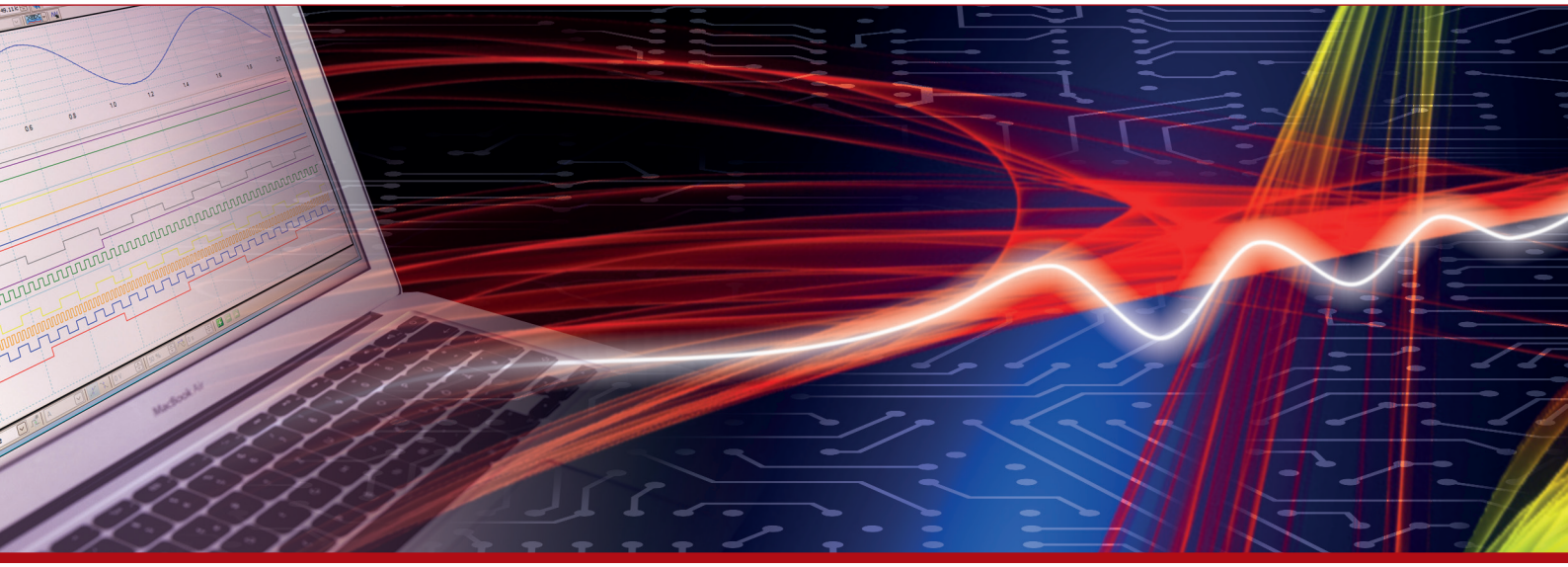
Product Datasheet - Technical Specifications



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Your contact

Technical and commercial sales, price information, quotations, demo/test equipment, consulting:

Tel.: **+49 - 81 41 - 52 71-0**

FAX: **+49 - 81 41 - 52 71-129**

E-Mail: **sales@meilhaus.com**

Downloads:
www.meilhaus.com/en/infos/download.htm

Meilhaus Electronic GmbH
Am Sonnenlicht 2
82239 Alling/Germany

Tel. **+49 - 81 41 - 52 71-0**
Fax **+49 - 81 41 - 52 71-129**
E-Mail **sales@meilhaus.com**

www.meilhaus.de

Data Sheet

Battery Analyzers
BA6010 Series

The BA6010 Series battery analyzers measure voltage and resistance of modern battery technologies with high accuracy, resolution, and speed. Additionally, these instruments provide auxiliary measurement parameters inductance, dissipation factor, impedance, quality factor, reactance, phase angle in degrees, and capacitance in farads.

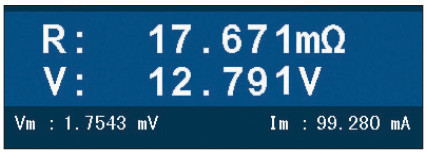
The BA6010 Series is suitable for characterizing battery chemistries that are responsive to a 1 kHz AC stimulus signal, including lead acid, lithium and alkaline type batteries used in consumer products, electric vehicles, power backup, security, and fire alarm systems. Model BA6011 supports voltage measurements of battery packs up to 300 V whereas the BA6010 features a 6 V measurement range ideal for battery cell testing. The handler and remote interfaces expands the analyzer's application to R&D and automated manufacturing environments.

Features & Benefits

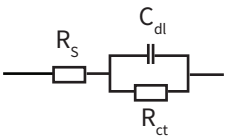
- 4.3 inch color LCD display
- Trace function for graphical display of voltage and resistance with on-screen cursor measurements
- 4-wire kelvin test leads with fault monitoring of drive and sense lines
- Compare and sort using 9 bins with statistical evaluations
- Δ% mode for quickly determining the percent difference between batteries
- Pass/Fail indicator with audible tone
- Fast test speed up to 50 measurements per second to increase manufacturing throughput
- Trigger modes internal, manual, bus and external
- 100 internal and external storage locations for setup and screen save
- Handler interface for easy integration with a component handler or integration with PLC
- Standard RS232, USB (USBTMC and virtual COM) interfaces

Wide range of measurements

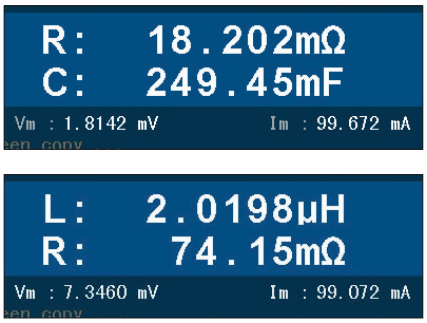
Two user-selected measurements can be displayed simultaneously, along with stimulus signals Vm and Im. Unlike comparable battery testers that only support voltage and resistance measurements, users can also characterize additional parameters such as battery capacitance thus providing additional insight into a battery's condition.



Main measurement parameters



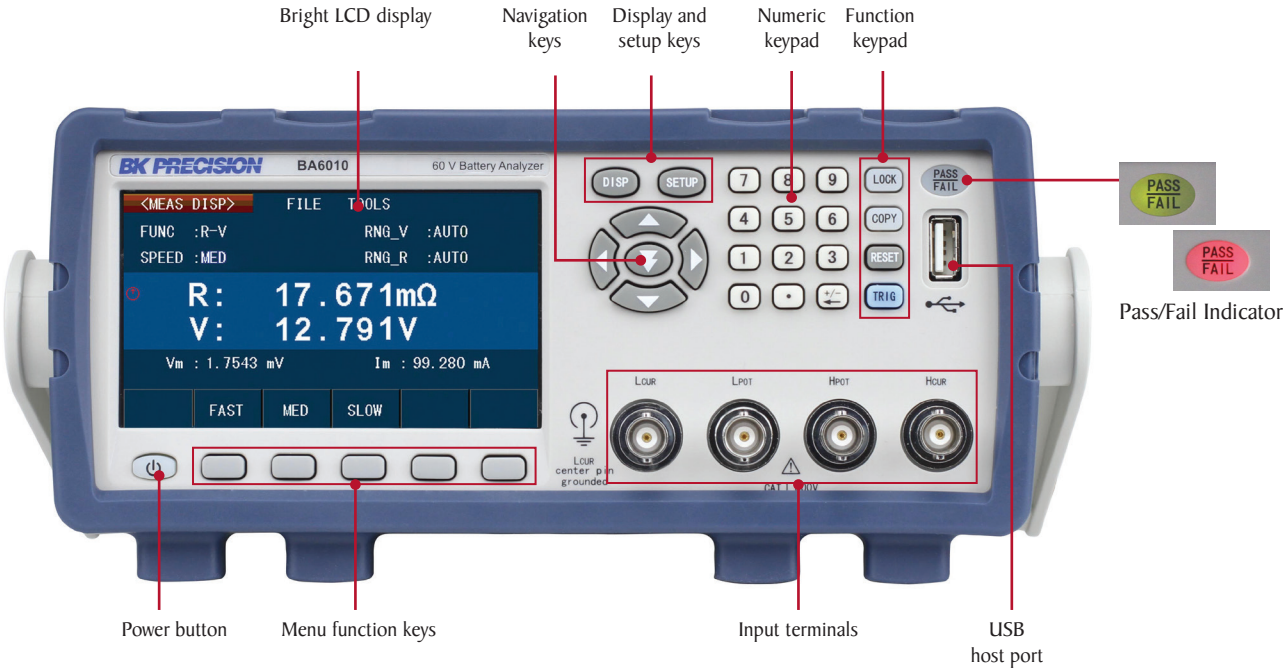
Simplified Randles cell



Auxiliary measurement parameters

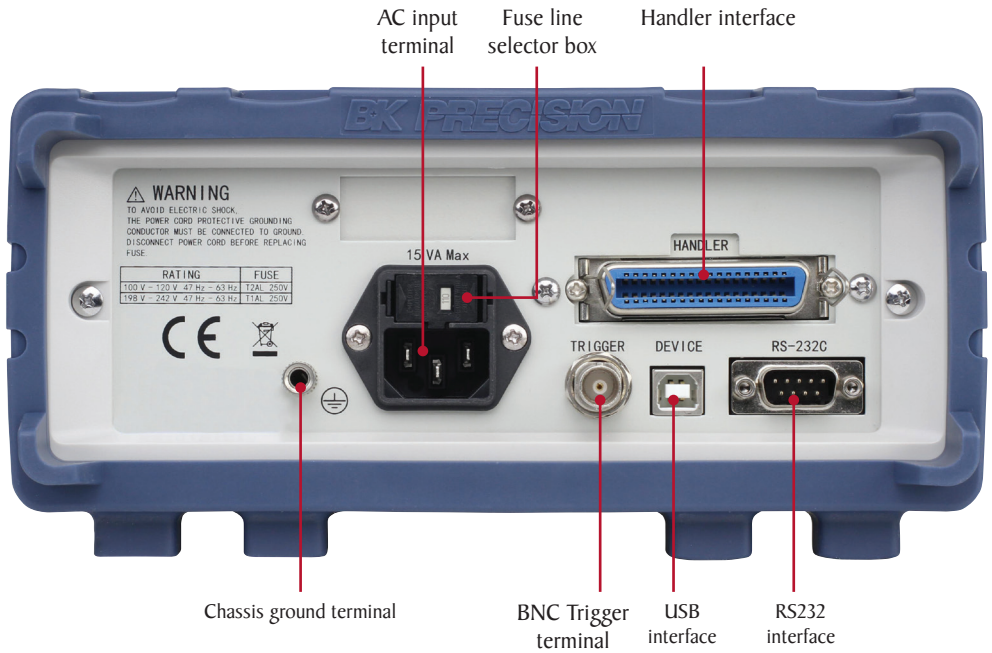
Model	Input voltage range	Basic voltage accuracy	Voltage resolution
BA6010	6 V / 60 V	0.05 %	100 µV
BA6011	30 V / 300 V	0.05 %	1 mV

Front panel



Large 4.3 inch color LCD screen for easy viewing of configuration and measurements. 4-terminal front panel connection and quick connect test fixture for high accuracy measurements.

Rear panel



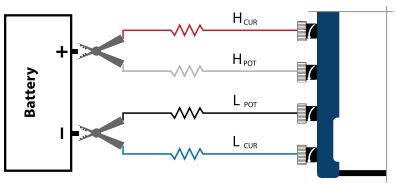
Standard RS232, USB (USBTMC and virtual COM) interfaces, handler interface and external BNC trigger input are useful for production automation.

Flexible operation

Improved measurement accuracy

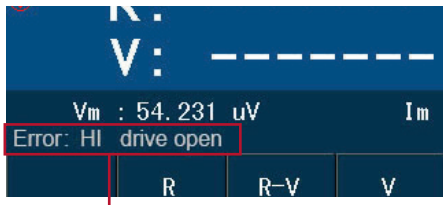
The 4-terminals on the front of the BA6010 Series are used together with the Kelvin clip test fixture. This system minimizes the influence of the test lead resistance and improves measurement accuracy.

Kelvin clip test fixture



4-wire kelvin connection

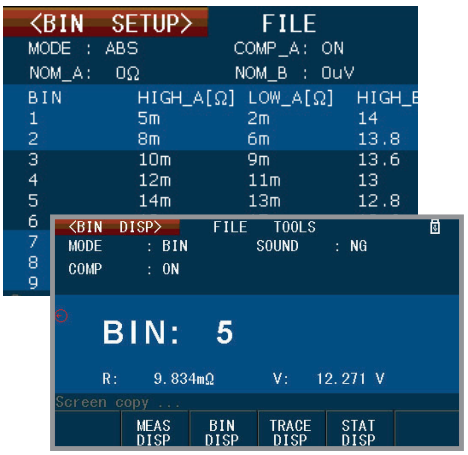
On screen monitoring system detects test probe contact failure and damaged leads for reliable measurements.



Error: HI drive open
Error: LO drive open
Error: HI sense open
Error: LO sense open
Error: Measure line open

Binning function

Quickly sort components using up to 9 bins. The bin results are displayed on-screen with each cycle. The handler interface includes dedicated signal pins for each bin, Pass/Fail and end of measurement. The handler interface is suitable for integration with device handler systems or programmable logic controllers (PLC) used in production automation.



Bins for sorting devices

Comparator function

The comparator function evaluates measurements against a user specified upper and lower limit for pass/fail (Go/No Go) style testing. Comparative evaluations can be made using primary, secondary or both measurements. The front panel PASS / FAIL indicator will illuminate and a sounder can be enabled for audible confirmation.

Bin comparator display

Compare test - below limits

Compare test - above limits

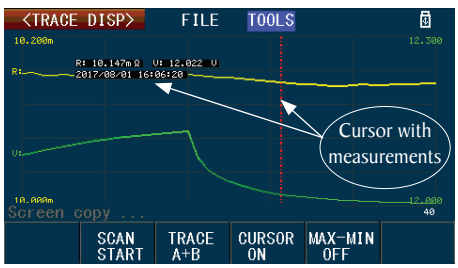
Statistical function

The analyzers can perform statistical calculations on the measurements and display the results on-screen.

Statistical tools menu

Trace function

The trace function samples and plots two user-selected measurement readings over a specified time. Enable cursors for viewing plotted values and time stamp information.



Trace display

Specifications

All specifications apply to the unit after a temperature stabilization time of 15 minutes over an ambient temperature range of 20 °C ± 5 °C. Specifications are subject to change without notice.

Model		BA6010, BA6011
Measurement Parameters	Main	V, R
	Auxiliary	L, C, D, Z, X, Q, θd, and θr
Test Frequency		1 kHz ± 0.2 Hz
Display Resolution		5 digits (SLOW & MED), 4 digits (FAST)
Measurement Speed		SLOW, approx. 6.25 measurements/sec MED, approx. 10 measurements/sec FAST, approx. 50 measurements/sec
Temperature Coefficient	Voltage Meas.	0.005 % / °C
	Resistance Meas.	0.05 % / °C
Triggering		Internal, External, Manual, Bus
Delay Time		On / Off, 0 ms to 60 s
Averaging		1 to 255 samples
Statistical Calculations		Valid data count, Invalid data count, Mean, Maximum, Minimum, Standard Deviation, Sample Standard Deviation, Process Capability Index (Dispersion), Process Capability Index (Deviation)

Voltage Measurement (BA6010)			
SLOW, MED			
Range	**Maximum Display Value**	**Resolution**	**Accuracy**
6 V	6.5000 V	100 µV	±(0.05 % FS)
60 V	65.000 V	1 mV	

FAST			
Range	**Maximum Display Value**	**Resolution**	**Accuracy**
6 V	6.500 V	1 mV	±(0.1 % FS)
60 V	65.00 V	10 mV	

Voltage Measurement (BA6011)			
SLOW, MED			
Range	**Maximum Display Value**	**Resolution**	**Accuracy**
30 V	35.000 V	1 mV	±(0.05 % FS)
300V	310.00 V	10 mV	

FAST			
Range	**Maximum Display Value**	**Resolution**	**Accuracy**
30 V	35.00 V	10 mV	±(0.1 % FS)
300 V	310.0 V	100 mV	

Specifications

Resistance Measurement				
SLOW, MED				
Range	**Maximum Display Value**	**Resolution**	**Measurement Current**	**Accuracy**
30 mΩ	33.000 mΩ	1 µΩ	100 mA (± 10 %)	±(0.3 % + 0.1 % FS)
300 mΩ	330.00 mΩ	10 µΩ	100 mA (±10 %)	
3 Ω	3.3000 Ω	100 µΩ	10 mA (± 10 %)	
30 Ω	33.000 Ω	1 mΩ	1 mA (± 10 %)	
300 Ω	330.00 Ω	10 mΩ	100 µA (± 10 %)	
3 kΩ	3.5000 kΩ	100 mΩ	10 µA (± 10 %)	
FAST				
Range	**Maximum Display value**	**Resolution**	**Measurement Current**	**Accuracy**
30 mΩ	33.00 mΩ	10 µΩ	100 mA (± 10 %)	±(0.5 % + 0.3 % FS)
300 mΩ	330.0 mΩ	100 µΩ	100 mA (± 10 %)	
3 Ω	3.300 Ω	1 mΩ	10 mA (± 10 %)	
30 Ω	33.00 Ω	10 mΩ	1 µA (± 10 %)	
300 Ω	330.0 Ω	100 mΩ	100 µA (± 10 %)	
3 kΩ	3.500 kΩ	1 Ω	10 µA (± 10 %)	

Accuracy of Auxiliary Measurement Parameters	
L, C, D, Z, X, Q, θd, and θr	5 % typical**

** see user manual for more details

Bin Comparator Function		
Limit Setting Mode		Tolerance (TOL) or Absolute (ABS) value
Number of Bins		9 sorting bins BIN1-BIN9
Beep Warning		OFF, PASS, FAIL
Trace Function		
Total Time		1 s - 99999 s
Sampling Interval		1 s - 86400 s
General		
Save/ Recall	**Instrument Settings**	
	Save / Recall	Internal or External Memory: Up to 100
	Measurements, Bin Comparator Results, Screenshots	
	Save	External Memory: Up to 100
Remote Interface		USBTMC / USB (Virtual COM), RS232,
Display		4.3", 480 × 272 LCD display
AC Input		110 V ±10 % or 220 V ± 10 %, 47 to 63 Hz
Power Consumption		15 VA Max.
Operating Temperature		0 °C to 40 °C
Storage Temperature		-10 °C to 70 °C
Relative Humidity		up to 80 %
Dimension (W×H×D)		9.25" x 4.1" x 14.17" (235 x 104 x 360 mm)
Weight		7.9 lbs (3.6 kg)
		Three-Year Warranty
Included Accessories		User manual (downloadable), power cord, 4-wire kelvin clip test fixture (TLKB1), certificate of calibration & test report