

METRAVOLT 12D+L

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





- 1 Test probes
- 2 LEDs for low voltage test (red): as of 50 V / 120 V
- 3 Ω LED (green): lights up for resistance measurement from 0 to 1999 k Ω (continuity is indicated by means of a sound generator)
- 4 POL-L1 LED (230 V): phase sequence and phase
- 5 Polarity display
- 6 LCD panel for voltage and resistance
- 7 HOLD key: freezes the display value
- 8 Ω/V and CAL key: shift key for resistance / voltage measurement and zero balancing for resistance measuring range
- 9 ⏻ and Test key: On/Off key (manual) and function test
- 10 Handle bar

Meanings of symbols on the instrument:



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



VDE testing authority approval mark



Indicates EC conformity



This device may not be disposed of with the trash. Further information regarding the WEEE mark can be accessed on the Internet at www.gossenmetrawatt.com by entering the search term 'WEEE'.

ED: On-time for voltage testing

Table of Contents	Page
1 Applications	3
2 Safety Precautions	4
3 Initial Start-Up	5
3.1 Battery	5
3.2 Testing for Correct Display and Function	5
4 Measuring and Testing	6
4.1 General Instructions	6
4.2 Testing Voltage and Polarity	6
4.3 Testing of Phase and Phase Sequence	7
4.3.1 Phase Test	7
4.3.2 Testing of Phase Sequence	8
4.4 Resistance and Continuity Testing	8
5 Characteristic Values	9
6 Maintenance – Recalibration	10
6.1 Battery	10
6.2 Housing	11
6.3 Recalibration	11
6.4 Device Return and Environmentally Compatible Disposal	11
7 Repair and Replacement Parts Service Calibration Center and Rental Instrument Service	12
8 Product Support	12

1 Applications

The METRAVOLT 12D+L 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 24 to 1000 V at frequencies of up to 4 kHz. Resistance within a range of 0 to 1999 k Ω can also be measured with the integrated continuity tester. Voltage and resistance values appear in digital format at the LCD. In addition to this, 4 LEDs indicate voltage, phase, phase sequence, and a LED and a sound generator indicate continuity.

The METRAVOLT 12D+L can also be used in precipitation 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+L 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, the 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 two test probes as well as two completely autonomous test systems:

- Low voltage test display which reliably indicates any existing voltage by means of LED, even without batteries.
- Digital display for exact test values.

The METRAVOLT 12D+L voltage tester has been approved by the VDE test authority for application of the VDE GS mark.

Observe the following safety precautions:

- The instrument has a nominal voltage range of 24 to 1000 V AC/1500 V DC.
The instrument may only be used in electrical systems whose nominal voltage lies within this range.
- Touch 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 in 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 12).
- The voltage tester has a maximum allowable on-time of 2 minutes for voltage tests.
- 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 block 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 Ω and POL-LED light up as well and the buzzer sounds.
- Release the ⏻ key.
A value within a range of 00.0 to 00.2 V appears at the display.
- Now press the Ω/V key.
OL and **M 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.
- Check the function of the low voltage display (50 V LED /120 V LED) at a known voltage source, e.g. a 230 V socket. At the same time, the tested voltage value is indicated at the LCD.

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 until **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 lights up permanently. An 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 24 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 maximum voltage value can be „stored“ on the display when pressing and holding the „**HOLD**“ button. The value is shown for approx. 30 seconds or until you press the „**HOLD**“ button again. The Hold function is deactivated when voltage is applied again.

If the measured value remains stable for approx. 2 seconds, the maximum value has been recorded.

4.2 Testing Voltage and Polarity



Attention!

The maximum allowable on-time for voltage testing is 2 minutes.

Nominal Voltage Range of 24 to 1000 V

- Securely contact the measuring points with the test probes.

The instrument is switched on automatically as of a voltage value of 24 V. If “continuity testing” has been activated, the instrument switches automatically to “voltage testing”.

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



Note!

The low voltage display lights up as from a voltage of at least 50 V / 120 V DC. A hazardous voltage is present!

The low voltage display (LEDs) even remains in working order when the battery is empty or when the device is not equipped with a battery.

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 sign appears. If the minus pole is connected to the test probe identified with “+” symbol, the minus sign „–“ appears before the displayed value.

Voltages of More than 1220 V AC/DC

If a voltage of more 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. “~” appears before the display value in order to identify alternating voltage.


Voltages with a frequency of more than 2 kHz are indicated by a flashing Hz symbol. DC voltage measurements can be reliably performed up to 1500 V.




Note!

If only one pole of a test probe is connected to voltage or to a statically charged object, the voltage tester may turn itself on automatically. This has no significance.

Voltages of Less than 24 V

➤ Press the  key.

For voltages of less than 24 V (as from 0.1 V), the instrument must be switched on, or the measuring range has to be adapted with the  key.

4.3 Testing of Phase and Phase Sequence

The METRAVOLT 12D+L is equipped with a triangular LED display in order to perform phase and phase sequence tests. These tests can be performed at a nominal voltage of at least 165 V (50 Hz) to earth.



Attention!

When performing these tests, the handle bar of the device must be clasped firmly (see picture below).



Note!

You may wear insulating gloves when performing the tests.

Tests can be impaired by unfavourable locations, for example on wooden ladders or insulating floor coverings, as well as in improperly grounded AC voltage systems.

4.3.1 Phase Test

The phase conductor is determined by applying the test probe (+L1) to the conductor.

If “POL” appears at the LCD panel and the triangle symbol lights up, the conductor is live.

4.3.2 Testing of Phase Sequence

The phase sequence between two phases in a grounded 230/400 V 3-phase system (up to max. 690/1200 V) is determined as follows by applying both test probes and by clamping the device component:

- Identify the phase conductors one pole at a time (see chapter 4.3.1).
- Apply both test probes to two phase conductors (display approx. 400 V).

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 counter clockwise. 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.
„OL“ and „M Ω “ appear on the LCD.
- Securely contact the measuring points with the test probes.

If resistance values of 0 ... 10 k Ω are present, the measured value is indicated on the LCD in „k Ω “. The green LED “ Ω ” **lights up** at the same time, and an acoustic signal is generated.

If resistance values of 10 k Ω ... 1.999 M Ω are present, the measured value is indicated on the LCD panel in „k Ω “ or in „M Ω “. The green LED “ Ω ” **blinks** at the same time, and **no** acoustic signal is generated.

If resistance values > 2 M Ω are present, the display passes to overflow and „OL“ and “M Ω “ appear on the display. The LED does **not** light up and **no** acoustic signal is generated.

Notes regarding continuity testing:

- During continuity testing, the measuring voltage plus pole is located at the test probe identified with L1.
- 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 24 V or greater is applied when the tester is in the “continuity testing” mode, the instrument is automatically switched to “voltage testing”.

5 Characteristic Values

Measured Qty.	Measuring Ranges (auto-ranging) ²⁾	Resolution	Frequency Range / Measuring Current	Intrinsic Uncertainty
U-	0.01 V ... 8.99 V 9.0 V ... 99.9 V 100 V ... 1500 V	0.01 V 0.1 V 1 V	—	±(1.5% rdg. + 3 digits)
U~ TRMS	1.0 V ... 99.9 V 100 V ... 1200 V	0.1 V 1 V	15 Hz ... 1.8 kHz	±(1.5% rdg. + 3 digits)
U~¹⁾	15 V ... 99.9 V 100 V ... 1200 V		> 1.8 kHz ... 10 kHz	±(15% rdg. + 3 digits)
	500 V ... 1200V		> 1.8 kHz ... 4 kHz	
R	0.1 ... 49 kΩ	100 Ω	5 μA	±(5% rdg. + 3 digits)
	50 ... 1999 kΩ	1 kΩ	1 μA	

¹⁾TRMS value, sinusoidal


²⁾ Display as from 0,0 V

Nominal voltage range	24 ... 1000 V AC/1500 V DC (auto on from 24 V onwards)
Nominal frequency range	15 Hz ... 10 kHz < 500 V 15 Hz ... 4 kHz > 500 V
Input impedance	311 kΩ
Current	3.2 mA at 1000 V
On-time	2 minutes

Digital Display

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

Power Supply

Battery	9 V block battery zinc-carbon battery per IEC 6 F22, alkaline manganese cell per IEC 6 LR61 or equivalent NiCd rechargeable battery
Battery test	The battery status is symbolized by a 3-stage battery indicator. „  “.

Electrical Safety

Measurement category	1000 V CAT IV
Surge withstand capability	> 12 kV (1.2/50 μs)
Test voltage	6 kV

Electromagnetic Compatibility

Interference emission	EN 61326:2006 Class B
Interference immunity	EN 61326:2006

Ambient Conditions

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

Mechanical Design

Protection IP 65

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
6	dust-tight	5	water jets

Housing Impact resistant, dust-tight plastic housing with unbreakable display cover

Connector cable between test probes PUR sheathed cable with double insulation 1 x 1,5 mm², 1000 V

Dimensions Test probe with display panel 62 mm x 240 mm x 39 mm


Weight 270 g (including battery)


6 Maintenance – Recalibration

6.1 Battery

- ☞ Check the battery at short regular intervals to make sure that 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 is not to be used for a lengthy period of time.

If the empty battery symbol appears at the display, “”, the battery must be replaced. Depending upon the utilized type of battery, 30 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 block 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 onto the new 9 V block 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 always be kept dry and clean.

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

6.3 Recalibration

The respective measuring task and the stress to which your measuring instrument is subjected affect the ageing of the components and may result in deviations from the guaranteed accuracy.

If high measuring accuracy is required and the instrument is frequently used in field applications, combined with transport stress and great temperature fluctuations, we recommend a relatively short calibration interval of 1 year. If your measuring instrument is mainly used in the laboratory and indoors without being exposed to any major climatic or mechanical stress, a calibration interval of 2-3 years is usually sufficient.

During recalibration* in an accredited calibration laboratory (DIN EN ISO/IEC 17025) the deviations of your instrument in relation to traceable standards are measured and documented. The deviations determined in the process are used for correction of the readings during subsequent application.

We are pleased to perform DKD or factory calibrations for you in our calibration laboratory. Please visit our website at www.gossenmetrawatt.com (→ Services → DKD Calibration Center *or* → FAQs → Calibration questions and answers).

By having your measuring instrument calibrated regularly, you fulfill the requirements of a quality management system per DIN EN ISO 9001.

6.4 Device Return and Environmentally Compatible Disposal

The **instrument** is a category 9 product (monitoring and control instrument) in accordance with ElektroG (German Electrical and Electronic Device Law). This device is not subject to the RoHS directive.

We identify our electrical and electronic devices (as of August 2005) in accordance with WEEE 2002/96/EG and ElektroG with the symbol shown to the right per DIN EN 50419.



These devices may not be disposed of with the trash. Please contact our service department regarding the return of old devices.

* Verification of specifications or adjustment services are not part of the calibration. For products from our factory, however, any necessary adjustment is frequently performed and the observance of the relevant specification is confirmed.

If you use **batteries** or **rechargeable batteries** in your instrument or accessories which no longer function properly, they must be duly disposed of in compliance with the applicable national regulations.

Batteries or rechargeable batteries may contain harmful substances or heavy metal such as lead (Pb), cadmium (Cd) or mercury (Hg).

The symbol shown to the right indicates that batteries or rechargeable batteries may not be disposed of with the trash, but must be delivered to collection points specially provided for this purpose.



7 Repair and Replacement Parts Service Calibration Center and Rental Instrument Service

When you need service, please contact:

GMC-I Service GmbH
Service Center
Thomas-Mann-Straße 20
90471 Nürnberg • Germany
Phone +49 911 817718-0
Fax +49 911 817718-253
E-Mail service@gossenmetrawatt.com
www.gmci-service.com

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:

GMC-I Messtechnik GmbH
Product Support Hotline
Phone +49 911 8602-0
Fax +49 911 8602-709
E-Mail support@gossenmetrawatt.com