Digital Multimeter E 1006809

Instruction sheet

11/14 SD/UD

1 Measuring probe
1a Finger guards
2 Measurement socket “20 A” for current measurement in 20-A range (positive)
3 Measurement socket “A” for current measurement for up to 2 A (positive)
4 Measurement socket “COM“ (negative)
5 Measurement socket “V/Ω“ for voltage and resistance measurement (positive)
6 Transistor test socket
7 Measurement range dial
8 Hold function button
9 On/Off switch
10 Display
11 Unlock button

1. Safety instructions/using the equipment safely

Digital multimeter E is designed to display electrical measurements in the ranges and measurement environments specified in its technical data.

It conforms to safety regulations for electrical measurement, control and laboratory equipment, as specified in DIN EN 61010-1, protection class 2 and to excess voltage category CAT I for up to 1000 V. It is intended for measurements on experiments and laboratory apparatus. It is **not** approved for measurements on low-voltage mains distribution equipment, such as sockets, fuses, etc.

CAT I: Signal layer, telecommunications, electronic equipment with only minor excess voltage transients

CAT II: domestic appliances, mains sockets, portable instruments etc.

CAT III: Supply via buried cabling, built-in switches, automatic circuit breakers, sockets or contactors

CAT IV: Equipment and installations supplied, for example, by overhead mains cables and therefore subject to greater risk of lightning strikes. This includes, for example, main switches at the building mains feed, electricity meters and ripple control receivers.

Safe operation of the multimeter is guaranteed if it is solely used as specified. Safety cannot be guaranteed, however, if the multimeter is used incorrectly or handled without due care and attention. In order to avoid serious injury due to current or voltage shocks, the following safety instructions are to be observed at all times:

- Carefully read the instruction manual before using the multimeter and obey the instructions therein.
- The multimeter may only be used by persons who are able to recognise the risks of contact and take due precautions to avoid them.

This multimeter is not a toy and must not fall into the hands of children.

- Do not place it, keep it or use it anywhere within reach of children.
- When the multimeter is used by teenagers, trainees etc., a suitable person should supervise to ensure the equipment is used safely.
- If measurements are made where there are any risks of coming into contact with electricity, a second person is to be informed.

The assumption needs to be made that unforeseen voltages may be present in the vicinity of objects being measured (e.g. faulty equipment or capacitors).

- Before using the multimeter, check the housing and measuring leads for damage and if there should be any malfunctions or visible damage, the multimeter is not to be used. Pay specific attention to the insulation for the measuring sockets.
- Be particularly careful when measuring voltages in excess of 33 V AC (RMS) or 70 V DC.
- The authorised measuring range is not to be exceeded. If measurements are made when the magnitude of the variable is unknown, always select a large measuring range before shifting down to lower ones.
- The multimeter may not be used to make measurement on circuits which exhibit corona discharge (high voltage).
- Particular care is to be taken when making measurements on high-frequency circuits where dangerous voltages may arise due to superimposition of components.
- Make very sure that the voltage value between the measured contact and earth or between the ground socket and the measurement socket does not exceed 1000 V.
- In order to check that the multimeter is ready to use, select the battery test function. Afterwards, it is then possible to check that the voltage source is disconnected and no voltage is present.
- The multimeter may only be used in a dry, dust-free environment with no risk of explosions occurring.
- When measuring current in a circuit, make sure to switch off the power before connecting the multimeter into the circuit.
- When making measurements, always connect the ground lead first. Disconnect the signal measurement lead before unplugging the ground.
- When using the measuring leads always hold them with your fingers behind the finger guard.
- To avoid false readings, which may result in electric shocks or injuries, always replace the battery as soon as the flat battery indicator (+ -) is displayed.
- Turn off the multimeter before opening the casing, disconnect the power to the circuit and the measuring leads from the multimeter.
- Never use the multimeter when its casing is open.

2. Equipment supplied

1 Digital multimeter
1 Pair of measuring probes
1 Battery
1 Instruction manual

3. Symbol legend


Hazard, read instruction sheet


Dangerous voltages

V ⎓ DC voltage

A ⎓ DC current

V ~ AC voltage

A ~ AC current

Diode and continuity test

hFE Current amplifying factor of a transistor

Ω Resistance


Flat battery

CAT Measuring category as per IEC EN 61010-1


Double insulated casing

CE EU conformity mark


Earth symbol

⊥ Ground symbol

4. Technical data

General specifications

Dimensions:	90x190x35 mm approx.
Weight:	310 g approx. (with battery)
Display:	3½-digit LCD, 24 mm, max. 1999
Operating voltage:	9-V battery, 6F22
Automatic cut-off:	After 15 minutes
Fuse:	F2A/250 V
Connectors:	4-mm safety sockets
Measurements/second:	2 – 3 times
Overload display:	“1” shown on display
Overload protection:	
Voltage limits:	1000 V long-term in all voltage ranges
Current limits:	
2 A range:	max. 2 A
20 A range:	max. 20 A for 10 s with minimum interval 15 mins

Operating temperature: 0℃ – 40℃ with 0 – 75% humidity
Storage temperature: -10℃ – 50℃ with 0 – 75% humidity
Electrical safety:
Safety specifications: EN 61010-1
Excess voltage category: CAT I: 1000 V
Contamination level: 2
Protection type: IP20
Electromagnetic compatibility:
Interference emission: EN 55011:2009
Interference resistance: EN 61326-1:2013

Electrical specifications

V ⎓	
Measuring range	**Accuracy**
200 mV	±0.5 % ± 3 digits
2 V, 20 V, 200 V	±0.8 % ± 2 digits
1000 V	±1.0 % ± 2 digits

DC voltage
Input impedance: 10 MΩ

V ~	
Measuring range	**Accuracy**
200 mV	±1.2 % ± 5 digits
2 V, 20 V, 200 V	±1.0 % ± 5 digits
750 V	±1.2 % ± 5 digits

AC voltage
Input impedance: 10 MΩ
Frequency range: 40 – 400 Hz

A ⎓	
Measuring range	**Accuracy**
20 µA	±1.8 % ± 2 digits
200 µA, 2 mA, 2 mA 20 mA, 200 mA	±2.0 % ± 2 digits
2 A, 20 A	±2.0 % ± 10 digits

DC current
Measuring voltage drop: 200 mV

A ~	
Measuring range	**Accuracy**
20 µA, 200 µA, 2 mA 20 mA	±2.0 % ± 3 digits
200 mA	±2.0 % ± 5 digits
2 A, 20 A	±2.5 % ± 10 digits

AC current
Measuring voltage drop: 200 mV
Frequency range: 40 – 400 Hz

Ω	
Measuring range	**Accuracy**
200 Ω	±1.0 % ± 10 digits
2 kΩ, 20 KΩ, 200 kΩ 2 MΩ	±1.0 % ± 4 digits
20 MΩ	±1.0 % ± 10 digits

Accuracy is given for 1 year after calibration at 23℃ ±5℃, RH<75%.

5. Description

Digital multimeter E is a robust, battery operated multimeter with a 3½-digit LCD display for measuring voltage, current and resistance as well as for diode and hFE gain testing.

All measurement ranges are selected by means of a rotary dial. All measurement ranges are protected against overload except the 20 A range.

The meter is equipped with a hold function, negative polarity indication, over range indication, low battery indication and automatic switch off after 15 minutes. After the power is automatically switched off it needs to be turned off and turned on again to continue the power.

The digital display is folding for ease of reading and on the backside there is a fold out prop for standing the device on a table.

6. Operation

Note

The multimeter switches into an indeterminate state if the Hold button is activated (Hold function button (8) pressed). After it is switched on, the display will then show “1.666” (where the position of the decimal point is dependent on the selected measuring range). If this case should arise, deactivate the Hold function while the equipment is switched on (deactivate Hold function by pressing the button one more time).

6.1 Method of measurement

Warning! Dangerous voltages may be present at the input terminals and may not be displayed.

6.1.1 Voltage measurement

- Set the measurement range dial at the required position V⎓ or V~.
- Connect the black test lead to the measurement socket "COM" and the red test lead to the "V/Ω" socket. The meter is connected parallel to the measuring point. The polarity of the red lead connection will be indicated at the same time as the voltage.

Note

- If the voltage to be tested is unknown beforehand, set the measurement range dial to the highest range and work down.
- When only the figure "1" is displayed, over range is being indicated and the measurement range dial has be set to a higher range.
- Never measure voltages higher than 1000 V.

6.1.2 Current measurement

- Set the measurement range dial at the required position A⎓ or A~.
- Connect the black test lead to the measurement socket "COM" and the red test lead to the "A" socket for measurements up to 2 A. For measurements over 2 A connect it to the socket “20A”. The meter is connected in series to the measuring object. The polarity of the red lead connection will be indicated at the same time as the current.

Note

- If the current to be tested is unknown beforehand, set the measurement range dial to the highest range and work down.
- When only the figure "1" is displayed, over range is being indicated and the measurement range dial has be set to a higher range.
- Limit measurements in the 20-A range to max. 15 s.

6.1.3 Resistance measurement

Warning! To avoid electrical shock or damage to the meter when measuring resistance in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

- Set the measurement range dial to the Ω range.
- Connect the black test lead to the measurement socket "COM" and the red test lead to the "V/Ω" socket. Measurement is done parallel to the resistor

Note

- If the resistance to be tested is unknown beforehand, set the measurement range dial to the highest range and work down.
- When only the figure "1" is displayed, over range is being indicated and the measurement range dial has be set to a higher range.

When the input is not connected, i.e. at open circuit, the figure "1" will be displayed for the over range condition.

6.1.4 Diode test

- Set the measurement range dial to ▶|.
- Connect the black test lead to the measurement socket "COM" and to the cathode of the diode. Connect the red test lead to the "V/Ω" socket and the anode of the diode.

Note

When the input is not connected, i.e. at open circuit, the figure "1" will be displayed

The meter displays the forward voltage drop and displays figure "1" for overload when the diode is reversed.

6.1.5 Continuity test

Warning! To avoid electrical shock or damage to the meter when measuring continuity in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

- Set the measurement range dial to ▶|.
- Connect the black test lead to the measurement socket "COM" and the red test lead to the "V/Ω" socket.

A built-In buzzer sounds if the resistance is less than 30 ± 10 Ω.

6.1.6 Transistor hFE test

- Set the measurement range dial to **hFE**.
- Make sure the transistor is "NPN" or "PNP" type. Insert the transistor correctly into the corresponding transistor test socket.

Display reading is approx. transistor hFE value. Base current approx. 10 µA, V_{CE} approx.2.8 V.

6.2 LCD Display panel angle selection

LCD display panel is locked in lie down position in normal operating condition and storage.

- To change the display panel angle, push down the button which is above the top case, and release lock.
- Rotate the display panel to the best angle.

7. Maintenance

Turn off the meter and remove the test leads before you service or clean the device.

Beyond replacing batteries and fuses, do not attempt to repair or service your meter unless you are qualified to do so and have the relevant calibration, performance test, and service instructions.

7.1 Battery and fuse replacement

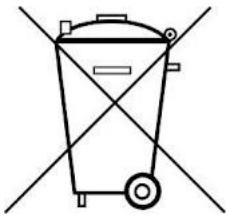
Replace the battery as soon as the flat battery icon (+ -) appears.

Remove from the multimeter any batteries which are flat or starting to disintegrate.

Also remove batteries from the multimeter if it has not been used for a long period of time.

Turn off the meter and remove the test leads before opening the case.

- Loosen screws with suitable screwdriver and remove case bottom.
- Replace the battery or the fuse.
- Replace the case bottom and reinstall the three screws. Never operate the meter unless the case bottom is fully closed.
- Do not dispose of the battery in regular household refuse. Follow the local regulations (In Germany: BattG; EU: 2006/66/EG).



7.2 Cleaning

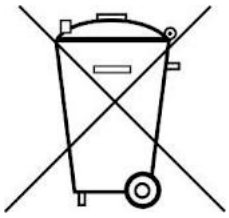
- Periodically wipe the case with a damp cloth and mild detergent.
- Do not use abrasives or solvents.

Dirt or moisture in the measurement sockets can affect readings.

- Shake out any dirt that may be in the measurement sockets.
- Soak a new swab with isopropyl alcohol and work around the inside of each measurement socket.

8. Disposal

- The packaging should be disposed of at local recycling points.
- Should you need to dispose of the equipment itself, never throw it away in normal domestic waste. Local regulations for the disposal of electrical equipment will apply.



- Do not dispose of the battery in regular household refuse. Follow the local regulations (In Germany: BattG; EU: 2006/66/EG).