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 4 points of analog input. PUMT is equipped 4 points 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
         - 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. Connecting method:
   - 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.
(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:
   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
   - 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) External 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 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 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/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 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/output module]

<table>
<thead>
<tr>
<th>Digit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Analog input/output module (AI/Ao 4 points)</td>
</tr>
<tr>
<td>5</td>
<td>Input type (ch 1, 2), voltage/current (ch 3, 4)</td>
</tr>
<tr>
<td>10</td>
<td>Operation manual (Japanese, English)</td>
</tr>
</tbody>
</table>

### [Analog input module]

<table>
<thead>
<tr>
<th>Digit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Analog input module (AI 4 points)</td>
</tr>
<tr>
<td>5</td>
<td>Input type (Thermocouple/resistance bulb [all channel], Voltage/current [all channel])</td>
</tr>
<tr>
<td>10</td>
<td>Operation manual (Japanese, English)</td>
</tr>
</tbody>
</table>

### [Analog output module]

<table>
<thead>
<tr>
<th>Digit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Analog output module (AO 4 points)</td>
</tr>
<tr>
<td>10</td>
<td>Operation manual (Japanese, English)</td>
</tr>
</tbody>
</table>

### [Accessories (optional)]

<table>
<thead>
<tr>
<th>Digit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>RS-485 terminating resistance</td>
</tr>
<tr>
<td>7</td>
<td>DIN rail mounting endplate</td>
</tr>
<tr>
<td>8</td>
<td>Side connecting terminal cover (right &amp; left 1 set)</td>
</tr>
<tr>
<td></td>
<td>Face screw terminal cover</td>
</tr>
<tr>
<td></td>
<td>Loader connecting cable (RS-232C)</td>
</tr>
</tbody>
</table>

## Table 1: Input type and standard input range

<table>
<thead>
<tr>
<th>Input type</th>
<th>Input code</th>
<th>Measurement range [°C]</th>
<th>Min. measurement unit [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance bulb (IEC)</td>
<td>Pt100Ω</td>
<td>2</td>
<td>0 to 150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>-150 to 300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>-150 to 850</td>
</tr>
<tr>
<td>Thermocouple</td>
<td>J</td>
<td>5</td>
<td>0 to 400</td>
</tr>
<tr>
<td></td>
<td>K</td>
<td>7</td>
<td>0 to 400</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>10</td>
<td>0 to 1600</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>11</td>
<td>0 to 1800</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>12</td>
<td>0 to 2000</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>13</td>
<td>-199 to 400</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>14</td>
<td>-199 to 800</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>18</td>
<td>0 to 1300</td>
</tr>
<tr>
<td></td>
<td>Pt-1</td>
<td>19</td>
<td>0 to 1300</td>
</tr>
<tr>
<td>DC voltage</td>
<td>DC0 to 5V</td>
<td>21</td>
<td>-1999 to 9999 (scaling range)</td>
</tr>
<tr>
<td></td>
<td>DC1 to 5V</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DC0 to 10V</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DC2 to 10V</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

## Table 2: Insulation block diagram

<table>
<thead>
<tr>
<th>Power</th>
<th>PV1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loader communication port</td>
<td>PV2</td>
</tr>
<tr>
<td>RS-485 communication port</td>
<td>PV3</td>
</tr>
<tr>
<td></td>
<td>PV4</td>
</tr>
<tr>
<td>OUT1 (Current)</td>
<td></td>
</tr>
<tr>
<td>OUT2 (Current)</td>
<td></td>
</tr>
<tr>
<td>OUT3 (Current)</td>
<td></td>
</tr>
<tr>
<td>OUT4 (Current)</td>
<td></td>
</tr>
</tbody>
</table>

---

*Functional insulation (1000V AC)  Functional insulation (5000V AC)*
OUTLINE DIAGRAM (Unit : mm)

Front terminal cover (Option)

Terminal block
(at attach/detach)

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)**

![Diagram of a 3-pin plug with labels: TX, RX, GND.]

$\phi 2.5$ 3-pole miniature plug

---

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

---

**Base part**

- **Power**: 24V DC
- **Communication**: RS485
- **A(+) B(–) SG**
**TERMINAL CONNECTION DIAGRAM**

(Analog input module [PUMN])

Loader interface plug (RS-232C)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX</td>
<td>RX</td>
<td>GND</td>
</tr>
</tbody>
</table>

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.
**TERMINAL CONNECTION DIAGRAM**

(Analog output module [PUMT])

Loader interface plug (RS-232C)

![Diagram](image)

- 3 TX
- 2 RX
- 1 GND

Φ2.5 3-pole miniature plug

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**Caution on Safety**

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

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Fuji Electric Co., Ltd.

Grobal Sales Section
Instrumentation & Sensors Planning Dept.
1, Fuji-machi, Hino-city, Tokyo 191-8502, Japan
http://www.fujielectric.com
Phone: +81-42-514-8930  Fax: +81-42-583-8275
http://www.fujielectric.com/products/instruments/

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