

# VAISALA

MEASUREMENT STANDARDS LABORATORY  
ACCREDITED CALIBRATION LABORATORY



**FINAS**  
Finnish Accreditation Service  
K008 (EN ISO/IEC 17025)

## CERTIFICATE OF CALIBRATION no K008-Y02500

**Customer** Alfred-Wegener-Institut  
c/o regionalflughafen Bremerhaven Hangar  
5-Manuel Sellmann Am Luneort 15  
Bremerhaven 27572  
Germany

**Item** Humidity and Temperature Transmitter  
Temperature calibrated at + 23 °C  
Humidity calibrated from 10 to 90,2 %rh at + 23 °C

**Manufacturer** Vaisala Oyj

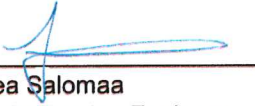
**Model** HMT333

**Serial number** A4650017

**Instrument number** - -

**Calibration performed** On October 6 and 7, 2015

**Date** October 8, 2015

**Signature**   
Andreea Salomaa  
Senior Calibration Engineer

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**Documents attached**

**NOTES** No adjustments were made.

**Conditions when received** Reported in Service Report.

This Certificate may only be reproduced in full, except with the prior written permission by the issuing Laboratory. The measurements carried out and the Certificates of Calibration issued by an Accredited Calibration Laboratory comply with the measurement ranges and uncertainties approved by FINAS Finnish Accreditation Service. The measurement results issued by the Laboratory are traceable to national or international measurement standards. Measurement Standards Laboratory of Vaisala Oyj is a calibration laboratory K008 accredited by FINAS Finnish Accreditation Service, accreditation requirement ISO/IEC 17025. The accreditation is included in the Multilateral Agreement (EA MLA) of the European co-operation for Accreditation (EA).

## CONFIGURATION

The transmitter's configuration, settings and coefficients were read from the transmitter's memory. Before measurements the transmitter was allowed to stabilize to the conditions of the laboratory for at least 1 hour with + 24,0 VDC  $\pm$  0,3 VDC power supply switched on.

The calibration is valid only with configuration and settings:

Software	HMT330 / 4.06	Pressure	1013,25 hPa
Filter	OFF	Ta	OFF

## REFERENCES USED DURING TEMPERATURE CALIBRATION

Hart 1560 Thermometer, serial number B05045, traceable to National Institute of Standards and Technology (NIST, USA) via MSL.

## REFERENCES USED DURING HUMIDITY CALIBRATION

Hart 1560 Thermometer, serial number B05045, traceable to National Institute of Standards and Technology (NIST, USA) via MSL.

Thunder 2500 Humidity Generator, serial number 9711111, traceable to National Institute of Standards and Technology (NIST, USA) via MSL.

Vaisala PTB220 Pressure Transmitter, serial number Z0510016, traceable to the National Institute of Standards and Technology (NIST, USA) via MSL and Centre for Metrology and Accreditation (MIKES, Finland).

## UNCERTAINTY

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2$ , which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with EA Publication EA-4/02.

The measurement uncertainty represents the situation at the time and conditions of calibration. When using the UUC at different conditions and at different time the effect of the conditions and stability of the UUC shall be evaluated separately.

The measurement results and uncertainty are representing the measurement points only.

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**TEMPERATURE CALIBRATION**

The temperature calibration was done in the Measurement Standards Laboratory (MSL) of Vaisala Oyj on October 6 and 7, 2015.

The temperature readings of the transmitter were compared to the values of the reference thermometer at + 23 °C in a climate chamber.

Temperature values were read via serial port with resolution of 0,01 °C.

Temperature values are given according to the International Temperature Scale of 1990, ITS-90.

**Measurement results**

The reference and the reading values are averages of ten independent observations.

Table 1. Final results, temperature, T

Reference [ °C ]	Reading T [ °C ]	Correction [ °C ]	Uncertainty [ °C ]
+ 23,07	+ 23,06	+ 0,01	± 0,07
+ 23,06	+ 23,05	+ 0,01	± 0,07
+ 23,08	+ 23,07	+ 0,01	± 0,07
+ 23,09	+ 23,08	+ 0,01	± 0,07
+ 23,11	+ 23,10	+ 0,01	± 0,07
+ 23,11	+ 23,09	+ 0,02	± 0,07

The correction shall be added algebraically to the reading.

Conditions                      Temperature                      + 22,1 °C ± 0,6 °C  
    Humidity                              30 %rh ± 3 %rh

## HUMIDITY CALIBRATION

The humidity calibration was done in the Measurement Standards Laboratory (MSL) of Vaisala Oyj on October 6 and 7, 2015. Before measurements the transmitter was allowed to stabilize to the conditions of the laboratory for at least 2 hours.

The humidity readings of the transmitter were compared to the reference humidity values at climate chamber in the range from 10 to 90,2 %rh. The humidity readings were read via serial port with resolution of 0,01 %rh.

### Measurement results

The probe was allowed to stabilize to each humidity for at least 90 minutes before the readings were read. The reference and the reading values are averages of ten independent observations.

Table 2. Final results, humidity

Temperature [ °C ]	Reference [ %rh ]	Reading RH [ %rh ]	Correction [ %rh ]	Uncertainty [ %rh ]
+ 23,1	10,0	9,9	+ 0,1	± 0,4
+ 23,1	30,1	30,4	- 0,3	± 0,6
+ 23,1	50,0	50,4	- 0,4	± 0,7
+ 23,1	70,0	110,0	- 40,0	± 0,8
+ 23,1	80,0	100,3	- 20,3	± 0,9
+ 23,1	90,2	100,3	- 10,1	± 0,9

The correction shall be added algebraically to the reading.

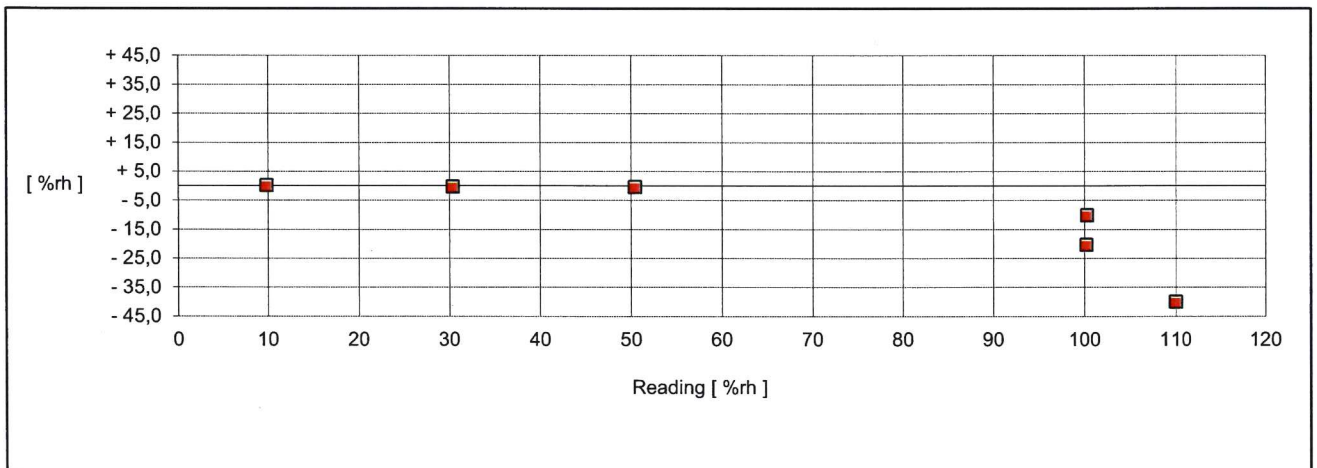


Figure 1. Final results

Conditions	Pressure	1027,3 hPa ± 2,1 hPa
	Temperature	+ 22,1 °C ± 0,7 °C
	Humidity	30 %rh ± 3 %rh