



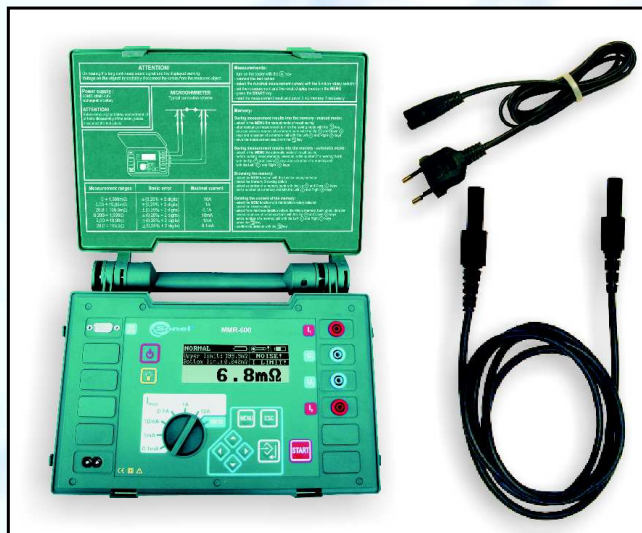
## The Art of Measuring Low Resistance

### MMR-600, MMR-610 Microohmmeters

The **MMR-600** Series meters are professional portable measuring instruments for testing very low resistances. Due to their special measurement algorithm they can be used for both resistive and inductive type of a specimen that makes the **MMR-600/610** a perfect instrument for electricians testing electrical junctions, motors and power transformers windings. The results can be stored in the internal memory and sent to a computer via serial interface. A quick PASS/FAIL test function with results displayed and acoustically indicated simplifies measurements considerably. The **MMR-600/MMR-610** meter can also be used for testing the quality of the junctions in a production process via the interface.

#### MMR-600 and MMR-610 features:

- Resistance measurement of:
  - Welded connections
  - Equipotential bonding
  - Terminals and connectors
  - Cable connections
  - Electrical connections of the heating elements
  - Rail fusion welds
  - Cables and wires
  - Coils (engines, transformers etc)
  - Low resistance coils
- Automatic discharge of a specimen inductance after a measurement
- Checking the continuity of earth wire and quality of all the junctions
- Auto ranging
- Selectable unidirectional or bidirectional current flow during a measurement. Accordingly one or two results are obtained. The instrument shows one result or the average of two bidirectional results.
- Three modes of measurement triggering:
  - Normal - a measurement triggered by pressing the START button
  - Automatic - a measurement triggered after detecting the connection of two pairs of terminals (voltage and current) to a specimen
  - Continuous measurements are triggered one by one continuously with a 3-second-readout refreshing
- Two measurement modes
  - Fast (3 seconds) - for resistive specimen measurements
  - Slow (lasting a few minutes) - for inductive specimen measurements



- High resistance to specimen noises (s/n rate <0,2)
- Programmable resistance window for  $R_{MIN} < R_x < R_{MAX}$  for fast PASS/FAIL tests
- Remote control of the measurements via interface
- Memory of 990 measurement results that can be sent to PC via RS-232C interface
- Large backlit graphic display
- Powered from NiMH batteries. A built-in charger with battery monitoring and charging process control
- Auto-off function
- Easy to operate

#### Standard equipment

- A set of the measurement cables:
  - Two 3m long two-core cables with banana plugs
- Cable for battery charger
- Four "crocodile" clips
- SONEL-NiMH 4,8V battery package
- Operation manual
- Carrying case

#### Optional Accessories

- A set of test leads with pin probes Catalogue No.: 113969051
- RS-323C interface cable Catalogue No.: 112542005
- SONEL PE software (for creating documentation from the measurement results, compatible with the SONEL meters) Catalogue No.: 094229008



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### MMR-600, MMR-610 Technical Specifications

#### Nominal operating conditions:

- measurement current.....DC, 0,1mA-10A
- measurement voltage.....20mV
- measurement current flow selectable, one or two directional
- noise immunity.....addit. error 1% for 50 Hz 100mV rms
- operating temperature range:
  - nominal.....+20°C...25°C
  - operating.....0...40°C
  - storage.....-20°C...+60°C
- temperature coefficient.....0,01% rdg/°C
- nominal line voltage for battery charger.....230V

#### Complies with standards:

- EN 61010-1:2002
- measurement category.....Cat. III 300V
- tightness.....IP 54 EN 60529

#### Other:

- inputs protection.....up to 440V AC for 10 sec.
- display.....graphic LCM 192X64dots, illuminated, 98x35mm
- dimensions.....295 x 222 x 95mm
- weight with NiMH battery package.....ca. 1,7kg
- power supply.....battery package type SONEL-NiMH 4,8V
- battery life.....min. 300 measurements with 10A
- measurement time:
  - resistive mode.....3 sec.
  - inductive mode.....few minutes (depending on current selection, inductance and resistance)
- max. cables resistance for 10A.....0,1Ω
- max. inductance of specimen.....40H
- meas. current accuracy.....10% MMR-600 10% MMR-610
- memory.....990 test results
- auto-off time.....2 minutes
- battery charging time.....ca. 2,5 hours
- interface standard.....RS-232C

#### Resistance measurements MMR-600

Range	Resolution	Accuracy	Voltage for full range	Meas. current
0...1,999 mΩ	1μΩ	±(0,25% rdg. + 2 μΩ)	20mV	10A
2,00...19,99 mΩ	10μΩ	±(0,25% rdg. + 20 μΩ)	20mV	1A
20,0...199,9 mΩ	0,1mΩ	±(0,25% rdg. + 0,2 mΩ)	20mV	0,1A
0,200...1,999 Ω	1mΩ	±(0,25% rdg. + 2 mΩ)	20mV	10mA
2,00...19,99 Ω	10mΩ	±(0,25% rdg. + 20 mΩ)	20mV	1mA
20,0...199,9 Ω	0,1Ω	±(0,25% rdg. + 0,2 Ω)	20mV	0,1mA

#### Resistance measurements MMR-610

Range	Resolution	Accuracy	Voltage for full range	Meas. current
0...1,9999 mΩ	0,1μΩ	±(0,25% rdg. + 0,2 μΩ)	20mV	10A
2,000...19,999 mΩ	1μΩ	±(0,25% rdg. + 2 μΩ)	20mV	1A
20,00...199,99 mΩ	10μΩ	±(0,25% rdg. + 20 μΩ)	20mV	0,1A
0,2000...1,9999 Ω	0,1mΩ	±(0,25% rdg. + 0,2 mΩ)	20mV	10mA
2,000...19,999 Ω	1mΩ	±(0,25% rdg. + 2 mΩ)	20mV	1mA
20,00...199,99 Ω	10mΩ	±(0,25% rdg. + 20 mΩ)	20mV	0,1mA

- voltmeter internal impedance: 200k
- „rdg” = of the reading

The errors given above are specified for bidirectional measurement current flow and refer to average value of two directions calculated from the following formula:

$$R = \frac{R_F + R_R}{2}$$

where  $R_F$  resistance at conventional „forward” current direction and  $R_R$  resistance at conventional „reverse” current direction. The specified accuracy is not guaranteed for unidirectional measurement.