



AUTOMATED RESISTANCE BRIDGE WITH RATIO 100:1

- Resistance and Temperature Applications
- Range 0.001 Ω to 1 G Ω
- Best Accuracy < 0.1 ppm with Optional 0.03 ppm
- Ratio Self-Calibration
- System Integration with Measurements International (MI) Matrix Scanners and High Current Range Extenders
- Make MI Your Partner in ISO 17025 Accreditation Through Coaching, System Design, Implementation, Calibration Services, Documentation Support and Ongoing Expert Support

ACCUBRIDGE® MODEL 6242D



ACCUBRIDGE® MODEL 6242D AUTOMATED RESISTANCE BRIDGE

Since its inception in 1987, MI has been providing customers with the best in resistance measuring equipment. As the original manufacturer of the Automated Direct Current Comparator (DCC) Resistance Bridge, MI has been the industry leader in providing the highest level of automated resistance bridges and turnkey systems to metrology laboratories worldwide.

The AccuBridge® 6242D (furthermore 6242D) is ideal for measurements in both resistance metrology and temperature thermometer applications. With its innovative technology, the 6242D's speed, measurement accuracy, and data handling capabilities make it the preferred primary resistance measurement system in primary and calibration labs worldwide. The 6242D is designed for flexibility and ease of use.

Ratio Range and Accuracy

The 6242D DCC with its binary wound current comparator technology balances current ratio with an effective resolution of 25-bit. It provides ratio measurements with an accuracy to better than 100 ppb with a linearity of better than 5 ppb. The 6242D can perform ratio measurements (R_x/R_s) with resistances valued from 0.001 Ω to 1 G Ω range. A line of optional high current range extenders permits measurements down to 1 $\mu\Omega$ for shunt resistance or direct-current current transformer (DCCT) measurement applications.

Automated Resistance Operation

The 6242D Bridge itself can ratio a standard resistor with another resistor being tested. Optional 10-, 16- or 20-channel scanners can be used individually or together to connect to up to 40-channels of ratio measurement for up to 40 different test resistors.

The 6242D is perfectly suited for front panel operation, or you can team it with MI's 6242D-SW Windows®-based operating software for fully automated measurements, history logging, graphing, and regression analysis. Front panel operation with the 6242D's touch sensitive display panel provides full bridge capabilities to the operator. The ratio or direct resistance measurements can be made. Multiple measurements over time can be numerically displayed or graphically displayed to best fit your needs.





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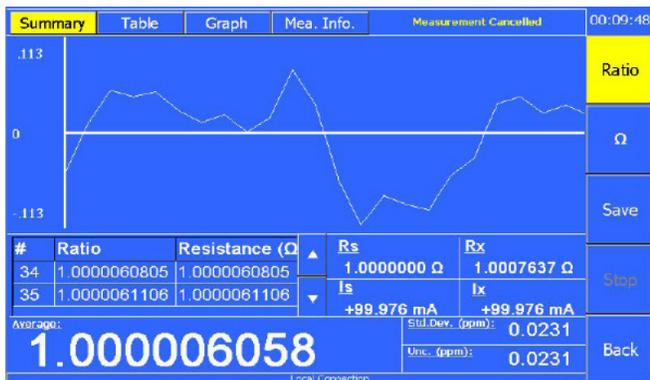
The AccuBridge® Family of Bridges

The 6242D is a high-performance model MI Bridge. It is one of a family of bridges where there are various bridges optimized for different tasks from measuring Quantum Hall Resistance Standards (QHR) over a smaller range of resistance but with excellent uncertainties, to others which are a better fit for other labs with a broader range of measurements but with larger uncertainties. Three different bridge designs use different measurement methods to measure over 21 orders of magnitude of resistance, from 1 $\mu\Omega$ to 10 P Ω . The Accubridge® family offers the best line of bridges available for measuring the widest range of resistance.

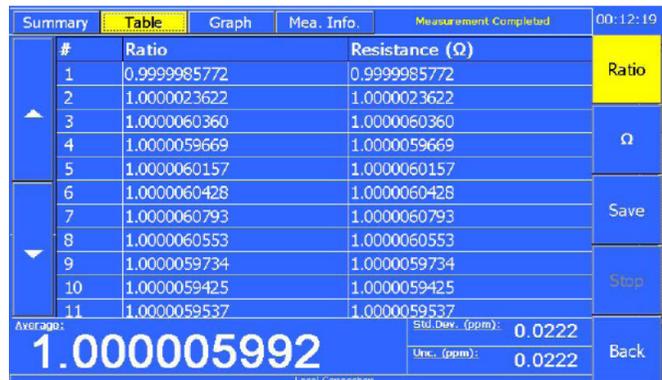
Overview

The 6242D measures both ratio and absolute values. You select functions using the menu on the 6242D's large touch screen display. For absolute measurements, you enter the value and related uncertainty of the standard resistor using the display's keypad. You enter the measurement functions such as current through the unknown resistor, settle time, number of measurements, and number of statistics the same way.

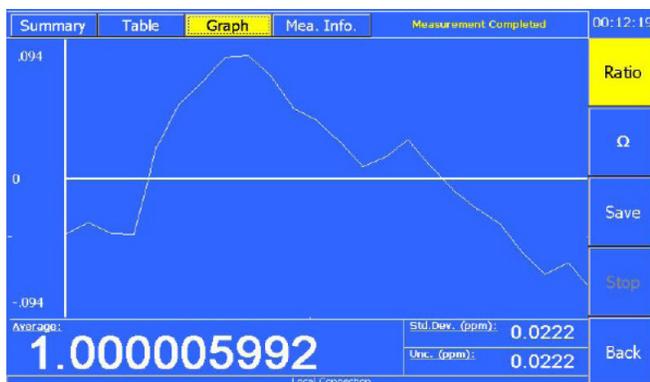
The 6242D's low-noise, touch screen display is interactive with the measurements, as shown in the screen images below. When a reading is complete, the average value and uncertainty (based on the number for statistics) are displayed. All uncertainty calculations are 2 sigma level.



The Summary tab displays current measurement data



The Table tab displays a chronological list of measurement data



The Graph tab displays a graphical representation of the data



The Measurement Information tab displays measurement parameters





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Measurements International provides world-class expertise in DC resistance metrology to National Measurement Institutes (NMIs) primary, and calibration laboratories who need to achieve the lowest possible traceable uncertainty in their measurements and calibration equipment. As your accreditation and global support partner, MI helps ensure your competitive advantage by offering leading product knowledge and applications expertise through coaching, system design, implementation, calibration services, and ongoing expert support.

At MI, it's not only about the equipment and science; it's about what you can do and the ease with which you can do it.

Automatic current reversal ensures that DC offsets and thermals are cancelled out during the measurement. The 6242D has a standard (R_s) input and an unknown (R_x) input for measuring the ratio of the two resistors. All resistor connections are made using 4-terminal connections. Calibration verification can be made by performing an interchange measurement at any ratio. The interchange technique works at all ratios.

6242 Windows® Based Operating Software

Measurements International's 6242D-SW Windows®-based operating software features measurements automation, report generation, historical analysis, and tracking and correcting for resistor drift rates.

When you combine the 6242D with a MI IEEE-controlled 9400 Standard Resistor Oil Bath or 9300A Air Bath, you can automatically perform alpha and beta calculations on resistors under test.

You can export all data directly to Excel® for various test patterns or mainframe applications. Resistor baths (oil or air), instrument controllers, printers, system software, IEEE-488 interface, installation, and training are available for complete system packages.

When you use the 6242D in conjunction with our 6011 series of Range Extenders and 6150A Power Supplies, you can extend its range. Our Range Extenders include the 6011D/150 A and 6011D/300 A modules. The range can be extended further to 1 $\mu\Omega$ with our model 6013M/400 A Range Extender, model 6012M/2000 A Range Extender, or model 6014M/3000 A Range Extender.





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AccuBridge® 6242D Accessories

Channel Extension

By using combinations of up to four matrix scanners, you can increase the number of input channels to almost any number from 10 to 40. Our Automated Low Thermal Matrix Scanners include the 4210A and 4210B with 10 input and 2 output channels; 4216A, 4216B with 16 input and 2 output channels; and 4220A and 4220B with 20 input and 2 output channels. Our A-series of matrix scanners has tellurium copper terminals on their inputs and outputs while our B-series units have four-wire Teflon cable on their inputs and outputs.

For more information, see our model 4210, 4216 and 4220 Automated Low Thermal Matrix Scanners data sheet.



Model 9300 Air Bath

The Model 9300 Series Air Baths are designed as a convenient and inexpensive way to maintain the temperature of air resistors in your calibration laboratory. It is large enough to house several standard air resistors and features an adjustable shelf to permit easy access to the standards. The shelves are easily removable to place a single ESI type SR104 standard in the bath. The bath is small and rugged and can be moved about easily.

For more information, see our model 9300 Air Bath data sheet.



Model 9300A Temperature Controlled Chamber with IEEE-488

The 6242D is also ideal for verifying the temperature and power coefficient of resistors or shunts using the MI 9300A Air Bath. Up to four SR104's or combination thereof can be installed in the bath, two shelves are provided. The IEEE drivers for this bath are built into the software for automated measurements and calculations of alpha, beta coefficients and resistor values. A Hi/Lo temperature protection circuit is built into the bath to protect your resistors.

For more information, see our model 9300A Air Bath data sheet.



Model 9400 Oil Bath with IEEE-488

We designed our model 9400 Standard Resistor Oil Bath based on years of customer feedback on existing resistor oil baths. You control this bath through a touch screen interface. Due to its low electrical noise, the quiet 9400 can be used with the Cryogenic Current Comparator (CCC) and Quantum Hall Resistance Standard (QHR). Depending on the quantity of resistors in the bath, the stirrer motor speed can be changed. The IEEE drivers for this bath are built into the software for automated measurements and calculations of alpha and beta coefficients and resistor values.

For more information, see our model 9400 Standard Resistor Oil Bath data sheet.



Model 9331 & 9331R Series Air Resistors

Our high-accuracy working standard air resistors are used for precision on-site resistance calibrations for values from 1 mΩ to 100 MΩ. Our 9331's are small, light, and rugged resistance standards that do not require a temperature-controlled oil or air bath for their specification range. The stability and temperature coefficients of the 9331's make them ideal for easy transport and operation in any working environment within the range of 18 °C to 28 °C.





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Connections to the model 9331R are made with tellurium copper 5-way binding posts for values to 10 MΩ. A separate ground terminal is included for guarding, and the case is hermetically sealed to keep moisture out. The model 9331 ranges from 0.001 Ω to 10 MΩ.

For more information, see our model 9331, 9331R and 9331G Standard Air Resistor data sheets.

Model 9210 Series Standard Oil Resistors

Standard Oil Resistors provide better stability and temperature coefficients over air resistors and provide the highest precision and stability in resistance measurements. Our standard oil resistors include the 9210A Primary 1 Ω, 9210A Primary 0.1 Ω, and 9210B series from 10 Ω to 100 kΩ. The 9210A 1 Ω and 9210A 0.1 Ω resistors have a negligible pressure coefficient.

For more information, see our model 9210A MI-Type Standard and model 9210B Reference Series Standard Oil Resistors data sheets.

6011D Series Range Extenders

Our 6011 series of Low Resistance Shunt Measurement Systems offer the best accuracy, lowest uncertainty, and are the easiest to use commercial systems available. Our range extenders are fully automated, expanding the measuring capabilities of the 6010D or 6242D to measure lower resistance values at higher currents. A typical MI measurement system consists of the AccuBridge® 6010 or 6242 Automated Resistance Bridge, a 6011 Range Extender, and the 6150A Power supply. All required cables are supplied with the system.

For more information, see our model 6011D Automated Range Extender and Power Supplies data sheet and the 6010/6242 Precision Shunt Measurement System data sheet.

ORDERING INFORMATION	
4210A	Low Thermal Matrix Scanner (10-Channels)
4216A	Low Thermal Matrix Scanner (16-Channels)
4220A	Low Thermal Matrix Scanner (20-Channels)
4210B	Low Thermal Matrix Scanner (10-Channels)
4216B	Low Thermal Matrix Scanner (16-Channels)
4220B	Low Thermal Matrix Scanner (20-Channels)
4220-1R	Hamon Adapter (4220A)
6511D	10 A Range Extender with DC Supply
6011D	150 A Range Extender
6011/300	300 A Range Extender
6150A/150	6150A 150 A DC Supply
9332	Series of Shunts (10 A to 3000 A, 100 mΩ to 10 μΩ)
9300A	Air Bath
9400	Oil Bath
J005-Spec 30/100	4-Conductor Teflon Cable, 30 m or 100 m





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Specifications: Rev 4

R _S Nominal Value	R _X Resistance Value			
	Ratio Specification 6242D/6242D Options			
1 Ω	0.1 Ω to 1 Ω	1 Ω	10 Ω	100 Ω
	0.2 ppm	0.1/0.03 ppm	0.1/0.05 ppm	0.2 ppm
10 Ω	1 Ω to 10 Ω	10 Ω	100 Ω	1000 Ω
	0.1 ppm	0.1/0.03 ppm	0.1/0.05 ppm	0.2 ppm
100 Ω	10 Ω to 100 Ω	100 Ω	1 kΩ	10 kΩ
	0.1 ppm	0.1/0.03 ppm	0.1/0.05 ppm	0.3 ppm
1 kΩ	100 Ω to 1 kΩ	1 kΩ	10 kΩ	100 kΩ
	0.1 ppm	0.1/0.05 ppm	0.1/0.05 ppm	0.8 ppm
10 kΩ	1 kΩ to 10 kΩ	10 kΩ	100 kΩ	1 MΩ
	0.1 ppm	0.1 ppm	0.2 ppm	2.5 ppm
100 kΩ	10 kΩ to 100 kΩ	100 kΩ	1 MΩ	10 MΩ
	0.25 ppm	0.5 ppm	0.3 ppm	5 ppm
1 MΩ	100 kΩ to 1 MΩ	1 MΩ	10 MΩ	100 MΩ
	1 ppm	1 ppm	2 ppm	10 ppm
10 MΩ	1 MΩ to 10 MΩ	10 MΩ	100 MΩ	
	3 ppm	2 ppm	7 ppm	
100 MΩ	10 MΩ to 100 MΩ	100 MΩ	1 GΩ	
	7 ppm	10 ppm	25 ppm	

Resistance Ratio Range	0.001:1, 0.01:1, 1:1, 10:1, 100:1	Test Voltage Range	1 V to 1 kV
Linearity	± 0.01 ppm	Current Reversal	4 to 1000 seconds
Resolution	± 0.001 ppm of full scale	Time to Stated Accuracy (warm-up)	< 1 minute
Input Channels	2 (expandable to 40 with 4220A Matrix Scanner)	Temperature Coefficient	± 0.01 ppm/°C
Configuration	4-Terminal	Mode of Operation	Front Panel Control or Automatic (IEEE-488)
Test Current Range	1 µA to 150 mA	Operating Environment	15 – 34 °C, 10 to 90 % RH non-condensing
Extended Test Current Option	150 mA to 3000 A	Warranty	2 Year Parts & Labour

Dimensions (W × D × H):
483 × 565 × 178 (mm)

Weight:
19 kg

Shipping Weight:
23 kg

Main Power:
100 V, 120 V, 220 V, 240 V_{ac}
50/60 Hz

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