

**Mitchell Instrument Company**  
**Model MIT2207**  
**Loop Calibrator**  
**Instruction Manual**

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## 1.Safety information


MIT2207 Loop Calibrator (hereafter to be referred as “Calibrator”) is an accurate tool for current supplying and measuring. The calibrator can deliver source output 0-24mA and simulate two-wire transducer output 0-24mA, and can measure 0-20mA or 4-20mA current loop, as well as measure DC voltage up to 28V.

This calibrator is an instrument subjects to IEC61010, CAT I 30V and Pollution grade II .







### 1.1 Warnings and notes

To avoid electric shock, personal injury or damage to the calibrator:

- Please use this calibrator following the guidance of this instruction, or the protection provided by this instrument may be failed.
- Never use this calibrator near explosive gas, vapor or dust.
- Check the calibrator before using, if any damage found, please be sure not to use.
- Check and test if the insulativity of lead wire is in good condition, and if there is any damaged or exposed metal. Replace the damaged test wire.
- Never apply voltage above 30 V to between any two terminals or between any terminal and the earth.
- Be sure to use proper terminal and model when measuring or supplying current.
- To avoid damage to this instrument when testing, it shall set the calibrator to proper model before connecting the test wire.
- When connecting, it shall connect the COM test wire first, and then connect the wire to be used; when disconnecting, it shall disconnect the wire to be used first, and then disconnect the COM test wire.





- Never use this calibrator when the housing cover is open.
- Use the calibrator after confirming that the battery cover is closed.
- Once the symbol  (low battery power) appears, please replace the battery to avoid possible reading error.
- It must remove the test wire from the calibrator before open the housing or battery door.





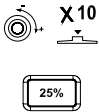




## 1.2 Symbols and marks







Symbol	Meaning
	Earth ground
	Caution: important information, refer to the instruction
	Double insulated
	Low battery power
	Conform to European Union directives
	Direct current

## 2. Description

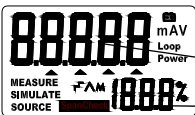
### 2.1 Button function

Button	Function
	Power ON/OFF button.
  	Start option: setting up the switch off time, for details please refer to power section.

	<p>Backlight ON/OFF button.</p>
	<p>Each pressing of this button goes to below mode in turn:</p> <ul style="list-style-type: none"> <li>•SOURCE mA (source output mA)</li> <li>•SIMULATE mA (analog output mA)</li> <li>•Loop Power (supply loop power)</li> <li>•MEASURE mA (measure DC mA)</li> <li>•MEASURE V (measure DC voltage)</li> </ul>
	<p>By pressing the turncap, the current output could be adjusted to resolution of <math>1\mu\text{A}</math>、<math>10\mu\text{A}</math>、<math>100\mu\text{A}</math> (default value is <math>1\mu\text{A}</math>); by rotating the turncap  , the current output could be increased or reduced by <math>1\mu\text{A}/10\mu\text{A}/100\mu\text{A}</math>. If turn the turncap in auto slope function or 25% stepping, the current change direction could be changed.</p>
	<p>Press  to increase the current with a stepping of 25% of the full range (0-20mA/4-20mA). When in full range, press  to reduce the current with stepping of 25% of the full range (0-20mA/4-20mA)</p>
	<p>Press  to enter into auto slope current output function and select a slope. mA slope current output signals that are being continuously applied or controlled by the calibrator and produced by one of three below slopes. <b>^</b> (slow), <b>M</b> (fast), <b>F</b> (stepping) indicate the selected slope.</p>

	<p>Press  to start SpanCheck from 0% of selected current span (e.g., 0mA within 0-20mA span, or 4mA within 4-20mA span), “SpanCheck” will appear.</p> <p>Press it again, then start from 100%.</p>
 + 	<p>Press  and  simultaneously to switch among mA output spans.</p> <ul style="list-style-type: none"> <li>• 4 mA-20 mA =0%-100% (default value)</li> <li>• 0 mA-20 mA =0%-100% (optional)</li> </ul> <p>The selection will be saved until next change.</p>



## 2.2 Display



1: show the measured value or output value

2: show the percentage of measured value or

output value account for of the full scale

Symbol	Explanation
MEASURE	Measure current or voltage
SIMULATE	Simulate output current
SOURCE	Source output current
SpanCheck	Full scale check (0%-100%)
Loop Power	Loop power
mA V	Unit symbol: mA or V
	Auto oblique wave function
	Low batter power

### 3. Use

#### 3.1 mA current output model

The calibrator can output current which may be used to calibrate and test 0-20 mA and 4-20 mA current loop and instrument.



In SOURCE model, The calibrator can supply current.

In SIMULATE model, the calibrator can simulate two-wire transducer which uses a set of external source.

Change the mA output span

The calibrator has two mA output spans:

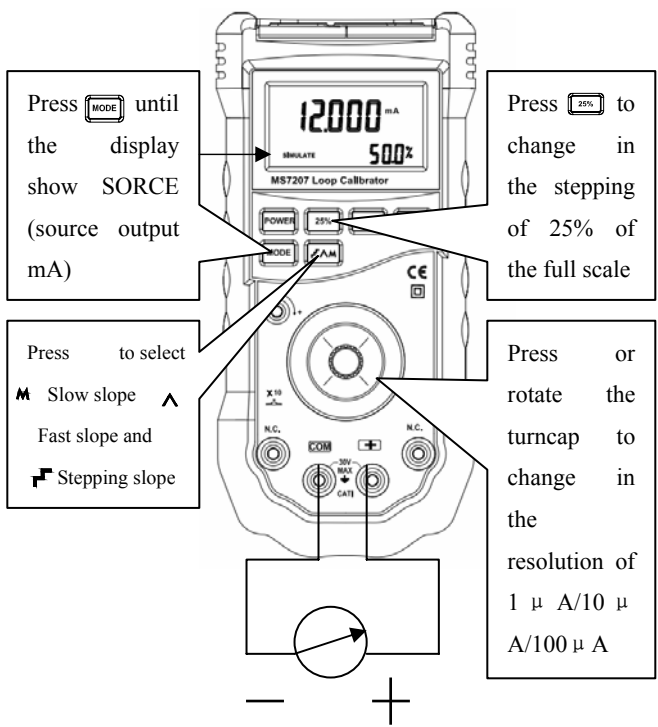
- 4 mA-20 mA (0%-100% ) [default value]
- 0 mA-20 mA (0%-100%) [optional]

To change the output span, please press  and  simultaneously. The setting value for selection will be saved before next change.

Supply mA current

Use SOURCE mode to supply current to passive circuit.

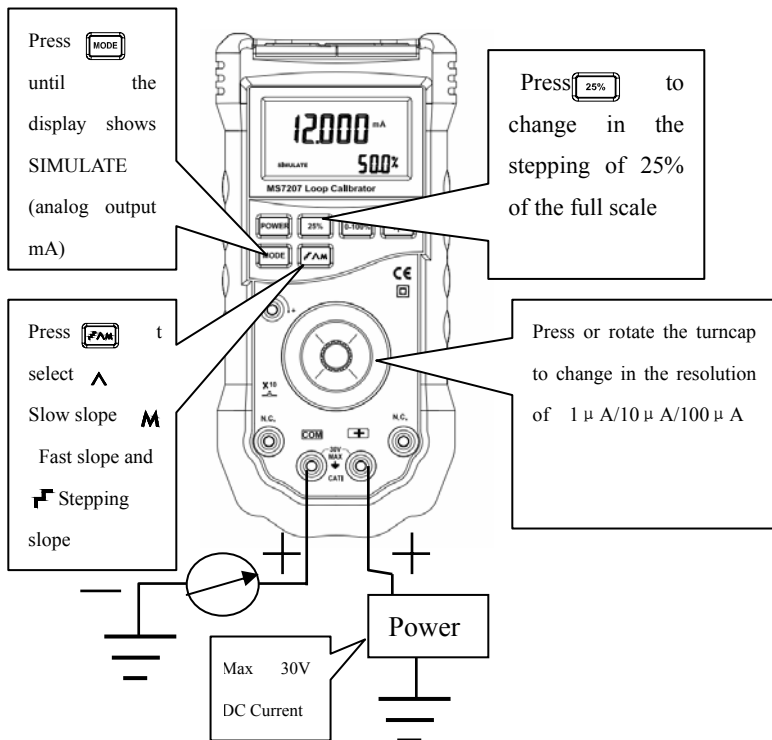
There must be a path which allows the current to flow between “+” terminal and COM terminal, or it will show overload (figure flashing) when you set up the output value.



## Analog transducer


When the calibrator is used as an analog transducer, it can adjust the output loop current to the known value you selected.

There must be 12-28 V loop source. Please connect the test wires as the figure below.





### 3.2 Auto linear increasing mA output


Auto loop current output allow the calibrator to output passive (supply current) or active (simulate) loop current that is continuously changing. And you can still leave your hands free to test calibrator responsibility.

Press  to enter into “Auto loop current output” model and step to next slope type.

The calibrator applies or controls a continuously repeated mA signal in one of below three slope types within the span of 0-20 mA or 4-20 mA:

Slow  slope: gentle slope with rate of change 0%-100%-0% within 40s.


Fast  slope: abrupt slope with rate of change 0%-100%-0% within 15s.

Stepping  slope: 25% stepping slope with 5s of pause per step.

Press any key or switch off the calibrator to exit this function.

Use “Spancheck” function

“Spancheck” function can be used to check the zero point or span of a calibrator under SOURCE or SIMULATE model.

To select “Spancheck”, please press .

Press any key or rotate the turncap to exit this function.


### 3.3 Measure DC current (mA)



Caution

To avoid damage to the device during test, please ensure the calibrator in proper model before connecting the test wire.

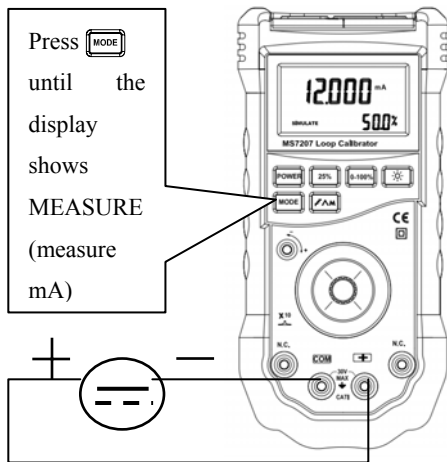
To test mA DC:

1. Press  to step to MEASURE model.

The display shows MEASURE mA.

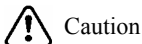
2. Contact the load circuit or source with the probe of the test wire.

3. If the current over 24mA, it will show “-OL-”.



24mA DC current in maximum


### 3.4 Measure mA current with loop Power



To avoid damage to the device during test, please ensure the calibrator in proper model before connecting the test wire.

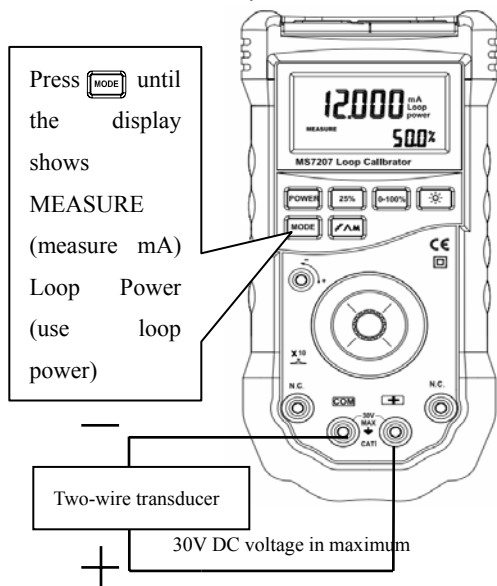
Under this model, the calibrator can supply +24V loop power to the transducer, and read the loop current value at the same time.

Measure DC mA current with loop Power scale

1. Press  to step to Loop Power model.

The display shows MEASURE with unit mA (measure mA) and Loop Power.

2. Contact the load circuit or source with the probe of the test wire.
3. If the current over 24mA, it will show “-OL-”.



### 3.5 Measure DC voltage



Caution


To avoid damage to the device during test, please ensure the calibrator in proper model before connecting the test wire.

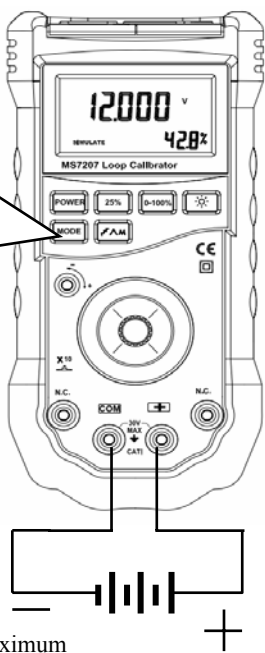
To measure DC voltage

1. Press [MODE] to step to MEASURE model.

The display shows MEASURE V.

2. Contact the load circuit or source with the probe of the test wire.
3. If the voltage over 28V, it will show “-OL-”.

Press  until the display shows MEASURE (measure voltage) with unit V



30V DC voltage in maximum

### 3.6 Power

Requirements for the power

Single battery 9V (ANSI/ENDA 1604A or IEC 6LR61)



Battery life (typical value):

Battery model: about 3 hours (500Ω with load 12 mA);


MEASURE/SIMULATE: 7 hours

Setting for battery power-saving function

By default, the calibrator will be auto-off after using for 15 minutes after switch on:

1. When the calibrator is off, press  +  to switch on.

The display shows PS-XX, in which XX indicates the switch-of time with unit minute. OFF indicates that the power protector is disabled.

2. Rotate the turncap  to reduce or increase the switch-off time, of which the shortest is 5minutes, while the longest is 30 minutes.

3. To disable this function, please rotate the turncap until the display shows OFF.

4. The calibrator will exit switch-off setting automatically about 5s later, and you may also press the turncap to do it.

#### 4. Accuracy specification

The accuracy is only applicable to 1 year after calibration with operation temperature 18°C-28°C, which shown as  $\pm$  ([% of the reading]+[count]).

##### 4.1 MEASURE V dc

Range: 0 — +28V

Resolution: 1mV (mV)

Input impedance: 1M $\Omega$

Accuracy:  $\pm$  (0.02% of the reading +4 counts)

##### 4.2 MEASURE mA dc

Range: 0 — +24mA (24mA in maximum)

Resolution: 1uA

Accuracy:  $\pm$  (0.02% of the reading +4 counts)

##### 4.3 SOURCE / SIMULATE mA dc

Range: 0 — +24mA

Resolution: 1uA

Accuracy:  $\pm$  (0.02% of the reading +4 counts)

SOURCE MODE iswith load ability:

When the current is 20mA, the impedance is 1200 $\Omega$ ; when under HART model with current 20mA, the impedance turns to 950 $\Omega$ .

External loop voltage specification under Simulate mode:

Typically 24V, max 30V, min 12V.

##### 4.4 Loop Power: $\geq$ 24V, $\leq$ 30V.

##### 4.5 General specifications

The voltage between any terminal and the earth or between any two terminals:  
not higher than 30V.

Storage temperature: -40°C-60°C

Operation temperature: -10°C-55°C

Operation elevation: max 2000m in height

Temperature coefficient: 0.005%×range/°C (-10°C—18 °C or 28 °C—55°C).

Relative humidity: 95%-30°C, 75%-40°C,  
45%-50°C, 35%-55°C.

Vibration: random sampling 2 grams, 5-500Hz

Impact: 1m free drop test

Size: 195(L)×92(W)×55(H) mm

Weight: about 400g, (including the rubber cover).

Conformity to safety standards:

Meet the standard of IEC 61010-1-95 CAT I, 30V;

Meet the standard of EN61010-1 EN61326.

## 5. Maintenance and calibration

### 5.1 Repair


To avoid electric shock, personal injury or damage to the calibration, please be sure to make this product repaired by qualified technician according to the instruction, and must prepare necessary devices and service information. Before open the housing, it must remove the test wire and all input signals in advance.

For repair procedures not referred in this instruction, please contact the service center.

### 5.2 Cleaning


It shall clean the housing of calibrator with wet cloth and detergent regularly, never use corrosive or solvent. Never make water leak in the calibrator.

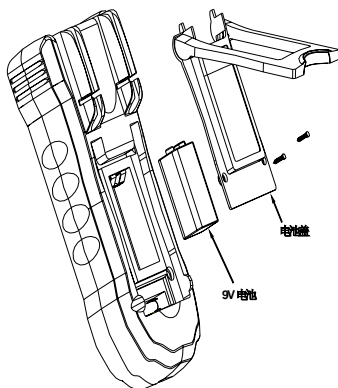
### 5.3 Replace the battery

Once the symbol  (low battery power) appears, please replace the

battery immediately to avoid reading error which may cause electric shock or personal injury.


The calibrator uses one 9V alkaline battery (ANSI/NEDA 1604A or IEC 6LR61), if want to replace this battery, please follow below steps:

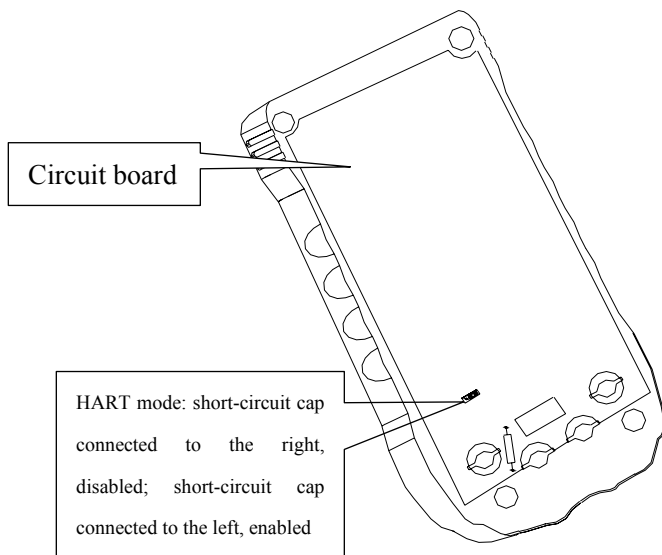
1. Press  to switch off the calibrator.
2. Disconnect the test wire from the terminal.
3. Remove the rubber cover.
4. Unscrew the two screws fastening the battery cover with screwdriver, then open the door at the back of this calibrator, see below figure.
5. Take out the used battery.
6. Put in the replacing battery, close the battery door. Ensure that the battery fastened in place.
7. Fit the cover, drive the screws to the cover tightly .
8. Put back the calibrator into the rubber cover.



## 5.4 Setting up HART model

If want to enable or disable the HART model of Calibrator (Highway Addressable Remote Transducer), please operate as follows:

1. Press  to switch off the calibrator and disconnect the test wire.
2. Take out the calibrator from the rubber cover.
3. Remove the battery from the device, shown as above figure.
4. Unscrew four screws from the bottom housing.
4. Separate the bottom housing form the top housing.
5. Pick up the short-circuit cap, then move it to enable (or disable) HART model (see figure).
6. Case the bottom housing on the top housing, then re-drive the four screws.
7. Fit the battery door, then put it in the rubber cover.



## 5.5 Calibration

It shall implement calibration on the calibrator to confirm if its function meets the specification, for details please refer to the factory.

## 6. Accessories included

Item	Description	Lot No.	Quantity
1	9V alkaline cell (ANSI /NEDA 1604A or IEC 6LR61)		1
2	Test lead wire set		1
3	Instruction		1
4	Certification		1

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