

ETX-2015 Current and Voltage Calibrator
ETX-1815 Current and Voltage Calibrator
User Manual



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1 Basic Introduction

1.1 Function

- Source of voltage, current and frequency.
- Measure of voltage, current, loop current and frequency.
- Manual stepping and automatic stepping and ramping.
- Support for PC communication

1.2 Summary of Source and Measure Functions

Function	Measure	Source
DC V	0~30 V	0~10 V
DC mV	0~100 mV	0~100 mV
DC mA	0~24 mA	0~24 mA
Frequency	1.000Hz~99.999kHz	0.00Hz~20.000kHz
Others	24V power supply, Step, Ramp.	

1.3 Interface (terminal) Description

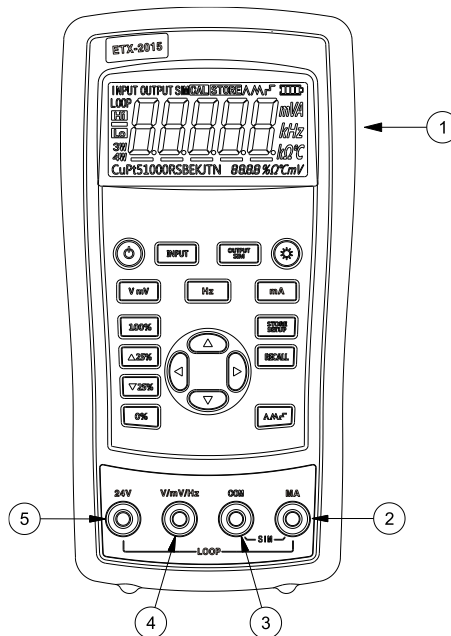


Figure 1.3-1

No.	Name	Description
①	Communication and charging connector	Connect power adaptor to charge batteries or connect the calibrator to the computer.
②	Current terminal	terminal for current measure and source.
③	COM terminal	All measure and source public terminal.
④	V, mV, Hz terminal	terminal for voltage, milli volt, frequency measure and source.
⑤	24V terminal	24V power supply terminal, used in LOOP mode

1.4 Key Description

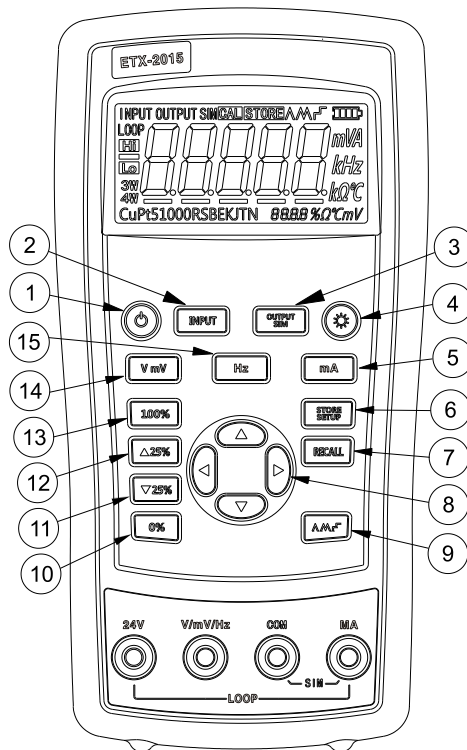












Figure 1.4-1

No.		Description
①		Turns the power on or off
②		Selects the measurement mode
③		Selects output and analog transmitter mode.
④		Enables backlight switch display during start, enters backlight brightness control mode.
⑤		Selects current or loop function

⑥		Sets and saves calibrator parameters setting
⑦		Recovers factory default setting
⑧		Sets manual output
⑨		Cycles through: \wedge slow repeating 0%-100%-0% ramp \nearrow Fast repeating 0 % - 100 % - 0 % ramp \square Repeating 0 % - 100 % - 0 % ramp in 25 % steps
⑩		Set output by 0% of span, Press and hold to store the source value as the 0 % value
(11)		Decrements output by 25% of span.
(12)		Increments output by 25% of span.
(13)		Sets output by 100% of span, Press and hold to store the source value as the 100 % value.
(14)		Selects DC V or DC mV function
(15)		Selects frequency function

1.5 Display Screen

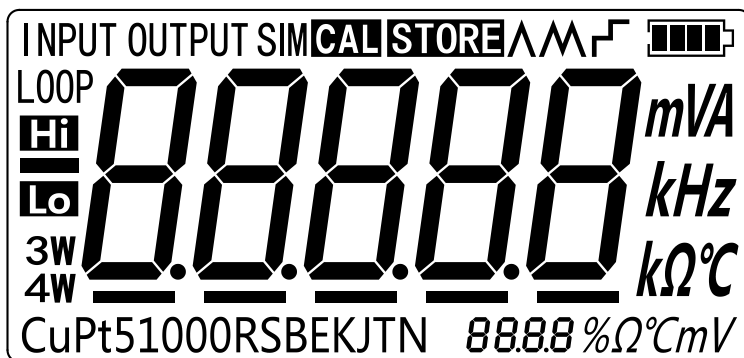


Figure 1.5-1

2 Basic Operation

2.1 Measure and Source

This section acquaints you with some basic operations of ETX-2015/ ETX-1815.

Proceed as follows:

1. The connection of the calibrator as shown in Figure 2.1-1.

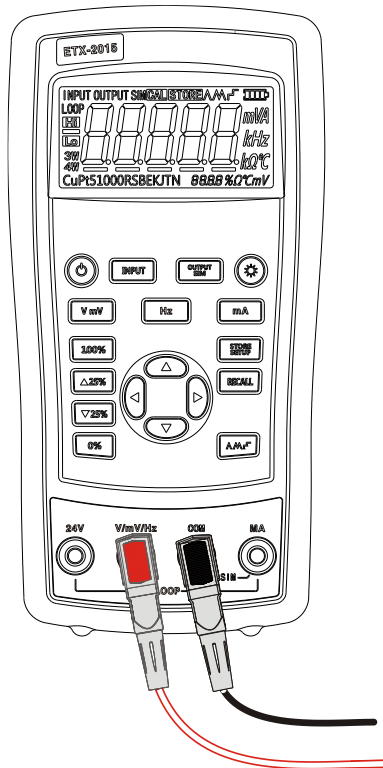


Figure 2.1-1


2. Press  more than 2 seconds to turn on the calibrator. The calibrator checks itself, including check on internal circuit and LCD, during which, LCD displays all contents for 1s as shown in Figure 2.1-2:





Figure 2.1-2

3. Then the product model (2015) and automatic shutdown time (30 min) will be displayed for 2 seconds as shown in Figure 2.1-3.



Figure 2.1-3

4. Press  switch to the voltage mode.
5. Press  to enter into output mode selection as shown in Figure 2.1-4.

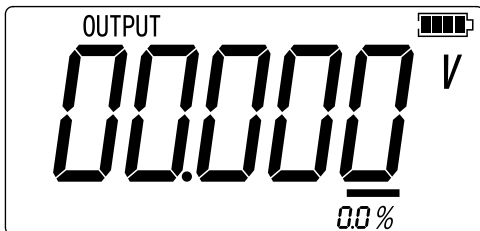














Figure 2.1-4

6. Press  and  to increase or decrease 1 of the horizontal line position (the number automatic carry but the position of the line have no change); press  or  to select a digit to change.

7. Press    to select 1 V for the output value, and then press and hold  until the buzzer works to enter 1V as the 0% value.
8. Press  to select 5 V for the output value, and then press and hold  until the buzzer work to enter 5V as the 100% value.
9. Press  or  to step between 0 and 100% in 25% step increments. The screen will display as shown in Figure 2.1-5.

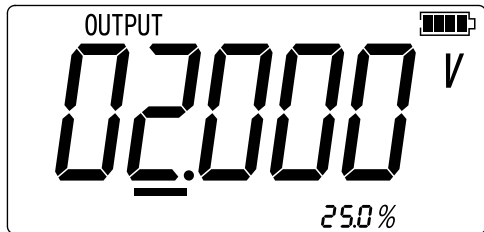


Figure 2.1-5

2.2 Shut Down Mode










The calibrator comes with the shutdown mode enabled for a time duration set to 30 minutes (displayed for about 2 seconds when the calibrator is initially turned on). When the shutdown mode is enabled, the calibrator will automatically shutdown after the time duration has elapsed from the time the last key was pressed. To disable the shutdown mode, press  and  simultaneously. To enable the mode, press  and  simultaneously. To adjust the time duration, press  and  simultaneously, the screen will display as shown in Figure 2.2-1, then press  and/or  to adjust the time between 1 and 30 minutes and then press  to store the new time duration (Without pressing any key for 5 seconds, the calibrator will quit from the adjustment automatically).



Figure 2.2-1

2.3 Backlight Brightness Adjustment

To adjust the brightness of backlight, proceed as follows:

1. Press until the buzzer works, then the screen will display as shown in Figure 2.3-1:

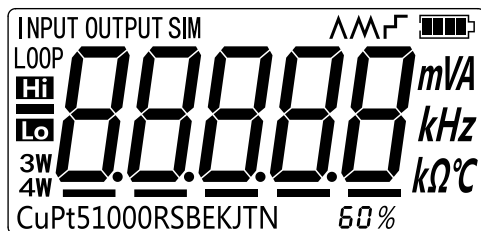


Figure 2.3-1

2. Press and to adjust the brightness of backlight.
3. Press to save brightness level, **STORE** will appear and then the calibrator will enter into the work mode(Without pressing key for 5 seconds, the calibrator will exit from the adjustment automatically).

3 Function Usage

3.1 DC V and DC mV Measurement

The default function after turn on is DC V measurement, press to select DC V or DC mV and the connection is shown in Figure 3.1-1:

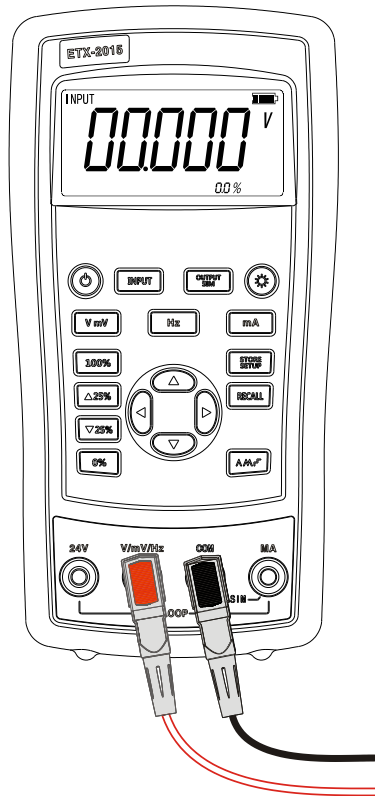


Figure 3.1-1

3.2 DC mA measurement

Press **mA** to select DC mA (unit: mA). The connecting method is shown in Figure 3.2-1.

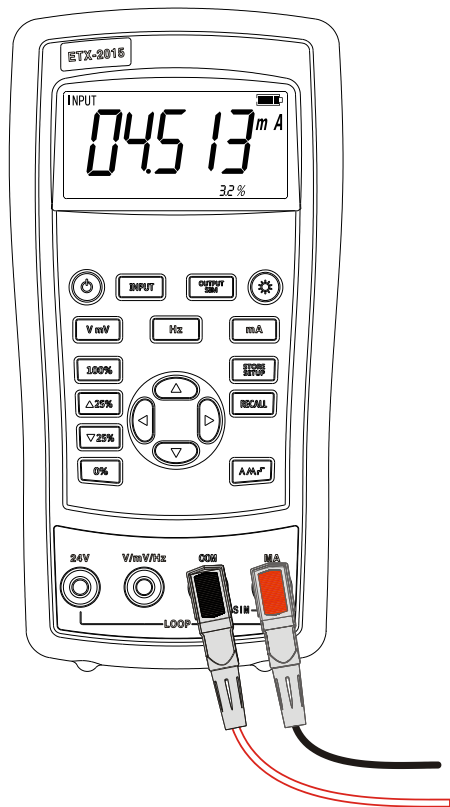


Figure 3.2-1

3.3 Current Measurement with Loop Power

The loop power function activates a 24 V supply in series with the current measuring

circuit, allowing you to test a transmitter when it is disconnected from plant wiring. To measure current with loop power, proceed as follows:

1. Connect the calibrator to the transmitter current loop terminals as shown in Figure 3.3-1.
2. Press **mA** until **LOOP** and **m A** appear simultaneously.

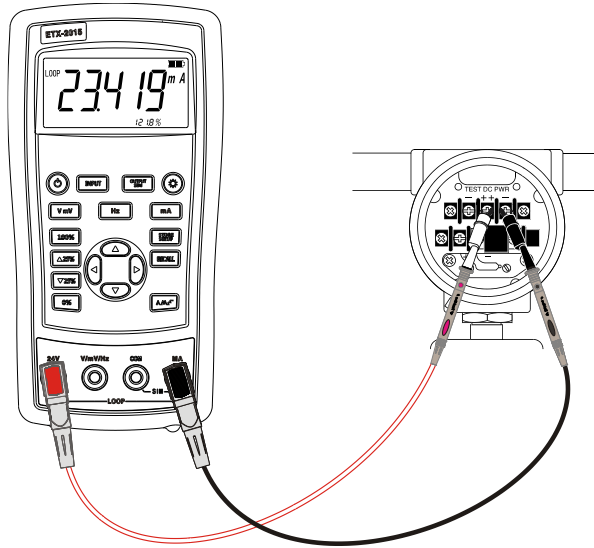


Figure 3.3-1

3.4 Frequency measurement

Press **Hz** to select frequency measurement, the connecting mode is same to that of voltage. The screen will display as shown in Figure 3.4-1.



Figure 3.4-1

3.5 DC V Source

Press and to select the DC V output function, the connection mode is same to that of voltage measurement.

3.6 DC mV Source

Press and to select the DC mv output function, the connection mode is same to that of voltage measurement.

3.7 DC mA Source (active)

Press and to select **SOURCE** mode, the connection mode is shown in Figure 3.7-1:

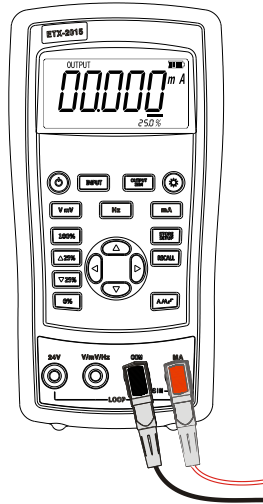


Figure 3.7-1

When the output current is overload, the LCD will show **Hi** which indicates the overload and meanwhile, the main display area flashes, shown in Figure 3.7-2:



Figure 3.7-2

3.8 Simulating a 4- to 20-mA Transmitter

Simulating is a special mode of operation in which the calibrator is connected into a loop in place of a transmitter and supplies a known, settable test current.

Proceed as follows:

1. Connect the 24 V loop power source as shown in Figure 3.8-1.

2. If necessary, press **OUTPUT SIM** and **mA** to select **m A** and **SIM** (simulation) mode.

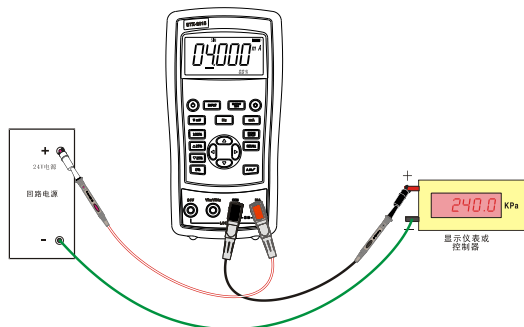


Figure 3.8-1

3.9 Frequency Output

Press **OUTPUT SIM** and **Hz** to select the frequency output function, the connection mode is same to that of voltage measurement. The screen will display as shown in Figure 3.9-1.

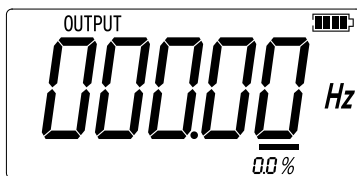


Figure 3.9-1

If necessary, press **Hz** to select other ranges as shown in Figure 3.9-2.

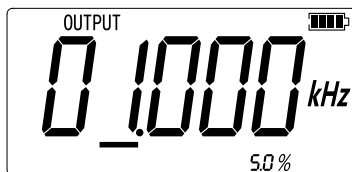


Figure 3.9-2

4 Advanced Application

4.1 Setting 0 % and 100 % output parameters


As for stepping operation and percentage display, 0% and 100% should be set before using. The default values have been set when delivered from the factory and set values are listed below:




Source function	0%	100%
DC V	0.000 V	10.000 V
DC mV	0.00 mV	100.00 mV
DC mA	4 .000 mA	20.000 mA
Frequency – 200Hz	0.00 Hz	200.00 Hz
Frequency – 2000Hz	0.0 Hz	2000.0 Hz
Frequency – 20kHz	0 .000 kHz	20 .000 kHz

The default set values may not meet your requirements, so you can reset them. Press and hold or to reset 0% and 100% value until the buzzer works. The reset value will be stored in the storage space of the calibrator automatically and remains effective after restart. Now you can start operation with the reset value:

- Manually stepping an output with 25 % increments.
- Jump between the 0 and 100 % span points by momentarily pushing or .

4.2 Automatic Ramp the Output

Auto ramping gives you the ability to continuously apply a varying stimulus from the calibrator to a transmitter, while your hands remain free to test the response of the transmitter. When you press , the calibrator produces a continuously repeating 0 % - 100 % - 0 % ramp in your choice of three ramp waveforms :


-  0%-100%-0% 40-second smooth ramp
-  0%-100%-0% 15-second smooth ramp
-  0%-100%-0% Stair-step ramp in 25 % steps, pausing 5 seconds at each step.

Press any key to quit ramp output function.

4.3 Factory Reset

Factory rest consists of the following items:

- The upper and lower working modes recover to DC V measurement function.
- Automatic shutdown time is reset to be 30 min and becomes effective.
- LCD backlight brightness is reset to be 60%.
- Output range is recovered to be factory default.





Start the calibrator and press  until the buzzer works and the recovery of factory default will enter working mode when the recovery is completed.

5 Power

The calibrator needs 6 disposable LR03 model (size 7) alkaline batteries or 6 R03 model (size 7) nickel-metal hydride batteries (or nickel-cadmium batteries). The longest service life of alkaline batteries can reach 50 hours.

A 12V/1A power adaptor is used for charging and providing working power for the calibrator.

5.1 Charge

When the battery indicator is pointed at , the remaining electric quantity is less than 20%. Charge is necessary for normal operation of the calibrator. The LCD backlight will start operation and the  will display on the screen when the power adaptor is used. If the battery indicator  flashes, the calibrator will be in the charging process, after which the battery indicator  will stop flashing.

The calibrator will stop charge automatically in case of the following circumstances:

- Disposable batteries are used.
- Electric quantity is enough.

6 Specifications

Specifications are based on a one year calibration cycle and apply from +18°C to +28 °C unless stated otherwise. All specifications assume a 10 minute warmup period.

6.1 DC Voltage Measurement

Range	Maximum measurement range	Resolution	Accuracy (% of reading + Counts)	
			ETX-1815	ETX-2015
30V	0V~31V	0.001V	0.05+2	0.02+2
100mV	-15mV~80mV	0.001mV	0.05+20	0.02+20
	80mV~125mV	0.01mV	0.05+2	0.02+2
-10°C~18°C, +28°C~55°C temperature coefficient,±0.005%FS/°C. Input resistance: >1MΩ.				

6.2 DC voltage Source

Range	Maximum output span	Resolution	Accuracy (% of reading + Counts)	
			ETX-1815	ETX-2015
100mV	-15mV~99.999mV	0.001mV	0.05+20	0.02+20
	100mV~125mV	0.01mV	0.05+2	0.02+2
10V	0~11V	0.001V	0.05+2	0.02+2
-10°C~18°C, +28°C~55°C temperature coefficient,±0.005%FS/°C. Maximum load: 1mA or 1kΩ (It should be based on the lower load.)				

6.3 DC mA Measurement

Range	Maximum measurement range	Resolution	Accuracy (% of reading + Counts)	
			ETX-1815	ETX-2015
20mA	0~24mA	0.001mA	0.05+2	0.02+2
<i>-10°C~18°C, +28°C~55°C temperature coefficient, ±0.005%FS/°C. Input resistance: <100Ω.</i>				

6.4 DC mA Source

Range	Maximum output range	Resolution	Accuracy (% of reading + Counts)	
			ETX-1815	ETX-2015
20mA	0~24mA	0.001mA	0.05+2	0.02+2
20mA (Transducer simulation)	0~24mA	0.001mA	0.05+2	0.02+2
<i>-10°C~18°C, +28°C~55°C temperature coefficient, ±0.005%FS/°C. Maximum load voltage: 20V, equivalent to voltage of 20mA on 1000Ω load resistance.</i>				

6.5 Frequency Measurement

Range	Maximum measurement range	Resolution	Accuracy (% of reading + Counts)	
			ETX-1815	ETX-2015
100Hz	1~99.999Hz	0.001Hz	0.02+1	0.01+1
1000Hz	100~999.99Hz	0.01Hz		

10kHz	1k~9.9999kHz	0.1Hz		
100kHz	10k~99.999kHz	1Hz		
<i>Sensitivity: 10Hz~10kHz, $V_p-p \geq 1V$; the rest: $V_p-p \geq 2V$. Wave form: 5 counting points should be added to errors of other wave forms. Commercial frequency can be measured directly.</i>				

6.6 Frequency Source

Range	Maximum output range	Resolution	Accuracy (% of reading + Counts)	
			ETX-1815	ETX-2015
200Hz	0~200Hz	0.01Hz	0.02+1	0.01+1
2000Hz	0~2000Hz	0.1Hz		
20kHz	0~20kHz	1Hz		
Output amplitude: $\geq 4.5V_{p-p}$; Wave form: Square wave				

7 Product Accessories

7.1 Standard Accessories

A set of ETX-2015/ETX-1815 calibrator also includes the following items:

- hard spot test leads (one set)
- alligator clip (one set)
- one 12V/1A power adaptor
- ETX-2015/ETX-1815 Users Manual

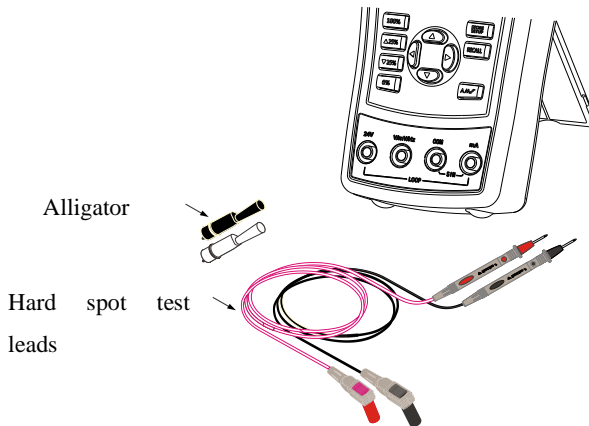


Figure 7.1-1

7.2 Optional accessories

- 6 R03-model rechargeable batteries
- 1 Metal Box
- Communication line

8 Warning

To avoid possible electric shock or personal injury:

- Test a given voltage to confirm its normal operation before using
- Please follow all the safety operation procedures.
- Select the proper function and span gear according to measurement requirements.
- Confirm that the battery door has been closed before application.
- Remove the test line of calibrator before opening the battery door.
- Check whether damaged or exposed metal exists in the test line and whether the test line has been conducted. Replace the damaged test line before using.
- Fingers should not touch the metal contact when the detector is used. Fingers should be behind the finger-protecting device.
- Connect the common line and then electric test line. As for wire removal, electric test line should be first removed.
- Don't use the calibrator under any abnormal conditions. Calibrator should be repaired because it may have been damaged.
- Don't use the calibrator near explosive gases.
- Remove the test line before changing measurement or source function.
- 6 LR03 (7 size) alkaline batteries or R03 nickel-metal hydride batteries (or nickel-cadmium batteries) should be used in the calibrator and the battery should be placed inside the meter housing.
- To avoid reading error and possible electric shock or personal injury when the screen displays the battery under-voltage, please replace or charge the battery.
- During measurement and current output, the right slot, function level and span level shall be used.

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