Tietzsch

User Instructions

MultiSafe
DSP 4 / 4ST / 4F / 4FST

Voltage-Continuity Tester

English

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DSP 4_BA_03-2022

1 Test electrodes
2 Red LED ⚠ for hazardous voltage
≥ 50 V AC / 120 V DC
3 Green LED „Ω" for continuity 0 ... 1999 kΩ
4 red LEDs for rotating field left/right
5 Display (LCD)
6 Button (HOLD) (for DSP 4 / DSP 4ST):
- Function HOLD

Button (F) (for DSP 4F / DSP 4FST):
- Functionen HOLD
- rotating field for IT-powergrids
- Frequencymeasurement

7 Button (Ω/V) :change-over switch for resistance and voltage measurements and zero balancing of the kΩ range or menu (for DSP 4F / DSP 4FST)
8 Button (⏻) : on/off switch and function test
9 Handle
10 Connecting line

Symbols on the instrument

⚠ Attention! Observe user instructions!

Mark of approval from VDE test authority

CE EC conformity indication

TR_{on} Power-on time at highest nominal voltage

RT_{off} Recovery time after tests with highest nominal voltage

Device for live working

This devices may not be disposed with the domestic waste (WEEE 2012/19/EU).
Please contact service@tietzsch.de in regard to the return of old devices.

1. Application

The MultiSafe DSP 4 is a two-pole voltage tester with digital display acording to DIN EN 61243-3 (VDE 0682 part 401).
With it you can determine the existence and the strength of voltages within a range of **0 to 1000 V AC** (Display up to 1200 V) at frequencies up to 4 kHz, from **0 up to 1500 V DC** as well as phase, phase sequence and continuity within a range of **0 to 1999 kΩ**. With the precise measuring range for small voltages of 0.00 to 8.99 V e.g. batteries can be accurately tested.
Due to its high protection category IP 65 the MultiSafe can be used when it rains. It can safely be used up to 600 V in CAT IV environments.

1.1 Intended Use

This device is intended for use in applications as described in the operating instructions only. Thus, it is necessary to observe the notes on safety and the technical data in accordance to the ambient conditions.
Any other form of usage is not permitted and can lead to accidents or destruction of the unit.
Any misuse will result in the expiry of all guarantee and warranty claims.

1.2 Types of Device

Type and displayrange	voltage, phase- / phasesequencetest, continuity test	Adjustable electrode length 4 / 16 mm	Frequency-measurement, IT-phasesequence-test
DSP 4 1,0 - 1200 V AC 0,10 - 1500 V DC	■		
DSP 4ST 1,0 - 1200 V AC 0,10 - 1500 V DC	■	■	
DSP 4F 1,0 - 1200 V AC 0,10 - 1500 V DC	■		■
DSP 4FST 1,0 - 1200 V AC 0,10 - 1500 V DC	■	■	■

2. Safety

When the DSP 4 is used for its intended purpose, safety of the operator, as well as that of the instrument, is assured. **In order to maintain a perfect safety-related condition and to ensure safe use, it is imperative that you read these operating instructions completely and carefully before use and that you follow all of the instructions given.**

The device offers a high level of safety thanks to resistors with large protection and creepage distances.

For the voltage tester MultiSafe DSP 4, the VDE test center has granted approval to use the VDE GS mark.

2.1 Safety Instructions

Please observe the following safety precautions:

- The voltages indicated on the MultiSafe DSP 4 are rated voltages. The voltage tester may only be used in systems working within this rated voltage range.
- A flawless indication of display values is only guaranteed between -15°C ... +45°C.
- Hold the instrument by its handles only to avoid covering the display or touching the test electrodes.
- The maximum on-period of the MultiSafe DSP 4 is 30 seconds.
- Only qualified persons may carry out work with these device. The user needs to be familiar with the risks for measuring voltage and compliance with safety regulations and the proper use of the voltage detector.
- Work may only be carried out with appropriate personal protective equipment.
  Observe the minimum object distance to other plant components that are energized or earthed and use personal protective equipment as specified by national accident prevention regulations
  (in Germany: DGUV V3 or EN 50110-1).
- The function of the voltage tester must be checked briefly before and whenever possible after use.
  Carry out the function test.
  If the indication of one or several systems fails in the course of checking the instrument must not be used again.
- The red LED ⚠ (LV-indication) only serves as a indication for hazardous voltage and not as measurement value.
- This voltage detector may not permit to clearly indicate the absence of operating voltage in case of interference voltage because of its relatively high internal impedance.
  When the indication "voltage present" appears on a part that is expected to be disconnected of the installation, it is recommended confirming by an other means that there is no operating voltage on the part to be tested.
- With determination of phase conductors and phase sequence the indication of the display may be affected, e.g. when using insulating protective gears in unfavourable locations, for example on wooden ladders or insulating floor coverings as well as in an improperly earthed AC voltage system.
- Before use the battery compartment must be closed.
- The voltage tester may only be dismantled by authorised personnel.
- Before using the device check the housing and connecting line for visible damage. If damages are visible the voltage tester must no longer be used.
  In case of strong dirt contamination the tester must be cleaned before use.
- The tester has to be stored in a clean and dry environment.

3. Putting into Operation

3.1 Battery

The instrument is already supplied with batteries.
The battery status is indicated by a battery symbol on the display (see section 6.1).

3.2 Testing of Display and Function (self-test)

In accordance with EN 51010-1 voltage testers must be checked if they function correctly, briefly before and whenever possible after the use for determining absence of voltage.

Step 1 – Test of the display

The device must be switched off for the self test.
Press and hold button ⏻.
All display segments light up on the display, the back-light lights up white, additionally the Ω- and the rotating field LEDs lights up as well as a buzzer sound can be heard.
Release button ⏻ the value 0.00 ... 0.02 is indicated.

Step 2 – Function test

Press the button Ω/⏦.
„OL" and „MΩ" appear in the display.
Hold the two test electrodes together.
A value „000 ... 1999 kΩ" is shown on the display.
This checks the measurement technology and the line of the device.

Note: The battery-independent display function of the red LED ⚠ is not checked during the self-test. Due to the highly reliable design and the redundant digital display, separate testing before use is not necessary.

Alternatively, the function can be checked using a known voltage source > 50V AC and > 120 V DC.
Both systems must display:
- the red LED ⚠
- the voltage value on the display

Caution!
If a display fails even partially during the self-test, the voltage tester must no longer be used!

3.3 Set of the Electrode Length (DSP 4ST / 4FST)

The length of the test electrodes can be set to 16 mm or 4 mm:

Long: turn the sleeve right and push it back until it snaps in.

Short: pull the sleeve forward and secure it by turning it to the left.

Note:
The marking shown in the field CAT II / CAT IV is not important for voltage testers.

English

4. Measuring and Testing

4.1 General Information

- When a voltage of at least 24 V is applied the voltage tester switches on or switches to voltage testing automatically.
- For voltages below 24 V the device must be switched on by the button ⏻ or switched to voltage by the button Ω/V.
- The instrument switches off automatically approximately 30 seconds after the last measurement.
- It is possible that the voltage tester switches on automatically when only one test electrode is connected to voltage or to a statically charged object. This has no significance.

4.2 Testing Voltage

Attention!
The self-test (see section 3.2) has to be carried out successfully.

Securely contact the test electrodes with the testing points.

The following display appears:

No voltage

LED off

Display-backlight white or off

Display 0.00 V

Low voltage under 50 V AC / 120 V DC

LED off

Display-backlight white

Display of voltage

Hazardous voltage above 50 V AC/120 V DC

LED lights up

Display-backlight white

Display of voltage and symbol on the display

Note: Tests above the certificated nominal voltage range in accordance with IEC 61243-3 are indicated as follows:

The **maximum display range is 1200 V AC / 1500 V DC.** For tests above the certificated nominal voltage range the measurement value is indicated by flashing on the display.

Impermissible voltages above 1200 V AC / 1500 V DC
"OL" in the display and an acoustic alarm warn against voltages exceeding 1200 V AC / 1500 V DC. In this case, the test procedure must be stopped immediately!

4.3 Function "Hold" Measurement Values (HOLD)

You can "freeze" the maximum reading shown on the display.
During the voltage measurement, press the button (HOLD) (DSP 4 / 4ST) or the button (F) (DSP 4F / 4FST).
The measured value will be "hold" on the display for approx. 30 seconds or until a button is pressed again.
Note: The hold function of the (F) button (DSP 4F / 4FST) must be selected beforehand (see 5.).

4.4 Testing Phase and Phase Sequence

Attention!
These tests can only be performed at a nominal voltage of at least 165 V (50 Hz) against earth.
When performing these tests, the device must be hold closely at the handgear of the display part.
Note:
You may wear insulating gloves when performing the tests.
Note:
Tests can be affected by unfavourable locations, for example on wooden ladders or insulating floor coverings as well as in improperly earthed AC voltage systems.

4.4.1 Phase Test

Determination of the outer conductor occurs by applying the test electrode +L1 to the conductor.
If „POL" appears on the display the conductor is live.

4.4.2 Testing Phase Sequence

To determine the phase sequence between two phases in the phase network apply both test electrodes, clasp the handle of the display part and proceed as follows:

- Search for the phase conductors using one pole (see phase test).
- Apply both test electrodes to the two phase conductors (display 400 V).
- When phase L1 is applied to the test electrode of the display unit marked (+ L1) and L2 to the other test electrode of the handgrip (-L2) „➔ R" appears on the display if the rotation is clockwise.
  If „L➔" is indicated the direction of rotation is counterclockwise.
- The test result has to be checked by exchanging the two test electrodes. The opposite direction of rotation must be displayed.

If 230 V is displayed instead of 400 V the neutral conductor may have been contacted with one of the test electrodes.

Note: If both rotating field LEDs are flashing, the location for the rotating field test with ground reference is unsuitable. In this case, repeat the test with the rotary field test without earth reference, see 4.4.3 (only DSP 4F / 4FST).

4.4.3 Phase Sequence Test without Earth Potential

(Function only for DSP 4F and DSP 4FST)

Note: The rotating field function of the (F) button must be selected beforehand (see 5.).
The test range is 20 - 1200 V AC / 50 Hz

- Identify the outer conductor by using bipolar testing against N-conductor.
- Press button (F) to start testing.
  The display shows "rdy" and "– U –" which signalizes readiness for testing.
- Measure the first two phases, e.g. L1 to L2.
  Afterwards the display shows "chang" and "L2".
  Switch over to the next phase with **handgear L2** within 5 seconds.
  Attention!
  The display unit must remain at the initial phase.
- As soon as the handgear L2 was changed the display shows the **first** measured phase:
  „RiG" for a clockwise or "LEF" for a counterclock wise rotation.
  The rotation direction is additionally signalized by LEDs. A switch back to previous phase is not possible.
- The test result has to be checked by exchanging the two test electrodes and a new measurement has to be started.
  The opposite direction of rotation must be displayed.

Note:
If „change" and „Err" is displayed the switch over from phase to phase with the handgear was faulty.
The test has to be repeated.

4.5 Frequency Test

(Function only for DSP 4F and DSP 4FST)

Note: The frequency function of the (F) button must be selected beforehand (see 5.).

As long as you press the button (F), the frequency of the measured voltage is shown on the display in Hz or in kHz.

Note: With measurements of more than 500 V in frequency ranges > 4 kHz interference coupling may affect indication on the display.
Reduce this effect by holding the DSP only on the sides of the casing.

4.6. Testing Resistance and Continuity

When the instrument is switched on press button Ω/V.
"OL" and "MΩ" appear on the display.
Securely contact the measuring points with the test electrodes.

For resistance values 0 ... 10 kΩ
the measured value is indicated in "kΩ". The green LED "Ω" lights up at the same time and an acoustic signal is generated.

For resistance values 10 kΩ ... 1999 kΩ
the measured value is indicated in "kΩ" or „MΩ". The green LED "Ω" flashes and no acoustic signal is generated.

For resistance values > 2 MΩ
the display passes to overflow and "OL" is indicated. The LED "Ω" does not light up and no acoustic signal is generated.

Function measured values „hold" (HOLD)
As long as you keep button HOLD pressed (DSP 4 / 4ST) or button F (DSP 4F / 4FST), you can record the latest measured resistance value on the display.

Zero balancing
The zero point in the resistance measuring range can be recalibrated if necessary:
Hold the test electrodes together and press and hold button Ω/V until „CAL" is displayed (DSP 4 / 4ST) or further start
the calibration by pressing the button F (DSP 4F / 4FST).

The electrodes must be held together until the „CAL" display goes out.
When "000" is indicated and the LED "Ω" lights up continuously the calibration has been carried out successfully.
Note: During continuity tests the plus pole of the measuring voltage is located at the test electrode designated with +L1. If in this operating mode a voltage of 24 V or more is applied the device automatically switches to voltage testing.

5. Menu and Functions for Button „F"

The following settings can be made via the menu:

- Adjust zero point/ohm range „CAL"
- Function assignment of the button F
- Backlight on/off

To access the menu, hold down the button Ω/V until „MEN" appears in the upper display.
With the button Ω/V (MENU) you can switch to the next menu item.

Menu options:

„CAL"	=	zero adjustment for ohm range (see 4.6)
„HOL"	=	recording function (HOLD) with button F
„rot"	=	rotating field measurement (ROTATION) with button F
„FrE"	=	frequency measuring (FREQUENCY) with button F
„LIG"	=	light on / off

With the button F (SET) you can select the option.
Selected menu options are flashing in the menu.

English

6. Battery

6.1. Battery Indication

The latest battery status is symbolised by a three-stage battery indicator.

indication of battery status

battery empty -
you still can perform a few tests
(flashing symbol:
no more measurements allowed)

Attention!
When the empty battery symbol flashes no more measurements can be performed and the battery has to be replaced immediately.

6.2 Replacing the Battery

On the back of the device, loosen the screw on the battery compartment cover and remove the cover.
Drop the battery with CAT IV protective cover out of the battery compartment and change the battery.
The device works with a 9 V block battery
IEC 6 LR61 / 6LF22 / 6LP3146 (alkali-manganese).
Therefore, snap the battery contacts onto the new 9 V block battery and insert the battery together with the CAT IV protection cover into the battery compartment.
Put the battery compartment cover back on and screw it tight.

If the battery leaks, you must completely remove the battery electrolyte.

In case of a long storage period remove the battery from the device.

Note:
Included in the scope of delivery are two batteries.
These batteries are not to be charged.
Attempting to charge these may cause risk to personal safety and damage to the equipment. The batteries may not be opened. Batteries must not be disposed with the domestic waste. Please return batteries at a local retailer or municipal recycling depot. Return is free of charge and required by law.

7. Maintenance

7.1 General Information

The MultiSafe is absolutely maintenance-free. Nevertheless, observe the following information in order to maintain safe operation:
Always keep the voltage tester dry and clean.
The housing can be cleaned with a cloth dampened with isopropanol (alcohol) or soapy water.

7.2 Repeated Inspection

According to EN 61243-3 it is recommended to carry out repeated examinations.
It should not exceed the time-limit of 6 years. Depending on operation conditions and frequency, a earlier inspection may be recommendable. The serial number with the date of manufacturing (WWYYNN=**W**eek **Y**ear **N**umber) is imprinted on the backside of the device. Repeated inspections are offered by the manufacturer and indicated by the inspection plate.

8. Repair

Repair is only allowed by the manufacturer or explicitly authorised repair shops.
In case of damages on the device or failure of the function test according to section 3.2 or for detailed inspection/ calibration, please contact:
service@tietzsch.de or send the device and a description of failure back to the manufacturer (address see page 1).

9. Limited Warranty and Limitation of Liability

By continuous quality checks and production controls, most modern electronics and high quality materials we will guarantee that the tester will be free from material and manufacturing damage for **2 years**.
This warranty does not cover batteries, improper handling, not intended purpose, opening the housing, improper storage or damages from accidents.

No other warranties such as fitness for a particular purpose will be given. We accept no liability for any incidental or consequential damage or loss, regardless of the underlying cause.

10. CE-Declaration of Conformity

The CE-declaration of conformity and further documents can be downloaded from the product page of the DSP 4 on our homepage www.tietzsch.de .

11. Technical Data DSP 4 / DSP 4ST / DSP 4F / DSP 4FST:

Nominal voltage range:	certificated in accordance with IEC 61243-3 0 ... 1000 V AC / 1500 V DC
display range:	0,10 V ... 1500 V DC 1,00 V ... 1200 V AC
Measurement range/ limit deviation:	0,10 V ... 8,99 V ± 1,5 % + 3 D 9,0 V ... 99,9 V ± 1,5 % + 3 D 100 V ... 1200 V AC ± 1,5 % + 3 D 100 V ... 1500 V DC ± 1,5 % + 3 D < 1800 Hz (TRMS) > 1800 Hz (Sin eff) ± 15 % + 3 D
Frequency:	16 $\frac{2}{3}$Hz ... 10 kHz < 500 V, 16 $\frac{2}{3}$Hz ... 4 kHz > 500 V
Display of voltage / phase / phase sequence:	red LED for voltage, red for phase sequence LCD digital display, backlighted 7-segment-figure, 2 lines, 0 ... 1999 digit
Display of resistance / continuity / diodes:	green LED for continuity up to 1999 kΩ and diodes, LCD 3½-digit for kΩ-measuring, buzzer ≤ 10 kΩ
Resistance range:	0 ... 1999 kΩ (5 % + 3 D)
Frequency range:	16 Hz ... 1850 Hz / 1,85 ... 9,99 kHz
Input resistance:	442 kΩ at 50 V / 50 Hz 362 kΩ at 1000 V AC, 793 kΩ at 1000 V DC
Current (Peak value Is):	2,76 mA at 1000 V AC 1,3 mA at 1000 V DC
On-time t_{on} / recovery time t_{off} :	at 230 V / 400 V unlimited at U_N 30 sec. t_{on} / 240 sec. t_{off}
Surge voltage category:	CAT IV 600 V / CAT III 1000 V in acc. to IEC 60664-1 (VDE 0110)
Impulse withstand voltage:	>12,0 kV housing-insulation to operator > 8,0 kV circuit between the test electrodes
Insulation test voltage:	6 kV / 5 s - routine test housing and connection line
Operating temperatures:	-15°C ... + 45°C
Power supply:	9 V block battery IEC 6 LR61 / 6 LF22 / 6 LP3146 automatic-off after 30 s (no action) multi-stage display of battery
Casing:	ABS, display cover PC unbreakable,
Pollution degree:	3
Protection category:	IP 65, device can be used in moist environments
Connecting line:	PUR-hose cable, 1000 V, 1 m, with protection-cap
Standards:	DIN EN 61243-3 VDE 0682-401:2015-08 IEC 61243-3:2014 + Cor.:2015
Repeated inspection:	every 6 years
Dimensions / weight:	240 x 62 x 39 mm (display unit) 185 x 30 x 30 mm (handgrip) 290 g

12. Accessories Optional

The following accessories are available for the DSP 4:

1. Bags

2. Extensions

3. Adapters

General information
Only screwable or attachable extensions/adapters DSP-S provided by the manufacturer may be used.
Please note the suitable fastening type:
screwable for (DSP 4 / DSP 4F / DSP 4ST / DSP 4FST)
attachable for (DSP 4 / DSP 4F)
For screwable extensions, adapters and tip-probes both test electrodes of the MultiSafe DSP 4 must be provided with thread set.

Attention!
The connection between test probe and voltage tester has to be controlled in each case! Check
function at a known voltage source or by self-test.
Only a perfect mechanical connection ensures safe contact and thus an unambiguous voltage test.

12.1 Additional Safety Precautions

- Only qualified personnel with appropriate protective equipment may do these workings. Observe the minimum object distance to other plant components that are energized or earthed and use personal protective equipment as specified by national accident prevention regulations (in Germany: DGUV V3 or EN 50110-1).
- Hold the instrument by its handles only to avoid covering the display or touching the extension probes.
- Voltage testers and test probes etc. must be kept dry and clean.
- Voltage testers and test probes etc. may not be used when they are damaged.

Additional safety instructions
Insertion prod DSP-S20-A

- Insertion prods may only be plugged to uncovered cables into single wires otherwise they risk to short circuit.
- Insertion tests damage the wire insulation. Tests may only be performed at test points that are sealable afterwards, e.g. at junction sleeves.

Pin tip DSP-S66/DSP-S120

- Secure functioning can only be ensured with contact positioned in the front. Test points at the side must be visibly connected (not suitable for sockets).

12.2 Available accessories

Art.no.	Type	Description
84019	DSP -G4 	Thread set including glue for DSP 4 / DSP 4F Required for the use of screwable extensions and adapters 170 x 100 x 30 mm; 0,020 kg
84023	DSP ST-G4 	Thread set including glue for DSP 4ST / DSP 4FST Required for the use of screwable extensions and adapters 170 x 100 x 30 mm; 0,020 kg
84313	LSP-S500-Y*	Extension 500 mm attachable insulated stainless steel tube, 1000 V 505 x 30 x 30 mm; 0,075 kg
84010	DSP-S500-Y*	Extension 500 mm screwable insulated stainless steel tube, 1000 V 550 x 30 x 30 mm; 0,090 kg
84014	DSP-S850-Y*	Extension 850 mm screwable light GRP-tube, 1000 V 860 x 30 x 30 mm; 0,090 kg
81031	S-HUELSE 	Plastic sleeve for storage of extensions up to 600 mm Suitable for a pair of extensions 350 x 45 x 45 mm; 0,070 kg
84315	DSP-S56 	Flexible pin prod 3 x 56 mm screwable for narrow test points CAT IV 600 V / CAT III 1000 V 180 x 30 x 30 mm; 0,040 kg
84318	DSP-S110 	Flexible pin prod 3 x 110 mm screwable for narrow test points CAT IV 600 V / CAT III 1000 V 235 x 30 x 30 mm; 0,040 kg
84312	DSP-S-ADAS 	Screwable adapter with 4 mm socket suitable for the connection of test leads CAT IV 600 V / CAT III 1000 V 120 x 30 x 30 mm; 0,035 kg
84311	L-SETR 	Test line with two 4 mm sockets, red including crocodile clip CAT IV 600 V / CAT III 1000 V 170 x 100 x 30 mm; 0,060 kg
81035	SP-KLT-S600 	Artifical leather bag for DSP and extensions up to 600 mm with shoulder strap 650 x 175 x 50 mm; 0,225 kg
84021	DSP-COR 	Cloth bag Cordura for DSP 4 with belt loop 310 x 160 x 15 mm; 0,075 kg

* Please select the electrode shape when ordering
- Electrode Y for overhead lines (standard)
- Electrode i for busbars and measuring points