Fuji Electric

Temperature Controller

MICRO-CONTROLLER X

48 × 48 mm

DATA SHEET

PXF4-2
SOCKET

PXF4 socket type is a plug & socket type compact temperature controller developed as a successor to PXR4 socket type. It has 48 × 48 mm front panel with color LCD, and an 85.7-mm deep body behind the panel.

FEATURES

1. Enhanced control function
   - Fast sampling speed of 50 ms
   - Improved indication accuracy
   - Freely configurable control cycle (100 ms to 99 s)
   - Variety in control method
2. User-friendly interface
   - Wide viewing angle LCD, high luminance white LED backlight
   - Digit select key for easier value-setting
3. Various functions
   - 8 steps ramp/soak function
   - Parameter loader interface
4. Universal input
   - Accepts thermocouple, RTD, voltage, and current

SPECIFICATIONS

1. General specifications

Power supply:
100 V (-15%) to 240 V (+10%) AC, 50/60 Hz;
24 V (±10%) DC/AC

Power consumption:
10 VA MAX. (100 to 240 V AC), 5 VA MAX. (24 V DC/AC)

Insulation resistance:
20 MΩ or more (at 500 V DC)

Withstand voltage:
Power source ↔ all terminals: 1500 V AC for 1 min
Relay contact output ↔ all terminals: 1500 V AC for 1 min
Between others 500 V AC for 1 min

2. Input section

2.1 Process value input

Number of input: 1

Input setting:
Programmable scale

Input signal: See Table 1
(Universal input: thermocouple, RTD, voltage, current)

Standard measurement range and input type:
See Table 1

Indication accuracy (at Ta = 23°C):
- Thermocouple input: ±0.5%FS ±1 digit ±1°C

*Exceptions:
Thermocouple B: 0 to 400°C: no accuracy assurance
Thermocouple R: 0 to 500°C: ±1%FS ±1 digit ±1°C
Thermocouples: -200 to -100°C: ±2°C ±1 digit

- RTD input: ±0.8°C ±1 digit or ±0.2% ±1 digit of indicated value, whichever is larger
- mV input, voltage input, current input: ±0.3%FS ±1 digit

* Note that the sensor should be sufficiently warmed up to secure the accuracy

Temperature effect on sensitivity:
±0.3%FS/10°C

Indication resolution:
See Table 1

Input sampling rate:
50 ms

Input impedance:
- Thermocouple, mV input: 1 MΩ or more
- Current input: 150 Ω or less (built-in diode)
- Voltage input: About 1 MΩ

Variation by signal source resistance:
- Thermocouple, mV input: ±0.3%FS ±1 digit per 100 Ω
- Voltage input: ±0.3%FS ±1 digit per 500 Ω

Allowable wiring resistance:
RTD: 10 Ω or less (per wire)

Allowable input voltage:
- DC voltage input: within ±35V
- Current input: within ±25 mA
- Thermocouple, RTD, mV input: within ±5 V

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

Input 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 OFF if set at 0.0)
(d) Square root extraction: -0.1 to 105% (OFF if set to -0.1%)

Overrange, underrange:

Out of the range between -5% and 105% FS (accuracy not guaranteed between -5 and 0, and between 100 and 105% FS)

*Exceptions:

- JPt, Pt, 0–10 V DC: out of the range between -2% and 105% FS
- Thermocouple E: out of the range between -5% and 102% FS

3. Output section

3.1 Control output

Number of points: 1

Type:

selected among (1) to (3) below

(1) Relay contact output (SPDT)
- Proportional cycle: 1 to 150 seconds
- Contact structure: SPDT (single pole double throw)
- Contact capacity: 250 V AC/30 V DC, 5 A (resistive load)
- Mechanial life: 50 million operations MIN. (100 operations/min)
- Electrical life: 100,000 operations MIN. (rated load)

(2) SSR drive output
- Proportional cycle: 1 to 150 s
- ON voltage: 12 V DC (between 10.7 and 13.2V DC)
- OFF voltage: 0.5 V DC or lower
- Maximum current: 20 mA DC
- Load resistance: 600 Ω MIN.

(3) Current output (4 to 20 mA DC)
- Accuracy: ±5%FS
- Load resistance: 500 Ω MAX.

3.2 Alam output (option)

Number of outputs:

Relay contact output: Up to 2

Output specifications:

Relay contact output
Contact structure: SPST (single pole single throw)
Contact capacity: 250 V AC/30 V DC, 1 A (resistive load)
Minimum ON/OFF current: 10 mA (5 V DC)
Mechanical life: 20 million operations MIN. (100 operations/min)
Electrical life: 100,000 operations MIN. (rated load)

Alarm kind:

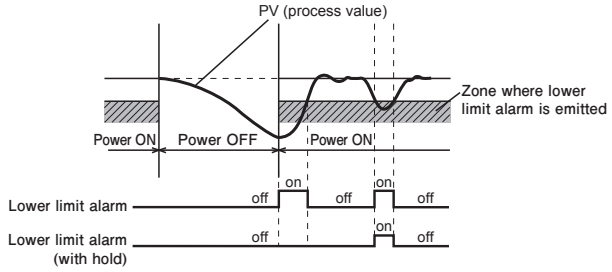
Absolute alarm, deviation alarm, zone alarm, upper and lower limit, and hold function available for each kind of alarms.
Alarm latch, Excitation/non-excitation selecting function provided.

Output cycle:

100 ms

What is alarm with hold?

The alarm is not turned ON immediately even when the process value is in the alarm band. It turns ON when it goes out the alarm band and enters again.



4. Indication/setting section

4.1 Display unit

Type:

LCD (with backlight)

Indication contents:

Process value indication: 11-segment, 4-digit [white]
Setpoint indication: 11-segment, 4-digit [green]
Screen No. indication: 7-segment, 3-digit [orange]
Status indication: 23 indicator lamps

4.2 Setting section

Five embossed keys

5. Control functions

5.1 Control types

ON/OFF control

PID control
- PID parameters determination: Auto tuning

Fuzzy PID control
- PID parameters determination: Auto tuning

Self tuning control

PID2 control
- PID parameters determination: Auto tuning

5.2 Control parameters

- Proportional band (P): 0.0–999.9% (On/off control when P=0)
- Integral time (I): 0 to 3200 s
  Integral time control invalidated when I = 0.
- Differential time (D): 0.0 to 999.9 s
  Differential time control invalidated when D = 0.
- Control cycle: 100 to 900 ms (in 100 ms), 1 to 99 s (in s)
- Anti-reset windup:
  0 to 100% of measurement range
- Hysteresis band: 50% of measurement range
  (available only during the on/off control)

5.3 Control mode

Mode type:

Auto, Manual

*In the manual mode on/off control, available MVs are 100% and 0%.

Mode switching:

- Auto↔Manual: Balanceless·bumpless

6. Data backup at power failure

On non-volatile memory

7. Self-diagnosis

Program error supervision by watchdog timer

8. Operation and storage conditions

Operating ambient temperature:

-10 to 50°C

Storage temperature:

-20 to 60°C

Operating/storage ambient humidity:

90%RH MAX. (no condensation)

Warm-up time:

30 min MIN

Vibration:

During transportation 9.8 m/s^2 (1G) or less

Impact:

During transportation: 294 m/s^2 (30G) or less

9. Structure

Mounting method:

Panel flush mounting, DIN rail mounting
(DIN rail mounting requires the dedicated socket.)

External terminals:

8-pin or 11-pin socket, M3.5 screw terminals
*The socket is a separate order item.

Case:

- Material: ABS, PPO
- Flammability: equivalent to UL94V-0
- Color: Black

Protection structure:

- Panel front side: equivalent to IP66 and NEMA 4X
  (When the panel is mounted using our genuine packing.
  Not water-proof if mounted closely together.)
- Body (slits on top and bottom): equivalent to IP20

Dimensions:

48 (W) × 48 (H) × 85.7 (D) mm

Weight:

Approx. 200g

10. User customize function

Parameter mask function:

You can switch between show/hide of parameters.

Program (ramp/soak) function:

- Number of program patterns: 1 or 2
- 8 ramps and 8 soaks in total

User key:

You can assign the following functions to the user key:
auto/manual switching, standby on/off, etc.

11. Certification

- CSA
- UL, C-UL: expected date of certification: March 2019

12. EU Directive Compliance CE

LVD (2014/35/EU)
EN 61010-1
EN 61010-2-030
EMC (2014/30/EU)
EN 61326-1 (Table 2)
EN 55011 (Group 1 Class A)
EN 61000-3-2 (Class A)
EN 61000-3-3
RoHS (2011/65/EU)
EN 50581

*The following table shows the difference of outputs among other micro-controller X series models.

	SSR driving output		Allowable load resistance for 4 to 20mA DC output
	Voltage	Maximum current	
PXR3	DC15V	20mA	100 ~ 500 Ω
PXR4/5/7/9	DC24V	20mA	600 Ω or less
PXV3	DC5.5V	20mA	600 Ω or less
PXV/PXW/PXZ	DC24V	20mA	600 Ω or less
PXF	DC12V	20mA	500 Ω or less

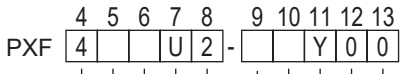
Table 1 Measurement range

Input type		Measurement range [°C]	Minimum input increment [°C]
RTD	JPt100	-199.9 to 600.0	150
	Pt100	-200 to 850	150
Thermocouple	J	-100 to 1000	400
	K	-200 to 1300	400
	R	0 to 1700	1700
	B	0 to 1800	1800
	S	0 to 1700	1700
	T	-199.9 to 400.0	399.9
	E	-200 to 800	800
	L	-100 to 850	950
	N	-200 to 1300	1500
	PL-II	0 to 1300	1300
	W	0 to 2300	2300
	U	-200 to 400.0	599.9
DC voltage	0–5 V DC	-1999 to 9999 (Scaling range)	—
	1–5 V DC		
	0–10 V DC		
	2–10 V DC		
	0–100 mV DC		
DC current	0–20 mA DC		
	4–20 mA DC		

Notes:
1. When the temperature exceeds 1000°C, the decimal point does not appear on the screen.
2. Input signal, measurement range, and set value at the time of delivery are as follows:
   Thermocouple K, Measurement range from 0 through 400°C, Set value 0°C.
   Switching the input signal among thermocouple, RTD, current, and voltage is available by key operation on the front panel.

CODE SYMBOLS

Standard type



Digit	Specifications	Note
4	<Front panel size W × H> 48×48mm	
5	<Input signal> Universal input (Thermocouple/Volt, backwards compatible wiring) Universal input (RTD/mA, backwards compatible wiring)	Note1
6	<Control output> Relay contact (SPDT) SSR drive output Current output	
7	<Terminal form> Socket type	
8	<Revision code>	
9	<Alarm output> None 2 points	
10	<Power supply voltage> 100 to 240V AC 24 V AC/DC	
11 12 13		

Note1: Wiring compatible to previous PXZ, PXW, PXV and PXR socket controllers.
(mA input dose not require the resistor)

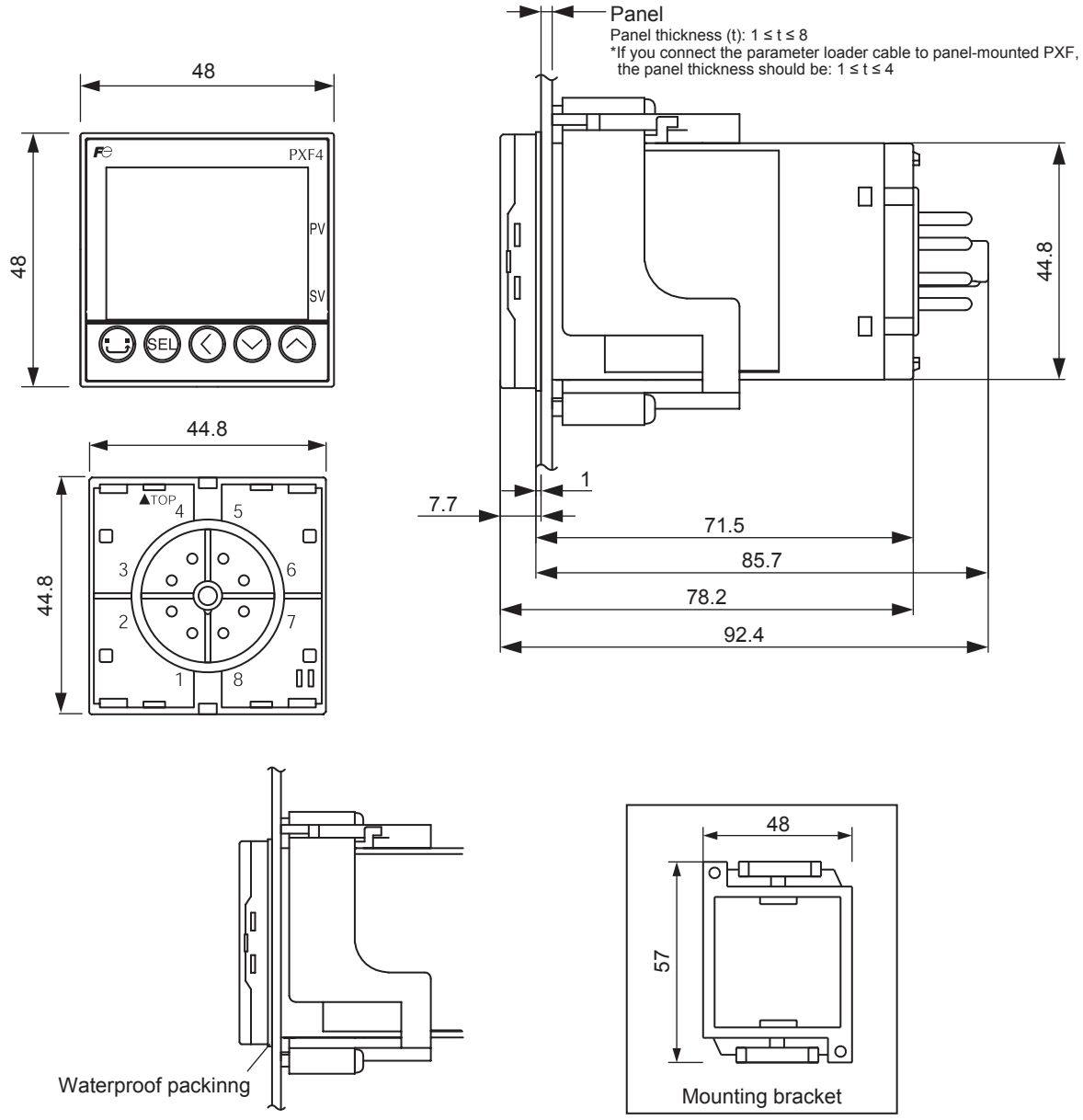
SCOPE OF DELIVERY

- Controller × 1
- Instruction manual × 1
- Panel mounting frame × 1
- Watertight packing × 1

SEPARATE ORDER ITEMS

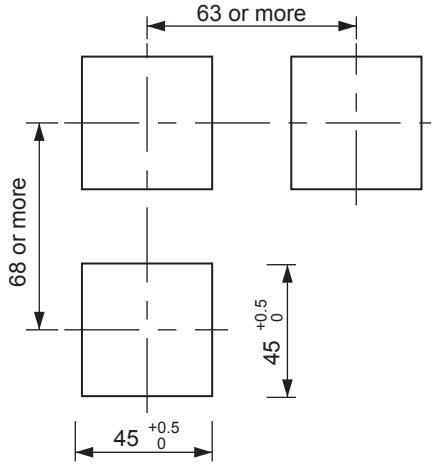
			Item	Q`ty	Ordering code
			PC loader communication cable	1	ZZP*TQ501923C3
4th code	4	No alarm	8-pin socket for DIN rail mounting (TP48X)	1	ZZP*PXF2-C100
			8-pin socket for panel mounting (TP48SB)	1	ZZP*PXF2-C101
	G	Two alarms	11-pin socket for DIN rail mounting (TP411X)	1	ZZP*PXF2-C102
			11-pin socket for panel mounting (TP411SBA)	1	ZZP*PXF2-C103

OUTLINE DIAGRAM (Unit : mm)

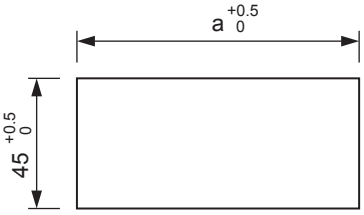


PANEL CUTOUT SIZE (Unit : mm)

Installing multiple controllers



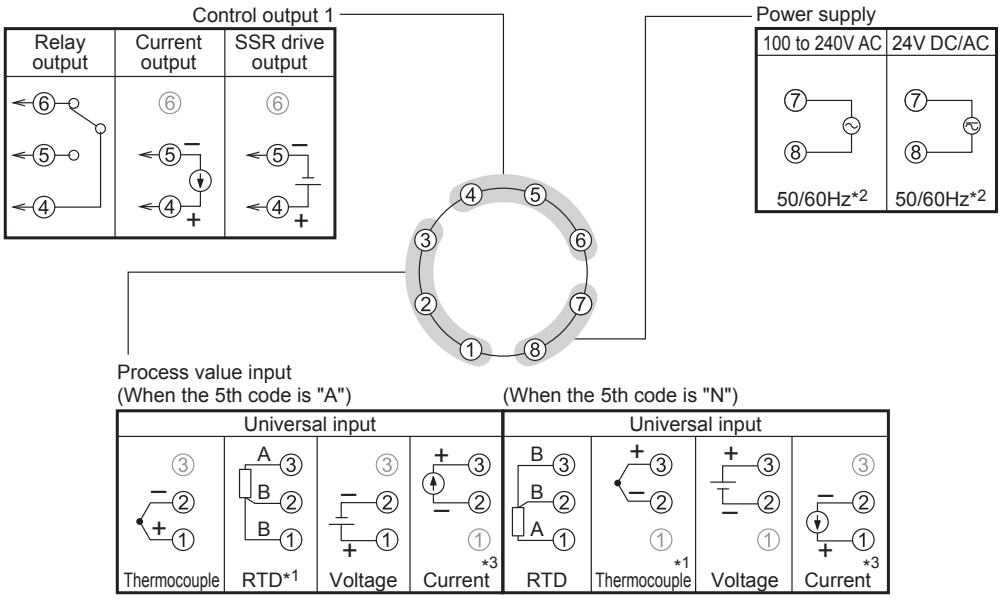
Side stick mounting



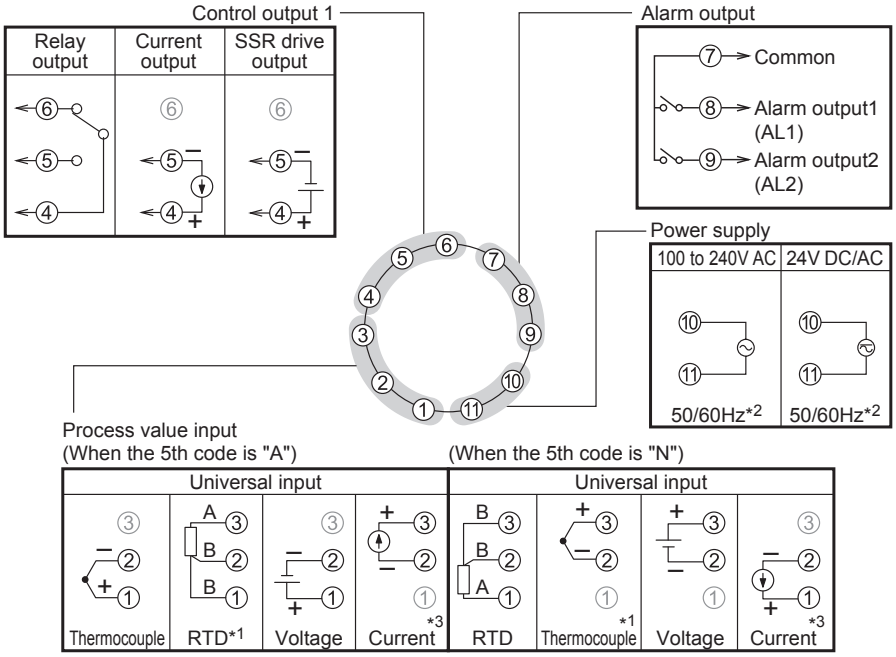
Number of units	2	3	4	5	6
a	93	141	189	237	285

TERMINAL ALLOCATION

8-pin socket (for the versions that have no alarm)



11-pin socket (for the versions that have two alarms)



*1: The terminal layout differs from that of PXW4/PXZ4/PXV4.
*2: Check the power supply voltage before installation.
*3: Terminal allocation is different from PXR4. A 250Ω shunt resistor is not required.

INSULATION BLOCK DIAGRAM

Power supply (100 to 240 V AC)	**Internal circuit**
Control output 1 (relay contact)	**Process value input**
Alarm output 1 and 2 (relay contact)	**Control output 1 (SSR drive, current, voltage)**

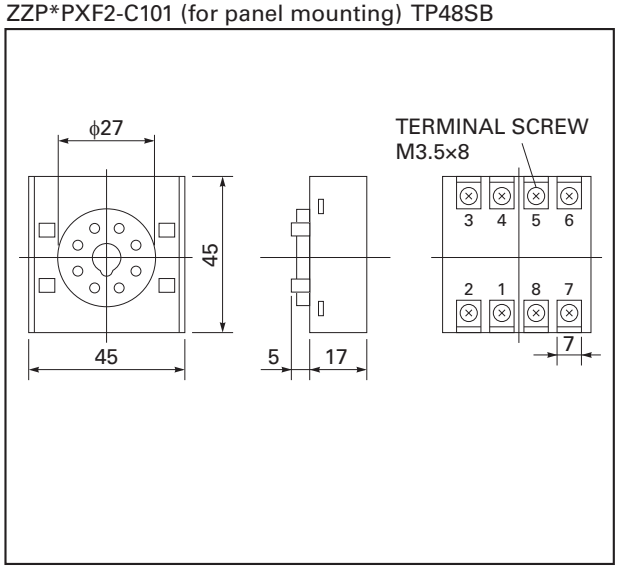
Power supply (24 V DC/AC)	**Internal circuit**
Control output 1 (relay contact)	**Process value input**
Alarm output 1 and 2 (relay contact)	**Control output 1 (SSR drive, current, voltage)**

: Basic insulation (1500 V AC)
: Functional insulation (500 V AC)
: No insulation

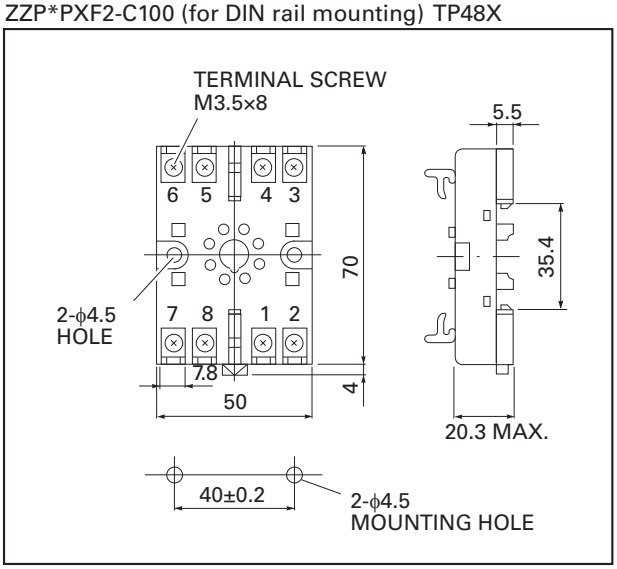
SOCKET OUTLINE DIAGRAM (Unit : mm)

8-pin socket (for the versions that have no alarm)

ZZP*PXF2-C101 (for panel mounting) TP48SB

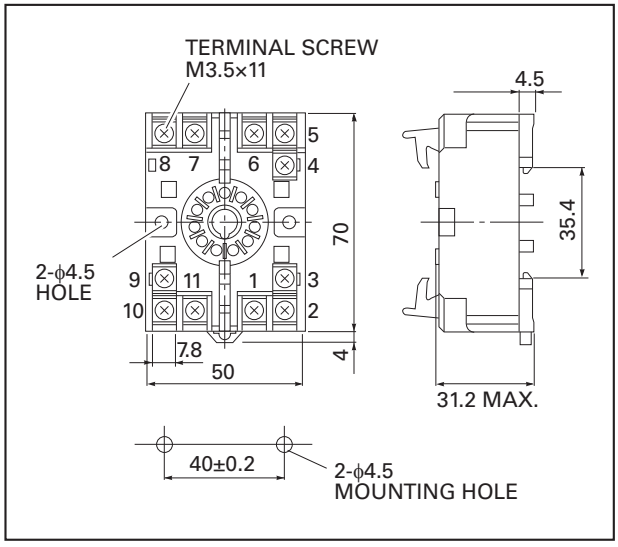


ZZP*PXF2-C100 (for DIN rail mounting) TP48X

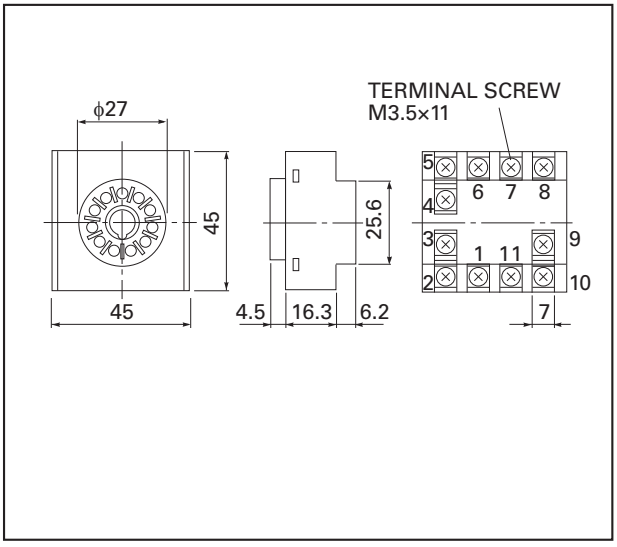


11-pin socket (for the versions that have two alarms)

ZZP*PXF2-C102 (for DIN rail mounting) TP411X



ZZP*PXF2-C103 (for panel mounting) TP411SBA



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

Fuji Electric Co., Ltd.

www.fujielectric.com

Instrumentation & Sensors Planning Dept.
Gate City Ohsaki, East Tower, 11-2, Osaki 1-chome, Shinagawa-ku, Tokyo 141-0032, japan
Phone: +81-3-5435-7021 Fax: +81-3-5435-7475
www.fujielectric.com/products/instruments/

Printed in Japan