Additel 875 & 878 Thermocouple Calibration Furnaces

Additel 875 & 878 Thermocouple Calibration Furnaces

-------User Manual

[Version：2010V03]

Additel Corporation

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STATEMENT

This user's manual provides operating and safety instructions for the Additel 875 & 878 Thermocouple Calibration Furnaces. 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. For the most up-to-date manual, please visit

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Safety Instructions

Warnings - identify action or conditions that may be hazards to the user.

Cautions - identify action or conditions that may damage the calibrator or the equipment under test.

Warning：

To prevent injury, please follow the instruction manual for use.

To prevent possible electrical shock, fire, or personal injury, please do following:

1. General：

- Before using the product, please read the manual, especially the "Safety Instructions" section.
- Before using the thermocouple calibration furnaces, please install the insert and top insulation piece first, otherwise the thermocouple calibration furnace could be damaged.
- The insertion and removal of inserts should be performed when the temperature of the thermocouple calibration furnace is 0 ~ 50 ℃ .

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- The thermocouple calibration furnaces should be used by trained personnel only.
- Check product exterior before use.
- Read and follow all instructions carefully.
- Before initial use, or after storage in humid environments, or anytime the thermocouple calibration furnace has not been used for more than 10 days, the the thermocouple calibration furnace needs to be started with "Dry-out" function over 2 hours first to meet all safety requirements and specifications, see section 5.3.
- Do not use the product if it is damaged or operates incorrectly.
- Do not use in flammable, high humidity, or dusty environments.
- Turn off the power switch before unplugging the power cord.

2. High Temperature：

The Thermocouple Calibration Furnace has a high temperature warning symbol , this symbol indicates when the furnace itself temperature is over 50℃ .

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- Verify the status of the high temperature indicator prior to each use to avoid potential harm when handling the unit, probes and inserts.
- The temperature of body furnace exceeds 50 ℃, please thermocouple calibration furnace, never touch the high temperature parts inside the calibrator.

3. Electrical：

- Double check the power connection, fuse model and installation before use.
- Do not apply more than 30V AC or DC to any of the process calibrator inputs.
- Do not use any test leads other than those provided with the furnace.
- Disconnect all test leads before switching to other electrical measurement functions.
- Due to the high pressure inside the dry body furnace during use, please do not disassemble furnace.

CAUTIONS：

To prevent instrument damage, please follow this user manual.

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To prevent possible electrical shock, fire, or instrument damage, please follow these guidelines:

- Do not shake, drop, or bump the calibrator while in use.
- Do not use any power cord other than the one provided with the furnace.
- Do not unplug the power cord while in use.
- Do not clean the furnace with liquid, please contact Additel for cleaning process.
- Do not drop anything into the furnace. Slowly and carfully place inserts and probes into the thermocouple calibration furnace. To avoid damaging the unit, it is best to use the insert removal tool when both inserting and removing inserts.
- Do not use the furnace, if it appears to have any issues, and contact Additel immediately.
- Before an insert is used for temperature calibration, it should be heated to more than 1000 ℃ for 90 minutes.

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1. Introduction

1.1 Overview

Additel's 875-1200 & 878-1200 Thermocouple Calibration Furnaces are the latest in a generation of intelligent temperature calibration equipment from Additel. These calibrators move quickly from one temperature to the next and are designed specifically to reduce measurement noise while providing portability and a wide temperature control range with excellent uniformities. The large touch screen display, telescopic handle design, optional four channel process option, external standard thermocouple temperature control help to support automated calibration of thermocouples, temperature transmitters, temperature switches, and HART smart transmitters and other instruments.

Contact us:

Additel Corporation

Tel:

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1.2 Model Information

Table 1 Model Information

Specification	ADT875PC (100 ~ 1210)℃ ADT878PC (100 ~ 1210)℃	ADT875 (100 ~ 1210)℃ ADT878 (100 ~ 1210)℃
Temperature Range	(100 ~ 1210)℃	(100 ~ 1210)℃
mA/mV/V/ measurement	●	
DC 24V Output	●	
HART Communication	●	
Switch Test	●	
External TC (Temperature Control)	●	
Intelligent calibration	●	
Database	●	
Application	●	●
Intelligent Diagnosis	●	●
Remote Control	●	●
weight	10.3 kg	9.9 kg

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1.3 Basic Structure

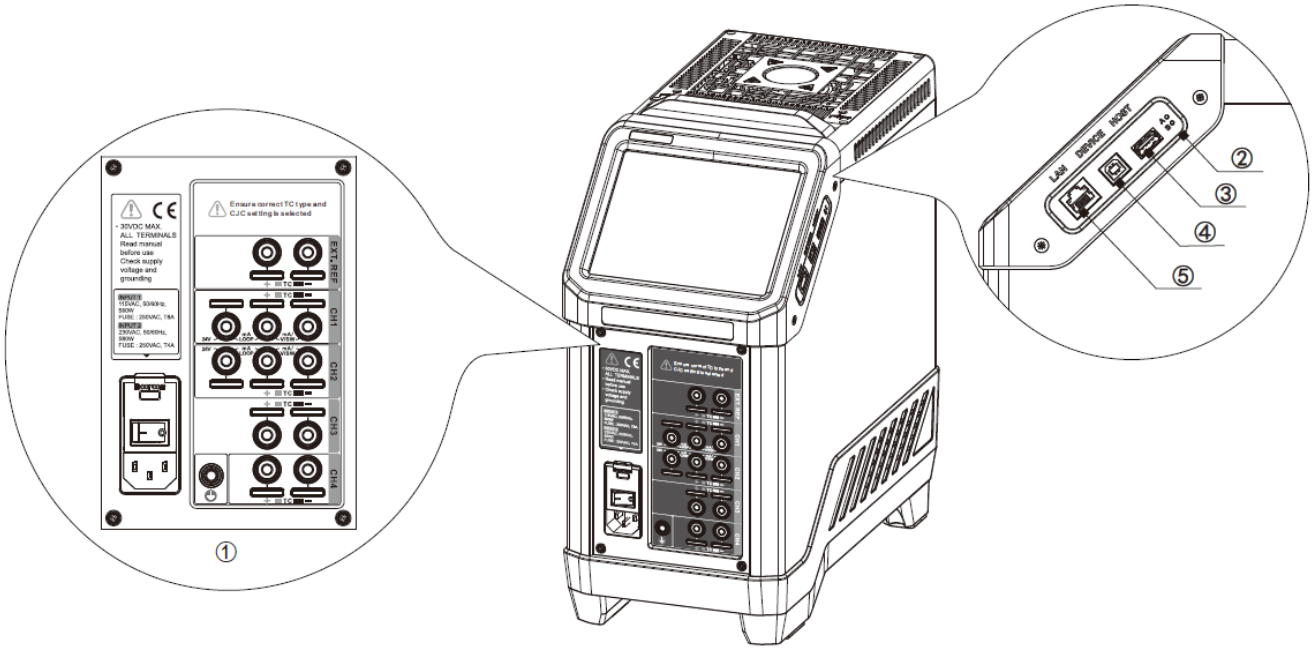

Table 2 Basic Stucture

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NO.	**Description**	Explanation
①	Electrical Measurement plug	Electrical test connection interface, electrical test cable interface and thermocouple interface
②	Reset Button	Furnace forced reset button, please consult Additel for usage details
③	USB Port (Host)	Used to connect U disk for system upgrade
④	USB Port (Device)	Used to connect to the host computer
⑤	Network Cable Port	Used to connect to the host computer

1.2 Features

- Temperature control from 23°C to 1210°C
- Two models to choose from: Reference (ADT878) and Standard (ADT875)
- Display Accuracy of ±1.5°C (ADT878)
- Process calibrator option provides a multi-channel readout for TCs, switches and transmitters, including task documentation and HART communication
- 4 on-board measurement channels (PC option)

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- Channel 1 (CH1): thermocouple, current, voltage, temperature switch, HART transmitter
- Channel 2 (CH2): thermocouple, current, voltage, temperature switch
- Channels 3 and 4 (CH3 & CH4): thermocouple
- Process calibrator option provides a multi-channel readout for TCs, switches and transmitters, including task documentation and HART communication
- Portable, rugged and quick to temperature
- Self-calibration feature (PC option)
- Multi-zone temperature control
- Internal and external sensor control (PC option)
- Metallic interchangeable inserts
- Wi-Fi and Bluetooth capable
- Color touch screen display
- ISO 17025-accredited calibration w/data included

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◆ Patent pending technology

1.3 Environmental Conditions

◆ Working Temperature: (0~50) ℃ /(32~122) ℉ (Accuracy guarantee: 8℃~38℃ /46℉ ~100℉)

◆ Storage Temperature: (-20~60) ℃ /(-4~140) ℉

◆ Humidity: 0 ~ 90%RH (0 ~ 50℃ /32℉ ~ 122℉), RH (non Condensing)

◆ Atmosphere Pressure: Less than 3,000 m (9,800 ft)

◆ Protect Level: IP20

1.4 Technical Specifications

1.4.1 General Specifications:

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Table 3 General Specifications

Specification	**ADT875PC** (100 ~ 1210)℃ **/ ADT875** (100 ~ 1210)℃ **ADT878PC** (100 ~ 1210)℃ / **ADT878** (100 ~ 1210)℃
Dimensions	170mm × 345mm × 330mm (13.6 x 6.7 x 13.0 in)
Power Supply	(90-242) VAC，(45-65) Hz, 580W
Screen	6.5 in (165 mm) TFT industrial touchscreen, resolution640×480
Communication	USB、LAN、WiFi、blurtooth
Language	Chinese, English
Temperature Units	℃/℉/K
Temperature Resolution	0.01℃
Operation Noise	Common temperature rising：＜55 dB(A) Mute Mode：＜60 dB(A) Fast temperature cooling：＜70 dB(A)
Compliance	CE

1.4.2 Furnace Specifications:

Table 4 Furnace Calibrator Specifications

Specification	875-1210	878-1210 [1]
Temperature Range	100°C to 1210°C	
Display Accuracy	±1.2°C @ 100°C	±1.0°C @ 100°C
	±1.2°C @ 300°C	±1.0°C @ 300°C
	±1.2°C @ 600°C	±1.0°C @ 600°C
	±1.6°C @ 900°C	±1.2°C @ 900°C
	±2.0°C @ 1210°C	±1.5°C @ 1210°C

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Stability	±0.1°C	
Axial Uniformity (20mm zone)	±0.6°C @ 100°C	±0.4°C @ 100°C
	±1.2°C @ 300°C	±0.8°C @ 300°C
	±1.5°C @ 600°C	±1°C @ 600°C
	±1.5°C @ 900°C	±1°C @ 900°C
	±1.5°C @ 1210°C	±1°C @ 1210°C
Radial Uniformity	±0.2°C @ 100°C	±0.2°C @ 100°C
	±0.3°C @ 300°C	±0.3°C @ 300°C
	±0.4°C @ 600°C	±0.4°C @ 600°C
	±0.8°C @ 900°C	±0.6C @ 900°C
	±1°C @ 1210°C	±0.8°C @ 1210°C
Loading Effect	±0.5°C	
Environmental Conditions	8°C to 38°C guaranteed accuracy, 0°C to 50°C 0% to 90% RH non-condensing, 3000 M altitude for normal operation	
Storage Conditions	-20°C to 60°C	

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Immersion Depth	XR style inserts = 138 mm (5.43") XS style inserts = 116 mm (4.57") (see insert ordering info for more details)	
Insert Size - OD	24.8 mm (0.98 inches)	
Heating Time	50 min: 23°C to 1210°C	
Cooling Time	50 mins:1210°C to 300°C 50 mins: 300°C to 50°C	55 mins:1210°C to 300°C 55 mins: 300°C to 50°C
Typical Time to Stability	15 min	
Resolution	0.01°C	
Units	°C, °F, and K	
Display	6.5 in (165 mm) color touch screen	
Power Requirements	90-254 VAC, 45-65 Hz, 580 W	
Mechanical Testing	Vibration: 2 g (10-500 Hz), 30 min for 2 sides Impact: 4 g three times Drop test: 500 mm (19.6 in)	
Communication	USB A, USB B, RJ45, WiFi, Bluetooth	
Localization	English, Chinese, Japanese, Russian, German	
Warranty	1 year	

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1.4.3 Electrical Measurement Specifications:

Table 5 Electrical Measurement Specifications

Specification	875-1210	878-1210
TC Measurement Channels	Patented TC terminals: Accepting S, R, K, B, N, E, J, T, L, and U	
TC Measurement Accuracy Type K Ch. 1-4 (excluding sensor)	±0.182°C @ 100°C	±0.172°C @ 100°C
	±0.266°C @ 300°C	±0.236°C @ 300°C
	±0.310°C @ 600°C	±0.251°C @ 600°C
	±0.397°C @ 900°C	±0.304°C @ 900°C
	±0.517°C @1210°C	±0.382°C @ 1210°C
TC Range	–75 mV to 75 mV (UUT Channels 1-4)–18 mV to 18 mV (Reference Channel)	
TC Resolution	0.0001 mV	
TC Voltage Accuracy	0.02% RD + 8μV (ch. 1-4) 0.01% RD + 2μV (ref ch.)	0.01% RD + 8μV (ch. 1-4) 0.005% RD + 2μV (Ref ch.)
Internal CJC Accuracy	±0.35°C (ch. 1-4)	±0.30°C (ch. 1-4)
	±0.25°C (ref ch.)	±0.20°C (ref ch.)
Current Range	–30 mA to 30 mA	
Current Accuracy	±(0.02% of rdg+ 2μA)	±(0.01% of rdg + 2μA)
Current Resolution	0.0001 mA, Input Impedance < 10Ω	
Voltage Range	–12 V to 12 V, –30 V to 30 V	
Voltage Accuracy	±(0.02% of rdg+ 2mV)	±(0.01% of rdg+ 0.6mV)

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Voltage Resolution	0.0001 V, Input Impedance >1MΩ
DC 24V Output	24 V ± 10%, MAX 60 mA
Hart Communication	Optional (ADT875PC and ADT878PC Models)
Temperature Coefficient 0°C to 8°C and 38°C to 50°C	TC Readouts: ±5 ppm/°C Current: ±5 ppm/°C Voltage: ±5 ppm/°C
Switch Test	Mechanical or Electrical - Channels 1 & 2 only
Documentation	Up to 1,000 tasks which store up to 10 results each containing as found and as left data. Snap shot feature allows for screen captures. Records auto step and ramp functions

1.4.4 Security Features

- Over-temperature hardware cutout
- Over-temperature software cutout
- Automatic detection of temperature control failure
- Automatic detection of measuring element failure

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Standard Packaging

Table 6 Standard Accessories

Model	Qty	**ADT875PC** (100 ~ 1210) ℃ **ADT878PC** (100 ~ 1210) ℃	**ADT875** (100 ~ 1210) ℃ **ADT878** (100 ~ 1210) ℃
Furnace	1pc	●	●
Inserts: (1) (see ordering info for types)	1pc	●	●
Insulation	2pcs	●	●
Insert Removal Tool	1pc	●	●
Test leads	2sets，2 red 2black / each set	●	●
USB Cable、power cord	1pc	●	●
Manual	1pc	●	
Fuse	2pcs	●	●
Accredited Calibration Certification	1pc	●	●

(1) Before Insert is used for temperature calibration, it should be heated to more than 1000 ℃ for 90 minutes.

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2. Display Operation

2.1 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 2-1.

(1) Status Bar：Includes date and time, Wi-Fi , cloud storage status , 24V power status , intelligence diagnose center , screenshot , External device measurement channel status, channel keys and system menu icon .

Note: All icons (except date and time, Wi-Fi and cloud storage function) on the status bar can be selected via the touch screen to manage and select options.

(2) DUT Channels (only ADT875PC (100 ~ 1210) ℃ and ADT878PC (100 ~ 1210) ℃): including sensor type (only supports TC measurement), automatic cold junction temperature (only supports TC measurement), thermoelectric protential measurement data (Only support TC measurement), real-time data of electrical

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measurement, data analysis (need to set);

(3) Temperature output channels: including target temperature setting value INT 0.00, real-time temperature data, and switch testing.

◆ When an external is connected, the furnace will allow the user to select the external probe as the temperature control component, The external temperature control icon, and external temperature setting value INT 0.00 are displayed on the screen.

(4) Lock screen: Click the main menu icon and select lock screen. After entering the lock screen state, only the unlock key can be used。

◆ Unlock：Under the lock screen, Click the unlock button in the upper right corner

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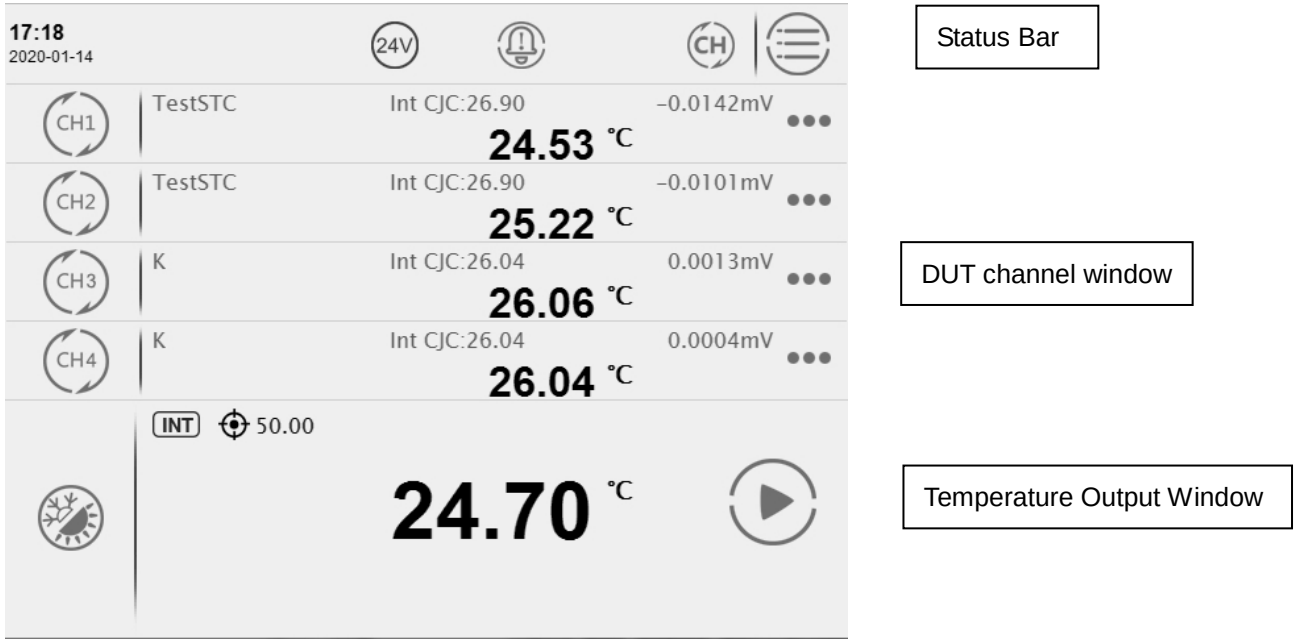

Figure 2 Main Screen

2.2 System Temperature Unit Settings

System temperature display units can be changed through the system menu or on the main screen

◆Once the system display temperature units are changed, Except for existing sensors and DUT information.

1. System Menu：

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Press on the top right corner of the screen → "Personalization" → "Temperature Unit" → Select temperature unit.

2. Main Screen：

Press the current temperature value on the display - Set desired temperature unit by typing in a new value.

2.3 Temperature Output

2.3.1 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 reference parameters. The user can switch through the top of the screen and set the following parameters:

(1) Control Parameters

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Table 7 Temperature Output Settings

Subject	Valid Value	Explanation
Stability Tolerance	0.04-10.00	One of the conditions for temperature control and stability. The condition is met when temperature varies within this range. Unit: ℃
Stabilazation 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	0-20.00	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: ℃
Cooling mode	Quiet/fast	When cooling down, the silent mode can effectively reduce noise; selecting the fast mode can effectively improve the cooling speed.
Temperature Control Rate	Max value ,0.01-100.00	Choose max or customize the temperature Scan rate. Customized rate is indicated on the process bar. Unit: ℃/min
Set Point Limit	Enable/disable	Limit the range of temperature control
Set Point Range (on)	Depends on furnace model and temperature unit	The temperature will not exceed the upper and lower limits after setting.

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(2) Standard Parameters

Table 8 Standard Parameters

Subject	Valid Value	Explanation
Internal Sensor		
Resolution	1, 0.1, 0.01	Temperature display resolution
Sensor Signal	Read only	Measured temperature of internal sensor
External Sensor（Only for **ADT875PC** (100 ~ 1210)℃ and **ADT878PC** (100 ~ 1210) ℃		
Resolution	1, 0.1, 0.01, 0.001	Temperature display resolution
Sensor Signal	Read only	Measured temperature of external sensor
Sensor Information	Read only	Information of external sensor

2.3.2 Target Temperature Input：

Click real-time temperature data area, then input the target temperature value through the numeric keyboard. 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

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furnace calibrator will start automatically.

2.3.3 Start/Pause Temperature Control:

Temperature control can be initiated or paused by pressing START or PAUSE on the right of the furnace temperature display screen.

2.3.4 Temperature Control Stabilization

Temperature control will stabilize when the conditions of fluctuation degree, stabilization time and target deviation are met. The display value will turn green accompanied by a beep when the unit is stable.

2.4 DUT Measurement

2.4.1 DUT Settings

Press the channel button to get into DUT settings, there are two parts in this interface: channel setting and sensor testing ：

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Table 9 DUT Settings

Subject	Valid Value
CH1	TC, mA, mV, switch, HART
CH2	TC, mA, mV, switch, HART
CH3、CH4	TC

Table 10 Sensor Testing

Subject	Fffective value	Explanation
Resolution	1、0.1、0.01	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 to for temperature control and stabilization. The condition is met when the stabilized time exceeds the set point. Unit: min

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2.4.2 Thermal Couple (TC) Measurement

(1) Connection

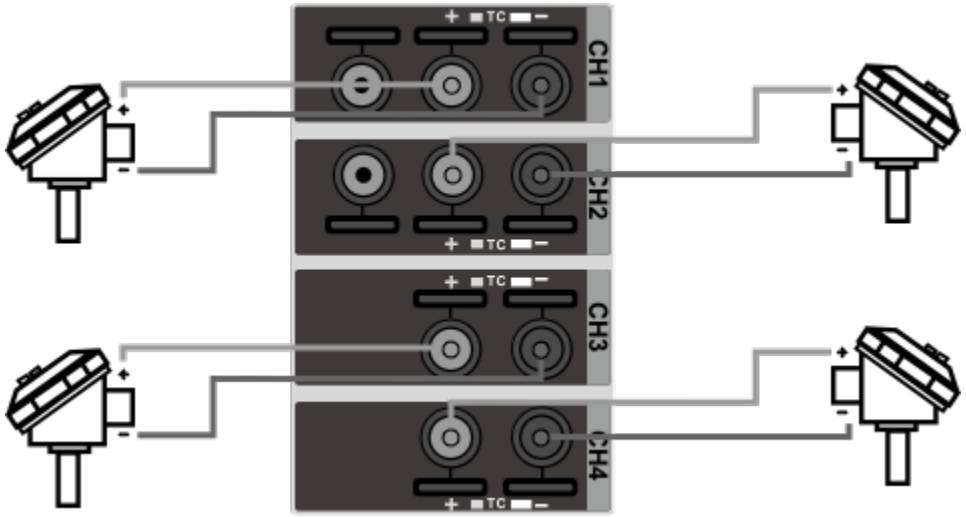

Figure3 TC Connection

(2) Measurement Settings

◆ Press the button CH1- CH4 on the left of the touchscreen display to access the channel measurement settings interface.

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◆ Choose the thermocouple measurement in the subject bar.

◆ Press sensor type to enter the sensor selection screen and choose the right thermocouple type.

System supported sensors are as follows:

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

◆ Cold Junction Type

Table 11 Cold Junction Type

Subject	Valid Value	Explanation
Cold Junction Type	Internal / External	"Int" means the calibrator is the using internal sensor as the cold junction reference. "Ext" means the calibrator is using user entered custom values as the 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 "Fixed")	Numeric Content	Set customer value for the cold junction compensation value

(3) Starting a Measurement

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After selecting the sensor type and the cold junction type, the system will jump back to the checked setting interface.

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

If the thermocouple (TC) line is connected incorrectly, the detected channel at the top of the main interface displays a red "------" icon with a prompt tone.

For the temperature output operation, please refer to Chapter 2.3.

2.4.3 Electric Current（mA）Measurement

(1) Wire Connection of Electric Current（mA）Measurement

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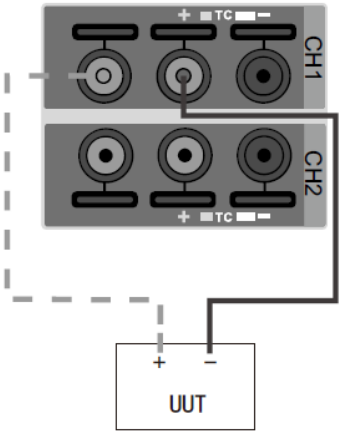

Figure 4 Connection way of Electric Current（mA）Measurement

(2) Measurement Settings

◆ Click CH1 or CH2 on the left side of the touchscreen display to access the channel measurement settings interface.

◆ Press “Measurement” and select the mA icon.

◆ Select mA & V resolution, then the system will return to the channel setting interface.

(3) Start Measurement:

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Click ✓ on the lower right corner, the system will return to the main page and wait for the measurement to start:

For the temperature output operation, please refer to Chapter 2.3.

2.4.4 Voltage (V) Measurement

(1) Wire Connection

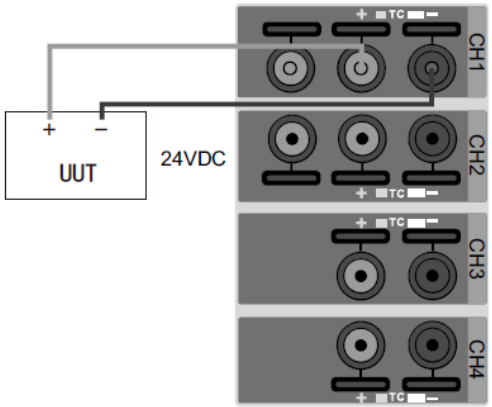

Figure 5 Connection diagram for Voltage Measurement

(2) Measurement Settings:

◆Press the button on the left CH1 or CH2, to access the measurement setting interface.

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◆Press “Measurement” and select V measurement.

◆Select Range and mA&V resolution, and the unit will return to the channel setting screen.

Table 12 Voltage Measurement Range Selection

Subject	Effective Value	Explanation
Range	12V、30V	Select voltage measurement range

(3) Start Measurement

Click on the lower right corner, the system will return back to the main page and wait for the measurement to start:

For the temperature output operation, please refer to Chapter 2.3.

2.4.5 Switch Test

(1) Connection

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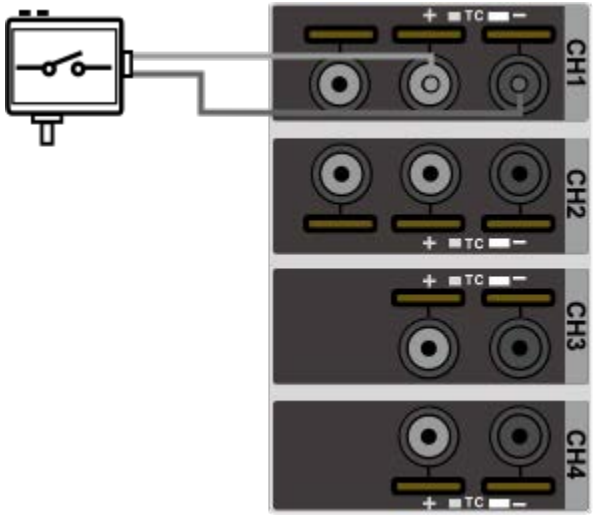

Figure 6 Connection Diagram for Switch Testing

(2) Measurement Settings:

◆Press the button on the left CH1 or CH2, to access the DUT settings interface.

◆Press “Measurement” and select switch test icon

◆Select switch type (seeing table12) and mA&V resolution, the unit will return to the channel setting screen.

Table 13 Switch Type Selection

Subject	Valid Value	Comment
Switch Type	Dry contact, Wet contact, PNP, NPN	Temperature switch type

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(3) Start Measurement

Press ✓ on the lower right and the unit will return to the main screen and wait for the measurements to start;

Please see section 2.3 for more information regarding the temperature output.

2.4.6 HART Transmitter Measurement

(1) Cable connection

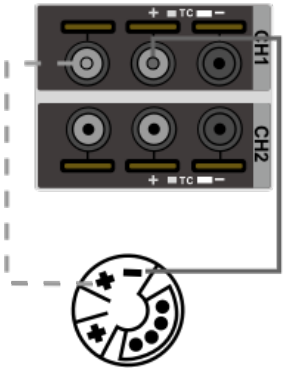

Figure 7 HART Transmitter Connection Diagram

◆Only CH1 supports HART Transmitters

(2) Transmitter Settings:

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◆Press the icon on the left, to access to DUT settings interface:

◆Press “Measurement” and select HART measurement icon:

◆Continue press the icon and the unit will return to the main screen and wait for the measurement to start:

(3) Search

Click the right ••• of DUT channel

Click "Search", 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 name of the desired transmitter and click on the bottom right corner of the screen after checking it:

The system automatically returns to the main screen and reads the measured data of the transmitter.

(4) Settings (some functions are HART only)

Click ••• on the right side of DUT channel and select " " to enter the transmitter setting page:

◆Device Information:

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Table 14 HART Device Information

Subject	Valid Value	Explanation
Manufacturer	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 (8 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 (20 max length)	Custom information
Description	Alphanumeric content (20 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	General version of the transmitter
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

◆Sensor

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

◆Device Output:

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Table 15 HART Device Output

Subject	Valid Value	Comment
Master Variable/Range Units	°C, °F, °R, K	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	Support numeric input, ≥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.

A: Current loop test:

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

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- ◆ The current loop test allows the user to compare and calibrate the transmitter current output signal and the furnace 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 “Get” button to intercept the current measurement signal of the furnace calibrator.
- ◆ After pressing the Enter or Confirm button, the furnace calibrator will output the current value and current measurement value to the transmitter.

B: D/A Adjustment:

- ◆ This function will be enabled only when the search address of the transmitter is 0.
- ◆ Customers can adjust the current output of the transmitter at zero and full scale through D/A adjustment.

① D/A Zero

1) Intercept the current measurement signal (4mA as the typical value) through the numeric keyboard or press the button “Fetch”.

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2) Press enter or pressing the confirm button, the calibrator will send instruction to the transmitter to adjust the current output at zero.

② D/A Gain

1) Intercept the current measurement signal (20mA as the typical value) through the numeric keyboard or press the button “Fetch”.

2) Press enter or pressing the confirm button, the calibrator will send instruction to the transmitter to adjust the current output at full scale.

(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 16 HART Device Process Explanation

Subject	Explanation
Maser Variable	The unit of the master variable depends on the setting unit of the transmitter. Please refer to transmitter output setting for details.
Output Current	Output current of the transmitter, unit: mA

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Percentage	The percentage of temperature readout in the temperature range of the transmitter
Loop Current	Loop current of the transmitter, unit: mA

2.5 Hart Communicator

The Calibration Furnace 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 Furnace always acts as the master during communication with the HART device, so in order 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.

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2.5.1 HART Connection and Search

- Turn on the display of the electrical signal measurement area in the main operation interface, select the mode 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, or click the HART measurement channel screen when no HART device is connected to enter the HART power supply configuration interface.

2.5.2 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;
- After entering, about some parameters, click on the right side of the screen to view their description

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information:

- After entering the parameter editing interface, click the icon of the control center in the status bar to copy the external standard indication value, HART indication value, and electrical measurement indication value.
- Click 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 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.

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3. Settings

3.1 Communication Settings

3.1.1 Ethernet:

Connect the furnace to a computer through the Network port.

Table 17 Ethernet Address Acquisition Ways

Subject	Valid Value	Explanation
Address Acquisition	DHCP / Manual	Choose Furnace address for acquisition way

◆ 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 18 Ethernet Address Manually Settings

Subject	Valid Value	Explanation
IP Address	0.0.0.0 ~ 255.255.255.255	Furnace IP address
Subnet Mask	0.0.0.0 ~ 255.255.255.255	Furnace subnet mask
Gateway	0.0.0.0 ~ 255.255.255.255	Furnace gateway

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

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

3.1.2 Wi-Fi

Connect the furnace to a computer through Wi-Fi.

Table 19 Wi-Fi Settings

Subject	Valid Value	EXplannation
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 furnace address acquisition way

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

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

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

Table 20 Wi-Fi Communication Manually Settings

Subject	Valid Value	Explanation
IP Address	0.0.0.0 ~ 255.255.255.255	Furnace IP address
Subnet Mask	0.0.0.0 ~ 255.255.255.255	Furnace subnet mask
Gateway	0.0.0.0 ~ 255.255.255.255	Furnace gateway

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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.

3.1.3 Bluetooth

Connect furnace with computer through Bluetooth.

Table 21 Bluetooth Settings

Subject	Valid Value	Explanation
BT Name	Read only	Furnace Bluetooth name
BT Status	On / Off	Enable or disable Bluetooth function
MAC	Read only	Device Physical Address(Displayed only the Bluetooth is on)
Disonnection	Disconnection	Disconnect WiFi device with Furnance

Bluetooth settings are applied immediately, press on the top left corner for previous menu.

3.1.4 Cloud Services

Upload data onto cloud server.

Table 22 Cloud Services

Subject	Valid Value	Comment
Enable	On / Off	Enable or disable cloud service function

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◆ Symbol on the title bar of main screen indicates that the cloud service is enabled.

3.2 Sensor Library

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

3.2.1 Management Functions

(1) Display Settings

Press on the bottom right corner of the screen to set the sensor list display contents

Table 23 Sensor Display Settings

Subject	Valid Value	Comment
Sensor Display Setting	Scientific / Decimal	Select parameter display mode： Scientific：$1.1*10^{-2}$ Decimal：0.011
TC display setting	Model & Name / Serial Number	Select display contents

(2) The interface of Sensor List

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Management function Icons in the sub-menu are listed below:

Table 24 General Management Icons in Sensor Library

Icon	Explanation
	Add e new sensor
	Delect one or all sensors

3.2.2 Standard TC

Table 25 Sensor Based Information

Subject	Valid Value	Explanation
Type/Name	Alphanumeric content (14 max length)	Sensor type and name information
Serial Number	Alphanumeric content (14 max length)	Sensor serial number
Temperature range	Depends on the temperature units	Sensor measurement range, Unit °C
Reference TC	S、B	Choosing different standard thermocouple types will affect the parameter setting. See the following table for specific parameters
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	Alphanumeric content (14 max length)	Sensor note information

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Table 26 Type S Thermocopule Parameters Setting

Parameter type	Valid value	Explanation
a_b_c	A	Parameters for the sensor calculation formula, please refer to the sensor calibration certificate for the values
	B	
	C	
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_660.323 ℃): (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	

3.3 Date Protection

The furnace provides data protection function. Users can customize the data protection password under this menu, and set the password protection enablement

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Table 27 Data Protection

Parameter type	Valid value	Explanation
Estabilish Passsword	Numeric content (20 max length)	Password setup, default password is: 123456
Task	Enable / Disable	Enable or disable Password Protection. Enable: Password is necessary when deleting task data
Sensor library	Enable / Disable	Enable or disable Password Protection. Enable: Password is necessary when deleting sensor library data

◆ Editing the password will affect the entry password for grid specifications, system calibration, factory reset, and system upgrade.

3.4 ACloud Services

Update the data to Acloud Service:

Table 28 Acloud Services

Subject	Valid Value	Explanation
Enable	ON /OFF	Enable or disable Acloud service function

◆Symbol on the title bar of main screen indicates that the cloud service is enabled.

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3.5 System Services

3.5.1 System Calibration

The Calibration Furnace includes a self-calibration feature/proceedure. Users need to enter a password to enter the system calibration page, the password can be customized, please refer to Chapter 3.3 Data Protection, and the factory default password is 123456.

After entering the “Setup” page, and then “System Services” page, users can calibrate the following items:

(1) Self-calibration of temperature indication

Select "temperature self-calibration" to enter the temperature self-calibration interface, the user can perform "manual calibration" or "automatic calibration" (automatic calibration function is limited to ADT875PC (100 ~ 1210) ℃ and ADT878PC (100 ~ 1210) ℃).

(A): Manual calibration:

1) If the user needs to modify the calibration point, this can be accomplished by clicking the to enter a custom calibration point.

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◆ The internal temperature and standard temperature values corresponding to each calibration point require the user to obtain readings outside the temperature display self-calibration interface.

◆ The number of calibration points cannot be less than 2.

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

2) Click to enter the temperature calibration manual calibration interface, and input the internal temperature value 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.

B. Automatic Calibration:

1) If need to modify the calibration point, user can click to input custom calibration points.

◆The number of calibration points cannot be less than 2.

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

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range.

2) Click to enter the temperature calibration automatic calibration interface, click to start the automatic calibration, the furnace 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 Calibration Furnace can facilitate the calibration for its electric measurement capailities. According to the measurement signals supported by each channel, the calibration items that can be performed are shown in the table below.

Table 29 Calibration Items Supported by Each Channel

Electrical Measurement	EXT.REF	CH1	CH2	CH3	CH4
TC.REF, (--18 ~ 18)mV	●				
TC, (-75 ~ 75) mV		●	●	●	●
(-30 ~ 30) mA		●	●		
(-12 ~ 12)V		●	●		
(-30 ~ 30) V		●	●		

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Cold Junction Calibration	•	•	•	•	•

The buttons on the electrical measurement calibration page are as follows:

Table 30 Press Button of Electrical Measurement list

Icon	Explanation
	Return to the previous level or exit the current operation
	Modify
	Cancel zero clearing
	Start or perform related operations
	switch to the next or proceed to the next step
	Switch to the previous point or take the previous step
	Save data

Please refer to the relevant content in section 2.4 for the wiring description of each measurement item of electrical

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measurement.

The operational steps for calibrating each measurement item of electrical measurement are essentially the same.

◆Select the corresponding channel (EXT.REF, CH1~CH4).

◆Select the items that need to be calibrated.

◆Edit the calibration points of the calibration.

◆Complete the calibration process and save the data.

(3)Temperature indication calibration (verification):

The process of temperature indication calibration (verification) is the same as 3.5.1.1 temperature indication self-calibration, except that the calibration data under this function is saved as verification data.

(4) Axial temperature field calibration:

Additel does not recommend users to calibrate the axial temperature field. Possibile incorrect calibration processes may cause the furnace calibrator to fail to meet the technical specifications of the product. If it is determined that the axial temperature field calibration of ADT875PC / ADT875 / ADT878PC / ADT878

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(100~1210 ℃) is requi

corundum tube for calibration. During the calibration process, each calibration point must ensure that the temperature is stable for more than 30 minutes before reading. Each calibration point should include readings with the reference probe fully inserted and from an elevated hight of 40mm. The Calibration Furnace provides "manual calibration" or "automatic calibration" two ways (automatic calibration function is limited to ADT875PC (100 ~ 1210) ℃ and ADT878PC (100 ~ 1210) ℃)

(A) Manual calibration

1) Click to enter a custom calibration point.

◆The number of calibration points cannot be less than 2.

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

2) Click to enter the manual calibration page of the axial temperature field, and input the internal temperature value corresponding to each calibration point, the standard temperature value of 0mm height and the standard temperature value of 40mm height one by one.

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3) Click on the ambient temperature and enter the ambient temperature value during the test.

4) 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.

B. Automatic calibration

1) Click to enter a custom calibration point.

◆The number of calibration points cannot be less than 2.

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

2) Connect a standard thermometer to the Ref channel.

3) Click to start the automatic calibration. The calibrator will automatically control the temperature according to the calibration point, and will prompt the user to enter or obtain the current internal temperature value and standard temperature value when the stable conditions are met, and at the same time prompt the user to change the standard thermometer Move to 0mm height or 40mm height.

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4) After completing the data reading of each calibration point according to the wizard, 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.

(5) Input Verification Certificate Data

The calibrator provides the method of inputting verification data for temperature indication input calibration and axial temperature field input calibration. In the system calibration interface, select "Enter verification certificate data" to enter the input verification certificate data interface, and then perform temperature according to the interface Indication value input calibration or axial temperature field input calibration.

C. Temperature indication input calibration:

1) Click to input custom calibration points.

◆The number of calibration points cannot be less than 2.

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

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2) Click to manually enter the data of the value verification certificate.

3) Input the corresponding internal temperature value and standard temperature value manually at the corresponding calibration points.

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

(5) Temperature Calibration History:

The user can click to view all temperature calibration history records, and select historical calibration data to be applied to the furnace calibrator according to requirements.

◆Calibration history consists of three parts: Manufacturer Calibration Data, User Calibration Data, and Verification Data, the differences are as follows:

Table 31 Temperature Calibration History

Subject	Save Date	Review	Add	Cover	Delete	Explanation
Manufacturer Calibration	Factory data					Factory data
User Calibration	the lastest data	●	●（user）	●	●	Self-calibration operated by user

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Verification Data	one history will be added after each recalibration	●	●（Third Party Organization）		●	Calibration operated by third party organization or user

Note: If old recalibration data is applied, the recalibrations after this date will turn gray and be automatically deleted on the next recalibration.

◆Invalid data can be re-activating before it is deleted

Fill in the following information when saving the verification data：

Table 32 Saving Setting of Verification Data

Subject	Effective Value	Explanation
Name	Alphanumeric content and Chinese (10 max length)	Verification Data name
Operator	Alphanumeric content and Chinese (10 max length)	verification operator information
Remarks	Alphanumeric content and Chinese (10 max length)	Remarks

◆How to use ：

1) Select a data to enter data information interface

2) After confirming that the calibration data of the axial temperature field and the temperature indication value are

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correct, click in the lower right corner of the screen (except for the recovery of factory calibration data, directly selecting the manufacturer calibration data will immediately prompt whether to switch to the factory calibration data)

(7) Due Date Reminder

User can switch on the due day reminder to calibrate the expiration date.

How to use：

◆Click “Due day reminder” to get into expiration date calibration interface

◆Click “calibrate due date” to set. (The setting due date ranging from 2001/1/1~ 2099/12/31)

◆Click on the status of “enable” or “disable”.

3.5.2 Restore Factory Settings

The furnace calibrator provides the function of restoring the factory settings. A password is required to enable this function. This password can be customized. For details, please refer to Chapter 3.3 Data Protection. The factory default password is 123456.

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◆Restore the factory settings will not restore all the data of the system calibration, if you want to restore the system calibration data, please refer to section 3.5.1.

◆Restore factory settings will not delete user data, including task data, sensor library data, etc.

◆After restoring the factory settings, the user needs to set the time after powering on again. For details, please refer to Chapter 3.6.2 Date and Time.

3.5.3 Maintenance

To turn on the maintenance function, you need to enter a password, which can be customized. Please refer to section 3.3. Factory default password: 123456.

◆Click the “ ⊕ ” to add maintenance information.

◆Click “brief information”, “Operator”, and “content” to add information.

◆ Click on “Date” to make calibration. (The setting due date ranging from 2001/1/1~ 2099/12/31)

3.5.4 System Updates

The furnace calibrator provides a firmware upgrade function.

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The system upgrade can use local U disk upgrade or network remote upgrade.

◆U disk needs to be used for local U disk upgrade operation, the U disk format needs to be FAT16 or FAT32 format

(1) U disk upgrade:

◆ Copy the upgrade file to the root directory of the U disk.

◆ Insert the U disk into the USB socket on the right side of the furnace calibrator.

◆ Choose to upgrade via USB in the furnace calibrator upgrade interface.

◆ Click until the system starts to upgrade automatically.

◆ After waiting a few minutes for the upgrade process to complete, the system will automatically display the upgrade completion message.

(2) Remote upgrade.

The remote upgrade requires the furnace to be connected to the Internet first, afterwhich it can be updated automatically or manually.

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3.6 Personalization

3.6.1 Temperature Units

Three units are available: ℃, ℉ , and K

◆Once this unit is changed, all related temperature units for other menus will be changed automatically, except for the sensor library and task function.

3.6.2 Date and Time

Table 33 Date and Time Settings

Subject	Valid Value	Explannation
Time	00:00 ~ 23:59	Time setting
Date	2000-1-1 ~ 2099-12-31	Date setting
24 hours	Open /close	Set the time display to 24-hour or 12-hour format
Time zone	UTC-12:00~ UTC+12:00	Set device time zone
Date format	Y-M-D / M-D-Y / D-M-Y	Date format setting
Date separator	-, /, .	Date separator setting

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3.6.3 Language

The Calibration Furnace is equipped with a multi-language user interface. Use this menu to change from the offered languages.

◆After the language interface is selected, the furnace calibrator needs to be restarted for the changes to take effect.

3.6.4 Sound

Table 34 Sound Settings

Subject	Valid Value	Explanation
Touch Beep	On / Off	Enable or disable touch beep
Prompt Beep	On / Off	Enable or disable prompt beep
Over range beep	On / Off	Enable or disable over range beep
Volume	0~100	Adjust beep volume, unit: %

3.6.5 Brightness

After entering the “Personalization” menu and selecting “Contrast” touch the graphical bar to adjust screen

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brightness.

3.6.6 Screen Protection

The Furnace will turn off the screen for power saving if it is not used over a amount of time.

◆To activate, enter the "Personalization" menu and select "Sceen Saver".

◆Available selections: 1 min, 5 min, 10 min, 30 min, 60 min, or Never.

3.6.7 Display

Switch to Light Theme or Dark Theme.

◆After display mode is selected, the furnace calibrator needs to be restarted to take effect.

3.7 Product Information

Furnace information is read only:

1. General Information: Including model, serial number and range information

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2. Version Information: Including main host, system version, control board, electric board, Wi-Fi, and Bluetooth information

◆The firmware version number normally means the main board version number, please provide it to the customer service if necessary.

3.8 Non-standard insert temperature deviation

To solve deviation problems the furnace provides a deviation calibration function.

Indication deviation calibration can be accomplished manually or automatically.

1) Manual calibration: input internal temperature and standard terperature data of furnace at a signal temperature point.
2) Automatic calibration: It is necessary to connect an external standard thermometer, furnace will start to read indication after we set a temperature point. When the indication satisfied a stable condition, automatic calibration procedure end up.

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Back to editing interface, the calibration date of temperature indication deviation will be updated automatically.

4. Task

The Calibration Furnace provides a task function. Users can establish a calibration task according to their needs to achieve fully automatic calibrations. In the task function, the user can create or select an existing device under test as the first step when starting a task. Users can also create or select existing test configurations.

◆Under the task menu, you can set the object of stable judgment conditions by clicking the setting button in the lower right corner:

1. Ref
2. DUT
3. Both

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4.1 Device Center

All DUTs can be managed in the Device Center.

4.1.1 DUT Management

1. Click “Added DUT” to view the DUT information.

2 Click on the right to add a DUT. Please refer to Chapter 4.1.2 to 4.1.9 on how to add a DUT

3. Click to delete an added task. Tasks to be deleted can be selected according to users’ needs and click to delete. Or click to delete all the test tasks.

4. Click to search added DUTs. The search conditions are as follows

Table 35 DUT Search Conditions in Device Center Menu

Subject	Valid Value	Explanation
Type	Thermocouple, temperature transmitter, temperature switch, liquid in glass thermometer, temperature controller, bimetallic thermometer, pressure thermometer, thermostat transmitter, surface thermometer, digital thermometer, all	Select the type of DUT. All as default
Name	Alphanumeric content (16 max length)	Input the name of DUT
S/N	Alphanumeric content (16 max length)	Input the Serial Number of DUT
Performance	Yes / No / All	Whether the DUT has performed any tasks on the

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		furnace calibration depends on if there is test data.
Creation Time	Starting time：2000-1-1 ~ 2099-12-31	Searching the time range when the DUT is created. For example: DUT created between Jan 1, 2018 to Dec 31, 2018.
	Finishing time：2000-1-1 ~ 2099-12-31	

Click on the lower right to apply search conditions. DUTs conforming to the conditions will appear in the list.

◆Click to delete all the input search conditions.

4.1.2 TC

Table 36 DUT TC Added Setting in Task Information

Subject	Valid Value	Explanation
Name	Alphanumeric content (16 max length)	Name of DUT
S/N	Alphanumeric content (16 max length)	Serial number of DUT
Location	Alphanumeric content (16 max length)	DUT location or area
Comment	Alphanumeric content (16 max length)	Information about the DUT
Company	Alphanumeric content (16 max length)	DUT owner
Range	-273-10000	DUT thermocouple range, Unit: ℃
Decimal number	1,0.1,0.01,0.001	Show decimal number of TC reading
Permissible Error	Dry body furnace provides several common thermocouple tolerances	The accuracy of the DUT thermocouple is divided into basic error and thermocouple accuracy, as well as the thermocouple industrial type
Type of thermal couple	S,R,B,K,N,J,T,C,D,G,L,U,LR,A	The type of thermal couple under test

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Type of cold junction compensation	automatic / fixed	Select the type of cold junction compensation. The compensation value has to be input manually when selecting fixed mode.

Click on the lower right to save.

4.1.3 Temperature Transmitters

Table 37 DUT Temperature Transmitter Add Setting in Task Information

Subject	Valid Value	Explanation
Name	Alphanumeric content (16 max length)	Name of DUT
S/N	Alphanumeric content (16 max length)	Serial Number of DUT
Location	Alphanumeric content (16 max length)	DUT location
Comment	Alphanumeric content (16 max length)	Comment information of DUT
Company	Alphanumeric content (16 max length)	DUT owner
Input	-273-10000	DUT thermocouple range, Unit: ℃
Output	Analog signals： 1. mA：4~20、0~10、0~20 2. V：0~5、0~10、4~20 3. Customize：-30~30（Click electrical signals to switch between mA and V.)	Output signal settings of the temperature transmitter
	HART Transmitter: Major variable, percentage, Output current, loop current	

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Accuracy	0.1%, 0.2%, 0.5%, 1%, 1.5%, 2%, 2.5%, custom	Users can set special accuracy by selecting custom options. Unit: %.
Display decimal places	0.001, 0.01, 0.1, 1	Temperature display digits
Transfer function	Linear, root	Transmitter conversion function

Click on the lower right to save

4.1.4 Temperature Switchs

Table 38 DUT temperature Switch Add Setting in Task Information

Subject	Valid Value	Explannation
Name	Alphanumeric content (16 max length)	Name of DUT
S/N	Alphanumeric content (16 max length)	Serial Number of DUT
Location	Alphanumeric content (16 max length)	DUT location
Comment	Alphanumeric content (16 max length)	Comment information of DUT
Company	Alphanumeric content (16 max length)	DUT owner
Range	-273-10000	DUT thermocouple range, Unit: ℃
Set point	Depends on the range of the switch	The setting points of DUT temperature switch
The range of set point	Depends on the range of the switch	The set point range of the DUT temperature switch, the furnace calibrator only captures the temperature switch action within the set point range
Type of switch	normally open / normally closed	Type of DUTswitch
Set point error	Depends on the range of the switch	Permissible error of the DUT switch
Type of switch	Dry contact, wet contact, NPN switch, PNP switch	Channel type of DUT temperature switch
Dead band	Depends on the range of the switch	Dead band of DUT temperature switch

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Click ✓ on the lower right to save

4.1.5 Liquid-In-Glass and Surface Thermometers

Table 39 Liquid-In-Glass Thermometer and Surface Thermometer Add Setting Task Information

Subject	Valid Value	Explanation
Name	Alphanumeric content (16 max length)	Name of DUT
S/N	Alphanumeric content (16 max length)	Serial Number of DUT
Location	Alphanumeric content (16 max length)	DUT location
Comment	Alphanumeric content (16 max length)	Comment information of DUT
Company	Alphanumeric content (16 max length)	DUT owner
Range	-273-10000	DUT thermocouple range, Unit: ℃
Permissible error	0.1,0.15,0.3,0.5,1,2.5	Customer can customize special accuracy of the DUT (There are reading errors on the surface of thermometer,valid value :0.001,0.002,0.004,0.005,0.008,0.01,default)
Scale Value	Depends on the range of the thermometer	The temperature difference represented by each scale of the DUT (for liquid-in-glass thermometers)

Click ✓ on the lower right to save

4.1.6 Temperature Controller, Bimetallic Thermometer, Pressure Type Thermometer and Surface Thermometer

Table 40 DUTs- Temperature Controller, Bimetallic Thermometer, Pressure Type Thermometer Add Setting in Task Center

Subject	Valid Value	Explanation
Name	Alphanumeric content (16 max length)	Name of DUT
S/N	Alphanumeric content (16 max length)	Serial Number of DUT
Location	Alphanumeric content (16 max length)	DUT location

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Comment	Alphanumeric content (16 max length)	Comment information of DUT
Company	Alphanumeric content (16 max length)	DUT owner
Range	-273-10000	DUT thermocouple range, Unit: ℃
Accuracy	1%, 1.5%, 2%, 2.5%, 4%, custom,unit is %	Users can set a custom accuracy. (Temperature controller:0.1,0.15,0.3,0.5,1,2.5, custom, unit is ℃)
Scale Value	Depends on the range of the thermometer	The display resolution of the DUT
Number of electric contacts	0、1、2	Number of electric contacts of the DUT. An electric contact value should be set if it is not zero. The upper and lower limits, valid value and unit depend on the range.

Click on the lower right to save

4.1.7 Digital Thermometer

Table 41 DUT-Digital Thermometer Add Setting in Task Information

Subject	Valid Value	Comment
Name	Alphanumeric content (16 max length)	Name of DUT
S/N	Alphanumeric content (16 max length)	Serial Number of DUT
Location	Alphanumeric content (16 max length)	DUT location
Comment	Alphanumeric content (16 max length)	Comment information of DUT
Company	Alphanumeric content (16 max length)	DUT owner
Input	-273-10000	DUT thermocouple range, Unit: ℃
Accuracy	1%, 1.5%, 2%, 2.5%, 4%, custom	Users can set a custom accuracy. Unit: %
Scale value	Depends on DUT	The temperature difference represented by each scale of the DUT
Number of electric contacts	0, 1, 2	Number of electrics contact of the DUT. An electric contact value should be set if it is not zero. The upper and lower limits, valid value and unit depend on the range.

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Enable analog output	open / close	Select if the digital thermometer has an analog output. Output signal should be set if this function is enabled.
Output (only when analog output is enabled)	-30~30	The output signal range of the DUT. The unit depends on the measurement of current or voltage (Click the unit of electric signal to switch between mA and V).
Analog output accuracy (only when analog output is enabled)	1%, 1.5%, 2%, 2.5%, 4%, custom	Users can set a custom accuracy by custom options. Unit: %

Click on the lower right to save

4.2 Test Center

All the tasks can be managed in test center.

4.2.1 Test Task Management

1. Click “Add Task” to view the task information.

◆ On the task information screen, the user can access the following operations.

1) Click to enter the task screen. The calibration furnace will perform the task again according to the previous device and task. Please refer to Chapter 4.3 to perform task actions.

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2) Click to use the current test settings as a template.

◆ The new task of the DUT cannot be revised. Please refer to the following instructions for task configuration.

3) On the task settings information screen, the contents with the icon > can be revised. Please refer to Chapter 4.2.2 For task settings operation.

2. Click to add new task. Click in the center of the screen and select a DUT from device center. The basic information of the selected DUT will be shown, and a task setting menu will be listed according to the type of the DUT.

3. Click to delete the added tasks. Click to delete a single task, or click to delete multiple tasks.

4. Click to search the tasks. The search conditions are as follows:

Table 42 Search Condition of Test Task in Test Center

Subject	Valid Value	Explanation
Name of task	Alphanumeric content (16 max length)	Input the name of the task
Name of device	Alphanumeric content (16 max length)	Input the name of the DUT
S/N	Alphanumeric content (16 max length)	Input the serial number of the DUT
Performance	Yes / No / All	“Yes” means the task has test data associated with it.
Creation Time	Starting time：2000-1-1 ~ 2099-12-31	The time range when the DUT was

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	Finishing time：2000-1-1 ~ 2099-12-31	created.
Update Time	Starting time：2000-1-1 ~ 2099-12-31	Search the time range of the latest task update.
	Finishing time：2000-1-1 ~ 2099-12-31	

Click to apply the search conditions. The results conforming to the conditions will appear in the list.

Click to delete all the input search conditions.

4.2.3 Task Settings

Task settings include basic information setting, control setting, device setting, set point list, indication error, etc.

(1) Four Channel Test.

The DUT types which support four- channel tests are as follows:

Table 43 Dual-Channel Test Compatibility Information

Type of DUT	Available for four Channel Test
Thermocouple	●
Temperature transmitter	
Temperature switch	
Glass liquid thermometer	●
Temperature controller	
Bimetal Thermometer	
Pressure thermometer	
Surface thermometer	●
Digital thermometer	

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As for DUTs devices of dual channel test, click ⊕ to add a second DUT when one is already selected.

(2) Basic Information Settings

The DUTs which support setting basic information are as follows:

Table 44 Test Basic Information Settings Compatibility Table

Type of DUT	Basic information		Operation settings				
	Name	Name	Cycle times	Trip	Dwell time	Reading times	Reading intervals
Thermocouple	●	●	●	●	●	●	●
Temperature transmitter	●	●	●	●	●	●	●
Temperature switch	●	●	●				
Liquid-in-glass thermometer	●	●	●	●	●	●	●
Temperature controller	●	●	●	●	●	●	●
Bimetallic thermometer	●	●	●	●	●	●	●
Pressure thermometer	●	●	●	●	●	●	●
Surface thermometer	●	●	●	●	●	●	●
Digital thermometer	●	●	●	●	●	●	●

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The basic information settings include the following:

Table 45 Basic Information Setting in the Task Menu

Subject	Valid Value	Comment
Basic Information Settings		
Name	Alphanumeric content (16 max length)	Name of the task
Comment	Alphanumeric content (16 max length)	Comment for the task
Operation Settings		
Cycle times	Cycle times	Cycle times
Trip	Trip	Trip
Dwell time	Dwell time	Dwell time
Reading times	Reading times	Reading times
Reading intervals	Reading intervals	Reading intervals

Click to apply the basic information setting

(3) Control Settings

The DUTs supported control settings are as follows:

The all DUTs support setting point's list function

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Temperature control settings which determine temperature stability are as follows:

Table 46 Temperature Control Settings of Test Task

Subject	Valid Value	Explanation
Temperature control standard	INT / EXT	Select internal（INT）or external（EXT）sensors as standard
Standard Values	INT / EXT	Select the measurement values of Internal（INT）or external（EXT）sensor as the reference standard
Fluctuation degree	0.04~10	The allowed range of temperature fluctuation
Stability time	1~60	The time in which stability is determined. Unit: minute
Target deviation	0~20	The allowed difference between the reading of the standard temperature and the target temperature

◆The temperature is considered stable when the fluctuation level, stability time and target deviation are within the allowed ranges.

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(4) Device Settings:

The DUTs supported device settings are as follows.

Table 47 Device Settings Compatibility in the Task Menu

Type of DUT	Device	Fluctuation Degree	Stability Time	Temperature Control Rate	Test Channels
Thermocouple	●	●	●		●
Temperature transmitter	●	●	●		●
Temperature switch	●			●	●
Glass liquid thermometer	●	●	●		
Temperature controller	●	●	●		
Bimetallic thermometer	●	●	●		
Pressure thermometer	●	●	●		
Surface thermometer	●	●	●		
Digital thermometer	●	●	●		

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Device setting affects the application of DUTs, the conditions are as follows:

Table 48 Device Settings Compatibility Instructions

Subject	Valid Value	Explanation
Device	Depends on the selected DUT. Refer to Chapter 4.1 for details.	Editable information about the DUT.
Fluctuation degree	0.04~10	The fluctuation degree particularly for a DUT can be set here.
Stability time	1~60	The stability time particularly for a DUT can be set here. Unit: minute
Temperature control rate	0~30	Temperature control rate of the furnace calibrator, unit: temperature unit/minute **Temperature control rate is only applied within the set point range of the temperature switch. Please refer to Chapter 4.1.4 for details.**
Channel 1 & Channel 2	Temperature controller , Temperature transmitter	Set the corresponding DUTs for Channel 1 and Channel 2, which depends on whether the DUT supports dual channel test and the connection.
Chnanel 1-4	TC	

(5) Set Point List:

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All types of DUTs support the set point list function.

◆The furnace calibrator supports 1 to 17 set point settings. The set points can be added or reduced through and ^ ˇ button on the right, or click the numbers of the set points and input the number through the keyboard.

◆The set points are single way. For example: If round trip is selected in the basic task setting, and the set points are 3 (0, 50, 100), then the actual set points run in the task will be 6(0, 50, 100,100, 50, 0).

(6) Indication Error:

Indication error function only relates to liquid-in-glass thermometers, bimetallic thermometers, temperature controllers, and pressure thermometers.

When indication error test is selected, the settings are as follows:

(7) Electric Contact Test:

Electric contact test function only supports such DUTs as bimetallic thermometer with more than zero electric contacts, and temperature controller.

When electric contact test is selected, the settings are as follows:

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Table 49 Electric Contact Test Setings

Subject	Valid Value	Explanation
Temperature control rate	0.01-100	Set the temperature control rate ,Unit : ℃
The first electric contact value	CH1 / CH2	Select the channel for the first electric contact
The second electric contact value (only for the device with two electric contacts)	CH1 / CH2	Select the channel for the second electric contact

◆Either one or both of electric contacts and indication errors should be selected. Indication error is checked as default.

4.3 Task Performance

4.3.1 DUT and Test Setting Selection

The task performance is able to start when DUT and task configuration are complete.

How to operate:

① Selected the added task setting, enter the task setting screen. Task settings can be changed here.

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② After task setting, click ▶ to enter task performance screen. Please refer to Chapter 4.3.2 for details.

◆All the setting changes will be effective and replace the previous changes after clicking CONFIRM button.

4.3.2 Task Performance

A wire connection diagram will show on the task performance screen to suggest the correct way to make the connection.

◆Only CH1 supports HART transmitters

Note: Please check the wire connections of the DUT carefully. Incorrect connections may damage the calibrator or the DUT. If you have special connection requirements, please consult the equipment seller for help

(1)Typical Task Screen

The typical task screen of the furnace calibrator is shown in the picture below (except temperature switch):

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Figure 8 Typical Task Interface

1) The lower part shows the furnace temperature, and the upper part shows the return value of the DUT.

◆DUTs such as thermal resistance, and thermocouple, etc., the reading is automatically collected and cannot be revised by the users.

◆DUTs such as liquid-in-glass thermometer, and bimetallic thermometer which the furnace calibrator cannot collect the reading automatically, the user can click on the return value and input the reading through the

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keyboard after the temperature is stable in required dwell time.

2) The bar on top of the screen shows the current temperature set point and cycle times.

3) The standard buttons are on the right of the screen:

Table 50 Button Instruction on Typical Task Interface

Icon	Manual Mode	Automatic Mode	Explanation
	•	•	Exit the task and the current data acquired will be cleared.
	•	•	Switch the display mode between regular mode and table mode. The DUT readings can be revised in the two modes. **In temperature switch test, click to switch display mode. The regular mode shows a temperature/time diagram.**
	•		Switch to the previous set point **The data of this set point will be cleared and the temperature control will automatically switch to the previous set point.**

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	•	•	Switch to the next set point **The standard value and the DUT readings will be saved and the furnace will control to the next set point.**
	•	•	Skip the current set point **The value of this set point will be skipped and will not be shown in the final report.**
		•	Pause or continue with the current task
50.00 1st cycle	•	•	Shows the current cycle times and the numbers of set points in current cycle **This example means the furnace is ascending to 50 ℃ as the set point under the first cycle**

(2) Thermocouple and temperature transmitter

◆ Only CH1 & CH2 support HART transmitters

The furnace calibrator provides manual and automatic performance modes for the DUTs above.

A: Manual Performance

1) Click on the lower right to start performance. The temperature will be automatically controlled to the first set

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point.

2) The temperature output value will become green when the temperature is stable, with dwell time is shown after the furnace is stable.

3) The dwell time will become green when it meets the requirement.

4) Click to record the data and proceed to the next set point.

5) When all the set points are tested, click to enter task report screen. The test data will be saved here. Please refer to Chapter 4.4 for details.

B: Automatic Performance

1) Click on lower right to start the task. The furnace calibrator will start controlling automatically.

2) When all the set points are tested, click to enter task report screen. The user can redo the test or save the data of this test. Please refer to Chapter4.4 for details.

(3) Temperature Switch

The furnace calibrator only provides automatic performance mode for temperature switch.

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1) Click on lower right to start the test. The furnace calibrator will start controlling automatically.

2) When all the set points are tested, click to enter task report screen. The user can redo the test or save the data of this test. Please refer to Chapter4.4 for details.

(4)Liquid-in-Glass Thermometer, Temperature Controller, Bimetallic Thermometer, Pressure Thermometer, Surface Thermometer, and Digital Thermometer

The calibrator only provides manual performance modes for the DUTs above.

A. Manual Mode:

1) Click in the lower right to start the test. The furnace will automatically control to the first set point.

2) The temperature output value will become green when the temperature is stable, with the dwell time shown.

3) The dwell time will become green when it meets the requirement.

4) Click the DUT's value on the screen, and input the current reading through the key board. Click Enter key to apply the value, and the furnace will proceed to the next set point.

5) When all the set points are complete, click to enter task report screen. The user can redo the test or save

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the data of this test. Please refer to Chapter4.4 for details

B. Automatic Performance:

1) Click in the lower right to start the test. The furnace calibrator will control automatically to the first set point.

2) When the temperature reaches the set point, the system will automatically take the standard value and the DUT's reading. The user can click and revise the DUT's reading manually if desired.

◆When the temperature reaches the set point, the user should revise the DUT's reading within the dwell time.

◆When the dwell time meets the requirement, the furnace will move to the next set point. The DUT's previous reading cannot be edited at this point.

3) When all the set points are tested, click to enter task report screen. The user can redo the test or save the data of this test. Please refer to Chapter4.4 for details

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4.4 End of Task

4.4.1 Task Report

The user can view all the data in the task report screen.

◆As for a dual channel task, click the DUT names on the top of the screen to view reports for different DUTs.

Table 51 Icons in Task Termination Interface

Icons	Explanation
	Exit the task. All the data of the current task will be cleared.
	The current task will restart again. All the data of the current task will be cleared.
	Save the data of this test. Please refer to Chapter 4.4.2 for details.

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4.4.2 Task Data Saving

When the task is completed, the furnace will proceed to a screen where the test results can be saved.

◆How to setup：

Table 52 Task Data Saving Settings

Subject	Valid Value	Explnation
Operator	Alphanumeric content (16 max length)	Input the information of the operator
Time	2000-1-1 ~ 2099-12-31	Input the time of the task performance
Environmental Temperature	Up to the temperature unit	Input the environmental temperature
Environmental Humidity	-20~100	Input the environmental humidity, Unit: ℃

◆How to use:

When the settings are saved, the user can choose to save the task data as “as found” or “as left”, or “both”, and click the CONFIRM button on the lower right to save.

◆Press ⊗ in the top right conner to cancel and go back to the task report screen.

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4.5 Data Center

Users can manage all test data in the data center.

4.5.1 Data Viewing

Click the test data existing in the data center to view the test information and test data.

◆On data information screen, press to redo the task. The user cannot change device or the test in this process.

4.5.2 Data Deletion

Press to enter data deletion screen and delete the existing task data.

How to use:

1. Click the task data to be deleted (multiple can be selected)

2. Press to delete the selected data.

◆Press to delete all the data.

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4.5.3 Data Search

Click to search the task data

How to use

1. The user can select 4 Subjects from the list below:

Table 53 Task Data Searching Section

No.	Subject Name
1	Device name
2	S/N
3	Type of the device
4	Name of the test
5	Operator
6	Type of the result
7	Pass
8	Time of the performance

2. Click to apply the settings.

3. Click the highlighted part of the search list subjects to select the keywords.

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◆Keyword selection is not case sensitive and supports partial keyword searching. Please refer to Example 1.

◆Cancel the keyword selection by deleting all the keywords. Please refer to Example 2.

Example 1: Name of device → click “All” → input “lg” → click → all the devices with “lg” in the name will be listed.

Example 2: Name of device → click “lg” → Delete All → click → cancel the search with the key word “lg”.

5. Application

The calibration furnace offers a variety of applications for providing a better user experience.

5.1 Thermal Calculator

The calibration furnace provides the calculated function of thermocouple and thermal resistance, which is convenient for users to carry out numerical calculation in the field.

◆ How to set up

Termocouple:

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Table 54 Thermal Calculator

Item	Effective Value	Notes
Sensor Type	S、R、B、K、N、E、J、T、C、D、G、L、U、LR、A、10μV/℃、1mV/℃	Select thermocouple type
Electric Signal	Depend on thermocouple type	thermocouple electrical signal output in mv unitsTo get the telecommunication value by calculation, enter the cold end fixed value firstly
degrees Celsius	Depend on thermocouple type	Celsius Value, Unit : ℃
Fahrenheit	Depend on thermocouple type	Fahrenheit Value, Unit : F
Kelvin	Depend on thermocouple type	Kelvn Value, Unit：K
Cold end fixed values	-10~50	A fixed value at the cold end as , parameters the telecommunication signal required, Unit :℃

For example: type K thermocouples:

1) The user type 20 degrees Celsius, the furnace automatically calculates 68 degrees Fahrenheit and 293.15 Kelvin

2) If the user needs to calculate the telecommunication value, the cold end fixed value as the supplementary condition need to be input , for obtaining the correct telecommunication value

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5.2 Control Temperature Data Record

The furnace provides temperature control recording function, which can record the temperature control data at the settingss range.

◆ How to set up:

1. Foundation Settings

Table 55 Control Temperature Data Records Settings

ITEM	Effective value	Note
Beginning temp.	Current Value/ defined Value	Reach a beginning temp. point, furnace begin to record data.
End up Temp.	Depend on Model	Once reach end up temp. the furnace end to record data
Control setups	Data record control settingss	Set up the parameters during control process
Population interval	1~60	Time interval, unit: second
Residence Time	1~60	While DUT is under constant temp. Stay time means between two test points after temp. stable, unit: minutes
Volatility test	Enable/disable	Enable or close the Volatility Test function and start the Volatility Test when

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		the furnace reaches the specified temperature
Volatility test time(only	1~60	The duration time of volatility test, Unit: mins
CH 1 ~ CH4	Refer to temp. control settingss	Set up parameters of Channels

2. Control Settings

Table 56 Temperature Control Data Record Settings

item	Effective value	Note
Parameter		
Volatility	0.04~10	One of the conditions of temp. stability is volatility range, the unit is depended on DUT's unit
Stability time	1~120	One of the conditions of temp. stability is duration volatility range, unit: mins
Deviation	0~20	One of the conditions of temp. stability , whish is the allowance range between Reference temp.value and target temp. value. Unit is depended on DUT 's
Temp. control rate	Max、0~100 ℃/min	Temp. rise and fall rate , select max and custom rate, process bar will

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		show the custom rate.
Setpoint limits	Enable/ disable	enable and close settings point limit
Set point range(only when point limits is enabled)	-200-2000	Settings Point Range, Unit: Unit : ℃
Temp. control standard		
Temperature controm resolution	1、0.1、0.01	Settings temp. control resolution , affect sensor signal display digits
Sensor signal	Only read	resolution is depended on settings

3. DUT Settings

Table 57 Temperature Control Data Record Channel Settings

Item	Effective value	note
Foundation settingss		
CH1 、CH2、CH3、CH4	Sensor type, cold end type, temp. resolution, volatility, stability time	Set DUT as TC
CH1、CH2	Current , voltage	12V or 30V two options can be chosen
Channel settingss（only select current and voltage measurement project can be enabled）		
Measurement range	-30~30	Set the measurement range , unit is depended on current measurement and voltage measurement (switch mA and V when click electrical signal)

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		Only CH1,CH2
Scale range	Depend on furnace model	set range scale, only CH1、CH2

◆How to use

◆ in the process of temperature control data recording, the user can click on the lower right corner at any time to stop the data recording process, all the data that has been executed will be lost

After the temperature control data record is finished, it will enter the result interface, the user can save the data

1: Finished settings, click right corner button to start the Temp. control data recording , after several minutes preparation of Temperature control, the data will start the temperature control process and begin recorded automatically.

◆During the process, the user can click button to stop data record at any time, all the data that has been executed will be lost.

2: After the data recording is finished, it will enter the result interface where the user can save the data.

◆How to review

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Click right button to review previous control data record on temp. control data record interface.

◆ Click to enter the deletion interface, choose records what need to be deleted, and click button to delete.

5.3 Drying and Dehumidification

◆ If the calibrator is stored for a long persion of time, please excute drying and dehumidification function before using the calibrator. Otherwise, the furnace could be be damaged.

Table 58 Drying and Dehumidification

item	Effective value	note
Dehumidification temp.	100-Temperature control limit	Set up dehumidification temp. the furnace will dehumidify under this defined temp.Unit: ℃
Stay time	≥10	Set up the duration time of dehumidification , Unit: min

◆How to use:

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1:Navigate to the “Applcation Menu” and select “Dehumidification”.

2:Click button to start dehumidification function.

3:Click button to end dehumidification function,but the user should wait for the process to complete.

5.4 Step Measurement

The furnace provides step measurement function

◆How to settings

Table 59 Step Measurement

Item	Effective value	note
Range	Up to furnace model	Set up step measurement range
Round trip	Single trip / （n measurement points ）	Set up travel mode, there are two round trip mode, the difference lies in the number of reentry points measurement.
	Return trip 1 Λ （2n-1measurement points）	

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	Round trip 2 Π（2nmeasurement point）	
Stay time	1~240	Stay time means the time when DUT'S constant temp is stable. Unit: min
Cycle time	1 / 2 / 3	Step measurement cycle time
Set point list	Refer to chapter 4.2.2.5 to set point	Set the quantity and value
CH1 ~ CH4	Refer to Chanpter 2.4 DUT device setting	Set up DUT information
Control settings	Refer to chapter 2.2.3 control settings	furnace temp. control settings

◆ How to save settings

The furnace can save 20 step measurement settings, the user can custom the settings by editing name and date.

1: On the step measurement setting interface, click right to enter save interface.

2: Click the settings that you want to cover , type the name and click to save

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◆How to load the saved configuration

On the step measurement settings interface, click to load the saved step measurement settings

◆How to use

Click right button to enter operation interface.

①Icon introduction：

Table 60 Step Measurement Icon

icon	Location	note
	Lower right	Start step measurement
	On the screen	Switch to next or previous one point
	Lower right	Cancel all data we tested, and restart test from first setting point in the first cycle
	upper right	Switch display mode to regular or chart mode
100.00 cycle time 2	Upper screen or lower screen	**Display the current cycle time and measurement point** **Item means the second cycle and set point**

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		is 100 ℃
	Upper right	Exit this step testing and enter data report page .

②Regular operation

Click to start testing , the furnace will be controlled at the first setting point automatically.

◆How to view

Click to view all previous saved temp. control data records on data records' interface

◆Click to enter delete page to choose delete records , then click to delete

5.5 Switch Testing

◆how to set up

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Table 61 Swich Testing

item	Effective value	note
CH 1& CH2	Open: drying connect point , wet connect point, NPN switch and PNP switch	Select switch connect channel and switch type
	Close	
Beginning Temp. value	Depend on furnace model	**Set up begin to swich testing and endup temp.**
Control temp. rate	Max、0~100 ℃/min	**Temp. rise and fall rate, select max or custom rate , the process bar show customs rate**
trip	Single trip / round trip	Set up switch testing trip way
Cycle time	1、2、3	set up switch testing repeat time

◆How to use

1: Click lower right “start” button to enter switch testing interface

2: On switch testing interface , the user can see current temp. value and status on screen.

◆The user can choose button to switch showing mode: graphic mode or list mode.

1. Graphic mode: the graphic mode will show switch testing procedure, and only show result under current cycle

2. list mode: Showing testing result in list way

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3. Click lower right button to end off switch testing and enter to save page

◆How to review history data

At the switch settings interface, click to enter testing data list, customer can review all saved data

◆Click to enter delete page, choose records you need to delete, click to delete.

5.6 Screen Capature

◆How to set up：

Table 62 Screen Capature

item	Effective value	note
Screen shotting	Open / close	enable or disable screen shotting function
Storage route	Local / U disk	Select storage location
Storage QTY	Only read	Remind customer the Qty that we can saved in local place
File Prefix	Numbers, letters and chinese , up to 16 digits input	Prefix settings
Documentary	Time / item	Select auo-add mode
Beginning item	1~1000	Select SN as beginning number

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◆How to use:

Click to access the screeshot feature.

◆ The calibrator supports taking a screenshot from the main screen only.

◆ How to view:

Navigate to the “Application Menu” and select the “Snapshot” menu. Then select the icon in the bottom right to view previous snapshots.

◆ Users can switch storage path to manage snapshots.

1. Select local as storage route:

Navigate to the “Application Menu” and select the “Snapshot” menu. Then select the icon in the bottom right to view previous snapshots.

◆Click , all screenshot documents will be saved into U disk

◆Click , all screenshots will be deleted

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2. Select U disk as storage route

◆Confirm the U disk connection

Click screenshot button will remind the storage name.

◆ Select "USB" from the snapshot menu to direct storage of snapshots to the external U disk.

Contact us

Additel Corporation

Tel:

1.888.610.7664 www.calcert.com sales@calcert.com

Additel Corporation

2900 Saturn Street #B

Brea, CA 92821 USA

Attn: Jenny Pu

Phone: 714-998-6899

Email: service@additel.com

website: www.additel.com