



USER'S MANUAL

HT824 Multifunction Process Calibrator

V1.0.0

<http://www.hantek.com>

Introduction

HT824 Multifunction Process Calibrator is handheld equipment with High-capacity rechargeable battery power supply. It can measurement or output a variety of electrical signal, and measurement or simulate a variety of TC and RTD.

HT824 process calibrator also has following features:

- 1.The display has two parts. The upper of display shows the voltage and current measured by the user, and has the function to use the loop power supply to measure current (LOOP). The bottom of display shows measurement or output voltage, millivolt, current, TC, RTD and resistance
- 2.TC can add environment temperature cold junction compensation. The environment temperature can be set calibration in menu function.
- 3.Each output function has manual step output and auto step/slope output function. It can be set as the value 0%, 100% in the range of signal output.
- 4.It can be manually set in setting menu, power-off time, turn-off time of backlight, screen contrast, setting clock, cold junction compensation ON/OFF, Chinese/English language, etc.
- 5.The calendar clock can be calibrated in setting menu.
- 6.It can save 8 packs of measurement and output data, and invoke to display all the times. All the setting and final operation will be automatically saved after power-off.
- 7.Novel appearance, bitmap graphics screen which can display Chinese character. Humanized digital key input which makes the operation easier.
- 8.USB communication function.

Table 1. Output and measurement function

Function	Measurement	SignalOutput
DC Voltage (Upper of display)	0—30.000V	
DC Current (Upper of display)	0—24.000mA	
Loop Power Supply (Upper of display)	0—24.000mA	
DC V (Bottom)	0—24.000V	0—20.000V
DC mV (Bottom)	0—90.000mV	0—90.000mV
DC mA (Bottom)	0—24.000mA	Simulation or source output 0—24.000mA
Resistance (Bottom)	0—400.00 Ω 400.0—4000.0 Ω	5.00—400.00 Ω 400.0—4000.0 Ω
TC (Bottom)	Type S, R, B, K, N, E, J, T, (mV)	
RTD (Bottom)	Pt100(385) Pt100(3926) Pt100(3916) Pt200(385) Pt500(385) Pt1000(385) Cu100(ITS) Cu50(ITS)	

Safety Information

Process calibrator is designed according to international standard IEC1010-1, 1010.1-92 standard of international safety specification design and manufacture. User should use the calibrator as the instructions of this manual. Otherwise, the protection provided by the calibrator might be damaged.

“**Warning**” indicates the situation or action that might cause danger to the user.

“**Caution**” indicates the situation or action that might cause damage to calibrator or the equipment been measured.

To avoid electric shock or personal injury

- ◆ Do not use the damaged calibrator. Inspect calibrator and probes before using. If probe is damaged, the case is broken or without any display in the screen, do not start measurement.
- ◆ The calibrator should only be used with the fitted probe together which accords fully with the requirements of safety standards. The probe should be replaced by the same model which has same specification if broken.
- ◆ Never apply voltage over the rated voltage indicated on the calibrator between the ports or any port and the ground. The maximum voltage between the ports is 30V, 24mA.
- ◆ When the connector of probe is plug into current port, do not test any voltage source with the probe.
- ◆ Choose correct function and range gear as the measurement requirement.
- ◆ Please confirm the battery cover is close before using.
- ◆ The probe wire should be removed before to open the battery cover.
- ◆ Inspect whether there is damage or exposed metal on the wire. Inspect whether it works or not. The damaged wire should be replaced before using the calibrator.
- ◆ The finger is forbidden to touch the metal contact when using the probe. The fingers should keep behind the protector of probe.
- ◆ The common wire should be connected before electriferous measurement wire. And the electriferous measurement wire should be removed first.

◆ If the calibrator is abnormal, please do not use it. The protective measures might be destroyed. If any doubt, send it for repair.

◆ Never use the calibrator around the explosive gas, steam or dirt. Do not let the calibrator explore to strong light, high temperature or humid place.

◆ The battery should be installed in the outer-case correctly.

◆ The probe should be removed before change different measurement or output function.

◆ The calibrator should be repaired with specified replaced parts.

◆ To avoid reading error or might cause electric shock or personal injury, it should be charged immediately when there is the battery symbol  displayed on the upper right corner of the screen.

◆ To avoid the damage to calibrator or equipment been measured

◆ The power should be cut off before resistance test, and all high-voltage condensers should be discharged.

◆ Correct port should be used and corresponding function keys should be pressed during measurement and output process.

Symbol	Explanation	Symbol	Explanation
TC	thermoelectric couple		fuse
RTD	resistance temperature detector (thermal resistance)		battery pack
	important information.		power switch
CJC	thermoelectric couple cold junction compensation		

Acquainting the Process Calibrator

The keys and ports distribution of calibrator is shown in the following picture.

Top ports / Bottom ports





The following table is the wiring instructions of port function.

Remarks	Name	Instruction
Bottom	V/Ω、COM port	The port to test or output voltage, millivolt, resistance and RTD.
Bottom	mA+/3W、mA-/4W port	1. The input port to test resistance or RTD third & fourth wire. 2. Positive and negative port to test and output current.
Top	thermoelectric couple micro input/output port+TC-	Test or output thermoelectric couple port. This port can joint with a micro thermoelectric couple plug with polarity (Flat contactor). The distance from one contactor to the other one is 7.9 millimeter (0.312 inch).
Top	V/LOOP、COM port	The port to test voltage or provide LOOP for testing current.
Top	mA、COM port	The port to test current.

The key of calibrator is shown as follows. The following table is the explanation of their functions.



NO.	Key Name	Instruction
1	V	Choose voltage measurement function, and show the value in the upper part of screen. Use V/LOOP, COM port to input.
2	mA	Choose current measurement function, and show the value in the upper part of screen. Use mA, COM port to input.
3	LOOP	Start the loop power supply to test current, show the value in the upper part of screen. Use V/LOOP, COM port.
4	CONFIG	Enter into configuration menu of calibrator. Set and calibrate the parameter and show the corresponding parameter in the upper part of screen.
5	EXIT	Exit configuration menu, or exit from the function of saving data or invoking data.
6	v	Choose voltage function (in the bottom of screen), the screen shows “voltage” correspondingly. Switch measurement or output through “MEAS” and “SOURCE” keys.
	mA	Choose mA (current) function (in the bottom of screen), the screen shows “mA” correspondingly. Switch measurement or output through “MEAS” and “SOURCE” keys. Press this key repeatedly and choose source output or simulated output function cyclically. The screen shows “mA SOUR” or “mA SIMU” correspondingly.

	mV	Choose millivolt function (in the bottom of screen), the screen shows “mV” correspondingly. Switch measurement or output through “MEAS” and “SOURCE” keys.
	TC	Choose TC (thermoelectric couple) function (in the bottom of screen), the screen shows “TC” correspondingly. Switch measurement or output through “MEAS” and “SOURCE” keys. Press this key repeatedly and choose the type of thermoelectric couple cyclically. The screen shows the type of thermoelectric couple correspondingly.
	Ω	Choose resistance function. Switch measurement or output through “MEAS” and “SOURCE” keys.
	RTD	Choose RTC (thermal resistance) function (in the bottom of screen), the screen shows “RTC” correspondingly. Switch measurement or output through “MEAS” and “SOURCE” keys. Press this key repeatedly and choose the type of RTC cyclically. The screen shows the type of thermal resistance correspondingly.
7	MEAS	Choose measurement mode, the screen shows “measurement” correspondingly.
	SOURCE	Choose output mode, the screen shows “output” correspondingly.
	STORE	To enter data store function, it means to save the measurement value or output value in the bottom of scree into internal address, total 8 addresses. Press this key repeatedly to store data address. When there is date in the address, this address will be shown bold.
	RECALL	To enter data recall function, it means to display and output the value saved in the internal address. Press this key repeatedly to select data recall address.
8		Repeat 0%-100%-0% slope (as 25% step)
		Repeat 0%-100%-0% slope slowly
		Repeat 0%-100%-0% slope quickly
	SLOPE STOP	Stop automatic slope of the output function. Stopped for manual output and its manual step function.
9	Numeric key	Input the digital value in output mode.
10	OUTPUT	In the output mode, input digital value by numeric key and press this key to output the signal from ports.
	ENTER	When entering into data store function or data recall function, confirm the address to store data or recall data. And calibrate the time in configuration menu or be used with other keys.

	CLEAR	Remove the input data
11	0%	Press this key in output mode, it will callout the setting value 0% from the memory and shows output. Press “0%” key and “ENTER” key together, it will save current output volume as 0% value.
	-25%	Press this key in output mode, it will increase output 25% of the range from 0% to 100%.
	+25%	Press this key in output mode, it will reduce output 25% of the range from 0% to 100%.
	100%	Press this key in output mode, it will callout the setting value 100% from the memory and shows output. Press “100%” key and “ENTER” key together, it will save current output volume as 100% value.
12	left/right/up/down direction key	Press the left or right direction key in resistance measurement function or RTD measurement function, circularly select 2W, 3W, 4W measurement. Used for calibrating output function and adjusting corresponding functions in the configuration menu.
13	Wheel	Turning this wheel in voltage, current, mV output function. The value will reduce a unit when rotate it counterclockwise. The value will increase a unit when rotate it clockwise. It is not workable in other function gears.
14	CALDN	Used for calibrating the function in the bottom. The calibration methods please see the calibration specification.
15	BL	Back light switch

Basic Operation

1、 Configuration menu function

There are ten items of setting in configuration menu. Press “CONFIG” to enter into. Press EXIT to exit.

Setting 1. Adjusting the time to power-off. (The calibrator will power off after the setting time when there is no any operation.) The factory default value is 20 minutes. The detail operation step and explanation are as follow.

- 1) Press “CONFIG” it shows “power off time XX minutes” in the upper part of screen.
The unit is minute.
- 2) Press up or down direction key, to increase or reduce the power-off time, range: 0-60 minutes. When the power-off time is setting as 0, the calibrator will cancel auto power-off. Then it can only be powered off manually.

- 3) Press CONFIG, enter into the next level setting. Press EXIT to exit configuration menu.

Setting 2. Adjusting screen contrast. Factory default is 09. The detail operation step and explanation are as follow.

- 1) Press CONFIG, keep pressing and select setting 2. It shows "Screen contrast XX" in the upper part of screen.
- 2) Press up or down direction key, to increase or reduce the number in the screen, range: 0-16. When the number gets larger, the content in the screen gets weaker. When the number gets smaller, the content in the screen gets darker.
- 3) Press CONFIG, enter into the next level setting. Press EXIT to exit configuration menu.

Setting 3. Adjusting the delay time of back light (The calibrator will turn off the back light after the setting time when there is no any operation). Factory default value is 5 minutes. The detail operation step and explanation are as follow.

- 1) Press CONFIG, keep pressing and select setting 3. It shows "Turn-off time of back light XX minutes" in the upper part of screen. The unit is minute.
- 2) Press up or down direction key, to increase or reduce the turn-off time of back light, range: 0-20 minutes. When the turn-off time is setting as 0, the calibrator will cancel auto turn-off. Then it can only be turned off manually by pressing BL key.
- 3) Press CONFIG, enter into the next level setting. Press EXIT to exit configuration menu.

Attention. It can save the battery and increase the using time to set the turn-off time of back light shorter.

Setting 4. Setting calendar and time. The detail operation step and explanation are as follow.

- 1) Press CONFIG, keep pressing and select setting 4. It shows "Calendar time setting: XX year" in the upper part of screen. The unit is year.
- 2) Press up or down direction key, to increase or reduce year, range: 00-99 year.
- 3) Press ENTER, enter into the setting of month, and continuously set date, hour, minute and second.
- 4) Press CONFIG, enter into the next level setting. Press EXIT to exit configuration menu.

Setting 5. Setting temperature unit. The factory default is °C. The detail operation step and explanation are as follow.

- 1) Press CONFIG, keep pressing and select setting 5. It shows "Setting temperature unit: °C" in the upper part of screen.
- 2) Press up or down direction key, to select °C or °F circularly. When the temperature unit is changed, the unit in measurement and output TC or RTD function will also

be changed.

- 3) Press CONFIG, enter into the next level setting. Press EXIT to exit configuration menu.

Setting 6. Setting HART. The factory default is OFF. The detail operation step and explanation are as follow.

- 1) Press CONFIG, keep pressing and select setting 6. It shows "Setting HART: OFF (ON)" in the upper part of screen.
- 2) Press up or down direction key, to select ON or OFF circularly. If select "ON", select output current (mA) in the bottom of screen and series 250Ω resistance, it shows "HART" in the bottom of screen.
- 3) Press CONFIG, enter into the next level setting. Press EXIT to exit configuration menu.

Setting 7. Setting cold junction compensation. The factory default is OFF. The detail operation step and explanation are as follow.

- 1) Press CONFIG, keep pressing and select setting 7. It shows "Cold junction compensation: OFF (ON)" in the upper part of screen.
- 2) Press up or down direction key, to select ON or OFF circularly. If select "ON", it automatically does cold junction compensation in measurement or output TC function in the bottom of screen. It shows "CJC XX.X" in the bottom of screen, XX.X means the temperature of current cold junction compensation.
- 3) Press CONFIG, enter into the next level setting. Press EXIT to exit configuration menu.

Setting 8. Calibrating the temperature of cold junction compensation. Put the calibrator in the calibration environment for 10 minutes before starting the calibration. Start to calibrate when the temperature inside the instrument is as same as it in the environment. The temperature has better been around ten °C. The environmental measurement thermometer with accuracy $\pm 0.2^{\circ}\text{C}$ should be used as standard. The detail operation step and explanation are as follow.

- 1) Press CONFIG, keep pressing and select setting 8. It shows "Cold junction compensation: XX.X°C" in the upper part of screen.
- 2) Press up or down direction key, to increase or reduce the number in the screen. Adjust the temperature in the screen as same as the value in standard environmental measurement thermometer.
- 3) Press CONFIG, enter into the next level setting. Press EXIT to exit configuration menu.

Setting 9. System calibration turns on or off. The factory default is (OFF). The detail operation step and explanation are as follow.

- 1) Press CONFIG, keep pressing and select setting 9. It shows "System calibration

- setting: OFF (ON)” in the upper part of screen.
- 2) Press up or down direction key, to select ON or OFF circularly. If select “ON”, turn on the system calibration. Otherwise, turn off the system calibration.
 - 3) Press CONFIG, enter into the next level setting. Press EXIT to exit configuration menu.

Setting 10. Language selection. The detail operation step and explanation are as follow.

- 1) Press CONFIG, keep pressing and select setting 10.
- 2) Press up or down direction key, to select Chinese or English circularly.
- 3) Press CONFIG, enter into the next level setting. Press EXIT to exit configuration menu.

2、 Data store and recall.

Data store is to save the measurement or output (analog) data in the bottom of screen. The calibrator can save 8 packs of data in the NVM (nonvolatile memory) for recall in the future. The stored data will not lose after powering off the calibrator. The detail operation step and explanation are as follow.

- 1) Press STORE to enter into data store function. It shows “STORE” and address number “1...8” in the right up corner of screen, total 8 addresses. The current store address number will blink.
- 2) Keep pressing STORE and select store address number circularly. If there is already been data in this address number, it will be shown with black in the screen. If saving data here, the current data will be replaced.
- 3) Press ENTER key, confirm to save data in current selected place. The next data store address number will start to blink.
- 4) Press EXIT, exit the data store function.

Data recall is to display the data in the NVM (nonvolatile memory), output with output (analog) data. The detail operation step and explanation are as follow.

- 1) Press RECALL to enter into data recall function. It shows “RECAL” and address number “1...8” of data recall in the right up corner of screen, total 8 addresses. The current data recall address number will blink.
- 2) Keep pressing RECALL and select data recall address number circularly. If there is already been data in this address number, it will be shown with black in the screen.
- 3) Press ENTER key, confirm to recall the data in current selected place. The next data store address number will start to blink.

- 4) Press EXIT, exit the data recall function.

3、 Back light of screen

Press BL, turn on the back light. It will automatically turn off after the appointed delay time or press BL again to turn it off. The delay time can be set, the default value is 5 minutes.

Measurement functions

1、 Measurement functions in the upper part of screen.

1) To measure the voltage of transmitter, please operate as following steps.

- ① Press **V(1)**, select voltage measurement. The red and black probe connects to V/LOOP and COM port separately.
- ② Observe the reading in the upper part of screen, like over range “-OL-”. The maximum measurement value is 30V. Attention: Do not connect the high voltage over the range to any end of the ports. It may damage the instrument.

2) To measure the current of transmitter, please operate as following steps.

- ① Press **mA(2)**, select current measurement. The red and black probe connects to mA and COM port separately.
- ② Observe the reading in the upper part of screen, like over range “-OL-”. The maximum measurement value is 24mA. Attention: Do not connect the current over the range to any end of the ports. It may damage the instrument.

3) To measure the current with loop power supply LOOP

The LOOP function start a 24V power supply connects in series with current measurement circuit. It can achieve the function to power up the

transmitter and measure the current output of transmitter after the wiring is removed in site. If to use LOOP to measure current, please operate as following steps.

- ① Press **LOOP(3)** when the calibrator is in other measurement mode, it shows "LOOP" in the upper part of screen. Then the calibrator provides 24V loop power supply internally.
- ② The red and black probe connects to V/LOOP and COM port separately. Observe the reading in the upper part of screen, like over range "-OL-".