Resistance Transfer Standard System

Oil Immersion Provides Thermal Isolation

All standards, except the 100 kΩ/step standard, are immersed in a mineral oil bath. Oil immersion provides thermal isolation to minimize the effects of ambient temperature variations. This means maximum short-term thermal stability for the standards. The SR1030 also exhibits superior long-term stability (±20 ppm for six months; ±35 ppm typical for two years; ±50 ppm typical for five years). This gives you longer mean time between calibrations, increasing your calibration throughput.

As an added benefit, the oil speeds the dissipation of heat created in the resistors during calibration. This heat dissipation further contributes to the stability of the standards.

Gaskets seal the SR1030 to keep the work surface and measuring contacts clean. The gaskets also minimize oil aging and contamination to lengthen the time between oil changes.

Since the 100 kΩ standard can be measured at much lower bridge power than the lower value standards, it is not necessary to immerse the standard in oil. However, this standard still benefits from the thermal lagging effects because it is sealed in a chamber using insulating materials that provide approximately the same temperature lagging effects as oil.

Refining Resistance Technology

TEGAM's experience in design and manufacture of resistance standards has made TEGAM's standards highly respected throughout government and industry. The SR1030 incorporates all the features of the SR1010 Resistance Transfer Standards with the many benefits of a sealed oil bath.

Ideal as a Multi-Value Standard Resistor or Reference Voltage Divider

The high accuracy and precision of the individual resistors make the SR1030 ideal for use as a multi-value standard resistor or reference voltage divider. The superior stability of the SR1030 makes it particularly suitable for calibrating 6-1/2, 7-1/2 and 8-1/2 digit digital multimeters.

Certified Traceable to the NIST

The SR1030 Resistance Transfer Standard is certified traceable to the National Institute of Standards and Technology. You can use the SR1030 to transfer this traceability to your resistance standards and measuring equipment. Certified calibration data is supplied with every standard.

Extremely Accurate and Stable

The Model SR1030 provides the part-per-million (ppm) resistance transfer accuracies and the long-term stabilities you need in today’s modern metrology and calibration laboratories.

The SR1030 Resistance Transfer Standards are extremely accurate, stable resistance standards that are used on the bench and are light enough to carry with you to remote calibration, repair, production or R&D sites. The SR1030 consists of six transfer standards in decades from 1 Ω to 100 kΩ per step. Each decade standard consists of 12 nominally equal resistors matched initially to within 10 ppm. In addition, each decade standard produces three decade values – 10 resistors in series (10R), 10 resistors in parallel (R/10), and nine of the 10 resistors in series/parallel (R). By making a 1:1 comparison with the tenth resistor, you can resolve a series-parallel value to better than 1 ppm.
**Specifications**

**Nominal Values (per step)**  
1, 10, 100, 1 k, 10 k and 100 kΩ

**Transfer Accuracy**  
- **100:1**  
  ±(1 ppm + 0.1 µΩ) at parallel value, using SB103, PC101, and SPC102 as necessary  
- **10:1**  
  ±(1 ppm + 0.1 µΩ) at series or parallel value, using SB103, PC101, and SPC102 as necessary

**Initial Adjustment**  
±20 ppm of nominal value matched within 10 ppm

**Calibration Accuracy**  
±10 ppm, NIST traceable

**Calibration Conditions**  
23 ± 1 °C, low-power, four-terminal measurement, initial calibration readings are provided.

**Long-Term Resistance Stability**  
- ±20 ppm of nominal for 6 months  
- ±35 ppm for 2 years, typical  
- ±50 ppm for 5 years, typical

**Temperature Coefficient (typical)**  
- 1 Ω ±15 ppm/°C, matched within 5 ppm/°C  
- 10 Ω ±1 ppm/°C  
- 100 Ω to 100 kΩ ±5 ppm/°C, matched within 3 ppm/°C

**Power Coefficient (typical)**  
- 1 Ω ±0.3 ppm/mW/resistor  
- 10 Ω ±0.02 ppm/mW/resistor  
- 100 Ω to 100 kΩ ±0.1 ppm/mW/resistor

**Maximum Current and Voltage Capabilities**

<table>
<thead>
<tr>
<th>SR1030 Resistance Value Per Step</th>
<th>One Resistor Alone</th>
<th>10 Resistors in Parallel (R/10)</th>
<th>10 Resistors in Series (R10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Value (per step)</td>
<td>Maximum I, V</td>
<td>Maximum I, V</td>
<td>Maximum I, V</td>
</tr>
<tr>
<td>1 Ω</td>
<td>1.0 A, 1.0 V</td>
<td>7.07 A, 7.07 mV</td>
<td>707 mA, 7.07 V</td>
</tr>
<tr>
<td>10 Ω</td>
<td>316 mA, 3.16 V</td>
<td>2.23 A, 2.23 V</td>
<td>223 mA, 22.3 V</td>
</tr>
<tr>
<td>100 Ω</td>
<td>100 mA, 10 V</td>
<td>70.7 mA, 70.7 V</td>
<td>70.7 mA, 70.7 V</td>
</tr>
<tr>
<td>1 kΩ</td>
<td>31.6 mA, 31.6 V</td>
<td>223 mA, 22.3 V</td>
<td>22.3 mA, 233 V</td>
</tr>
<tr>
<td>10 kΩ</td>
<td>10 mA, 100 V</td>
<td>7.07 mA, 7.07 V</td>
<td>7.07 mA, 7.07 V</td>
</tr>
</tbody>
</table>

* Based on the breakdown voltage of 1500 volts peak to case

**Order Information**

<table>
<thead>
<tr>
<th>SR1030 Resistance Transfer Standard</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ω Resistance Transfer Std.</td>
<td>SR1030-1</td>
</tr>
<tr>
<td>10 Ω Resistance Transfer Std.</td>
<td>SR1030-10</td>
</tr>
<tr>
<td>100 Ω Resistance Transfer Std.</td>
<td>SR1030-100</td>
</tr>
<tr>
<td>1 kΩ Resistance Transfer Std.</td>
<td>SR1030-1 K</td>
</tr>
<tr>
<td>10 kΩ Resistance Transfer Std.</td>
<td>SR1030-10 K</td>
</tr>
</tbody>
</table>

**Included Accessories**

- Manual: P/N 67041
- Z540 Compliant Calibration: P/N OPT-Z540

**Optional Accessories**

- Shorting Bars: P/N SB103
- Series Parallel Compensation Network: P/N SPC102
- Parallel Compensation Network: P/N PC101

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**Maximum Power Rating**  
- Single Step: 1W/step  
- 10 resistors: 5W/distributed

**Leakage Resistance**  
- 1 Ω to 10 kΩ: >10¹² Ω terminal to case  
- 100 kΩ: >10¹³ Ω terminal to case

**Breakdown Voltage**  
1500 volts peak to case

**Oil Bath**  
- **Type**: Mineral oil, Penreco Drakeol #9, white  
- **Insulation Resistance**: Typically 10⁸ Ω cm  
- **Quantity**: Approximately 0.5 gallons

**Dimensions (with oil)**  
- **Height**: 120 mm (4.7 in)  
- **Width**: 117 mm (4.6 in)  
- **Depth**: 335 mm (13.2 in)  
- **Weight**: 6.35 kg (10 lb)

**Operating Environment**  
- **Temperature**: 22.8 °C ±3.3 °C (73±6 °F)  
- **Humidity**: 20 to 50 % relative humidity

**Safe Operating Environment**  
- **Temperature**: 0 °C to 50 °C (32 °F to 126 °F)  
- **Humidity**: 15 to 80 % relative humidity

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**Combined Option Functional Specifications**

<table>
<thead>
<tr>
<th>Resistor Grouping</th>
<th>Ten Resistors in Parallel</th>
<th>Nine Resistors in Series/Parallel</th>
<th>Ten Resistors in Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal Value (Relative to Individual Resistor Value R)</strong></td>
<td>0.1R</td>
<td>R</td>
<td>10R</td>
</tr>
<tr>
<td><strong>Four-Terminal Measurement</strong></td>
<td>Resistance Added to Value Calculated from Individual Resistor Values (Value and Tolerance in Microhms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With SB103 and PC101 or SPC102</td>
<td>0 ±0.1 µΩ</td>
<td>0 ±1 µΩ</td>
<td>–</td>
</tr>
<tr>
<td>With SB103 Alone</td>
<td>50 ±10 µΩ</td>
<td>200 ±40 µΩ</td>
<td>–</td>
</tr>
<tr>
<td>With No Accessories</td>
<td>–</td>
<td>–</td>
<td>0 ±10 µΩ</td>
</tr>
<tr>
<td><strong>Two-Terminal Measurement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With SB103</td>
<td>150 ±30 µΩ</td>
<td>300 ±60 µΩ</td>
<td>–</td>
</tr>
<tr>
<td>With No Accessories</td>
<td>–</td>
<td>–</td>
<td>300 ±60 µΩ</td>
</tr>
</tbody>
</table>