

DIGITAL MULTIMETER

WACO 92A



Fully Protected non burning meter

DI

TER

WACO®

92A



ON/OFF

SELECT

HOLD/BL

PNP
NPN



Ω 200k 20k 2k 200 200μ 20μ F 2μ 200n 20n

200M 20M 200M RFE Hz NCV 200m 20 200 1000 1000 1000 1000

200m 200m 10 10 200m Hz

mA COM A

2m 20m 200m 10

Hz VΩ



10A
MAX



200mA MAX
FUSED




COM




Cx
CAT III 600V
CAT II 1000V

WARNING AND PRECAUTIONS

To avoid possible electric shock or personal injury, and to avoid possible damage to the meter or to the equipment under test, comply with the follow practices:

- ◆ Do not use the meter if it is damaged. Before you use the meter, inspect the case. Pay particular attention to the insulation surrounding the connectors.
- ◆ inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before you use the meter.
- ◆ Do not use the meter if it operates abnormally. Protection may be impaired. When in doubt, have the meter serviced.
- ◆ Do not operate the meter around explosive gas, vapor, or dust.
- ◆ Do not apply more than the rated voltage, as marked on the meter, between terminals or between any terminal and earth ground.
- ◆ Before use, verify the meter's operation by measuring a known voltage.
- ◆ When measuring current, turn off circuit power before connecting the meter in the circuit.
- ◆ When servicing the meter, use only specified replacement parts. Do not use the Meter in a manner not specified by this manual or the safety features of the Meter may be impaired.
- ◆ Use with caution when working above 30V ac rms, 42V peak, or 60V dc. Such voltages pose a shock hazard.
- ◆ When using the probes, keep your fingers behind the finger guards on the probes.
- ◆ Connect the common test lead before you connect the live test lead. When you disconnect test leads, disconnect the live test lead first.
- ◆ Remove the test leads from the meter before you open the battery door.
- ◆ Do not operate the meter with the battery door or portions of the cover removed or loosened.
- ◆ To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the low battery indicator () appears.

1. GENERAL SPECIFICATION

- Display: 3-3/4 digits LCD with a maximum reading of 4000.
- Measurement rate: updates 2-3/sec.
- Over range indication: "1" figure only in the display
- Automatic negative polarity indication.
- The  is displayed when the battery voltage drops below the operating voltage. Full range over load protection.
- Capacitance measurement Auto Zeroing.
- Auto Power Off: It will be automatically cut off in about 15 minutes after the power is turned on. It needs to be turned off and turned on again to continue the power.

➤ Operating temperature: 0°C ~40°C, 0~75% R.H.

Storage temperature: -10°C~50°C, 0~75% R.H.

➤ Power: Single standard 9V battery IEC 6F22, NEDA 1604, JIS 006P.

➤ Dimensions: 182L*78W*40Hmm.

➤ Weight: approx 310g (including battery)

➤ Accessories: test leads (pair), spare fuse 0.5A piece in case,

K-type thermocouple wire (model VC9808 only), operator's manual.

➤ Safety Compliance: IEC 61010-1, 2000 CAT I 1000V overvoltage standards.

Overvoltage installation categories per IEC 61010-1, 2000: The Meter is designed to protect against transients in these categories:

CAT I From high-voltage low-energy sources, e.g., electronic circuits or a copy machine.

CAT II From equipment supplied from the fixed installation, e.g., TVs, PCs, portable tools and household appliances.

CAT III From equipment in fixed equipment installations, e.g., installation panels, feeders and short branch circuits, and lighting systems in large buildings.

2. ELECTRICAL SPECIFICATIONS

Accuracy is given as \pm (% of reading + number of least significant digits) for one year, at 23°C±5°C RH<75%

1) DCV

Range	Accuracy	resolution
400mV	\pm (1.2%+3d)	100uV
4V	\pm (0.5%+3d)	1mV
40V		10mV
400V		100mV
1000V (VC9805)	\pm (1.0%+3d)	1V
2000V (VC9808)	\pm (2.0%+5d)	1V

Input impedance: 10M Ω on all range

2) ACV

Range	Accuracy	resolution
400mV(VC9805)	\pm (1.2%+3d)	100uV
4V		1mV
40V		10mV
400V		100mV
750V(VC9805)	\pm (1.5%+3d)	1V
2000V(VC9808)	\pm (2.5%+10d)	1V

Input impedance: 10M Ω Frequency range: 40 ~ 400Hz

3) DCA

Range	Accuracy	
4mA	$\pm (1.0\%+3d)$	1uA
40mA	$\pm (1.0\%+3d)$	10uA
400mA	$\pm (1.0\%+3d)$	100uA
10A(VC9805)	$\pm (1.5\%+5d)$	10mA

Measuring voltage drop: 200mV

4) ACA

Range	Accuracy	resolution
4mA	$\pm (2.0\%+3d)$	1uA
40mA	$\pm (2.0\%+3d)$	10uA
400mA	$\pm (2.0\%+5d)$	100uA
10A(VC9805)	$\pm (2.5\%+10d)$	10mA

Measuring voltage drop: 200mV Frequency range: 40 ~ 400Hz

5) CAPACITANCE

Range	Accuracy	resolution
40nF	$\pm (4.0\%+5d)$	10pF
400nF	$\pm (4.0\%+5d)$	100pF
4uF	$\pm (4.0\%+5d)$	1nF
40uF	$\pm (4.0\%+5d)$	10nF
400uF	$\pm (4.5\%+5d)$	100nF

6) OHM

Range	Accuracy	resolution
400 Ω	$\pm (1.0\%+5d)$	0.1 Ω
4K Ω		1 Ω
40K Ω		10 Ω
400K Ω		100 Ω
4M Ω		1K Ω
40M Ω	$\pm (1.2\%+8d)$	10K Ω
400M Ω	$\pm (4\%+10d)$	100K Ω

7) TEMPERATURE (VC9805)

Range	Accuracy	resolution
-40°C ~ 400°C	$\pm (1\%+8d)$	1°C
-400°C ~ 1000°C	$\pm (1.5\%+15d)$	1°C

With K-type thermocouple wire

than 100V rms, but reading maybe out of specification.

- 3) It can also switch frequency measurement from AC750V (VC9805) and AC2000V (VC9806) by pressing the "SELECT" button (this function can measure the frequency of high voltage in this range).

3.6 TEMPERATURE MEASUREMENT (Suitable for VC9808)

- 1) Set the function range switch at the "TEMP" position.
- 2) Plug the thermocouple into the meter's "C" and "COM" terminals, insuring the thermocouple red plug is inserted into the "C" terminal on the meter.
- 3) The working end (testing end) on or inside the object being tested.
- 4) The value of the temperature is shown on the display in degrees centigrade (°C).

Note:

- a) The testing temperature is displayed automatically when the thermocouple is put into the testing terminals.
- b) The surrounding temperature is shown when the circuit of the sensor is cut off.
- c) The limit temperature measured by the thermocouple given together with the instrument is 250°C, 300°C is acceptable within short period.

3.7 DIODE & CONTINUITY TEST

- 1) Set the function range switch at the $\rightarrow \rightarrow \rightarrow \rightarrow$ position.
- 2) Connect the black test lead to "COM" terminal and red test lead to "VΩ" input terminal; (Note: the polarity of the red test lead is "+").
- 3) This range with "AUDIBLE CONTINUITY TEST" function. Built-in buzzer sounds if the resistance between two probes is less than $30 \pm 10 \Omega$.
- 4) Connect the test leads across the diode and read the display value.

Note:

- a) When the input is not connected, i.e. at open circuit, the figure "1" will be displayed.
- b) Test condition: Forward DC current approx. 1mA. Reversed DC voltage approx. 2.8V.
- c) The meter displays the forward voltage drop and displays figure "1" for overload when the diode is reversed.

3.8 TRANSISTOR hFE TEST

- 1) Set the function range switch to the "hFE" position.
- 2) Make sure the transistor is "NPN" or "PNP" type.
- 3) Transistor correctly insert in E.B.C connector.
- 4) Display reading is approx. transistor hFE value.

Note: Test condition: Base current approx. 10uA. VcE approx. 2.8V

3.9 Non-contact induced voltage test (NCV)

- 1) Set the function range switch at "NCV" position.
- 2) Put the top of the multimeter near the ac charged body
- 3) When the sensor on the top of the multimeter detects the presence of ac electric field, the internal buzzer will alarm and the corresponding induced voltage intensity will be displayed on the LCD screen.

Note: This function is only used for the presence of inductive electric field, so it is not possible to judge whether the measured circuit is safe. Cause the risk of electric shock.

4. The key that

1. "ON/OFF" : Power on and off
2. "SELECT" : Function selection button
3. "HOLD/BL" : Digital hold and backlight. (Short press : number hold and release; Long press : backlight on and of.)

5. MAINTENANCE

Beyond replacing batteries and fuses, do not attempt to repair or service your Meter unless you are qualified to do so and have the relevant calibration, performance test, and service instructions. The recommended calibration cycle is 12 months.

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents. Dirt or moisture in the terminals can affect readings.

To clean the terminals

- a) Push the Meter OFF and remove the test leads.
 - b) Shake out any dirt that may be in the terminals.
 - c) Soak a new swab with isopropyl alcohol and work around the inside of each input terminal.
- Use a new swab to apply a light coat of fine machine oil to the inside of each terminal.

6. BATTERY AND FUSE REPLACEMENT

- 1) Battery and fuse replacement should only be done after the test leads have been

8) FREQUENCY TEST

Range	Accuracy	resolution
4kHz	$\pm(1.5\%+8d)$	1Hz
40kHz	$\pm(1.5\%+8d)$	10Hz
400kHz	$\pm(1.5\%+8d)$	100Hz
4MHz	$\pm(1.5\%+40d)$	1kHz

3. METHOD OF MEASUREMENT



Warning

Dangerous voltages may be present at the input terminals and may not be displayed.

3.1 DCV & ACV MEASUREMENT

- 1) Set the Function range switch at the required position.
- 2) Connect black test lead to "COM" terminal and red test lead to the "V Ω " input terminal.
- 3) Connect test leads to measuring point and read the display value the polarity of the red lead connection will be indicated at the same time as the voltage.
- 4) 2000V high voltage measurement: Connect black test lead to "COM" terminal and red test lead to the "2KV" input terminal. (Only VC9808 is available)

Note:

- a) If the voltage to be tested is unknown beforehand, set the Function range switch to the highest range and work down.
- b) When only the figure "1" is displayed over range is being indicated and the function range switch has been set to a higher range.
- c) Never try to measure the voltage above 1000V! Although the indication is possible to show, there is a danger of damaging the internal circuitry. (Unless it is VC9808)
- d) When measuring voltages higher than DC1000V and AC750V, in order to prevent instrument damage and obtain accurate measurement values, use the red test pen to contact the high-voltage area and the black test pen to contact the low-voltage area. (Suitable for VC9808)

3.2 DCA & ACA MEASUREMENT

- 1) Connect the black test lead to the "COM" terminal and the red test lead to "mA" terminal for a maximum of 0.4A.
- 2) Set the function range switch at the required position.
- 3) Connect test leads to measuring points and read the display value. The polarity at the red test lead connection will be indicated at the same time as the current.

Note:

- a) If the current range is unknown beforehand, set the function range switch to the highest range and work down.
- b) When only the figure "1" is displayed, over range is being indicated and the function range switch should be set to a higher range.

- c) Excessive current will below the fuse that must be replaced when the input is from "A" terminal. Fuse type is 0.5A.
- d) The 10A range is not protected by a fuse, maximum 10A continuous, maximum 10A measuring time must be less than 15 seconds. (Only VC9805 is available)

3.3 RESISTANCE MEASUREMENT



Warning

To avoid electrical shock or damage to the Meter when measuring resistance or continuity in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

- 1) Connect black test lead to "COM" terminal and red test lead to the "V Ω " input terminal.
- 2) Set the function range switch to the Ω range.
- 3) Connect the test leads across the resistance under measurement and read the display value.

Note:

- a) The polarity of the red test lead is "+".
- b) When the input is not connected, i.e. at open circuit, the figure "1" will be displayed for the over range condition.
- c) If the resistance value being measured exceeds the maximum value of the range selected, an over range indication "1" will be displayed and function range switch should be set to a higher range.
- d) 200M Ω range has a 10 digits (1M Ω) constant, the figure will appear in short circuit status it should be subtracted from measurement result, for instance: when measuring 100M Ω resistor, figure 101.0 will be shown in display and the last 10 digits should be subtracted.

3.4 CAPACITANCE MEASUREMENT



Warning

To avoid damage to the Meter, disconnect circuit power and discharge all high-voltage capacitors before measuring capacitance.

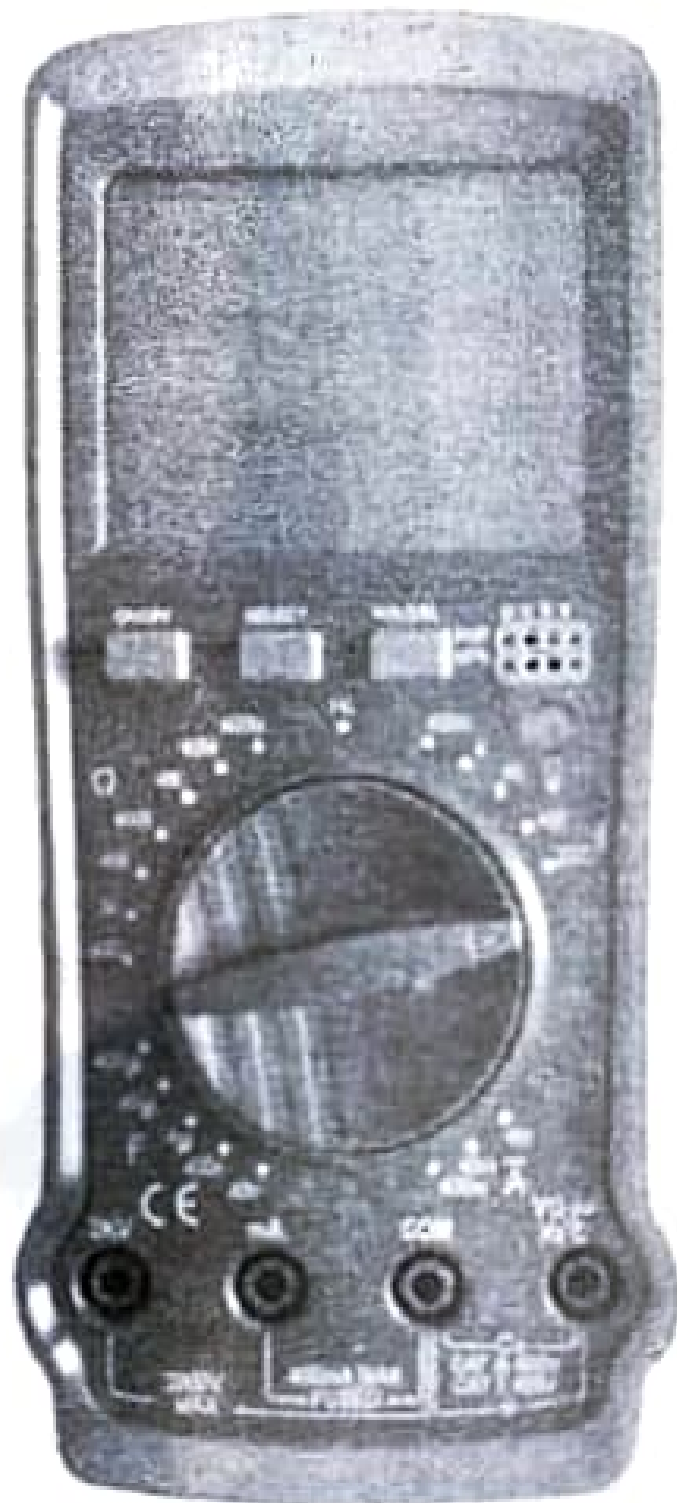
- 1) Set the function range switch at the "Cx" position. Before connecting the capacitor, the display could be zeroed automatically slowly.
- 2) Connect the test capacitor to the "mA" and "COM" input terminals and read the display value.

Note: The tested capacitor should be discharged before the testing procedure. Never apply voltage to the "mA" input terminals, or serious damage may result.

3.5 FREQUENCY MEASUREMENT

- 1) Set the function range switch at the required "Hz" position.
- 2) Connect test leads to measuring points and read the display value.

Note: Do not apply more than 250V rms to the input. Indication is possible a voltage higher



Large screen digital multimeter Operating instruction

WAGO

92A

ON/OFF SELECT HOLD/BL PNP NPN e c b e

Ω 200k 20k 2k 200 200 μ 20 μ 200n 20n 2m 20m 200m 10 1000 1000 200 20 2mV 200m

F 2 μ 200n 20n 2m 20m 200m 10 1000 1000 200 20 2mV 200m

A mA COM Cx CAT-III 600V CAT-II 1000V 10A MAX 200mA MAX FUSED



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