

# Temperature Controllers

From simple control to advanced control



# Temperature Controller Selection Guide

|                              |                          | Color LCD                                                                         |                                                                                   |                                                                                    | Compact                                                                             | Plug & socket connection                                                            |
|------------------------------|--------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                              |                          |  |  |  |  |  |
| Model                        |                          | PXF4                                                                              | PXF5                                                                              | PXF9                                                                               | PXR3                                                                                | PXR4                                                                                |
| Panel size in mm             | 96 × 96                  |                                                                                   |                                                                                   | ✓                                                                                  |                                                                                     |                                                                                     |
|                              | 48 × 96                  |                                                                                   | ✓                                                                                 |                                                                                    |                                                                                     |                                                                                     |
|                              | 48 × 48                  | ✓                                                                                 |                                                                                   |                                                                                    |                                                                                     | ✓                                                                                   |
|                              | 48 × 24                  |                                                                                   |                                                                                   |                                                                                    | ✓                                                                                   |                                                                                     |
| Power supply                 | 100–240 V AC             | ✓                                                                                 | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              | 24 V DC                  | ✓                                                                                 | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
| Communication                | RS-485 (Modbus)          | ✓                                                                                 | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |                                                                                     |
|                              | RS-485 (Z-ASCII)         |                                                                                   |                                                                                   |                                                                                    | ✓                                                                                   |                                                                                     |
|                              | Loader interface         | ✓                                                                                 | ✓                                                                                 | ✓                                                                                  |                                                                                     |                                                                                     |
| Display                      |                          | 4-digit                                                                           | 4-digit                                                                           | 4-digit                                                                            | 4-digit                                                                             | 4-digit                                                                             |
| Electrical connection        |                          | M3 screw terminal, for wire with terminal lug                                     |                                                                                   |                                                                                    | Euro-style terminal block, for bare wire or wire ferrule                            | 8-pin or 11-pin, M3.5 screw terminal socket                                         |
| Reading accuracy             |                          | ±0.2% FS                                                                          | ±0.2% FS                                                                          | ±0.2% FS                                                                           | ±0.5% FS                                                                            | ±0.5% FS                                                                            |
| Sampling time                |                          | 50 ms                                                                             | 50 ms                                                                             | 50 ms                                                                              | 500 ms                                                                              | 500 ms                                                                              |
| Input                        | No. of PV input          |                                                                                   | 1                                                                                 | 1                                                                                  | 1                                                                                   | 1                                                                                   |
|                              | Sensor                   | RTD                                                                               | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              |                          | TC                                                                                | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              |                          | Voltage/current                                                                   | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              |                          | Thermistor                                                                        |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                              | Options                  | Remote setpoint                                                                   | ✓                                                                                 | ✓                                                                                  |                                                                                     |                                                                                     |
|                              |                          | Current transformer                                                               | ✓                                                                                 | ✓                                                                                  |                                                                                     |                                                                                     |
|                              |                          | Valve position                                                                    |                                                                                   | ✓                                                                                  |                                                                                     |                                                                                     |
|                              |                          | Digital                                                                           | ≤ 3                                                                               | ≤ 3                                                                                | ≤ 2                                                                                 |                                                                                     |
| Output                       | Control output           | Relay contact                                                                     | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              |                          | SSR/SSC                                                                           | ✓ (SSR only)                                                                      | ✓ (SSR only)                                                                       | ✓                                                                                   | ✓                                                                                   |
|                              |                          | Linear current                                                                    | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              |                          | Linear voltage                                                                    | ✓                                                                                 | ✓                                                                                  |                                                                                     |                                                                                     |
|                              |                          | Motor-operated valve                                                              | ✓                                                                                 | ✓                                                                                  |                                                                                     |                                                                                     |
|                              | Options                  | Transfer output (current)                                                         | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |                                                                                     |
|                              |                          | Transfer output (voltage)                                                         | ✓                                                                                 | ✓                                                                                  |                                                                                     |                                                                                     |
|                              |                          | Power to transmitter                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                              | Digital output           |                                                                                   | ≤ 3                                                                               | ≤ 5                                                                                | ≤ 5                                                                                 | ≤ 2                                                                                 |
| Control<br>※with auto-tuning | ON-OFF                   |                                                                                   | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              | PID※                     |                                                                                   | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              | Fuzzy※                   |                                                                                   | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              | Self tuning              |                                                                                   | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   | ✓                                                                                   |
|                              | PID 2※                   |                                                                                   | ✓                                                                                 | ✓                                                                                  |                                                                                     |                                                                                     |
|                              | 2-degree-of-freedom PID※ |                                                                                   | ✓                                                                                 | ✓                                                                                  |                                                                                     |                                                                                     |
| Others                       | Ramp soak                |                                                                                   | 64 steps                                                                          | 64 steps                                                                           | 64 steps                                                                            | 8 steps                                                                             |
|                              | No. of PID palletes      |                                                                                   | 8                                                                                 | 8                                                                                  | 8                                                                                   |                                                                                     |
|                              | No. of SVs               |                                                                                   | 8                                                                                 | 8                                                                                  | 8                                                                                   | 4                                                                                   |
|                              | Manual operation         |                                                                                   | ✓                                                                                 | ✓                                                                                  | ✓                                                                                   |                                                                                     |
|                              | User key                 |                                                                                   | 1                                                                                 | 1                                                                                  | 1                                                                                   |                                                                                     |
| Page                         |                          | 4-9                                                                               | 4-9                                                                               | 4-9                                                                                | 10-13                                                                               | 10-13                                                                               |

| Simple                                                                            | High-end                                                                          | Thermostat                                                                        |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|  |  |  |
| PXE4                                                                              | PXH9                                                                              | PXR3                                                                              |
|                                                                                   | ✓                                                                                 |                                                                                   |
| ✓                                                                                 |                                                                                   |                                                                                   |
|                                                                                   |                                                                                   | ✓                                                                                 |
| ✓                                                                                 | ✓                                                                                 | ✓                                                                                 |
|                                                                                   | ✓                                                                                 |                                                                                   |
| ✓                                                                                 | ✓                                                                                 |                                                                                   |
| 4-digit                                                                           | 5-digit                                                                           | 4-digit                                                                           |
| M3 screw terminal, for wire with terminal lug                                     | Euro-style terminal block, for bare wire or wire ferrule                          |                                                                                   |
| ±0.5% FS                                                                          | ±0.1% FS                                                                          | ±0.5% FS                                                                          |
| 200 ms                                                                            | 50 ms                                                                             | 2 s                                                                               |
| 1                                                                                 | 2                                                                                 | 1                                                                                 |
| ✓                                                                                 | ✓                                                                                 |                                                                                   |
| ✓                                                                                 | ✓                                                                                 | ✓                                                                                 |
|                                                                                   | ✓                                                                                 |                                                                                   |
|                                                                                   | ✓                                                                                 | ✓                                                                                 |
|                                                                                   | ✓                                                                                 |                                                                                   |
| ✓                                                                                 | ≤ 9                                                                               | ✓                                                                                 |
| ✓ (SSR only)                                                                      | ✓                                                                                 |                                                                                   |
|                                                                                   | ✓                                                                                 |                                                                                   |
|                                                                                   | ✓                                                                                 |                                                                                   |
|                                                                                   | ≤ 2                                                                               |                                                                                   |
|                                                                                   | ✓                                                                                 |                                                                                   |
| ≤ 2                                                                               | ≤ 9                                                                               | ≤ 2                                                                               |
| ✓                                                                                 | ✓                                                                                 |                                                                                   |
| ✓                                                                                 | ✓                                                                                 |                                                                                   |
| ✓                                                                                 |                                                                                   |                                                                                   |
|                                                                                   |                                                                                   |                                                                                   |
| ✓                                                                                 | ✓                                                                                 |                                                                                   |
|                                                                                   | 64 steps                                                                          |                                                                                   |
|                                                                                   | 7                                                                                 |                                                                                   |
|                                                                                   | 7                                                                                 |                                                                                   |
|                                                                                   | ✓                                                                                 |                                                                                   |
|                                                                                   | 3                                                                                 |                                                                                   |
| 14-15                                                                             | 16-19                                                                             | 22-23                                                                             |

| Module Type Temperature Controllers                                                                             |                                 |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------|
|  <p>Common Specifications</p> |                                 |
| Size                                                                                                            | 30 (W) × 100 (H) × 85 (D) mm    |
| Power supply                                                                                                    | 24 V DC                         |
| Accuracy                                                                                                        | ±0.3% FS                        |
| Sampling time                                                                                                   | 200 ms                          |
| Communication                                                                                                   | RS-485 (MODBUS)                 |
| Loader communication                                                                                            | RS-232C (MODBUS)                |
| Installation                                                                                                    | Rail mount or wall mount        |
| Control Module (PUMA/PUMB)                                                                                      |                                 |
| No. of inputs                                                                                                   | 2 or 4                          |
| Sensor                                                                                                          | TC, RTD, voltage/current        |
| No. of outputs                                                                                                  | 2 or 4                          |
| Control output signal                                                                                           | Relay contact, current, SSR/SSC |
| Control                                                                                                         | On/off, PID, heating/cooling    |
| Auto, manual, remote                                                                                            | Auto, manual, remote            |
| Options                                                                                                         | CT input (4 or 8)               |
| Event I/O Module (PUME)                                                                                         |                                 |
| No. of DIs                                                                                                      | 8                               |
| No. of DOs                                                                                                      | 8                               |
| Output type                                                                                                     | Relay contact or transistor     |
| Analog I/O Module (PUMV/PUMN/PUMT)                                                                              |                                 |
| No. of AIs                                                                                                      | 4                               |
| Input signal                                                                                                    | TC, RTD, voltage/current        |
| No. of AOs                                                                                                      | 4                               |
| Output signal                                                                                                   | 4–20 mA DC                      |
| CC-Link Communication Module (PUMCL)                                                                            |                                 |
| Programless Communication with Mitsubishi PLC (PUMCM)                                                           |                                 |
| PROFIBUS Communication Module (PUMCP)                                                                           |                                 |
| Ethernet Communication Module (PUMCE)                                                                           |                                 |
| Page                                                                                                            | 20-21                           |

# Micro-Controller X PXF

## Superior Versatility and Flexibility for a Wide Range of Applications



PXF9  
96 × 96 × 58 mm



PXF5  
48 × 96 × 58 mm



PXF4  
48 × 48 × 58 mm



### Fast and Precise control

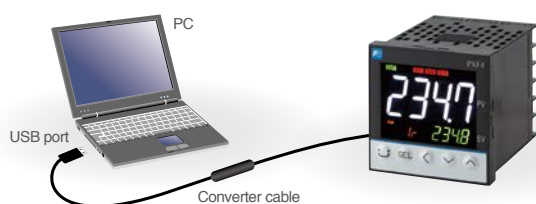
- Sampling time 50 ms
- Control 100 ms

### Variety of Control Functions

- On-off
- PID
- Fuzzy
- Self-tuning
- PID2
- Two-degree-of-freedom PID
- Motor-operated-valve control

### Bus-Powered USB Interface

For configuration and data viewer software



### Universal Input

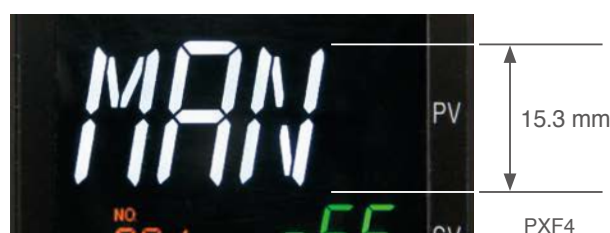
- Accept any signal
- User can change the input type later on

### Compact Design

- Shallow body with 58-mm depth

### Easy-to-See Display

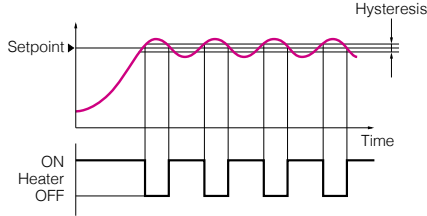
- Bright and clear color-LCD
- Tallest character height in market
- PV indication in white



## Control Functions

### On-Off Control Simple and Basic Control

When process value (PV) is below the set value (SV), PXF turns on the output to energize the heater, and vice versa. In this way, PXF keeps the temperature constant by turning the output on and off based on the SV as a threshold.



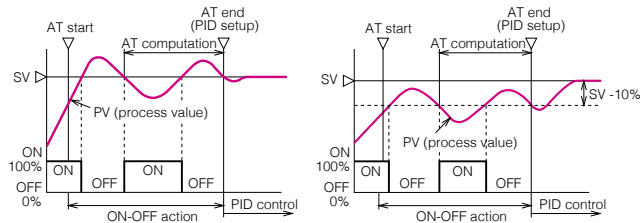
### PID Control with Auto Tuning

Typical Control Based on PID Theory

The controller calculates optimal PID parameters. There are 2 types of auto-tuning functions; the standard type (auto-tuning with reference to SV) and the low-SV type (auto-tuning with reference to the value 10% below SV). The low-SV type auto tuning is useful when you want to avoid overshoots. You can also set the PID parameters manually.

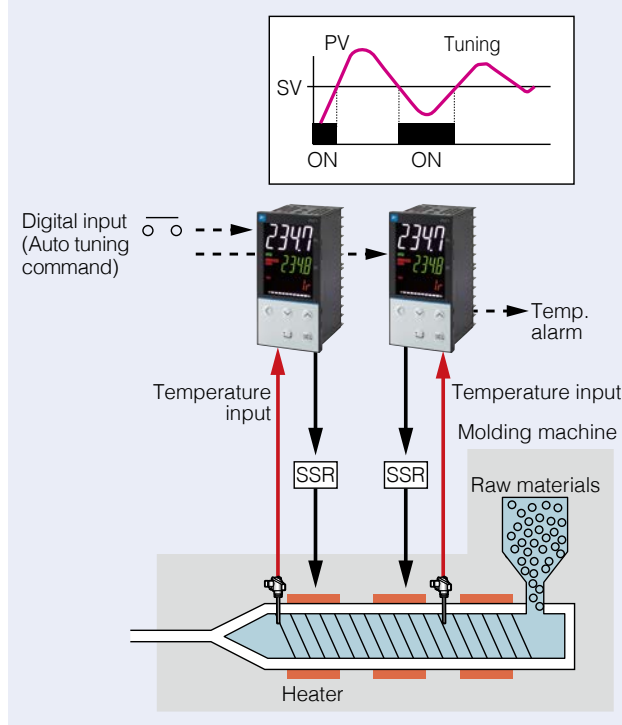
#### PID Auto Tuning

(a) Standard type



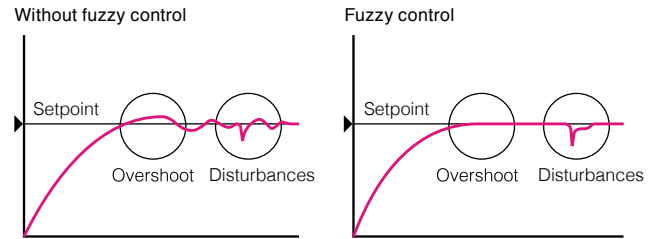
(b) Low-PV type

### Molding Machine



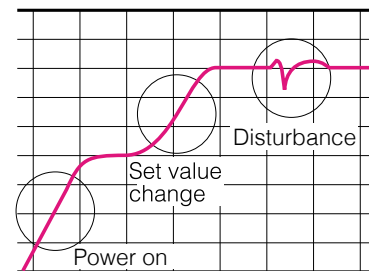
### Fuzzy Control with Auto Tuning

Suppresses Overshoot by Fuzzy Calculation



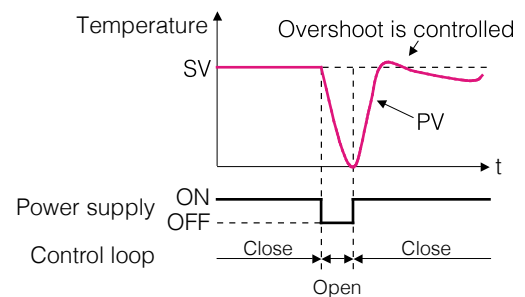
### Self Tuning Control

For Changing Temperature



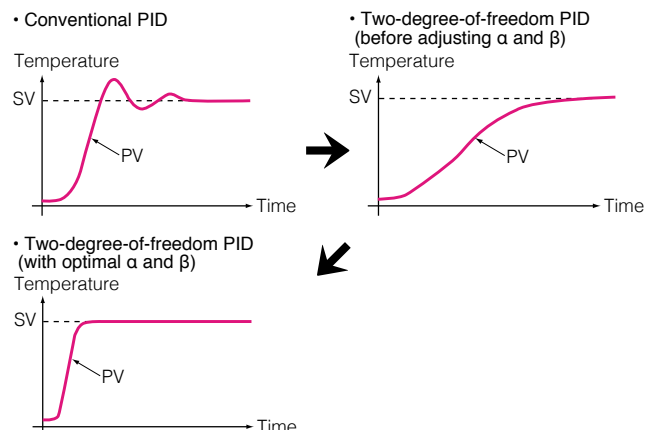
### PID2 Control with Auto Tuning

Suppresses Overshoot and Undershoot



### Two-Degree-of-Freedom PID Control with Auto Tuning

Combined Method for Stable Control



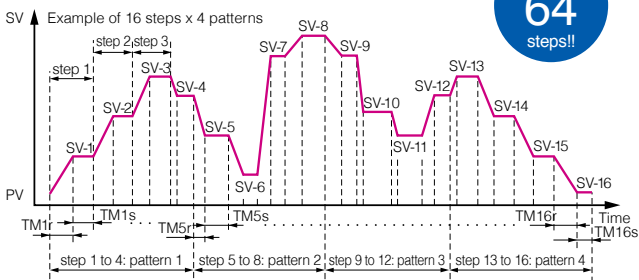
## Functions for better user experience

### Simple Program Control (Ramp Soak Function)

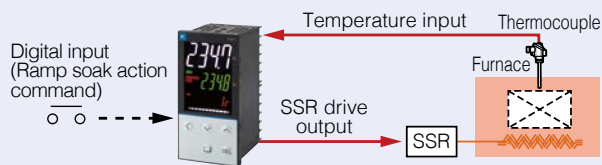
PXF automatically changes SV to the preset values at preset times. You can set up to 64 steps and 15 types of operation patterns. For example, when you bake four kinds of bread, you can divide 64 steps into four patterns to set suitable temperature for each bread. You can start/stop/suspend the operation using a user key, parameter setting, digital input, or communication.

#### Number of steps and patterns

| Steps | Patterns |
|-------|----------|
| 64    | 1        |
| 32    | 2        |
| 16    | 4        |
| 8     | 8        |



### Controlling Temperature Gradient of Furnace by heating patterns

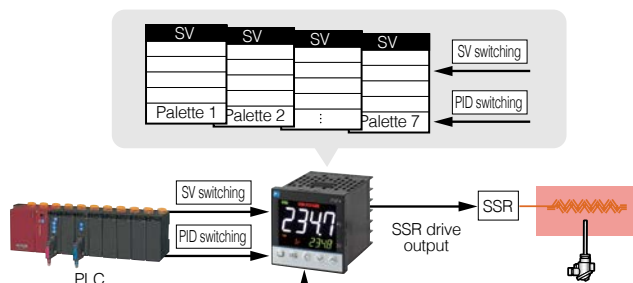


### Heating and Cooling Control (option)

### Motorized Valve Control

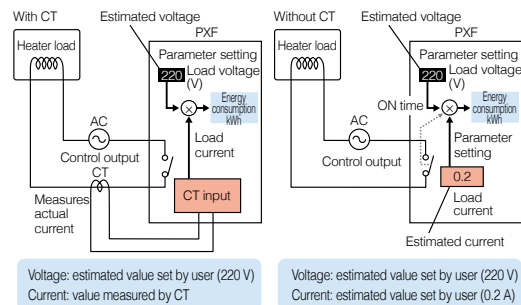
### SV and PID selection Easy Switching Among 8 Presets

Enables optimum PID setting for changing process, materials, or PV. You can perform SV selection only, PID selection only, or PID selection according to PV.



### Simple Watt-Hour Metering Function

Tells You the Energy Consumption



### Operating Days Alarm

For Well-Timed Maintenance

Indicator or alarm output alert you when the number of days operated has reached the limit you set.

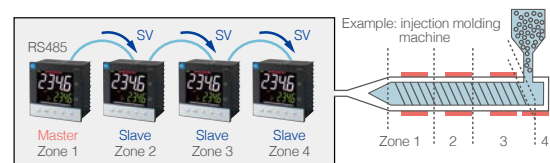


### Soft Start

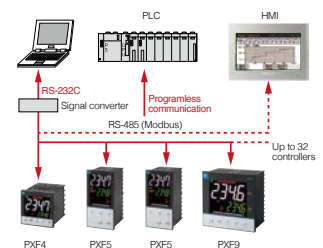
Saves Energy at Startup

### RS-485 Communication (option)

Multi-drop master function in combination with the two-degree-of-freedom PID control enables synchronous heating control.



- Parameter values can be copied to multiple PXFs simultaneously.
- Communication with PC, HMI, or PLC



### Heater Burnout Alarm (option)

Quickly Informs You a Failure

- A current transformer (CT) is required.
- The power supply voltage and the alarm action point must be configured beforehand.

### Transfer Output (option)

Temperature Signals to External Devices

### Alarm Output (option)

Up to 5 Alarms (PXF4: up to 3)

### Digital Input (option)

SV Can be Switched Externally

### Remote SV Input (option)

SV Can be Configured Externally

# Specifications

## General

|                                    |                                                                                                                                                                      |                 |            |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------|
| Power supply voltage               | 100 V (-15%) to 240 V (+10%) AC, 50/60 Hz, or 24 V (±10%) AC/DC                                                                                                      |                 |            |
| Power consumption                  | Model                                                                                                                                                                | 100 to 240 V AC | 24 V DC/AC |
|                                    | PXF4                                                                                                                                                                 | 10 VA MAX.      | 5 VA MAX.  |
|                                    | PXF5 & PXF9                                                                                                                                                          | 13 VA MAX.      | 8 VA MAX.  |
| Insulation resistance              | ≥ 20 MΩ (at 500 V DC)                                                                                                                                                |                 |            |
| Withstand voltage                  | Between the power source and other terminals: 1500 V AC for 1 min                                                                                                    |                 |            |
|                                    | Between the relay output and other terminals: 1500 V AC for 1 min<br>Others: 500 V AC for 1 min                                                                      |                 |            |
| Input impedance                    | <ul style="list-style-type: none"> <li>Thermocouple, mV input: ≥ 1 MΩ</li> <li>Current input: ≤ 150 Ω (built-in diode)</li> <li>Voltage input: About 1 MΩ</li> </ul> |                 |            |
| Allowable input voltage            | <ul style="list-style-type: none"> <li>DC voltage input: ≤ ±35 V</li> <li>Current input: ≤ ±25 mA</li> <li>Thermocouple, RTD, mV input: ≤ ±5 V</li> </ul>            |                 |            |
| Effect of signal source resistance | <ul style="list-style-type: none"> <li>Thermocouple, mV input: ±0.3%FS ±1 digit per 100 Ω</li> <li>Voltage input: ±0.3%FS ±1 digit per 500 Ω</li> </ul>              |                 |            |
| Allowable wire resistance          | RTD: ≤10 Ω per wire                                                                                                                                                  |                 |            |
| Input value correction             | (a) User adjustment: ±50%FS for each of zero and span point                                                                                                          |                 |            |
|                                    | (b) Process value shift: ±10%FS                                                                                                                                      |                 |            |
|                                    | (c) Input filter: 0.0 to 120.0 s (filter is off when set to 0.0)                                                                                                     |                 |            |
|                                    | (d) Square root extraction: -0.1 to 105% (OFF if set to -0.1%)                                                                                                       |                 |            |
| Noise reduction ratio              | Normal mode: 40 dB (50/60 Hz)                                                                                                                                        |                 |            |
|                                    | Common mode: 120 dB (50/60 Hz)                                                                                                                                       |                 |            |
|                                    | Between input and power supply: ±1°C at 220 V AC, 50/60 Hz                                                                                                           |                 |            |
| Temperature effect on sensitivity  | ±0.3%FS per 10°C                                                                                                                                                     |                 |            |

## Display and keys

|                   |                                                                                                                                             |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Type              | Backlit LCD                                                                                                                                 |
| Keys              | 5 embossed keys                                                                                                                             |
| Cotents           | PV: 11-segment, 4-digit [white]<br>SV: 11-segment, 4-digit [green]<br>Parameter name: 7-segment, 4-digit [orange]<br>Status indicator: ≤ 42 |
| Luminance setting | 4 levels                                                                                                                                    |
| User key          | Allows you to switch between: auto/manual, standby on/off, remote SV, ramp/soak, etc.                                                       |

## Structure

|                       |                                                                                                                                                                                                                                                                                               |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Installation          | Panel mounting                                                                                                                                                                                                                                                                                |
| Electrical connection | M3 screw terminal                                                                                                                                                                                                                                                                             |
| Case                  | <ul style="list-style-type: none"> <li>Material: ABS, PPO</li> <li>Non-combustibility grade: UL94V-0 equivalent</li> <li>Color: black</li> </ul>                                                                                                                                              |
| IP rating             | <ul style="list-style-type: none"> <li>Panel front side: IP66, NEMA-4X equivalent (When the panel is mounted using our genuine packing. Not water-proof if mounted closely together.)</li> <li>Body: IP20 equivalent (slits on top and bottom)</li> <li>Terminals: IP00 equivalent</li> </ul> |
| Weight                | PXF4: approx. 100 g, PXF5: approx. 170 g, PXF9: approx. 220 g                                                                                                                                                                                                                                 |

## PV input

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of inputs                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Signal                        | Thermocouples, RTD, voltage, or current<br>*See a separate table for measurement range.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Input setting                 | Programmable scale                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Sampling rate                 | 50 ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Indication accuracy (at 23°C) | <ul style="list-style-type: none"> <li>Thermocouple input: either ±1°C ±1 digit or ±0.3% of indicated value ±1 digit, whichever is larger</li> <li>*except:<br/>Thermocouple B: 0 to 400°C: no accuracy assurance<br/>Thermocouple R: 0 to 500°C: ±3°C ±1 digit<br/>Thermocouples of which measuring range is between -200°C and -100°C: ±2°C ±1 digit</li> <li>RTD input: ±0.8°C ±1 digit or ±0.2% of indication value ±1 digit, whichever is larger</li> <li>mV input, voltage input, current input: ±0.3%FS ±1 digit</li> </ul> |
| Overrange · underrange        | Out of the range between -5% and 105% FS (accuracy is not assured between -5 and 0, and between 100 and 105%FS)<br>*Pt (-200°C to 850°C) input, 0–10 V DC input, thermocouple E:<br>Out of the range between -5 to 102% of FS                                                                                                                                                                                                                                                                                                      |

## Remote SV input (option)

|               |                                                                                                        |
|---------------|--------------------------------------------------------------------------------------------------------|
| No. of inputs | 1                                                                                                      |
| Signal        | Voltage: 0–5 V DC, 1–5 V DC, 0–10 V DC<br>Current (250 Ω resistor is required): 0–20 mA DC, 4–20 mA DC |
| Impedance     | Approx. 1 MΩ                                                                                           |
| Sampling rate | 50 ms                                                                                                  |

## Current transformer input (option)

|                                 |                                                                                           |
|---------------------------------|-------------------------------------------------------------------------------------------|
| Input type                      | Single phase CT, 1 point<br>For 1 A to 30 A: CTL-6-S-H<br>For 20 A to 100 A: CTL-12-S36-8 |
| Detection range                 | 1 A to 100A                                                                               |
| Accuracy                        | Setpoint ±5%FS                                                                            |
| Resolution                      | 0.1A                                                                                      |
| ON time necessary for detection | ≥ 300 ms                                                                                  |

## Digital input (option)

|                   |                                                                                                                                                                            |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of inputs     | PXF5 and PXF9: up to 3<br>PXF4 standard version: 1<br>PXF4 motorized valve control version: 3                                                                              |
| Switch            | Volt-free contact or transistor                                                                                                                                            |
| Contact capacity  | 5 V DC, about 2 mA (per point)                                                                                                                                             |
| Input judgment    | ON voltage: 2 V DC or lower<br>OFF voltage: 3 V DC or higher                                                                                                               |
| Input pulse width | ≥ 50 ms                                                                                                                                                                    |
| Functions         | Remote mode selection, SV changeover, control standby, AT startup, timer startup, alarm unlatch, program selection, start/stop/reset, PID switching (normal/reverse), etc. |

## Valve position feedback signal input (option for PXF5 and PXF9 only)

|                                   |                           |
|-----------------------------------|---------------------------|
| Resistance range                  | 100Ω to 2.5kΩ, three-wire |
| Resolution                        | 0.5% FS                   |
| Accuracy                          | ±1.0%FS                   |
| Temperature effect on sensitivity | ±0.5%FS per 10°C          |
| Burnout function                  | None                      |

## Alarm output (option)

|               |                                                                                                                                                                                                                                                                                                                                    |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of points | Relay contact<br>Shared COM: PXF4: ≤3, PXF5 & PXF9: ≤5<br>Independent COM: PXF4: ≤2, PXF5 & PXF9: ≤3                                                                                                                                                                                                                               |
| Contact       | <ul style="list-style-type: none"> <li>Contact structure: SPST-NO</li> <li>Contact capacity: 250 V AC / 30 V DC, 1A (resistive load)</li> <li>Minimum ON/OFF current: 10 mA (5 V DC)</li> <li>Mechanical life: ≥ 20 million operations (100 operations/min)</li> <li>Electrical life: ≥ 100,000 operations (rated load)</li> </ul> |
| Functions     | Alarm output, main unit control mode output, program status output, control output 1 and 2, etc.                                                                                                                                                                                                                                   |
| Output cycle  | 100 ms                                                                                                                                                                                                                                                                                                                             |

## Alarm

|                                        |                                                                                                                                                                                        |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of alarms                          | PXF4: ≤ 3<br>PXF5 & PXF9: ≤ 5 (depends on the number of DO)                                                                                                                            |
| Alarm type                             | Process value (upper limit/lower limit, absolute/deviation, range), device error, etc.(non-excitation, delay, latch, timer function available)                                         |
| Heater current alarm function (option) | Current transformer (CT) is to be prepared separately<br>Detectable range: 1 A to 100 A<br>Detected current resolution: 0.1A<br>Setting resolution: 0.1A<br>Hysteresis: 0.0 to 100.0 A |

## Transfer output (option)

|                     |                                                                                                                                                                                                                                                                                                                                 |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of points       | 1                                                                                                                                                                                                                                                                                                                               |
| Type                | 0–20 mA DC / 4–20 mA DC / 0–5 V DC / 1–5 V DC / 0–10 V DC / 2–10 V DC<br><ul style="list-style-type: none"> <li>Guaranteed output range: 0–21 mA DC / 0–10.5 V DC</li> <li>Accuracy: ±0.2%FS (±5%FS at 1 mA or smaller)</li> <li>Resolution: ≥ 10,000</li> <li>Load resistance: ≤ 500 Ω (current), ≥ 10 kΩ (voltage)</li> </ul> |
| Output cycle        | 100 ms                                                                                                                                                                                                                                                                                                                          |
| Contents            | PV, SV, DV, MV                                                                                                                                                                                                                                                                                                                  |
| Additional function | Scaling function                                                                                                                                                                                                                                                                                                                |

## Specifications

### Control output

| No. of points | ≤ 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type          | <ol style="list-style-type: none"> <li>Relay contact output (SPST-NO) <ul style="list-style-type: none"> <li>Proportional cycle: 1 to 150 s</li> <li>Contact capacity: 250 VAC / 30 VDC, 3A (resistive load)</li> <li>Minimum ON/OFF current: 10 mA (5 V DC)</li> <li>Mechanical life: ≥ 20 million operations (100 operations/min)</li> <li>Electrical life: ≥ 100,000 operations (rated load)</li> </ul> </li> <li>Relay contact output (SPDT) <ul style="list-style-type: none"> <li>Proportional cycle: 1 to 150 s</li> <li>Contact capacity: 250 VAC / 30 VDC, 5A (resistive load)</li> <li>Mechanical life: ≥ 50 million operations (100 operations/min)</li> <li>Electrical life: ≥ 100,000 operations (rated load)</li> </ul> </li> <li>SSR drive output <ul style="list-style-type: none"> <li>Proportional cycle: 1 to 150 s</li> <li>ON voltage: 12 V DC (between 10.7 and 13.2 V DC)</li> <li>OFF voltage: ≤ 0.5 V DC</li> <li>Maximum current: 20 mA DC</li> <li>Load resistance: ≥ 600 Ω</li> </ul> </li> <li>Current output (0–20 mA DC / 4–20 mA DC) <ul style="list-style-type: none"> <li>Accuracy: ±5%FS</li> <li>Load resistance: ≤ 500 Ω</li> </ul> </li> <li>Voltage output (0–5 V DC / 1–5 V DC / 0–10 V DC / 2–10 V DC) <ul style="list-style-type: none"> <li>Accuracy: ±5%FS</li> <li>Load resistance: ≥ 10 kΩ</li> </ul> </li> <li>Motorized valve control output <ul style="list-style-type: none"> <li>Contact structure: 2 SPST-NO contacts without interlock circuit</li> <li>Contact capacity: 250 VAC / 30 VDC, 3A (resistive load)</li> <li>Minimum ON/OFF current: 100 mA (24 V DC)</li> <li>Mechanical life: ≥ 20 million operations (100 operations/min)</li> <li>Electrical life: ≥ 100,000 operations (rated load)</li> </ul> </li> </ol> |

### Control

| Control type                      |                                                                                                                                                                                                                                                       |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| On-off                            |                                                                                                                                                                                                                                                       |
| PID                               |                                                                                                                                                                                                                                                       |
| Fuzzy PID                         | Can be used in heating and cooling dual control. PID parameters are auto tuned.                                                                                                                                                                       |
| PID2                              |                                                                                                                                                                                                                                                       |
| Self tuning                       |                                                                                                                                                                                                                                                       |
| Two-degree-of-freedom PID         | PID parameters are auto tuned.                                                                                                                                                                                                                        |
| Position proportional PID (servo) | PXF4: without position feedback<br>PXF5 and PXF9: with position feedback<br>Full stroke time: ≥ 30 s                                                                                                                                                  |
| Control mode                      | Auto/Manual/Remote<br>* In manual mode, on/off control is performed with 100% MV or 0% MV.<br>Mode changeover:<br>• Auto ↔ Manual: Balanceless · bumpless<br>• Auto/Manual → Remote: Balance · bumpless<br>• Auto/Manual ← Remote: Balance · bumpless |
| Parameters                        |                                                                                                                                                                                                                                                       |
| Proportional band (P)             | 0.1% to 999.9%                                                                                                                                                                                                                                        |
| Integration time (I)              | 0 to 3200 s (invalidated when I = 0)                                                                                                                                                                                                                  |
| Differential time (D)             | 0.0 to 999.9 s (invalidated when D = 0)                                                                                                                                                                                                               |
| Control cycle                     | 100 to 900 ms (in 100 ms), 1 to 99 s (in seconds)                                                                                                                                                                                                     |
| Anti-reset windup                 | 0 to 100% of measurement range                                                                                                                                                                                                                        |
| Hysteresis band                   | 50% of measurement range (for on/off action only)                                                                                                                                                                                                     |
| Number of SV and PID patterns     | 8: Changed by any of parameter setting, digital input, communication, user function keying, zone change.                                                                                                                                              |

### RS-485 communication

| Modbus RTU, half-duplex bit serial, asynchronous communication |                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Serial characteristics                                         | Data bits: 8 bits. Parity: odd, even, none<br>Baud rate: 9600 bps, 19200 bps, 38.4 kbps, 115.2 kbps                                                                                                                                                                                                                                                                                                                                            |
| Connection                                                     | ≤ 32 units                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Communication distance                                         | ≤ 500 m (total connection length)                                                                                                                                                                                                                                                                                                                                                                                                              |
| Additional function                                            | <ul style="list-style-type: none"> <li>Multidrop master function</li> </ul> The function in which slave devices can be operated by a master device by connecting several temperature controllers.<br><ul style="list-style-type: none"> <li>Programless communication</li> </ul> The function in which a temperature controller can be connected to a PLC without program.<br>Supported PLCs: Mitsubishi PLC Q series<br>Siemens PLC S7 series |

### Other functions

|                                    |                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ramp soak                          | 64 steps × 1 pattern, 32 steps × 2 patterns, 16 steps × 4 patterns, or 8 steps × 8 patterns (1 step = 2 segments)<br>- Control option: control by digital input or status output by digital output<br>- Time setting: "Hour, Minutes" or "Minutes, Seconds"<br>- Guaranteed soak<br>- Repeat action<br>- PV start<br>- Delay start<br>- Power failure recovery<br>- Memory backup on EEPROM |
| Data backup at power outage        | on non-volatile memory                                                                                                                                                                                                                                                                                                                                                                      |
| Self-diagnosis                     | by watchdog timer                                                                                                                                                                                                                                                                                                                                                                           |
| Password                           | three-level password                                                                                                                                                                                                                                                                                                                                                                        |
| Simple watt-hour metering function | <ul style="list-style-type: none"> <li>By connecting a current transformer (to be prepared separately), electric power consumption of the heater can be displayed. (Electric power is calculated based on the fixed voltage value you set.)</li> <li>Current transformer (CT) is to be prepared separately.</li> <li>Current detection range: 1 A to 100 A</li> </ul>                       |
| Operating days alarm               | <ul style="list-style-type: none"> <li>Indicates the number of days the controller has been operated and activates alarm output (optional) when it exceeds the setpoint.</li> <li>Useful for preventive maintenance because it let you know the appropriate time for maintenance work.</li> </ul>                                                                                           |

### Operation and storage conditions

|                       |                                                      |
|-----------------------|------------------------------------------------------|
| Operating temperature | -10°C to 50°C                                        |
| Storage temperature   | -20°C to 60°C                                        |
| Humidity              | ≤ 90% RH (no condensation)                           |
| Warm-up time          | ≥ 30 min                                             |
| Vibration             | during transportation: ≤ 9.8 m/s <sup>2</sup> (1 G)  |
| Impact                | during transportation: ≤ 294 m/s <sup>2</sup> (30 G) |

### Measurement range

| Input signal |               | Code (PvT) | Range [°C]                                     | Resolution [°C] |
|--------------|---------------|------------|------------------------------------------------|-----------------|
| RTD          | Pt 100        | PT1        | 0.0 to 150.0                                   | 0.1             |
|              |               | PT2        | 0.0 to 300.0                                   | 0.1             |
|              |               | PT3        | 0.0 to 500.0                                   | 0.1             |
|              |               | PT4        | 0.0 to 600.0                                   | 0.1             |
|              |               | PT5        | -50.0 to 100.0                                 | 0.1             |
|              |               | PT6        | -100.0 to 200.0                                | 0.1             |
|              |               | PT7        | -199.9 to 600.0                                | 0.1             |
|              |               | PT8        | -200 to 850                                    | 1               |
| DC voltage   | 0 to 5 V DC   | 0-5V       | -1999 to 9999 (Range where scaling is allowed) | —               |
|              | 1 to 5 V DC   | 1-5V       |                                                |                 |
|              | 0 to 10V DC   | 0-10       |                                                |                 |
|              | 2 to 10V DC   | 2-10       |                                                |                 |
|              | 0 to 100mV DC | MV         |                                                |                 |
| DC current   | 0 to 20 mA DC | 0-20       |                                                |                 |
|              | 4 to 20 mA DC | 4-20       |                                                |                 |

| Input signal |       | Code (PvT) | Range [°C]      | Resolution [°C] |
|--------------|-------|------------|-----------------|-----------------|
| Thermocouple | J     | J1         | 0.0 to 400.0    | 0.1             |
|              |       | J2         | -20.0 to 400.0  | 0.1             |
|              |       | J3         | 0.0 to 800.0    | 0.1             |
|              |       | J4         | -100 to 1000    | 1               |
|              | K     | K1         | 0 to 400        | 0.1             |
|              |       | K2         | -20.0 to 500.0  | 0.1             |
|              |       | K3         | 0.0 to 800.0    | 0.1             |
|              |       | K4         | -200 to 1300    | 1               |
|              | R     | R          | 0 to 1700       | 1               |
|              | B     | B          | 0 to 1800       | 1               |
|              | S     | S          | 0 to 1700       | 1               |
|              | T     | T1         | -199.9 to 200.0 | 0.1             |
|              |       | T2         | -199.9 to 400.0 | 0.1             |
|              | E     | E1         | 0.0 to 800.0    | 0.1             |
|              |       | E2         | -150.0 to 800.0 | 0.1             |
|              |       | E3         | -200 to 800     | 1               |
|              | L     | L          | -100 to 850     | 1               |
|              | U     | U1         | -199.9 to 400.0 | 0.1             |
|              |       | U2         | -200 to 400     | 1               |
|              | N     | N          | -200 to 1300    | 1               |
|              | W     | W          | 0 to 2300       | 1               |
|              | PL-II | PL-2       | 0 to 1300       | 1               |

## Ordering Code

### PXF4 Standard Type

| Digit | Specification                                                                      | Code |
|-------|------------------------------------------------------------------------------------|------|
| 1-4   | 〈Front dimensions W x H〉<br>48 × 48mm                                              | PXF4 |
| 5     | —                                                                                  | A    |
| 6     | 〈Control output 1〉<br>Relay contact (SPST) *1                                      | A    |
|       | Relay contact (SPDT) *1                                                            | B    |
|       | SSR drive output                                                                   | C    |
|       | Current output                                                                     | E    |
|       | Voltage output                                                                     | P    |
| 7     | 〈Control output 2〉<br>None                                                         | Y    |
|       | Relay contact (SPST)                                                               | A    |
|       | SSR drive output                                                                   | C    |
|       | Current output                                                                     | E    |
|       | Voltage output                                                                     | P    |
|       | Transfer output (current)                                                          | R    |
| 8     | 〈Revision code〉                                                                    | 2    |
|       | 〈Alarm output〉<br>None                                                             | 0    |
| 9     | 1 point                                                                            | 1    |
|       | 2 points                                                                           | F    |
|       | 3 points                                                                           | M    |
|       | 2 points (independent common)                                                      | J    |
| 10    | 〈Power supply voltage / instruction manual〉<br>100 to 240 V AC, Japanese & English | Y    |
|       | 100 to 240 V AC, English                                                           | V    |
|       | 100 to 240 V AC, Chinese & English                                                 | W    |
|       | 24 V AC/DC, Japanese & English                                                     | A    |
|       | 24 V AC/DC, English                                                                | B    |
|       | 24 V AC/DC, Chinese & English                                                      | D    |
| 11    | 〈Option〉<br>None                                                                   | 1    |
|       | RS-485 communication                                                               | M    |
|       | Digital input (DI1)                                                                | S    |
|       | RS-485 communication + Digital input (DI1)                                         | V    |
|       | RS-485 communication + Remote SV input *2                                          | K    |
|       | RS-485 communication + CT input *3                                                 | J    |
| 12    | —                                                                                  | 00   |
| 13    | —                                                                                  | 00   |

\*1: Not available for the 7th code "C", "E", "P", "R", "S". However, if you want to order the 6th code "A" (SPST relay contact for the control output 1) and the 7th code "R" or "S" (current/voltage re-transmission output for the control output 2), specify the model as follows:

PXF4AA 2-00002

\*2: When using current for the remote SV input, add a 250-ohm resistor to the input terminal.  
\*3: When using the CT input for heater burnout alarm, add one alarm output for it in the 9th code.

### PXF5 & PXF9 Standard Type

| Digit | Specification                                                                      | Code         |
|-------|------------------------------------------------------------------------------------|--------------|
| 1-4   | 〈Front dimensions W x H〉<br>48 × 96 mm<br>96 × 96 mm                               | PXF5<br>PXF9 |
| 5     | —                                                                                  | A            |
| 6     | 〈Control output 1〉<br>Relay contact (SPST)                                         | A            |
|       | Relay contact (SPDT)                                                               | B            |
|       | SSR drive output                                                                   | C            |
|       | Current output                                                                     | E            |
|       | Voltage output                                                                     | P            |
| 7     | 〈Control output 2〉<br>None                                                         | Y            |
|       | Relay contact (SPST)                                                               | A            |
|       | SSR drive output                                                                   | C            |
|       | Current output                                                                     | E            |
|       | Voltage output                                                                     | P            |
|       | Transfer output (current)                                                          | R            |
| 8     | 〈Revision code〉                                                                    | 2            |
|       | 〈Alarm output〉<br>None                                                             | 0            |
| 9     | 1 point                                                                            | 1            |
|       | 2 points                                                                           | F            |
|       | 3 points                                                                           | M            |
|       | 2 points (independent common)                                                      | J            |
| 10    | 〈Power supply voltage / instruction manual〉<br>100 to 240 V AC, Japanese & English | Y            |
|       | 100 to 240 V AC, English                                                           | V            |
|       | 100 to 240 V AC, Chinese & English                                                 | W            |
|       | 24 V AC/DC, Japanese & English                                                     | A            |
|       | 24 V AC/DC, English                                                                | B            |
|       | 24 V AC/DC, Chinese & English                                                      | D            |
| 11    | 〈Option〉<br>None                                                                   | 1            |
|       | RS-485 communication                                                               | M            |
|       | Digital input (DI 1 and DI2)                                                       | T            |
|       | Remote SV input + Digital input (DI3) *1                                           | H            |
|       | CT input + Digital input (DI1) *2                                                  | G            |
|       | RS-485 communication + Digital input (DI1)                                         | V            |
|       | RS-485 + Digital input (DI3, DI4, DI5) + Auxiliary alarm output (AL4, AL5)         | C            |
| 12    | —                                                                                  | 00           |
| 13    | —                                                                                  | 00           |

\*1: When using current for the remote SV input, add a 250-ohm resistor to the input terminal.  
\*2: When using the CT input for heater burnout alarm, add one alarm output for it in the 9th code.

### PXF4 Motorized Valve Control Type

| Digit | Specification                                                                      | Code |
|-------|------------------------------------------------------------------------------------|------|
| 1-4   | 〈Front dimensions W x H〉<br>48 × 48mm                                              | PXF4 |
| 5     | —                                                                                  | A    |
| 6     | 〈Control output 1〉<br>Motorized valve control output (without PFB input)           | T    |
| 7     | 〈Control output 2〉<br>None                                                         | Y    |
| 8     | 〈Revision code〉                                                                    | 2    |
| 9     | 〈Alarm output〉<br>None                                                             | 0    |
|       | 1 point                                                                            | 1    |
|       | 2 points                                                                           | F    |
|       | 2 points (independent common)                                                      | J    |
| 10    | 〈Power supply voltage / instruction manual〉<br>100 to 240 V AC, Japanese & English | Y    |
|       | 100 to 240 V AC, English                                                           | V    |
|       | 100 to 240 V AC, Chinese & English                                                 | W    |
|       | 24 V AC/DC, Japanese & English                                                     | A    |
|       | 24 V AC/DC, English                                                                | B    |
|       | 24 V AC/DC, Chinese & English                                                      | D    |
| 11    | 〈Option〉<br>None                                                                   | 1    |
|       | Digital input (DI 1, 2, 3)                                                         | D    |
|       | RS-485 communication + Digital input (DI1)                                         | V    |
| 12    | —                                                                                  | 00   |
| 13    | —                                                                                  | 00   |

### Separate order items

|                                                          |            |                   |
|----------------------------------------------------------|------------|-------------------|
| Current transformer                                      | 1 A to 30A | ZOZ*CCTL-6-S-H    |
|                                                          | 20 to 100A | ZOZ*CCTL-12-S36-8 |
| Terminal cover                                           |            | ZZPPXR1-A230      |
| Parameter loader interface cable                         |            | ZZP*Q501923C3     |
| Shunt resistor (250 Ω±0.1%)                              |            | ZZPPXR1-A190      |
| Panel mounting adapter for replacement from PXR7 to PXF4 |            | ZZP*Q502732C1     |

### PXF5 & PXF9 Motorized Valve Control Type

| Digit | Specification                                                                                                               | Code         |
|-------|-----------------------------------------------------------------------------------------------------------------------------|--------------|
| 1-4   | 〈Front dimensions W x H〉<br>48 × 96 mm<br>96 × 96 mm                                                                        | PXF5<br>PXF9 |
| 5     | —                                                                                                                           | A            |
| 6     | 〈Control output 1〉<br>Motorized valve control output (without PFB input)<br>Motorized valve control output (with PFB input) | S<br>V       |
| 7     | 〈Control output 2〉<br>None                                                                                                  | Y            |
| 8     | 〈Revision code〉                                                                                                             | 2            |
| 9     | 〈Alarm output〉<br>None                                                                                                      | 0            |
|       | 1 point                                                                                                                     | 1            |
|       | 2 points                                                                                                                    | F            |
|       | 3 points                                                                                                                    | M            |
| 10    | 〈Power supply voltage / instruction manual〉<br>100 to 240 V AC, Japanese & English                                          | Y            |
|       | 100 to 240 V AC, English                                                                                                    | V            |
|       | 100 to 240 V AC, Chinese & English                                                                                          | W            |
|       | 24 V AC/DC, Japanese & English                                                                                              | A            |
|       | 24 V AC/DC, English                                                                                                         | B            |
|       | 24 V AC/DC, Chinese & English                                                                                               | D            |
| 11    | 〈Option〉<br>None                                                                                                            | 1            |
|       | RS-485 communication + Digital input (DI1, DI2, DI3)                                                                        | U            |
| 12    | —                                                                                                                           | 00           |
| 13    | —                                                                                                                           | 00           |

### Separate order items

|                                  |            |                   |
|----------------------------------|------------|-------------------|
| Current transformer              | 1 A to 30A | ZOZ*CCTL-6-S-H    |
|                                  | 20 to 100A | ZOZ*CCTL-12-S36-8 |
| Terminal cover *1                |            | ZZPPXF1-B100      |
| Parameter loader interface cable |            | ZZP*Q501923C3     |
| Shunt resistor (250 Ω±0.1%)      |            | ZZPPXR1-A190      |

\*1: For PXF9, two covers are necessary for one unit.

### Scope of delivery

Controller, panel mounting adapter, water-proof packing, instruction manual

# Micro-Controller X PXR



PXR4  
48 × 48 × 84.7 mm



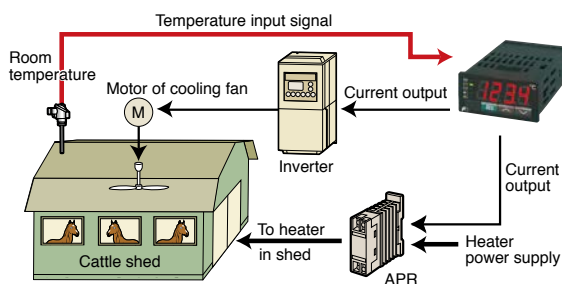
PXR3  
48 × 24 × 98 mm



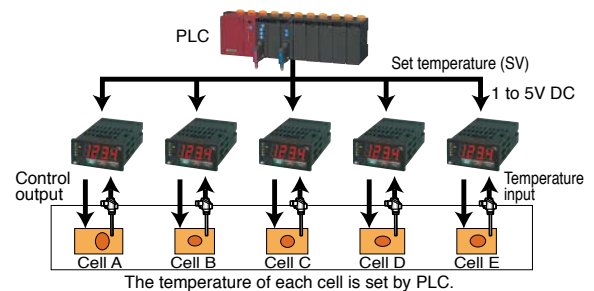
## Compact Type and Plug & Socket Connection type

- Heating and cooling control
- Front waterproof structure
- Sampling time 500ms
- 2 DI + 2 DOs available
- Options: alarm, RS-485 communication, transfer output, ramp soak

### Energy-efficient air conditioning system



### Optimal control of multiple heating devices

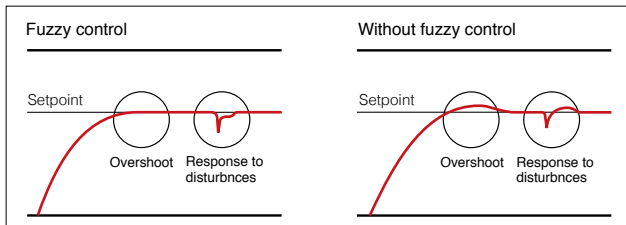


# PXR3 and PXR4

## Control Functions

### Auto-Tuned Fuzzy Control

PXR monitors the process temperature and suppress overshoot and effect of external disturbances based on the fuzzy logic, without increasing the startup time.

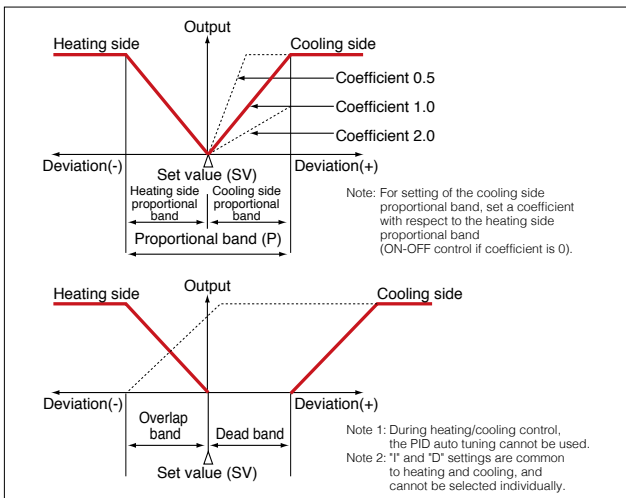


### On-Off Control

The temperature controller keeps the temperature stable by turning on the power supply for a heater when the process value is lower than the setpoint, and turning it off when the process value is higher than the setpoint. The controller works in on-off control if you set the parameter P to zero.

### Heating / Cooling Control (option for PXR3)

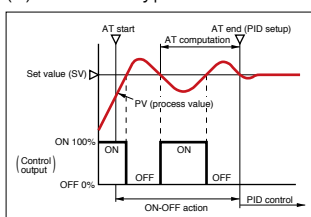
By using two control outputs, you can control both heating process and cooling process with a single controller.



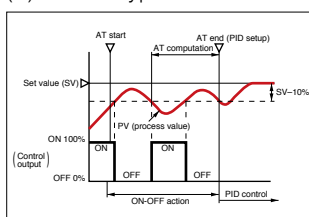
### Auto-Tuned PID Control

The controller calculates optimal PID parameters. There are 2 types of auto-tuning functions; the standard type (auto-tuning with reference to SV) and the low-SV type (auto-tuning with reference to the value 10% below SV). The low-SV type auto tuning is useful when you want to avoid overshoots. You can also set the PID parameters manually.

(a) Standard type



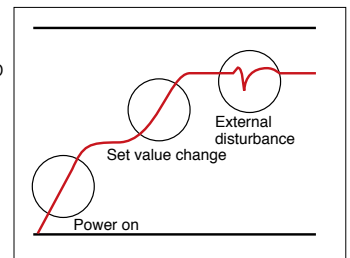
(b) Low-PV type



### Self-Tuned PID Control

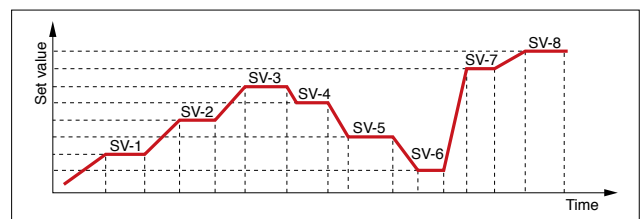
The controller tunes PID parameters when necessary; for example, at startup of the equipment, when the setpoint is changed, and/or the process temperature changed due to disturbance.

Note: For some objects to control, PID values could not be optimized.



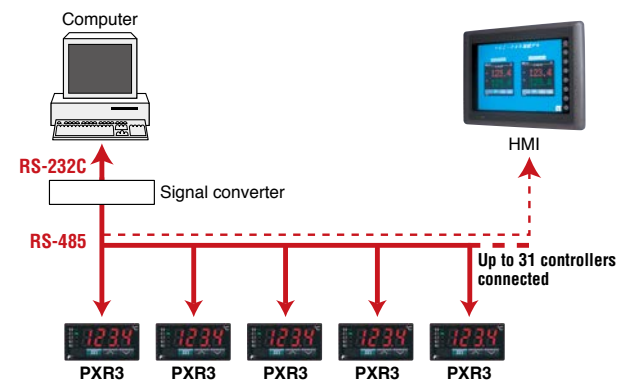
### Ramp Soak Control (option)

PXR automatically changes the setpoint to the preset values at preset times. You can set up to 64 steps and 15 patterns.



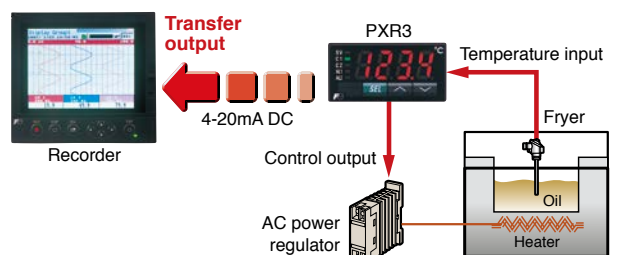
### RS-485 Communication (option for PXR3)

Allows the temperature controller to communicate with a PC, PLC, or HMI.



### Transfer Output (option for PXR3)

PXR3 can send SV, PV, MV, or deviation of PV and SV, as 4-20 mA signal to an external device such as a recorder. Allows you to save the cost for a temperature sensor for recorder.



# PXR3 and PXR4

## Specifications

### General

|                                    |                                                                                                                                                                                                                              |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply voltage               | 100 V (-15%) to 240 V (+10%) AC, 50/60 Hz, or 24 V (±10%) AC/DC                                                                                                                                                              |
| Power consumption                  | 100 V AC: ≤ 6 VA (PXR3), ≤ 8 VA (PXR4)<br>220 V AC: ≤ 8 VA (PXR3), ≤ 10 VA (PXR4)<br>24 V AC/DC: ≤ 8 VA (PXR3), ≤ 10 VA (PXR4)                                                                                               |
| Insulation resistance              | ≥ 20 MΩ (at 500 V DC)                                                                                                                                                                                                        |
| Withstand voltage                  | Between the power source and the ground terminal: 1500 V AC for 1 min<br>Between the power source and others: 1500 V AC for 1 min<br>Between the ground and relay outputs: 1500 V AC for 1 min<br>Others: 500 V AC for 1 min |
| Input impedance                    | Thermocouple, mV input: ≥ 1 MΩ<br>Current: 250 Ω (external resistor)<br>Voltage: ≥ 450 kΩ                                                                                                                                    |
| Allowable signal source resistance | Thermocouple: ≤ 100 Ω<br>Voltage: ≤ 1 kΩ                                                                                                                                                                                     |
| Allowable wire resistance          | RTD: ≤ 10 Ω per wire                                                                                                                                                                                                         |
| Input value correction             | Process value shift: ±10% FS<br>Input filter: 0 to 900.0 s settable in 0.5 s steps (first order lag filter)                                                                                                                  |
| Noise reduction ratio              | Normal mode noise (50/60 Hz): ≥ 50 dB<br>Common mode noise (50/60 Hz): ≥ 140 dB                                                                                                                                              |

### Display and keys

|         |                                                                                                                                    |
|---------|------------------------------------------------------------------------------------------------------------------------------------|
| Type    | LED, 3 keys                                                                                                                        |
| Cotents | SV and PV: 4 digits, 7-segment (PXR3: SV/PV switching, PXR4: SV/PV independent display)<br>Status indicator: control output, alarm |

### Structure

|                       |                                                                                                                                                                                                 |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Installation          | Panel flush mounting<br>Can be mounted to rail/wall by using the DIN rail mounting adapter available as option.                                                                                 |
| Electrical connection | PXR3: euro-style terminal<br>PXR4: 8-pin or 11-pin, M3.5 screw terminal socket                                                                                                                  |
| Case                  | Plastic (non-combustible grade UL94V-0 equivalent), black                                                                                                                                       |
| IP rating             | Front waterproof structure: NEMA4X (IP66 equivalent)<br>*When mounted on panel with our genuine packing. Waterproof feature unavailable in close mounting of multiple units.<br>Rear case: IP20 |
| Weight                | Approx. 150 g (PXR3), 200 g (PXR4)                                                                                                                                                              |

### Control output

|                       | Control output 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Control output 2 (option for PXR3, for cooling/heating control)                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type                  | Select one of the followings:<br>• Relay contact (PXR3: SPST-NO, PXR4: SPDT):<br>220 VAC / 30 VDC, 3A (resistive load)<br>Mechanical life: 10 million operations (no load)<br>Electrical life: 100,000 operations (rated load)<br>Minimum switching current: PXR3: 10 mA (5 VDC), PXR4: 100 mA (24 VDC)<br>• SSR / SSC drive (voltage pulse):<br>ON: PXR3: 12–16 V DC, PXR4: 17–25 VDC<br>OFF: ≤ 0.5V DC<br>Maximum current: 20 mA<br>• 4–20 mA DC: Allowable load resistance: PXR3: 100–500 Ω, PXR4: ≤ 600Ω | Select one of the followings:<br>• Relay contact: SPST-NO, 220 VAC / 30VDC, 3A (resistive load)<br>Mechanical life: 10 million operations (no load)<br>Electrical life: 100,000 operations (rated load)<br>Minimum switching current: 10 mA (5 V DC)<br>• SSR/SSC drive (voltage pulse):<br>ON: 12–16 V DC<br>OFF: ≤ 0.5V DC<br>Maximum current: 20 mA<br>• 4 to 20 mA DC: Allowable load resistance: 100–500 Ω |
| Control type          | PID control (with auto tuning, self-tuning)<br>Fuzzy control (with auto tuning)                                                                                                                                                                                                                                                                                                                                                                                                                              | PID control (with auto tuning)                                                                                                                                                                                                                                                                                                                                                                                  |
| Parameters            | On/off action if P = 0.<br>Proportional action when I, D = 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                | P,I,D=0: ON/OFF action (without dead band) for heating and cooling<br>I,D=0: Proportional action                                                                                                                                                                                                                                                                                                                |
| Proportional band (P) | 0 to 999.9% of measuring range settable in 0.1% steps                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Heating side: 0 to 999.9 % of measuring range<br>Cooling side: Heating side "P" × cooling side coefficient<br>Cooling side proportional band coefficient: 0 to 100.0<br>On/off action if P=0                                                                                                                                                                                                                    |
| Integration time (I)  | 0 to 3200 s settable in 1 s steps                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0 to 3200 s                                                                                                                                                                                                                                                                                                                                                                                                     |
| Differential time (D) | 0 to 999.9 s settable in 0.1 s steps                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0 to 999.9 s                                                                                                                                                                                                                                                                                                                                                                                                    |
| Proportional cycle    | 1 to 150 s settable in 1 s steps<br>Only for relay contact output or SSR/SSC drive output                                                                                                                                                                                                                                                                                                                                                                                                                    | 1 to 150 s<br>Only for relay contact output or SSR/SSC drive output only                                                                                                                                                                                                                                                                                                                                        |
| Control cycle         | 0.5 s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.5 s                                                                                                                                                                                                                                                                                                                                                                                                           |
| Anti-reset windup     | 0 to 100% of measuring range<br>Automatically validated at auto tuning                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0 to 100% of measuring range<br>Automatically validated at auto tuning                                                                                                                                                                                                                                                                                                                                          |
| Hysteresis band       | 0 to 50% of measuring range<br>For on/off action only                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 50% of measuring range common to heating and cooling sides,<br>For on/off action only                                                                                                                                                                                                                                                                                                                           |
| Overlap dead band     | —                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ±50% of heating side proportional band                                                                                                                                                                                                                                                                                                                                                                          |

### PV input

|                              |                                                                                                                                                                                                                                                                             |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of inputs                | 1                                                                                                                                                                                                                                                                           |
| Signal                       | Thermocouples, RTD, voltage, or current<br>*See a separate table for measurement range.                                                                                                                                                                                     |
| Sampling rate                | 0.5 s                                                                                                                                                                                                                                                                       |
| Indication accuracy(at 23°C) | Thermocouple: ±(0.5% of measuring range) ±1 digit ±1°C<br>For thermocouple R at 0 to 500°C: ±(1% of measuring range) ±1 digit ±1°C<br>For thermocouple B at 0 to 400°C: ±(5% of measuring range) ±1 digit ±1°C<br>RTD, voltage/current: ±(0.5% of measuring range) ±1 digit |
| Burnout                      | In the thermocouple input version or the RTD input version, a user can select either the upper or the lower limit to which the control output should go when a sensor burnout occurs.                                                                                       |

### Digital input (option for PXR3)

|                   |                                                                                                                                                                                                                                   |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of inputs     | ≤ 2                                                                                                                                                                                                                               |
| Switch            | Volt-free contact or transistor                                                                                                                                                                                                   |
| Contact capacity  | 5 V DC, about 2 mA (per point)                                                                                                                                                                                                    |
| Input judgment    | ON voltage: ≤ 2 V DC<br>OFF voltage: ≥ 3 V DC                                                                                                                                                                                     |
| Input pulse width | ≥ 0.5 s                                                                                                                                                                                                                           |
| Functions         | Set value (front SV, SV1 to 3) changeover<br>Control action start / stop<br>Ramp/soak action start / reset<br>Auto tuning start / stop<br>Alarm latch cancel<br>Alarm on- or off-delay timer: setting range 0–9999 s in 1 s steps |

### Alarm output

|                |                                                                                                                                                                                                                                              |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of alarms  | ≤ 2                                                                                                                                                                                                                                          |
| Alarm type     | Absolute alarm, deviation alarm, zone alarm with upper and lower limits for each<br>Hold function available<br>Alarm latch, Excitation/non-excitation selecting function provided                                                            |
| Alarm ON-delay | Delay setting 0 to 9999 s settable in 1 s steps                                                                                                                                                                                              |
| Contact        | Relay contact (SPST-NO): 220 VAC / 30 VDC, 1 A (resistive load)<br>Mechanical life: 10 million operations (no load)<br>Electrical life: 100,000 operations (rated load)<br>Minimum switching current: 10 mA (5 V DC).<br>Output cycle: 0.5 s |

### Transfer output (option for PXR3)

|               |                                                                                                 |
|---------------|-------------------------------------------------------------------------------------------------|
| No. of points | 1                                                                                               |
| Type          | 4–20 mA DC<br>• Load resistance: ≤ 500 Ω<br>• Accuracy: ±0.3%FS at 23°C<br>• Resolution: ≥ 2000 |
| Output cycle  | 500 ms                                                                                          |
| Contents      | PV, SV, DV, MV                                                                                  |

### RS-485 communication (option for PXR3)

|                                                                                        |                                                                          |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Modbus RTU or Z-ASCII,<br>two-wire, half-duplex bit serial, asynchronous communication |                                                                          |
| Serial characteristics                                                                 | Data bits: 8 bits. Parity: odd, even, none<br>Baud rate: 9600 bps        |
| Connection                                                                             | ≤ 32 units, multi drop                                                   |
| Communication distance                                                                 | ≤ 500 m (total connection length)                                        |
| Recommended RS-232C RS-485 converter                                                   | Isolated type<br>Manufacturer: OMRON Co., Ltd. (Japan)<br>Model: K3SC-10 |

### Other functions

|                             |                                                                                                                                                     |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Ramp soak (option)          | 2 program pattern of 4 steps each, or 1 program pattern × 8 steps<br>On PXR3, a user can use the digital input to start/reset the ramp soak action. |
| Data backup at power outage | on non-volatile memory                                                                                                                              |
| Self-diagnosis              | by watchdog timer                                                                                                                                   |

### Operation and storage conditions

|                       |                            |
|-----------------------|----------------------------|
| Operating temperature | -10°C to 50°C              |
| Storage temperature   | -20°C to 60°C              |
| Humidity              | ≤ 90% RH (no condensation) |

### Measurement range

| Input signal |           | Range(°C)     | Range(°F)     |
|--------------|-----------|---------------|---------------|
| RTD          | Pt100     | -150 to 850*  | -238 to 1562  |
|              | J         | 0 to 800      | 32 to 1472    |
|              | K         | 0 to 1200     | 32 to 2192    |
|              | R         | 0 to 1600     | 32 to 2912    |
| Thermocouple | B         | 0 to 1800     | 32 to 3272    |
|              | S         | 0 to 1600     | 32 to 2912    |
|              | T         | -150 to 400   | -238 to 752   |
|              | E         | -150 to 800   | -238 to 1472  |
|              | N         | 0 to 1300     | 32 to 2372    |
|              | PLII      | 0 to 1300     | 32 to 2372    |
|              |           |               |               |
| DC voltage   | 1 to 5V   | scaling range | -1999 to 9999 |
| DC current   | 4 to 20mA |               |               |

- For 4–20 mA current input, add the provided 250-ohm resistor to the input terminal.
- For temperatures of 1000°C (1832°F) or above, the decimal point does not appear on the display.
- By editing the parameter, you can switch the input type setting among RTD and thermocouples, or between voltage and current.

## Ordering Code

| PXR <span style="border: 1px solid black; padding: 0 2px;">3</span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;">2</span> - <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;">F</span> |                                                                    |  |  |  |  |  |  |  |  |  |  |  |  |      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|------|
| Digit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Specification                                                      |  |  |  |  |  |  |  |  |  |  |  |  | Code |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Front dimensions W × H><br>48 × 24 mm                             |  |  |  |  |  |  |  |  |  |  |  |  | 3    |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Input signal><br>Thermocouple °C                                  |  |  |  |  |  |  |  |  |  |  |  |  | T    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Thermocouple °F                                                    |  |  |  |  |  |  |  |  |  |  |  |  | R    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RTD Pt100 Ω 3-wire °C                                              |  |  |  |  |  |  |  |  |  |  |  |  | N    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RTD Pt100 Ω 3-wire °F                                              |  |  |  |  |  |  |  |  |  |  |  |  | S    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1 to 5 V DC                                                        |  |  |  |  |  |  |  |  |  |  |  |  | A    |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4 to 20 mA DC                                                      |  |  |  |  |  |  |  |  |  |  |  |  | B    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <Control output 1><br>Relay contact output                         |  |  |  |  |  |  |  |  |  |  |  |  | A    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | SSR/SSC driving output                                             |  |  |  |  |  |  |  |  |  |  |  |  | C    |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4 to 20 mA DC output                                               |  |  |  |  |  |  |  |  |  |  |  |  | E    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <Control output 2><br>None                                         |  |  |  |  |  |  |  |  |  |  |  |  | Y    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Relay contact output*1                                             |  |  |  |  |  |  |  |  |  |  |  |  | A    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | SSR/SSC driving output*1                                           |  |  |  |  |  |  |  |  |  |  |  |  | C    |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4 to 20 mA DC output*1                                             |  |  |  |  |  |  |  |  |  |  |  |  | E    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <Revision code>                                                    |  |  |  |  |  |  |  |  |  |  |  |  | 2    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <Option 1><br>None                                                 |  |  |  |  |  |  |  |  |  |  |  |  | 0    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Alarm 1 point                                                      |  |  |  |  |  |  |  |  |  |  |  |  | 1    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Ramp soak                                                          |  |  |  |  |  |  |  |  |  |  |  |  | 4    |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Alarm 1 point + ramp soak                                          |  |  |  |  |  |  |  |  |  |  |  |  | 5    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Alarm 2 points*2                                                   |  |  |  |  |  |  |  |  |  |  |  |  | F    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Alarm 2 points + ramp soak*2                                       |  |  |  |  |  |  |  |  |  |  |  |  | G    |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <Instruction Manual><Power supply voltage><br>None 100 to 240 V AC |  |  |  |  |  |  |  |  |  |  |  |  | N    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | English 100 to 240 V AC                                            |  |  |  |  |  |  |  |  |  |  |  |  | V    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | None 24 V AC/DC                                                    |  |  |  |  |  |  |  |  |  |  |  |  | C    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | English 24 V AC/DC                                                 |  |  |  |  |  |  |  |  |  |  |  |  | B    |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <Option 2><br>None                                                 |  |  |  |  |  |  |  |  |  |  |  |  | 000  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RS-485 Modbus interface                                            |  |  |  |  |  |  |  |  |  |  |  |  | M00  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RS-485 Z-ASCII interface                                           |  |  |  |  |  |  |  |  |  |  |  |  | N00  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Transfer output + Digital input 1 point*3                          |  |  |  |  |  |  |  |  |  |  |  |  | Q00  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Transfer output*3                                                  |  |  |  |  |  |  |  |  |  |  |  |  | R00  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Digital input 2 points                                             |  |  |  |  |  |  |  |  |  |  |  |  | T00  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RS-485 Modbus interface + Digital input 1 point                    |  |  |  |  |  |  |  |  |  |  |  |  | V00  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RS-485 Z-ASCII interface + Digital input 1 point                   |  |  |  |  |  |  |  |  |  |  |  |  | W00  |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Non-standard parameter setting                                     |  |  |  |  |  |  |  |  |  |  |  |  | F    |

\*1: Incompatible with two alarms specification (9th code "F" and "G").

\*2: Incompatible with two control outputs specification (7th code "A", "C", and "E").

\*3: Incompatible with two control outputs (7th code "A", "C", and "E"), two alarms (9th code "F" and "G"), and 24 V power supply (10th code "B" and "C").

### Separate order items

|                                      |                 |
|--------------------------------------|-----------------|
| DIN rail mounting adapter (for PXR3) | ZZR*CTK368715P1 |
|--------------------------------------|-----------------|

| PXR <span style="border: 1px solid black; padding: 0 2px;">4</span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;">S</span> <span style="border: 1px solid black; padding: 0 2px;">1</span> - <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> |                                                                    |  |  |  |  |  |  |  |  |  |  |  |  |      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|------|
| Digit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Specification                                                      |  |  |  |  |  |  |  |  |  |  |  |  | Code |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Front dimensions><br>48 × 48mm                                    |  |  |  |  |  |  |  |  |  |  |  |  | 4    |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Input signal><br>Thermocouple °C                                  |  |  |  |  |  |  |  |  |  |  |  |  | T    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Thermocouple °F                                                    |  |  |  |  |  |  |  |  |  |  |  |  | R    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RTD Pt100 3-wire type I (°C)*1                                     |  |  |  |  |  |  |  |  |  |  |  |  | N    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RTD Pt100 3-wire type I (°F)*1                                     |  |  |  |  |  |  |  |  |  |  |  |  | S    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1 to 5V DC                                                         |  |  |  |  |  |  |  |  |  |  |  |  | A    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4 to 20mA DC                                                       |  |  |  |  |  |  |  |  |  |  |  |  | B    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | RTD Pt100 3-wire type II (°C)*2                                    |  |  |  |  |  |  |  |  |  |  |  |  | W    |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Control output 1><br>Relay contact output                         |  |  |  |  |  |  |  |  |  |  |  |  | A    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Voltage pulse output (24V DC)                                      |  |  |  |  |  |  |  |  |  |  |  |  | C    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4 to 20mA DC output                                                |  |  |  |  |  |  |  |  |  |  |  |  | E    |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Terminal><br>Socket type                                          |  |  |  |  |  |  |  |  |  |  |  |  | S    |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Revision code>                                                    |  |  |  |  |  |  |  |  |  |  |  |  | 1    |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Option><br>None                                                   |  |  |  |  |  |  |  |  |  |  |  |  | 0    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Alarm 1 point                                                      |  |  |  |  |  |  |  |  |  |  |  |  | 1    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Ramp soak                                                          |  |  |  |  |  |  |  |  |  |  |  |  | 4    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Alarm 1 point + ramp soak                                          |  |  |  |  |  |  |  |  |  |  |  |  | 5    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Alarm 2 points                                                     |  |  |  |  |  |  |  |  |  |  |  |  | F    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Alarm 2 points + ramp soak                                         |  |  |  |  |  |  |  |  |  |  |  |  | G    |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <Instruction manual> <Power supply voltage><br>None 100 to 240V AC |  |  |  |  |  |  |  |  |  |  |  |  | N    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | English 100 to 240V AC                                             |  |  |  |  |  |  |  |  |  |  |  |  | V    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | None 24V AC/DC                                                     |  |  |  |  |  |  |  |  |  |  |  |  | C    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | English 24V AC/DC                                                  |  |  |  |  |  |  |  |  |  |  |  |  | B    |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <Socket><br>None                                                   |  |  |  |  |  |  |  |  |  |  |  |  | 000  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | For rail mounting (8-pin) Type: TP48X                              |  |  |  |  |  |  |  |  |  |  |  |  | 100  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | For panel mounting (8-pin) Type: TP48SB                            |  |  |  |  |  |  |  |  |  |  |  |  | 200  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | For rail mounting (11-pin) Type: TP411X                            |  |  |  |  |  |  |  |  |  |  |  |  | 400  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | For panel mounting (11-pin) Type: TP411SBA                         |  |  |  |  |  |  |  |  |  |  |  |  | 500  |

### Separate order items

|                              |              |
|------------------------------|--------------|
| Shunt resistor (250 Ω ±0.1%) | ZZPPXR1-A190 |
|------------------------------|--------------|

### Scope of delivery

# Micro-Controller X PXE



48 x 48 x 63.5 mm



## Simple and Easy

- 1.6-mm shallow and waterproof front panel
- A user can switch input type among Pt100 RTD and 9 types of thermocouples and their measuring range with front keys
- On-off, PID, and fuzzy control
- Relay contact output or SSR drive output
- Up to two alarm outputs



## Specifications

### General

|                                    |                                                                                                                       |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Power supply voltage               | 100 V (-15%) to 240 V (+10%) AC, 50/60 Hz                                                                             |
| Power consumption                  | 100 V AC: ≤ 5 VA<br>220 V AC: ≤ 6 VA                                                                                  |
| Insulation resistance              | ≥ 20 MΩ (at 500 V DC)                                                                                                 |
| Withstand voltage                  | Between the power supply and others: 1500 V AC for 1 min<br>*SSR driving output is not isolated from input terminals. |
| Input impedance                    | Thermocouple: ≥ 1 MΩ                                                                                                  |
| Allowable signal source resistance | Thermocouple: ≤ 100Ω                                                                                                  |
| Allowable wire resistance          | RTD: ≤10 Ω per wire                                                                                                   |
| Input value correction             | Process value shift: ±10% FS<br>Input filter: 0 to 120.0 s settable in 0.1 s steps (first order lag filter)           |
| Noise reduction ratio              | Normal mode noise (50/60 Hz): ≥ 40 dB<br>Common mode noise (50/60 Hz): ≥ 120 dB                                       |

### Display and keys

|         |                                                                                    |
|---------|------------------------------------------------------------------------------------|
| Type    | LED                                                                                |
| Keys    | 4 keys                                                                             |
| Cotents | PV and SV: 4 digits, 7-segment<br>Status indicator: control output, alarm, standby |

### Structure

|                       |                                                                                                                                                                                                  |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Installation          | Panel flush mounting                                                                                                                                                                             |
| Electrical connection | M3 screw terminal                                                                                                                                                                                |
| Case                  | Plastic (non-combustible grade UL94V-0 equivalent)<br>Color: black                                                                                                                               |
| IP rating             | Front waterproof structure: NEMA4X (IP66 equivalent)<br>(When mounted on panel with our genuine packing. Waterproof feature unavailable in close mounting of multiple units.)<br>Rear case: IP20 |
| Weight                | Approx. 100g                                                                                                                                                                                     |

### PV input

|                               |                                                                                                                                                                                                                                                                   |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of inputs                 | 1                                                                                                                                                                                                                                                                 |
| Signal                        | Thermocouples or RTD<br>*See a separate table for measurement range.                                                                                                                                                                                              |
| Sampling rate                 | 0.2 s                                                                                                                                                                                                                                                             |
| Indication accuracy (at 23°C) | (±0.5% of process value or 1°C whichever is greater) ±1digit±1°C<br>•Thermocouple -100°C or less : (±2% of process value) ±1digit±1°C<br>•Accuracy is not assured for ranges from 0 to 500°C for type R thermocouple and from 0 to 400°C for type B thermocouple. |
| Burnout                       | A user can select either the upper or the lower limit to which the control output should go when a sensor burnout occurs.                                                                                                                                         |

### Control output 1

|               |                                                                                                                                                                                                                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of points | 1                                                                                                                                                                                                                                                                                                        |
| Type          | Select either of the followings:<br>•Relay contact (SPST-NO):<br>220 VAC / 30 VDC, 3A (resistive load)<br>Electrical life: 100,000 operations (rated load)<br>Minimum switching current: 100 mA (24 VDC)<br>•SSR drive (Voltage pulse):<br>ON: 10.2~15 V DC<br>OFF: ≤ 0.5 V DC<br>Maximum current: 20 mA |

### Alarm or control output 2 (option)

|                |                                                                                                                                                                                         |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of alarms  | ≤ 2                                                                                                                                                                                     |
| Alarm type     | Absolute alarm, deviation alarm, zone alarm with upper and lower limits for each<br>Hold function available<br>Alarm latch, excitation/non-excitation selecting function                |
| Alarm ON-delay | 0 to 9999 s, settable in 1 s steps                                                                                                                                                      |
| Contact        | Relay contact: SPST-NO, 220 V AC/30 V DC, 1 A (resistive load)<br>Electrical life: 100,000 operations (rated load)<br>Minimum switching current: 100 mA (5 V DC)<br>Output cycle: 0.2 s |

\*In the heating and cooling dual control, the alarm output 1 functions as the control output 2.

### Control

|                       |                                                                        |
|-----------------------|------------------------------------------------------------------------|
| Control type          | On-off, PID, fuzzy, two-degree-of-freedom PID                          |
| Parameters            |                                                                        |
| Proportional band (P) | 0.1 to 999.9% of measuring range settable in 0.1% steps                |
| Integration time (I)  | 0 to 3200 s settable in 1 s steps                                      |
| Differential time (D) | 0 to 999.9 s settable in 0.1 s steps                                   |
|                       | Proportional action when I, D = 0.                                     |
| Proportional cycle    | 1 to 150 s, settable in 1 s steps                                      |
| Control cycle         | 0.2 s                                                                  |
| Anti-reset windup     | 0 to 100% of measuring range<br>Automatically validated at auto tuning |
| Hysteresis band       | 0 to 50% of measuring range<br>For on-off action only                  |

### Other functions

|                             |                        |
|-----------------------------|------------------------|
| Data backup at power outage | on non-volatile memory |
| Self-diagnosis              | by watchdog timer      |

### Operation and storage conditions

|                       |                            |
|-----------------------|----------------------------|
| Operating temperature | -10°C to 50°C              |
| Storage temperature   | -20°C to 60°C              |
| Humidity              | ≤ 90% RH (no condensation) |

### Measurement range

| Input signal |      | Range(°C) |          |
|--------------|------|-----------|----------|
| RTD          | PT1  | -200      | to 850   |
|              | PT2  | -199.9    | to 500.0 |
| Thermocouple | J1   | 0         | to 800   |
|              | J2   | 0.0       | to 400.0 |
|              | K1   | 0         | to 400   |
|              | K2   | -200      | to 1200  |
|              | K3   | 0.0       | to 400.0 |
|              | T1   | -200      | to 400   |
|              | T2   | -199.9    | to 400.0 |
|              | R    | 0         | to 1600  |
|              | B    | 0         | to 1800  |
|              | S    | 0         | to 1600  |
|              | E    | -200      | to 800   |
|              | N    | 0         | to 1300  |
|              | PL-2 | 0         | to 1300  |

## Ordering Code

P X E 

|   |   |   |   |   |   |   |    |    |    |    |    |
|---|---|---|---|---|---|---|----|----|----|----|----|
| 4 | 5 | 6 | 7 | 8 | - | 9 | 10 | 11 | 12 | 13 | 14 |
| 4 | T | Y | 2 |   | - | Y | 0  | 0  | 0  | -  | E  |

| Digit | Specification                                                       | Code        |
|-------|---------------------------------------------------------------------|-------------|
| 4     | <Front dimensions><br>48 x 48mm                                     | 4           |
| 5     | <Input signal><br>Thermocouple, RTD Pt100 [°C]                      | T           |
| 6     | <Control output><br>Relay contact output<br>SSR drive output        | A<br>C      |
| 7     | -                                                                   | Y           |
| 8     | <Revision code>                                                     | 2           |
| 9     | <Alarm output><br>1 point<br>2 points<br>2 points (independent COM) | 1<br>2<br>J |
| 10    | <Instruction manual><br>Japanese/English/Chinese                    | Y           |

### Scope of delivery

Controller, panel mounting bracket, watertight packing, instruction manual

### Separate order item

|                |              |
|----------------|--------------|
| Terminal cover | ZZPPXR1-A230 |
|----------------|--------------|

# Digital Controller

# PXH



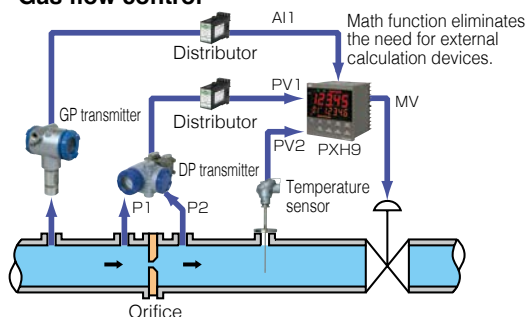
96 × 96 × 81.5 mm



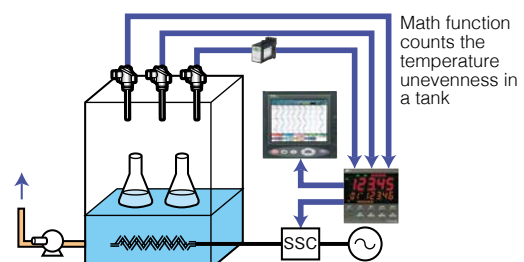
## High Speed and High Accuracy

- Fast sampling: 50 ms
- Reading accuracy: 0.1%
- 5-digit display can show hundredths place
- Universal input (up to 2 points)
- 9 DI + 9 DO
- 1 AI + 2AO
- Relay contact, SSR/SSC drive, 4–20 mA DC, or motor-operated valve control output
- 64 steps ramp soak function
- Math function
- Pre-installed program templates
- RS-485 communication

### Gas flow control



### Multi-point measurement

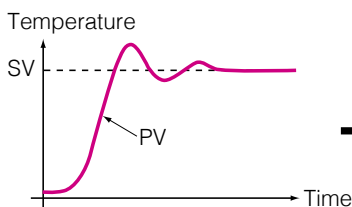


## Control Functions

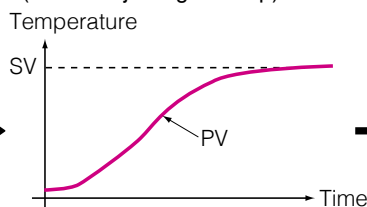
### Two-Degree-of-Freedom PID

Suppresses overshoot and undershoot occurs at startup or at SV change, or due to disturbances.

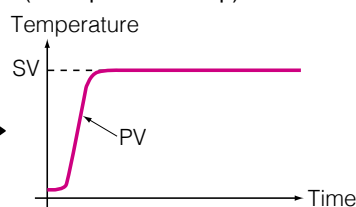
#### • Normal PID



#### • Two-degree-of-freedom PID (before adjusting $\alpha$ and $\beta$ )



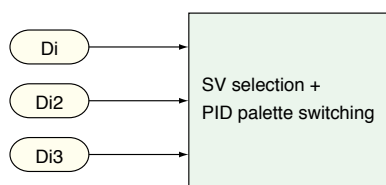
#### • Two-degree-of-freedom PID (with optimal $\alpha$ and $\beta$ )



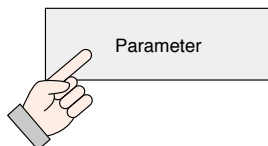
### PID Palette

PID palette is pre-installed program templates that allow easy configuration for various applications. You can switch among seven palettes by the following three methods.

- Automatic switching according to PV
- SV switching

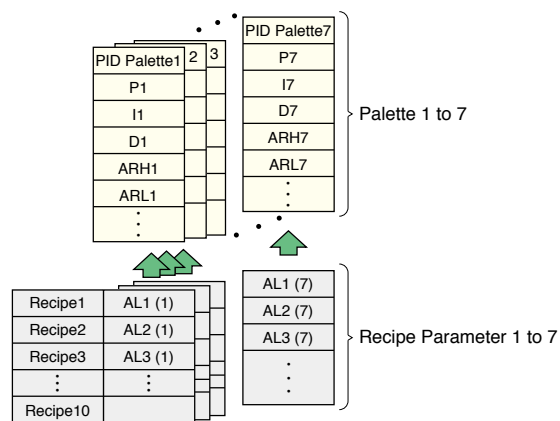


- Manually (by changing parameter)



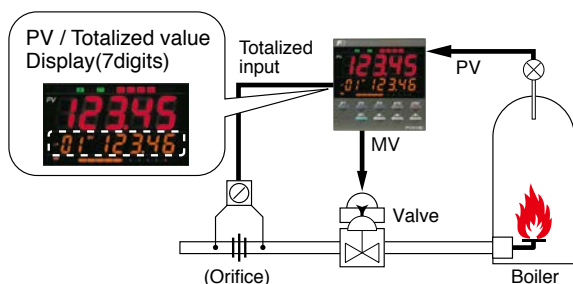
### Recipe

A user can add up to 10 parameters to each PID palette. This allows more optimal batch process control.



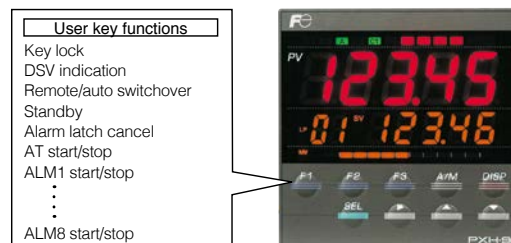
### Totalizer

By combining the analog totalizer with the calculation function, you can obtain the flow rate after temperature and pressure compensation.



### User Key

PXH has three user keys to which you can allocate various functions.



## Specifications

### General

|                                    |                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply voltage               | 100V AC (-15%) to 240 V AC (+10%), 50/60 Hz                                                                                                                                                                                                                                                                                      |
| Power consumption                  | 100 V AC: ≤ 15 VA<br>220 V AC: ≤ 20 VA                                                                                                                                                                                                                                                                                           |
| Insulation resistance              | ≥ 20 MΩ (at 500 V DC)                                                                                                                                                                                                                                                                                                            |
| Withstand voltage                  | Between the power source and other terminals: 1500 V AC for 1 min<br>Between the relay output and other terminals: 1500 V AC for 1 min<br>Others: 500 V AC for 1 min                                                                                                                                                             |
| Input impedance                    | <ul style="list-style-type: none"> <li>Thermocouple, mV input: ≥ 1 MΩ</li> <li>Current input: 250 Ω</li> <li>Voltage input: 1 MΩ</li> </ul>                                                                                                                                                                                      |
| Allowable input voltage:           | <ul style="list-style-type: none"> <li>DC voltage input: ≤ ±35 V</li> <li>Current input: ≤ ±25 mA</li> <li>Thermocouple, RTD, mV input: ≤ ±5 V</li> </ul>                                                                                                                                                                        |
| Effect of signal source resistance | <ul style="list-style-type: none"> <li>Thermocouple, mV input: ±0.1%FS per 100 Ω</li> <li>Voltage input: ±0.1%FS per 500 Ω</li> </ul>                                                                                                                                                                                            |
| Allowable wire resistance          | RTD: ≤ 10 Ω per wire                                                                                                                                                                                                                                                                                                             |
| Input value correction             | <ul style="list-style-type: none"> <li>User adjustment: ±50%FS both for zero point and span point</li> <li>Square-root extractor: OFF or cut point from 0.0 to 125.0%</li> <li>First-order lag filter: 0.0 to 900.0 s</li> <li>Linearizer: Makes a line chart in which 16 data points are connected by straight lines</li> </ul> |
| Noise reduction ratio              | <ul style="list-style-type: none"> <li>Normal mode: 40 dB (50/60 Hz)</li> <li>Common mode: 120 dB (50/60 Hz)</li> </ul>                                                                                                                                                                                                          |

### Display and keys

|         |                                                                                                                                                                                        |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type    | LED                                                                                                                                                                                    |
| Keys    | 9 keys                                                                                                                                                                                 |
| Cotents | PV: 7-segment, 5-digit<br>SV/MV: 7-segment, 5-digit<br>Parameter number: 7-segment, 2-digit<br>Bar graph: 12-segment<br>Status indicator: standby, control output, alarm, control mode |

### Structure

|                       |                                |
|-----------------------|--------------------------------|
| Installation          | Panel mounting                 |
| Electrical connection | M3 screw terminal              |
| Case                  | Plastic, gray                  |
| IP rating             | Equivalent to IP66 and NEMA 4X |
| Weight                | Approx. 500 g                  |

### PV input

|                               |                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of inputs                 | 1 or 2                                                                                                                                                                                                                                                                                                                                                 |
| Signal                        | Thermocouples, RTD, voltage, or current<br>*See a separate table for measurement range.                                                                                                                                                                                                                                                                |
| Sampling rate                 | 50 ms                                                                                                                                                                                                                                                                                                                                                  |
| Indication accuracy (at 23°C) | <ul style="list-style-type: none"> <li>Thermocouple: (±0.1%FS ±1digit ±1°C) or ±1.5°C, whichever is larger</li> <li>Thermocouple B, 0–400°C range: ±5%FS ±1digit ±1°C</li> <li>Thermocouple R, 0–500°C range: ±1%FS ±1digit ±1°C</li> <li>RTD: (±0.1% FS ±1digit) or 0.25°C, whichever is larger</li> <li>Voltage, current: ±0.1%FS ±1digit</li> </ul> |
| Burnout                       | In the thermocouple input version or the RTD input version, a user can select either the upper or the lower limit to which the control output should go when a sensor burnout occurs.                                                                                                                                                                  |

### Digital input

|                   |                                                                                                                              |
|-------------------|------------------------------------------------------------------------------------------------------------------------------|
| No. of inputs     | 4 to 9                                                                                                                       |
| Switch            | Volt-free contact or transistor                                                                                              |
| Contact capacity  | 12 V DC, about 2 mA (per point)                                                                                              |
| Input pulse width | ≥ 200 ms                                                                                                                     |
| Functions         | Control mode changeover, EX-MV selection, SV changeover, Control standby, Auto-tuning start, Timer start, Alarm latch cancel |

### Analog input (option)

|               |                                                                                                                                                                                             |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of inputs | 1                                                                                                                                                                                           |
| Signal        | <ul style="list-style-type: none"> <li>DC voltage: 1–5 V DC, 0–5 V DC, 0–10 V DC</li> <li>Valve position feedback signal (potentiometer): resistance range: 100Ω to 10KΩ, 3-wire</li> </ul> |

### Control output

|               | Control output 1                                                                                                                                                                                                                                                                                                           | Control output 2 (for heating and cooling control)                                                                                                                                              |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of points | 1                                                                                                                                                                                                                                                                                                                          | 1                                                                                                                                                                                               |
| Type          | select one among four. <ul style="list-style-type: none"> <li>Relay contact output: SPDT contact (DO4)</li> <li>SSR/SSC driving output: Rating: 12 V DC (10–15 V DC)</li> <li>4–20 mA DC</li> <li>Motor-operated valve operation pulse output (open–close output): SPST-NO contact × 2 (with interlock circuit)</li> </ul> | select one among three. <ul style="list-style-type: none"> <li>Relay contact output: SPST-NO (DO3)</li> <li>SSR/SSC driving output: Rating: 12 V DC (10–15 V DC)</li> <li>4–20 mA DC</li> </ul> |

### Control

|                               |                                                                                                |                                                    |
|-------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Control type                  | Two-degree-of-freedom PID                                                                      |                                                    |
| Control mode                  | Auto/manual/remote (changeover is available by key operation, digital input, or communication) |                                                    |
| Control template              | allows a user to switch among the operation block and the I/O settings.                        |                                                    |
| Parameters                    | (Basic control type and valve control type)                                                    | (Heating and cooling control type)                 |
| Proportional band (P)         | 0.0 to 999.9%, ON/OFF (2-position) operation at P = 0                                          | 0.0 to 999.9%                                      |
| Integration time (I)          | 0.0 to 3200.0 s, Integral operation OFF at I = 0                                               | 0.0 to 3200.0 s, Integral operation OFF at I = 0   |
| Differential time (D)         | 0.0 to 999.9 s, Derivative operation OFF at D = 0                                              | 0.0 to 999.9 s, Derivative operation OFF at D = 0  |
| Proportional cycle            | 1 to 150 s, For SSR/SSC drive or relay output only                                             | 1 to 150 s, For SSR/SSC drive or relay output only |
| Control cycle                 | 50 ms                                                                                          | 50 ms                                              |
| Anti-reset windup             | 0 to 100% of measurement range                                                                 | 0 to 100% of measurement range                     |
| Hysteresis band               | 50% of measurement range, for on-off control only                                              | 50% of measurement range, for on-off control only  |
| Number of SV and PID patterns | 7                                                                                              | 7                                                  |

### Alarm

|                |                                                                                          |
|----------------|------------------------------------------------------------------------------------------|
| No. of alarms  | ≤ 8                                                                                      |
| Alarm type     | PV (H/L limit, absolute/deviation, band), PV variation ratio, SV H/L limit, device error |
| Alarm ON-delay | 0 to 9999 s, 0 to 9999 min                                                               |

### Digital output

|                |                                                                                                                                                                                                                           |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No. of outputs | 2 (DO3 & DO4) to 9                                                                                                                                                                                                        |
| Contact        | <ul style="list-style-type: none"> <li>SPST-NO contact (except for DO4)</li> <li>SPDT contact (DO4)</li> </ul> Contact capacity: 220 V AC / 30 V DC, 1A (resistive load)<br>Contact life: 100,000 operations (rated load) |
| Functions      | Alarm, timer, control output (DO4)                                                                                                                                                                                        |

### Transfer output

|               |                               |
|---------------|-------------------------------|
| No. of points | ≤ 2                           |
| Type          | 4–20 mA                       |
| Contents      | PV, SV, MV, DV, AIM, MVRB, TV |

### Power supply output for transmitter

|                |                      |
|----------------|----------------------|
| No. of outputs | 1                    |
| Rating         | 24 V DC (17–30 V DC) |

### RS-485 communication

|                                                                          |                                                                                         |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Modbus RTU, two-wire, half-duplex bit serial, asynchronous communication |                                                                                         |
| Serial characteristics                                                   | Data bits: 8 bits. Parity: odd, even, none<br>Baud rate: 9600 bps, 19200 bps, 38400 bps |
| Connection                                                               | ≤ 32 units                                                                              |
| Communication distance                                                   | ≤ 500 m (total connection length)                                                       |

### Other functions

|                             |                                                                                     |
|-----------------------------|-------------------------------------------------------------------------------------|
| Ramp soak                   | 64 step ramp soak with guaranteed soak                                              |
| Data backup at power outage | on non-volatile memory                                                              |
| Self-diagnosis              | by watchdog timer                                                                   |
| Math function               | Temperature and pressure compensation, average, H/L selector, input switching, etc. |

### Operation and storage conditions

|                       |                            |
|-----------------------|----------------------------|
| Operating temperature | -10°C to +50°C             |
| Storage temperature   | -20°C to +60°C             |
| Humidity              | ≤ 90% RH (no condensation) |

# Ordering Code

## Basic Type

P X H 4 5 6 7 8 9 10 11 12 13  
9 A 1 - V 0

| Digit          | Specification                                                                                                                                                                                                                                                                      | Code   |      |         |      |         |         |         |                    |                |      |                |         |                       |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|---------|------|---------|---------|---------|--------------------|----------------|------|----------------|---------|-----------------------|
| 4              | <Front dimensions><br>96 x 96 mm                                                                                                                                                                                                                                                   | 9      |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 5              | <Number of control loops/Function><br>1-loop basic controller                                                                                                                                                                                                                      | A      |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 6              | <PV input><br>1 point<br>2 points*1                                                                                                                                                                                                                                                | 1<br>2 |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 7              | <Analog input><br>None<br>DC voltage: 1 point                                                                                                                                                                                                                                      | 0<br>1 |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 8              | <Revision code>                                                                                                                                                                                                                                                                    | 1      |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 9              | <Output>*3                                                                                                                                                                                                                                                                         |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
|                | <table><tr><th>OUT1</th><th>OUT2</th></tr><tr><td>Current</td><td>None</td></tr><tr><td>Current</td><td>Current</td></tr><tr><td>Current</td><td>Transmitter supply</td></tr><tr><td>SSR/SSC driver</td><td>None</td></tr><tr><td>SSR/SSC driver</td><td>Current</td></tr></table> | OUT1   | OUT2 | Current | None | Current | Current | Current | Transmitter supply | SSR/SSC driver | None | SSR/SSC driver | Current | 1<br>2<br>5<br>A<br>B |
| OUT1           | OUT2                                                                                                                                                                                                                                                                               |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
| Current        | None                                                                                                                                                                                                                                                                               |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
| Current        | Current                                                                                                                                                                                                                                                                            |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
| Current        | Transmitter supply                                                                                                                                                                                                                                                                 |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
| SSR/SSC driver | None                                                                                                                                                                                                                                                                               |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
| SSR/SSC driver | Current                                                                                                                                                                                                                                                                            |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 10             | <Power supply><br>100 to 240 V AC                                                                                                                                                                                                                                                  | V      |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 11             | <Communication interface><br>None<br>RS-485                                                                                                                                                                                                                                        | 0<br>R |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 12             | <Digital input and output>*1,2                                                                                                                                                                                                                                                     |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
|                | <table><tr><th>DI</th><th>DO</th></tr><tr><td>4</td><td>2</td></tr><tr><td>4</td><td>4</td></tr><tr><td>9</td><td>9</td></tr></table>                                                                                                                                              | DI     | DO   | 4       | 2    | 4       | 4       | 9       | 9                  | 0<br>A<br>B    |      |                |         |                       |
| DI             | DO                                                                                                                                                                                                                                                                                 |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 4              | 2                                                                                                                                                                                                                                                                                  |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 4              | 4                                                                                                                                                                                                                                                                                  |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 9              | 9                                                                                                                                                                                                                                                                                  |        |      |         |      |         |         |         |                    |                |      |                |         |                       |
| 13             | <Additional specifications><br>None                                                                                                                                                                                                                                                | 0      |      |         |      |         |         |         |                    |                |      |                |         |                       |

\*1:The 6th code "2" (2 inputs) and the 12th code "B" (9 DI and 9 DO) are not compatible.

\*2:When you use a relay for the control output 1, the terminal DO4 is allocated to it.

\*3:See the matrix on the right side for the function of each output.

|      |           | Terminal    | DO4                              | OUT1                              |                | OUT2                 |                          |
|------|-----------|-------------|----------------------------------|-----------------------------------|----------------|----------------------|--------------------------|
|      |           | Output Kind | Relay                            | Current (4 to 20 mA)              | SSR/SSC driver | Current (4 to 20 mA) | Transmitter power supply |
|      |           | Function*   | Control output or Digital output | Control output or Transfer output | Control output | Transfer output      |                          |
| Code | 9th digit | 1           | ✓                                | ✓                                 |                |                      |                          |
|      |           | 2           | ✓                                | ✓                                 |                | ✓                    |                          |
|      |           | 5           | ✓                                | ✓                                 |                |                      | ✓                        |
|      |           | A           | ✓                                |                                   | ✓              |                      |                          |
|      |           | B           | ✓                                |                                   | ✓              | ✓                    |                          |

\* If there are two functions listed, a user can select the function by parameter setting.

## Heating/Cooling Control Type

P X H 4 5 6 7 8 9 10 11 12 13  
9 F 1 - V 0

| Digit          | Specification                                                                                                                                                                                                                                                                                                                                                                           | Code   |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|---------|------|---------|---------|---------|---------------|-------------|--------------------|----------------|------|----------------|---------|----------------|---------------|---------------------------------|
| 4              | <Front dimensions><br>96 x 96 mm                                                                                                                                                                                                                                                                                                                                                        | 9      |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 5              | <Number of control loops/Function><br>1-loop heating/cooling controller                                                                                                                                                                                                                                                                                                                 | F      |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 6              | <PV input><br>1 point<br>2 points*1                                                                                                                                                                                                                                                                                                                                                     | 1<br>2 |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 7              | <Analog input><br>None<br>DC voltage: 1 point                                                                                                                                                                                                                                                                                                                                           | 0<br>1 |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 8              | <Revision code>                                                                                                                                                                                                                                                                                                                                                                         | 1      |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 9              | <Output>*3                                                                                                                                                                                                                                                                                                                                                                              |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
|                | <table><tr><th>OUT1</th><th>OUT2</th></tr><tr><td>Current</td><td>None</td></tr><tr><td>Current</td><td>Current</td></tr><tr><td>Current</td><td>SSR/SSC drive</td></tr><tr><td>Current</td><td>Transmitter supply</td></tr><tr><td>SSR/SSC driver</td><td>None</td></tr><tr><td>SSR/SSC driver</td><td>Current</td></tr><tr><td>SSR/SSC driver</td><td>SSR/SSC drive</td></tr></table> | OUT1   | OUT2 | Current | None | Current | Current | Current | SSR/SSC drive | Current     | Transmitter supply | SSR/SSC driver | None | SSR/SSC driver | Current | SSR/SSC driver | SSR/SSC drive | 1<br>2<br>3<br>5<br>A<br>B<br>C |
| OUT1           | OUT2                                                                                                                                                                                                                                                                                                                                                                                    |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| Current        | None                                                                                                                                                                                                                                                                                                                                                                                    |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| Current        | Current                                                                                                                                                                                                                                                                                                                                                                                 |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| Current        | SSR/SSC drive                                                                                                                                                                                                                                                                                                                                                                           |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| Current        | Transmitter supply                                                                                                                                                                                                                                                                                                                                                                      |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| SSR/SSC driver | None                                                                                                                                                                                                                                                                                                                                                                                    |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| SSR/SSC driver | Current                                                                                                                                                                                                                                                                                                                                                                                 |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| SSR/SSC driver | SSR/SSC drive                                                                                                                                                                                                                                                                                                                                                                           |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 10             | <Power supply><br>100 to 240 V AC                                                                                                                                                                                                                                                                                                                                                       | V      |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 11             | <Communication interface><br>None<br>RS-485                                                                                                                                                                                                                                                                                                                                             | 0<br>R |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 12             | <Digital input and output>*1,2                                                                                                                                                                                                                                                                                                                                                          |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
|                | <table><tr><th>DI</th><th>DO</th></tr><tr><td>4</td><td>2</td></tr><tr><td>4</td><td>4</td></tr><tr><td>9</td><td>9</td></tr></table>                                                                                                                                                                                                                                                   | DI     | DO   | 4       | 2    | 4       | 4       | 9       | 9             | 0<br>A<br>B |                    |                |      |                |         |                |               |                                 |
| DI             | DO                                                                                                                                                                                                                                                                                                                                                                                      |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 4              | 2                                                                                                                                                                                                                                                                                                                                                                                       |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 4              | 4                                                                                                                                                                                                                                                                                                                                                                                       |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 9              | 9                                                                                                                                                                                                                                                                                                                                                                                       |        |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |
| 13             | <Additional specifications><br>None                                                                                                                                                                                                                                                                                                                                                     | 0      |      |         |      |         |         |         |               |             |                    |                |      |                |         |                |               |                                 |

\*1:The 6th code "2" (2 inputs) and the 12th code "B" (9 DI and 9 DO) are not compatible.

\*2:When you use one relay for the control output, the terminal DO4 is allocated to it. When you use two relays for the control output 1 and the control output 2, the terminal DO3 and DO4 are allocated respectively.

\*3:See the matrix on the right side for the function of each output.

## Scope of delivery

Controller, mounting bracket, watertight packing, unit label, terminating resistor (for version with RS-485 communication only), instruction manual

## Motorized Valve Control Type

P X H 4 5 6 7 8 9 10 11 12 13  
9 V 1 - V 0

| Digit   | Specification                                                                                                                                                                             | Code   |      |         |      |         |         |         |                    |             |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|---------|------|---------|---------|---------|--------------------|-------------|
| 4       | <Front dimensions><br>96 x 96 mm                                                                                                                                                          | 9      |      |         |      |         |         |         |                    |             |
| 5       | <Number of control loops/Function><br>1-loop motorized valve controller (with valve position feedback input)<br>1-loop motorized valve controller (without valve position feedback input) | D<br>S |      |         |      |         |         |         |                    |             |
| 6       | <PV input><br>1 point<br>2 points*1                                                                                                                                                       | 1<br>2 |      |         |      |         |         |         |                    |             |
| 7       | <Analog input><br>None<br>DC voltage: 1 point                                                                                                                                             | 0<br>1 |      |         |      |         |         |         |                    |             |
| 8       | <Revision code>                                                                                                                                                                           | 1      |      |         |      |         |         |         |                    |             |
| 9       | <Output>*2                                                                                                                                                                                |        |      |         |      |         |         |         |                    |             |
|         | <table><tr><td>OUT1</td><td>OUT2</td></tr><tr><td>Current</td><td>None</td></tr><tr><td>Current</td><td>Current</td></tr><tr><td>Current</td><td>Transmitter supply</td></tr></table>     | OUT1   | OUT2 | Current | None | Current | Current | Current | Transmitter supply | 1<br>2<br>5 |
| OUT1    | OUT2                                                                                                                                                                                      |        |      |         |      |         |         |         |                    |             |
| Current | None                                                                                                                                                                                      |        |      |         |      |         |         |         |                    |             |
| Current | Current                                                                                                                                                                                   |        |      |         |      |         |         |         |                    |             |
| Current | Transmitter supply                                                                                                                                                                        |        |      |         |      |         |         |         |                    |             |
| 10      | <Power supply><br>100 to 240 V AC                                                                                                                                                         | V      |      |         |      |         |         |         |                    |             |
| 11      | <Communication interface><br>None<br>RS-485                                                                                                                                               | 0<br>R |      |         |      |         |         |         |                    |             |
| 12      | <Digital input and output>*1,3                                                                                                                                                            |        |      |         |      |         |         |         |                    |             |
|         | <table><tr><td>DI</td><td>DO</td></tr><tr><td>4</td><td>2</td></tr><tr><td>4</td><td>4</td></tr><tr><td>9</td><td>9</td></tr></table>                                                     | DI     | DO   | 4       | 2    | 4       | 4       | 9       | 9                  | 0<br>A<br>B |
| DI      | DO                                                                                                                                                                                        |        |      |         |      |         |         |         |                    |             |
| 4       | 2                                                                                                                                                                                         |        |      |         |      |         |         |         |                    |             |
| 4       | 4                                                                                                                                                                                         |        |      |         |      |         |         |         |                    |             |
| 9       | 9                                                                                                                                                                                         |        |      |         |      |         |         |         |                    |             |
| 13      | <Additional specifications><br>None                                                                                                                                                       | 0      |      |         |      |         |         |         |                    |             |

\*1:The 6th code "2" (2 inputs) and the 12th code "B" (9 DI and 9 DO) are not compatible.

Select "2 points" when a remote SV input (RSV) is required.

\*2:"D" for the 5th digit and "1" for the 7th digit cannot be specified at the same time.

\*3:DO4 is used as control output. If 2 or 3 DO points are required for event output, specify the code A, and if 4 to 8 DO points are required, specify the code B.

|      |           | Terminal    | DO4                  | OUT1                 | OUT2                 |                          |
|------|-----------|-------------|----------------------|----------------------|----------------------|--------------------------|
|      |           | Output Kind | Relay                | Current (4 to 20 mA) | Current (4 to 20 mA) | Transmitter power supply |
|      |           | Function*   | Valve control output | Transfer output      | Transfer output      |                          |
| Code |           |             |                      |                      |                      |                          |
|      | 9th digit | 1           | ✓                    | ✓                    |                      |                          |
|      |           | 2           | ✓                    | ✓                    | ✓                    |                          |
|      |           | 5           | ✓                    | ✓                    |                      | ✓                        |

\* If there are two functions listed, a user can select the function by parameter setting.

|      |           | Terminal    | DO3                              | DO4                              | OUT1                              |                | OUT2                              |                |                          |
|------|-----------|-------------|----------------------------------|----------------------------------|-----------------------------------|----------------|-----------------------------------|----------------|--------------------------|
|      |           | Output Kind | Relay                            | Relay                            | Current (4 to 20 mA)              | SSR/SSC driver | Current (4 to 20 mA)              | SSR/SSC driver | Transmitter power supply |
|      |           | Function*   | Control output or Digital output | Control output or Digital output | Control output or Transfer output | Control output | Control output or Transfer output | Control output |                          |
| Code | 9th digit | 1           | ✓                                | ✓                                | ✓                                 |                |                                   |                |                          |
|      |           | 2           | ✓                                | ✓                                | ✓                                 |                | ✓                                 |                |                          |
|      |           | 3           | ✓                                | ✓                                | ✓                                 |                |                                   | ✓              |                          |
|      |           | 5           | ✓                                | ✓                                | ✓                                 |                |                                   |                | ✓                        |
|      |           | A           | ✓                                | ✓                                |                                   | ✓              |                                   |                |                          |
|      |           | B           | ✓                                | ✓                                |                                   | ✓              | ✓                                 |                |                          |
|      |           | C           | ✓                                | ✓                                |                                   | ✓              |                                   | ✓              |                          |

\* If there are two functions listed, a user can select the function by parameter setting.

## Measurement range

| Input signal                      |               | Range [°C]                                          |             | Resolution (°C) |
|-----------------------------------|---------------|-----------------------------------------------------|-------------|-----------------|
|                                   |               | Max.                                                | Min.        |                 |
| RTD                               | Pt100         | -150 to 850                                         | 0 to 150    | 0.01            |
|                                   | J             | 0 to 1000                                           | 0 to 400    | 0.1             |
|                                   | K             | 0 to 1200                                           | 0 to 400    | 0.1             |
|                                   | R             | 0 to 1600                                           | 0 to 1600   | 0.1             |
|                                   | B             | 0 to 1800                                           | 0 to 1800   | 0.1             |
|                                   | S             | 0 to 1600                                           | 0 to 1600   | 0.1             |
|                                   | T             | -200 to 400                                         | -200 to 200 | 0.1             |
|                                   | E             | -200 to 800                                         | 0 to 800    | 0.1             |
|                                   | PR40/20       | 0 to 1800                                           | 0 to 1800   | 0.1             |
|                                   | Ni            | 0 to 1300                                           | 0 to 1300   | 0.1             |
|                                   | PL-II         | 0 to 1300                                           | 0 to 1300   | 0.1             |
|                                   | WRe5-26       | 0 to 2300                                           | 0 to 2300   | 0.1             |
| DC voltage                        | 1 to 5 V      | -19999 to 99999<br>(Range where scaling is allowed) |             | 1/10000 digit   |
|                                   | 0 to 5 V      |                                                     |             |                 |
|                                   | 0 to 10 V     |                                                     |             |                 |
|                                   | 0 to 10 mV    |                                                     |             |                 |
|                                   | 0 to 50 mV    |                                                     |             |                 |
|                                   | 4 to 20 mA    |                                                     |             |                 |
| DC current                        | 0 to 20 mA    |                                                     |             |                 |
|                                   | 0 to 20 mA    |                                                     |             |                 |
| Motorized valve position feedback | Potentiometer | 100 to 10 k                                         |             | 1/1000 digit    |

## Separate order items

|                           |                   |                                    |
|---------------------------|-------------------|------------------------------------|
| Terminal cover            | ZZP PXR1-B230     | Two pieces are necessary per unit. |
| PC loader interface cable | ZZP PXH1*TK4H4563 | For RS-232C Interface              |

# Multi-Loop Module Type Temperature Controller PUM



30 × 100 × 85 mm



- Control Module
- Event Input/Output
- Analog Input/Output
- Analog Input
- Analog Output
- CC-LINK
- Programless Communication with Mitsubishi PLC
- PROFIBUS
- Ethernet

## Smart!

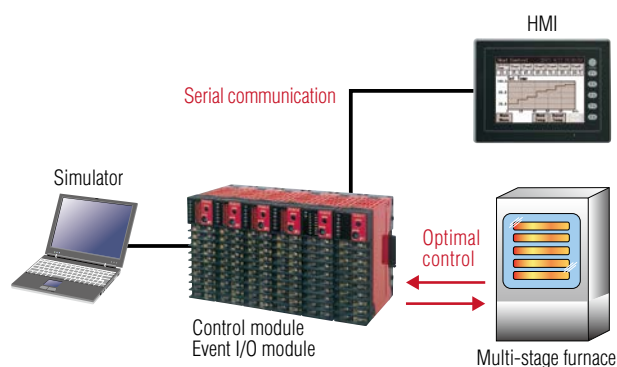
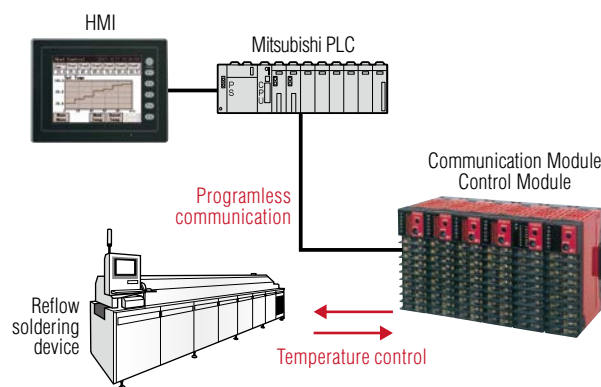
- Up to 64 loops (4 loops × 16 units)
- Heater break alarm by using CT, up to 8 points
- Communication with PLC

## Easy!

- Detachable terminal
- Easy-to-use software
- Easy mounting onto DIN rail

## Fast!

- High-speed data transmission (RS-485 / 115.2 kbps or 230.4 kbps)
- Sampling time: 200 ms

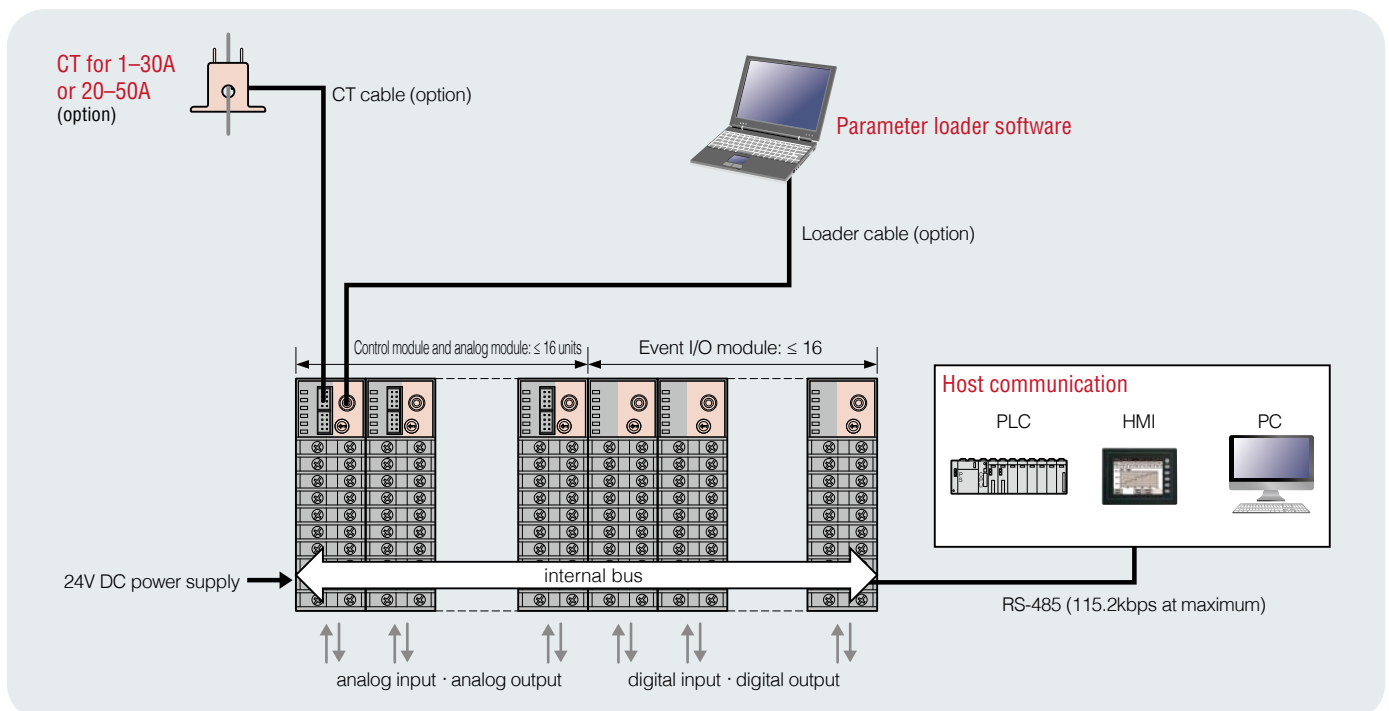


## Variations

|                      |                             |                                                                                    |               |                                                              |                                                                                     |                     |                                    |                                                                                      |
|----------------------|-----------------------------|------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------|------------------------------------|--------------------------------------------------------------------------------------|
| Temperature control  | <b>Control Module</b>       | PUMA<br>PUMB                                                                       | Communication | <b>CC-LINK</b>                                               | PUMCL                                                                               | Analog input/output | <b>Analog I/O Module</b>           | PUMV                                                                                 |
|                      | 2 ch or 4 ch<br>8 CT inputs |   |               | Communication speed<br>10 Mbps                               |   |                     | 4 AIs and 4 AOs<br>Transfer output |   |
|                      |                             |                                                                                    |               |                                                              |                                                                                     |                     |                                    |                                                                                      |
| Digital input/output | <b>Event I/O Module</b>     | PUME                                                                               | Communication | <b>Programless<br/>Communication with<br/>Mitsubishi PLC</b> | PUMCM                                                                               | Analog input/output | <b>Analog Input<br/>Module</b>     | PUMN                                                                                 |
|                      | 8 DIs & 8 DOs               |   |               | Direct address<br>mapping                                    |   |                     | 4 AIs<br>Remote input              |   |
| Communication        | <b>Ethernet</b>             | PUMCE                                                                              | Communication | <b>PROFIBUS</b>                                              | PUMCP                                                                               | Analog input/output | <b>Analog Output<br/>Module</b>    | PUMT                                                                                 |
|                      | 10BASE-T<br>100BASE-TX      |  |               | PROFIBUS DP-V0<br>Communication speed<br>12 Mbps             |  |                     | 4 AOs<br>Transfer output           |  |

## System Configuration Example

- Control module (PUMA, PUMB) + analog I/O module (PUMV, PUMN, PUMT): up to 16 units in total
- Event I/O module (PUME): up to 16 units



# Digital Thermostat

## PXR3



48 × 24 × 98 mm



### Temperature Alarm with On-Off Contact Output Ideal for Overheat Detection

---

- Thermocouple input or thermistor input
- Waterproof front panel: IP66 and NEMA 4X equivalent
- Up to two alarm outputs (H, L, HH, LL alarm available)
- Alarm setting in 1°C steps
- Panel mounting
- DIN rail mounting or wall mounting with optional adapter
- Lightweight 150 g
- Simple operation with three front keys
- European-style terminal

## Specifications

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply voltage     | 100 (-15%) V to 240 (+10%) V AC, 50/60 Hz<br>Power consumption: ≤ 6 VA (at 100 V AC), ≤ 8 VA (at 240 V AC),                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Input                    | Number of inputs: 1<br>Input signal and measurable range: see Table 1.<br>Allowable signal source resistance: thermocouple input ≤ 100Ω<br>Measurement cycle: ≤ 2 seconds<br><br>Burnout function (open-circuit detection): you can set the output upon an open-circuit to the upper limit or the lower limit<br>Input impedance: thermocouple input ≥ 1 MΩ<br>Input filter: first-order lag filter, configurable in 0.5-second steps, within 0–90 seconds<br>Input compensation: configurable within ±10% of measurement range                |
| Display and keys         | Green LED<br>7-segment 4-digit alphanumeric display<br>Display contents: measured value, alarm 1 setpoint, alarm 2 setpoint, parameter name, parameter value<br>3 keys, with key lock function                                                                                                                                                                                                                                                                                                                                                 |
| Accuracy                 | Indication accuracy: See Table 1 (Error of temperature sensor is not included)<br>Reference junction compensation accuracy: ±1°C (at 23°C)                                                                                                                                                                                                                                                                                                                                                                                                     |
| Alarm output             | SPST-NO contact, 1 or 2 points<br>Contact capacity: 220 V AC / 30 V DC, 1A (resistive load)<br>Mechanical life of contact: 10 million times (no load)<br>Electrical life of contact: 100 thousand times (rated load)<br><br>Output cycle: 0.5 seconds<br><br>Alarm type: (high or low absolute alarm, hold function available)<br>Alarm setpoint: configurable in 1°C steps, within 0–100% of measurement range<br>Hysteresis: configurable in 1°C steps, within 0–110% of measurement range<br>Alarm delay: configurable within 0–120 seconds |
| Operating conditions     | Ambient temperature: -10°C to +50°C<br>Ambient humidity: ≤ 90% RH (no condensation)                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Installation             | Panel mount, or<br>DIN rail or wall mount when using DIN rail mounting adapter (separate order item)                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Electrical connection    | European-style terminal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Case                     | Plastic (equivalent to non-combustibility grade UL94V-0), black                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| IP rating of front panel | IP66 (equivalent to NEMA 4X)<br>When installed with our genuine waterproof packing.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Weight                   | Approx. 150 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

### Measurement range

| Sensor       | Range (°C) | Indication accuracy                   |
|--------------|------------|---------------------------------------|
| Thermocouple | J          | 0 to 800<br>±0.5% FS<br>±1digit ±1°C  |
|              | K          | 0 to 1200<br>±0.5% FS<br>±1digit ±1°C |
|              | R          | 0 to 1600<br>±0.5% FS<br>±1digit ±1°C |
|              | T          | 0 to 400<br>±0.5% FS<br>±1digit ±1°C  |
|              | E          | 0 to 600<br>±0.5% FS<br>±1digit ±1°C  |
| Thermistor   | PB-36      | 0 to 100<br>±4°C                      |

#### Notes:

- The thermostat cannot deliver the accurate indication when the sensor is the type R thermocouple and the temperature is in the range between 0 and 500°C.
- You cannot switch the input type between the thermistor and the thermocouple. You can switch the input type among the five type of thermocouples by using the front keys.
- If you change the input type, be sure to change the measurement range setting accordingly.
- The indication accuracy of thermocouple does not include the reference junction compensation error (±1°C).
- The indication accuracy of thermistor does not include the error of sensor.

### Ordering code

| Sensor       |              | Number of alarms | Model code     |
|--------------|--------------|------------------|----------------|
| Thermocouple | Not provided | 1                | PXR3TAY2-0V061 |
|              |              | 2                | PXR3TAY2-1V061 |
| Thermistor   | Provided     | 1                | PXR3HAY2-0V061 |
|              |              | 2                | PXR3HAY2-1V061 |

### Scope of delivery

Thermostat, panel-mounting adapter, front waterproof packing, instruction manual  
\*For the thermistor input version, a thermistor sensor is additionally provided.

### Separate order item

|                  |                 |
|------------------|-----------------|
| DIN rail adapter | ZZP*CTK368715P1 |
|------------------|-----------------|

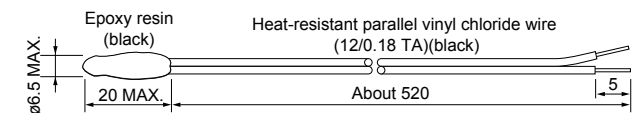
### Default setting

|                          |                                                                                                                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measurement range        | Type K thermocouple: 0°C to 1200°C<br>Thermistor: 0°C to 100°C                                                                                                                                                               |
| Alarm setpoint           | Type K thermocouple, 1 alarm: upper limit 1200°C<br>Type K thermocouple, 2 alarms: lower limit 0°C, upper limit 1200°C<br>Thermistor, 1 alarm: upper limit 100°C<br>Thermistor, 2 alarms: lower limit 0°C, upper limit 100°C |
| Alarm hysteresis width   | 1°C                                                                                                                                                                                                                          |
| Alarm delay time         | 0 seconds                                                                                                                                                                                                                    |
| Indication               | Measured value                                                                                                                                                                                                               |
| Burnout                  | Upper limit                                                                                                                                                                                                                  |
| Input filter             | 5 seconds                                                                                                                                                                                                                    |
| Input value compensation | 0%                                                                                                                                                                                                                           |

### Attached thermistor sensor

|                    |                                                                                     |
|--------------------|-------------------------------------------------------------------------------------|
| Measurement range  | 0°C to 100°C                                                                        |
| Constant β         | 3990 K                                                                              |
| Nominal resistance | 6 kΩ (°C)                                                                           |
| Lead wire          | Heat-resistant vinyl chloride, black, 520 mm,<br>Temperature range: -20°C to +105°C |
| Accuracy           | ≤ 2°C                                                                               |

### Dimensions (unit: mm)



### Thermistor sensor for replacement

|                 |
|-----------------|
| ZZP*CTK7L3941P1 |
|-----------------|

Please read the following instructions carefully before operating the Digital Temperature Controller



## **Over-Temperature Protection**

Any control system design should take into account that any part of the system has the potential to fail.

For temperature control systems, continued heating should be considered the most dangerous condition, and the machine should be designed to automatically stop heating if unregulated due to the failure of the control unit or for any other reason.

The following are the most likely causes of unwanted continued heating:

- 1) Controller failure with heating output constantly on
- 2) Disengagement of the temperature sensor from the system
- 3) A short circuit in the thermocouple wiring
- 4) A valve or switch contact point outside the system is locked to keep the heat switched on.

In any application where physical injury or destruction of equipment might occur, we recommend the installation of independent safety equipment, with a separate temperature sensor, to disable the heating circuit in case of overheating.

The controller alarm signal is not designed to function as a protective measure in case of controller failure.

Information in this catalog is subject to change without notice.  
Read the instruction manuals thoroughly before using the products.

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