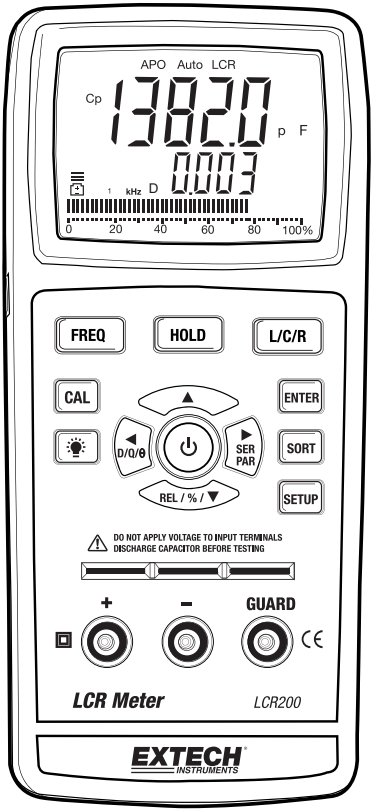
EXTECH INSTRUMENTS
A FLIR COMPANY

User's Guide

Digital LCR Meter

Model LCR200



Introduction

Thank you for selecting the Extech Model LCR200 LCR meter. This meter will accurately measure capacitors, inductors and resistors using the test frequencies of 100Hz, 120Hz 1 kHz, 10 kHz and 100 kHz. The dual display will simultaneously display the associated quality factor, dissipation or phase angle value using a series or parallel equivalent circuit.

This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service. Please visit the Extech Instruments website (www.extech.com) to check for the latest version of this User Guide. Extech Instruments is an ISO-9001 certified company.

Features

- 19,999/1,999 count dual LCD display
- Auto LCR smart-check and measurement
- Selectable Serial/Parallel modes
- Ls/Lp/Cs/Cp with D/Q/RP/ESR parameters
- DC Resistance
- Five test frequencies:100Hz/120Hz/1kHz/10kHz/100kHz
- Test AC signal level: 600mV rms typical
- Test ranges: (ex. F = 1 KHz)

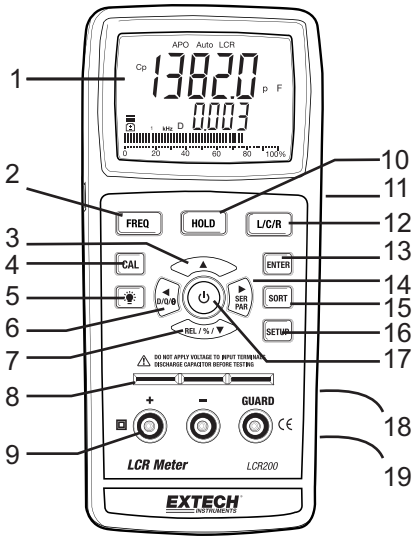
  L: 0.00uH to 2000.0H

  C: 0.0pF to 2.000 mF

  R: 0.000Ω to 200.0 MΩ
- Multi-level battery detector
- LCD with green backlight

Meter Description

1. Display
2. Frequency Button
3. ▲ Button, RS232 Button
4. CAL Button
5. Backlight Button
6. ◄, D/Q/θ Button
7. REL/%/ ▼ Button
8. Input terminals (pin terminals)
9. Input terminals (banana terminals)
10. Hold Button
11. Data Output Port
12. L/C/R Button
13. Enter Button
14. ►, SER/PAR Button
15. Sorting Button
16. Setup Button
17. Power Button
18. Stand (rear)
19. Battery Compartment (rear)



Operation

Setup

1. Press the ⏻ Power button to switch the meter ON.
2. The meter will switch ON in the default mode: AUTO LCR and 1kHz
3. APO will be active with auto shutoff every 5 minutes.

LCR primary parameter selection

1. The meter will switch ON with auto parameter selection enabled and with the “APO” (auto power off), “Auto” (Autoranging) and “LCR” (auto-parameter) icons appearing at the top of the display.
2. To manually select the parameter, press the L/C/R button to step through and select the parameter needed. Each button press will sequentially display:

Auto-LCR	Auto Range	Auto Parameter
Auto-L	Auto Range	Inductance
Auto-C	Auto Range	Capacitance
Auto-R	Auto Range	Resistance
DCR		DC Resistance

3. The value of the primary parameter will be displayed in the upper display and the secondary parameter in the lower display.

D/Q/θ secondary parameter selection

1. The meter will switch ON with auto parameter selection “LCR” enabled. The primary and secondary parameter will be automatically selected based on the value of the measured impedance.
2. To manually select the secondary display, first select the primary display.
3. Press the D/Q/θ button to select the secondary parameter:

L	D, Q, ESR(RP) or θ
C	D, Q, ESR(RP) or θ
R	none
DCR	none

4. The value of the secondary parameter will be displayed in the lower display

Series or Parallel

1. When the L/C/R function mode is selected and ‘AUTO” is enabled, the default measurement in serial or parallel mode is auto selected. A parallel equivalent circuit (Lp, Cp or Rp) will be selected if the impedance is greater than 10kΩ. A series equivalent circuit (Ls, Cs or Rs) will be selected if the impedance is less than 10kΩ.
2. Press the SER/PAR button as needed to change the default selection.

Frequency

Press the FREQ button to change the test frequency. The selections are: 100Hz, 120Hz, 1kHz, 10kHz and 100kHz.

Data Hold

Press the HOLD button to freeze the reading in the display. Push the HOLD key again to cancel the hold mode and return to normal operation.

Relative / % Function

The REL/% mode allows for % deviation measurements from a stored reference value.

1. Configure the meter with the parameters required for the test to be performed.
2. Insert the reference component into the test fixture and wait for a stable reading.
3. Press the REL/% button to store the value. The Δ icon will appear in the display.
4. For all subsequent measurements, readings on the lower display will indicate the % difference between the currently measured component and the stored value.
5. Press and hold the REL/% button for >2 seconds to exit the mode.

Sorting

The sorting mode is used to select components within a % limit of a reference value.

1. Insert the reference component and set the test parameters. “LCR” auto-parameter is not allowed in the sorting mode.
2. With the desired reading in the display, press the SORT button to establish the reference value. The main display will indicate “PASS” and the lower display will indicate the value of the component. The default sorting % is +/- 1%.
   Note: If the reference value is above 2000 counts or below 200 counts, sort will not work.
3. Press the SETUP button in sequence to change the Range, Reference Value, and the % Tolerance.
   a. Range: With the “RANGE” icon flashing, press the ◄ or ► button to change the range. Press the ENTER button to store the setting and proceed to the Value setting.
   b. Value Setting: Press the ◄ or ► button to select the flashing digit for adjustment. Press the ▲ or ▼ button to adjust the value of the digit. Press the ENTER button to store the setting and proceed to the Tolerance setting.
   c. Tolerance setting: Press the ◄ or ► button to step through the available tolerance selections:
      ± 0.25%
      ± 0.5%
      ± 1%
      ± 2%
      ± 5%
      ± 10%
      ± 20%
      +80% -20%
      Press the ENTER button to store the Tolerance setting.
4. Press the SORT button to exit the Sorting mode.

Open/Short Calibration

In order to improve the accuracy for high/low impedance measurements, it is recommended that an OPEN/SHORT calibration be performed before the measurement; this removes stray impedances in test leads or fixtures.

1. Press the CAL button for at least 2 seconds to start the open/short calibration procedure.
2. The “CAL” icon and the word “OPEn” will appear in the display
3. With no component connected, press the CAL button. The display will count down from 30 and then either “PASS” or “FAIL” will appear in the display.
4. Press the CAL button and “Srt” will appear.
5. Short the input and press the CAL button. The display will count down from 30 and then either “PASS” or “FAIL” will appear in the display.
6. Press the CAL button to exit the CAL mode.
7. If PASS appeared for both the OPEN and SHORT modes, the calibration data will be saved to external EEPROM.
8. If FAIL appeared for either calibration, the impedance was deemed to be too large to zero out and therefore the data will not be stored.

Backlight

Press the backlight button to switch the backlight ON. Press again to switch it OFF.

Guard Terminal

The guard is used to improve noise immunity and reduce stray impedances. The optional test fixtures utilize the guard feature.

Auto Power Off

In order to extend battery life APO will turn the meter off after 5 minutes of inactivity (no button is pressed). The meter will alarm (beep) three times before the power is shut off. Press any button to reset the APO and continue using the meter.

RS232 output

Press the ▲ button to enable the RS232 port. “RS232” will appear in the display. When enabled, the displayed data can be sent to a PC via the RS232 port.

Battery Replacement

The battery icon indicates the status of the 9V battery. A fresh battery will show the battery icon with three lines above it. As the battery weakens, the number of lines will decrease. When the battery becomes too weak to power the meter, “batt” will appear in the display and the meter will shut down.

To replace the battery:

1. Remove the two screws holding the rear bottom battery cover.
2. Remove and replace the 9V battery.
3. Secure the cover with the two screws.

Battery Safety Reminders

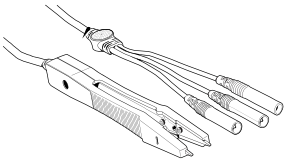
- Please dispose of batteries responsibly; always observe local, state, and federal regulations with regard to battery disposal.
- Never dispose of batteries in a fire. Batteries may explode or leak.
- Never mix battery types. Always install new batteries of the same type.

All EU users are legally bound by the battery ordinance to return all used batteries to collection points in your community or wherever batteries / accumulators are sold! Disposal in the household garbage is prohibited!

Optional Accessories

LCR203 SMD Component Tweezers

Used to quickly measure and sort chip components.



LCR205 SMD Component Fixture

Used to accurately measure surface mount devices

Specifications

Display	LCD size: 66.8 X 52.8 mm (2.7 x 2.1”)
	LCD with green backlight
Test frequency	100Hz, 120Hz, 1KHz, 10KHz, 100KHz
Dissipation factor	0.000 to 1999
Quality factor	0.000 to 1999
θ measurement	± 90°
Sorting tolerance	± 0.25%, ± 0.5%, ± 1%, ± 2%, ± 5% ± 10%, ± 20%, +80% -20%
Calibration	Open/Short calibration
Data output	RS232/USB PC computer interface
Power off	Auto shut off saves battery life or manual off by push button
Operating temperature	0°C to 50°C (32 to 122°F)
Operating humidity	Less than 85% R.H
Power Supply	9V battery (Alkaline)
Power consumption	35mADC approximately
Dimension	193 x 88 x 41mm (7.6 x 3.5 x 1.6”)
Weight	385g (13.6oz.) meter only

Electrical Specifications (23± 5 ° C)

DC Resistance

Range	*Accuracy*	*Remark*
20Ω	± (0.5%rdg + 5digits)	After calibration
200Ω	± (0.5%rdg + 5digits)	
2kΩ	± (0.5%rdg + 5digits)	
20kΩ	± (0.5%rdg + 5digits)	
200kΩ	± (0.5%rdg + 5digits)	
2MΩ	± (0.5%rdg + 5digits)	After calibration
20MΩ	± (1.0%rdg + 5digits)	After calibration
200MΩ	± (2.0%rdg + 5digits)	After calibration

AC Resistance

Range	*Accuracy*	*Accuracy*	*Remark*
	100Hz/120Hz	1000Hz	
20Ω	± (1% + 5digits)	± (1%rdg + 5digits)	After calibration
200Ω	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
2kΩ	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
20KΩ	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
200kΩ	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
2MΩ	± (1.0%rdg + 5digits)	± (1.0%rdg + 5digits)	After calibration
20MΩ	± (1.0%rdg + 5digits)	± (2.0%rdg + 5digits)	After calibration

Range	*Accuracy*	*Accuracy*	
	10kHz	100kHz	
20Ω	± (1.0%rdg + 5digits)	± (2.0%rdg + 5digits)	After calibration
200Ω	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
2kΩ	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
20kΩ	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
200kΩ	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
2MΩ	± (1%rdg + 5digits)	± (2.0%rdg + 5digits)	After calibration
20MΩ	± (2.0%rdg + 5digits)	----------	After calibration

* If the impedance is larger than 10kΩ, Rp is shown on the display.
* If the impedance is less than 10kΩ, Rs is shown on the display.

Capacitance (Cp/Cs) : D □ 0.1

Range	*Accuracy*	*Accuracy*	*Remark*
	100Hz/120Hz	1000Hz	
20pF	± (2.0%rdg + 5digits)	± (1.0%rdg + 5digits)	After calibration
200pF	± (1.0%rdg + 5digits)	± (1.0%rdg + 5digits)	After calibration
2000pF	± (0.8%rdg + 5digits)	± (0.8%rdg + 5digits)	After calibration
20nF	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
200nF	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
2000nF	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
20uF	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	
200uF	± (0.5%rdg + 5digits)	± (0.5%rdg + 5digits)	After calibration
2000uF	± (1.0%rdg + 5digits)	± (1.0%rdg + 5digits)	After calibration
20mF	± (2.0%rdg + 5digits)	----------	After calibration

Capacitance (Cp/Cs) : D □ 0.1

Range	*Accuracy*	*Accuracy*	*Remark*
	10kHz	100kHz	
20pF	± (1.0%rdg + 5digits)	± (1.0%rdg + 5digits)	After calibration
200pF	± (0.5%rdg + 5digits)	± (0.5%rdg+ 5digits)	After calibration
2000pF	± (0.5%rdg + 5digits)	± (0.5%rdg+ 5digits)	After calibration
20nF	± (0.5%rdg + 5digits)	± (0.5%rdg+ 5digits)	
200nF	± (0.5%rdg + 5digits)	± (0.5%rdg+ 5d igits)	
2000nF	± (0.5%rdg + 5digits)	± (0.5%rdg+ 5digits)	
20uF	± (0.8%rdg + 5digits)	± (0.8%rdg+ 5digits)	
200uF	± (1.0%rdg + 5digits)	----------	After calibration

* If the impedance is larger than 10kΩ, Cp is shown on the display.
* If the impedance is less than 10kΩ, Cs is shown on the display.

Inductance (Lp/Ls) : D □ 0.1

Range	Accuracy	Accuracy	Remark
	100Hz/120Hz	1000Hz	
20uH	± (1% + 5d)	± (1% + 5d)	After calibration
200uH	± (1% + 5d)	± (1% + 5d)	After calibration
2000uH	± (0.8% + 5d)	± (0.8% + 5d)	
20mH	± (0.5% + 5d)	± (0.5% + 5d)	
200mH	± (0.5% + 5d)	± (0.5% + 5d)	
2000mH	± (0.5% + 5d)	± (0.5% + 5d)	
20H	± (0.5% + 5d)	± (0.5% + 5d)	
200H	± (0.5% + 5d)	± (0.8% + 5d)	After calibration
2000H	± (1% + 5d)	----------	After calibration

Range	Accuracy	Accuracy	Remark
	10kHz	100khz	
20uH	± (1% + 5d)	± (1% + 5d)	After calibration
200uH	± (0.8% + 5d)	± (0.8% + 5d)	After calibration
2000uH	± (0.5% + 5d)	± (0.5% + 5d)	
20mH	± (0.5% + 5d)	± (0.5% + 5d)	
200mH	± (0.5% + 5d)	----------	
2000mH	± (0.5% + 5d)	----------	

Note:
* If the impedance is larger than 10kΩ, Lp is shown on the display.
* If the impedance is less than 10kΩ, Ls is shown on the display.