Fuji Electric

MICROJET RECORDER-E

(Programmable Type)

DATA SHEET

PHE

This recorder can record up to 6 channels of thermocouples, resistance bulbs and DC voltage/current signals. The adoption of ink jet system makes it possible to record measured data in analog trace and digital color printing (6 colors, max) on a 100mm wide chart paper.

FEATURES

1. Compact size
   Depth: 175mm, mass; about 1.2kg (continuous type)
   Depth: 197mm, mass; about 1.5kg (6-intermittent type)
   Ideally suited for use with machines and equipments.
2. High-quality recording
   - Continuous traces without pen offset are possible by our unique ink jet system.
   - Scales are printed on a chart paper for each channel, eliminating the need for scale plate.
   - 6 different scale on 6 intermittent recording universal input type is available.
3. Easy setting of input signals
   DC voltage input (5mV span, 50V max.), DC current (4-20mA, 10-50mA), 12 kinds of thermocouples and resistance bulbs (Pt100) are field-settable for each channel.
4. Digital printing
   In addition to analog recording of measured data, periodic data printing, measured value list, scale printing, alarm printing, burnout printing, and parameter list are also available.
5. Easy Operation
   - A cartridge type recording device is used for easy replacement.
   - Allow to draw out the chart paper while recording.

SPECIFICATIONS

Input system

Input points: 1, 2-continuous recording, 6-intermittent recording

Input signal: Thermocouple: B, R, S, K, E, J, T, N, W, L, U, PN
Resistance bulb: Pt100
DC voltage: 50mV, 500mV, 5V, 50V range
DC current: 4 to 20mA DC, 10 to 50mA DC (Shunt resistor (option) need to be connected to the terminal.)

Input signal setting and change:
Setting and change of input signal between thermocouple, resistance bulb and DC voltage (50mV, 500mV, 5V, 50V range) is possible for each channel by the setting pin in the instrument and keyboard operation.

Measuring range (Recording range):
Recording range on each channel is settable within the raference range with keyboard operation.

Measurement cycle:
1, 2-continuous: 0.2s/point
6-intermittent: 30s/all points

Burnout: When thermocouple or resistance bulb input is disconnected, the recording is deflected to 100%.

Input filter: Settable within the range of 0-255s by 1s. steps.
Initial set before delivery is 3 s.

Reference range

Input signal		°C	°F
Thermocouple	B	400 to 1760	752 to 3200
	R	0 to 1760	32 to 3200
	S	0 to 1760	32 to 3200
	K	-200 to 1370	-328 to 2498
	E	-200 to 800	-328 to 1472
	J	-200 to 1100	-328 to 2012
	T	-200 to 400	-328 to 752
	N	0 to 1300	32 to 2372
	W	0 to 1760	32 to 3200
	L	-200 to 900	-328 to 1652
	U	-200 to 400	-328 to 752
	PN	0 to 1300	32 to 2372
Resistance bulb	Pt 100	-200 to 600	-328 to 1112
DC voltage	±50mV	-50.00 to 50.00mV	
	±500mV	-500.0 to 500.0mV	
	±5V	-5.000 to 5.000V	
	±50V	-50.00 to 50.00V	
	Scaling	Scaling is possible within the range of -32767 to +32767 (decimal point may be put as necessary)	

Recording system

Writing system: Ink jet system, in 6 colors as max.
Chart width: 100mm
Chart length: Z fold 15.08m
Service life of ink (depends on operating conditions):
About 12 months for 1 continuous line recording at 20mm/h of chart speed.

Recording color: 1-continuous: Recording: purple
Printing: purple
2-continuous: Recording:
No. 1 channel, red
No. 2 channel, blue
Printing: purple
6-intermittent recording:
No. 1 channel, orange
No. 2 channel, green
No. 3 channel, purple
No. 4 channel, red
No. 5 channel, black
No. 6 channel, blue
Printing: black

Chart speed: 10, 20, 24, 30, 50, 120, 200, 300, 400, 1000, 1200, 1500 mm/h
Can be changed by key operation.
Initial set before delivery is 20mm/h
(Note) In continuous type, it records data intermittently when the speed exceeds 400mm/h.

Recording cycle: **Continuous recording:**
Depend on chart speed
[Calculation formula]

$$\text{Recording cycle (sec)} = \frac{400}{\text{chart speed (mm/h)}}$$

(not faster than 2 seconds.)
Intermittent recording:
30 s/all points.

Industrial unit: Selectable on each channel in max. 7 characters by ASCII code.

Printing function: [Printing during analog recording]
[Note] Chart speed of continuous type should be slower than 400mm/h and that of intermittent type should be slower than 50mm/h.
Channel No. printing: Beside of recording line
Periodic printing: Channel number, measurement value, unit, chart speed and year, month, day, hour, minute.
[Note] Print period is automatically fixed on chart speed.
Scale printing: This print out is effected alternately with periodic printing.
[Note] Print interval is automatically fixed on chart speed.
Alarm printing: Channel number, kind of alarm and hour, minute.
Burnout printing: Channel number and hour, minute.
[Printing independent of analog recording]
[Note] Printing is performed by key operation, while analog recording is interrupted. After completion of the printing, analog recording starts again.
Instantaneous value list: Channel number, measured value, industrial unit, year, month, day, hour, minute.
Parameter list (set value list):
Input signal, recording range, measuring range, scaling range, unit, alarm, input filter, chart speed, year, month, day, hour, minute, etc.
Scale line printing: Optional scale line by user.
Test pattern: All characters and color patterns can be printed.
[Other printing]
Recording start mark
Chart speed change mark

Indicating, key operation system

Indication: LED (7 segments), 6 digits, green

Indication character:
7 segments, alphanumeral
Character height 10mm, width 5mm

Contents of indication:
Channel No.: 1 digit (1 to 6)
Measured value:
5 digits (including sign for value below 0)
Temperature: 1 digit below decimal point
Voltage/current:
Scaling, -9999 is displayed for -10000 and under.
Time: Hour, Minute
Status indication:
Symbolic code as alarm, burnout or carriage failure.
Measurement display cycle:
3s for channel selection, 1s for data update in the same channel

Operation key: 3 keys and 1 reset key
Key lock: soft key lock is available by key operation.

Power requirement

Line supply: Specify when ordering
Rated voltage
100 to 120VAC or 200 to 240VAC
Usable voltage
85 to 132VAC or 180 to 264VAC

Frequency: 50/60Hz

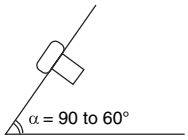
Power consumption:
100 to 120VAC or 200 to 240VAC, without option, 13VA or less
100 to 120VAC or 200 to 240VAC, with alarm, 15VA or less

Alarm

Type: Absolute value alarm, high and low
Setting: Two levels for each channel (high: 2 levels, low: 2 levels, or each level at high/low)
Indication: Alarm level is indicated for each channel at occurrence of alarm.
Printing: Channel No. alarm level and hour, minute.
Hysteresis: Approx. 0.2% of measuring (recording) range
Alarm output: See "Optional specifications".

Physical data

Mounting: Panel (may be inclined up to 30° backwards from the vertical)



Two or more recorders can be mounted side by side.
Panel thickness: 2 to 30mm
Material: Case: mold Front door frame: mold
Finish color: Case: black Front door frame: black
Protective structure:
Front door: IEC IP50
Case size: Bezel 144 x 144mm
Depth 175mm (Continuous type)
195mm (Intermittent type)
Cutout 137 x 137mm
External terminals:
Screw terminals (M4 screw)
Mass: Approx. 1.2kg (continuous type)
Approx. 1.5kg (intermittent type)
External terminals: M4 screw

Performance and characteristics

Indication accuracy*1:
DC voltage, DC current :
±(0.3% of measuring range +1 digit)
Thermocouple, Resistance bulb:
Depend on the measuring range for each input signal.
Refer to the table below.

input signal	(0.3% of measuring range+1 digit) measuring range		(1% of measuring range+1 digit) measuring range	
B	1000°C or more	1832°F or more	600°C or more	1112°F or more
R	1000°C or more	1832°F or more	600°C or more	1112°F or more
S	1000°C or more	1832°F or more	600°C or more	1112°F or more
K	300°C or more	572°F or more	200°C or more	392°F or more
E	300°C or more	572°F or more	200°C or more	392°F or more
J	300°C or more	572°F or more	200°C or more	392°F or more
T	300°C or more	572°F or more	200°C or more	392°F or more
N	300°C or more	572°F or more	200°C or more	392°F or more
W	500°C or more	932°F or more	400°C or more	752°F or more
L	300°C or more	572°F or more	200°C or more	392°F or more
U	300°C or more	572°F or more	200°C or more	392°F or more
PN	300°C or more	572°F or more	200°C or more	392°F or more
Pt100	150°C or more	302°F or more	50°C or more	122°F or more

[Note] 1. For thermocouple input, in case of measuring range includes -200°C to -100°C (-328°F to -148°F), indication accuracy should be added +0.5%.
2. The indication accuracy of thermocouple does not include reference junction compensation error.

Resolution*1: Thermocouple input : 0.1°C 0.1°F
Resistance bulb : 0.1°C 0.1°F
DC voltage : ±50mV : 10μV
: ±500mV : 100μV
: ±5V : 1mV
: ±50V : 10mV
DC current : converted value to DC voltage is guaranteed
Recording accuracy *1:
Indication accuracy ±(0.2% of measuring range)
Recording resolution:
0.1mm
Chart speed accuracy:
±0.1% (in case continuous feed of more than 1m. Expansion and contraction of paper is not included)
Reference junction compensation accuracy:
K, E, J, T, N, L, U, PN : ±0.5°C
B, R, S, W : ±1°C
90% response time:
Less than 2s (continuous type only)
Maximum input voltage:
Thermocouple, resistance bulb and DC voltage (50mV, 500mV range):
±10V DC or less
DC 5V/50V range: ±100V DC or less
Input resistance: Thermocouple, 50mV voltage range > 10MΩ
5V/50V range: > 1MΩ
500mV range: > 100kΩ
Isolation: 100MΩ (between each terminal and earth at 500V DC)
Channel to channel:
500V AC, 1min
Power terminal to ground: 2000V AC, 1min
Input terminal to ground: 500V AC, 1min
Power terminal to input terminal: 1000V AC, 1min
Alarm to alarm: 750V AC, 1min
(leak current: 5mA or less)
Common mode noise rejection:
120dB (50/60Hz)
Series mode noise rejection:
30dB (50/60Hz)
Clock accuracy: ±50ppm (2 minutes per month)
Memory protection: Non-volatile memory for parameters. Lithium battery for clock.
[Note] *1 Measurement condition:
23±2°C, 65±10%RH, power voltage 100 to 120V, 200 to 240V, frequency 50/60Hz within 1%, warm-up time 30min or more, vertical mounting, and free from the effects of vibration, noise, etc.

Operating environment

Temperature limits: 0 to 50°C
Humidity limits: 20 to 80%RH
(temperature × humidity < 3200)
Mounting position:
Front inclination 0°, rear inclination 30°, left/right inclination 0°
Signal source resistance:
Thermocouple input: 1kΩ or less
Resistance bulb input: Less than 10Ω (line resistance of each wire of 3-wires system should be balanced)
Voltage input: Less than 0.1% of input resistance
Vibration: 10 to 60Hz, 0.2m/s^2 or less
Shock: None

Optional specifications

Alarm output (DO):
2, 4 or 6 points N.O contact relay (refer to code symbols)
Contact capacity 250V AC/3A.
30V DC/3A (resistance load)
Alarm output unit is required.

External control input (DI):
1 point, no-voltage contact input is used for selection of chart speed in 2 steps.
Normally, operation is effected at main chart speed.
Sub-speed is selected with contact ON, and main speed with contact OFF.
Main/sub speed is set by key operation.
When sub-speed is set to 0mm/h, recording start/stop can be selected.
Alarm output /external control input unit is required.

Other functions

Printing/recording adjustment:
Make adjustment when characters bend and/or disturbance of record (round trip difference) occur.
Adjustment of zero/span of analog trend record position:
The position of ink cartridge is adjusted for correct recording on 0% point and 100% point on chart paper.
This adjustment should be made after replacement of ink cartridge or chart paper.
Measured value shift:
Indication or recording value is shifted by adding or subtracting calculation of measured value.
Sub chart speed: This is for selecting chart speed with external control input. It is selected from the following.
0, 10, 20, 30, 50, 120, 200, 300, 400, 1000, 1200, 1500mm/h
Initial set before delivery: 20mm/h
0mm/h means stop recording.
Channel skip: This is used to stop the operation of unused channel. Skipped channel stops all operations including display and alarm.
Setting recording status at power ON:
Recording can be started again or disabled when power is ON or when power is recovered from failure.
Real time clock: Setting year, month, day, hour, minute

CODE SYMBOLS

1	2	3	4	5	6	7	8		9	10	11	12	13	Description
P	H	E		0	0		2	–	V	V		E	V	
			1											Recording points <4th digit code>
			1											1 continuous recording
			2											2 continuous recording
			9											6 intermittent recording
						1								Power supply •Temperature Unit <7th digit code>
						1								100 to 120VAC 50/60Hz °C
						2								200 to 240VAC 50/60Hz °C
						3								100 to 120VAC 50/60Hz °F
						4								200 to 240VAC 50/60Hz °F
											0			Alarm output/external control input (1 point) <11th digit code>
											0			Without
											1			2 points alarm output (1 continuous only)
											2			4 points alarm output (2 continuous only)
											3			6 points alarm output (6-intermittent only)
											A			2 points alarm output/External control (1 continuous only)
											B			4 points alarm output/External control (2 continuous only)
											C			6 points alarm output/External control (6 intermittent only)

Input : Universal (Programmable)
Range: Field settable (Programmable)

Note) 1. Initial set before delivery is ;
• Thermocouple K type 0 to 1200°C
2. Shunt resistor (10Ω ±0.1%) should be ordered separately for current input.
Shunt Resister : Ordering code PHZT1101
3. When changing the kinds of input signal, some adjustments may become necessary.

SCOPE OF DELIVERY

Recorder, panel mounting bracket, accessories (ink cartridge 1 pc, chart paper 1 roll, input signal setting pin for replacement 1pc, ink absorption cloth 1 sheet). instruction manual (1 copy)
Note: Ink cartridge is not mounted on the recorder at the time of delivery.

Spare parts

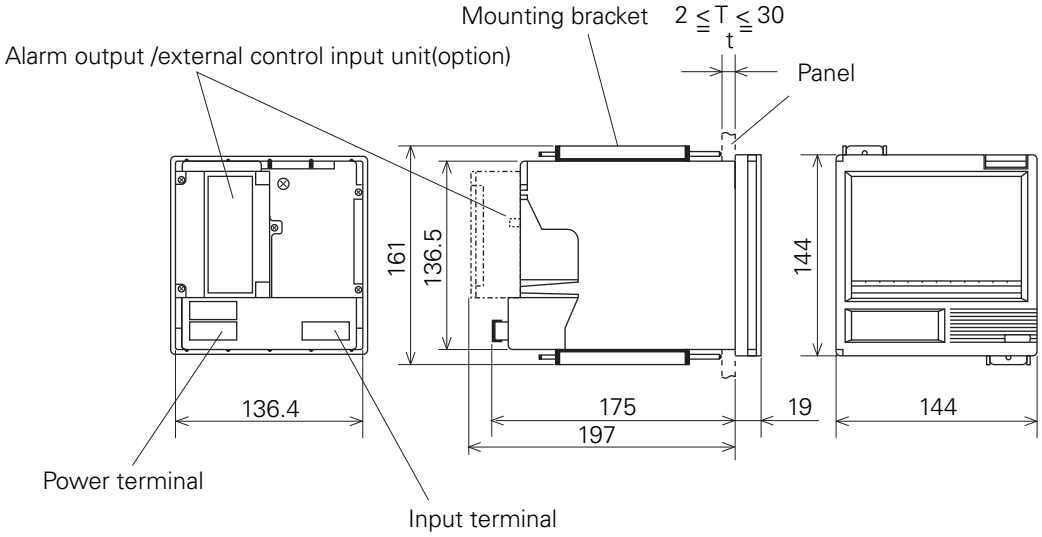
Item	Part No.	Unit of quantity for sale
Ink cartridge	PHZH2002 (1, 2-continuous)	1 pc
	PHZH1002 (6-intermittent)	1 pc
Chart paper (0 to 50, 50 uniform division)	PEX00DL1 - 5000B	1 box (6 charts)

Other (optional items)

Item	Type	Specification
Shunt resistor	PHZT1101	For 10Ω±0.1%

OUTLINE DIAGRAM (Unit:mm)

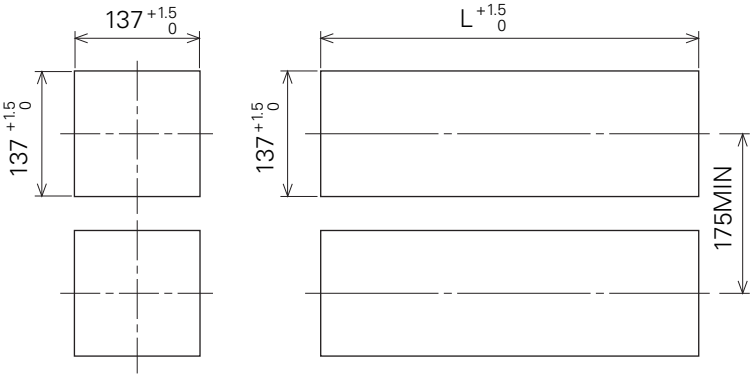
1-continuous type



Panel cutout

When mounting one unit

When mounting multiple n unit

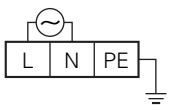


No. of units	L +1.5 0 (mm)
2	282
3	426
4	570
5	714
6	858
7	1002
8	1146
9	1290
10	1434
n	(144 x n) – 6

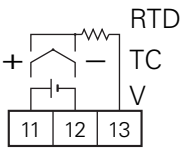
Connection diagram
Alarm output / external control input unit

⑪ —○ ○— ㉑	Alarm output 1
⑫ —○ ○— ㉒	Alarm output 2
⑬ ㉓	Not used
⑭ ㉔	Not used
⑮ ㉕	Not used
⑯ ㉖	Not used
⑰ —○ ○— ㉗	External control input
⑱ ㉘	Not used
⑲ ㉙	Not used

Power terminal
100 to 120VAC or
200 to 240VAC
50/60HZ

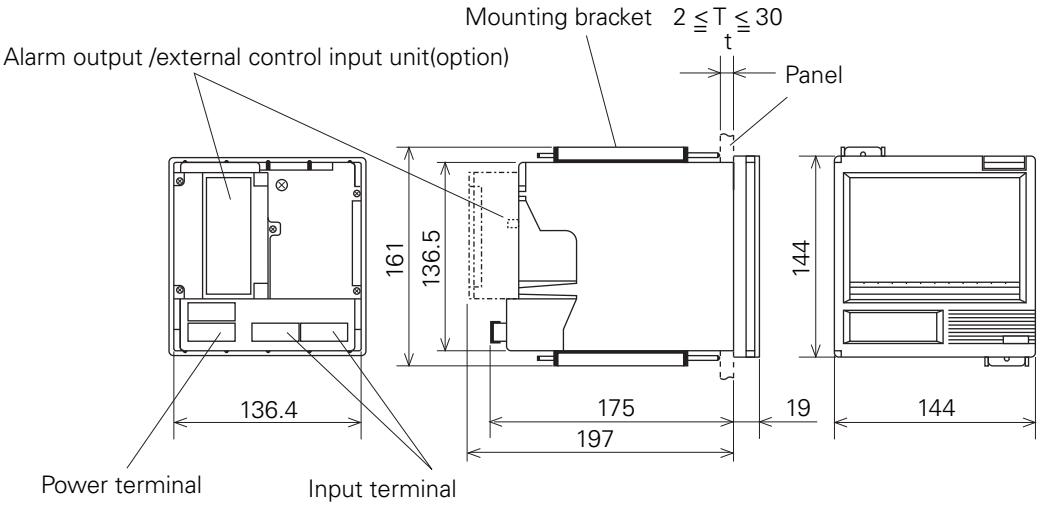


Input terminal



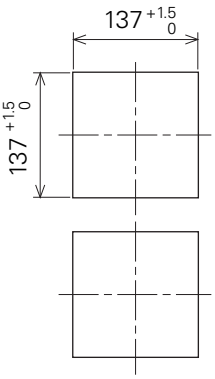
OUTLINE DIAGRAM (Unit:mm)

2-continuous type

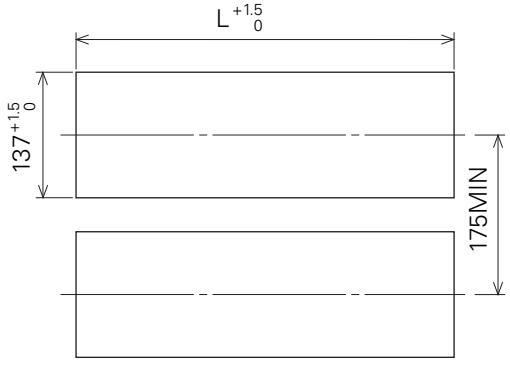


Panel cutout

When mounting one unit



When mounting multiple n unit



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Connection diagram

Alarm output /external control input unit

⑪ ○ ○ ㉑	Alarm 1
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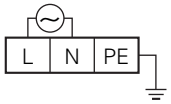
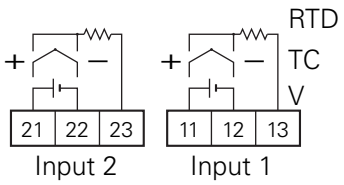
⑬ ○ ○ ㉓	Alarm 3
⑭ ○ ○ ㉔	Alarm 4
⑮ ㉕	Not used
⑯ ㉖	Not used
⑰ ○ ○ ㉗	External control input
⑱ ㉘	Not used
⑲ ㉙	Not used

Power terminal

100 to 120VAC or
200 to 240VAC
50/60HZ

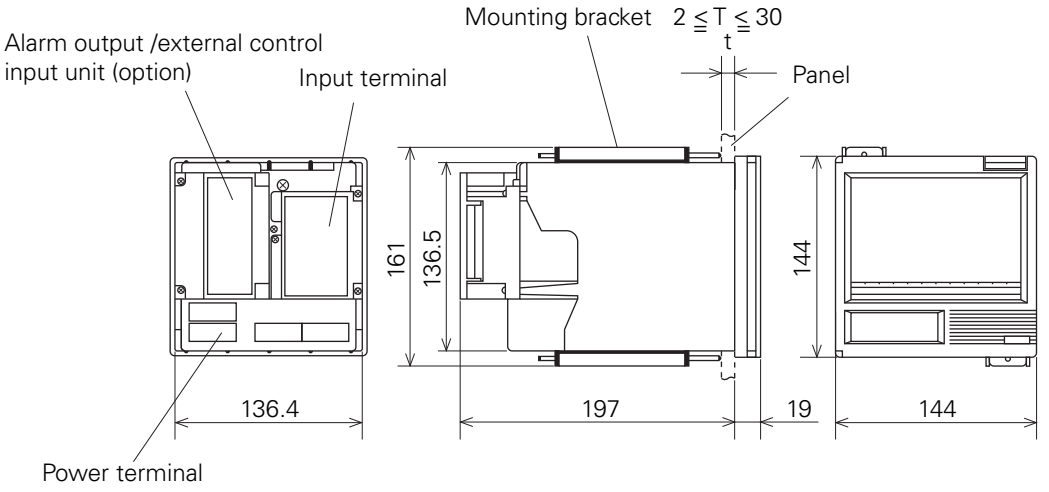


Input terminal



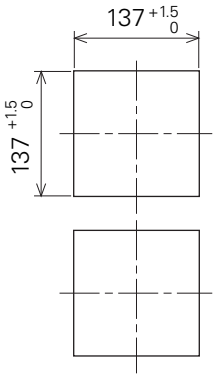
OUTLINE DIAGRAM (Unit:mm)

6-intermittent type

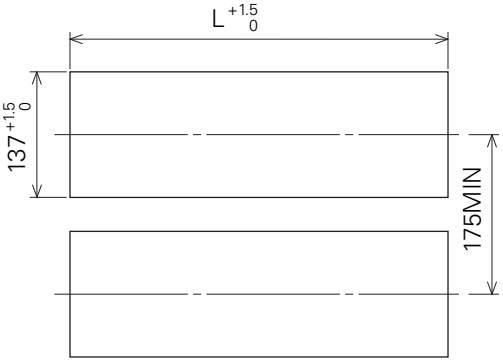


Panel cutout

When mounting one unit



When mounting multiple n unit



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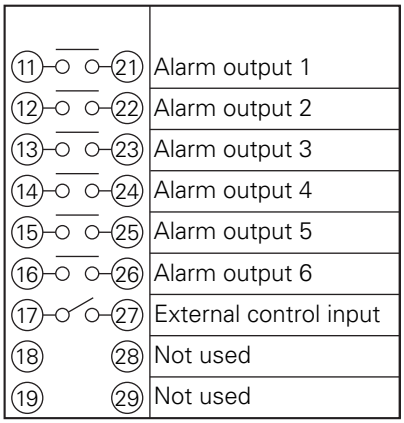
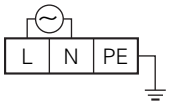
Connection diagram

Alarm output /external control input unit

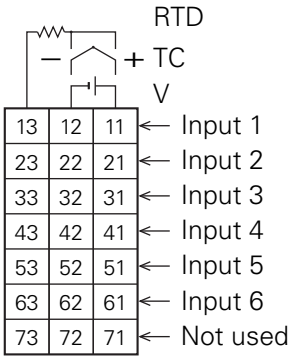


Power terminal

100 to 120VAC or
200 to 240VAC
50/60HZ



Input terminal



⚠ Caution on Safety

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

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