Fuji Electric

PUM Series
Multi-loop module type
Temperature controller

ANALOG INPUT/OUTPUT MODULE [PUMV/N/T]

DATA SHEET

PUMV/N/T

PUMV/N/T is usable Analog I/O module as the accessory I/O of PUM series. Each control module, 30mm wide, is equipped the follows. PUMV is equipped 4 points of analog input/output. PUMN is equipped 4points of analog input. PUMT is equipped 4points of analog output. And all models are equipped high-speed RS-485 port. By connecting with PUM control modules, it realizes a compact and high-performance system.

FEATURES

I. User-friendly structure and functions
  1. Lateral connection with control module: Max.16 units (64 channels) + event input/output module 16 units = total 32 units
     Simple wiring for power supply and communication
  2. Detachable structure: Terminal block, main unit, and the base part
       → Easy wiring with detachable terminal blcok
       → Main units exchangeable without re-wiring
  3. Status LED for each input/output
       → Easy to detect input status and output status
  4. Smart loader communication: Connect one module and all connected modules are able to communicate using a loader software.
II. Large scale system using high speed RS-485
  1. Modbus RTU protocol for large volume communication
  2. High-speed communication: Maximum 115.2kbps
  3. Highly-efficient communication: Parameters dispersed on the address map are re-allocated to contiguous address
III. Various functions to enhance the control module functions
  1. Analog input
       - Remote SV
  2. Analog output
       - Control output (included distribution output)
       - Re-transmission output

SYSTEM SPECIFICATION

1. **Product type:** Multi-loop module type temperature controller
2. Module type
   1) Analog module: Total maximum 16 units
      a) Control module (4 loop/unit)
      b) Enhanced input/output (analog) module
         - Analog input/output module
                         (Input/output 4 points/unit)
         - Analog input module (Input 4 points/unit)
         - Analog output module (output 4 points/unit)
   2) Enhanced input/output (digital) module:
                         Maximum 16 units
         - Event input/output module
                         (Input/output ; 8 points/unit)
   3) Enhanced communication module: 1 unit
3. Connecting method:
                Lateral connecting with connectors
         - For power supply and RS-485 communication, any one of connected modules is required to be connected.
4. No. of loop, input/output
   1) Control loop: Max. 64
   2) No.of input/output: DI 128 points / DO 128 points

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ANALOG I/O MODULE SPECIFICATION

1. General specification

(1) **Power supply:** 24V DC ±10%
(2) **Power consumption:** Max. 3.2 W (135 mA)
[when 24V DC is applied]
(3) **Insulation resistance:** 20MΩ or more (500V DC)
(4) **Withstand voltage:**
Power supply ↔ all terminals
1000V AC 1 min.
Others 500V AC 1 min.
(5) **Applied standards:**
UL, C-UL, CE marking, RoHS directive
[Pending for UL, C-UL marking]

2. Input (PUMV, PUMN only)

(1) **No. of input:** 4 points (4 ch)
(2) **Input setting:** Input code selection
(3) **Input signal:** See table 1
Select from group I or II depending on the model code.
(setting can be done by points within group)
[Group I] a) Thermocouple
b) Resistance bulb (3 wire)
[Group II] c) DC voltage, current
(4) **Measurement range and input type:** See table 1
(5) **Measurement accuracy (Ta = 23°C):**
- Thermocouple: ±0.3%FS±1digit±1°C or ±3°C whichever is greater
* Unless
B thermocouple 0 to 400°C
:±5%FS±1digit±1°C
R thermocouple 0 to 500°C
:±1%FS±1digit±1°C
T thermocouple -200 to 0°C
:±0.5%FS±1digit±1°C
- Resistance bulb input
:±0.3%FS±1digit±1°C
whichever is greater
- Voltage/Current input
:±0.3%FS±1digit
(6) **Resolution:** See table 1
(7) **Temperature fluctuation:** ±0.3%FS±10°C
(8) **Input sampling cycle:** 200ms
(9) **Input impedance:**
- Thermocouple: 1MΩ or more
- Current input: 250 Ω
- Voltage input: approx. 1 MΩ
(10) **Influence of signal source resistance:**
- Thermocouple: ±0.3%FS±1digit/100Ω
- Voltage input: ±0.3%FS±1digit/500Ω
(11) **Allowable wiring resistance:**
- Resistance bulb: 10 Ω or less (per wire)
(12) **Allowable input voltage:**
- DC voltage input :within ±15V
- Current input :within ±25mA
- Thermocouple/resistance bulb: within ±5V
(13) **Noise rejection ratio:**
- Normal mode : 30dB or more (50/60Hz)
- Common mode : 120dB or more (50/60Hz)
between process value input and earth, power supply, output 220V AC, 50/60Hz
(14) **Input compensation:**
a) User adjustment :zero point, span point ±50%FS
b) Input value :±10%FS
c) First order lag filter :0.0 to 120.0 sec.

(15) **Over range, Under range:**
Out of range of -5 to 105%FS
(Accuracy cannot be ensured for -5 to 0, 100 to 105% FS)
(16) **Insulation:** Functional insulation between channels, and with any other input/output

3. Output (PUMV, PUNT only)

(1) **No. of output:** 4 points
(2) **Output type:** Current output (4-20mA DC, 0-20mA DC)
- Actual output range: 0mA to 20.6mA DC
- Accuracy: ±0.3%FS
(less than 1mA : ±5%FS)
- Linearity : ±0.3%FS
(less than 1mA : ±5%FS)
- Resolution: 5,000 or more
- Ripple current: P-P 0.3mA or less
- Load resistance: 300Ω or less
- Insulation: No insulation between outputs
Functional insulation other then output
(3) **Output functions:** Output limit, output scaling

4. Communication function

4.1 RS-485 interface

(1) **Communication standards:** RS-485 compatible
(2) **No. of port:** 1 port
(3) **Communication, synchro method:**
Two-wire, half-duplex, asynchronous cycle
(4) **Communication speed:** 9.6k, 19.2k, 38.4k, 115.2kbps
(5) **Communication distance:** 1km (38.4kbps or less), 250m (115.2kbps)
(6) **Recommended cable:** KPEV-SB 0.5sq-equivalent
(7) **No. of connectable units:**
33 units (Master and slave)
(32 units if any modules other than PUM series are included in slaves.)
(8) **Data format:** Data bit; 8, parity; even / odd / none
(9) **Protocol:** Modbus RTU compatible
(10) **Insulation:** No insulation with loader communication port
Functional insulation with any other input/output

4.2 Loader communication (RS-232C) interface

(1) **Communication standards:** RS-232C compatible
(2) **No. of port:** 1 port
(3) **Communication, synchro method:**
Half-duplex, asynchronous cycle
(4) **Communication speed:** 19.2kbps (fixed)
(5) **Data format:** Data bit 8, no parity
(6) **Protocol:** Modbus RTU compatible
(7) **Connection method:**
2.5 diameter mini-plug/jack
[on the front of the module]
(Common cable with PXG, PXH)
(8) **Insulation:** No insulation with RS-485 communication
Functional insulation with any other input/output

5. Display, configuration

5.1 Display

(1) **Display:** Status display LED
(2 colors × 6 points)
(2) **Display contents:**
RUN/FAULT, RS-485 TX/RX, OUT/ERR by loop (4 loops) (Functions are assigned to LED of each channel)

5.2 Setting device

(1) **Setting device:** Rotary SW × 1
(2) **Set contents:** RS-485 Station No.
(Station No.= setting value + 1)

6. Power outage

(1) **Impact of power outage:**
Outage of 2ms or less ; no impact
(2) **Operation after power outage:**
Start from the first step (cold start)
(3) **Memory backup:**
Non volatile memory (EEPROM)
No. of update ; 100,000

7. Self diagnosis

Diagnosis method:
Program error monitoring by watch dog timer

8. Structure

(1) **Installation method:**
DIN rail mounting or mounting with M3 screws inside a cabinet
(2) **Dimensions:** 30 (W) × 100 (H) × 85 (D) mm
(excluding terminal cover and projected part)
(3) **Weight:** Approx. 200 g
(4) **Extrenal terminal**
- Process value input/control output:
Detachable terminal block
(M3 screw × 20 terminals)
- Power supply connection:
Terminal block on the base part
(M3 screw × 2 terminals)
Power is supplied via side connectors in case of lateral connecting. (Max. 33 units)
- RS-485 communication connection:
Terminal block on the base part
(M3 screw × 3 terminals)
RS-485 communication is connected via side connectors in case of lateral connecting.
- Loader communication port:
2.5 diameter 3 prong mini-plug/jack
[on the front of the module]
(5) **Case material:** Polyphenylene oxide
(flame retardant grade : UL94V-0 equivalent)
(6) **Case color:** Case ; red
Terminal, base part ; black

(7) **Protection**
- Body: IP20 grade protection
(ventilation slits on the top and the bottom of the body)
- Terminal: IP00 grade protection, terminal cover is available as an option

9. Normal operating condition

(1) **Ambient temperature*:** -10 to 50°C
* "Ambient temperature" is the temperature underneath the controller inside the equpiment or the cabinet where the controller is installed.
(2) **Ambient humidity:**
90% RH or less (non condensing)
(3) **Vibration:** 10 to 70Hz, 9.8m/s^2 (1G) or less
(4) **Warmup time:** 30 min. or more

10. Transporting, storage condition (packing condition)

(1) **Storage temperature:** -20°C to 60°C
(2) **Ambient humidity:** 90%RH or less (no condensing)
(3) **Vibration:** 10 to 70Hz, 9.8m/s^2 (1G) or less
(4) **Shock:** 294m/s^2 (30G) or less

11. Packing list

-Temperature controller: 1unit
-Instruction manual: 1 copy
-250Ω resistance: 0, 2, or 4
(For no. points of voltage/current input selected)

12. Loader software

(1) **Distribution medium:**
Free download from Fuji Electric Systems HP (http://www.fic-net.jp/eng/index.html)
(2) **Recommended operating environment**
PC: DOS/V (PC-AT compatible)
OS: Windows XP (operating confirmed in Japanese / English)
RAM: 256M bytes or more
Free space on the hardware: 500M bytes or more
Display resolution: 1024 × 768 dots or more
Serial interface: RS-232C 1 port
(without RS-232C, USB serial converter cable required)
(3) **Connection with PUM**
Via loader interface on the front face of the module (special cable available from Fuji is required) or via RS-485

CODE SYMBOLS

[Analog input/ouput module]

Digit → | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 9 | 10 | 11 | 12 | 13 |

P U M E E 1 – 0 0 0 0

Digit	Description								
4	< Module type > Analog I/O module [Ai/Ao 4 points]	V							
5	<Input type> Thermocouple/resistance bulb [all channel] Voltage/current [all channel] Thermocouple/resistance bulb [ch 1, 2], voltage/current [ch3, 4]		T A C						
10	<Operation manual> Japanease English							A B	

[Analog input module]

Digit → | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 9 | 10 | 11 | 12 | 13 |

P U M Y Y 1 – 0 0 0 0

Digit	Description								
4	< Module type > Analog input module[Ai 4 points]	N							
5	<Input type> Thermocouple/resistance bulb [all channel] Voltage/current [all channel] Thermocouple/resistance bulb [ch 1, 2], voltage/current [ch3, 4]		T A C						
10	<Operation manual> Japanease English							A B	

[Analog output module]

Digit → | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 9 | 10 | 11 | 12 | 13 |

P U M Y E E 1 – 0 0 0 0

Digit	Description								
4	< Module type > Analog output module[Ao 4 points]	T							
10	<Operation manual> Japanease English							A B	

[Accesories (optional)]

Digit → | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

P U M Z *

Digit	Description			
6	RS-485 terminating resistance	A	0	1
7	DIN rail mounting endplate	A	0	2
8	Side connecting terminal cover (right & left 1 set)	A	0	3
	Fron face screw terminal cover	A	0	4
	Loader connecting cable (RS-232C)	L	0	1

[Table 1] Input type and standard input range

Input type		Input code	Measurement range [°C]	Min. measurement unit [°C]
Resistance bulb (IEC)	Pt100Ω	2	0 to 150	0.1
		3	−150 to 300	0.1
		4	−150 to 850	1
Thermocouple	J	5	0 to 400	0.1
		6	0 to 800	0.1
	K	7	0 to 400	0.1
		8	0 to 800	0.1
		9	0 to 1200	1
	R	10	0 to 1600	1
	B	11	0 to 1800	1
	S	12	0 to 1600	1
	T	13	−199 to 400	0.1
	E	14	−199 to 800	0.1
	N	18	0 to 1300	1
	PL-Ⅱ	19	0 to 1300	1
DC voltage	DC0 to 5V	21	−1999 to 9999 (scaling range)	——
	DC1 to 5V	22		
	DC0 to 10V	23		
	DC2 to 10V	24		

[Table 2] Insulation block diagram

Power	PV1
Loader communication port	PV2
RS-485 communication port	PV3
	PV4
	OUT1 (Current)
	OUT2 (Current)
	OUT3 (Current)
	OUT4 (Current)
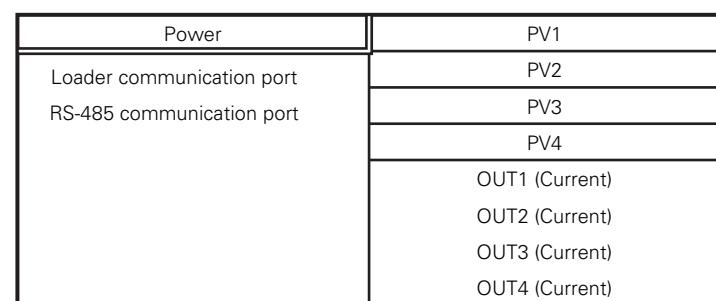
══ Functional insulation (1000V AC)   ── Functional insulation (500V AC)

OUTLINE DIAGRAM (Unit : mm)

Front terminal cover (Option)

(10)

Base part
(Main unit is detached)

Hole for screw mounting

Terminal block
(at attach/detach)

30

85

LOADER

STATION

1.5

6

100

50

DIN rail

6.1

Terminal
screw M3

Terminal screw
M3

5

(30)

Hole for screw
mounting

(8)

At mounting to the DIN rail

Main unit (at attach/detach)

Locking tab
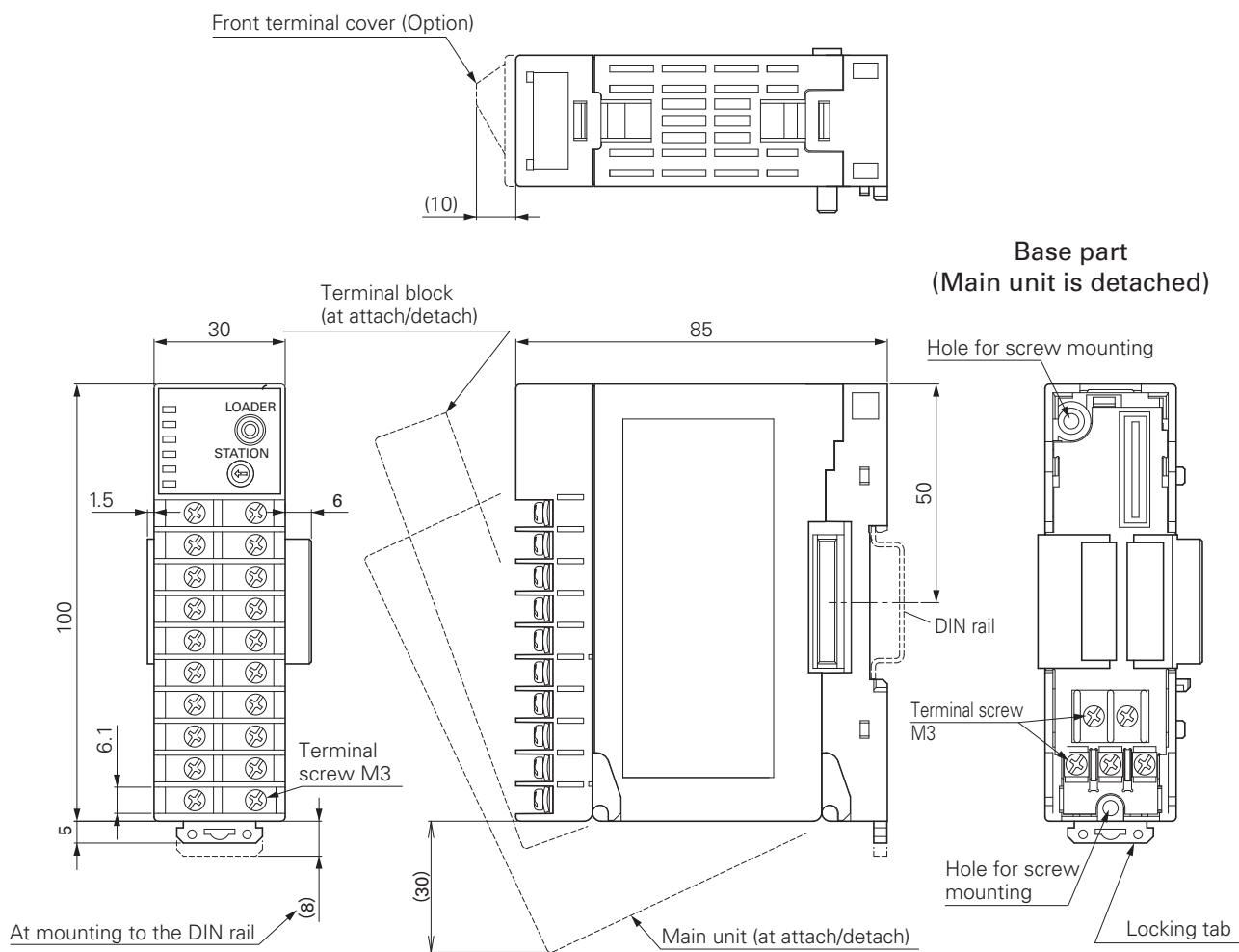
Dimensions for screw mounting

(30)

2-M3

9$^{±0.2}$

(100)

88.5$^{±0.2}$

(3)

30$^{+0.7}_{+0.2}$
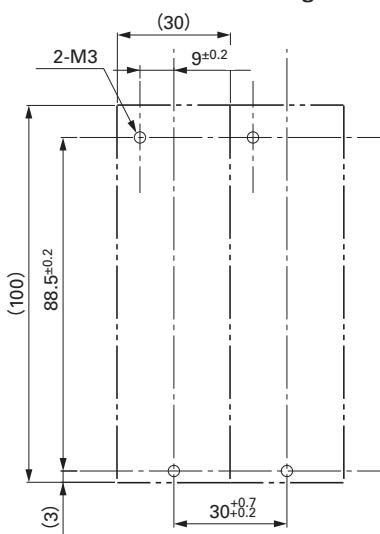
Notice at the installation

Please keep the distance of 30mm from this instrument to radiate.
[50mm is recommended]

30 or more

30 or more
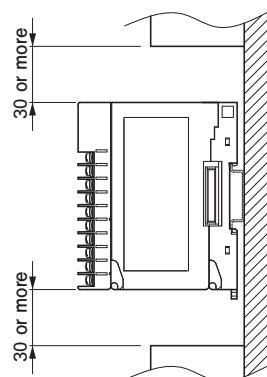
TERMINAL CONNECTION DIAGRAM

(Analog I/O module [PUMV])

Loader interface plug (RS-232C)

3	TX
2	RX
1	GND
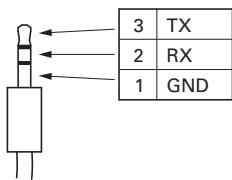
φ2.5 3-pole miniature plug
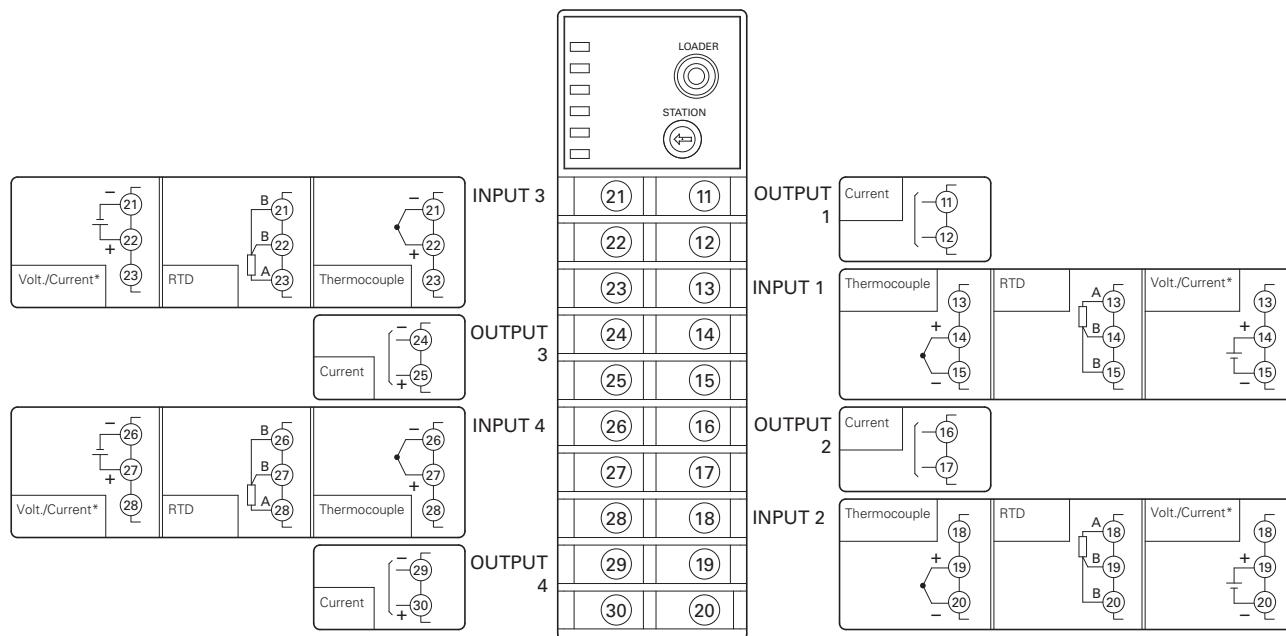
* In case of current input, attach I/V unit which comes with controller to the voltage input terminal.
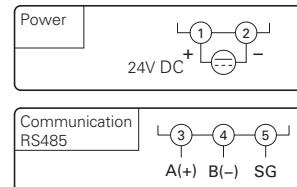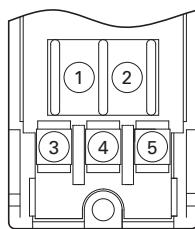
Base part

TERMINAL CONNECTION DIAGRAM

(Analog input module [PUMN])

Loader interface plug (RS-232C)

3	TX
2	RX
1	GND

φ2.5 3-pole miniature plug

INPUT 3

INPUT 4

INPUT 1

INPUT 2

Volt./Current* RTD Thermocouple

Don't connect

Volt./Current* RTD Thermocouple

Don't connect

Don't connect

Thermocouple RTD Volt./Current*

Don't connect

Thermocouple RTD Volt./Current*

* In case of currenet input, attach I/V unit which comes with the controller to the voltage input terminal.

Base part

Power

24V DC

Communication RS485

A(+) B(−) SG
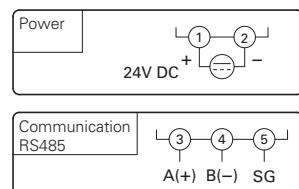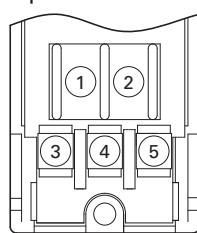
TERMINAL CONNECTION DIAGRAM

(Analog output module [PUMT])

Loader interface plug (RS-232C)

3	TX
2	RX
1	GND

φ2.5 3-pole miniature plug

LOADER

STATION

(21)	(11)	OUTPUT 1
(22)	(12)	
(23)	(13)	
(24)	(14)	
(25)	(15)	
(26)	(16)	OUTPUT 2
(27)	(17)	
(28)	(18)	
(29)	(19)	
30	(20)	

Don't connect — (21) (22) (23)

OUTPUT 3 — Current (24) (25)

Don't connect — (26) (27) (28)

OUTPUT 4 — Current (29) (30)

Current + (11) − (12)

Don't connect (13) (14) (15)

Current + (16) − (17)

Don't connect (18) (19) (20)

Base part

1	2
3	4	5

Power
24V DC   + 1 — 2 −

Communication
RS485   3   4   5
         A(+) B(−) SG
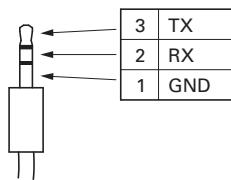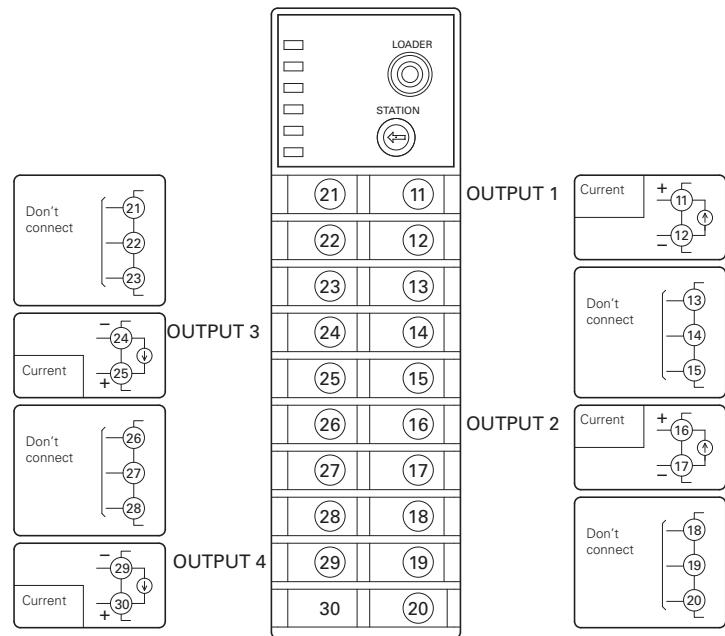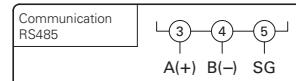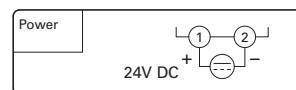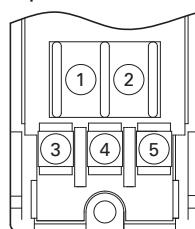
⚠ Caution on Safety

*Before using this product, be sure to read its instruction manual in advance.

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