Unity Drive

User Guide

MD880-50 Series Inverter Hardware

User Guide

A01
Data code 19011312

Preface

Thank you for purchasing the Invonance technology MD880 high-performance multi-drive inverter!

The MD880 high-performance multi-drive inverter has unparalleled advantages in unit structure, power density, response speed and control accuracy. It supports a wide range of applications. The MD880 high-performance multi-drive inverter has set a new benchmark for the industry.

The product advantages are as follows:

- Voltage class: 400 V/690 V
- Rated power range: 3.7 kW to 5600 kW
- Comprehensive rectification module types: basic rectification, feedback rectification and active rectification.
- Able to achieve the drive control of asynchronous induction motor, permanent magnet synchronous motor and synchronous reluctance motor.
- Excellent dynamic response and control accuracy

MD880 high-performance multi-drive AC drive has a wide range of applications:

- Metallurgy

The MD880 can be applied in industries such as high speed wire rod and hot strip mill, heavy plate equipment, cold rolling mill, pickling wire, annealed wire, zinc-plated wire, color-coated wire, non-ferrous metal alloy manufacturing equipment, non-ferrous metal rolling equipment.

- Papermaking

Joint papermaking equipment, including the headbox, filtering, pressing , drying, gluing, hard calendering, super calender and rewinding machine in continuous production line.

Port machine and other large-scale lifting equipment

Shore container bridge crane, tire type (rail type) container gantry crane, grab ship unloader, grab portal crane, large shipbuilding gantry crane, large-scale metallurgical casting crane.

- Ship

Power driving marine main and auxiliary systems and ship installation.

- Cable

Large-scale frame stranding machine, circle stranding machine, multi-motor wire drawing machine for copper aluminum material.

- Other

Wind power conversion, equipment test platform, military equipment, low voltage control, oil and gas transportation, mine equipment transmission.

The MD880-50 inverter belongs to MD880 series products, it has single machine power ranging from 3.7 kW to 560 kW, and can achieve 5600 kW drive capability in parallel connection. All the inverter modules have book structure, which is convenient to build a cabinet and is easy to maintain. The book structure also enhanced the cabinet utility efficiency by reducing number of cabinets and ground occupation area.

This manual is the hardware manual of the MD880-50 series inverter. It provides the instructions for general safety, product information, mechanical installation, electrical installation, routine maintenance and repair. Read this manual carefully if you are operating on the inverters for the first time. Contact our technical support for assistance If you have any doubts about functionality and performance.

Precaution
◆ The drawing in the manual are shown without covers or protective guards, remember to install the protective guards as specified first, and then perform operations in accordance with the instructions. ◆ The drawing in the manual are shown for description only and may not match the product you purchased. ◆ The instructions are subject to change, without notice, due to product upgrade, specification modification as well as effort to increase the accuracy and convenience of the manual. ◆ Contact our regional agents or customer service centers if you have problems during the use. ◆ Website: http://www.inovance.com

Correlated manual:

《SOP-20-880 Series Smart Operating Panel User Guide》

Contents

Chapter 1 Safety Precautions

This user guide includes notices you have to observe in order to ensure your personal safety and prevent damage to property. These notices shown below are graded according to the degree of danger.

Danger: It indicates that failure to comply with the notice will result in severe personal injury or even death.

Alarm: It indicates that failure to comply with the notice may result in severe personal injury or even death.

Caution: It indicates that failure to comply with the notice may result in minor or moderate personal injury or damage to the equipment.

Read the following safety notices carefully so that you understand how to install, commission, operate and maintain the equipment. Unity Drive assumes no liability or responsibility for any injury or loss caused by improper operation of the equipment described in the user guide.

1.1 Safety Precautions

Installation, wiring, maintenance, inspection or component replacement must be performed only by qualified personnel under instructions described in this user guide, Failure to comply may result in electronic shock.

Before installation

Before installation	
Danger:	◆ Handle the equipment with care during transportation to prevent damage to the equipment. ◆ Do not install the equipment if you find component missing or damage.
Caution:	◆ Do not install the equipment if the packing list does not conform to the product you received. ◆ Do not install the inverter if you find component missing or damage upon unpacking. ◆ Do not touch the components with bear hands. Failure to comply will result in static electricity damage.

During Installation

During installation	
Danger:	◆ Do not loosen the fixed screws of the components, especially the screws with red mark. ◆ It is strictly prohibited to modify the equipment. The modified equipment may cause electric shock. The company shall not be responsible for any damages dues to product modification. ◆ Install the equipment on incombustible objects such as metal, and keep it away from combustible materials. Failure to comply may result in a fire.

During installation	
Caution:	◆ Do not install any equipment (such as transformers) that produces electromagnetic waves or disturbances around the equipment. Such installation may cause equipment malfunction. If such equipment is to be installed, set up a shield board between the equipment and the inverter. ◆ Do not drop conductors such as wire end or screw into the inverters. Failure to comply will result in damage to the inverters. ◆ Select a suitable installation position to ensure the heat dissipation effect.

During Wiring

At Wiring	
Danger:	◆ Ensure that the system is disconnected from the power supply and is in a de-energized condition before wiring. Failure to comply may result in electric shock. ◆ Disconnect the power for all equipment before wiring. If there is residual voltage in the internal capacitor, wait at least 15 minutes before operation. ◆ Never connect the power cables to the output terminals (U, V, W) of the inverters. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in damage to the inverters. ◆ Pay attention to the mark on the terminal, misconnection may result in inverter damage. ◆ Properly ground the inverter according to the correct standard, fail to comply may result in electric shock. ◆ Ensure that the cabling satisfies the EMC requirements and the local safety standards. Use wire sizes recommended in the user guide. Failure to comply may result in accidents. ◆ Never connect the braking resistor between the DC bus terminals (+) and (-). Failure to comply may result in a fire. ◆ Use the shielded cable for the encoder, and ensure that the shield is reliably grounded at one end. ◆ Before connecting the units power, make sure that the units cover is securely mounted and that the motor is allowed to restart. ◆ Before connecting the units power, make sure that the units rated voltage match power supply voltage ◆ Incorrect main circuit voltage may result in fire. ◆ It is strictly forbidden to connect the input power to the output terminals of the inverters (U, V, W). Fail to comply may result in inverters damage!
Caution:	◆ Do not perform wiring if you find, component missing or damage on the equipment. ◆ Wiring must be performed only by qualified personnel under instructions described in this user guide.

Before power-on

Before Power-on	
Danger:	◆ Close the doors properly before power-on to prevent electric shock. ◆ All peripheral devices must be connected properly according to the circuit wiring instructions provided in this manual. Failure to comply will result in accidents.
Caution:	◆ Check that the voltage class of the power supply is consistent with the rated voltage class of the inverters. ◆ Check that the input terminals (R, S, T) and output terminals (U, V, W) are properly connected. No short-circuit exists in the peripheral circuit. The wiring is secured. Failure to comply will result in damage to the inverters. ◆ Do not perform the voltage resistance test on any part of the inverters because such test has been done in the factory. Failure to comply will result in accidents.

After power-on

After Power-on	
Danger:	◆ Do not open or remove the protective cover of the inverters after power-on. ◆ Never touch the inverters and peripheral circuits with wet hand. Failure to comply may result in electric shock. ◆ Never touch any of the input or output terminals of the inverters to prevent electric shock. ◆ Do not remove the cover plate of the inverter or touch the printed circuit board in the power on condition to prevent electric shock. ◆ The inverters performs safety detection on main circuit components automatically at the beginning of power-on. Do not touch the U, V, W terminals of the inverters or the motor terminals at the moment. Failure to comply may result in electric shock.
Caution:	◆ Prevent personal injury due to the rotating part of the motor during the motor auto-tuning or running. Failure to comply will result in accidents. ◆ Do not change the default settings of the inverters. Failure to comply may result in damage to the inverters.

During operation

During Operation	
Danger:	◆ Do not perform signal detection during operation. Failure to comply may result in personal injury or equipment damage. ◆ Do not touch the cooling fan and discharge resistor. Failure to comply may result in burn.
Caution:	◆ Prevent objects falling into the inverters. Otherwise, the equipment may be damaged. ◆ Do not control the units start/stop by contactor break/close. Failure to comply may result in equipment damage.

During Maintenance

During Maintenance	
Danger:	◆ Never repair or maintain the inverters while the power is on. Follow the repair and maintenance instructions in this user guide. ◆ Repair or maintain the inverters when its voltage is lower than 36 Vdc, about 15 minutes after the inverters are powered off. Otherwise, the residual voltage in the capacitor may result in personal injury. ◆ Do not allow unqualified personnel to repair or maintain the inverters. Failure to comply will result in personal injury or damage to the inverters. ◆ Perform parameter setting and check again after the inverters are replaced. ◆ All the pluggable components must be plugged or removed only after power-off.

1.2 Precautions

1. Motor insulation test

Perform an insulation test on the motor under the following conditions:

- Before the motor is used for the first time
- When the motor is reused after being stored for a long time
- During periodic inspection

This is to prevent poor insulation of motor windings from damaging the inverters. The motor must be disconnected from the inverters during the insulation test. It is recommended to use a 500 V voltage type mega-ohm meter, and the insulation resistance shall be no less than 5 milliohm.

2. Thermal protection of the motor

If the rated capacity of the motor selected does not match that of the inverters, especially when the rated power of the inverters is greater than that of the motor, adjust the motor protection parameters or install a thermal relay for the motor circuit for protection.

3. Running at above mains frequency

The inverters can output frequency in the range 0 to 300 Hz. If it is necessary to operate the inverters at frequency higher than the mains frequency (generally 50 Hz), consider the capacity of the machine.Mechanical vibration

The inverters may encounter the mechanical resonance point at certain output frequencies, which can be avoided by setting the jump frequency of the inverters.

4. Motor heat and noise

The output of the inverters is pulse width modulation (PWM) wave with certain harmonic wave, and therefore, the motor temperature rise, noise, and vibration are slightly greater than those running with the mains frequency.

5. Voltage-sensitive device or capacitor on the output side of the inverters

The inverters outputs PWM waves, and therefore, do not install the capacitor for improving power factor or lightning protection voltage-sensitive resistor on the output side of the inverters. Otherwise, the inverters may suffer transient overcurrent or even be damaged.

6. Switch components such as input or output contactor for inverters

It is not recommended to frequently charge or discharge the inverters, or it may reduce the product life of the capacitor in inverters.

If the output and the motor are equipped with contactors and other switching devices, do not switch on or switch off while there is no output from the inverters. otherwise, the inverters may be damaged.

7. Use the MD880-50 inverters outside the allowable voltage range

Do not use the MD880-50 inverters outside the allowable voltage range specified by the manual, otherwise it will cause damage to the components in the inverters. If necessary, use a corresponding step-up or step-down device for voltage transformation.

8. Altitude and de-rating

In places where the altitude is above 1000 m and the cooling effect reduces due to thin air, it is necessary to derate the inverters. Contact us for technical support.

9. Disposal

The electrolytic capacitors on the main circuits and PCB may explode when they are burnt. Poisonous gas is generated when the plastic parts are burnt. Treat them as ordinary industrial waste.

10. Adaptable motor

Select a standard adaptable motor, and configure inverters based on rated current, otherwise, select the correct inverters according to the motor rated current.

The cooling fan and rotor shaft of non-variable-frequency motors are coaxial, which results in reduced cooling effect when the motor speed reduces. If variable speed is required, add a more powerful fan or fit a variable-frequency motor in applications where the motor overheats easily.

Identify motor parameters before running the inverters, otherwise, Otherwise, the running result and protection performance will be adversely affected.

The inverters might alarm or be damaged when a short circuit exists on cables or inside the motor. Therefore, perform the insulation short circuit test when the motor and cables are newly installed or during routine maintenance. During the test, disconnect the inverters from the tested parts.

11. Safety warning signs of the inverter

The inverters is labeled with warning signs. Be sure to observe the contents of the warning sign in usage.

Chapter 2 Product Information

2.1 Product Information

The MD880-50M series is a general low voltage inverter developed by Unity Drive technology featuring high power density, compact structure, and high reliability. The MD880-50M series supports motor V/F control, vector control without encoder (SVC), and vector control with encoder (FVC).

The MD880-50M series inverter has two voltage classes, 400 V and 690 V, which can be used to build inverters with rated power from 7.5 kW to 5600 KW. The maximum rated power of a single inverter is 560 kW; The parallel connected multiple modules can achieve higher power rates, which is applied in scenarios that requires single or multi-axis drive devices supporting multiple power sections, such as papermaking equipment, rolling mill, test station, lifting equipment, oil drilling, mining engineering machinery.

2.2 Model and Nameplate

MD880 - 50M - 0639 - 4

Mark 1	Product name
MD880	MD880 Series inverter

Mark 2	Product model
50M	Inverter unit

Mark 3	Rated current
0639	639A

Mark 4	Voltage grade
4	Three-phase 400 Vac
7	Three-phase 690 Vac

Figure 2-1 Model Description

NOTE

◆ In mark 3, only one current level is listed as an example.

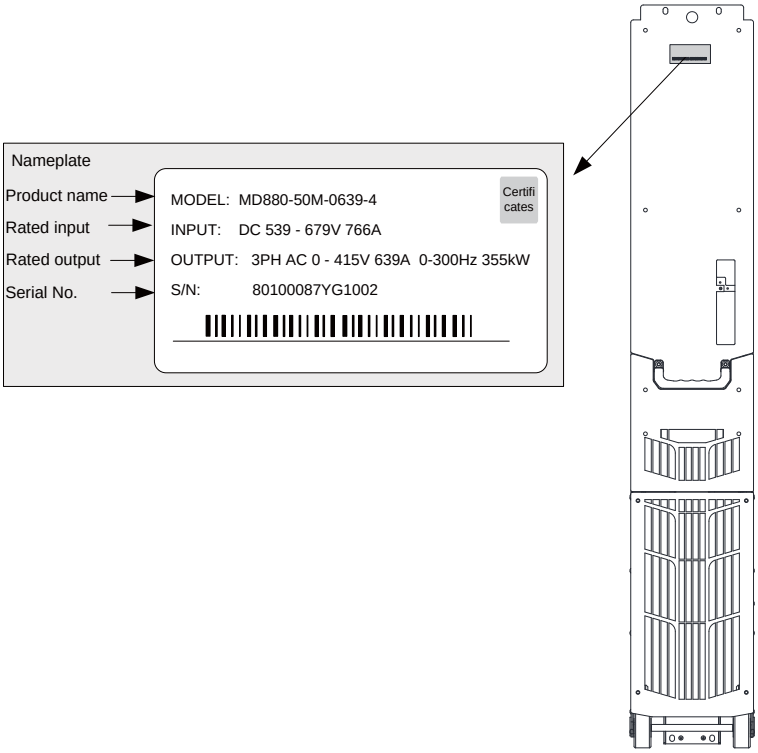


Figure 2-2 Nameplate Description

The nameplate of the inverter (H1...H4) is attached to the left of the unit.

The nameplate of the inverter (H6...H8) is attached to the front of the unit, as shown in figure 2-2.

2.3 Voltage and Power Level

Table 2-1 Table 2-1 Voltage and Power Level of Inverter

Structure	Grid Voltage	DC Bus Voltage	Output Current	Power Section
H1	400 V system: 380 Vac to 415 Vac	537 Vac to 679 Vdc	9 A to 23 A	3.7 A to 11 kW
H2	400 V system: 380 Vac to 415 Vac	537 Vac to 679 Vdc	33 A to 60 A	15 A to 22 kW
H3	400 V system: 380 Vac to 415 Vac	537 Vac to 679 Vdc	78 A to 94 A	30A to 45 kW
H4	400 V system: 380 Vac to 415 Vac	537 Vac to 679 Vdc	116 A to 183 A	55 A to 90 kW

Structure	Grid Voltage	DC Bus Voltage	Output Current	Power Section
H6	400 V system: 380 Vac to 415 Vac	540to 720 Vdc	245 A to 299A	110 KW to 132 kW
	690 V system: 525 Vac to 690 Vac	740 to 975 Vdc	62 A to 192A	55 KW to 160 kW
H7	400 V system: 380 Vac to 415 Vac	540 to 720 Vdc	349 A to 395A	160 KW to 200 kW
	690 V system: 525 Vac to 690 Vac	740 to 975 Vdc	217 A to 270A	200 KW to 250 kW
H8	400 V system: 380 Vac to 415 Vac	540 to 720 Vdc	516 A to 900A	250 KW to 500 kW
	690 V system: 525 Vac to 690 Vac	740 to 975 Vdc	340 A to 600A	315 KW to 560 kW

2.4 Technical Specifications

Table 2-2 Technical Specifications of MD880

Item		Specificaton
Basic performance	DC input voltage	400 V system: 540 to 720 Vdc 690 V system: 740 to 975 Vdc
	Output voltage	400 V system: 0 to 415 Vac 690 V system: 0 to 690 Vac
	Output frequency	0 to 300 Hz (When output frequency is greater than 120 Hz, derating is required for some models)
	Overload capacity	Light load mode: 110%, overload for 1 min (5 min interval) Heavy load mode: 150%, overload for 1 min (5 min interval)
	Working efficiency	> 98%

Item		Specificaton
Control characteristics	Motor control mode	V/f, SVC, FVC
	Carrier frequency	400 V system: 3.7 to 90 kW, 3.2 kHz by default; 110 to 500 kW, 2 kHz by default 690 V system: 55 to 560 kW,1.5 kHz by default Derating is required to enhance the carrier frequency.
	Speed adjustment range	V/F: 1: 50
		SVC: 1: 200
		FVC: 1: 1000
	Speed accuracy	SVC: ±10%Fsl
		FVC: ±0.01%
	Speed fluctuation	SVC: ± 0.2%
		FVC: ± 0.1%
	Torque response	SVC: 3 ms
		FVC: 3 ms
	Startup torque	SVC: 0.5 Hz/150%
		FVC: 0 Hz/200%
Mechanical Data	Anti-vibration performance	GB/T4798.3 3M4-compliant Steady-state sinusoidal vibration: 2–9 Hz, 3 mm 9–200 Hz, 10 m/s^2 Impact: 100 m/s^2 in 11 ms
	Security performance	Compliant with EN 61800-5-1
	Cooling method	Forced air cooling (AF), compliant with EN 60146
Protection	Protection functions	Short circuit, overcurrent, overvoltage, undervoltage, phase loss, encoder wire-break, overheat.

Item		Specificaton
Environment	Palces	Indoor, away from direct sunlight, no dust, corrosive gas, flammable gas, oil mist, water vapor, water or salt etc.
	Installation height	There is no power derating below 1000 m, it requires derating operation at above 1000 m attitude, and the power drops 1% for every added 100 m attitude. The highest operation altitude is 4000 m.
	Operation temperature	-10°C to +40°C ,when the temperature is more than 40°C , and the power drops by1% for every added 1°C environmental temperature .the highest environmental temperature for operation is 50°C
	Operation humidity	5% to 95%, no dew
	Storage temperature	-40°C to +70°C
	Storage humidity	5% to 95%, no water drop
	Pollution level	PD2
	Overvoltage level	OVCIII
	IP level	IP00 H1 to H4 size inverter: IP20 H6 to H8 size inverter:IP00

2.5 Specification and Model Selection

Table 2-3 MD880-50M series inverter model selection

Model	Model Name	No Overload		Light Overload		Heavy Overload		Product Weight (W)	Loss (W)	Dimension (W * D * H) (mm)
		Current (A)	Power (kW)	Current (A)	Power (kW)	Current (A)	Power (kW)			
UN：three-phase AC 400 V（380 V to 415 V）										
H1	MD880-50M-0009-4	9	3.7	9	3.7	5.1	2.2	⩽ 9	100	100 X 413 X 415
H1	MD880-50M-0013-4	13	5.5	13	5.5	9	3.7		136	
H1	MD880-50M-0017-4	17	7.5	17	7.5	13	5.5		168	
H1	MD880-50M-0023-4	23	11	22	11	17	7.5		190	
H2	MD880-50M-0033-4	33	15	32	15	25	11	⩽ 10	290	
H2	MD880-50M-0038-4	38	18.5	37	18.5	32	15		308	
H2	MD880-50M-0048-4	48	22	45	22	37	18.5		401	
H2	MD880-50M-0060-4	60	30	58	30	45	22		502	
H3	MD880-50M-0078-4	78	37	75	37	60	30	⩽ 11	592	
H3	MD880-50M-0094-4	94	45	91	45	75	37		735	
H4	MD880-50M-0116-4	116	55	112	55	91	45	⩽ 20	762	200 X 413 X 415
H4	MD880-50M-0149-4	149	75	143	75	112	55		1150	
H4	MD880-50M-0183-4	183	90	176	90	150	75		1468	
H6	MD880-50M-0245-4	245	110	236	110	184	90	⩽ 35	1758	180 X 438 X 770
H6	MD880-50M-0299-4	299	132	287	132	224	110		2104	
H7	MD880-50M-0349-4	349	160	335	160	262	132	⩽ 45	2587	180 X 463 X 920
H7	MD880-50M-0395-4	395	200	380	200	296	160		3203	

Model	Model Name	No Overload		Light Overload		Heavy Overload		Product Weight (W)	Loss (W)	Dimension (W * D * H) (mm)
		Current (A)	Power (kW)	Current (A)	Power (kW)	Current (A)	Power (kW)			
H8	MD880-50M-0516-4	516	250	495	250	387	200	⩽ 130	4921	230 X 582 X 1394
H8	MD880-50M-0639-4	639	355	613	315	479	250		6701	
H8	MD880-50M-0757-4	757	400	727	400	568	315		7960	
H8	MD880-50M-0900-4	900	500	864	450	675	355		10133	
UN：three-phase AC 690 V（525 V to 690 V）										
H6	MD880-50M-0062-7	62	55	60	55	46	45	⩽ 35	798	180 X 438 X 770
H6	MD880-50M-0082-7	82	75	79	75	61	55		1163	
H6	MD880-50M-0099-7	99	90	95	90	74	75		1321	
H6	MD880-50M-0125-7	125	110	120	110	94	90		1494	
H6	MD880-50M-0144-7	144	132	138	132	108	110		1788	
H6	MD880-50M-0192-7	192	160	184	160	144	132		2436	
H7	MD880-50M-0217-7	217	200	215	200	162	160	⩽ 45	2724	180 X 463 X 920
H7	MD880-50M-0270-7	270	250	260	250	202	200		3342	
H8	MD880-50M-0340-7	340	315	326	315	255	250	⩽ 130	5109	230 X 582 X 1394
H8	MD880-50M-0410-7	410	400	394	355	308	315		6143	
H8	MD880-50M-0530-7	530	500	509	450	398	355		7912	
H8	MD880-50M-0600-7	600	560	576	560	450	400		9086	

2.6 Derating

1. Temperature derating

When the temperature range is within +40 ° C to 50 ° C, the rated output current is derated

by 1% for every added 1 ° C (1.8 ° F). The output current can be calculated by multiplying the current given in the rating table by the derating factor (k):

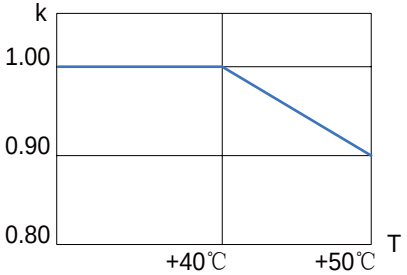


Figure 2-3 Temperature Derating

2. Altitude Derating

At altitudes from 1000 m to 4000 m above sea level, the continuous output currents given above must be derated 1% for every 100 m.

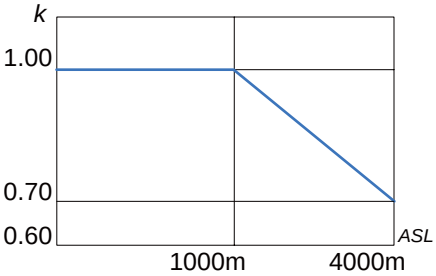


Figure 2-4 Altitude Derating

3. Carrier Frequency Derating

Table 2-4 Carrier Frequency Derating of Inverter

Model	Rated Power	Carrier Frequency (kHz)									
	P (kW)	1.2	1.5	2	2.5	3.2	4	5	6	7	8
Three-phase 400 V (SVPWM_7 section)											
MD880-50M-0009-4	3.7	100%	100%	100%	100%	100%	100%	92%	84%	71%	63%
MD880-50M-0013-4	5.5	100%	100%	100%	100%	100%	100%	92%	83%	74%	66%

Model	Rated Power	Carrier Frequency (kHz)									
	P (kW)	1.2	1.5	2	2.5	3.2	4	5	6	7	8
MD880-50M-0017-4	7.5	100%	100%	100%	100%	100%	100%	92%	84%	75%	67%
MD880-50M-0023-4	11	100%	100%	100%	100%	100%	100%	91%	82%	75%	68%
MD880-50M-0033-4	15	100%	100%	100%	100%	100%	100%	93%	86%	80%	74%
MD880-50M-0038-4	18.5	100%	100%	100%	100%	100%	100%	94%	87%	81%	75%
MD880-50M-0048-4	22	100%	100%	100%	100%	100%	100%	94%	88%	83%	78%
MD880-50M-0060-4	30	100%	100%	100%	100%	100%	100%	94%	88%	82%	77%
MD880-50M-0078-4	37	100%	100%	100%	100%	100%	100%	91%	82%	75%	68%
MD880-50M-0094-4	45	100%	100%	100%	100%	100%	100%	92%	84%	78%	71%
MD880-50M-0116-4	55	100%	100%	100%	100%	100%	100%	92%	84%	77%	71%
MD880-50M-0149-4	75	100%	100%	100%	100%	100%	100%	92%	84%	78%	72%
MD880-50M-0183-4	90	100%	100%	100%	100%	100%	94%	87%	79%	71%	63%
MD880-50M-0245-4	110	100%	100%	100%	98%	95%	88%	—	—	—	—
MD880-50M-0299-4	132	100%	100%	100%	96%	94%	84%	—	—	—	—
MD880-50M-0349-4	160	100%	100%	100%	96%	94%	86%	—	—	—	—
MD880-50M-0395-4	200	100%	100%	100%	96%	92%	84%	—	—	—	—
MD880-50M-0516-4	250	100%	100%	100%	94%	92%	82%	—	—	—	—
MD880-50M-0639-4	355	100%	100%	100%	93%	90%	78%	—	—	—	—
MD880-50M-0757-4	400	100%	100%	100%	93%	91%	80%	—	—	—	—
MD880-50M-0900-4	500	100%	100%	100%	92%	89%	79%	—	—	—	—

Model	Rated Power	Carrier Frequency (kHz)									
	P (kW)	1.2	1.5	2	2.5	3.2	4	5	6	7	8
Three-phase 690V (SVPWM_7 section)											
MD880-50M-0062-7	55	100%	100%	100%	100%	100%	85%	—	—	—	—
MD880-50M-0082-7	75	100%	100%	100%	93%	83%	65%	—	—	—	—
MD880-50M-0099-7	90	100%	100%	88%	77%	69%	54%	—	—	—	—
MD880-50M-0125-7	110	100%	100%	100%	91%	81%	65%	—	—	—	—
MD880-50M-0144-7	132	100%	100%	88%	79%	70%	56%	—	—	—	—
MD880-50M-0192-7	160	100%	100%	89%	79%	71%	57%	—	—	—	—
MD880-50M-0217-7	200	100%	100%	88%	78%	68%	55%	—	—	—	—
MD880-50M-0270-7	250	100%	100%	87%	77%	67%	52%	—	—	—	—
MD880-50M-0340-7	315	100%	100%	84%	74%	64%	53%	—	—	—	—
MD880-50M-0410-7	400	100%	100%	87%	77%	70%	57%	—	—	—	—
MD880-50M-0530-7	500	100%	100%	85%	75%	66%	54%	—	—	—	—
MD880-50M-0600-7	560	100%	100%	87%	77%	69%	56%	—	—	—	—

NOTE

◆ The derating ratio between the two carriers frequency can be linearly handled.

2.7 Overload Capacity

The MD880-50M series inverters must use an appropriate current as the reference load in the drive system with overload requirements. The criterion for overload is that the transmission system runs at reference load before and after the overload occurs (a 300s load duration is used as reference here).

1. Light overload mode curve

The base load current (IL) of the light overload mode is based on a 110% load cycle continuing 60s.

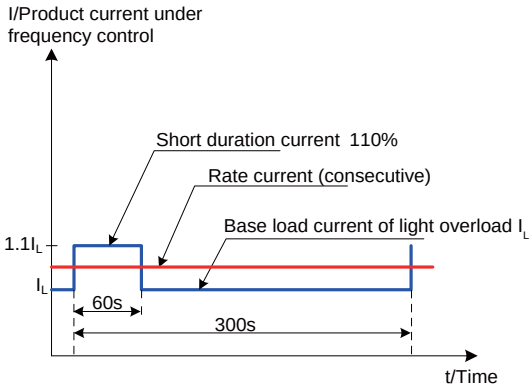


Figure 2-5 Light Overload Mode Curve

2. Heavy load mode curve

The base load current (IL) of the heavy load mode is based on a 150% load cycle continuing 60s.

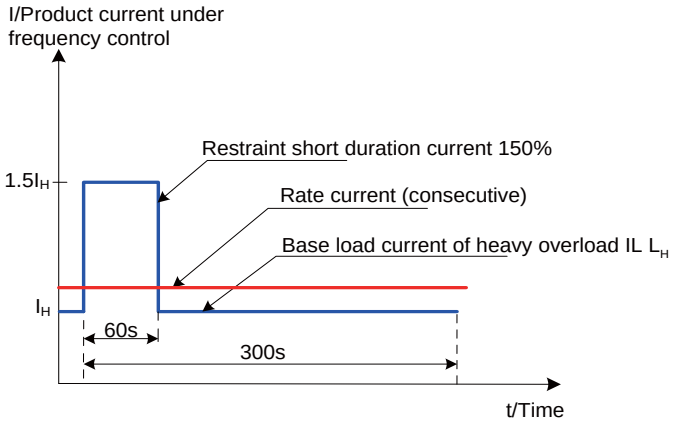


Figure 2-6 Heavy Load Mode Curve

2.8 Hardware Description

2.8.1 Typical Drive System Electrical Diagram

The following diagram describes a typical transmission system for a common DC bus.

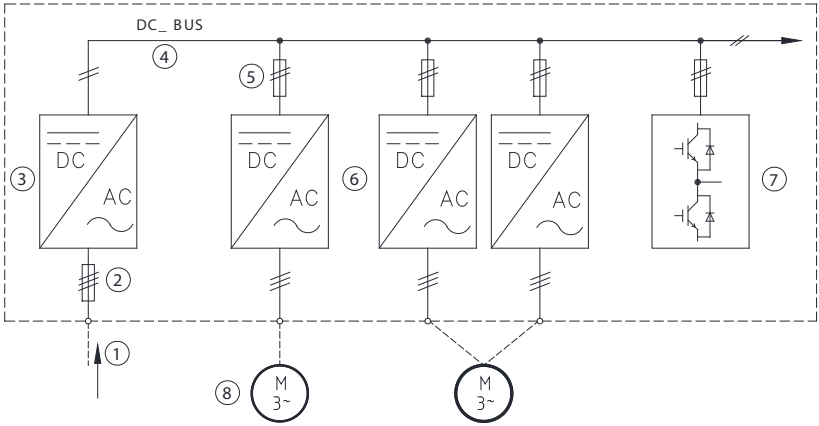


Figure 2-7 Typical Drive System Electrical Diagram

No.	Name
1	AC power supply
2	Three-phase input fuse
3	Power supply unit
4	DC bus
5	DC fuse of inverter (with or without DC bus buffer module)
6	Inverter (in this example, one of two devices is consisted of two parallel connected inverters)
7	Brake module (resistor not shown)
8	Motors

The power supply unit converts the AC voltage to the DC voltage, and the DC voltage is distributed to all the inverters through the DC bus. The inverters, then converts the DC voltage to the AC voltage and drives the motor to rotate. Each inverters needs an additional DC fuse when it is connected with the DC bus. MD880-50 series inverters are often used to drive AC Asynchronous induction motors.

2.8.2 Structure of Inverter with Size H6, (H1...H4)

1. Summary

The DC input terminal is located at the top of the units, and the AC output terminal is at the bottom of the units, and the HCU control module is installed in the front of the units. The inverter control system includes the standard I/O and the optional function modules. For description of the I/O terminal configured on HCU control module, refer to "Chapter 5 HCU Control Module". Other optional modules are installed on the HCU control module.

The control circuit boards of the size H6 inverter supports an external voltage supply or an auxiliary voltage provided by the DC bus. The running inverter automatically triggers the fan that is powered by the DC input.

2. DC bus connection and DC bus buffer module

The postitive bus inside the standard size H1...H4 inverter cabinet is configured with quick fuse, configure an external configuration quick fuse for size H6 inverter, for the specific model, refer to "2.12 Fuse Selection"; when necessary, configure an external DC bus buffer module, for specific models, refer to "Chapter 8 Parts Selection". If you need to isolate the inverters and the DC bus for online maintenance, install an load isolating switch. For switch selection, refer to "2.13 Isolating Switch Type Selection".

The DC bus buffer module must be installed under the following conditions:

- The inverter is connected to the DC bus through the load isolating switch.
- The inverter is directly connected to the DC bus, while the power supply unit of the system does not have power buffering capability.

3. External power

- The HCU control module on the size H6, H1...H4 inverter needs external 24 Vdc/2 A power supply. The power supply is connected to the input power supply (24 VI-GND terminal) of the HCU control module.
- Before the main power is established , the internal auxiliary power supply can be supplied by the external 24 Vdc/1 A. After the main power is established, the auxiliary power supply of the inverter is provided by the DC bus. At this time, the external 24 Vdc/1A power supply realizes redundancy.

4. Structure of inverter (H6, H1...H4)

■ Structure of Inverter (H1...H3)

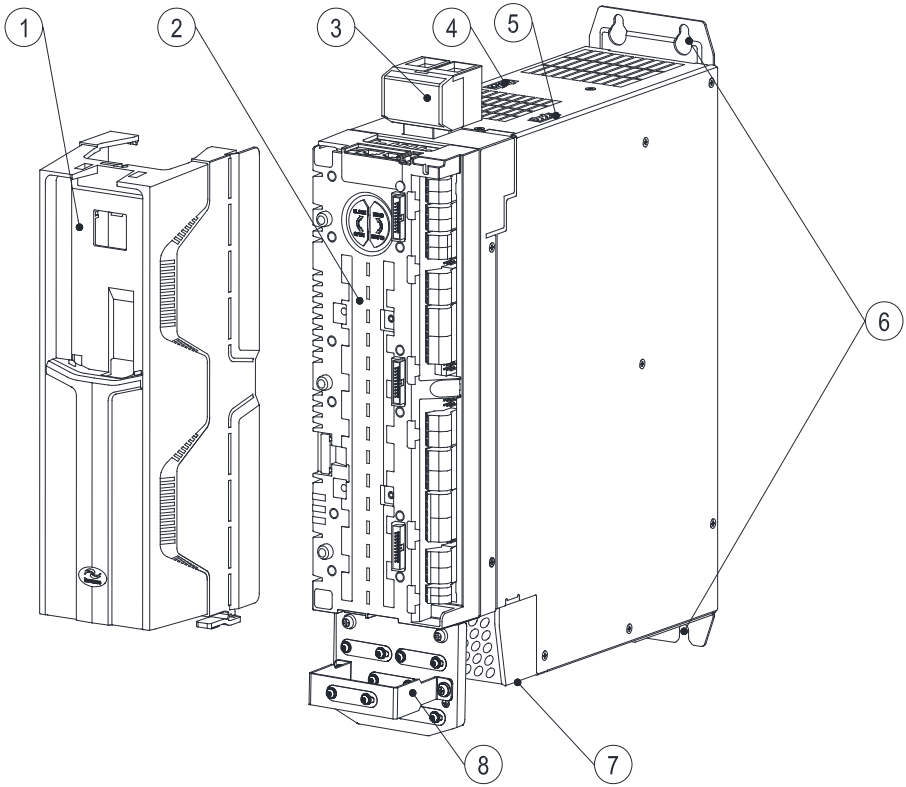


Figure 2-8 Structure of Inverter (H1...H3)

Number	Name
1	SOP-20-880 keyboard mounting slot
2	HCUcontrol module
3	DC bus input terminal
4	Internal 24 Vdc auxiliary power terminal
5	Control terminal of DC bus buffer module
6	Back mounting hole
7	U, V, W OUTPUT TERMINALS (BLOCKED)
8	Ground floor of control cable

■ Structure of size H4 inverter

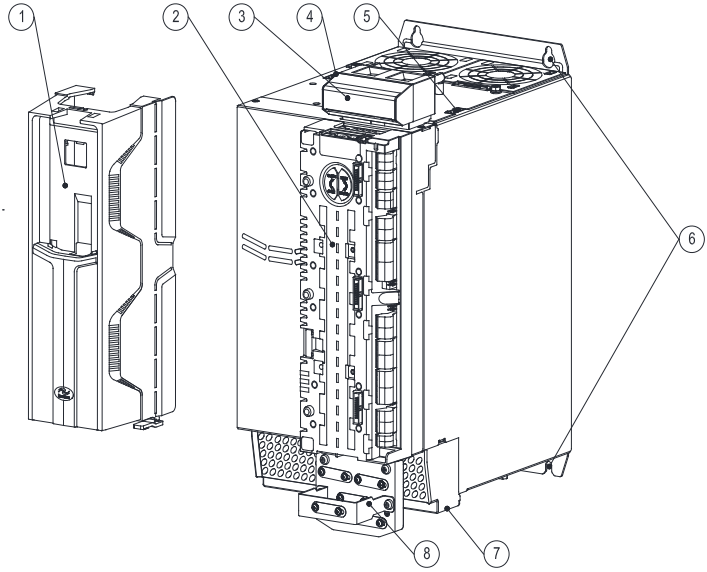


Figure 2-9 Structure of Size H4 Inverter

Number	Name
1	SOP-20-880keyboard mounting slot
2	HCU control module
3	DC bus input terminal
4	Internal 24 Vdc auxiliary power terminal
5	Control terminal of DC bus buffer module
6	Back mounting hole
7	U, V, W OUTPUT TERMINALS (BLOCKED)
8	Ground floor of control cable

■ Structure of size H6 inverter

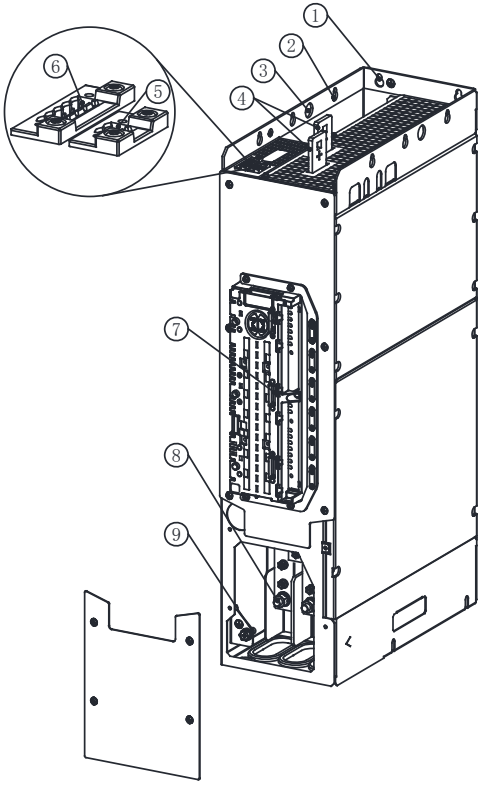


Figure 2-10 Structure of Size H6 Inverter

Number	Name
1	Back mounting hole
2	Side mounting hole
3	Lifting hole
4	DC bus input terminall
5	Internal 24 Vdc auxiliary power terminal
6	External IO terminal
7	HCU control module
8	AC output terminal
9	Grounding terminal

5. The electrical connection diagram of the inverter cabinet consisting of the inverter with size H1 to H4, H6.

The following figure gives an example of an electrical connection diagram of a cabinet containing multiple H1 to H4 and H6 inverter.

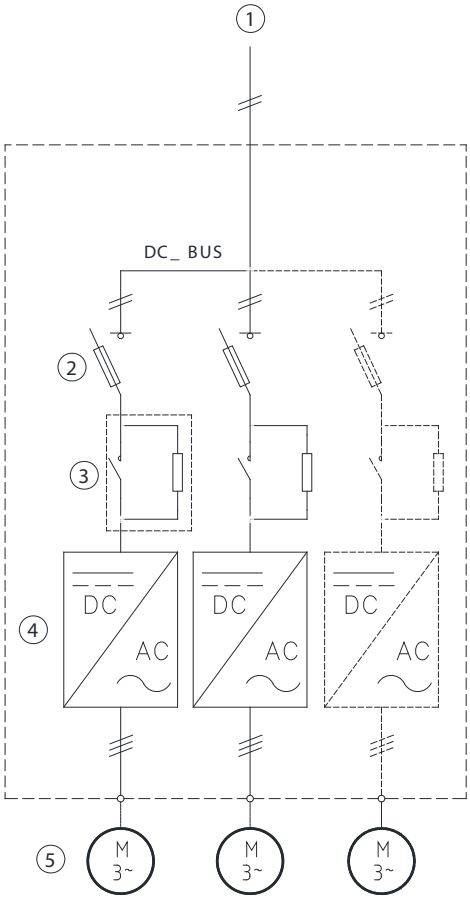


Figure 2-11 H1...H4, H6 Electrical Connection Diagram

Number	Name
1	DC power supply
2	Fuse type isolating switch
3	DC bus buffer module (optional parts)
4	Inverter
5	Motor

2.8.3 Structure of Size H7 Inverter

1) Summary

The DC input terminal is at the top of the module, while the AC output terminal is at the bottom of the module, and the HCU control module is installed in the front of the module. The inverter control systems consists of the standard I/O and optional modules. For the description of I/O terminal for HCU control module, refer to "Chapter 5 HCU Control Module". Other optional modules are installed on the HCU control module.

Optionally, the power supply of control circuit board for the size H6...H7 inverter can use external or DC bus auxiliary voltage.

A running inverter triggers the fan that is powered by DC input.

2) DC bus connection and DC bus buffer module

The size H7 inverter supports external quick fuse configuration, for specific models, refer to "2.12 Fuse Selection";

Configure an external DC bus buffer module when necessary, for specific models, refer to "Chapter 8 Options". If necessary, quickly isolate the inverter and the DC bus for online maintenance, where it is necessary to install the load isolating switch. for specific models, refer to "2.13 Isolating Switch Type Selection".

The DC bus buffer module must be installed under the following conditions:

- The inverter is connected to the DC bus through the load isolating switch.
- Inverter is directly connected to DC bus, and the system power supply unit does not have power buffering capability.

3) External power

- The HCU control module on the inverter with a size of H7 is powered by external 24 Vdc/2 A power supply
- The power supply needs to be connected to the input power supply (24VI-GND terminal) of the HCU control module.

Before the main power is established , the internal auxiliary power supply can be supplied by the external 24 Vdc/1 A. After the main power is established, the auxiliary power supply of the inverter is provided by the DC bus. At this time, the external 24 Vdc/1A power supply realizes redundancy.

4) Structure of size H7 inverters

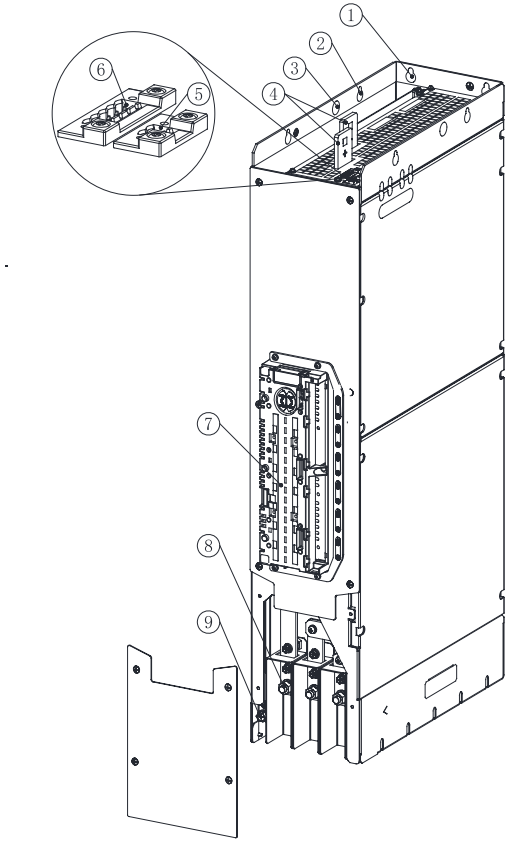


Figure 2-12 Structure of Size H7 Inverters

Number	Name
1	Back mounting hole
2	Side mounting hole
3	Lift hole
4	DC bus input terminal
5	Internal 24 Vdc auxiliary power terminal
6	External IO terminal
7	HCU control module
8	AC output terminal
9	PE terminal

5) Electrical connection diagram of the inverter cabinet consisting of size H7 inverters

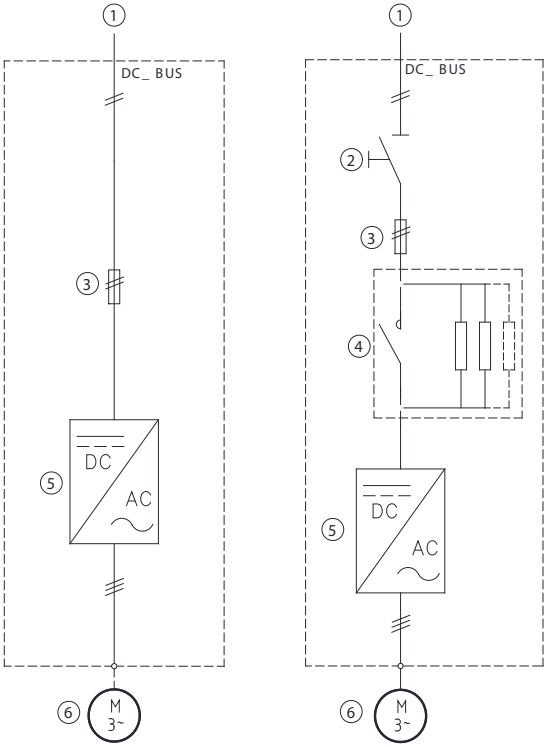


Figure 2-13 H7 Electrical Connection

NOTE

- When the DC input power has power buffering capacity, press the electrical diagram on the left.
- When the DC input power does not have power buffering capacity, press the electrical diagram on the right.

Number	Name
1	DC power supply
2	Load isolating switch
3	Fuse
4	DC bus buffer module (optional)
5	Inverter
6	Motor

2.8.4 Structure Design and Combined Applications of Size H8 Inverter

1) Summary

Size H8 inverters are applied in single or multiple parallel systems. The 400 V voltage level of size H8 inverter power ranges from 250 kW to 500 kW, and the 690 V voltage level size H8 inverters power ranges from 315 kW to 560 kW, it supports up to 10 parallel connected modules. The size H8 inverters are equipped with pulleys at the bottom to facilitate installation and maintenance.

A fast connection socket is configured outside of the size H8 inverter, the socket is connected with the fast connection socket inside the cabinet. When inverters are in parallel connection, the AC output of each inverter can be connected to the motor separately, and the output of all parallel modules can be connected in parallel with the AC bus before connecting to the motor.

The control circuit board of size H8 inverter can provide auxiliary voltage for external or DC bus. When the inverter is running, it automatically triggers the fan, which is powered by the internal DC power supply.

The size H8 inverter outputs reactor by default.

An HCU control module is configured for size H8 inverter externally, configure an HPCU module when inverters are in paralleled connection. The inverter control system is consisted of a standard I/O and optional function modules, for description of the I/O terminal on the HCU control module, refer to "Chapter 5 HCU Control Module". Other optional modules are installed on the HCU control module.

2) DC bus connection and power on buffer circuit

The inverter must be externally configured with the DC fuse. For specific models, refer to "2.12 Fuse Selection".

If it is necessary to quickly isolate the inverter and the DC bus for on-line maintenance, install a load isolation switch, for specific model, refer to "2.13 Isolating Switch Type Selection".

An electric buffer circuit must be installed under the following circumstances:

- The inverter is connected to the DC bus through the load isolating switch;
- The inverter is directly connected to the DC bus, and the power supply unit of the system does not have power buffer capability.

3) External power

The HCU control module of size H8 inverter is feed by an external 24 Vdc/2 A power supply, and the power supply is connected to the input power terminal 24VI-GND of the HCU control module.

Before the main power is established, the internal auxiliary power supply can be supplied by the external 24 Vdc/1 A. After the main power is established, the auxiliary power supply of the inverter is provided by the DC bus. At this time, the external 24 Vdc/1 A power supply realizes redundancy.

4) Structure layout of H8 size inverter

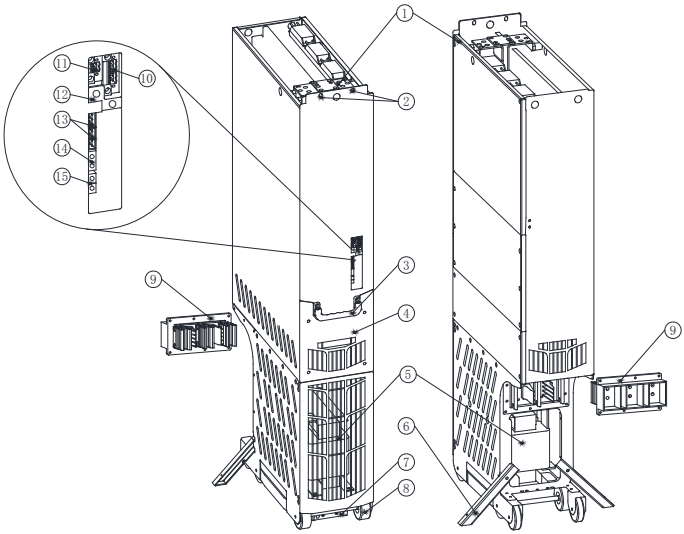


Figure 2-14 Structure Layout of H8 Size Inverter

Number	Note
1	DC bus input terminal
2	Fastening holes at the top of which is secured by protective coating, and the junction between the inverter frame and the cabinet frame where PE is located.
3	Handle
4	Cooling fan
5	Output choke
6	Anti-dumping rack
7	Fastening holes at the bottom of which is sprayed with protection, and the junction between the inverter frame and the cabinet frame where PE is located.
8	Pulley
9	Quick connection socket (adaptor is fastened to the cabinet behind the module)
10	External IO terminal
11	24 Vdc auxiliary internal power terminal
12	Shielding layer wiring clamp
13	STO terminal (reserved)
14	Fiber optic interface 1
15	Fiber optic interface 2

5) Electrical connection of a size H8 inverters

As shown below, an electrical connection diagram of a cabinet with one size H8 inverter.

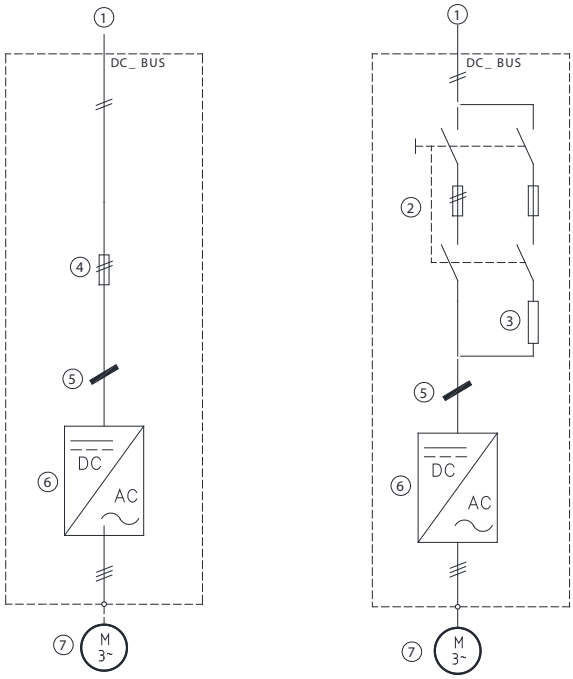


Figure 2-15 Electrical Connection of a Size H8 Inverters

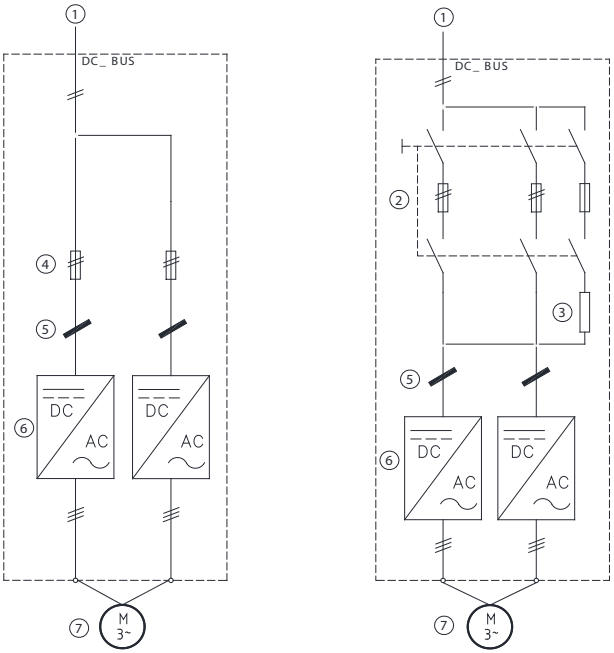
NOTE

- When the DC input power has power buffering capacity, press the electrical diagram on the left.
- When the DC input power does not have power buffering capacity, press the electrical diagram on the right.

Number	Note
1	DC power supply
2	DC side operating switch with precharge circuit
3	Buffer resistance
4	Fuse
5	Common mode filter
6	Inverter
7	Motor

6) Electrical connection diagram of an inverter cabinet consisting of two size H8 inverters

As shown below, an electrical connection diagram of a cabinet based on two parallel connected size H8 inverters.



Connection without fuse Isolating switch Connection with fuse Isolating switch

Figure 2-16 2 * H8 Electrical Connection

NOTE

- When the DC input power has power buffering capacity, press the electrical diagram on the left.
- When the DC input power does not have power buffering capacity, press the electrical diagram on the right.

Number	Note
1	DC power supply
2	DC side operation switch with precharge circuit
3	Buffer resistance
4	Fuse
5	Common mode filter
6	Inverter
7	Motor

7) Electrical connection diagram of an inverter cabinet consisting of three size H8 inverters

As shown below, an electrical connection diagram of a cabinet based on three parallel connected size H8 inverters.

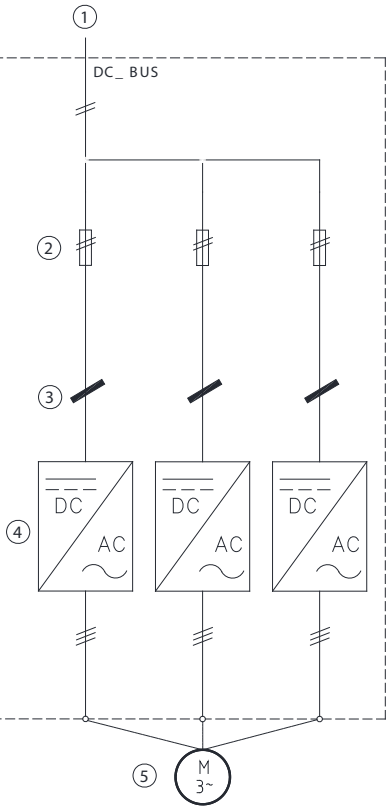


Figure 2-17 Electrical Connection Diagram of Three Size H8 Inverters

NOTE

◆ DC side operation switch with precharge circuit does not support 3 parallel connected H8 in 800 mm wide cabinet.

Number	Note
1	DC power supply DC power supply
2	Fuse
3	Common mode filter
4	Inverter
5	Motor

2.9 Dimensions

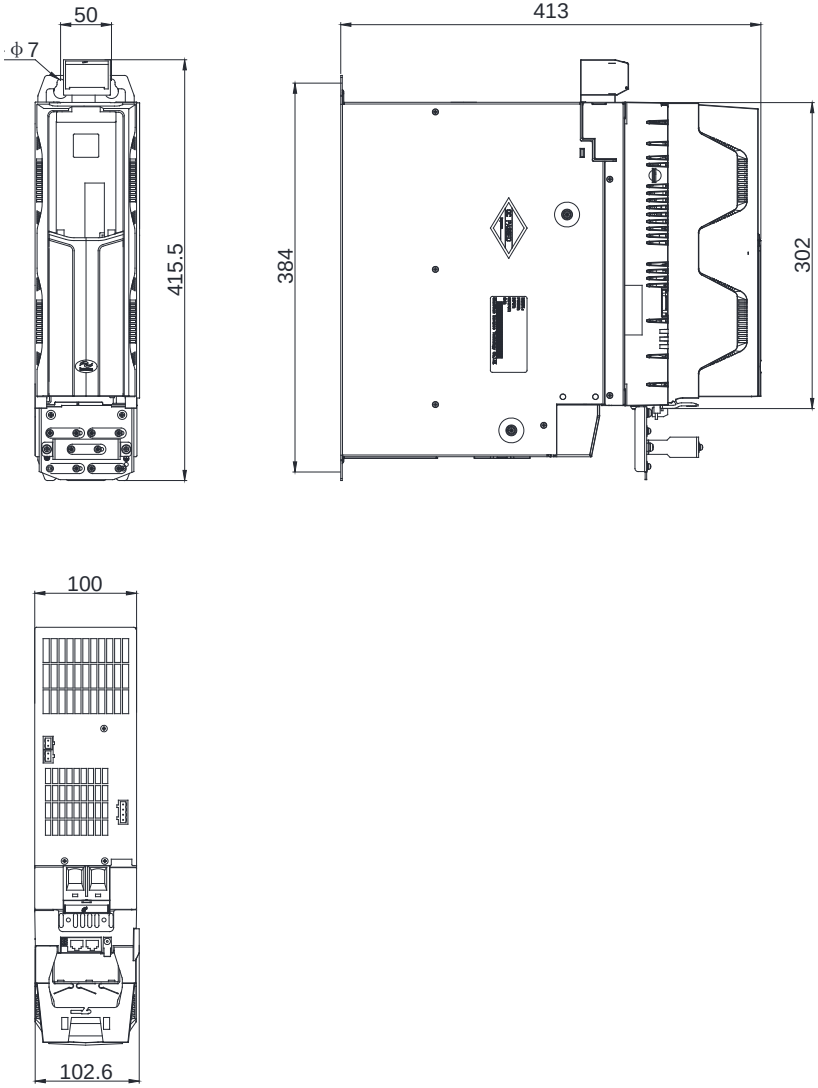


Figure 2-18 Dimensions of Size H1...H3 Inverter (mm)

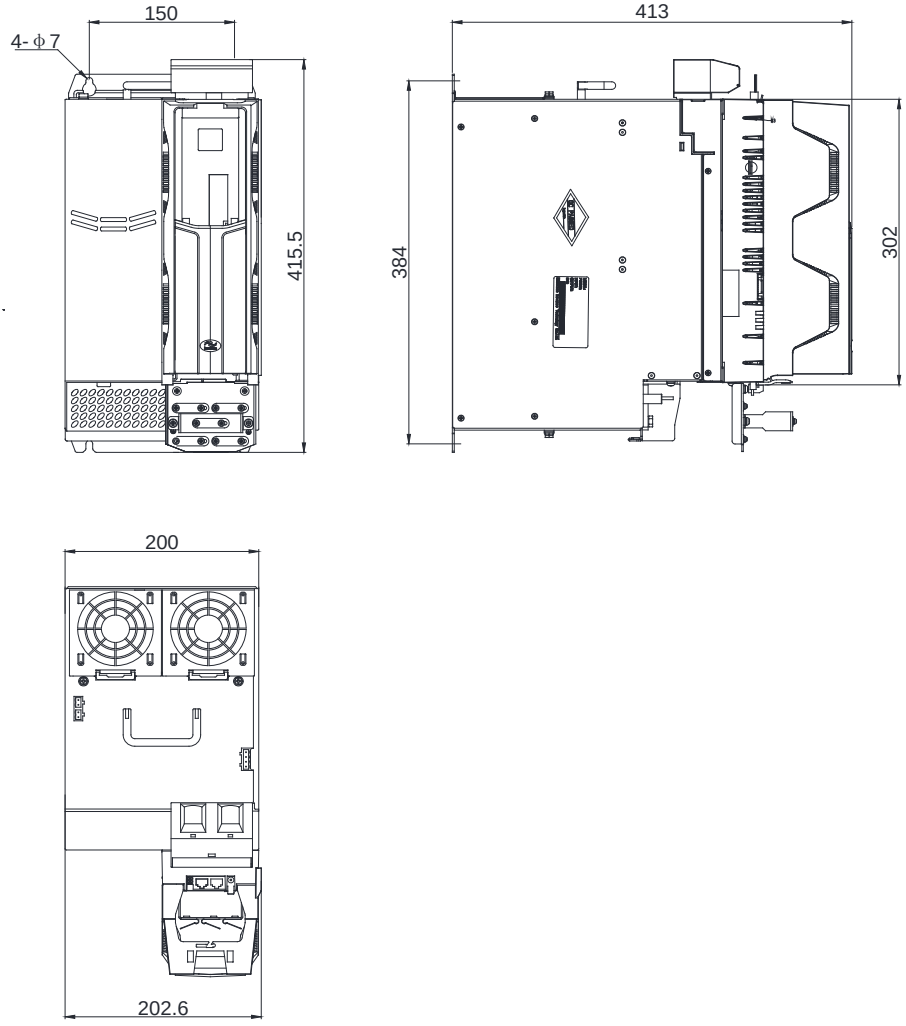


Figure 2-19 Dimensions of Size H4 Inverter (mm)

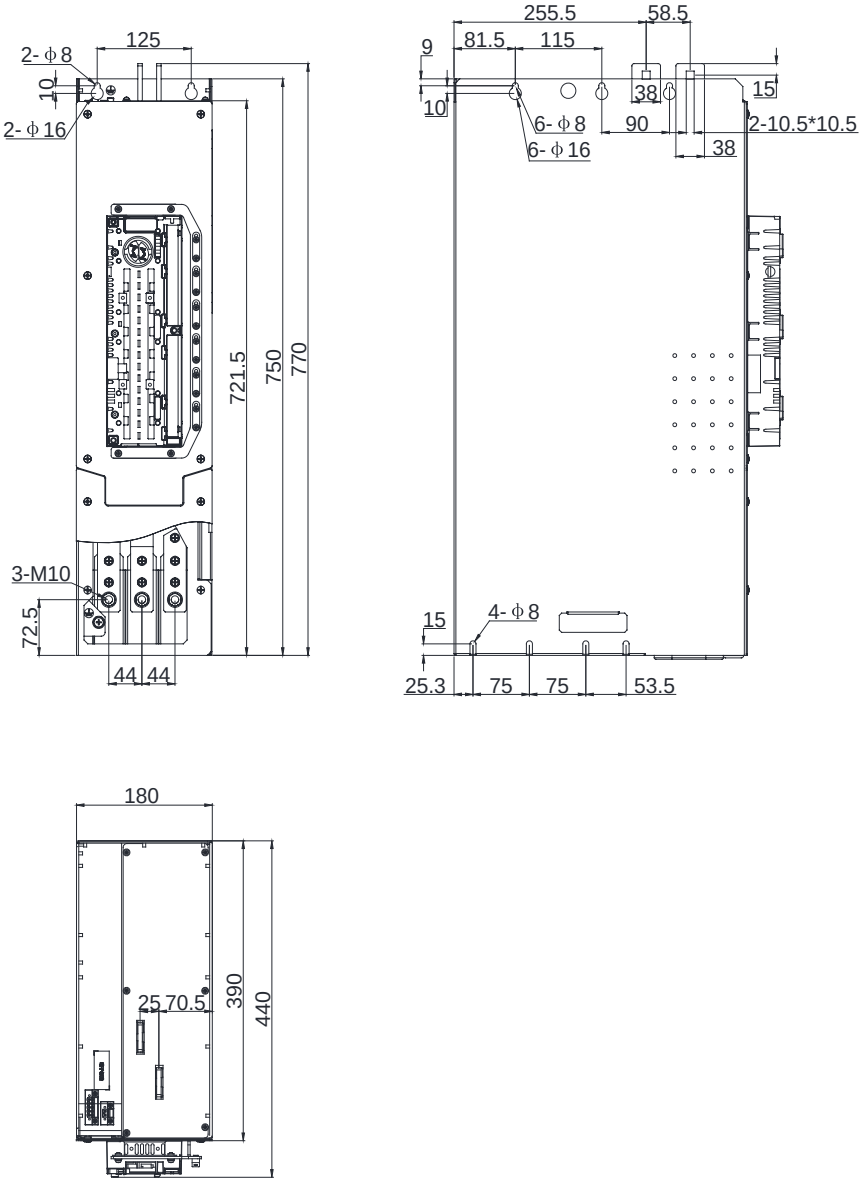


Figure 2-20 Dimensions of Size H6 Inverter (mm)

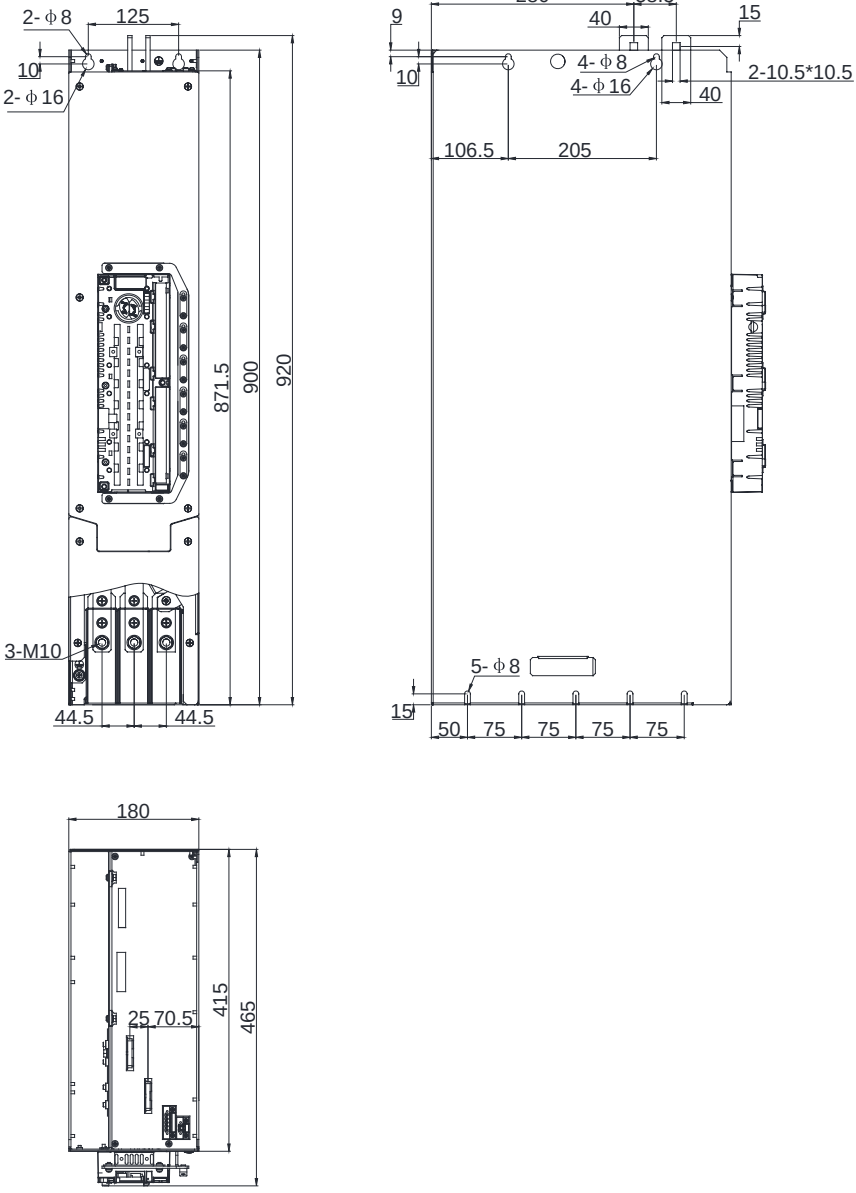


Figure 2-21 Dimensions of Size H7 Inverter (mm)

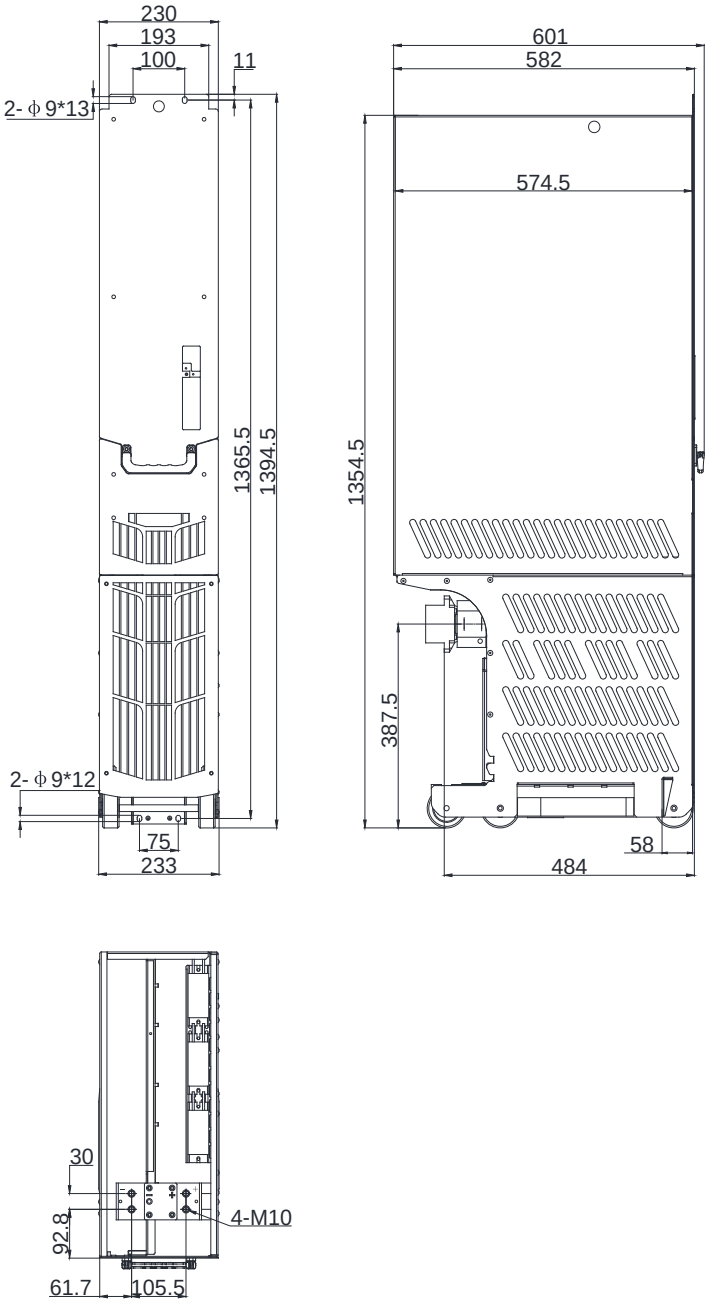


Figure 2-22 Dimensions of Size H8 Inverter (mm)

2.10 Common Tightening Torque of Screws and Bolts

Table 2-5 Electrical Connection

Name	Strength level	Maximum torque (N·m)
M3	4.8	0.5
M4	4.8	1.2
M5	4.8	2.8
M6	4.8	4.8
M8	8.8	20
M10	8.8	40
M12	8.8	70
M16	8.8	200

Table 2-6 Mechanical Connection

Name	Strength level	Maximum torque (N·m)
M5	4.8	2.8
M6	4.8	4.8
M8	8.8	20

Table 2-7 Insulated Column Connection

Name	Strength level	Maximum torque (N·m)
M6	4.8	4.8
M8	8.8	9
M10	8.8	18
M12	8.8	31

Table 2-8 Cable Connection Head

Name	Strength level	Maximum torque (N·m)
M8	8.8	15
M10	8.8	32
M12	8.8	50

2.11 Auxiliary Power Consumption

Table 2-9 Auxiliary power consumption

Module structure	HCU control module power input	Internal auxiliary power input of inverter	Remark
H1...H8	24 Vdc/2 A	24 Vdc/1 A	Before the main power is established, the internal auxiliary power supply can be supplied by the external 24 Vdc/1 A. After the main power is established, the auxiliary power supply of the inverter is provided by the DC bus. At this time, the external 24 Vdc/1 A power supply realizes redundancy.

2.12 Fuse Selection

Inverter modules of 3.7 kW to 90 kW (400 V) are built-in with the bus fuse. For those outside this power range, it is recommended to install a bus fuse between the power supply unit and the drive unit to prevent system damage and accidents caused by short circuit as well as protect the semiconductors of the upstream power supply unit. The recommended fuses are listed in the following table.

Table 2-10 Fuse Selection(BUSSMANN)

Model	Recommended DC Fuse Model		
	Model (BUSSM ANN)	Parameters	Number
UN: three phase AC current 400 V (380 V to 415 V)			
MD880-50M-0009-4	170M1559	16 A, 690V, SIZE: 000	2
MD880-50M-0013-4	170M1561	25 A, 690V, SIZE: 000	2
MD880-50M-0017-4	170M1562	32 A, 690V, SIZE: 000	2
MD880-50M-0023-4	170M1563	40 A, 690V, SIZE: 000	2
MD880-50M-0033-4	170M1565	63 A, 690V, SIZE: 000	2
MD880-50M-0038-4	170M1566	80 A, 690V, SIZE: 000	2
MD880-50M-0048-4	170M1567	100 A, 690V, SIZE: 000	2
MD880-50M-0060-4	170M1568	125 A, 690V, SIZE: 000	2
MD880-50M-0078-4	170M1569	160 A, 690V, SIZE: 000	2
MD880-50M-0094-4	170M1569	160 A, 690V, SIZE: 000	2
MD880-50M-0116-4	170M1570	200 A, 690V, SIZE: 000	2
MD880-50M-0149-4	170M1571	250 A, 690V, SIZE: 000	2
MD880-50M-0183-4	170M1572	315 A, 690V, SIZE: 000	2
MD880-50M-0245-4	170M4413	450 A, 690V, SIZE: 1	2

Model	Recommended DC Fuse Model		
	Model (BUSSM ANN)	Parameters	Number
MD880-50M-0299-4	170M4413	450 A, 690V, SIZE: 1	2
MD880-50M-0349-4	170M4416	630 A, 690V, SIZE: 1	2
MD880-50M-0405-4	170M4416	630 A, 690V, SIZE: 1	2
MD880-50M-0516-4	170M6413	900 A, 690V, SIZE: 3	2
MD880-50M-0639-4	170M6415	1100 A, 690V, SIZE: 3	2
MD880-50M-0757-4	170M6416	1250 A, 690V, SIZE: 3	2
MD880-50M-0900-4	170M6418	1500 A, 690V, SIZE: 3	2
UN: three phase AC 690 V (525 V to 690V)			
MD880-50M-0062-7	170M4437	125 A, 1250V, SIZE: 1	2
MD880-50M-0082-7	170M4438	160 A, 1250V, SIZE: 1	2
MD880-50M-0099-7	170M4438	160 A, 1250V, SIZE: 1	2
MD880-50M-0125-7	170M4440	250 A, 1250V, SIZE: 1	2
MD880-50M-0144-7	170M4441	315 A, 1250V, SIZE: 1	2
MD880-50M-0192-7	170M4441	315 A, 1250V, SIZE: 1	2
MD880-50M-0217-7	170M4444	450 A, 1250V, SIZE: 1	2
MD880-50M-0270-7	170M4444	450 A, 1250V, SIZE: 1	2
MD880-50M-0340-7	170M6543	550 A, 1250V, SIZE: 3	2
MD880-50M-0410-7	170M6545	700 A, 1250 V, SIZE: 3	2
MD880-50M-0530-7	170M6547	900 A, 1250 V, SIZE: 3	2
MD880-50M-0600-7	170M6548	1000 A, 1250 V, SIZE: 3	2

Table 2-11 Fuse Selection (Middle Melting)

Model	Recommended DC Fuse Model		
	Model (middle melting)	Parameter	Number
UN: three phase AC 400 V (380 V to 415 V)			
MD880-50M-0009-4	RS306-00-C1Z-16 A-690 V	16 A, 690 V, SIZE:000	2
MD880-50M-0013-4	RS306-00-C1Z-25 A-690 V	25 A, 690 V, SIZE:000	2
MD880-50M-0017-4	RS306-00-C1Z-32 A-690 V	32 A, 690 V, SIZE:000	2
MD880-50M-0023-4	RS306-00-C1Z-40 A-690 V	40 A, 690 V, SIZE:000	2
MD880-50M-0033-4	RS306-00-C1Z-63 A-690 V	63 A, 690 V, SIZE:000	2
MD880-50M-0038-4	RS306-00-C1Z-80 A-690 V	80 A, 690 V, SIZE:000	2
MD880-50M-0048-4	RS306-00-C1Z-100 A-690 V	100 A, 690 V, SIZE:000	2
MD880-50M-0060-4	RS306-00-C1Z-125 A-690 V	125 A, 690 V, SIZE:000	2
MD880-50M-0078-4	RS306-00-C1Z-160 A-690 V	160 A, 690 V, SIZE:000	2

Model	Recommended DC Fuse Model		
	Model (middle melting)	Parameter	Number
MD880-50M-0094-4	RS306-00-C1Z-160 A-690 V	160 A, 690 V, SIZE:000	2
MD880-50M-0116-4	RS306-00-C1Z-200 A-690 V	200 A, 690 V, SIZE:000	2
MD880-50M-0149-4	RS306-00-C1Z-250 A-690 V	250 A, 690 V, SIZE:000	2
MD880-50M-0183-4	RS306-00-C1Z-315 A-690 V	315 A, 690 V, SIZE:000	2
MD880-50M-0245-4	RS306-1-S1P-450 A690 V	450 A, 690 V, SIZE: 1	2
MD880-50M-0299-4	RS306-1-S1P-450 A690 V	450 A, 690 V, SIZE: 1	2
MD880-50M-0349-4	RS306-1-S1P-630 A690 V	630 A, 690 V, SIZE: 1	2
MD880-50M-0405-4	RS306-1-S1P-630 A690 V	630 A, 690 V, SIZE: 1	2
MD880-50M-0516-4	RS306-3-S1P-900 A690 V	900 A, 690 V, SIZE: 3	2
MD880-50M-0639-4	RS306-3-S1P-1100 A690 V	1100 A, 690 V, SIZE: 3	2
MD880-50M-0757-4	RS306-3-S1P-1250 A690 V	1250 A, 690 V, SIZE: 3	2
MD880-50M-0900-4	RS306-3-S1P-1500 A690 V	1500 A, 690 V, SIZE: 3	2
UN: three phase AC 690 V (525 V to 690 V)			
MD880-50M-0062-7	RS306-1-S5P-125 A1250 V-D	125 A, 1250 V, SIZE: 1	2
MD880-50M-0082-7	RS306-1-S5P-160 A1250 V-D	160 A, 1250 V, SIZE: 1	2
MD880-50M-0099-7	RS306-1-S5P-160 A1250 V-D	160 A, 1250 V, SIZE: 1	2
MD880-50M-0125-7	RS306-1-S5P-250 A1250 V-D	250 A, 1250 V, SIZE: 1	2
MD880-50M-0144-7	RS306-1-S5P-315 A1250 V-D	315 A, 1250 V, SIZE: 1	2
MD880-50M-0192-7	RS306-1-S5P-315 A1250 V-D	315 A, 1250 V, SIZE: 1	2
MD880-50M-0217-7	RS306-1-S5P-450 A1250 V-D	450 A, 1250 V, SIZE: 1	2
MD880-50M-0270-7	RS306-1-S5P-450 A1250 V-D	450 A, 1250 V, SIZE: 1	2
MD880-50M-0340-7	RS306-3-S5P-550 A1250 V-D	550 A, 1250 V, SIZE: 3	2
MD880-50M-0410-7	RS306-3-S5P-700 A1250 V-D	700 A, 1250 V, SIZE: 3	2
MD880-50M-0530-7	RS306-3-S5P-900 A1250 V-D	900 A, 1250 V, SIZE: 3	2
MD880-50M-0600-7	RS306-3-S5P-1000 A1250 V-D	1000 A, 1250 V, SIZE: 3	2

2.13 Isolating Switch Type Selection

Table 2-12 Type Isolating Switch Selection Table (H1...H4, H6)

Model	Recommended Fuse Type Isolating Switch Recommended DC fuse model		
	Model (BUSSM ANN)	Parameter	Number
UN: three phase AC 400 V (380 V to 415 V)			
MD880-50M-0009-4	body: 26P V 2010 H Andle: 1112 1111	100 A, 1000 Vdc	1
MD880-50M-0013-4	body: 26P V 2010 H Andle: 1112 1111	100 A, 1000 Vdc	1
MD880-50M-0017-4	body: 26P V 2010 H Andle: 1112 1111	100 A, 1000 Vdc	1
MD880-50M-0023-4	body: 26P V 2010 H Andle: 1112 1111	100 A, 1000 Vdc	1
MD880-50M-0033-4	body: 26P V 2010 H Andle: 1112 1111	100 A, 1000 Vdc	1
MD880-50M-0038-4	body: 26P V 2010 H Andle: 1112 1111	100 A, 1000 Vdc	1
MD880-50M-0048-4	body: 26P V 2010 H Andle: 1112 1111	100 A, 1000 Vdc	1
MD880-50M-0060-4	body: 26P V 2010 H Andle: 1112 1111	100 A, 1000 Vdc	1
MD880-50M-0078-4	body: 26P V 2016 H Andle: 1112 1111	160 A, 1000 Vdc	1
MD880-50M-0094-4	body: 26P V 2016 H Andle: 1112 1111	160 A, 1000 Vdc	1
MD880-50M-0116-4	body: 26P V 2025 H Andle: 1112 1111	250 A, 1000 Vdc	1
MD880-50M-0149-4	body: 26P V 2025 H Andle: 1112 1111	250 A, 1000 Vdc	1
MD880-50M-0183-4	body: 26P V 2031 H Andle: 1112 1111	310 A, 1000 Vdc	1
MD880-50M-0245-4	body: 26P V 4040 H Andle: 1112 1111	400 A, 1000 Vdc	1
MD880-50M-0299-4	body: 26P V 4040 H Andle: 1112 1111	400 A, 1000 Vdc	1
UN: three phase AC 690 V (525 V to 690 V)			
MD880-50M-0062-7	body: 26P V 2016 H Andle: 1112 1111	160 A, 1000 Vdc	1
MD880-50M-0082-7	body: 26P V 2016 H Andle: 1112 1111	160 A, 1000 Vdc	1

Model	Recommended Fuse Type Isolating Switch Recommended DC fuse model		
	Model (BUSSM ANN)	Parameter	Number
MD880-50M-0099-7	body: 26P V 2016 H Andle: 1112 1111	160 A, 1000 Vdc	1
MD880-50M-0125-7	body: 26P V 2025 H Andle: 1112 1111	250 A, 1000 Vdc	1
MD880-50M-0144-7	body: 26P V 2025 H Andle: 1112 1111	250 A, 1000 Vdc	1
MD880-50M-0192-7	body: 26P V 2031 H Andle: 1112 1111	315 A, 1000 Vdc	1

Table 2-13 Isolating Switch Type Selection (H7)

Model	Recommended Model of Load Isolating Switch		
	Model (BUSSMANN)	Parameter	Number
UN: three phase AC 400 V (380 V to 415 V)			
MD880-50M-0349-4	body: 26P V 4063 Handle: 1112 1111	630 A, 1000 Vdc	1
MD880-50M-0395-4	body: 26P V 4063 Handle: 1112 1111	630 A, 1000 Vdc	1
UN: three phase AC 690 V (range 525 V to 690 V)			
MD880-50M-0217-7	body: 26P V 2031 Handle: 1112 1111	315 A, 1000 Vdc	1
MD880-50M-0270-7	body: 26P V 4040 Handle: 1112 1111	400 A, 1000 Vdc	1

Table 2-14 Type Selection of DC Side Operating Switch with Precharging Circuit (H8)

Model	Recommended DC Side Operating Switch With Prech Arging Circuit		
	Model (BUSSM ANN)	Parameter	Number
UN: three phase AC 400 V (380 V to 415 V)			
MD880-50M-0516-4	body: 38S1 2080 Handle: 1433 3111 Extension bar: 1403 1240	800 A, 1250 Vdc	1
MD880-50M-0639-4	body: 38S1 2080 Handle: 1433 3111 Extension b Ar: 1403 1240	800 A, 1250 Vdc	1

Model	Recommended DC Side Operating Switch With Prech Arging Circuit		
	Model (BUSSM ANN)	Parameter	Number
MD880-50M-0757-4	body: 38S1 4100 Handle: 1433 3111 Extension b Ar: 1403 1240	1200 A, 1250 Vdc	1
MD880-50M-0900-4	body: 38S1 4160 Handle: 1433 3111 Extension bar: 1403 1240	1600 A, 1250 Vdc	1
UN: three phase AC 690 V (525 V to 690 V)			
MD880-50M-0340-7	body: 38S1 2060 Handle: 1433 3111 Extension bar: 1403 1240	600 A, 1250 Vdc	1
MD880-50M-0410-7	body: 38S1 2060 Handle: 1433 3111 Extension bar: 1403 1240	600 A, 1250 Vdc	1
MD880-50M-0530-7	body: 38S1 2080 Handle: 1433 3111 Extension bar: 1403 1240	800 A, 1250 Vdc	1
MD880-50M-0600-7	body: 38S1 4100 Handle: 1433 3111 Extension bar: 1403 1240	1200 A, 1250 Vdc	1

Chapter 3 Mechanical Installation

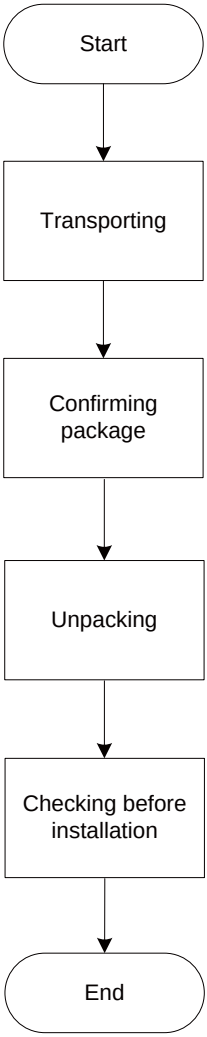


Figure 3-1 Work Flow of Mechanical Installation

3.1 Storage and Transportation Precautions

3.1.1 Storage

Keep the equipment in a clean and dry space, and the temperature should be between -40°C to +70°C , and the allowed environmental temperature change should be <1°C / min. For long term storage, cover the inverter and keep it alway from pollution and environmental impact.

After purchasing, observe the followings for euipment temporary and long-term storage:

- Use the original package
- Do not expose the machine in humid, high temperature or outdoor environment for a long time.

3.1.2 Transportation

Equipment transportation must be performed only by qualified personnel following below instructions:

- The packed inverter (H1...H4) are small-sized, light, and can be manually carried.
- The packed inverter with size of (H6...H8) is carried on the pallet below the outside package using forklift and crane. When use a forklift, the equipment must be secured to wooden pallets. When use crane, the equipment must be secured to the wooden pallets and lift together.
- The bearing capacity of the transportation equipment must be greater than the weight of the inverter.

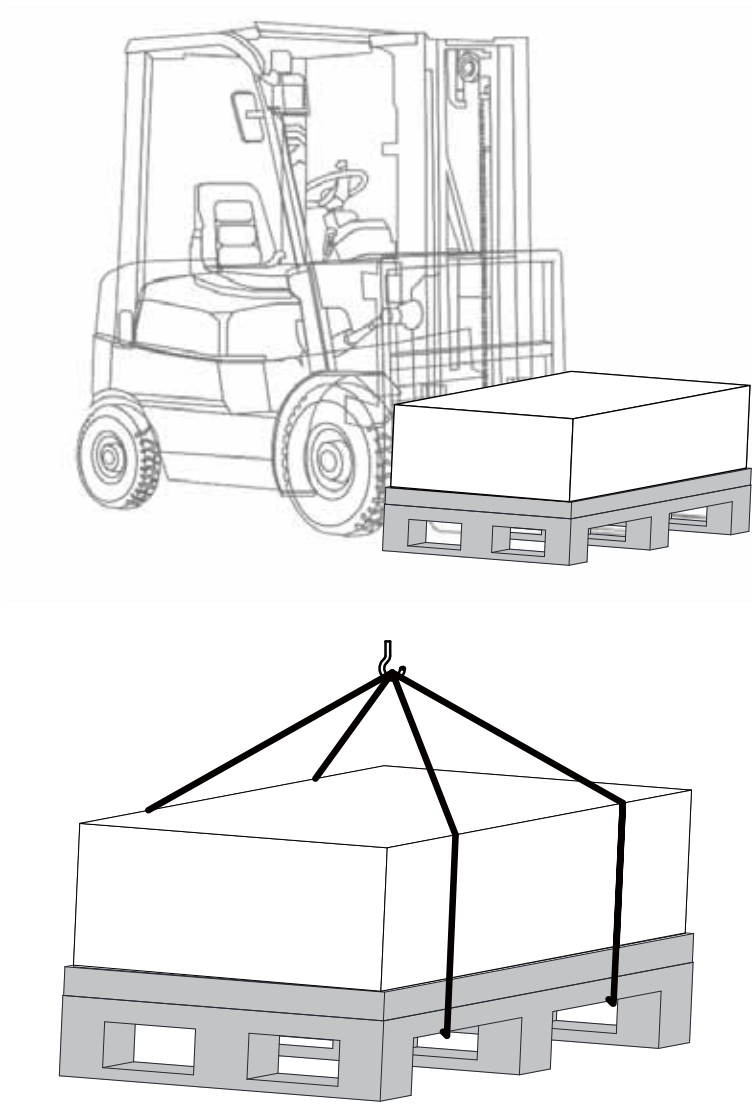


Figure 3-2 Equipment Transportation Before Unpacking

- Ensure that the ground at the installation location is flat, stable, and strong enough to bear the weight of the equipment.
- The size H6...H8 inverters are heavy and have high center of gravity. Do not place the cable units on the slope more than 5 degrees.
- The cabinet units must always be transported in the upright position indicated. The cabinet modules must not be transported upside down or in a horizontal position.

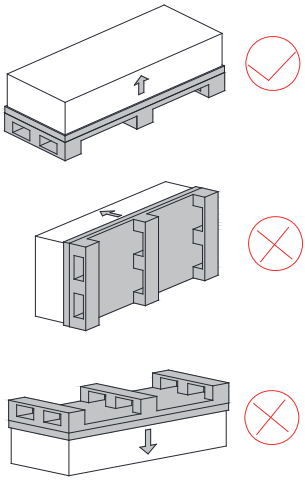


Figure 3-3 Transportation Methods

3.1.3 Package Check

Carry out a thorough visual inspection of the MD880-50 series inverters before accepting the equipment 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 Unity Drive office or the local agent for technical support if you have any problem.

Danger:	◆ If the cabinet units are damaged during transportation, the electrical safety of the cabinet can no longer be ensured. They must not be connected until a thorough high-voltage test has been carried out. ◆ Failure to observe this warning may result in personal injury or even death or equipment damage.

3.1.4 Unpacking

The inverter (H1...H4) is delivered in a corrugated cardboard box, and the inverter (H6...H8) is also packaged in corrugated cardboard box and fixed on a wooden base by PET belt for delivery. Manuals and accessories are placed in different compartments of the box.

Follow steps below to unpack the equipment:

1. Remove all banding and remove the cover of the box.
2. Remove all filling material.
3. Lift the inverter out of the box.
4. Cut open the plastic wrapping of the inverter.
5. Make sure there are no signs of damage.

Dispose or recycle packaging according to local regulations.

3.1.5 Mechanical Installation Checklist

Danger:	◆ To ensure safe and reliable running, the inverter must be properly installed and commissioned by qualified personnel, taking into account all the warning notices provided. ◆ Failure to comply may cause casualties or server property dnamage.

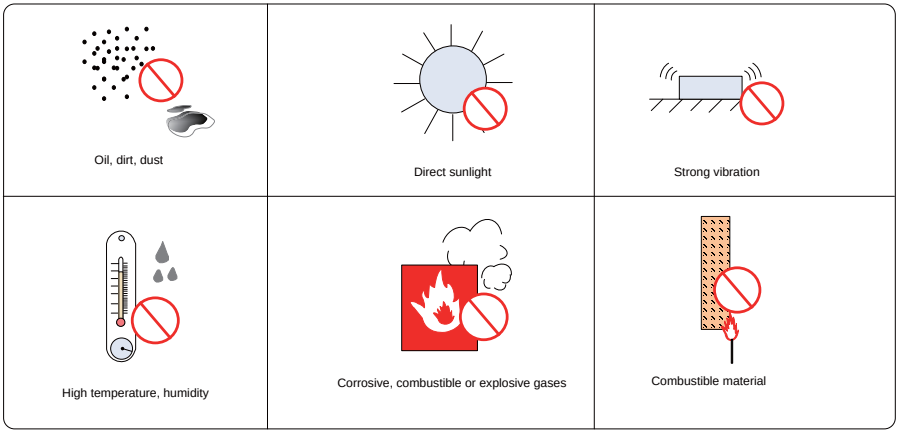
Check if the activities on the right boxes applies to the received inverter and are in your scope of delivery. In the same way, check the boxes once you have finished the installation procedure to confirm that the activities are completed.

表 3-1 Table 3-1 Mechanical installation checklist

Item	Activity	Applicable
1	The packing box is free of loss, damage, and dampness.	☐
2	The inverter housing is intact without distortion, peeling, or crack, and there is no water stain.	☐
3	The accessories (user guide, optional parts) inside the cabinet units are complete.	☐
4	The installation space of the inverter should meet the minimum requirements (with sufficient airflow), and there should be sufficient space for the air inlet and outlet without obstruction.	☐
5	All protection measures (guards) in and on the inverters must be completed before commissioning.	☐

3.2 Installation Environment

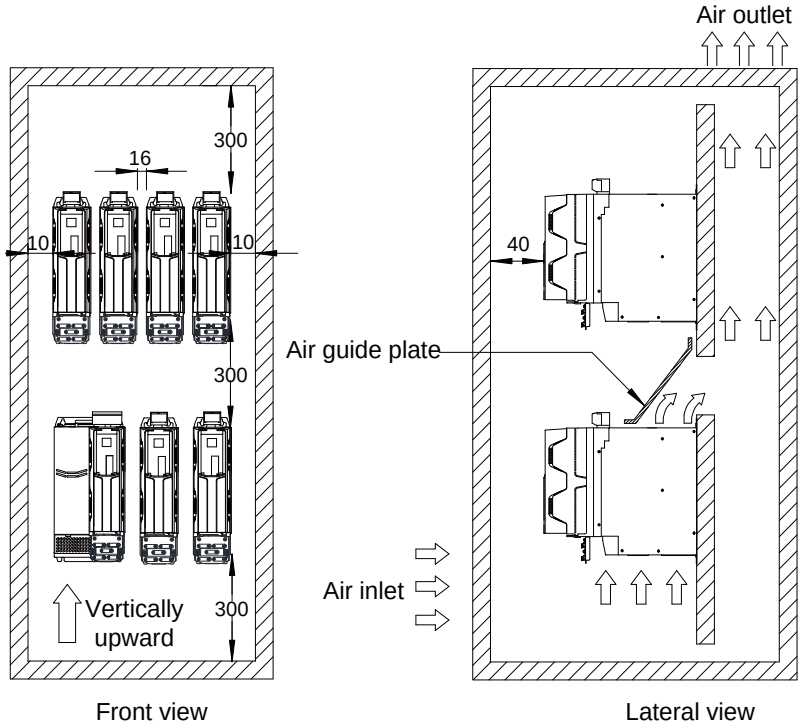
Item	Requirement
Heat dissipation and ventilation	Install the inverter on the surface of the flame retardant object with sufficient room for heat dissipation. The inverter tends to generate a lot of heat while running. Install the unit vertically on the support rack and tighten it with screws.
Site requirement	The installation site ensures that the installation site meets the following requirements: Do not install in direct sunlight. Avoid to install in places where moisture is greater than 95% and water drops. Avoid place where there is corrosive, flammable, and explosive gas air. Avoid place where there is oil or dust.
Vibration	Install on stable ground, vibration should not be greater than 0.6 g.
Environment temperature	Temperature must meet the requirement: When the environment temperature is > 40°C , power derating is required; when the inverter is installed above 1000 m altitude, power derating is a must, for derating coefficient, refer to “2.6 Derating” .
Shell	This product is design for cabinet installation, and need to install in the final system, the system should provide corresponding fire protection shell, electrical enclosure and mechanical enclosure, The standard of the shell should meet the requirements of local laws, regulations and the IEC standard.



3.3 Installation Space

1. Installation space requirement for inverter (H1...H4)

The installation space and space around the inverter is reserved based on different power levels, as follows:

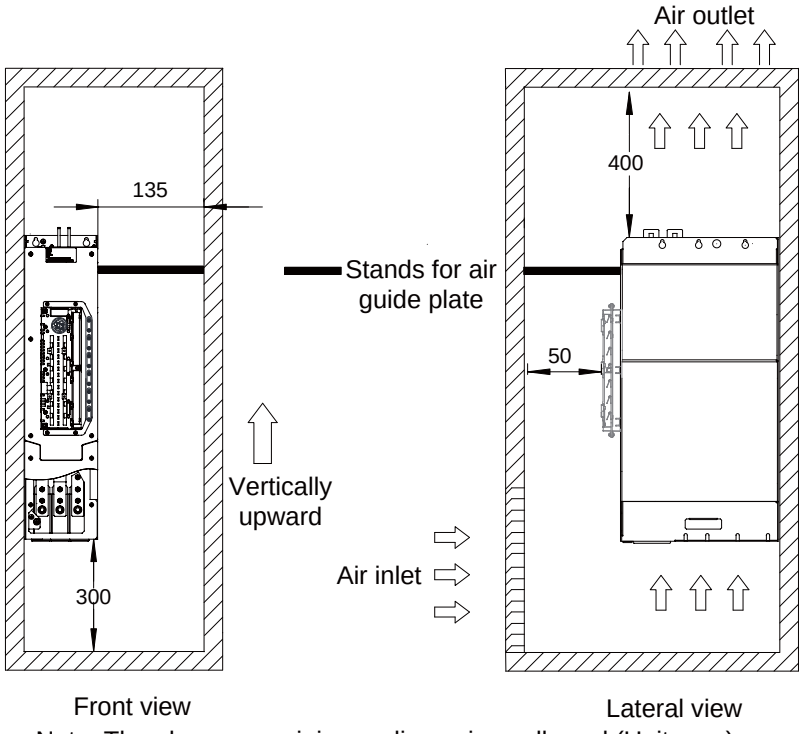


Note: The above are minimum dimensions allowed (Unit: mm)

Figure 3-4 Space Requirement

2. Installation space requirement inverter (H6...H7)

Installation space and space around the inverter is reserved based on different power levels, as follows:

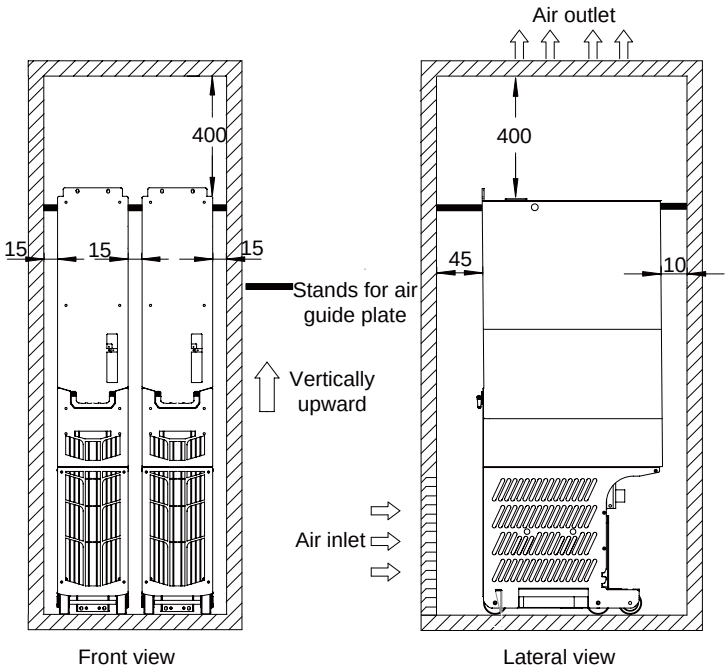


Note: The above are minimum dimensions allowed (Unit: mm)

Figure 3-5 Space Requirement

3. Space requirement for H8 size inverter installation

The installation space and space around are reserved based on different power levels, as follows:



Note: The above are minimum dimensions allowed (Unit: mm)

Figure 3-6 Space Requirement

4. Cabinet air inlet/outlet area

Maintain minimum ventilation space at the top and bottom of the inverter to ensure cooling air flow. Especially when use cable tray, it is essential to comply with the requirement that no parts and wire should be installed within this area.

When install one unit up above another, install an air guide plate to prevent the heat of the lower inverter from causing an overheat/overload failure on the upper unit. The installation of one inverter up another has greater power density and stricter heat dissipation condition as compared with a single line inverter.

The inlet and outlet design should comply with the following requirements:

The area of the air inlet shall be: Sin = (1.5 to 2) * (S module, 1+, S module, 2+, S module, 3+)..... + S module N)

S: in - system air inlet area, m^2,

S in: air inlet area of each module, m^2;

The outlet area should be: Sout = (1.2 to 1.5) * S.

Air inlet area of each inverter for MD880 is as follows:

Ventilation area

Model	Air inlet area of inverter Sin（cm^2）
H1 to H2	60
H3	70
H4	120
H6	710
H7	750
H8	1400

NOTE

◆ The service life of the inverter will be significantly shortened if the installation rules of the inverter is violated, which may result in fault or premature failure of the inverter.

3.4 Cabinet layout

Unity Drive provides cabinet products with the cabinet layout as follows:

1. Layout of the inverter (H1...H4) in the 400 mm wide cabinet:

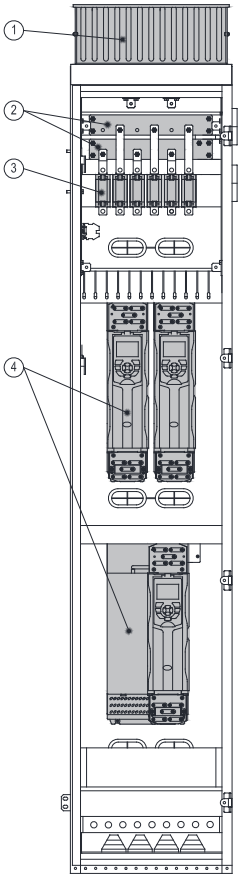


Figure 3-7 H1...H4-400 mm Cabinet

NOTE

◆ This example does not include the DC bus buffer module.

Number	Name
1	Top cover (IP21)
2	DC input copper bar
3	Fuse
4	Inverter

2. Layout of the inverter (H1...H4) in the 600 mm wide cabinet

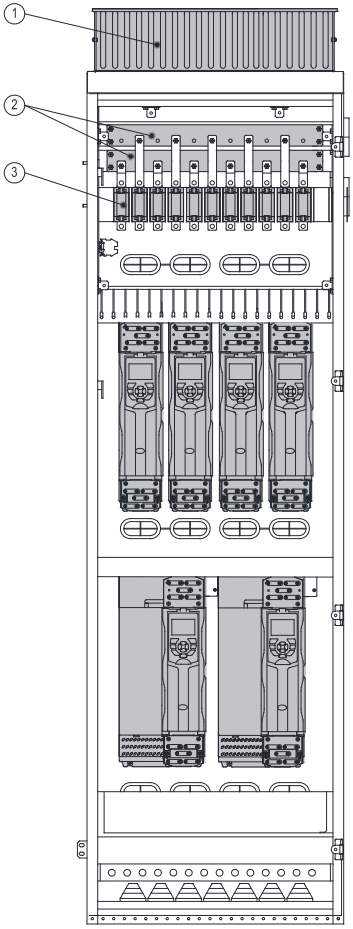


Figure 3-8 H1...H4-600 mm Cabinet

NOTE

◆ This example does not include the DC bus buffer module.

Number	Name
1	Top cover (IP21)
2	DC input copper bar
3	Fuse
4	Inverter

3. Layout of the inverter (H1...H4) in the 800 mm wide cabinet

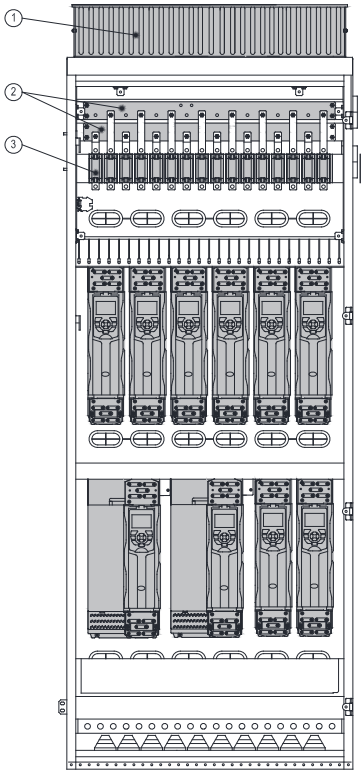


Figure 3-9 H1...H4-800 mm Cabinet

NOTE

◆ The layout example does not contain the DC bus buffer module.

Number	Name
1	Top cover (IP21)
2	DC input copper bar
3	Fuse
4	Inverter

Example of components installation for inverter (H1...H4) in 800mm wide cabinet

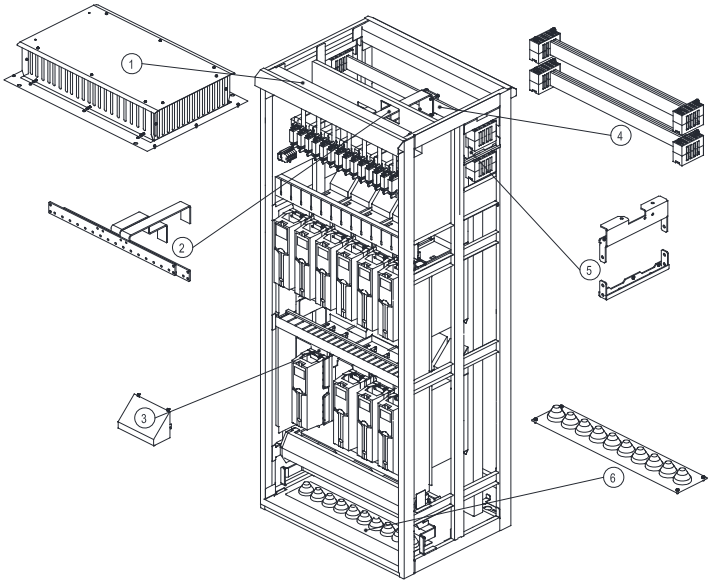


Figure 3-10 H1...H4-800 mm Cabinet Component Installation

Number	Name
1	Top cover (IP21)
2	DC input copper bar
3	Air guide cover
4	Bus and bus clip
5	Bus clip cable rack
6	Bottom cable outlet

4. Layout of inverter (H6...H7) in 400 mm wide cabinet

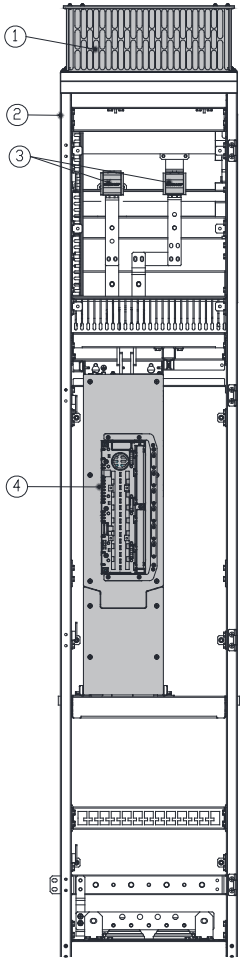


Figure 3-11 H6...H7-400 mm Cabinet

NOTE

◆ This example does not include the DC bus buffer module.

Number	Name
1	Top cover (IP21)
2	DC bus bar (block)
3	Fuse
4	Inverter

Example of components installation for size H6...H7 inverter in 400 mm wide cabinet

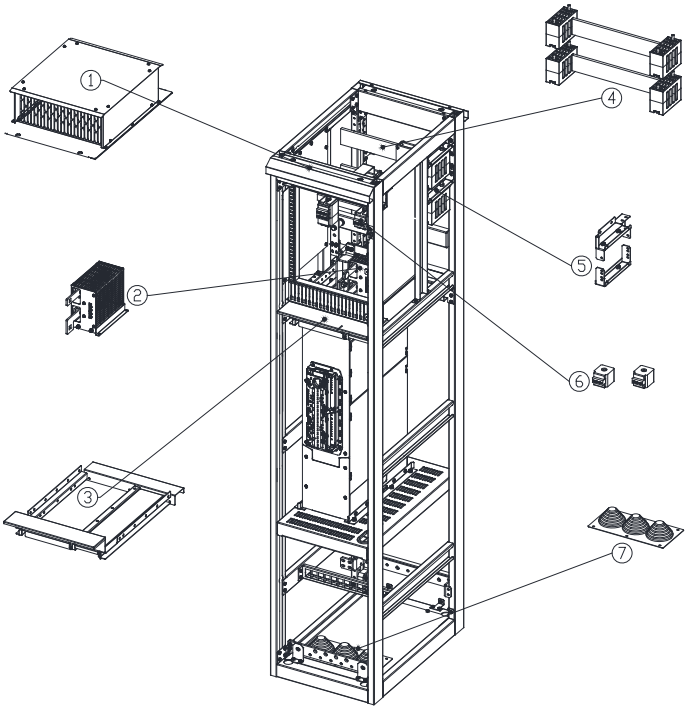


Figure 3-12 H6...H7-400 mm Cabinet Components Installation

Number	Name
1	Top cover (IP21)
2	DC bus buffer module
3	parts
4	Bus and bus clip
5	Bus clip cable rack
6	Fuse
7	Bottom cable outlet

5. Layout of size H8 inverter in 400 mm wide cabinet

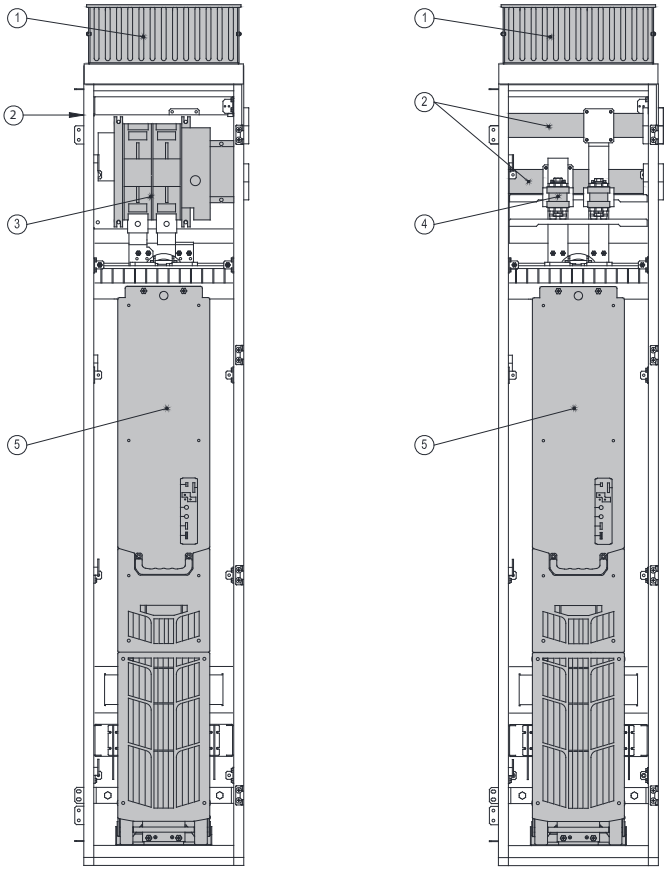


Figure 3-13 H8-400 mm Cabinet

NOTE

- The left figure shows the cabinet layout of DC switch side with precharge circuit.
- The right figure shows the cabinet layout with fuse module only.

Number	Name
1	Top cover (IP21)
2	DC input copper bar (occlusion)
3	DC side operation switch with precharge circuit
4	Fuse
5	Inverter

Example of components installation for size H8 inverter in 400 mm wide cabinet

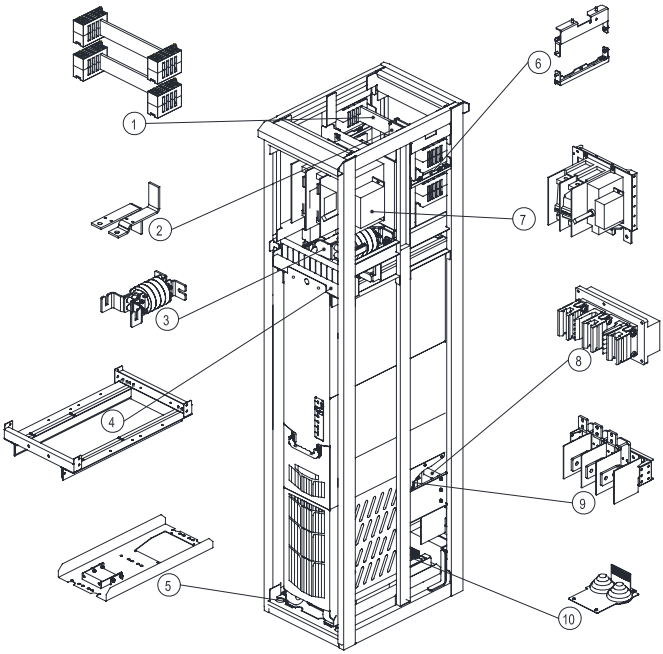


Figure 3-14 H8-400 mm Cabinet Components Installation (DC switch with precharge circuit)

Number	Name
1	Bus and bus clip
2	DC input copper bar
3	Filter ring
4	Upper mounting parts
5	Lower mounting parts
6	Bus clip cable rack
7	DC side operation switch with precharge circuit
8	Quick connector socket
9	AC output of copper bar
10	Bottom cable outlet

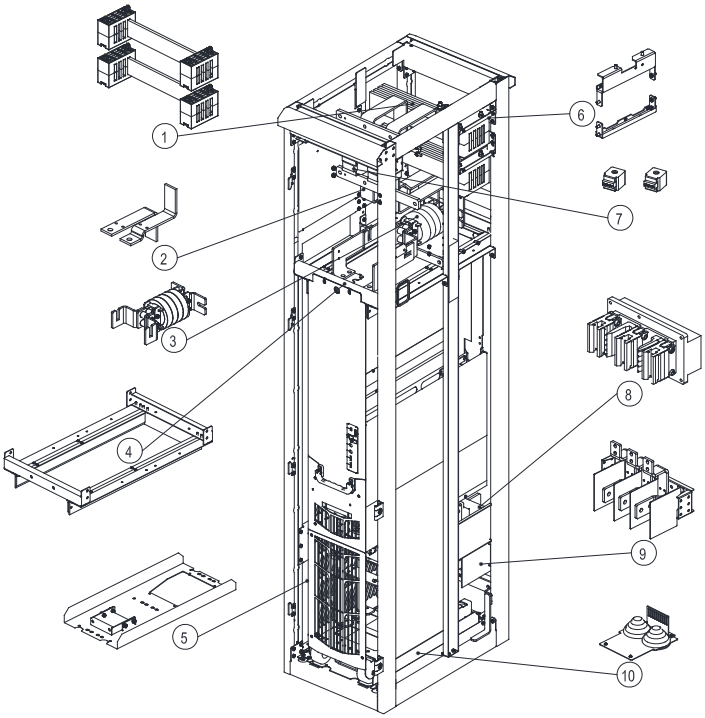


Figure 3-15 H8-400 mm Cabinet Installation (fuse only)

Number	Name
1	Bus and bus clip
2	DC input copper bar
3	Filter ring (Optional)
4	Upper mounting parts
5	Lower mounting parts
6	Bus clip cable rack
7	Fuse
8	Quick connector socket
9	AC output of copper bar
10	Bottom cable outlet

6. Layout of size 2*H8 inverter in 600 mm wide cabinet

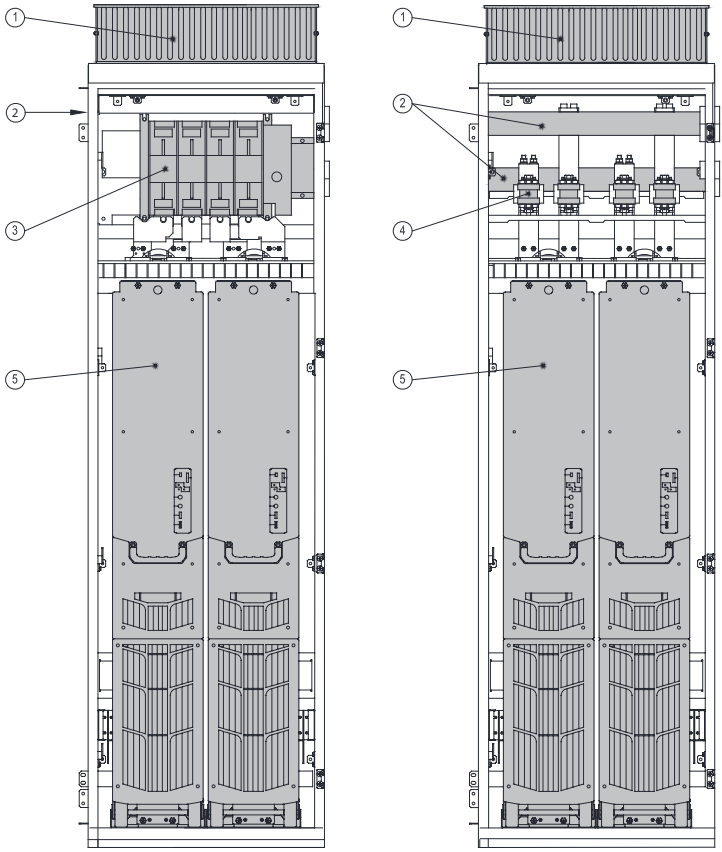


Figure 3-16 H8-600 mm Cabinet

NOTE

- The left figure shows the cabinet layout of DC side operation switch with precharge circuit.
- The right figure shows the cabinet layout with fuse module only.

Number	Name
1	Top cover (IP21)
2	DC input copper bar
3	DC side operation switch with precharge circuit
4	Fuse
5	Inverter

Example of components installation for size H8 inverter in 600 mm wide cabinet

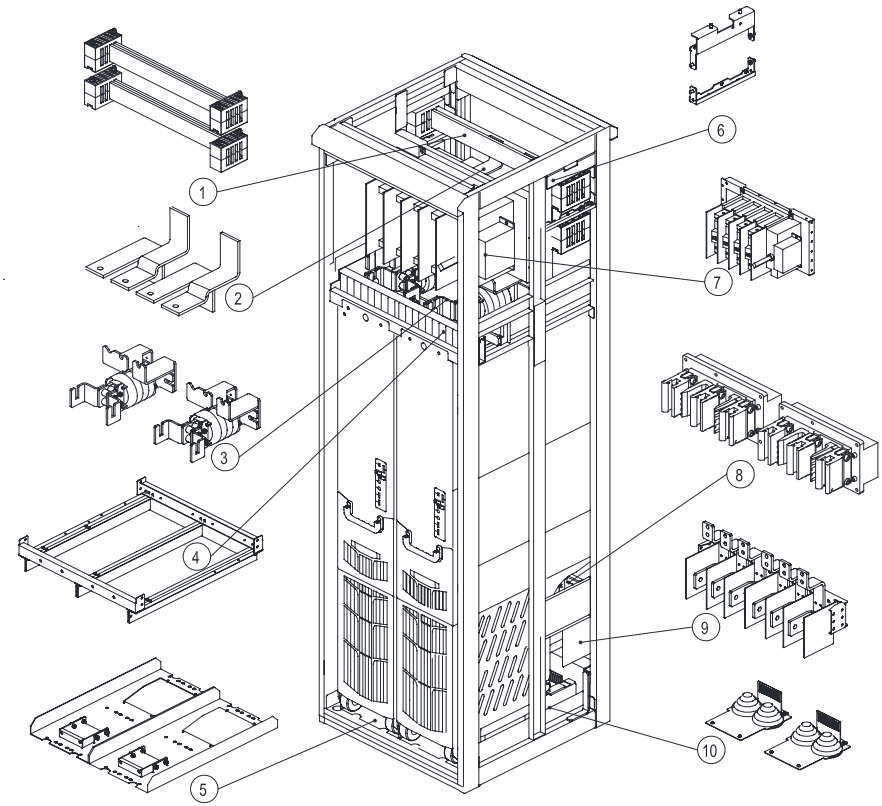


Figure 3-17 H8-600 mm Cabinet Components Installation (DC switch with precharge circuit)

Number	Name
1	Bus and bus clip
2	DC input copper bar
3	Filter ring (Optional)
4	Upper mounting parts
5	Lower mounting parts
6	Bus clip cable rack
7	DC side operation switch with precharge circuit
8	Quick connector socket
9	AC output of copper bar
10	Bottom cable outlet

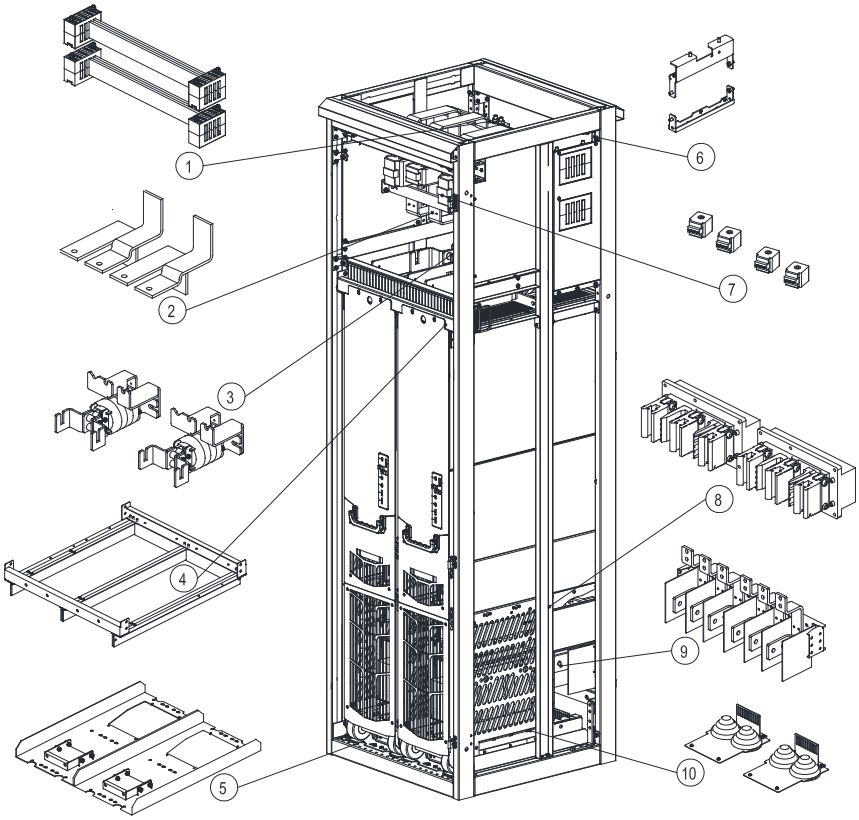


Figure 3-18 H8-600 mm Cabinet Installation (fuse only)

Number	Name
1	Bus and bus clip
2	DC input bar
3	Filter ring (Optional)
4	Upper mounting parts
5	Lower mounting parts
6	Bus clip cable rack
7	Fuse
8	Quick connector socket
9	AC output of copper
10	Bottom cable outlet

7. Layout of size 3*H8 inverter in 800 mm wide cabinet

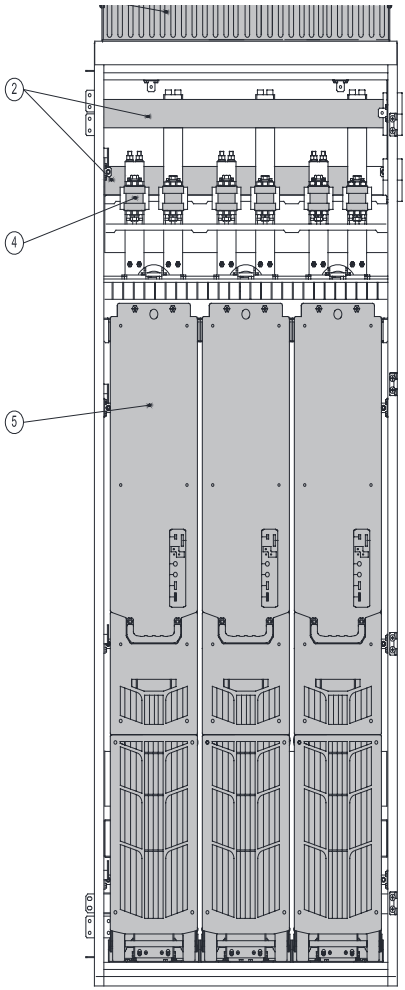


Figure 3-19 H8-800 mm Cabinet

NOTE

◆ The DC side operation switch with precharge circuit does not support 3 parallel connected H8 in 800mm wide cabinet.

Number	Name
1	Top cover (IP21)
2	DC input copper bar
3	Fuse
4	Inverter

Example of components installation for size H8 inverter in 800 mm wide cabinet

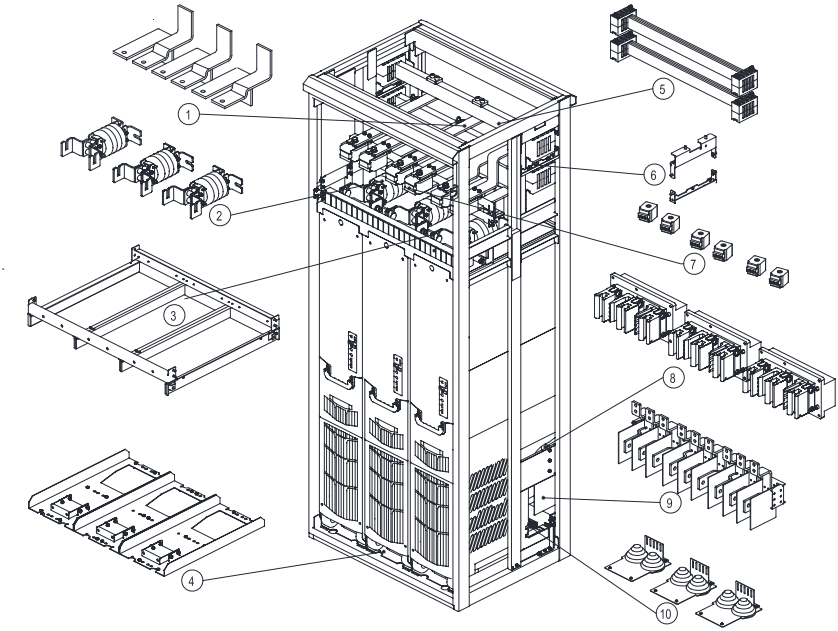


Figure 3-20 H8-800 mm Cabinet Components Installation

Number	Name
1	DC input copper bar
2	Filter ring (Optional)
3	Upper mounting parts
4	Lower mounting parts
5	Bus and bus clip
6	Bus clip cable rack
7	Fuse
8	Quick connector socket
9	AC output of copper bar
10	Bottom cable outlet

Chapter 4 Electrical Installation

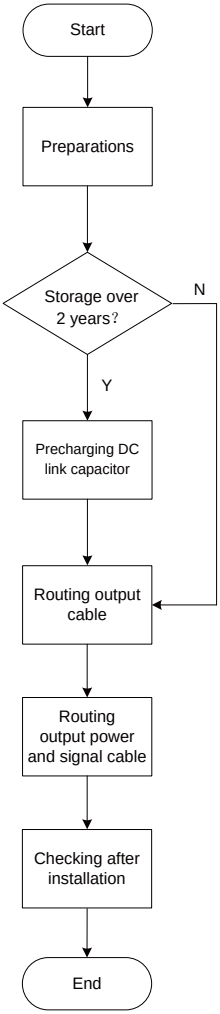


Figure 4-1 Electrical Installation Work Flow

4.1 Safety Precaution

4.1.1 Safety Precautions Before Installation

Before installation
◆ The inverters are used in industrial high-voltage installations. During operation, an inverter contains rotating and live parts. For this reason, there is a risk of severe injury or significant material damage if the required covers are removed without authorization, if it is used or operated incorrectly, or if it has not been properly maintained. ◆ Only professional technicians are allowed to perform operations and they must read and comply with the safety information provided in this user guide. ◆ When carrying out any kind of work on electrical devices, the following "five safety rules" must always be observed: 1. Disconnect the equipment from power supply. 2. Make sure that power supply will not be connected again. 3. Make sure that the equipment is de-energized. 4. Make sure that the equipment is reliably grounded. 5. Cover or enclose the adjacent components that are still live.

4.1.2 Electrical Installation Inspection

Electrical installation inspection
◆ The cabinet units are operated with high voltages. All connection work must be carried out when the cabinet unit is de-energized. ◆ Only trained technicians are allowed to operate the inverter. ◆ Take caution when operating the cabinet unit disconnected from power supply, as there may still be external supply voltage. The power and control terminals may be live even when the motor is not running. ◆ The user is responsible for ensuring that the motor, cabinet units, and other components are installed and connected in accordance with the recognized technical rules in the country of installation and with other applicable regional regulations. Special attention should be paid to cable dimensions, fuses, grounding, shutdown, disconnection, and overcurrent protection. ◆ If an item of protective gear trips in a branch circuit, a leakage current may have been disconnected. To reduce the risk of fire or an electric shock, the current-carrying parts and other components in the cabinet should be inspected and damaged parts should be replaced. When an item of protective gear trips, the cause of the trip must be identified and rectified

4.1.3 Common declaration

Electrostatic/optical component	
Danger:	◆ The Circuit boards has static sensitive components, wear a grounded strap while operating on the circuit board. Do not touch the circuit board unless necessary.
Caution:	◆ Take the fiber optics with care. Since fiber optics is extremely sensitive to dirt, do not touch the end of the fiber optics with bare hands. When pulling out the fiber, be sure to grab the connecting terminal, not the fiber.

4.1.4 Component Insulation Check

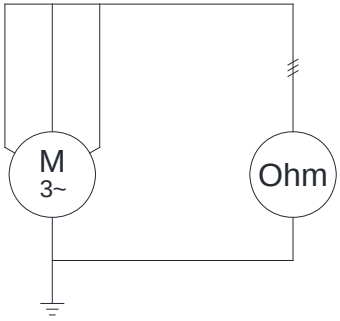
Insulation test between the main circuit and the shell has been performed on MD880-50 series inverter before delivery.

Therefore, do not perform any withstand voltage and insulation resistance test on the inverter. Perform an insulation test on the motor and motor wiring under the following conditions:

Component insulation check	
Danger:	◆ Before insulation test, make sure that the drive system is disconnected from the main power. ◆ Make sure the motor cable is connected to the motor and disconnect from the drive output terminals U, V, and W. ◆ Measure the insulation resistance between the phase conductor and the PE wire using the voltage of the 500 Vdc. For insulation resistance of the motor, refer to the manufacturer’ s instructions.

NOTE

◆ Humidity in the motor cabinet shall deducts insulation resistance. If the insulation resistance has not meet the standard, degrade the environmental humidity of the motor cabinet and measure again.



4.2 Overview

1) Basic wiring rules

Observe the following basic rules when performing installation and wiring inside the cabinet:

- Comply with EMC guidelines.
- Use existing wiring for cable assemblies.
- Always use the shield plates provided.
- Use existing wiring path.
- Take cable protective measures at places such as cabinet corner or sharp object.
- Refit all covers removed during cabling process before completing the work and commissioning.

2) Preparation

Before starting any wiring or connection in the cabinet modules, ensure that the following measures are performed:

- Disconnect the cabinet unit from the power supply.
- Observe the "five safety rules".
- Remove the covers that may ob struct access to the necessary components in the inverter.

3) Safety and EMC

Safety and EMC	
Danger:	◆ Before the inverter is put into operation, refit all protective covers during cabling process.
Caution:	◆ The shielding layer of power cable shall be secured on the shielding plate, and the PE cable shall be connected to the PE bus.

4.3 Wiring in Compliance with EMC Requirements

4.3.1 Requirement Description

1) Wire signal cables and power cables separately.

When analog signals are used to control the inverter in remote control, the signal cables and strong-current circuit cables (power input, inverter output, and braking resistor connecting cable) of the controlled inverter must be wired separately with a distance larger than 40 cm, to reduce interference on the analog generated by the inverters and other devices. This requirement must be met even inside the control cabinet.

2) Requirements on the analog control signal cable

Use the twisted pair shielded cables as the analog control signal cables. When stripping the sheathing back of the cable, the stripped part must be as short as possible (5–7 mm), and wrap the stripped shield with the insulating tape to prevent the shielded cable from contacting other cables, eliminating interference.

3) Requirements on the motor cable

Use the shielded cables as the motor cables. The distance between the inverter. and the motor must be as short as possible. The motor cables must be separated from other cables. To avoid electromagnetic interference caused by rapid change of the inverter output voltage, the motor cables and other cables must not be laid side by side for a long distance.

4) Requirements on the power cables

Use the shielded cables as the motor cables, or protect all cables between the AC drive and the motor with ducts.

5) Requirements on the control cables and power cables

If the control cable must run across the power cable, make sure they are arranged at an angle of close to 90° .

4.3.2 Wiring Suggestions

1) Separate cables for transmitting different signals. Reserve a distance between interfering cables and sensitive cables. If the wiring space is large, the recommended distance is 40 cm. If these two types of cables must cross, arrange them at an angle of 90° to prevent interference.

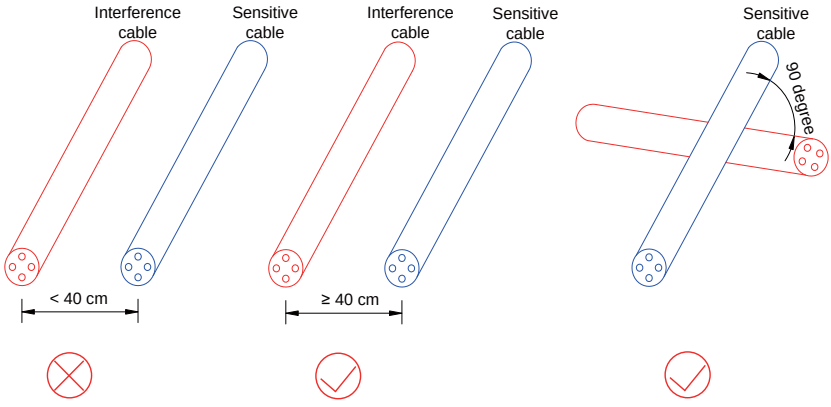


Figure 4-2 Wiring of Interfering Cable and Sensitive Cable

2) Isolate different types of signals with the equipotential signal. When wiring cables of same signal type, lay the equipotential signal cables at the outer layer, and consider the equipotential signal arrangement in the middle. The following figure shows an example.

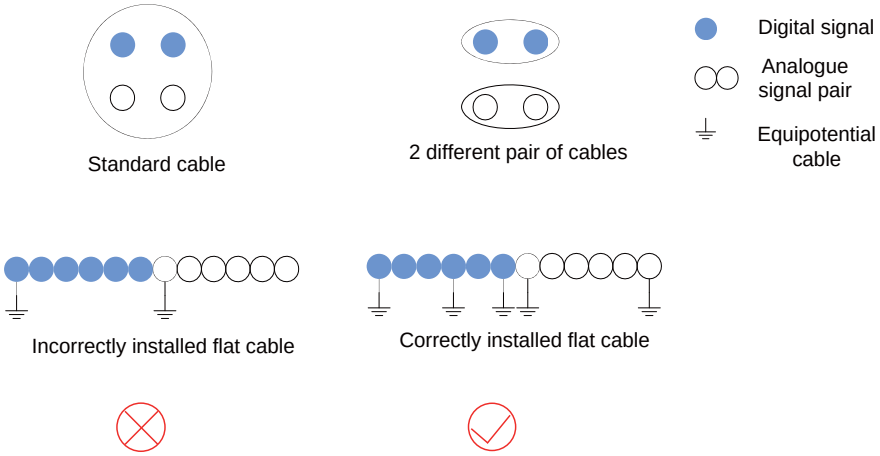


Figure 4-3 Wiring of Different Types Of Signal Cables

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

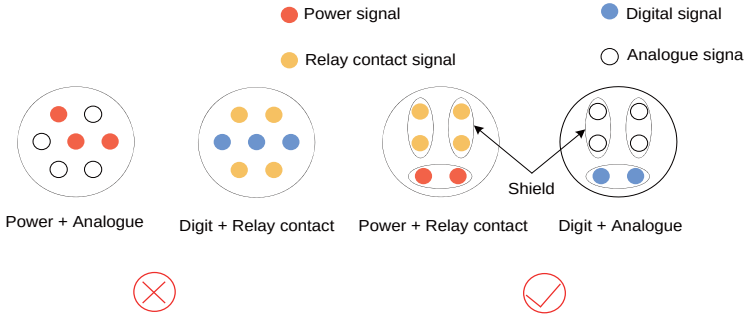


Figure 4-4 Wiring of Multi-Conductor Cable

4) When certain conductors in a multi-conductor cable are not used, connect all the unused (or reserved) cables to the equipotential connection point.

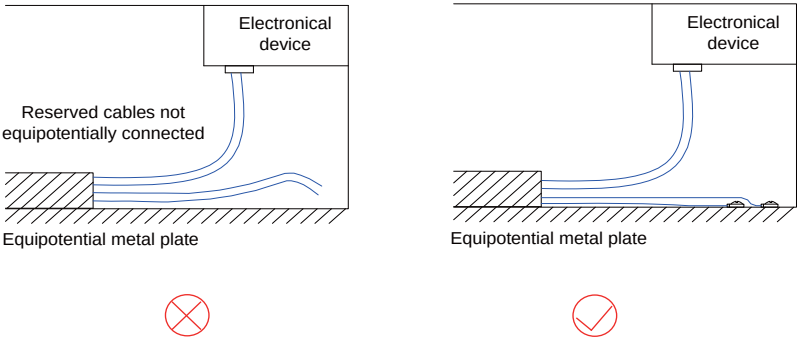


Figure 4-5 Handling of Remaining Cores of Multi-Conductor Cable

5) For the low-level sensor signals and relay signals with a common, lay the two cables close to each other to prevent large loop area. Make sure to use a twisted pair cable for analog signal. Lay the digital signal cables close to each other.

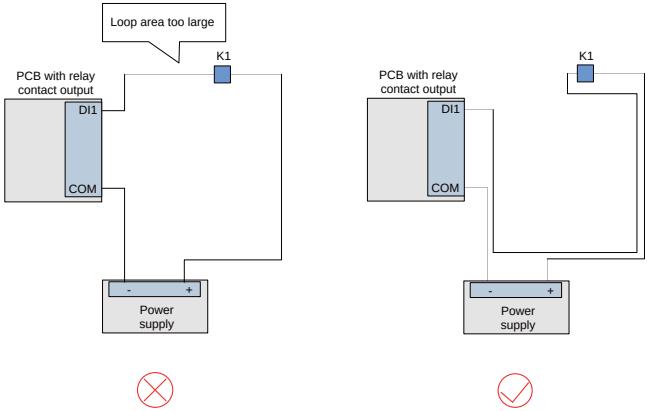


Figure 4-6 Avoid Wiring Loops Too Large

6) Lay multiple types of cables along the metal block with equipotential connection and separate them to improve internal EMC. If cables in the same metal (zinc-iron or stainless steel) duct are separated with metal plate, the effect will be better.

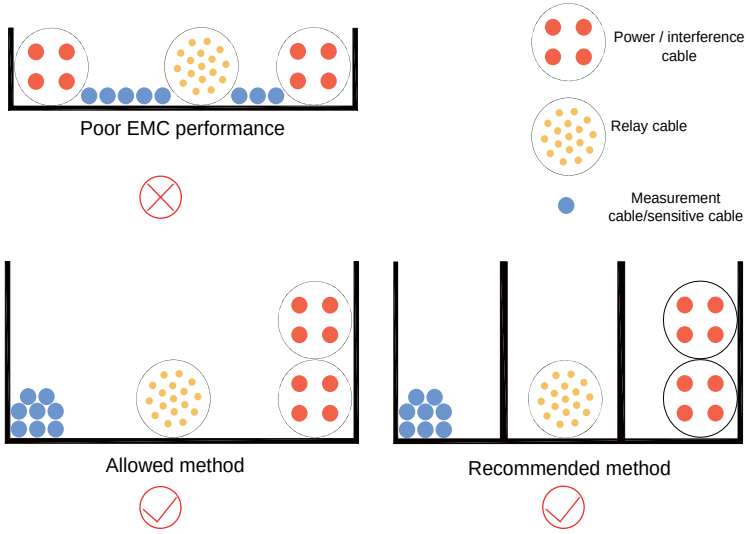


Figure 4-7 Wiring of Multiple Types of Cables

7) The unshielded part of the shielded cable must be as short as possible, and the shield braid is connected to the nearest PE terminal. If the stripped part is long, the cable is prone to interference, especially for encoder signals.

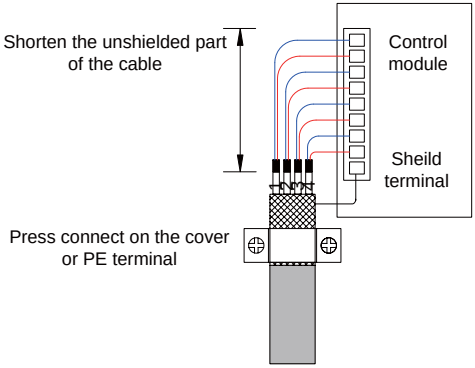


Figure 4-8 Shielded Cable Requirements

4.3.3 Connection of Shielded Power Cables

The shielded power input/output cables inside the inverter must be in large-area contact with the shield plate in the cabinet modules to achieve good EMC effect. The following figure shows the connection diagram.

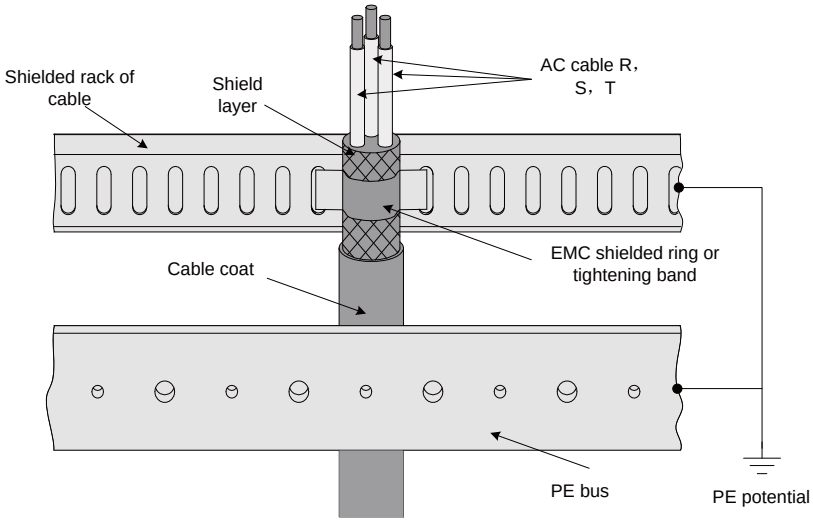


Figure 4-9 Connection of Shielded Power Cables

4.4 DC Link Capacitor Precharge

The DC side of the inverter contains multiple electrolytic capacitors. Its service life depends on working time, load and environment temperature. The service life of the capacitor can be prolonged by reducing the environment temperature.

Capacitor faults are usually accompanied by device damage, as well as input fuse fault or fault tripping. In case of a capacitor fault, please contact the company to obtain spare parts. Do not use the spare parts provided by Unity Drive nominated supplier.

Caution:	The storage period of the equipment shall not exceed two years. For long term storage (exceed two years), recharge the DC link capacitor before commissioning storage time is calculated from the date of manufacture rather than the date of shipment.

Charging methods are as the following steps:

Charging requirement:

Apply the rated voltage to the DC link capacitors without load for at least 30 minutes; during this period, no charging module is allowed to be enabled.

Device for charging loop:

1） Three-phase fuse switch 10 A/400 V, or 10 A/690 V

2） 3 incandescent lamps 100 W/230 V, for line voltage 3 AC 380–480 V, or 3 resistors 1

K/100 W in the incandescent lamp position

3) 6 incandescent lamps 100 W/230 V, for line voltage 3 AC 525–690 V; two incandescent lamps must be connected in serial in every power phase.

4) Various small components, such as lamp holder, 1.5mm^2 cable.

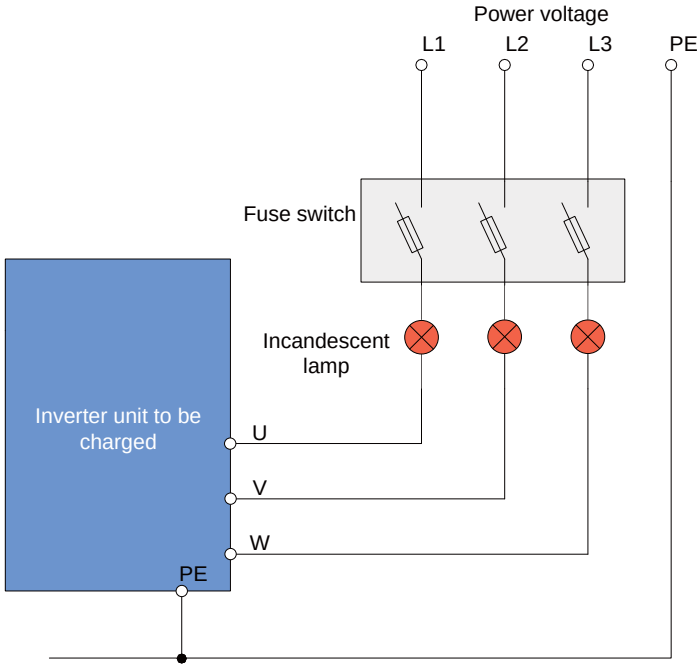


Figure 4-10 Charging Connection Diagram of MD880 Inverter

4.5 Wiring

Danger:	◆ Tighten the screws with appropriate torque, refer to "2.10 Common Tightening Torque of Screws and Bolts" , otherwise, the terminal contacts could get overheat during operation.

4.5.1 Cable Connection of Inverter (H1...H4)

1. Terminal Distribution of Inverter (H1...H4)

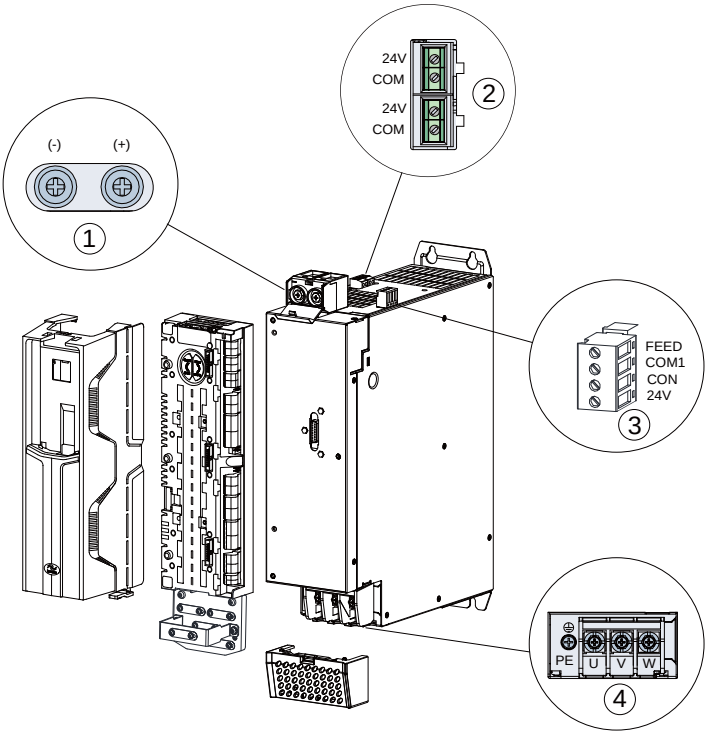


Figure 4-11 Terminal Distribution of Inverter (H1...H4)

NOTE

◆ For HCU inverter control module terminal description, refer to "Chapter 5 HCU Control Module" .

Table 4-1 H1...H4 Inverter Terminal Connection Parameter

Number	Terminal	Technical description
1	(+), (-) DC input	Voltage: DC 537 V to 679 V Connection: H1 to H3: M6/9 N · m cable terminal H4: M10/22 N·m cable terminal
2	Internal 24 Vdc auxiliary power terminal	Two-conductor twisted pair cable, single-conductor cable, cross sectional area: 0.5 mm^2 to 2.5 mm^2
3	DC bus buffer module control terminal	Single-conductor cable, cross sectional area: 0.5 mm^2 to 2.5 mm^2
4	U, V, W AC output	U, V, W terminals: Voltage: AC 0 V to 415 V Connection: H1:M5/4 N · m cable terminal H2 to H3:M6/9N · m cable terminal H4:M10/22N · m cable terminal PE terminal: Connection: H1:M4/4 N · m cable terminal H2 to H3:M6/9 N · m cable terminal H4:M10/22 N · m cable terminal

2. Wiring steps of Inverter (H1...H4)

1) Remove protective shell of cable terminal area;

2) Connect the cable to the output terminal following the correct connection sequence: U, V, W, or (+), (-);

3) Fix the power cable on the cable holder to avoid the force of the terminal;

4) When shielded power cables are used, fix the shield layer to the shield plate according to EMC requirements.

4.5.2 Wiring of Inverter (H6...H7)

1. The terminal distribution of the inverter (H6...H7)

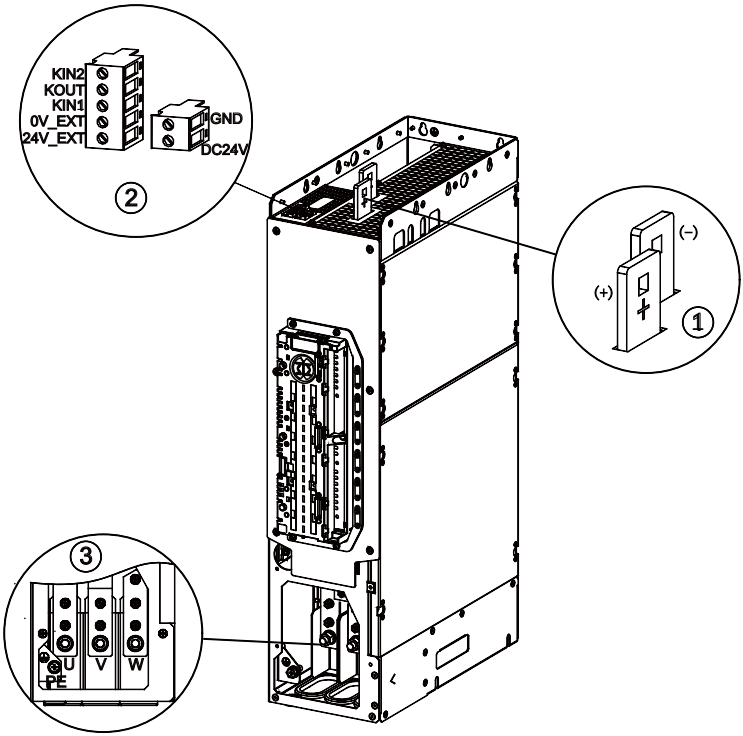


Figure 4-12 Terminal distribution of Inverter (H6...H7)

NOTE

◆ For description of HCU control module terminals, refer to "Chapter 5 HCU Control Module".

Table 4-2 Terminal Connection Specifications of Inverter (H6...H7)

Number	Terminal	Technical specification
1	(+), (-) DC input	Voltage: 400 V system: 540 Vdc to 720 Vdc 690 V system: 749 Vdc to 975 Vdc Connection: M10/42N - M of copper bar terminal
2	2PIN-internal 24 Vdc auxiliary power terminal 5PIN-DIDO terminal	2PIN- internal 24 Vdc auxiliary power terminals: Two-conductor twisted pair cable, single-conductor cable, cross sectional area: 0.5 to 2.5 mm^2
3	U, V, W AC output	U, V, W terminals: voltage: 400 V system: AC, 0 V to 415 V 690 V system: AC 0 V to 690 V Connection: M10/32 N · m cable terminal PE terminals: Connection: M6/9 N · m cable terminal

2. Wiring steps of Inverter (H6...H7)

1) Remove the protective shell of cable terminal area;

2) Connect the cable to the output terminal following the correct connection sequence: U, V, W, or (+), (-);

3) Fix the power cable on the cable holder to avoid the force of the terminal;

4) When shielded power cables are used, fix the shield layer to the shield plate according to EMC requirements.

4.5.3 Wiring of H8 Size Inverter

1. Terminal distribution of H8 size inverter

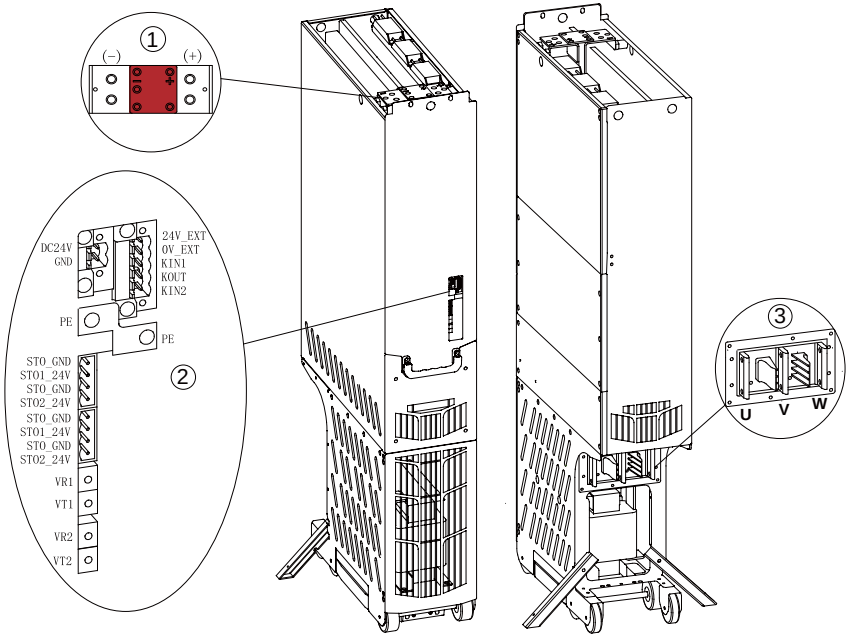


Figure 4-13 Terminal distribution of H8 Size Inverter

Table 4-3 H8 Inverter Terminal Connection Parameter

Number	Terminal	Technical specification
1	(+), (-) DC input	400V system: 540 Vdc to 679 Vdc 690V system: 740 Vdc to 975 Vdc Connection: copper terminal M10/42 N - M

Number	Terminal	Technical specification
2	2PIN_power terminal 5PIN_DIDO terminal 4PIN_STO1 terminal (reserved) 4PIN_STO2 terminal (reserved) Fiber optic terminal 1 Fiber optic terminal 2 (for shore power) U, V, W AC output	2PIN_ power terminals: two-conductor twisted pair cable, single-conductor cable, cross sectional area: 0.5 to 2.5 mm^2 5PIN_DIDO terminals: single-conductor cable, cross sectional area: 0.5 to 2.5 mm^2 4PIN_STO1 terminals (reserved): Four-conductor shielding wire, cross sectional area: 0.5 to 2.5 mm^2 4PIN_STO2 terminals (reserved): Four-conductor shielding wire, cross sectional area: 0.5 to 2.5 mm^2 Fiber optic terminal 1: Fiber optic connections Fiber optic terminal 2: Fiber optic connection (dedicated to shore power)
3	U, V, W AC output	Fast connection

2. Wiring steps of H8 Size Inverter

1) Make sure all input and output terminals are correctly connected.

2) Fix the power cable on the cable holder to avoid the force of the terminal.

3) When shielded power cables are used, fix the shield layer to the shield plate according to EMC requirements.

4.5.4 Cable Specification and Model Recommendations

Table 4-4 Recommended Main Circuit Cable

Model	Rated output current (A)	Recommended number of cables and cable diameter (mm^2)	Terminals
UN: three-phase alternating current 400V (range 380 V to 415V)			
MD880-50M-0009-4	9	1×2.5	OT/2.5-4
MD880-50M-0013-4	13	1×4	OT/4-4
MD880-50M-0017-4	17	1×6	OT/6-5
MD880-50M-0023-4	23	1×6	OT/6-5
MD880-50M-0033-4	33	1×10	OT/10-6
MD880-50M-0038-4	38	1×10	OT/10-6
MD880-50M-0048-4	48	1×10	OT/10-6
MD880-50M-0060-4	60	1×16	OT/16-6
MD880-50M-0078-4	78	1×16	OT/16-6
MD880-50M-0094-4	94	1×25	OT/25-6
MD880-50M-0116-4	116	1×35	OT/35-10
MD880-50M-0149-4	149	1×50	OT/50-10

Model	Rated output current (A)	Recommended number of cables and cable diameter (mm^2)	Terminals
MD880-50M-0183-4	183	1×70	OT/70-10
MD880-50M-0245-4	245	1×120	OT/120-10
MD880-50M-0299-4	299	2×70	OT/70-10
MD880-50M-0349-4	349	3×50	OT/50-10
MD880-50M-0395-4	395	3×70	OT/70-10
MD880-50M-0516-4	516	3×95	OT/95-12
MD880-50M-0639-4	639	3×120	OT/120-12
MD880-50M-0757-4	757	4×120	OT/120-12
MD880-50M-0900-4	900	4×120	OT/120-12
UN: three-phase alternating current 690V (range 525 V to 690 V)			
MD880-50M-0062-7	62	1×16	OT/16-10
MD880-50M-0082-7	82	1×25	OT/25-10
MD880-50M-0099-7	99	1×35	OT/35-10
MD880-50M-0125-7	125	1×50	OT/50-10
MD880-50M-0144-7	144	1×50	OT/50-10
MD880-50M-0192-7	192	1×95	OT/95-10
MD880-50M-0217-7	217	2×50	OT/50-10
MD880-50M-0270-7	270	2×70	OT/70-10
MD880-50M-0340-7	340	5×50	OT/50-10
MD880-50M-0410-7	410	3×70	OT/70-10
MD880-50M-0530-7	530	3×95	OT/95-12
MD880-50M-0600-7	600	3×120	OT/120-12

NOTE

- The cable recommended is symmetric three-conductor shielded cable, and connected to the three phases of the power supply. The PE cable must be connected separately, with the sectional area being at least one half of the power phase sectional area.
- 3 x 120 mm^2: indicates that each phase requires 3 cables and cable sectional area is 120 mm^2.
- OT/120-12: cable crimping OT-type terminal, matching cable size 120 mm^2, wiring screw M12.
- The maximum size of the cable lug listed in the following table. The actual cable lug for wiring must not be larger than the permissible size. Otherwise, the mechanical stability and electrical clearance cannot be ensured.
- Derating calculation is required when multiple cables with the same specifications are in parallel connection.

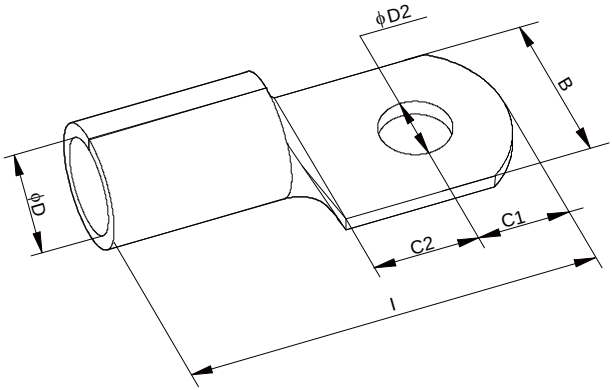


Figure 4-14 Appearance of Cable Lug

Table 4-5 Maximum Size of Cable Lug

Bolt	Cross section area (mm^2)	D2(mm)	B(mm)	I(mm)	C1(mm)	C2(mm)
M5	6	5.3	10	23.8	5.5	6.0
M6	10	6.4	12.4	27.5	7.0	8.0
M6	16	6.4	12.4	31.0	7.0	8.0
M6	25	6.4	14.0	32.0	7.0	8.0
M10	35	10.5	17.5	40.5	10.0	10.5
M10	50	10.5	18.0	43.5	10.5	11.0
M10	70	10.5	21.8	50.0	13.0	13.0
M10	95	10.5	25.0	55.0	13.0	13.0
M12	70	13.0	21.8	50.0	13.0	13.0
M12	95	13.0	25	55	13.0	13.0
M12	120	13.0	28.4	60	14.0	14.0

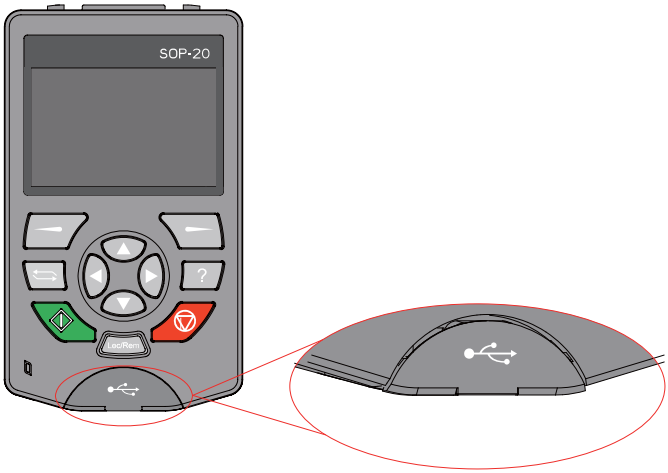
4.5.5 HCU Control Module Connection

For HCU control module installation and control cable connection, refer to “Chapter 5 HCU Control Module”.

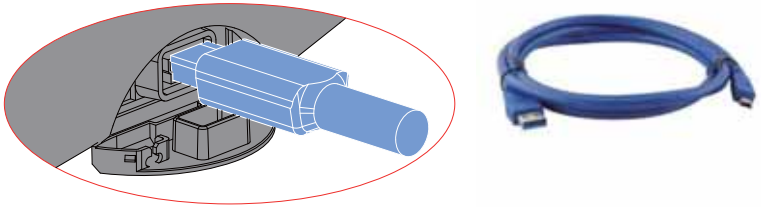
4.5.6 Connection SOP-20-880 and PC

Type B Mini USB terminal on the SOP-20-880 is used to connect with a PC, and the length of the connecting cable is no more than 3 meters. The communication between SOP-20-880 and PC uses USB 2.0 communication protocol.

1) Open the cover of the USB connection terminal;



2) Insert the USB shielded cable, and it is recommend to use cable with ferrite ring, as shown below:



3) Connect the cable with PC;

When the USB cable is connected to a PC, there are two options: the USB relay mode and the USB mass storage mode.

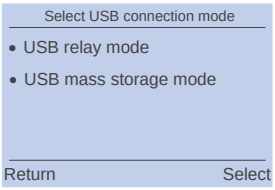


Figure 4-15 USB Connection Method Selection

When the USB relay mode is selected, the SOP-20-880 is used for the PC tool to interact with the drive; When the USB mass storage mode is selected, the SOP-20-880 can be used as memory.

4.5.7 SOP-20-880 and Drive Connection

The SOP-20-880 has a RJ45 connection terminal on the back, it connects with SOP-20-880 and drive control board (such as HCU, detailed operation, see the HCU control module hardware manual) using EIA/TIA/568A or 568B standard cable. A jumper is required to select the terminal resistor on the control panel of the communication network terminals, recommend to select shielded twisted pair cable for SOP-20-880 bus cable, the total maximum length is 100 meters.

Table 4-6 SOP-20-880 Bus Transmission Distance, Number of Nodes and Transmission Speed Rate

Distance (m)	Baud Rate (kbps)	Number of Nodes	Cable Diameter	Remarks
100	1000	32	⩾ 0.5mm^2	With repeaters, the maximum number of nodes is 128; Without repeaters, 32 nodes are allowed at most; In the case of polar bias, the maximum number of nodes decreases by 4.
50	2000	32	⩾ 0.5 mm^2	
25	4000	32	⩾ 0.5 mm^2	

Example of SOP-20-880 System Connection

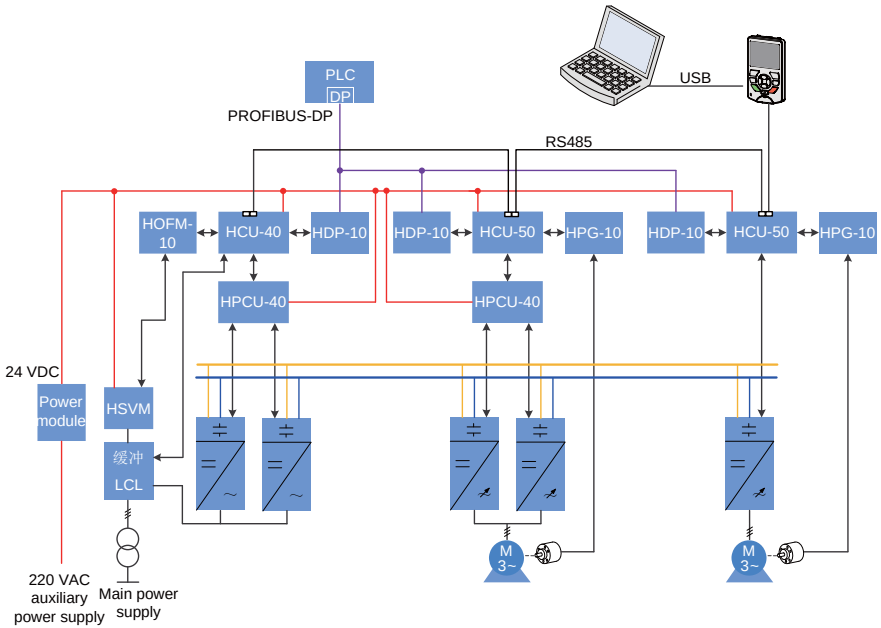


Figure 4-16 SOP-20-880 System Connection

4.6 Installation Checklist

After completing necessary electrical installation, check the key items during installation in the following table.

When operating on the equipment, read all the safety precautions in "Chapter 1 Safety Precautions".

Number	Check Item	Check √
1	Input power is connected to motor cable to provide correct voltage supply.	☐
2	The auxiliary power supply ensures a correct voltage supply.	☐
3	To reduce tension, the input and output power cables should be fixed on the cable holder.	☐
4	The cable shall be connected to the provided terminal contactor at the required torque.	☐
5	Use EMC shielded cable with screwed pipe terminal that has large-area contact with shielded layer and properly grounded on the motor terminal box. In the inverter, cable shielding layer should be fixed on shielding plate to meet EMC requirements.	☐
6	The parallel connected outputs of inverter are connected to the motor. When the parallel connection is connected to the motor, the connection of the inverter is correct.	☐
7	Obtain the date of manufacture for inverter on the nameplate. If the downtime from the first commissioning or the power component operation is shorter than 2 years, the DC link capacitor precharge is not required. If the downtime is more than 2 years, precharge the DC link capacitor according to the description of "4.4 DC Link Capacitor Precharge".	☐
8	Control cables shall be connected according to the corresponding interface layout and paved by shielding layer! To prevent interference, the control cables should be isolated from the power cables, and paved separately, following the EMC requirement in principle.	☐

Chapter 5 HCU Control Module

There are two types of HCU used for inverter control: HCU-50 and HCU-51:

Inverter Control Unit Model	Communication Methods with Inverter	Matching Inverter	Mounting Method
HCU-50	High speed fiber optic communication	H8	Single unit installation, install in auxiliary control cabinet
HCU-51	High speed RS422 comunication	H1...H4, H6 ...H7	Install on inverter

The HCU control module needs an external 24 Vdc power supply. The HCU supports multiple isolating power supply, can provide isolated digital power supply, RS485 isolated power supply of InoLink communication, and SOP-20-880 power supply. Meanwhile, providing power for function modules that installed on HCU extension module.

5.1 HCU Control Module Components

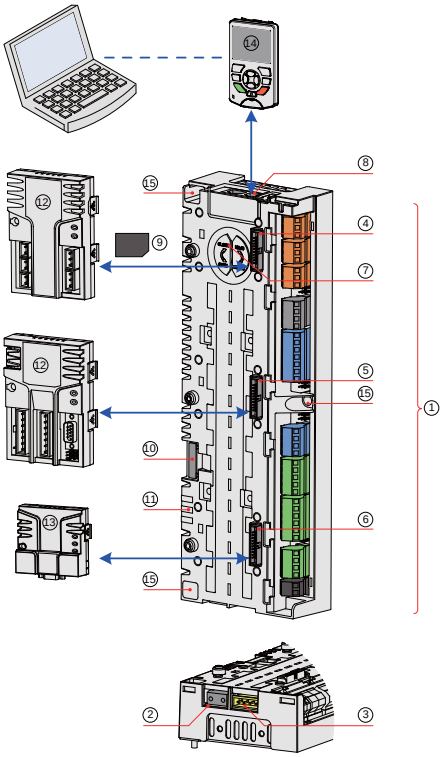


Figure 5-1 HCU Diagram

Table 5-1 HCU Function Description Table

Number	Component Name	Function Description
1	User terminal	HCU standard user input / output terminal
2	Communication fiber optic,	Optical fiber communication interface between HCU-50 and inverter
3	XSTO	safety torque interrupt input (inverter H1...H4, H6, H7)
4	SLOT 1	Function module interface: SLOT1_1, SKOT1_2, SLOT1_3
5	SLOT2	Function module interface: SLOT2_1, SKOT2_2, SLOT2_3
6	SLOT3	Function module interface: SLOT3_1
7	Battery cap	RTC backup cap, RTC battery are inchargeable lithium battery, and requires regular replacement.
8	Smart operation panel terminal	HCU and SOP-20-880 interface terminal, 2 RJ45 are defined as the same, easy to cascade
9	SD card	microSD card with HCU standard configuration, pluggable, capacity: 8G
10	safety slot function	safety module interface terminal
11	Indicator	Power, operation, fault indicator
12	Function module SIZE1	105*73*24 (mm)
13	Function module SIZE1	75*73*24 (mm)
14	SOP-20-880 Smart operation panel keyboard	Human-machine interface
15	Fixing holes	HCU fixing holes, 3 places

NOTE

- Slot1, slot2, slot 3 are for function module direct installation, the address are A1,B1,C1 respectively.
- Slot1, slot2 can be used in conjunction with HOFM-30 and HESD-10 to realize SLOT extension, the addressses are A1, A2, A3 and B1, B2, B3 respectively.
- SLOT3 slot-free extension function.

5.2 Standard Terminal

Table 5-2 HCU standard terminal description

Name	Terminal Description	Remarks
Input power supply	XPWR: 24VI	HCU power supply
Digital power output	XDPWR: 24VD	Digital power output, isolated from XPWR

Name	Terminal Description	Remarks
Digital input	XDI: DI1 to DI6, DIL	Input type: Relay contactor, NPN or PNP
High speed digital input	XHDIO: HDI1, HDI2	Input type: NPN or PNP
High speed digital output	XHDIO: HDO1, HDO2	Output type: Open collector circuit
Analog output	XAO: AO1, AO2	Output type: Current or voltage, jumper selection
Analog input	XHDIO: AI1, AI2	Input type: Current or voltage, jumper selection
Relay output	XRO1, XRO2, XRO3	Relay output: always open, always close and common terminal
InoLink communication	XCOMM	High-speed RS485, jumper selection bus match resistor
RJ45 terminal	X11, X12	SOP-20-880 or PC (requires RS485 to RS232 transformer) communication, defined the same, and able to realize multiple HCU cascading connection: connect cable length< 3 m

5.3 HCU Size and Installation Instructions

5.3.1 Installation Precautions

- Before installation, make sure that the cabinet is powered down for at lest 15 minutes (including external power supply);
- Avoid damage to the HCU module;
- Do not disassemble the HCU module, otherwise it may damage the module;
- Do not use fasten the screw too hard, avoid to damages the terminal.

Danger:	◆ Before HCU installation or uninstallation, the cabinet must be powered down for at least 15 minutes, and the HCU input power is disconnected, to avoid live installation or uninstallation that causes damage to the HCU control module. ◆ When installing or uninstalling functional modules on the HCU, the HCU input must be disconnected, avoiding live installation or disassembly that causes damage to HCU or function modules.

1. Tools required during installation

The following tools may be required in installation:

- Screw driver size 1#

2. Screw and tightening torque of screw tightening parts

Screw	Tightening torque:
M3	0.55 N · m

5.3.2 HCU Dimensions

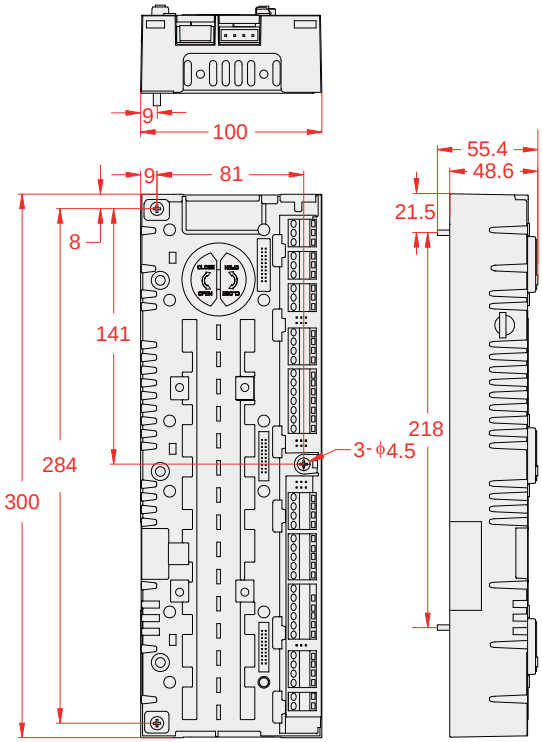
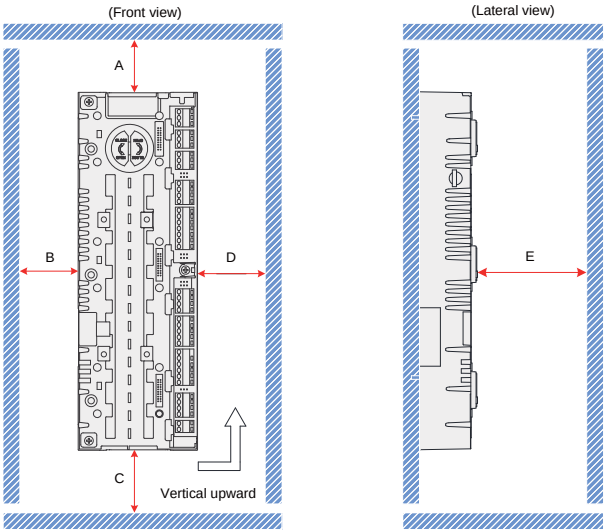


Figure 5-2 HCU Diagram

5.3.3 Requirements on Installation Clearances

To make sure successful installation of HCU, reserve enough space between the HCU and the wall, as shown in figure below: The HCU must be installed on the conductive metal mounting surface to ensure that the entire conductive base of the HCU is well lapped with the mounting surface.



HCU Installation space requirement (Unit: mm

A	B	C	D	E
≥100	≥30	≥100	≥50	≥100

Figure 5-3 HCU Installation Clearance Requirements (Unit: mm)

5.3.4 Installation Procedure

Step 1: Align the HCU vertically with the 2 mounting holes on the metal mounting plate.

Step 2: Tighten the HCU mounting screws with1# screw driver (three M4 screws are fixed in the HCU) , as shown below.

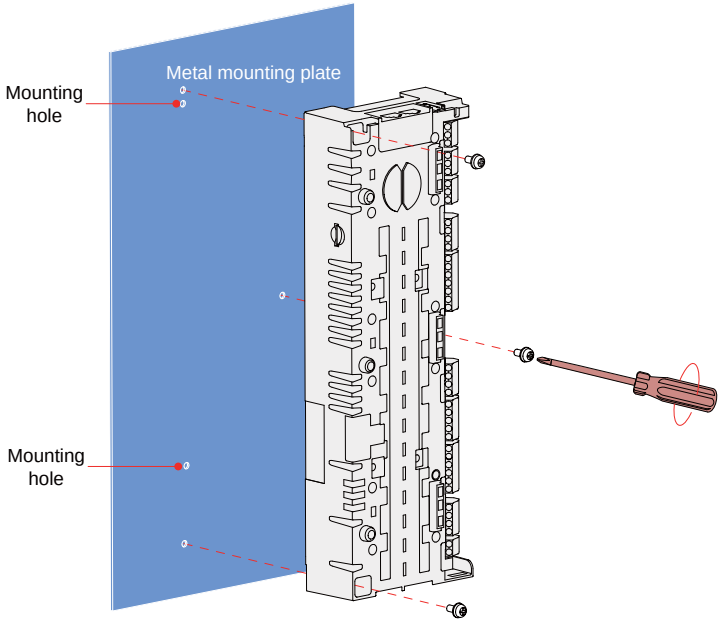


Figure 5-4 HCU Installation

■ Grounded inside the cabinet

The HCU assembly panels must be exposed metal plates, ensure that the assembly panels are reliably grounded.

The HCU housing should be connected to the cabinet shell by mounting screws.

5.4 Function Module

HCU can be used in conjunction with other function modules to realize corresponding function. Details are as below:

Table 5-3 Function Modules Description while Use in Conjunction with HCU

Name	Module Type	Function Description	HCU Connection	Dimension (L x W x H) (Unit: mm)
Encoder detection module	HPG-10	HTL incremental encoder signal detection	SLOT	105 x 73 x 24
	HPG-40	Rotate transformer encoder signal detection	SLOT	105 x 73 x 24
	HPG-50	TTL/RS422 incremental encoder signal detection	SLOT	105 x 73 x 24
Input/Output module	HIO-10	Two AI Two AOs Two DIOs One RO	SLOT	105 x 73 x 24
PROFIBUS-DP module	HDP-10	PROFIBUS-DP bus adaption	SLOT	75 x 73 x 24
CAN bus module	HCAN-10	CANopen bus module	SLOT	75 x 73 x 24
MODBUS RTU module	HMBA-10	MODBUS RTU bus adaption	SLOT	75 x 73 x 24
EtherNET module	HETN-10	EtherNet tunning module	SLOT	75 x 73 x 24
PROFINET IO module	HPFN-10	PROFINET IO industrial Ethernet	SLOT	75 x 73 x 24
MODBUS ICP module	HMBT-10	MODBUS TCP industrial Ethernet	SLOT	75 x 73 x 24
Fiber optic extension module	HOFM-10	One pair of 50M fiber optic	SLOT	75 x 73 x 24
	HOFM-30	Three pairs of 50 M fiber optic	SLOT	75 x 73 x 24
Parallel connected inverter control unit	HPCU-40	Support 2 to 4 parallel connected modules	Fiber optic	232 x 86 x 40
	HPCU-60	Support 2 to 6 parallel connected modules	Fiber optic	232 x 86 x 40
	HPCU-A0	Support 2 to 10 parallel connected modules	Fiber optic	232x86x40
Function extension module	HESD-10	Extent one extension slot	Fiber optic	105 x 75 x 70
Synchronous voltage detection module	HSVM-10	AC Voltage detection	Fiber optic	150x100x30
	HSVM-20	DC Voltage detection	Fiber optic	150x100x30

Name	Module Type	Function Description	HCU Connection	Dimension (L x W x H) (Unit: mm)
Smart operation keyboard	SOP-20-880	Human-machine interface	RS485	150x100x30
Fiber optic router control module	HOFR-50	Support 5 HCU control module data interaction	Fiber optic	232x86x40
Wave by wave current limit controller module	HCBC-A0	Pulse by pulse current limiting control of parallel power modules	Fiber optic	232x86x40

NOTE

- HOFM-30 can only be mounted to SLOT1 or SLOT 2.
- Recommended to install HDP-10 at SLOT3.

5.5 LED Indicator

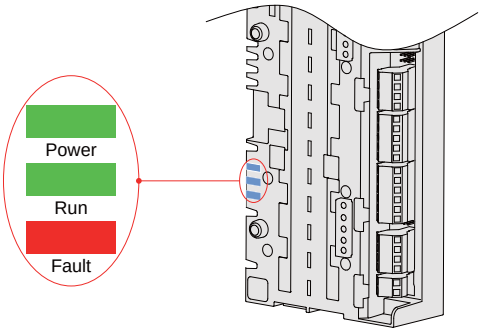


Figure 5-5 Led Indicator Position and Definition

Table 5-4 LED Definitions

No.	Name	State	Description
1	Power	Steady ON	HCU power supply normal
		OFF	HCU has no usable voltage or power fault
2	Run	Steady ON	Power module in running state
		OFF	Power module is off
3	fault	Steady ON	System Faults
		OFF	System in good condition
		blinks	HCU auxiliary power fault, check if the 24Vdc power is short or overload
4	Fault, Run	Blinks at the same time	PC or SOP-20-880 select this HCU, and ends after 10S

5.6 SD Storage Card

The HCU is internally equipped with SD cards to store real-time data of the control module related phases, the data assists in monitoring and analysis of power modules, and will be stored on the microSD memory card and analyzed by professional maintenance personnel.

5.7 HCU Control Module Interface Overview

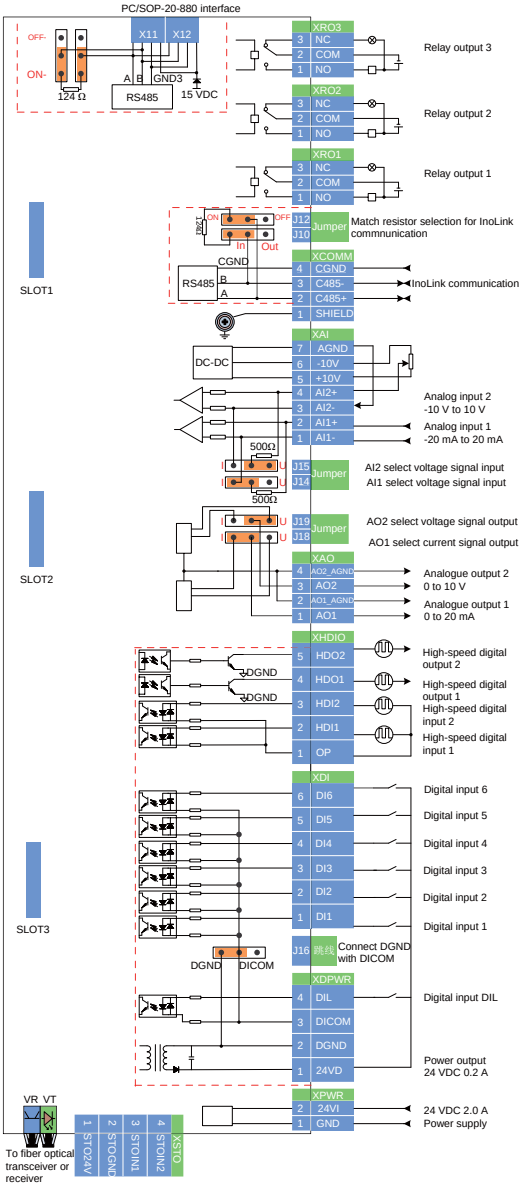
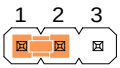
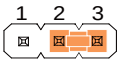


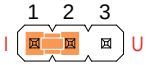
Figure 5-6 Connection Application Example

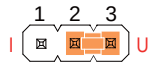
Table 5-5 HCU Control Module Interface Description

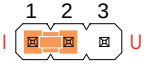
<table>
<tr><th>Terminal</th><th>Name</th><th>Function Description</th><th>Cable specification</th></tr>
<tr><td colspan="4">XPWR: Input power terminal</td></tr>
<tr><td>1</td><td>GND</td><td rowspan="2">24.0 Vdc±10% 2.0 A</td><td rowspan="2">Recommend to use two-conductor twisted cable
Cross section area: 0.5 to 2.5 mm^2</td></tr>
<tr><td>2</td><td>24VI</td></tr>
<tr><td colspan="4">XDPWR: DIL connection terminal</td></tr>
<tr><td>1</td><td>24VD</td><td>Provide power to DI, HDI, HDO
24.0 Vdc ±10% 0.2 A</td><td rowspan="4">Twisted pair cable, one-conductor cable
Cross section area: 0.5 to 2.5 mm^2
Note: 24 VD load should be no more than 0.2 A</td></tr>
<tr><td>2</td><td>DGND</td><td>24 VD grounded</td></tr>
<tr><td>3</td><td>DICOM</td><td>DI public terminal output: Can connect with DGND with jumper J16</td></tr>
<tr><td>4</td><td>DIL</td><td>Digital interlock or common DI: Technical parameters are the same as common DI</td></tr>
<tr><td colspan="4">Jumper J16: Power Options
 

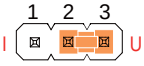
1 and 2 are short circuited, and the DI is powered by an internal 24VD supply
 

2 and 3 are short circuited, and the DI is powered by an external power supply</td></tr>
<tr><td colspan="4">XDI: DI input terminal</td></tr>
<tr><td>1</td><td>DI1</td><td rowspan="6">24 V logic level: “0” < 5 V; “1” > 15 V;
Rin: 2.0 kohm
Input type: NPN or PNP, Relay contactor
Hardware filter: 0.04 ms
Imax: 15 mA</td><td rowspan="6">Single-conductor cable
Cross section area: 0.5 to 2.5 mm^2</td></tr>
<tr><td>2</td><td>DI2</td></tr>
<tr><td>3</td><td>DI3</td></tr>
<tr><td>4</td><td>DI4</td></tr>
<tr><td>5</td><td>DI5</td></tr>
<tr><td>6</td><td>DI6</td></tr>
<tr><td colspan="4">XHDIO: HDIO input terminal</td></tr>
<tr><td>1</td><td>OP</td><td>HDI Common terminal</td><td rowspan="5">Cross section area: 0.5 to 2.5 mm^2
Recommend to use shielded twisted pair cable
HDO and DGND twisted pair
HDI and DGND twist pair</td></tr>
<tr><td>2</td><td>HDI1</td><td rowspan="2">Output type: NPN, PNP
24 V logic level: “0” < 5V; “1” > 15V;
Rin: 2.0 kohm
Output voltage range: 0 Vdc to 30 Vdc
Input frequency range: 0 kHz to 100 kHz
HDI maximum load: Imax: 15 mA</td></tr>
<tr><td>3</td><td>HDI2</td></tr>
<tr><td>4</td><td>HDO1</td><td rowspan="2">Output type: OC
Output frequency range: 0 kHz to 100 kHz
HDO maximum load: Imax: 20 mA
Output voltage range: 0 Vdc to 26.4 Vdc</td></tr>
<tr><td>5</td><td>HDO2</td></tr>
</table>

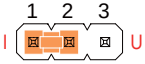
<table>
<tr><th>Terminal</th><th>Name</th><th>Function Description</th><th>Cable specification</th></tr>
<tr><td colspan="4">XAO: AO output terminal</td></tr>
<tr><td>1</td><td>AO1</td><td rowspan="4">AO1 output range: 0 to 20 mA, Rload ⩽ 500 ohm
0 V to 10 V, Rload ⩾ 10 kohm
AO2 output range: 0 to 20 mA, Rload ⩽ 500 ohm
0 to 10 V, Rload ⩾ 10 kohm
Resolution: 11 bit + sign bit
Accuracy: 2% full scale range</td><td rowspan="4">Cross section area: 0.5 to 2.5 mm^2
Recommend to use shielded twisted pair cable
AO1 and AO1_AGND twisted pair
AO2 and AO2_AGND twisted pair</td></tr>
<tr><td>2</td><td>AO1_
AGND</td></tr>
<tr><td>3</td><td>AO2</td></tr>
<tr><td>4</td><td>AO2_
AGND</td></tr>
<tr><td colspan="4">Jumper J18: AO1 selection, voltage signal selection
 

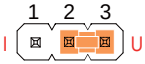
1 and 2 are short circuited, AO1 current signal output
 

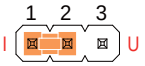
2 and 3 are short circuited, AO1 voltage signal output</td></tr>
<tr><td colspan="4">Jumper J19: AO1 selection, voltage singal selection
 

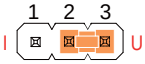
1 and 2 are short circuited, AO2 current signal output
 

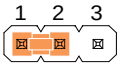
2 and 3 are short circuited, AO2 voltage signal output</td></tr>
<tr><td colspan="4">XAI: AI input terminal</td></tr>
<tr><td>1</td><td>AI1-</td><td rowspan="4">Current input: -20 m to + 20 mA, Rin: 500 ohm
Voltage input: -10 V to + 10 V, Rin: 200 kohm
Differential input, input range: ± 30 V
Sampling interval per channel: 0.25 ms
Hardware filter: 0.25 ms
Resolution: 11 bit + sign bit
Erroe: Full range 1%</td><td rowspan="7">Cross section area: 0.5 to 2.5 mm^2
Select 2 pieces of two-conductor shielded twisted pair cables when using 2 AIs;
When the reference voltage is provided, select 1piece of four-conductor shielded twisted pair cables for 1 AIs;</td></tr>
<tr><td>2</td><td>AI1+</td></tr>
<tr><td>3</td><td>AI2-</td></tr>
<tr><td>4</td><td>AI2+</td></tr>
<tr><td>5</td><td>+10 V</td><td rowspan="3">+10 V: +10 V ± 1%
-10 V: -10 V ± 1%
Rload 1 kohm to 10 kohm</td></tr>
<tr><td>6</td><td>-10 V</td></tr>
<tr><td>7</td><td>AGND</td></tr>
</table>

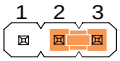
<table>
<tr><th>Terminal</th><th>Name</th><th>Function Description</th><th>Cable specification</th></tr>
<tr><td colspan="4">Jumper J14: AI1 current or voltage signal input selection
 

1 and 2 are short circuited, AI1 current signal output
 

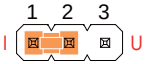
2 and 3 are short circuited, AI2 voltage signal output</td></tr>
<tr><td colspan="4">Jumper J15: AI2 current, voltage signal input
 

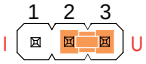
1 and 2 are short circuited, AI2 current signal output
 

2 and 3 are short circuited, AI2 voltage signal output</td></tr>
<tr><td colspan="4">XCOMM: InoLink communication RS485 terminal</td></tr>
<tr><td>1</td><td>SHIELD</td><td rowspan="4">RS485 bus, 5 V standard level
Bus matching resistor: 124 ohm
Maximum transmission rate: 5 Mbps
Maximum nodes: 32 (without repeater)
Transmission Distance: 1200 m</td><td rowspan="4">Four-conductor shielded twisted pair cable
Cross section area: 0.5 to 2.5 mm^2
For Inolink, the maximum number of nodes are 16, 4 Mbps, the longest cable length is 40 m</td></tr>
<tr><td>2</td><td>C485+</td></tr>
<tr><td>3</td><td>C485-</td></tr>
<tr><td>4</td><td>CGND</td></tr>
<tr><td colspan="4">Jumper J10, J12: RS485 bus matching resistor selection, must selection the same state, terminal matching
 

1 and 2 are short circuited, terminal match resistor connected
 

2 and 3 are short circuited, terminal match resistor disconnected</td></tr>
<tr><td colspan="4">XR01: relay 1 output terminal</td></tr>
<tr><td>1</td><td>RO1_NO</td><td rowspan="3">Output type: always open without power supply and always close contactor
Contactor parameter: 250 Vac / 30 Vdc, 2 A</td><td rowspan="3">Single-conductor cable
Cross section area: 0.5 to 2.5 mm^2</td></tr>
<tr><td>2</td><td>RO1_COM</td></tr>
<tr><td>3</td><td>RO1_NC</td></tr>
<tr><td colspan="4">XR02: relay 2 output terminal</td></tr>
<tr><td>1</td><td>RO2_NO</td><td rowspan="3">Output type: always open without power supply and always close contactor
Contactor parameter: 250 Vac / 30 Vdc, 2 A</td><td rowspan="3">Single-conductor cable
Cross section area: 0.5 to 2.5 mm^2</td></tr>
<tr><td>2</td><td>RO2_COM</td></tr>
<tr><td>3</td><td>RO2_NC</td></tr>
</table>

<table>
<tr><th>Terminal</th><th>Name</th><th>Function Description</th><th>Cable specification</th></tr>
<tr><td colspan="4">XR03: relay 3 outputs terminal</td></tr>
<tr><td>1</td><td>RO3_NO</td><td rowspan="3">Output type: always open without power supply and always close contactor
Contactor parameter: 250 Vac / 30 Vdc, 2 A</td><td rowspan="3">Single-conductor cable
Cross section area: 0.5 to 2.5 mm^2</td></tr>
<tr><td>2</td><td>RO3_COM</td></tr>
<tr><td>3</td><td>RO3_NC</td></tr>
<tr><td colspan="4">X11,X12： PC or SOP-20-880 communication RS485 terminal</td></tr>
<tr><td>1, 2, 7</td><td>NC</td><td rowspan="4">RS485 bus, 5 V standard level
Bus matching resistor: 124 ohm
Maximum transmission rate: 4 Mbps
Maximum number of nodes: 32 (without repeater)
Maximum transmission distance: 1200 m</td><td rowspan="4">Standard cable</td></tr>
<tr><td>3, 8</td><td>GND3</td></tr>
<tr><td>4</td><td>A</td></tr>
<tr><td>5</td><td>B</td></tr>
<tr><td>6</td><td>15 V3</td><td>15V3: 15 V ± 15%</td><td></td></tr>
<tr><td colspan="4">Jumper J12, J15: Bus matching resistor selection, the state of J12 and J15 are the same, jumper side is valid
 

1 and 2 are short circuited, add match resistor
 

2 and 3 are short circuited, cancel match resistor</td></tr>
<tr><td colspan="4">VR, VT: Optical fiber receiver and transmitter</td></tr>
<tr><td>1</td><td>VR</td><td>Receive optical fiber communication signals</td><td rowspan="2">optical fiber model: plastic optical fiber (POF)</td></tr>
<tr><td>2</td><td>VI</td><td>Send optical fiber communication signals</td></tr>
<tr><td colspan="4">XSTO: Safe torque terminal disconnection</td></tr>
<tr><td>1</td><td>STO24V (reserved)</td><td rowspan="4">Inverter H1...H4, H7 safe torque input disconnection STO1 (reserved), STO2 (reserved): 24 V ± 10%</td><td rowspan="4">Four-conductor shielded cable
Cross section area: 0.5 to 2.5 mm^2
For details, see “Chapter 7 Safe Torque Stop Function”</td></tr>
<tr><td>2</td><td>STOGND</td></tr>
<tr><td>3</td><td>STO1 (reserved)</td></tr>
<tr><td>4</td><td>STO2 (reserved)</td></tr>
</table>

5.8 HPCU Parallel Connected Inverter Control Unit

HPCU is a system control module for parallel connection, it serves as a connection link between the inverter units and the HCU by receiving the HCU drive and control signals, then synchronize fast to inverters, and quickly uploading the inverter current, voltage and state information to HCU; at the same time, the HCU module also do synchronization, rectification, resetting, start-stop to the parallel connected inverters.

Based on different system requirements, 4 parallel connected modules HPCU-40 and 6 parallel control module HPCU-60 can be selected.

5.8.1 Standard Interface

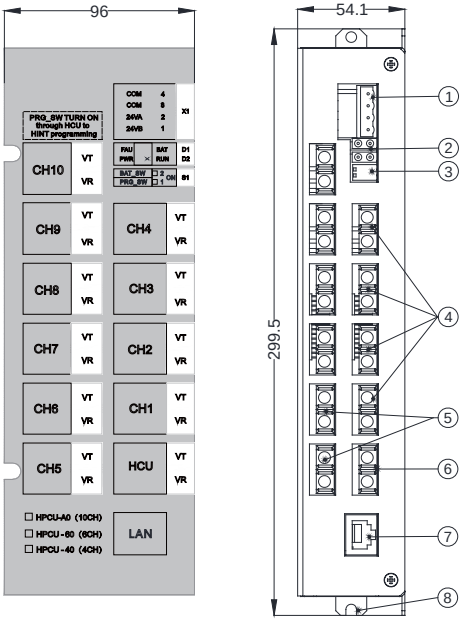


Figure 5-7 Example of HESD Cable Selection

Table 5-6 HPCU Function Description

No.	Name	Note	Description
1	Input power supply	COM: 24 V ground	HPCU external power supply X1 terminal, 5.08 mm spacing, 4PIN pluggable black terminal Twisted pair cable Cross section area: 0.5 mm^2 to 2.5 mm^2
		COM: 24 V ground	
		24VA Input power A 24.0 V ± 10% 0.5 A	
		24VB: Input power B (redundancy design) 24.0 V± 10% 0.5 A	
2	LED indicator	PWR/BAT/TX/RX	Power/battery indication/ send/receive

No.	Name	Note	Description
3	Battery switch	S2: BAT_SW	Reserved
4	Optical fiber transceiver	VT/VR: CH1 to CH4, parallel connected module channel 1 to channel 4	VI: 50 M send optical fiber communication signals VR: 50 M receive optical fiber communication signals Optical fiber model: plastic optical fiber (POF) HPCU-40 include channel: CH1 to CH4 HPCU-60 include channel: CH1 to CH6
5	Optical fiber transceiver	VT/VR: CH5 or CH6, parallel connected module channel 5 to channel 6	
6	Optical fiber transceiver	VT/VR: HCU Inodrive, communication between HPCU and HCU	
7	LAN	PC control and tunning terminal	-
8	Fixing holes	HCU fixing holes, 4 places	-

5.8.2 LED Indicator

Table 5-7 LED definitions

No.	Name	State	Function Description
1	PWR	Green light steady on	HPCU power supply normal
		OFF	HCU has no usable voltage or power fault
2	RUN	Green light steady on	Power module in running state
		OFF	Inverter at stop state
3	FAU	Red light blinks	System Faults
		OFF	System in good condition
4	BAT	Red light steady on	Battery undervoltage
		OFF	Battery normal

5.8.3 HPCU Electrical Connection

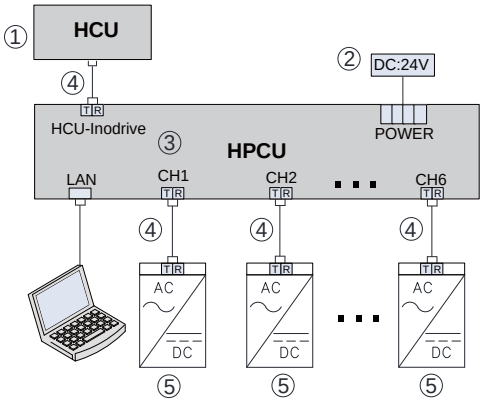


Figure 5-8 HPCU Electrical Connection Diagram

Table 5-8 HPCU Electrical Connection Function Description

No.	Name
1	HCU control module
2	External 24 Vdc current
3	HPCU parallel connected inverter control unit
4	Communication optical fiber
5	Inverter

5.9 HCU Function Application

5.9.1 Slot Expansion Application

- Optionally configure different function modules of HCU applications, the function module can be directly installed in the HCU slot.
- HCU has only 3 slots, when more modules are selected, install HOFM with HESD extension function module to implement, each HESD can extend one functional modules.

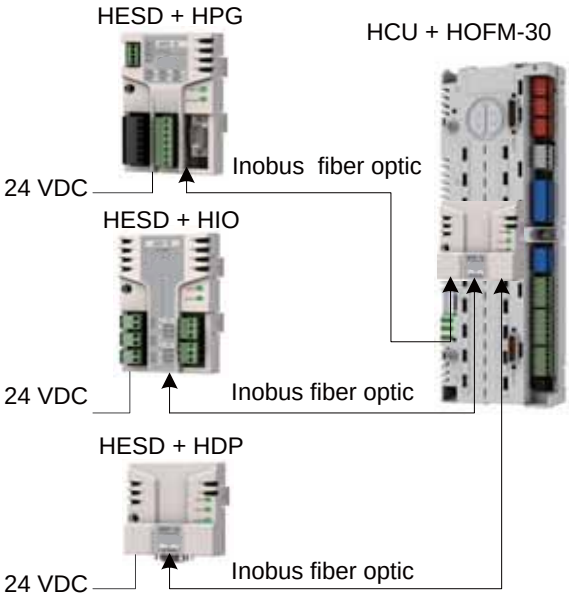


Figure 5-9 Example of HESD Cable Selection

NOTE

- Install function modules in SLOT1, SLOT2 and SLOT3, the addresses are: A1, B1, C1.
- When use HOFM-30 module in conjunction with SLOT1, SLOT2 to achieve 3 slots extension, the address are A1, A2, A3 and B1, B2, B3 respectively.
- Slot 3 has no slot extension function.
- Install the HOFM optical extension module on HESD is not allowed.

5.9.2 Using AI in Conjunction with AO for Temperature Detection

Using AI in conjunction with AO to detect PT100 temperature sensor signal. This method is generally used for motor temperature detection. It supports single PT100 detection, and it also supports 1 to 3 PT100 in series connection. Select a constant current output for AO, and select voltage signal input for AI.

Both ends of shielded layer grounding directly during usage is not allowed, you can choose one end ground, the other end suspend or one end ground, the other end connected to the ground through a series of capacitor.

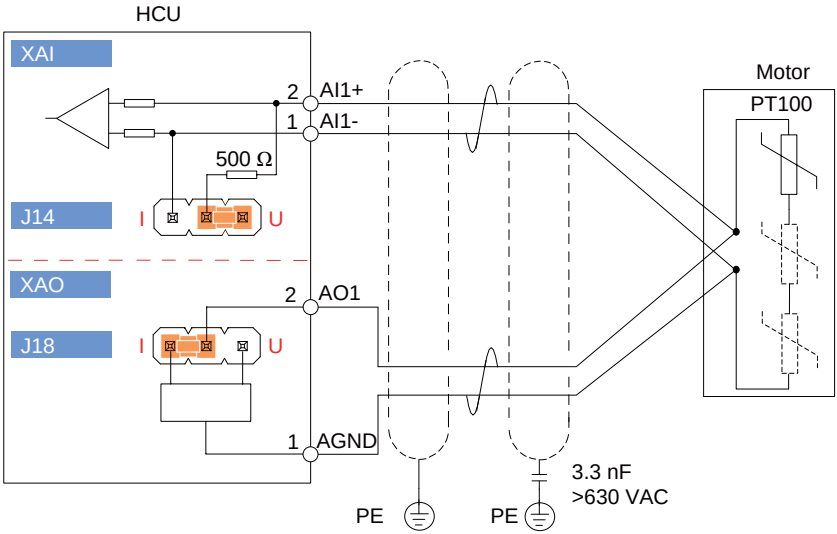


Figure 5-10 Wiring Diagram of Using AI in Conjunction With AO to Detect Temperature

5.9.3 Function Application of InoLink Communication Bus

The InoLink bus can be used to realize data exchange between several inverters.

The InoLink bus parameters are as follows:

Baud rate: 4 Mbps

Maximum number of nodes: 16

It is mandatory to use shielded twisted pair cable in order to realize high-quality communication, and prevent electromagnetic interference. It is recommended to use of high-quality cable, such as PROFIBUS cable. Keep the cable as short as possible (within 40 m), and avoid twisting or using near the power cable.

When the HCU is at the end of the InoLink, configure a terminal resistance to switch the J10 and J12 jumpers to the ON position.

The InoLink bus RS485 link topology is as follows:

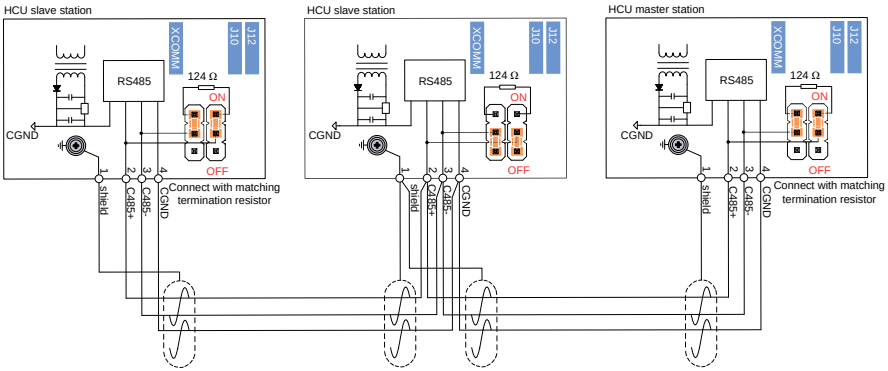


Figure 5-11 Connection Application Example

5.9.4 Communication Applications

The X11 and X12 terminals are the communication interfaces between the HCU control module and the intelligent operation keyboard SOP-20-880 or PC. It adopts the RS485 communication mode to support one host SOP-20-880 or PC, and multiple slave HCUs communication mode. The X11 and X12 supports RJ45 terminals, making it easy to cascade due to identical pins.

1) Connection rationale with SOP-20-880

With host SOP-20-880 and slave HCU, it realizes communication between PC and SOP-20-880 through USB. Terminal resistance configuration is required on the most remote HCU of link SOP-20-880.

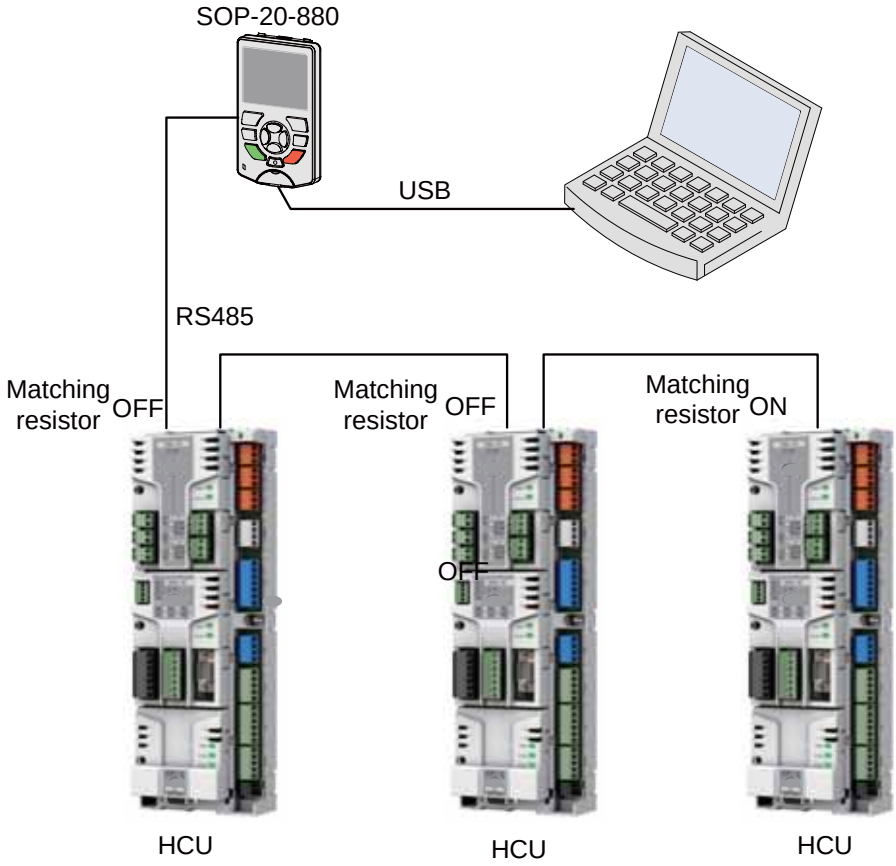


Figure 5-12 Wiring Diagram When Connecting with SOP-20-880

2) Connection rationale with PC

PC is the host, HCU is a slave, module conversion is required between PC and HCU (RS485 convert to RS232 or USB). Resistance configuration is required on the most remote HCU and conversion module of this circuit.

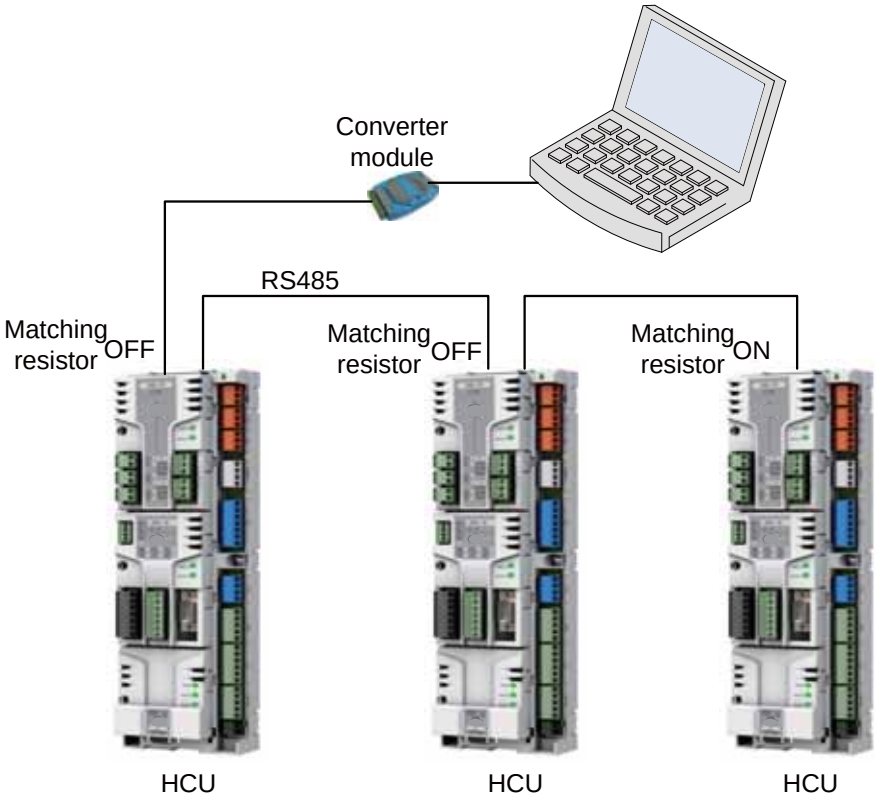


Figure 5-13 Wiring Diagram When Connecting with PC

Chapter 6 Safe Torque Stop Function (reserved)

Safe torque stop function is used to realize the followings:

- Effective stop in case of danger, such as emergency stop;
- To prevent careless start, such as short period of maintenance without having to cut the inverter unit power supply.

6.1 Safe Torque Stop Requirements

1. STO active switch requirement (reserved)

The STO active switch (reserved) can be an emergency stop button switch, a manual switch, a safe relay or a contact point of the safe PLC, and the switch or contactor is often open.

As an STO activating switch, the switch or relay contactor must be able to disconnect or close within 200 ms;

When using the manual switch as the STO activating switch (reserved), the

must has lock function, and can lock at the disconnection position;

2. Cable type and length requirement

As cable that connects with the STO activating switch (reserved), recommend to use a shielded twisted pair cable. Cable length requirement are as follows:

The cable length between the activating switch and the HCU inverter control unit is no more than 30 m;

The cable length between each inverter units is not more than 60 m;

The cable length between the external power supply and the first inverter unit is no more than 60 m;

The cable length between the HCU control unit and the last inverter unit is not more than 30 m, for system consisting of multiple parallel connected size H8 inverter units.

NOTE

- Each STO signal (reserved) reaches the HCU control module or the size H8 inverter unit terminal voltage must be greater than 17 Vdc, HCU control module or the size H8 inverter module can detect the STO normal signal (reserved).

3. Protect shielding layer grounding

The cable between the HCU control module and the STO activating switch (reserved), and the shielding layer is grounded on the HCU side;

The cable between the HCU control module and the HCU control module is only grounded in one of the HCU side cable shielding layers.

For a syztem consisting of multiple parallel connected size H8 inverter units: The shielding layer between the HCU control module and the H8 inverter unit (or the multiple parallel connected H8 inverter units) is not grounded.

6.2 Example of STO Application (reserved)

Configure safe torque stop wiring based on different systems, the following wiring solutions are provided:

1) Single-inverter application

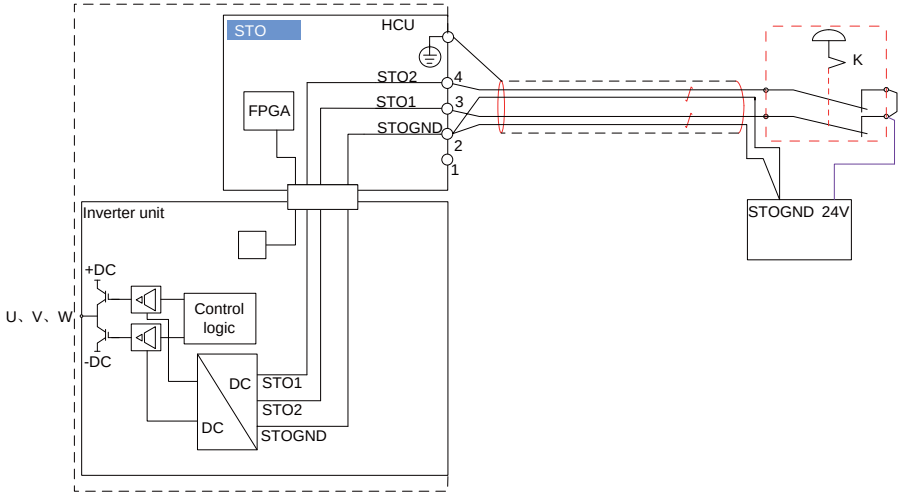


Figure 6-1 Single-Inverter Application (H1 to H7 Inverter Units)

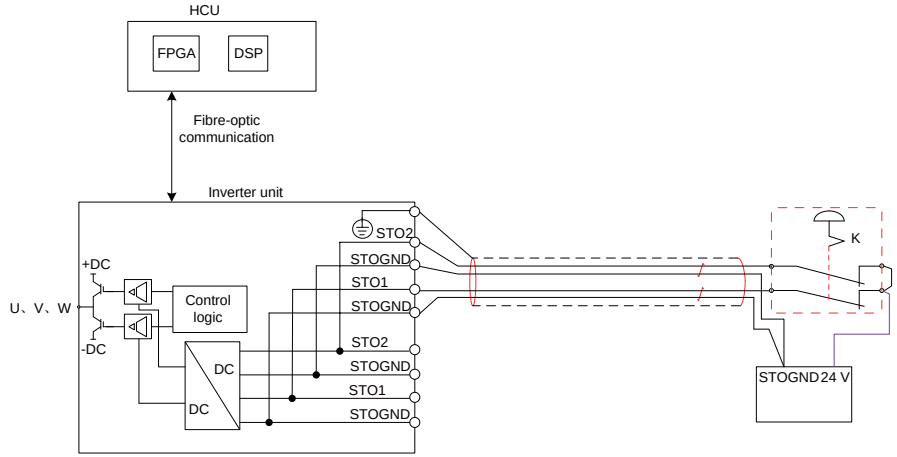


Figure 6-2 Single-Inverter Application (H8 Inverter Units)

2) N * H8 Inverter Units Parallel Connection Application

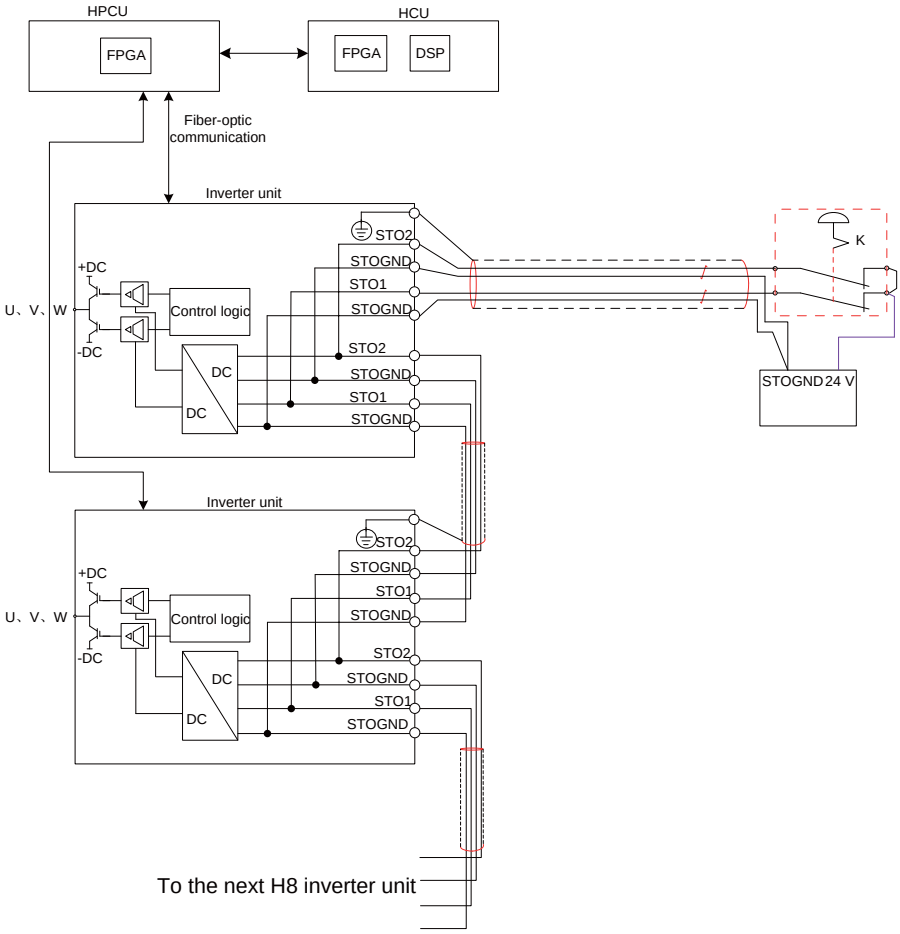


Figure 6-3 N * H8 Inverter Units Parallel Connection Application

Chapter 7 Maintenance and Repair

7.1 Overview

This chapter describes the followings:

- Precautions on maintenance and repair;
- Periodic maintenance and repair of components;
- Replacement of components during maintenance.

Before maintenance and repairment		
Danger:	◆ Before opening the cabinet doors to start any maintenance or repair work, switch off all power supplies and wait for at least 15 minutes. The waiting time is very necessary. This allows the capacitors to discharge to the safe value (< 36 V). After 15 minutes, measure the DC bus voltage before maintenance or repair. ◆ When external power supply is connected, hazardous voltage are still present in the inverter unit and cabinet even if the main breaker is open. ◆ Be aware of the possibly residual rotation of the cooling fan.	

7.2 Cleaning precautions

The cabinet comprises mostly electronic components. Except the cooling fan, no other components are subject to wear and require maintenance or inspection. Cleaning is purposed to keep the cabinet in the specified state.Thus remove the dust and contamination periodically.

Generally, observe the following points:

1) Dust

The dusts inside the cabinet must be removed by authorized personnel at a regular interval according to theusing environment (at least once a year). The cleaning must comply with the relevant safety regulations. A brush and Vacuum cleaner must be used to clean the dust. For the positions that cannot be easily reached, use dry compressed air (max. 1 bar) for cleaning.

2) Ventilation

Always keep the ventilation openings of the cabinet unobstructed and ensure that the cooling fan is functioning properly.

7.3 Precautions on Inspection

Inspection means taking measures to maintain and restore normal operation of the fault.

During Repair	
Danger:	◆ Strictly obey correct operating instructions before starting any maintenance or inspection work. ◆ Maintain and inspect the cabinet modules only after the cabinet modules are de-energized and cool off. ◆ Mount and wire the equipment in line with the national standards, industry standards and local safety codes. ◆ Residual voltage are still present in the cabinet when you turn off the input breaker switch. Check and confirm that no voltage exists before maintenance and inspection. ◆ The tools you use must satisfy the withstanding voltage requirement and the housing must be well grounded. ◆ Be careful when measuring components inside the cabinet. Never touch the multimeter probes together or touch the other terminals by the probes. ◆ Only authorized personnel are allowed to install, maintain and inspect the cabinet modules.

1) Required tools

The following tools are required to inspect and replace the components:

- Spanner or socket spanner with width across flats 6
- Spanner or socket spanner with width across flats 8
- Spanner or socket spanner with width across flats 10
- Spanner or socket spanner with width across flats 12
- Torque wrench
- Screwdriver of size 1/2
- A socket spanner case with two long extension rods is recommended.

2) Standard service time of components

To ensure normal use of inverter unit for a long time, regular maintenance and inspection must be performed on the electronic components inside the cabinets according to their service life. The service life of the electronic components inside the inverter unit is influenced by the operating environment and conditions. The following table lists the service life of the components inside the cabinets for your reference.

Table 7-1 Service Life of Components

Component Name	Standard Service Life
Axial flow fan	3 to 5 years
Electrolytic capacitor	8 years
Printed circuit board;	8 to 10 years

NOTE

The operating conditions of the components of standard service life are as follows:

- Ambient temperature: 30° C on average yearly
- Load coefficient: below 80%
- Operating rate: below 12 hours per day

3) Tightening torques

When tightening conductive parts (DC bus connections, motor connections and busbar), non-conductive parts(grounding terminals and protective grounding terminals) and common steel-made parts, obey the following tightening torques.

Table 7-2 Torque of tightening conductive parts

Screw	Grounding Terminals, Protective Grounding Terminals and Steel-Made Terminals（N·m）(Conduct Fault Current)	Plastic Case Busbar（N·m）(Conduct Operating Current)
M2.5	0.8	0.6
M3	1.25	0.8
M4	2.9	1.8
M5	5.5	2.5
M6	9.5	5.5
M8	20	10.5
M10	45	20
M12	80	45

4) Cable and screw tightening

Check whether the cable terminals and screw terminals are secure. If not, re-tighten them. Check the cabling fault. If any component is damaged, replace it immediately. The actual maintenance and inspection period is determined by the equipment mounting environment and operating conditions.

NOTE

- The actual maintenance and inspection period is determined by the equipment mounting environment and operating conditions.

7.4 Replacing Parts

7.4.1 Overview

This section describes the components that need to be replaced at maintenance and inspection. The other components are not subject to wear normally and are not described here.

7.4.2 Safety Information

Necessary safety measures must be taken before starting maintenance and inspection.

During Repair	
Danger:	◆ Be aware that the inverter unit is operated with high voltages. ◆ All connection work must be done only after the inverters are de-energized. ◆ There is still hazardous voltage present inside the cabinet modules within 15 minutes after the power of inverters are switched off because of the capacitors in the AC input circuit and DC circuit. Therefore, the cabinet doors can be opened only after a reasonable period of time. ◆ Only the trained personnels can perform the maintenance and inspection. Failure to comply may result in severe personal injury or death or severe property loss. ◆ Because voltage of external power supply may exist, be careful when maintaining and inspecting the open units. Even when the motor does not rotate, the power supply and terminals may still be energized. ◆ Some equipments are very heavy or top heavy, and thus must be handled with care by trained personnels. If hoisted or transported improperly, severe personal injury or even death or severe property loss may occur.

7.4.3 Replacing Filter Mats

1. Preparations

■ Follow the “five safety rules”.

■ Switch off the power of the cabinets (including external power supply).

■ Ensure that the window blinds in the cabinet doors are not damaged.

Replacing Filter Mats	
Danger:	◆ The power of the cabinets must be switched off to prevent the fan from drawing in contaminated air from outside. When applying external power supply to the fan, be aware of the residual rotation of the fan or disconnect the external power supply. ◆ If the dirty filter mats are not replaced, the cabinet modules may stop due to the overtemperature fault.

2. Removal of the filter mats

If the inverter cabinet uses the IP42 inlet kit, following the steps below to clear the inlet:

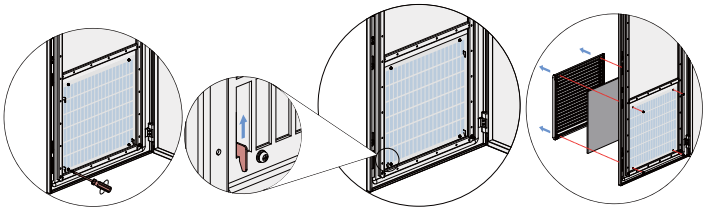


Figure 7-1 Maintenance of the filter mats

1) Open the cabinet front door and remove the four M4 screws from the window blind.
2) Lift up the window blind and remove it.
3) Remove the filter mat from the window blind and clean (or replace) it.

3. Re-installation of the filter mats

Re-install the filter mat in the procedure reverse to the removal sequence.

1) Insert the filter mat that has been cleaned or new filter mat into the window blind.
2) Snap the window blind back into the preset position.
3) Fix the window blind with the four M4 screws from the inner side of the front door.

Replace all filter mats as described in the preceding procedure.

7.4.4 Replacing DC Fan

1. Fan replacement of size H1...H3 inverter unit

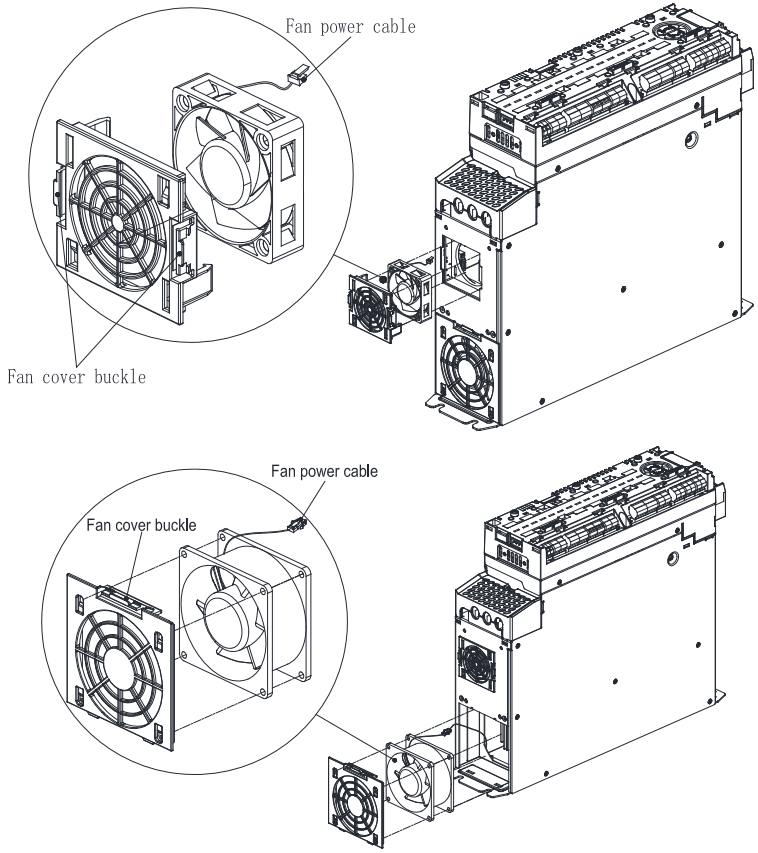


Figure 7-2 Fan Replacement of Size H1...H3 Inverter Unit

1) Switch off the DC power of the driving system, making sure no usable voltage exists inside the unit.
2) Press the fan cover buckle to remove the cover.
3) Pull the power connector of the fan when taking the fan out.
4) Install a new fan in reverse order.

NOTE

- Airflow direct is from the bottom up. Install the fan, abeying the upward direction marked on the fan.
- During fan installation, be aware that the power cable should not be squeezed by the fan.

2. Fan Replacement of Size H4 Inverter Unit

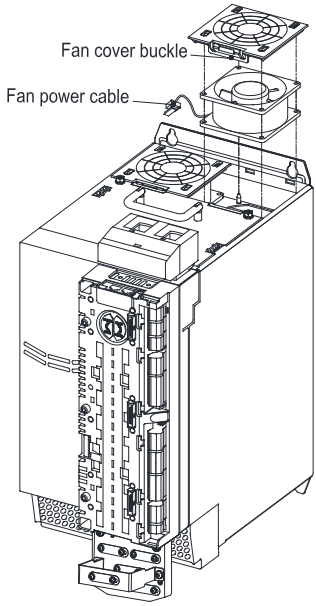


Figure 7-3 Fan Replacement of Size H4 Inverter Unit

1) Switch off the DC power of the driving system, making sure there is no usable voltage inside the unit.
2) Press the buckle of the fan cover to remove the cover.
3) Pull the power connector of the fan when taking the fan out.
4) Install a new fan in reverse order.

NOTE

- Airflow direct is from the bottom up. Install the fan, abeying the upward direction marked on the fan.
- During fan installation, be aware that the power cable should not be squeezed by the fan.

3. Fan Replacement of Size H6...H7 Inverter Unit

Size H6 inverter unit has one fan, and size H7 inverter unit has two fans.

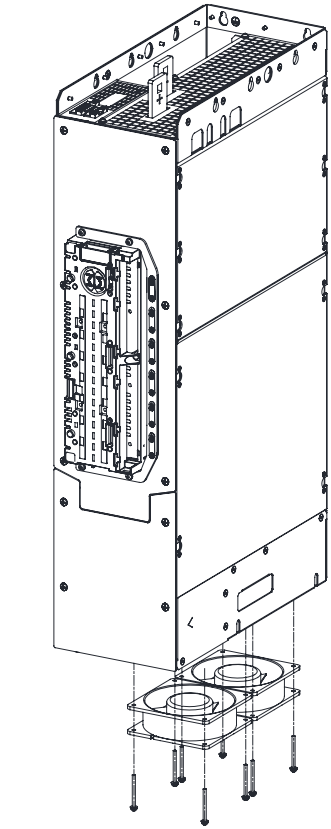


Figure 7-4 Fan Replace of Size H6...H7 Inverter Unit

Size H6...H7 inverter unit has three type of fans classified by power sections, replacing methods are as follows:

1) Switch off the DC power of the driving system, making sure there is no usable voltage inside the unit.

2) Open the cabinet door, remove all eight M4 screws from the module bottom (each fan has four M4 screws).

3) Pull the power connector of the fan when taking the fan out.

4) Install a new fan in reverse order.

NOTE

- Airflow direct is from the bottom up. Install the fan, abeying the upward direction marked on the fan.
- During fan installation, be aware that the power cable should not be squeezed by the fan.

4. Fan replace of size H8 inverter unit

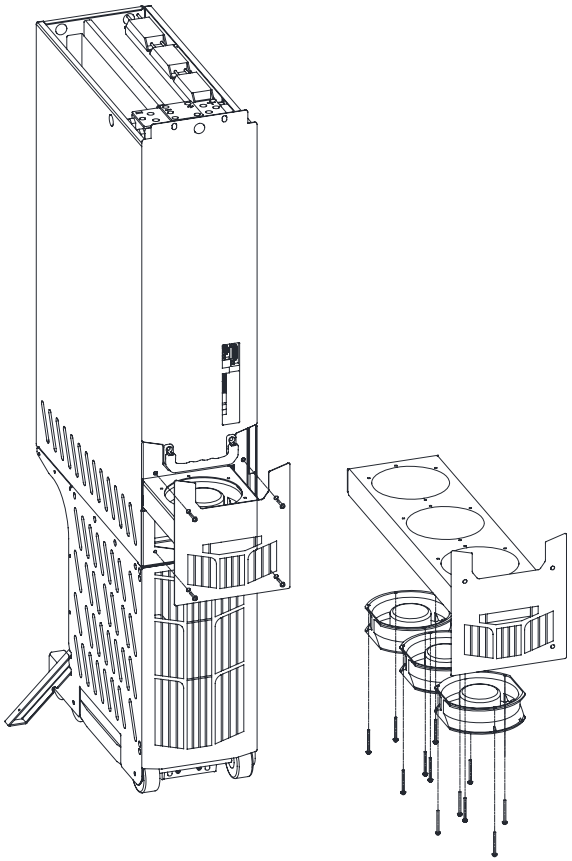


Figure 7-5 Fan Replace of Size H8 Inverter Unit

Size H8 inverter unit has five type of fans classified by power sections, methods are as follows:

1) Switch off the DC power of the driving system, making sure there is no usable voltage inside the unit.
2) Remove all four M5 screws (a) from the fan(d).
3) Pull the power connector(b) of the fan when taking the fan out.
4) Remove all 12 M4 screws from fan (each fan has 4 M4 screws).
5) Install a new fan with the same specification in reverse order.

NOTE

- Airflow direct is from the bottom up. Install the fan, following the upward direction marked on the fan.
- During fan installation, be aware that the power cable should not be squeezed by the fan.

7.4.5 Replacing the Fan of Size H6...H7 Inverter Unit

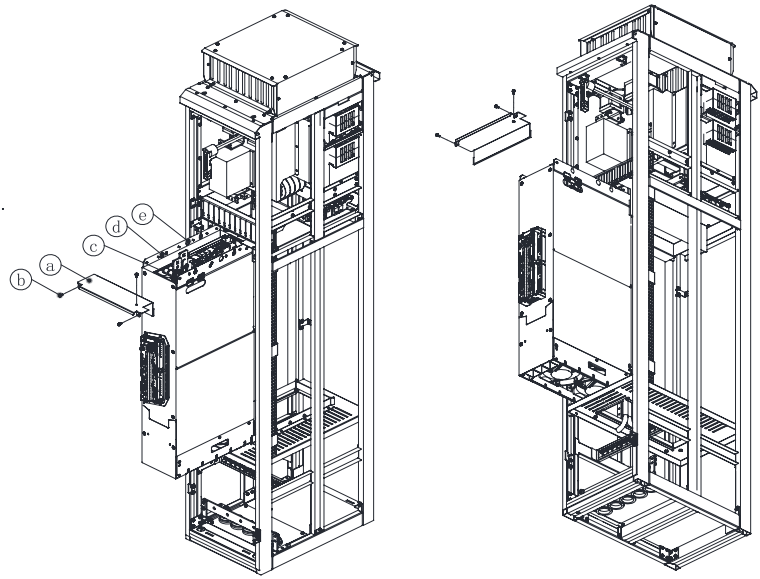


Figure 7-6 Fan Replacement of Size H6...H7 Inverter Unit

1) Switch off the DC power of the driving system, making sure there is no usable voltage inside the unit.
2) Open the cabinet door.
3) Loss all three screws of the air partition plate, remove the partition plate.
4) Cut off all control cables that is connected to HCU control module in front of the inverter unit, move the cables to one side and fix them, avoid blocking by them.
5) Pull the external IO of inverter units and control power terminal plug (c).
6) Disconnect DC power input bus
7) Disconnect AC power output bus
8) Remove fixing screws (d) of inverter unit.
9) Take out the inverter unit until it can be lift by hositing equipment, connect the inverter unit to the hositing holes (e) on both side of the inverter units.
10) Make sure the hositing equipment can bear the weight of the inverter units, then take the inverter unit out completely.

You may install an inverter unit in reverse order.

7.4.6 Replacing the Fan of Size H8 Inverter Unit

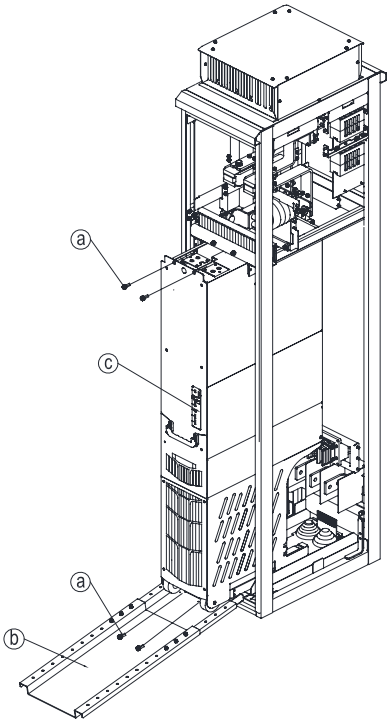


Figure 7-7 Fan Replacement of Size H8 Inverter Unit

1) Switch off the DC power of the driving system, making sure there is no usable voltage inside the unit.
2) Open the cabinet door.
3) Pull the external IO of the inverter units and control power terminal plug (c).
4) Disconnect the optic fiber.
5) Disconnect DC power input bus
6) Fix the installation rail of the inverter unit(b).
7) Remove all 4 M8 screws (a) the inverter unit.
8) Take out the inverter unit.
9) Open the Anti-dumping rack
10) Install a inverter unit in reverse order.

NOTE

◆ The base height of the cabinet should be less than 10 mm to avoid the slope degree too big.

The opening and closing steps of anti-dumping rack are as follows:

1) Pull down the anti-dumping bracket directly, as shown in Figure.

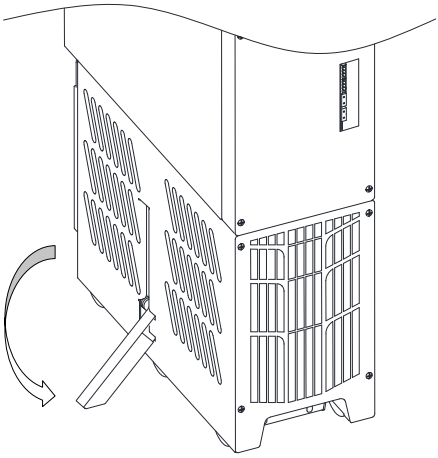


Figure 7-8 Opening of anti-dumping bracket

2) Press the anti-dumping bracket to the left unit the spring reaches the bracket slot;

3) Gently put the anti-dumping bracket up in the bracket slot to close it.

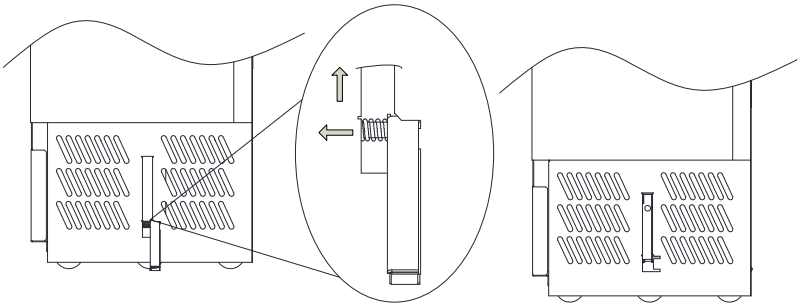


Figure 7-9 Closing of anti-dumping bracket

7.4.7 Mainten HCU Control Module

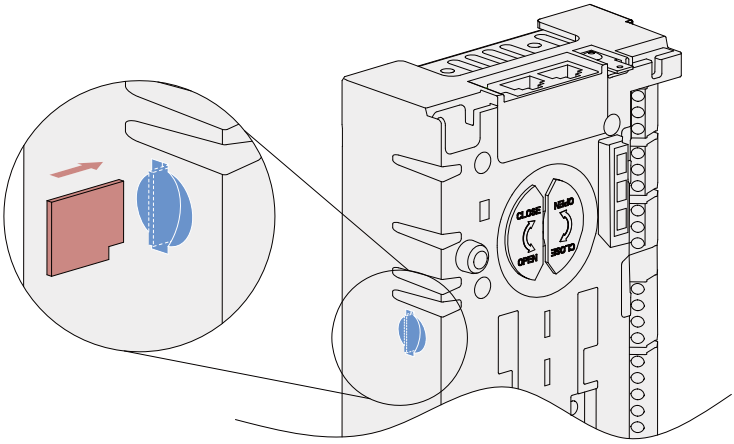
1. Replacing the memory card

After replacing the HCU control module, you can retain the existing parameter settings by transmitting the SD memory card from the old module to the new one.

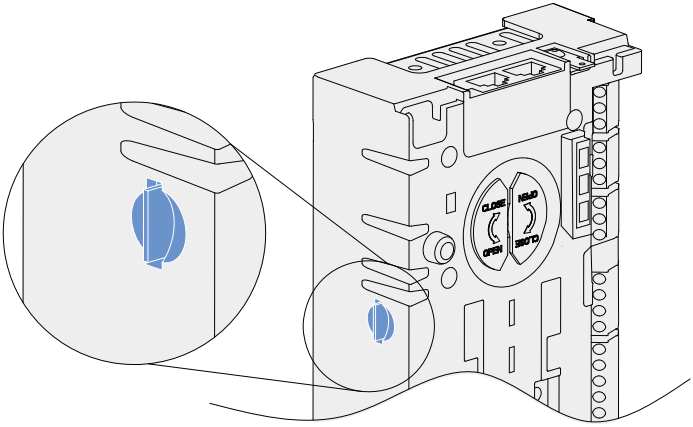
Parameter setting

The installing and uninstalling steps are as follows:

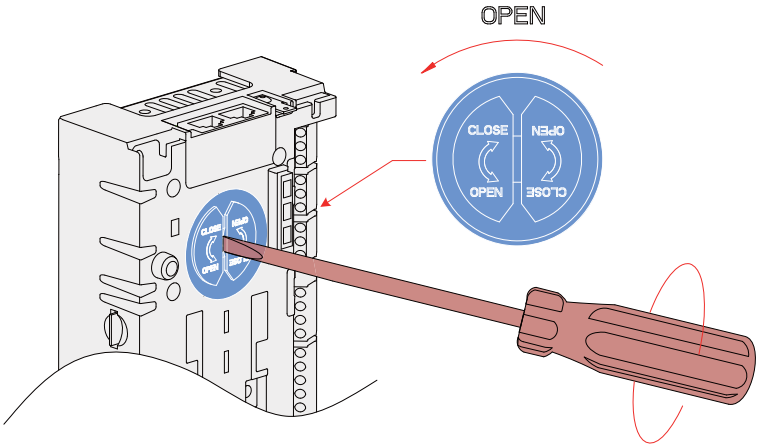
Step 1: Push the SD card into the SD slot.



Step 2: Make sure the SD card is secured in the slot, otherwise it causes fault due to bad connection.



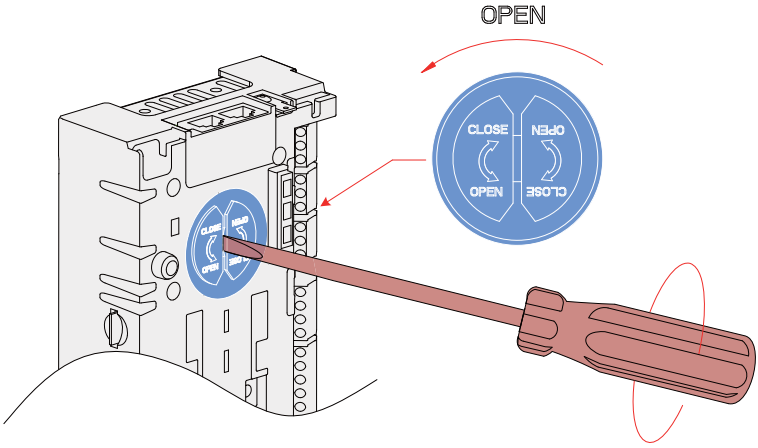
Step 3: Press the SD memory card till it ejected, pull out the SD memory card straightly.

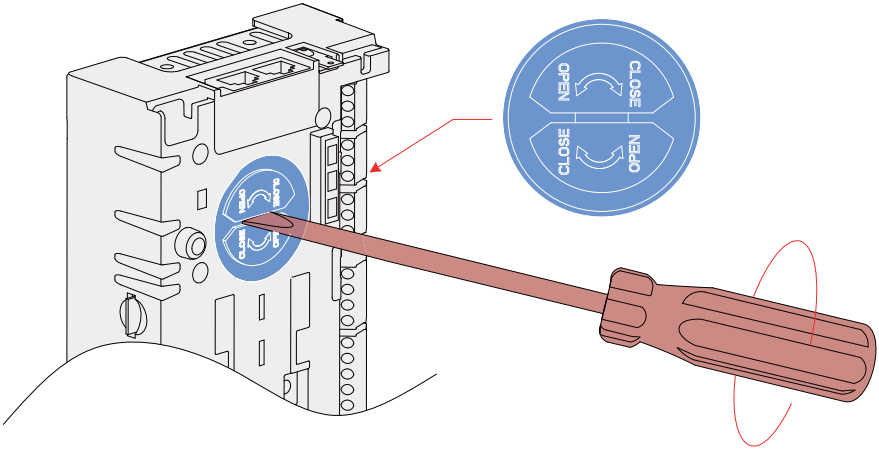


2. Replacing Battery

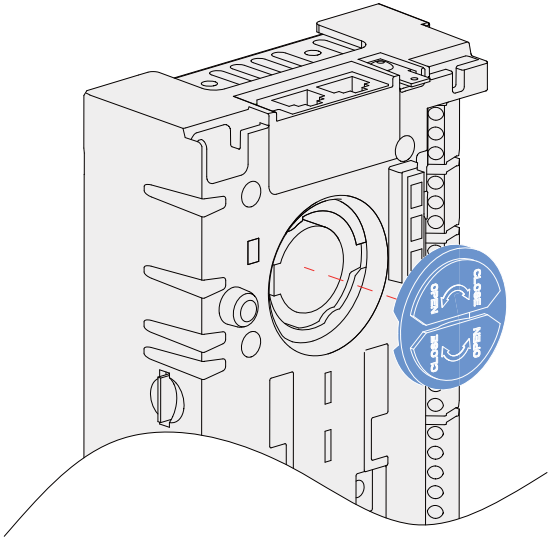
The following describes how to replace the battery of HCU control module clock.

Step 1: Use a 2# screwdriver to rotate the battery cover 90 degrees counterclockwise until the lid is open.

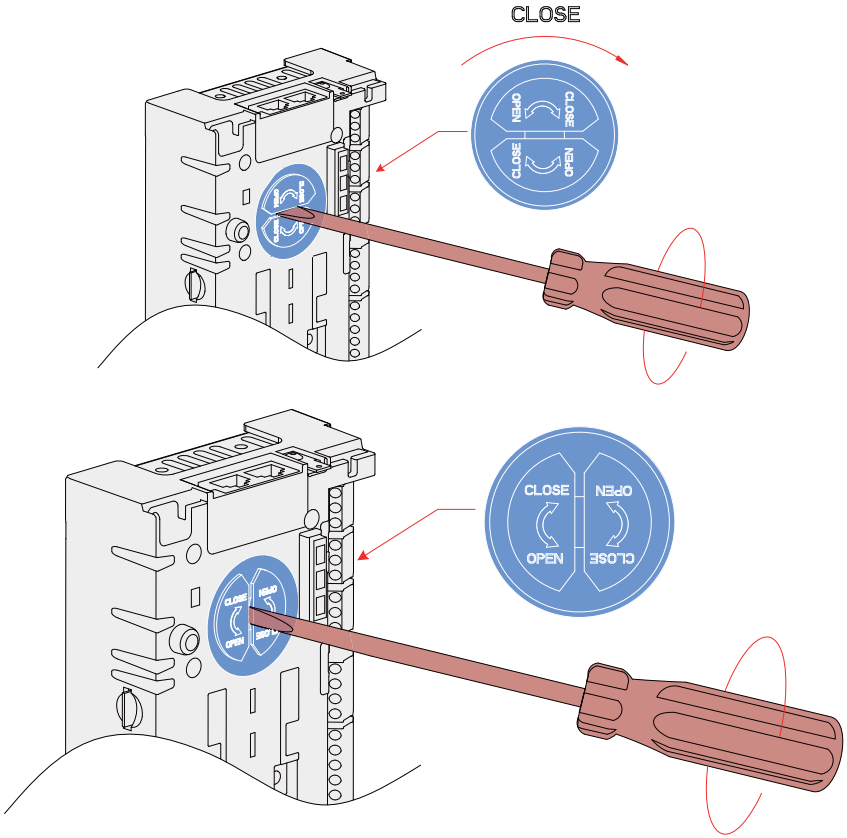




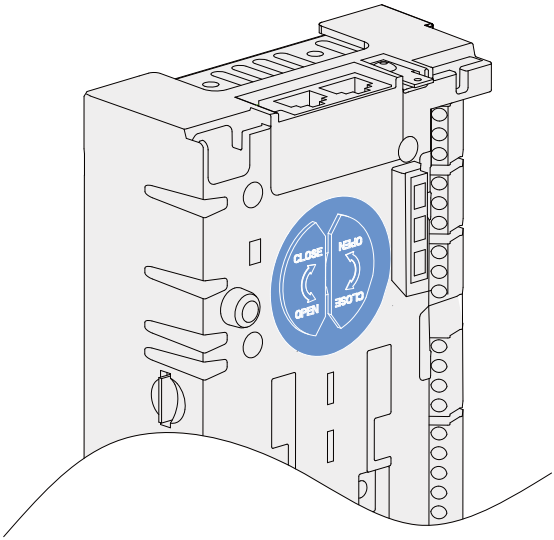
Step 2: Open the lid and replace the battery.



Step 3: Close and tighten the lid by rotating 90 degrees clockwise.

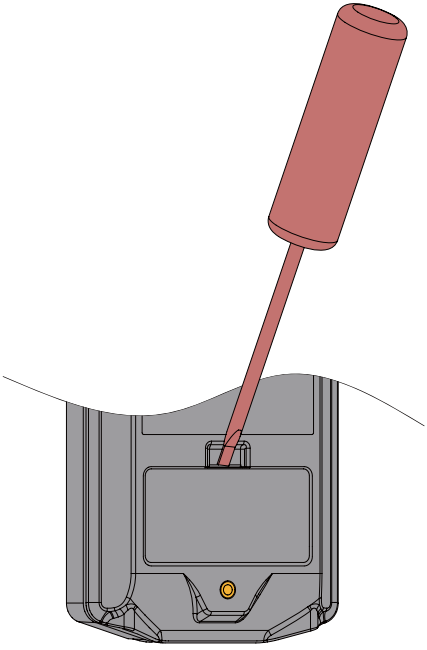


Step 4: Following local disposal regulations and laws to dispose waste batteries .

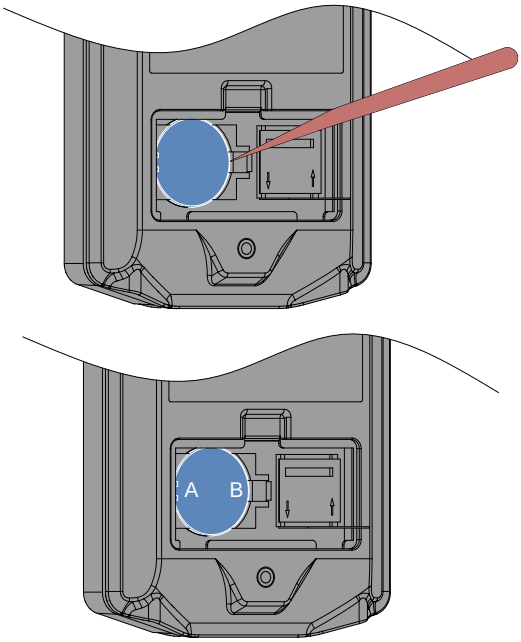


7.4.8 Replacement of SOP-20-880 Battery

Step 1: Use tool or finger following the operation shown in the figure, loose the battery back cover;

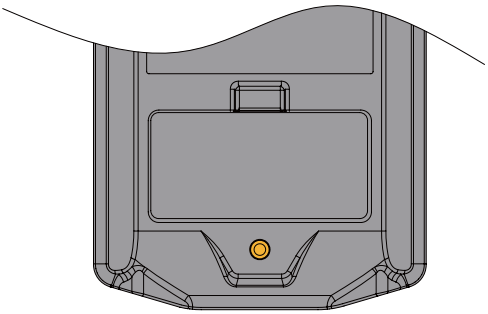


Step 2: Use a tweezers or a small screwdriver to pry the battery out following the operation shown in the figure.



Step 3: During battery installation, put the battery into the buckle at the A end of the battery seat, press the B end with force until the battery fits is secured.

Step 4: Cover the battery with a tool/finger and battery replacement competes.



7.4.9 Replacement DC Bus Buffering module

For information of DC bus module replacement, see “8.2 DC Bus Buffer Module”.

Chapter 8 Options

8.1 Function Extension Module

For details of function extension module, refer to "5.4 Function Module", For the usage of function modules, see user manual for each function module.

8.2 DC Bus Buffer Module

Based on different field applications, a series of DC bus buffer modules are developed to facilitate system troubleshooting and single equipment maintenance.

Table 8-1 Buffering Module Type Selection

Applicable Model	Buffering Module Type
MD880-50M-0009-4	HST-1001
MD880-50M-0013-4	
MD880-50M-0017-4	
MD880-50M-0023-4	
MD880-50M-0033-4	HST-1002
MD880-50M-0038-4	
MD880-50M-0048-4	
MD880-50M-0060-4	
MD880-50M-0078-4	HST-1003
MD880-50M-0094-4	
MD880-50M-0116-4	HST-20
MD880-50M-0149-4	
MD880-50M-0183-4	
MD880-50M-0245-4	HST-6004
MD880-50M-0299-4	
MD880-50M-0062-7	
MD880-50M-0082-7	
MD880-50M-0099-7	
MD880-50M-0125-7	
MD880-50M-0144-7	
MD880-50M-0192-7	
MD880-50M-0349-4	HST-7004
MD880-50M-0395-4	
MD880-50M-0217-7	
MD880-50M-0270-7	

1. The HST-1001, HST-1002, HST-1003 buffer module have the same size, The figure below shows the diagram when using in conjunction with the MD880-50 series Inverter units:

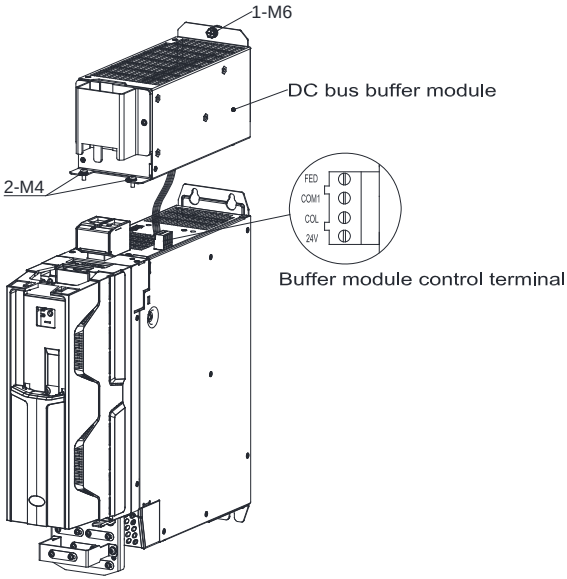


Figure 8-1 HST-1001/HST-1002/HST-1003 Buffer Module Installation

2. Diagram of using the HST-20 buffer module in conjunction with the MD880-50 series inverter unit are shown below:

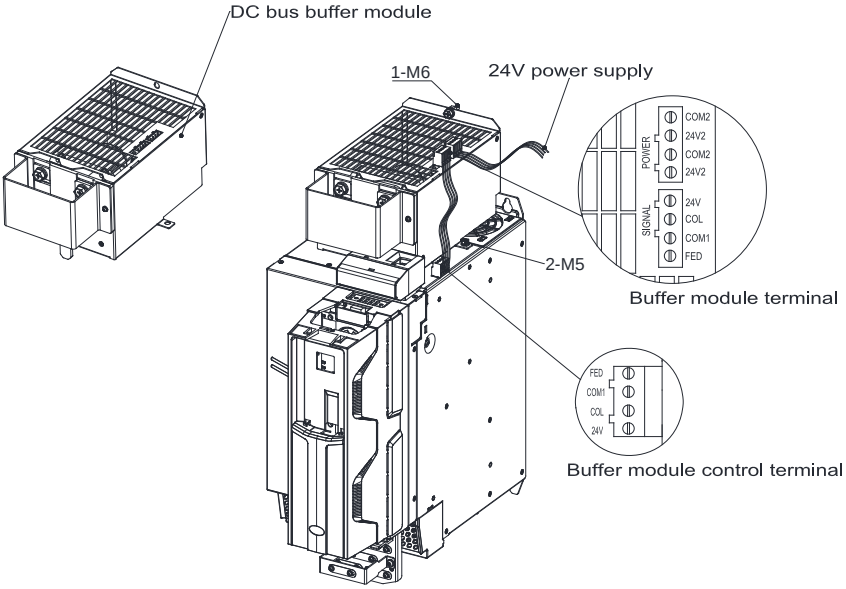


Figure 8-2 HST-20 Buffer Module Installation

3. HST-6004, HST-7004 and module installation steps (taking HST-6004 as an example):

1) As shown in Figure A, remove the two M6 screws in front of the HST-6004.

2) As shown in Figure B, slightly rotate the upper assembly of the HST-6004 upward,and then take it out.

3) The HST-6004 is split into a function module and a base assembly, the HST-6004 function module is shown in Figure C , and the base is shown in figure D.

4) Connect the cable to the buffer module terminal as shown in Figure E.

5) Remove the four M4 screws behind the top of the HST-6004 module, as shown in Figure F.

6) As shown in Figure F, fix the HST-6004 module base on the corresponding four M4 holes, figure g shows the equipment appearance after installation.

7) Reinstall the HST-6004 function module on the base, connect the buffer module terminal to the corresponding module terminal, the busbar below the HST-6004 module are fixed with the cathode of H6 module busbar, the M10 * 30 square neck bolt (GB14), the flat cushion, the elastic pad, and the nut are used to fix.

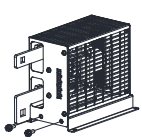


Figure A

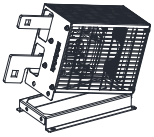


Figure B

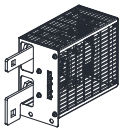


Figure C

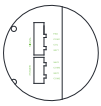
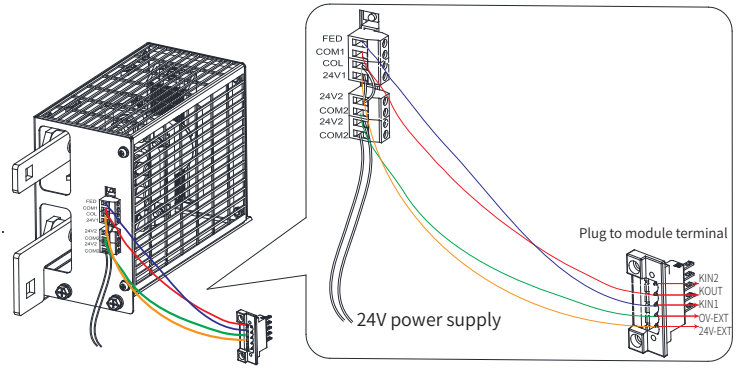


Figure D



Note: The colors are only for identifying different cables and not the real color of these cables.

Figure E

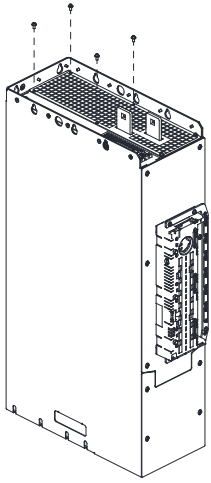


Figure F

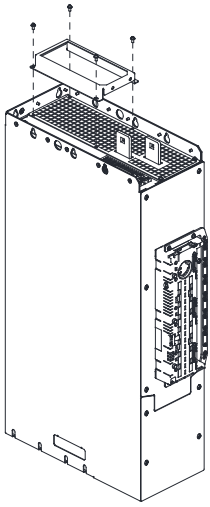


Figure G

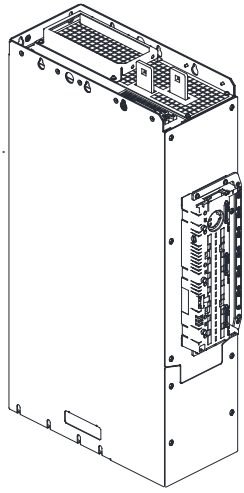


Figure H

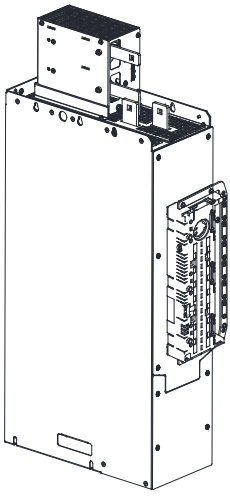


Figure I

Figure 8-3 Example of HST-6004/HST-7004 Buffer Module Installation

8.3 Quick Plug Installation Kit of Size H8 Inverter Unit

The AC output terminal of size H8 inverter unit is quick plug by default, and it is required to install a supporting quick socket to fit with the inverter unit, otherwise, the quick plug terminal cause serious heat when running in high current, and brings adverse effects. Therefore, for customers who bought the size H8 inverter units alone, it is recommended to select the quick plug installation kit provided by Unity Drive, following

instructions below:

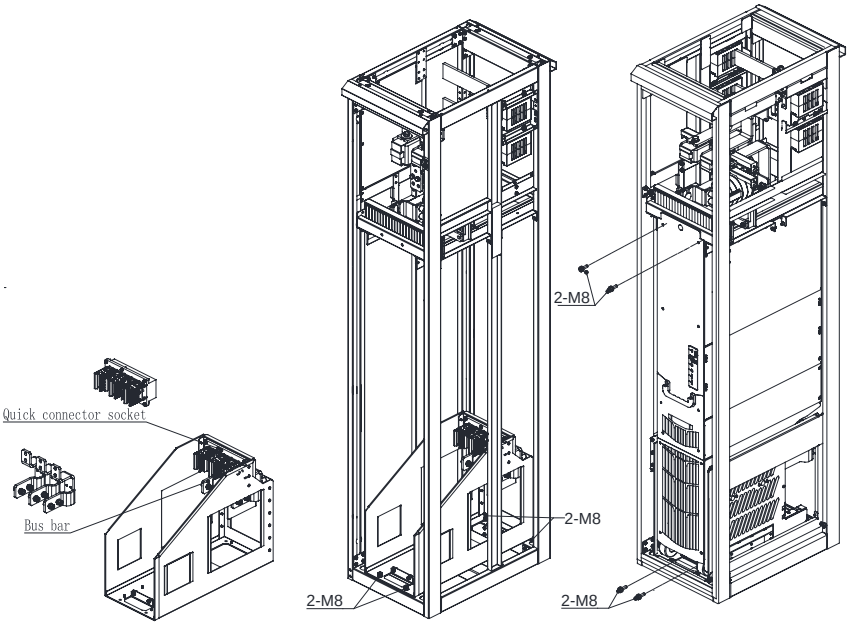


Figure 8-4 H8 Quick Plug Installation

1. The quick plug installation kit is secured in the cabinet by four M8 screws located underneath, in the front and in the rear of the device.
2. After the module is pushed into the cabinet, the module is fixed by two M8 screws at the bottom and two M8 screws above the cabinet.

Table 8-2 Quick Plug Installation Kit Type

Quick plug-in install kit type	Applicable model
H8-quick-kit	All models with size of H8

8.4 Installation Rail of Size H8 Inverter Unit

During size H8 inverter unit installation and maintenance, installation rail is introduced to facilitate the inverter unit pushing-in and pulling-out, for detailed instructions,see “7.4.6 Fan Replacement of Size H8 Inverter Unit”.

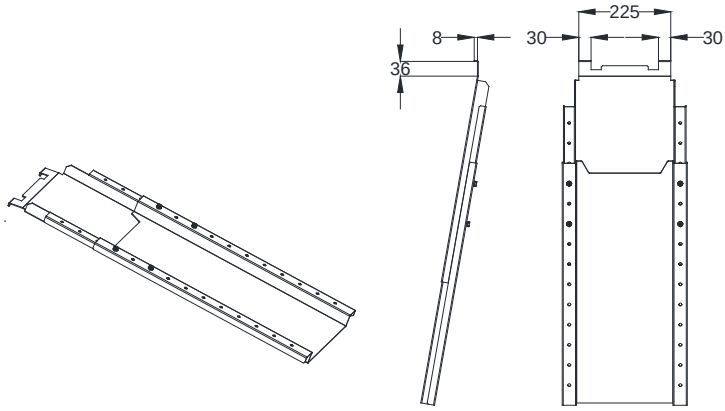


Figure 8-5 Install Rail Dimensions

Table 8-3 Installation Rail Type List

Installation Rail Type	Applicable Model
Mounting-rail	All models with size H8

8.5 Size of Optional Parts

The size of the HST-1001/HST-1002/HST-1003 buffer module is shown below:

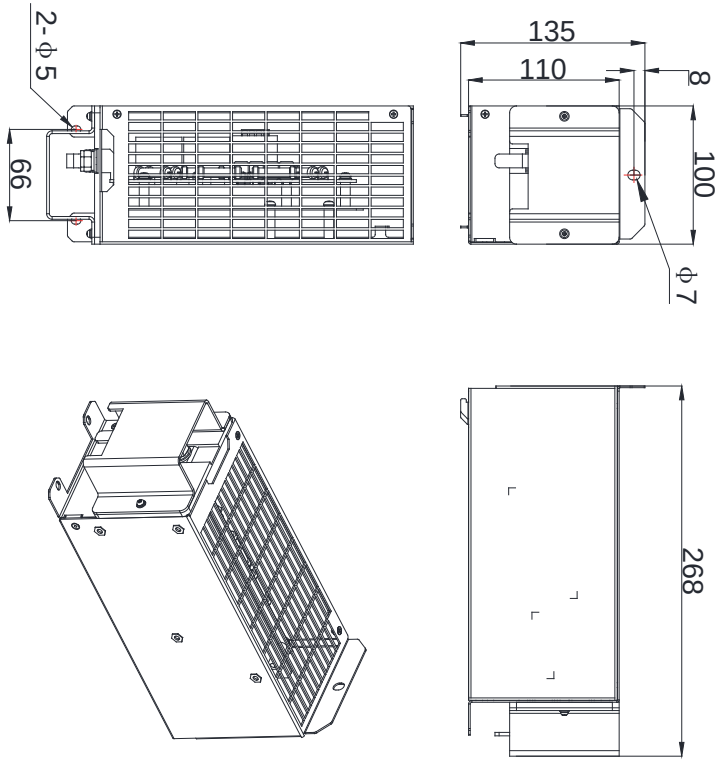


Figure 8-6 HST-1001, HST-1002 and HST-1003 Dimensions

The size of the HST-20 buffer module is shown below:

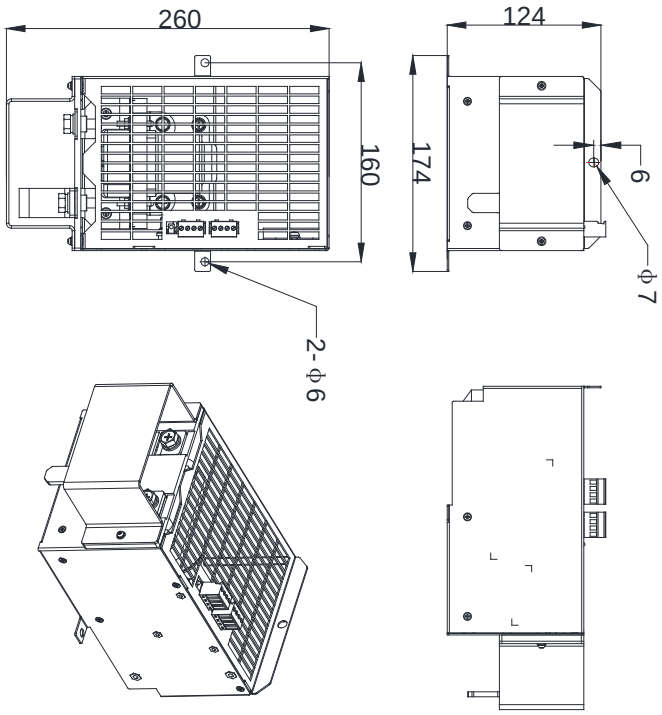


Figure 8-7 HST-20 Dimensions

Dimensions of the HST-6004 buffer module is shown below:

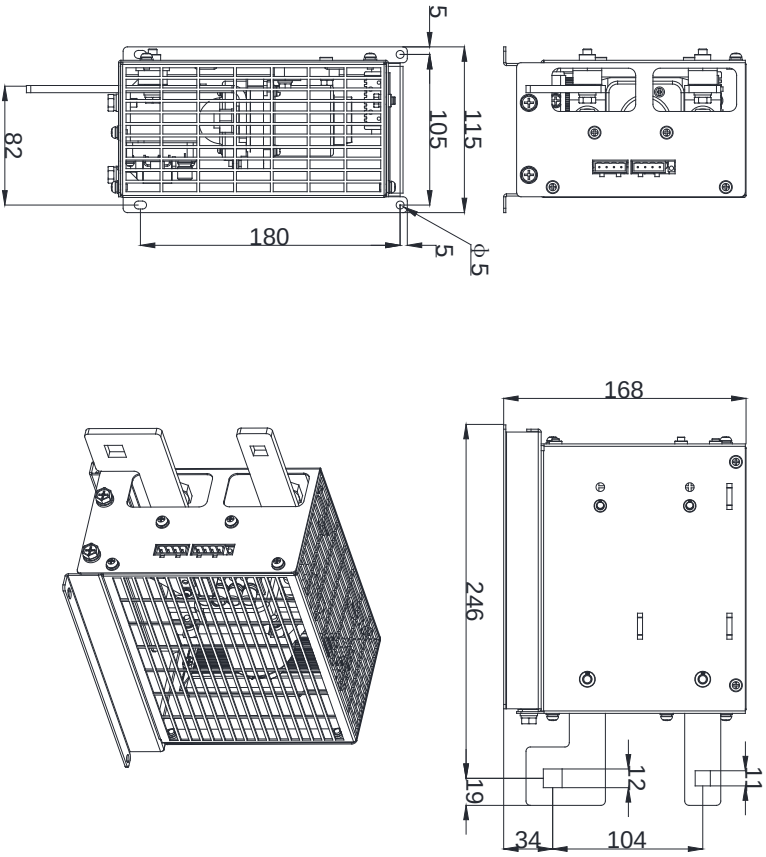


Figure 8-8 Dimensions of HST-6004 DC Bus Buffer Module

Dimensions of the HST-7004 buffer module is shown below:

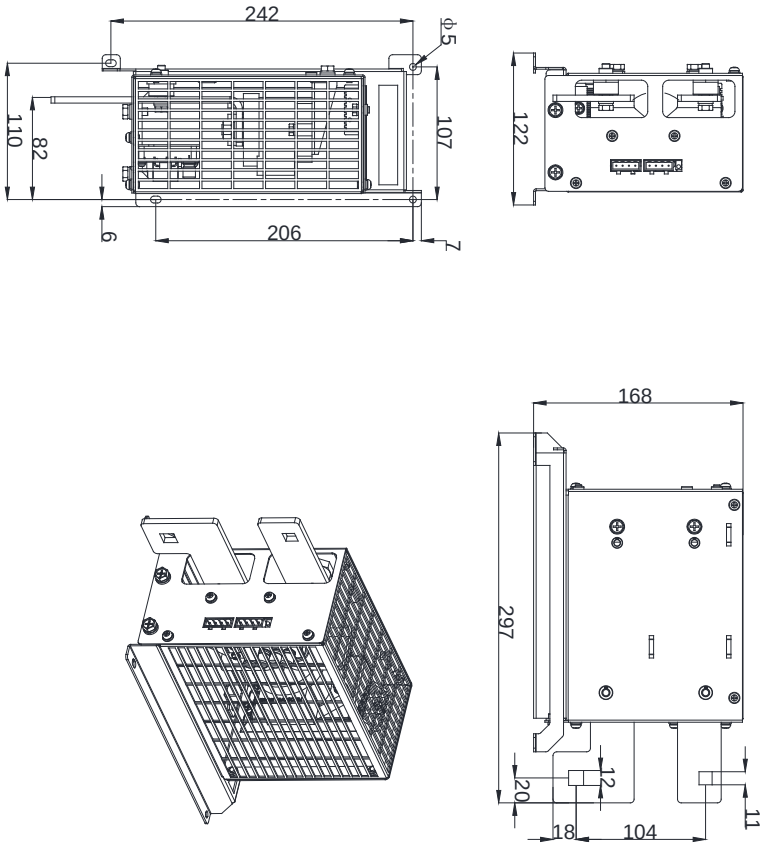


Figure 8-9 Dimensions of HST-7004 DC Bus Buffer Module

Dimensions of the quick plug installation kit size is shown below:

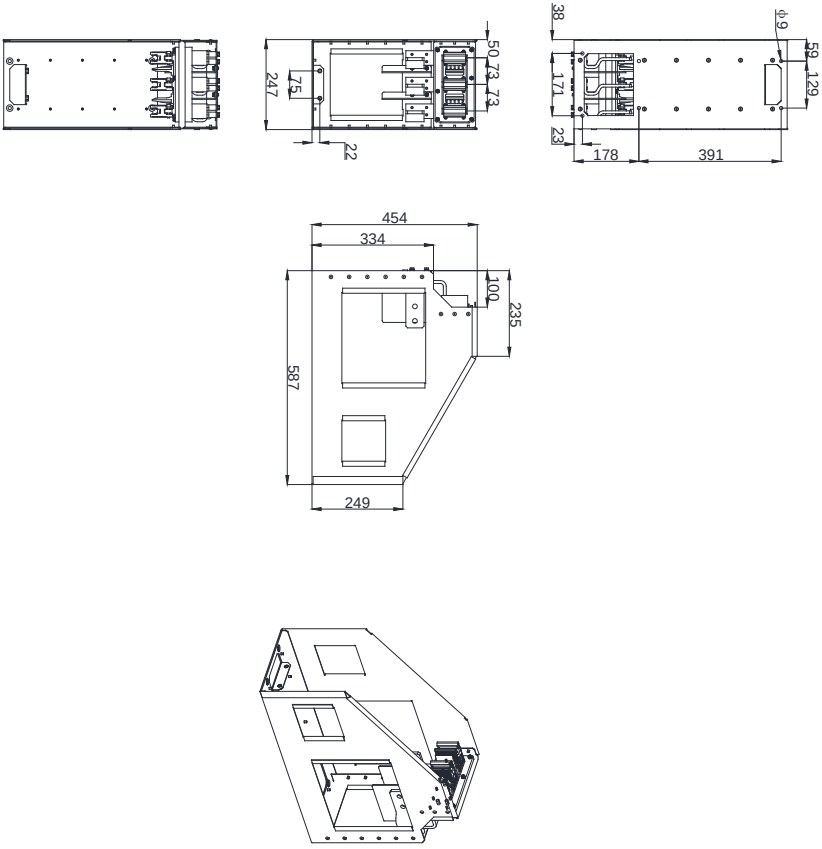


Figure 8-10 8-10 Dimensions of H8-quick-kit Quick Plug Installation Kit

Version Change Record

Date	Version	Date
2020.6	A00	First issue
2020.11	A01	Made minor corrections

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