

SECU-cal 10

Calibration Adapter for Testers

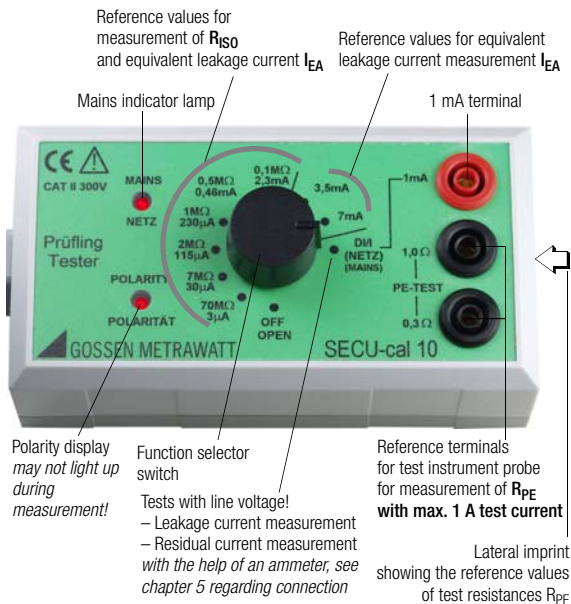
per DIN VDE 0701-0702/

EN 62353 (VDE 751-1)

3-349-169-15

10/3.18





Note

The indicated current values of 30 μ A and 3 μ A for switch positions 7 M Ω and 70 M Ω are merely guidance values. Usually, the capacitance of the connector cables is sufficiently high to ensure that the current values actually measured exceed considerably that level and can therefore not be used as reference values.

This applies particularly for the test instruments of the SECUTEST[®]... series.

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1 Applications

The adapter is used for testing measuring accuracy of test instruments in accordance with DIN VDE 0701-0702 and DIN EN 62353 (VDE 0751-1). As a rule, these instruments must be tested once each year as set forth by accident prevention regulation (DGUV rule 3), as well as for certification in accordance with the ISO 9000 quality standard.

All measuring ranges for tests required in accordance with DIN VDE 0701-0702 such as protective conductor resistance, insulation resistance, equivalent leakage current and residual and/or contact current must be tested.

2 Safety Features and Precautions

This instrument fulfills the requirements of the applicable EU guidelines and national regulations. We confirm this with the CE marking. The relevant declaration of conformity can be obtained from GMC-I Messtechnik GmbH.

The SECU-cal 10 calibration adapter is manufactured and tested in accordance with safety regulations IEC 61010-1 / DIN EN 61010-1 / VDE 0411-1.

If used for its intended purpose, safety of the user and of the device is assured.

Read the operating instructions completely and carefully before using the adapter, and follow all instructions included therein. Observe the operating instructions included with the test instrument to be tested as well.



Attention!

The calibration adapter may only be used for testing test instruments in accordance with DIN VDE 0404! Under no circumstances may the adapter be used in electrical systems!

**Attention!**

Before plugging the calibration adapter into a live outlet (test socket or mains outlet) for the performance of tests with line voltage, set the rotary switch at the calibration adapter to the **DI/I** position.

Non-observance may result in:

- Destruction of the adapter
- Charging of the protective conductor with impermissible fault currents of up to 8.25 mA
- Tripping of 10 mA RCCBs

If the “NETZ/MAINS” and “POLARITÄT/POLARITY” lamps light up simultaneously during the test with mains voltage in rotary switch position **DI/I**, the polarity of the calibration adapter must be reversed before measurement is performed. Only the “NETZ/MAINS” lamp may remain illuminated. Non-observance may result in erroneous measurements.

**Attention!**

Only test instruments with a **protective conductor test current of no greater than 1 A** may be connected to the calibration adapter. Greater current values result in destruction of the adapter.

**Attention!**

The device is not equipped with overcurrent or excessive temperature protection. Under no circumstances may the device's load capacities be exceeded, because this may damage the device or reduce its level of accuracy.

Visual Inspection of Test Instruments

Perform a visual inspection of test instruments and their connector cables before connecting them to the calibration adapter. Damaged test instruments must first be repaired.

The calibration adapter may not be used:

- with open housing
- if visible damage is apparent
- if the connection cable is damaged
- if it no longer functions flawlessly
- if the safety sockets are damaged
- after excessive stress, i.e. if the load capacities specified in the technical data have been exceeded
- after lengthy periods of storage under unfavorable conditions (e.g. humidity, dust, temperature)

The calibration adapter may only be repaired by the manufacturer. Observance of technical measuring and safety requirements cannot otherwise be assured.

Meanings of symbols on the device

The symbols on the device have the following meanings:

 Indicates EC conformity



Warning concerning a source of danger
(Attention, observe documentation!)



This device may not be disposed of with the trash.
Further information regarding the WEEE mark can be accessed on the Internet at
www.gossenmetrawatt.com by entering the search term 'WEEE'.

Opening of Equipment / Repair

The equipment may be opened only by authorized service personnel to ensure the safe and correct operation of the equipment and to keep the warranty valid.

Even original spare parts may be installed only by authorized service personnel.

In case the equipment was opened by unauthorized personnel, no warranty regarding personal safety, measurement accuracy, conformity with applicable safety measures or any consequential damage is granted by the manufacturer.

3 Connecting the Calibration Adapter to the Test Instrument

3.1 Tests without Line Voltage

- ☞ Make sure that the test socket is voltage-free (e.g. set **Mains VDE (Netz-VDE)** switch to **VDE** position for SECUTEST® 11P, 15P or 21F workshop test panels).
- ☞ The earthing contact outlet of the calibration adapter may only be plugged into the earthing contact outlet of the test instrument, identified as test socket.

Reversal of L and N at the outlet has no effect on measurement results.

3.2 Tests with Line Voltage

- ☞ Before connecting the calibration adapter to the test socket: Set the rotary switch to the **DI/I** position.

The rotary switch must also be set to the **DI/I** position for automatic test instruments, and for test panels with VDE MAINS selector switches before activating the test function (i.e. before starting the function test).

If the “NETZ/MAINS” and “POLARITÄT/POLARITY” lamps light up simultaneously, mains plug polarity must be reversed for the test instrument or the calibration adapter before measurement is performed.

Only the “NETZ/MAINS” lamp may be illuminated during measurement.

4 Performing Tests without Line Voltage

- Connect the test instrument to mains power.
- Make sure that the test socket at the test instrument is voltage-free.
- Plug the earthing contact plug of the calibration adapter into the test socket at the test instrument.

4.1 Checking Display Values for Protective Conductor Resistance Measurement



Attention!

Use test instruments with test current of less than 1 A only. The reference resistors are destroyed at values of greater than 1 A.

- Connect the probe from the test instrument to the “0.3 Ω ” or “1.0 Ω ” socket at the calibration adapter.
- Start “protective conductor measurement” at the test instrument.

The value displayed at the test instrument must lie within the test instrument’s specified operating error tolerance for the selected test type, plus calibration adapter error.

The reference values of the test resistances R_{PE} are indicated on the front side of the calibration adapter and in the test report. Please use these values for assessing your DUT.

Calibration adapter intrinsic error for protective conductor resistance measurement: 1 %

4.2 Checking Display Values for Insulation Resistance Measurement

- Start “insulation measurement” at the test instrument.
- Set the selector switch at the calibration adapter to either 70 or 0.1 M Ω .

The value displayed at the test instrument must lie within the test instrument’s specified operating error tolerance for the selected test type, plus calibration adapter error.

Calibration adapter intrinsic error for various insulation resistance values		
Value in M Ω	70	0.1 ... 7
Intrinsic error as %	1	0.5

4.3 Checking Display Values for Equivalent Leakage Current Measurement

- Start “equivalent leakage current measurement” at the test instrument.
- Set the selector switch at the calibration adapter to either 3.5 or 7 mA.

The value displayed at the test instrument must lie within the test instrument’s specified operating error tolerance for the selected test type, plus calibration adapter error.

$$I_{\text{Display}} [\text{mA}] = \frac{230 \text{ V}}{R_x + R_i}$$

R_x represents the resistors integrated into the SECU-cal 10. Any possible phase error is avoided through the use of ohmic resistors.

R_i represents the internal resistance of the test instrument during equivalent leakage current measurement. It amounts to typ. 2 k Ω , according to standard.

Calibration adapter intrinsic error for equivalent leakage current measurement: 1 %



Note

Before introduction of the DIN VDE 0701:2000-09 standard, the display value was calculated according to the following formula:

$$I_{\text{Display}} [\text{mA}] = \frac{230 \times 1.06}{R_x + 2 \text{ k}\Omega},$$

i.e. the display value included an allowance of 6%.

Veteran instruments therefore show an equivalent leakage current increased by 6%. We recommend upgrading such instruments to the current version as soon as possible.

4.4 Checking Display Values for Equivalent Device Leakage Current Measurement per DIN EN 62353 (VDE 0751-1)

- Start “equivalent leakage current measurement ($R_i = 1 \text{ k}\Omega$)” at the test instrument.
- Connect the probe to the $0.3 \text{ }\Omega$ socket. In accordance with DIN EN 62353 (VDE 0751-1), the protective conductor at the test socket is not connected. The probe functions as a return conductor.

The value displayed at the test instrument must lie within the test instrument’s specified operating error tolerance for the selected test type, plus calibration adapter error.

$$I_{\text{Display}} [\text{mA}] = \frac{230 \text{ V}}{R_x + R_i}$$

R_x represents the resistors integrated into the SECU-cal 10. Any possible phase error is avoided through the use of ohmic resistors.

R_i represents the internal resistance of the test instrument during equivalent device leakage current measurement. It amounts to typ. $1 \text{ k}\Omega$, according to standard.

Nominal Values Switch Positions	Equivalent Leakage Current	Equivalent Device Leakage Current
70 M Ω	3.29 μA	3.29 μA
7 M Ω	32.8 μA	32.8 μA
2 M Ω	115 μA	115 μA
1 M Ω	0.23 mA	0.23 mA
0.5 M Ω	0.46 mA	0.46 mA
0.1 M Ω	2.25 mA	2.28 mA
3.5 mA	3.5 mA	3.55 mA
7 mA	7.0 mA	7.22 mA

4.5 Checking Display Values for Equivalent Patient Leakage Current Measurement per DIN EN 62353 (VDE 0751-1)

Plug the calibration adapter into the test socket at the test instrument. Plug the probe into sockets 4 and 5 at the test instrument. The probe handle is left open and may not be touched (hum). Connect one of the applied parts sockets (A through K) to the 1 mA socket at the SECU-cal 10. The included quick clip and a 2 mm cable can be used to this end. Start “equivalent patient leakage current measurement” at the

test instrument. The display value must lie within a range of 0.98 mA and 1.01 mA plus the measuring uncertainty of the test instrument. Other values cannot be tested with the SECUCAL 10. In order to test all of the sockets (A through K) for correct functioning, connect each of these sockets with the 1 mA socket at the SECUCAL 10, one after the other. The display value must lie within the above specified range for each of the sockets.

5 Performing Tests with Line Voltage



Attention!

Set the rotary switch at the calibration adapter to the **DI/I** position before plugging the calibration adapter into the test socket.

The following test with line voltage must be performed with an additional ammeter (calibrated multimeter, 1 mA respectively 10 mA AC range, e.g. METRAHIT X-TRA).

5.1 Checking Display Values for Leakage Current Measurement



Note

The “POLARITÄT/POLARITY” lamp may not light up during measurement.

- Start the requested leakage current measurement with mains voltage at the test instrument.
- Connect the “contact and probe current measurement” socket at the test instrument to the “1 mA” safety socket at the calibration adapter via a series connected multimeter with the help of measurement cables.

The values displayed at the multimeter and the test instrument must be in compliance by taking device tolerances into account.

Line voltage tolerances influence measurement results.

5.2 Checking Display Values for Patient Leakage Current Measurement

This test can be performed with all test instruments of the **SECUTEST/SECULIFE** series with sockets A through K for applied parts.

Please proceed as follows to calibrate the patient leakage current with SECU-cal 10:

- Connect SECU-cal 10 with the test socket.
- Select function „I-leakage“ at the **SECUTEST** (via switch position or menu), and then patient leakage current.
- Start measurement.
- Connect the applied part A to the 0.3 Ohm socket of SECU-cal 10 via a series connected multimeter with the help of measurement cables.
- Select „SFC Prot. Cond. interrupted“.
- Set the requested leakage current at the SECU-cal 10 test instrument (e. g. 115 μA).

The values displayed at the multimeter and the test instrument must be in compliance by taking device tolerances into account.

5.3 Checking Display Values for Direct or Differential Protective Conductor Measurement

Being optimized for equivalent leakage current measurements, SECU-cal 10 cannot be directly connected to the test socket for precisely checking the measured values of the protective conductor current. An adapter is required for this purpose which provides for the measurement of current in the protective conductor with a supplementary ammeter (calibrated multimeter for the 1 mA or 30 mA AC range, e. g. MET-RAHIT X-TRA).

Proceed as follows to calibrate the protective conductor current with SECU-cal 10:

- Connect SECU-cal 10 with the test socket by means of an adapter.
- Connect the ammeter at the disconnected protective conductor cable of the adapter.
- Set the rotary switch of the Secutest to switch position IPE.
- Select measurement type „Direct“ or „Differential“.
- Start measurement.
- Set the desired leakage current at the SECU-cal 10 (e. g. 3.5 mA).

The values displayed by the multimeter and the test instrument must conform to each other by taking device tolerances into account.

6 Characteristic Values

6.1 Nominal Range of Use

Maximum Voltage	For the measurement of Insulation resistance: 600 V DC Equivalent leakage/equivalent device leakage current: 250 V AC Equivalent patient leakage current: 250 V AC Leakage current: 250 V AC
Maximum Current	For the measurement of protective conductor resistance: 1 A DC/AC _{eff} Insulation resistance: 2 mA Equivalent leakage current: 3.5 mA AC _{eff}
AC frequency:	50 Hz ... 60 Hz, sinusoidal

6.2 Ambient Conditions

Operating Temperature	0 °C ... +40 °C
Storage Temperature	-20 °C ... +60 °C

6.3 Electrical Safety

Safety Class	I per IEC 61010-1
Operating Voltage	300 V
Measuring Category	I for insulation resistance II for all other measurements
Pollution degree	2
EMC	IEC/EN 61326

6.4 Mechanical Design

Protection housing: IP 40, terminals: IP 20

Extract from table on the meaning of IP codes

IP XY (1 st digit X)	Protection against foreign object entry	IP XY (2 nd digit Y)	Protection against the penetration of water
0	not protected	0	not protected
2	≥ 12.5 mm dia.	2	vertically falling drops with enclosure tilted 15°
4	≥ 1.0 mm dia.	4	splashing water

Dimensions	125 mm x 66 mm x 41 mm (L x W x H)
Weight	approx. 0.26 kg

7 Maintenance

Annual calibration, performed by the manufacturer, is recommended.

7.1 Housing Maintenance

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

7.2 Device Return and Environmentally Compatible Disposal

The **instrument** is a category 9 product (monitoring and control instrument) in accordance with ElektroG (German Electrical and Electronic Device Law). This device is subject to the RoHS directive. Further-more, we make reference to the fact that the current status in this regard can be accessed on the Internet at www.gossenmetrawatt.com by entering the search term WEEE.

We identify our electrical and electronic devices in accordance with WEEE 2012/19/EU and ElektroG with the symbol shown to the right per DIN EN 50419.



These devices may not be disposed of with the trash. Please contact our service department regarding the return of old devices.

8 Product Support

When you need support, please contact:

GMC-I Messtechnik GmbH

Product Support Hotline

Phone +49 911 8602-0

Fax +49 911 8602-709

E-Mail support@gossenmetrawatt.com

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

When you need service, please contact:

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www.gmci-service.com

This address is only valid in Germany.
Please contact our representatives or subsidiaries for service in
other countries.

*** DAkKS Calibration Laboratory for Electrical Quantities D-K-15080-01-01 accredited per DIN EN ISO/IEC 17025**

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

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