HITACHI

MICRO-EH (RTD Expansion Unit) Safety Precautions

Thank you for purchasing a Hitachi Programmable Logic Controller. To operate it safely, please read these safety precautions and all the user manuals carefully. Please be sure to use the latest versions of the user manuals and keep them at hand of end users for future reference.

1. **It is not allowed to reprint any part of this manual without permission.**
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 as directed 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.)

General cautions

■ Definitions and Symbols

DANGER — **Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.**

CAUTION — **Indicates a potentially hazardous situation which, if not avoided, can result in minor to moderate injury, or serious damage of product.**

: Indicates prohibition

: Indicates Compulsion

DANGER

- **Do not touch terminals during power ON. There is a danger of electric shock and/or injury.**
- **Be sure to install external safety devices outside of the PLC like emergency stop circuit or interlock circuit.**

CAUTION

- **Be sure that the rated voltage matches the power supply voltage of the unit. Otherwise, there is a danger of breakdown and/or injury and/or fire.**
- **Only qualified personnel shall carry out wiring work. Otherwise, there is a danger of breakdown and/or injury and/or fire.**

COMPULSION

- **Be sure to ground the unit. Otherwise, there is a danger of electric shock and/or malfunction.**

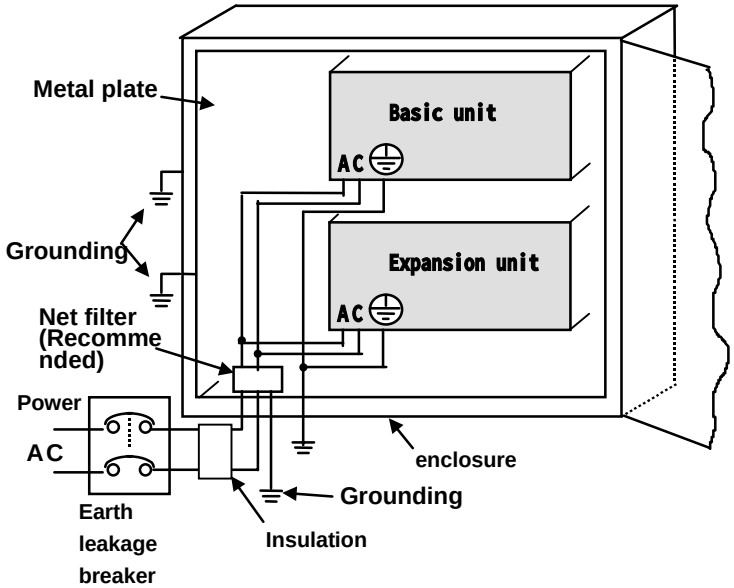
PROHIBITION

- **Do not modify or take apart the unit. There is a danger of breakdown and/or injury and/or fire.**

■ Mounting

-This equipment must be placed within a suitable enclosure such a cabinet (key or tool entry) .

- **Mount the PLC on a metal plate and install in a cabinet as follows.**
- **Be sure to ground the cabinet and the metal plate, otherwise there is a risk of malfunction.**
- **Install the PLC as described in user manual.**
- **Take appropriate measures when installing systems in locations :**
  - **Subject to static electricity or other forms of noise.**
  - **Subject to strong electromagnetic field.**
  - **Close to power supplies.**
- **Be sure to tighten mounting screws, terminal screws and connector screws.**
- **Check that devices with lock mechanism, such as an expansion cable and terminal blocks are locked properly.**



NJI-453(X)

Figure 1 Power wiring example

■ General Wiring Procedures

- 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.
- Turn off power to the PLC before connecting field wiring. Otherwise, there is a risk of fire.
- Do not attempt to disassemble, repair or modify any part of the PLC.
- Do not pull on cables or bend cables beyond their natural limit. Otherwise, there is a risk of breaking of wire.

■ Power Wiring Procedures

- Appropriate emergency circuitry, interlock circuitry and similar safety measures should be added to the system.
- Appropriate safety measures should be included in the system unexpected breaking of wire or malsignal caused from instantaneous power failure.
- Applied voltage must be in the range specified in the manual. Otherwise, there is a danger of breakdown and/or injury and/or fire.
- Install an external earth leakage breakers to avoid short circuit accident.
- In case of the followings, turn off power. Otherwise, there is a danger of breakdown and/or injury and/or fire.
  - Mounting or dismounting CPU or I/O modules.
  - Assembling cabinet or machine including PLC.
  - Wiring.
- Install net filter specified in table-1. The input and output cable of the net filter should be separated as much as possible. Be sure to ground the net filter.
- A shielded and insulated transformer is recommended.
- The basic and expansion unit should be wired to a common power source and powered up together as shown in fig.1.

Table1 Net filter

Item		Spec.
Rated voltage		250 V
Rated current		5 A
Withstand voltage (V) (between Terminal and case)		1500 V
Insulation resistance (MΩ) (500VDC, 1 min., between terminal and case)		min. 100 MΩ
Attenuation frequency range (MHz)	Differential mode, 40dB	0.5 to 30
	Common mode, 40dB	0.15 to 30

Reference : EMC filter ZAC2205-00U (TDK)

■ I/O Wiring Procedures

- Be sure that the input/output voltage matches the specified voltage. Otherwise, there is a danger of breakdown and/or fire.
- Route the AC power line and I/O lines should be separated as much as possible. Do not route both cables in a same duct.
- Route the I/O lines and data lines as close as possible to the grounded surfaces such as cabinet elements, metal bars and cabinets panels.

■ Other cautions

- Keep PLC modules in their boxes during storage and transport.
- Check carefully your PLC program before using.

Environmental Conditions

Avoid the following locations to install the PLC.

- Excessive dust, 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.

■ 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 No.
MICRO-EH APPLICATION MANUAL	NJI-350*(X)

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

■ Specifications

General Specifications

Item	Specification			
Type	EH-A6ERTD	EH-A4ERTD	EH-D6ERTD	EH-D4ERTD
Power voltage	100/110/120/200/220/240V(50/60Hz)		24V DC	
Power voltage fluctuation range	85 to 264V AC		19.2 to 30V DC	
Allowable momentary power failure	85 to 100V :10ms 100 to 264V:20ms		10ms	
Operating ambient temperature	0 to 55 °C (Storage ambient temperature –10 to 75 °C)			
Operating ambient humidity	5 to 95 % RH (no condensation) (Storage ambient humidity 5 to 95 % RH (no condensation))			
Vibration resistance	Complies with JIS C 0911			
Noise resistance	- Noise voltage 1500 Vp-p Noise pulse width 100 ns, 1 micro sec (Noise created by the noise simulator is applied across the power supply module's input terminals. This is determined by this company's measuring methods.) - Based on NEMA ICS 3-304 (with the exception of input module) - Static noise: 3000 V at metal exposed area			
Insulation resistance	20 MΩ or more between the AC terminal and case ground (PE) terminal (based on 500 V DC mega)			
Dielectric withstand voltage	1500V AC		500V DC	
Grounding	Class D (100Ω) independent grounding			
Usage environment	No corrosive gases, no excessive dirt			
Structure	Attaches to an open wall			
Cooling	Natural air cooling			
Protection against electrical shock hazard	Class 1 equipment			
	Open equipment			
I/O assignment	FUN0 (X5W / Y3W)			

RTD input Specifications

No. of input channel	4
RTD type supported	Pt100 (2 or 3 wire)
Input resolution	0.1 °C / 0.1 °F
Input Ranges	-100.0 °C to +600.0 °C -148.0 °F to +1112.0 °F
Accuracy	+/-0.5% of full scale over temp. range
Response time	141 / 563 ms
Error detection	Data H7FFF and LED blinking at below –110°C (-166°F) or beyond +610°C (+1130°F). (including wire breaking or cable disconnection)
Cable length (shielded)	100 m (Max.) *

* Note : The max. cable length is 100m, however it depends on noise environment or other conditions.

Analog output Specifications

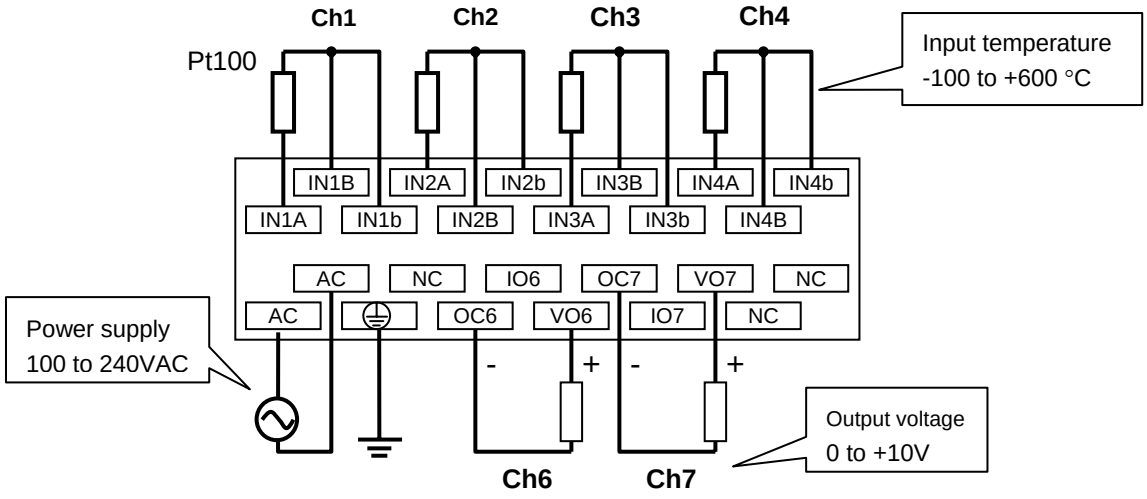
No. of analog output	2
Output Ranges	0-10 V (10.23 V Max.)* 0-20 mA (20.48 mA Max.)* / 4-20 mA (20.38 mA Max.)*
Resolution	12 Bits
Accuracy	+/-1% of full scale over temp. range
Response time	8.8 ms
Current Outputs: Max. Voltage at 20 mA User Load Range Output Load Capacitance Output Load Inductance	 10 V 10 to 500 Ω 2000 pF Max. 1 Henry Max.
Voltage Outputs: Output Loading Output Load Inductance	 10 kΩ Minimum at 10 V 1 micro F Max.

* Value in brackets is in case of mode 4000.

■ Terminal configuration

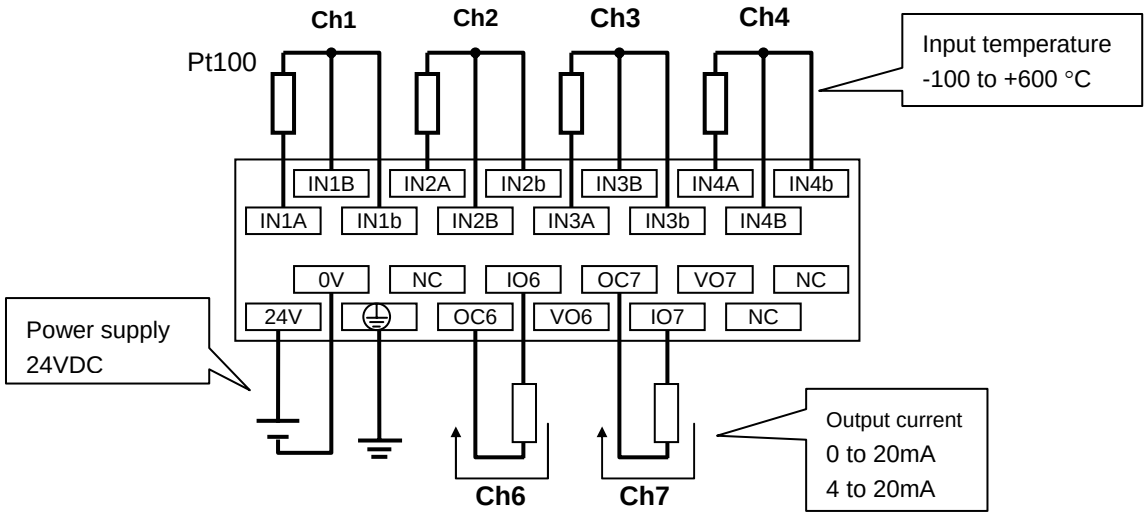
EH-A6ERTD (AC power and Analog output type)

RTD input and Voltage output



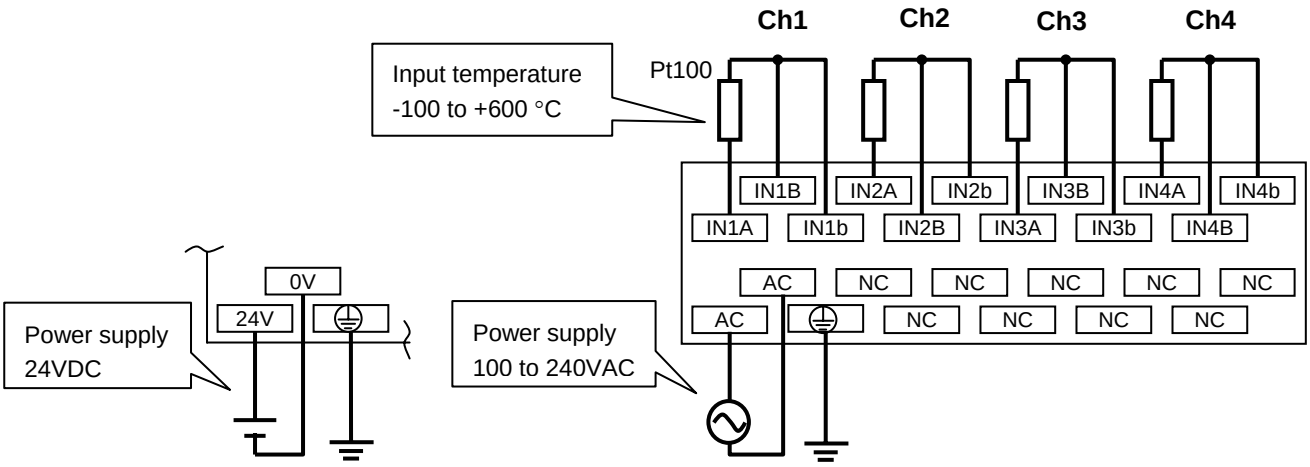
EH-D6ERTD (DC power and Analog output type)

RTD input and Current output



EH-A4ERTD (AC power, no analog output version)

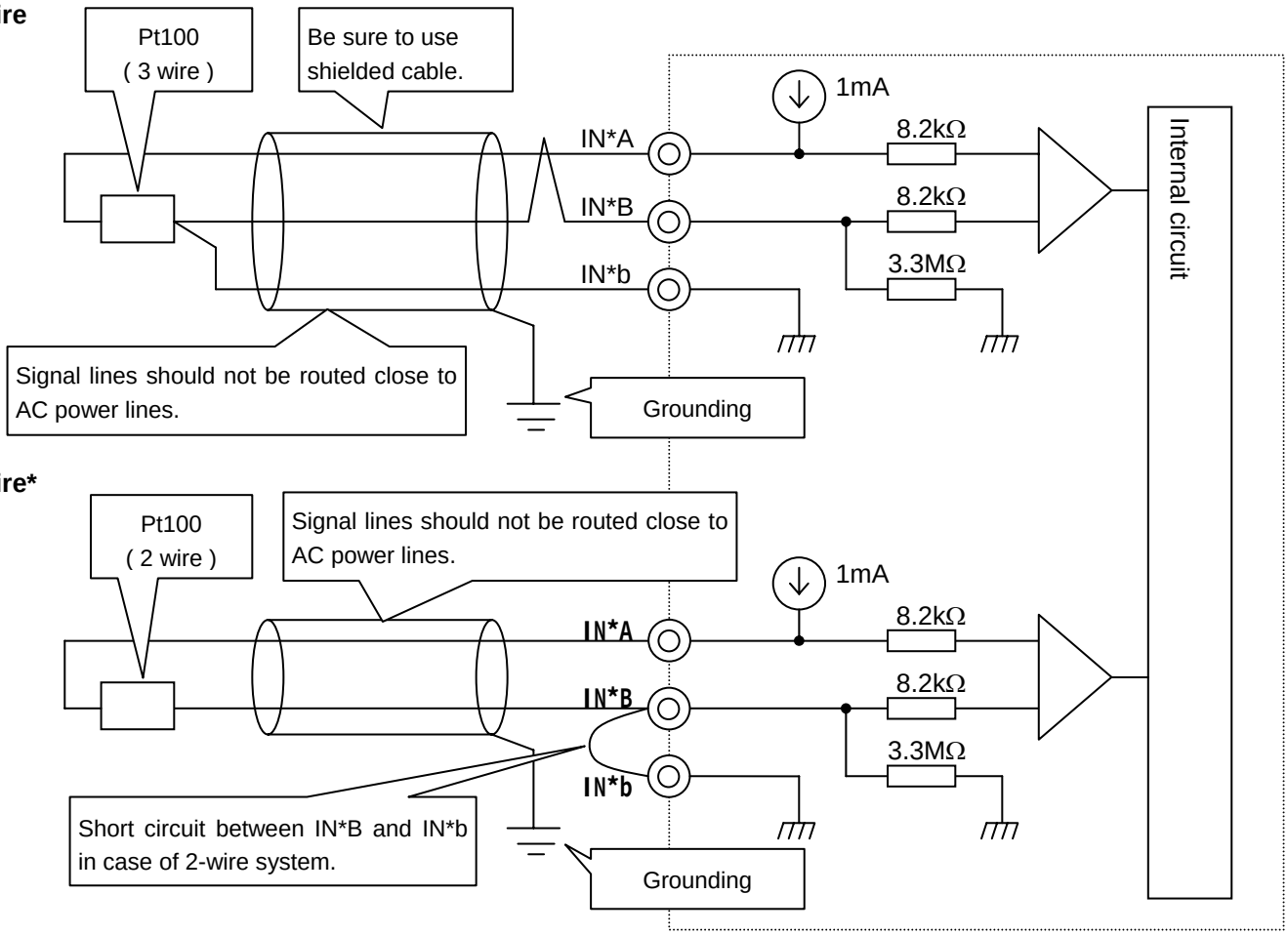
EH-D4ERTD (DC power, no analog output version)



■ Wiring and circuit diagram

RTD input signal (Pt100)

3 wire



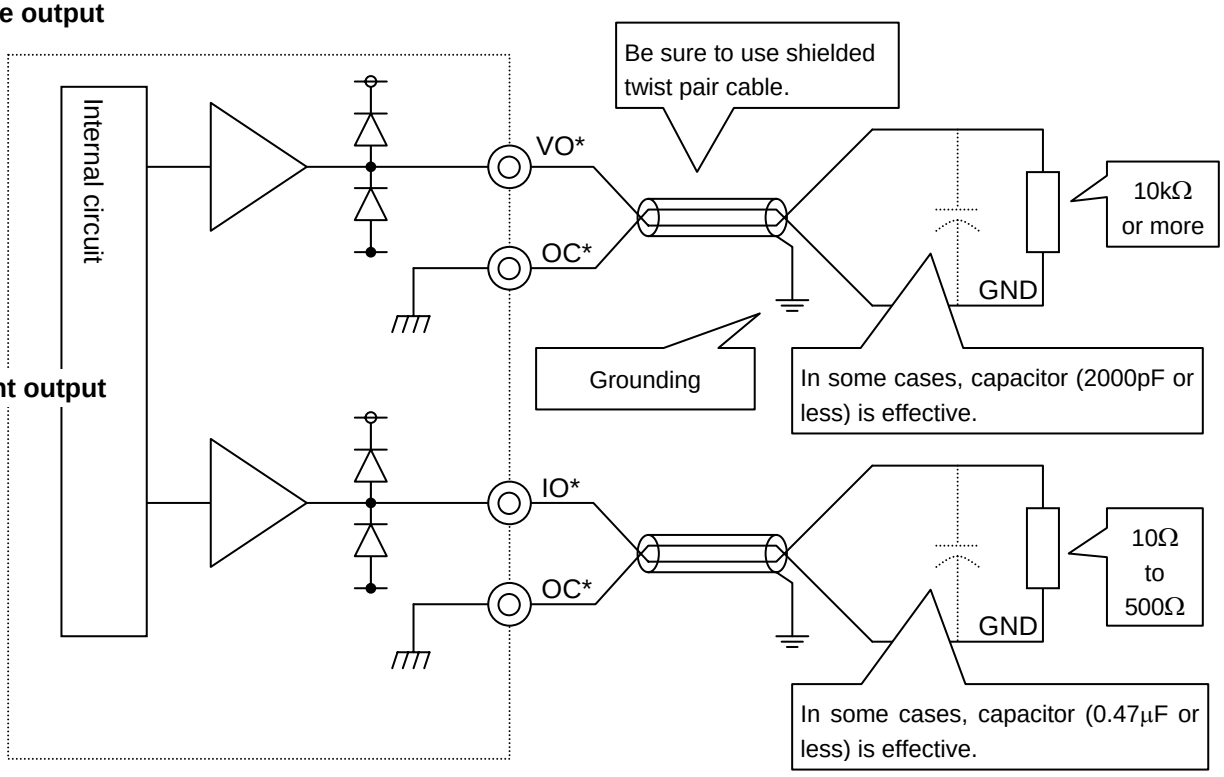
2 wire*

* 3-wire system is recommended for this product. Since cable resistance is not cancelled in 2-wire system, it is not suitable for high accuracy measurement especially for long cable used.

Analog output signal

Voltage output

Current output



■ Data conversion

RTD input

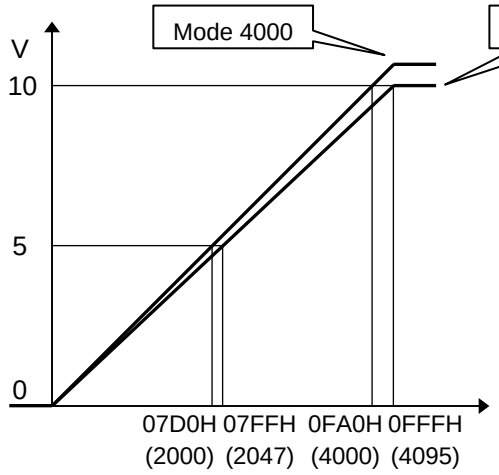
Data conversion

°C/°F	Input data	Dec.	Hex.	LED (ch.1-4) *
°C	610 °C or more or wire breaking	32767	H7FFF	Blinking
	600 °C	6000	H1770	Off
	0 °C	0	H0000	Off
	-100 °C	-1000	HFC18	Off
	-110 °C or less or cable short circuit	32767	H7FFF	Blinking
°F	1130 °F or more or wire breaking	32767	H7FFF	Blinking
	1112 °F	11120	H2B70	Off
	0 °F	0	H0000	Off
	-148 °F	-1480	HFA38	Off
	-166 °F or less or cable short circuit	32767	H7FFF	Blinking

* LED blinks depending on input value. Please check wiring by the LED indication.
* LED at open channel blinks as it is regarded as wire breaking. This LED blinking can be avoided by short circuit between IN*A and In*b with 100 to 300 Ω resistor. Input data in this case will be undefined value.

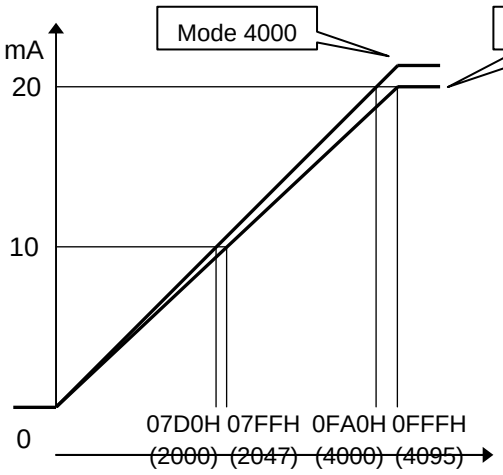
Analog output

0 to 10V



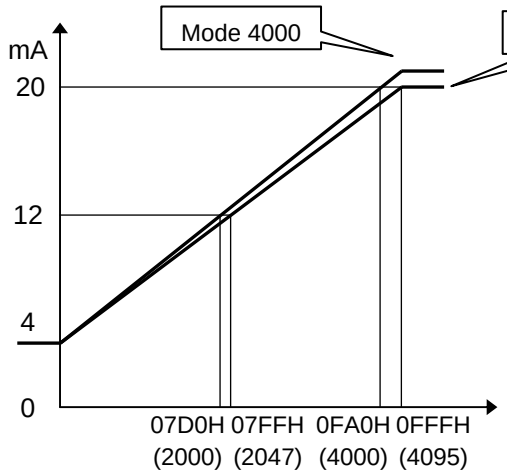
		Mode 4000	Mode 4096
Voltage	10**V**	0FA0H (4000)	0FFFH (4095)
	5**V**	07D0H (2000)	07FFH (2047)
	0**V**	0000H (0)	0000H (0)
Resolution		0.0025**V**	approx. 0.00244**V**

0 to 20 mA



		Mode 4000	Mode 4096
Current	20mA	0FA0H (4000)	0FFFH (4095)
	10mA	07D0H (2000)	07FFH (2047)
	0mA	0000H (0)	0000H (0)
Resolution		0.005mA	approx. 0.00488mA

4 to 20 mA



		Mode 4000	Mode 4096
Current	20mA	0FA0H (4000)	0FFFH (4095)
	12mA	07D0H (2000)	07FFH (2047)
	4mA	0000H (0)	0000H (0)
Resolution		0.004mA	approx. 0.00391mA

■ Range configuration

RTD input (Common for all channels)

Sw1	°C/°F switching	Remarks
OFF	°C (Celsius)	Factory default
ON	°F (Fahrenheit)	
Sw2	**Response time**	**Remarks**
OFF	563 ms	Factory default
ON	141 ms	

Analog output (Common for all channels)

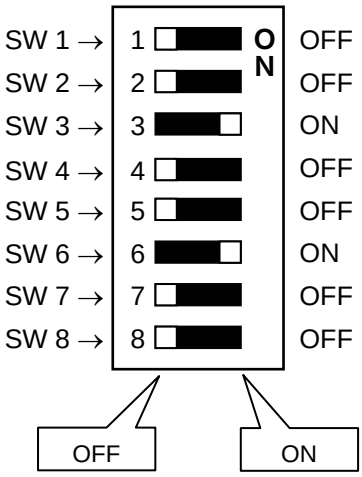
Sw4	Sw5	Range	Remarks
OFF	OFF	0 - 10V	Factory default
OFF	ON		
ON	OFF	0 - 20mA	
ON	ON	4 - 20mA	

Conversion mode

Sw6	Mode	Remarks
OFF	4,096 (H0FFF)	
ON	4,000 (H0FA0)	Factory default

Sw3 : Be sure to set on.
Sw7 : Be sure to set off.
Sw8 : Be sure to set off.

Dip switch
(Factory default)



Note : Power up again after adjusting.

■ I/O assignment, Data allocation

I/O assignment : FUN0

WXu00	System area	
WXu01	RTD input data Ch.1	Signed 16 bits data
WXu02	RTD input data Ch.2	
WXu03	RTD input data Ch.3	
WXu04	RTD input data Ch.4	
WYu05	System area	Do not write any value.
WYu06	Analog output data Ch.6	Be sure to write 12 bits data (0 to HFFF).
WYu07	Analog output data Ch.7	

u : Unit number (1 to 4)
Example : Unit 1, Ch.2 → WX102, Unit 4, Ch.7 → WY407

■ Caution

- Basic unit corresponding to an analog expansion unit

Be sure to use with basic unit of software version 1.20 or newer. Analog expansion unit is not supported by basic unit of software version 1.12 or older.

Software version of basic unit is given in WRF051 of special internal output area.

- Data out of the range

Value for data out of the range is H7FFF.

- Signal level in case written output data is out of range

If output data is over the range, the signal stays at the Max. value. If under the range, it stays at the minimum value. Output value is signed 16 bits data. 8000H to 7FFFH (-32768 to 32767)

Example : Range 0-10V, 2000H written → 10V (10.24V) output

Example : Range 4-20mA, FFFFH written → 4mA output

• LED indication

LED	Lighting	off	Blinking
POW	- Power supplied to exp. unit - Power supplied to the next connected unit.	No power supplied.	-
OK	Unit OK	- No power supplied to basic unit. - Expansion cable disconnected	Unit has fault. Power up again, or replace it.
ch.1-4	-	- RTD connected properly.	- Wire breaking or short circuit * - Data out of the range

*** Since wire breaking only at IN*B or short circuit only between IN*B and IN*b can not be detected by the module, LED indication is off in those cases.**

- UL requirements

This PLC is certified UL508 CSA C22.2 No142-M1987, UL 1604 (CSA C22.2 No.142-M1987). Hazardous locations is suitable for use in Class 1, Div.2 Groups A, B, C & D. Power down before installation, exchanging unit and wiring.