

Thank you for purchasing a Hitachi Programmable Logic Controller.

To operate it safely, please read this instruction manual and all the user manuals carefully. Please be sure to use the latest versions of user manuals and keep them at hand of end users for future reference.

### Caution

1. All rights reserved.
2. The content of this manual may be changed without notice.
3. While efforts have been made on this manual to be accurate, please contact us if any mistakes or unclear part is found.

### ■ Warranty period and coverage

The warranty period is either 18 months after manufacturing date (MFG. No.) or 12 months after installation.

Examination and repair within the warranty period is covered. However within the warranty period, the warranty will be void if the fault is due to ;

- (1) Incorrect use from instructed in this manual and the application manual.
- (2) Malfunction or failure of external other devices than this unit.
- (3) Attempted repair by unauthorized personnel.
- (4) Natural disasters.

The warranty is for the PLC only, any damage caused to third party equipment by malfunction of the PLC is not covered by the warranty.

### ■ Repair

Any examination or repair after the warranty period is not covered. And within the warranty period any repair and examination which results in information showing the fault was caused by any of the items mentioned above, the repair and examination cost are not covered. If you have any questions regarding the warranty or repair cost, please contact your supplier or the local Hitachi Distributor. (Depending on failure part, repair might be impossible.)

### ■ Ordering spare parts and inquiries

Please contact your local suppliers for ordering products/spare parts or any inquiries with providing the following information.

- (1) Product name
- (2) Manufacturing number (MFG. No.)
- (3) Details of failure

### ■ Definitions and Symbols



**DANGER**

Identifies information about practice or circumstances, which may lead to personal injury or death, property damage, or economic loss.



**CAUTION**

Identifies information about practice or circumstances, which may lead to personal injury, property damage, or economic loss.

### ■ Safety precautions



**DANGER**

- Do not touch terminals while power is ON. There is a risk of electric shock and/or injury.
- Appropriate emergency stop circuit, interlock circuitry and similar safety measures should be added to the PLC system to ensure safety in the event of incorrect, missing or abnormal signals caused by broken signal lines, momentary power interruptions or other causes.



**CAUTION**

- Always use the power supply voltage listed in specifications. Using other voltage may damage the equipment or present a risk of fire.
- The wiring operation should be performed by a qualified personnel. Failure to do so could result in fire, damage or electric shock.



**COMPULSION**

- The PLC must be grounded. Failure to do so could result in injury to personnel or causing it to malfunction.



**PROHIBITION**

- Do not attempt to disassemble, repair or modify any part of the PLC. Electric shock, malfunction or failure may result.
- Do not connect or disconnect cable unless power has been switched off or the area is known to be Non-Hazardous. (This unit is not industrial control equipment for use in hazardous locations "class I, Division2, Groups A,B,C,D")



**CAUTION**

- DO NOT CONNECT DIRECTLY TO LINE VOLTAGE. LINE VOLTAGE MUST BE SUPPLIED BY A SUITABLE, APPROVED ISOLATING TRANSFORMER HAVING SHORT CIRCUIT CAPACITY NOT EXCEEDING 150VA MAXIMUM.



**MISE EN GARDE**

- NE PAS CONNECTER DIRECTEMENT A LA TENSION D'ALIMENTATION.CELLE-CI DOIT ETRE FOURNIE PAR UN TRANSFORMATEUR D'ISOLATION POSSEDANT UNE CAPACITE DE COURT-CIRCUIT N'EXCEDANT PAS 150 VA.

### ■ Common precautions

- Use proper cable ferrules for terminals. Using improper cable ferrules or connecting bare wires to terminals directly might result in fire.
- Do not turn on power, if the unit appears damaged.
- Be sure to check all field wiring before PLC power on. Otherwise, there is a risk of fire.
- Do not cover vent holes of the housing.
- Do not pull on cables or bend cables beyond their natural limit. Otherwise, there is a risk of breaking of wire.
- Check carefully your PLC program before operation.
- Keep PLC modules in their boxes during storage and transport.

## ■ Installation environment

Avoid the following locations to install the PLC.

- Excessive dusts, salty air, or conductive materials (iron powder, etc.)
- Direct sunlight.
- Temperature less than 0 °C or more than 55 °C.
- Humidity less than 5 % or more than 95 %.
- Dew condensation.
- Direct vibration or impact to the unit.
- Corrosive, explosive or combustible gases.
- Water, chemicals or oil splashing on the PLC.
- Close to noise emission devices.

## ■ Outline

These products are option board for MICRO-EHV+ series. Although being small size, I/O circuits are isolated from internal circuits, and these products have equivalent performance with analog expansion unit and RTD expansion unit. There are three models as the following table.

Product name	Model name	Specifications
Analog input option board	OBV-AIG	• 4 Channels of analog input
Analog I/O option board	OBV-AIOG	• 2 Channels of analog input • 2 Channels of analog output
RTD input option board	OBV-RTD	• 4 Channels of RTD input (2 Channels for 3-wire)

## ■ Reference Manual

Read the following application manual carefully to use the PLC safely and properly. Be sure to keep the latest version.

Manual name	Manual number
MICRO-EHV+ APPLICATION MANUAL	NJI-611*(X)

The postfix of the publication number is subject to change for revision.

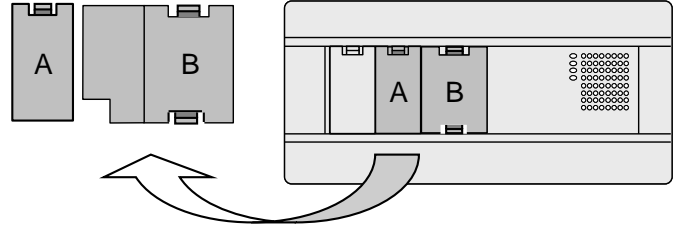
## ■ Installation



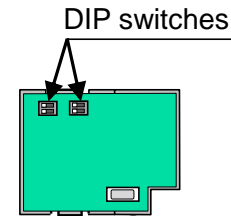
### CAUTION

- Do not attach or detach an option board with power applied to MICRO-EHV+, otherwise this could result in damaging module or malfunction.

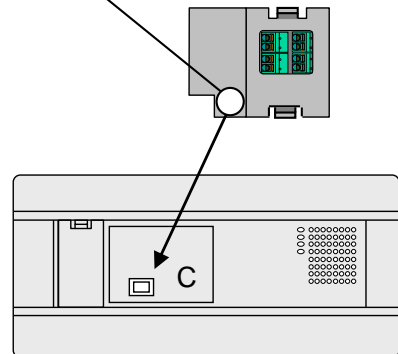
- (1) Remove the cover A and B.



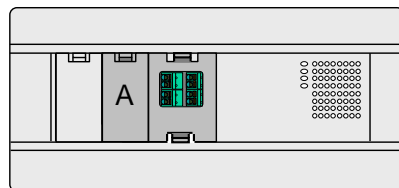
- (2) Set DIP switches of the back side of the option board according to “■Setting of the DIP switches” of the later page. But there is no DIP switch in OBV-RTD, so it is no need to do for OBV-RTD.



- (3) Insert an option board to a basic unit as below picture. Insert pressing down the connector area case of an option board.

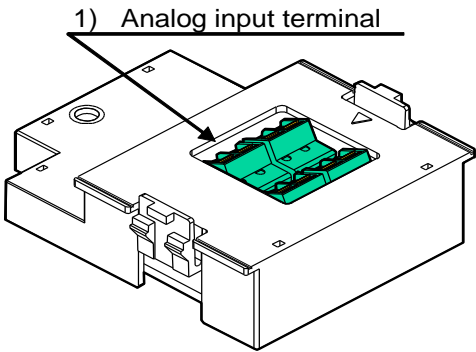
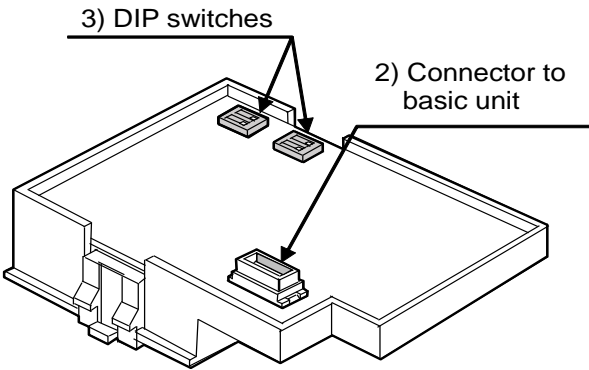


- (4) Attach the cover A.  
Since the cover B becomes unnecessary, please keep it.

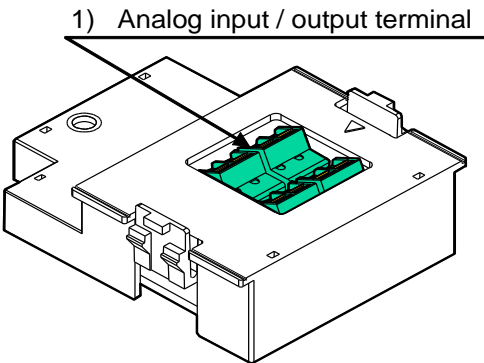
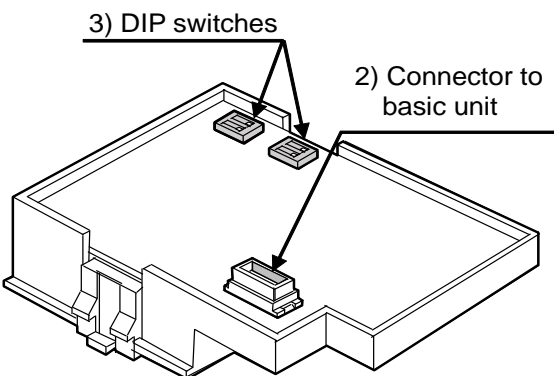


## ■ Part names and functions

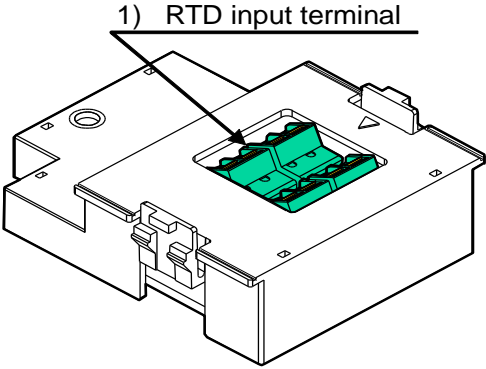
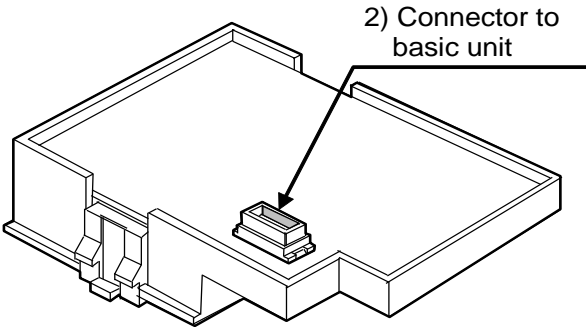
### (1) OBV-AIG part names and functions

Part names and functions		Model name	OBV-AIG
		Mass	0.02 kg (0.04 lb)
<p>[Upper side]</p>  <p>1) Analog input terminal</p>		<p>[Back side]</p>  <p>3) DIP switches</p> <p>2) Connector to basic unit</p>	
No.	Name	Details	
1)	Analog input terminal	Terminals to connect analog input signals. Cable diameter : Single wire : 0.2 mm <sup>2</sup> to 1.5 mm <sup>2</sup> Strand wire : 0.2 mm <sup>2</sup> to 1.0 mm <sup>2</sup>	
2)	Connector to basic unit	A connector is located at the back side to connect basic unit.	
3)	DIP switches	DIP switches to change voltage / current mode of analog input signals. Please set these DIP switches before insertion of the option board.	

### (2) OBV-AIOG part names and functions

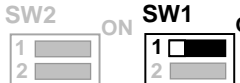
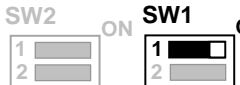
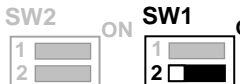
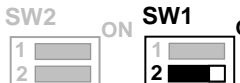
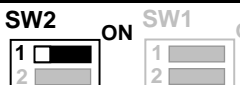
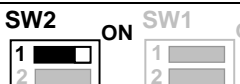
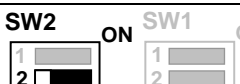
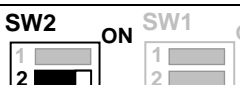
Part names and functions		Model name	OBV-AIOG
		Mass	0.02 kg (0.04 lb)
<p>[Upper side]</p>  <p>1) Analog input / output terminal</p>		<p>[Back side]</p>  <p>3) DIP switches</p> <p>2) Connector to basic unit</p>	
No.	Name	Details	
1)	Analog input / output terminal	Terminals to connect analog input / output signals. Cable diameter : Single wire : 0.2 mm <sup>2</sup> to 1.5 mm <sup>2</sup> Strand wire : 0.2 mm <sup>2</sup> to 1.0 mm <sup>2</sup>	
2)	Connector to basic unit	A connector is located at the back side to connect basic unit.	
3)	DIP switches	DIP switches to change voltage / current mode of analog I/O signals. Please set these DIP switches before insertion of the option board.	

### (3) OBV-RTD part names and functions

Part names and functions		Model name	OBV-RTD
		Mass	0.02 kg (0.04 lb)
<p>[Upper side]</p>  <p>1) RTD input terminal</p>		<p>[Back side]</p>  <p>2) Connector to basic unit</p>	
No.	Name	Details	
1)	RTD input terminal	Terminals to connect RTD input signals. Cable diameter : Single wire : 0.2 mm <sup>2</sup> to 1.5 mm <sup>2</sup> Strand wire : 0.2 mm <sup>2</sup> to 1.0 mm <sup>2</sup>	
2)	Connector to basic unit	A connector is located at the back side to connect basic unit.	

### ■ Setting of the DIP switches

Voltage / current mode can be set for each channel of analog I/O. Be sure to make setting of DIP switches and setting by the programming tool the same. In the case of not equal, the option board does not work normally.

Switch No.	Setting	Figure of setting	Setting items	
			OBV-AIG	OBV-AIOG
SW1-1	OFF		IN1: Voltage input	IN1: Voltage input
	ON		IN1: Current input	IN1: Current input
SW1-2	OFF		IN2: Voltage input	IN2: Voltage input
	ON		IN2: Current input	IN2: Current input
SW2-1	OFF		IN3: Voltage input	OUT1: Current output *1
	ON		IN3: Current input	OUT1: Voltage output *1
SW2-2	OFF		IN4: Voltage input	OUT2: Current output *1
	ON		IN4: Current input	OUT2: Voltage output *1

\*1: Be careful that the setting of output is reverse to it of input about voltage / current mode.

\*2: All DIP switches are set voltage I/O mode at the time of shipment from factory.

### (1) OBV-AIG terminal layout

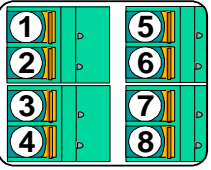
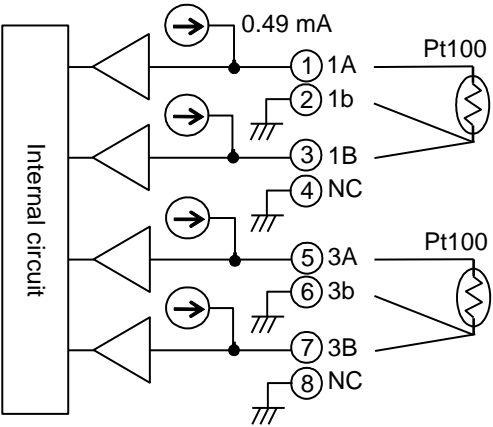
## (2) OBV-AIOG terminal layout

\*1 An output method of this product is the method that current flows out from this product. If current flows from the other equipment, the error may become large by addition to output from this product. So, please confirm input circuit of the other equipment beforehand.

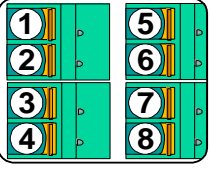
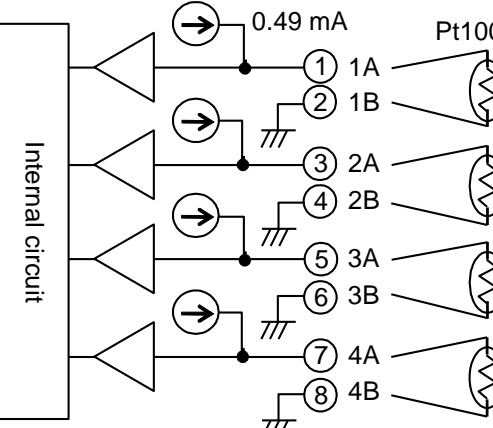
Example 2) If a pull-up resistor is inserted in input of the other equipment, and current flows out from there.

**NJI-669(X)**

(3) OBV-RTD terminal layout (3-wire)

Terminal layout	No.	Signal	Function	Internal circuit
	①	1A	CH1 input A	
	②	1b	CH1 input -	
	③	1B	CH1 input B	
	④	-	NC	
	⑤	3A	CH3 input A	
	⑥	3b	CH3 input -	
	⑦	3B	CH3 input B	
	⑧	-	NC	

(4) OBV-RTD terminal layout (2-wire)

Terminal layout	No.	Signal	Function	Internal circuit
	①	1A	CH1 input A	
	②	1B	CH1 input B	
	③	2A	CH2 input A	
	④	2B	CH2 input B	
	⑤	3A	CH3 input A	
	⑥	3B	CH3 input B	
	⑦	4A	CH4 input A	
	⑧	4B	CH4 input B	

## ■ Analog input specifications (OBV-AIG / AIOG)

Item		Specifications	
Model name		OBV-AIG	OBV-AIOG
Number of channel		Single-ended 4 channels	Single-ended 2 channels
Input range	Voltage input	0 to 10 V (Max. 10.24 V)	
	Current input	0 to 20 mA (Max. 20.48 mA)	
Resolution	Voltage input	0 to 10 V: 0 to 4,000 / 0 to 16,000	
	Current input	0 to 20 mA: 0 to 4,000 / 0 to 16,000	
Accuracy *1	At 25±3 °C	±0.2 % (FS)	±0.4 % (FS)
	Temperature coefficient	±0.01 % / °C (FS)	
Conversion time		8 ms × 1 to 10	4 ms × 1 to 20
Input impedance	Voltage input	150 kΩ	
	Current input	250 Ω	
Cable		Shielded cable (length: Max. 20 m)	
Isolation	Channel - internal circuit	Isolated	
	Between channels	None-isolated	

\*1 e.g. Accuracy at 35 °C in voltage input of OBV-AIOG without noise is calculated as follows.

Accuracy:  $(0.4 \% + 0.01 \% \times 10 [\text{Difference from } 25\text{ }^{\circ}\text{C}]) \times 10\text{ V} [\text{Full scale}] = \pm 0.05\text{ V}$

## ■ Analog output specifications (OBV-AIOG)

Item		Specifications	
Number of channel		Single-ended 2 channels	
Output range	Voltage output	0 to 10 V (Max. 10.24 V)	
	Current output	0 to 20 mA (Max. 20.48 mA)	
Resolution	Voltage output	0 to 10 V: 0 to 4,000	
	Current output	0 to 20 mA: 0 to 4,000	
Accuracy *1	At 25±3 °C	±0.4 % (FS)	
	Temperature coefficient	±0.01 % / °C (FS)	
Conversion time		4 ms × 1 to 20 (2 channels)	
Output load impedance	Voltage output	Min. 1 kΩ	
	Current output	1 to 500 Ω (Max. 10 V)	
Cable		Shielded cable (length: Max. 20 m)	
Isolation	Channel - internal circuit	Isolated	
	Between channels	None-isolated	

\*1 e.g. Accuracy at 45 °C in voltage output of OBV-AIOG without noise is calculated as follows.

Accuracy:  $(0.4 \% + 0.01 \% \times 20 [\text{Difference from } 25\text{ }^{\circ}\text{C}]) \times 10\text{ V} [\text{Full scale}] = \pm 0.06\text{ V}$

## ■ RTD input specifications (OBV-RTD)

Item		Specifications	
Supported RTD type		Pt100 (3-wire or 2-wire)	
Number of channel		4 channels (2-wire) or 2 channels (3-wire)	
Measurement temperature range		-200 to 850 °C	
Resolution		0.1 °C	
Accuracy *1		Measured temperature under 0 °C: Max. ±0.3 °C	
		Measured temperature over 0 °C:	
		Max. $\pm (0.3 + \text{Measured temperature} \times 0.2 \%)$ °C	
Measurement current		0.49 mA	
Conversion time		80 ms	
Diagnostic error		Conversion value: H7FFF	
Cable		Shielded cable (Ohmic value of cable: Max. 5 Ω)	
Isolation	Channel - internal circuit	Isolated	
	Between channels	None-isolated	

\*1 e.g. In the case of measured temperature is 100 °C, accuracy without noise is calculated as follows.

Accuracy:  $0.3\text{ }^{\circ}\text{C} + 100\text{ }^{\circ}\text{C} \times 0.2 \% = \pm 0.5\text{ }^{\circ}\text{C}$

## ■ Available combination of products

Be sure to use basic units and programming software with software version as follows.

Basic units and programming software with old version do not support OBV-AIG / AIOG / RTD.

Series name	Product name	Software version
MICRO-EHV+	Basic units	Ver.3.5.3.44 or later
	programming software HX-CODESYS	V3.5 SP8 Patch 4 or later *1

\*1 In the case of using these products, the XML file for these products is required for HX-CODESYS. This file will be included in HX-CODESYS V3.5 SP13 Patch2. If this file isn't installed in HX-CODESYS, contact your local supplier for the XML file.

## ■ Caution for wiring

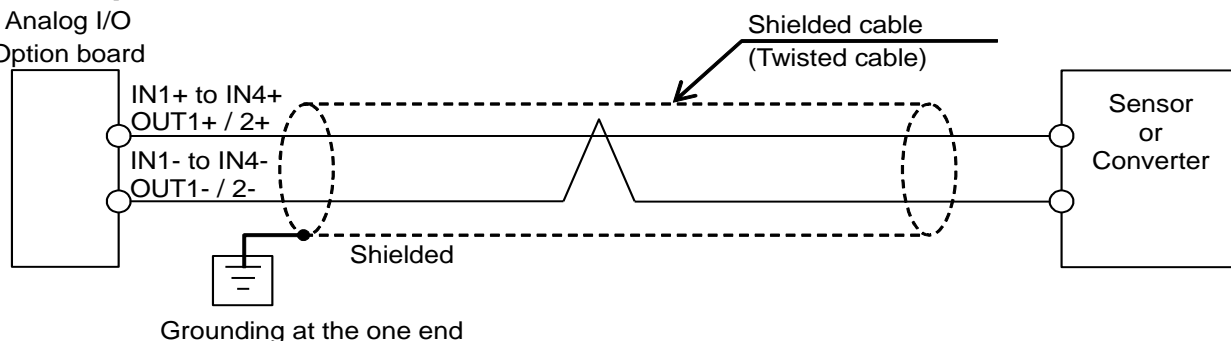
### (1) Shield

Since analog signal is very sensitive, be sure to use shielded cable in order to protect from noise, and route the cable apart from other power/signal cables.

Be sure to ground the shield at one end basically. But grounding at both ends or no grounding can be more effective depending on system environment.

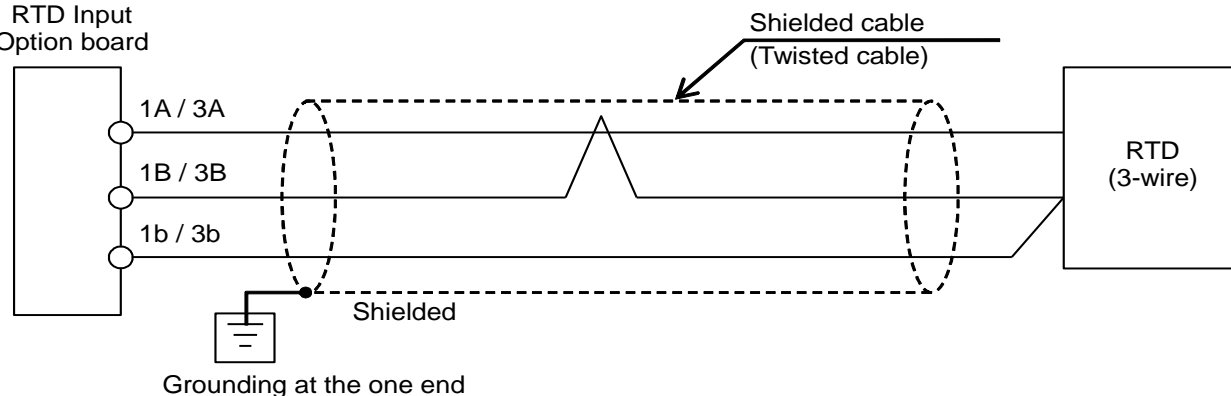
[OBV-AIG / AIOG]

Analog I/O  
Option board



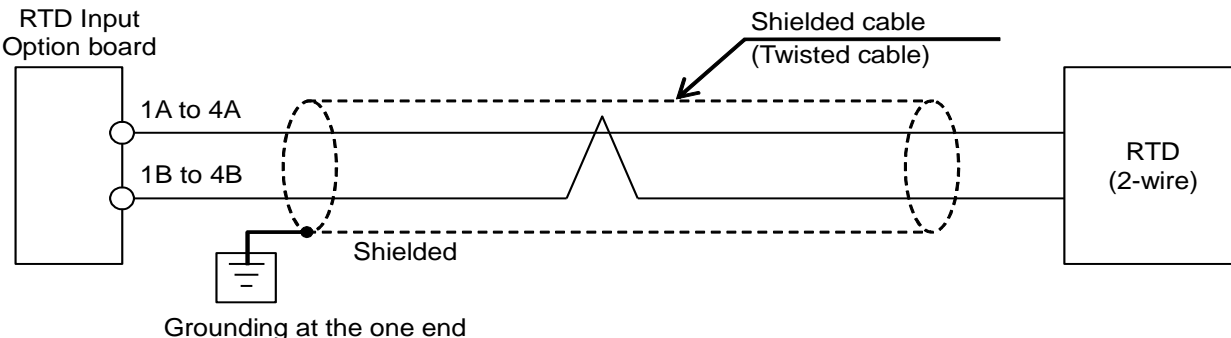
[OBV-RTD (3-wire)]

RTD Input  
Option board



[OBV-RTD (2-wire)]

RTD Input  
Option board



\*RTD (3-wire) is recommended for OBV-RTD. Because measured value with RTD (2-wire) includes ohmic value of cable as error, it is not suitable for measurement required accuracy. Please be in particular careful when the length of the cable is long.

### (2) Short of analog output (OBV-AIOG)

Analog outputs must not be short-circuit. Otherwise it causes malfunction.