

# EL3000 SERIES

100mm CHART ANALOG RECORDER (1-PEN TYPE)



EL3000 series is 1-pen continuous type analog recorder sized 144x144mm with 100mm width chart.

The unit starts recording as soon as the power supply and input are connected and it is also easy to operate.

Scale plate, input range and function of the recorder can be selected for various purpose and applications as many kinds of options are prepared.



## ■ FEATURES

### ● Universal power supply

Universal power supply with voltage range of 100 to 240V AC (50/60Hz) is applied.

### ● Linear temperature scale

Temperature scale of thermocouple and resistance thermometer input is a linear scale that is excellent in reading indication value.

### ● Standard 6 chart speeds

6 chart speeds (5,10,20,40,80,160mm/h) are switchable as standard.

5 chart speed and hour/minute change are prepared as option.

### ● Alarm setting (common alarm) as standard

Higher and lower limit alarm can be programmed for every point. Alarm value is easy to be programmed by pointer location.

You can check the alarm by front LED lighting.

Alarm output is prepared as option.

### ● Unit structure and light-weight

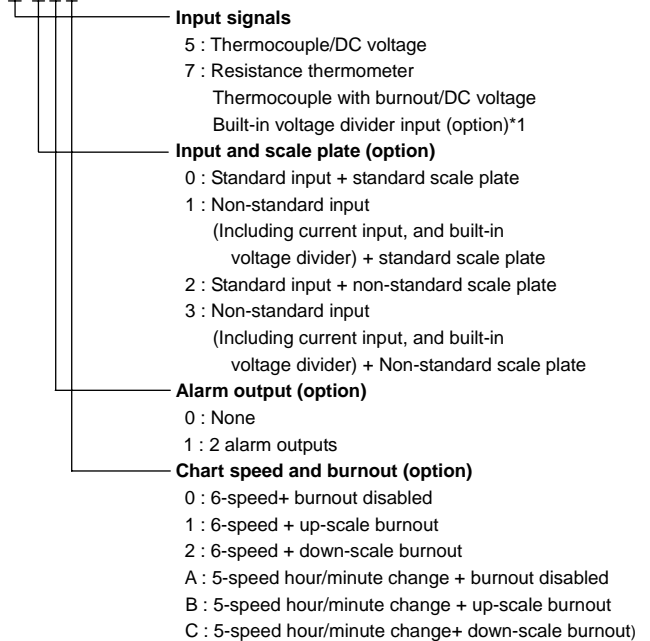
Light-weight (50% of the previous unit weight) was realized by easy maintenance unit structure.

### ● Employing removable type terminal board

Employing easy connecting removable type terminal board.

## ■ MODELS

EL3P1□□□



\*1: Optional built-in voltage divider and thermocouple/resistance thermometer burnout input is only type "7".

## INPUT SPECIFICATIONS

Measurement point:	1-pen continuous trace
Reference range and types:	DC voltage --- $\pm 13.8\text{mV}$ , $\pm 27.6\text{mV}$ , $\pm 69\text{mV}$ , $200\text{mV}$ , $\pm 500\text{mV}$ , $\pm 2\text{V}$ , $\pm 5\text{V}$ Built-in voltage divider; $\pm 10\text{V}$ , $\pm 25\text{V}$ , $\pm 50\text{V}$ DC current --- External installation of shunt resistor ( $250\Omega$ ) is applied (option) Thermocouples --- K, E, J, T, R, and B (option) Resistance thermometer --- Pt100(1997) (Measured current; 1mA) * Linear scale for thermocouple and resistance thermometer
Input designation:	Single scale (standard)
Accuracy rating:	$\pm 0.5\%$ of input span (except for some input under standard operating condition) Refer to the table of standard range and minimum width of scale for non-standard input
Indicating deadband:	0.3% of input span
Reference junction compensation accuracy:	K, E, J, T --- $\pm 1.0^\circ\text{C}$ or less ( $23^\circ\text{C} \pm 10^\circ\text{C}$ ) $\pm 2.0^\circ\text{C}$ or less (0 to $50^\circ\text{C}$ ) (For internal reference junction compensation, the errors above are added to the accuracy rating)
Temperature drift:	$\pm 0.02\%/^\circ\text{C}$ (Converted into reference ranges)
Sampling rate:	125 ms
Indicating resolution:	Approximately 1/2,000
Burnout (option):	On thermocouple or resistance thermometer input, disconnection of signal can be detected. (Specify up scale or down-scale) Burnout detection --- Voltage application method (approximately 8V, 1mA)
Allowable signal source resistance:	Thermocouple inputs, DC voltage inputs ( $\pm 5\text{V}$ or less) --- 1k $\Omega$ (burnout disabled) or less DC Voltage inputs (input more than $\pm 5\text{V}$ ) --- 100 $\Omega$ or less Resistance thermometer inputs --- per wire 10 $\Omega$ or less (Same resistance for 3 wires)
Input resistance:	Thermocouple inputs, DC voltage inputs ( $\pm 5\text{V}$ or less) --- Approximately 8M $\Omega$ DC voltage inputs (more than $\pm 5\text{V}$ ) --- Approximately 1 M $\Omega$
Maximum allowable input voltage:	Thermocouple inputs, DC voltage inputs --- $\pm 10\text{V}$ DC or less DC voltage inputs (Voltage divider built-in) --- $\pm 60\text{V}$ DC or less Resistance thermometer --- $\pm 6\text{V}$ DC or less
Maximum common mode voltage:	30V AC
Common mode rejection ratio:	120dB or more (50/60Hz $\pm 0.1\%$ )
Normal mode rejection ratio:	50dB or more (50/60Hz $\pm 0.1\%$ )

## RECORDING SPECIFICATIONS

Recording accuracy:	$\pm 0.5\%$ of recording span
Recording system:	Cartridge pen
Balancing time:	Input span movement --- approximately 2 seconds
Recording color:	Red
Chart paper:	Fan-fold type: total width of 114mm, total length of 10m, effective chart width of 100mm
Chart speed:	6-speed change, 5, 10, 20, 40, 80, 160mm/h (standard)
Chart speed accuracy:	$\pm 0.1\%$ or less (It is based on the chart scale.)
Pen lift:	Manual operation (up or down)

## INDICATING SPECIFICATIONS

Analog indication:	Scale plate and pointer
Scale plate:	Single scale (minimum scale division: 80)

## ALARM SPECIFICATIONS

Alarm display:	Pointer and alarm-point sticker pasted on scale. Alarm LED lamp lightens for alarming (All channels OR output)
Alarm types:	Higher and lower-limit alarm
Alarm programming:	Individual setting for higher and lower-limit value (Programming percentage of input span by indicating pointer, input resolution 0.5%)
Alarm deadband:	0.4% of input span
Alarm output (option):	1a contact and 2 outputs (common) Maximum contact capacity: 2A (resistive load), 0.5A (inductive load)

## OPERATION / PROGRAMMING SPECIFICATIONS

Switches:	POWER --- ON/OFF the recorder power supply INDICATE --- Normal operation / stop indication & recording CHART SPEED --- Selecting chart speed (Chart feed stops when all switches are OFF) SET-RUN --- Switching alarm setup/normal operation mode ◀▶ --- Moves pointer for alarm setup and calibration
Indication:	LED (green) --- Power ON monitor LED (red) --- Alarm monitor

## GENERAL SPECIFICATIONS

Rated power voltage:	100 to 240V AC, 50/60Hz (Universal power supply) with power supply switch
Power consumption:	Maximum 16VA (100V AC) Maximum 22VA (240V AC)
Environmental conditions:	Reference operation condition --- Ambient temperature range: 21 to $25^\circ\text{C}$ Ambient humidity range: 45 to 65%RH Power voltage: 100V AC $\pm 1\%$ Power frequency: 50/60Hz $\pm 0.5\%$ Attitude: left/right 0°, forward tilting 0°, backward tilting 0° Warm-up time: longer than 30 minutes Normal operation condition --- Ambient temperature range: 0 to $50^\circ\text{C}$ Ambient humidity range: 20 to 80%RH Power voltage: 90 to 264V AC Power frequency: 50/60Hz $\pm 2\%$ Attitude: left/right 0 to 10°, forward tilting 0°, backward tilting 0 to 20° Transportation condition (at the packed condition on shipment from our factory) --- Ambient temperature range: $-20$ to $60^\circ\text{C}$ Ambient humidity range: 5 to 90%RH (No dew condensation) Vibration: 10 to 60Hz, 4.9m/S <sup>2</sup> (0.5G) or less Impact: 392m/S <sup>2</sup> (40G) or less Storage condition --- Ambient temperature range: $-20$ to $60^\circ\text{C}$ Ambient humidity range: 5 to 90%RH (No dew condensation)
Insulation resistance:	Secondary terminals and protective conductor terminals --- 20M $\Omega$ or more at 500V DC Primary terminals and protective conductor terminals --- 20M $\Omega$ or more at 500V DC Primary and secondary terminals --- 20M $\Omega$ or more at 500V DC Notes: Primary terminals --- Power (L,N), Alarm terminals (mechanical relay) Secondary terminals --- Measurement input terminals
Dielectric strength:	Secondary terminals and protective conductor terminals --- 1 minute at 500V AC Primary terminals and protective conductor terminals --- 1 minute at 1500V AC Primary and secondary terminals --- 1 minute at 2300V AC Notes: Primary terminals --- Power(L,N), Alarm terminals(mechanical relay) Secondary terminals --- Measurement input terminals
Case:	Door (frame) --- ABS resin, window --- glass Case --- ABS resin
Color:	Door (frame) --- Black (equivalent to Mussel N1.5), window --- Transparent Case --- Black (equivalent to Mussel N1.5)
Mounting:	Panel mounting
Weight:	Approximately 1.6kg
Power voltage fluctuation:	Indication fluctuation 0.2% or less (converted into reference ranges at 90 to 264V AC)

## STANDARDS (Conformity pending)

CE marking:	EMC directive, low voltage directive conformity EN61326+A1+A2 +A3, EN61010-1 * Under EMC directive test condition, indication equivalent to maximum 500 $\mu\text{V}$ fluctuates in case
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## MAINTENANCE

Input correction:	Zero/span correction for all channels
Memory reset:	Initializes indication adjustment value (User maintenance area)

## OPTION SPECIFICATIONS

Options	Contents
Alarm output	Alarm contact output is available Alarm relay --- Mechanical relay 1a contact, 2 outputs (common) Maximum contact rating --- 250V AC 2A, 30V DC 2A(resistive load) 250V AC 0.5A, 30V DC 0.5A (inductive load))
DC current input	250 of shunt resistor is applied to measure voltage input
Built-in voltage divider	Built-in voltage divider(1/1000) measures input in the range of $\pm 5V$ to $\pm 50V$ (input type "7" only)
Non-standard input	Refer to the table of standard range and programmable minimum width of scale Minimum width of scale --- DC voltage: 10mV DC width or more Thermocouple: K: 250°C width or more E,J,T; 200°C width or more R; 800°C width or more Resistance thermometer: 100°C width or more
Non-standard scale plate	Scale plate for non-standard input
Burnout	Function for detecting disconnection for sensor with thermocouple or resistance thermometer input. Specify up-scale or down-scale (Input type "7" only), parallel operation is not possible
Chart speed Hour/minute change	5-speed change, 5,10,20,40,80mm/minute, hour change
16m chart paper	Maximum length 15.6m

## Standard range and minimum width of scale

Input type	Standard range	Minimum width of scale	
DC voltage	-13.8 to 13.8mV	10mV	
	-27.6 to 27.6mV	17mV	
	-69 to 69mV	35mV	
	-200 to 200mV	100mV	
	-500 to 500mV	250mV	
	-2 to 2V	1V	
	-5 to 5V	2.5V	
	-10 to 10V	5V	
	-25 to 25V	13V	
	-50 to 50V	25V	
DC current	4 to 20mA	10mA	
T/C	K	-200 to 330°C	250°C
		-200 to 660°C	400°C
		-200 to 1370°C	700°C
	E	-200 to 200°C	200°C
		-200 to 380°C	250°C
		-200 to 720°C	380°C
	J	-200 to 900°C	720°C
		-200 to 250°C	200°C
	T	-200 to 500°C	300°C
		-200 to 1200°C	500°C
	R	-200 to 280°C	200°C
		-200 to 400°C	300°C
	B	0 to 1240 °C	800°C
		0 to 1760°C	1480°C
RTD	0 to 1820°C	900°C	
	-140 to 150°C	150°C	
	-200 to 300°C	200°C	
	-200 to 650°C	400°C	

K,E,J,T,R : IEC584,JIS C 1602-1995

Pt100 : IEC751,JIS C 1604-1997

Programmable minimum width of scale: DC voltage --- 10mV DC width or more

Thermocouple ---K: 250 width or more

E,J,T: 200 width or more

R: 800 width or more

Resistance thermometer --- 100 width or more

## Standard scale and chart paper Nos.

Input type	Scales	Chart paper Nos.	Minimum scales	Input signals
DC voltage	0 to 10mV	EM-008	0.2	M1
	0 to 20mV	EM-519	0.5	M8
	0 to 50mV	EL42003	1	M9
	-5 to 5mV	EL42056	0.2	M6
	-10 to 10mV	EL42057	0.5	M7
	1 to 5V	EL42010	0.05	V6
T/C	K	0 to 250°C	5	K2
		0 to 300°C	5	K3
		0 to 400°C	10	K4
		0 to 600°C	10	K6
		0 to 800°C	10	K8
		0 to 1000°C	20	KA
	E	0 to 1200°C	20	KC
		0 to 200°C	5	E2
	J	0 to 300°C	5	E3
		0 to 400°C	10	J3
	T	0 to 400°C	10	J4
		0 to 200°C	5	T2
	R	0 to 300°C	5	T3
		-50 to 150°C	5	T5
RTD	0 to 1400 °C	20	R4	
	0 to 1600°C	20	R6	
	0 to 100°C	2	31	
	0 to 150°C	2	3A	
	0 to 200°C	5	32	
	0 to 300°C	5	33	
	0 to 500°C	10	35	
	-20 to 80°C	2	38	
-50 to 50°C	2	3E		
-50 to 150°C	5	3B		

K,E,J,T,R : IEC584,JIS C 1602-1995

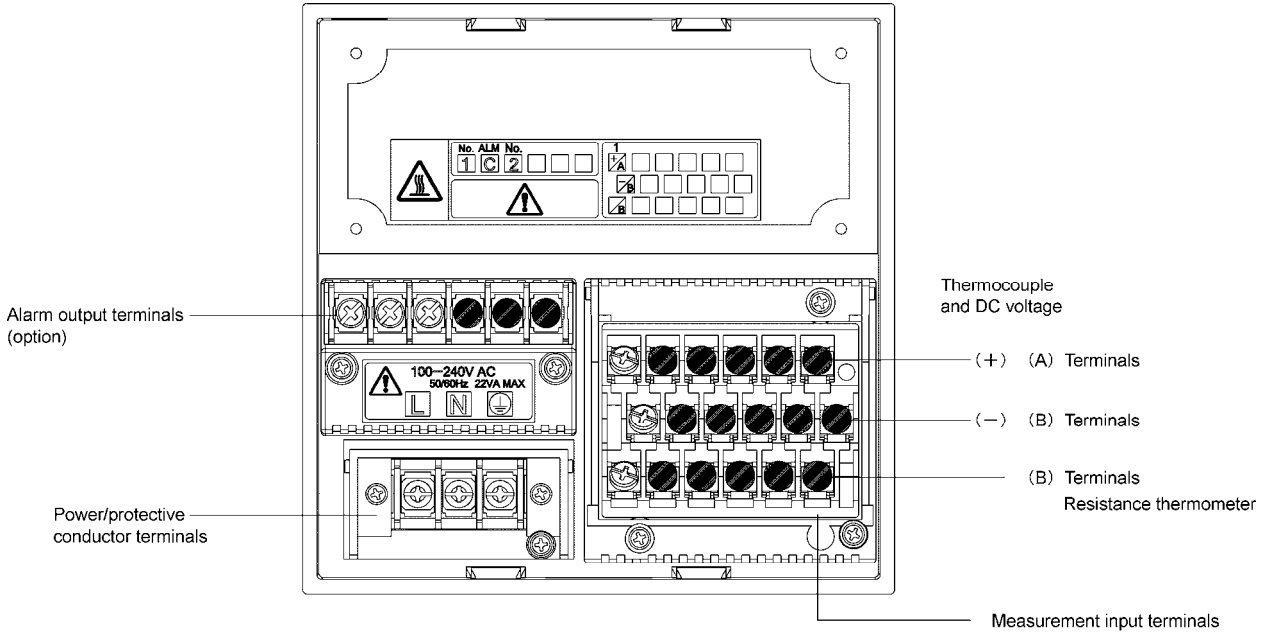
Pt100 : IEC751,JIS C 1604-1997

## Exceptions of accuracy ratings

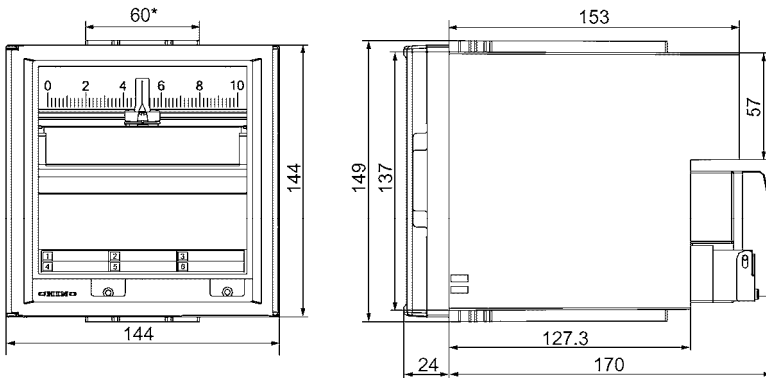
Input types	Measuring range	Accuracy ratings
K,E,J,T	-200 to -50°C	$\pm 1.0\%$ of measuring range
B	0 to 400°C	None
R	0 to 400°C	$\pm 1.0\%$ of measuring range

Note) The accuracy ratings are converted into the measuring range

■ **TERMINAL BOARD**

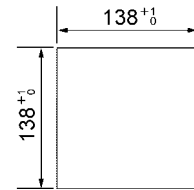


■ **DEMENSIONS**

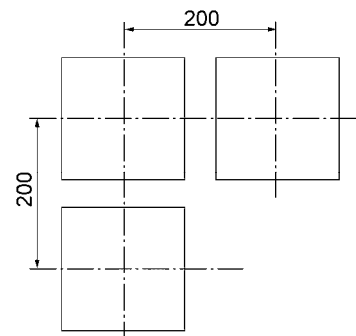


\* Mounting bracket

● **Panel cutout**



● **Minimum clearance for plural installation**



Unit: mm

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