EL3000 SERIES

100mm CHART   ANALOG RECORDER (DOT PRINTING TYPE)

PS
PERFORMANCE SPECIFICATION
CHINO

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. (Conformity pending)
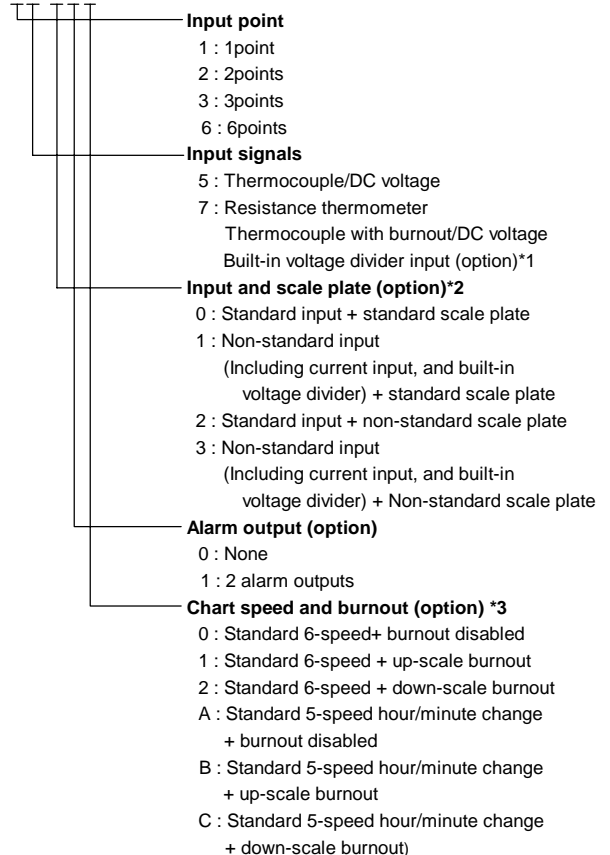
●**Unit structure and light-weight**
  Light-weight (50% of the previous unit weight) was realized by easy maintenance unit structure.

●**Employing removable type terminal board**
  Employing easy connecting removable type terminal board.

■ MODELS

EL3D☐☐-☐☐☐

Input point
1 : 1point
2 : 2points
3 : 3points
6 : 6points

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 (option)
0 : None
1 : 2 alarm outputs

Chart speed and burnout (option) *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/residence 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 --- ±13.8mV, ±27.6mV, ±69mV, 200mV, ±500mV,±2V, ±5V
	Built-in voltage divider; ±10V, ±25V, ±50V
	DC current --- External installation of shunt resistor(250Ω) 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:	±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 --- ±1.0°C or less (23°C±10°C)
	±2.0°C or less (0 to 50°C)
	(For internal reference junction compensation, the errors above are added to the accuracy rating)
Temperature drift:	±0.02%/°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 (±5V or less)
	--- 1kΩ(burnout disabled) or less
	DC Voltage inputs (input more than ±5V) --- 100Ω or less
	Resistance thermometer inputs --- per wire 10Ω or less (Same resistance for 3 wires)
Input resistance:	Thermocouple inputs, DC voltage inputs (±5V or less) --- Approximately 8MΩ
	DC voltage inputs (more than ±5V) --- Approximately 1 MΩ
Maximum input voltage:	Thermocouple inputs, DC voltage inputs --- ±10V DC or less
	DC voltage inputs (Voltage divider built-in) --- ±60V DC or less
	Resistance thermometer --- ±6V DC or less
Maximum common mode voltage:	30V AC
Common mode rejection ratio:	120dB or more (50/60Hz±0.1%)
Normal mode rejection ratio:	50dB or more (50/60Hz±0.1%)

■ RECORDING SPEIFICATIONS

Recording accuracy:	±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:	±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°C
	Ambient humidity range: 45 to 65%RH
	Power voltage: 100V AC±1%
	Power frequency: 50/60Hz±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: 50/60Hz ±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 60Hz, 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 --- 20MΩ or more at 500V DC
	Primary terminals and protective conductor terminals --- 20MΩ or more at 500V DC
	Primary and secondary terminals --- 20MΩ 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 (conversed into reference ranges at 90 to 264V AC)

■ STANDARADS (Conformity pending)

CE marking:	EMC directive, low voltage directive conformity EN61326+A1+A2, EN61000-3-2 EN61000-3-3+A1, EN61010-1
	* Under EMC directive test condition, indication equivalent to maximum 500μV fluctuates in case

■ 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 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	EL05096	5	K2
		0	to	300°C	EL05010	5	K3
		0	to	400°C	EL05009	10	K4
		0	to	600°C	EL05081	10	K6
		0	to	800°C	EL05121	10	K8
		0	to	1000°C	EL05157	20	KA
		0	to	1200°C	EL05060	20	KC
	E	0	to	200°C	EL05047	5	E2
		0	to	300°C	EL05010	5	E3
	J	0	to	300°C	EL05010	5	J3
		0	to	400°C	EL05009	10	J4
	T	0	to	200°C	EL05047	5	T2
		0	to	300°C	EL05010	5	T3
		-50	to	150°C	EL05007	5	T5
	R	0	to	1400°C	EL05137	20	R4
		0	to	1600°C	EL05113	20	R6
RTD		0	to	100°C	EL05052	2	31
		0	to	150°C	EL05034	2	3A
		0	to	200°C	EL05047	5	32
		0	to	300°C	EL05010	5	33
		0	to	500°C	EL05048	10	35
		-20	to	80°C	EL05035	2	38
		-50	to	50°C	EL05006	2	3E
		-50	to	150°C	EL05007	5	3B

K,E,J,T,R : IEC584,JIS C 1602-1995
Pt100 : IEC751,JIS C 1604-1997

■ 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	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
		-200	to	900°C	720°C
	J	-200	to	250°C	200°C
		-200	to	500°C	300°C
		-200	to	1200°C	500°C
	T	-200	to	280°C	200°C
		-200	to	400°C	300°C
	R	0	to	1240°C	800°C
		0	to	1760°C	1480°C
	B	0	to	1820°C	900°C
RTD		-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
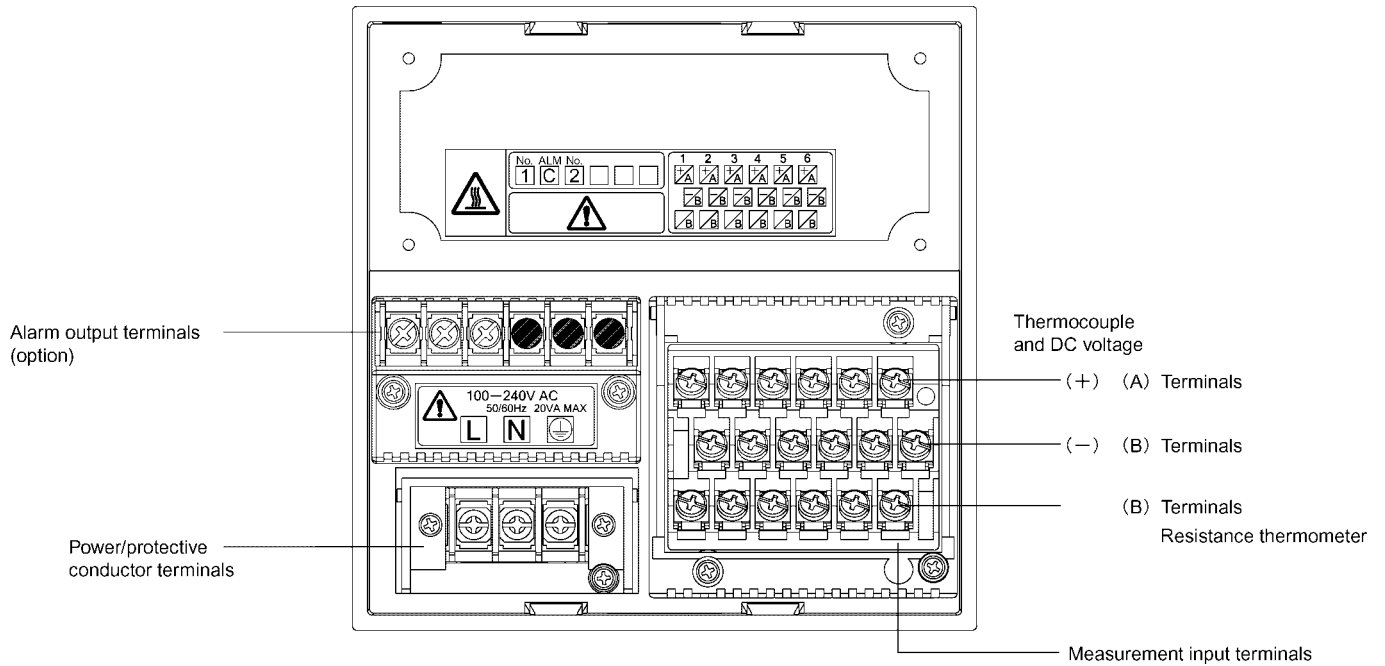R: 800°C width or more
Resistance thermometer --- 100°C width or more
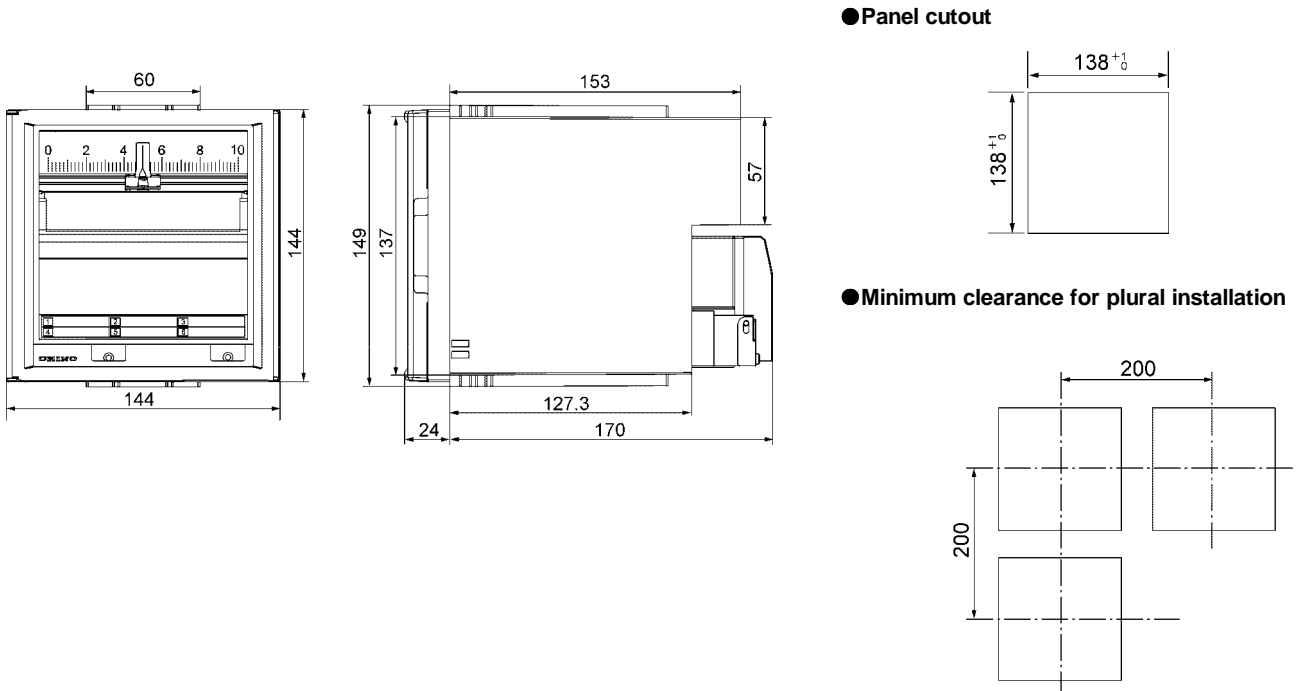
●Exceptions of accuracy ratings

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

Alarm output terminals
(option)

Power/protective
conductor terminals

No. ALM No.
1 C 2

100—240V AC
50/60Hz 20VA MAX
L N

Thermocouple
and DC voltage

（＋）（A）Terminals

（－）（B）Terminals

（B）Terminals
Resistance thermometer

Measurement input terminals

■ DEMENSIONS

60

0 2 4 6 8 10

144

144

153

149

137

57

127.3

24 170

● Panel cutout

138 $^{+1}_{0}$

138 $^{+1}_{0}$

● Minimum clearance for plural installation

200

200

Unit: mm