

CP7400 and CP7401 Multimeter User Manual


I. Inspection

Open the clamshell and take out the multimeter. Check whether any items are missing or damaged and contact your supplier immediately if they are.







- User Manual _____ 1 pc
- Test Leads _____ 1 pair
- Multimeter in Protective Holster _____ 1 pc

II. Safety Precautions



Warning: Read carefully before using the Multimeter.

- Do not use the multimeter if the device or test leads appear damaged or if you suspect that the device is not operating properly. Pay particular attention to the test lead insulation.
- If the test leads are damaged, they must be replaced with leads of the same type or the same electrical specifications.
- When measuring, do not touch exposed wires, connectors, unused inputs, or other exposed parts of the circuit being measured.
- When measuring the voltage higher than 60 VDC or 36 VACrms, keep your fingers behind the finger guards on the test leads in order to prevent electric shock.
- Never try to measure voltage or current that exceeds the maximum value listed on the multimeter.
- Before switching functions or ranges, make sure to disconnect the test leads from the circuit to be tested.
- To avoid false readings, replace the batteries when the low-battery indicator  appears.

III. Electrical Symbols

	Low battery		High voltage warning
	Electrical ground		AC/DC
	Double insulation		Warning

IV. General Specifications

- The maximum voltage between the input jack and ground: 250Vrms
- Max display 1999, over range display "OL", update rate: 2-3 times/second
- Range select: Auto range CP7401; Manual range CP7400
- Backlight: manual on, auto shut off after 30 seconds
- "APO" displayed on screen to indicate that Auto Power Off mode is active
- Polarity: "-" symbol displayed on screen to indicate negative polarity signal
- Data hold function:  symbol displayed on screen when data hold function is activated
- Low battery power:  symbol displayed on screen when the power from the batteries is low
- Battery: (2) AAA, 1.5V
- 10A jack: Fuse, 10A 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm
- mA/ μ A jack: Fuse, 200mA, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm
- Operating temperature: 0-40°C (32°F-104°F)
 - Storage temperature: -10-50°C (14°F-122°F)
 - Relative humidity: 0°C-30°C: $\leq 75\%$ RH, 30°C-40°C: $\leq 50\%$ RH
 - Operating altitude: 0-2000m
- Dimensions: 134 x 77 x 47 mm
- Weight: about 200 g (batteries included)
- Electromagnetic compatibility:
 - In fields with less than 1 V/m radio frequency, the total accuracy = designated accuracy + 5% of measurement range
 - In fields with more than 1 V/m radio frequency, the accuracy is not specified.

V. Multimeter Parts (Figure 1)

- Display screen
- Function buttons
- Function Selector Switch
- 10A input jack
- COM jack
- V Ω mA jack (other functions present depending on model)

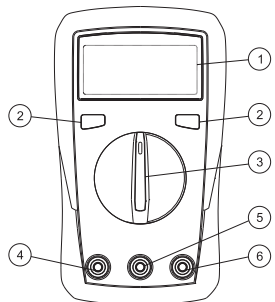





Figure 1

VI. Button Functions

- CP7401:
 - SEL/REL: press this button to switch between AC and DC modes for mV, μ A, mA, A, Ω , press to activate the relative measurement mode when measuring capacitance.
 - HOLD: Press to enter or exit data hold mode. Hold the button longer than 2 seconds to turn the backlight on/off.
- CP7400:
 - HOLD/SEL: Press to enter or exit the data hold mode
 - In continuity/diode mode, press to switch between the two modes
 - : Press to turn on/off backlight.

VII. Basic Functions

To avoid incorrect readings, replace the batteries if the battery low power symbol  appears. Pay special attention to the warning sign  beside the test lead jacks. The tested voltage or current must not exceed the values listed on the multimeter front housing.

- AC/DC Voltage Measurement** (see Figure 2a)
 - Turn the selector switch to one of the "V~" or "V-" positions.
 - Insert the black test lead into the COM jack, and the red test lead into the "V Ω mA" jack. Connect test leads in parallel with the load.

Notes:

- Do not measure voltage over 250Vrms. This may expose the user to electric shock and damage the multimeter. On CP7400 only, if the range of the voltage to be measured is unknown, select the maximum range to start and then reduce the range accordingly.
- Pay extra attention when measuring high voltage in order to avoid electric shock.
- Before using the multimeter, it is suggested to measure a known voltage for verification.

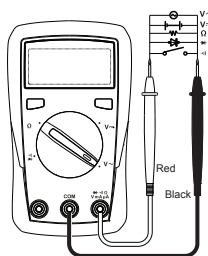


Figure 2a

2. Resistance Measurement

- Turn the selector switch to "Ω" position.
- Insert the black test lead into the COM jack, the red test lead into the "V Ω mA" jack. Connect test leads in parallel with the component or circuit to be measured.

Notes:

- Before measuring resistance, turn off the circuit power, and fully discharge all capacitors. If possible disconnect one end of the component from the rest of the circuit.
- If the resistance of the component or circuit is greater than the range, the "OL" symbol will be displayed on the screen.
- When measuring low resistance, the test leads will produce 0.1 Ω -0.2 Ω measurement error. To obtain an accurate measurement, subtract the value displayed when the two test leads are shorted from the measured value. **PLEASE NOTE that the relative measurement mode (REL) cannot be used when measuring resistance.** Use REL ONLY when measuring capacitance.
- When measuring high resistance above 1M Ω , it may take a few seconds to steady the readings.

3. Continuity Measurement

- Turn the selector switch to "diode" position.
- Insert the black test lead into the COM jack, the red test lead into the "V Ω mA" jack. Connect test leads in parallel with the circuit to be tested.
- Measured circuit's resistance > 5 Ω , the circuit is open.
- Measured circuit's resistance $\leq 10\Omega$, the circuit is complete, and the continuity test buzzer will sound.

4. Diode Test

- Turn the selector switch to "diode" position.
- Insert the black test lead into the COM jack, the red test lead into the "V Ω mA" jack. Connect test leads in parallel with the diode as follows: red lead to anode, black lead to cathode (direct polarity); then red lead to cathode, black lead to anode (reverse polarity).
- "OL" symbol appears when the diode is open or polarity is reversed. Direct polarity reading for a good silicon diodes is 500 to 800mV (0.5 to 0.8V).

Notes:

Before testing diodes, turn off the circuit power, and fully discharge all capacitors. Disconnect one end of the diode from the rest of the circuit if possible.

5. Capacitance Measurement

Notes:

- If the tested capacitor is shorted or its capacity is over the specified range, "OL" symbol will be displayed on the screen.
- When measuring large capacitors, it may take a few seconds to obtain steady readings.
- Before measuring capacitors (especially for high voltage capacitors), fully discharge them.

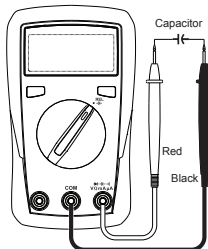


Figure 2b

- Turn the selector switch to capacitance test.
- Insert the black test lead into the COM jack, the red test lead into the "V Ω mA" jack. Connect the test leads in parallel with the capacitor.
- When there is no input, the multimeter displays a fixed value (internal capacitance of multimeter). To ensure accuracy when measuring small capacitors, the internal capacitance must be subtracted from the measured value. Disconnect the test leads from the capacitor, press the (REL) button to subtract the internal capacitance, and reconnect the test leads in parallel across the capacitor.

6. DC Current Measurement

Notes:

- Before measuring DC current, turn off the circuit power and carefully check the input jack and selector switch position.
- If the range of the measured current is unknown, start with the "A" position of the switch, and if needed, step down to the "mA" or "μA" switch position. Remember to insert the red test lead into the appropriate test jack.
- If a fuse is blown during testing, replace the fuse with the same type.
 - 10A jack: Fuse 10A, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm
 - V Ω mA jack: Fuse 200mA, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm
- Multimeter must be connected in series with the circuit. Do not connect the test leads in parallel with any circuit, to avoid the risk of personal injury and damage to the multimeter.
- If measuring current on the 10A scale, each measurement time should be less than 10 seconds and the next test should not be made until after a 15 minute wait.

- Turn the selector switch to A, mA, or μ A position.
- Insert the black test lead into the COM jack. To measure amperes, insert the red test lead into the "10A" jack. To measure milliamps or microamps insert the red test lead into the "V Ω mA" jack. Connect test leads in series with the circuit under test.

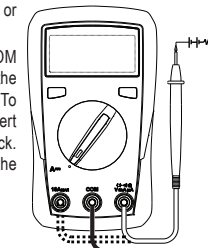


Figure 3

7. AC Current Measurement

Notes:

- Before measuring AC current, turn off the circuit power and carefully check the input jack and selector switch position.
- If the range of the measured current is unknown, start with the "A" position of the switch, and if needed, step down to the "mA" or "μA" switch position. Remember to insert the red test lead into the appropriate test jack.
- If a fuse is blown during testing, replace the fuse with the same type.
 - 10A jack: Fuse 10A, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm
 - V Ω mA jack: Fuse 200mA, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm
- Multimeter must be connected in series with the circuit. Do not connect the test leads in parallel with any circuit, otherwise there is a risk of personal injury and damage to the multimeter.
- If measuring current on the 10A scale, each measurement time should be less than 10 seconds and the next test should not be made until after a 15 minute wait.

- Turn the selector switch to "A", "mA", or "μA" position.
- Insert the black test lead into the COM jack. To measure amperes, insert the red test lead into the "10A" jack. To measure milliamps or microamps insert the red test lead into the "V Ω mA" jack. Connect test leads in series with the circuit under test.

8. Small Battery Measurement

- Turn the selector switch to "1.5V", "9V", or "12V" position to match the type of battery being tested.
- Insert the black test lead into the COM jack, the red test lead into the "V Ω mA" jack. Connect the red test lead to the positive battery terminal "+", black test lead to the negative battery terminal "-."
- Battery voltage under load and the battery's condition will be shown on the screen.

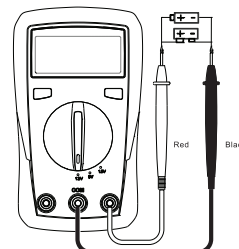




Figure 4

Small Battery Type	1.5V	9V	12V
Load Resistance	30 Ω	900 Ω	60 Ω
"Good" Voltage Range	$\geq 1.31V$	$\geq 7.8V$	$\geq 10.5V$
"Low" Voltage Range	0.95V - 1.31V	5.7V - 7.7V	7.6V - 10.4V
"Bad" Voltage Range	$\leq 0.94V$	$\leq 5.6V$	$\leq 7.5V$

Notes:

- When the measured voltage is less than 0.2V (0.05V-0.19V), no indicator status will be displayed and the reading will flash for 3 seconds in every 6 second interval.

9. Additional Features

- The multimeter is ready for use 2 seconds after it is turned on.
- The multimeter automatically shuts down if there is no operation for 15 minutes. Press any button to wake it up.
- To disable auto shutdown, turn the selector switch to OFF position, press and hold the "HOLD/SEL" button on CP7400 or "SEL/REL" button on CP7401, and turn on the multimeter.
- When pressing any button or turning the selector switch, the buzzer will beep once.
- Buzzer Operation
 - Input voltage $\geq 250V$ (AC/DC), the buzzer will continuously beep indicating the input voltage is at least 250V (AC/DC) or higher.
 - Input current > 10A (AC/DC), the buzzer will continuously beep indicating the input current is higher than 10A (AC/DC).
 - 1 min before auto shutdown, the buzzer will emit 5 continuous beeps.
 - Immediately before shutdown, the buzzer will emit 1 long beep.
 - When testing continuity the buzzer will beep continuously when the resistance is $\leq 10\Omega$.
- Low power warnings:
 - Combined voltage of two internal AAA batteries < 2.5V,  symbol appears and flashes for 3 seconds every 6 second period. During low power status, the multimeter can still work.
 - Combined voltage of two internal AAA batteries < 2.2V, a solid  symbol appears, the multimeter will not work.

VIII. Specifications

- Accuracy: \pm (% of reading + numerical value of the least significant digit) listed at 23°C ± 5 °C (73.4°F ± 9 °F), relative humidity: $\leq 75\%$.

1. DC voltage

Range	Model	Resolution	Accuracy
200.0mV	CP7400	0.1mV	$\pm(0.7\%+3)$
2000mV		1mV	$\pm(0.5\%+2)$
20.00V	CP7401	0.01V	$\pm(0.7\%+3)$
200.0V		0.1V	$\pm(0.7\%+3)$
250V		1V	$\pm(0.7\%+3)$

- Input impedance: 10M Ω ; Overload protection: 250Vrms (AC/DC)
- Reading might be unstable at mV range when no load is connected. The value becomes stable once the load is connected.
- Max input voltage: $\pm 250V$. When the voltage $\geq 250V$, "OL" symbol appears.

2. AC voltage

Range	Model	Resolution	Accuracy
200.0mV	CP7401	0.1mV	$\pm(1.0\%+2)$
2.000V	CP7401	0.001V	$\pm(0.7\%+3)$
20.00V	CP7401	0.01V	$\pm(1.0\%+2)$
200.0V	CP7400/CP7401	0.1V	$\pm(1.2\%+3)$
250V	CP7400/CP7401	1V	$\pm(1.2\%+3)$

- Input impedance: 10M Ω
- Frequency response: 40Hz-400Hz, sine wave RMS (average response).
- Max input voltage: $\pm 250V$, when the voltage $\geq 250V$, "OL" symbol appears.
- Overload protection: 250Vrms (AC/DC)

3. Resistance

Range	Model	Resolution	Accuracy
200.0 Ω	CP7400/CP7401	0.1 Ω	$\pm(1.0\%+2)$
2000 Ω	CP7400/CP7401	1 Ω	$\pm(0.8\%+2)$
20.00k Ω	CP7400/CP7401	0.01k Ω	$\pm(0.8\%+2)$
200.0k Ω	CP7400/CP7401	0.1k Ω	$\pm(0.8\%+2)$
20.00M Ω	CP7400/CP7401	0.01M Ω	$\pm(1.2\%+3)$
200.0M Ω	CP7401	0.1M Ω	$\pm(5.0\%+10)$

- Measurement result = reading of resistance - reading with shorted test leads
- Overload protection: 250Vrms (AC/DC)

4. Continuity, Diode Test

Range	Resolution	Remark
•••	0.1 Ω	Resistance $\geq 50\Omega$, no beep. Resistance $\leq 10\Omega$, continuous beep.
••	0.001V	Open circuit voltage: 2.1V, test current: 1mA Silicon diode voltage drop: 0.5 ~ 0.8V.

- Overload protection: 250Vrms (AC/DC)

5. Capacitance

Range	Resolution	Accuracy
2.000nF	0.001nF	Using REL mode $\pm(5\%+5)$
20.00nF	0.01nF	$\pm(4\%+8)$
200.0nF	0.1nF	$\pm(4\%+8)$
2.000 μ F	0.001 μ F	$\pm(4\%+8)$
20.00 μ F	0.01 μ F	$\pm(4\%+8)$
200.0 μ F	0.1 μ F	$\pm(4\%+8)$
2.000mF	0.001mF	$\pm(10\%)$

- Overload protection: 250Vrms (AC/DC); To test capacitance $\leq 200nF$, use REL mode.

6. DC Current

Range	Model	Resolution	Accuracy
200.0 μ A	CP7400/CP7401	0.1 μ A	$\pm(1.0\%+2)$
2000 μ A	CP7401	1 μ A	$\pm(1.0\%+2)$
20.00mA	CP7401	0.01mA	$\pm(1.2\%+3)$
200.0mA	CP7400/CP7401	0.1mA	$\pm(1.0\%+2)$
2.000A	CP7401	0.001A	$\pm(1.2\%+5)$
10.00A	CP7400/CP7401	0.01A	$\pm(1.2\%+5)$

- Input current > 10A, "OL" symbol appears and meter beeps
- Overload protection: 250Vrms
- μ A, mA range: F1 Fuse 200mA, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm
- 10A range: F2 Fuse 10A, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm

7. AC Current

Range	Model	Resolution	Accuracy
200.0 μ A	CP7401	0.1 μ A	$\pm(1.2\%+3)$
2000 μ A		1 μ A	$\pm(1.2\%+3)$
20.00mA	CP7401	0.01mA	$\pm(1.2\%+3)$
200.0mA		0.1mA	$\pm(1.2\%+3)$
2.000A		0.001A	$\pm(1.5\%+5)$
10.00A		0.01A	$\pm(1.5\%+5)$

- Frequency response: 40-400 Hz; Overload protection: 250Vrms
- Accuracy guarantee range: 5-100% of the range, shorted circuit allows least significant digit ≤ 2
- Input current > 10.10A, "OL" symbol appears and meter beeps
- μ A, mA range: F1 Fuse 200mA, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm
- 10A range: F2 Fuse 10A, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm

IX. Maintenance


Warning: Before opening the rear cover, turn function selector switch to "OFF", disconnect the test leads from the circuit under test, then unplug the test leads from the test jacks.

1. General Maintenance

- Clean the case with a damp cloth and mild detergent. Do not use abrasive cleaners or solvent.
- If there is any malfunction, stop using the multimeter and return it for repair or replacement.

2. Battery and Fuse Replacement

Battery replacement:

To avoid false readings, replace the batteries when the low battery indicator  appears.

- Turn the selector switch to "OFF" position and remove the test leads from the circuit and then from the input jacks.
- Take off the protective holster. Loosen the screw on the battery cover at the top of the rear housing, remove the battery cover to replace the batteries.

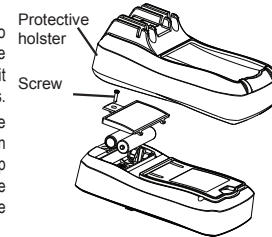



Figure 5a

- Remove used exhausted batteries.  Note the correct battery polarity shown inside the battery compartment. Install two fresh 1.5V AAA batteries.

Fuse replacement:

- Turn the selector switch to "OFF" position and remove the test leads from the circuit and then from the input jacks.
- Take off the protective holster. Loosen both screws on the rear housing, then remove the rear housing.
- Remove the blown fuse and install a new fuse with exactly the same specifications.

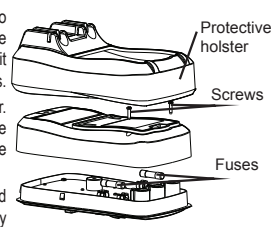


Figure 5b

Fuse specification:

- F1 Fuse 200mA, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$ mm
- F2 Fuse 10A, 250V, fast-acting ceramic fuse, $\Phi 5 \times 20$