

EL3000 SERIES

100mm CHART ANALOG RECORDER (PEN WRITING TYPE)



EL 3000 series are analog recorders sized 144 x 144mm with 100mm width chart which have 3 types of 1-pen, 2-pen and 3-pen.

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 is applied. (50/60Hz switchable)

• 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.

• Unit structure and light-weight

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

• Alarm setting (individual input alarm) as standard

Higher and lower limit alarm can be programmed for each channel. 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.

MODELS

• 1-pen type

EL3P1□□□□

Input signals

- 5 : Thermocouple/DC voltage
- 7 : Resistance thermometer
- Thermocouple with burnout/DC voltage
- Built-in voltage divider input (option)*1

Input and scale plate (option)

- 0 : Standard input + standard scale plate
- 1 : Non-standard input
(Including current input, and built-in voltage divider) + standard scale plate
- 2 : Standard input + non-standard scale plate
- 3 : Non-standard input
(Including current input, and built-in voltage divider) + Non-standard scale plate

Alarm output (option)

- 0 : None
- 1 : 2 alarm outputs

Chart speed and burnout (option)

- 0 : 6-speed+ burnout disabled
- 1 : 6-speed + up-scale burnout
- 2 : 6-speed + down-scale burnout
- A : 5-speed hour/minute change + burnout disabled
- B : 5-speed hour/minute change + up-scale burnout
- C : 5-speed hour/minute change+ down-scale burnout

• 2-pen type, 3-pen type

EL3□□□□□□

Input points

- F : 2 pen
- G : 3 pen

1st pen input and scale plate*2

- 0 : Standard input + standard scale plate
- 1 : Non-standard input (Including current input and built-in voltage divider) +standard scale plate
- 2 : Standard input + non-standard scale plate
- 3 : Non-standard input (Including current input and built-in voltage divider) +non-standard scale plate

2nd pen input and scale plate*2

- 0 : Standard input + standard scale plate
- 1 : Non-standard input (Including current input and built-in voltage divider) +standard scale plate
- 2 : Standard input + non-standard scale plate
- 3 : Non-standard input (Including current input and built-in voltage divider) +non-standard scale plate

3rd pen input and scale plate*2

- N : None (for 2 pen)
- 0 : Standard input + standard scale plate
- 1 : Non-standard input (Including current input and built-in voltage divider)+ standard scale plate
- 2 : Standard input + non-standard scale plate
- 3 : Non-standard input (Including current input and built-in voltage divider) +non-standard scale plate

Alarm output (option)

- 0 : None
- 2 : Alarm output 4points/6points
(2-pen type : 4 points, 3-pen type : 6 points)

Chart speed and burnout (option)*3

- 0 : 6-speed + burnout disabled
- 1 : 6-speed + up-scale burnout
- 2 : 6-speed + down-scale burnout
- A : 5-speed hour/minute change + burnout disabled
- B : 5-speed hour/minute change + up-scale burnout
- C : 5-speed hour/minute change + down-scale burnout

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

*2: Input and scale selection are needed for non-standard input and non-standard scale plate. 1st pen must be selected as thermocouple input.

*3: Burnout are programmed together for all channels for thermocouple/ resistance thermometer input.

■ INPUT SPECIFICATIONS

Measuring channels :	1, 2, 3 channels
Reference range and types :	DC voltage --- $\pm 13.8\text{mV}$, $\pm 27.6\text{mV}$, $\pm 69\text{mV}$, $\pm 200\text{mV}$, $\pm 500\text{mV}$, $\pm 2\text{V}$, $\pm 5\text{V}$ Built-in voltage divider (option) ; $\pm 10\text{V}$, $\pm 25\text{V}$, $\pm 50\text{V}$ DC current --- External installation of shunt resistor (250Ω) is applied (option) Thermocouples --- K, E, J, T, R, B (option) Resistance thermometer --- Pt100 (1997) (Measured current ; 1mA) *Linear scale for thermocouple and resistance thermometer
Input designation :	Refer to above reference range Single scale
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°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 :	125ms
Indicating resolution :	Approximately 1/2000
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) --- $1\text{k}\Omega$ (burnout disabled) or less DC voltage inputs (input more than $\pm 5\text{V}$) --- 100Ω or less Resistance thermometer inputs --- per wire 10Ω or less (Same resistance for 3 wires)
Input resistance :	Thermocouple inputs, DC voltage inputs ($\pm 5\text{V}$ or less) --- Approximately $8\text{M}\Omega$ DC voltage inputs (more than $\pm 5\text{V}$) --- Approximately $1\text{M}\Omega$
Maximum allowable input voltage :	Thermocouple inputs, DC voltage inputs --- $\pm 10\text{V}$ DC or less
Applied voltage :	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 type :	Disposable fiber tipped pen
Balancing time :	Input span movement --- approximately 2 seconds
Recording color :	1 Red, 2 Green, 3 Blue
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):	Individual for each channels, a 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 and 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 alarms setup and calibration Hz --- Power frequency 50/60Hz switchable SELECT --- Pen selection for programming and adjusting (2-pen type and 3-pen type only) LED (green) --- Power ON monitor LED (red) --- Alarm monitor
Indication :	

■ GENERAL SPECIFICATIONS

Rated power voltage :	100 to 240V AC, 50/60Hz (switchable) with power supply switch
Power consumption :	1- pen type --- Maximum 16VA (100V AC), Maximum 22VA (240V AC) 2- pen type --- Maximum 24VA (100V AC), Maximum 34VA (240V AC) 3- pen type --- Maximum 30VA (100V AC), Maximum 40VA (240V AC)
Environmental conditions :	Reference operation condition --- Ambient temperature range : 21 to 25°C Ambient humidity range : 45 to 65% RH Power voltage : 100V AC $\pm 1\%$ Power frequency : 50/60 Hz $\pm 0.5\%$ 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°C Ambient humidity range : 20 to 80% RH Power voltage : 90 to 264V AC Power frequency : 50/60 Hz $\pm 2\%$ 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°C Ambient humidity range : 5 to 90% RH (No dew condensation) Vibration : 10 to 60 Hz, 4.9m/s^2 , (0.5G) or less Impact : 392m/s^2 (40G) or less Storage condition --- Ambient temperature range : -20 to 60°C Ambient humidity range : 5 to 90% RH (No dew condensation)
Insulation resistance :	Secondary terminals and protective conductor terminals --- $20\text{M}\Omega$ or more at 500V DC Primary terminals and protective conductor terminals --- $20\text{M}\Omega$ or more at 500V DC Primary and secondary terminals --- $20\text{M}\Omega$ or more at 500V DC Note : 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 1500V AC Note : Primary terminals --- Power (L.N), Alarm terminals (mechanical relay) Secondary terminals --- Measurement input terminals
Case :	Door (frame) --- ABS resin Window --- glass Case --- 1-pen type --- ABS resin 2-pen type and 3-pen-type --- Steel
Color :	Door (frame) --- Black (equivalent to Mussel N1.5), Window --- Transparent Case --- Black (equivalent to Mussel N1.5)
Mounting :	Panel mounting
Weight :	1-pen type --- Approximately 1.6kg (full option) 2-pen type and 3-pen type --- Approximately 2.6kg (full option)
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 individual input
Memory reset :	Initializes indication adjustment value (User maintenance area)

OPTION SPECIFICATIONS

Options	Contents
Alarm output	Alarm contact output is available Alarm relay --- Individual mechanical relay a 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	250Ω 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 ±5V to ±50V (input type "7" only for 1-pen type)
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 for 1-pen type), 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°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

Standard scale and chart paper Nos.

Input type	Scales	Chart paper Nos.	Minimum scales	Input signals
DC voltage	0 to 10mV	EM008	0.2	M1
	0 to 20mV	EM519	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

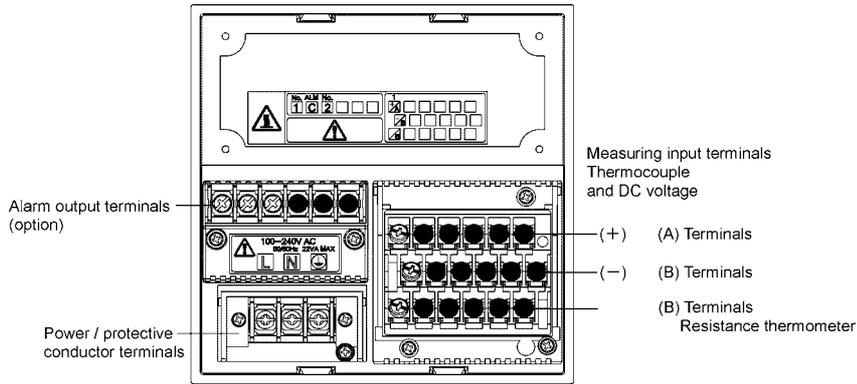
Exceptions of accuracy ratings

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

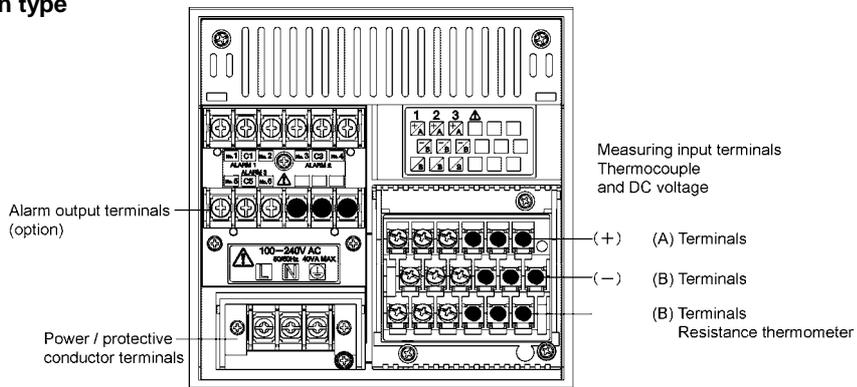
Note) The accuracy ratings are converted into the measuring range

■ TERMINAL BOARD

● 1-Pen type

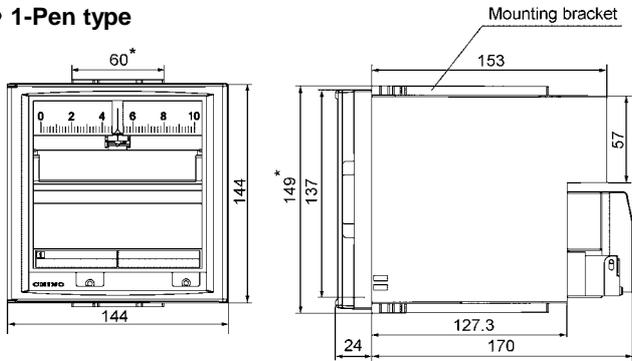


● 2-Pen type, 3-Pen type

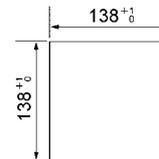


■ DIMENSIONS

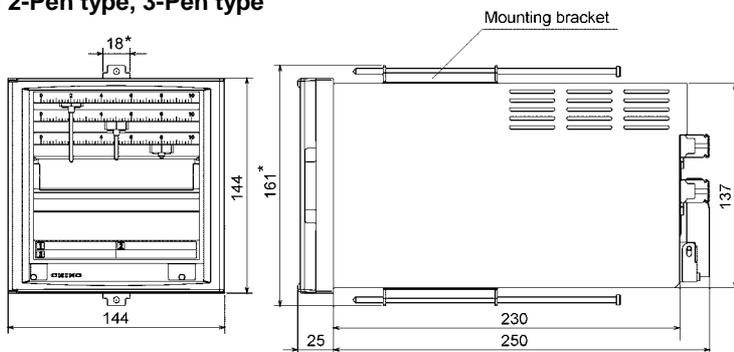
● 1-Pen type



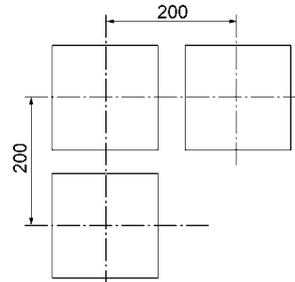
● Panel cutout



● 2-Pen type, 3-Pen type



● Minimum clearance for plural installation



Unit: mm

*Mounting bracket

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