

Chart Recorders **SBR-EY/EM series**



SBR-EY series **SBR-EM series**



SBR-EY series



SBR-EM series

General Description

<SBR-EY100/180>

The chart recorder SBR-EY series covers a wide range of specifications with 13 models of 144 x 144mm DIN size SBR-EY100 series (1-pen, 2-pen, 3-pen, 4-pen, and 6 dot-matrix) and 288 x 288mm DIN size SBR-EY180 series (1-pen, 2-pen, 3-pen, 4-pen, 6 dot-matrix, 12 dot-matrix, 18 dot-matrix, and 24 dot-matrix).

The SBR-EY series offers universal input (voltage, thermocouple, RTD, and contact input) and versatile optional functions such as serial communication, mathematical computations, IC memory card slot, alarms, remote control.

<SBR-EM100/180>

The SBR-EM series is easy-to-use recorders with high reliability and accuracy. Analog scale plate for each channel is standard equipment. Input ranges and units on the scale plate are configured at the factory so that you can use it by simply powering up.

Features

< SBR-EY100/180 >

- ☆ Universal inputs
- ☆ Interactive setup
- ☆ Brushless DC servo motor

Universal inputs

Universal inputs allows you to select input types among DC voltage (mV, V), thermocouple, RTD and contact input for operation recording, without setting DIP switches or replacing circuit cards.

In addition, interactive setup assures you easy operations.

High reliability in a compact design

Advanced contact-less technology with brushless DC servo motors and ultra-sound position transmitter has been adopted for high reliability and accuracy.

< SBR-EM100/180 >

- ☆ Simple operation
- ☆ Compact and reliable
- ☆ No set-up configuration at field

Simplified operation

Input ranges are pre-configured to save time and eliminate initial set up.

Just power up and start recording.

Choice of recording styles

Both the SBR-EM100 and SBR-EM180 have four-pen models to handle a wide range of applications.

Dot-matrix printing provides high quality analog recording.

SBR-EM100 : 6 points in 10 seconds.

SBR-EM180 : 24 points in 30 seconds.

Chart Recorders SBR-EY/EM series

Specifications

Inputs

<Common to SBR-EY/EM series>

Number of measured points

1, 2, 3, 4 (pens) or 6, 12, 18 and 24 (dots) points
(12, 18, 24 points are only for SBR-EY180, SBR-EM180)

Input signals

DC voltage ($\pm 20\text{mV}$ to $\pm 20\text{V}$ range)
TC (Thermocouple)
RTD (Resistance temperature detector)
DC current (Adding external shunt resistance [10 Ω , 100 Ω and 250 Ω])
• Contact or Voltage input (TTL level) for SBR-EY series

• Refer to measuring range code table (P.5) for input signals, measuring range and measuring range limits.

Measuring and recording accuracy

Measuring accuracy : $\pm(0.1\%$ of reading + 2 digits) at 2V range
Recording accuracy : Measured accuracy $\pm(0.3\%$ of recording span)

Reference junction compensation accuracy (more than 0°C)

Type R, S, B, W5Re/W26Re : $\pm 1^\circ\text{C}$
Type K, J, E, T, N, PLII, L, U : $\pm 0.5^\circ\text{C}$
• PLII is only referred to dot model of SBR-EY series

Measuring interval

Pen models : 125msec./channel
Dot models : 2.5sec./24 channels (SBR-EY series)
10sec./24 channels (SBR-EM series)

Input resistance

2V DC or lower and TC ranges : More than 10M Ω
6 to 20V DC ranges : Approx. 1M Ω

Maximum input voltage

2V DC or lower and TC ranges : $\pm 10\text{V}$ DC (continuous)
6 to 20V DC ranges : $\pm 30\text{V}$ DC (continuous)

Common mode rejection ratio

120dB (50/60 Hz $\pm 0.1\%$, 500 Ω imbalance between minus and ground)

Normal mode rejection ratio

40dB (50/60Hz $\pm 0.1\%$)

<Only for SBR-EY series>

Thermocouple burnout detection

Available for TC ranges (ON/OFF selectable for each channel)

Filter function

Pen models : Signal damping (can be turned ON/OFF for each channel)
Dot models : Moving average (can be turned ON/OFF for each channel)

<Only for SBR-EM series>

Dot model with measuring range of more than one.

Range code	Measuring range
62	Two measuring ranges for DC V
63	Three measuring ranges for DC V
64	Four measuring ranges for DC V
72	Two measuring ranges for DC V or TC
73	Three measuring ranges for DC V or TC
74	Four measuring ranges for DC V or TC
82	Two measuring ranges for DC V, TC or RTD
83	Three measuring ranges for DC V, TC or RTD
84	Four measuring ranges for DC V, TC or RTD

• Input signals to dot models are switched by a high voltage resistant semiconductor relay.

Recording

<Common to SBR-EY/EM series>

Recording system

Pen-recording : Disposable felt pens for analog recording, plotter pens for digital recording.
Dot-recording : 6-color dot recording.

Recording paper

Total length of Z-fold chart : 16m (SBR-EY100, SBR-EM100)
20m (SBR-EY180, SBR-EM180)
Effective analog recording width : 100mm (SBR-EY100, SBR-EM100)
180mm (SBR-EY180, SBR-EM180)

Step response time (Pen model)

1sec. or max. / IEC TC85 (SBR-EY100, SBR-EM100)
1.5sec. or max. / IEC TC85 (SBR-EY180, SBR-EM180)

Recording colors

Pen-recording : 1st pen, red ; 2nd pen, green ; 3rd pen, blue ; 4th pen, violet ; plotter, purple

Recording colors

Dot-recording : CH 1, 7, 13, 19 purple
CH 2, 8, 14, 20 red
CH 3, 9, 15, 21 green
CH 4, 10, 16, 22 blue
CH 5, 11, 17, 23 brown
CH 6, 12, 18, 24 black

(Colors can be assigned for each channel) CH 7 to 24 is only for SBR-EY180, SBR-EM180 (Each channel can be programmed for a separate color with the SBR-EY series)

Deadband (Pen model)

Programmable up to 0.2% of the recording span.

Analog recording cycle

Pen model : Continuous
Dot model : 6 dots/10 sec. (Maximum)
12 dots/15 sec. (Maximum)
18 dots/20 sec. (Maximum)
24 dots/30 sec. (Maximum)

Periodic printout

Engineering units (up to 6 alphanumeric characters)
Tag numbers (up to 7 alphanumeric characters)
Scale marking (0/100%) the measured data printout.

List printout

Printout of range and alarm settings and other parameters.

Manual printout

Provides a digital printout of measured results.

<Only for SBR-EY series>

Chart speed

Pen model : 5 to 12,000mm/h (82 steps)
Dot model : 1 to 15,000mm/h (1mm steps)

Message printout : 5 messages, 16 characters

<Only for SBR-EM series>

Chart speed

Pen model : 10 to 12,000mm/h (40 steps)
Dot model : 10 to 1,500mm/h (28 steps)

Display

<Only for SBR-EY series>

Display and status indicators

Measured data (channel number or tag name, alarm type, measured value, engineering units) and time.

Bar graph display

Measured value : (1% resolution) Left-referenced or center-zero bar graph display (individually selectable for each channel).
Alarm : Indicates alarm setting or occurred point.

Alarm display : Displays alarm setting and alarm channel number (dot model)

Display type : Vacuum Fluorescent Display (VFD) 5 x 7 dot matrix

<Only for SBR-EM series>

Display type : LED (7 segments, 2 digits)

Displayed information

Depending on status, the following information can be displayed :
Record number (Channel display for dot model), alarms, end-of-paper alarm and battery end-of-life alarm.

Scale plate

Specified graduation
Black character, line and symbol with white background.

Computing function

<Only for SBR-EY series>

Liner scaling

Available input for scaling : DC Voltage, TC, RTD
Available range for scaling : -20,000 to 20,000
Data display / printout range : -19,999 to 20,000
Decimal point position : User - definable
Engineering units : User - definable (6 characters maximum)

Inter channel difference (ΔT)

Between optional two channels (At Reference CH < Measuring CH)
Range ; DC Voltage, TC, RTD

Square root extraction

Available for DC Voltage range.
Scaling limit : -20,000 to 20,000
Data display / printout range : -19,999 to 20,000
Decimal point position : User - definable

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<Only for SBR-EM series>

Fixed liner scaling (Specify when ordering)

Fixed square root extraction (Specify when ordering)

Available for DC Voltage range.

Scaling limit : -20,000 to 20,000

Data display / printout range : -19,999 to 20,000

Decimal point position : Fixed decimal position
(Specify when ordering)

Unit symbol : User - definable (Up to 6 characters)

Alarms

<Common to SBR-EY/EM series>

Number of alarm levels

Four levels per channel

Alarm recording

Prints channel number, alarm type, and ON or OFF time on the right side of a chart.

Alarm relay contact output (Optional function)

2, 4, 6 points (SBR-EY100, SBR-EM100)

2, 4, 6, 12, 24 points (SBR-EY180, SBR-EM180)

<Only for SBR-EY series>

Alarm type

High, Low, High rate of change, Low rate of change, Delta High, and Delta Low

Alarm indicators

Common alarm indicator flashes. For a dot-printing model, individual channel alarm status is also displayed.

<Only for SBR-EM series>

Alarm type

High, Low

Alarm indicators

Common alarm indicator flashes in digital display

Construction / power source

<Common to SBR-EY/EM series>

Power source

Rated power voltage : 100 to 240V AC

Usable power voltage ranges : 90 to 132V AC, 180 to 250V AC

Rated power frequency : 50/60 Hz

<Only for SBR-EY series>

Power consumption

		100V AC power supply (Approx.)	240V AC power supply (Approx.)	Max. (Approx.)
SBR-EY100	4pen	18VA	25VA	70VA
	6dots	18VA	26VA	50VA
SBR-EY180	4pen	29VA	32VA	70VA
	Dot model	32VA	33VA	55VA

Weight : approx.

SBR-EY100 : 1-pen, 3.2kg ; 4-pen, 3.8kg ; 6-dot, 3.5kg

SBR-EY180 : 4-pen, 9.4kg ; 6-dot, 9.1kg ; 24-dot, 9.6kg

<Only for SBR-EM series>

Power consumption

		100V AC power supply (Approx.)	240V AC power supply (Approx.)	Max. (Approx.)
SBR-EM100	4pen	18VA	25VA	70VA
	6dots	18VA	26VA	50VA
SBR-EM180	4pen	30VA	40VA	70VA
	Dot model	29VA	39VA	70VA

Weight : approx.

SBR-EM100 : 1-pen, 3.1kg ; 4-pen, 3.7kg ; 6-dot, 3.4kg

SBR-EM180 : 4-pen, 9.2kg ; 6-dot, 8.9kg ; 24-dot, 9.4kg

General specifications

<Common to SBR-EY/EM series>

Ambient temperature and humidity
0 to 50°C, 20 to 80%RH (at 5 to 40°C)

Input source external resistance

DC voltage : TC input : 2kΩ max.

RTD input : 10W max. each line

Insulation resistance

Between terminals and ground : 20MΩ or more (at 500V DC)

Dielectric strength

1000V AC for one minute between measured terminals and ground

1000V AC for one minute between contact output terminals and ground

1500V AC for one minute between power terminals and ground

• Between each input terminals (between measuring channels) ; 1,000V AC (50/60Hz) for one minute (Except RTD input dot printing model as the "b" terminal is common.)

Memory backup

Lithium battery to protect setup parameters.

Life : approx. 10 years (at 23°C ±2°C, 55% ±10%RH, for standard model)

Standard accessories

One Z-fold chart paper, one 6-color ribbon (dot model), one of each color of disposable pens and plotter pen (pen model), time-lag fuse, two mounting brackets, two keys (for key lock), one instruction manual

Optional functions

<Common to SBR-EY/EM series>

Alarm relay contact output (/A1, /A2, /A3, /A4, /A5)

Number of output points : 2, 4, 6, 12 or 24 points

Contact capacity : 250V DC 0.1A, 250V AC 3A (Resistive load)

Digital communications (/C3)

Conforms to EIA RS-422A

Asynchronous method : Start - stop synchronization

Wiring 4 wires

Data length : 7 or 8 bits

Stop bit : 1 or 2 bits

Parity bit : Without, Odd or Even

Baud rate : 75, 150, 300, 600, 1200, 2400, 4800, 9600 BPS

FAIL/chart end detection, output (/F1)

Clamped input terminals (/H2)

Non-reflective glass door (/H3)

Remote control (/R1)

Input signal : TTL, open collector contact input

Signal pulse width : More than 1 second

<Only for SBR-EY series>

IC memory card slot (/E1) : Read/write setup parameters.

IC memory card slot (/E2) : Read/write setup, measurement data.

Mathematical function (/M1)

(General computation) Arithmetical operations, SQR (square root), ABS (absolute value), LOG (logarithm), EXP (exponent), relational and logical operations and statistical computations.

3-Leg Isolated RTD input (/N2)

Provides input circuitry in which all RTD input terminals ("A", "B" and "b") for each channel are isolated with each other.

Remote control (/R1)

Recording start/stop, chart speed change, message printout start (up to five), manual printout start, statistical computation start/stop (with /M1 option), and periodic printout start, start saving of measured data to IC memory card (with /E2 option).

<Only for SBR-EM series>

Thermocouple burnout protection : Up scale (/B1), down scale (/B2)

Opening circuit of input causes the indication scale goes up to 100% (/B1) or down to 0% (/B2).

Pen offset compensation (/D1)

Eliminates the in-time phase offset between pens.

Remote control (/R1)

Recording start/stop level

Chart speed change level

Manual printout start trigger

24V DC power supply (/P1)

Rated power voltage : 24V DC

Usable power voltage ranges : 21.6 to 26.4V DC

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Model and Suffix Code

■ For SBR-EY Series

Specifications	Model and Suffix Code	
Model	SBR-EY10 SBR-EY18	<input type="checkbox"/> <input type="checkbox"/>
SBR-EY10	1-pen recorder 2-pen recorder 3-pen recorder 4-pen recorder 6-dot recorder	1 2 3 4 6
SBR-EY18	1-pen recorder 2-pen recorder 3-pen recorder 4-pen recorder 6-dot recorder 12-dot recorder 18-dot recorder 24-dot recorder	1 2 3 4 6 7 8 9
Options	Alarm output relay 2 points *1 4 points *1 6 points *1 12 points *1, *2 24 points *1, *2 Digital communications (RS-422A) FAIL/chart end detection and output *4, *5 24V DC power supply Remote control IC memory card slot *3 (Memory and readout of setup parameters) IC memory card slot *3 (Memory and readout of setup parameters and measured data) Mathematical function 3-leg isolated RTD input (Dot model only) *6 Non-reflective door glass Clamped input terminal *6	/A1 /A2 /A3 /A4 /A5 /C3 /F1 /P1 /R1 /E1 /E2 /M1 /N2 /H3 /H2

*1 : /A1, /A2, /A3, /A4, /A5 cannot be specified together.

*2 : /A5 is for 12, 18, 24 dot model.

*3 : IC memory card is sold separately.

*4 : For SBR-EY180, /F1 and /A5 cannot be specified together.

*5 : If /F1 is selected for SBR-EY100, alarm relay contact output can be specified up to 4 points (/A1 or /A2).

*6 : /N2 and /H2 cannot be specified together.

- Sample of model and suffix code with more than 2 options ; SBR-EY104/A2/C3/E1.....

Chart Recorders SBR-EY/EM series

■ For SBR-EM Series

Specifications	Model and Suffix Code				
Model	SBR-EM10 SBR-EM18	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SBR-EM10	1-pen recorder	1			
	2-pen recorder	2			
	3-pen recorder	3			
	4-pen recorder	4			
	6-dot recorder	6			
SBR-EM18	1-pen recorder	1			
	2-pen recorder	2			
	3-pen recorder	3			
	4-pen recorder	4			
	6-dot recorder	6			
	12-dot recorder	7			
	18-dot recorder	8			
24-dot recorder	9				
Input of 1st pen(for pen model)	See "Measuring range code table" (00 to 44)	<input type="checkbox"/>			
Input of dot printing model	See "Measuring range code table" (00 to 84)	<input type="checkbox"/>			
2nd pen input 2-, 3- or 4-pen model	See "Measuring range code table" (00 to 44)		<input type="checkbox"/>		
3rd pen input 3- or 4-pen recorder	See "Measuring range code table" (00 to 44)			<input type="checkbox"/>	
4th pen input of 4-pen recorder	See "Measuring range code table" (00 to 44)				<input type="checkbox"/>
Options	Alarm output relay 2 points *1				/A1
	4 points *1				/A2
	6 points *1				/A3
	12 points *1, *2				/A4
	24 points *1, *2				/A5
	TC burnout protection (Up-scale)				/B1
	TC burnout protection (Down-scale)				/B2
	Digital communications (RS-422A)				/C3
	Pen offset compensation *3				/D1
	FAIL/chart-end detection/output				/F1
	Clamped input terminals				/H2
	Non-reflective glass door				/H3
	24V DC power supply				/P1
Remote control				/R1	
Single scale and double marking for dot printing recorder				/SC12	
Single scale and triple marking for dot printing recorder				/SC13	
Double scale and double marking for dot printing recorder				/SC22	
Double scale and triple marking for dot printing recorder				/SC23	
Triple scale and triple marking for dot printing recorder				/SC33	

*1 : /A1, /A2, /A3, /A4, /A5 cannot be specified together.

*2 : /A4 and /A5 can only be specified for SBR-EM180

/A5 is for 12, 18, 24 dot model.

*3 : /A3 or /A5 and /F1 cannot be specified together.

• Sample of model and suffix code with more than 2 options ; EM102-13-13/A2/D1

Ordering information

1. Model and suffix code

2. Option code

3. Recording span in each channel

4. When 6*, 7* or 8* is specified for the range code of a dot recorder :

For 62, 72 or 82 - specify the two range codes, the recording spans and corresponding channel numbers.

For 63, 73 or 83 - specify the three range codes, the recording spans and corresponding channel numbers.

For 64, 74 or 84 - specify the four range codes, the recording spans and corresponding channel numbers.

5. When a scaling range (range code : 30 to 34 and 40 to 44) is required, specify the scaling range value (numeric value only) and unit.

In case the scaling range is required within the specified range code of 6□, 7□, 8□, specify also the scaling value (s) and unit (s) in the same way.

6. Scale and unit of the scale plate.

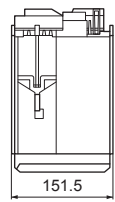
■ Measuring range code table

Input	Range	SBR-EM Range code			Measuring range
		DC Voltage	Linear scaling	Square root extracting	
DC voltage	20mV	00	30	40	-20.00 - 20.00mV
	60mV	—	—	—	-60.00 - 60.00mV
	200mV	01	31	41	-200.0 - 200.0mV
	2V	02	32	42	-2.000 - 2.000V
	6V	03	33	43	-6.000 - 6.000V
	20V	04	34	44	-20.00 - 20.00V
Thermocouple	R		10		0 - 1760°C
	S		11		0 - 1760°C
	B		12		0 - 1820°C
	K		13		-200 - 1370°C
	E		14		-200 - 800°C
	J		15		-200 - 1100°C
	T		16		-200 - 400°C
	N		17		0 - 1300°C
	W		18		0 - 2315°C
	L		19		-200 - 900°C
	U		1A		-200 - 400°C
RTD	PLII		1C		0 - 1390°C
	JPt100		20		-200 - 550°C
	Pt100		21		-200 - 600°C
Recording of operation	DI 1 Voltage input				OFF : Under 2.4V
	DI 2 Contact input				ON : Over 2.4V Contact ON / OFF

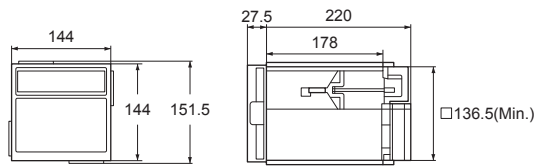
Chart Recorders **SBR-EY/EM series**

External Dimensions and Rear Terminals

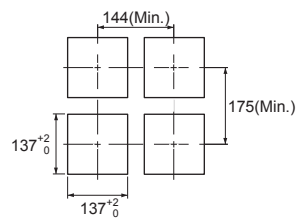
SBR-EY/EM100



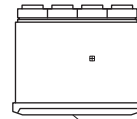
Unit : mm
 Acceptable thickness of panel board :
 2 ~ 26mm
 Mounting angle :
 Up to 30° backward from vertical
 Right and left angle must be horizontal.



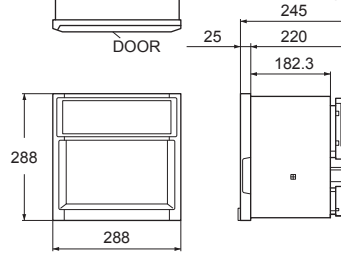
Panel cutout



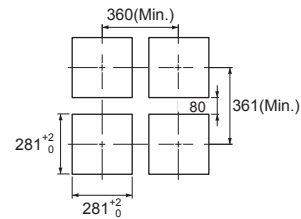
SBR-EY/EM180



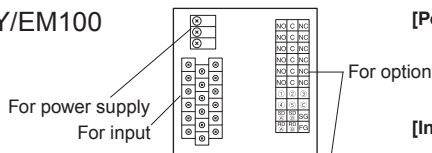
Unit : mm
 Acceptable thickness of panel board :
 2 ~ 26mm
 Mounting angle :
 Up to 30° backward from vertical
 Right and left angle must be horizontal.



Panel cutout



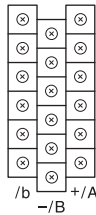
SBR-EY/EM100



[Power supply terminals]

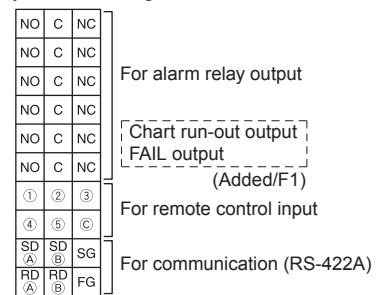


[Input terminals]

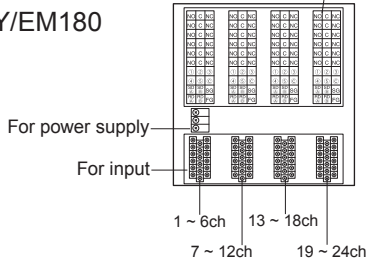


	Pen model	Dot model
1 ch	1	7
2 ch	2	8
3 ch	3	9
4 ch	4	10
	5	11
	6	12
		13
		14
		15
		16
		17
		18
		19 ch
		20 ch
		21 ch
		22 ch
		23 ch
		24 ch

[Option terminals]



SBR-EY/EM180



* Please be minded that the arrangement of clamped type terminal is different

* Number of terminals varies according to the additional functions.