General Description

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.

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

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.

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 (±20mV to ±20V range)
  - TC (Thermocouple)
  - RTD (Resistance temperature detector)

- DC current (Adding external shunt resistance [10Ω, 100Ω and 250Ω] )
  - Contact or Voltage input (TTL level) for SBR-EY series
  - Refers to measuring range code table (P/5) for input signals, measuring range and measuring range limits.

- Measuring and recording accuracy
  - Measuring accuracy: ±0.5% of reading + 2 digits at 2V range
  - Recording accuracy: Measured accuracy ±0.3% of recording span

- Reference junction compensation accuracy (more than 0°C)
  - Type: R, S, B, W5Re/W26Re ±1°C

- Type K, J, E, T, N, PLII, L, U: ±0.5°C

- Type R, S, B, W5Re/W26Re: ±1°C

- **Pen models**
  - Signal damping (can be turned ON/OFF for each channel)
  - Available for TC ranges (ON/OFF selectable for each channel)

- **Thermocouple burnout detection**
  - 20dB (50/60Hz ±0.1%)
  - Normal mode rejection ratio
  - 120dB (50/60Hz ±0.1%)

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

**Only for SBR-EY series**

- 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.**

#### 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
  - Dot models: 125msec/channel

- **Dot models**: 2.5sec./24 channels (SBR-EY series)

- **Measuring interval**
  - Pen models: 10sec., 20sec., 30sec., 1min., 2min., 5min., 10min., 15min., 30min.

- **Dot models**: 2.5sec./24 channels (SBR-EY series)

- **Measuring interval**
  - Pen models: 1sec., 2sec., 4sec., 8sec., 1min., 2min., 4min., 5min., 10min., 15min., 30min.

- **Dot models**: 2.5sec./24 channels (SBR-EY series)

- **Recording colors**
  - Dot-model: 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

- **Dead band (Pen model)**
  - Programmable up to 0.2% of the recording span.

- **Analog recording cycle**
  - Pen model: Continuous
  - Dot model: 6 dots/10sec. (Maximum)
  - 12 dots/15sec. (Maximum)
  - 18 dots/20sec. (Maximum)
  - 24 dots/30sec. (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 (111 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: (±% resolution) Left referenced or center zero bar graph display (individual 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) 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**

- **Linear scaling**
  - Available input for scaling: DC Voltage, TC, RTD

- **Available range for scaling**: 0.000 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** (αT)
  - 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

- **Input signals** to dot models are switched by a high voltage resistant semiconductor relay.
### General specifications

- **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, 24mA max.
  - RTD input: 10 W max. each line
- **Insulation resistance:**
  - Between terminals and ground: 20 MΩ or more (at 500 V DC)
  - Dielectric strength:
    - 1000 V AC for one minute between measured terminals and ground
    - 1000 V AC for one minute between contact output terminals and ground
    - 1500 V AC for one minute between power terminals and ground
  - Between each input terminals (between measuring channels): 1.000 V 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)

### Optional functions

- **Alarm relay contact output (/A1, /A2, /A3, /A4, /A5)**:
  - Number of output points: 2, 4, 6, 12, 24 points (for SBR-EY180, SBR-EM180)
  - Alarm type: High, Low, High rate of change, Low rate of change, Delta High, Delta Low
- **Common alarm indicator flashes:**
  - For a dot-printing model, individual channel alarm status is also displayed.
- **Construction / power source**

#### Power source
- **Rated power voltage:** 100 to 240 V AC
- **Usable power voltage ranges:** 90 to 132 V AC, 180 to 250 V AC
- **Rated power frequency:** 50/60 Hz

### Chart Recorders SBR-EY/EM series

#### Alarms
- **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, 12, 24 points (SBR-EY180, SBR-EM180)

#### Construction / power source

### Power consumption

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

#### General specifications

#### Optional functions

#### Power source
- **Input signal:** TTL, open collector contact input
- **Signal pulse width:** More than 1 second

#### Construction / power source

#### Power consumption

#### Chart Recorders SBR-EY/EM series
## For SBR-EY Series

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Model and Suffix Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>SBR-EY10</strong></td>
</tr>
<tr>
<td>1-pen recorder</td>
<td>1</td>
</tr>
<tr>
<td>2-pen recorder</td>
<td>2</td>
</tr>
<tr>
<td>3-pen recorder</td>
<td>3</td>
</tr>
<tr>
<td>4-pen recorder</td>
<td>4</td>
</tr>
<tr>
<td>6-dot recorder</td>
<td>6</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td></td>
</tr>
<tr>
<td>Alarm output relay</td>
<td>2 points *1</td>
</tr>
<tr>
<td></td>
<td>4 points *1</td>
</tr>
<tr>
<td></td>
<td>6 points *1</td>
</tr>
<tr>
<td></td>
<td>12 points *1, *2</td>
</tr>
<tr>
<td></td>
<td>24 points *1, *2</td>
</tr>
<tr>
<td>Digital communications</td>
<td>/A1</td>
</tr>
<tr>
<td></td>
<td>/A2</td>
</tr>
<tr>
<td></td>
<td>/A3</td>
</tr>
<tr>
<td></td>
<td>/A4</td>
</tr>
<tr>
<td></td>
<td>/A5</td>
</tr>
<tr>
<td>24V DC power supply</td>
<td>/C3</td>
</tr>
<tr>
<td>Remote control</td>
<td>/P1</td>
</tr>
<tr>
<td>IC memory card slot</td>
<td>/E1</td>
</tr>
<tr>
<td></td>
<td>/E2</td>
</tr>
<tr>
<td>3-leg isolated RTD input</td>
<td>/M1</td>
</tr>
<tr>
<td>Non-reflective door glass</td>
<td>/N2</td>
</tr>
<tr>
<td>Clamped input terminal</td>
<td>/H1</td>
</tr>
<tr>
<td></td>
<td>/H2</td>
</tr>
</tbody>
</table>

*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....
For SBR-EM Series

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>SBR-EM10</th>
<th>SBR-EM18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-pen recorder</td>
<td>2-pen recorder</td>
</tr>
<tr>
<td></td>
<td>1-pen recorder</td>
<td>2-pen recorder</td>
</tr>
<tr>
<td>Input of 1st pen/pen model</td>
<td>See “Measuring range code table” (00 to 44)</td>
<td></td>
</tr>
<tr>
<td>Input of dot printing model</td>
<td>See “Measuring range code table” (00 to 44)</td>
<td></td>
</tr>
<tr>
<td>Input of 3rd pen input 3- or 4-pen recorder</td>
<td>See “Measuring range code table” (00 to 44)</td>
<td></td>
</tr>
<tr>
<td>Input of 2nd pen input 2-, 3- or 4-pen model</td>
<td>See “Measuring range code table” (00 to 44)</td>
<td></td>
</tr>
<tr>
<td>Input of 4th pen input of 4-pen recorder</td>
<td>See “Measuring range code table” (00 to 44)</td>
<td></td>
</tr>
</tbody>
</table>

.Options

- Alarm output relay 2 points *1
- 4 points *1
- 6 points *1
- 12 points *1, *2
- 24 points *1, *2
- /A1
- /A2
- /A3
- /A4
- /A5
- TC burnout protection (Up-scale) /B1
- TC burnout protection (Down-scale) /B2
- Digital communications (RS-422A) /C3
- Pen offset compensation *3 /D1
- FALL/char t-end detection/output /F1
- 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

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 40 and 40 to 44) is required, specify the scaling range value (numeric value only) and unit.
6. Scale and unit of the scale plate.

Measuring range code table

<table>
<thead>
<tr>
<th>Input</th>
<th>DC Voltage</th>
<th>SBR-EM Range code</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200mV</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>600mV</td>
<td>31</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>2V</td>
<td>32</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>6V</td>
<td>33</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>20V</td>
<td>34</td>
<td>64</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thermocouples</th>
<th>DC Voltage</th>
<th>SBR-EM Range code</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>19</td>
<td>0 – 1250°C</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>17</td>
<td>0 – 1400°C</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>15</td>
<td>0 – 1820°C</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>13</td>
<td>0 – 0°C</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>11</td>
<td>0 – 1100°C</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>12</td>
<td>0 – 1200°C</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>13</td>
<td>0 – 0°C</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>14</td>
<td>0 – 600°C</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>15</td>
<td>0 – 600°C</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RTD</th>
<th>DC Voltage</th>
<th>SBR-EM Range code</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt100</td>
<td>21</td>
<td>0 – 600°C</td>
<td></td>
</tr>
<tr>
<td>Pt1000</td>
<td>21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Recording of operation

<table>
<thead>
<tr>
<th>Input</th>
<th>DC Voltage</th>
<th>SBR-EM Range code</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>DI 1 Voltage input</td>
<td>OFF</td>
<td>Under 2.4V</td>
<td></td>
</tr>
<tr>
<td>DI 2 Contact input</td>
<td>ON</td>
<td>Over 2.4V</td>
<td></td>
</tr>
</tbody>
</table>

*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 40 and 40 to 44) is required, specify the scaling range value (numeric value only) and unit.
6. Scale and unit of the scale plate.
Chart Recorders SBR-EY/EM series

External Dimensions and Rear Terminals

**SBR-EY/EM100**
- Panel cutout: 137 x 185 x 137 (mm)
- Acceptable thickness of panel board: 2 ~ 26mm
- Mounting angle: Up to 30° backward from vertical
- Right and left angle must be horizontal.

**SBR-EY/EM180**
- Panel cutout: 281 x 252 x 288 (mm)
- Acceptable thickness of panel board: 2 ~ 26mm
- Mounting angle: Up to 30° backward from vertical
- Right and left angle must be horizontal.

**Power supply terminals**
- Pen model: 1 ~ 6ch
- Dot model: 7 ~ 12ch

**Input terminals**
- 1 ~ 6ch
- 7 ~ 12ch
- 13 ~ 18ch

**Option terminals**
- 1 ch
- 2 ch
- 3 ch
- 4 ch
- 5 ch
- 6 ch
- 7 ch
- 8 ch
- 9 ch
- 10 ch
- 11 ch
- 12 ch
- 13 ch
- 14 ch
- 15 ch
- 16 ch
- 17 ch
- 18 ch
- 19 ch
- 20 ch
- 21 ch
- 22 ch
- 23 ch
- 24 ch

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

* Number of terminals varies according to the additional functions.

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**For alarm relay output**
- FAIL output

**For remote control input**
- (Added/F1)

**For communication (RS-422A)**

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Unit: mm

SBR_01E