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Overview

AI-5600 Handheld High-Precision Digital Thermometer, based on 24-bit A/D converters and 16-bit MCU, features high precision, high stability, low power consumption, multiple input types, multiple measurement results, easy operation, etc. When suitable sensors are matched, it can be widely used for handheld precise temperature measurement and Ω/mV/mA precise measurement in production, scientific research and labs. Its main characteristics are as follows:

Input types:

Pt100, Pt1000, Cu50, Cu100, K, S, E, T, J, R, B, N, as well as Ω, mV, and mA signals. There are three compensation modes for thermocouples, including internal compensation, external compensation and manual(simulated) compensation.

Mathematical-statistical measurement:

In addition to basic measurement values, the relative value, maximum value, minimum value, average value, peak-peak value, standard deviation and sampling number can also be measured at the same time.

6-digital display, resolution can be set:

The highest resolution is 0.001℃ (RTD :Resistance Temperature Detector) or 0.01℃ (K/E/J/T/N thermocouple).

There are four display units for thermal resistances and thermocouples:

Which can be switched at will, including Ω or mV, ℃, ℉ and K.

Customized start-up display:

Including math modes, resolution, display units and the reference junction compensation modes.

Other:

Clear LCD layout, white backlight,

Easy keypad operation and smart and exquisite appearance,

Upper limit alarm and lower limit alarm can be set,

Users calibration is provided,

Low power consumption; three AA alkaline batteries, 1,500 hours battery life(typical value, backlight off）.

Adjustable sampling rate and the filter action.

Sensor offset correction, display holding.

Automatic backlight shut-off, automatic power shut-off and low battery voltage detection.

Specifications

(1) Measurement Range and Accuracy

tyPE Code	Type	Effective Measurement Range	1-year tolerance Δ (see the notes)	Temperature Coefficient (0~18) ℃ and (28~40) ℃
0	Pt100	(-100.000~+200.000)℃	±0.060℃	±0.003℃/℃
1	Pt100	(-200.000~+850.000)℃	±(0.02%RDG +0.060℃)	±0.010℃/℃
2	Pt1000	(-140.000~+320.000)℃	±(0.02%RDG +0.060℃)	±0.003℃/℃
3	Cu50	(-50.000~+150.000)℃	±0.080℃	±0.004℃/℃
4	Cu100	(-50.000~+150.000)℃	±0.060℃	±0.008℃/℃
10	Ω	(0.000~2220.00) Ω	±(0.02%RDG +50mΩ)	±20 mΩ/℃
11	mV	(-100.000~+200.000)mV	±(0.015%RDG+10μV)	±3uV/℃
12	mA	(-2.000~+24.000) mA	±(0.03%RDG +3μA)	±0.4uA/℃
13	K	(-200.00~+1372.00)℃	(-100~-1372)℃: ±0.50℃	±0.03℃/℃
			(-200~-100)℃: ±0.80℃	±0.05℃/℃
14	S	(0.0~1768.0)℃	(200~1768)℃:±0.8℃	±0.05℃/℃
			(0~200)℃:±1.2℃	±0.07℃/℃
15	E	(-200.00~+1000.00)℃	(-100~+1000)℃:±0.40℃	±0.03℃/℃
			(-200~-100)℃:±0.60℃	±0.05℃/℃

16	T	(-200.00~+400.00)℃	(-100~+400)℃:±0.50℃	±0.03℃/℃
			(-200~-100)℃:±0.60℃	±0.05℃/℃
17	J	(-210.00~+1200.00)℃	(-100~+1200)℃:±0.50℃	±0.03℃/℃
			(-210~-100)℃:±0.60℃	±0.05℃/℃
18	R	(0.0~1768.0)℃	(200~1768)℃:±0.8℃	±0.05℃/℃
			(0~200)℃:±1.2℃	±0.07℃/℃
19	B	(300.0~+1820.0)℃	(600~+1820)℃:±0.9℃	±0.05℃/℃
			(300~600)℃:±1.3℃	±0.07℃/℃
20	N	(-200.00~+1300.00)℃	(-100~+1300)℃:±0.50℃	±0.03℃/℃
			(-200~-100)℃:±0.90℃	±0.05℃/℃

Notes:

1) Based on ITS-90（ITS: The International Temperature Scale）; the environmental condition: (23±5)℃, ≤85%RH; it should be put in the stable environmental conditions for at least one hour, wait 5 minutes after start-up, with the menu parameters of S_rAtE=1 and FILt=1, exclusive of sensor errors. The tolerance is 1.2Δ in case of S_rAtE=2.

2) The thermal resistance and thermocouple's measurement range and tolerance shown in other units (Ω, mV, ℉ and K) are equivalent to the above table.

(2) **Resolution**: The highest resolution:

tyPE Code	tyPE	Electric Quantity	Celsius Degree ℃	Fahrenheit degree ℉	Kelvin K
0	Pt100	1mΩ	0.001℃	0.001℉	0.001K
1	Pt100	1mΩ	0.001℃	0.001℉	0.001K
2	Pt1000	10mΩ	0.001℃	0.001℉	0.001K
3	Cu50	1mΩ	0.001℃	0.001℉	0.001 K
4	Cu100	1mΩ	0.001℃	0.001℉	0.001 K
10	Ω	<998.000Ω:1mΩ ≥998.00Ω:10 mΩ			
11	mV	1μV	-----	-----	-----
12	mA	1μA	-----	-----	-----
13	K	1μV	0.01℃	0.01℉	0.01 K
14	S	1μV	0.1℃	0.1℉	0.1 K
15	E	1μV	0.01℃	0.01℉	0.01 K
16	T	1μV	0.01℃	0.01℉	0.01 K
17	J	1μV	0.01℃	0.01℉	0.01 K
18	R	1μV	0.1℃	0.1℉	0.1 K
19	B	1μV	0.1℃	0.1℉	0.1 K
20	N	1μV	0.01℃	0.01℉	0.01 K

Notes: The Fahrenheit degree (℉) is not the legal measurement unit in the P.R.C, so Fahrenheit degree (℉) cannot be used as temperature measurement unit except for special need.

(3) Stability of Indicating Values:

It is smaller than Δ/6 in a short period (10 minutes) and smaller than Δ/4 in a long period (8 hours).

Notes:

1) The stability of indicating values means the fluctuation range of indicating values at a stable input, and is defined as a half of the value the maximum value minus the minimum value (i.e. a half of P-P value). The stability of indicating values is associated with the input signal magnitude, S_rAtE value and FILt

value.

2) Measurement condition: the instrument is placed in the environment with stable temperature and humidity for 1 hour, wait 5 minutes after start-up, S_rAtE=1, FILt=1, MAN compensation mode is adopted for thermocouple, and 80%FS stable signals are input.

(4) Sampling Rate: The sampling rate is set by the menu parameter S_rAtE.

Input signals	S-rAtE=0	S-rAtE =1	S-rAtE =2
Thermocouple (INT/EXT Compensation)	3.3 times/s	6.6 times/s	12.1 times/s
Other input signals	3.5 times/s	7.0 times/s	13.2 times/s

(5) Power Supply and Power Consumption: Three 1.5V AA batteries. The operating current is no more than 1.5mA when the backlight is shut off, and about 27mA when turned on.

(6) Conditions for Application Environment:

Ambient temperature : (0~50)℃,

Ambient humidity : ≦85%RH

Environment conditions to ensure accuracy:

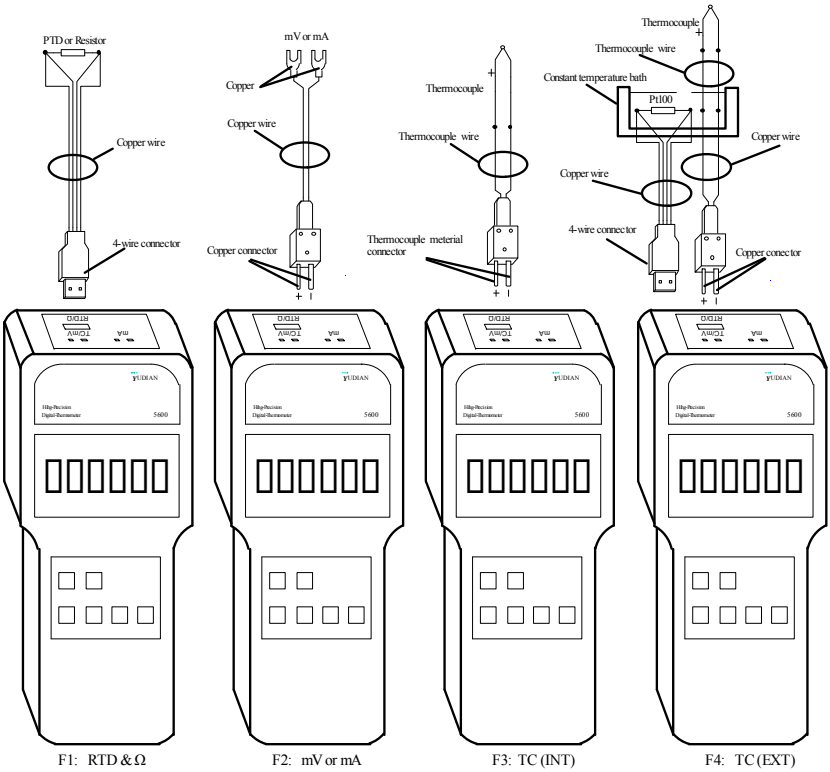
Ambient temperature : (23±5)℃,

Ambient humidity : 30~85%RH,

and there is no obvious electromagnetic interference.

(7) Dimensions and Weight: 155 X 70 X 30 mm, about 0.25kg (batteries included).

Input Wiring and Notes



1. Wiring for RTD and Ω type:

The 4-wire connection is adopted, which is shown as F1 in the above drawing. Two wires on the left side of the plug are connected to one end of the RTD or resistance, and two wires on the right side of the plug are connected to the other end of the RTD or resistance.

Special Notes: the 4-wire connection plug cannot be used as USB interface purpose. It cannot be pluged into any USB sockets of computers or other devices so as to avoid damage

2. Wiring for DC mV signals:

Pure copper conductor wires, plugs, connection lugs should be used for connection, which is shown as F2 in the above drawing. In order to minimize the influence of thermoelectric potentials, the surface feculences should be eliminated timely. The thermoelectric potentials for some materials and copper are as follows for reference.

Copper-Copper	0.2μV/℃	Copper-Silver	0.3μV/℃
Copper-Copper Oxide	1000μV/℃	Copper-Gold	0.3μV/℃
Copper-Tin	(1~3)μV/℃	Copper-Iron	10μV/℃

With regard to thermocouple or mV signals, wait for at least 5 minutes after the plug is inserted into the instrument, and start to measure after thermal balance so as to reduce the impact of thermoelectric potential!

3. Wiring with the interior reference end compensation method (INT) is adopted for thermocouples:

The same thermoelectric characteristics should be ensured for connection from the thermocouple measurement end to the plug, that's to say, the compensation wires and plugs should be used as the same type as the "tyPE", the extension type is preferable. See F3 in the above drawing.

4. Wiring with the manual reference end compensation mode (MAN) or the external reference end compensation mode (EXT):

Compensation wires are used for connection from the thermocouple to the constant temperature oven, and pure copper wires and plugs are used for connection from the constant temperature oven to the instrument. With regard to the external compensation mode (EXT), a four-wire Pt100 platinum resistance is required to be inserted into the constant temperature oven, and a four-wire plug is required to be connected to the RTD socket of the instrument, which is shown as F4 in the above drawing.

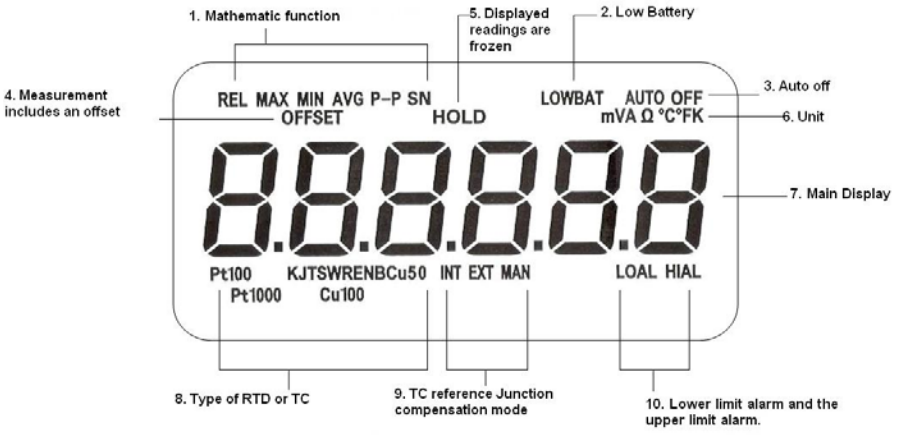
Note 1:

Insulation between the external wires of each socket should be ensured, or the measurement results will be affected.

Note 2:

If any signals exceeding 5V or 100mA are input, the instrument will be damaged.

Display Screen



(1) REL/MAX/MIN/AVG/P-P/SN:

Mathematic function, which respectively the relative value, maximum value, minimum value, average value, peak-peak value, standard deviation and sampling number. The standard deviation and sampling number have the same sign “SN”.

(2) LOWBAT:

This sign is displayed when the battery voltage is low;

(3) AUTOOFF:

The sign is displayed when the automatic shutdown is set.

(4) OFFSET:

The sign is displayed when in the menu the sensor’s correction value OFFSEt is not equal to 0.

(5) HOLD:

Display hold;

(6) mV / A / Ω / ℃ / ℉ / K:

Measurement units;

(7) 6-digital LCD display:

Measurement values or prompt information;

(8) Pt100 / Pt1000 / Cu50 / Cu100 / K / J / T / S / R / E / N / B:

Type of RTD and thermocouples. The “type” of the Ω, mV and mA functions is itself, so respectively use their display units Ω, mV and mA as their function signs.

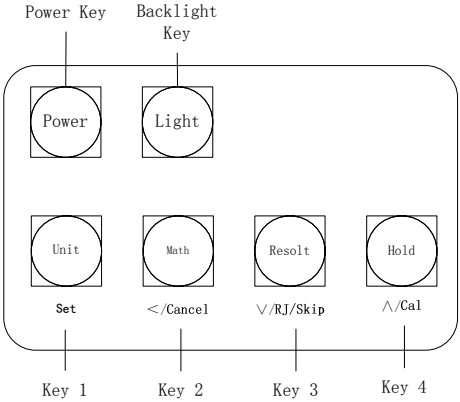
(9) INT/EXT/MAN:

Compensation modes for the thermocouple reference ends;

(10) LOAL/HIAL:

Indicates the lower limit or upper limit alarm.

Keypad Operation



Keys are divided into three types including the short keys, long keys and key. Long keys or key combinations (keys should be pressed and hold for 2 seconds) are used to realize the functions of Set, Cancel, RJ or Cal, and short keys are used to realize other functions.

(1) Power Key: Power switch, the automatic shut-off function can be realized when the menu parameter AutoFF is not equal to 0. That's to say, automatic shut-off can be realized when no key-press time is larger than or equal to the time set by AutoFF (unit: minute), and automatic shut-off is canceled when AutoFF is equal to 0.

(2) Backlight Key: Backlight switch. The absolute value of the menu parameter Auto.b.L is the backlight's automatic shut-off time (second), and the backlight's automatic shut-off function is canceled in case of Auto.b.L=0. The positive and negative signs of Auto.b.L indicate that if the buzzer sound for key-press and alarm exceeding the lower/upper limit is allowed or not: buzzer sound is allowed when

Auto.b.L is no less than zero, and buzzer sound is not allowed when Auto.b.L is less than zero.

(3) Key 1: in the measuring state, briefly press “Key 1” to switch display unit; press “Key 1” and hold it for 2 seconds to realize the “Set” function and enter menu settings. See Chapter 6 “Menu Settings” for details.

(4) Key 2:

1) In the measuring state, briefly press “Key 2” to select mathematic measurement functions: The functions can be switched in the eight states of “basic measurement values- REL-MAX-MIN-AVG- PP-s-n”. In which,

a) When no any “REL-MAX-MIN-AVG- PP-SN” signs appear, the value is the current measurement value.

b) REL is relative measurement value. It is similar to “manual zeroing”, subtracting the “reference value” from the current value, i.e. the REL value = current measurement value x_i –reference value. The “reference value” is the measurement value in the beginning of star-up, or the measurement vale in the beginning of altering input tyPE, or the measurement value in the moment of pressing “Cancel”.

REL can be used to measure very small temperature differences and realize the function of digital Beckmann thermometer.

c) MAX is the maximum measurement value. It is the maximum measurement value since start-up (or after pressing “Cancel”).

d) MIN is the minimum measurement value. It is the minimum measurement

value since start-up (or after pressing “Cancel”).

e) AVG is the average measurement value. It is the average value since start-up (or after pressing “Cancel”):

$$\text{AVG} = \bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

When the sampling number n exceeds 1 million times, the average value calculation will be suspended and the displayed AVG value remain the same.

f) P-P is the peak to peak value during measurement. It is equal to the peak to peak value for the measurement results since start-up (or after pressing “Cancel”), i.e. P-P=MAX - MIN.

g) SN is the standard deviation and sampling number, and s and n respectively refer to the standard deviation and sampling number below. The first displayed value of SN is the standard deviation, which is equal to the measurement value standard deviation since start-up (or after pressing “Cancel”):

$$s = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$, in which $$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

When the sampling number n exceeds 1 million times, the deviation value calculation will be suspended and the displayed value remain the same.

h) The second displayed value of SN is the sampling number, which is equal to the sampling number since start-up (or after pressing “Cancel”):

n≤999,999. n is shown as “OVER” in case of n≥1,000,000, which is a prompt that the average value and the standard deviation are the measurement results up to 1,000,000 times.

Notes: When the sampling number exceeds 1 million times, the average value, standard deviation and sampling number will be suspended and remain the same, and the measurement for REL/MAX/MIN/P-P is still progressing and is not subject to the sampling number.

2) In the measurement state, press “Key 2” and hold it for 2 seconds until “————————” is displayed in order to realize the clear (“Cancel”) function. The function refers to taking the current measurement value as the “reference value” for the new relative value, clearing all mathematic measurement results and restarting all mathematic measurement.

3) In the menu state, press “Key 2” briefly to realize the function of “shift key”; press “Key 2” and hold it for 2 seconds to realize the function of menu backwards.

4) In the menu state, briefly pressing Key 2 and Key 1 at the same time can also realize the function of menu backwards.

5) In the calibration state, press “Key 2” to cancel (ESCAPE) the calibration function, and then press “Key 4” to exit the calibration state.

6) In the measurement state, press “Key 2 + Key 4” and hold them for 2 seconds to calibrate internal compensation errors of thermocouple reference ends.

(5) Key 3:

1) In the measurement state, press “Key 3” briefly to change the display resolution.

2) In the measurement state, press “Key 3” and hold it for 2 seconds to select the compensation modes for thermocouple reference ends.

a) **INT** is the internal compensation mode: see 3.(3) above for its wiring.

b) **EXT** is the external compensation mode: see 3.(4) above for its wiring.

c) **MAN** is manual compensation mode for the reference ends’ temperatures: see 3.(4) above for its wiring, and the menu parameter mAn.tMP should be set to the temperature of constant temperature oven.

3) In the calibration state, press “Key 3” to skip the current calibration point (as well as other relevant calibration point) and enter the next calibration point.

4) In the menu parameter setting state, “Key 3” is the decrease key.

(6) Key 4:

1) In the measurement state, press “Key 4” briefly to realized the “HOLD” function, which means that the current measurement values and all mathematical measurement results remain unchanged until “Key 4” is pressed briefly again to deactivate the “hold” state. When exiting the menu, “HOLD” is canceled.

2) In the measurement state:

a) When the menu parameter CAL.Cod is equal to 808, pressing “Key 4” for long can be used for user calibration, and pressing “Key 2 + Key 4” for long

can be used for calibration of compensation errors of the thermocouple interior (INT) reference ends.

b) When the menu parameter CAL.Cod is equal to 5600, pressing “Key 4” for long can restore the factory calibration datum and settings.

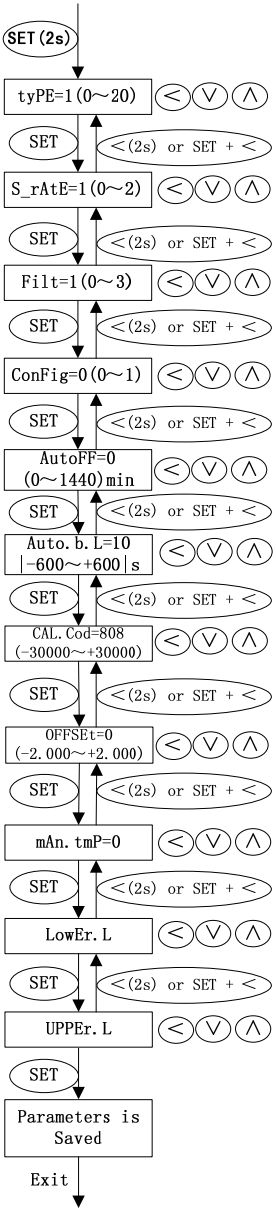
3) In the menu parameter setting state, “Key 4” is the increase key.

Menu Settings

Press “Key 1” (i.e. SET key) and hold it for 2 seconds to enter the menu. Once “Set” key is pressed briefly, the parameter name is displayed first, then if “Set” key is pressed again the parameter value will be displayed which can be modified with the keys of  .

The set menu parameters are saved when exiting the menu. The set parameters will not be saved in case of low battery voltage (“LOWBAT”) or automatically exiting the menu without key-press for 30 seconds.

The menu settings are as follows.



Input Seletion:in which 0=Pt100(-100～+200)℃, 1=Pt100(-200～+850)℃,2=Pt1000 (-140～＋320) ℃.Ref section 2(1).

Sample Rate Seletion:in which 0≈3.3times/s, 1≈6.6times/s, 2≈12times/s.

Filter Action Seletion:in which 0≈slightest,3＝most better.

Start-up Config:when =1,current RJ compensation mode,unit,resolution,math mode are saved so as to display in the same mannaer at next start-up.After setting, Config is auto-reset to 0.

Auto Power Off time:＝the one of no key-press(minute).When ＝0, Auto Off is canceled.

Its absolute value is the Auto BackLit shut-off time(second),among which 0 means Auto BackLit is canceled, the positive sign means buzzer sound is not allowed, and negative signs or zero means buzzer sound is allowed.

Calibration Code: when ＝808,user calibration is allowed, and when ＝5600, the factory calibration datum and settings can be restored.

The electric correction value(ie Offset) of sensor.

The manual setting value for TC reference junction temperature.

The setting value for the lower limit alarm.

The setting value for the upper limit alarm.

Parameters will not be saved if battery voltage is low.

Description of Menu Parameters

(1) Input Signal Type – tyPE: There are corresponding signs for thermal resistances and thermocouples. And the resistance /millivolt /milliampere ranges are signed with their units Ω/mV/mA respectively. In which, both tyPE=0 and tyPE=1 mean Pt100, and the main difference for the two types is that tyPE=0 is smaller measurement span but more stability than tyPE=1.

(2) Sampling Rate - S_rAte: The sampling features low rate but high accuracy in case of S_rAtE=0; the sampling features high rate but low accuracy in case of S_rAtE=2; thereby S_rAtE=1 is always adopted.

(3) Filter Time Constant – FiLt: The larger FiLt will have the stronger on filter action, however, the response will slower. FiLt can be set to 2 or 3 or commonly 1 in case of slow input variable.

(4) Start-up Customization – ConFig: If the current mathematic measurement mode, display unit, resolution and reference end compensation mode are expected to be kept for each start-up in the future, then the menu parameter "ConFig" should be set to 1, so that the current measurement and display forms can be saved after exiting the menu (the ConFig return to zero automatically at the same time).

(5) Automatic Shut-off Time – AutoFF: Its value represents the automatic shut-off time (minutes) in case of no key-press, and the function of automatic shut-off will be canceled in case of AutoFF=0.

(6)Automatic Backlight Shut-off Time - Auto.b.L: Its absolute value is the

automatic backlight shut-off time (second), the automatic backlight shut-off function will be canceled in case of Auto.b.L=0, and the negative sign only means that the buzzer sound for key-press and alarm is not allowed.

(7) Instrument Calibration Code - CAL.Cod: User calibration is allowed in case of CAL.Cod=808; it will restore the factory calibration datum and settings in case of CAL.Cod=5600.

(8) Sensor Correction Value (Offset) - OFF.SEt: The measured value is translated in the form of electric quantity value, i.e. $x_i=x_i$ + OFF.SEt. Only the electric quantity value can be used for setting.

(9) The manual setting value for reference end's temperature - mAn.tmp: Set the menu parameter mAn.tmp to the temperature value of the constant temperature oven in case of adopting the MAN compensation mode.

When verify the indicating value errors for the thermocouple of the instrument, sometimes it is inconvenient to use INT compensation mode, and the MAN compensation mode can be used. With regard to the MAN compensation mode, use copper conductor wires to connect the instrument and standard mV signal source, verify the basic indicating value errors, and then verify the compensation errors of the interior (INT) reference ends. Finally, errors with the INT compensation mode are the synthesis of the basic indicating value error and compensation error.

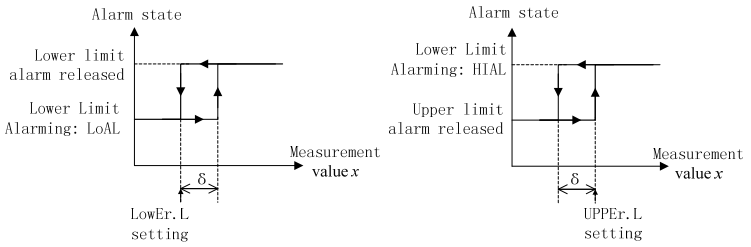
(10) The Upper and Lower Limit Alarm —LowEr.L and UPPEr.L:

1) The lower limit alarm value - LowEr.L: Once the measured value *x* is

smaller than the set lower limit value LowEr.L, LOAL alarm will be generated immediately. After the LOAL occurs, only the measured increases to no less than (LowEr.L + alarm hysteresis error δ) can the LOAL alarm be released. The alarm sound will stop automatically after 60 seconds, or can be deactivated by pressing any key.

2) The upper limit alarm value - UPPEr.L: Once the measured value *x* is larger than the set upper limit value UPPEr.L, HIAL alarm will be generated immediately. After the HIAL occurs, only the measured reduces to no more than (UPPEr.L- alarm hysteresis error δ) can the HIAL alarm be released. The alarm sound will stop automatically after 60 seconds, or can be deactivated by pressing any key.

3) The alarm hysteresis error δ is a fixed value for each tyPE, which cannot be changed by users. Δ≈(0.2~0.8)Δ (electric quantity). The alarm hysteresis error can avoid oscillation alarm near the alarm points.



Calibration

When the instrument exceeds the tolerance according to measurement verification or after repairing, user can perform calibration, and the factory calibration coefficient can be resumed if there are errors in the user calibration. User calibration includes instrument coefficient calibration and temperature error calibration for the interior reference ends. Before calibration, old batteries should be replaced with new ones, signal wires should be connected well, the instrument should be placed in the environment with stable temperature and humidity, before calibration you should wait for 30 minutes after start-up, and no obvious external interference factors should be guaranteed, so as to ensure accurate calibration results.

(1) Selection of standard device: Four-wire real material object resistance should be adopted for Ω standard signals, and no simulated resistance can be used; the internal resistance of the mV standard signal source should be less than 500Ω. The standard device's expanded uncertainty or tolerance should be no more than one third of the instrument's tolerance Δ, and enough stability should be ensured for the standard device during calibration. Please see the below table for requirements of the standard device:

Signal source	*U*,*k*=3	Signal source	*U*,*k*=3	Stability
28Ω	5mΩ	0mV	1.3μV	0.5μV

58Ω	5mΩ	18mV	1.6μV	0.5μV
158Ω	6.5mΩ	58mV	3.4μV	1.5μV
358Ω	22mΩ	158mV	7.0μV	3μV
648Ω	40mΩ	0mA	Open circuit is ok.	———
2048Ω	140mΩ	18mA	2.0μA	1.0μA

(2) Calibration Sequence: The sequence of "Ω→mV→mA" should be followed during calibration, and the error calibration for the interior reference ends should be carried out in the end. If some calibration point is skipped (Skip), then other relevant calibration point will be invalid or skipped.

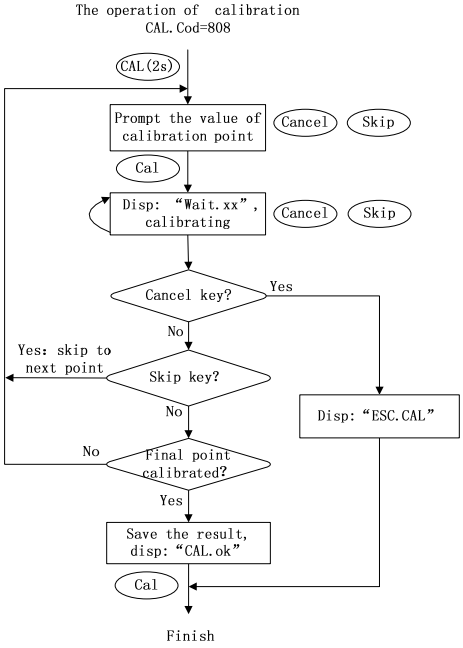
1) The sequence for Ω calibration points: 28Ω, 58Ω, 158Ω, 358Ω, 648Ω and 2048Ω. It is the RTD/Ω four-wire socket for input.

2) The sequence for mV calibration points: 0mV, 18mV, 58mV and 158mV. It is the TC/mV socket for input.

3) The sequence for mA calibration points: 0mA and 18mA. It is the mA socket for input and it is 0mA for input open-circuit.

(3) Calibration for Instrument Coefficients: Set CAL.Cod=808, and press "Key 4" for long to enter calibration. According to prompts, input each standard signal value in a point-by-point way, in which, "xxxxr" indicates the input value of xxxxΩ, "xxxxm" indicates xxxxmV and "xxmA" xxmA. The calibration

operation diagram is as follows.



(4) Calibration for Errors of the Interior Reference Ends: Set CAL.Cod=808, and press "Key 2 + Key 4" for long to enter calibration. Place the instrument in the environment with stable temperature, set the type to the thermocouple with larger thermoelectric potentials (K thermocouple or E thermocouple is favorable and B thermocouple, S thermocouple or R thermocouple is not suitable), set OFF.SEt = 0, set the compensation mode to the INT interior mode, connect the (class-Ⅰ) thermocouple. (The thermocouple need same as "tyPE" setting) to the TC/mV input end, place the measuring ends of thermocouple wires in the constant temperature oven (or ice bath) for 15 minutes, press "Key 2 + Key 4" at the same

time and hold them for 2 seconds when the instrument's indicating value vary less than 0.03℃/5min, when "rEF=?" is shown input the accurate temperature value (plus the correction value of the used thermocouple wire) of the constant temperature oven according to the indicated units (℃, ℉, K, mV), and press "Key 4" for confirmation at last. When "rEF=?" is shown, you can also press "Key 2" or "Key 3" for long to exit the error calibration for the interior reference ends.

(5) Restore for Factory Calibration State and Settings: Set CAL.Cod=5600, and press "CAL" for long to enter calibration. When there is prompt of "rEStor", press "Key 2" or "Key 3" for cancellation or press "Key 4" for confirmation, and then press "Key 4" to exit.

Description of Prompt Information

(1) PrA.Err: There are errors for the setting of calibration parameters. During temperature calibration for the interior reference ends, this sign will occurs if the tyPE is not set to the thermocouple or INT compensation mode is not set, so please set the correct parameters and then recalibrate it; if the sign occurs in case of start-up, it indicate errors for menu parameters, so please reenter the menu and reconfirm the menu parameters.

(2) Cod.Err: There are errors for the calibration code, so the calibration code should be correctly set for calibration.

(3) C 28.r, C 58.r, C 158.r, C 358.r, C 648.r and C 2048: "r" represents Ω,

indicating that the connected standard real material object resistance values are respectively equal to 28.000Ω, 58.000Ω, 158.000Ω, 358.000Ω, 648.00Ω and 2048.00Ω

(4) C 0.m, C 18.m, C 58.m and C 158.m: "m" represents mV, indicating that the input standard mV values are respectively equal to 0.000mV, 18.000mV, 28.000mV and 158.000mV.

(5) C 0mA and C 18mA: It indicates that the input standard mA values are respectively equal to 0.000mA (open-circuit) and 18.000mA.

(6) CA.FAIL: The calibration has failed. Press "Key 4" briefly to exit.

(7) CAL.ok: The calibration is successful and the calibration coefficient is saved. Press "Key 4" briefly to exit.

(8): ESC.CAL: Cancel calibration or resumption of factory calibration coefficients and settings, and press "Key 4" briefly to exit.

(9) rEStor: Resume the factory calibration coefficients and settings, and press "Key 4" for confirmation or press "Key 2" or "Key 3" for cancellation.

(10) rESt.ok: It has correctly resumed the factory calibration state and settings.

(11) Un.StAb: The input signals are not stable during calibration. Check if the input signals are stable and press "Key 4" briefly for redoing.

(12) rEF?: During temperature error calibration for the thermocouple's interior reference ends, it is required that the real temperature value (plus the used thermocouple's correction value, i.e. ℃ or mV value) of the constant temperature oven should be input.

(13) OVEr: 3 events will display this message.

1. During calibration for the reference ends, the correction value exceeds the tolerant range,

2. There are failures for the compensation components of the interior reference ends during measurement

3. The sampling number has exceeded one million times.

(14) WAIt.xx: In which, xx refers to the percentage of calibration progress.

(15) In.LoW: The input signals (including signals of the reference ends) are lower than the measurement range.

(16) In.HIgh: The input signals (including signals of the reference ends) are higher than the measurement range.

(17) In.Err: Abnormal input (open, broken and other situation for sensors).

(18) WrI.Err: There are errors for saving parameters, which may results from low battery voltage, so try to resolve this problem by replacing the batteries with new ones.

Accessories

(1) One K-type class-Ⅰ thermocouple wire with plug. (-40℃~250℃)

(2) One four-wire resistance measuring wire.

(3) One mV/mA measuring wire with two-wire plug.

Optional Accessories:

Customized probes with different structure forms can be provided.

(1) Precise platinum resistance probe: class-A, four-wire plug, with handle.

(2) Precise thermocouple probe: K-type, class-Ⅰ, with handle.

User Records

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