FUJI ELECTRIC

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.

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.

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.

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

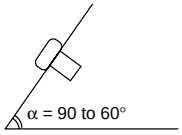
Power consumption:
100 to 120VAC or 200 to 240VAC, without option, 13VA or less
100 to 120VAC or 200 to 240VAC, with alarm, 15VA or less

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)



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.

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.

CODE SYMBOLS

1	2	3	4	5	6	7	8		9	10	11	12	13	Description
P	H	E		0	0		1	–	V	V		E	V	
														Recording points
			1											1 continuous recording
			2											2 continuous recording
			9											6 intermittent recording
														Power supply • Temperature Unit
						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
														Alarm output/external control input (1 point)
											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

Note) Items to specify when ordering except model : PHE□00
1. Code symbols (according to above table)
2. Recording range (scale) and unit in case of DC voltage and DC current input.
For 2 continuous type, recording range and unit should be specified for each channel 1 and channel 2.
3. Recording range should be specified with 3 or more effective figures.
exp. 0 to 100, 0.0 to 10.0, 0.00 to 1.00

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 10Ω±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	○	○	○	○	○	○	○	○	○	○	○	○	○

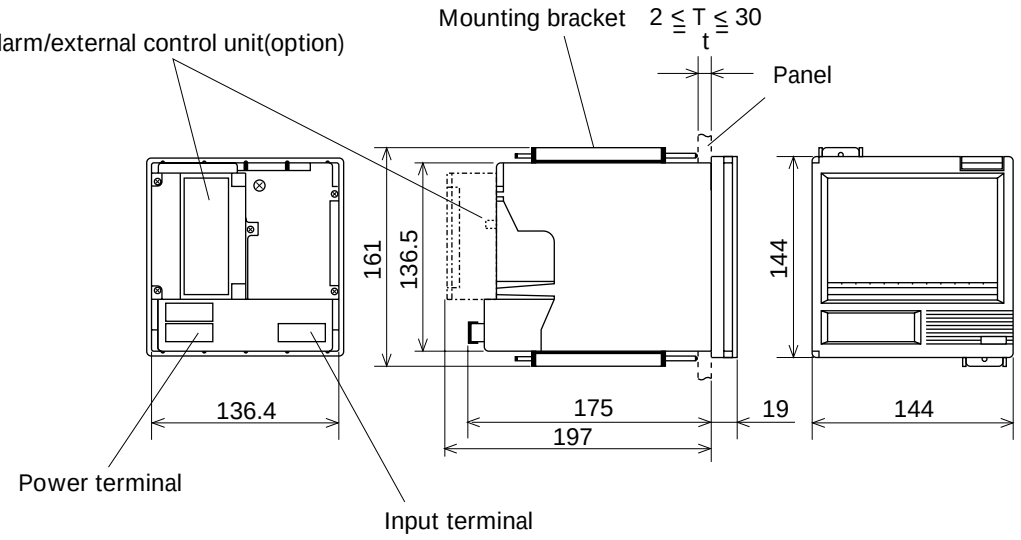
<Thermocouple/resistance bulb input> °F range/marked "○ or ●" can be designated.

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 ± (0.3%+1digit) Indication accuracy and "●" means ± (1%+1digit) 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 ± (0.5%+1digit) 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 ± (0.5%+1digit) 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 ± (0.5%+1digit) between 0°C to 300°C (32° F to 600° F).

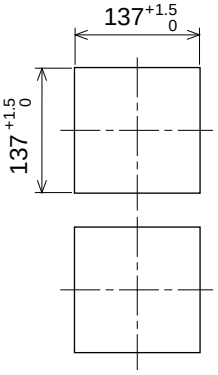
OUTLINE DIAGRAM (Unit:mm)

1-continuous type

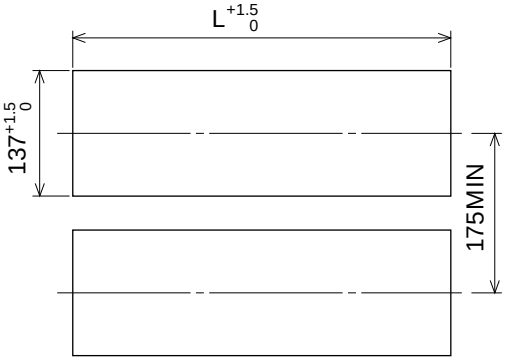


Panel cutout

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 x n) – 6

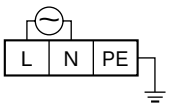
Connection diagram

Alarm/external control unit

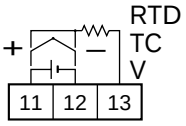
11 — 21	Alarm 1
12 — 22	Alarm 2
13 — 23	Not used
14 — 24	Not used
15 — 25	Not used
16 — 26	Not used
17 — 27	Chart speed change
18 — 28	Not used
19 — 29	Not used

Power terminal

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

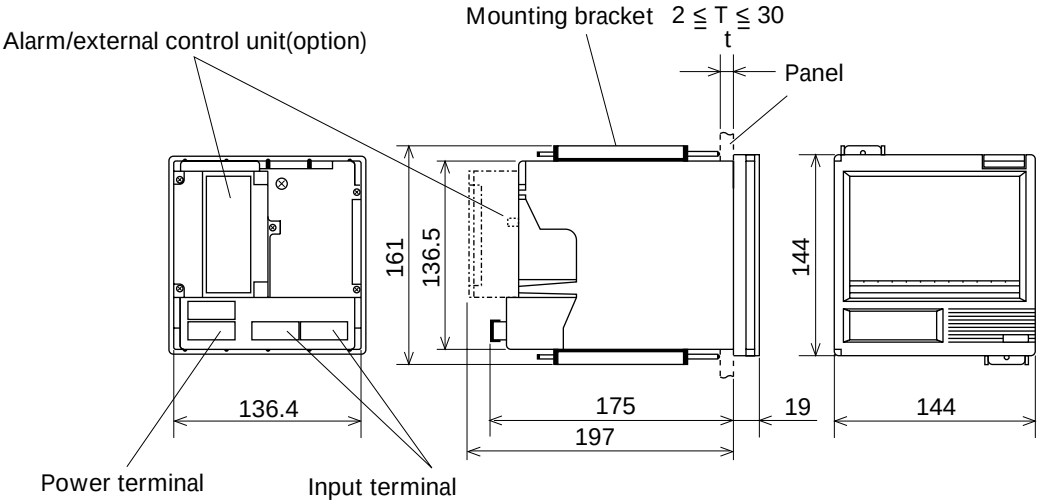


Input terminal



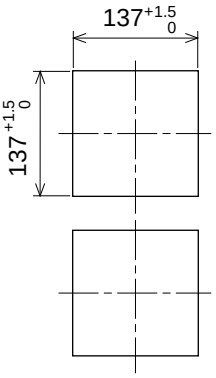
OUTLINE DIAGRAM (Unit:mm)

2-continuous type

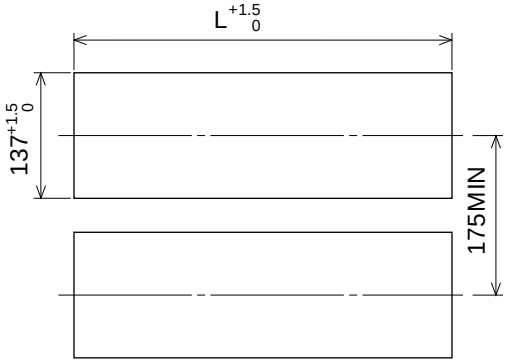


Panel cutout

When mounting one unit



When mounting multiple n unit



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Connection diagram

Alarm/external control unit

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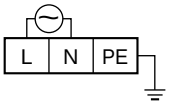
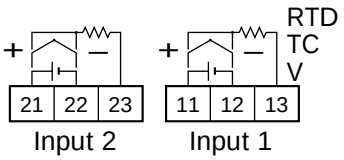
17 — 27	Chart speed change
18 — 28	Not used
19 — 29	Not used

Power terminal

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

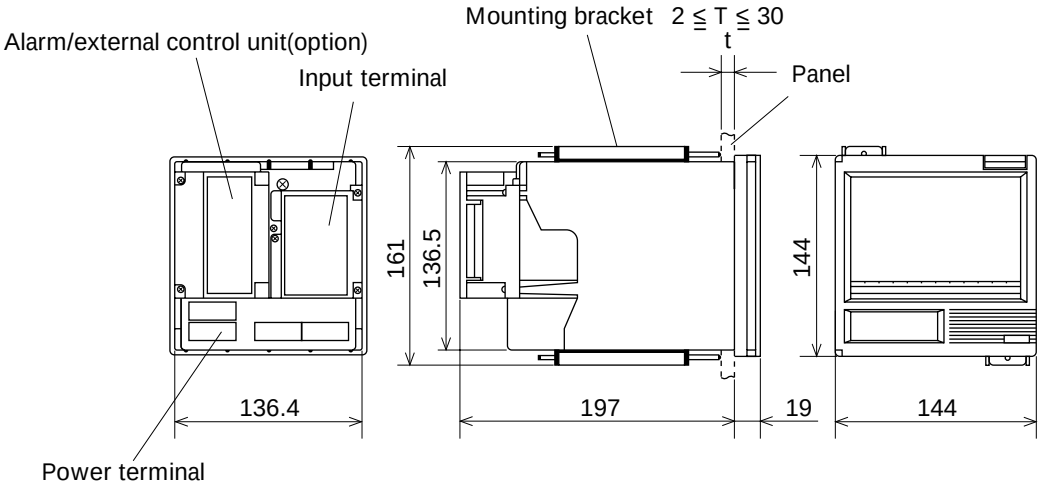


Input terminal



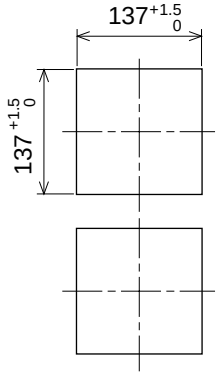
OUTLINE DIAGRAM (Unit:mm)

6-intermittent type

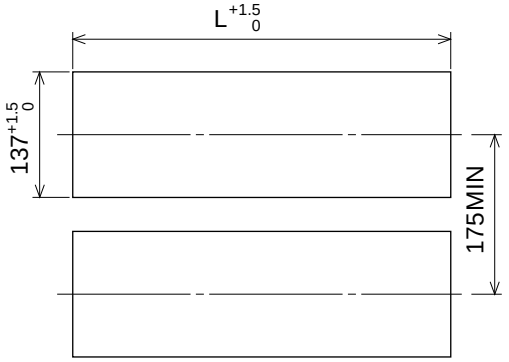


Panel cutout

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

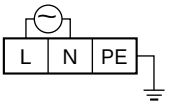
Connection diagram

Alarm/external control unit

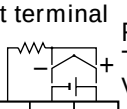
11 — 21	Alarm 1
12 — 22	Alarm 2
13 — 23	Alarm 3
14 — 24	Alarm 4
15 — 25	Alarm 5
16 — 26	Alarm 6
17 — 27	Chart speed change
18 — 28	Not used
19 — 29	Not used

Power terminal

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



Input terminal



13	12	11	← Input 1
23	22	21	← Input 2
33	32	31	← Input 3
43	42	41	← Input 4
53	52	51	← Input 5
63	62	61	← Input 6
73	72	71	← Not used

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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