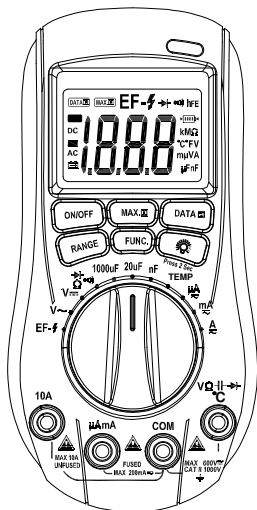


eM530S Digital Multimeter

User Manual



Digital Multimeter ennoLogic eM530S

Made in China

User Manual Version 1.1. Revised 2/22/2016.

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<http://ennologic.com>

1.GENERAL INSTRUCTIONS

This multimeter has been designed according to IEC1010 concerning electronic measurement instruments with an overvoltage category (CAT II, CAT III 600V) and pollution degree 2.

To get the best service from this instrument, please read this user manual carefully and follow the safety precautions.

1.1 Precautionary safety measures


1.1.1 Preliminary

- When using this multimeter, the user must observe all safety rules concerning protection against the dangers of electric current.
- For your own safety, only use the test probes supplied with the instrument. Before use, please check that they are in good condition.

1.1.2 During Use

- If the meter is used near noise generating equipment, be aware that the display may become unstable or indicate large errors.
- Do not use the meter or test leads if they look damaged.
- Use the meter only as specified in this manual; otherwise, the protection provided by the meter may be impaired.
- Use extreme caution when working around bare conductors or bus bars.
- Do not operate the meter around explosive gases, vapors, or dust.
- Check the main rotary switch and make sure it is at the

correct position before each measurement.

- When the range of the value to be measured is unknown, check that the range initially set on the multimeter is at the highest position.
- To avoid damage to the instrument, do not exceed the maximum limits of the input values.
- Caution when working with voltages above 60VDC or 30VAC rms. Such voltages pose a shock hazard.
- When using the probes, keep your fingers behind the finger guards.
- Before changing functions, disconnect the test leads from the circuit under test.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity or diodes.
- Before measuring current, turn off power to the circuit before connecting the meter to the circuit.
- Change the battery when the  symbol appears to avoid incorrect data.

1.1.3 Symbols:

Symbols used in this manual and on the instrument:



Caution: refer to the instruction manual. Incorrect use may result in damage to the device or its components.



Earth



This instrument has double insulation.



Fuse: F 250mA/250V



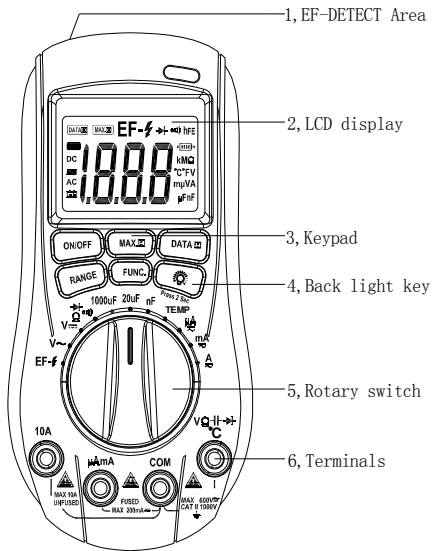
Conforms to European Union Directive

1.1.4 Instructions

- Before opening up the instrument, always disconnect from all sources of electric current and make sure you are not charged with static electricity, which may destroy internal components.
- Any adjustment, maintenance or repair work carried out on the meter while it is live should be carried out only by appropriately qualified personnel, after having taken into account the instructions in this manual.
- If any faults or abnormalities are observed, take the instrument out of service and ensure that it can not be used until it has been checked out.
- If the meter is not going to be used for a long time, take out the battery and do not store the meter in a high temperature or high humidity environment.
- For continued protection against fire, replace fuse only with the specified voltage and current rating: F250mA/250V.
- Never use the meter unless the back cover and battery cover are in place and fully fastened.

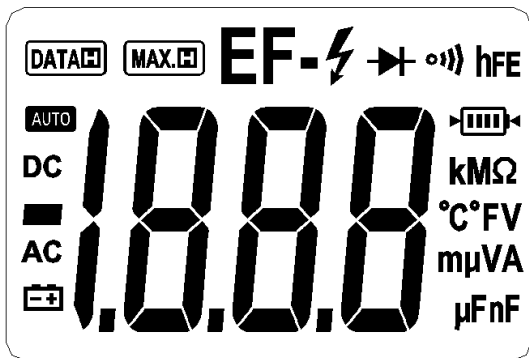
2. DESCRIPTION

2.1 Instrument Familiarization



2.2 LCD Display

3 1/2 digit, 18 mm tall LCD.



2.3 ON/OFF key

- This key is used to turn the meter on or off.

2.4 FUNC. key

- When measuring current, pressing the 'FUNC.' key will switch between DC and AC. When measuring diodes or continuity, pressing the 'FUNC.' key will switch between these two modes.

2.5 RANGE key

- This key is used in V and Ω ranges to select auto ranging (default) or manual ranging.
- Press the RANGE key briefly (< 1 second) to switch to manual ranging mode. The multimeter will beep. Keep pressing the RANGE key briefly to cycle through the manual ranges.
- To switch from manual to auto ranging mode: Press and hold the RANGE key for more than 1 second. The multimeter will beep and switch to auto ranging mode. This will be indicated by the "AUTO" symbol near the top left corner of the LCD display.

2.6 DATA-H key

- Freezes the currently displayed value and stores it in memory.
- A second short press returns the meter to normal mode.

2.7 MAX.H key

- Press this key briefly to start tracking the maximum value while measuring.
- A second short press returns the meter to normal mode.

2.8 key

- This key is used to turn the back light on or off. Press the key >2 sec. to turn the backlight on. Pressing the key again will turn the backlight off.

- The backlight will also turn off by itself after 15 seconds to conserve battery power.
- Note: This key is not operative in the **EF-⚡** mode.

2.9 Rotary switch

This switch is used to select functions and desired ranges.

2.10 Terminals

- **VΩ Hz °C →|**: Terminal receiving the red lead for voltage, resistance, capacitance, temperature, diode and continuity measurements.
- **COM**: Terminal receiving the black lead as a common reference.
- **BATT/uAmA**: Terminal receiving the red lead for battery/uA/mA measurements.
- **10A**: Terminal receiving the red lead for 10A measurements.


3. TECHNICAL SPECIFICATIONS

3.1 General specifications

- Environmental conditions:
 - 600V CAT.III and 1000V CAT. II
 - Pollution degree: 2
 - Altitude < 2000 m
 - Operating temperature:
 - 0~40 °C, (<80% RH, non-condensing)

Storage temperature:

-10~60 °C, (<70% RH, battery removed)

- Temperature Coefficient:
0.1×(specified accuracy) / °C (<18 °C or >28 °C)
- MAX. Voltage between terminals and earth ground:
600V DC or AC
- Fuse Protection:
uAmA: F 250mA/250V Ø5×20
10A: Unfused
- Sample Rate: 3 times/sec for digital data.
- Display: 3 1/2 digit LCD display with max. reading 1999.
Automatic indication of functions and symbols.
- Range selection: automatic and manual.
- Over Range indication: LCD will display "OL".
- Low battery indication:
The "" is displayed when the battery voltage is too low to operate the meter properly.
- Polarity indication: "-" displayed automatically.
- Auto power off:
If there is no key press or rotary switch operation for 15 minutes, the meter will power itself off to save battery power.
One minute before power off, the multimeter will beep 5 times. The beeper will sound again before power off.
- Power source: 3x 1.5V AAA battery
- Dimensions: 6.1"x3.2"x1.1" (156×82×29 mm).
- Weight: 8 oz (225g) approx. (battery included).

- Accessories: User manual, test leads.

3.2 Measurement specifications

- Accuracy: \pm (% of reading + number of digits) at 18°C to 28°C (64°F to 82°F) with relative humidity to 80%.

3.2.1 No contact AC Voltage detector

Sensitivity	Frequency	distance
>50V	50Hz	< 150mm

3.2.2 DC Voltage

Range	Resolution	Accuracy
200mV	0.1mV	\pm (0.7% of rdg +2 digits)
2V	0.001V	
20V	0.01V	\pm (0.7% of rdg +2 digits)
200V	0.1V	
600V	1V	

Input impedance: 10M Ω

Maximum input voltage: 600V DC.

3.2.3 AC Voltage

Range	Resolution	Accuracy
200mV	0.1mV	\pm (0.8% of rdg +3 digits)
2V	0.001V	
20V	0.01V	

200V	0.1V	
600V	1V	\pm (1% of rdg +3 digits)

Input impedance: 10M Ω

Maximum input voltage: 600V AC rms.

Frequency Range: 40Hz-400Hz,

Response: Average, calibrated in rms of sine wave

3.2.4 DC Current

Range	Resolution	Accuracy
200 μ A	0.1 μ A	\pm (1.2% of rdg +3 digits)
2000 μ A	1 μ A	
20mA	0.01mA	
200mA	0.1mA	
2A	0.001A	\pm (2.0% of rdg +10digits)
10A	0.01A	

Overload protection: F 250mA/250V fuse for μ A/mA ranges.

Maximum input current: 250mA DC for μ A and mA ranges.

10A DC for 10A ranges (unfused).

3.2.5 AC Current

Range	Resolution	Accuracy
200 μ A	0.1 μ A	\pm (1.5% of rdg + 5 digits)
2000 μ A	1 μ A	
20mA	0.01mA	
200mA	0.1mA	

2A	0.001A	± (3.0% of rdg + 10 digits)
10A	0.01A	

Overload protection: F 250mA/250V fuse for μ A/mA ranges.

Maximum input current: 250mA AC rms for mA ranges.

10A AC rms for 10A ranges (unfused).

Frequency Range: 40Hz-400Hz,

Response: Average, calibrated in rms of sine wave


3.2.6 Resistance


Range	Resolution	Accuracy
200 Ω	0.1 Ω	± (1.0% of rdg +3digits)
2k Ω	1 Ω	± (1.0% of rdg +1digit)
20k Ω	10 Ω	
200k Ω	100 Ω	
2M Ω	1k Ω	
20M Ω	10k Ω	± (1.0% of rdg +5 digits)

Open circuit voltage: approx. 0.25V

Overload protection: 250V DC or 250V AC rms.

3.2.7 Diode and Audible continuity Test

Range	description	Test Condition
	Built-in buzzer sounds if resistance is less than approx.40 Ω	Open circuit voltage: approximately 0.5V

	Display reads approx. forward voltage of diode	Forward DC Current: approx. 1mA Reverse DC Voltage: approx. 1.5V
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Overload protection: 250V DC or 250V AC rms.

3.2.8 Battery Test

Range	Resolution	Function
1.5V	0.01V	Shows the approx. voltage of the battery under load using test current below.
3V	0.01V	
9V	0.01V	

- Test Current:

1.5V Range: approx. 50mA

3V Range: approx. 30mA

9V Range: approx. 12mA

- Overload Protection:

1.5V, 3V, 9V Range: F250mA/250V fuse (quick acting).

4. OPERATING INSTRUCTIONS

4.1 No-Contact AC Voltage detector



There is no auto power off function in this mode, and the backlight is not available.

- Set the rotary switch to **EF-⚡**. The green LED of the EF indicator in the top right corner of the meter will light up.
- Hold the EF-DETECT AREA of the multimeter close to a power cord or outlet. If AC power is present, the red LED of the EF indicator will flash, an audible warning will sound, and the symbol **EF-⚡** will be displayed on the LCD.

4.2 Voltage measurement



To avoid electrical shock and/or damage to the instrument, do not attempt to measure any voltage that might exceed 600VDC or 600VAC rms. Do not apply more than 600VDC or 600VAC rms between the common terminal and the earth ground.

- Set rotary switch to the ACV (V~) or DCV (V=) mode.
- Press the "RANGE" key to select manual ranging or auto ranging.

- Connect the black and red test leads to the COM and V terminals respectively.
- Connect the test leads to the circuit being measured.
- Read the displayed value. The polarity of the red test lead will be indicated when making a DC measurement.

4.3 Resistance measurement



To avoid electrical shock and/or damage to the instrument, disconnect circuit power and discharge all high-voltage capacitors before measuring resistance.

- Set the rotary switch to the Ω mode.
- Press the "RANGE" key to select manual ranging or auto ranging (default).
- Connect the black and red test leads to the COM and V Ω terminals respectively.
- Connect the test leads to the circuit being measured and read the displayed value.
- In order to improve accuracy when measuring very low resistance, short the test leads before measurement and keep the test probe resistance in mind so you can subtract it from the measured value.


NOTE:

- When measuring resistances above 1M Ω , the reading may take a few seconds to stabilize. This is normal for high resistance measurements.
- When the input is not connected, i.e. open circuit, the symbol "OL" will be displayed (over-range condition.)

4.4 Continuity measurement



To avoid electrical shock and/or damage to the instrument, disconnect circuit power and discharge all high-voltage capacitors before testing for Continuity..


- Set the rotary switch to .
- Press the "FUNC." key to enter continuity measurement mode.
- Connect the black and red test leads to the COM and V Ω terminals respectively.
- Connect the test leads to the resistance in the circuit being measured.
- When the resistance of the circuit being tested is less than 40 Ω , the meter will beep continuously.

Note: Use the continuity test mode to check open and shorts of a circuit.

4.5 Diode measurement



To avoid electrical shock and/or damage to the instrument, disconnect circuit power and discharge all high-voltage capacitors before testing diodes.

- Set the rotary switch to .
- If the meter was in continuity test mode, press the "FUNC." key to enter diode measurement mode.
- Connect the black and red test leads to the COM and V Ω terminals respectively.
- Connect the red test lead to the anode, and black test lead to the cathode of the diode to be tested.
- The meter will show the approximate forward voltage of

the diode. If the lead connection is reversed, the symbol "OL" will be displayed.

4.9 Current measurement



To avoid damage to the meter, check the meter's fuse before proceeding. Use the proper terminals, function, and range for your measurement.

- Set the rotary switch to the μA , mA or A range.
- Press the "FUNC." key to select DC or AC measuring mode.
- Connect the black test lead to the COM terminal and the red test lead to the mA terminal for a maximum of 200mA. For a maximum of 10A, move the red test lead to the 10A terminal.
- Connect the test leads in series with the load for which the current is to be measured.
- Read the displayed value. The polarity of the red test lead will be indicated when making a DC measurement.
- When the figure "OL" is displayed and the buzzer sounds continuously, an over-range situation is present and a higher range should be selected.

4.10 TESTING BATTERIES

- The battery test mode can be used to test a battery under load using a small test current of a few mA.
- Connect the black test lead to the **COM** jack and the red test lead to the **BATT** jack.

- Depending on the type of the tested battery (1.5V, 3V, 9V), set the rotary switch to the proper battery voltage range.
- Connect the test leads to the battery to be tested.
- The LCD will display the battery voltage. The polarity of red test lead connection will be indicated.

5. MAINTENANCE

5.1 General Maintenance



To avoid electrical shock or damage to the meter, do not get water inside the case. Remove the test leads and any input signals before opening the case.

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:

- Turn the meter off and remove all test leads.
- Shake out any dirt that may be in the terminals.
- Soak a new swab with a cleaning and oiling agent (such as WD-40).
- Work the swab around in each terminal. The oil protects the terminals against dirt and moisture.

5.2 Fuse replacement



Before replacing the fuse, disconnect test leads from any circuit under test.

To prevent damage or injury, replace the fuse only with specified ratings.


- Turn the meter OFF.
- Disconnect test leads from any inputs terminals.
- Use a screwdriver to unscrew the three screws secured on the back cover and the battery cover, then unscrew the two screws under the battery cover.
- Separate the back cover from the top case.
- Replace the fuse only with the specified rating:
F 250mA/250V Ø5x20.
- Replace the back cover and screws.

5.3 Battery replacement



Before replacing the battery, disconnect test leads from any circuit under test, turn the meter off and remove test leads from the input terminals.

Use the following procedure:

- When the battery voltage drops below proper operation range the  symbol will appear on the LCD display and the batteries need to be replaced.
- Turn the meter OFF.
- Disconnect test leads from any inputs terminals.

- Use a screwdriver to unscrew the two screws holding the battery cover in place.
- Replace the batteries with three new 1.5V AAA batteries.
- Replace the battery cover and screws.

ennoLogic.com
PO Box 25207
Eugene, OR 97402

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