

LE5000 SERIES 250MM CHART HYBRID RECORDER



MODEL LE5100/LE5200

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

FEATURES

- High speed sampling at 0.1sec for 36 points and high-speed recording**
 Rapid changes of process data such as lab test results can be scanned simultaneously at 0.1 sec for 36 points and recorded at about 3 sec/line. Data for each channel is displayed in 10 different colors which is user selectable.
- High accuracy of 0.05%**
 The accuracy is $\pm 0.05\%$ and the resolution is $1\mu\text{V}$ or 0.1°C .
- Various industrial values can be measured at the same time with selectable ranges**
 With 36 temperature 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 is available.
- Corresponds to Compact Flash card (CF card)**
 Recorded data and parameter data can be saved to CF card. (PC card adapter and CF card are option).
- 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.
- Communications interfaces are available (Option)**
 RS422A, RS485 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. LE5200 series process arithmetic operation simultaneously
- Analyzing/data acquisition application software (option)**
 It is easy to replay and edit the recorded data file. Replay display has various mode of vertical/horizontal trend, circular trend, and also has wave-analyzing and marking by using the cursor.



MODELS

LE5□□□-□□□□

- Model**
 1: Standard type
 2: Arithmetic type
- Input points**
 0: None*1
 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: RS422A/ RS485
 Ethernet +1a contact output (Mechanical relay)
- External drive (Chart speed change + data print/ PC card ON/OFF) (Option)**
 N: None (Standard)
 1: Provided
- Others (Option)**
 N: None (Standard for LE5100)
 1: Recording format + change ratio/differential alarm (Option only for LE5100)
 2: Recording format + change ratio/differential alarm + arithmetic operation (LE5200 preset only) *2

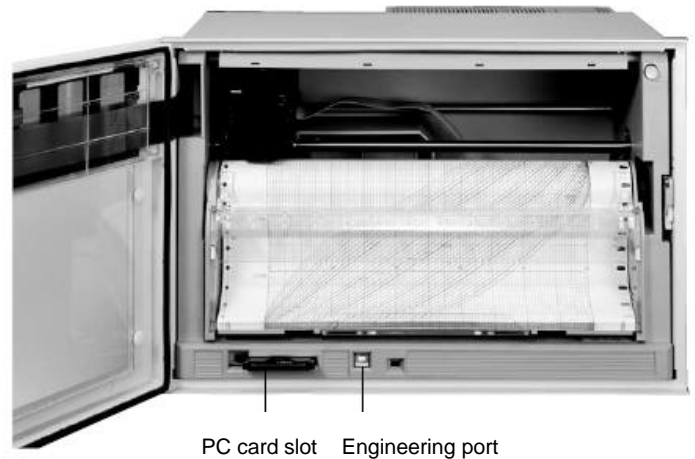
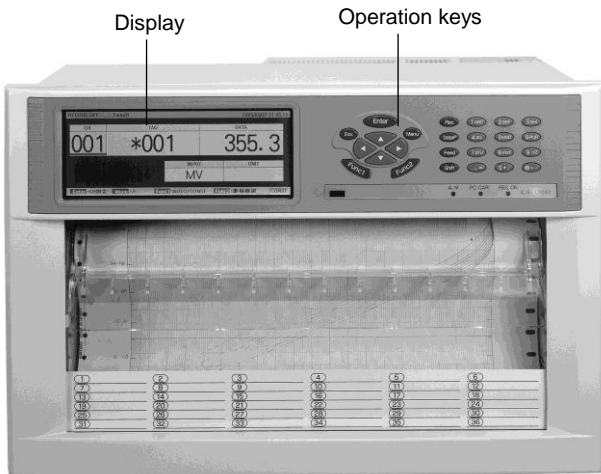
*1: Selectable when adding communication interface option.

*2: LE5200 series is fixed as LE52□□-□□2

LE5100/LE5200 function comparison

	LE5100	LE5200
Recording format		
Change ratio/differential alarm	Option	Standard equipped
Arithmetic	(Not applicable)	

■ NAMES AND FUNCTIONS OF EACH PART

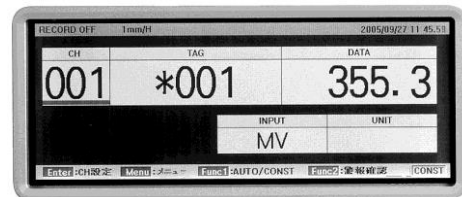


● DISPLAY

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.

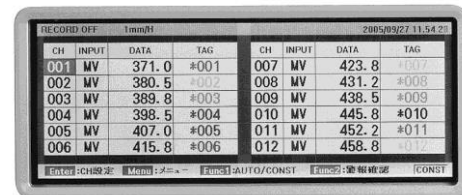
● Display of 1 channel

1 channel of consecutive or sequential display is available.



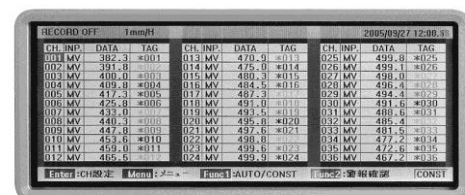
● Simultaneous display of 12 channels

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 are blank)



● **Operation key**

The operation keys are functionally laid out.



Names of keys		Functions
	Enter key	Used to set each function.
	Escape key	Each time this key is pressed, it returns to previous page.
	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 choose setting items and value.
	Function 1 key	Used to set and change setting for each function. Data is indicated in a lower part of screen.
	Function 2 key	Used to set and change setting for each function. Data is indicated in a lower part of screen.
	Recording key	Each time this key is pressed, recording is switched ON or OFF. Used with Enter key.
	Data print key	When this key is pressed, data is simultaneously printed. Used with Enter key.
	Feed key	While this key is pressed, chart paper is fed with a speed of 750mm/min.
	Shift key	Used to switch number key, alphabetic key and other symbol keys.
	Numeric key	Used to input numeric value. (used together with Shift key)
	Alphabetic key	Used to input alphabet. (used together with Shift key)
	Symbol key	Used to input symbols. (used together with shift key)

● **Engineering port (USB)**

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

Prepare exclusive option software PASS.



Engineering port

● **PC card slot**

By using PC card adaptor and CF card, save the record data, save and read out the setting parameter.

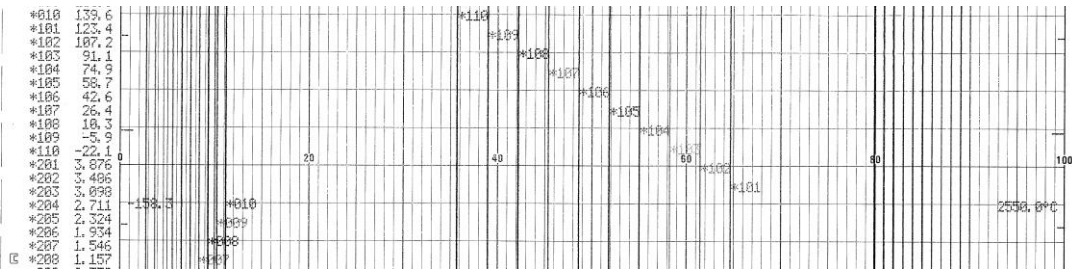


RECORDING FORMAT

Digital recording

Format 1

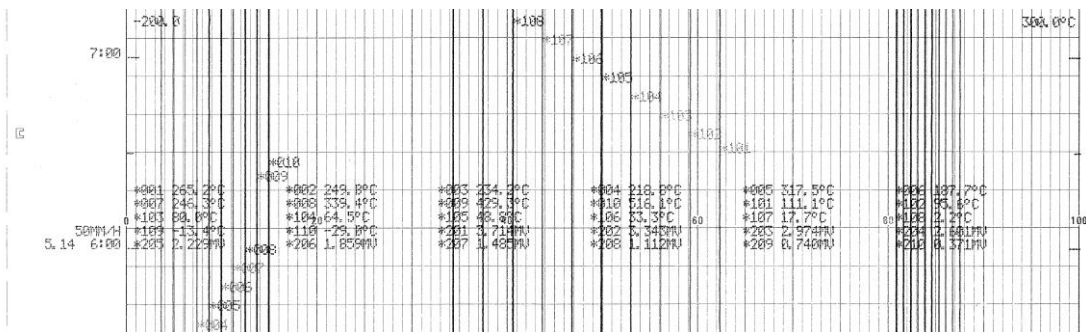
In the left margin of the chart, the tag number and measuring data are digitally recorded at a specified interval.



Digital recording

Format 2

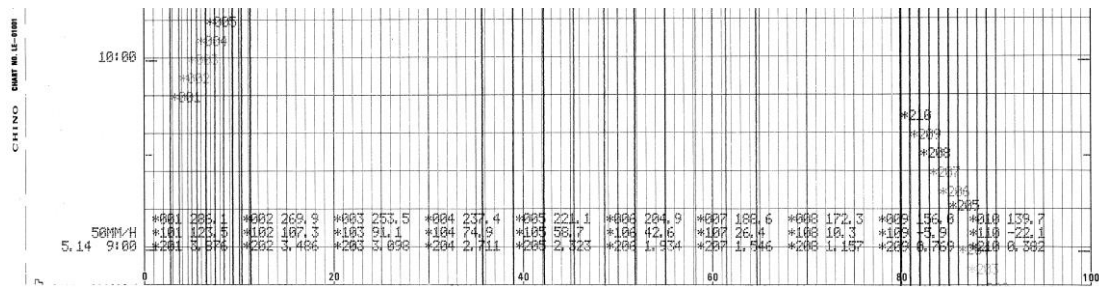
The tag number, measuring data and unit are digitally recorded 6 channels/ line at a specified interval superimposed on the analog recording.



Digital recording

Format 3

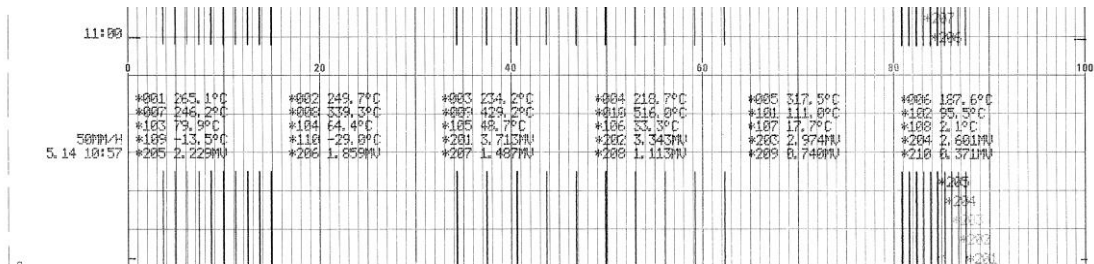
The tag number and measuring data are digitally recorded 10 channels/line at a specified interval superimposed on the analog recording.



● Data print

Format 1

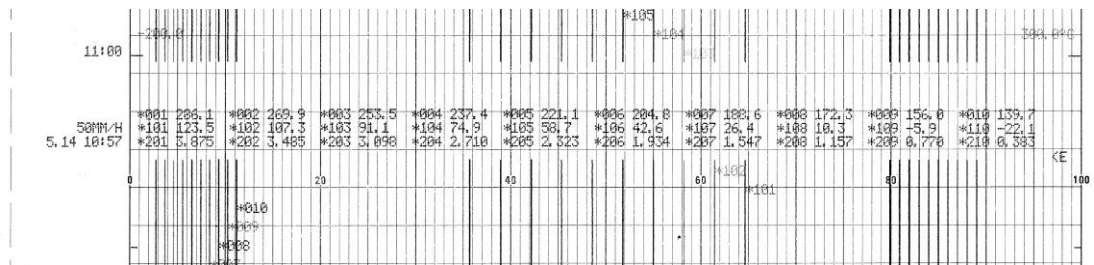
When Data print key is pressed, analog recording is interrupted and the latest data is printed digitally 6 channels/ line.



● Data print

Format 2

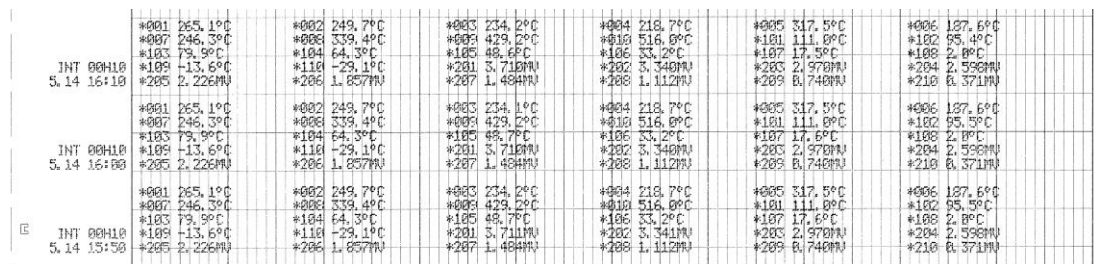
When Data print key is pressed, analog recording is interrupted and the latest data is printed digitally 10 channels/ line.



● Logging recording

Format 1

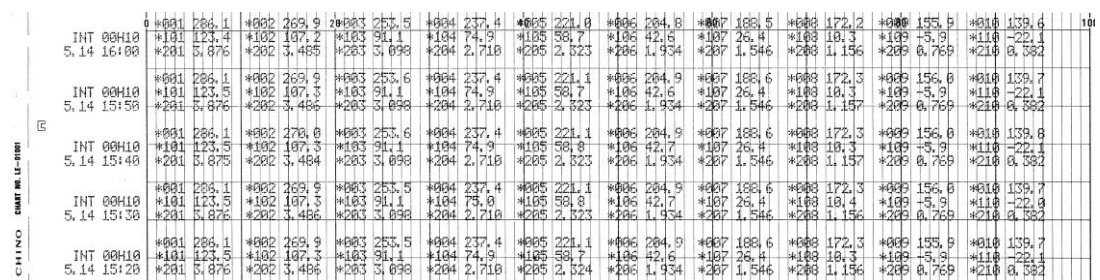
The tag number, data and unit are recorded digitally at a specified interval 6 channels/ line. Analog recording is not performed.



● 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:	0, 12, 24 and 36 points
Input:	Universal DC voltage --- $\pm 10\text{mV}$, $\pm 20\text{mV}$, $\pm 40\text{mV}$, $\pm 80\text{mV}$, $\pm 1.25\text{V}$, $\pm 2.5\text{V}$, $\pm 5\text{V}$, $\pm 10\text{V}$ 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 Data communication input --- Input from host by using higher communication (option) Non-voltage contact input --- Use for operation recording
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 User selectable (0 to 3)
Indication accuracy:	Refer to items of measuring ranges, accuracy rating and display resolutions
Temperature drift:	0.1% FS/ 10°C
Sampling rate:	0.1 sec for all channels
Reference junction compensation accuracy:	K, E, J, T, N, Platinel II --- $\pm 0.5^\circ\text{C}$ or less (0°C or more when measuring) R, S, WRe5-WRe26, NiMo-Ni, U, L --- $\pm 1.0^\circ\text{C}$ or less (Only when the ambient temperature is $23^\circ\text{C} \pm 5^\circ\text{C}$)
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. $1\text{M}\Omega$
Maximum input applied voltage:	$\pm 20\text{V}$ 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

Operating points:	Max. 72 points (measuring data 36 points, arithmetic operation data 36 points)
Recording points:	Max. 72 points
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
Recording format	Analog recording, digital recording (3 kinds), Logging recording (3 kinds)
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 is available.
Operation recording:	Record ON/OFF status of contact input Digital recording --- OFF when contact OFF, ON when contact ON Com. output --- 0 when contact OFF, 1 when contact OFF Data display --- OFF when contact OFF, ON when contact ON
External memory:	PC card adaptor + CF card (128MB to 2GB) (option) Recorded data --- Measuring data, setting parameter Saved data --- Measuring data (TEXT / Binary selectable) Setting parameter (Binary)

■ 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) PC CARD (lights when card is verified) LED * Details shown in digital display ALARM, CHART END and FAIL LED is common

■ 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 "0 * /"
1ABC	--- Setting parameter value 1 and character of "1ABC"
2DEF	--- Setting parameter value 2 and character of "2DEF"
3GHI	--- Setting parameter value 3 and character of "3GHI"
4JKL	--- Setting parameter value 4 and character of "4JKL"
5MNO	--- Setting parameter value 5 and character of "5MNO"
6PQR	--- Setting parameter value 6 and character of "6PQR"
7STU	--- Setting parameter value 7 and character of "7STU"
8VWX	--- Setting parameter value 8 and character of "8VWX"
9YZ	--- Setting parameter value 9 and character of "9YZ"

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, message printing)
(Option: communication and recording format, arithmetic)	

■ COMMUNICATION SPECIFICATIONS

Engineering port (USB)	Medium: USB1.1 (Full speed) 12Mbps
Transfer n method:	Bulk transfer, control transfer * Used as engineering port

■ 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: 100V AC \pm 1%
Power frequency: 50/60Hz \pm 2%
Attitude: Forward/ Backward/ Left/ Right within 0°
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 \pm 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/ S² (0.5G or less)
Impact: 392m/S² (Approx. 40G or less)

Storage condition:

Ambient temperature
-20 to 60°C, 5 to 90%RH
(No dew condensation)

*When it is high humidity condition during transportation or storage, it might require re-calibration.

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 --- 20M Ω or more at 500V DC
Between secondary terminals and protective conductor terminals --- 20M Ω or more at 500V DC
Between primary terminals and secondary terminals --- 20M Ω 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, alarm terminals --- M3.5
Power, protective conductor terminal, external drive terminal, communication terminal --- M4

Chart paper illumination: White LED

■ STANDARDS

CE marking: Conformity pending

■ OPTION SPECIFICATIONS

Options	Contents
External drive	Chart speed selection --- 3-speed, stop Data printing ---list printing PC card record ON/OFF
Alarm output	Output 1a mechanical relay when alarm occur, chart paper end, unit abnormal condition 12, 24, 36 points, Max contact capacity of 100 to 240V AC, 3A resistance load
Communication interface	<ul style="list-style-type: none"> RS422A/RS485 For higher communication interface, Select RS422A/RS485 from terminal connection. Com. protocol: MODBUS Com. specification: 9600 bps to 19200 bps 7E1 to 8N2 Function: Data com. input (36 points), Data acquisition, parameter setting using exclusive software Ethernet For higher communication interface, Medium: Ethernet10BASE-T/ 100BASE-T, automated recognition, TCP, IP, HTTP, exclusive protocol Function: Data com. input (36 points), Data acquisition, parameter setting using exclusive software
Recording format (LE5200 is standard equipped)	Analog record is selectable (for 1 kind only) Parallel scale: Recording range is divided into optional designation areas. Partial compression and enlarged recording: Specified recording range can be enlarged or compressed. Automatic range selection: If a measured value exceeds the higher-limit set value or lower-limit set value of recording, it is recorded by switching the recording range.
Change ratio and differential alarms (LE5200 is standard equipped)	<ul style="list-style-type: none"> Change ratio alarm Alarm arithmetic (increase-limit, decrease-limit) is applied to the change width of input certain fixed time. Differential alarm Alarm arithmetic (differential higher-limit, differential lower-limit) is applied to absolute value of 2 inputs differences.

■ ACCESSORIES (SOLD SEPARATELY)

Name	Description
Receiving resistance for current input	250 Ω (4 to 20mA) is externally mounted to measure direct current
External memory	PC card adaptor+ CF card CF card: 128MB (Apacer Technology made), 256MB, 512MB, 1GB, 2GB (TDK made)

■ APPLICATION SOFTWARE AND ENVIRONMENT (SOLD SEPARATELY)

Name	Description
ZAILA	Data analysis software
KIDS	Data acquisition software
PASS	Parameters programming software

CPU	Your OS recommended CPU and/or upper grade
OS	Windows XP/Vista/7
Memory	Your OS recommended memory or larger
Disk drive	CD-ROM drive: 1 drive or more Hard disk drive: More than 1 drive with free area of at least 100MB
Language	Japanese, English, Chinese (simplified and traditional characters) and Korean

MEASURING RANGE, ACCURACY RATING, AND DISPLAY RESOLUTION ■ TERMINAL BOARD

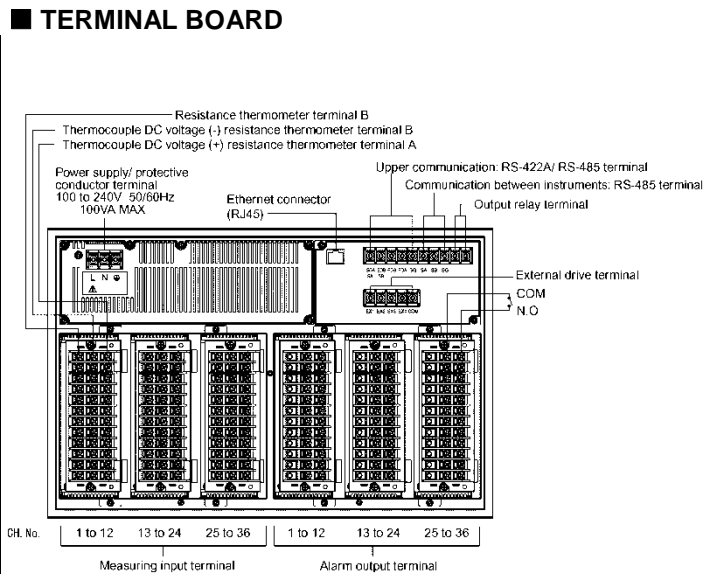
Input type	Measuring range	Standard range	Accuracy rating	Display resolution	
DC voltage	-10.0 to 10.0mV	±10mV	±0.05%±1digit	1μV	
	-20.0 to 20.0mV	±20mV			
	-40.0 to 40.0mV	±40mV		10μV	
	-80.0 to 80.0mV	±80mV			
	-1.25 to 1.25V	±1.25V		100μV	
	-2.5 to 2.5V	±2.5V			
	-5.0 to 5.0V	±5V			
T/C	-10.0 to 10.0V	±10V	±0.05%±1°C	0.1°C	
	-200 to 500°C	±20mV			
	-200 to 900°C	±40mV			
	-200 to 1370°C	±80mV			
	K	-200 to 250°C			±20mV
		-200 to 500°C			±40mV
		-200 to 900°C			±80mV
	E	-200 to 350°C			±20mV
		-200 to 700°C			±40mV
	J	-200 to 1200°C			±80mV
		-200 to 400°C			±20mV
	R	0 to 1760°C			±20mV
	S	0 to 1760°C			±20mV
	B	0 to 1820°C			±20mV
	N	0 to 600°C			±20mV
		0 to 1000°C			±40mV
		0 to 1300°C			±80mV
		0 to 2315°C			±80mV
	W-Re26	0 to 2315°C			±80mV
	Wre5-Wre26	0 to 2315°C			±80mV
	PrRh40-PrRh20	0 to 1888°C			±20mV
	NiMo-Ni	-50 to 1310 °C			±80mV
	Platinel II	0 to 500°C			±20mV
		0 to 950°C			±40mV
0 to 1395°C		±80mV			
-200 to 350°C		±20mV			
U	-200 to 600°C	±40mV			
	-200 to 350°C	±20mV			
L	-200 to 700°C	±40mV			
	-200 to 900°C	±80mV			
	-50 to 50°C	50Ω			
RTD	-100 to 130°C	100Ω			
	-200 to 250°C	200Ω			
	-200 to 550°C	300Ω			
	-50 to 50°C	50Ω			
	-100 to 130°C	100Ω			
	-200 to 250°C	200Ω			
JPt100	-200 to 550°C	300Ω			
	-200 to 550°C	300Ω			
	-200 to 550°C	300Ω			
	-200 to 550°C	300Ω			

Note 1: Ambient temperature/ humidity range: 23°C±2 °C
 Note 2: For thermocouple input, the accuracy of reference junction compensation is not included with the accuracy ratings.
 Note 3: Only when burnout
 Note 4: Accuracy rating is the percentage of measuring range
 K, E, J, T, R, S, B, N: IEC584, JIS C 1602-1995
 W-Wre26, Wre5-WRe26, PrRh40-PrRh20, NiMo-Ni, Platinel II: 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

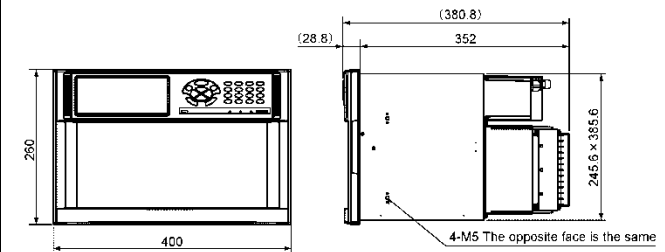
Exceptions of accuracy ratings

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

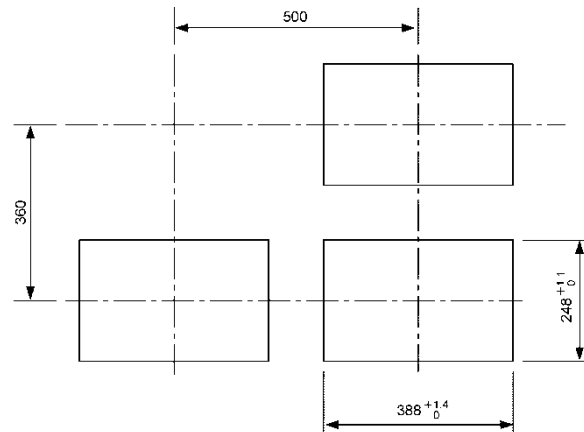
Input types	Measuring range	Accuracy ratings
K, E, J, T, L	-200 to 0°C	±0.2%+1digit
R, S	0 to 400°C	
B	0 to 400°C	None
	-200 to 800°C	±0.15%+1digit
W-WRe26	0 to 300°C	±0.3%+1digit
PrRh40-PrRh20	0 to 300°C	±1.5%+1digit
	300 to 800°C	±0.8%+1digit
NiMo-Ni	-50 to 100°C	±0.2%+1digit
U	-200 to 0°C	±0.3%+1digit
L	-200 to 0°C	±0.2%+1digit



DIMENSIONS



Panel cut-out and mounting minimum clearance



Unit: mm

Specifications subject to change without notice. Printed in Japan (I) 2016.11

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