

METRAVOLT® 12D

**Voltage and Continuity Tester
with Phase and Polarity Tester
and Phase Sequence Indicator**



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- 1 Test probes
- 2 LEDs for voltage test (red): $\geq 8\text{ V}$, 230 V, 400 V
- 3 Ω LED (green): lights up for resistance measurement from 0 to 1999 k Ω (continuity is indicated by means of a tone generator)
- 4 Phase L1 LED (230 V): direction of rotation and phase
- 5 Polarity: "AC" or "-" appears at the display
- 6 LCD for display of voltage and resistance
- 7 Contact electrode (phase L1 sensor)
- 8 HOLD key: freezes the display value
- 9 Ω/V and CAL key: shift key for voltage / resistance measurement and zero balancing for the resistance measuring range
- 10 ⏻ and Test key: On/Off key (manual) and function test

Meanings of symbols on the instrument:



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



Automatic voltage range selection on



VDE testing authority approval mark



Indicates EC conformity

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1 Applications

The METRAVOLT®12D is a 2-pole voltage tester with digital display, combined with an integrated continuity, phase and polarity tester, and a phase sequence indicator. It allows for safe detection and measurement of AC and DC voltages within a range of 8 to 1000 V at frequencies of up to 10 kHz. Resistance within a range of 0 to 1999 kΩ can also be measured with the integrated continuity tester. Voltage and resistance values appear in digital format at the LCD. In addition to this, 5 LEDs and a tone generator indicate voltage, phase, phase sequence and continuity.

The METRAVOLT®12D can be used in the rain thanks to IP 65 protection.

2 Safety Precautions

You have selected an instrument which provides you with a high level of safety.

The METRAVOLT® 12D voltage tester has been manufactured and tested in accordance with requirements set forth in DIN EN 61243-3 (VDE 0682 part 401) regarding “2-pole” voltage testers. When used for its intended purpose, safety of the operator, as well as that of the instrument, is assured.

In order to maintain flawless technical safety conditions, and to assure safe use, it is imperative that you read these operating instructions thoroughly and carefully before placing your instrument into service, and that you follow all instructions contained therein.

The instrument provides for excellent electrical safety by means of two series resistors immediately downstream from each of the test probes.

The METRAVOLT® 12D voltage tester has been approved by VDE test authorities for application of the VDE GS mark.

Observe the following safety precautions:

- The instrument has a nominal voltage range of 8 to 1000 V AC / 1500 V DC.
The instrument may only be used in electrical systems whose nominal voltage lies within this range.
- Grasp the instrument by the handles only during testing, and never touch the test probes.
- The voltage tester is equipped with IP 65 protection, and can be used under wet weather conditions (protected against jet water streams from all directions).
However, powerful water jets, flooding and submersion or immersion must be avoided.
- If one of the displays fails during the self-test described in chapter 3 – even if only partial failure occurs – or if no display appears indicating that the instrument is ready for use, the voltage tester may not be placed into operation.
- The voltage tester may not be dismantled by unauthorized persons (see chapter 7 on page 10).
- The voltage tester has a maximum allowable duty cycle of 2 minutes.
- Voltage testers must be kept dry and clean.
The housing can be cleaned with isopropyl alcohol or soapy water.

3 Initial Start-Up

3.1 Battery

Your instrument is supplied with an installed 9 V flat-cell battery in accordance with IEC 6 F 22 or EC 6 LR 61.



Attention!

Be sure to refer to chapter 6.1 before initial start-up, or after your device has been in storage for a lengthy period of time.

3.2 Testing for Correct Display and Function

According to DIN VDE 0105 part 1, voltage testers must be tested for correct functioning shortly before they are used for testing for the absence of voltage.

- Press and hold the ⏻ key. All display segments light up at the LCD, the 5 LEDs are illuminated and the buzzer sounds.
- Release the ⏻ key.
A value within a range of 00.0 to 00.1 V appears at the display.
- Now press the Ω/V key.
The green Ω LED lights up briefly, the acoustic signal changes from a low pitch to a high pitch, and **0L k Ω** appears at the display
- Short circuit the two test probes.
A value within a range of 00.0 to 00.2 **k Ω** appears at the LCD. An acoustic signal is generated at the same time, and the green Ω LED lights up. All device functions have now been tested.

Zero balancing for the resistance measuring range can be recalibrated if necessary:

- Activate the Ω range with the Ω/V key.
- Press the two test probes firmly together.
- Press the Ω/V key once again. **CAL k Ω** appears at the display and the green Ω LED blinks. Calibration has been successfully completed as soon as 0.00 is displayed and the Ω LED is continuously illuminated. A high pitched acoustic signal is generated for the entire duration of this procedure.



Attention!

If one of the displays fails during the self-test – even if only partial failure occurs – or if no display appears indicating that the instrument is ready for use, the voltage tester may not be placed into operation!

4 Measuring and Testing

4.1 General Instructions

Automatic On/Off

The voltage tester is switched on automatically as soon as a voltage of at least 8 V is applied. The instrument is switched off automatically approximately 30 seconds after the last measurement in order to extend battery life.

“Freezing” the Measured Value

The displayed measured value can be “frozen” at the LCD by pressing the **HOLD** key. The value is displayed until the key is once again released.

4.2 Testing Voltage and Polarity



Attention!

The maximum allowable duty cycle for voltage testing is 2 minutes.

Nominal Voltage Range of 8 to 1000 V

- Securely contact the measuring points with the test probes.

The instrument is switched on automatically as of a value of 8 V. If “continuity testing” has been activated, automatic switching occurs to “voltage testing”.

Depending upon the voltage value, either the ≥ 8 , the 230 or the 400 LED lights up (red).

The instrument automatically selects the measuring range which corresponds to the applied voltage (see Characteristic Values), and voltage is displayed in “V” at the LCD.

Displaying Polarity

The voltage type is identified by means of the “AC” or the “–” symbol. Direct voltage: If the plus pole is connected to the test probe identified with the “+” symbol, no preceding sign appears. If the minus pole is connected to the test probe identified with “+” symbol, the minus sign (–) appears to the left of the displayed value.


Voltages of Greater than 1220 V AC/DC


If a voltage of greater than 1220 V AC/DC is applied, an acoustic warning signal is generated and the display value blinks. Alternating voltages of up to 1220 V can be reliably measured. “AC” appears to the left of the display value in order to identify alternating voltage. “OL” (out of limit) appears at the display in the case of frequencies of greater than 10 kHz. Direct voltages of up to 1500 V can be reliably measured.

**Note!**

The voltage tester may turn itself on automatically even if only one test probe is connected to voltage or a statically charged object. This has no significance.

Voltages of Less than 8 V

⇒ Press the  key.

For voltages of less than 8 V, the instrument must be switched on, or the measuring range has to be adapted with the  key. The ≥ 8 LED (red) does not light up in this case. Voltage is displayed as described above.

4.3 Tests with the Contact Electrode

The METRAVOLT[®] 12D is equipped with a contact electrode (phase L1 sensor: metal knob at the right-hand side of the display unit), and a rectangular LED display for phase testing and phase sequence indication. Tests performed with the contact electrode are possible with nominal voltages as of 230 V to earth.

4.3.1 Phase Test

The phase conductor is identified by establishing contact with either one of the two test probes, and by touching the contact electrode at the same time. If the triangle in the display field lights up, the phase conductor is live.

4.3.2 Phase Sequence Indicator

The rotating field between two phases in a grounded 230/400 V 3-phase system is determined as follows by establishing contact with both test probes and simultaneously touching the contact electrode:

- ⇒ Identify the phase conductors one pole at a time (see chapter 4.3.1).
- ⇒ Contact each of the phase conductors with a separate test probe (display: approx. 400 V).
- ⇒ Touch the contact electrode with your finger.

If phase L1 has been contacted with the test probe with display (+L1), and if phase L2 has been contacted with the other test probe, the triangle lights up in the event of clockwise rotation. If the triangle does not light up, the direction of rotation is counterclockwise. If 230 V is displayed instead of 400 V, the neutral conductor may have been contacted with one of the test probes.

4.4 Resistance and Continuity Testing

- ⇒ With the instrument switched on, press the Ω/V key.
- ⇒ Securely contact the measuring points with the test probes.

If resistance lies within a range of 0 ... 1999 k Ω , the measured value appears at the LCD in k Ω . The green Ω LED lights up at the same time, and an acoustic signal is generated. A high pitched acoustic tone is generated for resistances ranging from 0 to 9.9 k Ω , and a low pitched tone is generated for greater resistances.

If resistance is greater than 1999 k Ω , overflow is indicated at the display (OL k Ω appears at the left). The LED does not light up and no acoustic signal is generated.

Notes regarding continuity testing:

- The measuring voltage plus pole is located at the test probe with display during continuity testing.
- Measuring current has a constant value of 5 μ A for values of 0 to 9.9 k Ω , and 1 μ A for values of 10 to 1999 k Ω .
- If a voltage of 8 V or greater is applied when the tester is in the “continuity testing” mode, it is automatically switched to “voltage testing”.

5 Characteristic Values

Measured Qty.	Measuring Ranges (auto-ranging)	Resolution	Frequency Range / Measuring Current	Intrinsic Error
U-	0.1 V ... 199.9 V 200 V ... 1500 V	0.1 V 1 V	—	$\pm 0.5\%$ rdg. +1 digit
U~ TRMS	0.5 V ... 199.9 V 200 V ... 1200 V	0.1 V 1 V	15 Hz ... 1.8 kHz	$\pm 1.0\%$ rdg. +2 digits
U~ 1)	15 V ... 199.9 V 200 V ... 1200 V		> 1.8 kHz ... 10 kHz	$\pm 15\%$ rdg. + 2 digits
R	0 ... 9.9 k Ω	0.1 k Ω	5 μ A	$\pm 5\%$ rdg. + 2 digits
	10 ... 1999 k Ω	1 k Ω	1 μ A	

1)TRMS value, sinusoidal

Nominal voltage range	8 ... 1000 V AC / 1500 V DC
Nominal frequency range	15 Hz ... 10 kHz
Input impedance	311 k Ω
Current	3.2 mA at 1000 V
Duty cycle	2 minutes

Digital Display

Type	7-segment characters
Display range	0 ... 1999 counts 3½ digits
Overflow display	“OL” appears
Measuring rate	3 measurements per second

Power Supply

Battery	9 V flat-cell battery Zinc-carbon battery per IEC 6 F22, alkaline manganese battery per IEC 6 LR61 or corresponding rechargeable battery
Battery test	“BAT” symbol is displayed automatically when the battery requires replacement.

Electrical Safety

Overvoltage category	1000 V CAT IV
Surge voltage withstand	14.8 kV (1.2/50 μ s)
Test voltage	6.6 kV

Electromagnetic Compatibility

Interference emission/ Interference immunity	IEC 61236
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Ambient Conditions

Operating temperature	-10 ... + 55 °C
Relative humidity	max. 85%
Elevation	max. 2000 m

Mechanical Design


Protection	IP 65
Housing	Impact resistant, dust-proof plastic housing with unbreakable display cover
Connector cable between test probes	Rubber-insulated flexible cable H 07 RNF
Dimensions	Test probe with indicator: 62 mm \times 240 mm \times 39 mm
Weight	270 g (including battery)

6 Maintenance

6.1 Battery

- Check the battery at short regular intervals to make sure no leakage has occurred. If leakage occurs, electrolyte must be fully removed from the instrument and a new battery must be installed.

Remove the battery if the voltage tester will not be used for a lengthy period of time.

If the low battery symbol appears at the display, , the battery must be replaced. Depending upon the utilized type of battery, 50 to 100 measurements can still be performed after the low battery symbol appears.

Caution: Measured values are no longer reliable when the symbol starts blinking, and the battery must be replaced immediately.

The instrument requires one 9 V flat-cell battery per IEC 6 F22 (zinc-carbon), or per IEC 6 LR61 (alkaline-manganese).

Replacing the Battery

- Loosen the screw at the back of the instrument which secures the battery compartment lid, and remove the lid.
- Let the battery slide out of the battery compartment with its CAT IV protection cover and replace it.
- To this end, snap the battery contacts on to the new 9 V flat-cell battery and insert the battery, together with the CAT IV protection cover, into the battery compartment.
- Replace the battery compartment lid and secure it with the screw.

6.2 Housing

- The voltage tester should be kept dry and clean.

The plastic housing can be cleaned with a cloth dampened with isopropyl alcohol or soapy water.

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

When you need service, please contact:

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This address is only valid in Germany.
Please contact our representatives or subsidiaries for service in other countries.

8 Product Support

When you need support, please contact:

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