HATS-LR Series

Make accurate calibrations and transfer measurements over three decades of resistance with the HATS-LR Series.

- Steps from 1 Ω to 100 kΩ
- Transfers from 0.1 Ω to 1 MΩ
- High transfer accuracy - to 1 ppm

The Benefits of Using Transfer Standards

In order to perform calibrations with a high degree of accuracy, reference standards must be employed at every range or decade of the measuring or calibration instrumentation. Clearly, this can be difficult and costly since these standards must be highly stable and their precise values must be known with a high degree of certainty and sufficient resolution. To minimize the cost and difficulty, more practical means of performing such calibrations is to use transfer standards.

If one has a single standard that is calibrated by a national laboratory, one can then compare the transfer standards to the certified standard by ratio techniques. See p. 5 for a full tutorial.

Model HATS-LR-10 Transfer Standard
with HATS-LR-SB shorting bars

The HATS-LR Series of transfer standards consist of 12 matched resistors, of value R, which may be connected in series or parallel combinations to produce any number of values such as R/10, R, and 10R, all with the same known deviation, thereby allowing progressive transfers to higher and lower decades. For example, the 10 kΩ transfer standard may be used to transfer calibrations across 1 kΩ, 10 kΩ and 100 kΩ.

The HATS-Y Series (p. 3) of transfer standards may be used for resistances ≥1 MΩ.

SPECIFICATIONS

Resistor Type: Wirewound, hermetically sealed, low inductance.

Step Size: 1 Ω, 10 Ω, 100 Ω, 1 kΩ, 10 kΩ, or 100 kΩ.

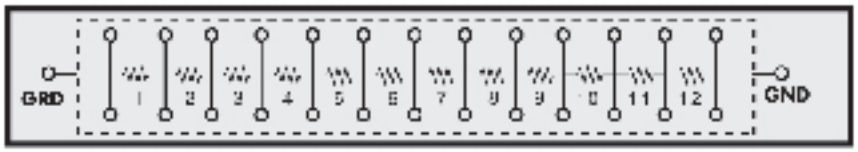
Accuracy:
Initial: <±15 ppm for 1 Ω, 10 Ω steps;
<±10 ppm for 100 Ω through 100 kΩ steps.
Long Term: <±10 ppm/year;

Transfer: ±(1 ppm + 0.1 μΩ) for 10:1 and 100:1 ratios for 1 Ω, 100 Ω, 1 kΩ, 10 kΩ, and 100 kΩ steps;
±1 ppm for 10:1 and 100:1 ratios for 10 Ω step.
(Transfer accuracies apply when HATS-LR-SB, HATS-LR-PC, or HATS-LR-SP fixtures are used)

Matching:
Accuracy: within 10 ppm for 1 Ω, 10 Ω steps;
within 5 ppm for 100 Ω through 100 kΩ steps.
Temperature Coefficient:
within 5 ppm/°C for 1 Ω step;
within 1 ppm/°C for ≥100 Ω steps and for HATS-LRTC-10
within 2 ppm/°C for HATS-LR-10 only

Calibration Accuracy: <10 ppm for 1 Ω
<5 ppm for all others.

Functional Schematic:



Temperature Coefficient:
±1 ppm/°C for HATS-LRTC-10 (low TC version)
±10 ppm/°C for HATS-LR-1;
±3 ppm/°C for HATS-LR-10;
±2 ppm/°C for HATS-LR-100 through 100K.

Power Coefficient:
±0.1 ppm/mW per resistor for HATS-LR-1;
±0.15 ppm/mW per resistor for HATS-LR-10;
±0.02 ppm/mW per resistor for HATS-LRTC-10;
±0.05 ppm/mW per resistor for HATS-LR-100 through 100K.

Maximum Applied Input: 1500 V maximum or 1 W per resistor, or 5 W for entire unit, whichever applies. 1500 V peak between any terminal and case.

Dimensions: 31.2 cm W x 9.7 cm H x 11.4 cm D (12.3" x 3.8" x 4.5").

Weight: 2 kg (4.4 lb).

Calibration Conditions: Four-wire Kelvin measurements, low power, at 23°C, traceable to NIST. Initial calibration data supplied with instrument.

Leakage Resistance: Greater than 1 TΩ from terminal to case.

Shorting Bars and Compensation Networks: For connecting resistors in parallel or series-parallel combinations.

ORDERING INFORMATION

HATS-LR-1	1 Ω/step transfer standard
HATS-LR-10	10 Ω/step transfer standard
HATS-LRTC-10	10 Ω/step transfer standard with low temperature coefficient
HATS-LR-100	100 Ω/step transfer standard
HATS-LR-1K	1 kΩ/step transfer standard
HATS-LR-10K	10 kΩ/step Transfer Standard
HATS-LR-100K	100 kΩ/step Transfer Standard
HATS-LR-SB	Shorting bars for HATS-LR units
HATS-LR-PC	Parallel Compensation Network
HATS-LR-SP	Series-Parallel Compensation Network
OPTIONS	
- RM	Rack mountable case for standard 19" rack

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