Automating temperature sensor calibration with the 1586A Super-DAQ

Take your calibration lab productivity to the next level

Use the 1586A Super-DAQ to automate temperature sensor calibration

The 1586A Super-DAQ Precision Temperature Scanner provides a unique feature for automating sensor calibration that can greatly increase your lab productivity—without a PC and software. When the Super-DAQ is connected to a Fluke Calibration dry-well or fluid bath, it can control the temperature source to run the calibration automatically. You simply program the number of set-point temperatures and their values, select a scan sequence, assign a reference channel, and set the required stability band.

The Super-DAQ monitors the temperature source's stability through the reference channel, collects the data from the reference probe and the "unit under test" (UUT) once stabilized, and then advances to the next set-point temperature.

After you configure and start the test, you can walk away to work on other things. The Super-DAQ just made your day a whole lot easier!

One temperature source can be connected to the Super-DAQ at a time. The Super-DAQ can control all of the following Fluke Calibration models:

- Field Metrology Wells: 9142, 9143, 9144, 9190A
- Metrology Wells: 9170, 9171, 9172, 9173
- Handheld Calibrators: 9100S, 9102S
- Field Dry-Well Calibrators: 3125, 9009, 9103, 9140, 9141

- Thermocouple Furnace: 9150, 9118A
- Dual Block Dry-Well: 9011
- Micro Baths: 6102, 7102, 7103
- Compact Baths: 6330, 7320, 7340, 7380
- Deep-Well Compact Baths: 6331, 7321, 7341, 7381
- Triple Point of Water Maintenance Bath: 7312
- High Temperature Oil Baths: 6020, 6022, 6024
- High Temperature Salt Bath: 6050H
- Cold Temperature Baths: 7008, 7040, 7037, 7012, 7060, 7080
- Deep-Well Baths: 6054, 6055, 7007
- Resistor Baths: 7009, 7108, 7015

How to set up an automated sensor calibration

### Step 1: Connect the RS-232 cable

Connect a DE-9, null-modem, female-female RS-232 cable from the Super-DAQ rear panel to the RS-232 port of the temperature source. Ensure that the baud rate of the temperature source matches the Super-DAQ. The default is 9600. You can designate any channel as the reference probe including the front panel channel (Ch 001).

Note: The Super-DAQ does not record temperature data from the temperature source's controller or Process Electronics input. All measurement, stability monitoring, and data collection are done through the Super-DAQ.

Temperature source control output   Reference probe   UUT
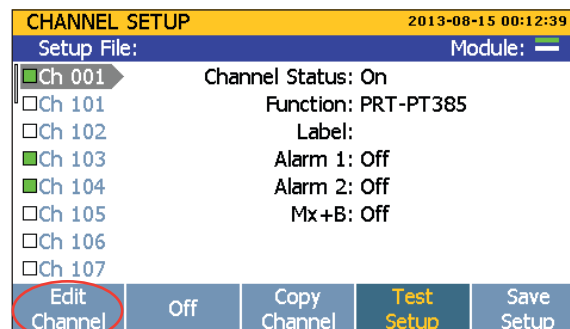
Example temperature control source
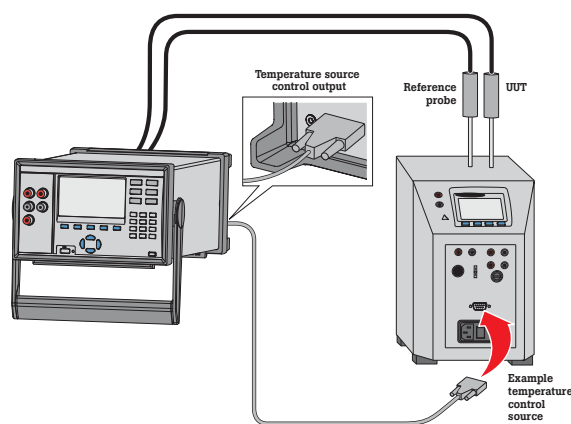
Step 2: Select the channels

Press the **Channel Setup** hard key, select a channel to be enabled and press ON (F2).
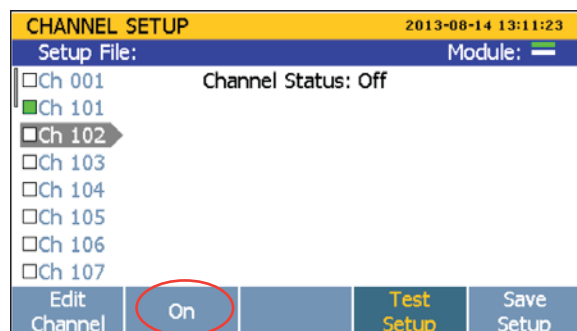
Press the **Edit Channel** soft key, set **Function** to Thermocouple, Thermistor, or PRT. Choose the appropriate parameters for the function selected. Configure additional channels. Press **Back** when finished.
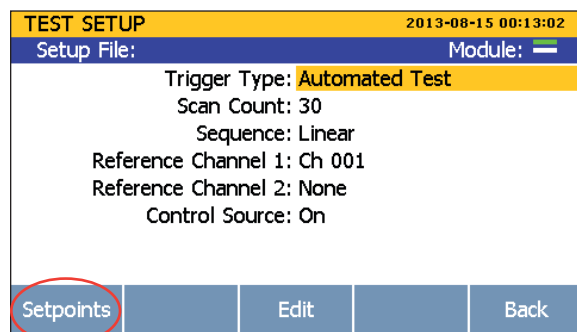

Step 3: Select test parameters

Press **Test Setup**. Change the **Trigger Type** to **Automated Test**, enter the **Scan Count**, set the **Sequence** to Linear, Alternate Reference, or Up/Down.

- **Linear Sequence** – Scans the first reference channel (Ref1), then all of the enabled channels in ascending channel order, followed by the optional second reference channel (Ref2). For example: Ref1 > Ch102 > Ch103 > Ch104 > Ref2.

- **Alternate Reference Sequence** – Scans the first reference channel (Ref1), then a single channel, followed by the optional second reference channel (Ref2). The sequence then repeats for the other enabled channels. For example: Ref1> Ch102 > Ref2 > Ref1 > Ch103 > Ref2 > Ref1 > Ch104 > Ref2.

- **Up/Down Sequence** – Scans the first reference channel (Ref1), then the enabled channels in ascending channel order, followed by the optional second reference channel (Ref2). The sequence is then immediately repeated in reverse, descending order. For example: Ref1 > Ch102 > Ch103 > Ch104 > Ref2 > Ref2 > Ch104 > Ch103 > Ch102 > Ref1.

Designate a **Reference Channel**, and turn **Control Source** On. The default is Off, so don't skip this step.
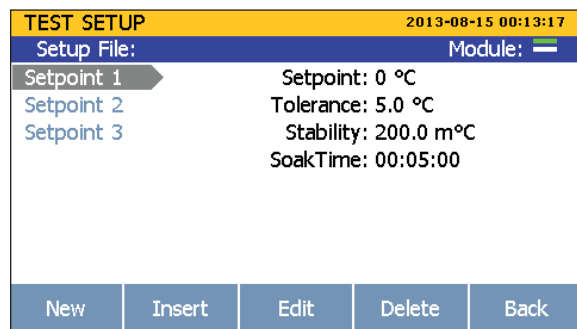
Note: If **Auto Recording** is On (Test Setup menu), data will be recorded automatically. If **Auto Recording** is Off, you can press the **Record** key once the scan has been started to manually capture data.

TEST SETUP	2013-08-15 00:13:02
Setup File:	Module: ▬

Trigger Type: Automated Test
Scan Count: 30
Sequence: Linear
Reference Channel 1: Ch 001
Reference Channel 2: None
Control Source: On

| Setpoints | | Edit | | Back |

Step 4: Choose setpoint temperatures

Press **Setpoints**. Select **Setpoint 1** and enter **Setpoint Temperature**, **Tolerance**, **Stability**, and **Soak Time**. Press **New** to add additional setpoints.

Note: The number and value of setpoint temperatures is dependent on your source.

TEST SETUP	2013-08-15 00:13:17
Setup File:	Module: ▬

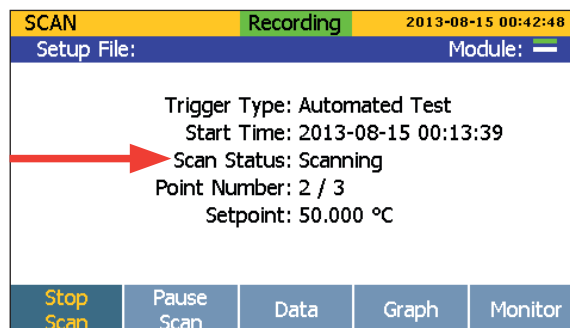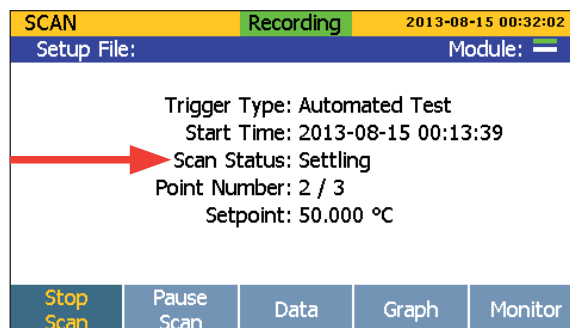| Setpoint 1 ▸ | Setpoint: 0 °C |
Setpoint 2	Tolerance: 5.0 °C
Setpoint 3	Stability: 200.0 m°C
	SoakTime: 00:05:00

| New | Insert | Edit | Delete | Back |

Step 5: Start the scan

Press the **Scan/Monitor** key and select **Start Scan**.

Step 6: Collect data

The **Automated Test** state will display a **Scan Status** of "Settling" while the temperature source is stabilizing. After the source has stabilized, the **Automated Test** state will then display a **Scan Status** of "Scanning" while the data is being collected. Data can be written to internal memory or a USB flash drive during a test. You can select Data, Graph, or Monitor view modes during data collection.

SCAN	Recording	2013-08-15 00:32:02
Setup File:		Module: ▬

Trigger Type: Automated Test
Start Time: 2013-08-15 00:13:39
→ Scan Status: Settling
Point Number: 2 / 3
Setpoint: 50.000 °C

| Stop Scan | Pause Scan | Data | Graph | Monitor |

SCAN	Recording	2013-08-15 00:42:48
Setup File:		Module: ▬

Trigger Type: Automated Test
Start Time: 2013-08-15 00:13:39
→ Scan Status: Scanning
Point Number: 2 / 3
Setpoint: 50.000 °C

| Stop Scan | Pause Scan | Data | Graph | Monitor |

Step 7: Analyze data

Once the data has been collected, it can be transferred to a PC as an Excel .CSV file for analysis.

Conclusion

The automated sensor calibration feature of the 1586A Super–DAQ can have a big impact on your calibration lab throughput and efficiency. It comes in real handy when you have lots of sensors to calibrate and limited time and staff to do it. No extra training on software packages is needed.

Once you set up a Super–DAQ automated test, you can move on to other work that needs to get done. The Super–DAQ controls the temperature source and gathers calibration data automatically—all within the parameters you've specified.

For more information on the 1586A Super–DAQ, please see the product page and videos on our website at **http://us.flukecal.com**

Fluke Calibration. *Precision, performance, confidence.*™

Electrical	RF	Temperature	Pressure	Flow	Software