9334A SERIES

ULTRA-PRECISE "AIR" RESISTANCE STANDARDS

Very High Stability Calibration Laboratory Resistance Standards

GUILDLINE INSTRUMENTS 9334A SERIES of Resistance Standards are designed as very stable laboratory standards for low uncertainty and high accuracy resistance calibration in air, without the need for a temperature-controlled oil bath.

Guildline Resistance Standards are based on design knowledge and manufacturing expertise going back to 1957. They are made with multiple resistors in parallel or series rather than using a single resistor. This technique reduces noise and self-heating.

The 9334A Series can be used as working standards or highly reliable and rugged transfer standards. These Standards 9334As are extremely useful for the calibration of resistance ranges of multi-function calibrators and high accuracy DMMs, as well as being used in classical calibration laboratory applications.

FEATURES

- 12 Month Stabilities Low as 2 μΩ/Ω
- Wide Operating Range 18 °C to 28 °C
- Resistance Range 100 μΩ to 100 GΩ
- ISO/IEC 17025 Calibration Included
- Low Temperature Coefficients
- Compact and Ruggedized
- Nominal Initial Accuracy < 2 μΩ/Ω
- High Power Rating, Low Power Coefficients
- Guard and Shield Compliant
- Special Values Available on Request

THE 9334A SERIES PRECISION RESISTANCE STANDARDS ARE AVAILABLE IN A WIDE RANGE OF OFF THE SHELF AND CUSTOM VALUES TO SATISFY DEMANDING APPLICATIONS BETWEEN 100 μΩ AND 100 GΩ.

Connections to these resistance standards are via 4-terminals up to 1 MΩ and via two terminals for values above 1 MΩ.

During manufacturing, the temperature coefficient of each standard is verified. For example, at 10 kΩ, with a wide laboratory environment of 23 ºC ± 3 ºC, the worse-case effect due to temperature will only be 0.2 μΩ/Ω.

The 9334A Series starts with the Low to Ultra-Low Values. The internal design of Guildline's low value resistance standards is unique and proprietary. With this design, Guildline provides the best performance for ohmic values below 1 mΩ of any commercially available resistance standard. The available standard values in this range start at 100 μΩ and go to 10 mΩ in decade values. For values less than 1 mΩ, the current (C) Terminals are easily identified by the large black knob terminals. These terminals can handle currents up to 20 A. With their ultra-low drift specifications, just 5 ppm per year for the 10 mΩ standard, these units are perfect for calibrating precision DC sources such as Transconductance Amplifiers, milli and micro-Ohmmeters. The resistor element is securely mounted to the inside of a hermetically sealed aluminum enclosure. **Beryllium copper, gold plated binding posts** are provided for measuring the voltage drop. The fifth (gold) connector is for chassis ground.

9334A Series Mid-Range values range from 100 mΩ to 1 MΩ. The resistor elements are enclosed in epoxy to minimize effects due to temperature and humidity changes. They are securely mounted to the inside of a hermetically sealed aluminum enclosure to provide mechanical stability. **5-way beryllium copper, gold plated binding posts** provide low thermal connections. The best in primary drift and other specifications means you are getting the best value for your money! For example, the **9334A-1 and the 9334A-10k have 1 year specifications that allow a full 4:1 artifact verification of Fluke Calibrators**. The **1 Year drift specification for the 9334A-1 is only 2.5 ppm,** while the **9334A-10k 1 year specification is only 2 ppm**. This means no special characterization or 6-month calibration intervals for these values minimizing life cycle and calibration costs.

9334A Series High to Ultra-High values are available in two-wire configurations. The High Value Models range from 10 MΩ to 100 GΩ. The 9334A-1M and higher ohmic values handles up to 1000 V DC. With the best yearly drift specification, the high voltage handling capability, and the very low voltage coefficients, these standards are perfect for calibration of long scale DMM's such as the Fluke 8508, 8558A, 8588A and the Keysight 3458A, all of which can handle higher voltages. They are also the best available solution for calibrating Meg-Ohmmeter, Electrometers and other high resistance applications. No need to worry about overloading these standards.

There are two levels of specifications for stability for the 9334A Series. The 1st year stability is the maximum drift specification after the first year of ownership; the 2nd year drift is the maximum drift specification for subsequent years of ownership. For example, if you purchased a 1 mΩ model (9334A-0.001), after 12 months of use the measured value should be no more than 15 μΩ/Ω from the initial calibration value. Then after the 2nd year of use, the unit should not drift any more than 10 μΩ/Ω. Over time the drift of a Guildline Standard will decrease.

Specifications for Low to Ultra-Low Values (4-Wire)

Model (Nominal Ω)	Initial [1] Tolerance ± μΩ/Ω	Stability (± μΩ/Ω) [2]		Maximum Limits		Temperature Coefficient ± μΩ/Ω / °C	Voltage [4] Coefficient ± μΩ/Ω / V_{dc}
		Initial 12 Months [3]	2nd Year [3]	Current (A)	Voltage (V)		
9334A-100μ	50	25	15	20	0.002	50.0	NA
9334A-0.001	20	15	10	6	0.01	5.0	NA
9334A-0.01	10	10	5	3	0.03	2.0	NA

Specifications for Mid-Range Values (4-Wire)

Model (Nominal Ω)	Initial [1] Tolerance ± μΩ/Ω	Stability ± μΩ/Ω [2]		Maximum Limits		Temperature Coefficient ± μΩ/Ω / °C	Voltage [4] Coefficient ± μΩ/Ω / V_{dc}
		Initial 12 Months [3]	2nd Year[3]	Current (mA)	Voltage (V)		
9334A-0.1	5	2.5	2	1000	0.1	0.3	NA
9334A-1	2	2.5	2	320	0.32	0.2	NA
9334A-10	2	2.5	2	100	1	0.2	NA
9334A-25	2	2.5	2	64	1.6	0.2	NA
9334A-100	2	2.5	2	32	3.2	0.2	NA
9334A-200	2	2.5	2	23	4.5	0.2	NA
9334A-400	2	2.5	2	16	6.3	0.2	NA
9334A-1k	2	2.5	2	10	10	0.2	NA
9334A-10k	2	2	1.5	3.2	32	0.2	0.01
9334A-12.9064k	2	2	1.5	2.8	36	0.2	0.01
9334A-100k	3	2.5	2	1	100	0.3	0.03
9334A-1M	5	4	3	0.32	320	0.3	0.05

Specifications for High to Ultra High Values (2-Wire)

Model (Nominal Ω)	Initial [1] Tolerance ± μΩ/Ω	Stability (± μΩ/Ω) [2]		Maximum Limits		Temperature Coefficient ± μΩ/Ω / °C	Voltage [4] Coefficient ± μΩ/Ω / V_{dc}
		Initial 12 Months [3]	2nd Year[3]	Current (μA)	Voltage (V)		
9334A-10M	15	5	4	100	1000	3	0.1
9334A-100M	35	20	10	10	1000	6	0.2
9334A-1G	35	35	30	1	1000	6	0.5
9334A-10G	200	100	75	0.1	1000	25	1
9334A-100G	500	200	150	0.01	1000	250	1

Note 1: Nominal initial tolerance is defined as the maximum variation of resistance mean values as initially adjusted at the point of sale.
Note 2: Calibrated in air at 23 °C traceable to the SI unit of electric resistance, calibration uncertainties expanded and expressed at the 95 % level of confidence. An ISO/IEC 17025 accredited certificate and report of calibration stating the calibrated value and estimated uncertainty is provided with each resistor.
Note 3: Initial 12-month drift is for after the first year of ownership only. The initial 12-month drift is higher due to stabilization of elements. After the initial 24 months, the two-year specification is used as the maximum yearly drift specification.
Note 4: Voltage hysteresis: negligible to < 0.1 ± μΩ/Ω. Temperature hysteresis: < 0.3 μΩ/Ω between 0 °C and 40 °C
Note 5: Special/Custom Values available upon request.

General Specifications

Temperature (All Models)		Operating Humidity (Non-Condensing)		Storage Humidity (Non-Condensing)	
Operating	**Storage**	(Models ≤1 MΩ)	(Models ≥10 MΩ)	(Models ≤1 MΩ)	(Models ≥10 MΩ)
18 °C to 28 °C	-20 °C to 60 °C	15 % to 70 % RH	15 % to 50 % RH	15 % to 80 % RH	15 % to 80 % RH

Dimensions	Height		Width		Depth		Weight		Shipping Weight	
Models > 100 μΩ	88 mm	3.5“	124 mm	4.9”	79 mm	3.1”	.63 kg	1.4 lbs	1 kg	2.2 lbs
Models ≤ 100 μΩ	97 mm	3.8“	124 mm	4.9”	79 mm	3.1”	1.1 kg	2.4 lbs	2 kg	4.4 lbs

For The Ultimate In a Resistance Standard Check Out The
6634A Temperature Stabilized Resistance Standard!

Ordering Information

9334A-Model	Resistance Standard (List Ohmic Value For Model)
9334A-X	Customer Specified Value (State Value)
	ISO/IEC 17025 Accredited Calibration Certificate Included
/OM	Operator,m Manual Included
92302	100 Ampere Lead Set
/Temp	Additional Customer Specified Temperature Point (Charge)
/Voltage	Additional Customer Specified Voltage Point (Charge)
/Current	Additional Customer Specified Current Point (Charge)
*Other Precision Leads Are Available – Call and tell us your requirements	

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