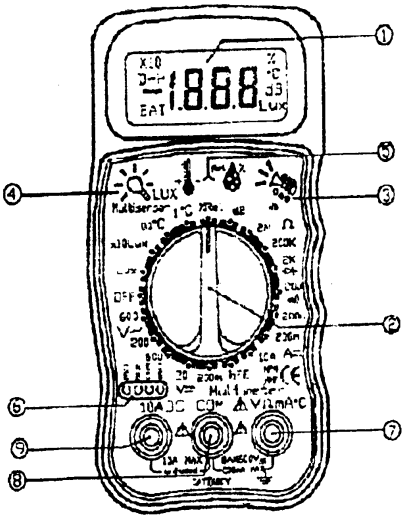
Bedienungsanleitung
Users' Manual
Mode d'emploi

Multisensor-Multimeter 5-in-1
5-in-1 Digital Multimeter with environmental measurments
Multimètre Multisensor 5 en 1
FMM 5


1
2
3
4
5
6
7
8
9
LUX
OFF
10A DC COM
V Ω mA °C

PANEL DESCRIPTION

1) LCD display: 3 1/2 digits LCD display with units of Lux, x10 Lux, °C, %, dB and low battery “BAT” indication
2) Power / Function / Range switch
3) Microphone: Electric condenser microphone inside
4) Photo detector: Long life silicon photo diode inside
5) Humidity & Temperature: Humidity sensor and semiconductor sensor inside
6) Socket for transistor hFE test
7) Socket for V / Ω / mA / °C input jack
8) Socket for “COM“ input jack
9) Socket for 10A input jack

SUPPLIED WITH

Multimeter, 9 VDC battery, measuring cable, temperature sensor, manual

OPTIONAL ACCESSORIES

Flexible wire probe K-type element Ø 2,5 mm, all-purpose probe K-type element Ø 3 mm, flexible steel probe K-type element Ø 2 mm, surface temperature probe K-type element, right angle surface temperature probe K-type element

TECHNICAL DATA

Display	1999 counts LCD display with function of Lux, °C, % and dB indication
Polarity	Automatic, (-) negative polarity indication.
Over-range	“OL” mark indication

Low battery indication	The “BAT” is displayed when the battery voltage drops below the operating level
Measurement rate	1,5 times per second, nominal
Operating temperature	0°C to +50°C at < 70 % relative humidity
Storage temperature	-10°C to +60°C at < 80 % relative humidity
Power	One standard 9V, NEDA1604 or 6F22 battery
Dimensions	122 x 60 x 50 mm
Weight	280 gr

Accuracy is given at 18°C to 28°C, less than 70 % RH.

Sound Level

Measurement range	35-100dB
Resolution	0,1dB
Typical instrument frequency range	30Hz-10KHz
Frequency weighting	C –weighting
Time weighting	Fast
Accuracy	+3,5 dB at 94 dB sound level, 1KHZ sine wave
Microphone	Electric condenser micro-phone

Light

Measuring range	200, 20.000lux (20.000lux range reading x10)
Overrate display	Highest digit of “1” is displayed
Accuracy	+ 5 % rdg + 10 dgts (calibrated to standard incandescent lamp at colour temperature 2856 k)
Repeatability	+ 2 %.
Temperature characteristic	+0,1 % / °C

Photo detector	One silicon photo diode with filter

Humidtiy / Temperature

Measurement range	2 % - 95 % RH
Temperature	-20 - + 200, -20 - +1300
Resolution	0,1 % RH, 0,1 °C, 1°C
Accuracy (after calibration)	
Humidity	+ 5 % RH (at 25°, 35 % - 95% RH)
	+ 6 % RH (at 25°C, 10 % - 35 % RH)
Temperature	+3 % rdg ± 1°C (at -20°C - +200°C)
	+ 3;5 % rdg ± 5 dgts (at 20°C - +1300°C)

Response time	
Humidity	45 % RH → 95 % RH < 10 min.
	95 % RH → 45 % RH < 15 min.
Temperature	1°C / 2 sec

Multimeter

DC Voltage

Range	Resolution	Accuracy
200V	0,1mV	
20V	10mV	+0,5 % of rdg + 2 dgts
600V	1V	+1,0 % of rdg + 2 dgts

Input impedance: 1MΩ
Overload protection: 220Vdc or ac rms. for 200mV range and 600V dc or 600V ac rms. for other ranges.

AC Voltage

Range	Resolution	Accuracy
200V	100mV	+1,2 %of rdg + 10dgts
600V	1V	+1,2 %of rdg + 10dgts

Input impedance: 1MΩ
Frequency range: 45 to 450Hz
Maximum input: 600V dc or 600V ac rms.

DC Current

Range	Resolution	Accuracy
200uA	0,1uA	+1,0 % of rdg + 2 dgts
200mA	100uA	+1,2 % of rdg + 2 dgts
10A	10mA	+2,0 % of rdg + 5 dgts

Overload protection: 0,2A / 250V fuse (10A range unfused).
Measuring voltage drop: 200mV.

Resistance

Range	Resolution	Accuracy
200Ω	0,1 Ω	+0,8 % of rdg + 4 dgts
2 kΩ	1 Ω	+0,8% of rdg + 2 dgts
200 kΩ	100 Ω	
2 MkΩ	1 kΩ	+1,0 % of rdg + 2 dgts

Overload protection: 15 seconds maximum 250V dc or 250V ac rms. on all ranges.
Maximum open circuit voltage: 2,8V.
Transistor hFE
Range: 0~1000
Base current: 10uA dc approx. (Vce=2,8V dc)

Diode and continuity check

Diode: Test current 1,4mA dc and open circuit voltage 2,8V dc.
Continuity: Built-in-buzzer will sound if the circuit resistance is less than 100Ω

Overload protection: 15 seconds maximum 250V dc or 250V ac rms.

OPERATION

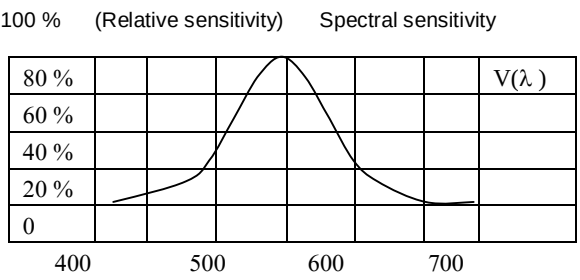
Measuring sound level

1) Turn the power/function/range switch to “dB” position.
2) Remove the meter and face the microphone to sound source in a horizontal position.
3) The C-weighting curve is nearly uniform over the frequency range from 30 to 10,000Hz, thus giving an indication of overall sound level.
4) The fast response is suitable to measure shout bursts and peak values from sound source.
5) The sound level will be displayed.
6) Note: Strong wind (over 10m/sec.) striking the microphone can cause misreading for measurement in windy locations, a wind-screen should be used in front of microphone.

Measuring light (Lux)

1) Turn the power/function/range switch to select the “lux” scale and set the range to desired (“lux” or “x10 lux”) range.
2) Remove the meter and face the photo detector to light source in a horizontal position.
3) Read the illuminance nominal from the LCD display.
4) Over-range: If the instrument only displays one “1” in the M.S.D. the input signal is too strong, and a higher range should be selected.
5) When the measurement is completed, replace the photo detector from the light source.
6) Spectral sensitivity characteristic: To the detector, the applied photo diode with filters makes the spectral sensitivity characteristic almost meet C.I.E. (International Commission on Illumination) photopia curve V (Ω) as the following chart

described.



Recommended illumination

Locations	Lux	
***Office**		
Conference, reception room	200	~ 750
Clerical work	700	~ 1.500
Typing drafting	1.000	~ 2.000
***Factory**		
Packing work, entrance passage	150	~ 300
Visual work at production line	300	~ 750
Inspection work	750	~ 1.500
Electronic parts assembly line	1.500	~ 3.000
***Hotel**		
Public room, cloakroom	100	~ 200
Reception, cashier	200	~ 1.000
***Store**		
Indoors stairs corridor	150	~ 200
Show window, packing table	750	~ 1.500
Forefront of show window	1.500	~ 3.000
***Hospital**		

Sickroom, warehouse	100	~ 200
Medical examination room	300	~ 750
Operating room / Emergency Treatment	750	~ 1.500
***School**		
Auditorium, indoor gymnasium	100	~ 300
Class room	200	~ 750
Laboratory, library, drafting room	500	~ 1.500

Measuring humidity

1) Set the power/function/range switch to “%RH” position.
2) Then the display will show the humidity reading value (%RH) directly.
3) When the tested environment humidity value changes this is due to temperature fluctuation. Wait some minutes and you will get the stable “%RH” reading.

Measuring temperature

1) Set the power/function/range switch to “0,1°C or °C” position.
2) Then the display will show the environment temperature reading value (°C) directly.
3) Connect the black plug of temperature probe the COM jack and red plug to the " V / Ω / mA / °C " jack.
4) Touch the end of the temperature sensor to the area or surface of the object to be measured. The display will show the temperature reading value (°C) directly.

Caution

To avoid damage to the meter, don’t apply input which exceeds the limit shown below:

Function	Red lead connection	Input limits
DCV/ACV	"V/Ω/mA/oC"	600V dc or ac rms.
Ω /CONTINUITY/ DIODE	"V/ Ω//mA/oC"	250V dc or ac rms.
DCA	"V/Ω/mA/oC"	200mA dc or ac rms. (0,2A/250V fuse protected)
A	"10A"	10A dc or ac rms. (10A range unfused)

Measuring voltage

1) Connect the black test lead to the COM jack and red lead to the "V/Ω/mA/oC" jack.
2) Set the function switch at DCV or ACV ranges to be used and connect test leads across the source or load under measurement.
3) Read LCD display. The polarity of red connection will be indicated when making a DC measurement.

Measuring current

1) Connect the black test lead to the COM jack and the red test lead to the "V/Ω/mA/oC" jack for a maximum of 200mA. For a maximum of 10A,move the red lead to the "10A" jack.
2) Set the function switch at uA, mA or A range to be used.
3) Connect test leads in series with the load in which the current is to be measured.
4) Read LCD display. The polarity of red lead connection will be indicated.

Measuring resistance

1) Connect the black test lead to the COM jack and the red test

lead to the “V/Ω/mA/oC” jack.
2) Set the function switch to desired Ω position.
3) Make sure all the power of the circuit to be measured is off.
4) Connect the test leads to the circuit to be measured.
5) The value indicated on the display is the measured value of resistance.

Measuring diode

1) Connect the black test lead to the COM jack and the red test lead to the “V/Ω/mA/oC” jack.
2) Set the function switch to “  ” position.
3) Make sure all the power of the circuit to be measured is off.
4) Connect the test leads to the anode of the diode to be measured and black test lead to cathode.
5) The forward voltage drop in mV will be displayed. If the diode is reversed, figure “1” will be shown.

Measuring transistor hFE

1) Set the function switch to hFE position.
2) Determine whether the transistor is NPN or PNP type and locate the emitter, base and collector leads. Insert the leads into the proper holes of hFE socket on the front panel.
3) The meter will display the approximate hFE value at the condition of base current 10uA and Vce 2,8V.

Audible continuity test

1) Connect the black test lead to the COM jack and the red test lead to the “V/Ω/mA/°C” jack.
2) Set the function switch to “·)))” position.
3) Connect test leads to two points of circuit to be tested. If the resistance is lower than 100 ohm, buzzer will sound.

SAFTEY INSTRUCTIONS

The following safety information must be observed to insure maximum personal safety during the operation at this meter:

- Please follow up instructions given in operator's manual.
- Carefully read users' manual before operation.
- Do not open instrument housing. Repairs should be carried out by authorized workshops only. Please contact your local dealer.
- Do not remove warning labels or safety instructions.
- Keep instrument away from children.
- Do not use the instrument in explosive environment.
- Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.
- Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.
- Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
- Use caution when working above 60V dc or 30V ac rms. such voltages pose a shock hazard.
- When using the probes, keep your fingers behind the finger guards on the probes.
- Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage limits as stated on the front of the meter.
- General precautions in handling electrical current have to be observed.

SAFETY SYMBOLS

Indicates operators must refer to the explanation in this manual.

Indicates terminals at which dangerous voltage May be present.

WARRANTY

- This product is warranted by the manufacturer to the original purchaser to be free from defects in material and workmanship under normal use for a period of two (2) years from the date of purchase.
- During the warranty period, and upon proof of purchase, the product will be repaired or replaced (with the same or similar model at manufacturers option), without charge for either parts or labour.
- In case of a defect please contact the dealer where you originally purchased this product.
- The warranty will not apply to this product if it has been misused, abused or altered.
- Without limiting the foregoing, leakage of the battery, bending or dropping the unit are presumed to be defects resulting from misuse or abuse.

EXCEPTIONS FROM RESPONSIBILITY

- The user of this product is expected to follow the instructions given in operators' manual. Although all instruments left our warehouse in perfect condition and adjustment the user is expected to carry out periodic checks of the product's accuracy and general performance.
- The manufacturer, or its representatives, assumes no responsibility of results of a faulty or intentional usage or misuse including any direct, indirect, consequential damage, and loss of profits.
- The manufacturer, or its representatives, assumes no responsibility for consequential damage, and loss of profits by any disaster (earthquake, storm, flood etc.), fire, accident, or an act of a third party and/or a usage in other than usual conditions.
- The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits due to a change of data, loss of data and interruption of business etc., caused by using the product or an unusable product.
- The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits caused by usage other than explained in the users' manual.
- The manufacturer, or its representatives, assumes no responsibility for damage caused by wrong movement or action due to connecting with other products.