

# EL3000 SERIES 100mm CHART ANALOG RECORDER (DOT PRINTING TYPE)



EL3000 series is a dot printing 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.

### ● CE marking

The EL recorder is conformed to the rules of safety standards of CE.

### ● 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

EL3D   -

### Input point

- 1 : 1 point
- 2 : 2 points
- 3 : 3 points
- 6 : 6 points

### 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)\*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

### Alarm output

- 0 : None
- 1 : 2 alarm outputs

### Chart speed and burnout\*3

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

Input and scale selection are needed for non-standard input and non-standard scale plate.

\*3 : Burnout on all channels is programmed together for thermocouple / residence thermometer input.

## INPUT SPECIFICATIONS

Measurement point:	1,2,3 and 6 points
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), double scale (option)
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)
Measurement cycle:	6 seconds/point
Indicating resolution:	Approximately 1 / 2,000
Burnout (option):	On thermocouple or resistance thermometer input, disconnection of signal can be detected. (Up-scale and down scale burnout on all channels can be programmed.) 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 $\pm 5\text{V}$ ) --- $100\Omega$ 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 $8\text{M}\Omega$ DC voltage inputs (more than $\pm 5\text{V}$ ) --- Approximately $1\text{M}\Omega$
Maximum 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:	Inkpad dotting
Balancing time:	Input span movement --- approximately 2 seconds
Recording color:	1: red 2: blue 3: green 4: violet 5: purple 6: brown
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.)

## INDICATING SPECIFICATIONS

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

## ALARM SPECIFICATIONS

Alarm display:	Pointer and alarm-point seal 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 AUTO CH --- Switching automatic channels change and fixed channel (Chart feed stops when 1 point indication mode selected) 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 (All channels or output)

## GENERAL SPECIFICATIONS

Rated power voltage:	100 to 240V AC, 50/60Hz (Universal power supply) with power supply switch
Power consumption:	Maximum 12VA (100V AC) Maximum 20VA (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 $0^\circ$ , forward tilting $0^\circ$ , backward tilting $0^\circ$ 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 $10^\circ$ , forward tilting $0^\circ$ , backward tilting 0 to $20^\circ$ 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/ S2 (0.5G) or less Impact: 392m/S2 (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 --- $20\text{M}\Omega$ 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 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 1.7kg
Power voltage fluctuation:	Indication fluctuation 0.2% or less (converted into reference ranges at 90 to 264V AC)

## STANDARDS

CE marking:	EMC directive, low voltage directive conformity EN61326+A1+A2+A3, EN61010-1 * Under EMC directive test condition, indication equivalent to maximum 500mV 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	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)
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
Double scale	Measures input with 2 types of scales (each scale is only serial channel)
Burnout	Function for detecting disconnection for sensor with thermocouple or resistance thermometer input. Up-scale and down scale burnout on all channels can be programmed (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 input and chart paper Nos.

Input type	Scales	Chart paper Nos.	Minimum scales	Input code
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
	0 to 5V	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 200°C	5	E2
		0 to 300°C	5	E3
		0 to 400°C	5	J3
	J	0 to 150°C	10	J4
		0 to 200°C	5	T2
	T	0 to 300°C	5	T3
		-50 to 150°C	5	T5
		0 to 1200°C	20	R4
	R	0 to 1400°C	20	R6
0 to 1600°C		2	31	
0 to 100°C		2	3A	
0 to 150°C		5	32	
RTD	0 to 200°C	5	33	
	0 to 250°C	10	35	
	0 to 300°C	2	38	
	-20 to 80°C	2	3E	
	-50 to 50°C	5	3B	

K, E, J, T, R : IEC584, JIS C1602-1995  
Pt100 : IEC751, JIS C1604-1997

## 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	200°C
		-200 to 660°C	400°C
		-200 to 1370°C	700°C
	E	-200 to 200°C	150°C
		-200 to 380°C	250°C
		-200 to 720°C	380°C
	J	-200 to 900°C	720°C
		-200 to 250°C	150°C
		-200 to 500°C	300°C
	T	-200 to 1200°C	500°C
		-200 to 280°C	150°C
	R	-200 to 400°C	300°C
0 to 1240°C		600°C	
RTD	0 to 1760°C	1300°C	
	0 to 1820°C	900°C	
	-140 to 150°C	150°C	
RTD	-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

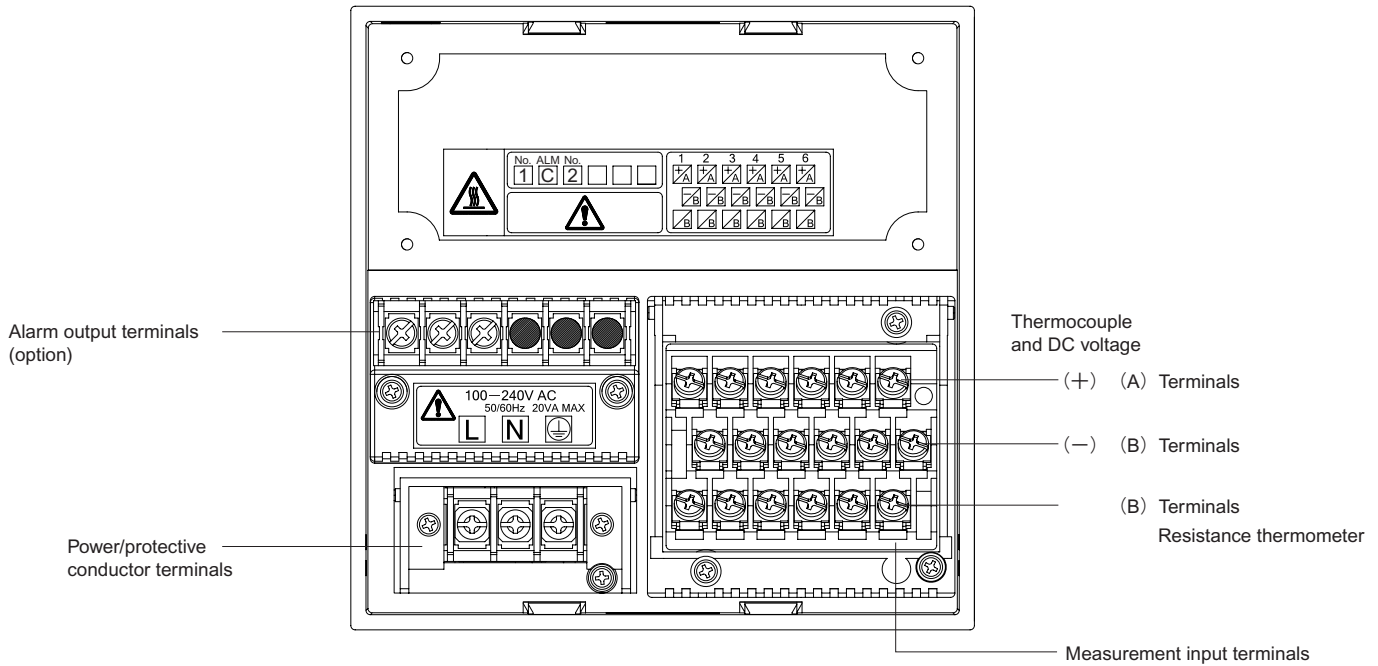
Programmable minimum width of scale: DC voltage --- 10mV DC width or more  
Thermocouple --- K: 250°C width or more  
E,J,T: 200°C width or more  
R: 800°C width or more  
Resistance thermometer --- 100°C width or more

## Exceptions of accuracy ratings

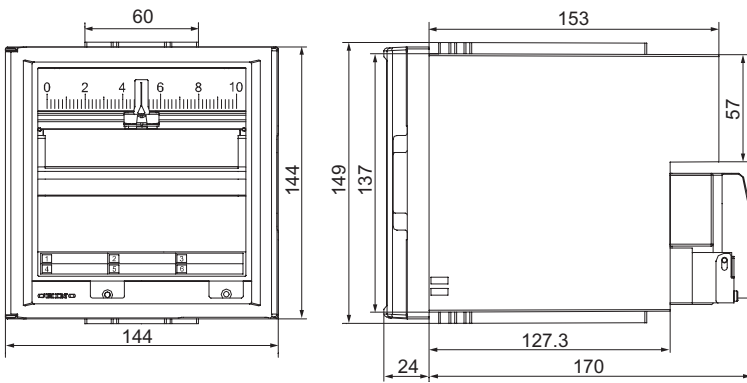
Input types	Measuring range	Accuracy ratings
K,E,J,T	-200 to -50°C	±1.0% of measuring range
B	0 to 400°C	None
R	0 to 400°C	±1.0% of measuring range

Note) The accuracy ratings are converted into the measuring range

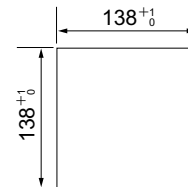
**TERMINAL BOARD**



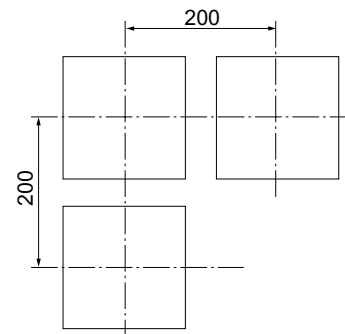
**DIMENSIONS**



**Panel cutout**



**Minimum clearance for plural installation**



Unit : mm

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**CHINO CORPORATION**

32-8 KUMANO-CHO, ITABASHI-KU, TOKYO 173-8632  
 Telephone : +81-3-3956-2171  
 Facsimile : +81-3-3956-0915  
 E-mail : inter@chino.co.jp  
 Website : www.chino.co.jp/