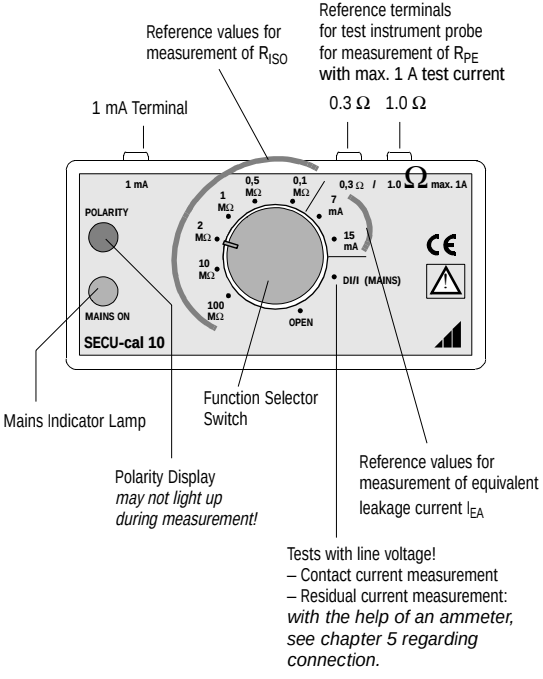
Operating Instructions

SECU-cal 10

Calibration Adapter for Testers per DIN VDE 0701/0702/0751

3-349-169-15
2/4.01


Reference values for measurement of R_{ISO}
Reference terminals for test instrument probe for measurement of R_{PE} with max. 1 A test current
1 mA Terminal
0.3 Ω
1.0 Ω
1 mA
0,5 MΩ
0,1 MΩ
0,3 Ω / 1.0 Ω max. 1A
1 MΩ
7 mA
POLARITY
2 MΩ
15 mA
10 MΩ
DI/I (MAINS)
100 MΩ
OPEN
MAINS ON
SECU-cal 10
Mains Indicator Lamp
Function Selector Switch
Polarity Display
may not light up during measurement!
Reference values for measurement of equivalent leakage current I_{EA}
Tests with line voltage!
– Contact current measurement
– Residual current measurement:
with the help of an ammeter, see chapter 5 regarding connection.

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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 VDE 0751. As a rule, these instruments must be tested once each year as set forth by accident prevention regulation BGV A2, 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

The SECU-cal 10 calibration adapter is manufactured and tested in accordance with safety regulations IEC 61010-1 / 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 18 mA
- Tripping of 30 mA RCCBs

If the “MAINS ON” and “POLARITY” lamps light up simultaneously, the polarity of the test instrument mains plug or the calibration adapter connection must be reversed before measurement is performed.
Only the “MAINS ON” 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 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 extraordinary stressing due to transport
- 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.

2.1 Meanings of symbols on the device

The symbols on the device have the following meanings:

CE Indicates EC conformity


Warning concerning a source of danger
Attention: observe documentation!

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 switch to VDE position for SECUTEST 11P, 15P or 20F workshop test panels).
- ⇨ The calibration adapter may only be plugged into the test socket identified as the earthing contact outlet.

Reversal of L1 and N at the outlet has no effect on measurement results.

3.2 Tests with Line Voltage

- ⇨ Before plugging the calibration adapter into 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 “MAINS ON” and “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 “Mains on” 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 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 clip or 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.

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 100 or 0.1 MΩ.

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 MΩ	100	0.1 … 10
Intrinsic error as %	5	1

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 7 or 15 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.

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

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

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

Display Value Range
SECUTEST ® measuring tolerance: ±(2.5% + 5 d)
Standard: DIN VDE 701, part 1/ 86 + 93

Switch Position	R-Tol	Min.	Max.
10 M	1%	0.019 mA	0.030 mA
2 M	1%	0.113 mA	0.131 mA
1 M	1%	0.230 mA	0.257 mA
500 K	1%	0.464 mA	0.508 mA
100 K	1%	2.26 mA	2.52 mA
7 mA (32.8 k)	1%	6.71 mA	7.29 mA
15 mA (14.28 k)	1%	14.42 mA	15.54 mA

4.4 Checking Display Values for Equivalent Device Leakage Current Measurement per DIN VDE 0751

- ⇨ Start “equivalent leakage current measurement (Ri = 1 kΩ)” at the test instrument.
- ⇨ Connect the probe to the 0.3 Ω socket.
  In accordance with DIN VDE 0751, the protective conductor at the test socket is not connected. The probe functions as a return conductor.
- ⇨ Set the selector switch at the adapter to the positions specified in the following table. 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.

Display Value Range
SECUTEST ® measuring tolerance: ±(2.5% + 5 d)
Standard: DIN VDE 0751

Switch Position	R-Tol	Min.	Max.
10 M	1%	23.0 µA	25.7 µA
2 M	1%	117.1 µA	126.6 µA
1 M	1%	234.6 µA	252.7 µA
500 K	1%	0.465 mA	0.509 mA
100 K	1%	2.28 mA	2.55 mA
7 mA (32.8 k)	1%	6.91 mA	7.51 mA
15 mA (14.28 k)	1%	15.36 mA	16.56 mA

4.5 Checking Display Values for Equivalent Patient Leakage Current Measurement per DIN VDE 0751

Plug the calibration adapter into the test socket at the SECUTEST ® 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 1.029 mA and 1.082 mA. Other values cannot be tested with the SECU-cal 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 SECU-cal 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, 3 mA AC range, e.g. METRA*Hit* 23S).

5.1 Checking Display Values for Contact Current Measurement:

☞ Note
The “POLARITY” lamp may not light up during measurement.

- ⇨ Start “contact current measurement” 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.

Values displayed at the multimeter and the test instrument must be in compliance with device tolerances.

Line voltage tolerances influence measurement results.

6 Characteristic Values

6.1 Nominal Range of Use

Maximum Voltage	For the measurement of	
	Insulation resistance:	600 V DC
	Equivalent leakage and equivalent device leakage current:	250 V AC
	Equivalent patient leakage current:	250 V AC
	Contact current:	250 V AC
Maximum Current	For the measurement of	
	Protective conductor resistance:	1 A DC/AC_{eff}
	Insulation resistance:	10 mA
	Equivalent leakage current	3.5 mA AC_{eff}

Maximum load at calibration resistors for insulation, equivalent leakage current, equivalent device leakage current, equivalent patient leakage current and contact current: 0.6 W

AC frequency: 50 Hz … 60 Hz, sinusoidal

6.2 Ambient Conditions

Operating Temperature	21 °C … +23 °C
Storage Temperature	–20 °C … +60 °C

6.3 Electrical Safety

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

6.4 Mechanical Design

Protection	housing: IP 40, terminals: IP 20
Dimensions	100 mm x 50 mm x 40 mm (L x W x H)
Weight	approx. 0.3 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.

8 Repair and Replacement Parts Service
DKD Calibration Lab and Rental Instrument Service

When you need service, please contact:

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Phone +49 911 86 02 - 410 / 256
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