

Manual



TERA Ohmmeter TOM 610

With USB Interface, Touch-Display and
“Break Down Resistance” Measurement etc.

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1. Product Description

Due to its compact design and battery powered operation the TOM 610 is suited for mobile applications in industrial areas. It also can be operated stationary with the provided wall power supply. The menu-driven TOM 610 is operated by only 2 pushbuttons and its touch display and therefore very user-friendly. All set measurement parameters are shown in the display for a better orientation. The provided PC software enables the user to perform computer driven measurements.

The enclosed PC software also allows the TOM 610 to be operated computer-controlled. In addition the measurement data can be administrated and processed.

The TOM 610 works according to the voltage current measurement principle. The measurement time required by norms, like DIN EN 61340 or EOS-ESD 4.1/6.1, can be set with an internal timer.

As a new world innovation, we measure the „Break-Down“ Resistor and Voltage and also the „Break-OFF“ – Time if it happens.

The measured data including environment parameters, can be stored in an internal memory (up to 200 records). Thereby the measurements are maintained and can be read out later via the USB interface.

As resistance values of some materials depend on air humidity and temperature, these environmental parameters are measured and saved together with each measurement value. Thus, reproducible measurements can be performed.

1.1. Specifications

| | | | |
|--------------------------------|---|--------------------|--|
| Dimensions (L x W x H): | 224mm x 81mm x 40mm | | |
| Weight: | 350g | | |
| Display: | Graphic Touch Display size: 75 mm x 50 mm | | |
| | Resistance: 1 k Ω - 10 .0 T Ω | accuracy \pm 10% | |
| | Temperature: 0°C...60°C | accuracy \pm 3°C | |
| | Rel. Humidity: 20%...80%r.F. | accuracy \pm 5% | |
| PC interface: | USB interface | | |
| PC software: | Turned-out Software | | |
| Battery: | 4 x AA-NiMH 2100 mAh Operation time with fully charged battery: > 12 hours permanent operation Charging time with provided wall power supply: max. 14h | | |
| Power supply: | 9V-DC / 300 mA | | |

The TERA – Ohm Meter TOM 6100 measures resistances in function of the selected measure voltage.

| | |
|------------------------|--|
| Measure Voltage 10V | from 1kOHM (10 ³ Ohm) until 200GOhm (10 ¹¹ Ohm) |
| Measure Voltage 100V | from 100kOHM (10 ⁵ Ohm) until 2TOhm (2x10 ¹² Ohm) |
| Measure Voltage 500V | from 1MOHM (10 ⁶ Ohm) until 5TOhm (5x10 ¹² Ohm) |
| Measure Voltage 1,000V | from 1MOHM (10 ⁶ Ohm) until 10TOhm (10 ¹³ Ohm) |
| Auto Measuring Voltage | 10V from 1kOHM (10 ³ Ohm) until ~1MOhm (10 ⁵ Ohm) 100V from ~1MOHM (10 ⁵ Ohm) until 2TOhm (2x10 ¹² Ohm) |

The tolerance is 10%

As long as the selected measuring voltage is not stable, the displayed measured value is highlighted in blue. If the measuring range is exceeded "Overflow" and if it fell below the range "**R < xxx0hm**" will be displayed. (depending of measure voltage)

When the measured value is displayed without a blue background it is stable !

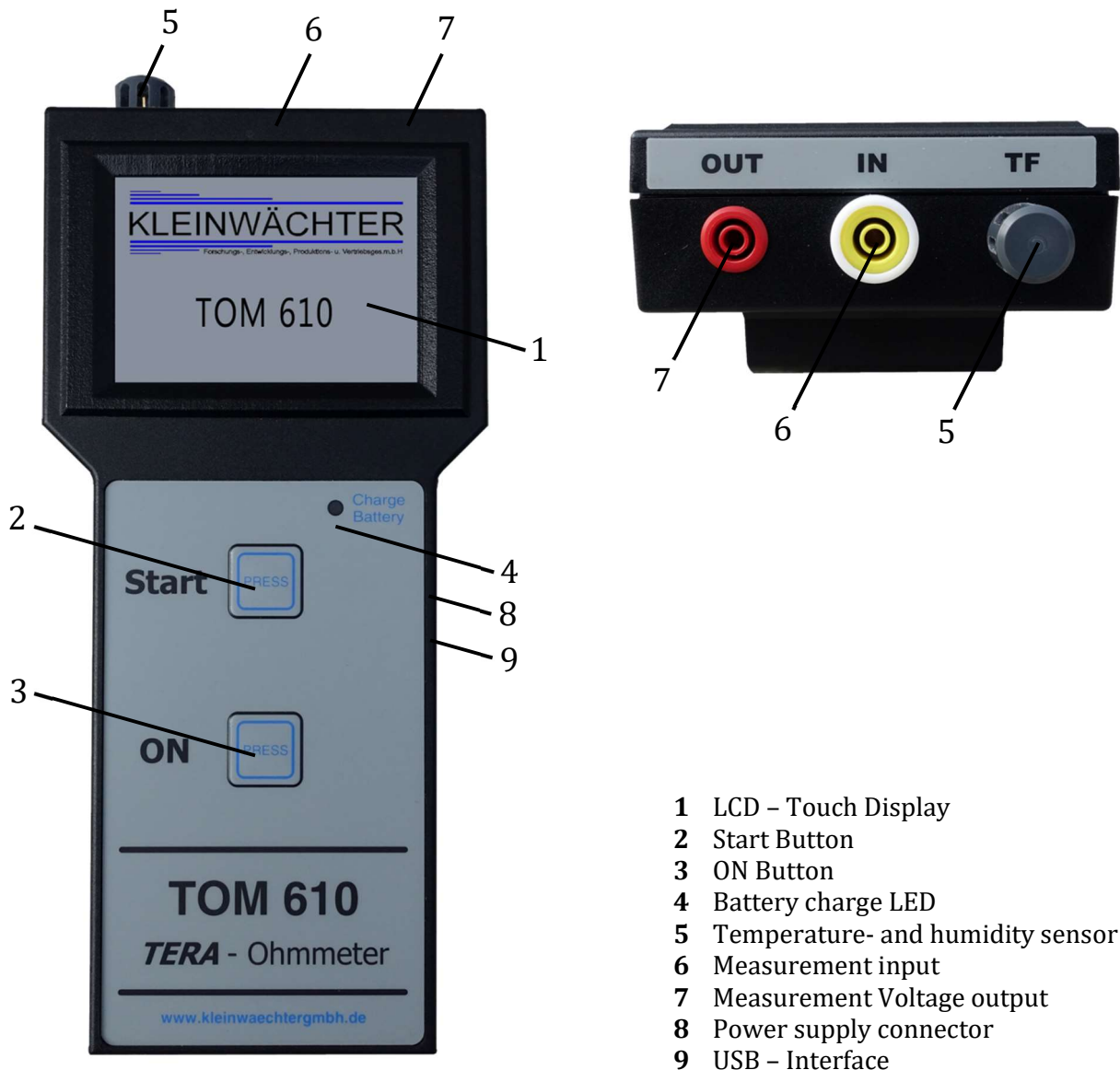
This can take up to a few seconds with very high resistances.

As a rule, we recommend a max. Measuring voltage of 100V !
Use 500V or 1.000V only if problems occur by 100V !

IMPORTANT !! U_{mess} > 100V => Do not touch the electrodes during the measurement !

After switching on it can also take a few seconds until the temperature and humidity are displayed. As long as these are set to zero no operation is possible !

1.2. Legend



- 1 LCD - Touch Display
- 2 Start Button
- 3 ON Button
- 4 Battery charge LED
- 5 Temperature- and humidity sensor
- 6 Measurement input
- 7 Measurement Voltage output
- 8 Power supply connector
- 9 USB - Interface

2. Manual

2.1. Operation

The TERA Ohmmeter TOM 610 is shipped with 4 AA NiMH rechargeable batteries and is immediately ready to start.

For charging the batteries and for continuous operation only the provided wall power supply may be used.

For start measurements, first connect the electrodes to the appropriate connectors (see legend) and position it on the object to be measured. Afterwards touch button «**Measure**» or «**Measure with timer**» has to be pressed to start the measurement.

Please pay attention by moving the measure cables or people passing by as it can cause electrostatic induction of the measurement setup.

Switch on the unit by touching button “**ON**”

After powering on, the software version is displayed and after 3 seconds it switches to the main menu:



The software version e.g. 1.91 and the date of the last calibration here Dec. 2021 are displayed !

If the calibration date deviates more than 2 years from the date in the main menu, the line is displayed in red letters. In addition, the duration of the start screen display is increased with each exceeded year up to max. 30 seconds.

In this case, send the device to the manufacturer for calibration !

2.2 MAIN MENU

Seven touch fields are available in the main menu:



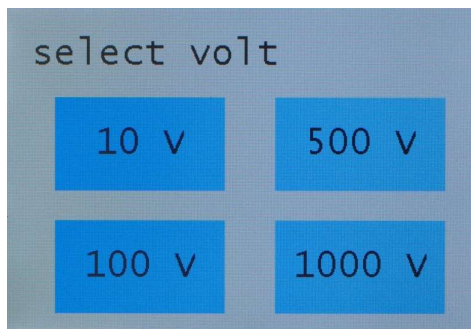
- 1 Umess => Manual ↔ Auto → Selection between automatic and Manuell measuring voltage - Field 3 is only active (blue background) if Manuell is selected !
- 2 Umess => submenu select measuring voltage 2.3 will be open
- 3 Display Mode Techn. ↔ Expo. → selection between displaying the Measure Value in technical (235MΩ) or exponential ($2,35 \times 10^8 \text{ Ohm}$) representation

- 4 By touching => off => the device switches off.
- 5 special function => submenu “special function” 2.4 will be opened.
- 6 Measure => Start the measurement 2.5 with selected parameters
- 7 Meas. with Timer => submenu “measuring with timer” 2.6 will be opened.

The current date and time will also be displayed.

By pressing the Button “Start” the measuring will start with the selected parameters.

2.3 select measuring voltage

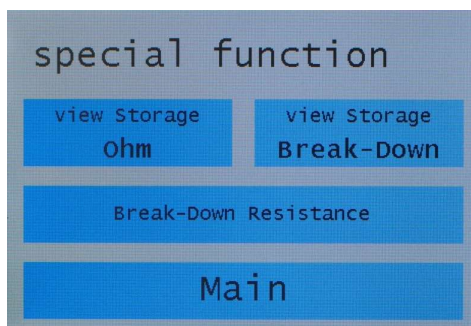


By touching =>desired Measure Voltage => it will be selected, and switches back to the main menu.

IMPORTANT !! The measuring voltage is only applied when the measuring is started.

First make the measuring setup then start the measure. Never change the setup during the measurement. Switch back to the main menu at the end of your measure.

2.4 Special function

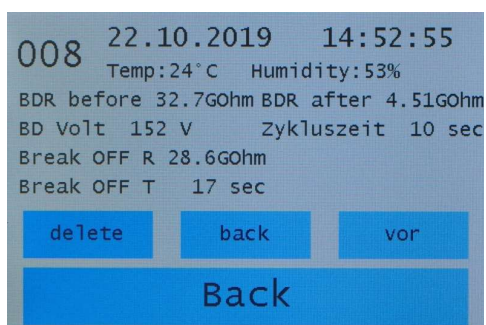
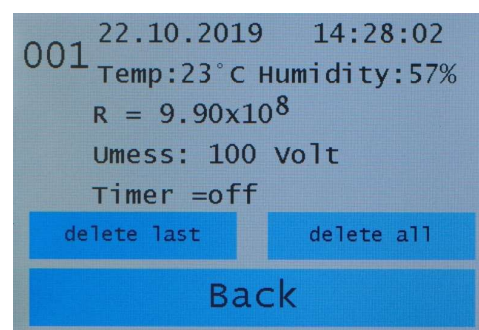
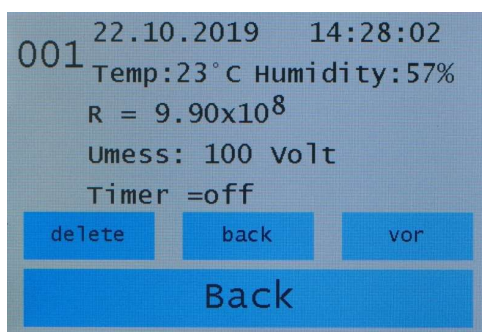


By touching => view storage => submenu storage 2.4.1 will be opened

By touching => Break down voltage => submenu Break down voltage 2.4.2 will be opened

By touching => Main => It will switch to the main menu

2.4.1 view storage



The saved file number (top left) is displayed and further the saved data.

By touching => -1 or +1 => changes the displayed file number

By touching => delete =>it switches into the delete menu and there you can select "delete last" or "delete all"

By touching => Back => It will switch to menu "special function" 2.4

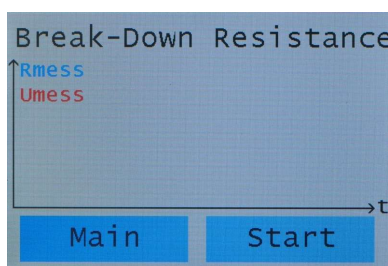
2.4.2 Break down resistance

Measuring the “Break Down” resistance in dependence of the measuring voltage

Important !! Measuring range 5M Ω up to 200G Ω !! ($5 \times 10^6 \dots 2 \times 10^{11}$)

Measurement procedure :

- Measure Voltage starts by 10V
- Continued by 100V and then in steps from +50V up to 1.000V.
- The resistance is measured continuously.
- If a Break Down takes place, the resistance value goes down sharply (>50%).
- This voltage value is displayed as BDV (Break Down Voltage)
- The resistance before and after is also displayed.



By touching => Start => (or by pressing the button “Start”) it starts measuring.

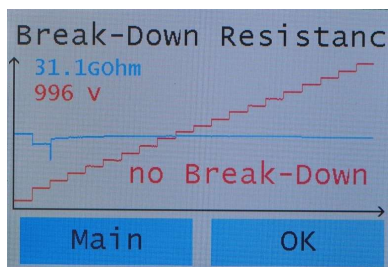
By touching => Main => it will switch back to the main menu.

After “Start” The **resistance value** and the **Measure voltage** is displayed. Down right, the time remaining of this voltage step is displayed. (The voltage step time can be selected in the user setup).



By touching => Stop => the measuring will stop and then it switches back to the start menu.

If the resistance is out of the measuring range an overflow or underflow will be displayed

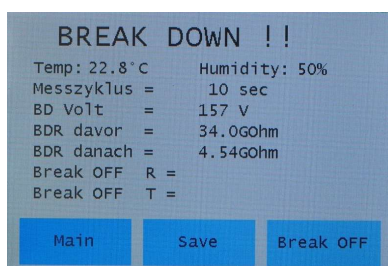


If there was no Break Down up to 1.000V => “no Break-Down” appears.

By touching => Main => It switches to the main menu.

By touching => ok => It switches to “Break Down Resistance” menu 2.4.2

2.4.3 Break down Voltage detected



The “BREAK DOWN !!” menu opens automatically after a break-down occurs.

By touching => Main => It switches to the main menu.

By touching => Save => it saves the measured data.

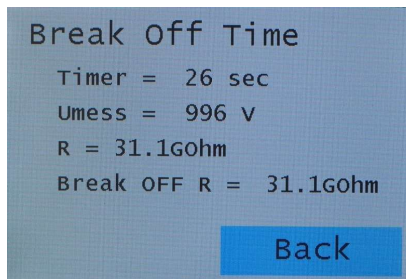
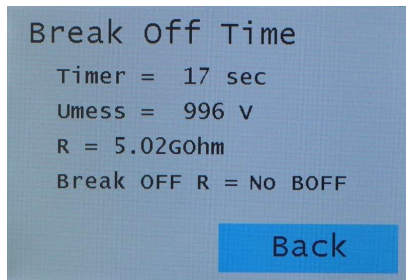
By touching => Break Off => It switches to menu “BOFF Time” 2.4.4

** If no “Break OFF” measurement has taken place => No values will be displayed.

After Break OFF measurement without Break OFF display shows “NO BOFF”.

If Break OFF has occurred, the Break OFF resistance value and the Break OFF time are displayed.

2.4.4 Break OFF



Measuring of the Break Off time (BOFF)

The voltage switches to 1.000 Volt and the timer will start.

If there is a sharp change in resistance value (<50%) this value (before and after) and the timer (BOFF) are displayed.

Break OFF time can be selected in the user setup.

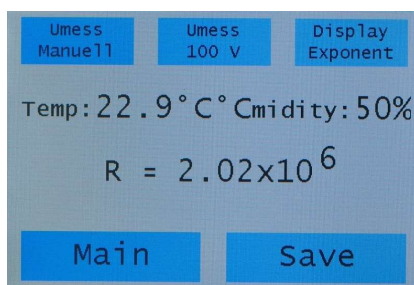
If the timer counts up to the max. time and no Break off occurs => it displays NO BOFF

By touching => Back => it switches back to menu 2.4.3 with "break OFF R = 0" and "Break OFF T"

If Break Off occurs, the timer stops and displays "Break Off R = xx.x Ohm" (actually value)

By touching => Back => it switches back to menu 2.4.3 with measured values in "break OFF R" and "Break OFF T"

2.5 measure



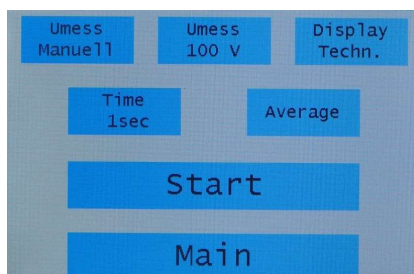
By touching => Umess / Display => you can select as well in the main menu.

By touching => Main => It switches to the main menu.

By touching => Save => (when measure voltage is stable = blue background) It switches to menu "save measurement" 2.7

Always switch back to main menu after measurement !

2.6 measuring with timer



By touching => Umess / Display => you can change it, like in the main menu

By touching => Time => It switches to menu "select timer" 2.6.1

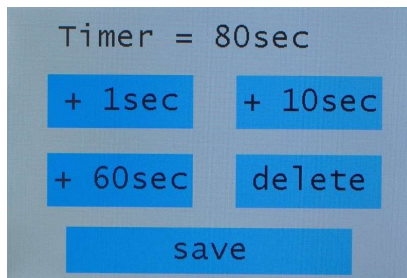
By touching => Lapse / Average => it switches between lapse** and average* mode

By touching => Start => it starts measuring 2.6.2

*Average => Averaging during the measuring time

**Lapse => At the end of the measuring time, the last measured value is displayed.

2.6.1 select timer

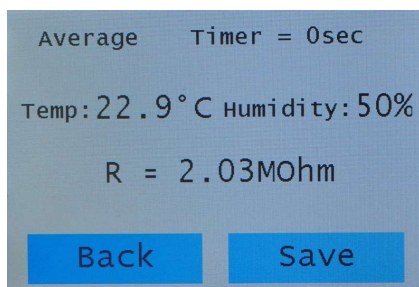


By touching => delete => sets the timer to zero

By touching => +1 / +10 / +60 => It chooses your time

By touching => save => saves the chosen time and goes back to "measuring with timer" menu 2.6

2.6.2 measure with timer started



In the first row you see the Measure mode and timer counts down to zero when the measured value is stable.

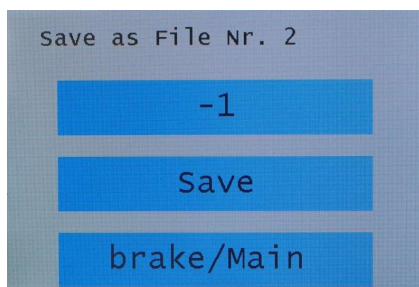
In the 2nd row temperature and humidity

In the 3rd row the measure value

By touching => Save => It switches to menu "save measurement" 2.7

By touching => Back => It switches to the main menu.

2.7 save measurement



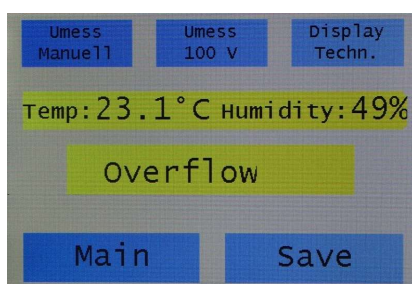
In the first row you see the next file number

By touching = -1 => It goes back to overwrite an old file number

By touching => Save => The measure is saved by the displayed file number in the EEPROM

By touching => brake/Main => It switches to the main menu.

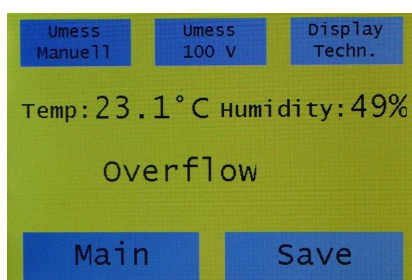
2.8 Battery monitoring



If the battery voltage drops below 4.4 V, the current values are highlighted. (yellow)

When switching to another menu, the background color also changes. (yellow)

In this case it is absolutely necessary to connect the power plug adapter!



If the battery voltage drops below 4.0 V, the device is switched off to prevent over discharge of the batteries!

2.9 Reset

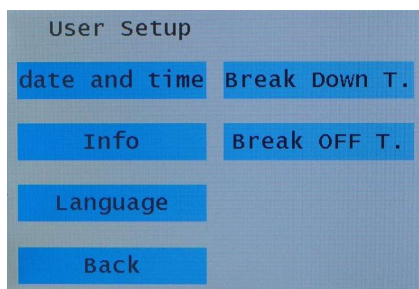
If the device no longer reacts, a “Reset” can be executed by pressing the hidden “R” button. The “R” button is located on the left side at the height of the display. Use a thin wire (e.g. paper clip) to press it through the 1.5mm hole.

=> In standard operation, this should never be necessary.

In normal operation, this should never be necessary.

3. User SetUp

The user setting can be accessed by pressing the button „Start” while the start screen is displayed !

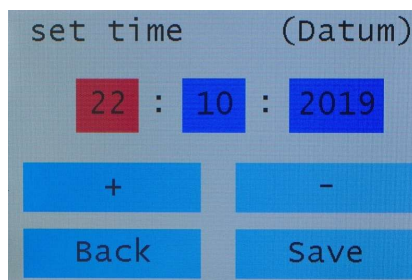


By touching

- Date and time
- Info
- Language
- Break Down T.
- Break Off T

By touching => Back => It switches to the main menu.

3.1 date and time

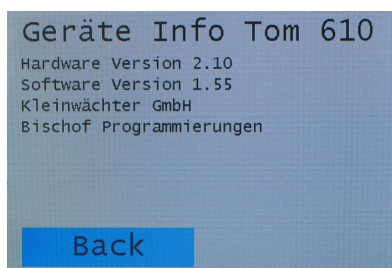


By touching => + / - => The field highlighted in red can be changed. First the date then the time.

By touching => Save => The data will be saved.

By touching => Back => It switches to the User Setup menu.

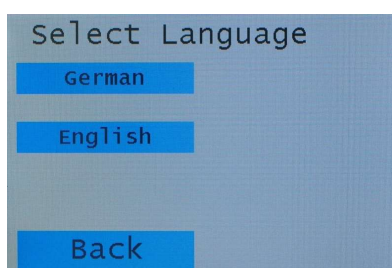
3.2 Info



Information about the hardware and software version.

By touching => Back => It switches to the User Setup menu.

3.3 Select Language



By touching => German / English => It selects the language from the display

By touching => Back => It switches to the User Setup menu.

3.4 Break Down T. / Break OFF T.

It switches to the sub – menu “Select Timer” 2.6.1

It is possible to set step duration time of Break Down measurement or the time for how long the Break OFF voltage is applied.

Break Down Time is the time how long the individual steps last during the Break Down Measurement. (Range 10. . . . 200 seconds)

Break Off Time is the time how long the Break OFF measurement last during. (Range 10. . . . 999 seconds)

4. PC Operation

4.1. System Requirements

- Intel Pentium CPU or higher
- Free USB Port
- Microsoft Windows XP, Win 7 or WIN10
- Microsoft Excel (To edit the saved files)
-

4.2. Installation

First install the TOM_ReadOut Software. Start “TOM_ReadOut Setup” (as Administrator) and follow the instructions.

Attach the TOM 610 by using of the provided cable for a USB Port and wait until Windows confirms it. Then turn the device on. Double-click the corresponding desktop icon to start the KL_ReadOut software.

5. Maintenance / Calibration

The device is maintenance-free. If the device is contaminated it can be cleaned by using a non-fuzzing cotton cloth and solvent-free cleanser. The device must not be opened otherwise device warranty is void. If the device is not used for long time batteries should be removed. Always store batteries charged.

The recommended factory calibration interval is 1 year.



If necessary, the manufacturer of the device can update the software via the USB interface.

6. Warranty

In case of proper use, we issue warranty within 24 months after shipping. Mechanical damage and the batteries are exempted from the warranty.

Warranty is void when the device is opened !!

7. Scope of Delivery

TOM 610

- TERA ohmmeter TOM610 with temperature and humidity sensor
- 4 x. NiMH batteries (AA)
- Conductive carrying case with foam insert
- Wall power supply 9V-DC / 500mA
- 2 x teflonized measurement line (1m)
- USB to USB mini cable
- USB Stick with PC software and manuals
- Declaration of factory calibration

TOM 610 ME

Same as TOM 610, additional:

- 1 x. teflonized measurement line (5m) instead of 1 x teflonized. Measurement line (1m)
- Pair of 2,50 kg electrodes according to EOS/ESD S 4.1/S 7.1 and DIN EN 61340 –5-1, -4-1, -2-3 for the measurement of grounding bleeder resistances and point to point measurements, especially for conductive table and floor coverings

8. Security Advices

The TOM 610 is not approved for use in explosive areas. Operation in power plants is not permitted.

Notice: Please make sure the object to be measured is potential free before every measurement. External voltage can distort the measurement results and damage the instrument.

Do not touch the measure equipment during measurement !

The device must not be operated without rechargeable batteries!

By using non rechargeable batteries, you lost your Warranty !

9. Measuring Electrodes

9.1 Surface Electrode ME 250

The 2.5kg electrodes enable measurements of surface and bleeder resistances on table or floor coverings according to the following norms:

- EOS / ESD – S 4.1 /S 7.1
- EN 100015 Teil1, IEC 93
- IEC 61340-2-3
- DIN IEC 1340-4-1

Cleaning the Electrode

- Never use a dissolver
- Only use a cotton rag
- If it is very dirty use a light soap solution



Specifications

| | |
|--------------------------------|--|
| Dimensions (L x W x H): | Diameter 70mm, height 100mm |
| Contact rubber: | Diameter: 63mm, Shore hardness: 60 |
| Weight: | 2,5kg |
| Connection: | Banana jack 4mm, topside central |
| Isolation: | Shrink hose $R > 10^{11} \Omega$ (U=100V) |
| Contact resistance: | $< 1k \Omega$ (measured on a metal plate, U=10V) |

Important Information

Please consider the following advices for reproducible results:

- The contact surface of the measurement electrodes must be kept clean to ensure an optimal contact resistance ([see cleaning the electrode](#))
- The covering to measure should also be cleaned
- Measurements may only be performed in zero-potential conditions
- The measurement line should be as short as possible but as long as necessary
- For the measurement of high resistances teflonized measurement lines are inevitable
- For repetitious accuracy in high resistance ranges holding time or a timer function should be considered
- To avoid influences of electrostatic induction cables must not be moved during the measurement
- The conductivity of some materials depends on temperature and humidity, therefore these values need to be logged
- For adequate accuracy the corresponding norms should be complied with the standards

9.2 Circle Electrode RME 810

- Für Oberflächen- und Volumenwiderstandsmessung
- Leitfähiger Kontaktgummi mit Silberpartikel (Durchgangswiderstand $< 5\Omega$)
- Härte Kontaktgummi: 65 Shore A
- Ringelektrode nach DIN EN 61340-5-1 und DIN EN 61340-2-3
- Gewicht: 515 g
- Normgewicht 2,5 kg kann durch separates Gewicht (z.B. Elektrode Modell 850) erreicht werden.



Made in Germany

Lieferumfang:

- Isolationsplatte
- Rostfreie Metall-Gegenelektrode
- Leitfähiger Trageoffer mit leitfähigem Schaumstoff
- Werkskalibrierschein

Technische Daten:

| | Standard |
|---|---|
| Oberflächenwiderstandsmessung R_s [Ω] bzw. ρ_s [Ω] | DIN EN 61340-5-1 DIN EN 61340-2-3 EOS:ESD STD 11.11 ASTM-D257 VDE 0300 Teil 5-1 / 2-3 |
| Volumenwiderstand / Durchgangswiderstand ρ_v [Ω] | DIN EN 61340-2-3 VDE 0300 Teil 2-3 |

► Zusätzlich zur gesetzlichen Gewährleistungsfrist gewähren wir für dieses Produkt 1 Jahr Garantie.

Die Angaben in diesem Merkblatt sind als Richtlinie gedacht. Sie wurden aufgrund umfangreicher Untersuchungen zusammengestellt. Eine Rechtsverbindlichkeit kann daraus nicht abgeleitet werden.

9.3 Two-point electrodes



For surface resistance measurements on small packages (e. g. SMD - blister tapes, conveyor belts, thermoforming trays, etc..)

- Corresponds to IEC 61340-4-10
- Measurements in Wells possible
- constant contact pressure due to spring-loaded electrode pins
- Ergonomically shaped handle with bend protection
- Very well handling
- Connection via shielded Teflon cable

9.4 Measuring handle



Measuring electrode - Tripod with conductive rubber pads and contact pressure 50 Newton

Measuring bracket for measuring surface resistances, especially on uneven surfaces

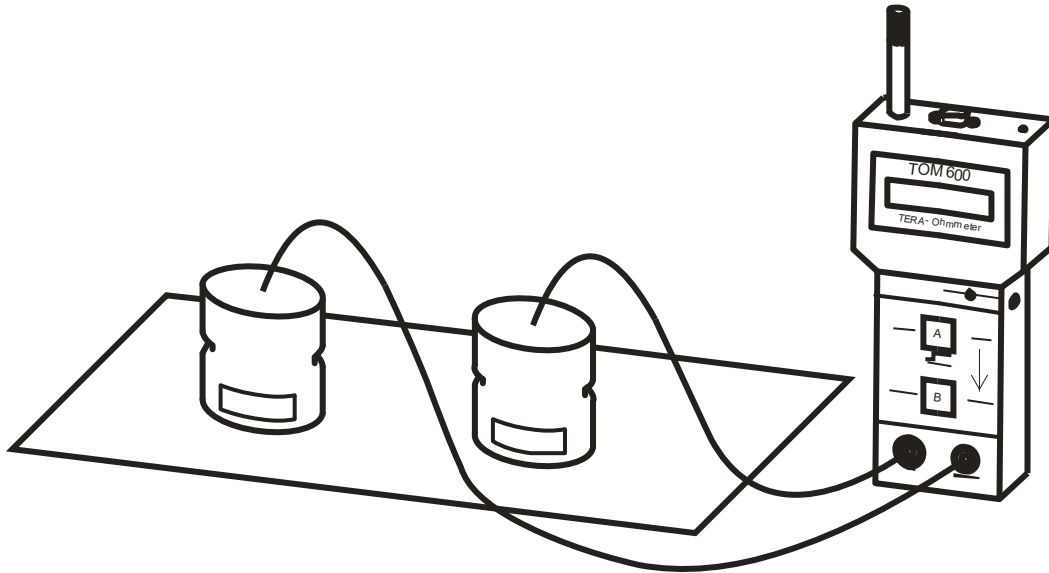
The measuring handle V50@ consists of two isolated, rod-shaped components, each of which is connected to a measuring disc via a joint.

The measuring discs are coated with a conductive rubber

10. Measuring Techniques according to IEC 61340-4-1

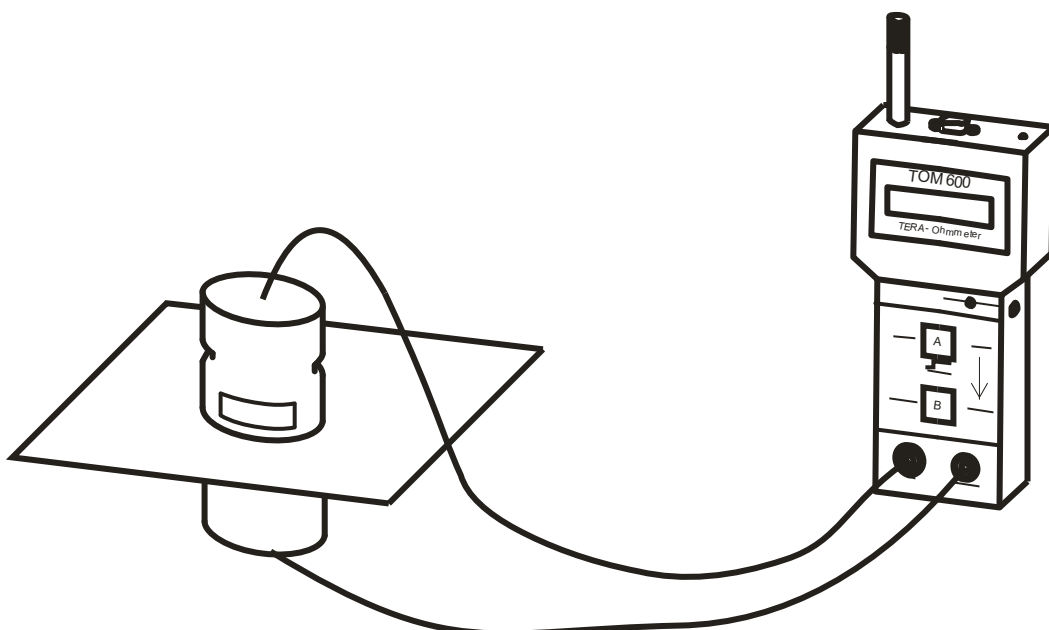
Surface Resistance (point to point)

The electrodes have to be put on the covering to measure. The measured resistance depends on the conductivity, the surface condition and the distance between the electrodes.



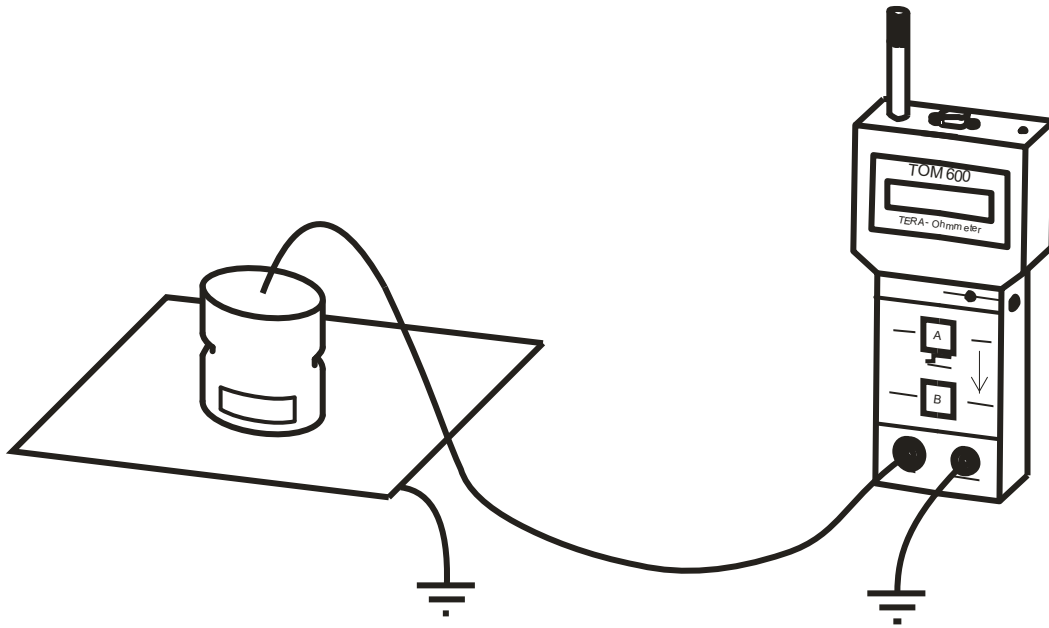
Volume Resistance

The covering has to be put between a metal plate and one electrode or between both electrodes. The measured resistance depends on the conductivity, the material thickness and the surface condition.



Leakage Resistance (point to ground)

The resistance of a covering to ground potential is measured. The measured resistance depends on the material's conductivity, its surface condition, the electrodes distance to the grounding point and the quality of the grounding.



A ring measurement electrode for measurements according to DIN EN 61340-2-3 is also available as accessory.