

# Milliohmmeter RESISTOMAT® for Production and Laboratory

Model 2316

Code:	2316 E
Manufacturer:	burster
Delivery:	ex stock/6 week
Warranty:	24 months
Issue:	1.2.2005



- Measuring ranges from 2 mΩ to 200 kΩ
- Resolution up to 0.1 μΩ
- Accuracy 0.03 % Rdg.
- Autorange
- Temperature compensation for all materials
- Thermal e.m.f. compensation
- Input voltage protection up to 400 V<sub>eff</sub>
- RS232 and PLC interface standard (USB option)

## Application

Fast and accurate measurements of the smallest resistance values are possible with the milliohmmeter RESISTOMAT® model 2316. Due to the robust desktop housing with membrane keypad it is suitable for use in laboratory and industrial environment likewise.

Wires and coils can be measured with temperature compensation. The temperature of the sample is measured with a Pt 100 or pyrometer and the resistance is then corrected to the equivalent at e.g. 20 °C (adjustable) in the instrument.

The application range is very wide such as the measurement of:

- transformer motor coil windings
- coils of all kind
- cables and wires on the drum or as meter samples
- switch and relay contacts
- heating elements
- fuses
- connections and transitions at power rails and many more

The complete control via RS232 interface enables the setup of fully automatic test stations. The instrument features a PLC interface for integration into production process control classification and makes selection of the samples an easy task.

## Description

The device works according to the proven 4-wire measurement method which eliminates errors caused by test lead and contact resistances. Thermo voltages that might be in the measurement circle would be compensated automatically by this measurement method. The control of the measurement leads is done with an integrated cable fraction detection.

A temperature compensation for any given sample material such as copper, aluminium, tungsten, etc. is self-evident. The temperature measurement is done by an external Pt100 sensor or by an external infrared measurement device (ref. to accessories). A special measurement voltage input protection was developed for testing large inductive samples so that voltage peaks do not cause permanent damage while pinching off the sample.

16 device settings such as the measurement range, limit values, temperature coefficient, etc. can be saved in order to test samples with different parameters in an automatic measurement system. All device specific settings are shown to the user via display. Calling up the settings is done via keypad or via PLC interface with a bit pattern (4-bits). It goes without saying that all device settings may also be effected via the RS232 interface.

The high-contrast LCD display with backlight assures very good reading of the measurement value in dark as well as bright spaces.

## Technical Data

### Construction

The device has a service-friendly construction in a sturdy aluminium die casting housing which enables good access to the various components. The operation is done via the membrane keypad. The connections for the sample, the in- and outputs of the RS232/PLC interface as well as the Pt100-sensors are located at the backside of the device. The device features a diagnosis function for current source, amplifier, display, internal operation voltage and PLC I/O.

Measuring range	Resolution	Measuring current
* 2.0000 mΩ	100 nΩ	3 A
20.000 mΩ	1 μΩ	1 A
200.00 mΩ	10 μΩ	100 mA
2.0000 Ω	100 μΩ	10 mA
20.000 Ω	1 mΩ	10 mA
200.00 Ω	10 mΩ	1 mA
2.0000 kΩ	100 mΩ	1 mA
20.000 kΩ	1 Ω	100 μA
200.00 kΩ	10 Ω	10 μA

\*Measuring range 2.0000 mΩ / 3A only model 2316-V0001

Accuracy (with temp. comp. off):	≤ ± 0,03 % Rdg. ± 3 Digit
Burden voltage:	approx. 5 V max.
Measuring time (for ohmic probes):	approx. 200 ms
Warm-up time to attain the error tolerance range:	< 15 min
Measurement connection:	4-wire technology for current and voltage measurement (KELVIN), ground-free circuit design FE-PE max. 250 V
Input protected:	up to 400 V <sub>eff</sub>
Measurement mode:	continuous and single measurement, cooling curve measurements on motor or transformer windings
Limit value:	programmable Hi/Lo limits
Range selection:	manual or automatic
Automatic temperature compensation:	7 different temperature coefficients can be chosen and additional 8 TC's are adjustable
Temperature measurement:	with and ext. PT100 sensor or temperature transmitter -pyrometer- with a voltage output of 10 V
Display:	high-contrast graphic LCD with adjustable contrast and LED background illumination 264*64 Dots, 127 x 34 mm
Measurement display:	max. 21 000 counts
Device setting memory:	for 16 different device settings
Operator language:	German, English, French, Italian, Espanol
Mains supply:	85 ... 264 V AC 50/60 Hz
Power consumption:	approx. 30 VA
Temperature drift:	50 ppm/K
Operation temperature:	0 ... +23 ... + 50 °C
Humidity non-condensing:	80 % rel. hum. (up to 31 °C), over linear decreasing to 50 % at 50 °C
Storage temperature:	0 ... + 70 °C
Weight:	3,5 kg
Dimensions (WxHxD):	247 x 106 x 275 [mm] 19"-3HU rack mount set, option
Device protection:	EN 61010-1 protection class1
Type of protection:	IP 40

### Connections

Measuring input:	alternative via 4 terminals (ø 4 mm) or 5-pin socket with bayonet lock
Pt 100-sensor:	6-pin, LEMO socket EGG.1B.306
Digital I/O:	37-pin subminiature D-socket PLC interface with pos. logic (negative logic option) additional comparator output with relay (disconnectible) 24 V / 1A
RS232 interface:	9-pin subminiature D-socket Baud rate: 300 ... 57 600 Protocol: ANSI X3.28 1976 Subc.2.1,A3 SCPI commands: Vers. 1995.0 data recording to a printer with RS232-interface is possible
USB interface:	possible with an RS232/USB adapter cable model 9900-K350

### Order Information

#### RESISTOMAT®

Range 20 mΩ ... 200 kΩ

**Model 2316-V0000**

Range 2 mΩ ... 200 kΩ

**Model 2316-V0001**

### Accessories

Measurement leads, 4-pin, 1,5 m long shielded, cable with banana plugs	<b>Model 2329-K001</b>
RS232 data transmission lead	<b>Model 9900-K333</b>
USB data transmission lead	<b>Model 9900-K350</b>
Temperature sensor with 2.5 m shielded connection line and connection plug	<b>Model 2392-V001</b>
Infrared temperature sensor (pyrometer) temperature range 0 ... 100 °C	<b>Model 2328-Z001</b>
37-pin plug for digital I/O interface	<b>Model 9900-V165</b>
5-pin bayonet plug for measuring input	<b>Model 9900-V172</b>
19"-Rack mount kit (3 HU)	<b>Model 2316-Z001</b>
<b>DKD Calibration</b> Model 2316-V0000 Model 2316-V0001	<b>Model 23DKD-2316-V0000</b> <b>Model 23DKD-2316-V0001</b>
<b>WKS Calibration</b> Model 2316-V0000 Model 2316-V0001	<b>Model 23WKS-2316-V0000</b> <b>Model 23WKS-2316-V0001</b>

For DKD (Deutscher Kalibrierdienst) calibrations we use PTB-calibrated standards (national institute).

For WKS (manufacturer calibration) calibrations we use DKD-calibrated resistors.

Calibration resistors	<b>see data sheet 1240-E</b>
Kelvin measuring pliers and probes	<b>see data sheet 2385-E</b>
Wire holding devices for wires up to 1500 mm <sup>2</sup>	<b>see data sheet 2381-E</b>