

Voltage Current Frequency Calibrator

User Manual

AWT718

Table of contents

1	SAFETY INFORMATION	2
1.1	Precautions and Safety Measures.....	2
1.2	Symbols.....	2
2	INSTRUMENT DESCRIPTION.....	2
2.1	Features	3
2.2	Description of Function Keys.....	4
2.3	Description of LCD	6
3	DURING USE	8
3.1	Measured V/mV mode, 0% & 100% setting.....	8
3.2	mA SOUR and SIMU Generating Output Mode, 0% & 100% Setting...8	
3.3	kHz/Hz Generating Output Mode, 0% & 100% Setting.....	9
3.4	Output Functions — Spancheck and 25% Step.....	10
3.5	DC Current Generation	10
3.5.1	mA DC Generation	11
3.5.2	mA DC Simulating Generation—Simulating a Transmitter.....	12
3.6	V/mV DC Generation.....	13
3.7	mA DC Measurement.....	14
3.8	mA DC Measurement with Loop Power.....	16
3.9	V/mV DC Measurement.....	18
3.10	kHz/Hz Measurement.....	20
3.11	kHz/Hz Generation.....	22
3.12	Adjusting and Disabling the Auto Power OFF Function	24
3.13	Recharging the Internal Battery.....	24
3.14	Data Transmission.....	25
4	TECHNICAL SPECIFICATIONS.....	28
5	MAINTENANCE AND CALIBRATION.....	30
5.1	Maintenance	30
5.2	Cleaning the Instrument.....	30
5.3	Calibration.....	30
6	ACCESSORIES.....	31

1. SAFETY INFORMATION

The instrument has been designed in compliance with IEC/EN61010, CAT I 30V, pollution degree II.

1.1 Precautions and Safety Measures

•For your safety and in order to prevent damaging the instrument, please pay particular attention to the following instructions:

• READ THE INSTRUCTIONS BEFORE USING THE INSTRUMENT

•Avoid use the instrument in in case gas, explosive materials or flammables are present, or in dusty environments.

•Never apply a voltage exceeding 30V between any pair of inputs or between an input and the grounding in order to prevent possible electrical shocks and any damage to the instrument

•Make sure the terminals completely coincide to the mode before using the instrument.

•When LCD displays the symbol , replace the battery or charge the battery group as soon as possible.

•Immediately disconnect the cable from the electrical mains in case of overheating of instrument parts during battery recharge.

1.2 Symbols

	Earth ground
	Caution: Important information. Refer to instruction sheet
	Double insulated
	Low power
	Conforms to European Union requirements

2. INSTRUMENT DESCRIPTION

V /mA /Hz Calibrator ((hereafter, the Calibrator)) is a compact current, voltage

and frequency sourcing and measuring tool. It can calibrate the input and output signal of the industrial automation instrument with analog data like sensors, transmitters, regulators, recorders, intelligent flow totalizer, electricity / gas and other conventional actuators. It can also be used to verify and modulate computer interface boards, such as the resistance plates, A / D boards, D / A boards, precision voltage and current equipments. This calibrator can be widely used in petroleum, chemical, metallurgy, paper, power generation, instrumentation, scientific research departments and other instruments. Instrumentation and electrical engineers work is an essential tool. It is an indispensable tool for instrument and electrical engineers.

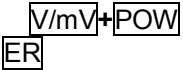
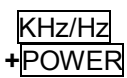
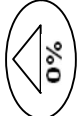
2.1 Features

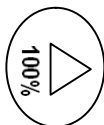
1. Innovative ergonomic keyboard design, waterproof, dustproof and rugged case.
2. LCD percentage --- can display the percentage between output/input value and full range;
3. Used interfaces image is shown on the display in case of wrong operation.
4. Large capacity lithium battery group, low self-discharge.
5. Auto power off time can set manually.
6. Linear charging control circuit makes battery charging and working simultaneously available.
6. 0%& 100% output keys, easily switch upper and lower limit; +25% & -25% step output keys. These values can be set on the start menu.
7. USB interface & transparent protocol make users integrated system easily.
8. 2 kinds of signal output: SOURCE mA & SIMULATE mA. SOURCE mA—the calibrator provide power and output signal;
SIMULATE mA—the calibrator need outside power, at this time, it is a simulated 2-wire transmitter.
9. 0.065-100.000HZ/0.065Khz-10.000kHz frequency output
The amplitude can be set among 0-10V, duty ratio set among 0.5%-99.5%;
0.001-100.00HZ/0.010-20.000kHz any waves measurement.
10. 0-10V / 0-100mV generation and measurement; 0-24mA measurement

11. Loop Power: 24V, it can provide power for 2- wire transmitters, current value is shown on the display.

2.2 Description of Function Keys

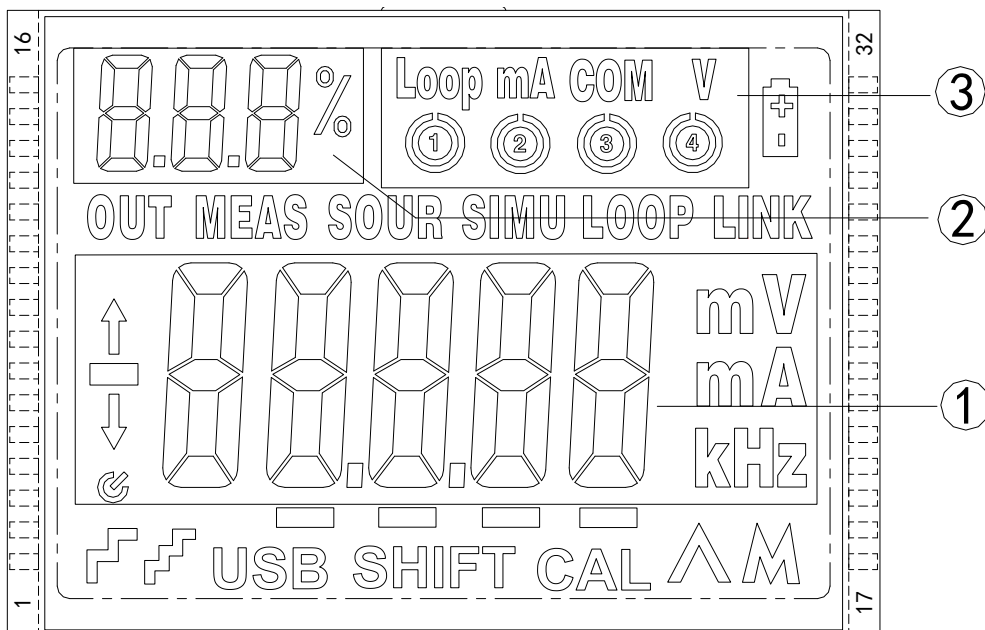
Function Keys	Function Description
POWER	ON or OFF button.
POWER + SHIFT	In power off mode, press SHIFT + POWER simultaneously step to AUTO POWER OFF TIME set(see 3.12)
SHIFT	Used to select the second function of mixed key. Press it, "SHIFT" is shown on the display. Press again, "SHIFT" disappears.
LED/USB	"SHIFT" not shown on display: press LED/USB , backlight on. Press again, backlight off; "SHIFT" shown on display: press LED/USB , USB function on, it's shown on the display simultaneously. Press again, USB function off.(see 3.14)
POWER + LED/USB	In power off mode, press LED/USB + POWER simultaneously to step to CALIBRATION function (see 5.3)
V/mV	Modes swift key, modes in sequence by pressing this key: •V DC measurement, LCD displays "MEAS x.xxx V" •mV DC measurement, LCD displays "MEAS x.xx mV" •V DC generation, LCD displays "OUT x.xxx V" •mV DC generation, LCD displays "OUT x.xx mV" Note: The Calibrator has memory function. The last selected function is indicated on the display.
mA	Press to step through modes: •mA DC measurement, LCD displays "MEAS x.xxx mA" •mA DC measurement from external transducers (Loop), LCD displays "MEAS Loop x.xxx mA" •mA DC generation, LCD displays "OUT SOUR x.xxx mA" •mA DC simulating generation, LCD displays "OUT SIMU x.xxx mA" Note: The Calibrator has memory function. The last selected function is indicated on the display.

	Press to step through modes: •Frequency measurement, LCD displays “MEAS x.xxx KHz”. •Frequency measurement, LCD displays “MEAS x.xxx Hz”. •Frequency output, LCD displays “OUT x.xxx KHz”. •Frequency output, LCD displays “OUT x.xxx Hz”. Note: The Calibrator has memory function. The last selected function is indicated on the display.
	In power on set mode, it's used to select next parameter. In other modes, reserved.
	In power off mode, press  +  simultaneously to step to voltage generation 0% % 100% set(see 3.1)
	In power off mode, press  +  simultaneously to step to SIMU& SOUR mA generation 0% % 100% set (see 3.2)
	In power off mode, press  +  simultaneously to step to Hz & KHz generation 0% % 100% set, amplitude and duty cycle set. (see 3.3)
	In generating mode: When LCD displays “SHIFT”, pressing this key allows quickly increasing the value of the generated output current/voltage in steps of 25%(among the rang of 0%-100%); When LCD doesn't display “SHIFT”, press this key to add 1 to the value.
	In generating mode: When LCD displays “SHIFT”, pressing this key allows quickly decreasing the value of the generated output current/voltage in steps of 25%(among the rang of 0%-100%); When LCD doesn't display “SHIFT”, press this key to deduct 1 to the value.
	In generating mode: When LCD displays “SHIFT”, press this key to set lower limit 0%; When LCD doesn't display “SHIFT”, press this key to move the “—” forwards.



In generating mode: When LCD displays “SHIFT”, press this key to set upper limit 100%; When LCD doesn’t display “SHIFT”, press this key to move the “—” backwards.

2.3 Description of LCD



There are 3 parts of LCD:

1. Main display- used to display the current measurement and generation value.
2. Percentage display - used to display the percentage better current value and full range.
3. Used interfaces indication display- used to indicate users the used interfaces in current mode.

4. Description of Symbols

Symbol	Description	Symbol	Description
MEAS	Current, voltage, frequency measurement	SIMU	Current simulating output
SOUR	Current sourcing output	OUT	Current, voltage, frequency generating output
Loop	Loop power output	mA mV kHz	Units for current, voltage & frequency
	Reserved		Auto power off function active.
	ONLY in generating modes, point to the signal changing direction.		Low power. Battery needs to be recharged.
CAL	In calibration mode		In generation modes, used to indicate the changed digit. In measurement modes, no this symbol.
USB	USB function active.	SHIFT	Used for select the 2nd function in composite keys.

3. DURING USE

There are 12 kinds of modes. They are mA DC generation, mA DC simulating generation, V/mV DC generation, KHz/Hz generation, mA DC measurement, mA DC measurement with loop power, V/mV DC measurement, KHz/Hz measurement.

Each mode has following functions:

3.1 Measured V/mV Mode, 0% & 100% Setting

- In power off mode, pressing **V/mV** + **POWER** simultaneously allows quickly setting the initial (0.000V and 0.00 mV) and final (100.00mV and 100.0V) values of the output generated voltage. The percentage values “0.0%” and “100%” appear on the percentage display.
- Use  and  to move forwards and backwards, use  and  to set value.
- Press  to step through modes **OUT V** 0.0% and 100% setting, **OUT mV** 0.0% and 100% setting.
- The Calibrator automatically quit the mode after 10 seconds idleness.

Note:

Factory default:

In OUT mV mode 0%=0V, 100%=10V;

In OUT V mode, 0%=0mV, 100%=100mV.

3.2 mA SOUR and SIMU Generating Output Mode, 0% & 100% Setting

- In power off mode, press **mA** + **POWER** simultaneously allows quickly setting the initial (4mA) and final (20mA) values of the output generated current.
- Use  and  to move forwards and backwards, use  and  to set value.
- Press  to step through modes **SOUR mA** 0.0% and 100% setting, **SIMU mA** 0.0% and 100% setting.
- The Calibrator automatically quit the mode after 10 seconds idleness.

Note:

Factory default:

In SOUR & SIMU mA mode 0%=4mA, 100%=20mA

3.3 kHz/Hz Generating Output Mode, 0% & 100% Setting

- a. In power off mode, pressing **kHz/Hz** + **POWER** simultaneously allows quickly setting the initial (1.000KHz and 1.000Hz) and final (10.000 KHz and 10.000Hz) values of the output generated frequency. The percentage values “0.0%” and “100%” appear on the percentage display.
- b. Use  and  to move forwards and backwards, use  and  to set value.
- c. Press  to step through modes OUT kHz 0.0% and 100% setting, OUT Hz 0.0% and 100% setting, amplitude setting and duty cycle setting.

Amplitude setting:

- I. “F-A” is shown on the percentage display,
- II. Use  and  to move forwards and backwards, use  and  to set value. Range is 0.500-10.000V.

Duty cycle setting

- I. “F-100%” is shown on the percentage display,
- II. Use  and  to move forwards and backwards, use  and  to set value. Range is 0.050-0.95.

- d. The Calibrator automatically quit the mode after 5 seconds idleness.

Note:

Factory default:

In OUT kHz mode, 0%=1 kHz, 100%=10 kHz;

In OUT Hz mode, 0%=1 Hz, 100%=10 Hz;

OUT kHz& Hz amplitude =5V;

OUT kHz& Hz duty cycle=50%.

3.4 Output Functions —Spancheck and 25% Step

- **SpanCheck:** SpanCheck function is used for all output modes. Press **SHIFT** key, “**SHIFT**” is displayed, press  to set 100% upper limit, press  to select 5% lower limit.
- **25% step:** Press **SHIFT** key, “**SHIFT**” is displayed, press  step the value up 25 % until upper limit 100%.

3.5 DC Current Generation

There are 2 modes in DC Current generation:

- In SOURCE mode, the instrument supplies the current;
- In SIMULATE mode, the instrument simulates a 2-wire transmitter in an externally-powered current loop A 8 V to 28 V loop supply must be available. A path must exist for current to flow between 2 terminals. Otherwise, the display blinks (indicates OL).

CAUTION:

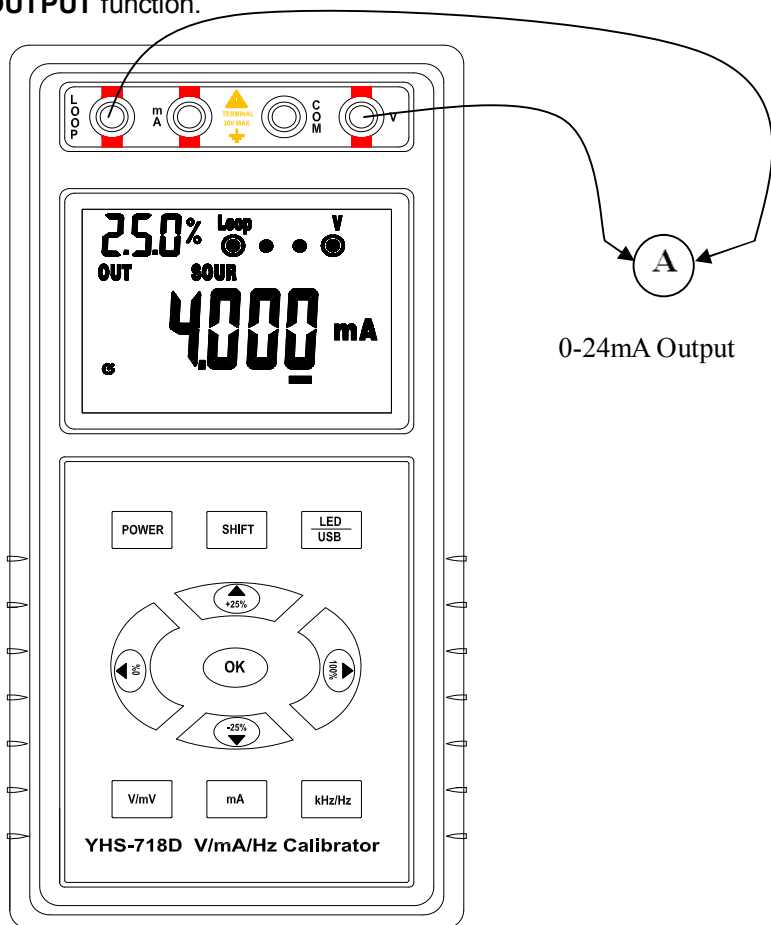
- With set value $>0.003\text{mA}$ and in open circuit, the display blink (indicates OL).
- The power consumption in SOURCE mode is bigger than in SIMULATE mode.
- SOUR mA mode, maximum allowed load : $1\text{k}\Omega @ 20\text{mA}$
SIMU mA mode, loop voltage: 24V rated, 28V maximum, 12V minimum ☐

CAUTION

To prevent damage to the unit under test, ensure that the Calibrator is in the correct mode before connecting the test leads.

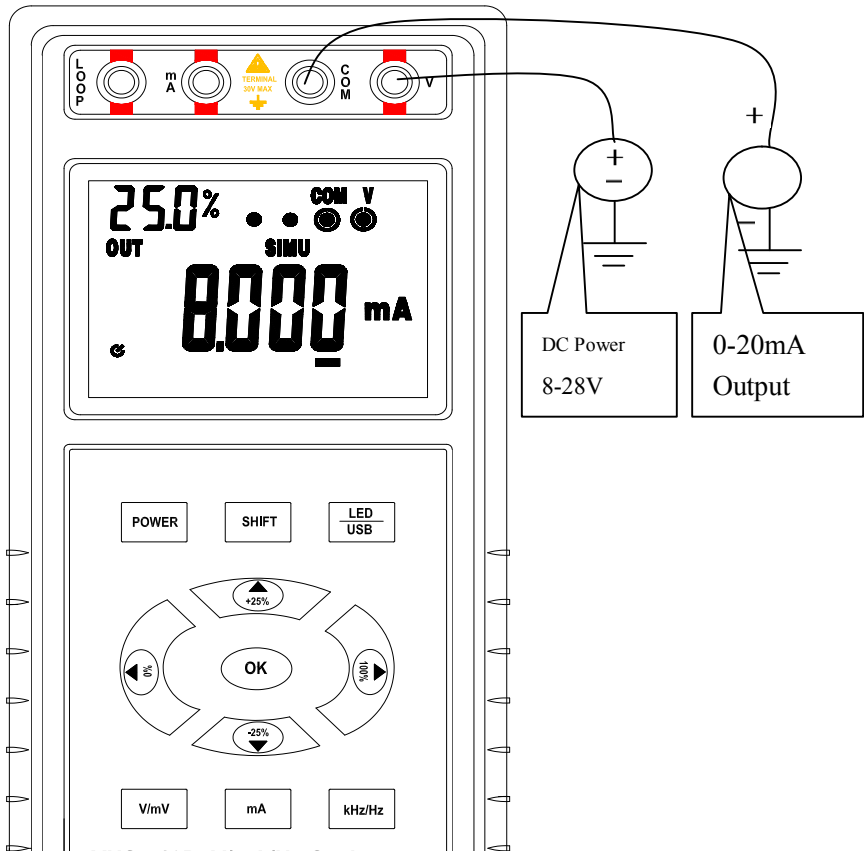
3.5.1 mA DC Generation

- Press **mA** key until “**OUT SOUR x.xxx mA**” is shown on the display, meanwhile, the used terminals is shown on the display.
- Insert the red cable into the input terminal “**Loop**” and the black cable into the input terminal “**V**”.
- Use  and  to move forwards and backwards, use  and  to set value.
- If needed, press **SHIFT** key, “**SHIFT**” is shown on the display, use  and  to enter **SPANCHECK** function; Use  and  to start **STEP OUTPUT** function.



3.5.2 mA DC Simulating Generation—Simulating a Transmitter

- Press **mA** key until “**OUT SIMU x.xxx mA**” is shown on the display, meanwhile, the used terminals will be shown on the display.
- Insert the red cable into the input terminal “**V**” and the black cable into the input terminal “**COM**”.
- Value set (see 3.5.1 c)
- Start **SPANCHECK & STEP OUTPUT** (see 3.5.1 d)

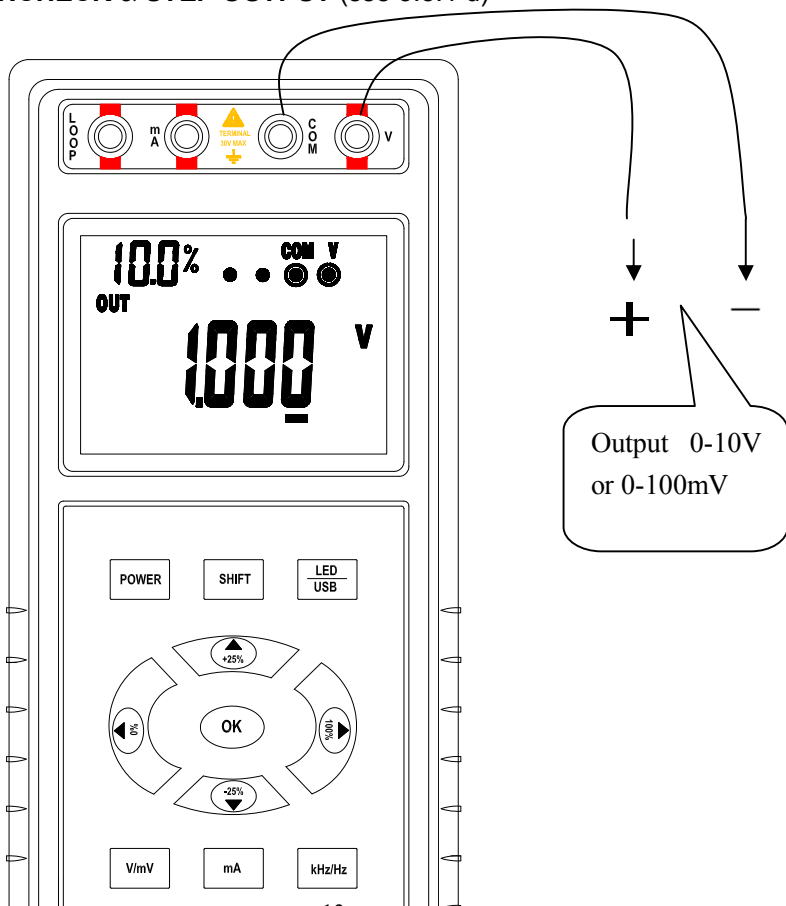


3.6 V/mV DC Generation

CAUTION

To prevent damage to the unit under test, ensure that the Calibrator is in the correct mode before connecting the test leads.

- Press **mV/V** key until “**OUT x.xxx V**” is shown on the display, meanwhile, the used terminals will be shown on the display.
- Insert the red cable into the input terminal “**V**” and the black cable into the input terminal “**COM**”.
- Value set (see 3.5.1 c)
- Start **SPANCHECK & STEP OUTPUT** (see 3.5.1 d)



3.7 mA DC Measurement



CAUTION

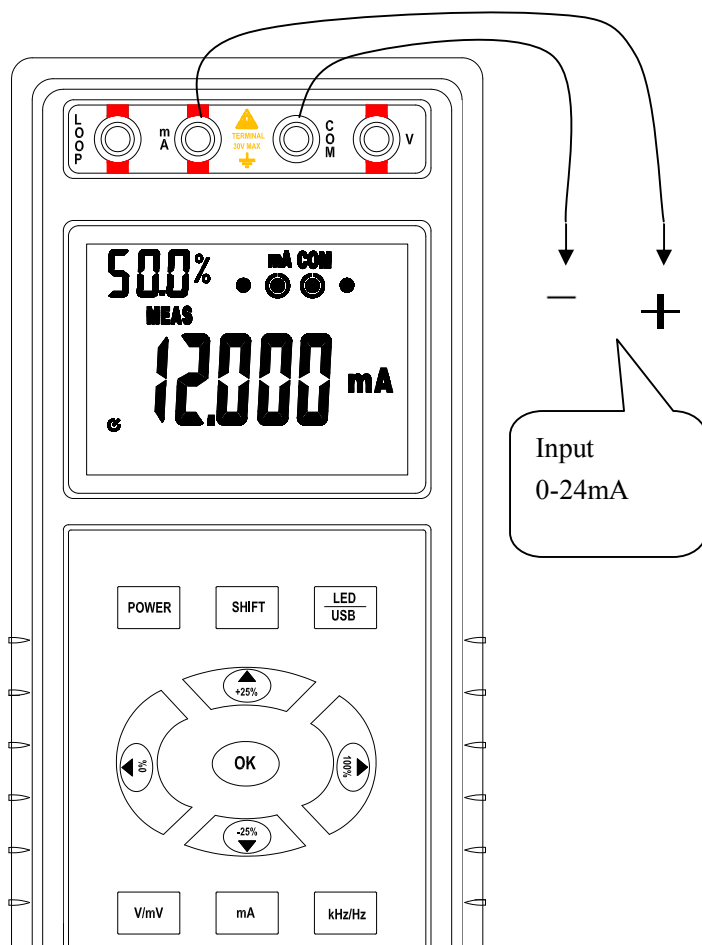
To prevent damage to the unit under test, ensure that the Calibrator is in the correct mode before connecting the test leads.

- a. Press **mA** until “**MEAS x.xxx mA**” is shown on the display, meanwhile, the used terminals will be shown on the display.
 - b. Insert the red cable into the input terminal “**mA**” and the black cable into the input terminal “**COM**”.
 - c. Current measurement value is shown on the main display; The percentage between current value and full span is shown on percentage area.
- The message “**-OL-**” indicates that the current being measured exceeds the maximum value (24mA) measurable by the instrument.



Caution:

The maximum limit is 50mA. Do not measure currents exceeding the limit. Exceeding these limits may burn the fuse.



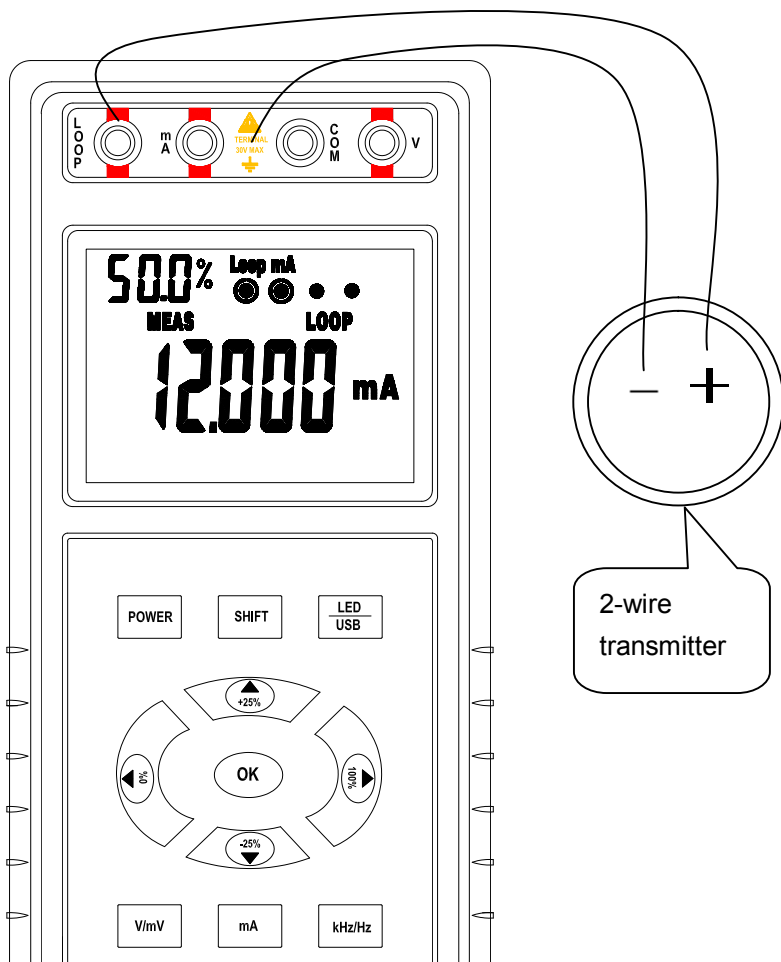
3.8 mA DC Measurement with Loop Power

In this mode, the Calibrator provides a fixed output voltage of 24V capable of supplying an external transducer and allowing measuring current at the same time.

- a. Press **mA** key until **“MEAS X.XXX mA”** and **“LOOP”** are shown on the display, meanwhile, the used terminals will be shown on the display.
- b. Insert the red cable into the input terminal **“LOOP”** and the black cable into the input terminal **“mA”**.
- c. Current measurement value is shown on the main display; The percentage between current value and full span is shown on percentage area.
The message **“-OL-”** indicates that the current being measured exceeds the maximum value (24mA) measurable by the instrument.

CAUTION

When exceeding the limit or in short circuit. The message “-OL-” will be shown. Long time “-OL-” state will result in the heat of the Calibrator and damage to the Calibrator.



3.9 V/mV DC Measurement

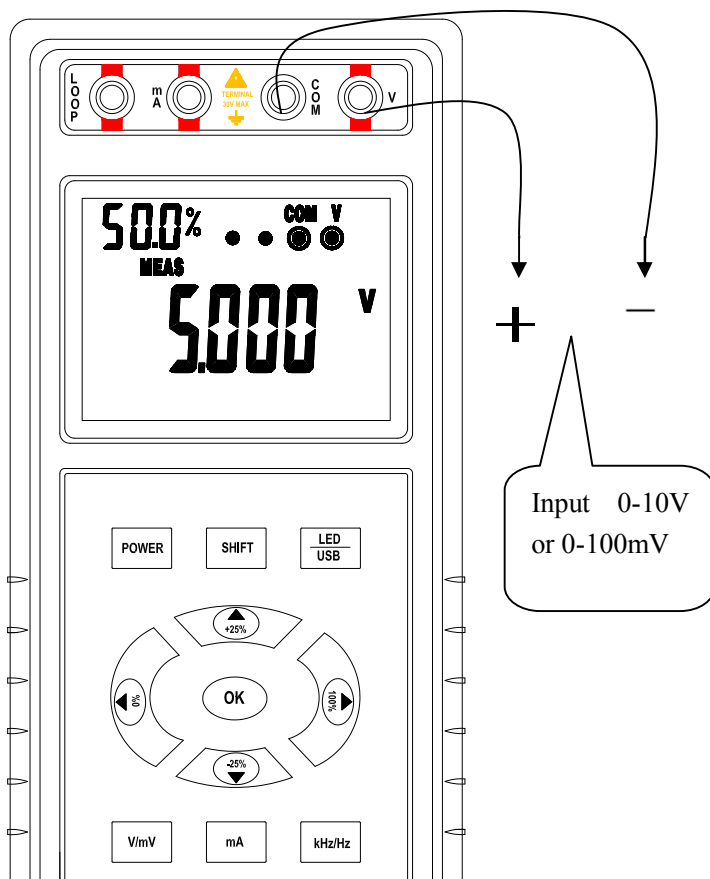
CAUTION

To prevent damage to the unit under test, ensure that the Calibrator is in the correct mode before connecting the test leads.

- a. Press **V/mV** key until “**MEAS X.XXX V**” is shown on the display, meanwhile, the used terminals will be shown on the display.
- b. Insert the red cable into the input terminal “**V**” and the black cable into the input terminal “**COM**”.
- c. The message “**-OL-**” indicates that the voltage being measured exceeds 10V measurable by the instrument.
The percentage between current value and full span is shown on percentage area.

CAUTION:

Do not measure voltages exceeding 30V. Exceeding 30V may result in damage to the Calibrator.



3.10 kHz/Hz Measurement



CAUTION

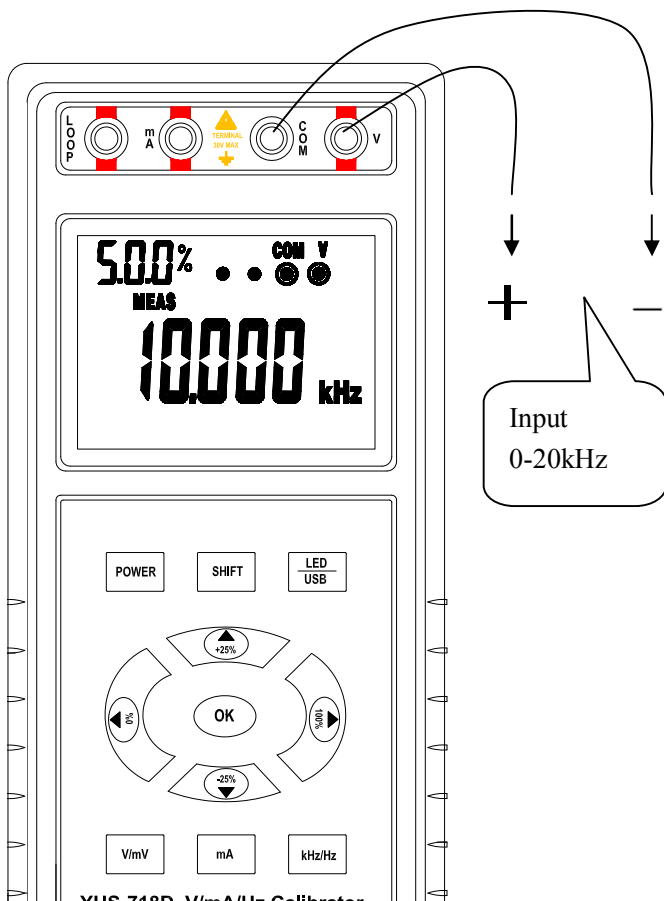
To prevent damage to the unit under test, ensure that the Calibrator is in the correct mode before connecting the test leads.

- a. Press **kHz/Hz** key until **"MEAS X.XXX kHz"** is shown on the display, meanwhile, the used terminals will be shown on the display.
- b. Insert the red cable into the input terminal **"V"** and the black cable into the input terminal **"COM"**.
The message **"-OL-"** indicates that the frequency being measured exceeds 20kHz measurable by the instrument.
The percentage between current value and full span is shown on percentage area.



Caution:

The voltage of frequency to be measured can not exceed 30V. Exceeding 30V may result in damage to the Calibrator.

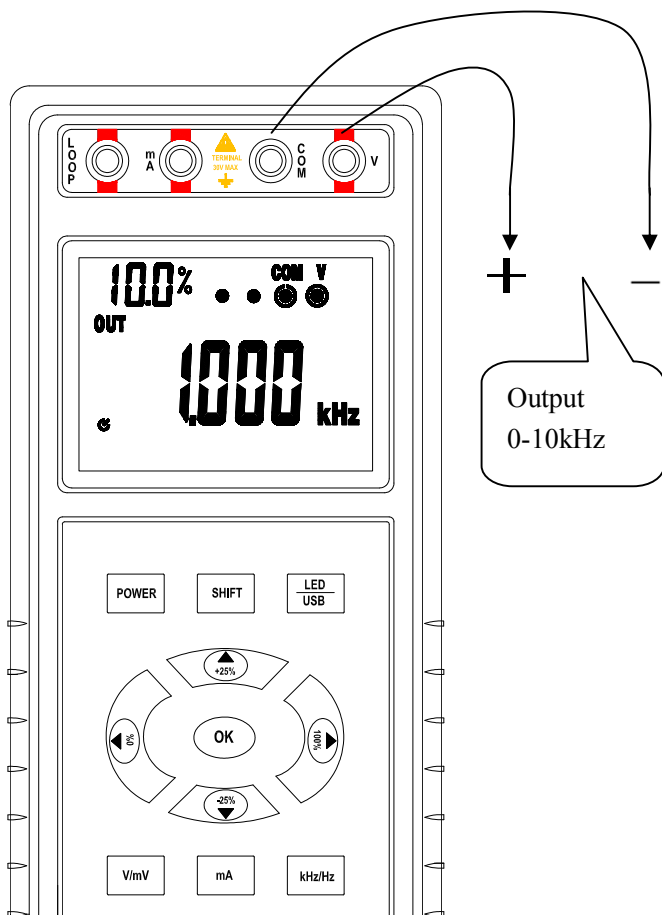


3.11 kHz/Hz Generation

CAUTION

To prevent damage to the unit under test, ensure that the Calibrator is in the correct mode before connecting the test leads.

- a. Press **kHz/Hz** key until “**OUT X.XXX kHz**” is shown on the display, meanwhile, the used terminals will be shown on the display.
- b. Insert the red cable into the input terminal “**V**” and the black cable into the input terminal “**COM**”.
- c. Value set (see 3.5.1 c)
- d. Start **SPANCHECK & STEP OUTPUT** (see 3.5.1 d)



3.12 Adjusting and Disabling the Auto Power OFF Function

The instrument has an Auto Power OFF function which activates after a certain period of idleness in order to preserve the instrument's internal battery. The symbol "⌚" appears on the display with enabled function and the default value is 20 minutes. To set a different time or deactivate this function, proceed as follows:

- Switch off the Calibrator. Keep the **SHIFT** key pressed and press **POWER** key. The message "PS – XX" appears on the display. "XX" stands for the time indicated in minutes.
- Use  and  to set the time value in the range 5 to 30 minutes.
- To set >30 minutes to disable the function, the message "PSOFF" appears on the display.
- Wait 5s until the instrument automatically quits the function.

CAUTION: The voltage can not exceed 10V when battery recharged.

3.13 Recharging the Internal Battery

When the LCD displays the symbol "  it is necessary to recharge the internal battery.

- Switch off the instrument.
- Connect the battery charger to the 220V/50Hz electric mains.
- When the backlight on means the charging process starts.

The charging process is finished when the backlight destroy at display. This operation has a duration time of approx. 3-4 hours

- Disconnect the battery charger at the end of the operation.

CAUTION

- Immediately disconnect the cable from the electrical mains in case of overheating of instrument parts or backlight off during battery recharge
- The Li-ION battery must always be fully recharged in order not to shorten its duration.
- If the battery group voltage is too low (<5V), the backlight may not switch on. Still continue the process in the same way

3.14 Data Transmission

The Calibrator has USB function. Its communication protocol is completely open to users. Users can design their own supporting terminal software and corresponding interface.

Hardware Drive

After the instrument connected to the PC, "USB-SERIAL CH340 (COMX)" will appear on the port item of PC's "Device Manager". It indicates the connection is successful. The PC will prompt the user to discover a new hardware and a dialog for driver installation. Users install the driver according to the guide.

CAUTION

Do not disconnect during serial data transmission (disconnect means removing the instrument from the USB port or turn off the instrument).

That is to say, unplug the Calibrator from the USB port.

Close or exit the application as soon as possible (it may take a few seconds) when the Calibrator is removed from the USB port during application.

If an error occurs during transmission, most probably it's disconnection from the Calibrator port. After confirming the error, wait 2 seconds and start the transmission again.

Frame data

USB Communication setting: asynchronous mode, 19200bps, 8 data bits, 1 stop bit, no parity. When the serial transmission of data, each frame contains 9 bytes, specifically as follows (the following data are used in

hexadecimal):

1st byte: frame start flag F1.

2nd bytes: it indicates the function mode of the Calibrator. In decimal value,

1 = voltage (V) measurement; 2 = millivolts (mV) measurement;
3 = voltage (V) output; 4 = millivolts (mV) output; 5 =
milliamperes (mA) measurement; 6= mA measurement with loop
power; 7 = source mA output; 8 = simulate mA output; 9 = kHz
frequency measurement; 10 frequency (Hz) measurement; 11=
kHz frequency (kHz) output; 12= frequency (Hz) output.

3rd bytes: high four - Reserved. Lower nibble (decimal value) indicates the
decimal point is in the data. For example, 2 means the second
highest value digit after the decimal point. 3 means the middle
value after the decimal point.

4th bytes: High 4 (decimal value) -0 indicates the current main display data
is positive, 8 indicates the current main display data is negative;
lower nibble (decimal value) - indicates the current main display
shows the highest value bits of data.

5th byte: Indicates currently the second highest value bits of data is shown
on the main display.

6th byte: Indicates currently the intermediate bit data is shown on the main
display.

7th byte: Indicates currently the next lowest value bits of data is shown on
the display.

The first 8 bytes: Indicates currently the lowest value bits of data is shown
on the display.

9th byte: frame end flag F0.

CAUTION:

When receiving 09 09 09 09 09 means the Calibrator exceeds the range.

4. TECHNICAL SPECIFICATIONS

Accuracy is specified for 1 year after calibration at operating temperatures of 18 °C to +28 °C and is given as: $\pm ([\% \text{ of reading }] + [\text{counts}])$

Measured DC voltage

Range	Resolution	Accuracy	Input impedance
0 — +10V	1mV	$\pm (0.02\% \text{rdg} + 4 \text{ digits})$	1M Ω
0 — +100mV	0.01mV	$\pm (0.02\% \text{rdg} + 4 \text{ digits})$	1M Ω
MAX. 30V, single polarity test voltage			

Measured DC Current

Range	Resolution	Accuracy	Sampling resistance
0 — +24 mA	1 μ A	$\pm (0.02\% \text{rdg} + 4 \text{ digits})$	10 Ω
Max. 50mADC, with 100mA integrated fuse			

Measured DC Current with loop function

Range	Resolution	Accuracy	Sampling resistance
0 — +24 mA	1 μ A	$\pm (0.02\% \text{rdg} + 4 \text{ digits})$	10 Ω
Max. 30mADC			

Generated DC current (SOUR and SIMU functions)

Range	Resolution	Accuracy
0 ---- +24 mA	1 μ A	$\pm (0.02\% \text{rdg} + 4 \text{ digits})$
SOURCECE MODE - maximum allowed load : 1k Ω @ 20mA		
SIMULATE MODE - loop voltage: 24V rated, 28V maximum, 8V minimum		

Generated DC voltage

Range	Resolution	Accuracy
0 ---- +10V	0.001V	$\pm (0.02\% \text{rdg} + 4 \text{ digits})$

0 ---- +100 mV	0.01 mV	$\pm (0.02\% \text{rdg} + 4 \text{ digits})$
----------------	---------	--

Measured frequency

Type	Range	Resolution	Accuracy
KHz measurement	0.010—20.000KHz	2Hz	$\pm 4\text{Hz}$
Hz measurement	0.001—39.999Hz	0.005Hz	$\pm 0.01\text{Hz}$
	40.00—99.99Hz	0.02Hz	$\pm 0.05\text{Hz}$
1. When measuring frequency, the amplitude becomes bigger as soon as the input frequency decreases. Typically, when measuring 1kHz, amplitude > 200mV. The amplitude of all input frequency < 20V. The wave may be sine wave, triangular wave and square wave.			

Generated frequency

Type	Range	Resolution	Accuracy
KHz generate	0.060—2.000KHz	1Hz	$\pm 2\text{Hz}$
	2.000—4.000KHz	4Hz	$\pm 8\text{Hz}$
	4.000—8.000KHz	16 Hz	$\pm 32\text{Hz}$
	8.000—10.000KHz	25 Hz	$\pm 50\text{Hz}$
Hz generate	0.060—99.999Hz	0.001Hz	$\pm 0.005\text{Hz}$
1. Output rectangular wave, default amplitude is 5V, it can be changed in configuration menu, range 0.5V—20.0V. 2. Output wave duty ratio (the percentage between the positive pulse duration and total pulse cycle.) Default is 50%, it can be changed in configuration menu, range 5%—95%.			

Loop power: 25V $\pm 10\%$, MAX output 30mA.

General Specifications

Storage temperature: -20°C to 60°C

Operating temperature: -10°C to 40°C

Operating altitude: 2000 meters maximum

Temperature coefficient: 0.005%× range /□ (-10□ - 18 □, 28 □ - 55□)

Allowable relative humidity: 95%(-10□ - 30□); 75% (30□ - 40□);

45% (40□ - 50□); 35% (>50□);

Vibration: Random 2 g, 5 to 500 Hz

Shock: 1 meter drop test

Size:195(L)×95(W)×40(H)mm

Weight (battery included): 365g.

Safety: IEC 61010-1-95 CAT I,30V

Power supply

Rechargeable battery 1x7.4/8.4V 1800mAh Li-ION

External adapter: 230VAC/50Hz – 12VDC/1A

Battery life:

SOUR mode: approx. 20 hours (@ 12mA, 500Ω)

MEAS/SIMU mode: approx. 50 hours

Low battery indication: the display shows symbol “ ”

Auto power off: after 20 minutes (adjustable) of non-operation

5. MAINTENANCE AND CALIBRATION

5.1 Maintenance

Only expert and trained technicians should perform maintenance operations.

Take off all the test leads before open the Calibrator.

5.2 Cleaning the Instrument

Use a soft and dry cloth to clean the instrument. Never use wet cloths, solvents, water, etc.

5.3 Calibration

Turn off the Calibrator, press **LED/USB** + **POWER** simultaneously, the calibrator step to CALIBRATION function. The “**CALOF**” shown on the display means quit the calibration function. “**CALON**” shown on the display means in calibration function. Use  and  to select the function.

CAUTION:

1. Only experts with calibration manual and necessary calibration instrument can start “**CALON**”. Contact supplier to get calibration manual.
2. Factory default is “**CALOF**” mode.

6. ACCESSORIES

Item	Description	Qty.
1	7.4V lithium ion rechargeable battery pack (inside)	1
2	Test lead set	1
3	Adapter DC 12V 1A	1
4	User manual	1
5	Carry case	1