

H783

Process calibration multimeter

Instruction



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Overview

H783 Process Calibration Multimeter is a handheld multi-function digital calibration instrument that is featured with high accuracy, resolution and reliability and anti-drop and is integrated with digital display of DC voltage, current signal source and digital multimeter functions. The instrument uses large liquid crystal display with clear reading and is featured with backlight reading hold and auto power-off. The instrument can be fed by DC or AC power source, which delivers more convenience.

Signal output and mA, mV measurement functions of this instrument are mainly for field calibration, service in industrial automation site. Besides, this instrument has general functions of multimeter, which is an ideal tool for field metermen, distributed control system maintainers and instrument installers. It is different from common electrician multimeters and signal sources, which is the multimeter used by metermen.

The overall machine circuit takes dual slope A/D converter as its core, and is featured with signal output and measurement functions. Its technical performance conforms to Automation Instrument Calibration Standard for type Electric II and Electric II, its operation environment complies with related regulations in GB6587.1-86 *Environmental tests program for electronic measuring instruments* about instrument Group II.

Functions and features

- 4 1/2 LCD display.
- Display "1" for Over range, max display value 19999.
- 24V.DC (30mA.MAX) power output, which can be used as 24V.DC working power supply for two-wire instrument.
- 0-10V, 0-100mV, 0-20mV, 0-20mA and 0-22mA DC signal source, which can simulate output signals of varieties of model II, III and other instruments in field calibration.
- 200mV, 2V, 20V, 200V and 700VDC voltage signal measuring scale.
- 2mA, 20mA and 200mA DC current signal measuring scale.
- 2V, 20V, 200V and 700V AC voltage signal measuring scale.
- 2mA, 20mA and 100mA AC current signal measuring scale.
- 200 Ω , 2k Ω , 20k Ω , 200k Ω , 2M Ω and 20M Ω resistance measuring scale.
- Diode voltage drop measuring and line break-and-make testing.
- Frequency measuring function.
- Backlight used for reading in site with insufficient light.
- Power undervoltage indication.

Safety information



Before use this instrument, please read this manual carefully and comply with all the safety warning information and notices, as well as warnings and instructions marked on the instrument!

This instrument meets the safety requirements for electronic measuring instrument and IEC61010 –1 overvoltage CAT. II 1000V standard, and adopts the safety requirements of pollution degree 2.

- Be sure to choose proper function range for measurement and output.
- Please switch off the power of circuit under measured and fully discharge capacitors in the circuit before measuring inline resistance, capacitor, break-and-make diode and others.
- Be sure to check your instrument and test leads for abnormality or damage before every time you use the instrument, if in any abnormal condition such as test lead worn and torn or fracture, no display on the LCD, please stop using and have it serviced immediately.

- The instrument can only be used with attached test leads to meet the requirements of safety standards. If the test lead is broke, it must be replaced with another one with the same mode or electrical specification.
- When in doubt about the safety of the instrument, please stop using and have it serviced immediately.
- Choose proper switch position, range and input port (socket) to complete the work during measuring, or it may endanger the user and damage the instrument.
- When turning the function/range selecting switch, please be sure to disconnect the test leads from the object under measured to ensure that no any signal input to the input terminal. It is forbidden to turn function/range selecting switch during measuring.
- When measuring voltage higher than 60V DC or 30V AC RMS, it must always keep in mind to prevent electric shock.
- During measuring, keep fingers behind the finger guard.
- When measuring the current, please switch off the power of the circuit

under measured before connect the instrument to the circuit in series.

- When measuring heavy current, the time of each measurement shall not be longer than 10s, and the time interval between every two measurements shall not be shorter than 15 minutes.
- Once low battery power symbol appears, please charge the battery in time to avoid possible electric shock or personal injury results from error reading.
- Never apply voltage above the rated voltage marked on the instrument to between input terminals or between any input terminal and the grounding.
- It shall remove the test leads from the input terminal before open the housing or battery door.
- Never store and use the instrument in environment with high temperature, high humidity, flammability, explosiveness and high-intensity magnetic field.

Description for symbols

	Warning! Notice!
	High voltage indication symbol!
	Grounding
	AC (Alternating Current)
	DC (Direct Current)
	Battery undervoltage symbol
	Fuse
	Comply with European Union (EU)
	Double insulation

- ① Battery charging port: charge the battery or provide working power for this instrument with attached charger through this port.
- ② **24V.DC** output port: this instrument can provide **24V DC** working power for the field through this port.
- ③ Liquid display: display the measuring result, unit and symbol.
- ④ Signal output increasing and decreasing key: regulate the output value of voltage signal, mV signal and current signal.
 - ▲: Fast value increasing key
 - ▼: Fast value decreasing key
 - ▲: Medium value increasing key
 - ▼: Medium-speed value decreasing key
 - ▲: Slow value increasing key
 - ▼: Slow value decreasing key
- ⑤ Function/Range selecting switch
- ⑥ Signal output port: mA, mV, (0-10V) voltage signal output port.
- ⑦ Measurement input port: input port for all the measuring signal.
- ⑧ Backlight key: Working site with sufficient light increases the difficulty to read LCD content, by pressing this key, the backlight is on, then it will be auto off several seconds later.
- ⑨ Data hold key: press this key to enter into data hold state; press again to restore to normal measurement state.

Usage

This section details the operation of each function range, necessary input/output connection method and safety criteria for the instrument. Please operate according to relevant function operation instructions.

Power

Considering the actual situation of using field, this instrument uses AC/DC power and has a set of Ni-Mh rechargeable batteries inside. In condition of 220V AC, attached charger may be used to provide working power for the instrument. When charging, it shall switch off the 220V power and set this instrument to OFF before plugging or unplugging the charging wire.

Generally, it shall turn the instrument rotary switch to OFF scale first, then charge the batteries with attached charger for about 3~5 hours. The batteries must be fully charged when charging, or its service life may be affected. It shall consider replacing the batteries when the working hour is significantly shortened.

DC or AC voltage measuring

- (1). Turn the function and range selecting switch to DC or AC voltage scale and select appropriate range.
- (2). Plug the red and black test lead into positive and negative pole of input sockets of "INPUT" respectively, then contact the two terminals of the circuit under measured with two probes (connected to the circuit under measured in parallel).
- (3). When measuring DC voltage, the pole indicated for the red test lead will be displayed on the LCD along with the measured value.
- (4). When the liquid display only shows "1", it indicates the voltage under measured at present is over the measuring range, please select higher range to complete current measurement.
- (5). Read the measuring result from the liquid display.



Warning:

- **Never measure voltage higher than 1000V DC or 700V AC RMS.**
- **When the magnitude of voltage under measured is unknown, it shall**

always start measuring from the highest range.

- **Pay special attention when measuring high voltage to prevent electric shock.**
- **After finishing all the measurements, be sure to disconnect the test leads from the circuit under measured and remove them from the instrument.**

DC or AC current measuring

- (1). Turn the function and range selecting switch to mA scale and select appropriate range.
- (2). Plug the red and black test lead into positive and negative pole of input sockets of “INPUT” respectively, then connect the circuit under measured with two probes in series.
- (3). When measuring DC current, the pole indicated for the red test lead will be displayed on the LCD along with the measured current value.
- (4). When the liquid display only shows “1”, it indicates the current under measured at present is over the measuring range, please select higher range to complete current measurement.

- (5). When measuring AC current, please turn the function and range selecting switch to AC mA scale; When measuring DC current, please turn the function and range selecting switch to DC mA scale.
- (6). Read the measuring result from the liquid display.



- **Never input current higher than 200mA.**
- **After finishing all the measurements, be sure to disconnect the test leads from the circuit under measured and remove them from the instrument.**

Resistance measuring and break-and-make testing

- (1). Turn the function and range selecting switch to resistance scale and select appropriate range.
- (2). Plug the red and black test lead into positive and negative pole of input sockets of "INPUT" respectively, then contact the two metal lead feet at the two ends of the resistance under measured with two probes

(connected to the circuit under measured in parallel).

- (3). When the liquid display only shows “1”, it indicates the resistance under measured at present is over the measuring range, please select higher range to complete current measurement.
- (4). When testing break-and-make of the circuit, please turn the function and range selecting switch to break-and-make and connect the test leads to the two end of the circuit in parallel. When the resistance between these two points lower than 50Ω , the built-in buzzer beeps.
- (5). Read the measuring result from the liquid display.



Warning:

- **Be sure to switch off the power and fully discharge the capacitors in the circuit before measuring inline resistances and testing break-and-make.**
- **After finishing all the measurements, be sure to disconnect the test leads from the circuit under measured and remove them from the instrument.**
- **Do not measure voltage when in resistance range to avoid damage to**

the instrument.

Frequency measuring

- (1). Turn the function and range selecting switch to 20kHz scale.
- (2). Plug the red and black test lead into positive and negative pole of input sockets of “INPUT” respectively, then contact the circuit under measured with two probes.
- (3). When the liquid display only shows “1”, it indicates the frequency under measured at present is beyond the max frequency value within the measurement capacity of the instrument.
- (4). Read the measuring result from the liquid display.



Warning:

- **The input voltage signal shall not exceed the max input voltage value (250V) regulated when measuring the frequency, in order to avoid damage to the instrument and danger to the user.**
- **The input voltage signal shall not be lower than 250mV when measuring the frequency, or incorrect result may be obtained.**
- **After finishing all the measurements, be sure to disconnect the test**

leads from the circuit under measured and remove them from the instrument.

Diode testing

- (1). Turn the function and range selecting switch to diode scale.
- (2). Plug the red and black test lead into positive and negative pole of input sockets of “INPUT” respectively, then contact the two metal lead feet at the two ends of the diode under measured with two probes.
- (3). When measuring the diode, the typical value of forward voltage drop of silicon diode is about 0.6V, while such value of germanium diode is about 0.3V. The liquid display will only show “1” if connect the diode backward.
- (4). Read the measuring result from the liquid display.



Warning:

- **Be sure to switch off the power and fully discharge the capacitors in the circuit before measuring inline diode.**
- **After finishing all the measurements, be sure to disconnect the test leads from the circuit under measured and remove them from the instrument.**

24V DC voltage source output

After powering on the instrument, 24V DC voltage output is applied to 24V power output port



Warning:

24V voltage source output wire can be plugged or unplugged only when the instrument is powered off, or it may be damaged.

0~10V DC voltage output

Turn the rotary switch to 10V (yellow word) scale, then the instrument signal output port OUTPUT can deliver 0-10V voltage output signal. You can regulate the output with increasing or decreasing key. The value displayed on the LCD is the output voltage.

mV DC voltage output

Turn the rotary switch to 20mV or 100mV (yellow word) signal output scale, then the instrument signal output port OUTPUT can deliver mV voltage output signal. You can regulate the mv voltage output value with increasing or decreasing key according to desired value and mV voltage value displayed on the LCD; and turn the function switch to 20mV or 100mV scale according to desired output mV voltage to obtain satisfactory resolution. At this moment, the value displayed on the LCD is output mV voltage.

mA DC current output

This instrument has a constant current source output. Turn the rotary switch to 22mA or 20mA (yellow word) signal output scale and connect the signal output port OUTPUT with a load (0-1K Ω), then it can deliver current signal output (if an open circuit of test leads is equivalent to infinite load, LCD will display 0); regulate the mA output value with increasing or decreasing key; set the function switch to 20mA or 22mA scale according to the magnitude of mA current value to obtain satisfactory resolution. At this moment, the value displayed on the LCD is mA output.

Technical indicators

General indicators

The voltage between the input terminal and the grounding: 1,000V.

Display mode: max reading 19999, auto pole indication.

Overload indication: “1” will be displayed on LCD.

Undervoltage indication: “ $\frac{-}{+}$ ” will be displayed on LCD.

Measurement speed: about 3 times/sec.

Data hold: available.

Backlight function: available.

Power supply mode: 4XAA batteries.

Operation environment: 0~40°C; 20~80%RH.

Storage temperature: -10~50°C.

Safety standard: comply with IEC1010_1,1000V CAT. II .

Accuracy indicators

Accuracy: \pm (%reading+figure), 1 year of calibration period.

Basic conditions: environment temperature 18°C-至 28°C, relative humidity not higher than 80%.

DC voltage 24V \pm 10%

DC voltage signal

Range	Resolution	Accuracy
20mV	1 μ V	\pm (0.05% reading +4 figures)
100mV	10 μ V	
10V	1mV	

DC current signal

Range	Resolution	Accuracy
20mA	1 μ A	\pm (0.05% reading +4 figures)
22mA	10 μ A	
Load capacity: 0~10kΩ		

DC voltage measuring

Range	Resolution	Accuracy
200mV	0.01mV	\pm (0.05% reading +4 figures)
2V	0.1mV	\pm (0.1% reading +3 figures)
20V	1mV	
200V	10mV	
1000V	0.1V	\pm (0.15% reading +3 figures)
Input impedance: 10M Ω		
Max input voltage: 1000V DC or 700V AC (RMS), for range 200mV, this value falls into 250V DC or AC (RMS).		

AC voltage measuring

Range	Resolution	Accuracy (50~60Hz)
2V	0.1mV	± (1.0% reading+25 figures)
20V	1mV	
200V	10mV	
700V	0.1V	
Input impedance: 10MΩ		
Max input voltage: 1000V DC or 700V AC (RMS)		

DC current measuring

Range	Resolution	Accuracy
2mA	0.1μA	± (0.1% reading +15 figures)
20mA	1μA	± (0.05% reading +4 figures)
200mA	10μA	± (0.05% reading +7 figures)
Overload protection: self-recovering fuse (F400mA/250V)		
Max input current: 200mA DC or AC (RMS)		

AC current measuring

Range	Resolution	Accuracy
2mA	0.1μA	± (1.5% reading + 35 figures)
20mA	1μA	
200mA	10μA	
Overload protection: self-recovering fuse (F400mA/250V)		
Max input current: 200mA DC or AC (RMS)		

Frequency measuring

Range	Resolution	Accuracy
20kHz	1 Hz	$\pm (1.5\% \text{ reading} + 15 \text{ figures})$
Input voltage range: 200mV-10V AC (RMS)		
Overload protection: 250V DC or AC (RMS)		

Resistance measuring

Range	Resolution	Accuracy
200 Ω	0.01 Ω	$\pm(0.5\% \text{ reading} + 10 \text{ figures})$
2k Ω	0.1 Ω	$\pm(0.5\% \text{ reading} + 10 \text{ figures})$
20k Ω	1 Ω	
200k Ω	10 Ω	
2M Ω	100 Ω	
20M Ω	1k Ω	
200M Ω	10k Ω	$\pm (5\% \text{ reading} + 5 \text{ figures})$
Overload protection: 250V DC or AC (RMS)		
Open circuit voltage: lower than 700mV		

Diode testing

Range	Resolution	Accuracy	Testing environment
Diode testing 	1 V	0.0001V	DC forward current: about 1mA; DC backward current: about 1.5V. Indicate the approximation of forward voltage drop.
Overload protection: 250V DC or AC (RMS)			

Buzz break-and-make testing

Function	Description	Testing environment
•))	When the built-in buzzer beeps, it indicates the resistance under measured is not higher than 70Ω approximately.	Open circuit voltage: about 1.5V
Overload protection: 250V DC or AC (RMS)		

Maintenance

The instrument shall be free from bumping, colliding and dropping. It shall be stored at where ventilated, shady and dry. No acid, alkali and corrosive gases, no strong mechanical vibration and impact indoor. Use the instrument in specified environment, keep away from strong electromagnetic field.

The battery must be replaced after removing the test leads and switching off the power. The battery cover could be undone after screwing out the two screws on which. Be sure not to use the instrument before completely getting

the battery cover on and tightened.

The instrument can be cleaned only on its case with wet cloth and a little detergent.

This device subjects to precise calibration instrument, please read clauses in the operation manual carefully before using. This instrument had been well regulated before rollout. Under normal circumstances, please do not open the cover for regulation. A part of parameters of this instrument is relatively higher, so it needs calibration with standard meter with 0.02% accuracy in annual inspection.

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