User Instructions

ΩMegaSafe ISO 1Ex

Rudolph Tietzsch GmbH & Co. KG
Willringhauser Str. 18
58256 Ennepetal
GERMANY
Phone: +49 2333-75989
info@tietzsch.de
www.tietzsch.de

ISO 1Ex_BA_04-2015

1 LEDs for the preselection of test voltage 32 V, 100 V, 500 V
2 Test-LED for resistance measurements
3 Volt-LED warns against external voltage
4 Display (double-spaced LCD)
5 Pushbutton (32 V 100 V 500 V) test voltage, zero balance, rapid discharge
6 Pushbutton (■) measuring, zero balance
7 Pushbutton (⏻) on/off, selftest
8 Lower socket
9 Upper socket
10 Crocodile clip
11 Measuring line

Symbole on the device

⚠ Attention! Observe user instructions!

Ex marking:
Approved for Ex areas in accordance with ATEX (DIN IEC 60079-0 und DIN IEC 60079-11)

CE EC conformity mark

This device has to be disposed according to the applicable regulations and laws (for Europe: WEEE 2012/19/EU). Please contact service@tietzsch.de in regard to the return of old devices.

1. Application

The megohmmeter ΩMegaSafe ISO 1Ex is a high-voltage testing device for safe testings of insulating resistances up to 2 GΩ, with test voltage of 32 up to 500 V and with digital read out system.
It is suitable for testing antistatic floors, surface resistivity, leakage resistance, volume resistance and insulation resistance.
Measurements up to 2 TΩ are possible, see section 4.6. The device is external voltage-proof up to 500 V. It has an integrated protective series resistor of 500 kΩ for safe application in Ex areas.
Reliable test results are achieved by the current and voltage measurement procedure.

1.1 Intended use

This device is intended for use in applications as described in the operating instructions only. Thus, it is imperative to observe the notes on safety and the technical data in conjunction with the ambient conditions.
Any other form of usage is not permitted and can lead to accidents or destruction of the unit.
Any misuse will result in the expiry of all guarantee and warrantly claims.

2. Safety

You have decided on an instrument which provides you with a high level of safety.
The device complies with the regulations of DIN IEC 60079-0 / DIN IEC 60079-11 and general requirements according to EN IEC 61010-1.
In order to assure correct and safe operation, it is imperative that you read these operating instructions entirely before placing your instrument into service.
When using this device follow thoroughly all instructions contained therein.
Please observe the following safety precautions:

- The insulation tester may only be used by experienced, safety-related instructed and qualified personnel, that is able to recognise Ex endangerments and to make safety arrangements.
- Observe the safety-related characteristics in Ex areas (see section 10)
- The ISO 1Ex may only be used in electricity networks with an operating voltage of maximal 500 V.
- In Ex areas both device connections have to be attached securely to the test line.
- For tests of wires and cables or capacities up to 200 nF the test in ex areas has to be started with 32 V (see section 4.5).
- Measurements may only be performed in zero potential system parts.

- An acoustic and optic warning signal occurs when applying the activated device to a voltage of more than 24 V (see section 4.7). In this case, first the test object has to be switched to zero potential before performing resistance measurements.
- Use connectors that are insulated against contact (IP 2x with flange) for the jacks of the ISO 1Ex when testing at metering points where voltages can occur.
- The battery may only be changed outside of Ex areas. Use only the indicated type of battery.
- Faultless indication of display values is only guaranteed between -15°C ... +45°C.
- The insulation tester may only be dismantled by authorised personnal.
- Before using the device check the housing and connecting line for visible damage. If damages are visible the insulation tester may not be placed into operation. In case of strong dirt contamination, the tester must be cleaned before use.
- The tester has to be stored in a clean and dry environment.

3. Putting into operation

3.1 Battery

We have already inserted a 9 V battery IEC 6LR61 or IEC 6LF22. Your device is ready for operation. Observe section 6 before the initial operation or after long storage of your device.

3.2 Testing correct display and function (self-test)

Step 1 – Test of the display

Press and hold button ⏻. All display segments lights up as well as a buzzer sound can be heard. Release button ⏻, the value „Rdy“ and “032 V“ is indicated on the display.

Step 2 – Checking the line / function

Connect the test lines with the sockets (upper/ lower) and short-circuit the crocodile clips. Hold button ■ and start the measurement. Push the button 32 V 100 V 500 V at the same time and the zero balance will be performed. The value “000 ... 002 MΩ“ is indicated on the display. Through this, the overall functions have been tested.

Step 3 – Batterytest

The battery needs to be replaced when an empty battery symbol [ ] is indicated (see section 6.).

Attention!

If one of the displays fails during the self-test – even if only partial failure occurs – (step 1) or if the instrument does not indicate a function standby (step 2), the insulation tester may not be placed into operation!

4. Measuring and testing
4.1 General information

Pushbutton functions:


Switch-on/-off (3), Selftest (3)


Measuring (4.4), Zero balance (4.2)

Preselect test voltage (4.4),
Zero balance (4.2)

The ISO 1Ex has an integrated protective resistor for current limiting, through this the terminal voltage during measurements below 100 MΩ can be lower than the chosen 32, 100, 500 V. The measurement is not influenced by this.
Note: The instrument switches off automatically approximately 60 seconds after the last measurement.

4.2 Zero balance
Perform the zero balance before each serie of measurement. This is important for the 2 MΩ range and the functional test.

- short-circuit measuring line
- switch-on the device with 
- Hold button  and start the measurement. Push the button  at the same time and the zero balance will be performed.
  The upper display line indicates "CAL" and the red LED lights up. Keep both pushbuttons pressed until the lower display line indicates .000 +/- 5D.
  This test has to be repeated with all test voltages (32, 100, 500 V).

The calibrated value up to max. 1 MΩ remains stored until a next zero balance is performed. It will not be reset when the device is switched-off or when the battery is changed.

4.3 Preparing measurement

In Ex-areas a secure connection with the measurement object must be ensured for safety reasons.

- ➤ Attach the black line to the lower socket and connect it with the first test point by using the crocodile clip.
- ➤ Attach the red line with the upper socket and plug the crocodile clip onto the second test point.

The following maximum test voltages apply in Ex-areas:

32 V at external capacitance up to 200 nF
100 V at external capacitance up to 100 nF
500 V at external capacitance up to 1 nF

Note: Outside of Ex areas, rapid checks may be performed without secure connection with the optionally attachable test electrode (see section 11.).

Attenion!

Observe the safety-related characteristics in Ex areas. The test object has to be zero potential.

4.4 Measuring

The equipment is ready for measurements after zero balance (see section 4.2) and measurement preparations (see section 4.3).

➤ switch on the device with ⏻

Attention! The test object has to be deenergised. In case the red Volt-LED light up and an acoustic signal occurs, then external voltage is applied. The pushbutton ■ is blocked and a resistance test is not possible (see section 4.7 – External voltage).

Note: Short warning singnals can result from inductive voltage or electrostatic charging.

- ➤ When no external voltage is applied, start measuring with 32 V.
- ➤ Keep pushbutton ■ pressed until a constant measurement result is indicated.

Note: If the measurement value is out of measurement range „OL“ (Overflow) appears on the display.

For measurements with very high resistances of more than 2 GΩ see section 4.6.

If the device does not display any measurement values evaluation can occur outside of the selected measurement range, e. g. if the test probe slips or if strong fluctuating impedances have influence.

- ➤ When capacitances exist, then, after having released the pushbutton ■, the discharge voltage will be indicated in the upper display part see section 4.5). The flashing Volt-LED warns against charging voltage of the external capacitance.

Note: Discharge can be accelerated by actuating pushbutton 32 V 100 V 500 V

- ➤ After discharging “Rdy” appears in the display and the test procedure is finished.

Attention! Do not disconnect the device form the plant until the Volt-LED has ceased.

- ➤ If required, repeat tests with higher test voltage. Therefore, observe the regulations of the plants that have to be tested.

4.5 Measuring with capacitance

Attention! Measurements with non allowed high capacitance in Ex-areas are not permitted. The test procedure must be stopped and the measurement object has to be discharged. Only after complete discharge the secure connection may be removed.

- ensure a secure connection with the measure ment object
- start measurement with 32 V
- Keep pushbutton ■ pressed until a constant measurement result is indicated.
- Release the pushbutton ■ the discharge voltage will be indicated in the upper display. The flashing Volt-LED warns against charging voltage of the external capacitance.

Charge voltage indication with external connected capacitance

Determine the time until the measurement object is discharged and the display shows„Rdy".

- Determine the connected capacitance in Ex-areas according to the following table:

Discharging time for 32 V test voltage terminating resistor: 1 GΩ		
Capacitance	Discharge time	Ex-Areas
47 nF	1 s	ok
100 nF	2 s	ok
200 nF	4 s	ok
> 200 nF	> 4 s	not allowed

Measurements with 100 V test voltage are only permitted, if the safety-related limit values of the plant allow this and the external capacitance was checked with 32 V and does not exceed 100 nF.

Discharging time for 100 V test voltage terminating resistor: 1 GΩ		
Capacitance	Discharge time	Ex-Areas
1 nF	< 1 s	ok
47 nF	4 s	ok
100 nF	7 s	ok
150 nF	10 s	not allowed

Measurements with 500 V test voltage are only permitted, if the safety-related limit values of the plant allow this and no external capacitance was checked with 100 V and does not exceed 1 nF.

Discharging time for 500 V test voltage terminating resistor: 1 GΩ		
Capacitance	Discharge time	Ex-Areas
1 nF	< 1 s	ok
47 nF	8 s	not allowed
100 nF	15 s	not allowed
200 nF	30 s	not allowed

4.6 Measurements of more than 2 GΩ

With the ΩMegaSafe ISO 1Ex you can perform measurements up to 2 TΩ.

Attention! Appropriate measures have to been taken for measurements of more than 2 GΩ.
The standard measuring lines has to be replaced by high-impedance special-purpose ISO-TΩ-measuring lines, for accessories see secttion 11.
Measurements in these ranges assume knowledge in the field of electrostatics.

Switch-over to TΩ range:
Keep pressed pushbutton ⏻ and pushbutton 32 V 100 V 500 V. The upper LCD part indicates vErS, the lower LCD part indicates a number, wait for about 10 seconds until the upper line indicates two flashing arrows and the flashing symbols G and T. For selection of TΩ press pushbutton 32 V 100 V 500 V until the lower line indicates the symbol ▭ . Now, the device switched-over to the TΩ range.

The device selects the GΩ range automatically when No pushbutton is actuated. A T in the upper display line indicates the selected TΩ range. This selection remains stored, even when you switch-off the device.

4.7 External voltage

When the activated ISO 1Ex is applied to a voltage from 24 up to 500 V you get warned by the flashing red Volt-LED and an acoustic signal.
At the same time, the voltage value is indicated at the LCD.

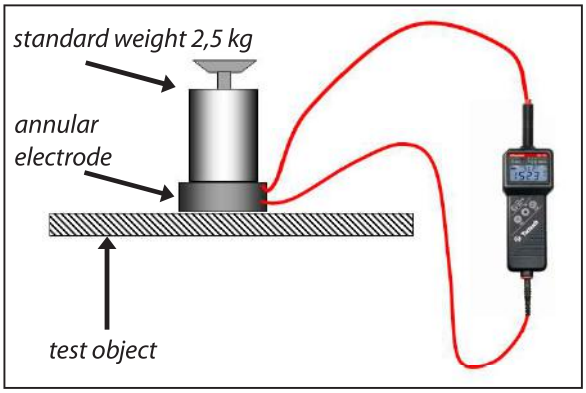
Attention! Then, the pushbutton ■ is locked.
The device is securely protected up to 500 V.
Attention! In Ex areas, at first the zero potential has to be ensured.

5. Measuring arrangements

For some measurements the following optional equipment is needed:

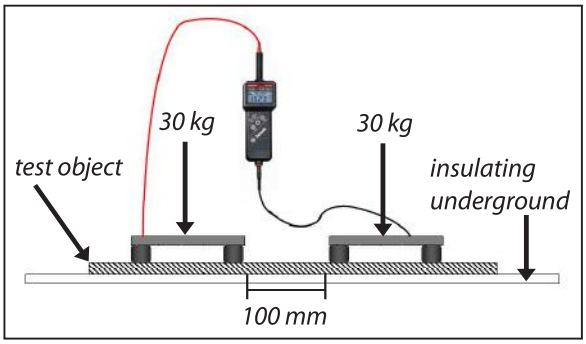
- One/two tripod electrodes, art.-no. 73013 (EN 1081)
- An annular electrode, art.-no. 73011 (EN 61340-5-1/61340-2-3)
- An electrode for surface resistance and volume resistivity in accordance with at once standard weight of 2,5 kg, art.-no. 73012 (EN 61340-4-1/61340-2-3)
- Measuring lines 4 mm unisulated socket, art. no. 73009

5.1 *Surface resistance with annular electrode and standard weight of 2,5 kg (art.-no. 73012):*
e. g. for antistatic surfaces like antstatic packaging



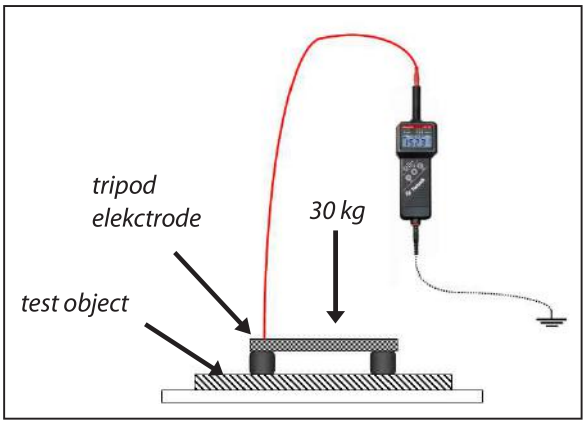
- ➤ Connect the annular electrode and the upper socket of the ΩMegaSafe ISO 1Ex with the measuring line
- ➤ Place the test object on a good insulating underground.
- ➤ Weight the annular electrode with about 2,5 kg e. g. standard weight / electrode 73012
- ➤ Test the surface resitance with the ΩMegaSafe ISO 1Ex

5.2 *Surface resistance with two tripod electrodes:*
e. g. for large antistatic surfaces



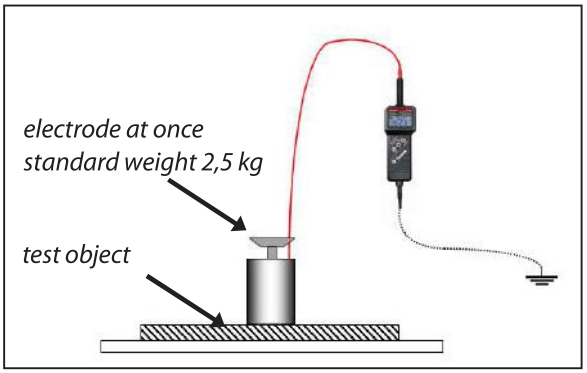
- ➤ Connect the tripod electrode and the upper socket of the ΩMegaSafe ISO 1Ex with the measuring line
- ➤ Place the test object on a good insulating underground.
- ➤ Connect the second tripod electrode and the lower socket of the ΩMegaSafe ISO 1Ex with the measuring line
- ➤ Place the tripod electrodes at a distance of 100 mm on the test object and weight both with approx. 30 kg each.
- ➤ Test the surface resistance with the ΩMegaSafe ISO 1Ex.

5.3 *Resistance to earth with tripod electrode: e. g. for antistatic floors*



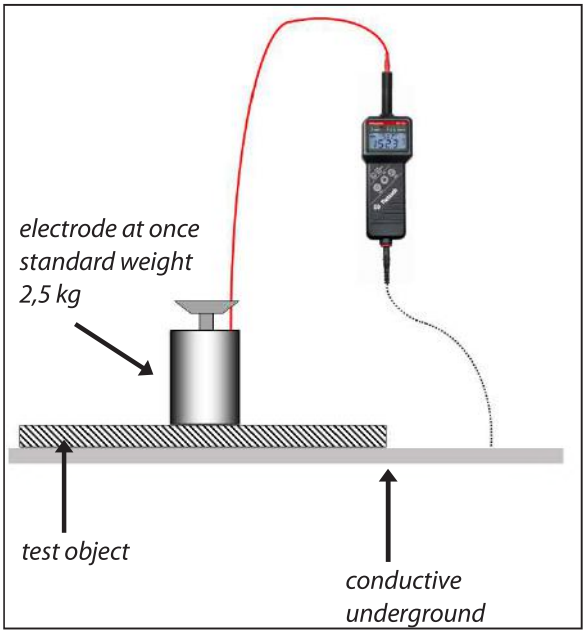
- Connect the tripod electrode and the upper socket of the ΩMegaSafe ISO 1Ex with the measuring line.
- Connect earth (PE) with the lower socket of the ΩMegaSafe ISO 1Ex.
  Accessories: 50m-measuring line on wire reel art.-no. 73006, Earth clamp art.-no. 73001
  Note: In Ex areas long measuring lines has to be unwounded because of the possible high inductance.
- Place the tripod electrode on the test object and weight the electrode with approx. 30 kg
- Test the resistance to earth with the ΩMegaSafe ISO 1Ex.

5.4 *Resistance to earth with electrode for surface resistance and volume resistivity art.-no. 73012: e. g. for antstatic table mat*



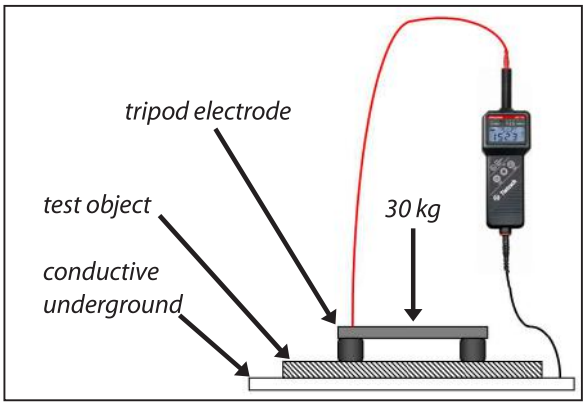
- Connect the electrode for surface resistance and volume resistivity and the upper socket of the ΩMegaSafe ISO 1Ex with the measuring line
- Connect earth (PE) with the lower socket of the ΩMegaSafe ISO 1Ex.
  Accessories: 50 m-measuring line on wire reel art.-no. 73006, earth clamp art.-no. 73001
  Note: In Ex areas long measuring lines has to be unwounded because of the possible high inductance.
- Place the electrode for surface resistance and volume resistivity on the test object
- Test the resistance to earth with the ΩMegaSafe ISO 1Ex.

5.5 *Volume resistance wirh electrode for surface resistance and volume resistivity for testing on surfaces, art.-no. 73012:*
e. g. insulation materials or conductive rubber pads



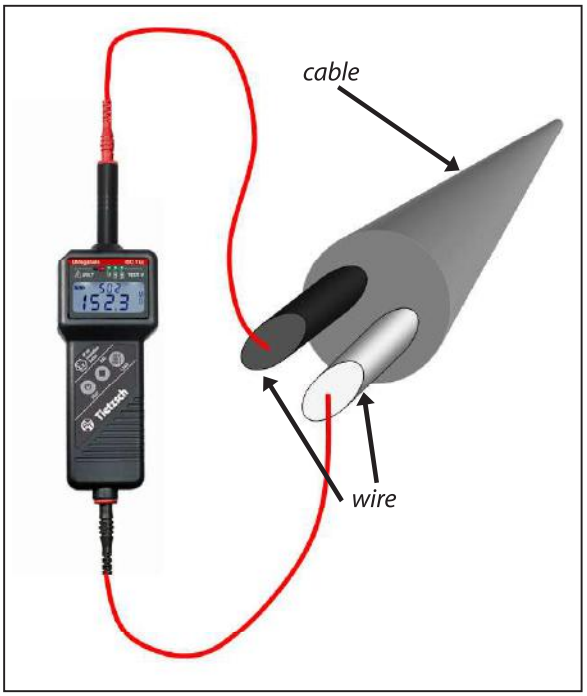
- Connect the electrode for surface resistance and volume resistivity and the upper socket of the ΩMegaSafe ISO 1Ex with the measuring line
- Connect the conductive underground with the lower socket of the ΩMegaSafe ISO 1Ex.
- Place the test object on the conductive under ground and place the test electrode on the test object
- Test the volume resistance with the ΩMegaSafe ISO 1Ex.

5.6 *Volumene rsistance with tripod electrode:*
e.g. large-area materials



- Connect the tripod electrode and the upper socket of the ΩMegaSafe ISO 1Ex with the measuring line
- Place the test object on a good conductive underground.
- Connect the the conductive underground with the lower socket of the ΩMegaSafe ISO 1Ex.
- Place the tripod electrodes on the test object and weight it with approx. 30 kg.
- Test the volume resistance with the ΩMegaSafe ISO 1Ex.

5.7 *Insulations resistance:*
e. g. wire - wire isulation of cables

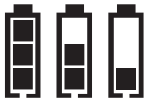


- Make sure no electrical consumer is connected and the safety-related limit values of the plant are respected
- Connect the upper and lower sockets of the ΩMegaSafe ISO 1Ex with the measuring lines and connect the open ends of the measuring lines securely to the wires of the cable
- Chose 32 V test voltage
- Test the insulation resistance with the ΩMegaSafe ISO 1Ex.
- Determine the capacitance of the connected cable (see section 4.5)
- If the safety-related limit values of the plant and the determined capacitance permits a higher test voltage switch to the next higher test voltage.
- Test the insulation resistance with the ΩMegaSafe ISO 1Ex at the maximum allowed test voltage for a meaningful measuring result.
  Note: If a very low-resistance value is indicated maybe an electrical consumer is still connected.

6. Battery

6.1 Battery indication

The latest battery status is symbolised by a three-stage battery indicator on the display.



indication of battery status

replace the battery soon – few measurements possible (Battery symbol flashing: no further measurements admissible!)

Attention!
When the empty battery symbol flashes, then no more measurements can be performed and the battery has to be replaced immediately.
The device requires a 9 V block battery IEC 6LR61 / 6LF22 (alkali-manganese).

The battery may only be replaced outside of Ex areas.

For replacing the battery the rear cover needs to be unscrewed.

- ➤ You may only insert the following types of batteries:
  DAIMON MN1604; IEC 6LR61
  Duracell MN 1604 Plus Power Duralock (6LF22)
- ➤ The connectors, jacks and contacts have to be kept clean.
- ➤ Regularly make sure that the battery does not leak. In case it does you have to replace the electrolyte completely and insert a new battery.
- ➤ In case of a longer storage period the ISO 1EX needs to be kept without battery at a dry and clean place with temperatures between -10° and + 70°C.

Note:
Included in the scope of delivery is one battery. These battery is not to be re-charged. Attempting to recharge it may cause risk to personal safety and damage to the equipment. The battery may not to be opened. Depleted batteries must not be disposed with the domestic waste. Please, return batteries at a local retailer or municipal recycling depot. Return is free of charge and required by law.

7. Maintainance

The ISO 1Ex is completely maintainance-free. Nevertheless, in order to assure safe operation observe the following information: The ISO 1Ex has to be kept in dry and clean places, always.
The plastic housing can be cleaned with a cloth dampened with isopropyl (alcohol) or soapy water.

7.1 Repeated inspection

It should not exceed the time-limit of 6 years. Depending on operation conditions and frequency, a previous inspection may be recommendable.
If the ΩMegaSafe ISO 1Ex is uesed as an inspection equipment, please note special repeated inspection time-limits. The serial number with the date of manufacturing (WWYYNN=**W**eek **Y**ear **N**umber) is imprinted on the backside of the device. Repeated inspections are offered by the manufacturer and indicated by the inspection plate.

8. Repair

Repair is only allowed by the manufacturer or explicitly authorised repair shops.
In case of damages on the device or failure of the function test according to section 3.2 or for detailed inspection/calibration, please contact: ***service@tietzsch.de*** or send the device and a description of failure back to the manufacturer (address see page 1).

9. Limited warranty and limitation of liability

By continuous quality checks and production controls, most modern electronics and high quality materials we guarantee that the tester will be free from defects in material and workmanship for two years.
This warranty does not cover batteries, improper handling, not intended purpose, opening the housing, improper storage or damages from accidents.
No other warranties such as fitness for a particular purpose will be given.
We are not liable for any indirect, incidental or consequential damages or losses arising from any cause or theory.

10. Technical data

High-voltage Insulation Resistance Tester
ΩMegaSafe ISO 1Ex in accordance with
EN/IEC 61010-1 and EN/IEC 61557-2 (VDE 0413 part 2)
Explosionproof type in accordance with EN 60079-0
and EN 60079-11

EC-type examination certificate (ISO 1 Ex)

Ⓔx II 2 G Ex ib IIBT4 BVS 06 ATEX E130
Ⓔx I M2 (M1) EX ib [ia] I BVS 06 ATEX E130

Safety-related characteristics:

max. output voltage 550 V
max. output current 1,5 mA
max. inductance 28 H
max. capacitance 1 nF / 500 V
100 nF / 100 V
200 nF / 32 V

Measurement range:

1,999 MΩ
Resolution 1 kΩ 5% +/- 5D
19,99 MΩ
Resolution 10 kΩ 5% +/- 5D
1,999 GΩ
Resolution 1 MΩ 5% +/- 5D

Additionally with selected measurement option TΩ:

19,99 GΩ
Resolution 10 MΩ 10% +/- 5D
199,9 GΩ
Resolution 100 MΩ 10% +/- 5D
1999 GΩ
Resolution 1 GΩ 25% +/- 5D

Test voltage/measuring current:

32 V 64 µA +/-20 %
100 V 200 µA +/-20 %
500 V 0,5 mA +/-20 %

Discharge: for rapid discharge of capacitive voltage

Digital display: doublespaced LCD display, 3 1/2-digit, overflow display through OL screen backlighting

Voltage indication:

red LED and acoustic warning signal and indication of the value in Volt
24 - 400 V AC
15 - 500 V DC

Surge voltage category:

CAT III 600 V in accordance with EN/IEC 61010-1

Operating temperature: -10 ... +50°C

Power supply: battery 9 V block AlMn IEC 6LR61 Duracell MN 1604 Plus Power Duralock (6LF22) (type, see instructions) multi-stage BAT indication automatic switch-off

Casing: made of impact-proof ABS with unbreakable display cover antistatic coating

Voltage surge protection:

IP 65,
usable in precipitation

Weight/Dimensions: 60 x 230 x 40 mm / 220 g

11. Accessories

Included in the scope of delivery are:

- 2 test lines 600 V CAT III
  red and black 80 cm
- 2 safety crocodile clips
  1000 V CAT III red and black

Optional accessories

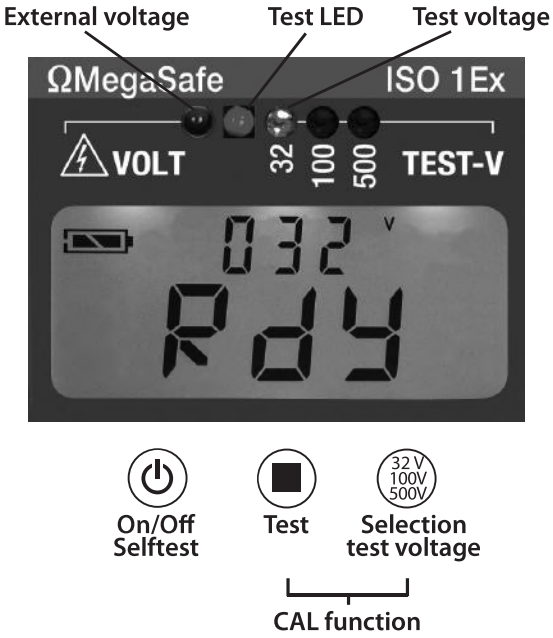
- leather bag (art.-no.: 81030)
- leather case (art.-no.: 73021)
- attachable test electrode (art.-no.: 73008)
- 50 m measuring line on wire reel (art.-no.: 73006)
- ISO-TΩ-measuring line for measurements from 2 GΩ up to 2 TΩ (art.-no.: 73006)
- annular electrode in accordance with EN 61 340-5-1 and EN 61 340-2-3 for surface and volume resistivity measurements
  Weight: 0,515 kg (art.-no.: 73011)
- electrode in accordance with EN 61 340-4-1 and EN 61 340-2-3 for bleeder and surface resistance measurements
  Weight: 2,27 kg (art.-no.: 73012)
- Tripod electrode for floors and surfaces in accordance with EN 1081 (art.-no.: 73013)

Attachable test electrode CAT III (not suitable for application in Ex areas)

Quick user guide 1

This quick user guide serves für a quick start. In regard of your own safety, please observe safety-related Ex characteristic values and for further information on the detailed user instruction.

Display in the GΩ-Ranges



1. Perform the selftest and the zero balance before each operation. Replace the battery only outside of Ex areas.

2. Switch-on the device.

3. Establish a secure connection between ISO 1Ex and the test object.

4. External voltage is applied when the red LED flashes and the display indicates a voltage >24 V. Then, the pushbutton ■ is blocked.
   Restistance measurements cannot be performed.

5. „Rdy“ appears in the display when no external voltage is applied.

6. Start measurements with 32 V test voltage. If the safety-related limit values of the plant and the determined external capacitance allow this the test voltage can be swiched to 100 / 500 V.

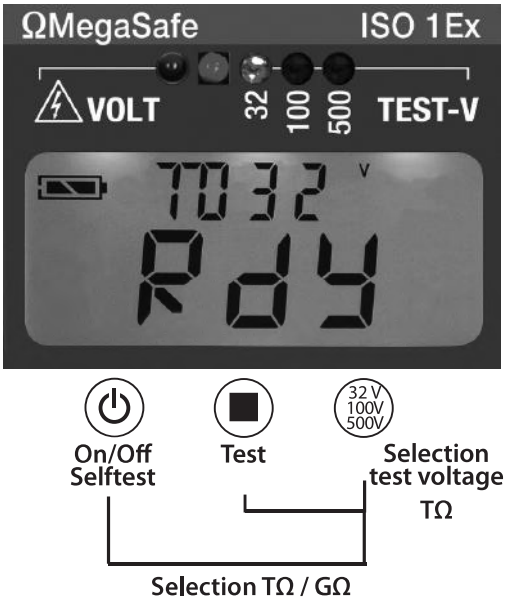
7. Attention! To avoid sparking disconnect the tester only if the red LED is off and “Rdy” is indicated in the display.
   Rapid discharge is possible with actuation of pushbutton (32 V 100V 500V).

Quick user guide 2

Special features for measurement ranges from 2 MΩ up to 2 TΩ

Knowledge for measurements of high resistances is assumed.
The range TΩ has to be selected (T in upper display line).
Special accessories need to be used for measurements in the TΩ range.

Display in the TΩ-Ranges



Switch-over to TΩ range:

1. Keep pressed pushbutton ⏻ and 32 V 100V 500V.
2. After 10 seconds in the upper display line two arrows and the symbols G and T are flashing.
3. Keep pressed pushbutton 32 V 100V 500V until □ is indicated.
4. The device is ready for operation when T032 and RdY are indicated in the display.

Switch back in the GΩ-Range:

1. Keep pressed pushbutton ⏻ and 32 V 100V 500V.
2. After 10 seconds in the upper display line two arrows and the symbols G and T are flashing.
3. Then wait until the ISO 1Ex switches back into the GΩ-range