LCR METER

Model : LCR-9073A

Your purchase of this LCR METER marks a step forward for you into the field of precision measurement. Although this LCR METER is a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.

SYSTEM CERTIFICATION ISO 9001:2008 SGS
UKAS QUALITY MANAGEMENT 005

OPERATION MANUAL

TABLE OF CONTENTS

1. FEATURES

* Professional LCR meter, used the LSI-circuit and exclusive microprocessor circuit, high reliability and High measuring accuracy.
* Wide ranger measurement for Inductance, Capacitance and Resistance measurement.
* Test frequency : 100 Hz, 1 KHz.
* Input overload protection
* Rotary switch function selector.
* RS232/USB Computer interface.
* Diode test.
* Large LCD display with backlight.
* Built-in low battery indicator

2. SPECIFICATIONS

2-1 General Specifications

Display	67 mm x 27 mm large LCD display. 17 mm x 9 mm, digit size. ** With LCD backlight ON/OFF control.*
Measurement	*Inductance (L) :* 5 ranges : 2 mH to 20 H.
	Capacitance (C) : 6 ranges : 2 nF to 200 uF.
	Resistance (R) : 6 ranges : 200 ohm to 20 Mega ohm.
	Diode test
Circuit	Custom one-chip of microprocessor LSI circuit
Sampling Time	Approx. 0.4 second.

Data Output	RS 232/USB PC computer interface. * *Connect the optional RS232 cable UPCB-02 will get the RS232 plug.* * *Connect the optional USB cable USB-01 will get the USB plug.*
Over Input Indication	Show " 1 " indicator.
Operating Temperature	0 ℃ to 50 ℃ (32 ℉ to 122 ℉).
Operating Humidity	Less than 80% RH.
Power Supply	Alkaline or heavy duty type DC 9V battery, 006P, MN1604 (PP3) or equivalent.
Power Consumption	Approx. 12 mA.
Weight	314 g/0.69 lb.
Dimension	204 x 90 x 36 mm (8.0 x 3.5 x 1.4 inch).
Accessories Included	Instruction manual..... 1 PC. Test alligator clips..... 1 Pair.
Optional Accessories	* Data Acquisition software, SW-801-WIN * USB cable, USB-01 * RS232 cable, UPCB-02

2-2 Electrical specifications (23 ± 5 ℃)

L (Inductance)

Range	Resolution	Test Frequency	Accuracy
2 mH	1 uH	1 kHz	± (2 %+2d)
20 mH	10 uH	1 kHz	± (2 %+2d)
200 mH	100 uH	1 kHz	± (2 %+2d)
2 H	1 mH	1 kHz	± (5 %+2d)
20 H	10 mH	100 Hz	± (5 %+2d)
uH = micro Henry (10^-6 H) *mH = mili Henry (10^-3 H)*			

Range	Current through Inductance under test
2 mH	150 u A
20 mH	150 u A
200 mH	150 u A
2 H	150 u A
20 H	15 u A

Overload Rating
AC 10V (50 Hz/60 Hz) max, or DC 10V max., less than 30 second.

C (Capacitance)

Range	Resolution	Test Frequency	Accuracy
2 nF	1 pF	1 kHz	± (2 %+2d)
20 nF	10 pF	1 kHz	± (2 %+2d)
200 nF	100 pF	1 kHz	± (2 %+2d)
2 uF	0.001 uF	1 kHz	± (2 %+2d)
20 uF	0.01 uF	100 Hz	± (2 %+2d)
200 uF	0.1 uF	100 Hz	± (2 %+2d)
pF = pico Farad (10^-12 F) *nF= nano Farad (10^-9 F)* *uF= micro Farad (10^-6 F)*			

Range	Voltage across Capacitance under test
2n F	150 mV
20 nF	150 mV
200 nF	150 mV
2 uF	150 mV
20 uF	150 mV
200 uF	15 mV

Overload Rating
Charged capacitor 100 uF/ 50 V Max.

R (Resistance)

Range	Resolution	Accuracy
200 Ω	0.1Ω	± (1 % + 2d)
2 kΩ	1 Ω	± (1 % + 2d)
20 kΩ	10 Ω	± (1 % + 2d)
200 kΩ	100 Ω	± (1 % + 2d)
2 MΩ	1 kΩ	± (1 % + 2d)
20 MΩ	10 kΩ	± (2 % + 2d)

Range	Open circuit Voltage
200 Ω	2.4 V
2 kΩ	2.4 V
20 kΩ	Approx. DC 250 m V
200 kΩ	Approx. DC 250 m V
2 MΩ	Approx. DC 250 m V
20 MΩ	Approx. DC 250 m V

Overload Rating
AC / DC 500V at 20 seconds Max.

Diode test

Short/non conductance, good/defect test

3. FRONT PANEL DESCRIPTION

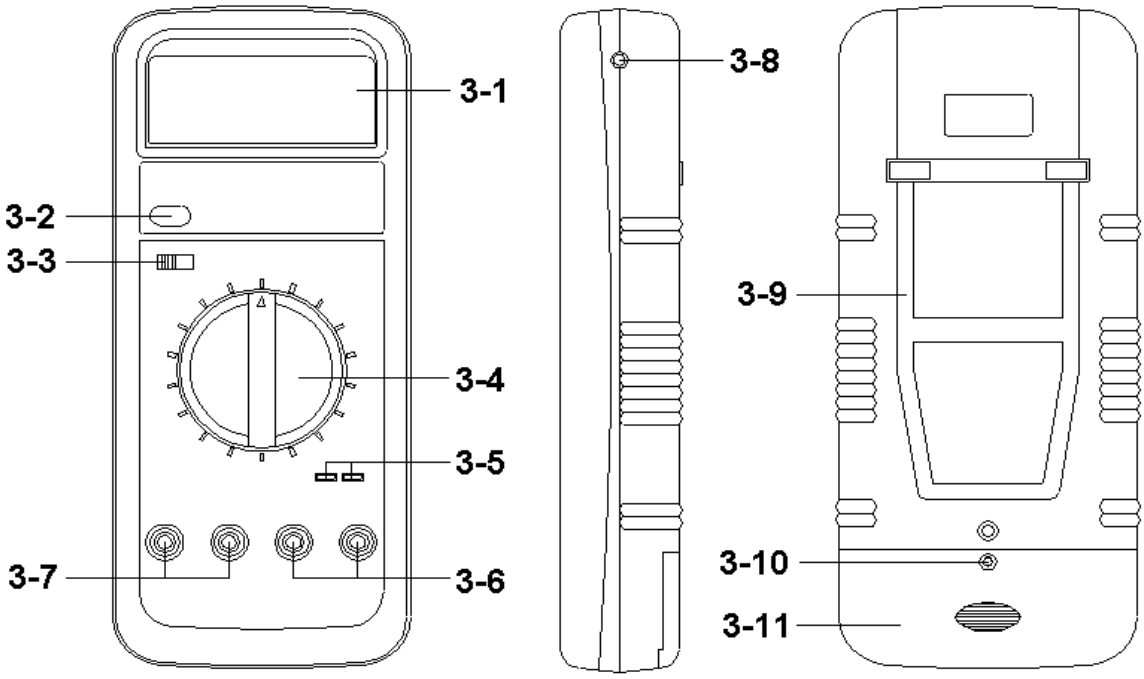


Fig. 1

3-1 Display
3-2 LCD backlight ON/OFF button
3-3 LC/R select switch
3-4 Function rotary switch/Power switch
3-5 L/C Measuring terminal 1
3-6 L/C Measuring terminal 2
3-7 Resistance/Diode Measuring terminal
3-8 RS-232 Output Terminal
3-9 Stand
3-10 Battery cover Screw
3-11 Battery Compartment/Cove

4. INDUCTANCE (L) MEASUREMENT PROCEDURE

1) Slide the " LC/R select switch " (3-3, Fig. 1) to the " LC " position.
2) Rotate the function switch for the maximum expected inductance range.
3)  **Fully discharge any charged inductors.**
4) Insert the tested inductor into socket " L/C Measuring input terminal 1 " (3-5, Fig. 1). Alternatively, connect the inductor to " L/C Measuring input terminal 2 " (3-6, Fig. 1). via using the measuring alligators supplied .

Note :

a. If the inductance value is unmarked start with the highest range and keep decreasing until a suitable reading is obtained.
b. Measurement of very low inductance should be performed using extremely short leads in order to avoid introducing any stray inductance.
c. This instruments is not intended for determining the " Q " factor for the inductor. Misleading readings may be obtained if the measurement of the inductance of a resistor is attempted.

5. CAPACITANCE (C) MEASUREMENT PROCEDURE

1) Slide the " LC/R select switch " (3-3, Fig. 1) to the " LC " position.

2) Rotate the function switch for the maximum expected capacitance range.

3)  **Fully discharge any charged capacitors.**

4) Observe polarity when connecting polarized capacitors.
5) Insert the tested capacitor into socket " L/C Measuring input terminal 1 " (3-5, Fig. 1). Alternatively, connect the capacitor to " L/C Measuring input terminal 2 " (3-6, Fig. 1) via using the measuring alligators supplied .
6) The Display value indicated corresponds to the range selected. If the Display shows " 1 ", it indicates an out of range selected measurement, then select to the next higher range.

Note :

a. If the capacitance value is unmarked start with the highest range and keep decreasing until a suitable reading is obtained.
b. A capacitor with low voltage leakage will read over range, or a much higher value than normal. An open circuit capacitor will read zero on all ranges possibly a few pF on 2 nF range due to stray capacitance of the instrument.
c. Measurement of very low capacitance should be performed using extremely short leads in order to avoid introducing any stray capacitance.
d. When using the test leads, remember that the leads may introduce a measurable capacitance to the measurement.
e. Capacitors, especially electrolytic type, often have wide tolerances.

6. RESISTANCE (R) MEASUREMENT PROCEDURE

1) Slide the " LC/R select switch " (3-3, Fig. 1) to the " R " position.
2) Rotate the function switch for the maximum expected resistance range.
3) Connect the tested resistor into socket " Resistance Measuring input terminal " (3-6, Fig. 1) via using the measuring alligators supplied .
4) The Display value indicate corresponds to the range selected. If the Display shows " 1 ", it indicates an out of range selected measurement, then select the next higher range.

Note :
In order to make precision measurement at lower range, to deduct the stray resistance of measuring leads from the readings. The stray resistance can be measured by shorting the leads.

7. DIODE MEASUREMENT PROCEDURE

1) Slide the " LC/R select switch " (3-3, Fig. 1) to the " R " position.
2) Rotate the function switch to the " Diode " range.
3) Connect Red alligator to " + " socket of " Diode Measuring terminal " (3-7, Fig. 1).
4) Connect Black alligator to " - " socket of " Diode Measuring terminal " (3-7, Fig. 1).

5) a. When connected with polarity as shown in Fig. 2, a forward current flow is established and the approx. Diode Forward Voltage (VF) values in volt will display on the display reading. If the diode under test is defective, ".000" or near ".000" value (short circuit) or " 1 " (open circuit) will be displayed.

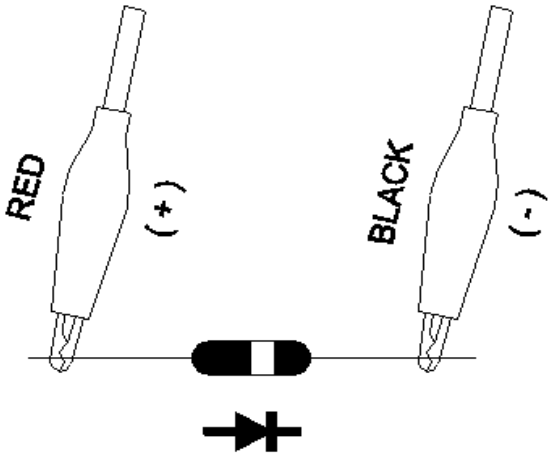


Fig. 2

b. When connected as shown in Fig. 3, a reverse check on the diode is made. If the diode under test is good, " 1 " will be displayed. If the diode under test is defective, ".000" or other numbers will be displayed. Proper diode testing should include both steps a. and b. above.

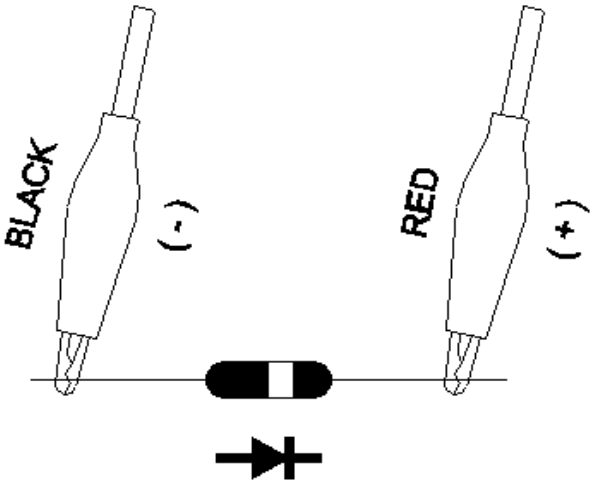


Fig. 3

8. MAINTENANCE

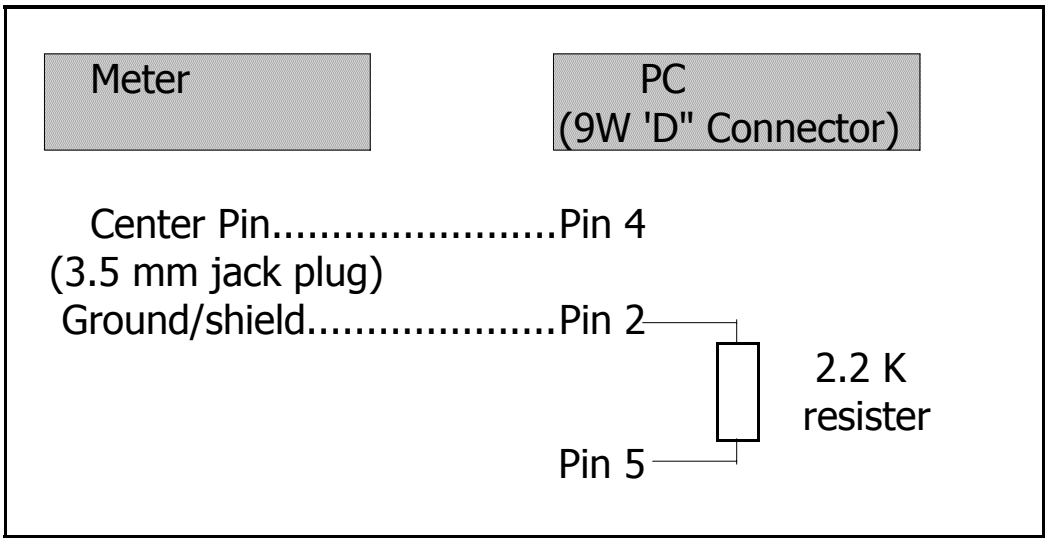
1) This LCR METER is intended for measuring the capacitance value of a capacitor, the inductance value of an inductor. It is not intended for determining the " Q " factor for above reactive components. Misleading readings may be obtained if the measurement of the inductance or capacitance of resistor is attempted
2) When measuring components within a circuit ensure the circuit the is switched off and de-energized before connecting the test leads.
3) Instruments used in dusty environments should be stripped and cleaned periodically.
4) Do not leave the instrument exposed to direct heat from the sun for long periods.
5) Before removing the battery compartment cover, ensure that the instrument is disconnected from any circuit and the power switch is in the off position.
6) For all measurements, connect the Black alligator into " - " terminal and Red alligator into " + " terminal .

9. RS232 COMPUTER INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-8, Fig. 1).

The data output is a 16 digit stream which can be utilized for user's specific application.

A RS232 lead with the following connection will be required to link the instrument with the PC serial port.



The 16 digits data stream will be displayed in the following format :

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

Each digit indicates the following status :

D15	Start Word		
D14	4		
D13	1		
D12, D11	Annunciator for Display		
	M ohm = 40	mH = 41	nF = 43
	K ohm = 39	H = 42	uF = 44
	ohm = 38		
D10	Polarity 0 = Positive 1 = Negative		

D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP
D8 to D1	Display reading, D1 = LSD, D8 = MSD For example : If the display reading is 1234, then D8 to D1 is : 00001234
D0	End Word

RS232 FORMAT : 9600, N, 8, 1

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

10. BATTERY REPLACEMENT

1) When the Display will show " BAT " indicator, it should to replace the battery although accurate measurement may still be kept within certain period.
2) To replace the battery, loss the " battery cover screw " (3-10, Fig. 1) slide the battery cover (3-11, Fig 1) always from the meter and remove the battery
3) Install a new 9v (pp3 type) battery and replace the cover.