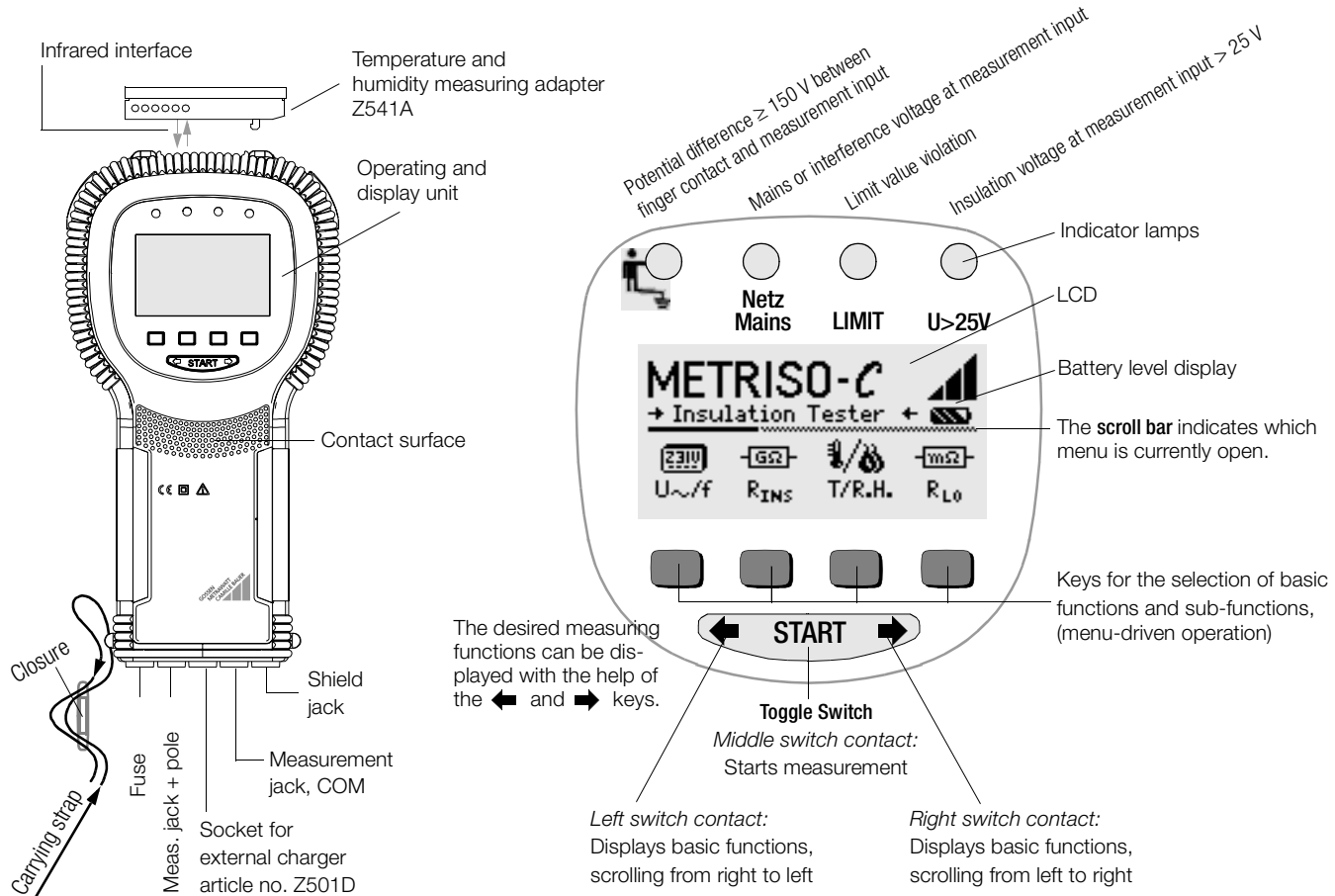


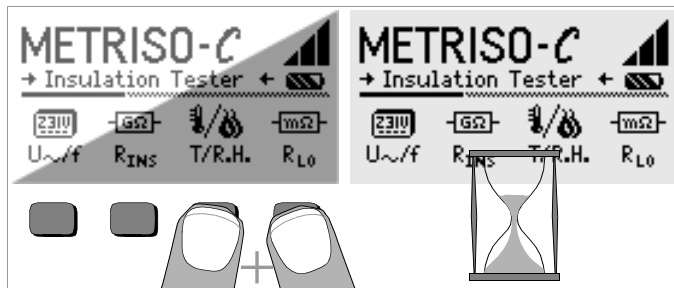
# METRISO<sup>®</sup> C

## Insulation, Resistance and Contact Current Measuring Instrument

3-349-087-03  
4/9.01







Please proceed as follows if the LCD display is not legible, i.e. too bright or too dark, after switching on the test instrument:

- 1 Simultaneously press the two right-hand keys to delete the memory which might be faulty.
- 2 Wait a few seconds to allow the display to be updated.

Readjust the contrast if necessary, see page 7.

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## 1 Applications

The METRISO<sup>®</sup>C test instrument allows for quick and efficient testing of protective measures in accordance with DIN VDE 0100, ÖVE-EN 1 (Austria), SEV 3569 (Switzerland) and other country specific regulations. The instrument is equipped with a microprocessor and complies with IEC/EN 61 557/VDE 0413.

Part 1: General requirements

Part 2: Insulation resistance measuring instruments

Part 4: Measuring instruments for the measurement of resistance at earth conductors, protective conductors and bonding conductors

as well as requirements in accordance with VDE 0701 part 240:

Repair, modification and testing of electrical devices

**The test instrument is especially well suited for:**

- Systems installation
- Initial start-up
- Periodic testing
- Troubleshooting in electrical systems

All required measurements can be performed for approval reports (e.g. for ZVEH) with the help of a set consisting of the PROFITEST<sup>®</sup>C and the METRISO<sup>®</sup>C.

Measurement values can be transmitted to a PC for printing and archiving via the integrated IR data interface at the METRISO<sup>®</sup>C. This is especially important where product liability is concerned.

**The following measurements and tests can be performed with the METRISO<sup>®</sup>C:**

- Insulation resistance
- Low-value resistance
- Contact current
- Voltage and frequency
- Temperature and humidity (with accessories)

**The following can also be measured with a shielded measurement cable:**

- Conductivity of floor coverings for electrostatic discharge

## Seals of Approval



applied for

applied for

## 2 Safety Features and Precautions

The METRISO<sup>®</sup>C electronic measuring and test instrument is manufactured and tested in accordance with safety regulations IEC/EN 61010-1/VDE 0411-1 and EN 61 557.

If used for its intended purpose, the safety of the operator and the instrument is assured.

**Read the operating instructions carefully and thoroughly before using your instrument, and observe all instructions included therein.**

**The measuring and test instrument may not be used:**

- If the battery compartment cover has been removed
- If external damage is apparent
- With damaged connector cables or measuring adapters
- If it no longer functions flawlessly
- After excessive stress due to transport
- After lengthy periods of storage under unfavorable conditions (e.g. humidity, dust, extreme temperatures)
- While the batteries are being charged

### Meanings of Symbols on the Instrument



Warning concerning a point of danger  
(Attention: observe documentation!)



Protection class II device

CAT III

Overvoltage category III device



9 V DC charging socket for NA 0100S charging adapter  
(Z501D)

## 3 Initial Start-Up

### 3.1 Battery Test

Five battery symbol segments ranging from depleted to fully charged continuously indicate the current battery level at the main menu.

### 3.2 Installing and Replacing Batteries

New batteries must be installed before initial start-up, or when **only one solid segment remains in the battery symbol**.



#### Attention!

The instrument must be disconnected from the measuring circuit (mains) at all poles before the battery compartment is opened.

Four 1.5 V baby cells in accordance with IEC LR14 are required for operation of the METRISO<sup>®</sup>C. Use alkaline-manganese batteries only. Rechargeable NiCd or NiMH batteries can be used as well. Be absolutely sure to refer to chapter 13.2, page 22, regarding the charging cycle and the charging adapter.

Always replace the batteries in complete sets.

Dispose of batteries in an environmentally sound fashion.

- ↳ Loosen the two slotted screws at the battery compartment cover on the housing rear panel and remove the cover.
- ↳ Insert four 1.5 V baby cells making certain they are poled in accordance with the symbols. Insert the two batteries which are half covered by the housing first.
- ↳ Replace the cover and retighten the screws.



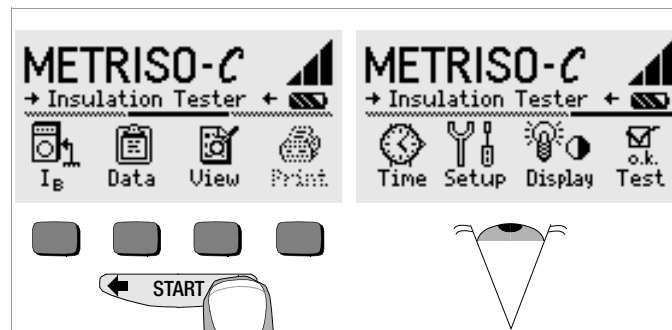
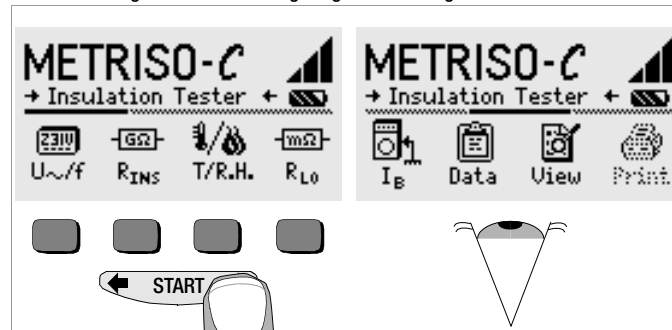
#### Attention!

The instrument may not be operated if the battery compartment cover has not been installed and properly tightened!

### 3.3 User Guide in a Different Language

By performing a software update it is possible to load another language for the user guide than the one included in the scope of supplies. Any language currently available can be supplied on request.

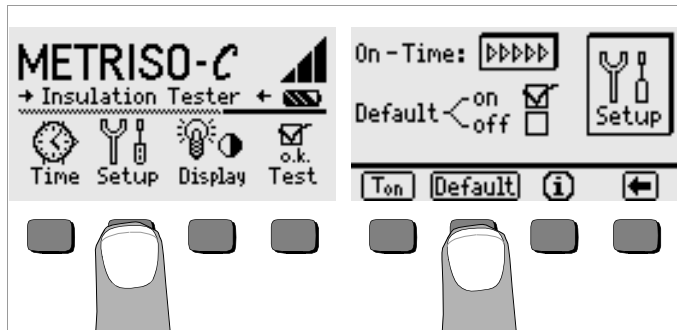
### 3.4 Selecting a Menu and Configuring Basic Settings




Press the ← or the → key in order to display the desired measuring function, the device settings or the database functions.

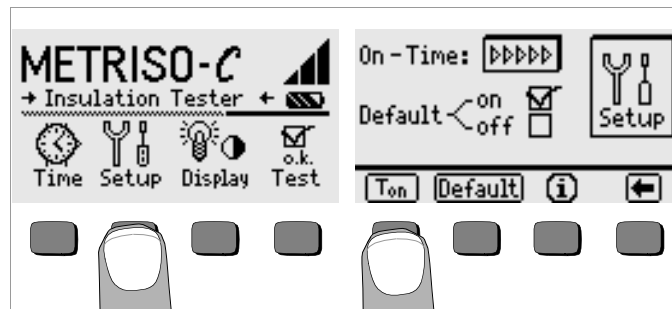
## Default Settings – Last Used Settings




A selection can be made here as to whether the menus will be displayed according to the default settings, or if the last opened menu should be displayed.



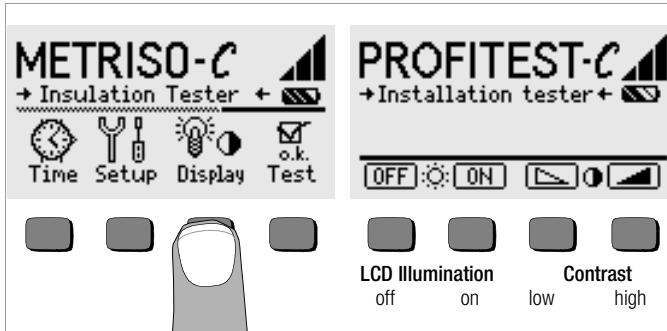
- ◇ Activate the Setup key.
- ◇ Press the Default key, if required:
  - on** ✓ Settings such as  $T_{on}$  (= 20sec) are reset to the default settings each time the instrument is switched on.
  - off** ✓ The last used settings remain when the instrument is switched on.
- ◇ Press the  key to quit the setup menu.

## Setting On-Time, Manual Shutdown



- ◇ Activate the Setup key.
- ◇ Press the  $T_{on}$  key and then the 10sec, 20sec, 30sec or 60sec key depending upon the desired duration after which the test instrument should switch off automatically. Additional setting options can be displayed with the help of the  and  scroll keys. The “>>>>” setting indicates that no automatic shutdown will occur. The selected setting has a considerable influence on battery service life.
- ◇ Press the  key to quit the setup menu.

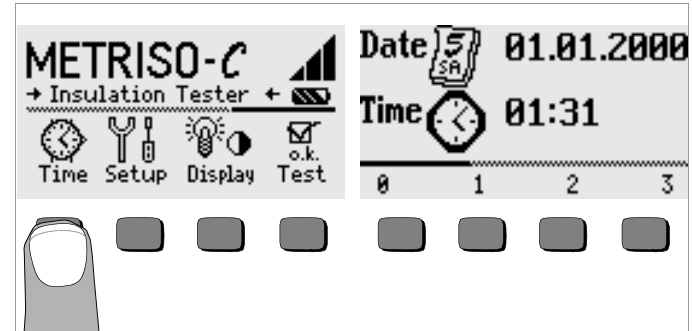
**The instrument can be switched off manually by simultaneously activating the two outermost softkeys.**



- ⇨ Activate the Display key.
- ⇨ In order to extend battery service life, display illumination can be switched off entirely. Press the corresponding softkey to this end.

If LCD illumination is activated (= ON), it is automatically switched off several seconds after the last key has been activated in order to extend battery service life. As soon as a key is activated again, illumination is switched back on.

- ⇨ Contrast can be optimized with the two keys at the far right.
- ⇨ Press the **START** key to quit the setup menu. The data are saved to memory.



- ⇨ Activate the Time key.
- ⇨ The cursor appears at the first digit in the date. Enter the desired numeral with one of the softkeys. Numerals which do not appear in the window can be displayed with the help of the ◀ or the ▶ key. Each time a numeral is selected, the cursor moves to the next position to the right.
- ⇨ Date and time are saved as soon as the last numeral has been entered.
- ⇨ Press the **START** key to quit the setup menu. The data are saved to memory.

## 4 General Operation

The test cables are connected to the “+” and “COM” jacks.


The shielded cable should also be connected to the **COM** and **SHIELD** jacks for the measurement of electrostatic discharge capacity at floor coverings. Observe color codes when connecting the cables!

### 4.1 Automatic Settings, Monitoring and Shutdown

The instrument cannot be placed into operation, or it is shut down automatically, if battery voltage has fallen to below the lower limit value. Measurement is automatically interrupted and/or the measuring function is disabled if voltage exceeds the allowable limit in the resistance range ( $U > 25\text{ V}$ ).

The instrument switches itself off automatically, at the earliest after the current (automatic) measuring sequence has been completed, and after the predefined on-time has elapsed (see chapter 3.4). On-time is reset to the duration selected in the setup menu each time a key is activated.

### Lamp Functions

Lamp	Status	Function
	red	Potential difference $\geq 150\text{ V}$ between finger contact and measurement input
<b>Netz Mains</b>	blinking red	Line voltage or interference voltage is present at the measurement inputs (insulation resistance and low resistance measurement are disabled)
<b>LIMIT</b>	red	– Measured insulation resistance is less than the selected limit value. – The measured low-value resistance is less than the allowable limit value.
<b>U&gt;25V</b>	red	A voltage of greater than 25 V is present at the measurement inputs. The discharging process is not yet complete.

### 4.2 Measurement Value Display


The following is displayed at the LCD:

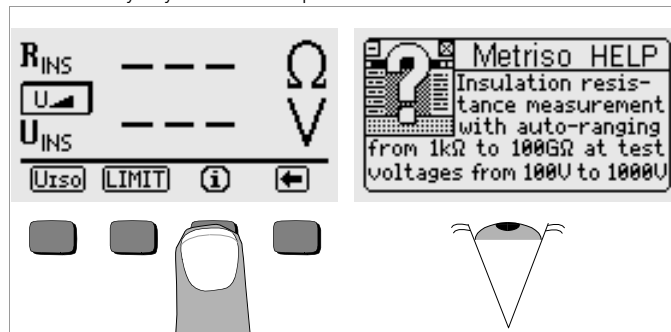
- Measurement values with abbreviated quantity type and units of measure
- The selected function

When automatic measuring sequences are used, the measurement values are displayed in digital format until the next measuring sequence is started, or until the instrument switches itself off automatically. If the measuring range upper value is exceeded, the upper value is displayed preceded by the greater than symbol “>” in order to indicate over-ranging.

### 4.3 Online Help

Appropriate online help texts can be displayed at the LCD for each of the basic functions and sub-functions, **after the respective function has been selected in the corresponding menu.**

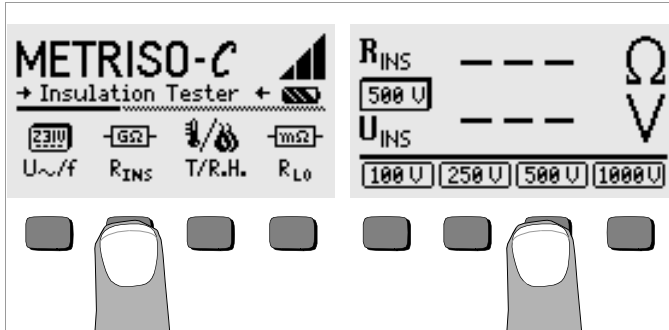
- ⇒ Press the  key to query online help.  
Press any key to exit the help function.





## 5 Measuring Insulation Resistance

Insulation resistance can only be measured at voltage-free objects. If mains voltage or an interference voltage is applied to the measurement cables, insulation resistance is not measured and the Netz/Mains lamp lights up.



- ⇨ Press the  $R_{ISO}$  key.

The currently selected test voltage (nominal voltage) is displayed between  $R_{ISO}$  and  $U_{ISO}$ .

- ⇨ Select another test voltage if necessary by pressing  $U_{ISO}$  and then the desired test voltage.
- ⇨ Connect the device under test to the + and COM jacks.
- ⇨ Start the measurement by pressing the **START** key.



### Attention!

Do not touch the connector terminals at the instrument during performance of insulation resistance measurement!



### Note Three-Phase Current Systems

All conductors (L1, L2, L3 and N) must be measured against PE!

If the connector terminals are free, or if they have been connected to an ohmic power consumer for the performance of a measurement, a current with a value of approximately 1 mA would flow over your body at a voltage of 500 V.

This electrical shock is not life endangering. However, the plainly perceptible shock may result in injury (as a result of startling etc.).

### Capacitive Devices Under Test



### Attention!

If measurement is performed at a capacitive object, e.g. a long cable, it is charged to a level of as great as 500 V!

**In this case, contact with the object is life-endangering!**

After completion of insulation resistance measurement at capacitive objects, the device under test is automatically discharged via the instrument after the **START** key has been released. Contact with the object must therefore be maintained.

**Do not disconnect the device under test until  $U_{ISO} < 25 V$  appears at the display.**

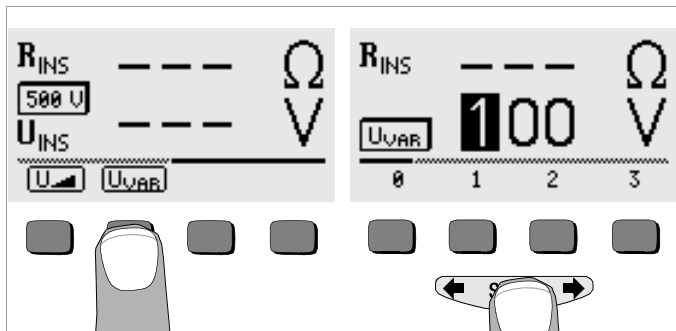


### Note

The instrument's batteries are depleted rapidly during the measurement of insulation resistance. Only hold the **START** key depressed until the display value has stabilized.

### 5.1 Insulation Measurement with Adjustable Test Voltage

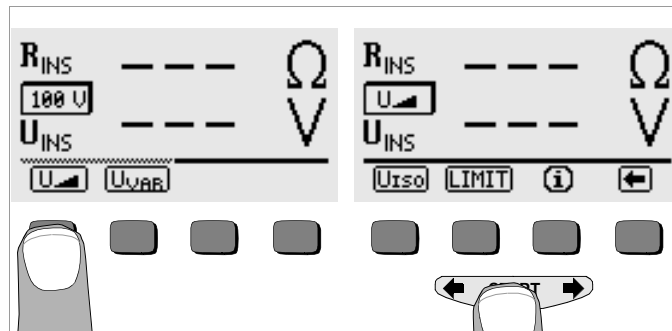
A DC test voltage within a range of 50 to 1000 V can be selected with the  $U_{VAR}$  function for measurements at sensitive components and in systems equipped with voltage limiting components.



- ◇ Select the  $U_{VAR}$  function from the  $U_{ISO}$  menu with the  $\leftarrow$  or the  $\rightarrow$  key and acknowledge with the  $U_{VAR}$  key.
- ◇ In order to enter the desired value:  
Display the desired numerals, and if required the decimal point, with the help of the  $\leftarrow$  and  $\rightarrow$  keys. Select the desired numerals with the appropriate softkeys. Each time an entry is made, the cursor moves one place to the right. After a maximum of three numerals have been entered, exit the data entry window by pressing the  $\rightarrow$  softkey. If the selected voltage is not within the valid range, the cursor jumps back to the entry position for the first digit.  
After the value has been completely entered and acknowledged with the **START** key,  $U_{VAR}$  is displayed between  $R_{ISO}$  and  $U_{ISO}$ .
- ◇ The remainder of the measurement procedure is identical to the test sequence used for predefined nominal voltages.

### 5.2 Measurement with Rising Test Current

The " $U_{\uparrow}$ " function can be used for the detection of weak points in insulation, as well as for the determination of response voltage at voltage limiting devices.



- ◇ Select the  $U_{\uparrow}$  function from the  $U_{ISO}$  menu with the  $\leftarrow$  or the  $\rightarrow$  key and acknowledge with the  $U_{\uparrow}$  key.

As long as the **START** key is depressed, test voltage is continuously increased. Insulation measurement begins:

- As soon as maximum voltage is reached (= variable test voltage, see chapter 5.1) or
- As soon as the **START** key is released (when the desired voltage appears at the display) or
- As soon as a measurable test current is detected (e.g. after a discharge voltage sparkover).

Test voltage, any response or discharge voltages values and insulation resistance are all displayed.

### 5.3 Setting the Limit Value

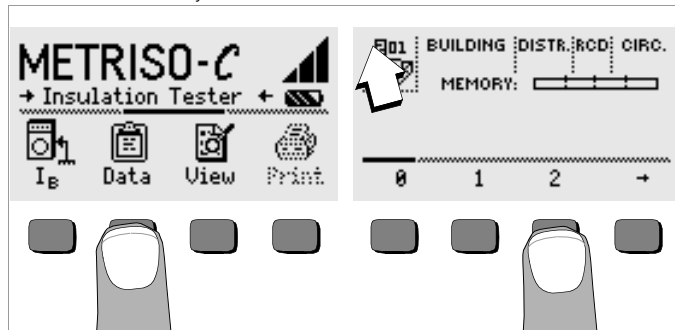
A limit value for insulation resistance can be selected with the **LIMIT** key. If measured values are detected below the limit value, the red **LIMIT** LED lights up.

## 6 Database Functions

The displayed measurement data for each measurement can be saved to an internal database, with or without a comment. A data record must be created and allocated to a specific memory address in order to be able to assign the individual measurement values to different buildings, distributor cabinets and measuring circuits.

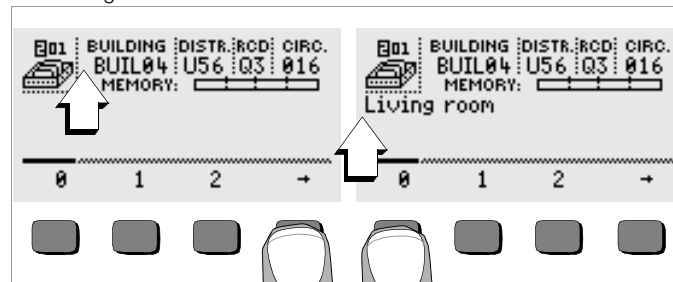
### 6.1 Creating a Data Record – Data Function

- Press the Data key.



- First create the desired memory address with the help of the softkeys. After acknowledging with the **START** key (press at center), the cursor appears at the first data entry position (BUILDING).

- With the help of the softkeys, entries can be made to the BUILDING, DISTRIBUTOR CABINET, RCD No. and CIRCUIT fields one after the other, and a designation can be entered for the electrical circuit.



#### Entering Data:

Display the desired alphanumeric character by pressing the **←** or the **→** key, and then select the character with the corresponding softkey.

Control characters can be entered in the same way and have the following meanings:

- ←**: Move cursor to the left (without deleting data)
- : Move cursor to the right (without deleting data)
- ↓**: Same function as the **START** key

After each character is selected, the cursor moves one position to the right. If **↓** or the **START** key is activated (press at center), the cursor moves to the next entry field. After the fields BUILDING, DISTRIBUTOR CABINET, RCD No. and CIRCUIT have been completed, and after acknowledgement has been confirmed with the **↓** softkey, the data fields are displayed as inverse images. After the **↓** softkey has been activated once again, a designation for the selected electrical circuit can be entered.



#### Note

These entries are required by the PC software in order to enter measurement values into the database, and to generate reports with this information automatically.

## 6.2 Saving Measurement Values – STORE Function

- Start the respective measurement. The STORE key is displayed after the measurement instead of the INFO key.  
The STORE key is not displayed until after a given amount of time has elapsed for measurements which are performed without the **START** key. For example, the store key is not displayed after voltage measurements until a given amount of time has elapsed, so that the operator can first query the help text with the INFO key.
- The displayed measurement values are stored to the currently selected database memory address by briefly acknowledging with the STORE key. The key is briefly displayed as an inverse image during storage to memory.
- Pressing and holding the STORE key allows for the entry of a comment, and storage of the current measurement.

### Entering a comment:

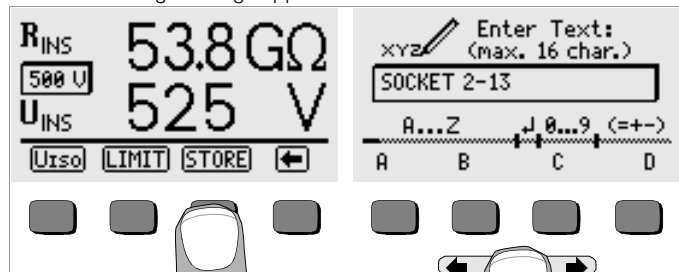
Display the desired alphanumeric character with the ← or the → key and select the desired character with the corresponding softkey. Control characters are entered in the same way and have the following meanings:

←: reverse and delete,

↵: same as the **START** key

After each character has been selected, the cursor moves one position to the right. Already entered characters can be deleted in reverse by pressing and holding any softkey (except for ↵).

After entry of up to 15 characters, save the measurement values and the comment by acknowledging with the **START** key (press at center). The following message appears: ”.

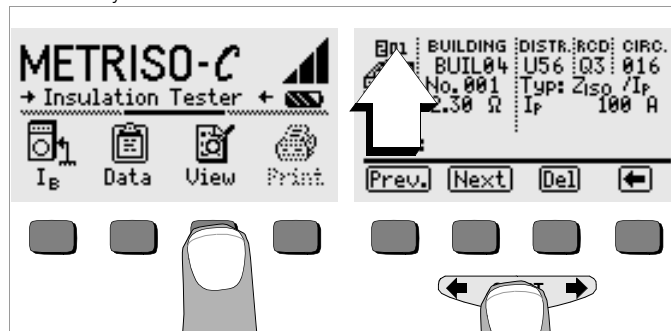


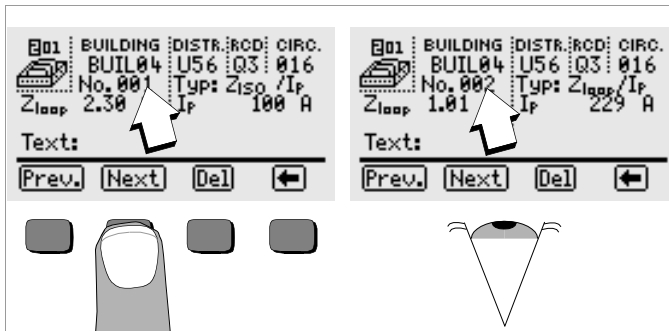
### Note

The test reports included with the analysis software (e.g. PS3) have separate fields for measured values  $R_{ISON}$  (without load) and  $R_{ISOL}$  (with load). Enter an "N" as the first character for measurement of  $R_{ISON}$  (i.e. without load), so that the analysis software is able to determine which value is to be stored for the report. Otherwise, measured values are automatically stored as  $R_{ISOL}$ , i.e. with load.

## 6.3 Querying Data Records – View Function

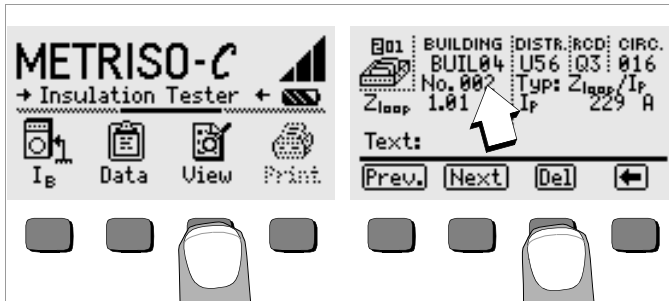
- Select View.
- You can scroll forward through the memory addresses with the → key, or backwards with the ← key.
- After selecting a memory address, the individual data records can be queried with the Prev. and Next softkeys, which have been stored to memory under consecutive numbers.





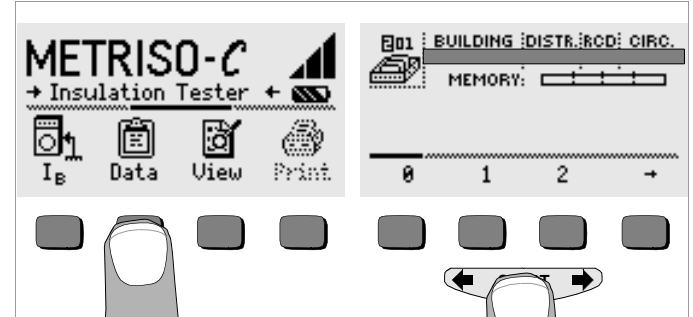
### 6.3.1 Deleting a Data Record from within a Memory Address – View Function

- ◊ Activate the Del key. No security request appears. Data record numbering is changed as soon as an individual data record is deleted.



### 6.3.2 Deleting a Memory Address – Data Function

- ◊ Select Data.
- ◊ Enter blanks to the data fields BUILDING, DISTRIBUTOR CABINET, RCD No. and CIRCUIT. After all of these fields have been entirely overwritten with blanks, they are displayed as inverse images.

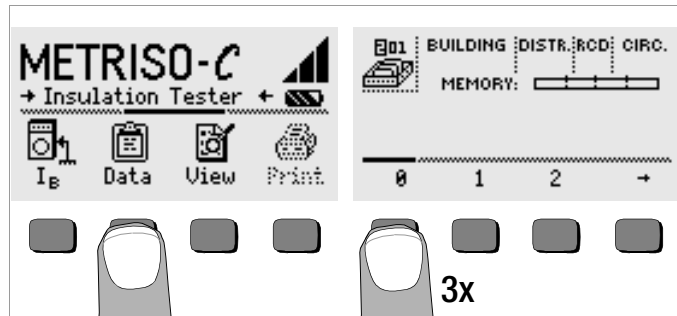


- ◊ Acknowledge with the **START** key (press at center). All data from the selected memory address are deleted.

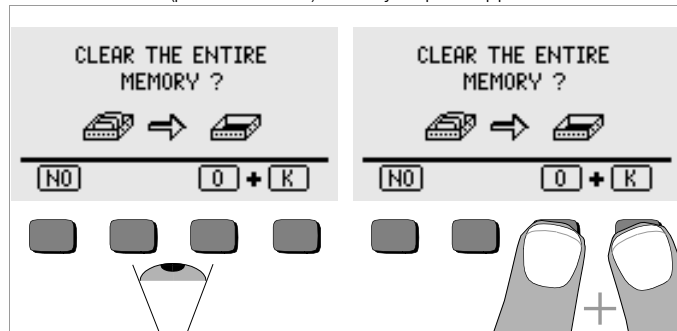
### 6.3.3 Delete All Memory Addresses – Data Function

Up to 250 data records can be stored to memory. The memory is full when the bar graph to the right of “MEMORY:” is entirely filled in. The entire memory, i.e. all data records from all memory addresses, can be deleted at once. We recommend uploading and saving your data to a PC before deletion.

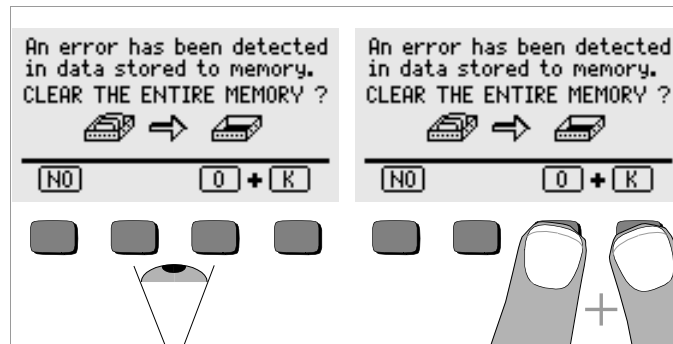
↪ Select Data.



↪ Enter memory address “000”. After acknowledgement by pressing button **START** (press at center) a safety request appears.



↪ By simultaneously activating O and K all data that have been saved are deleted from memory. The bar graph to the right of the parameter „MEMORY:“ is empty. To the left, memory address „001“ is displayed. New data can now be entered for the first address, or the database can be exited (press **↵** or **START** 9 times).



If the above message appears upon switching on the test instrument, all data can be saved to a PC before finally deleting the database in order to rectify the error.

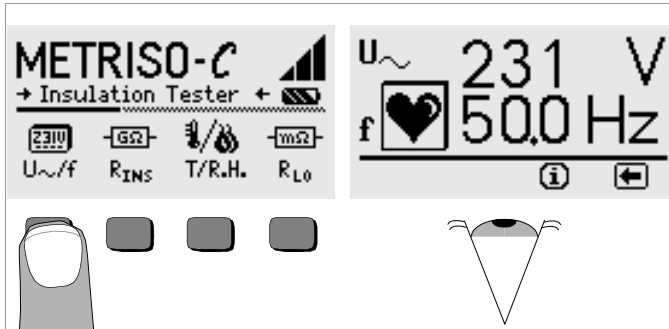
### 6.4 Print Function

Functions the symbols of which appear in gray or are displayed only in a faint raster screen, will not be available until after the next software update.

## 7 Measuring Alternating Voltage

Sinusoidal alternating voltage within a frequency range of 40 to 200 Hz can be measured with the test instrument.

- ◇ Press the U~/f key.
- ◇ Contact the measuring points with the measuring probes.



### Notes

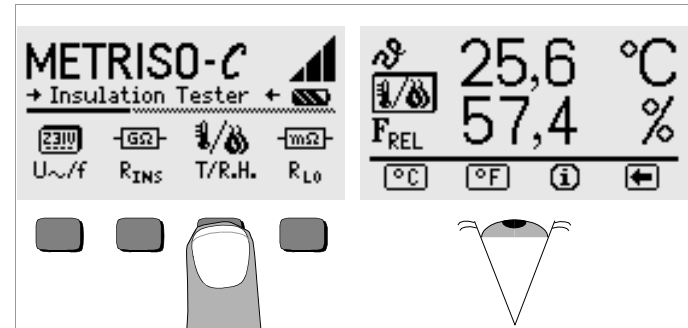
- The voltage measuring range has an overload capacity of 1200 V.
- The input impedance for the voltage measuring range is 5 MΩ.

## 8 Measuring Temperature and Humidity with Adapter Z541A (accessory adapter)

Temperatures within a range of -10.0 °C to +50.0 °C, as well as relative humidity from 10.0% to 90.0% can be measured with the temperature-humidity combination adapter.

- ◇ Connect the temperature-humidity adapter to the IR interface of the test instrument (see drawing on page 2) by inserting the guide pin of the adapter in the opening provided at the top of the test instrument such that the adapter is located on the two rubber pads in central position to the housing. Then push the adapter down to fix it tightly.

- ◇ Press the T/F<sub>REL</sub> key. The adapter is activated via the interface.
- ◇ Select the desired temperature unit of measure, °C or °F, with the corresponding key. Temperature and humidity are displayed directly.
- ◇ We recommend moving the test instrument with the adapter to and fro for a few seconds to enable the adapter to adjust to the prevailing room climate more quickly. The air current can thus penetrate through the opening into the adapter housing more quickly. It would otherwise take several minutes to achieve this condition.
- ◇ When changing to another function, the adapter is deactivated.
- ◇ The measured values are only updated every 5 seconds to spare the adapter batteries.



### Display at the Test Instrument

The „— —“ symbol shown on the display can be attributed to the following causes:

- incidence of sunlight
- depleted batteries in adapter Z541A
- adapter defective or not properly positioned

Adapter Z541A should not be exposed to intensive sunlight to prevent inadvertent activation via infrared (battery life!).

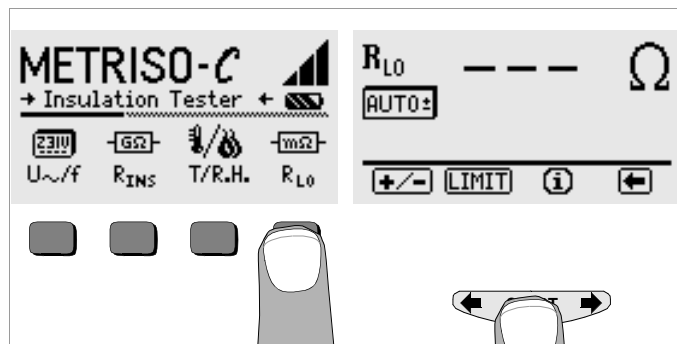
## 9 Measuring Low-Value Resistance (to 100 $\Omega$ )

According to the regulations, measurement of low-value resistance at protective conductors, earth conductors and bonding conductors must be performed with (automatic) measuring voltage polarity reversal, or with the flow of current in one direction (+ pole to PE), or the other (– pole to PE).



### Attention!

Low-value resistance may only be measured at voltage-free objects.



### Attention!

In order to be able to start the measurement, contact must first be established between the test probes and the device under test. If voltage is present at the device under test, or if resistance is greater than 100  $\Omega$ , no measurement is performed.

## Automatic Polarity Reversal – AUTO $\pm$ Function

With automatic polarity reversal, the instrument performs measurement first in one direction and then in the other, after the measuring sequence has been started.

The largest measured resistance value is always displayed. This presupposes that AUTO $\pm$  is displayed underneath R<sub>LO</sub>. If either of the values RLO/+ or RLO/– is displayed instead of AUTO $\pm$ , press the +/- key in the menu bar and then AUTO $\pm$ .

Resistance values which do not demonstrate stabilized values until after settling in, should not be measured with automatic polarity reversal. Measurement with automatic polarity reversal may result in varying, excessively high measured values and thus to an ambiguous read-out.

## Measurement with + Pole to PE, or – Pole to PE

In order to determine whether or not test results are independent of the direction of flow, measurement can be performed separately in both directions. Press the +/- key in the menu bar to this end, and then either + or – depending upon the desired direction of flow.

Differing results indicate that voltage is present at the device under test (e.g. thermoelectromotive force or elemental voltage).

Measurement results may be distorted by parallel connected impedances from load current circuits and equalizing current, especially in systems equipped with “overcurrent protective devices” (formerly neutralization) without a separate protective conductor. A change in resistance during measurement (e.g. inductance), or poor contact may also result in distorted measurements.

The following are examples of resistance values which may change during measurement :

- Resistance values for incandescent light bulbs due to warming caused by test current
- Resistance with an excessively high inductive component

In order to assure unambiguous measurement results, it is necessary to recognize and eliminate any cause of error.

The instrument's batteries are depleted rapidly during resistance measurement. Only press the START key as long as necessary during measurement with current flow in a single direction.



### 9.1 Compensation for Measurement and Extension Cables (up to 10 $\Omega$ )

Measurement and extension cable ohmic resistance can be subtracted automatically from the measurement results. Proceed as follows:

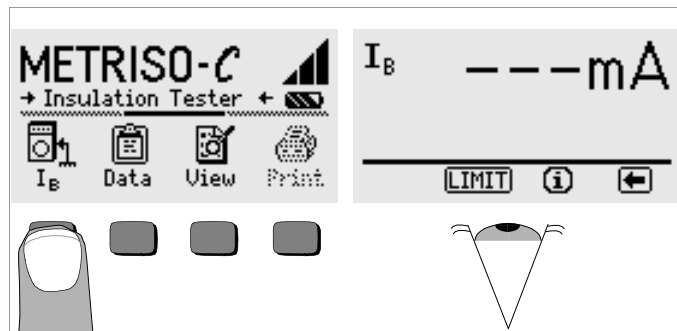
- ⇨ Activate the +/- key in the menu bar.
- ⇨ Short circuit the two test probes at the ends of the measuring cables, with interconnected extension cables if used.
- ⇨ Activate the Offset key. Cable resistance is displayed to the right of Offset.
- ⇨ Connect the device under test.
- ⇨ Start low-resistance measurement with the **START** key. The display value  $R_{LO}$  represents the measured value, from which the cable resistance value  $R_{Offset}$  has already been subtracted.

### 9.2 Setting the Limit Value

A resistance limit value can be selected with the "LIMIT" function. If a measured value exceeds this limit value, the red LIMIT LED lights up.

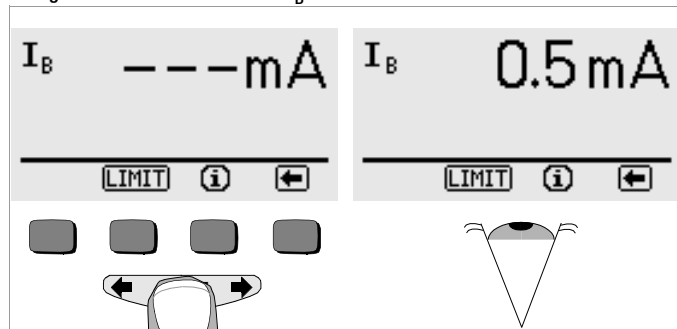
## 10 Measuring Contact Current

Substantiation of the absence of voltage can be provided by means of contact current measurement (DIN VDE 0701 part 240).



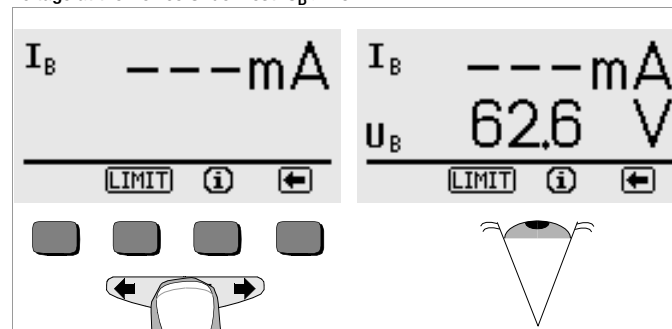
- ⇨ Press the  $I_B$  key.
- ⇨ Contact the measuring point with both test probes, which have been connected to the + Pole and COM jacks.

Voltage at the Device Under Test:  $U_B < 25 V$

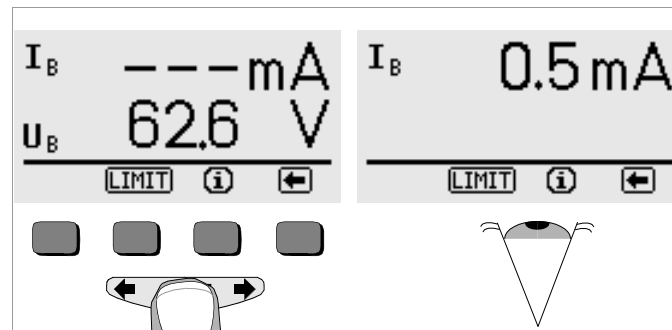


- ⇨ Briefly press the **START** key in order to start the measurement. Contact current  $I_B$  is measured and displayed.

Voltage at the Device Under Test:  $U_B > 25 V$



- ⇨ Briefly press the **START** key in order to start the measurement. Contact voltage  $U_B$  is measured and displayed.



If the **START** key is press and held,  $I_B$  is measured and displayed.

### 10.1 Setting the Limit Value

A limit value for contact current can be selected with the LIMIT key. If a measured value exceeds this limit value, the red LIMIT LED lights up.

## 11 Characteristic Values

Measured Quantity	Measuring Range	Test Current	Nominal Range of Use	Nominal Values / Impedance	Intrinsic Error	Measuring Error
$R_{ISO}$	000 k $\Omega$ ... 99.9 G $\Omega$	1 mA <sup>3)</sup>	10 k $\Omega$ ... 10 G $\Omega$	$U_N = 100/250/500/1000$ V <sup>2)</sup>	$\pm(5\%$ rdg. + 3 d)	$\pm(7\%$ rdg. + 3 d)
			> 10 G $\Omega$ ... 100 G $\Omega$		$\pm(8\%$ rdg. + 3 d)	$\pm(10\%$ rdg. + 3 d)
$U_{ISO}$	000 V ...		50 ... 1.00 kV	5 M $\Omega$	$\pm(2.5\%$ rdg. + 3 d)	$\pm(5\%$ rdg. + 3 d)
$U_{\sim}$	00.0 V ... 1.20 kV		10 ... 1.00 kV	5 M $\Omega$	$\pm(2.5\%$ rdg. + 3 d)	$\pm(5\%$ rdg. + 3 d)
f	15.0 ... 400 Hz		45 ... 200 Hz	5 M $\Omega$	$\pm(0.5\%$ rdg. + 2 d)	$\pm(1\%$ rdg. + 2 d)
$R_{LO}$	0.00 ... 9.99 $\Omega$	$I_N = 200$ mA	0.1 ... 10 $\Omega$	$U_0 = 4.5$ V	$\pm(2.5\%$ rdg. + 3 d)	$\pm(5\%$ rdg. + 3 d)
	> 10.0 ... 99.9 $\Omega$		> 10 ... 100 $\Omega$		$\pm(8\%$ rdg. + 3 d)	$\pm(10\%$ rdg. + 3 d)
$I_B$	0.00 $\mu$ A ... 9.99 mA		0.1 ... 10 mA AC	2 k $\Omega$	$\pm(5\%$ rdg. + 3 d)	$\pm(6\%$ rdg. + 3 d)
$T$ <sup>1)</sup>	-10.0 ... +50.0 $^{\circ}$ C		0 ... +40 $^{\circ}$ C		$\pm 2$ $^{\circ}$ C	
$F_{rel}$ <sup>1)</sup>	10.0 ... 90.0 %		20 ... 80 %		$\pm 5\%$	
Phase Test	LED PE > 100 V		100 ... 1000 V	> 100 M $\Omega$ /50 Hz		

1) With external adapter Z5414A as accessory

2) DC nominal voltage =  $U_N + (0 \dots 15\%)$

3) At nominal resistance  $R_N = 1000$   $\Omega$ /V

### Reference Conditions

Ambient Temperature + 23  $^{\circ}$ C  $\pm 2$  K

Relative Humidity 45 ... 55 %

Battery Voltage 5.5 V  $\pm 1\%$

Meas. Qty. Frequency 50 Hz  $\pm 0.2$  Hz

Live Voltage Waveshape sine, deviation between RMS and rectified values < 1 %

Battery Saver Circuit

Display illumination can be switched off. The test instrument switches itself off automatically 10 to 60 seconds after the last key operation. On-time can be selected by the user.

Service Life

**For  $R_{ISO}$ ,  $R_{LO}$ ,  $I_B$ :** 3000 measurements with one set of batteries (alkaline-manganese) with 10 s on-time and performance of one measurement before each automatic instrument shutdown

### Power Supply

Batteries 4 ea. 1.5 V baby cells (4 x C-Size) (alkaline-manganese per IEC LR14) or 4 ea. NiCd rechargeable batteries

Safety Shutdown

**For  $U_{\sim}/f$  and  $T/F_{REL}$ :**

5 hours (same conditions as above)

Nominal Range of Use 4.6 ... 6.5 V

Battery Test symbolic display

The instrument is switched off, or cannot be switched on, if supply voltage has dropped to below the critical level.

Charging Socket Installed rechargeable batteries can be recharged inside the instrument by connecting the NA0100S battery charger (Z501D) to the charging socket.

#### Overload Capacity

$R_{ISO}$  1000 V continuous, 1200 V for 10 s  
 $R_{LO}$  Electronic protection disables start-up if interference voltage is present.  
 $U_{\sim}$  1000 V~ continuous, 1200 V for 10 s

#### Electrical Safety

Safety Class II per IEC 61010-1/EN 61010-1/  
VDE 0411-1  
Nominal Voltage 1000 V  
Test Voltage 5.55 kV  
Overvoltage Category 600 V CAT III  
1000 V CAT II  
Fouling Factor 2  
Electromagnetic Compatibility (EMC) IEC 61326/EN 61326  
Fuses FF0.315-1000G

#### Ambient Conditions

Nominal Temperature 0 ... +40 °C  
Operating Temperature -10 ... +50 °C  
Storage Temperature -20 ... +60 °C (without batteries)  
Relative Humidity to 75% (max. 85% for storage and transport),  
no condensation allowed  
Elevation max. 2000 m  
Deployment indoors only

#### Mechanical Design

Display multiple dot matrix display  
128 x 64 pixels (65 mm x 38 mm), illuminated  
Protection housing: IP 52 per DIN VDE 0470 part 1/  
EN 60529  
Dimensions 275 mm x 140 mm x 65 mm  
Weight approx. 1.2 kg with batteries

#### Data Interface

Type infrared interface (SIR/IrDa)  
bidirectional, half-duplex  
Format 9600 baud,  
1 start bit, 1 stop bit, 8 data bits,  
no parity, no handshake  
Range max. 10 cm  
recommended: < 4 cm

## 12 List of Abbreviations and their Meanings

### Voltage

U	Test voltage or nominal voltage
U <sub>ISO</sub> ◀	Rising test voltage for insulation testing
U~	Measured voltage (sinusoidal alternating voltage)

### Temperature / Atmospheric Humidity

T / θ	Temperature
F <sub>REL</sub>	Relative atmospheric humidity

### Resistance, Contact Current

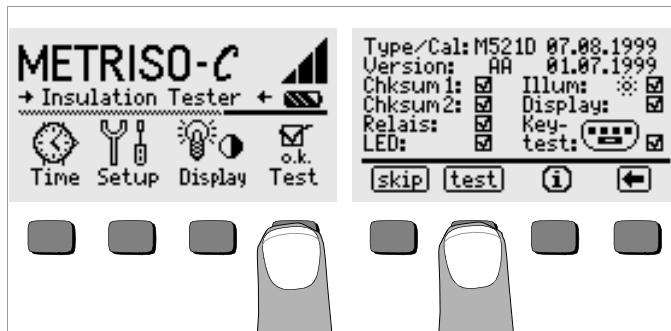
LIMIT	Limit value for insulation resistance, low-value resistance or contact current
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Offset Correction value of resistance for measurement cables

R <sub>INS</sub>	Insulation resistance
R <sub>LO</sub>	Low-value resistance (cable resistance)

## 13 Maintenance

### 13.1 Self-Test



- The self-test is started from the main menu with the Test key. The test has a duration of several seconds.

The following information is displayed in the two headers:

**Type/Cal:** Device type / date of last calibration

**Version:** Software version and issue date

Self-tests for the items Chksum through LED are performed automatically, one after the other, and are checked off or marked with a horizontal dash if they are not passed.

**Chksum1/2:** Status display for internal testing (Each test must be completed with a check mark. If not, the measuring and test instrument may no longer be used. Please contact our service center in this case.)

**Relays:** Each relay is switched twice.

**LED:** The U, LIMIT and NETZ/MAINS lamps each blink twice in red. The PE lamp cannot be tested automatically!

As soon as the tests in the left-hand column have been completed, the following tests must be started manually:

- ↗ **Illum:** Press the Test key twice in order to activate and deactivate display illumination.
- ↗ **Display:** Press the Test key after each test pattern appears in order to check the display elements.
- ↗ **Keytest:** Perform the key test by pressing each of the softkeys once, and by pressing the start key once in each of its three positions. The keys appear filled in at the key pictograph after they have been tested.

Individual tests can be skipped by pressing the skip key before starting the respective test. These tests are then identified with a horizontal dash, as is also the case for tests which have not been passed.

### 13.2 Battery Operation

When only one solid segment remains in the battery symbol, the batteries must be replaced, or recharged if rechargeable batteries are used.

Check the batteries at short, regular intervals or after lengthy periods of storage to make sure no leakage has occurred. If leakage has occurred, the electrolyte must be carefully and completely removed from the instrument with a damp cloth before new batteries are installed.

#### Charging the Batteries



#### Attention!

Use only the NA 0100S battery charger (article no. Z501D) with safe electrical isolation and a nominal secondary voltage of 9 V DC to recharge the batteries.

Before connecting the battery charger to the charging socket at the device, make sure of the following points:

- **Rechargeable batteries have been installed (not normal batteries).**
- The instrument has been disconnected from the measuring circuit at all poles.
- The voltage selector at the charger has been set to 9 V.

Connect the NA 0100S battery charger to the charging socket with the 3.5 mm jack plug. Set the voltage selector switch at the NA 0100S to 9 V. Switch the test instrument on.

The test instrument recognizes the fact that a battery charger has been connected and starts the charging cycle. The 5 segments of the battery symbol are continuously displayed in a sweeping pattern from left to right for the entire duration of the charging cycle.

Depleted batteries require a charging cycle of approximately 14 hours. If the batteries are exhausted to a great enough extent, the test instrument can no longer be switched on. If this is the case, leave the test instrument connected to the activated battery charger for about 30 minutes, and then proceed as described above.

### 13.3 Changing the Batteries of the Temperature and Humidity Measuring Adapter Z541A

Separate the bottom part of the housing from the top to change the batteries.

- ↗ Untighten the screw at the bottom of the housing and remove the housing lid.
- ↗ Insert two 1,5 V round cells of type LR1 (size N) in the battery compartment according to the indicated polarity symbols.
- ↗ Replace the housing lid (the opening at the bottom of the housing and the thread of the screw must be on top of each other) and press the lid until it engages. Retighten the screw carefully.

### 13.4 Fuses

If a fuse has blown due to an overload, an appropriate error message appears at the LCD. However, the instrument's voltage measuring ranges are still functional.

#### Replacing Fuses

- ⇨ Remove the cap for the respective fuse with the help of a suitable tool (e.g. screwdriver) by pressing and turning counterclockwise.



#### Attention!

##### **Incorrect fuses may cause severe damage to the test instrument.**

Only original fuses from GOSSEN-METRAWATT GMBH assure the required protection by means of suitable breaking characteristics (article no. 3-578-222-02). Bridging or repairing fuses is prohibited!

The instrument may be damaged if fuses with other current ratings, blowing or breaking characteristics are used!

- 
- ⇨ Remove the defective fuse and replace it with a new replacement fuse. Replacement fuses are located in the battery compartment.
  - ⇨ Insert the new fuse and the cap together, and lock into place by turning clockwise.
  - ⇨ Replace the battery compartment cover and secure it with the screws.

### 13.5 Housing

No special maintenance is required for the housing. Keep outside surfaces clean. Use a slightly dampened cloth or a special purifier for synthetic material for cleaning. Avoid the use of cleansers, abrasives and solvents.

### 14 Repair and Replacement Parts Service DKD Calibration Lab and Rental Instruments Service

If required please contact:

GOSSEN-METRAWATT GMBH  
Service Center  
Thomas-Mann-Straße 20  
90471 Nürnberg, Germany  
Phone: +49 911 86 02 - 410 / 256  
Fax: +49 911 86 02 - 2 53  
e-mail fr1.info@gmc-instruments.com

This address is for Germany only.

Abroad, our representatives or establishments are at your disposal.

### 15 Product Support

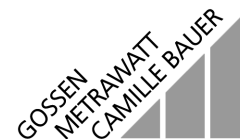
If required please contact:

GOSSEN-METRAWATT GMBH  
Product Support Hotline  
Phone: +49 911 86 02 - 112  
Fax: +49 911 86 02 - 709

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