LandMapper® ERM-04

Technical Specifications
&
Warranty

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WARNING:

- The LandMapper geophysical resistivity/conductivity/self-potential meter is internally powered equipment (1x9V)
- Equipment uses a variety of probes (electrodes) for use in the field and in laboratory.
- Some of those probes have sharp parts.
- Equipment type is continuous operation.
- If the equipment is receiving or causing interference, the equipment should be relocated away from the other equipment.
- There is no preventive inspection or maintenance required on the system or on parts of the system.
- Remove the battery if the equipment is not going to be used for prolonged time.
- Environmental requirements for storage and transport:
  Ambient temperature:-40C to +70C
  Relative humidity: 10% to 100%
  Atmospheric pressure: 500hPa to 1060hPa


Follow local governing requirements when disposing of equipment or batteries


CAUTION: General Warning – refer to accompanying documents

CE

MADE IN RUSSIA
exclusively for Landviser LLC, USA
Technical documentation on file at Landviser, LLC
828 Davis Rd., League City, TX 77573

The geophysical device LandMapper ERM-04 can be used to measure **electrical resistivity** or **conductivity** of soils as well as **natural electrical potential**s in soils and plants for fast non-destructive mapping of agricultural fields, construction and remediation sites, and similar applications.

Our device is **very versatile** and can be applied on soil surface, in wells/pits, or in soil and other semisolid laboratory samples. In a typical setting for resistivity or conductivity (ER or EC) the **four-electrode probe** is placed on the soil surface and ER/EC value is read from the digital display. Device allows to measure electrical resistivity/conductivity of the surface soil layer of the depth set by varying the size of the four-electrode probe.

To measure natural electrical potential between soil layers or between soil and plants, special non-polarizing electrodes (two) are required. Those electrodes can be ordered from Landviser, LLC or build by customer. Besides, standard non-polarizing electrodes supplied with other brands of conventional geophysical measurements also can be used.

The equipment is developed in Russia by IP GeoPro for Landviser, LLC, USA and based on more than 30 years of scientific research of Russian and American soil physicists. Prototypes of the LandMapper were developed and used for soil studies in Russia, USA, Canada, Western Europe, Philippines, Chili, China and even Antarctica (Pozdnyakov et al., 1996; Pozdnyakova et al., 1996; Pozdnyakov, 2001; Pozdnyakova, 1999; Pozdnyakova et al., 2001; Golovko and Pozdnyakov, 2009-2012).

DESCRIPTION of LandMapper ERM-03/ERM-04

Technical Specifications

LandMapper measures electrical parameters of soils and other semi-solid media – electrical resistivity (ER), conductivity (EC) and potential (EP).
Device is compact, portable and can be used for non-attended measurements (monitoring).
Measured parameters can be viewed on display as well as stored in internal non-volatile memory.

- Range of measurements……..…….……ER= 0.1-1 10^6 Ohm m
  ……..……..……..…… EC= 1 10^{-6} – 10 Sm^{-1}
  (ERM-04 only)…….……EP= -1 to +1 V (Δ=0.01 mV)
  - User-selectable ER/EC/SP modes of measurement.
  - Error of measurements is typically less than 1%.

  LandMapper automatically tunes to the range of measuring parameters for maximal accuracy.

- Current of consumption no more……..7.0 mA
- Output voltage, no more……5 V
- Internal Impedance……..……..2.5 MOhm
- Measurements comparable with DC methods, frequency…..……1.25 Hz

- User-defined K (geometrical coefficient)…….……..……...0.1 up to 99.9
- Quantity of (changeable) K-coefficients..……..(9) 10

- Quantity of data storage locations……..……..…1000
  Possibility to direct recording of measurement into specific memory cell in the field, reviewing and re-recording measurements

- Real-time stamp to the accuracy of……1 sec
  Synchronization of the internal clock of the device with atomic clock through PC
- Autonomous monitoring of ER/EC/EP at user-selected interval .....1, 2, 5, 15, 30 min;
  ……1, 2, 4, 6, 12, 24 h.
- Computer connection…….……..…..…….USB

- Range of operation temperatures……..from - 10 up to + 40 C^0 or 14 to 100 F
- Air humidity no more than…….……85 %
- Weight of the device no more…….…….…….... 250 g or 8 oz

CARE AND MAINTENANCE

Measuring unit

The measuring unit, LandMapper ERM-04, is made of rigid plastic which is adequate in protecting inside electronics during regular field use. It is designed to withstand everyday knocks and scrapes. However, the case is not designed for heavy impact such as being crushed by large objects or falling from too high above.

The LandMapper ERM-04 is not fully protected against the water penetration. If the device is partially or wholly immersed in water or used in heavy rain, the water might ingress inside the unit and cause non-repairable damage with the loss of all saved data. If immersion occurred, disconnect battery and allow unit to completely dry out several days and then try to turn device on again. Although some cases were reported that device worked fine after submergence and subsequent dry-out, LandMapper is not designed to operate in wet conditions and is not warranted for such damage.

The keys and LCD display are designed for routine use over many years. The LCD has a plastic screen to prevent some damage, but a direct hit from a sharp or heavy object may penetrate and damage the display.

The unit, keys, and display can be cleaned with a soft damp cloth. Do not use an abrasive material or chemical cleaner to clean unit or display. They may damage the plastic and make display difficult to read.

The LandMapper device should be stored at a room temperature when not in use. Remove the battery from the device for prolonged (> 1 month) storage. Use only 9V PP3 type battery – do not use any other type of battery or power supply. The meter may be damaged by a power source not recommended by Landviser, LLC. When replacing the battery in the battery compartment, do not pull the battery leads, because they may disconnect inside the meter and cause malfunctioning that can only be repaired by the manufacturer.

The LandMapper has been designed for use only with Landviser's supplied, specified or recommended four-electrode probes, cables, laboratory cells, or non-polarizing electrodes. The Landviser, LLC is not responsible for any damage to the measuring unit caused by using non-authorized accessories.

Four-electrode probe

The four-electrode probe is rigid enough for routine field mapping, but should not be forced into extremely stony or cemented soil. In most conditions a single push on the handle is enough to sufficiently ground all four electrodes. Sometimes, in case of very long probes, the outer A and B electrodes will not penetrate soil to provide a good contact for the measurements. In this case they can be grounded by a slight press on the probe directly above an electrode with a foot. Remove probe from the soil by a slight pull on the handle.

The plastic parts of the four-electrode probe are joined in a T-socket and can be reinforced with metal screws. To prevent the screws from becoming loose limit unnecessary assemble/ disassemble of a probe.

It is not necessary to clean the electrodes between measurements or after a field work, but it is a good practice to clean the electrodes with soapy water and completely dry them prior to prolonged storage. The probe can be stored in any compartment protected from a harsh weather conditions. It is advised to store electrodes away from excess moisture to prevent metal corrosion.

TROUBLESHOOTING

Problem	Solution
Device will not turn on or display is fading	Change the battery. Use only 9-V PP3 battery. It is a good habit to check the battery voltage before each field measuring session and always have spare batteries available.
The memory is full (display shows the memory cell ID number 999)	Transfer data to PC. Perform the “Cleaning Memory” procedure.
Low visibility of the display	Increase contrast in the “Contrast” mode.
Unusually low or high values of the measured resistivity (highly different from the same or nearby location)	Indicates interrupted connectivity (device/ wire/ electrode /soil). In most cases re-grounding of the electrodes will solve the problem. If the problem persists, check the connections at the device interface. Check and tighten the nuts where the wires connect to the electrodes on the probe.

GUARANTEE, REPAIRS AND SPARES

Instruments supplied by Landviser are guaranteed for one year against defects in manufacture or materials used. The guarantee does not cover damage through misuse, inexpert servicing, or other circumstances beyond our control.

For the US this means that no charges are made for labor, materials, or return shipment for guarantee repairs.

For other countries, the guarantee covers free exchange of faulty parts during the guarantee period.

Alternatively, if the equipment is returned to us for guarantee repair, we make no charge for labor or materials but we do charge for shipping and handling and US customs clearance.

We strongly prefer to have such repairs discussed with us first, and if we agree that the equipment does need to be returned, we may at our discretion waive these charges.

Service and spares

We recognize that some users of our instruments may not have easy access to technically specialized backup. Please refer to the Care and Maintenance section of this Manual for specific information on this product.

Spare parts for repairable instruments manufactured by Landviser can be supplied directly from us. These can normally be sent within 3 working days of receiving an order.

Spare parts and accessories for sensors not manufactured by Landviser, but supplied by us individually or as a part of a system, may be obtained from the original manufacturer. We will try our best to obtain the requested parts as quickly as we can, but an additional delay is possible.

Should it prove necessary, instruments may be returned to us for servicing. We normally expect to complete repairs of our instruments (such as four-electrode probes) within 2 days of receiving the equipment. The faulty measuring unit will be returned to the manufacturer, IP GeoPro in Russia and may be subject to an additional delay of two to four months. In that case we most likely will send a new unit if in stock (free exchange during warranty period of one year, pro-rated price afterwards).

Users in countries that have a Landviser Agent or Technical Representative should contact them first.