RESISTOMAT® for Fast Resistance Measurement in Automated Processes

Model 2329

Code:	2329 E
Manufacturer:	burster
Delivery:	ex stock/2 weeks
Warranty:	12 months
Issue:	1.10.2002

2329-E

NEW
Option with 6 channel switch system

- **Measurement range from 200 mΩ ... 200 kΩ**
- **Resolution of 10 μΩ**
- **Measurement accuracy 0.03 % rdg.**
- **Automatic measurement range selection**
- **Up to 50 measurements and evaluations per second**
- **Temperature compensation for all materials**
- **Thermovoltage compensation**
- **Dry-circuit measurement in accordance with DIN IEC 512**
- **Data logger for 20000 measurement values**
- **RS232 and PLC interface standard (IEEE488 option)**

Applications

The RESISTOMAT® model 2329 is particularly suitable for quick measurements of low resistances in automated processes. Up to 50 measurements per second can easily be performed.
The device complies with the latest CE guidelines and is designed for laboratory use as well as heavy-duty industrial applications.
A 2-fold and 4-fold comparator with switching outputs has been included for classification and selection; this feature is particularly useful for serial experiments.
One special application involves the measurement of contact resistances (dry-circuit measurement); the load voltage in this case is limited to 20 mV in order to prevent fritting (DIN IEC 512).
The RS232- (standard) and IEEE488- (optional) computer interfaces allow fully automatic testing stations to be set up. The PLC-interface allows easy integration into your production process control.

Typical applications are resistance and conductivity measurements of:

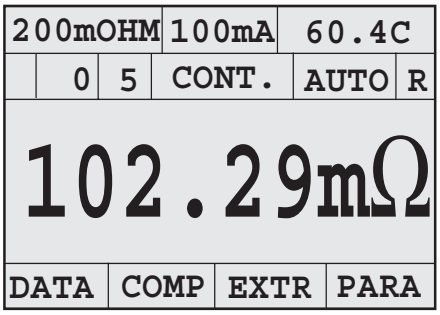
- ► Fuses
- ► Airbag triggers
- ► Coils for the automobile industry and electrical engineering
- ► Plug-in contacts and switches
- ► Commutator welded-joints
- ► Meter samples in cable manufacture
- ► Circuit-board conductors

etc.

Description

The device operates on the basis of proven 4-wire technology which corrects any incoming line or contact resistances. The measurement lines are checked by an integrated cable rupture monitor.
Needless to say, the functions include temperature compensation for various test substances such as copper, brass, tungsten etc. Temperatures are measured by a Pt 100 sensor or infrared sensor (pyrometer) with analog outputs or any temperature transmitter e.g. thermocouple.
For measuring test objects with low inductances, a special measurement input protection was developed to prevent voltage peaks from damaging the device when test objects are disconnected.
If objects need to be tested for several different parameters by an automatic measurement system, you can store up to 32 device settings such as measurement ranges, limiting values, temperature coefficients etc. These settings are called up via a bit pattern (5 bits). Naturally, all device settings can also be made via the RS232 (standard) or IEEE488 (optional) interface.
The integrated datalogger can be used during serial measurements to store up to 20.000 measurement values which can be divided into 32 individual blocks. A digital filter is available for preselecting the measurement values to be stored. The evaluation menu of the stochastic data logger displays the maximum, minimum and average values as well as the standard deviation.

Display:



Status line I
Measurement range, measurement current or 20 mV for dry-circuit measurements.
Temperature with active temperature compensation or setpoint values with Δ % display.

Status line II
Sample sign, error status, the device adjustment loaded last, continuous or single measurement, manual or automatic range selection, measurement sequence R or Z.

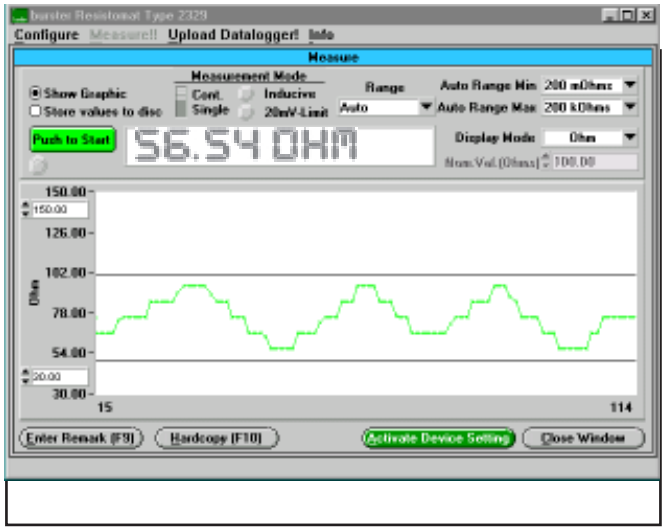
Measurement value field
The value measured last.

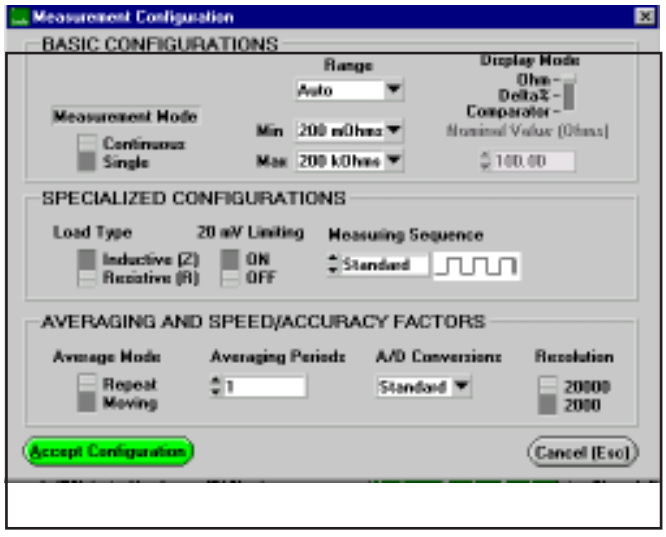
Meaning of the function keys.

Device and Documentation Software

The software model 2329-P001 is especially developed for the device setting as well as for the measurement value deviation and provides following features:

- ► Full control of the RESISTOMAT® model 2329.
- ► On-line display of the measure values (graphic or tabular)
- ► Direct storage of the measure values in ASCII-Files
- ► Read-in and storage of data logger values in ASCII-files
- ► Export of the datas in ASCII-format to e.g. MS-Excel





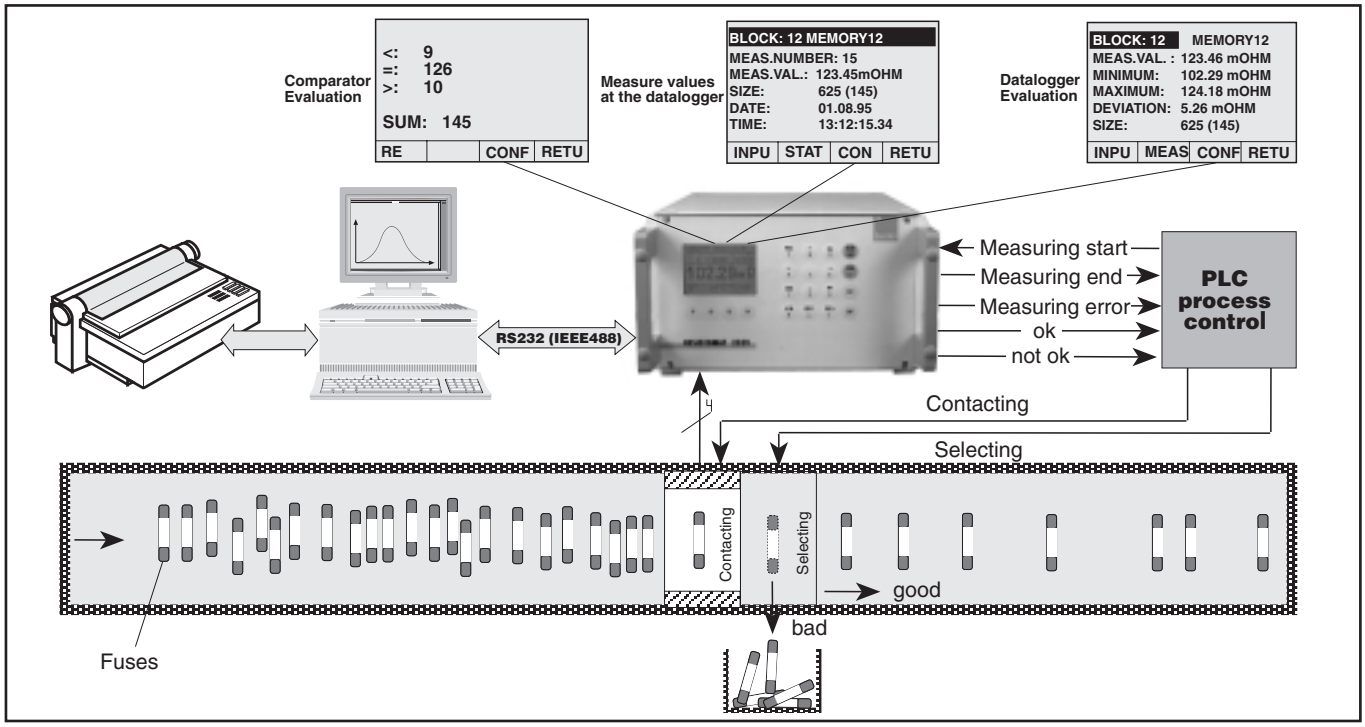
System Requirements

Processor:	80386 with co-processor or better
Graphic:	Standard VGA 640*480, 256 colours (also monochrome LCD-display)
Memory:	min. 8 MB RAM
Hard disk:	approx. 10 MB free memory
Relocation file:	min. 15 MB
Operating system:	Win 3.1, Win 3.11, Win 95, Win 98, WinNT 4.0
Interface:	RS232 or IEEE488

Application

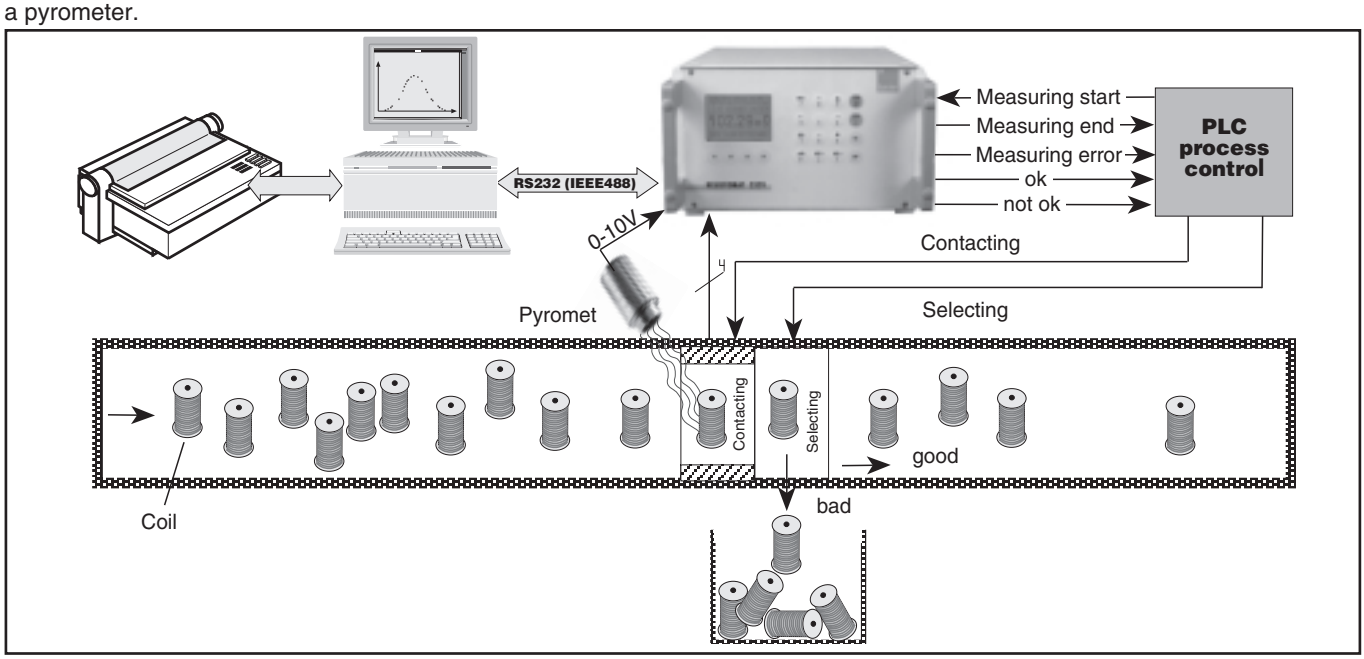
Fuses 100 % tested

Evaluation of the fuses production with device internal statistic program or externally via PC.



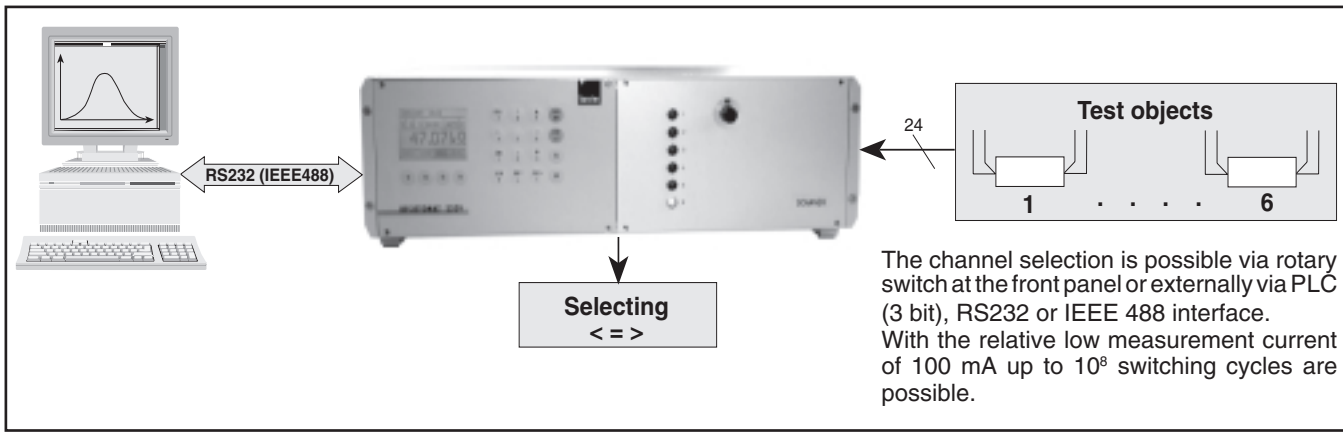
Coils 100 % tested

The measurement happens in consideration of the temperature coefficient. For that purpose the surface of the coil is measured with a pyrometer.



PC-controlled tests with 6 channel switch

Automatic 4-wire measurement for up to 6 test objects with the integrated switch box.



The channel selection is possible via rotary switch at the front panel or externally via PLC (3 bit), RS232 or IEEE 488 interface.
With the relative low measurement current of 100 mA up to 10^8 switching cycles are possible.

Technical Data

Design

The device is easy to maintain and equipped with a robust metal housing. Easy accessibility of the individual modules and ideal servicing conditions are thus also ensured.
All the control elements are arranged clearly and logically on the front panel. The connection socket for test objects and the inputs/outputs for the interface, comparators, Pt 100 sensor (for temperature compensation) and control unit are located on the rear panel of the device.

Measurement Range	Resolution	Measurement Current
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	100 µA
20.000 kΩ	1 Ω	100 µA
200.00 kΩ	10 Ω	10 µA

Measurement error (with the temperature compensation inactive):
up to 0.03 % of reading ± 2 digits

Warm-up time: < 10 min. to attain the error tolerance range

Max. voltage at the open terminals: < 16 V

Max. load voltage: ≥ 5 V

Measurement connection:
4-wire technology for current and voltage measurement (Kelvin), ungrounded circuit, potential binding is possible either on the test object or the RESISTOMAT®.

Measurement time:
Up to 50 measurements and evaluations per second, depending on the resolution and measurement mode in the case of purely ohmic test objects.

Measurement type: Continuous or single measurement

Range selection: Manual or automatic

Dry-circuit measurement: In accordance with DIN IEC 512
20 mV load voltage limiting up to 4 Ω

Temperature compensation:
Selection and adjustment of 10 different temperature coefficients

Temperature measurement:
Via an external Pt 100 sensor or transmitter (pyrometer) with a voltage (0 ... 10 V) or current output (0 ... 20 mA), (4 ... 20 mA)

Comparator: 2 or 4 limiting values, as required

Data logger: The data logger has a memory capacity of 20,000 measurement values which can be divided into blocks.

General Data

Display:
128 x 64 pixel, transflective LCD graphic display with adjustable contrast and background illumination.

Measurement value indication:
3 1/2 or 4 1/2-digit, 15 mm high, measurement value display as absolute, Δ% or evaluation >>, >, =, <, <<

Voltage supply: 230 V ± 10 % or 115 V ± 10 %

Mains frequency: 45 - 65 Hz

Power consumption: max. 25 VA

Ambient conditions: Operation: +5 ... **23** ... 50 °C,
Storage -10 ... 60 °C

Temperature drift: 20 ppm/K

Potential binding:
The measurement section is grounded internally; a switchover to external grounding is also possible

Clock, data logger, adjustment: Internal battery back-up

Parameter entry: Via keys or interface

Weight: approx. 5 kg

Housing dim. (HxWxD)151 x 237 x 285 [mm] with handles D = 325 mm

Device protection: in acc. withVDE 0411

Type of protection: IP 40

Technical alteration reserved

Connections

Rx input (test object):
5-pin Tuchel socket series C 70 BT 3015000 with bayonet lock

Pt 100 sensor: 6-pin LEMO socket EGG. 2B. 306

Analog I/0: 9-pin, subminiature D-plug
Temperature input 0 ... 10 V, 0 ... 20 mA, 4 ... 20 mA
Analog output 0 ... 10 V, scaling error ≤ 2,5 %

Digital I/0: 37 pin, subminiature D socket

PLC interface: ext. DC supply 20 V ... 24 V ... 30 V, pos. Logic with consume current PLC inputs
U_{min} = 15 V U_{max} = 30 V I_{miax} = 150 mV
5 Bit for evaluation <<, <, =, >, >>
1 Bit measure end
1 Bit measure bussy
1 Bit measure error
6 Bit for binary selection of the device setting
4 Bit for control input
3 Bit for control output
1 Bit START/STOP each for measurement, comparator, datalogger, min./max., printer

Relay output: One switching contact each for the evaluation results << , < , = , > , >>
Switching power 30 W
Voltage load max. 48 V
Current load max. 1 A

Contact input: Measurement START/STOP with footswitch

Interface connections:

RS232C interface:
9-pole Subminiature D-socket
Baud rate 300 - 38 400
Protocol ANSI X 3.28-1976 subcategory 2.1, A3
SCPI command language, version 1995.0
Data recording to a printer with RS232 interface is possible

IEEE488 interface (optional):
24 pole plug connection standardized for open collector output (E1)
SH1, AH1, T6, TEØ, L4, LEØ, SR1, RL1, PPØ, DC1, DTØ, CØ
SCPI command language, version 1995.0

Order Information

RESISTOMAT® **Model 2329**
with RS232 interface

RESISTOMAT® **Model 2329-V001**
with RS232 and IEEE488-interface

RESISTOMAT® **Model 2329-V002**
with RS232 interface and 6 channel switch system

Accessories

Measurement lead **Model 2329-K001**
4-pole, 1.5 m long shielded cable with banana plugs

RS232 data transmission lead **Model 9900-K333**
for PC connection

Temperature sensor **Model 2392-V001**
with 2.5 m shielded connection line and connection plug

Device and documentation software **Model 2329-P001**

37-pole plug **Model 9900-V165**
for digital I/0 interface

9-pole socket **Model 9900-V609**
for analog I/0 interface

Assembly set for 19" rack mounting **Model 2329-Z004**

Calibration resistors **see data sheet 1240 E**
Kelvin measuring pliers and probes **see data sheet 2381 E**
Wire holding device
for wires up to 1000 mm² **see data sheet 2385 E**