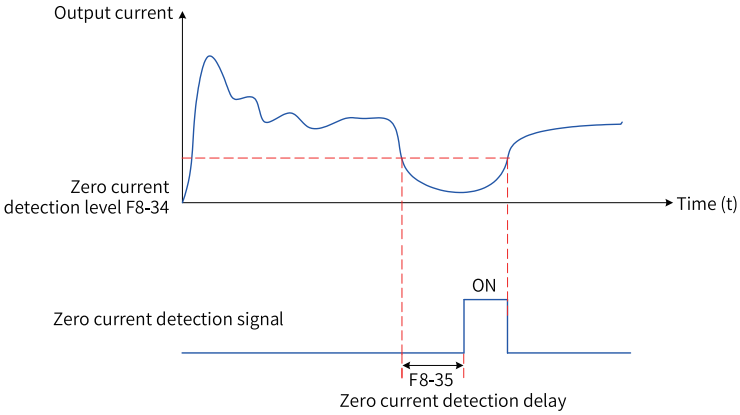


Figure 7-58 Zero current detection

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-34	Zero current detection level	5.0%	0.0% to 300.0% (rated motor current)	The DO outputs an active signal when the output current of the AC drive remains at or below the zero current detection level (F8-34) for a period greater than the value of F8-35 (Zero current detection delay).
F8-35	Zero current detection delay	0.10s	0.01s to 600.00s	

7.5.5.2 Output Current Overlimit

When the output current of the AC drive remains above the output current overlimit threshold (F8-36) for a period longer than the value of F8-37 (Delay of output current overlimit detection), the DO outputs an active signal.

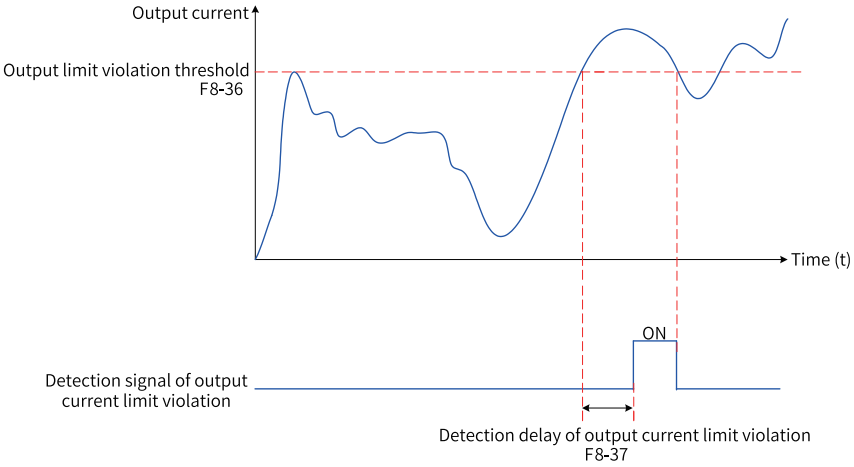


Figure 7-59 Output current overlimit detection

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-36	Output current overlimit threshold	200.0%	0.0% to 300.0%	When the output current of the drive keeps higher than F8-36 (Output current overlimit threshold) for a period longer than F8-37 (Delay of output current overlimit detection), the DO outputs an active signal.
F8-37	Delay of output current overlimit detection	0.00s	0.00s to 600.00s	

7.5.5.3 Current Detection Value

When the output current of the AC drive is within the range from Base value of current detection - Current detection amplitude x Rated motor current to Base value of current detection + Current detection amplitude x Rated motor current, the DO outputs an active signal.

The AC drive provides two groups of detection current and amplitude parameters, as shown below.

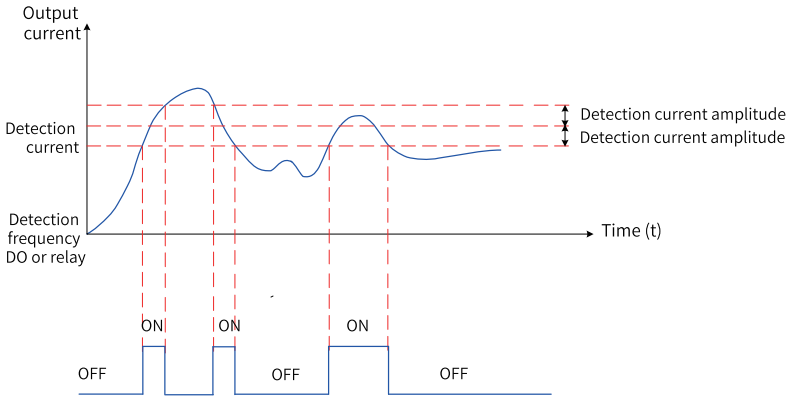


Figure 7-60 Current detection timing diagram

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-38	Base value 1 of current detection	100.0%	0.0% to 300.0% Rated current of the motor	When the output current of the drive is in the range of F8-38 ± F8-39 x F1-03, the DO outputs an active signal.
F8-39	Current detection amplitude 1	0.0%	0.0% to 300.0% Rated current of the motor	Detection current value 1 = F8-39 x F1-03 (rated motor current).
F8-40	Base value 2 of current detection	100.0%	0.0% to 300.0% Rated current of the motor	When the output current of the drive is in the range of F8-40±F8-39 x F1-03, the DO outputs an active signal.
F8-41	Current detection amplitude 2	0.0%	0.0% to 300.0% Rated current of the motor	Detection current value 2 = F8-41 x F1-03 (rated motor current).

7.5.6 Dead-Zone Time of Forward/Reverse Run Switchover

This function is used to specify the transition period at 0 Hz output during switchover between forward run and reverse run. The transition period is called dead zone time of forward/reverse run switchover, which can be set through F8-12.

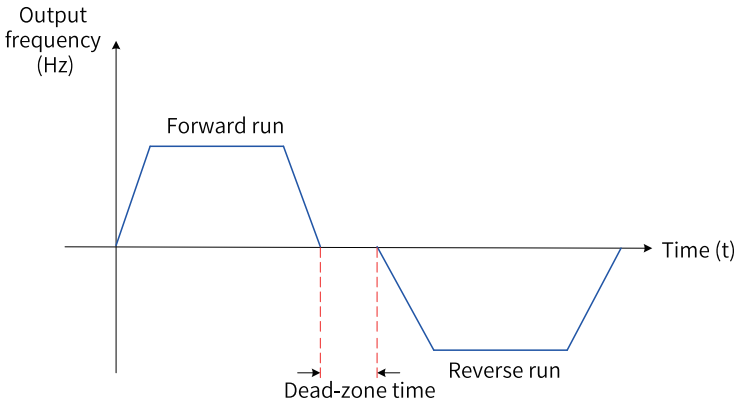


Figure 7-61 Dead zone time of forward/reverse run switchover

Related parameters

Parameter code	Parameter name	Default	Value range	Parameter description
F8-12	Dead-Zone Time of Forward/ Reverse Run Switchover	0.0s	0.0 to 3000.0	This parameter specify the transition period at 0 Hz output during switchover between forward run and reverse run.

7.5.7 Timing Function

The timer starts from 0 upon startup of the AC drive. When the timing duration (F8-44) expires, the AC drive automatically stops, and the DO outputs an active signal. The remaining timing duration can be viewed through U0-20.

- The DO outputs an active signal when the cumulative power-on time (F7-13) of the AC drive exceeds the cumulative power-on time threshold (F8-16).
- The DO outputs an active signal when the cumulative running time (F7-09) of the AC drive exceeds the cumulative running time threshold (F8-17).

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-42	Timing function	0	0: Disable 1: Enable	When F8-42 is set to 1 and the current running time of the AC drive reaches the set timing duration, the DO outputs an active signal. The timing duration is defined by F8-43 and F8-44.
F8-43	Timing operation setting source	0	0: Set by F8-44 (Timing duration) 1: AI1 2: AI2 3: AI3	When this parameter is set to 0, the timing operation time is set by F8-44. When this parameter is set 1, the timing operation time is equal to the result of AI1 voltage/10 V x F8-44. 100% of the analog input range corresponds to the value of F8-44. When this parameter is set to 2, the timing operation time is equal to the result of AI2 voltage/10 V x F8-44. 100% of the analog input range corresponds to the value of F8-44.
F8-44	Timing operation duration	0.0 min	0.0 min to 6500.0 min	The setting range is 0.0 min to 6500.0 min.

Table 7–23 Power-on time threshold

Parameter code	Parameter name	Default	Value range	Description
F8-16	Cumulative power-on time threshold	0h	0h to 65000h	This parameter is used to set the cumulative power-on time threshold of the AC drive. When F7-13 (Cumulative power-on time) exceeds F8-16 (Cumulative power-on time threshold), the DO outputs an active signal.

Table 7–24 Cumulative running time threshold

Parameter code	Parameter name	Default	Value range	Description
F8-17	Cumulative running time threshold	0h	0h to 65000h	This parameter is used to set the cumulative running time threshold of the AC drive. When F7-09 (Cumulative running time) exceeds F8-17 (Cumulative running time threshold), the DO outputs an active signal.

7.5.8 Fixed Length Control Function

The AC drive supports fixed length control in which the length pulses can be collected only by DI5. To use this function, allocate function 27 (length count input) to DI5.

In the following figure, the actual length is the monitored value. Actual length (FB-06) = Number of pulses sampled by DI/Number of pulses per meter (FB-07) When the actual length (FB-06) exceeds or equals the length reference (FB-05), the relay or DO allocated with function 10 (Length reached) outputs an active signal. During fixed length control, length reset can be implemented by a multi-function DI with function 28 assigned.

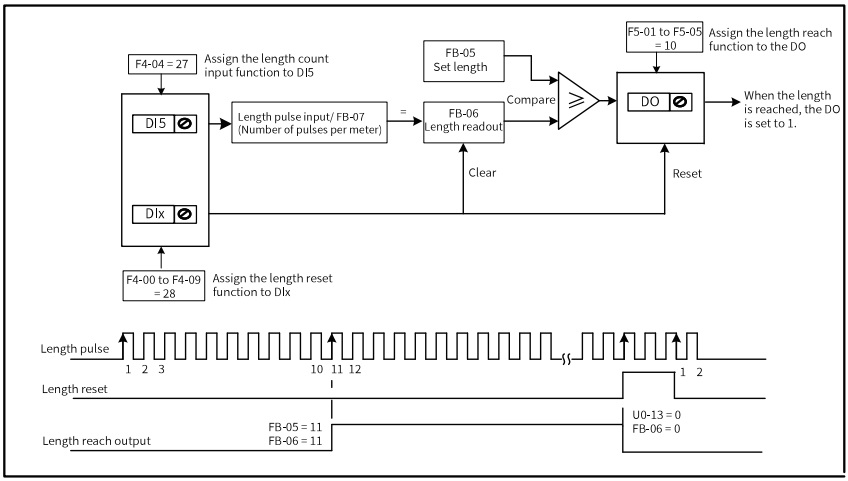


Figure 7-62 Fixed length control

Table 7–25 Parameter setting

Parameter code	Parameter name	Value	Function description
F4-04	DI5 function selection	27	Length counting input
F4-00 to F4-09 (any one)	DI1 to DI10 function selection (any one)	28	Length reset
F5-01 to F5-05 (any one)	Terminal output function selection (any one)	10	Length reach

Under the fixed length control mode, the length can be calculated only through the number of pulses but the direction cannot be identified.

When the T/A-T/B signal output by the delay with length reach function allocated is fed to the stop input terminal of the AC drive, the AC drive stops automatically.

Related Parameters

FB-05 to FB-07

7.5.9 Counting Function

The DI allocated with function 25 (counter input) is used to collect the count value (when the pulse frequency is high, the DI5 must be used).

In the following figure, the DI allocated with function 25 (counter input) is used to collect the count value. When the count value reaches the value of FB-08, the DO outputs an active signal indicating that the count value reference has reached. When the count value reaches FB-09, the DO outputs an active signal indicating that the designated count value has reached.

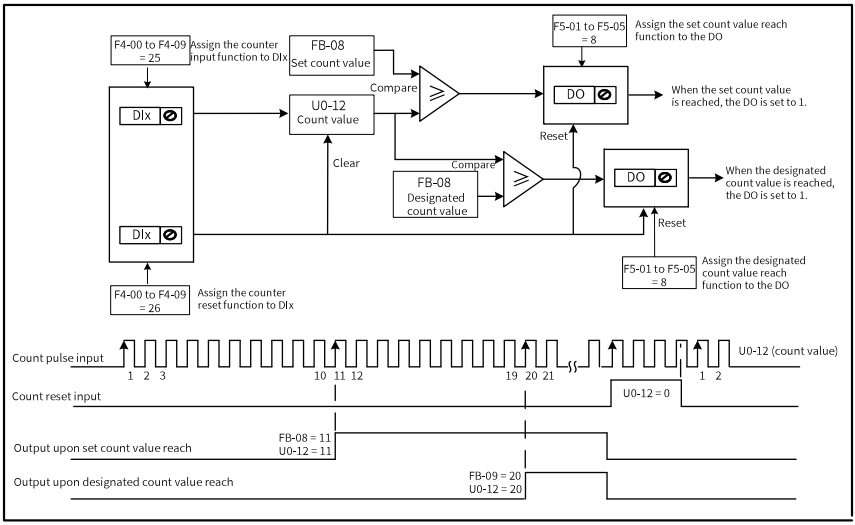


Figure 7-63 Schematic diagram of the counting function

Table 7–26 Parameter setting

Parameter code	Parameter name	Value	Function description
F4-00 to F4-09 (any one)	DI1 to DI10 function selection (any one)	25	Counter input
F4-00 to F4-09 (any one)	DI1 to DI10 function selection (any one)	26	Counting reset
F5-01 to F5-05 (any one)	Terminal output function selection (any one)	8	Set counting value reached
F5-01 to F5-05 (any one)	Terminal output function selection (any one)	9	Designated counting value reached

- For high pulse frequency, use terminal DI5.
- One DO can be assigned with either the "counting value reference reach" function or the "designated counting value reach" function, but not both.
- The counter keeps counting in the drive running/stop status. It stops counting until the set counting value is reached.
- The count value is retentive at a power failure.
- When the count value reach signal of the DO/RO is fed to the AC drive stop input terminal, the AC drive stops automatically.

Related Parameters

FB-08 to FB-09

7.6 Fault and Protection

7.6.1 Startup Protection

Set F8-18 (F8-18 = 1) to enable the startup protection of the AC drive. This helps to avoid unexpected motor running at power-on or fault reset.

Startup protection can be used in the following scenarios:

- If the running command is valid when the AC drive is powered on (for example, the terminal used to input the running command is closed before power-on), the AC drive does not respond to the command. The AC drive responds only after the running command is canceled and becomes valid again.
- If the running command is valid when the AC drive resets upon a fault, the AC drive does not respond to the running command. The startup protection can be disabled only after the running command is canceled.

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-18	Protection upon start	0	0: Disable 1: Enable	The drive is equipped with startup protection to prevent the motor from responding to commands upon unexpected power-on or fault reset.

7.6.2 Setting of Undervoltage/Overvoltage Threshold and Fast Current Limit

Parameter code	Parameter name	Default	Value range	Description
A5-06	Undervoltage threshold	350 V	210.0 V to 420.0 V	When the bus voltage exceeds the value of A5-06/A5-09, the AC drive reports an error (Err09/Err05 to Err07).
A5-09	Overvoltage threshold	820 V	650.0 V to 820.0 V	
A5-04	Fast current limit	1	0: Disable 1: Enable	It is recommended to disable this function in hoisting applications, such as cranes.

7.6.3 Phase Loss Protection

Parameter code	Parameter name	Default	Value range	Description
F9-12	Input phase loss/Contactor close protection	11	Ones: Input phase loss protection 0: Disabled 1: Protection enabled when both software and hardware input phase loss conditions are met 2: Protection enabled when software input phase loss conditions are met 3: Protection enabled when hardware input phase loss conditions are met Tens: Contactor close protection 0: Disabled 1: Enabled	This parameter sets whether to implement the protection against input phase loss or contactor close.
F9-13	Output phase loss protection	01	Ones: Output phase loss protection 0: Disabled 1: Enabled Tens: Output phase loss protection before running 0: Disabled 1: Enabled	Ones: It determines whether to enable output phase loss protection. If F9-13 is set to 0, the output phase loss will not be reported when it occurs. In this case, the actual current is larger than the current displayed on the operating panel. Use this function cautiously. Tens: It takes about several seconds to detect output phase loss before operation. In low-frequency operations or applications where risks exist in start with phase loss, this function can be used to detect output phase loss fault upon start. However, in applications where short start time is required, do not use this function.

7.6.4 Motor Overtemperature Protection

Parameter code	Parameter name	Default	Value range	Description
F9-56	Motor temperature sensor type	0	0: No sensor 1: PT100 2: PT1000	A motor temperature sensor needs to be connected to the AI3 and PGND terminals on the MD38IO1 expansion card. The AC drive supports PT100 and PT1000 motor temperature sensors. Set the sensor type properly. You can view the motor temperature in U0-34.
F9-57	Motor overtemperature protection threshold	110℃	0℃ to +200℃	When the motor temperature exceeds the motor overtemperature protection threshold (F9-57), the AC drive reports Err45 and acts according to the fault protection action set by F9-48.
F9-58	Motor overtemperature warning threshold	90℃	0℃ to +200℃	When the motor temperature exceeds the motor overtemperature warning threshold (F9-58), the DO terminal assigned with function 39 (Motor overtemperature alarm) outputs a valid signal.

7.6.5 Motor Overload Protection

To protect motors with different loads, set the motor overload protection gain based on the overload capacity of the motor. The motor overload protection curve is an inverse time lag curve, as shown in the following figure.

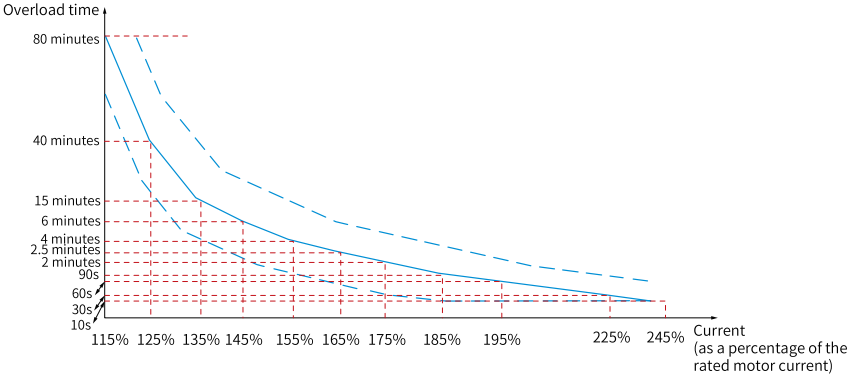


Figure 7-64 Inverse time-lag curve of protection

When the running current reaches 1.75 times the rated motor current and the motor runs at this level for 2 minutes, or when the running current reaches 1.15 times the rated motor current and the motor runs at this level for 80 minutes, the AC drive reports a motor overload alarm (Err11).

1. Example 1

- Assume that the rated motor current is 100 A and F9-01 is set to 1.00. If the running current reaches 125 A (125% of 100 A) and the motor runs at this level for 40 minutes, the AC drive reports a motor overload alarm (Err11).
- Assume that the rated motor current is 100 A and F9-01 is set to 1.20. If the running current reaches 125 A (125% of 100 A) and the motor runs at this level for 48 minutes (40 x 1.2), the AC drive reports a motor overload alarm (Err11).

Note

The maximum overload time is 80 minutes and the minimum overload time is 10 seconds.

2. Example 2

The AC drive reports a motor overload error after the motor runs for 2 minutes at 150% of the rated motor current. As shown by the overload curve, 150% (I) of the rated motor current is between 145% (I1) and 155% (I2) of the rated motor current. The overload error reporting time for 145% of the rated motor current is 6 minutes (T1), and that for 155% of the rated motor current is 4 minutes (T2). Therefore, the overload error reporting time for 150% of the rated motor current in default settings can be calculated. The calculation formula is as follows:

"T = T1 + (T2 - T1) x (I - I1)/(I2 -I1) = 4 + (6 - 4) x (150% - 145%)/(155% -145%) = 5 (min)"

Therefore, if the overload fault needs to be reported when the motor runs at 150% of the rated motor current for 2 minutes, set the motor overload protection gain F9-01 to 0.4 (F9-01 = 2/5).



Note: Set F9-01 properly based on the actual overload capacity. If the value of F9-01 is set too high, the motor may be damaged because the motor overheats but the AC drive does not report the alarm timely.

When the motor overload detection level reaches the value of F9-02 (motor overload warning coefficient), the DO or fault relay outputs the motor overload warning signal. The value of F9-02 is the percentage of the time duration during which the motor runs continuously at a certain overload point without reporting the overload fault.

Example: When the motor overload protection gain is set to 1.00 and motor overload alarm coefficient is set to 80%, if the motor operating current reaches 145% of the rated motor current and the motor runs at this current for 4.8 min (80% x 6), the DO or fault relay outputs the motor overload alarm signal.

The motor overload warning function is used to send a warning signal to the control system via the DO before the motor overload protection applies. The motor overload warning coefficient is used to determine how early the alarm signal is sent before the motor overload protection applies. The higher the value is, the later the warning signal is sent. When the cumulative output current of the AC drive exceeds the product of multiplying the overload time (Y value of motor overload protection inverse time lag curve) and F9-02 (motor overload warning coefficient), the DO outputs an active motor overload warning signal. When F9-02 is set to 100% and the warning advance value is 0, the motor overload warning and the motor overload protection are triggered simultaneously.

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F9-00	Motor overload protection selection	1	0: Disable	The motor overload protection function is disabled. It is recommended to install a thermal relay before the motor.
			1: Enable	The AC drive judges whether the motor is overloaded according to the inverse time lag curve of the motor overload protection.
F9-01	Motor overload protection gain	1.00	0.20 to 10.00	Set F9-01 if you need to adjust the motor overload current and time.
F9-02	Motor overload warning coefficient	80%	50% to 100%	This parameter is used to determine the degree of warning before the motor overload protection. The higher the value is, the later the warning signal is sent.

7.6.6 Load Loss Protection

Parameter code	Parameter name	Default	Value range	Description
F9-63	Protection against load loss	0	0: Invalid 1: Valid	If load loss protection is enabled, when the output current of the drive falls below the load loss detection level (F9-64) for longer than the time set by F9-65, the drive initiates load loss protection action (which is selected from F9-49 and the default is "Coast to stop"). Once the load recovers during load loss protection, the drive operates at the set frequency again.
F9-64	Load loss detection level	10.00%	0.0% to 100.0%	
F9-65	Load loss detection time	1.0s	0.0 to 60.0s	

7.6.7 Power Dip Ride-Through

The power dip ride-through function ensures continuous system running upon an instantaneous power failure. When an instantaneous power failure occurs, the AC drive keeps the motor in the power generation state to keep the bus voltage at a value around

the threshold for enabling power dip ride-through. This prevents the AC drive from stopping due to undervoltage, as shown in the following figure.

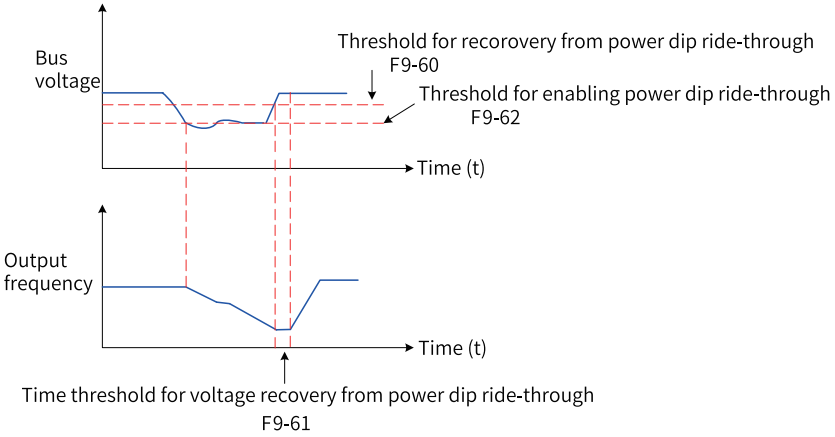


Figure 7-65 Power dip ride-through process

In the "bus voltage constant control" mode, when the power grid recovers from the failure, the AC drive restores the output frequency to the target output frequency based on the acceleration time. In the "decelerate to stop" mode, when the power grid recovers from the failure, the AC drive decelerates to 0 Hz and stops, and will start only after receiving a start command.

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F9-59	Power dip ride-through	0	0: Invalid 1: Bus voltage constant control 2: Decelerate to stop 3: Voltage dip suppression	The function enables the AC drive to keep running upon an instantaneous power failure. When an instantaneous power failure occurs, the AC drive keeps the motor in the power generation state to keep the bus voltage at a value around the threshold for enabling power dip ride-through. This prevents the AC drive from stopping due to undervoltage. 0: Invalid The power dip ride-through function is disabled. 1: Bus voltage constant control When a power failure occurs, the bus voltage is retained at a value around the threshold for enabling power dip ride-through. In this mode, when the power grid recovers from the failure, the AC drive restores the output frequency to the target output frequency based on the acceleration time.
Continued	Continued	Continued	Continued	2: Decelerate to stop When a power failure occurs, the AC drive decelerates to stop. In this mode, when the power grid recovers from the failure, the AC drive decelerates to 0 Hz and stops, and will start only after receiving a start command. 3: Voltage dip suppression This function prevents AC drive stop caused by undervoltage when an instantaneous power failure occurs due to voltage dip. You can use F9-66 to set the voltage dip suppression time.

Parameter code	Parameter name	Default	Value range	Description
F9-60	Threshold for recovery from power dip ride-through	85%	80% to 100%	This parameter defines the voltage threshold for recovery from power dip ride-through. The value 100% corresponds to 540 V. This value is slightly lower than the bus voltage before power failure. Upon power loss, the bus voltage is maintained at about F9-62 (threshold for enabling power dip ride-through). When the power supply recovers, the bus voltage rises from F9-62 (threshold for enabling power dip ride-through) to F9-60 (threshold for recovery from power dip ride-through). During this period, the output frequency of the AC drive keeps decreasing until the bus voltage reaches F9-60 (threshold for recovery from power dip ride-through).
F9-61	Duration for judging voltage recovery from power dip ride-through	0.5s	0.0 to 100.0	This parameter is used to set the time required for the bus voltage to rise from F9-60 (Threshold for recovery from power dip ride-through) to the voltage before power loss.
F9-62	Threshold for enabling power dip ride-through	80%	60% to 100%	This parameter defines the bus voltage level upon power failure. When a power failure occurs, the bus voltage is kept at a value around F9-62 (Threshold for enabling power dip ride-through).
F9-71	Power dip ride-through gain Kp	40	0 to 100	This parameter is valid only when F9-59 (Power dip ride-through) is set to 1 (bus voltage constant control). If undervoltage is likely to occur during power dip ride-through, increase the power dip ride-through gain and the power dip ride-through integral coefficient.
F9-72	Integral coefficient Ki of power dip ride-through	30	0 to 100	

Parameter code	Parameter name	Default	Value range	Description
F9-73	Deceleration time of power dip ride-through	20.0 s	0.0s to 300.0s	This parameter is active only when F9-59 (Power dip ride-through) is set to 2 (Decelerate to stop). When the bus voltage is lower than the value of F9-62, the AC drive decelerates to stop. The deceleration time is determined by this parameter instead of F0-18.

7.6.8 Fault Reset

In the case of an undervoltage fault (Err09), the AC drive resets automatically when the bus voltage restores to the normal range. This reset is not counted in the number of fault auto reset times. In the case of a short circuit to ground (Err23), the AC drive AC does not support automatic or manual reset, and you need to reset the AC drive by powering it off and then powering it on again. The fault protection action selection is performed after the number of automatic reset times upon fault is reached.

Parameter	Name	Default	Value range	Description
F9-09	Number of automatic resets upon fault	0	0 to 20	Used to set the automatic fault reset times of the drive. If the reset times exceed the value of this parameter, the AC drive will remain in the faulty state. Note that the overvoltage fault (Err09) is reset automatically when the bus voltage is back to normal. It is not included in the automatic reset times.
F9-10	DO action during automatic reset upon fault	0	0: The DO does not act 1: The DO acts.	Used to determine whether the fault output function of the DO takes effect during the automatic fault reset of the AC drive. The fault output function of the DO is defined by setting F5-04 to 2.
F9-11	Interval time of automatic fault reset	1.0s	0.1s to 100.0s	Used to set the delay of auto reset after the AC drive reports a fault.

7.6.9 Protective Action Against Fault

Parameter code	Parameter name	Default	Value range	Description
F9-47	Fault protection action selection 1	00000	Ones: Motor overload (Err11) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Input phase loss (Err12); same as the ones place Hundreds: Output phase loss (Err13); same as the ones place Thousands: External fault (Err15); same as the ones place Ten thousands: Communication error (Err16); same as the ones place	-
F9-48	Fault protection action selection 2	00000	Ones: Reserved Tens: Parameter read/ write error (Err21) 0: Coast to stop 1: Stop according to the stop mode Hundreds: Action upon AC drive overload fault (Err10) 0: Coast to stop 1: Derated operation Thousands: Motor overheat (Err25); same as the tens place. Ten thousands: Running time reached (Err26); same as the tens place.	The hundreds place is used to select the action when a drive overload fault occurs. When this parameter is set to 0, the AC drive will report a fault upon overload and the output will be blocked. When this parameter is set to 1, in case that the drive is about to be overloaded, the AC drive automatically lowers down the output current to about the rated current. This can avoid overload; however, the running speed may be reduced or block may occur. For lifting loads, set this parameter to 0.

Parameter code	Parameter name	Default	Value range	Description
F9-49	Fault protection action selection 3	00000	Ones position: User-defined fault 1 (Err27) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: User-defined fault 2 (Err28); same as the ones place Hundreds: Power-on time reach (Err29); same as the ones place Thousands: Load loss (Err30) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run at 7% of the rated motor frequency and resume to the frequency reference if the load recovers Ten thousands: PID feedback loss during operation (Err31)	-
F9-54	Frequency for continuing operation upon fault	0	0: Current running frequency 1: Frequency reference 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon fault	This parameter is used to select the frequency at which the drive continues operation upon a fault. If a fault occurs during the operation of the drive and the fault protection action is set to "Continue operating", the drive displays A** and continues to run at the frequency set by F9-54.

Parameter code	Parameter name	Default	Value range	Description
F9-55	Backup frequency upon fault	100.00%	0.0% to 100.0% (Max. frequency)	This parameter defines the backup frequency of the drive upon a fault. If a fault occurs during the operation of the drive and the fault protection action is set to "Operating at backup frequency" (F9-54 = 4), the drive displays A** and continues to operate at the backup frequency.

7.7 Monitoring

The monitoring function enables you to view the drive state on the operating panel. You can view monitoring parameters in the following two ways.

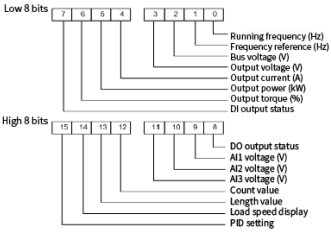
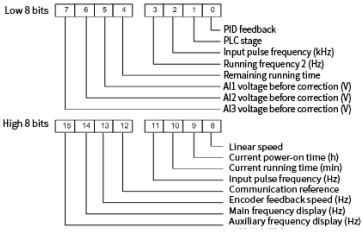
1. In the stop or operation state, you can view multiple status parameters by switching every bit of F7-03, F7-04, and F7-05 through the keys on the operating panel.
   In the operation state, 32 operating status parameters are available. Each binary bit of F7-03 (Parameter 1 displayed on the LED operating panel during operation) and F7-04 (Parameter 2 displayed on the LED operating panel during operation) determine whether the corresponding parameter is displayed. In the stop state, 13 stop status parameters are available. Each binary bit of F7-05 (Parameter displayed on the LED operating panel at stop) determines whether the corresponding parameter is displayed.

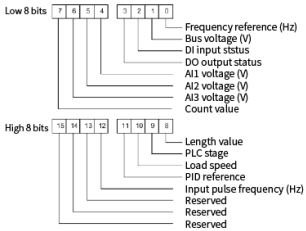
   For example, to view the parameters in the operation status on the operating panel, such as the running frequency, bus voltage, output voltage, output current, output power, and PID reference, perform the following operations.

   Each bit of F7-03 (Parameter 1 displayed on the LED operating panel during operation) corresponds to one parameter. Set the corresponding bit to 1. Convert the binary value to a hexadecimal value and set F7-03 to this hexadecimal value. For specific conversion methods, see *"Table 7-28 Converting a binary number into the hexadecimal equivalent" on page 341*. You can view related parameter values by switching every bit of F7-03 through the keys on the operating panel.

   Other monitoring parameters are viewed in the same way as F7-03. The following table shows the corresponding relationship between the monitoring parameters and every bit of F7-03, F7-04, and F7-05.

Table 7–27 Corresponding relationship between the monitoring parameters and every bit of F7-03, F7-04, and F7-05

Parameter code	Parameter name	Default	Value range	Description
F7-03	Parameter 1 displayed on LED operating panel during operation	1F	0000 to FFFF	If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting the binary number to a hexadecimal number, set F7-03 to the hexadecimal number.  Note: The shaded parameters are displayed by default.
F7-04	Parameter display 2 on the LED operating panel during operation	0	0000 to FFFF	If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting the binary number to a hexadecimal number, set F7-04 to the hexadecimal number. 

Parameter code	Parameter name	Default	Value range	Description
F7-05	Parameter displayed on the LED operating panel at stop	33	0000 to FFFF	If a parameter needs to be displayed when the AC drive stops, set its corresponding bit to 1. After converting the binary number to a hexadecimal number, set F7-05 to the hexadecimal number.  Note: The shaded parameters are displayed by default.

Note

After the drive is powered off and then powered on, the parameter selected before the power failure is displayed by default.

The monitoring parameters corresponding to the bytes of F7-03, F7-04, and F7-05 may not be the same as those in group U0. If the parameter to be monitored cannot be found by bytes of F7-03, F7-04, and F7-05, search it in group U0 through the operating panel.

To convert a binary number into a hexadecimal equivalent, do as follows:

From right to left, every four binary digits correspond to one hexadecimal digit. If there are less than four binary digits left, fill in with 0 to make the number of left binary digits to be four. Then, convert every four binary digits into a decimal number. 0000 to 1111 in the binary format correspond to 0 to 15 in the decimal format and 0 to F in the hexadecimal format. Convert the decimal number into a hexadecimal equivalent according to the corresponding relationship between decimal and hexadecimal numbers. See the following table for details.

For example, the binary number is 011 1101 1111 1001. After adding 0 to the highest place, the binary number changes to 0011 1101 1111 1001. According to the preceding table, the hexadecimal equivalent is 3DF9.

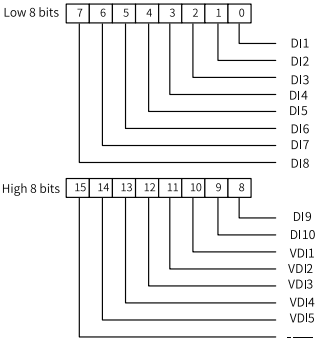
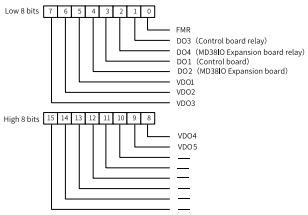
Table 7-28 Converting a binary number into the hexadecimal equivalent

Format	Value															
Binary	1111	1110	1101	1100	1011	1010	1001	1000	0111	0110	0101	0100	0011	0010	0001	0000
Decimal	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Hexadecimal	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0

2. Use the operating panel to enter group U0 and view the monitoring parameters.
   Monitoring parameters in *"Table 7-29 Monitoring parameters in group U0" on page 341* are only readable.

Table 7-29 Monitoring parameters in group U0

Parameter code	Parameter name	Minimum unit	Value range	Description
U0-00	Operating frequency	0.01 Hz	0.00 Hz to 320.00 Hz	It displays the absolute value of the drive operating frequency. For details, see *"Figure 7-66 " on page 348* .
U0-01	Frequency reference	0.01 Hz	0.00 Hz to 320.00 Hz	It displays the absolute value of the drive frequency reference. For details, see *"Figure 7-66 " on page 348* .
U0-02	Bus voltage	0.1 V	0.0 V to 3000.0 V	It displays the bus voltage of the drive.
U0-03	Output voltage	1 V	0 V to 1140 V	It displays the output current of the drive in the running state.
U0-04	Output current	0.01 A	0.00 A to 655.35 A	It displays the output current of the drive in the running state.
U0-05	Output power	0.1 kW	0.0 kW to 3276.7 kW	It displays the output power of the drive in the running state.
U0-06	Output torque	0.10%	-200.0% to +200.0%	It displays the output torque of the drive in the running state. This percentage takes the rated motor torque as the basis.

Parameter code	Parameter name	Minimum unit	Value range	Description
U0-07	DI input state	1	0x0000 to 0x7FFF	It displays the input status value of the DI. After the value is converted to binary data, each bit corresponds to one DI signal. The value 1 indicates high level input, and the value 0 indicates low level input. The corresponding relationship between bits and DIs is as follows. 
U0-08	DO output state	1	0x0000 to 0x03FF	It displays the output status value of the DO. After the value is converted to binary data, every bit corresponds to one DO signal. The value 1 indicates high level output, and the value 0 indicates low level output. The relationship between bits and DOs is as follows. 
U0-09	AI1 voltage	0.01 V	0.00 V to 10.57 V	-
U0-10	AI2 voltage	0.01 V/ 0.01 mA	0.00 V to 10.57 V	You can select voltage input or current input through J9 jumper cap on the control board.
U0-11	AI3 voltage	0.01 V	0.00 V to 10.57 V	-

Parameter code	Parameter name	Minimum unit	Value range	Description
U0-12	Counting value	0	0 to 65535	It displays the value in the counting function.
U0-13	Length value	0	0 to 65535	It displays the value in the fixed length function.
U0-14	Load speed display	0	0 rpm to 65535 rpm	It displays the load speed.
U0-15	PID reference	0	0 to 65535	PID reference = PID reference (percentage) x FA-04 (PID reference feedback range)
U0-16	PID feedback	0	0 to 65535	PID feedback = PID feedback (percentage) x FA-04 (PID reference feedback range)
U0-17	PLC stage	0	0 to 65535	-
U0-18	Pulse input frequency	0.01 kHz	0.00 kHz to 100.00 kHz	It displays the high-speed pulse sampling frequency of DI5.
U0-19	Feedback speed	0.01 Hz	-500.0 Hz to +500.0 Hz (the tens place of F7-12 is 1) -320.00 Hz to +320.00 Hz (the tens place of F7-12 is 2)	When the tens place of F7-12 (number of decimal places for load speed display) is set to 1, the number of decimal places of U0-19 is 1 and the display range is -500.0 Hz to +500.0 Hz. When the tens of F7-12 is set to 2, the number of decimal places of U0-19 is 2 and the display range is -320.00 Hz to +320.00 Hz. For details, see *"Figure 7-66 " on page 348* .
U0-20	Remaining running time	0.1 min	0.0 min to 6500.0 min	It displays the remaining running time when the timing operation is performed.
U0-21	AI1 voltage before correction	0.001 V	0.000 V to 10.570 V	It displays the actual value of analog input sampling voltage/current. The voltage/current used has been corrected linearly to reduce the deviation between the sampling voltage/current and the actual input voltage/current. For the corrected voltage/current used, see U0-09 and U0-10.
U0-22	AI2 voltage before correction	0.001 V	0.000 V to 65.535 V	
U0-23	AI3 voltage before correction	0.001 V	-10.570 V to +10.570 V	

Parameter code	Parameter name	Minimum unit	Value range	Description
U0-24	Motor speed	1 rpm	0 rpm to 65535 rpm	The calculation formula for this parameter is as follows: n = 60f/p, where p is the number of motor pole pairs, f is the actual encoder feedback speed in the FVC mode, and f is the calculated synchronization frequency in the non-FVC mode.
U0-25	Current power-on time	1 min	0 min to 65535 min	-
U0-26	Current operating time	0.1 min	0.0 min to 6553.5 min	-
U0-27	Pulse input frequency	1 Hz	0 Hz to 65535 Hz	It displays the high-speed pulse sampling frequency of the DI5. It is the same as U0-18 but in different units.
U0-28	Communication reference	0.01%	-100.00% to +100.00%	It displays data written by means of the communication address 0x1000. The setpoint of address 0x1000 determines the base of this percentage.
U0-30	Display of main frequency X	0.01 Hz	0.00 Hz to 320.00 Hz	It displays the main frequency reference.
U0-31	Display of auxiliary frequency Y	0.01 Hz	0.00 Hz to 320.00 Hz	It displays the auxiliary frequency reference.
U0-32	Memory address view	0	0 to 65535	It displays any memory address.
U0-34	Motor temperature	0℃	0℃ to 200℃	It indicates the motor temperature sampled through AI3. For motor temperature detection, see F9-56 (Type of motor temperature sensor).
U0-36	Resolver position	0	0 to 65535	It displays the resolver position.
U0-37	Power factor angle	0°	0.0 to 6553.5	It displays the current power factor angle.
U0-38	ABZ position	0	0 to 65535	-

Parameter code	Parameter name	Minimum unit	Value range	Description
U0-39	Target voltage in decoupled V/f mode	1 V	0 V to 65535 V	It displays the target output voltage in the decoupled V/f mode.
U0-40	Output voltage in V/f decoupled mode	1 V	0 V to 65535 V	It displays the actual output voltage in the decoupled V/f mode.
U0-45	Fault information	1	0 to 51	It displays the fault code of the drive part.
U0-59	Frequency reference (%)	0.01%	-100.00% to +100.00%	It displays the current frequency reference. The parameter value takes the maximum frequency of the drive (F0-10) as the base.
U0-60	Operating frequency (%)	0.01%	-100.00% to +100.00%	It displays the current operating frequency. The parameter value takes the maximum frequency of the drive (F0-10) as the base.
U0-61	AC drive running status	1	Bit 1, bit 0	0: Stop; 1: Forward running; 2: Reverse running
			Bit 3, bit 2	0: Constant speed; 1: Acceleration; 2: Deceleration
			Bit 4	0: Bus voltage normal; 1: Undervoltage
U0-62	Current fault	1	0 to 99	It displays the current fault code, in which "2" represents Err02.
U0-63	Value sent by master in point-to-point communication	0.01%	-100.0% to +100.0%	It displays the torque value sent by the master when point-to-point communication is effective. The percentage base is the rated motor torque.
U0-64	Number of slaves in master/ slave control	1	0 to 65535	It displays the number of online slaves that the master can view.
U0-66	Model of communication expansion card	0	0 to 65535	It displays the model of the communication expansion card.

Parameter code	Parameter name	Minimum unit	Value range	Description
U0-67	Communication extension version	0	0 to 65535	It displays the communication extension version.
U0-68	Drive state read through DP card	0	0 to 65535	It displays the drive state read through the DP card.
U0-69	Speed transmitted to DP card	0	0.00 Hz to 655.35 Hz	It displays the speed transmitted to DP card.
U0-70	Speed	0	0 rpm to 65535 rpm	It displays the motor speed (rpm).
U0-71	Communication card-specific current	0	0 rpm to 65535 rpm	It displays the current dedicated for the communication card.
U0-72	Communication card error state	0	0 to 65535	It displays the communication card error state.
U0-73	Motor S/N	0	0 to 65535	It displays the motor S/N.
U0-74	Actual motor output torque	0.0	-3276.7 to +3276.7	It displays the actual motor output torque.

Parameter code	Parameter name	Minimum unit	Value range	Description
U0-76	Low bits of cumulative power consumption (0 to 999.9)	0.0	0.0 kWh to 6553.5 kWh	The power consumption can be recorded up to 65,535,999.9 kW·h, enough for at least 10 years of use within the full power range. The display accuracy is 0.1 kW·h. U0-76 and U0-77 are used together for the display, with U0-76 displaying the low bits and U0-77 displaying the high bits. The accumulated power consumption is calculated as follows: Cumulated power consumption = U0-77 x 1000 + U0-76 For example, if U0-77 is 26 and U0-76 is 769.1, the total power consumption of the MD290 is 26769.1 degrees. While ensuring no overflow, users using low-power drives can read the cumulated power consumption via F7-14. Users using high-power drives can directly read the values of U0-77 and U0-76.
U0-77	High bits of cumulative power consumption (0 to 65535)	0	0 kWh to 65535 kWh	
U0-78	Linear speed	0	0 to 65535	It displays the linear speed.

The following figure shows the relationship among U0-00, U0-01, U0-19, and U0-29

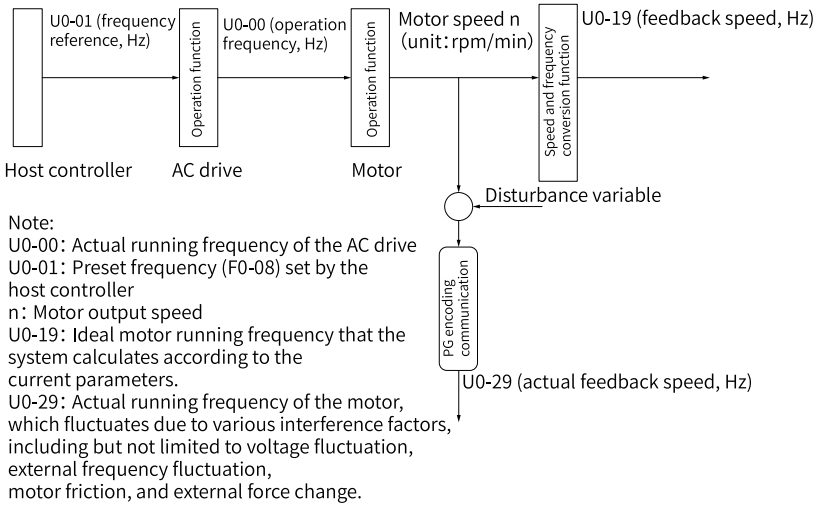


Figure 7-66 Relationship among U0-00, U0-01, U0-19, and U0-29

7.8 User Configuration

7.8.1 User Password

Password setting

Set the user password through FP-00. After the password is set, you need to enter the password each time you access it for parameter reading and modification.

1. Password verification is required in function parameter mode and user-changed parameter mode.
2. Password verification is required in the communication mode. The communication address of password verification through communication is 1F00H. Directly write the correct user password to this address. If the actual password value is returned, password verification is passed.
3. Password protection is not involved in the user-defined parameter mode, which requires no password verification.

Disabling the user password

Set FP-00 to 0 to disable the user password.

7.8.2 User-Defined Parameters

Group FE consists of user-defined parameters (FE-00 to FE-29). Users can define up to 30 commonly used parameters for easy check and modification.

- If F0.00 is displayed, the corresponding user-defined parameter is empty. In the user-defined parameter mode, the displayed parameters are defined by FE-00 to FE-31, and the sequence is consistent with that in group FE. The parameter is skipped if F0-00 is displayed.
- U3-17 and U3-16 indicate PZD1 (AC drive command word) in the communication control mode and PZD2 (AC drive target frequency) in the communication control mode, respectively.

Related parameters

Parameter code	Parameter name	Default	Value range	Description
FP-03	Customized parameter group display	11	Ones: Display of user-defined parameter group 0: Not displayed 1: Displayed Tens: Display of user-modified parameter group 0: Not displayed 1: Displayed	-
FE-00	User-defined parameter 0	7317	F0-00 to FP-xx A0-00 to Ax-xx U0-xx to U0-xx U3-00 to U3-xx	-
FE-01	User-defined parameter 1	7316		-
FE-02	User-defined parameter 2	F0-00		-
FE-03	User-defined parameter 3	F0-00		-
FE-04	User-defined parameter 4	F0-00	Continued	-
FE-05	User-defined parameter 5	F0-00		-
FE-06	User-defined parameter 6	F0-00		-
FE-07	User-defined parameter 7	F0-00		-
FE-08	User-defined parameter 8	F0-00		-

Parameter code	Parameter name	Default	Value range	Description
FE-09	User-defined parameter 9	F0-00	Continued	-
FE-10	User-defined parameter 10	F0-00		-
FE-11	User-defined parameter 11	F0-00		-
FE-12	User-defined parameter 12	F0-00		-
FE-13	User-defined parameter 13	F0-00		-
FE-14	User-defined parameter 14	F0-00		-
FE-15	User-defined parameter 15	F0-00	Continued	-
FE-16	User-defined parameter 16	F0-00		-
FE-17	User-defined parameter 17	F0-00		-
FE-18	User-defined parameter 18	F0-00		-
FE-19	User-defined parameter 19	F0-00		-
FE-20	User-defined parameter 20	U0-68		-
FE-21	User-defined parameter 21	U0-69		-
FE-22	User-defined parameter 22	F0-00		-

Parameter code	Parameter name	Default	Value range	Description
FE-23	User-defined parameter 23	F0-00	Continued	-
FE-24	User-defined parameter 24	F0-00		-
FE-25	User-defined parameter 25	F0-00		-
FE-26	User-defined parameter 26	F0-00		-
FE-27	User-defined parameter 27	F0-00		-
FE-28	User-defined parameter 28	F0-00		-
FE-29	User-defined parameter 29	F0-00		-
FE-30	User-defined parameter 30	F0-00		-
FE-31	User-defined parameter 31	F0-00		-

7.8.3 Data Backup and Restoration

Set FP-01 to 4 to back up current user parameters.

Set FP-01 to 501 to restore the parameters backed up by setting FP-01 to 4.

7.8.4 Parameter Initialization

When FP-01 is set to 01, all parameters can be restored to the factory settings. After initialization is completed, FP-01 is restored to 0.

The following parameters cannot be restored to default values:

- Motor 1 parameters
- Motor 2 Parameters
- Frequency reference decimal place (F0-22)
- Fault records
- Cumulative operating time (F7-09)
- Cumulative power-on time (F7-13)
- Cumulative power consumption (F7-14)
- Inverter module heatsink temperature (F7-07)

When FP-01 is set to 02, the fault records, cumulative operating time (F7-09), cumulative power-on time (F7-13), and cumulative power consumption (F7-14) are cleared.

7.8.5 Hibernation and Wakeup

Hibernation enables you to set any time period within 24 hours, during which the AC drive stops running and hibernates.

Wakeup is a process that the AC drive wakes up from the hibernation state and starts to run.

To use the hibernation and wakeup functions, set the wakeup frequency, hibernation frequency, and hibernation duration. Generally, set the wakeup frequency (F8-49) equal to or greater than the hibernation frequency (F8-51). The hibernation and wakeup function is disabled if both the wakeup frequency and hibernation frequency are set to 0.00 Hz.

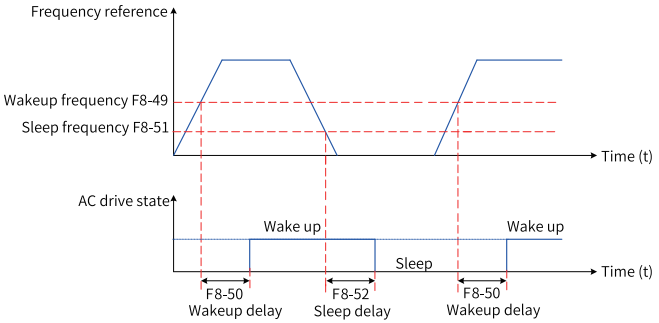


Figure 7-67 Hibernation and wakeup settings

Note

When sleep is enabled during PID operation, you can set FA-28 (selection of PID operation at stop) to 1 to continue the PID operation or to 0 to stop PID operation.

Related parameters

Parameter code	Parameter name	Default	Value range	Description
F8-49	Wakeup frequency	0.00 Hz	Hibernation frequency (F8-51) to maximum frequency (F0-10)	In the hibernation state, when the frequency reference keeps equal to or larger than the wakeup frequency (F8-49) for the time set by F8-50 and the current running command is valid, the AC drive starts directly.
F8-50	Wakeup delay	0.0s	0.0 to 6500.0	
F8-51	Hibernation frequency	0.00 Hz	0.00 Hz to wakeup frequency (F8-49)	During AC drive running, when the frequency reference keeps lower than F8-51 (Hibernation frequency) for the time longer than the value of F8-52 (Hibernation delay), the AC drive enters the hibernation state and coasts to stop.
F8-52	Hibernation delay	0.0s	0.0 to 6500.0	

8 Troubleshooting

8.1 Common Faults and Diagnosis

8.1.1 Alarm and Fault Display

Upon exceptions, the AC drive stops output immediately, the fault indicator 

blinks, and the contact of the fault relay acts. The operating panel of the AC drive displays a fault code (example: 

), as shown in the following figure.

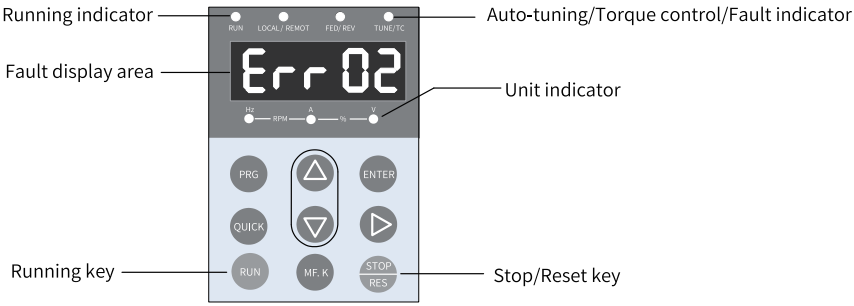


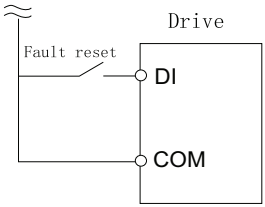
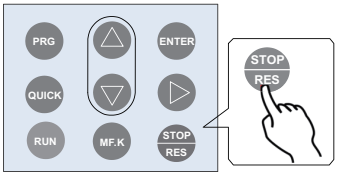
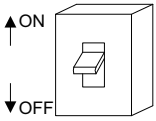
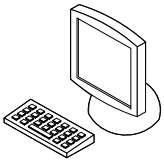
Figure 8-1 Display of faults

CAUTION

Do not repair or retrofit the drive by yourself. For faults that cannot be rectified, contact the agent or Inovance for technical support.

8.1.2 Restart After Fault Occurrence

Table 8–1 Fault view and start method after fault occurrence

Stage	Solution	Description
Upon fault	Check the operating panel for detailed information of the recent three faults, such as the fault type and the time, frequency, current, bus voltage, DI/DO state, cumulative power-on duration, and cumulative running duration upon occurrence of the faults.	View the record through F9-14 and F9-44. 
Before fault reset	Before fault reset, find the fault cause and remove the fault according to the fault type displayed on the operating panel.	-
Reset mode to clear faults	1. Allocate function 9 (fault reset) to the DI by setting any of F4-00 to F4-09 to 9.	
	2. Check that F7-02 is set to 1 (default value), indicating that the STOP/RES key is available in any operating mode.	Press the STOP/RES key on the operating panel. 
	3. Power off and then power on the AC drive for automatic reset. Disconnect the main circuit power supply. Wait until the fault code disappears, and then connect the power supply again.	
	4. Reset the drive through communication. When F0-02 (Command source) is set to 2 (Communication control), write "7" (Fault reset) to communication address 2000H using the host controller to reset the AC drive after the fault is cleared.	

8.1.3 Common Troubleshooting

Table 8–2 Common faults and solutions

No.	Fault	Possible cause	Solution
1	There is no display upon power-on. 	The drive is not connected to the grid or the grid voltage is too low.	Check the input power supply.
		The switched-mode power supply (SMPS) on the driver board of the AC drive is faulty.	Check whether the +24 V output voltage and +10 V output voltage on the control board are normal.
		The control board is disconnected from the driver board and operating panel.	Re-connect the 8-pin and 40-pin flat cables.
		The snubber resistor of the AC drive is damaged.	Contact the agent or Inovance.
		The control board or the operating panel is faulty.	
		The rectifier bridge is damaged.	
2	"HC" is displayed after power-on. 	The cable connecting the driver board and the control board is in poor contact.	Re-connect the 8-pin and 28-pin flat cables.
		Related components on the control board are damaged.	Contact the agent or Inovance.
		The motor or the motor cable is short circuited to the ground.	
		The Hall sensor is faulty.	
		The grid voltage is excessively low.	
3	"Err23" is displayed upon power-on. 	The motor or the motor cable is short circuited to ground.	Check the insulation status of the motor and the output cable with a megger.
		The drive is damaged.	Contact the agent or Inovance.

No.	Fault	Possible cause	Solution
4	The display is normal after power-on. After the drive is operating, "HC" is displayed and the drive stops immediately. 	The fan is damaged or does not rotate.	Replace the fan.
		A short circuit occurs on external control terminals.	Rectify the short circuit fault.
5	Err14 (Module overtemperature) is reported frequently.	The carrier frequency is set too high.	Reduce the value of F0-15 (Carrier frequency).
		The fan is damaged or the air duct is clogged.	Replace the fan or clean the air duct.
		Devices (thermistor or other devices) inside the AC drive are damaged.	Contact the agent or Inovance.
6	The motor does not rotate when the AC drive is running.	The wiring between the AC drive and the motor is incorrect.	Check that the wiring between the AC drive and the motor is correct.
		Motor parameters of the AC drive are set incorrectly.	Restore parameters to default settings and reset related parameters.
			Check that the rated motor parameters are set properly, including the rated motor frequency and rated motor speed.
			Check that F0-01 (control mode) and F0-02 (operation mode) are set properly.
			Modify F3-01 (Torque boost) in the V/f control mode during start with heavy load.
		The cable connecting the drive board and the control board is in poor contact.	Re-connect the cable and ensure the cable is connected properly.
		The driver board is faulty.	Contact the agent or Inovance.

No.	Fault	Possible cause	Solution
7	The DI is inactive.	The related parameters are set incorrectly.	Check and reset the parameters in group F4 again.
		The external signal is incorrect.	Re-connect the external signal cable.
		The jumper between OP and +24V is connected loosely.	Secure the jumper between OP and +24V.
		The control board is faulty.	Contact the agent or Inovance.
8	The AC drive reports overcurrent and overvoltage frequently.	The motor parameters are set incorrectly.	Reset motor parameters or perform motor parameter auto-tuning.
		The acceleration/ deceleration time is improper.	Set proper acceleration/ deceleration time.
		The load fluctuates.	Contact the agent or Inovance.
9	Err17 is reported upon power-on or during operation.	The soft startup contactor is not closed.	Check whether the contactor cable is loose.
			Check whether the contactor is faulty.
			Check whether +24 V power supply of the contactor is faulty.
			Contact the agent or Inovance.
10	The motor coasts to stop or the brake fails during deceleration or deceleration to stop.	The overvoltage stall protection takes effect.	If a braking resistor is configured, disable the overvoltage stall protection function by setting F3-23 to 0.

8.1.4 Troubleshooting in V/f Control Mode

- V/f control mode (F0-01 = 2)
  This mode applies to applications without an encoder for speed feedback. You only need to set the rated motor voltage and rated motor frequency correctly.

Table 8-3 Troubleshooting in V/f control mode

Problem	Solution
Motor oscillation during operation	Decrease the value of F3-11 (Oscillation suppression gain in V/f mode) by the step value of 5. The minimum value is 5.
Overcurrent at startup with high power	Decrease the value of F3-01 by the step value of 0.5%.

Problem	Solution
Excessively high current during operation	Set F1-02 (Rated motor voltage) and F1-04 (Rated motor frequency) correctly. Decrease the value of F3-01 (Torque boost) by the step value of 0.5%.
Too loud motor noise	Increase the value of F0-15 (Carrier frequency) by the step value of 1.0 kHz. (Note that increasing the carrier frequency will lead to an increase in the motor leakage current.)
Overvoltage upon deceleration or sudden removing of heavy load	Set F3-23 (Overvoltage stall suppression in V/f mode) to 1 (Valid). Increase the value of F3-24/F3-25 (Frequency gain/Voltage gain for overvoltage stall suppression, 30 by default) by the step value of 10 gradually. The permissible maximum value is 100. Decrease the value of F3-22 (Overvoltage stall action voltage in V/f mode, default: 770 V) by the step value of 10 V. The permissible minimum value is 700 V.
Overcurrent upon acceleration or sudden addition of heavy load	Increase the overcurrent stall suppression gain (F3-20, default: 20) properly by the step value of 10. The permissible maximum value is 100. Decrease the value of F3-18 (overcurrent stall suppression action current, default: 150%) by the step value of 10%. The permissible minimum value is 50%.

8.2 List of fault codes

Code	Fault Name	Fault level range:	Default fault level:	Resettable
E002.0	Overcurrent during acceleration	0: Coast to stop	0: Coast to stop	No
E003.0	Overcurrent during deceleration	0: Coast to stop	0: Coast to stop	No
E004.0	Overcurrent during operation at constant speed	0: Coast to stop	0: Coast to stop	No
E005.0	Overvoltage during acceleration	0: Coast to stop	0: Coast to stop	No
E006.0	Overvoltage during deceleration	0: Coast to stop	0: Coast to stop	No
E007.0	Overvoltage at a constant speed	0: Coast to stop	0: Coast to stop	No
E008.0	Pre-charge resistor fault	0: Coast to stop	0: Coast to stop	No
E009.0	Undervoltage	0: Coast to stop	0: Coast to stop	No

Code	Fault Name	Fault level range:	Default fault level:	Resettable
E010.0	AC drive overload	0: Coast to stop	0: Coast to stop	No
E011.0	Motor overload	0: Coast to stop	0: Coast to stop	No
E012.0	Input phase loss exists.	0: Coast to stop 1: Stop according to the stop mode 2: Continue operation	0: Coast to stop	No
E013.0	Output phase loss occurs.	0: Coast to stop 1: Stop according to the stop mode 2: Continue operation	0: Coast to stop	No
E014.0	Drive overtemperature	0: Coast to stop	0: Coast to stop	No
E015.0	The external device is faulty.	0: Coast to stop	0: Coast to stop	No
E016.0	Communication fault.	0: Coast to stop 1: Stop according to the stop mode 2: Continue operation	1: Stop according to the stop mode	Not supported
E017.0	Contactor fault	0: Coast to stop	0: Coast to stop	No
E018.0	Current detection circuit fault	0: Coast to stop	0: Coast to stop	No
E019.0	Motor parameter auto-tuning fault	0: Coast to stop	0: Coast to stop	No
E021.0	EEPROM read/write fault	0: Coast to stop	0: Coast to stop	No
E023.0	Output short-circuited to ground	0: Coast to stop	0: Coast to stop	No
E025.0	Motor over-temperature	0: Coast to stop	0: Coast to stop	No
E026.0	Cumulative operating time reached	0: Coast to stop	0: Coast to stop	No
E027.0	User-defined fault 1	0: Coast to stop	0: Coast to stop	No
E028.0	User-defined fault 2	0: Coast to stop	0: Coast to stop	No
E029.0	Cumulative power-on time reached	0: Coast to stop	0: Coast to stop	No

Code	Fault Name	Fault level range:	Default fault level:	Resettable
E030.0	Load loss	0: Coast to stop	0: Coast to stop	No
E031.0	PID feedback loss during operation	0: Coast to stop	0: Coast to stop	No
E040.0	Pulse-by-pulse current limit fault	0: Coast to stop	0: Coast to stop	No
E041.0	Motor switchover fault during running	0: Coast to stop	0: Coast to stop	No
E045.0	Motor temperature fault	0: Coast to stop	0: Coast to stop	No
E049.0	Analog limit violation	0: Coast to stop	0: Coast to stop	No
E055.0	Slave fault under master/slave control	0: Coast to stop	0: Coast to stop	No
E061.0	Braking transistor overload	0: Coast to stop	0: Coast to stop	No
E062.0	The braking transistor is short-circuited.	0: Coast to stop	0: Coast to stop	No

8.3 Description of Fault Codes

E002.0: Overcurrent during acceleration

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

This fault occurs when the transient current outputted exceeds 2.5 x 1.414 x rated current of the drive during acceleration.

Troubleshooting:

Cause	Check method	Solution
The output circuit of the AC drive is grounded or short-circuited.	1. Check whether short circuit occurs at the output terminals U/V/W with a multimeter. 2. Check whether power cables are short-circuited with a multimeter. 3. Check whether the motor resistance is symmetric with a multimeter. 4. Check whether three-phase output grounding points are available. Detect the impedance to ground with a tramegger.	1. If the power cable is short-circuited, replace the output cable. 2. If the motor resistance is not symmetrical, replace the motor.
The acceleration time is too short under abrupt acceleration conditions.	Check whether the acceleration/deceleration time is appropriate. Increase the acceleration/deceleration time parameters F0-17 and F0-18 to test whether the output current decreases.	Increase the acceleration time (F0-17).
The overcurrent stall suppression parameters are set improperly.	Check whether the overcurrent stall suppression function (F3-19) is enabled and whether the overcurrent stall suppression current (F3-18) is set properly.	1. Ensure that the overcurrent stall suppression function is enabled (F3-19 = 1). 2. If the value of F3-18 is excessively high, change it to a value between 120% and 160%. 3. If the value of F3-20 is excessively low, change it to a value between 20 and 40.
The manual torque boost or V/f curve is improper.	Check whether the manual torque boost coefficient (F3-01) is excessively high or whether the V/f curve is modified in the V/f mode.	Adjust the manual torque boost or V/f curve.

Cause	Check method	Solution
The motor is started while rotating.	Check whether the motor is started while rotating.	Select the flying start mode or start the motor after it stops.
The drive suffers external interference.	1. Check whether devices that cause significant interference are in operation on the site. 2. Check whether the power supply is normal upon the fault.	1. Check if the current upon the fault reaches the overcurrent threshold (F3-18) in the fault log. 2. If not, the fault may be caused by external interference. In this case, remove the external interference to clear the fault. 3. If no external interference source is found, the driver board or Hall device may be faulty. Contact the manufacturers to replace them.

E003.0: Overcurrent during deceleration

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

This fault occurs when the transient current outputted exceeds 2.5 x 1.414 x rated current of the drive during deceleration.

Troubleshooting:

Cause	Check method	Solution
The output circuit of the AC drive is grounded or short-circuited.	1. Check whether short circuit occurs at the output terminals U/V/W with a multimeter. 2. Check whether power cables are short-circuited with a multimeter. 3. Check whether the motor resistance is symmetric with a multimeter. 4. Check whether three-phase output grounding points are available. Detect the impedance to ground with a tramegger.	1. If the power cable is short-circuited, replace the output cable. 2. If the motor resistance is not symmetrical, replace the motor.
The control mode is FVC or SVC but parameter auto-tuning is not performed.	Check whether parameter auto-tuning has been performed. Set F1-37 to select different types of auto-tuning mode based on the motor type.	Set the motor parameters according to the motor nameplate and perform motor parameter auto-tuning.

Cause	Check method	Solution
The deceleration time is too short under abrupt deceleration conditions.	Check whether the acceleration/deceleration time is appropriate. Increase the acceleration/deceleration time parameters F0-17 and F0-18 to test whether the output current decreases.	Increase the deceleration time (F0-18).
The overcurrent stall suppression parameters are set improperly.	Check whether the overcurrent stall suppression function (F3-19) is enabled and whether the overcurrent stall suppression current (F3-18) is set properly.	1. Ensure that the overcurrent stall suppression function is enabled (F3-19 = 1). 2. If the value of F3-18 is excessively high, change it to a value between 120% and 150%. 3. If the value of F3-20 is excessively low, change it to a value between 20 and 40.
The braking unit or braking resistor is not installed.	Check whether the braking unit and braking resistor are installed.	Install the braking unit and braking resistor.
The drive suffers external interference.	1. Check whether devices that cause significant interference are in operation on the site. 2. Check whether the power supply is normal upon the fault.	1. Check if the current upon the fault reaches the overcurrent threshold (F3-18) in the fault log. 2. If not, the fault may be caused by external interference. In this case, remove the external interference to clear the fault. 3. If no external interference source is found, the driver board or Hall device may be faulty. Contact the manufacturers to replace them.

E004.0: Overcurrent during operation at a constant speed

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

This fault occurs when the transient current outputted exceeds 2.5 x 1.414 x rated current of the drive during operation at a constant speed.

Troubleshooting:

Cause	Check method	Solution
The output circuit of the AC drive is grounded or short-circuited.	1. Check whether short circuit occurs at the output terminals U/V/W with a multimeter. 2. Check whether power cables are short-circuited with a multimeter. 3. Check whether the motor resistance is symmetric with a multimeter. 4. Check whether three-phase output grounding points are available. Detect the impedance to ground with a tramegger.	Check whether the motor is short-circuited or disconnected.
The overcurrent stall suppression parameters are set improperly.	Check whether the overcurrent stall suppression function (F3-19) is enabled and whether the overcurrent stall suppression current (F3-18) is set properly.	1. Ensure that the overcurrent stall suppression function is enabled (F3-19 = 1). 2. If the value of F3-18 is excessively high, change it to a value between 120% and 150%. 3. If the value of F3-20 is excessively low, change it to a value between 20 and 40.
The drive power rating is too low.	Check whether the power of the drive meets the requirements of the working conditions.	If the running current exceeds the rated current of the motor or the rated output current of the drive during stable running, replace the drive with one of a higher power rating.
The drive suffers external interference.	1. Check whether devices that cause significant interference are in operation on the site. 2. Check whether the power supply is normal upon the fault.	1. Check if the current upon the fault reaches the overcurrent threshold (F3–18) in the fault log. 2. If not, the fault may be caused by external interference. In this case, remove the external interference to clear the fault. 3. If no external interference source is found, the driver board or Hall device may be faulty. Contact the manufacturers to replace them.

E005.0: Overvoltage during acceleration

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The bus voltage is higher than the overvoltage threshold set by A5-09 (unit: V) during acceleration.

Troubleshooting:

Cause	Check method	Solution
The input grid voltage is excessively high.	Check whether the input grid voltage is excessively high with a multimeter. Normal range: The input voltage of the three-phase 380 V model ranges from 342 VAC to 418 VAC. The input voltage of the three-phase 220 V model ranges from 198 VAC to 235.4 VAC.	Adjust the voltage until it is within the normal range.
External force drives the motor during acceleration.	Check whether the external force drives the motor during acceleration.	1. Remove the external force or install a braking resistor. 2. The maximum rising frequency during overvoltage suppression (F3-26) is too low. Adjust it to a value between 5 Hz and 15 Hz when external force is applied.
The overvoltage suppression parameters are set improperly.	1. Check whether the overvoltage stall suppression function (F3-23) is enabled. 2. Check whether the overvoltage suppression action voltage (F3-22) is proper.	1. Ensure that the overvoltage stall suppression function (F3-23) is enabled. 2. If the value of F3-22 (Overvoltage suppression action voltage) is too high, change it to a value between 770 V and 700 V. 3. If the value of F3-24 (Overvoltage suppression gain) is too low, change it to a value between 30 and 50.
The braking unit or braking resistor is not installed.	Check whether the braking unit and braking resistor are installed.	Install the braking unit and braking resistor.
The acceleration time is too short.	Check whether the acceleration time (F0-17) is too short (less than 50% of the default value of F0-17), resulting in overmodulation and eventually overvoltage.	Increase the acceleration time (F0-17).

E006.0: Overvoltage during deceleration

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The bus voltage is higher than the overvoltage threshold set by A5-09 (unit: V) during deceleration.

Troubleshooting:

Cause	Check method	Solution
The overvoltage suppression parameters are set improperly.	1. Check whether the overvoltage stall suppression function (F3-23) is enabled. 2. Check whether the overvoltage suppression action voltage (F3-22) is proper.	1. Ensure that the overvoltage stall suppression function (F3-23) is enabled. 2. If the value of F3-22 (Overvoltage suppression action voltage) is too high, change it to a value between 770 V and 700 V. 3. If the value of F3-24 (Overvoltage suppression gain) is too low, change it to a value between 30 and 50.
External force drives the motor during deceleration.	Check whether the external force drives the motor during deceleration.	1. Remove the external force or install a braking resistor. 2. The maximum rising frequency during overvoltage suppression (F3-26) is too low. Adjust it to a value between 5 Hz and 15 Hz when external force is applied.
The deceleration time is too short.	Check whether the deceleration time (F0-18) is too short (less than 50% of the default deceleration time), resulting in excessive generating energy and eventually overvoltage.	Increase the deceleration time.
The braking unit or braking resistor is not installed.	Check whether the braking unit and braking resistor are installed.	Install the braking unit and braking resistor.

E007.0: Overvoltage during operation at a constant speed

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The bus voltage is higher than the overvoltage threshold set by A5-09 (unit: V) during operation at a constant speed.

Troubleshooting:

Cause	Check method	Solution
The overvoltage suppression parameters are set improperly.	1. Check whether the overvoltage stall suppression function (F3-23) is enabled. 2. Check whether the overvoltage suppression action voltage (F3-22) is proper.	1. Ensure that the overvoltage stall suppression function (F3-23) is enabled. 2. If the value of F3-22 (Overvoltage suppression action voltage) is too high, change it to a value between 770 V and 700 V. 3. If the value of F3-24 (Overvoltage suppression gain) is too low, change it to a value between 30 and 50. 4. If the value of F3-26 (Maximum frequency rise threshold for overvoltage suppression) is too low, change it to a value between 5 Hz and 20 Hz.
External force drives the motor during running.	Check whether the external force drives the motor during deceleration.	1. Remove the external force or install a braking resistor. 2. The maximum rising frequency during overvoltage suppression (F3-26) is too low. Adjust it to a value between 5 Hz and 15 Hz when external force is applied.

E008.0: Pre-charge resistor fault

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The relay closes for many times within a short period of time with power ON.

Troubleshooting:

Cause	Check method	Solution
The input voltage is not within the permissible range, leading to frequent open/close of the contactor.	1. Check whether the input grid voltage or power supply is between 342 VAC and 418 VAC. 2. Check that the input power supply does not power on or off repeatedly. 3. Check whether the input grid voltage fluctuates greatly.	Adjust the voltage to a value within the normal range to ensure that bus voltage fluctuation does not cause frequent open/close of the contactor.

E009.0: Undervoltage

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The bus voltage is lower than the undervoltage threshold set by A5-06 (unit: V).

Troubleshooting:

Cause	Check method	Solution
An instantaneous power failure occurs.	1. Check whether the input grid voltage or power supply is between 342 VAC and 418 VAC. 2. Check whether voltage dip occurs.	Enable the power dip ride-through function (F9-59=1) to prevent undervoltage upon instantaneous power failure.
The input voltage of the drive is beyond the allowed range.	Check whether the input grid or power supply is within the normal range: 342 VAC to 418 VAC.	Adjust the voltage to the normal range.
The bus voltage is abnormal.	Use a voltage measurement device or InoDriverShop to measure the bus voltage and check whether oscillation exists.	Seek technical support.
The rectifier, the inverter driver board, or the inverter control board is faulty.	1. Check whether the effective value of the DC bus voltage is about 1.414 times the effective value of the input voltage with a multimeter. If the difference is significant, an error exists. 2. On the basis of step 1, check whether the bus voltage of the drive is consistent with the bus voltage detected by the multimeter. If the difference is significant, an error exists.	Seek technical support.

E010.0: Drive overload

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The drive is considered to be overloaded when the overload time is reached based on the overload curve of the drive.

Troubleshooting:

Cause	Check method	Solution
The carrier frequency is set too high.	Check whether F0-15 (Carrier frequency) is set to a value higher than the default value.	Reduce the value of F0-15 (Carrier frequency).
The load is too heavy or the motor is stalled.	1. Check whether the load (output current) is too heavy during normal operation. 2. When an overload fault occurs, check whether the motor is stalled (the motor does not rotate). 3. Check whether the output cable is cracked.	1. Reduce the load and perform testing again. 2. Eliminate the risk of motor stall and perform testing again. If the fault persists, contact Inovance technical support. 3. Perform parameter auto-tuning again. 4. Check whether the cable is short-circuited and or in poor contact due to surface crack.

E011.0: Motor overload

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The motor is considered to be overloaded when the overload time is met based on the motor overload curve.

Troubleshooting:

Cause	Check method	Solution
F9-01 (Motor overload protection gain) is set incorrectly.	Check whether the value of F9-01 (Motor overload protection gain) is lower than 1.0. The default value is 1.0.	Set the value of F9-01 properly. If you increase the value of F9-01, the motor overload time is prolonged.
The load is too heavy or the motor is stalled.	1. Check whether the load (output current) is too heavy during normal operation. 2. When an overload fault occurs, check whether the motor is stalled (the motor does not rotate).	Reduce the load and check the motor and machinery.

E012.0: Input phase loss

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop
1: Stop according to the stop mode
2: Continue operation

Mechanism

If the input phase loss signal is active, the input phase loss occurs.

Troubleshooting:

Cause	Check method	Solution
The three-phase input power supply is abnormal.	Check whether the input grid voltage or power supply is between 342 VAC and 418 VAC.	Check and eliminate faults in peripheral circuits.
The driver board, lightning protection board, main control board, or rectifier bridge is faulty.	Use a voltage detection device to check whether the three-phase grid is unbalanced.	1. Troubleshoot the cause for unbalanced grid voltage or perform derating during use. 2. If the fault persists, contact Inovance technical support.

E013.0: Output phase loss

Default fault level:	0: Coast to stop	Fault level range:	0: Coast to stop 1: Stop according to the stop mode 2: Continue operation

Mechanism

The average value of three-phase output current is detected when the operating frequency is higher than 0.8 Hz. The ratio of the maximum phase output current to the minimum phase output current is larger than 7.

Troubleshooting:

Cause	Check method	Solution
The motor is faulty.	Check whether open circuit occurs on U/V/W phase of the motor.	Replace the motor.
The drain wire between the drive and the motor is abnormal.	Check whether the drain wire between the drive output end and the motor end is proper.	Eliminate external faults.
The three-phase outputs of the AC drive are unbalanced during motor running.	Check whether the effective values of the three-phase output current of the AC drive are consistent.	Ensure the motor three-phase winding is correct or replace the motor.
The driver board or the IGBT module is abnormal.	If the drive output phase loss persists, the driver board and IGBT module are abnormal.	Replace the drive.

E014.0: Drive overheat

Default fault level:	0: Coast to stop	Fault level range:	0: Coast to stop

Mechanism:

The heatsink temperature exceeds the overtemperature threshold, leading to a drive overheat fault.

Troubleshooting:

Cause	Check method	Solution
The ambient temperature is excessively high.	1. Check whether the ambient temperature exceeds 40℃. 2. Check whether the drive is derated (derated 1.5% for every additional 1℃) if the temperature is between 40℃ and 50℃.	1. Lower the ambient temperature to a value below 40℃. 2. Derate the drive if the temperature is between 40℃ and 50℃.
The air duct is blocked.	Check whether the air duct of the drive or in the environment is blocked.	Clean the air duct.
The fan is damaged.	Check whether the fan stops.	Replace the damaged fan.
The thermistor is damaged.	Stop the drive for more than 1 h and check whether the temperature rises or does not fall.	Contact Inovance for technical support to replace the thermistor.
Product components are damaged.	If the fault persists, the internal components of the drive may be damaged.	Contact Inovance for technical support to replace the damaged component.

E015.0: External device fault

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The DI terminal should be normally open, but it is detected to be closed. The DI terminal should be normally closed, but it is detected to be open.

Troubleshooting:

Cause	Check method	Solution
An external fault signal is input through the multi-functional DI (NO).	Check the parameter of the DI terminal (group F4) to see which DI is assigned with function 11, and check whether the corresponding physical DI is closed.	Eliminate external faults and ensure that restart is allowed under the mechanical condition.
An external fault signal is input using the virtual I/O terminal (NO).	Check the parameter of the DI terminal (group F4) to see which DI is set to function 33, and check whether the corresponding physical DI is disconnected.	Check that the virtual I/O parameters in group A1 are set correctly and reset the device.

E016.0: Communication fault

Default fault level:	1: Stop according to the stop mode	Fault level range:	0: Coast to stop 1: Stop according to the stop mode 2: Continue operation

Mechanism

The MD290 supports the following protocols: Modbus-RTU, PROFINET, EtherCAT, PROFIBUS DP, CANopen and CANlink. This section describes all communication-related faults.

1. If the time interval between the current communication and the next communication exceeds the value of FD-04 (Modbus communication interruption detection time) or the value of FD-08 (Expansion communication interruption detection time), the drive reports a communication fault.

2. When connection to the slave is abnormal, the master reports a communication fault during running.

Troubleshooting:

Cause	Check method	Solution
The host controller does not work properly.	Check whether the program of the host controller is correct, whether the configuration file is correct according to the current communication protocol, and whether the wiring is secure and correct.	Contact after-sales engineers to check the host controller software, obtain the correct configuration file, and check the wiring.
The communication cable is faulty.	Check whether the network cable and differential signal cable are abnormal.	1. Check that the cable is intact. 2. Connect the communication cable properly.
F0-28 (Communication protocol selection) is set incorrectly.	Check whether F0-28 (Communication protocol selection) is set correctly as follows: 0: Modbus protocol; 1: Non-Modbus protocol	Set the communication expansion card correctly.
Communication parameters in group FD are set improperly.	Check whether the values of FD-00 (Baud rate), FD-01 (Modbus data format), FD-02 (local address) set through the drive are consistent with those set through the host controller.	Ensure the values of FD-00 (Baud rate), FD-01 (Modbus data format), FD-02 (local address) set through the drive are consistent with those set through the host controller.

E017.0: Contactor fault

Default fault level:	0: Coast to stop	Fault level range:	0: Coast to stop

Mechanism:

The pre-charge contactor is considered to be faulty when abnormal signals are detected continuously for 1s based on hardware contactor exception signal detection.

Troubleshooting:

Cause	Check method	Solution
The driver board and power supply are abnormal.	Check whether the input grid voltage is normal. The input voltage of the three-phase 380 V model ranges from 342 VAC to 418 VAC. The input voltage of the three-phase 220 V model ranges from 198 VAC to 235.4 VAC.	If the mains voltage is normal and the fault persists, replace the drive.
The contactor is abnormal.	Check whether the contactor can be closed or opened by the sound upon power-on.	Replace the contactor.
The lightning protection board is abnormal.	If the fault persists after troubleshooting, check whether the lightning protection board is abnormal.	Replace the lightning protection board.

E018.0: Current detection circuit fault

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

Zero drift is detected only in the undervoltage and stop state. If zero drift detection value is greater than 10% of the rated current, the current sampling is considered abnormal.

Troubleshooting:

Cause	Check method	Solution
The main circuit is not powered on.	Check whether voltage exists on the R/S/T input end with a multimeter.	Power on the R/S/T input end.
The current sampling of the drive is abnormal.	In the stop state, check the three-phase output UVW current and check whether the current fluctuation exceeds 10% of the rated current.	If the current fluctuation exceeds 10% of the rated current, the Hall sensor or current sampling circuit is damaged. Contact Inovance for technical support.

E019.0: Motor parameter auto-tuning fault

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The current is low during stator resistance auto-tuning.

Troubleshooting:

Cause	Check method	Solution
Motor parameters are not set according to the nameplate.	Check whether parameters F1-00 to F1-06 are set according to the motor nameplate.	Set the motor parameters correctly according to the motor nameplate.
Parameter auto-tuning times out.	1. Check whether the motor is connected. 2. Check whether the contactor between the drive and the motor are open.	Ensure the drain wire between the drive and the motor is connected firmly.

E021.0: EEPROM read/write failure

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

1. The continuous operation time on the EEPROM exceeds the threshold defined internally.

2. The continuous read operation time on the EEPROM exceeds the threshold defined internally.

3. The continuous write operation time on the EEPROM exceeds the threshold defined internally.

4. The number of write-read operations on the EEPROM within 1s exceeds the value of F8-58.

5. The EEPROM internal cache queue length exceeds the length defined internally.

Troubleshooting:

Cause	Check method	Solution
The EEPROM chip is damaged.	Check whether parameters are operated through communication, and then check whether the RAM address or EEPROM address is operated. Note: For mapping of RAM addresses of each group of parameters, see the parameter list section in the user guide. If parameters are written through communication, check whether the write operation is performed frequently.	Contact the agent or Inovance for technical support.

E023.0: Drive output short circuited to ground

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The drive output is short-circuited to ground when the current between the output phase and ground exceeds the designed threshold.

Troubleshooting:

Cause	Check method	Solution
The motor is short circuited to the ground.	Check whether each adapter is normal, and measure the impedance to ground with a megger.	Check whether each adapter is normal, and measure the impedance to ground with a megger. Replace the cable or motor if you have to. Note: Do not run the motor before the short circuit to ground fault is rectified.
IGBT short circuit is reported during self-check.	Perform static self-check repeatedly to check whether the fault persists.	If the fault persists, replace the drive. Note: Do not run the motor before the short circuit to ground fault is rectified.

E025.0: Motor overheat

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The motor temperature is detected through sampling to determine whether the motor is overheated. The fault is triggered after the overheat temperature is reached.

Troubleshooting:

Cause	Check method	Solution
The motor temperature is too high.	Check whether the motor temperature exceeds the temperature upper limit.	1. Reduce the carrier frequency or take other heat dissipation measures for the motor. 2. Replace the motor. 3. Contact technical support engineers of Inovance.

E026.0: Cumulative operating time reach

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

This fault is reported when the cumulative operating time is longer than or equal to F8-75 + F8-17 x 3600s.

Troubleshooting:

Cause	Check method	Solution
The cumulative operating time reaches the setpoint.	Check whether this condition is met: F7-09 + F7-28 x 3600 ≥ F8-75 + F8-17 x 3600.	Clear the record by parameter initialization (FP-01=2).

E027.0: User-defined fault 1

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

A DI terminal is assigned with function 44 through a parameter in group F4 or group A1 and the DI terminal is enabled.

Troubleshooting:

Cause	Check method	Solution
The signal of user-defined fault 1 is input through the multi-functional DI or the virtual I/O.	A DI terminal is assigned with function 44 through a parameter in group F4 or group A1 and the DI terminal is enabled.	Reset the operation.

E028.0: User-defined fault 2

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

A DI terminal is assigned with function 45 through a parameter in group F4 or group A1 and the DI terminal is enabled.

Troubleshooting:

Cause	Check method	Solution
The signal of user-defined fault 2 is input through the multi-functional DI or the virtual I/O terminal.	A DI terminal is assigned with function 45 through a parameter in group F4 or group A1 and the DI terminal is enabled.	Reset the operation.

E029.0: Cumulative power-on time reach

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

This fault is reported when the cumulative power-on time is longer than or equal to F8-74 + F8-16 x 3600s.

Troubleshooting:

Cause	Check method	Solution
The cumulative power-on duration reaches the setpoint.	Check whether this condition is met: F7-09 + F7-29 x 3600 ≥ F8-74 + F8-16 x 3600.	Clear the record by parameter initialization (FP-01=2).

E030.0: Load loss

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

In the running state, the current is lower than the value of F9-64 for the time set by F9-65.

Troubleshooting:

Cause	Check method	Solution
The operation current of the drive is lower than the value of F9-64.	Check whether the load is actually disconnected, and whether the cables (such as output cables) are connected properly.	Check that the load is disconnected or ensure that F9-64 and F9-65 are set properly based on the actual conditions.

E031.0: PID feedback loss during running

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

If the PID feedback keeps lower than the value of FA-26 (Detection level of PID feedback loss) after the time defined by FA-27 (Detection time of PID feedback loss) elapses, the drive reports this fault.

Troubleshooting:

Cause	Check method	Solution
The PID feedback is lower than the value of FA-26.	Monitor the feedback channel through the InoDriverShop to check whether the values in the feedback channel are correct.	1. Check the PID feedback signal and analyze the system feedback error. 2. Set FA-26 properly.

E040.0: Pulse-by-pulse current limit fault

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The pulse-by-pulse current limit fault is only applied in the V/f control mode of the asynchronous motor. After the current exceeds the pulse-by-pulse current limit threshold and the pulse-by-pulse current limit lasts for 500 ms, the fault is reported.

Troubleshooting:

Cause	Check method	Solution
The load is too heavy or the motor is stalled.	1. Check whether the load (output current) is too large during normal operation. 2. When an overload fault occurs, the motor is stalled (the motor does not rotate).	Reduce the load and check the motor and machinery.
The drive power rating is too low.	The drive power is lower than the motor power.	Replace the drive with a higher power rating.

E041.0: Motor switchover fault during running

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

This fault is reported when the motor is switched over when the drive is running.

Troubleshooting:

Cause	Check method	Solution
Motor switchover is performed using a terminal during running of the drive.	Check whether the DI assigned with function 41 is enabled during operation.	Perform motor switchover after the drive stops.

E045.0: Motor temperature fault

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The motor temperature transmitted through the AI is higher than the set motor temperature alarm threshold.

Troubleshooting:

Cause	Check method	Solution
The cable of the temperature sensor becomes loose.	Check the wiring of the temperature sensor.	Reconnect the cable.
The motor temperature is too high.	Check whether the value of U0-34 is higher than F9-57.	Increase the carrier frequency or take other measures to cool the motor.
The value of F9-57 (Motor overtemperature protection threshold) is too small.	Check the value of F9-57 (Motor overtemperature protection threshold).	Increase the motor overtemperature protection threshold (90℃ to 100℃ for normal motors).

E049.0: Voltage overlimit

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

The voltage transmitted through AI1 to AI3 is higher than the set voltage threshold.

Troubleshooting:

Cause	Check method	Solution
The input voltage of AI1 to AI3 is out of the range set by A6-16 to A6-21.	Check whether the input voltage of AI1 to AI3 is out of the range set by A6-16 to A6-21.	1. Adjust the input voltage of AI1 to AI3 to the value within the allowed range. 2. Change the values of A6-16 to A6-21. 3. Disable the fault report function.

E055.0: Slave fault in master/slave control mode

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

When a fault occurs on the slave, the fault signal is transmitted to the master through the CAN bus. The master reports the fault.

Troubleshooting:

Cause	Check method	Solution
The slave is faulty.	Rectify the fault according to the slave fault code.	Troubleshoot the problem according to the slave fault code.

E061.0: Braking transistor overload

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

Determine whether the braking transistor is overloaded based on the overload curve.

Troubleshooting:

Cause	Check method	Solution
The power of the braking resistor is too high (resistance is too low).	Check whether the braking resistor model is correct. For details, see the section on the braking resistor in the user guide.	Use a braking resistor with larger resistance.

E062.0: Braking transistor shoot through

Default fault level: 0: Coast to stop Fault level range: 0: Coast to stop

Mechanism:

1. This fault is reported when the braking transistor is turned off and the braking transistor current exceeds 0.375 times the rated current of the braking transistor for 4s consecutively.

2. This fault is reported when the braking transistor current exceeds two times the maximum current of the braking transistor several times.

Troubleshooting:

Cause	Check method	Solution
The braking module is abnormal.	1. Use a multimeter to measure the resistance of the braking resistor and check whether it is consistent with the nominal value of the braking resistor. If the deviation is too large, the braking resistor is damaged. 2. Check whether the braking resistor is connected properly and whether the braking unit operates properly. 3. Check the bus voltage (U0-02) through the InoDriverShop or the operating panel to determine whether the braking voltage is active.	1. Replace the braking resistor. 2. Connect the braking resistor properly. 3. Contact technical support engineers of Inovance.

9 Routine Maintenance

9.1 Routine Check

9.1.1 Routine Checklist

The ambient temperature, humidity, dust, and vibration will cause aging of components inside the drive, which leads to potential faults and shortens the service life of the drive. Therefore, routine maintenance on the device is required. The maintenance interval must be shortened when the drive is used in environments suffering from high ambient temperature, frequent startup and stop, violent fluctuation in the AC power supply and the load, strong vibration or shock, and intrusive and corrosive substances such as dust, metal dust, and hydrochloric acid.

Check the following items daily to ensure a proper operation of the product. It is recommended to make a copy of this checklist and sign the "Checked" column after each inspection.

Inspection Item	Content	Solution	Checked
Motor	Check for unusual vibration and noise.	• Check for abnormal mechanical connection. • Check whether phase loss occurs on the motor. • Check whether motor screws are tightened.	
Cooling fan	Check whether the fan of the AC drive and motor operates normally.	• Check whether the fan of the AC drive operates properly. • Check whether the fan of the motor operates properly. • Check whether the air duct is blocked. • Check whether the ambient temperature is within the permissible range.	
Installation Environment	Check whether the control cabinet and cable ducts are normal.	• Check input and output cables HVD100 for damaged insulation. • Check the mounting bracket for vibration. • Check whether copper busbars and wiring terminals are connected loosely or corroded.	

Inspection Item	Content	Solution	Checked
Load	Check whether the operating current of the drive exceeds the rated current of the drive and motor.	• Check whether the motor parameters are set correctly. • Check whether the motor is overloaded. • Check whether mechanical oscillation is large (application scenario: tested according to IEC 60068-2-6). Vibration amplitude at 5 Hz to 8.4 Hz: 3.5 mm; acceleration at 8.4 Hz to 200 Hz: 1 g; 10 cycles in each of X/Y/Z-axis direction Transportation scenario: Tested according to IEC 60068-2-64 Power spectrum density at 5 Hz to 100 Hz: 0.01 g^2/Hz; power spectrum density at 200 Hz: 0.001 g^2/Hz; Grms: 1.14 g	
Input voltage	Check whether the power supply voltage between the main circuit and control circuit is normal.	• Check whether the input voltage is within the permissible range. • Check whether heavy load starts around.	

9.1.2 Regular Checklist

Check the items listed in the following table every one or two years. Determine the actual inspection cycle based on actual application and operating environment. Regular maintenance helps detect product function deterioration and damage.

Make a copy of the following checklist and sign the "Checked" column after each inspection.



Do not perform inspection or connection work with power on. Failure to do so may result in an electric shock. Cut off the power supplies of all equipment before wiring or repair. Wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safety voltage range. Failure to do so may result in an electric shock.

Inspection Item	Content	Solution	Checked
Product	Check the surface of the AC drive for wastes, strains, and dust.	• Check whether the controller cabinet has been powered off. • Use a vacuum cleaner to suck up waste and dust to prevent direct contact with the components. • Wipe the surface dirt that is difficult to clean with alcohol and wait until the surface becomes dry.	
Cables	• Check power cables and connections for discoloration. • Check whether the insulation is aged or cracked.	• Replace the cracked cable. • Replace the damaged terminals.	
Peripherals of the solenoid contactor	• Check whether the contactor closes tightly or generates unusual noise during closing. • Check whether short circuit, water seepage, swelling, or cracking occurs on any peripheral device.	Replace the abnormal components.	
Air duct	• Check whether the air duct and heatsink are blocked. • Check whether the fan is damaged.	• Clean the air duct. • Replace the fan.	
Control circuit	• Check whether control components are in poor contact. • Check whether terminal screws are loose. • Check whether the insulation of the control cable is cracked.	• Remove foreign objects on the surface of control cables and terminals. • Replace the damaged or corroded control cables.	
Coolant (for T13 models only)	Check coolant for yellowing, discoloration, and foreign matters.	Replace the coolant.	
Filter foam (for T13 models only)	Check the dust filter foam for dust that affects heat dissipation.	Clean the filter foam.	

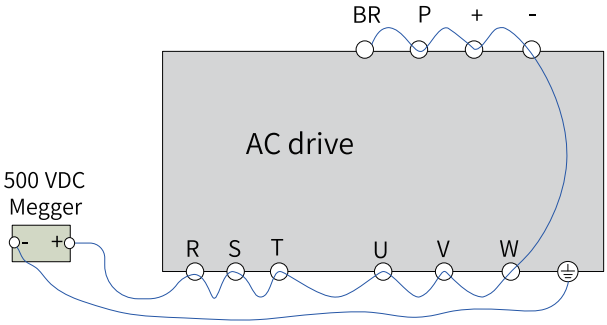
9.2 Main Circuit Insulation Test

Note

Do not perform high voltage test (> 500 V) again because it has been done before delivery.

Remove the voltage dependent resistor screw before test and disconnect the voltage dependent resistor.

Before measuring insulation resistance with a megameter (500 VDC megameter recommended), disconnect the main circuit from the AC drive. Do not use the insulation resistance meter to test the insulation of the control circuit. See the following figure.



The measured insulation resistance must be greater than 5 MΩ.

CAUTION

Disconnect the optional grounding screw of VDR before performing a voltage resistance test. Otherwise, the test may fail.

9.3 Quick-Wear Parts Replacement

9.3.1 Service Life of Quick-Wear Parts

Quick-wear parts of the AC drive include the cooling fan and electrolytic capacitor. Their service life is related to the operating environment and maintenance status. Generally, the service life is as follows.

Name	Service life [Note]
Cooling fan	≥ 5 years
Electrolytic capacitor	≥ 5 years
Note: The service life indicates the time when the part is used in the following conditions. You can determine when to replace the part according to the actual operating time. Ambient temperature: 40°C Load rate: 80% Operating rate: 24 hours per day	

9.3.2 Replacing the Cooling Fan

Fan quantity

- Possible causes of fan damage: bearing wear or blade aging
- Criteria for determining the fan damage: cracks on the blade, unusual vibration noise upon start, and improper operation of fan blades
- Replacement of the fan: Press the snap-fit joint on the fan plastic cover and pull the fan outward. After replacing the fan, ensure the fan blows the air upwards.

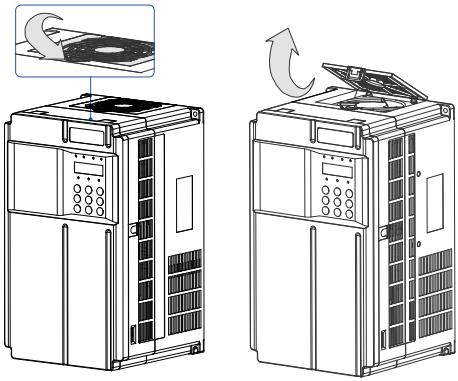
Table 9–1 Number of cooling fans

Structure	Cooling fan
T1 (0.4 kW to 1.1 kW)	-
T1 (1.5 kW to 3.0 kW) T2 T3 (7.5 kW) T5 to T7	1
T3 (11 kW) T4 T8 to T10	2
T11 to T12	3

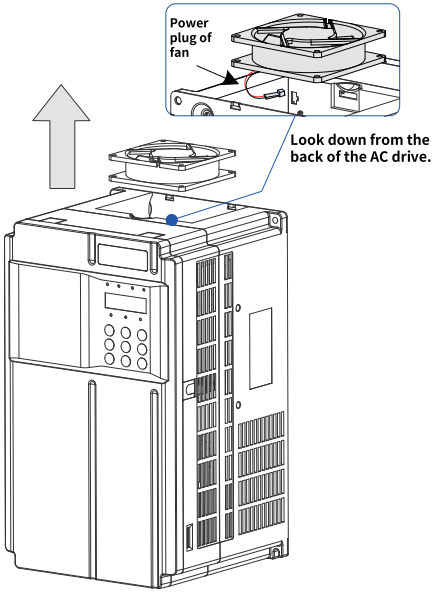
Removing and installing the fan of T1 to T6 models

Removing the fan

1. Press the snap-fit joint on the fan cover gently and remove the cover.



2. Pull the fan upwards and unplug the power cable connector from the socket.

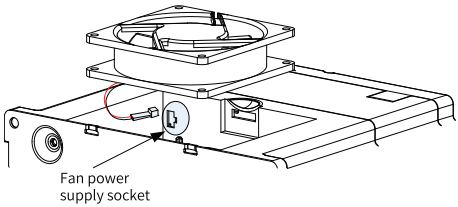


Installing the fan

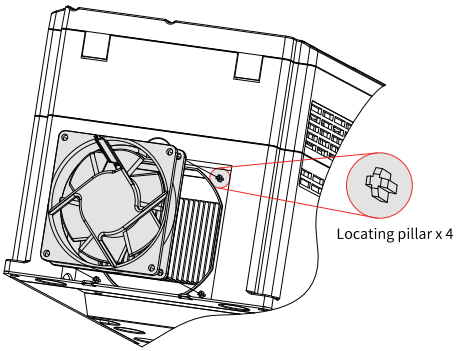
Note

- Install the fan in the reverse order of removal and ensure the correct direction of the fan.
- The fan should rotate clockwise to blow air into the motor air duct when viewed from the rear cover of the fan.

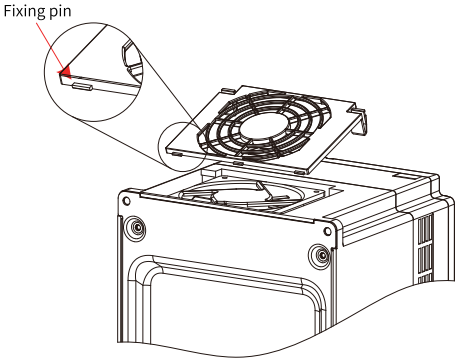
1. Plug the fan power cable connector to the socket.



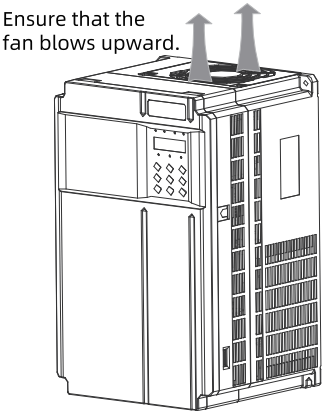
2. Install the fan into the drive, with the four fixing holes at the bottom of the fan aligned with the positioning pins.



3. Insert the two small snap-fit joints on the fan cover into the slot and then press down to fix the snap-fit joints.



4. After replacing the fan, ensure the fan blows the air upwards.



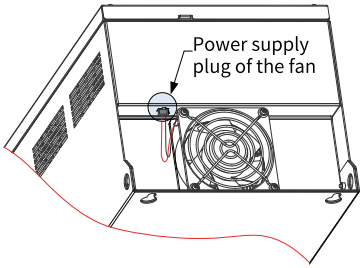
Removing and installing cooling fans of T7 to T9 Models

Note

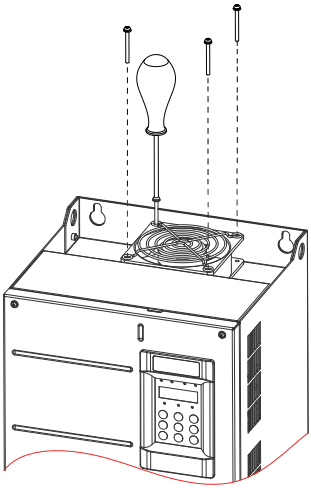
The number and location of cooling fans vary with product models, but the fans are removed and installed in the same way.

Removing the fan

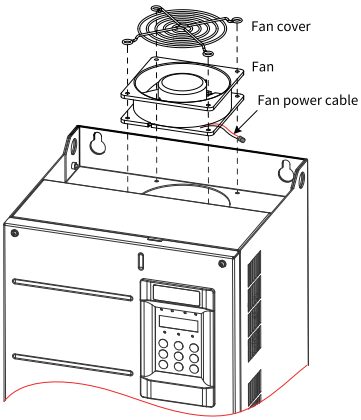
1. Unplug the fan power cable plug from the socket (top view).



2. Remove the four screws from the fan cover using a screwdriver.



3. Remove the fan and fan cover from the drive.

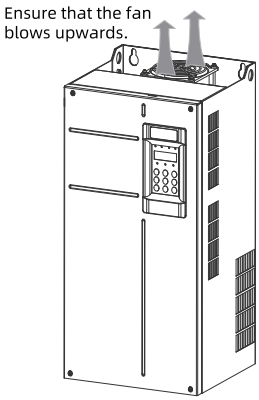


Installing the fan

1. Install the fan in the reverse order of removal and ensure the correct direction of the fan.

2. Align the fixing holes of the fan cover and the fan with those on the drive during installation.

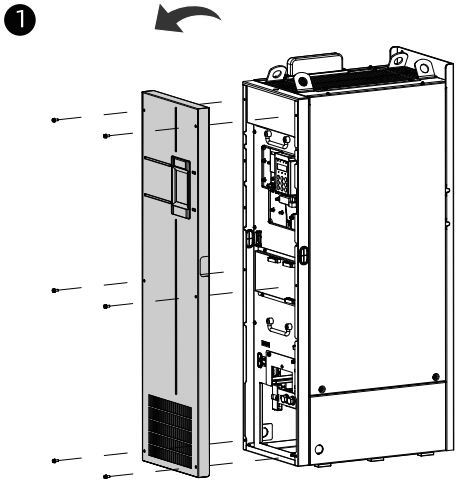
3. After replacing the fan, ensure the fan blows the air upwards.



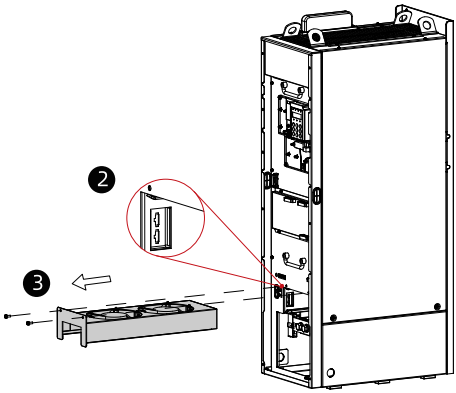
Removing and installing cooling fans of T10 to T12 models

Removing the fan

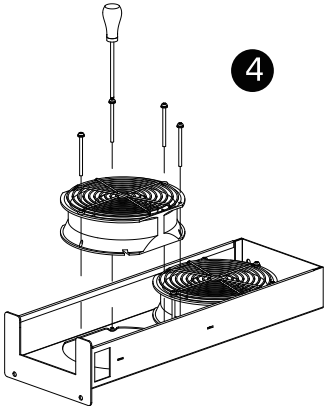
1. Remove the six fixing screws on the cover. Then, hold the cover with both hands and lift it up in the direction indicated by the arrow to remove the cover.



2. Disconnect the power cable connectors of all fans. Remove the three fixing screws from the fan box and pull out the fan box in the direction indicated by the arrow.



3. Loosen four screws from each fan cover and remove the fan.

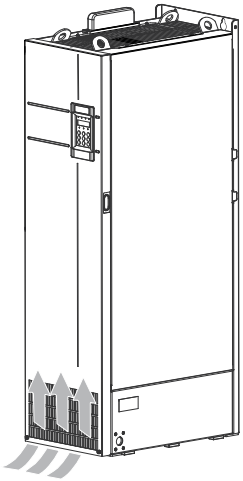


Installing the fan

1. Install the fan in the reverse order of removal and ensure the correct direction of the fan.

2. Align the fan box with the rail and push it into the drive.

3. Connect the fan power cable connector first and then fix the fan box. After replacing the fan, ensure the fan blows the air upwards.



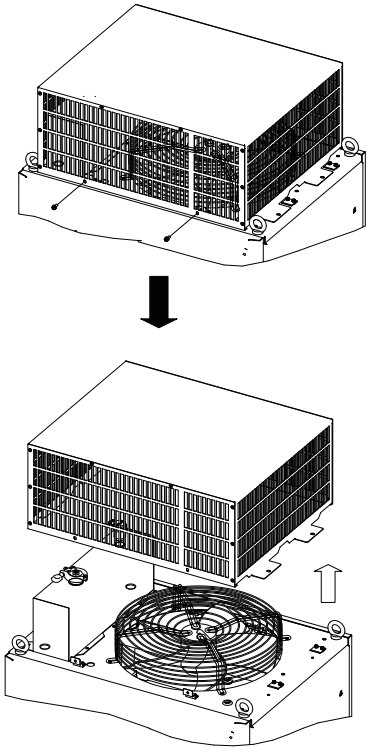
Removing and installing the fan of T13 models

Note

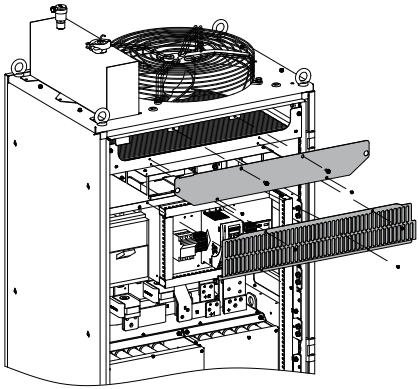
T13 models have a top-mounted fan and a cabinet-mounted fan. See the following for how to remove and install the fan.

Removing the fan on the top

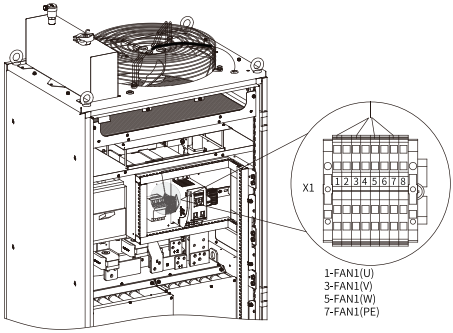
1. Remove the two fixing screws from the top cover at the front, slide forward the protective cover with two hands along the guide for about 20 mm, and lift it up to remove the protective cover.



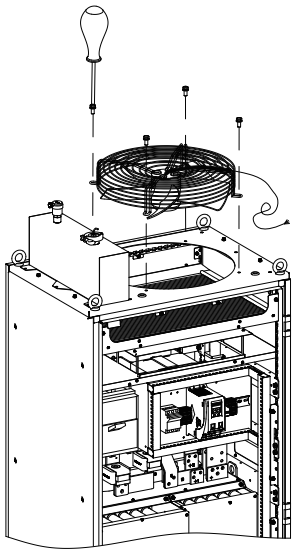
2. Remove the baffle plate as shown in the figure.



3. Disconnect the cables connecting the top fan from the X1 terminal block. Then, pull out the cables from the cable tray. Remove cables of terminals 1, 3, 5, and 7 only.



4. Remove the four fixing screws from the top-mounted fan and take out the fan from the AC drive.



Installing the fan on the top

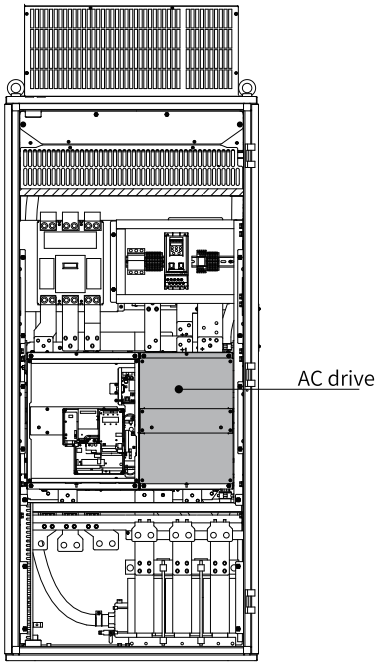
1. Install the fan in the reverse order of removal.

2. Route fan cables according to the wiring diagram.

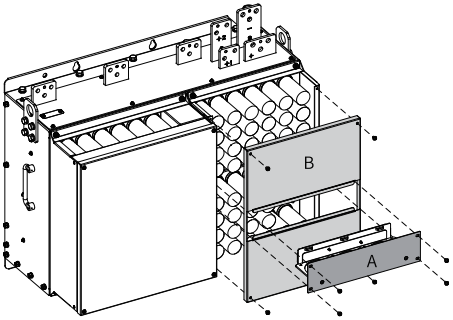
3. Connect the cables to terminals 1, 3, 5, and 7 of the X1 terminal block.

Removing the AC drive fan in the cabinet

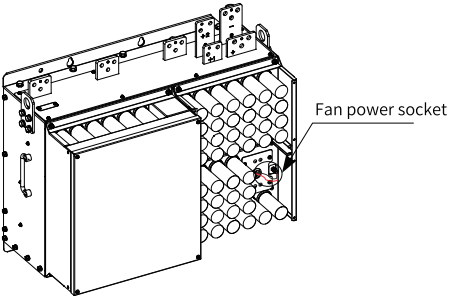
1. Open the cabinet door to locate the AC drive, which is shown in the following figure.



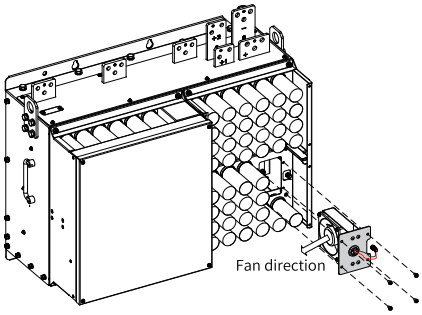
2. Remove baffle plates A and B in sequence from the AC drive.



3. Unplug the fan power cable connector from the socket.



4. Remove the four fixing screws from the fan and take out the fan from the AC drive. Note that the fan direction is from right to left.



Installing the AC drive fan in the cabinet

1. Install the fan in the reverse order of removal. Pay attention to the direction of the fan.

2. When installing the fan to the AC drive, align the mounting holes as indicated by the dotted lines in removal step 4.

3. After replacement, check the air flow direction.

9.3.3 Replacing the Filter Electrolytic Capacitor

- Possible damage causes: input power supply in poor quality, high ambient temperature, frequent load jumping, and electrolytic aging
- Condition to determine whether the capacitor needs to be replaced: 1) Check whether there is liquid leakage. 2) Check whether the safety valve has protruded. 3) Measure the static capacitance and the insulation resistance.
- Replacing the capacitor: As the filter capacitor involves the internal parts, do not replace the capacitor by yourself. Contact Inovance for replacement.

9.3.4 Replenishing and Replacing Coolant

The coolant is applicable to T13 models only.

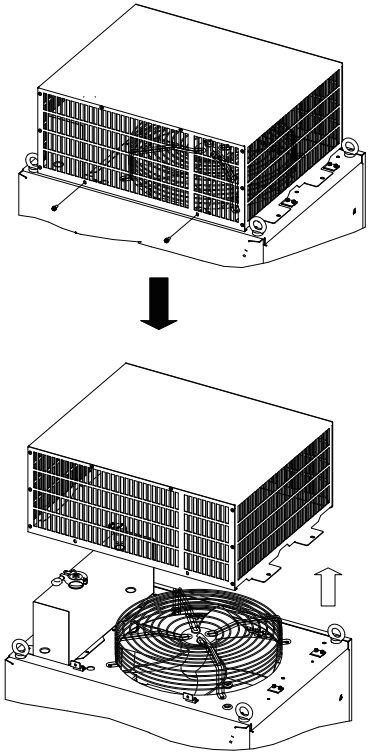
Replenishing coolant

If A66 is displayed on the operating panel of the AC drive, the level of the coolant (coolant used by this product is 45% ethylene glycol solution with the freezing temperature of -40℃) is blow the required threshold. In this case, add the coolant according to the following procedure.

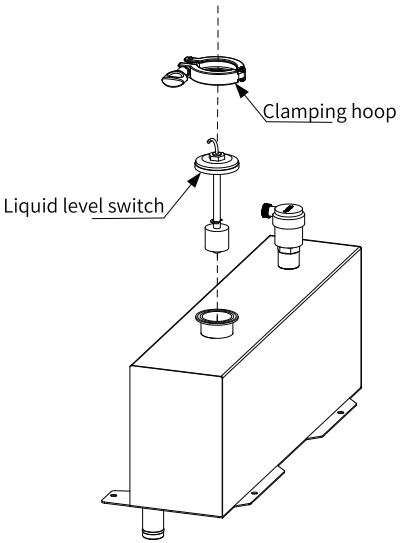
Note

The drive provides coolant as standard and you do not need to add the coolant. If the coolant level is lower than the warning level, contact technical support to add the coolant.

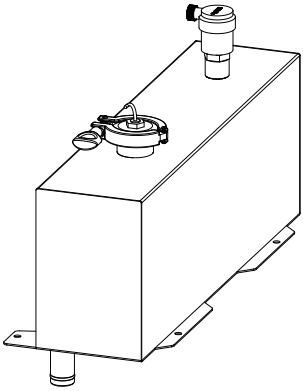
1. Remove the two fixing screws from the top cover at the front, slide forward the protective cover with two hands along the guide for about 20 mm, and lift it up to remove the protective cover.



2. Remove the clamping hoop and liquid level switch from the water tank, as shown below.



3. Add coolant, install the liquid level switch, and tighten the clamping hoop.



4. Install the top cover on the AC drive cabinet.

Replacing cooling liquid

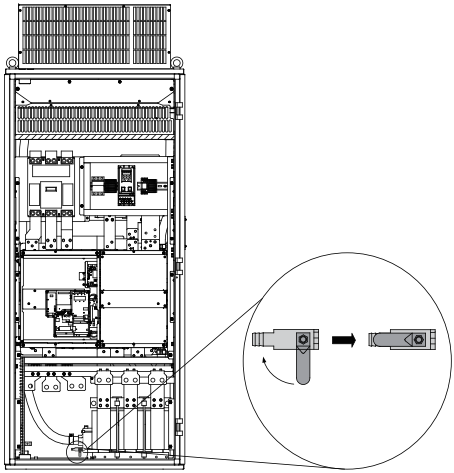
Periodic check (once per year) is recommended. If the coolant becomes yellow, discolors, or has many foreign matters, replace the coolant. It is recommended that the coolant be replaced once every five years.

You can exhaust the original coolant and add the new coolant by following the steps below:

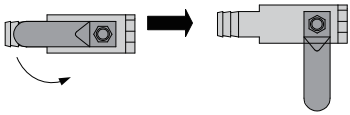
1. Open the bottom protective cover of the AC drive cabinet. Prepare a 16 L container. Then, put one end of the drain pipe of

the bottom water pump in the container.

2. Remove the clamping hoop from the water tank on the cabinet top, open the pump valve (rotate the valve to the horizontal position) as shown in the figure, and completely drain the coolant (it takes about 10 minutes).



3. Close the pump valve (rotate the valve to the vertical position) as shown in the figure.



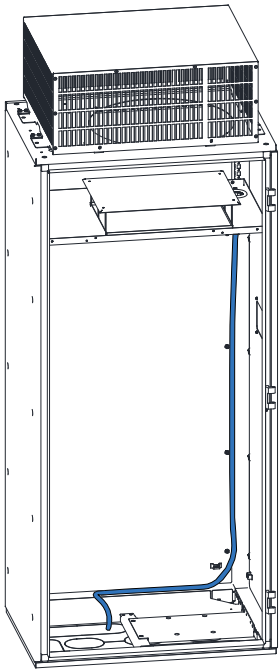
4. Add coolant. Note that about 13.5 L coolant is required.

9.3.5 Placing Waterproof Baffle Plate Hoses

This section applies only to T13 models. For safety of the AC drive, the waterproof baffle plate is used to prevent component damage caused by drip due to condensation. The procedure for placing the hose of the waterproof baffle plate is as follows.

1. Open the bottom protective cover of the AC drive cabinet.

2. Pass the other end of the hose through the bottom protective cover of the AC drive, and then put it in the trench.



9.3.6 Replacing the Dust Filter Mesh

The dust filter mesh is applicable only to T13 models. When dust accumulated on the dust filter mesh affects ventilation and heat dissipation of the cabinet door, clean or replace the dust filter mesh by following the steps below.

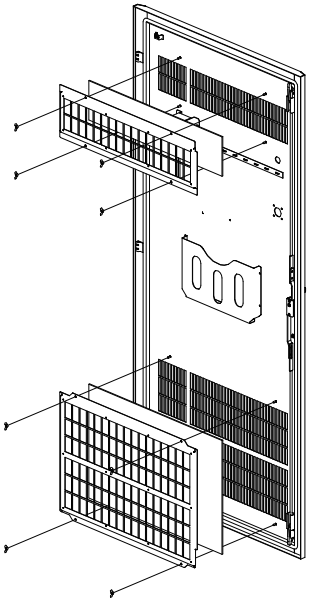
Note

The dust-proof cotton is 15 PPI with a hole diameter of 0.0667 inches and can filter particles with a diameter greater than or equal to 1.7 mm. The dust filter mesh with 15 PPI and with the pore diameter of 0.06667 inches is selected, which can filter particles with a diameter of 1.7 mm or larger.

Removing the dust filter mesh

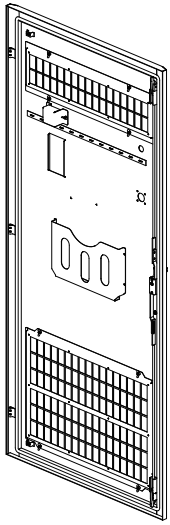
1. Remove the M6 wing nuts at the four corners of the dust filter mesh, hold the mesh frame with two hands, and pull out the dust filter mesh.

2. Wipe the dust on the dust filter mesh with water or cleaner. After cleaning, put the dust filter mesh in a well ventilated and clean place to dry it.



Installing the dust filter mesh

1. Install the dust filter mesh in the reverse order of removal.



9.4 Storage and Repair

Storage

For storage of the product, observe the following requirements.

- Try to store the product with the original packing box provided by Inovance.
- Do not expose the product to environments with moisture, high temperatures, or direct sunlight for a long time.
- The electrolytic capacitor will deteriorate after long-term storage. Therefore, switch on the drive once for at least 5 hours every 6 months. Increase the input voltage slowly to the rated value by using a voltage regulator. Contact Inovance for technical support if necessary.

Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. Maintenance will be charged after the warranty expires.

Within the warranty period, maintenance will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or unusual voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see Product Warranty Card.

10 Accessories

10.1 Option List

Optional peripherals include braking units, function expansion cards, and external operating panels. For use of each option, see the related user guide. If any option is required, specify it in your order.

Table 10–1 Option list

Name		Option model	Order number	Applicable drive model	Description
Braking components	External braking unit[1]	MDBUN-60-T	01013133	All models	60 A, 380 VAC series
		MDBUN-60-5T	0101AR57		60 A, 480 VAC series
		MDBUN-90-T	01013126		90 A, 380 VAC series
		MDBUN-90-5T	0101AR58		90 A, 480 VAC series
		MDBUN-200-T	01040104		200 A, 380 VAC series
		MDBUN-200-5T	01040160		200 A, 480 VAC series
	Built-in braking unit	Models with the name containing letter "B"	/	T1 to T7, and the following T8 models: MD290T75G/90P(B) MD290-2T37G/45P(B)	The T1 to T4 models have built-in braking units. For T5 to T8 models, the braking unit is optional.

Name		Option model	Order number	Applicable drive model	Description
Expansion card	I/O expansion card 1	MD38IO1	01013098	T4 to T13	It provides five DIs, one AI, one relay output terminal, one AO, and one DO. Modbus and CANlink are supported.
	I/O expansion card 2	MD38IO2	01013103	All models	It provides three DIs.
	I/O expansion card 3	MD38IO3	01040051	All models	It provides three DIs, one RS485 communication signal isolation input terminal, and one NO relay output terminal.
	I/O expansion card	MD520IO1	01040250	All models	It provides three DI circuits, one AO circuit, one RO circuit, and one isolated RS-485 circuit.
	RS485 communication card	MD38TX1	01013112	All models	Modbus communication card with the isolation feature
	CANlink communication expansion card	MD38CAN1	01013100	All models	CANlink communication expansion card
	CANopen communication expansion card	MD38CAN2	01013102	All models	CANopen communication expansion card
	PROFIBUS DP communication expansion card	MD38DP2	01013144	T4 to T13	PROFIBUS DP communication expansion card
	PROFIBUS DP communication expansion card	MD-SI-DP1	01040172	All models	PROFIBUS DP communication expansion card
	PROFIBUS DP communication expansion card	MD-SI-DP2	01040249	All models	PROFIBUS DP communication expansion card The MD-SI-DP2 card is compatible with the MD-SI-DP1 card and can be used in the same way as the MD-SI-DP1 card.
	PROFINET communication expansion card	MD500-PN1	01040098	All models	PROFINET communication expansion card
	PROFINET communication expansion card	MD500-PN2	01040198	All models	PROFINET communication expansion card

Name		Option model	Order number	Applicable drive model	Description
Expansion card	EtherCAT communication expansion card	MD500-ECAT	01040113	All models	EtherCAT communication expansion card
	User programmable expansion card	MD38PC1	01013104	T4 to T13	User programmable expansion card Compatible with H1U series PLCs of Inovance
Mounting accessory	Through-hole mounting bracket	MD500-AZJ-A1T1	01040072	T1	The bracket is used for through-hole mounting. It applies only to T1 to T9 models.
		MD500-AZJ-A1T2	01040073	T2	
		MD500-AZJ-A1T3	01040074	T3	
		MD500-AZJ-A1T4	01040075	T4	
		MD500-AZJ-A1T5	01040001	T5	
		MD500-AZJ-A1T6	01040002	T6	
		MD500-AZJ-A1T7	01040003	T7	
		MD500-AZJ-A1T8	01040004	T8	
		MD500-AZJ-A1T9	01040005	T9	
	Grounding bracket of cable shield	MD500-AZJ-A2T1	01040085	T1	The accessory is used for re-fixing the power cable and stable grounding of the shield in 360°. It applies only to T1 to T9 models.
		MD500-AZJ-A2T2	01040088	T2	
		MD500-AZJ-A2T3	01040083	T3	
		MD500-AZJ-A2T4	01040082	T4	
		MD500-AZJ-A2T5	01040081	T5	
		MD500-AZJ-A2T6	01040086	T6	
		MD500-AZJ-A2T7	01040087	T7	
		MD500-AZJ-A2T8	01040084	T8	
		MD500-AZJ-A2T9	01040089	T9	
	Mounting guide rail	MD500-AZJ-A3T10	01040009	T10 to T12	The option is used for installing the AC drive in a cabinet. For T10 models and models above T10, it is recommended that a guide rail be used to push the AC drive into the cabinet.

Name		Option model	Order number	Applicable drive model	Description
Mounting accessory	Conduit box	MD500-NEMA1-T1	01040108	T1 to T2	Models requiring UL Type 1 enclosures are equipped with conduit boxes. The conduit box is optional and needs to be purchased (applicable to T6 models and models below T6).
		MD500-NEMA1-T3	01040109	T3	
		MD500-NEMA1-T4	01040110	T4	
		MD500-NEMA1-T5	01040111	T5	
		MD500-NEMA1-T6	01040112	T6	
Cable	Main circuit cable	Lugs manufactured by Suzhou Yuanli are recommended. For details of recommended cables and cable lugs, see *"5.6.3.2 Dimensions and Cable Selection for Main Circuit Terminals" on page 150*.			It is recommended that the input and output main circuit cables and power cables use symmetrical shielded cables. Compared with four-conductor cables, symmetrical shielded cables can reduce electromagnetic radiation in the whole transmission system. It is recommended that power cables also use symmetrical shielded cables.
	Control circuit cable	All control circuit cables must be shielded cables. Use a separate shielded cable for each type of analog signal. It is recommended to use shielded twisted pair (STP) cables as digital signal cables.			
Operating panel	External LED operating panel	MD32NKE1	01013061	All models	External LED operating panel
	External LCD operating panel	MDKE9	01040037	All models	The external LCD operating panel supports parameter copying and English or Chinese display.
	MDKE9 mounting base	CP600-BASE1	01040022	All models	It is used to fix the MDKE9 operating panel.
	Extension cable	MDCAB	01013008	All models	It is a standard eight-conductor, three-meter network cable that can be used to connect the MD32NKE1, MD32KC, and MDCP.
		MDCAB-1.5	15048471	All models	1.5-meter cable for the external operating panel
Transparent protective cover	Protective cover on the input side	MD500-FHZ-L-T10	01040336	T10	The protective cover only on the left input side is supported.
		MD500-FHZ-L-T11	01040337	T11	
		MD500-FHZ-L-T12	01040338	T12	
	Top protective cover	MD500-FHZ-T-T11	01040344	T11	-

Note

For details on models and specifications of other peripheral electrical components, such as input reactors, EMC filters, output reactors, and fuses, see the section of peripheral electrical components.

10.2 Mounting Accessories

10.2.1Through-hole Mounting Bracket

The through-hole mounting bracket is optional, which should be purchased separately as needed.

Applicable model

Table 10–2 Models of through-hole mounting brackets

Through-hole mounting bracket model	Structure
MD500-AZJ-A1T1	T1
MD500-AZJ-A1T2	T2
MD500-AZJ-A1T3	T3
MD500-AZJ-A1T4	T4
MD500-AZJ-A1T5	T5
MD500-AZJ-A1T6	T6
MD500-AZJ-A1T7	T7
MD500-AZJ-A1T8	T8
MD500-AZJ-A1T9	T9

Mounting hole dimensions

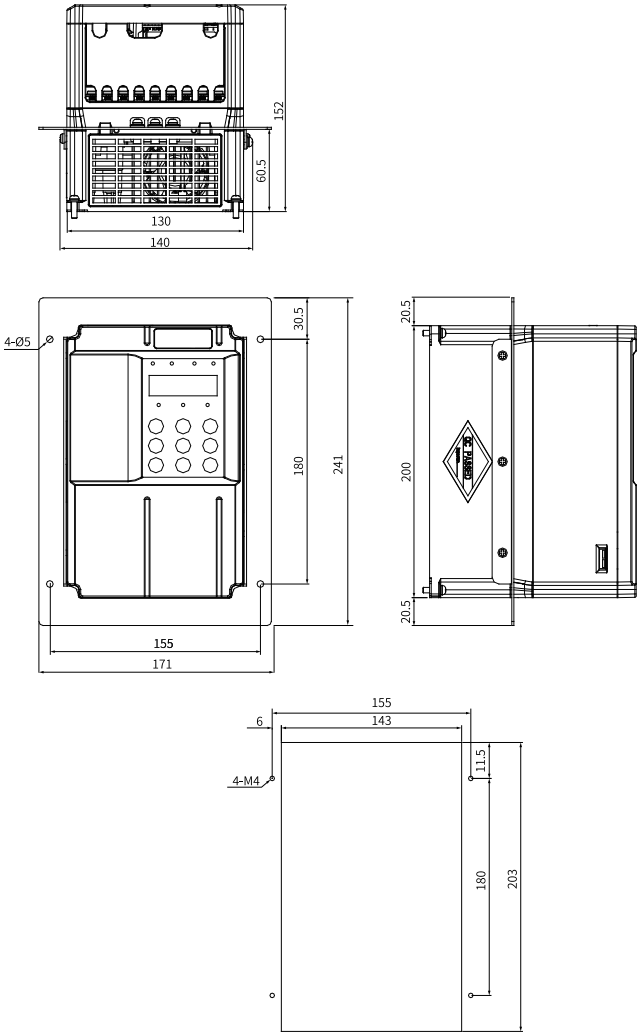


Figure 10-1 MD500-AZJ-A1T1 through-hole mounting bracket and mounting hole dimensions (unit: mm)

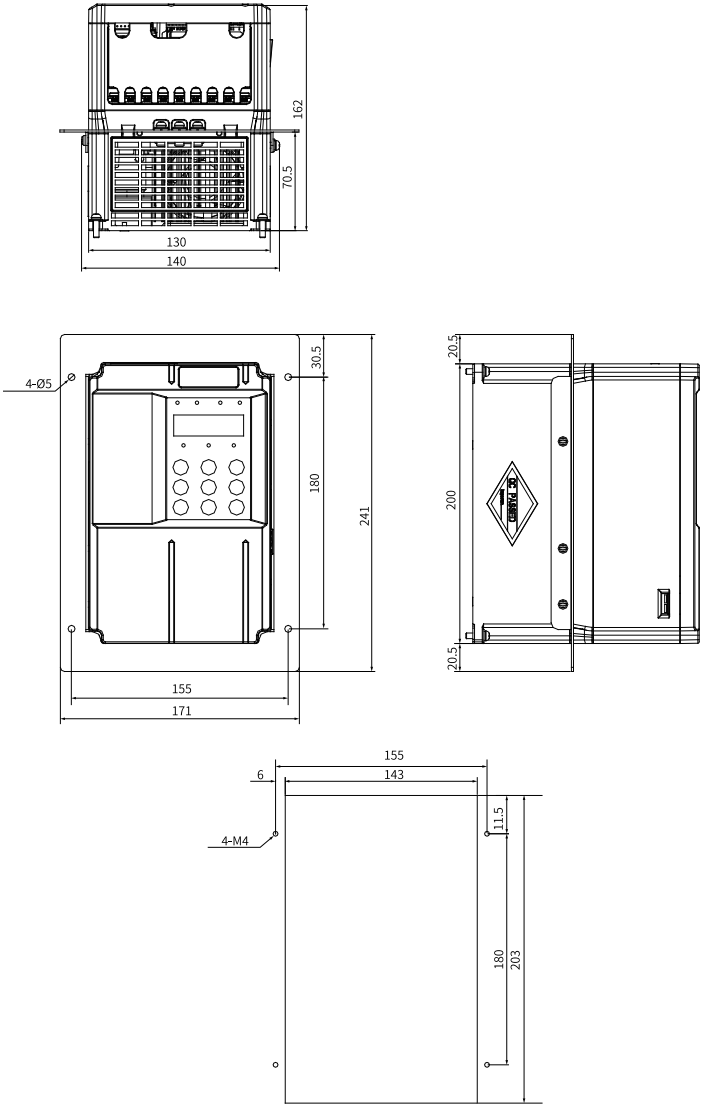


Figure 10-2 MD500-AZJ-A1T2 through-hole mounting bracket and mounting hole dimensions (unit: mm)

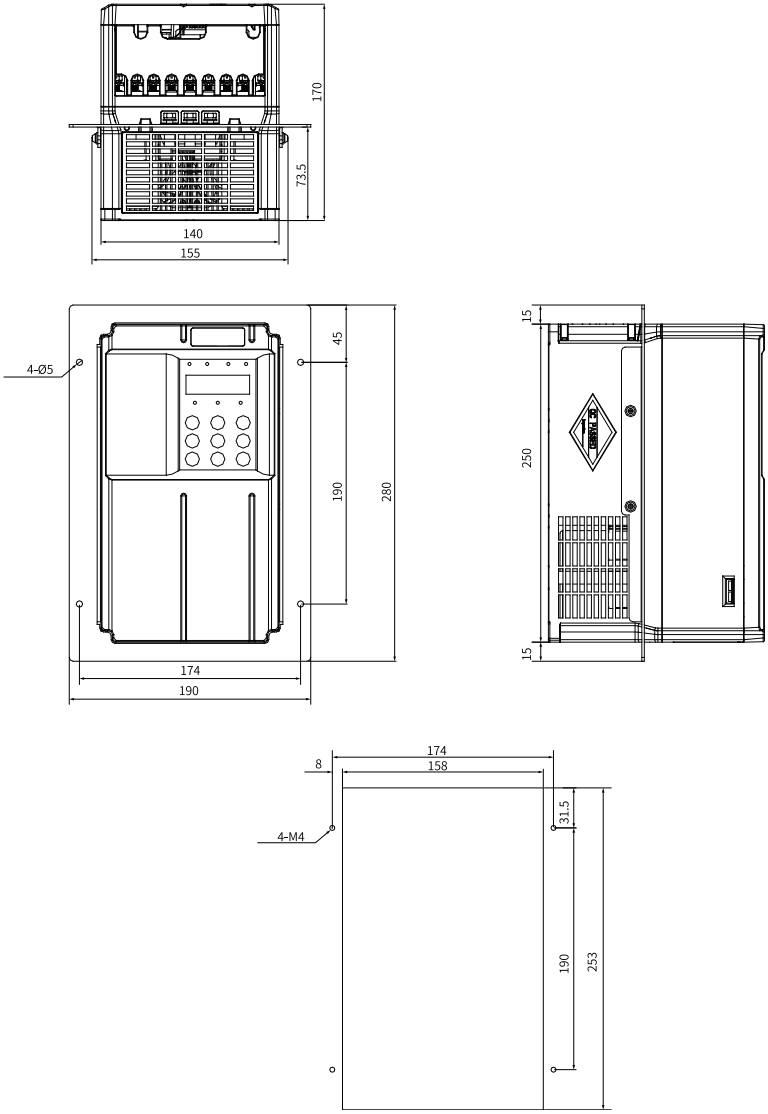


Figure 10-3 MD500-AZJ-A1T3 through-hole mounting bracket and mounting hole dimensions (unit: mm)

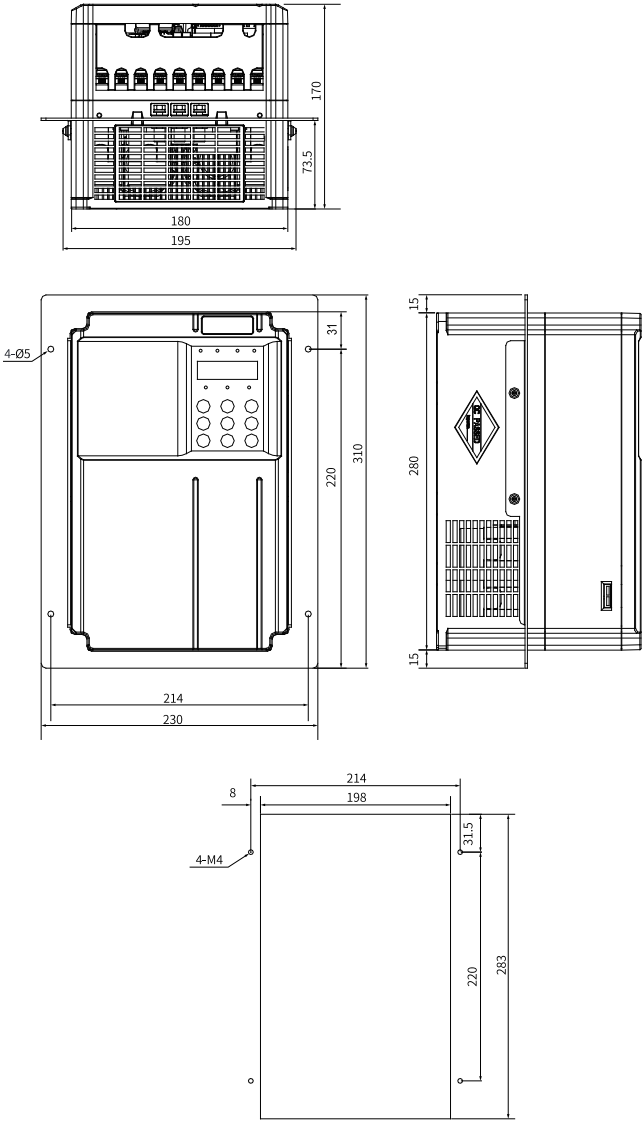


Figure 10-4 MD500-AZJ-A1T4 through-hole mounting bracket and mounting hole dimensions (unit: mm)

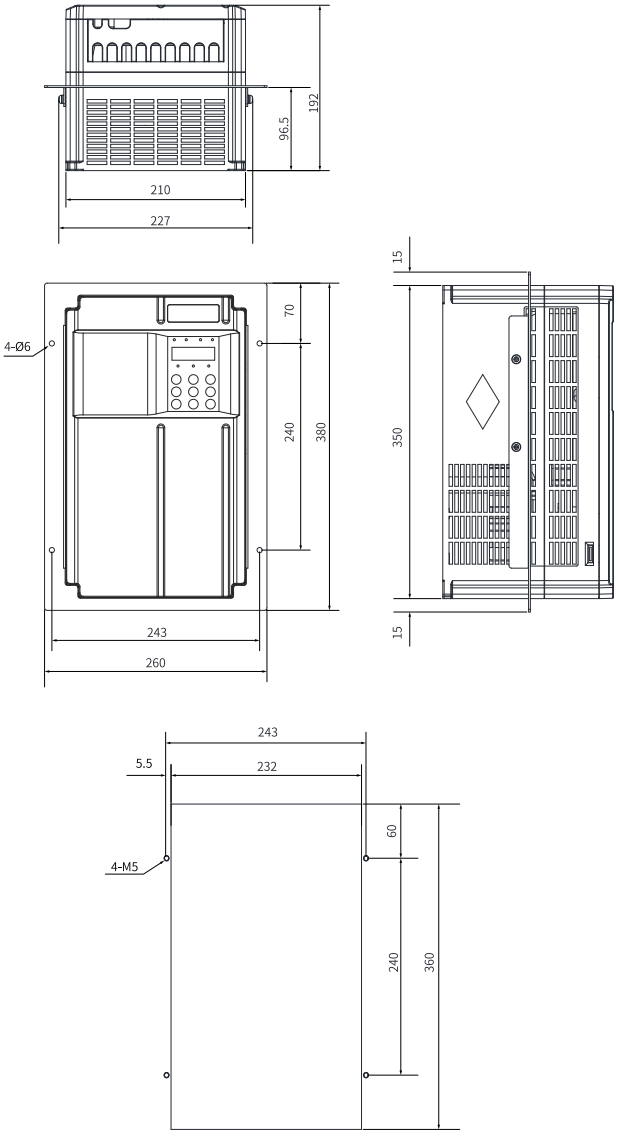


Figure 10-5 MD500-AZJ-A1T5 through-hole mounting bracket and mounting hole dimensions (unit: mm)

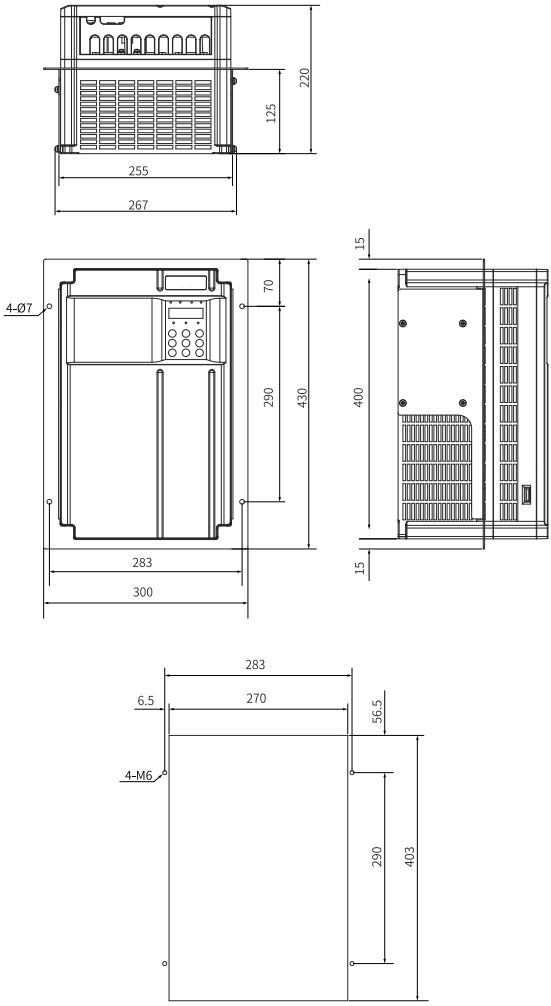


Figure 10-6 MD500-AZJ-A1T6 through-hole mounting bracket and mounting hole dimensions (unit: mm)

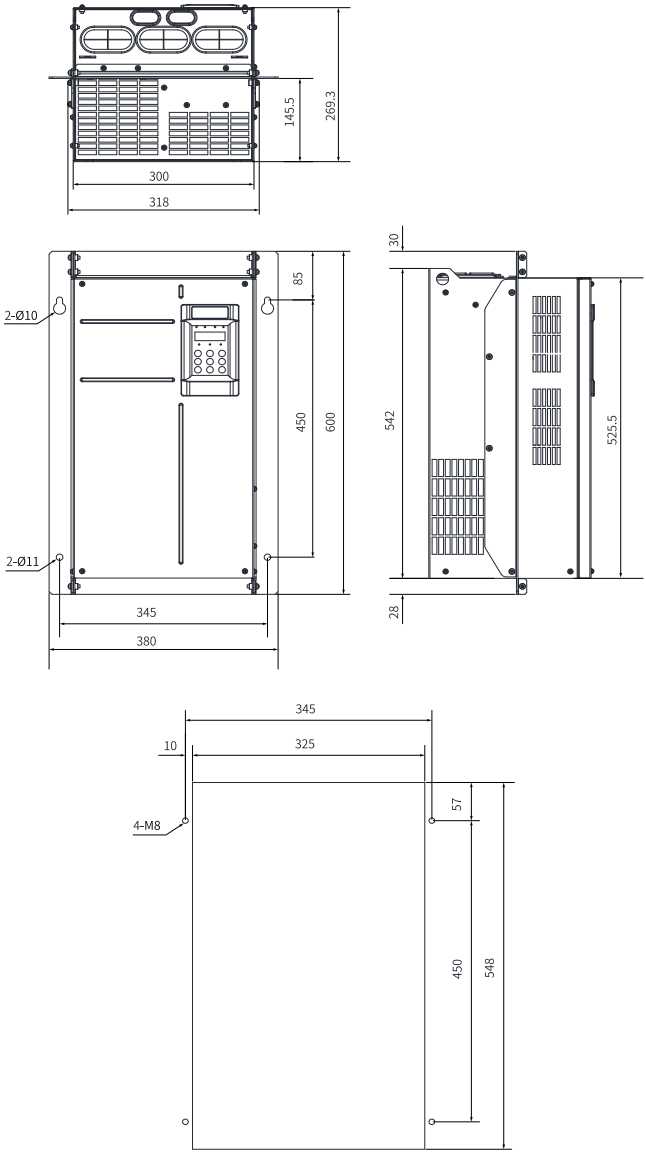


Figure 10-7 MD500-AZJ-A1T7 through-hole mounting bracket and mounting hole dimensions (unit: mm)

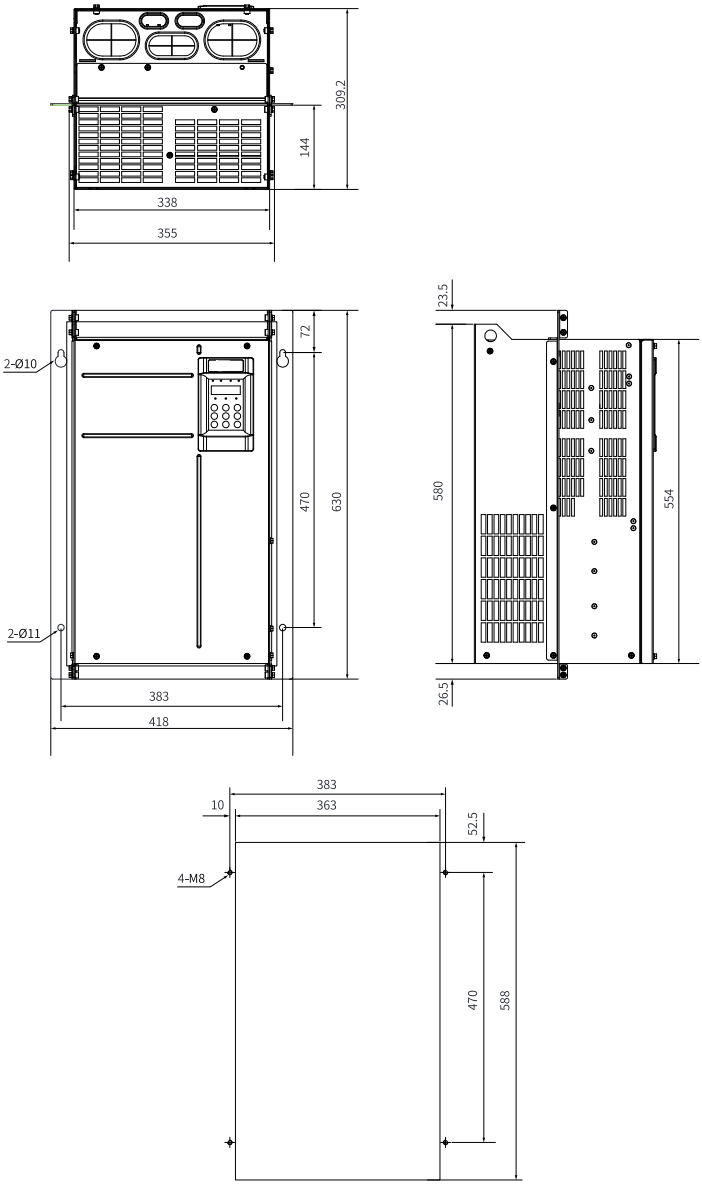


Figure 10-8 MD500-AZJ-A1T8 through-hole mounting bracket and mounting hole dimensions (unit: mm)

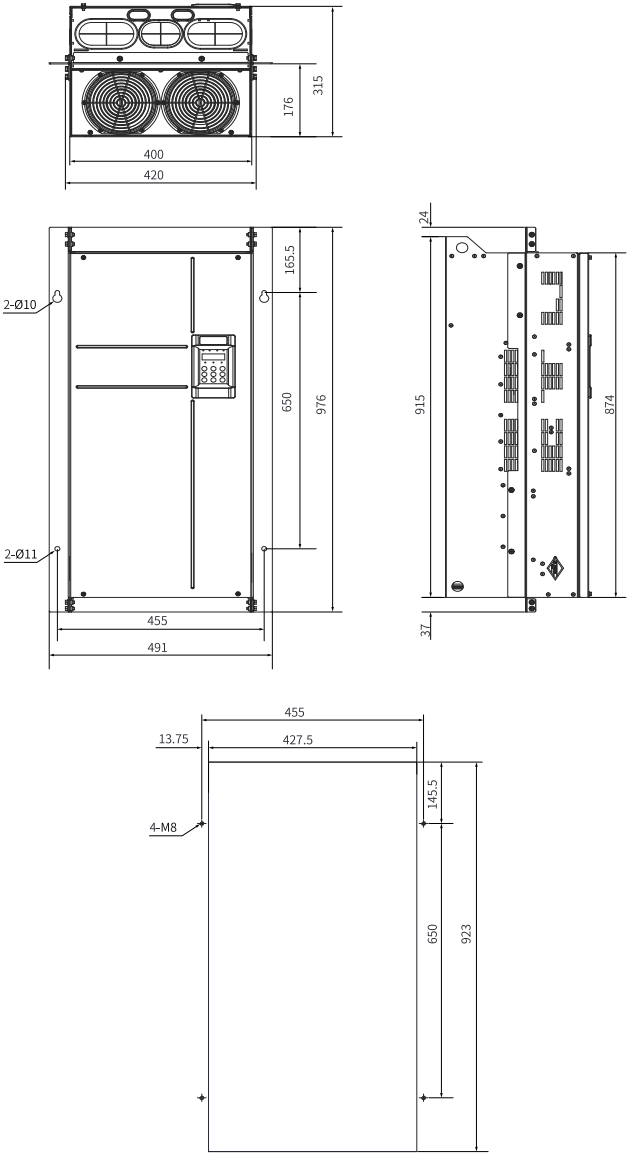


Figure 10-9 MD500-AZJ-A1T9 through-hole mounting bracket and mounting hole dimensions (unit: mm)

10.2.2Bottom Mounting Bracket

T10 to T12 models come with a bottom mounting bracket as standard. When the AC drive is installed in a cabinet, the bottom mounting bracket is required for fixing the AC drive to the cabinet rack base. The dimensions of bottom mounting brackets vary with the power rating, weight, and size of the AC drive, as shown in the following figures.

The bracket delivered with the AC drive is applicable to cabinets with the depth of 600 mm. If you need a bracket for a cabinet with the depth of 800 mm, contact Inovance.

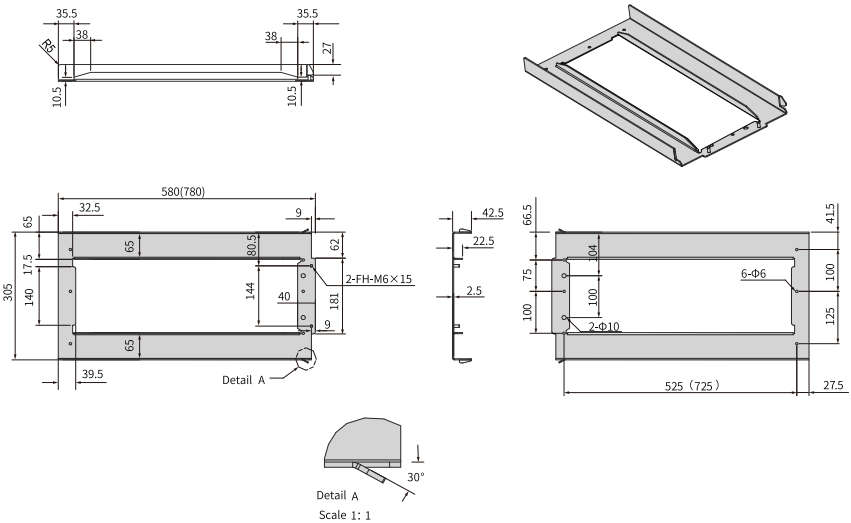


Figure 10-10 Dimensions (mm) of the bottom mounting bracket for T10 models

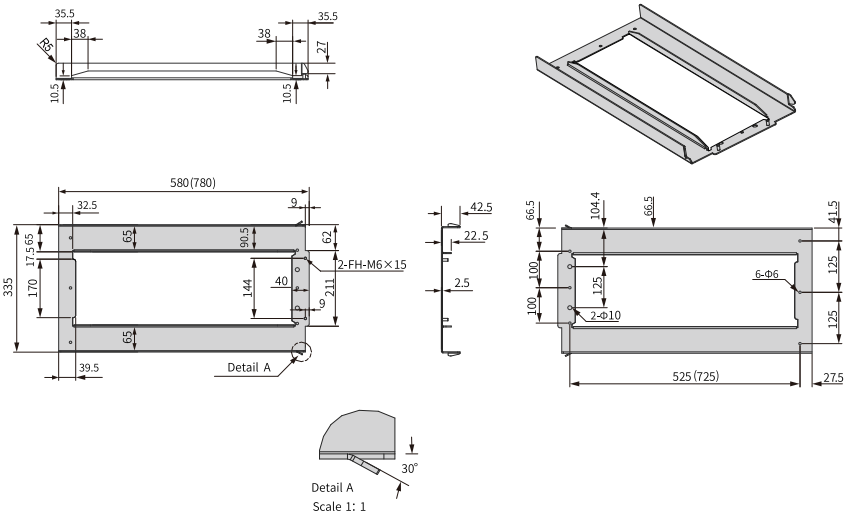


Figure 10-11 Dimensions (mm) of the bottom mounting bracket for T11 models

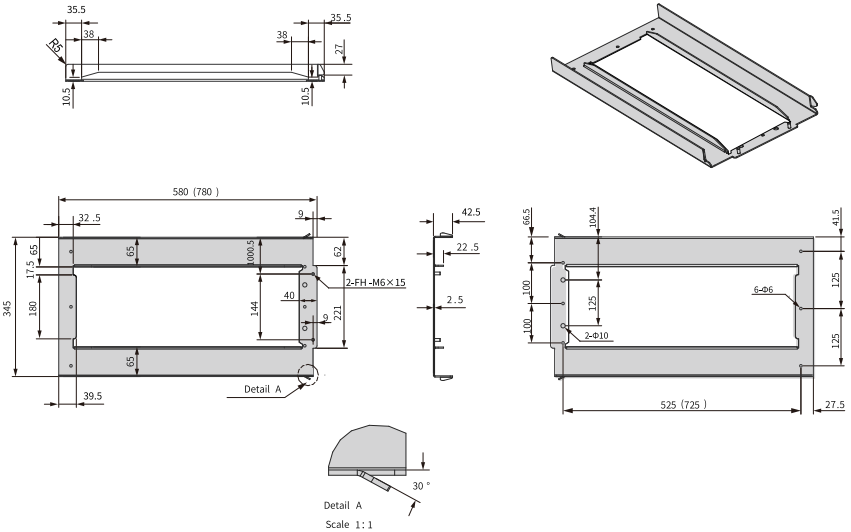


Figure 10-12 Dimensions (mm) of the bottom mounting bracket for T12 models

Note

- The bottom installation bracket applies to the PS standard cabinet, which is classified into two types: 800 mm (width) x 600 mm (depth) and 800 mm (width) x 800 mm (depth). The size described in the figure applies to the PS standard cabinet with 800 mm (width) x 800 mm (depth).
- The bottom installation bracket for T10 to T12 models applies only to the PS standard cabinet with 800 mm (width) x 600 mm (depth). To apply to the PS standard cabinet with 800 mm (width) x 800 mm (depth), contact Inovance.

10.2.3Mounting Guide Rail

For details of the guide rails, see *MD500-AZJ-A3T10 Guide Rail Operation Guide*.

10.2.4Conduit Box

T1 to T6 models are equipped with the conduit box to make the enclosure protection degree meet requirements of UL Type 1. The conduit box needs to be purchased. The following table lists conduit box models.

Applicable model

Table 10–3 Conduit box model

Conduit box model	Applicable drive structure
MD500-NEMA1-T1	T1
	T2
MD500-NEMA1-T3	T3
MD500-NEMA1-T4	T4
MD500-NEMA1-T5	T5
MD500-NEMA1-T6	T6

Dimension

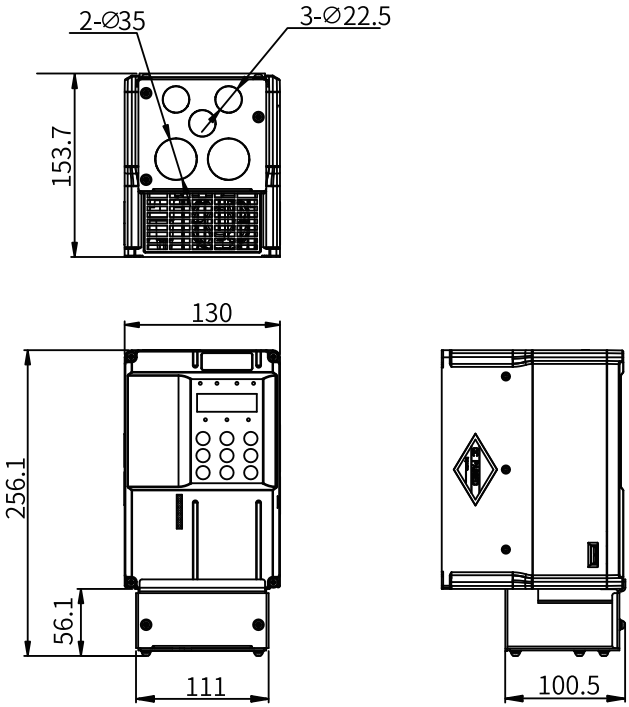


Figure 10-13 Overall dimensions (unit: mm) of T1 models (with conduit box)

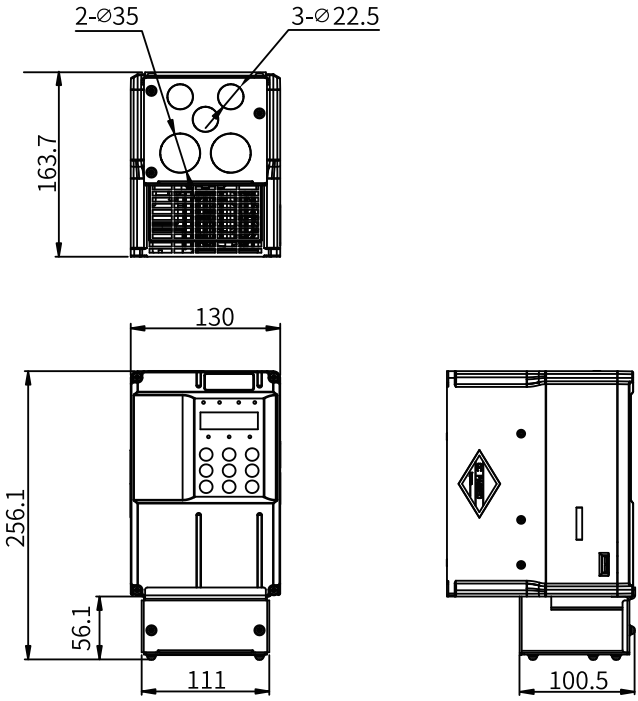


Figure 10-14 Overall dimensions (unit: mm) of T2 models (with conduit box)

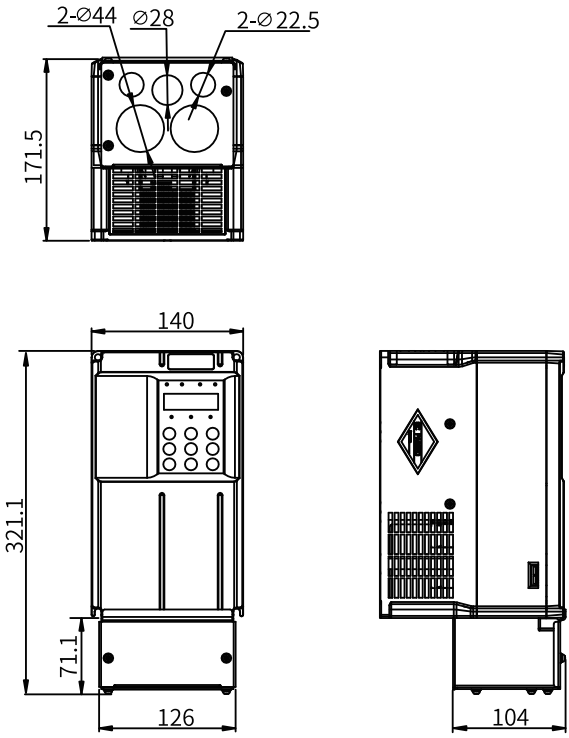


Figure 10-15 Overall dimensions (unit: mm) of T3 models (with conduit box)

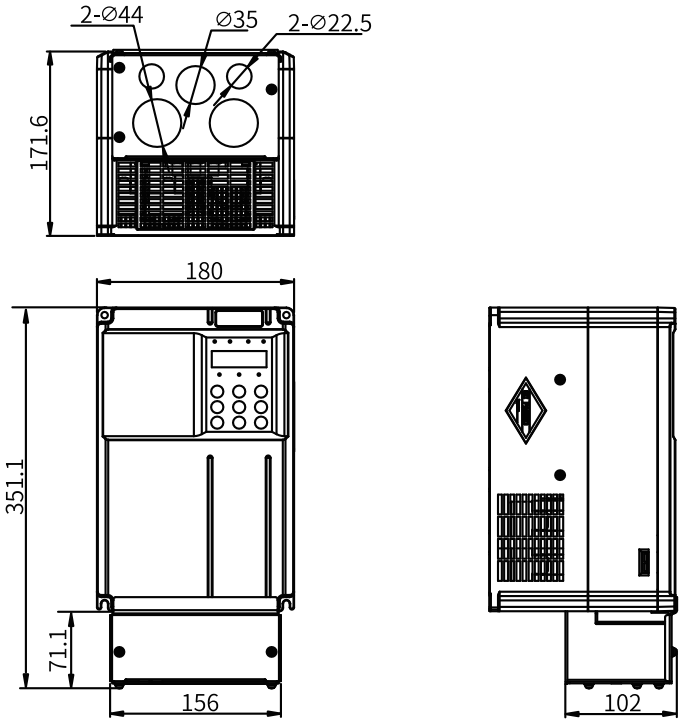


Figure 10-16 Overall dimensions (unit: mm) of T4 models (with conduit box)

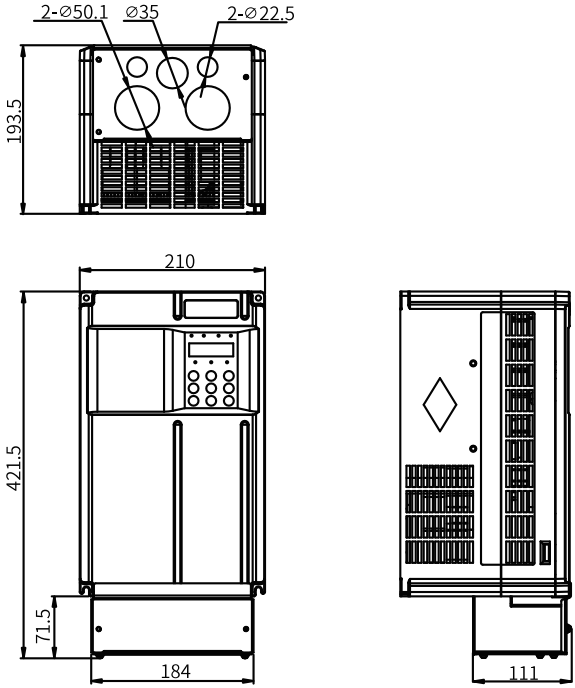


Figure 10-17 Overall dimensions (unit: mm) of T5 models (with conduit box)

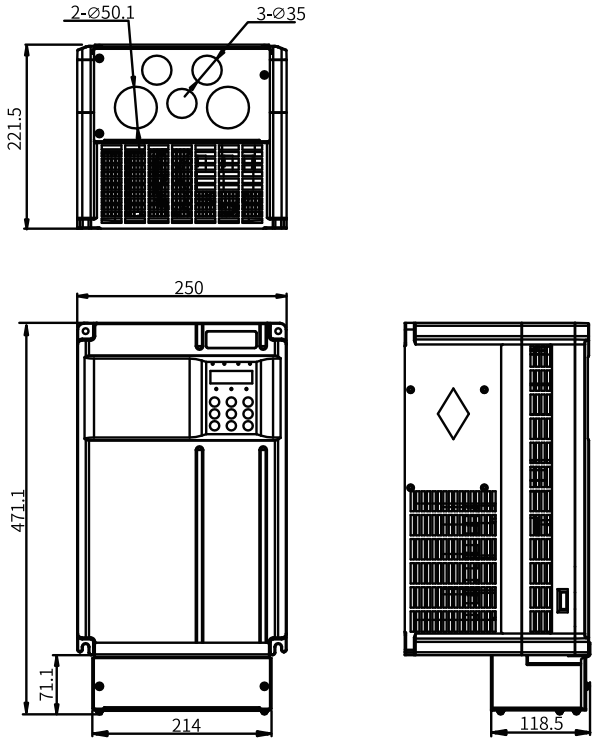


Figure 10-18 Overall dimensions (unit: mm) of T6 models (with conduit box)

10.3 Peripheral Electrical Component

10.3.1Fuse, Contactor, and Circuit Breaker

CAUTION

To avoid electric shock, do not power on the drive or operate peripherals immediately after a fuse is blown or a circuit breaker trips. Instead, wait for at least a period of time specified on the product warning label before further operations. Failure to comply can result in product damage, severe injury, or even death.

To comply with standards EN 61800-5-1 and UL 61800-5-1, install the fuse and circuit breaker on the input side to prevent accidents caused by short circuit in the internal circuit.

The following table lists the recommended fuses, contactors, and circuit breakers.

Table 10–4 Selection of fuses, contactors, and circuit breakers (single-phase 200 V to 240 V)

Structure	Model	Bussmann fuse		ABB A series contactor	ABB Tmax series inverse time circuit breaker
		Rated current (A)	Model	Rated current (A)	
T2	MD290-2S0.4GB	10	FWP-10B	9	10
	MD290-2S0.75GB	15	FWP-15B	12	13
	MD290-2S1.5GB	25	FWP-20B	16	16
	MD290-2S2.2GB	35	FWP-30B	26	32
	MD290-2S3.0GB	40	FWP-40B	30	40

Note

The recommended values in the preceding table are based on the following conditions.

1. The ambient temperature of the device is 40℃ without forced air-cooling device.

The altitude is 2000 m.

An individual drive is installed.

The current-carrying density of the conductor or copper busbar is 1.3 A/mm².

2. If conditions vary, select the cable model according to actual conditions.

3. Fuses with the UL certification are recommended.

Table 10–5 Selection of fuses, contactors, and circuit breakers (single-phase 200 V to 240 V, compliance with UL certification)

Structure	Model	Bussmann fuse		ABB A series contactor	ABB Tmax series inverse time circuit breaker
		Rated current (A)	Model	Rated current (A)	
T2	MD290-2S0.4GB	10	FWP-10B	9	10
	MD290-2S0.75GB	15	FWP-15B	12	13
	MD290-2S1.5GB	25	FWP-20B	16	16
	MD290-2S2.2GB	35	FWP-30B	26	32
	MD290-2S3.0GB	40	FWP-40B	30	40

Note

The recommended values in the preceding table are based on the following conditions.

1. The ambient temperature of the device is 40℃ without forced air-cooling device.

The altitude is 2000 m.

An individual drive is installed.

The current-carrying density of the conductor or copper busbar is 1.3 A/mm².

2. If conditions vary, select the cable model according to actual conditions.

Table 10–6 Selection of fuses, contactors, and circuit breakers (three-phase 380 V to 480 V)

Structure	Model	Bussmann fuse		Contactor	Circuit breaker
		Rated current (A)	Model	Rated current (A)	Rated current (A)
T1	MD290T0.4G/0.7PB	5	FWP-5B	9	4
	MD290T0.7G/1.1PB	10	FWP-10B	9	6.3
	MD290T1.1G/1.5PB	10	FWP-10B	9	10
	MD290T1.5G/2.2PB	10	FWP-10B	9	10
	MD290T2.2G/3.0PB	15	FWP-15B	12	16
	MD290T3.0G/3.7PB	20	FWP-20B	16	16
T2	MD290T3.7G/5.5PB	30	FWP-30B	26	25
	MD290T5.5G/7.5PB	35	FWH-35C	26	32
T3	MD290T7.5G/11PB	50	FWH-50C	38	40
	MD290T11G/15PB	60	FWH-60C	50	50
T4	MD290T15G/18.5PB	70	FWH-70C	50	63
T5	MD290T18.5G/22P(B)	90	FWH-90C	65	80
	MD290T18.5G/22P(B)-T	80	FWH-80C	65	80
	MD290T22G/30P(B)	100	FWH-100C	80	80
	MD290T22G/30P(B)-T	100	FWH-100C	80	100
T6	MD290T30G/37P(B)	125	FWH-125C	80	100
	MD290T37G/45P(B)	150	FWH-150C	95	125
T7	MD290T45G/55P(B)	175	FWH-175C	115	160
	MD290T55G/75P(B)	225	FWH-225C	150	200
T8	MD290T75G/90P(B)	250	FWH-250C	170	250
	MD290T90G/110P	300	FWH-300C	205	250
	MD290T110G/132P	400	FWH-400C	245	400
T9	MD290T132G/160P	450	FWH-450C	300	400
	MD290T160G/200P	600	FWH-600C	410	500

Structure	Model	Bussmann fuse		Contactor	Circuit breaker
		Rated current (A)	Model	Rated current (A)	Rated current (A)
T10	MD290T200G(-L)	700	FWH-700C	410	630
	MD290T220P(-L)	700	FWH-700C	410	630
	MD290T220G(-L)	800	FWH-800C	475	630
	MD290T250P(-L)	800	FWH-800C	475	630
	MD290T280P(-L)	800	FWH-800C	620	630
T11	MD290T250G(-L)	800	FWH-800C	475	630
	MD290T355P(-L)	1000	170M5016	800	800
	MD290T280G(-L)	1000	170M5016	620	800
	MD290T315P(-L)	1000	170M5016	620	800
T12	MD290T315G(-L)	1000	170M5016	620	800
	MD290T355G(-L)	1100	170M6015	800	1000
	MD290T400P(-L)	1100	170M6015	800	1000
	MD290T400G(-L)	1250	170M6016	800	1000
	MD290T450P(-L)	1250	170M6016	800	1000
	MD290T450G(-L)	1400	170M6017	800	1000
	MD290T500P(-L)	1400	170M6017	1000	1250
T13	MD290T500G(-A)	1500	170M6018	-	Note: The circuit breaker is configured in the T13 cabinet.
	MD290T560G(-A)	1600	170M6019		
	MD290T630G(-A)	1800	170M6020		
	MD290T560P(-A)	1500	170M6018		
	MD290T630P(-A)	1600	170M6019		
	MD290T710P(-A)	1800	170M6020		
	MD290T800P(-A)	2000	170M6021		

Note

The recommended values in the preceding table are based on the following conditions.

1. The ambient temperature of the device is 40℃ without forced air-cooling device.

The altitude is 2000 m.

An individual drive is installed.

The current-carrying density of the conductor or copper busbar is 1.3 A/mm².

2. If conditions vary, select the cable model according to actual conditions.

3. UL-certified fuses are recommended.

Table 10–7 Selection of fuses, contactors, and circuit breakers (three-phase 380 V to 480 V, compliant with UL certification)

Structure	Model	Bussmann fuse		Contactor	Circuit breaker
		Rated current (A)	Model	Rated current (A)	Rated current (A)
T1	MD290T0.4G/0.7PB	5	FWP-5B	9	4
	MD290T0.7G/1.1PB	10	FWP-10B	9	6.3
	MD290T1.1G/1.5PB	10	FWP-10B	9	10
	MD290T1.5G/2.2PB	10	FWP-10B	9	10
	MD290T2.2G/3.0PB	15	FWP-15B	12	16
	MD290T3.0G/3.7PB	20	FWP-20B	16	16
T2	MD290T3.7G/5.5PB	30	FWP-30B	26	25
	MD290T5.5G/7.5PB	35	FWH-35C	26	32
T3	MD290T7.5G/11PB	50	FWH-50C	38	40
	MD290T11G/15PB	60	FWH-60C	50	50
T4	MD290T15G/18.5PB	70	FWH-70C	50	63
T5	MD290T18.5G/22P(B)	90	FWH-90C	65	80
	MD290T18.5G/22P(B)-T	80	FWH-80C	65	80
	MD290T22G/30P(B)	100	FWH-100C	80	80
	MD290T22G/30P(B)-T	100	FWH-100C	80	100
T6	MD290T30G/37P(B)	125	FWH-125C	80	100
	MD290T37G/45P(B)	150	FWH-150C	95	125
T7	MD290T45G/55P(B)	175	FWH-175C	115	160
	MD290T55G/75P(B)	225	FWH-225C	150	200
T8	MD290T75G/90P(B)	250	FWH-250C	170	250
	MD290T90G/110P	300	FWH-300C	205	250
	MD290T110G/132P	400	FWH-400C	245	400
T9	MD290T132G/160P	450	FWH-450C	300	400
	MD290T160G/200P*	600	FWH-600C	410	500
T10	MD290T200G(-L)	700	FWH-700C	410	630
	MD290T220P(-L)	700	FWH-700C	410	630
	MD290T220G(-L)	800	FWH-800C	475	630
	MD290T250P(-L)	800	FWH-800C	475	630
	MD290T280P(-L)	800	FWH-800C	-	630
T11	MD290T250G(-L)	800	FWH-800C	475	630
	MD290T355P(-L)	1000	170M5016	-	800
	MD290T280G(-L)	1000	170M5016	620	800
	MD290T315P(-L)	1000	170M5016	620	800

Structure	Model	Bussmann fuse		Contactor	Circuit breaker
		Rated current (A)	Model	Rated current (A)	Rated current (A)
T12	MD290T315G(-L)	1100	170M6015	800	1000
	MD290T355G(-L)	1100	170M6015	800	1000
	MD290T400P(-L)	1250	170M6016	800	1000
	MD290T400G(-L)	1250	170M6016	800	1000
	MD290T450P(-L)	1400	170M6017	1000	1250
	MD290T450G(-L)	1400	170M6017	1000	1250
	MD290T500P(-L)	1250	170M6016	800	1000

Note

The recommended values in the preceding table are based on the following conditions.

1. The ambient temperature of the device is 40℃ without forced air-cooling device.

The altitude is 2000 m.

An individual drive is installed.

The current-carrying density of the conductor or copper busbar is 1.3 A/mm².

2. If conditions vary, select the cable model according to actual conditions.

Table 10–8 Selection of fuses, contactors, and circuit breakers (three-phase 200 V to 240 V)

Structure	Model	Bussmann fuse		ABB A series contactor	ABB Tmax series inverse time circuit breaker
		Rated current (A)	Model	Rated current (A)	
T1	MD290-2T0.4G/0.7PB	10	FWP-10B	9	6.3
	MD290-2T0.7G/1.1PB	10	FWP-10B	9	10
	MD290-2T1.1G/1.5PB	15	FWP-15B	12	16
	MD290-2T1.5G/2.2PB	20	FWP-20B	16	16
T2	MD290-2T2.2G/3.7PB	30	FWP-30B	26	20
	MD290-2T3.7G/5.5PB	35	FWH-35C	26	32
T3	MD290-2T5.5G/7.5PB	60	FWH-60C	50	50
T4	MD290-2T7.5G/11PB	70	FWH-70C	50	63
T5	MD290-2T11G/15P(B)	100	FWH-100C	80	80
	MD290-2T11G/15P(B)-T	100	FWH-100C	80	100
T6	MD290-2T15G/18.5P(B)	125	FWH-125C	80	100
	MD290-2T18.5G/22P(B)	150	FWH-150C	95	125
T7	MD290-2T22G/30P(B)	175	FWH-175C	115	160
	MD290-2T30G/37P(B)	225	FWH-225C	150	200
T8	MD290-2T37G/45P(B)	250	FWH-250C	170	250
	MD290-2T45G/55P	300	FWH-300C	205	250
	MD290-2T55G/75P	400	FWH-400C	245	320

Note

The recommended values in the preceding table are based on the following conditions.

1. The ambient temperature of the device is 40℃ without forced air-cooling device.

The altitude is 2000 m.

An individual drive is installed.

The current-carrying density of the conductor or copper busbar is 1.3 A/mm².

2. If conditions vary, select the cable model according to actual conditions.

3. Fuses with the UL certification are recommended.

Table 10–9 Selection of fuses, contactors, and circuit breakers (three-phase 200 V to 240 V, compliant with UL certification)

Structure	Model	Bussmann fuse		ABB A series contactor	ABB Tmax series inverse time circuit breaker
		Rated current (A)	Model	Rated current (A)	
T1	MD290-2T0.4G/0.7PB	10	FWP-10B	9	6.3
	MD290-2T0.7G/1.1PB	10	FWP-10B	9	10
	MD290-2T1.1G/1.5PB	15	FWP-15B	12	16
	MD290-2T1.5G/2.2PB	20	FWP-20B	16	16
T2	MD290-2T2.2G/3.7PB	30	FWP-30B	26	20
	MD290-2T3.7G/5.5PB	35	FWH-35C	26	32
T3	MD290-2T5.5G/7.5PB	60	FWH-60C	50	50
T4	MD290-2T7.5G/11PB	70	FWH-70C	50	63
T5	MD290-2T11G/15P(B)	100	FWH-100C	80	80
	MD290-2T11G/15P(B)-T	100	FWH-100C	80	100
T6	MD290-2T15G/18.5P(B)	125	FWH-125C	80	100
	MD290-2T18.5G/22P(B)	150	FWH-150C	95	125
T7	MD290-2T22G/30P(B)	175	FWH-175C	115	160
	MD290-2T30G/37P(B)	225	FWH-225C	150	200
T8	MD290-2T37G/45P(B)	250	FWH-250C	170	250
	MD290-2T45G/55P	300	FWH-300C	205	250
	MD290-2T55G/75P	400	FWH-400C	245	320

Note

The recommended values in the preceding table are based on the following conditions.

1. The ambient temperature of the device is 40℃ without forced air-cooling device.

The altitude is 2000 m.

An individual drive is installed.

The current-carrying density of the conductor or copper busbar is 1.3 A/mm².

2. If conditions vary, select the cable model according to actual conditions.

3. Fuses with the UL certification are recommended.

10.3.2AC Input Reactor

The optional AC input reactor is mainly used to reduce harmonics in the input current. In applications where harmonics need to be suppressed, install an external reactor.

If an AC input reactor is required for models with the power over 200 kW, reserve sufficient installation space in the cabinet for the reactor.

Models

Recommended AC input reactor manufacturers and models are listed in the following tables.

Table 10–10 Selection of Inovance input reactors (three-phase 380 V to 480 V)

Structure	Drive model	Rated power (kW)	Rated input current (A)	Applicable reactor	Inductance (mH)	Power consumption (W)
T1	MD290T0.4G/0.7PB	0.4 0.75	1.8 2.5	MD-ACL-10-5-4T	5	50
	MD290T0.7G/1.1PB	0.75 1.1	2.4 3.7	MD-ACL-10-5-4T	5	50
	MD290T1.1G/1.5PB	1.1 1.5	3.7 4.6	MD-ACL-10-5-4T	5	50
	MD290T1.5G/2.2PB	1.5 2.2	4.6 6.4	MD-ACL-10-5-4T	5	50
	MD290T2.2G/3.0PB	2.2 3.0	6.3 9.1	MD-ACL-10-5-4T	5	50
	MD290T3.0G/3.7PB	3.0 3.7	9.0 11.3	MD-ACL-10-5-4T	5	50
T2	MD290T3.7G/5.5PB	3.7 5.5	11.4 15.9	MD-ACL-15-3-4T	3	50
	MD290T5.5G/7.5PB	5.5 7.5	16.7 22.4	MD-ACL-15-3-4T	3	50

Structure	Drive model	Rated power (kW)	Rated input current (A)	Applicable reactor	Inductance (mH)	Power consumption (W)
T3	MD290T7.5G/11PB	7.5 11	21.9 32.9	MD-ACL-40-1.45-4T	1.45	100
	MD290T11G/15PB	11 15	32.2 39.7	MD-ACL-40-1.45-4T	1.45	100
T4	MD290T15G/18.5PB	15 18.5	41.3 44.0	MD-ACL-50-1.2-4T	1.2	150
T5	MD290T18.5G/22P(B)	18.5 22	49.5 59.0	MD-ACL-60-0.24-4T-2%	0.24	-
	MD290T18.5G/22P(B)-T	18.5 22	43.4 51.3	MD-ACL-60-0.24-4T-2%	0.24	-
	MD290T22G/30P(B)	22 30	59.0 65.8	MD-ACL-80-0.17-4T-2%	0.17	-
	MD290T22G/30P(B)-T	22 30	51.3 65.8	MD-ACL-80-0.17-4T-2%	0.17	-
T6	MD290T30G/37P(B)	30 37	57.0 71.0	MD-ACL-80-0.17-4T-2%	0.17	-
	MD290T37G/45P(B)	37 45	69.0 86.0	MD-ACL-90-0.16-4T-2%	0.16	-
T7	MD290T45G/55P(B)	45 55	89.0 111.0	MD-ACL-120-0.12-4T-2%	0.12	-
	MD290T55G/75P(B)	55 75	106.0 143.0	MD-ACL-150-0.095-4T-2%	0.095	-
T8	MD290T75G/90P(B)	75 90	139.0 167.0	MD-ACL-200-0.07-4T-2%	0.07	-
	MD290T90G/110P	90 110	164.0 198.0	MD-ACL-250-0.056-4T-2%	0.056	-
	MD290T110G/132P	110 132	196.0 239.0	MD-ACL-250-0.056-4T-2%	0.056	-
T9	MD290T132G/160P	132 160	240.0 295.0	MD-ACL-330-0.042-4T-2%	0.042	-
	MD290T160G/200P	160 200	287.0 359.0	MD-ACL-330-0.042-4T-2%	0.042	-
T10	MD290T200G(-L)	200	365.0	MD-ACL-490-0.028-4T-2%	0.028	-
	MD290T220P(-L)	220	410.0	MD-ACL-490-0.028-4T-2%	0.028	-
	MD290T220G(-L)	220	410.0	MD-ACL-490-0.028-4T-2%	0.028	-
	MD290T250P(-L)	250	456.0	MD-ACL-490-0.028-4T-2%	0.028	-

Structure	Drive model	Rated power (kW)	Rated input current (A)	Applicable reactor	Inductance (mH)	Power consumption (W)
T11	MD290T250G(-L)	250	441.0	MD-ACL-490-0.028-4T-2%	0.028	-
	MD290T280P(-L)	280	507.0	MD-ACL-660-0.021-4T-2%	0.021	-
	MD290T280G(-L)	280	495.0	MD-ACL-660-0.021-4T-2%	0.021	-
	MD290T315P(-L)	315	559.0	MD-ACL-660-0.021-4T-2%	0.021	-
T12	MD290T315G(-L)	315	565.0	MD-ACL-660-0.021-4T-2%	0.021	-
	MD290T355P(-L)	355	624.0	MD-ACL-660-0.021-4T-2%	0.021	-
	MD290T355G(-L)	355	617.0	MD-ACL-800-0.017-4T-2%	0.017	-
	MD290T400P(-L)	400	708.0	MD-ACL-800-0.017-4T-2%	0.017	-
	MD290T400G(-L)	400	687.0	MD-ACL-800-0.017-4T-2%	0.017	-
	MD290T450P(-L)	450	782.0	MD-ACL-800-0.017-4T-2%	0.017	-
	MD290T450G(-L)	450	782.0	MD-ACL-1000-0.014-4T-2%	0.014	-
	MD290T500P(-L)	500	840.0	MD-ACL-1000-0.014-4T-2%	0.014	-
T13	MD290T500G(-A)	500	838.1	GH-MVT504ZG-L2	0.022	-
	MD290T560G(-A)	560	949.6	GH-MVT634ZG-L3	0.018	-
	MD290T630G(-A)	630	1043.5	GH-MVT634ZG-L3	0.018	-
	MD290T560P(-A)	560	946.3	GH-MVT504ZG-L2	0.022	-
	MD290T630P(-A)	630	1041.0	GH-MVT504ZG-L2	0.022	-
	MD290T710P(-A)	710	1170.9	GH-MVT634ZG-L3	0.018	-
	MD290T800P(-A)	800	1301.5	GH-MVT634ZG-L3	0.018	-

Table 10–11 Selection of Inovance input reactors (three-phase 200 V to 240 V)

Structure	Drive model	Rated power (kW)	Rated input current (A)	Applicable reactor	Inductance (mH)	Power consumption (W)
T1	MD290-2T0.4G/0.7PB	0.4 0.7	2.4 3.7	MD-ACL-10-5-4T	5	50
	MD290-2T0.7G/1.1PB	0.7 1.1	4.6 6.4	MD-ACL-10-5-4T	5	50
	MD290-2T1.1G/1.5PB	1.1 1.5	6.3 9.1	MD-ACL-10-5-4T	5	50
	MD290-2T1.5G/2.2PB	1.5 2.2	9.0 11.3	MD-ACL-10-5-4T	5	50
T2	MD290-2T2.2G/3.7PB	2.2 3.7	11.4 15.9	MD-ACL-15-3-4T	3	50
	MD290-2T3.7G/5.5PB	3.7 5.5	16.7 22.4	MD-ACL-15-3-4T	3	50
T3	MD290-2T5.5G/7.5PB	5.5 7.5	32.2 39.7	MD-ACL-40-1.45-4T	1.45	100
T4	MD290-2T7.5G/11PB	7.5 11	41.3 44.0	MD-ACL-50-1.2-4T	1.2	150
T5	MD290-2T11G/15P(B)	11 15	59.0 65.8	MD-ACL-80-0.17-4T-2%	0.17	-
T6	MD290-2T15G/18.5P(B)	15 18.5	57.0 71.0	MD-ACL-80-0.17-4T-2%	0.17	-
	MD290-2T18.5G/22P(B)	18.5 22	69.0 86.0	MD-ACL-90-0.16-4T-2%	0.16	-
T7	MD290-2T22G/30P(B)	22 30	89.0 111.0	MD-ACL-120-0.12-4T-2%	0.12	-
	MD290-2T30G/37P(B)	30 37	106.0 143.0	MD-ACL-150-0.095-4T-2%	0.095	-
T8	MD290-2T37G/45P(B)	37 45	139.0 167	MD-ACL-200-0.07-4T-2%	0.07	-
	MD290-2T45G/55P	45 55	164.0 198	MD-ACL-250-0.056-4T-2%	0.056	-
	MD290-2T55G/75P	55 75	196.0 239	MD-ACL-250-0.056-4T-2%	0.056	-

Description of the input reactor model:

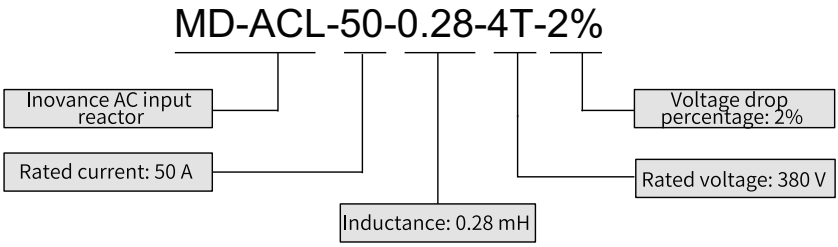


Figure 10-19 Input reactor model

Dimensions

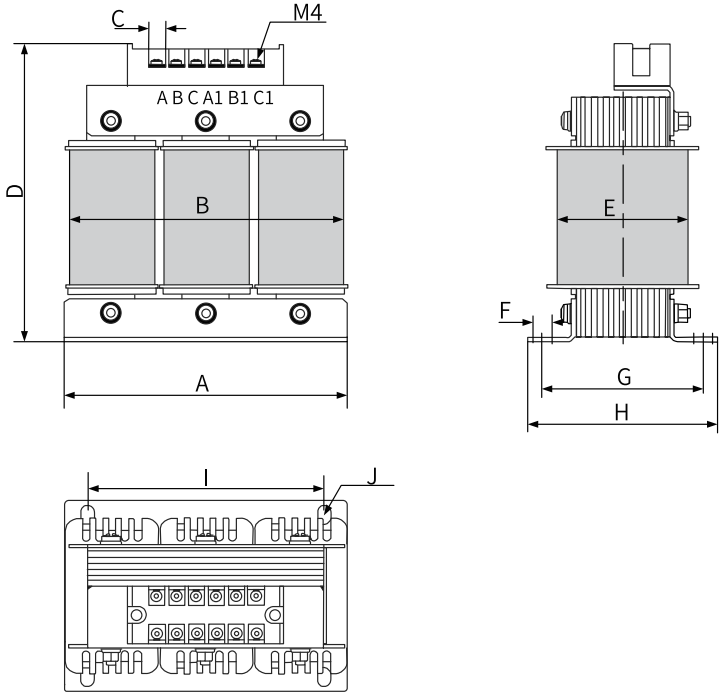


Figure 10-20 Dimensions of input reactors (10 A to 15 A)

Table 10–12 Dimensions of input reactors (10 A to 15 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J
10	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7x10
15	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7x10

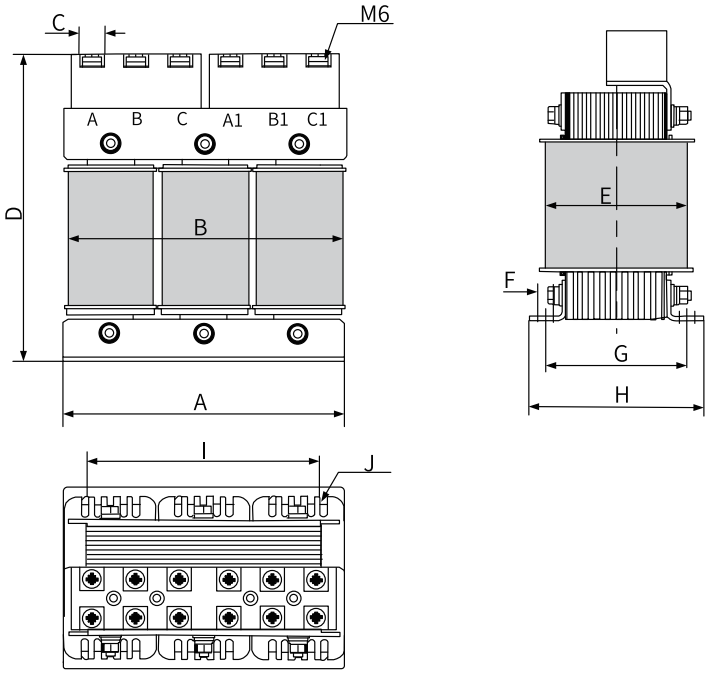


Figure 10-21 Dimensions of input reactors (40 A to 50 A, 1.2 mH)

Table 10–13 Dimensions of input reactors (40 A to 50 A, 1.2 mH, unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J
40	180±2	185	16	200	105	10	95±2	117±2	150±1	Φ7x10
50	200±2	210	16	230	110	10	115±2	130±2	170±1	Φ7x10

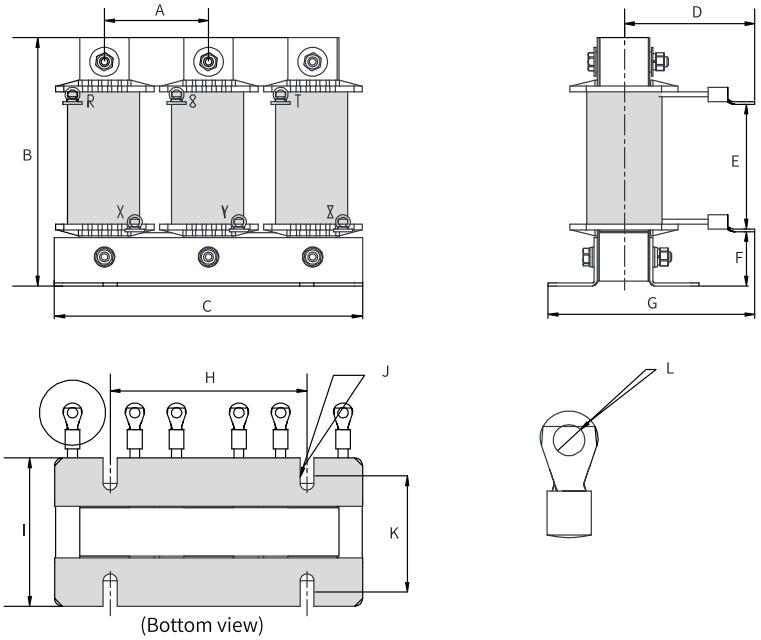


Figure 10-22 Dimensions of input reactors (50 A (0.28 mH)/60 A)

Table 10–14 Dimensions of input reactors (50 A (0.28 mH)/60 A) (unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L
50	64	160	195	80±10	75±5	35±5	135	120±1	92±2	Φ8.5x20	72±2	Φ6.4
60	64	160	195	80±10	75±5	35±5	135	120±1	92±2	Φ8.5x20	72±2	Φ6.4

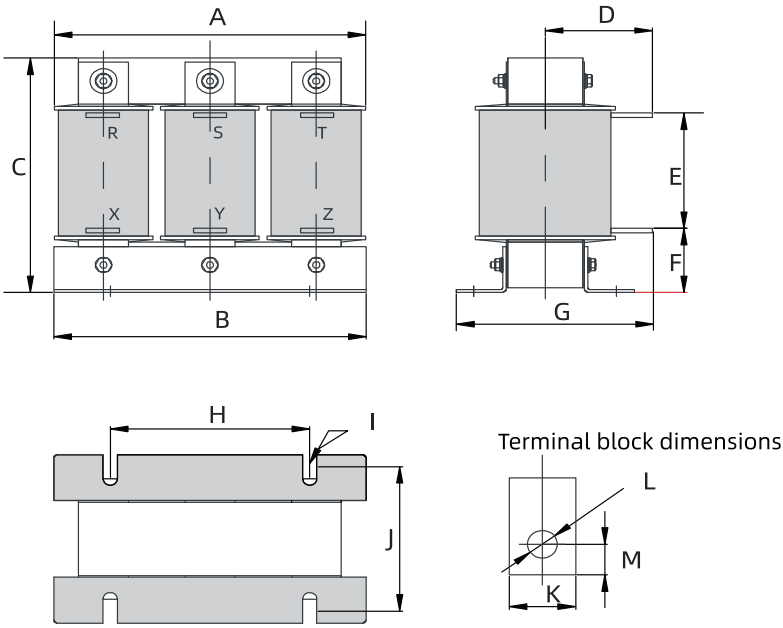


Figure 10-23 Dimensions of input reactors (80 A to 120 A)

Table 10–15 Dimensions of input reactors (80 A to 120 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
80	195	188±1	160	-	-	-	150	120±1	Φ8.5x20	72±2	-	-	-
90	195	188±1	160	-	-	-	150	120±1	Φ8.5x20	72±2	-	-	-
120	195	188±1	160	78±10	79±5	40±5	135	120±1	Φ8.5x20	92±2	20	Φ9	10

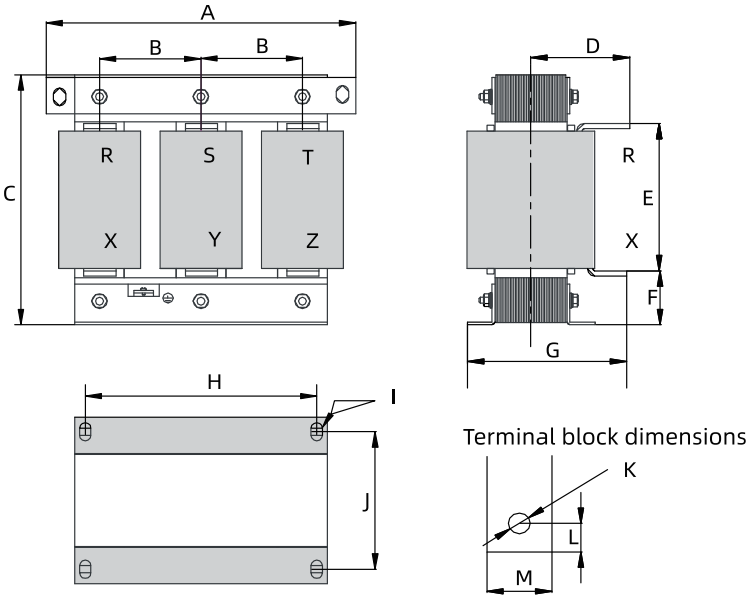


Figure 10-24 Dimensions of input reactors (150 A to 330 A)

Table 10–16 Dimensions of input reactor (150 A to 330 A, (unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
150	250	81±5	230	92±10	145±5	38±5	155	182±1	Φ11x18	76±2	Φ11	13	25
200	250	81±5	230	102±10	145±5	40±5	175	182±1	Φ11x18	96±2	Φ11	13	25
250	250	81±5	260	102±10	160±5	50±5	175	182±1	Φ11x18	96±2	Φ11	13	25
330	290	95±5	275	107±10	160±5	60±5	180	214±1	Φ11x18	100±2	ϕ12	15	30

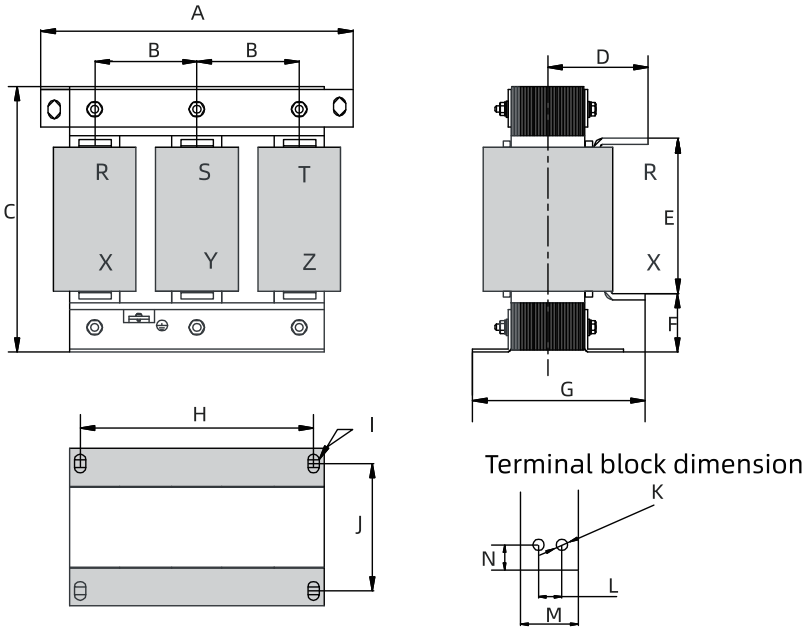


Figure 10-25 Dimensions of input reactors (490 A to 660 A)

Table 10–17 Dimensions of input reactors (490 A to 660 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M	N
490	320	106±5	305	137±10	198±5	60±5	220	243±1	Φ12x20	122±2	Φ12	22	50	23
660	320	106±5	305	145±10	203±5	50±5	240	243±1	Φ12x20	137±2	Φ12	22	50	23

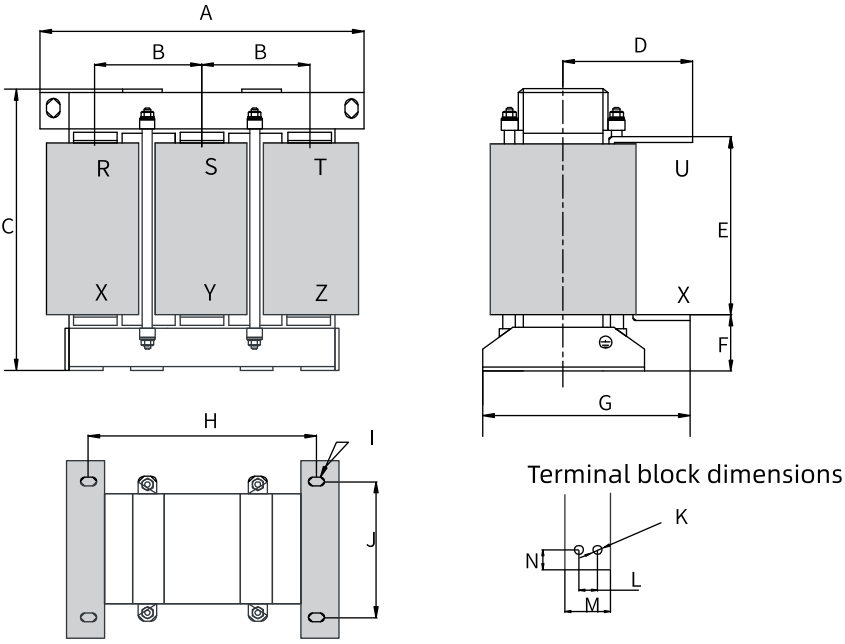


Figure 10-26 Dimensions of input reactors (800 A to 1000 A)

Table 10–18 Dimensions of input reactors (800 A to 1000 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M	N
800	385	123±5	390	142±10	238±5	70±5	250	260±2	Φ12x20	175±1	Φ12	22	50	23
1000	385	123±5	390	142±10	238±5	70±5	250	260±2	Φ12x20	175±1	Φ12	22	50	23

Note

The dimensions of AC input reactors provided here are for reference only. Actual dimensions may vary with models.

10.3.3EMC filter

Overview

To comply with the radiated and conducted emission requirements of EN IEC 61800-3, install the EMC filter listed in the following table. The following EMC filters can be used.

- For 15G/18.5PB AC drives and blow, built-in filters can meet requirements of EN IEC 61800-3 C3. Therefore, external filters are not required.
- For 18.5G/22P(B) to 110G/132P AC drives, install external filters to meet requirements of EN IEC 61800-3 C3.
- For 132G/160P AC drives and above, built-in filters can meet requirements of EN IEC 61800-3 C3. Therefore, external filters are not required.

Table 10–19 Standard EMC filter model and appearance

Filter model		Appearance
Schaffner series	FN 2090 series	
	FN 3258 series	
	FN 3359 series	
Jianli series	EBK series	

Models and dimensions (Schaffner filters)

Table 10–20 Selection of Schaffner filters (single-phase 200 V to 240 V)

Drive model	Rated power (kW)	Rated current (A)	Filter model	Power consumption (W)
MD290-2S0.4GB	0.4	5.4	FN 2090-8-06	-
MD290-2S0.75GB	0.7	8.2	FN 2090-12-06	-
MD290-2S1.5GB	1.5	14	FN 2090-20-08	-
MD290-2S2.2GB	2.2	23	FN 2090-30-08	-

Table 10–21 Selection of Schaffner filters (three-phase 380 V to 480 V)

Drive model	Rated power (kW)	Rated current (A)	Filter model	Power consumption (W)
MD290T0.4G/0.7PB	0.4	1.8	FN 3258-7-44	3.8
MD290T0.7G/1.1PB	0.7	2.4	FN 3258-7-44	3.8
MD290T1.1G/1.5PB	1.1	3.7	FN 3258-7-44	3.8
MD290T1.5G/2.2PB	1.5	4.6	FN 3258-7-44	3.8
MD290T2.2G/3.0PB	2.2	6.3	FN 3258-7-44	3.8
MD290T3.0G/3.7PB	3.0	9.0	FN 3258-16-44	6.1
MD290T3.7G/5.5PB	3.7	11.4	FN 3258-16-44	6.1
MD290T5.5G/7.5PB	5.5	16.7	FN 3258-30-44	11.8
MD290T7.5G/11PB	7.5	21.9	FN 3258-30-44	11.8
MD290T11G/15PB	11	32.2	FN 3258-42-44	15.7
MD290T15G/18.5PB	15	41.3	FN 3258-42-44	15.7
MD290T18.5G/22P(B)(-T)	18.5	49.5	FN 3258-55-44	25.9
MD290T22G/30P(B)(-T)	22	59.0	FN 3258-75-44	31.2
MD290T30G/37P(B)	30	57.0	FN 3258-75-44	32.2
MD290T37G/45P(B)	37	69.0	FN 3258-75-44	32.2
MD290T45G/55P(B)	45	89	FN 3258-100-44	34.5
MD290T55G/75P(B)	55	106	FN 3258-130-44	43.1
MD290T75G/90P(B)	75	139	FN 3258-180-44	58.3
MD290T90G/110P	90	164	FN 3258-180-44	58.3
MD290T110G/132P	110	196	FN 3359-250-28	49
MD290T132G/160P	132	240	FN 3359-250-28	49

Drive model	Rated power (kW)	Rated current (A)	Filter model	Power consumption (W)
MD290T160G/200P	160	287	FN 3359-320-99	19
MD290T200G(-L)	200	365	FN 3359-400-99	29
MD290T220G(-L)	220	410	FN 3359-600-99	44
MD290T220P(-L)	220	410	FN 3359-600-99	44
MD290T250G(-L)	250	441	FN 3359-600-99	44
MD290T250P(-L)	250	456	FN 3359-600-99	44
MD290T280G(-L)	280	495	FN 3359-600-99	44
MD290T280P(-L)	280	507	FN 3359-600-99	44
MD290T315G(-L)	315	560	FN 3359-600-99	44
MD290T315P(-L)	315	559	FN 3359-600-99	44
MD290T355G(-L)	355	617	FN 3359-800-99	39
MD290T355P(-L)	355	624	FN 3359-800-99	39
MD290T400G(-L)	400	687	FN 3359-800-99	39
MD290T400P(-L)	400	708	FN 3359-800-99	39
MD290T450G(-L)	450	782	FN 3359-800-99	39
MD290T450P(-L)	450	782	FN 3359-800-99	39
MD290T500G(-A)	500	838.1	FN 3359-1000-99	60
MD290T500P(-L)	500	840	FN 3359-1000-99	60
MD290T560G(-A)	560	952.9	FN 3359-1000-99	60
MD290T560P(-L)	560	946.3	FN 3359-1000-99	60
MD290T630G(-A)	630	1043.5	FN 3359-1600-99	131
MD290T630P(-L)	630	1041	FN 3359-1600-99	131

Drive model	Rated power (kW)	Rated current (A)	Filter model	Power consumption (W)
MD290T710P(-L)	710	1170.9	FN 3359-1600-99	131
MD290T800P(-L)	800	1301.5	FN 3359-1600-99	131

Table 10–22 Selection of Schaffner filters (three-phase 200 V to 240 V)

Drive model	Rated power (kW)	Rated current (A)	Filter model	Power consumption (W)
MD290-2T0.4G/0.7PB	0.4	2.4	FN 3258-7-44	3.8
MD290-2T0.7G/1.1PB	0.7	4.6	FN 3258-7-44	3.8
MD290-2T1.1G/1.5PB	1.1	6.3	FN 3258-7-44	3.8
MD290-2T1.5G/2.2PB	1.5	9.0	FN 3258-16-44	6.1
MD290-2T2.2G/3.7PB	2.2	11.4	FN 3258-16-44	6.1
MD290-2T3.7G/5.5PB	3.7	16.7	FN 3258-30-44	11.8
MD290-2T5.5G/7.5PB	5.5	32.2	FN 3258-42-44	15.7
MD290-2T7.5G/11PB	7.5	41.3	FN 3258-42-44	15.7
MD290-2T11G/15P(B)(-T)	11	59.0	FN 3258-75-44	31.2
MD290-2T15G/18.5P(B)	15	57.0	FN 3258-75-44	31.2
MD290-2T18.5G/22P(B)	18.5	69.0	FN 3258-75-44	31.2
MD290-2T22G/30P(B)	22	89	FN 3258-100-44	34.5
MD290-2T30G/37P(B)	30	106	FN 3258-130-44	43.1
MD290-2T37G/45P(B)	37	139	FN 3258-180-44	58.3
MD290-2T45G/55P	45	164	FN 3258-180-44	58.3
MD290-2T55G/75P	55	196	FN 3359-250-28	49

The following figure shows the dimensions of FN 2090 series filters (8 A to 12 A).

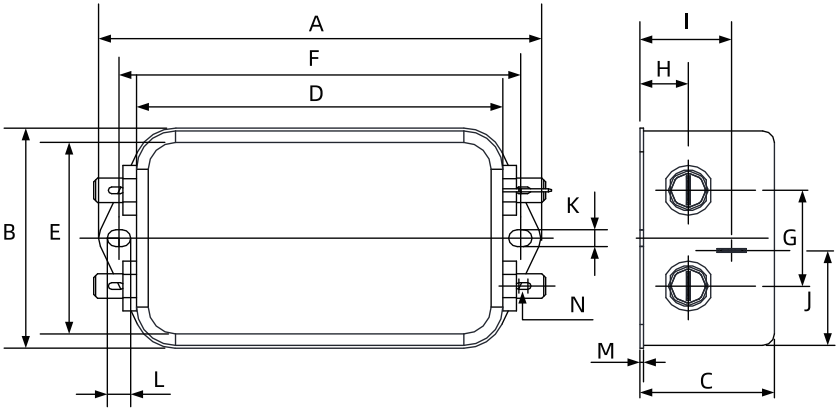


Figure 10-27 Dimensions of FN 2090 series filters (8 A to 12 A)

Table 10–23 Dimensions of FN 2090 series filters (8 A to 12 A, unit: mm)

Filter model	A	B	C	D	E	F	G	H	I	J	K	L	M	N
FN 2090-8-06	113.5	57.5	45.4	94	56	103	25	12.4	32.4	15.5	4.4	6	0.9	6.3 x 0.8
FN 2090-12-06	113.5	57.5	45.4	94	56	103	25	12.4	32.4	15.5	4.4	6	0.9	6.3 x 0.8

The following figure shows the dimensions of FN 2090 series filters (20 A to 30 A).

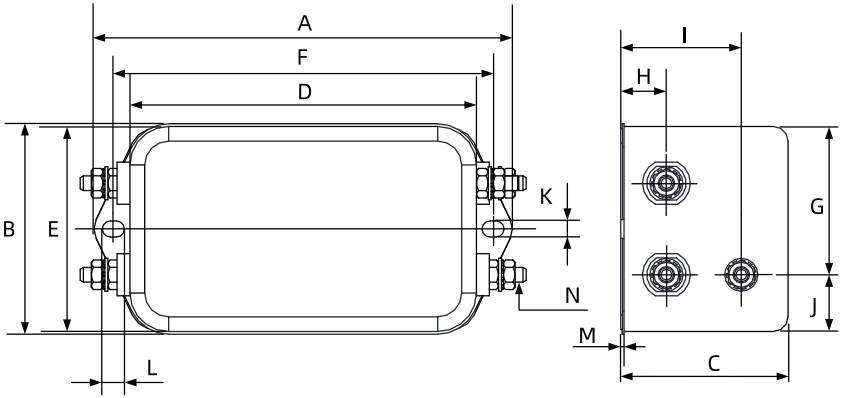


Figure 10-28 Dimensions of FN 2090 series filters (20 A to 30 A)

Table 10–24 Dimensions of FN 2090 series filters (20 A to 30 A, unit: mm)

Filter model	A	B	C	D	E	F	G	H	I	J	K	L	M	N
FN 2090-20-08	113.5	57.5	45.4	94	56	103	25	12.4	32.4	15.5	4.4	6	0.9	M4
FN 2090-30-08	113.5	57.5	45.4	94	56	103	25	12.4	32.4	15.5	4.4	6	0.9	M4

The following figure shows the dimensions of FN 3258 series filters (7 A to 180 A).

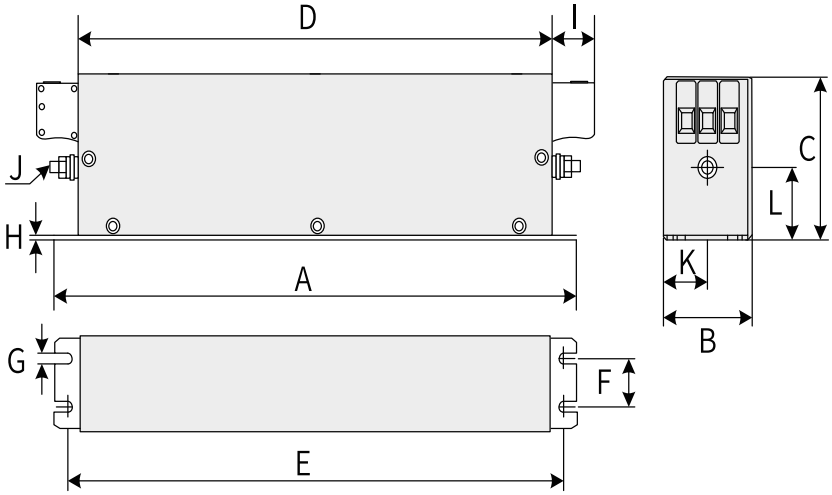


Figure 10-29 Dimensions of FN 3258 series filters (7 A to 180 A)

Table 10–25 Dimensions of FN 3258 series filters (7 A to 180 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L
7	190	40	70	160	180	20	4.5	1	22	M5	20	29.5
16	250	45	70	220	235	25	5.4	1	22	M5	22.5	29.5
30	270	50	85	240	255	30	5.4	1	25	M5	25	39.5
42	310	50	85	280	295	30	5.4	1	25	M6	25	37.5
55	250	85	90	220	235	60	5.4	1	39	M6	42.5	26.5
75	270	80	135	240	255	60	6.5	1.5	39	M6	40	70.5
100	270	90	150	240	255	65	6.5	1.5	45	M10	45	64
130	270	90	150	240	255	65	6.5	1.5	45	M10	45	64
180	380	120	170	350	365	102	6.5	1.5	51	M10	60	47

The following figure shows the dimensions of FN 3359 series filters (150 A to 250 A).

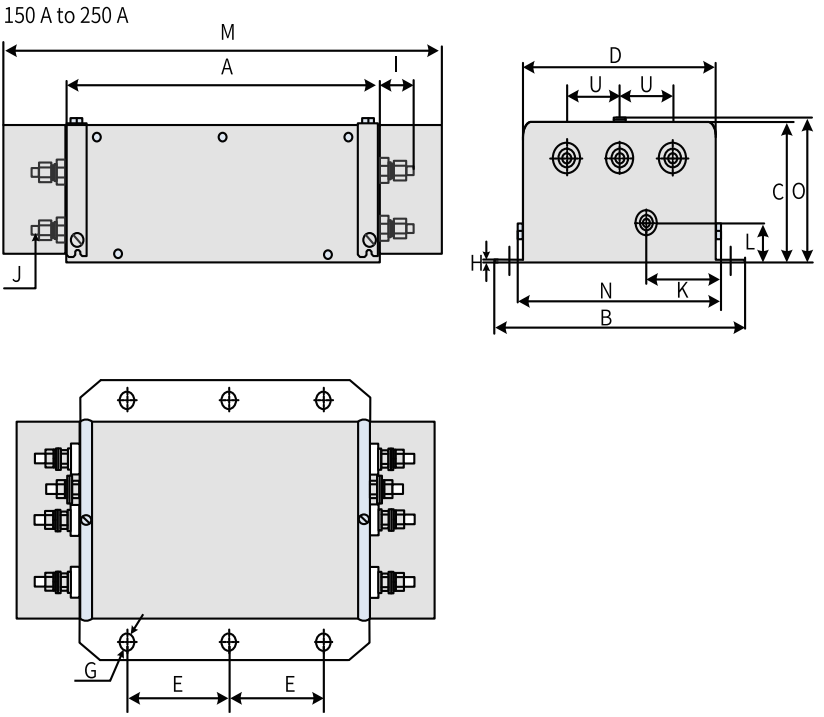


Figure 10-30 Dimensions of FN 3359 series filters (150 A to 250 A)

Table 10–26 Dimensions of FN 3359 series filters (150 A to 250 A, unit: mm)

Mark	Rated current		
	150 A	180 A	250 A
A	300	300	300
B	210	210	230
C	120	120	125
D	160	160	180
E	120	120	120
F	185	185	205
G	Φ12	Φ12	Φ12
H	2	2	2
I	33	33	33
J	M10	M10	M10
K	55	55	62.5
L	30	30	35
M	420	420	420
N	171	171	191
O	127	127	132

Mark	Rated current		
	150 A	180 A	250 A
S	-	-	-
T	-	-	-
U	50	50	55
V	-	-	-
W	-	-	-
X	-	-	-
Y	-	-	-
Z	-	-	-

The following figure shows the dimensions of FN 3359 series filters (320 A to 2500 A).

320 A to 2500 A

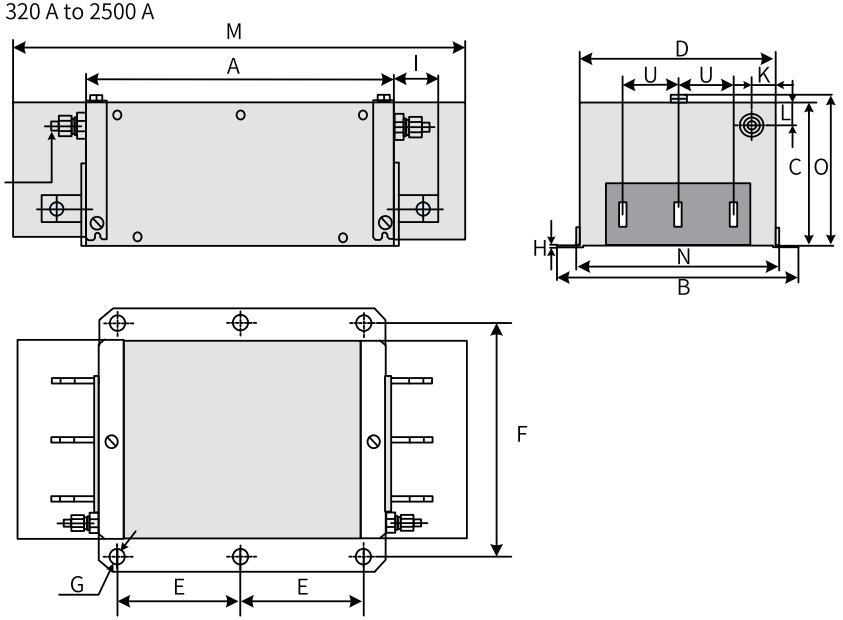


Figure 10-31 Dimensions of FN 3359 series filters (320 A to 2500 A)

The following figure shows the dimensions of the copper busbar.

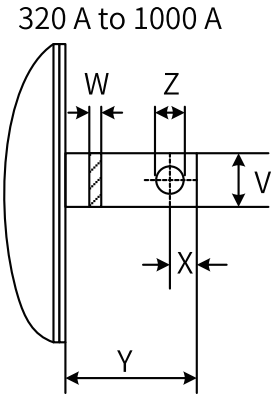


Figure 10-32 Dimensions of the copper busbar

Table 10–27 Dimensions of FN 3359 series filters (320 A to 2500 A, unit: mm)

Mark	Rated current						
	320 A	400 A	600 A	800 A	1000 A	1600 A	2500 A
A	300	300	300	350	350	400	600
B	260	260	260	280	280	300	370
C	115	115	135	170	170	160	200
D	210	210	210	230	230	250	300
E	120	120	120	145	145	170	250
F	235	235	235	255	255	275	330
G	Φ12	Φ12	Φ12	Φ12	Φ12	Φ12	Φ14
H	2	2	2	3	3	3	3
I	43	43	43	53	53	93	98
J	M12	M12	M12	M12	M12	M12	M16
K	20	20	20	25	25	25	25
L	20	20	20	25	25	25	25
M	440	440	440	510	510	-	-
N	221	221	221	241	241	-	-
O	122	122	142	177	177	-	-
S	-	-	-	-	-	26	35
T	-	-	-	-	-	26	35
U	60	60	60	60	60	60	100
V	25	25	25	40	40	60	70
W	6	6	8	8	8	10	15
X	15	15	15	20	20	17	20
Y	40	40	40	50	50	90	95
Z	Φ10.5	Φ10.5	Φ10.5	Φ14	Φ14	Φ14	Φ14

Models and dimensions (Jianli filters)

Table 10–28 Selection of Jianli filters (single-phase 200 V to 240 V)

Drive model	Rated power (kW)	Rated current (A)	Filter model	Power consumption (W)
MD290-2S0.4GB	0.4	5.4	DL-10TH3	-
MD290-2S0.75GB	0.7	8.2	DL-20TH1	-
MD290-2S1.5GB	1.5	14	DL-20TH1	-
MD290-2S2.2GB	2.2	23	DL-30TH1	-

Table 10–29 Selection of Jianli filters (three-phase 380 V to 480 V)

Drive model	Rated power (kW)	Rated current (A)	Filter model	Power consumption (W)
MD290T0.4G/0.7PB	0.4	1.8	DL-5EBK5	6.9
MD290T0.7G/1.1PB	0.7	2.4	DL-5EBK5	6.9
MD290T1.1G/1.5PB	1.1	3.7	DL-5EBK5	6.9
MD290T1.5G/2.2PB	1.5	4.6	DL-5EBK5	6.9
MD290T2.2G/3.0PB	2.2	6.3	DL-10EBK5	6.9
MD290T3.0G/3.7PB	3.0	9.0	DL-10EBK5	6.9
MD290T3.7G/5.5PB	3.7	11.4	DL-16EBK5	8.5
MD290T5.5G/7.5PB	5.5	16.7	DL-25EBK5	9.4
MD290T7.5G/11PB	7.5	21.9	DL-25EBK5	11
MD290T11G/15PB	11	32.2	DL-35EBK5	19.2
MD290T15G/18.5PB	15	41.3	DL-50EBK5	21.7
MD290T18.5G/22P(B)	18.5	49.5	DL-50EBK5	21.7
MD290T22G/30P(B)(-T)	22	59.0	DL-65EBK5	27.4
MD290T30G/37P(B)	30	57.0	DL-65EBK5	27.4
MD290T37G/45P(B)	37	69.0	DL-80EBK5	32.6
MD290T45G/55P(B)	45	89	DL-100EBK5	33
MD290T55G/75P(B)	55	106	DL-130EBK5	37.5
MD290T75G/90P(B)	75	139	DL-160EBK5	38.4
MD290T90G/110P	90	164	DL-200EBK5	34
MD290T110G/132P	110	196	DL-250EBK5	49
MD290T132G/160P	132	240	DL-300EBK3	49
MD290T160G/200P	160	287	DL-400EBK3	19
MD290T200G(-L)	200	365	DL-400EBK3	29
MD290T220G(-L)	220	410	DL-600EBK3	44
MD290T250G(-L)	250	441	DL-600EBK3	44

Drive model	Rated power (kW)	Rated current (A)	Filter model	Power consumption (W)
MD290T280G(-L)	280	495	DL-600EBK3	44
MD290T315G(-L)	315	560	DL-600EBK3	44
MD290T355G(-L)	355	617	DL-700EBK3	39
MD290T400G(-L)	400	687	DL-700EBK3	39
MD290T450G(-L)	450	782	DL-800EBK3	39
MD290T500G(-A)	500	838.1	DL-1000EBK3	60
MD290T560G(-A)	560	952.9	DL-1000EBK3	60
MD290T630G(-A)	630	1043.5	1600EBK1-60-HV	131

Table 10–30 Selection of Jianli filters (three-phase 200 V to 240 V)

Drive model	Rated power (kW)	Rated current (A)	Filter model	Power consumption (W)
MD290-2T0.4G/0.7PB	0.4	2.4	DL-5EBK5	6.9
MD290-2T0.7G/1.1PB	0.7	4.6	DL-5EBK5	6.9
MD290-2T1.1G/1.5PB	1.1	6.3	DL-10EBK5	6.9
MD290-2T1.5G/2.2PB	1.5	9.0	DL-10EBK5	6.9
MD290-2T2.2G/3.7PB	2.2	11.4	DL-16EBK5	8.5
MD290-2T3.7G/5.5PB	3.7	16.7	DL-25EBK5	9.4
MD290-2T5.5G/7.5PB	5.5	32.2	DL-35EBK5	19.2
MD290-2T7.5G/11PB	7.5	41.3	DL-50EBK5	21.7
MD290-2T11G/15P(B)(-T)	11	59.0	DL-65EBK5	27.4
MD290-2T15G/18.5P(B)	15	57.0	DL-65EBK5	27.4
MD290-2T18.5G/22P(B)	18.5	69.0	DL-80EBK5	32.6
MD290-2T22G/30P(B)	22	89	DL-100EBK5	33
MD290-2T30G/37P(B)	30	106	DL-130EBK5	37.5
MD290-2T37G/45P(B)	37	139	DL-160EBK5	38.4
MD290-2T45G/55P	45	164	DL-250EBK5	49
MD290-2T55G/75P	55	196	DL-250EBK5	49

The following figure shows the dimensions of Jianli filters (10 A to 30 A).

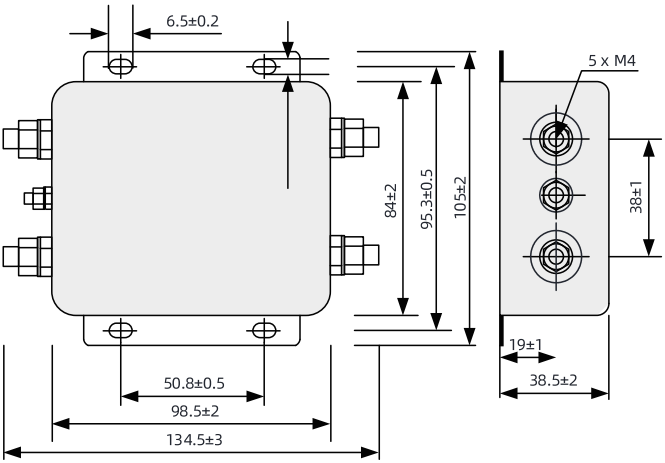


Figure 10-33 Dimensions of Jianli filters (10 A, unit: mm)

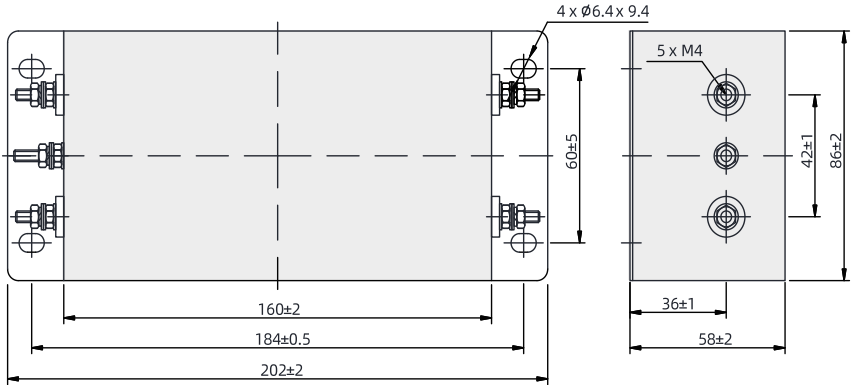


Figure 10-34 Dimensions of Jianli filters (20 A to 30 A, unit: mm)

The following figure shows the dimensions of Jianli filters (50 A to 200 A).

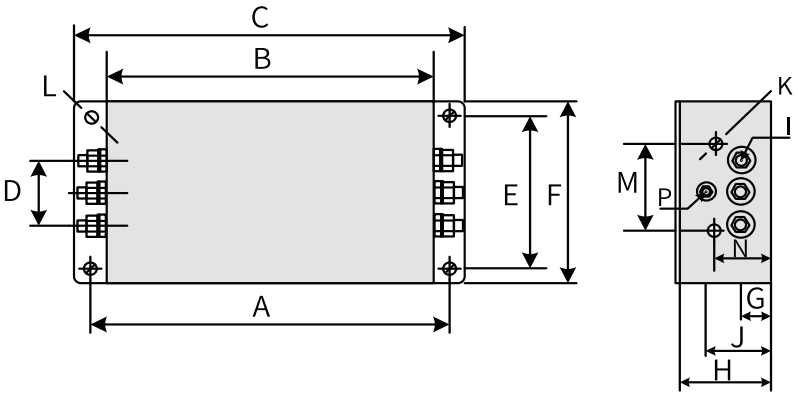


Figure 10-35 Dimensions of Jianli filters (50 A to 200 A, unit: mm)

Table 10–31 Dimensions of Jianli filters (50 A to 200 A, unit: mm)

Model	A	B	C	D	E	F	G	H	I	J	K	M	N	P	L
DL-25EBK5	243	224	265	58	70	102	25	92	M6	58	M4	74	49	M6	6.4 x 9.4
DL-35EBK5															
DL-50EBK5															
DL-65EBK5															
DL-80EBK5	354	323	388	66	155	188	30	92	M8	62	M4	86	56	M8	6.4 x 9.4
DL-100EBK5															
DL-130EBK5															
DL-160EBK5															
DL-200EBK5															

The following figure shows the dimensions of Jianli filters (250 A to 800 A).

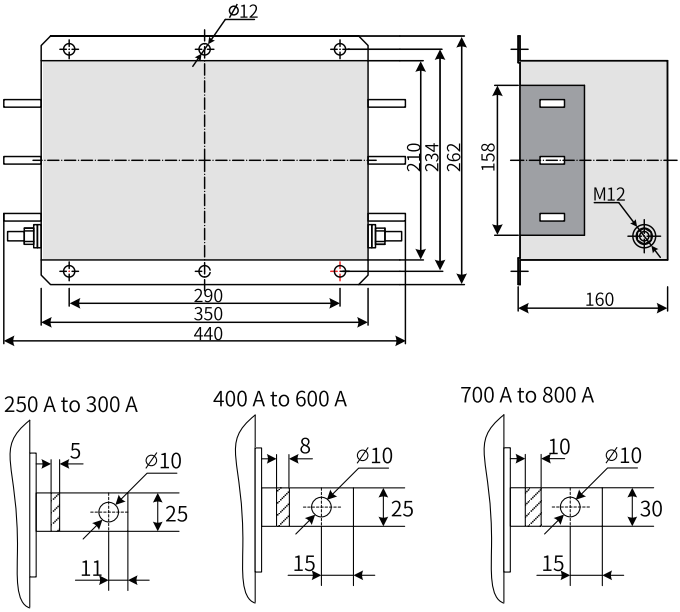


Figure 10-36 Dimensions of Jianli filters (250 A to 800 A, unit: mm)

The following figure shows the dimensions of Jianli filters (1000 A).

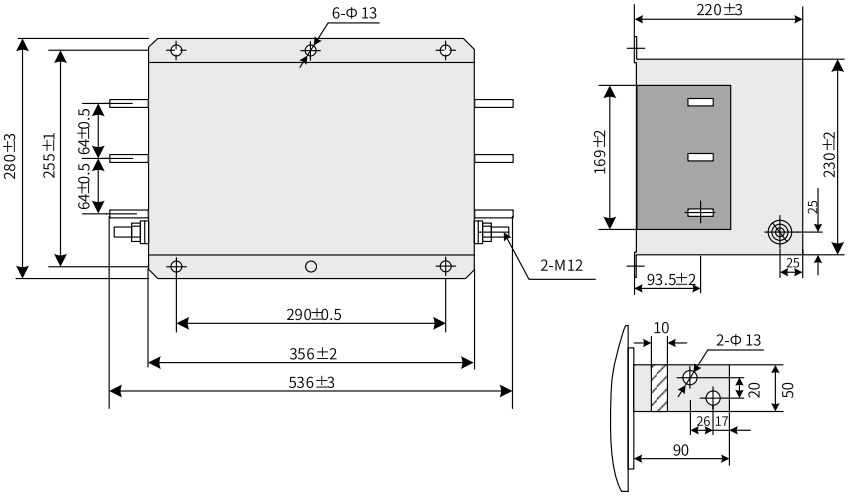


Figure 10-37 Dimensions of Jianli filters (1000 A, unit: mm)

10.3.4Simple Filter

The simple EMC filter effectively attenuates radio frequency noise from the power grid and running AC drive. In addition, for devices equipped with the residual current device (RCD), if the RCD trips incorrectly, install a simple filter on the input side of the drive for suppression.

Ground the simple filter properly and use a cable shorter than 30 cm to connect the filter and the drive. The grounding terminal of the simple filter must be connected to that of the drive, and the grounding cable must be as short as possible (shorter than 30 cm).

Dimensions

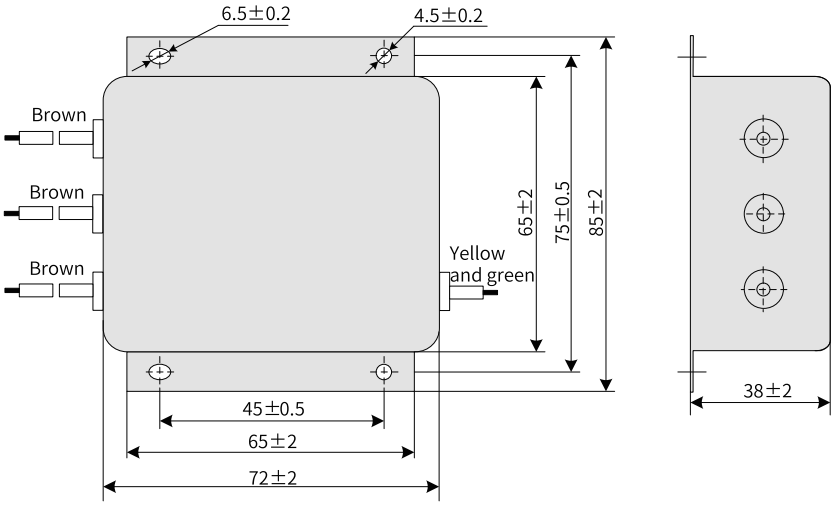


Figure 10-38 Outline dimensions of the simple filter (unit: mm)

Table 10–32 Outline dimensions of the simple filter

Model	Code	Outline dimension (width x depth x height) (unit: mm)	Mounting dimension (width x depth) (unit: mm)
Cxy-1-1	11025018	85 x 72 x 38	45 x 75

Mounting method

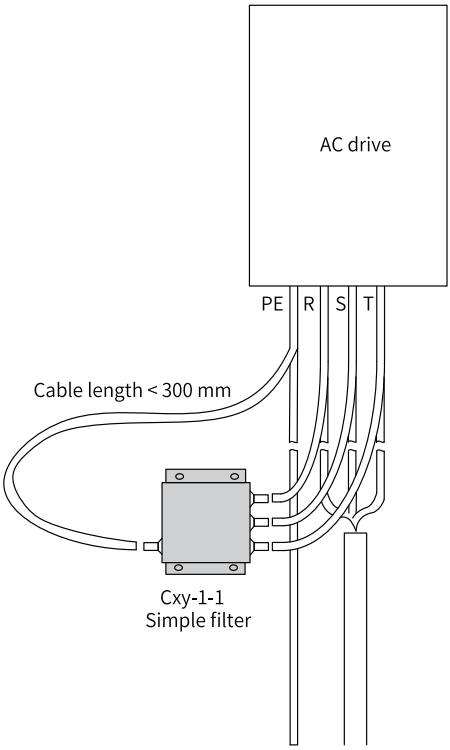


Figure 10-39 Simple filter installation

10.3.5Braking Component

Dimensions

The following figures show dimensions of two types of braking unit.

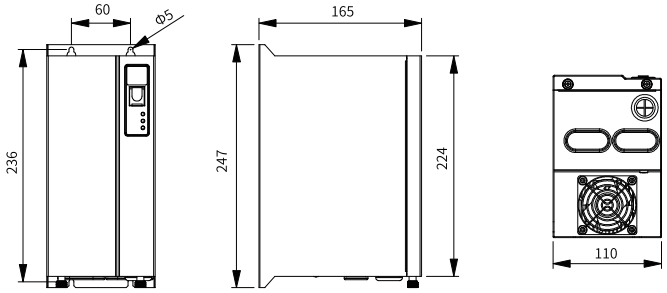


Figure 10-40 Dimensions of MDBUN series braking units (MDBUN-45-2T to MDBUN-90-2T; MDBUN-45-T to MDBUN-90-T; MDBUN-45-5T to MDBUN-90-5T) (mm)

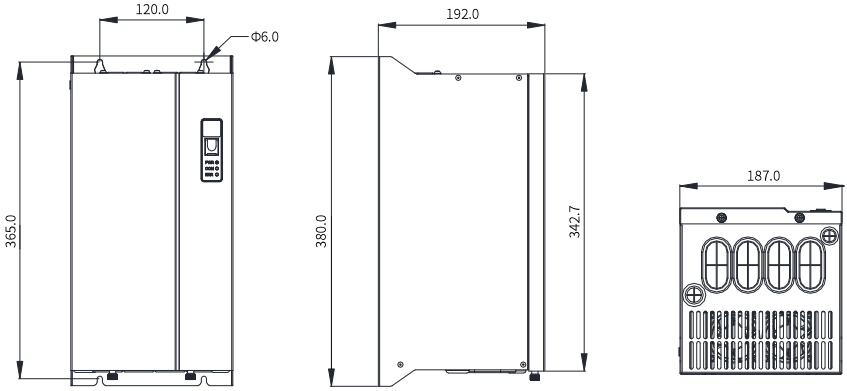


Figure 10-41 Dimensions of MDBUN series braking units (MDBUN-200-T, MDBUN-200-5T, MDBUN-200-7T) (mm)

Model

Table 10–33 Selection of braking components (single-phrase 200 V to 240 V)

Drive model	Applicable motor (kW)	Braking unit		(125% of braking torque, ED: 10% ; max. 10s)		Remarks	Minimum braking resistance (Ω)
		Model	Quantity	Recommended braking resistor specifications	Quantity of braking resistors		
MD290-2S0.4GB	0.4	Built-in, standard		80 W, 200 Ω	1	AC drive model with the model name containing B	64
MD290-2S0.75GB	0.7			80 W, 150 Ω	1		64
MD290-2S1.5GB	1.5			100 W, 100 Ω	1		64
MD290-2S2.2GB	2.2			100 W, 70 Ω	1		32
MD290-2S3.0GB	3.0			100 W, 70 Ω	1		32

Table 10–34 Selection of braking components (three-phrase 380 V to 480 V)

Drive model	Applicable motor (kW)	Braking unit		(125% of braking torque, ED: 10% ; max. 10s)		Remark	Minimum braking resistance (Ω)
		Model	Quantity	Recommended braking resistor specifications	Quantity of braking resistors		
MD290T0.4G/0.7PB	0.75	Built-in, standard		140 W, 800 Ω	1	AC drive model with the model name containing B	96
MD290T0.7G/1.1PB	1.1			220 W, 500 Ω	1		96
MD290T1.1G/1.5PB	1.5			300 W, 380 Ω	1		96
MD290T1.5G/2.2PB	2.2			440 W, 260 Ω	1		96
MD290T2.2G/3.0PB	3			600 W, 190 Ω	1		64
MD290T3.0G/3.7PB	3.7			740 W, 150 Ω	1		64
MD290T3.7G/5.5PB	5.5			1100 W, 100 Ω	1		32
MD290T5.5G/7.5PB	7.5			1500 W, 75 Ω	1		32
MD290T7.5G/11PB	11			2200 W, 50 Ω	1		32
MD290T11G/15PB	15			3000 W, 38 Ω	1		20
MD290T15G/18.5PB	18.5			4000 W, 32 Ω	1		20
MD290T18.5G/22P(B)	22	Built-in, optional		4000 W, 32 Ω	1	AC drive model with the model name containing B	24
MD290T22G/30P(B)	30			4500 W, 27 Ω	1		24
MD290T30G/37P(B)	37			6000 W, 20 Ω	1		19.2
MD290T37G/45P(B)	45			7000 W, 16 Ω	1		14.8
MD290T45G/55P(B)	55			9000 W, 13 Ω	1		12.8
MD290T55G/75P(B)	75			11000 W, 10.5 Ω	1		9.6
MD290T75G/90P(B)	90			15000 W, 7.7 Ω	1		6.8
MD290T90G/110P	110	MDBUN-60-T	2	9000 W, 10.0 Ω	2	Input voltage ≤ 440 VAC	9.3 x 2
	110	MDBUN-60-5T	2	9000 W, 12.8 Ω	2	Input voltage > 440 VAC	10.5 x 2
MD290T110G/132P	132	MDBUN-60-T	2	11000 W, 9.4 Ω	2	Input voltage ≤ 440 VAC	9.3 x 2
	132	MDBUN-60-5T	2	11000 W, 10.5 Ω	2	Input voltage > 440 VAC	10.5 x 2
MD290T132G/160P	160	MDBUN-90-T	2	13000 W, 6.8 Ω	2	Input voltage ≤ 440 VAC	6.2 x 2
	160	MDBUN-90-5T	2	13000 W, 8.8 Ω	2	Input voltage > 440 VAC	7.0 x 2
MD290T160G/200P	200	MDBUN-90-T	2	16000 W, 6.3 Ω	2	Input voltage ≤ 440 VAC	6.2 x 2
	200	MDBUN-90-5T	2	16000 W, 7.2 Ω	2	Input voltage > 440 VAC	7.0 x 2

Drive model	Applicable motor (kW)	Braking unit		(125% of braking torque, ED: 10% ; max. 10s)		Remark	Minimum braking resistance (Ω)
		Model	Quantity	Recommended braking resistor specifications	Quantity of braking resistors		
MD290T200G	200	MDBUN-200-T	2	19000 W, 4.5 Ω	2	Input voltage ≤ 440 VAC	2.5 x 2
	200	MDBUN-200-5T	2	19000 W, 5.8 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD290T220P	220	MDBUN-200-T	2	19000 W, 4.5 Ω	2	Input voltage ≤ 440 VAC	2.5 x 2
	220	MDBUN-200-5T	2	19000 W, 5.8 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD290T220G	220	MDBUN-200-T	2	21000 W, 4.1 Ω	2	Input voltage ≤ 440 VAC	2.5 x 2
	220	MDBUN-200-5T	2	21000 W, 5.3 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD290T250P	250	MDBUN-200-T	2	21000 W, 4.1 Ω	2	Input voltage ≤ 440 VAC	2.5 x 2
	250	MDBUN-200-5T	2	21000 W, 5.3 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD290T250G	250	MDBUN-200-T	2	24000 W, 3.6 Ω	2	Input voltage ≤ 440 VAC	2.5 x 2
	250	MDBUN-200-5T	2	24000 W, 4.6 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD290T280P	280	MDBUN-200-T	2	27000 W, 3.2 Ω	2	Input voltage ≤ 440 VAC	2.5 x 2
	280	MDBUN-200-5T	2	27000 W, 4.1 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD290T280G	280	MDBUN-200-T	2	27000 W, 3.2 Ω	2	Input voltage ≤ 440 VAC	2.5 x 2
	280	MDBUN-200-5T	2	27000 W, 4.1 Ω	2	Input voltage > 440 VAC	3.0 x 2
MD290T315P	315	MDBUN-200-T	3	20000 W, 4.3 Ω	3	Input voltage ≤ 440 VAC	2.5 x 3
	315	MDBUN-200-5T	3	20000 W, 5.5 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD290T315G	315	MDBUN-200-T	3	20000 W, 4.3 Ω	3	Input voltage ≤ 440 VAC	2.5 x 3
	315	MDBUN-200-5T	3	20000 W, 5.5 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD290T355P	355	MDBUN-200-T	3	23000 W, 3.8 Ω	3	Input voltage ≤ 440 VAC	2.5 x 3
	355	MDBUN-200-5T	3	23000 W, 4.9 Ω	3	Input voltage > 440 VAC	3.0 x 3

Drive model	Applicable motor (kW)	Braking unit		(125% of braking torque, ED: 10% ; max. 10s)		Remark	Minimum braking resistance (Ω)
		Model	Quantity	Recommended braking resistor specifications	Quantity of braking resistors		
MD290T355G	355	MDBUN-200-T	3	23000 W, 3.8 Ω	3	Input voltage ≤ 440 VAC	2.5 x 3
	355	MDBUN-200-5T	3	23000 W, 4.9 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD290T400P	400	MDBUN-200-T	3	26000 W, 3.4 Ω	3	Input voltage ≤ 440 VAC	2.5 x 3
	400	MDBUN-200-5T	3	26000 W, 4.3 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD290T400G	400	MDBUN-200-T	3	26000 W, 3.4 Ω	3	Input voltage ≤ 440 VAC	2.5 x 3
	400	MDBUN-200-5T	3	26000 W, 4.3 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD290T450P	450	MDBUN-200-T	3	29000 W, 3.0 Ω	3	Input voltage ≤ 440 VAC	2.5 x 3
	450	MDBUN-200-5T	3	29000 W, 3.9 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD290T450G	450	MDBUN-200-T	3	29000 W, 3.0 Ω	3	Input voltage ≤ 440 VAC	2.5 x 3
	450	MDBUN-200-5T	3	29000 W, 3.9 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD290T500P	500	MDBUN-200-T	3	29000 W, 3.0 Ω	3	Input voltage ≤ 440 VAC	2.5 x 3
	500	MDBUN-200-5T	3	29000 W, 3.9 Ω	3	Input voltage > 440 VAC	3.0 x 3
MD290T500G(-A)	500	MDBUN-200-T	4	25000 W, 3.6 Ω	4	Input voltage ≤ 440 VAC	2.5 x 4
	500	MDBU-200-C	4	25000 W, 4.6 Ω	4	Input voltage > 440 VAC	3.0 x 4
MD290T560G(-A)	560	MDBUN-200-T	4	28000 W, 3.2 Ω	4	Input voltage ≤ 440 VAC	2.5 x 4
	560	MDBU-200-C	4	28000 W, 4.1 Ω	4	Input voltage > 440 VAC	3.0 x 4
MD290T630G(-A)	630	MDBUN-200-T	4	32000 W, 2.8 Ω	4	Input voltage ≤ 440 VAC	2.5 x 4
	630	MDBU-200-C	4	32000 W, 3.7 Ω	4	Input voltage > 440 VAC	3.0 x 4
MD290T560P(-A)	560	MDBUN-200-T	4	28000 W, 3.2 Ω	4	Input voltage ≤ 440 VAC	2.5 x 4
	560	MDBU-200-C	4	28000 W, 4.1 Ω	4	Input voltage > 440 VAC	3.0 x 4

Drive model	Applicable motor (kW)	Braking unit		(125% of braking torque, ED: 10% ; max. 10s)		Remark	Minimum braking resistance (Ω)
		Model	Quantity	Recommended braking resistor specifications	Quantity of braking resistors		
MD290T630P(-A)	630	MDBUN-200-T	4	32000 W, 2.8 Ω	4	Input voltage ≤ 440 VAC	2.5 x 4
	630	MDBU-200-C	4	32000 W, 3.7 Ω	4	Input voltage > 440 VAC	3.0 x 4
MD290T710P(-A)	710	MDBUN-200-T	4	36000 W, 2.5 Ω	4	Input voltage ≤ 440 VAC	2.5 x 4
	710	MDBU-200-C	4	39000 W, 3.0 Ω	4	Input voltage > 440 VAC	3.0 x 4
MD290T800P(-A)	800	MDBUN-200-T	5	32000 W, 2.8 Ω	5	Input voltage ≤ 440 VAC	2.5 x 5
	800	MDBU-200-C	5	32000 W, 3.7 Ω	5	Input voltage > 440 VAC	3.0 x 5

Table 10–35 Selection of braking components (three phrase 200 V to 240 V)

Drive model	Applicable motor (kW)	Braking unit		125% of the braking torque (10% ED, max.: 10s)		Remark	Minimum braking resistance (Ω)
		Model	Quantity	Recommended braking resistor specifications	Quantity of braking resistors		
MD290-2T0.4G/0.7PB	0.75	Built-in, standard		160 W, 170 Ω	1	AC drive model with the model name containing B	48
MD290-2T0.7G/1.1PB	1.1			250 W, 110 Ω	1		48
MD290-2T1.1G/1.5PB	1.5			340 W, 80 Ω	1		32
MD290-2T1.5G/2.2PB	2.2			500 W, 55 Ω	1		32
MD290-2T2.2G/3.7PB	3.7			800 W, 33 Ω	1		16
MD290-2T3.7G/5.5PB	5.5			1300 W, 22 Ω	1		16
MD290-2T5.5G/7.5PB	7.5			1700 W, 16 Ω	1		10
MD290-2T7.5G/11PB	11			2300 W, 12 Ω	1		10
MD290-2T11G/15P(B)	15	Built-in, optional		2300 W, 12 Ω	1	AC drive model with the model name containing B	12
MD290-2T15G/18.5P(B)	18.5			3000 W, 9 Ω	1		9
MD290-2T18.5G/22P(B)	22			4000 W, 7 Ω	1		7
MD290-2T22G/30P(B)	30			4600 W, 6 Ω	1		6
MD290-2T30G/37P(B)	37			5500 W, 5 Ω	1		5
MD290-2T37G/45P(B)	45			6800 W, 4 Ω	1		4

Drive model	Applicable motor (kW)	Braking unit		125% of the braking torque (10% ED, max.: 10s)		Remark	Minimum braking resistance (Ω)
		Model	Quantity	Recommended braking resistor specifications	Quantity of braking resistors		
MD290-2T45G/55P	55	MDBUN-60-2T	2	5600 W, 4.9 Ω	2	-	4.9
MD290-2T55G/75P	75	MDBUN-90-2T	2	8300 W, 3.3 Ω	2	-	3.3

Note

- The default initial braking voltages of built-in braking units for the 380-480 V models and 200-240 V models are 760 V and 350 V, respectively.
- The default initial braking voltage of the external braking units MDBUN-60-T, MDBUN-90-T, and MDBUN-200-T is 670 V. These braking units apply to grids with the input voltage lower than or equal to 440 VAC. The default initial braking voltage of the external braking units MDBUN-60-5T, MDBUN-90-5T, and MDBUN-200-5T is 760 V. These braking units apply to grids with the input voltage higher than 440 VAC. You can adjust the initial braking voltage based on the grid voltage. Higher initial braking voltage requires higher braking resistance.
- The data in the preceding table is only for reference. You can select the resistance and power of the braking resistor as required. (Note that the resistance cannot be lower than the recommended minimum value, whereas the power can exceed or be equal to the recommended value.) Select the braking resistor based on the generation power of the motor in the actual system, system inertia, deceleration time, and potential energy load.
- Larger system inertia requires shorter deceleration time and more frequent braking. In this case, select a braking resistor with a higher power rating and lower resistance.
- For details on how to install and use the MDBUN, see *MDBUN Series Braking Unit User Guide*.

10.3.6AFE Unit

The active front end (AFE) is an optional unit used to feed the energy generated by the motor during braking back to the mains power. With the AFE installed, the braking unit and braking resistor are not required, which reduces heat emission. Inovance AFE features energy efficiency, low noise, low harmonic, and high power factor.

Note

The optional AFE unit is not available for T13 models.

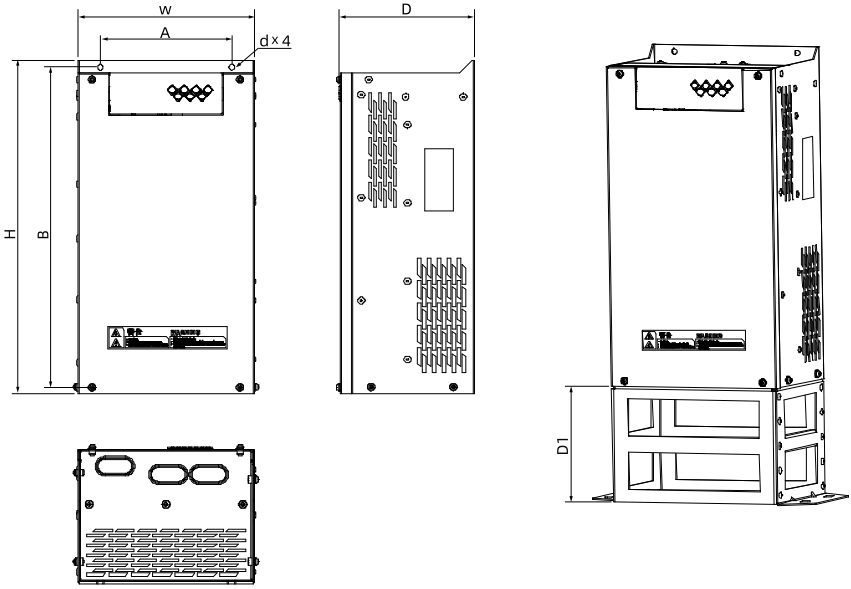


Figure 10-42 Outline dimensions of MD051 series AFE unit

Table 10–36 Outline dimensions of MD051 series AFE unit

Model	Dimensions (mm)			Bracket dimension (mm)	Mounting hole dimension (mm)		Mounting hole diameter (mm)	Weight (kg)
	H	W	D	D1	A	B	d	
MD051T5.5G	365	200	153	121	160	350	Φ6	8.5
MD051T7.5G								8.7
MD051T11G								9.0
MD051T15G	405	215	165	142	160	390	Φ7	14.0
MD051T18.5G								14.8
MD051T22G	505	260	171	161	160	490	Φ7	18.2
MD051T30G								20.0

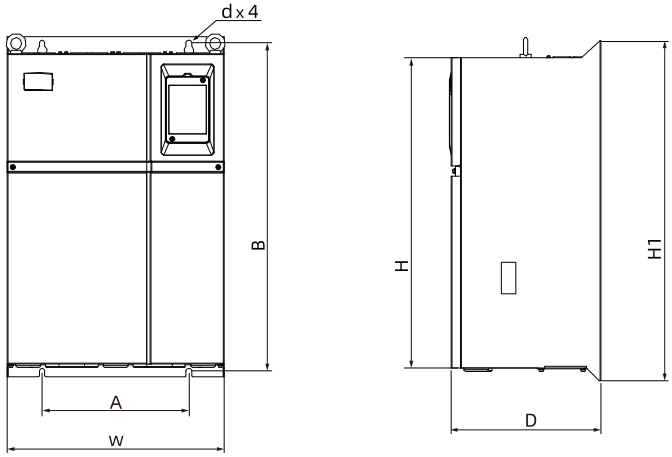


Figure 10-43 Outline dimensions of MD050 series AFE unit

Table 10–37 Outline dimensions of MD050 series AFE unit

Model	Dimension (mm)				Mounting hole dimension (mm)		Mounting hole diameter (mm)	Weight (kg)
	H	H1	W	D	A	B	d	
MD050-T37G	549	600	385	265	260	580	Φ10	32
MD050-T45G								
MD050-T55G								
MD050-T75G	660	700	473	307	343	678	Φ10	47
MD050-T90G								
MD050-T110G	880	930	579	380	449	903	Φ10	90
MD050-T132G								
MD050-T160G								
MD050-T200G	983	1060	650	377	420	1030	Φ12	130
MD050-T220G								
MD050-T250G								
MD050-T280G								
MD050-T315G	1203	1358	800	400	520	1300	Φ14	200
MD050-T355G								
MD050-T400G								
MD050-T450G								

Note

For installation and use of the energy feedback unit, see *MD051 Series Active Front End (AFE) User Guide*.

10.3.7 Output Reactors

Installing an output reactor to the output side of the drive helps reduce excessive dV/dt and voltage stress on the motor winding, protecting the motor winding from insulation breakdown, lowering the motor temperature, and prolonging the service life of the motor as well as reducing interference to neighboring devices.

Whether to install an output reactor on the output side of the AC drive is dependent on the actual situation. When the output cable length is greater than or equal to the recommended value in the following table, install an output reactor around the AC drive.

The cables connecting the AC drive and motor should not be too long. Overlong cables cause large distributed capacitance, which may result in high harmonic current.

Table 10–38 Minimum cable length when the output reactor is configured (three-phase 380 V to 480 V)

Drive power (kW)	Rated voltage (V)	Min. cable length for optional output reactor (m)
0.4 to 3.0	200 to 500	50
3.7	200 to 500	50
5.5	200 to 500	70
7.5	200 to 500	100
11	200 to 500	110
15	200 to 500	125
18.5	200 to 500	135
22	200 to 500	150
≥ 30	280 to 690	150

Table 10–39 Minimum cable length when the output reactor is installed (three-phase 200 V to 240 V)

Drive power (kW)	Rated voltage (V)	Min. cable length for optional output reactor (m)
0.4 to 3	200 to 500	50
3.7	200 to 500	70
5.5	200 to 500	110
7.5	200 to 500	125
≥ 11	200 to 500	150

Models and dimensions (Inovance)

Models and dimensions of the recommended Inovance AC output reactors are as follows.

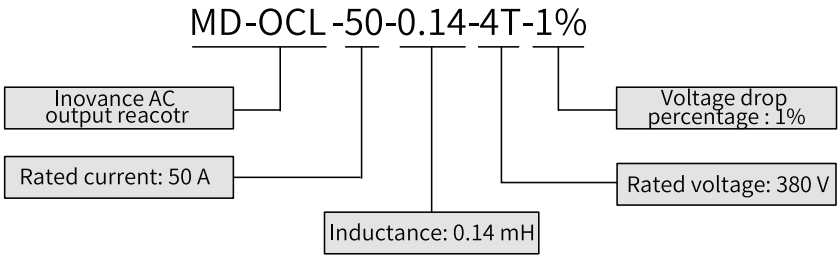


Figure 10-44 AC output reactor model

Note

- The following recommended AC output reactors are applicable only to T1 to T9 models.
- For T10 to T12 models (three-phase 380 V to 480 V), purchase MD290T200G-L to MD290450G-L AC output reactors. For T10 to T12 models (three-phase 200 V to 240 V), AC output reactors are not supported.
- The T13 model is equipped with a built-in output reactor as standard.

Table 10–40 Selection of Inovance AC output reactors (three-phase 380 V to 480 V)

Structure	Drive model	Motor capacity (kW) (kW)	Rated current (A)	Reactor model	Inductance (mH)	Power consumption (W)
T1	MD290T0.4GB	0.4	1.5	MD-OCL-5-1.4-4T-1%	1.4	-
	MD290T0.7GB	0.75	2.1	MD-OCL-5-1.4-4T-1%	1.4	-
	MD290T1.1GB	1.1	3.1	MD-OCL-5-1.4-4T-1%	1.4	-
	MD290T1.5GB	1.5	3.8	MD-OCL-5-1.4-4T-1%	1.4	-
	MD290T2.2GB	2.2	5.1	MD-OCL-7-1.0-4T-1%	1.0	-
	MD290T3.0GB	3.0	7.2	MD-OCL-10-0.7-4T-1%	0.7	-
T2	MD290T3.7GB	3.7	9.0	MD-OCL-10-0.7-4T-1%	0.7	-
	MD290T5.5GB	5.5	13	MD-OCL-15-0.47-4T-1%	0.47	-
T3	MD290T7.5GB	7.5	17	MD-OCL-20-0.35-4T-1%	0.35	-
	MD290T11GB	11	25	MD-OCL-30-0.23-4T-1%	0.23	-
T4	MD290T15GB	15	32	MD-OCL-40-0.18-4T-1%	0.18	-
T5	MD290T18.5G(B)(-T)	18.5	37	MD-OCL-40-0.18-4T-1%	0.18	-
	MD290T22G(B)(-T)	22	45	MD-OCL-50-0.14-4T-1%	0.14	-
T6	MD290T30G(B)	30	60	MD-OCL-60-0.12-4T-1%	0.12	-
	MD290T37G(B)	37	75	MD-OCL-80-0.087-4T-1%	0.087	-

Structure	Drive model	Motor capacity (kW) (kW)	Rated current (A)	Reactor model	Inductance (mH)	Power consumption (W)
T7	MD290T45G(B)	45	91	MD-OCL-90-0.078-4T-1%	0.078	-
	MD290T55G(B)	55	112	MD-OCL-120-0.058-4T-1%	0.058	-
T8	MD290T75G(B)	75	150	MD-OCL-150-0.047-4T-1%	0.047	-
	MD290T90G	90	176	MD-OCL-200-0.035-4T-1%	0.035	-
	MD290T110G	110	210	MD-OCL-250-0.028-4T-1%	0.028	-
T9	MD290T132G	132	253	MD-OCL-330-0.021-4T-1%	0.021	-
	MD290T160G	160	304	MD-OCL-330-0.021-4T-1%	0.021	-

Table 10–41 Selection of Inovance AC output reactors (three-phase 200 V to 240 V)

Structure	Drive model	Motor capacity (kW) (kW)	Rated current (A)	Applicable reactor	Inductance (mH)	Power consumption (W)
T1	MD290-2T0.4GB	0.4	2.1	MD-OCL-5-1.4-4T-1%	1.4	-
	MD290-2T0.7GB	0.7	3.8	MD-OCL-5-1.4-4T-1%	1.4	-
	MD290-2T1.1GB	1.1	5.1	MD-OCL-7-1.0-4T-1%	1.0	-
	MD290-2T1.5GB	1.5	7.2	MD-OCL-10-0.7-4T-1%	0.7	-
T2	MD290-2T2.2GB	2.2	9.0	MD-OCL-10-0.7-4T-1%	0.7	-
	MD290-2T3.7GB	3.7	13	MD-OCL-15-0.47-4T-1%	0.47	-
T3	MD290-2T5.5GB	5.5	25	MD-OCL-30-0.23-4T-1%	0.23	-
T4	MD290-2T7.5GB	7.5	32	MD-OCL-40-0.18-4T-1%	0.18	-
T5	MD290-2T11G(B)	11	45	MD-OCL-60-0.12-4T-1%	0.12	-
T6	MD290-2T15G(B)	15	60	MD-OCL-60-0.12-4T-1%	0.12	-
	MD290-2T18.5G(B)	18.5	75	MD-OCL-80-0.087-4T-1%	0.087	-
T7	MD290-2T22G(B)	22	91	MD-OCL-90-0.078-4T-1%	0.078	-
	MD290-2T30G(B)	30	112	MD-OCL-120-0.058-4T-1%	0.058	-
T8	MD290-2T37G(B)	37	150	MD-OCL-150-0.047-4T-1%	0.047	-
	MD290-2T45G	45	176	MD-OCL-200-0.035-4T-1%	0.035	-
	MD290-2T55G	55	210	MD-OCL-250-0.028-4T-1%	0.028	-
T9	MD290-2T75G	75	304	MD-OCL-330-0.021-4T-1%	0.021	-

Dimensions of AC output reactors

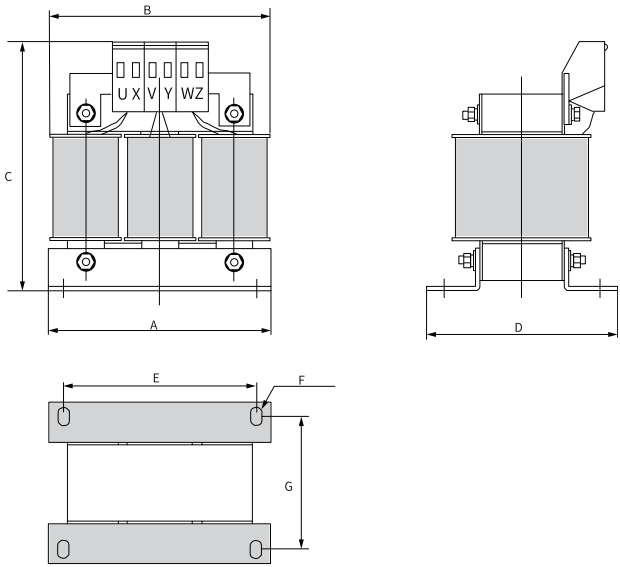


Figure 10-45 Dimensions of AC output reactors (5 A to 10 A)

Table 10–42 Dimensions of AC output reactors (5 A to 10 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G
5	105±1	110	130	84±2	91±1	Φ6x11	65±2
7	105±1	110	130	84±2	91±1	Φ6x11	65±2
10	105±1	110	130	84±2	91±1	Φ6x11	65±2

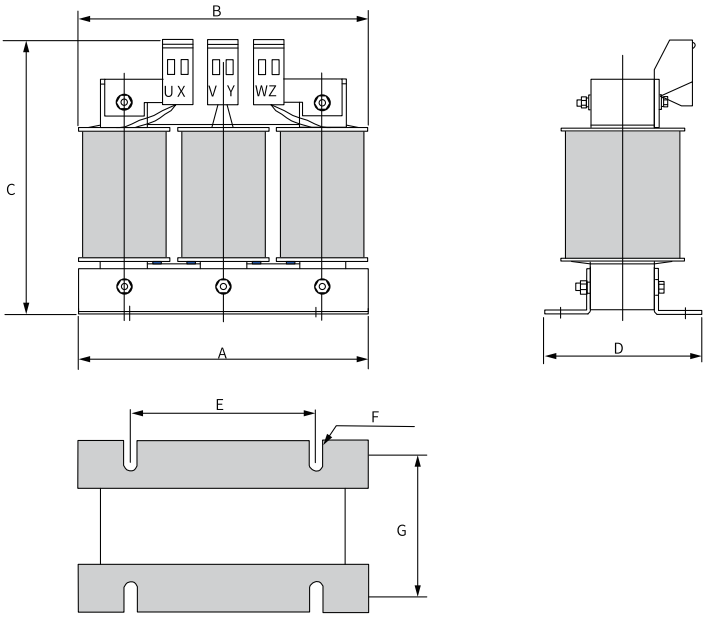


Figure 10-46 Dimensions of AC output reactors (15 A)

Table 10–43 Dimensions of AC output reactor (15 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G
15	148±1	155	140	76±2	95±1	Φ6x15	61±2

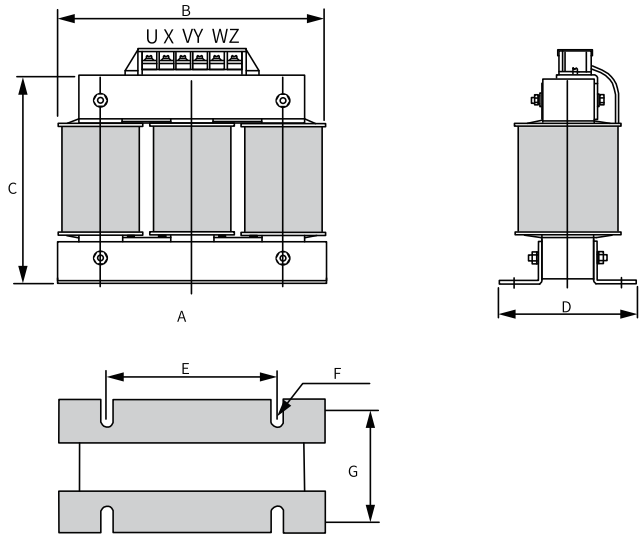


Figure 10-47 Dimensions of AC output reactors (20 A)

Table 10–44 Dimensions of AC output reactor (20 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G
20	148±1	155	165	76±2	95±1	Φ6x15	61±2

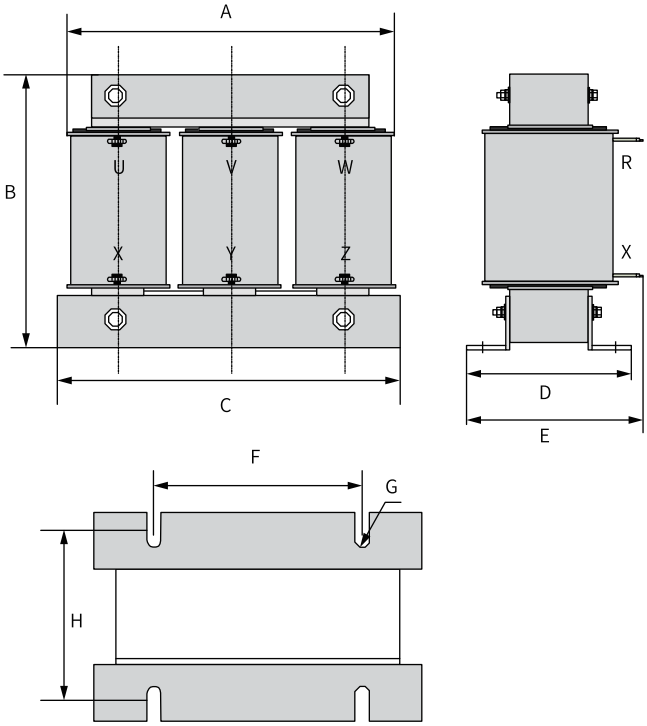


Figure 10-48 Dimensions of AC output reactors (30 A to 60 A)

Table 10–45 Dimensions of AC output reactors (30 A to 60 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H
30	155	130	148±1	95±2	135	95±1	Φ6x15	80±2
40	155	130	148±1	95±2	135	95±1	Φ6x15	80±2
50	155	130	148±1	95±2	135	95±1	Φ6x15	80±2
60	195	165	188±1	92±2	130	120±1	Φ8.5x20	72±2

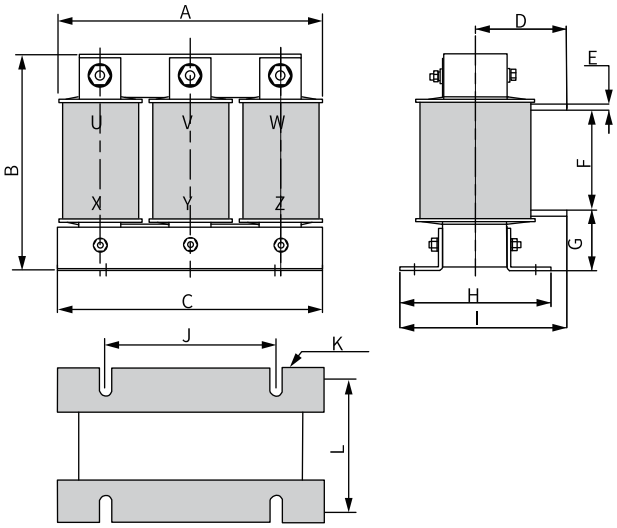


Figure 10-49 Dimensions of AC output reactors (80 A to 120 A)

Table 10–46 Dimensions of AC output reactors (80 A to 120 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L
80	195	165	188±1	68±10	4	75±5	40±5	92±2	130	120±1	Φ8.5x20	72±2
90	195	165	188±1	68±10	4	75±5	40±5	92±2	130	120±1	Φ8.5x20	72±2
120	195	165	188±1	78±10	4	75±5	40±5	112±2	135	120±1	Φ8.5x20	72±2

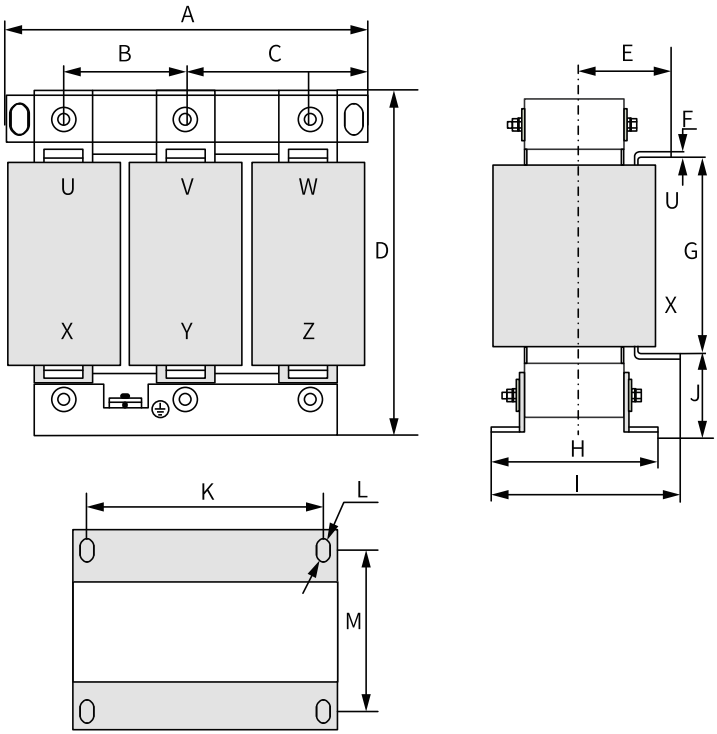


Figure 10-50 Dimensions of AC output reactors (150 A to 250 A)

Table 10–47 Dimensions of AC output reactors (150 A to 250 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
150	250	81±5	81±5	230	97±10	5	140±5	113±2	170	42±5	182±1	Φ11x18	87±2
200	250	81±5	81±5	230	102±10	5	140±5	123±2	175	42±5	182±1	Φ11x18	97±2
250	250	81±5	81±5	230	102±10	5	140±5	123±2	175	42±5	182±1	Φ11x18	97±2

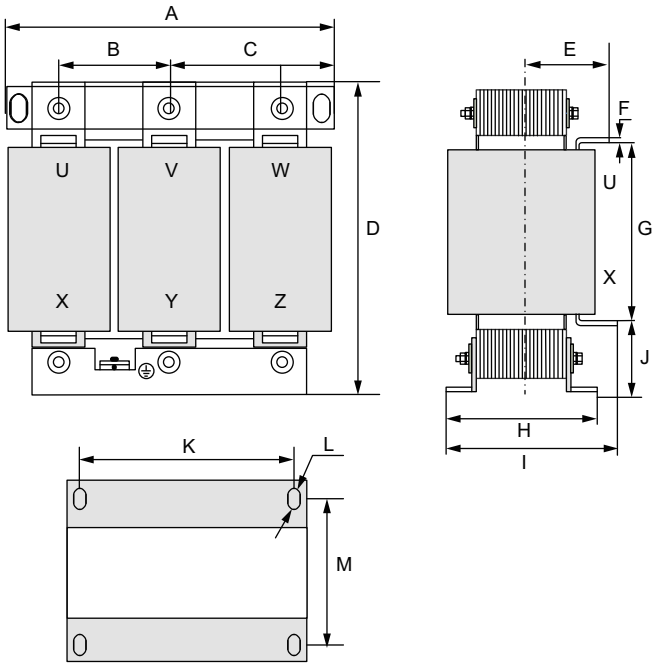


Figure 10-51 Dimensions of AC output reactors (330 A)

Table 10–48 Dimensions of AC output reactor (330 A, unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M
330	290	95±5	95±5	250	110±10	5	155±5	132±2	190	45±5	214±1	Φ11x18	106±2

Models and dimensions (Schaffner)

Models and dimensions of the recommended Schaffner AC output reactors are as follows.

Table 10–49 Selection of Schaffner output reactors (single-phase 200 V to 240 V)

Structure	Drive model	Motor capacity (kW)	Rated current (A)	Applicable reactor	Inductance (mH)	Power consumption (W)
T2	MD290-2S0.4GB	0.4	1.5	RWK 305-4-KL	1.47	22
	MD290-2S0.75GB	0.75	2.1	RWK 305-7.8-KL	0.754	22
	MD290-2S1.5GB	1.5	3.1	RWK 305-10-KL	0.588	25
	MD290-2S2.2GB	2.2	3.8	RWK 305-14-KL	0.42	30

Table 10–50 Selection of Schaffner output reactors (three-phase 380 V to 480 V)

Structure	Drive model	Motor capacity (kW) (kW)	Rated current (A)	Applicable reactor	Inductance (mH)	Power consumption **(W)**
T1	MD290T0.4GB	0.4	1.5	RWK 305-4-KL	1.47	22
	MD290T0.7GB	0.75	2.1	RWK 305-4-KL	1.47	22
	MD290T1.1GB	1.1	3.1	RWK 305-4-KL	1.47	22
	MD290T1.5GB	1.5	3.8	RWK 305-4-KL	1.47	22
	MD290T2.2GB	2.2	5.1	RWK 305-7.8-KL	0.754	25
	MD290T3.0GB	3.0	7.2	RWK 305-7.8-KL	0.754	25
T2	MD290T3.7GB	3.7	9.0	RWK 305-10-KL	0.588	30
	MD290T5.5GB	5.5	13	RWK 305-14-KL	0.42	34
T3	MD290T7.5GB	7.5	17	RWK 305-17-KL	0.346	38
	MD290T11GB	11	25	RWK 305-32-KL	0.184	55
T4	MD290T15GB	15	32	RWK 305-32-KL	0.184	55
T5	MD290T18.5G(B) MD290T18.5G(B)-T	18.5	37	RWK 305-45-KL	0.131	60
	MD290T22G(B) MD290T22G(B)-T	22	45	RWK 305-45-KL	0.131	60
T6	MD290T30G(B)	30	60	RWK 305-60-KL	0.098	65
	MD290T37G(B)	37	75	RWK 305-90-KL	0.065	75
T7	MD290T45G(B)	45	91	RWK 305-110-KL	0.053	90
	MD290T55G(B)	55	112	RWK 305-124-KS	0.047	110
T8	MD290T75G(B)	75	150	RWK 305-156-KS	0.038	120
	MD290T90G	90	176	RWK 305-182-KS	0.032	140
	MD290T110G	110	210	RWK 305-230-KS	0.026	180
T9	MD290T132G	132	253	RWK 305-280-KS	0.021	220
	MD290T160G	160	304	RWK 305-330-KS	0.018	240
T10	MD290T200G MD290T200G-L	200	377	RWK 305-400-S	0.015	330
	MD290T220G MD290T220G-L	220	426	RWK 305-500-S	0.012	340
T11	MD290T250G MD290T250G-L	250	465	RWK 305-500-S	0.012	340
	MD290T280G MD290T280G-L	280	520	RWK 305-600-S	0.01	380
T12	MD290T315G MD290T315G-L	315	580	RWK 305-600-S	0.01	380
	MD290T355G MD290T355G-L	355	650	RWK 305-680-S	0.009	410
	MD290T400G MD290T400G-L	400	725	RWK 305-790-S	0.007	590
	MD290T450G MD290T450G-L	450	820	RWK 305-910-S	0.006	740

Structure	Drive model	Motor capacity (kW) (kW)	Rated current (A)	Applicable reactor	Inductance (mH)	Power consumption **(W)**
T13	MD290T500G-A MD290T500G	500	900	RWK 305-1100-99-E0XXX	0.029	1167
	MD290T560G-A MD290T560G	560	1020	RWK 305-1100-S	0.005	760
	MD290T630G-A MD290T630G	630	1120	-	-	-

Table 10–51 Selection of Schaffner output reactors (three-phase 200 V to 240 V)

Structure	Drive model	Motor capacity (kW) (kW)	Rated current (A)	Applicable reactor	Inductance (mH)	Power consumption **(W)**
T1	MD290-2T0.4GB	0.4	2.1	RWK 305-4-KL	1.47	22
	MD290-2T0.7GB	0.75	3.8	RWK 305-4-KL	1.47	22
	MD290-2T1.1GB	1.1	5.1	RWK 305-7.8-KL	0.754	25
	MD290-2T1.5GB	1.5	7.2	RWK 305-7.8-KL	0.754	25
T2	MD290-2T2.2GB	2.2	9.0	RWK 305-10-KL	0.588	30
	MD290-2T3.7GB	3.7	13	RWK 305-14-KL	0.42	34
T3	MD290-2T5.5GB	5.5	25	RWK 305-32-KL	0.184	55
T4	MD290-2T7.5GB	7.5	32	RWK 305-32-KL	0.184	55
T5	MD290-2T11G(B)	11	45	RWK 305-45-KL	0.131	60
T6	MD290-2T15G(B)	15	60	RWK 305-60-KL	0.098	65
	MD290-2T18.5G(B)	18.5	75	RWK 305-90-KL	0.065	75
T7	MD290-2T22G(B)	22	91	RWK 305-110-KL	0.053	90
	MD290-2T30G(B)	30	112	RWK 305-124-KS	0.047	110
T8	MD290-2T37G(B)	37	150	RWK 305-156-KS	0.038	120
	MD290-2T45G	45	176	RWK 305-182-KS	0.032	140
	MD290-2T55G	55	210	RWK 305-230-KS	0.026	180
T9	MD290-2T75G	75	304	RWK 305-330-KS	0.018	240
T10	MD290-2T90G	90	377	RWK 305-400-S	0.015	330
	MD290-2T110G	110	426	RWK 305-500-S	0.012	340
T11	MD290-2T132G	132	465	RWK 305-500-S	0.012	340
T12	MD290-2T160G	160	580	RWK 305-600-S	0.01	380
	MD290-2T200G	200	725	RWK 305-790-S	0.007	590

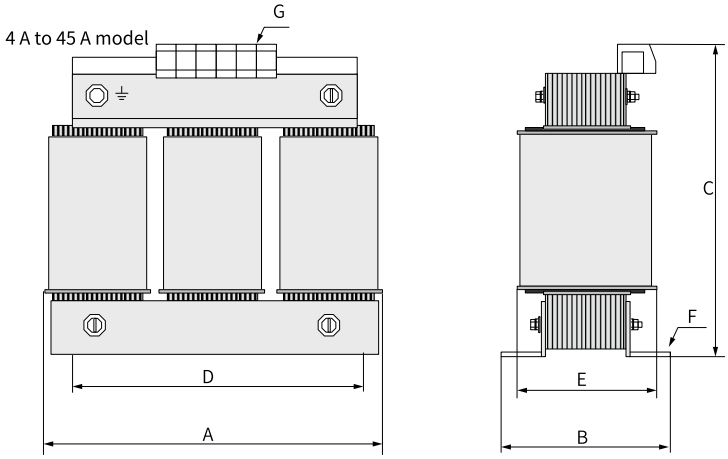


Figure 10-52 Dimensions of output reactors (4 A to 45 A)

Table 10–52 Dimensions of output reactors (4 A to 45 A, unit: mm)

Series	A	B	C	D	E	F	G
4 A and 7.8 A	100	Max. 60	Max. 115	56	34	4.8 x 9	2.5 mm^2
10 A	100	Max. 70	Max. 115	56	43	4.8 x 9	2.5 mm^2
14 A	125	Max. 70	Max. 135	100	45	5 x 8	2.5 mm^2
17 A	125	Max. 75	Max. 135	100	55	5 x 8	2.5 mm^2
24 A	125	Max. 75	Max. 135	100	55	5 x 8	4 mm^2
32 A	155	Max. 95	Max. 170	130	56	8 x 12	10 mm^2
45 A	155	Max. 110	Max. 190	130	72	8 x 12	10 mm^2

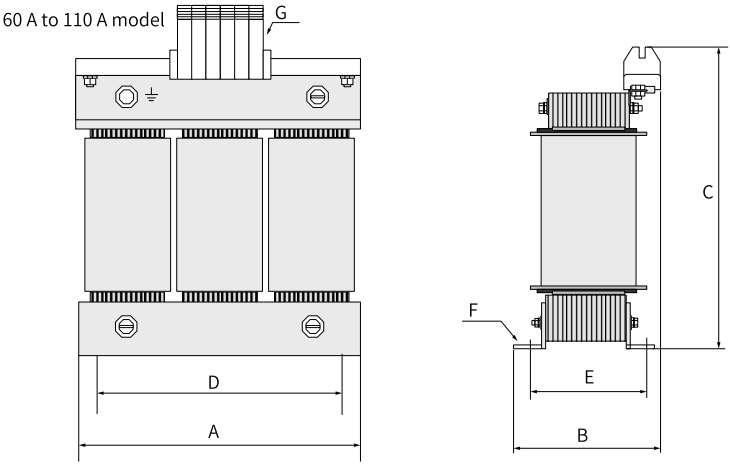


Figure 10-53 Dimensions of output reactors (60 A to 110 A)

Table 10–53 Dimensions of output reactors (60 A to 110 A, unit: mm)

Series	A	B	C	D	E	F	G
60 A and 72 A	155	Max. 125	Max. 190	130	70	8 x 12	16 mm^2
90 A	190	Max. 115	Max. 225	170	57	8 x 12	35 mm^2
110 A	190	Max. 130	Max. 220	170	67	8 x 12	35 mm^2

124 A to 1100 A model

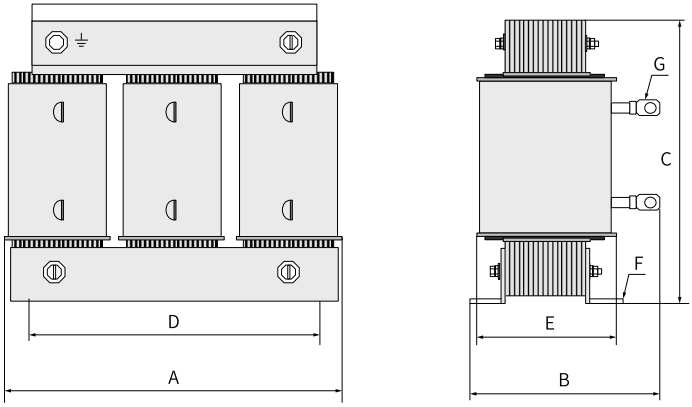


Figure 10-54 Dimensions of output reactors (124 A to 1100 A)

Table 10–54 Dimensions of output reactors (124 A to 1100 A, unit: mm)

Series	A	B	C	D	E	F	G
124 A	190	Max. 180	Max. 160	170	67	8 x 12	Φ8
143 A	190	Max. 180	Max. 160	170	77	8 x 12	Φ8
156 A and 170 A	190	Max. 180	Max. 160	170	77	8 x 12	Φ10
182 A	210	Max. 180	Max. 185	175	97	8 x 12	Φ10
230 A	240	220	220	190	119	11 x 15	Φ12
280 A	240	235	220	190	133	11 x 15	Φ12
330 A	240	240	220	190	135	11 x 15	Φ12
400 A and 500 A	240	220	325	190	119	11 x 15	Φ11
600 A and 680 A	240	230	325	190	128	11 x 15	Φ11
790 A	300	218	355	240	136	11 x 15	Φ11
910 A	300	228	355	240	148	11 x 15	Φ11
1100 A	360	250	380	310	144	11 x 15	Φ11

10.3.8Magnetic Ring and Ferrite Clamp

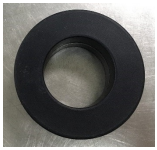
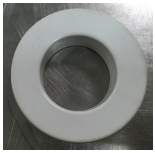
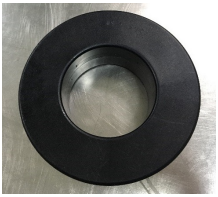
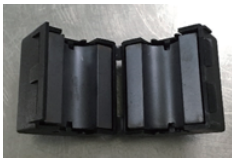
Models

The magnetic ring can be used on the input or output side of the AC drive. Install it as close to the AC drive as possible. When installed on the input side, the magnetic ring can suppress the noise in the input power supply system of the drive. When installed on the output side, the magnetic ring can suppress interference generated by the AC drive to external devices and reduce the bearing current.

In applications with leakage current and signal cable interference, install a magnetic ring or a ferrite clamp.

- Amorphous magnetic ring: featuring high permeability when the frequency is within 1 MHz and excellent anti-interference performance, but not as low-cost as the ferrite clamp
- Ferrite clamp: featuring high permeability when the frequency is above 1 MHz and excellent suppression performance on interference generated by low-power drives and signal cables

Table 10–55 Appearance and models of the magnetic ring and ferrite clamp

Category	Model	Appearance
Magnetic ring	DY644020H	
	DY805020H	
	DY1207030H	
Ferrite clamp	DYR-130-B	

Dimensions

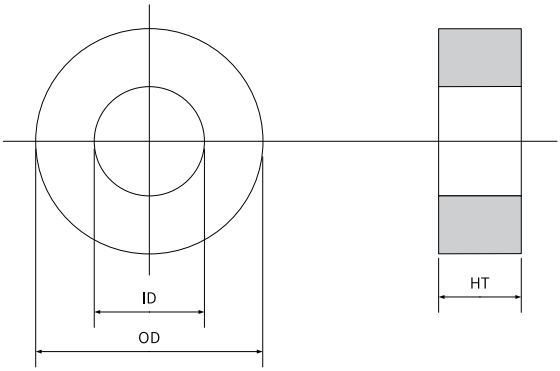


Figure 10-55 Dimensions of the magnetic ring

Table 10–56 Dimensions of the magnetic ring

Model	Dimension (OD x ID x HT) (mm)
DY644020H	64 x 40 x 20
DY805020H	80 x 50 x 20
DY1207030H	120 x 70 x 30

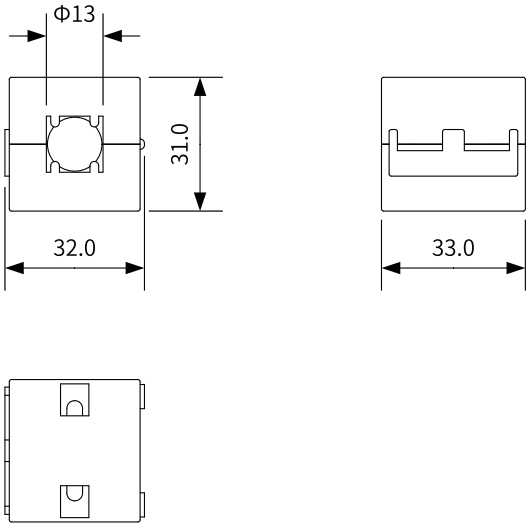
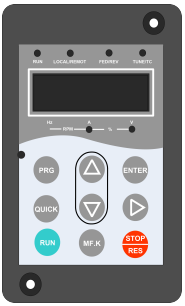


Figure 10-56 Dimensions of the ferrite clamp (unit: mm)

10.4 External Operating Panel

Model	Description	Appearance
MD32NKE1	It is an external LED operating panel applicable to the drive. It has the same operation mode as the operating panel on the drive and is easy for commissioning. For dimensions, see *"Figure 10-57 " on page 488* .	
MDKE9	It is an LCD operating panel (optional) through which you can copy and download parameters. The LCD operating panel offers an easy way of parameter modification and displays information in Chinese and English. It is easy to use. For dimensions, see *"Figure 10-58 " on page 488* .	

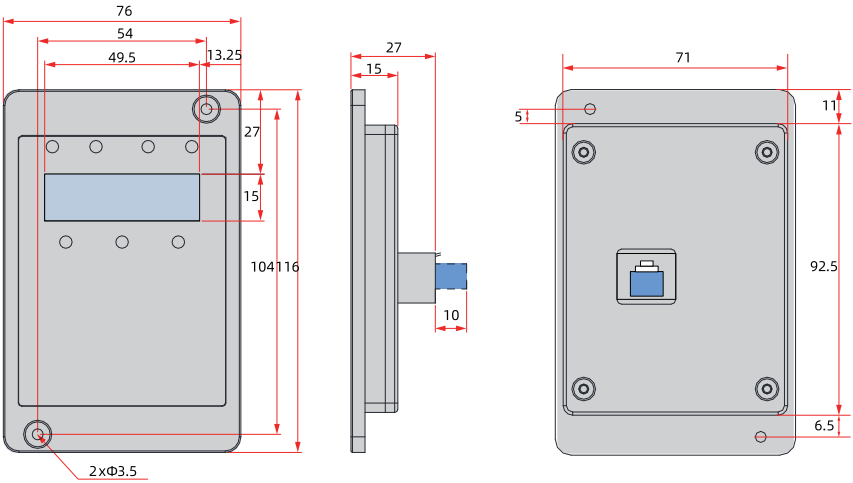


Figure 10-57 Dimensions (unit: mm) of the MD32NKE1

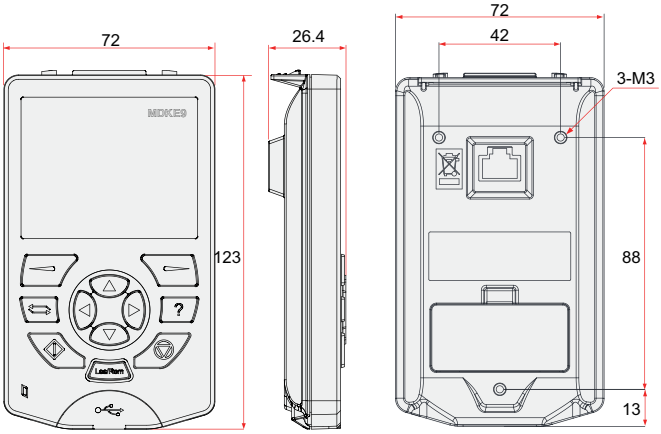


Figure 10-58 Dimensions (unit: mm) of the MDKE9

Note

The external operating panel connected to the drive does not support the display of FB and FD. Instead, it displays FB and FD as Fb and Fd, which correspond to the parameter groups FB and FD.

10.5 Expansion Card

The AC drive comes with four I/O expansion cards, one PC programmable card, and ten field bus cards (Modbus RTU, PROFIBUS DP, CANlink, CANopen, PROFINET, and EtherCAT). For details on functions of the cards, see *"10.1 Option List" on page 404*. Installation positions of the cards are shown in the figure below. Before installing the cards, remove the front cover of the AC drive.

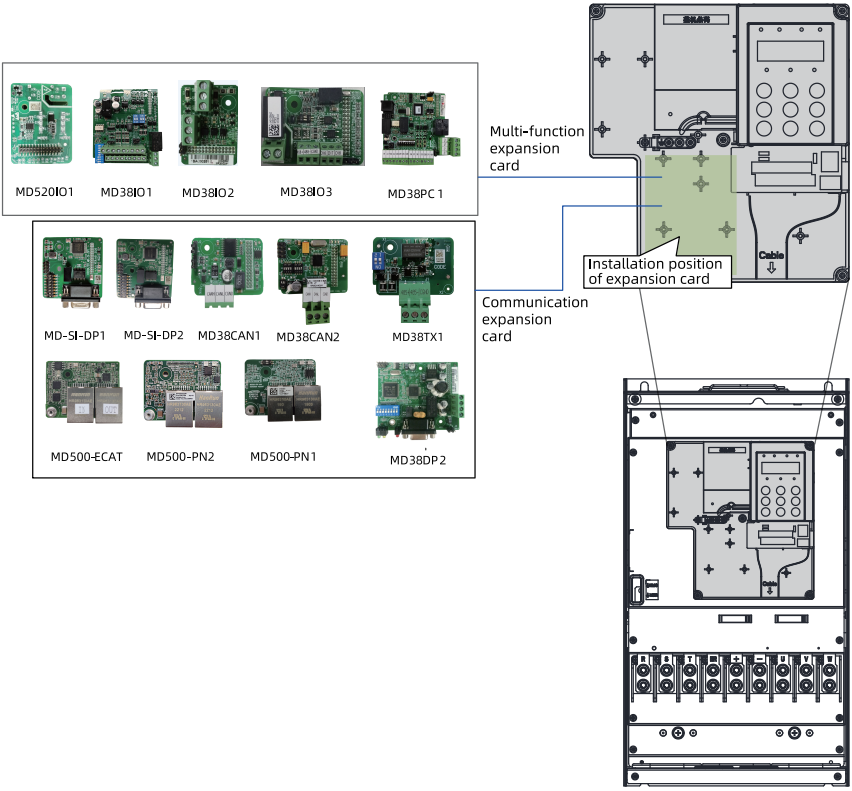


Figure 10-59 Installation positions of the expansion cards

10.6 Transparent Protective Cover

10.6.1Protective Cover Dimensions

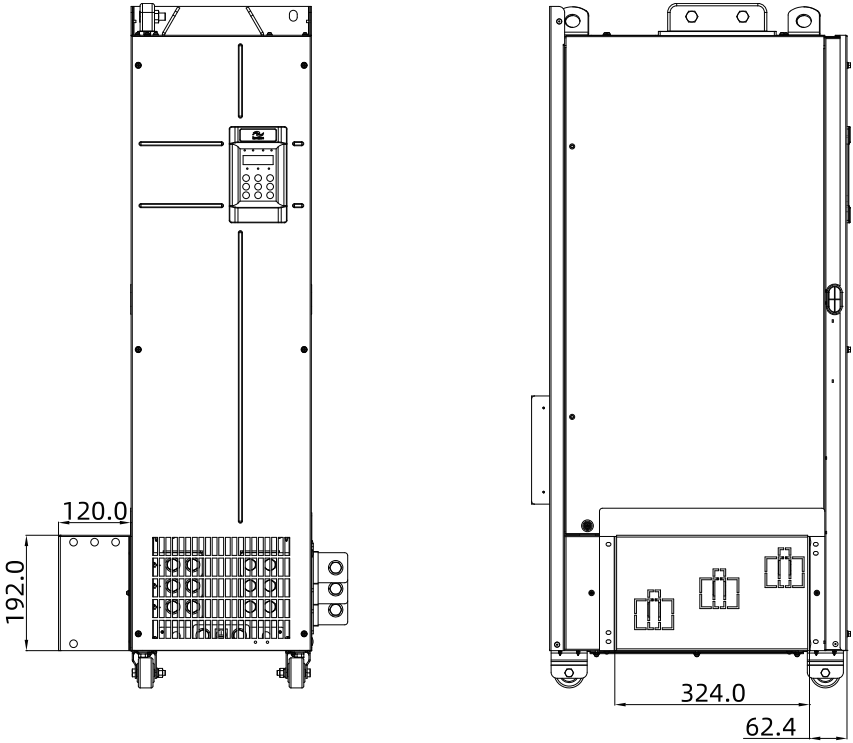


Figure 10-60 Dimensions of the transparent protective cover for T10 models (mm)

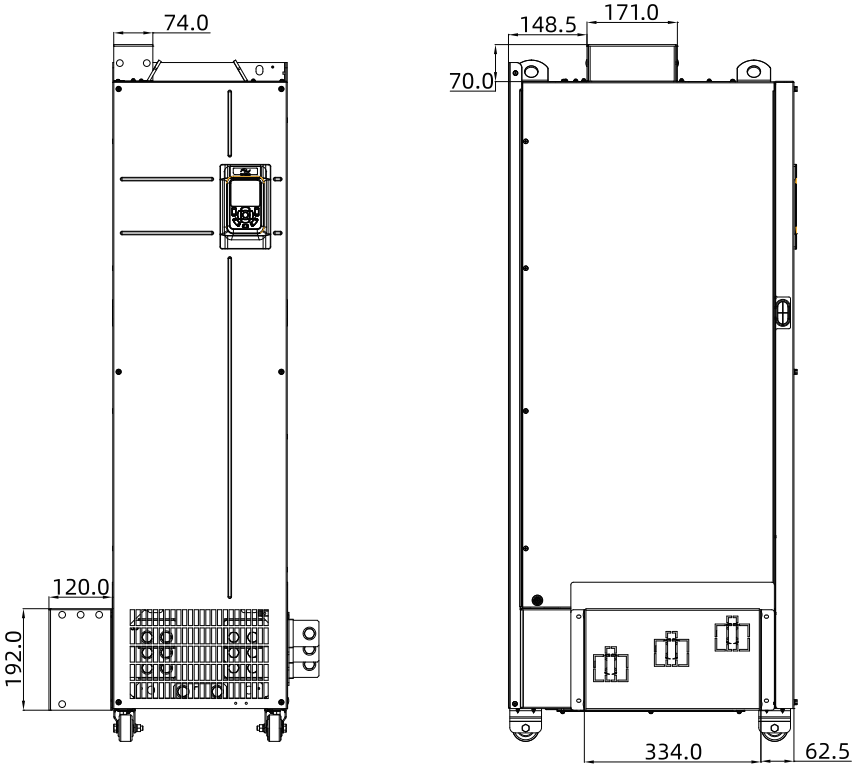


Figure 10-61 Dimensions of the transparent protective cover for T11 models (mm)

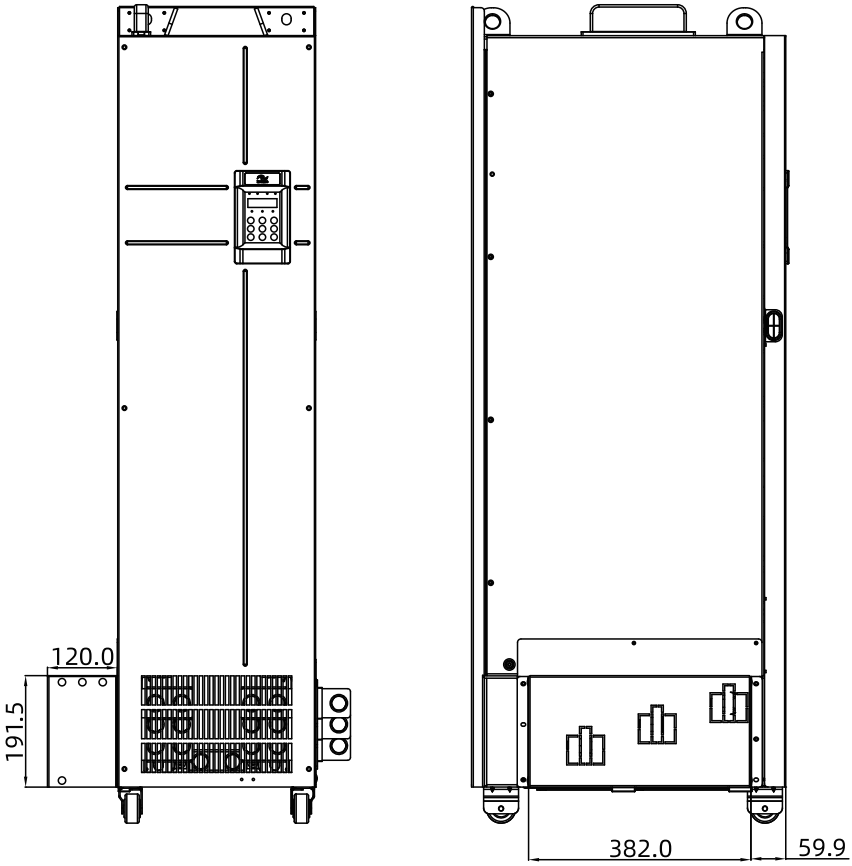
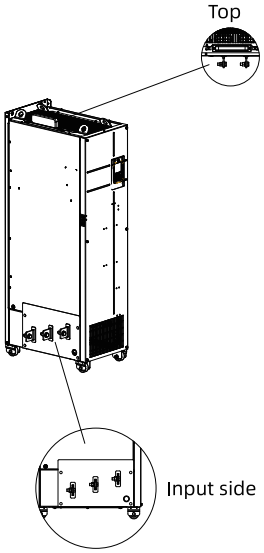


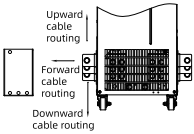
Figure 10-62 Dimensions of the transparent protective cover for T12 models (mm)

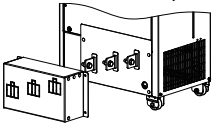
10.6.2Protective Cover Installation

1. Check the models that require the protective cover and the position of the protective cover. Only T11 models have the protective cover on the top.

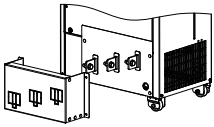


2. Confirm the cable outgoing direction on the input side.



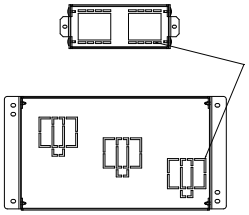


Installation direction of the cover for downward and forward cable routing

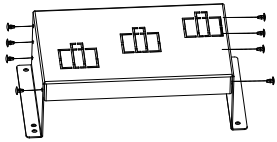


Installation direction of the cover for upward cable routing

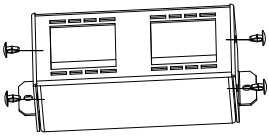
3. Nylon rivet is included in the package. Assemble the protective cover with the nylon rivet. Check whether to cut off the cable from the knockout according to cable outgoing requirements and cable diameter.



The cable output space can be manually cut according to actual requirements.

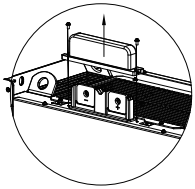


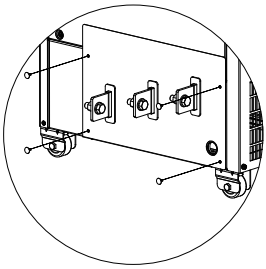
Input side cover



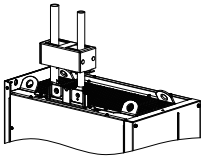
Top cover

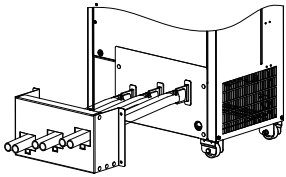
4. Use a Phillips screwdriver to remove the cover and screws on the top and use a slotted screwdriver to remove the four nylon rivets on the input side (different from the optional rivet).



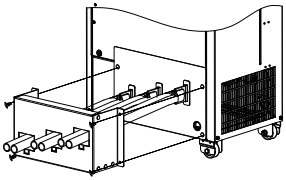


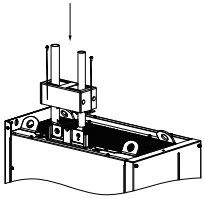
5. Before installing the equipment, make sure the cable outgoing direction. The front and top cables must be routed through the cover before locked.





6. Fix the protective cover on the input side with the nylon rivet delivered with the product, and fix the top cover with screws.





11 Communication

11.1 Parameter Communication Address

11.1.1 Introduction to Parameters

The AC drive supports six communication protocols, including Modbus RTU, CANopen, CANlink, PROFIBUS DP, PROFINET, and EtherCAT. The user-programmable card and point-to-point communication are derived from the CANlink protocol. The host controller allows users to control the AC drive, such as monitoring states, or viewing and changing parameters through these protocols. The communication data is classified into parameter data and non-parameter data. The non-parameter data includes operation commands, operation status, operation parameters, and alarm information.

Parameter data

Parameter data	Group F (read/write)	F0, F1, F2, F3, F4, F5, F6, F7, F8, F9, FA, FB, FC, FD, FE, and FF
	Group A (read/write)	A0, A1, A2, A3, A4, A5, A6, A7, A8, A9, AA, AB, AC, AD, AE, and AF

The communication addresses of parameter data are defined as follows:

1. Reading parameter data through communication
   For groups F0 to FF and A0 to AF, the high-order 8 bits of the communication address indicate the group number and the low-order 8 bits indicate the parameter number.

   Example:

   The communication address of F0-16 is F010H, where F0H represents group F0 and 10H is the hexadecimal data format of serial number 16 in the group.

   The communication address of AC-08 is AC08, where ACH represents group AC and 08H is the hexadecimal data format of serial number 8 in the group.

2. Writing parameter data through communication
   For parameters in groups F0 to FF, the high-order 8 bits of the communication address are 00 to 0F or F0 to FF, depending on whether the parameter is written to the EEPROM. The low-order 8 bits indicate the parameter number in the group.

   Take writing F0-16 as an example.

   If F0-16 does not need to be written to the EEPROM, the communication address is 0010H.

   If F0-16 needs to be written to the EEPROM, the communication address is F010H.

For parameters in groups A0 to AF, the high-order 8 bits of the communication address are 40 to 4F or A0 to AF, depending on whether the parameter is written to the EEPROM. The low-order 8 bits indicate the parameter number in the group.

Take writing AC-08 as an example.

If AC-08 does not need to be written to the EEPROM, the communication address is 4C08H.

If AC-08 needs to be written to the EEPROM, the communication address is AC08H .

Non-parameter data

Non-parameter data	Status data (read-only)	Monitoring parameters in group U, AC drive fault description, and AC drive running status
	Control parameters (write-only)	Control commands, communication references, DO control, AO1 control, AO2 control, high-speed pulse (FMP) output control, and parameter initialization

1. Status data

   Status data includes group U (monitoring parameters), AC drive fault description, and AC drive running status.

   - Group U (monitoring parameters)

     For group U0 to UF, the high-order 8 bits of the communication address is 70 to 7F, and the low-order 8 bits indicate the parameter number in the group. For example, the communication address of U0-11 is 700BH.

   - AC drive fault description:

     When the AC drive fault description is read via communication, the communication address is fixed to 8000H. The host controller can obtain the current fault code of the AC drive by reading the address. For the fault code description, see definitions of F9-14.

   - AC drive running status

     When the operating status of the drive is read through communication, the communication address is fixed to 3000H. The host controller can obtain the current operating status of the drive by reading the address. The communication address is defined as follows.

Communication address of the operating status	Definition of the status word
3000H	1: Forward run
	2: Reverse run
	3: Stop
	4: Auto-tuning
	5: Fault

2. Control parameters

Control parameters are divided into control commands, communication setpoint, DO control, AO1 control, AO2 control, and parameter initialization.

- Control commands

  When F0-02 (command source) is set to 2 (communication control), the host controller can implement control such as start/stop of the AC drive by using the communication address. The control command is defined as follows.

Communication address of the operating status	Definition of the status word
2000H	1: Forward run 2: Reverse run 3: Forward jog 4: Reverse jog 5: Coast to stop 6: Decelerate to stop 7: Reset upon fault

- References set through communication

  The communication setting values apply when the frequency, torque upper limit, voltage source in decoupled V/f mode, PID reference, and PID feedback of the AC drive are set through communication The communication address is 1000H. When the communication address is set through the host controller, the data range of the address is -10000 to 10000, corresponding to -100.00% to 100.00% of the reference.

- DO control

  When the DO is assigned with function 20, the host controller can control the DO of the AC drive through the communication address in the communication control mode. The communication address is defined as follows.

Communication address for DO control	Command
2001H	Bit 0: DO1 control Bit 1: DO2 control Bit 2: Relay 1 output control Bit 3: Relay 2 output control Bit 4: FMR output control Bit 5: VDO1 Bit 6: VDO2 Bit 7: VDO3 Bit 8: VDO4 Bit 9: VDO5

- Analog output AO1, AO2, high-speed pulse (FMP) output control

  When AO1, AO2, and high-speed pulse output FMP terminals are assigned with function 12, the host controller can control the AO and FMP terminal through the

communication address in the communication control mode. The communication address is defined as follows.

Communication address for AO and FMP terminal control		Command
AO1	2002H	0 to 7FFF represent 0% to 100%.
AO2	2003H	
FMP	2004H	

- Parameters initialization
  This function is required when you need to initialize parameters of the drive through the host controller.

  If FP-00 (User password) is set to a non-zero value, the password needs to be verified through communication. After successful password verification, the host controller performs parameter initialization within 30s.

  The communication address of password verification through communication is 1F00H. Directly write the correct user password to this address to perform password verification. The communication address of parameter initialization through communication is 1F01H, as defined in the following table.

Communication address for parameter initialization	Command function
1F01H	1: Restore to factory settings 2: Clear records 4: Restore user backup parameters 501: Back up current user parameters

11.1.2Modbus Communication Protocol

Overview

The AC drive provides RS485 communication interfaces and supports the Modbus RTU slave communication protocol. You can carry out centralized control by using a PC or PLC and set the running commands, modify or read parameters, and read the operating status and fault information of the AC drive through the communication protocol.

This protocol defines content and format of information transmitted during serial communication, including the master polling (or broadcasting) format and master coding method for the action, transmission data, and error check. The slave response uses the same structure including action confirmation, returned data, and error check. If an error occurs when the slave receives a message, or the slave cannot complete the action required by the master, the slave returns a fault message as a response to the master.

Application mode

The drive, acting as a communication slave, is connected to a PC/PLC control network consisting of one master and multiple slaves and RS485 bus.

Hardware port

The RS485 expansion card MD38TX1 must be inserted into the AC drive.

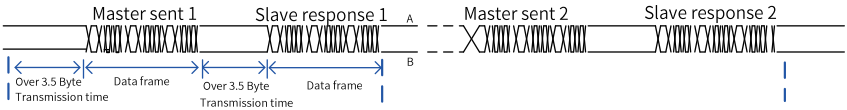
Topology

The system consists of one master and multiple slaves. In the network, each communication device has a unique address. One of the devices (usually a PC host controller, a PLC, or an HMI) acts as the master to initiate communication and reads or writes parameters of the slave. Other devices act as slaves to respond to the query or operations from the master. At the same moment, only one device can transmit data and the other can only receive data.

The address range of the slaves is 1 to 247, and 0 is a broadcast address. A slave address must be unique in the network.

Communication transmission mode

The asynchronous serial and half-duplex transmission mode are used. During asynchronous serial communication, data is sent frame by frame in the form of packets. According to the Modbus RTU protocol, an interval that is longer than the transmission time of 3.5 bytes on the communication data line marks the start of a new communication frame.



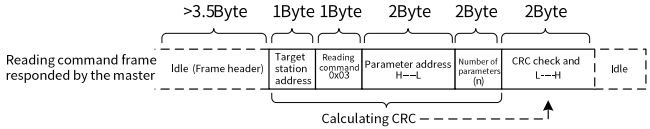
The built-in communication protocol of the AC drive is the Modbus RTU slave communication protocol, which allows the AC drive to respond to the query command from the master or execute the action according to query command from the master and respond with communication data.

A master can be a PC, an industrial control device, or a PLC, etc. The master can separately communicate with a slave or issue broadcast information to all slaves. When the master sends a query command to a single slave, the slave needs to return a response frame. For a broadcast message sent by the master, the slaves do not need to return a response to the master.

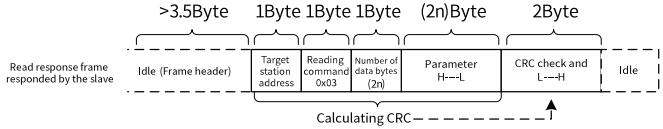
11.1.3Communication Data Frame Structure

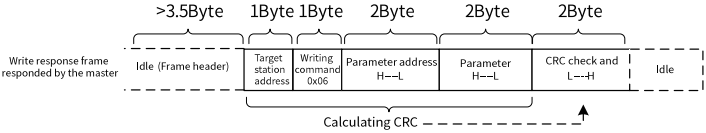
The following figure shows the communication data format of the Modbus RTU protocol. The AC drive supports reading or writing only of word type parameters, and does not

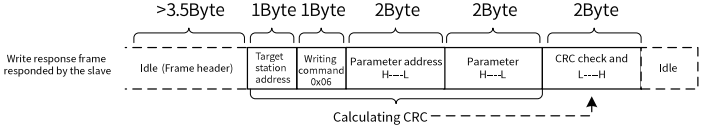
support reading or writing of bytes or bits. The read operation command is 0x03, the write operation command is 0x06, and the multi-data write operation command is 0x10.

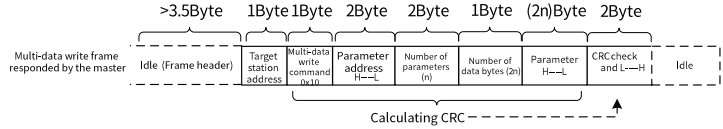


In theory, the host controller can read or write a maximum of 12 consecutive parameters. However, these parameters must be in the same group. Otherwise, an error will be reported in the response.

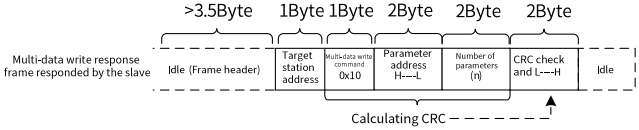








A maximum of 12 consecutive parameters can be read or written.



If the slave detects a communication frame error or a reading/writing failure caused by other reasons, an error frame will be returned.

Note

CRC check errors will not be responded.

The Modbus mode is the standard Modbus protocol.

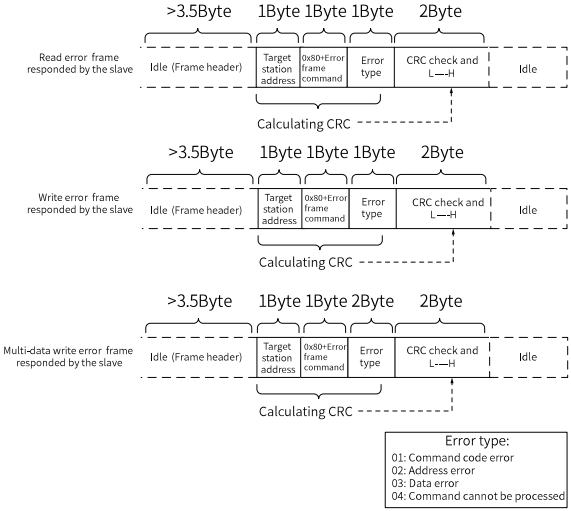


Table 11–1 Data frame fields

Data frame field	Description
Frame header (START)	Longer than the time for transmitting 3.5 bytes
Slave address (ADR)	Communication address range: 1 to 247; 0: Broadcast address
Command code (CMD)	03: Read a slave parameter; 06: Write a slave parameter; 10: Write multiple slave parameters

Data frame field	Description
Parameter address (H)	Internal parameter address of the drive are in hexadecimal format, which are divided into parameter type and non-parameter type (such as running status parameters and running commands). See the address definition for details. Low-order bytes follow high-order bytes during transmission.
Parameter address (L)	
Number of parameters (H)	Number of parameters read in this frame. 1 indicates that one parameter is read. Low-order bytes follow high-order bytes during transmission. Only one parameter can be modified at a time. This field does not exist.
Number of parameters (L)	
Number of data bytes	Data length, which is twice the number of parameters
Data (H)	Response data or data to be written. Low-order bytes follow high-order bytes during transmission.
Data (L)	
CRC low-order bit	Detection value: CRC16 check value. During transmission, high-order bytes follow low-order bytes. For details about the calculation method, see the description of CRC in this section.
CRC high-order bit	
END	Time for transmitting 3.5 bytes

CRC method:

The cyclical redundancy check (CRC) adopts the RTU frame format. A Modbus message includes a CRC-based error check field. The CRC field checks the content of the entire message. The CRC field is two bytes, containing a 16-bit binary value. It is added to the message after being calculated by the transmission device. The reception device recalculates the CRC value in the message, and compares the calculated value with the CRC value in the received CRC field. If the two CRC values are different, transmission errors occur.

The CRC is first stored to 0xFFFF. Then a procedure is invoked to process the consecutive 8-bit byte in the message and the value in the register. Only the 8-bit data in each character is valid for the CRC. The start bit, stop bit and the parity bit do not apply to the CRC.

During generation of CRC, every bit is in exclusive or (XOR) with the content in the register. The result is shifted to the least significant bit (LSB), and 0 is filled in the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB is 1, the register then performs XOR with a preset value. If the LSB is 0, no XOR is performed. This process is repeated eight times. After the last bit (eighth bit) is done, the next byte is in XOR with the register's current value. The final value in the register is the CRC value after all the bytes in the message are executed.

The CRC is added to a message from the low-order byte to the high-order byte. A simple function for the CRC is as follows:

unsigned int crc_chk_value（unsigned char *data_value, unsigned char length）

```
{
unsigned int crc_value=0xFFFF;
    int i;
    while（length- -）
      {
          crc_value^=*data_value++;
           for（i=0;i<8;i++）
          {
               if（crc_value&0x0001）
                   {
                     crc_value= (crc_value>>1) ^0xa001;
               }
               else
               {
                     crc_value=crc_value>>1;
               }
          }
    }
return（crc_value）;
}
```

Definition of communication parameter addresses:

The parameters can be read and written (except those which cannot be changed because they are only for factory use or monitoring).

11.1.4Parameter Address Representation Rules

The parameter group number and parameter identification number are used to represent parameter addresses.

High-order byte: F0 to FF (group F), A0 to AF (group A), 70 to 7F (group U)

Low-order bytes: 00 to FF

For example, to access F3-12, the communication address of F3-12 is expressed as 0xF30C.

Group FF: Parameters cannot be read or modified. Group U: Parameters are ready-only and cannot be modified.

Some parameters cannot be modified when the AC drive is running. Some parameters cannot be modified regardless of the status of the AC drive. When modifying a parameter, pay attention to the range, unit, and description of the parameter.

Group No.	Access address	Parameter address in RAM modified via communication
F0 to FE	0xF000 to 0xFEFF	0x0000 to 0x0EFF
A0 to AC	0xA000 to 0xACFF	0x4000 to 0x4CFF
U0	0x7000 to 0x70FF	-

Note

Frequent storing to the EEPROM reduces its service life. Therefore, in communication mode, users can change values of certain parameters in RAM without storing the settings.

It takes about 15 ms to read and write a parameter per time. Frequent operations to the EEPROM may cause data interaction (read-write) failure.

For parameters in group F, if you want to change a parameter through communication without saving it to the EEPROM, change the high-order F of the parameter address to 0. For parameters in group A, if you want to change a parameter through communication without saving it to the EEPROM, change the high-order A of the parameter address to 4.

The parameter addresses are represented as follows:

High-order bytes: 00 to 0F (group F), 40 to 4F (group A)

Low-order bytes: 00 to FF

Example:

If the parameter F3-12 is not stored to the EEPROM, the address is expressed as 030C. If the parameter A0-05 is not stored to the EEPROM, the address is expressed as 4005. This address indicates that the parameter can only be written to RAM. It is invalid when the parameter is read from RAM.

The following table lists some stop/running parameters.

Parameter address	Parameter description	Parameter address	Parameter description
1000H	*Communication setting value (decimal) (write-only) -10000 to 10000	1010H	PID reference
1001H	Operating frequency	1011H	PID feedback
1002H	Bus voltage	1012H	PLC stage
1003H	Output voltage	1013H	Pulse input frequency (unit: 0.01 kHz)
1004H	Output current	1014H	Feedback speed (unit: 0.1 Hz)
1005H	Output power	1015H	Remaining running time
1006H	Reserved	1016H	AI1 voltage before correction

Parameter address	Parameter description	Parameter address	Parameter description
1007H	Running speed	1017H	AI2 voltage before correction
1008H	DI input flag	1018H	AI3 voltage before correction
1009H	DO output flag	1019H	Linear speed
100AH	AI1 voltage	101AH	Current power-on time
100BH	AI2 voltage	101BH	Current operating time
100CH	AI3 voltage	101CH	Pulse input frequency (unit: 1 Hz)
100DH	Counting value input	101DH	Communication setting value (read-only)
100EH	Length value input	101EH	Actual feedback speed
100FH	Load speed	101FH	Display of main frequency X
-	-	1020H	Display of auxiliary frequency Y

Note

- The reference set through communication is a relative percentage. The value 10000 corresponds to 100.00%, and -10000 corresponds to -100.00%.
- For frequency dimension data, this percentage corresponds to the maximum frequency (F0-10).
- F0-03, F0-04, F0-11, FA-00, and FA-02 are set by H1000 through communication. However, only one parameter can be set through communication at a time. If all the above parameters need to set through communication, use the following method.Take F0-03 and F0-11 as examples.If F0-03 is set to 9, the operating frequency is controlled by H1000. Then F0-11 cannot be set to 5 and can be set to 0. In this case, you can modify the value of F0-12 through communication.

Control command input to the drive (write-only)

Command word address	Command function
2000H	0001: Forward run
	0002: Reverse run
	0003: Forward jog
	0004: Reverse jog
	0005: Coast to stop
	0006: Stop according to the stop mode specified by F6-10
	0007: Reset upon fault

Read AC drive state (read-only)

Status word address	State word function
3000H	0001: Forward run
	0002: Reverse run
	0003: Stop
	0004: Auto-tuning
	0005: Fault

Parameter lock password check: If the actual password value is returned, password verification is passed. If password protection is not applied (FP-00 = 0), the returned value is 0000H.

Password address	Password
1F00H	*****

DO control (write-only)

Command address	Command	
2001H	Bit 0: DO1 output control Bit 1: DO2 output control Bit 2: Relay 1 output control Bit 3: Relay 2 output control Bit 4: FMR output control	Bit 5: VDO1 Bit 6: VDO2 Bit 7: VDO3 Bit 8: VDO4 Bit 9: VDO5

AO1 control (write-only)

Command address	Command
2002H	0 to 7FFF represent 0% to 100%.

AO2 control (write-only)

Command address	Command
2003H	0 to 7FFF represent 0% to 100%.

Pulse output control (write-only)

Command address	Command
2004H	0 to 7FFF represent 0% to 100%.

AC drive fault description

Fault address	Fault information	
8000H	0000: Normal 0001: Reserved 0002: Overcurrent during acceleration 0003: Overcurrent during deceleration 0004: Overcurrent during operation at constant speed 0005: Overvoltage during acceleration 0006: Overvoltage during deceleration 0007: Overvoltage during operation at constant speed 0008: Pre-charge resistor overload 0009: Undervoltage 000A: Drive overload 000B: Motor overload 000C: Input phase loss 000D: Output phase loss 000E: Module overtemperature 000F: External fault 0010: Communication fault	0011: Contactor fault 0012: Current detection fault 0013: Motor auto-tuning fault 0015: Parameter read-write error 0016: AC drive hardware fault 0017: Motor short-circuited to ground 0018: Reserved 0019: Reserved 001A: Operating time reached 001B: User-defined fault 1 001C: User-defined fault 2 001D: Power-on time reach 001E: Load loss 001F: PID feedback loss during operation 0028: Fast current limit timeout 0029: Motor switchover fault during running 002D: Motor overtemperature

11.1.5Descriptions of Communication Parameters in Group FD

Parameter FD-00 is used to set transmission speed between the host controller and the drive. Note that the baud rate of the host controller must be the same as that of the AC drive. Otherwise, communication will fail. A larger baud rate indicates faster communication speed.

Parameter code	Parameter name	Default	Value range
FD-00	Baud rate	5005	Ones: Modbus 0: 300 bps 1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps 5: 9600 bps 6: 19200 bps 7: 38400 bps 8: 57600 bps 9: 115200 bps Tens: PROFIBUS DP 0: 115200 bps 1: 208300 bps 2: 256000bps 3: 512000bps Hundreds: Reserved Thousands: CANlink 0: 20 kbps 1: 50 kbps 2: 100 kbps 3: 125 kbps 4: 250 kbps 5: 500 kbps 6: 1 Mbps

The data format on the host controller must be the same as that on the AC drive. Otherwise, the host controller and AC drive cannot communicate with each other.

Parameter code	Parameter name	Default	Value range
FD-01	Data format	0	0: No check (8-N-2) 1: Even parity check (8-E-1) 2: Odd parity check (8-O-1) 3: No check (8-N-1)

When the local address is set to 0 (broadcast address), the AC drive communicates with the host controller in broadcast mode. The local address is unique (except the broadcast address), which is the basis for point-to-point communication between the host controller and the AC drive.

Parameter code	Parameter name	Default	Value range
FD-02	Local address	1	1-247 (0 indicates the broadcast address.)

Response delay defines the interval from when the AC drive finishes receiving data to when it sends data to the host controller. If the response delay is shorter than the system processing time, the system processing time will prevail. If the response delay is longer than the system processing time, the drive will not send data to the host controller unless the response delay elapses.

Parameter code	Parameter name	Default	Value range
FD-03	Response delay	2 ms	0 ms to 20 ms

When FD-04 is set to 0.0s, the communication timeout parameter is invalid.

When FD-04 is set to a non-zero value and the interval between two consecutive communication exceeds the value of FD-04, Err16 (communication error) will be reported. Generally, set it to 0.0s. In a system with continuous communication, you can monitor the communication status by setting this parameter.

Parameter code	Parameter name	Default	Value range
FD-04	Communication timeout time	0.0s	0.0s (invalid) 0.1s to 60.0s

If FD-05 is set to 1, the standard Modbus protocol applies. For details, see *" FD-05" on page 757*.

If FD-05 is set to 0 (non-standard Modbus protocol), for the read command, the number of bytes returned by the slave in the non-standard Modbus protocol is one byte more than that in the standard Modbus protocol. For the read/write command, the number of bytes returned by the slave in the non-standard Modbus protocol is the same as that in the standard Modbus protocol.

Parameter code	Parameter name	Default	Value range
FD-05	Modbus and PROFIBUS DP communication data format	0	0: Non-standard Modbus protocol 1: Standard Modbus protocol

FD-06 is used to determine the current unit when the output current is read through communication.

Parameter code	Parameter name	Default	Value range
FD-06	Current resolution read through communication	0	0: 0.01 A (active when the power is lower than or equal to 55 kW) 1: 0.1 A (active when the power is higher than 55 kW)

When FD-08 is set to 0.0s, the communication (PROFIBUS DP/PROFINET/CANopen) timeout time is invalid. Generally, set it to 0.0s. This parameter is used to monitor communication status in a system with continuous communication.

When it is set to an effective value, if communication interval time between current communication and the next communication exceeds FD-08, the system reports a communication fault (Err16).

Parameter code	Parameter name	Default	Value range
FD-08	CANlink communication timeout	0.0	0.0 to 60.0

12 List of Parameters

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F0-00	0xF000	G/P model	1: G model: Heavy load application 2: P model: Light load application	2	-	At stop	" F0-00" on page 577
F0-01	0xF001	Motor 1 control mode	2: V/f control	2	-	Unchangeable	" F0-01" on page 577
F0-02	0xF002	Command source	0: Operating panel 1: Terminal 2: Communication	0	-	Real time	" F0-02" on page 577
F0-03	0xF003	Selection of main frequency source X	0: Digital setting (preset frequency F0-08, which can be changed by UP/DOWN keys; non-retentive upon power failure) 1: Digital setting (preset frequency F0-08, which can be changed by UP/DOWN keys; retentive upon power failure) 2: AI1 3: AI2 4: AI3 5: Pulse (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication	0	-	At stop	" F0-03" on page 578
F0-04	0xF004	Selection of auxiliary frequency source Y	Same as F0-03.	0	-	At stop	" F0-04" on page 580
F0-05	0xF005	Base value of auxiliary frequency Y range upon superposition	0: Relative to maximum frequency 1: Relative to main frequency X	0	-	Real time	" F0-05" on page 582
F0-06	0xF006	Range of auxiliary frequency Y upon superposition	0% to 150%	100	%	Real time	" F0-06" on page 583

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F0-07	0xF007	Frequency superposition selection	Ones: Frequency reference selection 0: Main frequency X 1: Main and auxiliary frequency operation result (based on tens place) 2: Switchover between the main frequency X and the auxiliary frequency Y 3: Switchover between the main frequency X and the main and auxiliary frequency operation result 4: Switchover between the auxiliary frequency Y and the main and auxiliary frequency operation result Tens: Main and auxiliary frequency operation 0: Main frequency + Auxiliary frequency 1: Main frequency - Auxiliary frequency 2: Max. (main frequency, auxiliary frequency) 3: Min. (main frequency, auxiliary frequency)	0	-	Real time	" F0-07" on page 583
F0-08	0xF008	Preset frequency	0.00 Hz to F0-10	50.00	Hz	Real time	" F0-08" on page 585
F0-09	0xF009	Running direction	0: Default direction 1: Opposite to the default direction	0	-	Real time	" F0-09" on page 585
F0-10	0xF00A	Maximum frequency	50.00 Hz to 500.00 Hz	50.00	Hz	At stop	" F0-10" on page 586
F0-11	0xF00B	Source of frequency upper limit	0: F0-12 1: AI1 2: AI2 3: AI3 4: Pulse 5: Communication	0	-	At stop	" F0-11" on page 586
F0-12	0xF00C	Frequency upper limit	F0-14 to F0-10	50.00	Hz	Real time	" F0-12" on page 587
F0-13	0xF00D	Frequency upper limit offset	0.00 Hz to F0-10	0.00	Hz	Real time	" F0-13" on page 587

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F0-14	0xF00E	Frequency lower limit	0.00 Hz to F0-12	0.00	Hz	Real time	" F0-14" on page 587
F0-15	0xF00F	Carrier frequency	0.5 kHz to 16.0 kHz	6.0	kHz	Real time	" F0-15" on page 588
F0-16	0xF010	Carrier frequency change with temperature	0: No 1: Yes	1	-	Real time	" F0-16" on page 588
F0-17	0xF011	Acceleration time 1	0.0 to 6500.0	20.0	s	Real time	" F0-17" on page 589
F0-18	0xF012	Deceleration time 1	0.0 to 6500.0	20.0	s	Real time	" F0-18" on page 589
F0-19	0xF013	Acceleration/ Deceleration time unit	0: 1s 1: 0.1s 2: 0.01s	1	s	At stop	" F0-19" on page 590
F0-21	0xF015	Auxiliary frequency offset upon superposition	0.00 Hz to F0-10	0.00	Hz	Real time	" F0-21" on page 590
F0-22	0xF016	Decimal places of frequency reference	0: 1 Hz 1: 0.1 Hz 2: 0.01 Hz	2	Hz	Unchangeable	" F0-22" on page 591
F0-23	0xF017	Retention of digital setting frequency upon stop	0: Non-retentive 1: Retentive	0	-	Real time	" F0-23" on page 591
F0-24	0xF018	Motor parameter group selection	0: Motor parameter group 1 1: Motor parameter group 2	0	-	At stop	" F0-24" on page 592
F0-25	0xF019	Base frequency for acceleration/ deceleration time	0: Maximum frequency (F0-10) 1: Frequency reference 2: 100 Hz	0	-	At stop	" F0-25" on page 592
F0-26	0xF01A	Base value for frequency adjusted by UP/DOWN key during operation	0: Running frequency 1: Frequency reference	0	-	At stop	" F0-26" on page 592

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F0-27	0xF01B	Bind command source to frequency source	Ones: Bind the command source of the operating panel to the frequency source 0: Unbound 1: Digital setting frequency 2: AI1 3: AI2 4: AI3 5: Pulse (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication Tens: Bind the command source of the terminal to the frequency source 0: Unbound 1: Digital setting frequency 2: AI1 3: AI2 4: AI3 5: Pulse (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication Hundreds: Bind the command source of the communication to the frequency source 0: Unbound 1: Digital setting frequency 2: AI1 3: AI2 4: AI3 5: Pulse (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication	0	-	Real time	*" F0-27" on page 593*
F0-28	0xF01C	Communication protocol selection	0: Modbus protocol 1: Extension communication protocol	0	-	At stop	*" F0-28" on page 595*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F1-00	0xF100	Motor type	0: Common asynchronous motor 1: Variable frequency asynchronous motor	0	-	At stop	"F1-00" on page 596
F1-01	0xF101	Rated motor power	0.1 kW to 1000.0 kW	3.7	kW	At stop	"F1-01" on page 596
F1-02	0xF102	Rated motor voltage	1 V to 2000 V	380	V	At stop	"F1-02" on page 597
F1-03	0xF103	Rated motor current	0.01 A to 655.35 A	9.00	A	At stop	"F1-03" on page 597
F1-04	0xF104	Rated motor frequency	0.01 Hz to F0-10	50.00	Hz	At stop	"F1-04" on page 597
F1-05	0xF105	Rated motor speed	1 rpm to 65535 rpm	1460	rpm	At stop	"F1-05" on page 598
F1-06	0xF106	Stator resistance of asynchronous motor	0.001 Ω to 65.535 Ω	1.204	Ω	At stop	"F1-06" on page 598
F1-07	0xF107	Rotor resistance of asynchronous motor	0.001 Ω to 65.535 Ω	0.908	Ω	At stop	"F1-07" on page 598
F1-08	0xF108	Leakage inductance of asynchronous motor	0.01mH to 655.35mH	5.28	mH	At stop	"F1-08" on page 599
F1-09	0xF109	Mutual inductance of asynchronous motor	0.1mH to 6553.5mH	158.6	mH	At stop	"F1-09" on page 599
F1-10	0xF10A	No-load current of asynchronous motor	0.01 A to F1-03	4.24	A	At stop	"F1-10" on page 600
F1-37	0xF125	Parameter auto-tuning selection	0: No auto-tuning 1: Auto-tuning of some asynchronous motor parameters in static state 2: Auto-tuning of all asynchronous motor parameters in dynamic state 3: Auto-tuning of all asynchronous motor parameters in static state	0	-	At stop	"F1-37" on page 600

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F3-00	0xF300	V/f curve setting	0: V/f line 1: Multi-point V/f curve 2: Square V/f curve 3: 1.2-power V/f curve 4: 1.4-power V/f curve 6: 1.6-power V/f curve 8: 1.8-power V/f curve 9: Reserved 10: V/f fully-decoupled mode 11: V/f half-decoupled mode	0	-	At stop	" F3-00" on page 602
F3-01	0xF301	Torque boost	0.0% to 30.0%	1.0	%	Real time	" F3-01" on page 603
F3-02	0xF302	Cut-off frequency of torque boost	0.00 Hz to F0-10	50.00	Hz	At stop	" F3-02" on page 604
F3-03	0xF303	Frequency 1 on multi-point V/f curve	0.00 Hz to F3-05	0.00	Hz	At stop	" F3-03" on page 604
F3-04	0xF304	Voltage 1 on multi-point V/f curve	0.0% to 100.0%	0.0	%	At stop	" F3-04" on page 604
F3-05	0xF305	Frequency 2 on multi-point V/f curve	F3-03 to F3-07	0.00	Hz	At stop	" F3-05" on page 604
F3-06	0xF306	Voltage 2 on multi-point V/f curve	0.0% to 100.0%	0.0	%	At stop	" F3-06" on page 605
F3-07	0xF307	Frequency 3 on multi-point V/f curve	F3-05 to F1-04	0.00	Hz	At stop	" F3-07" on page 605
F3-08	0xF308	Voltage 3 on multi-point V/f curve	0.0% to 100.0%	0.0	%	At stop	" F3-08" on page 605
F3-09	0xF309	Slip compensation factor	0.0% to 200.0%	0.0	%	Real time	" F3-09" on page 606
F3-10	0xF30A	Overexcitation gain in V/f mode	0-200	64	-	Real time	" F3-10" on page 606
F3-11	0xF30B	Oscillation suppression gain in V/f mode	0-100	0	-	Real time	" F3-11" on page 606
F3-13	0xF30D	Voltage source in V/f decoupled mode	0: Digital setting (F3-14) 1: AI1 2: AI2 3: AI3 4: Pulse (DI5) 5: Multi-reference 6: Simple PLC 7: PID 8: Communication	0	-	Real time	" F3-13" on page 606

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F3-14	0xF30E	Voltage digital setting in V/f decoupled mode	0 V to F1-02	0	V	Real time	"F3-14" on page 608
F3-15	0xF30F	Voltage rise time in V/f decoupled mode	0.0s to 1000.0s	0.0	s	Real time	"F3-15" on page 608
F3-16	0xF310	Voltage decline time in V/f decoupled mode	0.0s to 1000.0s	0.0	s	Real time	"F3-16" on page 608
F3-17	0xF311	Stop mode in V/f decoupled mode	0: The frequency and voltage decline to 0 independently. 1: The frequency declines to 0 after the voltage declines to 0.	0	-	At stop	"F3-17" on page 609
F3-18	0xF312	Overcurrent stall action current in V/f mode	50% to 200%	130	%	At stop	"F3-18" on page 609
F3-19	0xF313	Overcurrent stall suppression	0: Invalid 1: Valid	1	-	At stop	"F3-19" on page 609
F3-20	0xF314	Overcurrent stall suppression gain	0-100	20	-	Real time	"F3-20" on page 610
F3-21	0xF315	Current compensation coefficient for overcurrent stall action at multiplied rated frequency	50% to 200%	50	%	At stop	"F3-21" on page 610
F3-22	0xF316	Overvoltage stall action voltage in V/f mode	650.0 V to 800.0 V	770.0	V	At stop	"F3-22" on page 611
F3-23	0xF317	Overvoltage stall suppression in V/f mode	0: Invalid 1: Valid	1	-	At stop	"F3-23" on page 611
F3-24	0xF318	Frequency gain for overvoltage stall suppression in V/f mode	0-100	30	-	Real time	"F3-24" on page 611
F3-25	0xF319	Voltage gain for overvoltage stall suppression in V/f mode	0-100	30	-	Real time	"F3-25" on page 612
F3-26	0xF31A	Frequency rise threshold for overvoltage stall suppression	0 Hz to 50 Hz	5	Hz	At stop	"F3-26" on page 612

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F3-27	0xF31B	Slip compensation time constant	0.1 to 10.0	0.5	-	Real time	*" F3-27" on page 612*
F3-28	0xF31C	Automatic frequency rise	0: Disable 1: Enable	0	-	Real time	*" F3-28" on page 613*
F3-29	0xF31D	Minimum motoring torque current	10 to 100	50	-	Real time	*" F3-29" on page 613*
F3-30	0xF31E	Maximum generating torque current	10 to 100	20	-	Real time	*" F3-30" on page 613*
F3-31	0xF31F	Automatic frequency rise Kp	0-100	50	-	Real time	*" F3-31" on page 614*
F3-32	0xF320	Automatic frequency rise Ki	0-100	50	-	Real time	*" F3-32" on page 614*
F3-33	0xF321	Online torque compensation gain	80 to 150	100	-	Real time	*" F3-33" on page 614*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F4-00	0xF400	DI1 function selection	0: No function 1: Forward run (FWD) 2: Reverse run (REV) 3: Three-wire operation control 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6: Function as the UP key 7: Function as the DOWN key 8: Coast to stop 9: Fault reset (RESET) 10: Operation pause 11: External fault NO input 12: Multi-reference terminal 1 13: Multi-reference terminal 2 14: Multi-reference terminal 3 15: Multi-reference terminal 4 16: Acceleration/ Deceleration time selection terminal 1 17: Acceleration/ Deceleration time selection terminal 2 18: Frequency reference switchover 19: Clear information set by UP/DOWN keys on the operating panel or by terminals functioning as the UP/DOWN keys 20: Control command switchover terminal 1 21: Acceleration/ Deceleration inhibited 22: PID pause 23: Simple PLC state reset 24: Wobble frequency pause 25: Counter input 26: Counter reset 27: Length counting input 28: Length reset 29: Torque control inhibited (To be continued)	1	-	At stop	*" F4-00" on page 614*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F4-00	0xF400	DI1 function selection	(Continued) 30: Pulse frequency input (only DI5) 31: Reserved 32: Immediate DC braking 33: External fault NC input 34: Frequency modification enable 35: PID action direction reversal 36: External stop terminal 1 37: Control command switchover terminal 2 38: PID integral pause 39: Switch main frequency source to preset frequency 40: Switch auxiliary frequency source to preset frequency 41: Motor terminal selection 42: Reserved 43: PID parameter switchover 44: User-defined fault 1 45: User-defined fault 2 46: Speed/Torque control switchover 47: Emergency stop 48: External stop terminal 2 49: Deceleration DC braking 50: Clear the current running time 51: Two-wire/Three-wire mode switchover 52: Reverse frequency inhibited 53 to 59: Reserved	1	-	At stop	" F4-00" on page 614
F4-01	0xF401	DI2 function selection	Same as F4-00	4	-	At stop	" F4-01" on page 622
F4-02	0xF402	DI3 function selection	Same as F4-00	9	-	At stop	" F4-02" on page 622
F4-03	0xF403	DI4 function selection	Same as F4-00	12	-	At stop	" F4-03" on page 622
F4-04	0xF404	DI5 function selection	Same as F4-00	13	-	At stop	" F4-04" on page 623

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F4-05	0xF405	DI6 function selection	Same as F4-00	0	-	At stop	"F4-05" on page 623
F4-06	0xF406	DI7 function selection	Same as F4-00	0	-	At stop	"F4-06" on page 623
F4-07	0xF407	DI8 function selection	Same as F4-00	0	-	At stop	"F4-07" on page 623
F4-08	0xF408	DI9 function selection	Same as F4-00	0	-	At stop	"F4-08" on page 624
F4-09	0xF409	DI10 function selection	Same as F4-00	0	-	At stop	"F4-09" on page 624
F4-10	0xF40A	DI filter time	0.000s to 1.000s	0.010	s	Real time	"F4-10" on page 624
F4-11	0xF40B	Terminal command mode	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2	0	-	At stop	"F4-11" on page 624
F4-12	0xF40C	Step value of frequency changed by UP/DOWN keys	0.001 Hz/s to 65.535 Hz/s	1.000	Hz/s	Real time	"F4-12" on page 625
F4-13	0xF40D	Minimum input of AI curve 1	0.00 V to F4-15	0.00	V	Real time	"F4-13" on page 626
F4-14	0xF40E	Percentage corresponding to the minimum input of AI curve 1	-100.0% to +100.0%	0.0	%	Real time	"F4-14" on page 626
F4-15	0xF40F	Maximum input of AI curve 1	F4-13 to 10.00 V	10.00	V	Real time	"F4-15" on page 626
F4-16	0xF410	Percentage corresponding to the maximum input of AI curve 1	-100.0% to +100.0%	100.0	%	Real time	"F4-16" on page 627
F4-17	0xF411	AI1 filter time	0.00s to 10.00s	0.10	s	Real time	"F4-17" on page 627
F4-18	0xF412	Minimum input of AI curve 2	0.00 V to F4-20	0.00	V	Real time	"F4-18" on page 627
F4-19	0xF413	Percentage corresponding to the minimum input of AI curve 2	-100.0% to +100.0%	0.0	%	Real time	"F4-19" on page 628
F4-20	0xF414	AI curve 2 maximum input	F4-18 to 10.00 V	10.00	V	Real time	"F4-20" on page 628

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F4-21	0xF415	Percentage corresponding to the maximum input of AI curve 2	-100.0% to +100.0%	100.0	%	Real time	" F4-21" on page 628
F4-22	0xF416	AI2 filter time	0.00s to 10.00s	0.10	s	Real time	" F4-22" on page 629
F4-23	0xF417	Minimum input of AI curve 3	-10.00 V to F4-25	-10.00	V	Real time	" F4-23" on page 629
F4-24	0xF418	Percentage corresponding to the minimum input of AI curve 3	-100.0% to +100.0%	-100.0	%	Real time	" F4-24" on page 630
F4-25	0xF419	Maximum input of AI curve 3	F4-23 to 10.00 V	10.00	V	Real time	" F4-25" on page 630
F4-26	0xF41A	Percentage corresponding to the maximum input of AI curve 3	-100.0% to +100.0%	100.0	%	Real time	" F4-26" on page 630
F4-27	0xF41B	AI3 filter time	0.00s to 10.00s	0.10	s	Real time	" F4-27" on page 631
F4-28	0xF41C	Pulse minimum input	0.00 kHz to F4-30	0.00	kHz	Real time	" F4-28" on page 631
F4-29	0xF41D	Percentage corresponding to pulse minimum input	-100.0% to +100.0%	0.0	%	Real time	" F4-29" on page 631
F4-30	0xF41E	Pulse maximum input	F4-28 to 100.00 kHz	50.00	kHz	Real time	" F4-30" on page 632
F4-31	0xF41F	Percentage corresponding to pulse maximum input	-100.0% to +100.0%	100.0	%	Real time	" F4-31" on page 632
F4-32	0xF420	Pulse filter time	0.00s to 10.00s	0.10	s	Real time	" F4-32" on page 632

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F4-33	0xF421	AI curve selection	Ones: AI1 curve selection 1: Curve 1 (2 points) 2: Curve 2 (2 points) 3: Curve 3 (2 points) 4: Curve 4 (4 points) 5: Curve 5 (4 points) Tens: AI2 curve selection 1: Curve 1 (2 points) 2: Curve 2 (2 points) 3: Curve 3 (2 points) 4: Curve 4 (4 points) 5: Curve 5 (4 points) Hundreds: AI3 curve selection 1: Curve 1 (2 points) 2: Curve 2 (2 points) 3: Curve 3 (2 points) 4: Curve 4 (4 points) 5: Curve 5 (4 points)	0x321	-	Real time	*" F4-33" on page 633*
F4-34	0xF422	Selection when AI value lower than the minimum input value	Ones: Setting for AI1 less than minimum input 0: Corresponding percentage of minimum input 1: 0.0% Tens: Setting for AI2 less than minimum input 0: Corresponding percentage of minimum input1 1: 0.0% Hundreds: Setting for AI3 less than minimum input 0: Corresponding percentage of minimum input 1: 0.0%	0x0	-	Real time	*" F4-34" on page 633*
F4-35	0xF423	DI1 delay time	0.0 to 3600.0	0.0	s	Real time	*" F4-35" on page 634*
F4-36	0xF424	DI2 delay time	0.0 to 3600.0	0.0	s	Real time	*" F4-36" on page 634*
F4-37	0xF425	DI3 delay time	0.0 to 3600.0	0.0	s	Real time	*" F4-37" on page 635*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F4-38	0xF426	DI active mode selection 1	Ones: DI1 0: Active high 1: Active low Tens: DI2 0: Active high 1: Active low Hundreds: DI3 0: Active high 1: Active low Thousands: DI4 0: Active high 1: Active low Ten thousands: DI5 0: Active high 1: Active low	0	-	At stop	" F4-38" on page 635
F4-39	0xF427	DI active mode selection 2	Ones: DI6 0: Active high 1: Active low Tens: DI7 0: Active high 1: Active low Hundreds: DI8 0: Active high 1: Active low Thousands: DI9 0: Active high 1: Active low Ten thousands: DI10 0: Active high 1: Active low	0	-	At stop	" F4-39" on page 636
F5-00	0xF500	Multi-functional terminal output selection	0: Pulse output (FMP) 1: Digital output (FMR)	0	-	Real time	" F5-00" on page 637

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F5-01	0xF501	FMR output function selection	0: No output 1: Drive in operation 2: Fault output (coast to stop) 3: Frequency level detection 1 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (no output at stop) 19: Undervoltage 20: Communication setting 21: Reserved 22: Reserved 23: Operation at zero speed 2 (output at stop) (To be continued)	0	-	Real time	*" F5-01" on page 637*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
Continued	Continued	Continued	(Continued) 24: Cumulative power-on time reached 25: Frequency level detection 2 26: Frequency 1 reached 27: Frequency 2 reached 28: Current 1 reached 29: Current 2 reached 30: Timing reached 31: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Alarm (all faults) 39: Motor overheat 40: Present operating time reached 41: Fault output (coast to stop; no output upon undervoltage)	Continued	Continued	Continued	Continued
F5-02	0xF502	Control board relay function selection (T/A-T/B-T/C)	Same as F5-01	2	-	Real time	*" F5-02" on page 642*
F5-03	0xF503	Output function selection of expansion card relay (P/A-P/B-P/C)	Same as F5-01	0	-	Real time	*" F5-03" on page 643*
F5-04	0xF504	DO1 output function selection	Same as F5-01	1	-	Real time	*" F5-04" on page 643*
F5-05	0xF505	Output function selection of DO2 on expansion card	Same as F5-01	4	-	Real time	*" F5-05" on page 643*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F5-06	0xF506	FMP output function selection	0: Operating frequency 1: Frequency reference 2: Output current 3: Output torque (absolute value, proportion to rated motor torque) 4: Output power 5: Output voltage 6: Pulse input (100.0% corresponds to 100.00 kHz) 7: AI1 8: AI2 9: AI3 (expansion card) 10: Length 11: Count value 12: Communication setting 13: Motor speed 14: Output current (100.0% corresponds to 1000.0 A) 15: Output voltage (100.0% corresponds to 1000.0 V) 16: Output torque (positive and negative) 17: Actual output torque (positive and negative)	0	-	Real time	" F5-06" on page 643
F5-07	0xF507	AO1 output function selection	Same as F5-06	0	-	Real time	" F5-07" on page 645
F5-08	0xF508	AO2 output function selection	Same as F5-06	1	-	Real time	" F5-08" on page 645
F5-09	0xF509	Maximum frequency of FMP output	0.01 kHz to 100.00 kHz	50.00	kHz	Real time	" F5-09" on page 646
F5-10	0xF50A	AO1 zero offset coefficient	-100.0% to +100.0%	0.0	%	Real time	" F5-10" on page 646
F5-11	0xF50B	AO1 gain	-10.00 to +10.00	1.00	-	Real time	" F5-11" on page 647
F5-12	0xF50C	AO2 zero offset coefficient	-100.0% to +100.0%	0.0	%	Real time	" F5-12" on page 647
F5-13	0xF50D	AO2 gain	-10.00 to +10.00	1.00	-	Real time	" F5-13" on page 648
F5-17	0xF511	Relay 1 output delay	0.0 to 3600.0	0.0	s	Real time	" F5-17" on page 649
F5-18	0xF512	Relay 2 output delay	0.0 to 3600.0	0.0	s	Real time	" F5-18" on page 649
F5-19	0xF513	DO1 output delay	0.0 to 3600.0	0.0	s	Real time	" F5-19" on page 649

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F5-20	0xF514	DO2 output delay	0.0 to 3600.0	0.0	s	Real time	" F5-20" on page 650
F5-21	0xF515	DO3 output delay	0.0 to 3600.0	0.0	s	Real time	" F5-21" on page 650
F5-22	0xF516	DO valid status selection	Ones: FMR 0: Positive logic 1: Negative logic Tens: Relay 1 0: Positive logic 1: Negative logic Hundreds: Relay 2 0: Positive logic 1: Negative logic Thousands: DO1 0: Positive logic 1: Negative logic Ten thousands: DO2 0: Positive logic 1: Negative logic	0	-	Real time	" F5-22" on page 650
F6-00	0xF600	Start mode	0: Direct start 1: Flying start 2: Pre-excitation start (asynchronous motor) 3: Quick start in SVC mode	0	-	Real time	" F6-00" on page 651
F6-01	0xF601	Flying start mode	0: Start from the stop frequency 1: Start from the mains frequency 2: Start from the maximum frequency 4: Magnetic field directional flying start (set F1-37 to 1)	0	-	Real time	" F6-01" on page 652
F6-02	0xF602	Flying start speed	1 to 100	20	-	Real time	" F6-02" on page 653
F6-03	0xF603	Startup frequency	0.00 Hz to 10.00 Hz	0.00	Hz	Real time	" F6-03" on page 653
F6-04	0xF604	Startup frequency holding time	0.0 to 100.0	0.0	s	At stop	" F6-04" on page 654
F6-05	0xF605	DC braking current/ Pre-excitation current at start	0% to 100%	50	%	At stop	" F6-05" on page 654
F6-06	0xF606	DC braking time/Pre-excitation time at start	0.0 to 100.0	0.0	s	At stop	" F6-06" on page 654

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F6-07	0xF607	Acceleration/ Deceleration mode	0: Linear acceleration/ deceleration 1: Static S-curve acceleration/deceleration 2: Dynamic S-curve acceleration/deceleration	0	-	At stop	" F6-07" on page 655
F6-08	0xF608	Time proportion of S-curve start segment	0.0% to 100.0%	30.0	%	At stop	" F6-08" on page 655
F6-09	0xF609	Time proportion of S-curve end segment	0.0% to 100.0%	30.0	%	At stop	" F6-09" on page 656
F6-10	0xF60A	Stop mode	0: Decelerate to stop 1: Coast to stop	0	-	Real time	" F6-10" on page 656
F6-11	0xF60B	DC braking start frequency for stop	0.00 Hz to F0-10	0.00	Hz	Real time	" F6-11" on page 656
F6-12	0xF60C	Waiting time of DC braking for stop	0.0 to 100.0	0.0	s	Real time	" F6-12" on page 657
F6-13	0xF60D	DC braking current for stop	0% to 100%	50	%	Real time	" F6-13" on page 657
F6-14	0xF60E	DC braking time for stop	0.0 to 100.0	0.0	s	Real time	" F6-14" on page 657
F6-15	0xF60F	Braking usage rate	0% to 100%	100	%	Real time	" F6-15" on page 658
F6-16	0xF610	Closed loop current Kp of flying start	0-1000	500	-	Real time	" F6-16" on page 658
F6-17	0xF611	Closed loop current Ki of flying start	0-1000	800	-	Real time	" F6-17" on page 658
F6-18	0xF612	Current of flying start	30 to 200	100	-	Real time	" F6-18" on page 659
F6-19	0xF613	Closed loop current lower limit of flying start	10 to 100	30	-	Real time	" F6-19" on page 659
F6-20	0xF614	Voltage rise time of flying start	0.5-3.0	1.1	-	Real time	" F6-20" on page 659
F6-21	0xF615	Demagnetization time	0.00 to +10.00	0.50	-	Real time	" F6-21" on page 659
F6-23	0xF617	Overexcitation mode selection	0-2	0	-	Real time	" F6-23" on page 660
F6-24	0xF618	Overexcitation suppression current	0-150	100	-	Real time	" F6-24" on page 660
F6-25	0xF619	Overexcitation mode gain	1.00 to 2.50	1.25	-	Real time	" F6-25" on page 661
F7-00	0xF700	LED default display check	0: Invalid 1: Valid	0	-	At stop	" F7-00" on page 661

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F7-01	0xF701	MF.K key function	0: MF.K key disabled 1: Switchover between operating panel control and remote control (terminal or communication) 2: Switchover between forward run and reverse run 3: Forward jog 4: Reverse jog	0	-	At stop	" F7-01" on page 661
F7-02	0xF702	STOP/RES key function	0: STOP/RES key enabled only in operating panel control mode 1: STOP/RES key enabled in any control mode	1	-	Real time	" F7-02" on page 662
F7-03	0xF703	Parameter 1 displayed on LED operating panel during operation	Bit 0: Running frequency (Hz) Bit 1: Frequency reference (Hz) Bit 2: Bus voltage (V) Bit 3: Output voltage (V) Bit 4: Output current (A) Bit 5: Output power (kW) Bit 6: Output torque (%) Bit 7: DI state Bit 8: DO state Bit 9: AI1 voltage (V) Bit 10: AI2 voltage (V) Bit 11: AI3 voltage (V) Bit 12: Count value Bit 13: Length value Bit 14: Load speed Bit 15: PID reference	0x1F	-	Real time	" F7-03" on page 663

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F7-04	0xF704	Parameter 2 displayed on LED operating panel during operation	Bit 0: PID feedback Bit 1: PLC stage Bit 2: Pulse input frequency (kHz) Bit 3: Operating frequency 2 (Hz) Bit 4: Remaining operating time Bit 5: AI1 voltage before correction (V) Bit 6: AI2 voltage before correction (V) Bit 7: AI3 voltage before correction (V) Bit 8: Motor speed Bit 9: Current power-on time (h) Bit 10 Current running time (min) Bit 11: Pulse input frequency (Hz) Bit 12: Communication setting value Bit 13: Encoder feedback speed (Hz) Bit 14: Main frequency X display (Hz) Bit 15: Auxiliary frequency Y display (Hz)	0x0	-	Real time	" F7-04" on page 664
F7-05	0xF705	Parameter displayed on LED operating panel at stop	Bit 0: Frequency reference (Hz) Bit 1: Bus voltage (V) Bit 2: DI input state Bit 3: DO output state Bit 4: AI1 voltage (V) Bit 5: AI2 voltage (V) Bit 6: AI3 voltage (V) Bit 7: Count value Bit 8: Length value Bit 9: PLC stage Bit 10: Load speed Bit 11: PID reference Bit 12: Pulse input frequency (kHz)	0x33	-	Real time	" F7-05" on page 665
F7-06	0xF706	Load speed display coefficient	0.001 to 65.000	1.000	-	Real time	" F7-06" on page 666

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F7-07	0xF707	Inverter module heatsink temperature	0°C to 999°C	0	°C	Unchangeable	"F7-07" on page 666
F7-08	0xF708	Product No.	0.0 to 655.35	0.00	-	Unchangeable	"F7-08" on page 666
F7-09	0xF709	Cumulative running time	0 h to 65535 h	0	h	Unchangeable	"F7-09" on page 667
F7-10	0xF70A	Performance software version	0.0 to 655.35	0.00	-	Unchangeable	"F7-10" on page 667
F7-11	0xF70B	Function software version	0.0 to 655.35	0.00	-	Unchangeable	"F7-11" on page 667
F7-12	0xF70C	Number of decimal places for load speed display	Ones: Number of decimal places for the value of U0-14 0: 0 1: 1 2: 2 Tens: Number of decimal places for the value of U0-19/U0-29 1: 1 2: 2	20	-	Real time	"F7-12" on page 668
F7-13	0xF70D	Cumulative power-on time	0 h to 65535 h	0	h	Unchangeable	"F7-13" on page 668
F7-14	0xF70E	Cumulative power consumption	0 kWh to 65535 kWh	0	kWh	Unchangeable	"F7-14" on page 669
F7-15	0xF70F	Temporary performance software version	0.0 to 655.35	0.00	-	Unchangeable	"F7-15" on page 669
F7-16	0xF710	Temporary function software version	0.0 to 655.35	0.00	-	Unchangeable	"F7-16" on page 669
F8-00	0xF800	Jog frequency	0.00 Hz to F0-10	2.00	Hz	Real time	"F8-00" on page 669
F8-01	0xF801	Jog acceleration time	0.0 to 6500.0	20.0	s	Real time	"F8-01" on page 670
F8-02	0xF802	Jog deceleration time	0.0 to 6500.0	20.0	s	Real time	"F8-02" on page 670
F8-03	0xF803	Acceleration time 2	0.0 to 6500.0	20.0	s	Real time	"F8-03" on page 670
F8-04	0xF804	Deceleration time 2	0.0 to 6500.0	20.0	s	Real time	"F8-04" on page 671
F8-05	0xF805	Acceleration time 3	0.0 to 6500.0	20.0	s	Real time	"F8-05" on page 671
F8-06	0xF806	Deceleration time 3	0.0 to 6500.0	20.0	s	Real time	"F8-06" on page 671

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F8-07	0xF807	Acceleration time 4	0.0 to 6500.0	20.0	s	Real time	" F8-07" on page 672
F8-08	0xF808	Deceleration time 4	0.0 to 6500.0	20.0	s	Real time	" F8-08" on page 672
F8-09	0xF809	Jump frequency 1	0.00 Hz to F0-10	0.00	Hz	Real time	" F8-09" on page 673
F8-10	0xF80A	Jump frequency 2	0.00 Hz to F0-10	0.00	Hz	Real time	" F8-10" on page 673
F8-11	0xF80B	Jump frequency amplitude	0.00 Hz to F0-10	0.00	Hz	Real time	" F8-11" on page 673
F8-12	0xF80C	Dead-zone time of forward/reverse run	0.0 to 3000.0	0.0	s	Real time	" F8-12" on page 674
F8-13	0xF80D	Reverse running prohibition	0: Reverse run allowed 1: Reverse run prohibited	0	-	Real time	" F8-13" on page 674
F8-14	0xF80E	Running mode when frequency reference < lower limit	0: Run at frequency lower limit 1: Stop 2: Run at zero speed	0	-	Real time	" F8-14" on page 674
F8-15	0xF80F	Droop control	0.00 Hz to 10.00 Hz	0.00	Hz	Real time	" F8-15" on page 675
F8-16	0xF810	Cumulative power-on time threshold	0 h to 65000 h	0	h	Real time	" F8-16" on page 675
F8-17	0xF811	Cumulative running time threshold	0 h to 65000 h	0	h	Real time	" F8-17" on page 676
F8-18	0xF812	Protection upon start	0: Disable 1: Enable	0	-	Real time	" F8-18" on page 676
F8-19	0xF813	Detection frequency 1	0.00 Hz to F0-10	50.00	Hz	Real time	" F8-19" on page 676
F8-20	0xF814	Frequency detection hysteresis rate 1	0.0% to 100.0%	5.0	%	Real time	" F8-20" on page 677
F8-21	0xF815	Frequency detection amplitude	0.0% to 100.0%	0.0	%	Real time	" F8-21" on page 677
F8-22	0xF816	Jump frequency state during acceleration/ deceleration	0: Invalid 1: Valid	0	-	Real time	" F8-22" on page 677
F8-25	0xF819	Switchover frequency between acceleration time 1 and acceleration time 2	0.00 Hz to F0-10	0.00	Hz	Real time	" F8-25" on page 678
F8-26	0xF81A	Switchover frequency between deceleration time 1 and deceleration time 2	0.00 Hz to F0-10	0.00	Hz	Real time	" F8-26" on page 678

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F8-27	0xF81B	Jog control through terminal with priority	0: Invalid 1: Valid	0	-	Real time	" F8-27" on page 679
F8-28	0xF81C	Detection frequency 2	0.00 Hz to F0-10	50.00	Hz	Real time	" F8-28" on page 679
F8-29	0xF81D	Frequency detection hysteresis rate 2	0.0% to 100.0%	5.0	%	Real time	" F8-29" on page 679
F8-30	0xF81E	Base value 1 of frequency detection	0.00 Hz to F0-10	50.00	Hz	Real time	" F8-30" on page 680
F8-31	0xF81F	Frequency detection amplitude 1	0.0% to 100.0%	0.0	%	Real time	" F8-31" on page 680
F8-32	0xF820	Base value 2 of frequency detection	0.00 Hz to F0-10	50.00	Hz	Real time	" F8-32" on page 680
F8-33	0xF821	Frequency detection amplitude 2	0.0% to 100.0%	0.0	%	Real time	" F8-33" on page 681
F8-34	0xF822	Zero current detection level	0.0% to 300.0%	5.0	%	Real time	" F8-34" on page 681
F8-35	0xF823	Zero current detection delay	0.01s to 600.00s	0.10	s	Real time	" F8-35" on page 681
F8-36	0xF824	Output current overlimit threshold	0.0% to 300.0%	200.0	%	Real time	" F8-36" on page 682
F8-37	0xF825	Delay of output current overlimit detection	0.00s to 600.00s	0.00	s	Real time	" F8-37" on page 682
F8-38	0xF826	Base value 1 of current detection	0.0% to 300.0%	100.0	%	Real time	" F8-38" on page 682
F8-39	0xF827	Current detection amplitude 1	0.0% to 300.0%	0.0	%	Real time	" F8-39" on page 683
F8-40	0xF828	Base value 2 of current detection	0.0% to 300.0%	100.0	%	Real time	" F8-40" on page 683
F8-41	0xF829	Current detection amplitude 2	0.0% to 300.0%	0.0	%	Real time	" F8-41" on page 683
F8-42	0xF82A	Timing function	0: Disable 1: Enable	0	-	At stop	" F8-42" on page 684
F8-43	0xF82B	Timing operation setting source	0: Set by F8-44 (Timing duration) 1: AI1 2: AI2 3: AI3	0	-	At stop	" F8-43" on page 684
F8-44	0xF82C	Timing operation duration	0.0 min to 6500.0 min	0.0	min	At stop	" F8-44" on page 685
F8-45	0xF82D	Lower limit of AI1 input voltage protection value	0.00 V to F8-46	3.10	V	Real time	" F8-45" on page 685

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F8-46	0xF82E	Upper limit of AI1 input voltage protection value	F8-45 to 11.00 V	6.80	V	Real time	"F8-46" on page 685
F8-47	0xF82F	Module temperature reach	0°C to 100°C	75	°C	Real time	"F8-47" on page 686
F8-48	0xF830	Cooling fan control	0: Keep working during operation of the drive 1: Always working	0	-	At stop	"F8-48" on page 686
F8-49	0xF831	Wakeup frequency	F8-51 to F0-10	0.00	Hz	Real time	"F8-49" on page 686
F8-50	0xF832	Wakeup delay	0.0 to 6500.0	0.0	s	Real time	"F8-50" on page 687
F8-51	0xF833	Hibernation frequency	0.00 Hz to F8-49	0.00	Hz	Real time	"F8-51" on page 687
F8-52	0xF834	Hibernation delay	0.0 to 6500.0	0.0	s	Real time	"F8-52" on page 687
F8-53	0xF835	Current running duration threshold	0.0 min to 6500.0 min	0.0	min	At stop	"F8-53" on page 688
F8-54	0xF836	Output power correction coefficient	0.0% to 200.0%	100.0	%	Real time	"F8-54" on page 688
F8-55	0xF837	Deceleration time for emergency stop	0.0s to 6553.5s	5.0	s	Real time	"F8-55" on page 688
F9-00	0xF900	Motor overload protection selection	0: Disable 1: Enable	1	-	Real time	"F9-00" on page 689
F9-01	0xF901	Motor overload protection gain	0.20 to 10.00	1.00	-	Real time	"F9-01" on page 689
F9-02	0xF902	Motor overload warning coefficient	50% to 100%	80	%	Real time	"F9-02" on page 690
F9-07	0xF907	Protection against short circuit to ground	Ones: Protection against short circuit to ground upon power-on 0: Inactive 1: Active Tens: Protection against short circuit to ground before operation 0: Inactive 1: Active	1	-	Real time	"F9-07" on page 691
F9-08	0xF908	Start voltage for braking unit action	650.0 V to 800.0 V	760.0	V	Real time	"F9-08" on page 691
F9-09	0xF909	Number of automatic fault resets	0 to 20	0	-	Real time	"F9-09" on page 692

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F9-10	0xF90A	DO action during automatic fault reset	0: Disable 1: Enable	0	-	Real time	" F9-10" on page 692
F9-11	0xF90B	Time interval between automatic fault reset	0.1 to 100.0	1.0	s	Real time	" F9-11" on page 692
F9-12	0xF90C	Input phase loss/ Contactor close protection	Ones: Input phase loss protection 0: Disabled 1: Protection enabled when both software and hardware input phase loss conditions are met 2: Protection enabled when software input phase loss conditions are met 3: Protection enabled when hardware input phase loss conditions are met Tens: Contactor close protection 0: Disabled 1: Enabled	11	-	Real time	" F9-12" on page 693
F9-13	0xF90D	Output phase loss protection	Ones: Output phase loss protection 0: Disabled 1: Enabled Tens: Output phase loss protection before running 0: Disabled 1: Enabled	1	-	Real time	" F9-13" on page 693

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F9-14	0xF90E	Type of the 1st fault	0: No fault 1: Reserved 2: Overcurrent during acceleration 3: Overcurrent during deceleration 4: Overcurrent during operation at constant speed 5: Overvoltage during acceleration 6: Overcurrent during deceleration 7: Overvoltage during operation at constant speed 8: Pre-charge resistor overload 9: Undervoltage 10: Drive overload 11: Motor overload 12: Input phase loss 13: Output phase loss 14: Module overheat 15: External fault 16: Communication error 17: Contactor error 18: Current detection error 19: Motor parameter auto-tuning error 20: Reserved 21: Parameter read/write error 22: Drive hardware error 23: Motor short circuit to ground 24: Reserved 25: Reserved 26: Running time reached 27: User-defined fault 1 To be continued	0	-	Unchangeable	*" F9-14" on page 694*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
Continued	Continued	Continued	Continued 28: User-defined fault 2 29: Power-on time reached 30: Load loss 31: PID feedback loss during operation 40: Fast current limit timeout 41: Motor switchover during operation 42: Reserved 43: Reserved 45: Motor overheat 55: Slave error in master/ slave control mode	Continued	Continued	Continued	Continued
F9-15	0xF90F	Type of the 2nd fault	Same as F9-14	0	-	Unchangeable	*" F9-15" on page 696*
F9-16	0xF910	Type of the 3rd (latest) fault	Same as F9-14	0	-	Unchangeable	*" F9-16" on page 696*
F9-17	0xF911	Frequency upon the 3rd (latest) fault	0.00 Hz to 655.35 Hz	0.00	Hz	Unchangeable	*" F9-17" on page 696*
F9-18	0xF912	Current upon the 3rd (latest) fault	0.00 A to 655.35 A	0.00	A	Unchangeable	*" F9-18" on page 696*
F9-19	0xF913	Bus voltage upon the 3rd (latest) fault	0.0 V to 6553.5 V	0.0	V	Unchangeable	*" F9-19" on page 697*
F9-20	0xF914	Input terminal state upon the 3rd (latest) fault	0 to 65535	0	-	Unchangeable	*" F9-20" on page 697*
F9-21	0xF915	Output terminal state upon the 3rd (latest) fault	0 to 65535	0	-	Unchangeable	*" F9-21" on page 697*
F9-22	0xF916	Drive state upon the 3rd (latest) fault	0 to 65535	0	-	Unchangeable	*" F9-22" on page 698*
F9-23	0xF917	Power-on time upon the 3rd (latest) fault	0 to 65535	0	-	Unchangeable	*" F9-23" on page 698*
F9-24	0xF918	Running duration upon the 3rd (latest) fault	0.0 to 6553.5	0.0	-	Unchangeable	*" F9-24" on page 699*
F9-27	0xF91B	Frequency upon the 2nd fault	0.00 Hz to 655.35 Hz	0.00	Hz	Unchangeable	*" F9-27" on page 699*
F9-28	0xF91C	Current upon the 2nd fault	0.00 A to 655.35 A	0.00	A	Unchangeable	*" F9-28" on page 699*
F9-29	0xF91D	Bus voltage upon the 2nd fault	0.0 V to 6553.5 V	0.0	V	Unchangeable	*" F9-29" on page 699*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F9-30	0xF91E	Input terminal state upon the 2nd fault	0 to 65535	0	-	Unchangeable	" F9-30" on page 700
F9-31	0xF91F	Output terminal state upon the 2nd fault	0 to 65535	0	-	Unchangeable	" F9-31" on page 700
F9-32	0xF920	Drive state upon the 2nd fault	0 to 65535	0	-	Unchangeable	" F9-32" on page 700
F9-33	0xF921	Power-on time upon the 2nd fault	0 to 65535	0	-	Unchangeable	" F9-33" on page 701
F9-34	0xF922	Running time upon the 2nd fault	0.0 to 6553.5	0.0	-	Unchangeable	" F9-34" on page 701
F9-37	0xF925	Frequency upon the 1st fault	0.00 Hz to 655.35 Hz	0.00	Hz	Unchangeable	" F9-37" on page 702
F9-38	0xF926	Current upon the 1st fault	0.00 A to 655.35 A	0.00	A	Unchangeable	" F9-38" on page 702
F9-39	0xF927	Bus voltage upon the 1st fault	0.0 V to 6553.5 V	0.0	V	Unchangeable	" F9-39" on page 702
F9-40	0xF928	Input terminal state upon the 1st fault	0 to 65535	0	-	Unchangeable	" F9-40" on page 702
F9-41	0xF929	Output terminal state upon the 1st fault	0 to 65535	0	-	Unchangeable	" F9-41" on page 703
F9-42	0xF92A	Drive state upon the 1st fault	0 to 65535	0	-	Unchangeable	" F9-42" on page 703
F9-43	0xF92B	Power-on time upon the 1st fault	0 to 65535	0	-	Unchangeable	" F9-43" on page 704
F9-44	0xF92C	Running time upon the 1st fault	0.0 to 6553.5	0.0	-	Unchangeable	" F9-44" on page 704

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F9-47	0xF92F	Fault protection action selection 1	Ones: Motor overload (Err11) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Input phase loss (Err12) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Output phase loss (Err13) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: External fault (Err15) 0: Coast to Stop 1: Stop according to the stop mode 2: Continue to run Ten thousands: Communication error (Err16) 0: Coast to Stop 1: Stop according to the stop mode 2: Continue to run	0	-	Real time	*" F9-47" on page 705*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F9-48	0xF930	Fault protection action selection 2	Ones: Reserved Tens: Parameter read/write error (Err21) 0: Coast to stop 1: Stop according to the stop mode Hundreds: Action upon drive overload fault (Err10) 0: Coast to stop 1: Derated operation Thousands: Motor overheat (Err25) 0: Coast to stop 1: Stop according to the stop mode Ten thousands: Running time reached (Err26) 0: Coast to stop 1: Stop according to the stop mode	0	-	Real time	*" F9-48" on page 706*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F9-49	0xF931	Fault protection action selection 3	Ones: User-defined fault 1 (Err27) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: User-defined fault 2 (Err28) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Power-on time reach (Err29) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Load loss (Err30) 0: Coast to stop 1: Decelerate to stop 2: Continue to run at 7% of the rated motor frequency and resume to the frequency reference if the load recovers Ten thousands: PID feedback loss during operation (Err31) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	0	-	Real time	*" F9-49" on page 706*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F9-50	0xF932	Fault protection action selection 4	Ones: Excessive speed deviation (Err42) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: Motor overspeed (Err43) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Incorrect initial position (Err51) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	0	-	Real time	" F9-50" on page 708
F9-54	0xF936	Frequency for continuing operation upon fault	0: Current running frequency 1: Frequency reference 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon fault	0	-	Real time	" F9-54" on page 708
F9-55	0xF937	Backup frequency upon fault	0.0% to 100.0%	100.0	%	Real time	" F9-55" on page 709
F9-56	0xF938	Motor temperature sensor type	0: No sensor 1: PT100 2: PT1000	0	-	Real time	" F9-56" on page 709
F9-57	0xF939	Motor overtemperature protection threshold	0°C to 200°C	110	°C	Real time	" F9-57" on page 710
F9-58	0xF93A	Motor overtemperature warning threshold	0°C to 200°C	90	°C	Real time	" F9-58" on page 710
F9-59	0xF93B	Power dip ride-through	0: Disabled 1: Bus voltage constant control 2: Decelerate to stop 3: Voltage dip suppression	0	-	At stop	" F9-59" on page 710
F9-60	0xF93C	Threshold for recovery from power dip ride-through	80% to 100%	85	%	At stop	" F9-60" on page 711

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
F9-61	0xF93D	Duration for judging voltage recovery from power dip ride-through	0.0 to 100.0	0.5	s	At stop	" F9-61" on page 712
F9-62	0xF93E	Threshold for enabling power dip ride-through	60% to 100%	80	%	At stop	" F9-62" on page 712
F9-63	0xF93F	Protection against load loss	0: Invalid 1: Valid	0	-	Real time	" F9-63" on page 712
F9-64	0xF940	Load loss detection level	0.0% to 100.0%	10.0	%	Real time	" F9-64" on page 713
F9-65	0xF941	Load loss detection time	0.0 to 60.0	1.0	s	Real time	" F9-65" on page 713
F9-71	0xF947	Power dip ride-through gain Kp	0 to 100	40	-	Real time	" F9-71" on page 714
F9-72	0xF948	Integral coefficient Ki of power dip ride-through	0-100	30	-	Real time	" F9-72" on page 714
F9-73	0xF949	Deceleration time of power dip ride-through	0.0s to 300.0s	20.0	s	At stop	" F9-73" on page 714
F9-74	0xF94A	Voltage dip suppression time	0.1s to 600.0s	0.5	s	At stop	" F9-74" on page 715
FA-00	0xFA00	PID reference source	0: FA-01 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication setting 6: Multi-reference	0	-	Real time	" FA-00" on page 715
FA-01	0xFA01	PID reference	0.0% to 100.0%	50.0	%	Real time	" FA-01" on page 716
FA-02	0xFA02	PID feedback source	0: AI1 1: AI2 2: AI3 3: AI1 - AI2 4: Pulse reference (DI5) 5: Communication setting 6: AI1 + AI2 7: Max. (|AI1|, |AI2|) 8: Min. (|AI1|, |AI2|)	0	-	Real time	" FA-02" on page 716
FA-03	0xFA03	PID action direction	0: Positive 1: Negative	0	-	Real time	" FA-03" on page 717

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
FA-04	0xFA04	PID reference feedback range	0 to 65535	1000	-	Real time	" FA-04" on page 717
FA-05	0xFA05	Proportional gain Kp1	0.0 to 1000.0	20.0	-	Real time	" FA-05" on page 718
FA-06	0xFA06	Integral time Ti1	0.01s to 10.00s	2.00	s	Real time	" FA-06" on page 718
FA-07	0xFA07	Differential time Td1	0.000s to 10.000s	0.000	s	Real time	" FA-07" on page 718
FA-08	0xFA08	Reverse action cutoff frequency for PID control	0.00 Hz to F0-10	0.00	Hz	Real time	" FA-08" on page 719
FA-09	0xFA09	PID deviation limit	0.0% to 100.0%	0.0	%	Real time	" FA-09" on page 719
FA-10	0xFA0A	PID differential limit	0.00% to 100.00%	0.10	%	Real time	" FA-10" on page 719
FA-11	0xFA0B	PID reference change time	0.00s to 650.00s	0.00	s	Real time	" FA-11" on page 720
FA-12	0xFA0C	PID feedback filter time	0.00s to 60.00s	0.00	s	Real time	" FA-12" on page 720
FA-13	0xFA0D	PID output filter time	0.00s to 60.00s	0.00	s	Real time	" FA-13" on page 720
FA-15	0xFA0F	Proportional gain Kp2	0.0 to 1000.0	20.0	-	Real time	" FA-15" on page 721
FA-16	0xFA10	Integral time Ti2	0.01s to 10.00s	2.00	s	Real time	" FA-16" on page 721
FA-17	0xFA11	Differential time Td2	0.000s to 10.000s	0.000	s	Real time	" FA-17" on page 721
FA-18	0xFA12	PID parameter switchover condition	0: No switchover 1: Switchover by DI 2: Automatic switchover based on deviation 3: Switchover based on running frequency	0	-	Real time	" FA-18" on page 722

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
FA-19	0xFA13	PID parameter switchover deviation 1	0.0% to FA-20	20.0	%	Real time	" FA-19" on page 723
FA-20	0xFA14	PID parameter switchover deviation 2	FA-19 to 100.0%	80.0	%	Real time	" FA-20" on page 723
FA-21	0xFA15	PID initial value	0.0% to 100.0%	0.0	%	Real time	" FA-21" on page 723
FA-22	0xFA16	Active time of PID initial value	0.00s to 650.00s	0.00	s	Real time	" FA-22" on page 724
FA-25	0xFA19	PID integral property	Ones: Integral separation 0: Inactive 1: Active Tens: Whether integral operations stop when the output reaches the limit 0: Continue integral operation 1: Stop integral operation	0	-	Real time	" FA-25" on page 724
FA-26	0xFA1A	Detection value of PID feedback loss	0.0% to 100.0%	0.0	%	Real time	" FA-26" on page 725
FA-27	0xFA1B	Detection time of PID feedback loss	0.0s to 20.0s	0.0	s	Real time	" FA-27" on page 725
FA-28	0xFA1C	PID operation at stop	0: Disable 1: Enable	0	-	Real time	" FA-28" on page 725
FB-00	0xFB00	Wobble frequency setting mode	0: Relative to the central frequency 1: Relative to the maximum frequency	0	-	Unchangeable	" FB-00" on page 726
FB-01	0xFB01	Wobble frequency amplitude	0.0% to 100.0%	0.0	%	Unchangeable	" FB-01" on page 726
FB-02	0xFB02	Jump frequency amplitude	0.0% to 50.0%	0.0	%	Unchangeable	" FB-02" on page 727
FB-03	0xFB03	Wobble frequency cycle	0.1 to 3000.0	10.0	s	Unchangeable	" FB-03" on page 727

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
FB-04	0xFB04	Triangular wave rise time of wobble frequency	0.1% to 100.0%	50.0	%	Unchangeable	" FB-04" on page 727
FB-05	0xFB05	Set length	0 m to 65535 m	1000	m	Real time	" FB-05" on page 727
FB-06	0xFB06	Actual length	0 m to 65535 m	0	m	Real time	" FB-06" on page 728
FB-07	0xFB07	Number of pulses per meter	0.1 to 6553.5	100.0	-	Real time	" FB-07" on page 728
FB-08	0xFB08	Set count value	1 to 65535	1000	-	Real time	" FB-08" on page 728
FB-09	0xFB09	Designated count value	1 to 65535	1000	-	Real time	" FB-09" on page 729
FC-00	0xFC00	Multi-reference 0	-100.0% to +100.0%	0.0	%	Real time	" FC-00" on page 729
FC-01	0xFC01	Multi-reference 1	-100.0% to +100.0%	0.0	%	Real time	" FC-01" on page 730
FC-02	0xFC02	Multi-reference 2	-100.0% to +100.0%	0.0	%	Real time	" FC-02" on page 730
FC-03	0xFC03	Multi-reference 3	-100.0% to +100.0%	0.0	%	Real time	" FC-03" on page 731
FC-04	0xFC04	Multi-reference 4	-100.0% to +100.0%	0.0	%	Real time	" FC-04" on page 732
FC-05	0xFC05	Multi-reference 5	-100.0% to +100.0%	0.0	%	Real time	" FC-05" on page 732
FC-06	0xFC06	Multi-reference 6	-100.0% to +100.0%	0.0	%	Real time	" FC-06" on page 733
FC-07	0xFC07	Multi-reference 7	-100.0% to +100.0%	0.0	%	Real time	" FC-07" on page 734
FC-08	0xFC08	Multi-reference 8	-100.0% to +100.0%	0.0	%	Real time	" FC-08" on page 734
FC-09	0xFC09	Multi-reference 9	-100.0% to +100.0%	0.0	%	Real time	" FC-09" on page 735
FC-10	0xFC0A	Multi-reference 10	-100.0% to +100.0%	0.0	%	Real time	" FC-10" on page 736
FC-11	0xFC0B	Multi-reference 11	-100.0% to +100.0%	0.0	%	Real time	" FC-11" on page 736
FC-12	0xFC0C	Multi-reference 12	-100.0% to +100.0%	0.0	%	Real time	" FC-12" on page 737

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
FC-13	0xFC0D	Multi-reference 13	-100.0% to +100.0%	0.0	%	Real time	" FC-13" on page 738
FC-14	0xFC0E	Multi-reference 14	-100.0% to +100.0%	0.0	%	Real time	" FC-14" on page 738
FC-15	0xFC0F	Multi-reference 15	-100.0% to +100.0%	0.0	%	Real time	" FC-15" on page 739
FC-16	0xFC10	Simple PLC operation mode	0: Stop after operating for one cycle 1: Keep final values after operating for one cycle 2: Cyclic operation	0	-	Real time	" FC-16" on page 740
FC-17	0xFC11	Simple PLC retention selection upon power failure	Ones: 0: Non-retentive upon power failure 1: Retentive upon power failure Tens: 0: Non-retentive upon stop 1: Retentive upon stop	0	-	Real time	" FC-17" on page 740
FC-18	0xFC12	Operation time of multi-reference 0 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-18" on page 741
FC-19	0xFC13	Acceleration/ Deceleration time of multi-reference 0 set by PLC	0-3	0	-	Real time	" FC-19" on page 741
FC-20	0xFC14	Operation time of multi-reference 1 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-20" on page 742
FC-21	0xFC15	Acceleration/ Deceleration time of multi-reference 1 set by PLC	0-3	0	-	Real time	" FC-21" on page 742
FC-22	0xFC16	Operation time of multi-reference 2 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-22" on page 743
FC-23	0xFC17	Acceleration/ Deceleration time of multi-reference 2 set by PLC	0-3	0	-	Real time	" FC-23" on page 743
FC-24	0xFC18	Operation time of multi-reference 3 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-24" on page 743

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
FC-25	0xFC19	Acceleration/ Deceleration time of multi-reference 3 set by PLC	0-3	0	-	Real time	" FC-25" on page 744
FC-26	0xFC1A	Operation time of multi-reference 4 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-26" on page 744
FC-27	0xFC1B	Acceleration/ Deceleration time of multi-reference 4 set by PLC	0-3	0	-	Real time	" FC-27" on page 744
FC-28	0xFC1C	Operation time of multi-reference 5 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-28" on page 745
FC-29	0xFC1D	Acceleration/ Deceleration time of multi-reference 5 set by PLC	0-3	0	-	Real time	" FC-29" on page 745
FC-30	0xFC1E	Operation time of multi-reference 6 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-30" on page 746
FC-31	0xFC1F	Acceleration/ Deceleration time of multi-reference 6 set by PLC	0-3	0	-	Real time	" FC-31" on page 746
FC-32	0xFC20	Operation time of multi-reference 7 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-32" on page 746
FC-33	0xFC21	Acceleration/ Deceleration time of multi-reference 7 set by PLC	0-3	0	-	Real time	" FC-33" on page 747
FC-34	0xFC22	Operation time of multi-reference 8 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-34" on page 747
FC-35	0xFC23	Acceleration/ Deceleration time of multi-reference 8 set by PLC	0-3	0	-	Real time	" FC-35" on page 747
FC-36	0xFC24	Operation time of multi-reference 9 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-36" on page 748

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
FC-37	0xFC25	Acceleration/ Deceleration time of multi-reference 9 set by PLC	0-3	0	-	Real time	" FC-37" on page 748
FC-38	0xFC26	Operation time of multi-reference 10 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-38" on page 749
FC-39	0xFC27	Acceleration/ Deceleration time of multi-reference 10 set by PLC	0-3	0	-	Real time	" FC-39" on page 749
FC-40	0xFC28	Operation time of multi-reference 11 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-40" on page 749
FC-41	0xFC29	Acceleration/ Deceleration time of multi-reference 11 set by PLC	0-3	0	-	Real time	" FC-41" on page 750
FC-42	0xFC2A	Operation time of multi-reference 12 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-42" on page 750
FC-43	0xFC2B	Acceleration/ Deceleration time of multi-reference 12 set by PLC	0-3	0	-	Real time	" FC-43" on page 750
FC-44	0xFC2C	Operation time of multi-reference 13 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-44" on page 751
FC-45	0xFC2D	Acceleration/ Deceleration time of multi-reference 13 set by PLC	0-3	0	-	Real time	" FC-45" on page 751
FC-46	0xFC2E	Operation time of multi-reference 14 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-46" on page 752
FC-47	0xFC2F	Acceleration/ Deceleration time of multi-reference 14 set by PLC	0-3	0	-	Real time	" FC-47" on page 752
FC-48	0xFC30	Operation time of multi-reference 15 set by PLC	0.0s (h) to 6500.0s (h)	0.0	s (h)	Real time	" FC-48" on page 752

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
FC-49	0xFC31	Acceleration/ Deceleration time of multi-reference 15 set by PLC	0-3	0	-	Real time	*" FC-49" on page 753*
FC-50	0xFC32	PLC operating time unit	0: s (second) 1: h (hour)	0	-	Real time	*" FC-50" on page 753*
FC-51	0xFC33	Multi-reference 0 source	0: FC-00 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: PID 6: Preset frequency (F0-08)	0	-	Real time	*" FC-51" on page 753*
FD-00	0xFD00	Baud rate	Ones: Modbus 0: 300 bps 1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps 5: 9600 bps 6: 19200 bps 7: 38400 bps 8: 57600 bps 9: 115200 bps Tens: PROFIBUS DP 0: 115200 bps 1: 208300 bps 2: 256000 bps 3: 512000 bps Hundreds: Reserved Thousands: CANlink 0: 20 kbps 1: 50 kbps 2: 100 kbps 3: 125 kbps 4: 250 kbps 5: 500 kbps 6: 1 Mbps	5005	-	Real time	*" FD-00" on page 754*
FD-01	0xFD01	Data format	0: No check (8-N-2) 1: Even parity check (8-E-1) 2: Odd parity check (8-O-1) 3: No check (8-N-1)	0	-	Real time	*" FD-01" on page 755*
FD-02	0xFD02	Local address	1 to 247	1	-	Real time	*" FD-02" on page 756*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
FD-03	0xFD03	Modbus response delay	0 ms to 20 ms	2	ms	Real time	" FD-03" on page 756
FD-04	0xFD04	Communication timeout time	0.0 to 60.0	0.0	s	Real time	" FD-04" on page 757
FD-05	0xFD05	Modbus and PROFIBUS DP communication data format	Ones: Modbus 0: Non-standard Modbus protocol 1: Standard Modbus protocol Tens: PROFIBUS DP 0: PPO1 1: PPO2 2: PPO3 3: PPO4	31	-	Real time	" FD-05" on page 757
FD-06	0xFD06	Current resolution read through communication	0: 0.01 A (active when the power is lower than or equal to 55 kW) 1: 0.1 A (active when the power is higher than 55 kW)	0	-	Real time	" FD-06" on page 758
FD-08	0xFD08	CANlink communication timeout	0.0 to 60.0	0.0	s	Real time	" FD-08" on page 758
FE-00	0xFE00	User-defined parameter 0	0 to 65535	7017	-	Real time	" FE-00" on page 759
FE-01	0xFE01	User-defined parameter 1	0 to 65535	7016	-	Real time	" FE-01" on page 759
FE-02	0xFE02	User-defined parameter 2	0 to 65535	0	-	Real time	" FE-02" on page 759
FE-03	0xFE03	User-defined parameter 3	0 to 65535	0	-	Real time	" FE-03" on page 760
FE-04	0xFE04	User-defined parameter 4	0 to 65535	0	-	Real time	" FE-04" on page 760
FE-05	0xFE05	User-defined parameter 5	0 to 65535	0	-	Real time	" FE-05" on page 760
FE-06	0xFE06	User-defined parameter 6	0 to 65535	0	-	Real time	" FE-06" on page 761
FE-07	0xFE07	User-defined parameter 7	0 to 65535	0	-	Real time	" FE-07" on page 761
FE-08	0xFE08	User-defined parameter 8	0 to 65535	0	-	Real time	" FE-08" on page 761
FE-09	0xFE09	User-defined parameter 9	0 to 65535	0	-	Real time	" FE-09" on page 762

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
FE-10	0xFE0A	User-defined parameter 10	0 to 65535	0	-	Real time	"FE-10" on page 762
FE-11	0xFE0B	User-defined parameter 11	0 to 65535	0	-	Real time	"FE-11" on page 762
FE-12	0xFE0C	User-defined parameter 12	0 to 65535	0	-	Real time	"FE-12" on page 763
FE-13	0xFE0D	User-defined parameter 13	0 to 65535	0	-	Real time	"FE-13" on page 763
FE-14	0xFE0E	User-defined parameter 14	0 to 65535	0	-	Real time	"FE-14" on page 763
FE-15	0xFE0F	User-defined parameter 15	0 to 65535	0	-	Real time	"FE-15" on page 764
FE-16	0xFE10	User-defined parameter 16	0 to 65535	0	-	Real time	"FE-16" on page 764
FE-17	0xFE11	User-defined parameter 17	0 to 65535	0	-	Real time	"FE-17" on page 764
FE-18	0xFE12	User-defined parameter 18	0 to 65535	0	-	Real time	"FE-18" on page 765
FE-19	0xFE13	User-defined parameter 19	0 to 65535	0	-	Real time	"FE-19" on page 765
FE-20	0xFE14	User-defined parameter 20	0 to 65535	6768	-	Real time	"FE-20" on page 765
FE-21	0xFE15	User-defined parameter 21	0 to 65535	6769	-	Real time	"FE-21" on page 766
FE-22	0xFE16	User-defined parameter 22	0 to 65535	0	-	Real time	"FE-22" on page 766
FE-23	0xFE17	User-defined parameter 23	0 to 65535	0	-	Real time	"FE-23" on page 766
FE-24	0xFE18	User-defined parameter 24	0 to 65535	0	-	Real time	"FE-24" on page 767
FE-25	0xFE19	User-defined parameter 25	0 to 65535	0	-	Real time	"FE-25" on page 767
FE-26	0xFE1A	User-defined parameter 26	0 to 65535	0	-	Real time	"FE-26" on page 767
FE-27	0xFE1B	User-defined parameter 27	0 to 65535	0	-	Real time	"FE-27" on page 768
FE-28	0xFE1C	User-defined parameter 28	0 to 65535	0	-	Real time	"FE-28" on page 768
FE-29	0xFE1D	User-defined parameter 29	0 to 65535	0	-	Real time	"FE-29" on page 768
FE-30	0xFE1E	User-defined parameter 30	0 to 65535	0	-	Real time	"FE-30" on page 769

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
FE-31	0xFE1F	User-defined parameter 31	0 to 65535	0	-	Real time	" FE-31" on page 769
FP-00	0x1F00	User password	0 to 65535	0	-	Real time	" FP-00" on page 769
FP-01	0x1F01	Parameter initialization	0: No operation 1: Restore to factory settings 1 2: Clear records 4: Back up current user parameters 501: Restore user backup parameters	0	-	At stop	" FP-01" on page 770
FP-02	0x1F02	Parameter display	Ones: Parameter group U display 0: Not displayed 1: Displayed Tens: Parameter group A display 0: Not displayed 1: Displayed	11	-	At stop	" FP-02" on page 770
FP-03	0x1F03	Customized parameter group display	Ones: Display of user-defined parameter group 0: Not displayed 1: Displayed Tens: Display of user-modified parameter group 0: Not displayed 1: Displayed	0	-	Real time	" FP-03" on page 771
FP-04	0x1F04	User password modification	0: Modification allowed 1: Modification prohibited	0	-	Real time	" FP-04" on page 771

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A1-00	0xA100	VDI1 function selection	0: No function 1: Forward run (FWD) 2: Reverse run (REV) 3: Three-wire operation control 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6: Function as the UP key 7: Function as the DOWN key 8: Coast to stop 9: Fault reset (RESET) 10: Operation pause 11: External fault NO input 12: Multi-reference terminal 1 13: Multi-reference terminal 2 14: Multi-reference terminal 3 15: Multi-reference terminal 4 16: Acceleration/ Deceleration time selection terminal 1 17: Acceleration/ Deceleration time selection terminal 2 18: Frequency reference switchover 19: Clear information set by UP/DOWN keys on the operating panel or by terminals functioning as the UP/DOWN keys 20: Control command switchover terminal 1 21: Acceleration/ Deceleration inhibited 22: PID pause 23: Simple PLC state reset 24: Wobble frequency pause 25: Counter input (To be continued)	0	-	At stop	*"A1-00" on page 772*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A1-00	0xA100	VDI1 function selection	(Continued) 26: Counter reset 27: Length counting input 28: Length reset 29: Torque control inhibited 30: Pulse frequency input (only DI5) 31: Reserved 32: Immediate DC braking 33: External fault NC input 34: Frequency modification enable 35: PID action direction reversal 36: External stop terminal 1 37: Control command switchover terminal 2 38: PID integral pause 39: Switch main frequency source to preset frequency 40: Switch auxiliary frequency source to preset frequency 41: Motor terminal selection 42: Reserved 43: PID parameter switchover 44: User-defined fault 1 45: User-defined fault 2 46: Speed/Torque control switchover 47: Emergency stop 48: External stop terminal 2 49: Deceleration DC braking 50: Clear the current running time 51: Two-wire/Three-wire mode switchover 52: Reverse frequency inhibited 53 to 59: Reserved	0	-	At stop	"A1-00" on page 772
A1-01	0xA101	VDI2 function selection	Same as A1-00	0	-	At stop	"A1-01" on page 779

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A1-02	0xA102	VDI3 function selection	Same as A1-00	0	-	At stop	"A1-02" on page 779
A1-03	0xA103	VDI4 function selection	Same as A1-00	0	-	At stop	"A1-03" on page 779
A1-04	0xA104	VDI5 function selection	Same as A1-00	0	-	At stop	"A1-04" on page 780
A1-05	0xA105	VDI state setting mode	Ones: VDI1 0: Decided by state of VDOx 1: Decided by A1-06 Tens: VDI2 0: Decided by state of VDOx 1: Decided by A1-06 Hundreds: VDI3 0: Decided by state of VDOx 1: Decided by A1-06 Thousands: VDI4 0: Decided by state of VDOx 1: Decided by A1-06 Ten thousands: VDI5 0: Decided by state of VDOx 1: Decided by A1-06	0	-	At stop	"A1-05" on page 780
A1-06	0xA106	VDI state setting	Ones: VDI1 0: Invalid 1: Valid Tens: VDI2 0: Invalid 1: Valid Hundreds: VDI3 0: Invalid 1: Valid Thousands: VDI4 0: Invalid 1: Valid Ten thousands: VDI5 0: Invalid 1: Valid	0	-	Real time	"A1-06" on page 781
A1-07	0xA107	Function selection for AI1 used as DI	Same as A1-00	0	-	At stop	"A1-07" on page 781
A1-08	0xA108	Function selection for AI2 used as DI	Same as A1-00	0	-	At stop	"A1-08" on page 782

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A1-09	0xA109	Function selection for AI3 used as DI	Same as A1-00	0	-	At stop	"A1-09" on page 782
A1-10	0xA10A	Active status of AI used as DI	Ones: AI1 0: Active high 1: Active low Tens: AI2 0: Active high 1: Active low Hundreds: AI3 0: Active high 1: Active low	0	-	At stop	"A1-10" on page 782

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A1-11	0xA10B	VDO1 function selection	0: No output 1: Drive in operation 2: Fault output (coast to stop) 3: Frequency level detection 1 4: Frequency reached 5: Operation at zero speed (no output at stop) 6: Motor overload alarm 7: Drive overload alarm 8: Set count value reached 9: Designated count value reached 10: Length reached 11: Simple PLC cycle completed 12: Cumulative operating time reached 13: Frequency limited 14: Torque limited 15: Ready to run 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (no output at stop) 19: Undervoltage 20: Communication setting 21: Reserved 22: Reserved 23: Operation at zero speed 2 (output at stop) 24: Cumulative power-on time reached 25: Frequency level detection 2 To be continued	0	-	Real time	*"A1-11" on page 783*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
Continued	Continued	Continued	Continued 26: Frequency 1 reached 27: Frequency 2 reached 28: Current 1 reached 29: Current 2 reached 30: Timing reached 31: AI1 input limit exceeded 32: Drive output load loss 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Output current limit exceeded 37: Frequency lower limit reached (output at stop) 38: Alarm (all faults) 39: Motor overheat 40: Present operating time reached 41: Fault output (coast to stop; no output upon undervoltage)	Continued	Continued	Continued	Continued
A1-12	0xA10C	VDO2 function selection	Same as A1-11	0	-	Real time	"A1-12" on page 788
A1-13	0xA10D	VDO3 function selection	Same as A1-11	0	-	Real time	"A1-13" on page 788
A1-14	0xA10E	VDO4 function selection	Same as A1-11	0	-	Real time	"A1-14" on page 789
A1-15	0xA10F	VDO5 function selection	Same as A1-11	0	-	Real time	"A1-15" on page 789
A1-16	0xA110	VDO1 output delay	0.0 to 3600.0	0.0	s	Real time	"A1-16" on page 789
A1-17	0xA111	VDO2 output delay	0.0 to 3600.0	0.0	s	Real time	"A1-17" on page 789
A1-18	0xA112	VDO3 output delay	0.0 to 3600.0	0.0	s	Real time	"A1-18" on page 790

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A1-19	0xA113	VDO4 output delay	0.0 to 3600.0	0.0	s	Real time	"A1-19" on page 790
A1-20	0xA114	VDO5 output delay	0.0 to 3600.0	0.0	s	Real time	"A1-20" on page 790
A1-21	0xA115	Active state of VDO	Ones: VDO1 0: Positive logic 1: Negative logic Tens: VDO2 0: Positive logic 1: Negative logic Hundreds: VDO3 0: Positive logic 1: Negative logic Thousands: VDO4 0: Positive logic 1: Negative logic Ten thousands: VDO5 0: Positive logic 1: Negative logic	0	-	Real time	"A1-21" on page 791
A2-00	0xA200	Motor type	0: Common asynchronous motor 1: Variable frequency asynchronous motor	0	-	At stop	"A2-00" on page 791
A2-01	0xA201	Rated motor power	0.1 kW to 6553.5 kW	3.7	kW	At stop	"A2-01" on page 792
A2-02	0xA202	Rated motor voltage	1 V to 2000 V	380	V	At stop	"A2-02" on page 792
A2-03	0xA203	Rated motor current	0.01 A to 655.35 A	9.00	A	At stop	"A2-03" on page 793
A2-04	0xA204	Rated motor frequency	0.01 Hz to F0-10	50.00	Hz	At stop	"A2-04" on page 793
A2-05	0xA205	Rated motor speed	1 rpm to 65535 rpm	1460	rpm	At stop	"A2-05" on page 793
A2-06	0xA206	Stator resistance of asynchronous motor	0.001 Ω to 65.535 Ω	1.204	Ω	At stop	"A2-06" on page 794
A2-07	0xA207	Rotor resistance of asynchronous motor	0.001 Ω to 65.535 Ω	0.908	Ω	At stop	"A2-07" on page 794

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A2-08	0xA208	Leakage inductance of asynchronous motor	0.01mH to 655.35mH	5.28	mH	At stop	"A2-08" on page 794
A2-09	0xA209	Mutual inductance of asynchronous motor	0.1mH to 6553.5mH	158.6	mH	At stop	"A2-09" on page 795
A2-10	0xA20A	No-load current of asynchronous motor	0.01 A to A2-03	4.24	A	At stop	"A2-10" on page 795
A2-37	0xA225	Parameter auto-tuning selection	0: No auto-tuning 1: Auto-tuning of some asynchronous motor parameters in static state 2: Auto-tuning of all asynchronous motor parameters in dynamic state 3: Auto-tuning of all asynchronous motor parameters in static state	0	-	At stop	"A2-37" on page 796
A2-62	0xA23E	Motor 2 control mode	2: V/f control	2	-	Unchangeable	"A2-62" on page 797
A2-63	0xA23F	Motor 2 acceleration/deceleration time selection	0: Same as motor 1 1: Acceleration/Deceleration time 1 2: Acceleration/Deceleration time 2 3: Acceleration/Deceleration time 3 4: Acceleration/Deceleration time 4	0	-	Real time	"A2-63" on page 797
A2-64	0xA240	Motor 2 torque boost	0.0% to 30.0%	1.0	%	Real time	"A2-64" on page 798
A2-66	0xA242	Motor 2 oscillation suppression gain	0-100	0	-	Real time	"A2-66" on page 798
A5-00	0xA500	Frequency upper limit for DPWM switchover	5.00 Hz to F0-10	8.00	Hz	Real time	"A5-00" on page 799
A5-01	0xA501	PWM modulation mode	0: Asynchronous modulation 1: Synchronous modulation	0	-	Real time	"A5-01" on page 799
A5-02	0xA502	Dead-zone compensation mode	0: No compensation 1: Compensation mode 1	1	-	Real time	"A5-02" on page 800

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A5-03	0xA503	Random PWM depth	0-10	0	-	Real time	*"A5-03" on page 800*
A5-04	0xA504	Fast current limit	0: Disable 1: Enable	1	-	Real time	*"A5-04" on page 801*
A5-05	0xA505	Voltage overmodulation coefficient	100 to 110	105	-	At stop	*"A5-05" on page 801*
A5-06	0xA506	Undervoltage threshold	210.0 V to 420.0 V	350.0	V	Real time	*"A5-06" on page 801*
A5-08	0xA508	Low speed carrier frequency	0.0 kHz to 8.0 kHz	0.0	kHz	Real time	*"A5-08" on page 801*
A5-09	0xA509	Overvoltage threshold	650.0 V to 820.0 V	820.0	V	At stop	*"A5-09" on page 802*
A5-10	0xA50A	Energy saving control	0: Invalid 1: Valid	0	-	At stop	*"A5-10" on page 802*
A5-11	0xA50B	Frequency limit threshold for DC braking at low speed	1 Hz to 20 Hz	5	Hz	At stop	*"A5-11" on page 802*
A6-00	0xA600	Minimum input of curve 4	-10.00 V to A6-02	0.00	V	Real time	*"A6-00" on page 803*
A6-01	0xA601	Percentage corresponding to the minimum input of curve 4	-100.0% to +100.0%	0.0	%	Real time	*"A6-01" on page 803*
A6-02	0xA602	Input of inflection point 1 on curve 4	A6-00 to A6-04	3.00	V	Real time	*"A6-02" on page 803*
A6-03	0xA603	Percentage corresponding to the input of curve 4 inflection point 1	-100.0% to +100.0%	30.0	%	Real time	*"A6-03" on page 804*
A6-04	0xA604	Input of inflection point 2 on curve 4	A6-02 to A6-06	6.00	V	Real time	*"A6-04" on page 804*
A6-05	0xA605	Percentage corresponding to the input of curve 4 inflection point 2	-100.0% to +100.0%	60.0	%	Real time	*"A6-05" on page 804*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A6-06	0xA606	Maximum input of curve 4	A6-04 to 10.00 V	10.00	V	Real time	"A6-06" on page 805
A6-07	0xA607	Percentage corresponding to the maximum input of curve 4	-100.0% to +100.0%	100.0	%	Real time	"A6-07" on page 805
A6-08	0xA608	Minimum input of curve 5	-10.00 V to A6-10	-10.00	V	Real time	"A6-08" on page 805
A6-09	0xA609	Percentage corresponding to the minimum input of curve 5	-100.0% to +100.0%	-100.0	%	Real time	"A6-09" on page 805
A6-10	0xA60A	Input of inflection point 1 on curve 5	A6-08 to A6-12	-3.00	V	Real time	"A6-10" on page 806
A6-11	0xA60B	Percentage corresponding to the input of curve 5 inflection point 1	-100.0% to +100.0%	-30.0	%	Real time	"A6-11" on page 806
A6-12	0xA60C	Input of inflection point 2 on curve 5	A6-10 to A6-14	3.00	V	Real time	"A6-12" on page 806
A6-13	0xA60D	Percentage corresponding to the input of curve 5 inflection point 2	-100.0% to +100.0%	30.0	%	Real time	"A6-13" on page 807
A6-14	0xA60E	Maximum input of curve 5	A6-12 to 10.00 V	10.00	V	Real time	"A6-14" on page 807
A6-15	0xA60F	Percentage corresponding to the maximum input of curve 5	-100.0% to +100.0%	100.0	%	Real time	"A6-15" on page 807
A6-16	0xA610	AI1 monitored minimum value	F4-13 to A6-17	0.00	V	Real time	"A6-16" on page 808
A6-17	0xA611	AI1 monitored maximum value	A6-16 to F4-15	10.00	V	Real time	"A6-17" on page 808
A6-18	0xA612	AI2 monitored minimum value	F4-18 to A6-19	0.00	V	Real time	"A6-18" on page 808

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A6-19	0xA613	AI2 monitored maximum value	A6-18 to F4-20	10.00	V	Real time	*"A6-19" on page 808*
A6-20	0xA614	AI3 monitored minimum value	F4-23 to A6-21	0.00	V	Real time	*"A6-20" on page 809*
A6-21	0xA615	AI3 monitored maximum value	A6-20 to F4-25	10.00	V	Real time	*"A6-21" on page 809*
A6-22	0xA616	Analog value alarm	Bit 0: AI1 value < minimum value (A6-16) Bit 1: AI1 value > maximum value (A6-17) Bit 2: AI2 value < minimum value (A6-18) Bit 3: AI2 value > maximum value (A6-19) Bit 4: AI3 value < minimum value (A6-20) Bit 5: AI3 value > maximum value (A6-21)	0x0	-	Real time	*"A6-22" on page 809*
A6-23	0xA617	Processing mode for analog value overlimit	0-5	0	-	At stop	*"A6-23" on page 810*
A6-24	0xA618	AI1 jump point	-100.0% to +100.0%	0.0	%	Real time	*"A6-24" on page 810*
A6-25	0xA619	AI1 jump amplitude	0.0% to 100.0%	0.5	%	Real time	*"A6-25" on page 811*
A6-26	0xA61A	AI2 jump point	-100.0% to +100.0%	0.0	%	Real time	*"A6-26" on page 811*
A6-27	0xA61B	AI2 jump amplitude	0.0% to 100.0%	0.5	%	Real time	*"A6-27" on page 811*
A6-28	0xA61C	AI3 jump point	-100.0% to +100.0%	0.0	%	Real time	*"A6-28" on page 811*
A6-29	0xA61D	AI3 jump amplitude	0.0% to 100.0%	0.5	%	Real time	*"A6-29" on page 812*
A6-30	0xA61E	AI1 overlimit detection time	0.0s to 10.0s	0.1	s	Real time	*"A6-30" on page 812*

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A6-31	0xA61F	AI2 overlimit detection time	0.0s to 10.0s	0.1	s	Real time	"A6-31" on page 812
A6-32	0xA620	AI3 overlimit detection time	0.0s to 10.0s	0.1	s	Real time	"A6-32" on page 813
A6-33	0xA621	Safe speed of analog value overlimit	0.00 Hz to F0-10	0.00	Hz	Real time	"A6-33" on page 813
A7-00	0xA700	PLC card function selection	0: Invalid 1: Valid	0	-	At stop	"A7-00" on page 813
A7-01	0xA701	Output terminal control mode	Ones: FMR (FM used as digital output) 0: Controlled by the drive 1: Controlled by the PLC Tens: Relay (T/A-T/B-T/C) 0: Controlled by the drive 1: Controlled by the PLC Hundreds: DO1 0: Controlled by the drive 1: Controlled by the PLC Thousands: FMP (FM used as pulse output) 0: Controlled by the drive 1: Controlled by the PLC Ten thousands: AO1 0: Controlled by the drive 1: Controlled by the PLC	0	-	At stop	"A7-01" on page 814
A7-02	0xA702	PLC AI3 function configuration	0: AI3 voltage input, AO2 voltage output 1: AI3 voltage input, AO2 current output 2: AI3 current input, AO2 voltage output 3: AI3 current input, AO2 current output 4: AI3 PTC input, AO2 voltage output 5: AI3 PTC input, AO2 current output 6: AI3 PTC100 input, AO2 voltage output 7: AI3 PTC100 input, AO2 current output	0	-	At stop	"A7-02" on page 814

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A7-03	0xA703	FMP output	0.0% to 100.0%	0.0	%	Real time	"A7-03" on page 815
A7-04	0xA704	AO1 output	0.0% to 100.0%	0.0	%	Real time	"A7-04" on page 815
A7-05	0xA705	Digital output	Ones: FMR 0: Inactive 1: Active Tens: Relay 1 0: Inactive 1: Active Hundreds: DO1 0: Inactive 1: Active	0	-	Real time	"A7-05" on page 816
A7-06	0xA706	Frequency set by programmable card	-100.00% to +100.00%	0.00	%	Real time	"A7-06" on page 816
A7-07	0xA707	Torque set by programmable card	-200.0% to +200.0%	0.0	%	Real time	"A7-07" on page 817
A7-08	0xA708	Command given by programmable card	0: No command 1: Forward run 2: Reverse run 3: Forward jog 4: Reverse jog 5: Coast to stop 6: Decelerate to stop 7: Fault reset	0	-	Real time	"A7-08" on page 817
A7-09	0xA709	Fault set by programmable card	0 to 65535	0	-	Real time	"A7-09" on page 818
A8-00	0xA800	Point-to-point communication	0: Invalid 1: Valid	0	-	At stop	"A8-00" on page 818
A8-01	0xA801	Master/Slave selection	0: Master 1: Slave	0	-	At stop	"A8-01" on page 818

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
A8-02	0xA802	Selection of action of the slave	Ones: Whether the slave follows the operation command of the master 0: No 1: Yes Tens: Whether the slave fault information is transmitted 0: No 1: Yes Hundreds: Whether the master reports a fault (Err16) upon disconnection of the slave 0: No 1: Yes	11	-	At stop	"A8-02" on page 819
A8-03	0xA803	Function selection for data received by the slave	0: Running frequency of master 1: Target frequency of master	1	-	At stop	"A8-03" on page 819
A8-04	0xA804	Zero offset of received data (torque)	-100.00% to +100.00%	0.00	%	Real time	"A8-04" on page 820
A8-05	0xA805	Gain of received data (torque)	-10.00 to +10.00	1.00	-	Real time	"A8-05" on page 820
A8-06	0xA806	Master-slave communication heartbeat time	0.0s to 10.0s	1.0	s	At stop	"A8-06" on page 821
A8-07	0xA807	Data transmission cycle of the master in point-to-point communication	0.001 to 10.000	0.001	s	At stop	"A8-07" on page 821
A8-08	0xA808	Zero offset of received frequency	-100.00 to 100.00	0.00	-	Real time	"A8-08" on page 822
A8-09	0xA809	Gain of received frequency	-10.00 to +10.00	1.00	-	Real time	"A8-09" on page 822
A8-10	0xA80A	Anti-runaway coefficient	0.00 to 100.00	10.00	-	Real time	"A8-10" on page 822
A8-11	0xA80B	Maximum reverse deviation of slave frequency	0.20% to 10.00%	0.50	%	Real time	"A8-11" on page 822

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
AC-00	0xAC00	AI1 measured voltage 1	-10.000 V to +10.000 V	2.000	V	Real time	"AC-00" on page 823
AC-01	0xAC01	AI1 displayed voltage 1	-10.000 V to +10.000 V	2.000	V	Real time	"AC-01" on page 823
AC-02	0xAC02	AI1 measured voltage 2	-10.000 V to +10.000 V	8.000	V	Real time	"AC-02" on page 823
AC-03	0xAC03	AI1 displayed voltage 2	-10.000 V to +10.000 V	8.000	V	Real time	"AC-03" on page 824
AC-04	0xAC04	AI2 measured voltage 1	-10.000 V to +10.000 V	2.000	V	Real time	"AC-04" on page 824
AC-05	0xAC05	AI2 displayed voltage 1	-10.000 V to +10.000 V	2.000	V	Real time	"AC-05" on page 824
AC-06	0xAC06	AI2 measured voltage 2	-10.000 V to +10.000 V	8.000	V	Real time	"AC-06" on page 825
AC-07	0xAC07	AI2 displayed voltage 2	-10.000 V to +10.000 V	8.000	V	Real time	"AC-07" on page 825
AC-08	0xAC08	AI3 measured voltage 1	-10.000 V to +10.000 V	2.000	V	Real time	"AC-08" on page 826
AC-09	0xAC09	AI3 displayed voltage 1	-10.000 V to +10.000 V	2.000	V	Real time	"AC-09" on page 826
AC-10	0xAC0A	AI3 measured voltage 2	-10.000 V to +10.000 V	8.000	V	Real time	"AC-10" on page 826
AC-11	0xAC0B	AI3 displayed voltage 2	-10.000 V to +10.000 V	8.000	V	Real time	"AC-11" on page 827
AC-12	0xAC0C	AO1 target voltage 1	-10.000 V to +10.000 V	2.000	V	Real time	"AC-12" on page 827
AC-13	0xAC0D	AO1 measured voltage 1	-10.000 V to +10.000 V	2.000	V	Real time	"AC-13" on page 827
AC-14	0xAC0E	AO1 target voltage 2	-10.000 V to +10.000 V	8.000	V	Real time	"AC-14" on page 828

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
AC-15	0xAC0F	AO1 measured voltage 2	-10.000 V to +10.000 V	8.000	V	Real time	"AC-15" on page 828
AC-16	0xAC10	AO2 target voltage 1	-10.000 V to +10.000 V	2.000	V	Real time	"AC-16" on page 828
AC-17	0xAC11	AO2 measured voltage 1	-10.000 V to +10.000 V	2.000	V	Real time	"AC-17" on page 829
AC-18	0xAC12	AO2 target voltage 2	-10.000 V to +10.000 V	8.000	V	Real time	"AC-18" on page 829
AC-19	0xAC13	AO2 measured voltage 2	-10.000 V to +10.000 V	8.000	V	Real time	"AC-19" on page 829
U0-00	0x7000	Operating frequency	0.00 Hz to 500.00 Hz	0.00	Hz	Unchangeable	"U0-00" on page 830
U0-01	0x7001	Frequency reference	0.00 Hz to 500.00 Hz	0.00	Hz	Unchangeable	"U0-01" on page 830
U0-02	0x7002	Bus voltage	0.0 V to 3000.0 V	0.0	V	Unchangeable	"U0-02" on page 830
U0-03	0x7003	Output voltage	0 V to 1140 V	0	V	Unchangeable	"U0-03" on page 830
U0-04	0x7004	Output current	0.00 A to 655.35 A	0.00	A	Unchangeable	"U0-04" on page 831
U0-05	0x7005	Output power	0.0 kW to 3276.7 kW	0.0	kW	Unchangeable	"U0-05" on page 831
U0-06	0x7006	Output torque	-200.0% to +200.0%	0.0	%	Unchangeable	"U0-06" on page 831
U0-07	0x7007	DI input state	0-32767	0	-	Unchangeable	"U0-07" on page 832
U0-08	0x7008	DO output state	0-32767	0	-	Unchangeable	"U0-08" on page 832
U0-09	0x7009	AI1 voltage	-10.57 V to 10.57 V	0.00	V	Unchangeable	"U0-09" on page 833

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
U0-10	0x700A	AI2 voltage	0.00 V to 10.57 V	0.00	V	Unchangeable	" U0-10" on page 833
U0-11	0x700B	AI3 voltage	-10.57 V to 10.57 V	0.00	V	Unchangeable	" U0-11" on page 834
U0-12	0x700C	Counting value	0 to 65535	0	-	Unchangeable	" U0-12" on page 834
U0-13	0x700D	Length value	0 to 65535	0	-	Unchangeable	" U0-13" on page 834
U0-14	0x700E	Load speed display	0 rpm to 65535 rpm	0	rpm	Unchangeable	" U0-14" on page 835
U0-15	0x700F	PID reference	0 to 65535	0	-	Unchangeable	" U0-15" on page 835
U0-16	0x7010	PID feedback	0 to 65535	0	-	Unchangeable	" U0-16" on page 835
U0-17	0x7011	PLC stage	0-15	0	-	Unchangeable	" U0-17" on page 836
U0-18	0x7012	Pulse input frequency	0.00 kHz to 100.00 kHz	0.00	kHz	Unchangeable	" U0-18" on page 836
U0-19	0x7013	Feedback speed	-5000.00 Hz to 5000.00 Hz	0.00	Hz	Unchangeable	" U0-19" on page 836
U0-20	0x7014	Remaining running time	0.0 min to 6500.0 min	0.0	min	Unchangeable	" U0-20" on page 837
U0-21	0x7015	AI1 voltage before correction	0.000 V to 10.570 V	0.000	V	Unchangeable	" U0-21" on page 837
U0-22	0x7016	AI2 voltage before correction	0.000 V to 65.535 V	0.000	V	Unchangeable	" U0-22" on page 837
U0-23	0x7017	AI3 voltage before correction	-10.570 V to 10.570 V	0.000	V	Unchangeable	" U0-23" on page 838
U0-24	0x7018	Motor speed	0 rpm to 65535 rpm	0	rpm	Unchangeable	" U0-24" on page 838

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
U0-25	0x7019	Current power-on time	0 min to 65535 min	0	min	Unchangeable	" U0-25" on page 838
U0-26	0x701A	Current operating time	0.0 min to 6553.5 min	0.0	min	Unchangeable	" U0-26" on page 839
U0-27	0x701B	Pulse input frequency	0 Hz to 65535 Hz	0	Hz	Unchangeable	" U0-27" on page 839
U0-28	0x701C	Communication reference	-100.00% to +100.00%	0.00	%	Unchangeable	" U0-28" on page 839
U0-30	0x701E	Display of main frequency X	-500.00 Hz to +500.00 Hz	0.00	Hz	Unchangeable	" U0-30" on page 840
U0-31	0x701F	Display of auxiliary frequency Y	-500.00 Hz to +500.00 Hz	0.00	Hz	Unchangeable	" U0-31" on page 840
U0-32	0x7020	Memory address view	0 to 65535	0	-	Unchangeable	" U0-32" on page 840
U0-34	0x7022	Motor temperature	0°C to 200°C	0	°C	Unchangeable	" U0-34" on page 840
U0-36	0x7024	Resolver position	0-4095	0	-	Unchangeable	" U0-36" on page 841
U0-37	0x7025	Power factor angle	0.0 to 6553.5	0.0	°	Unchangeable	" U0-37" on page 841
U0-38	0x7026	ABZ position	0 to 65535	0	-	Unchangeable	" U0-38" on page 841
U0-39	0x7027	Target voltage in V/f decoupled mode	0 V to 65535 V	0	V	Unchangeable	" U0-39" on page 842
U0-40	0x7028	Output voltage in V/f decoupled mode	0 V to 65535 V	0	V	Unchangeable	" U0-40" on page 842
U0-45	0x702D	Fault information	0 to 65535	0	-	Unchangeable	" U0-45" on page 842
U0-58	0x703A	Z signal counter	0 to 65535	0	-	Unchangeable	" U0-58" on page 843

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
U0-59	0x703B	Frequency reference	-100.00% to +100.00%	0.00	%	Unchangeable	" U0-59" on page 843
U0-60	0x703C	Operating frequency	-100.00% to +100.00%	0.00	%	Unchangeable	" U0-60" on page 843
U0-61	0x703D	AC drive running status	0 to 65535	0	-	Unchangeable	" U0-61" on page 844
U0-62	0x703E	Current fault	0-99	0	-	Unchangeable	" U0-62" on page 844
U0-63	0x703F	Value sent by master in point-to-point communication	-100.0% to +100.0%	0.0	%	Unchangeable	" U0-63" on page 844
U0-64	0x7040	Number of slaves in master/slave control	0-63	0	-	Unchangeable	" U0-64" on page 845
U0-65	0x7041	Torque upper limit (%)	-200.0% to +200.0%	0.0	%	Unchangeable	" U0-65" on page 845
U0-66	0x7042	Model of communication expansion card	0 to 65535	0	-	Unchangeable	" U0-66" on page 845
U0-67	0x7043	Communication extension version	0.0 to 655.35	0.00	-	Unchangeable	" U0-67" on page 845
U0-68	0x7044	Drive state read through DP card	0 to 65535	0	-	Unchangeable	" U0-68" on page 846
U0-69	0x7045	Speed transmitted to DP card	0.00 Hz to 655.35 Hz	0.00	Hz	Unchangeable	" U0-69" on page 846
U0-70	0x7046	Speed/rpm	-32767 rpm to 32767 rpm	0	rpm	Unchangeable	" U0-70" on page 847
U0-71	0x7047	Communication card-specific current	0.0 A to 6553.5 A	0.0	A	Unchangeable	" U0-71" on page 847
U0-72	0x7048	Communication card error state	0 to 65535	0	-	Unchangeable	" U0-72" on page 847
U0-73	0x7049	Motor SN	0 to 65535	0	-	Unchangeable	" U0-73" on page 848

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
U0-74	0x704A	Actual motor output torque	0.0% to 6553.5%	0.0	%	Unchangeable	" U0-74" on page 848
U0-76	0x704C	Low bit of cumulative power consumption	0.0 kWh to 6553.5 kWh	0.0	kWh	Unchangeable	" U0-76" on page 848
U0-77	0x704D	High bit of cumulative power consumption	0 kWh to 65535 kWh	0	kWh	Unchangeable	" U0-77" on page 849
U0-78	0x704E	Linear speed	0 m/min to 65535 m/min	0	m/min	Unchangeable	" U0-78" on page 849
U0-80	0x7050	EtherCAT slave name	0 to 65535	0	-	Unchangeable	" U0-80" on page 849
U0-81	0x7051	EtherCAT slave alias	0 to 65535	0	-	Unchangeable	" U0-81" on page 850
U0-82	0x7052	EtherCAT ESM transmission error code	0 to 65535	0	-	Unchangeable	" U0-82" on page 850
U0-83	0x7053	EtherCAT XML file version	0.0 to 655.35	0.00	-	Unchangeable	" U0-83" on page 850
U0-84	0x7054	Number of lost EtherCAT synchronization frames	0 to 65535	0	-	Unchangeable	" U0-84" on page 850
U0-85	0x7055	Maximum number of error frames and invalid frames of EtherCAT port 0 per unit time	0 to 65535	0	-	Unchangeable	" U0-85" on page 851
U0-86	0x7056	Maximum number of error frames and invalid frames of EtherCAT port 1 per unit time	0 to 65535	0	-	Unchangeable	" U0-86" on page 851
U0-87	0x7057	Maximum number of error frames forwarded by EtherCAT port per unit time	0 to 65535	0	-	Unchangeable	" U0-87" on page 851

Parameter code	Address	Parameter name	Value range	Default	Unit	Change mode	Page
U0-88	0x7058	Maximum number of error frames processed by EtherCAT data frame processing unit per unit time	0 to 65535	0	-	Unchangeable	*" U0-88" on page 852*
U0-89	0x7059	Maximum number of lost links over the EtherCAT port per unit time	0 to 65535	0	-	Unchangeable	*" U0-89" on page 852*

13 Parameter Group

13.1 F0 Basic Function Group

F0-00 **G/P model**

Address:	0xF000	Effective mode:	/
Min.:	1	Unit:	-
Max.:	2	Data type:	UInt16
Default:	2	Change mode:	At stop

Range:

1: G model: Heavy load application

2: P model: Light load application

Parameter description

This parameter indicates the overload type of the AC drive.

1: G model: Heavy load application

Generally, overload of 1.5 times is supported, such as fully-loaded conveyor belts and cranes.

2: P model: Light overload application

Generally, overload of 1.1 times is supported, such as fan and water pump.

F0-01 **Motor 1 control mode**

Address:	0xF001	Effective mode:	/
Min.:	2	Unit:	-
Max.:	2	Data type:	UInt16
Default:	2	Change mode:	Unchangeable

Range:

2: V/f control

Parameter description

2: V/f control (open loop speed control). It is applicable to scenarios without high requirements on load control performance such as fans and pumps. If one drive is used to control multiple motors, only the V/f control mode can be used.

F0-02 **Command source**

Address:	0xF002	Effective mode:	/
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16

Default:	0	Change mode:	Real time

Range:

0: Operating panel

1: Terminal

2: Communication

Parameter description

This parameter is used to select the input channel of the AC drive control commands, such as run, stop, forward run, reverse run and jog operation.

0: Operating panel

Operation commands are input by using the RUN, STOP/RES, and MF.K keys on the operating panel. It is applicable to initial commissioning.

1: Terminal

Operation commands are input through the DIs of the AC drive. The DI can be assigned with different functions such as start/stop, forward/reverse run, jog, two-wire/three-wire mode, and multi-reference (independent from each other). This mode is suitable for most applications.

2: Communication

Operation commands are input through remote communication with the communication address of 0x7310 or 0x1000 in general. The AC drive must be equipped with a communication card to communicate with the host controller. The communication address for Modbus RTU and CANlink communication is 0x2000 and that for PROFIBUS DP, CANopen, PROFINET, and EtherCAT communication is 0x2073-12. The related parameter is U3-17. This mode applies to remote control or centralized control of multiple equipment.

F0-03 Selection of main frequency source X

Address	0xF003	Effective mode:	/
Min.:	0	Unit:	-
Max.:	9	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Digital setting (preset frequency F0-08, which can be changed by UP/DOWN keys; non-retentive upon power failure)
1: Digital setting (preset frequency F0-08, which can be changed by UP/DOWN keys; retentive upon power failure)
2: AI1
3: AI2
4: AI3
5: Pulse (DI5)
6: Multi-reference
7: Simple PLC
8: PID
9: Communication

Parameter description

This parameter is used to set the source of the main frequency X, as shown below.

0: Digital setting (non-retentive at power failure)

The initial value of the frequency reference is the value of F0-08 (Preset frequency). The frequency can be changed by using the ▲ and ▼ keys on the operating panel or the multi-functional input terminal functioning as the UP/DOWN key. When the AC drive is powered on again after a power failure, the frequency reference is restored to the value of F0-08.

1: Digital setting (retentive at power failure)

The initial value of the frequency reference is set by F0-08 (preset frequency). The frequency can be changed by using the ▲ and ▼ keys on the operating panel or the multi-functional input terminal functioning as the UP/DOWN key. When the drive is powered on again after a power failure, the frequency reference is the same as that at the moment of the last power failure. Modifications made by using keys ▲ and ▼ on the operating panel or the multi-functional input terminal functioning as the UP and DOWN key remain effective.

2: AI1

The frequency is input by the voltage signal through AI1. The frequency is calculated according to the preset AI curve. AI curves can be set in parameter group F4.

3: AI2

The frequency reference is input by current or voltage signals through AI2. The frequency is calculated according to the preset AI curve. AI curves can be set in parameter group F4.

4: AI3

The frequency reference is input by current or voltage signals through AI3. The frequency is calculated according to the preset AI curve. AI curves can be set in parameter group F4.

5: Pulse reference (DI5)
The frequency reference is set through the DI5. The frequency (F4-28 to F4-31) is calculated based on the relationship curve between the pulse frequency and the frequency reference.
6: Multi-reference
When multi-reference is used as the frequency source, different combinations of DI terminal states correspond to different frequency references. The four multi-reference terminals (assigned with functions 12 to 15) can provide 16 states, corresponding to 16 frequencies (set by FC-00 to FC-15).
7: Simple PLC
Simple PLC provides multi-speed running commands that can control the running time and acceleration and deceleration time. Parameters FC-00 to FC-15 are used to set the values of each frequency. FC-18 to FC-49 are used to set the running time and acceleration and deceleration time of each frequency. Up to 16 frequencies can be set.
8: PID
PID is selected as the frequency reference. As a general process control method, PID control is a closed-loop mechanism in which each controlled variable is stabilized at the target level. This is implemented through proportional, integral, and differential calculation of the difference between the feedback signal and the target signal of the controlled variable and through adjustment of the AC drive output frequency. PID control is generally used in closed-loop control scenarios, such as constant pressure closed-loop control and constant tension closed-loop control. Set PID-related parameters in group FA.
9: Communication
The frequency reference is set through communication. The frequency reference is input through remote communication with the communication address of 0x7310 or 0x1000 in general. The AC drive must be equipped with a communication card to communicate with the host controller. The communication address for Modbus RTU and CANlink communication is 0x2000 and that for PROFIBUS DP, CANopen, PROFINET, and EtherCAT communication is 0x2073-12. The related parameter is U3-17. This mode applies to remote control or centralized control of multiple equipment.

F0-04 **Selection of auxiliary frequency source Y**

Address	0xF004	Effective mode:	/
Min.:	0	Unit:	-
Max.:	9	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Digital setting (preset frequency F0-08, which can be changed by UP/DOWN keys; non-retentive upon power failure)

1: Digital setting (preset frequency F0-08, which can be changed by UP/DOWN keys; retentive upon power failure)

2: AI1

3: AI2

4: AI3

5: Pulse (DI5)

6: Multi-reference

7: Simple PLC

8: PID

9: Communication

Parameter description

This parameter is used to set the source of the auxiliary frequency Y, as shown below.

0: Digital setting (non-retentive at power failure)

The initial value of the frequency reference is the value of F0-08 (Preset frequency). The frequency can be changed by using the ▲ and ▼ keys on the operating panel or the multi-functional input terminal functioning as the UP/DOWN key. When the AC drive is powered on again after a power failure, the frequency reference is restored to the value of F0-08.

1: Digital setting (retentive at power failure)

The initial value of the frequency reference is set by F0-08 (preset frequency). The frequency can be changed by using the ▲ and ▼ keys on the operating panel or the multi-functional input terminal functioning as the UP/DOWN key. When the drive is powered on again after a power failure, the frequency reference is the same as that at the moment of the last power failure. Modifications made by using keys ▲ and ▼ on the operating panel or the multi-functional input terminal functioning as the UP and DOWN key remain effective.

2: AI1

The frequency is input by the voltage signal through AI1. The frequency is calculated according to the preset AI curve. AI curves can be set in parameter group F4.

3: AI2

The frequency reference is input by current or voltage signals through AI2. The frequency is calculated according to the preset AI curve. AI curves can be set in parameter group F4.

4: AI3

The frequency reference is input by current or voltage signals through AI3. The frequency is calculated according to the preset AI curve. AI curves can be set in parameter group F4.

5: Pulse reference (DI5)
The frequency reference is set through the DI5. The frequency (F4-28 to F4-31) is calculated based on the relationship curve between the pulse frequency and the frequency reference.
6: Multi-reference
When multi-reference is used as the frequency source, different combinations of DI terminal states correspond to different frequency references. The four multi-reference terminals (assigned with functions 12 to 15) can provide 16 states, corresponding to 16 frequencies (set by FC-00 to FC-15).
7: Simple PLC
Simple PLC provides multi-speed running commands that can control the running time and acceleration and deceleration time. Parameters FC-00 to FC-15 are used to set the values of each frequency. FC-18 to FC-49 are used to set the running time and acceleration and deceleration time of each frequency. Up to 16 frequencies can be set.
8: PID
PID is selected as the frequency reference. As a general process control method, PID control is a closed-loop mechanism in which each controlled variable is stabilized at the target level. This is implemented through proportional, integral, and differential calculation of the difference between the feedback signal and the target signal of the controlled variable and through adjustment of the AC drive output frequency. PID control is generally used in closed-loop control scenarios, such as constant pressure closed-loop control and constant tension closed-loop control. Set PID-related parameters in group FA.
9: Communication
The frequency reference is set through communication. The frequency reference is input through remote communication with the communication address of 0x7310 or 0x1000 in general. The AC drive must be equipped with a communication card to communicate with the host controller. The communication address for Modbus RTU and CANlink communication is 0x2000 and that for PROFIBUS DP, CANopen, PROFINET, and EtherCAT communication is 0x2073-12. The related parameter is U3-17. This mode applies to remote control or centralized control of multiple equipment.

F0-05 **Base value of auxiliary frequency Y range upon superposition**

Address:	0xF005	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Relative to maximum frequency

1: Relative to main frequency X

Parameter description

0: Relative to maximum frequency

The maximum auxiliary frequency at superposition is equal to the result of F0-06 (Range of auxiliary frequency Y upon superposition) multiplied by F0-10 (Maximum frequency).

1: Relative to main frequency X

The maximum auxiliary frequency at superposition is equal to the result of F0-06 (Range of auxiliary frequency Y upon superposition) multiplied by the main frequency.

F0-06 Range of auxiliary frequency Y upon superposition

Address:	0xF006	Effective mode:	/
Min.:	0	Unit:	%
Max.:	150	Data type:	UInt16
Default:	100	Change mode:	Real time

Range:

0% to 150%

Parameter description

This parameter sets the range of auxiliary frequency Y upon superposition.

F0-07 Frequency superposition selection

Address	0xF007	Effective mode:	/
Min.:	0	Unit:	-
Max.:	34	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

Ones: Frequency reference selection
0: Main frequency X
1: Main and auxiliary frequency operation result (based on tens place)
2: Switchover between the main frequency X and the auxiliary frequency Y
3: Switchover between the main frequency X and the main and auxiliary frequency operation result
4: Switchover between the auxiliary frequency Y and the main and auxiliary frequency operation result
Tens: Main and auxiliary frequency operation
0: Main frequency + Auxiliary frequency
1: Main frequency – Auxiliary frequency
2: Max. (main frequency, auxiliary frequency)
3: Min. (main frequency, auxiliary frequency)

Description

This parameter is used to set the superposition mode of the main frequency X and auxiliary frequency Y.
Ones: Frequency reference selection
0: Main frequency X
The running frequency of the AC drive is determined by the main frequency X (F0-03).
1: Main and auxiliary frequency operation result (based on tens place)
The running frequency of the AC drive is the operation result of the main and auxiliary frequencies, and the operation method is determined by the tens place of F0-07.
2: Switchover between the main frequency X and the auxiliary frequency Y
The running frequency of the AC drive is selected or switched between the main frequency X and the auxiliary frequency Y through the DI terminal. In this case, the corresponding DI must be assigned with the frequency source switchover function. If the DI2 terminal is used for switchover, set F4-01 to 18.
3: Switchover between the main frequency X and the main and auxiliary frequency operation result
The running frequency of the AC drive is selected or switched between the main frequency X and the main and auxiliary frequency operation result through the DI terminal. If the DI2 terminal is used for switchover, set F4-01 to 18.
4: Switchover between the auxiliary frequency Y and the main and auxiliary frequency operation result
The running frequency of the AC drive is selected or switched between the auxiliary frequency Y and the main and auxiliary frequency operation result through the DI terminal. If the DI2 terminal is used for switchover, set F4-01 to 18.
Tens: Main and auxiliary frequency operation

0: Main frequency + Auxiliary frequency
The main and auxiliary frequency operation result is the main frequency X plus the auxiliary frequency Y.
1: Main frequency - Auxiliary frequency
The main and auxiliary frequency operation result is the main frequency X minus the auxiliary frequency Y.
2: Max. (main frequency, auxiliary frequency)
The main and auxiliary frequency operation result is the larger value between the main frequency X and the auxiliary frequency Y.
3: Min. (main, auxiliary)
The main and auxiliary frequency operation result is the smaller value between the main frequency X and the auxiliary frequency Y.

F0-08 **Preset frequency**

Address:	0xF008	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50.00	Change mode:	Real time

Range:
0.00 Hz to F0-10
Parameter description
When the frequency source is set by digital setting (F0-03 = 0 or 1), this parameter is the target frequency of the AC drive.

F0-09 **Running direction**

Address:	0xF009	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0: Default direction
1: Opposite to the default direction
Parameter description
You can change the rotation direction of the motor by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of the U, V, and W wires of the motor.

F0-10 **Maximum frequency**

Address:	0xF00A	Effective mode:	/
Min.:	50.00	Unit:	Hz
Max.:	500.00	Data type:	UInt16
Default:	50.00	Change mode:	At stop

Range:

50.00 Hz to 500.00 Hz

Parameter description

This parameter defines the maximum output frequency of the drive.

F0-11 **Source of frequency upper limit**

Address	0xF00B	Effective mode:	/
Min.:	0	Unit:	-
Max.:	5	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: F0-12

1: AI1

2: AI2

3: AI3

4: Pulse

5: Communication

Parameter description

This parameter defines the source of frequency upper limit, as described below.

0: F0-12

The frequency upper limit is set by F0-12.

1: AI1

The frequency upper limit is input by voltage signals through the AI1 terminal. The frequency is calculated according to the preset AI curve.

2: AI2

The frequency upper limit is input by current or voltage signals through the AI2 terminal. The frequency is calculated according to the preset AI curve.

3: AI3

The frequency upper limit is input by current or voltage signals through the AI3 terminal. The frequency is calculated according to the preset AI curve.

4: Pulse reference (DI5)
The frequency upper limit is set through the DI5. The frequency is calculated based on the curve of the relationship between the pulse frequency and the maximum frequency.
5: Communication
The frequency upper limit is set through communication.

F0-12 Frequency upper limit

Address:	0xF00C	Effective mode:	/
Min.:	F0-14	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50.00	Change mode:	Real time

Range:
F0-14 to F0-10
Parameter description
This parameter defines the maximum operating frequency of motors.

F0-13 Frequency upper limit offset

Address:	0xF00D	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:
0.00 Hz to F0-10
Parameter description
This parameter defines the offset of the frequency upper limit. It is used to adjust the output frequency upon the lowest frequency reference signal level when the frequency is set by an external analog signal (voltage or current).

F0-14 Frequency lower limit

Address:	0xF00E	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	F0-12	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:
0.00 Hz to F0-12

Parameter description

This parameter defines the minimum operating frequency of motors. If the frequency is lower than the lower limit, you can determine whether to stop, run at the lower limit, or run at zero speed by F8-14.

F0-15 Carrier frequency

Address:	0xF00F	Effective mode:	/
Min.:	0.5	Unit:	kHz
Max.:	16.0	Data type:	UInt16
Default:	6.0	Change mode:	Real time

Range:

0.5 kHz to 16.0 kHz

Parameter description

The carrier frequency of the AC drive, also called switching frequency, determines the number of times that the power switching device (such as IGBT) of the inverter is turned on and off. It mainly affects the following aspects:

1. Power loss of the power module IGBT: Higher carrier frequency incurs higher power consumption and higher temperature of the power module, which affects the drive adversely.
2. Waveform of the secondary current output by the drive: A high carrier frequency allows a smooth sinusoidal current waveform and low harmonics, but it may intensify interference. When the carrier frequency is too low, the effective torque of the motor decreases, the loss increases, and the temperature rises. On the contrary, when the carrier frequency is too high, the loss of the AC drive increases, the IGBT temperature rises, and the change rate dv/dt of the output voltage increases, which affects the motor insulation performance.

Note: The default carrier frequency of F0-15 is related to the power range of the AC drive. The higher the power of the drive, the lower the default value of F0-15.

F0-16 Carrier frequency change with temperature

Address:	0xF010	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change mode:	Real time

Range:

0: No
1: Yes

Parameter description

This parameter is used to select whether the carrier frequency changes with the temperature. After this function is enabled, the drive automatically reduces the carrier frequency upon detecting that the heatsink temperature is high, thereby lowering the temperature of the drive. The AC drive resumes the carrier frequency to the set value when the heatsink temperature becomes normal. This function reduces the risk of overtemperature alarm.

F0-17 Acceleration time 1

Address:	0xF011	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:

0.0 to 6500.0

Parameter description

This parameter indicates the time required for the output frequency to increase from 0 to the base frequency for acceleration/deceleration time (F0-25). When the motor accelerates, the rising rate of the frequency reference must be limited to prevent overcurrent.

Acceleration time setting requirements: The acceleration current must be limited below the overcurrent capacity of the AC drive, so as not to cause the AC drive to trip due to overcurrent stall.

Note that when the power is equal to or lower than 55 kW, the factory value equals 20s. When the power is higher than 55 kW, the factory value equals 50s.

F0-18 Deceleration time 1

Address:	0xF012	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:

0.0 to 6500.0

Parameter description

This parameter indicates the time required for the output frequency to decrease from the value of F0-25 to 0. The deceleration time is usually determined by the falling of frequency setting signal. When the motor decelerates, the dropping rate of the frequency must be limited to prevent overvoltage.
Deceleration time setting requirements: Avoid too large smoothing circuit voltage, so as not to cause the AC drive to trip due to overvoltage stall.
Note that when the power is equal to or lower than 55 kW, the factory value equals 20s. When the power is higher than 55 kW, the factory value equals 50s.

F0-19 Acceleration/Deceleration time unit

Address:	0xF013	Effective mode:	/
Min.:	0	Unit:	s
Max.:	2	Data type:	UInt16
Default:	1	Change mode:	At stop

Range:
0: 1s
1: 0.1s
2: 0.01s
Parameter description
Three acceleration/deceleration time units (values 0 to 2) are available. When this parameter is modified, the decimal places of related acceleration/deceleration time parameters change, and the corresponding acceleration/deceleration time changes accordingly.

F0-21 Auxiliary frequency offset upon superposition

Address:	0xF015	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.00	Change mode:	Real time:

Range:
0.00 Hz to F0-10
Parameter description
This parameter defines the offset of the auxiliary frequency during superposition. It is used to adjust the frequency when the frequency is set by an external analog voltage or current signal. Output frequency = Current frequency reference+ F0-21

F0-22 **Decimal places of frequency reference**

Address:	0xF016	Effective mode:	/
Min.:	0	Unit:	Hz
Max.:	2	Data type:	UInt16
Default:	2	Change mode:	Unchangeable

Range:

0: 1 Hz

1: 0.1 Hz

2: 0.01 Hz

Parameter description

This parameter defines the number of decimal places for the frequency reference.

0: 1 Hz; no decimal place

1: 0.1 Hz; one decimal place

2: 0.01 Hz; two decimal places

F0-23 **Retention of digital setting frequency upon stop**

Address:	0xF017	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Non-retentive

1: Retentive

Parameter description

This parameter is used to set whether the digital setting frequency will be retained upon stop

0: Non-retentive

F0-08 (preset frequency) is set through the operating panel and the frequency is modified by using the ▲ and ▼ keys on the operating panel or the terminal functioning as the UP/DOWN key. When the AC drive stops, the modification will be cleared.

1: Retentive

F0-08 (preset frequency) is set through the operating panel and the frequency is modified by using the ▲ and ▼ keys on the operating panel or the terminal functioning as the UP/DOWN key. When the AC drive stops, the modification will be retained.

F0-24 Motor parameter group selection

Address:	0xF018	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Motor parameter group 1

1: Motor parameter group 2

Parameter description

This parameter is used to select the current active motor parameter group. You can view the current active motor parameter group through U0-73. Note that the switchover is successful only when the AC drive is in the stop state.

F0-25 Base frequency for acceleration/deceleration time

Address:	0xF019	Effective mode:	/
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Maximum frequency (F0-10)

1: Frequency reference

2: 100 Hz

Parameter description

This parameter specifies the base frequency for the acceleration/deceleration time. It is used as the target frequency during acceleration and the starting frequency during deceleration.

F0-26 Base value for frequency adjusted by UP/DOWN key during operation

Address	0xF01A	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Running frequency

1: Frequency reference

Parameter description

This parameter is used to set the base frequency from which the frequency reference is modified by using the UP/DOWN keys. For example, when F0-26 is set to 0 and the running frequency is 25 Hz, the target frequency will change from 25 Hz by a certain step value when the UP key is pressed. This parameter is valid only when F0-03 or F0-04 is set to 0.

F0-27 Bind command source to frequency source

Address:	0xF01B	Effective mode:	/
Min.:	0	Unit:	-
Max.:	9999	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

Ones: Bind the command source of the operating panel to the frequency source

0: Unbound

1: Digital setting frequency

2: AI1

3: AI2

4: AI3

5: Pulse (DI5)

6: Multi-reference

7: Simple PLC

8: PID

9: Communication

Tens: Bind the command source of the terminal to the frequency source

0: Unbound

1: Digital setting frequency

2: AI1

3: AI2

4: AI3

5: Pulse (DI5)

6: Multi-reference

7: Simple PLC

8: PID

9: Communication

(to be continued)

(Continued)
Hundreds: Bind the command source of the communication to the frequency source
0: Unbound
1: Digital setting frequency
2: AI1
3: AI2
4: AI3
5: Pulse (DI5)
6: Multi-reference
7: Simple PLC
8: PID
9: Communication

Parameter description

It is used to bind the three operating command sources to the nine frequency sources, facilitating synchronous switchover.
For details on the frequency sources, see the description of F0-03 (Main frequency source X selection).
Different operating command sources can be bound to the same frequency source.
If a command source has been bound to a frequency source, the frequency source set in F0-03 to F0-07 no longer takes effect when this command source is active. For example, if F0-02 (Command source) is set to 1 (terminal), F0-03 (Selection of main frequency source X) is set to 2 (AI1), F0-04 (Selection of auxiliary frequency source Y) is set to 3 (AI2), F0-07 (Frequency superposition selection) is set to 11 (Frequency superposition mode: main frequency X minus auxiliary frequency Y), F0-27 (Bind command source to frequency source) is set to 090 (the tens place is set to 9 communication), the frequency set by F0-27 takes effect.
0: Not bound
1: Digital setting frequency
The initial value of the frequency reference is the value of F0-08.
2: AI1
The frequency is input by the voltage signal through AI1. The frequency is calculated according to the preset AI curve.
3: AI2
The frequency reference is input by current or voltage signals through the AI2. The frequency is calculated according to the preset AI curve.
4: AI3
The frequency reference is input by current or voltage signals through the AI3. The frequency is calculated according to the preset AI curve.

5: Pulse reference (DI5)
The frequency reference is set through the DI5. The frequency (F4-28 to F4-31) is calculated based on the relationship curve between the pulse frequency and the frequency reference.
6: Multi-reference
In the multi-reference mode, combinations of different DI terminal states correspond to different frequency reference. The four multi-reference terminals (assigned with functions 12 to 15) can provide 16 states, corresponding to 16 frequencies (set by FC-00 to FC-15).
7: Simple PLC
Simple PLC provides multi-speed running commands that can control the running time and acceleration and deceleration time. Parameters FC-00 to FC-15 are used to set the values of each frequency. FC-18 to FC-49 are used to set the running time and acceleration and deceleration time of each frequency. Up to 16 frequencies can be set.
8: PID
PID is selected as the frequency reference. As a general process control method, PID control is a closed-loop mechanism in which each controlled variable is stabilized at the target level. This is implemented through proportional, integral, and differential calculation of the difference between the feedback signal and the target signal of the controlled variable and through adjustment of the AC drive output frequency. PID control is generally used in closed-loop control scenarios, such as constant pressure closed-loop control and constant tension closed-loop control.
9: Communication
The frequency is set through communication. This mode is applicable to applications requiring remote control or centralized control of multiple devices. In this mode, you can input the frequency through remote communication. In this case, the AC drive must be installed with a communication card for communicating with the host controller.

F0-28 Communication protocol selection

Address:	0xF01C	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
0: Modbus protocol
1: Extension communication protocol
Parameter description

This parameter is used to select a communication protocol.
0: Modbus protocol
The Modbus protocol is used.
1: Extension communication protocol
The PROFIBUS DP, CANopen, CANlink, PROFINET, or EtherCAT protocol is used.

13.2 F1 Motor 1 Parameters

F1-00 **Motor type**

Address:	0xF100	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
0: Common asynchronous motor
1: Variable frequency asynchronous motor
Parameter description
This parameter is used to set the motor type.
0: Common asynchronous motor
A common asynchronous motor is suitable for applications with normal voltage but often full load. It is designed based on constant frequency and constant voltage. Therefore, it may not meet all the frequency and speed control requirements.
1: Variable frequency asynchronous motor
A variable frequency motor can adjust its frequency and speed according to the load. When the voltage is low, the variable frequency motor can reduce the frequency for a reliable start. When the load is light, it can reduce the frequency, speed, and current to save energy.

F1-01 **Rated motor power**

Address:	0xF101	Effective mode:	/
Min.:	0.1	Unit:	kW
Max.:	1000.0	Data type:	UInt16
Default:	3.7	Change mode:	At stop

Range:
0.1 kW to 1000.0 kW

Parameter description

This parameter indicates the power of the motor during normal operation. Its value is the product of the rated motor voltage multiplied by the rated motor current. Select a motor with a proper power rating on the premise that the motor can meet the requirements of mechanical load. Take the motor heat dissipation, allowable overload capacity, and starting capacity into account.

F1-02 Rated motor voltage

Address:	0xF102	Effective mode:	/
Min.:	1	Unit:	V
Max.:	2000	Data type:	UInt16
Default:	380	Change mode:	At stop

Range:

1 V to 2000 V

Parameter description

The rated motor voltage indicates the voltage of the motor during normal operation, which usually refers to the line voltage.

F1-03 Rated motor current

Address:	0xF103	Effective mode:	/
Min.:	0.01	Unit:	A
Max.:	655.35	Data type:	UInt16
Default:	9.00	Change mode:	At stop

Range:

0.01 A to 655.35 A

Parameter description

The rated motor current indicates the current of the motor during normal operation, which usually refers to the line current.

Note that when the power is lower than or equal to 55 kW, the decimal place is 0.01. When the power is higher than 55 kW, the decimal place is 0.1.

F1-04 Rated motor frequency

Address:	0xF104	Effective mode:	/
Min.:	0.01	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50.00	Change mode:	At stop

Range:

0.01 Hz to F0-10

Parameter description

The rated motor frequency indicates the frequency of the power supply connected to the stator winding under the rated operation conditions of the motor.

F1-05 Rated motor speed

Address:	0xF105	Effective mode:	/
Min.:	1	Unit:	rpm
Max.:	65535	Data type:	UInt16
Default:	1460	Change mode:	At stop

Range:

1 rpm to 65535 rpm

Parameter description

The rated motor speed indicates the speed of the rotor under the rated operating conditions.

F1-06 Stator resistance of asynchronous motor

Address:	0xF106	Effective mode:	/
Min.:	0.001	Unit:	Ω
Max.:	65.535	Data type:	UInt16
Default:	1.204	Change mode:	At stop

Range:

0.001 Ω to 65.535 Ω

Parameter description

This parameter indicates the DC resistance of stator winding of the asynchronous motor. This parameter can be obtained through motor auto-tuning.

Note that when the power is lower than or equal to 55 kW, the decimal place is 0.001. When the power is higher than 55 kW, the decimal place is 0.0001.

F1-07 Rotor resistance of asynchronous motor

Address:	0xF107	Effective mode:	/
Min.:	0.001	Unit:	Ω
Max.:	65.535	Data type:	UInt16
Default:	0.908	Change mode:	At stop

Range:

0.001 Ω to 65.535 Ω

Parameter description

The rotor resistance of the asynchronous motor is the DC resistance of the motor rotor winding, which can be obtained through parameter auto-tuning of the motor in static or dynamic state.

Note that when the power is lower than or equal to 55 kW, the decimal place is 0.001. When the power is higher than 55 kW, the decimal place is 0.0001.

F1-08 Leakage inductance of asynchronous motor

Address:	0xF108	Effective mode:	/
Min.:	0.01	Unit:	mH
Max.:	655.35	Data type:	UInt16
Default:	5.28	Change mode:	At stop

Range:

0.01mH to 655.35mH

Parameter description

The leakage inductance of the asynchronous motor is caused by the leakage flux of the motor winding. Flux is generated upon current injection into the motor winding, which can be divided into main flux and leakage flux. The leakage flux is the leakage inductance. The parameter value can be obtained by auto-tuning of the motor in static or dynamic state.

Note that when the power is lower than or equal to 55 kW, the decimal place is 0.01. When the power is higher than 55 kW, the decimal place is 0.001.

F1-09 Mutual inductance of asynchronous motor

Address	0xF109	Effective mode:	/
Min.:	0.1	Unit:	mH
Max.:	6553.5	Data type:	UInt16
Default:	158.6	Change mode:	At stop

Range:

0.1mH to 6553.5mH

Parameter description

When the current in one coil of the motor changes, induced electromotive force is generated in the adjacent coil. This mutual inductance electromotive force can be expressed by mutual inductance.

The mutual inductance of a motor can be divided into two types. One is the inter-phase inductance of the stator or rotor, which is the reactance between two phases of the stator or rotor. The other is the inductance between the stator and the rotor. The inductance of the first type does not change with the rotation of the rotor, whereas the inductance of the second type changes accordingly with the rotation of the rotor.
Both types are motor mutual inductance, which can be obtained by dynamic motor auto-tuning.
Note that when the power is lower than or equal to 55 kW, the decimal place is 0.1. When the power is higher than 55 kW, the decimal place is 0.01.

F1-10 No-load current of asynchronous motor

Address:	0xF10A	Effective mode:	/
Min.:	0.01	Unit:	A
Max.:	F1-03	Data type:	UInt16
Default:	4.24	Change mode:	At stop

Range:
0.01 A to F1-03
Parameter description
This parameter indicates the current that passes through the three-phase winding of the stator during no-load operation of the asynchronous motor. The parameter can be obtained by parameter auto-tuning of the motor in dynamic state.
Note that when the power is lower than or equal to 55 kW, the decimal place is 0.01. When the power is higher than 55 kW, the decimal place is 0.1.

F1-37 Parameter auto-tuning selection

Address	0xF125	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
0: No auto-tuning
1: Auto-tuning of some asynchronous motor parameters in static state
2: Auto-tuning of all asynchronous motor parameters in dynamic state
3: Auto-tuning of all asynchronous motor parameters in static state
Parameter description
This parameter is used to select the parameter auto-tuning mode.

Accurate motor parameters are required for high-performance motor operation. Motor parameters can be obtained through parameter auto-tuning. During parameter auto-tuning, you can set the corresponding parameter auto-tuning mode according to the motor type. The following parameter auto-tuning modes are available.

0: No auto-tuning

No auto-tuning is performed.

1: Auto-tuning of some asynchronous motor parameters in static state

This mode is applicable to scenarios where the motor cannot be disconnected from loads and auto-tuning in dynamic state is not feasible. In this mode, some motor parameters are auto-tuned, including F1-06 (Stator resistance of asynchronous motor), F1-07 (Rotor resistance of asynchronous motor), and F1-08 (Leakage inductance of asynchronous motor). Other parameters use the default values.

2: Auto-tuning of all asynchronous motor parameters in dynamic state

This mode is applicable to scenarios requiring high-speed operation. This auto-tuning mode can be performed without load or with load (friction of the load is small; operation with the load at a constant speed is almost equal to operation without load). In this mode, all motor parameters are auto-tuned, including F1-06 (Stator resistance of asynchronous motor), F1-07 (Rotor resistance of asynchronous motor), F1-08 (Leakage inductance of asynchronous motor), F1-09 (Mutual inductance of asynchronous motor), F1-10 (No-load current of asynchronous motor), and F1-30 (Encoder phase sequence).

3: Auto-tuning of all asynchronous motor parameters in static state

This mode is applicable to scenarios where the motor cannot be disconnected from loads and auto-tuning in dynamic state is not feasible. In this mode, all motor parameters are auto-tuned, including F1-06 (Stator resistance of asynchronous motor), F1-07 (Rotor resistance of asynchronous motor), F1-08 (Leakage inductance of asynchronous motor), F1-09 (Mutual inductance of asynchronous motor), F1-10 (No-load current of asynchronous motor), and F1-30 (Encoder phase sequence).

In the mode of auto-tuning of all asynchronous motor parameters in dynamic state, the parameters auto-tuned are the most accurate and complete. However, for some applications where the motor is not allowed to rotate or cannot rotate, only auto-tuning in static state can be selected. In this case, the mode of auto-tuning of all asynchronous motor parameters in static state is preferred. Select the mode auto-tuning of some asynchronous motor parameters in static state only when the previous auto-tuning mode in static state is unavailable.

13.3 F3 V/f Control Parameters

F3-00 **V/f curve setting**

Address	0xF300	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: V/f line
1: Multi-point V/f curve
2: Square V/f curve
3: 1.2-power V/f curve
4: 1.4-power V/f curve
6: 1.6-power V/f curve
8: 1.8-power V/f curve
9: Reserved
10: V/f fully-decoupled mode
11: V/f half-decoupled mode

Parameter description

This parameter is used to set the V/f curve. In V/f mode, different V/f curves can be set according to different application conditions.

0: V/f line

When the frequency is below the rated frequency, the drive output voltage and output frequency change linearly. It is applicable to general mechanical transmission applications such as acceleration of high-inertia fans, punch presses, centrifuges, and water pumps.

1: Multi-point V/f curve

The range of the frequency point is 0.00 Hz to the rated motor frequency (F1-04). The range of the voltage point is 0.0% to 100.0%, which corresponds to 0 V to the rated motor voltage. Set the multi-point V/f curve based on motor's load characteristic. Observe this formula during setting: F3-03 ≤ F3-05 ≤ F3-07.

2: Square V/f curve

When the frequency is below the rated frequency, the drive output voltage and output frequency change according to the 2-power curve. This curve applies to light loads and loads with slight changes, such as fans and water pumps.

3: 1.2-power V/f curve

When the frequency is below the rated frequency, the drive output voltage and output frequency change according to the 1.2-power curve.

4: 1.4-power V/f curve
When the frequency is below the rated frequency, the drive output voltage and output frequency change according to the 1.4-power curve.
6: 1.6-power V/f curve
When the frequency is below the rated frequency, the drive output voltage and output frequency change according to the 1.6-power curve.
8: 1.8-power V/f curve
When the frequency is below the rated frequency, the drive output voltage and output frequency change according to the 1.8-power curve.
10: V/f fully-decoupled mode
The output frequency and output voltage of the AC drive are independent of each other. The output frequency is determined by the frequency source, and the output voltage is determined by voltage source in V/f decoupled mode. This mode applies to torque motor control.
11: V/f half-decoupled mode
In this mode, the voltage and the frequency are proportional, which can be set through the voltage source. The relationship between the voltage and frequency is also related to the rated voltage and rated frequency of the first group of the motor. The relationship between the output voltage (V) and frequency (f) of the drive is as follows: V/f = 2 x (Voltage source input) x (Rated motor voltage)/(Rated motor frequency). Note: The input value of the voltage source is 0% to 100%.

F3-01 **Torque boost**

Address:	0xF301	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	30.0	Data type:	UInt16
Default:	1.0	Change mode:	Real time

Range:
0.0% to 30.0%
Parameter description
The torque boost function is generally applicable to low-frequency operations of the drive. The output torque of the AC drive in the V/f control mode is proportional to the frequency. During operation at low frequencies, the motor torque is low when the motor runs at a low speed. In this case, you can set this parameter to increase the output voltage of the drive to improve the output torque. Note that the torque boost value must be set properly. Otherwise, overload protection can be triggered.

F3-02 **Cut-off frequency of torque boost**

Address:	0xF302	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50.00	Change mode:	At stop

Range:

0.00 Hz to F0-10

Parameter description

When the operating frequency reaches the cutoff frequency of torque boost, the torque boost function is disabled.

F3-03 **Frequency 1 on multi-point V/f curve**

Address:	0xF303	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	F3-05	Data type:	UInt16
Default:	0.00	Change mode:	At stop

Range:

0.00 Hz to F3-05

Parameter description

This parameter indicates the frequency point 1 set by multi-point V/f curve.

F3-04 **Voltage 1 on multi-point V/f curve**

Address:	0xF304	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	At stop

Range:

0.0% to 100.0%

Parameter description

This parameter indicates the voltage point 1 set by multi-point V/f curve.

F3-05 **Frequency 2 on multi-point V/f curve**

Address:	0xF305	Effective mode:	/
Min.:	F3-03	Unit:	Hz
Max.:	F3-07	Data type:	UInt16
Default:	0.00	Change mode:	At stop

Range:
F3-03 to F3-07
Parameter description
This parameter indicates the frequency point 2 set by multi-point V/f curve.

F3-06 Voltage 2 on multi-point V/f curve

Address:	0xF306	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	At stop

Range:
0.0% to 100.0%
Parameter description
This parameter indicates the voltage point 2 set by multi-point V/f curve.

F3-07 Frequency 3 on multi-point V/f curve

Address:	0xF307	Effective mode:	/
Min.:	F3-05	Unit:	Hz
Max.:	F1-04	Data type:	UInt16
Default:	0.00	Change mode:	At stop

Range:
F3-05 to F1-04
Parameter description
This parameter indicates the frequency point 3 set by multi-point V/f curve.

F3-08 Voltage 3 on multi-point V/f curve

Address:	0xF308	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	At stop

Range:
0.0% to 100.0%
Parameter description
This parameter indicates the voltage point 3 set by multi-point V/f curve.

F3-09 Slip compensation factor

Address:	0xF309	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	200.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0% to 200.0%

Parameter description

In V/f mode, the output frequency can be increased to compensate for motor speed reduction. The greater the gain, the greater the compensation frequency. Note that an excessively high gain can result in overcompensation.

F3-10 Overexcitation gain in V/f mode

Address:	0xF30A	Effective mode:	/
Min.:	0	Unit:	-
Max.:	200	Data type:	UInt16
Default:	64	Change mode:	Real time

Range:

0-200

Parameter description

The higher the overexcitation gain, the better the suppression performance. When a braking resistor, braking unit, or energy feedback unit is used, set this parameter to 0. Otherwise, overcurrent may occur during operation.

F3-11 Oscillation suppression gain in V/f mode

Address:	0xF30B	Effective mode:	/
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0-100

Parameter description

The higher the oscillation gain, the better the suppression effect.

F3-13 Voltage source in V/f decoupled mode

Address	0xF30D	Effective mode:	/

Min.:	0	Unit:	-
Max.:	8	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Digital setting (F3-14)

1: AI1

2: AI2

3: AI3

4: Pulse (DI5)

5: Multi-reference

6: Simple PLC

7: PID

8: Communication

Parameter description

This parameter defines the target voltage reference source in the V/f decoupled mode.

0: Digital setting (F3-14)

The voltage in the V/f decoupled mode is set by F3-14.

1: AI1

The voltage is input by voltage signals through AI1. The frequency is calculated according to the set AI curve.

2: AI2

The voltage is input by current or voltage signals through AI2. The frequency is calculated according to the set AI curve.

3: AI3

The voltage is input by current or voltage signals through AI3. The frequency is calculated according to the set AI curve.

4: Pulse (DI5)

The voltage is set through DI5. The frequency is calculated based on the curve reflecting the relationship between the pulse frequency and running frequency.

5: Multi-reference

When multi-reference is used as the source of the voltage in the V/f decoupled mode, you can set different combinations of DI terminal states to select different reference values. The four multi-reference terminals can be grouped in different ways to indicate 16 states, which correspond to 16 frequency references (percentage x maximum frequency) in group FC.

6: Simple PLC

The voltage is set by simple PLC. For details, see the function description of simple PLC.

7: PID
The voltage is set by PID. For details, see the PID function description.
8: Communication
The main frequency is set through communication. The operating frequency is inputted through remote communication. The drive must be equipped with a communication card to communicate with the host controller. This mode applies to remote control or centralized control of multiple equipment.

F3-14 Voltage digital setting in V/f decoupled mode

Address:	0xF30E	Effective mode:	/
Min.:	0	Unit:	V
Max.:	F1-02	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 V to F1-02
Parameter description
The value range is 0 V to the rated voltage.

F3-15 Voltage rise time in V/f decoupled mode

Address:	0xF30F	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	1000.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0s to 1000.0s
Parameter description
This parameter indicates the time required for the output voltage to rise from 0 to the voltage in the V/f decoupled mode.

F3-16 Voltage decline time in V/f decoupled mode

Address:	0xF310	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	1000.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0s to 1000.0s

Parameter description

This parameter indicates the time required for the output voltage to decline from the voltage in the V/f decoupled mode to 0.

F3-17 Stop mode in V/f decoupled mode

Address:	0xF311	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: The frequency and voltage decline to 0 independently.

1: The frequency declines to 0 after the voltage declines to 0.

Parameter description

This parameter defines the stop mode in the V/f decoupled mode. Stop mode 1 is recommended for applications requiring energy discharge upon stop with load.

0: The frequency and voltage decline to 0 independently.

1: The frequency declines to 0 after the voltage declines to 0.

F3-18 Overcurrent stall action current in V/f mode

Address:	0xF312	Effective mode:	/
Min.:	50	Unit:	%
Max.:	200	Data type:	UInt16
Default:	130	Change mode:	At stop

Range:

50% to 200%

Parameter description

When the motor current reaches this value, the AC drive starts overcurrent stall function. The default value is 130%, corresponding to 1.3 times the rated current of the AC drive.

F3-19 Overcurrent stall suppression

Address:	0xF313	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change mode:	At stop

Range:

0: Invalid
1: Valid

Parameter description

This parameter is used to determine whether overcurrent stall suppression in the V/f mode is valid.

0: Invalid

Overcurrent stall suppression in the V/f mode is disabled.

1: Valid

Overcurrent stall suppression in the V/f mode is enabled.

F3-20 Overcurrent stall suppression gain

Address:	0xF314	Effective mode:	/
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	20	Change mode:	Real time

Range:

0-100

Parameter description

When the current exceeds the action current of overcurrent stall, the overcurrent stall function is enabled and output frequency decreases. After the current falls below the overcurrent stall threshold, the output frequency increases to the target frequency again, which prolongs the actual acceleration time automatically. The higher the setpoint, the better the suppression effect.

F3-21 Current compensation coefficient for overcurrent stall action at multiplied rated frequency

Address:	0xF315	Effective mode:	/
Min.:	50	Unit:	%
Max.:	200	Data type:	UInt16
Default:	50	Change mode:	At stop

Range:

50% to 200%

Parameter description

This parameter reduces the overcurrent stall actuating current at high speed. It is invalid when set to 50%. The recommended value for F3-18 in the field weakening area is 100%.

F3-22 **Overvoltage stall action voltage in V/f mode**

Address:	0xF316	Effective mode:	/
Min.:	650.0	Unit:	V
Max.:	800.0	Data type:	UInt16
Default:	770.0	Change mode:	At stop

Range:

650.0 V to 800.0 V

Parameter description

When the bus voltage reaches this value, the AC drive starts the overvoltage stall protection.

F3-23 **Overvoltage stall suppression in V/f mode**

Address:	0xF317	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change mode:	At stop

Range:

0: Invalid

1: Valid

Parameter description

This parameter is used to determine whether overvoltage stall suppression in the V/f mode is valid.

0: Invalid

Overvoltage stall suppression in the V/f mode is disabled.

1: Valid

Overvoltage stall suppression in the V/f mode is enabled.

The function of F3-23 is the same as F9-04 (Overvoltage stall protection voltage).

When a braking resistor, braking unit, or energy feedback unit is used, set this parameter to 0. Otherwise, the deceleration time may be prolonged.

F3-24 **Frequency gain for overvoltage stall suppression in V/f mode**

Address:	0xF318	Effective mode:	/
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	30	Change mode:	Real time

Range:

0-100

Parameter description

Increasing F3-24 improves the control accuracy on the bus voltage, but leads to fluctuation of the output frequency. If the output frequency fluctuates greatly, reduce F3-24 appropriately. The function of F3-24 is the same as F9-03 (Overvoltage stall gain).

F3-25 Voltage gain for overvoltage stall suppression in V/f mode

Address:	0xF319	Effective mode:	/
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	30	Change mode:	Real time

Range:

0-100

Parameter description

This parameter is used to suppress the bus voltage. Increasing the parameter value can reduce the overshoot of the bus voltage.

F3-26 Frequency rise threshold for overvoltage stall suppression

Address:	0xF31A	Effective mode:	/
Min.:	0	Unit:	Hz
Max.:	50	Data type:	UInt16
Default:	5	Change mode:	At stop

Range:

0 Hz to 50 Hz

Parameter description

The running frequency may increase during overvoltage stall suppression. This parameter limits the increase of the running frequency.

F3-27 Slip compensation time constant

Address:	0xF31B	Effective mode:	/
Min.:	0.1	Unit:	-
Max.:	10.0	Data type:	UInt16
Default:	0.5	Change mode:	Real time

Range:

0.1 to 10.0

Parameter description

This parameter defines the time constant of the slip compensation frequency. The larger the time constant, the smoother the slip compensation frequency, and the less it is affected by load disturbances and noise. However, the response to load change will be slower.

F3-28 Automatic frequency rise

Address:	0xF31C	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Disable

1: Enable

Parameter description

-

F3-29 Minimum motoring torque current

Address:	0xF31D	Effective mode:	/
Min.:	10	Unit:	-
Max.:	100	Data type:	UInt16
Default:	50	Change mode:	Real time

Range:

10 to 100

Parameter description

-

F3-30 Maximum generating torque current

Address:	0xF31E	Effective mode:	/
Min.:	10	Unit:	-
Max.:	100	Data type:	UInt16
Default:	20	Change mode:	Real time

Range:

10 to 100

Parameter description

-

F3-31 **Automatic frequency rise Kp**

Address:	0xF31F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	50	Change mode:	Real time

Range:
0-100
Parameter description
-

F3-32 **Automatic frequency rise Ki**

Address:	0xF320	Effective mode:	/
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	50	Change mode:	Real time

Range:
0-100
Parameter description
-

F3-33 **Online torque compensation gain**

Address:	0xF321	Effective mode:	/
Min.:	80	Unit:	-
Max.:	150	Data type:	UInt16
Default:	100	Change mode:	Real time

Range:
80 to 150
Parameter description
-

13.4 F4 Input Terminal Parameters

F4-00 **DI1 function selection**

Address	0xF400	Effective mode:	/
Min.:	0	Unit:	-

Max.:	59	Data type:	UInt16
Default:	1	Change mode:	At stop

Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire operation control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6: Function as the UP key
7: Function as the DOWN key
8: Coast to stop
9: Fault reset (RESET)
10: Operation pause
11: External fault NO input
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
(To be continued)

(Continued)
16: Acceleration/Deceleration time selection terminal 1
17: Acceleration/Deceleration time selection terminal 2
18: Frequency reference switchover
19: Clear information set by UP/DOWN keys on the operating panel or by terminals functioning as the UP/DOWN keys
20: Control command switchover terminal 1
21: Acceleration/Deceleration inhibited
22: PID pause
23: Simple PLC state reset
24: Wobble frequency pause
25: Counter input
26: Counter reset
27: Length counting input
28: Length reset
29: Torque control inhibited
30: Pulse frequency input (only DI5)
31: Reserved
32: Immediate DC braking
33: External fault NC input
34: Frequency modification enable
35: PID action direction reversal
36: External stop terminal 1
37: Control command switchover terminal 2
38: PID integral pause
39: Switch main frequency source to preset frequency
40: Switch auxiliary frequency source to preset frequency
41: Motor terminal selection
42: Reserved
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed/Torque control switchover
(To be continued)
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/Three-wire mode switchover
52: Reverse frequency inhibited
53 to 59: Reserved
Parameter description

0: No function
The DI has no function.
1: Forward run (FWD)
The AC drive runs in the forward direction. FWD indicates forward running. In two-wire mode 1 (F4-11 = 0), activating DI function 1 triggers forward running. In two-wire mode 2 (F4-11 = 1), activating DI function 1 triggers a running command.
2: Reverse run (REV)
The AC drive runs in the reverse direction. REV indicates reverse running. In three-wire mode 1 (F4-11 = 2), activating DI function 2 triggers reverse running. In three-wire mode 2 (F4-11 = 3), activating DI function 2 triggers forward/reverse running.
3: Three-wire operation control
The AC drive operation mode is the three-wire control mode. To set the running command source to the terminal, set F4-11 (terminal command mode) to 2 (three-wire mode 1) or 3 (three-wire mode 2), and set the DI to function 3. The three-wire control modes include three-wire mode 1 and three-wire mode 2.
4: Forward jog (FJOG)
The operation mode of the AC drive is forward jog. In the jogging mode, the drive runs at the frequency set by F8-00 (Jogging frequency), which is generally used for maintenance and commissioning of the equipment on site.
5: Reverse jog (RJOG)
The operation mode of the AC drive is reverse jog.
6: Function as the UP key
The terminal is used to increase the frequency. Activating the terminal is equivalent to keeping the increment key pressed down. Deactivating the terminal is equivalent to releasing the increment key.
7: Function as the DOWN key
The terminal is used to decrease the frequency Activating the terminal is equivalent to keeping the decrement key pressed down. Deactivating the terminal is equivalent to releasing the decrement key.
8: Coast to stop
Once the drive receives a stop command, it immediately stops output and the load then coasts to stop based on the mechanical inertia. The AC drive stops output to shut down. At this time, the power supply of the motor is cut off and the driving system is in the free braking state. Since the stop time is determined by the inertia of the drive system, the process is also called inertia stopping.

9: Fault reset (RESET)
The terminal is used to reset the AC drive upon faults. It is equivalent to the STOP/RES key on the operating panel. This function allows you to perform a reset upon the fault remotely.
10: Running pause
The AC drive decelerates to stop with all running parameters retained (such as PLC, wobble, and PID parameters). When the terminal is inactive, the drive resumes to the status before decelerating to stop.
11: External fault NO input
The AC drive reports Err15 upon receiving an external signal.
12-15: Multi-reference terminals 1 to 4
The AC drive selects the multi-reference as the main frequency source. States of the four terminals can be combined in 16 ways to define 16 speeds or 16 references. This function is applicable to scenarios that need only several frequency references instead of continuous adjustment of the AC drive operation frequency.
16-17: Acceleration/Deceleration time selection terminals 1 to 2
Four groups of acceleration and deceleration time can be switched through four states of these two terminals.
The acceleration time indicates the time required by the AC drive to accelerate from 0 Hz to the acceleration/deceleration base frequency (F0-25). The deceleration time indicates the time required by the AC drive to decelerate from the acceleration/deceleration base frequency (F0-25) to 0 Hz.
18: Frequency source switchover
This function is used to switch among different frequency reference input modes. The frequency reference is set through F0-07.
19: Clear information set by UP/DOWN keys on the operating panel or by terminals functioning as the UP/DOWN keys
When the main or auxiliary frequency is set through the operating panel and the terminal is active, the terminal can be used to clear the frequency set through the UP/DOWN key on the operating panel or the terminal functioning as the UP/DOWN key. In this case, the frequency is reset to the value of F0-08.
20: Command source switchover terminal 1
When the running command is set through the terminal (F0-02=1) and the terminal is active, the control command source is switched from terminal control to operating panel control.
When the running command is set through communication (F0-02=2) and the terminal is active, the control command source is switched from communication control to operating panel control.
21: Acceleration/Deceleration inhibited
The terminal is used to maintain the current running frequency of the AC drive regardless of changes of the external input frequency (unless a stop command is received).

22: PID pause
PID is invalid temporarily. The AC drive maintains the current output frequency without supporting PID adjustment of frequency source.
23: Simple PLC state reset
The terminal is used to restore the AC drive to the initial state of the simple PLC.
24: Wobble frequency pause
In the wobble process, when the terminal is active, the wobble function pauses (the AC drive outputs at the center frequency).
25: Counter input
In the count process, when the terminal is active, a count pulse is input.
26: Counter reset
In the count process, when the terminal is active, the counter status is cleared.
27: Length counting input
In the fixed length process, when the terminal is active, the length count is input.
28: Length reset
In the fixed length process, when the terminal is active, the length is cleared.
29: Torque control inhibited
When the terminal is active, the AC drive switches from the torque control mode to the speed control mode. When the terminal is inactive, the AC drive switches back to the torque control mode.
30: Pulse frequency input
When DI5 is used as the pulse input terminal, DI5 must be allocated with this function.
31: Reserved
32: Immediate DC braking
The AC drive directly switches to the DC braking state. DC braking indicates that the drive outputs direct current to the stator winding of the asynchronous motor to form a static magnetic field, enabling the motor to brake with energy consumption. In this state, the rotor cuts the static magnetic field to generate braking torque, which stops the motor quickly.
33: External fault NC input
The AC drive reports Err15 upon receiving an external signal.
34: Frequency modification enable
When the terminal is active, the frequency can be modified. When the terminal is inactive, the frequency cannot be modified.
35: PID action direction reversal
The PID action direction is reversed to the direction set by FA-03 (PID action direction).

36: External stop terminal 1
When the running command is set through the operating panel (F0-02 = 0), this terminal is used to stop the AC drive, which functions in the same way as the STOP/RES key on the operating panel.
37: Command source switchover terminal 2
The terminal is used for switchover between terminal control and communication control.
If the command source is set to terminal control, activating the terminal switches the AC drive to communication control.
If the command source is set to communication control, activating the terminal switches the AC drive to terminal control.
38: PID integral pause
The integral adjustment function pauses when the terminal is active. However, the proportional and derivative adjustment functions are still valid.
39: Switch main frequency source to preset frequency
This function is used to switch the main frequency source to F0-08 (preset frequency).
40: Switch auxiliary frequency source to preset frequency
This function is used to switch the auxiliary frequency source to F0-08 (preset frequency).
41: Motor terminal function
The terminal is used to select motor parameters. When the terminal is active, motor 2 is selected. When the terminal is inactive, motor 1 is selected.
42: Reserved
43: PID parameter switchover
If PID parameters are switched over through DI (FA-18 = 1), the PID parameter values vary with the terminal state. When the terminal is inactive, PID parameters are FA-05 to FA-07 (proportional gain Kp1, integral time Ti1, and differential time Td1). When the terminal is active, PID parameters are FA-15 to FA-17 (proportional gain Kp2, integral time Ti2, and differential time Td2).
44: User-defined fault 1
When the AC drive reports Err27, the AC drive will act according to the value of F9-49 (Fault protection action selection).
45: User-defined fault 2
When the AC drive reports Err28, the AC drive will act according to the value of F9-49 (Fault protection action selection).
46: Speed/Torque control switchover
The terminal is used to switch between speed control and torque control. When A0-00 (Speed/Torque control mode) is set to 0 and the terminal is active, the control mode is torque control mode. When the terminal is inactive, the control mode is speed control mode.

When A0-00 (Speed/Torque control mode) is set to 1 and the terminal is active, the control mode is speed control mode. When the terminal is inactive, the control mode is torque control mode.

47: Emergency stop

When the system is in the emergency state, the AC drive decelerates according to F8-55 (terminal deceleration time for emergency stop). When the deceleration time for emergency stop is 0s in V/f decoupled mode, the AC drive decelerates according to the minimum unit time. The input terminal does not need to be in the closed state continuously. Even if it is closed only for a moment, an emergency stop will occur immediately. Different from general deceleration time, the emergency stop input terminal is opened after the deceleration time for emergency stop expires. In this case, if the operation signal is still active, the drive will not restart. To restart the drive, disconnect the operation terminal and input the operation command again.

48: External stop terminal 2

The terminal is used to make the AC drive decelerate to stop in any control mode (operating panel, terminal, or communication control). In this case, the deceleration time is fixed to the value of F8-08 (deceleration time 4).

49: Deceleration DC braking

The AC drive decelerates to the frequency set by F6-11 (DC braking start frequency for stop) and then enters the DC braking state.

50: Clear the current running time

The terminal is used to clear the current running time of the AC drive. If the current running time is shorter than the set value (greater than 0) of F8-53 (Current running time reached) and the terminal is active, the current running timing is cleared. If the current running time is longer than the set value (greater than 0) of F8-53 (Current running time threshold) and the terminal is active, the current running timing is not cleared.

51: Two-wire/Three-wire mode switchover

The terminal is used to switch between the two-wire control mode and the three-wire control mode.

When F4-11 is set to 0 (two-wire mode 1) and the terminal is active, the drive switches to three-wire mode 1. When the terminal is inactive, two-wire mode 1 is used.

When F4-11 is set to 1 (two-wire operation mode 2) and the terminal is active, the drive switches to three-wire operation mode 2. When the terminal is inactive, two-wire mode 2 is used.

When F4-11 is set to 2 (three-wire mode 1) and the terminal is active, the drive switches to two-wire mode 1. When the terminal is inactive, three-wire control mode 1 is used.

When F4-11 is set to 3 (three-wire mode 2) and the terminal is active, the drive switches to two-wire mode 2. When the terminal is inactive, three-wire control mode 2 is used.

52: Reverse frequency inhibited
When the terminal is active, even if the reverse frequency is set, the actual frequency of the AC drive is fixed to 0.
It functions the same as F8-13 (reverse frequency prohibited).

F4-01 DI2 function selection

Address:	0xF401	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	4	Change mode:	At stop

Range:
Same as F4-00
Parameter description
Same as F4-00

F4-02 DI3 function selection

Address:	0xF402	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	9	Change mode:	At stop

Range:
Same as F4-00
Parameter description
Same as F4-00

F4-03 DI4 function selection

Address:	0xF403	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	12	Change mode:	At stop

Range:
Same as F4-00
Parameter description
Same as F4-00

F4-04 **DI5 function selection**

Address:	0xF404	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	13	Change mode:	At stop

Range:
Same as F4-00
Parameter description
Same as F4-00

F4-05 **DI6 function selection**

Address:	0xF405	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
Same as F4-00
Parameter description
Same as F4-00

F4-06 **DI7 function selection**

Address:	0xF406	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
Same as F4-00
Parameter description
Same as F4-00

F4-07 **DI8 function selection**

Address:	0xF407	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

Same as F4-00

Parameter description

Same as F4-00

F4-08 DI9 function selection

Address:	0xF408	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

Same as F4-00

Parameter description

Same as F4-00

F4-09 DI10 function selection

Address:	0xF409	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

Same as F4-00

Parameter description

Same as F4-00

F4-10 DI filter time

Address:	0xF40A	Effective mode:	/
Min.:	0.000	Unit:	s
Max.:	1.000	Data type:	UInt16
Default:	0.010	Change mode:	Real time

Range:

0.000 to 1.000

Parameter description

This parameter defines the delay time for the DI status change.

F4-11 Terminal command mode

Address	0xF40B	Effective mode:	/

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Two-wire mode 1

1: Two-wire mode 2

2: Three-wire mode 1

3: Three-wire mode 2

Parameter description

This parameter defines the mode in which the AC drive is controlled by external terminals.

0: Two-wire mode 1

Two DIs are connected. One is used to start/stop the AC drive in the forward run mode, and the other is used to start/stop the AC drive in the reverse run mode.

1: Two-wire mode 2

Two DIs are connected. One is used to start/stop the AC drive, and the other is used to control the running direction.

2: Three-wire mode 1

Three DIs are connected. One is used to start/stop the AC drive, and the other two are used to control the running direction.

3: Three-wire mode 2

Three DIs are connected. One is used to start the AC drive, one is used to stop the AC drive, and the other is used to control the running direction.

F4-12 Step value of frequency changed by UP/DOWN keys

Address:	0xF40C	Effective mode:	/
Min.:	0.001	Unit:	Hz/s
Max.:	65.535	Data type:	UInt16
Default:	1.000	Change mode:	Real time

Range:

0.001 Hz/s to 65.535 Hz/s

Parameter description

This parameter defines the step value when the frequency is adjusted by UP/DOWN keys.

To make the DIx terminal function as the UP or DOWN key to adjust the frequency, set the corresponding parameter (F4-00 to F4-09) to 6 (Function as the UP key) or 7 (Function as the DOWN key).

F4-13 **Minimum input of AI curve 1**

Address	0xF40D	Effective mode:	/
Min.:	0.00	Unit:	V
Max.:	F4-15	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00 V to F4-15

Parameter description

When the main frequency is set by the AI, each AI supports five types of AI curves. The AI curve sets the relationship between the analog input voltage (or analog input current) and the percentage corresponding to the maximum frequency (F0-10). The x-axis of the AI curve represents the analog input voltage or current, and the y-axis represents the set value corresponding to the analog input, which is the percentage to the maximum frequency (F0-10). Five AI curves are provided, in which curves 1 to 3 are two-point curves. Their relevant parameters are F4-13 to F4-27. Curves 4 and 5 are four-point curves and their relevant parameters are A6-00 to A6-15.

The two points on curves 1 to 3 are the minimum input point and maximum input point, respectively. F4-13 corresponds to x-axis of minimum input of AI curve 1, namely the minimum analog input voltage or current.

F4-14 **Percentage corresponding to the minimum input of AI curve 1**

Address:	0xF40E	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

F4-14 corresponds to the y axis of the minimum input point on AI curve 1, namely the set value corresponding to the minimum analog input.

F4-15 **Maximum input of AI curve 1**

Address:	0xF40F	Effective mode:	/
Min.:	F4-13	Unit:	V
Max.:	10.00	Data type:	UInt16
Default:	10.00	Change mode:	Real time

Range:
F4-13 to 10.00 V
Parameter description
F4-15 corresponds to the x axis of the maximum input point on AI curve 1, namely the maximum analog input voltage or current.

F4-16 Percentage corresponding to the maximum input of AI curve 1

Address:	0xF410	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	100.0	Change mode:	Real time:

Range:
-100.0% to 100.0%
Parameter description
This parameter corresponds to the y axis of the maximum input point on AI curve 1, that is, the set value corresponding to the maximum analog input. For example, when the AI curve corresponds to the frequency, the set value is the percentage to the maximum frequency.

F4-17 AI1 filter time

Address:	0xF411	Effective mode:	/
Min.:	0.00	Unit:	s
Max.:	10.00	Data type:	UInt16
Default:	0.10	Change mode:	Real time

Range:
0.00s to 10.00s
Parameter description
This parameter indicates the software filter time of AI1. The longer the AI filter time, the stronger the anti-interference capability and the slower the response to analog detection. The shorter the AI filter time, the weaker the anti-interference capability and the faster the response to analog detection. When analog signals on the site are susceptible to interference, increase the AI filter time to enhance the stability of analog signals.

F4-18 Minimum input of AI curve 2

Address:	0xF412	Effective mode:	/
Min.:	0.00	Unit:	V
Max.:	F4-20	Data type	UInt16

Default:	0.00	Change mode:	Real time

Range:
0.00 V to F4-20
Parameter description
F4-18 corresponds to x-axis of the minimum input of AI curve 2, namely the minimum analog input voltage or current. For the current-type AI curve (jumper J9 connected to the current end), 1 mA current corresponds to 0.5 V voltage. That is, 4 mA corresponds to 2 V.

F4-19 Percentage corresponding to the minimum input of AI curve 2

Address:	0xF413	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:
-100.0% to 100.0%
Parameter description
F4-19 corresponds to y axis of the minimum input point on AI curve 2, namely the set value corresponding to the minimum analog input.

F4-20 AI curve 2 maximum input

Address:	0xF414	Effective mode:	/
Min.:	F4-18	Unit:	V
Max.:	10.00	Data type:	UInt16
Default:	10.00	Change mode:	Real time

Range:
F4-18 to 10.00 V
Description of parameters:
F4-20 corresponds to x-axis of the maximum input point on AI curve 2, namely the maximum analog input voltage or current. For the current-type AI curve (jumper J9 connected to the current end), 1 mA current corresponds to 0.5 V voltage. That is, 20 mA corresponds to 10 V.

F4-21 Percentage corresponding to the maximum input of AI curve 2

Address:	0xF415	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16

Default:	100.0	Change mode:	Real time:

Range:

-100.0% to 100.0%

Parameter description

F4-21 corresponds to the y axis of the maximum input point on AI curve 2, that is, the set value corresponding to the maximum analog input. For example, when the AI curve corresponds to the frequency, the set value is the percentage to the maximum frequency.

F4-22 AI2 filter time

Address:	0xF416	Effective mode:	/
Min.:	0.00	Unit:	s
Max.:	10.00	Data type:	UInt16
Default:	0.10	Change mode:	Real time

Range:

0.00s to 10.00s

Parameter description

This parameter indicates the software filter time of AI2.

The longer the AI filter time, the stronger the anti-interference capability and the slower the response to analog detection. The shorter the AI filter time, the weaker the anti-interference capability and the faster the response to analog detection.

When analog signals on the site are susceptible to interference, increase the AI filter time to enhance the stability of analog signals.

F4-23 Minimum input of AI curve 3

Address:	0xF417	Effective mode:	/
Min.:	-10.00	Unit:	V
Max.:	F4-25	Data type:	Int16
Default:	-10.00	Change mode:	Real time

Range:

-10.00 V to F4-25

Parameter description

F4-23 corresponds to x-axis of the minimum input point on AI curve 3, namely the minimum analog input voltage or current.

F4-24 **Percentage corresponding to the minimum input of AI curve 3**

Address:	0xF418	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	-100.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

F4-24 corresponds to the y axis of the minimum input point on AI curve 3, namely the set value corresponding to the minimum analog input.

F4-25 **Maximum input of AI curve 3**

Address:	0xF419	Effective mode:	/
Min.:	F4-23	Unit:	V
Max.:	10.00	Data type:	UInt16
Default:	10.00	Change mode:	Real time

Range:

F4-23 to 10.00 V

Parameter description

F4-25 corresponds to the x axis of the maximum input point on AI curve 3, namely the maximum analog input voltage or current.

F4-26 **Percentage corresponding to the maximum input of AI curve 3**

Address:	0xF41A	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	100.0	Change mode:	Real time:

Range:

-100.0% to 100.0%

Parameter description

F4-26 corresponds to the y axis of the maximum input point on AI curve 3, that is, the set value corresponding to the maximum analog input. For example, when the AI curve corresponds to the frequency, the set value is the percentage to the maximum frequency.

F4-27 **AI3 filter time**

Address:	0xF41B	Effective mode:	/
Min.:	0.00	Unit:	s
Max.:	10.00	Data type:	UInt16
Default:	0.10	Change mode:	Real time

Range:

0.00s to 10.00s

Parameter description

This parameter indicates the software filter time of AI3.

The longer the AI filter time, the stronger the anti-interference capability and the slower the response to analog detection. The shorter the AI filter time, the weaker the anti-interference capability and the faster the response to analog detection.

When analog signals on the site are susceptible to interference, increase the AI filter time to enhance the stability of analog signals.

F4-28 **Pulse minimum input**

Address	0xF41C	Effective mode:	/
Min.:	0.00	Unit:	kHz
Max.:	F4-30	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00 kHz to F4-30

Parameter description

When the DI5 high-speed pulse is used to set the main frequency, the mapping curve between the pulse frequency and the frequency reference must be defined. The frequency reference is a percentage to the maximum frequency (F0-10). The x-axis of the curve represents the DI5 pulse frequency and the y-axis represents the percentage to the maximum frequency (F0-10). The curve is a two-point straight line. These two points represent the minimum and maximum pulse input points respectively.

F4-28 corresponds to x-axis of the minimum pulse input point, namely the minimum pulse input frequency.

F4-29 **Percentage corresponding to pulse minimum input**

Address:	0xF41D	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16

Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

F4-29 corresponds to the y axis of the minimum pulse input point, namely the set value corresponding to the minimum pulse input.

F4-30 Pulse maximum input

Address:	0xF41E	Effective mode:	/
Min.:	F4-28	Unit:	kHz
Max.:	100.00	Data type:	UInt16
Default:	50.00	Change mode:	Real time

Range:

F4-28 to 100.00 kHz

Parameter description

F4-30 corresponds to the x axis of the maximum pulse input, namely the maximum pulse input frequency.

F4-31 Percentage corresponding to pulse maximum input

Address:	0xF41F	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	100.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

F4-31 corresponds to the y axis of the pulse maximum input point, that is, the set value corresponding to the pulse maximum input. For example, when the pulse corresponds to the frequency, the set value is the percentage to the maximum frequency.

F4-32 Pulse filter time

Address:	0xF420	Effective mode:	/
Min.:	0.00	Unit:	s
Max.:	10.00	Data type:	UInt16
Default:	0.10	Change mode:	Real time

Range:
0.00s to 10.00s
Parameter description
This parameter indicates the filter time of the frequency reference.

F4-33 AI curve

Address	0xF421	Effective mode:	/
Min.:	0x111	Unit:	-
Max.:	0x555	Data type:	UInt16
Default:	0x321	Change mode:	Real time

Range:
Ones: AI1 curve selection
1: Curve 1 (2 points)
2: Curve 2 (2 points)
3: Curve 3 (2 points)
4: Curve 4 (4 points)
5: Curve 5 (4 points)
Tens: AI2 curve selection
1: Curve 1 (2 points)
2: Curve 2 (2 points)
3: Curve 3 (2 points)
4: Curve 4 (4 points)
5: Curve 5 (4 points)
Hundreds: AI3 curve selection
1: Curve 1 (2 points)2: Curve 2 (2 points)
3: Curve 3 (2 points)
4: Curve 4 (4 points)
5: Curve 5 (4 points)
Parameter description
The ones, tens, and hundreds places of this parameter are used to set one of five curves for AI1 to AI3. When the main frequency is set by analog input, the AI terminals are used as frequency sources. Five types of different AI curves can be set for each AI terminal.

F4-34 Selection when AI value lower than the minimum input value

Address	0xF422	Effective mode:	/
Min.:	0x0	Unit:	-
Max.:	0x111	Data type:	UInt16
Default:	0x0	Change mode:	Real time

Range:
Ones: Setting for AI1 less than minimum input
0: Corresponding percentage of minimum input
1: 0.0%
Tens: Setting for AI2 less than minimum input
0: Corresponding percentage of minimum input1 1: 0.0%
Hundreds: Setting for AI3 less than minimum input
0: Corresponding percentage of minimum input
1: 0.0%
Parameter description
The ones, tens, and hundreds places of this parameter are used to set the setting method when the AI1, AI2, and AI3 input value is lower than the minimum input value. When the analog input voltage is lower than the minimum input (set by F4-13/F4-18/F4-23), the corresponding setting value is calculated according to the minimum input defined by this parameter or 0.0%.
0: Corresponding percentage of minimum input
The setting value is obtained based on the minimum input (set by F4-13/F4-18/F4-23).
1: 0.0%
The setting value is calculated based on 0.0%.

F4-35 DI1 delay time

Address:	0xF423	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter defines the delay time for the DI1 status change.

F4-36 DI2 delay

Address:	0xF424	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0

Parameter description

This parameter defines the delay time for the DI2 status change.

F4-37 DI3 delay

Address:	0xF425	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0 to 3600.0

Parameter description

This parameter defines the delay time for the DI3 status change.

F4-38 DI active mode selection 1

Address:	0xF426	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11111	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

Ones: DI1
0: Active high
1: Active low
Tens: DI2
0: Active high
1: Active low
Hundreds: DI3
0: Active high
1: Active low
Thousands: DI4
0: Active high
1: Active low
Ten thousands: DI5
0: Active high
1: Active low

Parameter description

The ones to ten thousands places of this parameter are used to the active status of DI1 to DI5.

0: Active high
The DI terminals (DI1 to DI5) are active when connected to COM and inactive when disconnected from COM.
1: Active low
The DI terminals (DI1 to DI5) are inactive when connected to COM and active when disconnected from COM.

F4-39 DI active mode selection 2

Address:	0xF427	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11111	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
Ones: DI6
0: Active high
1: Active low
Tens: DI7
0: Active high
1: Active low
Hundreds: DI8
0: Active high
1: Active low
Thousands: DI9
0: Active high
1: Active low
Ten thousands: DI10
0: Active high
1: Active low

Parameter description
The ones to ten thousands places of this parameter are used to the active status of DI6 to DI10.
0: Active high
The DI terminals (DI6 to DI10) are active when connected to COM and inactive when disconnected from COM.
1: Active low
The DI terminals (DI6 to DI10) are inactive when connected to COM and active when disconnected from COM.

13.5 F5 Output Terminal Parameters

F5-00 Multi-functional terminal output selection

Address	0xF500	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Pulse output (FMP)

1: Digital output (FMR)

Parameter description

The FM terminal is a programmable multi-functional terminal, which can be used as the high-speed pulse output (FMP) terminal or open collector digital output terminal (FMR).

When the FM terminal is used as the high-speed pulse output terminal (FMP), the maximum frequency of the output pulse is 100 kHz. For details, see the description of F5-06.

0: When the terminal is used for high-speed pulse output, the maximum frequency is 100 kHz.

1: When the terminal is used as open collector output, specifications are the same as DO1.

F5-01 FMR output function selection

Address	0xF501	Effective mode:	/
Min.:	0	Unit:	-
Max.:	41	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: No output
1: Drive in operation
2: Fault output (coast to stop)
3: Frequency level detection 1
4: Frequency reached
5: Operation at zero speed (no output at stop)
6: Motor overload alarm
7: Drive overload alarm
8: Set count value reached
9: Designated count value reached
10: Length reached
11: Simple PLC cycle completed
12: Cumulative operating time reached
13: Frequency limited
14: Torque limited
15: Ready to run
16: AI1 > AI2
17: Frequency upper limit reached
18: Frequency lower limit reached (no output at stop)
19: Undervoltage
20: Communication setting
21: Reserved
22: Reserved
23: Operation at zero speed 2 (output at stop)
24: Cumulative power-on time reached
25: Frequency level detection 2
26: Frequency 1 reached
27: Frequency 2 reached
28: Current 1 reached
29: Current 2 reached
30: Timing reached
31: AI1 input limit exceeded
32: Drive output load loss
33: Reverse running
34: Zero current state
(To be continued)

(Continued)
35: Module temperature reached
36: Output current limit exceeded
37: Frequency lower limit reached (output at stop)
38: Alarm (all faults)
39: Motor overheat
40: Present operating time reached
41: Fault output (coast to stop; no output upon undervoltage)

Parameter description

This parameter is used to set the function of the open collector output terminals (FMR).

0: No output

The terminal has no function.

1: Drive in operation

When the AC drive is running with output frequency (can be 0), the terminal outputs an active signal.

2: Fault output (coast to stop)

When the AC drive stops upon a fault, the terminal outputs an active signal.

3: Frequency level detection 1

When the running frequency is higher than the detection frequency, the DO outputs an active signal. When the running frequency is lower than the result of the detection frequency minus the FDT hysteresis value (F8-19 x F8-20), the DO stops outputting an active signal.

4: Frequency reached

When the running frequency of the AC drive is within a certain range (target frequency ± F8-21 x maximum frequency), the DO outputs an active signal.

5: Operation at zero speed (no output at stop)

When the output frequency is 0 during AC drive running, the DO outputs an active signal. When the drive is in the stop state, the signal is inactive.

6: Motor overload alarm

The AC drive determines whether the motor load exceeds the overload warning threshold according to the overload warning coefficient (F9-02) before performing the protection action. The terminal outputs an active signal when the overload warning threshold is exceeded.

7: Drive overload alarm

The terminal outputs an active signal 10s before the AC drive performs overload protection.

8: Set count value reached

The terminal outputs an active signal when the count value reaches the value of FB-08.

9: Designated count value reached

The terminal outputs an active signal when the count value reaches the value of FB-09.

10: Length reached
The terminal outputs an active signal when the detected actual length exceeds the value of FB-05.
11: Simple PLC cycle completed
The terminal outputs a pulse signal with the width of 250 ms when the simple PLC completes one cycle.
12: Cumulative operating time reached
The terminal outputs an active signal when the cumulative running time of the AC drive exceeds the value of F8-17 (cumulative running time threshold).
13: Frequency limited
The terminal outputs an active signal when the frequency reference exceeds the frequency upper or lower limit, and the output frequency of AC drive reaches the upper or lower limit.
14: Torque limited
The terminal outputs an active signal when the output torque of the AC drive reaches the toque limit in speed control mode.
15: Ready to run
The terminal outputs an active signal when the AC drive is ready for running without any fault after power-on.
16: AI1 > AI2
The terminal outputs an active signal when the AI1 input is higher than the AI2 input.
17: Frequency upper limit reached
The terminal outputs an active signal when the running frequency reaches the frequency upper limit (F0-12).
18: Frequency lower limit reached (no output at stop)
If F8-14 (running mode when frequency reference lower than lower limit) is set to 1 (stop), the terminal outputs an inactive signal no matter whether the running frequency reaches the frequency lower limit.
When F8-14 (running mode when frequency reference lower than lower limit) is set to 0 (run at the frequency lower limit) or 2 (run at zero speed) and the running frequency reaches the lower limit, the terminal outputs an active signal.
19: Undervoltage
The terminal outputs an active signal when undervoltage occurs on the AC drive.
20: Communication setting
Whether the DO is active or inactive is determined by communication address 0x2001.

21: Reserved
22: Reserved
23: Operating at zero speed 2 (output at stop)
When the output frequency is 0 during operation of the drive, the terminal outputs an active signal. The signal remains active when the drive is in the stop state.
24: Cumulative power-on time reached
The terminal outputs an active signal when the cumulative power-on time of the AC drive (F7-13) exceeds the value of F8-16 (cumulative power-on time threshold).
25: Frequency level detection 2
When the running frequency is higher than the detection frequency, the DO outputs an active signal. When the running frequency is lower than the result of the detection frequency minus the frequency detection hysteresis value (F8-28 x F8-29), the DO stops outputting an active signal.
26: Frequency 1 reached
When the running frequency of the AC drive is within the detection range set by F8-30, the DO outputs an active signal. Frequency detection range: F8-30 - F8-31 x F0-10 (Maximum frequency) to F8-30 + F8-31 x F0-10
27: Frequency 2 reached
When the running frequency of the AC drive is within the detection range set by F8-32, the DO outputs an active signal. Frequency detection range: F8-32 - F8-33 x F0-10 (Maximum frequency) to F8-32 + F8-33 x F0-10
28: Current 1 reached
When the output current of the AC drive is within the detection range set by F8-38, the DO outputs an active signal. Current detection range = F8-38 - F8-39 x F1-03 (Rated motor current) to F8-38 + F8-39 x F1 03.
29: Current 2 reached
When the output current of the AC drive is within the detection range set by F8-40, the DO outputs an active signal. Current detection range = F8-40 - F8-41 x F1-03 (Rated motor current) to F8-40 + F8-41 x F1 03.
30: Timing reached
With the timing function (F8-42) enabled, when the current running time of the AC drive reaches the set time, the terminal outputs an active signal. The timing duration is set by F8-43 and F8-44.
31: AI1 input limit exceeded
The terminal outputs an active signal when AI1 input is higher than the value of F8-46 (AI1 input voltage upper limit) or lower than the value of F8-45 (AI1 input voltage lower limit).
32: Drive output load loss
The terminal outputs an active signal when the drive is in the load loss state.

33: Reverse running
The terminal outputs an active signal when the AC drive runs in the reverse direction.
34: Zero current state
When the output current of the AC drive is within the zero-current range for a period exceeding the value of F8-35 (zero current detection delay), the DO outputs an active signal. Zero current detection range = 0 to F8-34 x F1-03
35: Module temperature reached
The terminal outputs an active signal when the inverter heatsink temperature (F7-07) reaches the value of F8-47 (module temperature reach).
36: Output current limit exceeded
When the output current of the AC drive is greater than F8-36 (output overcurrent threshold) for a period exceeding the value of F8-37 (output overcurrent detection delay), the DO outputs an active signal.
37: Frequency lower limit reached (output even at stop)
The terminal outputs an active signal when the running frequency reaches the frequency lower limit (F0-14). The terminal still outputs the active signal when the drive is in the stop state.
38: Alarm (all faults)
If a fault occurs on the AC drive and the AC drive continues to run upon fault, the DO outputs an active signal. For details about the fault protection action, see F9-47 to F9-50.
39: Motor overheat
The terminal outputs an active signal when the motor temperature reaches the value of F9-58 (Motor overtemperature warning threshold). You can check the motor temperature using U0-34.
40: Present operating time reached
The terminal outputs an active signal when the present running time of the AC drive is longer than the value of F8-53 (current running time threshold).
41: Fault output (coast to stop; no output upon undervoltage)
When a fault occurs on the AC drive (excluding undervoltage), the DO outputs an active signal.

F5-02 Control board relay function selection (T/A-T/B-T/C)

Address:	0xF502	Effective mode:	/
Min.:	0	Unit:	-
Max.:	41	Data type:	UInt16
Default:	2	Change mode:	Real time

Range:
Same as F5-01

Parameter description
Same as F5-01

F5-03 Output function selection of expansion card relay (P/A-P/B-P/C)

Address:	0xF503	Effective mode:	/
Min.:	0	Unit:	-
Max.:	41	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
Same as F5-01
Parameter description
Same as F5-01

F5-04 DO1 output function selection

Address:	0xF504	Effective mode:	/
Min.:	0	Unit:	-
Max.:	41	Data type:	UInt16
Default:	1	Change mode:	Real time

Range:
Same as F5-01
Parameter description
Same as F5-01

F5-05 Output function selection of DO2 on expansion card

Address:	0xF505	Effective mode:	/
Min.:	0	Unit:	-
Max.:	41	Data type:	UInt16
Default:	4	Change mode:	Real time

Range:
Same as F5-01
Parameter description
Same as F5-01

F5-06 FMP output function selection

Address	0xF506	Effective mode:	/
Min.:	0	Unit:	-

Max.:	16	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Operating frequency
1: Frequency reference
2: Output current
3: Output torque (absolute value, proportion to rated motor torque)
4: Output power
5: Output voltage
6: Pulse input (100.0% corresponds to 100.00 kHz)
7: AI1
8: AI2
9: AI3 (expansion card)
10: Length
11: Count value
12: Communication setting
13: Motor speed
14: Output current (100.0% corresponds to 1000.0 A)
15: Output voltage (100.0% corresponds to 1000.0 V)
16: Output torque (positive and negative)
17: Actual output torque (positive and negative)

Description

0: Operating frequency (100.0% corresponds to the maximum frequency F0-10)
1: Frequency reference
2: Output current (100.0% corresponds to 2 times the rated motor current)
3: Output torque (100.0% corresponds to 2 times the rated motor torque) (absolute value, proportion to rated motor torque)
4: Output power (100.0% corresponds to 2 times the rated motor power)
5: Output voltage (100.0% corresponds to 1.2 times the rated motor voltage)
6: Pulse input (100.0% corresponds to 100.0 kHz)
7: AI1 (100.0% corresponds to 10 V)
8: AI2 (100.0% corresponds to 10 V)
9: AI3 (100.0% corresponds to 10 V)
10: Length (100.0% corresponds to FB-05)
11: Count value (100.0% corresponds to FB-08)
12: Communication setting (100.0% corresponds to the AO communication setting)
13: Motor speed (100.0% corresponds to the maximum frequency F0-10)
14: Output current (100.0% corresponds to 1000.0 A)
15: Output voltage (100.0% corresponds to 1000.0 V)
16: Output torque
17: Actual output torque (100.0% corresponds to 2 times the rated motor torque; 50% corresponding to 0; 0 corresponds to 2 times the negative rated motor torque)

F5-07 AO1 output function selection

Address:	0xF507	Effective mode:	/
Min.:	0	Unit:	-
Max.:	16	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

Same as F5-06.

Parameter description

Same as F5-06.

F5-08 AO2 output function selection

Address:	0xF508	Effective mode:	/
Min.:	0	Unit:	-
Max.:	16	Data type:	UInt16

Default:	1	Change mode:	Real time

Range:
Same as F5-06.
Parameter description
Same as F5-06.

F5-09 Maximum frequency of FMP output

Address:	0xF509	Effective mode:	/
Min.:	0.01	Unit:	kHz
Max.:	100.00	Data type:	UInt16
Default:	50.00	Change mode:	Real time

Range:
0.01 kHz to 100.00 kHz
Parameter description
This parameter indicates the maximum frequency (0.01 KHz to 100.00 kHz) of the FMP terminal output pulse.

F5-10 AO1 zero offset coefficient

Address	0xF50A	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:
-100.0% to 100.0%
Parameter description
On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is kX plus b (Y = kX + b). The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 V to 10 V (or 0 mA to 20 mA) without zero offset or gain correction.
Zero offset = Zero offset coefficient x 10 V (or 20 mA)

Assume that the AO terminal outputs the running frequency. The rectified output needs to be 4 mA/2 V (Y1) when the frequency is 0 Hz (X1) and 20 mA/10 V (Y2) when the frequency is 50 Hz (X2). Use the J7 jumper to select voltage output or current output. The zero offset coefficient is calculated as follows: [(X1 x Y2 - X2 x Y1)/((X1-X2) x Ymax)] x 100%. Ymax is the current (voltage) and the value is 20 mA (10 V). If the result is 20%, the zero offset equals 4 mA (20 mA x 20%) or 2 V (10 V x 20%).
The drive supports two AOs, AO1 and AO2, which can be used to indicate the internal operating parameters in the analog mode. The parameter property indicated is defined by F5-07 and F5-08.

F5-11 AO1 gain

Address:	0xF50B	Effective mode:	/
Min.:	-10.00	Unit:	-
Max.:	10.00	Data type:	Int16
Default:	1.00	Change mode:	Real time

Range:
-10.00 to +10.00
Parameter description
On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is kX plus b (Y = kX + b). The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 V to 10 V (or 0 mA to 20 mA) without zero offset or gain correction.
Zero offset = Zero offset coefficient x 10 V (or 20 mA)
Assume that the AO terminal outputs the running frequency. The rectified output needs to be 4 mA/2 V (Y1) when the frequency is 0 Hz (X1) and 20 mA/10 V (Y2) when the frequency is 50 Hz (X2). Use the J7 jumper to select voltage output or current output. The gain is calculated as follows: (Y1-Y2) x Xmax)/(X1-X2) x Ymax. Xmax is the maximum output frequency (assume the maximum frequency of F0-10 is 50 Hz) and Ymax is the current/voltage (20 mA/10 V). The preceding formula result is 0.8.
The drive supports two AOs, AO1 and AO2, which can be used to indicate the internal operating parameters in the analog mode. The parameter property indicated is defined by F5-07 and F5-08.

F5-12 AO2 zero offset coefficient

Address	0xF50C	Effective mode:	/
Min.:	-100.0	Unit:	%

Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is kX plus b (Y = kX + b). The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 V to 10 V (or 0 mA to 20 mA) without zero offset or gain correction.

Zero offset = Zero offset coefficient x 10 V (or 20 mA)

Assume that the AO terminal outputs the running frequency. The rectified output needs to be 4 mA/2 V (Y1) when the frequency is 0 Hz (X1) and 20 mA/10 V (Y2) when the frequency is 50 Hz (X2). Use the J7 jumper to select voltage output or current output. The zero offset coefficient is calculated as follows: [(X1 x Y2 - X2 x Y1)/((X1-X2) x Ymax)] x 100%. Ymax is the current (voltage) and the value is 20 mA (10 V). If the result is 20%, the zero offset equals 4 mA (20 mA x 20%) or 2 V (10 V x 20%).

The drive supports two AOs, AO1 and AO2, which can be used to indicate the internal operating parameters in the analog mode. The parameter property indicated is defined by F5-07 and F5-08.

F5-13 AO2 gain

Address:	0xF50D	Effective mode:	/
Min.:	-10.00	Unit:	-
Max.:	10.00	Data type:	Int16
Default:	1.00	Change mode:	Real time

Range:

-10.00 to +10.00

Parameter description

On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is kX plus b (Y = kX + b). The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 V to 10 V (or 0 mA to 20 mA) without zero offset or gain correction.

Zero offset = Zero offset coefficient x 10 V (or 20 mA)

Assume that the AO terminal outputs the running frequency. The rectified output needs to be 4 mA/2 V (Y1) when the frequency is 0 Hz (X1) and 20 mA/10 V (Y2) when the frequency is 50 Hz (X2). Use the J7 jumper to select voltage output or current output. The gain is calculated as follows: (Y1-Y2) x Xmax)/(X1-X2) x Ymax. Xmax is the maximum output frequency (assume the maximum frequency of F0-10 is 50 Hz) and Ymax is the current/voltage (20 mA/10 V). The preceding formula result is 0.8.
The drive supports two AOs, AO1 and AO2, which can be used to indicate the internal operating parameters in the analog mode. The parameter property indicated is defined by F5-07 and F5-11.

F5-17 Relay 1 output delay

Address:	0xF511	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter indicates the output delay of relay 1 on the control board . An active signal of the output function set by F5-01 is output after the set delay time elapses.

F5-18 Relay 2 output delay

Address:	0xF512	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter indicates the output delay of relay 2 on the control board. An active signal of the output function set by F5-02 is output after the set delay time elapses.

F5-19 DO1 output delay

Address:	0xF513	Effective mode:	/

Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter indicates the output delay of DO1 on the expansion card. An active signal of the output function set by F5-03 is output after the set delay time elapses.

F5-20 DO2 output delay

Address:	0xF514	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter indicates the output delay of DO2 on the expansion card. An active signal of the output function set by F5-04 is output after the set delay time elapses.

F5-21 DO3 output delay

Address:	0xF515	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter indicates the output delay of DO3 on the expansion card. An active signal of the output function set by F5-05 is output after the set delay time elapses.

F5-22 DO valid status selection

Address	0xF516	Effective mode:	/
Min.:	0	Unit:	-

Max.:	11111	Data type:	UInt16
Default:	0	Change mode:	Real time:

Range:
Ones: FMR
0: Positive logic
1: Negative logic
Tens: Relay 1
0: Positive logic
1: Negative logic
Hundreds: Relay 2
0: Positive logic
1: Negative logic
Thousands: DO1
0: Positive logic
1: Negative logic
Ten thousands: DO2
0: Positive logic
1: Negative logic

Parameter description
The ones, tens, hundreds, thousands, and ten thousands places of this parameter are used to set the valid state of DOs to which F5-01 to F5-05 correspond.
0: Positive logic (same as NO contact)
Active state: The DO is connected to the COM/CME terminal internally.
Invalid state: The DO is disconnected from the COM/CME terminal.
1: Negative logic (same as NC contact)
Active state: The DO is disconnected from the COM/CME terminal.
Invalid state: The DO is connected to the COM/CME terminal internally.

13.6 F6 Start/Stop Control Parameters

F6-00 **Start mode**

Address	0xF600	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Direct start
1: Flying start
2: Pre-excitation start (asynchronous motor)
3: Quick start in SVC mode

Parameter description

This parameter is used to set the start mode of the motor. Flying start is recommended if you need to start a motor that is rotating at a high speed. Pre-excitation start and SVC quick start apply to AC asynchronous motors only.

0: Direct start

This mode is applicable to most loads. Startup with the startup frequency is applicable to load hoisting applications such as elevators and cranes.

1: Flying start

In some applications, the motor rotates before the AC drive is started. In flying start, the AC drive tracks the motor speed and direction automatically to start the spinning motor without impact. For example, the drive restarts after power-off caused by an instantaneous power failure during operation, but the motor still rotates due to inertia. In this case, the drive must detect the actual speed of the motor to control the asynchronous motor again. Otherwise, overcurrent or overvoltage can occur on the drive during start, which may damage the power transistor of the drive.

2: Pre-excitation start (asynchronous motor)

This mode applies only to asynchronous motors in SVC or FVC mode. Performing pre-excitation on the motor before start improves the responsiveness of the motor and reduces the starting current. The startup timing is the same as that of DC braking restart.

3: Quick start in SVC mode

This mode is applicable to asynchronous motors only in SVC mode, which can shorten acceleration time. It is used when system inertia is large and quick start is required. However, torque impact exists in this mode.

F6-01 **Flying start mode**

Address	0xF601	Effective mode:	/
Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Start from the stop frequency
1: Start from the mains frequency
2: Start from the maximum frequency
4: Magnetic field directional flying start (set F1-37 to 1)

Parameter description

This parameter indicates the start frequency for the flying start mode upon restart.

The start frequency of flying start upon restart varies with different modes.

0: Start from the stop frequency

The search mode from the stop frequency is to search for 0 Hz from the frequency at the previous stop. If external force drives the motor to a speed higher than the speed at stop, this mode is not applicable.

1: Start from the mains frequency

This mode is applicable to the scenario where the mains frequency is switched to the variable frequency and the motor is restarted after stop for a long time.

2: Start from the maximum frequency

Frequency tracking starts from the maximum frequency to a lower frequency. This mode is applicable to generating load.

4: Magnetic field directional flying start

This mode is the quick flying start. Before using the mode, perform motor parameter auto-tuning in the status state.

F6-02 Flying start speed

Address:	0xF602	Effective mode:	/
Min.:	1	Unit:	-
Max.:	100	Data type:	UInt16
Default:	20	Change mode:	Real time

Range:

1 to 100

Parameter description

This parameter sets the flying start speed. The larger the value, the faster the flying start. The default value is recommended.

F6-03 Startup frequency

Address:	0xF603	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	10.00	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00 Hz to 10.00 Hz

Parameter description

This parameter defines the startup frequency for direct start of the drive. When the startup frequency is higher than the frequency reference (F0-08), the AC drive will not start but stay standby.

F6-04 Startup frequency holding time

Address:	0xF604	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	At stop

Range:

0.0 to 100.0

Parameter description

This parameter defines the hold time during which the output frequency remains at the startup frequency (F6-03). After this hold time expires, the AC drive will accelerate from the output frequency to the frequency reference (F0-08).

F6-05 DC braking current/Pre-excitation current at start

Address:	0xF605	Effective mode:	/
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	50	Change mode:	At stop

Range:

0% to 100%

Parameter description

When start with DC braking is enabled, DC braking will be performed first after a start command is set. A greater DC braking current indicates greater braking force. The setpoint 100% corresponds to the rated motor current. The upper limit of the current is 80% of the rated current of the drive.

F6-06 DC braking time/Pre-excitation time at start

Address:	0xF606	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	At stop

Range:

0.0 to 100.0

Parameter description

This parameter indicates the time for DC braking, which is active only when the direct start mode applies.

F6-07 Acceleration/Deceleration mode

Address:	0xF607	Effective mode:	/
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Linear acceleration/deceleration

1: Static S-curve acceleration/deceleration

2: Dynamic S-curve acceleration/deceleration

Parameter description

This parameter defines the frequency change mode during start and stop of the drive.

0: Linear acceleration/deceleration

The output frequency increases or decreases linearly.

1: Static S-curve acceleration/deceleration

When the target frequency remains unchanged, the output frequency increases or decreases based on the S-curve. This mode applies to scenarios requiring smooth operation and quick response in real time.

2: Dynamic S-curve acceleration/deceleration

When the target frequency changes dynamically in real time, the output frequency increases or decreases based on the S-curve. This mode applies to scenarios requiring smooth operation and quick response in real time. Flying start does not apply to dynamic S-curve acceleration/deceleration mode.

F6-08 Time proportion of S-curve start segment

Address:	0xF608	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	30.0	Change mode:	At stop

Range:

0.0% to 100.0%

Parameter description

The sum of F6-08 (Time proportion of S-curve start segment) and F6-09 (Time proportion of S-curve end segment) must be lower than or equal to 100%.

F6-09 **Time proportion of S-curve end segment**

Address:	0xF609	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	30.0	Change mode:	At stop

Range:

0.0% to 100.0%

Parameter description

The sum of F6-08 (Time proportion of S-curve start segment) and F6-09 (Time proportion of S-curve end segment) must be lower than or equal to 100%.

F6-10 **Stop mode**

Address:	0xF60A	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Decelerate to stop

1: Coast to stop

Parameter description

0: Decelerate to stop

Upon receiving the stop command, the AC drive decreases the output frequency to 0 and then stops based on the deceleration time.

1: Coast to stop

Upon receiving the stop command, the AC drive immediately stops output. The motor then coasts to stop according to the mechanical inertia.

F6-11 **DC braking start frequency for stop**

Address:	0xF60B	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00 Hz to F0-10

Parameter description

During decelerating to stop, the drive starts DC braking when the operating frequency drops below the value of F6-11.

F6-12 **Waiting time of DC braking for stop**

Address:	0xF60C	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 100.0
Parameter description
When the operating frequency decreases to the starting frequency of DC braking for stop, the drive stops output temporarily and then starts DC braking. This prevents faults such as overcurrent caused by DC braking at a high speed.

F6-13 **DC braking current for stop**

Address:	0xF60D	Effective mode:	/
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	50	Change mode:	Real time

Range:
0% to 100%
Parameter description
The following two conditions are present.
1. When the rated current of the motor is lower than or equal to 80% of the rated current of the AC drive, the rated motor current is used as the percentage base value.
2. When the rated current of the motor is greater than 80% of the rated current of the AC drive, 80% of the rated current of the AC drive is used as the percentage base value.

F6-14 **DC braking time for stop**

Address:	0xF60E	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 100.0

Parameter description

This parameter specifies the hold time of DC braking. If it is set to 0, DC braking is canceled.

F6-15 Braking usage rate

Address:	0xF60F	Effective mode:	/
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	100	Change mode:	Real time

Range:

0% to 100%

Parameter description

This parameter indicates the braking usage rate.

F6-16 Closed loop current Kp of flying start

Address:	0xF610	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1000	Data type:	UInt16
Default:	500	Change mode:	Real time

Range:

0-1000

Parameter description

This parameter takes effect when F6-01 is set to 0, 1, or 2. It is used to set the proportional gain of the current suppression PI regulator during the speed search process in the flying start mode.

F6-17 Closed loop current Ki of flying start

Address:	0xF611	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1000	Data type:	UInt16
Default:	800	Change mode:	Real time

Range:

0-1000

Parameter description

This parameter takes effect when F6-01 is set to 0, 1, or 2. It is used to set the integral gain of the current suppression PI regulator during the speed search process in the flying start mode.

F6-18 **Current of flying start**

Address:	0xF612	Effective mode:	/
Min.:	30	Unit:	-
Max.:	200	Data type:	UInt16
Default:	100	Change mode:	Real time

Range:
30 to 200
Parameter description
Generally, overcurrent can occur on asynchronous motors due to large slip upon flying start. The current must be limited to prevent overcurrent. This parameter is used to set the motor current threshold for triggering suppression during flying start.

F6-19 **Closed loop current lower limit of flying start**

Address:	0xF613	Effective mode:	/
Min.:	10	Unit:	-
Max.:	100	Data type:	UInt16
Default:	30	Change mode:	Real time:

Range:
10 to 100
Parameter description
-

F6-20 **Voltage rise time of flying start**

Address:	0xF614	Effective mode:	/
Min.:	0.5	Unit:	-
Max.:	3.0	Data type:	UInt16
Default:	1.1	Change mode:	Real time

Range:
0.5–3.0
Parameter description
-

F6-21 **Demagnetization time**

Address:	0xF615	Effective mode:	/
Min.:	0.00	Unit:	-

Max.:	10.00	Data type:	UInt16
Default:	0.50	Change mode:	Real time

Range:
0.00 to 10.00
Parameter description
When flying start is enabled (F6-00 = 1), the drive cannot be started when the motor has residual magnetism. The drive can be started only after the voltage output of the drive has been disconnected for at least the demagnetization time set by F6-21.

F6-23 Overexcitation mode selection

Address:	0xF617	Effective mode:	/
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-2
Parameter description
This parameter is used to set the overexcitation trigger condition. When the generating energy during deceleration is too large, activating overexcitation can consume part of the energy.
0: Disabled
1: Active when the motor decelerates in the generating state
2: Active when the motor decelerates and the bus voltage pump rises above the threshold (threshold = overvoltage suppression threshold minus 100 V)

F6-24 Overexcitation suppression current

Address:	0xF618	Effective mode:	/
Min.:	0	Unit:	-
Max.:	150	Data type:	UInt16
Default:	100	Change mode:	Real time

Range:
0-150
Parameter description
This parameter indicates the current superimposed on the original excitation current after overexcitation occurs, which is a ratio to the rated motor current.

F6-25 Overexcitation mode gain

Address:	0xF619	Effective mode:	/
Min.:	1.00	Unit:	-
Max.:	2.50	Data type:	UInt16
Default:	1.25	Change mode:	Real time

Range:

1.00 to 2.50

Parameter description

This parameter indicates the overexcitation response speed. The default value is recommended.

13.7 F7 Operating Panel and Display Parameters

F7-00 LED default display check

Address:	0xF700	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Invalid

1: Valid

Parameter description

This parameter is used to enable or disable the LED default display check.

0: Invalid The LED default display check is disabled.

1: Valid All indicators on the LED operating panel blink for 5s.

F7-01 MF.K key function

Address:	0xF701	Effective mode:	/
Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: MF.K key disabled
1: Switchover between operating panel control and remote control (terminal or communication)
2: Switchover between forward run and reverse run
3: Forward jog
4: Reverse jog

Description

The MF.K key is a multi-functional key. This parameter is used to set the function of the MF.K key.
0: MF.K key disabled
The MF.K key does not work.
1: Switchover between operating panel control and remote control terminal or communication)
When F0-02 is set to 0 (operating panel), the MF.K key does not work. When F0-02 is set to 1 (terminal), the MF.K key is used for switchover between terminal control and operating panel control. When F0-02 is set to 2 (communication), the MF.K key is used for switchover between the communication control and operating panel control.
2: Switchover between forward run and reverse run
The MF.K key is used for changing the direction of the frequency reference. This function is valid only when the command source is set to operating panel control.
3: Forward jog
The MF.K key is used for enabling forward jog (FJOG). This function is valid only when the command source is set to the operating panel.
4: Reverse jog
The MF.K key is used for enabling reverse jog (RJOG). This function is available only when the command source is set to the operating panel.

F7-02 **STOP/RES key function**

Address:	0xF702	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change mode:	Real time

Range:

0: STOP/RES key enabled only in operating panel control mode
1: STOP/RES key enabled in any control mode

Parameter description

The STOP/RES key on the operating panel is used to stop/reset the AC drive. This parameter is used to set the function of the key.

0: STOP/RESET key enabled only in operating panel control mode
The STOP/RESET key is valid only in operating panel control mode.
1: STOP/RESET key enabled in any operating mode
The STOP/RESET key is valid in any operating mode.

F7-03 **Parameter 1 displayed on LED operating panel during operation**

Address	0xF703	Effective mode:	/
Min.:	0x0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0x1F	Change mode:	Real time

Range:
Bit 0: Running frequency (Hz)
Bit 1: Frequency reference (Hz)
Bit 2: Bus voltage (V)
Bit 3: Output voltage (V)
Bit 4: Output current (A)
Bit 5: Output power (kW)
Bit 6: Output torque (%)
Bit 7: DI state
Bit 8: DO state
Bit 9: AI1 voltage (V)
Bit 10: AI2 voltage (V)
Bit 11: AI3 voltage (V)
Bit 12: Count value
Bit 13: Length value
Bit 14: Load speed
Bit 15: PID reference
Parameter description

If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting the binary number to a hexadecimal number, set F7-03 to the hexadecimal number.
1. This parameter defines parameters displayed on the LED operating panel during operation.
2. You can view the parameters corresponding to each bit by pressing the left and right shift keys.
3. When the bit value is 1, the parameter is displayed. When the bit value is 0, the parameter is not displayed.
4. Each parameter is displayed in the hexadecimal.
For example, if you need to display the bus voltage, output power, and PID reference during operation, set bit 2, bit 5, and bit 15 to 1 (namely, 1000 0000 0010 0100). Convert the binary data to the hexadecimal equivalent 8024 and then set this parameter to 8024.

F7-04 Parameter 2 displayed on LED operating panel during operation

Address	0xF704	Effective mode:	/
Min.:	0x0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0x0	Change mode:	Real time

Range:
Bit 0: PID feedback
Bit 1: PLC stage
Bit 2: Pulse input frequency (kHz)
Bit 3: Operating frequency 2 (Hz)
Bit 4: Remaining operating time
Bit 5: AI1 voltage before correction (V)
Bit 6: AI2 voltage before correction (V)
Bit 7: AI3 voltage before correction (V)
Bit 8: Linear speed
Bit 9: Current power-on time (h)
Bit 10 Current running time (min)
Bit 11: Pulse input frequency (Hz)
Bit 12: Communication setting value
Bit 13: Encoder feedback speed (Hz)
Bit 14: Main frequency X display (Hz)
Bit 15: Auxiliary frequency Y display (Hz)
Description of parameters:

If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting the binary number to a hexadecimal number, set F7-04 to the hexadecimal number.

1. This parameter defines parameters displayed on the LED operating panel during operation.
2. You can view the parameters corresponding to each bit by pressing the left and right shift keys.
3. When the bit value is 1, the parameter is displayed. When the bit value is 0, the parameter is not displayed.
4. Each parameter is displayed in the hexadecimal.

For example, if you need to display the remaining running time, current power-on time, and main frequency X during operation, set bit 4, bit 9, and bit 14 to 1 (namely, 0100 0010 0001 0000). Convert the binary data to the hexadecimal equivalent 4210 and then set this parameter to 4210.

F7-05 Parameter displayed on LED operating panel at stop

Address:	0xF705	Effective mode:	/
Min.:	0x1	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0x33	Change mode:	Real time

Range:

Bit 0: Frequency reference (Hz)
Bit 1: Bus voltage (V)
Bit 2: DI input state
Bit 3: DO output state
Bit 4: AI1 voltage (V)
Bit 5: AI2 voltage (V)
Bit 6: AI3 voltage (V)
Bit 7: Count value
Bit 8: Length value
Bit 9: PLC stage
Bit 10: Load speed
Bit 11: PID reference
Bit 12: Pulse input frequency (kHz)

Parameter description

If a parameter needs to be displayed when the AC drive stops, set its corresponding bit to 1. After converting the binary number to a hexadecimal number, set F7-05 to the hexadecimal number.
1. This parameter defines the parameters displayed on the LED operating panel at stop.
You can view the parameters corresponding to each bit by pressing the left and right shift keys.
3. When the bit value is 1, parameters are displayed. When the bit value is 0, parameters are not displayed.
4. Each parameter is displayed in the hexadecimal.
For example, if you need to display the DI status, AI3 voltage (V), and pulse input frequency (kHz) at stop, set bit 2, bit 6, and bit 12 to 1 (namely, 0001 0000 0100 0100). Convert the binary data to the hexadecimal equivalent 1044 and then set this parameter to 1044.

F7-06 Load speed display coefficient

Address:	0xF706	Effective mode:	/
Min.:	0.001	Unit:	-
Max.:	65.000	Data type:	UInt16
Default:	1.000	Change mode:	Real time

Range:
0.001 to 65.000
Parameter description
This parameter indicates the ratio between the actual load and motor speed. You can change the load speed display (U0-14) through this coefficient.

F7-07 Inverter module heatsink temperature

Address:	0xF707	Effective mode:	/
Min.:	0	Unit:	℃
Max.:	999	Data type:	Int16
Default:	0	Change mode:	Unchangeable

Range:
0℃ to 999℃
Parameter description
This parameter indicates the temperature of the inverter module heatsink.

F7-08 Product No.

Address:	0xF708	Effective mode:	/

Min.:	0.00	Unit:	-
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.0 to 655.35
Parameter description
This parameter displays the product No. of the drive.

F7-09 **Cumulative running time**

Address:	0xF709	Effective mode:	/
Min.:	0	Unit:	h
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0h to 65535h
Parameter description
This parameter indicates the cumulative operating time of the drive.

F7-10 **Performance software version**

Address:	0xF70A	Effective mode:	/
Min.:	0.00	Unit:	-
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.0 to 655.35
Parameter description
This parameter indicates the performance software version of the drive.

F7-11 **Function software version**

Address:	0xF70B	Effective mode:	/
Min.:	0.00	Unit:	-
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.0 to 655.35

Parameter description

This parameter indicates the function software version of the drive.

F7-12 Number of decimal places for load speed display

Address:	0xF70C	Effective mode:	/
Min.:	10	Unit:	-
Max.:	22	Data type:	UInt16
Default:	20	Change mode:	Real time

Range:

Ones: Number of decimal places for the value of U0-14

0: 0

1: 1

2: 2

Tens: Number of decimal places for the value of U0-19/U0-29

1: 1

2: 2

Parameter description

Set the number of decimal places for U0-14 (Load speed) through the ones place of this parameter. Set the number of decimal places for U0-19 (Feedback speed) or U0-29 (Encoder feedback speed) through the tens place of this parameter.

0: 0

No decimal places are retained.

1: 1

One decimal place is retained.

2: 2

Two decimal places are retained.

F7-13 Cumulative power-on time

Address:	0xF70D	Effective mode:	/
Min.:	0	Unit:	h
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0h to 65535h

Parameter description

This parameter indicates the cumulative power-on time of the drive.

F7-14 **Cumulative power consumption**

Address:	0xF70E	Effective mode:	/
Min.:	0	Unit:	kWh
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 kWh to 65535 kWh
Parameter description
This parameter indicates the cumulative power consumption of the drive.

F7-15 **Temporary performance software version**

Address:	0xF70F	Effective mode:	/
Min.:	0.00	Unit:	-
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.0 to 655.35
Parameter description
This parameter indicates the temporary performance software version.

F7-16 **Temporary function software version**

Address:	0xF710	Effective mode:	/
Min.:	0.00	Unit:	-
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.0 to 655.35
Parameter description
This parameter indicates the temporary function software version.

13.8 F8 Auxiliary Functions

F8-00 **Jog frequency**

Address:	0xF800	Effective mode:	Real time
Min.:	0.00	Unit:	Hz

Max.:	F0-10	Data type:	UInt16
Default:	2.00	Change mode:	Real time

Range:
0.00 Hz to F0-10
Parameter description
This parameter indicates the operating frequency of the drive in the jog mode.

F8-01 Jog acceleration time

Address:	0xF801	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:
0.0 to 6500.0
Parameter description
This parameter defines the acceleration time of the AC drive in the jog mode.

F8-02 Jog deceleration time

Address:	0xF802	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:
0.0 to 6500.0
Parameter description
This parameter defines the deceleration time of the AC drive in the jog mode.

F8-03 Acceleration time 2

Address:	0xF803	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:
0.0s to 6500.0s
Parameter description

The AC drive provides four groups of acceleration time, which can be switched by the DI. This parameter defines the second group of acceleration time.
Note that when the power is equal to or lower than 55 kW, the factory value equals 20s. When the power is higher than 55 kW, the factory value equals 50s.

F8-04 Deceleration time 2

Address:	0xF804	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:
0.0 to 6500.0
Parameter description
The drive provides four groups of deceleration time, which can be switched by the DI. This parameter defines the second group of deceleration time.
Note that when the power is equal to or lower than 55 kW, the factory value equals 20s. When the power is higher than 55 kW, the factory value equals 50s.

F8-05 Acceleration time 3

Address:	0xF805	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:
0.0 to 6500.0
Parameter description
The AC drive provides four groups of acceleration time, which can be switched by the DI. This parameter defines the third group of acceleration time.
Note that when the power is equal to or lower than 55 kW, the factory value equals 20s. When the power is higher than 55 kW, the factory value equals 50s.

F8-06 Deceleration time 3

Address:	0xF806	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16

Default:	20.0	Change mode:	Real time

Range:
0.0 to 6500.0
Parameter description
The drive provides four groups of deceleration time, which can be switched by the DI. This parameter defines the third group of deceleration time.
Note that when the power is equal to or lower than 55 kW, the factory value equals 20s. When the power is higher than 55 kW, the factory value equals 50s.

F8-07 Acceleration time 4

Address:	0xF807	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:
0.0 to 6500.0
Parameter description
The AC drive provides four groups of acceleration time, which can be switched by the DI. This parameter defines the fourth group of acceleration time.
Note that when the power is equal to or lower than 55 kW, the factory value equals 20s. When the power is higher than 55 kW, the factory value equals 50s.

F8-08 Deceleration time 4

Address:	0xF808	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:
0.0 to 6500.0
Parameter description
The drive provides four groups of deceleration time, which can be switched by the DI. This parameter defines the fourth group of deceleration time.
Note that when the power is equal to or lower than 55 kW, the factory value equals 20s. When the power is higher than 55 kW, the factory value equals 50s.

F8-09 **Jump frequency 1**

Address:	0xF809	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00 Hz to F0-10

Parameter description

The jump frequency enables the AC drive to avoid mechanical resonance points of the load. This parameter defines the first jump frequency. If it is set to 0, the first jump frequency function is disabled.

F8-10 **Jump frequency 2**

Address:	0xF80A	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00 Hz to F0-10

Parameter description

The jump frequency enables the AC drive to avoid mechanical resonance points of the load. This parameter defines the second jump frequency. If it is set to 0, the second jump frequency function is canceled.

F8-11 **Jump frequency amplitude**

Address	0xF80B	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.00	Change mode:	Real time:

Range:

0.00 Hz to F0-10

Parameter description

When the running frequency approaches the jump frequency during acceleration, the AC drive runs at the current frequency for a period and then skips over the jump frequency. The jump range is twice the value of F8-11 (jump frequency amplitude).
When the running frequency approaches the jump frequency during deceleration, the AC drive runs at the current frequency for a period and then skips over the jump frequency. The jump range is twice the value of F8-11 (jump frequency amplitude).

F8-12 Dead-zone time of forward/reverse run

Address:	0xF80C	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	3000.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3000.0
Parameter description
This parameter specify the transition period at 0 Hz output during switchover between forward run and reverse run.

F8-13 Reverse running prohibition

Address:	0xF80D	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode	Real time

Range:
0: Reverse run allowed
1: Reverse run prohibited
Parameter description
When F8-13 is set to 1, the motor runs at zero frequency after a reverse running command is input to the AC drive.

F8-14 Running mode when frequency reference < lower limit

Address:	0xF80E	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change mode:	Real time:

Range:
0: Run at frequency lower limit
1: Stop
2: Run at zero speed
Parameter description
0: Run at frequency lower limit
If the running frequency is lower than the frequency lower limit, the AC drive operates at the frequency lower limit.
1: Stop
If the running frequency is lower than the frequency lower limit, the AC drive stops.
2: Run at zero speed
If the running frequency is lower than the frequency lower limit, the AC drive runs at zero speed.

F8-15 Droop control

Address	0xF80F	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	10.00	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:
0.00 Hz to 10.00 Hz
Parameter description
This function is used for balancing the workload allocation when multiple motors are used to drive the same load. Droop control refers to the decrease in the drive output frequency as the load increases. This way, when multiple motors drive the same load, the motors experience a greater decrease in output frequency, which can reduce the load on each motor and achieve an even distribution of load among these motors.

F8-16 Cumulative power-on time threshold

Address:	0xF810	Effective mode:	Real time
Min.:	0	Unit:	h
Max.:	65000	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0h to 65000h

Parameter description

This parameter is used to set the cumulative power-on time threshold of the AC drive. When F7-13 (Cumulative power-on time) exceeds F8-16 (Cumulative power-on time threshold), the DO outputs an active signal.

F8-17 Cumulative running time threshold

Address:	0xF811	Effective mode:	Real time
Min.:	0	Unit:	h
Max.:	65000	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0h to 65000h

Parameter description

This parameter is used to set the cumulative running time threshold of the AC drive. When F7-09 (Cumulative running time) exceeds F8-17 (Cumulative running time threshold), the DO outputs an active signal.

F8-18 Protection upon start

Address:	0xF812	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Disable

1: Enable

Parameter description

The drive is equipped with startup protection to prevent the motor from responding to commands upon unexpected power-on or fault reset.

F8-19 Detection frequency 1

Address:	0xF813	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50.00	Change mode:	Real time

Range:

0.00 Hz to F0-10

Parameter description

When the running frequency is higher than the detection frequency (FDT1), the DO terminal outputs an active signal. When the running frequency is lower than the result of the detection frequency (FDT1) minus the frequency detection hysteresis value (FDT1), the DO terminal outputs an inactive signal. The setting range is from 0.00 Hz to F0-10 (Maximum frequency).

F8-20 Frequency detection hysteresis rate 1

Address:	0xF814	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	5.0	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

The frequency detection hysteresis value (FDT1) is the result of F8-19 multiplied by F8-20. When the running frequency is higher than F8-19, the DO outputs an active signal. When the running frequency is lower than a specific value (F8-19 - F8-19 x F8-20), the DO outputs an inactive signal.

F8-21 Frequency detection amplitude

Address:	0xF815	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0% to 100.0%

Real time

When the running frequency of the AC drive is within the range of Reference frequency ± Maximum frequency (F0-10) x Frequency detection amplitude (F8-21), the DO outputs an active signal.

Note 1: The maximum frequency is used as the base of percentage.

Note 2: The range includes the maximum and minimum values.

F8-22 Jump frequency state during acceleration/deceleration

Address:	0xF816	Effective mode:	Real time
Min.:	0	Unit:	-

Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time:

Range:

0: Invalid

1: Valid

Parameter description

This parameter is used to enable or disable the jump frequency function during acceleration/deceleration.

0: Invalid

During acceleration and deceleration, if the running frequency reaches the jump frequency threshold, the drive continues to run at the running frequency.

1: Valid

During acceleration/deceleration, if the operating frequency reaches the jump frequency threshold, the jump frequency is skipped. The jump amplitude is twice the value of F8-11 (Jump frequency amplitude)

F8-25 Switchover frequency between acceleration time 1 and acceleration time 2

Address	0xF819	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00 Hz to F0-10

Parameter description

This parameter is used to switch the acceleration/deceleration time based on the operating frequency range when the AC drive is running. This function is active only when motor 1 is selected (F0-24 = 0) and the DI terminal is not assigned with function 16 (acceleration/deceleration time selection terminal 1) or 17 (acceleration/deceleration time selection terminal 2). The setting range is from 0.00 Hz to F0-10 (Maximum frequency).

F8-26 Switchover frequency between deceleration time 1 and deceleration time 2

Address	0xF81A	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00 Hz to F0-10

Parameter description

This parameter is used to switch the acceleration/deceleration time based on the operating frequency range when the AC drive is running. This function is active only when motor 1 is selected (F0-24 = 0) and the DI terminal is not assigned with function 16 (acceleration/deceleration time selection terminal 1) or 17 (acceleration/deceleration time selection terminal 2). The setting range is from 0.00 Hz to F0-10 (Maximum frequency).

F8-27 Jog control through terminal with priority

Address:	0xF81B	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Invalid

1: Valid

Parameter description

This parameter determines whether to assign the highest priority to jog by terminal. If F8-27 is set to 1 and any of F4-00 to F4-09 to is set to 4 (forward jog) or 5 (reverse jog), the AC drive enters jog status immediately.

F8-28 Detection frequency 2

Address:	0xF81C	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50.00	Change mode:	Real time

Range:

0.00 Hz to F0-10

Description of parameters:

When the running frequency is higher than the detection frequency (FDT2), the DO terminal outputs an active signal. When the running frequency is lower than the result of the detection frequency (FDT2) minus the frequency detection hysteresis value (FDT2), the DO terminal outputs an inactive signal. The setting range is from 0.00 Hz to F0-10 (Maximum frequency).

F8-29 Frequency detection hysteresis 2

Address:	0xF81D	Effective mode:	Real time

Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	5.0	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

The frequency detection hysteresis value (FDT2) is the result of F8-28 multiplied by F8-29. When the operating frequency is higher than F8-28, the DO outputs an active signal. When the operating frequency is lower than a specific value (F8-28 - F8-28 x F8-29), the DO outputs an inactive signal.

F8-30 Base value 1 of frequency detection

Address:	0xF81E	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50.00	Change mode:	Real time

Range:

0.00 Hz to F0-10

Parameter description

When the running frequency of the AC drive is within the frequency detection range, the DO terminal outputs an active signal. The valid range is from 0.00 Hz to F0-10 (maximum frequency).

F8-31 Frequency detection amplitude 1

Address	0xF81F	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

Frequency detection amplitude value 1 = F0-10 (maximum frequency) x F8-31; Frequency detection range: F8-30 - F8-31 x F0-10 to F8-30 + F8-31 x F0-10

F8-32 Base value 2 of frequency detection

Address:	0xF820	Effective mode:	Real time
Min.:	0.00	Unit:	Hz

Max.:	F0-10	Data type:	UInt16
Default:	50.00	Change mode:	Real time

Range:
0.00 Hz to F0-10
Parameter description
When the running frequency of the AC drive is within the frequency detection range, the DO terminal outputs an active signal. The valid range is from 0.00 Hz to F0-10 (maximum frequency).

F8-33 Frequency detection amplitude 2

Address:	0xF821	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0% to 100.0%
Parameter description
Frequency detection amplitude value 2 = F0-10 (Maximum frequency) x F8-33; Frequency detection range = F8-32 - F8-33 x F0-10 to F8-32 + F8-33 x F0-10

F8-34 Zero current detection level

Address:	0xF822	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data type:	UInt16
Default:	5.0	Change mode:	Real time

Range:
0.0% to 300.0%
Parameter description
The DO outputs an active signal when the output current of the AC drive remains at or below the zero current detection level (F8-34) for a period longer than the value of F8-35 (Zero current detection delay time).

F8-35 Zero current detection delay

Address:	0xF823	Effective mode:	Real time
Min.:	0.01	Unit:	s
Max.:	600.00	Data type:	UInt16

Default:	0.10	Change mode:	Real time

Range:
0.01s to 600.00s
Parameter description
The DO outputs an active signal when the output current of the AC drive remains at or below the zero current detection level (F8-34) for a period longer than the value of F8-35 (Zero current detection delay time).

F8-36 Output current overlimit threshold

Address:	0xF824	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data type:	UInt16
Default:	200.0	Change mode:	Real time:

Range:
0.0% to 300.0%
Parameter description
The parameter is based on the rated current of the drive. When the output current of the drive keeps higher than F8-36 (Output current overlimit threshold) for a period longer than F8-37 (Delay of output current overlimit detection), the DO outputs an active signal.

F8-37 Delay of output current overlimit detection

Address:	0xF825	Effective mode:	Real time
Min.:	0.00	Unit:	s
Max.:	600.00	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:
0.00s to 600.00s
Parameter description
When the output current of the drive keeps higher than F8-36 (Output current overlimit threshold) for a period longer than F8-37 (Delay of output current overlimit detection), the DO outputs an active signal.

F8-38 Base value 1 of current detection

Address:	0xF826	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data type:	UInt16

Default:	100.0	Change mode:	Real time

Range:
0.0% to 300.0%
Parameter description
When the output current of the drive is in the range of F8-38 ± F8-39 x F1-03, the DO outputs an active signal.

F8-39 Current detection amplitude 1

Address:	0xF827	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0% to 300.0%
Parameter description
Current detection amplitude value 1 = F8-39 x F1-03 (rated motor current).

F8-40 Base value 2 of current detection

Address:	0xF828	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data type:	UInt16
Default:	100.0	Change mode:	Real time

Range:
0.0% to 300.0%
Parameter description
When the output current of the drive is in the range of F8-40 ± F8-39 x F1-03, the DO outputs an active signal.

F8-41 Current detection amplitude 2

Address:	0xF829	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	300.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0% to 300.0%

Parameter description

Current detection amplitude value 2 = F8-41 x F1-03 (rated motor current).

F8-42 **Timing function**

Address:	0xF82A	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Disable

1: Enable

Parameter description

When F8-42 is set to 1 and the current running time of the AC drive reaches the set timing duration, the DO outputs an active signal. The timing duration is defined by F8-43 and F8-44.

F8-43 **Timing operation setting source**

Address	0xF82B	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Set by F8-44 (Timing duration)

1: AI1

2: AI2

3: AI3

Parameter description

When this parameter is set to 0, the timing operation time is set by F8-44.

When this parameter is set 1, the timing operation time is equal to the result of AI1 voltage/10 V x F8-44. 100% of the analog input range corresponds to the value of F8-44.

When this parameter is set 2, the timing operation time is equal to the result of AI2 voltage/10 V x F8-44. 100% of the analog input range corresponds to the value of F8-44.

When this parameter is set 3, the timing operation time is equal to the result of AI3 voltage/10 V x F8-44. 100% of the analog input range corresponds to the value of F8-44.

F8-44 Timing operation duration

Address:	0xF82C	Effective mode:	Real time
Min.:	0.0	Unit:	min
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	At stop

Range:

0.0 min to 6500.0 min

Parameter description

The timing operation duration is set by F8-43 and F8-44.

When F8-43 is set to 0, the timing operation duration is set by F8-44.

When F8-43 is set to 1, the timing operation duration is equal to the result of AI1 voltage/10 V x F8-44. 100% of the analog input range corresponds to the value of F8-44.

When F8-43 is set to 2, the timing operation duration is equal to the result of AI2 voltage/10 V x F8-44. 100% of the analog input range corresponds to the value of F8-44.

When F8-43 is set to 3, the timing operation duration is equal to the result of AI3 voltage/10 V x F8-44. 100% of the analog input range corresponds to the value of F8-44.

F8-45 Lower limit of AI1 input voltage protection value

Address:	0xF82D	Effective mode:	Real time
Min.:	0.00	Unit:	V
Max.:	F8-46	Data type:	UInt16
Default:	3.10	Change mode:	Real time

Range:

0.00 V to F8-46

Parameter description

When the AI1 value is higher than F8-46 (Upper limit of AI1 input voltage protection value) or lower than F8-45 (Lower limit of AI1 input voltage protection value), the DO outputs an "AI1 input limit exceeded" active signal to indicate whether the AI1 input voltage is in the setting range.

F8-46 Upper limit of AI1 input voltage protection value

Address:	0xF82E	Effective mode:	Real time
Min.:	F8-45	Unit:	V
Max.:	11.00	Data type:	UInt16
Default:	6.80	Change mode:	Real time

Range:
F8-45 to 11.00 V
Parameter description
When the AI1 value is higher than F8-46 (Upper limit of AI1 input voltage protection value) or lower than F8-45 (Lower limit of AI1 input voltage protection value), the DO outputs an "AI1 input limit exceeded" active signal to indicate whether the AI1 input voltage is in the setting range.

F8-47 Module temperature reach

Address:	0xF82F	Effective mode:	Real time
Min.:	0	Unit:	℃
Max.:	100	Data type:	UInt16
Default:	75	Change mode:	Real time

Range:
0℃ to 100℃
Parameter description
When the heatsink temperature reaches the value of F8-47, the DO outputs an active signal.

F8-48 Cooling fan control

Address:	0xF830	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
0: Keep working during operation of the drive
1: Always working
Parameter description
0: When this parameter is set to 0, the fan works when the AC drive is running. When the AC drive stops, the fan works if the heatsink temperature is higher than 40℃ and stops if the heatsink temperature is lower than 40℃.
1: When this parameter is set to 1, the fan keeps working after power-on.

F8-49 Wakeup frequency

Address:	0xF831	Effective mode:	Real time
Min.:	F8-51	Unit:	Hz
Max.:	F0-10	Data type:	UInt16

Default:	0.00	Change mode:	Real time

Range:
F8-51 to F0-10
Parameter description
In the hibernation state, when the current running command is valid and the frequency reference is equal to or larger than F8-49 (Wakeup frequency) for the time longer than the value of F8-50 (Wakeup delay), the drive starts directly.

F8-50 Wakeup delay

Address:	0xF832	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 6500.0
Parameter description
In the hibernation state, when the current running command is valid and the frequency reference is equal to or larger than F8-49 (Wakeup frequency) for the time longer than the value of F8-50 (Wakeup delay), the drive starts directly.

F8-51 Hibernation frequency

Address:	0xF833	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	F8-49	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:
0.00 Hz to F8-49
Parameter description
During AC drive running, when the frequency reference keeps lower than F8-51 (Hibernation frequency) for the time longer than the value of F8-52 (Hibernation delay), the AC drive enters the hibernation state and coasts to stop.

F8-52 Hibernation delay

Address:	0xF834	Effective mode:	Real time

Min.:	0.0	Unit:	s
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 6500.0
Parameter description
During AC drive running, when the frequency reference keeps lower than F8-51 (Hibernation frequency) for the time longer than the value of F8-52 (Hibernation delay), the AC drive enters the hibernation state and coasts to stop.

F8-53 Current running duration threshold

Address:	0xF835	Effective mode:	Real time
Min.:	0.0	Unit:	min
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	At stop

Range:
0.0 min to 6500.0 min
Parameter description
When the current running time reaches the value of F8-53, the DO outputs an active signal. This parameter is valid only for current operation. The previous operating time is not accumulated.

F8-54 Output power correction coefficient

Address:	0xF836	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	200.0	Data type:	UInt16
Default:	100.0	Change mode:	Real time

Range:
0.0% to 200.0%
Parameter description
When the output power (U0-05) is not equal to the expected value, perform linear correction on the output power through this value.

F8-55 Deceleration time for emergency stop

Address:	0xF837	Effective mode:	Real time
Min.:	0.0	Unit:	s

Max.:	6553.5	Data type:	UInt16
Default:	5.0	Change mode:	Real time

Range:
0.0s to 6553.5s
Parameter description
This parameter defines the deceleration time for emergency stop.

13.9 F9 Fault and Protection Parameters

F9-00 Motor overload protection selection

Address:	0xF900	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change mode:	Real time

Range:
0: Disable
1: Enable
Parameter description
This parameter defines whether to enable the motor overload protection function. The drive determines whether the motor is overloaded according to the inverse time lag curve. When motor overload is detected, the AC drive will report an overload fault.
0: Disable
Motor overload protection is disabled. If this parameter is set to 0, it is recommended to install a thermal relay before the motor for protection.
1: Enable
Motor overload protection is enabled. The AC drive judges whether the motor is overloaded according to the inverse time lag curve of the motor overload protection.

F9-01 Motor overload protection gain

Address:	0xF901	Effective mode:	/
Min.:	0.20	Unit:	-
Max.:	10.00	Data type:	UInt16
Default:	1.00	Change mode:	Real time

Range:
0.20 to 10.00

Parameter description

The motor overload protection gain is calculated according to the percentage of time during which the motor runs continuously at a certain overload threshold without reporting an overload fault. It is used to adjust the actual overload fault report time of the AC drive when motor overload occurs.

Example:

Assume that the rated motor current is 100 A and F9-01 is set to 1.00. According to the motor overload protection inverse time curve, if the operating current reaches 125 A (125% of 100 A) and the motor runs at this level for 40 minutes, the drive reports a motor overload alarm (Err11).

Assume that the rated motor current is 100 A and F9-01 is set to 1.20. If the running current reaches 125 A (125% of 100 A) and the motor runs at this level for 48 minutes (40 x 1.2), the AC drive reports a motor overload alarm (Err11).

Note: Set F9-01 properly based on the actual overload capacity. An excessively high setpoint may result in motor damage when the motor is overheated but the drive does not report the alarm timely.

F9-02 Motor overload warning coefficient

Address	0xF902	Effective mode:	/
Min.:	50	Unit:	%
Max.:	100	Data type:	UInt16
Default:	80	Change mode:	Real time

Range:

50% to 100%

Parameter description

The motor overload warning coefficient is calculated according to the percentage of time during which the motor runs continuously at a certain overload threshold without reporting overload warning. A warning signal is sent to the control system through the DO before motor overload protection. This signal is used to determine how long in advance to send the warning signal before the motor overload protection applies. The larger the coefficient is, the later the warning signal is sent. When the cumulative output current of the AC drive exceeds the product of the overload time (Y value of motor overload protection inverse time lag curve) multiplied by F9-02 (motor overload warning coefficient), the DO outputs a motor overload warning signal.

Example:

On the condition that the motor overload protection gain is set to 1.00 and motor overload warning coefficient is set to 80%, when the motor running current reaches 145% of the rated motor current and the motor runs at this level for 4.8 min (80% x 6), the DO or fault relay outputs the motor overload warning signal.
When F9-02 is set to 100%, the motor overload warning and the motor overload protection are performed simultaneously.

F9-07 Protection against short circuit to ground

Address:	0xF907	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16
Default:	1	Change mode:	Real time

Range:
Ones: Protection against short circuit to ground upon power-on
0: Inactive
1: Active
Tens: Protection against short circuit to ground before operation
0: Inactive
1: Active
Parameter description
-

F9-08 Start voltage for braking unit action

Address	0xF908	Effective mode:	/
Min.:	650.0	Unit:	V
Max.:	800.0	Data type:	UInt16
Default:	760.0	Change mode:	Real time

Range:
650.0 V to 800.0 V
Parameter description
This parameter is used to adjust the energy consumption efficiency of the braking resistor. When the motor is in the power generation state, the DC bus voltage of the drive rises. In this case, the braking unit can be used to control the voltage of the DC bus to consume the regenerative energy generated by the motor through the braking resistor or feed back the regenerative energy to the power supply.

Application scenario:
In the V/f control mode, if the actual deceleration time of the motor is far longer than the set deceleration time, the motor decelerates too slowly. To enable the motor to decelerate quickly by enhancing the energy consumption of the braking resistor, you can set F9-08 to 690 V if the following conditions are met: The AC drive is equipped with a braking resistor or an energy feedback unit; The input voltage of the AC drive is 360 V to 420 V.

F9-09 Number of automatic fault resets

Address:	0xF909	Effective mode:	/
Min.:	0	Unit:	-
Max.:	20	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-20
Parameter description
This parameter defines the maximum number of automatic fault reset times of the AC drive. If the number of automatic fault resets exceeds this setpoint, the drive remains in the faulty state.
Note: The undervoltage fault (Err09) is reset automatically when the bus voltage recovers to the normal value, and the number of this fault reset is not counted as the number of automatic fault resets.

F9-10 DO action during automatic fault reset

Address:	0xF90A	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0: Disable
1: Enable
Parameter description
This parameter is used to determine whether the fault output function of the DO terminal takes effect during automatic fault reset of the drive. The fault output function of the DO is defined by setting F5-04 to 2.

F9-11 Time interval between automatic fault reset

Address:	0xF90B	Effective mode:	/

Min.:	0.1	Unit:	s
Max.:	100.0	Data type:	UInt16
Default:	1.0	Change mode:	Real time

Range:

0.1 to 100.0

Parameter description

This parameter sets the duration from the time when the drive reports a fault to the time when automatic fault reset is performed.

F9-12 Input phase loss/Contactor close protection

Address	0xF90C	Effective mode:	/
Min.:	0	Unit:	-
Max.:	13	Data type:	UInt16
Default:	11	Change mode:	Real time

Range:

Ones: Input phase loss protection

0: Disabled

1: Protection enabled when both software and hardware input phase loss conditions are met

2: Protection enabled when software input phase loss conditions are met

3: Protection enabled when hardware input phase loss conditions are met

Tens: Contactor close protection

0: Disabled

1: Enabled

Parameter description

This parameter defines whether to perform input phase loss or contactor close protection through the ones and tens places.

After the input phase loss protection function is enabled, if the three-phase input power supply, driver board, lightning protection board, main control board, or rectifier bridge is abnormal, the drive will report Err12 (input phase loss).

For models of 450 kW and below, the tens place is used to set the contactor close protection function. For models of 500 kW and above, the tens place is used to set the fan fault selection.

F9-13 Output phase loss protection

Address:	0xF90D	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16

Default:	1	Change mode:	Real time

Range:

Ones: Output phase loss protection

0: Disabled

1: Enabled

Tens: Output phase loss protection before running

0: Disabled

1: Enabled

Parameter description

Ones: It is used to determine whether to perform output phase loss protection. If the ones place of F9-13 is set to 0, the output phase loss will not be reported when it occurs. In this case, the actual current is larger than the current displayed on the operating panel. Use this function cautiously.

Tens: It takes about several seconds to detect output phase loss before operation. In low-frequency operations or applications where risks exist in start with phase loss, this function can be used to detect phase output loss fault upon start. However, in applications where short start time is required, do not use this function.

F9-14 Type of the 1st fault

Address:	0xF90E	Effective mode:	/
Min.:	0	Unit:	-
Max.:	99	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0: No fault
1: Reserved
2: Overcurrent during acceleration
3: Overcurrent during deceleration 4: Overcurrent during operation at constant speed
5: Overvoltage during acceleration
6: Overcurrent during deceleration
7: Overvoltage during operation at constant speed
8: Pre-charge resistor overload
9: Undervoltage
10: Drive overload
11: Motor overload
12: Input phase loss
13: Output phase loss
14: Module overheat
15: External fault
16: Communication error
17: Contactor error
18: Current detection error
19: Motor parameter auto-tuning error
20: Reserved
21: Parameter read/write error
22: Drive hardware error
23: Motor short circuit to ground
24: Reserved
25: Reserved
26: Running time reached
27: User-defined fault 1
28: User-defined fault 2
29: Power-on time reached
30: Load loss
31: PID feedback loss during operation
40: Fast current limit timeout
41: Motor switchover during operation
42: Reserved
43: Reserved
45: Motor overheat
55: Slave error in master/slave control mode

Description

This parameter records the fault code of the first fault of the drive. The host controller reads the communication address to obtain the fault code of the AC drive and triggers the AC drive to report the fault.

Note 1: The fault code can be viewed through the operating panel.
Note 2: For the meaning of the fault code, see the troubleshooting section in this product manual.

F9-15 Type of the 2nd fault

Address:	0xF90F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	99	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
Same as F9-14.
Parameter description
Same as F9-14.

F9-16 Type of the 3rd (latest) fault

Address:	0xF910	Effective mode:	/
Min.:	0	Unit:	-
Max.:	99	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
Same as F9-14.
Parameter description
Same as F9-14.

F9-17 Frequency upon 3rd (latest) fault

Address:	0xF911	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.00 Hz to 655.35 Hz
Parameter description
This parameter indicates the frequency of the drive upon the latest fault.

F9-18 Current upon the 3rd (latest) fault

Address:	0xF912	Effective mode:	/

Min.:	0.00	Unit:	A
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.00 A to 655.35 A
Parameter description
This parameter indicates the current of the AC drive upon the latest fault. Note that when the power is lower than or equal to 55 kW, the decimal place is 0.01. When the power is higher than 55 kW, the decimal place is 0.1.

F9-19 Bus voltage upon the 3rd (latest) fault

Address:	0xF913	Effective mode:	/
Min.:	0.0	Unit:	V
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:
0.0 V to 6553.5 V
Parameter description
This parameter indicates the bus voltage of the drive upon the latest fault.

F9-20 Input terminal state upon the 3rd (latest) fault

Address:	0xF914	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
This parameter indicates the DI state of the drive upon the latest fault.

F9-21 Output terminal state upon the 3rd (latest) fault

Address:	0xF915	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter indicates the DO state of the drive upon the latest fault.

F9-22 Drive state upon the 3rd (latest) fault

Address	0xF916	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter indicates the state of the AC drive upon the latest fault.

Bit 0: Running flag

Bit 1: Normal operation

Bit 2: Jog

Bit 3: Parameter auto-tuning

Bit 4: Jog during motion

Bit 5 and bit 6: Acceleration/Deceleration state. 00: Constant speed; 01: Acceleration; 10: Deceleration

Bit 7: PLC operation

Bit 8: PID operation

Bit 9: Torque control

Bit 10: Frequency reference direction (before the setting of F0-09)

Bit 11: Current running frequency direction. 0: Forward; 1: Reverse

Bit 12: Current reverse flag

Bit 13: Frequency reference direction (after the setting of F0-09)

Bit 14 and bit 15: Motor acceleration/deceleration state 00: Constant speed; 01: Acceleration; 10: Deceleration

F9-23 Power-on time upon the 3rd (latest) fault

Address:	0xF917	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter indicates the power-on time of the drive upon the latest fault.

F9-24 **Running duration upon the 3rd (latest) fault**

Address:	0xF918	Effective mode:	/
Min.:	0.0	Unit:	-
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:

0.0 to 6553.5

Parameter description

This parameter indicates the operating time of the drive upon the latest fault.

F9-27 **Frequency upon the 2nd fault**

Address:	0xF91B	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:

0.00 Hz to 655.35 Hz

Parameter description

This parameter indicates the frequency of the drive upon the second fault.

F9-28 **Current upon the 2nd fault**

Address:	0xF91C	Effective mode:	/
Min.:	0.00	Unit:	A
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:

0.00 A to 655.35 A

Parameter description

This parameter indicates the current of the drive upon the second fault.

F9-29 **Bus voltage upon the 2nd fault**

Address:	0xF91D	Effective mode:	/
Min.:	0.0	Unit:	V
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:
0.0 V to 6553.5 V
Parameter description
This parameter indicates the bus voltage of the drive upon the second fault.

F9-30 Input terminal state upon the 2nd fault

Address:	0xF91E	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
This parameter indicates the DI state of the drive upon the second fault.

F9-31 Output terminal state upon the 2nd fault

Address:	0xF91F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
This parameter indicates the DO state of the drive upon the second fault.

F9-32 Drive state upon the 2nd fault

Address	0xF920	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535

Parameter description

This parameter indicates the state of the drive upon the second fault.

Bit 0: Operation flag

Bit 1: Normal operation

Bit 2: Jog

Bit 3: Parameter auto-tuning

Bit 4: Jog during operation

Bit 5 and bit 6: Acceleration/Deceleration state 00: Constant speed; 01: Acceleration; 10: Deceleration

Bit 7: PLC operation

Bit 8: PID operation

Bit 9: Torque control

Bit 10: Frequency reference direction (before the setting of F0-09)

Bit 11: Current running frequency direction. 0: Forward; 1: Reverse

Bit 12: Current reverse direction flag

Bit 13: Frequency reference direction (after the setting of F0-09)

Bit 14 and bit 15: Motor acceleration/deceleration state 00: Constant speed; 01: Acceleration; 10: Deceleration

F9-33 Power-on time upon the 2nd fault

Address:	0xF921	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter indicates the power-on time of the drive upon the second fault.

F9-34 Running time upon the 2nd fault

Address:	0xF922	Effective mode:	/
Min.:	0.0	Unit:	-
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:

0.0 to 6553.5

Parameter description

This parameter indicates the operating time of the drive upon the second fault.

F9-37 Frequency upon the 1st fault

Address:	0xF925	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:

0.00 Hz to 655.35 Hz

Parameter description

This parameter indicates the frequency of the drive upon the first fault.

F9-38 Current upon the 1st fault

Address:	0xF926	Effective mode:	/
Min.:	0.00	Unit:	A
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:

0.00 A to 655.35 A

Parameter description

This parameter indicates the current of the drive upon the first fault.

F9-39 Bus voltage upon the 1st fault

Address:	0xF927	Effective mode:	/
Min.:	0.0	Unit:	V
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:

0.0 V to 6553.5 V

Parameter description

This parameter indicates the bus voltage of the drive upon the first fault.

F9-40 Input terminal state upon the 1st fault

Address:	0xF928	Effective mode:	/

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
This parameter indicates the DI state of the drive upon the first fault.

F9-41 **Output terminal state upon the 1st fault**

Address:	0xF929	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
This parameter indicates the DO state of the AC drive upon the first fault.

F9-42 **Drive state upon the 1st fault**

Address	0xF92A	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535

Parameter description

This parameter indicates the state of the drive upon the first fault.

Bit 0: Operation flag

Bit 1: Normal operation

Bit 2: Jog

Bit 3: Parameter auto-tuning

Bit 4: Jog during operation

Bit 5 and bit 6: Acceleration/Deceleration state 00: Constant speed; 01: Acceleration; 10: Deceleration

Bit 7: PLC operation

Bit 8: PID operation

Bit 9: Torque control

Bit 10: Frequency reference direction (before the setting of F0-09)

Bit 11: Current running frequency direction. 0: Forward; 1: Reverse

Bit 12: Current reverse direction flag

Bit 13: Frequency reference direction (after the setting of F0-09)

Bit 14 and bit 15: Motor acceleration/deceleration state 00: Constant speed; 01: Acceleration; 10: Deceleration

F9-43 Power-on time upon the 1st fault

Address:	0xF92B	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter indicates the power-on time of the AC drive upon the first fault.

F9-44 Running time upon the 1st fault

Address:	0xF92C	Effective mode:	/
Min.:	0.0	Unit:	-
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:

0.0 to 6553.5

Parameter description

This parameter indicates the operation time of the AC drive upon the first fault.

F9-47 Fault protection action selection 1

Address	0xF92F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	22222	Data type:	UInt16
Default:	0	Change mode:	Real time:

Range:

Ones: Motor overload (Err11)
0: Coast to stop
1: Stop according to the stop mode
2: Continue to run
Tens: Input phase loss (Err12)
0: Coast to stop
1: Stop according to the stop mode
2: Continue to run
Hundreds: Output phase loss (Err13)
0: Coast to stop
1: Stop according to the stop mode
2: Continue to run
Thousands: External fault (Err15)
0: Coast to Stop
1: Stop according to the stop mode
2: Continue to run
Ten thousands: Communication error (Err16)
0: Coast to Stop
1: Stop according to the stop mode
2: Continue to run

Parameter description

The protective actions are set through the ones, tens, hundreds, thousands, and ten thousands places of this parameter.
0: Coast to stop
The AC drive coasts to stop.
1: Stop according to the stop mode
The drive stops according to the specified stop mode.
2: Continue to run
The AC drive continues to run.

F9-48 Fault protection action selection 2

Address	0xF930	Effective mode:	/
Min.:	0	Unit:	-
Max.:	22110	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

Ones: Reserved

Tens: Parameter read/write error (Err21)

0: Coast to stop

1: Stop according to the stop mode

Hundreds: Action upon drive overload fault (Err10)

0: Coast to stop

1: Derated operation

Thousands: Motor overheat (Err25)

0: Coast to stop

1: Stop according to the stop mode

Ten thousands: Running time reached (Err26)

0: Coast to stop

1: Stop according to the stop mode

Parameter description

The protective actions are set through the ones, tens, hundreds, thousands, and ten thousands places of this parameter.

0: Coast to stop

The AC drive coasts to stop.

1: Stop according to the stop mode

The drive stops according to the specified stop mode.

2: Continue to run

The AC drive continues to run.

The hundreds place is used to select the action when a drive overload fault occurs. When this parameter is set to 0, the AC drive will report a fault upon overload and the output will be blocked. When this parameter is set to 1, in case that the drive is about to be overloaded, the AC drive automatically lowers down the output current to about the rated current. This can avoid overload; however, the running speed may be reduced or block may occur. For lifting loads, set this parameter to 0.

F9-49 Fault protection action selection 3

Address:	0xF931	Effective mode:	/
Min.:	0	Unit:	-
Max.:	22222	Data type:	UInt16

Default:	0	Change mode:	Real time

Range:

Ones: User-defined fault 1 (Err27)

0: Coast to stop

1: Stop according to the stop mode

2: Continue to run

Tens: User-defined fault 2 (Err28)

0: Coast to stop

1: Stop according to the stop mode

2: Continue to run

Hundreds: Power-on time reach (Err29)

0: Coast to stop

1: Stop according to the stop mode

2: Continue to run

Thousands: Load loss (Err30)

0: Coast to stop

1: Decelerate to stop

2: Continue to run at 7% of the rated motor frequency and resume to the frequency reference if the load recovers

Ten thousands: PID feedback loss during operation (Err31)

0: Coast to stop

1: Stop according to the stop mode

2: Continue to run

Parameter description

The protective actions are set through the ones, tens, hundreds, thousands, and ten thousands places of this parameter.

0: Coast to stop

The AC drive coasts to stop.

1: Stop according to the stop mode

The drive stops according to the specified stop mode.

2: Continue to run

The AC drive continues to run.

The hundreds place is used to select the action when a drive overload fault occurs. When this parameter is set to 0, the AC drive will report a fault upon overload and the output will be blocked. When this parameter is set to 1, in case that the drive is about to be overloaded, the AC drive automatically lowers down the output current to about the rated current. This can avoid overload; however, the running speed may be reduced or block may occur. For lifting loads, set this parameter to 0.

F9-50 Fault protection action selection 4

Address:	0xF932	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	22222	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

Ones: Excessive speed deviation (Err42)

0: Coast to stop

1: Stop according to the stop mode

2: Continue to run

Tens: Motor overspeed (Err43)

0: Coast to stop

1: Stop according to the stop mode

2: Continue to run

Hundreds: Incorrect initial position (Err51)

0: Coast to stop

1: Stop according to the stop mode

2: Continue to run

Parameter description

The protective actions are set through the ones, tens, and hundreds places of this parameter.

0: Coast to stop

The AC drive coasts to stop.

1: Stop according to the stop mode

The drive stops according to the specified stop mode.

2: Continue to run

The AC drive continues to run.

F9-54 Frequency for continuing operation upon fault

Address:	0xF936	Effective mode:	/
Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Current running frequency

1: Frequency reference

2: Frequency upper limit

3: Frequency lower limit

4: Backup frequency upon fault

Parameter description

This parameter is used to select the frequency at which the drive continues operation upon a fault. If a fault occurs during the running of the AC drive and the fault protection action is set to "Continue to run", the AC drive displays A** and continues to run at the frequency set by F9-54.

F9-55 Backup frequency upon fault

Address:	0xF937	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	100.0	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

This parameter defines the backup frequency of the drive upon a fault. If a fault occurs during the operation of the drive and the fault protection action is set to "Operating at backup frequency" (F9-54 = 4), the drive displays A** and continues to operate at the backup frequency.

F9-56 Motor temperature sensor type

Address:	0xF938	Effective mode:	/
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: No sensor

1: PT100

2: PT1000

Parameter description

A motor temperature sensor needs to be connected to the AI3 and PGND terminals on the MD38IO1 expansion card.

The AC drive supports PT100 and PT1000 motor temperature sensors. Set the sensor type properly.

Set the DIP switch on the MD38IO1 expansion card. For details, see section MD38IO1 expansion card in the AC drive expansion card selection guide.

You can view the motor temperature in U0-34.

F9-57 Motor overtemperature protection threshold

Address:	0xF939	Effective mode:	/
Min.:	0	Unit:	℃
Max.:	200	Data type:	UInt16
Default:	110	Change mode:	Real time

Range:

0℃ to 200℃

Parameter description

This parameter is used to set the motor overtemperature protection threshold. When the motor temperature exceeds the value of F9-57 (Motor overheat protection threshold), the AC drive reports a motor overheat fault (Err45) and acts as selected by F9-48.

F9-58 Motor overtemperature warning threshold

Address:	0xF93A	Effective mode:	/
Min.:	0	Unit:	℃
Max.:	200	Data type:	UInt16
Default:	90	Change mode:	Real time

Range:

0℃ to 200℃

Parameter description

This parameter defines the motor overtemperature warning threshold. When the motor temperature exceeds the value of F9-58 (Motor overtemperature warning threshold), the DO terminal allocated with function 39 (Motor overheat) outputs an active signal.

F9-59 Power dip ride-through

Address	0xF93B	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Disabled

1: Bus voltage constant control

2: Decelerate to stop

3: Voltage dip suppression

Parameter description

The function enables the AC drive to keep running upon an instantaneous power failure. When an instantaneous power failure occurs, the drive keeps the motor in the generating state to keep the bus voltage at a value around the threshold for enabling power dip ride-through. This prevents the drive from stopping due to undervoltage.
0: Disabled
The power dip ride-through function is disabled.
1: Decelerate
When power failure occurs, the bus voltage stays at a value around the "voltage threshold for enabling power dip ride-through". In this mode, when the power grid recovers from the failure, the AC drive restores the output frequency to the target output frequency based on the acceleration time.
2: Decelerate to stop
When power failure occurs, the AC drive decelerates to stop. In this mode, when the power grid recovers from the failure, the AC drive decelerates to 0 Hz and stops, and will start only after receiving a start command.
"Bus voltage constant control" is applicable to large-inertia applications such as fan, water pump and centrifuge. "Decelerate to stop" is applicable to the textile industry.
3: Voltage dip suppression
In this mode, the AC drive will not stop upon undervoltage caused by voltage dip. The voltage dip suppression time is set by F9-74.

F9-60 **Threshold for recovery from power dip ride-through**

Address	0xF93C	Effective mode:	/
Min.:	80	Unit:	%
Max.:	100	Data type:	UInt16
Default:	85	Change mode:	At stop

Range:
80% to 100%
Parameter description
This parameter defines the voltage threshold for recovery from power dip ride-through. The value 100% corresponds to 540 V. This value is slightly lower than the bus voltage before power failure.
Upon a power failure, the bus voltage is maintained at about F9-62 (threshold for enabling power dip ride-through). When the power supply recovers, the bus voltage rises from F9-62 (threshold for enabling power dip ride-through) to F9-60 (threshold for recovery from power dip ride-through). During this period, the output frequency of the AC drive keeps decreasing until the bus voltage reaches F9-60 (threshold for recovery from power dip ride-through).

F9-61 **Duration for judging voltage recovery from power dip ride-through**

Address:	0xF93D	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	100.0	Data type:	UInt16
Default:	0.5	Change mode:	At stop

Range:

0.0 to 100.0

Parameter description

This parameter is used to set the time required for the bus voltage to rise from F9-60 (Threshold for recovery from power dip ride-through) to the voltage before a power failure.

F9-62 **Threshold for enabling power dip ride-through**

Address:	0xF93E	Effective mode:	/
Min.:	60	Unit:	%
Max.:	100	Data type:	UInt16
Default:	80	Change mode:	At stop

Range:

60% to 100%

Parameter description

This parameter defines the bus voltage level upon power failure. When a power failure occurs, the bus voltage is kept at a value around F9-62 (Threshold for enabling power dip ride-through).

F9-63 **Protection against load loss**

Address:	0xF93F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Invalid

1: Valid

Parameter description

When the output current of the drive keeps lower than F9-64 (Load loss detection level) for a period longer than the time set by F9-65 (Load loss detection time), the drive performs load loss protection action (coast-to-stop by default, as defined by F9-49).
Once the load recovers during load loss protection, the drive operates at the set frequency again.

F9-64 Load loss detection level

Address:	0xF940	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	10.0	Change mode:	Real time

Range:
0.0% to 100.0%
Parameter description
When the output current of the drive keeps lower than F9-64 (Load loss detection level) for a period longer than the time set by F9-65 (Load loss detection time), the drive performs load loss protection action (coast-to-stop by default, as defined by F9-49).
Once the load recovers during load loss protection, the drive operates at the set frequency again.

F9-65 Load loss detection time

Address:	0xF941	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	60.0	Data type:	UInt16
Default:	1.0	Change mode:	Real time

Range:
0.0 to 60.0
Parameter description
When the output current of the drive keeps lower than F9-64 (Load loss detection level) for a period longer than the time set by F9-65 (Load loss detection time), the drive performs load loss protection action (coast-to-stop by default, as defined by F9-49).
Once the load recovers during load loss protection, the drive operates at the set frequency again.

F9-71 Power dip ride-through gain Kp

Address:	0xF947	Effective mode:	/
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	40	Change mode:	Real time

Range:

0-100

Parameter description

This parameter is valid only in the constant control of the bus voltage (F9-59 = 1).

If undervoltage is likely to occur during power dip ride-through, increase the power dip ride-through gain and the power dip ride-through integral coefficient.

F9-72 Integral coefficient Ki of power dip ride-through

Address:	0xF948	Effective mode:	/
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	30	Change mode:	Real time

Range:

0-100

Parameter description

This parameter is valid only in the constant control of the bus voltage (F9-59 = 1).

If undervoltage is likely to occur during power dip ride-through, increase the power dip ride-through gain and the power dip ride-through integral coefficient.

F9-73 Deceleration time of power dip ride-through

Address:	0xF949	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	300.0	Data type:	UInt16
Default:	20.0	Change mode:	At stop

Range:

0.0s to 300.0s

Parameter description

This parameter is active only when F9-59 (Power dip ride-through) is set to 2 (Decelerate to stop).
When the bus voltage is lower than the value of F9-62, the AC drive decelerates to stop. The deceleration time is determined by this parameter instead of F0-18.

F9-74 Voltage dip suppression time

Address:	0xF94A	Effective mode:	/
Min.:	0.1	Unit:	s
Max.:	600.0	Data type:	UInt16
Default:	0.5	Change mode:	At stop

Range:
0.1s to 600.0s
Parameter description
-

13.10FA PID Function

FA-00 PID reference source

Address	0xFA00	Effective mode:	/
Min.:	0	Unit:	-
Max.:	6	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0: FA-01
1: AI1
2: AI2
3: AI3
4: Pulse reference (DI5)
5: Communication setting
6: Multi-reference
Parameter description
This parameter indicates the reference channel of the PID target value. The PID reference is a relative value. The value 100% corresponds to 100% of the feedback signal of the controlled system.
0: FA-01
The PID reference source is set by FA-01 (PID reference value).
1: AI1
The PID reference source is the AI1.

2: AI2
The PID reference source is the AI2.
3: AI3
The PID reference source is the AI3.
4: Pulse reference (DI5)
The PID reference is set by the pulse frequency through the DI5. The frequency is calculated according to the corresponding relationship curve between the pulse frequency and running frequency.
5: Communication setting
The PID reference is set by remote communication.
6: Multi-reference
In the multi-reference mode, different combinations of DI states correspond to different frequency references. The four multi-reference terminals have 16 state combinations, corresponding to 16 target frequency values. Note: When FA-00 is set to 6 (Multi-reference), FC-51 (Multi-reference 0 source) cannot be set to 5 (PID).

FA-01 PID reference

Address:	0xFA01	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	50.0	Change mode:	Real time

Range:
0.0% to 100.0%
Parameter description
When FA-00 (PID reference source) is set to 0, this parameter must be set. When the parameter is set to 100%, it corresponds to the maximum value of the feedback.

FA-02 PID feedback source

Address:	0xFA02	Effective mode:	/
Min.:	0	Unit:	-
Max.:	8	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: AI1
1: AI2
2: AI3
3: AI1 – AI2
4: Pulse reference (DI5)
5: Communication setting
6: AI1 + AI2
7: Max. (|AI1|, |AI2|)
8: Min. (|AI1|, |AI2|)

Parameter description

This parameter is used to select the PID feedback channel.

FA-03 PID action direction

Address:	0xFA03	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Positive
1: Negative

Parameter description

0: Positive
When the feedback signal value is lower than the PID reference signal value, the output frequency of the AC drive rises.
1: Negative
When the feedback signal value is lower than the PID reference signal value, the output frequency of the AC drive declines.

FA-04 PID reference feedback range

Address:	0xFA04	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	1000	Change mode:	Real time

Range:

0 to 65535

Parameter description

This parameter is used for display of the PID reference and feedback, which are dimensionless. For example, if this parameter is set to 1000, the PID reference (0% to 100%) corresponds to the feedback value (0 to 1000) linearly.

FA-05 **Proportional gain Kp1**

Address:	0xFA05	Effective mode:	/
Min.:	0.0	Unit:	-
Max.:	1000.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:
0.0 to 1000.0
Parameter description
This parameter indicates the proportional gain Kp in PID control. The deviation reduction speed depends on the proportional coefficient Kp. A larger Kp value indicates faster deviation reduction but higher possibility of oscillation. A smaller Kp value indicates lower possibility of oscillation but slower deviation reduction.

FA-06 **Integral time Ti1**

Address:	0xFA06	Effective mode:	/
Min.:	0.01	Unit:	s
Max.:	10.00	Data type:	UInt16
Default:	2.00	Change mode:	Real time

Range:
0.01s to 10.00s
Parameter description
This parameter defines the integral time Ti in PID control. The parameter value determines the integral adjustment intensity of the PID regulator. The shorter the integral time, the greater the regulation intensity.

FA-07 **Differential time Td1**

Address:	0xFA07	Effective mode:	/
Min.:	0.000	Unit:	s
Max.:	10.000	Data type:	UInt16
Default:	0.000	Change mode:	Real time

Range:
0.000s to 10.000s
Parameter description
This parameter defines the differential time Td in PID control. Its value determines the regulation intensity of the PID regulator on the deviation change. The longer the differential time, the greater the regulation intensity.

FA-08 **Reverse action cutoff frequency for PID control**

Address:	0xFA08	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00 Hz to F0-10

Parameter description

When the frequency source is only the PID, the PID reverse cutoff frequency is the minimum value of the current PID output. When the frequency source is main frequency + PID, the setting of FA-08 is valid. The minimum frequency after "main frequency + PID" operation is output.

FA-09 **PID deviation limit**

Address:	0xFA09	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

When the deviation is within the PID deviation limit, no adjustment is required. This parameter is used to ensure the accuracy and stability of the system output.

FA-10 **PID differential limit**

Address:	0xFA0A	Effective mode:	/
Min.:	0.00	Unit:	%
Max.:	100.00	Data type:	UInt16
Default:	0.10	Change mode:	Real time

Range:

0.00% to 100.00%

Parameter description

This parameter is used to set the PID differential output range. In PID control, the differential operation may easily cause system oscillation. Therefore, the PID differential output is restricted to a specific range.

FA-11 **PID reference change time**

Address:	0xFA0B	Effective mode:	/
Min.:	0.00	Unit:	s
Max.:	650.00	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00s to 650.00s

Parameter description

This parameter defines the time required for the PID reference to change from 0.0% to 100.0%.

FA-12 **PID feedback filter time**

Address	0xFA0C	Effective mode:	/
Min.:	0.00	Unit:	s
Max.:	60.00	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00s to 60.00s

Parameter description

If the PID feedback fluctuates greatly, filter the PID feedback. Increase the value of this parameter to improve the PID feedback filter performance. After filtering, the PID feedback fluctuation becomes smooth. The filtering helps to reduce the impact of interference on the feedback. If the filter time is too long, the response performance of the process closed-loop system will be degraded. However, if the filter time is too short, the fluctuation cannot be suppressed. Therefore, it is recommended to increase the filter time gradually until the fluctuation suppression effect is too strong.

FA-13 **PID output filter time**

Address:	0xFA0D	Effective mode:	/
Min.:	0.00	Unit:	s
Max.:	60.00	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00s to 60.00s

Parameter description

If the PID output fluctuates significantly, you need to filter the PID output to smooth the output. If the filter time is too long, the response performance of the process closed-loop system will be degraded. However, if the filter time is too short, the fluctuation cannot be suppressed. Therefore, it is recommended to increase the filter time gradually until the fluctuation suppression effect is too strong.

FA-15 Proportional gain Kp2

Address:	0xFA0F	Effective mode:	/
Min.:	0.0	Unit:	-
Max.:	1000.0	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:

0.0 to 1000.0

Parameter description

This parameter indicates the proportional gain Kp in PID control. The deviation reduction speed depends on the proportional coefficient Kp. A larger Kp value indicates faster deviation reduction but higher possibility of oscillation. A smaller Kp value indicates lower possibility of oscillation but slower deviation reduction.

FA-16 Integral time Ti2

Address:	0xFA10	Effective mode:	/
Min.:	0.01	Unit:	s
Max.:	10.00	Data type:	UInt16
Default:	2.00	Change mode:	Real time

Range:

0.01s to 10.00s

Parameter description

This parameter defines the integral time Ti in PID control. The parameter value determines the integral adjustment intensity of the PID regulator. The shorter the integral time, the greater the regulation intensity.

FA-17 Differential time Td2

Address:	0xFA11	Effective mode:	/
Min.:	0.000	Unit:	s
Max.:	10.000	Data type:	UInt16

Default:	0.000	Change mode:	Real time

Range:

0.000s to 10.000s

Parameter description

This parameter defines the differential time Td in PID control. Its value determines the regulation intensity of the PID regulator on the deviation change. The longer the differential time, the greater the regulation intensity.

FA-18 PID parameter switchover condition

Address:	0xFA12	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: No switchover

1: Switchover by DI

2: Automatic switchover based on deviation

3: Switchover based on running frequency

Parameter description

This parameter is used for switchover between two groups of PID parameters.

0: No switchover

No switchover is performed.

1: Switchover by DI

To use this function, the DI must be assigned with function 43 (PID parameter switchover). If the DI is inactive, parameter group 1 (FA-05 to FA-07) is selected. If the DI is active, parameter group 2 (FA-15 to FA-17) is selected.

2: Automatic switchover based on deviation

If the absolute value of the deviation between the reference and the feedback is smaller than FA-19 (PID parameter switchover deviation 1), parameter group 1 is selected. If the absolute value of the deviation between the reference and the feedback is greater than FA-20 (PID parameter switchover deviation 2), parameter group 2 is selected. If the absolute value of the deviation between the reference and the feedback is between FA-19 (PID parameter switchover deviation 1) and FA-20 (PID parameter switchover deviation 2), the PID parameters are linear interpolation values of the two sets of PID parameters.

3: Switchover based on running frequency

PID parameters are switched automatically based on the running frequency of the AC drive.

FA-19 PID parameter switchover deviation 1

Address:	0xFA13	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	FA-20	Data type:	UInt16
Default:	20.0	Change mode:	Real time

Range:

0.0% to FA-20

Parameter description

The value 100% corresponds to the maximum deviation between the reference and feedback. The setting range is 0.0% to FA-20 (PID parameter switchover deviation 2).

FA-20 PID parameter switchover deviation 2

Address:	0xFA14	Effective mode:	/
Min.:	FA-19	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	80.0	Change mode:	Real time

Range:

FA-19 to 100.0%

Parameter description

The value 100% corresponds to the maximum deviation between the reference and feedback. The setting range is FA-19 (PID parameter switchover deviation 1) to 100.0%.

FA-21 PID initial value

Address:	0xFA15	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

When the AC drive starts, the PID starts closed-loop algorithm only after the PID output is fixed to the PID initial value (FA-21) and lasts for the time longer than the value of FA-22 (Active time of PID initial value).

FA-22 **Active time of PID initial value**

Address:	0xFA16	Effective mode:	/
Min.:	0.00	Unit:	s
Max.:	650.00	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00s to 650.00s

Parameter description

When the AC drive starts, the PID starts closed-loop algorithm only after the PID output is fixed to the PID initial value (FA-21) and lasts for the time longer than the value of FA-22 (Active time of PID initial value).

FA-25 **PID integral property**

Address:	0xFA19	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

Ones: Integral separation

0: Inactive

1: Active

Tens: Whether integral operations stop when the output reaches the limit

0: Continue integral operation

1: Stop integral operation

Parameter description

Ones: Integral separation

0: Inactive. When integral separation is inactive, the integral separation remains inactive no matter whether the DI is active.

1: Active. When integral separation is active and the DI assigned with the PID integral pause function is active (such as F4-00 = 22), the PID integral operation stops. In this case, only PID proportional and derivative operations take effect.

When the PID operation output reaches the maximum or minimum value, you can select whether to stop the integral operation. If you select "Stop integral operation", the PID integral operation stops, which may help reduce the PID overshoot.

FA-26 **Detection value of PID feedback loss**

Address:	0xFA1A	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

This parameter is used to check whether the PID feedback is lost. If the PID feedback keeps lower than the value of FA-26 (Detection level of PID feedback loss) for a period longer than FA-27 (Detection time of PID feedback loss), the drive reports Err31.

When this parameter is set to 0, PID feedback loss detection is disabled.

FA-27 **Detection time of PID feedback loss**

Address:	0xFA1B	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	20.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time:

Range:

0.0s to 20.0s

Parameter description

This parameter is used to check whether the PID feedback is lost. If the PID feedback keeps lower than the value of FA-26 (Detection level of PID feedback loss) for a period longer than FA-27 (Detection time of PID feedback loss), the drive reports Err31.

FA-28 **PID operation at stop**

Address:	0xFA1C	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Disable

1: Enable

Parameter description

This parameter is used to determine whether to continue PID operation when the AC drive stops.

0: Disable
When the motor is not running, PID operation is not performed and the output is cleared.
1: Enable
When the motor is not running, PID operation is still performed and the output changes based on the feedback and reference.

13.11 FB Wobble Frequency, Fixed Length, and Counting Functions

FB-00 Wobble frequency setting mode

Address:	0xFB00	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0: Relative to the central frequency
1: Relative to the maximum frequency
Parameter description
0: Relative to the center frequency (F0-07, frequency reference superposition). This option applies to variable wobble systems, in which the wobble changes with the center frequency (frequency reference).
1: Relative to the maximum frequency (F0-10). This option applies to fixed wobble systems, in which the wobble is a fixed value calculated based on the maximum frequency.

FB-01 Wobble frequency amplitude

Address:	0xFB01	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:
0.0% to 100.0%
Parameter description
When FB-01 is set to 0, the wobble frequency function is disabled. The wobble frequency is limited by the frequency upper limit and frequency lower limit.

FB-02 **Jump frequency amplitude**

Address:	0xFB02	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	50.0	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:
0.0% to 50.0%
Parameter description
This parameter sets the jump frequency amplitude.

FB-03 **Wobble frequency cycle**

Address:	0xFB03	Effective mode:	/
Min.:	0.1	Unit:	s
Max.:	3000.0	Data type:	UInt16
Default:	10.0	Change mode:	Unchangeable

Range:
0.1 to 3000.0
Parameter description
This parameter defines the time of a complete wobble frequency cycle.

FB-04 **Triangular wave rise time of wobble frequency**

Address:	0xFB04	Effective mode:	/
Min.:	0.1	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	50.0	Change mode:	Unchangeable

Range:
0.1% to 100.0%
Parameter description
This parameter indicates the percentage of triangular wave rising time to FB-03 (Wobble frequency cycle).

FB-05 **Set length**

Address:	0xFB05	Effective mode:	/
Min.:	0	Unit:	m
Max.:	65535	Data type:	UInt16
Default:	1000	Change mode:	Real time

Range:
0 m to 65535 m
Parameter description
This parameter specifies the length value to be controlled in fixed length control mode.

FB-06 Actual length

Address:	0xFB06	Effective mode:	/
Min.:	0	Unit:	m
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 m to 65535 m
Parameter description
The actual length is a monitored value. Actual length (FB-06) = Number of pulses sampled by terminal/Number of pulses per meter (FB-07).

FB-07 Number of pulses per meter

Address:	0xFB07	Effective mode:	/
Min.:	0.1	Unit:	-
Max.:	6553.5	Data type:	UInt16
Default:	100.0	Change mode:	Real time

Range:
0.1 to 6553.5
Parameter description
This parameter indicates the number of pulses outputted per meter. The length pulse is collected by DI5, which must be assigned with the length count input function (F4-04 = 27).

FB-08 Set count value

Address:	0xFB08	Effective mode:	/
Min.:	1	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	1000	Change mode:	Real time

Range:
1 to 65535

Parameter description

When the counting value reaches FB-08, the multi-function DO outputs an active signal indicating that the counting value reference has reached.

FB-09 Designated count value

Address:	0xFB09	Effective mode:	/
Min.:	1	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	1000	Change mode:	Real time

Range:

1 to 65535

Parameter description

When the counting value reaches FB-09, the DO outputs an active signal indicating that the designated counting value has reached. The value of FB-09 must be lower than or equal to the value of FB-08.

13.12FC: Multi-Reference and Simple PLC Parameters

FC-00 Multi-reference 0

Address:	0xFC00	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-01 Multi-reference 1

Address:	0xFC01	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:
-100.0% to 100.0%
Parameter description
This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.
Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-02 Multi-reference 2

Address:	0xFC02	Effective mode:	/
Min.:	-100.0	Unit:	%

Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.

When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-03 Multi-reference 3

Address:	0xFC03	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-04 Multi-reference 4

Address:	0xFC04	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode	Real time

Range:
-100.0% to 100.0%
Parameter description
This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.
Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-05 Multi-reference 5

Address:	0xFC05	Effective mode:	/
Min.:	-100.0	Unit:	%

Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.

When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-06 Multi-reference 6

Address:	0xFC06	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-07 Multi-reference 7

Address:	0xFC07	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode	Real time

Range:
-100.0% to 100.0%
Parameter description
This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.
Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-08 Multi-reference 8

Address:	0xFC08	Effective mode:	/
Min.:	-100.0	Unit:	%

Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.

When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-09 Multi-reference 9

Address:	0xFC09	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode	Real time

Range:

-100.0% to 100.0%

Description of parameters:

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-10 Multi-reference 10

Address:	0xFC0A	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:
-100.0% to 100.0%
Parameter description
This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.
Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-11 Multi-reference 11

Address:	0xFC0B	Effective mode:	/
Min.:	-100.0	Unit:	%

Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.

When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-12 Multi-reference 12

Address:	0xFC0C	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-13 Multi-reference 13

Address:	0xFC0D	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:
-100.0% to 100.0%
Parameter description
This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.
Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-14 Multi-reference 14

Address:	0xFC0E	Effective mode:	/
Min.:	-100.0	Unit:	%

Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.

When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-15 Multi-reference 15

Address:	0xFC0F	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency references. The frequency references are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency references.

Application scenario of parameters in group FC: When simple PLC is used as the main frequency, set parameters in group FC. In some industrial applications, the AC motor only needs to support the functions of start/stop, time- and segment-based speed regulation, and automatic forward and reverse run. In this case, using the simple PLC can provide the preceding control functions and a PLC is not required. The simple PLC is generally used in industrial equipment such as mixture mixing and industrial washing machines.
When the simple PLC is used as the main frequency source (F0-03=7), set parameters in group FC.

FC-16 Simple PLC operation mode

Address	0xFC10	Effective mode:	/
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0: Stop after operating for one cycle
1: Keep final values after operating for one cycle
2: Cyclic operation
Parameter description
When using the simple PLC to set the main frequency, set FC-16 to select the operation mode of the PLC and FC-17 to select whether to remain the operating status and frequency of the PLC after power failure or stop.
0: Stop after running for one cycle
The AC drive stops automatically after running for one cycle and starts again only after receiving a running command.
1: Keep final values after running for one cycle
The AC drive keeps the final running frequency and direction after running for one cycle and starts to run from the initial PLC state upon restart.
2: Cyclic operation
The AC drive automatically starts another cycle after running for one cycle and stops only after receiving a stop command.

FC-17 Simple PLC retention selection upon power failure

Address	0xFC11	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

Ones:

0: Non-retentive upon power failure

1: Retentive upon power failure

Tens:

0: Non-retentive upon stop

1: Retentive upon stop

Parameter description

When using the simple PLC to set the main frequency, set FC-16 to select the operation mode of the simple PLC and FC-17 to select whether to remain the operating status and frequency of the PLC after power failure or stop.

Ones: Retention selection upon power failure

The AC drive restarts the PLC process upon power-on. When it is set to 1, the AC drive retains the PLC operation stage and operating frequency upon power failure and continues to run from the retained values after the drive is powered on again.

Tens: Retention selection upon stop

The AC drive restarts the PLC process upon start. When it is set to 1, the AC drive retains the PLC operation stage and operating frequency upon stop and continues to run from the retained values after the drive is started again.

FC-18 Operation time of multi-reference 0 set by simple PLC

Address:	0xFC12	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the running time of multi-reference 0 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-19 Acceleration/Deceleration time of multi-reference 0 set by PLC

Address:	0xFC13	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-3
Parameter description
This parameter indicates the acceleration/Deceleration time of multi-reference 0 set by PLC.
0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-20 Operation time of multi-reference 1 set by PLC

Address:	0xFC14	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0s (h) to 6500.0s (h)
Parameter description
This parameter indicates the operating time of multi-reference 1 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-21 Acceleration/Deceleration time of multi-reference 1 set by PLC

Address:	0xFC15	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-3
Parameter description
This parameter indicates the acceleration/deceleration time of multi-reference 1 set by simple PLC.
0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-22 **Operation time of multi-reference 2 set by PLC**

Address:	0xFC16	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 2 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-23 **Acceleration/Deceleration time of multi-reference 2 set by PLC**

Address:	0xFC17	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0-3

Description of parameters:

This parameter indicates the acceleration/deceleration time of multi-reference 2 set by simple PLC.

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)

1: Group 2 acceleration/deceleration time (F8-03 and F8-04)

2: Group 3 acceleration/deceleration time (F8-05 and F8-06)

3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-24 **Operation time of multi-reference 3 set by PLC**

Address:	0xFC18	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 3 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-25 Acceleration/Deceleration time of multi-reference 3 set by PLC

Address:	0xFC19	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0-3

Parameter description

This parameter indicates the acceleration/deceleration time of multi-reference 3 set by simple PLC.

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)

1: Group 2 acceleration/deceleration time (F8-03 and F8-04)

2: Group 3 acceleration/deceleration time (F8-05 and F8-06)

3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-26 Operation time of multi-reference 4 set by PLC

Address:	0xFC1A	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 4 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-27 Acceleration/Deceleration time of multi-reference 4 set by PLC

Address:	0xFC1B	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-3
Parameter description
This parameter indicates the acceleration/deceleration time of multi-reference 4 set by simple PLC.
0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-28 Operation time of multi-reference 5 set by PLC

Address:	0xFC1C	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0s (h) to 6500.0s (h)
Parameter description
This parameter indicates the operating time of multi-reference 5 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-29 Acceleration/Deceleration time of multi-reference 5 set by PLC

Address:	0xFC1D	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-3
Parameter description
This parameter indicates the acceleration/deceleration time of multi-reference 5 set by simple PLC.
0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-30 Operation time of multi-reference 6 set by PLC

Address:	0xFC1E	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 6 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-31 Acceleration/Deceleration time of multi-reference 6 set by PLC

Address:	0xFC1F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0-3

Parameter description

This parameter indicates the acceleration/deceleration time of multi-reference 6 set by simple PLC.

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)

1: Group 2 acceleration/deceleration time (F8-03 and F8-04)

2: Group 3 acceleration/deceleration time (F8-05 and F8-06)

3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-32 Operation time of multi-reference 7 set by PLC

Address:	0xFC20	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 7 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-33 Acceleration/Deceleration time of multi-reference 7 set by PLC

Address:	0xFC21	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0-3

Parameter description

This parameter indicates the acceleration/deceleration time of multi-reference 7 set by simple PLC.

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)

1: Group 2 acceleration/deceleration time (F8-03 and F8-04)

2: Group 3 acceleration/deceleration time (F8-05 and F8-06)

3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-34 Operation time of multi-reference 8 set by PLC

Address:	0xFC22	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 8 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-35 Acceleration/Deceleration time of multi-reference 8 set by PLC

Address:	0xFC23	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-3
Parameter description
This parameter indicates the acceleration/deceleration time of multi-reference 8 set by simple PLC.
0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-36 Operation time of multi-reference 9 set by PLC

Address:	0xFC24	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0s (h) to 6500.0s (h)
Parameter description
This parameter indicates the operating time of multi-reference 9 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-37 Acceleration/Deceleration time of multi-reference 9 set by PLC

Address:	0xFC25	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-3
Parameter description
This parameter indicates the acceleration/deceleration time of multi-reference 9 set by simple PLC.
0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-38 **Operation time of multi-reference 10 set by PLC**

Address:	0xFC26	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 10 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-39 **Acceleration/Deceleration time of multi-reference 10 set by PLC**

Address:	0xFC27	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0-3

Parameter description

This parameter indicates the acceleration/deceleration time of multi-reference 10 set by simple PLC.

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)

1: Group 2 acceleration/deceleration time (F8-03 and F8-04)

2: Group 3 acceleration/deceleration time (F8-05 and F8-06)

3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-40 **Operation time of multi-reference 11 set by PLC**

Address:	0xFC28	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 11 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-41 Acceleration/Deceleration time of multi-reference 11 set by PLC

Address:	0xFC29	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0-3

Parameter description

This parameter indicates the acceleration/deceleration time of multi-reference 11 set by simple PLC.

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)

1: Group 2 acceleration/deceleration time (F8-03 and F8-04)

2: Group 3 acceleration/deceleration time (F8-05 and F8-06)

3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-42 Operation time of multi-reference 12 set by PLC

Address:	0xFC2A	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 12 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-43 Acceleration/Deceleration time of multi-reference 12 set by PLC

Address:	0xFC2B	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data Type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-3
Parameter description
This parameter indicates the acceleration/deceleration time of multi-reference 12 set by simple PLC.
0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-44 Operation time of multi-reference 13 set by PLC

Address:	0xFC2C	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0s (h) to 6500.0s (h)
Parameter description
This parameter indicates the operating time of multi-reference 13 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-45 Acceleration/Deceleration time of multi-reference 13 set by PLC

Address:	0xFC2D	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-3
Parameter description
This parameter indicates the acceleration/deceleration time of multi-reference 13 set by simple PLC.
0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-46 **Operation time of multi-reference 14 set by PLC**

Address:	0xFC2E	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 14 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-47 **Acceleration/Deceleration time of multi-reference 14 set by PLC**

Address:	0xFC2F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0-3

Parameter description

This parameter indicates the acceleration/deceleration time of multi-reference 14 set by simple PLC.

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)

1: Group 2 acceleration/deceleration time (F8-03 and F8-04)

2: Group 3 acceleration/deceleration time (F8-05 and F8-06)

3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-48 **Operation time of multi-reference 15 set by PLC**

Address:	0xFC30	Effective mode:	/
Min.:	0.0	Unit:	s (h)
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0s (h) to 6500.0s (h)

Parameter description

This parameter indicates the operating time of multi-reference 15 set by simple PLC. Operating time of each reference = acceleration or deceleration time + operating time at constant speed and target frequency.

FC-49 Acceleration/Deceleration time of multi-reference 15 set by PLC

Address	0xFC31	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0-3

Parameter description

Indicates the acceleration/deceleration time of multi-reference 15 set by simple PLC.

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)

1: Group 2 acceleration/deceleration time (F8-03 and F8-04)

2: Group 3 acceleration/deceleration time (F8-05 and F8-06)

3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

FC-50 PLC operating time unit

Address:	0xFC32	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: s (second)

1: h (hour)

Parameter description

This parameter defines the unit of the PLC running time for each speed.

FC-51 Multi-reference 0 source

Address	0xFC33	Effective mode:	/
Min.:	0	Unit:	-
Max.:	6	Data type:	UInt16
Default:	0	Change mode	Real time

Range:

0: FC-00
1: AI1
2: AI2
3: AI3
4: Pulse reference (DI5)
5: PID
6: Preset frequency (F0-08)

Parameter description

Multi-reference 0 can be selected through seven ways, including digital setting, analog input, pulse frequency, PID, and preset frequency.

0: FC-00
The frequency reference of multi-reference 0 is set by FC-00.
1: AI1
The frequency reference of multi-reference 0 is set by AI1.
2: AI2
The frequency reference of multi-reference 0 is set by AI2.
3: AI3
The frequency reference of multi-reference 0 is set by AI3.
4: Pulse reference (DI5)
The frequency reference of multi-reference 0 is set by pulse frequency.
5: PID
The frequency reference of multi-reference 0 is set by PID.
6: Preset frequency (F0-08)
The frequency of multi-reference 0 is set by F0-08 (preset frequency).

13.13 FD Communication Parameters

FD-00 **Baud rate**

Address	0xFD00	Effective mode:	/
Min.:	0	Unit:	-
Max.:	6009	Data type:	UInt16
Default:	5005	Change mode:	Real time

Range:

Ones: Modbus
0: 300 bps
1: 600 bps
2: 1200 bps
3: 2400 bps
4: 4800 bps
5: 9600 bps
6: 19200 bps
7: 38400 bps
8: 57600 bps
9: 115200 bps
Tens: PROFIBUS DP
0: 115200 bps
1: 208300 bps
2: 256000 bps
3: 512000 bps
Hundreds: Reserved
Thousands: CANlink
0: 20 kbps
1: 50 kbps
2: 100 kbps
3: 125 kbps
4: 250 kbps
5: 500 kbps
6: 1 Mbps

Parameter description

This parameter defines the speed of data transmission between the host controller and the drive. A larger baud rate indicates faster communication speed.

Note that the baud rate of the host controller must be the same as that of the AC drive. Otherwise, communication will fail.

FD-01 **Data format**

Address:	0xFD01	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: No check (8-N-2)
1: Even parity check (8-E-1)
2: Odd parity check (8-O-1)
3: No check (8-N-1)

Parameter description

This parameter defines the format of Modbus data transmitted between the host controller and the AC drive. The data format on the host controller must be the same as that on the AC drive. Otherwise, the host controller and AC drive cannot communicate with each other.

FD-02 Local address

Address:	0xFD02	Effective mode:	/
Min.:	1	Unit:	-
Max.:	247	Data type:	UInt16
Default:	1	Change mode:	Real time

Range:

1 to 247

Parameter description

The local address must be unique in the range of 1 to 247, which is the basis of implementing point-point communication between the AC drive and host controller.

FD-03 Modbus response delay

Address	0xFD03	Effective mode:	/
Min.:	0	Unit:	ms
Max.:	20	Data type:	UInt16
Default:	2	Change mode:	Real time

Range:

0 ms to 20 ms

Parameter description

This parameter defines the interval from the end of data reception by the drive to the start of data transmission to the host controller.
If the response delay is shorter than the system processing time, the system processing time prevails. This means that the system processes data and then sends the data to the host controller. If the response delay is longer than the system processing time, the system processes data and waits for the response delay time. After the time elapses, the system sends the data to the host controller.

FD-04 Communication timeout

Address:	0xFD04	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	60.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0 to 60.0

Parameter description

When this parameter is set to 0.0s, the Modbus communication timeout time is invalid. Generally, set it to 0.0s. This parameter is used to monitor communication status in a system with continuous communication.

When it is set to an effective value, if the time interval between the current communication and the next communication exceeds FD-04 (Modbus communication interruption detection time), the system reports a communication fault (Err16).

FD-05 Modbus and PROFIBUS DP communication data format

Address	0xFD05	Effective mode:	/
Min.:	0	Unit:	-
Max.:	31	Data type:	UInt16
Default:	31	Change mode:	Real time

Range:

Ones: Modbus

0: Non-standard Modbus protocol

1: Standard Modbus protocol

Tens: PROFIBUS DP

0: PPO1

1: PPO2

2: PPO3

3: PPO4

Parameter description

Ones: Modbus

0: Non-standard Modbus protocol. The number of bytes returned by the slave is one byte more than the byte stipulated in the standard Modbus protocol. Other read/write operations are the same as those stipulated in the standard Modbus protocol.
1: Standard Modbus protocol. Only word-type parameters can be read and written. The reading command is 0x03 and writing command is 0x06. Reading and writing of bytes or bits are not supported.
Tens: PROFIBUS DP
0: PPO1, including four PKW data words and two PZD data words.
1: PPO2, including four PKW data words and six PZD data words.
2: PPO3, including two PZD data words.
3: PPO4, including six PZD data words.

FD-06 Current resolution read through communication

Address:	0xFD06	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time:

Range:
0: 0.01 A (active when the power is lower than or equal to 55 kW)
1: 0.1 A (active when the power is higher than 55 kW)
Parameter description
This parameter determines the output unit of the current when the output current is read through communication.
Note that when the power is lower than or equal to 55 kW, the decimal place is 0.01. When the power is higher than 55 kW, the decimal place is 0.1.

FD-08 CANlink communication timeout

Address:	0xFD08	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	60.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0s to 60.0s
Parameter description

When FD-08 is set to 0.0s, the communication (PROFIBUS DP/PROFINET/ CANopen) timeout time is invalid. Generally, set it to 0.0s. This parameter is used to monitor communication status in a system with continuous communication.
When it is set to an effective value, if communication interval time between current communication and the next communication exceeds FD-08, the system reports a communication fault (Err16).

13.14FE User-defined Parameters

FE-00 **User-defined parameter 0**

Address:	0xFE00	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	7017	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-01 **User-defined parameter 1**

Address:	0xFE01	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	7016	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-02 **User-defined parameter 2**

Address:	0xFE02	Effective mode:	/
Min.:	0	Unit:	-

Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-03 User-defined parameter 3

Address:	0xFE03	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-04 User-defined parameter 4

Address:	0xFE04	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-05 User-defined parameter 5

Address:	0xFE05	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16

Default:	0	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-06 **User-defined parameter 6**

Address:	0xFE06	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-07 **User-defined parameter 7**

Address:	0xFE07	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-08 **User-defined parameter 8**

Address:	0xFE08	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-09 **User-defined parameter 9**

Address:	0xFE09	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-10 **User-defined parameter 10**

Address:	0xFE0A	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 to 65535
Parameter description
Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-11 **User-defined parameter 11**

Address:	0xFE0B	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-12 User-defined parameter 12

Address:	0xFE0C	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-13 User-defined parameter 13

Address:	0xFE0D	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-14 User-defined parameter 14

Address:	0xFE0E	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-15 **User-defined parameter 15**

Address:	0xFE0F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-16 **User-defined parameter 16**

Address:	0xFE10	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-17 **User-defined parameter 17**

Address:	0xFE11	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-18 User-defined parameter 18

Address:	0xFE12	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-19 User-defined parameter 19

Address:	0xFE13	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-20 User-defined parameter 20

Address:	0xFE14	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	6768	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-21 User-defined parameter 21

Address:	0xFE15	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	6769	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-22 User-defined parameter 22

Address:	0xFE16	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-23 User-defined parameter 23

Address:	0xFE17	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-24 User-defined parameter 24

Address:	0xFE18	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-25 User-defined parameter 25

Address:	0xFE19	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-26 User-defined parameter 26

Address:	0xFE1A	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-27 User-defined parameter 27

Address:	0xFE1B	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-28 User-defined parameter 28

Address:	0xFE1C	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-29 User-defined parameter 29

Address:	0xFE1D	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-30 User-defined parameter 30

Address:	0xFE1E	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

FE-31 User-defined parameter 31

Address:	0xFE1F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

Group FE is the user-defined parameter group. You can select the required parameters from the parameter list and add them to group FE, which facilitates view and modification.

13.15FP User Password

FP-00 User password

Address:	0x1F00	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0 to 65535
Parameter description
This parameter is used to set the user password.

FP-01 Parameter initialization

Address	0x1F01	Effective mode:	/
Min.:	0	Unit:	-
Max.:	501	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
0: No operation
1: Restore to factory settings 1
2: Clear records
4: Back up current user parameters
501: Restore user backup parameters
Parameter description
This parameter is used to set the action upon parameter initialization of the drive.
0: No operation
The AC drive does not perform any operation.
1: Restore to factory settings 1
Most of the parameters are restored to default settings. However, motor parameters, F0-22 (Decimal places of frequency reference), fault records, F7-09 (Cumulative running time), F7-13 (Cumulative power-on time), F7-14 (Cumulative power consumption), and F7-07 (Inverter module heatsink temperature) are not restored.
2: Clear records
The fault records, F7-09 (Cumulative running time), F7-13 (Cumulative power-on time), and F7-14 (Cumulative power consumption) are cleared.
4: Back up current user parameters
The current parameter settings are backed up.
501: Restore user backup parameters
Parameters backed up by setting FP-01 to 4 are restored.

FP-02 Parameter display

Address:	0x1F02	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16

Default:	11	Change mode:	At stop

Range:

Ones: Parameter group U display

0: Not displayed

1: Displayed

Tens: Parameter group A display

0: Not displayed

1: Displayed

Parameter description

This parameter is used to determine whether parameters in groups U and A are displayed on the operating panel.

FP-03 Customized parameter group display

Address:	0x1F03	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

Ones: Display of user-defined parameter group

0: Not displayed

1: Displayed

Tens: Display of user-modified parameter group

0: Not displayed

1: Displayed

Parameter description

The ones place or tens place of the parameter is used to determine whether the user-defined parameter group or the user-modified parameter group is displayed on the operating panel.

FP-04 User password modification

Address:	0x1F04	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Modification allowed

1: Modification prohibited

Parameter description

This parameter is used to determine whether the user password can be modified.

13.16A1 Virtual DI/DO

A1-00 VDI1 function selection

Address	0xA100	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire operation control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6: Function as the UP key
7: Function as the DOWN key
8: Coast to stop
9: Fault reset (RESET)
10: Operation pause
11: External fault NO input
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Acceleration/Deceleration time selection terminal 1
17: Acceleration/Deceleration time selection terminal 2
18: Frequency reference switchover
19: Clear information set by UP/DOWN keys on the operating panel or by terminals functioning as the UP/DOWN keys
20: Control command switchover terminal 1
21: Acceleration/Deceleration inhibited
22: PID pause
23: Simple PLC state reset
24: Wobble frequency pause
25: Counter input
26: Counter reset
27: Length counting input
28: Length reset
29: Torque control inhibited
30: Pulse frequency input (only DI5)
31: Reserved
32: Immediate DC braking
33: External fault NC input
34: Frequency modification enable
35: PID action direction reversal
36: External stop terminal 1
37: Control command switchover terminal 2
38: PID integral pause
39: Switch main frequency source to preset frequency
40: Switch auxiliary frequency source to preset frequency
41: Motor terminal selection (To be continued)

(Continued)
42: Reserved
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/Three-wire mode switchover
52: Reverse frequency inhibited
53 to 59: Reserved

Description of parameters:

0: No function

The DI has no function.

1: Forward run (FWD)

The AC drive runs in the forward direction. FWD indicates forward running. In two-wire mode 1 (F4-11 = 0), activating DI function 1 triggers forward running. In two-wire mode 2 (F4-11 = 1), activating DI function 1 triggers a running command.

2: Reverse run (REV)

The AC drive runs in the reverse direction. REV indicates reverse running. In three-wire mode 1 (F4-11 = 2), activating DI function 2 triggers reverse running. In three-wire mode 2 (F4-11 = 3), activating DI function 2 triggers forward/reverse running.

3: Three-wire operation control

The AC drive operation mode is the three-wire control mode. To set the running command source to the terminal, set F4-11 (terminal command mode) to 2 (three-wire mode 1) or 3 (three-wire mode 2), and set the DI to function 3. The three-wire control modes include three-wire mode 1 and three-wire mode 2.

4: Forward jog (FJOG)

The operation mode of the AC drive is forward jog. In the jogging mode, the drive runs at the frequency set by F8-00 (Jogging frequency), which is generally used for maintenance and commissioning of the equipment on site.

5: Reverse jog (RJOG)

The operation mode of the AC drive is reverse jog.

6: Function as the UP key

The terminal is used to increase the frequency. Activating the terminal is equivalent to keeping the increment key pressed down. Deactivating the terminal is equivalent to releasing the increment key.

7: Function as the DOWN key
The terminal is used to decrease the frequency Activating the terminal is equivalent to keeping the decrement key pressed down. Deactivating the terminal is equivalent to releasing the decrement key.
8: Coast to stop
Once the drive receives a stop command, it immediately stops output and the load then coasts to stop based on the mechanical inertia. The AC drive stops output to shut down. At this time, the power supply of the motor is cut off and the driving system is in the free braking state. Since the stop time is determined by the inertia of the drive system, the process is also called inertia stopping.
9: Fault reset (RESET)
The terminal is used to reset the AC drive upon faults. It is equivalent to the STOP/RES key on the operating panel. This function allows you to perform a reset upon the fault remotely.
10: Running pause
The AC drive decelerates to stop with all running parameters retained (such as PLC, wobble, and PID parameters). When the terminal is inactive, the drive resumes to the status before decelerating to stop.
11: External fault NO input
The AC drive reports Err15 upon receiving an external signal.
12-15: Multi-reference terminals 1 to 4
The AC drive selects the multi-reference as the main frequency source. States of the four terminals can be combined in 16 ways to define 16 speeds or 16 references. This function is applicable to scenarios that need only several frequency references instead of continuous adjustment of the AC drive operation frequency.
16-17: Acceleration/Deceleration time selection terminals 1 to 2
Four groups of acceleration and deceleration time can be switched through four states of these two terminals.
The acceleration time indicates the time required by the AC drive to accelerate from 0 Hz to the acceleration/deceleration base frequency (F0-25). The deceleration time indicates the time required by the AC drive to decelerate from the acceleration/deceleration base frequency (F0-25) to 0 Hz.
18: Frequency source switchover
This function is used to switch among different frequency reference input modes. The frequency reference is set through F0-07.
19: Clear information set by UP/DOWN keys on the operating panel or by terminals functioning as the UP/DOWN keys
When the main or auxiliary frequency is set through the operating panel and the terminal is active, the terminal can be used to clear the frequency set through the UP/DOWN key on the operating panel or the terminal functioning as the UP/DOWN key. In this case, the frequency is reset to the value of F0-08.

20: Command source switchover terminal 1
When the running command is set through the terminal (F0-02=1) and the terminal is active, the control command source is switched from terminal control to operating panel control.
When the running command is set through communication (F0-02=2) and the terminal is active, the control command source is switched from communication control to operating panel control.
21: Acceleration/Deceleration inhibited
The terminal is used to maintain the current running frequency of the AC drive regardless of changes of the external input frequency (unless a stop command is received).
22: PID pause
PID is invalid temporarily. The AC drive maintains the current output frequency without supporting PID adjustment of frequency source.
23: Simple PLC state reset
The terminal is used to restore the AC drive to the initial state of the simple PLC.
24: Wobble frequency pause
In the wobble process, when the terminal is active, the wobble frequency function pauses (the AC drive outputs at the center frequency).
25: Counter input
In the count process, when the terminal is active, a count pulse is input.
26: Counter reset
In the count process, when the terminal is active, the counter status is cleared.
27: Length counting input
In the fixed length process, when the terminal is active, the length count is input.
28: Length reset
In the fixed length process, when the terminal is active, the length is cleared.
29: Torque control inhibited
When the terminal is active, the AC drive switches from the torque control mode to the speed control mode. When the terminal is inactive, the AC drive switches back to the torque control mode.
30: Pulse frequency input
When DI5 is used as the pulse input terminal, DI5 must be allocated with this function.
31: Reserved
32: Immediate DC braking
The AC drive directly switches to the DC braking state. DC braking indicates that the drive outputs direct current to the stator winding of the asynchronous motor to form a static magnetic field, enabling the motor to brake with energy consumption. In this state, the rotor cuts the static magnetic field to generate braking torque, which stops the motor quickly.

33: External fault NC input
The AC drive reports Err15 upon receiving an external signal.
34: Frequency modification enable
When the terminal is active, the frequency can be modified. When the terminal is inactive, the frequency cannot be modified.
35: PID action direction reversal
The PID action direction is reversed to the direction set by FA-03 (PID action direction).
36: External stop terminal 1
The terminal is used to stop the drive, which functions in the same way as the STOP/RES key on the operating panel. In this case, the setting of F0-02 is invalid.
37: Command source switchover terminal 2
The terminal is used for switchover between terminal control and communication control.
If the command source is set to terminal control, activating the terminal switches the AC drive to communication control.
If the command source is set to communication control, activating the terminal switches the AC drive to terminal control.
38: PID integral pause
The integral adjustment function pauses when the terminal is active. However, the proportional and derivative adjustment functions are still valid.
39: Switch main frequency source to preset frequency
This function is used to switch the main frequency source to F0-08 (preset frequency).
40: Switch auxiliary frequency source to preset frequency
This function is used to switch the auxiliary frequency source to F0-08 (preset frequency).
41: Motor terminal function
The terminal is used to select motor parameters. When the terminal is active, motor 2 is selected. When the terminal is inactive, motor 1 is selected.
42: Reserved
43: PID parameter switchover
If PID parameters are switched over through DI (FA-18 = 1), the PID parameter values vary with the terminal state. When the terminal is inactive, PID parameters are FA-05 to FA-07 (proportional gain Kp1, integral time Ti1, and differential time Td1). When the terminal is active, PID parameters are FA-15 to FA-17 (proportional gain Kp2, integral time Ti2, and differential time Td2).
44: User-defined fault 1
When the AC drive reports Err27, the AC drive will act according to the value of F9-49 (Fault protection action selection).

45: User-defined fault 2
When the AC drive reports Err28, the AC drive will act according to the value of F9-49 (Fault protection action selection).
46: Speed/Torque control switchover
The terminal is used to switch between speed control and torque control.
When A0-00 (Speed/Torque control mode) is set to 0 and the terminal is active, the control mode is torque control mode. When the terminal is inactive, the control mode is speed control mode.
When A0-00 (Speed/Torque control mode) is set to 1 and the terminal is active, the control mode is speed control mode. When the terminal is inactive, the control mode is torque control mode.
47: Emergency stop
When the system is in the emergency state, the AC drive decelerates according to F8-55 (terminal deceleration time for emergency stop). When the deceleration time for emergency stop is 0s in V/f decoupled mode, the AC drive decelerates according to the minimum unit time. The input terminal does not need to be in the closed state continuously. Even if it is closed only for a moment, an emergency stop will occur immediately. Different from general deceleration time, the emergency stop input terminal is opened after the deceleration time for emergency stop expires. In this case, if the operation signal is still active, the drive will not restart. To restart the drive, disconnect the operation terminal and input the operation command again.
48: External stop terminal 2
The terminal is used to make the AC drive decelerate to stop in any control mode (operating panel, terminal, or communication control). In this case, the deceleration time is fixed to the value of F8-08 (deceleration time 4).
49: Deceleration DC braking
The AC drive decelerates to the frequency set by F6-11 (DC braking start frequency for stop) and then enters the DC braking state.
50: Clear the current running time
The terminal is used to clear the current running time of the AC drive. If the current running time is shorter than the set value (greater than 0) of F8-53 (Current running time reached) and the terminal is active, the current running timing is cleared. If the current running time is longer than the set value (greater than 0) of F8-53 (Current running time threshold) and the terminal is active, the current running timing is not cleared.
51: Two-wire/Three-wire mode switchover
The terminal is used to switch between the two-wire control mode and the three-wire control mode.
When F4-11 is set to 0 (two-wire mode 1) and the terminal is active, the drive switches to three-wire mode 1. When the terminal is inactive, two-wire mode 1 is used.

When F4-11 is set to 1 (two-wire mode 2) and the terminal is active, the drive switches to three-wire mode 2. When the terminal is inactive, two-wire mode 2 is used.
When F4-11 is set to 2 (three-wire mode 1) and the terminal is active, the drive switches to two-wire mode 1. When the terminal is inactive, three-wire control mode 1 is used.
When F4-11 is set to 3 (three-wire mode 2) and the terminal is active, the drive switches to two-wire mode 2. When the terminal is inactive, three-wire control mode 2 is used.
52: Reverse frequency inhibited
When the terminal is active, even if the reverse frequency is set, the actual frequency of the AC drive is fixed to 0.
It functions the same as F8-13 (reverse frequency prohibited).

A1-01 VDI2 function selection

Address:	0xA101	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
Same as A1-00.
Parameter description
Same as A1-00.

A1-02 VDI3 function selection

Address:	0xA102	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
Same as A1-00.
Parameter description
Same as A1-00.

A1-03 VDI4 function selection

Address:	0xA103	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16

Default:	0	Change mode:	At stop

Range:
Same as A1-00.
Parameter description
Same as A1-00.

A1-04 VDI5 function selection

Address:	0xA104	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
Same as A1-00.
Parameter description
Same as A1-00.

A1-05 VDI state setting mode

Address:	0xA105	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11111	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
Ones: VDI1
0: Decided by state of VDOx
1: Decided by A1-06
Tens: VDI2
0: Decided by state of VDOx
1: Decided by A1-06
Hundreds: VDI3
0: Decided by state of VDOx
1: Decided by A1-06
Thousands: VDI4
0: Decided by state of VDOx
1: Decided by A1-06
Ten thousands: VDI5
0: Decided by state of VDOx
1: Decided by A1-06
Parameter description

The VDIx (x ranges from 1 to 5) state is set by the ones to ten thousands places of this parameter.
0: Decided by state of VDOx
When it is set to 0, the VDI state is determined by the state of the corresponding VDO. VDIx is uniquely bound to VDOx (x ranges from 1 and 5).
1: Decided by A1-06
When it is set to 1, the VDI state is determined by the binary bit of A1-06.

A1-06 **VDI state setting**

Address:	0xA106	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11111	Data type:	UInt16
Default:	0	Change mode:	Real time:

Range:
Ones: VDI1
0: Inactive
1: Active
Tens: VDI2
0: Inactive
1: Active
Hundreds: VDI3
0: Inactive
1: Active
Thousands: VDI4
0: Inactive
1: Active
Ten thousands: VDI5
0: Inactive
1: Valid

Parameter description
The VDIx (x ranges from 1 to 5) state is set by the ones to ten thousands places of this parameter.

A1-07 **Function selection for AI1 used as DI**

Address:	0xA107	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

Same as A1-00.

Parameter description

Same as A1-00.

A1-08 Function selection for AI2 used as DI

Address:	0xA108	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

Same as A1-00.

Parameter description

Same as A1-00.

A1-09 Function selection for AI3 used as DI

Address:	0xA109	Effective mode:	/
Min.:	0	Unit:	-
Max.:	59	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

Same as A1-00.

Parameter description

Same as A1-00.

A1-10 Active status of AI used as DI

Address:	0xA10A	Effective mode:	/
Min.:	0	Unit:	-
Max.:	111	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

Ones: AI1
0: Active high
1: Active low
Tens: AI2
0: Active high
1: Active low
Hundreds: AI3
0: Active high
1: Active low

Parameter description

The active mode for terminals AI1 and AI2 are set through the ones and tens places of this parameter.

0: Active high

The AI is active when the corresponding place of A1-10 is set to 0 and inactive when set to 1.

1: Active low

The AI is inactive when the corresponding place of A1-10 is set to 0 and active when set to 1.

A1-11 VDO1 function selection

Address	0xA10B	Effective mode:	/
Min.:	0	Unit:	-
Max.:	41	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: No output
1: Drive in operation
2: Fault output (coast to stop)
3: Frequency level detection 1
4: Frequency reached
5: Operation at zero speed (no output at stop)
6: Motor overload alarm
7: Drive overload alarm
8: Set count value reached
9: Designated count value reached
10: Length reached
11: Simple PLC cycle completed
12: Cumulative operating time reached
13: Frequency limited
14: Torque limited
15: Ready to run
16: AI1 > AI2
17: Frequency upper limit reached
18: Frequency lower limit reached (no output at stop)
19: Undervoltage
20: Communication setting
21: Reserved
22: Reserved
23: Operation at zero speed 2 (output at stop)
24: Cumulative power-on time reached
25: Frequency level detection 2
26: Frequency 1 reached
27: Frequency 2 reached
28: Current 1 reached
29: Current 2 reached
30: Timing reached
31: AI1 input limit exceeded
32: Drive output load loss
33: Reverse running
34: Zero current state
35: Module temperature reached
36: Output current limit exceeded
37: Frequency lower limit reached (output at stop)
38: Alarm (all faults)
39: Motor overheat
40: Present operating time reached
41: Fault output (coast to stop; no output upon undervoltage)

Parameter description

0: No output

The terminal has no function.

1: Drive in operation

When the AC drive is running with output frequency (can be 0), the terminal outputs an active signal.

2: Fault output (coast to stop)

When the AC drive stops upon a fault, the terminal outputs an active signal.

3: Frequency level detection 1

When the running frequency is higher than the detection frequency, the DO outputs an active signal. When the running frequency is lower than the result of the detection frequency minus the FDT hysteresis value (F8-19 x F8-20), the DO stops outputting an active signal.

4: Frequency reached

When the running frequency of the AC drive is within a certain range (target frequency ± F8-21 x maximum frequency), the DO outputs an active signal.

5: Operation at zero speed (no output at stop)

When the output frequency is 0 during AC drive running, the DO outputs an active signal. When the drive is in the stop state, the signal is inactive.

6: Motor overload alarm

The AC drive determines whether the motor load exceeds the overload warning threshold according to the overload warning coefficient (F9-02) before performing the protection action. The terminal outputs an active signal when the overload warning threshold is exceeded.

7: Drive overload alarm

The terminal outputs an active signal 10s before the AC drive performs overload protection.

8: Set count value reached

The terminal outputs an active signal when the count value reaches the value of FB-08.

9: Designated count value reached

The terminal outputs an active signal when the count value reaches the value of FB-09.

10: Length reached

The terminal outputs an active signal when the detected actual length exceeds the value of FB-05.

11: Simple PLC cycle completed

The terminal outputs a pulse signal with the width of 250 ms when the simple PLC completes one cycle.

12: Cumulative operating time reached

The terminal outputs an active signal when the cumulative running time of the AC drive exceeds the value of F8-17 (cumulative running time threshold).

13: Frequency limited
The terminal outputs an active signal when the frequency reference exceeds the frequency upper or lower limit, and the output frequency of AC drive reaches the upper or lower limit.
14: Torque limited
The terminal outputs an active signal when the output torque of the AC drive reaches the toque limit in the speed control mode.
15: Ready to run
The terminal outputs an active signal when the AC drive is ready for running without any fault after power-on.
16: AI1 > AI2
The terminal outputs an active signal when the AI1 input is higher than the AI2 input.
17: Frequency upper limit reached
The terminal outputs an active signal when the running frequency reaches the frequency upper limit (F0-12).
18: Frequency lower limit reached (no output at stop)
If F8-14 (running mode when frequency reference lower than lower limit) is set to 1 (stop), the terminal outputs an inactive signal no matter whether the running frequency reaches the frequency lower limit.
When F8-14 (running mode when frequency reference lower than lower limit) is set to 0 (run at the frequency lower limit) or 2 (run at zero speed) and the running frequency reaches the lower limit, the terminal outputs an active signal.
19: Undervoltage state
The terminal outputs an active signal when undervoltage occurs on the AC drive.
20: Communication setting
Whether the DO is active or inactive is determined by communication address 0x2001.
21 to 22: Reserved
23: Operating at zero speed 2 (output at stop) When the output frequency is 0 during operation of the drive, the terminal outputs an active signal. The signal is still active when the AC drive stops.
24: Cumulative power-on time reached
The terminal outputs an active signal when the cumulative power-on time of the AC drive (F7-13) exceeds the value of F8-16 (cumulative power-on time threshold).
25: Frequency level detection 2
When the running frequency is higher than the detection frequency, the DO outputs an active signal. When the running frequency is lower than the result of the detection frequency minus the frequency detection hysteresis value (F8-28 x F8-29), the DO stops outputting an active signal.

26: Frequency 1 reached
When the running frequency of the AC drive is within the detection range set by F8-30, the DO outputs an active signal. Frequency detection range: F8-30 - F8-31 x F0-10 (Maximum frequency) to F8-30 + F8-31 x F0-10
27: Frequency 2 reached
When the running frequency of the AC drive is within the detection range set by F8-32, the DO outputs an active signal. Frequency detection range: F8-32 - F8-33 x F0-10 (Maximum frequency) to F8-32 + F8-33 x F0-10
28: Current 1 reached
When the output current of the AC drive is within the detection range set by F8-38, the DO outputs an active signal. Current detection range = F8-38 - F8-39 x F1-03 (Rated motor current) to F8-38 + F8-39 x F1 03.
29: Current 2 reached
When the output current of the AC drive is within the detection range set by F8-40, the DO outputs an active signal. Current detection range = F8-40 - F8-41 x F1-03 (Rated motor current) to F8-40 + F8-41 x F1 03.
30: Timing reached
With the timing function (F8-42) enabled, when the current running time of the AC drive reaches the set time, the terminal outputs an active signal. The timing duration is set by F8-43 and F8-44.
31: AI1 input limit exceeded
The terminal outputs an active signal when AI1 input is higher than the value of F8-46 (AI1 input voltage upper limit) or lower than the value of F8-45 (AI1 input voltage lower limit).
32: Drive output load loss
The terminal outputs an active signal when the drive is in the load loss state.
33: Reverse running
The terminal outputs an active signal when the AC drive runs in the reverse direction.
34: Zero current state
When the output current of the AC drive is within the zero-current range for a period exceeding the value of F8-35 (zero current detection delay), the DO outputs an active signal. Zero current detection range = 0 to F8-34 x F1-03
35: Module temperature reached
The terminal outputs an active signal when the inverter heatsink temperature (F7-07) reaches the value of F8-47 (module temperature reach).
36: Output current limit exceeded
When the output current of the AC drive is greater than F8-36 (output overcurrent threshold) for a period exceeding the value of F8-37 (output overcurrent detection delay), the DO outputs an active signal.

37: Frequency lower limit reached (output even at stop)
The terminal outputs an active signal when the running frequency reaches the frequency lower limit (F0-14). The terminal still outputs the active signal when the drive is in the stop state.
38: Alarm (all faults)
If a fault occurs on the AC drive and the AC drive continues to run upon fault, the DO outputs an active signal. For details about the fault protection action, see F9-47 to F9-50.
39: Motor overheat
The terminal outputs an active signal when the motor temperature reaches the value of F9-58 (Motor overtemperature warning threshold). You can check the motor temperature using U0-34.
40: Present operating time reached
The terminal outputs an active signal when the present running time of the AC drive is longer than the value of F8-53 (current running time threshold).
41: Fault output (coast to stop; no output upon undervoltage)
When a fault occurs on the AC drive (excluding undervoltage), the DO outputs an active signal.

A1-12 VDO2 function selection

Address:	0xA10C	Effective mode:	/
Min.:	0	Unit:	-
Max.:	41	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
Same as A1-11.
Parameter description
Same as A1-11.

A1-13 VDO3 function selection

Address:	0xA10D	Effective mode:	/
Min.:	0	Unit:	-
Max.:	41	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
Same as A1-11.
Parameter description
Same as A1-11.

A1-14 VDO4 function selection

Address:	0xA10E	Effective mode:	/
Min.:	0	Unit:	-
Max.:	41	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
Same as A1-11.
Parameter description
Same as A1-11.

A1-15 VDO5 function selection

Address:	0xA10F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	41	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
Same as A1-11.
Parameter description
Same as A1-11.

A1-16 VDO1 output delay

Address:	0xA110	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter indicates the VDO1 output delay time.

A1-17 VDO2 output delay

Address:	0xA111	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter indicates the VDO2 output delay time.

A1-18 VDO3 output delay

Address:	0xA112	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter indicates the VDO3 output delay time.

A1-19 VDO4 output delay

Address:	0xA113	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter indicates the VDO4 output delay time.

A1-20 VDO5 output delay

Address:	0xA114	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	3600.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 to 3600.0
Parameter description
This parameter indicates the VDO5 output delay time.

A1-21 **Active state of VDO**

Address:	0xA115	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11111	Data type:	UInt16
Default:	0	Change mode:	Real time:

Range:

Ones: VDO1

0: Positive logic

1: Negative logic

Tens: VDO2

0: Positive logic

1: Negative logic

Hundreds: VDO3

0: Positive logic

1: Negative logic

Thousands: VDO4

0: Positive logic

1: Negative logic

Ten thousands: VDO5

0: Positive logic

1: Negative logic

Parameter description

This parameter is used to set the active state of the VDO output terminal.

0: Positive logic

When the terminal is inactive, 0 is output. When the terminal is active, 1 is output.

1: Negative logic

When the terminal is inactive, 1 is output. When the terminal is active, 0 is output.

13.17A2 Motor 2 Control Parameters

A2-00 **Motor type**

Address:	0xA200	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Common asynchronous motor
1: Variable frequency asynchronous motor

Parameter description

This parameter is used to set the motor type.

0: Common asynchronous motor

A common asynchronous motor is suitable for applications with normal voltage but often full load. It is designed based on constant frequency and constant voltage. Therefore, it may not meet all the frequency and speed control requirements.

1: Variable frequency asynchronous motor

A variable frequency motor can adjust its frequency and speed according to the load. When the voltage is low, the variable frequency motor can reduce the frequency for a reliable start. When the load is light, it can reduce the frequency, speed, and current to save energy.

A2-01 Rated motor power

Address:	0xA201	Effective mode:	/
Min.:	0.1	Unit:	kW
Max.:	6553.5	Data type:	UInt16
Default:	3.7	Change mode:	At stop

Range:

0.1 kW to 6553.5 kW

Parameter description

This parameter indicates the power of the motor during normal operation. Its value is the product of the rated motor voltage multiplied by the rated motor current. Select a motor with a proper power rating on the premise that the motor can meet the requirements of mechanical load. Take the motor heat dissipation, allowable overload capacity, and starting capacity into account.

A2-02 Rated motor voltage

Address:	0xA202	Effective mode:	/
Min.:	1	Unit:	V
Max.:	2000	Data type:	UInt16
Default:	380	Change mode:	At stop

Range:

1 V to 2000 V

Parameter description

The rated motor voltage indicates the voltage of the motor during normal operation, which usually refers to the line voltage.

A2-03 **Rated motor current**

Address:	0xA203	Effective mode:	/
Min.:	0.01	Unit:	A
Max.:	655.35	Data type:	UInt16
Default:	9.00	Change mode:	At stop

Range:

0.01 A to 655.35 A

Parameter description

The rated motor current indicates the current of the motor during normal operation, which usually refers to the line current.

Note that when the power is lower than or equal to 55 kW, the decimal place is 0.01. When the power is higher than 55 kW, the decimal place is 0.1.

A2-04 **Rated motor frequency**

Address:	0xA204	Effective mode:	/
Min.:	0.01	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50.00	Change mode:	At stop

Range:

0.01 Hz to F0-10

Parameter description

The rated motor frequency indicates the frequency of the power supply connected to the stator winding under the rated operation conditions of the motor.

A2-05 **Rated motor speed**

Address:	0xA205	Effective mode:	/
Min.:	1	Unit:	rpm
Max.:	65535	Data type:	UInt16
Default:	1460	Change mode:	At stop

Range:

1 rpm to 65535 rpm

Parameter description

The rated motor speed indicates the speed of the rotor under the rated operating conditions.

A2-06 **Stator resistance of asynchronous motor**

Address:	0xA206	Effective mode:	/
Min.:	0.001	Unit:	Ω
Max.:	65.535	Data type:	UInt16
Default:	1.204	Change mode:	At stop

Range:

0.001 Ω to 65.535 Ω

Parameter description

This parameter indicates the DC resistance of stator winding of the asynchronous motor. This parameter can be obtained through motor auto-tuning.

Note that when the power is lower than or equal to 55 kW, the decimal place is 0.001. When the power is higher than 55 kW, the decimal place is 0.0001.

A2-07 **Rotor resistance of asynchronous motor**

Address:	0xA207	Effective mode:	/
Min.:	0.001	Unit:	Ω
Max.:	65.535	Data type:	UInt16
Default:	0.908	Change mode:	At stop

Range:

0.001 Ω to 65.535 Ω

Parameter description

The rotor resistance of the asynchronous motor is the DC resistance of the motor rotor winding, which can be obtained through parameter auto-tuning of the motor in static or dynamic state.

Note that when the power is lower than or equal to 55 kW, the decimal place is 0.001. When the power is higher than 55 kW, the decimal place is 0.0001.

A2-08 **Leakage inductance of asynchronous motor**

Address:	0xA208	Effective mode:	/
Min.:	0.01	Unit:	mH
Max.:	655.35	Data type:	UInt16
Default:	5.28	Change mode:	At stop

Range:

0.01mH to 655.35mH

Parameter description

The leakage inductance of the asynchronous motor is caused by the leakage flux of the motor winding. Flux is generated upon current injection into the motor winding, which can be divided into main flux and leakage flux. The leakage flux is the leakage inductance. The parameter value can be obtained by auto-tuning of the motor in static or dynamic state.
Note that when the power is lower than or equal to 55 kW, the decimal place is 0.01. When the power is higher than 55 kW, the decimal place is 0.001.

A2-09 Mutual inductance of asynchronous motor

Address:	0xA209	Effective mode:	/
Min.:	0.1	Unit:	mH
Max.:	6553.5	Data type:	UInt16
Default:	158.6	Change mode:	At stop

Range:
0.1mH to 6553.5mH
Parameter description
When the current in one coil of the motor changes, induced electromotive force is generated in the adjacent coil. This mutual inductance electromotive force can be expressed by mutual inductance.
The mutual inductance of a motor can be roughly divided into two types. One is the inter-phase inductance of the stator or rotor, which is the inductance between two phases of the stator or rotor. The other is the inductance between the stator and the rotor, which will change with the rotor.
The parameter value can be obtained by parameter auto-tuning of the motor in the dynamic state.
Note that when the power is lower than or equal to 55 kW, the decimal place is 0.1. When the power is higher than 55 kW, the decimal place is 0.01.

A2-10 No-load current of asynchronous motor

Address:	0xA20A	Effective mode:	/
Min.:	0.01	Unit:	A
Max.:	A2-03	Data type:	UInt16
Default:	4.24	Change mode:	At stop

Range:
0.01 A to A2-03
Parameter description

This parameter indicates the current that passes through the three-phase winding of the stator during no-load operation of the asynchronous motor. The parameter can be obtained by parameter auto-tuning of the motor in dynamic state.
Note that when the power is lower than or equal to 55 kW, the decimal place is 0.01. When the power is higher than 55 kW, the decimal place is 0.1.

A2-37 Parameter auto-tuning selection

Address	0xA225	Effective mode:	/
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
0: No auto-tuning
1: Auto-tuning of some asynchronous motor parameters in static state
2: Auto-tuning of all asynchronous motor parameters in dynamic state
3: Auto-tuning of all asynchronous motor parameters in static state
Parameter description
For high-performance motor operation, accurate motor parameters are required. Select different motor auto-tuning modes based on the motor type.
0: No auto-tuning
No auto-tuning is performed.
1: Auto-tuning of some asynchronous motor parameters in static state
This mode is applicable to scenarios where the motor cannot be disconnected from loads and auto-tuning in dynamic state is not feasible. In this mode, some motor parameters are auto-tuned, including F1-06 (Stator resistance of asynchronous motor), F1-07 (Rotor resistance of asynchronous motor), and F1-08 (Leakage inductance of asynchronous motor). Other parameters use the default values.

2: Auto-tuning of all asynchronous motor parameters in dynamic state
This mode is applicable to scenarios requiring high-speed operation. This auto-tuning mode can be performed without load or with pure inertia load. In this mode, all motor parameters are auto-tuned, including F1-06 (Stator resistance of asynchronous motor), F1-07 (Rotor resistance of asynchronous motor), F1-08 (Leakage inductance of asynchronous motor), F1-09 (Mutual inductance of asynchronous motor), F1-10 (No-load current of asynchronous motor), and F1-30 (Encoder phase sequence).
3: Auto-tuning of all asynchronous motor parameters in static state
This mode is applicable to scenarios where the motor cannot be disconnected from loads and auto-tuning in dynamic state is not feasible. Auto-tuning is performed on some motor parameters, including F1-06 (Asynchronous motor stator resistance), F1-07 (Asynchronous motor rotor resistance), F1-08 (Asynchronous motor leakage inductance), F1-09 (Asynchronous motor mutual inductance), and F1-10 (Asynchronous motor no-load current). However, F1-09 and F1-10 have higher precision in the dynamic auto-tuning mode than in this mode.

A2-62 Motor 2 control mode

Address:	0xA23E	Effective mode:	/
Min.:	2	Unit:	-
Max.:	2	Data type:	UInt16
Default:	2	Change mode:	Unchangeable

Range:
2: V/f control
Parameter description
2: V/f control (open loop speed control)
It is applicable to scenarios without high requirements on load control performance such as fans and pumps. If one drive is used to control multiple motors, only the V/f control mode can be used.

A2-63 Motor 2 acceleration/deceleration time selection

Address:	0xA23F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Same as motor 1
1: Acceleration/Deceleration time 1
2: Acceleration/Deceleration time 2
3: Acceleration/Deceleration time 3
4: Acceleration/Deceleration time 4

Parameter description

This parameter is used to select the acceleration/deceleration time for motor 2.

A2-64 Motor 2 torque boost

Address:	0xA240	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	30.0	Data type:	UInt16
Default:	1.0	Change mode:	Real time

Range:

0.0% to 30.0%

Parameter description

The torque boost function is generally applicable to low-frequency operations of the drive. The output torque of the AC drive in the V/f control mode is proportional to the frequency. During operation at low frequencies, the motor torque is low when the motor runs at a low speed. In this case, you can set this parameter to increase the output voltage of the drive to improve the output torque.

Note that the torque boost value must be set properly. Otherwise, overload protection can be triggered.

A2-66 Motor 2 oscillation suppression gain

Address:	0xA242	Effective mode:	/
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0-100

Parameter description

The higher the oscillation gain, the better the suppression effect.

13.18A5 Control Optimization Parameters

A5-00 **Frequency upper limit for DPWM switchover**

Address:	0xA500	Effective mode:	/
Min.:	5.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	8.00	Change mode:	Real time

Range:

5.00 Hz to F0-10

Parameter description

The drive supports two PWM wave modulation modes, which are CPWM and DPWM. When the operating frequency is higher than the value of A5-00, the DPWM mode applies. When the operating frequency is lower than the value of A5-00, the CPWM mode applies. The DPWM mode can improve the drive efficiency, whereas the CPWM mode can reduce the motor noise.
Increasing A5-00 to the maximum frequency will reduce the motor noise.

A5-01 **PWM modulation mode**

Address:	0xA501	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0: Asynchronous modulation

1: Synchronous modulation

Parameter description

When the result of the carrier frequency divided by the running frequency is smaller than 10, output current oscillation or large current harmonic waves may occur. To address the problem, set this parameter to 1 (synchronous modulation).

0: Asynchronous modulation

In this mode, the carrier frequency and signal wave frequency are not synchronized. The carrier frequency usually remains unchanged. The carrier ratio changes with the signal wave frequency.

1: Synchronous modulation
In this mode, the carrier frequency and signal wave frequency are synchronized.
The carrier frequency and signal frequency change simultaneously, and the carrier ratio remains unchanged. Therefore, the number of transverse SPWM pulses formed in one cycle is fixed, and the equivalent sine wave is symmetrical.

A5-02 Dead-zone compensation mode

Address:	0xA502	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change mode:	Real time

Range:
0: No compensation
1: Compensation mode 1
Parameter description
A dead zone must be reserved for the switch signals of the upper and lower switching devices on same bridge arm of the drive. Dead zone compensation can improve the current waveform of the motor during operating at low frequency.
0: No compensation
1: Compensation mode 1

A5-03 Random PWM depth

Address:	0xA503	Effective mode:	/
Min.:	0	Unit:	-
Max.:	10	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:
0-10
Parameter description
If the motor noise is loud, setting A5-03 to a non-zero value can suppress the motor noise. The higher the value, the better the effect. However, if the value is too high, the motor control may be affected. Therefore, set this parameter to 1 first during commissioning and then increase it by 1 each time as required.

A5-04 Fast current limit

Address:	0xA504	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change mode:	Real time

Range:
0: Disable
1: Enable
Parameter description
This function is used to minimize the possibility of overcurrent faults, ensuring normal operation of the AC drive.
It is recommended to disable this function in hoist applications, such as cranes.

A5-05 Voltage overmodulation coefficient

Address:	0xA505	Effective mode:	/
Min.:	100	Unit:	-
Max.:	110	Data type:	UInt16
Default:	105	Change mode:	At stop

Range:
100 to 110
Parameter description
-

A5-06 Undervoltage threshold

Address:	0xA506	Effective mode:	/
Min.:	210.0	Unit:	V
Max.:	420.0	Data type:	UInt16
Default:	350.0	Change mode:	Real time

Range:
210.0 V to 420.0 V
Parameter description
When the bus voltage is lower than the value of A5-06, the AC drive reports Err05 to Err07 and Err09.

A5-08 Low speed carrier frequency

Address:	0xA508	Effective mode:	/

Min.:	0.0	Unit:	kHz
Max.:	8.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:
0.0 kHz to 8.0 kHz
Parameter description
-

A5-09 Overvoltage threshold

Address:	0xA509	Effective mode:	/
Min.:	650.0	Unit:	V
Max.:	820.0	Data type:	UInt16
Default:	820.0	Change mode:	At stop

Range:
650.0 V to 820.0 V
Parameter description
When the bus voltage is higher than the value of A5-09, the AC drive reports Err05 to Err07 and Err09.

A5-10 Energy saving control

Address:	0xA50A	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:
0: Invalid
1: Valid
Parameter description
-

A5-11 Frequency limit threshold for DC braking at low speed

Address:	0xA50B	Effective mode:	/
Min.:	1	Unit:	Hz
Max.:	20	Data type:	UInt16
Default:	5	Change mode:	At stop

Range:

1 Hz to 20 Hz

Parameter description

-

13.19A6 AI Curve Setting

A6-00 **Minimum input of curve 4**

Address:	0xA600	Effective mode:	/
Min.:	-10.00	Unit:	V
Max.:	A6-02	Data type:	Int16
Default:	0.00	Change mode:	Real time

Range:

-10.00 V to A6-02

Parameter description

A6-00 corresponds to the x axis of the minimum input point on AI curve 4, namely the minimum analog input voltage or current.

A6-01 **Percentage corresponding to the minimum input of curve 4**

Address:	0xA601	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

A6-01 corresponds to the y axis of the minimum input point on AI curve 4, namely the set value corresponding to the minimum analog input.

A6-02 **Input of inflection point 1 on curve 4**

Address:	0xA602	Effective mode:	/
Min.:	A6-00	Unit:	V
Max.:	A6-04	Data type:	Int16
Default:	3.00	Change mode:	Real time

Range:

A6-00 to A6-04

Parameter description

A6-02 corresponds to the x axis of the inflection point 1 input on AI curve 4, namely the minimum analog input voltage.

A6-03 Percentage corresponding to the input of curve 4 inflection point 1

Address:	0xA603	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	30.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

A6-03 corresponds to the y axis of the input of inflection point 1 on AI curve 4, namely the set value corresponding to the minimum analog input.

A6-04 Input of inflection point 2 on curve 4

Address:	0xA604	Effective mode:	/
Min.:	A6-02	Unit:	V
Max.:	A6-06	Data type:	Int16
Default:	6.00	Change mode:	Real time

Range:

A6-02 to A6-06

Parameter description

A6-04 corresponds to the x axis of the inflection point 2 input on AI curve 4, namely the minimum analog input voltage.

A6-05 Percentage corresponding to the input of curve 4 inflection point 2

Address:	0xA605	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	60.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

A6-05 corresponds to the y axis of the input of inflection point 2 on AI curve 4, namely the set value corresponding to the minimum analog input.

A6-06 Maximum input of curve 4

Address:	0xA606	Effective mode:	/
Min.:	A6-04	Unit:	V
Max.:	10.00	Data type:	Int16
Default:	10.00	Change mode:	Real time

Range:

A6-04 to 10.00 V

Parameter description

A6-06 corresponds to the x axis of the maximum input point on AI curve 4, namely the maximum analog input voltage or current.

A6-07 Percentage corresponding to the maximum input of curve 4

Address:	0xA607	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	100.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

A6-07 corresponds to the y axis of the maximum input point on AI curve 4, namely the set value corresponding to the maximum analog input.

A6-08 Minimum input of curve 5

Address:	0xA608	Effective mode:	/
Min.:	-10.00	Unit:	V
Max.:	A6-10	Data type:	Int16
Default:	-10.00	Change mode:	Real time

Range:

-10.00 V to A6-10

Parameter description

A6-08 corresponds to the x axis of the minimum input point on AI curve 5, namely the minimum analog input voltage or current.

A6-09 Percentage corresponding to the minimum input of curve 5

Address:	0xA609	Effective mode:	/
Min.:	-100.0	Unit:	%

Max.:	100.0	Data type:	Int16
Default:	-100.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

A6-09 corresponds to the y axis of the minimum input point on AI curve 5, namely the set value corresponding to the minimum analog input.

A6-10 Input of inflection point 1 on curve 5

Address:	0xA60A	Effective mode:	/
Min.:	A6-08	Unit:	V
Max.:	A6-12	Data type:	Int16
Default:	-3.00	Change mode:	Real time

Range:

A6-08 to A6-12

Parameter description

A6-10 corresponds to the x axis of the inflection point 1 on AI curve 5, namely the minimum analog input voltage.

A6-11 Percentage corresponding to the input of curve 5 inflection point 1

Address:	0xA60B	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	-30.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

A6-11 corresponds to the y axis of the inflection point 1 on AI curve 5, namely the set value corresponding to the minimum analog input.

A6-12 Input of inflection point 2 on curve 5

Address:	0xA60C	Effective mode:	/
Min.:	A6-10	Unit:	V
Max.:	A6-14	Data type:	Int16
Default:	3.00	Change mode:	Real time

Range:

A6-10 to A6-14

Parameter description

A6-12 corresponds to the x axis of the inflection point 2 input on AI curve 5, that is, the minimum analog input voltage.

A6-13 Percentage corresponding to the input of curve 5 inflection point 2

Address:	0xA60D	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	30.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

A6-13 corresponds to the y axis of the input of inflection point 2 on AI curve 5, namely the set value corresponding to the minimum analog input.

A6-14 Curve 5 maximum input

Address:	0xA60E	Effective mode:	/
Min.:	A6-12	Unit:	V
Max.:	10.00	Data type:	Int16
Default:	10.00	Change mode:	Real time

Range:

A6-12 to 10.00 V

Parameter description

A6-14 corresponds to the x axis of the maximum input point on AI curve 5, namely the maximum analog input voltage or current.

A6-15 Percentage corresponding to the maximum input of curve 5

Address:	0xA60F	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	100.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

A6-15 corresponds to the y axis of the maximum input point on AI curve 5, namely the set value corresponding to the maximum analog input.

A6-16 AI1 monitored minimum value

Address:	0xA610	Effective mode:	Real time
Min.:	F4-13	Unit:	V
Max.:	A6-17	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

F4-13 to A6-17

Parameter description

This parameter indicates the minimum value monitored by AI1.

A6-17 AI1 monitored maximum value

Address:	0xA611	Effective mode:	Real time
Min.:	A6-16	Unit:	V
Max.:	F4-15	Data type:	UInt16
Default:	10.00	Change mode:	Real time

Range:

A6-16 to F4-15

Parameter description

This parameter indicates the maximum value monitored by AI1.

A6-18 AI2 monitored minimum value

Address:	0xA612	Effective mode:	Real time
Min.:	F4-18	Unit:	V
Max.:	A6-19	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

F4-18 to A6-19

Parameter description

This parameter indicates the minimum value monitored by AI2.

A6-19 AI2 monitored maximum value

Address:	0xA613	Effective mode:	Real time
Min.:	A6-18	Unit:	V
Max.:	F4-20	Data type:	UInt16
Default:	10.00	Change mode:	Real time

Range:
A6-18 to F4-20
Parameter description
This parameter indicates the maximum value monitored by AI2.

A6-20 AI3 monitored minimum value

Address:	0xA614	Effective mode:	Real time
Min.:	F4-23	Unit:	V
Max.:	A6-21	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:
F4-23 to A6-21
Parameter description
This parameter indicates the minimum value monitored by AI3.

A6-21 AI3 monitored maximum value

Address:	0xA615	Effective mode:	Real time
Min.:	A6-20	Unit:	V
Max.:	F4-25	Data type:	UInt16
Default:	10.00	Change mode:	Real time

Range:
A6-20 to F4-25
Parameter description
This parameter indicates the maximum value monitored by AI3.

A6-22 Analog value alarm

Address	0xA616	Effective mode:	Real time
Min.:	0x0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0x0	Change mode:	Real time

Range:
Bit 0: AI1 value < minimum value (A6-16)
Bit 1: AI1 value > maximum value (A6-17)
Bit 2: AI2 value < minimum value (A6-18)
Bit 3: AI2 value > maximum value (A6-19)
Bit 4: AI3 value < minimum value (A6-20)
Bit 5: AI3 value > maximum value (A6-21)

Parameter description

Bit 0: AI1 value < minimum value (A6-16)
Bit 1: AI1 value > maximum value (A6-17)
Bit 2: AI2 value < minimum value (A6-18)
Bit 3: AI2 value > maximum value (A6-19)
Bit 4: AI3 value < minimum value (A6-20)
Bit 5: AI3 value > maximum value (A6-21)
When a bit is set to 1, the alarm detection function is enabled. For example, if bit 0 is set to 1 and the AI1 input voltage keeps lower than the value of A6-16 for the time defined by A6-30, the drive reports Err49 (or A49). The input value is a hex. Input C to make bit 3 and bit 2 be 1.

A6-23 Processing mode for analog value overlimit

Address:	0xA617	Effective mode:	Real time
Min.:	0	Unit:	-
Max.:	5	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0-5

Parameter description

This parameter is used to set the response action of the drive when the analog value limit is exceeded.
0: No action
1: Stop at fault
2: Alarm, operating at last speed
3: Alarm, operating at the speed defined by A6-33
4: Alarm, operating at last speed (lower limit invalid)
5: Alarm, operating at the speed defined by A6-33 (lower limit invalid)

A6-24 AI1 jump point

Address:	0xA618	Effective mode:	Real time
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter is used to set the AI1 jump point. If the input value is within the range defined by A6-25, the value of the jump point will be output.

A6-25 AI1 jump amplitude

Address:	0xA619	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.5	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

This parameter is used to set the AI1 jump amplitude. If the input is within the range defined by A6-25, the value of the jump point will be outputted.

A6-26 AI2 jump point

Address:	0xA61A	Effective mode:	Real time
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter is used to set the AI2 jump point. If the input value is within the range defined by A6-27, the value of the jump point will be output.

A6-27 AI2 jump amplitude

Address:	0xA61B	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.5	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

This parameter is used to set the AI2 jump amplitude. If the input is within the range defined by A6-27, the value of the jump point will be outputted.

A6-28 AI3 jump point

Address:	0xA61C	Effective mode:	Real time
Min.:	-100.0	Unit:	%

Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Real time

Range:

-100.0% to 100.0%

Parameter description

This parameter is used to set the AI3 jump point. If the input value is within the range defined by A6-29, the value of the jump point will be output.

A6-29 AI3 jump amplitude

Address:	0xA61D	Effective mode:	Real time
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.5	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

This parameter is used to set the AI3 jump amplitude. If the input is within the range defined by A6-29, the value of the jump point will be outputted.

A6-30 AI1 overlimit detection time

Address:	0xA61E	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	10.0	Data type:	UInt16
Default:	0.1	Change mode:	Real time

Range:

0.0s to 10.0s

Parameter description

This parameter defines the detection time for AI1 limit violation. AI is disconnected when the detection time has been exceeded.

A6-31 AI2 overlimit detection time

Address:	0xA61F	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	10.0	Data type:	UInt16
Default:	0.1	Change mode:	Real time

Range:

0.0s to 10.0s

Parameter description

This parameter defines the detection time for AI2 limit violation. AI is disconnected when the detection time has been exceeded.

A6-32 AI3 overlimit detection time

Address:	0xA620	Effective mode:	Real time
Min.:	0.0	Unit:	s
Max.:	10.0	Data type:	UInt16
Default:	0.1	Change mode:	Real time

Range:

0.0s to 10.0s

Parameter description

This parameter defines the detection time for AI3 limit violation. AI is disconnected when the detection time has been exceeded.

A6-33 Safe speed of analog value overlimit

Address:	0xA621	Effective mode:	Real time
Min.:	0.00	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.00	Change mode:	Real time

Range:

0.00 Hz to F0-10

Parameter description

This parameter defines the safe speed of analog value overlimit when A6-23 is set to 3.

13.20A7 Programmable Card Parameters

A7-00 PLC card function selection

Address:	0xA700	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Invalid

1: Valid

Parameter description

0: Invalid. The interface for connecting the programmable card is disabled.

1: Valid. The interface for connecting the programmable card is enabled.

A7-01 Output terminal control mode

Address:	0xA701	Effective mode:	/
Min.:	0	Unit:	-
Max.:	11111	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

Ones: FMR (FM used as digital output)

0: Controlled by the drive

1: Controlled by the PLC

Tens: Relay (T/A-T/B-T/C)

0: Controlled by the drive

1: Controlled by the PLC

Hundreds: DO1

0: Controlled by the drive

1: Controlled by the PLC

Thousands: FMP (FM used as pulse output)

0: Controlled by the drive

1: Controlled by the PLC

Ten thousands: AO1

0: Controlled by the drive

1: Controlled by the PLC

Parameter description

This parameter is used to select the control mode of the output terminal on the control board.

A7-02 PLC AI3 function configuration

Address	0xA702	Effective mode:	/
Min.:	0	Unit:	-
Max.:	7	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: AI3 voltage input, AO2 voltage output
1: AI3 voltage input, AO2 current output
2: AI3 current input, AO2 voltage output
3: AI3 current input, AO2 current output
4: AI3 PTC input, AO2 voltage output
5: AI3 PTC input, AO2 current output
6: AI3 PTC100 input, AO2 voltage output
7: AI3 PTC100 input, AO2 current output

Parameter description

The user programmable card provides an analog input terminal AI3 and an analog output terminal AO2. Set DIP switch S1, jumper J2 and jumper J3 on the card and then set A7-02.

Settings of S1, J2, and J3 must be consistent with settings in A7-02. Otherwise, the data transmission will be abnormal.

A7-03 FMP output

Address:	0xA703	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

When the FMP is controlled by the PLC program (thousands place of A7-01 set to 1), the FMP output can be controlled by changing the value of A7-03. Its percentage base is the maximum frequency of the FMP output (F5-09).

A7-04 AO1 output

Address:	0xA704	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	100.0	Data type:	UInt16
Default:	0.0	Change mode:	Real time

Range:

0.0% to 100.0%

Parameter description

When AO1 is controlled by the PLC program (ten thousands place of A7-01 set to 1), the AO1 output can be controlled by changing the value of A7-04. Its percentage base is 10 V (voltage signal) or 20 mA (current signal).

A7-05 Digital output

Address:	0xA705	Effective mode:	/
Min.:	0	Unit:	-
Max.:	111	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

Ones: FMR

0: Inactive

1: Active

Tens: Relay 1

0: Inactive

1: Active

Hundreds: DO1

0: Inactive

1: Active

Parameter description

When the digital output (FMR/relay 1/DO) is controlled by the PLC program (ones, tens, or hundreds place of A7-01 set to 1), the digital output can be controlled by changing the value of A7-05.

Ones: FMR

0: Inactive

1: Active

Tens: Relay 1

0: Inactive

1: Active

Hundreds: DO1

0: Invalid

1: Valid

A7-06 Frequency set by programmable card

Address:	0xA706	Effective mode:	/
Min.:	-100.00	Unit:	%
Max.:	100.00	Data type:	Int16
Default:	0.00	Change mode:	Real time:

Range:

-100.00% to 100.00%

Parameter description

When the programmable card is enabled (A7-00 = 1) and the frequency is set by communication, the frequency reference of the AC drive is determined by the setting of A7-06. You can control the frequency reference of AC drive through the PLC program by operating the corresponding D component, which can change the value of A7-06.
The percentage base is the maximum frequency (F0-10).

A7-07 Torque set by programmable card

Address:	0xA707	Effective mode:	/
Min.:	-200.0	Unit:	%
Max.:	200.0	Data type:	Int16
Default:	0.0	Change mode:	Real time:

Range:
-200.0% to 200.0%
Parameter description
When the torque reference is set by communication and the programmable card is enabled (A7-00 = 1), the torque reference of the AC drive is determined by the setting of A7-07. You can control the torque reference of AC drive through the PLC program by operating the corresponding D component, which can change the value of A7-07.
The percentage base is the rated motor torque.

A7-08 Command given by user programmable card

Address:	0xA708	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time:

Range:
0: No command
1: Forward run
2: Reverse run
3: Forward jog
4: Reverse jog
5: Coast to stop
6: Decelerate to stop
7: Fault reset

Parameter description

When the programmable card is enabled (A7-00 = 1) and the running command is set by communication (F0-02 = 2), the action of the AC drive is determined by the setting of A7-08. You can control the AC drive through the PLC program by operating the corresponding D component, which can change the value of A7-08.

A7-09 Fault set by programmable card

Address:	0xA709	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Real time

Range:

0 to 65535

Parameter description

0: No fault

80 to 89: User-defined fault

Note: If A7-09 is set to a value out of 80 to 89, the setting will not take effect.

13.21 A8 Master/Slave Control

A8-00 Point-to-point communication

Address:	0xA800	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change mode:	At stop

Range:

0: Invalid

1: Valid

Parameter description

-

A8-01 Master/Slave selection

Address:	0xA801	Effective mode:	/
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16

Default:	0	Change mode:	At stop

Range:

0: Master

1: Slave

Parameter description

This parameter is used to set the AC drive as the master or slave.

During point-to-point communication, set FD-00 (CANlink communication baud rate). The communication address is assigned automatically based on whether the master or slave is selected.

A8-02 Selection of action of the slave

Address	0xA802	Effective mode:	/
Min.:	0	Unit:	-
Max.:	111	Data type:	UInt16
Default:	11	Change mode:	At stop

Range:

Ones: Whether the slave follows the operation command of the master

0: No

1: Yes

Tens: Whether the slave fault information is transmitted

0: No

1: Yes

Hundreds: Whether the master reports a fault (Err16) upon disconnection of the slave

0: No

1: Yes

Parameter description

Note: When the slave connection is abnormal, the master does not report a fault when stopping and reports a fault (Err16) during running.

When F0-02 is set to 2 (Communication control) for the slave in the master/slave control mode and the ones place of A8-02 is set to 1, the slave runs/stops by following the master's running command.

When the tens place of A8-02 is set to 1, the fault information is sent to the master when the slave is faulty.

When the hundreds place of A8-02 is set to 1, an alarm is reported when the slave is disconnected.

A8-03 Function selection for data received by the slave

Address	0xA803	Effective mode:	/

Min.:	1	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change mode:	At stop

Range:

0: Running frequency of master

1: Target frequency of master

Parameter description

0: Running frequency of master. The frequency transferred from the master to the slave is the running frequency of the master. If the value of F8-15 (Droop ratio) is not 0, the frequency transferred from the master to the slave is the droop control frequency. This is applied to droop control or speed synchronization control (that is, the slave is in the speed mode). In the load distribution control (that is, the slave is in the torque mode), the frequency transferred from the master to the slave is the running frequency of the master. In this case, the value of F8-15 must be set to 0.

1: Target frequency of master. The frequency transferred from the master to the slave is the target frequency of the master.

A8-04 **Zero offset of received data (torque)**

Address:	0xA804	Effective mode:	/
Min.:	-100.00	Unit:	%
Max.:	100.00	Data type:	Int16
Default:	0.00	Change mode:	Real time

Range:

-100.00% to 100.00%

Parameter description

This parameter is used to correct the received data and used to define the reference relationship between the master and slave.

When A0-00 is set to 0, A8-04 and A8-05 are used to correct frequency references.

When A0-00 is set to 1, A8-04 and A8-05 are used to correct torque references.

In the calculation method of A8-04 and A8-05, b represents zero offset, k represents gain, x represents the data received by the slave, and y represents the actually used data. The formula is as follows: y = kx + b, and the range is from -100.00% to 100.00%.

A8-05 **Gain of received data (torque)**

Address:	0xA805	Effective mode:	/
Min.:	-10.00	Unit:	-

Max.:	10.00	Data type:	Int16
Default:	1.00	Change mode:	Real time

Range:
-10.00 to +10.00
Parameter description
This parameter is used to correct the received data and used to define the reference relationship between the master and slave.
When A0-00 is set to 0, A8-04 and A8-05 are used to correct frequency references.
When A0-00 is set to 1, A8-04 and A8-05 are used to correct torque references.
In the calculation method of A8-04 and A8-05, b represents zero offset, k represents gain, x represents the data received by the slave, and y represents the actually used data. The formula is as follows: y = kx + b, and the range is from -100.00% to 100.00%.

A8-06 Master-slave communication heartbeat time

Address:	0xA806	Effective mode:	/
Min.:	0.0	Unit:	s
Max.:	10.0	Data type:	UInt16
Default:	1.0	Change mode:	At stop

Range:
0.0s to 10.0s
Parameter description
This parameter is used to set the time required to detect communication interruption of the master or slave in point-to-point communication. To disable the detection function, set this parameter to 0.

A8-07 Data transmission cycle of the master in point-to-point communication

Address:	0xA807	Effective mode:	/
Min.:	0.001	Unit:	s
Max.:	10.000	Data type:	UInt16
Default:	0.001	Change mode:	At stop

Range:
0.001 to 10.000
Parameter description
-

A8-08 **Zero offset of received frequency**

Address:	0xA808	Effective mode:	/
Min.:	-100.00	Unit:	-
Max.:	100.00	Data type:	Int16
Default:	0.00	Change mode:	Real time

Range:
-100.00 to 100.00
Parameter description
-

A8-09 **Gain of received frequency**

Address:	0xA809	Effective mode:	/
Min.:	-10.00	Unit:	-
Max.:	10.00	Data type:	Int16
Default:	1.00	Change mode:	Real time

Range:
-10.00 to +10.00
Parameter description
-

A8-10 **Anti-runaway coefficient**

Address:	0xA80A	Effective mode:	/
Min.:	0.00	Unit:	-
Max.:	100.00	Data type:	Int16
Default:	10.00	Change mode:	Real time

Range:
0.00 to 100.00
Parameter description
-

A8-11 **Maximum reverse deviation of slave frequency**

Address:	0xA80B	Effective mode:	/
Min.:	0.20	Unit:	%
Max.:	10.00	Data type:	UInt16
Default:	0.50	Change mode:	Real time

Range:
0.20% to 10.00%
Parameter description
-

13.22AC AI/AO Correction

AC-00 **AI1 measured voltage 1**

Address:	0xAC00	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	2.000	Change mode:	Real time:

Range:
-10.000 V to 10.000 V
Parameter description
When analog voltage correction is conducted on AI1, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI1 voltage before correction (U0-21).

AC-01 **AI1 displayed voltage 1**

Address:	0xAC01	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	2.000	Change mode:	Real time

Range:
-10.000 V to 10.000 V
Parameter description
When analog voltage correction is conducted on AI1, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI1 voltage before correction (U0-21).

AC-02 **AI1 measured voltage 2**

Address:	0xAC02	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16

Default:	8.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is conducted on AI1, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI1 voltage before correction (U0-21).

AC-03 AI1 displayed voltage 2

Address:	0xAC03	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	8.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is conducted on AI1, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI1 voltage before correction (U0-21).

AC-04 AI2 measured voltage 1

Address:	0xAC04	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	2.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is conducted on AI2, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI2 voltage before correction (U0-22).

AC-05 AI2 displayed voltage 1

Address:	0xAC05	Effective mode:	/

Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	2.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is conducted on AI2, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI2 voltage before correction (U0-22).

AC-06 AI2 measured voltage 2

Address:	0xAC06	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	8.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is conducted on AI2, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI2 voltage before correction (U0-22).

AC-07 AI2 displayed voltage 2

Address:	0xAC07	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	8.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is conducted on AI2, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI2 voltage before correction (U0-22).

AC-08 AI3 measured voltage 1

Address:	0xAC08	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	2.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is conducted on AI3, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI3 voltage before correction (U0-23).

AC-09 AI3 displayed voltage 1

Address:	0xAC09	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	2.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is conducted on AI3, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI3 voltage before correction (U0-23).

AC-10 AI3 measured voltage 2

Address:	0xAC0A	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	8.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is conducted on AI3, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI3 voltage before correction (U0-23).

AC-11 AI3 displayed voltage 2

Address:	0xAC0B	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	8.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is conducted on AI3, a correction curve is obtained based on two points, which correspond to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI3 voltage before correction (U0-23).

AC-12 AO1 target voltage 1

Address:	0xAC0C	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	2.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is carried out on AO1, a correction curve is formed through two points, which correspond to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage measured.

AC-13 AO1 measured voltage 1

Address:	0xAC0D	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	2.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is carried out on AO1, a correction curve is formed through two points, which correspond to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage measured.

AC-14 AO1 target voltage 2

Address:	0xAC0E	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	8.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is carried out on AO1, a correction curve is formed through two points, which correspond to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage measured.

AC-15 AO1 measured voltage 2

Address:	0xAC0F	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	8.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is carried out on AO1, a correction curve is formed through two points, which correspond to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage measured.

AC-16 AO2 target voltage 1

Address:	0xAC10	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	2.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is carried out on AO2, a correction curve is formed through two points, which correspond to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage measured.

AC-17 AO2 measured voltage 1

Address:	0xAC11	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	2.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is carried out on AO2, a correction curve is formed through two points, which correspond to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage measured.

AC-18 AO2 target voltage 2

Address:	0xAC12	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	8.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is carried out on AO2, a correction curve is formed through two points, which correspond to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage measured.

AC-19 AO2 measured voltage 2

Address:	0xAC13	Effective mode:	/
Min.:	-10.000	Unit:	V
Max.:	10.000	Data type:	Int16
Default:	8.000	Change mode:	Real time

Range:

-10.000 V to 10.000 V

Parameter description

When analog voltage correction is carried out on AO2, a correction curve is formed through two points, which correspond to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage measured.

13.23U0 Monitoring Parameters

U0-00 Operating frequency

Address:	0x7000	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	500.00	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:

0.00 Hz to 500.00 Hz

Parameter description

This parameter displays the absolute value of the drive operating frequency.

U0-01 Frequency reference

Address:	0x7001	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	500.00	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:

0.00 Hz to 500.00 Hz

Parameter description

This parameter displays the absolute value of the drive frequency reference.

U0-02 Bus voltage

Address:	0x7002	Effective mode:	/
Min.:	0.0	Unit:	V
Max.:	3000.0	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:

0.0 V to 3000.0 V

Parameter description

This parameter displays the bus voltage of the AC drive.

U0-03 Output voltage

Address:	0x7003	Effective mode:	/
Min.:	0	Unit:	V
Max.:	1140	Data type:	UInt16

Default:	0	Change mode:	Unchangeable

Range:
0 V to 1140 V
Parameter description
This parameter displays the output voltage of the drive during operation.

U0-04 Output current

Address:	0x7004	Effective mode:	/
Min.:	0.00	Unit:	A
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.00 A to 655.35 A
Parameter description
This parameter displays the output current of the drive during operation. Note that when the power is lower than or equal to 55 kW, the decimal place is 0.01. When the power is higher than 55 kW, the decimal place is 0.1.

U0-05 Output power

Address:	0x7005	Effective mode:	/
Min.:	0.0	Unit:	kW
Max.:	3276.7	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:
0.0 kW to 3276.7 kW
Parameter description
This parameter displays the output power of the drive during operation.

U0-06 Output torque

Address:	0x7006	Effective mode:	/
Min.:	-200.0	Unit:	%
Max.:	200.0	Data type:	Int16
Default:	0.0	Change mode:	Unchangeable

Range:
-200.0% to 200.0%

Parameter description

This parameter displays the output torque of the drive during operation. The value is a percentage of the output torque to the rated motor torque.

U0-07 DI input state

Address	0x7007	Effective mode:	/
Min.:	0	Unit:	-
Max.:	32767	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0-32767

Parameter description

This parameter displays the input state of each DI terminal in hexadecimal. After converted to a binary equivalent, each bit represents the state of each DI terminal.

The bit values correspond to the following states.
1: DI terminal active
0: DI terminal inactive
The functions of the bits are as follows:
Bit 0: DI1
Bit 1: DI2
Bit 2: DI3
Bit 3: DI4
Bit 4: DI5
Bit 5: DI6
Bit 6: DI7
Bit 7: DI8
Bit 8: DI9
Bit 9: DI10
Bit 10: DI11
Bit 11: DI12
Bit 12: DI13
Bit 13: DI14
Bit 14: DI15
Bit 15: Reserved

U0-08 DO output state

Address	0x7008	Effective mode:	/
Min.:	0	Unit:	-
Max.:	32767	Data type:	UInt16

Default:	0	Change mode:	Unchangeable

Range:
0-32767
Parameter description
This parameter displays the output state of each DO terminal in hexadecimal. After converted to a binary equivalent, each bit represents the state of each DO terminal.

The bit values correspond to the following states.
1: DO terminal active
0: DO terminal inactive
The functions of the bits are as follows.
Bit 0: FMR
Bit 1: DO3 (control board relay)
Bit 2: DO4 (MD38IO expansion board relay)
Bit 3: DO1 (control board)
Bit 4: DO2 (MD38IO expansion board)
Bit 5: VDO1
Bit 6: VDO2
Bit 7: VDO3
Bit 8: VDO4
Bit 9: VDO5
Bit 10 to bit 15: Reserved

U0-09 AI1 voltage

Address:	0x7009	Effective mode:	/
Min.:	-10.57	Unit:	V
Max.:	10.57	Data type:	Int16
Default:	0.00	Change mode:	Unchangeable

Range:
-10.57 V to 10.57 V
Parameter description
This parameter displays AI1 voltage.

U0-10 AI2 voltage

Address:	0x700A	Effective mode:	/
Min.:	0.00	Unit:	V
Max.:	10.57	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.00 V to 10.57 V
Parameter description
This parameter displays AI2 voltage.

U0-11 AI3 voltage

Address:	0x700B	Effective mode:	/
Min.:	-10.57	Unit:	V
Max.:	10.57	Data type:	Int16
Default:	0.00	Change mode:	Unchangeable

Range:
-10.57 V to 10.57 V
Parameter description
This parameter displays AI3 voltage.

U0-12 Counting value

Address:	0x700C	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
This parameter displays the counting value in the counting function.

U0-13 Length value

Address:	0x700D	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
This parameter displays the length value in the fixed-length function.

U0-14 Load speed display

Address:	0x700E	Effective mode:	/
Min.:	0	Unit:	rpm
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 rpm to 65535 rpm

Parameter description

This parameter indicates the speed calculated based on the frequency reference. The formula is n = 60f/p, where f is the frequency reference U0-01 and p is the number of motor pole pairs.

The number of decimal places for U0-14 is determined by the ones place of F7-12. When the ones place of F7-12 is set to 0, the number of decimal places for U0-14 is 0 and the display range is 0 rpm to 65535 rpm. When the ones place of F7-12 is set to 1, the number of decimal places for U0-14 is 1 and the display range is 0.0 rpm to 65535.0 rpm. When the ones place of F7-12 is set to 2, the number of decimal places for U0-14 is 2 and the display range is 0.00 rpm to 65535.00 rpm.

U0-15 PID reference

Address:	0x700F	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

PID reference = PID reference (percentage) x FA-04 (PID reference feedback range)

U0-16 PID feedback

Address:	0x7010	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

PID feedback = PID feedback (percentage) x FA-04 (PID reference feedback range)

U0-17 PLC stage

Address:	0x7011	Effective mode:	/
Min.:	0	Unit:	-
Max.:	15	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0-15

Parameter description

This parameter displays the current simple PLC stage, which supports 16 speeds.

U0-18 Pulse input frequency

Address:	0x7012	Effective mode:	/
Min.:	0.00	Unit:	kHz
Max.:	100.00	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:

0.00 kHz to 100.00 kHz

Parameter description

This parameter displays DI5 high-speed pulse sampling frequency.

U0-19 Feedback speed

Address	0x7013	Effective mode:	/
Min.:	-5000.00	Unit:	Hz
Max.:	5000.00	Data type:	Int16
Default:	0.00	Change mode:	Unchangeable

Range:

-5000.00 Hz to 5000.00 Hz

Parameter description

This parameter displays the feedback speed (Hz).
The number of decimal places for U0-19 is determined by the tens place of F7-12. When the tens place of F7-12 (number of decimal places for load speed display) is set to 1, the number of decimal places for U0-19 is 1 and the display range is -5000.0 Hz to 5000.0 Hz. When the tens place of F7-12 (number of decimal places for load speed display) is set to 2, the number of decimal places for U0-19 is 2 and the display range is -5000.00 Hz to 5000.00 Hz.

U0-20 Remaining running time

Address:	0x7014	Effective mode:	/
Min.:	0.0	Unit:	min
Max.:	6500.0	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:
0.0 min to 6500.0 min
Parameter description
This parameter displays the remaining running time when the timing operation is performed.

U0-21 AI1 voltage before correction

Address:	0x7015	Effective mode:	/
Min.:	0.000	Unit:	V
Max.:	10.570	Data type:	UInt16
Default:	0.000	Change mode:	Unchangeable

Range:
0.000 V to 10.570 V
Parameter description
This parameter displays the actual value of AI1 analog input sampling voltage/current.

U0-22 AI2 voltage before correction

Address:	0x7016	Effective mode:	/
Min.:	0.000	Unit:	V
Max.:	65.535	Data type:	UInt16
Default:	0.000	Change mode:	Unchangeable

Range:

0.000 V to 65.535 V

Parameter description

This parameter displays the actual value of AI2 analog input sampling voltage/current.

U0-23 AI3 voltage before correction

Address:	0x7017	Effective mode:	/
Min.:	-10.570	Unit:	V
Max.:	10.570	Data type:	Int16
Default:	0.000	Change mode:	Unchangeable

Range:

-10.570 V to 10.570 V

Parameter description

This parameter displays the actual value of AI3 analog input sampling voltage/current.

U0-24 Motor speed

Address:	0x7018	Effective mode:	/
Min.:	0	Unit:	rpm
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 rpm to 65535 rpm

Parameter description

The calculation formula for this parameter is as follows: n = 60f/p, where p is the number of motor pole pairs, f is the actual encoder feedback speed in the FVC mode, and f is the calculated synchronization frequency in the non-FVC mode.

U0-25 Current power-on time

Address:	0x7019	Effective mode:	/
Min.:	0	Unit:	min
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 min to 65535 min

Parameter description
This parameter displays the current power-on time.

U0-26 Current operating time

Address:	0x701A	Effective mode:	/
Min.:	0.0	Unit:	min
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:
0.0 min to 6553.5 min
Parameter description
This parameter displays the current running time.

U0-27 Pulse input frequency

Address:	0x701B	Effective mode:	/
Min.:	0	Unit:	Hz
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 Hz to 65535 Hz
Parameter description
This parameter displays DI5 high-speed pulse sampling frequency. It is the same as U0-18 but in different units.

U0-28 Communication reference

Address:	0x701C	Effective mode:	/
Min.:	-100.00	Unit:	%
Max.:	100.00	Data type:	Int16
Default:	0.00	Change mode:	Unchangeable

Range:
-100.00% to 100.00%
Parameter description
This parameter displays data written through the communication address 0x1000. The setpoint of address 0x1000 determines the base of this percentage.

U0-30 Display of main frequency X

Address:	0x701E	Effective mode:	/
Min.:	-500.00	Unit:	Hz
Max.:	500.00	Data type:	Int16
Default:	0.00	Change mode:	Unchangeable

Range:

-500.00 Hz to 500.00 Hz

Parameter description

This parameter displays the main frequency X (Hz).

U0-31 Display of auxiliary frequency Y

Address:	0x701F	Effective mode:	/
Min.:	-500.00	Unit:	Hz
Max.:	500.00	Data type:	Int16
Default:	0.00	Change mode:	Unchangeable

Range:

-500.00 Hz to 500.00 Hz

Parameter description

This parameter displays the auxiliary frequency Y (Hz).

U0-32 Memory address view

Address:	0x7020	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter displays any memory address.

U0-34 Motor temperature

Address:	0x7022	Effective mode:	/
Min.:	0	Unit:	℃
Max.:	200	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0°C to 200°C
Parameter description
This parameter displays the motor temperature sampled through AI3. For motor temperature detection, see F9-56 (Type of motor temperature sensor).

U0-36 Resolver position

Address:	0x7024	Effective mode:	/
Min.:	0	Unit:	-
Max.:	4095	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0-4095
Parameter description
This parameter displays the resolver position.

U0-37 Power factor angle

Address:	0x7025	Effective mode:	/
Min.:	0.0	Unit:	°
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:
0.0 to 6553.5
Parameter description
This parameter indicates the current power factor angle.

U0-38 ABZ position

Address:	0x7026	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535

Parameter description

This parameter displays the number of phase-A and phase-B pulses of the ABZ encoder. The parameter value is four times the number of actual encoder pulses. For example, if 4000 is displayed, the number of actual encoder pulses is 1000 (4000/4). The value increases when the encoder rotates in the forward direction and decreases when the encoder rotates in the reverse direction. After increasing to 65535, the value will be set to 0 and increase from 0 again. After decreasing to 0, the value will be set to 65535 and decrease from 65535 again. You can check whether the encoder is installed properly through this parameter.

U0-39 Target voltage in V/f decoupled mode

Address:	0x7027	Effective mode:	/
Min.:	0	Unit:	V
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 V to 65535 V

Parameter description

This parameter displays the target output voltage in the V/f decoupled mode.

U0-40 Output voltage in V/f decoupled mode

Address:	0x7028	Effective mode:	/
Min.:	0	Unit:	V
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 V to 65535 V

Parameter description

This parameter displays the actual output voltage in the V/f decoupled mode.

U0-45 Fault information

Address:	0x702D	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

In case of a communication fault, 1 indicates Modbus fault, 2 indicates CANlink fault, 3 indicates CANopen fault, 4 indicates PROFIBUS fault, 5 indicates P2P fault, 6 indicates PLC fault, 7 indicates expansion card fault, 20 indicates address conflict fault, and 21 indicates slave offline, and 22 indicates slave fault.
Other values have no meanings.

U0-58 Z signal counter

Address:	0x703A	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

The ABZ encoder Z signal counter is the same as the number of motor revolutions.

U0-59 Frequency reference

Address:	0x703B	Effective mode:	/
Min.:	-100.00	Unit:	%
Max.:	100.00	Data type:	Int16
Default:	0.00	Change mode:	Unchangeable

Range:

-100.00% to 100.00%

Parameter description

This parameter indicates the frequency reference of the PLC programming card.

U0-60 Operating frequency

Address:	0x703C	Effective mode:	/
Min.:	-100.00	Unit:	%
Max.:	100.00	Data type:	Int16
Default:	0.00	Change mode:	Unchangeable

Range:

-100.00% to 100.00%

Parameter description

This parameter indicates the operating frequency read by PLC programming card.

U0-61 AC drive running status

Address:	0x703D	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

Bit 1 and bit 0: 0 indicates "stopped", 1 indicates "forward running", and 2 indicates "reverse running".

Bit 3 and bit 2: 0 indicates "constant speed", 1 indicates "acceleration", and 2 indicates "deceleration".

Bit 4: 0: "Normal (voltage)"; 1: "Undervoltage"

U0-62 Current fault

Address:	0x703E	Effective mode:	/
Min.:	0	Unit:	-
Max.:	99	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0-99

Parameter description

This parameter displays the current fault code. For example, 2 represents Err02.

U0-63 Value sent by master in point-to-point communication

Address:	0x703F	Effective mode:	/
Min.:	-100.0	Unit:	%
Max.:	100.0	Data type:	Int16
Default:	0.0	Change mode:	Unchangeable

Range:

-100.0% to 100.0%

Parameter description

-

U0-64 Number of slaves in master/slave control

Address:	0x7040	Effective mode:	/
Min.:	0	Unit:	-
Max.:	63	Data type:	Int16
Default:	0	Change mode:	Unchangeable

Range:

0-63

Parameter description

-

U0-65 Torque upper limit (%)

Address:	0x7041	Effective mode:	/
Min.:	-200.0	Unit:	%
Max.:	200.0	Data type:	Int16
Default:	0.0	Change mode:	Unchangeable

Range:

-200.0% to 200.0%

Parameter description

-

U0-66 Model of communication expansion card

Address:	0x7042	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

-

U0-67 Communication extension version

Address:	0x7043	Effective mode:	/
Min.:	0.00	Unit:	-

Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.0 to 655.35
Parameter description
-

U0-68 Drive state read through DP card

Address:	0x7044	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
Bit 0: Operation
Bit 1: Forward run
Bit 2: Reverse run
Bit 3: Fault
Bit 4: Stop mode other than coast to stop
Bit 5: Whether DP communication is normal
Bit 6: Master
Bit 7: Target frequency reached
Bit 8: Whether close-loop vector control applies
Bit 9: Whether the load is allocated
Bit 10: Speed control active
Bit 11: Torque control active
Bit 12: Communication command active
Bit 13: Whether the PG fault occurs
Bit 14: Reserved
Bit 15: Reserved

U0-69 Speed transmitted to DP card

Address:	0x7045	Effective mode:	/
Min.:	0.00	Unit:	Hz
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:
0.00 Hz to 655.35 Hz

Parameter description

In the FVC mode, the value of this parameter is the actual encoder feedback speed. In the non-FVC mode, the value of this parameter is the synchronization frequency estimated based on the algorithm.

U0-70 Speed/rpm

Address:	0x7046	Effective mode:	/
Min.:	-32767	Unit:	rpm
Max.:	32767	Data type:	Int32
Default:	0	Change mode:	Unchangeable

Range:

-32767 rpm to 32767 rpm

Parameter description

The speed is calculated based on the speed set by U0-69. The calculation formula for this parameter is as follows: n = 60f/p, where p is the number of motor pole pairs, f is the actual encoder feedback speed in the FVC mode, and f is the calculated synchronization frequency in the non-FVC mode.

U0-71 Communication card-specific current

Address:	0x7047	Effective mode:	/
Min.:	0.0	Unit:	A
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:

0.0 A to 6553.5 A

Parameter description

-

U0-72 Communication card error state

Address:	0x7048	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

-

U0-73 Motor SN

Address:	0x7049	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
-

U0-74 Actual motor output torque

Address:	0x704A	Effective mode:	/
Min.:	0.0	Unit:	%
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:
0.0% to 6553.5%
Parameter description
-

U0-76 Low bit of cumulative power consumption

Address:	0x704C	Effective mode:	/
Min.:	0.0	Unit:	kWh
Max.:	6553.5	Data type:	UInt16
Default:	0.0	Change mode:	Unchangeable

Range:
0.0 kWh to 6553.5 kWh
Parameter description
The power consumption can be recorded up to 65,535,999.9 kW·h, enough for at least 10 years of use within the full power range. The display accuracy is 0.1 kW·h. U0-76 and U0-77 are used together for the display, with U0-76 displaying the low bits and U0-77 displaying the high bits. The cumulated power consumption is calculated as follows:
Cumulative power consumption = U0-77 x 1000 + U0-76 (maximum cumulative range: 0.0 kWh to 65535 999.9 kWh), where U0-76 ranges from 0 to 999.9, and U0-77 ranges from 0 to 65535

U0-77 High bit of cumulative power consumption

Address	0x704D	Effective mode:	/
Min.:	0	Unit:	kWh
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 kWh to 65535 kWh

Parameter description

The power consumption can be recorded up to 65,535,999.9 kW·h, enough for at least 10 years of use within the full power range. The display accuracy is 0.1 kW·h. U0-76 and U0-77 are used together for the display, with U0-76 displaying the low bits and U0-77 displaying the high bits. The cumulated power consumption is calculated as follows:

Cumulative power consumption = U0-77 x 1000 + U0-76 (maximum cumulative range: 0.0 kWh to 65535 999.9 kWh), where U0-76 ranges from 0 to 999.9, and U0-77 ranges from 0 to 65535

U0-78 Linear speed

Address:	0x704E	Effective mode:	/
Min.:	0	Unit:	m/min
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 m/min to 65535 m/min

Parameter description

This parameter displays the linear speed of the drive during operation.

U0-80 EtherCAT slave name

Address:	0x7050	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter indicates the EtherCAT slave name.

U0-81 EtherCAT slave alias

Address:	0x7051	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter indicates the EtherCAT slave alias.

U0-82 EtherCAT ESM transmission error code

Address:	0x7052	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter indicates the EtherCAT ESM transmission error code.

U0-83 EtherCAT XML file version

Address:	0x7053	Effective mode:	/
Min.:	0.00	Unit:	-
Max.:	655.35	Data type:	UInt16
Default:	0.00	Change mode:	Unchangeable

Range:

0.0 to 655.35

Parameter description

This parameter indicates the EtherCAT XML file version.

U0-84 Number of lost EtherCAT synchronization frames

Address:	0x7054	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
This parameter indicates the number of lost EtherCAT synchronization frames.

U0-85 Maximum number of error frames and invalid frames of EtherCAT port 0 per unit time

Address:	0x7055	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change Mode	Unchangeable:

Range:
0 to 65535
Parameter description
This parameter indicates the maximum number of error frames and invalid frames of EtherCAT port 0 per unit time.

U0-86 Maximum number of error frames and invalid frames of EtherCAT port 1 per unit time

Address:	0x7056	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535
Parameter description
This parameter indicates the maximum number of error frames and invalid frames of EtherCAT port 1 per unit time.

U0-87 Maximum number of error frames forwarded by EtherCAT port per unit time

Address:	0x7057	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:
0 to 65535

Parameter description

This parameter indicates the maximum number of error frames forwarded by EtherCAT port per unit time.

U0-88 Maximum number of error frames processed by EtherCAT data frame processing unit per unit time

Address:	0x7058	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter indicates the maximum number of error frames processed by EtherCAT data frame processing unit per unit time.

U0-89 Maximum number of lost links over the EtherCAT port per unit time

Address:	0x7059	Effective mode:	/
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change mode:	Unchangeable

Range:

0 to 65535

Parameter description

This parameter indicates the maximum number of lost links over the EtherCAT port per unit time.

14 Compliance

14.1 Compliance List

The following table lists the certifications, directives, and standards that the product may comply with. For details about the acquired certificates, see the certification marks on the product nameplate.

Certification name	Directive name		Standards compliance
CE certification	EMC	2014/30/EU	EN IEC 61800-3
	LVD	2014/35/EU	EN 61800-5-1
	RoHS directive	2011/65/EU	EN 50581
UL/cUL certification	-		UL61800-5-1 C22.2 No.274-17

Note

The three-phase 380 V to 480 V and single-phase 200 V to 240 V products meet the requirements of the latest instructions and standards of the CE/UL/cUL certification.

14.2 CE certification

14.2.1 Precautions for Compliance with European Standards



Figure 14-1 CE mark

- The CE mark indicates compliance with the Low Voltage Directive (LVD), Electromagnetic Compatibility (EMC), and Restriction of Hazardous Substances (RoHS) directives for commercial trades (production, import, and sales) in Europe.
- The CE mark is mandatory for engaging in commercial business (production, importation, and distribution) in Europe.
- The product complies with the LVD, EMC, and RoHS directives and is labeled with the CE mark.
- Machines and devices integrated with this drive must also comply with CE requirements for distribution in Europe.

- The integrator who integrates this drive into other products and attaches CE mark to the final assembly has the responsibility of ensuring compliance with CE certification.

14.2.2Requirements for Compliance with EMC Directive

- This product is applicable to the first environment and second environment and complies with EMC directive 2014/30/EU and standard EN IEC 61800-3.



If the product is used in the first environment, radio interference may be generated. In addition to CE compliance requirements, measures should be taken to prevent interference when necessary.

- To enable the drive to comply with the EMC directive and standards, install an EMC filter on the input side and use shielded cables on the output side. Ground the filter properly. Ground the shield of the output cable in 360 degrees.



The manufacturer of the system with the product installed must ensure that the system meets the requirements of the European EMC Directive, and ensure that the system meets the requirements of the standard EN IEC 61800-3 according to the application environment of the system.

EMC specifications

The drive complies with EN IEC 61800-3. The maximum length of the motor cable allowed by the conducted and radiated emission is shown in the following table.

Table 14–1 Maximum motor cable length allowed by conducted and radiated emission

Product model	Maximum cable length allowed by conducted emission				Maximum cable length allowed by radiated emission			
	Category C2		Category C3		Category C2		Category C3	
	Built-in filter	External EMC filter	Built-in filter	External EMC filter	Built-in filter	External EMC filter	Built-in filter	External EMC filter
T1	-	3 m	3 m	-	-	3 m	3 m	-
T2 to T4	-	1 m	1 m	-	-	1 m	1 m	-
T5 to T8	-	3 m	-	-	-	3 m	-	-

Product model	Maximum cable length allowed by conducted emission				Maximum cable length allowed by radiated emission			
	Category C2		Category C3		Category C2		Category C3	
	Built-in filter	External EMC filter	Built-in filter	External EMC filter	Built-in filter	External EMC filter	Built-in filter	External EMC filter
T9 to T13	-	3 m	3 m	-	-	3 m	3 m	-
Item with an asterisk (*): For T2 model single-phase series products, you need to install the DY644020H magnetic ring on the input side of the filter.								

Introduction to EMC standards

Electromagnetic compatibility (EMC) describes the ability of electronic and electrical devices or systems to work properly in the electromagnetic environment and not to generate electromagnetic interference that influences other local devices or systems. EMC includes the following requirements:

- The electromagnetic interference generated by a device during normal operation must be restricted within a certain limit.
- The device must have sufficient immunity to electromagnetic interference in the environment and can work properly in the environment with electromagnetic interference, which is described as electromagnetic sensitivity.

EN IEC 61800-3 defines the following two environments:

- First environment: It includes domestic premises. It also includes establishments directly connected without intermediate transformer to a low-voltage power supply network which supplies buildings used for domestic purposes.
- Second environment: Environment that includes all establishments other than those directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes

Devices are divided into the following four categories based on the intended application environment.

- Category C1 equipment: Power drive system (PDS) with the rated voltage lower than 1000 V, which is intended for use in the first environment
- Category C2 equipment: PDS with rated voltage less than 1000 V, which is neither a plug-in device nor a movable device and, when used in the first environment, is intended to be installed and commissioned only by professionals.
- Category C3 equipment: PDS with rated voltage less than 1000 V, intended for use in the second environment and not intended for use in the first environment.
- Category C4 equipment: PDS with rated voltage equal to or above 1000 V, or rated current equal to or above 400 A, or intended for use in complex systems in the second environment.

14.2.3Requirements for Compliance with LVD

The product has been tested in accordance with EN61800-5-1 and complies with the Low Voltage Directive. Observe the following requirements to enable machines and devices integrated with this drive to comply with the LVD.

Mounting location

Install the AC drive in a place with the pollution degree of 2 or below and overvoltage category III as specified in IEC 606641.

Installation Environment

For requirements of the installation environment, see *"5.1.2.1 Installation Environment" on page 70*.

Installation protection requirements

- The drive serves as a part of a final system. Install the drive as the system component in a fireproof cabinet that provides effective electrical and mechanical protection, and install it in accordance with local laws and regulations and relevant IEC standards.
- For IP20 products, install them in structures where foreign objects cannot enter from the top or front sides.

Wiring requirements of main circuit terminals

For details, see *"5.6.3.4 Wiring Requirements of the Main Circuit" on page 179*.

Requirements for protective devices

To comply with EN 61800-5-1 standards, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by short circuit in the internal circuit. Use a fuse that matches the maximum input current of the AC drive. For selection of fuses, see *"10.3.1 Fuse, Contactor, and Circuit Breaker" on page 427*.

14.3 UL or cUL Certification



Figure 14-2 UL/cUL mark

- The UL/cUL mark is commonly applied to products sold in the United States and Canada. Products with UL/cUL mark have been inspected and assessed by the UL organization. To pass UL/cUL certification, main built-in components of electrical products must also be UL certified.

- The drive has been tested in accordance with UL 61800-5-1 and CSA C22.2 No. 274-17 standards and has complied with UL/cUL standards. Observe the following requirements to enable machines and devices integrated with this drive to comply with UL/cUL standards.

Mounting location

Install the drive in a place with overvoltage category III and pollution degree 1 or 2 as specified by UL61800-5-1.

Ambient temperature

According to the protection level, the ambient temperature must be maintained within the following range:

- T1 to T6 models (Type 1, enclosed type): -10℃ to +50℃
- T1 to T12 models (open type): -10℃ to +50℃

Installation requirements

- T1 to T6 models are enclosed-type, which must be installed according to the following requirements:
  - The enclosure protection must meet requirements of UL Type 1.
  - Drill the holes according to the mounting dimensions. For details of mounting dimensions, see the dimension section.
- T1 to T12 models are open-type, which must be installed in a cabinet according to the following requirements:
  The drive must be installed in a fireproof cabinet with the housing that provides effective electrical and mechanical protection. The installation must conform to local and regional laws and regulations and relevant NEC standards.

Main circuit wiring requirements



Field installation is not allowed for output terminals BR, (-), and (+).

- Terminals BR, (-), and (+) are used to connect options. Avoid connecting these terminals to an AC power supply.
- To protect the main circuit, separate it from all surfaces that may come into contact with it and provide covers as required.
- The control circuit is the internal safety extra-low voltage (SELV) circuit, which must be insulated and isolated from other circuits. Make sure that the control circuit is connected to an external SELV circuit.

- Prevent foreign matters from entering the wiring part of the terminal block.
- Do not solder the twisted conductors.
- The tightening torque may vary with terminals. Tighten terminal screws with the specified tightening torque. You can use the torque screwdriver, ratchet, or wrench.
- When using an electric screwdriver to tighten terminal screws, set a low speed to prevent damage to the terminal screws.
- Tighten the terminal screws with an angle not higher than 5°. Failure to comply may damage the terminal screws.

Control circuit wiring requirements

Observe the requirements in UL508 during wiring.

Selection of main circuit cables

For the selection of cable dimensions, follow the requirements of US National Electrical Code (NEC) and Part 1 of Canadian Electrical Code (CEC) and relevant local regulations.

- Use cables with copper conductors.
- The recommended cables for the main circuit are 600 V Class 2 heat-resistant indoor PVC cables that can work under temperature of 75°C continuously. The following conditions are used as premises:

  1. Ambient temperature: < 40°C
  2. Normal operating ratings

If recommended cables for peripheral devices or options are not suitable for the product, contact Inovance.

Terminal dimensions and cable selection

For selection of main circuit terminals and cables, see *"5.6.3.2 Dimensions and Cable Selection for Main Circuit Terminals" on page 150*.

Requirements for protective devices

- To comply with UL61800-5-1, install a fuse/circuit breaker on the input side of the drive to prevent accidents caused by short circuit in the internal circuit.
- Install sufficient protective devices against short circuit in branch circuits according to applicable regulations and this guide. The drive is applicable to circuits with a rated breaking capacity lower than 100000 A and a maximum voltage of 480 VAC (400 V class). For details about selection of fuses, see *"10.3.1 Fuse, Contactor, and Circuit Breaker" on page 427*.

Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel #1: Contact service@inovance.com.
- Channel #2: Visit https://www.inovance.com/global to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (https://zshc-eu.inovance.com/download-pc/) where you can access products info and documentation, and query product parameters.

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.

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Shenzhen Inovance Technology Co., Ltd.

www.inovance.com

Add.: Inovance Headquarters Tower, High-tech Industrial Park,
Guanlan Street, Longhua New District,
Shenzhen 518000, P.R. China
Tel: (0755) 2979 9595 Fax: (0755) 2961 9897

Suzhou Inovance Technology Co., Ltd.

www.inovance.com

Add.: No. 52, Tian E Dang Road, Wuzhong District, 215104,
Suzhou City, Jiangsu Province, P.R. China
Tel: (0512) 6637 6666 Fax: (0512) 6285 6720