LE5000 SERIES
250MM CHART HYBRID RECORDER

PERFORMANCE SPECIFICATION
CHINO

MODEL LE5100

LE5000 series are 250mm hybrid recorders with multi-range input. Innovative design high performance recorder provides high accuracy, ±0.05%; high speed scanning, 0.1second for 36 points and high speed recording, 1 line in 3 seconds. Simple operational keys and PC setting functions drastically improved usability of recording system.

■ FEATURES

- **High speed scanning at 36 points/sec and high-speed recording**
  Rapid changes of process data such as lab test results can be scanned simultaneously at 36 points/sec and recorded at about 1 line/ 3 sec. Data for each channel is displayed in 10 different colors which is user selectable.
- **High accuracy of 0.05%**
  The accuracy is ±0.05% and the resolution is 1μV or 0.1℃
- **Various industrial values can be measured at the same time with selectable ranges**
  With 35 thermocouple ranges and 8 DC voltage ranges, a total of 43 input ranges are provided which enables universal input and optional mixed input: current inputs are also possible,
- **Superior ease of operation**
  Operation keys are functionally designed for ease of use.
- **Engineering port is provided (USB)**
  A personal computer can be used as an engineering tool and parameter setting and data collecting is available.
- **Anti-noise countermeasures**
  High effective anti-noise countermeasures are taken; suppressive induced noise by 130 dB or more in the common mode while 50dB or more is achieved in the series mode. Effective countermeasures are taken against impulse noise.
- **Communication interfaces are available (Option)**
  RS-422A, RS-485 and Ethernet can be provided to meet various customers' needs.
- **Recording and calculation of data communication input (Option)**
  Data input by communications from a host can be recorded as analog and digital values at the same time with measuring data. Mathematical process of the data communications input from a host can be processed in parallel.

■ MODELS

LE51□□-□□N

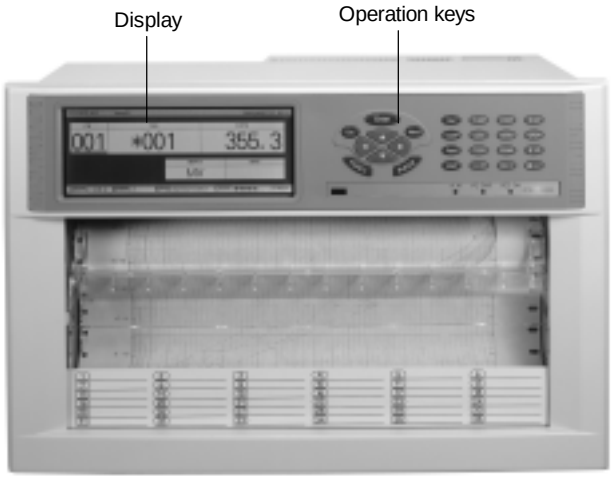
Input points
1 : 12 points
2 : 24 points
3 : 36 points

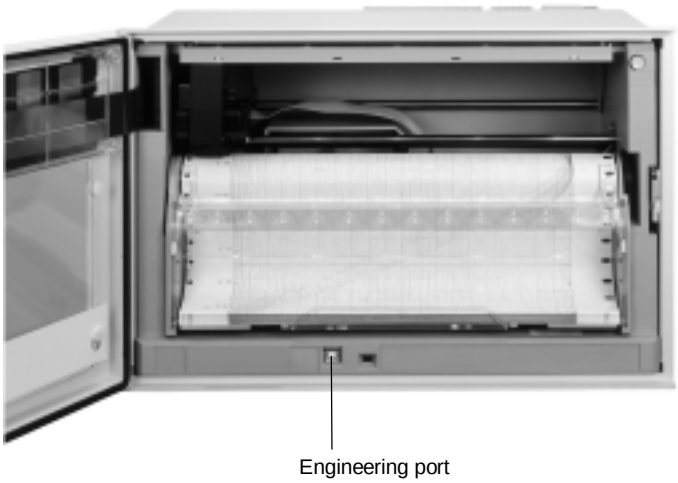
Alarm output points (Option)
0: None
1: 12 points
2: 24 points
3: 36 points

Communication interface/ contact output (Option)
N: None (Standard)
1: RS-422A/ RS-485
Ethernet +1a contact output (Mechanical relay)

External drive / Chart speed change (Option)
N: None (Standard)
1: Provided

■ NAMES AND FUNCTIONS OF EACH PART



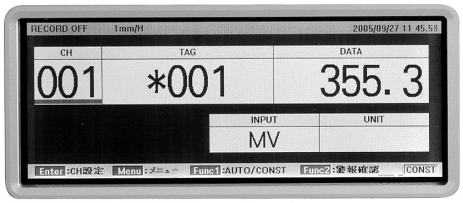


● DISPLAY

Three types of displays are available according to user's demand. Chart speed and time clock are always displayed on an upper part of screen and an operational instruction of a setting key is displayed on a lower part of screen.

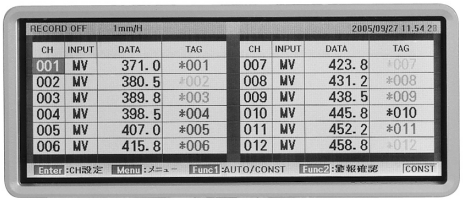
●Display of 1 channel

1 channel of consecutive or sequential display is available.



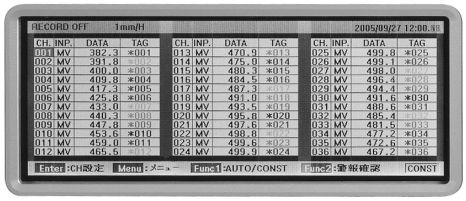
●Simultaneous display of 12 channels

12 channels of consecutive or sequential display are available.



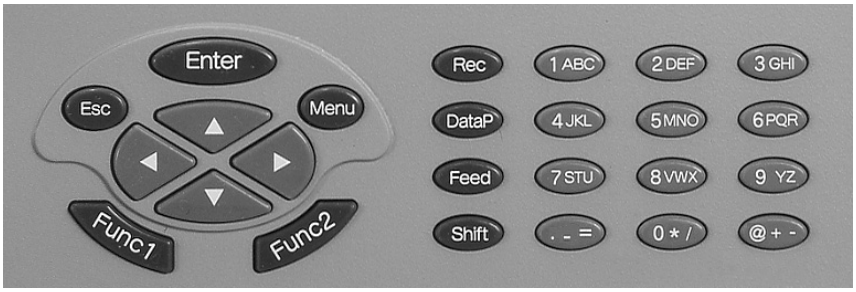
● Simultaneous display of 36 channels

36 channels of consecutive display is available. 24 channels display is also available for 24 points input. (In the case of 24 channels, the part of CH 25 to 36 is blank)



● Operation key

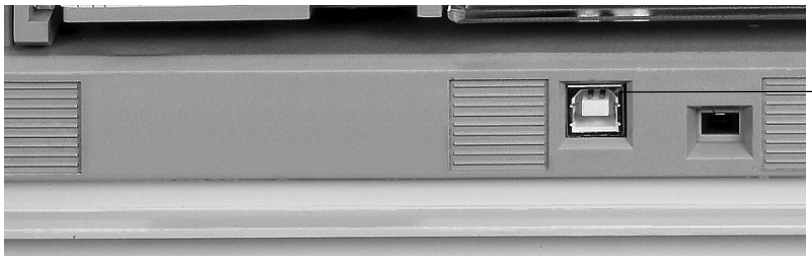
The operation keys are functionally laid out.



Names of keys		Functions
Enter	Enter key	Used to set each function.
Esc	Escape key	Each time this key is pressed, it returns to previous page.
Menu	Menu key	Used to display settings for each function.
	Up/ Down and Left/Right key	Used to move a cursor up/ down and left/ right, and also to chose setting items and value.
Func1	Function 1 key	Used to set and change setting for each function. Data is indicated in a lower part of screen.
Func2	Function 2 key	Used to set and change setting for each function. Data is indicated in a lower part of screen.
Rec	Recording key	Each time this key is pressed, recording is switched ON or OFF. Used with Enter key.
DataP	Data print key	When this key is pressed, data is simultaneously printed. Used with Enter key.
Feed	Feed key	While this key is pressed, chart paper is fed with a speed of 750mm/min.
Shift	Shift key	Used to switch number key, alphabetic key and other symbol keys.
1 ABC	Number key	Used to input numeric value. (used together with Shift key)
1 ABC	Alphabetic key	Used to input alphabet. (used together with Shift key)
@ + -	Symbol key	Used to input symbols. (used together with shift key)

● Engineering port

Engineering port allows parameter setting, setting confirmation and measuring data transmission in connection with PC.

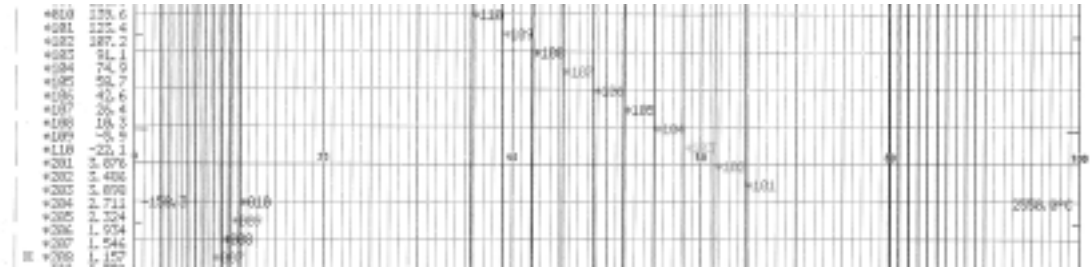


■ RECORDING FORMAT

● Digital recording

Format 1

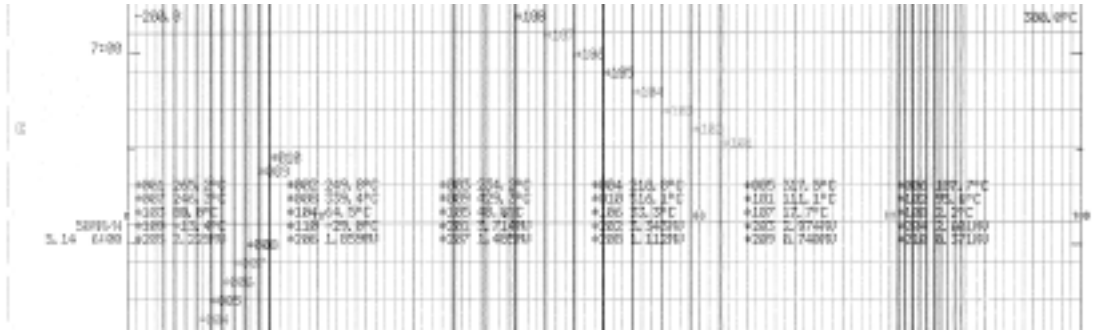
In the left margin of the chart, the tag number and measuring data are digitally recorded at a specified interval.



● Digital recording

Format 2

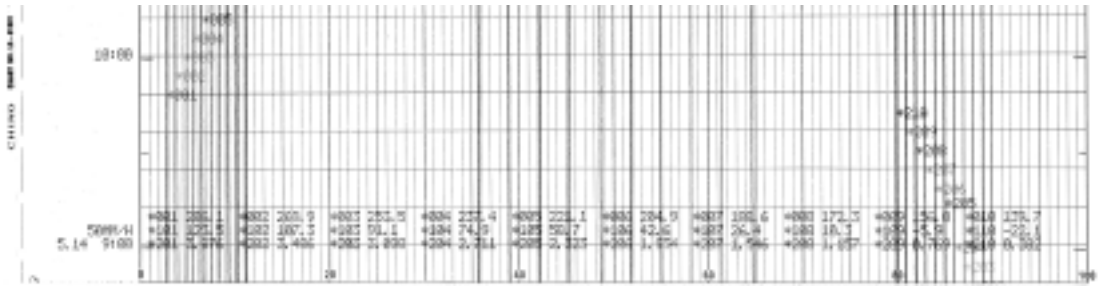
The tag number, measuring data and unit are digitally recorded 6 channels/ line at a specified interval superimposed on the analog recording.



● Digital recording

Format 3

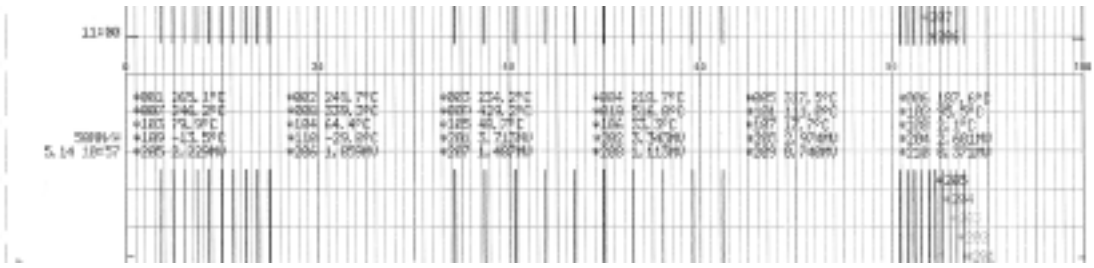
The tag number and measuring data are digitally recorded 10 channels/line at a specified interval superimposed on the analog recording.



● Data print

Format 1

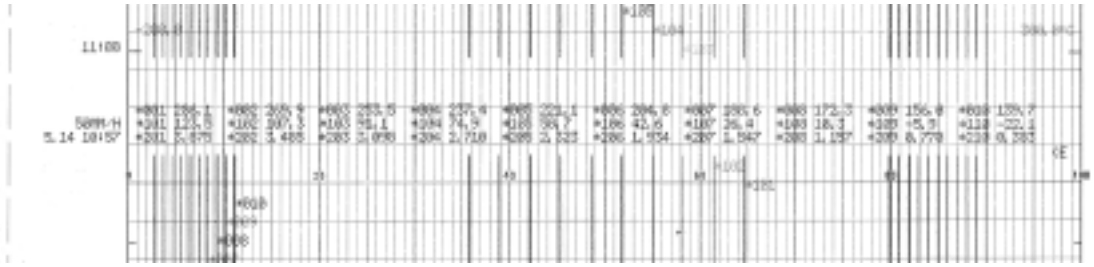
When Data print key is pressed, analog recording is interrupted and the latest data is printed digitally 6 channels/ line.



● Data print

Format 2

When Data print key is pressed, analog recording is interrupted and the latest data is printed digitally 10 channels/ line.



● Logging recording

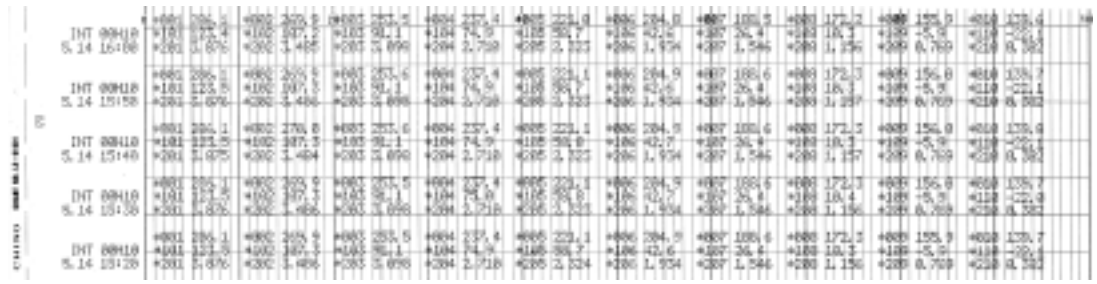
Format 1

The tag number, data and unit are recorded digitally at a specified interval 6 channels/ line. Analog recording is not performed.

● Logging recording

Format 2

The tag number, data and unit are recorded digitally at a specified interval 10 channels/ line. Analog recording is not performed.



■ INPUT SIGNALS

Measuring points : 12, 24 and 36 points
Input : Multi-channel data range
DC voltage --- ±10mV, ±20mV, ±40mV, ±80mV, ±1.25V, ±2.5 V, ±5 V, ±10V
DC current --- Shunt resistor (100Ω, 250Ω) needs to be mounted externally
Thermocouple --- B, R, S, K, E, J, T, N, PtRh40-PtRh20, NiMo-Ni,WRe5 – WRe26, W-WRe26, Platinel II, U, L
Resistance thermometer --- Pt 100, JPt 100
Range setting: Input type and range are set with front keys
Scale setting: The minimum and maximum values and unit are set for each point with front keys
Setting range -30000 to 30000
Decimal points Optional setting
Indication accuracy: Refer to items of measuring ranges, accuracy rating and display resolutions
Temperature drift: 0.1% FS/ 10°C
Measuring period: 0.1 sec/ channel
Reference junction compensation accuracy:
K, E, J, T, N, Platinel II --- ±0.5°C or less (0℃°C or more when measuring)
R, S, WRe5-WRe26, NiMo-Ni, U, L --- ±1.0°C or less
(Only when the ambient temperature is 23°C±5°C)
Input resolution: Approx. 1/40000 (Standard range conversion)
Burnout: Select with/ without burnout for each input
Allowable signal source resistance:
Thermocouple inputs, DC voltage input (10mV) --- 500Ω or less (without burnout)
DC Voltage input (except 10mV) --- 100Ω or less
Resistance thermometer inputs --- 10Ω or less/ line
Three lines are common, Pt100, JPt100
Input resistance: Thermocouple input,
DC voltage input --- approx.1MΩ
Maximum input applied voltage: ±20V DC
Input correction: Zero/span correction and shift correction for each channel
Maximum common mode voltage:
30V AC (support LVD) *250V AC at evaluation
Common mode rejection ratio: 130dB
Series mode rejection ratio:
50dB (Only when the peak value of noise is below standard range.)
Terminal board: Detachable type, removable for wire connection

■ RECORDING SPECIFICATIONS

Recording system : Raster scan system, 10-color wire dot printing
Recording and recording color :
Analog recording --- color can be specified for each channel as required.
10 colors (red, purple-red, orange, brown, green, yellow-green, blue-green, purple, purple-blue, black)
Digital recording and logging recording - Black
Message printing --- Black
List printing --- Black
Chart paper: Fan-fold type,
Overall width 318 mm, total length 20m; Effective recording width 250mm (analog recording)
Chart speed: 1 to 1500mm/H (in 1mm/H steps)
Skip function: Analog recording, digital recording and digital display can be set independently from recording slip.
Recording compensation:
Independent setting of zero spans are available.

■ DISPLAY SPECIFICATIONS

Digital display: Color LCD panel RGB (640 x 240 dot)
Display size W149.8 x H57.4 mm
Setting display: Common to digital display
Display contents: Digital display
Channel display (One-point/ multiple points continuous/sequential indication change)
Display measuring value of each channel (One-point/ multiple points continuous/sequential indication change)
Clock display (Hour/Minute/Second/Tag/Unit)
Chart speed display
Status display: RECORD ON (lights during recording) LED
KEY LOCK (lights during key lock)
ALARM (lights during alarm activated) LED
CHART END (lights just before record ending)
FAIL (lights during unit abnormal time)
* Sharing LED and setting display

■ ALARM SPECIFICATIONS

Alarm display : Occurrence CH No., data is displayed in red when alarm occurs
Alarm types: High limit, low limit
Alarm setting method:
Individual setting for each point four levels/ channels
Alarm output: See option specification
(Option)

■ SETTING AND OPERATIONAL SPECIFICATIONS

Key types, operation:

Func1 --- Switching each function
Func2 --- Switching each function
Enter --- Setting a change of parameter for each mode
Menu --- Specifying each setting function
Esc --- Used to escape in the middle of setting
▲ --- Used to switch channels when specifying the parameter on cursor
▼ --- Used to switch channels when specifying the parameter on cursor
▶ --- Used to move cursor to the right
◀ --- Used to move cursor to the left
Rec --- Analog recording, digital recording, printing, switching chart ON/OFF
DataP --- Digital recording of latest data
Feed --- Fast-forwarding chart paper
Shift --- Specifying key
. _ = --- Setting characters of ". _ ="
@ + - --- Setting characters of "@ + -"
0 * / --- Setting parameter value 0 and character of "* / "
1ABC --- Setting parameter value 1 and character of "ABC "
2DEF --- Setting parameter value 2 and character of "DEF"
3GHI --- Setting parameter value 3 and character of "GHI"
4JKL --- Setting parameter value 4 and character of "JKL"
5MNO --- Setting parameter value 5 and character of "MNO"
6PQR --- Setting parameter value 6 and character of "PQR"
7STU --- Setting parameter value 7 and character of "STU"
8VWX --- Setting parameter value 8 and character of "VWX"
9YZ --- Setting parameter value 9 and character of "YZ"

Recording operation:
RECORD ON/OFF --- recording operation ON/OFF*
DATA PRINT --- printing measuring data*
FEED --- Fast-forwarding chart paper
* Two actions are taken to operate
Setting contents:
Parameter setting --- Clock time, chart speed, digital recording at set time range, scale, unit, tag, alarm, ℃, pass word
(for option communication and recording format, message printing, calculation)
Engineering port (USB) :
Setting of a whole parameter is available using engineering software (PASS) from PC

■ GENERAL SPECIFICATIONS

Rated power voltage: 100 to 240V AC (universal power supply)
50/60Hz
Maximum power consumption:
100V A
Reference operating condition:
Ambient temperature/ humidity range:
21 to 25 °C, 45 to 65%RH
Power voltage: 90 to 264V
Power frequency: 50/60Hz ±2%
Attitude: Forward/ Backward/ Left/ Right within 3°
Warm-up time: 1 hour or longer
Normal operating condition:
Ambient temperature/humidity range 0 to 40°C, 20 to 80% RH
Power voltage: 90 to 264V
Power frequency: 50/60Hz ±2%
Attitude: Forward/ Backward/ Left/ Right within 3°
Transportation condition:
At the packed condition on shipment from our factory
Ambient temperature/ humidity range:
-20 to 60 °C, 5 to 90%RH
(No dew condensation)
Vibration: 10 to 60 Hz, 4.9m/ S^2(0.5G or less)
Impact: 392m/S^2 (Approx. 40G or less)
Storage condition: Ambient temperature
-20 to 60 °C, 5 to 90%RH
(No dew condensation)
Working condition: Working temperature range 0 to 40 °C
Working humidity range 20 to 80%RH
Power failure protection:
Programmed parameters stored into EEPROM memory
Clock circuit sustained for 5 years or longer by a lithium battery
(at the operation of 8 hours or longer per day)
Insulation resistance: Between primary terminals and protective conductor terminals --- 20MΩ or more at 500V DC
Between secondary terminals and protective conductor terminals --- 20MΩ or more at 500V DC
Between primary terminals and secondary terminals --- 20MΩ or more at 500V DC
Dielectric strength: Between primary terminals and protective conductor terminals --- 1 minute at 1500V AC
Between secondary terminals and protective conductor terminals --- 1 minute at 500V AC
Between primary terminals and secondary terminals --- 1 minute at 1500V AC
Note 1: Primary terminals: power terminal, alarm output terminal, output relay terminal Secondary terminals: measuring input terminal, communication terminal, external drive terminal
Note 2: When testing insulation resistance and dielectric strength, please short-circuit every terminals of primary and secondary terminals before the test. Test without short-circuiting terminals can damage instruments.
Case assembly material:
Door (frame) --- ABS resin, Front panel --- Soda glass, Back case --- Normal steel
Color: Door(frame) --- White
(Equivalent to DIC546 1/2),
Front panel --- Transparent,
Back case --- White (Equivalent to DIC546 1/2)
Mounting: Panel mounting
Weight: About 15kg (Full option)
Dimensions, panel cut:
W400 x H260 x D300 mm (Dimensions)
388 x 248mm (Panel cut)
Terminal screws: Measuring input, alram terminals --- M3.5
Power, protective conductor terminal, external drive terminal, communication terminal --- M4
Chart paper illumination : White LED

■ OPTION SPECIFICATIONS

Options	Contents
External drive	Chart 3- speed, chart stop, data printing, list printing, message printing 5 types, operation recording
Alarm output	Mechanical relay ---- 12, 24, 36 points output, max contact capacity of 100 to 240V AC, 3A resistance load
Communication interface	RS-422A or RS-485 + Ethernet + 1a contact output (1a contact output is contact output of mecha relay
Chart end output	CHART END relay output when chart paper ended (communication interface is required)
FAIL output	FAIL relay output when abnormality (communication interface is required)
Receiving resistance for current input	250Ω(for 20mA) or 100Ω(for 50mA) are externally mounted to measure current

●Communication interface specification

		With communication interface	Without communication interface
Ethernet	Specification	Ethernet10BASE-T/ 100BASE-T, automated recognition, TCP, IP, HTTP, exclusive protocol	
	Function	Data display, parameter setting, with browser Data display, parameter setting on exclusive application	
RS-422A RS-485	Specification	RS-422A, RS-485, Communication protocol: MODBUS Communication specification: 9600 bps to 19200 bps 7E1 to 8N2	
	Function	Data display and parameter setting using exclusive application	
USB	Specification	Inside of front door, USB1.1, Full speed 12Mbps, Bulk transfer, Control transfer	
	Function	Parameter setting for exclusive application	

PERFORMANCE SPECIFICATION

■ MEASURING RANGE, ACCURCY RATING, AND DISPLAY RESOLUTION

Input type		Measuring range	Standard range	Accuracy rating	Display resolution
DC voltage		-10.0 to 10.0mV	±10mV	±0.05%+1digit	1μV
		-20.0 to 20.0mV	±20mV		
		-40.0 to 40.0mV	±40mV		10μV
		-80.0 to 80.0mV	±80mV		
		-1.25 to 1.25V	±1.25V		100μV
		-2.5 to 2.5V	±2.5V		
		-5.0 to 5.0V	±5V		1mV
		-10.0 to 10.0V	±10V		
T/C	K	-200 to 500ºC	±20mV	±0.05%+0.5ºC	0.1ºC
		-200 to 900ºC	±40mV		
		-200 to 1370ºC	±80mV	±0.05%+1ºC	
	E	-200 to 250ºC	±20mV	±0.05%+0.7ºC	
		-200 to 500ºC	±40mV		
		-200 to 900ºC	±80mV	±0.05%+1ºC	
	J	-200 to 350ºC	±20mV	±0.05%+0.7ºC	
		-200 to 700ºC	±40mV		
		-200 to 1200ºC	±80mV	±0.05%+1ºC	
	T	-200 to 400ºC	±20mV	±0.05%+0.7ºC	
	R	0 to 1760 ºC	±20mV	±0.05%+1ºC	
	S	0 to 1760ºC	±20mV		
	B	0 to 1820ºC	±20mV		
	N	0 to 600ºC	±20mV	±0.1%+0.1ºC	
		0 to 1000ºC	±40mV		
		0 to 1300ºC	±80mV	±0.1%+1ºC	
	W-Wre26	0 to 2315ºC	±80mV		
	Wre5-Wre26	0 to 2315ºC	±80mV		
	PtRh40-PtRh20	0 to 1888ºC	±20mV		
	NiMo-Ni	-50 to 1310 ºC	±80mV		
	Platinel Ⅱ	0 to 500ºC	±20mV	±0.1%+0.1ºC	
		0 to 950ºC	±40mV	±0.1%+1ºC	
		0 to 1395ºC	±80mV		
	U	-200 to 350ºC	±20mV	±0.05%+1ºC	
		-200 to 600ºC	±40mV		
	L	-200 to 350ºC	±20mV		
		-200 to 700ºC	±40mV		
		-200 to 900ºC	±80mV		
RTD	Pt100	-50 to 50ºC	50Ω	±0.05%+0.3ºC	0.1ºC
		-100 to 130ºC	100Ω		
		-200 to 250ºC	200Ω		
		-200 to 550ºC	300Ω		
	JPt100	-50 to 50ºC	50Ω		
		-100 to 130ºC	100Ω		
		-200 to 250ºC	200Ω		
		-200 to 550ºC	300Ω		

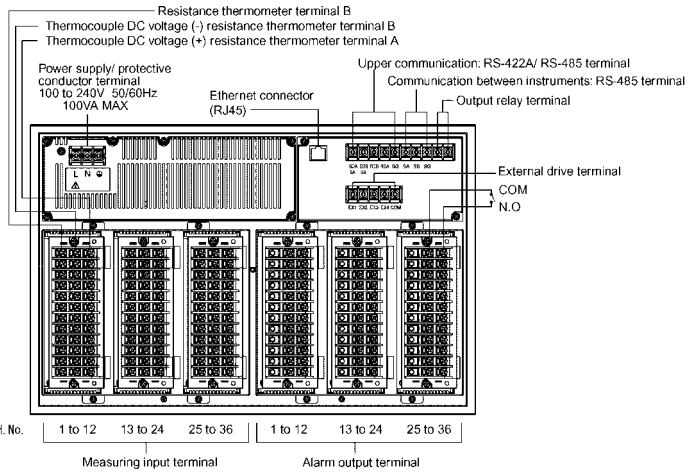
Note 1: Ambient temperature/ humidity range: 23℃±2℃
Note 2: For thermocouple input, the accuracy of reference junction compensation is not included with the accuracy ratings.
Note 3: Accuracy rating is the percentage of measuring range
K,E,J,T,R,S,B,N : IEC584,JIS C 1602-1995
W-Wre26,Wre5-WRs26,PtRh40-PtRh20,NiMo-Ni, PlatinelⅡ: ASTM Vol.14.03
U(Cu-CuNi),L(Fe-CuNi) : DIN43710
Pt100 : IEC751,JIS C 1604-1997
JPt100 : JIS C 1604-1981, JIS C 1606-1986

●Exceptions of accuracy ratings

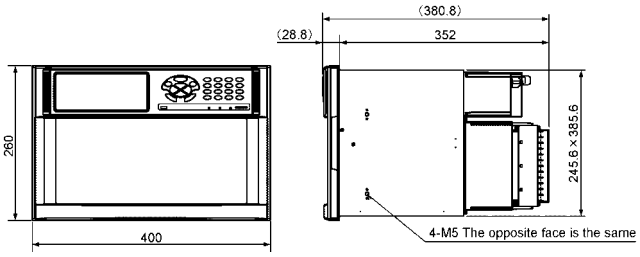
Note : Refer to T/C input accuracy is calculated based on standard range.

Input types	Measuring range	Accuracy ratings
K,E,J,T,L	-200 to 0ºC	±0.2%+1digit
R,S	0 to 400ºC	
B	0 to 400ºC	None
	400 to 800ºC	±0.15%+1digit
U	-200 to 0ºC	±0.3%+1digit
W-WRe26	0 to 300ºC	
PtRh40-PtRh20	0 to 300ºC	±1.5%+1digit
	300 to 800ºC	±0.8%+1digit
NiMo-Ni	-50 to 100ºC	±0.2%+1digit

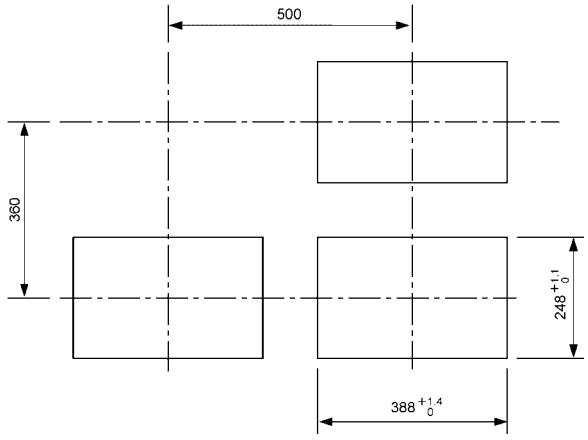
■ TERMINAL BOARD



■ DIMENSIONS



●Panel cut-out and mounting minimum clearance



Unit: mm

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