1 Description
The demo multimeter is an overload-protected electronic pointer meter for measuring DC currents and voltages, sinusoidal AC currents and voltages and resistances. Thanks to the large scale positioned high on the meter, and the function and mode switches on both the front and the rear of the device, the demo multimeter is ideal for demonstration experiments. The measured values are displayed directly on any of six switchable scales graduated from 1 to 3 and zero point left, or on one scale with zero point middle.

Current can be measured in the range from 1 µA to 30 A, voltage in the range from 1 mV to 10 kV and resistance in the range from 1 kΩ to 300 kΩ. The additionally available clip-on ammeter (531 901) can be used to measure currents of up to 300 A DC or 200 A AC, and the high tension probe (531 93) permits measurement of non-hazardous contact voltages up to 300 kV.

Safety notes

The demo multimeter complies with all safety requirements for electrical equipment for measurement, control and laboratory use (EN 61010 Part 1) and is constructed according to protection class II. It is designed for use in dry rooms which are suitable for the operation of electrical installations and equipment.

The demo multimeter is equipped with a special patented socket inhibitor mechanism to ensure user safety and protect the measuring instrument. It is coupled with the function switch and enables only those sockets which are required for the selected function. It also prevents switching to impermissible functions while leads are connected.

Operational safety of the demo multimeter is ensured when the device is used as intended. However, safety cannot be guaranteed when the demo multimeter is operated improperly (e.g. subjected to overloads greater than the maximum permissible level) or handled carelessly. Whenever there are grounds for assuming that safe operation may no longer be possible (e.g. when the device is visibly damaged), shut off the device immediately.

- Before putting the demo multimeter into operation, always inspect the housing and the control and display elements for visible damage. In the event of malfunctions or visible damage, shut off the demo multimeter and make sure that it cannot be activated inadvertently.

- Do not attempt to measure any dangerous contact voltages greater than 1000 V, and only measure currents greater than 2 mA DC at voltages of less than 1000 V.

A contact hazard exists when the following values occur for voltages higher than safety extra-low voltage: 2 mA DC resp. 0.5 mA AC (RMS) for the current through an induction-free resistor of 2 kΩ or 45 µAs when charging at voltages up to 15 kV and 350 mJ for the stored energy at voltages above 15 kV.

Safety extra-low voltage comprises voltages below 60 V DC or 30 V RMS.

- Do not exceed the maximum voltage of 1000 V between any socket and ground.

- Use only measuring leads which are free of defects; use safety connecting leads (500 600 ff) when measuring voltages greater than safety extra-low voltages.

- Always disconnect the demo multimeter from the measuring circuit before inserting the battery.

- Never carry out adjustment, maintenance or repair work on the open meter while a voltage is connected to the device; such tasks may only be carried out by a qualified technician who is familiar with the dangers involved.
### 3 Technical data

**System:** Moving-coil mechanism (core magnet)

**Accuracy:**
- Class 1.5
- (1.5 % of max. scale value)

**Operating position:** vertical

**Curve form of measurement quantity:** sinusoidal

**Frequency range:** 45-200 Hz

**Large display (front):**
- Length of scale arch: 200 mm
- Height of numerals: 25 mm
- Scales: 0 ... 1 / 0 ... 3 / 0 ... 10 / 0 ... 30
- Scale graduation: linear
- Scale markings: 105 div. (0 ... 1/ 10/ 100)
- 66 div. (0 ... 3/ 30/ 300)
- 42 div. (-10 ... 10)

**Small display (rear):**
- Length of scale arch: 80 mm
- Height of numerals: 2 mm
- Scales: 0 ... 10 / 0 ... 3 / -10 ... 10
- Scale graduation: linear
- Scale markings: 21 div. (0 ... 10)
- 33 div. (0 ... 3)
- 22 div. (-10 ... 10)

**Insulation:**
- Insulation: Double or reinforced insulation throughout
- Max. permissible voltage of all sockets w.r.t. ground: 1kV

**Voltage measurements:**
- Internal resistance: 100 kΩ measuring function mV
- 10 MΩ measuring function V
- 1 GΩ measuring function kV, without probe
- 30 GΩ measuring function kV, with probe

**Current measurements:**
- Voltage drop: 120 mV Measurement function μA, mA
- 200 mV Measurement function A

**Power supply:**
- 3 batteries
  - 1.5 V, type IEC R 20
  - 1.2 V, type IEC HR 20
- Battery life: approx. 500 hours
- Automatic cutout: after 50-60 min.

**General data:**
- Dimensions of housing: approx. 39 cm × 34 cm × 23 cm
- Weight: approx. 5.1 kg

### 2 Scope of supply

1. Demo multimeter, incl. 3 batteries 1.5 V, type IEC R 20
2. Holder, for mounting in the demonstration experiment frame (301 300)
4 Explanation of symbols

Danger point (see Instruction Sheet)  Common ground connection  Alternating current/voltage  Battery test
Moving-coil mechanism (core magnet)  Ground symbol  Direct current/voltage  Symbol of EC conformity
Electronics in measurement circuit  Fully protected with double or reinforced insulation  Accuracy class 1.5  Clip-on ammeter

5 Operation

5.1 Switching on and off:

Switching the meter on:
– Turn the mode switch from the OFF position to either the ~ or – – position.

Switching the meter off:
– Turn the mode switch to the OFF position.
– When the device is switched off, the display pointer points to off (full left mechanical deflection of scale).

Automatic cutout:
The demo multimeter automatically switches off after approx. 50 - 60 minutes; the indicator needle points to the position off. If this pointer position is not due to a negative voltage:
– Switch the mode switch to OFF and then turn it back to the respective mode again.

If the demo multimeter is not to be used for a longer period:
– Remove the batteries from the battery compartment.

5.2 Inserting and changing batteries:

– Disconnect the demo multimeter from the measurement circuit.
– Carefully pry off the cover of the battery compartment, e.g. using a screwdriver.
– Remove the old batteries, and clean the contacts if necessary.
– Insert the new batteries with the correct polarity.
– Reclose the cover.

5.3 Battery test:

– Disconnect the demo multimeter from the measurement circuit.
– Set the mode switch to the “battery test” position.
– Read off the battery state from the display on the rear.
5.4 Setting the zero point:

- Disconnect the demo multimeter from the measurement circuit and switch it on.
- Set the zero point of the desired scale using e.g. a screwdriver.

5.5 Mounting the meter in the demonstration experiment frame

- Attach the demo multimeter to the holder and clamp it in place using the handle.
- Suspend the demo multimeter with holder from the profile rail of the demonstration experiment frame (301 300).

6 Measuring voltages

6.1 Measuring voltages up to 300 V:

Attention:
- Do not expose the measuring ranges to overloads greater than the maximum permissible level.

Overload capacity: 250 V (measurement function mV)
600 V (measurement function V, ~)
400 V (measurement function V, ~)

- Select the measurement function mV or V using the function switch and then connect the meter to the measurement circuit.
- Switch on the demo multimeter by selecting the type of current ~ or ~.
- Using the scale wheel, select one of the scales 0 ... 1, 0 ... 3, 0 ... 10, 0 ... 30, 0 ... 100, 0 ... 300 or -10 ... 10.

6.2 Measuring voltages up to 10 kV:

Attention:
- Do not measure dangerous contact voltages greater than 1 kV!
- Do not expose the measuring range to overloads greater than the maximum permissible level.

Overload capacity: 15 kV

- Select the measurement function kV using the function switch and then connect the meter to the measurement circuit.
- Switch on the demo multimeter by selecting the type of current ~ or ~.
- Using the scale wheel, select one of the scales 0 ... 1, 0 ... 3, 0 ... 10 or -10 ... 10.
7 Measuring currents

7.1 Measuring currents up to 300 mA:

Attention:
– Measure currents greater than 2 mA DC only at voltages of less than 1000 V.
– Do not expose the measuring range to overloads greater than the maximum permissible level.

Overload capacity: 20 A

– Select the measurement function mA or A using the function switch and then connect the meter to the measurement circuit.
– Switch on the demo multimeter by selecting the type of current / B53 or / B2d.
– Using the scale wheel, select one of the scales 0 ... 1, 0 ... 3, 0 ... 10, 0 ... 30, 0 ... 100, 0 ... 300 or -10 ... 10.

7.2 Measuring currents up to 30 A:

Attention:
– Measure currents greater than 2 mA DC only at voltages of less than 1000 V.
– Do not expose the measuring range to overloads greater than the maximum permissible level.

Overload capacity: 30 A

– Select the measurement function A using the function switch and then connect the meter to the measurement circuit.
– Switch on the demo multimeter by selecting the type of current / B53 or / B2d.
– Using the scale wheel, select one of the scales 0 ... 1, 0 ... 3, 0 ... 10 or -10 ... 10.

8 Measuring resistance values

– Using the function switch, select the measurement function kΩ and then connect the measurement leads.
– Switch on the demo multimeter by selecting the operating mode kΩ.
– Using the scale wheel, select one of the scales 0 ... 1, 0 ... 3, 0 ... 10, 0 ... 100 or 0 ... 300.
– Test the resistance to be measured using the measuring leads.
9 Measuring DC voltages up to 300 kV

Additionally required:
1 High tension probe 531 93

Attention:
- Do not measure dangerous contact voltages greater than 1 kV!
- Do not expose the measuring range to overloads greater than the maximum permissible level.

Overload capacity: 300 kV
Accuracy: Class 5

- Select the measurement function kV using the function switch and then connect the high tension probe.
- Switch on the demo multimeter by selecting the type of current.
- Use the scale wheel to select the scale 0 ... 30, 0 ... 100 or 0 ... 300
- Test the voltage-carrying wire using the high tension probe (see the Instruction Sheet for the high tension probe).

10 Measuring currents up to 300 A (200 A)

Additionally required:
1 Clip-on ammeter 531 901

Attention:
- Measure currents greater than 2 mA DC only at voltages of less than 1000 V.
- Do not expose the measuring ranges to overloads greater than the maximum permissible level.

Overload capacity: 30 (20) A in setting “20” of clip-on ammeter
300 (200) A in setting “200” of clip-on ammeter

- Use the function switch to select the measurement function ∞ and then connect the clip-on ammeter (connect the black plug to the ground socket).
- Switch on the demo multimeter by selecting the type of current ∞ or ∞.

For currents up to 10 A:
- Set the clip-on ammeter to 20 A and select one of the scales 0 ... 1, 0 ... 3, 0 ... 10 or -10 ... -10 using the scale wheel.

For currents up to 300 A (∼ resp. 200 A (∼):
- Set the clip-on ammeter to 200 A and select one of the scales 0 ... 30, 0 ... 100 or 0 ... 300 using the scale wheel.
- Attach the clip-on ammeter to the current-carrying wire and switch on the supply voltage (see Instruction Sheet of clip-on ammeter).