



eC380V Volt/mA Calibrator

User Manual

ennoLogic eC380V Volt/mA Calibrator

Made in China

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1. GENERAL INSTRUCTIONS

1.1 Precautionary Safety Measures

Important Note: Limited Liability

Cascadia Innovations is the exclusive distributor of all ennoLogic® products. Except as explicitly stated, Cascadia Innovations is not liable for direct, indirect, incidental, or other types of damages arising out of, or resulting from the use of this product. By using the eC380V you agree to hold ennoLogic® and Cascadia Innovations harmless for any and all consequences of the use of this instrument or application of data from the use of this instrument.

To avoid possible electric shock or personal injury:

- Never apply more than 30V between any two terminals, or between any terminal and earth ground.
- Make sure the battery door is closed and latched before you operate the instrument.
- Remove test leads from the calibrator before you open the battery door.
- Do not operate instrument if it appears to be damaged.

- Do not operate the calibrator around explosive gases, vapor, or dust.

To avoid possible damage to the calibrator:

- Make sure you choose the correct terminals and settings before using the calibrator for measurements or calibrations.
- Disconnect and remove the calibrator from the equipment or circuit under test after the testing has been completed.

1.2 Introduction

The ennoLogic Volt/mA Calibrator eC380V is a tool for sourcing and measuring voltages and mA currents. It can measure or output DC currents in the range of 0 to 24 mA, and DC voltages from 0 to 20 V. The calibrator also has a built-in 24V loop power supply.

Please note that this instrument cannot be used to measure and source signals simultaneously.

The following table summarizes the functions and technical specifications of the calibrator eC380V.

1.2.1 Measurement and Output of Voltages







Function	Range	Resolution
DC V and mV Input	0 ~ 100 mV	0.01 mV
	0 ~ 20 V	0.001 V
DC V and mV Output	0 ~ 100 mV	0.01 mV
	0 ~ 20 V	0.001 V
Loop Power Output	24V DC	N/A

1.2.2 Measurement and Output of mA Currents

Function	Range	Resolution
DC mA Input	0 ~ 24 mA	0.001 mA
DC mA Output	0 ~ 24 mA	0.001 mA

1.3 Symbols

The following is a list of symbols used in this manual and on the instrument:

	Caution: Incorrect use may result in damage to the device or its components. Please refer to the user manual.
	AC (Alternating Current)
	DC (Direct Current)
	AC or DC
	Earth Ground
	Conforms to European Union directives

1.4 General Instructions

- Remove the test leads from the instrument before opening the instrument's battery cover or case.
- Before opening the instrument, always disconnect it from all power sources and make sure your body is not electrostatically charged, which may destroy internal components.
- Any adjustments, maintenance or repair work carried out on the calibrator while it is operating

should be carried out only by qualified personnel, and after reviewing the instructions in this manual.

- A "qualified person" is someone who is familiar with the installation, construction and operation of the equipment and the hazards involved. This person is trained and authorized to energize and de-energize circuits and equipment in accordance with established practices.
- When the instrument is opened up, remember that some internal capacitors can retain a dangerous potential even after the instrument has been turned off.
- If any faults or abnormalities are observed, take the instrument out of service and ensure that it cannot be used until it has been checked out.
- If the meter is not going to be used for a long time, remove the batteries and do not store the instrument at high temperatures or in high humidity environments.

2. INSTRUMENT DESCRIPTION

2.1 Main User Elements

The front panel is shown in Figure 2-1, and its user elements are described below:

1. Loop power terminal (24V to ground)
2. mA measurement input terminal
3. COM terminal (ground/negative) for input and output
4. V / mV terminal for input and output
5. Power On/Off button
6. V / mV toggle switch
7. mA / mA% toggle switch
8. Input / output toggle switch
9. Increment value button, coarse
10. Decrement value button, coarse
11. Increment value button, fine
12. Decrement value button, fine

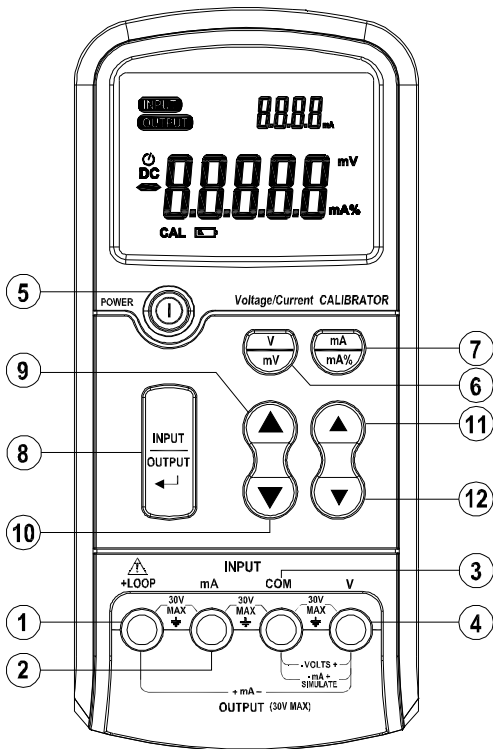


Figure 2-1: Calibrator Front Panel

2.2 LCD Display

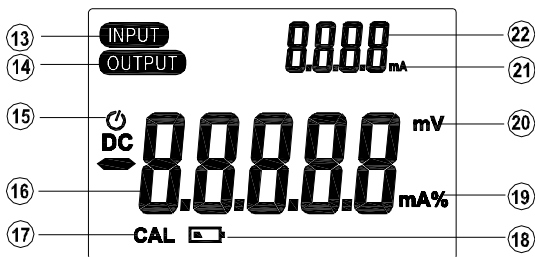


Figure 2-2: LCD Display

The LCD display is shown in Figure 2-2 above, and the symbols are explained below:

13. Input mode indicator
14. Output mode indicator
15. Auto Power Off enabled indicator
16. Measurement value or output value
17. Calibration mode indicator
18. Low battery indicator
19. Current mA/mA% indicator
20. Voltage V/mV indicator
21. Current mA indicator
22. Secondary display area

3. FUNCTION DESCRIPTIONS

3.1 DC Voltage Measurement

- ① Press the power button **5** to turn on the calibrator*.
- ② Press the input / output toggle switch **8** until the display shows the input mode indicator **13**. This will set the instrument to measurement (input) mode as opposed to output mode.
- ③ Press the V/ mV toggle switch **6** to select the desired measurement range (volt or millivolt, indicated by the V/mV indicator **20**).
- ④ Connect the red test lead to the V terminal **4**, and the black test lead to the COM terminal **3**.
- ⑤ Connect the test leads/probes to the circuit or equipment to be measured.
- ⑥ Read the displayed voltage value **16**.

* The numbers in the **□** refer to the descriptions of the main user elements and LCD symbols explained in the previous two sections 2.1 and 2.2.

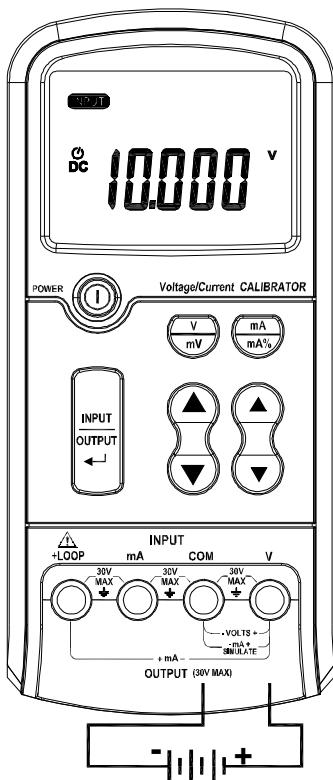


Figure 3-1: DC Voltage Measurement

3.2 DC Voltage Output

- ① Press the power button **5** to turn on the calibrator.
- ② Press the input / output toggle switch **8** until the display shows the output mode indicator **14**. This will set the instrument to output mode as opposed to measurement (input) mode.
- ③ Press the V/ mV toggle switch **6** to select the desired output range (volt or millivolt, indicated by the V/mV indicator **20**).
- ④ Press the value adjustment buttons **9** **10** **11** **12** to set the output voltage to the desired value.
- ⑤ Connect the red test lead to the V terminal **4**, and the black test lead to the COM terminal **3**.
- ⑥ Connect the test leads/probes to the circuit or equipment to be tested.
- ⑦ If you want to change the output value or range, press the value adjustment buttons **9** **10** **11** **12** or the V / mV toggle switch **6**.

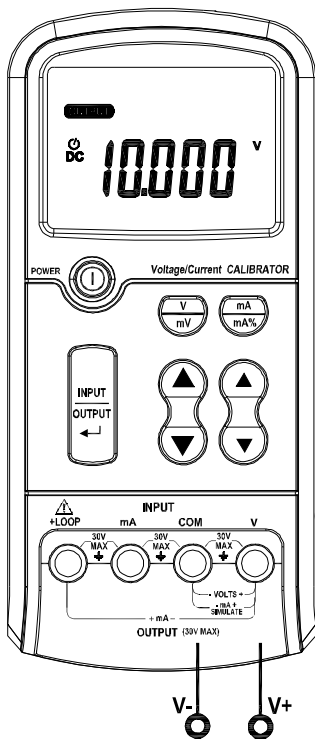


Figure 3-2: DC Voltage Output

3.3 DC mA Current Measurement

3.3.1 Current Measurement of Circuits Powered by an External Power Supply

- ① Press the power button **5** to turn on the calibrator.
- ② Press the input / output toggle switch **8** until the display shows the input mode indicator **13**. This will set the instrument to measurement (input) mode.
- ③ Press the mA / mA% toggle switch **7** to select either mA or mA% display **19**. If mA% is selected, the “4-20mA” symbol will be displayed in the secondary display area **22**.
- ④ Connect the red test lead to the mA terminal **2**, and the black test lead to the COM terminal **3**.
- ⑤ Connect the test leads/probes to the circuit or equipment to be measured.
- ⑥ Read the displayed current value **16**.

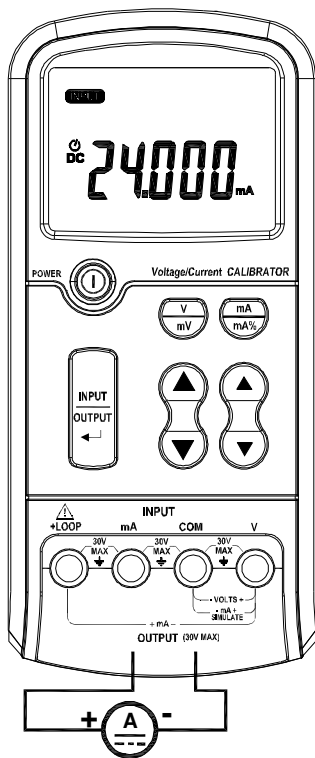


Figure 3-3-1: DC mA Current Measurement of Circuits Powered by an External Power Supply

3.3.2 Current Measurement of Circuits Powered by the Calibrator Loop Power Supply

- ① Press the power button **5** to turn on the calibrator.
- ② Press the input / output toggle switch **8** until the display shows the input mode indicator **13**. This will set the instrument to measurement (input) mode.
- ③ Press the mA / mA% toggle switch **7** to select either mA or mA% display **19**. If mA% is selected, the “4-20mA” symbol will be displayed in the secondary display area **22**.
- ④ Connect the red test lead to the LOOP power terminal **1**, and the black test lead to the mA terminal **2**.
- ⑤ Connect the test leads/probes to the circuit or equipment to be measured.
- ⑥ Read the displayed current value **16**.

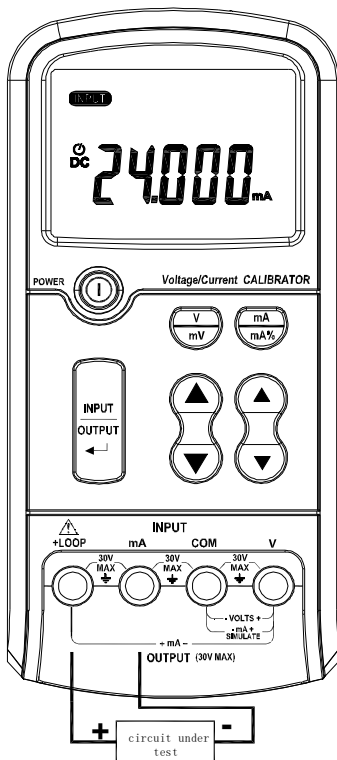


Figure 3-3-2: DC mA Current Measurement of Circuits Powered by the Calibrator Loop Power Supply

3.4 DC mA Output

3.4.1 Sourcing mA Current

- ① Press the power button **5** to turn on the calibrator.
- ② Press the input / output toggle switch **8** until the display shows the output mode indicator **14**. This will set the instrument to output mode.
- ③ Press the mA / mA% toggle switch **7** to select either mA or mA% display **19**. If mA% is selected, the “4-20mA” symbol will be displayed in the secondary display area **22**.
- ④ Press the value adjustment buttons **9** **10** **11** **12** to set the output voltage to the desired value.
- ⑤ Connect the red test lead to the LOOP power terminal **1**, and the black test lead to the V terminal **4**.
- ⑥ Connect the test leads/probes to the circuit or equipment to be tested.
- ⑦ If you want to change the output value or range, press the value adjustment buttons **9** **10** **11** **12** or the mA / mA% toggle switch **7**.

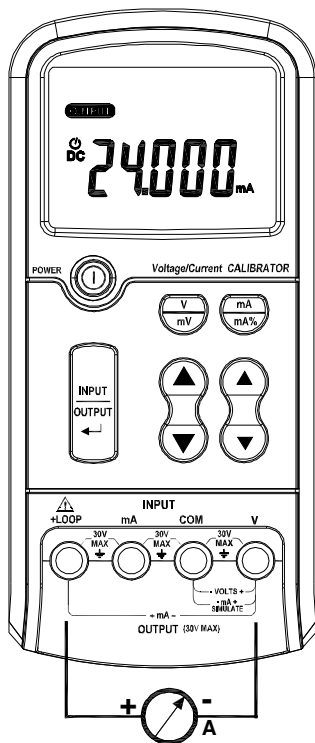


Figure 3-4-1: Sourcing mA Current

3.4.2 Simulating a Transmitter

- ① Press the power button **5** to turn on the calibrator.
- ② Press the input / output toggle switch **8** until the display shows the output mode indicator **14**. This will set the instrument to output mode.
- ③ Press the mA / mA% toggle switch **7** to select either mA or mA% display **19**. If mA% is selected, the “4-20mA” symbol will be displayed in the secondary display area **22**.
- ④ Press the value adjustment buttons **9** **10** **11** **12** to set the output voltage to the desired value.
- ⑤ Connect the red test lead to the V terminal **4**, and the black test lead to the COM terminal **3**.
- ⑥ Connect the test leads/probes to the circuit or equipment to be tested.
- ⑦ If you want to change the output value or range, press the value adjustment buttons **9** **10** **11** **12** or the mA / mA% toggle switch **7**.

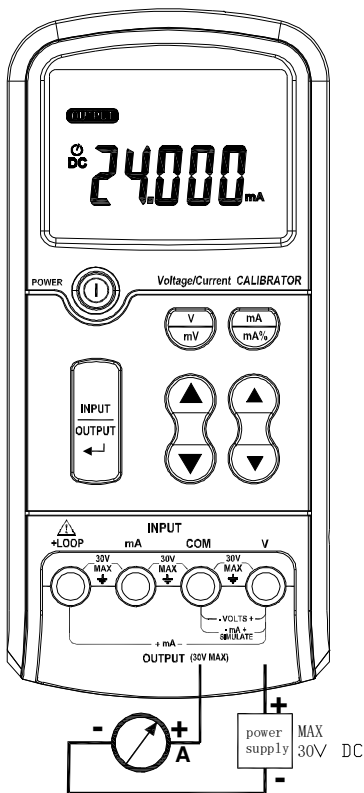








Figure 3-4-2: Simulating a Transmitter

3.5 General Functions and Features

3.5.1 Auto Power Off

The auto power off default setting is 30 minutes. If the calibrator has not been used for 30 minutes, it will turn itself off automatically.

To disable auto power off, or to change the default auto power off time of 30 minutes to a different value, follow the instructions below:

- ① Press and hold the mA mA% toggle switch  then turn on the instrument by pressing the power button.
- ② Release the mA mA% toggle switch .
- ③ Use the Increment and Decrement Value buttons  and  to adjust the auto power off time to a value in the range of 15 minutes and 60 minutes, or disable it entirely by pressing the Decrement Value button  until the display shows “off”.
- ④ To store the new setting and exit this mode, press the mA mA% toggle switch  again.

Notes: After changing the batteries, the auto power off time reverts back to the default setting of 30 minutes.

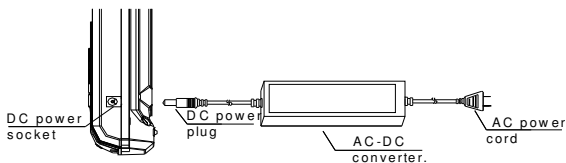
If after changing the batteries the calibrator will not turn on, remove the batteries, wait 3 minutes, reinsert the batteries and try again.

3.3 Using an External Power Adapter

The eC380V calibrator can be powered by an external power adapter (not included, but offered as an optional accessory). To use the calibrator with an external power adapter, please follow the instructions below:


Connecting the power adapter:

1. Connect the AC power cord to the AC/DC converter.
2. Plug the AC power cord into an electrical outlet (100V-240V AC).
3. Plug the DC power plug of the converter into the DC power socket of the calibrator (located on the right side near the bottom):



AC/DC Power Adapter Specifications:

Input: 100V-240VAC, 50-60Hz, 1.8A

Output: DC 12V , 2A MAX

Polarity: 

WARNINGS:

- 1) Please use the original AC power adapter for the eC380V. Using other AC power adapters may damage your instrument.
- 2) Do not use the AC power adapter outdoors.
- 3) Please plug the AC power cord into an electrical outlet first and then firmly insert the DC power plug into the DC power socket of the calibrator. When unplugging the AC power adapter, disconnect the DC power plug from the calibrator first, then unplug the AC power plug from the outlet.
- 4) Do not use the AC power adapter for any other equipment except for this instrument.
- 5) It is normal for the AC power adapter to get warm while in use and generate some noise.
- 6) Do not take the AC power adapter apart, as this may lead to personal injury or damage to the equipment.
- 7) Do not use the AC power adapter in a high temperature or high humidity environment.
- 8) Protect the AC power adapter from mechanical shocks or strong vibrations.

4. TECHNICAL SPECIFICATIONS

4.1 General Specifications

- Maximum voltage between any terminal and earth ground or between any two terminals: 30V
- Storage temperature : -40°C to 60°C (-40°F to 140°F)
- Operating temperature : -10°C to 55°C (14°F to 131°F)
- Maximum operating altitude: 3000m (9842ft)
- Temperature coefficient: $\pm 0.005\%$ of range per °C for the temperature range of -10°C to 55°C (14°F to 131°F)
- Relative humidity: 95% up to 30°C (86°F), 75% up to 40°C (104°F), 45% up to 50°C (122°F), 35% up to 55°C (131°F)
- Shock: Random 2g, 5Hz to 500Hz
- Safety: 1 meter drop test
- Power: 6x AAA batteries
- Size: 204mm x 99mm x 46mm (8" x 3.9" x 1.8")
- Weight: 460g (1 lbs.) including batteries

4.2 Measurement Specifications

4.2.1 DC V Input and Output

Range	Resolution	Accuracy (\pm (% of reading + Counts))
100 mV	0.01 mV	0.02 % + 3
20 V	0.001 V	0.02 % + 3
Input impedance: $2M\Omega$ (nominal), $< 100pF$ Over voltage protection: 30V Maximum load current: 1mA		

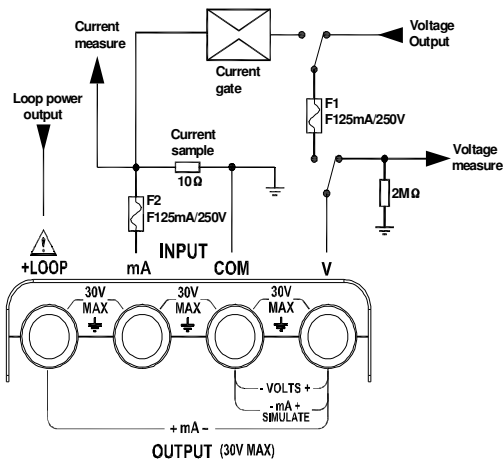
4.2.2 DC mA Input and Output

Range	Resolution	Accuracy (\pm (% of reading + Counts))
24 mA	0.001mA	0.015% + 3
Overload protection: 125 mA 250V fast acting fuse Percent display: 0%=4mA, 100%=20mA Source mode: When sourcing more than 15mA @500 Ω , use the external power adapter. The maximum load is 24mA @700 Ω using external power. Simulator mode: External loop voltage: 24V nominal, 30V maximum, 12V minimum.		

4.2.3 LOOP POWER

24V \pm 10%

4.3 Terminal Circuit Diagram



5. MAINTENANCE

This section provides basic maintenance information, including fuse and battery replacement instructions.

Do not attempt to repair or service your calibrator unless you are qualified to do so and have the relevant calibration, performance test, and service information.


5.1 General Maintenance



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

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.

5.2 Battery Replacement

Please change the battery when the LCD indicates . Turn off the calibrator and unplug an external power adapter. Use a screwdriver to unscrew the two screws on the battery cover on the back of the unit near the bottom, behind the stand. Remove the battery cover from the meter. If you are replacing the batteries: remove the used AAA

batteries. Install six new AAA batteries. Pay attention to polarity when you insert each battery, the polarity is indicated inside the battery compartment. Replace the battery cover and tighten the screws. Do not use the meter until the battery cover has been properly installed.

5.2 Fuse Replacement



Before replacing the fuse, disconnect test leads and/or any connectors from any circuit under test. To prevent damage or injury replace the fuse only with a 0.125A 250V fast fuse.

If the LCD display flashes “OL” in voltage output mode with the test leads unplugged, Fuse 1 is most likely blown. If the calibrator always reads 0.000 in mA input mode even when a signal is applied, Fuse 2 is most likely blown.

6. Accessories

Package Contents:

- Volt/mA Calibrator eC380V
- 1x pair of test leads
- 1x pair of alligator clips
- 6x AAA batteries
- User manual
- Carrying case

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