Introduction

The meter measures AC/DC Voltage, AC/DC Current , Resistance,Diode Test, Continuity , Capacitance, Frequency,Duty Cycle and Temperature .True RMS readings provide accurate AC measurements and a Lo Z setting eliminates errors caused by “ghost” voltages. It features a waterproof , rugged design for heavy duty use.and it also offers the added convenience of a built-in LED flashlight .Proper use and care of this meter will provide many years of reliable service.

1. Safety 

1.1. Warnings

- Read, understand and follow Safety Rules and Operating Instructions in this manual before using this meter.
- The meter’s safety features may not protect the user if not used in accordance with the manufacturer’s instructions.
- Keep fingers away from the metal probe tips when taking measurements.

- Before changing functions using the selector switch, always disconnect the test leads from the circuit under test.
- Comply with all applicable safety codes. Use approved personal protective equipment when working near live electrical circuits - particularly with regard to arc-flash potential.
- Use caution on live circuits. Voltages above 30 V AC rms, 42 V ac peak, or 60 V dc pose a shock hazard.
- Do not use if the meter or test leads appear damaged.
- Verify operation before using meter by measuring a known live voltage.
- Do not use the meter in wet or damp environments or during electrical storms.
- Do not use the meter or near explosive vapors, dust or gasses.
- Do not use the meter if it operates incorrectly. Protection may be compromised.
- Do not operate meter while Low Battery warning is on. Replace batteries immediately.
- Do not apply voltage or current that exceeds the meter’s maximum rated input limits.

1.2. Input Limits

Function	Maximum Input
Voltage AC or DC	600V AC /DC
Lo Z	600V AC/DC
Frequency,Resistance,Capacitance,Continuity, Diode Test,Temperature	600V AC/DC
10A Current AC or DC	10A/600V fast acting Fuse

1.1. International 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 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, the meter and its test leads should not be handled when these terminals are energized.

Double insulation

Indicates the terminal(s) so marked must not be connected to a circuit where the voltage with respect to earth ground exceeds the maximum safety rating of the meter.

WARNING This **WARNING** symbol indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.

CAUTION This **CAUTION** symbol indicates a potentially hazardous situation, which if not avoided, may result damage to the product.

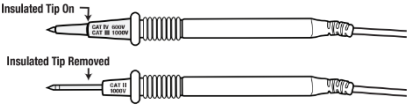
1.2. Safety Category Ratings

Category Rating	Brief Description	Typical Applications
CAT II	Single phase receptacles and connected loads	• Household appliances, power tools • Outlets more than 30ft (10m) from a Cat III source • Outlets more than 60ft (20m) from a Cat IV source
CAT III	Three phase circuits and single phase lighting circuits in commercial buildings	• Equipment in fixed installations such as 3-phase motors, switch gear and distribution panels

		• Lighting circuits in commercial buildings • Feeder lines in industrial plants • Any device or branch circuit that is close to a Cat III source

The measurement category (CAT) rating and voltage rating is determined by a combination of the meter, test probes and any accessories connected to the meter and test probes. The combination rating is the LOWEST of any individual component.

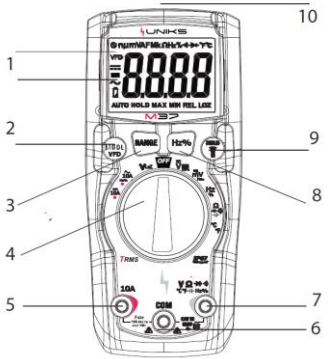
Test Leads



WARNING: Operation is limited to CAT II applications when the insulated tips are removed from one or both test probes. Refer to Input Limits section in this manual for maximum voltage ratings.

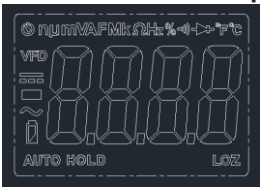
2. Description

2.1. Meter Description



1. LCD display
2. RANGE button
3. MODE and VFD button
4. Rotary function switch
5. 10A input jack
6. COM input jack
7. Positive input jack
8. HOLD and Flashlight button
9. Hz% button
10. Flashlight

2.2. Symbols Used on LCD Display



V	Volt	**k**	kilo (10^{3})
A	Ampere	**OL**	Overload
F	Farad (Capacitance)		Low battery
~	Alternating current	AUTO	Auto ranging
⎓	Direct current	HOLD	Display Hold
-	Minus Sign	Hz	Hertz (frequency)
Ω	Ohm	%	Duty Cycle
•))	continuity	°C	Degrees Celsius
▶|	Diode Test	°F	Degrees Fahrenheit
n	nano (10^{-9})		Auto Power OFF
µ	micro (10^{-6})	VFD	Filter
m	milli (10^{-3})	Loz	Low impedance

3. Button Function

3.1. MODE and VFD Button

Press the **MODE** key to select AC/DC Voltage ,AC/DC Current,Ohms, Diode Test, Continuity or Capacitance, Temperature.

When the AC voltages,press the **MODE** key for >2 second to turn on or off the VFD function .

3.2. RANGE Button

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 a range be manually selected, perform the following:

1. Press the RANGE button. The “AUTO” display indicator will turn off.
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 Ranging.

3.3. Hz/% Button

Used to select Frequency or Duty Cycle when the meter is set to AC voltage、Frequency or AC Current.

3.4. HOLD/ Flashlight Button

Press the **HOLD** key to turn on or off the **HOLD** function .

Press the **Flashlight** key for >2 second to turn on or off the **Flashlight** function .

3.5. Auto Power Off

The auto off feature will turn the meter off after 15 minutes. To disable the auto power off feature, hold down the **MODE** button and turn the meter on.

3.6. Low Battery Indication

The  icon will appear in the lower left corner of the display when the battery voltage becomes low. Replace the battery when this appears.

4. Operating Instruction

4.1. AC/DC Voltage (Frequency, Duty Cycle,VFD) Measurements

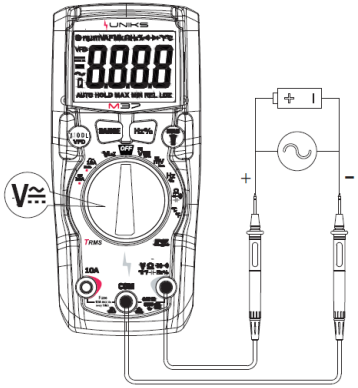
WARNING: Observe all safety precautions when working on live voltages.

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

1. Set the rotatory function switch to the V position.
2. To select AC or DC voltage, press the **MODE** button until The "~" (AC) or "⎓" (DC) symbol appears on the LCD display.
3. Insert the black test lead into the **COM** input jack and the red test lead into the Positive input jack.
4. Touch the test lead probes to the circuit under test. If measuring DC voltage, touch the red test lead to the

positive side of the circuit and the black test lead to the negative side of the circuit.

5. Read the voltage on the LCD display.
6. When the AC voltages ,Press the **Hz/%** button to indicate “**Hz**”.
7. Read the frequency in the display.
8. Press the Hz/% button again to indicate “**%**”.
9. Read the % of duty cycle in the display.
10. When the AC voltages ,press and hold the **MODE** key for >2 second to indicate “**VFD**” .
11. Read the voltage in the display.
12. To exit VFD mode press and hold the MODE key for >2 second.



4.2. MV Voltage(Frequency, Duty Cycle) Measurements

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

1.Set the function switch to the mV position.
2.Press the **MODE** button to indicate **DC** or **AC** .
3.Insert the black test lead banana plug into the negative COM jack. Insert the red test lead banana plug into the **positive** input jack.

4.Touch the black test probe tip to the negative side of the circuit.
Touch the red test probe tip to the positive side of the circuit.
5.Read the mV voltage in the display.
6.When the AC voltages ,press the **Hz/%** button to indicate "**Hz**".
7. Read the frequency in the display.
8. Press the **Hz/%** button again to indicate "**%**".
9. Read the % of duty cycle in the display.

4.3. Frequency/Duty Cycle Measurements (Electronic)

WARNING: Observe all safety precautions when working on live voltages.

1. Set the rotary function switch to **Hz/%** position .

2. Insert the black lead banana plug into the negative **COM** jack and the red test lead banana plug into the **Positive** input jack.

3. Touch the test probe tips to the circuit under test.

4.Read the frequency on the display.

4. Press the **HZ/%** button again to indicate “%” on the display.

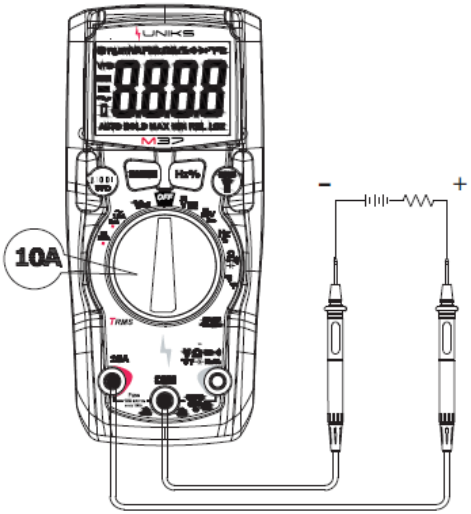
6.Read the % of duty cycle on the display.

4.4. AC(Frequency, Duty Cycle) Current Measurements

WARNING: Observe all safety precautions when working on live circuits.Measurements in the 10A range should be limited to 30 seconds maximum every 15 minutes.

1. For current measurements up to 10A AC, set the rotary function switch to the **10A~** position.

2. Insert the black test lead into the **COM** input jack and Insert the red test lead into the **10A** input jack .
3. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
4. Touch the black test probe tip to the neutral side of the circuit.
   Touch the red test probe tip to the “hot” side of the circuit.
5. Apply power to the circuit.
6. Read the current on the LCD display.
7. Press the **Hz/%** button to indicate “**Hz**”.
8. Read the frequency in the display.
9. Press the Hz/% button again to indicate “**%**”.
10. Read the % of duty cycle in the display**.**



4.5. DC Current Measurements

WARNINGS: Observe all safety precautions when working on live circuits. Measurements in the 10A range should be limited to 30 seconds maximum every 15 minutes.

1. For current measurements up to 10A DC, set the rotary function switch to the **10A ⎓** position.

2.Insert the black test lead into the **COM** input jack and Insert the red test lead into the **10A** input jack .

3.Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.

4.Touch the black test probe tip to the neutral side of the circuit.
Touch the red test probe tip to the “hot” side of the circuit.

5.Apply power to the circuit.

6.Read the current on the LCD display.

4.6. Resistance Measurements

WARNING: Never test resistance on a live circuit.

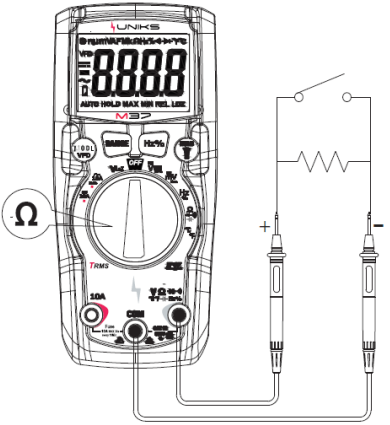
1. Set the rotary function switch to the **Ω/ / CAP** position.

2. Press the **MODE** button until the “**Ω”** symbol appears on the LCD display.

3.Insert the black test lead into the **COM** input jack and the red test lead into the **Positive** input jack.

4.Touch the test lead probes to the component under test. If the component is installed in a circuit, it is best to disconnect one side before testing to eliminate interference with other devices.

5.Read the resistance in on the LCD display.



4.7. Diode Test

WARNING: Never test diodes in a live circuit.

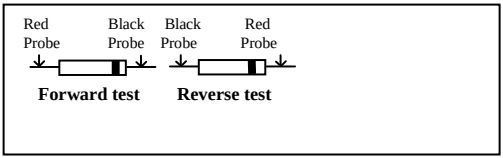
1.Set the rotary function switch to the **Ω/▶|/ •)) CAP** position.

2.Press the **MODE** button until the "▶|" symbol appears on the LCD display.

3.Insert the black test lead into the **COM** input jack and the red test lead into the **Positive** input jack.

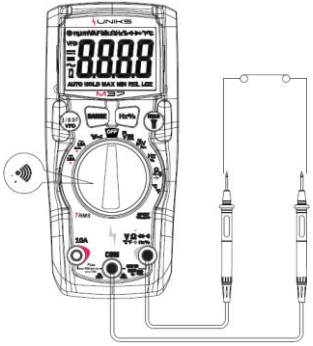
4.Touch the test lead probes to the diode under test.

5.Forward voltage will indicate 0.4 to 0.7 on the LCD display. Reverse voltage will indicate "**OL**". Shorted devices will indicate near 0 and an open device will indicate "**OL**" in both polarities.



4.8. Continuity Test

WARNING: Never test continuity on a live circuit.



1.Set the rotary function switch to the **Ω/⊣◀/ •))) CAP** position.

2.Press the **MODE** button until the "•)))" symbol appears on the LCD display.

3.Insert the black test lead into the **COM** input jack and the red test lead into the **Positive** input jack.
4.Touch the test lead probes to the device or wire under test.
5.A beeper will sound if the resistance is approx.50 ohms or less and the resistance reading will be shown on the LCD display.

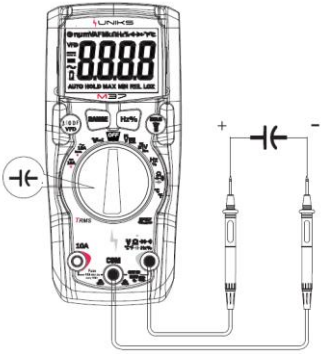
4.9. Capacitance Measurements

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 rotary function switch to the **Ω/▶|/ CAP** position.

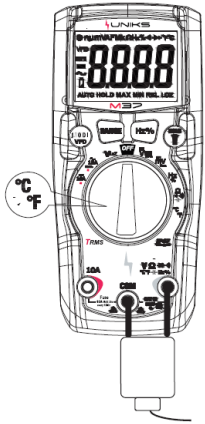
2.Press the **MODE** button until the “nF**”** symbol appears on the LCD display.

3. Insert the black test lead banana plug into the negative **COM** jack.
Insert the red test lead banana plug into the positive **Positive** jack.
4.Touch the test leads to the capacitor to be tested.Wait until the readings settle before ending the test.
5.Read the capacitance value in the display



4.10. Temperature Measurements

WARNING: Do not touch the temperature probe to live circuits.



1. Set the rotary function switch to the Temp **°C °F** position.
2. Press the **MODE** button to select readings in °F or °C.

3. Connect the Temperature Probe to the Banana Plug Adapter. Note the – and + markings on the adapter. Connect the adapter to the meter, making sure the – side goes into the **COM** input jack and the + side goes into the **Positive** input jack.

4. Touch the tip of the Temperature Probe to the object being measured.

5. Read the temperature on the LCD display.

4.11. Lo Z AC/DC Voltage Measurements

WARNING: Observe all safety precautions when working on live voltages. Do not connect to circuits that exceed 600V AC RMS or 600V DC when the meter is set to Lo Z.

Lo Z is used to check for “ghost” voltage. Ghost voltages are present when non-powered wires are in close proximity to powered wires. Capacitive coupling makes it appear that non-powered wires are connected to a real

source of voltage. The Lo Z setting places a load on the circuit, which greatly reduces the voltage reading when connected to ghost voltage.

1. Set the rotary function switch to the **V Lo Z** position.
2. To select AC or DC voltage, press the **MODE** button until the AC "~" or DC "⎓" symbol appears on the LCD display.
3. Insert the black test lead into the **COM** input jack and the red test lead into the **Positive** input jack.
4. Touch the test leads to the circuit under test. If measuring DC voltage, touch the red test lead to the positive side of the circuit and the black test lead to the negative side of the circuit.
5. Read the voltage on the LCD display.

5. Maintenance and Cleaning

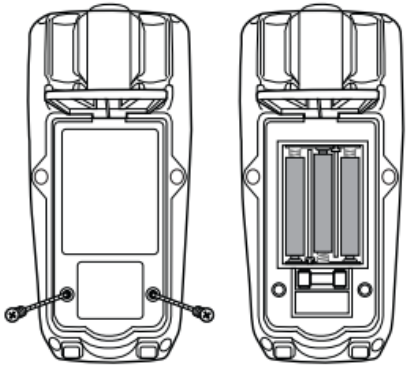
This MultiMeter is designed to provide years of dependable service, if the following care instructions are performed:

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 OF 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.

6. Battery Replacement

WARNING: To avoid electric shock, remove the test leads from the meter before removing the battery/fuse cover.

1. Lift up the tilt stand.
2. Loosen the two Phillips screws on the battery/fuse cover.
3. Remove the battery/fuse cover.
4. Replace the batteries with three AAA batteries.
5. Observe proper polarity as shown inside battery compartment.
6. Install the battery cover and tighten the screws.

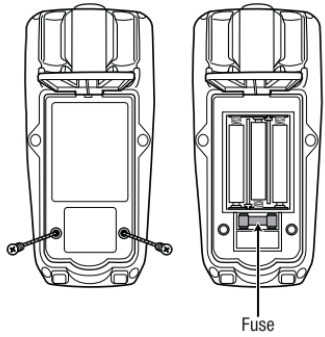


WARNING: To avoid electric shock, do not operate meter until the battery/fuse cover is securely fastened to the meter.

7. Fuse Replacement

WARNING: To avoid electric shock, remove the test leads from the meter before removing the battery/fuse cover.

1. Lift up the tilt stand.
2. Loosen the two Phillips screws on the battery/fuse cover.
3. Remove the battery/fuse cover.
4. Gently remove fuse and install new fuse into the holder.
5. Always use a UL recognized fuse of the proper size and value: 10A/600V (5 x 20mm) fast blow.
6. Install the battery cover and tighten the screws.



WARNING: To avoid electric shock, do not operate meter until the battery/fuse cover is securely fastened to the meter.

8. Specifications

8.1. Specifications

Function	Range	Resolution	Accuracy
Voltage	60.00mV	0.01mV	±(0.5% reading + 8digits)
	600.0mV	0.1mV	
	6.000V	0.001V	
	60.00V	0.01V	
	600.0V	0.1V	
AC True RMS Voltage	60.00mV	0.01mV	±(1.2% reading + 8digits)
	600.0mV	0.1mV	
	6.000V	0.001V	
	60.00V	0.01V	
	600.0V	0.1V	
	All AC voltage ranges are specified from 5% of range to 100% of range .AC Voltage Bandwidth:50Hz to 60Hz(ALL WAVE) 45Hz to 1KHz(SINE WAVE)		
Lo Z AC/DC Voltage	6.000V	0.001V	±(3.0% reading + 8digits)
	60.00V	0.01V	
	600.0V	0.1V	
	All AC voltage ranges are specified from 5% of range to 100% of range AC Voltage Bandwidth:50Hz to 60Hz(ALL WAVE) 45Hz to 1KHz(SINE WAVE) Input Impedance: approx. 3kΩ		
VFD 45Hz to 400Hz	100V~600V	0.1V	±(3.5% reading + 5 digits)
DC Current	6.000A	0.001A	±(1.5% reading + 8 digits)
	10.00A	0.01A	
AC True RMS Current	6.000A	0.001A	±(1.5% reading + 8 digits)
	10.00A	0.01A	
	All AC Current ranges are specified from 5% of range to 100% of range.AC Current Bandwidth:50Hz to 60Hz(ALL WAVE) 45Hz to 400Hz(SINE WAVE)		

Function	Range	Resolution	Accuracy
Resistance	600.0Ω	0.1Ω	±(1.5% reading + 5 digits)
	6.000kΩ	0.001kΩ	
	60.00kΩ	0.01kΩ	
	600.0kΩ	0.1kΩ	
	6.000MΩ	0.001MΩ	
	60.00MΩ	0.01MΩ	±(2.5% reading + 5 digits)
Capacitance	60.00nF	0.01nF	±(2.5% reading + 10 digits)
	600.0nF	0.1nF`	
	6.000μF	0.001μF	±(2.5% reading + 5 digits)
	60.00μF	0.01μF	
	600.0μF	0.1μF	
	6.000mF	0.001mF	±(3.5% reading + 5 digits)
	60.00mF	0.01mF	
Frequency (Electronic)	9.999Hz	0.001Hz	±(1.2%+5 reading)
	99.99Hz	0.01Hz	
	999.9Hz	0.1Hz	
	9.999kHz	0.001KHz	
	99.99kHz	0.01KHz	
	999.9KHz	0.1KHz	
	9.999MHz	0.001MHz	
	Sensitivity: >0.6V RMS while ≤100kHz; >3V RMS while >100kHz		
Frequency (Electrical)	9.999Hz	0.001Hz	±(1.2%+5 reading)
	99.99Hz	0.01Hz	
	999.9Hz	0.1Hz	
	Sensitivity: AC mV Range(≥100mV),ACV Range(≥15V) 6/10A Range(≥2A)		
Duty Cycle	0.1 to 99.9%	0.1%	±(1.2% reading +5 digits)
	Pulse width: >100us, <100ms Frequency(Electrical):10Hz to 1kHz Frequency(Electronic): 5Hz to 100kHz		
Temperature	-4°F to 1832°F	1°F	±(1.5% + 9°F)
	-20°C to 1000°C	1°C	±(1.5% + 5°C)

Note: Accuracy specifications consist of two elements:

- (% reading) – This is the accuracy of the measurement circuit.

- (+ digits) – This is the accuracy of the analog to digital converter.

8.2. General Specifications

Insulation	Class 2, Double Insulation
Enclosure	Double Molded, IP67 waterproof and dust-proof
Diode Test	Test current 1mA max., open circuit voltage 3V typical
Continuity Test	Audible signal if the resistance is approx. 50Ω or less
Low Battery Indication	“  ” is displayed
Display	6000 counts LCD Negativity display
Over Range Indication	“OL” is displayed
Polarity	Minus symbol “-” is displayed for negative polarity
Measurement Rate	3 readings per second, nominal
Auto Power Off	approx. 15 minutes
Input Impedance	>10MΩ AC/DC Voltage
AC Response	True RMS

AC Voltage Bandwidth	45Hz to 1kHz
AC Current Bandwidth	45Hz to 400Hz
Batteries	Three “AAA” 1.5V batteries
Fuse	10A/600V (5 x 20mm) fast acting Fuse
Operating Environment	41ºF to 104ºF (5ºC to 40ºC)
Storage Environment	14ºF to 122ºF (-10ºC to 50ºC)
Operating Humidity	Max 80% up to 87°F (31°C) decreasing linearly to 50% at 104°F(40°C)
Storage Humidity	<80%
Dimensions/ Weight	5.8” x 2.7” x 2.0”/0.70lb) (147 x 68 x 50mm/318g)
Safety	Complies with UL 61010-1 v.3 for measurement Category lll 600V, Pollution Degree 2

9. ASSISTANCE

9.1. WARRANTY CONDITIONS

This instrument is warranted against defects in materials and workmanship, in accordance with the general terms and conditions. During the warranty period, defective parts can be replaced, but the manufacturer reserves the right to repair or replace the product. If the instrument is to be returned to the after - sales service or to a dealer transportation is borne by the customer. The shipment must, however, be agreed. Attached to dispatch an explanatory note about the reasons of the instrument must always be inserted. For shipping only use the original packaging. Any damage caused by the use of non-original packing shall be charged to the customer. The manufacturer accepts no responsibility for damage caused to people or objects.

The warranty does not apply in the following cases:

- Repair and / or replacement of accessories and battery (not covered by warranty).
- Repairs made necessary because of a misuse of the instrument or of its use with no compatible devices.
- Repairs made necessary due to improper packaging.
- Repairs made necessary due to work carried out by unauthorized personnel.
- Modification of the instrument without the explicit permission of the manufacturer.
- Use not provided for in the specifications of the instrument or in the instruction manual.

9.2. ASSISTANCE

If the instrument does not operate properly, before contacting the Customer Service, check the status of the battery and wear of the cables and replace them if necessary. If the instrument continues to manifest malfunctions check if the procedure of use of the same is in accordance with what is indicated in this manual. If the instrument is to be returned to the after - sales service or to a dealer transportation is borne by the customer. The shipment must, however, be agreed. Attached to dispatch an explanatory note about the reasons of the instrument must always be inserted. For shipping only use the original packaging; any damage caused by the use of non-original packing shall be charged to the customer.

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