

NIST Traceable Sensors

What is NIST?

In the USA, the National Institute of Standards and Technology (NIST) develops and maintains the standards of measurement to which all others are ultimately traced. Numerous calibrations, texts, and measurement assurance programs are delivered directly to about 10,000 companies. From these companies, NIST-traceable intermediate service providers are the next link in a network that joins together the makers and users of precision instruments. NIST-traceability is typically required by public agencies monitoring weather conditions, private industry with strict tolerances for acceptable environmental conditions, and companies providing goods or services to the government. For more information about NIST, check out their website at www.NIST.gov.

How does Davis Instruments relate to NIST?

Each of our weather stations is carefully manufactured in our California factory. For those users who require NIST-traceability, certification and recertification of new and previously-owned sensors is now available. See the price list for applicable fees. Each NIST-traceable sensor includes a certificate showing that the unit has been compared against a NIST-traceable reference standard, and that it is within its stated specifications. The certificate also shows the range of conditions under which the instrument was tested, the date the test was performed, and the expiration date of the certification (one year from the date of the test).

How is the NIST program different from what Davis was already doing?

We have always made an effort to make sure that our instruments meet our stated specifications. Our manufacturing and calibration procedures are under continual review by our engineering, technical support, repair, and manufacturing departments. Many of our procedures include calibration and checking against known standards of equal or higher accuracy, including NIST-traceable instruments. NIST-traceable simply provides an extra level of documentation certifying the accuracy of your weather stations.

What sensors are available for NIST certification, and what are the specifications?

Sensor	Checked & Verified Accuracy	Check Points
Inside Humidity	± 5% RH between 33% RH & 90% RH	33% RH, 80% RH, 90% RH
Outside Humidity	± 3% RH between 33% RH & 90% RH	33% RH, 80% RH, 90% RH
Inside Temperature	± 1°F (0.5°C) between 40°F (4°C) and 110°F (43°C) ± 2°F (1°C) between 110°F (43°C) and 140°F (60°C)	40°F (4°C), 60°F (15°C), 80°F (27°C), 100°F (38°C), 140°F (60°C)
Outside Temperature	± 1°F (0.5°C) between -50°F (-46°C) and 110°F (43°C) ± 2°F (1°C) between 110°F (43°C) and 140°F (60°C)	-50°F (-46°C), -15°F (-26°C), 0°F (-18°C), 40°F (4°C), 60°F (15°C), 80°F (27°C), 100°F (38°C), 140°F (60°C)
Barometric Pressure	± 0.05" Hg (1.7 hPa) between 20" Hg (677 hPa) and 30" Hg (1016 hPa)	20.00" Hg (677 hPa), 22.25" Hg (753 hPa), 25.00" Hg (847 hPa), 27.75" Hg (940 hPa), 30.00" Hg (1016 hPa)
Wind Speed	± 2 mph (0.9 m/s) below 40 mph (18.0 m/s), ± 5% above 40 mph (18.0 m/s)	6 mph (2.7 m/s), 12 mph (5.4 m/s), 25 mph (11.2 m/s), 40 mph (18.0 m/s), and 75 mph (33.8 m/s)
Rain	± 4% + 1 tip up to 2"/hr (50.8 mm/hr). Available for model measuring in 0.01" increments only. If metric measurement is desired, use UNITS button to convert to the nearest 0.2 mm.	1.00" total at 0.39"/hr (9.9 mm/hr)

Specifications are subject to change.

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What instruments are used as reference standards, and what are their specifications?

Sensor	Standard Used	Standard's Accuracy
Inside Humidity	General Eastern M4-RH Dewpoint Monitor	$\pm 0.1\%$ RH at 33% RH, $\pm 0.3\%$ between 80% RH and 90% RH
Outside Humidity	General Eastern M4-RH Dewpoint Monitor	$\pm 0.1\%$ RH at 33% RH, $\pm 0.3\%$ between 80% RH and 90% RH
Inside Temperature	Davis Stainless Steel Temperature Probe	$\pm 0.4^\circ\text{F}$ (0.2°C) between -50°F (-46°C) and 110°F (43°C) $\pm 1.0^\circ\text{F}$ (0.5°C) between 110°F (43°C) and 140°F (60°C)
Outside Temperature	Davis Stainless Steel Temperature Probe	$\pm 0.4^\circ\text{F}$ (0.2°C) between -50°F (-46°C) and 110°F (43°C) $\pm 1.0^\circ\text{F}$ (0.5°C) between 110°F (43°C) and 140°F (60°C)
Barometric Pressure	SenSym SMRT-EB BARO 01	$\pm 0.02''$ Hg
Wind Speed	MKS Baratron 223B Pressure Transducer (Electronic Pitot Tube)	± 2 mph
Rain	CAVRO XL 3000 Modular Digital Pump	$\pm .07$ ml = $\pm 0.0001''$ (0.003 mm) rain = 1/100 tip

What happens when calibration expires?

You will have two options:

1. The most economical option is to return your unit to us, shipping charges prepaid. Include a check or money order for the price of the certification plus return shipping and handling (see the price list for details), or give us your VISA or MasterCard number, along with its expiration date. We will recalibrate and recertify your unit, and return it to you along with a new certificate within ten working days. In some cases, we may substitute a different, factory-reconditioned NIST-traceable sensor for the one you originally sent in. Please be sure to let us know if this would not be acceptable to you.
2. If you need to perform continuous weather monitoring, we can send you a factory-reconditioned NIST-traceable sensor in advance. We will bill you for the price of the sensor plus NIST-certification and shipping and handling, along with \$10.00 advance shipping fee. After you receive it, return your original sensor to us, freight pre-paid. We will issue a refund check or a credit to your VISA or MasterCard within ten working days of receipt of your unit. The refund will be for the price of the sensor itself; shipping and handling fees and the advance shipping fee are not refundable.

Is NIST-traceability relevant outside the USA?

The instruments we use as reference standards have been calibrated by labs that are ISO/IEC 9000 and ISO/IEC Guide 25 certified. In the US, NIST serves as one of the governing bodies for traceability and organizational procedures, and it meets and cooperates with these international requirements. Thus, any instrument with NIST certification meets traceability requirements internationally, with the exception of our rain collectors. While there is no international standard for rain collectors, there are standards for volumetric measurements. Our rain calibrations verify that a specific volume of water results in a specific number of tips, which is the equivalent to a given amount of rain. Unfortunately, the lab that certifies our volumetric delivery device is not Guide 25 or ISO/IEC 9000 Series certified at this time.