

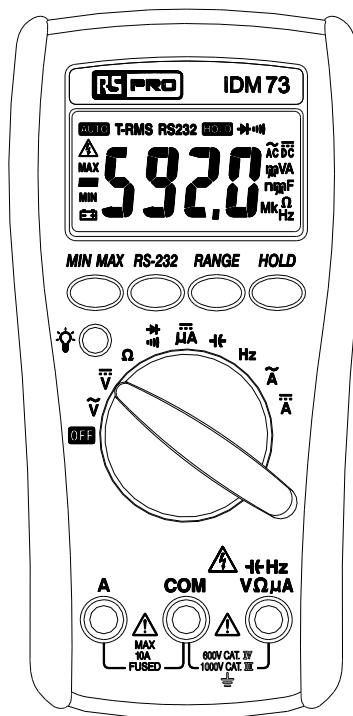


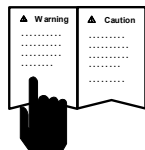
# INSTRUCTION MANUAL

## IDM 71/72/73

### DIGITAL MULTIMETER

EN FR IT DE





**Safety Alert Symbol : ⚠**

**READ and UNDERSTAND** all **safety alert symbols** : ⚠ in this manual. Failure to read and understand safety instructions can result in **INJURY** or **DEATH**

## Limited Warranty

This meter is warranted to the original purchaser against defects in material and workmanship for 3 years from the date of purchase. During this warranty period, RS Components will, at its option, replace or repair the defective unit, subject to verification of the defect or malfunction. This warranty does not cover fuses, disposable batteries, or damage from abuse, neglect, accident, unauthorized repair, alteration, contamination, or abnormal conditions of operation or handling.


Any implied warranties arising out of the sale of this product, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the above. RS Components shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expense or economic loss. Some states or countries laws vary, so the above limitations or exclusions may not apply to you. For full terms and conditions, refer to the current RS Catalogue.


Table of Contents

Title	Page
<b>SAFETY</b>	3
“⚠Warning” and “⚠Caution” Alert Symbol Statements	3
Warning and Cautions	3
Symbols as Marked on The Meter	4
Symbols and Terms in The Manual	5
<b>Safety Compliance And Certification</b>	6
Safety Compliance	6
Safety Certification	6
<b>Introduction</b>	7
Unpacking and Inspection	7
Environmental Conditions	7
Meter Description	8
<b>Making Basic Measurements</b>	8
Preparation and Caution Before Measurement	8
Measuring AC/DC Voltage and Frequency	9
Measuring Resistance	9
Measuring DC $\mu$ A and AC / DC A Current	10
Measuring Capacitance	12
Testing Diodes and Continuity	13
<b>Features</b>	14
Features Description	14
Features Available vs Functions	14
<b>Using The Features</b>	15
Manual Ranging and Auto Ranging	15
Min Max Recording Mode	15
RS-232	16
Display Hold	16
Backlight	16
Auto Power Off (Battery Saver)	17
Disable Auto Power Off	17
<b>Maintenance</b>	18
Cleaning and Storage	18
Fuse Replacement	18
Battery Replacement	19
<b>Trouble Shooting</b>	19
Basic Trouble Shooting	19
Testing the Fuse and Test Leads	19
<b>Specification</b>	20
General Specification	20
Electrical Specification	20


## Safety


### "⚠ Warning" and "⚠ Caution" Alert Symbol Statement :

	<b>"⚠ Warning" Alert Symbol</b>
	A " <b>⚠Warning</b> " Statement identifies hazardous conditions and actions that could cause <b>BODILY HARM</b> or <b>DEATH</b> .

	<b>"⚠ Caution" Alert Symbol</b>
	A " <b>⚠Caution</b> " Statement: identifies conditions and actions that could <b>DAMAGE</b> the meter or the equipment under test.

### "⚠ Warnings" and "⚠ Cautions" :

	<b>⚠ Warnings</b>
<ul style="list-style-type: none"><li>• When using test leads or probes, keep your fingers behind the finger guards.</li><li>• Remove test lead from meter before opening the battery door or meter case.</li><li>• Use the meter only as specified in this manual or the protection by the meter might be impaired.</li><li>• Always use proper terminals, switch position, and range for measurements.</li><li>• Never attempt a voltage measurement with the test Lead inserted into the A input terminal.</li><li>• Verify the meter's operation by measuring a known voltage. If in doubt, have the Meter serviced.</li><li>• Do not apply more than the rated voltage, as marked on meter, between terminals or between any terminal and earth ground.</li><li>• Do not attempt a current measurement when the open circuit voltage is above the fuse protection rating. Check the open circuit voltage with the voltage function.</li><li>• Only replace a blown fuse with one of the proper rating as specified in this manual.</li><li>• Use caution with voltages above 30 Vac rms, 42 Vac peak , or 60 Vdc. These voltages pose a shock hazard.</li></ul>	


- To avoid false readings that can lead to electric shock and injury, replace battery as soon as low battery indicator  appears.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.
- Do not use the meter around explosive gas or vapor.
- To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.





## Cautions




- Disconnect the test leads from the test points before changing the position of the function rotary switch.
- Never connect a source of voltage with the function rotary switch in  $\Omega/\ast/\ast/ /$   $\text{---} \sim A /+/\text{Hz}$  position.
- Do not expose Meter to extremes of temperature or high humidity.
- Never set the meter in  $\text{---} \sim A$  function to measure the voltage of a power supply circuit in equipment, as it could result in damage the meter and the equipment under test.


### **Symbols as Marked on The Meter :**

 : AC (Alternating Current)

 : DC (Direct Current)

 : Caution, **Risk of Electric shock**. To alert you to the presence of a potentially hazardous voltage.

 : Caution, **Risk of Danger**. Refer to  Warnings and  Cautions in the manual.


 : **Double Insulation** protection against electric shock.


 : Conforms to European Union directives.

## **Symbols and Terms in The Manual**

### **Symbols :**

 : Caution, Risk of Danger.

 **Warning** : Identifies hazardous conditions and actions that could cause **BODILY HARM** or **DEATH**

 **Caution** : Identifies conditions and actions that could **DAMAGE** the meter or equipment under test.

 : Fuse.

### **Terms :**

**CAT Level** : Over Voltage Category Level defines at which circuit level measurements may be safely made. Different category circuits have different high-voltage transients.

#### **PER IEC 1010 OVERVOLTAGE INSTALLATION CATEGORY OVERVOLTAGE CATEGORY I**

Equipment of **OVERVOLTAGE CATEGORY I** is equipment for connection to circuits in which measurements are taken to limit the transient overvoltage to an appropriate low level. Note examples include protected electronic circuits.

#### **OVERVOLTAGE CATEGORY II**

Equipment of **OVERVOLTAGE CATEGORY II** is energy consuming equipment to be supplied from a fixed installation.

#### **OVERVOLTAGE CATEGORY III**

Equipment of **OVERVOLTAGE CATEGORY III** is equipment in fixed installations. Note examples include switches in a fixed installation and some equipment for industrial use with permanent connection to the fixed installation.

#### **OVERVOLTAGE CATEGORY IV**

Equipment of **OVERVOLTAGE CATEGORY IV** is for use at the origin of the installations. Note examples include electricity meters and primary over-current protection equipment.

#### **PER IEC1010 Pollution degree**

##### **POLLUTION**

Addition of foreign matter, solid, liquid or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity.

##### **POLLUTION degree**

For the purpose of evaluating spacing of this product, the following degrees of POLLUTION in the microenvironment are defined.

**POLLUTION DEGREE 1**

No POLLUTION or only dry, non-conductive POLLUTION occurs.  
The POLLUTION has no influence.

**POLLUTION DEGREE 2**

Normal POLLUTION only non-conductive POLLUTION occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.

**POLLUTION DEGREE 3**

Conductive POLLUTION occurs, or dry, non-conductive POLLUTION occurs which becomes conductive due to condensation, which is expected.

**NOTE :** In such conditions equipment is *normally protected against exposure to direct sunlight, precipitation, and full wind pressure*, but neither temperature

## **Safety Compliance And Certification**

### **Safety compliance**

The meter conforms to CENELEC LVD (**Low-Voltage directive**)

73/23/EEC and EMC (**Electromagnetic Compatibility directive**) 89/336/EEC

The meter meet the requirements of IEC 61010-1 (2001) , EN 61010-1 (2001),  
UL 3111-1 (Jan.1994) , CSA C22.2 NO.1010-1-92 +A2: Feb. 1997

### **TEST EQUIPMENT RISK ASSESSMENT**

*Users of this equipment and or their employers are reminded that Health and Safety Legislation require them to carry out a valid risk assessments of all electrical work so as to identify potential sources of electrical danger and risk of electrical injury such as from inadvertent short circuits. Where the assessments show that the risk is significant, the use of fused test leads constructed in accordance with the HSE guidance note GS38 "Electrical Test Equipment for use by Electricians" should be used.*

## **Introduction**

### **Unpacking and Inspection**

Upon removing your new Digital Multimeter from its packing, you should have the following items.

1. Digital Multimeter.
2. Test lead set (one black, one red)
3. User Manual.
4. Protective holster.

### **Environmental Conditions**

This product is safe at least under the following conditions:

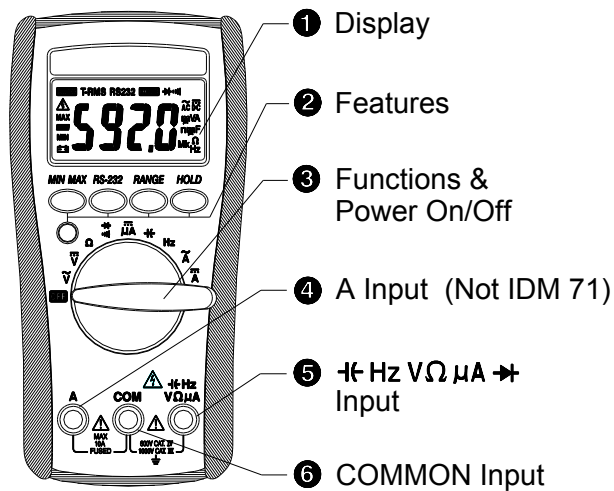
1. Indoor Use
2. Altitude up to 2000 Meter
3. Operating Temperature and Relative Humidity :  
Non-condensing  $\leq 10^{\circ}\text{C}$  ,  $11^{\circ}\text{C} \sim 30^{\circ}\text{C}$  ( $\leq 80\%$  R.H)  
 $31^{\circ}\text{C} \sim 40^{\circ}\text{C}$  ( $\leq 75\%$  R.H),  $41^{\circ}\text{C} \sim 50^{\circ}\text{C}$  ( $\leq 45\%$  R.H),
4. Storage Temperature and Relative Humidity :  $-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$  (0 ~ 80% R.H)  
when battery removed from Meter.
5. Pollution degree 2
6. Installation category :  
The standard 70 series models meet the requirements for double insulation to IEC 61010-(2001), EN61010 (2001), UL3111-1(6.1994), CSA C22.2 NO.1010-1-92 to terminals:  
**V $\Omega$  $\mu$ A IDM 71,72 and 73** : Cat. **IV** 600 Volts.  
**A IDM 72 and 73 only** : Cat. **IV** 600 Volts.
7. Shock Vibration : Sinusoidal vibration per Mil-T-28800E (5 ~55 Hz, 3g maximum).
8. Drop Protection : 4 feet drop to hardwood on concrete floor.



### The Meter Description

Front Panel Illustration

1. 6000 count LCD display.
2. Push-buttons for features.
3. Rotary switch to turn the power on or off and to select a function.
4. Input terminal for A current function.
5. Input terminal for all functions EXCEPT current (A) functions.
6. Common (Ground reference) input terminal for all functions.



### Making Basic Measurements

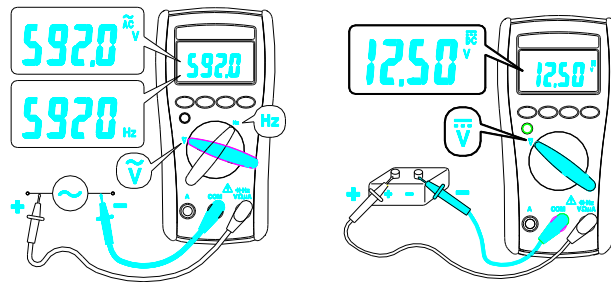
#### Preparation and Caution Before Measurement

⚠ : Observe the rules of ⚠ Warnings and ⚠ Cautions.

When connecting the test leads to the DUT (Device Under Test) **connect the common (COM) test lead before connecting the live lead ; when removing the test leads, remove the test live lead before removing the common test lead.**

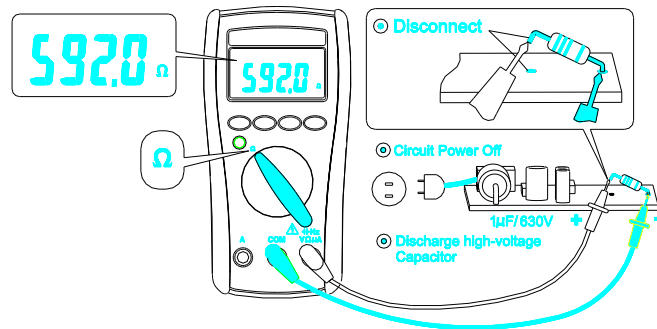
The figures on the following pages show how to make basic measurements.

### Measuring AC/DC Voltage And Frequency



The non-zero display reading is normal when the meter test leads are open, but this will not affect actual measurement accuracy. The meter will show zero or close to zero when the test leads are shorted. In reading AC voltage or current, reading-settling time increases to several seconds at the low end of AC voltage and current ranges in rms models.

### Measuring Resistance





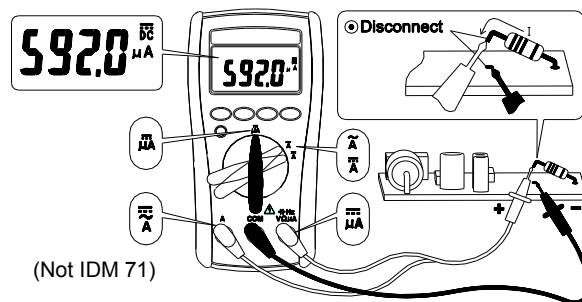
**To avoid possible damage to the meter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring resistance.**

**Note –** The meter provides an open voltage  $\leq -1.5V$  to the circuit under test that causes the diode or transistor junction to conduct, so it is better to disconnect the resistance from the circuit to get a correct measurement.

The resistance of test leads is about  $0.1\Omega \sim 0.2\Omega$ . To test the leads resistance, touch the probe tips together. For accurate measurement in low resistance.

$$R_{\text{UNKNOWN}} = R_{\text{MEASUREMENT}} - R_{\text{TEST LEAD}}$$

### Measuring DC $\mu A$ , DC A, AC A Current



**Never attempt an in-circuit measurement where the open-circuit potential to earth potential is greater than 500V for example a 3-phase system measurement; you may damage the meter or be injured.**



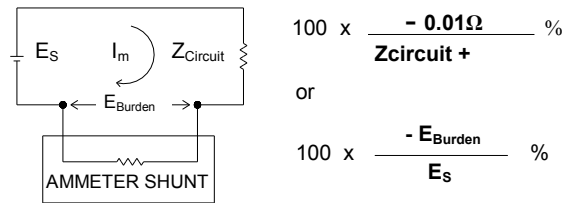
**To avoid possible damage to the meter or to the equipment under test, check the meter's fuses before measuring current. Use the proper terminals, function, and range for your measurement.**

**Never place the probes across (in parallel with) any circuit or component when the leads are plugged into the current terminals.**

When measuring current, the meter acts like an impedance such as  $0.01\Omega$  at AC/DC A (approximately  $1.5K\Omega$  at DC  $\mu A$ ) in series with the circuit.

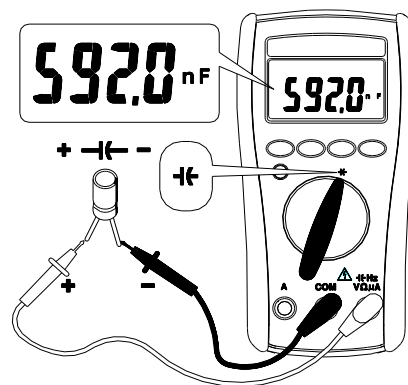
This loading effect of the meter can cause measurement errors, **loading effect error**, especially in low impedance circuits.

For example : To measure a  $1\Omega$  impedance circuit will cause a  $-1\%$  measuring error. The **error percentage of the loading effect** of the meter is expressed as following :



The DC  $\mu A$  input terminal is protected by a  $1.5K$  PTC ( $600V$  rating) thermistor.

### Measuring Capacitance



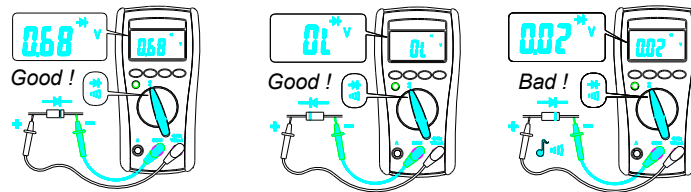
**To avoid possible damage to the meter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring capacitance. Use the DC voltage function to confirm that the capacitor is discharged.**

**Note** – To improve the measurement accuracy of small value capacitor, record the reading with the test leads open then subtract the residual capacitance of the meter and leads from measurement.

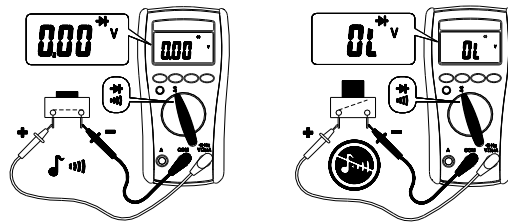
$$C_{UNKNOWN} = C_{MEASUREMENT} - C_{RESIDUAL}$$

### Testing Diodes and Continuity

Diode :



Continuity :



**For in-circuit test, turn circuit power off and discharge all high-voltage capacitors through an appropriate resistance load.**

**Note** - Use the diode test to check if the semiconductor junction is good or bad. The meter sends a current through the semiconductor junction to measure the voltage drop across the junction. A good junction drops between 0.4 V to 0.9 V.

## Features

### Feature Description

The meter has the following features :

**Display Hold** – Freezes the display.

**Min Max Hold** – Record the Max or Min reading of the display.

**Range** – Selects the manual ranging mode. The default mode is Automatic Range.

**Backlight** ☀ - LCD display backlight.

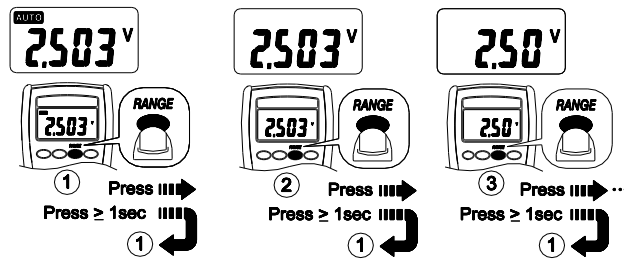
### APO (Auto Power Off) (Battery Saver) –

The meter automatically enters "Sleep Mode" and blanks the display if the meter is not used for 10 minutes. Press any of the feature buttons or change the rotary switch position to reset the time of APO. When the RS232 output is active, the

### Features Available vs Functions

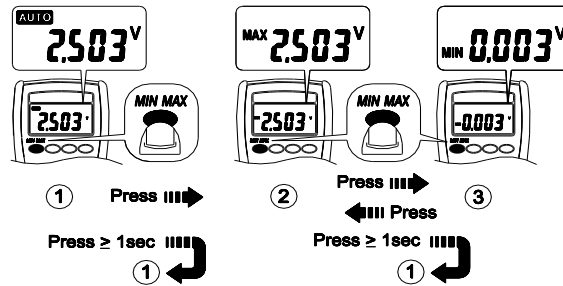
	~ V	≡ V	Ω	✱	≡ μA	+	Hz	~ A	≡ A
HOLD	o	o	o	o	o	o	o	o	o
MIN MAX HOLD	o	o	o	o	o	o	o	o	o
RANGE	o	o	o	x	o	o	o	o	o
RS232	o	o	o	o	o	o	o	o	o
BACK-LIGHT	o	o	o	o	o	o	o	o	o
APO	o	o	o	o	o	o	o	o	o

### Using The Features Manual Ranging and Auto Ranging



Note - The Range button is pressed to select manual ranging and to change ranges. When the Range button is pressed once, the **AUTO** indicator turns off. Press the Range button to select the appropriate range for the measurement you want to make. Press the Range button and hold for 1 second to return to Autorange mode.

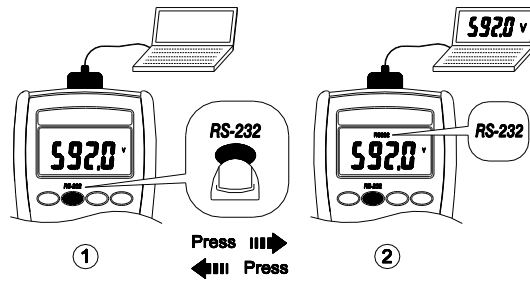
### MIN MAX Record



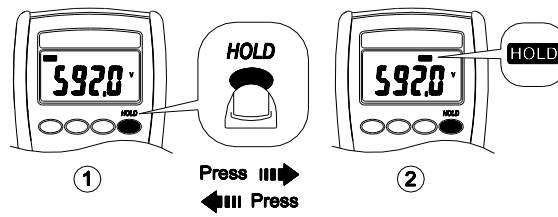
Note - Press the **HOLD** button in **MIN MAX** mode to make the meter stop updating the maximum and minimum value. When display **Hold** mode is nested in **MIN MAX** mode, the **MIN MAX** mode must be released before the display Hold.



**RS232 (IDM 73 only)**

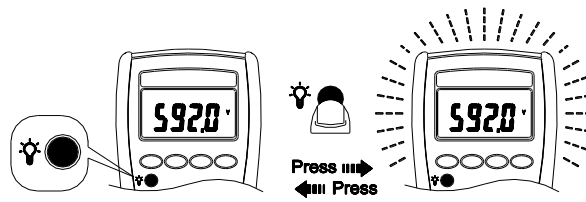


**Display Hold**



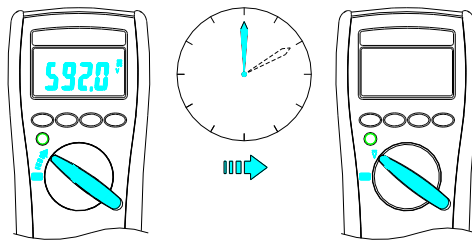
**Note** - Press the **Hold** button to toggle in and out of the display Hold mode.  
The **MAX / MIN** feature is unavailable when display Hold is active.

**Backlight**



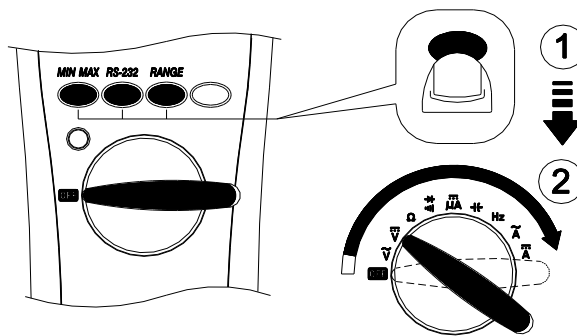
**Note** - Press the **Backlight** to toggle the display backlight on and off.

### Auto Power Off (Battery Saver)



**Note** - If the meter idles for more than 10 minutes, the meter automatically turns the power off. When this happens, the LCD displaying-state of the meter is saved. The meter can be turned back on by pushing any button, the LCD displays the saved state. Pushing **Hold** button to disables the hold state. Any button press or rotary switch change resets the time of Auto Power-OFF.

### Disable Auto Power Off



## Maintenance



- Do not attempt to repair this meter. It contains no userserviceable parts. Repair or servicing should only be performed by qualified personal.
- Failure to observe this precaution can result in injury and can damage the meter.

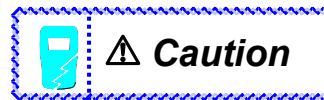
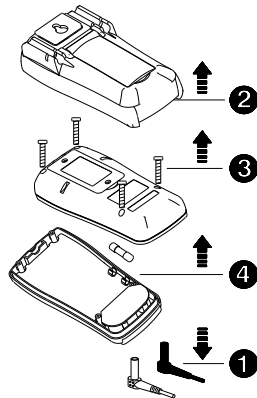
### Cleaning and storage

Periodically wipe the housing with a damp cloth and mild detergent. Dirt or moisture in the terminals can affect readings.

If the meter is not to be used for a long period, more than 60 days, **remove the battery and store it separately.**

### Fuse Replacement (Not IDM 71)

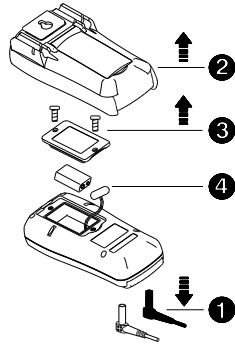
Refer to the following figure to replace fuse :



- Use ONLY a fuse with the amperage, interrupt, voltage, and speed rating specified.
- Fuse rating : 10A, 600V, high energy fuse.  
10x38 mm Fast Acting,  
Ferraz G330010 (RS 188-7971) or equivalent.

### Battery Replacement

Refer to the following figure to replace the battery :



- Replace the battery as soon as the low battery indicator "~" appears, to avoid false reading.
- 71 : Battery 1.5V x 2  
72/73 : Battery 9V

### Trouble Shooting

Do not attempt to repair your meter unless you are qualified to do so and have the relevant calibration, performance test and service information.

#### Basic Trouble Shooting

If the meter fails, first check the battery, the battery connection, fuse, test leads, and replace as necessary.

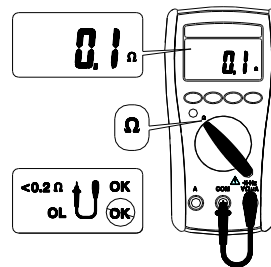
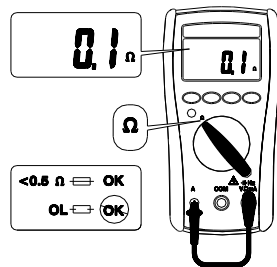
Review this manual to make sure that you are operating the meter correctly.

#### Testing the Fuse and Test Leads

Test the fuse and test leads as shown below.

##### Testing the Fuse (Not IDM 71)

##### Testing the Test Leads



## Specification

### General Specifications

**Display** : 6000 counts, updates 1.5/sec.

**Polarity Indication** : Automatic, positive implied, negative indicated.

**Overrange Indication** : "OL" or "-OL"

**Low Battery Indication** : "⚡" is displayed when the battery voltage drops below operating voltage.

**Auto Power Off** : Approx 10 minutes.

**Operating Ambient** : Non-condensing  $\leq 10^{\circ}\text{C}$  ,  $11^{\circ}\text{C} \sim 30^{\circ}\text{C}$  ( $\leq 80\%$  R.H)  
 $31^{\circ}\text{C} \sim 40^{\circ}\text{C}$  ( $\leq 75\%$  R.H),  $41^{\circ}\text{C} \sim 50^{\circ}\text{C}$  ( $\leq 45\%$  R.H),

**Storage Temperature** :  $-20^{\circ}\text{C}$  to  $60^{\circ}\text{C}$  , 0 to 80% R.H. when battery removed from Meter.

**Temperature Coefficient** :  $0.15 \times (\text{Spec.Acc'y}) / \pm$ ,  $< 18^{\circ}\text{C}$  or  $> 28^{\circ}\text{C}$  .

**Power Requirements** : Alkaline 1.5V (LR03) x 2 batteries for 71.

Alkaline 9V battery (6LR61) for 72,73

**Battery Life** : Alkaline 300 hours approximately.

**Dimensions (W x H x D)** : 76mm x 158mm x 38mm , without holster.

82mm x 164mm x 44mm , with holster.

**Accessories** : Battery (installed), Test leads and User manual.

### Electrical Specifications

Accuracy is  $\pm$  (% reading + number of digits) at  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$  , less than 80% R.H.

#### (1) DC / AC Volts

Range	DC Accuracy	AC Accuracy
600.0mV	$\pm(0.5\% + 2\text{dgt})$	50Hz / 60Hz sinewave only for 600.0mV range  $\pm(0.9\% + 5\text{dgt})$ 50Hz ~ 500Hz *1
6.000V		
60.00V		
600.0V		
DC1000V / AC750V		

**Over voltage protection** : DC1000 V or AC 750 Vrms.

**Input Impedance** :  $10\text{M}\Omega$  // less than 100pF.

*Specification*

**CMRR / NMRR : (Common Mode Rejection Ratio)  
(Normal Mode Rejection Ratio)**

$V_{AC}$  : CMRR > 60dB at DC, 50Hz / 60Hz

$V_{DC}$  : CMRR > 100dB at DC, 50Hz / 60Hz

NMRR > 50dB at DC, 50Hz / 60Hz

**AC Conversion Type :**

**71** : Average sensing rms indication.

**72 / 73** : AC conversions are ac-coupled true rms responding, calibrated to the sine wave input.

\*The basic accuracy is specified for a sine wave below 4000 counts. Over 4000 counts, add 0.6% to the accuracy. For a non-sine wave, the crest factor of the waveform is specified at  $\leq 3$  at full scale up to 2000 counts, decreasing linearly to a crest factor  $\leq 1.5$  at 1000 counts. Add  $\pm 1.5\%$  for a non-sinusoidal waveform. Crest Factor (C.F.) is the ratio of Peak value to RMS value.

**(2) DC / AC Current**

Range	DC Accuracy	AC Accuracy	Voltage Burden
600.0 $\mu$ A	$\pm(1.0\% + 2 \text{ dgt})$	N/A	<4mV / $\mu$ A
6000 $\mu$ A			
6.000A *2		$\pm(1.5\% + 5 \text{ dgt})$ 50Hz ~ 500Hz *1	2V max
10.00A *2			

**Overload Protection** : A input : 10A ,600V, high energy fuse. (Not IDM 71)  
 $\mu$ A input : 600V rms.

\* 1 **AC Conversion Type** : Conversion type and additional specification are same as DC/AC Voltage.

\*2 (Not IDM 71)

**(3) Resistance**

Range	Accuracy	Overload protection
600.0Ω *2	±(0.7% + 2 dgt)	600V rms
6.000KΩ		
60.00KΩ		
600.0KΩ		
6.000MΩ	±(1.0% + 2 dgt)	
60.00MΩ *1	±(1.5% + 2 dgt)	

**Open circuit Voltage** : -1.3V approx.

\* 1 < 100 dgt rolling.

\* 2 < 10 dgt rolling.

**(4) Diode Check and Continuity**

Range	Resolution	Accuracy
➔	10 mV	±(1.5% + 5 dgt)*

\* For 0.4V ~ 0.8V

**Max. Test Current** : 1.5mA

**Max. Open Circuit Voltage** : 3V

**Overload Protection** : 600V rms.

**Continuity** : Built-in buzzer sounds when resistance is less than approximately 100Ω. Response time is approximately 100 msec.

*Specification*

**(5) Frequency**

Range	** Sensitivity	Accuracy
6000Hz	100mV rms *	Frequency : 0.1%±1digit
60.00KHz		
600.0KHz		
6.000MHz	250mV rms	
60.00MHz	1V rms	

**Overload Protection** : 600V rms.

Sensitivity level tested by a square-wave form.

\* Less than 20Hz, the sensitivity is 1.5V rms.

\*\* **Max.Sensitivity** : <5 Vac rms.

**(6) Capacitance**

Range	Accuracy	Overload Protection
6.000nF	±(1.9% + 8 dgt)	600Vrms
60.00nF		
600.0nF		
6.000µF		
60.00µF		
600.0µF		
6.000mF *		

\* < 100 dgt of reading rolling.

**(7) Auto Power Off (APO)**

If the meter idles for more than 10 minutes, the meter automatically turns the power off.



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