Bedienungsanleitung
Operating Instructions

GOSSEN METRAWATT

MINITEST PRO I (3P) MASTER

Testers per DIN VDE 0701-0702

Testers per DIN VDE 0701-0702

3-349-358-15
9/5.21

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1 Safety Instructions

Observe this documentation, in particular all included safety information, in order to protect yourself and others from injury, and to prevent damage to the instrument.

- Carefully and completely read and adhere to these operating instructions. The respective document can be found at http://www.gossenmetrawatt.com. Retain the document for future reference.
- Tests/measurements may only be performed by a qualified electrician, or under the supervision and direction of a qualified electrician. The user must be instructed by a qualified electrician concerning performance and evaluation of the tests/measurements.
- Observe and comply with all safety regulations which are applicable for your work environment.
- Wear suitable and appropriate personal protective equipment (PPE) whenever working with the instrument.
- Use only the specified accessories (included in the scope of delivery or listed as an option) with the instrument.
- Carefully and completely read and adhere to the product documentation for optional accessories. Retain these documents for future reference.
- Use the instrument in undamaged condition only.
  Inspect the instrument before use. Pay particular attention to damage, interrupted insulation or kinked cables.
  Damaged components must be replaced immediately.
- Accessories and cables may only be used as long as they're fully intact.
  Inspect accessories and all cables and before use. Pay particular attention to damage, interrupted insulation or kinked cables.
- If the instrument or its accessories don't function flawlessly, permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- If the instrument or accessories are damaged during use, for example if they're dropped, permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- Do not use the instrument and its accessories after long periods of storage under unfavorable conditions (e.g. humidity, dust or extreme temperature).
- Do not use the instrument and its accessories after extraordinary stressing due to transport.
- Only use the instrument and its accessories within the limits of the specified technical data and conditions (ambient conditions, IP protection code, measuring category etc.).
- Do not use the instrument in potentially explosive atmospheres.

- Measurements within electrical systems are prohibited.
- The function test may only be performed after the device under test has successfully passed the safety test while connected to the test socket!
- The instrument and the accessories may only be used for the tests/measurements described in the documentation for the instrument.
- The instrument is equipped with fuses. The instrument may only be used as long as the fuses are in flawless condition. Defective fuses must be replaced.
- Be prepared for the occurrence of unexpected voltages at devices under test (for example, capacitors may be dangerously charged).
- Plugging in the measurement cables must not necessitate any undue force.
- Never touch conductive ends (e.g. of test probes).
- Fully unreel all measurement cables before starting a test/measurement. Never perform a test/measurement with the measurement cable rolled up.

2 Applications

Please read this important information!

2.1 Intended Use / Use for Intended Purpose

The test instrument is used to test the electrical safety of single phase and 3-phase electrical devices. The test instrument makes it possible to measure protective conductor resistance, insulation resistance and differential or touch current.

MINITEST 3P Master:
The instrument is designed for connection to a 3-phase mains system with up to 32 A.
The MINITEST 3P Master can also be connected to all common CEE and earthing contact outlets via the included adapter.

Safety of the operator, as well as that of the device, is only assured when it's used for its intended purpose.

2.2 Use for Other than Intended Purpose

Using the instrument for any purposes other than those described in the condensed operating instructions or these instrument operating instructions is contrary to use for intended purpose.

2.3 Liability and Guarantee

Gossen Metrawatt GmbH assumes no liability for property damage, personal injury or consequential damage resulting from improper or incorrect use of the product, in particular due to failure to observe the product documentation. Furthermore, all guarantee claims are rendered null and void in such cases.

Nor does Gossen Metrawatt GmbH accept any liability for data loss.

2.4 Opening the Instrument / Repairs

The instrument may only be opened by authorized, trained personnel in order to ensure flawless, safe operation and to assure that the guarantee isn't rendered null and void. Even original replacement parts may only be installed by authorized, trained personnel.

Unauthorized modification of the device is prohibited.

If it can be ascertained that the device has been opened by unauthorized personnel, no guarantee claims can be honored by the manufacturer with regard to personal safety, measuring accuracy, compliance with applicable safety measures or any consequential damages.

3 Documentation

3.1 Identifiers

The following identifiers are used in this documentation:

Identifier	Meaning
Attention! Warning	Safety information that must be complied with
Note! Important	Important information which must be taken into consideration and complied with
✓ Prerequisite	A condition etc. which must be fulfilled before a given action can be taken
1. Procedural step	Steps of a procedure which must be completed in the specified order
↳ Result	Result of a procedural step
• Enumeration	Bullet lists
– Enumeration	
Bild 1: Caption	Description of the content of a figure
Table 1:	Description of the content of a table
Footnote	Comment

4 Getting Started

1. Read and adhere to the product documentation. In particular observe all safety information in the documentation, on the instrument and on the packaging.
   ⇨ “Safety Instructions”, 🗎1
   ⇨ “Applications”, 🗎3
   ⇨ “Documentation”, 🗎4
2. Familiarize yourself with the instrument ⇨ “The Instrument”, 🗎5.
3. Perform and document measurements.
   ⇨ “Initial Startup”, 🗎12
   ⇨ “Performing Tests”, 🗎13
   ⇨ “Logging Functions”, 🗎19

5 The Instrument

5.1 Scope of Delivery

Please check for completeness.

1 test instrument

Refer to the table for accessories:

	MINITEST 3P Master (M712X)	MINITEST Master (M712U)	MINITEST Pro (M712D)
Probe cable with test probe	✘	✘	✘
Adapter, earthing contact plug to CEE coupling (3P+N+PE 32 A-6h)	✘	–	–
Adapter plug (1P+N+PE 16 A) to CEE coupling (3P+N+PE 32 A-6h)	✘	–	–
Adapter plug (3P+N+PE 16 A) to CEE coupling (3P+N+PE 32 A-6h)	✘	–	–
Adapter plug (1P+N+PE 32 A) to CEE coupling (3P+N+PE 32 A-6h)	✘	–	–
USB cable	✘	✘	✘
Operating instructions	✘	✘	✘

5.2 Optional Accessories

Description	Type	Article No.
Probe for measuring protective conductor resistance, e.g. at rotating devices under test	Brush probe	Z745G
Calibration adapter for test instruments per DIN VDE 0701-0702/IEC 63353 (VDE 0751) (max. 200 mA)	SECU-cal 10	Z715A
Test adapter for electrical devices and extension cables with CEE plug connectors	VL2 E	Z745W
Barcode Readers and Printers, RFID Readers		
See data sheet for **ID systems**		
PC Evaluation Software		
Information concerning the software can be found on the Internet at http://www.gossen-metrawatt.com after accessing the respective product page.		

Description	Type	Article No.
Cases/Pouches		
Case for MINITEST Master and MINITEST Pro	Case	Z740B
Universal carrying pouch for MINITEST Master and MINITEST Pro	F2000	Z700D
Large universal carrying pouch for MINITEST 3P Master	F2010	Z700F

5.3 Device Overview

5.3.1 Features

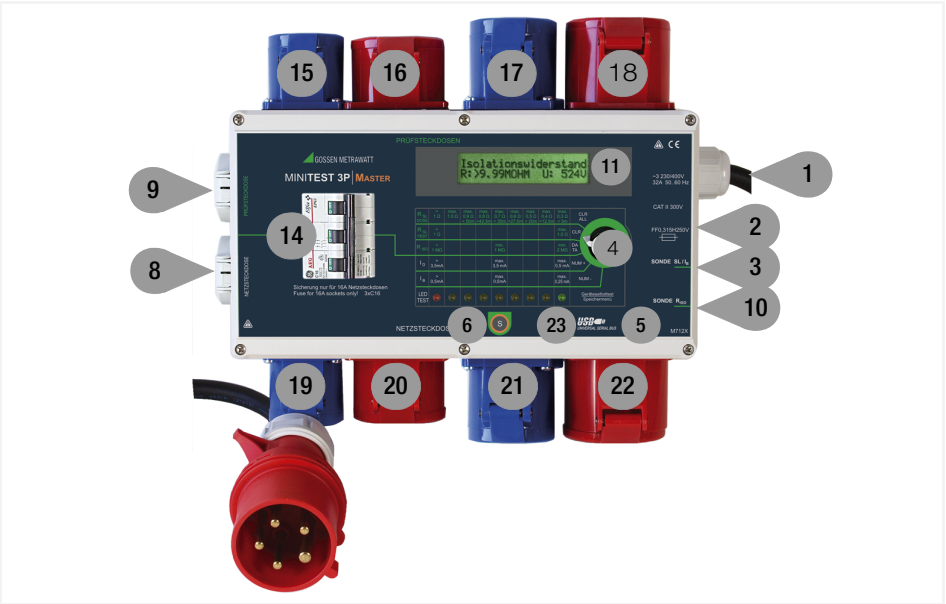
	MINITEST 3P Master	MINITEST Master	MINITEST Pro
Connection Types			
Tests at single-phase DUTs	✘	✘	✘
Tests at 3-phase DUTs via additional test sockets CEE 16A / CEE 32A	✘	–	–
Interrupters			
Fuse link for probe socket	✘	✘	✘
RCCB in the mains plug	–	✘	✘
Automatic circuit breaker	✘	–	–
Logging Functions			
2-line illuminated LCD panel *	✘	✘	✘
Memory for up to 2000 tests (10 measured values each)	✘	✘	–
Key for transmitting measured values	✘	✘	✘
Key for saving measured values	✘	✘	–
Data interface (USB port)	✘	✘	✘
Barcode reader socket (9-pin D-sub)	✘	✘	–

* For series produced as of March 2007

5.3.2 Connections and Controls

MINITEST Pro, MINITEST Master

MINITEST 3P Master



1 Mains power cable
2 Fuse link
(for the probe, 3)
3 Probe connector socket
For measurement of protective conductor SL (PE) or touch current I_B (I_T)
4 Rotary switch for selecting the desired measuring function
5 USB port
6 Key for transmitting or saving data
7 LEDs for indicating adherence to or violation of limit values
8 Earthing contact outlet
9 Earthing contact test socket
10 Probe connector socket
for insulation resistance measurement
(only required for protection category II)
11 LCD panel
12 On switch
13 Residual current test / off switch
14 Fuse for 16 A mains outlets
and mains switch
15 CEE test socket, 1P+N+PE 16 A-6h
16 CEE test socket, 3P+N+PE 16 A-6h
17 CEE test socket, 1P+N+PE 32 A-6h
18 CEE test socket, 3P+N+PE 32 A-6h
19 CEE outlet, 1P+N+PE 16 A-6h
20 CEE outlet, 3P+N+PE 16 A-6h
21 CEE outlet, 1P+N+PE 32 A-6h
22 CEE outlet, 3P+N+PE 32 A-6h
23 Barcode scanner socket
(9-pin D-sub) *
24 Probe cable

* Only with MINITEST Master and MINITEST 3P Master

5.3.3 Symbols on the Device and the Included Accessories

Warning concerning a point of danger
(attention, observe documentation!)

Double insulation (protection category II)

European conformity marking

The device may not be disposed of with household trash ⇨ “Returns and Environmentally Sound Disposal”, 25.

5.4 Relevant Standards

The instrument has been manufactured and tested in accordance with the following safety regulations:

IEC 61010-1 EN 61010-1 VDE 0411-1	Safety requirements for electrical equipment for measurement, control and laboratory use – general requirements
IEC 61557-2/-4 DIN EN 61557-2/-4 DIN VDE 0413-2/-4	Electrical safety in low-voltage systems up to 1000 V AC and 1500 V DC – Equipment for testing, measuring or monitoring of protective measures

5.5 Technical Data

Mechanical Design	Protection:	Housing: IP 44 (protection against ingress of solid foreign objects: ≥ 1.0 mm diameter, protection against ingress of water: 4 = splash protected) Connections: IP 20 (protection against ingress of solid foreign objects: ≥ 12.5 mm diameter, protection against ingress of water: 0 = not protected) (per DIN VDE 0470, part 1 / EN 60529)
	Housing (W × H × D):	MINITEST Master / Pro: 200 × 150 × 77 mm (without integrated outlets, grommets and rotary switch) MINITEST 3P Master: 350 × 160 × 125 mm (without surface mounted outlets, grommets, circuit breakers and rotary switch) (overall dimensions not including outgoing cables)
	Weight:	MINITEST Master / Pro**:** approx. 1.5 kg MINITEST 3P Master: approx. 3.3 kg
	Display:	LCD Dot matrix display, two lines of 20 characters each
	LEDs:	9 LEDs for indicating adherence to or violation of limit values: 1 red, 7 yellow and 1 green
Ambient Conditions	Operating temperature:	0 … +40 °C
	Storage temperature:	-20 ... +70 °C
	Relative atmospheric humidity:	Max. 75%, no condensation allowed
	Elevation:	Max. 2000 m
Power Supply	Line voltage:	MINITEST Master / Pro: 230 V, 50 Hz MINITEST 3P Master: 230/400 V, 50 Hz
	Throughput rating:	MINITEST Master / Pro: max. 3700 VA MINITEST 3P Master: max. 38.4 kVA depending on load at mains outlet

Electrical Safety	Nominal line voltage:	230 V
	Test voltage:	Mains + PE (mains) to test outlet, probe socket SL/I_B or R_{ISO}(PE/I_T or R_{INS}): 1.5 kV~ Mains to PE (mains): 3 kV~
	Measuring category:	CAT II 300 V
	Protection category:	I per DIN EN 61140 / VDE 0140-1 / IEC 61140
	Pollution degree:	2
	Fuse:	FF0.315H1000V or FF0.315H500V or FF0.315H250V MINITEST 3P Master only: 3 x C16A
	Residual current device (MINITEST Master/Pro only)	30 mA with undervoltage trigger and inhibiting of automatic restart
Electro-magnetic Compatibility (EMC)	Interference emission:	EN 61326-1, class B
	Interference immunity:	EN 61326-1

5.6 Characteristic Values

Measurements

Measured Quantity	**Measuring Range**	**Reso-lution**	$U_{no\text{-}load}$	R_i	I_{SC}	I_N
Protective conductor resistance	0 … 1.30 Ω	10 mΩ	< 5 V –			> 200 mA *
	1.0 ... 99.9 Ω	100 mΩ	< 5 V –			–
Insulation resistance	0 … 9.99 MΩ	10 kΩ	520 V –	Ap-prox. 5.0 kΩ	< 3.5 mA	> 1 mA
Touch current measure-ment (verification of absence of voltage)	0 … 9.99 mA ~	10 µA		1 kΩ		
Differential current MINITEST Master / Pro	0.1 ... 9.99 mA~	10 µA				
Differential current MINITEST 3P Master	0.2 ... 9.99 mA~	10 µA				

* With automatic polarity reversal

Intrinsic Error and Measuring Error

Measured Quantity	Intrinsic Uncertainty	Measuring Uncertainty
Protective conductor resistance	± (5% rdg. + 4 d)	± (10% rdg. + 6 d)
Insulation resistance	± (7% rdg. + 2 d)	± (10% rdg. + 5 d)
Touch current measurement (verification of absence of voltage)	± (5% rdg. + 4 d)	± (10% rdg. + 5 d)
Differential current MINITEST Master / Pro	± (5% rdg. + 6 d)	± (10% rdg. + 6 d)
Differential current MINITEST 3P Master	± (5% rdg. + 10 d)	± (10% rdg. + 10 d)

Influencing Quantities and Influence Error

Influencing Quantity / Sphere of Influence	Influence Error ± … % rdg.
Change of position	—
Change to test equipment supply voltage	2.5
Temperature fluctuation 0 … 21 °C and 25 … 40 °C	Specified influence error applies per 10 K temperature change: 1 for protective conductor resistance 0.5 for all other measuring ranges
Amount of current at DUT	2.5
Low frequency magnetic fields	2.5
DUT impedance	2.5
Capacitance during insulation measurement	2.5
Waveform of measured current **49 … 51 Hz** **45 … 60 Hz**	 2 with capacitive load (for equivalent leakage current) 1 (for touch current) 2.5 for all other measuring ranges

Reference Conditions

Ambient temperature:	+23 °C ±2 K	
Relative atmospheric humidity:	40 to 60%	
Line voltage:	MINITEST Master / Pro:	230 V ±1%
	MINITEST 3P Master:	230/400 V ± 1%
Measured quantity frequency:	50 Hz ± 0.2%	
Measured quantity waveform:	Sinusoidal (deviation between TRMS and rectified value ± 0.5%)	

6 Initial Startup

Connection

Connect the test instrument's mains plug to the mains power outlet.

MINITEST 3P Master:
The instrument can be connected to all common CEE outlets with the help of the mains connection adapters (included).

Attention!
Dangerous Voltage
Ensure correct polarity when connecting via the earthing contact plug adapter! In case of non-compliance, dangerous voltage is present at the neutral terminal of the CEE outlet, even when the test instrument is switched off.

Switching On and Off

MINITEST 3P Master:
The instrument is switched on and off via the 3-pole circuit breaker (automatic circuit breaker).

MINITEST Master / Pro:
The instrument can then be switched on with the green power switch located on the integrated RCD. It can be switched back off again with the blue test key.

7 Performing Tests

Attention!
MINITEST Master / Pro:
The instrument may only be connected to electrical systems with 230/240 V (e.g. IEC 60346, VDE 0100) which are protected with a fuse or circuit breaker with a maximum rating of 16 A.

Attention!
MINITEST 3P Master:
At any given time, only one device under test may be connected to an outlet/socket because all of the mains outlets and test sockets are connected in parallel.

7.1 Test Sequence

Testing for electrical safety always begins with a visual inspection. The measurements are then conducted in the order in which they appear next to the selector switch on the test instrument, from top to bottom.

For each type of measurement, the test instrument evaluates the measured values and indicates whether or not limit values in accordance with DIN VDE 0701-0702 have been adhered to by means of an LED array.

Indicator	Meaning
Green LED	The measured value is better than the strictest limit value.
Red LED	The measured value is worse than the most lenient limit value.
Yellow LED	The limit value is between the strictest and the most lenient limit values. Whether or not the DUT passes testing depends upon it's classification. Evaluation should be conducted by a qualified electrician.

The number and type of required measurements are determined according to the classification of the device under test:

Device under test			Connect the DUT to the test socket.				Connect the DUT to the mains outlet. – Switch the DUT on.	
			Protective conductor resistance Probe socket SL/I_B (PE/I_T)	**Protective conductor resistance** Permanent, probe socket SL/I_B (PE/I_T)	**Insulation resistance** No probe required	**Insulation resistance** Probe socket R_{ISO} (R_{INS})	**Differential current** No probe required	**Touch current** Probe socket SL/I_B (PE/I_T)
Protection Category I	Earth contact plug	All exposed parts are connected to PE	✘		✘		✘ Test with the mains plug in both positions.	
		With exposed parts which are not connected to PE				✘	✘ Test with the mains plug in both positions.	✘ Test with the mains plug in both positions.
	CEE plug *	All exposed parts are connected to PE	✘		✘		✘	
		With exposed parts which are not connected to PE	✘			✘	✘	✘
	Permanently connected DUT			✘				✘
Protection Category II	With Euro plug / earthing contact plug					✘		✘ Test with the mains plug in both positions.

* MINITEST 3P Master only

Use of mains outlet number depending on mains connection (All test sockets, as well as mains outlets numbered 8 and 19, can always be used regardless of whether or not mains connection adapters are used.)	Mains outlet number		
	20	21	22
Mains connection with mains plug (3P+N+PE 32 A)	✘	✘	✘
Connection with adapter – earthing contact plug to CEE coupling (3P+N+PE 32 A-6h)	–	✘ Max. 16 A	–
Connection with adapter – plug (1P+N+PE 16 A) to CEE coupling (3P+N+PE 32 A-6h)	–	✘ Max. 16 A	–
Connection with adapter – plug (3P+N+PE 16 A) to CEE coupling (3P+N+PE 32 A-6h)	✘	✘ Max. 16 A	✘ Max. 16 A
Connection with adapter – plug (1P+N+PE 32 A) to CEE coupling (3P+N+PE 32 A-6h)	–	✘	–

7.2 Descriptions of Individual Measurements

7.2.1 Measurements at the Test Socket(s)

Protective Conductor Resistance, R_{PE} SOCKET

The probe must be plugged into the **SONDE SL/I_B** (**PROBE PE/I_T**) socket in order to measure protective conductor resistance. Measurement is performed between the protective conductor terminal at the test outlet and the **SONDE SL/I_B** (**PROBE PE/I_T**) socket.

Protective Conductor Resistance, R_{PE} Permanent

This measurement is used for testing the protective conductor at permanently connected devices. The test instrument must be connected to the same supply circuit as the device under test during measurement.

Attention!

Good test results may be obtained with parallel ground connections, although the protective conductor is interrupted.

The probe must be plugged into the **SONDE SL/I_B** (**PROBE PE/I_T**) socket in order to measure protective conductor resistance. Measurement is performed between the protective conductor terminal at the mains connection and the **SONDE SL/I_B** (**PROBE PE/I_T**) socket.

Testing is performed up through a resistance value of approximately 1.3 Ω with automatic polarity reversal.

Protective conductor resistance and test current are displayed at the LCD.

Checking the Zero Point and the Fuse

The zero point and the internal fuse can be checked by inserting the plug attached to the test probe cable into the **SONDE R_{ISO}** (**PROBE R_{INS}**) socket and the tip of the test probe into the **SONDE SL/I_B** (**PROBE PE/I_T**) socket with the selector switch in the **R_{SL} DOSE** (**R_{PE} SOCKET**) or (**R_{PE} PERM**) setting. The displayed value should not exceed 100 mΩ.

Attention!
The test probe must be plugged in to the **SONDE SL/I_B** (**PROBE PE/I_T**) socket for this test!

Attention!
Use only the probe cable which is included with the test instrument. If a different probe cable is used:
– The measured value may be distorted.
– The test instrument may be damaged.
– Malfunctioning may occur.

Note!
If a current of 0 mA is displayed, the fuse is most likely blown. Check and replace the fuse if necessary ⇨ “Replacing the Fuse”, 22.

Insulation Resistance R_{INS}

Various test types are provided for the measurement of insulation resistance. The test type is selected automatically when the test probe is plugged into the probe connector socket (10).

Attention!
Use only the original test probe cable.
Test type switching cannot be assured if other test probe cables are used.

Attention!
Testing is conducted with up to 500 V. Current limiting is utilized ($I < 3.5$ mA), but if the terminals (L or N) are touched, electrical shock may occur which could result in consequential accidents.

- For protection category I DUTs without exposed conductive parts:
  test insulation between L/N and PE at the test outlet.
  No test probe cable may be plugged into the SONDE R_{ISO} (PROBE R_{INS}) socket for this test!
- For protection category II
  or protection category I DUTs
  with exposed conductive parts
  which are not connected to the protective conductor:
  test between L/N at the test outlet and the **SONDE R_{ISO} (PROBE R_{INS})**socket.
  The test probe must be plugged into the SONDE R_{ISO} (PROBE R_{INS}) socket for this test!

Insulation resistance and test voltage are displayed at the LCD.

Discharging the Device Under Test

The device under test is automatically discharged when the insulation test is switched off – turn switch to R_{SL} or I_D (R_{PE} or I_D).

The LEDs light up in quick succession from left to right during discharging.

Residual voltage also appears at the display.

Leave the DUT connected to the test instrument during the discharging sequence.

7.2.2 Measurements at the Mains Outlet(s)

Differential and touch current are measured at the mains outlet(s). The DUT must be unplugged, and plugged back in again.

Attention!
Voltage is always present at the mains outlet(s) as soon as the test instrument is switched on.
The DUT must be switched off before it's connected to the mains outlet.

Attention!
Danger of injury due to hazardous touch voltage.
Do not touch any conductive parts during measurement. They may conduct dangerous touch voltage during measurement because the DUT is operated with mains voltage while being tested.
(MINITEST Master / Pro: mains power is disconnected if leakage current exceeds approximately 15 mA.)

The device under test must be switched on during testing. The device under test must be switched back off before it's unplugged from the mains outlet.

In the case of mains plugs which are not polarity protected, testing must be conducted with the mains plug poled in both directions.

Differential Current Measurement, I_D

Total current from all phase conductors is measured during differential current measurement. For protection category I devices, this corresponds to the amount of current which is conducted by the protective conductor.

Differential current is displayed at the LCD in mA.

Evaluating the measured values:

– Measured values of less than 0.5 mA are indicated by means of a green LED.
– Measured values of greater than 3.5 mA are indicated by means of a red LED. These devices may be dangerous.

Note!
Under certain circumstances and depending on the manufacturer's specifications, higher limit values may be permissible, for example from 1 to 10 mA per kW in the case of 3-phase devices. These cases are all indicated by means of the red LED. Evaluation must be conducted by a qualified electrician in this case.

– Measured values of between 0.5 and 3.5 mA are indicated by means of a yellow LED. An evaluation of electrical safety must be conducted by a qualified electrician in this case.

Touch Current Measurement, I_T

When measuring contact current, current is measured which is conducted via the probe at the **SONDE SL/I_B** (**PROBE PE/I_T**) socket to the protective conductor terminal at the device under test.

Evaluating the measured values:

– Measured values of less than 0.25 mA are indicated by means of a green LED. There is no danger in touching these parts.
– Measured values of greater than 0.5 mA are indicated by means of a red LED. Devices which demonstrate these values are dangerous because persons who touch them are startled, which may result in consequential accidents. These devices may not be placed back into service.
– Measured values of between 0.25 and 0.5 mA are indicated by means of a yellow LED. Current within this range is not dangerous, but the threshold of perception is approximately 0.1 mA depending upon sensitivity, which causes mild tingling. This is unpleasant for some people. These devices must be tested.

7.3 LED Test

The LEDs are tested for correct functioning when the selector switch is turned to the **LED Test** position. All of the LEDs are tested by activating them one after the other from right to left.

8 Logging Functions

Depending on the selected operating mode, the measured values and the results of each test can be made available at a PC via the USB port for further processing, or saved internally at the instrument. Transmission or storage of the measured values is indicated by the LEDs, which all light up briefly, one after the other from left to right.

Operating Mode Selected at the Test Instrument	MINITEST 3P Master	MINITEST Master	MINITEST Pro
Transmission mode (individual measured value transmission)	✘	✘	✘
Continuous transmission (continuous measured value transmission)	✘	✘	✘
Memory mode (internal measured value memory)	✘	✘	—

8.1 Selecting the Operating Mode

In order to transfer data, the corresponding PC evaluation program must be installed and started for the three different operating modes ⇨ “Scope of Delivery”, 🗎5.

The operating mode can be selected by pressing the **S** key (6) while starting the instrument. The following operating modes are displayed one after the other:

- Transmission mode, see section 8.2
- Continuous transmission, see section 8.3
- Memory mode, see section 8.4

The operating mode is selected which is displayed when the **S** key (6) is released. The selected operating mode setting is retained even after the test instrument is switched off.

8.2 Transmission Mode

In the **transmission mode**, the **S** key has to be pressed in order to transmit the momentary measured value.

8.3 Continuous Transmission

If the **continuous transmission** mode has been activated, all measured values are transmitted via the USB port.

8.4 Memory Mode (MINITEST Master and MINITEST 3P Master only)

Approximately 2000 test objects with 10 measured values each can be stored to the MINITEST Master or MINITEST 3P Master test instrument. If an attempt is made to save more than 10 measured values for any given test object, the additional values are ignored and the red LED lights up briefly.

8.4.1 Activating the Memory Menu

After selecting the **memory mode** (see above), the rotary switch has to be turned to the **Geräteselbsttest/Speichermenü (instrument self-test / memory menu)** position. The memory menu can then be activated by pressing the **S** key (6). The following appears at the LCD panel:
** **MEMORY MENU** ** **SELECTION** -> **SWITCH**.
The desired memory function can then be selected with the help of the rotary switch.

8.4.2 Selecting a Memory Function

⇨ **Switch: NUM – > Menu: DUT NUM –**

Each time the **S** key (6) is pressed, the momentary memory location number is reduced by one. The smallest possible value is “1”. A “D” to the left of the number indicates that this memory location already contains data.

⇨ **Switch: NUM + > Menu: DUT NUM +**

Each time the **S** key (6) is pressed, the momentary memory location number is increased by one. Approximately 2000 memory locations can be occupied and the same number of DUTs can be tested. A “D” to the left of the number indicates that this memory location already contains data.

⇨ **Switch: DATA > Menu: MEASURED VALUE NO.**

In this switch position, all measured values for a given DUT are displayed consecutively in numeric format in the order in which they were recorded.

⇨ **Switch: CLR > Menu: DEL DUT?**

The momentary memory location, i.e. all data for the selected DUT, is deleted by pressing the **S** key (6). In order to assure that deletion doesn’t occur inadvertently, the **S** key (6) must be pressed and held for approximately half a second before deletion is started. The red LED lights up during deletion.

➪ **Switch: CLR ALL > Menu: DELETE MEMORY?**

Device memory is deleted entirely by pressing the **S** key (6). In order to assure that deletion doesn't occur inadvertently, the **S** key (6) must be pressed and held for approximately 1 to 2 seconds before deletion is started. The red LED lights up during deletion.

8.4.3 Exiting the Memory Menu

In order to exit the memory menu, turn the rotary switch to the **Geräteselbsttest/Speichermenü (device self-test / memory menu)** position and press the **S** key (6).

When the **S** key (6) is pressed after a measurement during **memory mode** operation, the last displayed measured value is stored to device memory. As is also the case when transmitting values, storage is indicated via the USB port by flickering LEDs. If more than 10 values are saved for a DUT, the red LED also lights up for approximately half a second, indicating that the measured values could not be saved.

8.4.4 Reading Out Stored Measured Values via a PC

✓ The test instrument must not be in the memory menu, nor may it be conducting a device self-test.

The stored measured values can be transferred from the instrument to a PC via the USB port with the help of evaluation software, where they can then be evaluated and documented. Connect the test instrument to the PC via the included USB cable.

8.4.5 Safe Shutdown

The memory menu must be exited before switching the test instrument off or disconnecting it from the mains. Turn the rotary switch (4) to the Geräteselbsttest/Speichermenü (device self-test / memory menu) position and press and hold the "S" key (6) for approximately half a second.

8.5 Barcode Reader Function (MINITEST Master and MINITEST 3P Master only)

A barcode reader can be used with the MINITEST Master or MINITEST 3P Master in order to identify the DUT during measurement and save this information to the test instrument.

Connect the barcode reader to socket 23. Only barcode readers from Gossen Metrawatt GmbH may be used which are listed as optional accessories ➪🗎5.

During the **NUM+** and **NUM-** functions, the text scanned by the barcode reader – with up to 24 characters – is entered as a description for the DUT, displayed in the second line of the LCD panel and saved.

9 Maintenance

9.1 Housing

No special maintenance is required for the housing. Keep outside surfaces clean. Use a slightly dampened cloth for cleaning.

Attention!
Avoid the use of cleansers, abrasives or solvents.

9.2 Replacing the Fuse

Notes on checking the zero point and the fuses can be found in the section entitled "Measurements at the Test Socket(s)" ⇨15. If the fuse is defective it must be replaced.

Attention!
Disconnect the instrument from the measuring circuit before unscrewing the fuse in order to replace it!

If a fuse should blow, eliminate the cause of overload before placing the instrument back into service!

The fuse holder is located between the mains connector cable and the probe connection socket. The fuse is removed by pressing and turning the fuse holder. The fuse rating is printed on the front panel and can also be found in the section entitled "Technical Data" ⇨9.

Attention!
Be absolutely sure to use only the specified fuse type ⇨ "Technical Data", 9! If fuses with other blowing characteristics, other current ratings or other breaking capacities are used, the user is placed in danger and protective diodes, resistors and other components may be damaged.

The use of repaired fuses or short-circuiting the fuse holder is prohibited.

Dispose of the blown fuse with household trash.

9.3 Recalibration

The measuring tasks performed with your instrument, and the stressing it's subjected to, influence aging of its components and may result in deviation from the specified levels of accuracy.

In the case of strict measuring accuracy requirements, as well as in the event of use at construction sites with frequent stress due to transport and considerable temperature fluctuation, we recommend a relatively short calibration interval of once per year. If your instrument is used primarily in the laboratory and indoors without considerable climatic or mechanical stressing, a calibration interval of once every 2 to 3 years is sufficient as a rule.

During recalibration * at an accredited calibration laboratory (DIN EN ISO / IEC 17025), deviations from traceable standards demonstrated by your measuring instrument are documented. Ascertained deviations are used to correct display values during later use of the instrument.

We would be happy to perform DAkkS or factory calibration for you at our calibration laboratory ➪🗎24.

Recalibration of your instrument at regular intervals is essential for the fulfillment of requirements according to quality management systems per DIN EN ISO 9001.

According to DIN VDE 0701-0702 and IEC 62353 (VDE 0751), only test instruments which are tested and calibrated at regular intervals may be used for testing.

* Examination of the specification, as well as adjustment, are not included in calibration. However, in the case of our own products, any required adjustment is performed and adherence to the specification is confirmed.

☞ **Note!**
These tests can be performed on-site with the SECU-cal 10 calibration adapter accessory.

10 Service and Support

10.1 Product Support

If required please contact:

Gossen Metrawatt GmbH

Product Support Hotline

Phone +49-911-8602-0

Fax +49 911-8602-709

e-mail support@gossenmetrawatt.com

10.2 Repair and Replacement Parts Service Calibration Center * and Rental Instrument Service

If required please contact:

GMC-I Service GmbH

Service Center

Beuthener Str. 41

D-90471 Nürnberg, Germany

Phone +49-911-817718-0

Fax +49 911-817718-253

e-mail service@gossenmetrawatt.com

Web www.gmci-service.com

This address is only valid in Germany.

Please contact our representatives or subsidiaries for service in other countries.

10.3 Competent Partner

Gossen Metrawatt GmbH is certified in accordance with DIN EN ISO 9001.

Our **DAkkS calibration laboratory** is accredited by the Deutsche Akkreditierungsstelle GmbH (national accreditation body for the Federal Republic of Germany) under registration number D-K-15080-01-01 in accordance with DIN EN ISO/IEC 17025.

Accredited quantities: direct voltage, direct current value, direct current resistance, alternating voltage, alternating current value, AC active power, AC apparent power, DC power, capacitance, frequency and temperature.

We offer a complete range of expertise in the field of metrology: from test reports and factory calibration certificates right on up to DAkkS calibration certificates.

An on-site DAkkS calibration station is an integral part of our service department. If errors are discovered during calibration, our specialized personnel is capable of completing repairs using original replacement parts.

As a full service calibration laboratory, we can calibrate instruments from other manufacturers as well.

Our spectrum of offerings is rounded out with free test equipment management.

11 CE Declaration

The device fulfills all requirements of applicable EU directives and national regulations. We confirm this with the CE mark. The CE declaration is available upon request.

12 Returns and Environmentally Sound Disposal

This device is subject to directive 2012/19/EC on Waste Electrical and Electronic Equipment (WEEE) and its German national equivalent implemented as the Waste Electrical and Electronic Equipment Act (ElektroG) on the marketing, return and environmentally sound disposal of electrical and electronic equipment. The instrument is a category 9 product (monitoring and control instrument) in accordance with ElektroG (German Waste Electrical and Electronic Equipment Act).

The symbol at the left indicates that this instrument and its electronic accessories must be disposed of in accordance with applicable legal regulations, and not together with household trash. In order to dispose of the instrument, bring it to a designated collection point or contact our product support department (⇨🗎24).

Segregated disposal and recycling conserves resources and protects our health and the environment.

Current and further information is available on our website at http://www.gossen-metrawatt.com under the search terms “WEEE” and “environmental protection”.

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