



200 mA

measurement
current



soil resistivity
without manual
conversion

MRU-200-GPS



built-in
GPS receiver

CAT III

600 V

CAT IV

300 V



IP54



BLUETOOTH

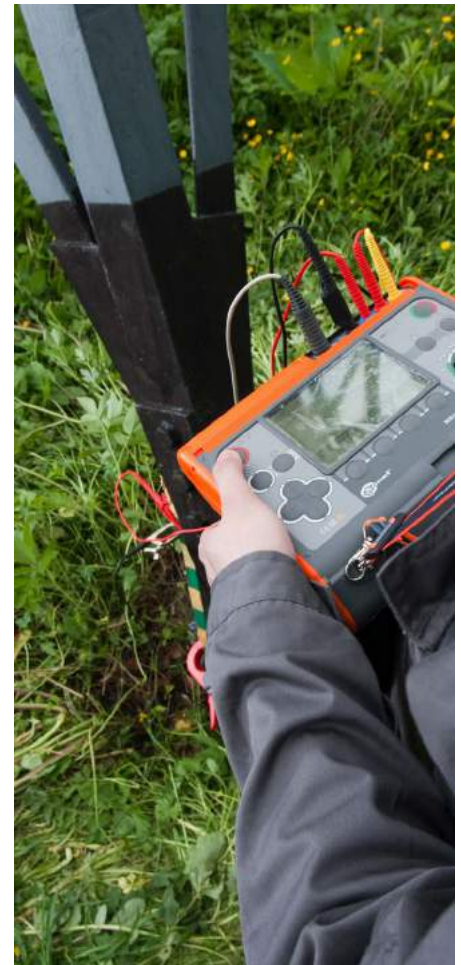
Multifunctional earthing and soil resistivity meter

Measurement methods

- **Impulse method** – measurement of lightning protection systems with a measuring impulse ramp of 4/10 μ s, 8/20 μ s, 10/350 μ s
- **3-pole and 4-wire method** – measurement of earthing systems using auxiliary probes
- **3-pole method with clamp** – measurement of earthing systems with multiple earth electrodes
- **Two-clamp method** – measurement of earthing system when the auxiliary probes cannot be used
- **Earth resistivity** – Wenner method
- **Resistance of earth connection and equipotential bonding** measured using current ≥ 200 mA with auto-zero function – meets the requirements of EN 61557-4
- **Measurement of leakage current**

Additional features

- **Built-in GPS receiver** – recording results with location coordinates (MRU-200-GPS)
- Measurement of resistance of auxiliary electrodes R_s and R_H
- Measurement of interference voltage
- Measurement of interference frequency
- Measurement in the presence of interference voltage generated by power networks with frequency of 16 2/3 Hz, 50 Hz, 60 Hz, 400 Hz
- Selection of maximum measuring voltage (25 V and 50 V)
- Automatic calculation of soil resistivity in ohm-meters (Ω m) and ohm-feet (Ω ft)
- Memory of 990 measurement results (10 banks of 99 cells each)
- Calibration of clamp used
- Real time clock (RTC)
- Data transmission to the computer and mobile devices
- Battery indication





Application

MRU-200 and MRU-200-GPS meters were created for **the most difficult working conditions**. They generate a measuring current exceeding 200 mA, which provides effective measurements of grounding of energy objects such as transformer stations and power stations.

Thanks to the methods using clamps, it is **not necessary to disconnect the control connectors**, which is sometimes a very tedious operation. This plays a special role when performing works on objects exposed to weather conditions, where the connecting elements are sometimes corroded or tarnished.

The graphical user interface provides clear readings and explicit messages. This translates into quick, trouble-free service.



Impulse method

MRU-200 and MRU-200-GPS may be used to test earthing of **lightning protection systems**, as these meters are able to simulate the conditions occurring during a lightning strike – they generate currents with a standardized pulse leading edge and a time to half-peak. Available **impulse ramps** include 4/10 μ s, 8/20 μ s, 10/350 μ s.

Compatible with ERP-1 adapter

ERP-1 adapter allows user to test earthing systems using flexible clamps. This is particularly useful, e.g. in case of lattice towers – there is no need to switch off the line or disconnect control connectors. Proprietary algorithm allows user to check the current direction in the individual measurements and facilitates damage detections, e.g. corroded steel strip (hoop).



Capabilities

The measuring methods available in the device allow for comprehensive control of working and protective grounding. The calibration function of the test leads eliminates the influence of their resistance on the result. However, this is just the beginning.

- **The 4-wire method** provides very accurate measurement of the expected small values of resistance – eliminates the resistance of the test leads connecting the meter to grounding.
- **Measurement of resistance** of earth connection and equipotential bonding with a current exceeding 200 mA meets the requirements of EN 61557-4 standard.
- Before performing the measurement, the meter checks whether the tested object is a subject to excessive **interference voltage**, which may indicate additional problems.



Memory and results

The results can be saved to the device's memory. It is divided into **10 banks of 99 cells**, each corresponding to one measurement. These results can be easily transferred to the **Sonel Reader** software for archiving or subsequent analysis and research.

Bluetooth wireless interface may be used to transfer measurement results to PC software or to a mobile phone with dedicated app – **Sonel MRU Mobile**. This provides not only data archiving function, but further data transfer – directly from the measurement site via an e-mail.

Technical specifications

| Measurement functions | Measurement range | Display range | Resolution | Accuracy ±(% m.v. + digits) |
|--|--|--------------------|--------------|--|
| Interference voltage | 0 V...100 V | 0 V...100 V | 1 V | ±(2% m.v. + 3 digits) |
| Resistance of earth connection and equipotential bonding | 0.045 Ω...19.99 kΩ acc. to EN 61557-4 | 0.000 Ω...19.99 kΩ | from 0.001 Ω | from ±(2% m.v. + 2 digits) |
| Earth resistance | | | | |
| 3-pole and 4-wire method | 0.100 Ω...19.99 kΩ acc. to EN 61557-5 | 0.000 Ω...19.99 kΩ | from 0.001 Ω | from ±(2% m.v. + 2 digits) |
| 3-pole + clamp method | 0.120 Ω...1999 Ω acc. to EN 61557-5 | 0.000 Ω...1999 Ω | from 0.001 Ω | ±(8% m.v. + 3 digits) |
| two-clamp method | 0.00 Ω...149.9 Ω | 0.00 Ω...149.9 Ω | from 0.01 Ω | from ±(10% m.v. + 3 digits) |
| impulse method 4/10 μs, 8/20 μs, 10/350 μs pulse | 0.0 Ω...199 Ω | 0.0 Ω...199 Ω | from 0.1 Ω | ±(2.5% m.v. + 3 digits) |
| auxiliary electrodes resistance | 0 Ω...19.9 kΩ | 0 Ω...19.9 kΩ | from 1 Ω | ±(5% (R _E +R _H +R _S) + 8 digits) |
| Earth resistivity | 0.0 Ωm...999 kΩm | 0.0 Ωm...999 kΩm | from 0.1 Ωm | Depends on the accuracy of the R _E 4p measurement. but not less than ±1 digit |
| Leakage current | 0.1 mA...300 A | 0.1 mA...300 A | from 0.1 mA | from ±(5% m.v. + 5 digits) |
| Safety and work conditions | | | | |
| Measuring category according to EN 61010 | | | | III 600 V / IV 300 V |
| Ingress protection | | | | IP54 |
| Type of insulation according to EN 61010-1 and IEC 61557 | | | | double |
| Dimensions | | | | 288 x 223 x 75 mm |
| Weight | | | | ca. 2 kg |
| Operating temperature | | | | -10...+50°C |
| Storage temperature | | | | -20...+80°C |
| Humidity | | | | 20...90% |
| Nominal temperature | | | | 23 ± 2°C |
| Reference humidity | | | | 40%...60% |
| Memory and communication | | | | |
| Memory of measurement results | | | | 990 results |
| Data transmission | | | | USB, Bluetooth |
| GPS position accuracy (MRU-200-GPS) | | | | 3 m |
| Other information | | | | |
| Quality standard – development, design and production | | | | ISO 9001 |
| The product meets the EMC (emission for industrial environment) requirements according to standards | | | | EN 61326-1 EN 61326-2-2 |

Standard accessories



**Test lead 2.2 m
(banana plugs) black**

WAPRZ2X2BLBB



**Test lead 1.2 m
(banana plugs) red**

WAPRZ1X2REBB



**Crocodile clip 1 kV
20 A black / red**

WAKROBL20K01
WAKRORE20K02



**Test lead 25 m for
earth resistance
measurements
(on a reel, banana
plugs) blue / red**

WAPRZ025BUBBSZ
WAPRZ025REBBSZ



**Test lead 50 m for
earth resistance
measurements (on
a reel, banana plugs,
shielded) yellow**

WAPRZ050YEBBSZE



USB cable

WAPRZUSB



**4x earth contact
test probe (30 cm)**

WASONG30



**Cramp with
banana socket**

WAZACIMA1



Hanging straps

WAPOZSZEKPL



**230 V mains power
cable (IEC C7 plug)**

WAPRZLAD230



**Z7 Power supply
adapter**

WAZASZ7



**Cable for battery
charging from car
cigarette lighter
socket (12 V)**

WAPRZLAD12SAM



L-2 carrying case

WAFUTL2



**NiMH battery
4.8 V 4.2 Ah**

WAAKU07



Calibration certificate issued by an accredited laboratory (no accreditation)



Optional accessories

| | | | | | |
|---|--|---|---|---|--|
|  | ERP-1 adapter WAADAERP1 |  | FS-2 flexible coil (Ø 1260 mm), output level 100 mV / 1 A WACEGFS20KR |  | FSX-3 flexible coil (Ø 630 mm), output level 300 mV / 1 A WACEGFSX30KR |
|  | F-1A flexible coil (Ø 360 mm) WACEGF1A0KR |  | F-2A flexible coil (Ø 235 mm) WACEGF2A0KR |  | F-3A flexible coil (Ø 120 mm) WACEGF3A0KR |
|  | C-3 current clamps (Ø 52 mm) WACEGC30KR |  | N-1 transmitting clamps (Ø 52 mm, incl. 2-wire cable) WACEGN1BB |  | Double-wire test lead 2 m for N-1 clamps WAPRZ002DZBB |
|  | Crocodile clip 1 kV 20 A red / blue / yellow WAKRORE20K02 WAKROBU20K02 WAKROYE20K02 |  | Test lead 1.2 m (banana plugs) blue / yellow WAPRZ1X2BUBB WAPRZ1X2YEBB |  | Pin probe 1 kV (banana socket) black / red / blue / yellow WASONBU0GB1 WASONRE0GB1 WASONBLOGB1 WASONYE0GB1 |
|  | AC-16 line splitter WAADAAC16 |  | Earth contact test probe 25 cm / 80 cm WASONG25 WASONG80 |  | L-3 carrying case (for 80 cm test probes) WAFUTL3 |
|  | Test lead on a reel red 75 m / 100 m / 200 m WAPRZ075REBBSZ WAPRZ100REBBSZ WAPRZ200REBBSZ |  | Test lead on a reel blue 75 m / 100 m / 200 m WAPRZ075BUBBSZ WAPRZ100BUBBSZ WAPRZ200BUBBSZ |  | Test lead on a reel yellow 75 m / 100 m / 200 m WAPRZ075YEBBSZ WAPRZ100YEBBSZ WAPRZ200YEBBSZ |
|  | Test lead 30 m for earth resistance measurements (on a reel, banana plugs) red WAPRZ030REBBSZ |  | Test lead 15 m for earth resistance measurements (on a reel, banana plugs) blue WAPRZ015BUBBSZ |  | Test lead 50 m for earth resistance measurements (on a reel, banana plugs) yellow WAPRZ050YEBBSZ |
|  | NiMH battery 4.8 V 3.2 Ah WAAKU08 |  | Battery pack 4xLR14 WAPOJ1 |  | Test lead on a reel yellow, screened, 75 m / 100 m / 200 m WAPRZ075YEBBSZE WAPRZ100YEBBSZE WAPRZ200YEBBSZE |
|  | XL3 carrying case (MRU) WAWALXL3 |  | XL-8 carrying case (ERP-1) WAWALXL8 |  | Test wire reel WAPOZSZP1 |
|  | Calibration certificate with accreditation | | | | |