



## ADT875 Series Dry Well Calibrator



# **Additel 875 Series Dry Well Calibrator**

—————User's Manual

Latest version at [www.additel.com](http://www.additel.com)

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Additel Corporation

## **STATEMENT**

This user's manual provides operating and safety instructions for the ADT875 Series Dry Well Calibrator. 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 [www.additel.com](http://www.additel.com).

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## Welcome

The Additel 875 Series Dry Well Calibrators combine excellent performance in stability, radial and axial uniformity, loading with speed, ruggedness and portability. The Process Calibrator option adds the capabilities of a three-channel thermometer readout and a documenting process calibrator. This option includes the ability to measure a reference PRT and two devices under test channels, which can measure, mA, voltage, switch, RTD or thermocouple. When utilizing a reference PRT, the user can control the dry well set point using the external reference PRT for improved performance and periodic self calibration.

## How to Contact Additel

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# Safety Information

**WARNINGS** - identify action or condition that may be hazards to the user.

**CAUTIONS** - identify action or condition that may damage the calibrator or the equipment under test.

## **WARNINGS:**


**To prevent personal injury, please follow this user manual.**

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

### **1. General:**

- ◆ Check product exterior before use
- ◆ Read and follow all instructions carefully
- ◆ Dry well calibrator should be used by trained person only
- ◆ Before initial use, or after storage in humid environments, or anytime the dry well calibrator has not been used for more than 10 days, the dry well calibrator 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:**

- ◆ Dry well calibrator has a high temperature warning symbol  , this symbol indicates when the block temperature is over 50°C
- ◆ Do NOT touch or move the probe or insert when the high temperature warning symbol is on
- ◆ Verify the status of the high temperature indicator prior to each use to avoid potential harm when handling the unit, probes and inserts
- ◆ Keep fingers, hands and other body parts clear of the heat shield at all times
- ◆ Do NOT touch any part of the dry well other than the touch screen, electrical measurement board and power switch, when the high temperature indicator is Active.

### **3. Electrical:**

- ◆ Double check power connection, fuse model and installation before each use
- ◆ Do NOT open the dry well exterior. High voltage is present when the unit is plugged in
- ◆ Do NOT apply more than 30V AC or DC to any of the process calibrator inputs (ADT875PC only)
- ◆ Do NOT use any test leads other than those provided with the dry well calibrator (ADT875PC only)
- ◆ Disconnect all test leads before switching to other electrical measurement functions (ADT875PC only)

### **CAUTIONS:**

**To prevent instrument damage, please follow this user manual.**

**To prevent possible electrical shock, fire, or instrument damage, please:**

- ◆ Do NOT shake, drop, or bump the calibrator while in use
- ◆ Do NOT use any power cord other than the one provided with the dry well calibrator
- ◆ Do NOT unplug the power cord while in use
- ◆ Do NOT clean the dry well with liquid, please contact Additel for cleaning process
- ◆ Do NOT drop anything into the dry well slowly and careful place inserts and probes into the dry well calibrator. To avoid damaging the unit, it is best to use the insert removal tool when both inserting and removing inserts.

# 1. Introduction

## 1.1 Model Information

Table 1 Model Information

| Specification                         | ADT875PC              |                       |                       | ADT875               |                      |             |
|---------------------------------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|-------------|
|                                       | -155                  | -350                  | -660                  | -155                 | -350                 | -660        |
| Temperature Range                     | (-40~155) °C          | (33~350) °C           | (33~660) °C           | (-40~155) °C         | (33~350) °C          | (33~660) °C |
| mA/mV/V/Ω Measurement                 | •                     | •                     | •                     |                      |                      |             |
| DC 24V Output                         | •                     | •                     | •                     |                      |                      |             |
| HART Communication                    | •                     | •                     | •                     |                      |                      |             |
| Switch Test                           | •                     | •                     | •                     |                      |                      |             |
| External PRT<br>(Temperature Control) | •                     | •                     | •                     |                      |                      |             |
| Task Function                         | •                     | •                     | •                     |                      |                      |             |
| Database                              | •                     | •                     | •                     |                      |                      |             |
| Self Calibration                      | Auto &<br>Manual Mode | Auto &<br>Manual Mode | Auto &<br>Manual Mode | Manual Mode          | Manual Mode          | Manual Mode |
| Application                           | •                     | •                     | •                     | •                    | •                    | •           |
| Intelligent Diagnosis                 | •                     | •                     | •                     | •                    | •                    | •           |
| Remote Control                        | •                     | •                     | •                     | •                    | •                    | •           |
| Weight                                | 9.9 kg<br>(21.8 lbs)  | 8.6 kg<br>(17.2 lbs)  |                       | 9.8 kg<br>(19.6 lbs) | 8.5 kg<br>(17.0 lbs) |             |



## 1.2 Basic Structure

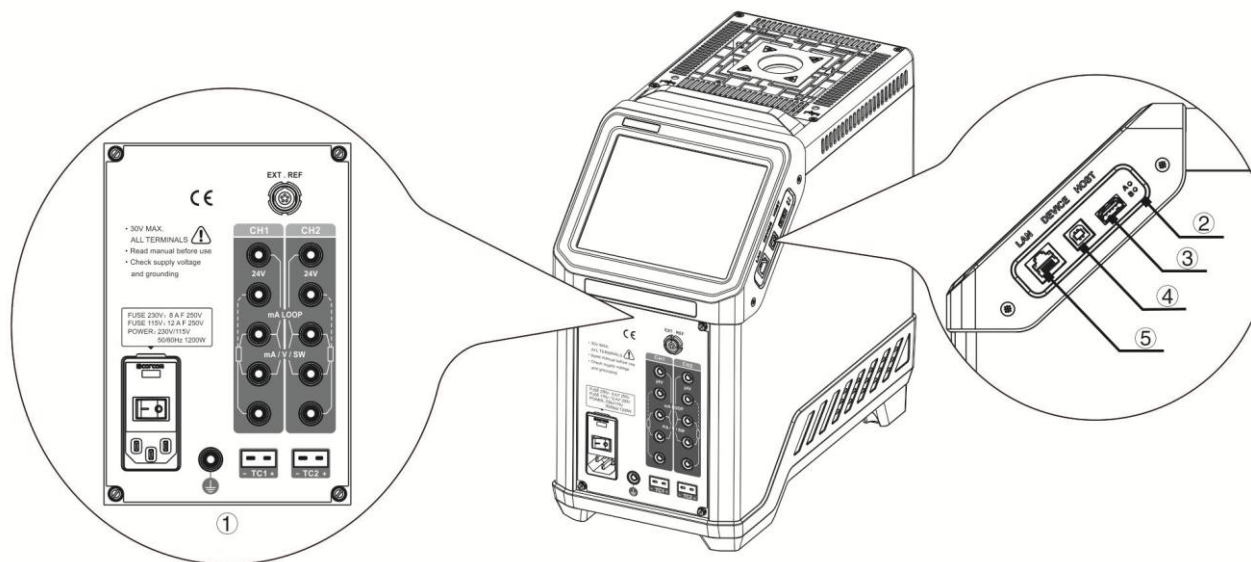


Figure 1 Basic Structure

Table 2 Basic Structure

| No. | Description                  |
|-----|------------------------------|
| 1   | Electrical Measurement Panel |
| 2   | Factory Restore Button       |
| 3   | USB Port (Host)              |
| 4   | USB Port (Device)            |
| 5   | Network Cable Port           |

## 1.3 Features

- ◆ Three models ranging from -40°C to 660°C
- ◆ Portable, rugged, and quick to temperature
- ◆ Metrology-level performance in stability, uniformity, accuracy and loading effect
- ◆ Dual-zone control
- ◆ Process calibrator option provides a multi-channel readout for use with a reference thermometer, RTDs and TCs, as well as task documentation, switch testing and HART communication
- ◆ Color touch screen display
- ◆ Choose your own range option
- ◆ Set point control by reference PRT
- ◆ Self-calibration feature

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## 1.4 Environmental Conditions

- ◆ Working Temperature: (0~50) °C / (32~122) °F (Accuracy guarantee: 8°C~38°C / 46°F~100°F)
- ◆ Storage Temperature: (-20~60) °C / (-4~140) °F
- ◆ Humidity: 0 ~ 90% (0°C ~ 50°C or 32°F ~ 122°F), RH (non-condensing)
- ◆ Atmosphere Pressure: Less than 3,000 m (9,800 ft)
- ◆ Protect Level: IP20

## 1.5 Technical Specifications

### 1. General:

Table 3 General Specifications

| Specification          | ADT875PC / ADT875   |                                     |         |
|------------------------|---|-------------------------------------|---------|
|                        | 875-155   | 875-350                             | 875-660 |
| Dimensions             | 320 x 170 x 330 mm (12.6 x 6.7 x 13.0 in)                                 |                                     |         |
| Power Supply           | (90-242)VAC, (45-65)Hz, 580W  | (90-242)VAC, (45-65)Hz, 1200W       |         |
| Fuse                   | 230V: 4A F 250V<br>115V: 8A F 250V  | 230V: 8A F 250V<br>115V: 16A F 250V |         |
| Display                | 6.5 in (165 mm) color touch screen  |                                     |         |
| Communication          | USB A, USB B, RJ45, Wi-Fi, Bluetooth                                      |                                     |         |
| Localization           | English, Chinese, Japanese, Russian, German, French, Italian, and Spanish |                                     |         |
| Temperature Unit       | °C, °F, K   |                                     |         |
| Temperature Resolution | 0.01°C / 0.01°F/ 0.01 K   |                                     |         |
| Compliance             | CE  |                                     |         |

2. Dry Well:

Table 4 Dry Well Specifications

| Specification                      | ADT875PC / ADT875         |                            |                            |
|------------------------------------|---------------------------|----------------------------|----------------------------|
|                                    | -155                      | -350                       | -660                       |
| Temperature Range at 23°C          | -40°C to 155°C            | 33°C to 350°C              | 33°C to 660°C              |
| Display Accuracy                   | ±0.18°C at Full Range     | ±0.2°C at Full Range       | ±0.3°C at 33°C             |
|                                    |                           |                            | ±0.3°C at 420°C            |
|                                    |                           |                            | ±0.5°C at 660°C            |
| Stability (30 min)                 | ±0.01°C at Full Range     | ±0.02°C at Full Range      | ±0.02°C at 33°C            |
|                                    |                           |                            | ±0.03°C at 50°C            |
|                                    |                           |                            | ±0.04°C at 420°C           |
|                                    |                           |                            | ±0.04°C at 660°C           |
| Axial Uniformity at 60 mm (2.4 in) | ±0.07°C at Full Range     | ±0.04°C at 33°C            | ±0.05°C at 33°C            |
|                                    |                           | ±0.1°C at 200°C            | ±0.3°C at 420°C            |
|                                    |                           | ±0.2°C at 350°C            | ±0.5°C at 660°C            |
| Radial Uniformity                  | ±0.01°C at Full Range     | ±0.01°C at 33°C            | ±0.02°C at 33°C            |
|                                    |                           | ±0.015°C at 200°C          | ±0.05°C at 420°C           |
|                                    |                           | ±0.02°C at 350°C           | ±0.1°C at 660°C            |
| Loading Effect                     | ±0.1°C (Display Sensor)   | ±0.15°C (Display Sensor)   | ±0.15°C (Display Sensor)   |
|                                    | ±0.02°C (External Sensor) | ±0.015°C (External Sensor) | ±0.025°C (External Sensor) |
| Hysteresis (Display Sensor)        | 0.025°C                   | 0.03°C                     | 0.1°C                      |
| Immersion Depth                    | 150 mm (5.9 in)           |                            |                            |

| Insert OD                 | 25.8 mm (1.02 in)      | 24.8 mm (0.98 in)      |                        |
|---------------------------|------------------------|------------------------|------------------------|
| Heating Time              | 13 min: -40°C to 155°C | 5 min: 33°C to 350°C   | 15 min: 33°C to 660°C  |
|                           | 5 min: -40°C to 23°C   |                        |                        |
|                           | 8 min: 23°C to 155°C   |                        |                        |
| Cooling Time              | 28 min: 155°C to -40°C | 15 min: 350°C to 100°C | 23 min: 660°C to 100°C |
|                           | 8 min: 155°C to 23°C   | 10 min: 100°C to 50°C  | 12 min: 100°C to 50°C  |
|                           | 20 min: 23°C to -40°C  | 10 min: 50°C to 33°C   | 12 min: 50°C to 33°C   |
| Typical Time to Stability | 10 min                 |                        |                        |

### 3. Electrical Measurement (Only for ADT875PC)

Table 5 Electrical Measurement Specifications

| Specification  | Description                      |
|--|----------------------------------|
| Readout Accuracy<br>for 100 ohm PRT<br>(Probe Accuracy Not Included) | ±0.009°C at -40°C                |
|  | ±0.010°C at 0°C                  |
|  | ±0.012°C at 50°C                 |
|  | ±0.017°C at 155°C                |
|  | ±0.019°C at 200°C                |
|  | ±0.026°C at 350°C                |
|  | ±0.030°C at 420°C                |
|  | ±0.042°C at 660°C                |
| Readout Resolution   | 1 mΩ                             |
| Reference Resistance Range   | 0 Ω to 400 Ω                     |
| Reference Resistance Accuracy  | 0 Ω to 50 Ω: 0.002 Ω             |
|  | 50 Ω to 400 Ω: 0.004% RD         |
| Reference Characterizations  | ITS-90, CVD, IEC-751, Resistance |
| Reference Measurement Capability                                     | 4-wire PRT                       |
| Reference Probe Connection   | 6-pin lemo smart connector       |
| RTD Channels   | 2                                |
| RTD Measurement Accuracy (excl sensor)                               | 0 Ω to 25 Ω: 0.002 Ω             |
|  | 25 Ω to 400 Ω: 0.008% RD         |
|  | 400 Ω to 4K Ω: 0.004% RD         |

|                                       |   |
|---------------------------------------|---|
| RTD Measurement Resolution            | 0 $\Omega$ to 400 $\Omega$ : 1 m $\Omega$   |
|                                       | 400 $\Omega$ to 4K $\Omega$ : 0.01 $\Omega$   |
| RTD Measurement Resistance Range      | 0 $\Omega$ to 4K $\Omega$   |
| RTD Characterizations                 | PT10, PT25, PT50, PT100, PT200, PT500, PT1000, CU10, CU50, CU100, NI100, NI120  |
| RTD Connection                        | Four 4 mm input jacks   |
| RTD Channels                          | 2 channels. Both accept 2, 3, or 4-wire RTDs  |
| TC Channel                            | 2   |
| TC Measurement Channels               | Mini TC terminals:<br>Accepting S, R, K, B, N, E, J, T, C, D, G, L, and U   |
| TC Measurement Accuracy (excl sensor) | Type K:<br>$\pm 0.13^{\circ}\text{C}$ at $0^{\circ}\text{C}$<br>$\pm 0.15^{\circ}\text{C}$ at $155^{\circ}\text{C}$<br>$\pm 0.18^{\circ}\text{C}$ at $350^{\circ}\text{C}$<br>$\pm 0.24^{\circ}\text{C}$ at $660^{\circ}\text{C}$ |
| TC Range                              | -100 mV to 100 mV   |
| TC Resolution                         | 0.001 mV, Input Impedance <1 M $\Omega$   |
| TC Voltage Accuracy                   | 0.02% RD + 5 $\mu\text{V}$  |
| Internal CJC Accuracy                 | $\pm 0.35^{\circ}\text{C}$ (ambient from $0^{\circ}\text{C}$ to $50^{\circ}\text{C}$ )  |
| Current Range                         | -30 mA to 30 mA   |
| Current Accuracy                      | 0.02% RD + 2 $\mu\text{A}$  |
| Current Resolution                    | 0.001 mA, Input Impedance: < 10 $\Omega$  |
| Voltage Range                         | -30 V to 30 V   |



|  |   |
|--|---|
| Voltage Accuracy                                       | $\pm 0.02\% \text{ RD} + 2 \text{ mV}$  |
| Voltage Resolution                                     | 0.001 V; Input impedance: $< 1 \text{ M}\Omega$   |
| Switch Test  | Mechanical or Electrical  |
| DC 24V Output  | 24 V $\pm 1$ V, MAX60 mA  |
| Hart Communication                                     | Optional (ADT875PC Model)   |
| Documentation  | Up to 1,000 tasks capable of storing up to 10 results. Each task contains as found and as left data. The snap shot feature allows for screen captures. Also records auto step and ramp functions. |
| Temperature Coefficient<br>0°C to 8°C and 38°C to 50°C | ADT875(PC)-155: $\pm 0.005 \text{ }^\circ\text{C}/^\circ\text{C}$   |
|  | ADT875(PC)-350/660: $\pm 0.01 \text{ }^\circ\text{C}/^\circ\text{C}$  |
|  | Ref Readout: $\pm 1 \text{ ppm FS}/^\circ\text{C}$  |
|  | RTD Readouts: $\pm 2 \text{ ppm FS}/^\circ\text{C}$   |
|  | TC Readouts: $\pm 5 \text{ ppm FS}/^\circ\text{C}$  |
|  | Current: $\pm 10 \text{ ppm FS}/^\circ\text{C}$   |
|  | Voltage: $\pm 10 \text{ ppm FS}/^\circ\text{C}$   |

#### 4. Compliance and Mechanical Testing

Table 6 Compliance and Mechanical Testing Specifications

| Subject            | Specification  | Description  |            |
|--------------------|--|--|------------|
| EMC-Directive      | Electrostatic Discharge Immunity                           | 4KV for contact<br>8KV for air                                 |            |
|                    | Radiated Radio-frequency Electromagnetic Field Immunity    | 10V/m (80MHZ~1GHZ)<br>3V/m (1.4GHZ~2GHZ)<br>1V/m (2GHZ~2.7GHZ) |            |
|                    | Immunity to Radio-frequency Induced Conducted Disturbance  | 3V/m (150kHz~50MHZ)  |            |
|                    | Voltage Dip  | 0% for 1 cycle<br>40% for 10 cycles, and 70% for 25 cycles     |            |
|                    | Short Interruption   | 0% for 250 cycles  |            |
|                    | Pulse Group  | 1KV (Measuring & Communication Cable)                          | 5ns, 5kHz  |
|                    |  | 2KV (Power Cord)   | 50ns, 5kHz |
|                    | Surge  | 1KV (Line-to-line) / 2KV (Line-to-ground)                      |            |
|                    | Radio-frequency Radiated Electromagnetic Disturbance Limit | Class B  |            |
|                    | Radio-frequency Induced Conducted Disturbance Limit        | Class B  |            |
| LVD-Directive      | Insulation Voltage   | 1KV: 875 and 875PC - 350 & 660<br>2KV: 875 and 875PC - 155     |            |
|                    | Insulation Resistance                                      | > 1GΩ when tested at 1KV                                       |            |
| Mechanical Testing | Vibration Test   | 2g (10 ~ 500HZ) , 30 minutes for 2 sides                       |            |
|                    | Impact Test  | 4g, 3 times  |            |
|                    | Drop Test  | 500mm  |            |

## 1.6 Standard Equipment







Table 7 Standard Equipment

| Model                                     | Quantity       | ADT875PC |                    | ADT875  |                    |
|---|----------------|----------|--------------------|---------|--------------------|
|   |                | ADT-155  | ADT-350<br>ADT-660 | ADT-155 | ADT-350<br>ADT-660 |
| Dry well                                  | 1 pc.          | •        | •                  | •       | •                  |
| ADT110-875-L-INSERT-X<br>(Selected Model) | 1 pc.          | •        |                    | •       |                    |
| ADT110-875-H-INSERT-X<br>(Selected Model) | 1 pc.          |          | •                  |         | •                  |
| Insulation Plug<br>(Selected Model)       | 1 pc.          | •        |                    | •       |                    |
| Silica Gel Plug                           | 1 pc.          | •        |                    | •       |                    |
| Thermal Shield                            | 1 pc.          |          | •                  |         | •                  |
| Insert Removal Tool                       | 1 pc.          | •        | •                  | •       | •                  |
| Test Leads                                | 2 set (6 pcs.) | •        | •                  |         |                    |
| USB Cable                                 | 1 pc.          | •        | •                  | •       | •                  |
| CD Manual                                 | 1 pc.          | •        | •                  | •       | •                  |
| Certificate of Calibration                | 1 pc.          | •        | •                  | •       | •                  |

## 2. Operation




### 2.1 Main Screen



The main operation interface includes two screens, the upper DUT measurement channel and the lower temperature output channel.


① Status Bar: Includes date and time, cloud storage status , 24V power status , intelligence diagnose center , screenshot , electrical measurement channel switch , and system menu icon .

**Note: All icons (except date and time) on the status bar can be selected via the touch screen to manage and select options.**

② DUT measurement window (only for ADT875PC): Includes external measurement readings and sensor type (RTD or TC measurement), automatic cold junction temperature (only for TC measurement), current or resistance measurements, real-time data of electrical measurement and data analysis

③ Temperature output window: Includes target temperature set point   **0.00**, real-time temperature data and temperature control play/pause button .

◆ The external PRT sensor can be used as a temperature control sensor: The external sensor window will automatically be displayed when the external PRT sensor is connected, click on the   **0.00** icon in the window to set the target temperature.

④ Screen lock: Press  on the top right corner of the screen and select "Screen Lock" to lock the touch display.


◆ Unlock: Press  on the top right corner of the screen to unlock the touch display.



Figure 2 Main Screen

## 2.2 System Temperature Unit Setup

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

◆ Once the system display temperature units are changed, all related parameters in the system will be changed, except existed sensors and DUTs information

1. System Menu:


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

2. Main Screen:

Press the temperature unit on the temperature display screen - Select desired temperature unit

## 2.3 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 reference parameters:

(1)Control Settings:

Table 8 Control Settings



| Subject                  | Valid Value  | Comment   |
|--------------------------|--|---|
| Fluctuation              | Dependant on the system temperature units selected     | One of the conditions for temperature control and stability. The condition is met when temperature varies within this range.  |
| 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                |
| Deviation                | Dependant on the system temperature units selected     | 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. |
| Temperature Control Rate | Max value depends on system temperature units selected | Choose max or customize the temperature Scan rate. Customized rate is indicated on the process bar.   |
| Set Point Limits         | On/Off   | Limit the range of temperature control  |
| Set Point Range (on)     | Depends on dry well model                              | The temperature will not exceed the upper and lower limits after setting.   |

(2)Standard Parameter:

Table 9 Standard Parameter

| Subject                                      | Valid Value         | Comment                                 |
|--|---------------------|---|
| <b>Internal Sensor</b>                       |                     |   |
| Resolution                                   | 1, 0.1, 0.01        | Temperature display resolution          |
| Sensor Signal                                | Read only           | Measured temperature of internal sensor |
| <b>External Sensor ( Only for ADT875PC )</b> |                     |   |
| 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. Target Temperature Input:

Press the Target Temperature icon  , or 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 dry well 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 dry-well temperature display screen.

## 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 (Only for ADT875PC)

### 2.4.1 DUT Settings







Press  (when CH1 and CH2 are always measuring the same measurement type) /  (when CH1 and CH2 are measuring different measurement types from each other) on the left of the DUT measurement channel screen to enter DUT settings, which includes channel settings, sensor testing and electrical signal.

Table 10 DUT Settings

| Subject  | Valid Value  | Comment  |
|--|--|--|
| <b>Channel Setting</b>   |  |  |
| CH1 & CH2 Connection   | Connected  / Disconnected  | Selecting whether the two-channel measurement types are the same:<br><b>Connected = Same; Disconnected = Different</b>                             |
| CH1 & CH2 Measurement subject<br>(when CH1 and CH2 are connected)    | RTD, TC, current, voltage, switch test, HART (transmitter), N/A  | Selecting a subject of DUT channel measurement   |
| CH1 (CH2) Measurement subject<br>(when CH1 and CH2 are disconnected) |  |  |
| <b>Sensor Testing</b>  |  |  |
| Resolution   | 1, 0.1, 0.01   | Temperature display resolution   |
| Fluctuation  | ≥0.005   | One of the conditions for temperature control and stability. The condition is met when temperature varies within this range. Unit: °C              |
| Stabilization Time   | 1~60   | One of the conditions to for temperature control and stabilization. The condition is met when the stabilized time exceeds the set point. Unit: min |
| <b>Electrical Signal</b>   |  |  |
| mA & V Resolution  | 1, 0.1, 0.01, 0.001, 0.0001  | Display resolution of current and voltage measurements   |

Press  on the lower right to confirm.

◆ Press  on the DUT measurement screen and select "Close" to close any or both of the electrical measurement channels.

## 2.4.2 Thermal Resistance (RTD) & NTC Measurement

### 1. Connection

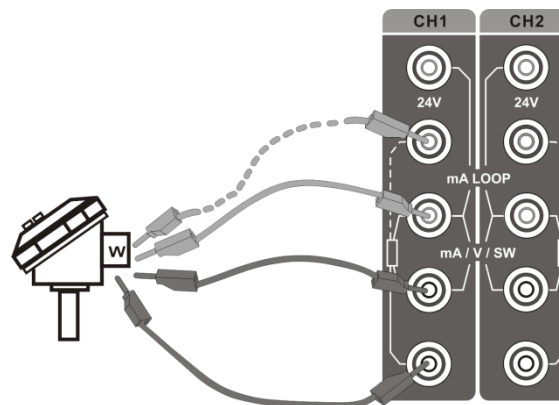


Figure 3 RTD Connection

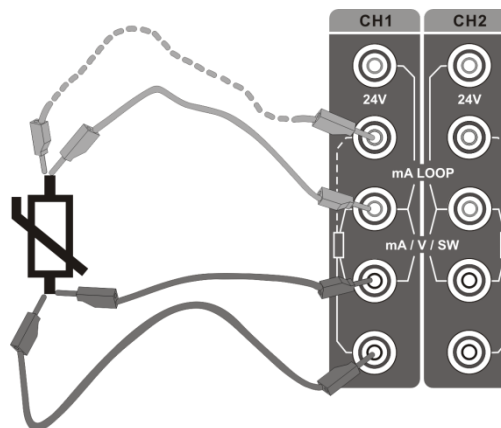




Figure 4 NTC Connection

## 2. Measurement Settings

Press  (when CH1 and CH2 are always measuring the same measurement type)/  (when CH1 and CH2 are measuring different measurement types from each other) on the left of DUT measurement channel screen to enter the DUT setting screen. Select CH1 or CH2 or CH1&CH2 to enter the channel setting screen. Press “Subject” and select RTD (thermal resistance), and the unit will return to the channel setting screen.


### 2.1 Sensor Type

Press “Sensor Type” to enter the sensor selection screen.

#### 2.1.1 Default Sensor

The default sensor can be selected from the sensor library.

#### 2.1.2 Custom Sensor


Press  on the right side of the screen to add a new sensor, please see section 3.2 Sensor Library for how to add a custom sensor.


### 2.2 Wire Type Selection

Table 11 RTD Wire Selection

| Subject | Valid Value | Comment            |
|---------|-------------|--------------------|
| Wire    | 2, 3, 4     | RTD Wire selection |

## 3. Starting a Measurement

Press  on the lower right of the screen after selecting the sensor and wire type, the system will then return to the DUT setting screen.

Press , again and the system will return to the main screen.

The DUT channel will show “-----” with an audible beep if there is an error in the RTD connection.

Please see section 2.3 for more info regarding the calibrator temperature output.

## 2.4.3 Thermal Couple (TC) Measurement

### 1. Connection

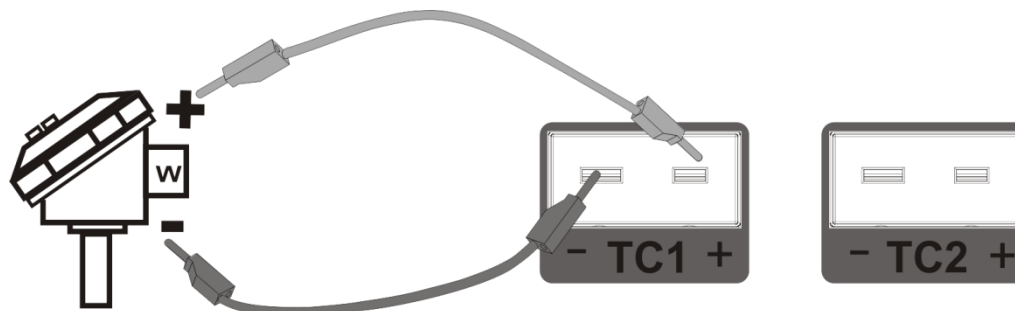


Figure 5 TC Connection

### 2. Measurement Settings

Press  $\text{CH}$  (when CH1 and CH2 are always measuring the same measurement type)/  $\text{CH}$  (when CH1 and CH2 are measuring different measurement types from each other) on the left of DUT measurement channel screen to enter the DUT setting screen. Select CH1 or CH2 or CH1&CH2 to enter the channel setting screen. Press “Subject” and select TC (thermal couple), and the unit will return to the channel setting screen.

#### 2.1 Thermal Couple (TC) Type

Press sensor type to enter the sensor selection screen:

##### 2.1.1 Default Sensor

System default sensors are as follows:


mV, S, R, B, K, N, E, J, T, C, D, G, L, U, LR, A,  $10\mu\text{V}/^\circ\text{C}$ ,  $1\text{mV}/^\circ\text{C}$


## 2.1.2 Cold Junction Type

Table 12 Cold Junction Type

| Subject                              | Valid Value       | Comment  |
|--------------------------------------|-------------------|--|
| Cold Junction Type                   | Automatic / Fixed | <p>“Automatic” means the calibrator is the using internal sensor as the cold junction reference.</p> <p>“Fixed” means the calibrator is using user entered custom values as the cold junction reference.</p> <p><b>Note: There is no need to choose the cold junction type when mV is selected as the sensor type.</b></p> |
| Fixed value (when selecting “Fixed”) | Numeric Content   | Set customer value for the cold junction compensation value  |

### 3. Starting a Measurement

Press  on the lower right of the screen after the sensor and cold junction type is selected. The unit will return to the DUT setting screen.

Press , again and the unit will jump back to the main screen.

The DUT channel will show “-----” with an audible beep if there is an error in the TC connection.

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

## 2.3.4 Current (mA) Measurement

### 1. Connection

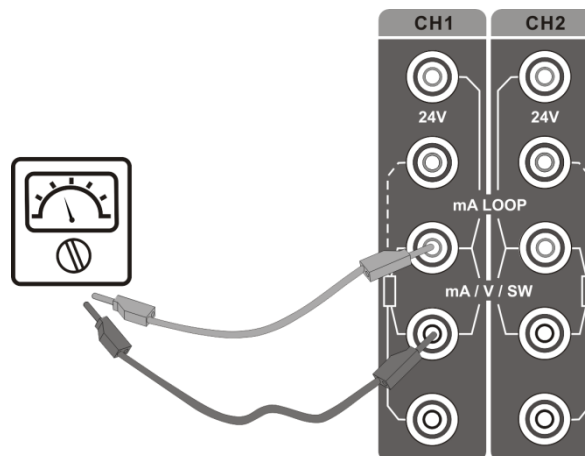


Figure 6 Current Measurement Connection

### 2. Measurement Settings

Press (when CH1 and CH2 are always measuring the same measurement type)/ (when CH1 and CH2 are measuring different measurement types from each other) on the left of DUT measurement channel screen to enter the DUT setting screen. Select CH1 or CH2 or CH1&CH2 to enter the channel setting screen. Press “Subject” and select mA measurement, and the unit will return to the channel setting screen.

### 3. Starting a Measurement

Press on the lower right screen, the unit will return to DUT setting screen.

Press again and, the unit will return to the main screen.

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

## 2.3.5 Voltage (V) Measurement

### 1. Connection

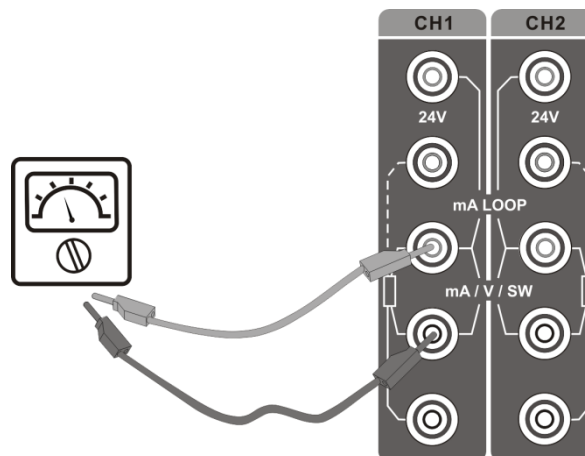


Figure 7 Voltage Measurement Connection


### 2. Measurement Settings


Press  $\text{CH}$  (when CH1 and CH2 are always measuring the same measurement type)/  $\text{CH}$  (when CH1 and CH2 are measuring different measurement types from each other) on the left of DUT measurement channel screen to enter the DUT setting screen. Select CH1 or CH2 or CH1&CH2 to enter the channel setting screen. Press “Subject” and select voltage (V) measurement, and the unit will return to the channel setting screen.

Table 13 Voltage Selection

| Subject | Valid Value | Comment                                  |
|---------|-------------|--|
| Range   | 12V, 30V    | Select a voltage measurement range scale |

### 3. Starting a Measurement

Press  on the lower right of the screen, the system will return to the DUT setting screen.

Press  again and the unit will return to the main screen.

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



## 2.3.6 Switch Test

### 1. Connection

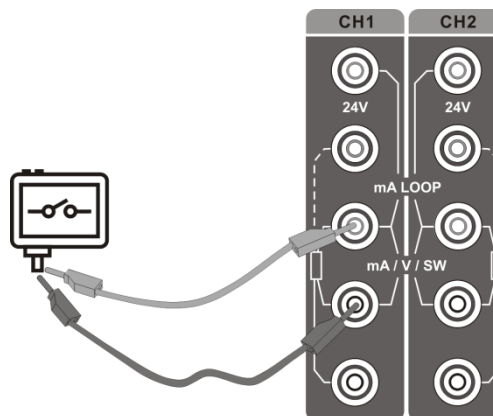


Figure 8 Switch Test Connection


### 2. Measurement Settings


Press  $\text{CH}$  (when CH1 and CH2 are always measuring the same measurement type)/  $\text{CH}$  (when CH1 and CH2 are measuring different measurement types from each other) on the left of DUT measurement channel screen to enter the DUT setting screen. Select CH1 or CH2 or CH1&CH2 to enter the channel setting screen. Press “Subject” and select Switch, and the unit will return to the channel setting screen.

Table 14 Switch Type Selection

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

### 3. Starting a Measurement

Press  on the lower right of the screen and the unit will return to DUT setting screen.

Press  again and the unit will return to the main screen.

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

## 2.3.7 Transmitter Measurement (including HART transmitter)

### 1. Connection

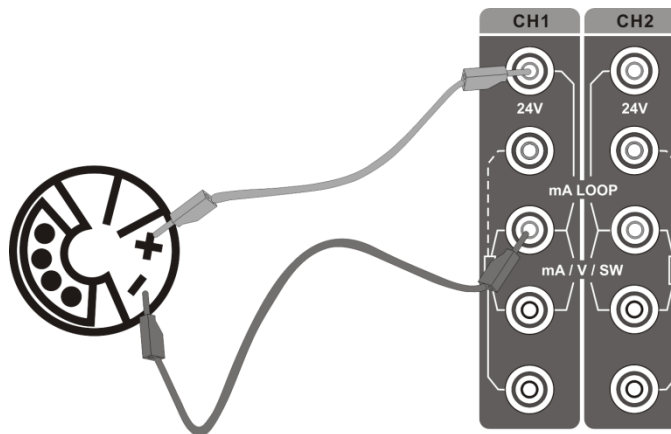


Figure 9 Transmitter Connection

◆ Only CH1 is available for HART transmitter

### 2. Transmitter Settings

Press (when CH1 and CH2 are always measuring the same measurement type)/ (when CH1 and CH2 are measuring different measurement types from each other) on the left of DUT measurement channel screen to enter the DUT setting screen. Select CH1 or CH2 or CH1&CH2 to enter the channel setting screen. Press “Subject” and select HART, and the unit will return to the channel setting screen.


Press and the unit will return to the main screen.

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


#### 2.1 Poll

Press in the submenu on the upper right of DUT measurement channel screen .

Press to search the unit for a list of transmitters automatically. If additional searches are needed press on the right of the screen.

Press the name of the target transmitter when searching is completed, then press  on the lower right of the screen. The unit will return to the main screen and read the measured data of the transmitter.

## 2.2 Setting (some functions are HART only)

Press ●●● on the upper right of DUT measurement channel screen, and select  to enter the transmitter setting screen.

### 1. Device Information:

Table 15 Transmitter Information

| Subject                  | Valid Value                                       | Comment   |
|--------------------------|---|---|
| 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               |

### 2. Sensor:


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

### 3. Device Output:

Table 16 Transmitter Output Information

| 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, $\geq 0$                  | 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 |

### 2.3 Diagnose/Test

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

#### 1. Current Loop Test

Customers can compare and calibrate the current output signal of the transmitter and the current measurement signal of the Calibrator through a current loop test.

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

- 1) Intercept the current measurement signal through the numeric keyboard or press the button "obtain", and apply by pressing Enter or pressing the confirm button.
- 2) A few seconds later, the calibrator will send output current value of the transmitter and current measurement value of the calibrator. Adjustment should be made if the difference is out of tolerance.

## 2. D/A Adjustment

Customers can adjust the current output of the transmitter at zero and full scale through D/A adjustment.

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

### ① D/A Zero

1) Intercept the current measurement signal (4mA as the typical value) through the numeric keyboard or press the button “obtain”, and apply by pressing Enter or pressing the confirm button.

2) A few seconds later, 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 “obtain”, and apply by pressing Enter or pressing the confirm button.

2) A few seconds later, the calibrator will send instruction to the transmitter to adjust the current output at full scale.

## 2.4 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 17 HART Device Variable

| Subject          | Comment  |
|------------------|--|
| Process Variable | The unit of the master variable depends on the setting of the transmitter. Please refer to transmitter output setting 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  |

## 3. Starting a Measurement

Please refer to section 2.3 for operation on calibrator temperature output.

## 3. System Setup

To enter the system setup menu, please select "Setup" under Main Menu .

- ◆ Any changes made in the Setup will become the default values after the calibrator is rebooted.
- ◆ Necessary information has to be completed, otherwise system will prohibit the next step with notification.

### 3.1 Communication

#### 3.1.1 Ethernet

Connect the dry well to a computer through the Network port.

Table 18 Ethernet Address Acquisition Setting

| Subject             | Valid Value   | Comment                           |
|---------------------|---------------|-----------------------------------|
| Address Acquisition | DHCP / Static | Ethernet address acquisition mode |


- ◆ All information in Table 18 is required and entered manually when static address acquisition mode is selected:

Table 19 Ethernet Settings

| Subject     | Valid Value               | Comment              |
|-------------|---------------------------|----------------------|
| IP Address  | 0.0.0.0 ~ 255.255.255.255 | Dry well IP address  |
| Subnet Mask | 0.0.0.0 ~ 255.255.255.255 | Dry well subnet mask |
| Gateway     | 0.0.0.0 ~ 255.255.255.255 | Dry well gateway     |

Port number and MAC address information are read only.

- ◆ All information in Table 18 above is filled in automatically when DHCP address acquisition mode is selected.

Press  on the bottom left corner of screen to confirm.

### 3.1.2 Wi-Fi

Connect the dry well to a computer through Wi-Fi.

Table 20 Wi-Fi Settings

| Subject  | Valid Value  | Comment  |
|----------|--|--|
| WLAN     | On / Off   | Enable or disable Wi-Fi communication function |
| SSID     | Depends on network environment<br>(only available when WLAN is on) | Select Wi-Fi router                            |
| Advanced | DHCP / Static  | Network address acquisition mode               |


◆ All information in Table 20 is required and entered manually when static address acquisition mode is selected:

Table 21 Wi-Fi Address Settings

| Subject     | Valid Value               | Comment              |
|-------------|---------------------------|----------------------|
| IP Address  | 0.0.0.0 ~ 255.255.255.255 | Dry well IP address  |
| Subnet Mask | 0.0.0.0 ~ 255.255.255.255 | Dry well subnet mask |
| Gateway     | 0.0.0.0 ~ 255.255.255.255 | Dry well gateway     |

Port number and MAC address information are read only.

◆ All information in Table 20 above is filled in automatically when DHCP address acquisition mode is selected.

Wi-Fi settings are applied immediately, press  on the top left corner for previous menu.




### 3.1.3 Bluetooth®

Connect dry well with computer through Bluetooth®.

Table 22 Bluetooth Settings

| Subject           | Valid Value                                   | Comment                              |
|-------------------|---|--------------------------------------|
| BT Name           | Alphanumeric content (14 max length)          | Dry well Bluetooth name              |
| Radio Mode        | On / Off                                      | Enable or disable Bluetooth function |
| MAC               | Read only<br>(only available when WLAN is on) | Dry well MAC address                 |
| Available Devices | Depends on Bluetooth environment              | Select Bluetooth device to connect   |

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

### 3.1.4 Cloud Service

Upload data onto cloud server for remote control

Table 23 Cloud Service Settings

| Subject  | Valid Value                          | Comment                                       |
|----------|--------------------------------------|---|
| Enable   | On / Off                             | Enable or disable cloud service function      |
| Account  | Alphanumeric content (16 max length) | Cloud server account                          |
| Interval | 1~100                                | Interval time between each reading, unit: sec |

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

## 3.2 Sensor Library (Only for ADT875PC)

Sensor information can be stored in the sensor library for future use. 5 type of sensors are available: Intelligent Sensor, ITS-90, CVD, RTD, and NTC. Press sensor type to enter sub-menu, then press sensor name to enter sensor information page.

### 3.2.1 General Management

1. Display Settings:


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







Table 24 Sensor Display Settings

| Subject                | Valid Value                  | Comment  |
|------------------------|------------------------------|--|
| Sensor Display Setting | Scientific / Decimal         | Select parameter display mode:<br>Scientific: $1.1 \times 10^{-2}$<br>Decimal: 0.011 |
| RTD                    | Model & Name / Serial Number | Select display contents  |
| ITS-90                 |                              |  |
| CVD                    |                              |  |
| NTC                    |                              |  |
| Intelligent Sensor     |                              |  |

2. Sub-menu:

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




Table 25 General Management Icons in Sensor Library

| Icon  | Comment  | Intelligent Sensor | ITS-90 | CVD | RTD | NTC |
|---|--|--------------------|--------|-----|-----|-----|
|  | Add a new sensor   | •                  | •      | •   | •   | •   |
|  | Add a new sensor based on selected sensor as template  | •                  | •      | •   |     |     |
|  | Export selected sensor data into connected PRT sensor  | •                  | •      | •   |     |     |
|  | Delete sensors:<br>1. Press sensors to select, then press  to delete<br>2. Press  to delete all sensors | •                  | •      | •   | •   | •   |

3. Sensor information:

Management function Icons in the sensor information page are listed below:

Table 26 Management Icons in Sensor Information Page

| Icon  | Comment   | Intelligent Sensor | ITS-90 | CVD | RTD | NTC |
|---|---|--------------------|--------|-----|-----|-----|
|  | Edit selected sensor                                  | •                  | •      | •   | •   | •   |
|  | Delete selected sensor                                | •                  | •      | •   | •   | •   |
|  | Export selected sensor data into connected PRT sensor | •                  | •      | •   |     |     |

### 3.2.2 Smart Sensor

Table 27 Smart Sensor Information

| Subject               | Valid Value                          | Comment   |
|-----------------------|--------------------------------------|---|
| Model / Name          | Alphanumeric content (14 max length) | Sensor type and name  |
| Serial Number         | Alphanumeric content (14 max length) | Sensor serial number  |
| Sensor Type           | ITS-90 / CVD                         | Sensor type, different type applies different calculation parameters and equations. See tables below. |
| Temperature Range     | Depends on system temperature units  | Temperature range, unit: mirrors system units   |
| Calibration Date      | 2000/1/1~2099/12/31                  | Calibration date  |
| Next Calibration Date | 2000/1/1~2099/12/31                  | Calibration due date  |
| Note                  | Alphanumeric content (14 max length) | Note  |

1. Select ITS-90 sensor type:

Table 28 ITS-90 Information

| ITS-90                                       |                                     |   |
|--|-------------------------------------|---|
| Subject                                      | Valid Value                         | Comment   |
| Negative temperature parameters coefficients | A4, b4: (-200~0) °C                 | Negative temperature parameters selection   |
|  | A5, b5: (-40~0) °C                  |   |
|  | N/A                                 |   |
| Positive temperature parameter coefficients  | A6, b6, c6, d, W660.323: (0~960) °C | Positive temperature parameter selection  |
|  | A7, b7, c7: (0~660) °C              |   |
|  | A8, b8: (0~420) °C                  |   |
|  | A9, b9: (0~232) °C                  |   |
|  | A10: (0~157) °C                     |   |
| A11: (0~30) °C                               |                                     |   |
| Rtp (Ω)                                      | Numeric content                     | Parameters for the sensor calculation equation, please refer to the sensor calibration certificate. |
| a4   |                                     |   |
| b4   |                                     |   |
| a6   |                                     |   |
| b6   |                                     |   |
| c6   |                                     |   |
| d  |                                     |   |
| W (660.323°C)                                |                                     |   |

2. Select CVD sensor type:

Table 29 CVD Information

| <b>CVD</b>      |                    |   |
|-----------------|--------------------|---|
| <b>Subject</b>  | <b>Valid Value</b> | <b>Comment</b>  |
| R0 ( $\Omega$ ) | Numeric content    | Parameters for the sensor calculation equation, please refer to the sensor calibration certificate. |
| a               | Numeric content    |   |
| b               |                    |   |
| c               |                    |   |

### 3.2.3 ITS-90

See table 27 & 28 for ITS-90 information.

### 3.2.4 CVD

See table 27 & 29 for CVD information.

### 3.2.5 RTD

Table 30 RTD Information

| Subject               | Valid Value                          | Comment                                       |
|-----------------------|--------------------------------------|---|
| Model / Name          | Alphanumeric content (14 max length) | RTD type and name                             |
| Serial Number         | Alphanumeric content (14 max length) | RTD serial number                             |
| Temperature Range     | Depends on system temperature units  | Temperature range, unit: mirrors system units |
| R0 (Ω)                | Numeric content                      | Resistance value at 0°C                       |
| Calibration Date      | 2000/1/1~2099/12/31                  | Calibration date                              |
| Next Calibration Date | 2000/1/1~2099/12/31                  | Calibration due date                          |
| Note                  | Alphanumeric content (14 max length) | Note  |

### 3.2.6 NTC

Table 31 NTC Information

| Subject               | Valid Value                          | Comment  |
|-----------------------|--------------------------------------|--|
| Model Name            | Alphanumeric content (14 max length) | NTC type and name  |
| Serial Number         | Alphanumeric content (14 max length) | NTC serial number  |
| Temperature Range     | Depends on system temperature unit   | Temperature range, unit: mirrors system units  |
| NTC Type              | NTC / Steinhart-Hart                 | Sensor type, different types apply different calculation parameters and equations. See tables below. |
| Calibration Date      | 2000/1/1~2099/12/31                  | Calibration date   |
| Next Calibration Date | 2000/1/1~2099/12/31                  | Calibration due date   |
| Note                  | Alphanumeric content (14 max length) | Note   |

1. Select NTC sensor type:

Table 32 NTC Information

| Subject | Valid Value     | Comment   |
|---------|-----------------|---|
| Rtn     | Numeric content | Parameters for the sensor calculation equation, please refer to the sensor calibration certificate. |
| Tn      |                 |   |
| $\beta$ |                 |   |

2. Select Hart sensor type:

Table 33 Hart Information

| Subject | Valid Value     | Comment   |
|---------|-----------------|---|
| a       | Numeric content | Parameters for the sensor calculation equation, please refer to the sensor calibration certificate. |
| b       |                 |   |
| c       |                 |   |



### 3.3 Power Grid Settings (Only for ADT875PC/875 - 350 & 660)

Two types of power supply voltages are available: 220V & 110V

- ◆ Please check and select the correct voltage
- ◆ Please check fuse value when voltage settings are changed
- ◆ The dry well will detect the power supply voltage each time of use, an error notification will be displayed if the voltage selection is different from the supply voltage
- ◆ A password is necessary when switching to another voltage, see section 3.4 Password Protection for more information. The default password is:123456

### 3.4 Password Protection

Table 34 Password Protection

| Subject                            | Valid Value                     | Comment   |
|------------------------------------|---------------------------------|---|
| Edit Password                      | Numeric content (20 max length) | Password setup, default password is: 123456   |
| Task (Only for ADT875PC)           | Enable / Disable                | Enable or disable Password Protection.<br>Enable: Password is necessary when deleting task data           |
| Sensor Library (Only for ADT875PC) | Enable / Disable                | Enable or disable Password Protection.<br>Enable: Password is necessary when deleting sensor library data |

- ◆ Password applies on: Tasks (when enabled), Sensors (when enabled), Calibration, Power Grid Settings, System Calibration, Factory Reset, and Updates.

## 3.5 Service

### 3.5.1 Calibration

Password applies when entering calibration menu, default password: 123456




◆ Please refer to section 3.4 Password Protection to change the password

#### 3.5.1.1 Electrical Calibration

##### 1. General Information

Display Icons on the right side of each calibration menu are listed below:

Table 35 General Display Icons in Electrical Calibration

| Icon  | Comment  | Ext.REF | CH1 & CH2             |                            |                              |  |                              |
|---|--|---------|-----------------------|----------------------------|------------------------------|--|------------------------------|
|   |  |         | ±30 mV<br>Measurement | TC (±75 mV)<br>Measurement | ±12 V & ±30 V<br>Measurement | 400Ω (4W) &<br>4000Ω (4W)<br>Measurement | Cold Junction<br>Calibration |
|  | Cancel the calibration, no data will be saved. | •       | •                     | •                          | •                            | •  | •                            |
|  | Restore the factory data                       | •       | •                     | •                          | •                            | •  | •                            |
|  | Cancel the zeroing                             |         | •                     | •                          | •                            |  |                              |

## 2. Ext.REF

To calibrate the resistance measurement of Ext.REF connector, please prepare standard resistance source.

- ◆ The number of set points cannot be changed, but set point values can be changed by pressing and inputting new values
- ◆ The last calibration date is shown below the set point table

### Connection diagram:

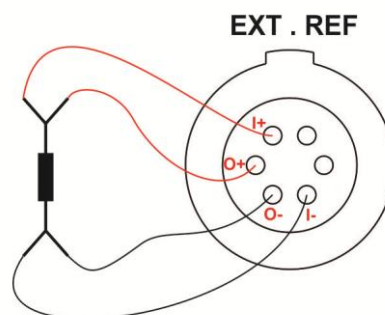






Figure 10 External Reference Connection

### Calibration Instructions:

- 1 Press  to start the calibration process. All reference data will need to be input manually.
- 2 Press  to record data and move to the next set point, or press  to delete current data and move to the previous set point.
- 3 Press  to save the calibration result after all set points are done.

### 3. CH 1 & CH2

#### 1 $\pm 30$ mA Measurement

To calibrate the current measurement for CH1 and CH2:

- ◆ The number of set points cannot be changed, but set point values can be changed by pressing and inputting the new values.

#### How to Connect:

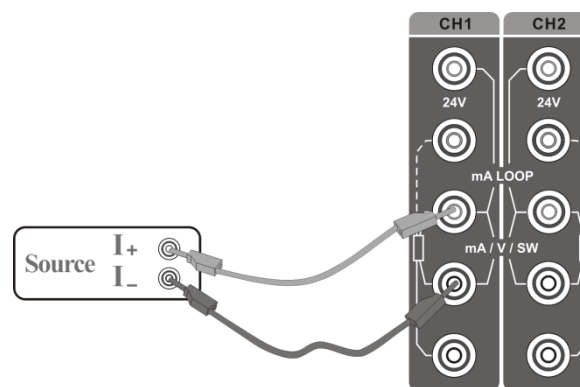


Figure 11  $\pm 30$  mA Measurement Calibration Connection

#### Calibration Instructions:

- 1 Press to start calibration process
- 2 Output the current from your standard which corresponds to the calibration set point value
- 3 When the Measured Value is stable, press to record data and move to the next calibration point, or press to return to the previous point to retake the data
- 4 Once the calibration has finished, press to save the data

2 TC, (-75~75)mV

To calibrate the TC measurement for CH1 and CH2:

- ◆ The set point values of TC, (-75~75)mV cannot be changed
- ◆ Press set point value on the left side of table to enter set point edit interface in which data is entered

#### How to Connect:

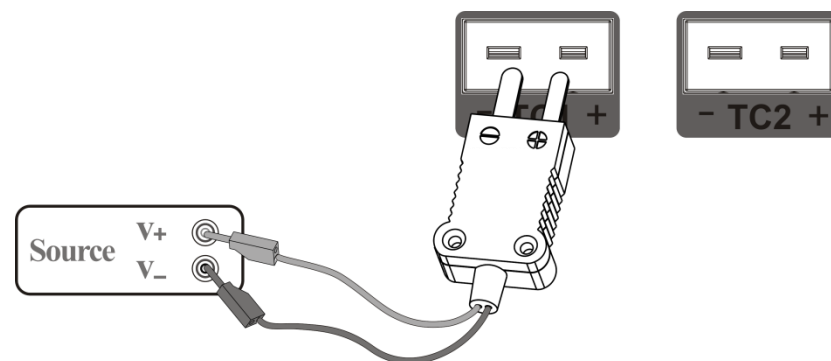


Figure 12 TC, (-75~75)mV Calibration Connection

#### Calibration Instructions:

- 1 Press (▶) to start calibration process
- 2 Output voltage from the standard to dry well corresponding to the calibration set point
- 3 When Measured Value is stable, press (▶) to record data and move to the next calibration point, or press (◀) to return to the previous point to retake the data
- 4 Once calibration has finished press (💾) to save the data

3 (-12~12)V & (-30~30)V

◆The number of set points (-12~12)V & (-30~30) cannot be changed

◆Press the set point value on the left side of table to enter set point edit interface in which data is entered

### How to Connect:

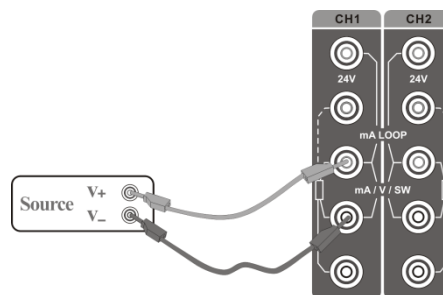





Figure 13 (-12~12)V & (-30~30)V Measurement Calibration Connection

### Calibration Instructions:

1 Press  to start calibration process

2 Output voltage from the standard to the dry well corresponding to the calibration set point

3 When the Measured Value is stable, press  to record data and move to the next calibration point, or press  to return to the previous point to retake the data

4 Once calibration has finished press  to save the data





4 400Ω (4W) & 4000Ω (4W)

- ◆The set point number for 400Ω (4W) & 4000Ω (4W) cannot be changed
- ◆Press the set point value on the left side of table to enter set point edit interface in which data can entered
- ◆The latest calibration date is shown under the table

#### How to Connect:

- ◆Correct electrical connection: please see Figure 3 RTD Connection

#### How to Execute:

- 1 Press  to start calibration process
- 2 Output resistance from the standard to dry well corresponding to calibration set point
- 3 When the Measured Value is stable, press  to record the data and move to the next calibration point, or press  to return to the previous point to retake the data
- 4 Once calibration has finished, press  to save the data

## 5 Cold Junction Calibration

◆ Please select cold junction sensor type. Available type are: S, R, B, K, N, E, J, T, C, D, G, L, U, LR, A,  $10\mu\text{V}/^\circ\text{C}$ ,  $1\text{mV}/^\circ\text{C}$

### How to Connect:

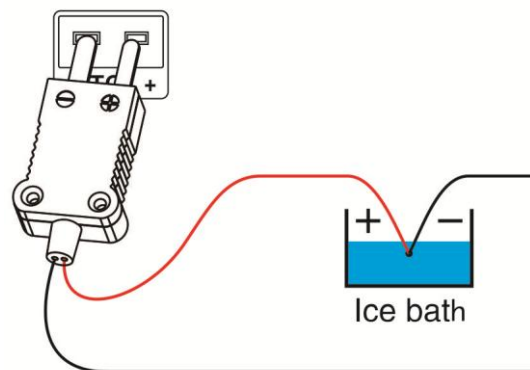



Figure 14 Cold Junction Calibration Connection

### Calibration Instructions:

- 1 The cold junction temperature is adjusted by clicking the set point value and changing it.
- 2 Press  to save the cold junction calibration result



### 3.5.1.2 Calibration History

Calibration history consist of three parts: Manufacturer Calibration Data, User Calibration Data, and Period Calibration Data

Table 36 Calibration History

| Subject                       | Data Source   | Review | Operated by                             | Delete | Comment  |
|-------------------------------|---|--------|---|--------|--|
| Manufacturer Calibration Data | Factory data  |        |   |        | Factory data   |
| Self Calibration Data         | Latest user calibration data  | •      | • (User)                                | •      | Self calibration operated by user                        |
| Recalibration Data            | All recalibration data is shown, one history will be added after each recalibration | •      | •<br>(Third Party Organization or User) | •      | 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-activate before it is deleted**

Each calibration history including axial homogeneity calibration and self calibration data:

◆ For axial homogeneity calibration operation, please refer to section 3.5.1.3 Axial Homogeneity Calibration

◆ For self calibration operation, please refer to section 3.5.1.4 Self Calibration

#### How to use:

1. Select a data to enter data information interface
2. Double check the axial homogeneity calibration and self calibration data first, then press  to apply



### 3.5.1.3 Axial Homogeneity Calibration

To calibrate dry well axial uniformity, the latest axial homogeneity calibration data will be listed

#### **How to connect:**

Please follow the instruction displayed on screen for correct connection

#### **How to use:**

1. Press  to start a new manual axial homogeneity calibration
2. Select “Period” or “User” as calibration data storage method
  - ◆Period: Periodic calibration operated by third party organization
  - ◆User: Regular calibration operated by user
3. Read the instructions displayed on the screen
4. Input reference values at 0 mm and 60 mm
  - ◆All reference values should be read on the main screen, reference value readings are not available in this interface under manual mode
5. Click humidity value to input the current humidity data
6. Press  to save and apply the calibration data



### 3.5.1.4 Self Calibration

To calibrate dry well display sensor.

#### How to connect:

Please follow the instruction displayed on screen for correct connection

#### How to use:

1. Press  or  to start a new calibration

◆ Automatic calibration  is only for ADT875PC models

◆ Click to change the set point if necessary before execution

2. Select “Period” or “User” as a calibration data storage method

◆ Period: Periodic calibration operated by third party organization


◆ User: Regular calibration operated by user

#### 3.1 Manual Mode:

1. Input reference value at different set point temperatures manually

◆ All reference values should be read on the main screen, reference value readings are not available in this interface under the manual mode


◆ Set point value cannot be changed under this interface

2. Press  to save and apply the calibration data

#### 3.2 Automatic Mode (only for ADT875PC):

1. Connect reference following the instructions displayed




2. Press  to execute automatic calibration

3. Press  to save and apply the calibration data

### 3.5.1.5 Dry Well Calibration (Only for ADT875PC)

Dry well calibration data including axial homogeneity calibration and self calibration data

#### How to use:

1. Connect reference following the instruction displayed on the screen
2. Press  to start a new calibration
  - ◆ Click to change the set point if necessary before execution
3. Select “Period” or “User” as calibration data storage method
  - ◆ Period: Periodic calibration operated by third party organization
  - ◆ User: Regular calibration operated by user
4. Move the reference for axial homogeneity calibration when indicated
5. Press  to advance to the next point when current set point calibration is done
6. Press  to save and apply the calibration data


### 3.5.2 Restore

Resets all data to factory data

- ◆ Default password: 123456
- ◆ Password is editable, please refer to section 3.4 Password Protection
- ◆ Restore operation will not apply dry well factory data, please refer to section 3.5.1.2 Calibration History for factory data applying
- ◆ User data (including task data, sensor library, etc.) will not be deleted when restore is selected

### 3.5.3 Updates

To update dry well firmware:

- 1). Copy the update file into an USB root directory
  - 2). Insert USB into dry well USB port
  - 3). Select Updates by USB on calibrator
  - 4). Press  to start update process
  - 5). Wait for the update to complete in which a notification will be given
- ◆ Password: 123456
  - ◆ To change the password, please refer to section 3.4 Password Protection
  - ◆ The USB has to be in FAT16 or FAT32 type

## 3.6 Personalization

### 3.6.1 Temperature Unit

Three units are available: °C, °F, 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 37 Date and Time Settings

| Subject        | Valid Value                        | Comment               |
|----------------|------------------------------------|-----------------------|
| Time           | 00:00 ~ 23:59                      | Time                  |
| Date           | 2000-1-1 ~ 2099-12-31              | Date                  |
| Date Format    | YYYY-MMDD /MM-DD-YYYY / DD-MM-YYYY | Date format           |
| Date Separator | -, /, .                            | Date format separator |

### 3.6.3 Language

Dry well is equipped with a multi-language user interface. Use this menu to change from the offered languages.

### 3.6.4 Sound

Table 38 Sound Settings

| Subject         | Valid Value | Comment                           |
|-----------------|-------------|-----------------------------------|
| 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

Press the bar to adjust screen brightness

### 3.6.7 Screen Saver

Dry well will turn off the screen for power saving if it is not used over set time.

- ◆ To activate, please touch the screen
- ◆ Available selections: 1 min, 5 min, 10 min, 30 min, 60 min, or Never

### 3.6.8 Display

Switch to **Light Theme** or **Dark Theme**.

## 3.7 Product Information

Dry well information is read only:

1. General Information: Including model, serial number and range information
  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 the to the customer service if necessary.



## 4 Task (Only for ADT875PC)

### 4.1 Device Center

All DUTs can be managed in 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 39 DUT search conditions in Device Center menu

| Subject       | Valid Value   | Comment   |
|---------------|---|---|
| Type          | Thermal resistance, thermocouple, NTC, 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 dry well 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 RTD

◆ Click  to select the task information of an existing sensor as a template


Table 40 RTD 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 or area  |
| Comment                    | Alphanumeric content (16 max length)   | Information about the DUT   |
| Company                    | Alphanumeric content (16 max length)   | DUT owner   |
| Range                      | Depends on the unit of temperature   | Click temperature units to switch.  |
| Accuracy                   | The dry well calibrator provides some common errors of thermal resistance. Click  to enter a custom page. | The accuracy of the DUT<br><b>Please refer to Chapter 4.1.10 for accuracy settings.</b> |
| Wire                       | Two-wire / three-wire / four-wire  | Select the wire type  |
| Type of thermal resistance | Pt series, Cu series, Ni series, and CVD   | The type of thermal resistance under test   |
| R0                         | Numeric content  | The R0 value of the thermal resistance at zero.   |

Click  on the lower right to save.

### 4.1.3 TC

Table 41 TC 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 or area  |
| Comment                            | Alphanumeric content (16 max length)   | Information about the DUT   |
| Company                            | Alphanumeric content (16 max length)   | DUT owner   |
| Range                              | Depends on the unit of temperature   | Click temperature units to switch.  |
| Accuracy                           | The dry well calibrator provides some common permissible errors of thermal resistance. Click  to enter custom page. | The accuracy of the DUT<br><b>Please refer to Chapter 4.1.10 for accuracy settings.</b>                                   |
| Type of thermal couple             | A, B, C, D, E, F, J, K, L, LR, N, R, S, T, U   | The type of thermal couple under test   |
| 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.

#### 4.1.4 NTC

◆ Click  to select the task information of an existing sensor as a template

Table 42 NTC 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   |
| Range             | Depends on the unit of temperature  | Click temperature units to switch.  |
| Permissible Error | Depends on the needs of the users.<br>Please refer to Chapter 4.1.10 for accuracy settings. | The accuracy of the DUT<br><b>Please refer to Chapter 4.1.10 for accuracy settings.</b> |
| Wire              | Two-wire / three-wire / four-wire   | Select the wire type  |
| Rtn               | Numeric content   | The Rtn value of NTC under test   |
| Tn                | Numeric content   | The Tn value of NTC under test  |
| $\beta$           | Numeric content   | The $\beta$ value of NTC under test   |

Click  on the lower right to save.

#### 4.1.5 Temperature Transmitter

Table 43 Temperature Transmitter 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    | Depends on the unit of temperature  | Click temperature units to switch.                                   |
| Output   | Analog signals:<br>1. mA: 4~20, 0~10, 0~20<br>2. V: 0~5, 0~10, 4~20<br>3. Customize: -30~30(Click electrical signals to switch between mA and V.) | Output signal settings of the temperature transmitter under test     |
|          | HART Transmitter:<br>Major variable, percentage, Output current, loop current   |  |
| Accuracy | 0.1%, 0.2%, 0.5%, 1%, 1.5%, 2%, 2.5%, custom  | Users can set special accuracy by selecting custom options. Unit: %. |

Click  on the lower right to save

#### 4.1.6 Temperature Switch

Table 44 Switch 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  |
| Range                  | Depends on the unit of temperature               | Click temperature units to switch.                               |
| Set point              | Depends on the range of the switch               | The anticipated temperature the switch will change states        |
| The range of set point | Depends on the range of the switch               | The open and close or set and reset temperatures of the switch   |
| Type of switch         | normally open / normally closed                  | Type of switch   |
| Set point error        | Depends on the range of the switch               | Accuracy of the DUT  |
| Type of switch         | Dry contact, wet contact, NPN switch, PNP switch | Type of switch   |
| Dead band              | Depends on the range of the switch               | The band of temperature when the switch will set and then reset. |

Click  on the lower right to save

#### 4.1.7 Liquid-In-Glass and Surface Thermometers

Table 45 Liquid-In-Glass Thermometer and Surface Thermometer 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  |
| Range       | Depends on the unit of temperature   | Click temperature units to switch.   |
| Accuracy    | Depends on the needs of the users. Please refer to Chapter 4.1.10 for accuracy settings. | The accuracy of the DUT<br><b>Please refer to Chapter 4.1.10 for accuracy settings.</b>            |
| 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



#### 4.1.8 Temperature Controller, Bimetallic Thermometer, and Thermostat Transmitter

Table 46 Temperature Controller, Bimetallic Thermometer, and Thermostat Transmitter 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  |
| Range                       | Depends on the unit of temperature      | Click temperature units to switch.   |
| Accuracy                    | 1%, 1.5%, 2%, 2.5%, 4%, custom          | Users can set a custom accuracy. The unit should be %.   |
| 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

#### 4.1.9 Digital Thermometer

Table 47 Digital Thermometer 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  | Depends on the unit of temperature   | Click temperature units to switch.   |
| 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 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. |
| 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<br>(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<br>(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

#### 4.1.10 Accuracy Setting of DUT

Apart from standard accuracy settings, the dry well calibrator also supports three sub selections.

◆ In the setting interface, every highlighted value can be revised.

##### 4.1.10.1 Accuracy Setting

The dry well calibrator provides two types of accuracy setting:

###### 1. Fixed Accuracy

Fixed accuracy setting can be applied to such DUTs liquid-in-glass thermometers.

For example: **(0 ~ 100)% ± (0.2 °C)**

How to set a fixed accuracy:

Click fixed accuracy value (the highlighted value, as 0.2 in the example above), and enter the selection page. The default accuracies are: 0.1, 0.15, 0.3, 0.5, 1, 2.5 and custom.

◆ Custom values can be selected. The unit depends on the DUT's unit setting.

###### 2. Fixed Accuracy + % of Reading Accuracy

Fixed and % of reading accuracy setting can be applied to such DUTs as resistance, thermocouple, NTC and surface thermometers.

For example: **(0 ~ 100)% ± (0.1 °C + 0.002 \* | t |)**

How to set fixed and % of reading accuracy:

1. Fixed accuracy setting: Click fixed accuracy value (the highlighted value, as 0.1 in the example above), and enter the selection page. The default accuracies are: 0.1, 0.15, 0.3, 0.5, 1, 2.5 and custom.

2. % of Reading accuracy setting: Click % of reading accuracy value (the highlighted value, as in 0.002 in the example above), and enter the selection page. The default accuracies are: 0.001, 0.002, 0.004, 0.005, 0.008, 0.01 and custom.

◆ Custom values can be selected. The unit depends on the DUT's unit setting.

#### **4.1.10.2 Subsection Setting**

The dry well calibrator allows users to list the accuracy in different subsections, and set the accuracies respectively in order to meet different demands.

How to set subsection accuracies:

1. Click **^** / **v** to add or reduce the number of sections. Or click the number on the right to input the sections through the keyboard.
  2. Please refer to 4.1.10.1 to set the accuracy for every subsection.
- ◆ The dry well calibrator supports as many as three subsections of accuracy.




## 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 task information screen, the user can:

- 1) Click  to enter the task screen. The dry well calibrator will perform the task again according to the previous device and task. Please refer to Chapter 4.3 to perform task actions.
- 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 48 Search Settings in the Test Center

| Subject        | Valid Value                           | Comment  |
|----------------|---------------------------------------|--|
| 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 created.             |
|                | Finishing time: 2000-1-1 ~ 2099-12-31 |  |
| 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.

## 4.2.2 Task Settings


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

### 4.2.2.1 Dual-Channel Test

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

Table 49 Dual-Channel Test Compatibility Information

| Type of DUT              | Available for Dual Channel Test |
|--------------------------|---------------------------------|
| Thermal resistance       | •                               |
| Thermocouple             | •                               |
| NTC                      | •                               |
| Temperature transmitter  |                                 |
| Temperature switch       |                                 |
| Glass liquid thermometer | •                               |
| Temperature controller   |                                 |
| Bimetallic thermometer   |                                 |
| Pressure thermometer     |                                 |
| Thermostat transmitter   |                                 |
| Surface thermometer      | •                               |
| Digital thermometer      |                                 |

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

#### 4.2.2.2 Basic Information Settings

The DUTs which support setting basic information are as follows:

Table 50 Basic Information Setting Compatibility in the Task Menu


| Type of DUT                 | Basic information |         | Operation settings |      |            |               |                   |
|-----------------------------|-------------------|---------|--------------------|------|------------|---------------|-------------------|
|                             | Name              | Comment | Cycle times        | Trip | Dwell time | Reading times | Reading intervals |
| Thermal resistance          | •                 | •       | •                  | •    | •          | •             | •                 |
| Thermocouple                | •                 | •       | •                  | •    | •          | •             | •                 |
| NTC                         | •                 | •       | •                  | •    | •          | •             | •                 |
| Temperature transmitter     | •                 | •       | •                  | •    | •          | •             | •                 |
| Temperature switch          | •                 | •       | •                  |      |            |               |                   |
| Liquid-in-glass thermometer | •                 | •       | •                  | •    | •          | •             | •                 |
| Temperature controller      | •                 | •       | •                  | •    | •          | •             | •                 |
| Bimetallic thermometer      | •                 | •       | •                  | •    | •          | •             | •                 |
| Pressure thermometer        | •                 | •       | •                  | •    | •          | •             | •                 |
| Thermostat transmitter      | •                 | •       | •                  | •    | •          | •             | •                 |
| Surface thermometer         | •                 | •       | •                  | •    | •          | •             | •                 |
| Digital thermometer         | •                 | •       | •                  | •    | •          | •             | •                 |



The basic information setting include the following:

Table 51 Basic Information Setting in the Task Menu

| Subject                           | Valid Value                          | Comment   |
|-----------------------------------|--------------------------------------|---|
| <b>Basic Information Settings</b> |                                      |   |
| Name                              | Alphanumeric content (16 max length) | Name of the task  |
| Comment                           | Alphanumeric content (16 max length) | Comment for the task  |
| <b>Operation Settings</b>         |                                      |   |
| Cycle times                       | 1 / 2 / 3                            | The number of times a test repeats  |
| Trip                              | One way / round trip                 | The operation mode of the task  |
| Dwell time                        | 1~60                                 | The time that the test point is stable before each reading. Unit: min         |
| Reading times                     | 1~6                                  | The number of readings the dry well calibrator measures after the dwell time. |
| Reading intervals                 | 0~3600                               | The intervals between every reading. Unit: sec                                |

Click  to apply the changes.

### 4.2.2.3 Control Settings

The DUTs supported control settings are as follows:

Temperature control settings which determine temperature stability are as follows:

Table 52 Temperature Control Settings in the Task Menu

| Subject            | Valid Value | Comment   |
|--------------------|-------------|---|
| Select REF         | INT / EXT   | Select 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 fluctuation degree, stability time and target deviation are within the allowed range.

#### 4.2.2.4 Device Settings

The DUTs supported device settings are as follows:

Table 53 Device Settings Compatibility in the Task Menu

| Type of DUT              | Device 1 & Device 2 | Fluctuation Degree | Stable Time | Temperature Control Rate | Channel 1 & Chanel 2 |
|--------------------------|---------------------|--------------------|-------------|--------------------------|----------------------|
| Thermal resistance       | •                   | •                  | •           |                          | •                    |
| Thermocouple             | •                   | •                  | •           |                          | •                    |
| NTC                      | •                   | •                  | •           |                          | •                    |
| Temperature transmitter  | •                   | •                  | •           |                          | •                    |
| Temperature switch       | •                   |                    |             | •                        | •                    |
| Glass liquid thermometer | •                   | •                  | •           |                          |                      |
| Temperature controller   | •                   | •                  | •           |                          |                      |
| Bimetallic thermometer   | •                   | •                  | •           |                          |                      |
| Pressure thermometer     | •                   | •                  | •           |                          |                      |
| Thermostat transmitter   | •                   | •                  | •           |                          |                      |
| Surface thermometer      | •                   | •                  | •           |                          |                      |
| Digital thermometer      | •                   | •                  | •           |                          |                      |

Device setting selections includes:

Table 54 Device Settings Compatibility Instruction

| Subject                  | Valid Value   | Comment  |
|--------------------------|---|--|
| Device1 & Device2        | Depends on the selected DUT.<br>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 dry well calibrator, unit: temperature unit/minute<br><b>Temperature control rate is only applied within the set point range of the temperature switch. Please refer to Chapter 3.1.6 for details.</b> |
| Channel 1 & Channel 2    | CH 1 (/CH 2)  | Set the corresponding DUTs for Channel 1 and Channel 2, which depends on whether the DUT supports dual channel test and the connection.  |

#### 4.2.2.5 Set Point List

All types of DUTs support the set point list function.

- ◆ The dry well calibrator supports 1 to 17 set point settings. The set points can be added or reduced through ^ and v button on the right, or click the numbers of the set points and input the number through the keyboard.
- ◆ The set points are one-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).

#### 4.2.2.6 Indication Error

Indication error function only relates to liquid-in-glass thermometers, bimetallic thermometers, temperature controllers, and pressure thermometers. When indication error test is checked, the settings are as follows:

#### 4.2.2.7 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 checked, the settings are as follows:

Table 55 Electric Contact Test Settings

| Subject   | Valid Value                | Comment  |
|---|----------------------------|--|
| Temperature control rate  | Up to the temperature unit | Set the temperature control rate of the electric contact |
| The first electric contact value  | CH 1 / CH 2                | Select the channel for the first electric contact        |
| The second electric contact value<br>(only for the device with two electric contacts) | CH 1 / CH 2                | 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

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.
  - 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 connection of the DUT carefully. The wrong connection may damage the dry well calibrator or the DUT.**

### 4.3.2.1 Typical Task Screen

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

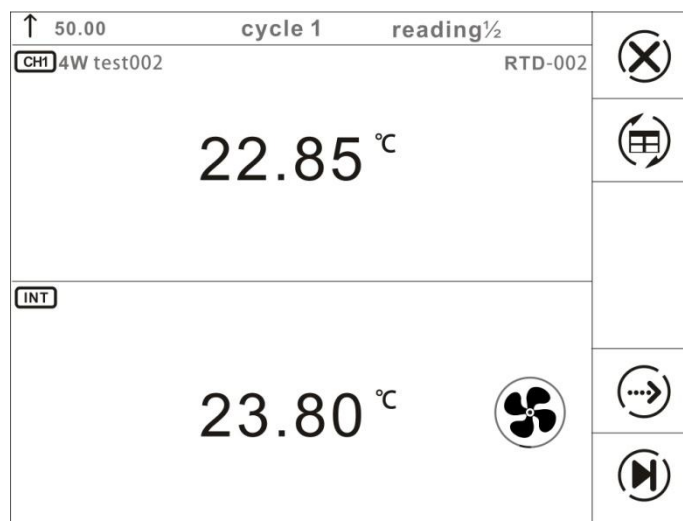


Figure 15 Typical Task Interface

1. The lower part shows the dry well 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 dry well calibrator cannot collect the reading automatically, the user can click on the return value and input the reading through the 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 56 Button Instruction on Typical Task Interface




| Icon  | Manual Mode<br> | Automatic Mode<br> | Comment   |
|---|--|---|---|
|    | •  | •   | 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.<br><b>In temperature switch test, click  to switch display mode. The regular mode shows a temperature/time diagram.</b> |
|    | •  |   | Switch to the previous set point<br><b>The data of this set point will be cleared and the temperature control will automatically switch to the previous set point.</b>  |
|    | •  | •   | Switch to the next set point<br><b>The standard value and the DUT readings will be saved and the dry well will control to the next set point.</b>   |
|   | •  |   | Skip the current set point<br><b>The value of this set point will be skipped and will not be shown in the final report.</b>   |
|  |  | •   | Pause or continue with the current task   |
| ↑ 50.00 cycle 1   | •  | •   | Shows the current cycle times and the numbers of set points in current cycle<br><b>This example means the dry well is ascending to 50 degrees as the set point under the first cycle</b>  |

#### 4.3.2.2 Thermal resistance, thermocouple, NTC, and temperature transmitter



##### ◆ Only CH1 supports HART transmitters

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

##### 1. Manual Performance



- 1) Click  on the lower right to start performance. The temperature will be automatically controlled to the first set point.
- 2) The temperature output value will become green when the temperature is stable, with dwell time is shown after the dry well 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.

##### 2. Automatic Performance

- 1) Click  on lower right to start the task. The dry well 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 Chapter 4.4 for details.

#### 4.3.2.3 Temperature Switch



The dry well calibrator only provides automatic performance mode for temperature switch.

- 1) Click  on lower right to start the test. The dry well 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 Chapter 4.4 for details.



#### 4.3.2.4 Liquid-in-Glass Thermometer, Temperature Controller, Bimetallic Thermometer, Pressure Thermometer, Thermostat Transmitter, Surface Thermometer, and Digital Thermometer

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

##### 1. Manual Mode:

- 1) Click  in the lower right to start the test. The dry well 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 dry well 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 the data of this test. Please refer to Chapter4.4 for details

##### 2. Automatic Mode:

- 1) Click  in the lower right to start the test. The dry well 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 dry well 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




## 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 57 Icon Meanings

| Icon  | Comment  |
|---|--|
|  | 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.                 |

#### 4.4.2 Task Data Saving

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


##### How to setup:

Table 58 Task Saving Settings

| Subject                   | Valid Value                          | Comment                                     |
|---------------------------|--------------------------------------|---|
| 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    | 0~100                                | Input the environmental humidity, Unit: %RH |

##### 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  to cancel and go back to the task report screen.


## 4.5 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.

### 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 59 Task Data Searching Subject Selection

| 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.

◆ 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

### 5.1 Temperature Converter

How to setup:

1.TC:

Table 60 Temperature Converter for TC

| Subject         | Valid Value   | Comment  |
|-----------------|---|--|
| Sensor Type     | S, R, B, K, N, E, J, T, C, D, G, L, U, LR, A, 10 $\mu$ V/ $^{\circ}$ C, 1mV/ $^{\circ}$ C | Select TC type   |
| Electric Signal | Depends on sensor type  | Electrical signal output from TC, unit: mV<br><b>Please input Ext CJC Value for correct calculation result</b> |
| Celsius         | Depends on sensor type  | Celsius degree, unit: $^{\circ}$ C   |
| Kelvin          | Depends on sensor type  | Kelvin degree, unit: K   |
| Fahrenheit      | Depends on sensor type  | Fahrenheit degree, unit: $^{\circ}$ F  |
| Ext CJC Value   | -10~50  | Fixed cold junction value, used for electrical signal calculation, unit: $^{\circ}$ C                          |

For example, type K TC:

1. Input 20 $^{\circ}$ C, corresponding 68 $^{\circ}$ F and 293.15K will be calculated by the dry well.
2. Once the Electric Signal needs to be calculated the Ext CJC Value shall be inputted as the compensated Electric Signal.

## 2. RTD

Table 61 Temperature Converter for RTD

| Subject         | Valid Value  | Comment   |
|-----------------|--|---|
| Sensor Type     | All available RTD, ITS-90, CVD and NTC from sensor library | Select RTD type                                   |
| Electric Signal | Depends on sensor type                                     | Electrical signal output from RTD, unit: $\Omega$ |
| Celsius         | Depends on sensor type                                     | Celsius degree, unit: $^{\circ}\text{C}$          |
| Kelvin          | Depends on sensor type                                     | Kelvin degree, unit: K                            |
| Fahrenheit      | Depends on sensor type                                     | Fahrenheit degree, unit: $^{\circ}\text{F}$       |

### How to use:

Press the known subject and input the corresponding value, other subject values will be calculated by the dry well.

## 5.2 Temperature Control Data Logging

### How to setup:

#### 1. General settings:

Table 62 Temperature Control Data Logging General Settings

| Subject   | Valid Value   | Comment  |
|---|---|--|
| Start Temperature   | Current Temperature / Custom Temperature<br>(value depends on temperature unit) | Data logging function will start after the dry well reaches the start temperature  |
| End Temperature   | Depends on dry well model   | Data logging function will end after the dry well reaches the end temperature  |
| Control Settings  | Refer to Control Settings table below   | Control settings   |
| Interval  | 1~60  | Data logging interval, unit: sec   |
| Dwell Time  | 1~60  | Dwell time after the dry well reaches the target temperature in the stability test, unit: min  |
| Stability Test  | Enable / Disable  | Enable or disable stability test<br><b>Dry well will start stability test only when it reaches the target temperature and meets the dwell time requirement</b> |
| Stability Test Time<br>(only available when stability test is on) | 1~60  | Logging time after the dwell time is reached during the stability test, unit: min  |
| CH 1 & CH 2   | Refer to UUT Settings table below   | Channel settings   |

2. Control Settings:

Table 63 Data Logging Control Settings



| Subject  | Valid Value               | Comment  |
|--|---------------------------|--|
| <b>Control Program</b>   |                           |  |
| Stability Tolerance  | 0.04~10                   | Temperature stability after set point is reached   |
| Stabilization Time   | 1~120                     | Dwell time after dry well reach the stability criteria is meet , unit: min   |
| Set Point Tolerance  | 0~20                      | The difference between display temperature and set point   |
| Control Rate   | Max, 0~100 °C/min         | The target slew rate at which the dry well increases or decreases temperature  |
| Set Point Limit  | Enable / Disable          | Enable or disable set point limit  |
| Restriction Range<br>(only available when Set Point Limit is enable) | Depends range of dry well | Set restriction range for set point<br><b>Dry well will only apply custom control rate within this restriction range</b> |
| <b>Control Reference</b>   |                           |  |
| Control Resolution   | 1, 0.1, 0.01              | Set temperature control resolution, which changes the sensor signal resolution as well (see below)                       |
| Sensor Signal  | Read only                 | Sensor display value, resolution depends on control resolution (see above)   |

### 3. UUT settings:

Table 64 Data Logging UUT Settings

| Subject  | Valid Value               | Comment   |
|--|---------------------------|---|
| <b>General settings</b>  |                           |   |
| CH 1 & CH 2 Connection   | Connected / Disconnected  | Selecting whether the two-channel measurement type is the same:<br><b>Connected-CH 1 &amp; CH 2 are the same measurement type</b><br><b>Disconnected-CH 1 &amp; CH2 are different from each other</b> |
| CH 1 / CH 2<br>(Measurement Subject)                                       | RTD, TC, mA, V, Off       | Set channel measurement type. <b>Please select voltage range when testing RTD or TC</b>   |
| Stability Tolerance  | ≥0.005                    | Set temperature stability tolerance, unit: °C   |
| <b>Channel settings (Only available when measuring current or voltage)</b> |                           |   |
| Measure Range  | -30~30                    | Set measurement range, unit depends on current or voltage (press electrical unit to switch between current and voltage measurement)   |
| Scale Range  | Depends on dry well model | Set scale range   |

#### How to use:

- 1) Press  on the lower-right to start data logging. The dry well will start temperature control and data logging automatically. It may take a few minutes of preparation before control is initiated.
  - ◆ During data logging, press  on the lower right to stop data logging process and the logged data will not be saved.
- 2) Once temperature control data logging is finished, a result interface will be shown where data can be saved.

#### How to review:

- To review saved temperature control data, press  on the right side to review saved data logging files
- ◆ To delete files, press  to delete a file or press  to delete multiple files.

## 5.3 Dehumidification



◆ After a extended time of inactivity, the dry well may need to be dehumidified. The dehumidification process is a 2 hour automated process to remove moisture that may have built up in the dry well and could cause damage.

How to setup:

Table 65 Dehumidification Settings

| Subject                      | Valid Value                        | Comment                          |
|------------------------------|------------------------------------|----------------------------------|
| Dehumidification Temperature | Depends on system temperature unit | Set dehumidification temperature |
| Dwell Time                   | ≥10                                | Set dehumidification time        |

How to use:

- 1) To start dehumidification process, press  on the lower right corner
- 2) To terminate dehumidification process, press  and wait for process to end.



## 5.4 Line Voltage Test (Only for ADT875PC/875 - 350 & 660)

### How to setup:


In the setting interface:




1. Supply Power: Input actual power supply voltage, valid value: (90~254) V
2. Frequency: Input actual power supply frequency, valid value: (45~65) Hz

### How to use:

1. Press  on the bottom right corner to start line voltage test.
  - ◆ During the test, supply power voltage will be recorded based on time line, the default test time is 5 min.
  - ◆ During the test, press  to stop and dry well will proceed to the report interface and all collected test results can be saved or abandoned

### How to review:

To review saved data, press  at setting interface, all saved data will be displayed

- ◆ Press  to export all saved data to a USB drive
- ◆ To delete files, press  to delete a single file or press  to delete multiple files

## 5.5 Step Test



### How to setup:

Table 66 Step Test Settings


| Subject          | Valid Value                                 | Comment   |
|------------------|---|---|
| Range            | Depends on dry well model                   | Set step test range   |
| Stroke           | One way / (N points)                        | Select step test stroke                                     |
|                  | Round trip 1 ^ (2N-1 points)                |   |
|                  | Round trip 2 ^ (21 points max)              |   |
| Dwell Time       | 1 ~ 240                                     | Dwell time for stabilization before each reading, unit: min |
| Repeat           | 1 / 2 / 3                                   | Number of test cycles                                       |
| Set Points       | Refer to section 4.2.2.5 set point settings | Set the value and quantity of set points                    |
| CH 1 & CH 2      | Refer to section 2.4 DUT information        | Set DUT settings  |
| Control Settings | Refer to section 2.3 Control Settings       | Set dry well temperature control settings                   |

### How to save a configuration:

Twenty step test configurations can be save with a unique name and test date

- 1) To enter setup saving interface, press  in step test settings interface
- 2) To save a new setup select one from the list, then press 

### How to run a saved configuration:

To run a saved configuration, press  on the right side then select desired configuration.



**How to use:**









- 1) Press  to enter step test operation
- 2) Icon introduction:

Table 67 Step Test Icons Instruction



| Icon   | Comment  |
|--|--|
|                 | Start step test  |
|                 | Switch to previous or next set point   |
|                 | Cancel current step test and re-start the step test from the first set point of the first cycle<br><b>All data within this test will be deleted</b>                      |
|                 | Switch display mode between chart and table  |
|  100.00 cycle 2 | Display current cycle and set point number<br><b>This icon shown on the left means the dry well is reaching to ascending 100 degree set point under the second cycle</b> |
|                | Stop the current step test and enter report interface, all data of current test can be saved   |

3) Regular operation:

Press  to start the test, dry well will control to the first set point

◆ **How to review:**

To review saved data, press  on the right side.

◆ To delete saved data, press  to delete a single file or press  to delete multiple files




## 5.6 Switch Test

### How to setup:


Table 68 Switch Test Settings



| Subject           | Valid Value  | Comment  |
|-------------------|--|--|
| CH 1 & CH 2       | On: Dry contact, Wet contact, NPN switch, PNP switch | Enable or disable channel, and select DUT type   |
|                   | Off  |  |
| Temperature Range | Depends on dry well model                            | Set switch test starting and ending temperatures<br><b>Dry well will only capture the switch activity within this temperature range</b>          |
| Control Rate      | Max, 0~100 °C/min                                    | Temperature control speed<br><b>Dry well will only apply this control rate when actual temperature is within the temperature range set above</b> |
| Stroke            | One way / / Round trip $\Lambda$                     | Select switch test stroke method   |
| Repeat            | 1, 2, 3  | Set switch test cycle times  |

### How to use:

- 1) Press  on the bottom right corner to enter switch test interface
- 2) Current temperature value and switch status will be displayed on the screen
- ◆ Press  to switch display mode between chart and table
  1. Chart: Display switch test process under current cycle
  2. Table: List all data under each cycle
- 3) Press  to stop switch test

**How to review data:**

At switch set up interface, press  to enter switch test data table, all saved data will be displayed

◆ To delete saved data, press  to delete a single record or press  to delete multiple records


## 5.7 Snapshot

### How to setup:


Table 69 Snapshot Settings

| Subject  | Valid Value                          | Comment  |
|--|--------------------------------------|--|
| Snapshot   | On / Off                             | Enable or disable snapshot function  |
| Storage Path   | Local / USB                          | Select snapshot storage path   |
| Storage Amount<br>(only available when using local storage path) | Read only                            | Display the current quantity of snapshots can be stored in local storage   |
| File Prefix  | Alphanumeric content (16 max length) | Edit prefix of snapshot name   |
| File Name  | Time / No.                           | Select snapshot automatic naming method  |
| Start No.<br>(only available when choosing No. as file name)     | 1~1000                               | Select starting number for the next snapshot name<br><b>If selected number is occupied, dry well will use the closest available number following selected number</b> |

### How to use:


To execute a snapshot, press  on the top of screen


### How to review:


Press  to review saved snapshot, swipe the screen to view others

◆ Only the snapshots under selected saving path can be viewed. Please change the saving path to view more snapshot under different saving path.

1. Local path:


Current snapshot name will display after press 

◆ Press  on the right side to transfer all snapshots into a USB drive

◆ Press  on the right side to delete all local path snapshots

2. USB drive:

◆ Please check USB connection first

Current snapshot name will display after press 



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