

UNI-T®

UT705



Operating Manual



Loop Calibrator



P/N:110401108718X

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1. Introduction

UT705 is a hand-held loop calibrator with stable performance and up to 0.02% high accuracy. UT705 can measure DC voltage/current and loop current, source/simulate DC current. It is designed with auto stepping and ramping, the 25% stepping function can be used for fast linearity detection.

The storage/recall feature also improves user's efficiency.

2. Features

- 1) Up to 0.02% output and measurement accuracy
- 2) Compact and ergonomic design, easy to carry
- 3) Solid and reliable, suitable for on-site use
- 4) Auto stepping and ramping output for fast linearity detection
- 5) Conduct mA measurement while providing loop power to the transmitter
- 6) Save frequently-used settings for future use
- 7) Adjustable backlight brightness
- 8) Convenient battery replacement

3. Accessories

Open the package box and take out the device. Please check whether the following items are deficient or damaged, and contact your supplier immediately if they are.

- | | |
|-------------------------|--------|
| 1) User manual ----- | 1 pc |
| 2) Test leads ----- | 1 pair |
| 3) Alligator clip ----- | 1 pair |
| 4) 9V battery ----- | 1 pc |
| 5) Warranty card ----- | 1 pc |

4. Safety Guidelines

4.1 Safety Certification

CE (EMC, RoHS) certification standards

EN 61326-1: 2013 Electromagnetic compatibility (EMC) requirements for measuring equipment

EN 61326-2-2: 2013

4.2 Safety Instructions

This calibrator is designed and manufactured in strict accordance with the safety requirements of GB4793 electronic measuring instruments. Please use the calibrator only as specified in this manual, otherwise the protection provided by the calibrator may be impaired or lost. To avoid electric shock or personal injury:

- Check the calibrator and the test leads before use. Do not use the calibrator if the test leads or the case appear damaged, or if there is no display on the screen, etc. It is strictly forbidden to use a calibrator without a rear cover (should be closed). Otherwise it may pose a shock hazard.
- Replace the damage test leads with the same model or the same electrical specifications.
- Do not apply >30V between any terminal and ground or between any two terminals.
- Select the proper function and range according to the measurement requirements.
- Do not use or store the calibrator in high temperature, high humidity, flammable, explosive and strong electromagnetic environments.
- Remove the test leads on the calibrator before opening the battery cover.
- Check the test leads for damage or exposed metal, and check the test leads continuity. Replace the damaged test leads before use.
- When using the probes, do not touch the metal part of the probes. Keep your fingers behind the finger guards on the probes.
- Connect the common test lead and then the live test lead when wiring. Remove the live test lead first when disconnecting.
- Do not use the calibrator if there is any malfunction, the protection might be impaired, please send the calibrator for maintenance.
- Remove the test leads before switching to other measurements or outputs.
- To avoid possible electric shock or personal injury caused by incorrect readings, replace the battery immediately when the low battery indicator appears on the screen.

5. Electrical Symbols

	Double insulated
	Warning
	Conforms to European Union directives

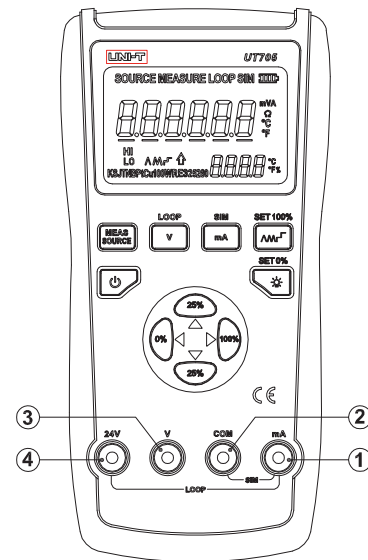
6. General Specifications

- 1) Max voltage between any terminal and ground or between any two terminals: 30V
- 2) Range: manual
- 3) Operating temperature: 0°C~50°C (32°F~122°F)
- 4) Storage temperature: -20°C~70°C (-4°F~158°F)
- 5) Relative humidity: ≤95% (0°C~30°C), ≤75% (30°C~40°C), ≤50% (40°C~50°C)
- 6) Operating altitude: 0~2000m
- 7) Battery: 9V×1
- 8) Drop test: 1m
- 9) Dimension: about 96×193×47mm
- 10) Weight: about 370 (including battery)

7. External Structure

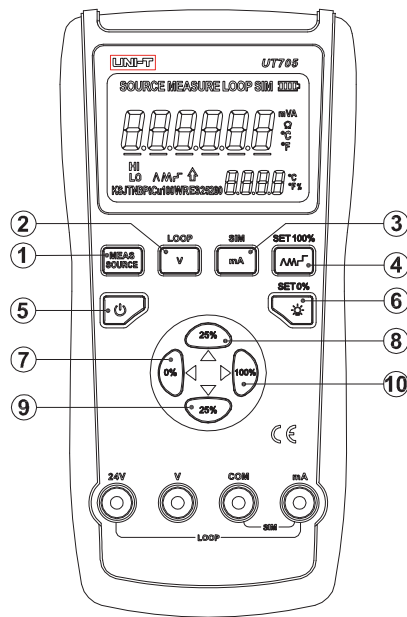
7.1 Connectors (Terminals) (picture 1)

1. **Current terminal:**
Current measurement and output terminal
2. **COM terminal:**
Common terminal for all measurements and outputs
3. **V terminal:**
Voltage measurement terminal
4. **24V terminal:**
24V power supply terminal (LOOP mode)



Picture 1

7.2 Buttons (picture 1a)

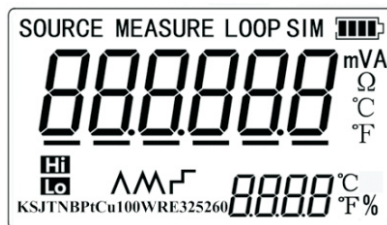


Picture 1a

No.		Description
1		Measure/source mode switching
2		Short press to select voltage measurement; long press to select loop current measurement
3		Short press to select mA mode; long press to select transmitter analog current output
4		Cycles through: ^ Continuously outputs 0%-100%-0% with a low slope (slow), and repeats the operation automatically; M Continuously outputs 0%-100%-0% with a high slope (fast), and repeats the operation automatically; ▢ Outputs 0%-100%-0% in 25% step size, and repeats the operation automatically. Long press to set the current value to 100%.
5		Power on/off (long press)
6		Short press to turn on/off backlight; long press to set current output value to 0%.
7-10		Short press to manually adjust the output setting value
		Long press to output 0% value of the currently set range
		Long press to decrease output by 25% of range
		Long press to increase output by 25% of range
		Long press to output 100% value of the currently set range

Note: Short press time: <1.5s. Long press time: >1.5s.

8. LCD Display (picture 2)



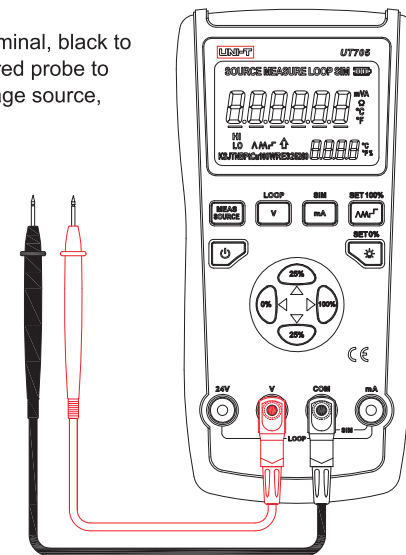
Symbols	Description
SOURCE	Source output indicator
MESUER	Measurement input indicator
—	Digit selecting indicator
SIM	Simulating transmitter output indicator
LOOP	Loop measurement indicator
	Battery power indicator
Hi	Indicates that the excitation current is too large
Lo	Indicates that the excitation current is too small
ΛMr	Ramp/step output indicators
V	Voltage unit: V
%	Percentage indicator of source/measurement value

9. Basic Operations and Functions

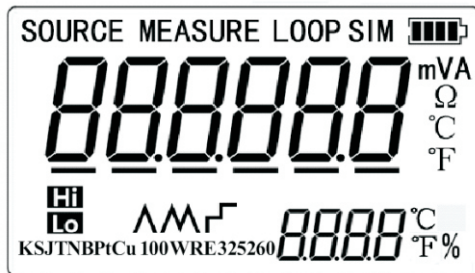
9.1 Measurement and Output

The purpose of this section is to introduce some basic operations of UT705. Follow the steps below for the voltage measurement:

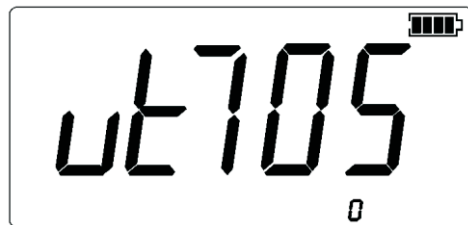
- 1) Connect the red test lead to V terminal, black to COM terminal; then connect the red probe to positive terminal of external voltage source, black to negative terminal.



- 2) Press  (>2s) to turn on the calibrator and it will perform self-test, which includes the internal circuit and LCD display testing. LCD screen will display all symbols for 1s during self-test. The interface is shown below:



- 3) Then the product model (UT705) and the auto power off time (0min: auto power off is disabled) are displayed for 2s, as shown below:



- 4) Press  to switch to voltage measurement mode. In this case, no switching is required after starting up.
5) Press  to select the source mode.



- 6) Press  or  to add or subtract 1 for the value above the underline (the value is automatically carried and the position of the underline remains unchanged); press  or  to change the position of the underline.
7) Use  to adjust the output value to 10mA, then press  until the buzzer makes a "beep" sound, 10mA will be saved as the value of 0%.
8) Similarly, press  to increase the output to 20mA, then press  until the buzzer makes a "beep" sound, 20mA will be saved as the value of 100%.
9) Long press  or  to increase or decrease the output between 0% and 100% in 25% steps.



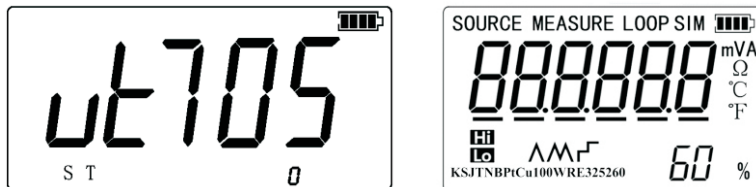
9.2 Auto Power Off

- * The calibrator will automatically shut down if there is no button or communication operation within the specified time.
- * Auto power off time: 30min (factory setting), which is disabled by default and is displayed for about 2s during the booting process.
- * To disable "auto power off", press down  while turning on the calibrator until the buzzer beeps. To enable "auto power off", press down  while turning on the calibrator until the buzzer beeps.
- * To adjust the "auto power off time", press down  while turning on the calibrator until the buzzer beeps, then adjust the time between 1~30 min with ,  buttons, long press  to save settings, ST will flash and then enter the operating mode. If the  button is not pressed, the calibrator will exit settings automatically in 5s after pressing the buttons (the current set value will not be saved).

9.3 LCD Backlight Brightness Control

Steps:

- 1) Press down  while turning on the calibrator until the buzzer makes a "beep" sound, the interface is as shown below:



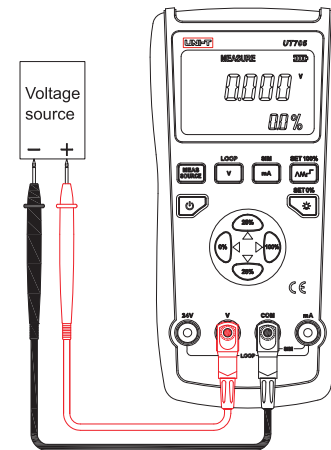
- 2) Then adjust the backlight brightness by ,  buttons, the brightness value is displayed on the screen.
- 3) Long press  to save settings, ST will flash and then enter the operating mode. If the  button is not pressed, the calibrator will exit settings automatically in 5s after pressing the buttons (the current set value will not be saved).

9.4 Functions

9.4.1 Voltage Measurement

Steps:

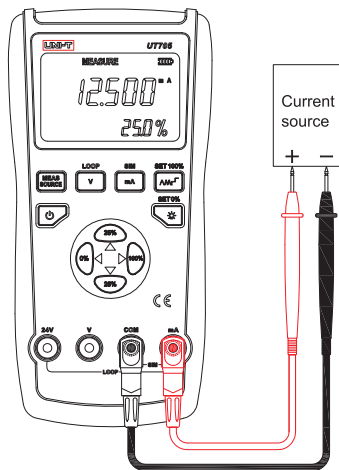
- 1) Press  to make the LCD display MEASURE; short press  and V unit is displayed.
- 2) Connect the red test lead to V terminal, black to COM terminal.
- 3) Then connect the test probes to the voltage points to be tested: connect the red probe to the positive terminal, black to negative terminal.
- 4) Read the data on the screen.



9.4.2 Current Measurement

Steps:

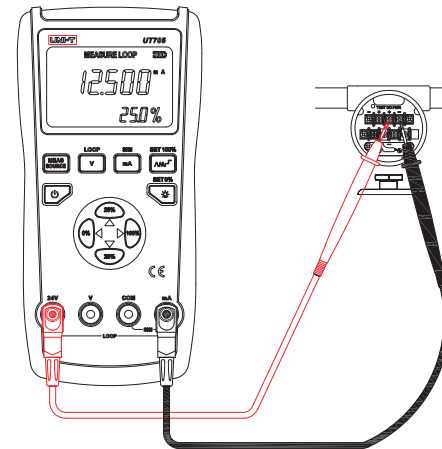
- 1) Press **MEASURE** to make the LCD display MEASURE; short press **mA** and mA unit is displayed.
- 2) Connect the red test lead to mA terminal, black to COM terminal.
- 3) Disconnect the circuit path to be tested, and then connect the test probes to the joints: connect the red probe to positive terminal, black to negative terminal.
- 4) Read the data on the screen.



9.4.3 Loop Current Measurement with Loop Power

The loop power function activates a 24V power supply in series with the current measuring circuit inside the calibrator, allowing you to test the transmitter out of the field power supply of the 2-wire transmitter. The steps are as follows:

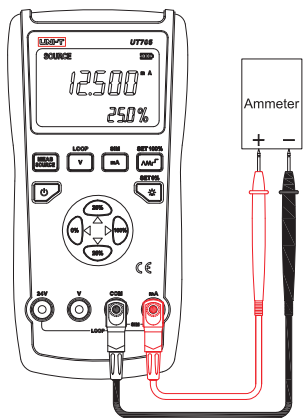
- 1) Press **MEASURE** to make the LCD display MEASURE; long press **LOOP** button, LCD will display MEASURE LOOP, the unit is mA.
- 2) Connect the red test lead to 24V terminal, black to mA terminal.
- 3) Disconnect the circuit path to be tested: connect the red probe to positive terminal of the 2-wire transmitter, black to negative terminal of the 2-wire transmitter.
- 4) Read the data on the screen.



9.4.4 Current Source Output

Steps:

- 1) Press **mA** to make the LCD display SOURCE; short press **ON/OFF** and mA unit is displayed.
- 2) Connect the red test lead to mA terminal, black to COM terminal.
- 3) Connect the red probe to the ammeter positive terminal, black to the ammeter negative terminal.
- 4) Select an output digit by **◀▶** buttons, and adjust its value with **▲▼** buttons.
- 5) Read the data on the ammeter.

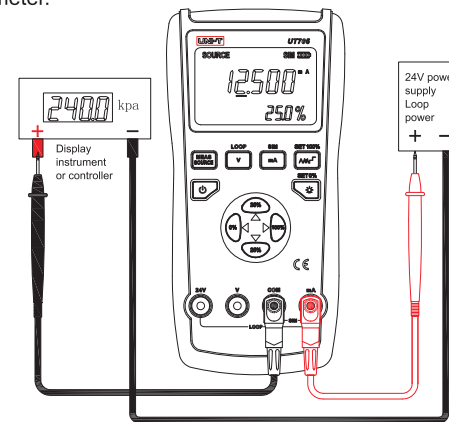


When the current output is overloaded, LCD will display the **Hi** overload indicator, and the value on the main display will flash, as shown in the figure below.

9.4.5 Simulating Transmitter

Simulating the 2-wire transmitter is a special operation mode in which the calibrator is connected to the application loop instead of the transmitter, and provides a known and configurable test current. The steps are as follows:

- 1) Press **mA** to make the LCD display SOURCE; long press **ON/OFF** button, LCD will display SOURCE SIM, the unit is mA.
- 2) Connect the red test lead to mA terminal, black to COM terminal.
- 3) Connect the red probe to positive terminal of the external 24V power supply, black to ammeter positive terminal; then connect the ammeter negative terminal to the negative terminal of the external 24V power supply.
- 4) Select an output digit by **◀▶** buttons, and adjust its value with **▲▼** buttons.
- 5) Read the data on the ammeter.



10. Advanced Applications

10.1 Setting 0 % and 100 % Output Parameters

Users need to set the values of 0% and 100% for the step operation and percentage display. Some values of the calibrator have been set before delivering. The table below lists the factory settings.

Output function	0%	100%
Current	4.000mA	20.000mA

These factory settings may not be suitable for your work. You can reset them according to your requirements. To reset the 0% and 100% values, select a value and long press  or  until the buzzer beeps, the newly set value will be saved automatically in the calibrator's storage area and it is still valid after restarting. Now you can do the following with the new settings:

- Long press  or  to manually step (increase or decrease) the output in 25% increments.
- Long press  or  to switch the output between 0% and 100% range.

10.2 Auto Ramping (Increase/Decrease) the Output

The auto ramping function allows you to continuously apply a varying signal from the calibrator to the transmitter, and your hands can be used to test the calibrator's response.

When you press , the calibrator will generate a continuous and repeating 0%-100%-0% ramping output.

Three types of ramping waveforms are available:

-  0%-100%-0% 40-second smooth ramp
-  0%-100%-0% 15-second smooth ramp
-  0%-100%-0% 25% step ramp, pausing 5s at each step

Press any key to exit the ramping output function.

11. Technical Specifications

All specifications are based on a one-year calibration period and applied to a temperature range of +18°C~+28°C unless otherwise specified. All specifications are assumed to obtain after 30 minutes operation.

11.1 DC Voltage Measurement

Range	Max measurement range	Resolution	Accuracy (% of reading + digits)
30V	0V~31V	0.001V	0.02+2
-10°C~18°C, +28°C~55°C temperature coefficient: $\pm 0.005\%FS/^{\circ}C$ Input resistance: $> 1M\Omega$			

11.2 DC Current Measurement

Range	Max measurement range	Resolution	Accuracy (% of reading + digits)
24mA	0~24mA	0.001mA	0.02+2
24mA (LOOP)	0~24mA	0.001mA	0.02+2
-10°C~8°C, +28°C~55°C temperature coefficient: $\pm 0.005\%FS/^{\circ}C$ Input resistance: $< 100\Omega$			

11.3 DC Current Output

Range	Max output range	Resolution	Accuracy (% of reading + digits)
24mA	0~24mA	0.001mA	0.02+2
24mA (Simulating transmitter)	0~24mA	0.001mA	0.02+2
-10°C~18°C, +28°C~55°C temperature coefficient: $\pm 0.005\%FS/^{\circ}C$ Max load voltage: 20V, equivalent to the voltage of 20mA current on 1000 Ω load.			

11.4 24V Power Supply: Accuracy: 10%

12. Maintenance

⚠ Warning: Before opening the rear cover or the battery cover, switch off the power supply and remove the test leads from the input terminals and the circuit.

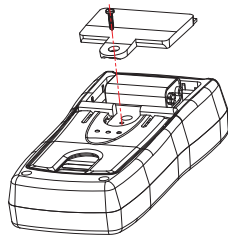
12.1 General Maintenance

- * Clean the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
- * If there is any malfunction, stop using the device and send it for maintenance.
- * The calibration and maintenance must be implemented by qualified professionals or designated departments.
- * Calibrate once a year to ensure performance indicators.
- * Switch off the power supply when not in use. Remove the battery when not in use for a long time.
- * Do not store the calibrator in humid, high temperature or strong electromagnetic environments.

12.2 Battery Installation and Replacement (picture 11)

Remark:

“” indicates that the battery power is less than 20%, please replace the battery in time (9V battery), otherwise the measurement accuracy might be affected.



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