SR1030 Series

The SR1030 series are extremely precise and stable resistance transfer standards. They may be used as as a multi-value standard resistor or reference voltage divider. Their superior stability make them particularly suitable for calibrating 6-1/2, 7-1/2 and 8-1/2 digit digital multimeters.

The SR1030's may be used on a lab benchtop as well as out in the field. Even out in the field they remain accurate and stable because they are filled with mineral oil. The oil immersion provides thermal isolation to minimize the effects of ambient temperature variations. It further improves both short and long-term stability of the standard.

SR1030-1: 1 Ω Resistance Transfer Standard

Features

- Part-per-million transfers from 100 mΩ to 1 MΩ
- Thermally isolated by oil for maximum short-term stability
- Excellent long-term stability: ±20 ppm for 6 months
- Seven decades of resistance transfer: 1, 10, 100, 1k, 10 k, 100 kΩ/step
- Resistors within each decade are matched to within 10 ppm
- 100:1 resistance transfers using series, parallel, and series/parallel connections
- Calibration traceable to SI through an NMI

Description

Accuracy and Stability

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.

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.

IET's Resistance Technology

IET's experience in design and manufacture of resistance standards has made our 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.

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 of nominal 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 of internal insulating materials.

Calibration Traceable to SI

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

Specifications

Resistance per Step	One Resistor Alone		10 Resistors in Parallel (R/10)		10 Resistors in Series (10R)		Temperature Coefficient	Power Coefficient	Leakage Resistance
	Max Current	Max Voltage	Max Current	Max Voltage	Max Current	Max Voltage			
1 Ω	1.0 A	1.0 V	7.07 A	707 mV	707 mA	7.07 V	±15 ppm/°C matched within 5 ppm/°C	±0.3 ppm/mW/resistor	>10^{12} Ω terminal to case
10 Ω	316 mA	3.16 V	2.23 A	2.23 V	223 mA	22.3 V	±1 ppm/°C	±0.02 ppm/mW/resistor	
100 Ω	100 mA	10 V	707 mA	7.07 V	70.7 mA	70.7 V	±5 ppm/°C matched within 3 ppm/°C	±0.1 ppm/mW/resistor	
1 kΩ	31.6 mA	31.6 V	223 mA	22.3 V	22.3 mA	233 V			
10 kΩ	10 mA	100 V	70.7 mA	70.7 V	7.07 mA	707 V			
100 kΩ	3.16 mA	316 V	22.3 mA	223 V	2.23 mA	2,230 V			>10^{13} Ω terminal to case

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

Transfer Accuracy:
100:1 ±(1 ppm + 1 μΩ) at parallel value, using SB103, PC101, and SP102 as necessary
10:1 ±(1 ppm + 0.1 μΩ) at parallel value, using SB103, PC101, and SP102 as necessary

Initial Adjustment:
± 20 ppm of nominal, resistors matched to within 10 ppm

Calibration Conditions:
23 ±1°C, low-power, four-terminal measurement
initial calibration reading are provided

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

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

Breakdown Voltage:
1500 V peak to case

Oil Bath:
Type: Mineral oil, Panreco Drakeol #9
Quantity: Approximately 1.9 liters (0.5 gallons)

Insulation Resistance:
Typically 100 TΩ-cm

Resistor Type:
Wirewound

Environment:
Operating: +10 to +40°C, <50% RH
Storage: -20 to +65°C

Dimensions:
33 cm W x 11.7 cm H x 10.8 cm D (13" x 4.6" x 4.25")

Weight:
6.35 kg (10 lb)

Combined Option Functional Specifications:

Resistor Grouping		10 Resistors in Parallel (R/10)	9 Resistors in Series/Parallel	10 Resistors in Series (10R)
Nominal Value (Relative to individual Resistor Value R)		0.1 R	R	10R
With SB103 and PC101 or SPC 102		0 ±0.1 μΩ	0 ±1 μΩ	-
With SB103 alone	Four-terminal*	50 ± 10 μΩ	200 ±40 μΩ	-
	Two-terminal	150 ±30 μΩ	300 ± 60 μΩ	-
With no Accessories	Four-terminal*	-	-	0 ±10 μΩ
	Two-terminal	-	-	300 ±60 μΩ

**Resistance added to value calculated from individual resistor values (value and tolerance in microhms)*

Ordering Information

SR1030 Transfer Standards

Model Number	Description
SR1030-1	1 Ω Resistance Transfer Standard
SR1030-10	10 Ω Resistance Transfer Standard
SR1030-100	100 Ω Resistance Transfer Standard
SR1030-1K	1 kΩ Resistance Transfer Standard
SR1030-10K	10 kΩ Resistance Transfer Standard
SR1030-100K	100 kΩ Resistance Transfer Standard

Optional Accessories

Model Number	Description
SB103	Shorting Bars
SPC102	Series/Parallel Compensation Network
PC101	Parallel Compensation Network