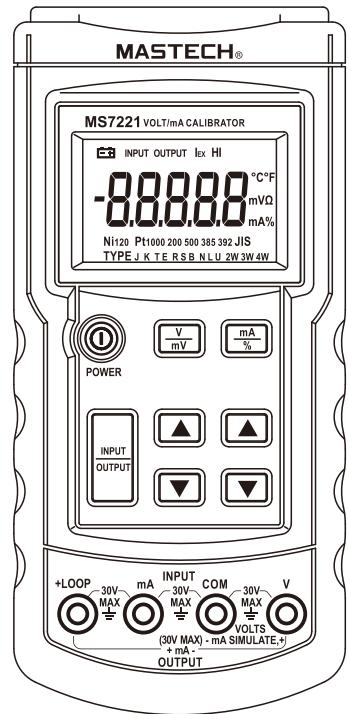


## VOLT/MA CALIBRATOR OPERATION MANUAL



### MASTECH®

#### Safety Information

- To avoid possible electric shock or personal injury:
- Never apply more than 30V between any two jacks, or between any jack and earth ground.
  - Make sure the battery door is closed and latched before you operate the calibrator.
  - Remove test leads from the calibrator before you open the battery door.
  - Do not operate calibrator if it is damaged.
  - Do not operate the calibrator around explosive gas, vapor, or dust.
- To avoid possible damage the calibrator:
- Make sure choose the right jack and rang, before use the calibrator to measurement or calibrator.
  - Take away the calibrator from the used circumstance, before operate the calibrator or after close the calibrator.

#### Introduction

MS7221 Volt/ma Calibrator is a source and measurement tool. This Calibrator is use to measure or output 0 to 24 mA DC current loop, and 0 to 10 V DC voltage. But the calibrator cannot be used to measurement and source simultaneously. MS7221 Volt/ma Calibrator include this accessories: Holster, a pair of Test Leads, 9V battery, and this manual. If the calibrator is broken or short of some accessories, please contact the supplier. Please contact the MASTECH distributor about other accessory's information. The following table has showed the technical parameter and function of the Calibrator.

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#### Measurement and output voltage parameter

Function	Range	Resolution
DC V mV Input	0 ~ 100 mV	0.01 mV
	0 ~ 10 V	0.001 V
DC V mV Output	0 ~ 100 mV	0.01 mV
	0 ~ 10 V	0.001 V
Loop Power Output	24V DC	N/A

#### Measurement and output mA parameter

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

#### Specification

Specification are based on a one year calibration cycle and apply from +18°C to +28°C unless stated otherwise. "Counts" means number of increments or decrements of the least significant digit.

#### DC V Input and Output

Range	Resolution	Accuracy ±(% of reading+Counts)
100mV	0.01mV	0.02 % + 2
10V	0.001V	0.02 % + 2

Input impedance: 2MΩ (nominal), <100pF  
Over voltage protection: 30 V  
Voltage driver capability: 1 mA

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#### DC mA Input and Output

Range	Resolution	Accuracy ±(% of reading+Counts)
24mA	0.001mA	0.015 % + 4

Overload protection: 125 mA, 250V fast acting fuse  
Percent display: 0%=4mA, 100%=20mA  
Source mode: compliance 1000Ω at 20mA for battery voltage >6.8V, (700Ω at 20mA for battery voltage 5.8 to 6.8V)  
Simulate mode: External loop voltage requirement: 24V nominal, 30V maximum, 12V minimum.

#### LOOP POWER

24 V ± 10%

#### General Specifications:

- **Maximum voltage applied between any jack and earth ground or between any tow jack: 30V**
- **Storage temperature: -40°C~60°C**
- **Operating temperature: -10°C~55°C**
- **Operating altitude: 3000 meters maximum**
- **Temperature coefficient: ±0.005% of range per °C for the temperature range -10 °C to 18 °C and 28 °C to 55 °C**
- **Relative humidity: 95% up to 30°C, 75% up to 40°C, 45% up to 50°C, 35% up to 55°C**
- **Shock: Random 2g , 5Hz to 500Hz**
- **Safety: 1 meter drop test**
- **Power requirements: 9VDC, 006P or 1604A**
- **Size: 190mm L × 89mm W × 42mm H**
- **Weight: 350g (include battery)**
- **Auto Power Off function: 6min**  
Cancel the function of Auto Power Off: Hold Input / Output key, then press Power button. The full screen appears and the Auto Power Off is canceled. On the contrary, the Auto Power Off could be recovered after reboot the calibrator.

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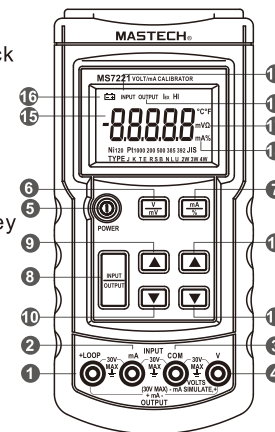
#### International Symbols

Symbol	Meaning
⏚	Earth ground
CE	Conforms to European Union directives
⚠	Refer to this instruction sheet for information about this feature.

#### Explanation On Front Panel

The front panel is show as in right figure

1. Loop power 24V to ground
2. mA measurement input jack
3. Input or output negative (ground) jack
4. V, mV input or output jack
5. Power switch
6. V mV conversion key
7. mA mA% conversion key
8. Input/output conversion key
9. Increase more value key
10. Reduce more value key
11. Increase less value key
12. Reduce less value key
13. Low power indication
14. Input state indication
15. Output state indication
16. Result value
17. Voltage V mV indication
18. Current mA mA% indication

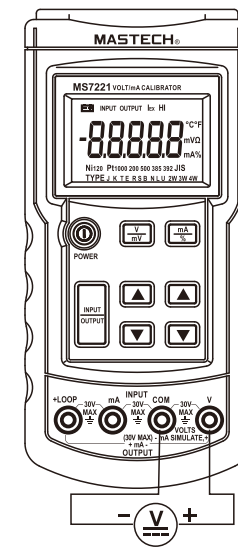


### MASTECH®

#### Operation Instructions

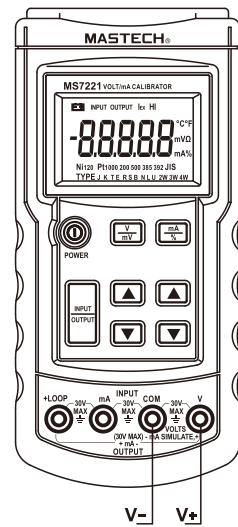
##### DC V Measurement

- ① Press the power switch [5], turn on the Calibrator.
  - ② Press the input/output conversion key [8], when the state of no input indicator [14]. Make it under the state of measurement.
  - ③ Press the V mV conversion key [6], make it indicate VDC or mV DC [17], at the range of measure you need.
  - ④ Put the red test lead in V jack [4], black one to the COM jack [3].
  - ⑤ Connect the red test lead with the positive of voltage which is waiting for measurement, black one to the negative (ground).
  - ⑥ The value of result show [16].
- \* The number in the □, referring to the Explanation on Front Panel (Page9)



**DC V Output**

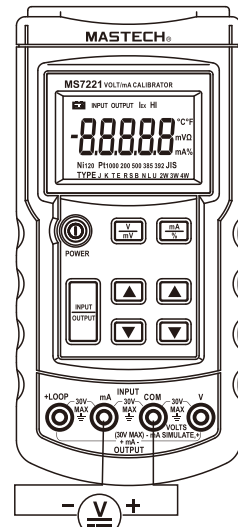
- ① Press the power switch **5**, turn on the Calibrator.
- ② Press the input/output conversion key **8**, when the state of no output indicator **15**. Make it under the state of output.
- ③ Press the V mV conversion key **6**, make it indicate VDC or mVDC **17**, at the range of output you need.
- ④ Press the value adjust key **9|10|11|12**, make the value you want.
- ⑤ Put the red test lead in V jack **4**, black one to the COM jack **3**.
- ⑥ Connect the red test lead with the positive of voltage which is waiting for measurement, black one to the negative(ground).
- ⑦ If you want to change the output value or range, then press the value adjust key **9|10|11|12** or the V mV conversion key **6**.



**DC mA Measurement**

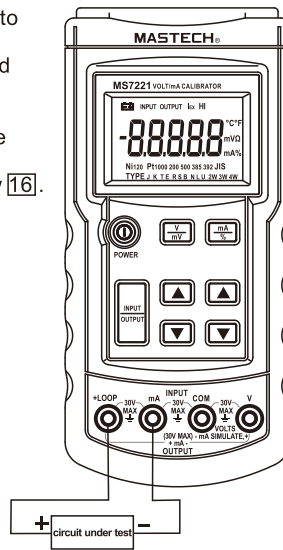
Outside supply power measurement

- ① Press the power switch **5**, turn on the Calibrator.
- ② Press the input/output conversion key **8**, when the state of no input indicator **14**. Make it under the state of measurement.
- ③ Press the mA mA% conversion key **7**, make it indicate mA or mA% **18**, at the state of measure you need.
- ④ Put the red test lead in mA jack **2**, black one to the COM jack **3**.
- ⑤ Connect the red test lead with the positive of current which is waiting for measurement, black one to the negative(ground).
- ⑥ The value of result show **16**.



Calibrator supply Loop power measurement

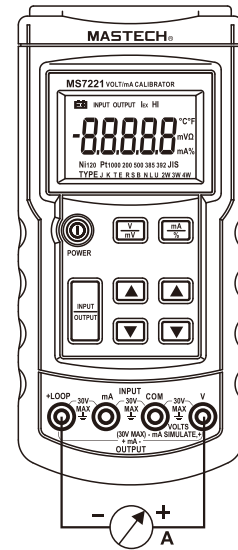
- ① Press the power switch **5**, turn on the Calibrator.
- ② Press the input/output conversion key **8**, when the state of no input indicator **14**. Make it under the state of measurement.
- ③ Press the mA mA% conversion key **7**, make it indicate mA or mA% **18**, at the state of measure you need.
- ④ Put the red test lead in LOOP jack **1**, black one to the mA jack **2**.
- ⑤ Connect the red test lead with the in of current which is waiting for measurement, black one to the out of current.
- ⑥ The value of result show **16**.



**DC mA Output**

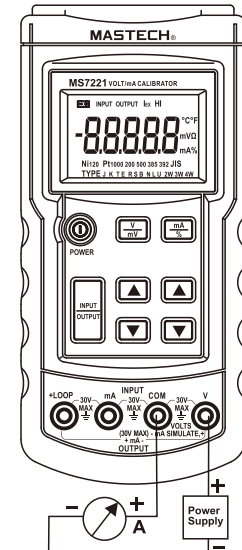
Sourcing mA

- ① Press the power switch **5**, turn on the Calibrator.
- ② Press the input/output conversion key **8**, when the state of no output indicator **15**. Make it under the state of output.
- ③ Press the mA mA% conversion key **7**, make it indicate mA or mA% **18**, at the state of output you need.
- ④ Press the value adjust key **9|10|11|12**, make the value on you want.
- ⑤ Put the red test lead in LOOP jack **1**, black one to the V jack **4**.
- ⑥ Connect the red test lead with the positive of current which is waiting for output, black one to the negative.
- ⑦ If you want to change the output value or state, then press the value adjust key **9|10|11|12** or the mA mA% conversion key **7**.



Simulating a Transmitter

- ① Press the power switch **5**, turn on the Calibrator.
- ② Press the input/output conversion key **8**, when the state of no output indicator **15**. Make it under the state of output.
- ③ Press the mA mA% conversion key **7**, make it indicate mA or mA% **18**, at the state of output you need.
- ④ Press the value adjust key **9|10|11|12**, make the value you want.
- ⑤ Put the red test lead in V jack **4**, black one to the COM jack **3**.
- ⑥ Connect the red test lead with the positive of power which is outside, black one to the positive of current which is waiting test.
- ⑦ If you want to change the output value or state, then press the value adjust key **9|10|11|12** or the mA mA% conversion key **7**.



**Maintenance**

**Cleaning**

Periodically wipe the case with a damp cloth and detergent; do not use abrasives or solvents.

**Calibration**

Calibrate your calibrator once a year to ensure that it performs according to its specifications.

**Replacing the Battery**

Please change the battery when the LCD indicates . Turn off the power of the Calibrator, When you change the battery, and screw off the breechblock on the battery cabinet cover, then take off it and instead the fresh battery.

Replacing a Fuse

**Warning**

**To avoid personal injury or damage to the calibrator, use only a 0.125A 250V fast fuse.**

Fuse 1 is probably blown if:

In the V output mode, with the test leads removed from the calibrator, the display flashes OL.

Fuse 2 is probably blown if:

In the mA input mode, the calibrator always reads 0.000, even with a signal applied.

