

# 48x24mm PID Digital Indicating Temperature/Process Controllers TP20

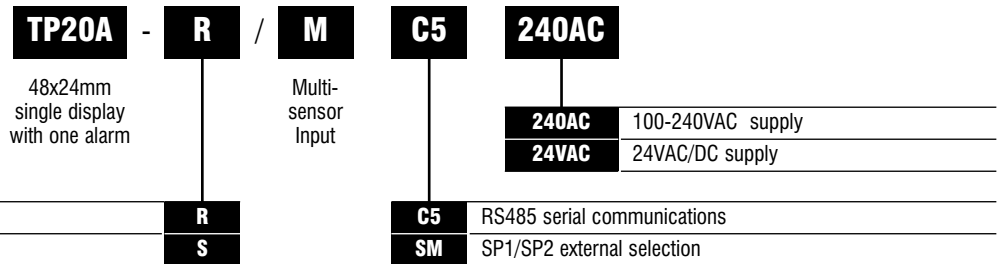


Single display 4 digit PID process/temperature controller with auto-tuning.

- Multi –Input selectable
- 1 alarm standard
- Two set point selection option
- PID with Auto-tune, PD or on/off modes
- RS485 Communication option with IMO/Modbus
- IP66 protection
- Conforms to UL/CSA & CE



## Options and ordering codes



Relay output	<b>R</b>
Signal Voltage for SSR	<b>S</b>
Analogue Current 4-20mA	<b>A</b>
Analogue Voltage 0 – 10V	<b>V</b>

## Input ranges

Input type		Scale	
Thermocouple	K	-200 to 1370°C	-320 to 2500°F
		-199.9 to 400.0°C	-199.9 to 750.0°F
	J	-200 to 1000°C	-320 to 1800°F
	R	0 to 1760°C	0 to 3200°F
	S	0 to 1760°C	0 to 3200°F
	B	0 to 1820°C	0 to 3300°F
	E	-200 to 800°C	-320 to 1500°F
	T	-199.9 to 400.0°C	-199.9 to 750.0°F
	N	-200 to 1300°C	-320 to 2300°F
	PL-II	0 to 1390°C	0 to 2500°F
C (W/Re5-26)	0 to 2315°C	0 to 4200°F	
RTD	Pt100	-200 to 850°C	-300 to 1500°F
		-199.9 to 850.0°C	-199.9 to 999.9°F
	JPt100	-200 to 500°C	-300 to 900°F
		-199.9 to 500.0°C	-199.9 to 900.0°F
DC	4 to 20mA DC		
	0 to 20mA DC		
DC	0 to 1V DC	-1999 to 9999□	-199.9 to 999.9
	0 to 10V DC	-19.99 to 99.99□	-1.999 to 9.999
	1 to 5V DC		
	0 to 5V DC		

- As for DC input, scaling and decimal point place change are possible.
- As for DC current input, shunt resistor 50 is needed as an external device.

## Specification

### Display

PV/SV [Red 4 digits, Character size: 7.5 x 4.1mm (H x W)]

### Input: Thermocouple

External resistance: 100Ω or less (However, for B input: 40Ω or less)

### Input: RTD

3-wire system (Allowable input wire resistance per wire: 10Ω or less)

### Input: DC Current

Input impedance: 50Ω (Connect shunt resistor 50Ω between input terminals.)  
Allowable input current: 50mA or less (When shunt resistor 50Ω is used)

### Input: DC Voltage (0-1V)

Input impedance: 1MΩ or greater  
Allowable input voltage: 5V or less  
Allowable signal source resistance: 2kΩ or less

### Input: DC Voltage (0-5V, 1-5V, 0-10V)

Input impedance: 100kΩ or greater  
Allowable input voltage: 15V or less  
Allowable signal source resistance: 100Ω or less

### Accuracy: Thermocouple (Setting • Indicating)

Within ±0.2% of each input span ±1 digit or ±2°C (4°F) whichever is greater  
However, R or S input 0 to 200°C (0 to 400°F): Within ±6°C (12°F), B input 0 to 300°C (0 to 600°F): Accuracy is not guaranteed. K, J, E, and N input less than 0°C (32°F): Within ±0.4% of each input span ±1 digit

### Accuracy: RTD (Setting • Indicating)

Within ±0.1% of each input span ±1 digit or ±1°C (2°F) whichever is greater

### Accuracy: DC Current & V (Setting • Indicating)

Within ±0.2% of each input span ±1 digit

### Input sampling period 0.25 seconds

### Output: Relay types

SPNO/NC: 3A 250V AC Resistive load, 1A Inductive load  $\cos\phi=0.4$

### Output: signal voltage types

12VDC +2VDC/-0VDC, Max. 40mA (Short-circuit protected)

### Output: analogue current 4 to 20mA DC Load resistance: Max. 550Ω

### Output: analogue voltage 0-10VDC – Output impedance 500Ω

### Control action

User selectable: PID (with auto-tuning function), PI, PD (with manual reset function), P (with manual reset function), ON/OFF

### Proportional band (P)

Thermocouple: 0 to 1000°C (0 to 2000°F)  
RTD: 0.0 to 999.9°C (0.0 to 999.9°F)  
DC current and DC voltage: 0.0 to 100.0%

### Integral time (I) 0 to 1000 seconds

### Derivative time (D) 0 to 300 seconds

### Proportional cycle 1 to 120 seconds (Not available for DC current output type)

### ARW 0 to 100%

### Hysteresis

Thermocouple and RTD: 0.1 to 100.0°C (°F)  
DC current and DC voltage: 1 to 1000

### Alarm (A1)

Open collector, Control capacity: 24Vdc 0.1A Max.

### Alarms action

ON/OFF action, Hysteresis 0.1 to 100.0°C (°F) (1 to 1000 analogues)

**Alarm Functions** Alarm Function and NO/NC can be selected by key operation.

#### • No alarm

• **High limit alarm** (Deviation setting)  
Setting range: -(Input span) to Input span

• **Low limit alarm** (Deviation setting)  
Setting range: -(Input span) to Input span

• **High/Low limits alarm** (Deviation setting)  
Setting range: 0 to Input span

• **High/Low limit range alarm** (Deviation setting)  
Setting range: 0 to Input span

• **Process high alarm**  
Setting range: Input range low limit value to Input range high limit value

• **Process low alarm**  
Setting range: Input range low limit value to Input range high limit value

• **High limit alarm w/standby** (Deviation setting)  
Setting range: -(Input span) to Input span

• **Low limit alarm w/standby** (Deviation setting)  
Setting range: -(Input span) to Input span

• **High/Low limits alarm w/standby** (Deviation setting)  
Setting range: 0 to Input span

The negative low limit value is -199.9 or -1999 and the positive high limit value is 999.9 or 9999

### Supply voltage

85 to 264VAC 50/60Hz (100 to 240VAC +10% -15%), 20 to 28VDC/AC 50/60Hz

### Power consumption

Approx. 6VA

### Insulation resistance > 10MΩ at 500VDC

### Dielectric strength

1.5kV AC for 1min between input terminal and ground terminal, between input terminal and power terminal, between power terminal and ground terminal, between output terminal and ground terminal, between output terminal and power terminal

### Ambient temperature 0 to 50°C

### Ambient humidity 35 to 85%RH (No condensation)

### Mounting

Flush - Screw type mounting bracket  
(Mountable panel thickness: Within 1 to 15mm)

### Front Panel IP66

### Weight

Approx. 100g

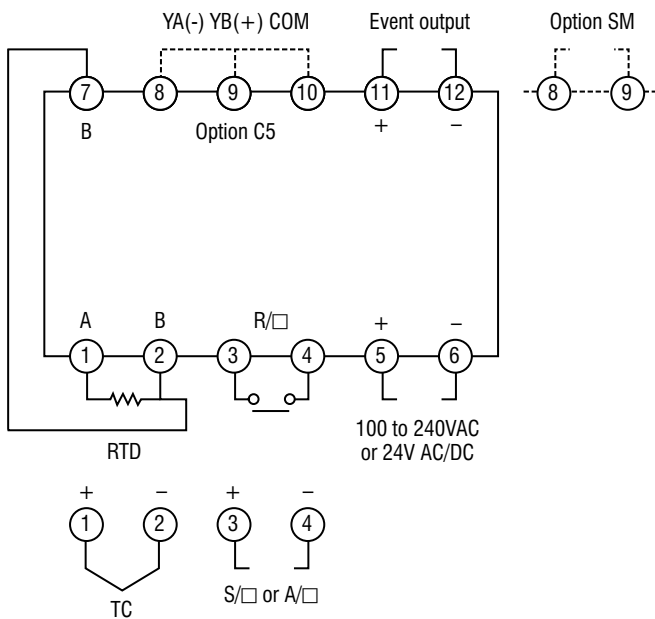
### Case material

Light grey flame resisting resin

### Standard functions

Sensor correction, Setting value LOCK, Power failure countermeasure, Self diagnosis, Automatic cold junction temperature compensation (Only thermocouple), Sensor burnout alarm, Input burnout, Warm-up display, Auto/Manual control selection

## Wiring connections



Key	
<b>R/5</b>	Relay contact output
<b>S/5</b>	Non-contact voltage output
<b>A/</b>	Current output
<b>SM</b>	Setting value memory (external selection)
<b>Event output</b>	Temperature alarm

• Dotted line: Option (designation required)  
 When wiring use the solderless terminal adapted to the M3 terminal screw  
 (Nichifu 1.25Y-3 or Fuji 1.25-YAS3 recommended)

## Optional features

### Serial communication [C5]

Various setting status changing, reading and setting of the TP Series can be performed from external computer, HMI or PLC.

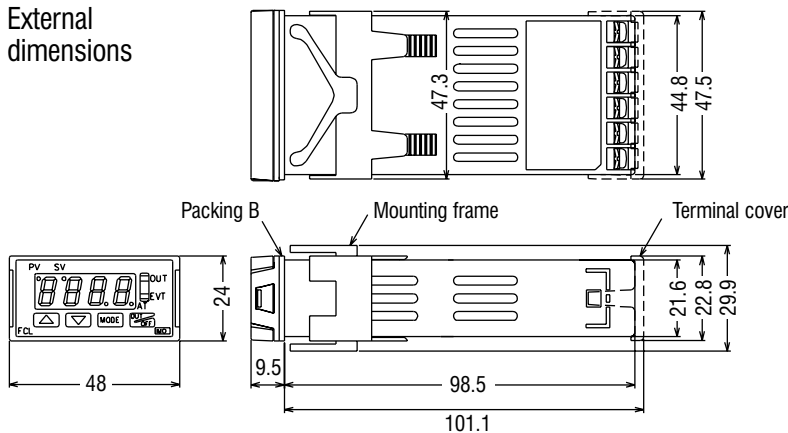
<b>Communication interface</b>	Based on EIA, RS-485
<b>Communication method</b>	Half-duplex communication start-stop synchronous
<b>Data transfer rate</b>	(2400/4800/9600/19200bps) Select by key operation
<b>Parity</b>	(Even/ Odd/ No parity) Selectable by key operation
<b>Stop bit</b>	(1 or 2) Selectable by key operation
<b>Communication protocol</b>	Based on IMO standard protocol or Modbus (Selectable by key operation) When Modbus is selected, RTU mode or ASCII mode can be selected by key operation.
<b>Number of connectable units</b>	A maximum of 31 units per communication port
<b>Communication error detection</b>	Parity check and Checksum

### Set point 1/ Set point 2 external selection [SM]

Set Point 1 & Set point 2 can be changed by external contact  
 Terminal between 13 and 14 is open: SV1, Terminal between 13 and 14 is closed: SV2

## Dimensions and mounting mm

External dimensions



Panel cut out (lateral close mounting)

