GOSSEN METRAWATT

Quick Start Guide

SECULIFE ST PRO / SECULIFE ST PRIME

Test Instruments for Testing the Electrical Safety of Medical Devices



Read the complete operating instructions, available at

www.gossenmetrawatt.com.

The condensed operating instructions do not replace the detailed operating instructions!

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Table of Contents

1 Safety Regulations 4
1.1 General 4
1.2 Accessories 4
1.3 Handling 4
1.4 Tests/Measurements 4
1.5 Operating Conditions 5
1.6 Fuses 5
1.7 Emissions 5
1.8 Measurement Cables and Establishing Contact 5
1.9 Data Security 6
1.10 Documentation 6

2 Application 7
2.1 Intended Use/Use for Intended Purpose 7
2.2 Use for Other Than Intended Purpose 9
2.3 Liability and Guarantee 9
2.4 Opening the Instrument / Repairs 10

3 Documentation 11
3.1 Information Concerning These Instructions 11
3.2 Scope 11
3.2.1 Firmware Version 11
3.3 Description of Instrument Variants 11
3.4 Copyright 11
3.5 Identification of Warnings 11
3.6 Identifiers 12
3.7 Symbols in the Documentation 13
3.8 Definition of Terms 13

4 Getting Started 14

5 Device 15
5.1 Scope of Delivery 15
5.2 Device Overview 15
5.2.1 Front 15
5.2.2 Symbols on the Instrument and the Included Accessories 17
5.3 Product Features 17
5.4 Included Features 18
5.5 Relevant Standards 21
5.6 Technical Data 21
5.7 Characteristic Values 24

6 Initial Startup 33
6.1 Connecting the Test Instrument to the Mains 33
6.2 Automatic Detection of Mains Connection Errors 33
6.3 Connecting the P1 or P2 test probe 35

6.4 International Use ... 35

7 Operation ... 36

7.1 Basic Operation of the Test Instrument ... 36

7.1.1 Icons for Softkey Operation ... 37

7.2 Entering Text and Numbers ... 40

7.3 Help Functions (HELP key) ... 43

8 Test Instrument Settings ... 44

8.1 System Parameters ... 44

8.2 Configuration of Test Standards/Integrated Test Sequences After Update or Extension (Enabling Function) ... 44

8.3 Configuring the Rotary Switch Positions ... 44

8.4 "Bluetooth" Submenu (with feature M01 only) ... 45

9 Inspector Management ... 47

10 Internal Database ... 48

11 Connecting the DUT ... 49

12 Important Basic Information on Tests and Measurements ... 50

12.1 Important Safety Information ... 50

12.1.1 Switching Loads - Maximum Starting Current ... 50

12.2 Measurement with DUT Connected to Line Voltage ... 51

12.3 Measurement of Insulation Resistance and Equivalent Leakage Current (alternative measuring methods for leakage current) ... 51

12.4 UHV High-Voltage Testing, DC ... 52

13 Single Measurements ... 53

13.1 General ... 53

13.2 Icons for User Guidance – Measurements ... 53

13.3 Displaying the Last Measured Values ... 55

13.4 Saving Single Measurements and Measurement Series ... 55

13.4.1 Conducting a Measurement Procedure with Preselection of the Test Object ... 56

13.4.2 Conducting a Measurement Procedure with Subsequent Entry of the Test Object ... 56

13.4.3 Conducting a Measurement Procedure with Entry of a New Test Object at the End of the Test 57

13.4.4 Alternative: Transferring Measurement Data to the PC (IZYTRONIQ - push-print) ... 57

14 Test Sequences (Automatic Test Procedures) ... 58

15 Reports ... 60

16 Transferring and Saving Test Structures and Measurement Data (Test Instrument Database) ... 61

17 Contact, Support, and Service ... 62

18 Certifications ... 63

18.1 CE Declaration ... 63

19 Disposal and Environmental Protection ... 64

19.1 Disposing of Waste Equipment and (Rechargeable) Batteries ... 64

19.2 Disposing of Packaging Materials ... 64

19.3 Regulations for the Federal Republic of Germany ... 65

1 Safety Regulations



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

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

Keep for future reference.

1.1 General

- 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.
- Tests/measurements may only be performed by a qualified electrician, or under the supervision and direction of a qualified electrician in the commercial sector. The user must be instructed by a qualified electrician concerning performance and evaluation of tests and/or measurements.
- Observe and comply with all safety regulations that apply to your work environment.
- Wear suitable and appropriate personal protective equipment (PPE) whenever working with the device.
- Be aware that PPE may be required for the DUT 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 device, thereby impairing the health of their users. Implement corresponding protective measures in consultation with the manufacturer of the medical device and your physician. If any potential risk cannot be ruled out, do not use the device.

1.2 Accessories

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

1.3 Handling

- Use the device only if it is in perfect condition.

  Inspect the device before use. Pay particular attention to damage, interrupted insulation, or kinked cables.

  Damaged components must be replaced immediately.
- Use only accessories and cables that are in perfect condition.

  Inspect accessories and all cables before use. Pay particular attention to damage, interrupted insulation, or kinked cables.
- Avoid plugging in or unplugging accessories (e.g., probes) while measurements are in progress.
- If the device or its accessories do not function flawlessly, permanently remove the device/accessories from operation and secure them against being restarted inadvertently.
- If the device or accessories are damaged during use (e.g., if they are dropped), permanently remove the device/accessories from operation and secure them against being restarted inadvertently.
- If signs of interior damage to the device or accessories (e.g., loose parts in the housing) are apparent, permanently shut down the device/accessories and secure them against being restarted inadvertently.

1.4 Tests/Measurements

- 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 264 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.

- Ensure compliant functionality of this test instrument within the scope of operational equipment testing through the use of a suitable calibrator.
- SECULIFE ST PRIME: In particular, the detectability of a potential insulation defect with each measurement type must be checked regularly as part of the high-voltage testing provided in the instrument. This can be done with the aid of suitable calibrators. We recommend the use of the ISO-Kalibrator 1 (M662A).
- The test instrument is equipped with fuses. The test instrument may only be used as long as the fuses are in good working order. 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.

1.5 Operating Conditions

- Do not use the device and accessories after long periods of storage under unfavorable conditions (e.g., humidity, dust, temperature).
- Do not use the device and accessories after extraordinary stressing due to transport.
- Only use the device and accessories within the limits of the specified technical data and conditions (ambient conditions, IP protection code, measurement category, etc.).

1.6 Fuses

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

1.7 Emissions

Test instruments with feature M01:

- The device is equipped with a Bluetooth® module. Determine whether or not use of the implemented frequency band of 2400 MHz to 2483.5 MHz is permissible in your country.

1.8 Measurement Cables and Establishing Contact

- 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 DUT.
- Unexpected voltages may occur at DUTs (for example, capacitors can be dangerously charged). Take appropriate precautions.
- In particular during high-voltage testing, be aware that dangerous residual voltage may be present at the HV test pistol and/or the DUT. Do not touch the DUT for any reason during high-voltage testing.

1.9 Data Security

- The device is equipped with a data memory on which personal and/or sensitive data can be stored. Observe and comply with the applicable national data protection regulations. Use the corresponding functions provided by the instrument (such as access protection), as well as other appropriate measures to prevent unauthorized access to the data.
- Protect the device against unauthorized tampering. Use the functions provided by the device (e.g., key lock / sealing / lock) as well as other appropriate measures (e.g., restricting physical access to the device).

1.10 Documentation

- Test reports must be checked for correctness and signed by the inspector.

2 Application

Please read this important information!

2.1 Intended Use/Use for Intended Purpose

The SECULIFE ST PRO and the SECULIFE ST PRIME are test instruments for testing the electrical protective measures of electrical devices, medical electrical equipment, and arc 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 performed.

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 perform standards-compliant tests repeatedly and efficiently. Their progress is interrupted by safety-related stoppages, as well as associated warnings and instructions. As a result, the level of protection provided to the user is greater than demanded by standard IEC / 61557-16 / DIN EN 61557-16 / VDE 0413-16 with regard to "automatic test sequences."

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

- EN 50699 / VDE 0702 Periodic testing for electrical devices
- EN 50678 / VDE 0701 General procedure for verifying the effectiveness of the protective measures of electrical equipment after repair
- IEC 62353 / EN 62353 / VDE 0751-1 Medical electrical equipment – Recurrent test and test after repair of medical electrical equipment
- IEC 61010-1 / EN 61010-1 / VDE 0411-1 Safety requirements for electrical equipment for measurement, control and laboratory use [1] [2]
- IEC 60335 / EN 60335-1 / VDE 0700-1 Safety of electrical equipment for household use and other similar applications [1] [2]
- IEC 60601-1 / VDE 0750-1 Medical electrical equipment - Part 1: General requirements for safety and essential performance [1]
- VDE 0701-0702 (withdrawn) / ÖVE E 8701 / SNR 462638 Inspection after repair, modification of electrical appliances – Periodic testing of electrical devices
- IEC 60974-4 / EN 60974-4 / VDE 0544-4 Arc welding equipment – Part 4: Periodic inspection and testing
- NEN 3140 Operation of Electrical Installations – Low Voltage
- IEC 62368 / EN 62368 / VDE 0868-1 Audio/video, information and communication technology equipment [1]
- IEC 62911 / EN 62911 / VDE 0868-911 Audio, video and information technology equipment – Routine electrical safety testing in production [1]

NOTE

The integrated, preconfigured test sequences do not include all of the tests stipulated by the product standard which are required for type testing! They are 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.

[1] With feature F01/F02 the test procedure also includes high-voltage test steps

[2] Only with feature KA03 or subsequently enabled with Z853V

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/your test instrument and the 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 SECULIFE ST ... front panels and housings of the test instruments also have antimicrobial properties, which make it possible to use them in hygienically sensitive areas.

The safety of the user and the device is only guaranteed with intended use.

DUTs	Repair	Reason for Testing Periodic Testing (occupational safety, DGUV)	Routine Testing in Production
Electric devices (as a rule with mains power cable) including extension cords and multiple outlet strips	EN 50678 / VDE 0701 VDE 0701-0702 (withdrawn) / ÖVE E 8701 / SNR 462638 NEN 3140	EN 50699 / VDE 0702 VDE 0701-0702 (withdrawn) / 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 (withdrawn) / ÖVE E 8701 / SNR 462638	EN 50699 / VDE 0702 VDE 0701-0702 (withdrawn) / 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 1: Standards according to device and reason for testing

	EN 50678 / VDE 0 701 EN 50699 / VDE 0 702 VDE 0701-0702 (withdrawn)/ ÖVE E 8701 / SNR 462638	IEC 60974-4 / EN 60974-4 / VD E 0544-4	IEC 62353 / EN 62353 / VDE 0 751-1	IEC 60601-1 / EN 60601-1 / VD E 0750-1	IEC 62368 / EN 62368 / VDE 0 868-1 IEC 62911 / EN 62911 / VDE 0 868-911
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 the applied part			×		
Measuring Method					
Alternative (equivalent [device] leakage current)	×		×		
Differential current	×	×	×		
Direct	×	×	×	×	×

Table 2: Standard Designations for Available Tests

2.2 Use for Other Than Intended Purpose

Using the instrument for any purposes other than those described in the instrument's operating instructions or these condensed operating instructions is contrary to use for intended purpose. Use for other than the intended purpose may lead to unpredictable damage!

2.3 Liability and Guarantee

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

2.4 Opening the Instrument / Repairs

The device may only be opened by authorized, qualified personnel in order to ensure flawless, safe operation and to assure that the guarantee is not rendered null and void. Even original replacement parts may only be installed by authorized, qualified personnel.

Unauthorized modification of the device is prohibited.

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

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

3 Documentation

3.1 Information Concerning These Instructions

Read these instructions carefully and attentively. They contain all the information for safe use of this device. Follow them to protect yourself and others from injury and to avoid damage to the device.

The latest version of these instructions is available on our website:

https://www.gossenmetrawatt.de/en/service-support/download-center/

3.2 Scope

This guide applies to the following instruments:

- SECULIFE ST PRO
- SECULIFE ST PRIME

3.2.1 Firmware Version

This documentation describes instruments with software version 4.0.0.

You can view your instrument's firmware version in the test instrument. Documentation for other firmware versions is available on request.

Refer to the operating instructions with regard to updates.

3.3 Description of Instrument Variants

This documentation describes the instruments specified within the scope and their variants.

As a result, features and functions may be described which do not apply to your instrument. In addition, the illustrations may differ from your device.

3.4 Copyright

This document is protected by copyright. Content modifications, reproduction, duplication, processing, or translation in any form (including excerpts) are only permissible after obtaining prior written permission from Gossen Metrawatt GmbH. This applies in particular to storage and processing in electronic systems, provided they do not exclusively serve legitimate internal purposes.

3.5 Identification of Warnings

Instructions for your safety and for the protection of the device and its environment are provided as warnings and notes at certain points in these instructions.

They are laid out as shown below and are graded in terms of the severity of the respective hazard. They also describe the nature and cause of the hazard, the consequences of non-observance, and steps to take to prevent hazards.

DANGER



Death or serious injury is almost certain.

WARNING



Death or serious injury is possible.

CAUTION



Minor or moderate injury is possible.

ATTENTION

Damage to the product or the environment is possible.

NOTE



Important information.

TIP



Useful additional information or application tip.

3.6 Identifiers

The following identifiers are used in this documentation:

Hardware controls	Keys and other controls
Software buttons	Buttons, menus
■ List	Bullet lists
– List	

▶ **Procedure: Beginning of a procedural instruction**

✓ Prerequisite: A condition, etc., that must be fulfilled before a given action can be taken.

1. Step 1: Steps that must be completed in the specified order.
2. Step 2

   ↳ Interim result: Interim result of the steps

3. Step 3

↳ Result: Result of steps

Table 1:	Description of the content of a table
Figure 1:	Description of the content of a figure
Footnote[1]	Footnote

3.7 Symbols in the Documentation

The following symbols are used in this documentation:

Symbol	Meaning
	Read and follow to the product documentation.
	General warning symbol.
	Warning regarding electrical voltage.

Table 3: Symbols in this documentation

3.8 Definition of Terms

Term	Definition
Test instrument	The instrument specified in the scope of these instructions.
Device under test (DUT)	Electrical device, medical electrical equipment, or electric welding equipment to be tested (DUT – device under test).
Test object	Electronic representation of a specific DUT 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	A test sequence (see above) that is available upon delivery or once activated 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.

Table 4: Definition of Terms

4 Getting Started

This section provides an overview of the initial steps for working with the instrument.

1. Read and follow the product documentation. In particular, observe all safety information in the documentation, on the instrument and on the packaging.
   - ⇨ **"Safety Regulations "** 🗋 **4**
   - ⇨ **"Application"** 🗋 **7**
   - ⇨ **"Documentation"** 🗋 **11**
2. Familiarize yourself with the instrument.
   - ⇨ **"Instrument"** 🗋 **15**
3. Start up the instrument.
   - Initial Startup
4. Familiarize yourself with instrument operation.
   - ⇨ **"Operation"** 🗋 **36**
5. Prepare the test instrument for use.
   - ⇨ **"Test Instrument Settings"** 🗋 **44**
   - ⇨ **"Inspector Management"** 🗋 **47**
6. Perform measurements.
   - ⇨ **"Connecting the DUT"** 🗋 **49**
   - ⇨ **"Important Basic Information on Tests and Measurements"** 🗋 **50**
   - ⇨ **"Single Measurements"** 🗋 **53**
   - ⇨ **"Test Sequences (Automatic Test Procedures)"** 🗋 **58**
7. Generate a report if required.
   - ⇨ **"Reports"** 🗋 **60**
8. Transfer measurement data to the IZYTRONIQ software if required.
   - ⇨ **"Alternative: Transfer measurement data to the PC (IZYTRONIQ – push-print)"** 🗋 **57**

5 Device

5.1 Scope of Delivery

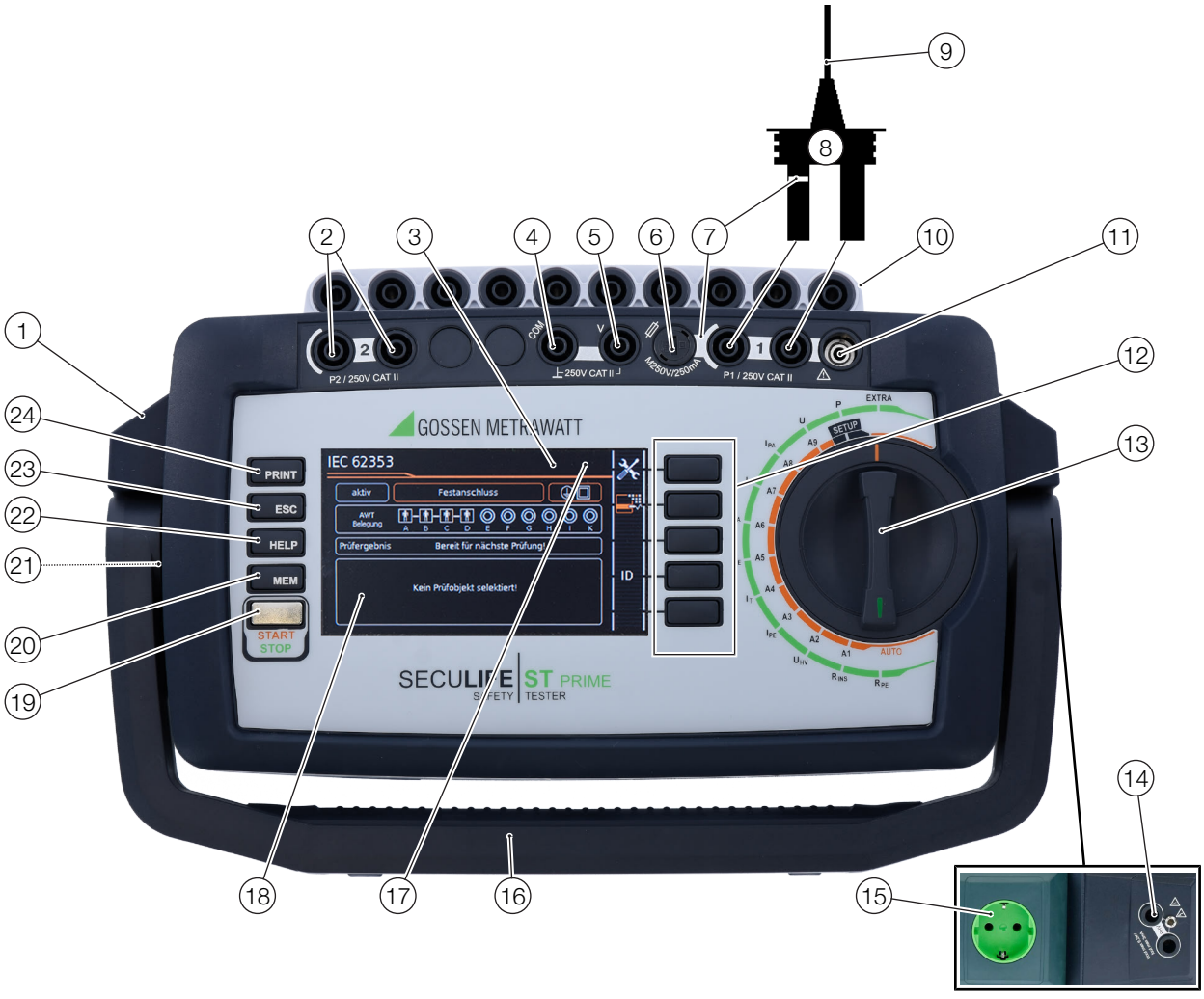
The scope of delivery varies depending on which test instrument variant has been ordered, and is country-specific.

Information concerning the scope of delivery can be found in your order and in the data sheet, in which all order information is listed.

Please check the scope of delivery for completeness and intactness.

5.2 Device Overview

5.2.1 Front



1	2 USB masters		For keyboard
			For scanner
			For printer
			For USB flash drive
			For USB BLE communication adapter Z705A

	1 USB slave	For PC	
2	2 connector sockets for test probe (P2, for 2-pole measurement)[1)]		
3	Cross-functional icons show the status of special functions or detected connections to accessories (USB).		
	Display of special icons:		Measurement at IT system active
			OFFSET for RPE active
			Active connection to the Test Report Receiver app
4	Voltage measuring inputs [1]		
5	Voltage measuring inputs [1]		
6	Fuse compartment (fuse link for probe input P1)		
7	White/silver color-coded, fused high-current path		
8	1 connector socket for test probe (P1)		
9	Reinforcing sleeve:	Black: max. 16 A	
		Green: max. 25 A	
10	Applied part sockets AP A ... K		
11	Supply power connection for SECUTEST CLIP (Z745H) [2]		
12	Softkeys with functions that vary depending upon the menu level		
13	Rotary function selector switch	Orange rotary switch level Test sequences A1 ... A9 (Test sequences according to standard or user-defined test procedure)	
		Green rotary switch level Single measurements	
14	HV test pistol connector socket (SECULIFE ST PRIME with feature F02)		
15	Test socket (country-specific) for connecting DUTs Attention! Depending on the measuring task, the test socket may be charged with line voltage		
16	Carrying handle and tilt stand		
17	Mains to test socket. SFC: Normal cond.		
	Mains to test socket. SFC: N interrup.		
	High voltage is present (with feature F01/F02)		
18	LCD panel		
19	**START STOP**	Start/stop ■ Single measurement ■ Test sequence Finger contact	
20	**MEM** function key	Database	
21	Socket for mains power via inlet plug (country-specific)		
22	**HELP** function key	Context-sensitive help	

23	**ESC** function key	Go back
24	**PRINT** function key	Print via USB

[1] Only test instruments with feature H01

[2] See also operating instructions for the device

5.2.2 Symbols on the Instrument and the Included Accessories

Symbol	Meaning
	Warning concerning a source of danger (Attention, follow the documentation!)
	If the guarantee seal is damaged or removed, all guarantee claims are rendered null and void.
250 V CAT II	Maximum permissible voltage and measurement category between connections P1 (test probe), the test socket and ground
	European conformity marking
	The instrument must not be disposed of with household trash. Follow the section “Disposal and Environmental Protection”.
	Warning regarding dangerous electrical voltage

Table 5: Symbols on the Instrument and the Included Accessories

5.3 Product Features

The instrument supports the following features:

	Features	SECULIFE ST PRO	SECULIFE ST PRIME
Touchscreen/keyboard	E01	×	×
High-voltage testing, LN–PE/P1	F01		×
High-voltage testing, LN–PE/P1 and P1–PHV	F02		o
10 A RPE test current	G01	×	o
25 A RPE test current	G02	o	×
2nd test probe (connector socket for 2nd test probe)	H01	×	o
Voltage measuring input [1]	I01	×	×
Integrated test sequences for EN 50678 / VDE 0701, EN 50699 / VDE 0702, IEC 62368 / EN 62368 / VDE 868-1, IEC 62911 / EN 62911/ VDE 868-911	KE	×	×
Additional test procedure for IEC 60601	KA01	×	×

	Features	SECULIFE ST PRO	SECULIFE ST PRIME
Additional test procedures IEC 60601 / IEC 61010 / IEC 60335	KA03	o	o
SECUTEST DB+	KB01	×	×
SECUTEST DB COMFORT	KD01	×	×
Bluetooth®	M01	o	×
Antimicrobial housing	-	×	×
Key: × = included o = optional			

[1] For voltage measurement or for connecting a current clamp sensor or an AT3 adapter, and for temperature measurement via RTD

Table 6: Product Features

5.4 Included Features

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

Single Measurements

Switch Position	Measuring Functions Test Current/Voltage		Measurement type Connection type
Single measurements (rotary switch level: green)			
Measurements at voltage-free DUTs			
R_{PE}	R_{PE}	Protective conductor resistance	PE(TS) - P1 active: PE(TS) - P1 PE(mains) - P1 [1] PE(mains) - P1 clamp [1 2] P1 - P2 [3]
	I_P	Test current: 200 mA Test current: 10 A [4] (feature G01) Test current: 25 A [4] (feature G02)	
R_{INS}	R_{ISO}	Insulation resistance	LN(TS) - PE(TS) LN(TS) - P1 P1 - P2 [3] PE(mains) - P1 PE(TS) - P1 LN(TS) - P1//PE(TS) LN(TS) - AP PE(mains) - AP PE(TS) - AP P1//PE(TS) - AP P2 - AP [3]
	U_{SIO}	Test voltage	
U_{HV} [5]		High-voltage testing	LN(TS) - P1 LN(TS) - P1//PE(TS) PHV - P1 [6]
	U_{min}	Determined minimum voltage value during the set test time	
	U_{Gen}	Test voltage	

Switch Position	Measuring Functions Test Current/Voltage		Measurement type Connection type
Single measurements (rotary switch level: green)			
Measurements at DUTs with line voltage			
I_{PE}	I_{PE} ≃	Protective conductor current, TRMS value	Direct Differential Alternative AT3 adapter [2] Clamp [2]
	I_{PE} ∿	AC component	
	I_{PE} =	DC component	
	U_{LPE}	Voltage L-PE from the mains power	
	U_{Gen}	Test voltage (alternative method)	
I_T	I_B ≃	Touch current, TRMS value	Direct P1 Differential P1 Alternative P1 Perm. conn. P1 Alternative P1–P2
	I_B ∿	AC component	
	I_B =	DC component	
	U_{LPE}	Voltage L-PE from the mains power	
	U_{Gen}	Test voltage (alternative method)	
I_E	I_G ≃	Device leakage current, TRMS value	Direct Differential Alternative AT3 adapter [2] Clamp [2]
	I_G ∿	AC component	
	I_G =	DC component	
	U_{LPE}	Voltage L-PE from the mains power	
	U_{Gen}	Test voltage (alternative method)	
I_A	I_A ≃	Leakage current from the applied part, TRMS value	Direct P1 Direct AP Alternative P1 Alternative AP Perm. conn. P1 Perm. conn. AP AP–P2 [7]
	U_{LPE}	Voltage L-PE from the mains power	
	U_{Gen}	Test voltage	
I_P	I_P ≃	Patient leakage current, TRMS value	Direct P1 Direct AP Perm. conn. P1 Perm. conn. AP
	I_P ∿	AC component	
	I_P =	DC component	
	U_{LPE}	Voltage L-PE from the mains power	
I_{PA}	I_P ≃	Patient auxiliary current, TRMS value	Direct AP Perm. conn. AP
	I_P ∿	AC component	
	I_P =	DC component	
	U_{LPE}	Line voltage	
U	U ≃	Measuring voltage, TRMS value	PE - P1 PE - P1 (with mains*) V – COM V – COM (with mains*) * Polarity setting
	U ∿	Alternating voltage component	
	U =	Direct voltage component	

Switch Position	Measuring Functions Test Current/Voltage		Measurement type Connection type
Single measurements (rotary switch level: green)			
P	**Function test at the test socket**		Polarity setting
	I	Current between L and N	
	U	Voltage between L and N	
	f	Frequency	
	P	Active power	
	S	Apparent power	
	PF	Power factor	
Special measuring functions			
EL1 [8]	Function test for extension cords Continuity, short-circuit, polarity (wire reversal [9])		EL1 adapter AT3-IIIE adapter VL2E adapter
EXTRA	Reserved for expansion within the framework of software updates		
	°C temperature measurement [2] with Pt100/Pt1000		V – COM
	ICL current clamp measurement with current clamp sensor		V – COM
	Relay continuity check [5]		N(TS) L(TS) PHV [6]
	t_{PRCD}	t_A Time to trip for 10/30 mA PRCD	
		U_{LN} Line voltage at the test socket	

1 Connection type not available with feature G02

2 Voltage measurement inputs with test instruments with feature I01 only

3 Connector socket for 2nd test probe for 2-pole measurement only with test instrument with feature H01

4 10 A/25 A RPE measurements are only possible with line voltages of 115 V/230 V and line frequencies of 50 Hz/60 Hz.

5 Only ST PRIME ... version.

6 Only with feature F02

7 For ME equipment (medical electrical equipment) with own supply

8 For version ... ST PRIME under the EXTRA rotary switch position.

9 No checking for reversed wires when the EL1 adapter is used.

Integrated Test Sequences

NOTE

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

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

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. The test instrument is preconfigured upon delivery.

5.5 Relevant Standards

The 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
DIN EN 62353 DIN VDE 0751-1	Medical electrical devices – Recurrent test and test after repair of electrical medical devices
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

5.6 Technical Data

Reference Ranges	Line voltage:	230 V AC ±0.2%	
	Line frequency:	50 Hz ±2 Hz	
	Waveform:	Sinusoidal (deviation between RMS and rectified values < 0.5%)	
	Ambient temperature:	+23 °C ±2 K	
	Relative humidity:	40 ... 60%	
	Load resistance:	Linear	
Nominal Ranges of Use	Nominal line voltage:	90 V ... 264 V A	
	Nominal line frequency:	50 Hz ... 400 Hz	
	Line voltage waveform:	Sinusoidal	
	Temperature:	0 °C ... +40 °C	
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: 10 A DUT: 25 A DUT:	approx. 32 VA approx. 105 VA approx. 280 VA
	Mains to test socket (e.g., for 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	

Ambient Conditions	Operating temperatures:	+0 ... +40 °C
	Storage temperatures:	-20 ... +60 °C
	Relative humidity:	Max. 75%, no condensation allowed
	Elevation:	Max. 2000 m
	Place of use:	Indoors; outdoors: only 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 is 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.
Electrical Safety	Measurement category:	Designed for 300 V CAT II (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
	Protection class:	I in accordance with 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, test probe(s), test socket, AP sockets)
	Safety shutdown:	At DUT differential current of > 10 mA, shutdown time < 500 ms, can also be switched to > 30 mA with probe current (electronic fuse) during: Leakage current measurement > 30 mA~/< 500 ms [1] Protective conductor resistance measurement: > 250 mA~/< 1 ms in case of continuous current I > 16.5 A
	Fuse links:	Mains fuses: 2 × 500 V/16 A T Probe fuse: M 250 V/250 mA 10 A RPE test current (feature G01 only): 1 × T 500 V/ 16 A Applied parts: 2 × M 250 V/250 mA
Electromagnetic Compatibility (EMC)	Interference emission:	EN 55011 class A EN 55032 class A EN IEC 61000-3-2 EN IEC 61000-3-3
	Interference immunity:	DIN EN 61326-1 DIN EN 61326-2-2

Mechanical Design	Protection:	Housing: IP 40 (protection against penetration of solid foreign bodies: ≥ 1.0 mm ∅; protection against the ingress of water: not protected) Test socket: IP 20 (protection against penetration of solid foreign bodies: ≥ 12.0 mm ∅; protection against the ingress of water: not protected) Applied part: IP20 (protection against penetration of solid foreign bodies: ≥ 12 mm ∅; protection against the ingress of water: not protected) in accordance with DIN EN 60529 / IEC 60529 Housing with antimicrobial properties in accordance with JIS standard Z 2801	
	Housing (W × H × D):	approx. 295 mm ×145 mm × 150 mm SECULIFE ST PRIME: approx. 295 mm × 145 mm × 240 mm	
	Height with handle:	170 mm	
	Weight:	Feature G00/G01:	approx. 2.5 kg
		Feature G02:	approx. 4.0 kg
		(depending on test instrument version) SECULIFE ST PRIME:	approx. 6.0 kg
	Display:	4.3" multi-display (9.7 × 5.5 cm) with backlighting, 480 × 272 pixels with 24-bit color depth (true color)	
Data Interfaces	Bluetooth® 2.1 + EDR (test instruments with feature M01 only):	Frequency range:	2400 ... 2483.5 MHz
		Transmission intensity:	Max. 2.5 mW (class II)
		Connecting a Bluetooth® keyboard. Only Bluetooth® keyboards that support Bluetooth® Classic mode (3.0) are compatible. Keyboards that can only connect to Bluetooth® Low Energy hosts (as of Bluetooth 4.x) are not supported (including Bluetooth® Low Energy (LE)).	
	USB:	USB slave for PC connection/remote control [2] 2 × USB master, for data entry devices [3] with HID boot interface, for USB flash drive for data backup, for USB flash drive for saving reports as HTML files for USB thermal report printer (Z721S) and label printer Z721D/E	
Database	Number of data records:	50,000 (1 data record = 1 DUT or location node or customer or single measurement)	

1 Firmware version 3.2.0 and lower: 12 mA

2 Remote control only with extension: "Remote Control via PC (IZYTRONIQ)" (included as standard feature with SECUTEST ST PRO, SECUTEST ST PRIME, and SECULIFE ST BASE(25), and available with SECUTEST DB+ (Z853R or feature KB01).

3 See section "Connecting and Configuring External Devices" for compatible devices.

Influencing Quantities and Influence Error

Abbreviation	Influencing Quantity	R_{PE}	R_{ISO}	I_{PE}, I_B, I_G, I_A Leakage currents Alternative measurement	I_{PE}, I_B, I_G, I_A, I_P, I_{PH} Leakage currents Direct measurement	I_{PE}, I_B, I_GLeakage currents Differential current measurement
A	Intrinsic Uncertainty °	±(10% rdg. + 10 d) >10 d	±(2.5% rdg. +2 d) >10 d ≥ 20 Mμ: ±(5% rdg. + 4 d)	±(2% rdg. +2 d) >10 d > 15 mA: ±(5% rdg. + 4 d)	±(2.5% rdg. +2 d) > 10 d	±(2.5% rdg. +2 d) > 10 d
E1	Reference position ±90	0%	0%	0%	0%	0%
E2	Supply voltage	2.5%	2.5%	2.5%	2.5%	2.5%
E3	Temperature 0°C ... +40°C	2.5%	2.5%	2.5%	2.5%	2.5%
E9	Mains harmonics				1%	1%
E11	Low frequency magnetic fields	2.5%	2.5%	2.5%	2.5%	2.5%
E12	Load current					2.5%
E13	Touch current, common-mode voltage					
E15	Repetition accuracy					

Table 7: Influencing Quantities and Influence Error

5.7 Characteristic Values

Conducting tests

Measured Quantity	Display Range[1] / Nominal Operating Range	Resolution	Nominal voltage U_N	Open-circuit voltage U_0	Nominal Current $_{IN}$	Short-circuit current I_{SC}	Internal resistance R_i	Reference Resistor R_{REF}	Operational Measurement Uncertainty[2]	Self-Uncertainty[2]	Overload Capacity	
											Value	Time
Protective conductor resistance R_{PE}	1 MΩ ... 999 MΩ	1 mΩ	--	< 6 V AC or DC	-	>200 mA AC / DC > 10 A AC[3] >25 A AC[4]	-	-	±(15% rdg. + 10 D) > 10 D > 10,0 Ω: ±(10% rdg.+ 10 d)	±(10% rdg.+ 10 d) > 10 d	264 V 250 mA	continuous
	1.00 Ω ... 9.99 Ω	10 mΩ									16 A[5]	
	10.0 Ω ... 27.0 Ω	100 mΩ									>42 AA C[4]	15 s
Insulation resistance[4] R_{INS}	10 kΩ ... 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 ≥20 MΩ: ± (5% rdg. +4 d)	264 V	continuous
	1.00 MΩ ... 9.99 MΩ	10 kΩ										
	10.0 MΩ ... 99.9 MΩ	100 kΩ										

Measured Quantity	Display Range[1] / Nominal Operating Range	Resolution	Nominal voltage U_N	Open-circuit voltage U_0	Nominal Current $_{IN}$	Short-circuit current I_{SC}	Internal resistance R_I	Reference Resistor R_{REF}	Operational Measurement Uncertainty[2]	Self-Uncertainty [2]	Overload Capacity	
											Value	Time
	100 MΩ ... 300 MΩ	1 MΩ										
Leakage Currents Alternative Measurement[6] I I_T, I_E, I_A	0 µA ... 99 µA	1 µA	-	50 ... 250 V~ – 20/ +10 %	-	< 1,5 m A	>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	continuous
	100 µA ... 999 µA	1 µA										
	1.00 mA ... 9.99 mA	10 µA										
	10.0 mA ... 30.0 mA	100 µA										
Direct Measurement of Leakage Currents [6] I_{PE}, I_T, I_E, I_A, I_P, I_{PH}	Only I_P, I_{PA}: 0.0 µA ... 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	continuous
	0 µA ... 99 µA	1 µA										
	100 µA ... 999 µA	1 µA										
	1.00 mA ... 9.99 mA	10 µA										
	10.0 mA ... 30.0 mA	100 µA										
Leakage Currents —Differential Current Measurement[6 6] I_{PE}, I_T, I_E	0 µA ... 99 µA	1 µA	-	-	-	-	-	-	(5% rdg. + 4 d) > 10 d	±(|2.5% rdg. +2 d)> 10 d	264 A	continuous
	100 µA ... 999 µA	1 µA										
	1.00 mA ... 9.99 mA	10 µA										
	10.0 mA ... 30.0 mA	100 µA										
rdg. = reading (measured value) d = digit(s)												

1 Under certain circumstances, the display range may be changed only if the value has fallen below the hysteresis range.

2 ">10D" means that the specified value only applies as of a display of > 10 digits (the same applies whenever ">XXD" is specified).

3 Measurement types IPE_clamp and IE_clamp.

4 Only with feature G02.

5 Only with feature G01.

6 Known as equivalent leakage current or equivalent patient leakage current from previous standards.

Table 8: Characteristic Values Conducting tests

Function Test at the Test Socket

Measured Quantity	Display Range[1] / Nominal Range of Use	Resolution	Nominal Voltage U_N	Open-Circuit Voltage U_0	Nominal Current I_N	Short-Circuit Current I_K	Internal Resistance R_i	Reference Resistance R_{REF}	Measuring Uncertainty[2]	Intrinsic Uncertainty[2]	Overload Capacity	
											Value	Time
Line voltage U_{L-N}[3]	90.0 V~ ... 264.0 V~	0.1 V	-	-	-	-	-	-	-	±(2% rdg.+2 d)	264 V 16 A 20 A	Continuous Continuous <10 min
Load current I_V	0 A_{RMS} ... 20.00 A_{RMS}	10 mA	-	-	-	-	-	-	-	±(2% rdg.+2 d)		
Active power P	0 W ... 999 W	1 W	-	-	-	-	-	-	-	±(5% rdg.+10 d) 1.00 kW > 20 d		
	1.00 kW > 20 d ... 4.50 kW	10 W										
Apparent power S	0 VA ... 999 VA	1 VA	Calculated value $U_{L-N} \times I_V$							±(5% rdg.+10 d) 1.00 kVA > 20 d		
	1.00 kVA > 20 d ... 4.50 kVA	10 VA										
Power factor LF with sinusoidal waveform: cosφ	0.00 ... 1.00	0.01	Calculated value, P / S, display > 10 W							±(10% rdg.+5 d)		
Line frequency f	0 Hz ... 420.0 Hz	0.1 Hz	-	-	-	-	-	-	-	±(2% rdg.+2 d)		
rdg. = reading (measured value) d = digit(s)												

1 Under certain circumstances, the display range may be changed only if the value has fallen below the hysteresis range.

2 ">10D" means that the specified value only applies as of a display of > 10 digits (the same applies whenever ">XXD" is specified).

3 Voltage at the test socket may be lower than measured line voltage due to components which limit inrush current.

Table 9: Characteristic Values Function Test at the Test Socket

t_{PRCD}

Measured Quantity	Display Range[1] / Nominal Range of Use	Resolution	Nominal Voltage U_N	Open-Circuit Voltage U_0	Nominal Current I_N	Short-Circuit Current I_K	Internal Resistance R_i	Reference Resistance R_{REF}	Measuring Uncertainty[2]	Intrinsic Uncertainty[2]	Overload Capacity	
											Value	Time
Time to trip	0.1 ms ... 999.0 ms	0.1 ms	-	-	30 mA ±2%	-	-	-	±5 ms	-	264 V	Continuous
rdg. = reading (measured value) d = digit(s)												

1 Under certain circumstances, the display range may be changed only if the value has fallen below the hysteresis range.

2 ">10D" means that the specified value only applies as of a display of > 10 digits (the same applies whenever ">XXD" is specified).

Table 10: Characteristic Values t_{PRCD}

Voltage Measurement

Measured Quantity	Display Range [1] / Nominal Range of Use	Resolution	Nominal Voltage U_N	Open-Circuit Voltage U_0	Nominal Current I_N	Short-Circuit Current I_K	Internal Resistance R_I	Reference Resistance R_{REF}	Measuring Uncertainty [2]	Intrinsic Uncertainty [2]	Overload Capacity	
											Value	Time
Probe voltage (probe P1 to PE) DC, AC and DC/AC	0.0 V ... 99.9 V 100 V ... 264 V	100 mV 1 V	-	-	-	-	3 MΩ	-	-	±(2% rdg.+2 d)	264 V	Continuous
Measuring voltage Continuous (V–COM sockets [3]) DC, AC and DC/AC	0.0 V ... 99.9 V 100 V ... 300 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	
rdg. = reading (measured value) d = digit(s)												

1 Under certain circumstances, the display range may be changed only if the value has fallen below the hysteresis range.

2 ">10D" means that the specified value only applies as of a display of > 10 digits (the same applies whenever ">XXD" is specified).

3 Only with feature I01.

Table 11: Characteristic Values Voltage Measurement

I_{Abl}

Measured Quantity	Display Range [1] / Nominal Range of Use	Resolution	Nominal Voltage U_N	Open-Circuit Voltage U_0	Nominal Current I_N	Short-Circuit Current I_K	Internal Resistance R_I	Reference Resistance R_{REF}	Measuring Uncertainty [2]	Intrinsic Uncertainty [2]	Overload Capacity	
											Value	Time
Leakage current via AT3-IIIE adapter Z745S [3] [4] AC	0.00 mA ... 0.99 mA	0.01 mA	–	-	-	-	-	-	-	±(2% rdg.+2 d) > 10 d without adapter	253 V	Continuous
	1.0 mA ... 9.9 mA	0.1 mA										
	10 mA ... 20 mA	1 mA										
rdg. = reading (measured value) d = digit(s)												

1 Under certain circumstances, the display range may be changed only if the value has fallen below the hysteresis range.

2 ">10D" means that the specified value only applies as of a display of > 10 digits (the same applies whenever ">XXD" is specified).

3 Only with feature I01.

4 Measurement types IPE_AT3 adapter and IG_AT3 adapter.

Table 12: Characteristic Values I_{Abl}

Temp

Measured Quantity	Display Range[1] / Nominal Range of Use	Resolution	Nominal Voltage U_N	Open-Circuit Voltage U_0	Nominal Current I_N	Short-Circuit Current I_K	Internal Resistance R_I	Reference Resistance R_{REF}	Measuring Uncertainty[2]	Intrinsic Uncertainty[2]	Overload Capacity	
											Value	Time
Temperature with Pt100 sensor	– 200.0 °C ... +850.0 °C	0.1 °C	-	< 20 V		1.1 mA	-	-	-	±(2% rdg.+1 °C)	10 V	Continuous
Temperature with Pt1000 sensor	– 150.0 °C ... +850.0 °C											
rdg. = reading (measured value) d = digit(s)												

1 Under certain circumstances, the display range may be changed only if the value has fallen below the hysteresis range.

2 ">10D" means that the specified value only applies as of a display of > 10 digits (the same applies whenever ">XXD" is specified).

Table 13: Characteristic Values Temp

I_{clamp}

Measured Quantity	Display Range[1] / Nominal Range of Use	Resolution	Nominal Voltage U_N	Open-Circuit Voltage U_0	Nominal Current I_N	Short-Circuit Current I_K	Internal Resistance R_I	Reference Resistance R_{REF}	Measuring Uncertainty[2]	Intrinsic Uncertainty[2]	Overload Capacity	
											Value	Time
Current via current clamp sensor [1 mV: 1 mA] (V-COM sockets[3] [4]) AC	1 mA ... 99 mA	1 mA (1 mV)	-	-	-	-	-	-	-	±(2% rdg.+2 d) > 10 d 20 Hz ... 20 kHz without clamp	253 V	Continuous
	0.1 A ... 0.99 A	0.01 A (10 mV)										
	1.0 A ... 9.9 A	0.1 A (100 mV)										
	10 A ... 300 A	1 A (1 V)										
Current via current clamp sensor [10 mV: 1 mA] (V-COM sockets[3] [4]) AC	0.1 mA ... 9.9 mA	0.1 mA (1 mV)	-	-	-	-	-	-	-			
	10 mA ... 99 mA	1 mA (10 mV)										
	0.10 A ... 0.99 A	0.01 A (100 mV)										
	1.0 A ... 30.0 A	0.1 A (1 V)										
Current via current clamp sensor [100 mV: 1 mA] (V-COM sockets[3] [4]) AC	0.01 mA ... 0.99 mA	0.01 mA (1 mV)	-	-	-	-	-	-	-			
	1.0 mA ... 9.9 mA	0.1 mA (10 mV)										
	10 mA ... 99 mA	1 mA (100 mV)										
	0.10 A ... 3.00 A	0.01 A (1 V)										

Measured Quantity	Display Range[1] / Nominal Range of Use	Resolution	Nominal Voltage U_N	Open-Circuit Voltage U_0	Nominal Current I_N	Short-Circuit Current I_K	Internal Resistance R_I	Reference Resistance R_{REF}	Measuring Uncertainty[2]	Intrinsic Uncertainty[2]	Overload Capacity	
											Value	Time
Current via current clamp sensor [1000 mV: 1 mA] (V-COM sockets[3] [4]) AC	1 µA ... 99 µA	1 µA (1 mV)	-	-	-	-	-	-	-			
	0.10 mA ... 0.99 mA	0.01 mA (10 mV)										
	1.0 mA ... 9.9 mA	0.1 mA (100 mV)										
	10 mA ... 300 mA	1 mA (1 V)										
rdg. = reading (measured value) d = digit(s)												

1 Under certain circumstances, the display range may be changed only if the value has fallen below the hysteresis range.

2 “>10D” means that the specified value only applies as of a display of > 10 digits (the same applies whenever “>XXD” is specified).

3 Only with feature I01.

4 Measurement types IPE_clamp and IE_clamp.

Table 14: Characteristic Values I_{clamp}

Testing Times, Automatic Procedure

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.

Leakage current measurement

With all leakage current measurements (I_{PE}, I_T, I_E, I_A, I_P, I_{PH}) (direct, differential, alternative), the frequency response is taken into account.

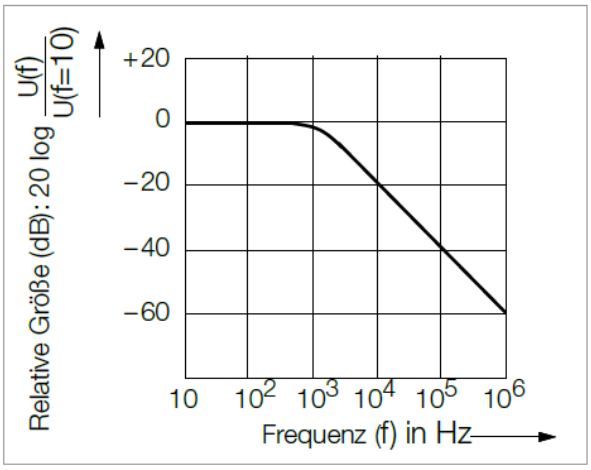


Fig. 1: Frequency response

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.

SECUTEST ST PRIME with Integrated High-Voltage Testing

- High-voltage testing is available as a single test via the rotary switch position U_{HV}
- Test L/N - PE (protection category I) and L/N to handheld probe (protection category II) are possible
- Test voltages depend on country variant/test socket ⇨ **"Maximum adjustable test voltage"** 🗋 **30**
- Also with feature F02: optional high-voltage connection for high-voltage test pistol
  - This connection enables in conjunction with the optional high-voltage test pistol (Z746H), for example, the verification of the resistance to high voltages on electrical components with two handheld probes
  - In conjunction with the high-voltage pistol Z746H, the test voltage can be ramped up/down from the pistol
- High-voltage testing (F01/F02) in conjunction with SECUTEST DB+ (feature KB01)
  - Also enables the remote control of the test instrument including high-voltage testing [1] via PC data interface for integration [2] in customer-specific test systems
  - User-defined test sequences, including high-voltage test steps, can be created in IZYTRONIQ and imported into the test instrument.
- Integrated test procedures augmented with test steps for the high-voltage testing for protection category I and protection category II DUTs Integrated Test Sequences

High-voltage source

DC test voltage	U_{Gen} adjustable in 50 V steps	0.50 ... 6.00 kV [1]
Open-circuit voltage	U_0	(U_{Gen} × 1.011) + 60 V
Accuracy of open-circuit voltage		±(2.5% U_0 + 5 digits) (resolution: 0.01 kV)
DC nominal current	In accordance with DIN VDE 0104	< 3 mA
Short-circuit current	Discharging current based on 6 × 2.7 nF	> 5 A at 5 kV
Interference Voltage Withstand		None

[1] See following table – Adjustable rise time and test time

Table 15: High-voltage source

Maximum adjustable test voltage (U_{Gen}) as a function of the measurement type and test socket

Test socket [country]	Measurement type	Limit value
B00 [Germany]	LN(TS) – PE(TS)||P1	max. 3.00 kV [1]
	LN(TS) - P1	max. 6.00 kV
B01 [Great Britain]	LN(TS) – PE(TS)||P1	max. 3.00 kV [1]
	LN(TS) - P1	max. 6.00 kV
B03 [France, Czech Republic, Poland]	LN(TS) – PE(TS)||P1	max. 3.00 kV [1]
	LN(TS) - P1	max. 6.00 kV
B04 [China]	LN(TS) – PE(TS)||P1	max. 3.00 kV [1]
	LN(TS) - P1	max. 6.00 kV
B05 [USA]	LN(TS) – PE(TS)||P1	max. 3.00 kV [1]
	LN(TS) - P1	max. 4.00 kV

[1] Remote control of the high-voltage testing using “IZYTRONIQ” software is not supported.

[2] Documentation of the remote control commands is available upon request.

Test socket [country]	Measurement type	Limit value
B06 [Australia]	LN(TS) – PE(TS)||P1	max. 3.00 kV[1]
	LN(TS) - P1	max. 6.00 kV
B07 [Denmark]	LN(TS) – PE(TS)||P1	max. 3.00 kV[1]
	LN(TS) - P1	max. 6.00 kV
B09 [Switzerland, with connector socket and detection of protection category]	LN(TS) – PE(TS)||P1	max. 3.00 kV[1]
	LN(TS) - P1	max. 6.00 kV
B00 - B09 With feature F02, optional high-voltage connection (for HV test pistol Z746H)	PHV - P1	max. 6.00 kV

[1] As from firmware 3.6.1; previously 2.25 kV

Table 16: Maximum adjustable test voltage (U_{Gen}) as a function of the measurement type and test socket

Voltage Measurement

Measuring range	Display Range	Resolution	Accuracy
0 ... U_{0max}DC	0.00 ... 9.99 kV	0.01 kV	±(2.5% rdg. + 5 digits)

Table 17: Voltage Measurement

Lower Supply Limit for High-Voltage Testing

In order to be able to conduct high-voltage testing, the load must always be greater than the respective characteristic curve (see following diagrams).

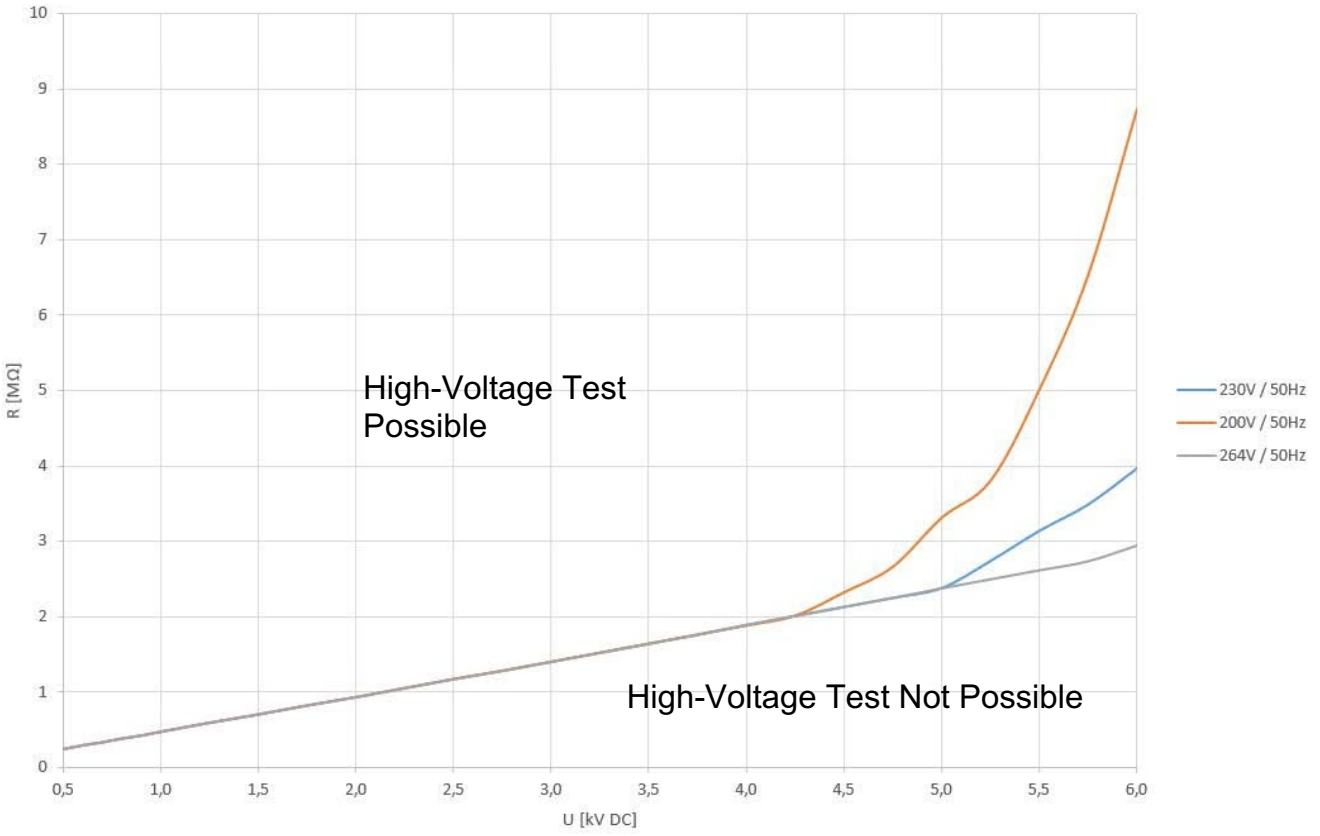


Fig. 2: Typical Maximum Load for the HV Source as a Function of Supply Voltage at 50 Hz

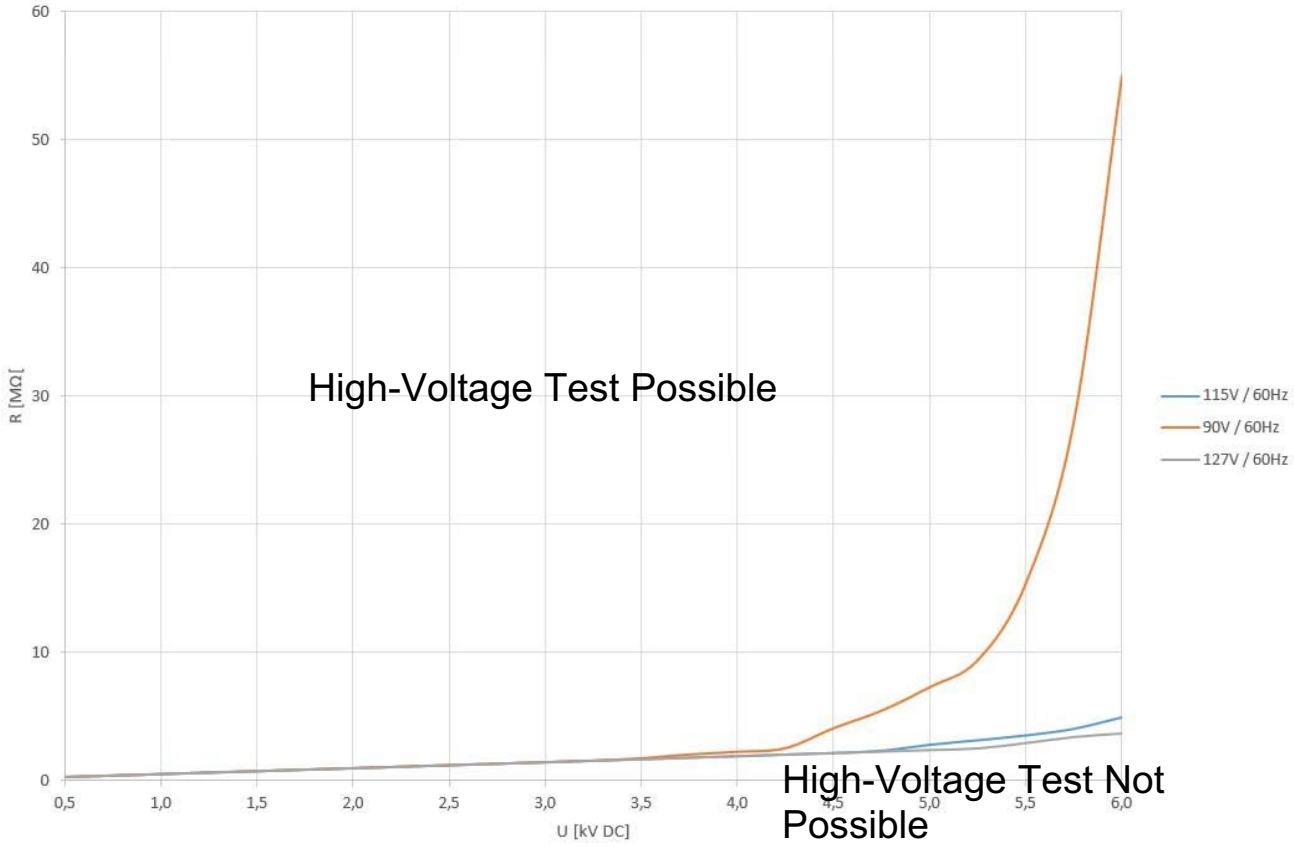


Fig. 3: Typical Maximum Load for the HV Source as a Function of Supply Voltage at 60 Hz

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

DANGER



Electric Shock!

Incorrectly connected power supply cables or connecting the instrument while energized may result in injury due to electrical voltage.

— If connection is not possible via an earthing contact outlet: Shut down mains power first.
— Then connect the cables from the coupling socket to the mains terminals using pick-off clips and finally activate the electrical circuit.

✓ The nominal mains values and nominal ranges of use correspond to the specifications in the technical data.

1. Connect the mains cable to the inlet plug on the test instrument.
2. Connect the mains plug to the mains power. The rotary switch position is not relevant here.

TIP



If a mains outlet (earthing contact outlet) is not 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.

Measurements in IT Systems

In ungrounded supply systems, it is technically not possible to record leakage or fault currents. To prevent these measurements, certain parameters must be enabled.

The **IT Mains** setting can be activated in the **SETUP** switch position (Setup 1/3) in the **All Measurements** submenu: 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.

6.2 Automatic Detection of Mains Connection Errors

DANGER



Electric Shock! Risk of Consequential Accidents!

Voltage from the protective conductor is also applied to the test socket's exposed protective contacts and can cause life-threatening injury if touched.

If, while testing protective conductor potential, you determine that the mains protective conductor is conducting voltage (in accordance with the first two cases shown in the table above), no measurements may be performed with the test instrument at this mains connection.

— Immediately disconnect the test instrument from the mains connection.
— Arrange for rectification of the fault at the mains outlet/installation.

WARNING



Electric Shock! Risk of Consequential Accidents!

Voltage at the electrical system's protective conductor PE may result in distorted measured values during testing for the absence of voltage or during leakage voltage measurements. For example, DUTs can falsely pass the test and pose a safety risk when used.

— Make sure that the mains connection is correct. If necessary, change the mains outlet.

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.).

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 the **START/STOP** key: U > 25 V key →PE: < 1 MΩ[1)]	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 [2)]
Test for IT/TN system	Display	Connection N →PE > 20 kΩ	Possible under certain circumstances

Table 18: Mains Connection Errors

[1)] If the location impedance of the inspector is very high, the following error message may appear: "Interference voltage at mains connection PE"

[2)] 10 A/25 A R_{PE} measurements are only possible with line voltages of 115 V/230 V and line frequencies of 50 Hz/60 Hz.

6.3 Connecting the P1 or P2 test probe

CAUTION



Risk of Puncture When Using Test Probes with Coil Cable (SK2W)!

Tensioning at the coil cable may cause the test tip to snap back resulting in possible injury.

— Grasp the test probe firmly, for example if it has been inserted into a jack socket.

NOTE



Test current: 25 A

For test currents of 25 A with R_{PE} measurements, a test probe with a green strain relief sleeve must be used. Only these are suitable for this test current.

Measurements with 25 A may only be performed with test probes with a maximum probe cable of 5 m. With longer probe cables, the 25 A will not flow.

The inspector must take this into account with regards to any normative requirements.

1. Insert the double plug of test probe P1 or P2 into sockets 1 or 2 so that the side of the plug with the white ring is aligned with the silver-colored circle segment printed on the housing.

The white ring marks the connection of the high-current conductor. In the case of connection 1 for test probe P1, this is protected via the neighboring fuse.

TIP



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 DUTs with special tools at a suitable location.

The tip of test probe P1 is not 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.

▶ **Checking the Probe**

1. Check probe P1 after each test – checking probe P1 also checks whether the probe fuse is still OK when the probe is plugged in.

NOTE



Tests that use the P1 probe may lead to erroneously good or overly low measured values when insulation resistance values or touch currents are evaluated.

If a probe check fails after a test, make sure that the test of the previously tested DUT is repeated after the probe fuse has been replaced.

6.4 International Use

The test instrument can be used internationally.

A complete description is included in the full operating instructions.

7 Operation

NOTE



The connections of the device must not be loaded with more than 30 V_{DC} 30 mA.
If these values are exceeded, a fuse will trip. The fuse will reset after a delay as soon as the overload has been removed.

7.1 Basic Operation of the Test Instrument

The test instrument is operated using the keys and the rotary switch on the test instrument.

Softkeys

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

Function Keys

Function keys have a permanently assigned function:

PRINT	Print via USB
ESC	Go back
MEM	Database
HELP	Help images
START STOP	Start/stop ■ Single measurement ■ Test sequence Finger contact

In some situations, for example when using the softkey keyboard, 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
- 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 “>” (greater than) symbol, which indicates measured value overrun. Falling short of the lower range limit is indicated by the “<” (less than) symbol, e.g., for RINS.

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 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.

Version with touchscreen

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

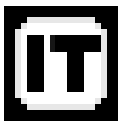
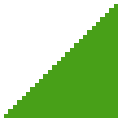
ATTENTION

Scratching the display!

Operating the touchscreen with hard or pointed objects, such as a test probe or a ballpoint pen, may damage the display.

— Operate the display with your fingers only.

7.1.1 Icons for Softkey Operation

Icon	Designation	Meaning
	**Set Parameters**	Set Parameters
	**IT**	
	**OK**	Accept changed parameters, acknowledge memory location
	**Resume test**	Acknowledges messages during tests/measurements or resumes the test sequence
	**Abort**	Abort measurement
	**Set measurement type**	Direct selection key for selecting the measurement type
	**SEL**	Calls up a selection list of parameters
	**Polarity normal**	Currently selected polarity: “normal” (green field) Pressing the key switches to “reversed” polarity
	**Polarity reversed**	Currently selected polarity: “reversed” (green field) Pressing the key switches to “normal” polarity
I_P	**Set test current**	Direct selection key for selecting test current for protective conductor measurement

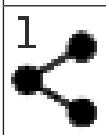
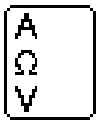
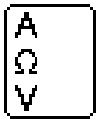
Icon	Designation	Meaning
U+ **U–**	**Change voltage value**	Direct selection key for gradually changing the voltage ■ In 10 V steps with the insulation measurement ■ In 50 V steps with the high-voltage testing (UHV switch position)
	**Start evaluation**	Start evaluation – record measured value. Each 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.
	**Save**	Valid measured values have been obtained for a measurement. This measurement can be saved.
	**Save as**	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)
	**Push-Print**	Send measurement data to the PC, e.g., for saving to IZYTRONIQ report generating software (push-print function) (see online help for IZYTRONIQ)
	**Display measured values**	Display measured values from performed measurements
	**Show details**	Show details from the measurement results list
	**Hide details**	Hide details from the measurement results list
	**Search**	Searches for compatible Bluetooth® devices

Table 19: Icons for user guidance

Icon	Designation	Meaning
	**Inspector**	Inspector
	**Inspector with password protection**	Inspector with password protection

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

Table 20: Icons for inspector list

Icon	Designation	Meaning
	**Change display**	Change display to menu selection
	**NEW**	Add object
	**DEL**	Delete selected object or selected measurement
	**EDIT**	Edit object (ID, designation, comment ...)
	**MOVE**	Move object (with SECUTEST DB COMFORT only (Z853S or feature KD01))
	**Display measured values**	When a measurement is selected: Display measured values
	**Show details**	Show details from the measurement results list
	**Hide details**	Hide details from the measurement results list

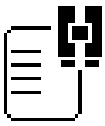
Icon	Designation	Meaning
	**Search All**	Search in the ID, designation, or UDI fields > enter the entire ID or designation (complete word)
	**Search ID**	Search by ID: > enter complete ID number of a test object
	**Show structure designation**	Show the structure designation
	**Hide structure designation**	Hide the structure designation
	**Standard instrument**	Standard instrument
	**ME equipment**	Medical test object
	**QEDIT**	Quick Edit
	**Save**	Save

Table 21: Icons for database

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 via the touchscreen keyboard.

Alternatively, entries can also be made via a connected USB keyboard or Bluetooth® keyboard (with feature M01 only).

▶ **Entry via the softkey keyboard**

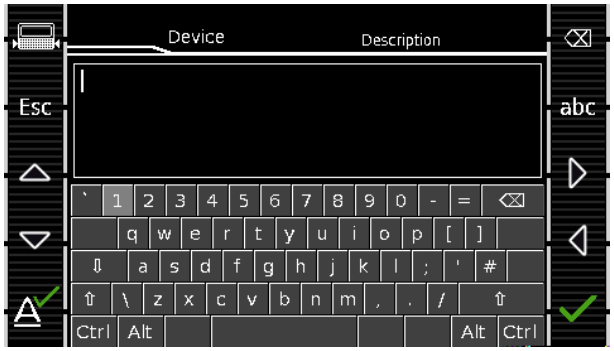
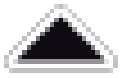


Fig. 4: Softkey keyboard

Icon	Designation	Function
	**Switch**	Switch between keypad and display panel
Esc	**Esc**	Exit entry mode without applying
	**Up**	Scroll up
	**Down**	Scroll down
	**Paste**	Accept character at cursor position in display panel
	**Delete**	Delete character to the left of the cursor
abc	**abc**	Switch between upper-/lowercase and symbols
	**Right**	Scroll right
	**Left**	Scroll left
	**OK**	Accept entry

▶ **Entry via touchscreen keyboard (feature E01)**

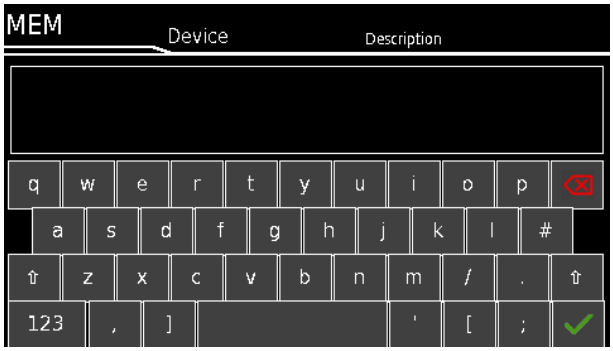


Fig. 5: Touchscreen keyboard

Action/icon	Designation	
Press the shift key once	**Uppercase**	Switches to uppercase for the following character
Pressing the shift key for a longer period of time	**All in uppercase**	Switches to all uppercase
Press the display panel at a certain point in the text that has already been entered	**Cursor**	Positions the cursor
⌫	**Delete**	Delete character to the left of the cursor (also via the assigned softkey)
✓	**OK**	Accept entry (also via the assigned softkey)

▶ **Example: Name 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** / **Down**. The selection cursor can be accelerated by pressing and holding the respective scroll key.
3. Press the **Insert** key to copy the respective symbol into the display panel.
4. Repeat steps 1 through 3 until the complete designation appears in the display panel.
5. To subsequently change designations in the display panel, press the **Toggle** key.
   ↳ The bottom keyboard is hidden. The cursor position can then be changed in order to delete individual characters.
6. Press the green checkmark **OK** to copy the value to the display panel.

7.3 Help Functions (HELP key)

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

▶ **Calling up the help function**

1. Press the **HELP** key.

↳ The help function is called up.

▶ **Closing the help function**

1. Press the **ESC** key.

↳ The help function is closed.

8 Test Instrument Settings

After the initial startup, you must first set the basic system parameters for language, keyboard layout, date and time as well as the display brightness.

Then you will 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.

NOTE

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

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.

8.1 System Parameters

You must first set the basic system parameters in the **SETUP** rotary switch position:

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 %)

8.2 Configuration of Test Standards/Integrated Test Sequences After Update or Extension (Enabling Function)

The initial configuration of the test standards/integrated test sequences should be performed during the initial startup. After an update or an extension (enabling function), reconfiguration is necessary in the following cases:

- When updating the firmware from Version 3.2.0 or lower to firmware Version 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.
- With a subsequent extension and enabling for additional test sequences.

▶ **Reconfigure test standards and integrated test sequences after an update or extension (enabling function)**

1. Install the firmware update or extension.
2. Select the standard designations.
3. Disable standards that you do not need.
4. Reconfigure the rotary switch positions.

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

8.3 Configuring the Rotary Switch Positions

The integrated test sequences can be individually assigned to the rotary switch positions.

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

▶ **Configuring rotary switch positions**

1. Select an orange rotary switch position **A1** through **A9**).
   ↳ The start page for the respective integrated test sequence set at the factory is displayed.

2. Press the **SEL** key to select the classification parameters.
   ↳ The **Classification Parameters 1/2** page is displayed.
   The standard which is currently assigned to the respective rotary switch position is displayed under **Standard/Test Procedure**.
3. Select **Standard/Test Procedure**.
   ↳ The **Standard/Test Procedure** page opens. All standards available on the test instrument are displayed here according to the selected setting.
4. Select the desired standard.
   ↳ The menu is returned to the **Classification Parameters 1/2** page.
5. Acknowledge the setting with **OK**.
   ↳ The settings are saved.
6. Repeat the above described procedure for each of the respective rotary switch positions.

8.4 "Bluetooth" Submenu (with feature M01 only)

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

- Data transmission (test structure and measurement data) to IZYTRONIQ test software
- Transfer of results to the IZYTRONIQ test software (push-print function)

NOTE

Data Security

For security reasons, we recommend disabling the Bluetooth® interface unless it is 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

Risk of mix-up when using multiple test instruments

The test instrument's device name is set to "SECUTEST" by default. If you access one PC with several test instruments, their names should differ or be added individually, e.g., SECUTEST1, SECUTEST2, etc.

Use the **Bluetooth** submenu to enter the settings for the Bluetooth® interface.

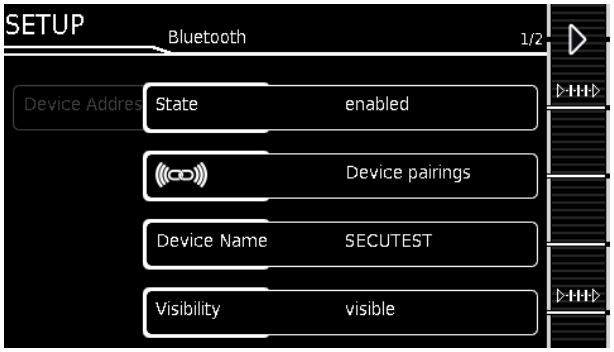


Fig. 6: "Setup 3/3 > Bluetooth 1/2" page

Operating parameter	Function
Status	Switch the Bluetooth® interface on or off
Device pairings	Search for/pair Bluetooth® devices, with status “ON”: View/edit existing pairings
Device name	With status “ON”: The name of the test instrument displayed above the interface can be changed here.
Visibility	With status “ON”: Specifies whether the test instrument can be found by other Bluetooth® devices.

Table 22: Setup 3/3 > Bluetooth 1/2

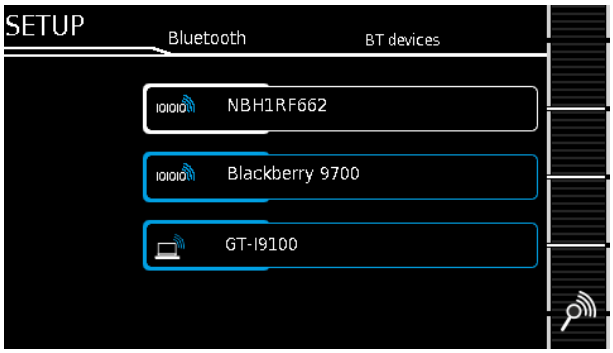


Fig. 7: “Setup 3/3 > Bluetooth 1/2 > Device Pairings” page

Operating parameter	Function
[Device name], white edge	Paired device found (white frame) > rename or delete
[Device name], blue edge and pairing PIN	Paired device found (blue frame) > rename or delete
[Device name], blue edge and device icon	Not yet paired device found (blue frame) > entry of the pairing PIN
Icon **Search**	Search for nearby Bluetooth® devices

Table 23: Setup 3/3 > Bluetooth 1/2 > Device Pairings

9 Inspector Management

The test instrument is equipped with an inspector management function. You can set up several inspectors and switch between 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 settings) the inspector is set up in the test instrument as “not defined.”

NOTE



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

A complete description is included in the full operating instructions.

10 Internal Database

The internal database of the test instrument can include a complete test structure with data regarding customers, properties, buildings, floors, rooms, and test objects.

NOTE



Sensitive Data – Mandatory Data Protection!

Customer data are confidential and must be protected.

Observe and comply with the applicable national data protection regulations.

This structure makes it possible to save the results of single measurements or test sequences for test objects belonging to various customers.

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.

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.

The scope of functions provided by the database structure and the transfer options depend on the instrument variant and its features.

A complete description of database creation is included in the full operating instructions.

11 Connecting the DUT

NOTE

Always connect the DUT in accordance with the schematic diagrams included in the online help function.

Connection of the DUT to the test instrument depends on the following factors:

- Type of DUT
  - Direct connection to the test socket (TS) for DUTs with single-phase connection, also for extension cords via the EL1 adapter, in which case the EL1 is connected to probe sockets P1
  - Permanent connection to the mains power 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 via a current clamp (possible with feature I01 only)
  - 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 three-phase extension cords via the VL2E adapter to the test socket – with DUTs with 5-pole, 16 A CEE plug via the AT16-DI differential current adapter to the test socket
  - With DUTs with 5-pole, 32 A CEE plug via the AT32-DI differential current adapter to the test socket
- Protection category (PC I, PC II, or PC III) or any combinations of protection categories

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.

A complete description is included in the full operating instructions.

12 Important Basic Information on Tests and Measurements

12.1 Important Safety Information

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

12.1.1 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

Fusing Together of Relay Contacts!

Despite extensive protective measures targeted at preventing overloading, the relay contacts may be fused together if starting current exceeds 30 A.

— Follow the procedure described below and observe information concerning defective relays.

NOTE

Observe correct sequence

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

▶ **Start of measurement**

1. DUT: Turn the DUT off via its own switch.
2. Test instrument: Switch line voltage to the test socket.
3. DUT: Turn the DUT on via its own switch.
4. Perform the measurement.

▶ **End of measurement**

1. DUT: Turn the DUT off via its own switch.
2. Test instrument: Deactivate line voltage to the test socket.

Safer Testing with Test Adapter

In the case of DUTs 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 (AT3-IIIE, AT3-IIICH, 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 (alternative method, formerly equivalent leakage current measuring 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 fuses. If they are 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.

12.2 Measurement with DUT Connected to Line Voltage

DANGER



Electric Shock! Risk of Consequential Accidents!

If the **PROCEED in case of limit violation** setting has been selected, there is a risk of electric shock. For example, an additional fault can result in current flowing through the body.

— Take the necessary precautions when testing; use an RCD 30 mA.
— Wear personal protective equipment (PPE).
— Make sure that the workplace (mobile test station) is safe.

WARNING



Dangerous Touch Voltage!

Exposed parts may conduct dangerous touch voltage during testing.

— Do not touch the parts.
— Use a special cover in order to avoid touch contact.

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

WARNING



Mechanical Hazard due to DUT Startup

Unintentional startup of a DUT or associated functions (such as rotating parts) can lead to serious injuries.

— Do not perform function testing until the DUT has passed the safety test.

12.3 Measurement of Insulation Resistance and Equivalent Leakage Current (alternative measuring methods for leakage current)

DANGER



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 tip are touched, an electric shock may occur (despite the current being limited to I< 3 mA for the test).

— Do not touch terminals L or N at the test socket or the test probe.

12.4 UHV High-Voltage Testing, DC

This function is available in the ST PRIME version .... only.

DANGER



High voltage! Life endangering!

Testing is conducted with up to 6000 V. Terminals L or N at the test socket or the tip of the HV test pistol, along with all contacted parts (such as the DUT), carry this voltage.

Despite the current being limited to I < 3 mA, there is a risk of electric shock; due to capacitances in the DUT, for example – which lie outside the range of influence of the test instrument – the current may be even higher!

— During testing, do not touch the L or N terminals at the test socket, the test tip of test probe P1, the test tip of the HV test pistol, parts of the DUT or the conductive surface.
— Even after the test, make sure that all parts mentioned are discharged before touching the DUT.

DANGER



High voltage! Life endangering!

Residual voltages may still be present after releasing the button of the HV test pistol or after interrupting an ongoing measurement.

— Do not touch the test probe contacts or connected parts (such as the DUT).
— When using the probe or the test pistol, maintain the electrical connection to the DUT to enable the voltage to be dissipated.
— Always wait until discharging has been completed. The discharge time varies and depends on the capacity of the DUT.

13 Single Measurements

13.1 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 **Setting Parameters** softkey.
- The measurement type parameter displayed in each case in the measuring view footer can be changed directly using the **Set Measurement Type** key without having to exit the measuring view.
- The display and selection of polarity for line voltage at the test socket can be changed directly using the **Polarity normal** or **Polarity reversed** key without having to exit the measuring view.
- No limit values can be specified for single measurements, and thus there is no evaluation.
- Checking is performed before each measurement in order to assure a trouble-free procedure 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 DUT with the desired polarity by making a preselection in the parameter settings.

Progress Bar

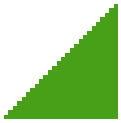
The progress bar shows the measurement status:

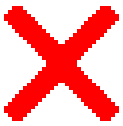
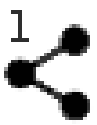
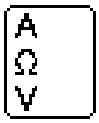
- Measurement standstill: Static lines
- Measurement in progress: Space between the lines is gradually filled in, pulsating



Fig. 8: Message status - progress bar

13.2 Icons for User Guidance – Measurements

Icon	Designation	Meaning
	**Set Parameters**	Set Parameters
	**START/STOP**	Start/stop measurement
	**OK**	Accept changed parameters, acknowledge memory location
	**Resume test**	Acknowledges messages during tests/measurements or resumes the test sequence

Icon	Designation	Meaning
	**Abort**	Abort measurement
	**Set measurement type**	Direct selection key for selecting the measurement type
	**Polarity normal**	Currently selected polarity: “normal” (green field) Pressing the key switches to “reversed” polarity
	**Polarity reversed**	Currently selected polarity: “reversed” (green field) Pressing the key switches to “normal” polarity
I_P	**Set test current**	Direct selection key for selecting test current for protective conductor measurement
U+ **U–**	**Change voltage value**	Direct selection key for gradually changing the voltage
	**Start evaluation**	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.
	**Save**	Valid measured values have been obtained for a measurement. This measurement can be saved.
	**Save as**	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)
	**Push-Print**	Send measurement data to the PC, e.g., for saving to IZYTRONIQ report generating software (push-print function) (see online help for IZYTRONIQ)
	**Display measured values**	Display measured values from performed measurements
	**Show details**	Show details from the measurement results list
	**Hide details**	Hide details from the measurement results list

Icon	Designation	Meaning
	**OFFSET**	Offset for RPE active
	**SET OFFSET**	Copy currently measured R_{PE} measured value as offset value
	**CLEAR OFFSET**	Reset offset to 0 Ω

Table 24: Icons for user guidance – measurements

13.3 Displaying the Last Measured Values

1. Press the **START/STOP** function key.
   ↳ The measurement is started.
   ↳ The Start evaluation icon appears and indicates how many measurements have already been performed.
2. Press the **START/STOP** function key to end the measurement. The measurement does not need to be ended if a fixed measurement time is specified.
   ↳ The **Save as** icon appears and indicates that one valid measured value has been recorded, which can now be saved.
3. Press the **Save as** key.
   ↳ "No test object selected!" appears.
4. Press the **Display measured values** key.
   ↳ The last measured values are displayed.
5. Press the **Up** or **Down** keys to select the desired measurement.
6. Press the **Show details** or **Hide details** keys to show or hide the associated measurement parameters.
7. Press **OK** to exit the measured values view.

You can then save the measured values or return to the initial view using **ESC**.

13.4 Saving Single Measurements and Measurement Series

The **Save as** key can be used to record the measured value. Repeatedly pressing the **Save as** key allows several measured values, in other words measurement series, to be generated. The **Save as** 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.

13.4.1 Conducting a Measurement Procedure with Preselection of the Test Object

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

1. Press the **MEM** key.
   ↳ The database view is activated.
2. Press the **Up** or **Down** keys to select the test object or its ID for the following measurements.
3. Press **ESC** or **START/STOP** to return to the measurement view.
4. Press **START/STOP**.
   ↳ The measurement is started. The **Start evaluation** icon appears and the zero indicates that no measurements have yet been recorded or saved to buffer memory.
5. Press **Start evaluation**.
   ↳ Each time the **Start evaluation** key is pressed, the respective 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. Press the **START/STOP** function key to end the measurement. The measurement does not need to be ended if a fixed measurement time is specified.
   ↳ The **Save as** icon appears and shows the number of measured values saved to the buffer memory.
7. Press **Save as**.
   ↳ The display switches to the test object in the database view.
8. Press **Save as** again.
   ↳ Feedback confirms that the data has been saved successfully. The display switches to the measurement view.

13.4.2 Conducting a Measurement Procedure with Subsequent Entry of the Test Object

1. Press **START/STOP**.
   ↳ The measurement is started. The **Start evaluation** icon appears and indicates how many measurements have already been performed.
2. Press the **START/STOP** function key to end the measurement. The measurement does not need to be ended if a fixed measurement time is specified.
   ↳ The **Save as** icon appears and indicates through the number 1 that one valid measured value has been recorded, which can now be saved.
3. Press **Save as**.
   ↳ A message appears stating that no test object was selected in the database.
4. Press the **ID** key.
5. Enter the test object ID number. Alternatively, you can select the test object ID using the barcode scanner.
   ↳ The cursor jumps to the location of the test object with the selected test object ID number.
6. Press **OK** to acknowledge the position.
7. Press **Save as**.
   ↳ Feedback confirms that the data has been saved successfully. The display switches to the measurement view.

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

If you have not yet created a test structure in the test instrument, the test object can be initially created. This also applies if you have already entered a test object ID number but it is not found (because it has not yet been saved to the database, for example).

1. Press **START/STOP**.
   ↳ The measurement is started. The **Start evaluation** icon appears and indicates how many measurements have already been performed.
2. Press the **START/STOP** function key to end the measurement. The measurement does not need to be ended if a fixed measurement time is specified.
   ↳ The **Save as** icon appears and indicates through the number that one or more valid measured values has/have been recorded, which can now be saved.
3. Press **Save as**.
   ↳ A message appears stating that no test object was selected in the database.
4. Optional: To call up details of the measured values, press **Display measured values**. To call up details of the measurements, press **Display details**. Press **OK** to return to the save menu.
5. Optional: To add a comment to the measurement, press **Edit**. Press **OK** to return to the save menu.
6. Press the **ID** key.
7. Enter the test object ID number.
   ↳ If the ID has not yet been entered in the database, a prompt appears asking you if you want to enter a new test object.
8. Press the **OK** key.

▶ **Entering a test object**

✓ The **QEDIT** function is enabled.

1. Select either device or ME equipment.
2. Fill out the fields for the DUT object.
3. Press the **OK** key.
   ↳ An overview of the database appears along with the newly entered test object.
4. Press **Save**.
   ↳ Feedback confirms that the data has been saved successfully. The display switches to the measurement view.

NOTE

You can abort the storage process by pressing the **ESC** key. The display is returned to the memory menu. You can delete all measured values by pressing the **ESC** key.

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

You can transfer 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 expansion SECUTEST DB COMFORT (Z853S or feature KD01) and, if applicable, feature M01 (Bluetooth®) are required to this end.

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

14 Test Sequences (Automatic Test Procedures)

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 is 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 instrument
  - Cannot be changed (test parameters are configurable)

NOTE

The integrated test sequences do not include all of the tests stipulated by the product standard which are required for type testing! They are 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 the associated IZYTRONIQ software and transferred to the test instrument.
  - (This function is available depending on test instrument model or features.)

NOTE

An insulation test can also be added to your instrument sequence as a control type test step in IZYTRONIQ. This type of step determines whether or not a DUT which is (directly) connected to the test socket is insulated. The DUT must be set up in an insulated manner in order to correctly determine protective conductor or device leakage current with the direct measurement type.
The test instrument automatically performs this type of test at the beginning of the sequence if test steps of this sort (protective conductor or device leakage current with the “Direct” measurement type) are included in the user-defined sequence – in such cases, it is not necessary to add this test step to the sequence manually!

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.

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 ⇨ **"the section “Configuring Test Standards/Integrated Test Sequences”"** 🗋 **44** again. Note that designations cannot be changed retroactively. Standard designations in tests that have already been saved cannot be changed.

▶ **Loading demo test sequences into the test instrument**

Free examples are available in our myGMC portal to illustrate the wide-ranging applications of user-defined test sequences. To use these, load them into your test instrument.

1. Go to the Gossen Metrawatt GmbH website: **https://www.gossenmetrawatt.de/en/service-support/mygmc/**
2. Create a myGMC account and register your test instrument (both free of charge).
3. Download the test sequence(s).
4. Save the test sequences onto a USB flash drive.
5. Connect the USB flash drive to your test instrument.
6. On the test instrument, select the **SETUP** rotary switch position.
7. Select the menu entry **Own sequences > Load from file**.
   ↳ The test sequences are transferred to your test instrument and are available there.

▶ **Preparing 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).
2. Configure the test sequences (rotary switch position **A1** through **A9**) as desired.
3. Familiarize yourself with the menu and the user interface.
4. Set the classification and sequence parameters which apply only to the respectively selected rotary switch position.

Depending on the test instrument model and its features, you can also create your own user-defined test sequences using the IZYTRONIQ software and transfer them to the test instrument.

▶ **Performing a Test Sequence**

1. Connect the DUT.
2. Select the test object from the database.
   ↳ The test instrument initializes connection type recognition.
3. Start the test sequence.
   ↳ The individual test steps are executed.
   ↳ The test instrument automatically evaluates the test steps.
4. Perform the manual assessment of the test steps.
   ↳ The test sequence is ended.
5. Optional: Display the test steps and results.
6. Optional: Save the results.

A complete description is included in the full operating instructions.

15 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:

- Printout with a printer directly on the test instrument
- Digital output (HTML) to a USB flash drive connected to the test instrument
- Transfer of the saved measurement data to the IZYTRONIQ software on the PC and subsequent printout via PC/ printer

A complete description is included in the full operating instructions.

16 Transferring and Saving Test Structures and Measurement Data (Test Instrument Database)

Test structures created in the test instrument and measurement data stored there can be transferred.

Data is transferred 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, 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[1]

- Import[1]

  Transfer a test structure from the PC (IZYTRONIQ software) to the test instrument.

  – Via USB connection
  – Via USB flash drive

- Backup and restore

  backup or restore data via USB flash drive

NOTE

Export and import are possible via Bluetooth® when using the virtual COM interface. Information is available on request.

Prerequisites: Feature M01 (Bluetooth®), SECUTEST DB+ (Z853R or feature KB01) for import.

Bluetooth® transfer with IZYTRONIQ is NOT possible.

A complete description is included in the full operating instructions.

[1] Only with SECUTEST DB+ database expansion (Z853R or feature KB01)

17 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:	08:00 a.m. – 4:00 p.m.
	Friday:	08:00 a.m. – 2:00 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

You can also request training courses and seminars by e-mail and online:

training@gossenmetrawatt.com

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

Please contact GMC-I Service GmbH for repairs, replacement parts and calibration [1]:

+49 911 817718-0	Beuthener Str. 41
service@gossenmetrawatt.com	90471 Nürnberg
	Germany

https://www.gmci-service.com/en/

[1] DAkkS calibration laboratory per DIN EN ISO/IEC 17025.
Accredited by the Deutsche Akkreditierungsstelle GmbH under reference number D-K-15080-01-01.

18 Certifications

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

18.1 CE Declaration

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 elektrische Sicherheit (Gerätetester)
Product name:	Safety Tester (Device Tester)
Typ / Type:	SECUTEST ST | BASE (10) | PRO | PRIME , SECULIFE ST | BASE (25) | PRO | PRIME
Bestell-Nr / Order No:	M7050, M707A/B/C, M708B/C/E/D, M694C/D/H/I/U/K
Zubehör / Accessories:	Z219C, Z723A, Z745D/H/N/O/R/S/G/W, Z750A/B, Z751A/E , Z721E , Z747A

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	Funkanlagenrichtlinie	Radio Equipment Directive (RED)

EN/Norm/Standard:

EN 301 489-1 V2.2.3 : 2019 , EN 301 489-17 V3.2.4 : 2020 , EN 300 328 V2.2.2 : 2019

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 + A1 : 2019 , EN IEC 61010-2-030 : 2021 + A11 : 2021, EN 61010-031 : 2015 ,

EN IEC 61010-2-032 : 2021 + A11 : 2021

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 IEC 61326-1 : 2021

2011/65/EU	RoHS - Richtlinie	RoHS Directive
(EU) 2015/863	Deligierte Richtlinie	Deligate Directive

EN/Norm/Standard:

EN IEC 63000 : 2018

Nürnberg, 21.08.2024
Ort, Datum / Place, Date:

Joachim Czabanski, Geschäftsführer / 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:
24-03-M7050-CE-Entwurf	15.01.2021	Eckl	Weiß

19 Disposal and Environmental Protection

Proper disposal makes an important contribution to the protection of our environment and the conservation of natural resources.

ATTENTION

Environmental damage

Improper disposal results in environmental damage.

— Follow the instructions concerning return and disposal included in this section.

19.1 Disposing of Waste Equipment and (Rechargeable) Batteries

Waste equipment and (rechargeable) batteries contain valuable raw materials that can be recycled, as well as hazardous substances that can cause serious harm to human health and the environment. These must be recycled and disposed of correctly.



The crossed-out wheeled bin symbol refers to the legal obligation of the owner or end user not to dispose of waste equipment and (rechargeable) batteries with unsorted municipal waste (“household waste”). The (rechargeable) batteries must be removed from the waste equipment (where possible) without destroying them and the waste equipment and the (rechargeable) batteries must be disposed of separately. The type and chemical composition of the (rechargeable) battery are indicated on the battery label. If the chemical symbols “Pb” for lead, “Cd” for cadmium, or “Hg” for mercury are included, the (rechargeable) battery exceeds the limit value for the respective metal.

You are obligated to comply with respective local requirements and implement them correctly on site. Further information can be obtained from the responsible authorities or your local distributor, for example.

Please also note that the owner or end user is responsible for deleting before disposal any personal data and, if applicable, other sensitive data from the waste equipment intended for disposal.

19.2 Disposing of Packaging Materials

Packaging and its components must be disposed of correctly, separate from unsorted municipal waste (“household waste”). You are obligated to comply with respective local requirements and implement them correctly on site. Further information can be obtained from the responsible authorities or your local distributor, for example.

We recommend retaining the packaging in case you require servicing or calibration in the future.

WARNING



Danger of asphyxiation from foils and other packaging materials

Children and other vulnerable persons may suffocate if they wrap themselves in packaging materials, their components, or foils or if they pull these over their heads or swallow them.

— Keep packaging materials, their components, and foils out of the reach of babies, children, and other vulnerable persons.

19.3 Regulations for the Federal Republic of Germany

The following comments refer specifically to the legal situation in the Federal Republic of Germany.

Waste Equipment, Electrical or Electronic Accessories, and (Rechargeable) Batteries

Waste equipment, electrical or electronic accessories, and (rechargeable) batteries used in Germany can be returned free of charge to Gossen Metrawatt GmbH or the service provider responsible for their disposal in compliance with applicable regulations, in particular laws concerning packaging and hazardous goods. (Rechargeable) batteries must be returned in the discharged state or with appropriate precautions against short circuiting.
For more information on returns, see our website.

Packaging Materials

Packaging that is not subject to mandatory system participation is taken back by the contracted service provider.
For more information on returns, see our website.

Notes

Gossen Metrawatt GmbH
Südwestpark 15
90449 Nürnberg
Germany

+49 911 8602-0

+49 911 8602-669

info@gossenmetrawatt.com

www.gossenmetrawatt.com

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