

FCR MICROJET RECORDER-E

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.



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.

Input range:

Input range on each channel is selectable in INPUT RANGE TABLE with keyboard operation.

Measurement cycle:

1, 2-continuous: 0.2sec/point
6-intermittent: 30sec/all points

Burnout:

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

Input filter:

Settable within the range of 0-255sec by 1sec. steps.
Initial set time before delivery is 3 sec.

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.

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.)

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 speed 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 sec/all points.

Recording range: Selectable on each channel.
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 lapsed time from the start of recording

[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 lapsed time from the start of recording when alarm is on or off.

Burnout printing: Channel number and lapsed time from the start of recording

[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, lapsed time from the start of recording

Parameter list (set value list):
 Input signal, input range, recording range, unit, alarm, input filter, chart speed, 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.
 Status indication:
 Symbolic code as alarm, burnout or carriage failure.
 Measurement display cycle:
 3sec for channel selection,
 1sec for data update in the same channel

Operation key: 3 keys
 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

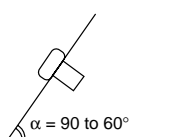
Power consumption:
 100 to 120VAC or 200 to 240VAC, without option, 13VA or less
 100 to 120VAC or 200 to 240VAC, with alarm, 15VA or less

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 lapsed time from the start of recording are printed on chart paper.
Hysteresis:	Approx. 0.2% of recording range
Alarm output:	See "Optional specifications".

Physical data

Mounting:	Panel (may be inclined up to 30° backwards from the vertical)
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Two more records 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:	Refer to the INPUT RANGE TABLE
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 reference 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 2sec (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: 2000V 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)
[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 (0.02G) or less
Shock:	None
Memory protection:	Non-volatile memory

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.
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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 unit and external control input unit are 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 zero point (0% point) and span point (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 speed before delivery: 20mm/h

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.

SCOPE OF DELIVERY

Recorder, panel mounting bracket, accessories
 (ink cartridge 1 pc, chart paper 1 roll, ink absorption cloth
 1 sheet) instruction manual (1 copy, as per code symbols)
 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 $10\Omega \pm 0.1\%$

[Supplement] MAX INPUT RANGE for EACH INPUT SIGNAL

Input type		°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)	

INPUT RANGE TABLE

<DC voltage, DC current input >

Input range code	±50mV	±500mV	±5V	±50V	1 to 5V	4 to 20mA	10 to 50mA
0	0 to 10	0 to 100	0 to 1	0 to 10	—	—	—
1	0 to 15	0 to 150	0 to 1.5	0 to 15	—	—	—
2	0 to 20	0 to 200	0 to 2	0 to 20	—	—	—
3	0 to 30	0 to 300	0 to 3	0 to 30	—	—	—
4	0 to 50	0 to 500	0 to 5	0 to 50	—	—	—
5	10 to 50	100 to 500	1 to 5	10 to 50	1 to 5	—	100 to 500mV
6	4 to 20	40 to 200	0.4 to 2	4 to 20	—	40 to 200mV	—
7	-50 to 0	-500 to 0	-5 to 0	-50 to 0	—	—	—
Y	-50 to 50	-500 to 500	-5 to 5	-50 to 50	—	—	—

[Note] DC current input is converted into voltage by shunt resistor prior to delivery (shunt resistor: 10Ω).
 In 4-20mA DC, 40-200mV DC input.
 In 10-50mA DC, 100-500mV DC input.

INPUT RANGE TABLE

<Thermocouple/resistance bulb input> °C range/marked "○" or "●" can be designated.

Input range code	Input range (°C)	B	R	S	K	E	J	T	N	W	L	U	PN	Pt
0	0 to 100					●	●				●			○
1	0 to 200				○	○	○	○	●		○	○	●	○
2	0 to 300				○	○	○	○	○		○	○	○	○
3	0 to 400				○	○	○	○	○	●	○	○	○	○
4	0 to 500				○	○	○	○	○	○	○	○	○	○
5	0 to 600		●	●	○	○	○	○	○	○	○	○	○	○
6	0 to 800		●	●	○	○	○	○	○	○	○	○	○	○
7	0 to 1000		○	○	○		○		○	○	○		○	
8	0 to 1200		○	○	○				○	○	○		○	
9	0 to 1400		○	○					○	○	○		○	
A	0 to 1600		○	○						○				
B	0 to 150				●	○	○	●			○	●		○
C	400 to 1400	○	○	○						○				
D	600 to 1600	○	○	○						○				
E	100 to 300				○	○	○	○	●		○	○	●	○
F	200 to 400				○	○	○	○	○	●	○	○	○	○
G	300 to 600				○	○	○	○	○	○	○	○	○	○
H	400 to 800				○	○	○	○	○	○	○	○	○	○
J	500 to 1000		●	●	○		○		○	○	○		○	
K	600 to 1200		●	●	○				○	○	○		○	
L	800 to 1600	○	○	○						○				
M	-50 to 50					●	●				●			○
N	-50 to 150				○	○	○	○			○	○		○
P	-200 to 100				○	○	○	○			○	○		○
Q	-200 to 500				○	○	○	○			○	○		○
Y	Maximum range of each input signal	○	○	○	○	○	○	○	○	○	○	○	○	○

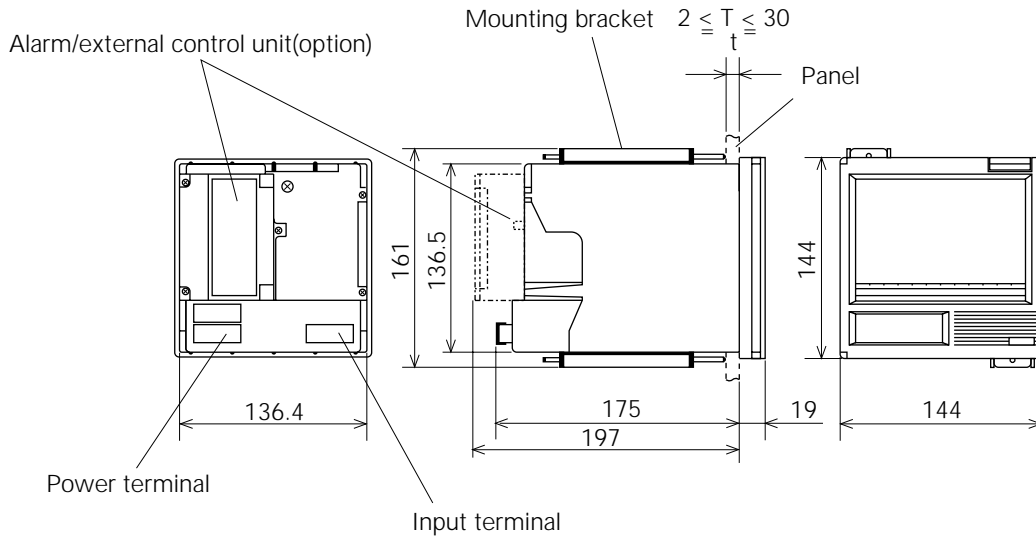
<Thermocouple/resistance bulb input> °F range/marked "○" or "●" can be designated.

Input range code	Input range (°C)	B	R	S	K	E	J	T	N	W	L	U	PN	Pt
0	32 to 200					●								○
1	32 to 400				○	○	○	○	●		○	○	●	○
2	32 to 600				○	○	○	○	○	○	○	○	○	○
3	32 to 800				○	○	○	○	○	○	○	○	○	○
4	32 to 1000				○	○	○	○	○	○	○	○	○	○
5	32 to 1200		●	●	○	○	○	○	○	○	○	○	○	○
6	32 to 1500		○	●	○	○	○	○	○	○	○	○	○	○
7	32 to 2000		○	○	○		○		○	○			○	
8	32 to 2400		○	○	○				○	○				
9	32 to 2500		○	○	○				○	○				
A	32 to 3000		○	○						○				
B	32 to 300				●	○	●	●			○	●		○
C	500 to 2500		○	○	○					○				
D	1000 to 3000	○	○	○						○				
E	200 to 600				○	○	○	○	○	○	○	○	○	○
F	400 to 800				○	○	○	○	○	○	○	○	○	○
G	600 to 1200				○	○	○	○	○	○	○	○	○	○
H	1000 to 1500				○	○	○	○	○	○	○	○	○	○
J	1000 to 2000		●	●	○		○		○	○			○	
K	1000 to 2500	●	○	○	○				○	○				
L	1500 to 3000	○	○	○						○				
M	-100 to 100					●	●				●			○
N	-100 to 300				○	○	○	○			○	○		○
P	-300 to 200				○	○	○	○			○	○		○
Q	-300 to 1000				○	○	○	○			○	○		○
Y	Maximum range of each input signal	○	○	○				○	○	○	○	○	○	○

- [Note] 1. Marked "○" above means $\pm(0.3\%+1\text{digit})$ Indication accuracy and "●" means $\pm(1\%+1\text{digit})$ Indication accuracy. This indication accuracy is in % of reference range.
2. Indication accuracy of K, E, J, T, L, U thermocouple of input range code "P" is $\pm(0.5\%+1\text{digit})$ between -200°C to -100°C (-300°F to -150°F).
3. Indication accuracy of K, E, J, L thermocouple of input range code "Q" is $\pm(0.5\%+1\text{digit})$ between -200°C to -100°C (-300°F to -150°F).
4. Indication accuracy of R, S thermocouple of input range code "7" "8""9""A" is $\pm(0.5\%+1\text{digit})$ between 0°C to 300°C (32°F to 600°F).

OUTLINE DIAGRAM (Unit:mm)

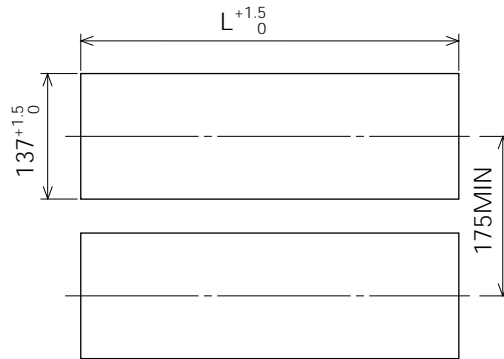
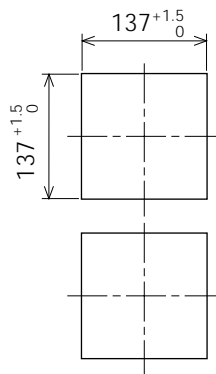
1-continuous type



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	$(144 \times n) - 6$

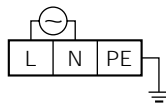
Connection diagram

Alarm/external control unit

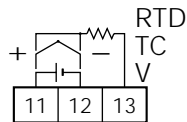
①①—○—○—②①	Alarm 1
①②—○—○—②②	Alarm 2
①③—○—○—②③	Not used
①④—○—○—②④	Not used
①⑤—○—○—②⑤	Not used
①⑥—○—○—②⑥	Not used
①⑦—○—○—②⑦	Chart speed change
①⑧—○—○—②⑧	Not used
①⑨—○—○—②⑨	Not used

Power terminal

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

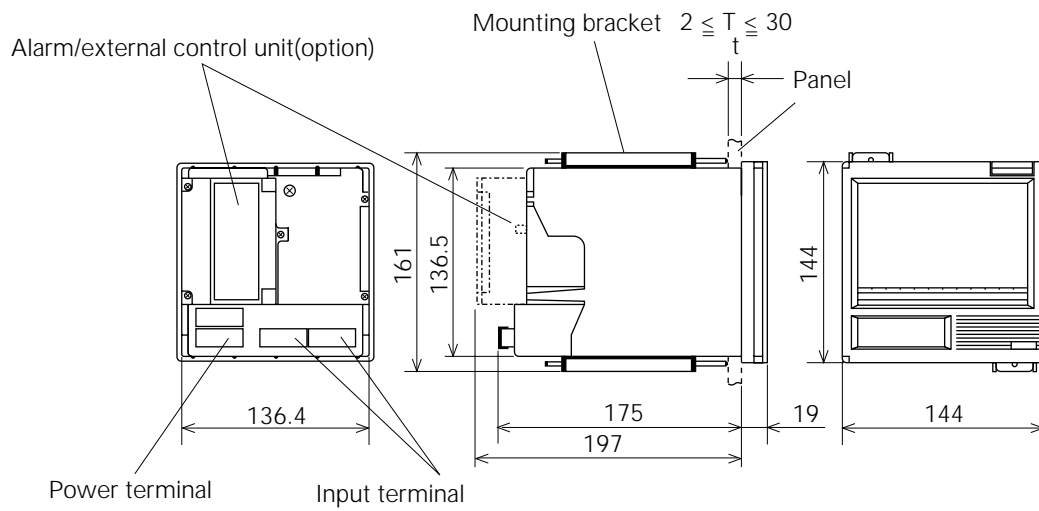


Input terminal



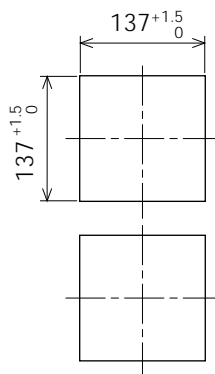
OUTLINE DIAGRAM (Unit:mm)

2-continuous type

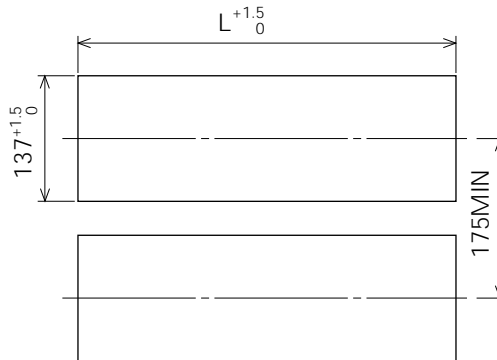


Panel cutout

When mounting one unit



When mounting multiple n unit



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	$(144 \times n) - 6$

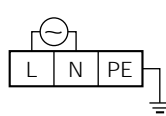
Connection diagram

Alarm/external control unit

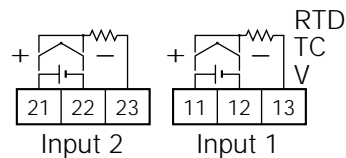
⑪	○	○	⑳	Alarm 1
⑫	○	○	㉑	Alarm 2
⑬	○	○	㉒	Alarm 3
⑭	○	○	㉓	Alarm 4
⑮	○	○	㉔	Not used
⑯	○	○	㉕	Not used
⑰	○	○	㉖	Chart speed change
⑱	○	○	㉗	Not used
㉘	○	○	㉘	Not used
㉙	○	○	㉙	Not used

Power terminal

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

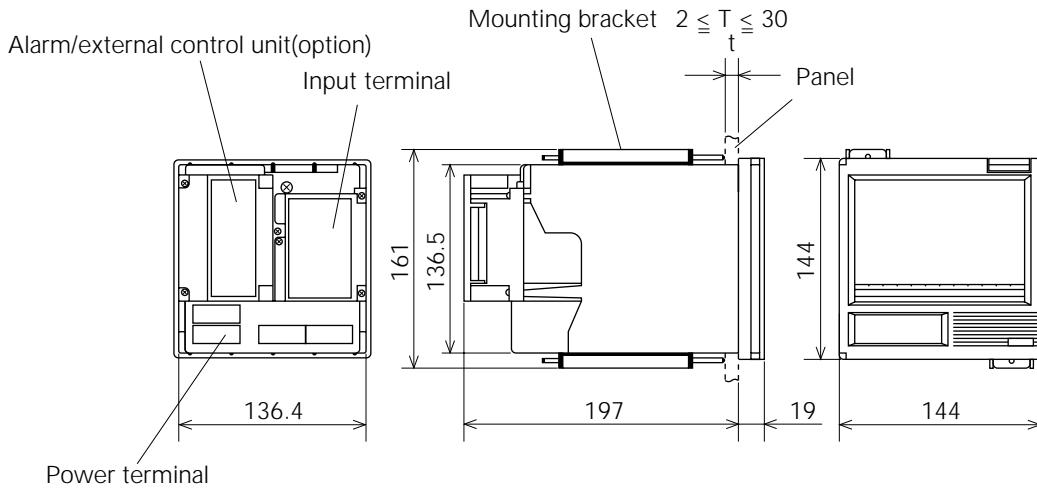


Input terminal

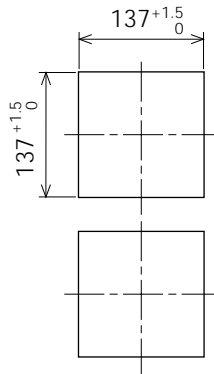


OUTLINE DIAGRAM (Unit:mm)

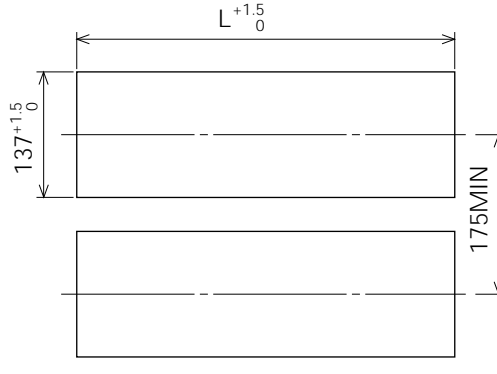
6-intermittent type



Panel cutout
When mounting one unit



When mounting multiple n unit

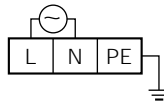


No. of units	L ^{+1.5} ₀ (mm)
2	282
3	426
4	570
5	714
6	858
7	1002
8	1146
9	1290
10	1434
n	(144 x n) - 6

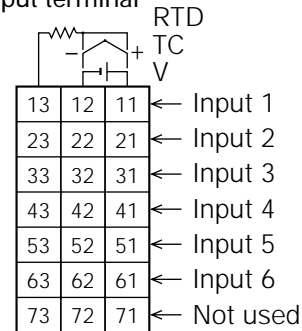
Connection diagram
Alarm/external control unit

⑪	○	○	⑫	Alarm 1
⑬	○	○	⑭	Alarm 2
⑮	○	○	⑯	Alarm 3
⑰	○	○	⑱	Alarm 4
⑲	○	○	⑳	Alarm 5
㉑	○	○	㉒	Alarm 6
㉓	○	○	㉔	Chart speed change
㉕			㉖	Not used
㉗			㉘	Not used

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



Input terminal



CE mark

*The products conform to the requirements of the Electro magnetic compatibility Directive and Low voltage Directive.

⚠Caution on safety

*Before using this unit, be sure to read the instruction manual.

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