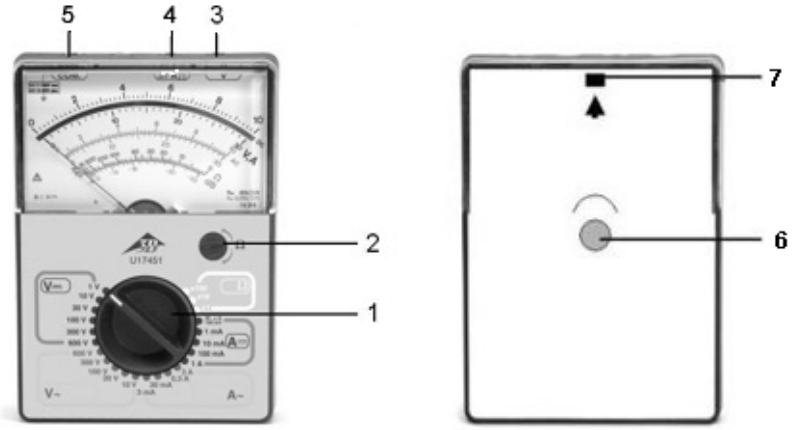
Analogue Multimeter AM51 1003074

Instruction sheet

04/15 SD



1 Rotary switch to select measurement range
2 Rotary knob to set full-scale deflection for 0 Ω
3 Connection for voltage measurement
4 Connection for current and resistance measurement
5 Connection for ground
6 Adjustment screw for mechanical zero-point setting
7 Nub to latch the housing shut

1. Safety instructions

- Before using the analogue multimeter, make sure you read the operating instructions carefully and that you comply with them completely.
- The safety of the multimeter and the person operating it can only be guaranteed if it is used in accordance with the instructions. Do not operate or handle this unit incorrectly or inappropriately.
- The device may only be used by persons, who are aware of the hazards of contact (for voltages over 30 V rms) and can undertake the appropriate safety precautions. This also includes the appearance of unforeseen voltages e.g. in defective units or charged capacitors.

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.
- Be particularly careful when measuring voltages in excess of 33 V AC (RMS) or 70 V DC.
- For voltages which are in excess of 33 V AC or 70 V DC, only use safety measurement leads conforming at least to CAT II.
- In the case of voltage and current measurements the nominal voltage between the phase and neutral conductor may not exceed 300 V according to CAT II (in circuits that are directly connected to the mains) and CAT III (in building wiring installations) 300 V.
- The analogue multimeter may not be used for measurements in circuits with corona discharge (high voltage).
- In measurements involving RF circuits special care must be taken due to the existence of dangerous hybrid voltages.
- The appropriate permissible measurement range may not be exceeded. Always change from a higher measurement range to a lower measurement range.
- Before using the device, check the housing and the measurement cables for any damage.
- The multimeter may only be used in a dry, dust-free environment with no risk of explosions occurring. Workplace, hands, shoes and floor must be dry.

- Before opening the housing all measurement leads are disconnected from the device.
- Do not dispose of the battery in the regular household garbage. Follow the local regulations.

1.1 Symbol legend

 Hazard, read instruction sheet

V Voltage

A Current

 Moving coil galvanometer

 AC/DC quantities accuracy class 2,5

 Use in horizontal position

 DC quantities

 AC quantities

CAT Measuring category as per IEC EN 61010-1

 Double insulated casing

CE EU conformity mark

 Earth symbol

 Ground symbol

 Battery symbol

2. Description

Handheld meter used to measure current, voltage and resistance as well as gain levels or attenuation e.g. in chains of quadripoles.

Passive analog multimeter with a rotary switch for selecting the measurement ranges and a scale with mirrored background for parallaxfree readings. The device is extremely robust in terms of load capacity and is equipped with excellent overload protection due to its two antiparallel diodes as well as moving coil movement, which is not sensitive to external electromagnetic fields. The safety connection sockets offer protection against accidental touch contact. The robust plastic housing and the spring-connected bearing jewels of the movement guarantee protection against damage caused by mechanical stress.

3. Technical data

Measurement ranges:
Voltage measurement:

DC	
Measurement range	Internal resistance
100 mV	2 kΩ
1 V	20 kΩ
10 V	200 kΩ
30 V	600 kΩ
100 V	2 MΩ
300 V	6 MΩ
600 V	12 MΩ

AC	
Measurement range	Internal resistance
10 V	66.7 kΩ
30 V	200 kΩ
100 V	667 kΩ
300 V	2 MΩ
600 V	4 MΩ

Current measurement:

DC	
Measurement range	Voltage drop
50 µA	100 mV
1 mA	500 mV
10 mA	500 mV
100 mA	500 mV
1 A	590 mV

AC	
Measurement range	Voltage drop
3 mA	1.5 V
30 mA	1.6 V
300 mA	1.6 V
3 A	1.8 V

Widerstandsmessung:

Rotary switch	Measurement range and scale centre	Max. meas. current
Ω x 1	1 Ω...35 kΩ...5 kΩ	45 mA
Ω x 10	10 Ω...350 kΩ...50 kΩ	4.5 mA
Ω x 100	100 Ω...3.5 kΩ...500 kΩ	0.45 mA

Accuracy:: Class 2.5
Influencing variables and nominal operating ranges:
Temperature 0 – 40° C: ± 1% / 10 K for DC
± 2.5% / 10 K for 100 mV/50 µA DC
± 1.5% / 10 K for AC
Frequency (30 Hz...1 kHz): ± 2.5%

Reference conditions:	
Ambient temperature:	+ 23° C
Frequency:	50...60 Hz
Waveform:	Sinusoidal
Environmental conditions:	
Ambient temperature:	5°C...23°C…40°C
Storage temperature:	-20…70°C
Relative humidity:	<85% with no condensation
Shock tests:	max. 147 m/s²
Electrical safety:	
Safety stipulations:	EN 61010-1
Overvoltage category:	CAT III max. 300 V; CAT II max. 600 V
Degree of pollution:	2
Protection class:	II
Protection type:	IP20
Overload protection:	Fuse FF 3, 15 A / 600 V (IEC127 6.3 x 32 mm) Breaking capacity: 1.5 kA Recommended type: SIBA: 7012540.3.15
Electromagnetic compatibility:	
Jamming::	EN 500081-2
Interference immunity:	EN 500082-2
Power supply::	1 x 1.5 V Battery IEC LR6
Connectors:	4-mm safety sockets
Scale length:	85 mm
Pointer deflection:	0…100°
Operating alignment:	horizontal
Dimensions::	98x138x35 mm
Weight:	approx. 0.25 kg

4. Operation

4.1 Readying for use

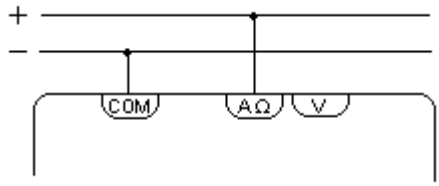
- Insert battery into the battery compartment. To do this open the appropriate section of the housing by pressing in the nub (7), e.g. using a screwdriver. Then insert the battery and connected it to the battery clip. Replace the section of housing and snap it into place.
- Check the mechanical zero-point. The measuring instrument may not be connected to anything at this time. The needle must be located in the zero-point position when the multimeter is in a horizontal position. If necessary make the corresponding adjustments by means of the adjustment screw (6).
- Check the full scale deflection setting for 0 Ω. To do this set the rotary switch (1) to "x 1 Ω". Shortcircuit the connection sockets "COM" (5) and "A, Ω" (4). Set the full scale deflection by turning the knob (2).
- If full scale deflection cannot be set or the needle no longer stays still, the battery must be replaced.

4.2 General instructions

- When performing measurements always set the rotary switch (1) to the highest measurement range. Then turn to lower ranges until the optimum needle deflection is obtained.
- When the multimeter is not in use, disconnect all measurement leads from the meter, reset the rotary switch (1) to the highest range and, if necessary, remove the battery.

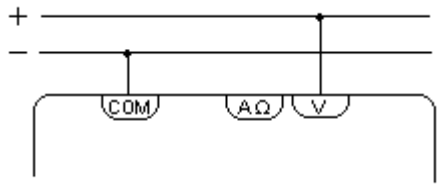
4.3 Voltage measurement

4.3.1 DC voltage up to 100 mV



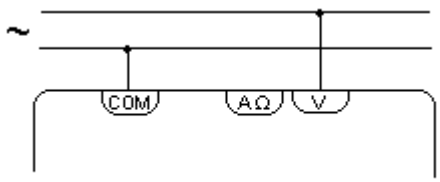
- Set the rotary switch (1) to the measurement range "50 µA, 100 mV".
- Connect the multimeter and take a reading from the V, A DC scale.

4.3.2 DC voltage up to 600 V



- Using the rotary switch (1) select the corresponding measurement range "600,...,1 V DC".
- Connect the multimeter and take a reading from the V, A DC scale.

4.3.3 AC voltage up to 600 V

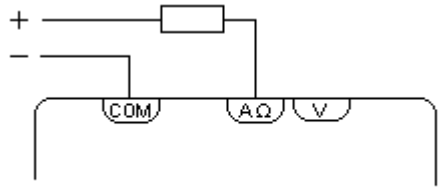


- Using the rotary switch (1) select the corresponding measurement range "600,...,10 V AC".
- Connect the multimeter and take a reading from the V, A AC scale.

4.4 Current measurement

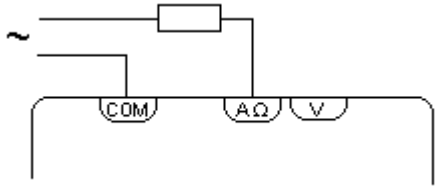
- When taking any current measurements connect the multimeter in series to the load in the circuit, which has the least potential with respect to ground.
- Measurements conducted in the 3 A range may not take longer than 1 min.

4.4.1 Direct current up to 1 A



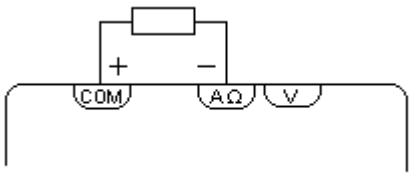
- Using the rotary switch (1) select the corresponding measurement range “1 A,...,50 µA DC”.
- Connect the multimeter and take a reading on the V, A, DC scale.

4.4.2 Alternating current up to 3 A



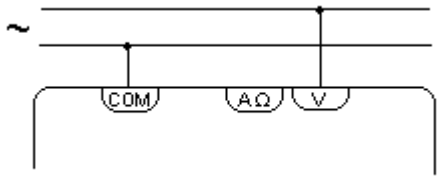
- Using the rotary switch (1) select the corresponding measurement range “3 A,..., 3 mA AC”.
- Connect the multimeter and take a reading on the V, A, AC scale.

4.5 Measuring resistance



- Using the rotary switch (1) select the corresponding measurement range “x 100 Ω,..., x 1 Ω”.
- Connect the multimeter and take a reading on the Ω scale.
- When performing measurement on semiconductors use the following terminals: positive pole connected to “COM” and negative pole connected “A A, Ω”.
- Resistance measurement is carried out using the DC voltage from the battery being used. Since the battery is under extreme loading during measurements in the “x 1 Ω” range, the measurement should only be of a brief duration.
- Only measure zero-voltage elements due to the fact that external voltages falsify measured values.
- When resistances measurements are carried out involving longer periods and switchover to other measurement ranges is complete check for 0 Ω full scale deflection and adjust, if necessary.

4.6 Attenuation and gain measurement



- In communications engineering the gain or attenuation of a signal is specified in decibels as the logarithm of the ratio between the measured voltage and a defined reference voltage. Positive values correspond to a gain and negative values reflect attenuation. The reference voltage of the multimeter amounts to 0.775 V (= 1 mW at 600 Ω). With this voltage there is a gain of 0 dB.
- Using the rotary switch (1) select the corresponding measurement range “600,..., 10 V AC”.
- Connect the multimeter and take a reading on the dB scale.
- Since this scale is only valid for the 10 V measurement range, in the other measurement ranges a relative constant must be added to the value obtained from the scale:

Measurement range	Constants
30 V	10 db
100 V	20 db
300 V	30 db
600 V	36 db

5. Maintenance

5.1 Storage, cleaning

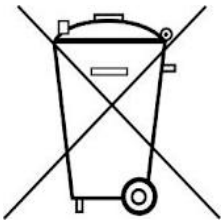
- Keep the equipment in a clean, dry and dust-free place.
- Only use a paintbrush or soft towel to clean the multimeter. If static electrical charging occurs on the view window this can be eliminated using a damp rag or an antistatic agent.

5.2 Battery

- Test the battery from time to time. If it is dead or it has started to decompose, it must

be removed from the device. The battery is replaced in accordance with 4.1.

- If the multimeter remains idle over a long period of time, the battery should be removed from the unit.
- Do not dispose of the battery in the regular household garbage. Follow the local regulations (In Germany: BattG; EU: 2006/66/EG).

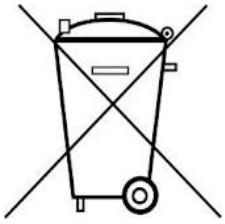


5.3 Replacing the fuse

- The multimeter is equipped with a safety fuse FF 3, 15 A / 600 V, breaking capacity 1.5 kA. To replace the fuse the device must be opened as described in section 4.1. Remove the fuse and replace it with a fuse of identical type. Then replace the section of housing and snap it back into place securely.

6. 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 the regular household garbage. Follow the local regulations (In Germany: BattG; EU: 2006/66/EG).