

SECULIFE | ST and SECULIFE | ST HV

Test Instrument for DIN EN 60601/60335/60950/61010, DIN VDE 0700/0701-0702 and IEC 62353 (VDE 0751-1)

3-349-450-03
15/3.16

The SECULIFE ST/ST HV test instruments can be configured for international utilization. The test socket, user interface language and the desired test regulation can all be configured to this end.

Universal test instrument for testing the electrical safety of:

- after repair and for periodic testing of electrical devices in accordance with DIN VDE 0701-0702:2008
- after repair and for periodic testing as well as for technical safety checks of electrical medical devices per IEC 62353 (VDE 0751-1) and/or DIN EN 60601 on the basis of the MPG¹⁾
- in the production of:
 - electrical measuring, control and laboratory devices per DIN EN 61010
 - data processing systems per DIN EN 60950
 - electrical medical devices per DIN EN 60601
 - household appliances per DIN EN 60335

DAkKS Calibration Certificate included

Power shutdown as soon as the leakage current exceeds approx. 15mA provides a maximum of safety for the user

High-voltage test for:

DIN EN 60950, DIN EN 61010, DIN EN 60335 and DIN EN 60601



DAkKS Calibration Certificate as Standard Feature



Features

The device under test can be connected:

- to the test socket with or without adapter for various types of mains connection
- to the connector jacks if the device under test does not have a mains plug
- with an adapter for extension cables with or without multiple outlet sockets
- connection for BE²⁾ and FE³⁾
- 10 application parts can be connected individually or in groups

Mains Plug Polarity Reversal

Mains plug polarity need not be reversed manually. Polarity reversal is accomplished internally during the test sequence (except if 3-phase current adapters are used).

Automatic Recognition

of mains connection errors and protection class (I or II). Measurement is automatically disabled in the event of danger.

Display

Menus, setting options, measurement results, instructions and error messages, as well as online help and schematic diagrams for test setups, can all be displayed at the backlit, dot matrix LCD.

¹⁾ MPG = German medical product law
²⁾ BE = Operational earth
³⁾ FE = Functional earth

Menu Driven Test Sequences

Fully automatic or manual

Selectable Test Current for Protective Conductor Testing (4-pole Measurement)

With 200 mA, 10 A or 25 A test current

Insulation Test

By means of insulation resistance or equivalent leakage current measurement or high-voltage test

Leakage Current Test

With measurement of earth, housing or patient leakage current, patient auxiliary current, protective conductor current, contact current, verification of absence of voltage by means of current measurement or device leakage current

Basic Instrument and Expansion Features

The test instrument can be configured with specific features required for the given application (see table on page 6).

Data Interface for PC, Printer and Barcode

Expandable

The SECUTEST SI+ option expands the basic instrument into a unique data logger with memory and alphanumeric keypad for data entry. All required reports can be generated, and data can be analyzed and managed with the help of user-friendly WINDOWS software.

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Applications

Testing for the Electrical Safety of Electrical Equipment in Accordance with BGV A3

The test instrument can be utilized for quick and safe testing of repaired or modified electrical devices and as well as for periodic testing in accordance with DIN VDE 0701-0702:2008.

The following are measured in accordance with the standards:

- Protective conductor resistance
- Insulation resistance
- Protective conductor current for SC1 devices
- Contact current for SC2 devices
- Absence of voltage at exposed conductive parts (= contact current)

Measuring methods for leakage current measurements:

- Direct measurement
- Equivalent leakage current
- Residual current

Testing for the Electrical Safety of Electrical Medical Devices in Accordance with the German Medical Product Law (MPG) and the associated Operator's Regulations

The test instrument with feature KA01 is used for quick and safe testing and measurement of repaired or modified electrical medical devices or their components (e.g. patient ports) in accordance with IEC 62353/DIN EN 62353 (VDE 0751) and EN 60601.

Observance of technical safety requirements allows the user of the test instrument to operate electrical medical devices in a hazard-free fashion. The safety of the patient is also assured through the use of tested electrical medical devices.

The following are measured in accordance with IEC 62353 (VDE 0751-1) regulations:

- Protective conductor resistance
- Insulation resistance
- Equivalent device leakage current
- Equivalent patient leakage current
- Device leakage current
- Patient leakage current (AC/DC portions are measured separately)

Measuring methods for leakage current measurements:

- Direct measurement
- Equivalent leakage current
- Residual current

A software upgrade (optional) allows for measurement in accordance with EN 60601 regulations, see features on page 6 (with the following single-fault conditions: voltage at application part, interrupted neutral and interrupted protective conductor, with automatic polarity reversal L-N)

- Protective conductor resistance
- Insulation resistance
 - L and N connected to protective conductor
 - Application parts connected to protective conductor
- Earth leakage current, housing leakage current, patient leakage current, patient auxiliary current

The following additional test conditions can be selected:

- Interrupted operational earth \perp and equipotential bonding ∇
- Housing to ground, application parts to ground

Function Test with Power Analysis

(also suitable for high power devices under test up to 16 A)

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

The following are measured or automatically calculated during the function test:

- Line voltage
- Residual current
- Power consumption
- Active and apparent power
- Power factor
- Electrical energy
- On-time

Multimeter Functions

Extensive multimeter functions including temperature measurement expand measuring options for the user in a sensible fashion. The following individual measurements can be performed:

- Direct and alternating voltage (momentary and min/max values)
- Resistance
- Voltage against PE, e.g. phase detection
- Current and protective conductor resistance with clip-on meter (accessory)
- Temperature with Pt100 or Pt1000 (accessory)

High-Voltage Test with Direct Voltage (SECULIFE ST HV)

The mains plug of the device under test (safety class I and II devices) is connected to the test socket at the test instrument.

The test instrument monitors the mains connection. Incorrect or dangerous mains connection is indicated, and measurement is disabled in the event of danger.

Use of the test instrument for high-voltage testing is trouble-free because DIN VDE 0104 does not apply. The high-voltage test is performed with direct voltage. In order to comply with requirements for alternating voltage, testing is performed with 1.5-fold direct voltage. This multiplying factor is applied automatically during testing.

This DC high-voltage test complies with EN 60601 3rd edition/EN 50106 (VDE 0700 part 500), as well as with other standards.

Report Functions

All values required for electrical device approval reports or device log books (e.g. for ZVEH) can be measured with the test instrument.

All measured data can be documented and archived with the measurement and test report, which can be saved to memory and printed out from a PC.

The measurement and test report substantiates regular maintenance and testing for users of electrical devices.

The SECUTEST SI+ module (accessory equipment), a memory with integrated interface and keypad which can be mounted inside the lid of the test instrument, expands the applications range of the test instrument.

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Test Instrument for DIN EN 60601/60335/60950/61010, DIN VDE 0700/0701-0702 and IEC 62353 (VDE 0751-1)

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

| | |
|---|--|
| IEC/EN 61 010-1:2001 VDE 0411-1:2002 | Safety requirements for electrical measurement, control and laboratory devices – General requirements |
| DIN VDE 0404 Part 1: 2002 | Test and measuring equipment for testing the safety of electrical devices – General requirements |
| DIN VDE 0404 Part 2: 2002 | – Testing equipment for tests after repair, modification or in the case of periodical tests |
| DIN VDE 0404 Part 3: 2005 | – Equipment for periodical tests and tests prior to commissioning medical electrical devices or systems |
| DIN EN 60 529/ VDE 0470 Part 1 | Test instruments and test procedures, protection provided by enclosures (IP code) |
| DIN EN 61 326-1 VDE 0843-20-1 | Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements |

Standards for the Use of the Test Instruments

| Devices under test in accordance with the following regulations | Testing after Repairs / Periodic Testing | | Routine Testing | | | |
|---|--|---|-----------------|--------------|-----------------------|--------------------------|
| | DIN VDE 0701-0702:2008 | IEC 62353:2007 DIN EN 62353:2008 (VDE 0751-1) | DIN EN 60950 | DIN EN 61010 | DIN EN 60335/EN 50106 | IEC 60601/DIN EN 60601 * |
| Electrical devices | • | | | • | | |
| Appliances and electric equipment | • | | | | • | |
| Mains operated electronic devices | • | | | | | |
| Hand-held electric tools | • | | | | | |
| Extension cables | • | | | | | |
| Data processing devices | • | | • | | | |
| Electrical medical devices, application parts | | • | | | | • |

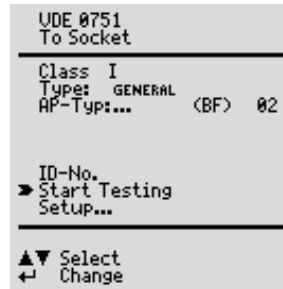
* only test instruments with Feature KA01

Table: Individual Measurements – Standards

| Individual Measurements per Regulation | Test Current [A] | DIN VDE 0701-0702 | DIN VDE 0701 Part 1 | DIN VDE 0701 Part 2/40 | DIN VDE 0701 attachment E | DIN EN 60950 | DIN EN 61010 | DIN EN 60335 | IEC 62353 (VDE 0751-1) | IEC 601/EN 60 601 2nd | IEC 601/EN 60 601 3rd |
|---|------------------|---------------------------------|---------------------|------------------------|---------------------------|--------------|--------------|--------------|------------------------|-----------------------|-----------------------|
| | | Protective Conductor Resistance | 0.2 10 25 | • | • | • | | | | | • |
| Insulation Resistance | | • | • | | | | | | | | |
| Equivalent Leakage Current | | • | • | • | | | | | | | |
| High-Voltage Test | | | | | | • | • | • | | AC | AC |
| Equivalent (Device) Leakage Current | | | | | | | | • | • | | |
| Equivalent Patient Leakage Current | | | | | | | | | • | | |
| Residual Current | | • | • | | | | | | • | | |
| Contact Current | | • | • | | | | | | | | |
| Absence of Voltage (exposed conductive parts) | | • | | • | | | | | | | |
| Housing Leakage Current | | | | | | • | • | | | • | • |
| Earth Leakage Current | | | | | | | | | | • | • |
| Patient Leakage Current | | | | | | | | | • | • | • |
| Total Patient Leakage Current | | | | | | | | | | | • |
| Patient Auxiliary Current | | | | | | | | | | • | • |
| Device Leakage Current | | | | | | | | | • | | |
| Single Fault Conditions | N PE | | | | | | • | | | • | • |
| Mains at Application Part | | | | | | | | | | • | • |

Sample displays, menu-driven operation:

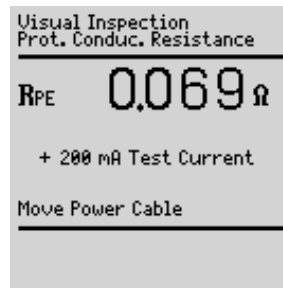
Test Sequence Setup



Visual Inspection



Protective Conductor Test

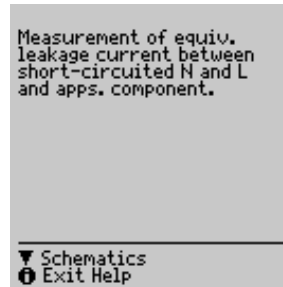


Leakage Current Measurement

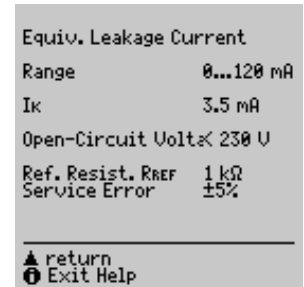


Sample displays, online help:

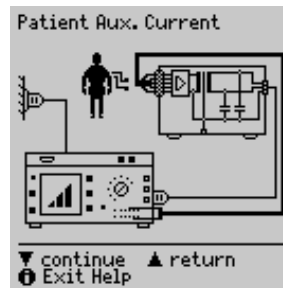
Online Help Texts



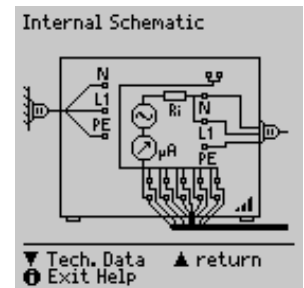
Technical Data



Schematic Diagrams

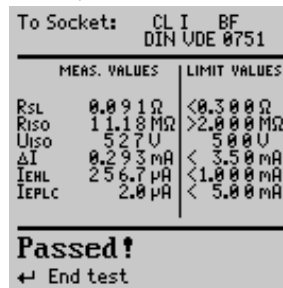


Internal Circuit Diagrams

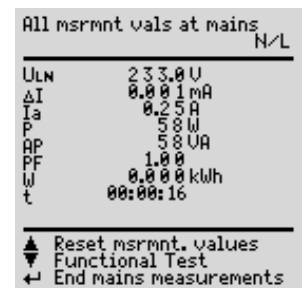


Sample reports with measurement results:

Test Sequence Results



Function Test Results



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Test Instrument for DIN EN 60601/60335/60950/61010, DIN VDE 0700/0701-0702 and IEC 62353 (VDE 0751-1)

Characteristic Values (Test durations for automatic sequence *: > 2 sec., except for device protection conductor resistance $R_{SL} > 7$ sec.)

| Measured Quantity | Measuring Range/ Nominal Range of Use | Resolu- tion | Nominal Voltage U_N | Open- Circuit Voltage U_0 | Nominal Current I_N | Short- Circuit Current I_k | Internal Resis- tance R_i | Refer- ence Resistance R_{REF} | Measuring Uncertainty ⁸⁾ | Intrinsic Uncertainty ⁸⁾ | Overload Capacity | |
|--|---|-------------------------|---------------------------------------|--------------------------------------|-----------------------------|---------------------------------------|--------------------------------------|---|---|---|-----------------------------|----------------|
| | | | | | | | | | | | Value | Time |
| Device Protective Conductor Resis- tance R_{PE} | 0.000 ... 2.100 Ω | 1 m Ω | — | 4.5 ... 9 V DC | — | > 200 mA DC | — | — | $\pm(5\% \text{ rdg.} + 10 \text{ digits})$ > 10 d | $\pm(2.5\% \text{ rdg.} + 5 \text{ digits})$ > 10 digits | 253 V | cont. |
| | 2.11 ... 31.00 Ω | 10 m Ω | | | | | | | | | no protection ⁵⁾ | |
| Insulation Resistance R_{ISO} | 0.050 ... 1.500 M Ω | 1 k Ω | 50 ... 500 V DC | 1.0 • U_N ... 1.5 • U_N | > 1 mA | < 10 mA | — | — | $\pm(5\% \text{ rdg.} + 10 \text{ digits})$ | $\pm(2.5\% \text{ rdg.} + 5 \text{ digits})$ > 10 digits | 253 V | cont. |
| | 1.01 ... 10.00 M Ω | 10 k Ω | | | | | | | | | | |
| | 10.1 ... 310.0 M Ω | 100 k Ω | | | | | | | | | | |
| Equivalent Leakage Current I_{EL} | 0.00 ... 21.00 mA | 10 μ A | — | 230 V ~ -20/ +10 % | — | < 3.5 mA | > 72 k Ω | 2 k Ω | $\pm(5\% \text{ rdg.} + 10 \text{ digits})$ | $\pm(2.5\% \text{ rdg.} + 5 \text{ digits})$ > 10 digits | 253 V | cont. |
| | 20.1 ... 120.0 mA | 100 μ A | | | | | | | | | | |
| Contact Current I_{probe} | 0 ... 3.500 mA | 1 μ A | — | — | — | — | 2 k Ω | — | $\pm(5\% \text{ rdg.} + 10 \text{ digits})$ | $\pm(2.5\% \text{ rdg.} + 5 \text{ digits})$ > 10 digits | 253 V | cont. |
| Residual Current I_{Δ} between L and N | 0.000 ... 3.100 mA ~ 3.00 ... 31.00 mA ~ | 1 μ A 10 μ A | — | — | — | — | — | — | $\pm(10\% \text{ rdg.} + 10 \text{ digits})$ > 10 digits | $\pm(5\% \text{ rdg.} + 5 \text{ digits})$ > 10 digits | 1) | 1) |
| Equivalent Device and/or Equivalent Patient Leakage Current I_{EDL} and/or I_{EPL} | 0.0 ... 310.0 μ A | 0.1 μ A | — | 230 V ~ -20/ +10 % | — | < 3.5 mA | > 72 k Ω | 1 k Ω $\pm 50 \Omega$ | $\pm(5\% \text{ rdg.} + 10 \text{ digits})$ | $\pm(2.5\% \text{ rdg.} + 5 \text{ digits})$ > 10 digits | 253 V | cont. 1) 3) |
| | 0.000 ... 2.100 mA | 1 μ A | | | | | | | | | | |
| | 2.101 ... 21.00 mA | 10 μ A | | | | | | | | | | |
| | 20.1 ... 120.0 mA | 100 μ A | | | | | | | | | | |
| Leakage Current I_L ²⁾ | 0.0 ... 310.0 μ A | 100 nA | approx. line voltage ⁶⁾ | — | — | — | 1 k Ω | — | $\pm(5\% \text{ rdg.} + 10 \text{ digits})$ | $\pm(2.5\% \text{ rdg.} + 5 \text{ digit})$ > 10 digit | 253 V | cont. 1) 3) |
| All Leakage ⁷⁾ Current I_L | 0.210 ... 3.600 mA 3.10 ... > 15.00 mA | 1 μ A 10 μ A | | — | — | — | — | — | $\pm(5\% \text{ rdg.} + 10 \text{ digits})$ | $\pm(2.5\% \text{ rdg.} + 5 \text{ digit})$ > 10 digit | 253 V | cont. 1) 3) |

| Function | Measured Quantity | Measuring Range / Nominal Range of Use | Resolu- tion | Open- Circuit Voltage U_0 | Short- Circuit Current I_k | Internal Resis- tance R_i | Measuring Uncertainty | Intrinsic Uncertainty | Overload Capacity Value | Overload Capacity Duration | | |
|----------------|---|--|-----------------|--|---------------------------------------|--------------------------------------|--------------------------|--|--|---|-------|-------|
| Functions Test | Nominal Voltage U_{L-N} | 103.5 V ... 126.5 V 207.0 ... 253.0 V ~ | 0.1 V | — | — | — | — | $\pm(2.5\% \text{ rdg.} + 5 \text{ digits})$ | 253 V | cont. | | |
| | Load Current I_V | 0 ... 16.00 A RMS | 10 mA | — | — | — | — | $\pm(2.5\% \text{ rdg.} + 5 \text{ digits})$ | 20 A | 10 min | | |
| | Active Power P | 0 ... 3700 W ⁹⁾ | 1 W | — | — | — | — | $\pm(5\% \text{ rdg.} + 10 \text{ digits})$ > 20 digits | 253 V | cont. | | |
| | Apparent Power S | 0 ... 4000 VA | 1 VA | Calculated Value $U_{L-N} \cdot I_V$ | | | | $\pm(5\% \text{ rdg.} + 10 \text{ digits})$ > 20 digits | 20 A | 10 min | | |
| | Power Factor PF, sinusoidal: $\cos \phi$ | 0.00 ... 1.00 | 0.01 | Calculated Value P / S, Display > 10 W | | | | $\pm(10\% \text{ rdg.} + 5 \text{ digits})$ | | | | |
| | Residual Current ΔI between L and N | 0.00 ... 31.00 mA ~ | 10 μ A | — | — | — | — | $\pm(10\% \text{ rdg.} + 10 \text{ d})$ > 10 digits | $\pm(5\% \text{ rdg.} + 5 \text{ digits})$ | 1) | 1) | |
| $U_{AC/DC}$ | Voltage | 0 ... 253.0 V =, ~ and \approx | 0.1 V | — | — | — | — | $\pm(5\% \text{ rdg.} + 10 \text{ d})$ | $\pm(2.5\% \text{ rdg.} + 5 \text{ digits})$ > 10 digits | 253 V | cont. | |
| U_{probe} | Probe Voltage | 0 ... 253.0 V =, ~ and \approx | 0.1 V | — | — | — | — | — | $\pm(2.5\% \text{ rdg.} + 5 \text{ digits})$ > 10 digits | 253 V | cont. | |
| R | Resistance | 0 ... 150.0 k Ω | 100 Ω | < 20 V - | 1.1 mA | — | — | — | $\pm(1\% \text{ rdg.} + 3 \text{ digits})$ | 253 V | cont. | |
| I_{clip} | Current via Clip-On Current- Voltage Converter WZ12C | 0.000 ... 10.00 A ~ | 1 mA | — | — | 1.5 M Ω | — | — | $\pm(3\% \text{ rdg.} + 10 \text{ digits})$ > 10 digits without clip | 253 V | cont. | |
| | | 0 ... 100 A ~ | 1 A | — | — | 1.5 M Ω | — | — | — | 253 V | cont. | |
| Temp | Temperature with Pt100 / Pt1000 Sensor | -200 ... -50 °C | 1 °C | < 20 V - | 1.1 mA | — | — | — | — | $\pm(2\% \text{ rdg.} + 1 \text{ } ^\circ\text{C})$ | 10 V | cont. |
| | | -50.1 ... +300.0 °C | 0.1 °C | | | | | | | $\pm(1\% \text{ rdg.} + 1 \text{ } ^\circ\text{C})$ | 10 V | cont. |
| | | +300 ... +850 °C | 1 °C | | | | | | | $\pm(2\% \text{ rdg.} + 1 \text{ } ^\circ\text{C})$ | 10 V | cont. |

* The test durations are not tested and calibrated, but are determined on the basis of the processor cycle times.

- As of 25 mA: shutdown by residual current measurement within 100 ms
- Except for contact current: only 0.000 to 3.100 mA
- Measuring circuit is highly resistive, indication at display
- Measurement with AC test current is not possible at jacks (1) to (3); feature G01: > 25 A: Short-circuit current is less than 25 A if the SK5 special cable is used.
- Test duration max. 40 s, protection against overheating: measurement cannot be restarted until a waiting period of 1 minute has elapsed.
- Calculated value: max. 253 V
- AC and DC are measured for patient leakage current and patient auxiliary current.
- The data are only valid for the values displayed at the test instrument. Data which are transmitted via the RS232 interface may deviate.
- Measured value P and calculated value S are compared, and the smaller value is displayed. Key: rdg. = reading, d = digits
 I_L = patient, housing and earth leakage current, as well as patient auxiliary current

High Voltage Test (feature F02 or SECULIFE ST HV)

Transducer

| | | |
|------------------------------------|-----------------------------------|--|
| Nominal Voltage, AC | U_N - adjustable in 10 V steps | 0.5 ... 0.99 kV |
| Open-Circuit Voltage, DC | U_0 in 100 V steps | 1 ... 4 kV $((U_N \cdot 1.5) \cdot 1.011) + 60 \text{ V}$ |
| Intrinsic Uncertainty, U_0 | U_0 | $\pm 1.5\%$ |
| Nominal Current | per DIN VDE 0104 | < 3.5 mA DC |
| Short-Circuit Current | discharge current from 6 x 2.7 nF | > 5 A at 5 kV |
| Resistance to Interference Voltage | | none |

Measuring




| Measuring Range | Display Range | Intrinsic Uncertainty, U_0 |
|------------------|-------------------------|---|
| 0 ... U_{omax} | 0.000 ... > 10.00 kV DC | $\pm 1.5\% \text{ rdg.} + 2 \text{ digits}$ |

Test duration for automatic sequence per IEC 60601: approx. 60 sec., adjustable per DIN EN 60950, DIN EN 61010 and DIN EN 60335: approx. 5 sec. to 60 sec.

Test Instrument for DIN EN 60601/60335/60950/61010, DIN VDE 0700/0701-0702 and IEC 62353 (VDE 0751-1)

Testing for Correct Mains Connection

The test instrument 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 | Text appears at LCD | Press  key $U > 40$ V | disabled |
| Protective conductor PE and phase conductor L reversed and/or neutral conductor N interrupted |  lamp lights up | Voltage at PE > 65 V | impossible (no supply power) |
| Contact voltage at protective conductor PE to neutral conductor N or phase conductor L | Text appears at LCD | $U > 25$ V | disabled, although disabling can be deactivated (e.g. IT network) |
| Mains voltage too low |  lamp lights up | $U_{L-N} < 90/180$ V | possible under certain circumstances |

Influencing Quantities and Influence Error

| Influencing Quantity/ Sphere of Influence | Designation per DIN VDE 0404 | Influence Error $\pm \dots$ % of Measured Value |
|--|---------------------------------|---|
| Position Change | E1 | — |
| Change in Test Setup Supply Power | E2 | 2.5 |
| Temperature Fluctuation | E3 | Specified influence error applies per 10 K change in temperature: 1 in case of PE measurement 0.5 of all other measuring ranges |
| 0 ... 21 °C and 25 ... 40 °C | | |
| Current at Device Under Test | E4 | 2.5 |
| Low-Frequency Magnetic Fields | E5 | 2.5 |
| Impedance at Device Under Test | E6 | 2.5 |
| Capacitance, Insulation Measurement | E7 | 2.5 |
| Waveshape of Measured Current | E8 | 2 for capacitive load (for equivalent leakage current) |
| 49 ... 51 Hz | | |
| 45 ... 100 Hz | | 1 (for contact current) 2.5 for all other measuring ranges |

Reference Ranges

| | |
|---------------------|---|
| Line Voltage | 115/230 V \pm 0.2 % |
| Line Frequency | 50/60 Hz \pm 0.1 % |
| Waveshape | sine (deviation between effective and rectified value < 0.5%) |
| Ambient Temperature | +23 °C \pm 2 K |
| Relative Humidity | 40 % ... 60 % |
| Load Impedance | linear |

Nominal Ranges of Use

| | |
|----------------|--|
| Line Voltage | 103.5 V ... 126.5 V or 207 V ... 253 V |
| Line Frequency | 50 Hz or 60 Hz |
| Line Voltage | |
| Waveshape | sine |
| Temperature | 0 °C ... + 50 °C |

Ambient Conditions

| | |
|---------------------|-----------------------------------|
| Storage Temperature | - 20 °C ... + 60 °C |
| Operating Temp. | - 10 °C ... + 50 °C |
| Accuracy Range | 0 °C ... + 50 °C |
| Relative Humidity | max. 75%, no condensation allowed |
| Elevation | max. 2000 m |

Electromagnetic Compatibility

Product standard DIN EN 61326-1

| Interference emission | | Class |
|-----------------------|----------------------------|---------------------|
| EN 55011 | | B |
| Interference immunity | Test Value | Evaluation Criteria |
| EN 61000-4-2 | Contact/Atmos. - 4 kV/8 kV | A |
| EN 61000-4-3 | 3 V/m or 1 V/m | A |
| EN 61000-4-4 | 1 kV | B |
| EN 61000-4-5 | 1 kV bzw. 2 kV | A |
| EN 61000-4-6 | 3 V/m | A |
| EN 61000-4-11 | 0.5/1/25 Periods | A |
| | 250 Periods | C |

Power Supply

| | |
|---|--|
| Line Voltage | 103.5 V ... 126.5 V or 207 V ... 253 V |
| Line Frequency | 50 Hz or 60 Hz |
| Power Consumption for 10 A test current | approx. 30 VA |
| for 25 A test current for function test | approx. 95 VA, test duration max. 40 s approx. 180 VA, test duration max. 40 s continuous max. 3600 VA, power is conducted through the instrument only, switching capacity \leq 16 A |

RS 232 Data Interface

| | |
|-----------|-------------------------------------|
| Type | RS 232C, serial, per DIN 19241 |
| Format | 9600, N, 8, 1 |
| Connector | 9-pin subminiature socket connector |

Electrical Safety

| | |
|--------------------|--|
| Safety Class | I per IEC 61010-1/EN 61010-1/ VDE 0411-1 |
| Nominal Voltage | 115/230 V |
| Test Voltage | 3.7 kV 50 Hz |
| Measuring Category | 250 V CAT II (is not valid for the jacks 1, 2 and 3) |
| Pollution degree | 2 |
| Safety Shutdown | for residual current at device under test > 25 mA, disconnecting time < 100 ms probe current > 10 mA, < 1 ms |

Mechanical Design

| | |
|------------|---|
| Display | multiple backlit dot matrix display, 128 x 128 pixels |
| Dimensions | test instruments without high-voltage module: LxWxH: 292 mm x 138 mm x 243 mm test instruments with high-voltage module: LxWxH: 292 mm x 138 mm x 300 mm |
| Weight | standard device: approx. 4.5 kg device with HV test: approx. 5.24 kg device with 25 A PE test: approx. 5.5 kg with 25 A PE and HV test: approx. 5.9 kg |
| Protection | housing: IP 40, connections: IP 20 per DIN VDE 0470 Part 1/EN 60529, Extract from table on the meaning of IP codes |

| IP XY (1 st digit X) | Protection against foreign object entry | IP XY (2 nd digit Y) | Protection against the penetration of water |
|------------------------------------|--|------------------------------------|--|
| 2 | ≥ 12.5 mm \varnothing | 0 | not protected |
| 4 | ≥ 1.0 mm \varnothing | 0 | not protected |

SECULIFE | ST and SECULIFE | ST HV

Test Instrument for DIN EN 60601/60335/60950/61010, DIN VDE 0700/0701-0702 and IEC 62353 (VDE 0751-1)

Standard equipment SECULIFE ST/ST HV

- | | |
|--|-------------------------------------|
| 1 test instrument with 10 + 2 connectors for application parts | 10 Clip-on alligator clip 2 mm |
| 1 probe cable with test probe | 1 Calibration Certificate per DAkkS |
| 1 plug-on alligator clip for test probes | 1 operating instructions |
| 3 plug-on quick-connect terminals | 1 carrying strap |
| 10 conductor patient connection cable 2 mm | |

Features and Options

List of possible options:

| Feature | | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | XX |
|---|----|---------|--------------------|------------------------------|-------|----|------------------|----|----|-------------------------|----|----|------------------------------|----|
| Mains Connection for Country of Use | B | D | D + service socket | UK ⁴⁾ | F/CZE | | DK ⁴⁾ | | | China/AUS ⁴⁾ | CH | | Adapter kit ^{2),4)} | |
| User Interface Language | C | D | UK | F | I | E | CZE | NL | | | | | | |
| High-Voltage Test HV DC | F | without | | max. 6,126 kV DC (≅ 4 kV AC) | | | | | | | | | | |
| AC Test Current 50/60 Hz for Protective Conductor Measurement | G | 10 A | 25 A | | | | | | | | | | | |
| Test Sequence for IEC 60601 | KA | without | with | | | | | | | | | | | |
| Data Memory for up to 125 Tests ⁵⁾ | KB | without | with | | | | | | | | | | | |
| Recognition of Probe on Protective Conductor | KD | without | with | | | | | | | | | | | |
| Direct Printing after each Measurement for Automatic Test Sequences ¹⁾ via RS232 | KE | without | with | | | | | | | | | | | |
| Calibration Certificate per DAkkS | P | D/GB/F | GB/PL | | | | | | | | | | | |

¹⁾ Each measured value is documented in this case, as opposed to the results of a test sequence for which the poorest value for each given test is displayed (via the PSI module, the SECUSTORE memory adapter or a PC)

²⁾ Adapter kit for international use (equipped with Feature B01)

⁴⁾ for mains connections B02, B05, B08 and/or if adapter (feature B11) is applied: HV-DC max. 1.5 kV DC

⁵⁾ without function test values and without comments on DUT

Enter the designation of the basic instrument to your order, i.e. M6930, and only those desired features which are other than 00!

Example of a complete type designation (= article number, = order designation) for a SECULIFEST:

SECULIFEST with Swiss plug and Swiss socket in French language, without high-voltage test, with AC test current 25 A, without test sequence for IEC 60601, without data memory, with recognition of probe on protective conductor, without direct print-out option, with Calibration Certificate per DAkkS in D/GB/F:

Features:

M6930 B09 C02 F00 G01 KA00 KB00 KD01 KE00 P00

For Standard types available from stock, see order information page 10.

Features which are additionally required can be retrofitted by GMC-I Service GmbH upon request.

SECULIFE | ST and SECULIFE | ST HV

Test Instrument for DIN EN 60601/60335/60950/61010, DIN VDE 0700/0701-0702 and IEC 62353 (VDE 0751-1)

Feature KA01: Tests per IEC 60 601/EN 60601

Measurements in accordance with this standard are made possible by uploading the appropriate software to the instrument with the help of a PC via the included interface cable. Special features:

- Patient ports can be assigned to groups
- Automatic sequence under all single-fault conditions

Feature KB01:

Data memory for up to 125 tests

Memory expansion for test results

If no (P)SI module is connected, up to **125 test results*** are stored to the test instrument. The test results can be viewed on the display and printed out, for example, via a terminal program. The test results are sorted in chronological order and are shown with the associated ID number. If no ID number has been allocated, date and time of storage are automatically saved instead. Alternatively, a consecutive number can be entered.

* without function test values and without comments on DUT

Storage of parameter settings

for test sequences per IEC/DIN EN 60335/60950/61 010

Test sequences can be configured on-site and performed in the appropriate selector switch position in accordance with the respective regulations. These **configurations for various test sequences** are stored to the test instrument and can be reactivated as required.

Feature KD01: (Recognition of Probe on Protective Conductor)

For freely configurable instruments the feature additionally includes a 5 m long probe cable with a test probe. The protective conductor measurement is expanded to include the function: "automatic recognition of measuring point change".

During protective conductor measurement, the instrument recognizes whether or not the probe is in contact with the protective conductor, and indicates these two possible conditions by means of acoustic signals. This function is helpful if several protective conductor connections need to be tested.

Feature KE01: Direct Print-Out

After completion of each test (individual test or at the end of a test sequence), test results are read out directly via the RS232 interface.

User interface languages which are not included as a standard feature can also be uploaded from our homepage (www.gossen-metrawatt.com). One language at a time can be uploaded to the test instrument.

Accessories

Memory and Input Module SECUTEST SI+

Values measured by the test instrument can be stored to this module, and can be furnished with comments with the help of the alphanumeric keypad. The LCD panel at the test instrument is used as a display for the module. Statistical analysis of the measurement results is also possible (percentage of tests which have been successfully passed). The SI module is screwed into the lid of the test instrument in a space-saving fashion.



Please request our SECUTEST SI+ data sheet for further information.

SECUSTORE – Memory Adapter for SECULIFE ST/ST HV

Test reports and individual test steps and/or test series can be directly written („printed“) from the **SECULIFE ST/ST HV** test instrument to the memory adapter. They can be subsequently read out and processed at the PC. This memory adapter is therefore an excellent tool for the archiving and transmission of test reports.

Depending upon the size of the reports, up to 1,000 test reports or test series can be stored.

Please note that the direct print-out option must be enabled in the **SECULIFE ST/ST HV** to allow for the storage of individual test steps and test series.

Comparison of Memory Adapters / Testers with Memory Option

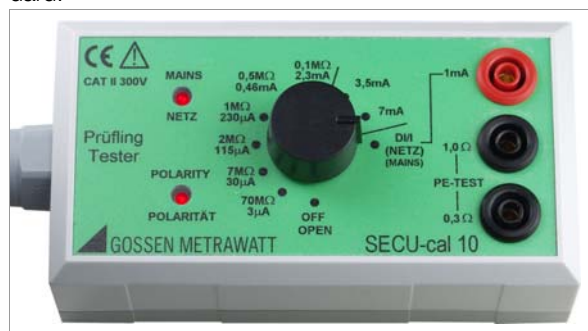
| Features | SECUSTORE (Z745U) | SECUTEST SI+ (M702G) | SECUTEST PSI (GTM5016000R0001) | SECUTEST SIII+ Feature KB01 | SECULIFE ST | SECUTEST S2N+ Option DBmed |
|--|-------------------|----------------------|--------------------------------|-----------------------------|-------------|----------------------------|
| Integrated printer for recording charts | — | — | • | — | — | — |
| Annotations via keyboard | — | • | • | — | — | — |
| Data memory (flash) | • | • | — | — | — | — |
| Data memory (battery buffered) | — | • | • | • | • | • |
| Protocol functions | • | • | • | — | — | — |
| Statistical evaluation of up to 8 instrument classes | — | • | • | — | — | — |
| Data transmission to PC via RS232 interface | • | • | • | • | • | • |
| Data transmission to PC via USB interface | — | • | — | — | — | — |
| Connection of a barcode scanner | • | • | • | • | • | • |
| Connection of an RFID scanner | • | • | • | • | • | • |
| Storage of function test values | • | • | • | — | — | — |
| Storage of comments on DUT | — | • | • | — | — | — |

SECULIFE | ST and SECULIFE | ST HV

Test Instrument for DIN EN 60601/60335/60950/61010, DIN VDE 0700/0701-0702 and IEC 62353 (VDE 0751-1)

SECU-cal 10 Calibration Adapter (Z715A)

The calibration adapter is used for testing the measuring uncertainty of test instruments in accordance with DIN VDE 0701-0702 and IEC 62353 (VDE 0751-1). As a rule, these instruments must be tested once each year, as set forth by accident prevention regulation BGV A3 (previously VBG 4) as well as for certification in accordance with the ISO 9000 quality standard.



All limit values for the required tests per DIN VDE, as well as protective conductor resistance, insulation resistance, equivalent leakage current, differential and/or contact as well as housing leakage current must be tested.

3-phase current adapter AT3-III-E (Z745S)



3-phase current adapter AT3-II-S (Z745T)



K2010 (Z504L) Accessory Case for SECULIFEST and Accessories (not suited for Feature F02 or SECULIFE ST HV)



Safety tester medicine set (M693E)



F2000 (Z700D) Accessory Pouch for SECULIFEST and Accessories (not suited for Feature F02 or SECULIFE ST HV)



SECULIFE | ST and SECULIFE | ST HV

Test Instrument for DIN EN 60601/60335/60950/61010, DIN VDE 0700/0701-0702 and IEC 62353 (VDE 0751-1)

Order Information

| Designation | Type | Article Number |
|---|-----------------------------------|------------------------------------|
| Test instrument with automatic test sequence, interface, German online instructions, earthing contact plug and socket, with 10 + 2 connectors for application parts, probe cable with test probe, plug-on alligator clip, 3 plug-on quick-connect terminals, DAKkS calibration certificate, operating instructions. See table on page 6 for features and expansions. | SECULIFEST | M6930 (all features: 00) |
| Standard types available from stock | | |
| Test instrument with test current ± 200 mA DC and 10 A AC Sequences for IEC 61 010, IEC 60335, IEC 60950 and IEC 60601, data memory for up to 125 tests | SECULIFEST | M693A |
| Same instrument as M693A, however, suited to international use with adapter set for mains connection in the respective user country and English user interface language | SECULIFEST | M693B |
| Same instrument as M693A, however, with test current ± 200 mA DC or 25 A AC, additionally with high-voltage test max. 6.126 kV DC (≥ 4 kV AC) | SECULIFE ST HV | M693C |
| Same instrument as M693C, however, suited to international use with adapter set (application of adapter: high-voltage test max. 1.5 kV DC) for mains connection in the respective user country and English user interface language | SECULIFE ST HV | M693D |
| Test instrument SECULIFEST (M6930 all features 00, standard equipment see above), pouch F2000, patient connection cable PA4, SI module SECUTEST SI+ and protocol software GMST | Safety tester medicine set | M693E |
| PC Analysis Software | | |
| For further information on software, please refer to our website http://www.gossenmetrawatt.com (→ Products → Electrical Testing → → Testing of Electric. Appliances → SECUTEST ...) or http://www.gossenmetrawatt.com (→ Products → Software → Software for Testers) | | |
| Accessories for Report Generation | | |
| SI module with RS232 and USB interface, with user languages D, GB, F, NL, I, E and CZ, batteries and operating instructions | SECUTEST SI+ ^{D)} | M702F |
| same as SECUTEST SI+, without USB interface, however, with additional integrated printer including 2 rolls of recording charts and 1 printer ribbon cartridge | SECUTEST PSI ^{D)} | GTM5016000R0001 |
| Memory adapter for „direct print-out“ and internal test reports | SECUSTORE ^{D)} | Z745U |
| Firmware upgrade for SECUTEST data base: data memory for up to 125 tests (without function test values and without comments on DUT) | DBmed | Z853H |
| For barcode scanner, printer and RFID scanner see separate datasheet ID systems | | |
| Accessory Probes, Sensors, Adapters and Cables | | |
| Test probe with cable (no coil cord), 2 m, suitable for high-voltage test | SK2 | Z745D |
| Test probe with cable (coil-cable), 2 meters long, suitable for high-voltage test | SK2W | Z745N |
| Probe cable 5 m | SK5 | Z745K |

| Designation | Type | Article Number |
|--|--------------------------|-----------------|
| Brush probe | Z745G | Z745G |
| 12 conductor patient connection cable, each conductor with 4 mm plug | PA4 | Z745L |
| Pt100 temperature sensor for surface and immersion measurements, $-40 \dots +600^\circ\text{C}$ | Z3409 | GTZ3409000R0001 |
| Pt100 oven sensor, $-50 \dots +550^\circ\text{C}$ | TF550 | GTZ3408000R0001 |
| Clip-on current sensor, can be set to 1 mA to 15 A or 1 A to 150 A, Frequency range: 45 ... 65 ... 500 Hz, 1 mV/mA and 1 mV/A | WZ12C ^{D)} | Z219C |
| Shunt for measuring range matching when using the instrument with feature G01 in combination with WZ12C transformer | Z864A | Z864A |
| Adapter for testing single-phase extension cables including earthing contact and inlet plug inserts, do not use for high-voltage tests | EL1 | Z723A |
| Plug insert for EL1 in Switzerland per SEV | PRO-CH | GTZ3225000R0001 |
| Plug insert for EL1 in Great Britain | PRO-GB | GTZ3226000R0001 |
| Plug insert for EL1 GB measurement | PRO-GB/ring | GTZ3226000R0002 |
| Plug insert for EL1 in Italy per IMQ | PRO-I | GTZ3227000R0001 |
| Plug insert for EL1 in Denmark | PRO-DK | GTZ3219000R0001 |
| Plug insert for EL1 in South Africa | PRO-RSA | Z501A |
| Plug insert for EL1 with 3 connector cables for any desired connection standards | PRO-UNI | GTZ3214000R0003 |
| Plug insert for EL1 with 10 m cable for PE measurements and the like | PRO-RLO | GTZ3214000R0002 |
| Plug insert Schuko or the like (replacement plug, included in EL1) | PRO-Schuko | GTZ3228000R0001 |
| test adapter with single-phase and three-phase plug connectors up to CEE 32A – for all tests on single-phase and three-phase electrical devices without mains voltage per DIN VDE – for tests on single-phase and three-phase extension cables per DIN VDE | VL2E | Z745W |
| 3 phase 16 A differential current adapter | AT16-DI | Z750A |
| 3 phase 32 A differential current adapter | AT32-DI | Z750B |
| Test adapter for tests on devices with CEE16 and CEE32 connections (load rating of max 20 A) | AT3-II-S ^{D)} | Z745T |
| same as AT3-II-S, however, with a load rating of 32 A | AT3-II S32 ^{D)} | Z745X |
| 3-phase current adapter 16A/32A (test case) for connection to the test instrument for tests per DIN VDE 0701-0702/IEC 62353 (VDE 0751) and IEC 601 | AT3-III-E ^{D)} | Z745S |
| Adapter for connecting devices under test: 3-pole 16 A, 5-pole 16 A and 32 A, 5 ea. 4 mm jack – for all tests in accordance with DIN VDE without line voltage at single and 3 phase electrical devices | CEE-Adapter | Z745A |
| Cable set for connecting test instruments to the mains without earthing contact socket and for connection of DUTs, do not use for high-voltage tests | KS13 | GTY3624065P01 |
| Cable set (1 pair of measuring cables) 1.2 m, with VDE-GS sign 1000 V/CAT III 1 A, 600 V/CAT IV 1 A, 1000 V/CAT II 16 A* | KS17-2 | GTY3620034P0002 |
| Further Accessories | | |
| Calibration adapter for test instruments per DIN VDE 0701-0702 and IEC 62353 (VDE 0751) (max. 200 mA), do not use for high-voltage tests and for protective conductor test current of 10 A or 25 A | SECU-cal 10 | Z715A |

SECULIFE | ST and SECULIFE | ST HV

Test Instrument for DIN EN 60601/60335/60950/61010, DIN VDE 0700/0701-0702 and IEC 62353 (VDE 0751-1)

| Designation | Type | Article Number |
|---|---------------------|----------------|
| Pouch for SECULIFEST | F2000 ^{D)} | Z700D |
| Pouch big for SECULIFE ST HV and accessories | F2020 | Z700F |
| Carrying case SECULIFEST | K2010 | Z504L |

^{D)} Data sheet available

* without safety cap applied

For additional information on accessories, please refer to:

- Measuring Instruments and Testers catalog
- our website www.gossenmetrawatt.com

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