Operating instructions

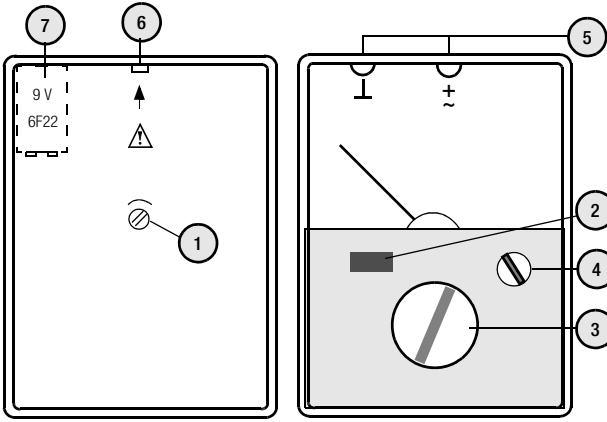
GOSSEN METRAWATT

METRAmax 2

Analog Multimeter

3-348-734-02
5/6.16

Operating Controls



1 Adjustment screw for the mechanical zero
(⊣|⊢ OFF on scale)
2 Sliding function switch
3 Rotary range selector switch
4 Rotary knob for mid-scale setting of the electrical zero
5 Safety connection sockets
6 Nose to open the meter
7 Battery compartment

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1 Safety Features and Safety Precautions

This instrument fulfills the requirements of the applicable EU guidelines and national regulations. We confirm this with the CE marking. The relevant declaration of conformity can be obtained from GMC-I Messtechnik GmbH.

The analog multimeter METRAmax 2 is manufactured in accordance with safety regulations IEC 61010-1/ DIN EN 61010-1/VDE 0411-1. When used for its intended purpose, the safety of the operator, as well as that of the instrument, is assured. Their safety is however not guaranteed if the instrument is used improperly or handled carelessly. It is therefore imperative that you read the operating instructions thoroughly and carefully before placing the METRAmax 2 into service, and that you follow all instructions contained therein.

Observe the following safety precautions:

- The instrument may only be operated by persons who are capable of recognizing contact hazards and taking the appropriate safety precautions.
- Contact hazards exist anywhere, where voltages of greater than 30 V may occur (effective value).
- Be prepared for the occurrence of unexpected voltages at devices under test (e.g. defective devices). For example, capacitors can be dangerously charged!
- Housing and measurement cables may not be damaged, e.g. by cracks or ruptures.
- No measurements may be made with the METRAmax 2 in electrical circuits with corona discharge (high-voltage).
- Special care is required when measurements are made in HF electrical circuits. Dangerous pulsating voltages may be present.

- Measurements under moist ambient conditions are not allowable. Hands, shoes, floor and workplace must be dry.
- Be absolutely certain that the measuring ranges are not overloaded beyond their allowable capacities.

Meaning of Symbols on the Instrument

CE indicates EC conformity

Warning concerning a point of danger.
(Attention: observe documentation!)

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'.

2 Description

On the METRAmax 2, the measuring ranges are selected with a sliding function switch and a rotary range selector switch. The scale is mirror-backed.

The rugged plastic case and the spring-loaded jewel bearings of the stray-field-insensitive moving-coil movement with core magnet protect the meter against damages in the case of severe mechanical stress.

The electrical zero of the pointer can be positioned at midscale. This allows for bipolar DC voltage and DC current measurements regardless of the polarity.

The connection sockets are protected against accidental contact. Both the special test leads with contact-protected connection plugs and all test leads with commercial banana plugs (4 mm diameter) can be used.

The DC current measuring ranges can be expanded by means of a shunt (e.g. 10 A/100 mV).

The meter is of service-friendly design.

3 Operation

3.1 Initial Start-up

3.1.1 Connecting the Battery

The battery compartment (7) contains a 9-V battery (IEC 6F22) which is not connected. To connect the battery, it is required to remove the lower part of the case. For this purpose, press the nose (6) on the front of the meter inwards, using an adequate tool. Securely connect the battery contacts to the battery clip located in the battery compartment. Ensure reliable contact making. Replace the lower part of the case and press the two parts together until they engage.

Attention!
Both measurement cables must be disconnected from the measuring circuit before opening the meter!

Note
The integrated battery switches off automatically after 45 minutes. Switching off and on again of the sliding function switch activates the power supply.

3.1.2 Checking the Mechanical Zero

The METRAmax 2 must not be connected when checking the mechanical zero.

- ➪ Set the sliding function switch (2) to the "0" position
- ➪ Place the METRAmax 2 in a horizontal position
- ➪ The pointer must be located exactly above the line marked " ⊣|⊢ OFF"

- Correct the deviation by means of the adjustment screw 1 on the bottom of the case using a screwdriver, if required.

3.1.3 Checking the Electrical Zero

- Set the sliding function switch (2) to the ⊥ position, select the measuring range
- The pointer must rest exactly above the line for the zero at mid-scale
- Correct deviations by means of the rotary knob (4), if required

3.1.4 Battery Test

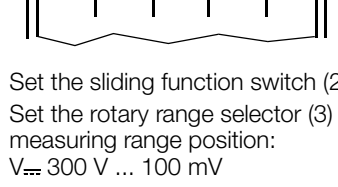
- Set the sliding function switch (2) to the " ⏦ " position
- Set the rotary range selector switch (3) to the " ⊣⊢ " position
- The pointer must travel into the battery test section marked " ⊣⊢ "

If the pointer no longer travels into the battery test section, or if there is an instable indication, the battery is exhausted. It must be replaced with a new one (see chapter 5.1 on page 16, Battery Replacement).

3.2 Voltage Measurement

3.2.1 DC Voltage Measurement

Operating Mode: Electrical Zero at the Left

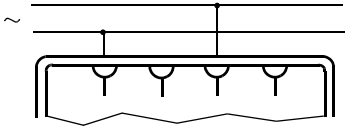


- Set the sliding function switch (2) to the position
- Set the rotary range selector (3) to the corresponding measuring range position:
  V⎓ 300 V ... 100 mV
- Connect the METRAmax 2
- Read the measured value: black scale ≂

Operating Mode: Electrical Zero at Mid-scale

- Set the sliding function switch (2) to the position
- Set the rotary range selector (3) to the corresponding measuring range position: V⎓ 300 V ... 100 mV
- Check that the pointer rests at mid-scale, see chapter 3.1.3 on page 8
- Connect the METRAmax 2
- Read the measured value: red scale +/–

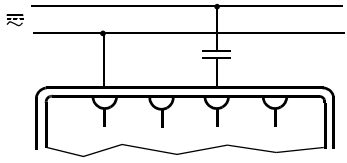
3.2.2 Direct AC Voltage Measurement up to 300 V



- Set the sliding function switch (2) to the ⏜ position
- Set the rotary range selector switch (3) to the corresponding measuring range: V~ 300 V ... 3 V
- Connect the METRAmax 2
- Read the measured value: black scale ≂

To keep the influence of the frequency as low as possible, the connection socket " ⊥ " should be connected to the ground potential as directly as possible or to lowest point with respect to ground.

3.2.3 AC Voltage Measurement with Superimposed DC Voltage Component



The DC voltage component, such as occurs with an amplifier output stage, for example, can be cut off by means of a capacitor (recommended value: 4.7 µF/630 V). In this case, the additional service error is smaller than 0.2% at a measuring frequency of 50 Hz. The measuring procedure corresponds to the one described above.

The DC component can be determined same as with DC voltage measurement.
To protect the meter against overload, the selected measuring range must always be higher than the DC voltage component determined at first.

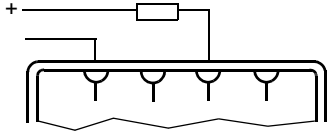
Attention!
Both voltage components must be tested before switching to a lower measureing range.

3.3 Current Measurement

For all current measurements, connect the METRAmax 2 in series with the consumer in the line having the lower potential to ground.

3.3.1 Direct DC Current Measurement

Operating Mode: Electrical Zero at the Left



- Set the sliding function switch (2) to the position
- Set the rotary range selector switch (3) to the corresponding measuring range: A ⎓ 3 A...100 µA
- Connect the METRAmax 2
- Read the measured value: black scale ≂

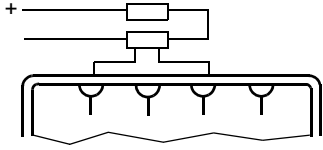
Operating Mode: Electrical Zero at Mid-scale

- Set the sliding function switch (2) to the ⊥ position
- Set the rotary range selector switch (3) to the corresponding measuring range: A ⎓ 3 A...100 µA
- Check that the pointer rests at mid-scale, see chapter 3.1.3 on page 8
- Connect the METRAmax 2 according to the wiring diagram
- Read the measured value: red scale +/–

3.3.2 DC Current Measurement via Shunts

The accuracy of the measurement is influenced by the measuring error of the shunt.

Operating Mode: Electrical Zero at the Left

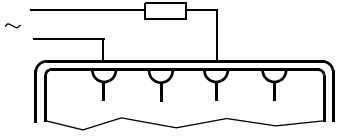


- Set the sliding function switch (2) to the ↖ position
- Set the rotary range selector switch (3) to the following position: V⎓ 100 V
- Connect the METRAmax 2
- Read the measured value: black scale ≂

Operating Mode: Electrical Zero at Mid-scale

- Set the sliding function switch (2) to the ⊥ position
- Set the rotary range selector switch (3) to the following position: V⎓ 100 mV
- Check that the pointer rests at mid-scale, see chapter 3.1.3 on page 8
- Connect the METRAmax 2
- Read the measured value: red scale +/–

3.3.3 AC Current Measurement



- Set the sliding function switch (2) to the ⏜ position
- Set the rotary range selector switch (3) to the corresponding measuring range: A~ 3 A...100 µA
- Connect the METRAmax 2
- Read the measured value: black scale ≂

3.4 End of Measurement

When no measurements are made, the sliding function switch (2) should always be set to "0" to conserve the battery life.

4 Characteristic Values

Measuring Ranges

DC and AC voltage	Internal resistance		DC and AC voltage	Voltage drop
	⎓	∼		
100 mV ⎓	10 MΩ		100 µA ⎓/∼	55 mV
300 mV ⎓	10 MΩ		1 mA ⎓/∼	55 mV
1 V ⎓	10 MΩ		10 mA ⎓/∼	55 mV
3 V ⎓/∼	10 MΩ	1 MΩ	100 mA ⎓/∼	55 mV
10 V ⎓/∼	10 MΩ	1 MΩ	1 A ⎓/∼	53 mV
30 V ⎓/∼	10 MΩ	1 MΩ	3 A ⎓/∼	51 mV
100 V ⎓/∼	10 MΩ	1 MΩ		
300 V ⎓/∼	10 MΩ	1 MΩ		

Influence Quantities and Nominal Ranges of Use

Temperature in the range 0 ... +40 °C	± 2%/10 K for ≂
Frequency for all measuring ranges	± 2.5 % in the range 30 Hz ... 1.5 kHz ± 5 % in the range 1.5 kHz ... 3 kHz

Display

Measuring mechanism	Moving-coil mechanism with core magnet
Scale	mirror-backed
Scale length	*black scale:* 87 mm in the range V, A, 0 ... 3/10 *red scale:* 62 mm in the range V, A, -10/-3 ... 0 ... +3/+10

Accuracy

under reference conditions	Class 2 for ⎓, class 3 for ∼

Reference Conditions

Ambient temperature	+23 °C ± 2 K
Position of use	horizontal
Frequency	50 ... 60 Hz

Waveshape	sinusoidal

Ambient Conditions

Storage temperatures	–25 ... 65 °C (without batteries)
Relative humidity	max. 75 %, no condensation allowed

Power Supply

Battery	9 V flat cell battery, IEC 6 L R61 (IEC 6F22), automatic battery switch-off after 45 minutes
Overload Protection	Fuse F3,15 H/250 V per DIN VDE 0820 part 22/EN 60127-2 protects the electrical circuits against overload. The measuring mechanism is protected by 2 diodes in inverse-parallel connection.

Electrical Safety

Protection class	II per IEC 61010-1/DIN EN 61010-1/ VDE 0411-1
Measuring category	300 V CAT III
Nominal voltage	300 V
Contamination degree	2
Test voltage	3.7 kV~
EMC	Electromagnetic Compatibility
Interference emission/immunity	EN 61326-1

Mechanical Design

Protection: Housing IP50, terminals IP20
Extract from table on the meaning of IP codes

IP XY (1st digit X)	Protection against foreign object entry	IP XY (2nd digit Y)	Protection against the penetration of water
2	≥ 12.5 mm dia.	0	not protected
5	dust protected	0	not protected

Dimensions	100 mm x 140 mm x 35 mm
Weight	approx. 0.3 kg

5 Maintenance

5.1 Battery Replacement

When a battery test reveals that the pointer no longer travels into the battery test section marked " ⊣|⊢ ", the battery must be replaced. Replace the exhausted battery with a new 9-V flat cell battery according to IEC 6 L R61 (IEC 6F 22). Remove the lower part of the case as described in chapter 3.1.1 on page 7.

5.2 Fuse Replacement

Remove the case as described in chapter 3.1.1 on page 7. The fuse holders are soldered to the circuit board.

5.3 Cleaning

The meter may only be cleaned with a soft cloth or brush. Possible static charges of the glass pane can be eliminated by means of an antistatic agent or a moist cloth.

5.4 Device Return and Environmentally Compatible Disposal

The METRAmax 2 is a category 9 product (monitoring and control instrument) in accordance with ElektroG (German Electrical and Electronic Device Law). This device is subject to the RoHS directive. Furthermore, we make reference to the fact that the current status in this regard can be

by entering the search term WEEE.

We identify our electrical and electronic devices in accordance with WEEE 2012/19/EU and ElektroG with the symbol shown to the right per DIN EN 50419.

These devices may not be disposed with the trash. Please contact our service department regarding the return of old devices, see chapter 6 on page 17.

6 Repair and Replacement Parts Service DAkkS Calibration Lab * and Rental Instrument Service

When you need service, please contact:

GMC-I Service GmbH
Service Center

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

*** DAkkS Calibration Laboratory for Electrical Quantities D-K-15080-01-01 accredited per DIN EN ISO/IEC 17025:2005**

Accredited measured quantities: direct voltage, direct current values, DC resistance, alternating voltage, alternating current values, AC active power, AC apparent power, DC power, capacitance, frequency and temperature

Competent Partner

GMC-I Messtechnik GmbH is certified in accordance with DIN EN ISO 9001:2008.

Our DAkkS calibration laboratory is accredited by the Deutsche Akkreditierungsstelle GmbH (National accreditation body for the Republic of Germany) in accordance with DIN EN ISO/IEC 17025:2005 under registration number D-K-15080-01-01.

We offer a complete range of expertise in the field of metrology: from **test reports** and **proprietary calibration certificates** right on up to **DAkkS calibration certificates**.

Our spectrum of offerings is rounded out with free **test equipment management**.

An **on-site DAkkS calibration station** is an integral part of our service department. If errors are discovered during calibration, our specialized personnel are capable of completing repairs using original replacement parts.

As a full service calibration laboratory, we can calibrate instruments from other manufacturers as well.