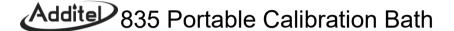# Additel 835

Portable Calibration Bath

835 Portable Calibration Bath

-------User Manual

[Version number: 2506V01]

Additel Corporation

Statement

This user manual provides operating and safety instructions for Additel 835 Portable Calibration Bath. To ensure correct operation and safety, please follow the instructions in this manual. Additel Corporation reserves the right to change the contents and other information contained in this manual without notice.

Content

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Safety Instructions

Please use the calibration bath strictly in accordance with this manual, otherwise the protective measures may become ineffective. Read the "Warnings" and "Notes" carefully.

Warning: To prevent fire, electric shock, or personal injury, always follow these instructions:

1. General

◆ Before using the bath, please read this manual carefully, especially the "Safety Instructions" section.

◆ Do not leave bath running at high temperatures unattended.

◆ This bath is intended for professional use only. Non-professional use may weaken its safety protection.

◆ Do not use the bath in an environment not specified in this manual. Inappropriate environments may weaken the safety protection.

◆ The device should be operated by trained professionals to prevent operator injury or equipment damage.

◆ Do not use this bath near flammable materials, as this may cause a fire under extreme circumstances.

◆ Avoid splashing heat transfer fluid onto the ground to prevent potential safety hazards.

◆ Before use, please check whether the bath is in good condition. If it is damaged or operating abnormally, please stop using it immediately and contact Additel.

2. Burn hazard

◆ Keep your body away from the parts of the device that may be hot or cold, such as the bath access opening, overflow port, drain port, overflow oil tank, fan outlet and nearby areas, so as to avoid harm.

◆ The device has a high temperature warning function. In the event of the temperature of the heat transfer fluid exceeding 50°C after startup, a warning sign ⚠ will be displayed on the top of the screen.

◆ Before use, please turn on the power and check the temperature of the bath liquid to prevent burns from residual heat from the last operation.

◆ Do not heat the heat transfer fluid above its ignition point unless necessary and authorized; the heat transfer fluid or its vapors may cause fire.

3. Electrical safety

◆ Before use, please make sure that the power supply is correct and the correct fuse is used in accordance with the user manual.

◆ When replacing the fuse, use the fuse that complies with the requirements of the user manual.

◆ When replacing the power cord, use a power cord with rated current and voltage that meets the requirements of the user manual.

◆ Before operating the internal parts of the bath, be sure to turn off the power and disconnect the power cord to prevent electric shock.

4. Heat transfer fluid safety

◆ Under certain circumstances, the fluids may generate hazardous or toxic fumes. Refer to the heat transfer fluid's Material Safety Data Sheet (MSDS) for detailed information and additional safety precautions.

◆ When the recommended silicone oil is heated above 150°C, trace amounts of formaldehyde and other harmful decomposition products may be produced. Please ensure good ventilation and fume exhaust.

◆ When using the recommended silicone oil heated to elevated temperatures, please wear a mask and safety glasses to avoid skin contact, and wash your hands promptly after use.

◆ If a fire occurs when using the recommended silicone oil, the following fire extinguishing methods can be used: water spray, alcohol-resistant foam, carbon dioxide (CO_2), dry powder.

Notes: To prevent damage to the bath or DUTs, as well as to avoid affecting the calibration results, please be sure to follow the instructions below.

1. Environment and storage

◆ Avoid using the bath in an environment with strong mechanical vibration.

◆ When in use, please ensure that the bath is in a horizontal and upright position and never operate it on a tilted or unstable surface.

◆ The bath is suitable for an ambient temperature range of 0-40℃, and it is recommended to operate within the range of 13-33℃ to ensure excellent performance.

◆ A minimum of 150 mm of space must be left in front and on the sides of the bath, and a minimum of 300 mm of space must be left at the rear to ensure that ventilation and cooling fans can function properly.

◆ Do not place other heat sources at the air inlets in front of and on the sides of the bath. Excessively high air inlet temperatures will affect the performance of the bath.

◆ Maintaining a stable ambient temperature around the bath and avoiding significant direct airflow will help ensure the performance of the bath.

2. Cleaning and maintenance

◆ Do not use the bath in harsh environments with a lot of dust. Dust may enter the bath and cause malfunctions or may block the air inlet, affecting the performance of the bath or causing damage.

◆ Regularly clean the dust screen at the air inlet of the bath using a brush or vacuum cleaner to ensure that the bath is always in good operating condition.

◆ Clean the surface of the bath regularly to keep it clean.

3. Heat transfer fluid management

◆ The overflow tank is used to collect the heat transfer fluid overflowed due to heating expansion and insertion of the

tested equipment. Due to its limited volume, monitor the fluid level inside the overflow tank.

◆ Before adding the heat transfer fluid, please ensure that the bath is placed stably, the overflow tank has been installed, and the drain plug has been tightened to prevent liquid from spilling.

◆ When adding heat transfer fluid into the tank, the heat transfer fluid level should be higher than the minimum liquid level line and close to the bottom of the overflow port.

◆ During the cooling process, please check the liquid level regularly to ensure that the liquid level is always above the minimum liquid level line. A low liquid level may affect the performance of the bath and may even cause damage.

4. Movement and transportation

◆ Do not move or transport the bath when it is full of fluid to prevent injury from spilling fluid.

◆ Before transportation, please drain the heat transfer fluid in the tank. Do not invert, overturn, or tilt the bath during transportation to prevent the heat transfer fluid from entering the bath and damaging it, or flowing out of the bath and contaminating other equipment.

5. Special notes for ADT835-150

◆ If ADT835-150 bath is tipped over or inverted during transportation and storage, be sure to stand it upright and let it stand for more than 30 minutes before power on.

◆ The condenser of ADT835-150 is prone to dust accumulation, which will cause air duct to be blocked and will reduce the performance of the bath and even cause equipment damage. Therefore, please use a vacuum cleaner or compressed air to clean the condenser regularly.

◆ After ADT835-150 bath has been running at low temperatures for a long time, the silicone oil in the bath will absorb moisture from the air and produce a large number of ice crystals, which will affect the accuracy, stability and uniformity of the bath. In this case, please heat the silicone oil to 100 ° C to remove moisture. When the silicone oil is heated above 100 ° C, the silicone oil may overflow on to the table due to the violent boiling of water. Please pay

attention to the safety of operators and equipment.

◆ When ADT835-150 is operated at low temperatures for a long time, it is recommended to seal the bath to reduce air flow so as to reduce the formation of ice crystals.

◆ When the ambient temperature ≥ 30 ℃, the performance of refrigeration system will be restricted; when the ambient temperature ≥ 40 ℃, the refrigeration system will be shut down and cannot provide cooling function. For details, please refer to the section of "Temperature Source Specification".

Symbols

Symbol	Description
⚠	Hazard warning
⚠	Hazardous voltage, risk of electric shock
⚠	High temperature warning
C€	Comply with EU standards

1.Unpacking instructions

1.1 Unpacking

Please carefully unpack the box and store it properly for subsequent product transportation or transfer. After unpacking, carefully check the product. If any parts are found to be damaged, please contact Additel immediately. If you need to return the product, be sure to use the original box. If you need to order a new box, please also contact Additel.

1.2 Standard accessories

Table 1   Portable calibration bath standard accessories

Items	Qty.	ADT835PC-150	ADT835-150	ADT835PC-250	ADT835-250
Multiple hole Teflon cover	1 pc.	●	●	●	●
Protection basket	1 pc.	●	●	●	●
Fluid overflow box	1 pc.	●	●	●	●
AC power cord	1 pc.	●	●	●	●
USB communication cable	1 pc.	●	●	●	●
Test leads (1 red, 1 black)	2 sets	●		●	
Fuses	2 pcs	●	●	●	●
Calibration certificate and user manual	1 set	●	●	●	●

2.Introduction

2.1 Summary

2.1.1 Production introduction

The ADT835 Portable calibration bath is a new generation of thermostatic bath, which integrates portability, large bath size, excellent temperature controlling stability, temperature uniformity and fast control rate. It has two models: ADT835-150 (-30℃～150℃) and ADT835-250 (33℃～250℃). Each model can be optional equipped with a built-in high-precision process calibrator to meet diverse calibration needs.

The ADT835 features a well size of 90mm x 90mm. Unlike typical integrated dry-liquid baths, the ADT835 delivers exceptional versatility—accommodating temperature sensors of virtually any type, size, or shape. It also supports batch calibration of multiple temperature sensors.

Combining the precision and reliability of a traditional calibration bath with the portability of a bath, the ADT835 is a dependable choice for demanding calibration environments

2.1.2 Integrated three-channel high-precision process calibrator (only for ADT835PC-150 and ADT835PC-250)

The ADT835 offers an optional built-in three-channel high-precision process calibrator, designed to streamline field operations. It combines the functions of a thermometer, multimeter, 24V power supply, and HART handheld communicator, enabling the ADT835 to manage a wide range of calibration tasks effectively.

◆Convenience: quick push connectors, allowing for tool-free, rapid connections regardless of the connector type.

◆One reference channel: compatible with smart secondary reference PRTs, providing the accuracy of up to ±0.05℃, also supports user-provided reference thermometers.

◆Two channels for DUTs: support RTDs, TCs, temperature transmitters, HART temperature transmitters, and temperature switches.

2.1.3 Intelligent design improves user experience

Aside from excellent performance, ADT835 also focuses on optimizing user experience:

◆Intelligent calibration: Automatically documents calibration tasks, reducing manual recording workload and avoiding omissions or errors.

◆Efficient tools: Smart application tools significantly enhance testing efficiency.

◆Remote control: Supports intelligent remote access, enabling parallel workflows and improved productivity.

◆Touchscreen display: The intuitive 6.5-inch TFT touchscreen is user-friendly and easy to operate, allowing even beginners to get started quickly.

2.1.4 Versatile applications—Ideal choice for temperature calibration

ADT835 is widely used across multiple industries, including pharmaceuticals, biotechnology, food, power, petrochemicals, metrology, metallurgy, machinery, and transportation. It is particularly suitable for on-site process calibration, maintenance workshops, and laboratory environments, significantly improving calibration efficiency for metrologists and test engineers. As a result, it stands as the premier solution for temperature calibration.

The following table lists typical application scenarios.

Table 2   Typical application scenarios

No.	Application	Jigs	Pictures
1	Open batch calibration	Circular bracket + Protection basket	
2	Open batch calibration	Circular bracket + Protection basket	

3	Open batch calibration	Adjustable multiple hole jig	
4	Open single calibration	Clamp bracket	

5	Closed precision calibration	Multiple hole Teflon cover + Protection basket	

◆Open calibration is intended for batch calibration of low-precision temperature sensors, large dial low-precision sensors, or temperature transmitters.

◆Closed calibration is designed for precision temperature sensors or transmitters, featuring insulation to minimize heat loss.

2.2 Main features

◆Optimal balance of performance & portability – brings the temperature calibration lab directly to the field.

◆Versatile sensor compatibility – easily calibrates various types, sizes, and shapes of temperature sensors, reducing user calibration costs.

◆High-efficiency batch calibration – supports simultaneous calibration of multiple sensors, significantly improving efficiency.

◆Wide temperature range – covers most process applications, meeting the calibration needs of many temperature sensors.

◆Excellent temperature control accuracy – supports external reference thermometers.

◆Superior temperature stability & uniformity – ensures reliable calibration and testing results.

◆Rapid heating/cooling – saves multiple times the duration compared to standard calibration baths.

◆Adjustable control rate – accommodates the calibration of various temperature switches.

◆Built-in heat transfer fluid monitoring – tracks viscosity and low-level conditions to ensure stable and safe operation.

◆Patented dual heating technology (internal & external) – strong anti-interference capability, ideal for demanding field use.

◆Optional built-in 3-channel high-precision process calibrator – quick-push wiring eliminates the need to carry multiple instruments.

◆Current reversal RTD measurement – eliminates thermal EMF effects.

◆Optional smart reference probes – plug-and-play convenience.

◆Automated calibration documenting task – simplifies manual recording, preventing omissions or errors.

◆One-key self-calibration (internal sensor) – no manual data entry or deviation calculations required.

◆Smart remote control – enables parallel workflows for enhanced productivity.

◆Intelligent applications – streamlines testing procedures for greater efficiency.

◆Professional heat transfer fluid protection– easy to use and maintain.

2.3 Safety features

◆Over temperature hardware protection;

◆Over temperature software protection;

◆Auto shut down when controlling sensor is out of range;

◆Auto shut down when the temperature inside the shell exceeds 70℃;

◆Auto cut when the heater is overload or becomes shorted;

◆Automatic detection of actuator failure, disable temperature control in case of failure;

◆Automatic detection of measurement failures, disable temperature control in the event of failures.

![Additel]

2.4 Basic structure

Figure 1 ADT835 Basic structure

Table 3 ADT835 Basic structure

No.	Name	Description
1	Display	Display area, touch screen
2	Power button	Switch on and off
3	AC power supply	Connect to power cord
4	Electrical panel	Plugs for smart reference thermometer, test leads and TCs
5	Firmware reset button	Please contact Additel before operating this button, otherwise it can cause damage to the unit
6	USB Port (Host)	Connect USB disk for system upgrade
7	USB Port (Device)	USB communication to host computer
8	Ethernet Port	Connect to Internet
9	Bath sealing cover	Seal the bath during short-distance transportation to prevent the heat transfer liquid from spilling
10	Overflow port and plug	To overflow heat transfer fluid that expands due to heat
11	Fluid overflow box	To store heat transfer fluid that expands due to heat
12	Drain port	To drain the heat transfer fluid
13	Ventilation port	To cool down the heat transfer fluid (only for ADT835-250)
14	Cooling fan	Cooling the device. For ADT835-150, it can also cool down the condenser
15	Air inlet	Device cooling air inlet, including front inlet and side inlet

16	Motor cooling port	Used to cool down the motor. When facing the display, the left port is the air inlet and the right port is the air outlet.

2.5 Model description

Table 4 ADT835 model description

Functions	ADT835PC-150	ADT835-150	ADT835PC-250	ADT835-250
3-channel high precision temperature readout	●		●	
mA/mV/V/Ω measurement	●		●	
Switch measurement	●		●	
24V loop power	●		●	
HART communication	●		●	
Quick-Push connectors	●		●	
Int. temperature control	●	●	●	●
Ext. temperature control	●		●	
Self-calibration	●		●	
Documenting task	●		●	

Step test	●	●	●	●
Thermal calculator	●	●	●	●
Sensor library	●	●	●	●
Screenshot	●	●	●	●
Smart remote control	●	●	●	●
Smart diagnosis	●	●	●	●
USB upgrade	●	●	●	●

3.Technical Specifications

3.1 General specification

<p align="center">Table 5   General specification</p>

Category	Items	ADT835-150/ADT835PC-150	ADT835-250/ADT835PC-250
Heat transfer fluid	Recommended	Dow Corning XIAMETER PMX-200 10cSt	Dow Corning XIAMETER PMX-200 50cSt
	Volume	2.5 L	2.5 L
Bath size	Size	90 * 90 mm	
	Max. depth	155 mm	
	Working area	Bath center φ75mm circular zone, 15mm above bath bottom, 65mm below the fluid level, maximum depth 155mm	
Dimensions and weight	Main structure	7.5 × 16.2 × 15.2 in (191(W)×412(H)×387(D)mm)	
	Max. size	7.5 × 18.1 × 16.77 in (191(W)×460(H)×426(D)mm) (with handle, overflow tube)	
	Weight (exclude fluid)	35.27 lbs. (16 kg)	30.86 lbs. (14 kg)
	Dimensions with carrying case	430 × 575 × 560 mm(W×H×D)	
	Weight with carrying case	55 lbs. (25 kg)	50.7 lbs. (23 kg)
Power supply	Power supply	（90～254）VAC, (45～65) Hz	
	Max. power	800 W	

	Fuses	220 V input: 250VAC, T4A；110 V input: 250VAC, T8A	
Communication	Ports	USB-A, USB-B, LAN, WIFI, BLE	
Display	Touch screen	6.5 in (165 mm) color capacitive touch screen, anti-reflective panel, Dark or bright theme switchable	
	Resolution	640 × 480	
	Display refresh rate	Communication：10 times/s，display：4 times/s	
	Temp. units	℃, ℉, K	
	Highest resolution	0.001℃	
	Languages	English, Chinese, Japanese, Russian, German, French, Italian, and Spanish	
Noise	Stand by	52 dB(A)	52 dB(A)
	Maximum	60 dB(A)	60 dB(A)
Environment	Operating temp.	0℃～40℃	
	Guaranteed accuracy	13℃～33℃	
	Storage temp.	-20℃～60℃	
	Humidity	5%RH～95%RH, non-condensing	
	Altitude	＜2000 m	

3.2 Temperature specification

This technical specification describes the measurement uncertainty of the product within one year after calibration, using the recommended heat transfer fluid and the fluid level is above the lowest line, the working area is a cylindrical area of φ75mm circular zone of bath center, 15mm above bath bottom & 65mm below the fluid level, when the bath is not open and the ambient temperature is 13℃～33℃, with a confidence level of 95% (factor k = 2).

When the ambient temperature exceeds the range of 13℃～33℃ and still within the recommended working environment range, please multiply the stability and uniformity specification by 1.25.

When the bath is open, please multiply the stability and uniformity specification by 1.25.

Table 6   Temperature specification

Items	ADT835-150/ADT835PC-150	ADT835-250/ADT835PC-250
Range [1]	(-30～150)℃	(33～250)℃
INT REF accuracy [2]	±0.1℃	±0.1℃
EXT REF accuracy [3]	±0.05℃	±0.05℃
Stability [4]	±0.01℃	±0.015℃
Uniformity [5]	±0.02℃	±0.03℃（≤200℃） ±0.04℃（>200℃）
Repeatability [6]	0.04℃（internal reference） 0.01℃（external reference）	0.04℃（internal reference） 0.01℃（external reference）
Heating time [7]	-30℃～23℃：18min 23℃～150℃：30min	23℃～100℃：20min 100℃～250℃：35min

Cooling time [7]	150℃～23℃：45min 23℃～-25℃：45min 23℃～-30℃：55min	250℃～100℃：30min 100℃～33℃：45min
Typical time to stability [8]	10min	10min

[1] The lower limit of controlling range can vary depending on the environmental temperature.

[2] The internal reference accuracy takes into account the following sources of error including calibration uncertainty, stability, uniformity and repeatability.

[3] The external reference accuracy is available for ADT835PC-150 and ADT835PC-250, the reference probe used is Accumac model AM1730-12-ADT. (metal stem)

[4] Stability is defined as half of the difference between the maximum and minimum temperature variations of the heat transfer fluid within the working zone over a 10-minute period after the product has reached full stabilization.

[5] Uniformity is defined as half of the difference between the highest temperature point and the lowest temperature point in the valid working area.

[6] Repeatability considers the hysteresis and short-term stability of the reference sensor.

[7] Heating and cooling times are measured from the start of temperature control to when the set point is reached within the internal accuracy error band. Actual times may vary depending on ambient temperature, AC power supply voltage, sensor load, and whether the bath is covered during operation.

[8] The typical time to stability refers to the time taken for the temperature in the bath to reach the stability tolerance after the heating or cooling time ends.

3.3 Electrical specification (only for ADT835PC-150 and ADT835PC-250)

Table 7   Electrical specification

Channels	Category	Items	Specification
Reference RTD channel (EXT. REF)	RTD measure	Range	(0～400)Ω
		Accuracy	±1.25mΩ @ (0～50)Ω, ±0.0025%RD @ (50～400)Ω
		Resolution	0.1mΩ
		Temp. coefficient	±1ppm F.S/℃@(0～13)℃ and (33～50)℃
		Excitation current	0.75mA
		Technology	4-wire, true Ohm
		RTD type	PT25, PT100
DUT channels （CH1, CH2）	Current measure	Range	(-30～30)mA
		Accuracy	±(0.01%RD+2μA)
		Resolution	0.1μA
		Temp. coefficient	±5ppm F.S/℃@(0～13)℃ and (33～50)℃
		Input impedance	<10Ω
	Voltage measure	Range	(-30～30)V,(-12～12) V
		Accuracy	±(0.01%RD+0.6mV)
		Resolution	0.1mV
		Temp. coefficient	±5ppm F.S/℃@(0～13)℃ and (33～50)℃
		Input impedance	>1MΩ
	Switch measure		Mechanical switch or electrical switch
	Loop power		24 V±10%（with Load), 24 V±1%（no Load), Max 60mA for supply power to

		temperature transmitter and electronic thermometer	
	HART	CH1 supports measure and adjust HART transmitter	
	Ports protection voltage	50V	
	RTD measure	Range	(0～400)Ω and（0～4000Ω）（auto）
		Accuracy	±2.0mΩ@(0～25)Ω, ±0.004%RD@(25～400)Ω ±0.005%RD@(400～4000)Ω(4-wire measure)
		Resolution	0.1mΩ
		Temp. coefficient	±2ppmF.S/℃@(0～13)℃ and (33～50)℃
		Wires	2/3/4
		RTD type	Pt10, Pt25, Pt50, Pt100, Pt200, Pt500, Pt1000, Cu10, Cu50, Cu100, Ni100, Ni120, custom
	TC measure	Range	(-75～75)mV
		Accuracy	±（0.01%RD+5μV）
		Temp. coefficient	±5ppm F.S/℃ @(0～13)℃ and (33～50)℃
		TC type	S, R, B, K, N, E, J, T, C, D, G, L, U
		Cold junction range	0℃～50℃
		Cold junction accuracy	±0.2℃

Note: This specification reflects the bath's accuracy within one year after calibration, at a confidence level of 95% (k=2).

3.4 Temperature sensor measurement specification (only for ADT835PC-150 and ADT835PC-250)

Table 8   Temperature sensor measurement specification

Channel	Type	Accuracy							
Reference RTD channel（EXT. REF）	PT25	Temp. (℃)	-30	0	50	100	150	200	250
		Accuracy (℃)	±0.013	±0.013	±0.013	±0.013	±0.013	±0.014	±0.014
	PT100	Temp. (℃)	-30	0	50	100	150	200	250
		Accuracy (℃)	±0.006	±0.006	±0.008	±0.009	±0.011	±0.012	±0.013
DUT channels （CH1, CH2）	PT100	Temp. (℃)	-30	0	50	100	150	200	250
		Accuracy (℃)	±0.009	±0.010	±0.012	±0.015	±0.017	±0.019	±0.021
	K-TC	Temp. (℃)	-30	0	50	100	150	200	250
		Accuracy (℃)	±0.14	±0.13	±0.13	±0.13	±0.14	±0.15	±0.15
	N-TC	Temp. (℃)	-30	0	50	100	150	200	250
		Accuracy (℃)	±0.20	±0.19	±0.19	±0.18	±0.17	±0.17	±0.17
	E-TC	Temp. (℃)	-30	0	50	100	150	200	250
		Accuracy (℃)	±0.09	±0.09	±0.08	±0.08	±0.08	±0.09	±0.09
	J-TC	Temp. (℃)	-30	0	50	100	150	200	250
		Accuracy (℃)	±0.11	±0.10	±0.10	±0.10	±0.11	±0.11	±0.11
	T-TC	Temp. (℃)	-30	0	50	100	150	200	250
		Accuracy (℃)	±0.14	±0.13	±0.12	±0.12	±0.11	±0.11	±0.11

Note 1: The measurement accuracy specification does not include the accuracy of the DUT itself;

Note 2: Thermocouple measurement accuracy is calculated based on the cold junction temperature of 0° C and does not include the error of the CJC sensor.

3.5 Certification standards and mechanical performance

Table 9   Certification standards and mechanical performance

Category	Items	Standard
EMC-Directive (electromagnetic compatibility)	ESD immunity	Contact discharge ±4kV，air discharge ±8kV
	Radio frequency electromagnetic radiation immunity	10V/m（80MHz～1GHz），3V/m（1.4GHz～2GHz），1V/m(2GHz～2.7GHz)
	Conductive disturbance immunity of RF field induction	Power port：10V（150kHz～80MHz） Signal port：10V（150kHz～80MHz）
	Voltage sag	0% 1 cycle, 40% 10 cycles, 70% 25 cycles
	Short break	0% 250 cycles
	Disturbance Resistance of Electric Fast Instantaneous Pulse Group	±1kV（Signal port），5kHz/100kHz，1min
		±2kV（Power port），5kHz/100kHz，1min
	Surge immunity	±1kV（line to line）/±2kV（line to ground）
	Radiation emission	Level B
	Conductive emission	Level B
LVD- Directive (safety)	Insulation	L/N - FG 1.5kV, BI L/N - OP 3kV,PI
	Insulation resistance	Test condition 1kV DC，〉1000MΩ
Mechanical performance test	Vibration test	2g（High frequency：10Hz～500Hz～10Hz），3 axial tests, 30 mins each, scan rate 1oct/min

		2g（Low frequency: 5Hz～200Hz～5Hz）, 3 axial tests, 30 mins each，scan rate 1oct/min
	Impact testing	5g, 3 axial tests, 100 times each, half sine wave
	Drop test	0.25 m(base unit), working surface（bottom）, 2 times 1 m（with package），One corner, three edges, six sides，one time each

![Additel logo]

4.Installation and Usage

4.1 Installing the accessories

4.1.1 Installing the Bath sealing cover

Figure 2 Bath Sealing Cover Installation Diagram

1. Loosen the hand screw.
2. Using the contact line between the Bath sealing cover and the motor housing as the axis, rotate upward and remove the cover.

4.1.2 Installing the test jigs

Figure 3 Test Jig Installing Diagram

1. Screw the column on to the handle.
2. Insert the clamp/support ring into the slider and lock thightly.
3. Adjust the slider to the appropriate position and lock thightly.

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4.1.3 Installing the Overflow tank

Figure 4 Overflow Tank Installing Diagram

1. Unscrew the Overflow port plug.
2. Unscrew the Overflow tank cover.
3. Insert the Overflow tank's buckle into the slot on the back plate of the main unit and make sure it is intserted in right place.

Note: The Overflow port plug and the Overflow tank cover can be stored in the storage slot on the tank.

4.1.4 Installing the Protection basket and adjustable Adjustable multiple hole jig

Figure 5 Heat Balance Protective Barrier and adjustable tri-clamp bracket

1. Put the heat balance protective barrier into the slot from the slot port until the handle and worktable contact.
2. Put the adjustable bracket into the slot to be level.
   3. To adjust the insertion depth, firmly squeeze the bracket handle inward. Once the height is adjusted to the right position, release it.

Note: The heat balance protective barrier and mobile chunk are not essential equipment and only designed for specific requirement.

4.2 Power connection

To prevent possible electric shock, fire and personal injury, please connect the three-wire power cord provided with the product to the properly grounded power outlet. Please do not use two-wire power strips or extension cords, as this may disconnect the protective grounding connection.

When plugging the power cord of the constant temperature bath into the power outlet, please ensure that the voltage, frequency, and current of the power comply with the technical specifications of the product. For detailed information of power requirements, please refer to "Technical Specifications".

4.3 Fill the heat transfer fluid

The proper choice of the heat transfer fluid plays a key role in ensuring the product operates normally across the whole temperature range and meets the performance specification. Additel provides recommended heat transfer fluid (optional), please refer to the "General Specifications" section. Users can also choose other heat transfer fluid; But it should be noted that when using other fluid, the applicable temperature range may be limited, and the temperature stability and uniformity may change. The viscosity of the heat transfer fluid should not exceed 50 CSt at any working temperature. For more information on selecting heat transfer fluid, please refer to "Heat Transfer Fluids."

Requirements of the heat transfer fluid:

◆ Fluid level standard: It is generally recommended to fill the heat transfer fluid up to the maximum level which means flush with the overflow port, and the minimum filling amount cannot be below the "MIN" level line.

◆ Pre- filling check: Before filling the heat transfer fluid, ensure checking if there are impurities inside of the constant temperature bath, such as dirt, mud, or the residual packaging materials.

◆ Heat transfer fluid requirement：Please use uncontaminated and clean heat transfer fluid for filling.

◆ Filling operation: When filling, carefully pour through the bath opening and ensure that the overflow tank is clean and properly installed. Please note that If there is no heat transfer fluid in the constant temperature bath or if the fluid

◆Immerse the sensor in the fluid, making sure that the tip of the probe remains at least 15 mm above the bottom of the tank and within 65 mm below the fluid surface.

◆If a reference probe is used, it should be placed in the center of the working area to ensure accuracy.

◆For the specific range of the working area, please refer to chapter "Technical Specifications".

4.4.2 Ventilation

1. To ensure personal safety, please be sure to carefully read the MSDS of the heat transfer fluid and take corresponding precautions. Some heat transfer fluids may be corrosive, toxic, or irritating to the skin, eyes, nose and respiratory system.

2. Be sure to use the ventilation system to promptly exhaust the vapor generated by the heat transfer fluid and maintain air circulation in the working environment. Do not use heat transfer fluids that are corrosive to stainless steel to avoid damage to the equipment.

3. When the temperature exceeds a certain value, the heat transfer fluid may produce harmful substances such as formaldehyde. Silicone oil as an example, its safety data sheet usually indicates that there may be such risks when the temperature reaches 150℃.

4. Heat transfer fluid vapor can be a fire hazard, especially when working in an environment above its ignition point. In addition, it can easely condense on the surface of surrounding objects, which will not only contaminate materials and destroy the clean environment of the laboratory, but may also accumulate on the floor, causing the floor to be slippery and increase safety hazards.

5. To ensure that vapors can be effectively exhausted, a ventilation duct with a diameter of no less than 75 mm (3 inches) and an air flow rate between 1.4 - 1.7 cubic meters per minute (50 cfm - 60 cfm) should be considered. The air inlet of the ventilation duct should be as close to the top of the tank as possible to improve ventilation efficiency.

4.4.3 Calibration with comparative method

1. The principle of comparative method is to compare the DUT probe with the reference probe. After inserting the DUT into the thermostatic bath, it is necessary to wait for sufficient time for the probe temperature to reach equilibrium with the temperature in the bath, and at the same time ensure that the temperature of the bath is stable.

2. Compared to the bath, using a calibration bath to calibrate multiple probes has a significant advantage, namely that the probes do not need to be identical in structure. The heat transfer fluid in the bath enables simultaneous calibration of different types of probes. When calibrating, all probes must be inserted to the same depth and to a sufficient depth to avoid heat dissipation affecting the calibration results. As a rule of thumb, to minimize heat dissipation, the probe immersion depth should be 20 times the probe diameter plus the length of the probes sensing element.

3. When calibrating over a wide temperature range, it is usually recommended to start from the lowest temperature and then gradually increase to the highest temperature. This can reduce the number of times of refill and achieve better calibration results.

4. The multiple hole teflon cover or single clamp bracket can be used to fix the probe, or you can design other suitable probe fixing devices. When fixing, make sure that the reference probe and the DUT probe are both located in the working area of the bath and as close as possible, but not touching the surface of the bath. If the working area of the thermostat can be covered, it will help improve the temperature stability.

4.4.4 Calibration of multiple probes

When multiple probes are inserted, the load on the bath increases, and the time required for the temperature to stabilize will also be extended accordingly. In such cases, the reference probe should be used as the standard in order to ensure that the temperature has stabilized before starting calibration. For batch calibration, Additel offers a variety of

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solutions and accessories. Please refer to "Typical application scenarios " for more details.

4.4.5 For the ADT835-150 series

1. The ADT835-150 uses a compressor for cooling. To ensure stable operation and maximum life of the compressor, the shortest single running time is 2 minutes, and the shortest interval time between two operations is 1 minute. Please strictly follow this rule to avoid damage to the compressor due to frequent start and stop.

2. When the bath is controlling at low temperatures, it is not recommended to open it for a long periods of time. Opening it will cause a large amount of condensed water to enter the heat transfer fluid, which will lead to a series of adverse consequences:

   ◆A large amount of ice forms on the inner wall of the bath, which hinders the normal circulation of the heat transfer fluid and ultimately affects the uniformity and stability.

   ◆The internal reference sensor may absorb a large amount of ice crystals, resulting in reduced temperature accuracy.

   ◆The DUTs may also absorb a large amount of ice crystals, seriously affecting the reliability of the calibration results.

3. If possible, the bath should be sealed as much as possible, which can extend the continuous use time of the bath at low temperatures.

4. After the equipment has been running at low temperature, please dry the heat transfer fluid in time. For details, please refer to "Maintenance" for more details.

5. During the heating process, a large amount of heat transfer liquid may overflow due to thermal expansion. Therefore, we recommend limit the amount of filling before heating. In case of controlling to low temperaure afterwards, the heat transfer liquid needs to be replenished in time to ensure that the heat transfer liquid is always above the minimum liquid level.

4.4.6 For the ADT835-250 series

1. The air outlet on the back of the calibration bath is used to exhaust hot air so do not block it.

2. The working surface, overflow port, drain port, overflow tank, and back outlet of the bath may be extremely hot. Please take personal protection measures and be careful when touching them.

3. Please pay attention to monitor the viscosity of silicone oil during use. Long-term high temperature usage will cause the viscosity to increase or even gel.

4.4.7 Drain the fluid

1. Place the empty container under the drain port (volume ≥ 3L)
2. Open the drain port.
3. In the final stage, tilt the calibration bath backward appropriately to facilitate the complete draining of the heat transfer fluid.

4.4.8 Silent mode

The ADT835 provides two cooling modes: fast and silent. The silent mode is designed for noise-sensitive scenarios. In silent mode, the fan speed is reduced, so the device's heating and cooling speed will be sacrificed. For details, please refer to "Temperature output".

4.4.9 External reference sensor

The ADT835 supports external reference probe for temperature control. Both Additel smart probes and customer's own probes are compatible. Please refer to "RTD measure" for wiring method.

Figure 6 External reference probe connection(only connect one at a time)

If using an Additel smart probe, the probe parameters will be automatically detected and configured when the probe is connected to the bath. To check whether the parameters are correct, click sensor model/name" after EXT to view. You

can also enter the Sensor Library to check these values: System Settings-Sensor Library-Smart Sensors Find the serial

number of the corresponding probe and click to view (the S/N is on the handle of the thermometer).

When using a customer's probe, you will need to manually enter the thermometer parameters. The parameters/values can be found in the calibration certificate of the standard PRT. Below are steps for adding a new sensor:

1. Plug the probe into ADT835.
2. Select corresponding sensor type, click (✎) to enter Sensor library.
3. Click (⊕) to add new sensor, enter the parameter in accordance with the calibration certificate.

You can also add the sensor to the sensor library first, and then directly select the corresponding sensor after connecting the probe. The main steps are as follows

1. Plug the probe into the ADT835. (or plug it in after entering its parameters)
2. Go to System settings- Sensor library and select corresponding sensor type.
3. Click (⊕) to add new sensor, enter the parameter in accordance with the calibration certificate.
4. Click (✓) to save the parameters.
5. Click "----℃" under EXT.
6. Select corresponding sensor.

After the probe is connected properly and all parameters are entered, the external reference sensor will be displayed under EXT .

5.Display and Functional Operation

5.1 Main Operational Interface

The main operational interface utilizes a dual-screen display, the measured quantity channel at the top of the screen and the temperature output channel at the bottom, as shown in Figure 7.

1. Status Bar：Includes date and time, cloud service connection status ⟨⟩, 24V power status ⟨24V⟩, diagnose center ⟨⟩, screenshot ⟨⟩, external device measurement channel status⟨CH1⟩ ⟨CH2⟩, system menu icon ⟨☰⟩, and the high temperature warning ⚠.

2. DUT Channels：Including measurement project setting, sensor type chosen, automatic cold junction (only supports TC measurement), real-time data of electrical measurement and data analysis.

3. Temperature output channels: including target temperature point setting ⟨INT⟩ ⊕ 0.00, real-time temperature reading, and heating switch (▶). When a standard thermometer is connected, the bath will allow the user to select the external probe as the temperature control sensor, the external temperature control icon and external temperature setting value 0.00 will be displayed on the screen at the same time. ⟨EXT⟩ ⊕ 0.00.

4. Lock screen: Click the main menu icon ⟨☰⟩ and select lock screen. After entering the lock screen state, only the unlock button ⟨🔒⟩ can be used.

5. Unlock: Under the lock screen status, click the unlock button ⟨🔒⟩ in the upper right corner.

5.2 Temperature Unit Settings

System temperature display units can be changed through the system menu or on the main screen, the bath system will change relative temperature units automatically, except for existing sensors and DUT equipment.

1. Main Menu: Press ⟨☰⟩ on the top right corner of the screen → "Personalization" → "Temperature Unit" → Select temperature unit.

Figure 7 Main Screen

2. Main Screen: Press the current temperature unit on the display to select the desired temperature unit.

5.3 Temperature Output

1. Temperature Output Settings

Press the 🌡 icon on the left of the temperature display screen to enter the setting menu. This menu includes control parameters and temperature control standard. The user can switch through the top of the screen and set the following parameters.

(1) Control Parameters

Table 10 Temperature Output Settings

Subject	Valid Value	Description
Stability Tolerance	（0.01～10.00）	One of the conditions for temperature control and stability. The condition is met when temperature varies within this range. Unit: ℃
Stabilization Time	（1～120）	One of the conditions for temperature control stability. The condition is met when the stabilized time of temperature control exceeds the set value. Unit: min
Set Point Tolerance	（0.05～10.00）	One of the conditions for temperature control stability. The condition is met when the difference between the measured temperature and the target value is within this range. Unit: ℃
Temperature Control Rate	（0.05～10.00）	Heating and cooling rate. Choose max or customize the temperature Scan rate. The custom rate can be adjusted via the progress bar or entered manually by clicking the number below and using the keyboard. Unit: ℃/min.
Set Point Limit	Enable/disable	Limit the range of temperature control.
Set Point Range （When Set point limit is enabled）	Depends on the calibrator model and temperature units.	The temperature will not exceed the upper and lower limits after setting.

(2) Standard Parameters

Table 11 Standard Parameters

Subject	Valid Value	Description

Choose REF	INT/EXT	Choose the temperature controlling sensor
Auto choose Ext Controlling sensor	On/Off	The Ext will be set as controlling sensor when it is turned ON.
Internal Sensor		
Resolution	1, 0.1, 0.01, 0.001	Temperature display resolution.
Sensor Signal	Read only	Measured temperature of internal sensor.
External Sensor (Only connect and display external sensors.)		
Resolution	1, 0.1, 0.01, 0.001	Temperature display resolution.
Sensor Signal	Read only	Measured temperature of external sensor and resistance value.
Sensor Information	Read only	Information of external sensor.

2. Target Temperature Input: Click target temperature ⊕ real-time temperature data area, then input the target temperature value through the 36 numeric keyboards. The target set point should be set within the temperature range above the screen, which is restricted by different model numbers and customized set points. Press enter or press ✓ to confirm. Temperature control of the calibrator will start automatically.

3. Start/Pause Temperature Control: Temperature control can be initiated or paused by pressing START ▶/ or PAUSE 🎇 on the right of the calibrator temperature display screen.

4. Temperature Control Stabilization: Temperature control will stabilize when Fluctuation degree, stabilization time and target deviation are met. The display value will turn green accompanied by a beep when the unit is stable.

5.4 DUT Measurement

5.4.1 DUT Settings

Click icon (CH) on the left side of DUT channel (when CH1 is associated with the CH2, testing projects of two 37 channels are same) or click icon (CH) (when CH1 is independent with CH2, testing project of two channels can be different), three sections were separated when entered configuration display, which include DUT channel setting, testing sensor and the electrical signal.

Table 12   DUT Settings

Subject	Valid Value	Description
Channel settings		
CH1&CH2	Association 🔗 /Independent ⊂⊃	Choose if the testing project of two channels are same or not: association same/ independent different.
CH1&CH2 （CH1&CH2 association enable）	RTD, TC, mA, mV, switch, HART	Choose DUT Measurement Type
CH1（CH1&CH2 independent enable）		
CH2（CH1&CH2 independent enable）	RTD, TC, mA, mV, switch	DUT Measurement Type
Sensor testing		
Resolution	1, 0.1, 0.01, 0.001	Temperature display resolution.

Stability Tolerance	≥0.005	One of the conditions for temperature control and stability. The condition is met when temperature varies within this range. Unit: ℃
Stabilization Time	1～120	One of the conditions for temperature control and stabilization. The condition is met when the stabilized time exceeds the set point. Unit: min
Electrical signal		
mA&V resolution	1, 0.1, 0.01, 0.001, 0.0001	Current and voltage display resolution
RTD resolution	1, 0.1, 0.01, 0.001, 0.0001	RTD display resolution

After the settings are completed, click the bottom right corner. ✓。

5.4.2 Thermal Resistance (RTD) Measurement

1. Thermal Resistance (RTD) Measurement Connection.

Thermal Resistance (RTD) Measurement Connection as shown in Figure 8.

Figure 8 RTD Connection

2. Measurement settings

Click the ⊛ on the left side of DUT channel (when CH1 is associated with the CH2) or click the ⊛ Icon (when CH1 is independent with CH2), choose CH1, CH2 or CH1&CH2 to enter channel settings display, click "Measurement" and choose RTD, then return to the channel settings screen.

Sensor type: Click sensor type entering choose screen.

Standard type Sensor: Users can directly use the added sensors in the sensor library.

Custom sensor: Click right icon ✎ to enter sensor add page, please refer to section 6.2 sensor library.

(1) Wiring selection

Table 13 RTD wiring selection

Subject	Valid Value	Description
Wiring	2, 3, 4	RTD Wiring selection

3. Starting measurements

◆After sensor and wiring selection, click on the lower right icon ✓, then system wil turn back to setup interface.

◆ Continue clicking the bottom right corner ✓, the system will return to the main page and wait for measuring.

◆If RTD connection error occurs, a red "------" icon will display on the main interface above the detected measuremen channel and accompanied by an alert sound.

5.4.3 Thermal Couple (TC) Measurement

1. Thermal Couple (TC) Measurement Line Connection

Thermal Couple (TC) Measurement Line Connection as shown in Figure 9.

Figure 9 TC Connection

2. Measurement Settings

Click icon (CH) on the left side of DUT channel(when CH1 is associated with the CH2) or click icon (CH) (when CH1 is independent with CH2), choose CH1, CH2 or CH1&CH2 to enter the channel settings display, click "Measurement" and choose TC, then turn to channel setting display.

TC Type

Click sensor type and into selection screen.

(1) Sensor Type

The system supports following sensor types.：mV, S, R, B, K, N, E, J, T, C, D, G, L, U, LR, A, 10μV/℃, 1mV/℃

(2) Cold Junction Type

Table 14 Cold Junction Type

Subject	Valid value	Description
Cold Junction Type	INT/EXT	INT. means using bath internal sensor as the cold junction reference, EXT means inputting a custom value as cold junction reference. Note: There is no need to choose the cold junction type when mV is selected as the sensor type
Ext CJC value (when selecting "EXT")	Numeric Content	Set customer value for the cold junction compensation value

3. Starting a Measurement

◆Continue to click the icon ✓ on the lower right corner, the system will return to the main page and wait for the measurement to start.

◆If TC connection error occurs, a red "------" icon will display on the main interface above the detected measuremen channel and accompanied by an alert sound.

5.4.4 Electric Current (mA) Measurement

1.Electric Current (MA) Measurement Line Connection

Electric Current (MA) Measurement Line Connection as shown in Figure 10.

Figure 10 Electric Current (MA) Measurement Wiring Diagram

2.Measurement Settings

Click icon ⊕ on the left side of DUT channel(when CH1 is associated with the CH2) or click icon ⊕ (when CH1 is independent with CH2), choose CH1, CH2 or CH1 & CH2 to enter the channel settings display, click "Measurement" and choose mA, then turn to channel setting display.

3. Start Measurement
◆Continue to click the icon ✓ on the lower right corner, the system will return to the main page and wait for the measurement to start.

5.4.5 Voltage (V) Measurement
　1.Voltage (V) Measurement Line Connection.
　　Voltage (V) Measurement Line Connection as shown in Figure 11.

Figure 11　Voltage (V) Measurement Wiring Diagram

2. Measurement Settings
3. Click icon 🔘 on the left side of DUT channel(when CH1 is associated with the CH2) or click icon 🔘 (when CH1 is independent with CH2), choose CH1, CH2 or CH1&CH2 to enter the channel settings display, click

"Measurement" and choose V, then turn to channel setting display.

Table 15 Voltage Measurement Range Selection

Subject	Valid Value	Description
Range	12V, 30V	Select voltage measurement range

4.Start Measurement

Continue to click the icon ⊘ on the lower right corner, the system will return to the main page and wait for the measurement to start.

5.4.6 Switch Test

1. Switch Test Line Connection

Switch Test Line Connection as shown in figure 12.

Figure 12 Switch Test Wiring Diagram

2. Measurement Settings:

Click icon (CH) on the left side of DUT channel(when CH1 is associated with the CH2) or click icon (CH) (when CH1 is independent with CH2), choose CH1, CH2 or CH1&CH2 to enter the channel settings display, click "Measurement" and choose Switch, then turn to channel setting display.

3. Switch Type Selection

Table 16 Switch Type Selection

Subject	Valid value	Description
Switch Type	Dry contact, Wet contact, PNP, NPN	Temperature switch type

4. Start Measurement

Continue to click the icon ✓ on the lower right corner, the system will return to the main page and wait for the measurement to start.

5.4.7 HART Transmitter Measurement (Only CH1 supports HART Transmitters)

1. HART Transmitter Measurement Line Connection

HART Transmitter Measurement Line Connection as shown in figure 13.

Figure 13 HART Transmitter Measurement Wiring Diagram

2. HART Transmitter Settings:

Click icon (CH) on the left side of DUT channel(when CH1 is associated with the CH2) or click icon (CH) (when CH1 is independent with CH2), choose CH1, CH2 or CH1&CH2 to enter the channel settings display, click "Measurement" and choose HART, then turn to channel setting display.

Continue to click the icon ✓ on the lower right corner, the system will return to the main page and wait for the measurement to start.

3. Search

◆Click the right ••• of the DUT channel.

◆Click "Seach" (Q), the system will automatically search and list the transmitter, if users need to search again, please click (▷) on the right side of the screen to start searching.

◆After the search is complete, Click on the target transmitter name, and the system will automatically return to the

main screen while reading the actual measurement data from the transmitter.

4. Settings

◆Click ●●● on the right side of DUT channel and select (⬚) to enter the transmitter setting page.

(1)Device Information

Table 17 HART Device Information

Subject	Valid Value	Description
Manufacture	Read only	Manufacturer of the transmitter
Device Type	Read only	Type of the transmitter
S/N	Read only	Serial number of the transmitter
Label	Alphanumeric content (14 max length	Custom label of the transmitter
Date	2000/1/1～2099/12/31	Date setting
Write-protect	Read only	Protection type
Information	Alphanumeric content (30 max length)	Custom information
Description	Alphanumeric content (16 max length)	Custom description
Final Assembly Number	Support numeric input, no more than 20 characters	The final assembly number of the transmitter

Leading Character Number	5～20	The leading character number of the transmitter
General Version	Read only	HART protocol version
Software Version	Read only	Software version of the transmitter
Hardware Version	Read only	Hardware version of the transmitter
Device Version	Read only	Device version of the transmitter

(2)Sensor

 Check the information on sensor, upper-lower limits, and the minimum range.

(3)Device Output

Table 18 HART Device Output

Subject	Valid Value	Description
Master Variable/Range Units	°C, °F, °R, K, mV, Ω	Measurement unit of the transmitter
Lower Limit of PV Range	Support numeric input, lower limit expanding 10%	Lower limit of the master variable
Upper limit of PV Range	Support numeric input, upper limit expanding 10%	Upper limit of the master variable
Transform Function	Linear, Root	Transform function of the transmitter
Alarm State	Read only	Alarm state of the transmitter
Damping	≥0	Damping time

Poll Address	0～15	Poll address of the transmitter
Burst Mode	Disable, Enable	Burst mode state
Burst Command	1, 2, 3	Burst command depends on different transmitters

5.Diagnose/Service

Press the icon on the right of DUT measurement channel screen, select ⊕ "Diagnose/Service" to enter the transmitter setting screen.

  (1) Current loop test

    ◆This function is enabled if and only if the transmitter polling address is 0.

    ◆The current loop test allows the user to compare and calibrate the transmitter current output signal and the calibrator calibrator current measurement signal. If the difference between the two is greater than the tolerance, it is recommended to adjust.

    ◆Input through the numeric keyboard or click the "Fetch" button to intercept the current measurement signal of the calibrator calibrator.

    ◆After pressing the Enter or Confirm button, the calibrator calibrator will output the current value and current measurement value to the transmitter.

  (2) Current Adjustment

    ◆The current adjustment allows users to calibrate the transmitter's output current at 4mA and 20mA.

    ◆This function will be enabled only when the search address of the transmitter is 0.

    1) 4mA Adjustment

      ◆Input the current measurement signal of the bath via the numeric keypad or by clicking the button, then apply it by pressing Enter or the confirm button.

      ◆After few seconds, the bath will send a command to the transmitter to adjust its current output at 4mA.

2) 20mA Adjustment

◆Input the current measurement signal of the bath via the numeric keypad or by clicking the button, then apply it by pressing Enter or the confirm button.

◆After few seconds, the bath will send a command to the transmitter to adjust its current output at 20mA.

6. Process

Press ●●● on the right of DUT measurement channel screen and select "Process Quantity" to enter the transmitter setting screen, which allows the customers to select the process variable of the transmitter.

Table 19 Device Process Description

Subject	Description
Master Variable	The unit of the master variable depends on the setting unit of the transmitter. Please refer to transmitters output settings for details.
Output Current	Output current of the transmitter, unit: mA
Percentage	The percentage of temperature readout in the temperature range of the transmitter
Loop Current	Loop current of the transmitter, unit: mA

5.5 HART Communicator

The Calibration Calibrator provides full HART communicator functions. Using the original HART DD file, it can be used to complete the maintenance and debugging of all HART pressure equipment, including parameter modification, fault diagnosis, daily maintenance and calibration etc., Because the operation of the Communicator on the HART device depends on the DD file, the operation methods of different HART devices are quite different, so please refer to the instruction manual of the HART device before using the Communicator function.

Note: The Calibration Calibrator always acts as the master during communication with the HART device, so to avoid harm

to the control system, the HART device must be detached from the control system before using the calibrator to connect the HART device.

1. HART Connection and Search

◆Click DUT testing channel left icon (CH1) in the main operation interface, select the mode(H) to start the HART function, the calibrator will automatically switch to the power supply configuration selected by the last HART (the default is the internal power supply internal resistance connection), and set "0" Search by address. After searching for the HART device, it will automatically connect and display its indication

◆Press ••• to select search to enter HART device search screen, type "0-15" for searching.

2. HART Communicator Operations

◆Read the parameters in HART and modify them. The root directory options are 1 ~ 4 items, depending on the HART device, the parameters that have been modified but not written to HART are highlighted in yellow in the list, and you can click (↱) to complete the writing to HART operation.

◆Provide real-time display of temperature value and loop current value of bath at the bottom of the interface of communicator.

◆Click (AA) and (♀) on the right side of the screen to view the communication status and device status, respectively. After entering, the hollow circle on the right side of the list indicates that there is no abnormality, otherwise it indicates that the item is abnormal.

◆Click (Tref) on the right side of the screen to return to the main interface of the device. Click ← on the upper right corner of the screen to return to the HART Communicator again.

6. Settings

Click upper right icon ⊜ to choose system settings and enter the Calibrator system settings interface.

6.1 Communication Settings

6.1.1 Ethernet

Connect the Calibrator to the host computer via Network cable.

Table 20 Ethernet Address Acquisition methods

Subject	Valid Value	Description
Address Acquisition	DHCP/Manual	Choose Calibrator address for acquisition method

◆Port No. and physical address are factory settings, which cannot be changed.

◆When the DHCP mode is selected, the contents in the table below are automatically assigned by the system and become read-only items.

◆When the manual method is selected, the following table needs to be filled in manually.

Table 21 Ethernet Address Manually Settings

Subject	Valid Value	Description
IP Address	0.0.0.0～255.255.255.255	Calibrator IP address
Subnet Mask	0.0.0.0～255.255.255.255	Calibrator subnet mask
Gateway	0.0.0.0～255.255.255.255	Calibrator gateway

Click ⊘ on the lower right corner of the screen to confirm the settings.

6.1.2 Wi-Fi

Connect the Calibrator to the host computer via Network cable.

Table 22   Wi-Fi Settings

Subject	Valid Value	Description
WLAN	On/ Off	Enable or disable Wi-Fi communication function
WI-FI	Depends on network environment	Select WI-FI access point
Adavanced Option	DHCP/ Manual	Select calibrator address acquisition way

◆The port number and physical address are factory set and cannot be changed.

◆When the DHCP option is selected as the advanced option, the following table is automatically assigned by system and becomes a read-only item.

◆When selecting the manual method for advanced options, the following table needs to be filled in manually.

Table 23 Wi-Fi Communication Manually Settings

Subject	Valid Value	Description
IP Address	0.0.0.0～255.255.255.255	Calibrator IP address
Subnet Mask	0.0.0.0～255.255.255.255	Calibrator subnet mask
Gateway	0.0.0.0～255.255.255.255	Calibrator gateway

Click ✓ on the lower right corner of the screen to confirm the settings. The wireless communication settings take effect directly, without confirming the operation, click ↩ on the upper right corner of the screen to return to the previous menu.

6.1.3 Bluetooth

Connect the Calibrator to the host computer via Bluetooth.

Table 24 Bluetooth Settings

Subject	Valid Value	Description
Bluetooth Name	Read only	Calibrator Bluetooth Name
MAC	Read only	Device Physical Address
Bluetooth Status	On/ Off	Enable or Disable Bluetooth function
Disconnection	Disconnection	Disconnect Wi-Fi device with the bath

Bluetooth settings are applied immediately, press (↩) on the top left corner and back to previous menu.

6.2 Sensor Library

◆The Calibrator includes a sensor library. Sensor information can be stored in the library for future use.

◆Sensor types are classified into six categories: smart sensors, ITS-90, standard thermocouples, CVD, RTD and NTC.

◆Click to enter the sensor list under the sensor type, and then click the sensor to enter the selected sensor information page.

6.2.1 Management Functions

1. Display Settings

Press on the bottom right corner of the screen to manage the sensor information and the information display method in snesor list.

Table 25 Sensor Display Settings

Subject	Valid Value	Description
Parameter display	Scientific/ Decimal	Select parameter display mode: Scientific: 1.1×10-2 Decimal: 0.011
RTD display settings	Model& Name/ Serial	Select the display contents after entering the sensor list.

ITS-90 display settings	Number	
CVD display settings		
NTC display settings		
Smart sensor display settings		

2.The Page of Sensor List

On the sensor list page, select the corresponding sensor to enter its sensor page.

Table 26 Description of Common Icons in the Sensor List

Icon	Description	Smart Sensor	ITS-90	Standard TC	CVD	Thermal resistor	Thermistor
⊕	Add a new sensor	●	●	●	●	●	●
	Quickly add new sensor based on the model of selected sensor information	●	●	●	●		●
	Import selected sensor information into connected smart sensor	●	●	●	●		
	Delete sensor. Choose the sensor needed to delete and confirm to delete.	●	●	●	●	●	●

3.Sensor information Page

Click the sensor name and the page will jump to the sensor information page.

Table 27 The icon description of sensor information page.

Icon	Description	Smart Sensor	ITS-90	Standard TC	CVD	Thermal resistor	Thermistor
✐	Edit sensor	●	●	●	●	●	●
🗑	Delete sensor	●	●	●	●	●	●
⊖	Import selected sensor information into connected intelligent sensor.	●					

6.2.2 Smart Sensor.

Table 28 Basic Information of Sensor

Subject	Valid Value	Description
Type/ Name	Numeric/ Alphabet / Chinese, ≤14 characters	Sensor type and name information
Serial Number	Numeric/ Alphabet / Chinese, ≤14 characters	Sensor Serial number
Sensor Type	ITS-90/CVD	Smart sensor type ,if select different sensor type will affect the setting of parameters, as shown in the below table
Temperature Range	Depending on sensor type	Sensor temperature range: unit: ℃.

Calibration Date	2000/1/1～2099/12/31	Sensor calibration date.
Date for Next Calibration	2000/1/1～2099/12/31	Sensor calibration expiration time.
Note	Numeric/ Alphabet / Chinese, ≤14 characters	Sensor note information.

1.The parameter setting item when choose ITS-90 as sensor type.

Table 29 ITS-90 Sensor Parameter Setting

ITS-90		
Subject	**Valid Value**	**Description**
Negative temperature parameter selection	a4,b4：（-189.3442～0.01）℃	The selection of calculation parameters for the sensor's negative temperature range is typically automatically determined by the system when setting the temperature range.
	a5,b5：（-38.8344～0）℃	
	None	
Positive temperature parameter selection	a6,b6,c6,d,W660.323：（0～961.78）℃	The selection of calculation parameters for the sensor's positive temperature range is typically automatically determined by the system when setting the temperature range.
	a7,b7,c7：（0～660.323）℃	
	a8,b8：（0～419.527）℃	
	a9,b9：（0～231.928）℃	
	a10：（0～156.5985）℃	
	a11：（0～29.7646）℃	

Rtp（Ω）		
a4		
b4		
a6	Numbers	Please refer to parameter value.
b6		
c6		
d		
W（660.323℃）		

2. The parameter setting item when choosing CVD as sensor type.

Table 30 CVD Sensor Parameter

CVD		
Subject	**Valid Value**	**Description**
R0（Ω）		The sensor calculation formula uses parameters. For specific values, please refer to the calibration certificate of this sensor.
A	Numbers	
B		
C		

6.2.3 ITS-90 Sensor

Please refer to Table 28- Basic Information of Sensor and Table 29- ITS-90 Sensor Parameter Setting.

6.2.4 CVD Sensor

Please refer to Table 28- Basic Information of Sensor and Table 30 CVD Sensor Parameter.

6.2.5 Standard TC

Table 31 Standard TC Information

Subject	Valid Value	Description
Type/ Name	Numeric/ Alphabet / Chinese, ≤14 characters	Sensor type and name information
Serial Number	Numeric/ Alphabet / Chinese, ≤14 characters	Sensor Serial number
Temperature Range	Depend on the temperature unit.	Sensor measurement range, Unit °C
TC Type	S/B	Sensor raw TC type
Parameter type (original TC: S)	a_b_c/Zn_Au_Cu/Zn_Sb_Cu	Smart sensor type ,if select different sensor type will affect the setting of parameters, as shown in the below table
Calibration Date	2000/1/1～2099/12/31	Sensor calibration date.
Date for Next Calibration	2000/1/1～2099/12/31	Sensor calibration expiration time.
Note	Numeric/ Alphabet / Chinese, ≤14 characters	Sensor note information.

Table 32　Type S TC Parameter Settings

Parameter	Valid Value	Description
a_b_c	A	The sensor calculation formula uses parameters. For specific
	B	values, please refer to the calibration certificate of this

	C	sensor.
Zn_Al_Cu	mV(Zn_419.527℃):(3.4393～3.4547)mV	mV signal output by a sensor at a specified fixed point.
	mV(Al_670.323℃):(5.84945～5.87055)mV	
	mV(Cu_1084.620℃):(10.56～10.59)mV	
Zn_Sb_Cu	mV(Zn_419.527℃):(3.4393～3.4547)mV	mV signal output by a sensor at a specified fixed point.
	mV(Sb_630.630℃):(5.54245～5.56355)mV	
	mV(Cu_1084.620℃):(10.56～10.59)mV	

Table 33   Parameter Settings for Type B Standard TC

Parameter	Valid Range	Description
mV(1100°C)	(5.74～5.82)mV	mV signal output by a sensor at a specified fixed point.
mV(1200°C)	(6.746～6.826)mV	
mV(1300°C)	(7.808～7.888)mV	
mV(1400°C)	(8.916～8.996)mV	
mV(1500°C)	(10.059～10.139)mV	

6.2.6 RTD

Table 34 RTD Parameter Settings

Subject	Valid Value	Description
Type/ Name	Numeric/ Alphabet / Chinese, ≤14 characters	RTD type and name information
Serial Number	Numeric/ Alphabet / Chinese, ≤14 characters	RTD Serial number
Temperature range	Depends on sensor type	RTD measurement range, Unit °C
R0（Ω)	Number	RTD RO value
Note	Numeric/ Alphabet / Chinese, ≤14 characters	RTD note information.

6.2.7 Thermistor

Table 35 Thermistor Parameter Settings

Subject	Valid Value	Description
Type/ Name	Numeric/ Alphabet / Chinese, ≤14 characters	Thermistor type and name information.
Serial Number	Numeric/ Alphabet / Chinese, ≤14 characters	Thermistor serial number.
Temperature range	Depends on sensor type.	Thermistor measurement range: Unit °C
NTC Type	NTC/Steinhart-Hart	Thermistor type. Selecting different sensor types will affect the parameter settings. For specific parameter details, refer

		to the table below.
Calibration Date	2000/1/1～2099/12/31	Thermistor calibration date.
Date for Next Calibration	2000/1/1～2099/12/31	Thermistor calibration expiration time.
Note	Numeric/ Alphabet / Chinese, ≤14 characters	Thermistor note information.

1. Parameter setting items when selecting NTC as the thermistor type

Table 36 Parameter setting of NTC thermistor

Subject	Valid Value	Description
Rtn		The calculation formula for the thermistor uses parameters; please refer to the thermistor calibration certificate for specific numerical values.
Tn	Numeric	
β		

2. Parameter setting items when selecting Steinhart-Hart as the thermistor type

Table 37   Parameter setting of Stein-Hart thermistor

Subject	Valid Value	Description
a		The calculation formula for the thermistor uses parameters; please refer to the thermistor calibration certificate for specific numerical values.
b	Numeric	
c		

6.3 Data Protection

The calibrator provides data protection functions. Users can customize data protection password under this menu and set password protection enabling items.

Table 38 Data Protection Page

Subject	Valid Value	Description
Editing password	Numeric, ≤20 characters	Set the data protection password, the factory default password is: 123456.
Mission	Enable/ Disable	Enable or disable the task data password protection function. Startup: password is required to delete task data.
Sensor Bank	Enable/ Disable	Enable or disable the password protection function of the sensor library. Startup: Password is required to delete sensor library data
Factory Data Reset	Enable	Only show not editable.

Note: Editing the password will affect the system calibration and the password to enter factory reset mode.

6.4 ACloud Service

Upload data to cloud server.

Table 39 ACloud Service

Subject	Valid Value	Description
Enable	Open/ Close	Open or close Cloud service function.
Acloud State	⏸ / 🚫	Acloud State
Additel Link	Linkage Information	Linkage Information of could service.

6.5 System Service
6.5.1 System Calibration

The calibrator provides users with a calibration function. Enter the system calibration page requires a password. The password can be customized. For details, please refer to Chapter 6.3 Data Protection. The factory default password is: 123456. After entering the system calibration page, you can calibrate the following items:

1. Temperature Display Self-Calibration

Select "Temperature Display Self-Calibration" to enter the temperature display self-calibration interface, where users can perform either "Manual Calibration" or "Automatic Calibration" as needed.

Manual Calibration

1) If you need to modify the calibration point, click ✏ to enter a custom calibration point.
   ◆ The indicating temperature and standard temperature value corresponding to each calibration point need to be obtained by the user outside the temperature indicating value self-calibration interface.
   ◆ The number of calibration points cannot be less than 4.

   ◆ The minimum interval between calibration point values must be greater than or equal to 10% of the total range.
2) Input the indicated temperature and standard value of each point one by one.
3) Click ✔ on the lower right corner to save the data. The calibration data is saved as user calibration data. The calibration data can be viewed in the temperature calibration history.

(1) Automatic Calibration

1) If you need to modify the calibration point, click ✏ to enter a custom calibration point;
   ◆ The number of calibration points cannot be less than 4.

◆The minimum interval between calibration point values must be greater than or equal to 10% of the total range.

2) Click to enter the temperature display for self-calibration interface, click Start to start the automatic calibration wizard, the calibrator will automatically control the temperature according to the calibration point.

3) Click ✓ on the lower right corner to save the data. The calibration data is saved as user calibration data. The saved calibration data can be viewed in the temperature calibration history.

2. Electrical Measurement Calibration

The calibrator can calibrate the electrical measurement data of the standard channel, channel one and channel two.

(1) Standard Channel

1) Click the target external standard to enter the external standard calibration interface

◆Click ⟳ on the right to reset the factory settings of external sensors.

◆The number of external sensor calibration points cannot be changed, but you can manually modify the 72 calibration points by clicking the calibration point list on the left side of the calibration list.

◆Click ↩ during the calibration process to terminate the calibration procedure, the calibration data will not be saved.

◆The latest calibration time is displayed below the calibration list.

Calibration Process:

◆Click ▶ to start the calibration procedure, and the system will automatically collect data until manually enter the next calibration point.

◆Click ▶| to start to calibrate the next calibration point or click |◀ to return to the previous calibration point to recalibrate.

◆ After the calibration point is over, the system will automatically prompt whether to save the calibration data or click (🖫) on the right to save the calibration data.

(2) Channel One & Channel Two

1) ±30 mA measurement

◆Click (🕃) on the right to restore the factory setting of ±30 mA measurement.

◆The number of ±30 mA measurement calibration points cannot be changed, but you can manually modify the calibration points by clicking the calibration point list on the left side of the calibration list.

◆Click (↩) during the calibration process to terminate the calibration procedure, the calibration data will not be saved.

◆Click (⊷0⊷) on the right to cancel reset.

◆The latest calibration time is displayed below the calibration list.

Calibration Process:

◆Click the calibration start button (▶) to start the calibration procedure, and the system will automatically collect data until you manually enter the next calibration point.

◆Click (▶|) to start the calibration of the next calibration point or click (|◀) to return to the previous calibration point to recalibrate.

◆After all calibration points are over, the system will automatically prompt whether to save the calibration data, or 74 click (🖫) on the right to save the calibration data.

2) TC Measurement interface (±75mV)

◆Click (🕃) on the right to restore the factory settings of TC interface measurement (±75 mV).

◆The number of calibration points for TC interface measurement t (±75 mV) cannot be changed, but you can manually modify the calibration points by clicking the calibration point list on the left side of the

calibration list.

◆Click ⟲ during the calibration process to terminate the calibration process, and the calibration data will not be saved.

◆Click ⊖Ø⊖ on the right to cancel reset.

◆The latest calibration time is displayed below the calibration list.

Calibration Process

◆Click the calibration start button to start the calibration procedure, and the system will automatically collect data until you manually enter the next calibration point.

◆Click ▶ to start the calibration of the next calibration point or click ◀ to return to the previous calibration point to recalibrate.

◆After all calibration points are over, the system will automatically prompt whether to save the calibration data or click 🖫 on the right to save the calibration data.

3) ±12V & ±30V Measurement

◆Click ⟳ on the right to restore the factory settings of ±12V or ±30V measurement.

◆The number of ±12V or ±30V calibration points cannot be changed, but you can manually modify the calibration points by clicking the calibration point list on the left side of the calibration list.

◆Click ⟲during the calibration process to terminate the calibration procedure, the calibration data will not be saved.

◆Click ⊖Ø⊖ on the right to cancel reset.

◆The latest calibration time is displayed below the calibration list.

Calibration process:

◆Click the calibration start button (▶) to start the calibration procedure and the system will automatically collect data until you manually enter the next calibration point.

◆Click (▶|) to start the calibration of the next calibration point or click (|◀) to return to the previous calibration 76 point to recalibrate.

◆After all calibration points are complete, the system will automatically prompt whether to save the calibration data or click (▤) on the right to save the calibration data.

4) 400Ω（4W）& 4000Ω（4W）Resistance

◆Click (↻) to resistance calibration factory settings.

◆The number of resistance calibration points cannot be changed, but you can manually modify the calibration points by clicking the calibration point list on the left side of the calibration list.

◆Click (↩) during the calibration process to terminate the calibration procedure, the calibration data will not be saved.

◆The latest calibration time is displayed below the calibration list.

Calibration Process:

◆Click the calibration start button (▶) to start the calibration procedure, and the system will automatically collect data until you manually enter the next calibration point.

◆Click (▶|) to start the calibration of the next calibration point or click (|◀) to return to the previous calibration point to recalibrate.

◆After all calibration points are over, the system will automatically prompt whether to save the calibration data or click (▤) on the right to save the calibration data.

5) Cold Junction Calibration

◆Click (↻) on the right to restore the resistance calibration factory settings.

◆Click ⬅ during the calibration process to terminate the calibration procedure, the calibration data will not be saved.

◆Click the sensor type to select the cold end sensor type. The cold end types available for the calibrators are:

mV, S, R, B, K, N, E, J, T, C, D, G, L, U, LR, A, 10μV/℃, 1mV/℃.

Calibration Process:

◆Click the standard value display number to adjust the standard value, and enter the reference standard temperature of the environment where the cold junction is currently located;

◆Click 🖫 on the lower right corner to save the cold junction calibration data.

3. Temperature Calibration History Record

Users can click to view all temperature calibration history records and select historical calibration data to apply to the calibrator as needed.

◆Click to select the desired historical data and enter the viewing page.

◆After confirming that the temperature indication calibration data is correct, click ⟳ at the bottom right corner of the screen.

6.5.2 Factory Reset

The calibrator provides the function of restoring factory settings. To enable this function, you need to enter a password. The password can be customized. For details, please refer to chapter 6.3 Data Protection. The factory default password is: 123456.

◆Restore factory settings will not restore all the system calibration data. To restore the system calibration data, please refer to section 6.5.1.

◆Restore factory settings will not delete user data.

6.5.3 Maintenance

　　The calibrator provides maintenance functions. To enable this function, you need to enter a password. The password can be customized. For details, please refer to chapter 6.3 Data Protection. The factory default password is: 123456.

　　1. Maintenance records

　　◆Click ⊕ in the right side of the maintenance record page to add maintenance information.

　　◆Click "maintenance brief information", "maintenance person" and "maintenance content" to add content.

　　◆Click "Maintenance Date" to modify.

　　◆The expiration date setting time range is 2000/1/1～2099/12/31.

　　2. Export log files to USB drive

　　◆The log files will be exported to USB drive after clicking.

　　3. Control Panel Operation Information

　　◆Real-time display of control panel operation information.

6.5.4 System Updated

　　The calibrator provides a firmware upgrade function. System upgrades can apply via local U disk or by network. (The local U disk upgrade operation needs to use a U disk, and the format of the U disk needs to be FAT16 or FAT32.)

　　U disk upgrade: Copy the upgrade file to the root directory of the U disk, then insert the U disk into the USB port on the right side of the calibrator, select "U disk upgrade" on the calibrator upgrade interface, and click ⊘ to start the automatic upgrade. After a few minutes, the upgrade process is completed, the system will display the upgrade completion message and automatically restart after confirmation.

　　Remote upgrade: The remote upgrade needs to connect the calibrator to the Internet first, which can be completed by automatic or manual update.

6.5.5 Intelligent Diagnosis Center

◆Click icon (☆), you can view the operational information of the motherboard, control board, and electrical test board.

◆Click icon (⋮), you can view the system logs after entering the password (123456).

◆Click icon (⑤), you can export the diagnostic data to a USB drive.

6.6 Personalization

6.6.1 Temperature Unit

The calibrator provides three temperature units: ℃, ℉ and K. After the temperature unit is changed, the other temperature-related parameters will change except for the data in the sensor library and the mission center.

6.6.2 Date and Time

Table 40   Date and Time

Subject	Valid Value	Description
Time	00:00～23:59	Time setting
Date	2000-1-1～2099-12-31	Date setting
Date Format	Year-month-day / Month-day-year / day-month-year	Date format setting
Separator	-, /, .	Date separator setting
24 hours	Open/ Close	Set the Time to be displayed in 24-hour or 12-hour format
Time zone	UTC-12:00～UTC+12:00	Set the time zone of the device

6.6.3 Language

The calibrator provides multi-languages interface, you can select the available language interface through this menu.

6.6.4 Sound

Table 41   Sound Setting

Subject	Valid Value	Description
Key press sound	Open/ Close	Enable or disable key press sound
notification sound	Open/ Close	Enable or disable notification sound
Over range sound	Open/ Close	Enable or disable over range sound
Volume	0～100	Adjust key press sound volume, %

6.6.5 Screen Brightness

　　Tap the progress bar to adjust the screen brightness.

6.6.6 Screen Protector

　　The calibrator provides a screen protection function. If there is no operation within the set time, the calibrator will automatically turn off the touch screen to save energy and touch it again to activate the screen. The optional range of setting time is: 1 minute, 5 minutes, 10 minutes, 30 minutes, 60 minutes and never.

6.6.7 Display Mode

　　The calibrator provides two display modes: highlight and normal. After the display mode is selected, the calibrator needs to be restarted to take effect.

6.6.8 Product Information

　　Product information is read-only information, divided into two parts: basic information and version information.

　1. Basic information：Including model number, serial number and range information.

　2. Version Information: Including the main program, system version, control board, electrical test board, WiFi and Bluetooth version information.

◆The firmware version information usually refers to the main program version information. If necessary, please provide the main program version information when contacting customer service.

7.Task

The calibrator provides a task function, users can set up calibration task and execute automatic calibrations.In the task function, the user can create or select an existing tested device as the first step of the task start, or create or select an existing test configuration as the first step of the task.

In the task menu, you can set the object of stability judgment by clicking the settings button in the lower right corner.

7.1 Device Center

Users can manage all DUT in the device center.

7.1.1 Management of Device Under Inspection

1. Click on an added DUT in the Device Center to quickly view its information.
2. Click (+) to add the DUT. The operation of adding inspected please refer to chapter 7.1.2 to 7.1.11.
3. Click (🗑) on the right to delete the added test device. User can select the needed device that being deleted. And delete it by clicking (🗋) , or delete all test tasks by clicking (☑).

Click (🔍) on the right to search for the added DUT. And the search conditions are as follows:

Table 42   Search Criteria for DUT in the Task Center

Subject	Valid Value	Description
Type	Thermal resistance, thermocouple, thermistor, temperature transmitter, temperature switch, glass liquid thermometer, temperature controller, bimetal thermometer, pressure thermometer, transformer winding thermostat, surface thermometer, digital	Choose the DUT type and the default is all.

	thermometer, double touch Point switch, integrated thermal resistance pointer thermometer, all	
Name	Numbers / Alphabetic / Chinese, ≤16 characters	Fill in the name of the DUT.
Device Serial Number	Numbers / Alphabetic / Chinese, ≤16 characters	Fill in the serial number of the DUT.
Execution	Yes/No/All	Whether the DUT has performed tasks on the 92 calibrator depends on whether there is test data generated.
Creation Time	Start Time：2000-1-1～2099-12-31	The range used to search for the creation time of the DUTs, for example: devices created between January 1, 2024, and December 31, 2024.
	Over Time：2000-1-1～2099-12-31	

Click ✓ on the lower right corner to apply the search and finding criteria and the matched devices will appear in the list. Click ↻ on the right to clear the entire search and search criteria that have been entered.

7.1.2 Thermal Resistance

Click 📂 on the right to use the sensor on the right to use the sensor information in the sensor library as a template to quickly add thermal resistance parameters.

Table 43 Thermal Resistance Setting in Task Center

Subject	Valid Value	Description
Name	Number / Alphabetic /	Name of thermal resistance to be inspected.

	Chinese, ≤16 characters	
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	Serial No. of thermal resistance to be inspected
Location	Number / Alphabetic / Chinese, ≤16 characters	The position information of the thermistor under test, designed to address the user's need to distinguish between multiple thermistors from different departments within the same company.
Note	Number / Alphabetic / Chinese, ≤16 characters	Remarks of the thermal resistance to be inspected
Inspection Department	Number / Alphabetic / Chinese, ≤16 characters	The name of the company from which the thermal resistance is inspected is used to deal with the problem of distinguishing multiple thermal resistances from different companies.
Range	（-273～10000）℃	The range of the thermocouple to be inspected, the unit can be switched
Thermal Resistance Type	Pt series, Cu series, Ni series, CVD	Types of thermal resistance to be inspected
Permission Error	The calibrator provides common thermal resistance tolerances, and allows customers to customize	Accuracy of thermal resistance to be inspected For custom settings, please refer to Chapter 7.1.12 Accuracy Settings of the Device Under Inspection.
Resolution	1/0.1/0.01/0.001	Selection of the resolution for the tested thermal resistance.

| Wire System | 2/3/4 wiring system | Wire system selection of thermal resistance to be inspected. |
| R0 | Number | Thermal resistance RO value |

Click ✓ on the lower right corner to save and end the operation of adding thermal resistance.

7.1.3 Thermocouple

Table 44 Thermocouple Setting in Task Center

Subject	Valid Value	Description
Name	Number / Alphabetic / Chinese, ≤16 characters	Name of thermocouple to be inspected
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	Serial No, of thermocouple to be inspected
Location	Number / Alphabetic / Chinese, ≤16 characters	The location information of the inspected thermocouple is used to deal with the user's problem of distinguishing multiple thermocouples from different departments of the same company
Note	Number / Alphabetic / Chinese, ≤16 characters	Remarks of the thermocouple to be inspected
Inspection Department	Number / Alphabetic / Chinese, ≤16 characters	The name of the company from which the thermocouples are inspected is used to deal with the problem of 95 distinguishing multiple thermocouples from different companies
Range	（-273～10000）℃	The range of the thermocouple to be inspected, the unit can

	be switched	
Thermocouple type	A, B, C, D, E, F, J, K, L, LR, N, R, S, T, U	Types of thermocouples to be inspected
Permission Error	The calibrator provides common thermocouple tolerances, and allows customers to customize	Accuracy of thermocouple to be inspected For custom settings, please refer to Chapter 4.1.12 Accuracy Settings of the DUT
Resolution	1/0.1/0.01/0.001	Selection of resolution for the device thermocouple.
Cold junction compensation type	INT/EXT	Select the cold junction compensation method of the tested thermocouple and manually enter the compensation value after selecting the fixed method.

Click ✓ on the lower right corner to save and end the thermocouple adding operation.

7.1.4 Thermistor

Click 📷 on the right to use the sensor information in the sensor library as a template to quickly add thermal resistance parameters.

Table 45 Thermistor Setting in Task Center

Subject	Valid Value	Description
Name	Number / Alphabetic / Chinese, ≤16 characters	Name of Thermistor to be inspected.
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	Serial No, of Thermistor to be inspected

Location	Number / Alphabetic / Chinese, ≤16 characters	The location information of the thermistor being inspected is used to deal with the problem of distinguishing multiple thermistors from different departments of the same company
Note	Number / Alphabetic / Chinese, ≤16 characters	Remarks of the thermistor to be inspected
Inspection Department	Number / Alphabetic / Chinese, ≤16 characters	The name of the company from which the thermistor was inspected is used to deal with the user's problem of distinguishing multiple thermistors from different companies.
Range	（-273～10000）℃	Range of the thermistor to be tested, the unit can be switched
Permission error	Number	Accuracy of tested thermistor, please refer to chapter 7.1.12 Accuracy setting of tested equipment for details
Resolution	1/0.1/0.01/0.001	Selection of resolution for the inspected thermistor.
Wiring System	2/3/4 wiring	Number of lead wires on the thermistor probe being tested.
Rtn	Number	Rtn value of tested thermistor
Tn	Number	Tn value of tested thermistor
β	Number	β value of tested thermistor

Click ✓ on the lower right corner to save and end the thermistor adding operation.

7.1.5 Temperature Transmitter

Click 📷 to use the existing sensor information in the sensor library as a template to quickly add temperature transmitter parameters.

Table 46 Temperature Transmitter Setting in Task Center

Subject	Valid Value	Description
Name	Number / Alphabetic / Chinese, ≤16 characters	Name of temperature transmitter to be inspected.
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	Serial number of the temperature transmitter to be inspected.
Location	Number / Alphabetic / Chinese, ≤16 characters	The location information of the tested temperature transmitter is used to deal with the user's problem of distinguishing multiple temperature transmitters from different departments of the same company.
Note	Number / Alphabetic / Chinese, ≤16 characters	Remarks of the tested temperature transmitter.
Inspection Department	Number / Alphabetic / Chinese, ≤16 characters	The name of the company from which the temperature transmitters are inspected is used to deal with the problem of distinguishing multiple temperature transmitters from different companies.
Input	（-273～10000）℃	The range of the tested temperature transmitter, the unit can be switched.
Output	Analog signal 1. mA：4~20、0~10、0~20 2. V：0~5、0~10、4~20 3.Custom: -30~30 (click the	The output signal setting of the tested temperature transmitter.

	electrical signal unit to switch between mA and V)	
	HART transmitter: Primary variable, percentage, output current, loop current	
Accuracy	0.1%, 0.2%, 0.5%, 1%, 1.5%, 2%, 2.5%, custom.	The accuracy of the tested temperature transmitter, the user can set the special accuracy through a custom option, the unit is%
Resolution	1/0.1/0.01/0.001	Selection of temperature transmitter resolution
Conversion function	Wiring/Extraction of root	Transmitter conversion function

Click ✅ on the lower right corner to save and end the temperature transmitter adding operation.

7.1.6 Temperature Switch

Click 📤 to use the sensor information in the sensor library as a template to quickly add temperature switch parameters.

Table 47 Temperature Switch Setting in Task Center

Subject	Valid Value	Description
Name	Number / Alphabetic / Chinese, ≤16 characters	Name of temperature switch to be tested.
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	Serial No, of temperature switch to be tested.

Location	Number / Alphabetic / Chinese, ≤16 characters	The position information of the temperature switch to be checked is used to deal with the problem of distinguishing multiple temperature switches from different departments of the same company.
Note	Number / Alphabetic / Chinese, ≤16 characters	Remarks of temperature switch to be tested.
Inspection Department	Number / Alphabetic / Chinese, ≤16 characters	The name of the company from which the temperature switch is inspected is used to deal with the user's problem of distinguishing multiple temperature switches from different companies.
Range	（-273～10000）℃	The tested temperature switch range, the unit can be switched.
Set Point	Depends on switch range.	Set point of tested temperature switch.
Set Point Range	Depends on switch range.	The set point range of the tested temperature switch The calibrator only captures the temperature switch action within the set point range
Set Point Error	Depends on switch range.	Permission error range of the tested temperature switch.
Switch Type	Normally Open / Normally Closed	Open and close type of the tested temperature switch

Switch Channel Type	Dry contact, wet contact, NPN switch, PNP switch	Channel type of the tested temperature switch
Dead band	Depends on switch range	Dead band of the tested temperature switch

Click ✓ on the lower right corner to save and end the temperature switch adding operation.

7.1.7 Glass Liquid Thermometer, Surface Thermometer

Click 📷 to use the existing sensor information in the sensor library as a template to quickly add glass liquid thermometer and surface thermometer parameters.

Table 48   Glass Liquid Thermometers, Surface Thermometer Settings

Subject	Valid Value	Description
Name	Number / Alphabetic / Chinese, ≤16 characters	Name of the device being inspected
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	Serial number of the device being inspected.
Location	Number / Alphabetic / Chinese, ≤16 characters	The location information of the DUT is used to deal with the user's problem of distinguishing multiple glass liquid thermometers from different departments of the same company
Note	Number / Alphabetic / Chinese, ≤16 characters	Remarks of DUT.
Inspection Department	Number / Alphabetic / Chinese, ≤16 characters	The name of the company from which the DUT is sourced, to deal with the user's problem of distinguishing glass liquid thermometers from different companies

Range	(-273～10000) ℃	Range of tested equipment, unit can be switched.
Permission error	Depending on user needs, please refer to chapter 4.1.12 Accuracy Setting of the Equipment Under Inspection for details.	Accuracy of DUT, please refer to chapter 7.1.12 Accuracy setting of DUT for details.
Division value	Depending on thermometer range	The temperature difference represented by each grid of the DUT.

Click ✅ in the lower right corner to save and end the adding operation.

7.1.8 Temperature Controller, Bimetal Thermometer, Pressure Thermometer, Transformer Winding Thermostat.

Click 📷 to use the existing sensor information in the sensor library as a template to quickly add parameters for bimetal thermometers, pressure thermometers, and transformer winding thermostats.

Table 49 Settings in Task Center

Subject	Valid Value	Description
Name	Number / Alphabetic / Chinese, ≤16 characters	Name of the device being tested.
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	Serial number of the device being testing.
Location	Number / Alphabetic / Chinese, ≤16 characters	The location information of the DUT is used to deal with the user's problem of distinguishing multiple glass liquid thermometers from different departments of the same

		company.
Note	Number / Alphabetic / Chinese, ≤16 characters	Remarks of DUT.
Inspection Department	Number / Alphabetic / Chinese, ≤16 characters	The name of the company from which the DUT is sourced, to deal with the user's problem of distinguishing glass liquid thermometers from different companies.
Range	（-273～10000）℃	Range of tested equipment, unit can be switched.
Permission error	1%, 1.5%, 2%, 2.5%, 4%, custom unit is %	Accuracy of the DUT, the user can set a special accuracy through a custom option. (The temperature controller: 0.1, 0.15, 0.3, 0.5, 1, 2.5, custom unit ℃).
Division value	Depending on thermometer range	The display resolution of the DUT.
Electric contact	0, 1, 2	Number of electrical contacts of the equipment under inspection If the number of electrical contacts is not 0, you must set the electrical contact value, the upper and lower limits of the electrical contact, the effective value and unit depend on the range.

Click ✓ on the lower right corner to save and end the adding operation.

7.1.9 Digital Thermometer

Click 📇 on the right to use the existing sensor information in the sensor library as a template to quickly add digital thermometer parameters.

Table 50   The Digital Thermometer Setting in Task Center

Subject	Valid Value	Description
Name	Number / Alphabetic / Chinese, ≤16 characters	Name of Digital Thermometer to be tested.
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	Serial No. of Digital Thermometer to be tested.
Location	Number / Alphabetic / Chinese, ≤16 characters	The location information of the tested digital thermometer is used to deal with the user's problem of distinguishing multiple digital thermometers from different departments of the same company.
Note	Number / Alphabetic / Chinese, ≤16 characters	Remarks of digital thermometer to be tested.
Inspection Department	Number / Alphabetic / Chinese, ≤16 characters	The name of the company from which the digital thermometers are inspected is used to deal with the user's problem of distinguishing multiple digital 106 thermometers from different companies.
Input	（-273～10000）℃	Measurement range of Digital temperature to be tested, unit can be switched.
Accuracy	1%, 1.5%, 2%, 2.5%, 4%,custom	The accuracy of the digital thermometer being tested, the user can set the special accuracy through a custom option, the unit is%.
Division Value	Depends on Thermometer Rannge	The temperature difference represented by each cell of digital thermometer to be inspected.

Electrical contacts number	0, 1, 2	The number of electrical contacts of the digital thermometer to be inspected. If the number of electrical contacts is not 0, you must set the electrical contact value, the upper and lower limits of the electrical contact, the effective value and unit depend on the range
Enable analog output	Open/Close	Select whether the digital thermometer to be inspected has analog output function 107 If you turn on this function, the user also needs to set the output signal.
Output (only when the analog output function is enabled)	-30～30	The output signal range of the tested digital thermometer, the unit depends on the current or voltage measurement (click the electrical signal unit to switch between mA and V)
Analog output accuracy (only when the analog output function is enabled)	1%, 1.5%, 2%, 2.5%, 4%, Custom	The accuracy of the analog output signal of the tested digital thermometer, the user can set the special accuracy through a custom option, the unit is%

Click ✓ on the lower right corner to save and end the digital thermometer adding operation.

7.1.10 Double Contact Switch

Click 🖾 on the right to use the existing sensor information in the sensor library as a template to quickly add dual-contact switch parameters.

Table 51 Double Contact Switch in Task Center

Subject	Valid Value	Description
Name	Number / Alphabetic /	Name of temperature switch to be tested.

	Chinese, ≤16 characters	
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	Serial No. of temperature switch to be tested.
Location	Number / Alphabetic / Chinese, ≤16 characters	The position information of the temperature switch to be inspected is used to deal with the problem of distinguishing multiple temperature switches from different departments of the same company.
Note	Number / Alphabetic / Chinese, ≤16 characters	Remarks of temperature switch to be tested.
Inspection Department	Number / Alphabetic / Chinese, ≤16 characters	The name of the company from which the temperature switch is inspected is used to deal with the user's problem of distinguishing multiple temperature switches from different companies.
Range(Switch Contact1/2)	（-273～10000）℃	The range of the temperature switch to be tested (switch contact 1 / 2), the unit can be switched.
Set point (Switch Contact1/2)	Depends on switch range	Set point of temperature switch to be tested （switch contact 1 / 2).
Set point range (Switch Contact1/2)	Depends on switch range	Set point range of temperature switch to be tested (switch contact 1 / 2), the calibrator only 109 captures the temperature switch action within the set point range.
Switch type (Switch Contact1/2)	Normally open/ Normally close	Open and close type of temperature switch to be tested (switch contact 1 / 2).

Set point error (Switch Contact1/2)	Depends on switch range	Permission error range of temperature switch to be tested (switch contact 1 / 2).
Switch Channel type (Switch Contact1/2)	Dry contact, wet contact, NPN switch, PNP switch	Channel type of temperature switch to be tested (switch contact 1 / 2)
Dead band (Switch Contact1/2)	Depends on switch range	Dead band of temperature switch to be tested (switch contact 1 / 2)

Click ✓ on the lower right corner to save and end the digital thermometer adding operation.

7.1.11 Integrated Thermal Resistance Indicator Thermometer

Table 52 Integrated Thermal Resistance Indicator Thermometer Setting

Subject	Valid Value	Description
Name	Number / Alphabetic / Chinese, ≤16 characters	Name of tested thermal resistance.
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	The serial number of the thermal resistance being tested.
Location	Number / Alphabetic / Chinese, ≤16 characters	The location information of the thermal resistance under 110 inspection is used to deal with the problem of distinguishing multiple thermal resistances from different departments of the same company.
Note	Number / Alphabetic / Chinese, ≤16 characters	Remarks of the thermal resistance being inspected.
Inspection Department	Number / Alphabetic / Chinese, ≤16 characters	The name of the company from which the thermal resistors are inspected is used to deal with the user's problem of

		distinguishing multiple thermal resistors from different companies.
Range	（-273～10000）℃	Measuring range of thermal resistance under test, unit can be switched
Permissible Error	The calibrator provides common thermal resistance tolerances, and allows customers to customize	Accuracy of tested thermal resistance For custom settings, please refer to Chapter 7.1.12 Accuracy Settings of the Device Under Inspection.
Resolution	1/0.1/0.01/0.001	Selection of resolution for the temperature indicator with an integrated resistance thermometer under test.
Wiring System	Two/ Three/ Four wiring system	Selection of thermal resistance wire system to be inspected.
Thermal Resistance Type	Pt series/ Cu series/Ni series,/CVD	Types of thermal resistance to be inspected.
R0	Digit	RO value of Thermal resistance.
Pointer Guage Accuracy	0.5%, 1%, 1.5%, 2.5%, 4%, Custom	Division Value of pointer gauge to be inspected.
Pointer gauge division value	0.01～1000	Division Value of pointer gauge to be inspected.

Click ✓ on the lower right corner to save and end the digital thermometer adding operation.

7.1.12 Accuracy Settings of DUT

The calibrator provides a powerful function of setting the accuracy of the DUT. In addition to the conventional accuracy

setting, it also supports up to three segments of the accuracy setting of the DUT. In the setting interface, all the highlighted values can be modified.

1. Accuracy Settings

The calibrator provides two types of accuracy settings:

（1）Fixed Accuracy

The types of inspections that can be applied with a fixed accuracy setting are: glass liquid thermometer.

For example：（0～100）%±（0.2℃）

How to set a fixed accuracy value:

◆Click the fixed accuracy value (highlight the value, such as the value 0.2 in the example) to enter the selection page. The system default precision is: 0.1, 0.15, 0.3, 0.5, 1, 2.5 and custom.

◆After selecting custom, the user can input custom values through the keyboard. The unit depends on the range unit setting of the tested equipment.

（2）Fixed accuracy + reading accuracy

The types of inspections that can be applied with a fixed accuracy setting are: thermal resistance, thermocouple, thermistor, surface thermometer.

For example：（0～100）%±（0.1℃+0.002*ItI）

How to set a fixed accuracy value:

◆Set fixed accuracy: click on the fixed accuracy value (highlight the value, such as the value 0.1 in the example). Enter the selection page, the system default precision: 0.1, 0.15, 0.3, 0.5, 1, 2.5 and custom.

◆Set the reading accuracy: click on the fixed accuracy value (highlight the value, such as 0.002 in the example). Enter the selection page, the system default accuracy: 0.001, 0.002, 0.004, 0.005, 0.008, 0.01 and custom.

◆After selecting custom, the user can input custom values through the keyboard, and the unit depends on the range unit setting of the tested equipment.

2. Sectional Setting

The calibrator allows users to list the accuracy in sections, and each section is set separately to meet different needs.How to set the segmentation accuracy:

◆Click ∧ / ∨ on the right side of the screen to increase or decrease the number of segments, or click the number on the right to input the number of segments through the keyboard. Currently, the calibrator supports up to 3 segments of accuracy.

◆Refer to chapter 7.1.12 Accuracy Setting to set the accuracy of each segment.

7.2 Test Center

Users can manage all test tasks in the test center.

7.2.1 Test Task Management

1. Click the task in the test center to quickly read the testinformation.

On the test task information page, users can::

(1) Click (▶) to directly enter the task start interface. The calibrator will perform a calibration test again according to the previous spare parts equipment and task settings. For task execution operations, please refer to Chapter 7.3 Task Execution.

(2) Click (⧉) to use the current test settings as a template to quickly add new tasks. The tested device cannot be modified for new tasks added quickly. Please refer to the following for the configuration editing operations of test tasks.

(3) On the task setting information page, the content with ＞ the mark can be modified. For the task setting operation, please refer to chapter 7.2.2 task setting.

2. Click ⊕ on the right to add a task, click ⊕ in the center of the screen, select the equipment to be inspected from the equipment center, the calibrator will display the basic information of the equipment to be inspected, and will automatically list the corresponding equipment according to the type of equipment to be inspected Task setting menu.

3. Click 🗑 on the right to delete the added tasks. Users can select the tasks to be deleted according to their needs and click 🔲 to delete them, or click ☑ to delete all tasks.

4. Click 🔍 on the right to search for the added tasks, the search conditions are as follows:

Table 53 Task Search and Find Condition of Task Center

Subject	Valid Value	Description
Task Name	Number / Alphabetic / Chinese, ≤16 characters	Fill in the name of the task.
Device Name	Number / Alphabetic / Chinese, ≤16 characters	Fill in the name of the DUT involved in the task
Device Serial Number	Number / Alphabetic / Chinese, ≤16 characters	Fill in the serial number of the DUT
Execution	Yes/ No/ All	Whether the task has been performed on the calibrator depends on whether there is test data generated
Creation time	Start Time：2000-1-1～2099-12-31	The range used to search for the creation time of the task, for example: tasks created between January 1, 2025 and December 31, 2025
	Over Time：2000-1-1～2099-12-31	
Updated Time	Start Time：2000-1-1～	Used to search for the range of the last used time of the task

	2099-12-31	
	Over Time：2000-1-1～ 2099-12-31	

Click ✔ on the lower right corner to apply the search criteria, and the matching tasks will appear in the list. Click
⟳ on the right to clear all the search criteria that have been entered.

7.2.2 Test Task Settings

Click the task to enter the task setting interface, which is divided into basic information, control settings, equipment settings, set point list, indication error test, etc.

1. Dual Channel Test

The tested types that support dual-channel testing are as follows:

Table 54 Dual Channel Test Compatible information of Task Center

Type of DUT	Support dual channel
Thermal Resistance	●
Thermocouple	●
Thermistor	●
Temperature transmitter	
Temperature switch	
Glass liquid thermometer	●
Temperature Controller	
Bimetallic thermometer	

Pressure thermometer	
Winding thermostat for transformer	
Surface thermometer	●
Digital thermometer	
Double contact switch	
Integrated thermal resistance pointer meter thermometer	

For the tested device type that supports dual-channel testing, after adding a tested device, you can click ⊕ to add the next tested device.

2. Basic Information Settings

The types of inspections that support basic information settings are as follows:

Table 55 Task Basic Information Setting Compatibility Table

DUTs Type	Basic Information		Operation				
	Name	Remarks	Number of cycles	Range	Dwell Time	Number of readings	Reading interval
Thermal Resistance	●	●	●	●	●	●	●
Thermocouple	●	●	●	●	●	●	●
Thermistor	●	●	●	●	●	●	●
Temperature transmitter	●	●	●	●	●	●	●
Temperature switch	●	●	●				
Glass liquid thermometer	●	●	●	●	●	●	●

Temperature Controller	●	●	●	●	●	●	●
Bimetallic thermometer	●	●	●	●	●	●	●
Pressure thermometer	●	●	●	●	●	●	●
Winding thermostat for transformer	●	●	●	●	●	●	●
Surface thermometer	●	●	●	●	●	●	●
Digital thermometer	●	●	●	●	●	●	●
Double contact switch	●	●	●				
Integrated thermal resistance pointer meter thermometer	●	●	●	●	●	●	●

The basic information setting affects the basic process of the task. Each item is introduced as follows:

Table 56 Test Task Basic Information Settings

Subject	Valid Value	Description
Basic Information Setting		
Task Name	Number / Alphabetic / Chinese, ≤16 characters	Test task name
Note	Number / Alphabetic / Chinese, ≤16 characters	Test Task Remark
Operation Settings		

Number of cycles	1/2/3	Task repetition times
Route	One way/ Double way	Task running mode
Dwell Time	1～60	The dwell time of each test point after the temperature stabilizes to before the reading, to wait for the constant temperature of the tested equipment, unit: minute.
Number of readings	1～6	After each test point is stable and the dwell time has elapsed, the number of times the calibrator reads the number of the tested equipment.
Reading interval	0～3600	The time interval between each reading unit: second.

Click ✓ on the right corner to apply basic information settings.

3. Control Settings

The temperature control setting affects the temperature stability judgment conditions of the calibrator, and each item is introduced as follows:

Table 57 Task Temperature Control Settings

Subject	Valid Value	Description
Choose REF	INT/EXT	Choose built-in (INT) or external (EXT) sensor as standard
Fluctuation	0.01～10	Allowable range of temperature fluctuation, one of the conditions for temperature stability judgment, depends on the unit of the range of the tested equipment.
Stabilization Time	1～60	Temperature control stability duration, one of the temperature stability judgment conditions, unit: minute

Target deviation	0～10	The allowable range of the difference between the standard temperature indication and the target temperature, one of the conditions for temperature stability judgment, the unit depends on the unit of the tested equipment

When the three items of volatility, stabilization time and target deviation are met at the same time, the temperature is considered stable.

4. Device Setting

◆ In the device settings, after selecting the device under inspection, all information except the name and device number can be edited. For details, refer to Section 7.1, Device Center.

◆When selecting two items to be inspected, the channel where the items are located can be specified.

5. Setpoint List

All tested device types support the set point list function.

◆The calibrator supports 1 to 17 set point settings. The user can increase or decrease the set point by using the up and down keys on the right or click the number of set points on the right, and enter the number of set points through the keyboard.

◆The number of set points is one-way quantity. For example: if the route is set to round-trip in the basic task setting and the number of set points is 3 (0, 50, 100), the actual number of set points is 6 (0, 50, 100, 100, 50, 0).

6. Indication Error Test

The calibrator provides the error test function of the indication. This function only supports liquid glass thermometers, bimetal thermometers, temperature controllers, and pressure thermometers.

7. Electric Contact Test

The calibrator provides an electrical contact test function, this function only supports bimetal thermometers and

temperature controllers with non-zero electric contacts.

When checking the electric contact test, the settings are as follows:

Table 58 Electric Contact Test

Subject	Valid Value	Description
Temperature control rate	It depends on temperature unit.	Set electrical contact test temperature control rate
First electrical contact value	CH1/CH2	Select the first electrical contact to measure the occupied channel.
The second electrical contact value (only enabled for devices	CH1/CH2	Select the first electrical contact to measure the occupied channel.

You must select one or both electrical contact test and the indication error test. The system defaults to 125 select the indication error test.

7.3 Task Execution

7.3.1 Selection of Tested Equipment and Test Settings

After the tested device and task test configuration are added, the user needs to enter the task execution stage through the existing test tasks in the test center. Operation steps are as follows:

6. Select the added task settings and enter the task setting interface, where the user can modify the task settings.

7. After adjusting the task settings, click ▶ on the lower right corner to enter the task execution interface. For details, refer to chapter 7.3.2 Task execution.

Additel

◆All setting changes made by the user will overwrite the original settings and take effect immediately after clicking the confirm button.

7.3.2 Task Operation Page

On the task execution page, the calibrator will display a connection diagram to prompt the user the correct connection method.

◆Only CH1 supports HART transmitter

Note: Please carefully check the connection method of the tested equipment. The wrong connection method may cause damage to the calibrator or the tested equipment. If you have special connection requirements, please consult the equipment seller for help.

1. Typical Task Page

The typical task interface of calibrator is as follows (except temperature switch and double contact switch):

Figure 14 Typical Task Operation Interface

●In the page, the temperature output of the calibrator is displayed at the bottom, and the return value of the tested equipment is displayed at the top.

◆For equipment that can automatically collect data in calibrator, such as thermal resistance, thermocouple, etc., the return value is automatically collected data, and the user is not allowed to change it.

◆For equipment that cannot automatically collect numbers in calibrator, such as glass liquid thermometers, bimetal thermometers, etc., users need to manually click the returned value of the tested equipment after the calibrator has a stable temperature control and meet the requirements of the residence time, and use the numeric keyboard Enter the current value of the device under inspection.

●In the top column of the interface, the current temperature set point and current cycle times are displayed

●On the right side of the page are standard buttons, the descriptions are as follows:

Table 59 Typical Task Execution Interface Buttons

Button Icon	Manual mode 🔘	Automatic mode 🔘	Description
⊗	●	●	Launch the task, all the data currently obtained will be cleared.
🔳	●	●	Switch the display mode to normal or table mode, both modes can modify the displayed value of the tested equipment During the temperature switch test, click 🔳 to switch the display mode, and the normal mode displays the temperature-time graph

(◀◀)	●	●	Switch to the previous set point The calibrator will clear the set point data and automatically control the temperature to the previous set point.
(▶▶)	●	●	Switch to the next set point. The calibrator will save the instantaneous standard value and the value detected in the final report.
(⇢)	●	●	Skip current set point. The calibrator will leave the data at this point, and the standard value and the detected value will not be displayed in the final report
(‖)		●	Stop or continue the current task.
↑50.00 Number of cycles 1	●	●	Display the current number of cycles and the current number of test points in the cycle. In the example it means that the current is the first cycle, Up, and the set point is 50 ℃.

2. Temperature switch operation page

In the operation interface of the task temperature switch in Figure 15, the lower part displays the temperature output change of the calibrator in the form of a curve, and the upper part displays the switch status of the tested equipment and the corresponding temperature value during the last on and off action.

◆The operating interface of the double contact switch is like that of the temperature switch.

◆The upper part of the operating interface of the double contact switch displays the on-off status of the two temperature switches and does not display the temperature value corresponding to the last open and close action value.

Figure 15 Task Temperature Switch Operation Page

7.3.3 Thermal resistance, thermocouple, thermistor, temperature transmitter, integrated thermal resistance pointer meter thermometer

◆Only CH1 supports HART transmitter.

The calibrator provides manual and automatic execution modes for the above types of equipment to be inspected.

1. Execute manually:

◆Click 🔲 the lower right corner of the screen to start the task, the calibrator will automatically control the temperature to the first set point.

◆After the temperature of the calibrator is stable, the temperature output value of the calibrator will turn green, and the user will be prompted for the residence time next to it.

◆When the residence time meets the requirements, the calibrator will display the residence time as green.

◆Click (▶️) to enter the next set point measurement, the calibrator will automatically record the instantaneous temperature output value and the instantaneous return value of the tested equipment to the report.

◆After all the set point tests are completed, click (▶️) to enter the task report page, where the user can save the test data for this time. For details, refer to chapter 7.4 task termination.

2. Automatic execution：

◆Click (🔳) on the lower right corner of the screen to start the task, and the calibrator will automatically start temperature control. After all the set point tests are completed, click (▶️) to enter the task end page, where the user can redo the test or save the test data. For details, refer to chapter 7.4 task termination.

7.3.4 Temperature switch, double contact switch

The calibrator only provides automatic execution mode for temperature switch task, Operation steps:

◆Click (🔳) on the lower right corner of the screen to start the task, the calibrator will automatically start temperature control.

◆After all the set point tests are completed, click (▶️) to enter the task end page, where the user can redo the test or save the test data. For details, refer to chapter 7.4 task termination.

7.3.5 Liquid glass thermometer, temperature controller, bimetal thermometer, pressure thermometer, transformer winding thermostat, surface thermometer, digital thermometer

The calibrator provides both manual and automatic operation modes for the types of equipment under inspection.

1. Execute manually:

◆Click ⊞ on the lower right corner of the screen to start the task, and the calibrator will automatically control the temperature to the first set point.

◆After the temperature of the calibrator is stable, the temperature output value of the calibrator will turn green, and the user will be prompted for the residence time.

◆When the residence time meets the requirements, the calibrator will display the residence time in green.

◆The user needs to click the return value of the tested equipment at the top of the screen and input the current displayed value of the tested equipment through the keyboard. After the input is completed, click Enter to apply the value, and the calibrator will automatically control the temperature to the next set point.

◆After all the set point tests are completed, click ⊞ to enter the task end page, where the user can redo the test or save the test data. For details, refer to chapter 7.4 task termination.

2.. Automatic execution:

◆Click ⊞ on the lower right corner of the screen to start the task, and the calibrator will automatically start temperature control.

◆When the temperature reaches the set point, the system will automatically take the standard value as the reading of the DUT. At this time, the user can manually click and modify the reading of the DUT.

◆When the temperature reaches the set point, the user needs to modify the reading of the tested equipment within the dwell time.

◆If the residence time requirement is met, the calibrator will automatically advance to the next set point, and the reading of the tested equipment at this set point cannot be modified again.

3. After all the set point tests are completed, click ⊞ to enter the task end page, where the user can redo the test or save the test data. For details, refer to chapter 7.4 task termination.

7.4 Task Termination

7.4.1 Task Report

On the task report page, the user can browse all the data of this test. For a dual-channel task, the user can click on the name of the DUTs at the top of the screen to view the test reports of different DUTs.

Page key description:

Table 60 Task Termination Interface Button

Button Icon	Description
⊗	Exit this task immediately. All current task data will be cleared.
↻	The calibrator will restart this task immediately, and all current task data will be cleared.
💾	Save the data of this task. For details, refer to Chapter 7.4.2 Saving Report.

7.4.2 Saving Reports

After the task is over, the calibrator will automatically jump to the test result save page, where the user can save the test result.

1. How to set

Table 61 Task Data Saving Set

Subject	Valid Value	Description
Operator	Number/ Alphabetic / Chinese, ≤16 characters	Fill in the test operator information.
Execution Time	2000-1-1～2099-12-31	Fill in the task execution time
Environmental	Depends on temperature unit	Fill in the environmental temperature.

Temperature		
Environmental humidity	0～100	Fill in the environmental humidity. Unit: %RH

2.How to use:

After saving the settings, the user can choose to save the task data as: before adjustment, after adjustment or both, and click the confirm button in the lower right corner to save. Click the cancel button in the upper right corner to cancel the save and return to the task report page.

7.5 Data center

Users can manage all test data in the data center.

7.5.1 Data View and Management

Click the existing test data in the data center to read the essential information and test data of the test. On the data information page, the user can click ⏵ on the lower right corner to redo the task. During this process, the user is not allowed to make any changes to the device or test.

7.5.2 Data Deletion

Click �🗑 on the right side of the data center to enter the data deletion page to delete existing task data.

How to use：

◆After entering the data deletion page, click the task data to be deleted (multiple selections are possible).
◆Click 🗑 on the right corner to delete the selected task data.

The user can delete all task data in the center by clicking ☑ One-click delete button on the right.

7.5.3 Data Search

Click 🔍 on the lower right corner of data center to set the task data search items.

The operation is as follows:

1.The user can choose 4 items from the following items:

Table 62 Search Items

Serial Number	Item Name
1	Device Name
2	Device No.
3	Device Type.
4	Test Name
5	Executor
6	Result Type
7	Pass
8	Execution Time

2.Click ✓ on the lower right corner to apply settings.

3.Click the highlighted part under the search item to filter or select keywords for the search item.

◆Keyword filtering does not limit upper and lower case, and supports partial keyword search, refer to Example 1.

◆Delete the content of all search keywords to cancel the keyword filtering under the item, refer to Example 2.

Example 1: Device name-click "all" below-enter "lg"-click ✓ -all data with "lg" in the device name will be listed.

Example 2: Device name-click "lg" below-delete all content-click ✓ - cancel the search for the keyword "lg".

8.Applications

ADT835 calibration bath provides various applications to meet the needs of different customers.

8.1 Thermal Calculator

The bath provides thermocouple (TC) and thermal resistance(RTD) calculator functions, which is convenient for users to perform numerical calculations on site.

1.How to set

(1)TC：

Table 63　　TC thermal calculator

Item	Effective value	Description
Sensor type	S, R, B, K, N, E, J, T, C, D, G, L, U, LR, A, 10μV/℃, 1mV/℃	Select thermocouple type
Electrical signal	Depends on thermocouple type	Thermocouple electrical signal output, the unit is mV. If you need to calculate the electrical signal value, please enter the fixed value of the cold junction first
Celsius system	Depends on thermocouple type	Temperature in degrees Celsius, unit: ℃
Kelvin	Depends on thermocouple type	Temperature in Kelvin, unit: K
Fahrenheit	Depends on thermocouple type	Temperature in Fahrenheit, unit: ℉
Fixed CJC value	-10～50	The fixed value of cold junction, the parameter needed to calculate the electric signal value, unit: ℃

Example: K-type thermocouple:

The user only needs to enter 20°C, and the bath will automatically calculate 68 degrees Fahrenheit and 293.15 Kelvin

corresponding to 20 degrees Celsius

 If the user needs to calculate the electrical signal value, he also needs to enter the fixed value of the cold junction as a supplementary condition to obtain the correct electrical signal value.

 (2)RTD

Table 64   RTD thermal calculator

Item	Effective value	Description
Sensor type	All RTD, ITS-90, CVD and thermistors in the sensor library	Select RTD type
Electrical signal	Depending on RTD type	Thermal resistance electrical signal output, unit: Ω
Celsius system	Depending on RTD type	Temperature in degrees Celsius, unit: ℃
Kelvin	Depending on RTD type	Temperature in Kelvin, unit: K
Fahrenheit	Depending on RTD type	Temperature in Fahrenheit, unit: ℉

 2.How to use:

  The user only needs to click the known item and enter the value, and the bath will automatically calculate the value of the remaining items

8.2 Step test

 The calibration bath provides step test function.

 1.How to set：

Table 65   Step test

Item	Effective value	Description
Range	Depends on the model	Set step test range
Stroke	One way $/$ （n test points）	Set route mode, there are two round-trip modes, the difference is the number of times of return point measurement
	Round trip 1 $\wedge$ （2n-1 test points）	
	Round trip 2 $\wedge$ （2n test points）	
Dwell time	1～240	the amount of time, in minutes, that the calibrator waits at each test point after the temperature has stabilized before taking a reading.
Data log	Enable/ disable	Set data log
Cycle	1/2/3	Number of cycles
Setpoint list	Refer to section 7.2.2.5	Set the number and value of set points during calibration
CH1&CH2	Refer to section 5.4	Set DUTs information
Control setting	Refer to section 5.3	Set calibration bath's control temperature settings

2. How to save settings:

The calibration bath can save up to 20 step test settings. Users can distinguish by name and saving date.

(1)In the step test setting interface, click (🖫) on the right to enter the configuration save interface.

(2)Click to select the configuration to be overwritten, enter the configuration name, and click (✓) to save data.

(3)In the step test setting interface, click (📤) on the right to load the saved step test setting.

3.How to use：

(1) Click ▶ on the right to enter the step test operation interface.

(2) Buttons introduction：

Table 66　Step test Interface

Button	Location	Description
▶	Lower right conner	Begin step test
◀◀ ▶▶	Bottom center of screen	Switch to the previous or next set point
↻	Lower right conner	Cancel all current data of this step test, and restart the test from the first set point of the first cycle
⊞	Upper right conner	Switch display mode to normal or graph mode
↑100.00 cycle number 2	Above the screen (normal mode) or below (chart mode)	Display the current number of cycles and the current number of test points in the cycle For example, it means that the current is the second cycle, Up, and the set point is 100 ℃.
⊗	Upper right conner	Exit this step test and enter the data report page, where users can save this step data

(3)Click ▶ to start the test, the bath will automatically control the temperature to the first set point

4. How to view：

The user clicks (icon) on the right side of the temperature control data record setting page to view the previously saved temperature control data record

Users can click (icon) to enter the delete page, select the record to be deleted, and click (icon) to delete.

8.3 Switch test

1. How to set：

Table 67   Switch Test

Item	Effective value	Description
CH1&CH2	Open: dry contact, wet contact, NPN switch, PNP switch	Select switch connection channel and switch type
	Close	
Starting and ending temperature	Depends on the model	Set the start and end temperature of the switch test **The bath only starts to capture the temperature switch action within this temperature range.**
Temperature control rate	Max, 0～20℃/min	Temperature rise and fall rate, select the maximum or custom rate, the custom rate is displayed by the progress bar. **The bath only starts to control the temperature within the start and end temperature range.**
Route	One way/ round trip	Set switch test route mode
Cycle	1, 2, 3	Set times of repletion of Switch test

2. How to use：

◆Click the start button in the lower right corner to enter the switch test interface

-4

-1

-4

-3

◆In this interface, the user can read the current temperature indication and switch status at the top of the screen

◆Users can switch the interface display mode through ⊡ on the right interface: chart mode and list mode

◆Click the End button in the lower right corner to end the switch test and enter the data saving page

Graph mode: Display the switch test progress in a graph, and only display the switch test results under the current cycle.

List mode: display the test results of the switch in a list.

3. How to view the data:

In the switch setting interface, click ⊡ on the right to enter the switch test data list, and the user can view and save the switch test data as needed.

The user can click ⊞ to enter the delete page, select the record to be deleted, and click ⊡ to delete.

8.4 Screenshot

1. How to set：

Table 68 Screenshot Settings

Subject	Valid Value	Description
Screenshot	Enable/ Disable	Enable or disable Screenshot
Storage Path	Local/ U disk	Select store position of the Screenshot
Amount of storage (only if local storage path is selected)	Read Only	Prompts the user for the number of screenshots that can be saved in a local file.
File Prefix	Digital / Alphabetic / Chinese, ≤16 characters	Screenshot files save name prefix setting

File Name	Time/ Serial NO.	Select automatically add mode for screenshot file name.
Start Serial Number (only when serial number is selected as file name)	1～1000	Select the serial number as the starting serial number for screenshot file name. If the selected serial number is occupied, the bath will be automatically set to the latest available serial number during screen capture operation.

2. How to use:

   On the main interface of the bath, the user clicks (◎) on the top of the screen to take a screenshot.

   ◆The bath only supports screenshots of the main interface.

3. How to view:

   In the screenshot settings interface, users can browse the saved screenshot files by clicking the browse button in the lower right corner, and swipe the screen left or right to browse other screenshot files The browse operation can only browse the screenshot files in the current storage path. If you need to browse the screenshot files in other storage paths, please switch the storage path.

4. Select local as storage path:

   After clicking the snapshot button, the bath wiil take a screenshot and prompt to save the name of the current screenshot.

   ◆Click ⊖ on the right to export all the screenshots stored locally to the U disk.

   ◆Click (🗑) on the right to delete all locally stored snapshots.

5. Select U disk as storage path:

   ◆The users needs to first confirm whether the U disk is connected correctly. After clicking the snapshot button, the bath will take a snapshot operation and prompt for a file name of the current screenshot.

9.Heat transfer fluid

In addition to the recommended silicone oils, other fluids may also be used with this calibration bath. Different fluids have different properties and may be more suitable for specific applications. This section will provide information about the properties of the fluid to select proper fluid for operating ADT835.

9.1.1 Temperature range

Temperature range is often the most important consideration when selecting a heat transfer fluid. The recommended silicone fluid is one of the few fluids that can be used over the entire temperature range of ADT835 and is one of the safest fluids for calibration applications due to its low flammability, reactivity, and toxicity.

Fluids often become too viscous or freeze below the lowest usable temperature. At the highest temperatures, fluids may begin to oxidize, deteriorate, polymerize, volatilize, smoke, or burn.

The bath must be operated within the safe and usable temperature range of the fluid being used. The lower limit of the fluid's temperature range is determined by the fluid's freezing point or the temperature at which the fluid becomes very viscous. The upper limit is usually limited by conditions such as evaporation, flammability, or chemical decomposition of the fluid. Evaporation of the fluid at higher temperatures may affect temperature stability because condensed fluid can drip from the cover back into the bath.

If the bath temperature range is below the full temperature range of ADT835, limit it via the "Set point limit" (see "Temperature output" for details) so that the bath temperature does not exceed the safe operating temperature range of the fluid.

9.1.2 Viscosity

Viscosity is a measure of the fluid's thickness and how easily it can be poured and mixed. Viscosity affects the temperature uniformity and stability within the bath. ADT835 performs best when the fluid viscosity is 50 centistokes or less. The lower the viscosity, the easier the fluid is to stir, and the better the temperature uniformity and stability.

Silicone oils become more viscous over time. Silicone oils operating near the upper end of their temperature range will quickly deteriorate and thicken. Check the fluid regularly to make sure it stirs easily and is below the viscosity limit. Fluids with extremely low viscosities may splash when stirred vigorously. You may need to slow down the stirring speed.

9.1.3 Specific heat

Specific heat is a measure of a fluid's ability to store heat. Heat capacity affects the rate at which this product heats or cools. Silicone fluid has a low heat capacity, allowing this bath to change temperature up to 2 times faster than other fluids, such as water.

9.1.4 Thermal conductivity

Thermal conductivity is a measure of how easily heat flows through a fluid. The thermal conductivity of a fluid affects control stability, temperature uniformity, and temperature stabilization time. In fluids with higher thermal conductivity, heat is dispersed faster, which uniformly improves the performance of the calibration bath.

9.1.5 Thermal expansion

Thermal fluid expands when heated. This can cause the fluid level in this bath to rise or fall as the temperature changes. Silicone fluids expand more than some other fluids. It is best to use an "Overflow Tank" to prevent the fluid from overflowing from the top of the bath. Check the fluid frequently and add fluid when the level drops below the "MIN" mark.

If you do not use an overflow tank, be sure to pay close attention to the fluid level and remove any excess fluid to prevent it from overflowing from the edge of the bath.

9.1.6 Resistivity

Resistivity describes a fluid's ability to resist the flow of electrical current. In some applications (such as measuring the resistance of a temperature sensor), it is important that the fluid has little or no surge. In these cases, a fluid with an extremely high resistivity should be considered.

9.1.7 Life of heat transfer fluid

Many heat transfer fluids degrade over time due to evaporation, water absorption, gelation, or chemical decomposition. Usually the heat transfer fluids degrade more significantly when used near their upper temperature limits. Heat transfer fluids with a higher temperature range can be changed less frequently.

9.1.8 Safety

When selecting a heat transfer fluid, there are always safety issues to consider. Some heat transfer fluids can be toxic, causing damage to the eyes, skin, or by inhaling their vapors. Ventilation must be used if hazardous or offensive vapors are produced. Heat transfer fluids can also be flammable, requiring specialized firefighting equipment and procedures. An important property to consider is the flash point of the heat transfer fluid. The flash point is the temperature at which the vapor begins to burn when there is enough vapor, enough oxygen is present, and an ignition source is applied. The flash point can be open cup or closed cup, with the closed cup temperature always being lower than the open cup temperature. In the case of a calibration bath, both scenarios are possible. The closed cup temperature represents the vapor that is retained within the bath, while the open cup temperature represents the vapor that overflows the bath.

9.1.9 Silicone oil

Silicone oil is usually the best choice for the heat transfer fluid of ADT835. Silicone oil products have various temperature ranges and viscosities. As a general rule, please choose a heat transfer fluid with the highest temperature range and a viscosity that does not exceed 50 centistokes at the lowest operating temperature.

The following table lists some physical property data of silicone oil in the same series as our recommended heat transfer oil for user reference.

Table 69　Physical property data of silicone oil

Parameters	Unit	5.0 cSt	10.0 cSt	20.0 cSt	50 cSt	100 cSt	200 cSt	350 cSt
Specific gravity at 25°C	-	0.913	0.935	0.949	0.96	0.964	0.967	0.969
Flash Point, Closed Cup	°C	134	211	246	318 (open cup)	> 326 (open cup)	> 326(open cup)	> 326(open cup)
Acid Number, BCP	trace	trace	trace	-	trace	trace	trace	trace
Melt Point	°C	-70	-60	-52	-41	-28	-27	-26
Pour Point	°C	-100	-100	-84	-70	-65	-65	-50
Surface Tension at 25°C	dynes/cm	19.7	20.1	20.6	20.8	20.9	21	21.1
Volatile Content at 150°C	%	4.5			0.3	0.02	0.07	0.15
Viscosity Temperature Coefficient		0.55	0.56	0.59	0.59	0.6	0.6	0.6
Coefficient of Expansion	cc/cc/°C	0.00105	0.00108	0.00107	0.00104	0.00096	0.00096	0.00096
Thermal Conductivity at 50°C	g cal/cm·sec·°C	-	0.00032	0.00034	0.00037			
Solubility in Typical Solvents								
Chlorinated Solvents	-	High	High	High	High	High	High	High
Aromatic Solvents	-	High	High	High	High	High	High	High
Aliphatic Solvents	-	High	High	High	High	High	High	High
Dry Alcohols	-	Good	Good	Good	Poor	Poor	Poor	Poor

Water	-	Poor	Poor	Poor	Poor	Poor	Poor	Poor
Fluorination accelerator	-	-	-	-	High	High	High	High

9.1.10 Limitations and Disclaimers

Every effort has been made to ensure the accuracy of these graphs; however, no guarantee can be given as to the suitability of the data for a particular application. Operation near the limits of a property (such as flash point or viscosity limit) may result in loss of safety or degraded performance. Sources of information on certain properties may vary, and company's safety regulations and personal judgment regarding flash point, toxicity, etc. must be considered. Users should read the Material Safety Data Sheet (MSDS) and make your own judgment. We assume no responsibility for suitability for an application or for any injury, damage to equipment, product, or facility arising from the use of these heat transfer fluids.

10.Maintenance

This section describes general maintenance operations required by the operator to keep the calibration bath in optimum condition.

10.1.1 Clean

Keep the exterior of the bath dry to prevent the fluid from seeping inside or spreading to other equipment. Use paper towels or other absorbent materials to wipe fluid off all surfaces. Complete removal of fluid residue may require the use of a specialized mild solvent. Use solvents only in a well-ventilated area. Refer to the cleaning agent's Material Safety Data Sheet (MSDS) for further safety precautions.

10.1.2 Clean spilled fluid

Heat transfer fluid spilled on the floor can be a safety hazard. To avoid accidents, follow these precautions and guidelines.

◆Fill and operate the bath carefully to avoid dripping and splashing of the fluid.

◆Always keep materials clean

◆If a splash occurs, keep the area closed to traffic until the spill is cleaned up.

◆Use paper towels or other absorbent materials to wipe up spills.

◆Use ventilation systems to exhaust fumes from thermal or cleaning fluids.

◆Dispose of used cleaning materials properly.

Heat transfer fluids and solvents may require additional safety precautions; refer to the Material Safety Data Sheet (MSDS).

10.1.3 Check the heat transfer fluid

To achieve the best performance, the heat transfer fluid needs to be in good condition. Please check regularly to ensure that the heat transfer fluid is easy to stir. The heat transfer fluid needs to be replaced before polymerization begins.

Its viscosity should not exceed 50 centistokes at the lowest temperature. The viscosity of silicone oil will gradually increase with use time and will thicken sharply at the end of its service life.

When measuring viscosity with a viscometer, the heat transfer fluid temperature should be ≤35° C for safety and accuracy.

Since the ADT835-150/150PC can operate at a temperature below the ambient dew point, water tends to condense into the heat transfer fluid. Therefore, long-term operation at a temperature below the ambient dew point should be avoided, especially when working with an open bath, the effect of water condensation should be paid more attention. To remove condensed water, the temperature needs to be raised to 100℃ and maintained for more than 1 h to evaporate the water.

10.1.4 Drain the heat transfer fluid

When you need to drain the bath to replace the heat transfer fluid or transport this bath, please prepare a wide clean container that can hold at least 2.5L of fluid.

Warning: To prevent personal injury, please wear appropriate personal protective equipment.

To drain the fluid, please follow the following suggestions:

◆Set the set point to 23°C and wait for the bath to heat or cool to between 5°C and 60°C.

◆Turn off the bath and unplug the power cord.

◆Remove the overflow tank and pour the fluid into a large container.

◆Place the container just below the drainpipe and unscrew the drain plug. As the fluid flows out into the container, watch the container for proper positioning to ensure that all the thermal fluid is caught.

◆If the thermal fluid flows slowly, lift the front of the bath to speed up the flow of the remaining fluid.

◆After the bath is empty, insert the drain plug and tighten it.

◆Use a paper towel or other absorbent material to wipe off any fluid remaining in the bath.

◆Wipe up any drips or splashes.

◆Dispose of the fluid in a legal and environmentally friendly manner.

10.1.5 Transportation

Preparation before transporting the calibration bath：

◆Set the set point to 23°C and wait for the bath to heat or cool to between 5°C and 60°C.

◆Turn off the bath and unplug the power cord.

◆Remove all accessories.

◆Refer to section "Drain the heat transfer fluid" to drain the fluid.

◆Cover the bath and tighten it fully.

◆Install the overflow plug on the overflow pipe.

◆Wipe all oil off the bath and the overflow tank.

◆Lift the calibration bath with the handles.

◆If the calibration bath is transported by car or truck, carefully pack it in the original instrument box.

For precautions during transportation, please refer to "Safety Instruction".

10.1.6 Clean the ventilation port

◆Please avoid operating the instrument in an oily, humid, harsh, or dusty environment.

◆The dust screen at the air inlet of the equipment should be cleaned regularly depending on the environment in which it is used, to ensure that the dust accumulated on the dust screen does not affect the efficiency of the calibration bath. It is recommended to use a vacuum cleaner, brush, or cloth to clean the dust screen. Do not spray or rinse it directly with water. Water entering the equipment will cause damage.

◆The condenser heat sink should be cleaned regularly to ensure that the dust accumulated on the heat sink does not affect the efficiency of the calibration bath. The cleaning of the condenser requires trained professionals. If necessary, please contact Additel.

11. Troubleshooting

Please refer to the table below for troubleshooting. If you have any questions, please contact Additel.

Table 70   Common problems and remedy

Problem	Remedy
Cannot heat up or cool down	Check whether the bath is filled with heat transfer fluid. Check the temperature control rate setting. Check whether the stirring impeller rotates abnormally.
Heat up is slow	Check the temperature control rate setting. Check whether the stirring impeller rotates abnormally.
ADT835-150 cool down is slow	Check the temperature control rate setting. Check whether the stirring impeller rotates abnormally. Check whether the ambient temperature is within the specified range. Check whether the cooling fan speed is abnormal. Check whether the air inlet is blocked.
ADT835-250 cool down is slow	Check the temperature control rate setting. Check whether the stirring impeller rotates abnormally. Check whether the cooling fan speed is abnormal. Check whether the air inlet is blocked.
Temperature is not accurate	Check whether the viscosity of the fluid exceeds the limit. Check whether the stirring impeller rotates abnormally. Check the last calibration date. If it has expired, please perform temperature indication calibration.

Unable to stabilize after a prolonged period of time	Check whether there is strong interference around the device. Check whether the viscosity of the fluid exceeds the limit. Check whether the stirring impeller rotates abnormally. Check the control parameter settings.
Fluid overflows from the bath	Please check whether the overflow plug is removed. Check whether the overflow tank is overfilled.
The heat transfer fluid of ADT835-150 boils violently and splashes out of the bath	It is usually seen that the ADT835-150 heats up after a prolonged period of low-temperature operation, because the heat transfer fluid absorbs a large amount of water and boils. Please cut off the power supply immediately, control the temperature to 100℃ and stabilize it for more than 4 hours after stabilization, and then heat it up after the water is evaporated.
The thermometer reading drifts slowly when calibrating at low temperature (for ADT835)	This is common when the temperature is kept low for a long time, because a large amount of ice crystals in the bath are adsorbed on the sensor surface. Please dry the heat transfer fluid before calibration.
The heat transfer fluid produces fumes or odor	The heat transfer fluids usually generate fumes at elevated temperatures; use a vent to exhaust the fumes.
Wrong reading of reference probe	Check if the reference PRT is correctly connected. Check if the reference PRT's parameters are correctly configured. Verify that the coefficients are correct.
RTD reading is wrong	Check if the RTD is connected correctly. Check if the RTD is the correct type. Test another sensor.
TC reading is wrong	Check if the TC is connected correctly.

	Check if the TC is the correct type.
	Test another sensor.
Liquid level of the fluid is low	Add more fluid.
Stir motor is abnormal	Check whether the viscosity of the fluid exceeds the limit.
	Check whether the stirring impeller rotates abnormally.
Input voltage out of limit	Check the power supply.
Cooling down temperature of ADT835-150 is limited	Check the ambient temperature.
	Check for any other heat source at air inlet.
	Check whether the air inlet is blocked.

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