SBR-EW series

General Description

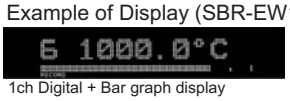
The chart recorder SBR-EW series covers a wide range of specifications with 13 models of 144 x 144mm DIN size SBR-EW100 series (1- pen, 2-pen, 3-pen, 4-pen, 6 dot-matrix and 12 dot-matrix) and 288 x 288mm DIN size SBR-EY180 series (1-pen, 2-pen, 3-pen, 4-pen, 6 dot-matrix, 12 dot-matrix, 18 dot-matrix, 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.

Features

- ☆ Universal inputs
- ☆ Interactive setup
- ☆ Digital contact inputs
- ☆ Long Life & High Speed Scanning

Multi-Display (Displays a Variety of Screens)

80 kinds of display patterns are prepared.
Example of Display (SBR-EW100)



1ch Digital + Bar graph display

1ch Digital + Date display

1ch Digital display

2ch Digital + Bar graph display

6ch Digital display

Flag display

Digital Input/Output status display

Alarm display

Navigational display Makes Setup a Snap

The instrument features a simple configuration, with Operation mode for normal use, and Setting mode for use during setup.
In Operation mode, measured values, time, and alarms are updated, and lists are printed. In Setting mode, you can enter measuring ranges, alarm values, and other parameters. Also, Setting mode offers a navigational display that eases entry of settings.

Scroll display

Bright Internal Illumination

By using a high intensity white LED and light diffusing rod for the internal illumination, the visibility of the chart section has been greatly increased.

Chart Ejection Function

The chart cassette is equipped with a chart ejection function.
You can write memos on the chart and check the historical trend during recording.

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.

Digital Communication (Optional)

The SBR-EW series offers an optional RS-422A/RS-485 communications interface for networking to computers, PLCs and SCADA softwares.

Digital Contact Input (Optional)

The contact input can be selected to Recording STOP/RUN, Chart speed change, Message printout start, Manual printout start, Alarm interlock reset, Time set, Math start/stop, Math reset. (Up to 5 points)

Light Weight

High integrated circuit and the new servo unit achieve high efficiencies and low heat emissions in all of the 1-, 2-, 3-, and 4-pen and 6-dot models while simultaneously limiting the weight to approximately 2.5 kg (SBR-EW100 6-dot model), and approximately 2.4 kg (SBR-EW100 4-pen model).

Select of Recording Style

SBR-EW100 (Chart width100mm)	SBR-EW100 (Chart width100mm)
1-pen recorder	1-pen recorder
2-pen recorder	2-pen recorder
3-pen recorder	3-pen recorder
4-pen recorder	4-pen recorder
6 dot-matrix recorder	6 dot-matrix recorder
	12 dot-matrix recorder
	18 dot-matrix recorder
	24 dot-matrix recorder

Specifications

Inputs

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-EW180)

Input signals
DC voltage : 20/60/200mV, 2/6/20/50V, 1 to 5VDC
TC (Thermocouple) : R, S, B, K, E, J, T, N, W5Re/W26Re, W3Re/W25Re, L, U
RTD (Resistance temperature detector) : Pt100, JPt100
DC current (Using external shunt resistor)
DI : Digital input (Contact or DC Voltage, TTL level)
• Refer to measuring range code table (P.5) for input signals, measuring range and measuring range limits.

Measurement range/accuracy: Refer to following table

Recording accuracy
Measurement accuracy : ±(0.3% of recording span)
* Recording span : SBR-EW100 :100mm
SBR-EW180 :180mm

Reference junction compensation accuracy (more than 0°C)
Type R, S, B, W5Re/W26Re, W3Re/W25Re : ±1°C
Type K, J, E, T, N, L, U : ±0.5°C

Measuring interval
Pen models : 0.125sec/channel
Dot models : 1sec/6dot or 2.5sec/12 to 24dot

Input resistance
10M or more (TC, 20mV, 60mV, 200mV range)
Approx. 1MΩ (2V range or more)

Burnout
Available on TC and DCV (1 to 5V) range
• ON/OFF selectable (per channel)
• Up scale / Down scale selectable
• 1-5V Burnout: less than 0.2V

Filter
Pen model: Signal damping
• ON/OFF selectable (per channel)
Time constant (2,5,10sec)
Dot model: Moving average
• ON/OFF selectable (per channel)
Moving average cycle (2 to 16)

Computation
Differential computation, Linear scaling, Square root, Bias addition

Maximum input voltage
200mVDC ranges or less and TC, RTD, DI ranges : ±10VDC (continuous)
2VDC or more : ±60VDC (continuous)

Common mode rejection ratio
120dB (50/60 Hz ±0.1%, 500Ω imbalance between minus and ground)

Normal mode rejection ratio
40dB (50/60Hz ±0.1%)

Recording

Recording system
Pen-recording : Disposable felt pens, plotter pens
Dot-recording : 6-color wire dot

Recording paper
Total length of Z-fold chart : 16m (SBR-EW100)
20m (SBR-EW180)
Effective analog recording width : 100mm (SBR-EW100)
180mm (SBR-EW180)

Step response time (Pen model)
1sec. or max. / IEC TC85 (SBR-EW100)
1. 5sec. or max. / IEC TC85 (SBR-EW180)

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

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)

Chart speed
Pen model : 5 to 12000mm/h (82 increments)
Dot model : 1 to 1500mm/h (1mm step)

Chart speed change
Speed 1, speed 2 change by remote control signals (option)

Chart Speed Accuracy:
Within ±0.1% (for recordings longer than 1000mm, related to the grid of the chart paper)

Recording format
1. Analog recording :
Analog recording ON/OFF selectable for each channel of dot model
Zone recording : Span: 5mm or more (1mm step)
Partial expanded recording: Boundary position: 1 to 99%
Boundary value: Within recording span
2. Digital printout:
Channel (dot model only):
Channel number or TAG will be printed during analog recording.
Approx. every 25mm this print will occur.
ON / OFF selectable (common for all channels)
Alarm:
At the right side of the chart, CH. No. or TAG, Type of alarm, (date/time) of alarm ON / OFF will be printed. Time of alarm ON / OFF, time of alarm ON, OFF selectable (common for all channels).
Periodic printout contents:
Date (mm/dd/yy), time(hh:mm), measurement data of each channel, scale printout, recording color, chart speed
Message printout :
With panel key or remote control option, up to 5 messages can be printed. Contents: Date/time and message (up to 16 characters).
Record start time:
Date/time will be printed when recording starts, ON / OFF selectable.
Chart speed printout:
Date/time when chart speed is changed will be printed, ON / OFF selectable.
List printout:
Listings of range and alarm setting, etc. will be printed.
Manual printout:
With panel key or remote control option, measuring value will be printed.
SET UP List printout:
Listings of settings in SET UP Mode will be printed.

Display

Display method :
SBR-EW100: VFD 101 x 16 dot matrix
SBR-EW180: VFD 181 x 16 dot matrix

Display contents :
Digital display (Channel No. Measured value, Alarm type, Bar graph, Flag display, DI/DO display, Alarm status, Date/Time display, Chart speed display, Status display, System display
• 15 display types can be selected from approx. 80 display types.

Status display:
Recording in progress (RECORD), Shared alarm display (ALARM)
Alarm occurrence No. display,
Chart end indicator (CHART END) (Option /F1)
Computation in progress(MATH) (Option /M1)
Key lock display (KEY LOCK)

Setting
Settings display by interactive mode.In setting, navigator method is used.

Display update of measured values
When displayed channels are fixed
Dot model: Updated at the scan interval
Pen model: Updated every 2 s
When displayed channels are automatically switched
Switches the channel and measured values at 1, 2, 3, 4, or 5 second intervals.

Display brightness setting
Display brightness level: 1 to 8

Alarms

Number of alarm levels
Four levels per channel

Alarm types:
High and low, limits, differential high and low limits, high and low rate-of-change limits and delay high and low
Alarm delay time: 1 to 3600s
Interval time of rate-of-change alarms:
The measurement interval times 1 to 15

Display:
Alarm value is indicated as a point on the bar graph.
In occurring an alarm:
On bar graph display, a point indicator is flashing.
On digital display, an alarm type indicator is shown.
A channel number of occurring alarm is displayed.
Flashing on bar-graph

Hysteresis:
0.0 to 1.0% (0.1% step) of recording span
(only High, Low alarm, common for all channels and all levels).

General specifications

Clock:
With calendar function
Clock Accuracy : 100 ppm, however not including error due to turning ON / OFF power

Panel Key Lock:
Protection by password

Internal illumination:
White LED

Memory backup
Lithium battery to protect setup parameters.
Life : approx. 10 years (at 23°C ±2°C, 55% ±10%RH, for standard model)

Ambient temperature and humidity
0 to 50°C, 20 to 80%RH

Operating Position:
Frontwards: 0° Backwards: Within 30° from horizontalInput

source external resistance
DC voltage : TC input : 2kΩ max.
RTD input : 10Ω 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
1500V 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.)

Construction / power source

Power source
Rated power voltage : 100 to 240V AC
Usable power voltage ranges : 90 to 132V AC, 180 to 264V AC
Rated power frequency : 50/60 Hz

Power consumption

		100V AC power supply (Approx.)	240V AC power supply (Approx.)	Max. (Approx.)
SBR-EW100	Pen model	12VA	17VA	40VA
	Dot model	13VA	18VA	40VA
SBR-EW180	Pen model	17VA	25VA	55VA
	Dot model	17VA	23VA	55VA

Weight : approx.
SBR-EW100 : 1-pen, 2.1kg ; 4-pen, 2.4kg ; 6-dot, 2.5kg
SBR-EW180 : 4-pen, 7.6kg ; 6-dot, 8.4kg ; 24-dot, 9.0kg

Optional functions

Alarm relay contact output (/A1, /A2, /A3, /A4, /A5)
Number of output points : SBR-EW100 : 2, 4, or 6 points
SBR-EW180 : 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/485
Asynchronous method : Start - stop synchronization
4-wire half-duplex multi-drop connection
Data bit : 7 or 8 bits
Stop bit : 1 bit
Parity bit : Without, Odd or Even
Communication speed : 1200, 2400, 4800, 9600, 19200, 38400bps

Remote Control (/ R1)
5 type are selectable from the below mentioned remote controls.
Recording start / stop, Chart speed change, Message printout start, Manual printout start, Alarm ACK, Time adjustment (Adjusting the time to a preset time), Computation start / stop, Computation reset

Computation function (/M1)
Arithmetic operation, Square, Absolute, Common logarithm, Exponential, Power, Relational operator, Logic
Statistical computation : Statistical type : MAX, MIN, AVE, SUM, MAX-MIN

FAIL/chart end detection, output (/F1)
If an error in the CPU board occurs, or when the chart reaches its end, output relay on the rear terminal will be activated. Besides, when the chart reaches its end, CHART END indicator will be shown on the display.
Relay contact rating : DC 250V / 0.1A, AC 250V / 3A
Chart end: Energized, FAIL: Deenergized

3-Wire Isolated RTD input (/N2)
A, B, b wires are isolated input type
• Only Dot Models (Pen Models : Standard function)

Other Functions
Clamped input terminals (/H2)
Non-reflective glass door (/H3)

Measurement range/accuracy

Input		Range	Measurement Accuracy	Max. Resolution
DC V	20mV	-20.00 to +20.00mV	±(0.1% of reading + 2 digits)	10µV
	60mV	-60.00 to +60.00mV		10µV
	200mV	-200.0 to +200.0mV		100µV
	2V	-2.000 to +2.000V		1mV
	6V	-6.000 to +6.000V		1mV
	20V	-20.00 to +20.00V		10mV
	50V	-50.00 to +50.00V	±(0.1% of reading + 3 digits)	10mV
	1 to 5V	1.000 to 5.000V	±(0.1% of reading + 2 digits)	1mV
TC (Thermocouple) • excluding the accuracy of reference junction compensation	R	0.0 to 1760.0°C	±(0.15% of reading+1°C) R, S : 0 to 100°C ±3.7°C 100 to 300°C ±1.5°C B : 400 to 600°C ±2°C Less than 400°C : Not guaranteed	0.1°C
	S	0.0 to 1760.0°C		
	B	0.0 to 1820.0°C		
	K	-200.0 to +1370.0°C	±(0.15% of reading+0.7°C) * -200 to -100°C: ±(0.15% of reading+1°C)	
	E	-200.0 to +800.0°C	±(0.15% of reading+0.5°C)	
	J	-200.0 to +1100.0°C	±(0.15% of reading+0.5°C) J : -200 to -100°C: ±(0.15% of reading+0.7°C)	
	T	-200.0 to +400.0°C		
	N	0.0 to 1300.0°C	±(0.15% of reading+0.7°C)	
	W (W5Re/W26Re)	0.0 to 2315.0°C	±(0.15% of reading+1°C)	
	L	-200.0 to +900.0°C	±(0.15% of reading+0.5°C) L : -200 to -100°C: ±(0.15% of reading+0.7°C)	
	U	-200.0 to +400.0°C		
	WRe (W3Re/W25Re)	0.0 to 2400.0°C	±(0.2% of reading+1.0°C)	
RTD	Pt100	-200.0 to +600.0°C	±(0.15% of reading+0.3°C)	0.1°C
	JPt100	-200.0 to +550.0°C		

Reference junction compensation accuracy
Type R, S, B, W, WRe: ±1.0°C, Type K, J, E, T, N, L, U : ±0.5°C
Maximum input voltage
±10 VDC (continuous) for ranges of 200 mV or less, TC, RTD, and DI ranges
±60 VDC (continuous) for 2 VDC or higher ranges
Input resistance
Approximately 10MΩ or more for ranges of 200 mV or less and TC
Approximately 1 MΩ for 2 VDC or higher ranges
Input source resistance
Volt, TC: 2 kΩ or less
RTD input: 10Ω or less per wire (The resistance of all three wires must be equal).

Expansion Inputs

Input		Range	Measurement Accuracy	Max. Resolution
TC (Thermocouple) • excluding the accuracy of reference junction compensation	PR40-20	0.0 to +1900.0°C	0 to 450°C : Not guaranteed 450 to 750°C : ±(0.9% of reading +3.2°C) 750 to 1100°C : ±(0.9% of reading +1.3°C) 1100 to 1900°C: ±(0.9% of reading +0.4°C)	0.1°C
	PLII *1	0.0 to +1400.0°C	±(0.25% of reading + 2.3°C)	
	NiNiMo	0.0 to +1310.0°C	±(0.25% of reading + 0.7°C)	
	W/WRe26	0.0 to +2400.0°C	0 to 400°C: ±15.0°C 400 to 2400°C : ±(0.2% of reading+2.0°C)	
	Type N(AWG14)	0.0 to +1300.0°C	±(0.2% of reading + 1.3°C)	
	Kp vs Au7Fe	0.0 to +300.0K	0 to 20K : ±4.5K 20 to 300K : ±2.5K	0.1K
	Pt25	-200.0 to +550.0°C	±(0.15% of reading+0.6°C)	0.1°C
	Pt50	-200.0 to +600.0°C	±(0.3% of reading+0.6°C)	
	Ni100(SAMA)	-200.0 to +250.0°C	±(0.15% of reading+0.4°C)	
	Ni100(DIN)	-60.0 to +180.0°C		
	Ni120	-70.0 to +200.0°C		
	J263*B	0.0 to 300.0K	0 to 40K : ±3.0K 40 to 300K : ±1.0K	0.1K
RTD	Cu53	-50.0 to +150.0°C	±(0.15% of reading+0.8°C)	0.1°C
	Cu100	-50.0 to +150.0°C	±(0.2% of reading+1.0°C)	

*1: PR40-20 : No reference junction compensation (0°C fix)

Model and Suffix Code

Specifications	Model and Suffix Code			
Model	SBR-EW10 SBR-EW18	□	□	□
SBR-EW10	1-pen recorder 2-pen recorder 3-pen recorder 4-pen recorder 6-dot recorder	1 2 3 4 6		
SBR-EW18	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		
Language	Japanese English & deg F / DST		-1 -2	
Options	Alarm output relay 2 points *1 4 points *1 6 points *1, *3 12 points *1, *2 24 points *1, *2, *4			/A1 /A2 /A3 /A4 /A5
	Digital communications (RS-422A/485)			/C3
	FAIL/chart end detection and output *3, *4,			/F1
	Clamped input terminal *5			/H2
	Non-reflective door glass			/H3
	Portable type, Power cable UL, CSA st'd7			/H5D
	Mathematical function			/M1
	Cu10, Cu25 RTD input			/N1
	3-leg isolated RTD input (Dot model only) *5,*6			/N2
	Expansion inputs			/N3
	Remote controls (5 contacts)			/R1

*1 : /A1, /A2, /A3, /A4, /A5 cannot be specified together.
*2 : /A4 is for SBR-EW180 series.
/A5 is for 12, 18, 24 dot model of SBR-EW180.
*3 : If /F1 is selected for SBR-EW100, alarm relay contact output can be specified up to 4 points (/A1 or /A2).
*4 : For SBR-EW180, /F1 and /A5 cannot be specified together.
*5 : /N2 and /H2 cannot be specified together.
*6 : /N2 can be specified only for dot model
• Sample of model and suffix code with more than 2 options ; SBR-EW104-2/A2/C3/M1.....

■ Standard Accessories

Name		1 pen	2 pen	3 pen	4 pen	6/12/18/24 dot
Z-fold chart		1 piece	1 piece	1 piece	1 piece	1 piece
6 color ribbon cassette		—	—	—	—	1 piece
Disposable felt-pen cartridge	Red	1 piece	1 piece	1 piece	1 piece	—
	Green	—	1 piece	1 piece	1 piece	—
	Blue	—	—	1 piece	1 piece	—
	Violet	—	—	—	1 piece	—
Plotter pen	Purple	1 piece	1 piece	1 piece	1 piece	—
Mounting brackets		2 piece	2 piece	2 piece	2 piece	2 piece

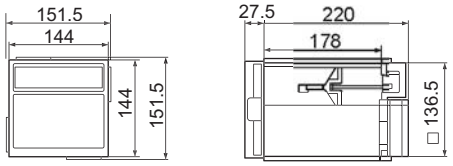
■ Separates/Optional Accessories

Name		Model code	Sales Unit	Specification
Z-fold chart for EW100		B-100EX	1	10 pieces/unit
Z-fold chart for EW180		R-100EX		
6 color ribbon cassette for EW100		B9901AX	1	1 pieces/unit
6 color ribbon cassette for EW180		B9906JA		
Disposable felt-pen cartridge	Red	B9902AM	1	3 pieces/unit
	Green	B9902AN	1	3 pieces/unit
	Blue	B9902AP	1	3 pieces/unit
	Violet	B9902AQ	1	3 pieces/unit
Plotter pen	Purple	B9902AR	1	3 pieces/unit
Mounting brackets		B9900BX	2	
Shunt resistor (for screw input terminal)		415920	1	250Ω±0.1%
		415921	1	100Ω±0.1%
		415922	1	10Ω±0.1%
Shunt resistor (for clamped input terminal)		438920	1	250Ω±0.1%
		438921	1	100Ω±0.1%
		438922	1	10Ω±0.1%

External Dimensions and Rear Terminals

SBR-EW100

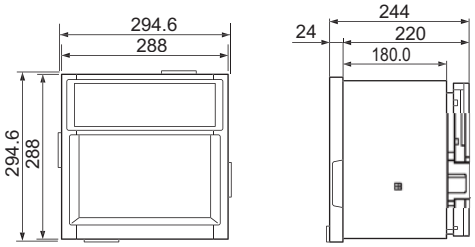
Unit:mm



Note) The SBR-EW100 should be mounted by only two brackets, either on the top & bottom of the recorder, or on the left & right side of the recorder.
If not specified, the tolerance is ±3%. However, in cases of less than 10mm, the tolerance is ±0.3mm.

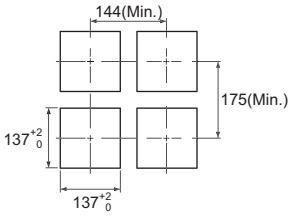
SBR-EW180

Unit:mm

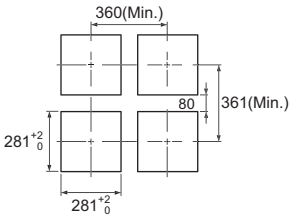


Note) The SBR-EW100 should be mounted by only two brackets, either on the top & bottom of the recorder, or on the left & right side of the recorder.
If not specified, the tolerance is ±3%. However, in cases of less than 10mm, the tolerance is ±0.3mm.

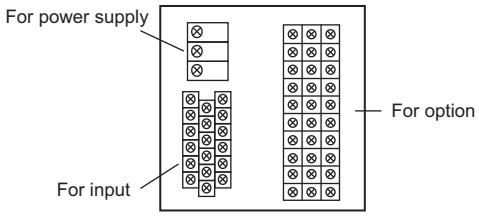
Panel cutout



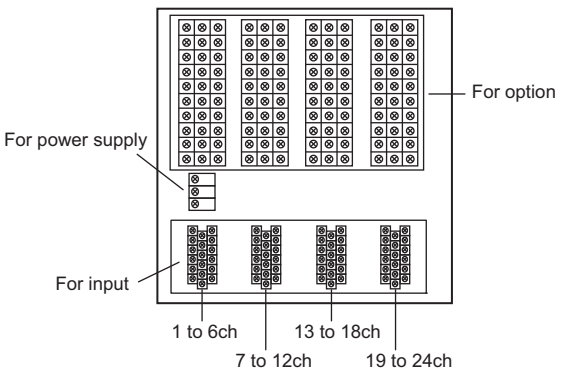
Panel cutout



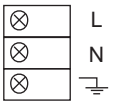
SBR-EW100



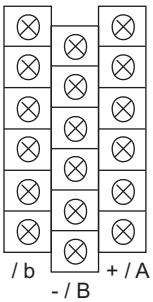
SBR-EW180



[Power supply terminals]



[Input terminals]



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

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

[Option terminals]

NO	C	NC	For alarm relay output
NO	C	NC	
NO	C	NC	
NO	C	NC	
NO	C	NC	Chart run-out output / FAIL output (Added/F1)
NO	C	NC	
1	2	3	For remote control input
4	5	C	
SD A [T(A)]	SD B [T(B)]	SG	For communication (RS-422A)
RD A [R(A)]	RD B [R(B)]	FG	

• Number of terminals varies according to the additional functions.