NJI-424BX

HITACHI
Inspire the Next

MICRO-EH (Analog 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.

Caution

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.)

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-EH APPLICATION MANUAL	NJI-350(X)
MICRO-EH BASIC UNIT(20/40/64 points type) APPLICATION MANUAL	NJI-465(X)

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

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. Failure to observe this caution may cause personal injury.
- Be sure to install external safety devices outside of the PLC like emergency stop circuit or interlock circuit.

CAUTION

- Always use the rated power voltage according to the module specifications. Using other voltages may damage the equipment or cause personal injury or fire.
- Only qualified personnel shall carry out wiring work. Failure to observe this caution may damage the equipment or cause personal injury or fire.

COMPULSION

- Be sure to ground the unit. Failure to do so may cause malfunction.

PROHIBITION

- Do not attempt to disassemble, repair or modify any part of the PLC. Failure to observe this caution may cause fire or damage of the equipment or malfunction.

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 if devices with lock mechanism, such as an expansion cable and terminal blocks, are locked properly.

■ 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 to ensure safety in the event of abnormal signals caused by broken wires or momentary power interruptions.
- Always use the rated power voltage according to the manual. Using other voltages may damage the equipment or cause personal injury or fire.
- Install an external earth leakage breakers to avoid short circuit accident.
- Always turn off the power supply to the PLC before attempting any of the following. Performing any of these acts may result in damage to the PLC or personal injury or malfunction.
  - Mounting or dismounting the basic or expansion unit.
  - Assembling the equipment.
  - 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.
- Install a lightning arrester
  To prevent damage to the equipment as a result of being struck by lightning, it is recommended that a lightning arrester be installed for each PLC's power supply circuit.

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)

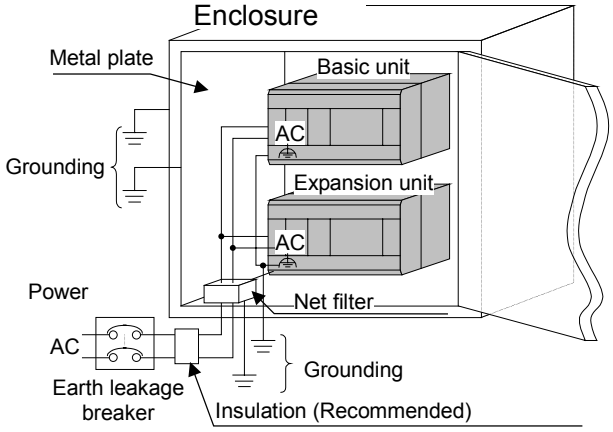


Figure 1 Power wiring example

■ I/O Wiring Procedures

- Always use the rated input/output voltage according to the module specifications. Using other voltages may damage the equipment or cause personal injury or fire.
- Use shielded cable and connect the both ends of shields to ground. Depending on actual noise environment, it could be more effective to connect only one end of shield or not to connect both ends. Take a appropriate grounding method accordingly.
- Install AC power cables in separate cable trays or bunches from I/O signal or data lines.
- 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.

■ General Wiring Procedures

- Use copper conductors for all wiring. You can use one copper conductor – AWG#14 (2.1 mm^2) through AWG#22 (0.36 mm^2) or two copper conductors – AWG#16 (1.3 mm^2) through AWG#22 (0.36 mm^2) – per terminal.
- The suggested torque for terminal connections is 0.5 to 0.6 Nm.
- 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 the power supply to a broken PLC.
- Be sure to check all wiring before applying the power. Incorrect wiring may damage the equipment or cause 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. The lines may break.
- Check carefully your PLC program before using.
- Keep PLC modules in their boxes during storage and transport.

Environmental Conditions

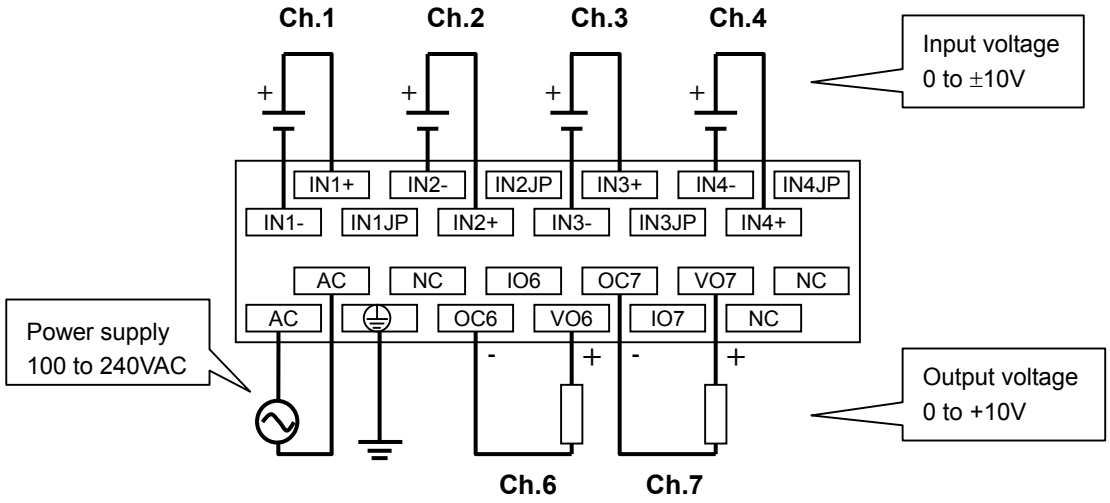
Avoid the following locations to install the PLC.

- 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.

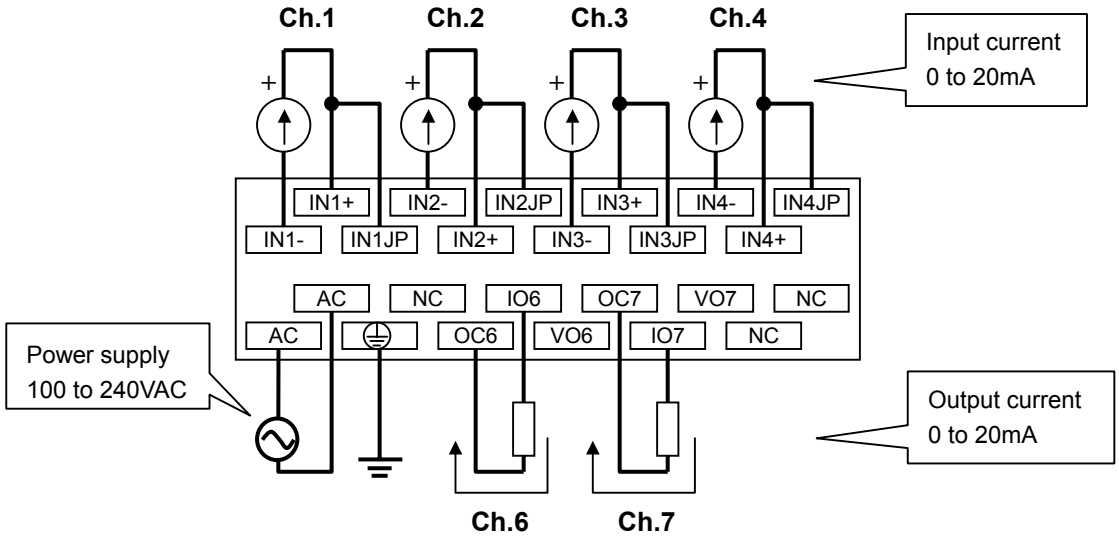
■ Terminal layout and wiring

EH-A6EAN (AC power type)

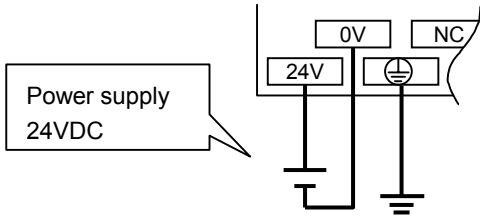
Voltage input and output (Input and output are configured separately.)



Current input and output (Input and output are configured separately.)



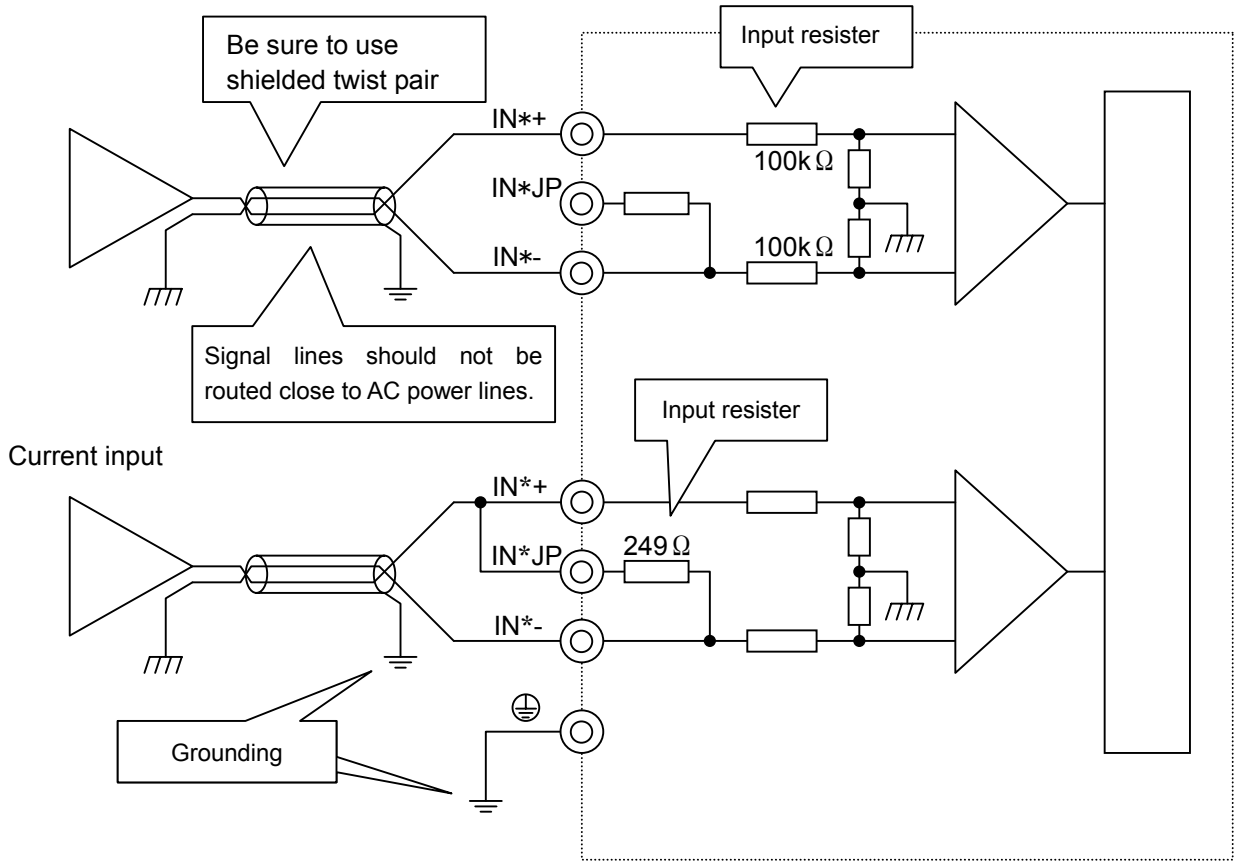
EH-D6EAN (DC power type)



■ Wiring and circuit diagram

Analog input signal

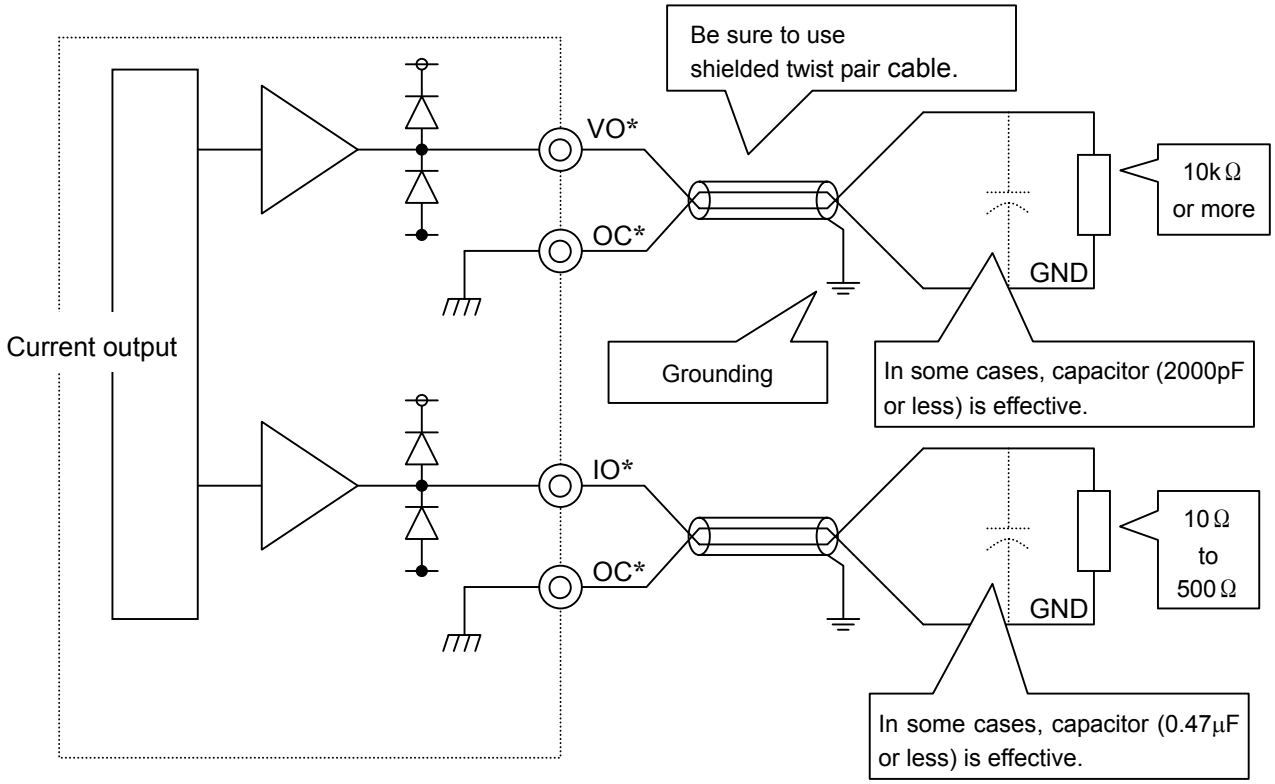
Voltage input



Current input

Analog output signal

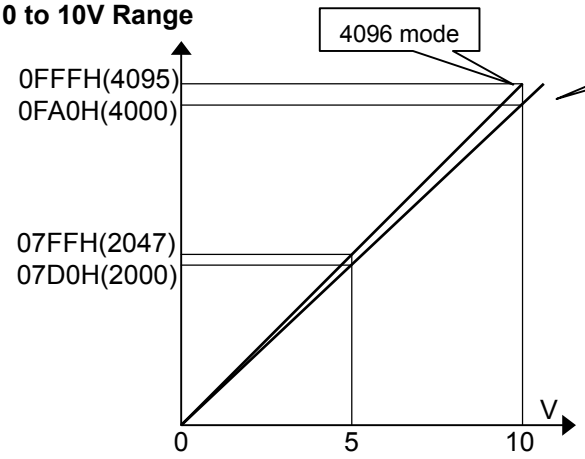
Voltage output



■ Data conversion

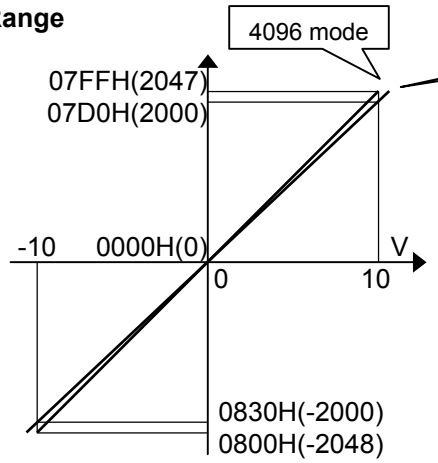
Analog input

0 to 10V Range



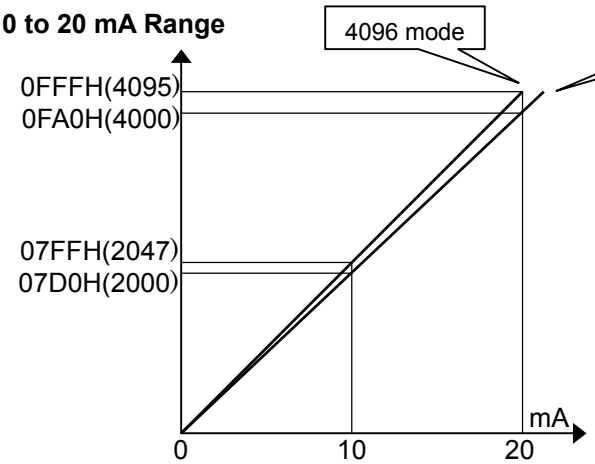
		4000 mode	4096 mode
Voltage	10V	0FA0H (4000)	0FFFH (4095)
	5V	07D0H (2000)	07FFH (2047)
	0V	0000H (0)	0000H (0)
Resolution		0.0025V	approx. 0.00244V

0 to ±10V Range



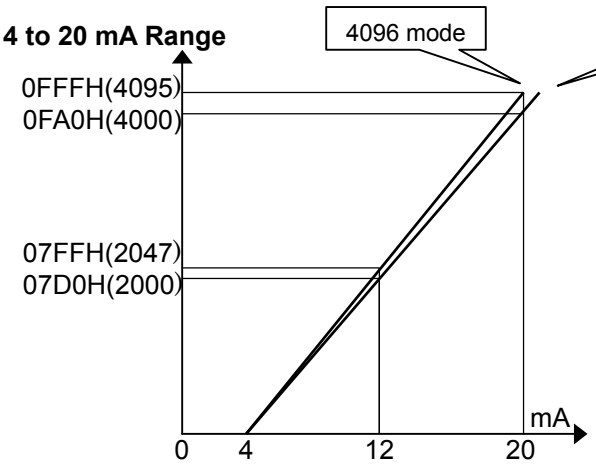
		4000 mode	4096 mode
Voltage	10V	07D0H (2000)	07FFH (2047)
	0V	0000H (0)	0000H (0)
	-10V	0830H (-2000)	0800H (-2048)
Resolution		0.00125V	approx. 0.00122V

0 to 20 mA Range



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

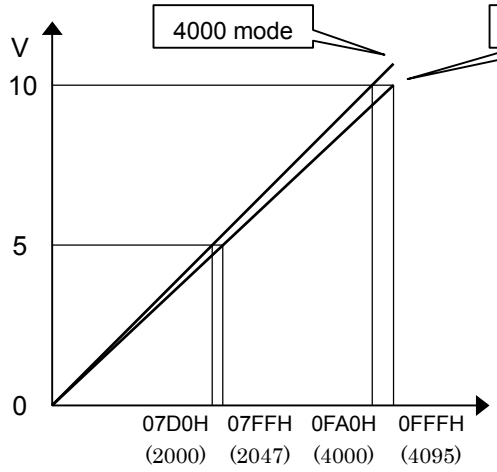
4 to 20 mA Range



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

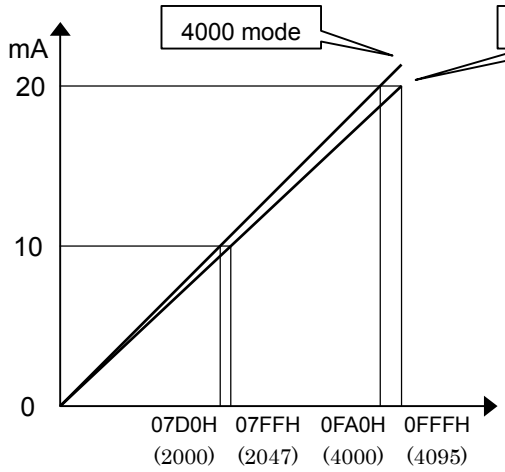
Analog output

0 to 10V Range



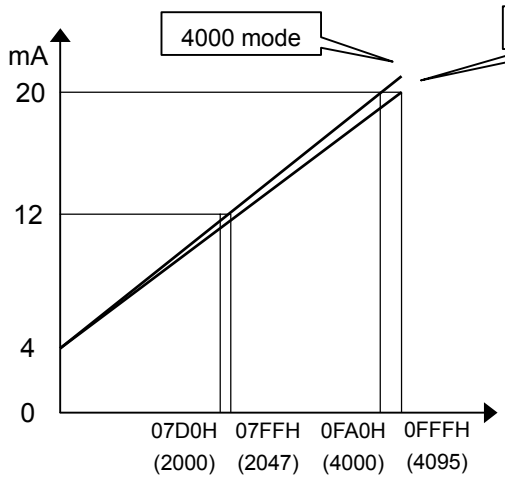
		4000 mode	4096 mode
Voltage	10V	0FA0H (4000)	0FFFH (4095)
	5V	07D0H (2000)	07FFH (2047)
	0V	0000H (0)	0000H (0)
Resolution		0.0025V	approx. 0.00244V

0 to 20 mA Range



		4000 mode	4096 mode
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 Range



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

■ Range configuration

Analog input (Common for all channels)

Sw1	Sw2	Range	Remarks
OFF	OFF	0－10V	Factory default
OFF	ON	0－±10V	
ON	OFF	0－20mA	
ON	ON	4－20mA	

Analog output (Common for all channels)

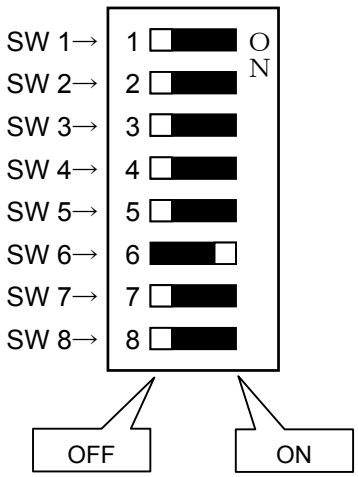
Sw3	Sw4	Range	Remarks
OFF	OFF	0－10V	Factory default
OFF	ON		
ON	OFF	0－20mA	
ON	ON	4－20mA	

Conversion mode

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

Sw5 : Be sure to set off.
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	Analog input data Ch.1	12 bits, Upper 4 bits are always 0.
WXu02	Analog input data Ch.2	
WXu03	Analog input data Ch.3	
WXu04	Analog 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.

- Conversion data in case input signal is out of range

If input data is over the range, the conversion data stays at the maximum value. If under the range, it stays at the minimum value.

Example : Range 0-20mA, 25mA input → 0FFFH

Example : Range 0±10V, -15V input → 0800H

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

If output data is over the range, the signal stays at the maximum 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 (10.23V) 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. - Cable to basic cable disconnected	- Unit has fault. Power up again, or replace it.

■ NOTE

・UL requirements

This unit is industrial control equipment for use in hazardous locations “class 1, Division 2. Groups A, B, C, and D”.

- WARNING: EXPLOSION HAZARD – SUBSTITUTION OF ANY COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION2.
- WARNING: EXPLOSION HAZARD – DO NOT REPLACE MODULES UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
- WARNING: EXPLOSION HAZARD – DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KOWN TO BE NON-HAZARDOUS.
- WARNING: EXPLOSION HAZARD – DO NOT CONNECT OR DISCONNECT CABLE UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
- WARNING: Fire, Explosion, and Severe Burn Hazard. Do Not Recharge, Disassemble, Heat Above 212°F (100°C), Incinerate, Or Expose Contents To Water.