Fuji Electric

Multi-Loop Module Type
Temperature Controller
PUM Series

ANALOG INPUT/OUTPUT MODULE

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 types
   1) Analog module: 16 units maximum
      • Control module (4 loops per unit)
      • Analog input/output module (4 points each per unit)
        Analog input module (4 points per unit)
        Analog output module (4 points per unit)
   2) Digital module: 16 units maximum
      Event input/output module (8 points each per unit)
   3) 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

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.

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 website (http://www.fujielectric.com/products/instruments/)
(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

13. Certification

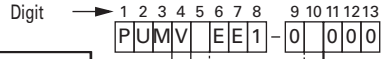
UL, C-UL

14. EU Directive Compliance CE

LVD (2014/35/EU)
EN 61010-1
EN 61010-2-030
EMC (2014/30/EU)
EN 61326-1 (Table 2)
EN 55011 (Group 1 Class A)
EN 61000-3-2 (Class A)
EN 61000-3-3
RoHS (2011/65/EU)
EN 50581

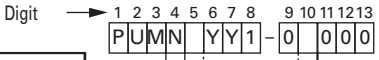
CODE SYMBOLS

[Analog input/ouput module]



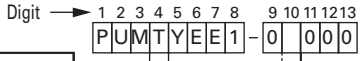
Digit	Description
4	< Module type > Analog I/O module [Ai/Ao 4 points]
5	<Input type> Thermocouple/resistance bulb [all channel] Voltage/current [all channel] Thermocouple/resistance bulb [ch 1, 2], voltage/current [ch3, 4]
10	<Operation manual> Japanese English

[Analog input module]



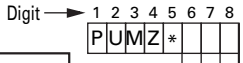
Digit	Description
4	< Module type > Analog input module[Ai 4 points]
5	<Input type> Thermocouple/resistance bulb [all channel] Voltage/current [all channel] Thermocouple/resistance bulb [ch 1, 2], voltage/current [ch3, 4]
10	<Operation manual> Japanese English

[Analog output module]



Digit	Description
4	< Module type > Analog output module[Ao 4 points]
10	<Operation manual> Japanese English

[Accesories (optional)]



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

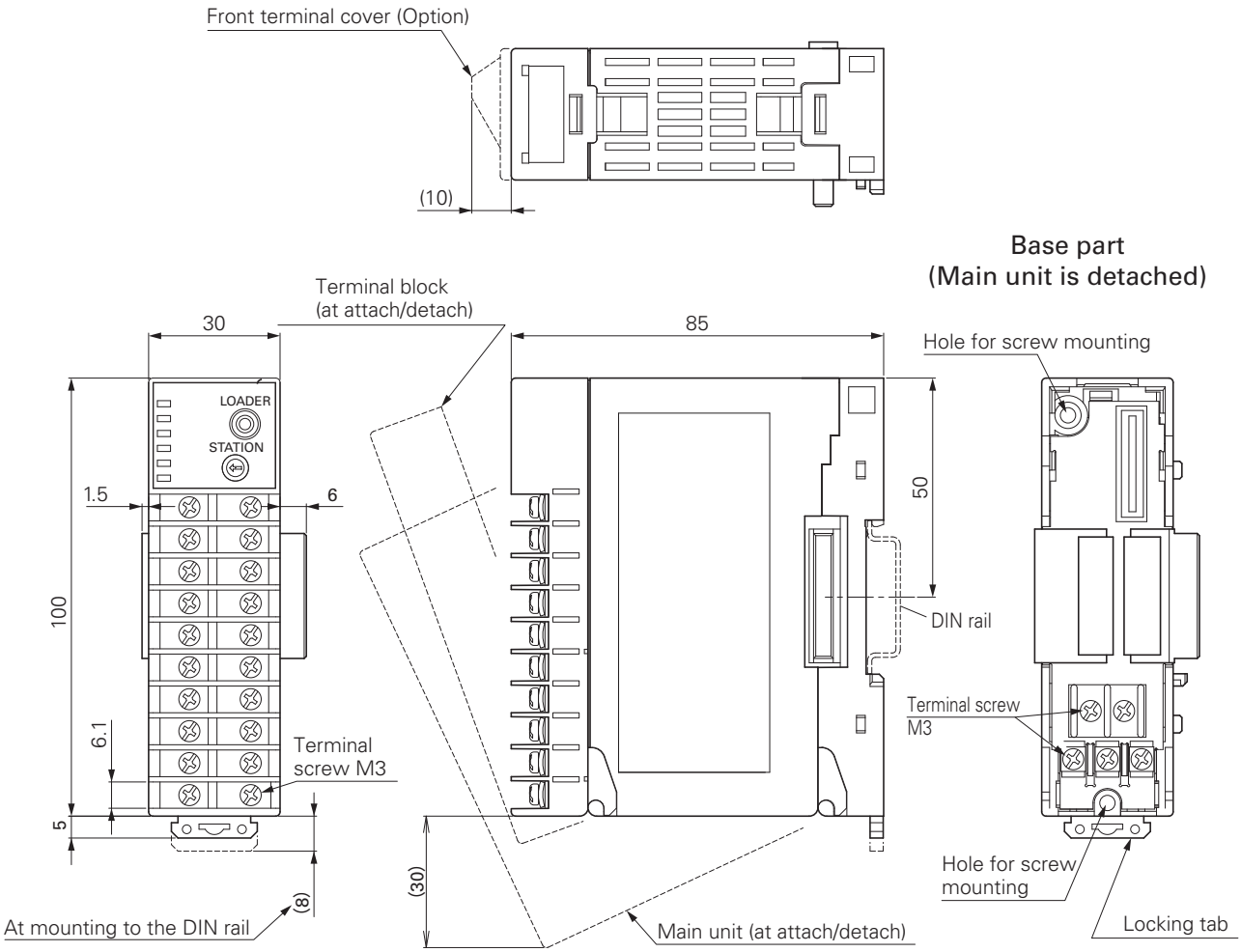
Input type		Input code	Measurement range [°C]	Min. measurement unit [°C]
Resistance bulb (IEC)	Pt100Ω	2	0 to 150	0.1
		3	–150 to 300	0.1
		4	–150 to 850	1
Thermocouple	J	5	0 to 400	0.1
		6	0 to 800	0.1
	K	7	0 to 400	0.1
		8	0 to 800	0.1
		9	0 to 1200	1
	R	10	0 to 1600	1
	B	11	0 to 1800	1
	S	12	0 to 1600	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

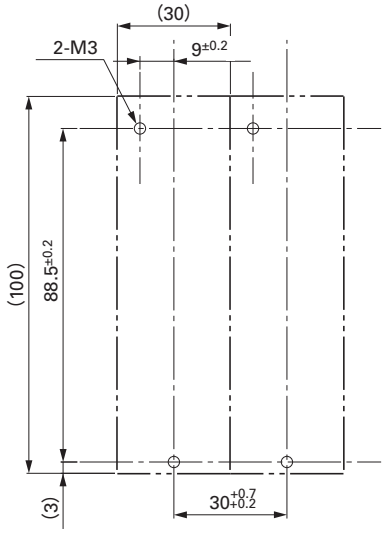
Power	PV1
Loader communication port RS-485 communication port	PV2
	PV3
	PV4
	OUT1 (Current)
	OUT2 (Current)
	OUT3 (Current)
	OUT4 (Current)

═══ Functional insulation (1000V AC) ——— Functional insulation (500V AC)

OUTLINE DIAGRAM (Unit : mm)

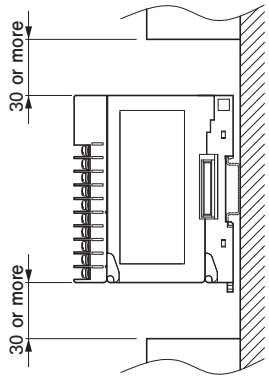


Dimensions for screw mounting



Notice at the installation

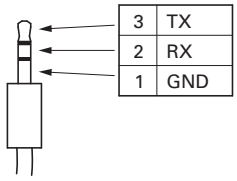
Please keep the distance of 30mm from this instrument to radiate.
[50mm is recommended]



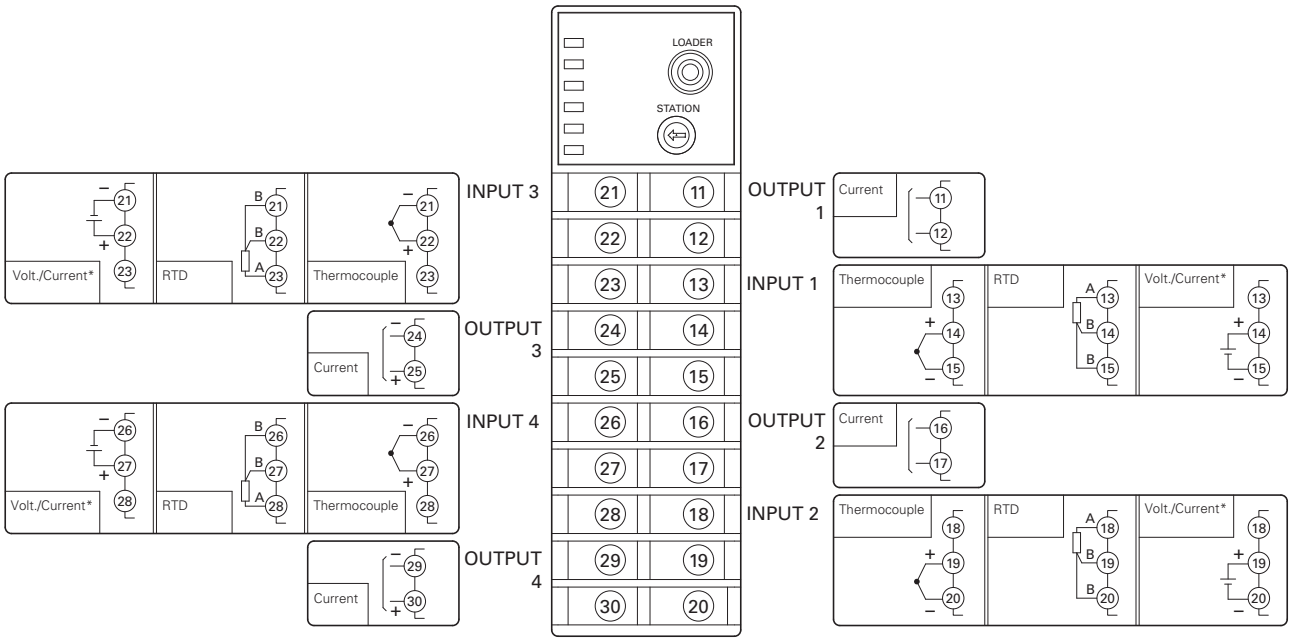
TERMINAL CONNECTION DIAGRAM

(Analog I/O module [PUMV])

Loader interface plug (RS-232C)

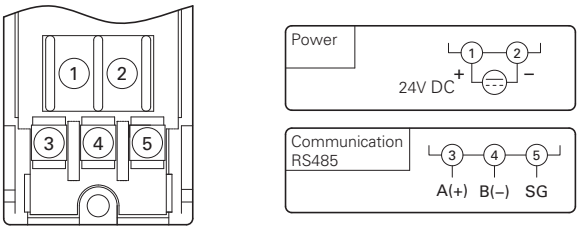


ϕ2.5 3-pole miniature plug



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

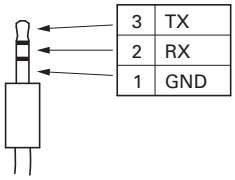
Base part



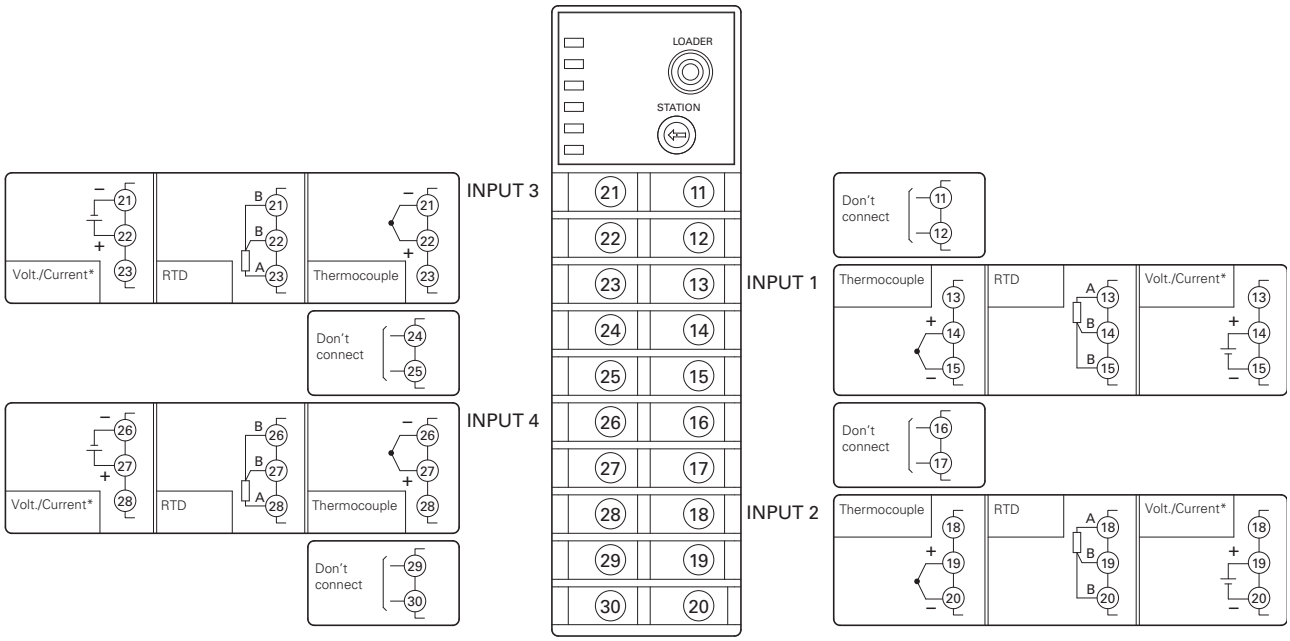
TERMINAL CONNECTION DIAGRAM

(Analog input module [PUMN])

Loader interface plug (RS-232C)

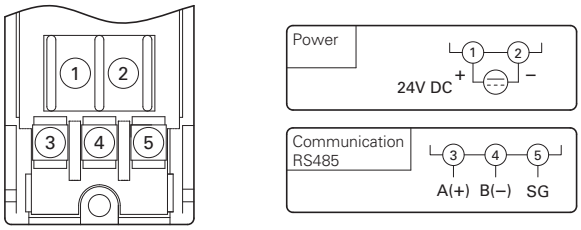


ϕ2.5 3-pole miniature plug



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

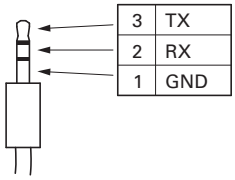
Base part



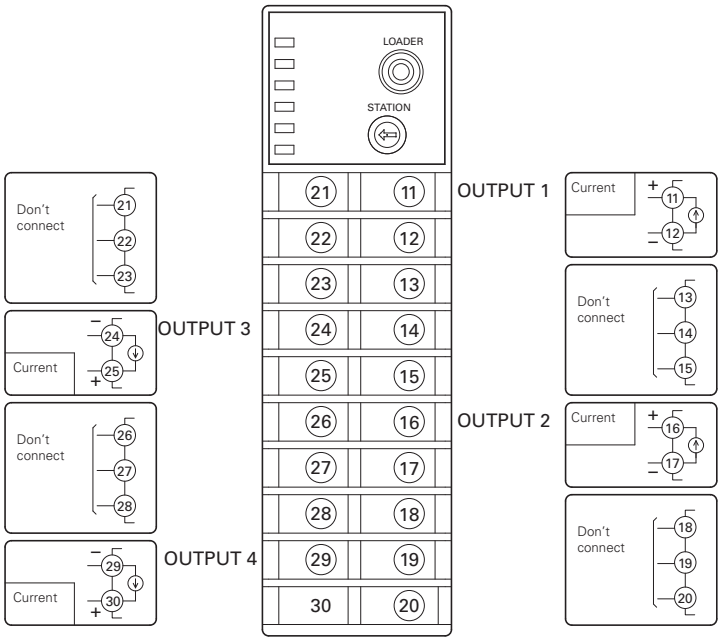
TERMINAL CONNECTION DIAGRAM

(Analog output module [PUMT])

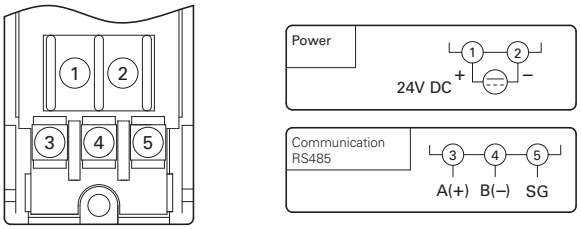
Loader interface plug (RS-232C)



ϕ2.5 3-pole miniature plug



Base part



⚠ Caution on Safety

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

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