Key Features

- High Power with Small Size for Space Saving
- Excellent Long Term Stability
- Complete Flameproof Construction
- Controlled Temperature Capability
- Solvent Resistant Coat and Code
- Special Lead Formations Possible

Type ROX Series

The resistive element comprises a metal oxide film deposited on a ceramic former. The element is protected by a flameproof coating which will withstand overload conditions without flame or mechanical damage. They are recommended for use in applications such as line protection etc.

Characteristics – Electrical

<table>
<thead>
<tr>
<th>Type</th>
<th>Rated Power @ 70°C</th>
<th>Max. Working Voltage</th>
<th>Max. Overload Voltage</th>
<th>Dielectric Withstand Voltage</th>
<th>Resistance Range Ω</th>
<th>Operating Temp. Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROX02S</td>
<td>0.25W</td>
<td>250V</td>
<td>400V</td>
<td>250V</td>
<td>0.3 ~ 50K</td>
<td></td>
</tr>
<tr>
<td>ROX05</td>
<td>0.5W</td>
<td>250V</td>
<td>400V</td>
<td>250V</td>
<td>0.3 ~ 330K</td>
<td></td>
</tr>
<tr>
<td>ROX1</td>
<td>1W</td>
<td>350V</td>
<td>600V</td>
<td>350V</td>
<td>0.1 ~ 470K</td>
<td></td>
</tr>
<tr>
<td>ROX2</td>
<td>2W</td>
<td>350V</td>
<td>600V</td>
<td>350V</td>
<td>0.1 ~ 560K</td>
<td></td>
</tr>
<tr>
<td>ROX3</td>
<td>3W</td>
<td>500V</td>
<td>800V</td>
<td>500V</td>
<td>5.0 ~ 100K</td>
<td></td>
</tr>
<tr>
<td>ROX5</td>
<td>5W</td>
<td>750V</td>
<td>1000V</td>
<td>750V</td>
<td>5.0 ~ 150K</td>
<td></td>
</tr>
<tr>
<td>ROX7</td>
<td>7W</td>
<td>750V</td>
<td>1000V</td>
<td>750V</td>
<td>20 ~ 150K</td>
<td>55 ~ 155°C</td>
</tr>
<tr>
<td>ROX8</td>
<td>8W</td>
<td>750V</td>
<td>1000V</td>
<td>750V</td>
<td>30 ~ 200K</td>
<td></td>
</tr>
<tr>
<td>ROX9</td>
<td>9W</td>
<td>750V</td>
<td>1000V</td>
<td>750V</td>
<td>50 ~ 200K</td>
<td></td>
</tr>
<tr>
<td>Small Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROX05S</td>
<td>0.5W</td>
<td>250V</td>
<td>400V</td>
<td>250V</td>
<td>0.3 ~ 50K</td>
<td></td>
</tr>
<tr>
<td>ROX1S</td>
<td>1W</td>
<td>350V</td>
<td>600V</td>
<td>350V</td>
<td>0.1 ~ 270K</td>
<td></td>
</tr>
<tr>
<td>ROX2S</td>
<td>2W</td>
<td>350V</td>
<td>600V</td>
<td>350V</td>
<td>0.1 ~ 470K</td>
<td></td>
</tr>
<tr>
<td>ROX3S</td>
<td>3W</td>
<td>350V</td>
<td>600V</td>
<td>350V</td>
<td>0.3 ~ 560K</td>
<td></td>
</tr>
<tr>
<td>ROX4S</td>
<td>4W</td>
<td>500V</td>
<td>800V</td>
<td>500V</td>
<td>5.0 ~ 100K</td>
<td></td>
</tr>
<tr>
<td>ROX5S</td>
<td>5W</td>
<td>500V</td>
<td>800V</td>
<td>500V</td>
<td>5.0 ~ 100K</td>
<td></td>
</tr>
<tr>
<td>ROX5S</td>
<td>5W</td>
<td>500V</td>
<td>800V</td>
<td>500V</td>
<td>5.0 ~ 560K</td>
<td></td>
</tr>
</tbody>
</table>

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial line frequency and waveform corresponding to the power rating, as determined from the following formula:

\[ RCWV = \sqrt{P \times R} \]

Where: \( RCWV \) = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

\( P \) = Power Rating (watt)

\( R \) = Nominal Resistance (ohm)

Rated Voltage = RCWV or Max. Working Voltage, whichever is smaller
## Environmental Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Specification</th>
<th>Test Methods (JIS C 5201-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC. Resistance</td>
<td>Must be within the specified tolerance</td>
<td>5.1 The limit of error of measuring apparatus shall not exceed allowable range or 5% of resistance tolerance</td>
</tr>
<tr>
<td><strong>Temperature Coefficient</strong></td>
<td><strong>Range Ω</strong></td>
<td><strong>TCR (PPM/°C)</strong></td>
</tr>
<tr>
<td></td>
<td>0.1Ω ~ 12Ω</td>
<td>±200</td>
</tr>
<tr>
<td></td>
<td>12.1Ω ~ 100K</td>
<td>±350</td>
</tr>
<tr>
<td></td>
<td>101K ~ 1M</td>
<td>-700</td>
</tr>
<tr>
<td></td>
<td>1.1M ~ 10M</td>
<td>-1500</td>
</tr>
<tr>
<td>Short time overload</td>
<td>Resistance change rate is Normal Size : ± (1% + 0.05Ω) Max. Small Size : ± (2% + 0.05Ω) Max. with no evidence of mechanical damage</td>
<td>5.5 Permanent resistance change after the application of a potential of 2.5 times RCWV or the max. overload voltage respectively specified in the above list, whichever less for 5 seconds</td>
</tr>
<tr>
<td>Dielectric Withstanding Voltage</td>
<td>No evidence of flashover mechanical damage, arcing or insulation break down</td>
<td>5.7 Resistors shall be clamped in the trough of a 90° metallic V-block and shall be tested at AC potential respectively specified in the electrical characteristics table for 60 + 10/-0 seconds</td>
</tr>
<tr>
<td>Terminal Strength</td>
<td>No Evidence of mechanical damage</td>
<td></td>
</tr>
<tr>
<td>Resistance to soldering heat</td>
<td>Resistance change rate is: ± (1% + 0.05Ω) Max. with no evidence of mechanical damage</td>
<td>6.4 Permanent resistance change when leads immersed to 3.2 mm to 4.8 mm from the body in 350°C ± 10 °C solder for 3 ± 0.5 seconds</td>
</tr>
<tr>
<td>Solderability</td>
<td>95 % coverage Min.</td>
<td>6.5 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. of solder: 245°C ± 3°C Dwell time in solder : 2 ~ 3 seconds</td>
</tr>
</tbody>
</table>
Environmental Characteristics (continued)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Specification</th>
<th>Test Methods (JIS C 5201-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance to Solvent</td>
<td>No deterioration of protective coatings and marking</td>
<td>6.9 Specimens shall be immersed in a bath of trichlorethene completely for 3 minutes with ultrasonic</td>
</tr>
<tr>
<td>Temperature cycling</td>
<td>Resistance change rate is: ± (2% + 0.05Ω) Max. with no evidence of mechanical damage</td>
<td>7.4 Resistance change after continuous 5 cycles for duty shown below:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Step</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Load life in humidity</td>
<td>Resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours “on”, 0.5 hour “off”) in a humidity test chamber controlled at 40 °C ± 2 °C and 90 to 95 % relative humidity</td>
<td>7.9</td>
</tr>
<tr>
<td>Load life</td>
<td>Resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours “on”, 0.5 hour “off”) at 70°C ± 2°C ambient</td>
<td>7.10 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours “on”, 0.5 hour “off”) at 70°C ± 2°C ambient</td>
</tr>
<tr>
<td>Pulse overload</td>
<td>Resistance change rate is: Normal Size : ± (2% + 0.05Ω) Max. Small Size : ± (5% + 0.05Ω) Max. with no evidence of mechanical damage</td>
<td>5.8 Resistance change after 10,000 cycles (1 second “on”, 25 seconds “off”) at 4 times RCWV or the max. pulse overload voltage</td>
</tr>
</tbody>
</table>

Derating:
In ambient temperatures greater than 70°C the load shall de-rate as shown in the graph below:
Flame-Proof Power Metal Oxide Film Resistors

Construction:

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Basic Body</td>
<td>Rod Type Ceramics</td>
</tr>
<tr>
<td>2</td>
<td>Resistance Film</td>
<td>0.1Ω ≤ R ≤ 12Ω : CNP film</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 ≤ R ≤ 100kΩ : Metal oxide film</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R &gt; 100kΩ : Carbon film</td>
</tr>
<tr>
<td>3</td>
<td>End Cap</td>
<td>Steel (Tin plated iron surface)</td>
</tr>
<tr>
<td>4</td>
<td>Lead Wire</td>
<td>Annealed copper wire coated with tin</td>
</tr>
<tr>
<td>5</td>
<td>Joint</td>
<td>By welding</td>
</tr>
<tr>
<td>6</td>
<td>Coating</td>
<td>Normal size:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>~Insulated &amp; Non-Flame Paint (Color: Gray)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small size:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>~Insulated &amp; Non-Flame Paint (Color: Sea-Blue)</td>
</tr>
<tr>
<td>7</td>
<td>Color Code</td>
<td>Non-Flame epoxy resin</td>
</tr>
</tbody>
</table>

Dimensions:

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions (MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>D (max.)</td>
</tr>
<tr>
<td>Normal Size</td>
<td></td>
</tr>
<tr>
<td>ROX05</td>
<td>2.5</td>
</tr>
<tr>
<td>ROX1</td>
<td>7.5</td>
</tr>
<tr>
<td>ROX2</td>
<td>8.5</td>
</tr>
<tr>
<td>ROX3</td>
<td>8.5</td>
</tr>
<tr>
<td>ROX4</td>
<td>8.5</td>
</tr>
<tr>
<td>ROX5</td>
<td>8.5</td>
</tr>
<tr>
<td>ROX6</td>
<td>8.5</td>
</tr>
<tr>
<td>ROX7</td>
<td>8.5</td>
</tr>
<tr>
<td>ROX8</td>
<td>8.5</td>
</tr>
<tr>
<td>ROX9</td>
<td>8.5</td>
</tr>
<tr>
<td>Small Size</td>
<td></td>
</tr>
<tr>
<td>ROX05S</td>
<td>2.5</td>
</tr>
<tr>
<td>ROX1S</td>
<td>3.5</td>
</tr>
<tr>
<td>ROX2S</td>
<td>5.5</td>
</tr>
<tr>
<td>ROX3S</td>
<td>5.5</td>
</tr>
<tr>
<td>ROX4S</td>
<td>6.5</td>
</tr>
<tr>
<td>ROX5S</td>
<td>6.5</td>
</tr>
<tr>
<td>ROX5S</td>
<td>8</td>
</tr>
</tbody>
</table>

NB. Pre-formed leads available on request.
Painting method:

Welding point, terminal and lead wire, is permissible to be exposed without the outer coated cover. The extent should be within 1/2 of the resistor body diameter.

Marking:

For 1/4W, 1/2W, 1W, 2W, 3W, 4W, 5W and all of small size Resistors shall be marked with color coding. Colors shall be in accordance with JIS C 0802.

For 7W, 8W, 9W marking shall be in text format:

Code description and regulation:

1. Wattage rating.
2. Nominal resistance value.
   - G: ± 2%
   - J: ± 5%
   - K: ± 10%
Packing Specification:

Taping:

<table>
<thead>
<tr>
<th>Type</th>
<th>Style</th>
<th>Q ±1</th>
<th>P</th>
<th>L1-L2</th>
<th>T</th>
<th>Z</th>
<th>R</th>
<th>t</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROX025</td>
<td>PT-52</td>
<td>52</td>
<td>5±0.3</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>4±1</td>
<td>0.5 max</td>
</tr>
<tr>
<td>ROX05</td>
<td>PT-52</td>
<td>52</td>
<td>5±0.3</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>4±1</td>
<td>0.5 max</td>
</tr>
<tr>
<td>ROX1</td>
<td>PT-52</td>
<td>52</td>
<td>5±0.3</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>4±1</td>
<td>0.5 max</td>
</tr>
<tr>
<td>ROX2</td>
<td>PT-64</td>
<td>64</td>
<td>10±0.5</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>5±1</td>
<td>0.5 max</td>
</tr>
<tr>
<td>ROX3</td>
<td>PT-64</td>
<td>64</td>
<td>10±0.5</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>5±1</td>
<td>0.5 max</td>
</tr>
<tr>
<td>ROX05S</td>
<td>PT-52</td>
<td>52</td>
<td>5±0.3</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>4±1</td>
<td>0.5 max</td>
</tr>
<tr>
<td>ROX1S</td>
<td>PT-52</td>
<td>52</td>
<td>5±0.3</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>4±1</td>
<td>0.5 max</td>
</tr>
<tr>
<td>ROX2S</td>
<td>PT-64</td>
<td>64</td>
<td>10±0.5</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>5±1</td>
<td>0.5 max</td>
</tr>
<tr>
<td>ROX3S</td>
<td>PT-64</td>
<td>64</td>
<td>10±0.5</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>5±1</td>
<td>0.5 max</td>
</tr>
<tr>
<td>ROX4S</td>
<td>PT-64</td>
<td>64</td>
<td>10±0.5</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>5±1</td>
<td>0.5 max</td>
</tr>
<tr>
<td>ROX5SS</td>
<td>PT-64</td>
<td>64</td>
<td>10±0.5</td>
<td>1 Max</td>
<td>6±1</td>
<td>1 Max</td>
<td>0</td>
<td>5±1</td>
<td>0.5 max</td>
</tr>
</tbody>
</table>

Tape in box packing (Ammopack):

<table>
<thead>
<tr>
<th>Type</th>
<th>C ±5</th>
<th>A ±5</th>
<th>B ±5</th>
<th>Pack Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROX025</td>
<td>250</td>
<td>75</td>
<td>96</td>
<td>5000</td>
</tr>
<tr>
<td>ROX05</td>
<td>260</td>
<td>85</td>
<td>70</td>
<td>1000</td>
</tr>
<tr>
<td>ROX1</td>
<td>262</td>
<td>86</td>
<td>80</td>
<td>1000</td>
</tr>
<tr>
<td>ROX2</td>
<td>262</td>
<td>92</td>
<td>108</td>
<td>1000</td>
</tr>
<tr>
<td>ROX3</td>
<td>256</td>
<td>92</td>
<td>80</td>
<td>500</td>
</tr>
<tr>
<td>ROX05SS</td>
<td>250</td>
<td>75</td>
<td>96</td>
<td>5000</td>
</tr>
<tr>
<td>ROX1S</td>
<td>260</td>
<td>85</td>
<td>70</td>
<td>1000</td>
</tr>
<tr>
<td>ROX2S</td>
<td>262</td>
<td>86</td>
<td>80</td>
<td>1000</td>
</tr>
<tr>
<td>ROX3S</td>
<td>262</td>
<td>92</td>
<td>108</td>
<td>1000</td>
</tr>
<tr>
<td>ROX4S</td>
<td>256</td>
<td>92</td>
<td>80</td>
<td>500</td>
</tr>
<tr>
<td>ROX5SS</td>
<td>256</td>
<td>92</td>
<td>80</td>
<td>500</td>
</tr>
</tbody>
</table>

NB Certain products can be supplied reeled on request.
Flame-Proof Power Metal Oxide Film Resistors

Plastic cases in box:

<table>
<thead>
<tr>
<th>Type</th>
<th>C ±5</th>
<th>A ±5</th>
<th>B ±5</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Plastic Case</td>
</tr>
<tr>
<td>ROX5S</td>
<td>36</td>
<td>20</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>ROX5</td>
<td>36</td>
<td>20</td>
<td>8</td>
<td>100</td>
</tr>
</tbody>
</table>

Bulk packaging (plastic bag in inner box):

<table>
<thead>
<tr>
<th>Type</th>
<th>Qty/Bag (Pcs)</th>
<th>Qty/Box (Pcs)</th>
<th>Qty/Carton Pcs</th>
<th>Box size LxWxH (±5)</th>
<th>Carton size LxWxH (±5)</th>
<th>Gross wt ±2 Kgs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROX7</td>
<td>8</td>
<td>32</td>
<td>1600</td>
<td>150 x 75 x 33</td>
<td>432 x 308 x 215</td>
<td>9.5</td>
</tr>
<tr>
<td>ROX8</td>
<td>8</td>
<td>32</td>
<td>1600</td>
<td>150 x 75 x 33</td>
<td>432 x 308 x 215</td>
<td>11.5</td>
</tr>
<tr>
<td>ROX9</td>
<td>10</td>
<td>300</td>
<td>1800</td>
<td>200 x 171 x 113</td>
<td>520 x 215 x 250</td>
<td>15</td>
</tr>
</tbody>
</table>

How To Order

<table>
<thead>
<tr>
<th>ROX</th>
<th>1S</th>
<th>J</th>
<th>100K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Part</td>
<td>Power Rating</td>
<td>Tolerance</td>
<td>Resistance Value</td>
</tr>
<tr>
<td>ROX – Flame proof power metal oxide film resistor</td>
<td>Normal size 025 - 1/4W 05 – 1/2W 1 – 1W 2 – 2W 3 – 3W 5 – 5W 7 – 7W 8 – 8W 9 – 9W</td>
<td>Small size 05S – 1/2W 1S – 1W 2S – 2W 3S – 3W 4S – 4W 5S – 5W 5S – 5W</td>
<td>G – 2% J – 5%</td>
</tr>
</tbody>
</table>

Dimensions in millimetres unless otherwise specified. Specifications subject to change.