

# **PeakTech**<sup>®</sup>

## **Prüf- und Messtechnik**

 **Spitzentechnologie, die überzeugt**



**PeakTech**<sup>®</sup> **3355 / 3360**

**Bedienungsanleitung /  
operation manual /  
Mode d'emploi /  
Istruzioni per l'uso /  
Manual de instrucciones**

**Digital Multimeter /  
Multimètre digital /  
Multimetro digitale /  
Multímetro digital**

# 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 1000V; over-voltage category IV 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: Distribution level, fixed installation, with smaller transient over-voltages than CAT IV.

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, over-voltage-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. This instrument is intended for use in installation over-voltage category III.
- \* Do not exceed the maximum permissible input ratings (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 prescale (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/ $\Omega$ -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.
- \* 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 35 V DC or 25 V 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 mild 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.**

### 1.1. Input limits

Input limits	1000 V DC/AC <sub>rms</sub> less than 10 sec.
mA range AC/DC	400 mA AC/DC 1000 V / 0,5 A (fused)
A range	10 A AC/DC 1000 V / 10 A (fused)
Frequency, Resistance, Capacitance, Duty Cycle, Diode test, Continuity and Temperature	600 V AC/DC <sub>rms</sub> (P 3355) 1000 V AC/DC <sub>rms</sub> (P 3360)

## 1.2. Safety Symbols



This symbol adjacent to another symbol, terminal or operating device indicates that the operator must refer to an explanation in the operating instructions to avoid personal injury or damage to the meter.



This symbol advises the user that the terminals so marked must not be connected to a circuit point at which the voltage, with respect to earth ground, exceeds (in this case) 1000 V AC or VDC



This symbol adjacent to one or more terminals identifies them as being associated with ranges that may, in normal use, be subjected to particularly hazardous voltages. For maximum safety, thermometer and its test leads should not be handled when these terminals are energized.



Indicates protection class II, double insulation

**IP67** Dust- and waterproof

**$\mu$ A** The maximum current that can measure with this

**mA** terminal is 400 mA AC/DC. This terminal is protected by 500 mA/1000 V fuse

**A** The maximum current that can measure with this terminal is 10 A AC/DC. This terminal is protected by 10 A/1000 V fuse.

## **CAUTION!**

**Note on using the supplied safety test leads according the IEC / EN 61010-031:2008:**

Measurements in the field of overvoltage category CAT I or CAT II can be performed with test leads without sleeves with a maximum of up to 18mm long, touchable metallic probe, whereas for measurements in the field of overvoltage category CAT III or CAT IV test leads with put on sleeves, printed with CAT III and CAT IV must be used, and therefore the touchable and conductive part of the probes have only max. 4mm of length.

## **CAUTION !**

This CAUTION symbol indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury, or damage to the product or other property.

## **2. Technical Data**

### **2.1. Specifications**

Display

P 3355

26 mm , 3  $\frac{3}{4}$  digit, 4000 counts with automatic polarity indication and backlight

P 3360

19 mm, 4  $\frac{3}{4}$  digit, 40000 county with automatic polarity indication, backlight and 42 segment bargraph

Overrange indicaton:

"OL"

Low battery indication:

Battery symbol indicates low battery condition (P 3360)

Measuring rate:

2 times / sec.

## Auto / manual Ranging

Auto power off:	about 15 min.
<u>P 3360</u> :	It is possible to turn off the APO (find on page 53)
Overload protection:	on all ranges
measuring functions:	True RMS measurement (only P 3360) Auto- or manual range selection Data Hold Relative zero Min/Max and Peak-Hold (only P 3360)
Overload protection:	on all ranges
Operating Temperature:	41 °F to 104 °F (5 °C to 40 °C)
Storage Temperature:	-4 °F to 140 °F (-20...+60 °C)
Accuracy Temperature:	64 °F to 82 °F (18 °C to 28 °C) to maintain guaranteed accuracy
Relative Humidity:	< 80% operating
Dimensions (W x H x D):	85 x 185 x 55 mm
Weight:	approx. 400 g
Power source:	9 V battery (Neda 1604)
Accessories supplied:	Operation manual, test leads, socket seals, Battery, K-type thermocouple, Adaptor for thermocouple, carrying case

## 2.2. Electrical Specifications

### DC Volts

Model	Range	Resolution	Accuracy
P 3355	400 mV	100 $\mu$ V	$\pm 0,5\%$ rdg. + 2 dgt
	4 V	1 mV	
	40 V	10 mV	
	400 V	100 mV	
	1000 V	1 V	$\pm 1,5\%$ rdg. + 2 dgt
P 3360	400 mV	10 $\mu$ V	$\pm 0,06\%$ rdg. + 2 dgt
	4 V	100 $\mu$ V	
	40 V	1 mV	
	400 V	10 mV	
	1000 V	100 mV	$\pm 0,1\%$ rdg. + 5 dgt

Overload protection

1000V AC/DC<sub>rms</sub>

Input Impedance:

(P 3355) 7,8 M $\Omega$  / (P 3360) 10 M $\Omega$

### AC Volts

Model	Range	Resolution	Accuracy
P 3355	400 mV	100 $\mu$ V	$\pm 1,0\%$ rdg. + 5 dgt
	4 V	1 mV	
	40 V	10 mV	
	400 V	100 mV	
	1000 V	1 V	$\pm 1,0\%$ rdg. + 3 dgt
P 3360	400 mV	100 $\mu$ V	$\pm 1,0\%$ rdg. + 5 dgt
	4 V	1 mV	
	40 V	10 mV	
	400 V	100 mV	
	1000 V	1 V	$\pm 1,0\%$ v.M. + 3 dgt

Overload protection

1000V AC/DC<sub>rms</sub>

Input Impedance:

(P 3355) 7,8 M $\Omega$  / (P 3360) 3 M $\Omega$

AC Response:

(P 3355) 50 to 400Hz / (P 3360) 50 to

1000Hz



## DC Current

Model	Range	Resolution	Accuracy
P 3355	400 $\mu$ A	0,1 $\mu$ A	$\pm 1,0$ % rdg. + 3 dgt.
	4000 $\mu$ A	1 $\mu$ A	.
	40 mA	10 $\mu$ A	$\pm 1,5$ % rdg. + 3 dgt.
	400 mA	100 $\mu$ A	
	10 A	10 mA	$\pm 2,5$ % rdg. + 5 dgt.
P 3360	400 $\mu$ A	0,01 $\mu$ A	.
	4000 $\mu$ A	0,1 $\mu$ A	.
	40 mA	1 $\mu$ A	$\pm 1,0$ % rdg. + 3 dgt.
	400 mA	10 $\mu$ A	
	10 A	1 mA	

Overload protection:

0,5A / 1000V and 10A / 1000V

Max. Input:

400mA DC on mA – ranges and

10A on A – range

## AC current

Model	Range	Resolution	Accuracy
P 3355	400 $\mu$ A	0,1 $\mu$ A	$\pm 1,5$ % rdg. + 5 dgt.
	4000 $\mu$ A	1 $\mu$ A	.
	40 mA	10 $\mu$ A	$\pm 1,8$ % rdg. + 5 dgt.
	400 mA	100 $\mu$ A	
	10 A	10 mA	$\pm 3,0$ % rdg. + 7 dgt.
P 3360	400 $\mu$ A	0,1 $\mu$ A	.
	4000 $\mu$ A	1 $\mu$ A	.
	40 mA	10 $\mu$ A	$\pm 1,5$ % rdg. + 3 dgt.
	400 mA	100 $\mu$ A	
	10 A	10 mA	

Overload protection:

0,5A / 1000V and 10A / 1000V

Max. input:

400mA DC on mA – Range and

10A on A – Range

AC Response :

(P 3355) 50 to 400Hz /

(P 3360) 50 to 1000Hz

## Resistance

Model	Range	Resolution	Accuracy
P 3355	400 $\Omega$	100 m $\Omega$	$\pm 1,2\%$ rdg. + 4 dgt.
	4 k $\Omega$	1 $\Omega$	$\pm 1,0\%$ rdg. + 2 dgt.
	40 k $\Omega$	10 $\Omega$	.
	400 k $\Omega$	100 $\Omega$	$\pm 1,2\%$ rdg. + 2 dgt
	4 M $\Omega$	1 k $\Omega$	.
	40 M $\Omega$	10 k $\Omega$	$\pm 2,0\%$ rdg. + 3 dgt.
P 3360	400 $\Omega$	10 m $\Omega$	$\pm 0,3\%$ rdg. + 9 dgt.
	4 k $\Omega$	100 m $\Omega$	$\pm 0,3\%$ rdg. + 4 dgt.
	40 k $\Omega$	1 $\Omega$	
	400 k $\Omega$	10 $\Omega$	
	4 M $\Omega$	100 $\Omega$	
	40 M $\Omega$	1 k $\Omega$	$\pm 2,0\%$ rdg. + 10 dgt.

Overload protection: 600 V DC/AC<sub>rms</sub>

## Capacitance

Model	Range	Resolution	Accuracy
P 3355	4 nF	1 pF	$\pm 5,0\%$ rdg. + 20 dgt
	40 nF	10 pF	$\pm 5,0\%$ rdg. + 7 dgt
	400 nF	100 pF	$\pm 3,0\%$ rdg. + 5 dgt
	4 $\mu$ F	1 nF	
	40 $\mu$ F	10 nF	$\pm 5,0\%$ rdg. + 5 dgt
	100 $\mu$ F	100 nF	
P 3360	40 nF	1 pF	$\pm 3,5\%$ rdg. + 40 dgt
	400 nF	10 pF	$\pm 3,5\%$ rdg. + 10 dgt
	4 $\mu$ F	100 pF	
	40 $\mu$ F	1 nF	
	400 $\mu$ F	10 nF	
	4000 $\mu$ F	100 nF	$\pm 5,0\%$ rdg. + 10 dgt
40 mF	1 $\mu$ F		

Overload protection: 600 V DC/AC<sub>rms</sub>

## Frequency

Model	Range	Resolution	Accuracy
P 3355	10 Hz	1 mHz	± 1,5% rdg. +5 dgt
	100 Hz	10 mHz	
	1000 Hz	100 mHz	± 1,2% rdg.+3 dgt
	10 kHz	1 Hz	
	100 kHz	10 Hz	
	1000 kHz	100 Hz	±1,5% rdg.+4dgt
	10 MHz	1 kHz	
P 3360	40 Hz	1 mHz	± 0,1% rdg. +1 dgt
	400 Hz	10 mHz	
	4 kHz	100 mHz	
	40 kHz	1 Hz	
	400 kHz	10 Hz	
	4 MHz	100 Hz	
	40 MHz	1 kHz	
	100 MHz	10 kHz	not specified

Overload protection:

600 V DC/AC<sub>rms</sub>

Sensitivity:

<0,5V RMS at ≤1MHz /

>3V RMS at >1MHz (P 3355)

Sensitivity:

<0,8V RMS at ≤100kHz /

>5V RMS at >100kHz (P 3360)

## Duty cycle

Model	Range	Resolution	Accuracy
P 3355	0,1...99,9 %	0,1%	$\pm 1,2\%$ rdg. +2 dgt.
	Pulse width: >100 $\mu$ s, < 100 ms Frequency: 5Hz-150kHz Sensitivity: <0,5V <sub>rms</sub>		
P 3360	0,1...99,9 %	0,01%	+/- 1,2% rdg. +2 dgt.
	4-20mA% -25...125%	0,01%	+/-50 dgt.
		0 mA = -25%; 4 mA = 0 %; 20 mA = 100 %, 24 mA = 125 %	
Pulse width: >100 $\mu$ s, < 100 ms Frequency: 5Hz-150kHz Sensitivity: <0,5V <sub>rms</sub>			

Overload protection: 600 V DC/AC<sub>rms</sub>

## Temperature

Model	Range	Resolution	Accuracy
P 3355	-20 ... +760 °C	1 °C	$\pm 3,0\%$ rdg. + 3,0 °C
	-4...+1400 °F	1 °F	$\pm 3,0\%$ rdg. + 3,0 °F.
P 3360	-50...+1000 °C	1 °C	$\pm 1,0\%$ rdg. + 2,5 °C
	-58...+1832 °F	1 °F	$\pm 1,0\%$ rdg. + 4,5 °F

Overload protection: 600 V DC/AC<sub>rms</sub>

Temperature Accuracy : Probe accuracy not included.

## Continuity

<b>Model</b>	<b>Audible Threshold</b>	<b>Test current</b>
P 3355	< 150 $\Omega$	<0,3 mA
P 3360	< 35 $\Omega$	< 0,35 mA

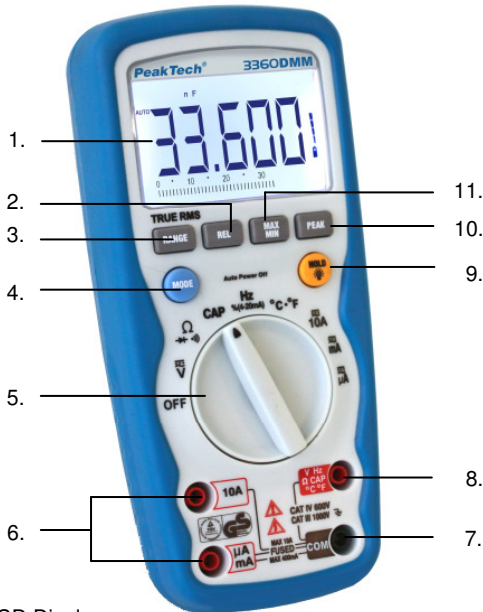
Overload protection: 600 V DC/AC<sub>rms</sub>

## Diode Test

<b>Model</b>	<b>Test current</b>	<b>Open circuit voltage</b>
P 3355	0,3 mA	1,5 V
P 3360	0,9 mA	2,8 V

Overload protection: 600 V DC/AC<sub>rms</sub>

## P 3360



1. LCD Display
2. Relative pushbutton
3. Range pushbutton
4. Mode pushbutton
5. Function switch
6.  $\mu\text{A}/\text{mA}/10\text{ A}$  (positive) input jack
7. COM (negative) input jack
8. Positive input jack for voltage, Hz, Duty cycle, Ohms, Diode, Continuity, Capacitance, and temperature measurements
9. Data Hold and Backlight pushbutton
10. PEAK button
11. MIN / MAX button

### 3.1. Symbols in the LCD Display

•)))	Continuity
-> -	Diode test
BAT	Battery status
n	nano ( $10^{-9}$ )
$\mu$	micro ( $10^{-6}$ )
m	milli ( $10^{-3}$ )
A	current
k	kilo ( $10^3$ )
F	capacitance (Farads)
M	mega ( $10^6$ )
$\Omega$	Resistance
Hz	Frequency
%	Duty cycle
AC	Alternating current
DC	Direct current
°F	Temperature in Fahrenheit
°C	Temperature in Centigrade
MAX	Maximum
MIN	Minimum
PEAK	Peak hold
V	voltage
REL	Relative
AUTO	Autoranging
HOLD	Display hold



## 4. Operating instructions

### Warning!

Risk of electrocution. High-voltage circuits, both AC and DC are very dangerous and should be measured with great care.

1. Always push the power pushbutton to the OFF position when the meter is not in use. This meter has Auto OFF that automatically shuts the meter OFF if 15 minutes elapse between uses.

2. If "OL" appears in the display during a measurement, that value you are measuring exceeds the range you have selected. Change to higher range.

**Note:**

On some low AC and DC voltage ranges, with the test leads not connected to a device, the display may show a random, changing reading. This is normal and is caused by the high-input sensitivity. The reading will stabilize and give a proper measurement when connected to a circuit.

3. Press the "POWER" pushbutton to turn the meter on and off.

#### **4.1. Autoranging / manual range selection**

When the meter is first turned on, it automatically goes into Auto-Ranging. This automatically selects the best range for the measurements being made and is generally the best mode for most measurements. For measurement situations requiring that the range be manually held, perform the following:

1. Press the "RANGE" button. The "AUTO" indicator will extinguish and the currently selected range will be held.
2. Press the "RANGE" button to step through the available ranges until you select the range you want.
3. Press and hold the "RANGE" button for 2 seconds to exit the manual ranging mode and return to "AUTO" mode.

#### **4.2. Backlight**

The backlight function is used to illuminate the display when the meter is used at night or in dimly lighted area.

1. Press the "HOLD" button (P 3355) or the backlight button (P 3360) for more than 2 seconds, the "HOLD" indicator will appear and backlight will be activated.



**Note (P 3360):**

The backlight automatically turns off after 30 seconds.

2. Press the "HOLD" button momentarily to remove the "HOLD" function. (P 3360).
3. Press the "HOLD" button (P 3355) or the backlight button (P 3355) for more than 2 seconds to remove the backlight function.
4. Press the "HOLD" button momentarily to remove the "HOLD" function. (P 3360)

**4.3 Auto Power Off**

The auto power off function will turn the meter off after 15 minutes operation time. To disable this function (only P 3360) press and hold the MODE button and then power on the meter. The display shows " APO d ". To activate the APO function the meter must be power off. Then power on the meter.

**5. Measuring****5.1. Relative**

The relative measurement feature allows you to make measurements relative to a stored reference value. A reference voltage, current, etc. can be stored and measurements made in comparison to that value. The displayed value is the difference between the reference and the measured value.

1. Perform any measurement as described in the operating instructions.
2. Press the "REL" button to store the reading in the display and the "REL" indicator will appear on the display.
3. The display will now indicate the difference between the stored value and the measured value.

## **5.2. Data Hold**

The data hold function allows the meter to "freeze" a measurement for later reference.

1. Press the "HOLD" button to freeze the display, the "HOLD" indicator will appear in the display.
2. Press the "HOLD" button to return to normal operation.

## **5.3. DC Voltage measurements**

### **Caution:**

Do not measure DC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur during the ON or OFF operations that can damage the meter.

1. Set the function switch to the "V" position.
2. If "AC" appears in the display, press the "MODE" pushbutton until "DC" appears in the display.
3. Insert the black test lead banana plug into the negative COM jack and the red test lead banana plug into the positive V jack.
4. Touch the test probe tips to the circuit under test. Be sure to observe the correct polarity (red lead to positive, black lead to negative).
5. Read the voltage in the display. The display will indicate the proper decimal point and value. If the polarity is reserved, the display will show (-) minus before the value.

## **5.4. AC voltage measurements**

### **Warning:**

Risk of Electrocution. The probe tips may not be long enough to contact the live parts inside some 230 V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips are contacting the metal contacts inside the outlet before assuming that no voltage is present.

### **Caution:**

Do not measure AC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur during the ON or OFF operations that can damage the meter.

1. Set the function switch to the "V" position.
2. Press the "MODE" button until "AC" appears in the display.
3. Insert the black test lead banana plug into the negative COM jack and the red test lead banana plug into the positive V jack.
4. Touch the test probe tips to the circuit under test.
5. Read the voltage in the display. The display will indicate the proper decimal point, value and symbol.

## **5.5. DC current measurement**

1. Insert the black test lead banana plug into the negative COM jack.
2. For current measurements up to 4000  $\mu\text{A}$  DC, set the function switch to the " $\mu\text{A}$ " position and insert the red test lead banana plug into the mA- $\mu\text{A}$  jack.

3. For current measurements up to 400 mA DC, set the function switch to the "mA" position and insert the red test lead banana plug into the mA- $\mu$ A jack.
4. For current measurements up to 10 A DC, set the function switch to the 10 A position and insert the red test lead banana plug into the 10 A jack.
5. Press the "MODE" button until "DC" appears in the display.
6. Remove power from the circuit under test and open the circuit at the point where you wish to measure current.
7. Touch the black test probe tip to the negative side of the circuit and touch the red test probe tip to the positive side of the circuit.
8. Apply power to the circuit.
9. Read the current in the display. The display will indicate the proper decimal point, value and symbol.

## **5.6. AC current measurements**

### **Warning:**

To avoid electric shock do not measure AC current on any circuit whose voltage exceeds 250 V AC.

1. Insert the black test lead banana plug into the negative COM jack.
2. For current measurements up to 4000  $\mu$ A AC, set the function switch to the " $\mu$ A" position and insert the red test lead banana plug into the mA- $\mu$ A jack.
3. For current measurements up to 400 mA DC, set the function switch to the "mA" position and insert the red test lead banana plug into the mA- $\mu$ A jack.

4. For current measurements up to 10 A DC, set the function switch to the 10 A position and insert the red test lead banana plug into the 10 A jack.
5. Press the "MODE" button until "AC" appears in the display.
6. Remove power from the circuit under test and open the circuit at the point where you wish to measure current.
7. Touch the black test probe tip to the negative side of the circuit and touch the red test probe tip to the positive side of the circuit.
8. Apply power to the circuit.
9. Read the current in the display. The display will indicate the proper decimal point, value and symbol.

## **5.7. Resistance measurements**

### **Warning:**

To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.

1. Set the function switch to the "OHM" position.
2. Insert the black test lead banana jack into the negative COM jack and the red test lead banana plug into the positive  $\Omega$  jack.
3. Touch the test probe tips across the circuit or part under test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
4. Read the resistance in the display. The display will indicate the proper decimal point, value and symbol.

When you short the test leads in the 400  $\Omega$  range, your meter display a small value (no more than 0.3  $\Omega$ ). This value is due to your meter's and test leads internal resistance. Make a note of this value and subtract it from small resistance measurements for better accuracy.

## **5.8. Continuity check**

### **Warning:**



To avoid electric shock, never measure continuity on circuits or wires that have voltage on them.

1. Set the function switch to the "OHM" position.
2. Insert the black test lead banana jack into the negative COM jack and the red test lead banana-plug into the positive  $\Omega$  jack.
3. Press the "MODE" push button until the "  $\blacktriangleleft$  )))" symbol appears in the display.
4. Touch the test probe tips to the circuit or wire you wish to check.
5. If the resistance is less than 150 ohms (P 3355) or 35 ohms (P 3360), the audible signal will sound. The display will also show the actual resistance.

## **5.9. Diode test**

### **Warning:**

To avoid electric shock, do not test any diode that has voltage on it.

1. Set the function switch to "  " position.
2. Press the "MODE" button until the "  " symbol appears in the display.

3. Insert the black test lead banana plug into the negative COM jack and the red test lead banana plug into the positive  $\Omega$  jack.
4. Touch the test probe tips to the diode or semiconductor junction you wish to test. Note the meter reading.
5. Reverse the probe polarity by switching probe position. Note this reading.
6. The diode or junction can be evaluated as follows:
  - A: If one reading shows a value and the other reading show OL, the diode is good.
  - B: If both readings are OL, the device is open.
  - C: If both readings are very small or 0, the device is shorted.

**Note:** The value indicated in the display during the diode check is the forward voltage.

### **5.10. Frequency / Duty cycle measurement**

1. Set the function switch to the "Hz" position.
2. Insert the black test lead banana jack into the negative COM jack and the red test lead banana plug into the positive Hz jack.
3. Touch the test probe tips to the circuit under test.
4. Read the frequency in the display. The digital reading will indicate the proper decimal point, symbols (Hz, kHz, MHz) and value.
5. Press the "MODE" button to display duty cycle in %.

## **5.11. Capacitance measurements**

### **Warning:**

To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. Remove the batteries and unplug the line cords.

1. Set the function switch to the "CAP"  $\left| \right|$  position.
2. Insert the black test lead banana jack into the negative COM jack and the red test lead banana plug into the positive  $\left| \right|$  jack.
3. Touch the test leads to the capacitor to be tested. The display will indicate the proper decimal point, value and symbol.

## **5.12. Temperature measurements**

### **Warning:**

To avoid electric shock, disconnect both test probes from any source of voltage before making a temperature measurement.

Insert the adapter in the input socket for temperature measurements.

Insert the K-type thermocouple into the temperature socket, making sure to observe the correct polarity. Touch the temperature probe head to the part whose temperature you wish to measure. Keep the probe touching the part under test until the reading stabilize (about 30 seconds). Read the temperature in the display. The digital reading will indicate the proper decimal point and value.

### **Warning:**

To avoid electric shock, be sure the thermocouple has been removed before changing to any other measurement function.



## 6. Replacing the fuses

### WARNING!

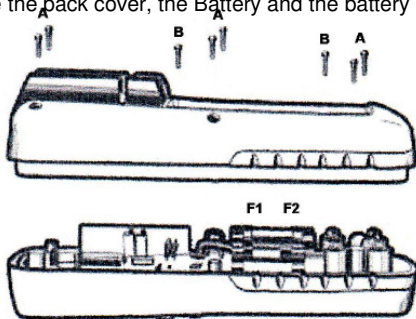
To avoid electric shock, disconnect all the test probes before removing the fuse. Replace only with the same type of fuse. Not note remove the top cover. Service should be performed only by qualified personnel.

### 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. Press ON/OFF button to turn the meter off and disconnect the test probes.
2. Remove the Battery cover (screws B) and the battery.
3. Remove the back cover by unscrewing the 6 screws (A)
4. Remove the blown fuse. Use only a fuse with the proper size and value 500mA/1000V (6,3x32mm) or 10A/1000V (10x38mm)
5. Replace the back cover, the Battery and the battery cover.



## **WARNING!**

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

## **7. Maintenance**

### **Warning:**

To avoid electric shock, disconnect the test leads from any source of voltage before removing the back cover or the battery/fuse door.

### **Warning:**

To avoid electric shock, do not operate your meter until the battery/fuse door are in place and fastened securely. This multimeter is designed to provide years of dependable service, if the following care instructions are performed.

1. Keep the meter dry. If it gets wet, wipe it off.
2. Use and store the meter in normal temperatures. Temperature extremes can shorten the life of the electronic parts and distort or melt plastic parts.
3. Handle the meter gently and carefully. Dropping it can damage the electronic parts or the case.
4. Keep the meter clean. Wipe the case occasionally with a damp cloth. Do not use chemicals, cleaning solvents or detergents.
5. Use only fresh batteries or the recommended size and type. Remove old or weak batteries so they do not leak and damage the unit.
6. If the meter is to be stored for a long period of time, the batteries should be removed to prevent damage to the unit.

## 8. Troubleshooting

There may be times when your meter does not operate properly. Here are some common problems that you may have and some easy solutions to them.

### **Meter does not operate:**

1. Always read all the instructions in this manual before use.
2. Check to be sure the battery is properly installed.
3. Check to be sure the battery is good.
4. If the battery is good and the meter still doesn't operate, check to be sure that both ends of the fuse are properly installed.

## 9. Replacing the battery

### **Warning:**

To avoid electric shock, disconnect the test leads from any source of voltage before removing the back cover or the battery/fuse door.

1. Disconnect the test leads from the meter.
2. Open the battery/fuse door by loosening one screw on the battery/fuse door using a screw-driver.
3. Clip the new battery into battery holder, observing the correct polarity.
4. Place the battery into the battery/fuse compartment.
5. Put the battery/fuse door back in place. Secure with the screw.

**Warning:**

To avoid electric shock, do not operate your meter until the back cover and the battery / fuse door is in place and fastened securely.

**Note:**

If your meter does not work properly, check the fuses and batteries to make sure that they are still good and that they are properly inserted.

**9.2. 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*).

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

*We herewith confirm, that the units are calibrated by the factory according to the specifications as per the technical specifications. We recommend to calibrate the unit again, after 1 year.*

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