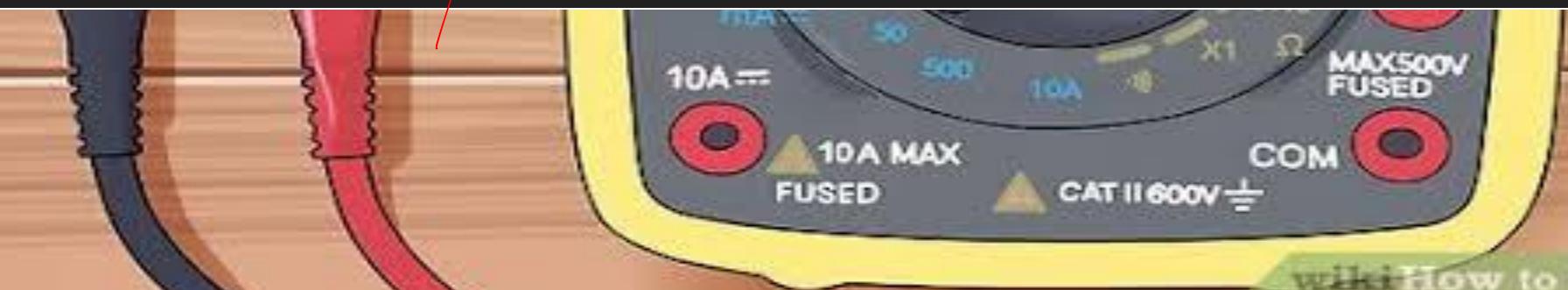


VOLTAGE AND CURRENT MEASUREMENT

CAVITE STATE UNIVERSITY-CCAT CAMPUS
ELEX 50



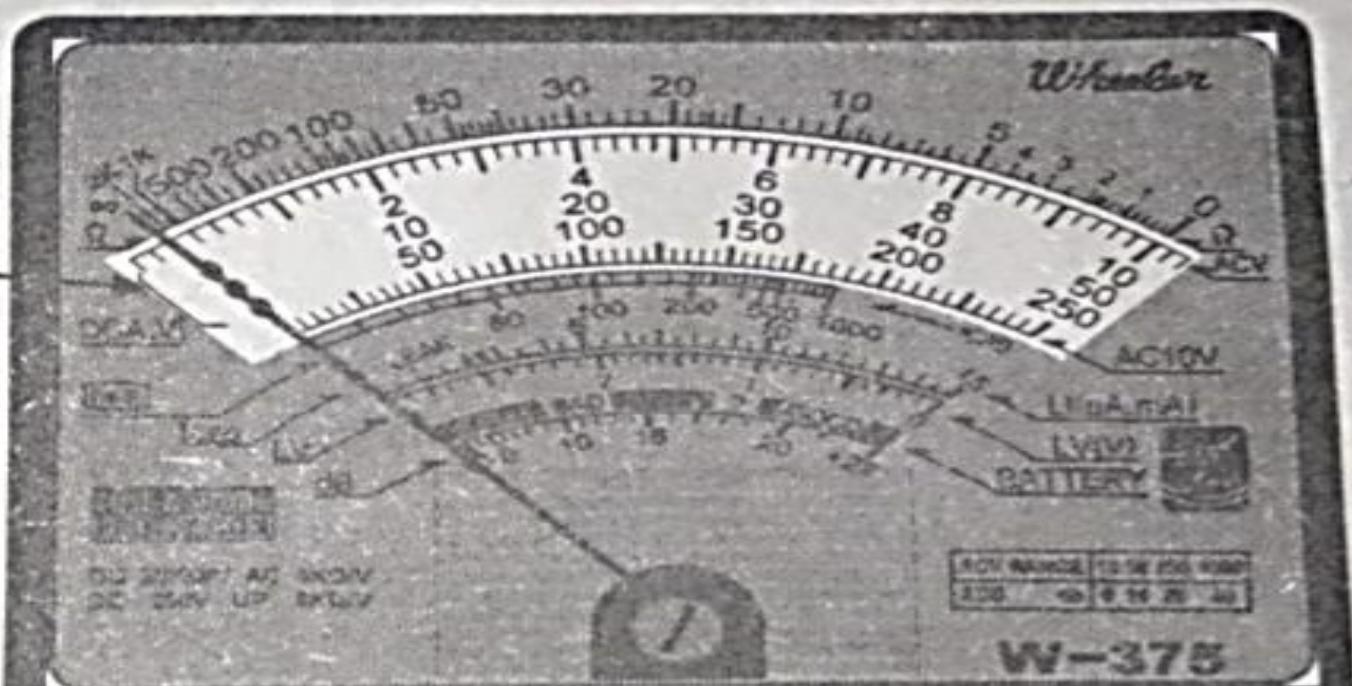
VOLTAGE MEASUREMENT



VOLTAGE MEASUREMENT

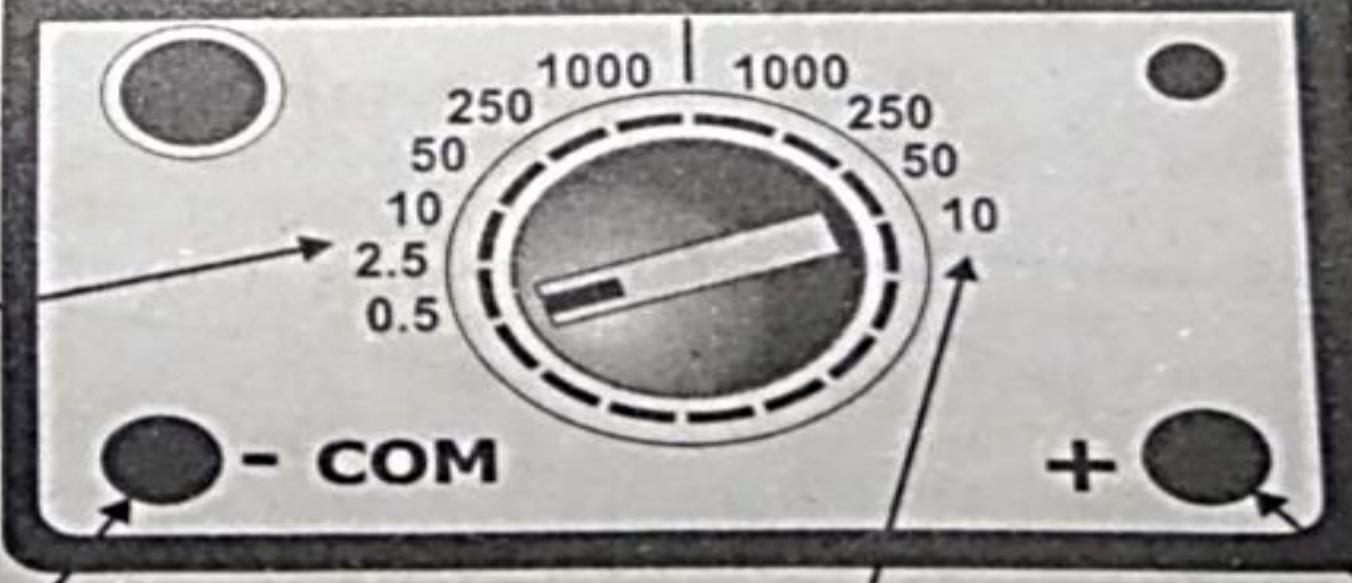
- Set the selector knob to the proper scale range. The chosen scale range must be higher than the anticipated voltage to be measured.

Voltmeter Scale (AC/DC)
(From 0 to 10, 50, 250)



WV-375

DC Voltmeter Selector Range
(0.5, 2.5, 10, 50, 250, 1000)

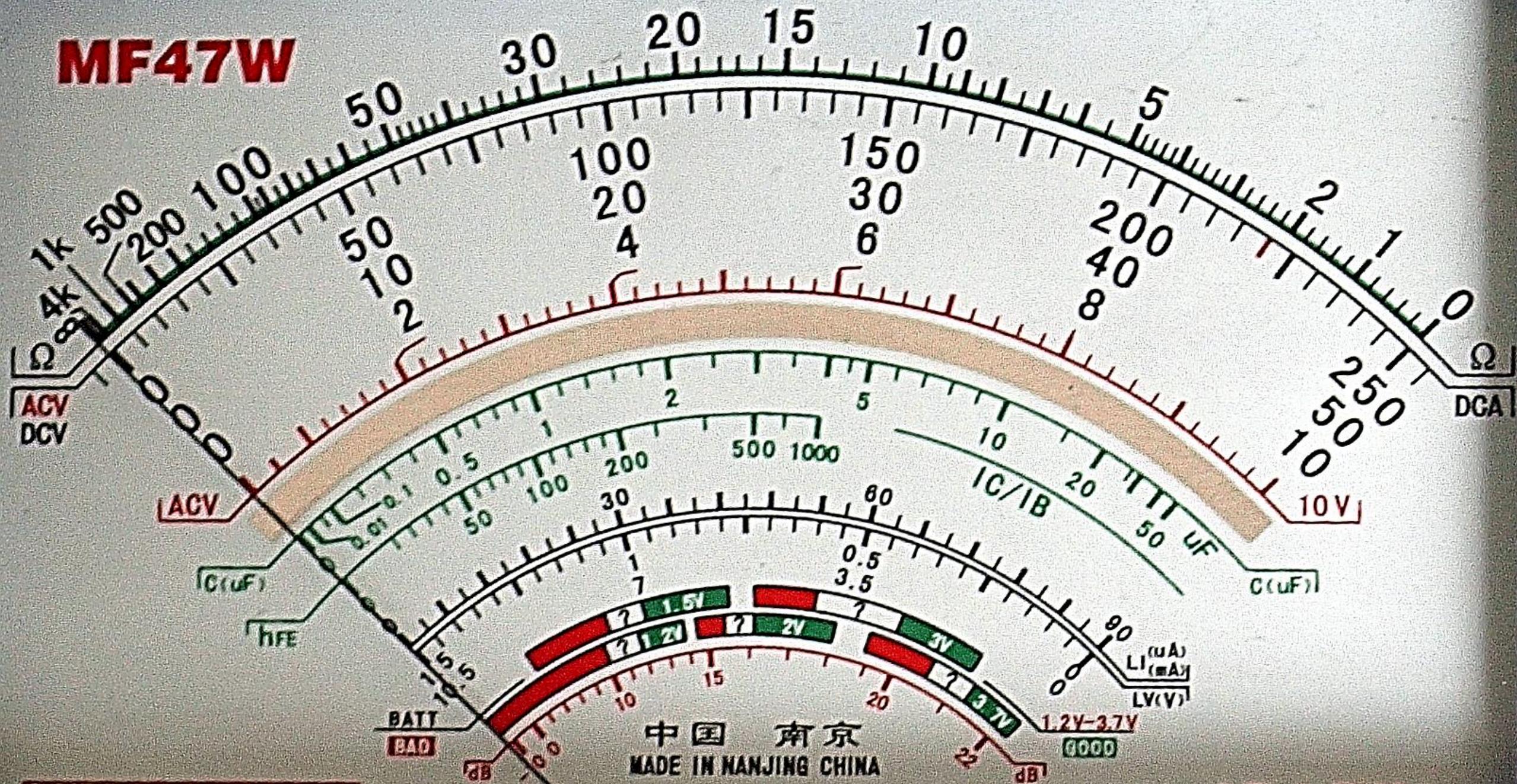


- COM (black)

AC Voltmeter Selector Range
(10, 50, 250, 1000)

+ POS (red)

MF47W



MULTIPLE
PROTECTION

0dB=1mW 600Ω

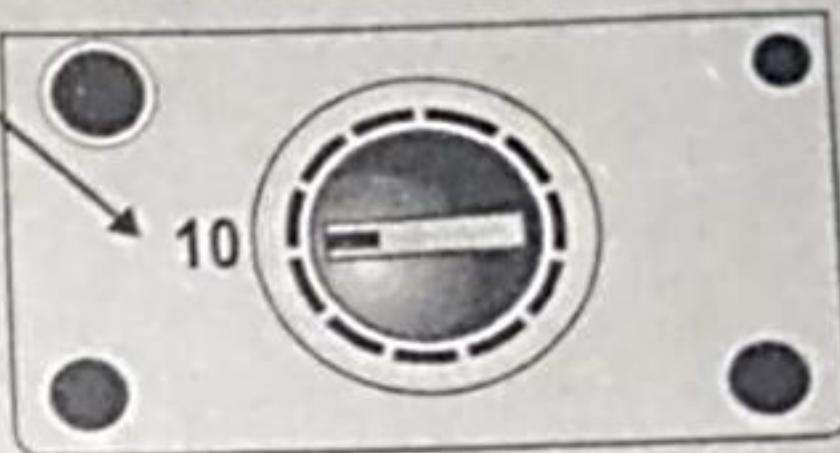
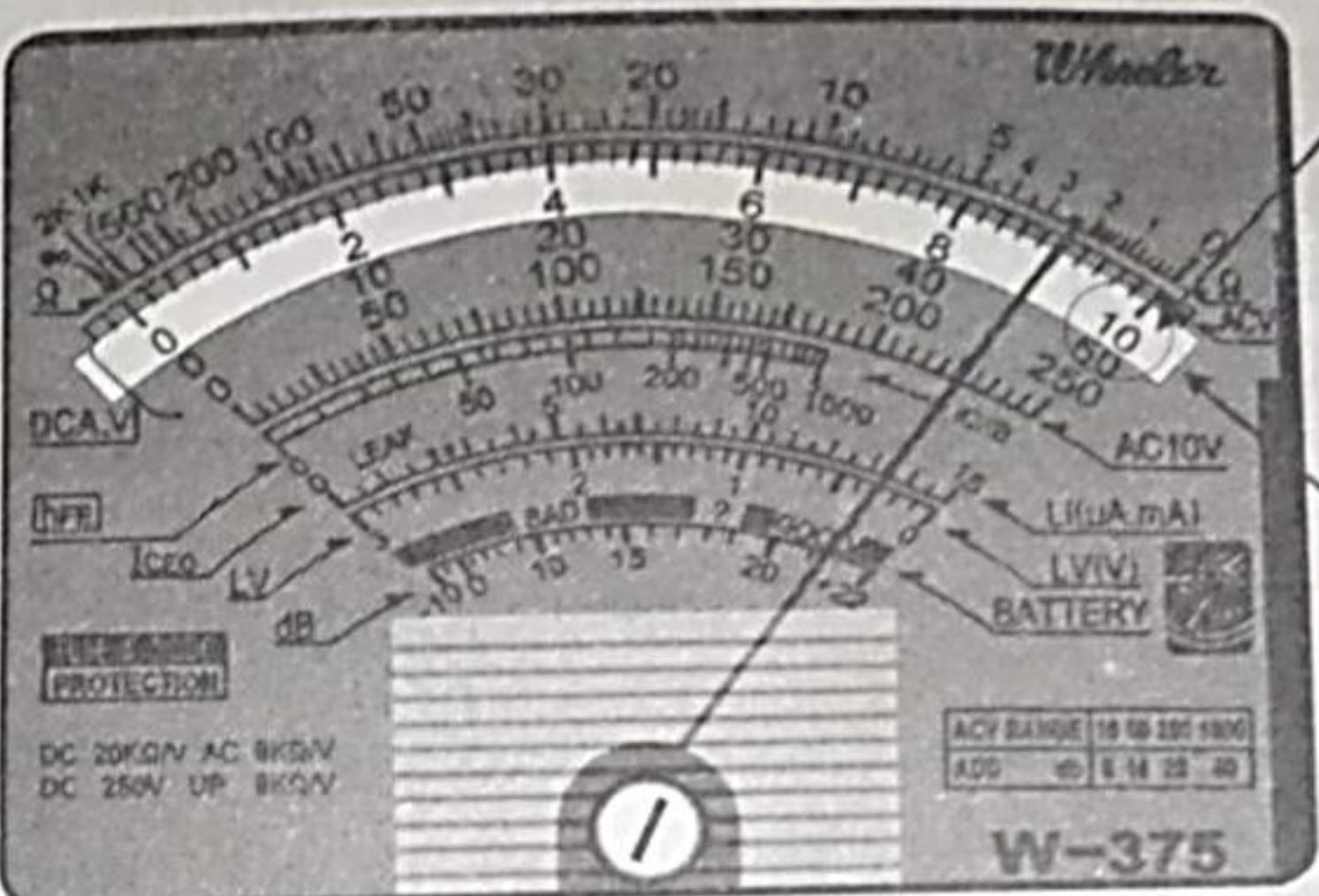
DCV 20k/V ACV 9k/V





DC VOLTAGE MEASUREMENTS

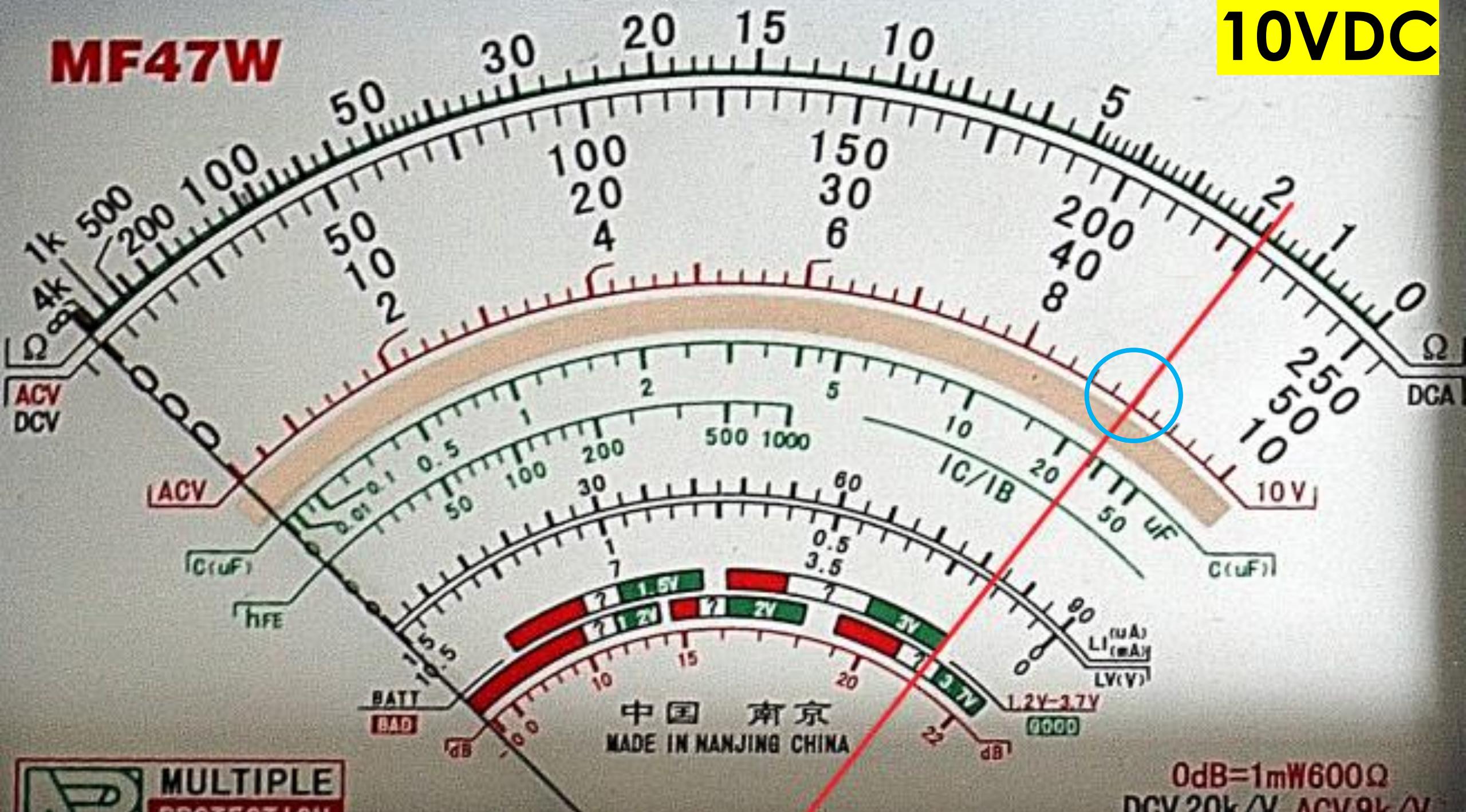
Measuring a 9-Volt battery.
Selector Range: 10 volts DC



Be careful in testing DC voltages especially in polarity. Be sure that the positive test probe (red) is at the positive voltage supply and the negative test probe (black) is at the negative or common ground of the supply voltage.

MF47W

10VDC



MULTIPLE PROTECTION

中国 南京
MADE IN NANJING CHINA

0dB=1mW600Ω
DCV 20k/V ACV 9k/V

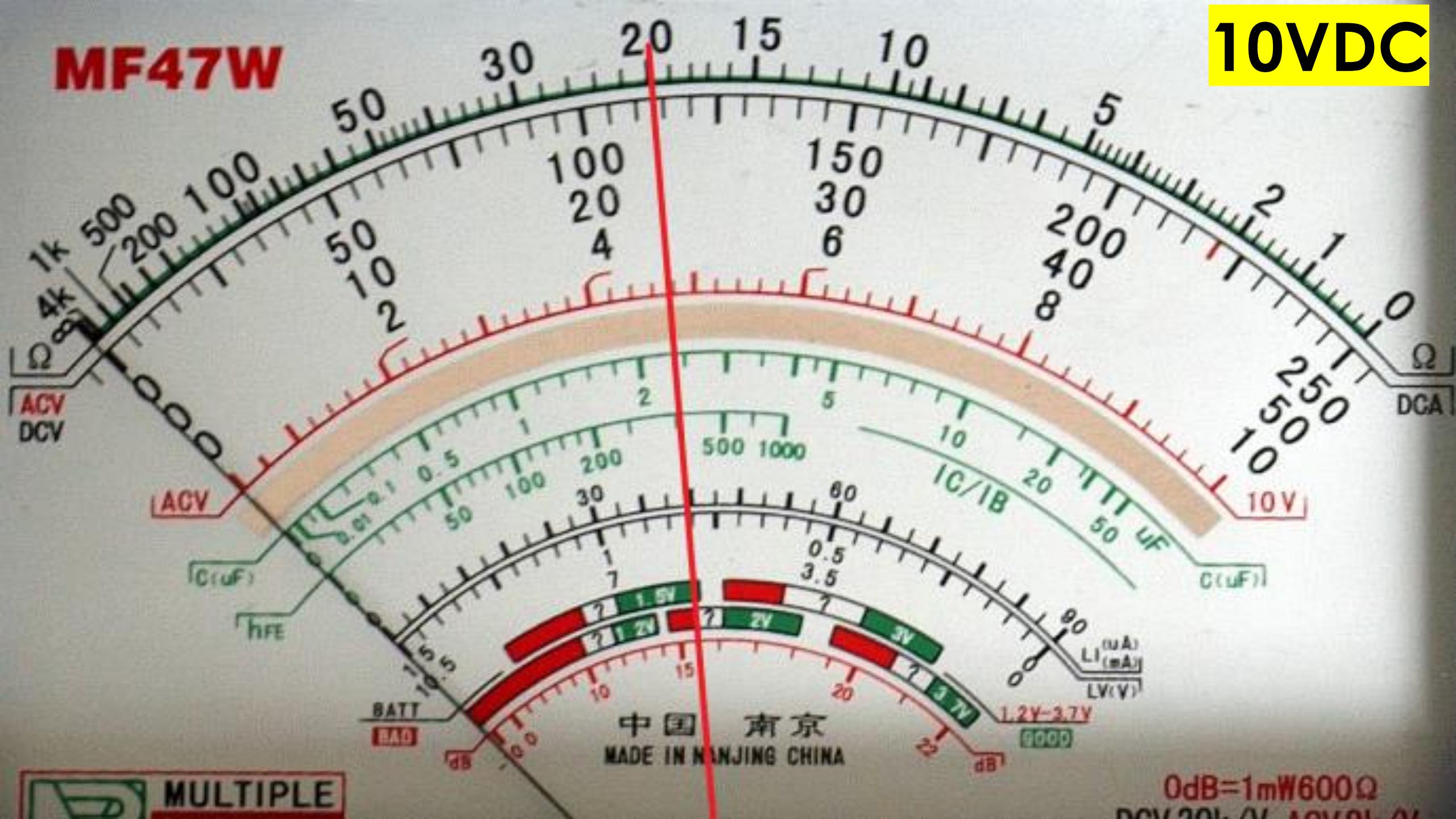
10VDC

9V

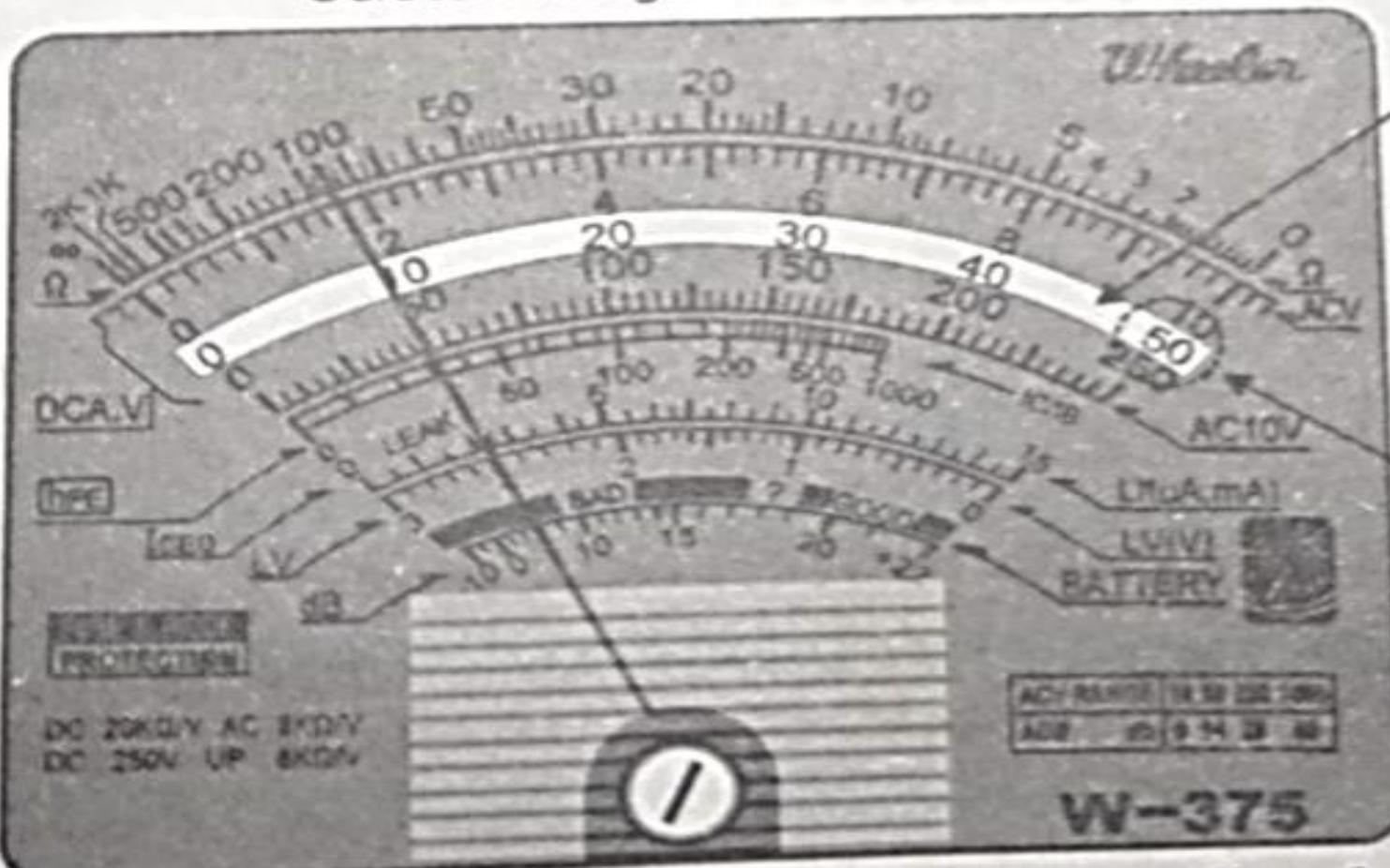


MF47W

10VDC

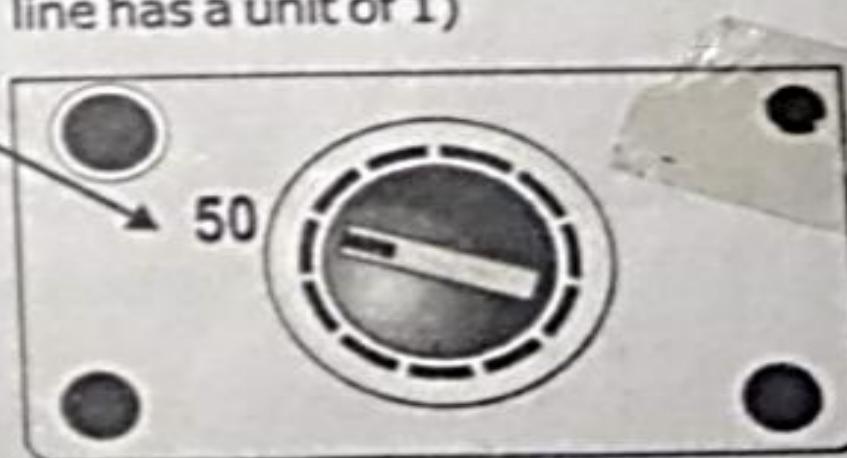


Measuring a 9-Volt battery.
Selector Range: 50 volts DC



The highlighted area is the voltmeter scale in 50-volt settings.
(0 to 50)

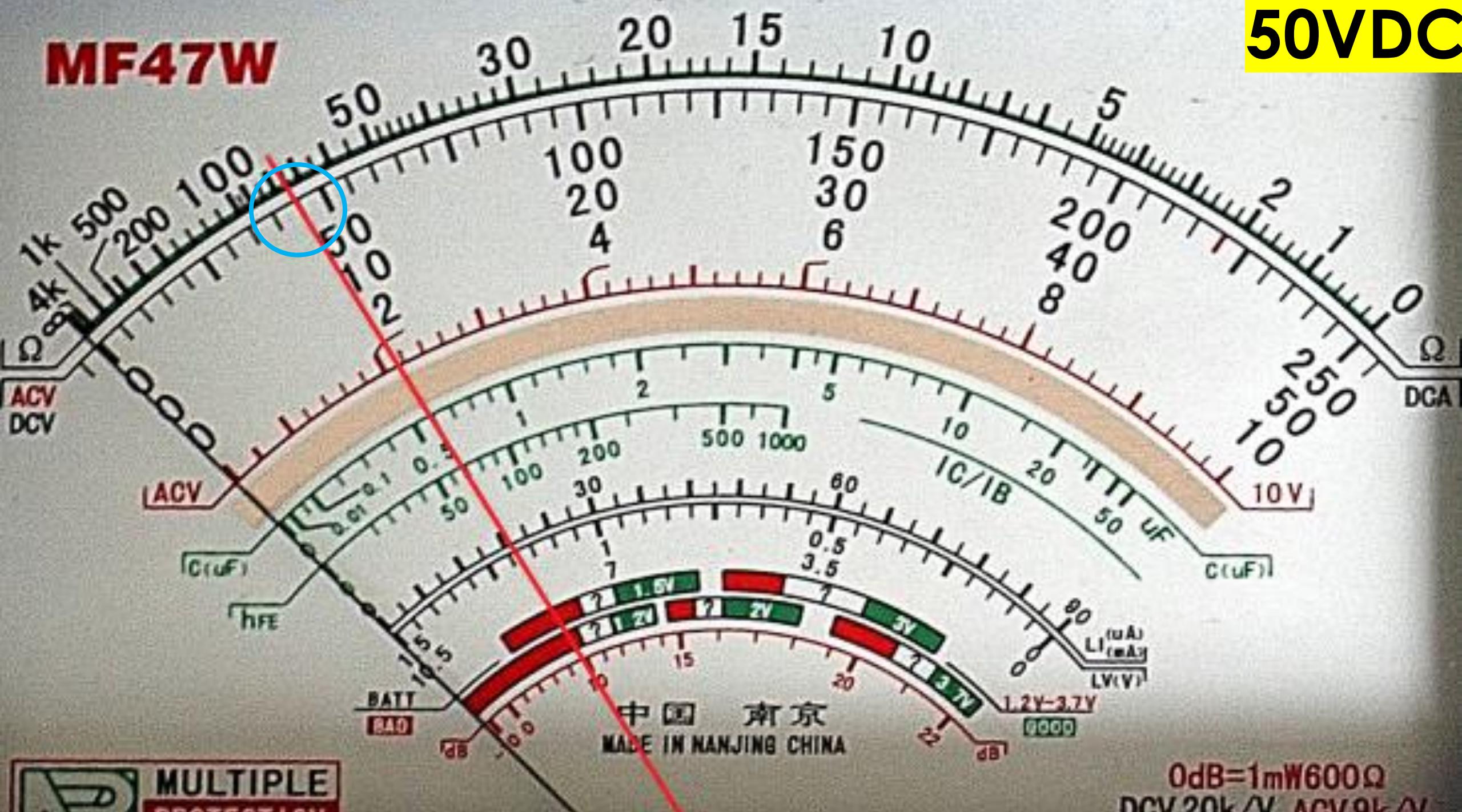
The pointer rests between 10 and 0. Do the same procedure in getting the unidentified lines. The reading measures 9 volts. (Each line has a unit of 1)



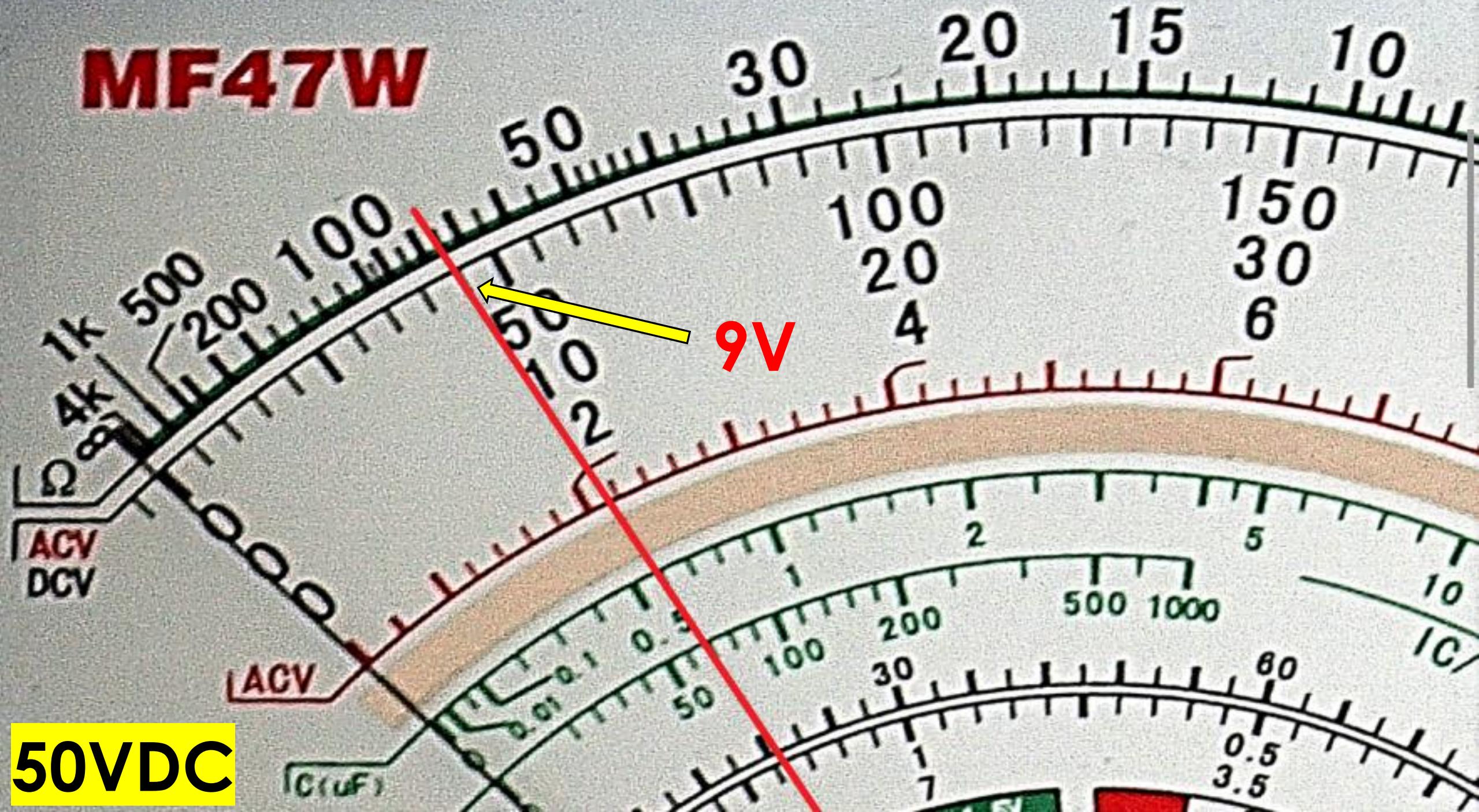
As illustrated, the deflection of the pointer differs from **example 5**. Don't be confused because the only difference is the setting, not the voltage. The first setting sets at 10 volts. This setting is more sensitive than 50 volts setting. Be careful in setting the voltage. In testing voltage like in our example, the best setting for 9 volts is at 10-volt setting. Because it reads more clearly than 50-volt or higher. Do not test 9-volt or higher in 0.5 or 2.5 volts setting. It can damage your tester.

MF47W

50VDC



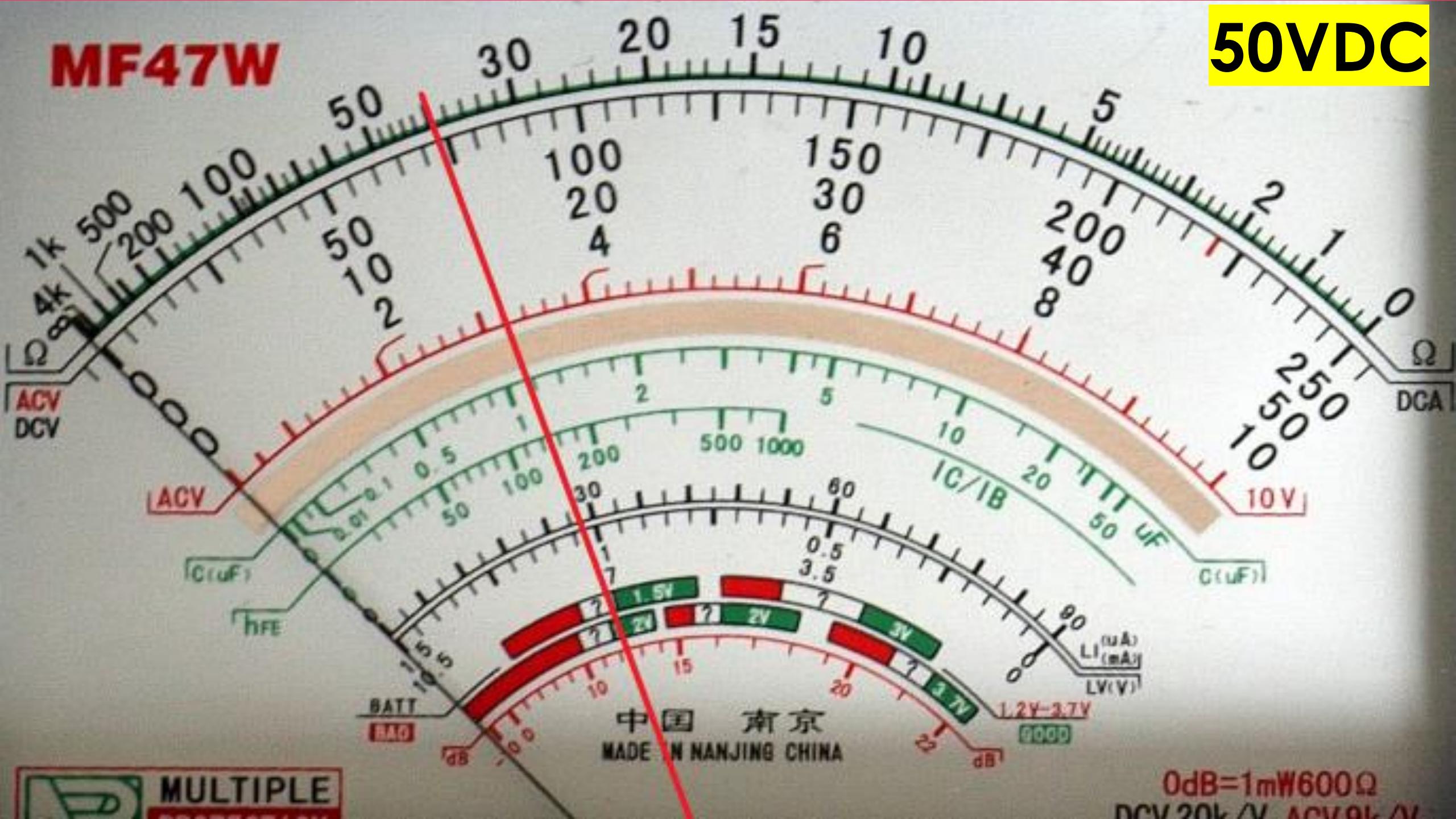
MF47W



50VDC

MF47W

50VDC



AC VOLTAGE MEASUREMENTS

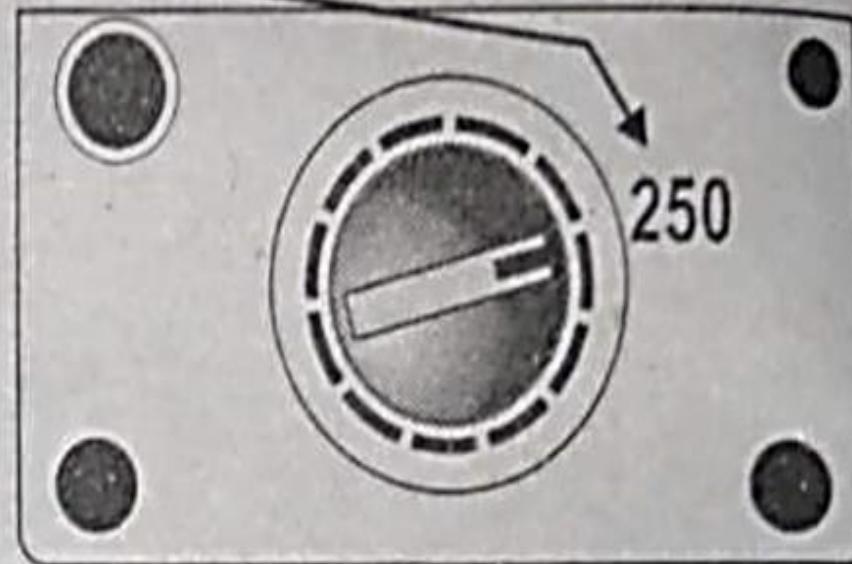
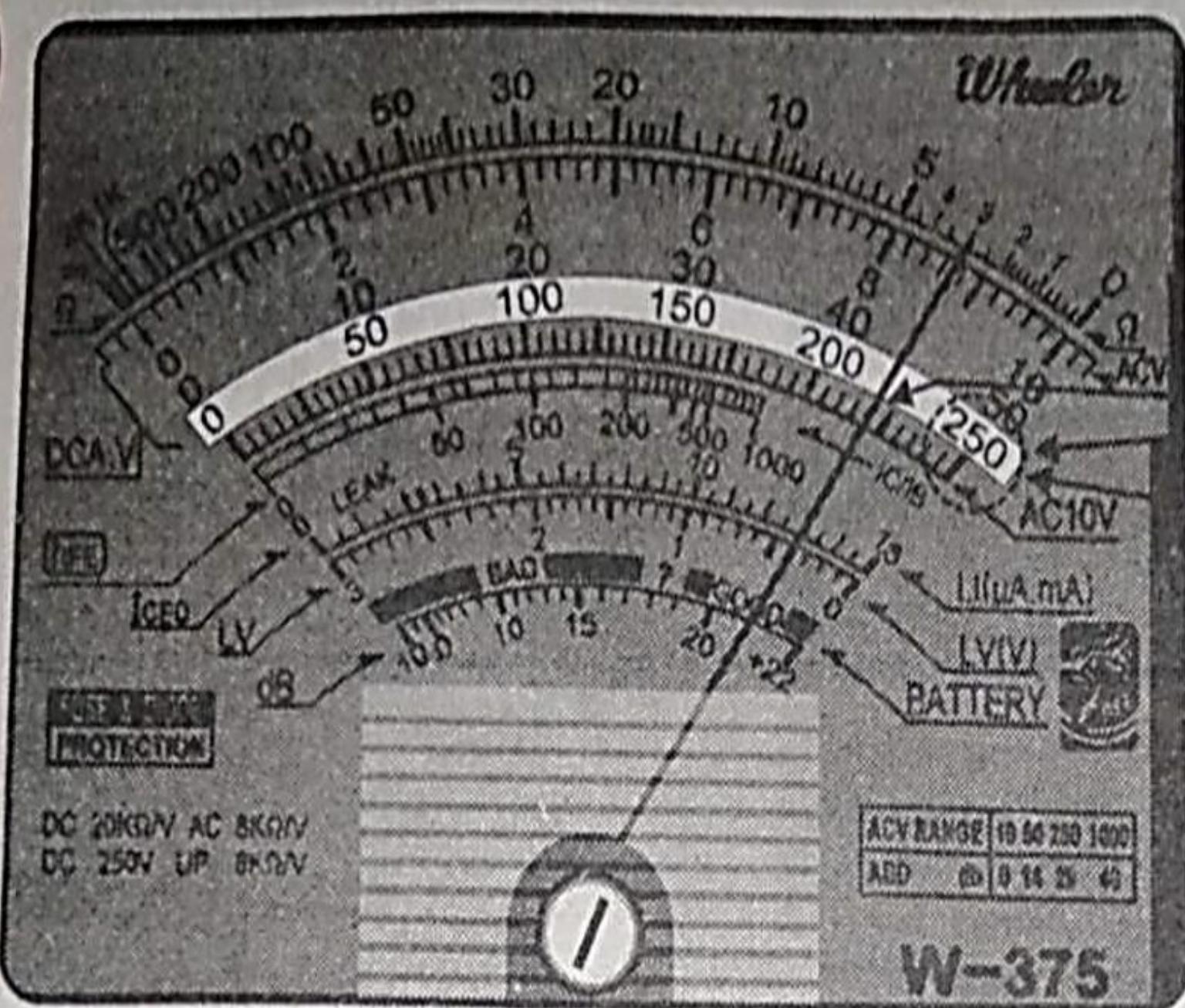
AC VOLTAGE MEASUREMENTS

- In testing AC voltages, it doesn't matter if the test probes are interchanged.

Measuring a 220 Volts AC.
Selector Range: 250 volts AC

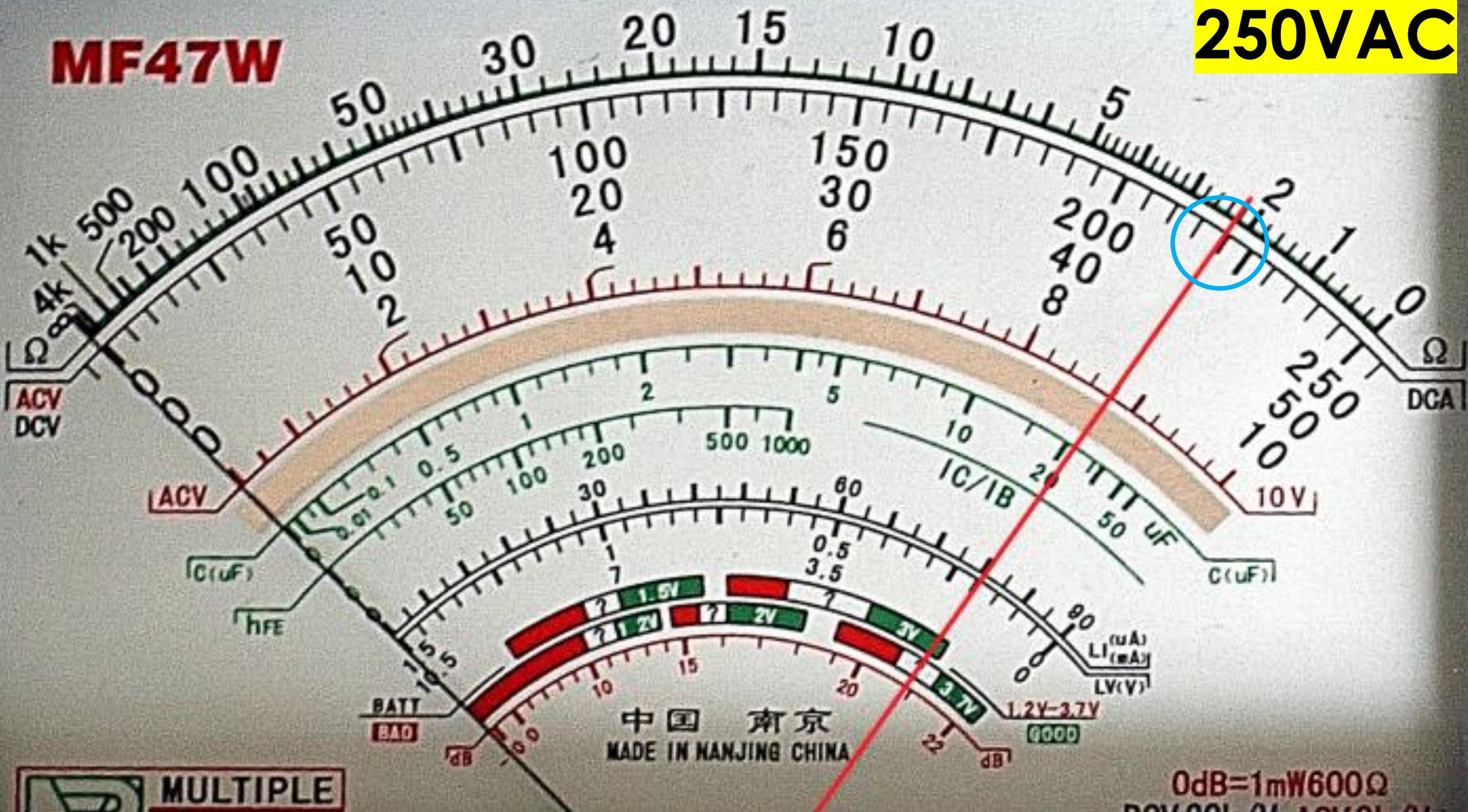
The highlighted area is the voltmeter scale in 250-volt AC settings. (0 to 250)

The pointer rests between 250 and 200. The reading measures 220 volts AC. (Each line has a unit of 5)



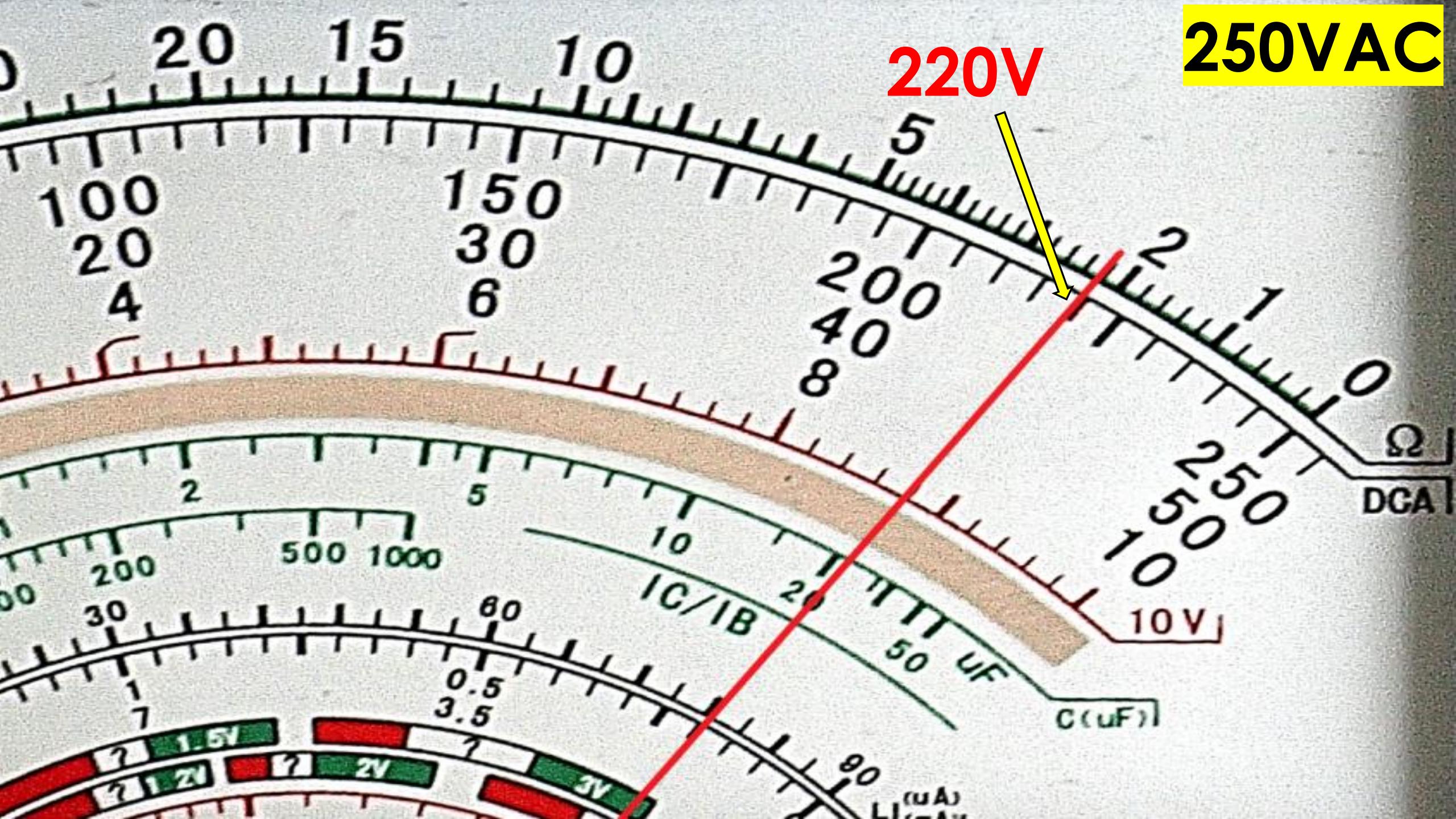
MF47W

250VAC



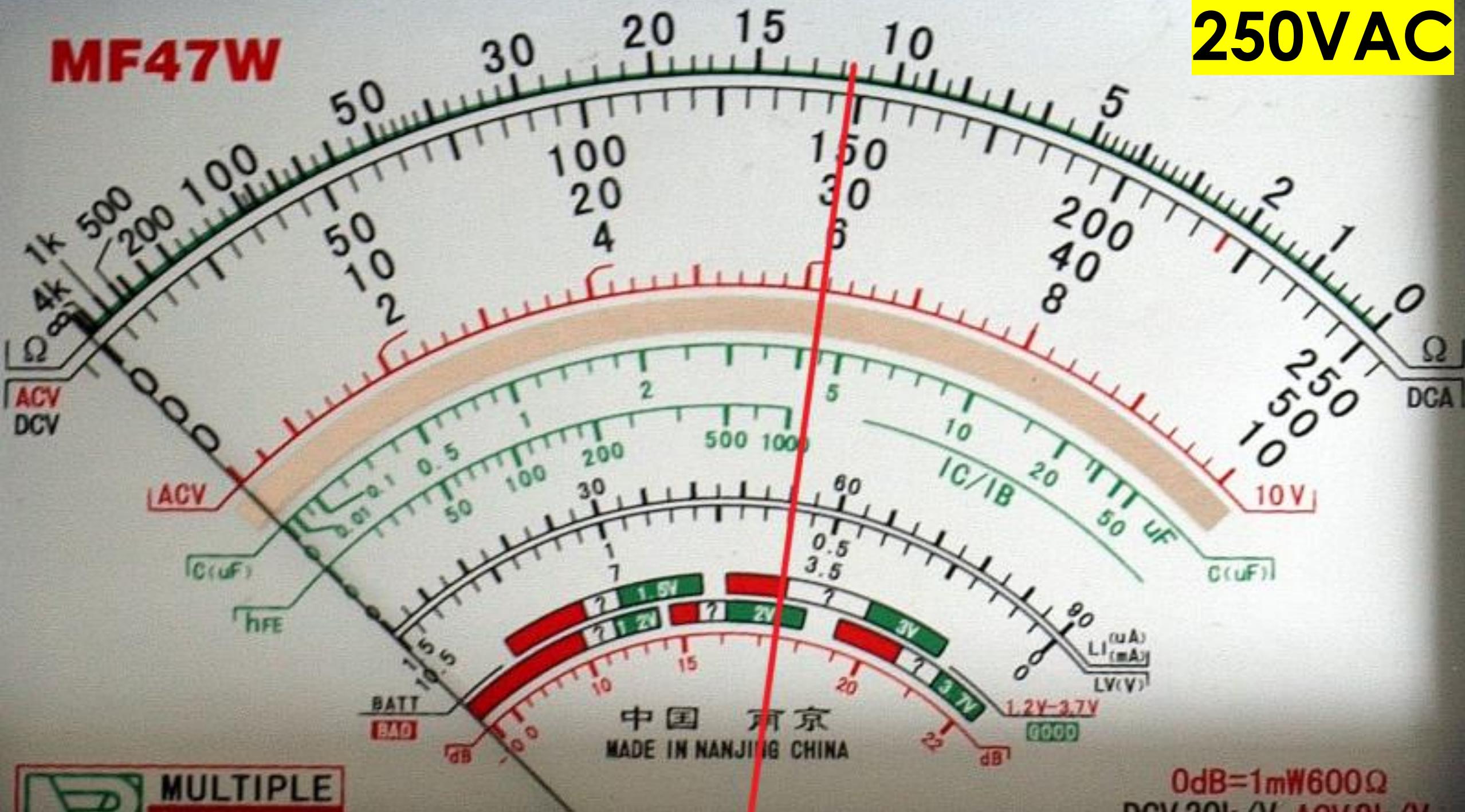
250VAC

220V



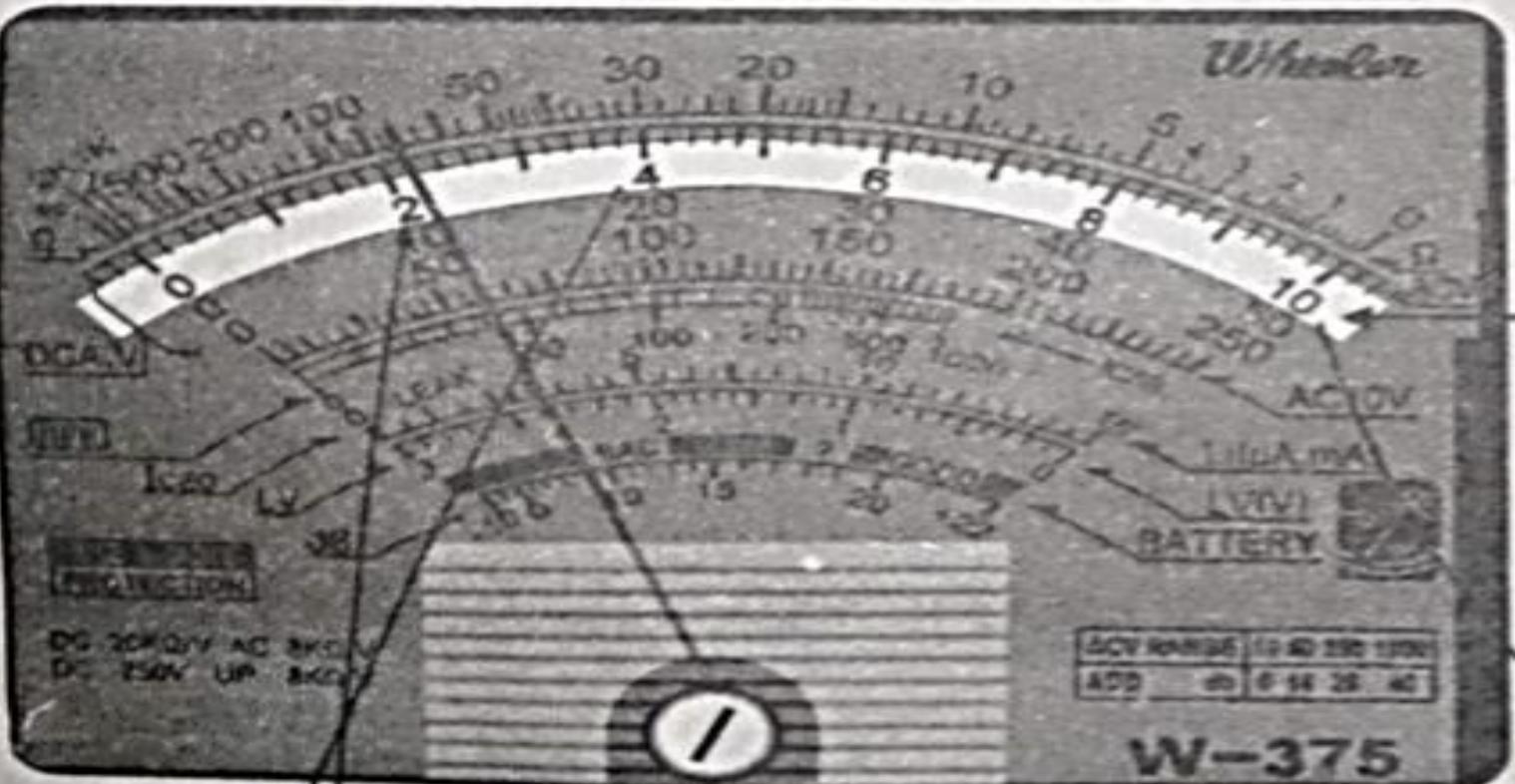
MF47W

250VAC



MULTIPLE

0dB=1mW600Ω
DCV 20L/AL ACV 20L/AL



To get the voltage at 1000-volt setting

$$4 - 2 = 2$$

number of lines from 2 to 4

$$2 / 10 = 0.2$$

unit of each line, meaning,
each line increase by **0.2**

since the pointer rest at the first line after 2, add 0.2

$$2 + 0.2 = 2.2 \leftarrow \text{meter reading}$$

Measuring a 220 Volts AC.
Selector Range: 1000 volts AC

The highlighted area is the voltmeter scale in 1000-volt AC settings. (0 to 10)

The pointer rests between 2 and 4. The reading measures 220 volts AC. (Each line has a unit of 0.2)

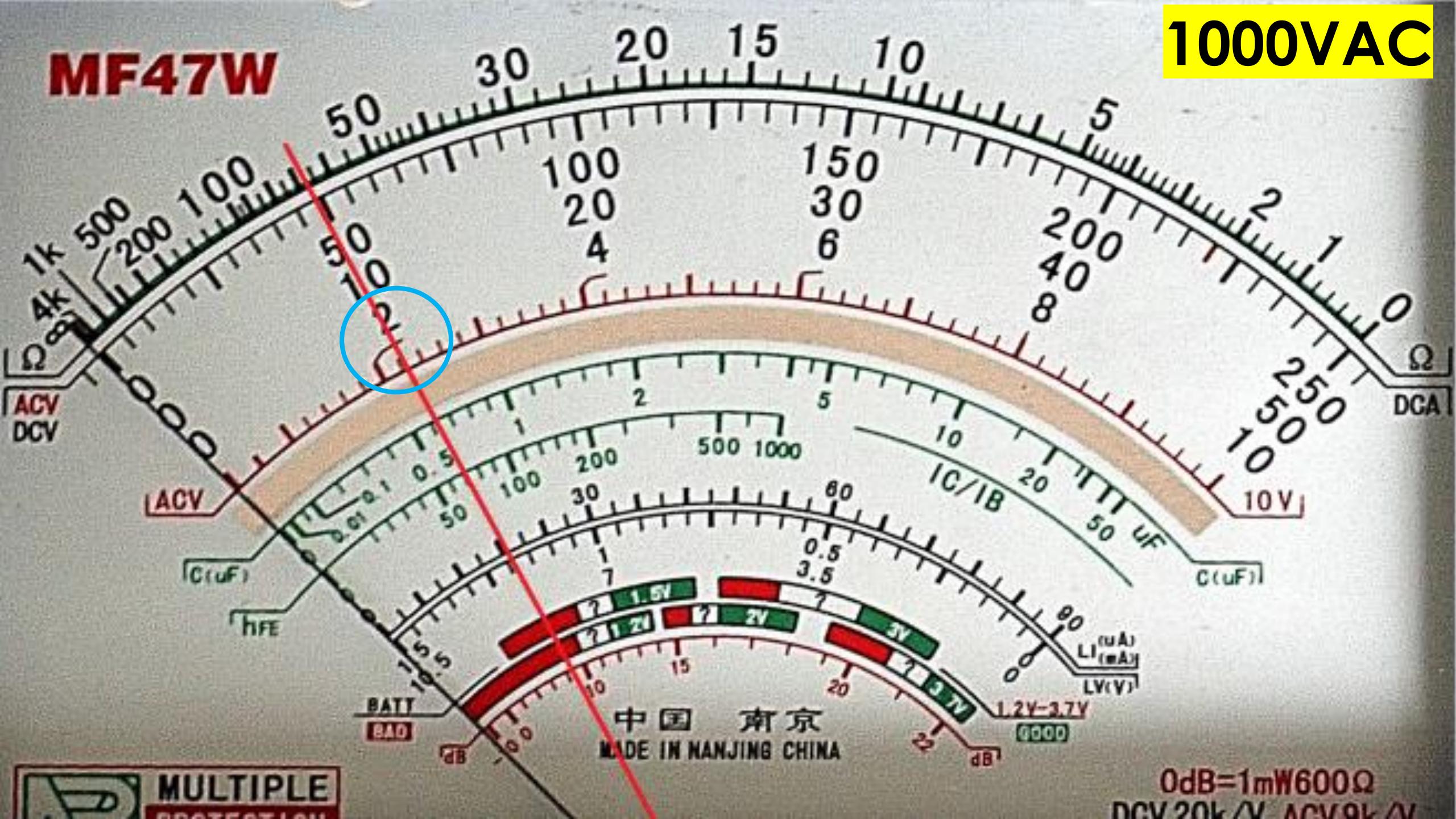


$$1000 / 10 = 100$$

$$2.2 \times 100 = \underline{\underline{220 \text{ volts}}}$$

MF47W

1000VAC

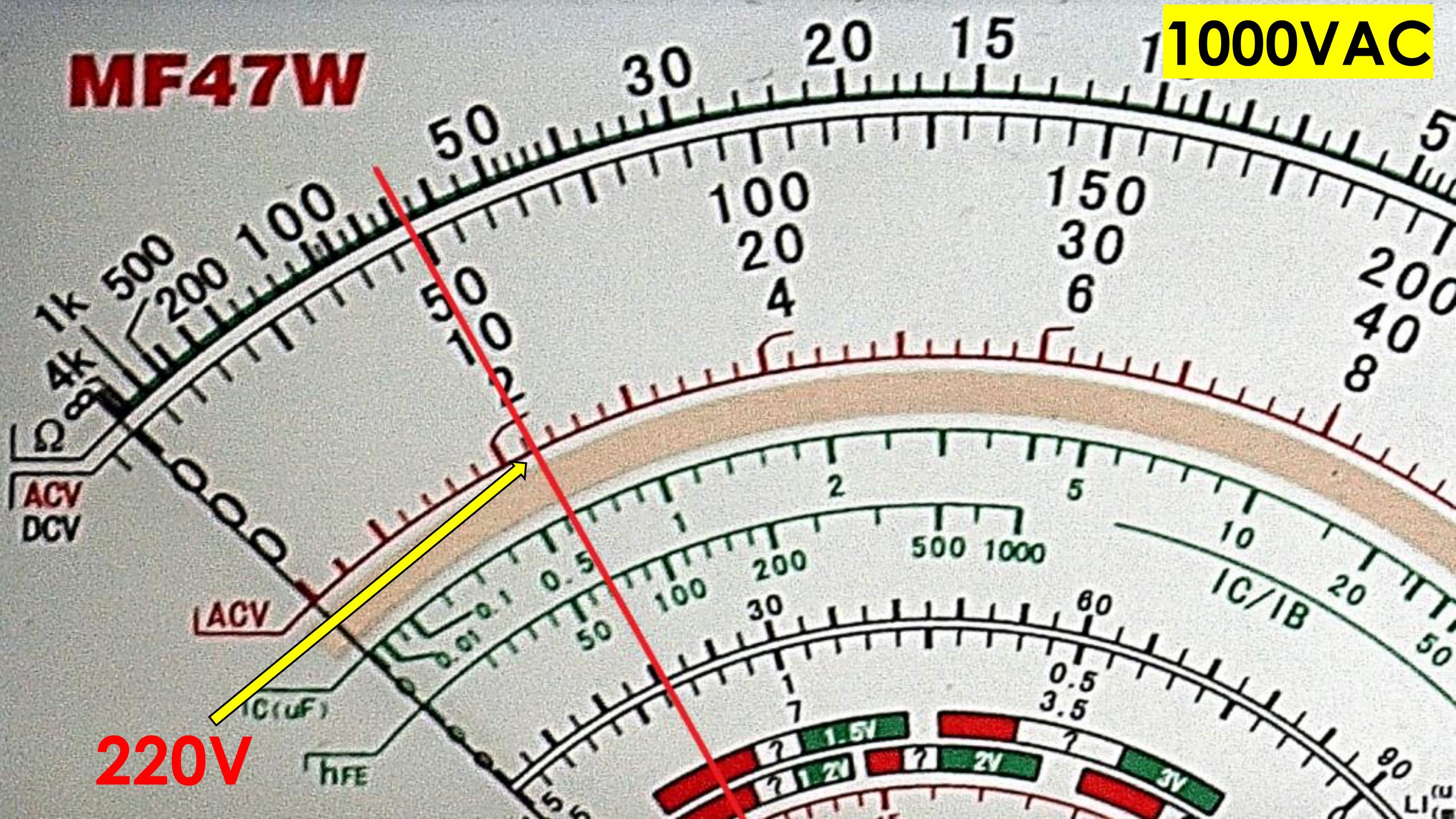


0dB=1mW600Ω
DCV 20kV ACV 9kV

MULTIPLE
PROTECTION

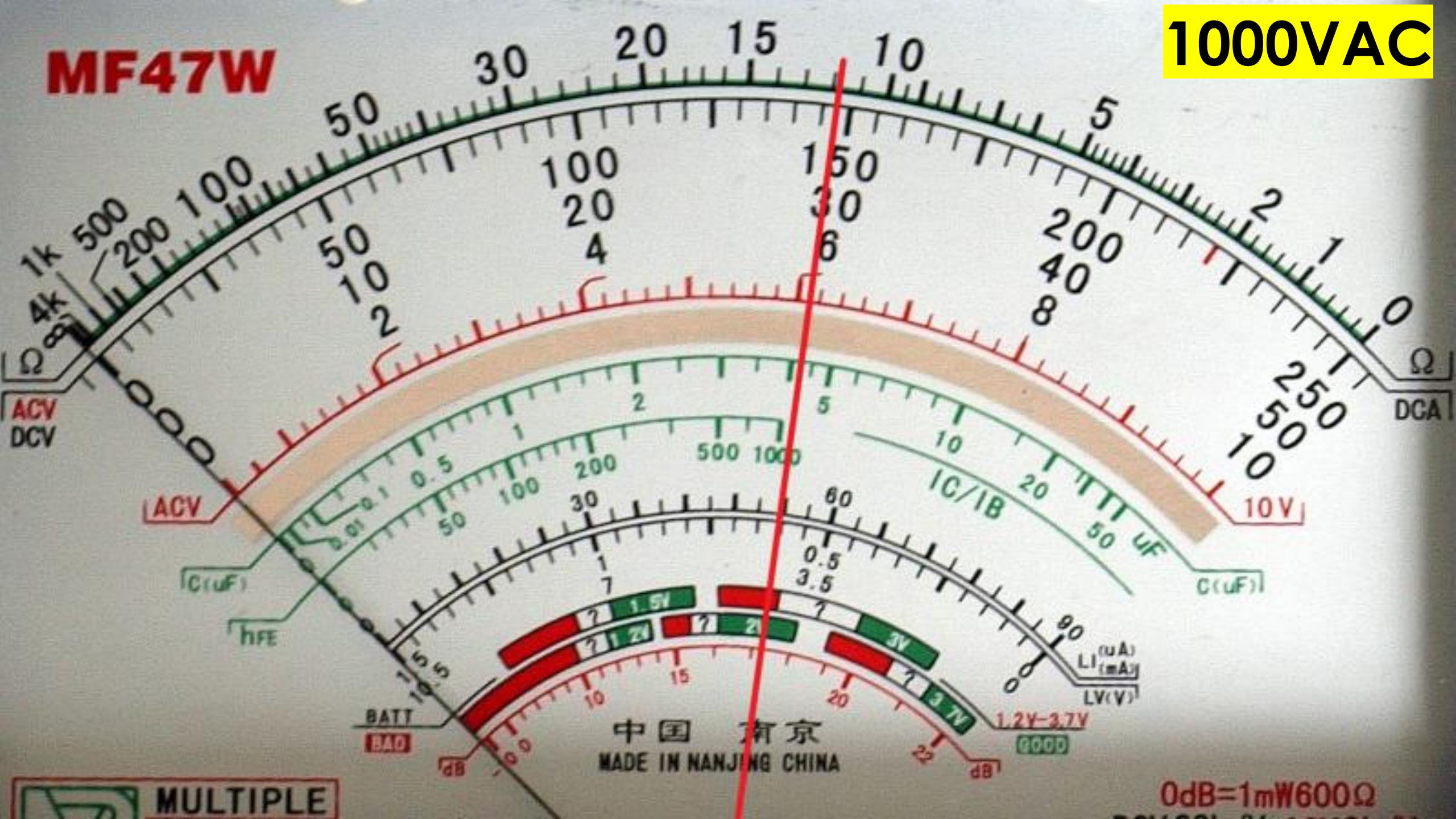
MF47W

1000VAC



MF47W

1000VAC

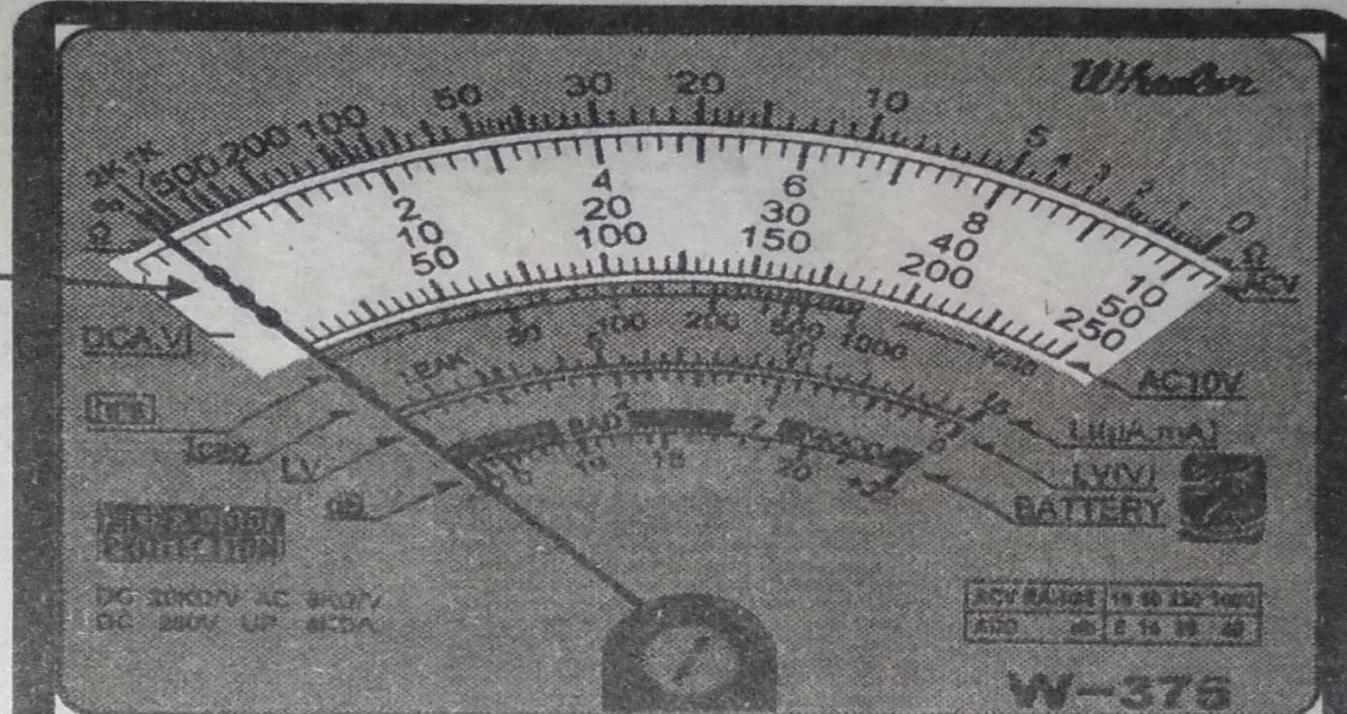


DC CURRENT MEASUREMENTS

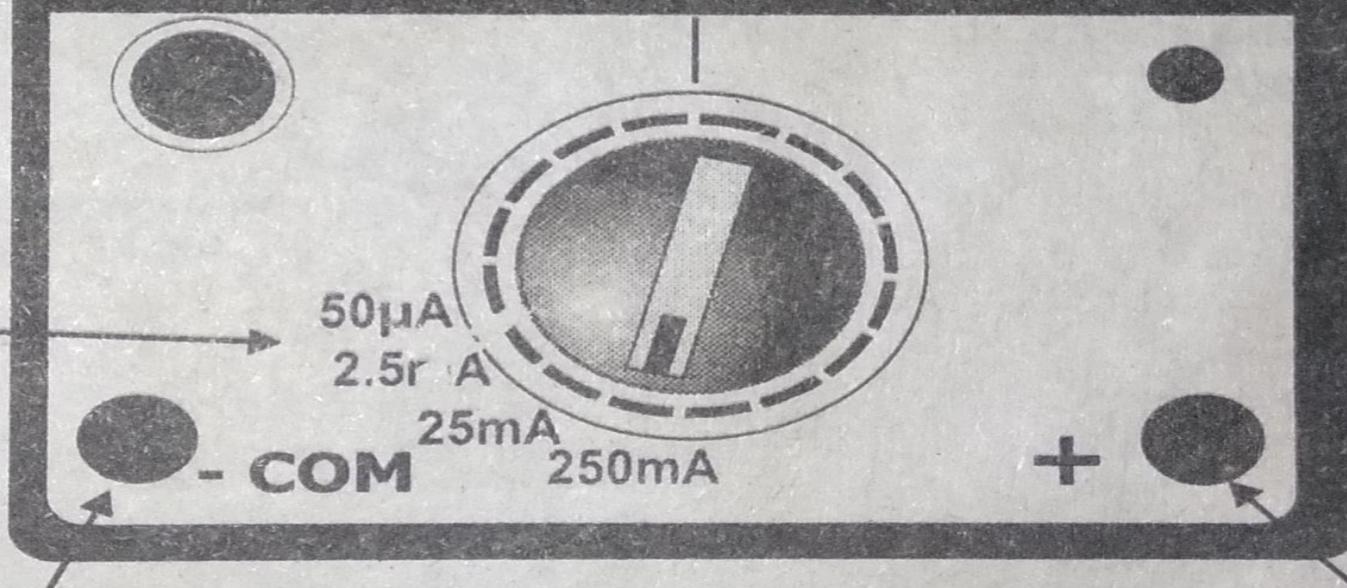
DC CURRENT MEASUREMENTS

- As you see, the ammeter scale is the same as the voltmeter scale. Apply the same procedure in measuring the voltage. However, in current measurement, the meter must be connected in series with the circuit. Unlike in measuring the voltage, the connection is in parallel.

DC Ammeter Scale
(From 0 to 10, 50, 250)



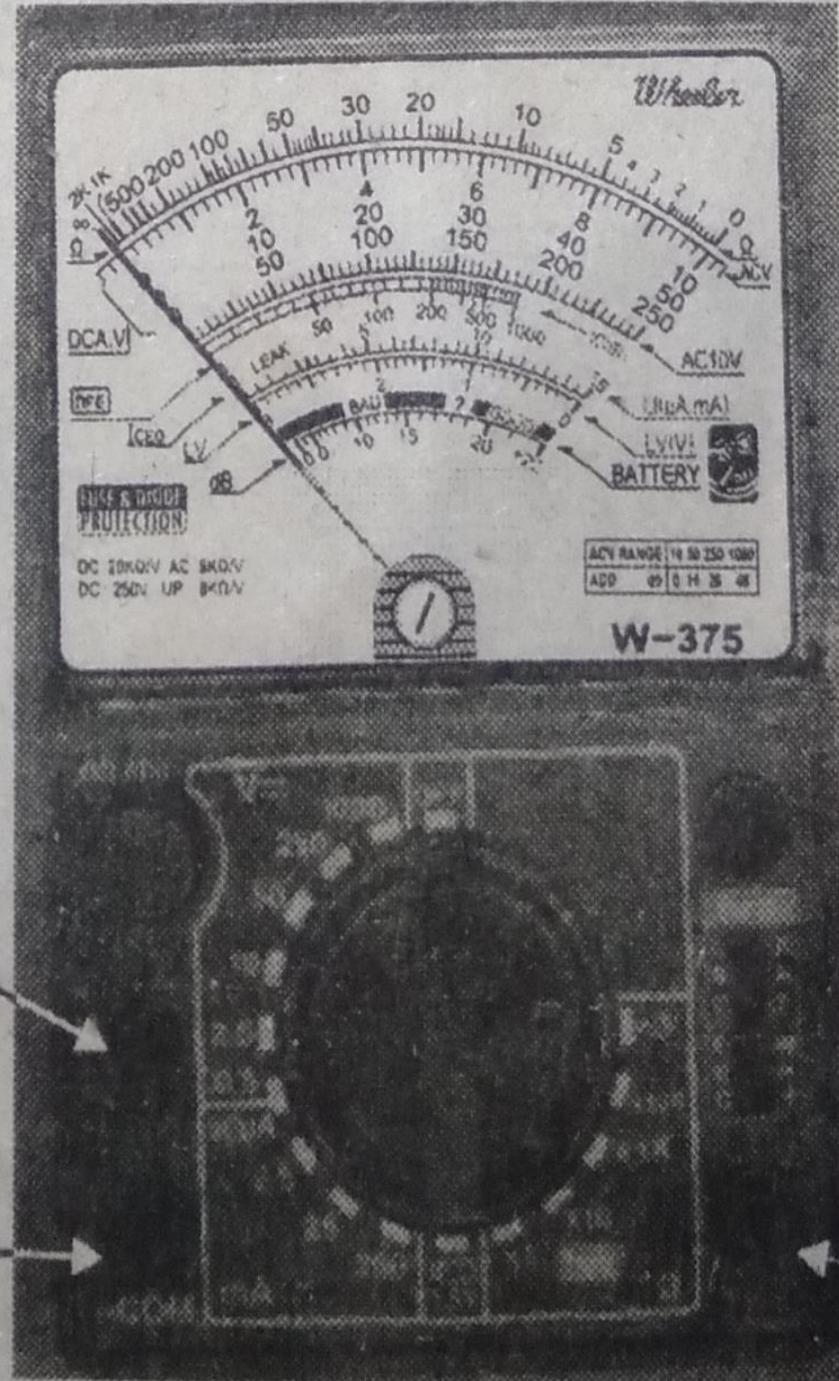
DC Ammeter Selector Range
($50\mu A$, $2.5mA$, $25mA$, $250mA$)



- COM (black)

+ POS (red)

Unplug the positive probe (+) to positive jack and plug it to 10 Amp Jack for measuring high current. (10A maximum)



10 Ampere Jack

**Common
Ground Jack**

Positive Jack

DIGITAL MULTI-TESTER

DIGITAL MULTI-TESTER

O A digital multi-tester is very different compare to analog multi-tester in terms of display. Digital multi-tester is purely electronic, without any moving element of coil. It uses Liquid Crystal display (LCD) which is also used in calculators and digital watches.

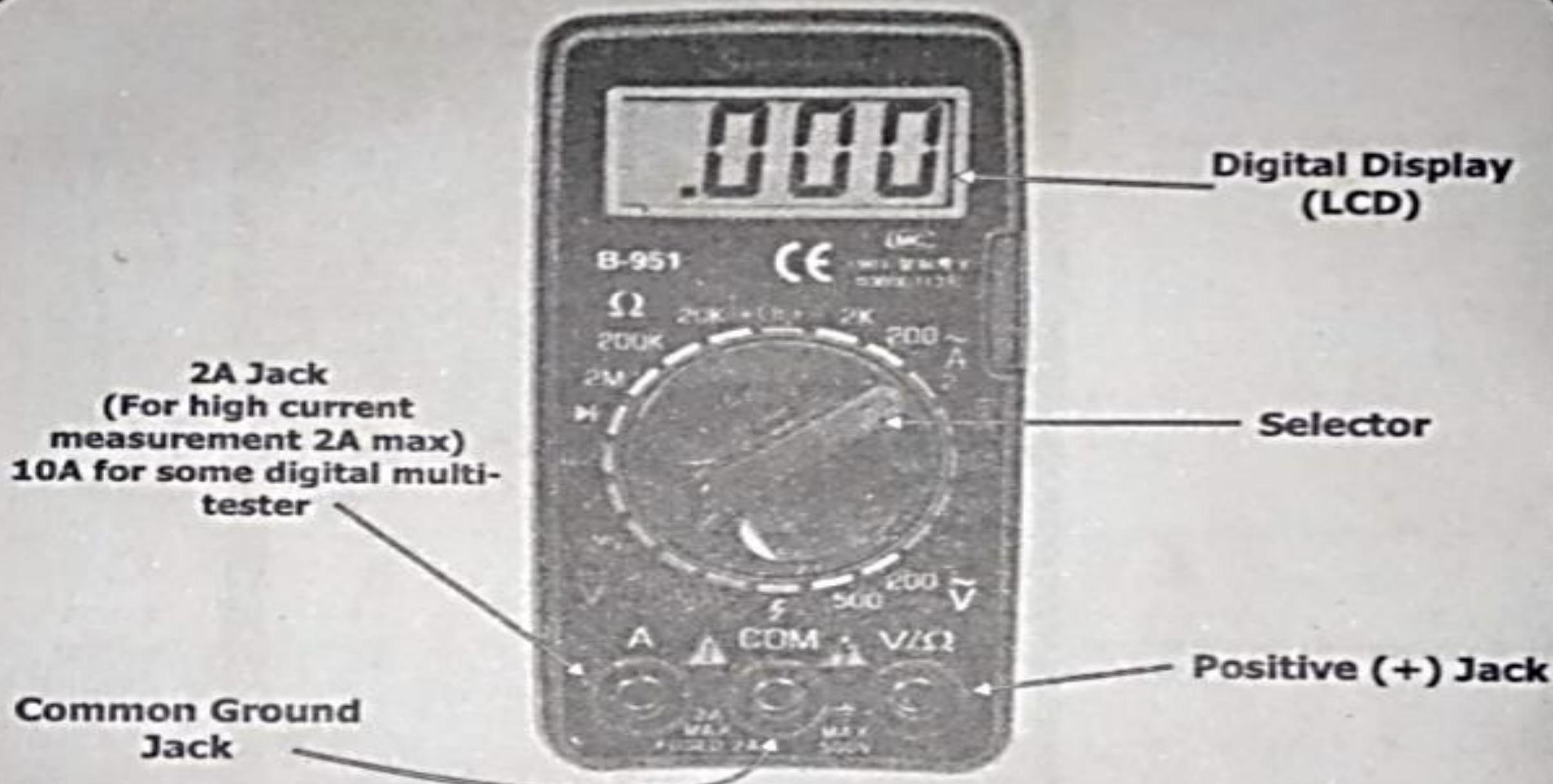
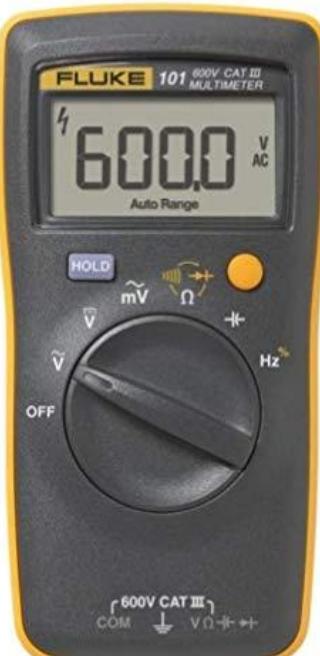


Figure 2-4 - Parts of Digital Multi-tester







DIGITAL MULTI-TESTER

○ Compared to analog multi-tester, digital multi-tester is more convenient and easy to operate because of the digital display. The digital display shows the exact value that you will need. Unlike in analog where sometimes you need to compute for the exact value. No need to calculate.

Advantages Of Digital over Analog Multi-tester

1. More accurate
2. It draws essentially no energy from the circuit being measured and hence will not affect the measured quantity.
3. Some are featured with "autoranges" that change the scale automatically providing the correct read out without having to change the range manually.

Advantages of Analog over Digital Multi-tester

1. It is most applicable when there is a need to monitor rapidly changing variables of safe or normal levels of operation and to do at a glance.

Other Types of Meter

1 . Galvanometer

- are the basic components of many power and current meters.

2. Wheatstone Bridge

- Is a resistance measuring device. This particular instrument measures resistance values from 1Ω to $11.01\text{ M}\Omega$.

3. Electrostatic Voltmeter

- constructed in the form a variable capacitor consisting of a pair of reading and stationary plate.

4. Thermocouple Ammeter

- consists of DC moving coil meter connected across the junction of a thermocouple.

5. Hot-Wire Ammeter

- It consists of a spring connected to a resistance wire in which current passes through.

6. Electrodynamometer

- made up of two wire wound fields of coils producing an electromagnetic field with the presence of current. Typically used in power frequency circuits.

7. Repulsion type Meter

- consists of a coil of wire, a fixed and a movable vane that is made-up of thin sheets of highly permeable low retentivity iron. Normally used to measure AC voltage or current.

8. Wattmeter

- a meter that indicates real power.

9. Watthour Meter

- a meter recording the electrical energy being drawn by a certain load.