VAISALA

Calibration Certificate

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Calibration - Certificate No: 2083.01

Certificate Number: B08-1067490

Customer: K & S Technical Services
115 Barnacle Court
Middletown, DE 19709

Manufacturer: Vaisala Oyj

Instrument: VL-1416-44V Temperature Logger

Serial Number: 11021175

Asset Number: T1-T4

The external temperature sensor(s) of the above described temperature logger were calibrated by comparing the logger readings to a reference thermometer in Vaisala Boston Calibration and Repair Services (CRS).
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 calibration results relate only to the calibrated instrument and the calibration points. The measurement results are traceable to the international system of units (SI) through national metrology institutes (NIST USA, MIKES Finland, or equivalent) or accredited calibration laboratories. Pass: Error less than Limit minus Uncertainty; Pass*: Error less than or equal to Limit; Fail: Error more than Limit.

Measurement results before adjustment:

Reference	Channel 1					Channel 2				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.02	-0.01	0.09	±0.35	Pass	-89.98	0.03	0.09	±0.35	Pass
-55.01	-55.02	-0.01	0.06	±0.35	Pass	-55.01	0.00	0.06	±0.35	Pass
-20.02	-20.03	-0.01	0.05	±0.35	Pass	-20.04	-0.02	0.05	±0.35	Pass
14.98	14.98	0.00	0.05	±0.35	Pass	14.96	-0.02	0.05	±0.35	Pass
49.98	49.96	-0.02	0.07	±0.35	Pass	49.96	-0.02	0.07	±0.35	Pass

Reference	Channel 3					Channel 4				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.02	-0.01	0.09	±0.35	Pass	-90.00	0.01	0.09	±0.35	Pass
-55.01	-55.02	-0.01	0.06	±0.35	Pass	-55.01	0.00	0.06	±0.35	Pass
-20.02	-20.04	-0.02	0.05	±0.35	Pass	-20.03	-0.01	0.05	±0.35	Pass
14.98	14.96	-0.02	0.05	±0.35	Pass	14.98	0.00	0.05	±0.35	Pass
49.98	49.96	-0.02	0.07	±0.35	Pass	49.97	-0.01	0.07	±0.35	Pass

Measurement results after adjustment:

Reference	Channel 1					Channel 2				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.01	0.00	0.09	±0.25	Pass	-90.01	0.00	0.09	±0.25	Pass
-55.01	-55.01	0.00	0.06	±0.25	Pass	-55.01	0.00	0.06	±0.25	Pass
-20.02	-20.02	0.00	0.05	±0.25	Pass	-20.02	0.00	0.05	±0.25	Pass
14.98	14.98	0.00	0.05	±0.25	Pass	14.98	0.00	0.05	±0.25	Pass
49.98	49.98	0.00	0.07	±0.25	Pass	49.98	0.00	0.07	±0.25	Pass

Reference	Channel 3					Channel 4				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.01	0.00	0.09	±0.25	Pass	-90.01	0.00	0.09	±0.25	Pass
-55.01	-55.01	0.00	0.06	±0.25	Pass	-55.01	0.00	0.06	±0.25	Pass
-20.02	-20.02	0.00	0.05	±0.25	Pass	-20.02	0.00	0.05	±0.25	Pass
14.98	14.98	0.00	0.05	±0.25	Pass	14.98	0.00	0.05	±0.25	Pass
49.98	49.98	0.00	0.07	±0.25	Pass	49.98	0.00	0.07	±0.25	Pass

Reference(s):	Instrument Number	Calibration Date	Certificate	Next Calibration
Fluke 2560/12005	3013-0083-1	2022-03-04	220304-3013-0083-1	2022-09-30

Note(s):
Service report as an attachment

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This instrument was calibrated in compliance with ISO/IEC 17025:2017.

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VAISALA

Calibration Certificate

Certificate Number: B08-1067490

Calibration Date: April 04, 2022

Issue Date: April 07, 2022

Signature:

Amanda Sanchez
Calibration Technician

Next Calibration: April 04, 2023

Ambient Condition(s):
22.1 °C ±1.4 °C
30.7 %RH ±3.8 %RH
1007.0 hPa ±1.6 hPa

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VAISALA

Calibration Certificate

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Calibration - Certificate No: 2083.01

Certificate Number: B08-1067703

Customer: K & S Technical Services
115 Barnacle Court
Middletown, DE 19709

Manufacturer: Vaisala Oyj

Instrument: VL-1416-44V Temperature Logger

Serial Number: 11041259

Asset Number: T9-T12

The external temperature sensor(s) of the above described temperature logger were calibrated by comparing the logger readings to a reference thermometer in Vaisala Boston Calibration and Repair Services (CRS).
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 calibration results relate only to the calibrated instrument and the calibration points. The measurement results are traceable to the international system of units (SI) through national metrology institutes (NIST USA, MIKES Finland, or equivalent) or accredited calibration laboratories. Pass: Error less than Limit minus Uncertainty; Pass*: Error less than or equal to Limit; Fail: Error more than Limit.

Measurement results before adjustment:

Reference	Channel 1					Channel 2				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.00	0.01	0.09	±0.35	Pass	-90.04	-0.03	0.09	±0.35	Pass
-55.02	-55.03	-0.01	0.06	±0.35	Pass	-55.05	-0.03	0.06	±0.35	Pass
-20.02	-20.03	-0.01	0.05	±0.35	Pass	-20.04	-0.02	0.05	±0.35	Pass
14.98	14.97	-0.01	0.05	±0.35	Pass	14.96	-0.02	0.05	±0.35	Pass
49.98	49.96	-0.02	0.07	±0.35	Pass	49.96	-0.02	0.07	±0.35	Pass

Reference	Channel 3					Channel 4				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-88.10	1.91	0.09	±0.35	Fail	-90.00	0.01	0.09	±0.35	Pass
-55.02	-54.07	0.95	0.06	±0.35	Fail	-55.02	0.00	0.06	±0.35	Pass
-20.02	-19.63	0.39	0.05	±0.35	Pass*	-20.03	-0.01	0.05	±0.35	Pass
14.98	15.04	0.06	0.05	±0.35	Pass	14.98	0.00	0.05	±0.35	Pass
49.98	49.81	-0.17	0.07	±0.35	Pass	49.97	-0.01	0.07	±0.35	Pass

Measurement results after adjustment:

Reference	Channel 1					Channel 2				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.01	0.00	0.09	±0.25	Pass	-90.01	0.00	0.09	±0.25	Pass
-55.02	-55.02	0.00	0.06	±0.25	Pass	-55.02	0.00	0.06	±0.25	Pass
-20.02	-20.02	0.00	0.05	±0.25	Pass	-20.02	0.00	0.05	±0.25	Pass
14.98	14.98	0.00	0.05	±0.25	Pass	14.98	0.00	0.05	±0.25	Pass
49.98	49.98	0.00	0.07	±0.25	Pass	49.98	0.00	0.07	±0.25	Pass

Reference	Channel 3					Channel 4				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.01	0.00	0.09	±0.25	Pass	-90.01	0.00	0.09	±0.25	Pass
-55.02	-55.02	0.00	0.06	±0.25	Pass	-55.02	0.00	0.06	±0.25	Pass
-20.02	-20.02	0.00	0.05	±0.25	Pass	-20.02	0.00	0.05	±0.25	Pass
14.98	14.99	0.01	0.05	±0.25	Pass	14.98	0.00	0.05	±0.25	Pass
49.98	49.98	0.00	0.07	±0.25	Pass	49.98	0.00	0.07	±0.25	Pass

Reference(s):	Instrument Number	Calibration Date	Certificate	Next Calibration
Fluke 2560/12005	3013-0083-1	2022-03-04	220304-3013-0083-1	2022-09-30

Note(s):
Service report as an attachment

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VAISALA

Calibration Certificate

Certificate Number: B08-1067703

Calibration Date: April 05, 2022

Issue Date: April 07, 2022

Signature:

Amanda Sanchez
Calibration Technician

Next Calibration: April 05, 2023

Ambient Condition(s):
22.1 °C ±1.4 °C
31.5 %RH ±4.2 %RH
1012.1 hPa ±1.9 hPa

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Calibration Certificate

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Calibration - Certificate No: 2083.01

Certificate Number: B08-1067491

Customer: K & S Technical Services
115 Barnacle Court
Middletown, DE 19709

Manufacturer: Vaisala Oyj

Instrument: VL-1416-44V Temperature Logger

Serial Number: 11041261

Asset Number: T13-T16

The external temperature sensor(s) of the above described temperature logger were calibrated by comparing the logger readings to a reference thermometer in Vaisala Boston Calibration and Repair Services (CRS).
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 calibration results relate only to the calibrated instrument and the calibration points. The measurement results are traceable to the international system of units (SI) through national metrology institutes (NIST USA, MIKES Finland, or equivalent) or accredited calibration laboratories. Pass: Error less than Limit minus Uncertainty; Pass*: Error less than or equal to Limit; Fail: Error more than Limit.

Measurement results before adjustment:

Reference	Channel 1					Channel 2				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.02	-0.01	0.09	±0.35	Pass	-90.03	-0.02	0.09	±0.35	Pass
-55.02	-55.03	-0.01	0.06	±0.35	Pass	-55.04	-0.02	0.06	±0.35	Pass
-20.02	-20.03	-0.01	0.05	±0.35	Pass	-20.04	-0.02	0.05	±0.35	Pass
14.98	14.98	0.00	0.05	±0.35	Pass	14.97	-0.01	0.05	±0.35	Pass
49.98	49.98	0.00	0.07	±0.35	Pass	49.97	-0.01	0.07	±0.35	Pass

Reference	Channel 3					Channel 4				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.00	0.01	0.09	±0.35	Pass	-90.03	-0.02	0.09	±0.35	Pass
-55.02	-55.02	0.00	0.06	±0.35	Pass	-55.03	-0.01	0.06	±0.35	Pass
-20.02	-20.02	0.00	0.05	±0.35	Pass	-20.03	-0.01	0.05	±0.35	Pass
14.98	14.97	-0.01	0.05	±0.35	Pass	14.97	-0.01	0.05	±0.35	Pass
49.98	49.97	-0.01	0.07	±0.35	Pass	49.97	-0.01	0.07	±0.35	Pass

Measurement results after adjustment:

Reference	Channel 1					Channel 2				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.01	0.00	0.09	±0.25	Pass	-90.01	0.00	0.09	±0.25	Pass
-55.02	-55.02	0.00	0.06	±0.25	Pass	-55.02	0.00	0.06	±0.25	Pass
-20.02	-20.02	0.00	0.05	±0.25	Pass	-20.02	0.00	0.05	±0.25	Pass
14.98	14.98	0.00	0.05	±0.25	Pass	14.98	0.00	0.05	±0.25	Pass
49.98	49.98	0.00	0.07	±0.25	Pass	49.98	0.00	0.07	±0.25	Pass

Reference	Channel 3					Channel 4				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.01	0.00	0.09	±0.25	Pass	-90.01	0.00	0.09	±0.25	Pass
-55.02	-55.02	0.00	0.06	±0.25	Pass	-55.02	0.00	0.06	±0.25	Pass
-20.02	-20.02	0.00	0.05	±0.25	Pass	-20.02	0.00	0.05	±0.25	Pass
14.98	14.98	0.00	0.05	±0.25	Pass	14.98	0.00	0.05	±0.25	Pass
49.98	49.98	0.00	0.07	±0.25	Pass	49.98	0.00	0.07	±0.25	Pass

Reference(s):	Instrument Number	Calibration Date	Certificate	Next Calibration
Fluke 2560/12005	3013-0083-1	2022-03-04	220304-3013-0083-1	2022-09-30

Note(s):
Service report as an attachment

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VAISALA

Calibration Certificate

Certificate Number: B08-1067491

Calibration Date: April 05, 2022

Next Calibration: April 05, 2023

Issue Date: April 07, 2022

Ambient Condition(s):
22.1 °C ±1.4 °C
31.5 %RH ±4.2 %RH
1012.1 hPa ±1.9 hPa

Signature:

Amanda Sanchez
Calibration Technician

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VAISALA

Calibration Certificate

Calibration - Certificate No: 2083.01

Certificate Number: B08-1067489

Customer: K & S Technical Services
115 Barnacle Court
Middletown, DE 19709

Manufacturer: Vaisala Oyj

Instrument: VL-1416-44V Temperature Logger

Serial Number: 19041097

Asset Number: T5-T8

The external temperature sensor(s) of the above described temperature logger were calibrated by comparing the logger readings to a reference thermometer in Vaisala Boston Calibration and Repair Services (CRS).
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 calibration results relate only to the calibrated instrument and the calibration points. The measurement results are traceable to the international system of units (SI) through national metrology institutes (NIST USA, MIKES Finland, or equivalent) or accredited calibration laboratories. Pass: Error less than Limit minus Uncertainty; Pass*: Error less than or equal to Limit; Fail: Error more than Limit.

Measurement results before adjustment:

Reference	Channel 1					Channel 2				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.02	-0.01	0.09	±0.35	Pass	-90.00	0.01	0.09	±0.35	Pass
-55.01	-55.03	-0.02	0.06	±0.35	Pass	-55.02	-0.01	0.06	±0.35	Pass
-20.02	-20.04	-0.02	0.05	±0.35	Pass	-20.03	-0.01	0.05	±0.35	Pass
14.98	14.96	-0.02	0.05	±0.35	Pass	14.97	-0.01	0.05	±0.35	Pass
49.98	49.96	-0.02	0.07	±0.35	Pass	49.97	-0.01	0.07	±0.35	Pass

Reference	Channel 3					Channel 4				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.03	-0.02	0.09	±0.35	Pass	-90.00	0.01	0.09	±0.35	Pass
-55.01	-55.03	-0.02	0.06	±0.35	Pass	-55.01	0.00	0.06	±0.35	Pass
-20.02	-20.03	-0.01	0.05	±0.35	Pass	-20.03	-0.01	0.05	±0.35	Pass
14.98	14.97	-0.01	0.05	±0.35	Pass	14.97	-0.01	0.05	±0.35	Pass
49.98	49.96	-0.02	0.07	±0.35	Pass	49.97	-0.01	0.07	±0.35	Pass

Measurement results after adjustment:

Reference	Channel 1					Channel 2				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.01	0.00	0.09	±0.25	Pass	-90.01	0.00	0.09	±0.25	Pass
-55.01	-55.01	0.00	0.06	±0.25	Pass	-55.01	0.00	0.06	±0.25	Pass
-20.02	-20.02	0.00	0.05	±0.25	Pass	-20.02	0.00	0.05	±0.25	Pass
14.98	14.98	0.00	0.05	±0.25	Pass	14.98	0.00	0.05	±0.25	Pass
49.98	49.98	0.00	0.07	±0.25	Pass	49.98	0.00	0.07	±0.25	Pass

Reference	Channel 3					Channel 4				
Temperature	Observed	Error	Uncertainty	Limit	Pass/Fail	Observed	Error	Uncertainty	Limit	Pass/Fail
°C	°C	°C	°C	°C		°C	°C	°C	°C	
-90.01	-90.01	0.00	0.09	±0.25	Pass	-90.01	0.00	0.09	±0.25	Pass
-55.01	-55.01	0.00	0.06	±0.25	Pass	-55.01	0.00	0.06	±0.25	Pass
-20.02	-20.02	0.00	0.05	±0.25	Pass	-20.02	0.00	0.05	±0.25	Pass
14.98	14.98	0.00	0.05	±0.25	Pass	14.98	0.00	0.05	±0.25	Pass
49.98	49.98	0.00	0.07	±0.25	Pass	49.98	0.00	0.07	±0.25	Pass

Reference(s):	Instrument Number	Calibration Date	Certificate	Next Calibration
Fluke 2560/12005	3013-0083-1	2022-03-04	220304-3013-0083-1	2022-09-30

Note(s):
Service report as an attachment

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VAISALA

Calibration Certificate

Certificate Number: B08-1067489

Calibration Date: April 04, 2022

Next Calibration: April 04, 2023

Issue Date: April 07, 2022

Ambient Condition(s):
22.1 °C ±1.4 °C
30.7 %RH ±3.8 %RH
1007.0 hPa ±1.6 hPa

Signature:

Amanda Sanchez
Calibration Technician

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