Operating Instructions

GOSSEN METRAWATT
GMC-INSTRUMENTS GROUP

PROFITEST | PRCD PRO

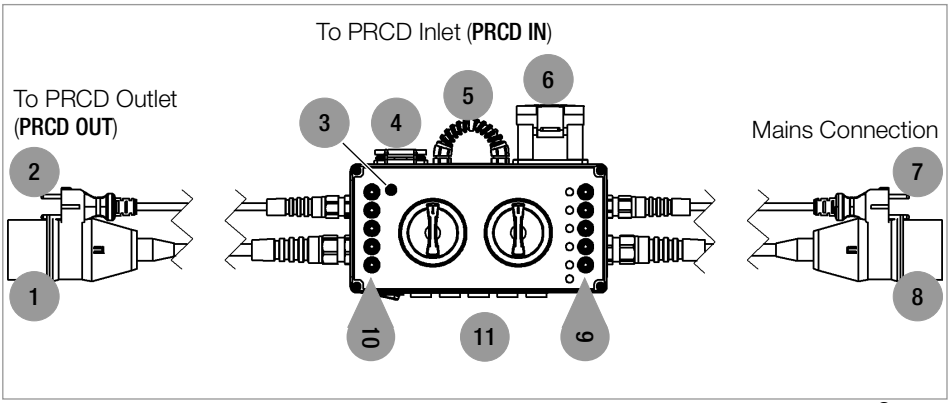
Adapter for Standards Compliant Testing of PRCDs by Simulating Faults

3-447-120-03
1/6.24

Important
Read carefully before use!
Keep on file for future reference!

Observe the manufacturer's specifications for DUTs!

Connections Overview



1 Coupling plug to the outlet of a 3-phase PRCD

2 Earthing contact plug (SCHUKO® plug) to the output of a single-phase PRCD

3 Probe socket for contacting the PRCD-ON/OFF key

4 SCHUKO® plug to the inlet of a single-phase PRCD

5 Loop for measuring protective conductor current with a current clamp transformer

6 CEE socket to the inlet of a 3-phase PRCD

7 Mains power cable with SCHUKO® plug

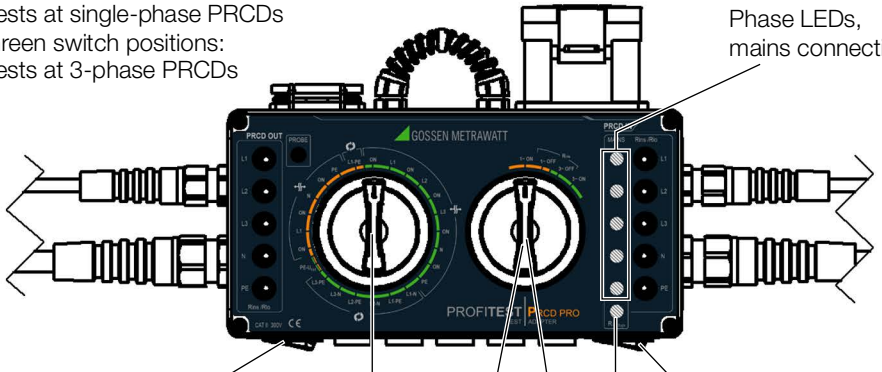
8 3-phase mains power cable with CEE mains plug, 1P+N+PE 16 A-6h

9 PRCD inlet sockets connected in parallel to sockets 4 and 6 – for connecting a test instrument (see section 2 on page 7) during protective conductor and insulation resistance measurements

10 PRCD outlet sockets connected in parallel to plugs 1 and 2 – for connecting a test instrument (see section 2 on page 7) during protective conductor and insulation resistance measurements

11 Five replaceable fuses

Operating Overview



Meanings of Symbols on the Instrument

300 V CAT II Maximum permissible voltage and measuring category between connections and ground

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

European conformity marking

The device may not be disposed of with household trash.
See "Returns and Environmentally Sound Disposal" on page 23.

Meanings of Symbols in Operating Instructions

LED (red) L1, L2, L3, N, PE or **R_{PE} high** at test adapter

LED ON LED OFF

PRCD LED at the device under test

LED ON LED OFF

Scope of Delivery

1 Test adapter
1 Probe cable with plug-in test probe
1 Set of operating instructions

Table of Contents

1 Safety Instructions

Read and follow these instructions carefully and completely in order to ensure safe and proper use.

The instructions must be made available to all persons who use the device.

Keep for future reference.

The test adapter has been manufactured and tested in accordance with the following safety regulations:
IEC/EN 61010-1 / VDE 0411-1, DIN VDE 0404, IEC/EN 61577 / VDE 0413-2,-4 / DIN EN 61557-16 / VDE 0413-16

General

- 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 tests and/or measurements.
- Observe and comply with all safety regulations which are applicable for your work environment.
- The functioning of active medical devices (for example pacemakers, defibrillators) and passive medical devices may be affected by voltages, currents and electromagnetic fields generated by the tester and the health of their users may be impaired. Implement corresponding protective measures in consultation with the manufacturer of the medical device and your physician. If any potential risk cannot be ruled out, do not use the device.

Accessories

- Use only the specified accessories (included in the scope of delivery or listed as options) with the device.
- Carefully and completely read and adhere to the product documentation for optional accessories. Retain these documents for future reference.

Handling

- Use the device in undamaged condition only.
  Inspect the device before use. Pay particular attention to damage, interrupted insulation or kinked cables.
  Damaged components must be replaced immediately.
- Use the accessories and all cables in undamaged condition only.
  Inspect accessories and all cables before use. Pay particular attention to damage, interrupted insulation or kinked cables.
- If the device or its accessories don't function flawlessly, permanently remove the device/accessories from operation and secure them against inadvertent use.
- If the device or accessories are damaged during use, for example if they're dropped, permanently remove the device/accessories from operation and secure them against inadvertent use.
- If there are any signs of interior damage to the device or accessories (e.g. loose parts in the housing), permanently remove the device/accessories from operation and secure them against inadvertent use.
- The device and the accessories may only be used for the tests/measurements described in the documentation for the device.
- Equipment and accessories from Gossen Metrawatt GmbH are designed to function ideally with products from Gossen Metrawatt GmbH which are specifically intended for this purpose. Unless expressly confirmed otherwise in writing

by Gossen Metrawatt GmbH, they are not intended or suitable for use with other products.
- Route cables in an orderly fashion, e.g. the mains power cable and accessory cables. Loose, disorderly cables result in unnecessary danger of tripping and falling.

Operating Conditions

- Do not use the device and its accessories after long periods of storage under unfavorable conditions (e.g. humidity, dust or extreme temperature).
- Do not use the device and its accessories after extraordinary stressing due to transport.
- Do not expose the device to direct sunlight.
- Only use the device 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 device in potentially explosive atmospheres. Danger of explosion!
- Do not use the device in areas subject to the risk of fire. Danger of fire!
- Implement adequate measures for protection against electrostatic discharge (ESD).

Fuses

- The device may only be used as long as the fuses are in flawless condition. Defective fuses must be replaced. Fuses may only be replaced by our repair service department.
- Never bridge the fuses. Never disable the fuses.

Measurement Cables and Establishing Contact

- Plugging in the measurement cables must not necessitate any undue force.
- Never touch conductive ends (for example of test probes).
- Fully unroll all measurement cables before starting a test/measurement. Never perform a test/measurement with the measurement cable rolled up.
- Avoid short circuits due to incorrectly connected measurement cables.
- Ensure that alligator clips, test probes or Kelvin probes make good contact.
- As far as possible, do not move or remove plugs, test probes, alligator clips or Kelvin probes until testing/measurement has been completed. Unwanted sparking may otherwise occur due to test current.

Data Security

- Always create a backup copy of your measurement/test data.

Observe the following safety precautions:

- The instrument may only be connected to electrical systems with a maximum of 230/400 V which comply with applicable safety regulations (e.g. IEC 60346, VDE 0100) and are protected with a fuse or circuit breaker with a maximum rating of 16 A.
- If an insulation fault is detected at the device under test during an insulation resistance measurement, the DUT may not be placed into service. Non-observance may result in tripping of the device's integrated protective fuse (FF 315 mA), as well as any upstream RCD in the supply network, in the case of a DUT with an earth fault when connected to the mains.
- No power consuming devices may be connected to the SCHUKO® and CEE sockets.
- The test adapter may not be used as an extension cord.
- Measurements within electrical systems are prohibited.
- When using a test probe with coil cord: Grasp the test probe firmly, for example if it has been inserted into a jack socket. Tensioning at the coil cord may otherwise cause the test probe to snap back resulting in possible injury.

- Touch current at the probe socket is limited by the internal protective circuit to less than the maximum permissible value of 0.5 mA in accordance with DIN EN 61010-1.
- Insulation resistance can only be measured at voltage-free objects.
- Do not touch the insulation measuring instrument's test probes during insulation resistance measurements!
- Please observe the manufacturer's specifications for the devices under test!

2 Applications

2.1 Intended Use / Use for Intended Purpose

The test adapter may only be used for testing PRCDs.

Testing of PRCDs with the Test Adapter by Simulating Faults

The following faults can be simulated with regard to mains supply power to the PRCD:

- Wire reversals
- Failure of individual conductors (undervoltage detection)
- Interference voltage at the protective conductor
  a) due to the application of interference voltage to the protective conductor (**PE-U_{EXT}** switch position) or
  b) due to contacting the **ON** key of the single-phase PRCD with the probe
- Excessive protective conductor resistance **R_{PE} high**

The evaluation of the PRCD's reaction to each respective fault is strictly visual:

- PRCD active or inactive (indicator LED on the PRCD)
- Fault indication by means of LEDs on the test adapter

Attention!
In any case, comply with the manufacturer's recommendations concerning tests to be conducted in accordance with DGUV rule 3.

Testing of PRCDs with the Test Adapter by Simulating Faults and Measuring Protective Conductor and Insulation Resistance, as well as Tripping Current and Time to Trip, Using One of the Following Test Instruments:

- **PROFITEST MXTRA (M522P; M520P)**
- **PROFITEST MXTRA IQ (M534M; M534D)**
- **PROFITEST MF XTRA (M534H)**
- **PROFITEST PRIME (M506A)**
- **PROFITEST PRIME AC (M506C)**

The following functions are possible after connecting the test instrument to the test adapter:

- There are three preset test sequences:
  Single-phase PRCDs:
  – PRCD-S: 11 test steps
  – PRCD-K: 4 test steps
  3-phase PRCDs:
  – PRCD-S: 18 test steps
- The test instrument runs through all test steps semi-automatically:
  Single-phase PRCDs: 11 test steps
  3-phase PRCDs: 18 test steps
- Each test step is evaluated and assessed by the user (go/no-go) for later documentation.
- Further individual test sequences are also available under myGMC at www.gossenmetrawatt.com. Adaptation and transfer are described in the operating instructions for the test instrument.
- Measurement of protective conductor resistance at the PRCD using the $\mathbf{R_{lo}}$ function at the test instrument with inactive $\mathbf{R_{PE}}$ **high**. Please note that the protective conductor measurement is a modified $\mathbf{R_{lo}}$ measurement with ramp sequence for PRCDs, which is only available via the test instrument.
- Measurement of the PRCD's insulation resistance using the test instrument's $\mathbf{R_{ins}}$ function
- Tripping test with nominal residual current using the test instrument's I_F ◢ function
- Measurement of time to trip using the test instrument's $I_{\Delta N}$ function
- Varistor test for PRCD-K: measurement via ISO ramp

Simulation of "Interference Voltage at the Protective Conductor" with Probe

In the case of type S PRCDs (PRCD-S), the on/off key is made of a conductive material or coated with conductive plastic so that the sensor inside the device is capable of detecting dangerous touch voltage at the protective conductor terminal of the electrical power connection in the form of a difference in potential relative to the user's contacting finger.

During simulation of the "interference voltage at the protective conductor" fault (tripping test / potential fault as extended function test for PRCD-S) by touching the on/off key of the single-phase PRCD (PRCD-S) with the probe, a difference in potential between the contactable sensor surface and the protective conductor terminal is generated which causes tripping of the PRCD-S.

The probe socket on the PRCD adapter is connected to the phase conductor (L) of the power supply network via a series resistor (safety impedance) with a value of 1 MΩ using the test adapter's SCHUKO® plug to this end.

Touch current at the probe socket is limited by the internal protective circuit to less than the maximum permissible value of 0.5 mA in accordance with DIN EN 61010-1.

Execution of this test results in maximum touch current of:

$$I_B\,[A] = \frac{U_{Mains\ (L–PE)}\,[V]}{1\ M\Omega}$$

Measuring Protective Conductor Current

Protective conductor current or bias current may result in premature tripping of PRCDs. For this reason, the protective conductor is led out of the housing as a loop between surface mount sockets 4 and 6. This makes it possible to measure any protective conductor current with the help of a current clamp transformer.

2.1 Use for Other than Intended Purpose

Use of the tester for any purposes other than those described in these operating instructions is contrary to use for intended purpose.

2.2 Liability and Guarantee

The warranty provided by Gossen Metrawatt GmbH, and its liability, are governed by the applicable contractual and mandatory statutory provisions.

2.3 Opening the Instrument / Repairs

The test adapter may only be opened by authorized, trained personnel in order to ensure flawless operation and to assure that the guarantee is not rendered null and void.

Even original replacement parts may only be installed by authorized, trained personnel.

If it can be ascertained that the test adapter 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 Initial Startup

See the connections overview on page 2 for all connection variants.

Note!
The photos shown in the following sections may differ from your device.

3.1 Testing Protective Conductor Resistance

Protective conductor resistance must be checked before each use. Protective conductor resistance is tested between the PE contact of the mains connection plug (SCHUKO® plug (7)) and the PE contact at **PRCD IN** (SCHUKO® socket (4), as well as parallel 4 mm PE socket (9)).

If **R_{PE} high** is not active, the value must be less than 2 Ω, or approximately 1.6 kΩ if **R_{PE} high** is active.

3.2 Testing the LEDs

Before performing any measurements, the LEDs should be tested for correct functioning.

Single-Phase Mains Connection

➪ Insert the SCHUKO® plug into the SCHUKO® mains outlet, remove it, rotate it 180° and insert it again.

When connected with correct polarity, the **PRCD IN L1** LED must light up, and when rotated 180° the **PRCD IN L1** and **PRCD IN PE** LEDs must light up simultaneously.

➪ Activate additional resistance **R_{PE} high** in the protective conductor path using the toggle switch.

The **R_{PE} high** LED must light up.

3-Phase Mains Connection

➪ Insert the CEE plug into the CEE outlet.

The **PRCD IN L1**, **L2** and **L3** LEDs must light up. If any of the phase conductors are connected to the neutral conductor, i.e. **L1-N**, **L2-N** or **L3-N**, **N** lights up instead of **L[X]**. If any of the phase conductors are connected to protective earth, i.e. **L1-PE**, **L2-PE** or **L3-PE**, **PE** lights up instead of **L[X]**.

3.3 Mains Connection

The test adapter must be connected to the mains for fault simulation, as well as for indication by means of the phase LEDs.

➪ Connect the test adapter to the mains via the single or 3-phase mains power cable. Refer to the characteristic values on page 21 for nominal mains values.

Attention!
Single-Phase Mains Connection
For correct phase connection, the SCHUKO® plug must inserted into the mains outlet such that only the **PRCD IN L1** LED lights up.
The **PRCD IN PE** LED light up as well in the case of polarity reversal.

Attention!
R_{PE} high must be deactivated via the toggle switch for all tests (except for the protective conductor quality test, e.g. PRCD-S pro).
The **R_{PE} high** LED must not light up.

3.4 Connecting the PRCD

The respective PRCD must be connected to the test adapter for all tests.

Connecting a Single-Phase PRCD

➪ Insert the SCHUKO® inlet plug from the PRCD into the SCHUKO® outlet (4) at the test adapter.

➪ Insert the SCHUKO® plug (2) from the test adapter into the outlet socket at the PRCD.

Example for a Single-Phase PRCD

Connecting a 3-Phase PRCD

➪ Insert the CEE inlet plug from the PRCD into the CEE outlet (6) at the test adapter.

➪ Insert the CEE plug (1) from the test adapter into the CEE outlet socket at the PRCD.

4 Measurements with Test Instrument

Attention!
When turning the switch, ensure that it engages at precisely the right position and that the corresponding LED signals are displayed as described in these operating instructions.

In order to perform protective conductor measurements (R_{lo}) at type S PRCDs with a test instrument, the test adapter must remain connected to the mains.
The test adapter can remain connected to the mains for protective conductor measurements on PRCDs whose protective conductor is not switched and for insulation resistance measurements (R_{ins} with switch position **1~OFF/3~OFF**) with the test instrument.

4.1 Measuring Protective Conductor Resistance (R_{lo})

Attention!
R_{PE} **high** must be deactivated!

As opposed to the usual default setting for low-resistance measurements, the device under test does not have to be disconnected from all sources of voltage in this case.
Depending on the PRCD, both rotary selector switches have to be set to the **ON and the 1~ ON or 3~ ON positions, in order to be able to activate the PRCD and switch the protective conductor through.**

Example for a Single-Phase PRCD

- Before performing protective conductor measurements, execute an offset measurement to assure that the test adapter's connector contacts are not included in the measurement results.
- Insert the respective test plug into the appropriate socket at the test adapter to this end: 2 to 4 or 1 to 6.
- Start the offset measurement at the test instrument.
- Connect the PRCD as described in section 3.4.
- Connect the test instrument to sockets 9 and 10 via the 2-pole measuring adapter.
- Activate the PRCD.
- Perform the measurement as described in the operating instructions for the test instrument.

4.2 Measuring Insulation Resistance (R_{ins})

Attention!
The right-hand rotary selector switch must be set to the mains disconnect position:
1~ OFF or **3~ OFF**.

Attention!
R_{PE} high must be deactivated!

- In order to perform the insulation resistance measurement (**R_{ins}**), connect the test instrument, via the measuring adapter, to socket 9 for the cable at the mains side and to socket 10 for the cable at the test object's outlet side.

Example, Single-Phase PRCD IN Sockets

- Connect the PRCD as described in section 3.4.
- **Single-phase PRCD:** Connect the test instrument, via the 2-pole measuring adapter, to the **PRCD IN / OUT L1**, **N** and **PE** sockets, one after the other.
- Perform the measurement as described in the operating instructions for the test instrument.
- **3-phase PRCD:** Connect the test instrument, via the 2-pole measuring adapter, to the **PRCD IN / OUT** L1, L2, L3, N and PE sockets, one after the other.

4.3 Tripping Test with Nominal Residual Current and Measurement of Time to Trip

Attention!
R_{PE} high must be deactivated!

Note!
If you operate the test adapter at an electrical system with a 30 mA breaker, the mains RCD may be tripped during the tripping test (tripping current and time to trip) instead of the PRCD. In this case the **MAINS L1** LED goes out.

We recommend the following procedure in order to prevent an upstream RCD (selective RCD as well) from tripping, and to ensure that actual tripping current or correct time to trip is measured:

- Connect the **PROFITEST MXTRA** test instrument, via the 2-pole measuring adapter, with the L1 pole to **L1 (PRCD-OUT)** and the PE pole to **N (PRCD-IN)**.
  Ensure correct polarity between the SCHUKO® plug and the PRCD!
  When the PRCD is activated, the phase must be connected to L1 at **PRCD-OUT**.

Alternative Measurement of Tripping Current for PRCD-K / PRCD K+

Attention!
The measurement of time to trip with this procedure may cause tripping of an upstream RCD.

- ⇨ Connect the test instrument, via the 2-pole measuring adapter, with the L1 pole to **L1 (PRCD-OUT)** and the PE pole to **PE (PRCD-OUT)**.
  Ensure correct polarity between the SCHUKO® plug and the PRCD!
  As an alternative, the test instrument can be connected to the outlet of the type K PRCD using the PRO-SCHUKO adapter.
- ⇨ Refer to the operating instructions for the test instrument regarding performance of the measurement.

With this procedure, the PRCD-K / PRCD K+ is tripped at 0.25 and 0.5 times nominal current.

4.4 Varistor Test (PRCD-K/PRCD-K+)

⚠ **Attention!**
R_{PE} high must be deactivated!

This measurement determines the voltage at which the varistor becomes conductive and thus checks its function. This is accomplished by means of an ISO ramp, or optionally with a fixed test voltage U_{ISO} of 50 V.
As a prerequisite for this measurement, the device under test must be switched on.

- ⇨ Connect the test instrument to the **PE IN** and **PE OUT** sockets via the 2-pole measuring adapter.
- ⇨ Perform the measurement as described in the operating instructions for the test instrument.
- ⇨ Evaluation of the measured varistor voltage depends on the manufacturer's specifications:

- PRCD-K (Kopp):12 V … 22 VDC
- PRCD-K+ (PCE): 18 V … 25 VDC

Note on Kopp's test specification:
PRCD-K (varistor in protective conductor circuit)

Kopp test procedure:

1) Connect operating voltage (e.g. 230 V / 50 Hz) and 24 V alternating voltage source.
2) Select R depending on residual current of the PRCD-K:
   For PRCD-K
   where In = 30 mA → R = 220 Ω/1 W.
   For PRCD-K
   where In = 10 mA → R = 620 Ω/0.5 W.
3) Switch on the PRCD-K using the ON key.
4) Press the <T> key → device must be tripped → PE circuit functions correctly.

Testing for shutdown of the PRCD-K as required by Kopp at this point is performed while testing the RCD protective device with continuously rising fault current until the device is tripped.

5 Protective Conductor Current Measurement

Attention!
R_{PE} **high** must be deactivated!

- Connect the PRCD as described in section 3.4.
- Switch mains power on by turning the **right-hand** rotary selector switch to the **1~ ON** or **3~ ON** position depending on the number of phases.
- **PRCD, single-phase:** Turn the **left-hand** rotary selector switch to the first **ON** position in the orange area for single-phase fault simulation.
- **PRCD, 3-phase:** Turn the **left-hand** rotary selector switch to the first **ON** position in the green area for 3-phase fault simulation.
- Enclose the external protective conductor loop (5) with the jaws of the current clamp transformer.
- Read the measured value for protective conductor current at the current clamp transformer.

Protective conductor current should not exceed 3.5 mA.

Example for a Single-Phase PRCD

6 Fault Simulation

Attention!
R_{PE} **high** must be deactivated!

Note!
If you operate the test adapter at an electrical system with a 30 mA breaker, the mains RCD may be tripped during the tripping test (tripping current and time to trip) instead of the PRCD. In this case the **MAINS L1** LED goes out.

6.1 PRCD-S (single-phase)

- Switch mains power on by turning the right-hand rotary selector switch to the **1~ ON** position.

6.1.1 Simulated Interruption

- Start with the left-hand rotary selector switch in the first **ON** position in the orange area for single-phase interruption.
- Switch through the positions, one after the other, in the clockwise direction (table from top to bottom).

Step	Rotary Switch	Test Adapter L1 LED	Test Adapter PE LED	PRCD LED	Action
1	ON	☀	○	☀	Activate the PRCD.
2	L1	○	○	○	The PRCD is tripped. It must not be possible to reactivate it.
3	ON	☀	○	☀	Activate the PRCD.
4	N	☀	○	○	The PRCD is tripped. It must not be possible to reactivate it.
5	ON	☀	○	☀	Activate the PRCD.

Step	Rotary Switch	Test Adapter L1 LED	Test Adapter PE LED	PRCD LED	Action
6	PE	☀	○	●	The PRCD is tripped. It must not be possible to re-activate it.

6.1.2 Simulated Wire Reversal

- ➪ Turn the left-hand rotary selector switch to the **L1-PE** position in the orange area for single-phase wire reversal.

Instead of the **L1 LED**, the **PE LED** must light up.

It must not be possible to activate the PRCD when this fault is simulated.

I

Step	Rotary Switch	Test Adapter L1 LED	Test Adapter PE LED	PRCD LED	Action
7	L1-PE	○	☀	●	It must not be possible to activate the PRCD.

6.1.3 Simulation of Interference Voltage in Protective Conductor at PRCD-S (Kopp)

Note!

This test cannot be performed on DUTs with protective conductor quality test (e.g. PRCD-S pro from Kopp).

- ➪ Set the left-hand rotary selector switch to the **PE-U_{EXT}** position.
- ➪ Switch mains power on by turning the right-hand rotary selector switch to the **1~ ON** position.

The **L1 LED** lights up, the **PE LED** lights up dimly if a single-phase DUT is connected.

Step	Rotary Switch	Test Adapter L1 LED	Test Adapter PE LED	PRCD LED	Action
8	PE-U_{EXT}	☀	☀	●	–

- ➪ Set the right-hand or three-position toggle switch to position 2 (center position).
- ➪ Select measurement type **R_{INS}** (insulation resistance measurement) at the test instrument.
- ➪ Select **U_{INS}** = 250 V as the measuring voltage.
- ➪ Contact the PE socket at **PRCD-OUT** with the positive pole (L1) of the test instrument's test probes.
- ➪ Start the measurement by pressing and holding the start key.
- ➪ Contact the N socket at **PRCD-IN** with the PE pole of the test probes.

The DUT must be tripped, and it must not be possible to switch it back on when interference voltage is applied.

See section 6.5.3 concerning 3-phase PRCDs.

6.1.4 Contacting the ON Key at the PRCD with the Probe (PRCD-S)

➪ Turn the left-hand rotary selector switch to the first **ON** position in the orange area for single-phase interruption**.**

The **L1 LED** must light up.

➪ Activate the PRCD.

➪ Plug the probe into the **PROBE** socket and contact the **ON** key at the PRCD with the test probe.

➪ Observe the notes under See “Simulation of “Interference Voltage at the Protective Conductor” with Probe” on page 8.

The PRCD is tripped.

It must not be possible to activate the PRCD as long as the probe is in contact with the **ON** key at the PRCD.

Step	Rotary Switch	Test Adapter L1 LED	Test Adapter PE LED	PRCD LED	Action
9	ON	☀	○	☀	Activate the PRCD.
	Contact “ON” key at PRCD with test probe.				
10	ON	☀	○	○	The PRCD is tripped. It must not be possible to reactivate it.

➪ Step 11: see Protective Conductor Current Measurement.

6.2 Protective Conductor Quality Test (e.g. PRCD-S pro)

In addition to the tests listed in section 6.1, the protective conductor quality test can be checked for correct functioning as follows.

➪ Turn the left-hand rotary switch to one of the **ON** positions in the orange area.

➪ Switch mains power on by turning the right-hand rotary selector switch to the **1~ ON** position.

The **L1 LED** must light up.

➪ Activate additional resistance **R_{PE} high** in the protective conductor path using the toggle switch.

➪ Measure resistance between the PE contact at the SCHUKO® plug (7) on the mains connection cable as well as the 4 mm PE **PRCD-IN** socket (9) and the PE contact at the **PRCD-IN** SCHUKO® socket (4).
The measured value must amount to approximately 1.6 kΩ.

➪ Deactivate **R_{PE} high** with the toggle switch.

➪ Activate the PRCD-S pro.
One palm must enclose the housing bottom of the PRCD-S pro during activation.

➪ Activate additional resistance **R_{PE} high** in the protective conductor path using the toggle switch.

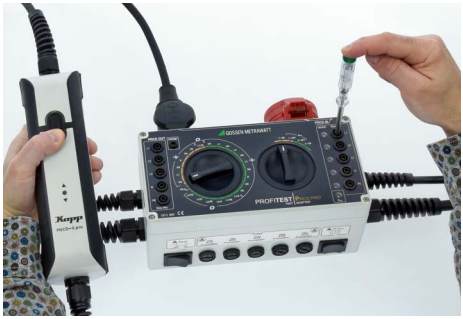
LED **R_{PE} high** lights up on the top of the test adapter.

The PRCD-S Pro must now be tripped, and reactivation must not be possible.

6.3 Function Test for the Sensor Surface on the PRCD-S pro (housing bottom)

- ➪ Insert a phase-tester screwdriver into the L1 socket at **PRCD-IN**.
- ➪ Touch its contact surface with a finger so that the integrated glow lamp lights up.

It must not be possible to switch on the PRCD-S pro if the palm of one hand encloses its housing bottom and the contact surface of the phase detector screwdriver is simultaneously touched with a finger of the other hand.



- ➪ Repeat testing of the sensor surface with the PRCD-S pro mains plug rotated 180°.

6.4 PRCD-K/PRCD-K+ (single-phase)

- ➪ Switch mains power on by turning the right-hand rotary selector switch to the **1~ ON** position.

Simulated Interruption

- ➪ Start with the left-hand rotary selector switch in the first **ON** position in the orange area for single-phase interruption.
- ➪ Switch through the positions, one after the other, in the clockwise direction (table from top to bottom).

Step	Rotary Switch	Test Adapter L1 LED	Test Adapter PE LED	PRCD LED	Action
1	ON	☀	○	☀	Activate the PRCD.
2	L1	○	○	○	The PRCD is tripped. It must not be possible to re-activate it.
3	ON	☀	○	☀	Activate the PRCD.
4	N	☀	○	○	The PRCD is tripped. It must not be possible to reactivate it.

Due to its design, the following tests are omitted for the PRCD-K:

- PE interruption
- Simulated wire reversal
- Simulation of PE to phase
- Contacting the “ON” key at PRCD with the test probe

6.5 PRCD-S (3-phase)

➪ Switch mains power on by turning the right-hand rotary selector switch to the **3~ ON** position.

6.5.1 Simulated Interruption

➪ Start with the left-hand rotary selector switch in the first **ON** position in the green area for single-phase interruption.

➪ Switch through the positions, one after the other, in the clockwise direction (table from top to bottom).

Conductor Interruption Using a 3-Phase PRCD from Kopp as an Example

Step	Rotary Switch	Test Adapter L1 LED	L2 LED	L3 LED	N LED	PE LED	PRCD LED	Action
1	ON	☀	☀	☀	○	○	☀	Activate the PRCD.
2	L1	○	☀	☀	○	○	○	The PRCD is tripped. It must not be possible to reactivate it.
3	ON	☀	☀	☀	○	○	☀	Activate the PRCD.
4	L2	☀	○	☀	○	○	○	The PRCD is tripped. It must not be possible to reactivate it.
5	ON	☀	☀	☀	○	○	☀	Activate the PRCD.
6	L3	☀	☀	○	○	○	○	The PRCD is tripped. It must not be possible to reactivate it.
7	ON	☀	☀	☀	○	○	☀	Activate the PRCD.
8	N	☀	☀	☀	☀	○	○	The PRCD is tripped. It must not be possible to reactivate it.
9	ON	☀	☀	☀	○	○	☀	Activate the PRCD.
10	PE	☀	☀	☀	○	○	○	The PRCD is tripped. It must not be possible to reactivate it.

Regarding step 8: The **N LED** also lights up due to star connection, although N is interrupted!

Note!
Tripping performance may deviate from this example in the case of PRCDs from other manufacturers – adhere to the manufacturer's test instructions!

6.5.2 Simulated Wire Reversal

- ➪ Turn the left-hand rotary selector switch to the **L1-N** position in the green area for 3-phase wire reversal.
- ➪ Switch through the positions, one after the other, in the clockwise direction (table from top to bottom).

It must not be possible to activate the PRCD when any of these faults is simulated.

Step	Rotary Switch	Test Adapter L1 LED	L2 LED	L3 LED	N LED	PE LED	PRCD LED	Action
11		○	☀	☀	☀	○	○	It must not be possible to activate the PRCD.
12		○	☀	☀	○	☀	○	It must not be possible to activate the PRCD.
13		☀	○	☀	☀	○	○	It must not be possible to activate the PRCD.
14		☀	○	☀	○	☀	○	It must not be possible to activate the PRCD.
15		☀	☀	○	☀	○	○	It must not be possible to activate the PRCD.
16		☀	☀	○	○	☀	○	It must not be possible to activate the PRCD.

6.5.3 Simulation of Interference Voltage at the Protective Conductor

➪ Set the left-hand rotary selector switch to the **PE-U_{EXT}** position.

➪ Turn the right-hand rotary switch to the **3~ ON** position:

LEDs L1, L2 and L3 light up and the **PE LED** lights up dimly if a 3-phase DUT is connected.

Step	Rotary Switch	Test Adapter L1 LED	L2 LED	L3 LED	N LED	PE LED	PRCD LED	Action
17	PE-U_{EXT}							–

➪ Set the right-hand or three-position toggle switch to position 1, 2 or 3.

- PRCD-S (Kopp): position 3
- DPRCD-M1 (Doepke): position 3
- NM5P (PCE): position 1, 2 or 3
- SLU3P (ABL SURSUM): position 1

➪ Select measurement type **R_{INS}** (insulation resistance measurement) at the test instrument.

➪ Select **U_{INS}** = 250 V as the measuring voltage.

➪ Contact the PE socket at **PRCD-OUT** with the positive pole (L1) of the test instrument's test probes.

➪ Start the measurement by pressing and holding the start key.

➪ Contact the N socket at **PRCD-IN** with the PE pole of the test probes.

The DUT must be tripped, and it must not be possible to switch it back on.

➪ Step 18: see Protective Conductor Current Measurement.

7 Characteristic Values

Measurement with **METRACLIP 61** as Accessory:

Protective conductor current measurement	Measuring range: 0 … 30 mA AC

Measurements with Test Instrument:

Protective conductor measurement	Measuring range: 0.1 Ω … 6 Ω, see test instrument technical data concerning R_{LO} function
Insulation resistance measurement	Measuring range: 50 kΩ … 500 MΩ, see test instrument technical data concerning R_{INS} function

Connections

Test outlets

SCHUKO®	1P+N+PE, 16 A, 230 V
CEE 3P+N+PE	16 A, 400 V

Test plug

SCHUKO®	1P+N+PE, 16 A, 230 V
CEE 3P+N+PE	16 A, 400 V

Sensor connection

2 mm connector socket with 1 MΩ safety impedance (laid out and as 5 × 200 kΩ in series) as series resistor to conductor L at the connection for the SCHUKO® plug
Touch current limited to 0.5 mA in accordance with **DIN EN 61010-1** if the device is used for its intended purpose

Power Supply

Nominal line voltage	230/400 V 50 Hz
Mains connection	SCHUKO® plug: 230 V 1P+N+PE 16 A or CEE plug: 230/400 V 3P+N+PE 16 A
Throughput rating	SCHUKO®: 10 VA CEE: 30 VA
Power consumption	SCHUKO®: < 2 VA CEE: < 4 VA

Electrical Safety

Measuring category	300 V CAT II
Pollution degree	2
Fuse links	5 × FF 315 mA/500 V

Ambient Conditions

Operating temperature	–5 … + 50 °C
Storage temperature	–20 … + 60 °C
Relative humidity	Max. 75%, no condensation allowed

Mechanical Design

Test adapter protection	IP 40 per DIN VDE 0470, part 1, connections: IP 20
Dimensions (W x H x D)	Housing: Approx. 24 × 17.5 × 11 cm (without connector cable, with surface mount sockets) Mains connector cable length with plug, SCHUKO®/CEE: approx. 97/100 cm: Connector cable length with test plug, SCHUKO®/CEE to PRCD: ca. 57/60 cm
Weight	Approx. 2.4 kg (with connector cable)

8 Maintenance

8.1 Housing Maintenance

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

Note!
If the test adapter has not been used for a long period of time, the switches may demonstrate increased contact resistance depending upon storage conditions.
If this is the case, actuate the switches several times.

The fuses may only be replaced when the device is voltage-free, i.e. the device must be disconnected from mains supply power and must not be connected to a measuring circuit. The fuse type must comply with the specifications in the technical data or the labeling on the instrument.

8.2 Technical Safety Inspections Testing per DGUV Regulation 3

Subject your test adapter to technical safety inspections at regular intervals.

The test adapter is designed in accordance with IEC 61010 and VDE 0404 as a protection category I and II test instrument.

Testing of the protective conductor, insulation resistance and touch current is described in the following subsections.

8.2.1 Testing Protective Conductor Resistance R_{PE}

Connecting/Contacting the PRCD Adapter, Single-Phase (230 V)

Protective conductor resistance is tested between the PE contact of the mains connection plug (SCHUKO® plug (7)) and the PE contact at **PRCD IN** (SCHUKO® socket (4), as well as parallel 4 mm PE socket (9)).

Testing the Single-Phase Connection

- ⇨ Turn the PRCD adapter's right-hand rotary switch to the **1~ON**position.
- ⇨ Turn the left-hand rotary switch to each switch position.*
- ⇨ If applicable, deactivate the additional **R_{PE} high** protective resistor.

With the exclusion of the exceptions specified below, protective conductor resistances R_{PE} of less than 3 Ω are permissible. This is due to the design of the PRCD adapter.

If **R_{PE} high** is enabled, the value must be approximately 1.6 kΩ.

* The following switch positions, in which faults are simulated for measurement purposes, must be excluded from this test:

- Conductor interruption:
  PE (orange), **PE** (green = 3P) → > 30 MΩ
- Reversed wires:
  L1-PE (orange), **L1-PE** (green), **L2-PE** (green), **L3-PE** (green) → > 30 MΩ
- Voltage at the protective conductor:
  PE-U_{EXT} (green/orange) depending on the position of the right-hand toggle switch
  – Position 1 = approx. 60 kΩ
  – Position 2 = approx. 150 kΩ
  – Position 3 = approx. 14.5 kΩ

Connecting/Contacting the PRCD Adapter, 3-phase (400 V)

Protective conductor resistance is tested between the PE contact of the mains connection plug (CEE plug (8)) and the PE contact at **PRCD IN** (CEE socket (6), as well as parallel 4 mm PE socket (9)).

Testing the 3-Phase Connection

- ⇨ Turn the PRCD adapter's right-hand rotary switch to the **3~ON**position.
- ⇨ Turn the left-hand rotary switch to each switch position.*

With the exclusion of the exceptions specified below, protective conductor resistances R_{PE} of less than 3 Ω are permissible. This is due to the design of the PRCD adapter.

* The following switch positions, in which faults are simulated for measurement purposes, must be excluded from this test:

- Conductor interruption:
  PE (orange), **PE** (green = 3P) → > 30 MΩ
- Reversed wires:
  L1-PE (orange), **L1-PE** (green), **L2-PE** (green), **L3-PE** (green) → > 30 MΩ
- Voltage at the protective conductor:
  PE-U_{EXT} (green/orange) depending on the position of the right-hand toggle switch
  – Position 1 = approx. 60 kΩ
  – Position 2 = approx. 150 kΩ
  – Position 3 = approx. 14.5 kΩ

8.2.2 Testing Insulation Resistance

Each test is performed in the corresponding switch position, i.e. **1~ON** or **3~ON**, at short-circuited contacts **L-N** or **L[X]-N** (for SCHUKO® and for CEE)

- at mains connection cables 7 and 8
- at **PRCD OUT** connector cables 2 and 1
- at **PRCD IN** sockets 4 and 6,

in each case against **PE**.

The usual limit values apply.

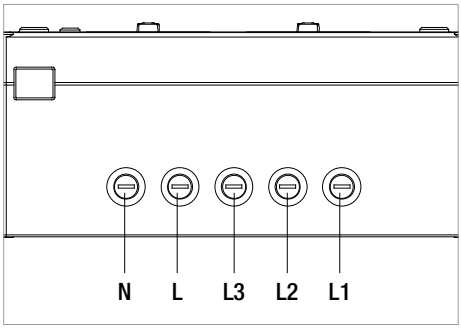
8.2.3 Touch Current Measurement

Touch current measurement is conducted at the screw connections of the **PRCD IN** sockets with the standard limit values (I_B < 0.5 mA).

8.3 Fuse Replacement

All fuses for neutral and phase conductors are accessible from the outside.

The fuses may only be replaced when the device is voltage-free, i.e. the device must be disconnected from mains supply power and must not be connected to a measuring circuit. The respective fuse type must comply with the specifications in the technical data or the labeling on the device.



8.4 Returns and Environmentally Sound Disposal

This tester 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 device 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 device 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.

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.gossenmetrawatt.com under the search terms “WEEE” and “environmental protection”.

Note!
Select “Pages” under “Filter Results:” on the search’s results page.

9 Contact, Support and Service

Gossen Metrawatt GmbH can be contacted directly and conveniently – we have a single number for everything! Whether you require support or training, or have an individual inquiry, we can answer all of your questions here:

+49 911 8602-0

Monday to Thursday: 8 a.m. to 4 p.m.
Friday: 8 a.m. to 2 p.m.

Or contact us by e- mail at: info@gossenmetrawatt.com

Do you prefer support by e-mail?

Measuring and Test Technology:
support@gossenmetrawatt.com

Industrial Measuring Technology:
support.industrie@gossenmetrawatt.com

Enquiries concerning training and seminars can also be submitted by e-mail and online:

training@gossenmetrawatt.com

https://www.gossenmetrawatt.de/en/knowledge/webinars/

Please contact GMC-I Service GmbH for repairs, replacement parts and calibration*:

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* DAkkS calibration laboratory per DIN EN ISO/IEC 17025 – accredited by the Deutsche Akkreditierungsstelle GmbH under reference number D-K-15080-01-01.

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