

NOTICE

Cost Center: DIV20
Mail Stop: B51
Customer: DON BANNON
Manufacturer/Model: VAISALA / HMP77B
Description: HUMIDITY/TEMPERATURE PROBE
Serial Number: Z0750006
Asset Number: 010700
Supplier or Calibration Procedure: TEMPERATURE, HUMIDITY, DEW-POINT - 3 APR 08
Work Order: 303089335

The above instrument was received for service on July 29, 2009 and found not to meet calibration procedure specifications, or as specified by the cost center. As-found readings are provided in the attached measurement report, or as noted in remarks below, for your review to determine if the instrument is out of tolerance for project requirements and processing in accordance with your cost center quality policy.

Please call extension 5215 if you have any questions or need additional information.

Remarks: Failed humidity tests.

NOTICE

Explanation of Measurement Report Results

“When statements of compliance (Pass/Fail) are made, the uncertainty of measurement shall be taken into account”. Reference ISO/IEC 17025:2005, 5.10.4.2

This explanation is provided to you because the instrument submitted for calibration has one or more of the following results.

Result

Pass – measured value or test is within the \pm limit, in tolerance, with a confidence level of 95 percent.

—/— Pass? – measured value is *within* the \pm limit, but by a margin less than half of the uncertainty interval and has a confidence level of less than 95 percent of being in tolerance. Adjustment is made and the measurement is repeated. If adjustment or repair is not possible or fails to improve the results, then the customer must determine in or out of tolerance.

—/— Fail? – measured value is *outside* the \pm limit, but by a margin less than half of the uncertainty interval and is reported as out of tolerance but it is not possible to state this with a 95 percent confidence level. Adjustment is made and the measurement is repeated. If adjustment or repair is not possible or fails to improve the results, then the customer must determine if out of tolerance action is necessary.

— Fail – measured value is *outside* the \pm limits with a 95 percent confidence level. Adjustment is made and the measurement is repeated for As-left data. If adjustment or repair is not possible or fails to improve the results, then the customer must determine if the measured value is in compliance for the intended use.

%Limit

—/— Adjustment is made, if possible, when the As-found measured value is equal to or greater than 70 percent of the \pm limit. If adjustment is not possible or did not lower the As-left reading below 70 percent, the customer shall determine if the instrument is suitable for their requirements.

Type Data

Found-left All measurements were in tolerance and no adjustments or repairs were preformed.

As-found One or more measurements were other than Pass or exceeded 70 percent of the \pm limit and adjustment or repairs were performed.

As-left Results of measurements after adjustment or repair.

Uncertainty

Best estimate of the dispersion of the measured value that could be contributed by the; standard, environment, repeatability of the measurement process, characterizes of the instrument being calibrated (i.e. resolution) etc.

Please call extension 5215 for questions or additional information.

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303089335	Mfr.:	Vaisala	Technician:	Mark Romero
Asset No.:	010700	Model:	HMP77B	Type Data:	As-found
Serial No.:	Z0750006	Type:	Humidity/Temp Probe	Cal Date:	31-Jul-09

Remarks: Calibrated as a system with Vaisala MI70. Temperature limit increased to +/-1 °C per custodian.

Function/Range	Test Point	TI Reading	Difference	+/- Limit	+/- Uncertainty	Result	% Limit
Temperature	°C	°C	°C	°C	°C		
at 20% RH	25.03	25.00	-0.03	1	0.12	Pass	3%
40% RH	25.04	25.02	-0.02			Pass	2%
60% RH	25.09	25.01	-0.08			Pass	8%
80% RH	25.13	25.06	-0.07			Pass	7%
	°C	°C	°C				
at 20% RH	49.16	49.06	-0.10			Pass	10%
40% RH	49.21	49.12	-0.09			Pass	9%
60% RH	49.28	49.16	-0.12			Pass	12%
80% RH	49.34	49.23	-0.11			Pass	11%
	°C	°C	°C				
at 20% RH	68.11	67.48	-0.63			Pass	63%
40% RH	68.52	68.19	-0.33			Pass	33%
60% RH	68.79	68.49	-0.30			Pass	30%
80% RH	69.09	68.70	-0.39			Pass	39%
Humidity	% RH	% RH	% RH	% RH	% RH		
at 25 °C	20.00	22.12	2.12	2	0.68	Fail?	106%
	40.05	43.80	3.75			Fail	188%
	59.97	63.88	3.91			Fail	196%
	79.95	83.70	3.75			Fail	188%
at 50 °C	20.00	21.28	1.28			Pass	64%
	39.99	42.96	2.97			Fail	149%
	60.00	63.42	3.42			Fail	171%
	79.99	82.83	2.84			Fail	142%
at 70 °C	19.99	20.61	0.62			Pass	31%
	39.97	41.76	1.79			Pass?	90%
	60.05	62.06	2.01			Fail?	101%
	79.99	81.63	1.64			Pass	82%

END OF REPORT



SOUTHWEST RESEARCH INSTITUTE®

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Institute Calibration Laboratory
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Calibration Laboratory
Certificate #0972-01

Certificate of Calibration

Cost Center: DIV20

Mail Stop: B51

Customer: DON BANNON

Manufacturer/Model: VAISALA / HMP77B

Description: HUMIDITY/TEMPERATURE PROBE

Serial Number: Z0750006

Asset Number: 010700

Procedure: TEMPERATURE, HUMIDITY, DEW-POINT - 3 APR 08

Work Order: 303089335

Date Issued: 20-Aug-2009

Date Calibrated: 20-Aug-2009

*** Date Due :** 20-Aug-2010

**** Results:** AS-LEFT

Temperature: 75.0 °F

Humidity: 46 %RH

Barometer: N/A

This certificate documents traceability to the National Institute of Standards and Technology (NIST) and the International System of Units (SI). The Laboratory quality system conforms to ISO/IEC 17025, 2003, ANSI/NCCL Z540-1-1994 and relevant requirements of the ISO 9000-2000 standard. This certificate shall not be reproduced, except in full, without the written approval of the Southwest Research Institute Calibration Laboratory. This certificate shall not be used to claim product endorsement by Southwest Research Institute, American Association for Laboratory Accreditation (A2LA) or any agency of the U. S. Government. Results of this calibration relate only to the instrument described above at the time of calibration and does not imply any long term stability of the instrument.

*Determined by the customer, does not imply the instrument will remain within tolerance as any number of factors may cause an out-of-tolerance condition before this date. **Data type found in this certificate or attached measurement report must be interpreted as: Found-left - adjustment and/or repair was not performed, As-found - data is before unit is adjusted and/or repaired, As-left - data is after adjusted and/or repaired was performed. The customer has sole responsibility for determination of in-/out-of-tolerance or compliance/noncompliance.

Measurement uncertainty calculated in accordance with the method described in the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM), for a confidence level of approximately 95 percent using a coverage factor of $k=2$.


Remarks: Calibrated as a system with Vaisala MI70 SN Z0730015. Limits: ± 1 °C/ $\pm 5\%$ RH.

Standards Used

<u>Asset #</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Description</u>	<u>Cal Date</u>	<u>Due Date</u>
006404	THUNDER SCIENTIFIC	2500	HUMIDITY GENERATOR	27-May-2009	27-May-2010
009414	HART SCIENTIFIC	1502A	TEMPERATURE READOUT	12-Jun-2009	12-Dec-2009
015895	HART SCIENTIFIC	5618B	RTD	12-Jun-2009	12-Dec-2009


Walt Hill

Laboratory Manager


Mark Romero

Metrology Technician

Southwest Research Institute
Calibration Laboratory
Measurement Report

Work Order:	303089335	Mfr.:	Vaisala	Technician:	Mark Romero
Asset No.:	010700	Model:	HMP77B	Type Data:	As-left
Serial No.:	Z0750006	Type:	Humidity/Temp Probe	Cal Date:	20-Aug-09

Remarks: Calibrated as a system with Vaisala MI70. Continued perviously assigned temperature limit of ± 1 °C and a "one-time" limit of $\pm 5\%$ R.H. has been applied per custodian for immediate use.

Function/Range	Test Point	TI Reading	Difference	+/- Limit	+/- Uncertainty	Result	% Limit
Temperature	°C	°C	°C	°C	°C		
at 20% RH	25.06	25.05	-0.01	1	0.12	Pass	1%
40% RH	25.11	25.08	-0.03			Pass	3%
60% RH	25.14	25.14	0.00			Pass	0%
80% RH	25.16	25.13	-0.03			Pass	3%
	°C	°C	°C				
at 20% RH	48.20	48.23	0.03			Pass	3%
40% RH	48.85	48.84	-0.01			Pass	1%
60% RH	49.10	49.00	-0.10			Pass	10%
80% RH			0.00			Pass	0%
	°C	°C	°C				
at 20% RH	68.28	68.30	0.02			Pass	2%
40% RH	68.55	68.47	-0.08			Pass	8%
60% RH	68.82	68.80	-0.02			Pass	2%
80% RH	69.08	69.11	0.03			Pass	3%
Humidity	% RH	% RH	% RH	% RH	% RH		
at 25 °C	20.01	19.91	-0.10	5	0.68	Pass	2%
	40.05	40.02	-0.03			Pass	1%
	60.00	60.07	0.07			Pass	1%
	80.00	76.59	-3.41			Pass	68%
at 50 °C	19.98	20.10	0.12			Pass	2%
	39.99	39.98	-0.01			Pass	0%
	60.00	58.90	-1.10			Pass	22%
	80.00	76.58	-3.42			Pass	68%
at 70 °C	20.01	19.70	-0.31			Pass	6%
	39.98	39.78	-0.20			Pass	4%
	60.00	58.55	-1.45			Pass	29%
	80.00	75.70	-4.30			Pass	86%

END OF REPORT