



Sea-Bird Scientific  
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## Pressure Test Certificate

Test Date: 2018-05-05

Description: SBE-5M Submersible Pump

### Sensor Information:

Model Number: SBE-5M

Serial Number: 9596

### Pressure Test Protocol:

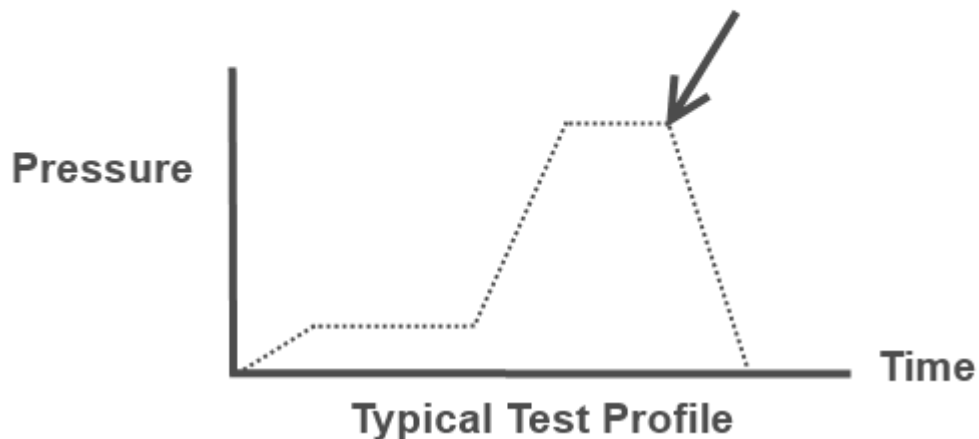
Low Pressure Test: 40 PSI Held For: 15 Minutes

High Pressure Test: 10000 PSI Held For: 15 Minutes

Passed Test: True

Tested By: VG

High pressure is generally equal to the maximum depth rating of the instrument





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SENSOR SERIAL NUMBER: 0278  
 CALIBRATION DATE: 04-Nov-18

Glider Payload CTD CONDUCTIVITY CALIBRATION DATA  
 PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -1.011873e+000      CPcor = -9.5700e-008  
 h = 1.324732e-001      CTcor = 3.2500e-006  
 i = -1.122503e-004      WBOTC = 2.1095e-007  
 j = 2.544344e-005

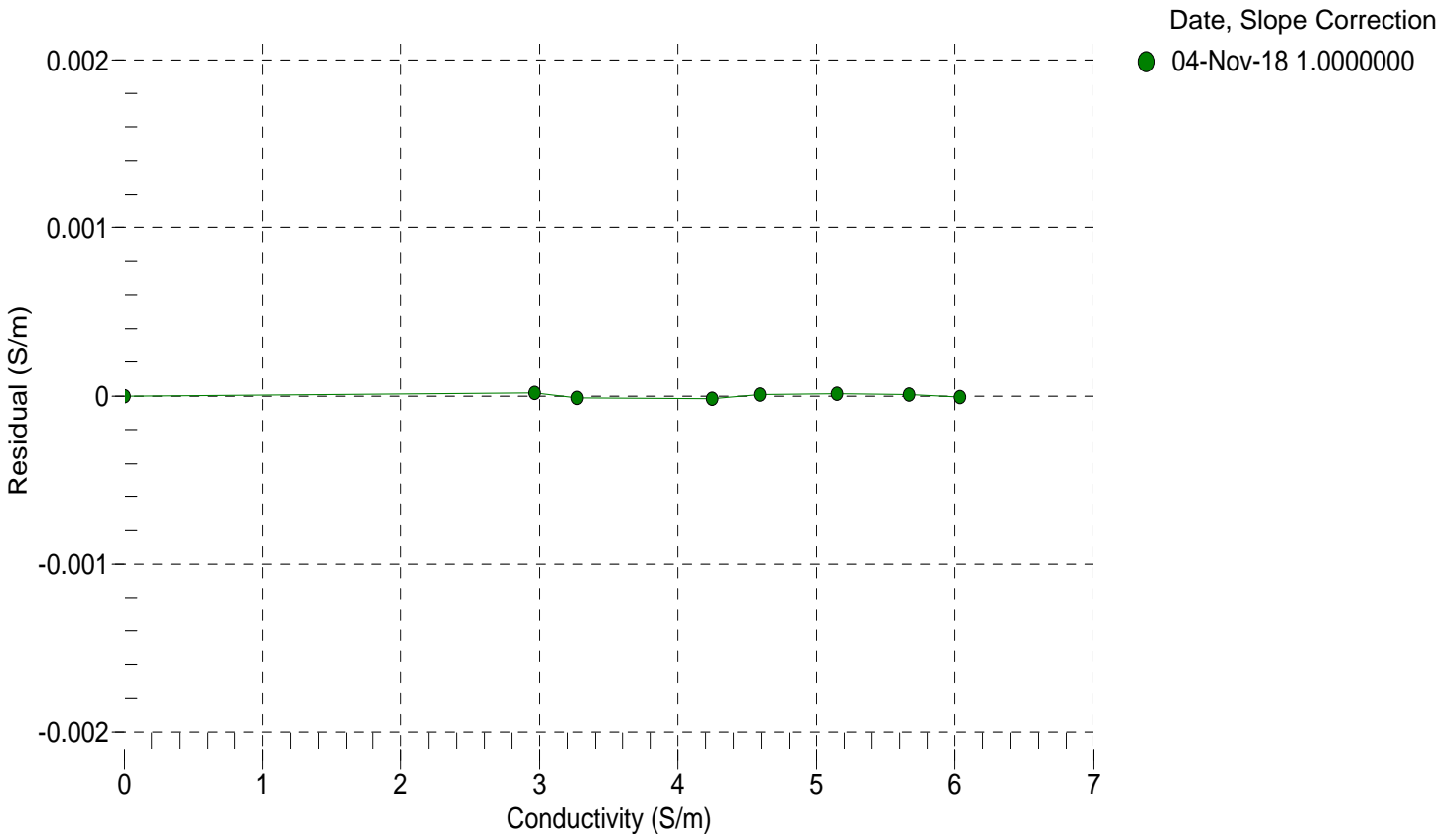
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (Hz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
22.0000	0.0000	0.00000	2764.95	0.00000	0.00000
1.0000	34.6639	2.96418	5475.46	2.96419	0.00001
4.5000	34.6432	3.27000	5681.38	3.26999	-0.00001
15.0000	34.5998	4.24786	6294.06	4.24784	-0.00002
18.5000	34.5901	4.59159	6495.47	4.59159	0.00001
24.0000	34.5811	5.14749	6808.29	5.14750	0.00001
29.0000	34.5764	5.66743	7088.07	5.66744	0.00001
32.5000	34.5735	6.03842	7280.95	6.03841	-0.00001

$$f = \text{Instrument Output(Hz)} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$$

t = temperature (°C); p = pressure (decibars);  $\delta$  = CTcor;  $\epsilon$  = CPcor;

$$\text{Conductivity (S/m)} = (g + h * f^2 + i * f^3 + j * f^4) / (1 + \delta * t + \epsilon * p)$$

Residual (Siemens/meter) = instrument conductivity - bath conductivity





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SENSOR SERIAL NUMBER: 0278  
 CALIBRATION DATE: 02-Nov-18

Glider Payload CTD PRESSURE CALIBRATION DATA  
 1450 psia S/N 11145984

COEFFICIENTS:

PA0 =	1.926662e-001	PTCA0 =	5.242791e+005
PA1 =	4.478011e-003	PTCA1 =	1.752916e+000
PA2 =	-2.157211e-011	PTCA2 =	7.668912e-003
PTEMPA0 =	-6.239804e+001	PTCB0 =	2.522362e+001
PTEMPA1 =	4.991607e-002	PTCB1 =	1.250000e-004
PTEMPA2 =	1.114888e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

THERMAL CORRECTION

PRESSURE (PSIA)	INSTRUMENT OUTPUT (counts)	THERMISTOR OUTPUT (volts)	COMPUTED PRESSURE (PSIA)	RESIDUAL (%FSR)	TEMP (°C)	THERMISTOR OUTPUT (volts)	INSTRUMENT OUTPUT (counts)
14.64	527526.8	1693.9	14.54	-0.01	32.50	1893	527770.40
302.24	591773.9	1695.9	302.11	-0.01	29.00	1823	527767.40
589.45	656007.4	1696.3	589.44	-0.00	24.00	1724	527756.20
876.75	720284.1	1696.8	876.78	0.00	18.50	1615	527741.00
1164.02	784579.3	1697.6	1164.03	0.00	15.00	1545	527734.00
1451.49	848943.4	1698.0	1451.41	-0.01	4.50	1336	527717.20
1164.14	784617.8	1698.0	1164.20	0.00	1.00	1267	527708.80
876.95	720342.5	1697.5	877.04	0.01			
589.76	656060.9	1697.2	589.68	-0.01	TEMPERATURE (°C)	SPAN	
345.48	601978.1	1697.7	347.77	0.16	-5.00	25.22	
14.66	527595.9	1697.8	14.85	0.01	35.00	25.23	

y = thermistor output (counts)

$$t = PTEMPA0 + PTEMPA1 * y + PTEMPA2 * y^2$$

$$x = \text{instrument output} - PTCA0 - PTCA1 * t - PTCA2 * t^2$$

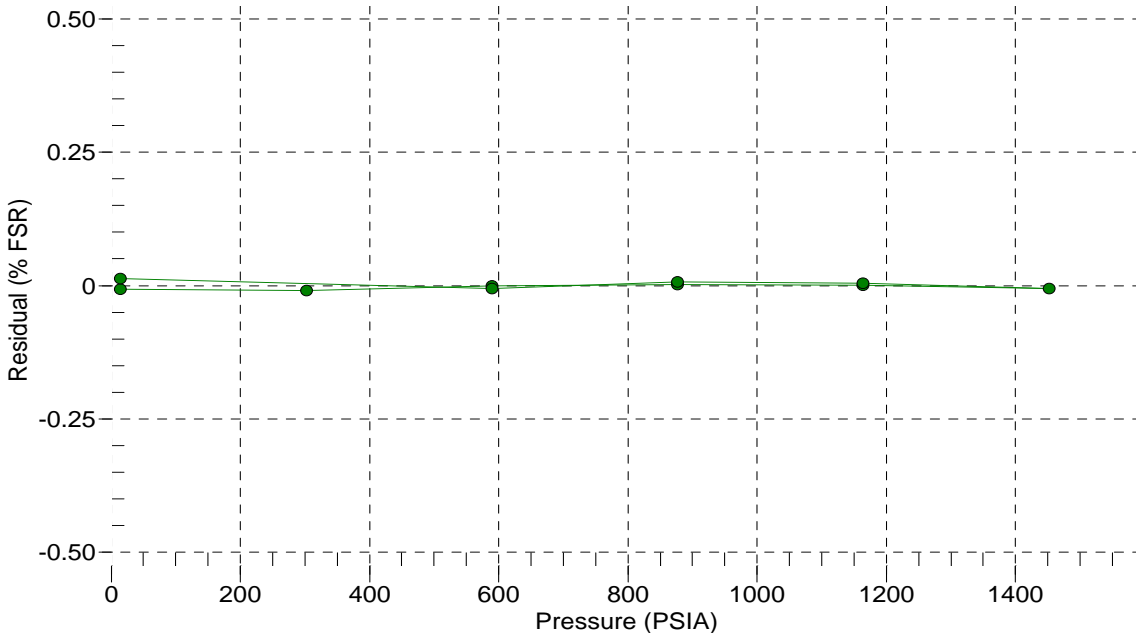
$$n = x * PTCB0 / (PTCB0 + PTCB1 * t + PTCB2 * t^2)$$

$$\text{pressure (PSIA)} = PA0 + PA1 * n + PA2 * n^2$$

$$\text{Residual (\%FSR)} = (\text{computed pressure} - \text{true pressure}) * 100 / \text{Full Scale Range}$$

Date, Offset (%FSR)

● 02-Nov-18 0.00





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## Pressure Test Certificate

Test Date: **2018-11-02**

Description: **Payload Glider CTD**

### Sensor Information:

Model Number: **PayLoad**

Serial Number: **0278**

### Pressure Test Protocol:

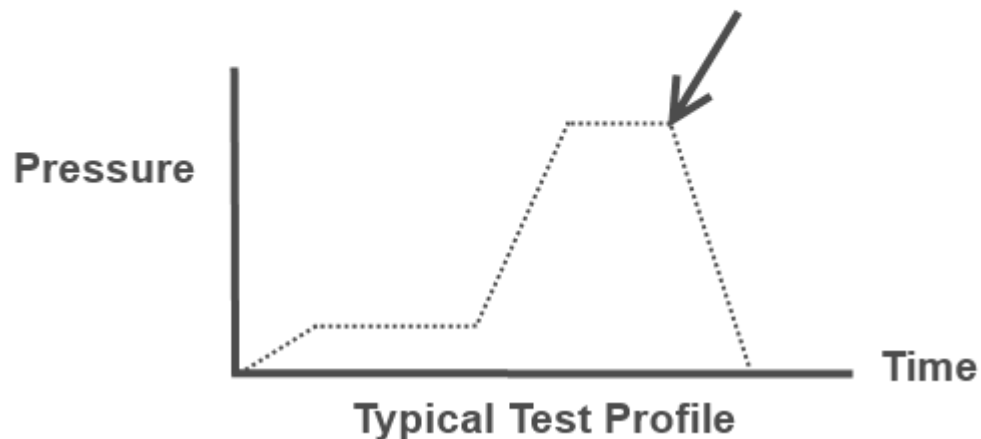
Low Pressure Test: **40**      PSI      Held For: **15**      Minutes

High Pressure Test: **1450**      PSI      Held For: **15**      Minutes

Passed Test: **True**

Tested By: **VG**

**High pressure is generally equal to the maximum depth rating of the instrument**





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SENSOR SERIAL NUMBER: 0278  
 CALIBRATION DATE: 04-Nov-18

Glider Payload CTD TEMPERATURE CALIBRATION DATA  
 ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

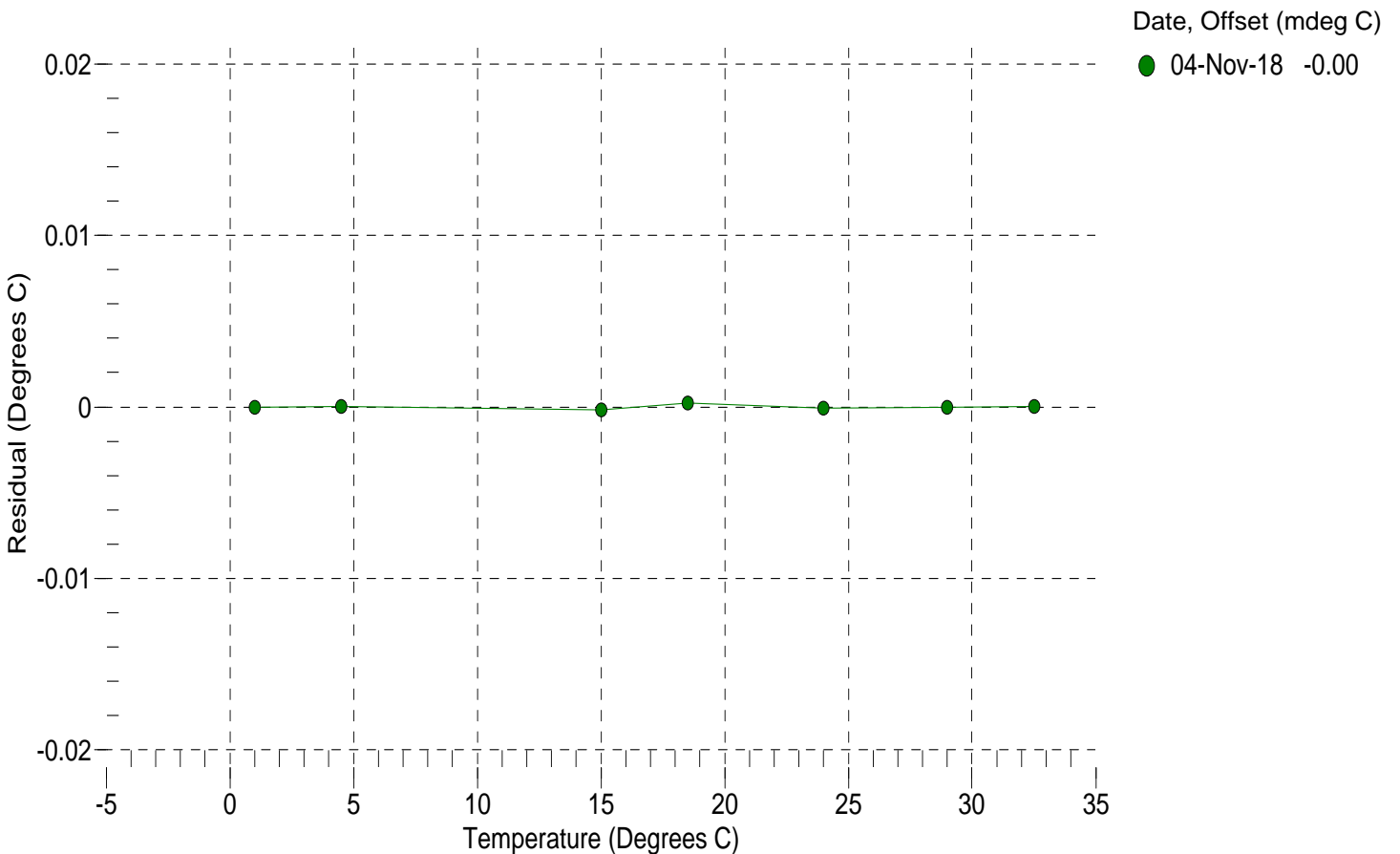
a0 = -1.873223e-004  
 a1 = 3.201811e-004  
 a2 = -5.230008e-006  
 a3 = 2.210332e-007

BATH TEMP (° C)	INSTRUMENT OUTPUT (counts)	INST TEMP (° C)	RESIDUAL (° C)
1.0000	561599.4	1.0000	-0.0000
4.5000	481142.2	4.5000	0.0000
15.0000	308527.8	14.9998	-0.0002
18.5000	267703.2	18.5002	0.0002
24.0000	215471.2	23.9999	-0.0001
29.0000	177962.2	29.0000	-0.0000
32.5000	156180.4	32.5000	0.0000

n = Instrument Output (counts)

$$\text{Temperature ITS-90 (°C)} = 1 / \{ a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)] \} - 273.15$$

Residual (°C) = instrument temperature - bath temperature



# Glider Payload CTD

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*Conductivity, Temperature and Pressure  
with optional Dissolved Oxygen*

## **Instrument Configuration:**

Serial Number	0278
Firmware Version	1.2.1
Baud Rate	9600
Interface Type	RS-232
Conductivity Range	0-7 S/m
Zero Conductivity	2764.95
Pressure Sensor	1000 db, S/N11145984
Pump S/N	05-9596
Oxygen Sensor S/N	<b>None</b>

<b>Maximum Depth</b>	<b>1000 meters</b>
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