

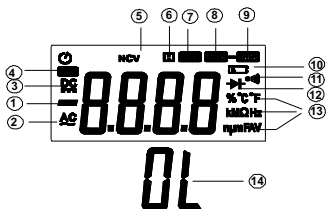
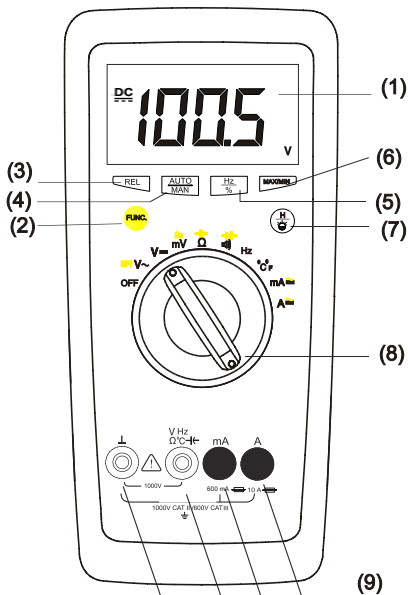
# User Manual

## RISHABH 610 TRMS

### Digital Multimeters















# Multimeter Operating Elements

- 1 LCD Display
- 2 Multifunction Pushbutton ( yellow key)
- 3 Pushbutton for Relative value
- 4 Pushbutton for Automatic or Manual range selection
- 5 Hz/% Pushbutton for VAC/AAC.
- 6 Max/Min Pushbutton
- 7 Backlight/Hold Pushbutton .
- 8 Function Selector Switch for ON/OFF and Measurement Function Selection
- 9 Terminal Sockets

## LCD Display

No.	Symbol	Meaning
1		Indicates negative readings
2		Indicator for AC voltage or current
3		Indicator for DC voltage or current
4	<b>AUTO</b>	The meter is in the Auto-range mode in which the meter automatically selects
5	<b>NCV</b>	No contact AC Voltage detect
6	<b>H</b>	The meter is in Data Hold mode w
7	<b>REL</b>	The meter is in Relative Measurement mode
8	<b>MAX</b>	Display maximum data
9	<b>MIN</b>	Display minimum data
10		Low battery indication
11		The meter is in Continuity Check mode
12		The meter is in Diode Test mode
13	<b>%C°F° KMHz µm FAV</b>	Measurement units
14		This symbol means that the input is too large for the selected range
15		This symbol means meter in auto power off mode

<b>Contents</b>	<b>Page</b>
<b>1. Safety Features and Precautions .....</b>	<b>4</b>
<b>2. Initial Start-up .....</b>	<b>6</b>
<b>3. Selecting Measuring Functions &amp; Ranges ....</b>	<b>7</b>
3.1 Measuring Function Selection.....	7
3.2 Automatic Measuring Range Selection.....	8
3.3 Manual Measuring Range Selection.....	8
<b>4. Liquid Crystal Display .....</b>	<b>9</b>
4.1 Digital Display .....	9
4.2 Display with Backlit(optional).....	9
<b>5.0 Max-Min.....</b>	<b>10</b>
<b>6.0 Measurement Value Storage " HOLD" .....</b>	<b>10</b>
<b>7.0 REL - Relative value measurement .....</b>	<b>10</b>
<b>8.0 Voltage Measurement .....</b>	<b>10</b>
<b>9.0 Current Measurement .....</b>	<b>12</b>
9.1 AC Measurement with (Clip-on) C.T. ....	13
<b>10.0 Diode Testing &amp; Continuity Measurement ...</b>	<b>14</b>
10.1 Diode Testing .....	14
10.2 Continuity Testing .....	15
<b>11.0 Resistance Measurement .....</b>	<b>16</b>
<b>12.0 Capacitance Measurement .....</b>	<b>17</b>
<b>13.0 Frequency &amp; Duty cycle Measurement .....</b>	<b>19</b>
13.1 Frequency Measurement .....	19
13.2 Duty Cycle Measurement .....	19
<b>14.0 Temperature Measurement .....</b>	<b>20</b>
<b>15.0 NCV (Non-Contact Voltage detect).....</b>	<b>20</b>
<b>16.0 Specifications .....</b>	<b>21</b>
<b>17.0 Maintenance .....</b>	<b>25</b>
17.1 Battery .....	25
17.2 Fuses .....	26
17.3 Housing .....	27
<b>18.0 Repair and Replacement parts service .....</b>	<b>27</b>

## 1 Safety Features and Precautions

You have selected an instrument which provides you with a high level of safety.

The digital multimeter is manufactured in compliance with safety regulations. In case of incorrect use or careless handling, the safety of both user and multimeter is not assured.




**To maintain the safe and proper condition of the meters and to ensure their safe operation, it is absolutely necessary to carefully and completely read these operating instructions before using any meter. These instructions must be followed in all respects.**

Observe the following safety precautions:

- The meter must only be operated by persons who understand the danger of shock hazards and know how to apply safety precautions. Shock hazards exist anywhere, where voltages of more than 30 V (TRMS) may occur.
- Do not work alone in shock hazardous environment while carrying out measurement
- *The maximum allowable voltage* between any terminal sockets (1) and earth is equal to 1000 V. Voltages of greater than 500 V may only be applied to sockets “ $\perp$ ”, and “V” with the selector switch in the voltage measurement position (selector switch in “V” position).
- Take in to account that unexpected voltages can occur at devices under test (e.g. defective devices). For example, capacitors can be dangerously charged.

- Verify that the test leads are in good condition, e.g. no cracked insulation, no open circuits in the leads or connectors.
- This meter must not be used for measurements on circuits with corona discharge (high-voltage).
- Be particularly careful when measurements are made in HF electrical circuits. Dangerous composite voltages may be present.
- Measurements under moist ambient conditions are not permitted.
- Do not exceed the *permissible overload limits of the measuring ranges*. Limit values can be found in the table "Measuring Ranges" in chapter 15 "Specifications".
- All current ranges are equipped with fuses. The maximum allowable voltage for the measuring current circuit (= nominal voltage of the fuse) is equal to 600 V ~.
- **The instrument may only be used in power installations when the electrical circuit is protected with a 20 A fuse or circuit breaker, and the nominal voltage of the installation does not exceed 1000 V.**

#### Meaning of the symbols

	Warning of a danger point (Attention, refer to the user manual)
	Earth (ground) terminal.
	Double or reinforced insulation
CAT II / III	Instrument for over voltage category II / III or IV
CE	EU conformity mark.

## **Repair, Parts Replacement and Calibration**

After opening the meter, live parts may be exposed. Therefore, the meter must be disconnected from the measuring circuit prior to opening its case for repair, replacement of parts or calibration. If repair or calibration cannot be avoided unless the meter is open and live, this work must be performed by a qualified person who understands the danger involved.

## **Faults and Extraordinary Stress**

When it must be assumed that the safe operation is no longer possible, take the meter out of service and secure it against accidental use.

It is assumed that Safe operation is no longer possible,

- when the meter shows obvious sign of damage,
- when the meter no longer functions correctly,
- after a prolonged storage under adverse conditions,
- due to severe stress due to transportation.

## **2 Initial Start-Up**

### **Battery**

Fit the meter with battery (batteries) provided along with the meter

*Please see chapter 16.1, page 26, before initial start-up of your instrument, or after a lengthy period of storage.*

### **Switching the Meter ON**

Turn the Function selector switch from the OFF position to the desired measuring function.

All of the segments of LCD are activated briefly.

A drawing of the LCD can be found on page 1 .



**Note!**

Electrical discharge and high frequency interference can cause incorrect displays, and may block the measuring sequence. To reset, switch the meter off, and then back on. If this procedure is unsuccessful, briefly disconnect the battery from the contact terminals.

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**Attention!**

*Before opening, disconnect the meter from the measuring circuit and observe chapter 16, page 25!*

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**Battery Saver (Sleep Mode)**

- Your meter switches itself OFF automatically after 15 minutes, if no keys or the selector switch have been activated during this time.
- Approximate 1 minute before the meter is auto power off, the buzzer will raise constantly 5 sounds to warning. Before the meter is power off, the buzzer will raise one long sound to warn the user.

**Switching the Meter back ON**

Press any key to wake the meter up.

**Switching the Meter OFF**

Turn the selector switch to the OFF position.

- To disable the Sleep mode, hold down the Func(Yellow) key while turning the meter on.

### **3 Selecting Measuring Functions and Ranges**

#### **3.1 Measuring Function Selection**

The desired measuring function is selected with the Function selector switch ( white or yellow print) . In order to select the function printed in yellow color , the yellow multifunction key must also be pressed. If the multifunction key is pressed again, the function printed in white half circle is reactivated .

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## 3.2 Automatic Measuring Range Selection

In the autorange mode, the Meter selects the best range for the input detected. This allows you to switch test points without having to reset the range. The Meter defaults to the autorange mode in measurement functions that have more than one range. When the Meter is in the autorange mode, AUTO is displayed.

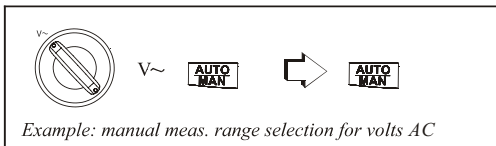
## 3.3 Manual Measuring Range Selection

1. Press RANGE key.

The Meter enters the manual ranging mode. AUTO turns off. Each presses of RANGE key increments the range. When the highest range is reached, the Meter wraps to the lowest range.

**NOTE:** If you manually change the measurement range after entering the Data Hold modes, the Meter exits this mode.

2. To exit the manual ranging mode, press and hold down RANGE key for two seconds. The Meter returns to the autorange mode and AUTO is displayed.



↓ AUTO/ MAN	Function	Acknowledge- ment	
		Display	Acoust. Signal
Brief	Manual Operation ON: Measuring Range is defined Switching Sequence at:		1 x
Brief	V $\overline{\text{---}}$ : 6V → 60V → 600V → 1000V → 6V → ... mV $\overline{\text{---}}$ : 60mV → 600mV → ... V $\sim$ / : 6V → 60V → 600V → 1000V → 6V → ... mA $\overline{\text{---}}$ : 60mA → 600mA → 60mA ... A $\overline{\text{---}}$ : 6A → 10A → 6A ... $\Omega$ : 60M $\Omega$ → 600 $\Omega$ → 6K $\Omega$ → 60K $\Omega$ → 600K $\Omega$ → 6M $\Omega$ → 60M $\Omega$ → ...		1 x
Long	Return to Automatic Range Selection	AUTO	2x

*Note : For Temperature (°C), Frequency (Hz), Duty cycle (%) and Capacitance (F) measuring range is always Auto. No manual range selection is possible.*

## 4 Liquid Crystal Display

### 4.1 Digital Display

The digital display shows the measurement value, decimal point and sign. The selected measuring unit and function are displayed. When measuring DC quantities minus sign appears in front of the digits, if the positive pole of the measurement magnitude is applied to the “ $\perp$ ” input.

“OL” appears if the measuring range upper limit is exceeded. The digital display is updated thrice per second for V, A, W, Cap Freq and duty cycle measurements.

### 4.2 Display with Backlight (Optional)


By long pressing  $\text{⏻}$  key back light can be made ON or OFF. User can take reading in poor light condition.

## 5. Max-Min


This key is for measuring maximum value and minimum value.

1. Press it to enter Max/Min mode.
2. Press it again; the LCD will display the Maximum Value.
3. Press it again; the LCD will display the Minimum Value.
4. Press it again; the LCD will display the Max-Min Value.
5. Press and hold it for two seconds, the meter will return to normal measurement state. (Except Hz/Duty and Capacitance)
6. With the function activated, you can select the measuring ranges only manually and the actual measured value can't be noted/read during this features
7. Switch to another range, the stored MIN/MAX values are cleared.

## 6 Measurement Value Storage "HOLD"

Data Hold mode makes the meter stop updating the display. Enabling Data Hold function in autorange mode makes the meter switch to Manual ranging mode, but the full-scale range remains the same. Data Hold function can be cancelled by changing the measurement mode, pressing RANGE key, or push  key again.

### To enter and exit the Data Hold mode:

1. Press  key (short press). Fixes the display on the current value, H is displayed.
2. A second short press returns the meter to normal mode

## 7 REL - Relative value measurement

REL key is the key to measure relative value & it acts in activation. All functions can be used for Relative value Measurement except Hz / duty.

## 8 Voltage Measurement

Turn the Function selector switch to  $V_{\text{AC}}$

- ⇒ Connect the measurement cable as shown. Terminal “⊥” should be grounded, and the second measuring cable with a higher potential connected to Terminal “V”.



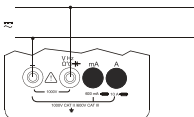
### Attention!

Make certain that the *current ranges* (“mA” or “A”) are deactivated and that the *measurement cables are connected to the correct terminals*, “V and ⊥”, before connecting your multimeter for the measurement of voltage! If the fuse tripping limit values are exceeded due to operator error, both the operator and the instrument are in danger! Observe the voltage limit values as printed on the meter !

The Meter's voltage ranges are 600.0mV, 6.000V, 60.00V, 600.0V and 1000V and buzzer will sound AC/DC Voltage > 1000 V. To measure ac or dc voltage.

1. Set rotary switch to the DCV, ACV or AC/DCmV range.
2. Connect the black and red test leads to the COM and V terminals respectively.
3. Connect the test leads to the circuit being measured
4. Read the displayed value. The polarity of red test lead connection will be indicated when making a DCV measurement.

NOTE: Unstable display may occur especially at 600mV range, even though you do not put test leads into input terminals. For better accuracy when measuring the dc offset of an ac voltage, measure the ac voltage first. Note the ac voltage range, then manually select a dc voltage range equal to or higher than the ac range. This improves the accuracy of the dc measurement by ensuring that the input protection circuits are not activated.



## 9 Current Measurement

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### Attention!

First switch off the power supply to the measuring circuit and/or to the load, and discharge any capacitors which might be present.

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a) Select function A with the function selector switch for currents  $> 600$  mA, or function mA for currents  $< 600$  mA. When measuring currents of an unknown magnitude, *Select the highest measuring range first.*

b) Select the function corresponding to the measured quantity by briefly pressing the yellow multi-function key. Each time the key is pressed, alternate switching takes place between AC and DC, and change over is acknowledged by sound signal. The symbols DC and AC indicate the selected current type in the LCD display.

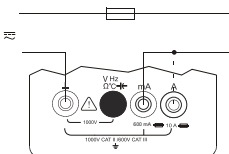
**After selection of this function with the selector switch, the Current type DC is always activated.**

c) Connect the measuring instrument in series to the load as shown (without contact resistance).

### Notes on Current Measurement :

- The meter must be used only in power systems, when the current circuit is protected with a 20 A fuse or circuit breaker, and the nominal voltage of the system does not exceed 600 V.
- Make the measuring circuit connections mechanically strong and secure, so that they do not accidentally open. The conductor cross sections and connection points should be designed to avoid excessive heating.
- Current ranges up to 600 mA are protected with a FF1A/600 V fuse.

- In the 600 mA measuring range an intermittent sound signal warns you, if the measurement value has exceeded the measuring range upper limit value.
- The 10 A current measuring range is protected with a 10 A / 600 V fuse.
- If a fuse blows, eliminate the cause of the overload before placing the meter back into operation!
- Fuse replacement is described in chapter 16.2, page 27.
- AC/DC A > 10 A, the buzzer will keep sounding as the overload warning.



## 9.1 AC Measurement with (Clip-On) Current Transformers

### 9.1.1 Transformer Output mA/A



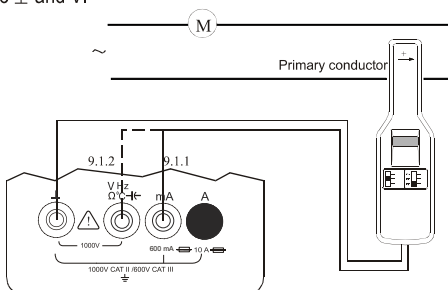
#### Attention!

If current transformers are operated with an open circuit on the secondary side, e.g. due to defective or disconnected leads, a blown fuse in the meter or a wrong connection, dangerously high voltages can occur at the connections. For this reason, verify that the current circuit of the multimeter and secondary winding of transformer connected to the multimeter form an intact circuit. Connect the transformer to the sockets  $\perp$  and mA or A

Some current transformers include safety devices, which prevent dangerous voltage increases at open electrical circuits. The maximum allowable operating voltage at the primary conductor is equal to the nominal voltage of the current transformer. When reading the measurement value, consider the transformation ration of the transformer, as well as additional display error.

### 9.1.2 Transformer Output mV/A.

Some transformers have a voltage output (designation: mV/A). Consequently, the secondary connection must be connected to  $\perp$  and V.



## 10 Diode Testing & Continuity Measurement

### 10.1 Diode Testing



#### Attention!

Verify that the device under test is electrically dead. External voltages would falsify the measurement results!

- \* Set the function selector switch to “ $\rightarrow \text{diode} \rightarrow$ ”.
- \* Press the yellow multifunction key to switch to the Diode Measuring range. Display of the  $\rightarrow \text{diode} \rightarrow$  symbol is activated



## Conducting Direction and Short-Circuit

The measuring instrument displays the forward voltage in volts. As long as the voltage drop does not exceed the maximum display value of 3.000 V, you can test several elements connected in series.

## Reverse Direction or Interruption

The measuring instrument displays a voltage of 'OL'



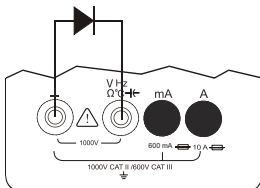
### Note!

Resistors and semiconductor paths in parallel to the diode distort the measurement results!

Conducting Direction



Reverse Direction



## 10.2 Continuity Testing



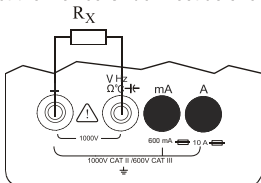
### Attention!

Verify that the device under test is electrically dead. External voltages would falsify the measurement results!

\* Set the selector switch to “ $\rightarrow \infty \rightarrow$ ”.

The instrument generates a continuous sound signal at a measured resistance of 0 ... approx.  $< 50 \Omega$ .

\* Connect the Device Under Test as shown.



## 11 Resistance Measurement

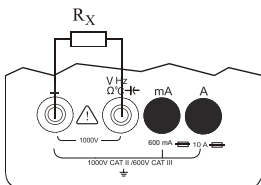


### Attention!

Verify that the device under test is electrically dead. External voltages would falsify the measurement results!

\* Set the selector switch to “ $\Omega$ ”.

\* Connect the Device Under Test as shown.



### Zero Adjustment (Relative mode)

In the measurement of resistance the inherent error of the meter and the resistance of leads can be eliminated by zero adjustment.

- Short the leads connected to meter
- Press REL key

The instrument acknowledges zero adjustment with a sound signal & value close to 00 & REL are displayed on LCD.

The resistance measured at the moment the REL key is pressed serves as a reference value. This value is then automatically subtracted from all measured value.

On 60M range, the meter may take a few seconds to stabilize reading. This is normal for high resistance measuring.

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

## 12 Capacitance Measurement

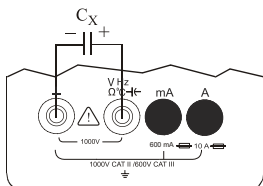


### Attention!

Be absolutely certain that the device under test is electrically dead. External voltages would falsify the measurement results!

Set the function selector switch to "F".

Connect the (discharged!) device under test to socket "⊥" and "F" with measurement leads. Polarized capacitors must be connected to the "⊥" socket at the "-" pole.



### Note!

Resistors and semiconductor paths in parallel to the capacitor falsify the measurement results!

To measure small value capacitors please use short measurement cables!

If  is displayed the measured values are not valid.

### **Zero Adjustment (relative mode)**

For the measurement of small capacitance values in the 6 nF and 60 nF ranges, the inherent error of the meter and the capacitance of the leads can be eliminated by zero adjustment.

-Connect the leads to the meter without Device under test.

-Briefly Press the REL key .

The instrument acknowledges zero adjustment with an sound signal, and a value close to "00.00" and REL are displayed at the LCD. The capacitance measured at the moment the key is activated serves as a reference value. This value is then automatically subtracted from all measured values.

### **Deleting Zero adjustment**

Press REL key

clearance is acknowledged by buzzer sound.

or Activate the function selector switch

or Switch the multimeter off.

The meter may take a few seconds(>30 seconds in 600.0uF range) to stabilize reading. This is normal for high capacitance measuring.

Below 100pF, the accuracy of measurements is unspecified.

## 13 Frequency & Duty Cycle Measurement

### 13.1 Frequency Measurement

#### Linear Frequency

The Meter can measure Frequency or Duty Cycle while making either an AC Voltage or AC Current measurement.

To measure frequency or Duty Cycle:

1. With the meter in the desired function (AC Voltage or AC Current), press the Hz % key.
2. Read the frequency of the AC signal on the display.

#### Logic Frequency

1. Set the rotary switch to the Hz range.
2. Insert the black and red test leads into the COM and Hz input terminals.
3. Connect the test leads tip in parallel with the circuit to be measured. And don't touch any electrical conductors.

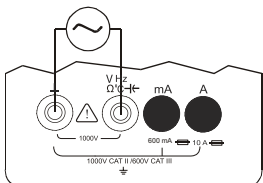
### 13.2 Duty Cycle Measurement

a) With duty cycle measurement, we can determine the ratio of pulse duration to cycle time of recurring square wave signals. The duty cycle that is the percentage pulse duration of signal is displayed on LCD i.e.

$$\text{Duty cycle (\%)} = \frac{\text{pulse duration}}{\text{cycle duration}} \times 100$$

Note : The applied frequency must remain constant during the duty cycle measurement.

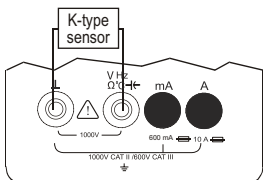
- a) Set the function selector switch to VAC/AC/Hz and press Hz/% key twice .  
The Duty cycle (%) mode is activated. “%” symbol is displayed on LCD.



## 14 Temperature Measurement

To measure temperature:

1. Set the rotary switch to C range and the LCD will show the current environment temperature.
2. Insert 'K' type thermocouples into the COM terminal and  $^{\circ}\text{C}$  terminal (or you can insert it by using Multi Function Socket) Takings care to observe the correct polarity.
3. Touch the object with the thermocouple probe for measurement.
4. Read the stable reading from LCD.



## 15.NCV (Non-Contact Voltage detect)

Set rotary switch to the ACV /EF-~~f~~ range. Press the Func(Yellow) key to go NCV detect mode. Put the EF-DETECT AREA close to the AC power cable or the power socket, if AC electrical voltage is present, the Buzzer warning will sound, and the symbol bar "-" will be displayed on the LCD. The lowest detect voltage is around 50V 50/60Hz. The LCD display EF, when detect the AC voltage signal, the LCD display ' - ' / ' -- ' / ' --- ' / ' ---- ' from weak to strong.

# 15 Specifications

Measuring Function	Measuring Range	Resolution	Input Impedance	Digital Display Inherent Deviation at reference conditions (±...% of rdg + ...digits)	Overload Capacity <sup>1)</sup>				
					Overload Value	Overload Duration			
V(AC)	6.000V	1mV	10M Ω	0.8+5	1000Vac rms	Continuous			
	60.00 V	10mV	10M Ω						
	600.0 V	100mV	10M Ω						
	1000 V	1V	10M Ω						
V(DC)	6.000V	1mV	10M Ω	0.5+3	1000VDC	Continuous			
	60.00 V	10mV	10M Ω						
	600.0 V	100mV	10M Ω						
	1000 V	1V	10M Ω						
mV(AC)	60.00mV	10uV	10M Ω	3+5	500VDC/ACrms	10 Min			
mV(DC)	600.0mV	100uV	10M Ω	1.5+5	500VDC/ACrms	10 Min			
	600.0mV	10uV	10M Ω	1+5					
			Approx Voltage Drop at max measuring current	0.5+5					
ADC	60.00mA	0.01mA	60mV	1.5+3	600mADC	Continuous			
	600.0mA	0.1mA	600mV						
	6.000A	1mA	60mV						
	10.00A	10mA	100mV						
AAC	60.00mA	1mA	60mV	1.8+5	600mAac rms	Continuous			
	600.0mA	10mA	600mV						
	6.000A	1mA	60mV						
	10.00A	10mA	100mV						
			Open Circuit Voltage						
Ω	600.0 Ω	100m Ω	Approx 0.5V	0.5+3	500VDC/ACrms	10 Min			
	6.000k Ω	1Ω		0.5+2					
	60.00k Ω	10 Ω							
	600.0k Ω	100 Ω							
	6.000M Ω	1k Ω							
	60.00M Ω	10k Ω							
Farad	6.000nF	1nF	Approx 3V	5+20 <sup>6)</sup>	500VDC/ACrms	10 Min			
	60.00nF	10nF		5+20					
	600.0nF	100nF		5+10					
	6.000uF	1uF							
	60.00uF	10uF							
	600.0uF	100uF							
	6.000mF	1mF							
	60.00mF	10mF		5+20					
							unspecified		
	BUZZER	600		100m			Approx 0.5V	Acoustic Signal 0....<50 approx	500VDC/ACrms
Diode	3.000V	0.001V	Forward Current 1mA	2+10	500VDC/ACrms	10 Min			
°C/°F	-200-0°C/32°F-32°F	1°C/1°F		5+4 <sup>6)</sup>	500VDC/ACrms	10 Min			
	0-400°C/32°F-752°F		2+3 <sup>6)</sup>						
	400-1200°C/752°F-2192°F		2+2 <sup>6)</sup>						
Hz	Logic Frequency			0.1+3 <sup>6)</sup>	500VDC/ACrms	10 Min			
	99.99Hz	0.01Hz							
	999.9 Hz	0.1Hz							
	9.999kHz	0.001kHz							
	99.99kHz	0.01kHz							
	999.9kHz	0.1kHz							
	Linear Frequency						0.05+8		
	99.99Hz	0.01Hz							
999.9 Hz	0.1Hz								
9.999kHz	0.001kHz								
Duty Cycle	2.0...98.0%	0.1%		10...1KHz: +/-SD 1KHz...10KHz: +/-SD/kHz	500VDC/ACrms	10 Min			

- 1) For Measurement >6A 15s ON and 10Min OFF  
 2) At 0-40°C  
 3) At Input 5Vrms Square wave bipolar inputs  
 4) Without Sensor  
 5) For Frequency display extended to 9999 counts  
 6) add 10 digits ±1nF

All the AC measurement values is the true RMS (true root-mean-square) values. Frequency range is up to 1KHz.

## Reference Conditions

Ambient	
Temperature	+ 23 °C ± 2 K
Relative Humidity	45% ... 55%
Measuring Magnitude	
Frequency	Sine, 50 Hz
Measuring Magnitude	
Waveform	Sine
Battery Voltage	3 V ± 0.1 V

## Ambient Conditions

Working Temperature	
Range	0 °C ... + 50 °C
Storage Temperature	
Range	- 25 °C ... + 70 °C
Climate Classification	2z/-10/50/70/75% (without batteries) in compliance with VDI/VDE 3540
Relative Humidity	45 ... 75%
Elevation	to 2000 m

## Display

LCD display field (58mmx31.4mm) with digital display and display of unit of measure, current type and various special functions.

## Digital


Display/Char. Height	7 segment digits / 19 mm
Number of Places	4 Digits 6000 Counts
Overflow Display	"OL"
Polarity Display	"-" sign is displayed when plus pole is at "⊥"
Measuring Rate	3 measurements/s



## Influence Quantity and Effects

Influence Quantity	Range of Influence	Measured Quantity/ Measuring Range	Variation <sup>1)</sup> ± (...% of rdg. + ....digits)
Temperature	0 °C +21 °C and +25 °C...+50°C	mV,VDC	0.1 X Intrinsic error / K
		mV,VAC	
		mA,ADC	
		mA,AAC	
		Ω	
		Diode	
		F	
		Hz	
		%	
Frequency of the Measured quantity	20 Hz...< 50 Hz	VAC AAC	2.0+3 2.5+3
	> 50Hz... 1 kHz		
	Relative Humidity	55.....75%	V~,VDC
A~,ADC			
Ω			
F			
Hz			
°C			
%			

## Power Supply

Battery	2 x 1.5 V mignon cell zinc-carbon cell per IEC R6 alkaline manganese cell per IEC LR 6
Service Life	with zinc-carbon cell: approx. 300 hr. with alkaline manganese cell: approx. 600 hr.
Battery Test	Automatic display of the symbol “  ” when battery voltage falls below : approx. 2.4 V
<b>Fuse</b>	
Fuse for ranges up to 600 mA	FF 1 A / 600 V; 6.3 mm x 32 mm; protects all current measuring ranges up to 600 mA in
Fuse for 10 A Range	FF 10 A / 600 V; 6.3 mm x 32 mm Protects all current measuring ranges up to 10 A.

## Electromagnetic compatibility (EMC)

EMC Immunity:	IEC 61326-1:2012, Table A.1 IEC 61000-4-2 8KV atmosphere discharge. 4KV contact discharge. IEC 61000-4-3 3V/m
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Short-term measured value deviation may occur during electro-magnetic interference thus reducing the specified operating quality.

<b>Electrical Safety</b>	IEC 61010-1-2010
Installation category	600V CAT III / 1000V CAT II
Pollution degree	2
High voltage test	3.7 kV~(IEC 61010-1-2010)

## Mechanical Design

Protection	For meter : IP 52 For Terminals : IP 20
Dimensions	W x H x D:
With Holster	86 mm x 188 mm x 53 mm
Without Holster	79 mm x 174 mm x 38 mm
Weight	approx. 0.480 kg with battery

## 16 Maintenance


*Attention:*

*Disconnect the instrument from the measuring circuit before opening the instrument to replace the battery or the fuse !*

### 16.1 Battery

Before initial start-up, or after storage of your instrument, make sure that no leakage has occurred at the instrument battery. Repeat this inspection at regular intervals.

If battery leakage has occurred, electrolyte from the battery must be carefully and completely removed and a new battery must be installed, before the instrument can be placed back into operation.

If the "" symbol appears in the LCD display, you should change the battery as soon as possible. You can continue to take measurements, but reduced measuring accuracy may result.

### Replacing the Battery(ies)

Simply unscrew the battery compartment cover from base housing. No need to remove whole base housing.

Remove the battery from the battery compartment.  
Insert two new 1.5 Vignon cells in accordance with the polarity symbols in the battery compartment.

Screw the battery compartment cover to base housing. Dispose of the dead battery in an environmentally sound fashion.

## 16.2 Fuses

The 10 A fuse interrupts the 10 A current measuring range and the 1 A fuse the mA current measuring ranges. All other measuring ranges continue to function.

If a fuse blows, eliminate the cause of the overload before placing the instrument back into operation!

### Replacement of Fuses

Unscrew the base housing cover from front housing. Remove the defective fuse with the help of, for example, a test prod, and replace it with a new fuse.

Screw the base housing cover to front housing.

Make certain that the new fuse makes good contact.

The following fuses may be used:

- for current measuring ranges up to 600 mA:  
type FF 1 A / 600 V~ ; 6.3 mm x 32 mm
- for the 10 A measuring range:  
type FF 1 A / 600 V~ ; 6.3 mm x 32 mm



### Attention!

Be absolutely certain that only the specified fuses as above are used. The use of fuse with different specifications may place the operator, the system & measuring instrument in danger. The use of repaired fuses or short-circuiting of the fuse holder is prohibited.

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## Fuse Testing

- # Take out the fuse to be tested.
- # Set the selector switch to “ $\rightarrow$ ”.
- # press yellow function key to select “ $\Omega$ ”.
- # Plug the measurement cable into the “V,  $\Omega$ ,  $\rightarrow$ , F” socket.
- # Measure the resistance of fuse.
- # A continuous audible signal and the display of approx.  $10.2\Omega$ , indicate that the fuse for the mA current range is OK.
- # A continuous audible signal and the display of approx.  $0.0\Omega$  indicate that the fuse for the A current range is OK.

If a value other than those indicated above, or if overflow (“OL”) is displayed, the corresponding fuse must be replaced.

### 16.3 Housing

No special maintenance is required for the housing. Excessive contamination has an adverse effect on isolation and reduces input resistance. The surface must be kept clean for this reason. Use a slightly dampened cloth for cleaning. Avoid the use of cleansers, abrasives or solvents.

## 17 Repair and Replacement parts service

When you need service Please contact;

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