

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 $\Omega$  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 $\Omega$  or more  
- Current input: 250  $\Omega$   
- Voltage input: approx. 1 M $\Omega$
- (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  $\Omega$  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 $\Omega$  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/s<sup>2</sup> (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/s<sup>2</sup> (1G) or less
- (4) **Shock:** 294m/s<sup>2</sup> (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			YEE1			-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

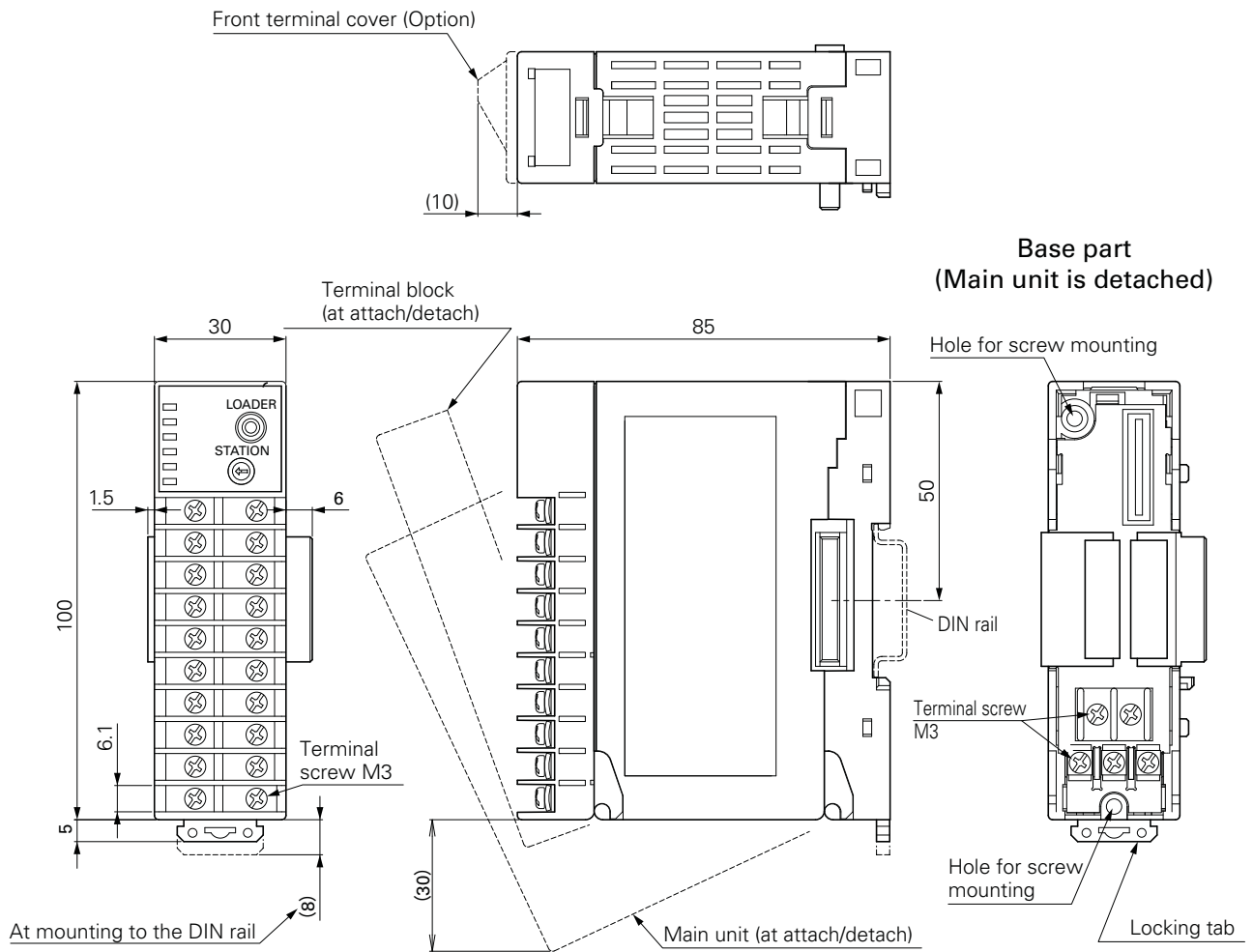
Input type		Input code	Measurement range [°C]	Min. measurement unit [°C]
Resistance bulb (IEC)	Pt100Ω	2	0 to 150	0.1
		3	-150 to 300	0.1
		4	-150 to 850	1
Thermocouple	J	5	0 to 400	0.1
		6	0 to 800	0.1
		7	0 to 400	0.1
	K	8	0 to 800	0.1
		9	0 to 1200	1
	R	10	0 to 1600	1
	B	11	0 to 1800	1
	S	12	0 to 1600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

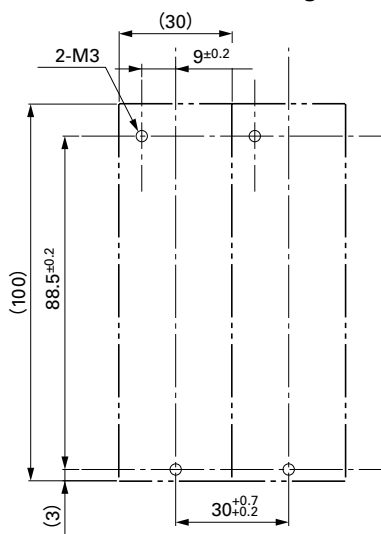
Power	PV1
Loader communication port RS-485 communication port	PV2
	PV3
	PV4
	OUT1 (Current)
	OUT2 (Current)
	OUT3 (Current)
	OUT4 (Current)

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

# OUTLINE DIAGRAM (Unit : mm)

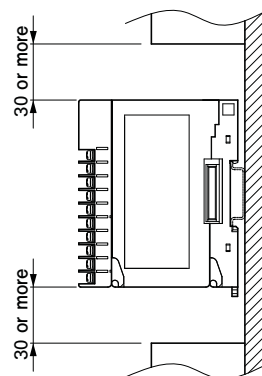


## Dimensions for screw mounting



## Notice at the installation

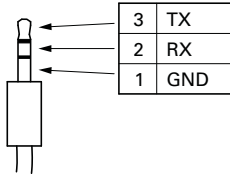
Please keep the distance of 30mm from this instrument to radiate.  
[50mm is recommended]



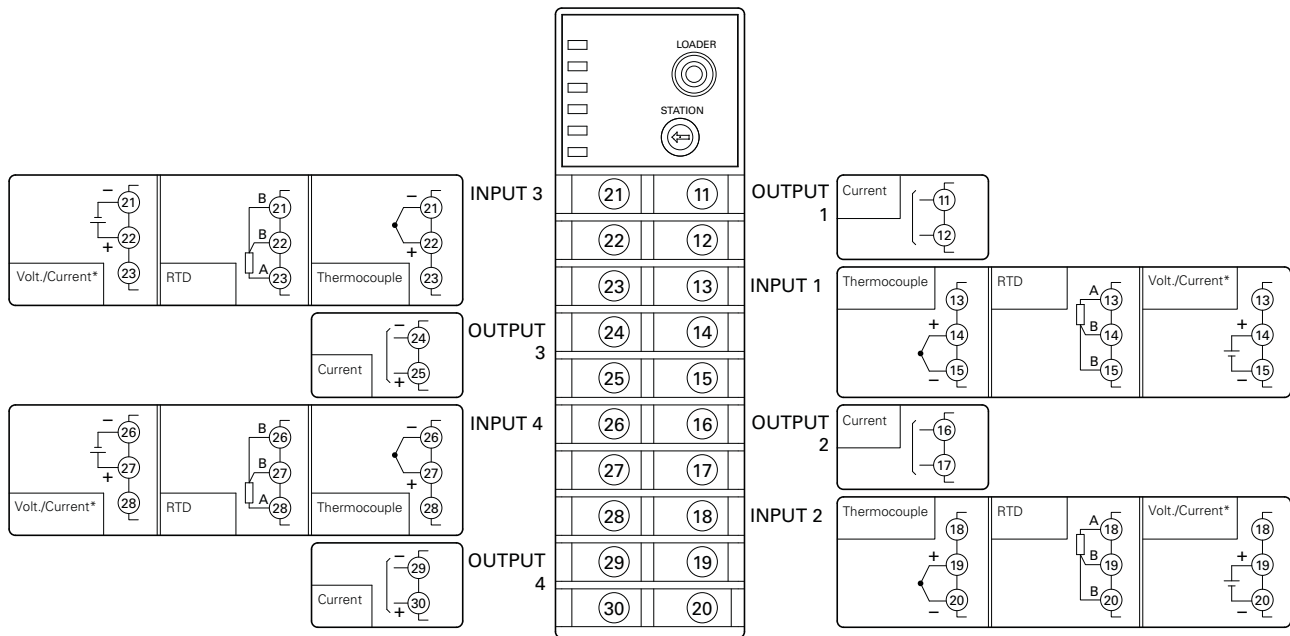
# TERMINAL CONNECTION DIAGRAM

(Analog I/O module [PUMV])

Loader interface plug (RS-232C)

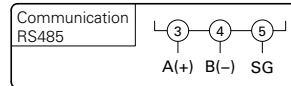
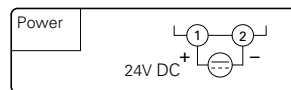
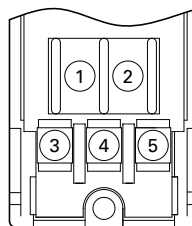


φ2.5 3-pole miniature plug



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

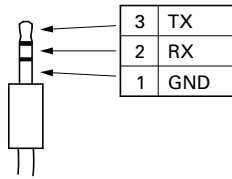
Base part



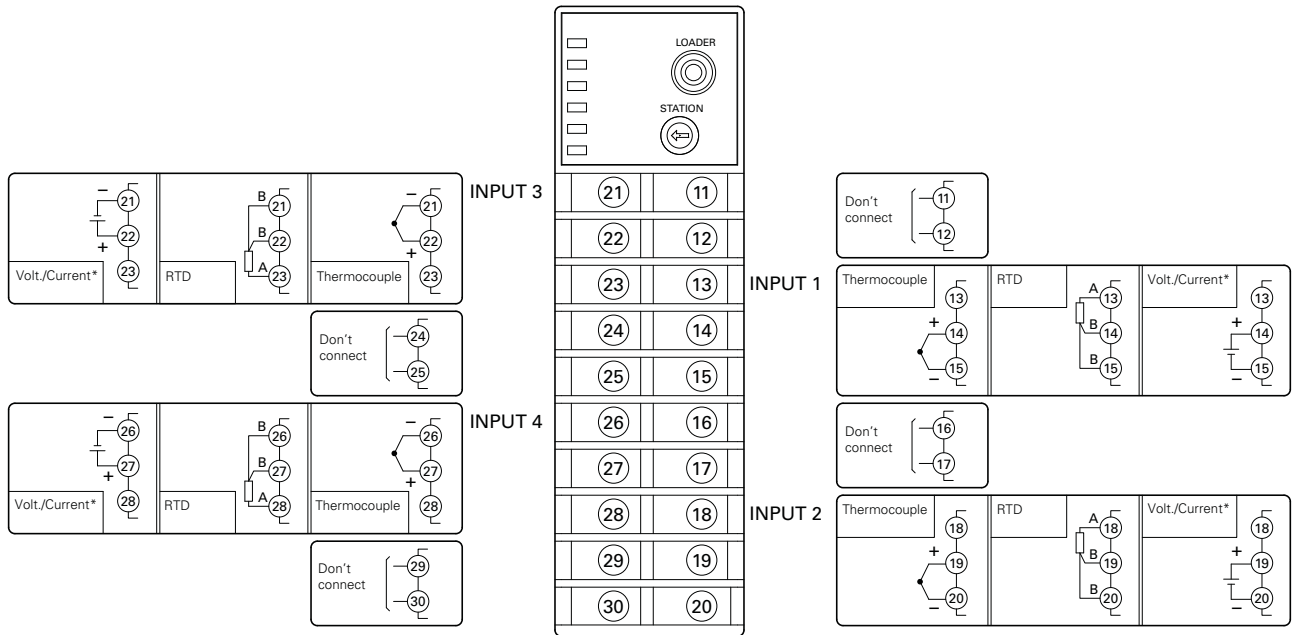
# TERMINAL CONNECTION DIAGRAM

(Analog input module [PUMN])

Loader interface plug (RS-232C)

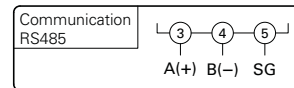
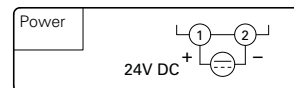
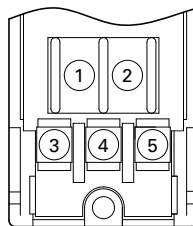


φ2.5 3-pole miniature plug



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

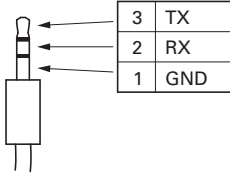
Base part



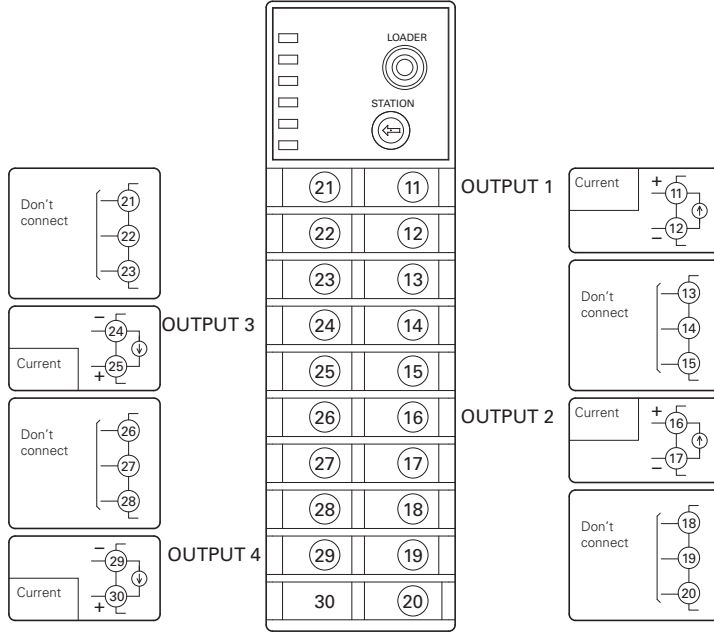
# TERMINAL CONNECTION DIAGRAM

(Analog output module [PUMT])

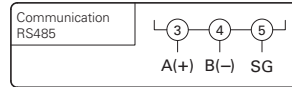
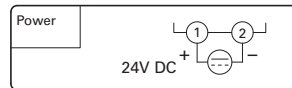
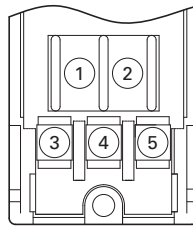
Loader interface plug (RS-232C)



φ2.5 3-pole miniature plug



## Base part



Caution on Safety

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

# Fuji Electric

Your distributor:

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