PRESSURE TEST CERTIFICATES

Sea-Bird Electronics, Inc.
1808 136th Place NE, Bellevue, Washington 98005 USA
Website: http://www.seabird.com

Phone: (425) 643-9866
FAX: (425) 643-9954
Email: seabird@seabird.com

SBE Pressure Test Certificate

Test Date: **1/5/2010** Description **SBE-16Plus SeaCat**

Job Number: **57353** Customer Name **EMS/SPAIN**

SBE Sensor Information:

Model Number: **16P**
Serial Number: **6479**

Pressure Sensor Information:

Sensor Type: **Druck**
Sensor Serial Number: **2926641**
Sensor Rating: **160**

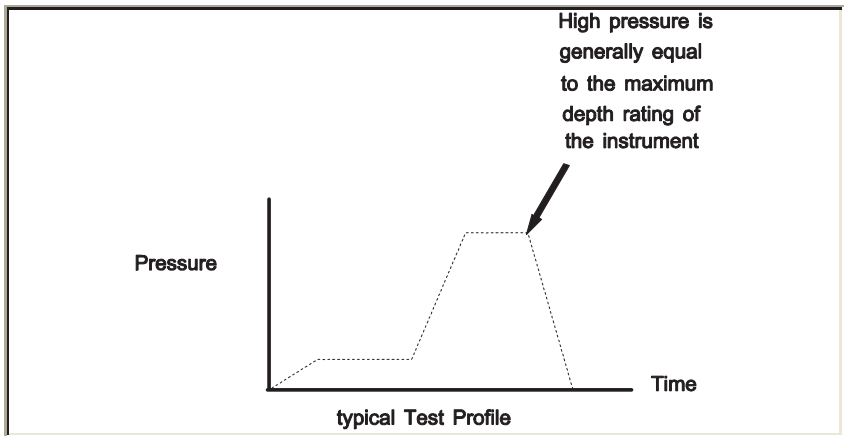
Pressure Test Protocol:

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

High Pressure Test: **100** PSI Held For **15** Minutes

Passed Test: ☑

Tested By: ND



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SBE Pressure Test Certificate

Test Date: **1/4/2010** Description **SBE-5M Mini-Submersible Pump**

Job Number: **57353** Customer Name **EMS/SPAIN**

SBE Sensor Information:

Model Number: **5M**
Serial Number: **1257**

Pressure Sensor Information:

Sensor Type: **None**
Sensor Serial Number: **None**
Sensor Rating: **0**

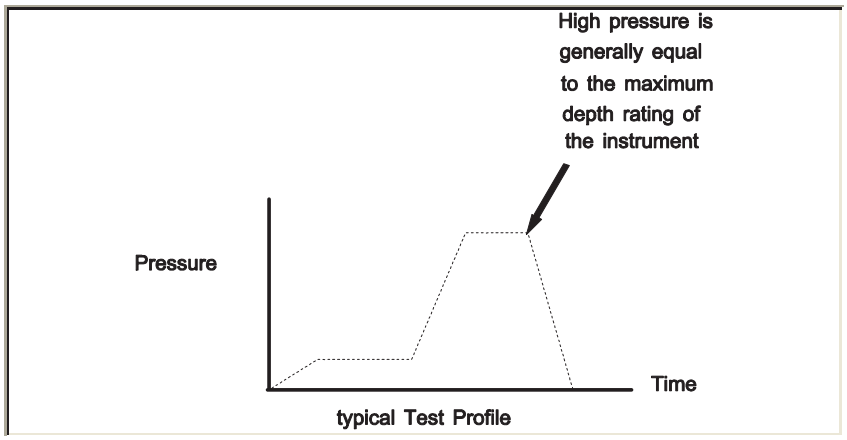
Pressure Test Protocol:

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

High Pressure Test: **800** PSI Held For **15** Minutes

Passed Test: ☑

Tested By: VG



CALIBRATION SHEETS

SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 6479
CALIBRATION DATE: 30-Dec-09

SBE19plus TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

a0 = 1.296268e-003
a1 = 2.570590e-004
a2 = 8.561273e-008
a3 = 1.338387e-007

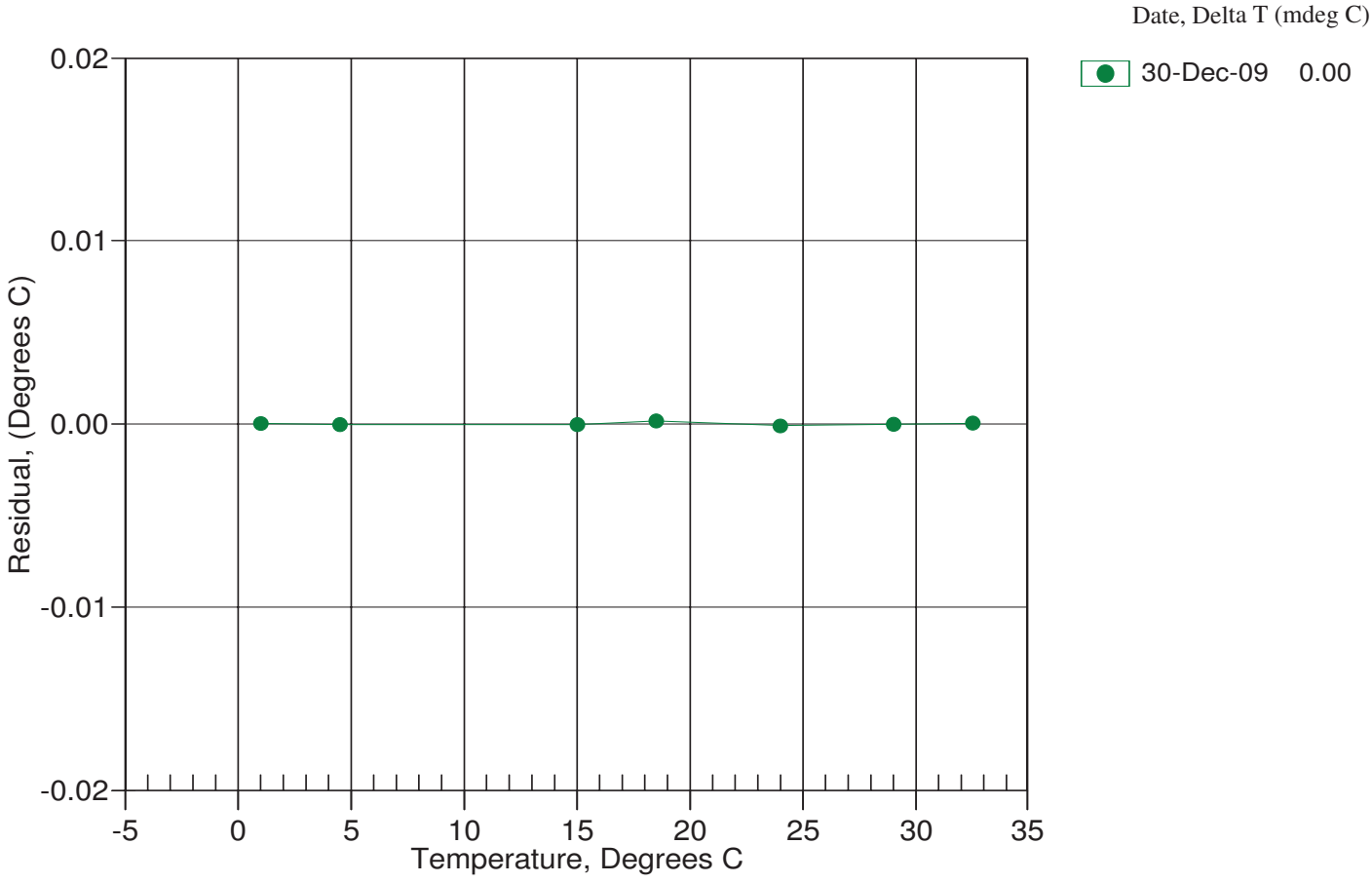
BATH TEMP (ITS-90)	INSTRUMENT OUTPUT(n)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	636986.475	1.0000	0.0000
4.5000	564664.288	4.5000	-0.0000
15.0001	385311.322	15.0001	-0.0000
18.5000	337275.644	18.5001	0.0001
24.0000	272224.881	23.9999	-0.0001
29.0001	222870.915	29.0001	-0.0000
32.5001	193151.576	32.5001	0.0000

MV = (n - 524288) / 1.6e+007

R = (MV * 2.900e+009 + 1.024e+008) / (2.048e+004 - MV * 2.0e+005)

Temperature ITS-90 = $1/\{a0 + a1[ln(R)] + a2[ln^2(R)] + a3[ln^3(R)]\} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



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SENSOR SERIAL NUMBER: 6479
CALIBRATION DATE: 30-Dec-09

SBE19plus CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

```
g = -1.067472e+000
h =  1.488908e-001
i = -2.544682e-004
j =  3.924910e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
```

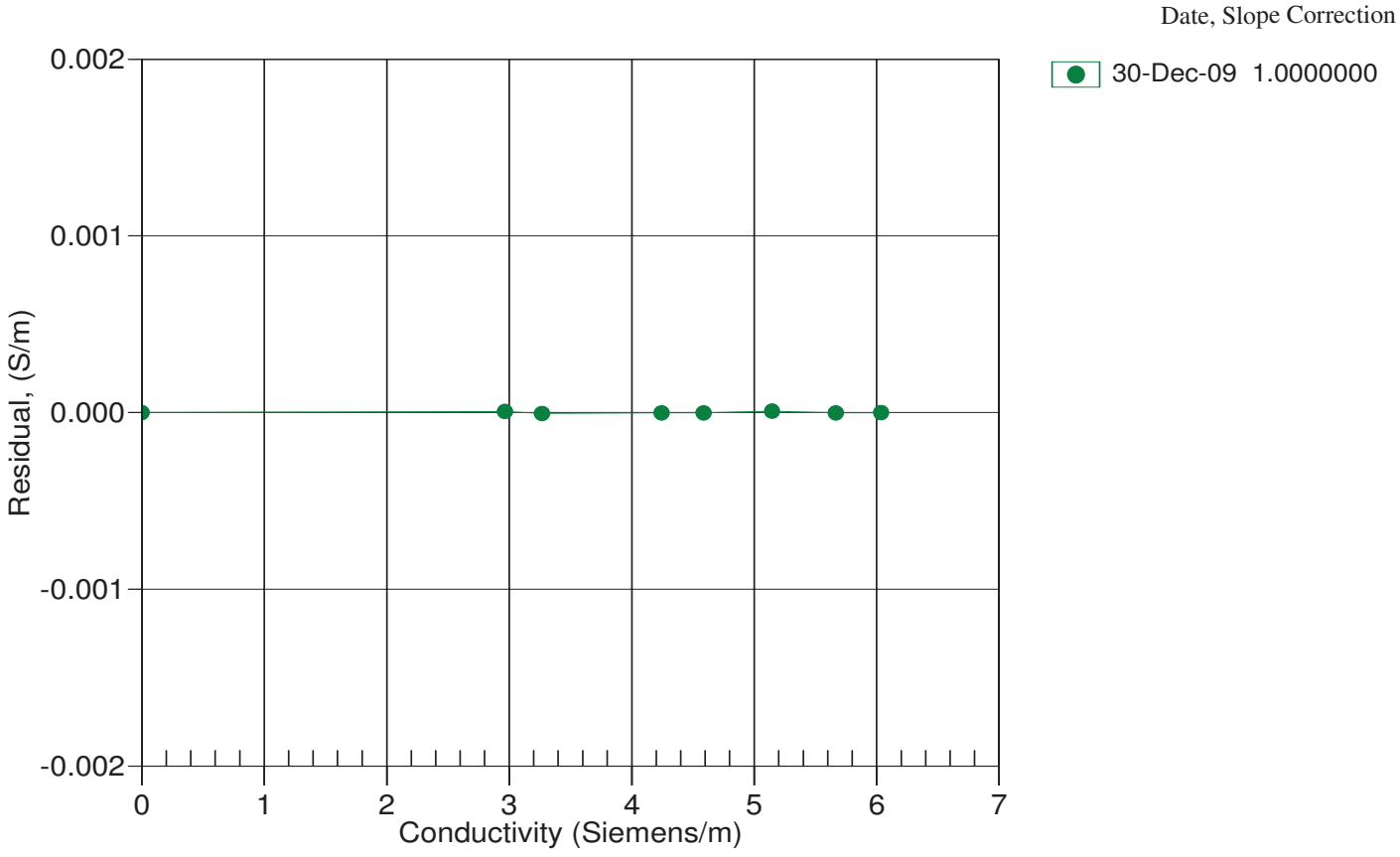
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2681.20	0.0000	0.00000
1.0000	34.6428	2.96254	5207.16	2.9625	0.00001
4.5000	34.6227	3.26825	5400.50	3.2682	-0.00001
15.0001	34.5788	4.24556	5976.12	4.2456	-0.00000
18.5000	34.5692	4.58911	6165.47	4.5891	-0.00000
24.0000	34.5582	5.14446	6459.55	5.1445	0.00001
29.0001	34.5516	5.66383	6722.66	5.6638	-0.00000
32.5001	34.5473	6.03437	6904.07	6.0344	-0.00000

f = INST FREQ / 1000.0

Conductivity = $(g + hf^2 + if^3 + jf^4) / (1 + \delta t + \varepsilon p)$ Siemens/meter

t = temperature[°C)]; p = pressure[decibars]; δ = CTcor; ε = CPcor;

Residual = instrument conductivity - bath conductivity



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SENSOR SERIAL NUMBER: 6479
CALIBRATION DATE: 10-Dec-09

SBE19plus PRESSURE CALIBRATION DATA
160 psia S/N 2926641

COEFFICIENTS:

PA0 =	4.049016e-002	PTCA0 =	5.242168e+005
PA1 =	4.872830e-004	PTCA1 =	1.276062e+001
PA2 =	-5.509904e-012	PTCA2 =	-5.608900e-001
PTEMPA0 =	-6.508839e+001	PTCB0 =	2.499250e+001
PTEMPA1 =	5.263066e+001	PTCB1 =	-9.000000e-004
PTEMPA2 =	-5.566800e-001	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.70	554357.0	1.5	14.70	-0.00
29.94	585619.0	1.5	29.92	-0.01
59.93	647290.0	1.5	59.93	0.00
94.96	719365.0	1.5	94.94	-0.01
124.94	781203.0	1.5	124.94	-0.00
159.96	853509.0	1.5	159.95	-0.00
124.95	781265.0	1.5	124.97	0.01
94.97	719438.0	1.5	94.98	0.00
59.98	647429.0	1.5	60.00	0.01
14.69	554359.0	1.6	14.70	0.01

THERMAL CORRECTION

TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	1.89	554547.32
29.00	1.82	554606.65
24.00	1.72	554686.42
18.50	1.62	554758.03
15.00	1.55	554789.81
4.50	1.34	554770.42
1.00	1.27	554718.13

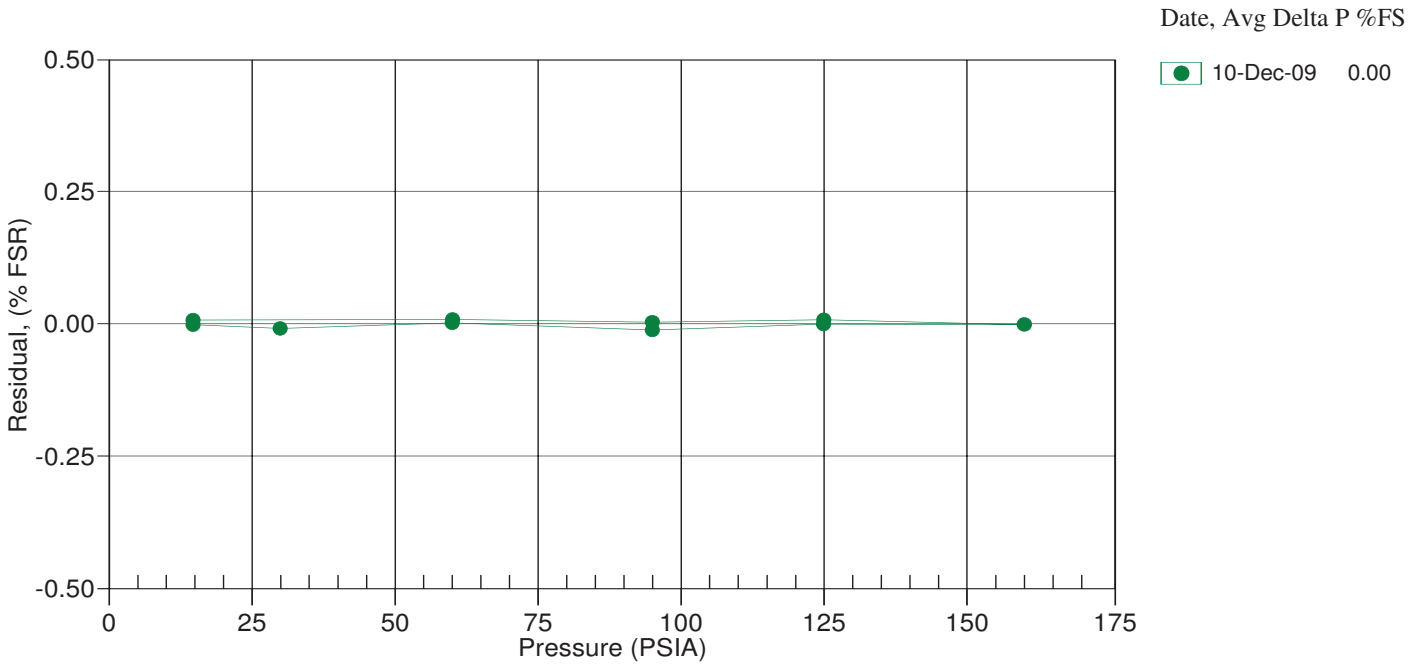
TEMP(ITS90)	SPAN(mV)
-5.00	25.00
35.00	24.96

y = thermistor output; $t = PTEMPA0 + PTEMPA1 * y + PTEMPA2 * y^2$

x = pressure output - $PTCA0 - PTCA1 * t - PTCA2 * t^2$

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

pressure (psia) = $PA0 + PA1 * n + PA2 * n^2$



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SBE 5M MINI SUBMERSIBLE PUMP CONFIGURATION SHEET

Serial Number: 1257

Job Number: 57353

Customer: EMS/SPAIN

Delivery Date: 1/12/2010

Single Bulkhead Connector.

Pressure Case: 600 meters (Plastic)

Maxon Motor Type:

P/N 801605, Motor PN 20130 (Pulsed Duty 6 VDC, 2000 RPM MAX) ☑

P/N 801606, Motor PN 20127 (Continuous Duty 9 VDC, 2000 RPM MAX) ☐

Vin 15V voltage across C2:	***5.055***	VDC	Current	***15.7***	mA
Vin 9V voltage across C2:	***5.056***	VDC	Current	***15.4***	mA
Vin 6V voltage across C2:	***5.057***	VDC	Current	***15.1***	mA

Pump submerged test, no load, Vin 12VDC Average current draw in water: ***271.6*** mA