Prüf- und Messtechnik

Spitzentechnologie, die überzeugt

Bedienungsanleitung

„5 in 1“ Digital-Multitester

1. Safety precautions

This product complies with the requirements of the following European Community Directives: 2004/108/EC (Electromagnetic Compatibility) and 2006/95/EC (Low Voltage) as amended by 2004/22/EC (CE-Marking).
Overvoltage category III 600V; pollution degree 2.

CAT I:For signal level, telecommunication, electronic with small transient over voltage

CAT II: For local level, appliances, main wall outlets, portable equipment

CAT III: Supplied from a cable under earth; fixed installed switches, automatic cut-off or main plugs

CAT IV: Units and installations, which are supplied overhead lines, which are stand in a risk of persuade of a lightning, i.e. main-switches on current input, overvoltage-diverter, current use counter.

To ensure safe operation of the equipment and eliminate the danger of serious injury due to short-circuits (arcing), the following safety precautions must be observed.

Damages resulting from failure to observe these safety precautions are exempt from any legal claims whatever.

* Do not use this instrument for high-energy industrial installation measurement.
* Do not place the equipment on damp or wet surfaces.
* Do not exceed the maximum permissible input ratings of 600V AC/DC and 10A (danger of serious injury and/or destruction of the equipment).
* The meter is designed to withstand the stated max voltages. If it is not possible to exclude without that impulses, transients, disturbance or for

other reasons, these voltages are exceeded a suitable presale (10:1) must be used.

* Replace a defective fuse only with a fuse of the original rating. Never short-circuit fuse or fuse holding.
* Disconnect test leads or probe from the measuring circuit before switching modes or functions.
* Do not conduct voltage measurements with the test leads connected to the mA/A- and COM-terminal of the equipment.
* The 10A-range is protected. To avoid damage or injury, use the meter only in circuits limited by fuse or circuit breaker to 10A or 2000VA.
* To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements.
* Do not conduct current measurements with the leads connected to the V/Ω-terminals of the equipment.
* Check test leads and probes for faulty insulation or bare wires before connection to the equipment.
* To avoid electric shock, do not operate this product in wet or damp conditions. Conduct measuring works only in dry clothing and rubber shoes, i. e. on isolating mats.
* Never touch the tips of the test leads or probe.
* Comply with the warning labels and other info on the equipment.
* The measurement instrument is not to be to operated unattended.
* Always start with the highest measuring range when measuring unknown values.
* Do not subject the equipment to direct sunlight or extreme temperatures, humidity or dampness.
* Do not subject the equipment to shocks or strong vibrations.
* Do not operate the equipment near strong magnetic fields (motors, transformers etc.).
* Keep hot soldering irons or guns away from the equipment.
* Allow the equipment to stabilize at room temperature before taking up measurement (important for exact measurements).
* Do not input values over the maximum range of each measurement to avoid damages of the meter.
* Do not turn the rotary function switch during voltage or current measurement, otherwise the meter could be damaged.

* Use caution when working with voltages above 35V DC or 25V AC. These Voltages pose shock hazard.
* Replace the battery as soon as the battery indicator "BAT" appears. With a low battery, the meter might produce false reading that can lead to electric shock and personal injury.
* Fetch out the battery when the meter will not be used for long period.
* Periodically wipe the cabinet with a damp cloth and mid detergent. Do not use abrasives or solvents.
* The meter is suitable for indoor use only
* Do not operate the meter before the cabinet has been closed and screwed safely as terminal can carry voltage.
* Do not store the meter in a place of explosive, inflammable substances.
* Do not modify the equipment in any way
* Do not place the equipment face-down on any table or work bench to prevent damaging the controls at the front.
* Opening the equipment and service – and repair work must only be performed by qualified service personnel
* - **Measuring instruments don't belong to children hands -**

Cleaning the cabinet

Clean only with a damp, soft cloth and a commercially available mild household cleanser. Ensure that no water gets inside the equipment to prevent possible shorts and damage to the equipment

1.1. Input limits

DCV	600V DC/AC_{rms}
ACV	600V DC/AC_{rms}
µA/mA DC/AC	500mA / 660V
10 A DC/AC	10A/ 600V
Resistance	600V DC/AC_{rms}
Capacity	600V DC/AC_{rms}
Frequency	600V DC/AC_{rms}
Duty Cycle	600V DC/AC_{rms}
Temperature	600V DC/AC_{rms}
Diode – and Continuity-Test	600V DC/AC_{rms}

1.2. Multimeter Safety

Be sure to follow the WARNINGS in this manual. Erroneous use may put human bodies in danger.

The following legend applied to this manual:

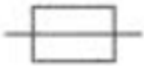
Dangerous voltage (take care not to get an electric shock in voltage measurement)

Ground (allowable applied voltage range between the input terminal and earth)

Refer to the instruction manual (very important description for safe use)

⎓ Direct current (DC)

~ Alternating current (AC)

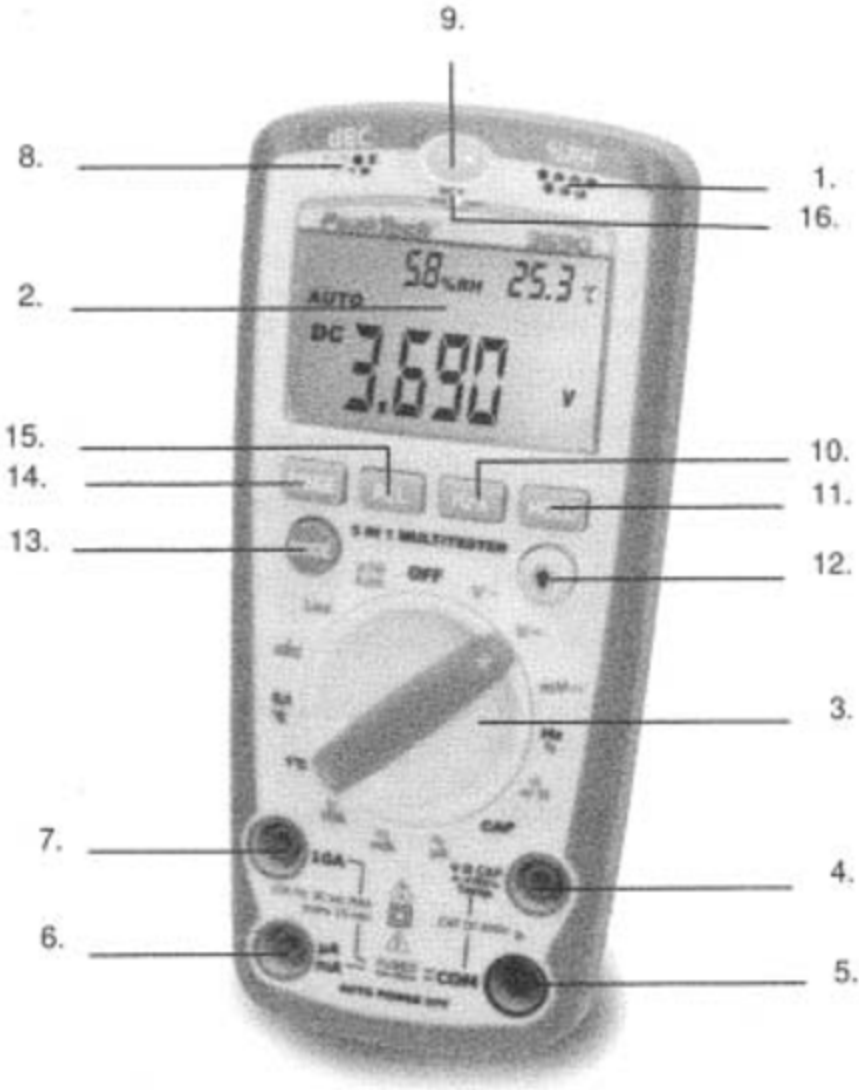
 Replace fuses with amp/voltrating shown

 Double insulation (Protection class II)

2. Features

- 14 positions "easy to use" rotary switch for function and range selection
- 15 mm high contrast multiline LCD with backlight
- Automatic overrange indication with the "OL" displayed
- Automatic polarity indication on DC ranges
- All ranges fully protected
- Diode testing & Audible continuity test
- Sound-Level Meter in dBC weighting
- Lux-Meter up to 40.000 Lux
- Humidity Meter with integrated sensor
- Temperature Meter for air temperature
- Universal temperature measurement with supplied wire probe
- High precision multimeter functions
- Complies with latest safety standards

3. Front Panel Description



1.) Humidity & Temperature: Humidity Sensor and Semiconductor Sensor inside for Indoor.
2.) LCD display: 3 4/5 digits LCD display
3.) Function switch
4.) V/Hz%/Ω/Cap/℃ input jack
5.) COM input jack
6.) uA/mA input jack
7.) 10A input jack
8.) Microphone: Electric condenser microphone inside.
9.) Photo Detector: Long life silicon photo diode inside.
10.) Hz/% button. The button at AC/DC Voltage measurement and AC/DC Current measurement and Hz % measurement Function is availability
11.) Hold button
The HOLD function allows the meter to "freeze" a measurement for later reference. Press the HOLD button to "freeze" the reading on the indicator. The "HOLD" message will be appear in the display.
12.) Backlight button
Press the backlight button for LCD light, again Press the backlight button to exit light mode.
13.) MODE button
The button to select AC or DC measurement when in A, mA, uA and Ω, ⊣►⊢, •))) ranges.
14.) Range button
The button to select AC or DC measurement when in Voltage, Ω ranges.
15.) REL button
The relative measurement feature allows you to make measurements
relative to a stored reference value. A reference voltage, current, Capacitor, etc. can be stored and measurements made in comparison to that value. The displayed value is the difference between the reference value and the measured value.
* Perform the measurement as described in the operating instructions.
* Press the REL button to store the reading in the display and the "REL" indicator will appear on the display.

* The display will now indicate the difference between the stored value and the measured value.
* Press the REL button to exit the relative mode.

16.) NCV indicate lamp

4. Specifications

Accuracies are: (% of reading + no. of digits) guaranteed for 1 year, 23°C +/- 5°, less than 75% RH

4.1. DC Voltage

Range	Resolution	Accuracy
400 mV	0,1 mV	+/-1,0% rdg. + 4 dgt.
4 V	1 mV	
40 V	10 mV	
400 V	100 mV	+/-1,5% rdg. + 4 dgt.
600 V	1 V	

Overload protection: 600V DC / AC_{rms}
Input Impedance: 10MΩ

4.2. AC Voltage

Range	Resolution	Accuracy
400 mV	0,1 mV	+/-1,5% rdg. + 15 dgt
4 V	1 mV	+/-1,0% rdg. + 4 dgt.
40 V	10 mV	
400 V	100 mV	+/-1,5% rdg. + 4 dgt
600 V	1 V	+/-2,0% rdg. + 4 dgt.

Overload protection: 600V DC / AC_{rms}
Frequency Range: 50 – 400Hz
Input Impedance: 10MΩ

4.3. DC Current

Range	Resolution	Accuracy
400 µA	0,1 µA	+/-1,0% rdg. + 2 dgt.
4000 µA	1 µA	
40 mA	10 µA	
400 mA	100 µA	
4 A	1 mA	+/-1,2% rdg. + 2 dgt.
10 A	10 mA	+/-2,0% rdg. + 5 dgt.

Overload protection:
µA/mA Ranges: 500mA/660V
10A Range: 10A/ 600V

4.4. AC Current

Range	Resolution	Accuracy
400 µA	0,1 µA	+/-1,2% rdg. + 2 dgt.
4000 µA	1 µA	
40 mA	10 µA	
400 mA	100 µA	+/-1,5% rdg. + 2 dgt.
4 A	1 mA	+/-2,0% rdg. + 5 dgt.
10 A	10 mA	

Overload protection:
µA/mA Ranges: 500mA/660V
10A Range: 10A/ 600V fuse (quick acting)
Frequency Range: 50 – 400 Hz

Range	Resolution	Accuracy
400 Ω	0,1 Ω	+/-1,5% rdg. + 4 dgt.
4 kΩ	1 Ω	+/-1,2% rdg. + 2 dgt.
40 kΩ	10 Ω	
400 kΩ	100 Ω	
4 MΩ	1 kΩ	+/-2,0% rdg. + 2 dgt.
40 MΩ	10 kΩ	+/-2,5% rdg. + 2 dgt.

Open circuit voltage: 2,8V
Overload protection: 600V DC/AC_{rms}

4.6. Capacitance

Range	Resolution	Accuracy
40 nF	10 pF	+/-5,0% rdg. + 20 dgt.
400 nF	0,1 nF	+/-3,0% rdg. + 5 dgt.
4 µF	1 nF	
40 µF	10 nF	
100 µF	100 nF	+/-4,0% rdg. + 5 dgt.

Overload protection: 600V DC/AC_{rms}

4.7. Frequency

Range	Resolution	Accuracy
5.000 Hz	1 mHz	+/-1,2% rdg. + 3 dgt.
50.00 Hz	10 mHz	
500.0 Hz	0,1 Hz	
5.000 kHz	1 Hz	
50.00 kHz	10 Hz	
500.0 kHz	100 Hz	
10.00 MHz	1 kHz	+/-1,5% rdg. + 4 dgt.

Sensivity:
> $0,5V_{rms}$ ≤ 1MHz
> $3V_{rms}$ >1MHz
Overload Protection: 600V DC/AC_{rms}

4.8. Diode and Continuity Test

Range	Description	Test condition
	displaying approximate forward voltage of diode	Forward DC current : 1,4mA DC voltage: 2,8V
)))	Built-in buzzer will sound if resistance is lower than 50Ω	Oben circuit voltage: ~ 2,8V DC

Overload protection: 600V DC/AC_{rms}

4.9. Duty

Range	Resolution	Accuracy
0,1 ... 99,9 %	0,1 %	+/-3,0%

4.10. Relative Humidity (on RH and humidity display)

Range	Resolution	Accuracy
33 ... 99 %	1 % RH	+/-3% + 5% RH

Operating temperature: 0°C ... 50°C
Sampling Period: ~20s.

4.11. Temperature (room temperature)

Range	Resolution	Accuracy
0°C ... 50°C	0,1°C	+/-3% rdg + 3°C

Sampling Period: ~20s.

4.12. Temperature (thermocouple at main display)

Range	Resolution	Accuracy	
°C	0,1°C	-20°C... 400°C	+/-3% rdg. + 3°C
	1°C	-20°C...1300°C	+/-3% rdg. + 3°C

Overload protection: 600V DC/AC_{rms}

4.13. Sound Level (dB)

Range	Resolution	Accuracy
35 – 100 dB	0,1 dB	+/-5 dB at 94dB, 1kHz sine wave

typical instrument frequency range: 30Hz ~ 10kHz
Weighting: C

4.14. Luminance (LUX)

Range	Resolution	Accuracy
4000 Lux	1 Lux	+/-5,0% rdg. + 10 dgt.
40000 Lux (x10Lux)	10 Lux	

Repeatability : +/- 2%

5. General Characteristics

Display	15mm LCD display, 3999 counts (3 3/4 digits) with automatic polarity indication
Overrange indication	"OL" Figure only in the display
Common mode voltage	max. 600V DC/600V AC_{eff}
Reading rate time	2,5 readings per sec. (approx.)
Temperature for guaranteed accuracy	23° C ± 5° C
Operating Temperature Storage Temperature	0° C...40° C, 32° F....104° F;<70%RH -10° C...50° C, 14° F...122° F;<80%RH
Power Supply	9V-batteries (NEDA 1604)
Low Battery Indication	 on the left of display
Size (WxHxD)	78 x 170 x 48 mm
Weight	335 g incl. Holster
Accessories	test leads, holster, battery, operation manual and temperature probe

6. Operation

6.1. Preliminary Note

1. Check the batteries by turning to any position. If the batteries are weak, a  sign will appear on the left of display. If this does not appear on the display proceed as below. See "Maintenance" if the batteries have to be replaced.

   Please use only 4mm-safety test leads to ensure immaculate functions.

2. The warning sign next to the test leads jack is for warning that the input voltage or current should not exceed the indicated values. This is to prevent damage to the internal circuitry.

3. The function switch should be set to the range which you want to test before operation.

6.2. DC Voltage Measurement

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω - jack.

2. Set the Function switch to mV ⎓ or V ⎓

3. Select DC by pressing the "SELECT" button.

4. Connect the test leads across the source or load under measurement.

Note:

1. If the voltage range is not known beforehand set the function switch to the highest range and work down.

2. When only the figure "OL" is displayed, overrange is being indicated and you must be set to a higher range.

3. **CAUTION**: Do not apply more than 600V to the input. Indication is possible at higher voltages but there is danger of damaging the internal circuitry.

4. Use extreme caution to avoid contact with high tension circuits when measuring high voltage.

6.3. AC Voltage Measurement

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω- jack.

2. Set Function Switch to V ~.

3. Connect the test leads across the source of load under measurement.

Note:

1. If the voltage range is not known beforehand set the function switch to the highest range and work down.

2. **Caution**: Do not apply more than 600V_{rms} to the input. Indication is possible at higher voltages but there is danger of damaging the internal circuitry.

3. Use extreme caution to avoid contact with high tension circuits when measuring high voltage.

6.4. DC Current Measurement

1. Connect the black test lead to the COM jack and the red test lead to the µA/mA- jack for a max. of 400mA. For a maximum of 10A, move the red test lead to the 10A jack.

2. Set the Function switch to the µA/mA or 10A range to be used and connect the test leads in series with the load under measurement

3. Select DC by pressing the "MODE" button.

Note:

1. If the current range is not known beforehand, set the FUNCTION switch to the highest range and work down.

2. When only the figure "OL" is displayed overrange is being indicated and the FUNCTION switch must be set at higher range.

3. **Caution**: The maximum input current is 400mA, or 10A depending upon the jack used. Excessive current will blow the fuse which must be replaced.

6.5. AC Current measurement

1. Connect the black test lead to the COM jack and the red test lead to the µA/mA jack for a max. of 400mA. For a maximum of 10A, move the red test lead to the 10 A jack.

2. Set the function switch to the µA/mA or 10A range to be used and connect the test leads in series with the load under measurement.

3. Select DC by pressing "MODE"-button.

Note:

1. If the current range is not known beforehand, set the FUNCTION switch to the highest range and work down.

2. When only the figure "OL" is displayed overrange is being indicated and the FUNCTION switch must be set at higher range.

3. **Caution**: The maximum input current is 400mA, or 10A depending upon the jack used. Excessive current will blow the fuse which must be replaced.

6.6. Resistance Measurement

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω - jack. (Note: The polarity of the red test lead is "+")

2. Set the Function switch to the " Ω/  " -function.

3. Select Ω -function by pressing "MODE"-button.

4. Connect the test leads across the resistance under measurement.

Note:

1. If the resistance value being measured exceeds the maximum voltage of the range selected, an overrange indication will be displayed ("OL"). Select a higher range. For resistance approx. 1 MΩ and above, the meter may take a few seconds to stabilise. This is normal for high resistance readings.

2. When the input is not connected, i. e. at open circuit, the figure "OL" will be displayed for the overrange condition.

3. When checking in-circuit resistance, be sure the circuit under test has all power removed and that all capacitors are fully discharged.

6.7. Capacitance measurements

Caution!

Turn off power and discharge the capacitor before attempting a capacitance measurement. Use the DCV function to confirm that the capacitor is discharged.

1. Set the Function switch to "CAP"-position.

2. Connect the red test lead to the V/Ω -input jack and the black test lead to the COM-input jack.

3. Connect the test leads to the capacitor. Observe polarity when measuring polarized capacitors.

3. Read the capacitance directly from the display. A shorted capacitor will indicate an overrange. An open capacitor will indicate near zero on all ranges.

6.8. Diode Measurement

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω - jack. (Note: the polarity of the red test lead is "+")

2. Set the function switch to the "Ω/ /·))) "- range.

3. Select Diode-function by pressing "MODE"-button.

4. Connect the test leads across the diode under measurement.

Note:

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

2. There is 1mA Current flow through the device under test.

3. The meter displays the forward voltage drop in millivolts, and overload when the diode is reversed.

6.9. Audible Continuity Test

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω- jack.

2. Set the Function switch to " Ω /  / ·))) " range and connect the test leads across the resistance under measurement.

3. Select continuity-function by pressing "MODE"-button.

4. Buzzer sounds if the resistance between two prods is less than approx. 50Ω.

Note:

1. When the input is not connected, i. e. at open circuit, the Figure "OL" will be displayed for the overrange indication.

2. The circuit to be tested must be in power off status during the continuity check.

6.10. Measuring Sound Level

1. Set the function to „dBC" Position.

2. Face the microphone to sound source in a horizontal position.

3. The C-weighting curve is nearly uniform over the frequency range from 30Hz to 10.000kHz, 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.

6.11. Measuring Light

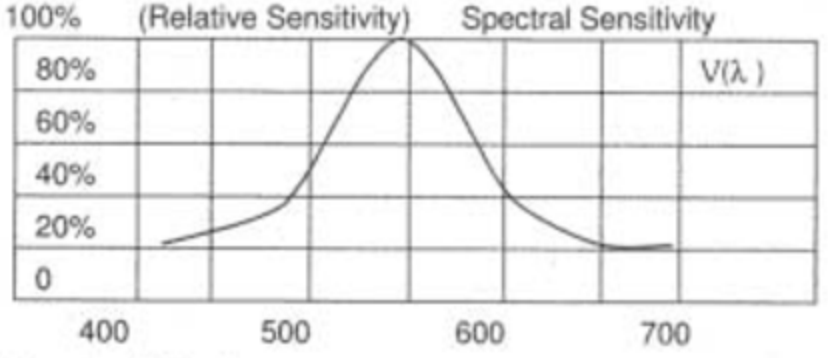
1. Set the function switch to „Lux"-position and set the range to desired („lux" or „10 x lux") range.

2. Face the photo detector to light source in a horizontal position.

3. Read the illuminance nominal from the LCD-display.

4. Overrange: If the instrument only display one „OL" in the LCD the input signal is too strong, and a higher range should be selected.

6.12. Measuring Light



Locations	LUX
Office	
Conference, Reception room	200 - 700
Clerical work	700 - 1500
Typing drafting	1000 - 2000
Factory	
Packing work, Entrance passage	150 - 300
Visual work at production line	300 - 750
Inspection work	750 - 1500
Electronic parts assembly line	1500 - 3000
Hotel	
Public room, Cloakroom	150 - 200
Reception, Cashier	200 - 1000
Store	
Indoors Stairs Corridor	150 - 200
Show window, Packing table	750 - 1500
Forefront of show window	1500 - 3000
Hospital	
Sickroom, Warehouse	100 - 200
Medical Examination room	300 - 750
Operating room, Emergency Treatment	750 - 1500
School	
Auditorium, Indoor Gymnasium	100 - 300
Class room	200 - 750
Laboratory Library Drafting room	500 - 1500

6.13. Measuring Humidity

1. Turn on the meter
2. The display will show the humidity reading value (%RH) directly.
3. When the tested environment humidity value changed, it needs a few minutes to get the stable „%RH" reading.

Warning!
Don´t expose the humidity sensor to direct sunlight.
Don´t touch or manipulate the humidity sensor.

6.14. Measuring Temperature

1. Set the function switch to "1℃ or 0,1℃" position.

2. Connect the black plug of temperature probe the COM-jack and red plug to the "V/ Ω" jack".

3. 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 (℃) directly.

Warning!

When function switch on temperature range, never attempt a voltage measurement.

6.15. Non-Contact AC voltage test (NCV):

* Set the function switch to the ON position
* Remove the meter and face the NCV detector to ACV source.
* If source voltage in 50-600V the NCV indicate lamp will light.

7. Maintenance

Installing the battery

Your meter requires a 9V-battery for power. The battery-symbol appears when the battery voltage drops to certain limits. For correct operation, replace the battery as soon as possible. Continued use with a low battery will lead to errors in readings.

WARNING!

To avoid electric shock, disconnect all leads from any equipment before you remove or install the battery.

Follow these steps to install the battery.

1. Turn off the power and disconnect all test leads.

2. Remove the back cover by unscrewing the two screws of the battery compartment and pull it off.

3. Remove the used battery.

4. Place the new battery inside the insulation capsule and snap it onto place.

WARNING!

Do not discard the provided battery insulation capsule. If you do not use this insulation capsule properly, it might cause damage or injury.

WARNING!

Do not operate the meter until you replace the batteries and close the battery compartment cover.

Statutory Notification about the Battery Regulations

The delivery of many devices includes batteries, which for example serve to operate the remote control. There also could be batteries or accumulators built into the device itself. In connection with the sale of these batteries or accumulators, we are obliged under the Battery Regulations to notify our customers of the following:

Please dispose of old batteries at a council collection point or return them to a local shop at no cost. The disposal in domestic refuse is strictly forbidden according to the Battery Regulations. You can return used batteries obtained from us at no charge at the address on the last side in this manual or by posting with sufficient stamps.

Batteries, which contain harmful substances, are marked with the symbol of a crossed-out waste bin, similar to the illustration shown left. Under the waste bin symbol is the chemical symbol for the harmful substance, e.g. „Cd" for cadmium, „Pb" stands for lead and „Hg" for mercury.

You can obtain further information about the Battery Regulations from the Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit *(Federal Ministry of Environment, Nature Conservation and Reactor Safety)*.

Replacing the fuse

WARNING!

To avoid electric shock, disconnect all the test probes before removing the fuse. Replace only with the same type of fuse. Service should be performed only by qualified personnel.

CAUTION!
For continued protection against fire or other hazard, replace only with fuse of the specified voltage and current ratings.

Follow these steps to replace the fuse:

1. Turn ON/OFF button to turn the meter off and disconnect the test probes.
2. Remove the back cover by unscrewing the 6 screws and pulling off the back cover.
3. Remove the blown fuse.
4. Install the new fuse in the fuse compartment.
   FF 500mA/600V; 5 x 20mm
   F 10A/600V; 6,3 x 32mm
5. Replace the battery compartment and secure it with the screws.

WARNING!
Do not operate your meter until the back cover is in place and fully closed.

This manual is according the latest technical knowing. Technical changings which are in the interest of progress reserved.