

TEST REPORT

| | | |
|--------------------|----------------------|------------|
| 9Calibration Check | Customer Order-No.: | FS Heincke |
| | MacArtney Order-No.: | DE211118 |
| Valeport Midas SVP | Serial-No.: | 31665 |

| | | | |
|--|--|--|--|
| Sound velocity test | Ultra SV ($\pm 0,01$ m/s) | Probe ($\pm 0,03$ m/s) | Error value Unesco Formel $\pm 0,25$ m/s |
| Sound velocity test approx. 1412 m/S, 1466 m/S clear water | 1412,456 m/s 1466,389 m/s | 1412,408 m/s 1466,264 m/s | -0,048 m/s -0,125 m/s |
| | | | |
| Pressure test | Budenberg Deadweight tester | Probe ($\pm 0,01$ % of range) | Error value $\pm 0,3$ dBar |
| Pressure test with approx. 600, 1800, 3000 dbar | 598,633 dBar 1187,436 dBar 2953,512 dBar | 598,913 dBar 1187,686 dBar 2953,686 dBar | 0,280 dBar 0,250 dBar 0,174 dBar |
| | | | |
| Temperatur test | Rosemount CE162 | Probe ($\pm 0,01$ °C) | Error value ($\pm 0,01$ °C) |
| Temperatur test approx. 2°C, 15 °C | 2,0334 °C 15,0716 °C | 2,031 °C 15,074 °C | -0,0024 °C +0,0024 °C |
| | | | |
| Online reading | | | i.O. |
| Offline modus | | | i.O. |
| Battery status | | | i.O. |
| Cable | | | i.O. |


Date of Test: 09.12.2021Tested by: Klaus SchollmeyerSignature: 

Kalibrierzertifikat Nummer:
Calibration Certificate Number:

2021-031

Dieses Dokument bestätigt, dass das unten angeführte Gerät nach Hersteller Standard-Prozeduren mit Messgeräten, die nach DAkkS oder nationalen Standards kalibriert sind, kalibriert wurde.

This document certifies that the instrument detailed below has been calibrated according to Manufacturer Standard Procedures, using equipment with calibrations traceable to DAkkS (Germany) or National Standards.

| | |
|--|--|
| Gerät: <i>Instrument Type:</i> | Valeport Midas SVP |
| Seriennummer: <i>Serial Number:</i> | 31665 |
| Bearbeitet von: <i>Calibrated by:</i> | Klaus Schollmeyer |
| Datum: <i>Date:</i> | 09.12.2021 |
| Unterschrift: <i>Signed:</i> |  |

Qualitätsprüfzertifikat / Quality Test Certificate
nach / according to DIN 55350 Part 18 – 4.2.1

Ausführliche Informationen zu den Ergebnissen der Kalibrierprozeduren der einzelnen installierten Sensoren sind in separaten Dokumenten verfügbar. Die Kalibrierzusammenfassung soll dem Gerät beigelegt sein.

Full details of the results from the calibration procedure applied to each fitted sensor are available in separate documents. This summary certificate should be kept with the instrument.

| PCB | |
|------------|-----------|
| Serial no. | 45341 |
| Part no. | 0400507F |
| Firmware | 040071160 |
| Module | 21 |

| Pressure sensor | |
|-----------------|-----------------|
| Type | Keller-PAA 10LX |
| Serial no. | 42657 |
| Tx Range | 3000 dBarAbs |
| Set Tx Range | 3000 dBarAbs |

| Calibration Equipment used | | |
|----------------------------|-------------|-----------|
| Instrument | Type | Serial No |
| DWT | Budenburg | 3067 |
| Barometer | Mensor 2400 | 650365 |

Stage 1: Determine Local pressure conditions

| | | |
|---------------------------|--------------------------|--------------------|
| Air temperature | 20.7 | °C |
| Grid reference (OSGB36) | 10176 East. 054328 North | |
| Height above sea level | 5 | metres |
| Local Gravity | 9.81460 | M/sec ² |
| Gravity std for barometer | 9.80665 | M/sec ² |
| Atmospheric pressure | 736.900 | mmHg |
| | 9.7993 | dBar |

As Received Calibration Check #025;21;1

| | | | | | | | | |
|---|--|---------------|----|-------------------|--------------------------------|--------|-----------|------|
| (Based on counts measured during recalibration) | | | | Polynomial Result | Pressure Error [Calc - Actual] | | | |
| Original Cal String | 21;15;0.000000e+00;0.000000e+00;0.000000e+00;-1.281369e-15;1.000338e-04;9.881235e-02 | | | dBarA | dBar | %FS | Pass/Fail | |
| Original Coefficients | a0 | 9.881235e-02 | a3 | 0.000000e+00 | 9.865 | 0.102 | 0.003 | Pass |
| | a1 | 1.000338e-04 | a4 | 0.000000e+00 | 598.586 | 0.255 | 0.009 | Pass |
| | a2 | -1.281369e-15 | a5 | 0.000000e+00 | 1187.478 | 0.319 | 0.011 | Fail |
| Corrective equation | | | | 1775.947 | 0.295 | 0.010 | Pass | |
| | | | | 2364.477 | 0.182 | 0.006 | Pass | |
| | | | | 2953.055 | -0.020 | -0.001 | Pass | |

Stage 2: Observe Raw Data

| Nominal Deadweight | List weights applied | Deadweight pressure | Atmospheric Pressure | Total pressure | Raw Output | | Pressure Error (Measured - Actual) | | Acceptable Error | Pass/Fail |
|--------------------|----------------------|---------------------|----------------------|----------------|------------|--------------|------------------------------------|--------|------------------|-----------|
| | | | | | dBar | (e.g. abfgk) | dBar | dBar | | |
| 0 | | 0.0000 | 9.799 | 9.799 | 97633 | 9.763 | -0.036 | -0.001 | ±0.01 | Pass |
| 600 | AJ | 588.8342 | 9.799 | 598.633 | 5983313 | 598.331 | -0.302 | -0.010 | ±0.01 | Fail |
| 1200 | AG | 1177.6363 | 9.799 | 1187.436 | 11871585 | 1187.159 | -0.277 | -0.009 | ±0.01 | Pass |
| 1800 | AGKL | 1766.3339 | 9.799 | 1776.133 | 17756518 | 1775.652 | -0.481 | -0.016 | ±0.01 | Fail |
| 2400 | ABK | 2354.9849 | 9.799 | 2364.784 | 23642954 | 2364.295 | -0.489 | -0.016 | ±0.01 | Fail |
| 3000 | ABG | 2943.7126 | 9.799 | 2953.512 | 29530759 | 2953.076 | -0.436 | -0.015 | ±0.01 | Fail |

The sensor is out of specification. We recommend at least a Straight Line calibration. Select required fit from the drop down menu.

Fit Applied: 2nd Order Polynomial

Stage 3: Enter Calibration Data

Calibration String: #024;21;1;15;0.000000E+00;0.000000E+00;0.000000E+00;-7.548154E-16;1.000358E-04;4.879414E-02
 Ensure that User calibration is OFF (#020;21;1;<space>) or set to linear fit (#022;21;1;15;0;0;0;1;0)

Gain & Offset: #035;21;1;10000;0

Stage 4: Post Calibration Check

| Nominal Deadweight | List weights applied | Deadweight pressure | Atmospheric Pressure | Total pressure | Sensor Output | Pressure Error (Measured - Actual) | | Acceptable Error | Pass/Fail |
|--------------------|----------------------|---------------------|----------------------|----------------|---------------|------------------------------------|--------------|------------------|-----------|
| | | | | | | dBar | (e.g. abfgk) | | |
| 0 | | 0.0000 | 9.799 | 9.799 | 9.827 | 0.028 | 0.001 | ±0.01 | Pass |
| 600 | AJ | 588.8342 | 9.799 | 598.633 | 598.913 | 0.280 | 0.009 | ±0.01 | Pass |
| 1200 | AG | 1177.6363 | 9.799 | 1187.436 | 1187.686 | 0.250 | 0.008 | ±0.01 | Pass |
| 1800 | AGKL | 1766.3339 | 9.799 | 1776.133 | 1776.415 | 0.282 | 0.009 | ±0.01 | Pass |
| 2400 | ABK | 2354.9849 | 9.799 | 2364.784 | 2364.959 | 0.175 | 0.006 | ±0.01 | Pass |
| 3000 | ABG | 2943.7126 | 9.799 | 2953.512 | 2953.686 | 0.174 | 0.006 | ±0.01 | Pass |

| | |
|---------------|---|
| Name | KI.Schollmeyer |
| Date | 09.12.2021 |
| PASSED | |
| Signed |  |

Sensor Calibration Record

TEMPERATURE

Valeport Ltd

| | | |
|-----|-----------------|-----------|
| PCB | Serial no. | 45341 |
| | Part no. | 400507F |
| | Firmware | 040071160 |
| | Thermistor Type | DS18B20 |
| | Module | 21 |

| | |
|--------------------|------|
| Temperature sensor | |
| Type | PRT |
| Serial no. | 2751 |

| Calibration Equipment used | | |
|----------------------------|-----------------|-----------|
| Instrument | Type | Serial No |
| Temp Bridge | ASL - F17A | 12-2/3/8 |
| PRT | Rosemount 162CE | 4956 |

As Received Calibration Check

(Based on counts measured during recalibration)

| | | | |
|---------------------------------|--|---------------|--|
| Original Cal String (#025;21;2) | 21;15;1.000000e+00;0.000000e+00;0.000000e+00;1.471568e-10;9.792146e-04;-2.196368e+01 | | |
| Original Coefficients | a019 | -2.196368e+01 | |
| | a1 | 9.792146e-04 | |
| | a2 | 1.471568e-10 | |
| Corrective equation | y = -1.915309E-03x ² + 1.033921E+00x - 8.216511E-02 | | |

| Polynomial Result °C | Temperature Error °C | Pass/Fail |
|----------------------|----------------------|-----------|
| 2.030 | -0.006 | Fail |
| 15.067 | -0.015 | Fail |
| 34.793 | -0.009 | Fail |

PCB/Sensor calibration

Stage 1: Obtain Calibration data and Polynomial fit

| Counts nnnn | Bath temp °C [90] | Polynomial fit for raw data Order >>>> 2 | | Polynomial calculations | | Acceptable Error | Pass/Fail |
|----------------|----------------------|---|---------------|-------------------------|----------------------------------|------------------|-----------|
| | | Parameter | Value | Calc Temp °C [90] | Error [Calc - Actual] °C [90] | | |
| 24413 | 2.035 | a0 | -2.200123E+01 | 2.035 | 0.000 | ±0.005 | Pass |
| 37604 | 15.082 | a1 | 9.817059E-04 | 15.081 | 0.000 | ±0.005 | Pass |
| 57465 | 34.802 | a2 | 1.178595E-10 | 34.802 | 0.000 | ±0.005 | Pass |

Enter polynomial in cell E28

$$y = 1.178595E-10x^2 + 9.817059E-04x - 2.200123E+01$$

Stage 2: Enter calibration string:


#024;21;2;15;1;0;0;1.178595E-10;9.817059E-04;-2.200123E+01

Stage 3: Enter System Gain & Offset

#035;21;2;1000;-20000

Stage 4: Post Calibration Check

| Reading °C [90] | Bath temp °C [90] | Error [Reading-Actual] °C [90] | Acceptable Error | Pass/Fail |
|--------------------|----------------------|-----------------------------------|------------------|-----------|
| 15.078 | 15.076 | 0.002 | ±0.005 | Pass |

| | |
|--------|---|
| Name | Kl.Schollmeyer |
| Date | 29.11.21 |
| Signed |  |