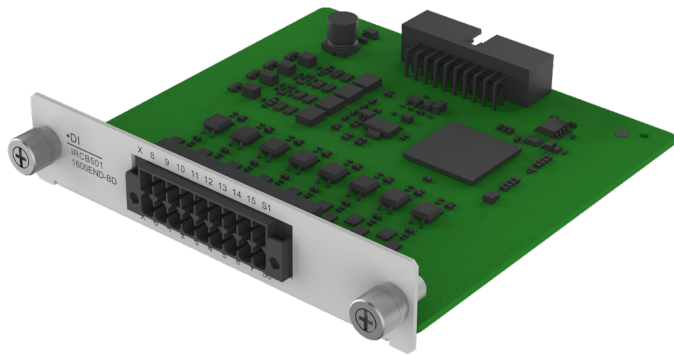




IRCB501 Series 16-Channel

Input I/O Expansion Card User Guide



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Preface

Thank you for purchasing the Inovance IRCB501 series expansion card.

The IRCB501 series expansion cards are developed specifically to expand resources for robot control systems. This series includes encoder expansion cards and I/O expansion cards.

This guide describes how to correctly use your card. Before use (installation, wiring, operation, maintenance, and inspection), please read this guide carefully and make sure to understand the safety precautions. If you are an equipment manufacturer, make sure to send this guide along with your equipment to end users for future reference.

During the use of this product, you may need to consult the following guides:

Doc Name	Data Code
IRCB501 Series Robot Control Cabinet User Guide	PS00010914
IRTP80 Series Teach Pendant User Guide	19012261

User guides may be updated without prior notice. You may download the latest version at www.inovance.com.

General Safety Precautions

Safety Disclaimer

- ◆ Read the safety precautions before product installation, operation, and maintenance.
- ◆ For personal and equipment safety, follow all safety precautions marked on the product and described in the user guide during product installation, operation, and maintenance.
- ◆ "CAUTION", "WARNING", and "DANGER" messages in the guide are for reference only and do not cover all safety precautions.
- ◆ Use this product in an environment that complies with the design specifications. Malfunction or component damage caused by improper use is not covered by warranty.
- ◆ Inovance shall not be liable for any physical injuries or property loss caused by improper use.

Safety Categories and Definitions

- "DANGER" indicates that failure to comply with the notice will result in severe physical injuries or even death.
- "WARNING" indicates that failure to comply with the notice may result in severe physical injuries or even death.
- "CAUTION" indicates that failure to comply with the notice may result in minor or moderate physical injuries or equipment damage.

Unpacking

- ◆ Before unpacking, check whether the package is intact without damage, water seepage, damp, and deformation.
 - ◆ Unpack the product layer by layer. Do not strike the package violently.
 - ◆ Check the surface of the product and accessories for damage or rust.
 - ◆ Check the product, accessories, and materials in the package against the packing list to ensure that all items are complete.
- ◆ Do not install the product if you find damage, rust, or signs of use on it or its accessories upon unpacking.
 - ◆ Do not install the product if you find water seepage or any components being missing or damaged upon unpacking.
 - ◆ Do not install the product if the packing list does not match the product you received.

Storage and Transportation

- ◆ Store and transport the product in accordance with the storage and transportation requirements regarding humidity and temperature.
 - ◆ Avoid storage and transportation in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
 - ◆ Avoid storage for more than three months. Long-term storage requires stricter protection and necessary inspections.
 - ◆ Pack the product properly before transportation by vehicle. Use an enclosed box for long-distance transportation.
 - ◆ Never transport the product with devices or materials that may damage or negatively impact the product.

Installation

- ◆ Read through the user guide and safety precautions before installation.
 - ◆ Do not modify the product.
 - ◆ Do not fiddle with the bolts used to fix parts and components or the bolts marked in red.
 - ◆ Do not install the product in places with strong electric or magnetic fields.
 - ◆ When installing the product in a cabinet or final assembly, make sure that the enclosure of the cabinet or final assembly provides adequate fire prevention, electrical protection, and mechanical protection conforming to relevant IEC standards and local laws and regulations.

- ◆ Never allow non-skilled personnel to carry out installation, wiring, maintenance, inspection, or part replacement.
 - ◆ Installation, wiring, maintenance, inspection, and part replacement must be carried out only by trained technicians with electrical expertise.
 - ◆ The installation personnel must be familiar with the installation requirements and relevant technical information.
 - ◆ If any equipment with strong electromagnetic interference, such as a transformer, is needed, install a shielding device to prevent malfunction of this product.

Wiring

- ◆ Never allow non-skilled personnel to carry out installation, wiring, maintenance, inspection, or part replacement.
 - ◆ Never perform wiring while the equipment is energized. Failure to comply will result in an electric shock.
 - ◆ Before wiring, cut off all the power supplies of the equipment. Wait at least 10 minutes before further operations because residual voltage exists after power-off.
 - ◆ Ensure that the equipment is well grounded. Failure to comply will result in an electric shock.
 - ◆ During wiring, follow the proper electrostatic discharge (ESD) procedures and wear an anti-static wrist strap. Failure to comply will result in damage to the equipment or internal circuits of the product.

- ◆ Do not connect the input power supply to the output end of the equipment. Failure to comply may result in equipment damage or even fire.
 - ◆ Use cables with required diameter and shield. Properly ground one end of the shield if a shielded cable is used.
 - ◆ After wiring, make sure that no loosened screws or exposed cables are left inside the device.

Power-on

- ◆ Before power-on, ensure that the equipment is properly installed, all cables are securely connected, and the motor can be restarted.
 - ◆ Check that the power supply meets equipment requirements before power-on to prevent equipment damage and fire.
 - ◆ Stay away from the equipment at power-on because unexpected mechanical operations may be triggered on the equipment.
 - ◆ Never open the cabinet door or protective cover of the equipment after power-on. Failure to comply will result in an electric shock.
 - ◆ Never touch any wiring terminals of the equipment while power is on. Failure to comply will result in an electric shock.
 - ◆ Never disassemble any unit or component of the equipment when it is powered on. Failure to comply will result in an electric shock.

Operation

- ◆ Never touch any wiring terminals of the equipment during operation. Failure to comply may result in an electric shock.
 - ◆ Never disassemble any unit or component of the equipment during operation. Failure to comply will result in an electric shock.
 - ◆ Do not touch the equipment casing, fan, or resistor to check the temperature. Failure to comply may result in burns.
 - ◆ Never allow non-skilled personnel to detect signals during operation. Failure to comply may result in physical injury or equipment damage.

- ◆ Never touch any wiring terminals of the equipment during operation. Failure to comply may result in an electric shock.
 - ◆ Never disassemble any unit or component of the equipment during operation. Failure to comply will result in an electric shock.

Maintenance

- ◆ Never allow non-skilled personnel to carry out installation, wiring, maintenance, inspection, or part replacement.
 - ◆ Do not maintain the equipment while power is on. Failure to comply will result in an electric shock.
 - ◆ Cut off all power supplies to the equipment and wait for at least 10 minutes before maintenance.
- ◆ Carry out daily and periodic inspection and maintenance on the equipment according to maintenance requirements and retain a maintenance record.

Repair

- ◆ Never allow non-skilled personnel to carry out installation, wiring, maintenance, inspection, or part replacement.
 - ◆ Do not repair the equipment while power is on. Failure to comply will result in an electric shock.
 - ◆ Cut off all power supplies to the equipment and wait for at least 10 minutes before maintenance.

- ◆ Submit the repair request according to the warranty agreement.
 - ◆ Upon equipment failure or damage, arrange for qualified technicians to troubleshoot and repair the equipment in accordance with the maintenance instructions and retain a maintenance record.
 - ◆ Replace quick-wear parts of the product according to the replacement instructions.
 - ◆ Do not use a damaged machine. Failure to comply may result in further damage.
 - ◆ After equipment replacement, check the wiring and set parameters again.

Disposal

- ◆ Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, physical injuries, or even death.
 - ◆ Recycle retired equipment in accordance with waste disposal standards of the industry to avoid environmental pollution.

1. Product Information

Expansion Card

Name	Model	Function
16-channel input I/O expansion card	IRCB501-1600END-BD	General-purpose 16-channel input I/O expansion

Installation Dimensions

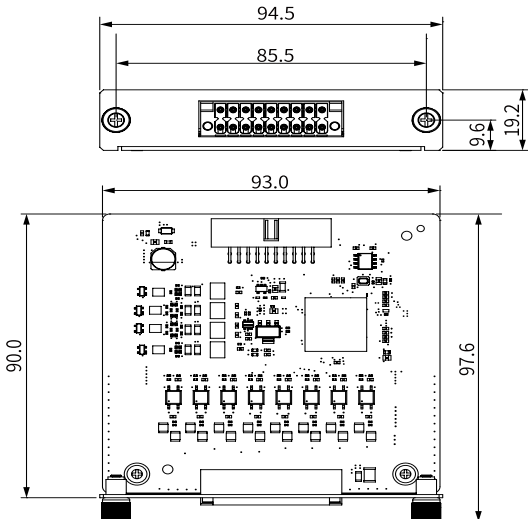
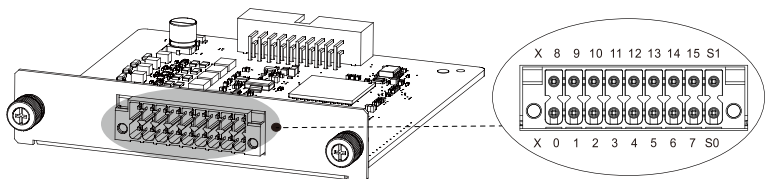


Figure 1 16-channel input I/O expansion card (unit: mm)

Terminal Assignment



Pin	Function Description
X0	Input channel 0
X1	Input channel 1
X2	Input channel 2
X3	Input channel 3
X4	Input channel 4

Pin	Function Description
X5	Input channel 5
X6	Input channel 6
X7	Input channel 7
X8	Input channel 8
X9	Input channel 9
X10	Input channel 10
X11	Input channel 11
X12	Input channel 12
X13	Input channel 13
X14	Input channel 14
X15	Input channel 15
S0	Common terminal for pins X0 to X7; active at 0 V or 24 V
S1	Common terminal for pins X8 to X15; active at 0 V or 24 V

Product Specifications

Item	Specifications
Number of input channels	16 (X0 to X15)
Input connection mode	Crimping terminal
Input type	Digital NPN or PNP input, selectable through the common terminals
Drive mode	Sink/Source
Maximum input voltage	30 VDC
Input current (typical 24 V)	Approx. 5 mA
Voltage at ON (V)	18 VDC to 30 VDC
Voltage at OFF (V)	0 VDC to 3 VDC
Maximum input signal frequency	1 kHz
Input impedance	> 4 kΩ
Isolation mode	Optoelectronic isolation
Hardware response time (ON/OFF)	250 μs (OFF to ON)/250 μs (ON to OFF)
Ambient temperature and humidity	Temperature: 0° C to 45° C; humidity: 20% to 95% RH (30° C), non-condensing
Storage temperature and humidity	Temperature: -10° C to +60° C; humidity: < 95% RH (30° C), non-condensing

Note: The ambient temperature and humidity range of the expansion card matches all robot control cabinets.

2. External Wiring

Cable Preparation

Wire pin structure:



Figure 2 Dimensions of the GETV05010 wire pin (unit: mm)

Item	Description
Part code	15074039
Applicable cable size	20 AWG to 24 AWG
Color	Orange
Packing unit	Approx. 120 pcs/pack
Materials	Oxygen-free copper alloy and PVC
Surface treatment	Tin-plated
Current carrying capacity	Maximum 8 A

Recommended crimp tool: Hoop-type manual crimp tool (10 AWG to 28 AWG)



Cable preparation procedure:

Step 1: Strip off 10 mm of the wire insulation.

Step 2: Thread the cable through the cable marking sleeve.

Step 3: Thread the cable conductor through the round hole of the wire pin. Crimp the wire pin with the crimping pliers recommended by the wire pin manufacturer.

Step 4: Insert the wire pin into the corresponding hole on the I/O port terminal block. Pull back the wire pin to ensure that it is securely locked by the spring in the terminal block.

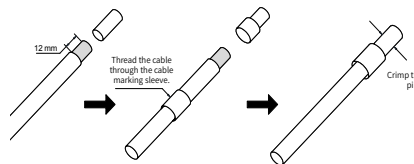


Figure 3 Cable preparation procedure

Sink Output and Source Output

1) Sink output (negative common terminal)

When the load current flows into the output (Y) terminal, the output is called sink output (or NPN output), which is low-level output.

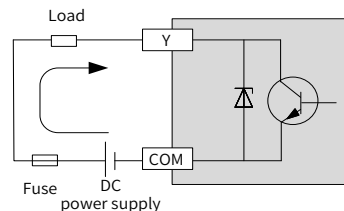


Figure 4 Sink output

2) Source output (positive common terminal)

When the load current flows out from the output (Y) terminal, the output is called source output (or PNP output), which is high-level output.

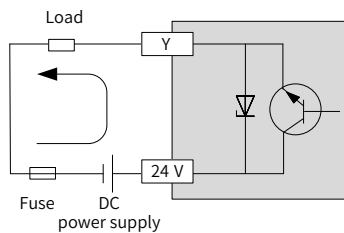


Figure 5 Source output



NOTE

An NPN output provides a low level, while a PNP output provides a high level.

Wiring Diagram

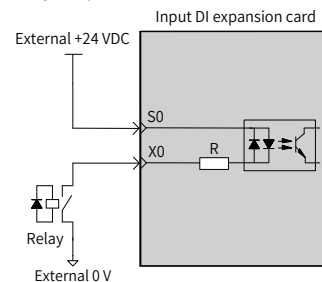


NOTE

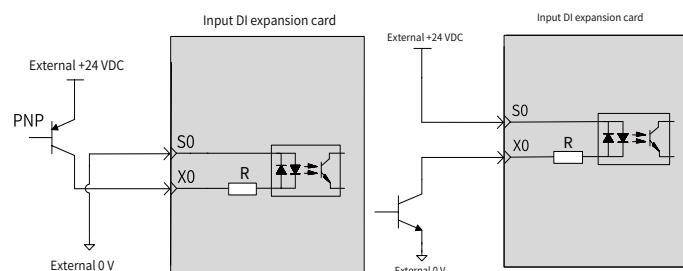
- ◆ S0 and X0 to X7 form one group, while S1 and X8 to X15 form another group.
- ◆ The S0/S1 terminal is a common terminal. When S0/S1 is connected to the 24V terminal, 0 V input to terminal X* is considered valid (internal photocoupler connected). Conversely, when S0/S1 is connected to the 0V terminal, 24 V input to terminal X* is considered valid (internal photocoupler connected). This setup allows for the connection of NPN or PNP output I/O devices.

The following diagrams take X0 as an example (X1 to X15 follow the same principle).

1) When the host controller provides relay output:



2) When the host controller provides open-collector output:



INOVANCE Warranty Agreement

- ◆ Inovance provides a 12-month free warranty service to the product from the date of factory shipment. The free warranty service covers free repairs and replacements in the case of product failure or damage caused by defects of the product under normal use conditions.
- ◆ Paid warranty service will be provided in the following scenarios:
 - a) The warranty period for the product on site has expired.
 - b) Damage is caused by improper operations violating the user guide of the product.
 - c) Damage is caused by inadequate protection measures in harsh environments, such as severe dust, humidity, and high temperatures.
 - d) Damage is caused by natural disasters, such as lightning, fire, floods, and earthquakes.
 - e) Damage is caused by peripheral equipment faults, such as poor wiring, water ingress, and abnormal voltages.
 - f) Additional support is required for equipment commissioning and installation.
 - g) New features, modifications, program changes, application issues, and selection errors.
- ◆ If the equipment is faulty or damaged, fill in the Warranty Card correctly and in detail.
- ◆ The maintenance fee will be charged according to the latest Maintenance Price List of Inovance.
- ◆ The Warranty Card is not re-issuable. Keep the card well and present it to the maintenance personnel during maintenance.
- ◆ If there is any problem during the service, contact Inovance's agent or Inovance directly.
- ◆ Inovance reserves the rights for explanation of this agreement.

INOVANCE Robot Warranty Card

Customer info.	Company add.:	
	Company name:	Contact:
	Post code:	Tel.:
Product info.	Product model:	
	Barcode (paste the barcode here):	
	Agent:	
Fault	Fault description:	
	Recorded by:	

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