GOSSEN METRAWATT

SECUTEST ST BASE(10) / PRO and SECULIFE ST BASE(25)

Test Instruments for Checking the Electrical Safety of Devices

3-447-067-03
2/4.22

Contents Page

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 test 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 test instrument.
  Be aware that PPE may be required for the device under test and wear it if necessary.
- The functioning of active medical devices (e.g. pacemakers, defibrillators) and passive medical devices may be affected by voltages, currents and electromagnetic fields generated by the test instrument 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 test instrument.
- Use only the specified accessories (included in the scope of delivery or listed as options) with the test instrument.
- Carefully and completely read and adhere to the product documentation for optional accessories. Retain these documents for future reference.
- Use the test instrument in undamaged condition only.
  Inspect the test 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 test instrument or its accessories don't function flawlessly, permanently remove the instrument/accessories from operation and secure them against inadvertent use.
- If the test 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 test instrument and its accessories after long periods of storage under unfavorable conditions (e.g. humidity, dust or temperature).
- Do not use the test instrument and its accessories after extraordinary stressing due to transport.
- Only use the test instrument and its accessories within the limits of the specified technical data and conditions (ambient conditions, IP protection code, measuring category etc.).
- The test instrument and the accessories may only be used for the tests/measurements described in the documentation for the test instrument.
- The test instrument may only be connected to TN, TT or IT electrical systems with a maximum of 240 V (nominal voltage) 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.
- The test instrument is equipped with fuses. The test instrument may only be used as long as the fuses are in flawless condition. Defective fuses must be replaced.
- Do not perform any measurements in electrical systems with the test Instrument. It has been neither designed nor approved for this purpose.
- Plugging in the measurement cables must not necessitate any undue force.
- Never touch conductive ends (e.g. 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.
- Conduct a probe check after completing each test.
- The test instrument must be operated within the same electrical system as the test object.
- Unexpected voltages may occur at devices under test (for example, capacitors can be dangerously charged). Take appropriate precautions.
- The fuses may only be replaced when the test instrument is voltage-free, i.e. it must be disconnected from mains supply power and may not be connected to a measuring circuit.
  The fuse type must comply with the specifications in the technical data or the labeling on the test instrument.
- Instruments with feature M01: The test instrument is equipped with a Bluetooth® module. Determine whether or not use of the implemented frequency band of 2.402 to 2.480 GHz is permissible in your country.
- Always create a backup copy of your measurement data. Please refer to this document for further information, for example see section 19 "Transferring and Saving Test Structures and Measurement Data (test instrument data base)".
- Observe and comply with the respectively applicable national data protection regulations. Use the corresponding functions provided by the test instrument such as password protection, as well as other appropriate measures.

2 Applications

Please read this important information!

2.1 Intended Use / Use for Intended Purpose

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

The SECUTEST ST BASE, the SECUTEST ST BASE10, the SECUTEST ST PRO, SECULIFE ST BASE and the SECULIFE ST BASE25 are test instruments for testing the electrical protective measures of electrical devices, electrical medical equipment and electric welding equipment.

All test instruments include measuring and test functions for checking the effectiveness of the protective measures required in accordance with the respective test standards for the particular field of technology. Single measurements and test sequences can be executed.

Test sequences (semi-automatic test procedures) can be used in an integrated, i.e. preconfigured form, or defined individually by the user.

The integrated test sequences consist of a preconfigured series of individual tests with subsequent documentation, as stipulated in the respective standard. They can thus be used to repeatedly and efficiently perform standards-compliant tests. Their progress is interrupted by safety-related pauses, as well as associated warnings and instructions. As a result, the level of protection provided to the user is greater than demanded by sections 4.1.6 and 4.1.7 of standard "IEC / 61557-16 / DIN EN 61557-16 / VDE 0413-16" with regard to "automated test sequences".

The integrated test sequences can be used to comply with the following standards:

- VDE 0701-0702 / ÖVE E 8701 / SNR 462638
  Inspection after repair, modification of electrical appliances – Periodic inspection on electrical appliances
- IEC 62353 / EN 62353 / VDE 0751-1
  Medical electrical equipment –
  Recurrent test and test after repair of medical electrical equipment
- IEC 60974-4 / EN 60974-4 / VDE 0544-4
  Arc welding equipment
  Part 4: Periodic inspection and testing
- NEN 3140
  Bedrijfsvoering van elektrische installaties - Laagspanning
- EN 50678 / VDE 0701
  General Procedure for Verifying the Effectiveness of the Protective Measures of Electrical Equipment After Repair
- EN 50699 / VDE 0702
  Recurrent Test of Electrical Equipment
- IEC 62368 / EN 62368 / VDE 0868-1
  Audio/video, information and communication technology equipment
- IEC 62911 / EN 62911 / VDE 0868-911
  Audio, video and information technology equipment – Routine electrical safety testing in production

Attention!
The integrated, preconfigured test sequences do not include all of the tests prescribed by the product standard which are required for type testing! They're restricted to the tests which are required as a rule after repair or during maintenance work and for occupational health and safety measures, as well as for quality assurance in production.

Note
Availability of the individual integrated test sequences depends on the test instrument type (SECUTEST ST... or SECULIFE ST...), the selected features (order features) and the enabled extensions (activations).
Refer to your order / test instrument and data sheet for details.

Suitable, database-driven test software is available, namely IZYTRONIQ. This software facilitates test organization and the management of test data from a broad range of test instruments. It also provides extended functions such as remote control in connection with the respective test instrument – support for extended functions depends on the test instrument and its order features or enabled extensions (activations). The software itself is included with test equipment sets, or can be purchased separately.

The test instrument housing is compact, impact resistant and includes an integrated rubber protector for mobile use, e.g. in factories, on construction sites and in industrial environments.

The front panels and housings of SECULIFE ST BASE and SECULIFE ST BASE25 test instruments are also furnished with antimicrobial properties, which make it possible to use them in hygienically sensitive areas.

Standards Table – by Device and Reason for Testing

	Reason for Testing		
DUTs	**Repair**	**Periodic Testing (occupational safety, DGUV)**	**Testing in Production / Routine Testing**
Electric devices (as a rule with mains power cable) including extension cords and multiple outlets	EN 50678 / VDE 0701 VDE 0701-0702 / ÖVE E 8701 / SNR 462638 NEN 3140	EN 50699 / VDE 0702 VDE 0701-0702 / ÖVE E 8701 / SNR 462638 NEN 3140	
IT equipment	Not defined To a given extent: IEC 62368 / EN 62368 / VDE 0868-1 IEC 62911 / EN 62911 / VDE 0868-911 VDE 0701-0702 / ÖVE E 8701 / SNR 462638	EN 50699 / VDE 0702 VDE 0701-0702 / ÖVE E 8701 / SNR 462638 NEN 3140	IEC 62911 / EN 62911 / VDE 0868-911
Medical electrical equipment	IEC 62353 / EN 62353 / VDE 0751-1	IEC 62353 / EN 62353 / VDE 0751-1	IEC 62353 / EN 62353 / VDE 0751-1 To a given extent: IEC 60601-1 / EN 60601-1 / VDE 0750-1
Arc welding equipment	IEC 60974-4 / EN 60974-4 / VDE 0544-4	IEC 60974-4 / EN 60974-4 / VDE 0544-4	

Table of Standard Designations for Available Tests

	EN 50678 / VDE 0701 EN 50699 / VDE 0702 VDE 0701-0702 / ÖVE E 8701 / SNR 462638	IEC 60974-4 / EN 60974-4 / VDE 0544-4	IEC 62353 / EN 62353 / VDE 0751-1	IEC 60601-1 / EN 60601-1 / VDE 0750-1	IEC 62368 / EN 62368 / VDE 0868-1 IEC 62911 / EN 62911 / VDE 0868-911
Single Measurements					
Protective conductor resistance	•			•	
Insulation resistance	•				
Protective conductor current	•				
Earth leakage current				•	
Primary leakage current		•			
Device leakage current			•		
Touch current	•	•	•	•	•
Current from welding circuit		•			
Patient leakage current				•	
Leakage current from applied part			•		
Measuring Method					
Alternative (equivalent [device] leakage current)	•		•		
Differential current	•	•	•		
Direct	•	•	•	•	•

Key: • = specified test

2.2 Use for Other than Intended Purpose

Using the test instrument for any purposes other than those described in the condensed operating instructions, or in these operating instructions for the test instrument, 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 assume any liability for data loss.

2.4 Opening the Instrument / Repairs

The test 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 test instrument is prohibited.

If it can be ascertained that the test instrument 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.

If the guarantee seal is damaged or removed, all guarantee claims are rendered null and void.

3 Documentation

Scope of Validity

These operating instructions describe a test instrument with software/firmware version FW 3.3.0.

See section 20.7 "Software/Firmware Update (system info parameter)".

Terminology

Test instrument	SECUTEST ST... or SECULIFE ST...
Device under test	Electrical device to be tested, medical electrical equipment or electric welding equipment (DUT)
Test object	Electronic representation of a specific test object in the internal test instrument database (unequivocal allocation to a real DUT by means of an ID)
Test sequence	Series of semi-automatic tests or test steps
Integrated test sequence	Test sequence (see above) which is available upon delivery or after enabling in the instrument. Cannot be changed (test parameters are configurable).
User-defined test sequence	A test sequence (see above) which is created individually by the user

4 Getting Started

- Read and adhere to the product documentation. In particular observe all safety information in the documentation, on the test instrument and on the packaging.
  - See “Safety Instructions” on page 4.
  - See “Applications” on page 5.
- Familiarize yourself with the test instrument.
  - See “Test Instrument” on page 7.
  - See “Initial Startup” on page 14.
  - See “Operation” on page 16.
- Prepare the test instrument for use.
  - See “Test Instrument Settings” on page 18.
  - See “Extensions (enabling functions/feature)” on page 24.
  - See “Connecting and Configuring External Devices” on page 25.
  - See “Inspector Management” on page 29.
  - See “Internal Database” on page 31.
- Perform measurements:
  - See “Connecting the Device Under Test” on page 38.
  - See “Important Basic Information on Tests and Measurements” on page 41.
  - See “Single Measurements” on page 43.
  - See “Special Functions – EXTRA” on page 74.
  - See “Test Sequences (automatic test sequences)” on page 76.
- Generate a report if required. See “Reports” on page 94.
- Transfer measurement data to IZYTRONIQ software if required. See “Transferring and Saving Test Structures and Measurement Data (test instrument data base)” on page 95.

Note

IZYTRONIQ test software is required for some functions. IZYTRONIQ may be included in the scope of delivery, for example with standard models and instrument sets (see data sheet).

If this is not the case or if you would like to take advantage of a variant with a larger scope of functions, you can purchase IZYTRONIQ separately. Detailed information is available at:

https://www.izytron.com/

Install IZYTRONIQ to your system. All relevant information, as well as information about the software, can be found in IZYTRONIQ online help.

5 Test Instrument

5.1 Scope of Delivery

The scope of delivery varies depending on which test instrument variant has been ordered, and is country-specific. Information concerning the scope of delivery can be found in your order and in the data sheet, in which all order information is listed.

5.2 Features

The test instruments are available with various features. These can be selected when placing an order.

The basic test instruments include the following features:

	Features	SECUTEST ST BASE	SECUTEST ST BASE10	SECUTEST ST PRO	SECULIFE ST BASE	SECULIFE ST BASE25
Touchscreen / keyboard	E01			•	•	•
10 A RPE test current	G01		•	•	•	
25 A RPE test current	G02					•
2nd test probe	H01			•	•	•
Voltage measuring input *	I01			•	•	•
Integrated test sequences for EN 50678 / VDE 0701, EN 50699 / VDE 0702, IEC 62368 / EN 62368 / VDE 868-1, IEC 62911 / EN62911/ VDE 868-911	KE	•	•	•	•	•
SECUTEST DB+	KB01	o	o	•	•	•
SECUTEST DB COMFORT	KD01	o	o	o	o	•
Bluetooth®	M01					
Antimicrobial housing	—				•	•

* For voltage measurement, or for connecting a current clamp sensor for current measurement or an AT3 adapter, and for temperature measurement via a Pt100 or Pt1000 temperature sensor

Key: • Included, o Optional

5.3 Symbols on the Test Instrument

The symbols on the test instrument have the following meanings:

250 V CAT II — Maximum permissible voltage and measuring category between connections P1 (test probe), the test socket and ground

Warning regarding dangerous electrical voltage

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

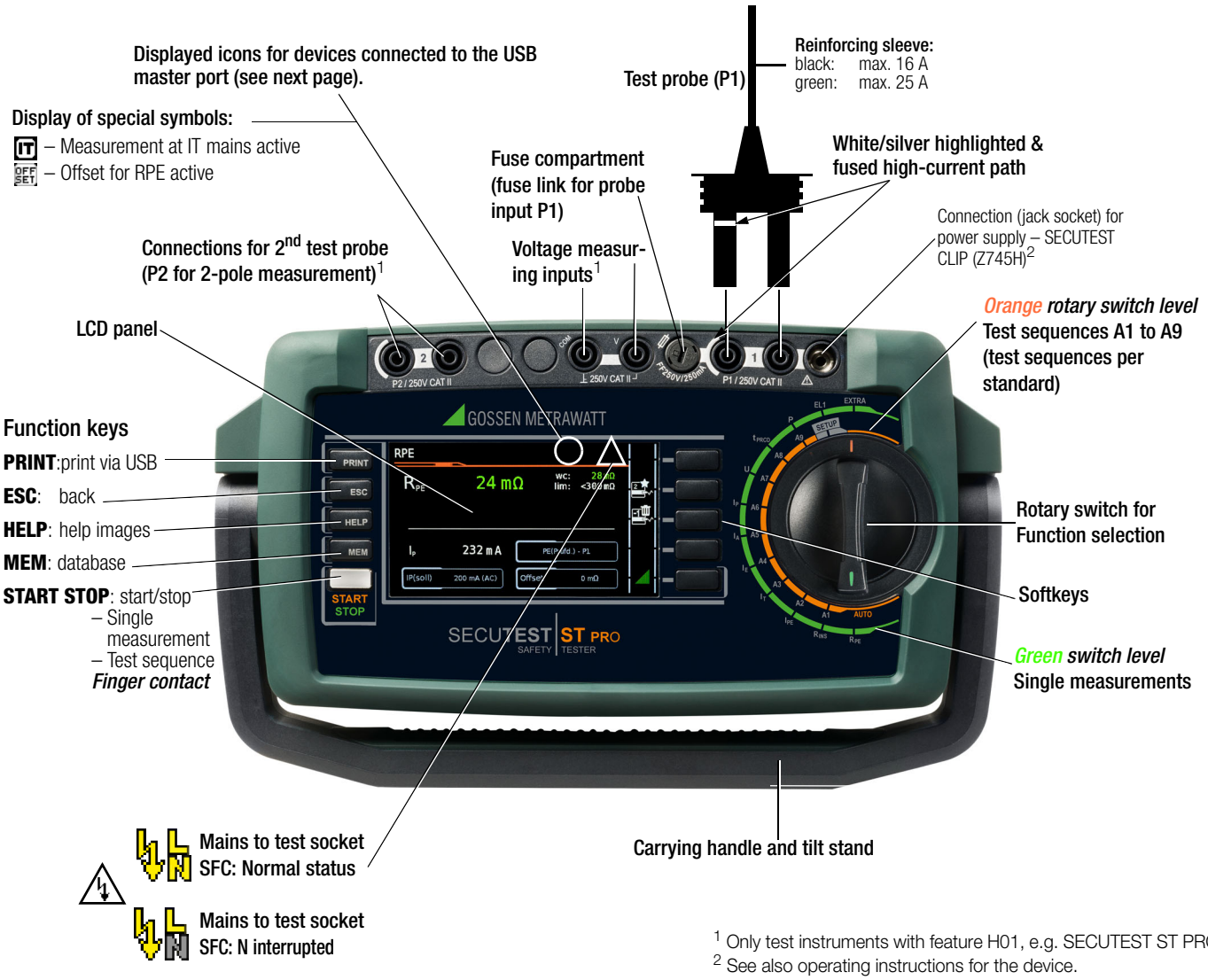
European conformity marking

The test instrument may not be disposed of with household trash (see section 23 “Returns and Environmentally Sound Disposal”).
Further information regarding the WEEE mark can be accessed on the Internet at www.gossenmetrawatt.com by entering the search term “WEEE”.

If the guarantee seal is damaged or removed, all guarantee claims are rendered null and void.

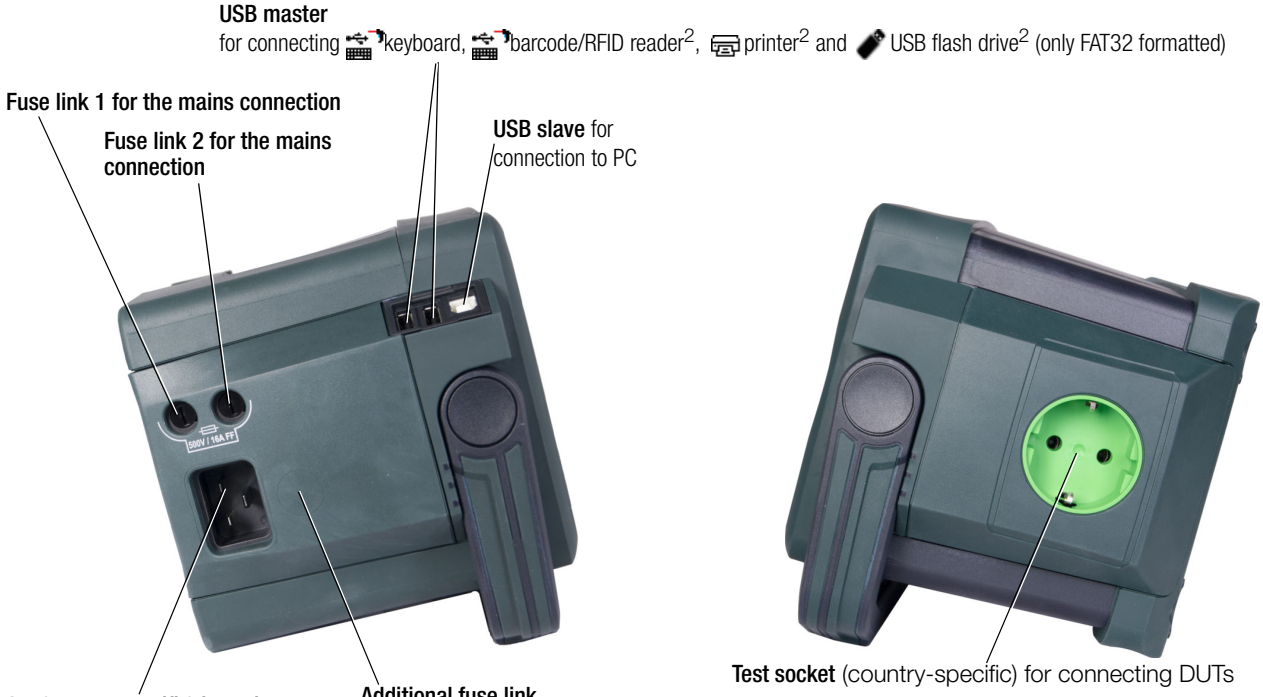
5.4 Controls and Connections

5.4.1 Front



[1] Only test instruments with feature H01, e.g. SECUTEST ST PRO
[2] See also operating instructions for the device.

5.4.2 Sides



Caution!
Depending on measuring task, test probe may be conduct line voltage.

5.5 Scope of Functions

Single measurements and test sequences can be executed with the test instruments.

Single Measurements

Switch Positions at Green Rotary Switch Level

Rotary Switch Position	Measuring Functions Test Current/Voltage		Measurement Type, Connection Type
RPE	R_{PE}	**Protective conductor resistance**	PE(TS) - P1 passive PE(TS) - P1 active PE(mains) - P1 [6] PE(mains) - P1 clamp [2, 6] P1–P2 [3]
section 15.6	I_P	Test current (200 mA) Feature G01 (e.g. SECUTEST ST BASE(10)/ PRO and SECULIFE ST BASE): 10 A [1] and feature G02 (e.g. SECULIFE ST BASE25): 25 A [1]	
RINS	R_{INS}	**Insulation resistance** (PC I/PC II)	LN(TS) - PE(TS) LN(TS) - P1 P1–P2 [3] PE(mains) - P1 PE(TS) - P1 LN(TS) - P1//PE(TS)
section 15.7	U_{INS}	Test voltage	
IPE	$I_{PE\simeq}$	**Protective conductor current, RMS**	Direct Differential Alternative AT3-Adapter [2] Clamp [2]
	$I_{PE\sim}$	AC component	
	$I_{PE=}$	DC component	
section 15.8.1	U_{LPE}	Test voltage	
	U_{Gen}	Reference voltage (alternative)	
IT	$I_{T\simeq}$	**Touch current, RMS**	Direct Differential Alternative (P1) Permanent connection Alternative (P1–P2)
	$I_{T\sim}$	AC component	
	$I_{T=}$	DC component	
section 15.8.2	U_{LPE}	Test voltage	
	U_{Gen}	Reference voltage (alternative)	
IE	$I_{E\simeq}$	**Device leakage current, RMS**	Direct Differential Alternative AT3-Adapter [2] Clamp [2]
	$I_{E\sim}$	AC component	
	$I_{E=}$	DC component	
section 15.8.3	U_{LPE}	Test voltage	
	U_{Gen}	Reference voltage (alternative)	
IA	$I_{A\simeq}$	**Leakage current from the applied part, RMS**	Direct (P1) Alternative (P1) Perm. conn. (P1)
section 15.8.4	U_{LPE}	Test voltage	
	U_{Gen}	Reference voltage (alternative)	
IP	$I_{P\simeq}$	**Patient leakage current, RMS**	Direct (P1) Perm. conn. (P1)
	$I_{P\sim}$	AC component	
	$I_{P=}$	DC component	
section 15.8.5	U_{LPE}	Test voltage	
U	$U_{\simeq}$	**Probe voltage, RMS**	P1–P2 P1–P2 (with mains *) * Polarity parameter
	$U_{\sim}$	Alternating voltage component	
	$U_{=}$	Direct voltage component	
	$U_{\simeq}$	**Measuring voltage, RMS** [2]	V – COM V – COM (with mains)
	$U_{\sim}$	Alternating voltage component [2]	
section 15.10	$U_{=}$	Direct voltage component [2]	
tPRCD [4]	ta	PRCD time to trip for 10/30 mA PRCDs	
section 15.11	U_{LN}	Line voltage at the test socket	
P	**Function test at the test socket**		Polarity parameter
	I	Current between L and N	
	U	Voltage between L and N	
	f	Frequency	
	P	Active power	
section 15.12	**S**	Apparent power	
	PF	Power factor	
Probe measuring functions			
EL1 section 15.13	Extension cord with adapter: continuity, short-circuit, polarity (reversed wires [5])		EL1 adapter EL1 adapter (continuity only) AT3-IIIE adapter VL2E adapter
EXTRA	Reserved for expansion within the framework of software updates		
section 16	°C Pt1000	Temperature measurement [2] with Pt100/	V – COM
	ICL	Current clamp measurement [2] with current clamp sensor	V – COM

[1] 10/25 A R_{PE} measurements are only possible with line voltages of 115/ 230 V and line frequencies of 50/60 Hz.

[2] Voltage measuring inputs only with test instruments including feature I01 (e.g. SECUTEST ST PRO and SECULIFE ST BASE(25))

[3] Connection for 2nd test probe for two-pole measurement with test instrument including feature H01(e.g. SECUTEST ST PRO or SECULIFE ST BASE(25))

[4] Measurement of time to trip isn't possible in IT systems.

[5] No checking for reversed wires takes place when the EL1 adapter is used.

[6] Connection type not available with feature G02 (e.g. SECULIFE ST BASE25)

Key:

Alternative	= alternative measurement (equivalent leakage current measurement)
Differential	= differential current measurement
Direct	= direct measurement
LN(TS)	= short-circuited conductors L and N at test socket
P1	= measurement with test probe P1
P1-P2	= 2-pole measurement with test probes P1 and P2
PE-P1	= measurement between PE and test probe P1
PE(TS)	= protective conductor at the test socket
PE(mains)	= protective conductor at the mains connection

Integrated Test Sequences

The test instrument is equipped with preconfigured, integrated test sequences which are selected via the switch positions at the orange rotary switch level.

Note

Availability of the individual integrated test sequences depends on the test instrument type (SECUTEST ST... or SECULIFE ST...), the selected features (order features) and the enabled extensions (activations).
Refer to your order / test instrument and data sheet for details.

The integrated test sequences are freely assignable, i.e. they can be individually assigned to the rotary switch positions (because there are more integrated test sequences than rotary switch positions). But the test instrument is preconfigured upon delivery.

Which integrated test sequences are assigned to the rotary switch positions on your test instrument upon delivery depends on several factors: test instrument type (SECUTEST ST... or SECULIFE ST...), selected features and enabled extensions.

Due to the great variety of possible combinations, a list of all delivery statuses would go beyond the scope of this documentation.

In order to provide you with an impression, the delivery status of a standard test instrument is listed below as an example.

SECUTEST ST PRO, German version, default settings:

Integrated Test Sequences, *Switch Positions at Orange Rotary Switch Level*

Rotary Switch Position	Standard / Test Sequence	Meas. Type	Connection	Type	Protection Class	Voltage Specification
A1	EN 50699	Auto	Auto		Auto	
A2	EN 50678	Auto	Auto		Auto	
A3	VDE 0701-0702	Auto	Auto		Auto	
A4	IEC 60974-4	Active	Auto		Auto	U(0) DC
A5	IEC 62353	Passive	Auto	BF	Auto	
A6	EN 50699	Passive	Test socket		Auto	
A7	EN 50678	Passive	Test socket		Auto	
A8	EN 50699-VLTG	VLTG	EL1 adapter		PC I	
A9	EN 50699	Active	Auto		Auto	

Auto = automatic detection

Details concerning test sequences can be found in section 17 "Test Sequences (automatic test sequences)".

5.6 Characteristic Values

Function	Measured Quantity	Display Range/ Nominal Range of Use	Resolution	Nominal Voltage U_N	Open-Circuit Voltage U_0	Nom. Current I_N	Short-Circuit Current I_{SC}	Internal Resistance R_I	Reference Resistance R_{REF}	Measuring Uncertainty	Intrinsic Uncertainty	Overload Capacity	
												Value	Time
Tests	Protective conductor resistance **R_{PE}**	1 … 999 mΩ	1 mΩ	—	< 24 V AC or DC	—	> 200 mA AC / DC > 10 A AC [5] > 35 A AC [11]	—	—	±(15% rdg.+ 10 d) > 10 d > 10.0 Ω: ±(10% rdg.+ 10 d)	±(10% rdg.+ 10 d) > 10 d	264 V 250 mA / 16 A AC [5]	Cont.
		1.00 ... 9.99 Ω	10 mΩ										
		10.0 … 27.0 Ω	100 mΩ									> 42 A AC [11]	15 s
	Insulation resistance [9] **R_{INS}**	10 … 999 kΩ	1 kΩ	50 … 500 V DC	1.0 • U_N … 1.5 • U_N	> 1 mA	< 2 mA	—	—	±(5% rdg.+ 4 d) > 10 d ≥ 20 MΩ: ±(10% rdg.+ 8 d)	±(2.5% rdg.+2 d) > 10 d ≥ 20 MΩ: ±(5% rdg.+4 d)	264 V	Cont.
		1.00 … 9.99 MΩ	10 kΩ										
		10.0 … 99.9 MΩ	100 kΩ										
		100 … 300 MΩ	1 MΩ										
	Leakage current, alternative measurement [2] **I_{PE}, I_T, I_E, I_A**	0 ... 99 µA	1 µA	—	50 ... 250 V~ – 20/+10%	—	< 1.5 mA	> 150 kΩ	1 kΩ ±10 Ω	±(5% rdg.+ 4 d) > 10 d > 15 mA: ±(10% rdg.+ 8 d)	±(2% rdg.+2 d) > 10 d > 15 mA: ±(5% rdg.+ 4 d)	264 V	Cont.
		100 ... 999 µA	1 µA										
		1.00 ... 9.99 mA	10 µA										
		10.0 ... 30.0 mA	100 µA										
	Leakage current, direct measurement [3] **I_{PE}, I_T, I_E, I_A, I_P**	Ip only: 0.0 ... 99.9 µA	100 nA	—	—	—	—	1 kΩ ±10 Ω	1 kΩ	±(5% rdg.+ 4 d) > 10 d	±(2.5% rdg.+2 d) > 10 d	264 V	Cont.
		0 ... 99 µA	1 µA										
		100 ... 999 µA	1 µA										
		1.00 ... 9.99 mA	10 µA										
		10.0 ... 30.0 mA	100 µA										
	Leakage current, differential current measurement [4] **I_{PE}, I_T, I_E**	0 ... 99 µA	1 µA	—	—	—	—	—	—	±(5% rdg.+ 4 d) > 10 d	±(2.5% rdg.+2 d) > 10 d	264 V	Cont.
		100 ... 999 µA	1 µA										
		1.00 ... 9.99 mA	10 µA										
		10.0 ... 30.0 mA	100 µA										
Function Test at the Test Socket	Line voltage $U_{L–N}$ [10]	100.0 … 240.0 V~	0.1 V	—	—	—	—	—	—	—	±(2% rdg.+2 d)	264 V	Cont.
	Load current I_L	0 … 16.00 A RMS	10 mA	—	—	—	—	—	—	—	±(2% rdg.+2 d)	16 A	Cont.
	Active power P	0 … 3700 W	1 W	—	—	—	—	—	—	—	±(5% rdg.+10 d) > 20 d	264 V	Cont.
												20 A	10 min
	Apparent power S	0 … 4000 VA	1 VA	Calculated value, $U_{L–N}$ • I_V							±(5% rdg.+10 d) > 20 d	264 V	Cont.
	Power factor PF with sinusoidal waveform: cosφ	0.00 … 1.00	0.01	Calculated value, P / S, display > 10 W							±(10% rdg.+5 d)	264 V	Cont.
	Line frequency f	0 ... 420.0 Hz	0.1 Hz	—	—	—	—	—	—	—	±(2% rdg.+2 d)	264 V	Cont.
t PRCD	Time to trip	0.1 ... 999.0 ms	0.1 ms	—	—	30 mA	—	—	—	±5 ms	—	264 V	Cont.
Voltage Measurement	Probe voltage (probe P1 to PE) ⎓, ∼ and ≂	0.0 ... 99.9 V	100 mV	—	—	—	—	3 MΩ	—	—	±(2% rdg.+2 d)	264 V	Cont.
		100 ... 264 V											
	Measuring voltage (V-COM sockets [6]) ⎓, ∼ and ≂	0.0 ... 99.9 V	1 V					1 MΩ			±(2% rdg.+2 d) > 45 Hz ... 65 Hz ±(2% rdg.+5 d) > 65 Hz ... 10 kHz ±(5% rdg.+5 d) > 10 kHz ... 20 kHz	300 V ⎓, ∼ and ≂	
		100 ... 300 V											
$I_{Leakage}$	Leakage current via AT3-IIIE adapter Z745S [6, 8]	0.00 ... 0.99 mA ∼	0.01 mA	—	—	—	—	—	—	—	±(2% rdg.+2 d) > 10 d without adapter	253 V	Cont.
		1.0 ... 9.9 mA ∼	0.1 mA										
		10 ... 20 mA ∼	1 mA										
Temp	Temperature with Pt100 sensor	– 200.0 ... +850.0 °C	0.1 °C	—	< 20 V –		1.1 mA	—	—	—	±(2% rdg.+1 °C)	10 V	Cont.
	Temperature with Pt1000 sensor	– 150.0 ... +850.0 °C											

Function	Measured Quantity	Display Range/ Nominal Range of Use	Resolution	Nominal Voltage U_N	Open-Circuit Voltage U_0	Nom. Current I_N	Short-Circuit Current I_{SC}	Internal Resistance R_I	Reference Resistance R_{REF}	Measuring Uncertainty	Intrinsic Uncertainty	Overload Capacity	
												Value	Time
I_{Clamp}	Current via current clamp sensor [1 mV : 1 mA] (V-COM sockets [6, 7])	1 ... 99 mA ~	1 mA (1 mV)	—	—	—	—	—	—	—	±(2% rdg.+2 d) > 10 d 20 Hz ... 20 kHz without clamp	253 V	Cont.
		0.1 ... 0.99 A ~	0.01 A (10 mV)										
		1.0 ... 9.9 A ~	0.1 A (100 mV)										
		10 ... 300 A ~	1 A (1 V)										
	Current via current clamp sensor [10 mV : 1 mA] (V-COM sockets [6, 7])	0.1 ... 9.9 mA ~	0.1 mA (1 mV)	—	—	—	—	—	—	—			
		10 ... 99 mA ~	1 mA (10 mV)										
		0.10 ... 0.99 A ~	0.01 A (100 mV)										
		1.0 ... 30.0 A ~	0.1 A (1 V)										
	Current via current clamp sensor [100 mV : 1 mA] (V-COM sockets [6, 7])	0.01 ... 0.99 mA ~	0.01 mA (1 mV)	—	—	—	—	—	—	—			
		1.0 ... 9.9 mA ~	0.1 mA (10 mV)										
		10 ... 99 mA ~	1 mA (100 mV)										
		0.10 ... 3.00 A ~	0.01 A (1 V)										
	Current via current clamp sensor [1000 mV : 1 mA] (V-COM sockets [6, 7])	1 ... 99 µA ~	1 µA (1 mV)	—	—	—	—	—	—	—			
		0.10 ... 0.99 mA ~	0.01 mA (10 mV)										
		1.0 ... 9.9 mA ~	0.1 mA (100 mV)										
		10 ... 300 mA ~	1 mA (1 V)										

[2] Known from previous standards as equivalent leakage current or equivalent patient leakage current
[3] Protective conductor current, touch current, device leakage current, patient leakage current
[4] Protective conductor current, touch current, device leakage current
[5] Only with feature G01 (e.g. SECUTEST ST BASE10/SECUTEST ST PRO and SECULIFE ST BASE)
[6] Only with feature I01 (e.g. SECUTEST ST PRO and SECULIFE ST BASE)
[7] Measurement types IPE_clamp and IE_clamp
[8] Measurement type IPE_AT3 adapter and IE_AT3 adapter
[9] The upper range limit depends on the selected test voltage.
[10] Voltage at the test socket may be lower than measured line voltage due to components which limit inrush current.
[11] Only with feature G02 (e.g. SECULIFE ST BASE25)

Key: rdg. = reading (measured value), d = digit(s)

Testing Times, Automatic Sequence

Testing times ("measurement duration" parameter) can be set separately for each rotary switch position during configuration of the sequence parameters. Testing times are neither tested nor calibrated.

Emergency Shutdown During Leakage Current Measurement

As of 10 mA of differential current (can also be set to 30 mA), automatic shutdown ensues within 500 ms. This shutdown does not take place during leakage current measurement with clamp meter or adapter.

See section 13.2 "Residual Current Monitoring".

Influencing Quantities and Influence Error

Influencing Quantity / Sphere of Influence	Designation per IEC 61557-16	Influence Error ± … % rdg.
Change of position	E1	—
Change to test equipment supply voltage	E2	2.5
Temperature fluctuation	E3	Specified influence error valid starting with temperature changes as of 10 K:
0 ... 40 °C		2.5
Amount of current at DUT	E4	2.5
Low frequency magnetic fields	E5	2.5
DUT impedance	E6	2.5
Capacitance during insulation measurement	E7	2.5
Waveform of measured current	E8	
49 … 51 Hz		2 with capacitive load (for equivalent leakage current)
45 … 100 Hz		1 (for touch current)
		2.5 for all other measuring ranges

Reference Ranges

Line voltage	230 V AC ±0.2%
Line frequency	50 Hz ± 2 Hz
waveform	

Sine (deviation between effective and rectified value < 0.5%)

Ambient temperature	+23 °C ± 2 K
Relative humidity	40 … 60%
Load resistors	Linear

Nominal Ranges of Use

Nominal line voltage	100 V … 240 V AC
Nominal line frequency	50 Hz … 400 Hz
Line voltage waveform	Sinusoidal
Temperature	0 °C … +40 °C

Ambient Conditions

Storage temperature	-20 °C … +60 °C
Relative humidity	Max. 75%, no condensation allowed
Elevation	Max. 2000 m
Place of use	Indoors, except within specified ambient conditions

In order to avoid deviation due to excessive temperature fluctuation, e.g. after outdoor transport at low temperature and subsequent operation in a warm indoor environment, it's advisable to wait until the test instrument has acclimatized before starting any measurements.

If the test instrument is colder than the ambient air, condensation may occur at high humidity, i.e. condensate may accumulate on components. This could result in the occurrence of parasitic capacitances and resistances which affect the measuring circuit and measuring accuracy.

Power Supply

Supply network	TN, TT or IT
Line voltage	90 V … 264 V AC
Line frequency	50 Hz …400 Hz
Power consumption	200 mA DUT: Approx. 32 VA 10 A DUT: Approx. 105 VA 25 A DUT: Approx. 280 VA
Mains to test socket (e.g. during function test)	Continuous max. 3600 VA, power is conducted through the instrument only, switching capacity ≤ 16 A, ohmic load, the AT3-IIS32 (Z745X) adapter (for example) can be used for current > 16 A AC

Electrical Safety

Protection class	I per EN 61140
Nominal voltage	230 V
Test voltage	2.3 kV AC 50 Hz or 3.3 kV DC (mains circuit / test socket to mains PE terminal, USB, finger contact, probe(s), test socket)
Measuring category	Designed for 300 V CAT II (but reduced to 250 V CAT II through the use of fuses for increased user safety. The user-friendly fuses are replaceable and replacements are easily obtainable).
Pollution degree	2
Safety shutdown	At DUT differential current of > 10 mA, shutdown time: < 500 ms, can also be set to > 30 mA in the event of probe current (electronic fuse) during: – Leakage current measurement: > 30 mA~/< 500 ms* – Protective conductor resistance measurement: > 250 mA~/< 1 ms in case of continuous current I > 16.5 A

* Firmware version 3.2.0 and lower: 12 mA

Fuse Links	Mains fuses: 2 ea. FF 500V/16A Special fuse: M 250V/250mA 10 A RPE test current (feature G01 only): 1 ea. FF 500V/16A

Electromagnetic Compatibility

Product standard	EN 61326-1 EN 61326-2-2

Interference emission		Class
EN 55011		B
IEC 61000-3-2		B
IEC 61000-3-3		B
Interference immunity	**Test Value ***	**Evaluation Criterion**
EN 61000-4-2	Contact/atmos. – 4 kV/8 kV	B
EN 61000-4-3	10 V/m (80 MHz … 1 GHz)	A
EN 61000-4-4	Mains connection – 2 kV	B
EN 61000-4-5	Mains connection – 1 kV (LN), 2 kV (LPE)	B
EN 61000-4-6	Mains connection – 3 V	A
EN 61000-4-8	30 A/m	A
EN 61000-4-11	0%: 1 period	B
	0%: 250/300 periods	C
	40%: 10/12 periods	C
	70%: 25/30 periods	C

USB Data Port

Type	USB slave for PC connection / remote control**
Type	2 ea. USB master, for data entry devices * with HID boot interface, for USB flash drive for data backup, for USB flash drive for saving reports as HTML files, for printers *

*** See section 10 for compatible devices**

** Remote control only with extension: "Remote Control via PC (IZYTRONIQ)" (included as standard feature with SECUTEST ST PRO and available with SECUTEST DB+ (Z853R or feature KB01).

Bluetooth® data interface 2.1 + EDR (test instruments with feature M01 only)

Frequency range	Max. 2.5 mW (class II)
Transmission intensity	2400 … 2483.5 MHz

Mechanical Design

Display	4.3" multi-display (9.7× 5.5 cm), backlit, 480 x 272 pixels at 24-bit color depth (true color)
Dimensions	W × H × D: 295 ×145 × 150 mm Height with handle: 170 mm
Weight	SECUTEST ST BASE(10)/PRO: approx. 2.5 kg SECULIFE ST BASE25: approx. 4.0 kg (depending on the test instrument version)
Protection	Housing: IP 40, Test socket: IP 20 per EN 60529

Table Excerpt Regarding Significance of IP Codes

IP XY (1st digit X)	Protection Against Foreign Object Ingress	IP XY (2nd digit Y)	Protection Against Water Ingress
2	≥ 12.5 mm ∅	0	Not protected
4	≥ 1.0 mm ∅	0	Not protected

SECULIFE ST BASE(25):
Housing with antimicrobial properties per JIS standard Z 2801

Database

Number of data records	50,000 1 data record = 1 DUT or location node or customer or individual measurement

5.7 Relevant Standards

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

EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements
EN 60529	Test instruments and test procedures Degrees of protection provided by enclosures (IP code)
EN 61326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements
EN 61326-2	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2-2: Particular requirements – Test configurations, operational conditions and performance criteria for sensitive test and measurement equipment for EMC unprotected applications
EN 61557-16	Electrical safety in low voltage distribution systems up to 1000 V AC and 1500 V DC – Equipment for testing, measuring or monitoring of protective measures – Part 16: Devices for testing the effectiveness of protective measures of electrical devices and/or electrical medical devices

6 Initial Startup

Initial startup of the test instrument is conducted by connecting it to the power supply. The following sections describe operation, as well as how to select various basic settings.

6.1 Connecting the Test Instrument to the Mains

- ➪ See section 20 for nominal mains values (nominal ranges of use).
- ➪ Connect the mains cable to the test instrument via its inlet plug and insert the mains plug into an electrical outlet. Any rotary switch position can be selected.
  If a mains outlet (earthing contact outlet) isn't available, or if only a 3-phase outlet is available, the adapter socket can be used to connect the phase conductor, the neutral conductor and the protective conductor. The adapter socket has three permanently attached cables and is included with the KS13 cable set.

Attention!
If connection isn't possible via an earthing contact outlet: Shut down mains power first.
Then connect the cables from the coupling socket to the mains using pick-off clips in accordance with the diagram.
Disconnection from mains power is only possible via the mains plug.

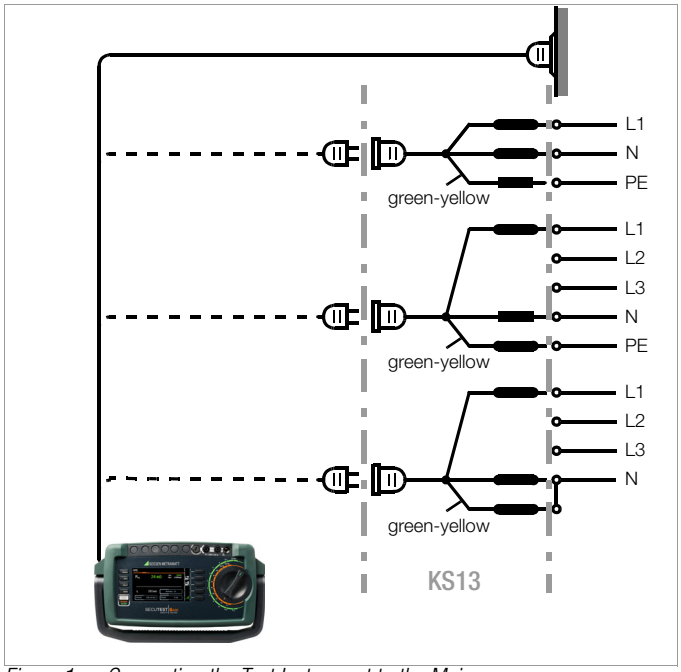


Figure 1 Connecting the Test Instrument to the Mains

6.1.1 Automatic Recognition of Mains Connection Errors

The device automatically recognizes mains connection errors if the conditions in the following table have been fulfilled. The user is informed of the type of error, and all measuring functions are disabled in the event of danger.

Type of Mains Connection Error	Message	Condition	Measurements
Voltage at protective conductor PE to finger contact (**START**/STOP key)	Display	Press **START**/STOP key U > 25 V key → PE: < 1 MΩ [2]	All measurements disabled
Protective conductor PE and phase conductor L reversed and/or neutral conductor N interrupted		Voltage at PE > 100 V	Not possible (no supply power)
Line voltage < 180 V / < 90 V (depending on mains)		U_{L-N} < 180 V U_{L-N} < 90 V	Possible under certain circumstances [1]
Test for IT/TN system	Display	Connection N → PE > 20 kΩ	Possible under certain circumstances

[1] 10/25 A R_{PE} measurements are only possible with line voltages of 115/230 V and line frequencies of 50/60 Hz.

[2] If the user of the test instrument is too well insulated, the following error message may appear: "Interference voltage at mains connection PE"

Attention!
In the event of mains connection errors as described in either of the first two cases in the table above, immediately disconnect the test instrument from the mains and arrange to have the error eliminated!

Attention!
If, while testing protective conductor potential, you determine that **the mains protective conductor is conducting voltage** (in accordance with the first two mentioned cases), **no further measurements may be performed with the test instrument**. If this is the case, potentially dangerous voltage is also present at the accessible earthing contacts of the standard socket (test socket). Immediately disconnect the test instrument from the mains and arrange to have the fault eliminated at the mains connection.

Note
Voltage at the electrical system's protective conductor PE may result in distorted measurement values during testing for the absence of voltage, or during leakage voltage measurements.

Note
Finger Contact
During this test for correct mains connection, a voltage measurement is performed between the finger contact and PE at the test instrument's mains connection, and its reference potential is acquired via the user's body resistance to the conductive start key. In order to obtain reliable measurement results, this resistance value must be less than 1 MΩ. If the user is wearing insulating shoes or gloves, or is standing on an insulating floor covering, erroneous measurements and display of the "Interference voltage at mains connection PE" message may result. Try to reduce resistance in this case, for example by touching ground potential with the other hand (e.g. a radiator, but not an insulating wall etc.).

6.2 Connecting Test Probe P1 or P2

Insert the double plug from test probe P1 or P2 into socket 1 or 2 respectively such that the plug with the white ring makes contact with the socket with the vertical bar.

The white ring identifies the terminal for the high current conductor which is safeguarded by the neighboring fuse link.

Attention!

Test probe with coil cord (SK2W):
Grip the tip of 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.

Attention!

Probe Test
Test the probe after completing each test (see also section 6.2 “Connecting Test Probe P1 or P2”).
If the fuse at test probe P1 is defective after testing has been started, all subsequent measurements conducted using this measuring path will be incorrectly evaluated as good!

Note

Difficultly in Contacting Exposed Conductive Parts when Using the Standard Probe with Test Tip

In order to assure good contact, surface coatings must be removed from devices under test with special tools at a suitable location.
The tip of test probe P1 isn’t suitable for scratching away paint, because this may impair its coating and/or mechanical strength. Brush probe Z745G may be more suitable than the test probe in certain individual cases.

6.3 International Use

Under the conditions described below, the test instrument can also be used internationally.

Power Supply

The test instrument is equipped with a **broad range input** (see section 20 “Maintenance”) and is thus suitable for nearly all AC networks anywhere in the world.

Depending on selected order features, the plug on the power supply cable is country-specific. This cable can be removed and replaced with another suitable power cable with different national specifications. Ask your electrical components dealer for a suitable power supply cable.

The test instrument can also be connected to the power supply by means of a travel adapter. Observe the following in this regard:

- The travel adapter’s protective earth conductor must demonstrate faultless continuity.
- The travel adapter must provide the necessary current carrying capacity (16 A or fusing of the upstream installation).
- The test instrument (irrespective of the travel adapter) is only suitable for active measurements of DUTs with nominal current of up to 16 A.
  For active tests on DUTs with current exceeding 16 A, use a suitable test adapter with its own residual current transformer and contactor (e.g. AT32-DI).

Test Socket

The test instrument’s test socket is also country-specific and depends on the selected order feature.

A universal test socket adapter is available as an accessory for the German test socket, which is suitable for DUTs with various country-specific plugs (see data sheet).

Make sure that the phase conductor is correctly positioned when connecting the universal test socket adapter: in the “normal polarity” setting, the phase conductor is fed to the contact of the active conductors in the test socket, which faces the carrying handle.

Voltage and frequency have to be set for the different mains voltages of the DUTs. Enter the appropriate value under:
SETUP 1/3 > **All Measurements 1/2** > **Ref. Voltage L-PE** and
SETUP 1/3 > **All Measurements 1/2** > **Alt. Test Freq.**

These two values influence your work with the test instrument as follows:

- When the “alternative” measurement type is used for leakage current measurements involving touch current, protective earth current and device leakage current, as well as for all measurement types associated with the measuring function for leakage current from the applied part:
  - The level of the generated test voltage is controlled (current limiting) on the basis of the selected reference voltage value.
  - The frequency of the generated test voltage is controlled according to the value selected in SETUP.

For all types of leakage current measurement, the displayed leakage current value is converted using the selected reference voltage value in order to compensate for any deviations of the actual mains voltage from nominal conditions.

7 Operation

7.1 Basic Test Instrument Operation

The test instrument is operated using the keys and the rotary switch on the test instrument. See “Test Instrument” on page 7.

Softkeys

The softkeys are assigned to different functions depending on the operating level

Function Keys

Fundamentally, these keys have a permanently assigned function:

PRINT	Print via USB
ESC	Back
HELP	Help images
MEM	Database
START **STOP**	Start/stop – Single measurement – Test sequence ***Finger contact***

In some situations, for example when using the softkey keyboard (see section 7.2 below), an alternative function appears at the display.

Display

Depending on the selected menu, the following appears at the display panel:

- Setup for test instrument settings
- The selected measuring function or standard
- Measured values with abbreviations and units of measure
- Setting parameters such as type of connection and measurement type
- Icons for softkey operation
- Wiring diagrams, notes regarding the test sequence and error messages

Display for measurements:

Green progress bars appear in the header for single measurements, and orange progress bars appear for test sequences.
If the upper range limit is exceeded, the upper limit value is displayed and is preceded by the “>” symbol (greater than), which indicates measurement value overrun. Falling short of the lower range limit is indicated by the “<” symbol (less than), e.g. for R_{INS}.

Display for connected devices:

Devices connected to the two USB master ports such as keyboard, barcode/RFID reader, printer or USB flash drive appear as icons in the display’s header.
For reasons of clarity, only one icon is displayed when several devices of the same type are connected. A small number also appears in the icon indicating the number of these devices.

Variant with Touchscreen

Depending on the selected order features, your test instrument may be equipped with a touchscreen.

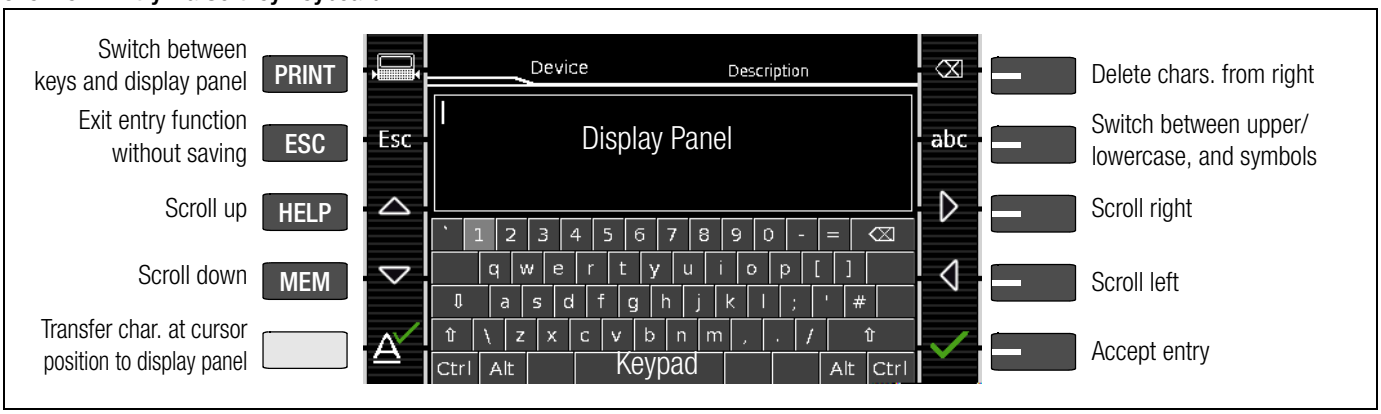
Operate the display with your fingers only. Never operate the touchscreen with hard or pointed objects such as a test probe or a ballpoint pen, because this may cause damage to the display.

7.2 Entering Text and Numbers

A softkey keyboard is displayed for entering text, numbers and characters (e.g. for entering an offset, a test object ID number, type designations, comments etc.), which is operated by means of the softkeys. In the case of test instruments with touchscreen (feature E01), entry is more convenient via the touchscreen keyboard.

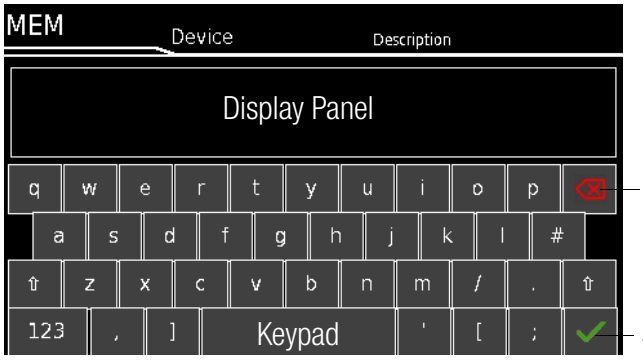
Alternatively, entries can also be made with the help of a USB keyboard which is connected to the instrument.

Overview: Entry via Softkey Keyboard



Overview of Entries via the Touchscreen Keyboard (feature E01)

- Briefly pressing the shift key once causes the next character to appear in uppercase.
- Pressing the shift key for a longer period of time causes all following characters to appear in uppercase.
- The cursor can be positioned as desired by pressing the display panel at the respective point in the existing text.



* Also via assigned softkey

Example: Entering a Designation for a DUT

1 Switch the keyboard to uppercase, lowercase or special characters with the abc key (Abc, ABC, Symb).
2 Select the desired alphanumeric character or a line break with the scroll keys (left, right, up and down). The selection cursor can be accelerated by pressing and holding the respective scroll key.
3 After pressing the A key, the respective character appears at the display panel.
4 Repeat steps 1 through 3 until the complete designation appears at the display panel.
5 The designation at the display panel can be changed subsequently by hiding the bottom keyboard by pressing the key. The cursor position can then be changed in order to delete individual characters.
6 The value appears at the display after pressing the green checkmark.

7.3 Entry via External USB Keyboard

Instead of using the touchscreen keyboard, characters can be entered directly with a USB keyboard which is connected to the test instrument. See “Connecting and Configuring External Devices” on page 25.

Note
In order to use a USB keyboard at the test Instrument, the “Keyboard Layout” settings in Setup must coincide with the connected keyboard.

Additional Key Functions, DB Comfort Option (only with SECUTEST DB COMFORT – Z853S or feature KD01)

If feature KD01 has been enabled, which is available for a fee, the following additional entry options are available via and external keyboard:

Print → PRINT
ESC → ESC
F1 → HELP
F2 → MEM
F5 → Softkey 1
F6 → Softkey 2
F7 → Softkey 3
F8 → Softkey 4
F9 → Softkey 5

F3 → Search for test object ID in the database (only in MEM database management, at the primary level of auto measurement screens and in green measurement screens)
F4 → Search for “Text” in the database (only in MEM database management, at the primary level of auto measurement screens and in green measurement screens)

Additional key functions within MEM database management:
Cursor → Navigation within the tree
Home → Jump to database root node
End → Jump to end of tree
Tab → Switch between location/customer tree
Insert → Create new object
Delete → Delete object
↵ (enter) → For editable objects: edit object, for measurements: test list view
⇧+**Insert** → Move object within tree (simultaneously press the shift and insert keys)

In the event that several objects have been found as the result of the search:
⇒⇐ → Scroll through found objects (right and left scroll keys)

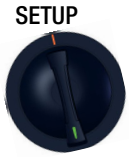
Additional Key Functions in the Test List View (when the test report is shown at the display):
⇑⇓ → scroll (up and down scroll keys)
⇒⇐ → Switch to detail view or back to list of tests steps (right and left scroll keys)
Tab → Select filter type for test steps (abridged / failed test steps only / all)
↵ (Enter) → Exit test list view

7.4 Help Functions (HELP key)

Depending on the **rotary selector switch** position and the selected measurement type, appropriate wiring diagrams are displayed.

- Press the **HELP** key in order to query online help.
- Press the **ESC** key in order to exit online help.

8 Test Instrument Settings



After initial startup (see section 6), basic system parameters must first be configured (see section 8.1). Then you'll need to decide which standard designations will be used for the integrated, preconfigured test sequences and, if necessary, change the assignment of test sequences to rotary switch positions (see section 8.2).

Attention!

The standard designation cannot be changed retroactively! Stored measurements retain the standard designation and it's used in the test report.

For this reason, select the standard designation carefully during initial startup.

As soon as the standard designation has been changed, the new designation is used in all future tests.

Depending on the selected model, the test instrument is equipped with a Bluetooth® interface which has to be configured.

8.1 System Parameters

Basic system parameters must first be set, for which descriptions are included below.

Setup 1/3 > System 1/2 > Culture > **Language**

Setup 1/3 > System 1/2 > Culture > **Keyboard Layout**

Setup 1/3 > System 1/2 > **Date/Time** (for report generation)

Setup 1/3 > System 2/2 > **Brightness** (display brightness as %)

SETUP Menu Overview

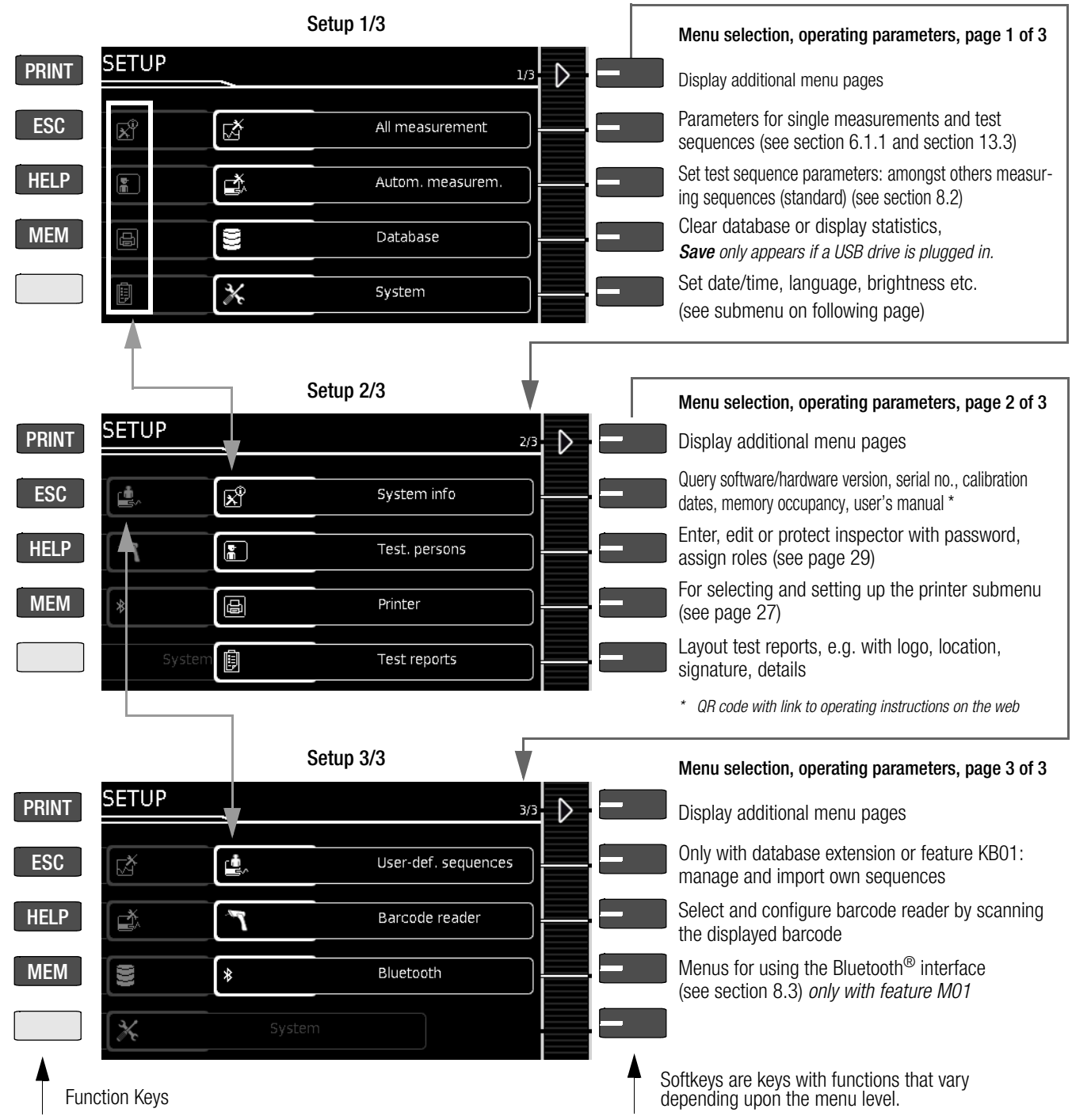


Figure 2 Test Instrument Settings, Main Menu Level – Rotary Switch in SETUP Position

Set language, keyboard layout, time, date and brightness

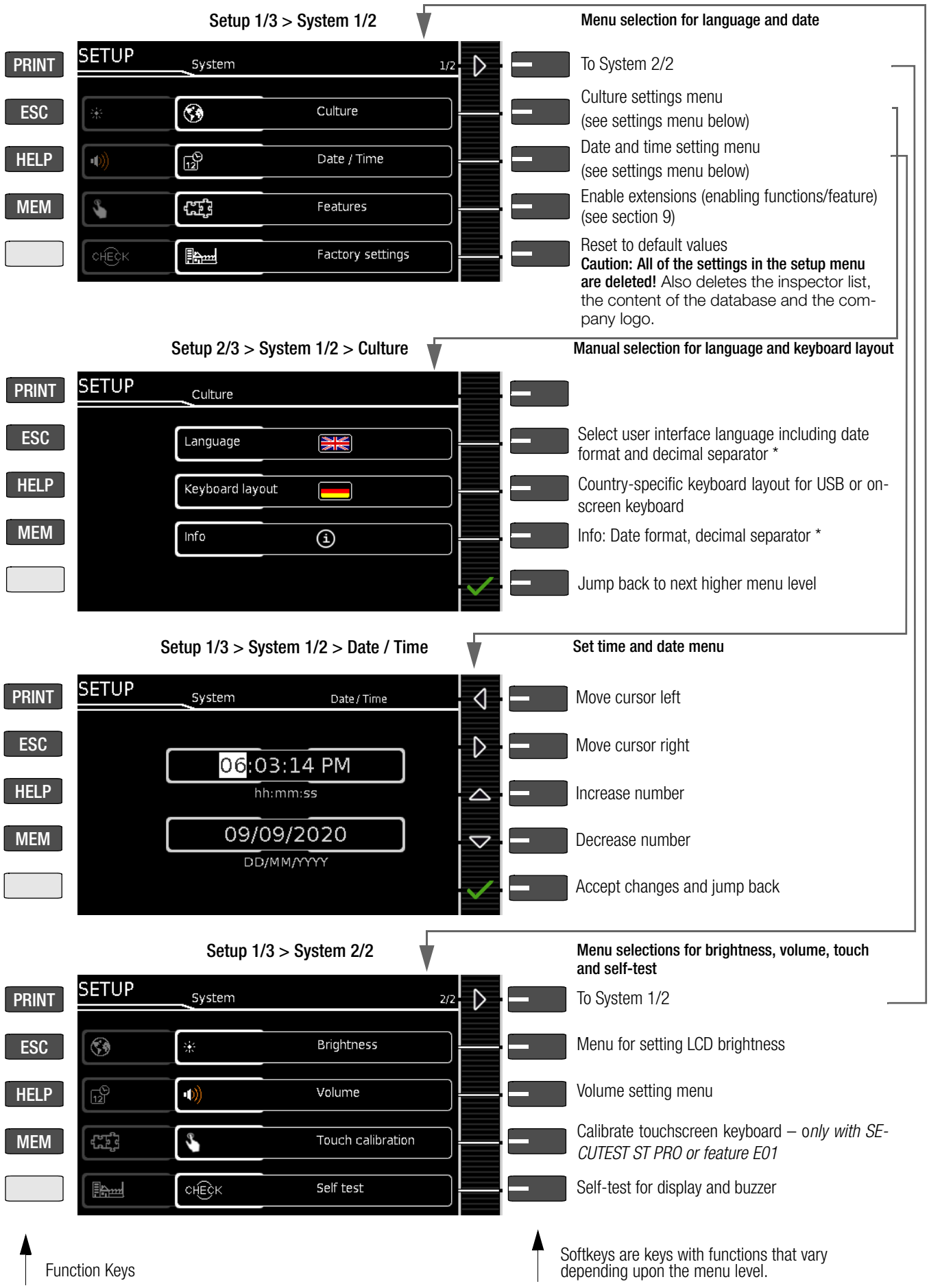


Figure 3 Test Instrument Settings, Submenu Level – Rotary Switch in SETUP Position

Attention!
If you change the keyboard layout setting later and you're already using a barcode reader, you'll have to set the barcode reader to the new keyboard layout via Setup 3/3 > Barcode Reader > Type Z751A. The barcode reader must also be accordingly configured. Please refer to the device documentation for further information.

8.2 Test Standards / Configuration of Integrated Test Sequences

Test sequences in accordance with the standards (also called measurement or test sequences) are preconfigured and integrated into the test instrument. They consist of a series of single tests with subsequent documentation, as stipulated in the respective standard. They can thus be used to repeatedly and efficiently perform standards-compliant tests. Detailed information and a description of the procedure can be found in section 17 "Test Sequences (automatic test sequences)".

In order to use the integrated test sequences, they have to be prepared during initial startup:
The integrated test sequences are identical in terms of content, but they have different national designations depending on the respective country (DIN, VDE, ÖNORM, SNR etc.). Furthermore, there are variants for each integrated test sequence, e.g. for testing PRCDs.
This is why a standard designation must first be selected in the test instrument for the integrated test sequences.

Attention!
Selection of the standard designation is mandatory and must be completed during initial startup.

Standards which are not needed can be deactivated in order to increase clarity.

The integrated test sequences are run in orange rotary switch positions A1 through A9. Integrated test sequences are preassigned to each rotary switch position at the factory, but these assignments can be changed. You can assign a different integrated test sequence to a rotary switch position if required, or leave the preselected, integrated test sequences as they are.

Attention!
If you've updated your test instrument from firmware 3.2.0 or lower to firmware 3.3.0 or higher, you'll also have to configure the test standards.
The same applies if you've subsequently purchased and enabled an extension for additional test sequences.
See "Selecting a Designation and Deactivating Standards in Case of Update or Extension (enabling function)" on page 22 in this regard.

8.2.1 Selecting the Standard Designation and Deactivating Standards

During initial startup, the desired national standard designation must be selected for each integrated test sequence.

The integrated test sequences are identified with this designation:

- For display at the test instrument
  (routine daily work)
- In the test results saved to the test instrument (and when these results are exported, e.g. to IZYTRONIQ test software)
  (data management)
- In reports
  (verification requirement)

Attention!
The standard designation cannot be changed retroactively! Stored measurements retain the standard designation and it's used in the test report.
For this reason, select the standard designation carefully during initial startup.
As soon as the standard designation has been changed, the new designation is used in all future tests.

Standards which are not needed can be deactivated in order to increase clarity.

The settings can be found under **SETUP** > **Auto Measurements**. Each standard for which a test sequence is integrated is displayed there.

➪ **SETUP 1/3** > **Auto Measurements**.

➪ Scroll through the menu pages until the individual standards appear.

➪ Select the first standard via the softkey.
All possible standard designations are displayed.
(An overview of all available standard designations can be found on the following page).

➪ Select the desired standard designation with the corresponding softkey.
Alternatively, the standard (the test sequence) can be deactivated by selecting the **off** entry.
The menu is returned to the standards display in **Auto Measurements**.

➪ Repeat this procedure for all standards.

➪ Finally, confirm with the green checkmark. The settings are saved.

Overview of Integrated Standards

Note
Availability of the individual integrated test sequences depends on the test instrument type (SECUTEST ST... or SECULIFE ST...), the selected features (order features) and the enabled extensions (activations).
Refer to your order / test instrument and data sheet for details.

SETUP > Auto Measurements

4/7 > VDE 0701-0702 >
- Off
- OVE E 8701
- SNR 462638
- VDE 0701-0702

5/7 > IEC 62353 >
- Off
- EN 62353
- IEC 62353
- VDE 0751-1

5/7 > IEC 60974-4 >
- Off
- EN 60974-4
- IEC 60974-4
- VDE 0544-4

5/7 > NEN 3140 >
- Off
- NEN 3140

6/7 > EN 50678 >
- Off
- EN 50678
- VDE 0701

6/7 > EN 50699 >
- Off
- EN 50699
- VDE 0702

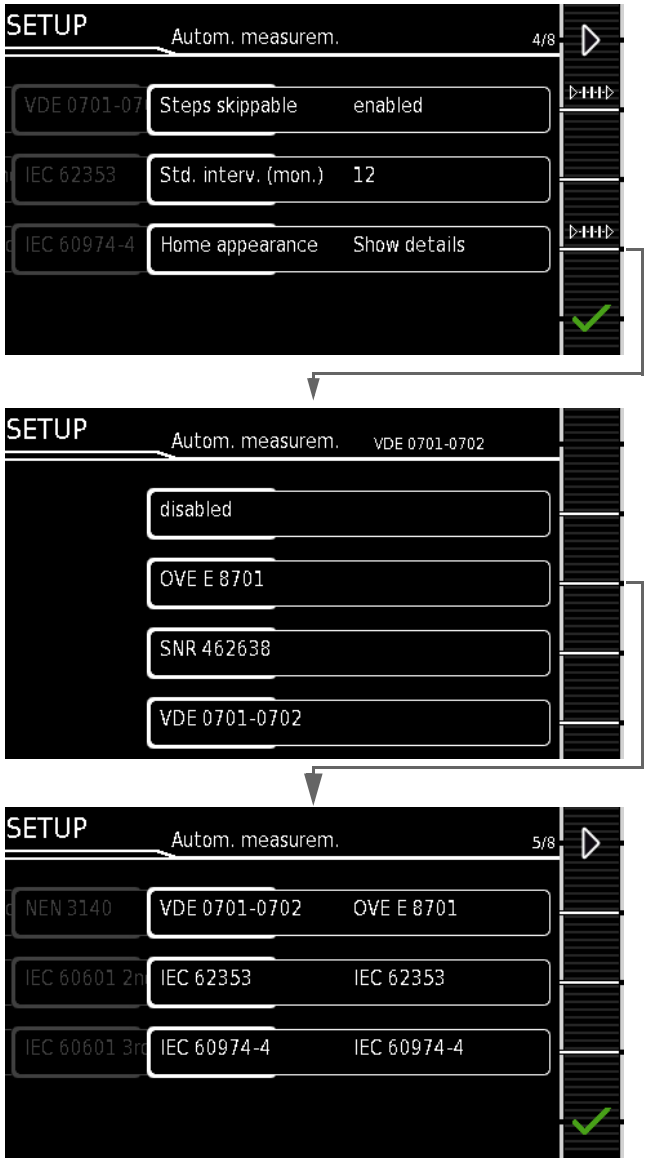
6/7 > IEC 62368 >
- Off
- EN 62368
- IEC 62368
- VDE 0868-1

7/7 > IEC 62911 >
- Off
- EN 62911
- IEC 62911
- VDE 0868-911

Example

Configure the standard designations in the SECUTEST ST PRO.

SETUP 1/3 > Auto Measurements 4/7 >VDE 0701-0702



Save the setting with the green checkmark.
The “OVE E 8701” designation is then used in the test instrument.

8.2.2 Configuring Rotary Switch Positions

We recommend assigning frequently used test sequences to A1 through A8 and reserving rotary switch position A9 for special sequences, for which parameters often need to be adjusted.

- ➪ Select an orange rotary switch position (**A1** … **A9**), after which the start page for the respective test sequence is displayed (i.e. the integrated test sequence set at the factory).
- ➪ Select classification parameters  .

  The **Classification Parameters 1/2** page appears.
  The standard which is currently assigned to the respective rotary switch position is displayed under **Standard / Test Sequence**.
- ➪ Select **Standard / Test Sequence**.
  The **Standard / Test Sequence** page appears. All standards available on the test instrument are displayed here according to the selected setting (off / national designation – see section 8.2.1).
- ➪ Select the desired standard.
  The menu is returned to the **Classification Parameters 1/2** page.
- ➪ Finally, confirm with the green checkmark  .

  The settings are saved.
- ➪ Repeat the above described procedure for each of the respective rotary switch positions.

All of the settings for the integrated test sequences can be adjusted at the test instrument. Detailed information on the individual settings and concerning the setting procedure can be found in section 17 “Test Sequences (automatic test sequences)”.

8.2.3 Selecting a Designation and Deactivating Standards in Case of Update or Extension (enabling function)

Implementation of the standards and integrated test sequences has changed fundamentally as of firmware version 3.3.0.

You can also expand the integrated test sequences/standards available in the test instrument after purchasing a corresponding extension (enabling function).

As a result, you also have to configure the test standards:

- If you update your test instrument from firmware 3.2.0 or lower to firmware 3.3.0 or higher
  (The update changes rotary switch position assignments **A1** through **A9** and how the standards are shown at the test instrument, in the test data and in the test reports!)
- If you’ve subsequently purchased and enabled an extension for additional test sequences

In both cases, it’s important to complete the following steps in the specified order:

- ➪ Install the firmware update or extension.
  See “Software/Firmware Update (system info parameter)” on page 98 and “Extensions (enabling functions/feature)” on page 24.
- ➪ Then select the standard designations and deactivate any standards you don’t need as described in section 8.2.1.
- ➪ Finally, reconfigure the rotary switch positions as described in section 8.2.2.

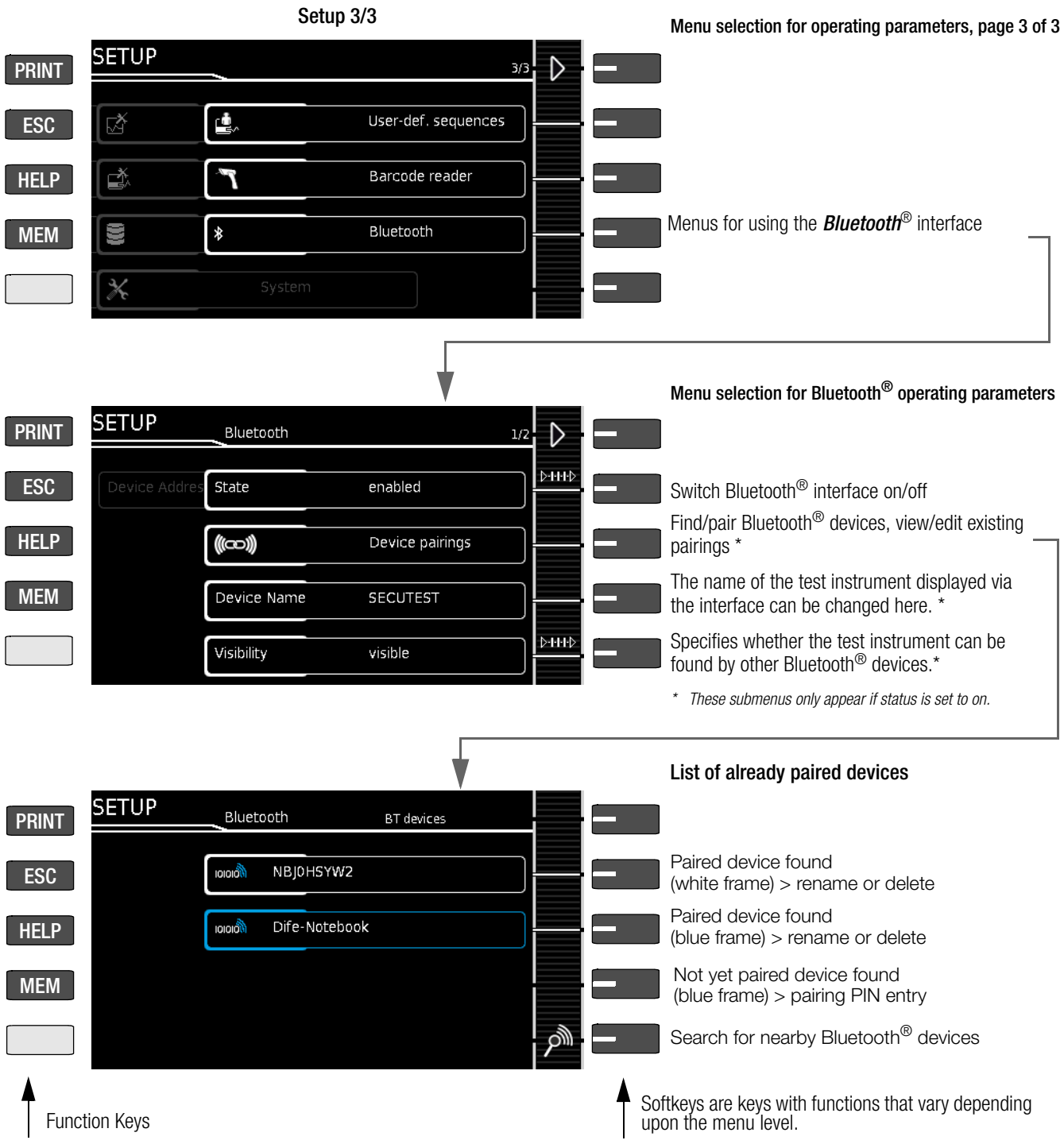
Your test instrument is now reconfigured and once again ready for use.

8.3 Bluetooth® Interface (only with feature M01)

The Bluetooth® interface facilitates various functions at the test instrument:

- Data transmission (test structure and measurement data) to IZYTRONIQ test software (see section 19)
- Transfer of results to IZYTRONIQ test software (push-print function) (see section 15.4 for single measurements and section 17.7 for test sequences)

Bluetooth® settings are entered under SETUP 3/3 > **Bluetooth**:



Note

Security

For security reasons, we recommend deactivating the Bluetooth® interface if it's not needed. (The "not visible" setting cannot be used as a substitute for shutting down the Bluetooth® interface, because invisible Bluetooth® devices can nevertheless be found using the appropriate means.)

Furthermore, device pairings which will no longer be required for a lengthy period of time should be deleted.

Note

Use of Multiple Test Instruments (risk of mix-up)

The test instrument's **device name** is set to "SECUTEST" as a default setting. If you access one PC with several test instruments, their names should differ (or at least be individually supplemented: SECUTEST1, SECUTEST2 etc.).

9 Extensions (enabling functions/feature)

Extensions can be purchased for test instruments. An extension is a package of several helpful functions.*

Amongst others, for example, the SECUTEST DB COMFORT (Z853S) extension includes database extensions (medical database objects, shifting of objects etc.), as well as functions such as auto-store, push-print and the “Continue/abort/restart test sequence despite limit violation” option.

The extension must be purchased and then enabled at the test instrument. Which enabling functions are available can be viewed at the instrument.

9.1 Viewing Available Extensions

Which extensions are available depends on the test instrument’s firmware. Run an update if necessary (see section 20.7 “Software/Firmware Update (system info parameter)”).

- ➪ Set the rotary selector switch to the **Setup** position.
- ➪ Select Setup 1/3 > **System** > **Extensions** > **Available Extensions**
  Available function extensions are displayed along with their current status (enabled or not installed).

9.2 Purchasing Extensions

Please contact your dealer or the sales department at Gossen Metrawatt GmbH for information regarding available extensions and how to buy them.

After purchasing an extension, you’ll receive a registration card. Then contact the sales department at Gossen Metrawatt GmbH in order to obtain an activation key for the extension after successful registration.

9.3 Enabling Extensions at the Test Instrument

After receiving the activation key (see section 9.2 “Purchasing Extensions”), you can enter it to the test instrument either from a USB flash drive or manually in order to enable the extension.

Enabling via USB Flash Drive

The activation key can be easily transferred to the test instrument by copying it to a USB flash drive, which is then connected to the test instrument. See section 10.1 “Use of USB Storage Devices”, regarding prerequisites and basic information concerning the USB flash drive.

- ➪ Copy the activation key to a USB flash drive.
- ➪ Set the rotary selector switch to the **Setup** position.
- ➪ Select Setup 1/3 > **System** > **Extensions** > **Enable via USB.**
  An information display appears.
- ➪ Connect the USB flash drive to the USB master port at the test instrument. See section 5.4 “Controls and Connections”.
- ➪ Press the green checkmark in order to start transfer of the activation key from the USB flash drive. The extension is enabled.

Manual Enabling

- ➪ Make a note of the activation key.
- ➪ Set the rotary selector switch to the **Setup** position.
- ➪ Select Setup 1/3 > **System** > **Extensions** > **Enable Manually**.
  The keyboard appears at the display.
- ➪ Enter the activation key via the keyboard. See section 7 “Operation”.
- ➪ Press the green checkmark in order to confirm the activation key. The extension is enabled.

Attention!

After installing additional testing standards, standard designations and rotary switch assignments must be re-selected and reconfigured!

Follow the instructions and observe the information included in section 8.2.3, “Selecting a Designation and Deactivating Standards in Case of Update or Extension (enabling function)” on page 22 to this end.

* Some test instruments already include certain extensions as an order feature which is included in the scope of delivery. Please check your test instrument’s order features.

10 Connecting and Configuring External Devices

The test instrument includes several functions for which a USB flash drive must be connected.

RFID readers and writers can also be used at the test instrument, as well as scanners and printers for 1 and 2D codes such as barcodes and QR codes.
Both are used to mark and identify tools and equipment.

This section describes connection and use of these external devices.

10.1 Use of USB Storage Devices

A USB flash drive must be directly connected to the test instrument for various test instrument functions:

- Saving HTML reports to a USB flash drive
  See section 18.2 “Saving Reports to a USB Flash Drive HTML)”
- Enabling expansions
  See section 9 “Extensions (enabling functions/feature)”

Prerequisites

The connected USB storage medium must meet at least the following requirements in order to be used with your instrument:

- File system: FAT32
- Maximum current consumption: < 500 mA
- No encryption functions

Note
An LED display on the USB flash drive is helpful. It indicates whether or not any given write operation has already been completed.

List of Tested and Approved USB Flash Drives

- Philips USB flash drive Snow Edition USB 3.0
  (tested size: 64 GB)
- Toshiba TransMemory-MX U361 USB 3.0
  (tested size: 64 GB)
- Corsair Flash Voyager Vega USB 3.0
  (tested size: 16 GB)
- SanDisk Cruzer Glide USB 2.0/3.0
  (tested size: 64 GB)

We are unable to offer any guarantees regarding use with other devices.

Connection

Connect the USB flash drive to a USB master port at the test instrument (see section 5.4 “Controls and Connections”).

Correct recognition of the RFID reader/writer by the test instrument after connection to the USB port is indicated by the icon in the header.

10.2 USB Keyboard

An external keyboard can be connected to the tester via USB for easier entry of text, numbers and other characters. The keyboard must be equipped with a USB boot keyboard profile (human interface device class).

Connect the USB keyboard to a USB master port at the test instrument (see section 5.4 “Controls and Connections”).

Correct recognition of the USB keyboard by the test instrument after connection to the USB port is indicated by the icon in the header.

See “Entry via External USB Keyboard” on page 17 for information concerning text entry.

Attention!
In order to use an external USB keyboard, the selected keyboard layout must match the layout of the connected keyboard. See “Set language, keyboard layout, time, date and brightness” on page 19.

10.3 RFID

An RFID reader/writer can be connected to the test instrument via USB. The following devices have been tested for use with the test instrument:

- Z751E RFID reader/writer

We are unable to offer any guarantees regarding use with other devices.

The RFID identification system is used to mark and identify tools and equipment. Test objects, for example, can be detected more quickly and conveniently during repeat tests by means of IDs that are stored in their RFID tags.

Connection

Connect the RFID reader/writer to a USB master port at the test instrument (see section 5.4 “Controls and Connections”).

Correct recognition of the RFID reader/writer by the test instrument after connection to the USB port is indicated by the icon in the header.

Reading in an RFID Code

When held at a distance of about 3 cm directly in front of the middle of the RFID tag, the tag’s current content (e.g. the ID code) is read by the RFID reader/writer. The SCAN LED on the test instrument blinks.

If the database view (MEM) is active at the test instrument (before or after a measurement), the cursor automatically jumps to the test object with the corresponding ID code. If the object isn’t found (because the test object’s ID code hasn’t yet been stored as a test object in the database), a prompt appears asking if you want to create a new object.

Note
All other fields can be filled in using the QEDIT function (only with SECUTEST DB COMFORT – Z853S or feature KD01) after the test object’s ID number has been created. See section 12.4.

Writing RFID Tags

An RFID tag can be written for each test object via the **PRINT** key:

- ⇨ Switch to the database view at the test instrument (**MEM** key).
- ⇨ Select the desired test object with the scroll keys or enter a new test object by means of its ID.
- ⇨ Briefly press the **PRINT** key on the test instrument.
- ⇨ You’re prompted to hold the scanner at a distance of about 3 cm directly in front of the middle of the RFID tag.
- ⇨ The “Successful write” message appears to indicate that the procedure has been completed.

Note
An error message appears if the test object’s ID cannot be converted to an RFID tag.

10.4 Barcodes / QR Codes

A code scanner can be connected to the test instrument via USB. The following devices have been tested for use with the test instrument:

- Z751A barcode scanner
  (scanning of 1 and 2D codes, e.g. barcodes and QR codes)

We are unable to offer any guarantees regarding use with other devices.

Codes can be used to encrypt test object IDs. Scanning the codes makes it quicker and more convenient to detect test objects and assign measured values to them during recurrent tests.

Frequently recurring designations, such as test object types, can also be encrypted as codes in order to be able to read them in for comments if required.

The codes (labels) must be printed on a separate label printer to this end.

Connecting the Scanner

Connect the scanner to a USB master port at the test instrument (see section 5.4 “Controls and Connections”).

Correct recognition of the scanner by the test instrument after connection to the USB port is indicated by the  icon in the header.

➪ Select the following parameter in order to configure the scanner:
3/3 > Barcode Scanner > Type **Z751A**.

➪ Scan the barcode which then appears.

Reading In Barcodes and QR Codes

When the menu for alphanumeric entry via the softkey keyboard is open at the display, any value read in by means of a scanner is directly accepted.

Note

If you scan a test object ID code and the object isn’t found (because the ID code hasn’t yet been stored as a test object in the database), a prompt appears asking if you want to create a new object. All other fields can be filled in using the QEDIT function (only with SECUTEST DB COMFORT – Z853S or feature KD01) after the test object’s ID number has been created. See section 12.4.

Printing Codes

A label printer can be connected to the instrument via USB and codes can be printed. The following devices have been tested for use with the test instrument:

- **Z721E barcode printer**
  Code39, Code128, EAN13, Text, QR Code, Micro QR Code, DataMatrix, Aztec
  (tapes: 6 mm, 9 mm, 12 mm, 18 mm, 24 mm, 36 mm)
- **Barcode printer Z721D** (discontinued model)

We are unable to offer any guarantees regarding use with other devices.

➪ Connect the label printer to a USB master port at the test instrument (see section 5.4 “Controls and Connections”).
Correct recognition of the label printer by the test instrument after connection to the USB port is indicated by the icon in the header.

➪ By viewing the printer information you can determine whether or not the connected label printer is correctly recognized by the test instrument:
Setup (2/3) > Printer > Z721D > Printer Information
or
Setup (2/3) > Printer > Z721E > Printer Information

➪ Select encoding in Setup:
Setup (2/3) > Printer > Z721D > Printer Settings > ID Labels or
Setup (2/3) > Printer > Z721E > Printer Settings > ID Labels

➪ Paper size is selected automatically.

➪ Switch to the database view (**MEM** key).

➪ Select the desired test object with the scroll keys.

➪ Press the **PRINT** key.

➪ Depending on your selection, the ID is printed onto the label as a barcode. An error message appears if the ID cannot be read out as a barcode or a 2D code.

Note

Code Recognition

Please make sure that the printed codes are recognized by your scanner. Some code types have to be activated on your scanner prior to being used (this is frequently the case with Aztec/DataMatrix).

Note

ID Labels: Width and Tapes

When using the label printer together with the test instrument, only TZ(e) tapes are supported with widths of 6, 9, 12, 18, 24 and 36 mm.
Tape cartridges with a minimum width of 12 mm are recommended for printing out 2D code labels (QR code, MicroQR code, DataMatrix, Aztec).
If a blank label is discharged upon printing an ID as a 2D code with a 9 mm ribbon cartridge, replace it with a 12 mm cartridge (or wider) and restart the printing process.

Note

Text Encryption

Read-out to the CP1252 character set is limited in the “Text” print-out mode – characters which cannot be displayed are replaced by an underline (_).

10.5 Thermal Printer for Reports

A printer can be connected to the instrument in order to print out test reports. The following device has been tested for use with the test instrument:

- Z721S thermal printer
  with report tapes (Z722S thermal paper as accessory)

We are unable to offer any guarantees regarding use with other devices.

Connection

Connect the printer to a USB master port at the test instrument (see section 5.4 “Controls and Connections”).

Correct recognition of printer by the test instrument after connection to the USB port is indicated by the icon in the header.

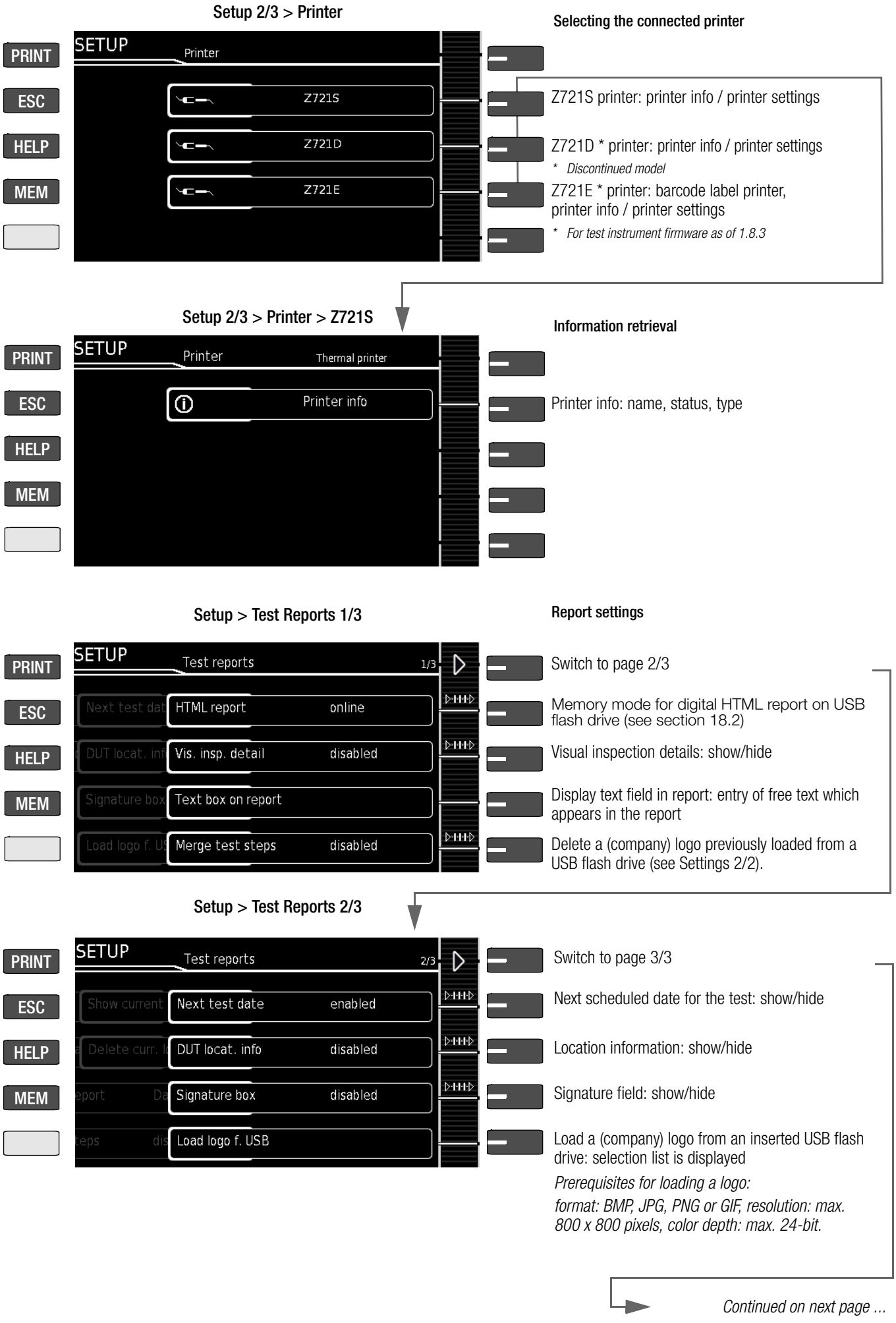
Test Report Customization

The test report can be edited and a company logo can be added to it directly in SETUP at the test instrument (see page 27). A company logo can be loaded from a USB flash drive for which the following image file formats are supported: BMP, JPG, PNG or GIF, resolution: max. 800 x 800 pixels, color depth: max. 24-bit.

Printing

Printout is started by pressing the **PRINT** key. Complete information concerning test reports and their content can be found in section 18 “Reports”.

Figure 4 Printer Functions – Selection and Settings Using the Thermal Printer as an Example



Continued on next page ...

Setup > Test Reports 3/3

Display the currently loaded logo.

Delete current logo

11 Inspector Management

The test instrument is equipped with an inspector management function. You can set up several inspectors and switch amongst them.

The “active” (currently used) inspector appears in completed tests as the “Inspector”: tests are saved under the inspector’s name and can thus be allocated unequivocally to the inspector.

Upon delivery (default setting) the inspector is set up in the test instrument as “not defined”.

Note

Create new users and delete the “not defined” default user for security reasons.
As soon as passwords (and/or user rights for test instruments with SECUTEST DB COMFORT – Z853S or feature KD01, see section 11.2) have been assigned, you should delete the unprotected default user (see section 11.1.2).

Note

Test instrument settings are valid for all inspectors. Separate settings are not saved for the individual inspectors.

11.1 Managing Inspectors

Inspector management can be accessed under **Setup 2/3** > **Inspectors**.

11.1.1 Adding an Inspector

Setup 2/3 > Inspector > New Inspector

Data entry depends on the model and its features (see section 7.1 “Basic Test Instrument Operation”). The inspector is added by pressing the green checkmark ✓.

11.1.2 Editing or Deleting an Inspector

Previously created inspectors can be edited under Setup 2/3 > Inspectors > Edit Inspectors. All existing inspectors are displayed in the list and can be selected for editing by pressing the softkey.

The following options are available:

- Specify a password for the user
- Change name
- Change role
  (only with SECUTEST DB COMFORT – Z853S or feature KD01 – see section 11.2)
- Delete inspector

Password Protection

Passwords can be assigned to inspectors. This prevents users who don’t know the password from signing on as the respective inspector (currently selected as the active inspector).

Note

The active tester is retained when the instrument is switched off, as well as in the event of a power failure. (There’s no password prompt when the test instrument is started up.)

An inspector can only be deactivated by activating another inspector. (There must always be an active inspector.)

Select the inspector to be edited from the list under Setup 2/3 > Inspector > Edit Inspector, and confirm by pressing the softkey. A password can be assigned to the inspector using the “Create Password” option. If the inspector already has a password, “Change Password” appears here.

Data entry depends on the model and its features (see section 7.1 “Basic Test Instrument Operation”). The password is assigned or changed by pressing the green checkmark ✓.

Note

If the **password is unknown**, you can enter an incorrect password **3 times**, after which you’re asked whether or not the inspector should be deleted.
- The inspector can then be permanently deleted by pressing the green checkmark ✓.
- Deletion can be cancelled by pressing the red X ✗.

Password-protected inspectors are identified by means of an additional key icon. Icons in the Inspector List (feature KD01 only):

Icon	Meaning
	Inspector
	Inspector with password protection

Changing an Inspector’s Name

Select the inspector to be edited from the list under Setup 2/3 > Inspector > Edit Inspector, and confirm by pressing the softkey. The inspector’s name can be edited with the help of the “Change Name” option. Data entry depends on the model and its features (see section 7.1 “Basic Test Instrument Operation”). The change is saved by pressing the green checkmark ✓.

Deleting an Inspector

The currently active inspector cannot be deleted. In order to delete, first select another inspector (change inspector). Then select the inspector to be deleted under Setup 2/3 > Inspectors > Edit Inspectors > Delete Inspectors.

The inspector is deleted by pressing the green checkmark ✓ after acknowledging a security prompt.

11.2 User Rights: Additionally Available for Test Instruments with SECUTEST DB COMFORT (Z853S or feature KD01)

Different roles with different user rights can be assigned to inspectors on test instruments with SECUTEST DB COMFORT (Z853S or feature KD01):

– **Test planner** = standard inspector
– **ETP** (electrically trained person) = inspector with limited functions

Rights:

Roles	Test planner	ETP
Change “Test Planner / ETP” role (for all other inspectors)	✓	—
Delete inspectors (all other inspectors)	✓	—
Select inspector	✓	✓
Change inspector’s name (own name only)	✓	✓
Change password (own password only)	✓	✓
Change **All Measurements** settings in setup menu	✓	—
Change **Auto. Measurements** settings in setup menu	✓	—
Change **Classification Parameters** (rotary switch: sequences A1 to A9)	✓	—
Change **Sequence Parameters** (rotary switch: sequences A1 to A9)	✓	—

Note

Password Protection for Test Planners
If you use more than one inspector with different roles, we urgently recommend password protection for inspectors with the test planner role. This ensures that inspectors with extended user rights are unable to make any changes using another name!

Icons in the Inspector List:

Icon	Meaning
	Test planner
	Password-protected test planner
	ETP
	Password-protected ETP

Adding/Editing User Rights

Only users with the test planner role can change roles. The role of the currently active inspector cannot be changed. In order to change a role, first select another inspector.

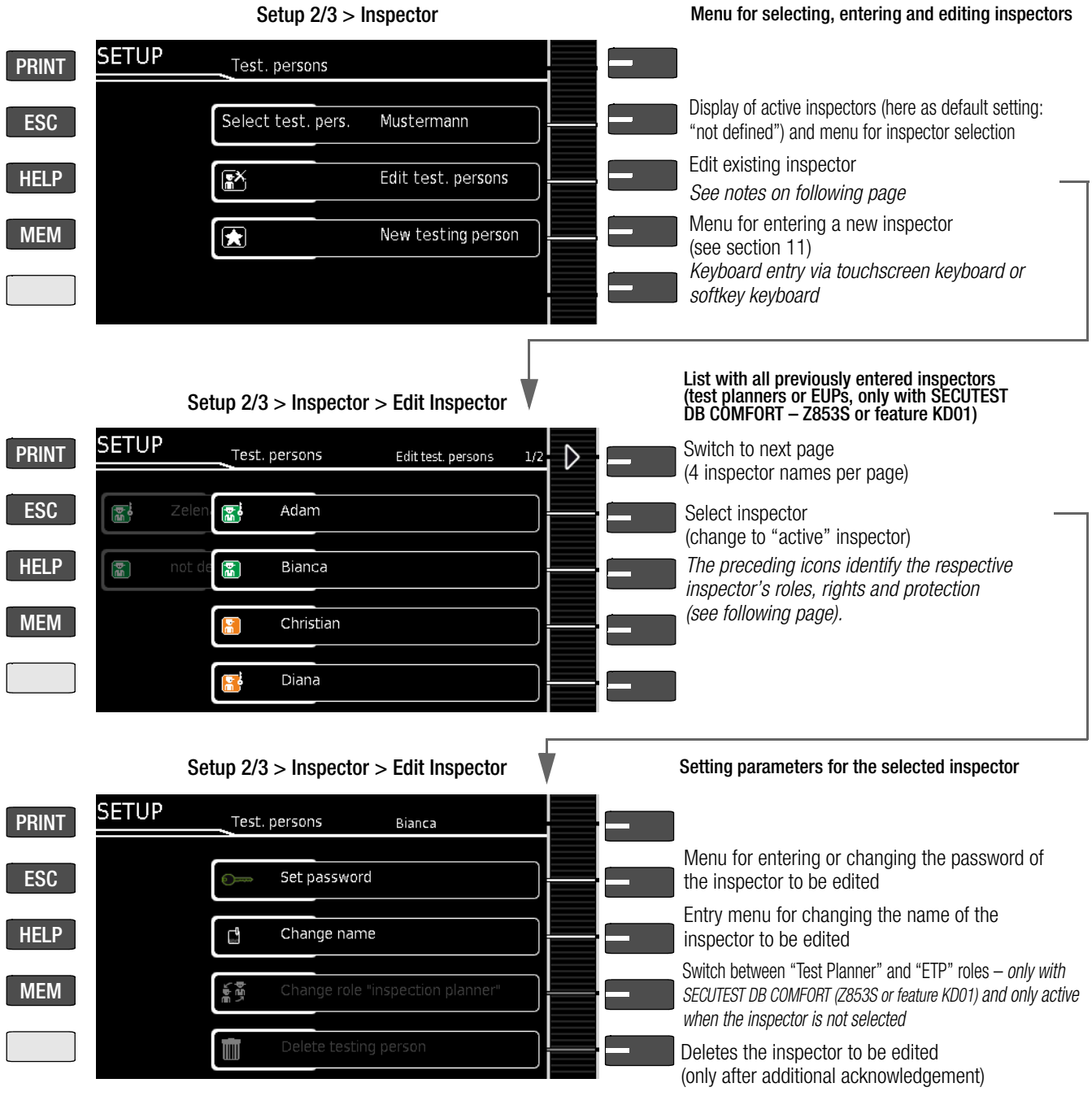
In order to assign user rights, select the inspector to be edited from the list under Setup 2/3 > Inspector > Edit Inspector, and confirm by pressing the softkey. Assign the other role via the "Change test planner role" or "Change ETP role" option by pressing the softkey.

Note

Protection Against Lockout

The active test planner can only change the roles of other inspectors – not his own role. This prevents the last inspector with the role of test planner from changing this role into the role of an ETP, in which case the last role with extended user rights would be deactivated.

Figure 5 Overview Enter, Activate, Edit, Delete or Protect Inspectors with Password and Assign Roles



12 Internal Database

A complete test structure with data regarding customer properties, buildings, floors, rooms and test objects can be created in the test instrument.

Attention!
Sensitive Data – Mandatory Data Protection!
Customer data are confidential and must be protected. Observe and comply with the respectively applicable national data protection regulations. Use the corresponding functions provided by the test instrument such as password protection (section 11 “Inspector Management”), as well as other appropriate measures.

This structure makes it possible to save the results of single measurements or test sequences to test objects belonging to various customers. Manual single measurements can be grouped together into a so-called “manual sequence”.

Structures can be created directly at the test instrument or at a PC (IZYTRONIQ software), and then transferred accordingly. They can also be saved to and restored from a USB flash drive. See section 19 “Transferring and Saving Test Structures and Measurement Data (test instrument data base)”, for details.

Note
The scope of functions provided by the database structure and the transfer options depend on the instrument variant and its features.
Database elements are grayed out on test instruments on which the “extended database structure” (= property, building, floor, room) from SECUTEST DB+ (Z853R or feature KB01) or SECUTEST DB COMFORT (Z853S or feature KD01) (medical electrical equipment) is not enabled.

12.1 Test Structure Layout

The test structure is a tree structure with elements, i.e. the so-called objects.

Objects

Objects can be identified with the following parameters (**boldface** parameters are mandatory entry fields):

- **Device** (**ID**, designation, location, test interval *, type, manufacturer, comment, serial number, protection class, cost center *****, department *****)
- **ME equipment**** **m**edical **e**lectrical equipment (**ID**, designation, **customer**, test interval*, type, manufacturer, comment, serial number, protection class, number of type B applied parts **, number of type BF applied parts **, number of type CF ** applied parts, cost center, department, UDI **, mains connection **)
- **Room *** (ID and **designation**)
- **Floor *** (ID and **designation**)
- **Building *** (ID, **designation**, street, ZIP code and city)
- **Property *** (ID and **designation**)
- **Customer** (**ID**, **designation**, street, ZIP code and city)

* Only with SECUTEST DB+ database extension (Z853R or feature KB01)
** Only with SECUTEST DB COMFORT database extension (Z853S or feature KD01)

Up to 50,000 data records can be stored in the test instrument. The following applies in this regard: 1 data record = 1 DUT or location node or customer or individual measurement.

Note
Results of measurements/tests can be saved under object types “Device” or “ME equipment”, which are also referred to as “test objects” in the following. Measurements can also be saved as a “manual sequence”.

Hierarchies

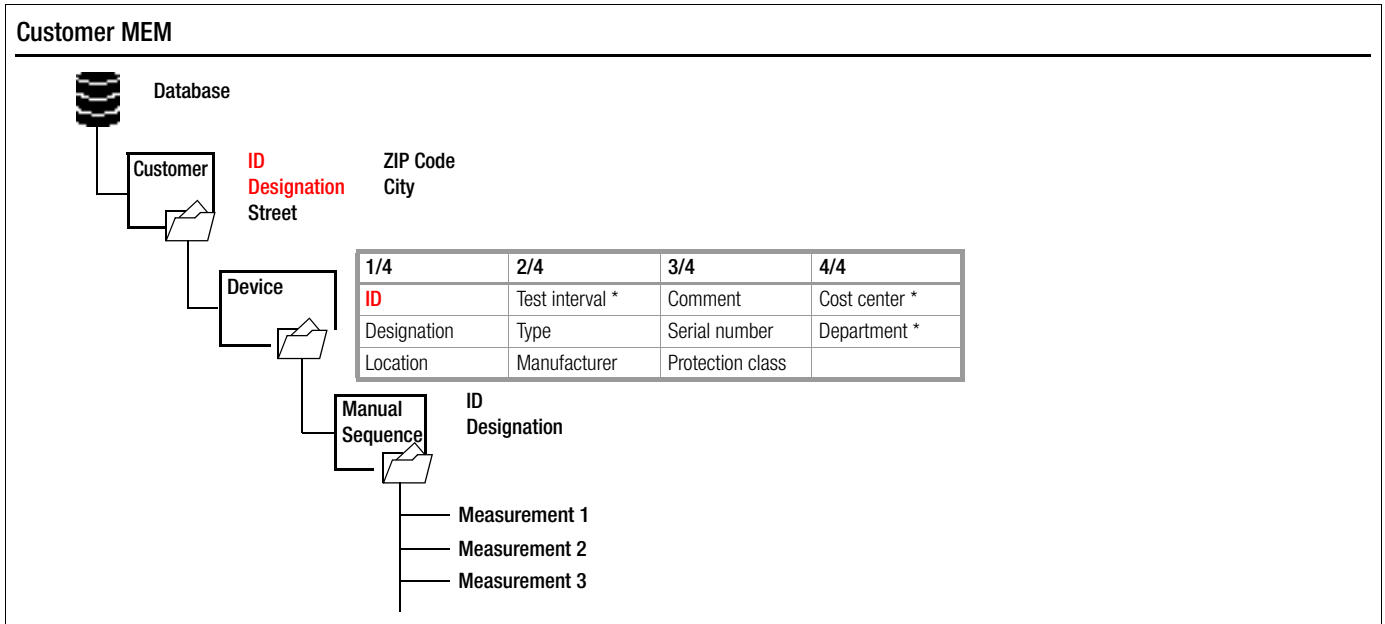
The following hierarchies must be complied with:
Room or Floor must always be subordinate to a **Building**.
Devices or ME equipment must always be subordinate to a **Customer**.

Note
Data Migration
If so-called “legacy data” have been imported into the test instrument which do not comply with the hierarchy (e.g. as a result of a firmware update or via the “Restore database” function), customer objects are generated automatically. The same applies to database objects “Room” and “Floor”, which must always be subordinate to a “Building”. In this case, Building objects are generated automatically if necessary.

Mandatory Entries

Mandatory entries are identified in red in the entry fields at the test instrument as well as in the illustrations in this section.

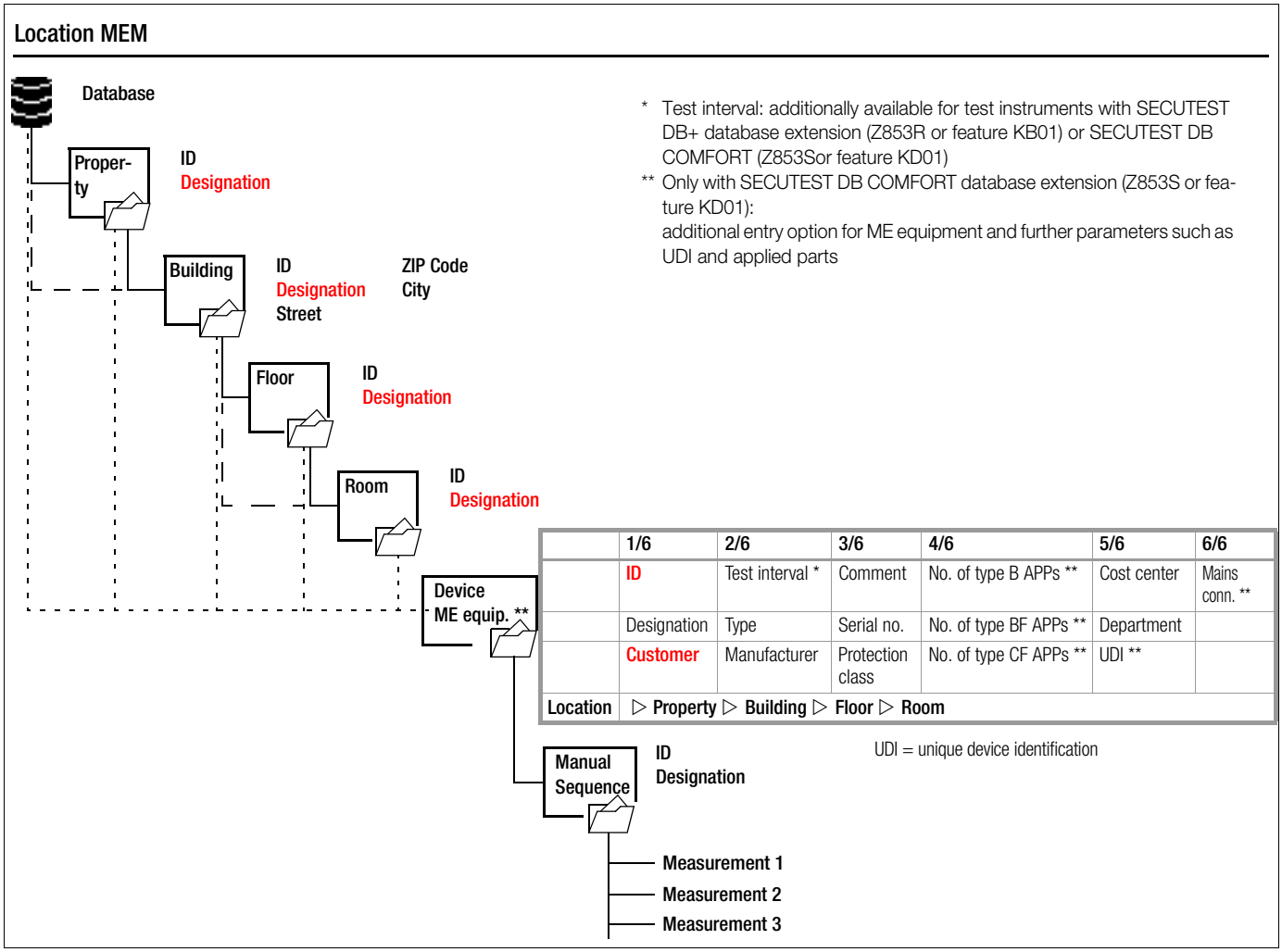
Test Structure – Hierarchy of Object Levels in the SECUTEST ST BASE(10)



* Test interval: additionally available for test instruments with SECUTEST DB+ database extension (Z853R or feature KB01) or SECUTEST DB COMFORT (Z853Sor feature KD01)

Figure 6 Database Structure

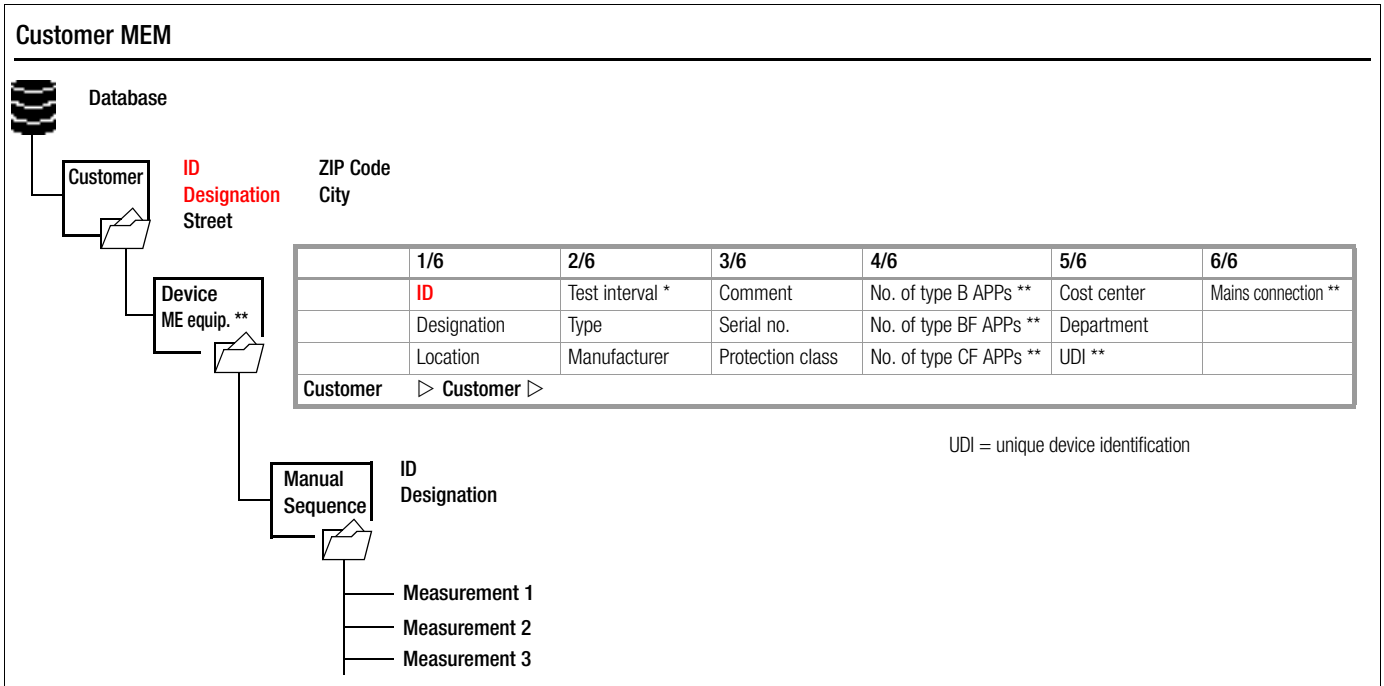
Test Structure, Location View – Hierarchy of Object Levels in SECUTEST ST PRO and SECULIFE ST BASE(25) or in Test Instruments with SECUTEST DB+ Database Extension (Z853R or feature KB01)



	1/6	2/6	3/6	4/6	5/6	6/6
	ID	Test interval *	Comment	No. of type B APPs **	Cost center	Mains conn. **
	Designation	Type	Serial no.	No. of type BF APPs **	Department	
	Customer	Manufacturer	Protection class	No. of type CF APPs **	UDI **	
Location	▷ Property ▷ Building ▷ Floor ▷ Room					

Figure 7 Database Structure as Location View for Test Instruments with SECUTEST DB+ (Z853R or feature KB01)

Test Structure, Customer View – Hierarchy of Object Levels in SECUTEST ST PRO and SECULIFE ST BASE(25) or in Test Instruments with SECUTEST DB+ Database Extension (Z853R or feature KB01)



	1/6	2/6	3/6	4/6	5/6	6/6
	ID	Test interval *	Comment	No. of type B APPs **	Cost center	Mains connection **
	Designation	Type	Serial no.	No. of type BF APPs **	Department	
	Location	Manufacturer	Protection class	No. of type CF APPs **	UDI **	
Customer	▷ Customer ▷					

* Test interval: additionally available for test instruments with SECUTEST DB+ database extension (Z853R or feature KB01) or SECUTEST DB COMFORT (Z853Sor feature KD01)

** Only with SECUTEST DB COMFORT database extension (Z853S or feature KD01):
additional entry option for ME equipment and further parameters such as UDI and applied parts

Figure 8 Database Structure as Customer View for Test Instruments with SECUTEST DB+ (Z853R or feature KB01)

12.2 Creating, Editing, Deleting and Searching the Test Structure

Structures can be created at the test instrument or at a PC and then transferred accordingly.

This section describes creation on the instrument. Creation on a PC using IZYTRONIQ software is described in the program's online help.

Refer to section 13 regarding transfer between the instrument and the PC, as well as saving the test structure to and restoring it from a USB flash drive.

12.2.1 Opening the Database

The database view can be opened at any time by pressing the **MEM** key.

The database view can be exited by pressing the **ESC** key.

12.2.2 Creating a Test Structure

Press the **MEM** key. The database is displayed.

Complete setting options for creating a tree structure can be found there on three menu pages (1/3, 2/3 and 3/3).

Depending on the model and its features, data can be entered via the displayed keyboard (function keys and the softkeys or touch-screen keyboard), a connected USB keyboard or a barcode scanner as soon as an object has been selected.

See section 7.2 "Entering Text and Numbers".

Meaning of Icons in the User Interface – Database Management

Icon		Meaning
Main level	Sub-level	
		Memory Menu, Page 1 of 3
		Change display to menu selection
		Cursor UP: scroll up
		Cursor DOWN: scroll down
		Cursor RIGHT: expand tree
		Cursor LEFT: collapse tree
		Memory Menu, Page 2 of 3
		Change display to menu selection
		Add object
		Delete selected object or measurement
		Edit object (ID, designation, comment ...)
		Move object (only with SECUTEST DB COMFORT – Z853S or feature KD01)
		When a measurement is selected: Display measured values
		Display details from the measurement results list
		Hide details from the measurement results list
		Memory Menu, Page 3 of 3
		Change display to menu selection
		Search in the ID, designation or UDI fields > enter the entire ID or designation (complete word)
		Search by ID: > enter complete ID number of a test object
		Confirm search results
		Display the structure designation
		Hide the structure designation

Selecting the Position at which a New Object will be Added

- Use the ▲ or ▼ key in order to select the desired objects.
- If a sublevel exists, you can switch to it by pressing the ▶ key, or you can open a branch.
- The open branch is then closed, or you can switch to the next higher hierarchical level, by pressing the ◀ key.

Creating a New Object

- Scroll to the second menu page (MEM 2/3) with the help of the ▶▶ key.
- After pressing **NEW**, a new object can be created. Depending on the current position within the hierarchy, the respectively available object types are suggested. Depending on the object type, you'll have to enter at least an ID number via the keyboard. If any of the mandatory entries (identified in red) have not been completed, an error message appears.
- Then press the green checkmark in order to accept the entered values. The display jumps back up to the higher hierarchical level.

12.3 Display

12.3.1 Switching Between 2 Tree Structure Views (with SECUTEST ST PRO and SECULIFE ST BASE(25) or with test instruments including SECUTEST DB+ – Z853R or feature KB01)

- The display can be switched back and forth between the location and customer views by repeatedly pressing the **MEM** key.
- The database view can be exited by pressing the **ESC** key.

12.3.2 Displaying Measured Values from Saved Tests

If measured values are available, they can be displayed.

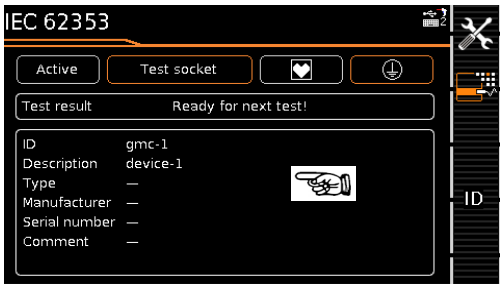
- Switch to the database view by pressing the **MEM** key.
- Scroll to the first menu page (**Navigation)** (MEM 1/3) with the help of the ▶▶ key.
- Either select the desired object (ID number) with the scroll keys or search for it as described in section 12.3.4.
- Then mark the desired test with the cursor, depending on whether single measurements or test sequences are involved:
  Single measurements: **date / measuring function(7/17/14 / RINS)**
  Test sequence: **date / test standard (7/17/14 / VDE...)**
- In order to view the single measurements of a test sequence after testing, press the icon for executed measurements. The measurements appear in a list.
- Select the desired measurement with the scroll keys.
- The associated measuring parameters can be shown or hidden using the keys shown at the right.
- The measured value view is exited by pressing the green checkmark.

12.3.3 Editing the Database

Changing the Description or ID Number of a Previously Created Object

- Scroll to the first menu page (MEM 1/3) with the help of the ▶▶ key.
- Select the object whose designation will be changed.
- Scroll to the second menu page (MEM 2/3) with the help of the ▶▶ key.
- Press the **EDIT** icon.
- Select the parameter whose description will be changed.
- The keyboard appears automatically.
  Change the displayed designation and acknowledge your entry.

Quick Command: Edit Object
(only with touchscreen – feature E01 – and SECUTEST DB COMFORT – Z853S or feature KD01)

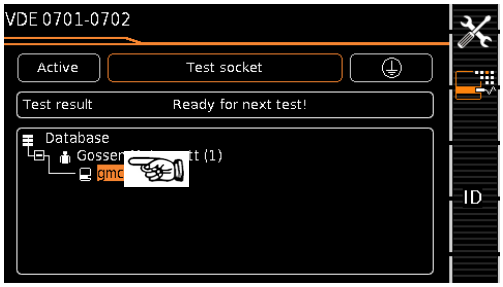


- Press and hold a point in the detail view field in the initial window of a test sequence until the progress bar starts to blink.
- Upon releasing finger pressure, the “Edit” menu for a device or ME equipment opens automatically.
- After entering or changing the data, the display is automatically returned to the initial window upon confirming with the green checkmark.

Move Object
(only with SECUTEST DB COMFORT – Z853S or feature KD01)

- Scroll to the first menu page (MEM 1/3) with the help of the key.
- Select the object to be moved (together with sub-objects) with the scroll keys.
- Scroll to the second menu page (MEM 2/3) with the help of the key.
- Press the **MOVE** icon.
- Using the scroll keys, select the position to which the object is to be moved and confirm by pressing the green checkmark.

Quick Command: Move Object
(only with touchscreen – feature E01 – and SECUTEST DB COMFORT – Z853S or feature KD01)



- Press and hold the object to be moved in the tree view in the initial window of a test sequence until the progress bar starts to blink.

Note
Depending on whether or not finger pressure is applied for a longer period of time in the customer or location tree, the device or ME equipment can be “moved” to another customer or between locations.

- Upon releasing finger pressure, the display is automatically switched to the database view (MEM), from where you can proceed to the “Move” menu.
- Now select the position with the scroll keys to which the object will be moved.
- The display is automatically returned to the initial window after confirming with the green checkmark.

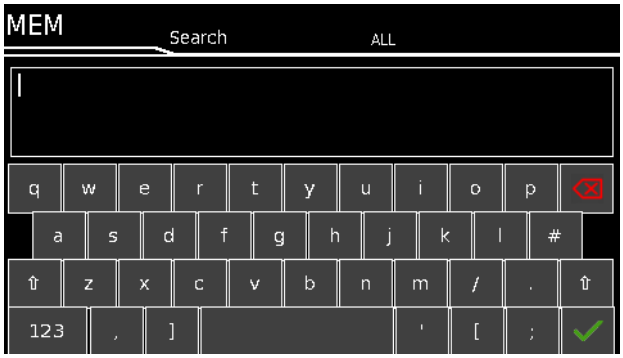
12.3.4 Searching for Objects

- Switch to the database view by pressing the **MEM** key.
- Scroll through the menu pages with the help of the key.

Searching for Text

- Press the text icon in order to search for text.

The following “Search **ALL**” entry field appears:



- Enter the text as described for data entry in section 7.2 “Entering Text and Numbers”, e.g. in order to search for a designation.

Note
When searching for text, elements are found regardless of whether they’re written in upper or lowercase.
Refer to section 10 “Connecting and Configuring External Devices”, regarding additional key functions via the connected USB keyboard.

- The search is started after the entered search term has been acknowledged.

Searching for ID Numbers

- Press the ID icon in order to search for an ID number. The “Search for **ID**” entry field appears.
- Enter the ID number as described for data entry in section 7.

Note
When searching for IDs, differentiation is made between uppercase and lowercase.
Refer to section regarding additional key functions via the connected USB keyboard.

- The search is started after the entered search term has been acknowledged.

Result

The ID number of the object found is displayed inversely, when searching for text as well.

- If several objects are found which match the search string, you can toggle with the scroll keys amongst the different search results.
- The designation and ID number can be shown or hidden by pressing the magnifying glass icon.

12.3.5 Clearing the Database

The database in the test instrument can be cleared in two different ways:

- Rotary switch in **SETUP** position, page 1/3 > Database > **Delete**

Press the MEM key > scroll up with the scroll key until the database is selected > press the **DEL** softkey.

Figure 9 Database Functions: Menu Overview

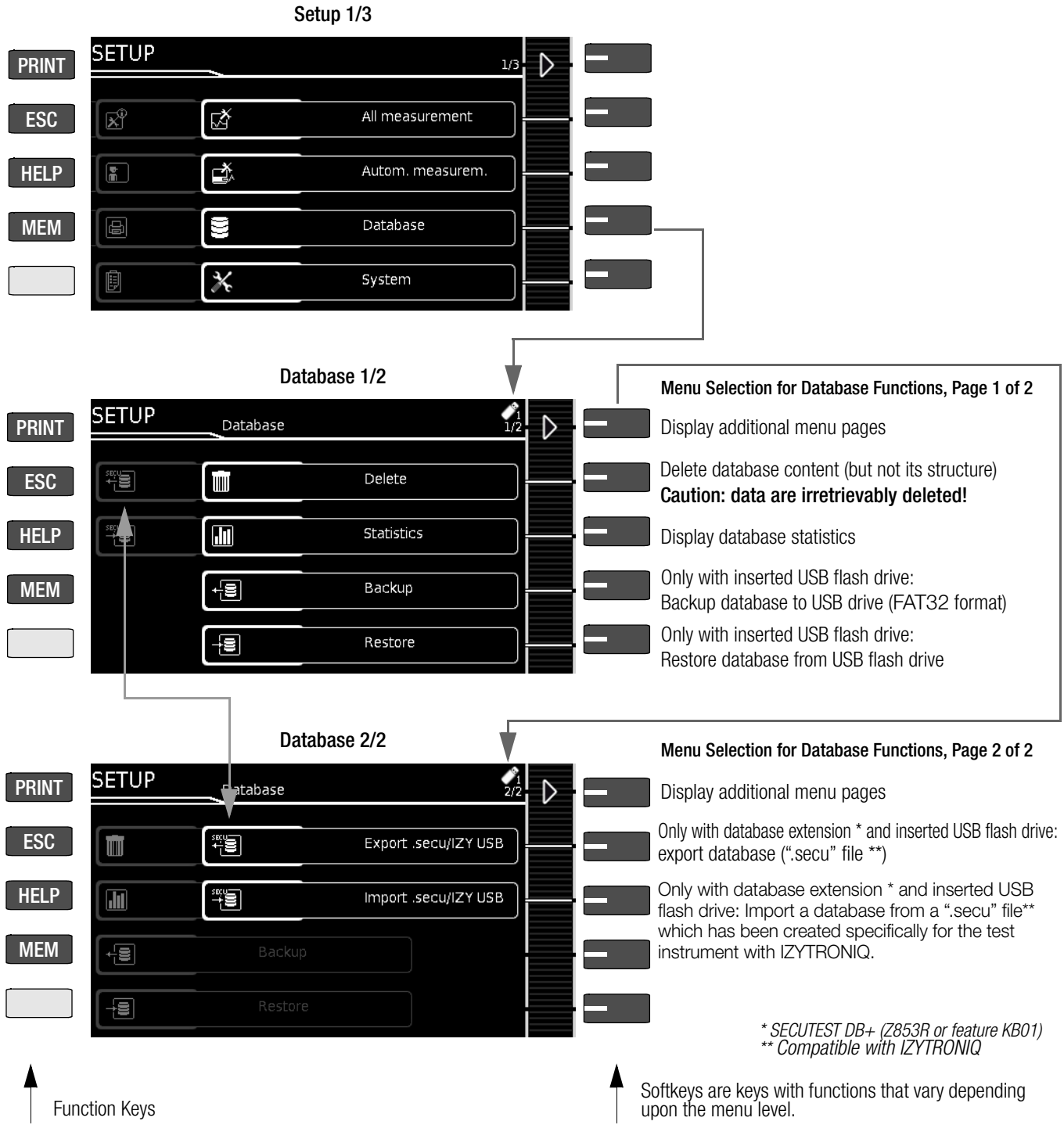
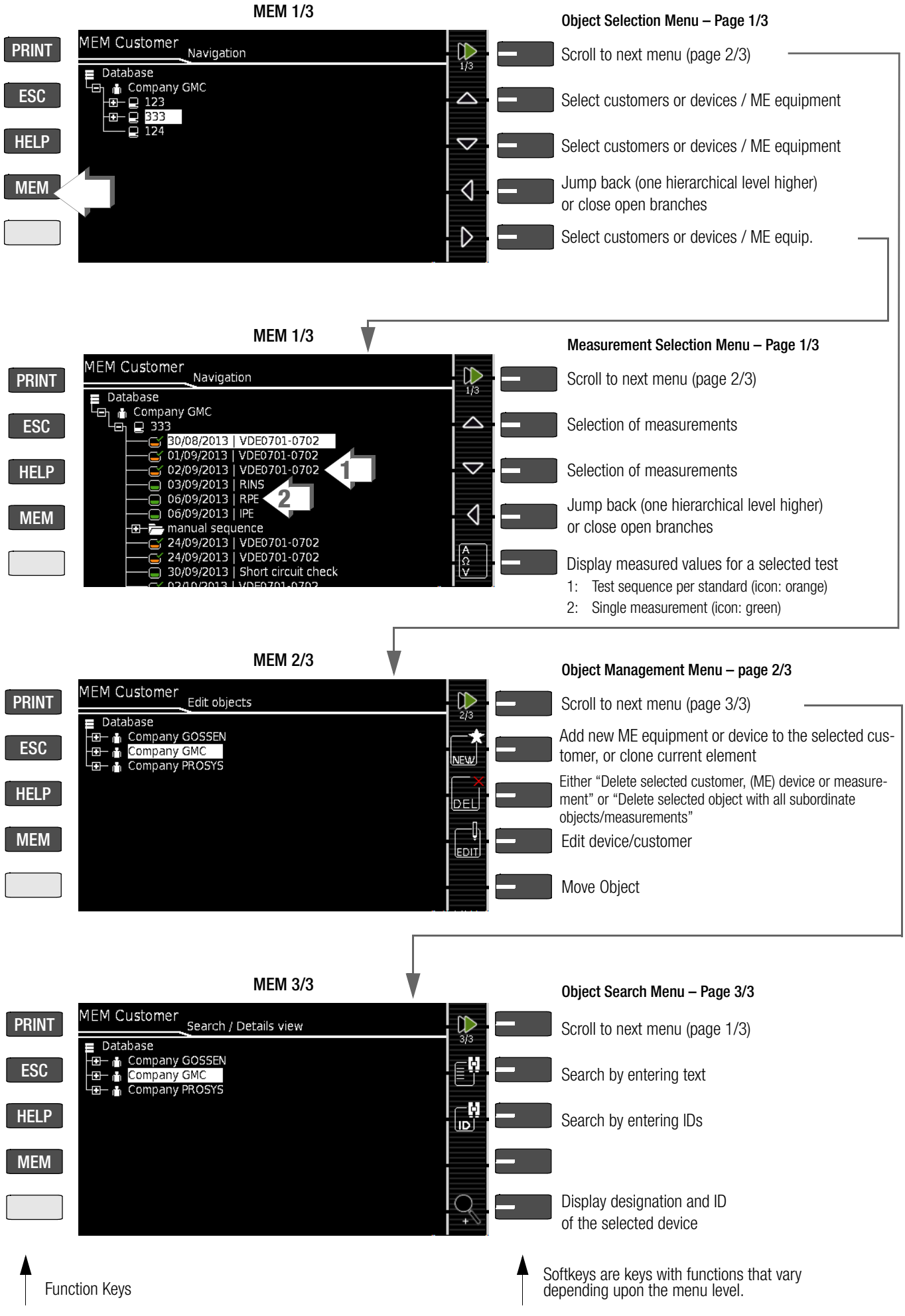


Figure 10 Overview of Navigation, Object Editing and Object Search in the Database



12.4 QuickEdit Function – QEDIT (only with SECUTEST DB COMFORT – Z853S or feature KD01)

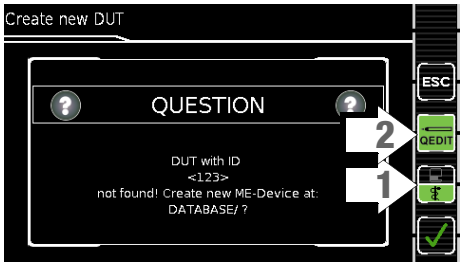
QuickEdit is an extension for the entry of new test objects. Without it, only the ID of the DUT can be defined. QuickEdit can be used to fill in all other fields after entering the ID numbers.

QuickEdit is available whenever you search for a test object ID which doesn't already exist in the database.

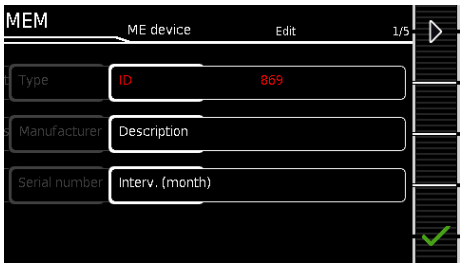
The following search options are available:

– Via the ID softkey in the test sequence or in the save menu for the individual measurement
(see section 15 "Single Measurements", and section 17 "Test Sequences (automatic test sequences)")
– ID search via ID softkey on page 3 of 3 of database management MEM
(see section 12.3.4 "Searching for Objects")
– Read-in of a test object ID via the barcode or RFID scanner
(see section 10.3 "RFID", and section 10.4 "Barcodes / QR Codes")

If the searched for test object ID isn't found, the following question appears. When creating a new test object you can first of all choose between a (standard) device (icon) or a medical test object – "new ME equipment" (staff of Aesculapius icon) – by pressing the (1) key.



If you select the QEDIT (QuickEdit function) key (2) (shown against a green background and not crossed out), you proceed directly to the memory management entry window by confirming with ✓, in order to create a new test object and enter further properties.



After confirming with ✓, the location of the test object ID in the database is displayed. Measurement results are saved to memory after pressing the save key once again.

13 Connecting the Device Under Test

Note
Always connect the DUT in accordance with the schematic diagrams included in the online help function (see section 7.4 “Help Functions (HELP key)”).

Connection of the DUT to the test instrument depends on:

- **The type of DUT:**

  For direct connection to the test socket (TS)
  For DUTs with single-phase connection
  and extension cords via the **EL1** adapter
  (in which case the EL1 is connected to probe sockets P1)

  For permanent connection (to the mains)
  by contacting the housing with the probe
  (for the *measurement of protective conductor resistance* or
  with the direct measuring method for the touch current measurement)
  Measurement of protective conductor current with a current clamp
  (only possible with feature I01)

  For connection via adapter
  – With *single-phase extension cords* via the **EL1** adapter
  (in which case the EL1 is connected to probe sockets P1)
  – With single and *3-phase extension cords* via the **VL2E** adapter
  to the test socket
  – With devices with 5-pole, 16 A CEE plug
  via the **AT16-DI** differential current adapter to the test socket
  – With devices with 5-pole, 32 A CEE plug
  via the **AT32-DI** differential current adapter to the test socket

- **DUT protection class** (PC I, PC II or PC III) or any combinations of protection classes

Note
The DUT must be switched on for all tests. Switches, relays, temperature regulators etc. must all be taken into consideration.

As a default setting, the program sequence assumes that the plug from the DUT has been connected to the test socket.

13.1 List of Possible DUT Connections Depending on Measurement Type

Meas. Type	Suitable for DUT Connection via
RPE	
PE(TS) - P1 passive	Test socket, EL1 test socket, VL2E, AT3-IIIE, AT3-IIS, AT3-IIS32, AT16DI/AT32DI
PE(TS) - P1 active	Test socket (for PRCDs)
PE(mains) - P1	Permanent connection
PE(mains) - P1 clamp	Permanent connection
P1 - P2	Permanent connection
RINS	
LN(TS) - PE(TS)	Test socket, EL1, VL2E, AT3-IIIE, AT3-IIS, AT3-IIS32, AT16DI/ AT32DI, CEE adapter
LN(TS) - P1	Test socket, VL2E, AT3-IIIE, AT3-IIS, AT3-IIS32, AT16DI/AT32DI
P1 - P2	No connection (PC3)
PE(mains) - P1	Permanent connection
PE(TS) - P1	Test socket
LN(TS) - P1//PE(TS)	Test socket, VL2E, AT3-IIIE, AT3-IIS, AT3-IIS32, AT16DI/AT32DI
IPE	
Direct	Test socket, AT16DI/AT32DI (direct or diff.)
Differential	Test socket
Alternative	Test socket, VL2E, AT3-IIIE, AT3-IIS, AT3-IIS32, AT16DI/AT32DI
AT3 adapter	AT3-IIIE, AT3-IIS, AT3-IIS32
Clamp	Permanent connection
IT	
Direct	Test socket, AT3-IIIE, AT3-IIS, AT3-IIS32, AT16DI/AT32DI
Differential	Test socket
Alternative (P1)	Test socket, AT3-IIIE, AT3-IIS, AT3-IIS32, AT16DI/AT32DI, VL2E
Permanent connection	Permanent connection
Alternative (P1–P2)	No connection (PC3)
IE	
Direct	Test socket, AT16DI/AT32DI (only diff. is sensible)
Differential	Test socket
Alternative	Test socket, AT16DI/AT32DI
AT3 adapter	AT3-IIIE, AT3-IIS, AT3-IIS32
Clamp	Permanent connection
IA	
Direct (P1)	Test socket
Alternative (P1)	Test socket
Perm. conn. (P1)	Permanent connection
IP	
Direct (P1)	Test socket
Perm. conn. (P1)	Permanent connection
U probe	
PE - P1	Permanent connection
PE - P1 (with mains)	Test socket
U meas.	
V - COM	Permanent connection
V - COM (with mains)	Test socket
tPRCD	
Mains to test socket	Test socket
P	
Function test	Test socket, AT3-IIIE, AT3-IIS, AT3-IIS32, AT16DI/AT32DI, CEE adapter
EL1	
EL1 adapter	EL1 and test socket
EL1 adapter (continuity only)	EL1 and test socket
AT3-IIIE adapter	AT3-IIIE
VL2E adapter	VL2E
Temperature	
V-COM PT100(0)	Permanent connection
Current (via clamp)	
V-COM	Permanent connection
V-COM (with mains)	Test socket
PRCD time to trip	
—	Test socket

13.2 Residual Current Monitoring

For your safety, the test instrument is equipped with continuous residual current monitoring. If residual current exceeds a specified limit value, all measuring processes are stopped, and if line voltage is fed through the test socket it's disconnected. This limit value can be set to one of two levels with the rotary switch in the **SETUP** position:

Setup 1/3 > All Measurements 2/2 > Residual Current Protection > **10 mA**/30 mA

Attention!
However, shutdown does not fulfill the requirements specified for a PRCD.

13.3 Reference Voltage L-PE and Alternative Test Sequence

Specifying Reference Voltage L-PE

Reference (line) voltage is the voltage to which the measured values for leakage current have been standardized.

It's used in the case of leakage current for mathematical adaptation of measured current values to the specified voltage.

Measurements with line voltage at the test socket: The setting value has no influence on the voltage with which the test object is supplied via the test instrument's test socket.

Leakage current measurements with "Alternative" method: The setpoint value of the synthetic test voltage is derived from the value specified here.

Note
The displayed measured values for leakage current are standardized to an adjustable reference value (typically 230 V) in order to permit reproducible measurement of leakage current even with fluctuating mains supply voltage.

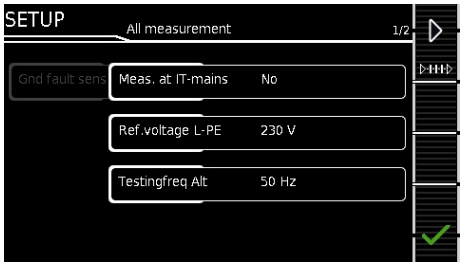
Reference voltage can be adjusted in Setup:
Setup 1/3 > All Measurements 1/2 > **Ref. Voltage L-PE**

Specifying an Alternative Test Frequency

Selectable frequency setpoint value for synthetic test voltage for all leakage current measurements of measurement type "Alternative", affecting the following measurements and/or rotary selector switch positions:

- Single measurements (rotary switch level: green)
- Measurements included in preconfigured, integrated test sequences
- Measurements included in user-defined test sequences (only with SECUTEST DB+ database extension – Z853R or feature KB01)

The **Alt. Test Freq.** parameter can be set in Setup:
Setup 1/3 > All Measurements 1/2 > **Alt. Test Freq.**



13.4 Manually Specifying the Connection Type for Single Measurements

In the case of single measurements, the test instrument is unable to detect the respective **connection type** (e.g. test socket or permanent connection (voltage measuring inputs)). The connection type must be specified manually.

- Select **parameter settings**.
- After selecting the **measurement type** parameter, a list of possible connection types is displayed.
- Select a **connection type**.

Once a connection type has been selected, it remains active for all following tests until it's changed again.

13.5 Manually Selecting a Connection Type / Protection Class For Test Sequences

If the test instrument is unable to detect the respective connection type or protection class, the suggested connection type must be examined and the connection type or protection class must be specified manually if necessary.

- Press the **Sel** key shown at the right in order to display the **Classif. Parameters**.
- After selecting the **protection class** or **connection type** parameter, a list of possible settings is displayed.
- Select the respective parameter.
- Acknowledge the **Classif. Param** once again (classification parameters).
  The connection type appears at the middle of the header.
  The symbol for the respective protection class appears to the right of the connection type.

Once a connection type or a protection class has been selected, it remains active for all following tests until it's changed again.

13.6 Special Conditions

Note
Protection Class II DUTs with Protection Class I Mains Plug
If the DUT is equipped with a protection class I plug although it complies with protection class II, protection class I is recognized by the test instrument. If this is the case, switch the protection class parameter from I to II.

Testing Several Protective Conductor Connections with the Function for "Automatic Detection of Measuring Point Changes"

During protective conductor measurement, the test instrument recognizes whether or not test probe P1 is in contact with the protective conductor, which is indicated by means of two different acoustic signals. This function can be adjusted with the rotary switch in the **SETUP** position via the "**Auto Measuring Point**" parameter in the "**Auto Measurements**" submenu.

Protective Conductor and Insulation Resistance Measurements for Permanently Installed DUTs

Attention!
Before connecting the DUT, deactivate the electrical system which supplies power to it!

- Remove the mains fuses from the device under test and disconnect neutral conductor N inside the device under test.

Touch Current Measurement (absence of voltage)

Note
Make sure that the contacted parts are not inadvertently grounded.
If ungrounded parts are connected to grounded parts when contacting parts for the touch current measurement, touch current bypasses the probe and is discharged to ground.

13.7 2nd Test Probe (only with feature H01, e.g. SECUTEST ST PRO)

If the device under test isn't equipped with a country-specific mains plug which fits into the test socket at the test instrument, or if a permanently installed DUT is involved, the second test probe, in combination with the first test probe, permits 2-pole measurement (dual-lead-measurement) of RPE, RISO and equivalent leakage current.

Measurements with test probe 1 to test probe 2 (P1 – P2) are electrically isolated from the mains. There's no voltage at the test socket.

Attention!
Please note that during insulation measurement the maximum test voltage of 500 V may be applied between the probes.

13.8 Connection Prompts

If a single measurement (green rotary switch positions) or a specific (integrated) automatic test sequence (orange rotary switch positions) is started, checking is conducted to determine whether or not all of the probes and measurement cables required to this end are connected (depending on the configuration level of your test instrument). If this isn't the case, you're prompted to connect probes, measurement cables or the test adapter to the test instrument.

Note
Checking is only performed to determine whether or not the corresponding sockets are occupied.
In any case, make sure that appropriate accessories for the selected measurement/connection type are connected.

A list of possible DUT connections depending on type of measurement is included in section 13.1.

13.9 Connection Tests Conducted by the Test Instrument

The following measurements are performed automatically when the DUT is connected to the test instrument.

- **Detection of Probes / Measurement Cables**
  During individual measurements / automatic test sequences, checking is conducted to determine whether or not the measuring sockets required for the measurement/sequence are occupied.
- **DUT Connection Detection** (only with country-specific variant *)
  With the rotary switch in the A1-A9 position, the "Test Socket" connection type is selected automatically (if correspondingly configured), if a mains plug is detected in the test socket.
- **Protection Class Detection** (only with country specific variant *):
  With the rotary switch in the A1-A9 position, protection class I or II is selected (if correspondingly configured), depending on the detected type of mains plug.
- **Short-Circuit Test**
  Before switching mains voltage to the device under test: test for short-circuiting between L and N or L/N and PE – if applicable additionally as an "inspection test step" in test sequences.
- **On Test**: test to determine whether the DUT is switched on or off.
- **Switchable Control:** If high internal DUT resistance is detected (R < 500 Ω), mains power is switched on automatically; if low internal DUT resistance is detected, a popup window appears prompting the user to switch off the DUT at its mains switch before mains power is switched on.

Automatic Recognition of States when Connecting DUTs and Probes

Test Function		Condition
Short-circuit testLie-in	Short-circuit / DUT starting current	R ≤ 2.5 Ω
	No short-circuit (AC test)	R > 2.5 Ω
Open-circuit voltage U_0 4.3 V, short-circuit current I_K < 250 mA		
Short-circuit testLN–PE	Short-circuit	R ≤ 2 kΩ
	No short-circuit (AC test)	R > 2 kΩ
Open-circuit voltage U_0 230 V AC, short-circuit current I_K < 1.5 mA		
On test	On (DUT passive)	R < 250 kΩ
	Off (DUT active)	R > 300 kΩ
Open-circuit voltage U_0 230 V AC, short-circuit current I_K < 1.5 mA		
Switchable control	Mains power switched on automatically	R >500 Ω
	Popup (switch off DUT first)	R < 500 Ω
Probe test	No probe	R > 2 MΩ
	Probe detected	R < 500 kΩ
Protection class detection (only with country specific variant [1])		
	Protective conductor found: PC I	R < 1 Ω
	No protective conductor: PC II	R > 10 Ω
Safety shutdown		
Triggered at following residual current value (selectable)		> 10 mA / > 30 mA
Triggered at following probe current values (electronic fuse)		
	During leakage current measurement	> 30 mA [2]
	During protective conductor resistance measurement	> 250 mA
Connection test (only with country specific variant [1])		
Checks whether the DUT is connected to the test socket.		
	DUT power cable found	R < 1 Ω
	No DUT power cable	R > 10 Ω
Insulation test		
	DUT set up in a well-insulated fashion	R ≥ 500 kΩ
	DUT set up in a poorly insulated fashion	R < 500 kΩ
PE mains – PE socket: Open-circuit voltage U_0 500 V DC, I_K < 2 mA		
Overcurrent protection		
Shutdown in the event of a continuous flow of current via the test socket at: Our SECUTEST ST BASE(10)/PRO and SECULIFE ST BASE(25) test instruments permit active testing of DUTs with a nominal current (load current) of up to 16 A. The test socket on the respective test instrument is equipped with 16 A fuses to this end, and the switching capacity of the internal relays is also 16 A. Starting current of up to 30 A is permissible. In the case of test objects for which a starting current of greater than 30 A can be expected, we urgently recommend the use of a test adapter for larger starting currents, e.g. a test adapter from the AT3 series.		I > 16.5 A

[1] Applies to **M7050** with feature B00 and B09
[2] Firmware version 3.2.0 and lower: 12 mA

Attention!
*** Safety Shutdown**
As of 10 mA of differential current (can also be set to 30 mA), automatic shutdown ensues within 500 ms. This automatic shutdown does not take place during leakage current measurement with clamp meter or adapter!

14 Important Basic Information on Tests and Measurements

14.1 Important Safety Information

Observe and comply with the following safety information when performing individual measurements and test sequences.

14.1.1 Switching Loads – Maximum Starting Current

The test instruments permit **active** testing of DUTs with a nominal current (load current) of up to 16 A.

The test socket on the respective test instrument is equipped with 16 A fuses to this end, and the switching capacity of the internal relays is also 16 A. Starting current of up to 30 A is permissible.

Attention!
Despite extensive protective measures targeted at preventing overloading, the relay contacts may be welded together if **starting current exceeds 30 A**.
Follow the procedure described below and observe information concerning defective relays.

Procedure

Be absolutely sure to adhere to the sequence specified below when switching the live device under test. This prevents excessive wear of the mains relays at the test instrument.

Before measurement:

1 **Device under test**: Turn the DUT off via its own switch.

2 **Test instrument**: Switch line voltage to the test socket.

3 **Device under test**: Turn the DUT on via its own switch.

Perform the measurement.

After measurement:

4 **Device under test**: Turn the DUT off via its own switch.

5 **Test instrument**: Deactivate line voltage to the test socket.

Safer Testing with Test Adapter

In the case of test objects for which a starting current of greater than 30 A can be expected, we urgently recommend the use of a test adapter for larger starting currents:
for example test adapters from the AT3 series
(AT3-IIIE, AT3-IIS, AT3-IIS32, AT16DI or AT32DI).

Alternative: Passive Test

If necessary on the basis of the hazard assessment, testing can be conducted as a passive test (equivalent leakage current method), i.e. without switching line voltage to the test socket.

Defective Relay ("L(N) test socket fuse defective")

If the following error message is displayed, the fuses and/or relays are defective:
"**L(N) test socket fuse defective**".

- ➪ Check both of the mains connection's fuse links. If they're defective replace them with new ones.
- ➪ If the error message described above still appears, it must be assumed that the relay is defective. If this is the case, the test instrument must be sent to our service department for repair (see section 22 "Contact, Support and Service").

14.2 Measurement with DUT Connected to Line Voltage

Attention!
Dangerous Touch Voltage!
Exposed parts may conduct dangerous touch voltage during testing.
Do not touch under any circumstances!
Use a special cover in order to avoid touch contact.

Mains power is disconnected by the instrument if leakage current exceeds approximately 10 mA (can also be set to 30 mA) (see section 13.2 "Residual Current Monitoring"). However, this does not fulfill the requirements specified for a PRCD.

Attention!
If the "PROCEED in case of limit violation" setting is used, enhanced safeguarding against touch contact and a 30 mA RCD must be used, and personal protective equipment (PPE) must be worn (secure workstation).

Attention!
The function test may only be performed after the DUT has successfully passed the safety test!

14.3 Measurement of Insulation Resistance and Equivalent Leakage Current (alternative leakage current measuring method)

Attention!
Electric Shock! Risk of Consequential Accidents!
Testing is conducted with up to 500 V. If terminals L or N at the test socket or the test probe are touched, electric shock may occur which could result in consequential accidents (despite current limiting for the test to < 3.5 mA).
Do not touch terminals L or N at the test socket or the test probe.

14.3.1 Measurements in IT Systems

The **IT system** setting can be activated for all single measurements and test sequences with the rotary switch in the **SETUP** position (Setup 1/3) via the **All Measurements** submenu (in this case the IT icon appears in the header of each display page):

with **"Meas. at IT Mains" set to Yes:** active leakage current measurements (or all measurements with reference to PE at the mains connection side) are disabled. Test sequences which include measurements of this sort are also disabled.

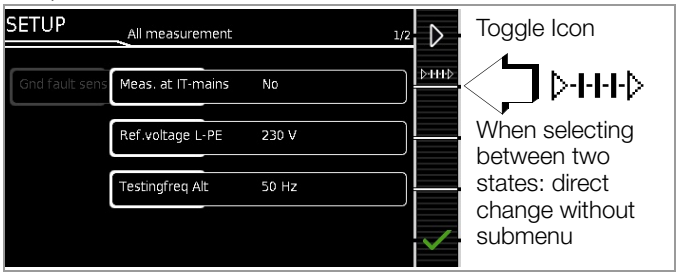
If, when being connected to line voltage, the test instrument detects a change at PE as compared with the previously used mains connection, the inspector is asked immediately after startup if the currently used outlet belongs to an IT system. The IT system option in SETUP is activated based on the user's answer. If "Meas. at IT Mains" is activated, this is indicated by the IT icon in the header.

Regardless of this, it's always possible to change the option manually in **SETUP.**

The setting for the "Meas. at IT Mains" option is retained even after disconnection from the mains.

In IT systems, active leakage current measurements (or any measurements with reference to PE at the mains connection side) do not deliver reliable measured values, for which reason all single measurements of this sort, as well as test sequences which include this type of measurement, are disabled when the "Meas. at IT Mains" option has been activated in **SETUP**.

The **Meas. at IT Mains** parameter can be set in Setup:
Setup 1/3 > All Measurements > **Meas. at IT Mains**



14.4 Next Test Date

The test instrument automatically determines when the next test is due. In this regard, the current test must be:

– Passed and

– Saved to memory

Calculation

The next test date is calculated using the selected standard interval (in months). The default setting is 12 months. This can be changed under SETUP > Auto Measurements > **Std. Interv. (Mon.)**.

Inclusion in Report

The due date for the next test is included by default in the report (see section 18 “Reports”).

This can be deactivated by setting **Next Test Date** to “Off” under SETUP > Test Reports.

Interaction with Individual Test Interval (of a test object in the database)

In the case of test instruments with feature KB01, the SECUTEST DB+ database extension (Z853R or feature KB01) or the SECUTEST DB COMFORT database extension (Z853S or feature KD01), each DUT can be assigned its own test interval. If a value has been entered to the “Test interval” field for the respective test object, this value will be used for calculation instead of the default interval.

Note
The individual test interval entered to the database for the test object has priority over the standard interval.
The default interval has no influence on the “Test interval” database field (no entry, no change of existing individual test intervals).

Refer to section 12 “Internal Database”, concerning the entry of individual test intervals.

Interaction with Test Intervals in IZYTRONIQ

In the case of test instruments with feature KB01 or the SECUTEST DB+ database extension (Z853R or feature KB01), data can be transferred from IZYTRONIQ to the test instrument. (See “Transferring and Saving Test Structures and Measurement Data (test instrument data base)” on page 95.)

A test interval can also be entered to IZYTRONIQ for each test object. If data are then transferred between IZYTRONIQ and the test instrument, existing data are overwritten/updated in either direction:

- Data transfer from IZYTRONIQ to the test instrument:
  The test interval specified in IZYTRONIQ is written to the test instrument’s database.
- Data transfer from the test instrument to IZYTRONIQ:
  The test interval specified in the test instrument’s database is written to IZYTRONIQ (and overwrites any existing interval there).

Note
The actual test dates – regardless of whether they’ve been calculated using the standard interval or the database interval – are NOT transferred to IZYTRONIQ!

15 Single Measurements

15.1 General

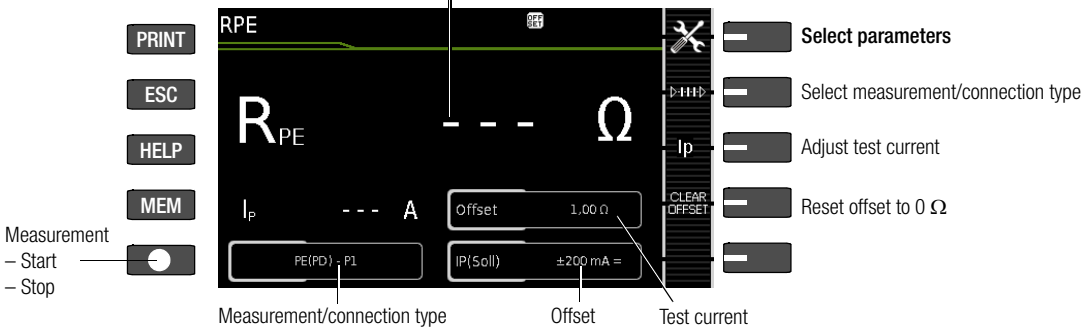
- The desired measurement is selected with the help of the green pointer on the rotary switch and the green semicircle.
- The respective measurement is configured with the help of the softkeys. The parameter settings can be accessed by pressing the softkey with the icon shown at the right.
- The **measurement type** parameter displayed in each case in the footer can be changed directly using the key shown at the right without having to exit the measuring view.
- Display and selection of **polarity** for line voltage at the test socket can be changed directly using the key shown at the right without having to exit the measuring view.
- No limit values can be specified for single measurements, and thus there's no evaluation.
- Checking is performed before each measurement in order to assure a trouble-free sequence, and to prevent any damage to the DUT.
- Single measurements can be saved to memory. The assignment of an ID is possible to this end.
- Single measurements can be combined into measurement series.
- Mains power can be connected to the device under test with the desired polarity by making a pre-selection in the parameter settings.

Measurement Status – Progress Bar

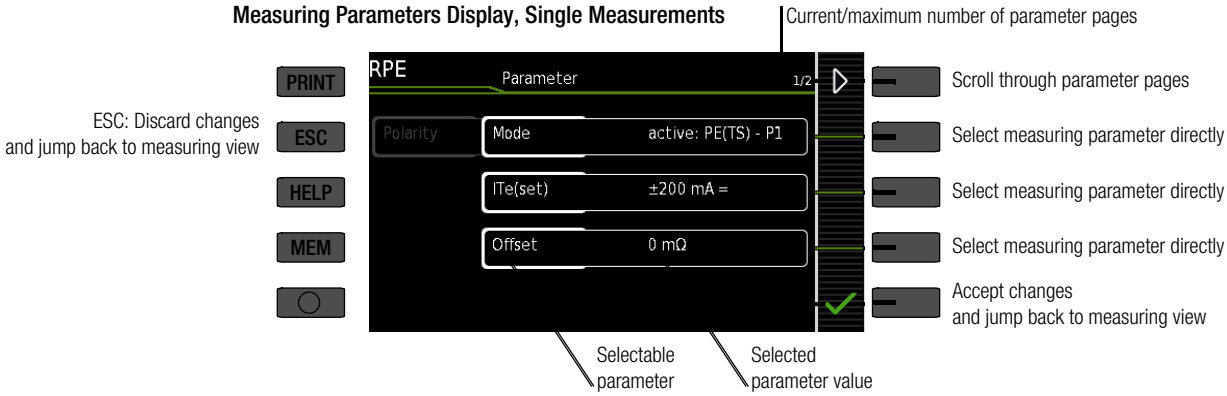
Measurement standstill (static line)

Measurement in progress (space is gradually filled in, pulsating)

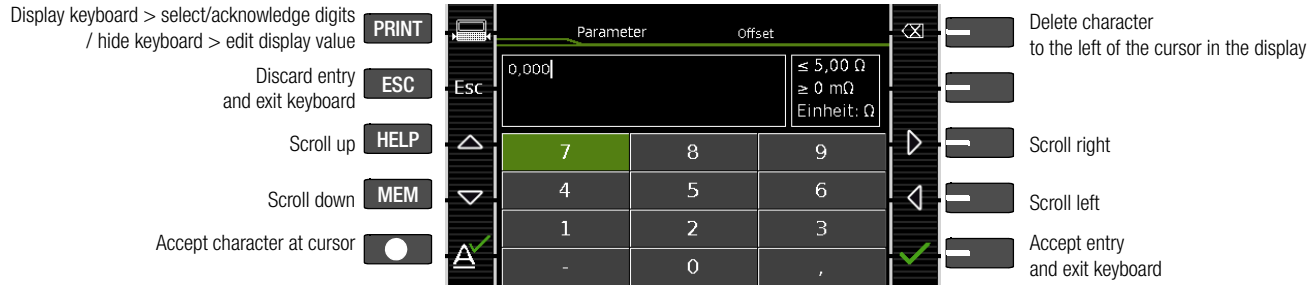
Measuring View, Single Measurements



Measuring Parameters Display, Single Measurements



Numeric Entry (for parameters UINS(set), Offset ...) via Softkeys with the SECUTEST ST BASE(10)



Numeric Entry (for parameters UINS(set), Offset ...) via Touchscreen Keyboard with feature E01 (e.g. SECUTEST ST PRO)

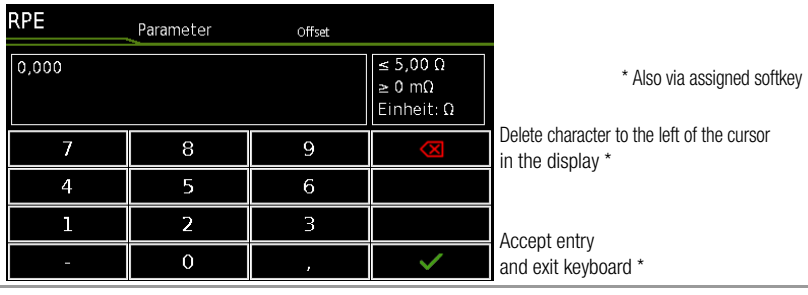


Figure 11 Configuring Single Measurements (parameters entry and display)

15.2 Meaning of Icons in the User Interface

Icon	Softkey Variants, Single Measurements
	Set parameters
	Accept changed parameters, acknowledge memory location
	Acknowledge messages during tests/measurements or continue test sequence
	Abort measurement
	Direct selection key for selecting measurement type
	Currently selected polarity: “normal” (green field) Pressing the key switches to “reversed” polarity
	Currently selected polarity: “reversed” (green field) Pressing the key switches to “normal” polarity
Ip	Direct selection key for selecting test current for protective conductor measurement
U+ **U–**	Direct selection key for changing voltage in 10 V steps for insulation measurement
	Start evaluation – record measured value. Each time this softkey is pressed, an additional measured value is saved and the number is increased by one.
ID	The ID number to which the measurement(s) will be stored can be entered here.
	Valid measured values have been obtained for a measurement. This measurement can be saved.
	Save measurement data as (with display of directory path / test object ID or new entry of a test object ID other than the preselected one)
1	Transmit measurement data to a PC, e.g. in order to save them to IZYTRONIQ report generating software (push-print function) – refer to IZYTRONIQ online help for description
A Ω V	Display measured values from performed measurements
A Ω V	**Magnifying glass icon:** show (+) or hide (–) details regarding database objects or selected measurements

15.3 Displaying the Last Measured Values

1 Start the measurement by pressing the **START**/STOP key
The icon shown at the right appears and indicates how many measurements have already been performed.

2 Stop the measurement by pressing the **START**/STOP key, unless a specified measuring time has been stipulated.
The save icon (floppy disk with a number 1) appears and indicates that one valid measured value has been recorded, which can now be saved.

3 Press the **save icon** (floppy disk).
“No DUT selected!” appears.

4 In order to view the last measured values, press the icon for executed measurements after testing. The last measured values are displayed.

5 The desired measurement can be selected with the scroll keys.

6 The associated measuring parameters can be shown or hidden using the keys shown at the right.

7 The measured value view is exited by pressing the green checkmark in order to subsequently save the measured values (as described in section 15.4) or to return to the initial view by pressing the ESC key.

15.4 Saving Single Measurements and Measurement Series

The measured value can be captured by pressing the save key or several measured values, i.e. a measurement series, can be acquired by repeatedly pressing the key. The save key indicates in each case whether one or several measured values have been acquired.

The measurements or measurement series can be saved after measurement has been completed.

Note
Measured values can only be added to intermediate buffer memory during a measurement.
If no measured values have been saved to buffer memory before the **STOP** key (interrupt/pause, end) is pressed, the last value is automatically saved so that no “empty” measurements or measurement series are saved.

Note
The storage process can be aborted: Press **ESC** twice in order to switch to the measuring view. If you press **ESC** again, a prompt appears asking whether or not you want to delete the measuring points in order to continue with the measurement without saving.

Note
Customer, location and other entries cannot be changed in the memory menu. These have to be selected directly in the database and entered or changed.

15.4.1 Measuring Sequence with Pre-Selection of the Test Object

You’ve already set up a test structure in the test instrument or uploaded one with the help of IZYTRONIQ software.

1 Activate the database view (MEM navigation) by pressing the **MEM** key.

2 Select the test object or its ID for the following measurements with the scroll keys.

3 Return to the measuring view by pressing the **ESC** key or the **START**/STOP key.

4 Start the test with the **START**/STOP key.
The icon shown at the right appears and the zero indicates that no measurements have yet been recorded or saved to buffer memory.

5 Each time the key shown at the right is pressed, the respectively current measured value is saved to buffer memory and the number shown in the icon increased.
In this way, you always know how many measurements have already been recorded.

6 End the measurement by pressing the **START**/STOP key (unless a specified measuring time has been stipulated).
The **Save as** icon appears (floppy disk icon with the number of measured values saved to buffer memory).

7 If you press the save icon now (floppy disk), the display is switched to the test object in the database view for checking.

8 After pressing the save icon once again, acknowledgement of successful storage appears.
At the same time, the display is switched to the measuring view.

15.4.2 Measuring Sequence with Subsequent Entry of the Test Object

You’ve already set up a test structure in the test instrument or uploaded one with the help of IZYTRONIQ software.

However, you perform the measurement without opening the database beforehand, i.e. you haven’t selected a test object before starting the measurement.

1 Start the measurement by pressing the **START**/STOP key
The icon shown at the right appears and indicates how many measurements have already been performed.

2 End the measurement by pressing the **START**/STOP key (unless a specified measuring time has been stipulated).
The save icon (floppy disk with a number 1) appears and indicates that one valid measured value has been recorded, which can now be saved.

3 Press the **save icon** (floppy disk).

4 You're informed that you haven't selected a test object in the database.

5 There are two ways to subsequently select your test object using an ID number which has already been set up in the database:
– Select the test object ID number with a **barcode scanner**.
or
– Enter a test object ID number by pressing the **ID** key.
(If the test object ID number isn't found, see section 15.4.3 "Measurement Procedure with Entry of a New Test Object at the End of the Test").

6 The cursor jumps to the location of the test object with the selected test object ID number. You only need to acknowledge this position by pressing the green checkmark.

7 Press the save icon (floppy disk).
A message appears indicating that the data have been successfully saved and the display is switched to the measuring view.

15.4.3 Measurement Procedure with Entry of a New Test Object at the End of the Test

If you haven't yet created a test structure in the test instrument, the test object can be initially created.

The same applies if you've already entered a test object ID number but it's not found (because it hasn't yet been saved to the database).

1 Start the measurement by pressing the **START**/STOP key
The icon shown at the right appears and indicates how many measurements have already been performed.

2 End the measurement by pressing the **START**/STOP key (unless a specified measuring time has been stipulated).
The save icon (floppy disk with a number) appears and indicates that one or more valid measured values have been captured, which can now be saved.

3 Press the **save icon** (floppy disk).
You're informed that you haven't selected a test object in the database.

4 Optional: If you want to view the measured values, press the **AΩV** key. Details concerning the individual measured value can be accessed via the **magnifying glass** icon.
Use the green checkmark in order to return to the memory menu.

5 Optional: Enter a comment via the icon which depicts a sheet of paper and a pencil.

6 Press the **ID** key.
You now have the option of entering a test object ID number. If you enter an ID here which is **not yet** included in the database, a prompt appears asking you if you want to enter a new test object.

Note
If you haven't yet set up a customer, you must do so now. Follow the instructions which appear in the dialog.

7 The test object can then be created:
– Select either device or ME equipment.
– (De)activate the QEDIT function (quick edit – with SECUTEST DB COMFORT only – Z853S or feature KD01 (see section 12.4).
If QEDIT is activated, you can fill in additional fields for the test object in the next step.
Confirm with the green checkmark.

8 If you activated the QEDIT function in the previous step, you can now fill in all the test object's fields. Confirm with the green checkmark.

9 An overview of the database appears along with the newly created test object.
Press the **save icon** (floppy disk) in order to store the measurement results. A message appears indicating that the data have been successfully saved and the display is switched to the measuring view.

Note
The storage process can be aborted by pressing the **ESC** key. The display is returned to the memory menu. All measured values can be deleted by once again pressing the **ESC** key.

15.4.4 Alternative: Transferring Measurement Data to the PC (IZYTRONIQ – push-print)

You can send the test results to a PC on which IZYTRONIQ software is running. This function is known as "push-print" and can be implemented via USB or Bluetooth®.

Database extension SECUTEST DB COMFORT (Z853S or feature KD01) and, if applicable, feature M01 (Bluetooth®) are required to this end.

Complete information regarding push-print and a description of the application can be found in IZYTRONIQ online help.

15.5 Abbreviations for Measuring Functions (overview)

Measuring Function	Rotary Switch Position	Displayed Abbreviation per Language			
		D	GB	F	I
Protective conductor resistance	**RPE**	RPE	RPE	RPE	RPE
Test current	**IP**	IP	IP	IP	IP
Insulation resistance	**RINS**	RISO	RINS	RISO	RISO
Test voltage	**RINS**	UISO	UINS	UISO	UISO
Protective conductor current	**IPE**	IPE	IPE	IPE	IPE
Touch Current	**IT**	IB	IT	IT	IT
Device leakage current	**IE**	IG	IE	IE	IE
Leakage current from applied part	**IA**	IA	IA	IA	IA
Patient leakage current	**IP**	IP	IP	IP	IP
Probe voltage	**U**	U	U	U	U
Measuring voltage	**U**	U	U	U	U
Test voltage	**IPE, IT, IE, IA, IP**	UL-PE	UL-PE	UL-PE	UL-PE
Reference voltage	**IPE, IT, IE, IA**	U_{Gen}	U_{Gen}	$U_{Gén.}$	$U_{\simeq}$
Function test	**P**	FT	FT	FT	FT
Temperature measurement	**EXTRA**	T[°C]	T_C	T[°C]	T_C
Temperature measurement	**EXTRA**	T[°F]	T_F	T[°F]	T_F
PRCD time to trip	**tPRCD**	tA	tB	tA	tB
Current clamp measurement	**EXTRA**	IZ~	ICL~	ICL~	ICL~

15.6 Measuring Protective Conductor Resistance – RPE

Single Measurements, *Rotary Switch Level: Green*					
Rotary Switch Position	Meas. Type With Mains to Test Socket	Meas. Type Without Mains to Test Socket	Measuring Functions R_{PE} Protective conductor resistance; Ip Test current		
			200 mA	10 A [1]	25 A [1]
R_{PE}		Passive: PE(TS) - P1	•	•	•
	Active: PE(TS) - P1 [4]		•		
		PE(mains) - P1	•	•	
		PE(mains) - P1 clamp [3]		•	
		P1 - P2 [2]	•	•	•

[1] 10/25 A RPE measurements are only possible with line voltages of 115/230 V and line frequencies of 50/60 Hz.

[2] Connection for 2nd test probe for two-pole measurement with test instrument including feature H01(e.g. SECUTEST ST PRO/SECULIFE ST BASE(25))

[3] Can only be selected if the IP(set) parameter has been set to 10 A~, only with test instruments including feature G01 (e.g. SECUTEST ST PRO/SECULIFE ST BASE)

[4] Can only be selected with SECUTEST ST BASE or if the IP(set) parameter has been set to 200 mA.

Application, Definition, Measuring Method

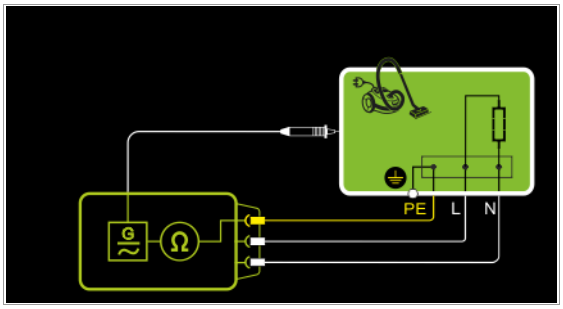
Protective conductor resistance is the sum of the following resistances:

- Connector cable or device connector cable resistance
- Contact resistance at plug and terminal connections
- Resistance of the extension cord if applicable

Protection Class I DUTs

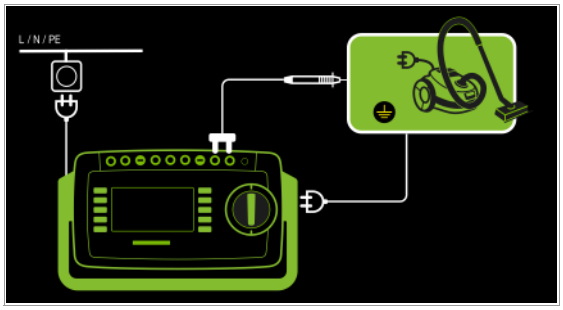
– *Measurement type PE(TS) - P1 (passive)*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

Schematic Diagram



Protective conductor resistance is measured between the earthing contacts at the mains plug and the earthing contact connected to the housing by contacting the housing with test probe P1.

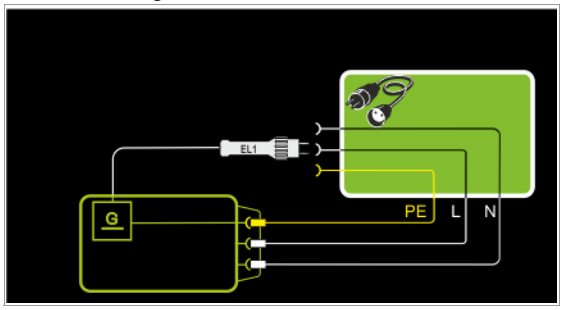
Wiring Diagram



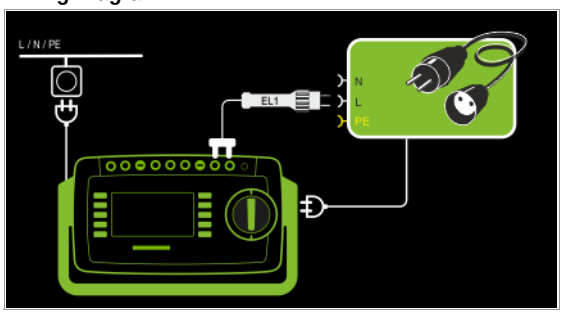
Measurement of RPE at Single-Phase Extension Cords with EL1

– *Measurement type PE(TS) - P1 (passive)*
– Extension cord plug to test socket
– EL1 to P1 terminals

Schematic Diagram



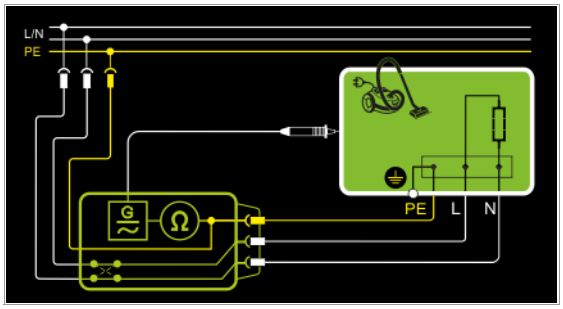
Wiring Diagram



Protection Class I DUTs
Special Case: Line Voltage at Test Socket (for testing PRCDs)

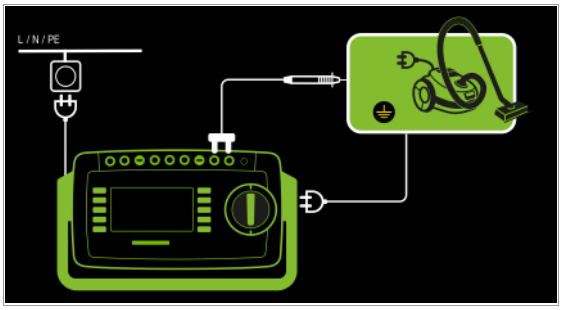
– *Measurement type PE(TS) - P1 (active)*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

Schematic Diagram



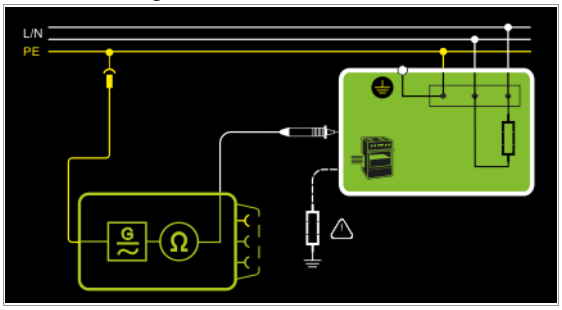
Protective conductor resistance is measured between the earthing contacts at the mains plug and the earthing contact connected to the housing by contacting the housing with test probe P1.

Wiring Diagram



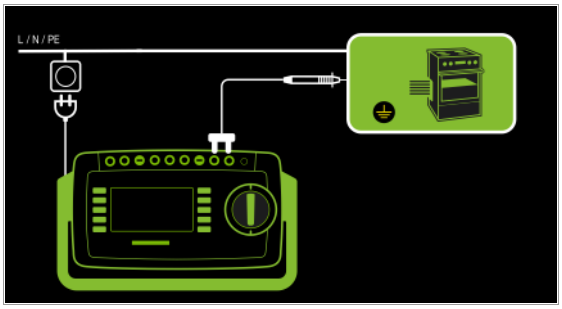
Protection Class I DUTs
Special Case: Permanently Installed DUTs
– *Measurement type PE(mains) - P1*
– Test probe P1 to P1 terminals

Schematic Diagram



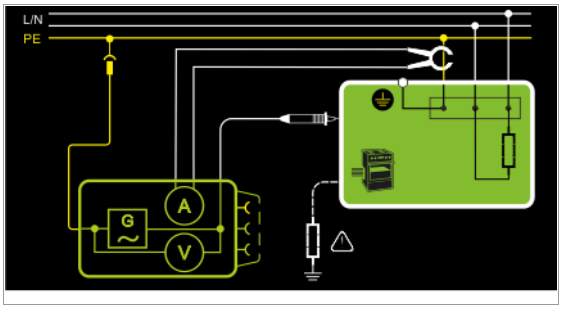
In the case of *permanently installed DUTs*, protective conductor resistance is measured between the mains power earthing contact and the earthing contact connected to the housing by contacting the housing with test probe P1.

Wiring Diagram



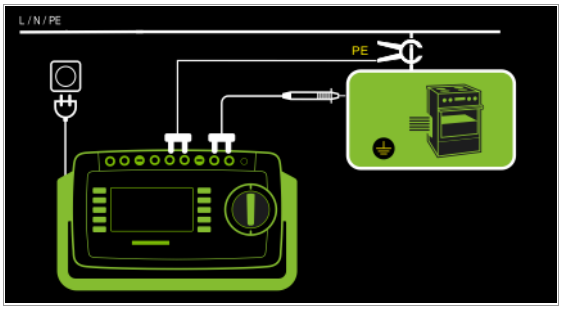
Measurement via current clamp sensor at permanently installed DUTs (only with test instruments including features I01 and G01)
– *Measurement type PE(mains) - P1 clamp*
– Test probe P1 to P1 terminals
– Clamp to COM-V (only with optional current clamp sensor)

Schematic Diagram



Measurement of test current by closing the current clamp sensor around mains PE and contacting the housing with test probe P1 for permanently installed protection class I devices under test

Wiring Diagram



Set measuring range at clamp and parameters at instruments with feature G01

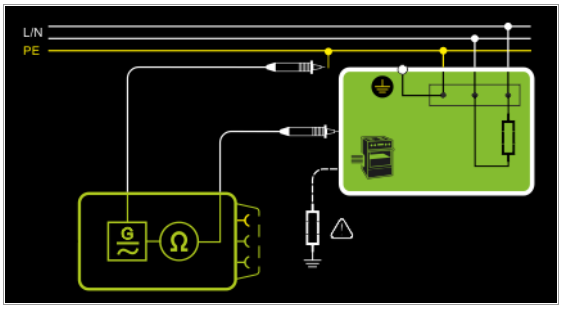
This measurement type can only be selected if test current is set to 10 A AC.

SSECUTEST ST PRO	Clamp		SECUTEST ST PRO
Transformation ratio parameter	Transformation ratio (switch *)	Measuring range	Display range with clamp
1 mV : 1 mA	WZ12C		
	1 mV : 1 mA	1 mA ... **15 A**	0 mA ... 300 A

* Only with WZ12C

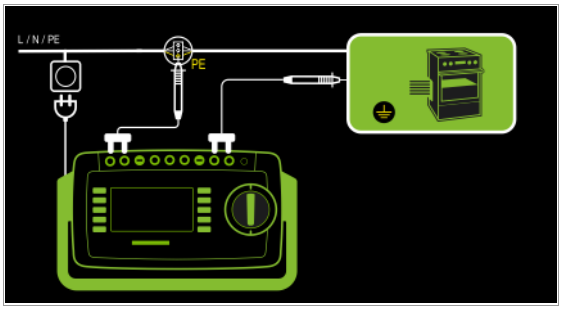
2-Pole Measurement at Permanently Installed DUTs (only test instruments with feature H01, e.g. SECUTEST ST PRO)
– *Measurement type P1 - P2*
– Test probe P1 to P1 terminals
– Test probe P2 to P2 terminals

Schematic Diagram



PE at the mains connection is contacted with the second test probe instead of via the test instrument's mains plug.

Wiring Diagram



Resistance is measured:

- Between each exposed *conductive part of the housing* and the earthing contacts at the mains and the device plug (if a removable mains connector cable is used), or the protective conductor terminal for permanently installed DUTs.
- As 4-pole measurement
- Between the earthing contacts at the mains plug and the earthing contacts at the device plug for *device connector cables*
- Between the earthing contacts at the mains plug and the earthing contacts at the coupling socket for *extension cords*

Setting Measuring Parameters for RPE

Measuring Parameter	Meaning	
Meas. Type		**Suitable for DUT Connection via**
(passive:) PE(TS) – P1	Testing is conducted between the two protective conductor terminals: at the test socket and test probe P1.	Test socket, EL1 with DUT at test socket, VL2E, AT3 adapter (AT3-IIIE, AT3-IIS, AT3-IIS32), AT16DI/AT32DI
Active: PE(TS) – P1 [1]	Same as **PE(TS) – P1**, but with line voltage to the test socket – 200 mA AC flows immediately. A ramp-like, slowly rising DC test current flows (PRCD triggering is avoided) at +200 mA DC, -200 mA DC and ±200 mA DC.	Test socket (for PRCDs)
PE(mains) – P1 *Permanently connected DUTs*	Testing is conducted between the ground terminal at the mains and test probe P1.	Permanent connection
P1 – P2	Feature H01(e.g. SECUTEST ST PRO/SECULIFE ST BASE): 2-pole measurement between test probes 1 and 2 (see section 13.7)	Permanent connection
Clamp [2]	Features G01 and I01 (e.g. SECUTEST ST PRO/ SECULIFE ST BASE): Test current measurement with current clamp sensor	Permanent connection
IP(set)		
+200 mA DC	Test current: positive direct current	
-200 mA DC	Test current: negative direct current	
±200 mA (DC)	Test current: direct current whose polarity is reversed every 2 seconds	
200 mA (AC)	Test current: alternating current, adjustable frequency f, see below	
10 A (AC)	10 A test current, only with feature G01 (e.g. SECUTEST ST BASE(10) or PRO)	
25 A (AC)	25 A test current, only with feature G02 (e.g. SECULIFE ST BASE25)	
f – only at 200 mA (AC)		
50 ... 200 Hz	Test frequency (adjustable in steps: 50, 60, 110, 150, 200 Hz)	
Offset		
> 0 ... < 5 Ω	Zero balancing for a selected reference point.	
Clamp factor – only for clamp measurement type		
1 mV : 1 mA	Transformation ratio of the WZ12C current clamp sensor. For setting the current clamp factor at the WZ12C clamp and the SECUTEST ST PRO (see table above).	

[1] Measurement cannot be performed with 10/25 A AC for this measurement type.

[2] Feature G01 (e.g. SECUTEST ST PRO / SECULIFE ST BASE): This type of measurement can only be selected if a test current of 10 A AC has been chosen.

Entering and Deleting Offset Values

The test instrument determines protective conductor resistance by means of a 4-pole measurement. If measurement cables or extension cords are used whose ohmic resistance should be automatically subtracted from the measurement results, there are two ways to save the respective offset value in the R_{PE} rotary switch position:

- Entry via the numeric keypad
- Acceptance of the momentary measured value by pressing the **SET OFFSET** softkey

Proceed as follows in order to accept the measured value:

➪ Start the measurement and wait until the measured value settles in.

➪ Press the **SET OFFSET** key. The value is transferred to the offset field.

The entered or accepted offset value is permanently stored and is subtracted from all protective conductor resistance values measured in the future. This applies to single measurements as well as to measurements conducted in the A9 rotary switch positions. The OFFSET icon is displayed in the header in all rotary switch positions until the offset value is deleted by pressing the **CLEAR OFFSET** softkey (rotary switch position R_{PE}).

Protective Conductor Current Measurement with 25 A AC

In accordance with numerous product standards, at least 25 A must be achieved with a load of 0.1 Ω and a maximum voltage of 0.6 V.

Continuous protective conductor resistance measurement with a test current of 25 A isn't possible due to contact resistance at the jacks.

If the test instrument is operated at room temperature, an uninterrupted **test duration of at least15 seconds** is possible. Under other conditions, maximum test duration may be shorter and/or the measurement may be prematurely terminated.

Attention!
Suitable measurement cables with a minimum wire cross-section of 2.5 mm must be used when measuring protective conductor resistances with a "25 A AC" test current.
Included with the SECULIFE ST BASE25: suitable test probe with **green** reinforcing sleeve.
For subsequent orders, we recommend the SK2-25A test probe (Z746C).
Under certain circumstances, the required standard values might not be complied with if unsuitable accessories are used.

Attention!
Measurement duration with a 25 A test current is limited (see technical data).
An error message is generated if measurement duration is exceeded which results in a temperature increase at the test instrument.

Test Procedure with Connection to the Test Socket

- Set the rotary switch to the R_{PE} position.
- Select measurement type or connection type, as well as test current. After pressing the **Ip** key, you have direct access to the test current parameters: each time this key is pressed, the setpoint value shown in the measuring window is switched to the next value.
- Connect the DUT to the test socket.
- **Start the test:** Press the **START**/STOP key.

- Contact all conductive parts which are connected to the protective conductor with test probe P1.

During measurement, the **connector cable** only needs to be moved to the extent to which it's accessible during repair, modification or testing.
If a change in resistance occurs during the manual step of the continuity test, it must be assumed that the protective conductor is damaged, or that one of the connector contacts is no longer in flawless condition.

- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory.

- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.

- Read the measured values and compare them with the table of permissible limit values.
- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

Special Case: Testing Extension Cords

- Set the measurement type parameter to "PE(TS) – P1".
- Connect the EL1 adapter to the P1 sockets at the test instrument.
- Connect the plug at the end of the extension cord to the test socket.
- Connect the coupling socket at the end of the extension cord to the plug at the EL1 adapter.
- The test procedure is the same as described above.

Further options for testing extension cords are included in the description of the single measurement in the EL1 rotary switch position and under the integrated test sequences.

– VDE 0701-0702-VLTG / ÖVE E 8701-VLTG / SNR 462638-VLTG,
– EN 50678-VLTG / VDE 0701-VLTG,
– EN 50669-VLTG / VDE 0702-VLTG.

Special Case: Permanently Installed DUT

- Contact the conductive parts of the housing with test probe P1.

Special Case: Testing Protective Conductor Resistance at PRCDs

For PRCDs whose protective conductor resistance cannot be measured when switched off, the SECUTEST ST BASE(10) offers the "active: PE(TS) - P1" measurement type, with which the PRCD can be switched on in order to ascertain protective conductor resistance.

- Set the measurement type parameter to "active: PE(TS) – P1".
- Connect the EL1 adapter (or a standard test probe as an alternative) to the P1 sockets at the test instrument.
- Connect the PRCD to be tested to the test socket via its plug.
- Connect the EL1 adapter to the outlet on the PRCD (alternative: connect the test probe to the protective conductor of the PRCD's outlet, e.g. by means of an alligator clip).
- Start the measurement.
- Switch line voltage to the test socket. Then switch the PRCD on.
- Otherwise, the test procedure is the same as described above.

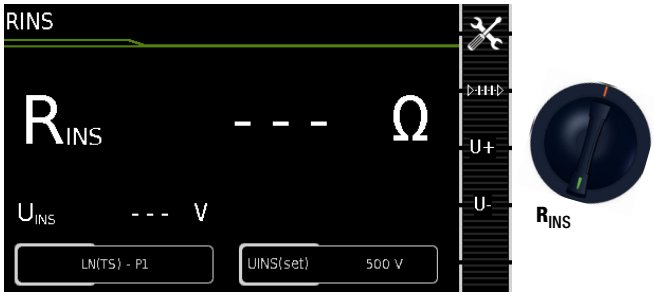
Note
With the +200 mA=, -200 mA= and ±200 mA= measurement types, test current rises very slowly in order to prevent triggering of residual current monitoring at the PRCD. And thus with this measurement type, it may take longer than usual until a valid measured value is displayed. For this reason, the protective conductor should not be contacted manually with the test probe, in order to prevent a sudden rise in test current resulting in inadvertent tripping of the PRCD.

Maximum Permissible Limit Values for Protective Conductor Resistance with Connector Cable Cross-Sections of up to 1.5 mm²

Test Standard	R_{PE} Housing – Device Plug	R_{PE} Housing – Mains Plug	Mains Cable
IEC 60974-4 / EN 60974-4 / VDE 0544-4 EN 50678 / VDE 0701 VDE 0701-0702 / ÖVE E 8701 / SNR 462638		0.3 Ω + 0.1 Ω [1] for each additional 7.5 m or + 100 mΩ at > 1.5 mm² raw *l/A	
IEC 62353 / EN 62353 / VDE 0751-1	0.2 Ω	0.3 Ω	0.1 Ω
IEC 62368 / EN 62368 / VDE 0868-1 **IEC 62911 / EN 62911 / VDE 0868-911**	0.1 Ω		

[1] Total protective conductor resistance: max. 1 Ω

15.7 Insulation Resistance Measurement – RINS



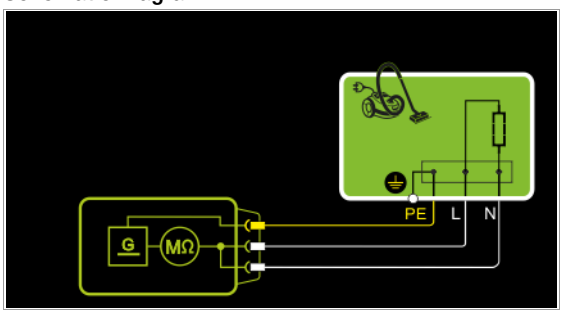
Single Measurements, *Rotary Switch Level: Green*			
Rotary Switch Position	Measuring Functions		Meas. Type Without Mains to Test Socket
R_{INS}	R_{INS}	**Insulation resistance (PC I / PC II)**	LN(TS) - PE(TS) LN(TS) - P1 P1 - P2 [1] PE(mains) - P1 PE(TS) - P1 LN(TS) - P1//PE(TS)
	U_{INS}	Test voltage	

[1] Connection for 2nd test probe for two-pole measurement with test instrument including feature H01 (e.g. SECUTEST ST PRO)

Application, Definition, Measuring Method

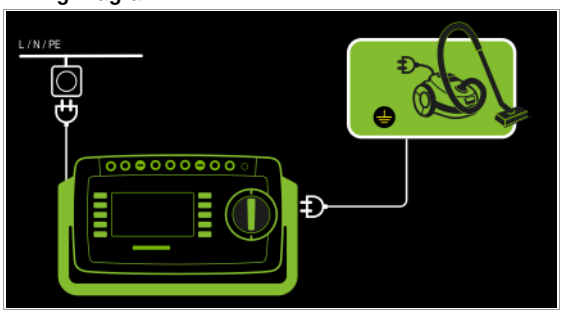
Protection Class I DUTs
– *Measurement type LN(TS) - PE(TS)*
– DUT mains plug to test socket

Schematic Diagram



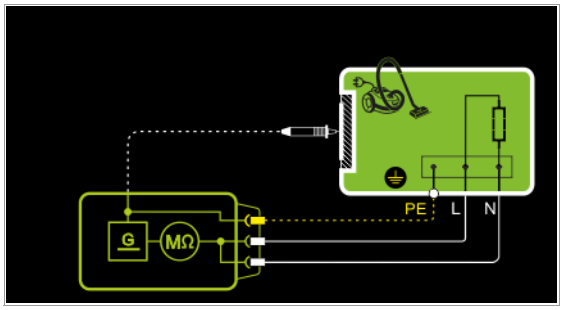
Insulation resistance is measured between short-circuited mains terminals (L-N) and protective conductor PE.

Wiring Diagram



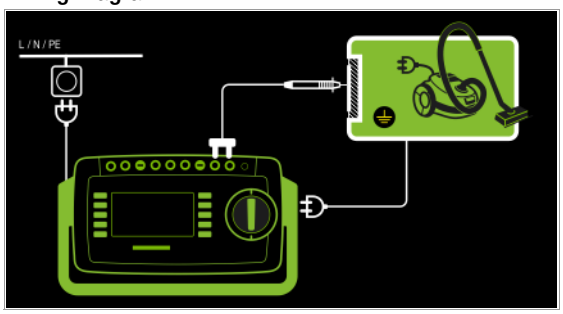
Protection Class II DUTs with Exposed Conductive Parts
– *Measurement type LN(TS) - P1*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

Schematic Diagram



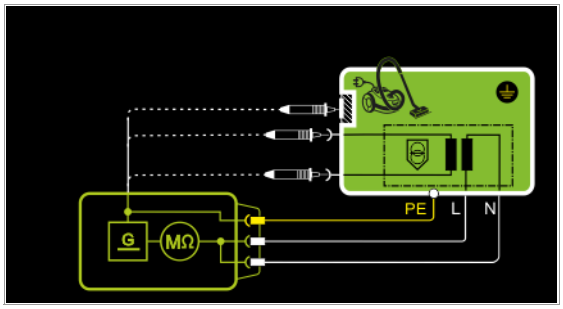
Insulation resistance is measured between short-circuited mains terminals (L-N) and external conductive parts which can be contacted with test probe P1 and are **not** connected to the housing.

Wiring Diagram



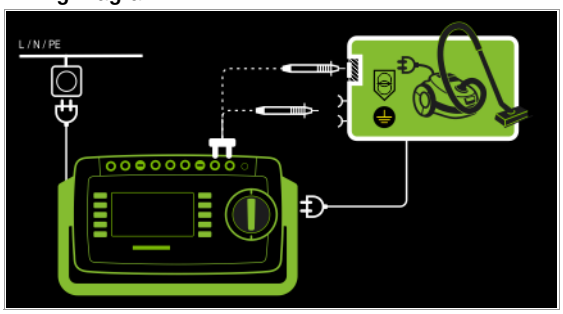
Protection Class II DUTs with Outputs for Safety Extra-Low Voltage
– *Measurement type LN(TS) - P1*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

Schematic Diagram



Insulation resistance is measured between short-circuited mains terminals (L-N) and the short-circuited safety extra-low voltage outputs which are contacted with probe P1.

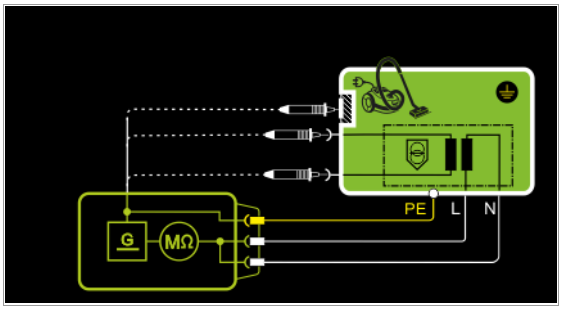
Wiring Diagram



Protection Class I DUTs with Outputs for Safety Extra-Low Voltage and Exposed Conductive Parts

– *Measurement type LN(TS) - P1*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

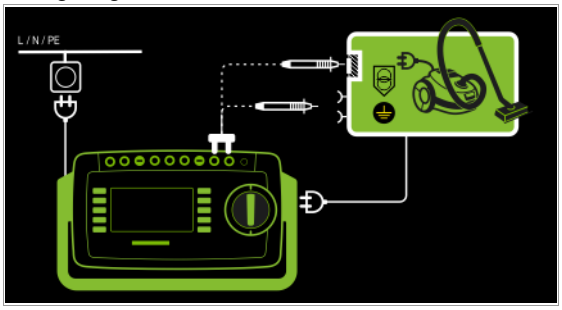
Schematic Diagram



Insulation resistance is measured successively between short-circuited mains terminals (L-N) and the safety extra-low voltage outputs which can be contacted with test probe P1, as well as external conductive parts which are **not** connected to the housing.

If measuring points should be contacted one after the other, this is indicated by a dashed line. However, there are two parallel measuring circuits for the RISO measurement with the LN(TS) – P1//PE(TS) measuring parameter, which are established simultaneously to the short-circuited L and N conductors: one insulation resistance is measured via PE at the test socket and, at the same time, a second insulation resistance is measured via test probe P1.

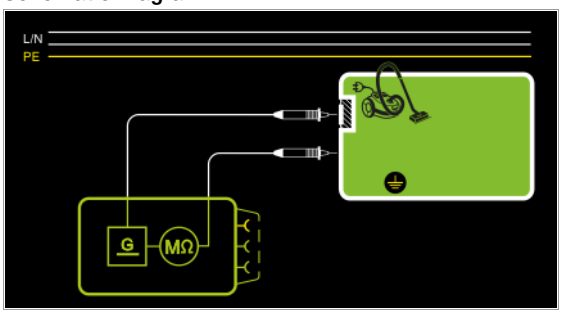
Wiring Diagram



2-Pole Measurement at Protection Class I Housing Parts (only with feature H01, e.g. SECUTEST ST PRO)

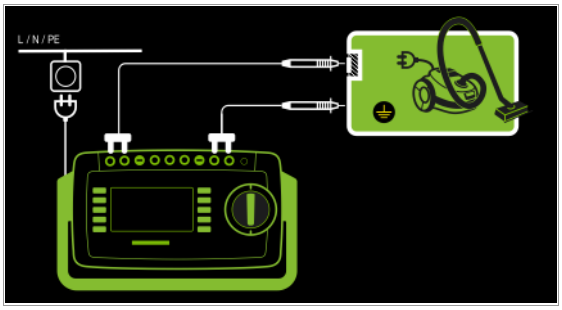
– *Measurement type P1 - P2*

Schematic Diagram



Insulation resistance is measured between external conductive parts which can be contacted from the outside with test probe P2 and are **not** connected to the housing, and the housing with test probe P1.

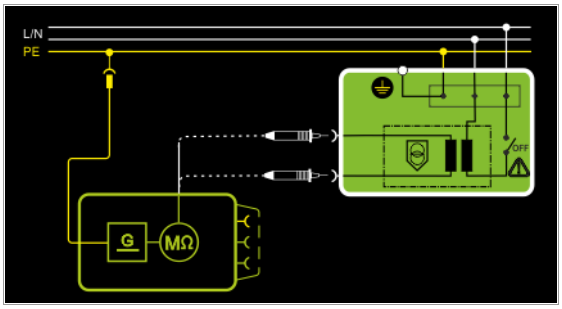
Wiring Diagram



Special Case: Permanently Installed Protection Class I DUTs

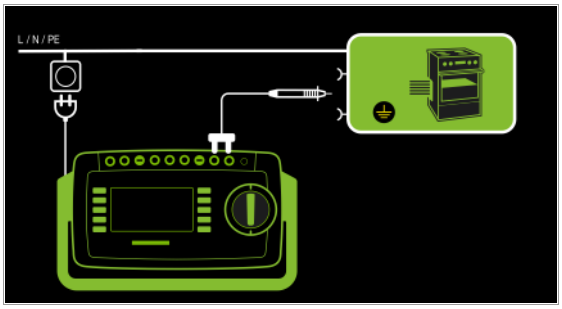
– *Measurement type PE(mains) - P1*
– Test probe P1 to P1 terminals

Schematic Diagram



Insulation resistance is measured successively between PE at the mains connection and the extra-low voltage inputs by contacting each of them with test probe P1.

Wiring Diagram

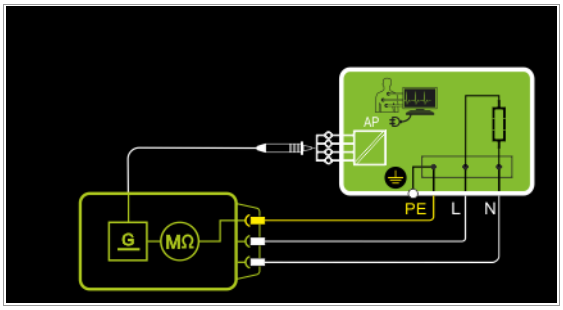


Attention!
Before connecting the DUT, deactivate the electrical system which supplies power to it!

- Remove the mains fuses from the device under test and disconnect neutral conductor N inside the device under test.
- Connect test probe P1 to phase conductor L at the device under test in order to measure insulation resistance.

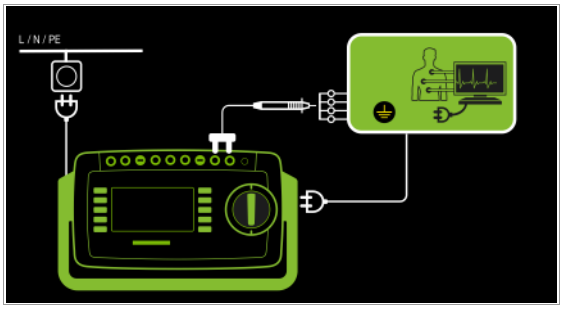
Protection Class I DUTs with Terminals for Applied Parts
– *Measurement type PE(TS) - P1*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

Schematic Diagram



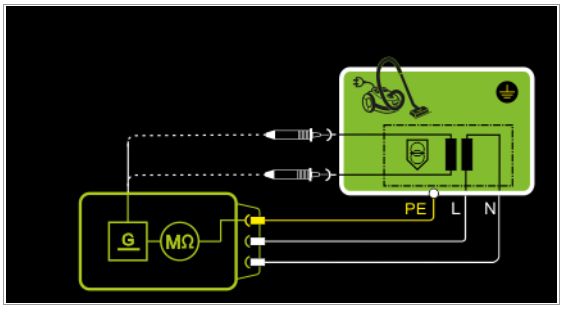
Insulation resistance is measured between protective conductor terminal PE and external, short-circuited applied parts which can be contacted with test probe P1.

Wiring Diagram



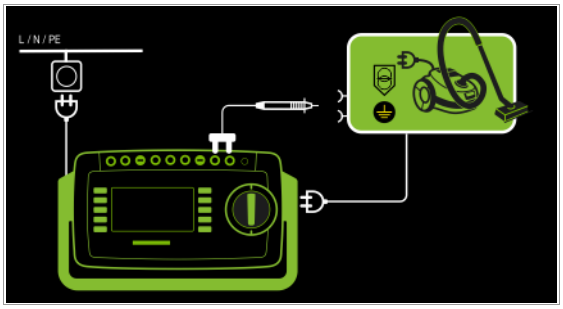
Protection Class I DUTs with Outputs for Safety Extra-Low Voltage
– *Measurement type PE(TS) - P1*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

Schematic Diagram



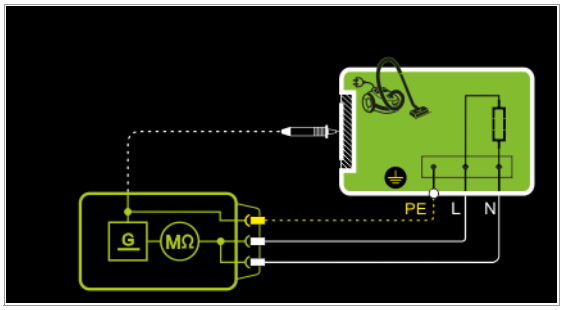
Insulation resistance is measured between the PE terminal and the safety extra-low voltage outputs, which must be contacted one after the other with probe P1.

Wiring Diagram



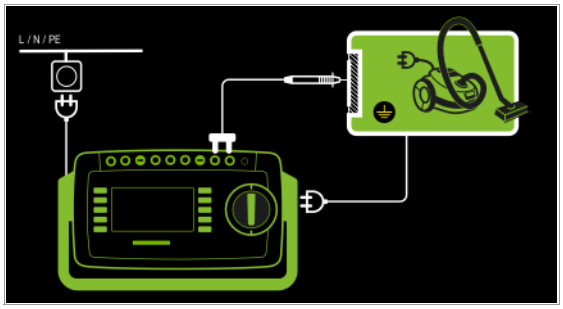
Protection Class I DUTs with Exposed Conductive Parts
– *Measurement type LN(TS) - P1//PE(TS)*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

Schematic Diagram



Insulation resistance is measured between short-circuited mains terminals (L-N) and external conductive parts which can be contacted with test probe P1 and are **not** connected to the housing, as well as protective conductor terminal PE at the housing.

Wiring Diagram



Setting Measuring Parameters for RINS

Measuring Parameter	Meaning	
Meas. Type		**Suitable for DUT Connection via**
LN(TS)-PE(TS)	PC I: Testing is conducted between short-circuited LN mains terminals at the test socket and the DUT's PE terminal.	Test socket, EL1, VL2E, AT3 adapter (AT3-IIIE, AT3-IIS, AT3-IIS32), AT16DI/AT32DI, CEE adapter
LN(TS)-P1	Testing is conducted between short-circuited LN mains terminals at the test socket and test probe P1.	Test socket, VL2E, AT3 adapter (AT3-IIIE, AT3-IIS, AT3-IIS32), AT16DI/AT32DI,
P1 – P2	Feature H01(e.g. SECUTEST ST PRO): 2-pole measurement between test probes 1 and 2 (see section 13.7)	No connection (PC3)
PE(mains)-P1	Cable test: Testing is conducted between the ground terminal at the mains and test probe P1.	Permanent connection
PE(TS)-P1	Testing is conducted between the PE terminal at the test socket and test probe P1.	Test socket
LN(TS)-P1 // PE(TS)	Testing is conducted between short-circuited LN mains terminals at the test socket and test probe P1, including PE at the test socket.	Test socket, VL2E, AT3 adapter (AT3-IIIE, AT3-IIS, AT3-IIS32), AT16DI/AT32DI,
UINS(set)		
> 50 ... < 500 V	Variable test voltage can be entered with the numeric keypad	

Test Procedure

Attention!
Prerequisite for Testing
Measurement of insulation resistance may not be conducted on protection class I DUTs which have not passed the protective conductor resistance test.

The insulation test cannot be performed for all DUTs, for example electronic devices, EDP equipment, medical devices etc. Leakage current measurements must be performed for these DUTs (see section 15.8).
Observe the notes in the service instructions.

Attention!
In order to prevent damage to the DUT, measurement of insulation resistance may only be performed between applied parts, measurement inputs or interfaces and the protective conductor or the housing if the DUT is laid out for measurements of this type.

Attention!
Touching the DUT During Measurement
Testing is conducted with up to 500 V, and although current is limited (I < 3.5 mA), if the DUT is touched electrical shock may occur which could result in consequential accidents.

Attention!
Switch Settings at the DUT
All switches at the DUT must be set to the on position during measurement of insulation resistance – including temperature controlled switches and temperature regulators.
Measurement must be performed in all program steps for devices equipped with program controllers.

- Set the rotary switch to the R_{INS} position.
- Select the measurement type:
  – By setting the parameters
  or
  – Directly via the **Measurement Type** key
- Select the test voltage.
  The **Up–** and **Up+** keys provide you with direct access to the test voltage parameters: each time this key is pressed, the setpoint value shown in the measuring window, Up(set), is reduced or increased by 10 V.
- Connect the DUT to the test socket.
- **Start the test:** Press the **START**/STOP key.
- Switch the device under test on.

Note
The measurement is disabled if a voltage of greater than 25 V is measured between the terminals.

- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory.
- Turn off the device under test.

Attention!
Removing the Connector Cable
Do not remove the DUT's connector cable until the test has been stopped, in order to assure that the capacitors have been discharged.

- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.
- Read the measured values and compare them with the table of permissible limit values.
- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

Minimum Permissible Limit Values for Insulation Resistance

Test Standard	Test Voltage	R_{ISO}				
		LN → PE	LN → Probe	Probe → PE	PC III	Heating
VDE 0701-0702 / ÖVE E 8701 / SNR 462638 EN 50678 / VDE 0701 EN 50699 / VDE 0702	500 V	1 MΩ	2 MΩ	—	0.25 MΩ	0.3 MΩ *
IEC 60974-4 / EN 60974-4 / VDE 0544-4		2 MΩ	5 MΩ	5 MΩ		

* With activated heating elements (where heating power > 3.5 kW and R_{ISO} < 0.3 MΩ: leakage current measurement is required)

Test Standard	Test Voltage	R_{ISO}	
		PC I	PC II
IEC 62353 / EN 62353 / VDE 0751-1	500 V	2 MΩ	7 MΩ
		BF or CF 70 MΩ	BF or CF 70 MΩ

Notes

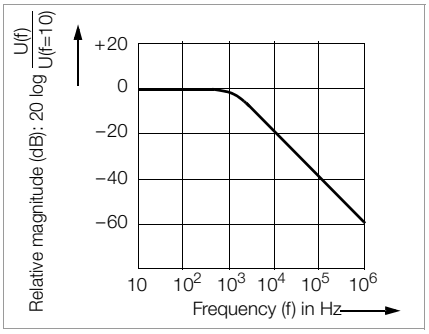
Insulation resistance and/or leakage current must be measured for protection class II and III DUTs, as well as for battery powered DUTs, by contacting all exposed conductive parts with test probe P1.

Batteries must be disconnected during testing of battery powered DUTs.

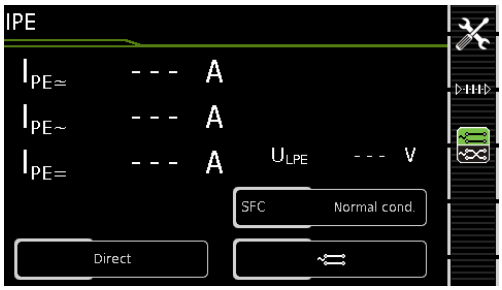
15.8 Measuring Leakage Current

Attention!
Measurement with DUT Connected to Line Voltage
It's absolutely essential to assure that the device under test is operated with line voltage during performance of **leakage current measurements with the direct or differential current method**. Exposed conductive parts may conduct dangerous touch voltage during testing, and may not under any circumstances be touched.
Mains power is disconnected if leakage current exceeds approximately 10 mA (can also be set to 30 mA).

Frequency response in accordance with the figure to the right is taken into consideration for all leakage current measurements (**IPE**, **IT**, **IE**, **IP**) (direct, differential, alternative).



15.8.1 Protective Conductor Current – IPE



Single Measurements, *Rotary Switch Level: Green*			
Rotary Switch Position	Meas. Type With Mains to Test Socket	Meas. Type Without Mains to Test Socket	Measuring Functions
I_{PE}	Direct		$I_{PE\simeq}$ **Protective conductor current, RMS** $I_{PE\sim}$ AC component $I_{PE=}$ DC component U_{LN} Test voltage
	Differential		$I_{PE\simeq}$ **Protective conductor current, RMS** U_{LN} Test voltage
		Alternative	$I_{PE\simeq}$ **Protective conductor current, RMS** $U_{\simeq}$ Test voltage
	AT3 adapter [1]		$I_{PE\simeq}$ **Protective conductor current, RMS** U_{LN} Test voltage
		Clamp [2]	$I_{PE\simeq}$ **Protective conductor current, RMS** U_{LN} Test voltage

[1] Adapter AT3-IIIE, AT3-IIS or AT3-II S32:
Voltage measuring inputs for leakage current measurement with differential method only with test instrument including feature I01 (e.g. SECUTEST ST PRO)

[2] Voltage measuring inputs for leakage current measurement with differential method and use of a current clamp sensor only with test instrument including feature I01 (e.g. SECUTEST ST PRO)

Application

Protective conductor current must be measured for protection class I DUTs.

Definition of Protective Conductor Current (direct measurement)

Current which flows through the protective conductor in the case of housings which are isolated from ground.

Definition of Differential Current

Sum of instantaneous current values which flow via the L and N conductors at the DUT's mains connection. Differential current is practically identical to fault current in the event of a fault. Fault current: current which is caused by an insulation defect, and which flows via the defective point.

Definition of Alternative Measuring Method (equivalent leakage current)

Equivalent leakage current is current which flows through the DUT's active conductors, which are connected to each other (L/N), to the protective conductor (PC1) or to the exposed, conductive parts (PC2).

Differential Current Measuring Method

The device under test is operated with mains power. The sum of the momentary values of all current which flows through all active conductors (L/N) at the mains side of the test instrument connection is measured. The measurements must be performed with mains plug polarity in both directions.

Alternative Measuring Method (equivalent leakage current)

A high-impedance power supply is connected between the short-circuited mains terminals and all exposed metal parts of the housing (which are connected to each other).
Current which flows over the insulation at the device under test is measured.

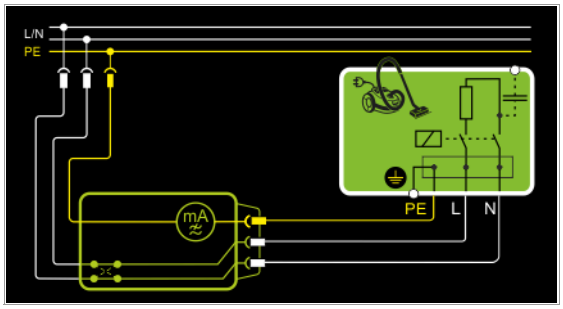
Protective Conductor Current Measuring Method (direct measurement)

The device under test is operated with mains power. Current which flows through the PE conductor to earth at the mains side of the test instrument connection is measured.

Note
Regardless of the currently selected connection type, all help images and schematic diagrams can be queried for the selected measuring function.

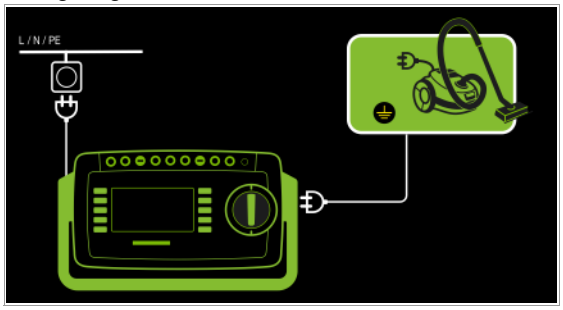
Direct measuring method
– *Direct measurement type*
– DUT mains plug to test socket

Schematic Diagram



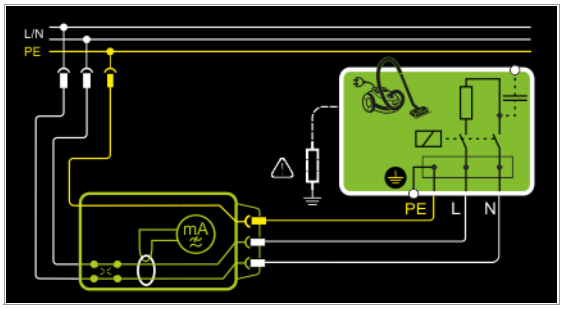
The device under test is operated with mains power.
Protective conductor current is measured between the protective conductor at the mains and the protective conductor terminal at the DUT via the test instrument's mains cable.

Wiring Diagram



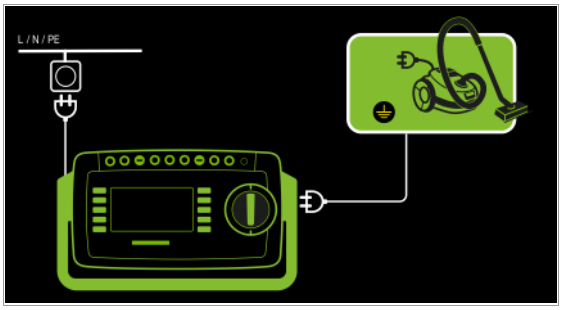
Differential Current Method
– *Differential measurement type*
– DUT mains plug to test socket

Schematic Diagram

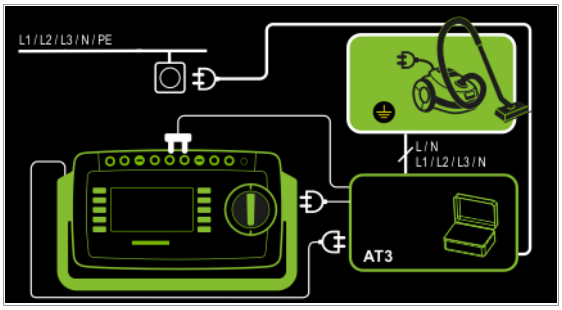


The device under test is operated with mains power.
Differential current is measured between mains conductors L and N (current clamp concept).

Wiring Diagram



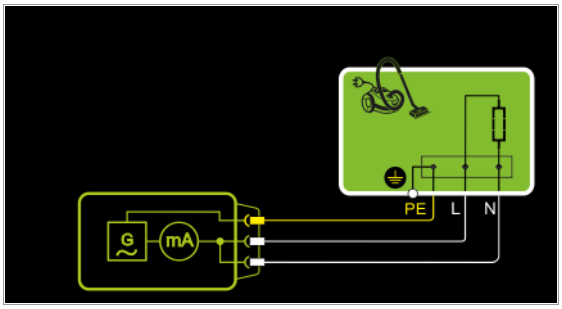
Wiring Diagram (AT3-IIIE probe to COM-V)



Alternative Measuring Method (equivalent leakage current)

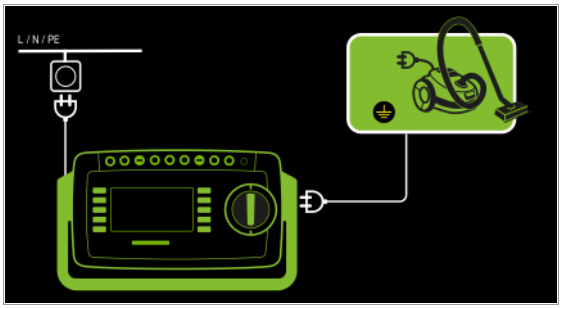
– *Alternative measurement type*
– DUT mains plug (protection class I) to test socket

Schematic Diagram



After activating test voltage, leakage current is measured via the DUT's mains cable between short-circuited mains conductors L and N and the protective conductor terminal at the DUT.

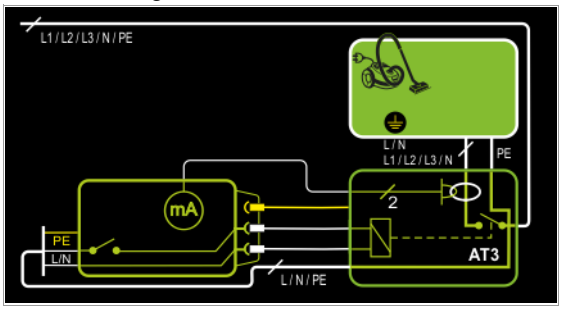
Wiring Diagram



Connection of 3-Phase DUTs (only with feature I0, e.g. SECUTEST ST PRO, and with optional AT3-IIIE test adapter)

– *AT3-Adapter measurement type*
– DUT mains plug to AT3-IIIE test adapter
– AT3-IIIE probe to COM-V terminals
– AT3-IIIE test plug to test socket

Schematic Diagram

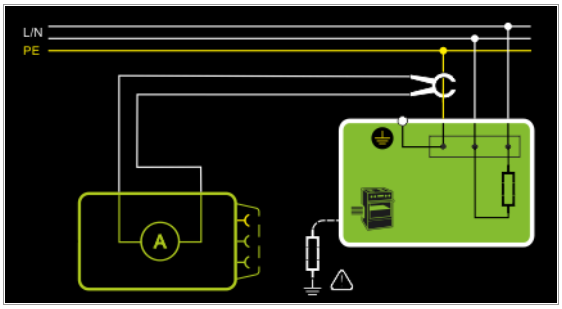


Measurement of the DUT with 3-phase mains connection via AT3-IIIE adapter

Measurement of Protective Conductor Current via Current Clamp Sensor with Voltage Output for Permanently Installed DUTs (only with feature I0, e.g. SECUTEST ST PRO, and with optional current clamp sensor)

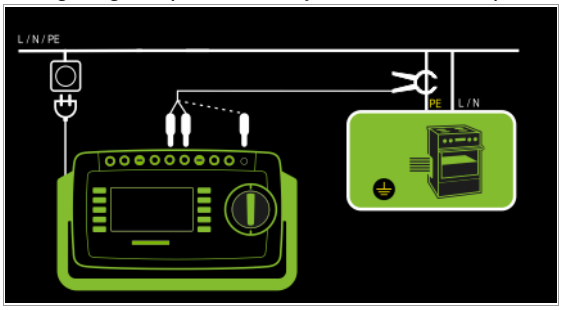
– *Clamp measurement type*

Schematic Diagram



Measurement of protective conductor current by closing the current clamp sensor around mains cable PE for permanently installed protection class I DUTs

Wiring Diagram (current clamp sensor to COM-V)



Set Measuring Range at Clamp Meter and Parameter at SECUTEST ST PRO

SECUTEST ST PRO	Clamp		SECUTEST ST PRO
Transformation ratio parameter	Transformation ratio (switch *)	Measuring range	Display range with clamp
1 mV : 1 mA	WZ12C		
	1 mV : 1 mA	1 mA ... **15 A**	0 mA ... 300 A
100 mV : 1 mA	SECUTEST CLIP		
	100 mV : 1 mA	0.1 ... **25 mA**	0.00 mA ... 3.00 A

* Only with WZ12C
** Default value

Setting Measuring Parameters for IPE

Measuring Parameter	Meaning	
Meas. Type		**Suitable for DUT Connection via**
Direct	Direct measuring method	Test socket, AT16DI/AT32DI (direct or diff.)
Differential	Differential current method	Test socket
Alternative	Equivalent leakage current method	Test socket, VL2E, AT3 adapter (AT3-IIIE, AT3-IIS, AT3-IIS32), AT16DI/AT32DI
AT3 adapter	Feature I01 (e.g. SECUTEST ST PRO): measurement with AT3 adapter	AT3-IIIE, AT3-IIS, AT3-IIS32
Clamp	Feature I01 (e.g. SECUTEST ST PRO): Measurement of protective conductor current via current clamp sensor with voltage output, and conversion to and display as current values.	Permanent connection
Single fault (SFC) – only with direct measurement type		
Normal status	Single fault simulation not active	
N interrupted	Fault simulation – only phase and protective conductor are connected to the DUT [1]	
Polarity – only with direct, differential and AT3 adapter measuring methods		
Normal / **Reversed**	Selection of polarity for mains voltage to the test socket	
The U(set) and Frequency(set) measuring parameters for the "Alternative" measurement type are no longer included as of firmware version 1.7.0. These parameters apply to single measurements as well as test sequences, and have to be entered in SETUP (see section 13.3).		
U(set) – for alternative measurement type only		
110 V, 115 V, 220 V, 230 V, 240 V	Selection of a line voltage for synthetic test voltage	
Frequency(set) – for alternative measurement type only		
48 Hz ... 400 Hz	Selection of a line frequency for synthetic test voltage	
Clamp factor – only for clamp measurement type		
1 mV : 1 mA	Transformation ratio of the WZ12C current clamp sensor. For setting the current clamp factor at the WZ12C clamp and the SECUTEST ST PRO (see table above).	
10 mV : 1 mA		
100 mV:1 mA	Transformation ratio of the SECUTEST CLIP current clamp sensor. For setting the current clamp factor at the SECUTEST ST PRO.	
1 V : 1 A		

[1] Only suitable for connecting the DUT to the test socket. Not suitable for measurements with AT16DI or AT32DI adapter.

When testing in accordance with product standards (e.g. EN 61010 or EN 60335), measurements must be conducted under all fault conditions. For testing after repair or periodic testing it's usually sufficient to perform measurement in the **Normal Status** setting.

Test Procedure for Direct Measuring Method

- Before conducting any leakage current measurements, make sure that the "Ref. voltage L-PE" and "Alt. Test Freq." measurement parameters have been set correctly in SETUP (see section 13.3).
- Set the rotary switch to the I_{PE} position.
- Select the **Direct** measurement type:
  – By setting the parameters
  or
  – Directly via the **Measurement Type** key
- Connect the DUT's mains plug (protection class I) to the test instrument's test socket.
- Make sure that the device under test is switched off.
- **Start the test:** Press the **START**/STOP key.
- Switch the device under test on.
- The measurement must be performed with mains plug polarity in both directions. Press the **Polarity** softkey in order to change polarity.
- Acknowledge the warning which indicates that line voltage will be connected to the test socket.
- Switch the device under test on.
- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory.
- Turn off the device under test.
- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.
- Read the measured values and compare them with the table of permissible limit values.
- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

Test Procedure with AT3-IIIE Adapter

Attention!
Please observe the operating instructions for the AT3-IIIE regarding correct connection of the test adapter and the DUT, as well as details concerning the test.

Test Procedure for Differential Current Method

- Before conducting any leakage current measurements, make sure that the “Ref. voltage L-PE” and “Alt. Test Freq.” measurement parameters have been set correctly in SETUP (see section 13.3).
- Set the rotary switch to the I_{PE} position.
- Select the **Differential** measurement type:
  – By setting the parameters
  or
  – Directly via the **Measurement Type** key 
- Connect the test object’s mains plug (protection class I) to the test instrument’s test socket.
- **Start the test:** Press the **START**/STOP key. 
- The measurement must be performed with mains plug polarity in both directions. Press the **Polarity** softkey in order to change polarity. 
- Acknowledge the warning which indicates that line voltage will be connected to the test socket. 
- Switch the device under test on.
- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory. 
- Turn off the device under test.
- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number. 
- Read the measured values and compare them with the table of permissible limit values.
- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right. 

Test Procedure for Alternative Measuring Method

- Before conducting any leakage current measurements, make sure that the “Ref. voltage L-PE” and “Alt. Test Freq.” measurement parameters have been set correctly in SETUP (see section 13.3).
- Set the rotary switch to the I_{PE} position.
- Select the **Alternative** measurement type:
  – By setting the parameters
  or
  – Via the **Measurement Type** key 
- Connect the DUT’s mains plug (protection class I) to the test instrument’s test socket.
- **Start the test:** Press the **START**/STOP key. 
- Switch the device under test on.
- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory. 
- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number. 
- Read the measured values and compare them with the table of permissible limit values.
- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right. 

Maximum Permissible Limit Values for Protective Conductor Current in mA

Test Standard	I_{PE}
VDE 0701-0702 / ÖVE E 8701 / SNR 462638 EN 50678 / VDE 0701 EN 50699 / VDE 0702	PC I: 3.5 1 mA/kW *
IEC 60974-4 / EN 60974-4 / VDE 0544-4	5 mA
IEC 62368 / EN 62368 / VDE 0868-1	At ES2 5 mA AC 25 mA DC

* For DUTs with heating power of greater than 3.5 kW

Note 1: DUTs which are not equipped with accessible parts that are connected to the protective conductor, and which comply with requirements for touch current and, if applicable, patient leakage current, e.g. EDP DUTs with shielded power pack

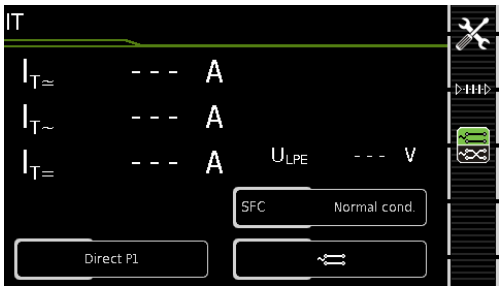
Note 2: Permanently connected DUTs with protective conductor

Note 3: Portable X-ray devices and DUTs with mineral insulation

Key

I_{PE} Current in the protective conductor (primary leakage current)

15.8.2 Touch Current – IT



Single Measurements, *Rotary Switch Level: Green*			
Rotary Switch Position	Meas. Type With Mains to Test Socket	Meas. Type Without Mains to Test Socket	Measuring Functions
I_T	Direct P1		$I_{T\simeq}$ **Touch current, RMS** $I_{T\sim}$ AC component $I_{T=}$ DC component U_{LN} Test voltage
	Differential P1		$I_{T\simeq}$ **Touch current, RMS** U_{LN} Test voltage
		Alternative P1	$I_{T\simeq}$ **Touch current, RMS** $U_{\simeq}$ Test voltage
		Perm. conn. P1	$I_{T\simeq}$ **Touch current, RMS** $I_{T\sim}$ AC component $I_{T=}$ DC component
		Alternative P1–P2	$I_{T\simeq}$ **Touch current, RMS** $U_{\simeq}$ Test voltage

Application

Make sure that the contacted parts are not inadvertently grounded.

Definition

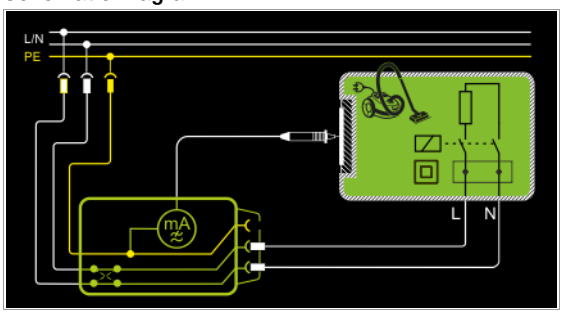
Current which flows from housing parts which are not connected to the protective conductor via an external conductive connection to earth or another part of the housing. Flow of current via the protective conductor is excluded in this case.

The following designations are also common:
housing leakage current, probe current.

Direct measuring method

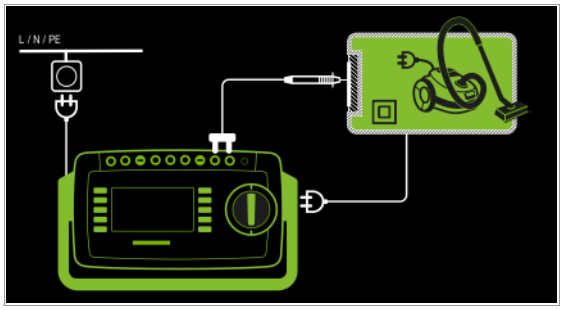
– *Measurement type: direct P1*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

Schematic Diagram



The device under test is operated with mains power. Current which flows to the protective conductor via exposed conductive parts and via the probe is measured. The measurements must be performed with mains plug polarity in both directions. Switching takes place via the polarity softkey. The RMS, the AC or the DC component of the current is measured.

Wiring Diagram

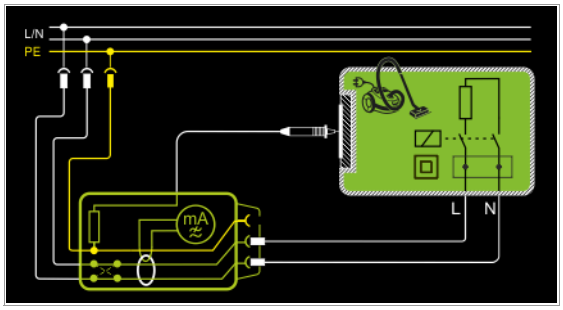


Note
Regarding protection class I DUTs:
Parts may or may not be grounded.
Coincidental grounding only occurs in the event of an error.

Differential Current Method

– *Measurement type differential P1*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

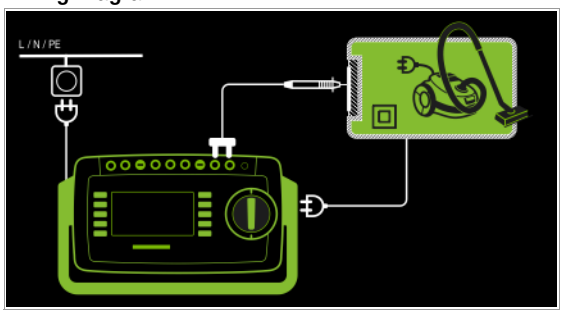
Schematic Diagram



The device under test (PCII) is operated with mains power. Differential current which flows via the two mains conductors is measured (current clamp measurement concept). The measurements must be performed with mains plug polarity in both directions. Switching takes place via the polarity softkey. The current's AC component is measured. Accessible conductive parts must be contacted with test probe P1.

Note
Only use the differential current method in order to determine touch current at PC II DUTs
(in the case of PC I DUTs, the measured value includes full protective conductor current as a result of the measuring method).

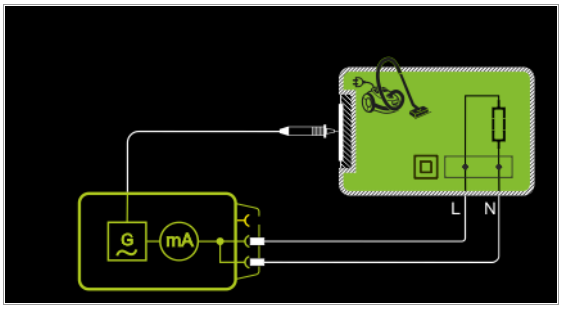
Wiring Diagram



Alternative Measuring Method (equivalent leakage current)

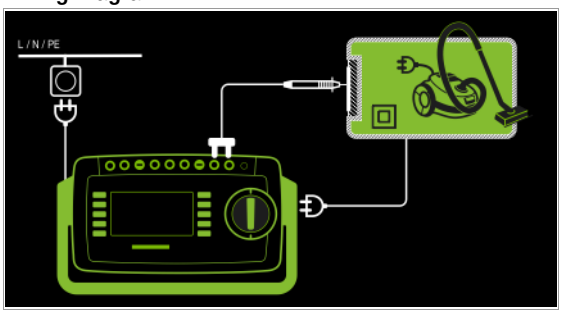
– *Measurement type: alternative P1*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

Schematic Diagram



After activating test voltage, leakage current is measured between short-circuited mains conductors L and N (DUT mains plug) and accessible conductive parts (probe contact). The RMS, the AC or the DC component of the current is measured.

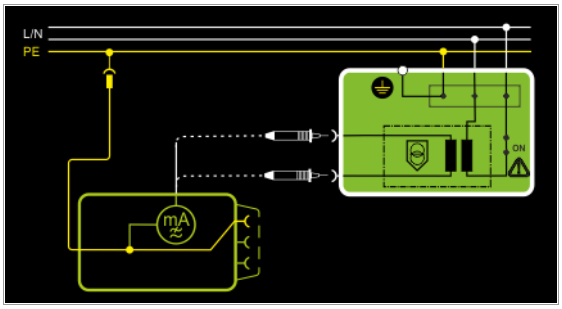
Wiring Diagram



Direct Measuring Method for Permanently Installed DUTs

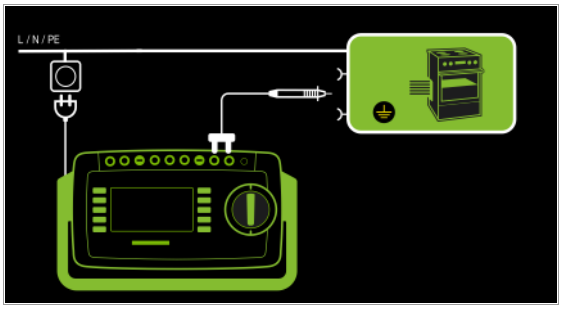
– *Measurement type: permanent connection P1*
– Test probe P1 to P1 terminals

Schematic Diagram



The DUT is operated with line voltage from a permanent installation. Leakage current is measured between the protective conductor at the mains and the output sockets for safety extra-low voltage at the DUT, one after the other, with the help of the test probe. Furthermore, accessible conductive parts which are **not** connected to the housing must also be contacted.

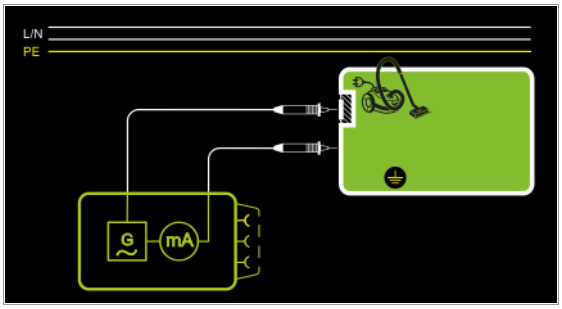
Wiring Diagram



Alternative measuring method with 2-pole measurement (P1–P2)

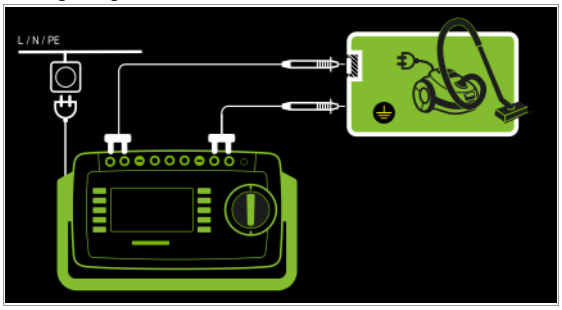
– *Alternative measurement type (P1 - P2)*
– Test probe P1 to P1 terminals
– Test probe P2 to P2 terminals

Schematic Diagram



Touch current is measured between external conductive parts which can be contacted with test probe P2 and are **not** connected to the housing, and the housing with test probe P1.

Wiring Diagram



Setting Measuring Parameters for IT

Measuring Parameter	Meaning	
Meas. Type		**Suitable for DUT Connection via**
Direct P1	Direct measuring method	Test socket, AT3 adapter (AT3-IIIE, AT3-IIS, AT3-IIS32), AT16DI/AT32DI
Differential P1	Differential current method	Test socket
Alternative P1	Equivalent leakage current method	Test socket, AT3 adapter (AT3-IIIE, AT3-IIS, AT3-IIS32), AT16DI/AT32DI, VL2E
Perm. conn. P1	Permanently installed DUT	Permanent connection
Alternative P1–P2	Equivalent leakage current method with feature H01 (e.g. SECUTEST ST PRO)	No connection, PC3: 2-pole measurement between test probes 1 and 2 (see section 13.7)
Single fault (SFC) – only with measurement type direct P1		
Normal status	Single fault simulation not active	
N interrupted	Fault simulation active – only phase and protective conductor are connected to the DUT [1]	
PE interrupted	Fault simulation active – the protective conductor is disconnected from the DUT for the duration of the measurement.	
Polarity – for direct P1 and differential P1 measurement types only		
Normal / **Reversed**	Selection of polarity for mains voltage to the test socket	
The U(set) and Frequency(set) measuring parameters for the "Alternative" measurement type are no longer included as of firmware version 1.7.0. These parameters apply to single measurements as well as test sequences, and have to be entered in SETUP (see section 13.3).		
U(set) – for measurement type alternative P1 only		
110 V, 115 V, 220 V, 230 V, 240 V	Selection of a line voltage for synthetic test voltage	
Frequency(set) – for measurement type alternative P1 only		
48 Hz ... 400 Hz	Selection of a line frequency for synthetic test voltage	

[1] Only suitable for connecting the DUT to the test socket. Not suitable for measurements with AT16DI or AT32DI adapter.

When testing in accordance with product standards (e.g. EN 61010 or EN 60335), measurements must be conducted under all fault conditions. For testing after repair or periodic testing it's usually sufficient to perform measurement in the **Normal Status** setting.

Prerequisites for Touch Current Measurement

- Visual inspection has been passed.
- With protection class I DUTs:
  Protective conductor resistance testing has been passed.
- Insulation resistance testing has been passed.

Test Procedure for Direct and Differential Current Methods

- ➪ Before conducting any leakage current measurements, make sure that the "Ref. voltage L-PE" and "Alt. Test Freq." measurement parameters have been set correctly in SETUP (see section 13.3). Set the rotary switch to the I_T position.
- ➪
- ➪ Select measurement type **Direct P1** or **Differential P1**:
  – By setting the parameters
  or
  – Via the **Measurement Type** key 
- ➪ In the case of **direct and differential current measurement**, measurement must be performed with mains plug polarity in both directions. Press the **Polarity** softkey in order to change polarity. 
- ➪ Connect the DUT's mains plug (protection class II) to the test instrument's test socket.

Attention!
Testing is conducted in the presence of line voltage.

- ➪ **Start the test:** Press the **START**/STOP key. 
- ➪ Acknowledge the warning which indicates that line voltage will be connected to the test socket. 
- ➪ Switch the device under test on.
- ➪ Contact all accessible conductive parts, one after the other, which are not connected to the housing with test probe P1.
- ➪ The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory. 
- ➪ Turn off the device under test.
- ➪ **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number. 
- ➪ Read the measured values and compare them with the table of permissible limit values.
- ➪ Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right. 

Test Procedure for Alternative Measuring Method – Alternative P1

- ➪ Before conducting any leakage current measurements, make sure that the "Ref. voltage L-PE" and "Alt. Test Freq." measurement parameters have been set correctly in SETUP (see section 13.3).
- ➪ Set the rotary switch to the I_T position.
- ➪ Select the **Alternative** P1 measurement type:
  – By setting the parameters
  or
  – Directly via the **Measurement Type** key 
- ➪ Connect the DUT's mains plug to the test instrument's test socket.
- ➪ **Start the test:** Press the **START**/STOP key. 
- ➪ Contact all accessible conductive parts, one after the other, which are not connected to the protective conductor with test probe P1.
- ➪ The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory. 
- ➪ **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number. 
- ➪ Read the measured values and compare them with the table of permissible limit values.
- ➪ Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right. 

Test Procedure for Alternative Measuring Method – Alternative P1–P2

Only with feature H01 (e.g. SECUTEST ST PRO)

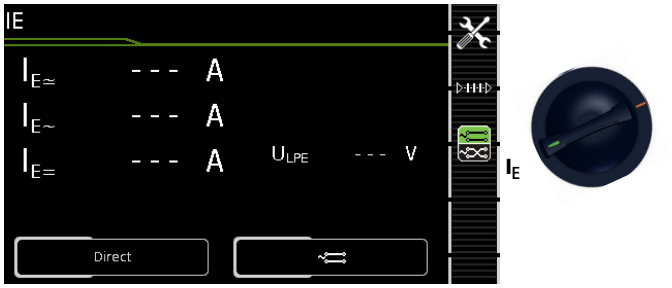
- ➪ Before conducting any leakage current measurements, make sure that the "Ref. voltage L-PE" and "Alt. Test Freq." measurement parameters have been set correctly in SETUP (see section 13.3).
- ➪ Set the rotary switch to the I_{BT} position.
- ➪ Select the **Alternative P1–P2** measurement type:
  – By setting the parameters
  or
  – Directly via the **Measurement Type** key 
- ➪ **Start the test:** Press the **START**/STOP key. 
- ➪ Using test probe P1, contact the first accessible part which is not connected to the protective conductor.
- ➪ Using test probe P2, contact all accessible conductive parts, one after the other, which are connected neither to the protective conductor nor to the first accessible part contacted with test probe P1.
- ➪ The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory. 
- ➪ **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number. 
- ➪ Read the measured values and compare them with the table of permissible limit values.
- ➪ Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right. 

Maximum Permissible Limit Values for Touch Current in mA

Test Standard	I_T
VDE 0701-0702 / ÖVE E 8701 / SNR 462638 EN 50678 / VDE 0701 EN 50699 / VDE 0702	0.5
IEC 60974-4 / EN 60974-4 / VDE 0544-4	10 mA
IEC 62368 / EN 62368 / VDE 0868-1	At ES1 0.5 mA AC 2 mA DC

Key
I_T Touch current (leakage current from welding current)

15.8.3 Device Leakage Current – IE



Single Measurements, *Rotary Switch Level: Green*				
Rotary Switch Position	Meas. Type With Mains to Test Socket	Meas. Type Without Mains to Test Socket	Measuring Functions	
I_E	Direct		$I_{E\simeq}$ $I_{E\sim}$ $I_{E=}$ U_{LN}	**Device leakage current, RMS** AC component DC component Test voltage
	Differential		$I_{E\simeq}$ U_{LN}	**Device leakage current, RMS** Test voltage
		Alternative	$I_{E\simeq}$ $U_{\sim}$	**Device leakage current, RMS** Test voltage
		AT3 adapter [1]	$I_{E\simeq}$ U_{LN}	**Device leakage current, RMS** Test voltage
		Clamp [2]	$I_{E\simeq}$ U_{LN}	**Device leakage current, RMS** Test voltage

[1] Adapter AT3-IIIE, AT3-IIS or AT3-II S32:
Voltage measuring inputs for leakage current measurement with differential method only with test instrument including feature I01 (e.g. SECUTEST ST PRO)

[2] Voltage measuring inputs for leakage current measurement with differential method and use of a current clamp sensor only with test instrument including feature I01 (e.g. SECUTEST ST PRO)

Application

The measurement of device leakage current is required for electrical medical devices in accordance with IEC 62353 / EN 62353 / VDE 0751-1.

In the case of device leakage current as the sum of all leakage current, all probe contact points must be contacted simultaneously.

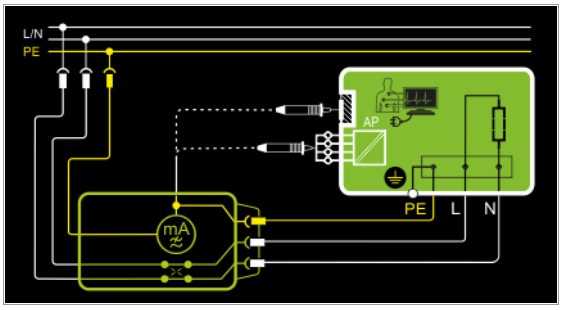
Definition

Device leakage current is the sum of all leakage current from the housing, accessible conductive parts and applied parts to PE.

Direct measuring method

– *Direct Measurement Type*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

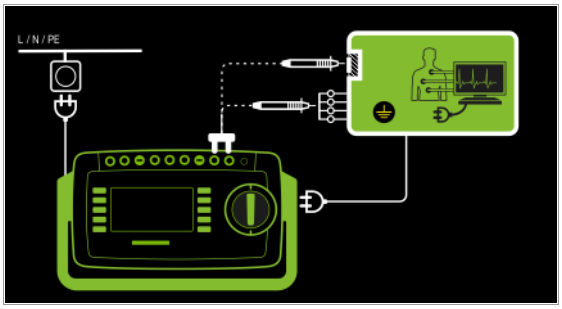
Schematic Diagram



The device under test (PC1) is operated with mains power. Protective conductor current is measured between the protective conductor at the mains (test instrument supply power) and the protective conductor terminal at the DUT via the DUT's mains cable. The measurements must be performed with mains plug polarity in both directions. Switching takes place via the polarity softkey.

Accessible conductive parts which are connected to the housing, as well as those which are not connected to the housing, must be contacted with test probe P1.
If the DUT includes connectors for applied parts, they must be short-circuited and contacted with test probe P1 as well.

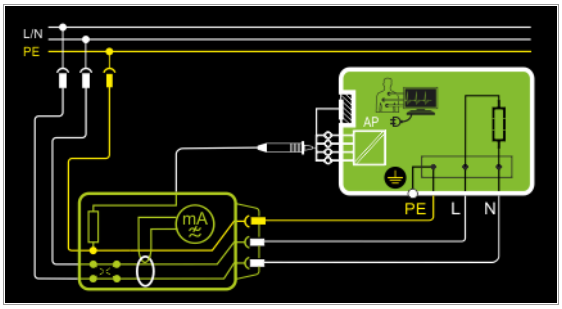
Wiring Diagram



Differential Current Method

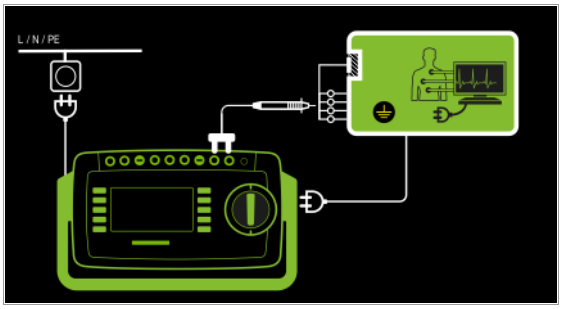
– *Differential measurement type*
– DUT mains plug to test socket
– Test probe P1 to P1 terminals

Schematic Diagram, Protection Class I

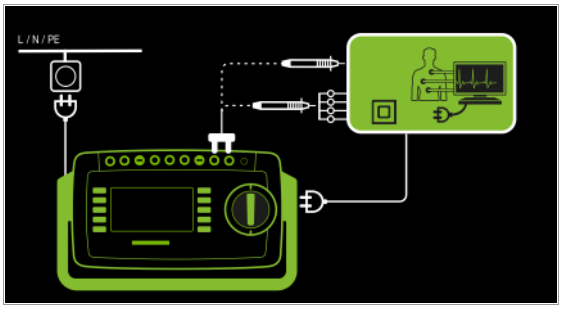


The device under test (PC1) is operated with mains power. Differential current which flows via the two mains conductors is measured (current clamp measurement concept). The measurements must be performed with mains plug polarity in both directions. Switching takes place via the polarity softkey.
Short-circuited terminals for applied parts or accessible conductive parts which are not connected to the housing must be contacted with test probe P1.

Wiring Diagram, Protection Class I

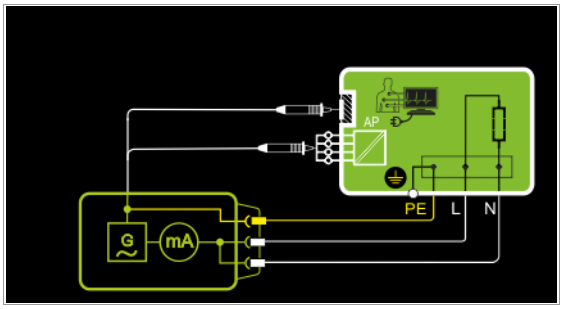


Wiring Diagram, Protection Class II



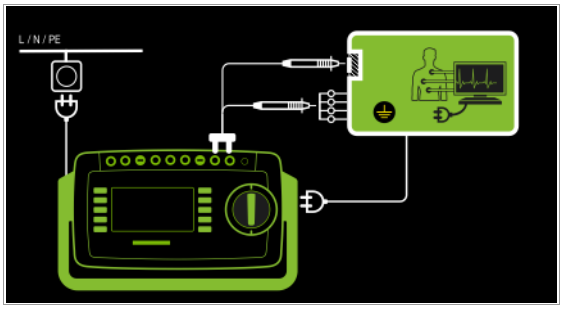
Alternative Measuring Method (equivalent leakage current)
– *Alternative measurement type (P1)*
– DUT mains plug connected to the test socket
– Test probe P1 to P1 terminals

Schematic Diagram, Protection Class I



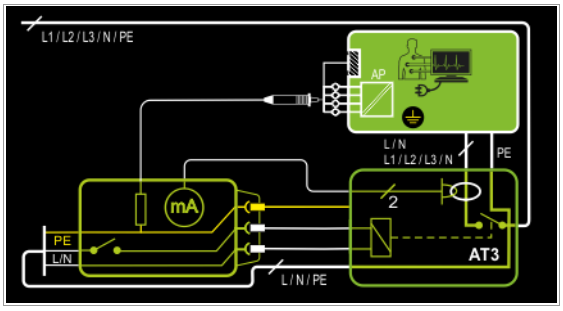
After activating test voltage, leakage current is measured between short-circuited mains conductors L and N (DUT mains plug) and accessible conductive parts (probe contact) which **are not connected to the housing**.
If the DUT includes connectors for applied parts, they must be short-circuited and contacted with test probe P1 as well.

Wiring Diagram, Protection Class I



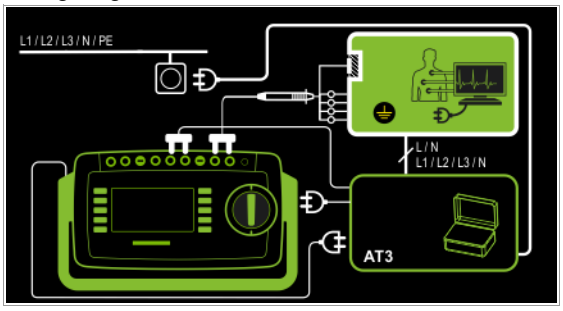
Differential Current Method
– *AT3-Adapter measurement type*
– DUT mains plug to AT3-IIIE test adapter
– Test probe P1 to P1 terminals
– AT3-IIIE probe to COM-V terminals
– AT3-IIIE test plug to test socket

Schematic Diagram



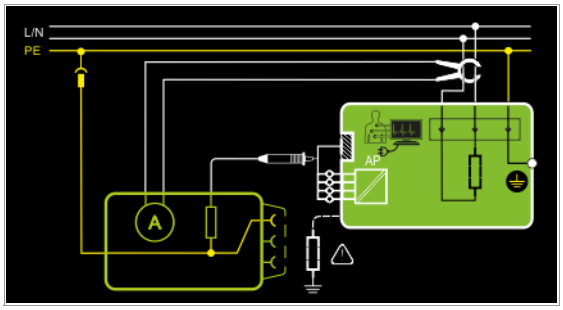
Measurement at the DUT with 3-phase mains connection via AT3-IIIE adapter

Wiring Diagram



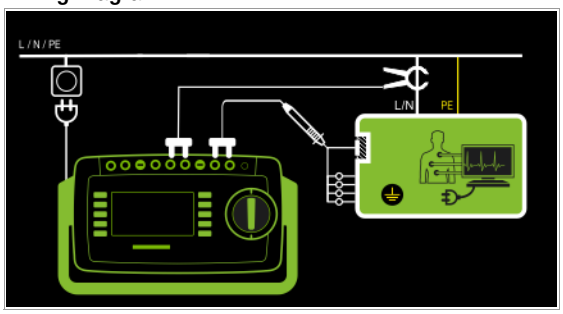
Measurement Method with Current Clamp Sensor for Permanently Installed DUTs
– *Clamp measurement type*
– Clamp to COM-V (only with feature I01, e.g. SECUTEST ST PRO, and with optional current clamp sensor)

Schematic Diagram



Measurement of device leakage current by closing the current clamp sensor around the L and N conductors of the mains cable for permanently installed protection class I devices under test

Wiring Diagram



Set Measuring Range at Clamp Meter and Parameter at SECUTEST ST PRO

SECUTEST ST PRO	Clamp		SECUTEST ST PRO
Transformation ratio parameter	**Transformation ratio** (switch *)	**Measuring range**	**Display range with clamp**
1 mV : 1 mA	**WZ12C**		
	1 mV : 1 mA	1 mA ... **15 A**	0 mA ... 300 A
100 mV : 1 mA	SECUTEST CLIP		
	100 mV : 1 mA	0.1 ... **25 mA**	0.00 mA ... 3.00 A

* Only with WZ12C
** Default value

Setting Measuring Parameters for IE

Measuring Parameter	Meaning	
Meas. Type		**Suitable for DUT Connection via**
Direct	Direct measuring method	Test socket, AT16DI/AT32DI
Differential	Differential current method	Test socket
Alternative	Equivalent leakage current method	Test socket, AT16DI/AT32DI
AT3 adapter	Feature I01 (e.g. SECUTEST ST PRO): measurement with AT3 adapter	AT3-IIIE, AT3-IIS, AT3-IIS32
Clamp	Feature I01 (e.g. SECUTEST ST PRO): Measurement of device leakage current via current clamp sensor with voltage output, and conversion to and display as current values.	Permanent connection
Polarity [1] – for direct, differential and AT3 adapter measurement types only		
Normal	Selection of polarity for mains voltage to the test socket	
Reversed		
The U(set) and Frequency(set) measuring parameters for the "Alternative" measurement type are no longer included as of firmware version 1.7.0. These parameters apply to single measurements as well as test sequences, and have to be entered in SETUP (see section 13.3).		
U(set) – for alternative measurement type only		
110 V, 115 V, 220 V, 230 V, 240 V	Selection of a line voltage for synthetic test voltage	
Frequency(set) – for alternative measurement type only		
48 Hz ... 400 Hz	Selection of a line frequency for synthetic test voltage	
Clamp factor – only for clamp measurement type		
1 mV : 1 mA	Transformation ratio of the WZ12C current clamp sensor. For setting the current clamp factor at the WZ12C clamp and the SECUTEST ST PRO (see table above).	
10 mV : 1 mA		
100 mV:1 mA	Transformation ratio of the SECUTEST CLIP current clamp sensor. For setting the current clamp factor at the SECUTEST ST PRO.	
1 V : 1 A		

[1] Measurement must be performed with mains polarity in both directions. The largest value is documented.

Test Procedure

- Before conducting any leakage current measurements, make sure that the "Ref. voltage L-PE" and "Alt. Test Freq." measurement parameters have been set correctly in SETUP (see section 13.3).
- Set the rotary switch to the I_E position.
- Connect the DUT in accordance with the selected measuring method.
- Select the measurement type:
  – By setting the parameters
  or
  – Directly via the **Measurement Type** key
- As an alternative, you can select the measurement type directly using the key shown at the right.
- In the case of **direct and differential current measurement**, measurement must be performed with mains plug polarity in both directions. Press the **Polarity** softkey in order to change polarity.
- Start the test: Press the **START**/STOP key.
- After each reconnection to the mains, and as soon as the first test is started, a mains connection test is executed.
- **In the case of the direct or differential measurement type:** Acknowledge the warning which indicates that line voltage will be connected to the test socket.
- Switch the device under test on.
- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory.
- Turn off the device under test.
- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.
- Read the measured values and compare them with the table of permissible limit values.
- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

Test Procedure with AT3-IIIE Adapter

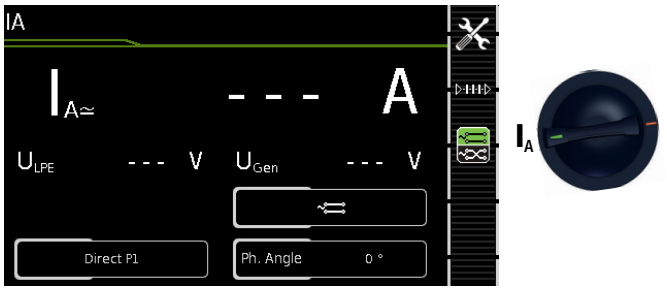
Attention!
Please observe the operating instructions for the AT3-IIIE regarding correct connection of the test adapter and the device under test, as well as peculiarities involved in the test procedure.

Maximum Permissible Limit Values for Device Leakage Current in mA

Test Standard	All Meas. Types Except "Alternative"	"Alternative" Measurement Type	
IEC 62353 / EN 62353 / VDE 0751-1	PC I: 0.5 PC II; 0.1	PC II	0.5
		PC I (PE or parts connected to PE)	1
		Permanently connected DUTs with PE	10
		Portable X-ray devices with additional PE	5
		Portable X-ray devices without additional PE	2
		DUTs with mineral insulation	5

I_{GA} Device leakage current
PE Protective conductor

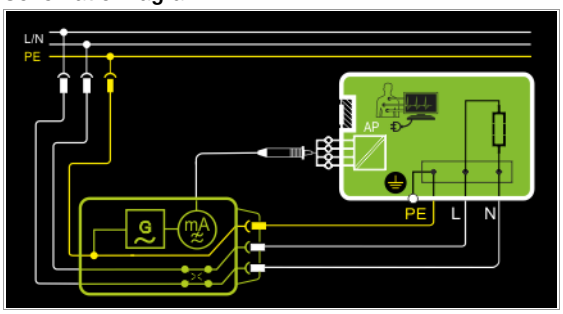
15.8.4 Leakage Current from the Applied Part – IA



Single Measurements, *Rotary Switch Level: Green*			
Rotary Switch Position	Meas. Type With Mains to Test Socket	Meas. Type Without Mains to Test Socket	Measuring Functions
I_A	Direct P1		$I_{A\simeq}$ Current from the applied part U_A Test voltage
		Alternative P1	
		Perm. conn. P1	

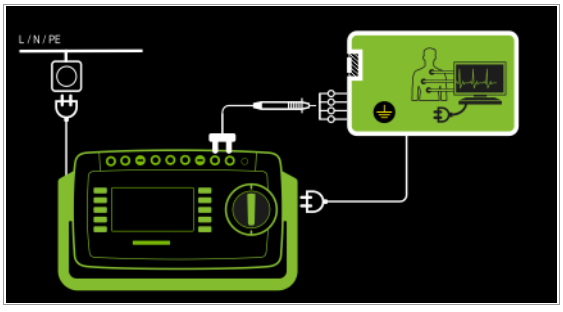
Direct Measuring Method
– *Measurement type: direct P1*
– DUT mains plug (PC1) connected to test socket
– Probe to P1 terminal

Schematic Diagram



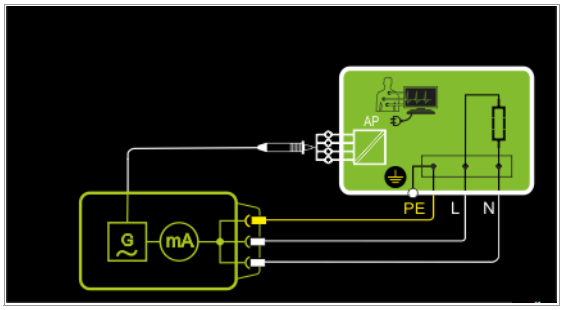
The device under test (PC1) is operated with mains power. The measurements must be performed with mains plug polarity in both directions. Switching takes place via the polarity softkey. After activating **test voltage** and **line voltage**, leakage current from the applied part is measured between the short-circuited terminals of the applied parts and PE (DUT mains plug).

Wiring Diagram



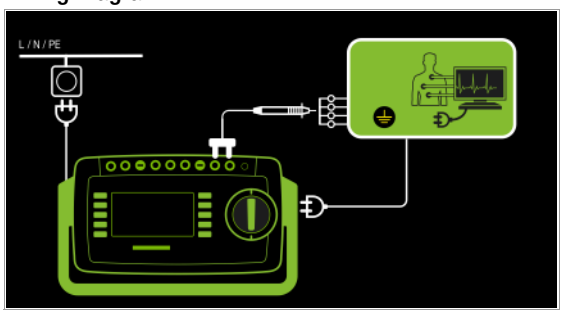
Alternative Measuring Method (equivalent patient leakage current)
– *Measurement type: alternative P1*
– DUT mains plug (PC1) connected to test socket
– Probe to P1 terminal

Schematic Diagram



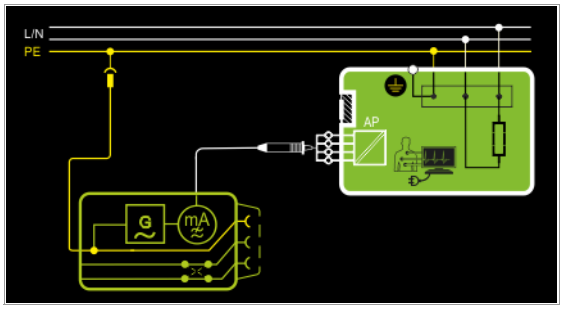
After activating test voltage, leakage current from the applied part is measured between short-circuited conductors L-N-PE (DUT mains plug) and the short-circuited terminals of the applied parts.

Wiring Diagram



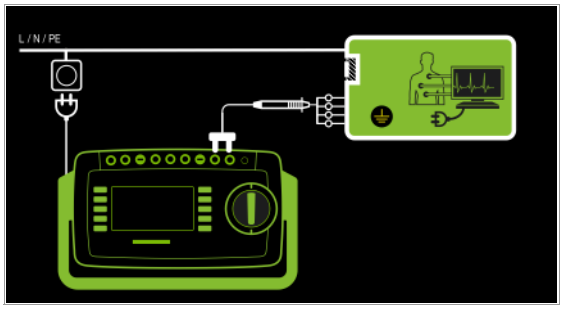
Direct Measuring Method
– *Measurement type: permanent connection P1*
– Permanent connection
– Probe to P1 terminal

Schematic Diagram



Leakage current from the applied part is measured between the short-circuited terminals of the applied parts and PE at the mains connection.

Wiring Diagram



Setting Measuring Parameters for IA

Measuring Parameter	Meaning	
Meas. Type		**Suitable for DUT Connection via**
Direct P1	Direct measuring method (via test socket) with test probe P1	Test socket, AT3 adapter (AT3-IIIE, AT3-IIS, AT3-IIS32), AT16DI/AT32DI
Alternative P1	Equivalent leakage current measuring method (via test socket) with test probe P1	Test socket
Perm. conn. P1	Direct measuring method	Permanent connection
Phase angle – for direct P1 and permanent connection P1 only		
0° or 180°	Selectable phasing for the internal generator relative to mains phasing	
Polarity – for direct P1 only		
Normal	Selection of polarity for mains voltage to the test socket	
Reversed		
The U(set) and Frequency(set) measuring parameters for the "Alternative" measurement type are no longer included as of firmware version 1.7.0. These parameters apply to single measurements as well as test sequences, and have to be entered in SETUP (see section 13.3).		
U(set) – for alternative (P1) and permanent connection (P1) only		
110 V, 115 V, 220 V, 230 V, 240 V	Selection of a line voltage for synthetic test voltage	
Frequency(set) – for alternative P1 only		
48 Hz ... 400 Hz	Selection of a line frequency for synthetic test voltage	

Test Procedure

- Before conducting any leakage current measurements, make sure that the "Ref. voltage L-PE" and "Alt. Test Freq." measurement parameters have been set correctly in SETUP (see section 13.3).
- Set the rotary switch to the I_A position.
- Connect the DUT in accordance with the selected measuring method.
- Select the measurement type:
  – By setting the parameters
  or
  – Directly via the **Measurement Type** key 
- In the case of **direct measurement**, measurement must be performed with mains plug polarity in both directions. Press the **Polarity** softkey in order to change polarity. 
- **Start the test:** Press the **START**/STOP key. 

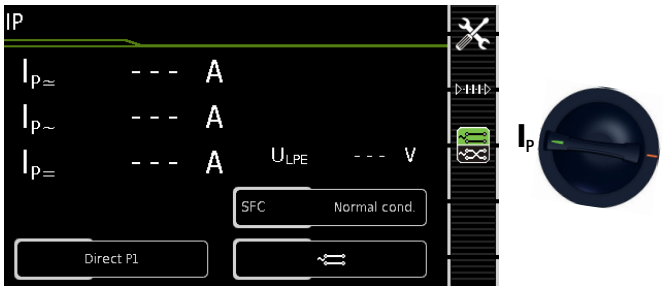
- After each reconnection to the mains, and as soon as the first test is started, a mains connection test is executed.
- **– Measurement type direct P1:** Acknowledge the warning which indicates that line voltage will be connected to the test socket. 
- Switch the device under test on.
- Contact the short-circuited applied parts with the test probe.
- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory. 
- Turn off the device under test.
- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number. 


- Read the measured values and compare them with the table of permissible limit values.
- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right. 

Maximum Permissible Limit Values for Leakage Current from the Applied Part in µA

Test Standard	Leakage Current from Applied Part – Alternating Current		
	Type B	Type BF	Type CF
IEC 62353 / EN 62353 / VDE 0751-1	–	5000	50

15.8.5 Patient Leakage Current – IP



Single Measurements, *Rotary Switch Level: Green*			
Rotary Switch Position	Meas. Type With Mains to Test Socket	Meas. Type Without Mains to Test Socket	Measuring Functions
I_P	Direct P1	Perm. conn. P1	$I_{P\simeq}$ **Patient leakage current, RMS** $I_{P\sim}$ AC component $I_{P=}$ DC component U_{LN} Test voltage

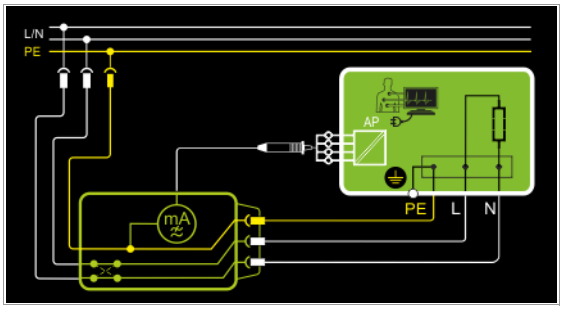
Definition

Patient leakage current is the current which flows to ground or PE from the patient ports at the running DUT via the patient.
The current's AC and DC components are measured.

Direct Measuring Method

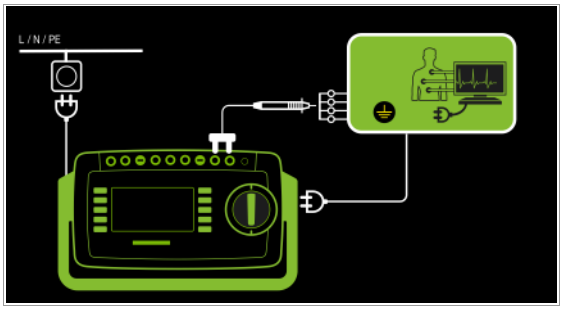
– *Measurement type: direct P1*
– DUT mains plug (PC1) connected to test socket
– Probe to P1 terminal

Schematic Diagram



Patient leakage current is measured at the DUT between PE (DUT mains plug) and the short-circuited applied parts.

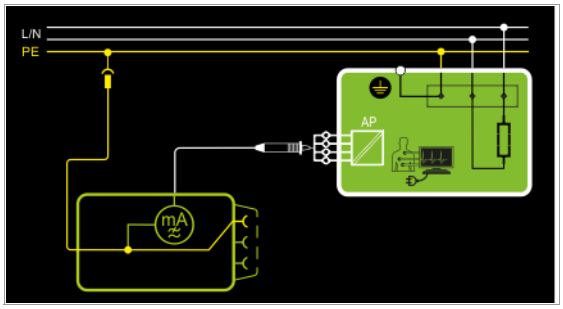
Wiring Diagram



Direct Measuring Method

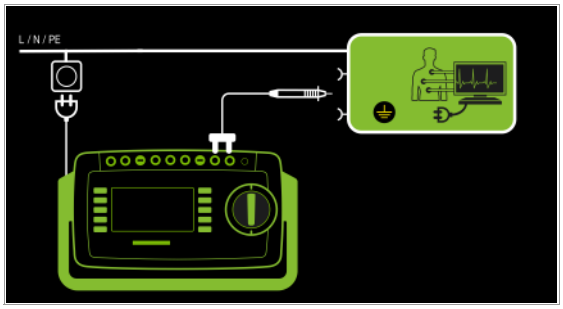
– *Measurement type: permanent connection P1*
– Permanent connection
– Probe to P1 terminal

Schematic Diagram



Patient leakage current is measured between the patient terminals and PE at the mains connection.

Wiring Diagram



Setting Measuring Parameters for IP

Measuring Parameter	Meaning	
Meas. Type		**Suitable for DUT Connection via**
Direct P1	Direct measuring method (via test socket) with test probe P1	Test socket
Perm. conn. P1	Permanently installed DUT	Permanent connection
Single fault (SFC) – only with measurement type direct P1		
Normal status	Single fault simulation not active	
N interrupted	Fault simulation active – only phase and protective conductor are connected to the DUT [1]	
PE interrupted	Fault simulation active – the protective conductor is disconnected from the DUT for the duration of the measurement.	
U low to APP	Fault simulation active – low voltage to applied part	
Polarity – only with measurement type direct P1		
Normal / **Reversed**	Selection of polarity for mains voltage to the test socket	

[1] Only suitable for connecting the DUT to the test socket. Not suitable for measurements with AT16DI or AT32DI adapter.

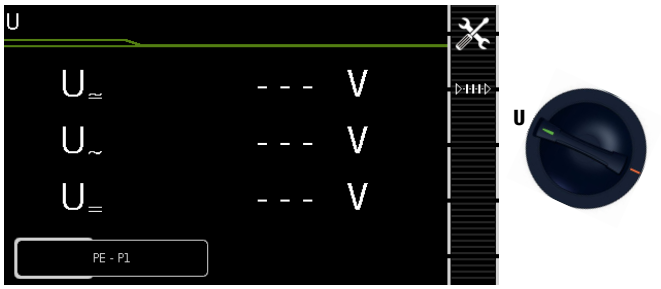
Test Procedure

- Before conducting any leakage current measurements, make sure that the “Ref. voltage L-PE” and “Alt. Test Freq.” measurement parameters have been set correctly in SETUP (see section 13.3).
- Set the rotary switch to the I_P position.
- Connect the DUT to the test socket.
- Select the measurement type:
  – By setting the parameters
  or
  – Directly via the **Measurement Type** key 
- In the case of **direct measurement P1**, measurement must be performed with mains plug polarity in both directions. Press the **Polarity** softkey in order to change polarity. 
- **Start the test:** Press the **START**/STOP key. 
- After each reconnection to the mains, and as soon as the first test is started, a mains connection test is executed.
- In the case of measurement type direct P1:
  Acknowledge the warning which indicates that line voltage will be connected to the test socket. 
- Switch the device under test on.
- Contact the short-circuited inputs for the applied parts with test probe P1.
- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory. 
- Turn off the device under test.
- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number. 
- Read the measured values and compare them with the table of permissible limit values.
- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right. 

Maximum Permissible Limit Values for Patient Leakage Current in mA

Test Standard		I_P		
		Type B	Type BF	Type CF
IEC 62353 / EN 62353 / VDE 0751-1 (or IEC 60601)	Direct current	0.01	0.01	0.01
	Alternating current	0.1	0.1	0.01

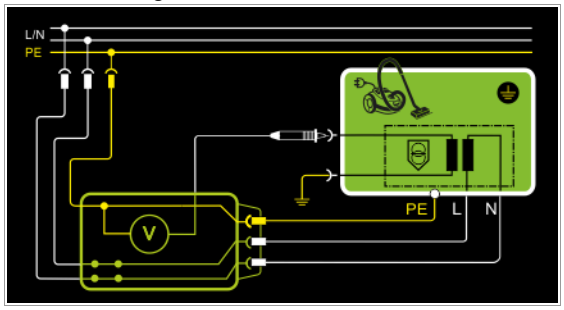
15.9 Probe Voltage – U



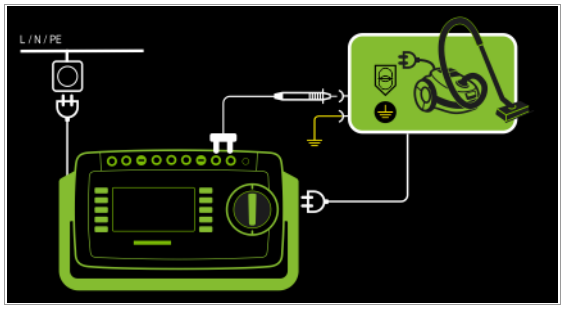
Single Measurements, *Rotary Switch Level: Green*			
Rotary Switch Position	Meas. Type With Mains to Test Socket	Meas. Type Without Mains to Test Socket	Measuring Functions
U		PE - P1	**Probe voltage, RMS** $U_{\simeq}$ Alternating voltage component $U_{\sim}$ Direct voltage component $U_{⎓}$ Direct voltage component
	PE - P1 (with mains)		**Probe voltage, RMS** $U_{\simeq}$ Alternating voltage component $U_{\sim}$ Direct voltage component $U_{⎓}$ Direct voltage component

Mains to Test Socket

Schematic Diagram

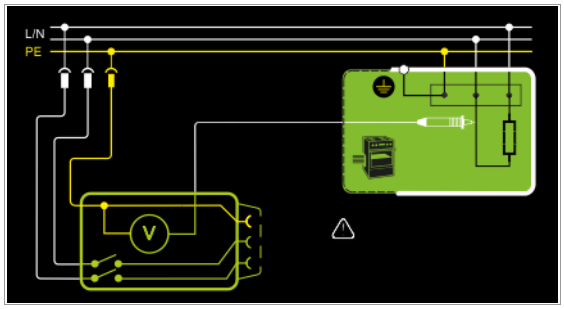


Wiring Diagram

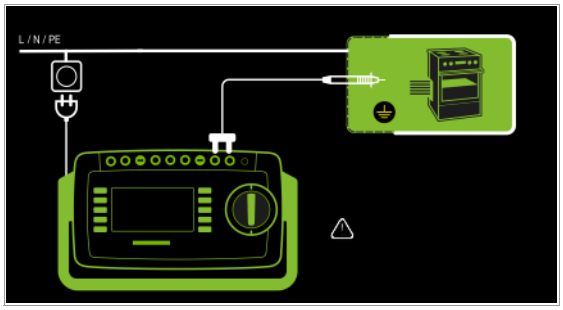


Permanently Connected DUT

Schematic Diagram



Wiring Diagram



Direct, alternating and pulsating voltages of up to 253 V can be measured. Two connection types are available, one of which has to be selected in the parameters menu.

Setting Measuring Parameters for U_{Probe}

Measuring Parameter	Meaning	
Meas. Type		**Suitable for DUT Connection via**
PE-P1	Measurement of voltages with reference to PE, test socket remains voltage-free	Permanent connection
PE-P1 (with mains)	Measurement of voltages with reference to PE, line voltage is applied to the test socket	Test socket
Polarity – only for PE-P1 (with mains)		
Normal / reversed	Selection of polarity for mains voltage to the test socket	

Test Procedure

- Set the rotary switch to the **U** position.
- Connect the DUT's mains plug to the test instrument's test socket.
- **Start the test:** Press the **START**/STOP key.

- **PE-P1 (with mains):** Acknowledge the warning which indicates that line voltage will be connected to the test socket.

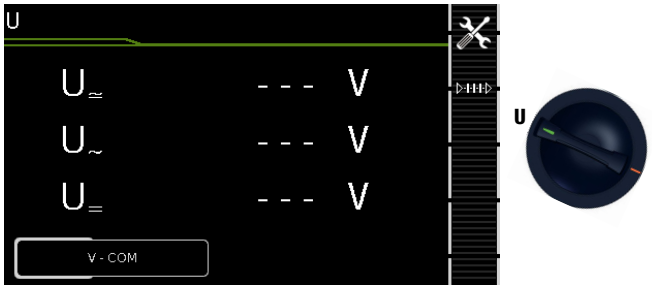
- Switch the device under test on.
- Contact the ungrounded output for safety extra-low voltage with test probe P1.
- Polarity can be set via direct selection immediately before measurement is started, without having to switch to the parameters menu.

- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory.

- Turn off the device under test.
- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.

- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

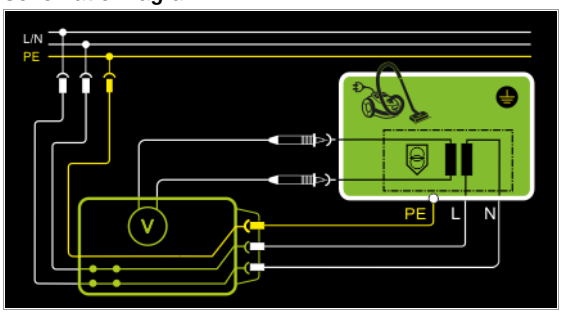
15.10 Measuring Voltage – U (only with feature I01, e.g. SECUTEST ST PRO)



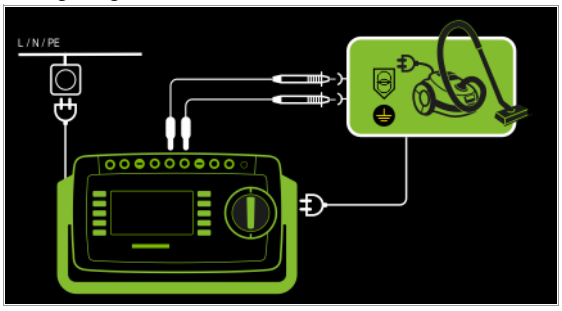
Single Measurements, *Rotary Switch Level: Green*			
Rotary Switch Position	Meas. Type With Mains to Test Socket	Meas. Type Without Mains to Test Socket	Measuring Functions
U		V – COM	U≃ **Measuring voltage, RMS** U~ Alternating voltage component U⎓ Direct voltage component
	V - COM (with mains)		U≃ **Measuring voltage, RMS** U~ Alternating voltage component U⎓ Direct voltage component

Mains to Test Socket

Schematic Diagram

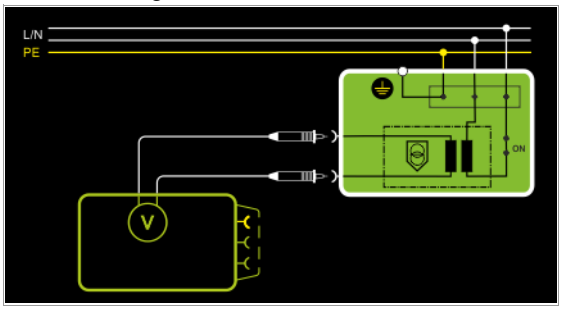


Wiring Diagram

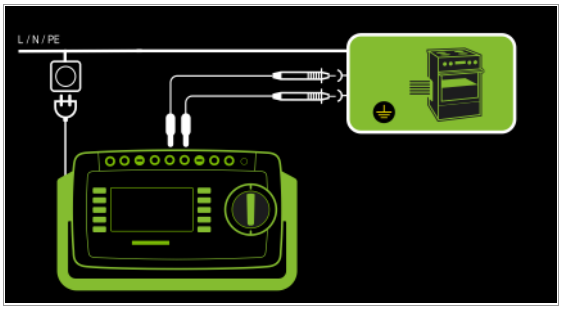


Permanently Connected DUT

Schematic Diagram



Wiring Diagram



Direct, alternating and pulsating voltages of up to 253 V can be measured between the **V** and **COM** socket terminals.

- Measurements with the voltage measuring input for the voltmeter function (V-COM), electrically isolated from the mains

Setting Measuring Parameters

Measuring Parameter	Meaning	
Meas. Type		**Suitable for DUT Connection via**
V – COM	Display: RMS value + AC + DC	Permanent connection
V – COM (with mains)	Display: RMS value + AC + DC; with mains to test socket, e.g. for measuring protective extra-low voltage at power packs	Test socket

Test Procedure, DUT at Test Socket (e.g. for measuring safety extra-low voltage at power packs or chargers)

- Set the rotary switch to the **U** position.
- Set the parameter to **V – COM (with mains)**.
- Connect the DUT's mains plug to the test instrument's test socket.

Attention!
Use only the included, contact-protected KS17-ONE measurement cables when measuring dangerous voltage.

- Connect the DUT's output sockets to the **V** and **COM** sockets, e.g. in order to be able to measure a **safety extra-low voltage** at the DUT's output.
- **Start the test:** Press the **START**/STOP key.

- **V-COM (with mains):** Acknowledge the warning which indicates that line voltage will be connected to the test socket.

- Switch the device under test on.
- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory.

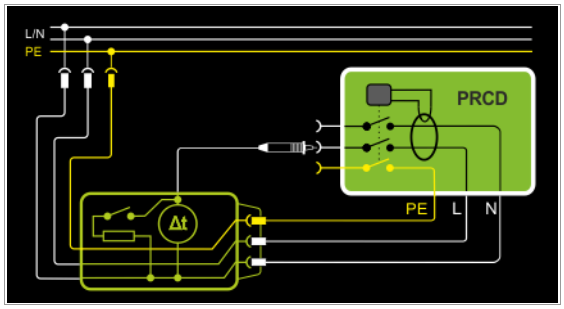
- Turn off the device under test.
- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.

- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

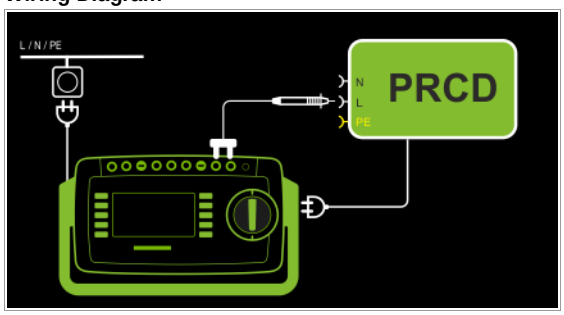
15.11 Measuring Time to Trip for RCDs of the Type PRCD – tPRCD

Single Measurements, *Rotary Switch Level: Green*			
Rotary Switch Position	**Measuring Functions**		**Meas. Type With Mains to Test Socket**
t_{PRCD}	ta	PRCD time to trip for 30 mA PRCD	
	U_{LN}	Line voltage at the test socket	

Schematic Diagram



Wiring Diagram



Definition

According to DIN VDE 0100-600:2008, verification must be provided that RCCBs are tripped within the time period specified in DIN VDE 0100-410.

PRCD Portable residual current device

Application

The PRCD under test is plugged into the test socket at the test instrument. The PRCD's phase conductor must be contacted with test probe P1 in order to trip the PRCD.

Note
Testing of PRCDs (test procedure and time to trip) is only possible for DUTs with a nominal voltage of 230 V.

Note
Measurement of time to trip isn't possible in IT systems.

Test Procedure

- Set the rotary switch to the t_{PRCD} position.
- Plug the PRCD into the test socket at the test instrument and connect the test probe to P1.
- **Start the test:** Press the **START**/STOP key.

- Acknowledge the warning which indicates that line voltage will be connected to the test socket.

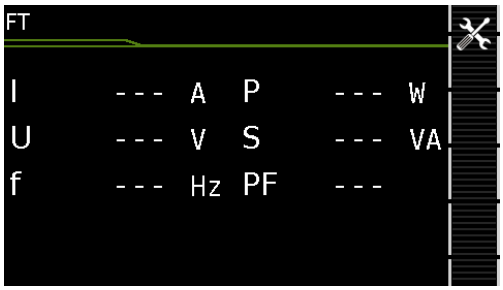
Execute the following steps when prompted to do so:

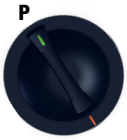
Note
Please note that test probe P1 is in continuous contact with the phase conductor from the point in time at which the PRCD is plugged in until it trips. Premature disconnection of the test probe may result in erroneous measured values.

- After each reconnection to the mains, and as soon as the first test is started, a mains connection test is executed.
- If the probe test reveals that probe P1 was not connected: connect probe P1 as described above.
- Switch the PRCD on after connection to line voltage (e.g. reset button on PRCD).
- Contact neutral conductor L at the PRCD with test probe P1 (ascertain by trial and error if necessary).
- The test is automatically ended and time to trip is displayed after the PRCD is tripped.
- The save icon appears and prompts you to save the measured values to a test object ID number.

- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

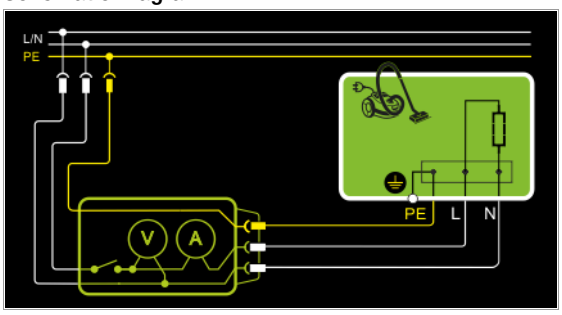
15.12 Function Test – P



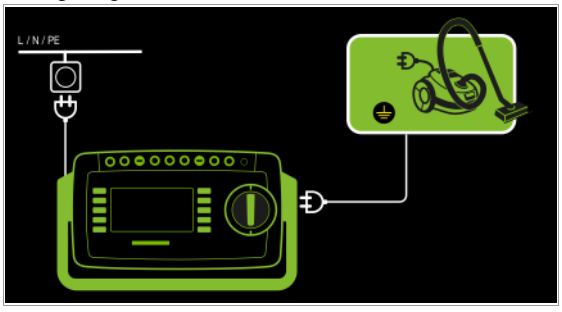


Single Measurements, *Rotary Switch Level: Green*			
Rotary Switch Position	Measuring Functions		Meas. Type With Mains to Test Socket
P	Function test at the test socket		Selection of polarity for mains voltage
	I	Current between L and N	
	U	Voltage between L and N	
	f	Frequency	
	P	Active power	
	S	Apparent power	
	PF	Power factor	

Schematic Diagram



Wiring Diagram



Setting Measuring Parameters for P

Measuring Parameter	Meaning
Polarity	
Normal / reversed	Selection of polarity for mains voltage to the test socket

The following connection types are possible:

- Test socket
- CEE adapter (only for connection via single-phase CEE or “caravan socket”)
- AT3 adapter (AT3-IIIE, AT3-IIS, AT3-IIS32)
- AT16DI/AT32DI

Note
These or similar adapters can be used for the function test (initial startup of the DUT), but measurement of apparent and active power, power factor and current consumption is only possible when the DUT is directly connected to the test socket or via the CEE adapter (single-phase CEE socket only).

The device under test can be subjected to a function test with mains voltage via the integrated test socket.

The test socket is tested for short-circuiting before switching to line voltage (a statement resulting from the short-circuit test can only be made regarding the DUT itself when a single-phase DUT is being tested).

In addition to testing with the selector switch in the function test position, a function test can also be performed immediately after safety testing has been passed in accordance with the selected standard (not possible for protection class III DUTs).

Test Procedure

Attention!
The function test may only be performed after the DUT has successfully passed the safety test.

Attention!
Refer to the safety precautions on page 41 with regard to **switching power consumers**.

Attention!

Starting the Function Test
For reasons of safety, the device under test must be switched off before the function test is started. This precaution prevents inadvertent startup of a DUT which may represent a hazard during operation, e.g. a circular saw or a disc grinder.

Ending the Function Test
After completion of the function test, DUTs must be turned off with their own switch – especially devices with relatively high inductivity.

- Set the rotary switch to the **P** position.
- Connect the DUT’s mains plug to the test instrument’s test socket.
- **Start the test:** Press the **START**/STOP key.

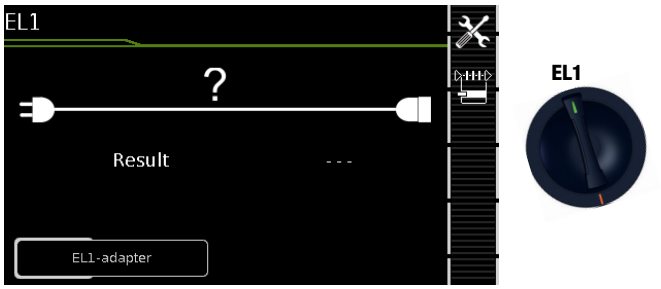
- Acknowledge the warning which indicates that line voltage will be connected to the test socket.

- Switch the device under test on.
- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory.

- Turn off the device under test.
- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.

- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

15.13 Testing Extension Cords for Correct Function – EL1



Single Measurements, *Rotary Switch Level: Green*		
Rotary Switch Position	Measuring Functions	Meas. Type Without Mains to Test Socket
EL1	Extension cord test with adapter for single or 3-phase extension cords for testing for: – Continuity – Short-circuit – Incorrect polarity (reversed wires *)	EL1 adapter EL1 adapter (continuity only) AT3-IIIE adapter VL2E adapter

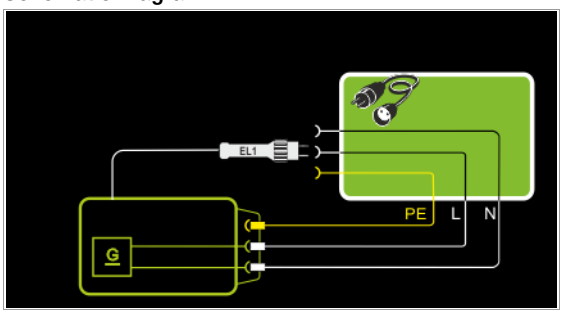
* No checking for reversed wires when the EL1 adapter is used

Testing for	Continuity L(1/2/3), N	Short-Circuit Between: L(1/2/3), N	Polarity Reversal / Clockwise Phase Sequence
EL1 adapter	X	X	—
EL1 adapter (continuity only)	X	—	—
VL2E adapter	X	X	X
AT3-IIIE adapter	X	X	X

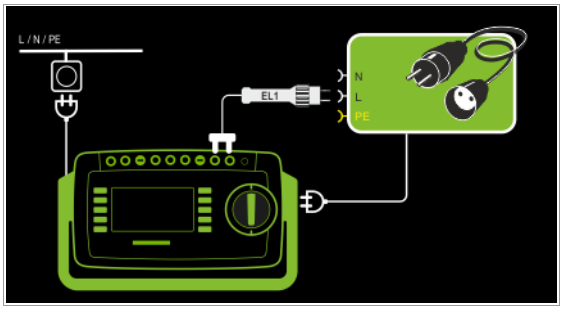
Attention!
This function permits an evaluation of the continuity of the extension cord's active conductors L(1, 2, 3) and N. The PE conductor isn't tested in this case.

Measurement at Single-Phase Extension Cords with EL1

Schematic Diagram

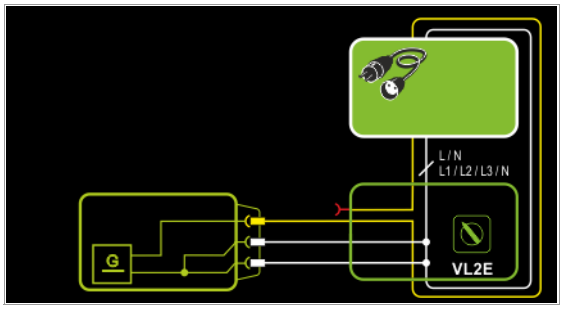


Wiring Diagram

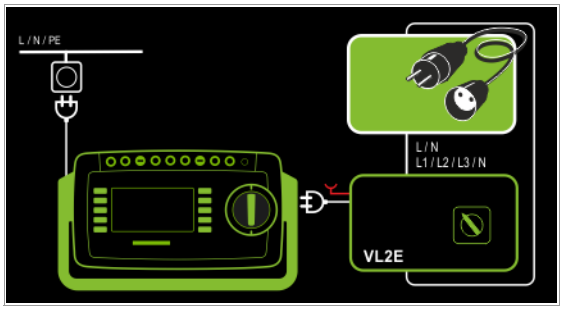


Measurement at Single and 3-Phase Extension Cords with VL2E

Schematic Diagram

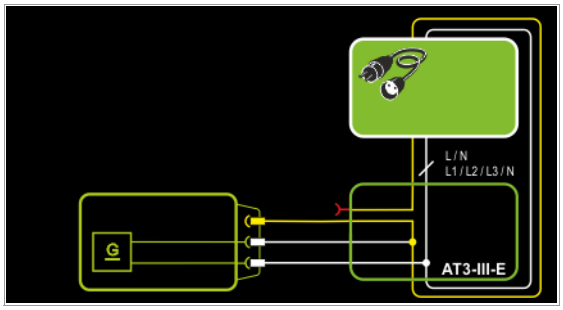


Wiring Diagram

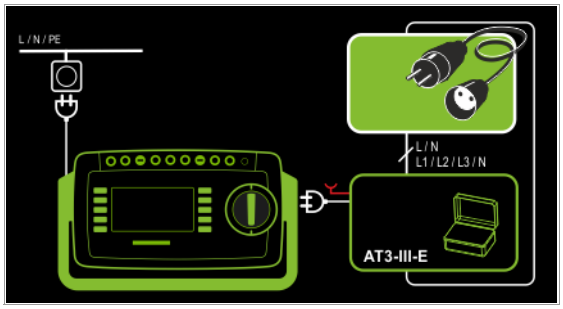


Measurement at Single and 3-Phase Extension Cords with AT3-IIIE

Schematic Diagram



Wiring Diagram



Setting Measuring Parameters

Testing for	Continuity L(1/2/3), N	Short-Circuit Between: L(1/2/3), N	Polarity Reversal / Clockwise Phase Sequence
EL1 adapter	X	X	—
EL1 adapter (continuity only)	X	—	—
VL2E adapter	X	X	X
AT3-IIIE adapter	X	X	X

See corresponding single measurements for the testing of RPE and RINS.

Note
Refer to section 17 “Test Sequences (automatic test sequences)” with regard to testing extension cords in accordance with EN 50678 / VDE 0701 or EN 50699 / VDE 0702 / or VDE 0701-0702 / ÖVE E 8701 / SNR 462638, for which RPE and RISO are measured.

Attention!
If the EL1 continuity test is conducted for an extension cord in combination with a “travel adapter”, results provided by the test instrument indicating the correctness of the extension cord’s polarity cannot be relied upon!

Note
In the case of cables with indicator lamp (usually a glow lamp in the switch), the results of the continuity test for L and N may be distorted due to additional resistance caused by the glow lamp.
In case of doubt, perform a continuity test for L and N by means of resistance measurement (R-PE or R-INS):
SECUTEST ST PRO: R-PE between probe 1 and probe 2.
SECUTEST ST BASE(10): R-PE between probe 1 and measurement cable at the protective conductor bar in the test socket (test type PE(TS)-P1).

Test Procedure with EL1 Adapter / EL1 Adapter (continuity only)

- Set the rotary switch to the **EL1** position.
- Select the **EL1 adapter** or **EL1 adapter (continuity only)** connection type directly via the key shown at the right.
- Connect the EL1 adapter to the P1 sockets at the test instrument.
- Connect the plug at the end of the extension cord to the test socket.
- Connect the coupling socket at the other end of the extension cord to the plug at the EL1 adapter.
- **Start the test:** Press the **START**/STOP key.
- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory.
- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.
- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

Test Procedure with VL2E Adapter

- Set the rotary switch to the **EL1** position.
- Select the **VL2E adapter** connection type directly via the key shown at the right.
- Connect the cable from the VL2E adapter to the test socket at the test instrument.
- Connect the extension cord’s plug and socket to the VL2E adapter.
- **Start the test:** Press the **START**/STOP key.
- Set the rotary selector switch on the VL2E adapter to position 2 and retain this position.
  The measured values are displayed.

Note
The test instrument only indicates whether or not the cable is **OK** or **not OK**. In the case of “not OK”, the inspector has to determine whether or not an interruption or a short-circuit is involved on his own by means of further measurements.

- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.
- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

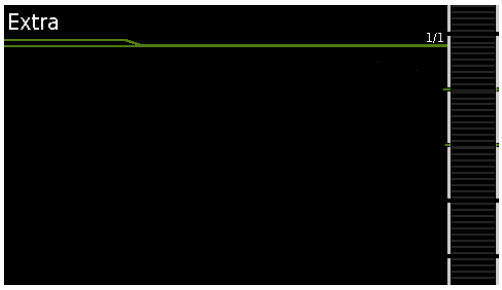
Test Procedure with AT3-IIIE Adapter

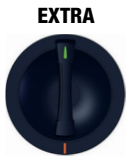
Attention!
Please observe the operating instructions for the AT3-IIIE regarding correct connection of the test adapter and the device under test, as well as peculiarities involved in the test procedure.

16 Special Functions – EXTRA

Depending on the test instrument configuration, either the QR code for the Internet link to the operating instructions or the measuring view for the temperature measurement is displayed.

SECUTEST ST BASE(10)

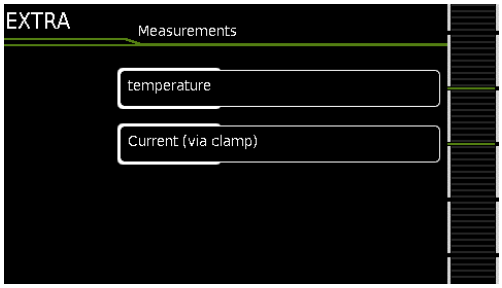


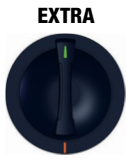


Single Measurements, *Rotary Switch Level: Green*		
Rotary Switch Position	Measuring Functions	Meas. Type
EXTRA	None	None

QR code: Scanning the QR code allows you to download and read the current operating instructions from www.gossenmetrawatt.com, for example at a tablet PC.

Feature I01 (e.g. SECUTEST ST PRO and SECULIFE ST BASE(25))



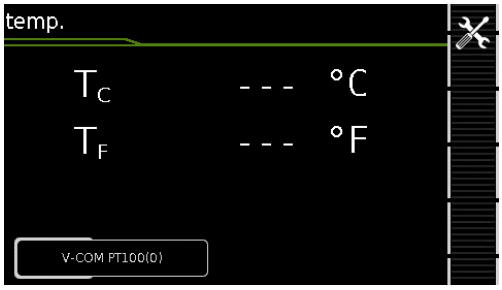


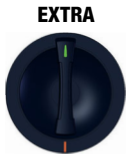
Single Measurements, *Rotary Switch Level: Green*		
Rotary Switch Position	Measuring Functions	Meas. Type
EXTRA	Temperature	V-COM
	Current clamp	V-COM

In this case, the additional functions are assigned to the rotary switch's **EXTRA** position.

➪ Select the desired measuring function.

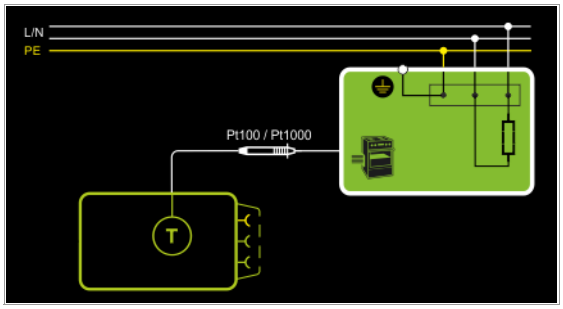
Measurement with Temperature Sensor



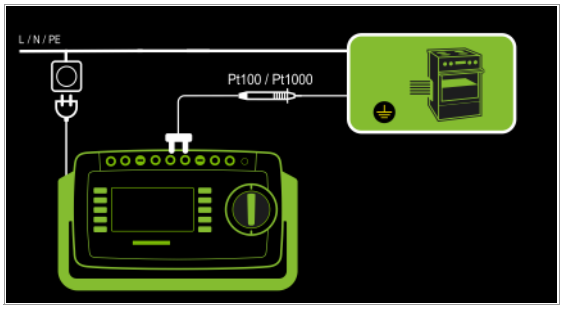


Temperature measurement is conducted with either a Pt100 or a Pt1000 temperature sensor – the sensor type is automatically detected internally.

Schematic Diagram



Wiring Diagram



Test Procedure with Temperature Sensor

➪ Set the rotary switch to the **EXTRA** position.

➪ Select the **Temperature** measurement type:

➪ Connect the temperature sensor's plug to the V-COM sockets at the test instrument.

➪ Contact the device under test.

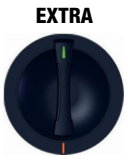
➪ **Start the test:** Press the **START**/STOP key.

➪ The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory.

➪ **End the test:** Press the **START**/STOP key.
The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.

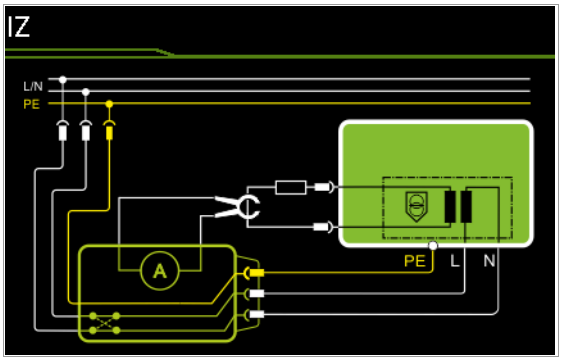
➪ Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

Measurement with Current Clamp Sensor

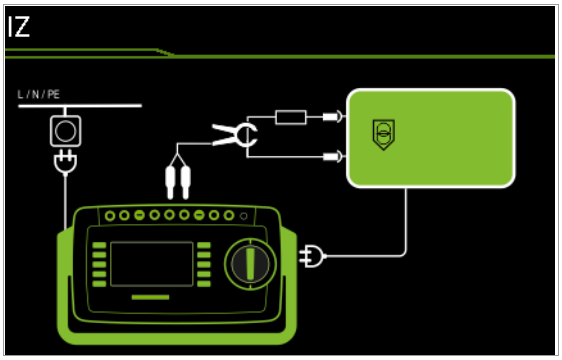


Current clamp measurement is possible in this case independent of measuring functions R_{PE}, I_{PE} and I_E, e.g. for measuring current at permanently installed DUTs.

Schematic Diagram



Wiring Diagram



Setting Measuring Parameters for a Current Clamp Sensor

Measuring Parameter	Meaning	
Meas. Type		**Suitable for DUT Connection via**
V – COM	Display: A AC	Permanent connection
V – COM (with mains)	Display: A AC: with mains to test socket, e.g. for measuring protective extra-low voltage at power packs	Test socket
Polarity – only for V-COM (with mains)		
Normal	Selection of polarity for mains voltage to the test socket	
Reversed		
Clamp Factor		
At tester	**Clamp transformation ratio**	**Suitable clamps**
1 V : 1000 A (1 : 1000)	1 mV / 1 A	WZ12C, Z3512A, METRAFLEX 3000
1 V : 100 A (1 : 100)	10 mV / 1 A	WZ11B, Z3512A, METRAFLEX 3000/300M
1 V : 10 A (1 : 10)	100 mV / 1 A	WZ12B, WZ11B, Z3512A, METRAFLEX 3000/300M
1 mV : 1 mA (1 : 1)	1000 mV / 1 A	WZ12C, Z3512A, METRAFLEX 300M
10 mV : 1 mA (10 : 1)		
100 mV : 1 mA (100 : 1)	100 mV : 1 mA	SECUTEST CLIP
1 V : 1 mA (1000 : 1)		

Test Procedure with Current Clamp Sensor

- Set the rotary switch to the **EXTRA** position.
- Select the **Current (via clamp)** measuring function.
- Set the clamp factor at the current clamp sensor.
- **Clamp factor:** Set clamp factor at the test instrument to the same value as at the current clamp sensor.
- Connect the current clamp to the V-COM sockets at the test instrument.
- Enclose the consuming device's cable with the current clamp sensor as shown in the schematic diagrams.
- **Start the test:** Press the **START**/STOP key.

- The measured values are displayed. The measured value recording icon shown at the right appears. Each time this key is pressed, the currently displayed measured value is saved to buffer memory.

- **End the test:** Press the **START**/STOP key.
  The save icon appears (floppy disk showing the number of measured values stored to buffer memory) and prompts you to save the measured values to a test object ID number.

- Press the **ESC** key in order to discard the measured values stored to buffer memory and acknowledge by pressing the key shown at the right.

Setting Measuring Range at the Clamp and Parameters at the Test Instrument

Test Instrument	Current Clamp Sensor		Test instrument
Clamp factor	**Transformation ratio** (switch *)	**Measuring range**	**Display range with clamp**
	WZ12C		
1000 mV : 1 A	1000 mV : 1 A	1 mA ... **15 A**	0 A ... 300 A
1 mV : 1 A	1 mV : 1 A	1 A ... **150 A**	1.0 A ... 300 A
	WZ12B		
100 mV : 1 A	100 mV : 1 A	10 mA ... **100 A**	0 A ... 300 A
	WZ11B		
100 mV : 1 A	100 mV : 1 A	0.5 A ... **20 A**	0 A ... 300 A
10 mV : 1 A	10 mV : 1 A	5 A ... **200 A**	0 A ... 300 A
	Z3512A		
1000 mV : 1 A	1000 mV : 1 A	0.001 A ... **1 A**	0 A ... 300 A
100 mV : 1 A	100 mV : 1 A	0.01 A ... **10 A**	0 A ... 300 A
10 mV : 1 A	10 mV : 1 A	0.1 A ... **100 A**	0 A ... 300 A
1 mV : 1 A	1 mV : 1 A	1 A ... 1000 A	0 A ... **300 A**
	METRAFLEX 3000		
100 mV : 1 A	100 mV : 1 A	0.01 A ... **30 A**	0 A ... 300 A
10 mV : 1 A	10 mV : 1 A	0.1 A ... 300 A	0 A ... **300 A**
1 mV : 1 A	1 mV : 1 A	1 A ... 3000 A	0 A ... **300 A**
	METRAFLEX 300M		
1000 mV : 1 A	1000 mV : 1 A	0.001 A ... **3 A**	0 A ... 300 A
100 mV : 1 A	100 mV : 1 A	0.01 A ... **30 A**	0 A ... 300 A
10 mV : 1 A	10 mV : 1 A	0.1 A ... 300 A	0 A ... **300 A**
100 mV : 1 mA	SECUTEST CLIP		
	100 mV : 1 mA	0.1 ... **25 mA**	0.01 mA ... 3.00 A

17 Test Sequences (automatic test sequences)

A test sequence is a series of semi-automatic tests or test steps. If the same sequence of individual tests will be run frequently (one after the other with subsequent report generation), for example as specified in the standards, it's advisable to make use of such test sequences.

The test instrument includes two types of test sequences:

- Integrated Test Sequences
  Available ex works or after enabling at the test instrument. Cannot be changed (test parameters are configurable).

Attention!
The integrated test sequences do not include all of the tests stipulated by the product standard which are required for type testing! They're restricted to the tests which are required as a rule after repair or during maintenance work and for occupational health and safety measures, as well as for quality assurance in production.

- User-Defined Test Sequences
  Created individually by the user with IZYTRONIQ software and transferred to the test instrument.
  (This function is available depending on test instrument model or features.)

All test sequences are run in orange rotary switch positions A1 through A9. Each of the rotary switch positions is preconfigured at the factory with integrated test sequences, but they can be adapted to suit your needs, i.e. integrated and user-defined test sequences can be subsequently assigned to the various rotary switch positions as required.

We recommend assigning frequently used test sequences to rotary switch positions A1 through A8, and running special sequences for which parameters often need to be adjusted in the A9 position.

The measurements included in the test sequences are evaluated – either automatically by the test instrument (in the case of limit values) or manually by the user (e.g. visual inspection). Automatic evaluation by the test Instrument is based on the worst-case and, depending on settings, in consideration of measuring uncertainty.

Note
The user selects standard designations (national designations) for the integrated test sequences during initial configuration. If the designations need to be changed, follow the instructions in section 8.2, "Test Standards / Configuration of Integrated Test Sequences" on page 20 once again. Please note that designations cannot be changed retroactively (standard designations in previously saved tests cannot be changed).

Proceed as follows for test sequences.

First of all, prepare the test sequences and adapt them to your needs. Settings are made at two points in the test instrument to this end:

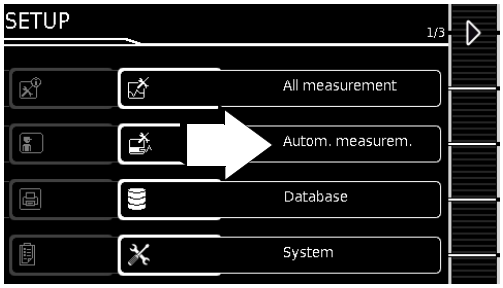
1 Enter general settings which apply to all test sequences, regardless of the respectively selected standard (**SETUP** rotary switch position).
  See section 17.1 "General Settings (Setup: Auto Measurements parameter)".
2 Configure the test sequences (rotary switch positions **A1** to **A9**) as desired.
  – Familiarize yourself with the menu and the user interface (see section 17.2.1 "Test Sequence Menu: View and Icons").
  – Set the classification and sequence parameters which apply only to the respectively selected rotary switch position. See section 17.2 "Configuring Test Sequences".
  – Depending on the test instrument model and its features, you can also create your own user-defined test sequences using IZYTRONIQ software and transfer them to the test instrument.
    See section 17.2.3.

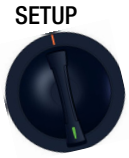
Run the test sequence:

3 Connect the DUT (see section 17.3).
4 Select the test object from the database (see section 17.4).
5 The test instrument initializes connection type recognition. Then start the test sequence (see section 17.5).
6 The individual test steps are now executed. Automatic evaluation of the test steps is conducted by the test instrument and manual evaluation is conducted by the user (see section 17.6).
7 The test sequence is ended. You can display the individual test steps and results (see section 17.7).
8 You can save the results (see section 17.8).

17.1 General Settings (Setup: Auto Measurements parameter)

The following settings can be entered for all test sequences with the rotary switch in the **SETUP** position on menu page 1/3 under the **Auto Measurements** parameter:





Automatic Measurements (1/7)

❑ **At the End of the Sequence**

Determines whether the main window with storage option ("memory screen") or a report with test results ("results list") is displayed at the end of a test sequence.

❑ **Considering Measuring Uncertainty**

If **Yes** is selected, measuring uncertainty is taken into consideration when the measurement results are displayed. The final result which appears at the display is downgraded by an amount equal to measuring uncertainty.

❑ **Auto Measuring Point**

If **Yes** is selected, the test instrument detects whether or not the protective conductor is contacted with the probe during the protective conductor resistance measurement of an automatic test sequence and automatically starts recording a new measuring point. Statuses are indicated by various, continuous acoustic signals. The protective conductor test can thus be conducted without using the keys on the test instrument.

Note

The "Auto Measuring Point" function is only activated during test steps of the "multiple measurement" type. If you want to use this function ...
– In the case of integrated test sequences: make sure that "multiple measurement is selected for the RPE test step.
– In the case of user-defined test sequences (only with the SECUTEST DB+ database extension – Z853R or feature KB01): make sure that the RPE test step has been entered to the sequence as a "multiple measurement".

Automatic Measurements (2/7)

❑ **Initial Window Style**

Selection can be made here between a tree view and a detail view for the first page of the test sequence (see section 17.2).

❑ **Auto Mains Off**

Automatic test sequences detect whether the DUT is switched on or off.

DUT is off: test sequence is continued automatically (without pressing any key on the test instrument).

DUT is on: as soon as the DUT is switched off by the user, mains power is also automatically switched off at the DUT. The test sequence is then continued automatically (without pressing any key on the test instrument).

Attention!

The function is NOT suitable for DUTs for which a systematic shutdown procedure is required (e.g. desktop PCs).
On/off detection is based on current consumption at the device under test. If momentary current consumption falls below a certain threshold, the test instrument disconnects the DUT from the mains without user confirmation (and continues with the test).
This function should only be activated for DUTs which are not vulnerable to unprepared disconnection from mains power.

❑ **Startup Instruction**

Specifies whether or not the test message "Start up DUT now and then confirm" is displayed after mains power is switched on during active testing.

Attention!

Erroneous Measurement Results
The DUT must be fully operational during leakage current measurements.
If the instruction is deactivated, the user must immediately place the DUT into full operation without being asked to do so (after mains power to the DUT has been switched on). An erroneous value would otherwise be obtained during the following leakage current measurement.
In case of doubt, the measured leakage current value must be verified with the rotary switch in the IPE or IE position.

Attention!

Deactivate instruction for experienced users only / deactivate instruction for "on/off" DUTs only.

The DUT must be fully operational during leakage current measurements because measurement results will otherwise be incorrect (see previous warning).

For this reason, the instruction should only be deactivated if:
- The DUT can be switched on fully within 3 seconds (examples: lamps, handheld tools, power supplies, monitor screens etc.)
- If the inspector is very experienced and thus knows at which point in time during the measurement the device under test must be fully switched on.

Automatic Measurements (3/7)

❑ **Limit Value Mode**

If you want to use only the limit values specified in the standards to evaluate the measurements, set the parameter to **Normal**.
When set to **Expert**, the **LIMIT** softkey appears next to the "measurement failed" popup if the measurement has not been passed. This key makes it possible to enter a user-defined limit value (as a rule a limit value specified by the manufacturer which deviates from the standard), in order to allow the test to be passed under these new conditions.

Note

Entry of a user defined limit value isn't possible if "Continue" is selected for the "Limit Violation" option.

❑ **In Case of Limit Value Violation**
(only with SECUTEST DB COMFORT – Z853S or feature KD01)

With its "**Try Again**" operating mode, the test instrument makes it possible to immediately restart the failed test step and repeat the measurement in the event that a limit value is violated.

In the "**Continue**" mode, the test instrument doesn't terminate the test sequence in the event of a limit value of violation, and instead continues testing despite any individual steps which have failed.

Attention!
Dangerous Voltage!
Do not touch metallic parts.
If the test sequence is continued, accessible parts may conduct **dangerous voltage** during the test, because the DUT is operated with mains voltage despite possible insulation faults, excessive protective conductor resistance etc.
Proceed as follows if you'd like to continue.
1 Wear suitable personal safety equipment (PSE).
2 Secure the DUT against touch contact with a suitable cover.
3 Use a 30 mA RCD.
4 Continue by pressing ✓.

Some standards may not provide for test sequences in the "Continue" mode. Responsibility is borne by the user.

Note
If a limit value violation occurs during the test sequence, the respective test step designation appears in red in the header during all following test steps, so that it's already made apparent during the test sequence that a limit value violation has occurred during one of the previous test steps, and that the device under test will not pass testing.

In the "**Interrupt**" mode, the test instrument stops the test sequence in the event of a limit value violation and evaluates the test as failed.

❑ **Auto-Store**
(only with SECUTEST DB COMFORT – Z853S or feature KD01)

If this function is activated ("on"), the test results for the automatic test sequence are immediately saved under the test object (= device or ME equipment) which is currently selected in the database.

If you haven't yet selected a test object in memory management (MEM key), a message appears informing you that automatic storage of the momentary test isn't possible.

You're prompted to enter a test object ID via the scanner or the softkeys, or to select one from the database (MEM key). In this case you have to save the test manually to the database via the "Save" softkey.

Automatic Measurements (4/7)

❑ **Skip Steps**

Here you can configure whether or not the user is allowed to skip test steps **during** a test sequence ("on").
This does **not** apply to inspection test steps that can be omitted (which have no relevance with regard to the standard)!

❑ **Std. Interv. (Mon.)**

Standard interval (in months) for calculating the next test date.
The default setting is 12 months.
Refer to section 14.4 "Next Test Date", for detailed information.

Automatic Measurements (4/7 and subsequent pages)

❑ Standards, e.g. **VDE 0701-0702**

The national designation is selected here for the standards (see section 8.2). Designations selected here are used in the test instrument and in reports.

Note
The test instrument must be restarted after changing the standard designation(s) and assignments for rotary switch positions A1 to A9 are lost!
(Database structure and content are retained.)

The change is not retroactive, i.e. previous measurements retain their previous designations!

17.2 Configuring Test Sequences

The test instrument includes integrated test sequences which are preconfigured at the factory.

User-defined test sequences can be used as an alternative (depending on test instrument model and features).

Status Upon Delivery / Initial State

Which integrated test sequences are assigned to rotary switch positions **A1** to **A9** on your test instrument upon delivery or after a test instrument reset depends on several factors: test instrument type (SECUTEST ST... or SECULIFE ST...), selected features and enabled extensions.

Furthermore, during initial startup you selected standard designations and deactivated unnecessary standards at the test instrument. See “Test Standards / Configuration of Integrated Test Sequences” on page 20.

Due to the great variety of possible combinations, a listing of standard assignments for rotary switch positions **A1** to **A9** would go beyond the scope of this documentation. An example is included in “Scope of Functions” on page 9.

Current assignments for your test instrument can be determined by selecting the individual rotary switch positions.

Individual Customization of Integrated Test Sequences

You can change the integrated, preconfigured test sequences to suit your needs:

You can adjust and change settings for the individual test sequences, i.e. classification and sequence parameters, directly at the test instrument. First familiarize yourself with the menu in section 17.2.1 and then change any desired parameters (see section 17.2.2).

User-Defined Test Sequences

As an alternative to the integrated test sequences and in accordance with your own specific requirements, you can create individual user-defined test sequences with IZYTRONIQ software at a PC and transfer them to the test instrument (depending on test instrument model and features). See section 17.2.3

17.2.1 Test Sequence Menu: View and Icons

Initial Test Sequence Page

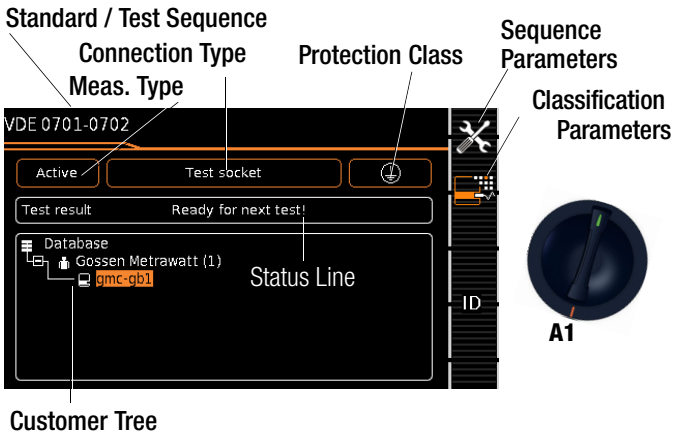
The initial test sequence page displays all available settings and provides access to them for editing.

Selection can be made between a tree view (structure view) and a detail view (information about the DUT) for this view. The tree view can be structured by location or customer (see screenshots below).

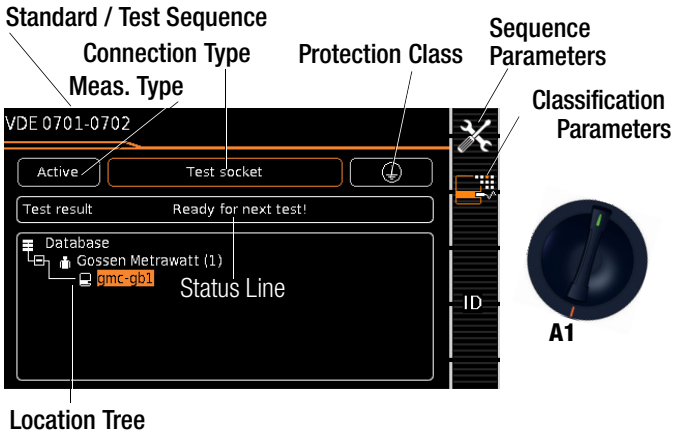
SETUP rotary switch position > Setup Menu 1/3 > Measurements 2/4 > Initial Screen: **customer tree view** or **location tree view** or **detail view**

In the case of test instruments with feature E01 (touchscreen), it’s also possible to switch between the views by means of “touch click”, i.e. by briefly tapping the respective area.

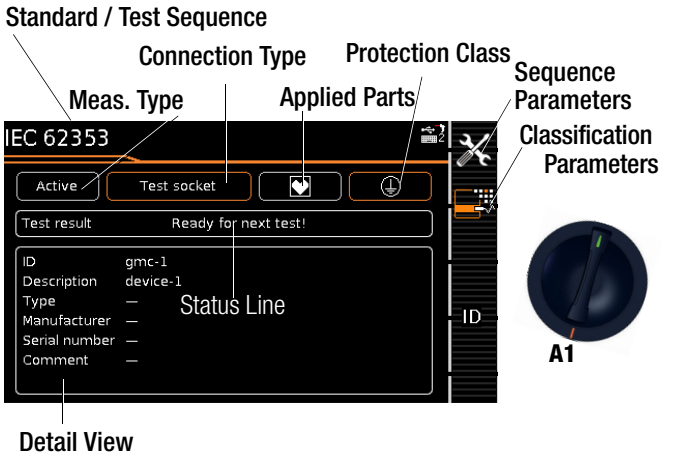
Customer Tree View:



Location Tree View:



Detail View and Applied Part:



User Interface Icons

Icon	Softkey Variants, Test Sequence
	Test for Protection Class I DUTs Exposed, conductive parts are connected to the protective conductor so that they're not charged with voltage if the basic insulation should fail.
	Test for Protection Class II DUTs These DUTs are equipped with double insulation or reinforced insulation.
	Test for Protection Class III DUTs These DUTs are supplied with safety extra-low voltage (SELV). Beyond this, no voltages are generated which exceed SELV.
	Type B applied parts (body)
	Type BF applied parts (body float)
	Type CF applied parts (cardiac float)
	Configure sequence parameters (see page 87)
	Set classification parameters (see page 81)
	Assess visual inspection or function test with **OK** ✓ or **not OK** ✗ (toggle key)
	Enter a comment, e.g. for the visual inspection or function test
	Continue test, next test step in the test sequence
	End **continuous measurement**, next test step in the test sequence
	Accept changed parameter, return to memory view
	End test sequence
	– Repeat inspection (if it has been failed). – Repeat test step
	– Skip inspection test step – Skip individual tests in the test sequence This option can be enabled for the user in SETUP under "Auto Measurements".
	Start evaluation – record measured value. Each time this softkey is pressed, an additional measured value is saved and the number is increased by one.
	Start evaluation sequence during a **continuous measurement**. The number blinks.
	Record measured value during the evaluation sequence of a **continuous measurement**.
	Repeat measured value recording
	Delete measured value
	Display measured values
	Display details from the results list
	Hide details from the results list
	The ID number to which the measurement(s) will be stored can be entered here.
	Valid measured values have been obtained for a test sequence. This measurement can be saved.
	Save measurement data as (with display of directory path / test object ID or new entry of a test object ID other than the preselected one)
	Transmit measurement data to a PC, e.g. in order to save them to IZYTRONIQ software (push-print function) – refer to IZYTRONIQ online help for description

Icon	Softkey Variants, Test Sequence
	Read-out of a complete test report at the end of a test sequence
	Read-out of a summarized test report at the end of a test sequence
	Read-out of all failed test steps instead of a test report at the end of the test sequence

17.2.2 Selecting and Configuring the Integrated Test Sequence at the Test Instrument

All of the settings for the integrated test sequences can be adjusted at the test instrument.

Select a switch position (A1 … A9), after which the start page for the respective integrated test sequence is displayed (either the default integrated test sequence or the previous setting).

The classification parameters (page 81) and the sequence parameters (page 87) can then be set.

Classification Parameters

DUT classification is set at the test instrument via classification parameters (protection class, connection type, measurement type etc.).

The test instrument attempts to automatically detect the settings of certain classification parameters. In each case, an orange border is displayed if this has been successful. Example for “test socket connection type and protection class I”:

Automatic Detection Active for Protection Class
When connecting or disconnecting a DUT, the protection class can be changed without confirmation.

Automatic Detection Inactive for Protection Class
The test instrument retains the selected protection class setting when a DUT is connected or disconnected.

Automatic setting of classification parameters must be checked by the user. If they’re not recognized automatically, or if they’re not recognized correctly, they have to be entered manually.

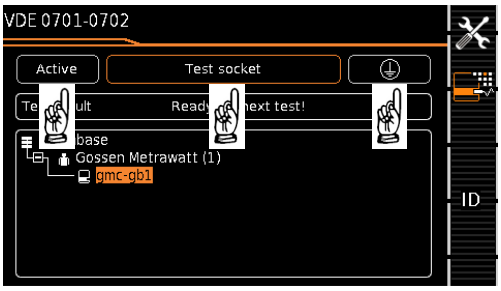
- Open the classification parameters menu by pressing the key. All available parameters are displayed.
- Select the parameter to be changed with the softkey. A selection of possible settings appears.

Note
Descriptions of these parameters and their setting options are shown in the following tables.

- Select the desired setting with the softkey. The classification parameters menu is displayed again.
- Change additional settings if necessary.
- Confirm and save all of your changes with the checkmark. The test menu’s initial page is displayed again.

Classification parameters can be changed very conveniently in the case of test instruments with touchscreen (feature E01).

- The corresponding selection menu appears after touch clicking (briefly tapping) the respective classification parameters window.
- The display is automatically returned to the start menu after selecting the desired parameter.



Classification Parameters – VDE 0701-0702 / ÖVE E 8701 / SNR 462638

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCII, PCI+II, PCI+III, PCII+III, PCI+II+III
Connection type [1, 2]	Test socket Permanent connection Adapter: AT16/32-DI adapter Adapter: VL2E Adapter: AT3-Adapter (feature I01) Permanent connection: P1+P2 (only with feature H01)
2/2	
Measurement type (MT) [1]	Passive Active
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

[2] The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

Classification Parameters – VDE 0701-0702-EDV / ÖVE E 8701-EDV / SNR 462638-EDV

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCII, PCI+II, PCI+III, PCII+III, PCI+II+III
Connection type [1, 2]	Test socket Permanent connection Adapter: AT16/32 Adapter: AT3-Adapter (feature I01)
2/2	
Measurement type (MT) [1]	Active
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

[2] The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

Classification Parameters – VDE 0701-0702-VLTG / ÖVE E 8701-VLTG / SNR 462638-VLTG

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI
Connection type [1, 2]	Test socket Adapter: AT3-IIIE Adapter: EL1 adapter Adapter: VL2E adapter
2/2	
Measurement type (MT) [1]	VLTG [2]
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

1 These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

2 The limit value for protective conductor resistance is determined on the basis of length and cross-section (length only in the case of EL1). Data remain in memory until a new entry is made.

Classification Parameters – VDE 0701-0702-PRCD / ÖVE E 8701-PRCD / SNR 462638-PRCD

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCI+II
Connection type [1, 2]	Test socket
2/2	
Measurement type (MT) [1]	PRCD [3]
PRCD type [3]	PRCD (standard) PRCD (SPE) PRCD-S (SPE) PRCD-K (SPE)
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

1 These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

2 The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

3 New classification parameters “PRCD type”
(only displayed if “VDE 0701-0702-PRCD / ÖVE E 8701-PRCD / SNR 462638-PRCD” standards parameter has been selected):
PRCD (standard): For the testing of simple circuit breaker safety adapters in which the protective conductor is permanently connected. Commonly designated 2-pole.
PRCD (SPE): (SPE = switched protective earth) for testing PRCDs in which the protective conductor is only connected in switched-on condition. Commonly designated 3-pole.
PRCD-S (SPE): For testing type PRCD-S circuit breaker safety adapters.
PRCD-K (SPE):
For testing type PRCD-K circuit breaker safety adapters.

Note
For more information on testing single-phase and 3-phase type S and K PRCDs by simulating faults see “**PROFITEST PRCD** test adapter” on our website.

Note
Testing of PRCDs (test procedure and time to trip) is only possible for DUTs with a nominal voltage of 230 V.

Classification Parameters – NEN 3140

(only with feature D01/D02 or corresponding enabling for a fee)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCII, PCI+II, PCI+III, PCII+III, PCI+II+III
Connection type [1, 2]	Test socket Permanent connection Adapter: AT16/32-DI adapter Adapter: VL2E Adapter: AT3-Adapter (feature I01) Permanent connection: P1+P2 (only with feature H01)
2/2	
Measurement type (MT) [1]	Passive Active
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

1 These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

2 The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

Classification Parameters – NEN 3140- EDV

(only with feature D01/D02 or corresponding enabling for a fee)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCII, PCI+II, PCI+III, PCII+III, PCI+II+III
Connection type [1, 2]	Test socket Permanent connection Adapter: AT16/32 Adapter: AT3-Adapter (feature I01)
2/2	
Measurement type (MT) [1]	Active
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

1 These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

2 The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

Classification Parameters – NEN 3140-VLTG

(only with feature D01/D02 or corresponding enabling for a fee)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI
Connection type [1, 2]	Test socket Adapter: AT3-IIIE Adapter: EL1 adapter Adapter: VL2E adapter
2/2	
Measurement type (MT) [1]	VLTG [2]
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

1 These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

2 The limit value for protective conductor resistance is determined on the basis of length and cross-section (length only in the case of EL1). Data remain in memory until a new entry is made.

Classification Parameters – NEN 3140-PRCD

(only with feature D01/D02 or corresponding enabling for a fee)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCI+II
Connection type [1, 2]	Test socket
2/2	
Measurement type (MT) [1]	PRCD [3]
PRCD type [3]	PRCD (standard) PRCD (SPE) PRCD-S (SPE) PRCD-K (SPE)
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

1 These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

2 The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

3 New classification parameters “PRCD type”
(only displayed if “NEN 3140-PRCD” standards parameter has been selected):
PRCD (standard): For the testing of simple circuit breaker safety adapters in which the protective conductor is permanently connected. Commonly designated 2-pole.
PRCD (SPE): (SPE = switched protective earth) for testing PRCDs in which the protective conductor is only connected in switched-on condition. Commonly designated 3-pole.
PRCD-S (SPE): For testing type PRCD-S circuit breaker safety adapters.
PRCD-K (SPE):
For testing type PRCD-K circuit breaker safety adapters.

Note
For more information on testing single-phase and 3-phase type S and K PRCDs by simulating faults see “**PROFITEST PRCD** test adapter” on our website.

Note
Testing of PRCDs (test procedure and time to trip) is only possible for DUTs with a nominal voltage of 230 V.

Classification Parameters – EN 50678 / VDE 0701

(Only with enabling of Z853U, “EN50678/50699 update” or with feature KE01)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCII, PCI+II, PCI+III, PCII+III, PCI+II+III
Connection type [1, 2]	Test socket Permanent connection Adapter: AT16/32-DI adapter Adapter: VL2E Adapter: AT3-Adapter (feature I01) Permanent connection: P1+P2 (only with feature H01)
2/2	
Measurement type (MT) [1]	Passive Active
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

[2] The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

Classification Parameters – EN 50678-VLTG / VDE 0701-VLTG

(Only with enabling of Z853U, “EN50678/50699 update” or with feature KE01)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI
Connection type [1, 2]	Test socket Adapter: AT3-IIIE Adapter: EL1 adapter Adapter: VL2E adapter
2/2	
Measurement type (MT) [1]	VLTG [2]
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

[2] The limit value for protective conductor resistance is determined on the basis of length and cross-section (length only in the case of EL1). Data remain in memory until a new entry is made.

Classification Parameters – EN 50678-PRCD / VDE 0701-PRCD

(Only with enabling of Z853U, “EN50678/50699 update” or with feature KE01)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCI+II
Connection type [1, 2]	Test socket
2/2	
Measurement type (MT) [1]	PRCD [3]
PRCD type [3]	PRCD (standard) PRCD (SPE) PRCD-S (SPE) PRCD-K (SPE)
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

[2] The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

[3] New classification parameters “PRCD type”
(only displayed if “EN 50678- PRCD/ VDE 0701-PRCD” standards parameter has been selected):
PRCD (standard): For the testing of simple circuit breaker safety adapters in which the protective conductor is permanently connected. Commonly designated 2-pole.
PRCD (SPE): (SPE = switched protective earth) for testing PRCDs in which the protective conductor is only connected in switched-on condition. Commonly designated 3-pole.
PRCD-S (SPE): For testing type PRCD-S circuit breaker safety adapters.
PRCD-K (SPE):
For testing type PRCD-K circuit breaker safety adapters.

Note

For more information on testing single-phase and 3-phase type S and K PRCDs by simulating faults see “**PROFITEST PRCD** test adapter” on our website.

Note

Testing of PRCDs (test procedure and time to trip) is only possible for DUTs with a nominal voltage of 230 V.

Classification Parameters – EN 50699 / VDE 0702

(Only with enabling of Z853U, “EN50678/50699 update” or with feature KE01)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCII, PCI+II, PCI+III, PCII+III, PCI+II+III
Connection type [1, 2]	Test socket Permanent connection Adapter: AT16/32-DI adapter Adapter: VL2E Adapter: AT3-Adapter (feature I01) Permanent connection: P1+P2 (only with feature H01)
2/2	
Measurement type (MT) [1]	Passive Active
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

[2] The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

Classification Parameters – EN 50699-EDV

(Only with enabling of Z853U, “EN50678/50699 update” or with feature KE01)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCII, PCI+II, PCI+III, PCII+III, PCI+II+III
Connection type [1, 2]	Test socket Permanent connection Adapter: AT16/32 Adapter: AT3-Adapter (feature I01)
2/2	
Measurement type (MT) [1]	Active
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

[2] The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

Classification Parameters – EN 50669-VLTG / VDE 0702-VLTG

(Only with enabling of Z853U, “EN50678/50699 update” or with feature KE01)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI
Connection type [1, 2]	Test socket Adapter: AT3-IIIE Adapter: EL1 adapter Adapter: VL2E adapter
2/2	
Measurement type (MT) [1]	VLTG [2]
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

[2] The limit value for protective conductor resistance is determined on the basis of length and cross-section (length only in the case of EL1). Data remain in memory until a new entry is made.

Classification Parameters – EN 50669-PRCD / VDE 0702-PRCD

(Only with enabling of Z853U, “EN50678/50699 update” or with feature KE01)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 “Test Standards / Configuration of Integrated Test Sequences”, for a list of standards available for selection in the test instrument)
Protection class [1, 2]	PCI, PCI+II
Connection type [1, 2]	Test socket
2/2	
Measurement type (MT) [1]	PRCD [3]
PRCD type [3]	PRCD (standard) PRCD (SPE) PRCD-S (SPE) PRCD-K (SPE)
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they’re not automatically detected, or if they’re detected incorrectly.

[2] The limit value for protective conductor resistance is determined on the basis of length and cross-section. Data remain in memory until a new entry is made.

[3] New classification parameters “PRCD type”
(only displayed if “EN 50669- PRCD/ VDE 0702-PRCD” standards parameter has been selected):
PRCD (standard): For the testing of simple circuit breaker safety adapters in which the protective conductor is permanently connected. Commonly designated 2-pole.
PRCD (SPE): (SPE = switched protective earth) for testing PRCDs in which the protective conductor is only connected in switched-on condition. Commonly designated 3-pole.
PRCD-S (SPE): For testing type PRCD-S circuit breaker safety adapters.
PRCD-K (SPE): For testing type PRCD-K circuit breaker safety adapters.

Note
For more information on testing single-phase and 3-phase type S and K PRCDs by simulating faults see "**PROFITEST PRCD** test adapter" on our website.

Note
Testing of PRCDs (test procedure and time to trip) is only possible for DUTs with a nominal voltage of 230 V.

Classification Parameters – IEC 62368/ EN 62368 / VDE 0868-1

(Only with enabling of Z853U, "EN50678/50699 update" or with feature KE01)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 "Test Standards / Configuration of Integrated Test Sequences", for a list of standards available for selection in the test instrument)
Protection class [1]	PCI, PCII, PCI+II
Connection type [1]	Test socket Permanent connection Adapter: AT16/32-DI adapter
2/2	
Measurement type (MT) [1]	Active
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they're not automatically detected, or if they're detected incorrectly.

Classification Parameters – IEC 62911/ EN 62911 / VDE 0868-911

(Only with enabling of Z853U, "EN50678/50699 update" or with feature KE01)

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 "Test Standards / Configuration of Integrated Test Sequences" for a list of standards available for selection in the test instrument)
Protection class [1]	PCI, PCII, PCI+II
Connection type [1]	Test socket Permanent connection Adapter: AT16/32-DI adapter
2/2	
Measurement type (MT) [1]	Active
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they're not automatically detected, or if they're detected incorrectly.

Classification Parameters – IEC 60974-4/ EN 60974-4 / VDE 0544-4

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 "Test Standards / Configuration of Integrated Test Sequences", for a list of standards available for selection in the test instrument)
Protection class [1]	PCI, PCII, PCI+II
Connection type [1]	Test socket Permanent connection Adapter: AT16/32-DI adapter Adapter: AT3-Adapter
2/2	
Measurement type (MT) [1]	Active
Voltage rating, serial plate	U(R)eff (= serial plate rating) U(0) DC (open circuit voltage, DC, fixed: 113 V)
Auto-detection	Conn. & PC & MT (not recommended as MT selection is fixed) Connection & PC Conn. & MT (not recommended as MT selection is fixed) Connection only PC & MT (not recommended as MT selection is fixed) Protection class only (PC) Meas. type only (MT) (not recommended as MT selection is fixed) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they're not automatically detected, or if they're detected incorrectly.

Classification Parameters – IEC 62353 / EN 62353 / VDE 0751-1

Parameter	Setting Options / Meaning
1/2	
Standard / Test Sequence	Currently selected standard with national designation (refer to section 8.2 "Test Standards / Configuration of Integrated Test Sequences", for a list of standards available for selection in the test instrument)
Protection class [1]	PCI, PCII or PCI+II
Connection type [1]	Test socket Permanent connection Adapter: AT16/32-DI adap. Adapter: AT3-Adapter Permanent connection: P1+P2 (only with feature H01)
2/2	
Measurement type (MT) [1]	Passive active
APPs	Applied parts: none, B, BF, CF or combinations **Type B (body):** DUTs of this type are suitable for both internal and external patient applications, except for use in direct proximity to the heart. The following protection classes are permissible: I, II, III or devices with internal electric power supply. **Type BF (body float):** Same as type B, but with type F insulated applied parts **Type CF (cardiac float):** DUTs of this type are suitable for use directly at the heart. The insulated applied part may ungrounded. The following protection classes are permissible: I, II or devices with internal electric power supply.
Auto-detection	Connection & PC & MT Connection & PC Connection & MT Connection only PC & meas. type Protection class only (PC) Measurement type only (MT) Off (= no auto-detection: all classification parameters such as connection and protection class must be entered manually)

[1] These parameters must be entered manually if they're not automatically detected, or if they're detected incorrectly.

Sequence Parameters

The default test sequences can be adapted to your application or test standard via the sequence parameters.

The entered sequence parameter settings are only valid for the currently selected switch position (A1 … A9) and are retained until they are changed.

Note
Not all of the parameters are relevant, depending on the selected DUT classification (protection class etc.).

Note
Availability of the individual test sequences depends on the test instrument type (SECUTEST ST... or SECULIFE ST...), the selected features (order features) and the enabled extensions (activations).
Refer to your order / test instrument and data sheet for details.

Sequence Parameters	Meaning
Visual inspection (1)	Visual inspection (standard): on: activate off: deactivate
Visual inspection 2	Visual inspection, function test, welding units on: activate off: deactivate
Function test	Function test: on: activate off: deactivate
Protective conductor resistance test	
RPE	Protective conductor resistance test: on: activate off: deactivate
RPE IP	Protective conductor resistance at test socket: Select test current IP: ±200 mA= / 200 mA~ / Feature G01: 10 A~ / feature G02: 25 A~
RPE IP permanent connection	Protective conductor resistance with permanent connection: Select test current IP: ±200 mA= / 200 mA~ / Feature G01: 10 A~ / feature G02: 25 A~ Note: Only used for RPE measurement with connection type “permanent connection”. (The current value selected for the “RPE IP” sequence parameter is used in the case of connection type “Perm. conn. P1+P2”.)
RPE as	Protective conductor resistance test: Execute as individual or multiple measurement. Multiple measurement: Repeat testing of various conductive parts as often as desired, in the event that it’s not clear as to whether or not all accessible, conductive parts are connected to each other or to the protective conductor.
RPE measurement duration	Protective conductor resistance test: A measurement duration within a range of 0 to 60 seconds can be entered here.
Insulation resistance test	
Measurement duration RISO	Insulation resistance, LN-PE: a measurement duration within a range of 0 to 60 seconds can be entered here. Default setting: 3 s Enter 0 s for long extension cords in order to have enough time to move the cord during the insulation test.
RINS PC I	Insulation resistance tests for PCI: on: activate off: deactivate
RINS PC II	Insulation resistance tests for PCII: on: activate off: deactivate
RINS PC I and II	Insulation resistance tests for PCI and II: on: activate off: deactivate
RINS at APP	Insulation resistance tests at applied parts: on: activate off: deactivate
Measurement duration RINS probe	Insulation resistance test via probe: a measurement duration within a range of 0 to 60 seconds can be entered here. Default setting: 3 s
Measurement duration RINS AP	Insulation resistance tests at applied parts: a measurement duration within a range of 0 to 60 seconds can be entered here. Default setting: 3 s
RINS pri./sec.	Insulation resistance test between the primary and secondary sides of PCIII DUTs on: activate off: deactivate
RINS PC II as	Insulation resistance test: Execute as individual or multiple measurement. Multiple measurement: Insulation resistance is measured between short-circuited mains terminals (L-N) and accessible, conductive parts which can be contacted with test probe P1 and are not connected to the housing, repeat as often as desired.
Measurement duration RINS PC II	Insulation resistance test: a measurement duration within a range of 0 to 60 seconds can be entered here. Default setting: 3 s
RINS sec./PE	Insulation resistance test between the secondary side and PE of PCIII DUTs: on: activate off: deactivate
Leakage current tests	
Polarity reversal	Leakage current tests: On: Measurements are conducted with both polarities. Off: Measurement is only conducted with one/momentary polarity.
IPE	Protective conductor current: on: activate off: deactivate
IPE measurement type (active)	Protective conductor current test (mains to test socket): Measuring method: Direct or differential
IPE measurement duration	Protective conductor current test: a measurement duration within a range of 0 to 60 seconds can be entered here. Default setting: 3 s
IE	Device leakage current test: on: activate off: deactivate
IE measurement type (active)	Device leakage current test (mains to test socket): Measuring method: Direct or differential
IE measurement duration	Device leakage current test: a measurement duration within a range of 0 to 60 seconds can be entered here. Default setting: 3 s
It measurement type (active)	Touch current test (mains to test socket): Measuring method: Direct P1 or differential P1 The “Differential P1” method is only advisable in this case if the device under test has ground connections which cannot be disconnected for testing. This setting only affects IT measurements at DUTs without protective conductor.
It	Touch current test on: activate off: deactivate
It as	Touch current test: Execute as individual or multiple measurement. Multiple measurement: Various accessible, conductive parts are contacted with test probe P1 in order to measure current flowing to the protective conductor via the probe – repeat as often as desired.
It measurement duration	Touch current test: a measurement duration within a range of 0 to 60 seconds can be entered here. Default setting: 3 s
It welding circuit	Touch current test at welding circuit: on: activate off: deactivate
It PC II as	Touch current test at welding circuit: Execute as individual or multiple measurement.
It PC II measurement duration	Touch current test at welding circuit: a measurement duration within a range of 0 to 60 seconds can be entered here. Default setting: 3 s
IP AC	Patient leakage current AC: on: activate off: deactivate
IP DC	Patient leakage current DC: on: activate off: deactivate
IP measurement duration	Patient leakage current: a measurement duration within a range of 0 to 60 seconds can be entered here. Default setting: 3 s

Sequence Parameters	Meaning
Test conditions / fault conditions	
IA	Leakage current test at applied part: on: activate off: deactivate
Measurement duration IA AP	Leakage current test at applied part: a measurement duration within a range of 0 to 60 seconds can be entered here. Default setting: 3 s
Connection and fuse tests	
Short-circuit test L-N	Short-circuit test between L and N [1]: on: activate off: deactivate
Short-circuit test LN-PE	Short-circuit test between LN and PE1 [1]: on: activate off: deactivate
Display test instructions	Test instructions which are not necessarily required for experienced inspectors. on: activate off: deactivate
Fuse test	Testing the fuses: Mains fuses, test probe fuse P1, applied part fuses
Other parameters	
Open-circuit voltage	Open-circuit voltage at welding unit on: activate off: deactivate
Supply voltage PC III	Supply voltage measurement (with PCIII DUTs, for measurement type "Active" only) on: activate off: deactivate
Testing of extension cords – additional parameters (VDE 0701-0702-VLTG)	
Continuity Test	Testing of conductors (L, N, PE) for continuity with the help of the EL1/VL2E/AT3-IIIE adapter on: activate off: deactivate
Testing of PRCDs – additional parameters (VDE 0701-0702-PRCD)	
RPE IP (standard PRCD)	Protective conductor resistance test with standard PRCDs: Select test current IP: ±200 mA= / 200 mA~ / Feature G01: 10 A~ / feature G02: 25 A~
Varistor test PRCD-K	Varistor test at type K PRCDs: on: activate off: deactivate
Sensor surface test	Testing of the sensor surface of the PRCD: on: activate off: deactivate
Man. tripping test	Manual tripping of the PRCD: on: activate off: deactivate
Time to trip	Tripping of the PRCD after xx seconds: on: activate off: deactivate

❑ Suppressing Test Steps

Depending on the selected test standard, some of the following test steps can be suppressed:

Parameter	Suppressible Test Step
Visual inspection (1)	Visual inspection, standard
Visual inspection 2	Visual inspection, function test, welding units
Function test	Function test
RPE	Protective conductor resistance test
RINS PCI+II	Insulation resistance tests for PCI and PCII
RINS pri./sec.	Insulation resistance test between the primary and secondary sides of PCIII DUTs
RINS sec./PE	Insulation resistance test between the secondary side and PE of PCIII DUTs
RISO BF/CF(IEC 62353)	Insulation resistance tests at BF/CF applied parts
RINS welding circuit (IEC 60974-4)	RINS tests between the primary side and the welding output, as well as between PE and the welding output
Polarity reversal	All leakage current measurements with reversed polarity
IPE measurement type (active)	Protective conductor current test
It	Touch current test
It welding circuit	Touch current test at welding circuit
Display test instructions	Test instructions which are not necessarily required for experienced inspectors.
Short-circuit test L-N	Short-circuit test between L and N [1]
Short-circuit test LN-PE	Short-circuit test between LN and PE1 [1]
Open-circuit voltage (IEC 60974-4)	Open-circuit voltage at welding unit
Continuity test (VLTG test only)	Continuity test with EL1/VL2E/AT3-IIIE adapter
PCIII supply voltage	Supply voltage measurement (with PCIII DUTs, for measurement type "Active" only)

[1] Before switching line voltage to the device under test, a short-circuit test is conducted regardless of this setting.

❑ Setting Measuring Parameters for Individual Test Steps

Depending on the selected test standard, some of the following test steps can be adjusted:

Parameter	Meaning
RPE IP	Select test current for protective conductor resistance test: 200 mA AC, ±200 mA DC, 10 A AC[1] or 25 A AC[2]
IPE measurement type (active)	Set measurement type of the protective conductor current measurement for the active device test (differential/direct)
IE measurement type (active) (IEC 62353)	Set measurement type of the device leakage current measurement for the active device test (differential/direct)

[1] Feature G01 (e.g. SECUTEST ST BASE(10)/PRO)

[2] Feature G02 (e.g. SECULIFE ST BASE25)

❑ Selecting Between Single and Multiple Measurement for Individual Test Steps

Parameter (as of FW1.5.0)	**Meaning**
RPE as	Toggle the "protective conductor resistance" test step between multiple and single measurement

Parameter (as of FW1.8.0)	**Meaning**
RINS PC II as	Toggle between multiple and single measurement for the insulation resistance measurement at PC II parts (measurements at applied parts and welding outputs are not affected)
It as	Toggle between multiple and individual measurement for the touch current measurement
It PC II as	(IEC 60974 only) toggle between multiple and individual measurement for touch current measurement at PC II parts

❑ Setting Measurement Duration for Individual Test Steps

Testing time for the respective measurement can be influenced with these parameters. If a test step for a single measurement is involved, the entire test step has a duration of the time entered in seconds. If a test step for a multiple measurement is involved, the measurement duration for each measuring point is influenced.

If 0 seconds is selected, continuous measurement is conducted which can only be ended by pressing a key.

Parameter (as of FW1.5.0)	**Meaning**
RPE measurement duration [1]	Set testing time for the protective conductor resistance measurement (0 to 60 seconds)
IPE measurement duration	Set testing time for the protective conductor current measurement (0 to 60 seconds)
IE measurement duration	Set testing time for the device leakage current measurement (0 to 60 seconds)

[1] During the test sequence (VDE 0701-0702-PRCD / ÖVE E 8701-PRCD / SNR 462638-PRCD, EN 50678 / VDE 0701, EN 50699 / VDE 0702) with the following setting:
"PRCD type: PRCD (SPE)", measurement duration cannot be influenced. The measurement duration which has been set here only affects the RPE measurement with PRCD types "PRCD (standard)" and "PRCD-S (SPE)".

Parameter (as of FW1.8.0)	**Meaning**
It measurement duration	Set testing time for touch current measurement (0 to 60 seconds)
It PC II measurement duration	(for IEC 60974 only) Set testing time for touch current measurement at PC II parts (with the exception of welding outputs) (0 to 60 seconds)
RINS PC II measurement duration	Set testing time for RINS measurements at PC II parts (0 to 60 seconds)

17.2.3 User-Defined Test Sequences (necessitates SECUTEST DB+ – Z853R or feature KB01 – and IZYTRONIQ)

Depending on the test instrument model and its features, you can create user-defined test sequences with IZYTRONIQ software and transfer them to the test instrument. Not only can you change the settings in this case – as opposed to the predefined test sequences you can also set up the entire test sequence according to your needs by defining and configuring the individual test steps yourself, and determine the order in which they take place.

Prerequisites

- SECUTEST DB+ (Z853R or feature KB01)
  Includes:
  – Up to 24 test sequences
    (a total of up to 1200 test steps)
  – Transfer to the test instrument via USB or Bluetooth®
    (feature M01 is also required for transmission via Bluetooth®).
- IZYTRONIQ Software

Implementation

The test sequences are created in IZYTRONIQ software as "test instrument sequences" (not to be confused with "IZY remote sequences" which are used for remote control and are described in section 17.9).

The measurements and parameters available in your test instrument version are loaded to IZYTRONIQ software from the test instrument and made available accordingly. These are used to create the test instrument sequence.

Attention!
Compliance with Standards /
Verification of Operating Safety in Accordance with DGUV Regulation 3 or BetrSichV

If user-created test sequences are set up and/or used, or if test sequences integrated at the factory are modified or shortened, the danger exists that they will no longer be compliant with the standards (and will thus become invalid as verification of operating safety in accordance with DGUV regulation 3 or BetrSichV, or will no longer fulfil these standards).
The originator or user/inspector assumes responsibility for standards-compliant test steps, as well as for the correct sequencing of any preliminary tests.

Attention!
Some test steps necessitate preliminary tests or explanatory notes.
For example, the inspector must have enough time to contact the respective point with the probe at the point in time of test execution, or to set the DUT to the appropriate state.
Add appropriate checks or inspection instructions.

Attention!
Probe Test Required when Using Probe P1
If probe P1 is used in a test sequence, a "Probe Test" step with "Probe: Probe Connection P1" must be executed as part of the test sequence. Background: In addition to assuring that a probe is connected to probe connection P1, the probe test at connection P1 also determines whether or not the probe's fuse link is intact.
Additional information can be found in section 6.2 "Connecting Test Probe P1 or P2".

Afterwards, the created test instrument sequence can be loaded directly to the test instrument and saved as an XML file on the computer. Detailed information concerning the overall process can be found in IZYTRONIQ online help.

Your user-defined "test instrument sequences" always appear in the test instrument's user interface with a preceding asterisk.

Note
We recommend saving your custom test instrument sequences as xml files with the help of IZYTRONIQ software. Please refer to IZYTRONIQ online help for further information.

Limit Value Violation / Troubleshooting Tip

In the case of standard settings, test sequences are ended as soon as a limit value is exceeded. Consequently, only one value is shown in the test report as a limit value violation.

In particular when troubleshooting for the purpose of repairs, but also for the evaluation of fault statistics, it's advisable to document all of the respective DUT's limit value violations in a single test report.

The test sequences can be optimized for troubleshooting with the help of SECUTEST DB+ (Z853R or feature KB01): test sequences are executed in their entirety even in the event of limit value violations, and all faults are documented in the report.

17.3 Connecting the DUT

➪ Connect the DUT to the test instrument in accordance with the selected test sequence.
  – Test socket
  – Permanent connection
  – Adapter

Connection depends on the type of DUT (see the respective connection type in the classification parameters tables).

For testing extension cords in accordance with standards: connect to the test socket via the following adapter:

– **EL1:** for single-phase extension cords
– **VL2E:** for single and 3-phase extension cords

Note concerning use of the AT3-IIIE test adapter

Please note that polarity reversal with the help of the utilized test instrument isn't active when the AT3-IIIE adapter is used for testing single-phase DUTs (socket 3 / earthing contact). In this case, all leakage current measurements must be performed manually with the plug in **both** directions.

17.4 Selecting a Test Object

The test object for which the test will be performed can be selected before starting the test sequence. Results can be saved directly after completion (see section 17.8 "Saving Test Results"). As a prerequisite, a test structure must already have been set up in the test instrument or uploaded with the help of IZYTRONIQ software.

➪ If no DUT has been selected in the initial display, enter its test object ID number (for example using a barcode scanner) after selecting **ID**.

➪ Alternatively, activate the database view with the **MEM** key. MEM

➪ Select the DUT for the test sequence with the scroll keys. △ ▽

➪ Return to the measuring view by pressing the **ESC** key. ESC

As an alternative, you can select the DUT after finishing the test sequence or create it if it's not already included in the database. See section 17.8 "Saving Test Results", for details.

17.5 Checking Connection and Starting the Test Sequence

➪ Trigger the connection test and the test sequence by pressing the START key.

The following checks are run automatically before the test sequence is started:

- Probe test
  (whether or not probe P1 is connected and fuse link P1 is intact)

Attention!
If the fuse at test probe P1 is defective, all subsequent measurements using this measuring path are incorrectly evaluated as good!

- Insulation test (whether or not the DUT is set up in a well-insulated fashion)
- On test and short-circuit test
  (prerequisite: sequence parameter for “short-circuit test L-N” is preset to “on”.
  In order to be able to detect a short-circuit at the DUT, testing is conducted between L and N, as well as LN and PE.

Note
If you deselect important test steps under sequence parameters (set to off), the test sequence might not fulfill the requirements stipulated by the standard any more.

If you’ve set the “**Detected classification**” parameter for the respective test sequence to “Always accept” and the “**Auto-detection of**” parameter to “Connection and SK” (before triggering **Start**), the following additional checks will be run before the test sequence is started:

- Protection class detection for DUTs with protective conductor *
- Connection test *: Checks whether the DUT is connected to the test socket. In the case of protection class I: whether or not the two protective conductor terminals are short-circuited.

* Applies to **M7050** with feature B00 and B09

17.6 Executing and Evaluating Test Steps

Depending on their type, test steps may require further action. This action may be executed automatically (e.g. automatic evaluation), or it may require manual intervention on your part (e.g. switching on mains voltage or evaluation of results).

All of these actions are described in this section.

Notes on Evaluation

Limit values have been entered for test sequences in accordance with the standards. And thus a go/no-go evaluation takes place during measurement based on worst-case assessment.

Note
The go/no-go evaluation of the measured values is performed with greater accuracy than the value which appears at the display, which may lead to the fact that, due to the missing decimal places, a measured value which appears at the display may seem to correspond exactly to the limit value although it’s displayed as a limit value violation due to the places to the right of the decimal point.

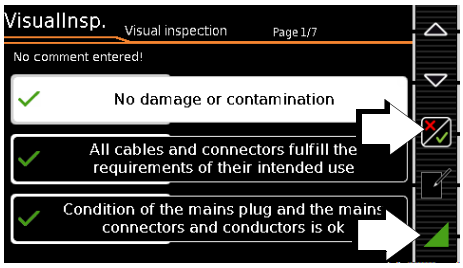
Results:

- Green:
  The momentary measured value lies within the limits specified in the standard.
- Orange:
  Further entries are required after the test step (e.g. cable length), which are decisive as to whether or not the test has been passed.
- Red:
  Limit value violation The measured value does not comply with the specifications stipulated in the standard.

Note
Even if the DUT fails just one single measurement, the test sequence is aborted and testing in accordance with the selected standard is failed.

Manual Evaluation of Visual Inspection

(prerequisite: “visual inspection” sequence parameter is preset to “on”.)



➪ Evaluate the visual inspection.

➪ If you mark even one visual inspection as not passed with the key shown at the right, the sequence is aborted and the test is evaluated as not passed.

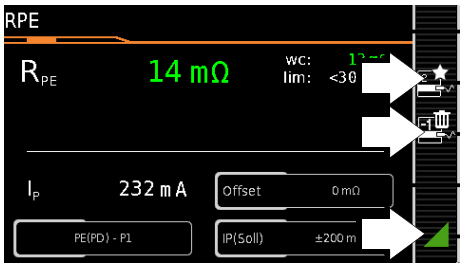
➪ Continue the test sequence.

Connecting Line Voltage

Connecting line voltage to the test socket at the test instrument and performance of a function test are only permissible if the DUT has already passed the **safety test** (protective conductor resistance and insulation resistance measurements)!

Do not start measurements at your test instrument unless it’s in plain view. Do not connect line voltage to the test socket of your test instrument before the surrounding area has been secured.

Test Steps with Manual Evaluation (e.g. R_{PE})



➪ Observe instructions which appear at the display, e.g. prompting to contact parts with test probe P1.

Attention!
Danger of Electric Arcs and Damage to Surfaces
(feature G01 or G02 only)

High test current is applied during test steps of sequence parameter RPE IP with 10 or 25 A test current. It’s activated as soon as the evaluation period starts and remains active until the evaluation period has ended.
Maintain contact between the probe and the DUT for the entire duration of the evaluation!

If the measured value appears green at the display, it lies within the limits specified by the standard.

➪ The measured value recording icon appears in the softkey bar. The 0 indicates that no measured values have thus far been saved to buffer memory.

➪ Each time this key is pressed, the measuring or evaluation procedure is restarted.

- First of all, the digit blinks (here: 1 without icon) until the measured value is stable. The evaluation cycle is visualized as follows: the progress bar starts at the left-hand edge of the display and moves to the right. When it reaches the rightmost position, evaluation has been completed and the icon shown at the right appears with the current number.
- Depending on whether you want to delete the last value saved to buffer memory or all values, press the icon with the wastebasket shown at the right an appropriate number of times.
- Proceed to the next measurement by pressing the key shown at the right.

If the measured value appears red at the display, a limit value has been violated. If you press , the DUT will not pass the test unless further measures are implemented.

Various options are available depending on which setting was selected in SETUP (Auto. Measurements 3/4):

– Abort: Testing is interrupted and the test is failed.
– Retry: A popup appears from which either interrupt or repeat can be selected.
– Continue: The test instrument continues with the next test step without displaying any further message.

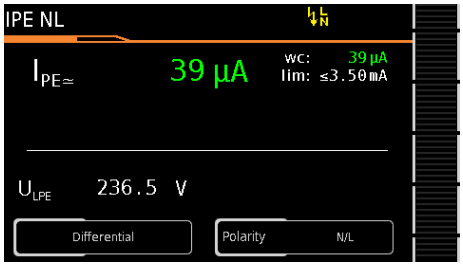
Note

A test step which is classified as critical generates a warning.
Caution: Dangerous Voltage! Do not touch metallic parts. If the test sequence is continued, accessible parts may conduct **dangerous voltage** during the test, because the DUT is operated with mains voltage despite possible insulation faults, excessive protective conductor resistance etc.
Proceed as follows if you'd like to continue.
1 Wear suitable personal safety equipment (PSE).
2 Secure the DUT against touch contact with a suitable cover.
3 Use a 30 mA RCD.
4 Continue by pressing ✓.

Note

Test Sequence IEC 60974-4 / EN 60974-4 / VDE 0544-4:
Section 5.2 of IEC 60974-4 / EN 60974-4 / VDE 0544-4 expressly stipulates that the cables have to be bent and twisted over their entire length during the measurement, in particular in proximity to the cable glands, in order to be able to detect any interruptions of the protective conductor.

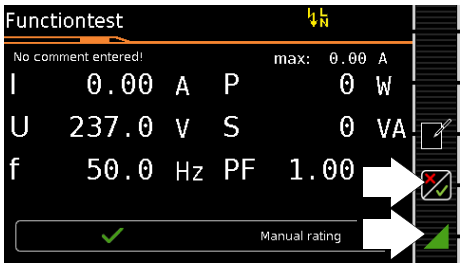
Test Steps with Automatic Evaluation (R_{INS}, I_{PE})



The measured value is ascertained automatically within a specified period of time. The evaluation cycle is visualized as follows: the progress bar starts at the left-hand edge of the display and moves to the right. When it reaches the rightmost position, evaluation has been completed. Depending on the results (see page 90), the test sequence is then automatically continued or aborted.

Manual Evaluation of the Function Test

(prerequisite: "function test" sequence parameter is preset to "on".



- Evaluate the function test:
- If you mark the function test as not passed with the softkey shown at the right, the sequence is aborted and the test is evaluated as not passed.
- If you evaluate the function test as passed, you can simply continue with the test sequence.

In either case you can enter a comment, which can be subsequently edited as well.

Setting Limit Values Manually

If "Expert" is selected instead of "Normal" in setup under "Auto Measurements" in the "Limit Value Mode" submenu, the LIMIT softkey appears next to the "measurement failed" popup. This key makes it possible to enter a user-defined limit value (as a rule a limit value specified by the manufacturer which deviates from the standard):

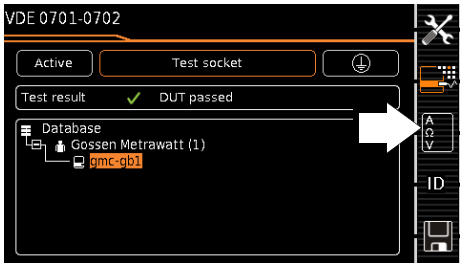
Note

Selecting "Abort" or "Try Again" rules out the possibility of entering a limit value.

17.7 End of the Test Sequence

"Sequence finished" appears at the display.

Initial Display (memory screen)

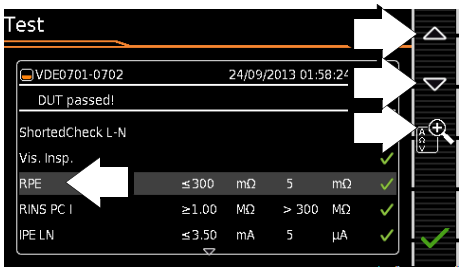


The memory screen display depends on the setting in the setup menu with the rotary switch in the **SETUP** position:
Setup 1/3 > Auto Measurements 1/4 > At End of Sequence > **Memory Screen**.

If set to **Results list**, the above display is skipped and the results list shown below is displayed.

You can also access the results list by pressing the key shown at the right.

Results List Display



➪ Select the desired test step with the scroll keys.

➪ If you want to view details for the selected test step, press the **magnifying glass+** key.

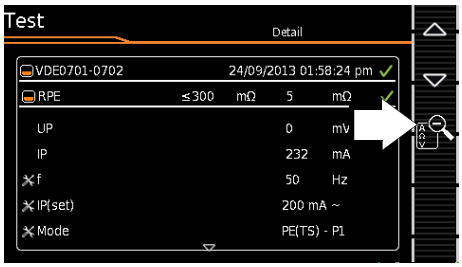
➪ You can still select from amongst 3 report views:

Filter Icon	Meaning of the Selectable Report View
	During report display: show complete test report
	During report display: show summarized (abridged) test report *
	During report display: show failed test steps only

* Skipped test steps are not shown in the abridged view – only the worst measured value for each measurement type is shown.

Taking measuring error into consideration depends on the setting in the setup menu with the rotary switch in the **SETUP** position: Setup 1/3 > Auto Measurements 1/4 > Error Considered. > **Yes**)

Display of Details for Individual Test Steps



➪ The display is returned to the list of test steps by pressing the **magnifying glass–** key.

➪ The memory screen is displayed again after acknowledging the list.

17.8 Saving Test Results

➪ Save the results of a successful test sequence by pressing the **Save** key.

Note

Please observe the following before storing tests or measurements to the test instrument:
If applicable, the DUT's date of recalibration is printed on test reports, or transmitted to a PC when exporting test data. For this reason we recommend checking the recalibration date saved in the test instrument before starting work with your new test instrument (see section 20.6 "Calibration").

One if the following scenarios occurs after pressing the **Save** key:

You already selected a test object before the measurement (see section 17.5 "Checking Connection and Starting the Test Sequence").

The display is switched to the SAVE view. The test object ID appears with a green or orange background. Press the save key once again in order to complete the procedure.

You didn't select a test object before the measurement.

The following message appears: "No test object selected!". Press the **ID** key. The softkey keyboard appears.

If you enter a test object ID here which is already in the database, the database view appears (MEM navigation) automatically, and the test object's ID is displayed inversely. Acknowledge the entry by clicking the ✓ icon. The display is switched to the SAVE view. The test object ID appears with a green or orange background. Press the save key once again in order to complete the procedure.

If you enter a test object ID here which is **not yet** included in the database, a prompt appears asking you if you want to enter a new test object. If you press , the display is switched to the database view (MEM navigation). You can go to the next page (**Edit Objects 2/3**) by pressing , and then enter a new test object. Press to this end. All possible object types are displayed. Press **Device**. The newly entered test object ID appears in red to the right of the ID parameter. Acknowledge the entry by pressing the ✓ key. The display is switched to the database view (MEM navigation). The newly entered test object is displayed inversely in the structure. Press **ESC** in order to return to the SAVE view. The test object ID appears with a green background. Press the save key once again in order to complete the procedure.

Note

All other fields can be filled in using the QEDIT function (only with SECUTEST DB COMFORT – Z853S or feature KD01) after the test object's ID number has been entered. See section 12.4.

Abort Saving

If you don't want to save the results, press **ESC** twice in order to switch to the measuring view. If you press **ESC** again, a prompt appears asking whether or not you want to delete the measuring points in order to continue with the measurement without saving.

Alternative: Transferring Measurement Data to the PC (IZYTRONIQ – push-print)

You can send the test results to a PC on which IZYTRONIQ software is running. This function is known as "push-print" and can be implemented via USB or Bluetooth®.
SECUTEST DB COMFORT (Z853S or feature KD01) and if applicable Bluetooth® (feature M01) are required for "push-print". Complete information regarding push-print and a description of the application can be found in IZYTRONIQ online help.

17.9 Remote Control – Automated Test Sequence Control with IZYTRONIQ Software

An IZY remote sequence can be set up in IZYTRONIQ (not to be confused with a “test instrument sequence”). This is a user-defined test sequence that can run via remote control with the help of IZYTRONIQ software.

IZYTRONIQ controls the test instrument in the remote mode, i.e. sends control commands to the test instrument which then performs the desired measurement. The terminal device with IZYTRONIQ is connected to the test instrument via USB.

The measurement data are transmitted from the test instrument to IZYTRONIQ and thus do not appear at the test instrument’s display.

Prerequisites

Remote control necessitates:

– SECUTEST DB+ (Z853R or feature KB01)
(includes the following functions: “remote control via PC” and “transfer user-defined test sequences from IZYTRONIQ to the test instrument”)
– IZYTRONIQ software
– At least one user-defined IZY remote sequence

Note
Predefined test sequences cannot be executed via remote control.

Procedure

➪ First of all, set up at least one user-defined IZY remote sequence in IZYTRONIQ. See IZYTRONIQ online help.
➪ Connect the test instrument to the PC with a USB cable (USB slave interface, see section 5.4 “Controls and Connections”).
➪ Remote control operation is described in IZYTRONIQ online help. Follow the instructions provided there.

Attention!
In the case of remote control or if a self-created IZY remote sequence is used with the test instrument, the originator of the test sequences or the user/inspector assumes responsibility for standards-compliant test steps and execution of preliminary tests in the correct order.

Attention!
Do not start any IZY remote sequences unless the test instrument and the DUT are in plain view.
Do not connect line voltage to the test socket of your test instrument before the surrounding area has been secured.

18 Reports

A report can be read out showing the results of individual measurements or test sequences stored to the internal database.

Various output formats can be selected:

- Print directly at the test instrument with a printer.
- Print as an HTML file to a USB flash drive connected to the test instrument
- by transferring the stored measurement data to IZYTRONIQ software on the PC and printing it out there as a report.

18.1 Print Settings

Report Template for Printer and HTML Read-Out

A report template is permanently stored to the test instrument. The designation of the standard in the report may vary depending on which test sequence has been executed.

The report template includes the following items:

- ID
- Designation
- Customer name
- Location
- Date
- Time
- Comment with 64 characters
- Standard designation / sequence name / manual test
- Measured values
- Limit values
- Evaluations
- Test equipment (serial number)

Note
The display which appears isn't a print preview and does not reflect the actual appearance of the printout.

Multi-Print: Printing Combined Test Reports for Several Tests

If, in the memory menu, you move the cursor to a test object for which several tests have been conducted (individual measurements or test sequences) and press the **PRINT** key, a combined test report with all test results for the respective test object is read out.

18.2 Saving Reports to a USB Flash Drive HTML)

You can connect a USB flash drive to the test instrument and save reports to it as HTML files.

Selecting the Memory Mode

One of two different memory modes can be selected when saving reports to a USB flash drive as HTML files:
SETUP 2/3 > **Test Reports** > **HTML Report** > **Online / Offline**

- Offline: Saves the reports in their entirety so that they can be opened without an Internet connection. The storage process takes more time.
- Online: Requires less memory space for saving reports and is faster. However, the reports can only be opened while connected to the Internet.

The selected mode appears in the filename (see below).

Filename

The filename of the HTML report is assigned automatically as follows.

– Single test/measurement:
[test object ID]-[test sequence name]-[test time]-[offline/online].html

– All tests/measurements performed for a specific DUT:
[test object ID]-multi-[offline/online].html

Note
Any of the following characters appearing in the test object ID are replaced by an underscore (_):
< > / \ : ? * | "

Saving HTML Reports

First make sure that a USB flash drive is connected to the test instrument (see section 10.1 "Use of USB Storage Devices").

In order to save a report, select a measurement from the database view (**MEM** key) with the scroll keys, for which a report will be saved to the USB flash drive. Then press the **PRINT** key. "Print job finished" appears. The report is written to an HTML file.

Alternatively, reports can be save or printed out immediately after conducting a test, or when the test list view is open.

Note
If information concerning the DUT needs to be included in the report, the test must be saved (i.e. the link between the test and the DUT must be established) BEFORE printing.

18.3 Sending Reports to the Printer

A printer can be connected to the test instrument in order to print out test reports:

- Z721S thermal printer
  with report tapes (Z722S thermal paper as accessory)

Complete information concerning connection and adjusting the print settings can be found in section 10.5 "Thermal Printer for Reports".

Printing

A test report can be printed out for each completed single measurement or test sequence by pressing the **PRINT** key. The respective single measurement or test sequence must be previously selected in the memory menu with the help of the scroll keys.

Alternatively, reports can be save or printed out immediately after conducting a test, or when the test list view is open.

Note
If information concerning the DUT needs to be included in the report, the test must be saved (i.e. the link between the test and the DUT must be established) BEFORE printing.

19 Transferring and Saving Test Structures and Measurement Data (test instrument data base)

Test structures created in the test instrument and measurement data stored there can be transferred.

Data is transmitted in XML format. The data structure can be taken from the corresponding XSD file, which is referenced in the header of the *.secu file.

Depending on the specific scenario, you can transfer the test structure and the data for further processing, save them as a backup for data security or restore a dataset.

- **Export:** transfer a test structure including measured values from the test instrument to the PC (IZYTRONIQ software)
  - – Via USB connection
  - – Via USB flash drive *

  See section 19.1.
- **Import *:** transfer a test structure from the PC (IZYTRONIQ software) to the test instrument
  - – Via USB connection *
  - – Via USB flash drive *

  See section 19.2.
- **Backup and restore**: backup or restore data via USB flash drive * See section 19.3.

* Only with SECUTEST DB+ database extension (Z853R or feature KB01)

19.1 Export – Transferring Test Structures and Measurement Data from the Test Instrument to the PC (IZYTRONIQ)

Structures set up in, and measurement data saved to the test instrument can be transferred to IZYTRONIQ software on the PC. There are 2 different ways to transfer the data:

- Direct data exchange via USB cable
- File via USB flash drive
  (only with SECUTEST DB+ database extension – Z853R or feature KB01)

If the respective function isn't available, it's grayed out at the display.

19.1.1 Via USB Cable

➪ Connect the test instrument to the PC with a USB cable (USB slave interface, see section 5.4 "Controls and Connections").

➪ Select **PORTABLE OBJECTS** > **IMPORT** > **FROM TESTER** in IZYTRONIQ and then select your test instrument from the drop-down list.
Further information concerning working with the software can be found in IZYTRONIQ online help.

Attention!
The memory structure in the test instrument may be destroyed if data transmission is interrupted.
The transfer dialog is shown in the test instrument's display for as long as data is being transferred. During the transfer procedure, do not under any circumstances disconnect:
- the USB connection: The interface cable must not be removed.
- the test instrument from supply power.
Wait an additional 5 seconds AFTER the transfer dialog closes before unplugging the USB connection or turning off the test instrument.

Attention!
Do not start data transfer to the PC during single measurements or test sequences.

19.1.2 Via USB Flash Drive (only with SECUTEST DB+ database extension – Z853R or feature KB01)

➪ Connect a USB flash drive to the test instrument (see section 10.1 "Use of USB Storage Devices").

➪ Select Setup 1/3 > Database 2/2 > **Export .secu/IZY USB** at the test instrument. The data are then converted into an IZYTRONIQ-compatible file with the ".secu" file extension and saved to the USB flash drive.

Attention!
The memory structure in the test instrument or in the connected USB flash drive may be destroyed if data transmission is interrupted.
The transfer dialog is shown in the test instrument's display for as long as data is being transferred. During the transfer procedure, do not under any circumstances disconnect:
– the USB connection: The USB flash drive may not be removed.
– the test instrument from supply power.
Wait an additional 5 seconds AFTER the transfer dialog closes before removing the USB flash drive or turning off the test instrument.

➪ After the save process has been completed, remove the USB flash drive from the test instrument.

➪ Connect the USB flash drive to the PC.

➪ Select **PORTABLE OBJECTS** > **IMPORT** > **FROM TESTER** in IZYTRONIQ and then **Secutest 4 File Import** from the drop-down list. Further information concerning working with the software can be found in IZYTRONIQ online help.

19.2 Import – Loading Test Structures Created in the Software (IZYTRONIQ) to the Test Instrument (only with SECUTEST DB+ database extension – Z853R or feature KB01)

A test structure can be created at the PC with the help of IZYTRONIQ software. A complete description of database creation can be found in IZYTRONIQ online help.

The created test structure must then be transferred to the test instrument. There are 2 different ways to transfer the data:

- Direct data exchange via USB cable
- File via USB flash drive

If the respective function isn't available, it's grayed out at the display.

Attention!
Existing data in the test instrument is overwritten.
If applicable, create a backup copy first (see section 19.3).

➪ Connect the test instrument to the PC with a USB cable (USB slave interface, see section 5.4 "Controls and Connections").
Or:
Connect a USB flash drive to the test instrument, to which the test structure has been saved (see section 10.1 "Use of USB Storage Devices").

➪ Select the **Import .secu/IZY USB** function under Setup 1/3 > Database 2/2 at the test instrument. The data is transmitted to the test instrument.

Attention!
The memory structure in the test instrument may be destroyed if data transmission is interrupted.
The transfer dialog is shown in the test instrument's display for as long as data is being transferred. During the transfer procedure, do not under any circumstances disconnect:

– the USB connection: The interface cable must not be removed.
– the test instrument from supply power.
Wait an additional 5 seconds AFTER the transfer dialog closes before unplugging the USB connection or turning off the test instrument.

19.3 Backup and Restore via USB Flash Drive

Structures created and measurement data saved at the test instrument can be backed up to and restored from a USB flash drive.

A USB flash drive must be connected to the test instrument to this end. The respective functions are grayed out at the display if this is not the case.

Backup

- ➪ Connect a USB flash drive to the test instrument (see section 10.1 “Use of USB Storage Devices”).
- ➪ Select the **Backup** function under Setup 1/3 > Database 1/2. The test instrument creates a backup file on the USB flash drive directly in the root directory. The backup files on the USB flash drive are named by means of a time stamp (file extension: .etcbak).

Attention!
The memory structure in the test instrument or in the connected USB flash drive may be destroyed if data transmission is interrupted.
The transfer dialog is shown in the test instrument’s display for as long as data is being transferred. During the transfer procedure, do not under any circumstances disconnect:
– the USB connection: The USB flash drive may not be removed.
– the test instrument from supply power.
Wait an additional 5 seconds AFTER the transfer dialog closes before removing the USB flash drive or turning off the test instrument.

Restore

Attention!
Existing data in the test instrument is overwritten.
If applicable, create a backup copy first (see above).

Attention!
An existing backup can only be restored to a test instrument with the same or a higher firmware/software version as the test instrument from which the backup was created.

- ➪ Connect a USB flash drive to the test instrument, to which the test structure has been saved (see section 10.1 “Use of USB Storage Devices”).
- ➪ Select the **Restore** function under Setup > Database 2/2 at the test instrument.
The data are restored.

Attention!
The memory structure in the test instrument or in the connected USB flash drive may be destroyed if data transmission is interrupted.
The transfer dialog is shown in the test instrument’s display for as long as data is being transferred. During the transfer procedure, do not under any circumstances disconnect:
– the USB connection: The USB flash drive may not be removed.
– the test instrument from supply power.
Wait an additional 5 seconds AFTER the transfer dialog closes before removing the USB flash drive or turning off the test instrument.

20 Maintenance

This section includes information concerning the various maintenance procedures required for the test instrument.

Depending on the type of action required, you'll need to complete it on a regular basis, for example safety inspection and recalibration, or arrange for its performance when necessary, for example fuse replacement.

20.1 Technical Safety Inspections

Conduct technical safety inspections on your test instrument at regular intervals. We recommend the same interval for inspections as is also used for recalibration (see section 20.6 "Calibration").

The test instrument is designed as a totally insulated device in accordance with IEC 61010 and IEC 61557-16/VDE 0413-16. The protective conductor is used for measuring purposes only, and is thus not always accessible. The protective conductor at the test socket can be tested as follows:

- ➪ Connect the test instrument to a multiple outlet strip.
- ➪ Conduct a touch current measurement for permanently connected DUTs (nothing may be connected to the test socket).
- ➪ Measure protective conductor resistance between the neighboring socket at the multiple outlet strip and the test socket.
- ➪ The measured value may not exceed 0.3 Ω.

For technical reasons, insulation resistance between LN and PE inside the test instrument is roughly 3 MΩ.
This must be taken into consideration during technical safety inspections or, instead of the insulation resistance measurement, the protective conductor current measurement must result in a value of less than 3.5 mA (or less than 7 mA if the equivalent leakage current method is used).

There are also 4 accessible conductive parts on the test instrument, at which the touch current measurement must result in a value of less than 0.5 mA:

- Connector for service plug (jack socket)
- USB ports
- Metallized start key
- Protective conductor bar in the test socket

Note
In order to prevent damage to the test instrument, we recommend avoiding the performance of measurements at the USB ports.

20.2 Housing Maintenance

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 and solvents.

20.3 Test Instrument Self-Tests

Various self-tests can be executed with the rotary switch set to SETUP 1/3 > System 2/2 > **Self-Test**:

- The color display can be checked for the failure of individual segments and for the loss of color components.
  A test image is displayed from which errors can be detected.
- The buzzer can be tested for 3 different frequencies. Whether or not the buzzer is working can be determined from the respective test tone.
- The database can be checked for corrupt data. You're provided with feedback concerning the results of automatic testing.
- The test socket can be checked for correct functioning. Connect a test DUT to this end, for which you know whether or not it has a protective earth terminal. The results are displayed (plug (not) detected / protective conductor terminal) and must coincide with the connected DUT.

20.4 Backup Battery for Real-Time Clock

The backup battery (lithium cell) should be replaced no later than after 8 years. The battery can only be replaced by the service department. See "Contact, Support and Service" on page 109.

If backup battery voltage is too low, the date and time assigned to the test data no longer correspond to the actual time of recording. This may also influence sorting in IZYTRONIQ software.

The instrument's database itself isn't affected by a depleted backup battery.

20.5 Fuse Replacement

The test instrument is equipped with a fuse for probe input P1 for the 10 A protective conductor test (only for test instruments with feature H01, e.g. SECUTEST ST PRO) and two fuses for the mains connection. These can be replaced when defective.

Required Materials

- A slotted screwdriver for opening the fuse compartment
- A replacement fuse which complies with the specifications in the technical data or the labeling on the instrument (see section 5.6 "Characteristic Values")

- ➪ Switch the test instrument off and disconnect it from mains power.

Attention!
The fuses may only be replaced when the test instrument is voltage-free, i.e. it must be disconnected from mains supply power and may not be connected to a measuring circuit.

- ➪ Open the respective fuse compartment. Insert the slotted screwdriver into the slot on the fuse compartment and turn it counterclockwise.
- ➪ Pull out the fuse cover as soon as it protrudes slightly from the housing.
- ➪ Remove the defective fuse from the fuse cover.
- ➪ Insert the new fuse into the fuse cover.

Attention!
Only use replacement fuses which comply with the specifications in the technical data or the labeling on the instrument (see section 5.6 "Characteristic Values").
No other fuses may not be used in the test instrument.

- ➪ Insert the fuse cover with the fuse back into the fuse compartment. The two tabs on the fuse cover must be inserted into the recesses in the housing.
- ➪ Insert the slotted screwdriver into the slot on the fuse compartment and turn it clockwise until the fuse compartment is closed.

20.6 Calibration

The test instrument must be calibrated at regular intervals. Refer to section 20.6.1 for information concerning the calibration interval.

Update the calibration and recalibration dates after each calibration in order to keep track of the intervals. See section 20.6.2.

20.6.1 Required Recalibration Interval

Use of your test instrument and resultant stressing influence the instrument and lead to deviation from warranted accuracy values.

In the case of strict measuring accuracy requirements, as well as in the event of severe stressing (e.g. severe climatic or mechanical stress), we recommend a relatively short calibration interval of once per year. If this is not the case, a calibration interval of 2 to 3 years is usually adequate.

Please contact GMC-I Service GmbH for calibration services. See "Contact, Support and Service" on page 109.

A sticker with an instrument-specific guideline value for the calibration interval and information regarding the service provider is included on the test instrument as an aid.

A factory calibration certificate or test report is included with the test instrument.

Note

Date on Calibration Certificate / Calibration Interval Begins Upon Receipt

Your test instrument is furnished with a calibration certificate on which a date appears. This date may be further in the past if your test instrument has been stored for some time prior to sale.

The test instruments are stored in accordance with the specified conditions. Drift is thus negligible for a duration of 1 year and longer storage periods are highly unusual. Consequently, the test instrument's characteristics lie within the specifications and the first calibration interval can be determined as of the date of receipt.

20.6.2 Setting Calibration and Recalibration Dates

The calibration and recalibration dates are registered in the test instrument:

- The dates of the last adjustment and calibration are entered by the calibration center.
- Date and time of the next calibration (recalibration date) can be adjusted, either on the tester itself or via a USB connection.

Viewing the Dates of the Last Adjustment and Calibration

Date and time of the last adjustment or calibration can be viewed under SETUP > System Info 2/3 > Calibration Dates.

Changing the Recalibration Date at the Test Instrument

Date and time of the next recalibration can be changed under SETUP > System Info 2/3 > Calibration Dates.

In order to change both as required, press the **EDIT** key and enter the desired date and time. Confirm with ✔.

Changing the (Re)Calibration Date via USB Connection

Date and time of the next recalibration can also be set or changed via the USB interface, for example with a terminal program.

The test instrument is connected to the PC via the USB port to this end. Data is transferred bidirectionally via a virtual COM port. The required driver can be installed via Driver Control software:

www.gossenmetrawatt.com/english/produkte/drivercontrol.htm

Communication between the PC and the test instrument is conducted in UTF-8 format.

No checksums are generated for strictly ASCII responses. Communication via the USB port is deemed secure thanks to native CRC-16 checks.

Each command must be terminated with an LF line break (ASCII 10).

The test instrument must be restarted after data transmission, in order for the changes to become effective.

Serial Port Settings:

Parameter	Value
Baud rate	9600 … 115,000 (freely selectable)
Data bits	8
Parity	none
Stop bits	1

Setting the Calibration Date:

IDN:SET:CALIB_DATETIME 2016-11-11T10:11:12

(the Thh:mm:ss time setting is optional)

Setting the Recalibration Date:

IDN:SET:RECALIB_DATETIME 2017-11-11T10:11:12

(the Thh:mm:ss time setting is optional)

20.7 Software/Firmware Update (system info parameter)

The current firmware or software version can be queried via **SETUP 2/3** > **System Info 1/3** > **Software Version**.

The test instrument's firmware can be updated via the USB port with the help of a PC.

Note

Adjustment data are not overwritten during updating, and thus recalibration is unnecessary.

Updating is only possible via the proprietary **Firmware Update Tool**.

As a registered user (if you've registered your test instrument), you're entitled to download the **Firmware Update Tool** and the current firmware version free of charge from the **myGMC** page at **www.gossenmetrawatt.com**.

Operating instructions for the **Firmware Update Tool** are available here as well.

Attention!

Data loss!

Before updating the firmware, be sure to save the structures you've created and your measuring data, because they might be deleted during the update process (see section 19.3 "Backup and Restore via USB Flash Drive").

Attention!

Damage to the test instrument due to faulty firmware update!

The test instrument:

– must be directly and securely connected to the PC via USB during the update (no virtualized environments, no USB virtualization)

– may not be disconnected from supply power during the update

Attention!

Update from Software/Firmware 3.2.0 or Lower to Software/ Firmware 3.3.0 or Higher

The update changes the rotary switch position assignments (A1 … A9), as well as how the standards are shown at the test instrument, in the test data and in the test reports!

Due to the fact that the standard display can't be changed retroactively, you'll have to reconfigure your test instrument immediately after updating the firmware. See "Selecting a Designation and Deactivating Standards in Case of Update or Extension (enabling function)" on page 22.

If different rotary switch position assignments are desired, these must also be customized. Corresponding information can also be found in the above-mentioned section.

21 Troubleshooting: Warnings, Error Messages and Notes

Error messages or notes regarding the individual tests or test sequences are displayed as popups.

21.1 Types

Differentiation is made amongst 5 types of messages:

- **Fatal Error**
- **Error**
- **Warning**
- **Note – INFO**
- **Question**

Fatal Error

This message indicates an extraordinary error. Fatal errors have to be acknowledged or cleared by pressing the **OK** key, and the cause of error must be eliminated before the test or the test sequence can be resumed.

Error

This message indicates, for example, operator errors. These errors have to be acknowledged or cleared by pressing the **OK** key, and the cause of error must be eliminated before the test or the test sequence can be resumed.

Example: Object cannot be created. General database error!

Warning

Warnings indicate hazards which, if not avoided, may result in severe injury. **Single test:** The warning has to be acknowledged or cleared by pressing the **OK** key before the test or the test sequence can be resumed.

Test sequence: The test sequence can be aborted or resumed without acknowledging.

Examples:

- Caution: Line voltage will be switched to the test socket!
- Caution: Line voltage polarity will be reversed at the test socket!

Note – INFO

A note involves either information regarding the functions executed by the test instrument or instructions which may have to be acknowledged or can be skipped by pressing the **OK** key.

Examples:

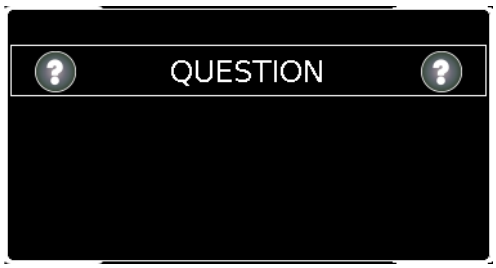
- Probe test
- Set up in a well-insulated fashion?
- On test
- Short-circuit test (L-N)
- Short-circuit test (LN-PE)
- Prompt: Contact with test probe P1 ...
- Prompt: Switch the DUT on/off with its own mains switch ...
- Prompt: Start up / shut down the DUT ...

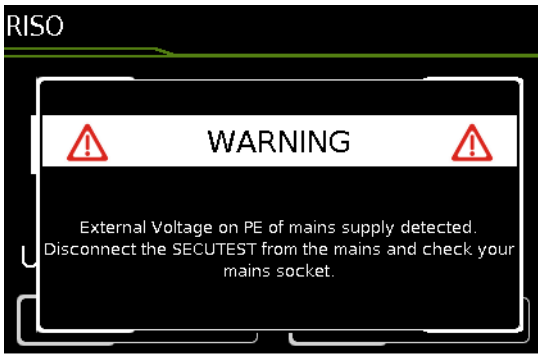
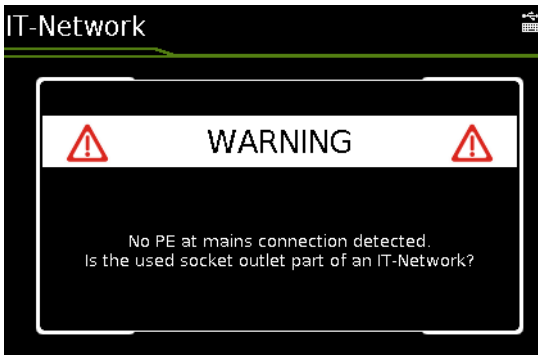
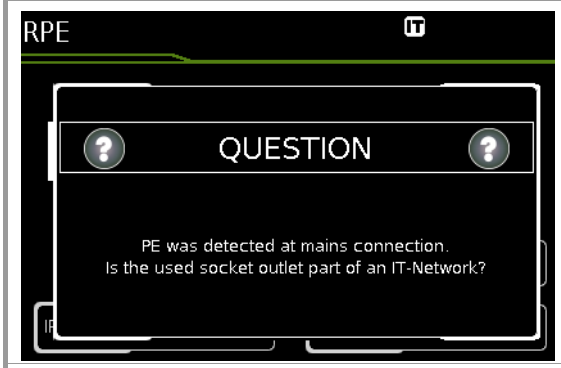
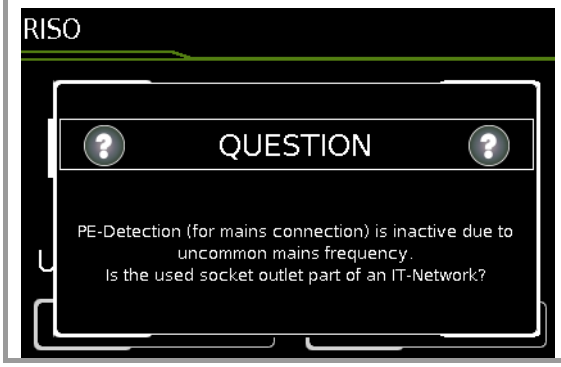
Question

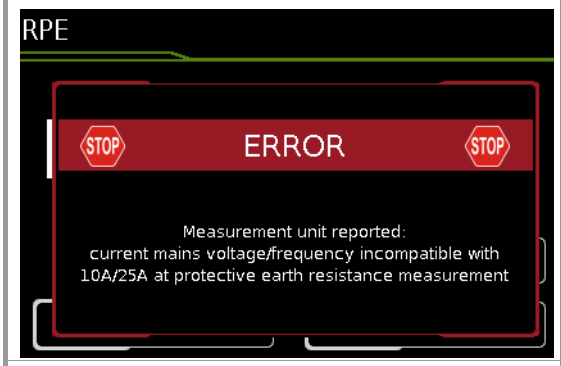
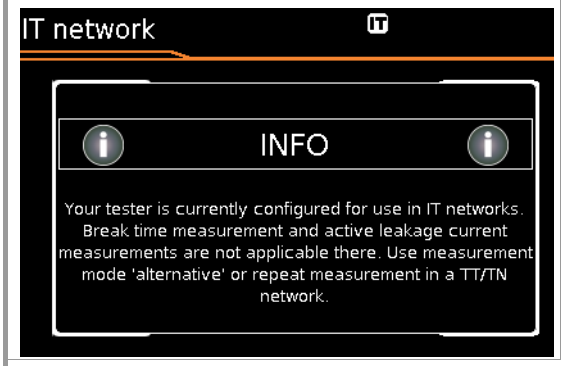
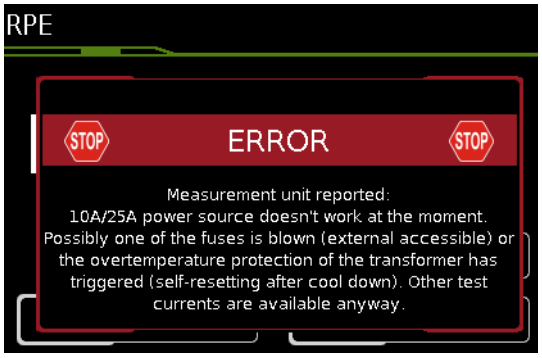
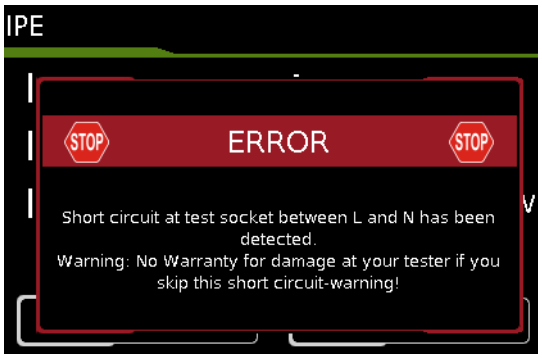
Questions must be answered by pressing **Yes** or **No** before the single test or test sequence is resumed.

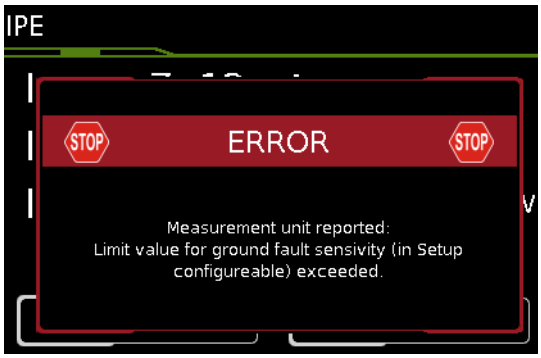
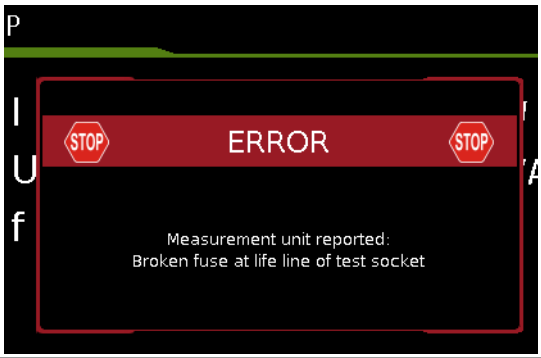
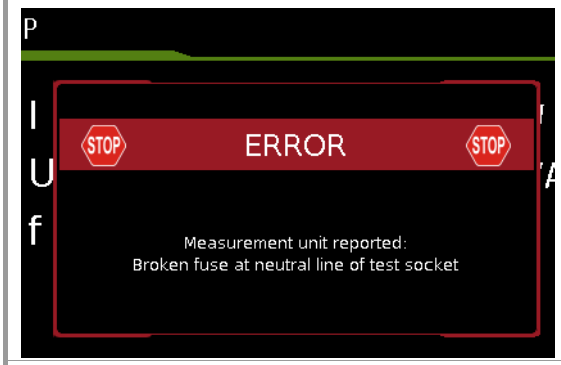
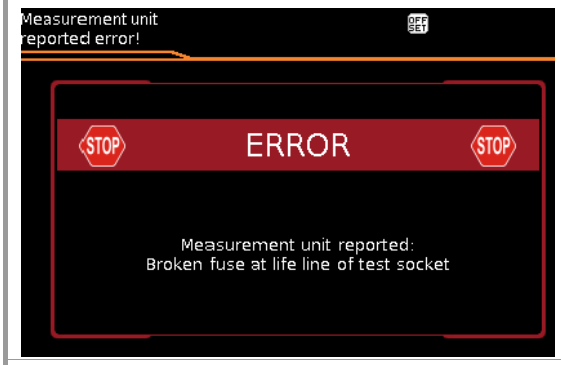
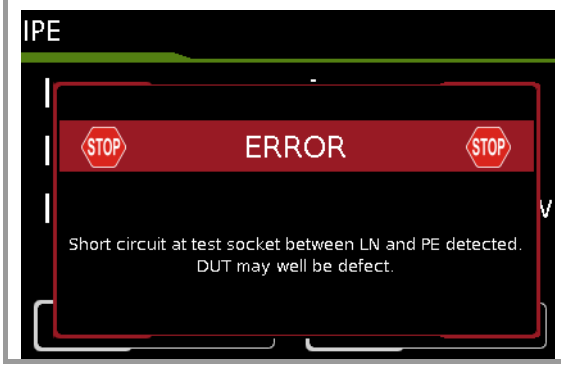
Example:

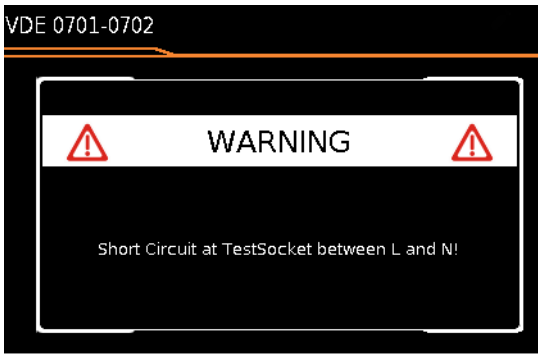
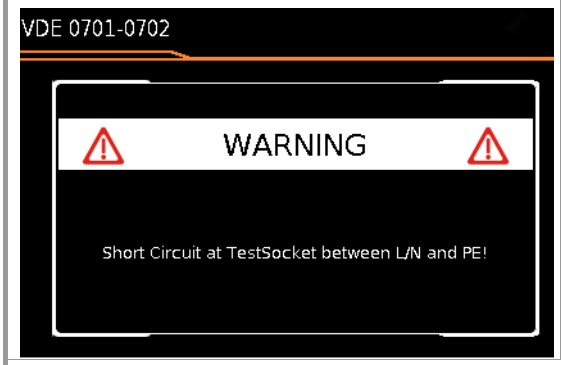
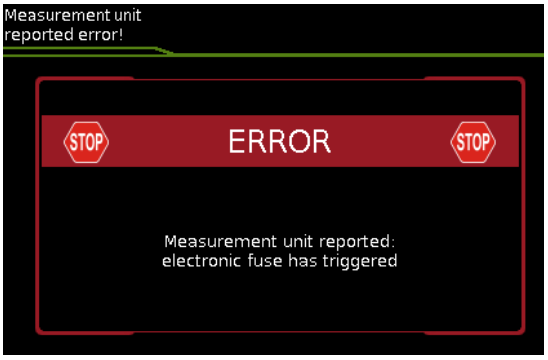
- Device / ME equipment not found!
  Create new object /database/ ?

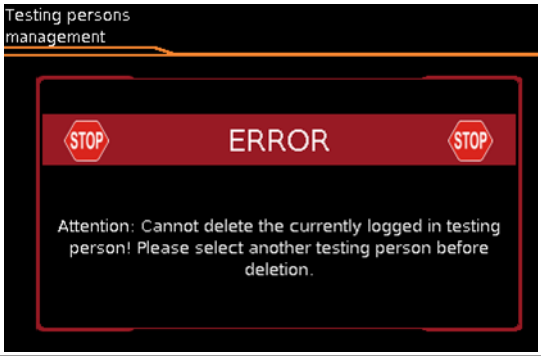
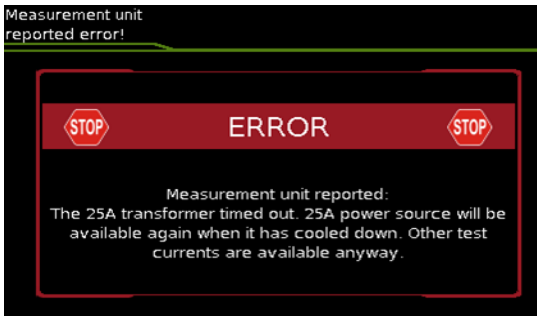
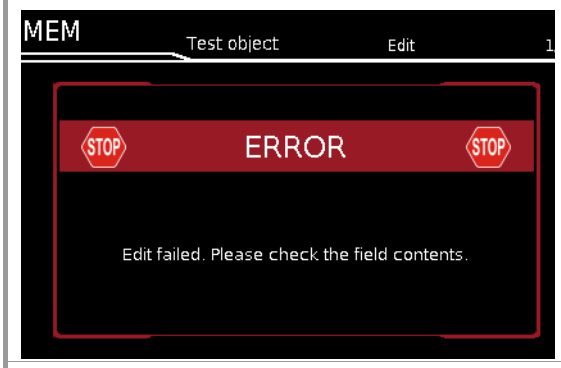
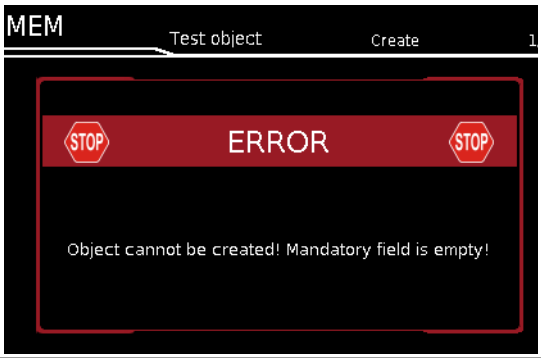
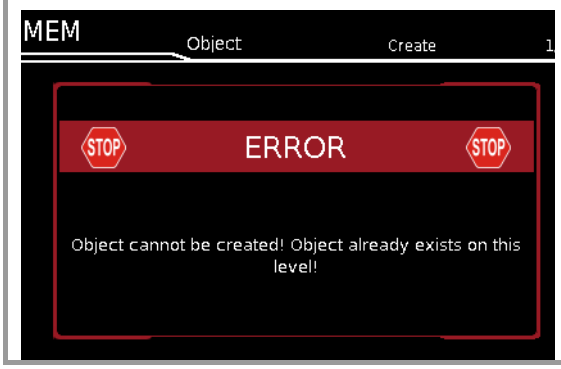


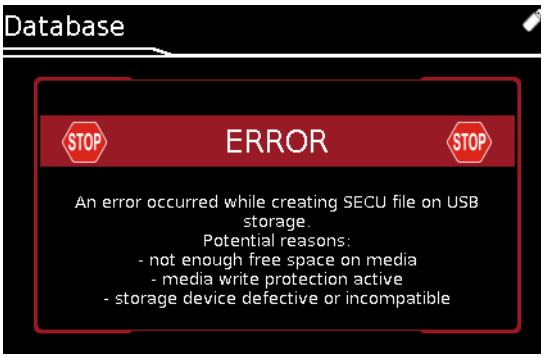
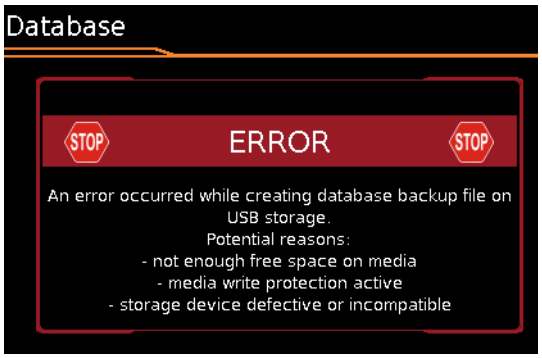
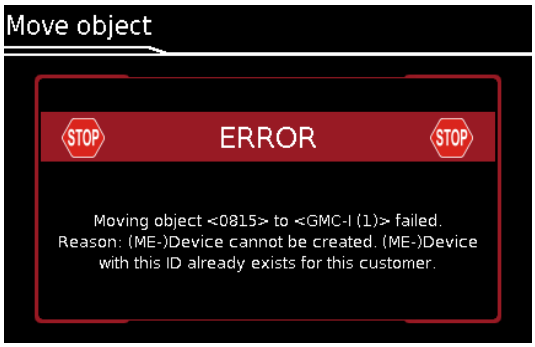
Error Message	Possible Causes	Corrective Measures
Mains Connection Errors		
	– Protective conductor PE at the mains outlet at which the test instrument is being operated is conducting voltage! This detection function makes use of the metallized **START**/STOP key on the test instrument. In order for detection to function correctly, it must be possible to establish reference to earth potential via the user's finger. **Note** If the user's finger is insulated from the key when it's pressed, this error message may occur although the installation is OK (see "Automatic Recognition of Mains Connection Errors" on page 14).	➪ Please remove the test instrument's mains plug from this outlet and arrange to have the outlet/installation inspected by a qualified electrician without delay. Do not operate any other test instruments at this electrical outlet before this inspection has been completed. ➪ In order to ensure that detection works reliably, repeat the interference voltage test and observe the following tips: – Unplug all USB devices from the test instrument's USB ports. – Remain in contact with a grounded object while pressing the **START**/STOP key (e.g. a heating pipe). – Do not contact the **START**/STOP key with any object or with gloves.
	PE connection not detected (at the outlet at which the test instrument is being operated): – If the installation is defective! – In the case of special types of TT systems; detection may fail in this case. – If the test instrument is being operated in an IT system	➪ If the test instrument is being operated in an IT system: Acknowledge the question by pressing ✓ – the IT system option is activated in this case. ➪ If it's not an IT system: remove the mains plug from the outlet and inspect the installation without delay! ➪ If it's a TT system without neutral conductor, press ✗; direct leakage current measurements are possible. (Please make absolutely sure that direct leakage current measurements are possible in your current mains type!)
	As opposed to the previously used mains connection, PE was detected while the IT system option was activated in setup.	➪ Operation in an IT system: respond to the question by pressing ✓. The IT system option remains active as a result. ➪ Operation in a TN or TT system: respond to the question by pressing ✗. The IT system option is deactivated as a result.
	Line frequency is less than 48 or greater than 62 Hz	➪ PE detection does not function in this case: select ✓ or ✗ depending on whether or not the utilized system is an IT system.

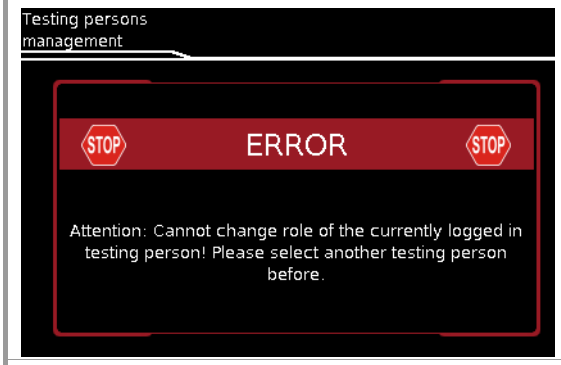
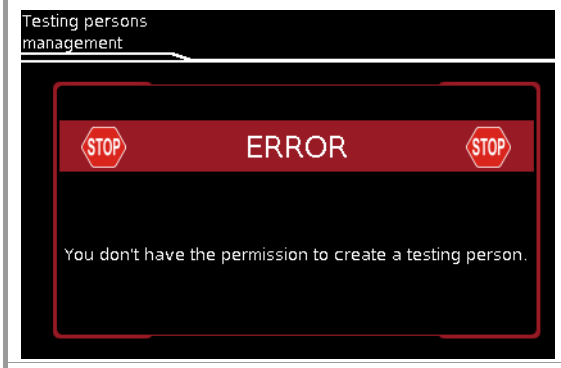
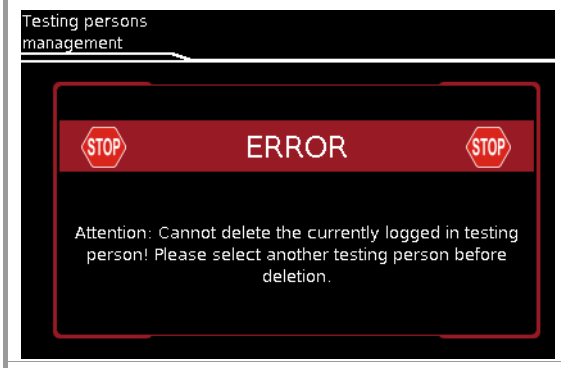
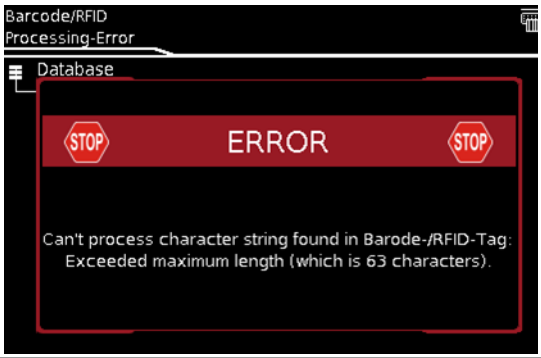
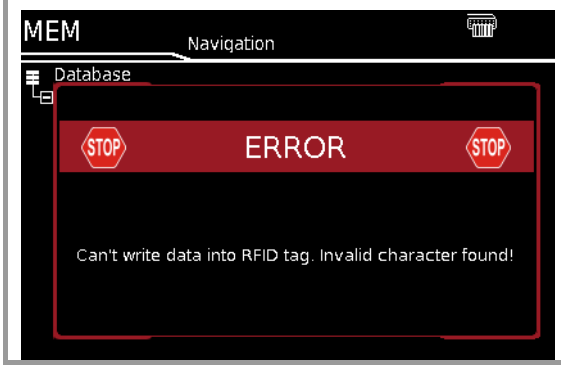
Error Message	Possible Causes	Corrective Measures
	– Momentary line voltage at the test instrument is outside of the permissible range (110 to 120 V or 220 to 240 V) for a 10 A/25 A R_{PE} measurement.	➪ The 10 A/25 A-R_{PE} measurement is only available when line voltage is between 220 and 240 V or 110 and 120 V at 50 or 60 Hz. ➪ If you're using the test instrument in an electrical system which does not lie within one of these voltage ranges, use the 200 mA test current in order to determine protective conductor resistance.
	– IT system option (see section 6.1.1, "Measurements in IT Systems") is activated. An attempt has been made to start an active leakage current measurement or a measurement with reference to PE at the mains connection side (or a test sequence which includes such measurements).	➪ Select measurement type "passive". or ➪ Conduct the desired tests in a TT/TN system instead of an IT system and configure the test instrument accordingly. or ➪ Deactivate leakage current measurements in the sequence parameters if possible.
Connection Error at the Test Socket		
	– Test probe P1 isn't connected. or – The test instrument's 10 A/25 A transformer is overheated. or – One of the fuses has blown (fuse holder in close proximity to the mains input).	➪ Repeat measurement with probe P1 connected. ➪ Check the fuses and replace if necessary. ➪ Select a different test current (e.g. 200 mA) or wait until the transformer has cooled down and then repeat the measurement. **Attention!** The 10 A/25 A measurement isn't suitable for continuous operation!
	– A short-circuit has been detected at the test socket between L and N.	➪ Determine whether or not the device under test is defective. ➪ In the case of DUTs which are intended for operation at an outlet that's protected with a 16 A fuse, a short-circuit may be detected under certain circumstances if, for example, they include a PTC thermistor (e.g. large floodlights). Be sure to use a 3-phase test adapter in order to test DUTs of this sort (e.g. the AT3-IIIE). ➪ You can skip this short-circuit message at your own risk and place the device under test into service. Any damage resulting from skipping this warning is excluded from the guarantee!

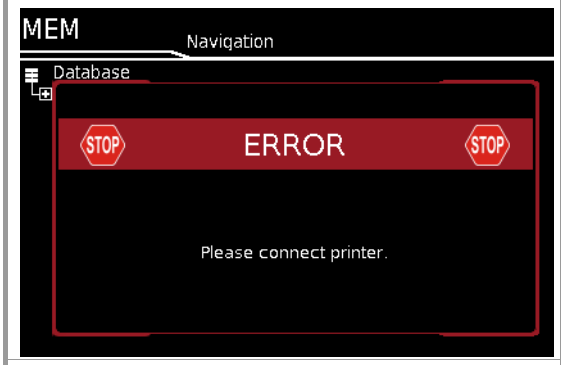
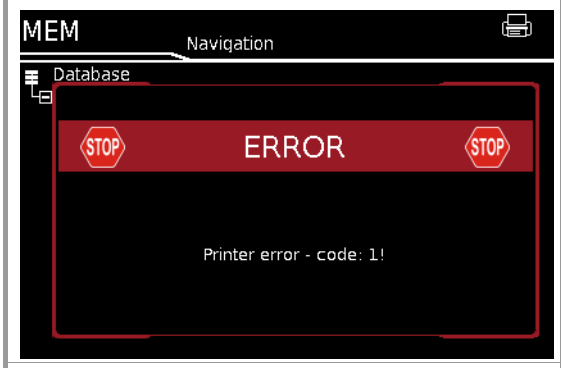
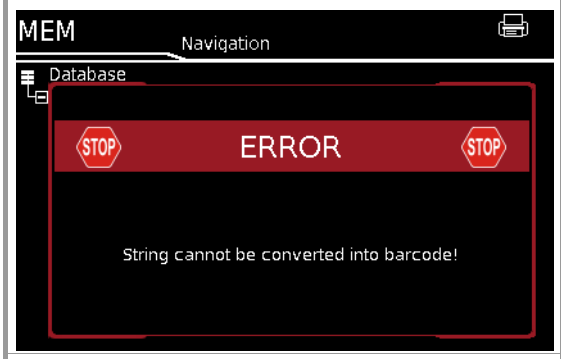
Error Message	Possible Causes	Corrective Measures
	– A device under test, whose leakage current (measured by means of the differential current method) exceeds the limit value specified in SETUP, is connected to the test instrument and has been started up.	➪ If the device under test normally generates a leakage current of greater than 10 mA (e.g. large heaters), temporarily increase the “residual current protection” value selected in setup to 30 mA and try again. ➪ If values of this magnitude are not to be expected for the respective device under test, or if the “residual current protection” value has already been set to 30 mA in Setup, there may be a ground fault at the DUT.
	– The fuse for the test socket’s L conductor has blown (fuse link 2).	➪ Disconnect the test instrument from the mains and inspect the fuses next to the it’s mains connection.
	– The fuse for the test socket’s N conductor has blown (fuse link 1).	➪ Disconnect the test instrument from the mains and inspect the fuses next to the it’s mains connection.
	– One of the two fuses for the test socket has blown (fuse link 1 or 2).	➪ Disconnect the test instrument from the mains and inspect the fuses next to the it’s mains connection.
	– A short-circuit has been detected at the test socket between L/N and PE.	➪ Determine whether or not the device under test is defective. Repeat the visual inspection.

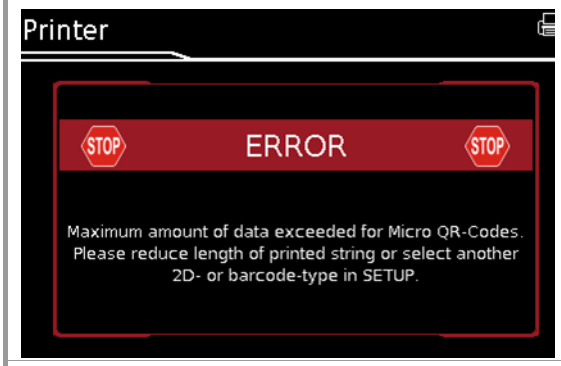
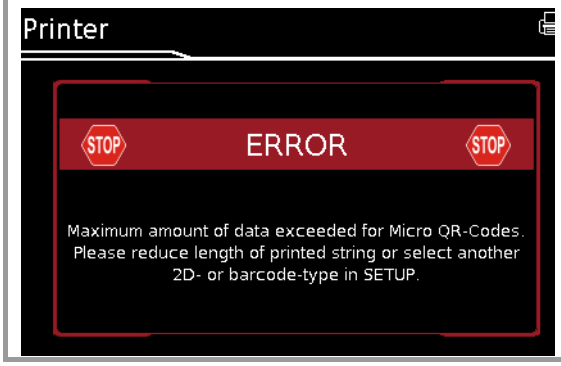
Error Message	Possible Causes	Corrective Measures
	– A short-circuit has been detected at the test socket between L and N.	➪ Determine whether or not the device under test is defective. ➪ In the case of DUTs which are intended for operation at an outlet that's protected with a 16 A fuse, a short-circuit may be detected under certain circumstances if, for example, they include a PTC thermistor (e.g. large floodlights). Be sure to use a 3-phase test adapter in order to test DUTs of this sort (e.g. the AT3-IIIE). ➪ You can deactivate this short-circuit test in the sequence parameters at your own risk.
	– A short-circuit has been detected at the test socket between L/N and PE.	➪ Determine whether or not the device under test is defective. Repeat the visual inspection.
Error During Use of the Test Probe		
	– During protective conductor resistance measurement (test current: 200 mA), more than 200 mA have flowed via the probe. – During leakage current measurement, more than 12 mA have flowed via the probe.	The electronic fuse resets itself. Despite this, implement the following measures: ➪ Check the fuse link next to the probe connection. ➪ Before repeating the protective conductor resistance measurement, make sure that the conductors are potential-free. ➪ Leakage current measurement: Perform a touch current measurement (differential method) in order to determine whether or not your DUT generates excessively high leakage current.

Error Message	Possible Causes	Corrective Measures
General Application Errors		
	– The inspector to be deleted is currently selected and thus cannot be deleted!	➪ Activate a different inspector before deleting.
	– The 25 A measurement takes too long. or – The 25 A measurement has been executed too often (without pauses).	➪ Wait until the test instrument has cooled down and then restart the measurement.
Database Processing Error		
	– One of the fields was filled in with invalid content while processing an existing database object.	➪ Please be certain to complete all mandatory fields (identified in red). ➪ If necessary, check your entries to the fields for invalid special characters.
	– The test object ID field was not filled in while creating a new device or new ME equipment.	➪ Fill in the test object ID field.
	– There's already an object with the same test object ID under the "Customer" database object.	An incorrect barcode has been selected. ➪ Assign another test object ID.

Error Message	Possible Causes	Corrective Measures
	**Error while writing the ".secu" file to the USB flash drive** There's not (no longer) enough available memory space on the storage medium. – In particular in the case of FAT16 formatted USB flash drives: too many files on the USB flash drive – Current consumption of the utilized USB flash drive exceeds 500 mA. – If the data on the USB flash drive are corrupt (e.g. due to an error during data export to the USB flash drive).	Make sure that at least 100 MB is available on the USB flash drive and delete any data files which are no longer needed. ➪ If the problem persists, save the data from the USB flash drive to another storage device and reformat the USB flash drive (FAT32). ➪ Only use USB flash drives with current consumption of less than 500 mA in combination with the test instrument. ➪ Make sure that the USB flash drive isn't disconnected or moved until the entire data export process has been completed. ➪ If none of these measures results in improvement, replace the USB flash drive. A list of tested USB flash drives is included in section 13.1.
	**Error while writing the data backup file to the USB flash drive** There's not (no longer) enough available memory space on the storage medium. – In particular in the case of FAT16 formatted USB flash drives: too many files on the USB flash drive – Current consumption of the utilized USB flash drive exceeds 500 mA. – The USB flash drive was disconnected during data import. – The USB flash drive is defective or incompatible with the test instrument.	➪ Make sure that a at least 100 MB is available on the USB flash drive and delete any data files which are no longer required. ➪ If the problem persists, save the data from the USB flash drive to another storage device and reformat the USB flash drive (FAT32). ➪ Only use USB flash drives with current consumption of less than 500 mA in combination with the test instrument. ➪ Make sure that the USB flash drive isn't disconnected or moved until the entire data backup process has been completed. ➪ If none of these measures results in improvement, replace the USB flash drive. A list of tested USB flash drives is included in section 13.1.
	**Moving of an object has failed** Moving a test object would lead to a test object ID conflict. The test object ID already exists for this customer.	➪ Delete the object with duplicate test object ID. ➪ Select another customer as a relocation target.

Error Message	Possible Causes	Corrective Measures
Test Management Errors		
	– The current inspector is assigned to the ETP role (electrically trained person). – An ETP is not permitted to change his own role or the role of another inspector.	➪ Log in as a test planner in order to change your own role or the role of another inspector.
	– The current inspector is assigned to the ETP role (electrically trained person). – An ETP is not permitted to enter rights for a new inspector.	➪ Log in as a test planner if you want to enter a new inspector.
	– The current inspector is assigned to the ETP role (electrically trained person). – An ETP is not permitted to delete an inspector's rights.	➪ Log in as a test planner if you want to delete an inspector.
Errors During Operation with Barcode or RFID Scanner		
	– The scanned barcode is too long.	
	– While writing an RFID tag an attempt was made to write an ID to the tag with vowel mutations such as ä, ü or ö, or with special characters.	➪ Change vowel mutations such as ä to ae. ➪ Avoid the use of special characters in the ID.

Error Message	Possible Causes	Corrective Measures
Printer Connection Error		
	– The printer isn't connected. – An incompatible printer has been connected.	➪ Connect the printer to the USB port before pressing the **PRINT** key. ➪ Make sure that the utilized printer is a compatible model. See "Connecting and Configuring External Devices" on page 25.
	– No recording chart in the thermal printer. – The printer is defective.	➪ Insert a new recording chart.
	– The test object ID to be printed as a barcode contains an inadmissible character, for example vowel mutation or special character, or it fails to conform to the conventions which apply to the selected barcode encryption type (e.g. EAN 13: only numeric characters, overall length 13 characters, last character as check digit only).	➪ Select another type of barcode encryption (SETUP 2/3 > Printer > Z721E > Printer Settings > ID Labels). ➪ Change vowel mutations such as ä to ae. ➪ Avoid the use of special characters in the ID. ➪ Change the ID to the specified length for the selected type of barcode encryption.
	– A 3.5 or 6 mm tape cartridge has been inserted into the printer. – These tape sizes are inappropriate for 2D code printing.	➪ Insert a cartridge with a tape width of 9 mm (or preferably 12 mm or more) and repeat printing. or ➪ Change to CODE128, CODE39 or EAN13 in SETUP (SETUP 2/3 > Printer > Z721E > Printer Settings > ID Labels).
	– A 9 mm tape cartridge has been inserted into the printer – this tape size is inappropriate for QR code label printing.	➪ Insert a cartridge with a tape width of 12 mm and repeat printing. or ➪ Change to another output format in SETUP (MicroQR code, DataMatrix, Aztec, Code128, Code39 or EAN13) (SETUP 2/3 > Printer > Z721E > Printer Settings > ID Labels).

Error Message	Possible Causes	Corrective Measures
	– Too many data in the ID to be printed as a Micro QR code.	➪ Shorten the ID or change to another output format in SETUP (QR Code, DataMatrix, Aztec, Code128, Code39, EAN13) (SETUP 2/3 > Printer > Z721E > Printer Settings > ID Labels).
	– The ID is too long to be printed as a Micro QR code.	

22 Contact, Support and Service

Gossen Metrawatt GmbH can be reached directly and simply – 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 English seminars can also be submitted by e-mail:

training@gossenmetrawatt.com

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

+49-911-817718-0

service@gossenmetrawatt.com

www.gmci-service.com

Beuthener Str. 41
90471 Nürnberg
Germany

23 Returns and Environmentally Sound Disposal

This test Instrument 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 test 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 test 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 test instrument, bring it to a designated collection point or contact our product support department. See “Contact, Support and Service” on page 109.

This test instrument is also subject to directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators and its German national equivalent implemented as the Battery Act (BattG) on the marketing, return and environmentally sound disposal of batteries and accumulators.

The symbol at the left indicates that batteries and rechargeable batteries must be disposed of in accordance with applicable legal regulations. Batteries and rechargeable batteries may not be disposed of with household trash. In order to dispose of batteries or rechargeable batteries, remove them from the test instrument and bring them to a designated collection point.

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”.

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

24 CE Declaration

The test instrument fulfills all requirements of applicable EU directives and national regulations. We confirm this with the CE mark.

Gossen Metrawatt GmbH	Begleitende Formulare zum PEP EU-Konformitätserklärung / EU Declaration of Conformity	Form E0F34

Hersteller / Manufacturer:	Gossen Metrawatt GmbH
Anschrift / Address:	Südwestpark 15, 90449 Nürnberg
Produktbezeichnung/	Prüfgerät für elektische Sicherheit
Product name:	Safety Tester
Typ / Type:	SECUTEST ... / SECUTEST ST ... / SECULIFE ST ...
Bestell-Nr / Order No:	M7050

Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsvorschriften der Union: / The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

2014/53/EU	RED - Richtlinie	RED Directive

Anforderungen an die Sicherheit gemäß 2014/35/EU (Niederspannungsrichtlinie) /
Safety requirements according to 2014/35/EU (Low Voltage Directive)

EN/Norm/Standard:

EN 61010-1 : 2010

Anforderungen an die elektromagnetische Verträglichkeit gemäß 2014/30/EU (EMV Richtlinie) /
Requirements for electromagnetic compatibility according to 2014/30/EU (EMC Directive)

EN/Norm/Standard:

EN 61326-1 : 2013

2011/65/EU	RoHS - Richtlinie	RoHS Directive
(EU) 2015/863	Deligierte Richtlinie	Deligate Directive

EN/Norm/Standard:

None

Nürnberg, 07.07.2021
Ort, Datum / Place, Date:

Geschäftsführung / Managing Director

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. Sie beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentationen sind zu beachten.

This Declaration of Conformity is issued under the sole responsibility of the manufacturer but does not include a property assurance. The safety notes given in the product documentation which are part of the supply, must be observed.

Datei:	Ausgabe:	Erstellt:	Freigabe:
21-2-005-M7050-CE-Entwurf	15.01.2021	Eckl	Weiß

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