1586A Super-DAQ
Precision Temperature Scanner

FLUKE ®
Calibration

The most accurate and flexible temperature data acquisition system on the market

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The 1586A Super-DAQ is the most accurate and flexible temperature data acquisition system on the market. It scans and records temperature, dc voltage, dc current, and resistance for up to 40 input channels and scan speeds as fast as 10 channels per second. The Super-DAQ can be configured for use as a multi-channel data logger in the factory or as a precision reference thermometer for benchtop sensor calibration in the lab.

The 1586A is ideal for applications such as thermal mapping, temperature validation, process sensor calibration, heat-treat furnace testing, process monitoring, quality control testing, and more. These applications are found in various industries including pharmaceutical, biotechnology, food processing, aerospace, and automotive.

There are six key features that set the Super-DAQ apart from other products in its class:

1 Best temperature measurement accuracy

2 Flexible configuration for the factory or benchtop

3 Multiple modes of operation

4 Real-time graphing in color

5 Data portability and security

6 Automated sensor calibration

1 Best temperature measurement accuracy

The 1586A Super–DAQ reads PRTs, thermocouples, and thermistors with best-in-class accuracy:

- PRTs ± 0.005 °C
  (using the external DAQ-STAQ Multiplexer)
- Thermocouples: ± 0.5 °C
  (using the High–Capacity Module and internal CJC)
- Thermistors: ± 0.002 °C
- Current reversal minimizes thermoelectric effects improving PRT/RTD measurement accuracy
- Automatic internal reference junction compensation improves thermocouple measurement accuracy

- Accurately measure scalable transducers such as temperature and pressure transmitters using Mx + B gain and offset calculations for each channel
- Temperature sensor characterizations include ITS–90, CVD, Polynomial, PT385, and PT392
- Probe library stores up to 100 sensor profiles simplifying setup
- 6–1/2 digit display resolution for dc voltage, dc current, and resistance

2 Flexible configuration for the factory or benchtop

For factory applications such as temperature validation, the Super–DAQ is configured with the internal High-Capacity Module. Connecting thermocouples or RTDs to input terminals can be time consuming—especially if you're using many sensors of the same type for one job, and then switching to a different sensor type for another job. The internal High-Capacity Module allows you to pre-configure multiple input modules and simply exchange one module for another depending on your test requirements. Recall a stored test setup to make the changeover even faster. And if you prefer, you can always measure a variety of different input types at the same time in a single High-Capacity Module, including thermocouples, RTDs, voltage, resistance, or current.

To simplify applications such as temperature uniformity testing, the Align Channels feature allows you to automatically "zero" offsets between sensors relative to a designated reference channel.

An Mx + B offset is stored for each channel and an indicator let's you know that an offset has been applied.

The Super–DAQ includes 20 math channels and 15 different mathematical operations that can be applied to measured results. Combining calculated results of multiple math channels lets you compute complex operations such as F_0 calculations.

For a calibration lab where accuracy is of primary importance, the Super–DAQ is best configured with a DAQ-STAQ Multiplexer. The external DAQ-STAQ features mini-jack thermocouple terminals—each with its own reference junction sensor—and patented mini-DWF, gold-plated input terminals, which accept bare wire, spade lug, or mini-banana-plug probe terminations. Easily connect and disconnect PRTs, thermistors, and thermocouples for benchtop temperature calibration. It can be stacked on the 1586A to reduce footprint in busy labs. Having the flexibility to configure the Super–DAQ for factory or lab use reduces your equipment needs and cost.

1586-2586 High-Capacity Module
Universal input channels accepts 2-, 3-, or 4-wire connections to measure temperature, resistance, dc voltage, and dc current for data acquisition applications on the factory floor where channel count and scan speed are important.

1586-2588 DAQ-STAQ Multiplexer
Designed for high-accuracy measurements in secondary temperature calibration labs. Easily connect/disconnect thermocouples, PRTs, and thermistors.

③ **Multiple modes of operation**

The Super-DAQ can operate in four modes that let you scan, monitor, measure, or function as a digital multimeter from a single instrument.

Sequentially scan through channels based on a user defined test. Depending on your application, select a fast, medium, or slow scan rate. With scan speeds as fast as 10 channels per second, you can collect data on all 40 channels in less than four seconds. Easily capture time-stamped measurements and correlate related events. Scans can be initiated through six different trigger types to include: external trigger, time interval, remote SCPI command, alarm trigger, manual trigger, and an automated test trigger.

Monitor any single channel during a scan, without interrupting the scan. Measure and record data on a single channel without pre-configuring a test file. In DMM mode, use the front panel channel like a familiar benchtop digital multimeter to quickly measure dc voltage, dc current, or 2-wire and 4-wire resistance.

Function keys are backlit so that you always know the mode of operation and recording status.

Scan, monitor, measure, and DMM function keys on the front panel.

④ **Real-time graphing in color**

Most data acquisition systems only let you view data on one channel. But now, the Super-DAQ lets you view real-time data for all channels in table format or chart up to four channels in color at the same time. You can quickly see the current process state at-a-glance, or easily verify that your channels have been connected and configured properly.

You can zoom in or out to see data of interest and monitor trends. A history mode lets you scroll through collected data within a scan file—all without a PC and expensive software. Switch between chart view and table view to see measurement data and statistics, including average,

standard deviation, minimum, maximum, peak-to-peak, and rate of change.

Not only does the Super-DAQ include a rich graphical display, but you can also select between nine different languages including English, Chinese, French, German, Japanese, Korean, Portuguese, Spanish, or Russian.

Each channel can be assigned two independent alarms which indicate when either an upper (HI) or lower (LO) range has been exceeded. If an alarm trips, the out-of-range condition is indicated on the display. Alarms can also be assigned to any of the six TTL outputs for control of external devices.
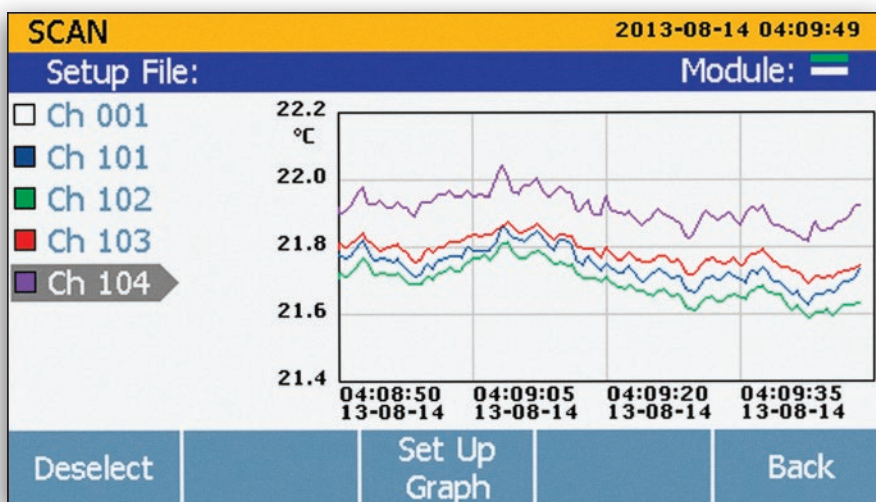
The 1586A Super-DAQ graphing real time data from four input channels.

5 Data portability and security

The Super–DAQ includes 20 MB of internal memory that can store over 75,000 time–stamped readings. Data and setup files can be easily moved to a PC for analysis using a USB flashdrive or over a network using the LAN interface connection.

The Super–DAQ also includes two levels of data security to prevent unauthorized users from tampering with or forging test data or setup files. This security feature is especially important to industries that are regulated by government agencies where data traceability is required.

Easily transfer Super–DAQ data and setup files using a USB flash drive.

6 Automated sensor calibration

With the Automated Test feature, you can automate sensor calibration without a PC and software. When connected to a Fluke Calibration drywell or fluid bath via the RS–232 interface, the Super–DAQ takes control of the temperature source and runs your calibration automatically. You simply program the number of setpoint temperatures and their values, select a scan sequence (linear, alternate, up/down), assign a reference channel, and set the required stability band.

The Super–DAQ monitors the temperature source's stability via the reference channel, collects the data once stabilized, and then advances to the next setpoint 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!
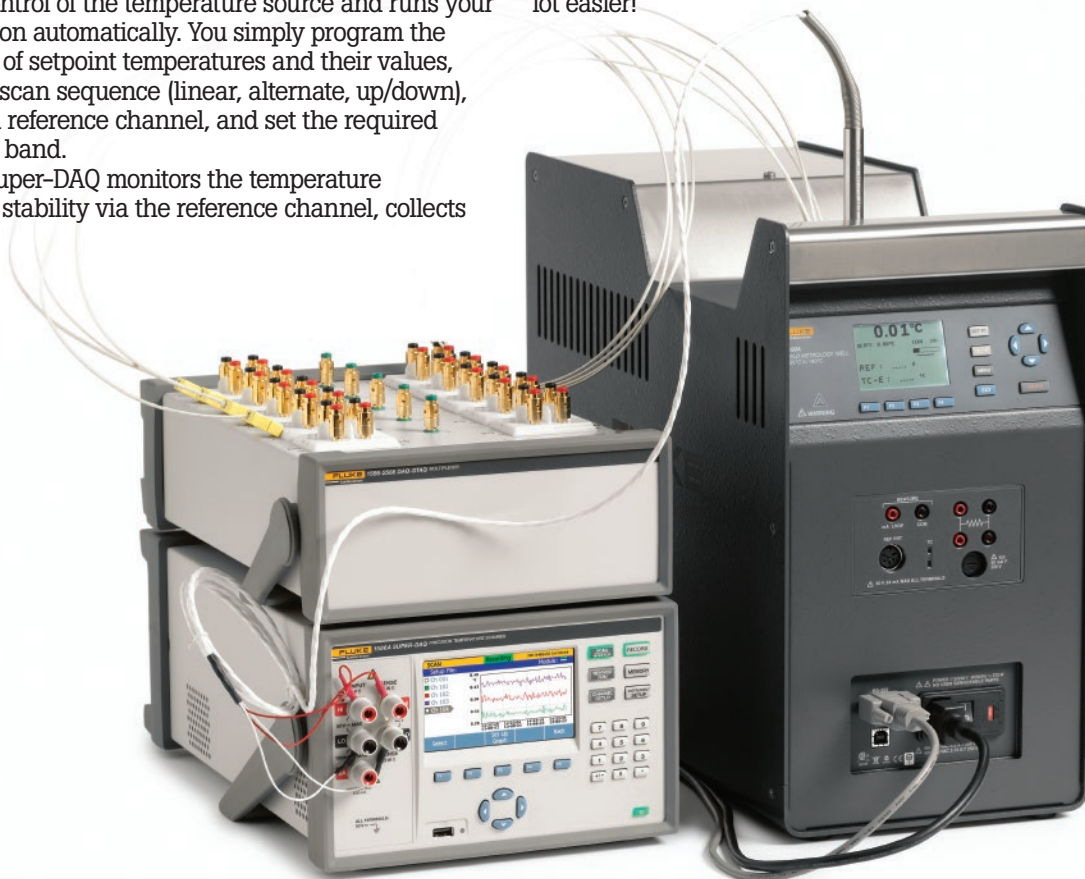
1586A configured with a DAQ–STAQ and 9190A Ultra–Cool Field Metrology Well for automated sensor calibration.

Temperature accuracy, 1586A with High-Capacity Module[1]

PRTs and Thermistors (4-wire)

	Temperature Range	Temperature Resolution	Temperature Accuracy	Resistance Accuracy	Excitation Current
PRT/RTD (100 Ω nominal)	−200 °C to 1200 °C (depending on the sensor)	0.001 °C	0.008 °C at −200 °C 0.008 °C at 0 °C 0.018 °C at 300 °C	0.003 % or 0.003 Ω (0 to 400 Ω)	1 mA with current reversal
Thermistor (10 KΩ nominal)	−200 °C to 400 °C (depending on the sensor)	0.0001 °C	0.002 °C at 0 °C 0.009 °C at 50 °C 0.024 °C at 100 °C	0.004 % + 0.5 Ω (600 Ω to 35 kΩ)	10 µA

Thermocouples

	Temperature Range	Temperature Resolution	Temperature Accuracy (int CJC)	Temperature Accuracy (ext CJC)	Voltage Accuracy
Thermocouple Type K	−270 °C to 1372 °C	0.01 °C	0.62 °C at 0 °C 0.64 °C at 1000 °C	0.15 °C at 0 °C 0.20 °C at 1000 °C	0.004 % + 4 µV ch. 1 0.004 % + 6 µV ch. x01–x20
Thermocouple Type T	−270 °C to 400 °C	0.01 °C	0.65 °C at 0 °C 0.47 °C at 200 °C	0.15 °C at 0 °C 0.12 °C at 200 °C	0.004 % + 4 µV ch. 1 0.004 % + 6 µV ch. x01–x20
Thermocouple Type S	−50 °C to 1768 °C	0.01 °C	0.76 °C at 300 °C 0.60 °C at 1200 °C	0.67 °C at 300 °C 0.54 °C at 1200 °C	0.004 % + 4 µV ch. 1 0.004 % + 6 µV ch. x01–x20

Temperature accuracy, 1586A with DAQ-STAQ Multiplexer[1]

PRTs and Thermistors (4-wire)

	Temperature Range	Temperature Resolution	Temperature Accuracy	Resistance Accuracy	Excitation Current
PRT/RTD (100 Ω nominal)	−200 °C to 1200 °C (depending on the sensor)	0.001 °C	0.005 °C at −200 °C 0.005 °C at 0 °C 0.012 °C at 300 °C	0.002 % or 0.008 Ω	1 mA with current reversal
Thermistor (10 KΩ nominal)	−200 °C to 400 °C (depending on the sensor)	0.0001 °C	0.002 °C at 0 °C 0.009 °C at 50 °C 0.024 °C at 100 °C	0.004 % + 0.5 Ω	10 µA

Thermocouples

	Temperature Range	Temperature Resolution	Temperature Accuracy (int CJC)	Temperature Accuracy (ext CJC)	Voltage Accuracy
Thermocouple Type K	−270 °C to 1372 °C	0.01 °C	0.29 °C at 0 °C 0.32 °C at 1000 °C	0.15 °C at 0 °C 0.20 °C at 1000 °C	0.004 % + 4 µV ch. 1 0.004 % + 6 µV ch. x01–x20
Thermocouple Type T	−270 °C to 400 °C	0.01 °C	0.30 °C at 0 °C 0.23 °C at 200 °C	0.15 °C at 0 °C 0.12 °C at 200 °C	0.004 % + 4 µV ch. 1 0.004 % + 6 µV ch. x01–x20
Thermocouple Type S	−50 °C to 1768 °C	0.01 °C	0.68 °C at 300 °C 0.55 °C at 1200 °C	0.67 °C at 300 °C 0.54 °C at 1200 °C	0.004 % + 4 µV ch. 1 0.004 % + 6 µV ch. x01–x20

[1] Accuracy specifications apply using medium sample rate (1 second per channel). Please consult the 1586A Super–DAQ Extended Specifications for additional specifications at slow (4 seconds per channel), fast (0.1 seconds per channel) sample rates and for other thermocouple types (R, J, N, E, B, C, D, G, L M, U, W).

DC Voltage (medium or slow sample rate)

Range	Accuracy Channel 1	Ch. X01 – x20 [2]	Fast Sample Rate	Resolution	Input Impedance
± 100 mV	0.0037 % + 0.0035 %	add 2 µV	add 0.0008 % of range	0.1 µV	10 GΩ [1]
± 50 V	0.0038 % + 0.0012 %	–	add 0.0008 % of range	1 mV	10 MΩ ± 1 %

[2] Ch. x01 – x20 refers to slot number and channels 1 – 20 for either module type.

DC Current (medium or slow sample rate)

Range	Accuracy	Fast Sample Rate	Resolution	Burden Voltage
± 100 µA	0.015 % + 0.0035 %	add 0.0008 % of range	0.1 nA	< 1 mV
± 10 mA	0.015 % + 0.0035 %	add 0.0008 % of range	10 nA	< 1 mV
± 100 mA	0.015 % + 0.0035 %	add 0.0008 % of range	100 nA	< 1 mV

Resistance (medium or slow sample rate, 4-wire resistance)[3]

Range	Accuracy	Fast Sample Rate	Resolution	Source Current
100 Ω	0.004 % + 0.0035 %	add 0.001 % of range	0.1 mΩ	1 mA
10 kΩ	0.004 % + 0.001 %	add 0.001 % of range	10 mΩ	100 µA
10 MΩ	0.015 % + 0.001 %	add 0.01 % of range	1 kΩ	0.1 µA

[3] For 2-wire resistance add 0.02 Ω internal resistance if using Channel 1, or 1.5 Ω if using channels x01 - x20, and add external lead wire resistance.

General specifications

Channel capacity	Total analog channels	45
	Voltage/resistance channels	41
	Current channels	5
	Digital I/O	1 (8-bit TTL)
	Totalizer	1
	Alarm outputs	6
	Trigger input	1
Sample rate	Fast: 10 channels per second (0.1 seconds per channel)	
	Medium: 1 channel per second (1 second per channel)	
	Slow: 4 seconds per channel	
Display resolution	6 1/2 digits	
Input Module options	2 rear panel slots ('x' designates slot 1 or slot 2 below). Can be configured for 2 High-Capacity Modules, 2 DAQ-STAQ Multiplexers, or one of each	
Internal High-Capacity Module configuration	20 channels per module (x01 - x20) 2 dedicated current channels (x21 - x22) (3- and 4-wire connections require 2 channels)	
External DAQ-STAQ Multiplexer configuration	10 PRT/thermistor channels (maximum) 20 mini-jack thermocouple channels (maximum)	
Math channels	20 channels	
	Operations: sum, difference, multiply, divide, polynomial, power, square root, reciprocal, exponential, logarithm, absolute value, average, maximum, minimum	
Triggers	Interval, external (trigger input), alarm, remote (bus), manual, automated test	
Memory	Scan data RAM	75,000 readings with timestamp
	Internal memory	20 MB
Standard interfaces	USB host, USB device, Ethernet 10/100 LAN, RS-232 temperature source control for automated temperature data collection from Fluke Calibration drywells and baths	
Mains voltage	100 V setting: 90, to 100 V; 120 V setting: 108, to 132 V; 220 V setting: 198, to 242 V; 240 V setting: 216, to 264 V	
Mains frequency	47 Hz to 440 Hz	
Input protection	50 V all functions, terminals and ranges	
Dimensions	Height x Width x Depth	150 mm x 245 mm x 385 mm (5.9 in x 9.6 in x 15.2 in)
	Weight	6 kg (13.2 lb) — typical configuration
	Shipping Weight	9.5 kg (20.9 lb) — typical configuration
Conformity	CE, CSA, IEC 61010 3rd edition	

Ordering information

Models	Description
Super-DAQ and High-Capacity Module	
1586A/1HC	Super-DAQ, 1 High-Capacity Module
1586A/1HC /C	Super-DAQ, 1 High-Capacity Module, Accredited Calibration
1586A/2HC	Super-DAQ, 2 High-Capacity Modules
1586A/2HC /C	Super-DAQ, 2 High-Capacity Modules, Accredited Calibration
Super-DAQ and DAQ-STAQ Multiplexer	
1586A/1DS	Super-DAQ, 1 DAQ-STAQ Multiplexer
1586A/1DS /C	Super-DAQ, 1 DAQ-STAQ Multiplexer, Accredited Calibration
1586A/2DS	Super-DAQ, 2 DAQ-STAQ Multiplexers
1586A/2DS /C	Super-DAQ, 2 DAQ-STAQ Multiplexers, Accredited Calibration
Super-DAQ, High-Capacity Module, and DAQ-STAQ Multiplexer	
1586A/DS-HC	Super-DAQ, 1 High-Capacity Module, 1 DAQ-STAQ Multiplexer
1586A/DSHC /C	Super-DAQ, 1 High-Capacity Module, 1 DAQ-STAQ Multiplexer, Accredited Calibration
Accessories	
1586-2586	High-Capacity Module without Relay Card
1586-2586-KIT	High-Capacity Module with Relay Card
1586-2588	DAQ-STAQ Multiplexer
1586-2588-KIT	DAQ-STAQ Multiplexer, Adapter Card, Interface Cable
1586-2588-CBL	DAQ-STAQ Multiplexer Interface Cable
Y1586S	Rack Mount Kit, Single (Half Rack)
Y1586D	Rack Mount Kit, Dual (Full Rack)
1586-CASE	Super-DAQ Carrying Case (Mainframe and Internal Modules)
1586/DS-CASE	Super-DAQ/DAQ-STAQ Multiplexer Carrying Case (Mainframe and External Module)

1586A/1HC

1586A/1DS

1586A/1DS-HC

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Electrical	RF	Temperature	Pressure	Flow	Software