

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 block
 - 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:
 - 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

ANALOG I/O MODULE SPECIFICATION

1. General specification

- (1) Power supply: 24V DC $\pm 10\%$
 (2) Power consumption: Max. 3.2 W (135 mA)
 [when 24V DC is applied]
 (3) Insulation resistance: 20M Ω or more (500V DC)
 (4) Withstand voltage:
 Power supply \leftrightarrow 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 ($T_a = 23^\circ\text{C}$):
 - Thermocouple: $\pm 0.3\% \text{FS} \pm 1 \text{digit} \pm 1^\circ\text{C}$ or $\pm 3^\circ\text{C}$ whichever is greater
 * Unless
 B thermocouple 0 to 400 $^\circ\text{C}$
 $\pm 5\% \text{FS} \pm 1 \text{digit} \pm 1^\circ\text{C}$
 R thermocouple 0 to 500 $^\circ\text{C}$
 $\pm 1\% \text{FS} \pm 1 \text{digit} \pm 1^\circ\text{C}$
 T thermocouple -200 to 0 $^\circ\text{C}$
 $\pm 0.5\% \text{FS} \pm 1 \text{digit} \pm 1^\circ\text{C}$
 - Resistance bulb input
 $\pm 0.3\% \text{FS} \pm 1 \text{digit} \pm 1^\circ\text{C}$
 whichever is greater
 - Voltage/Current input
 $\pm 0.3\% \text{FS} \pm 1 \text{digit}$
 (6) Resolution: See table 1
 (7) Temperature fluctuation: $\pm 0.3\% \text{FS} \pm 10^\circ\text{C}$
 (8) Input sampling cycle: 200ms
 (9) Input impedance:
 - Thermocouple: 1M Ω or more
 - Current input: 250 Ω
 - Voltage input: approx. 1 M Ω
 (10) Influence of signal source resistance:
 - Thermocouple: $\pm 0.3\% \text{FS} \pm 1 \text{digit} / 100\Omega$
 - Voltage input: $\pm 0.3\% \text{FS} \pm 1 \text{digit} / 500\Omega$
 (11) Allowable wiring resistance:
 - Resistance bulb: 10 Ω or less (per wire)
 (12) Allowable input voltage:
 - DC voltage input: within $\pm 15\text{V}$
 - Current input: within $\pm 25\text{mA}$
 - Thermocouple/resistance bulb: within $\pm 5\text{V}$
 (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 $\pm 50\% \text{FS}$
 b) Input value: $\pm 10\% \text{FS}$
 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: $\pm 0.3\% \text{FS}$
 (less than 1mA : $\pm 5\% \text{FS}$)
 - Linearity: $\pm 0.3\% \text{FS}$
 (less than 1mA : $\pm 5\% \text{FS}$)
 - Resolution: 5,000 or more
 - Ripple current: P-P 0.3mA or less
 - Load resistance: 300 Ω or less
 - Insulation: No insulation between outputs
 Functional insulation other than 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 con-
necting.
 - 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 equiva-
lent)
- (6) **Case color:** Case ; red
Terminal, base part ; black

(7) Protection

- Body: IP20 grade protection
(ventilation slits on the top and the bot-
tom 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 tempera-
ture underneath the controller inside
the equipment or the cabinet where
the controller is installed.
- (2) **Ambient humidity:**
90% RH or less (non condensing)
- (3) **Vibration:** 10 to 70Hz, 9.8m/s² (1G) or less
- (4) **Warmup time:** 30 min. or more

10. Transporting, storage condition (packing con- dition)

- (1) **Storage temperature:** -20°C to 60°C
- (2) **Ambient humidity:** 90%RH or less (no condensing)
- (3) **Vibration:** 10 to 70Hz, 9.8m/s² (1G) or less
- (4) **Shock:** 294m/s² (30G) or less

11. Packing list

- Temperature controller: 1 unit
- 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 Sys-
tems 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/output module]

		Digit → 1 2 3 4 5 6 7 8 9 10 11 12 13												
		PUM			EE1			-0			000			
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 > Japanese English												A	B

[Analog input module]

		Digit → 1 2 3 4 5 6 7 8 9 10 11 12 13												
		PUM			YY1			-0			000			
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 > Japanese English												A	B

[Analog output module]

		Digit → 1 2 3 4 5 6 7 8 9 10 11 12 13												
		PUM			YEE1			-0			000			
Digit	Description													
4	< Module type > Analog output module[Ao 4 points]				T									
10	< Operation manual > Japanese English												A	B

[Accessories (optional)]

		Digit → 1 2 3 4 5 6 7 8							
		PUMZ			*				
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
	Front face screw terminal cover							A	0 4
	Loader connecting cable (RS-232C)							L	0 1

[Table 1] Input type and standard input range

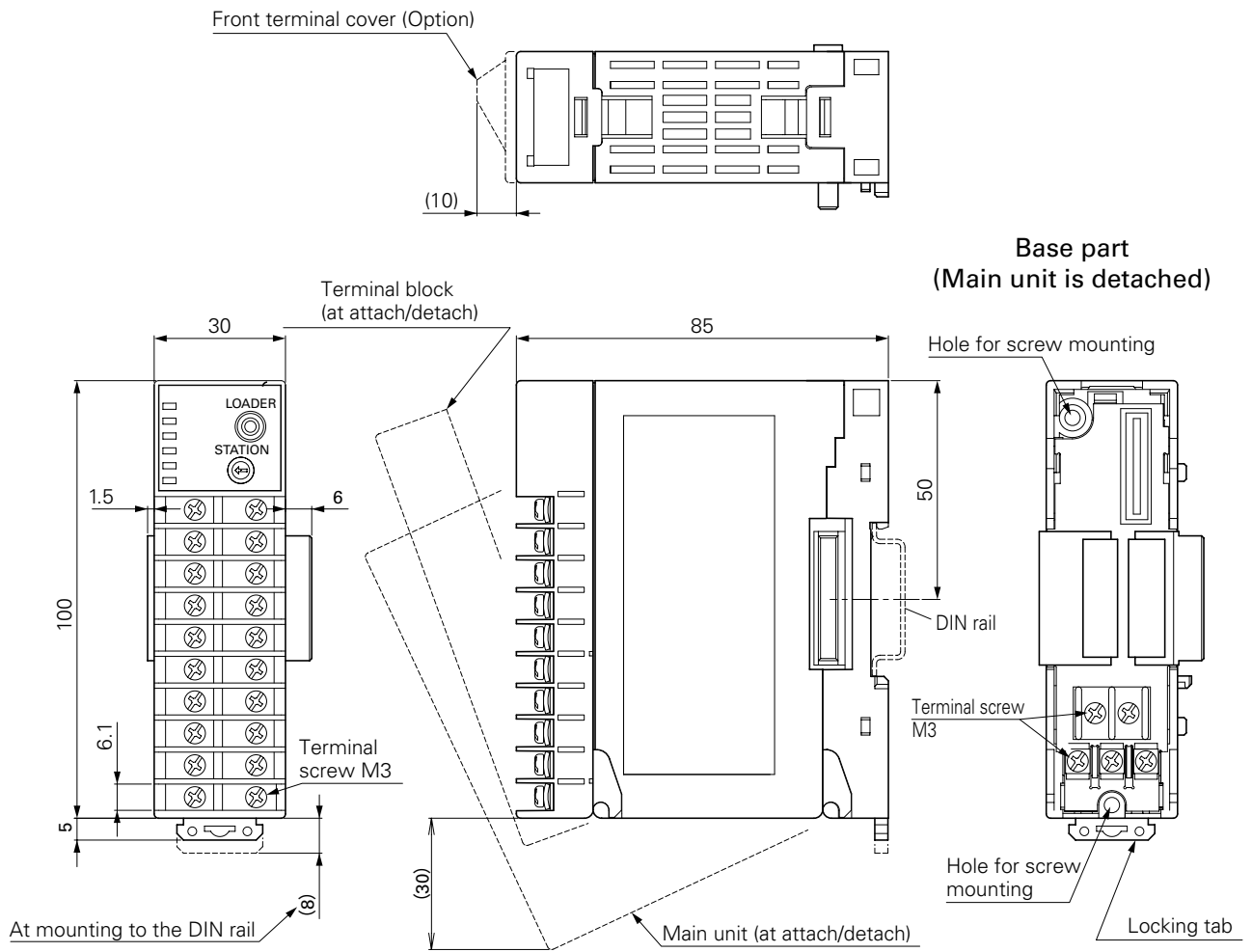
Input type		Input code	Measurement range [°C]	Min. measurement unit [°C]
Resistance bulb (IEC)	Pt100Ω	2	0 to 150	0.1
		3	-150 to 300	0.1
		4	-150 to 850	1
Thermocouple	J	5	0 to 400	0.1
		6	0 to 800	0.1
		7	0 to 400	0.1
	K	8	0 to 800	0.1
		9	0 to 1200	1
		10	0 to 1600	1
	R	11	0 to 1800	1
	B	12	0 to 1600	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)	—
		22		
		23		
		24		

[Table 2] Insulation block diagram

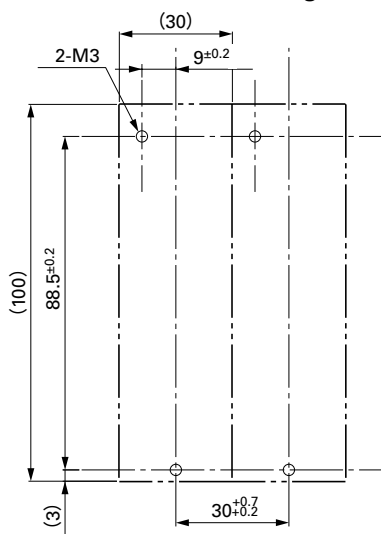
Power	PV1
Loader communication port RS-485 communication port	PV2
	PV3
	PV4
	OUT1 (Current)
	OUT2 (Current)
	OUT3 (Current)
	OUT4 (Current)

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

OUTLINE DIAGRAM (Unit : mm)

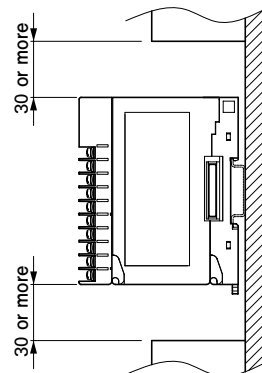


Dimensions for screw mounting



Notice at the installation

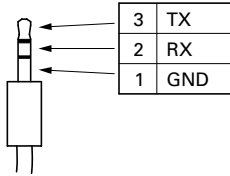
Please keep the distance of 30mm from this instrument to radiate.
[50mm is recommended]



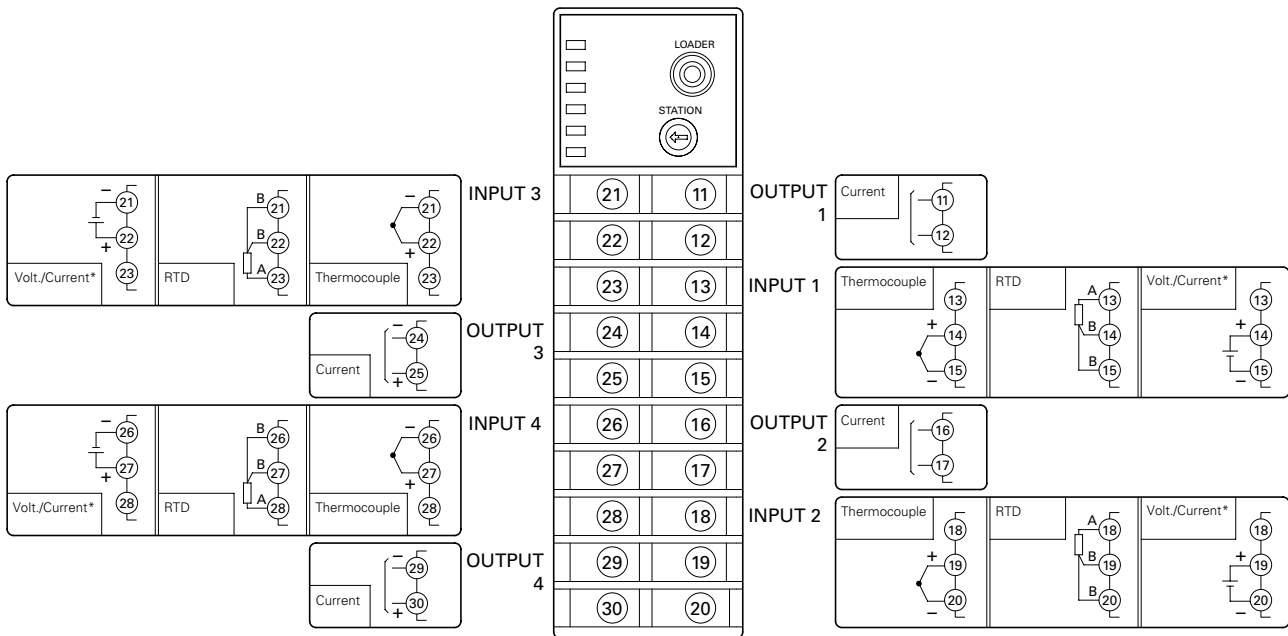
TERMINAL CONNECTION DIAGRAM

(Analog I/O module [PUMV])

Loader interface plug (RS-232C)

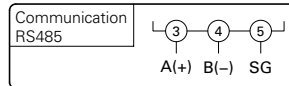
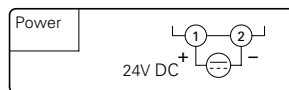
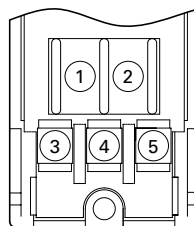


φ2.5 3-pole miniature plug



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

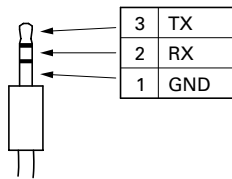
Base part



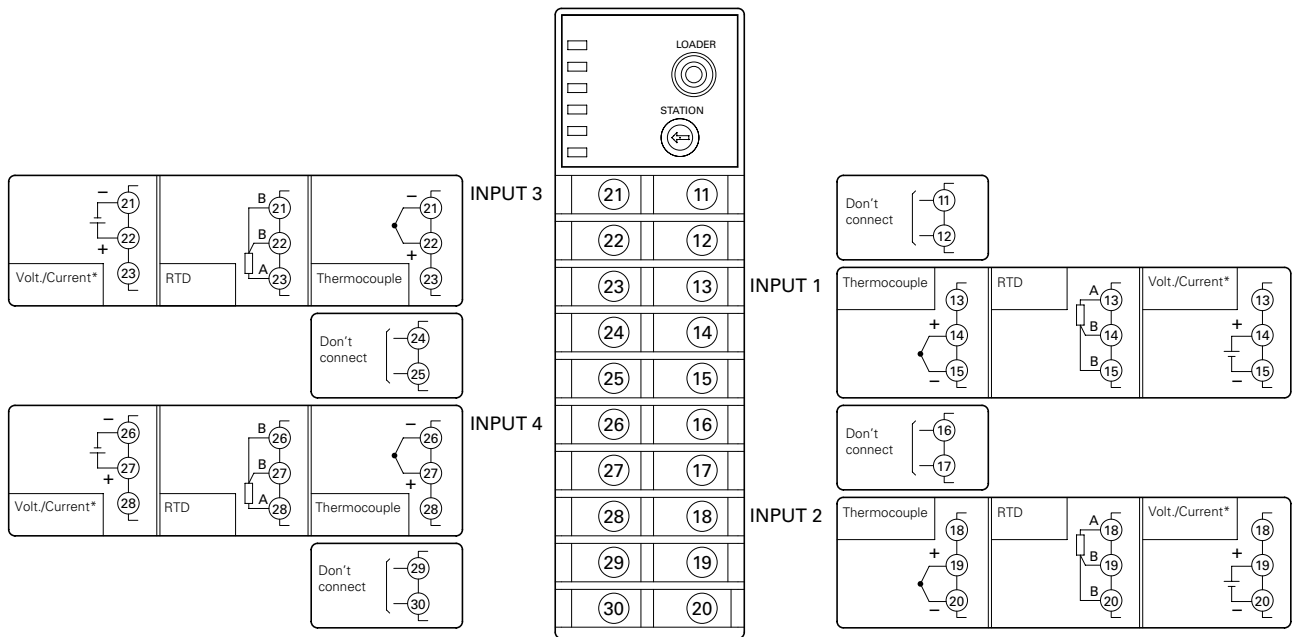
TERMINAL CONNECTION DIAGRAM

(Analog input module [PUMN])

Loader interface plug (RS-232C)

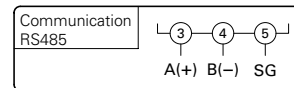
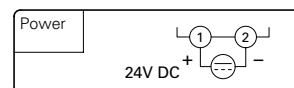
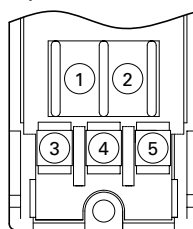


φ2.5 3-pole miniature plug



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

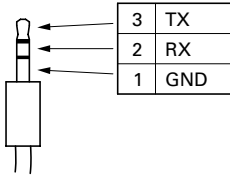
Base part



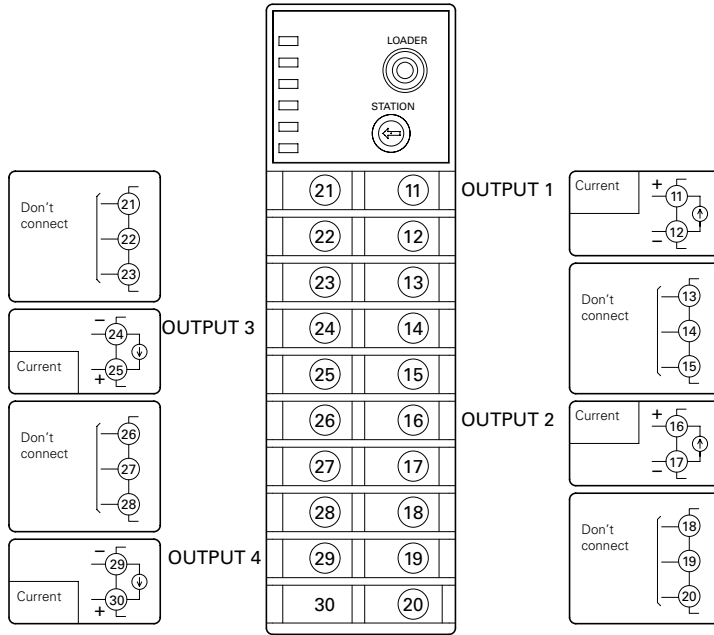
TERMINAL CONNECTION DIAGRAM

(Analog output module [PUMT])

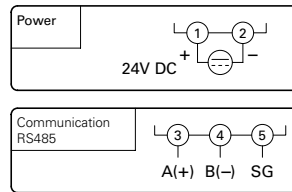
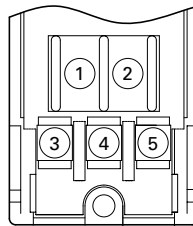
Loader interface plug (RS-232C)



φ2.5 3-pole miniature plug



Base part



⚠ Caution on Safety

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

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