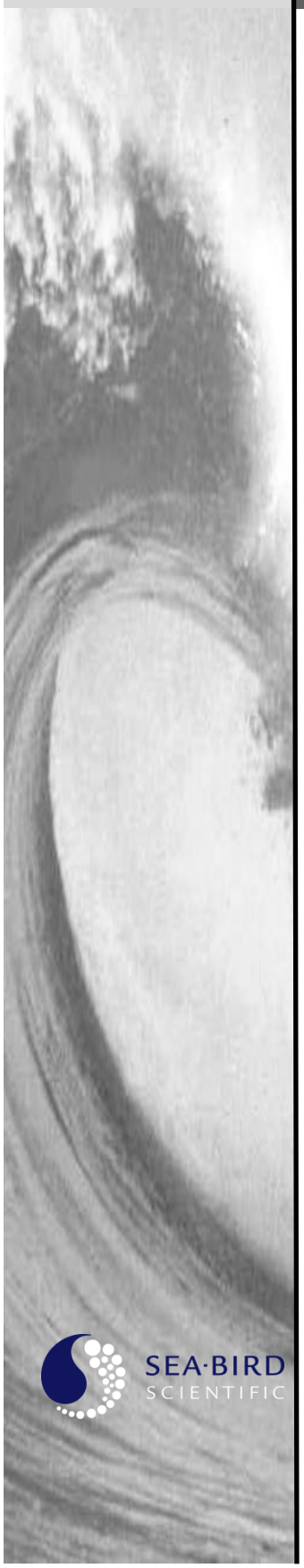
Sea-Bird Electronics, Inc.

Advancing the Science of Ocean Measurement



SBE 37-SM MicroCAT

Conductivity, Temperature, (optional) Pressure Recorder with RS232 Interface

Instrument Configuration

Instrument Serial Number:	37-11228
Instrument Firmware Version:	3.1
Zero Conductivity Frequency:	2684.20
Communications Format:	RS232
Communications Settings:	9600 baud, 8 Data Bits, No Parity

Installed Devices/Sensors

Data Format	*Measurement*	*Sensor Type*	*Serial Number*	*Rating*
Count	Temperature	Internal	N/A	N/A
Frequency	Conductivity	Internal	N/A	N/A
Count	Pressure Sensor	Kistler	2144986	7000m(7000 dBar)

Maximum Depth: 7000m

CAUTION - The maximum deployment depth will be limited by the measurement range of the pressure sensor, if installed, an attached sensor, if installed, or the housing.

SEA-BIRD SCIENTIFIC

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SENSOR SERIAL NUMBER: 11228
CALIBRATION DATE: 17-Oct-13

SBE 37 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

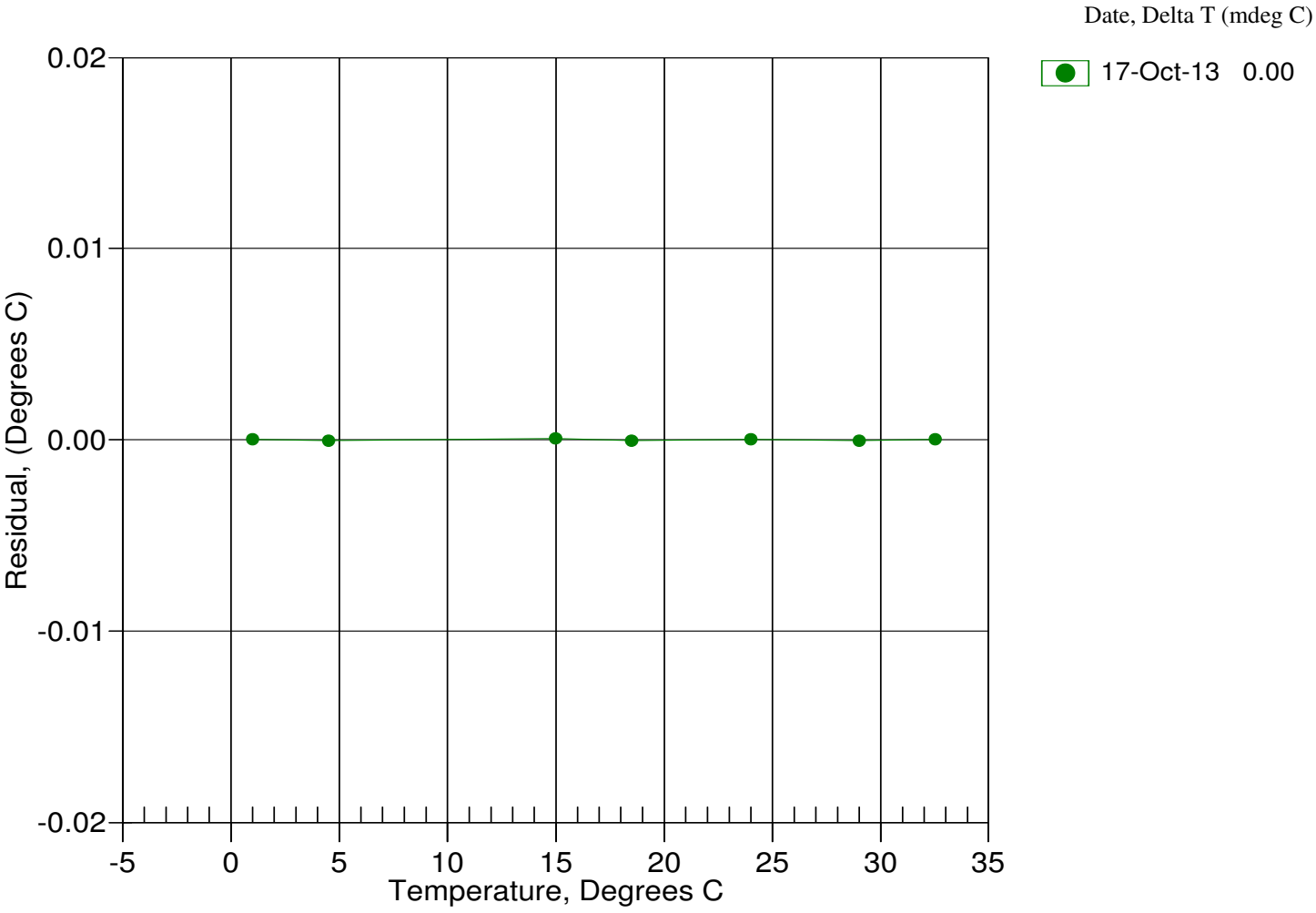
ITS-90 COEFFICIENTS

a0 = -6.557399e-005
a1 = 3.015205e-004
a2 = -4.158172e-006
a3 = 1.923923e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	569119.3	1.0000	0.0000
4.4999	486237.0	4.4999	-0.0000
14.9999	309287.5	15.0000	0.0001
18.5000	267669.7	18.4999	-0.0001
24.0000	214578.7	24.0000	0.0000
29.0000	176594.9	29.0000	-0.0000
32.5000	154600.3	32.5000	0.0000

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

Residual = instrument temperature - bath temperature



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SENSOR SERIAL NUMBER: 11228
CALIBRATION DATE: 17-Oct-13

SBE 37 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

```
g = -9.816220e-001
h =  1.401811e-001
i = -1.991406e-004
j =  3.491082e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC =  2.1731e-007
```

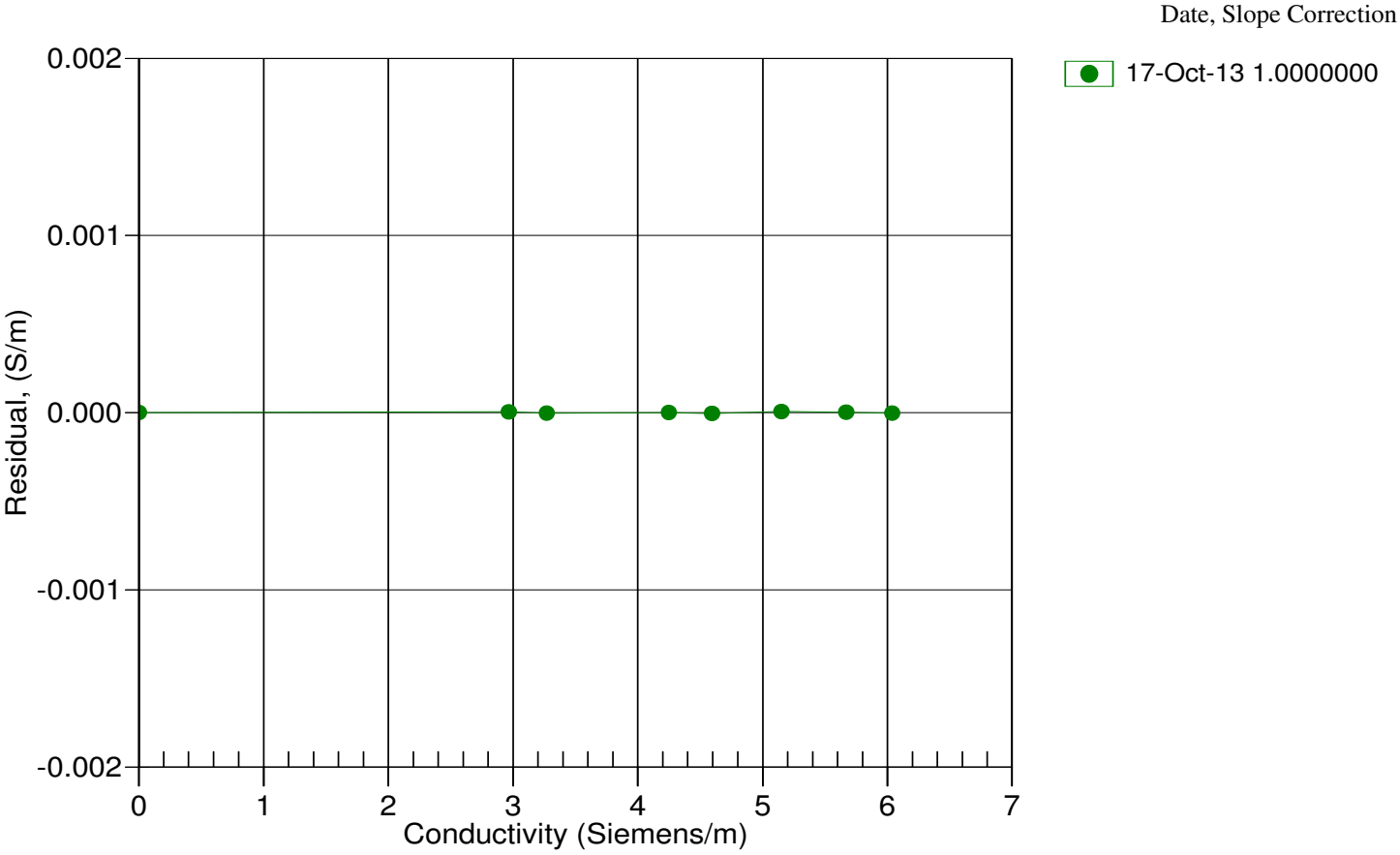
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2648.89	0.00000	0.00000
1.0000	34.6811	2.96551	5307.75	2.96551	0.00000
4.4999	34.6612	3.27152	5508.97	3.27152	-0.00000
14.9999	34.6181	4.24985	6107.20	4.24985	0.00000
18.5000	34.6089	4.59382	6303.77	4.59381	-0.00001
24.0000	34.5987	5.14982	6608.86	5.14983	0.00001
29.0000	34.5932	5.66988	6881.66	5.66988	0.00000
32.5000	34.5903	6.04102	7069.72	6.04102	-0.00000

f = INST FREQ * sqrt(1.0 + WBOTC * t) / 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: 11228
CALIBRATION DATE: 15-Oct-13

SBE 37 PRESSURE CALIBRATION DATA
10153 psia S/N 2144986

COEFFICIENTS:

PA0 =	-2.024860e+000	PTCA0 =	5.255181e+005
PA1 =	3.144399e-002	PTCA1 =	-7.535674e+000
PA2 =	2.008666e-009	PTCA2 =	2.415673e-001
PTEMPA0 =	-9.685029e+001	PTCB0 =	1.014659e+002
PTEMPA1 =	4.001805e-002	PTCB1 =	1.013007e-002
PTEMPA2 =	1.298080e-006	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.75	526018.1	2715.7	15.25	0.00
2001.39	589004.5	2721.4	1999.57	-0.02
3988.29	651588.8	2724.5	3986.89	-0.01
5975.31	713717.7	2726.1	5975.23	-0.00
7962.33	775354.5	2727.0	7963.08	0.01
9949.76	836438.1	2727.2	9948.10	-0.02
7962.25	775377.1	2726.2	7963.85	0.02
5975.16	713754.6	2725.4	5976.44	0.01
3988.17	651631.3	2725.0	3988.23	0.00
2001.32	589052.7	2724.9	2001.05	-0.00
14.74	526036.2	2727.0	15.77	0.01

THERMAL CORRECTION

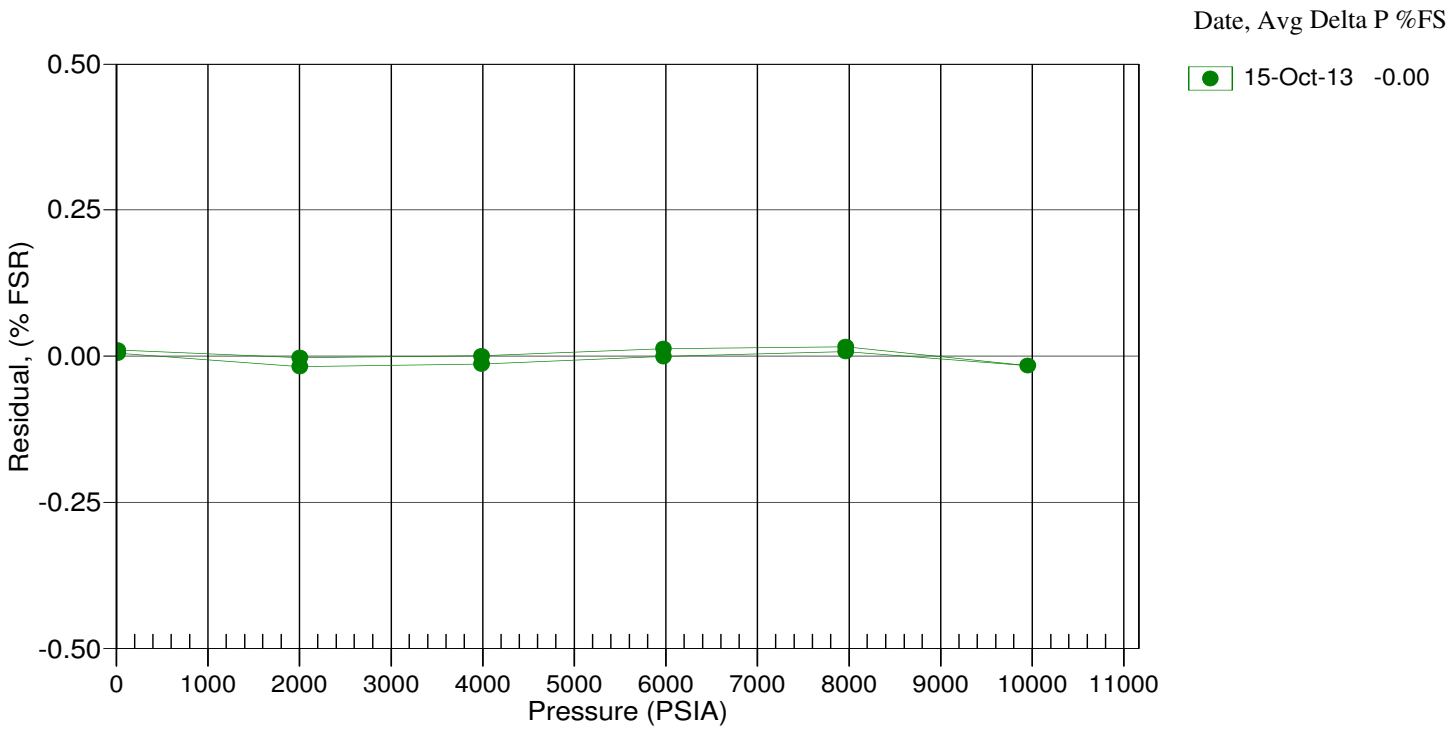
TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	2950	526101.96
29.00	2876	526076.15
24.00	2771	526050.33
18.50	2654	526035.23
15.00	2579	526032.73
4.50	2353	526062.49
1.00	2277	526084.64

TEMP(ITS90)	SPAN(mV)
-5.91	101.41
37.22	101.84

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 Pressure Test Certificate

Test Date: **10/2/2013** Description **SBE-37 Microcat**

Job Number: **stock** Customer Name

SBE Sensor Information:

Model Number: **37**
Serial Number: **11228**

Pressure Sensor Information:

Sensor Type: **Kistler**
Sensor Serial Number: **2144986**
Sensor Rating: **10153**

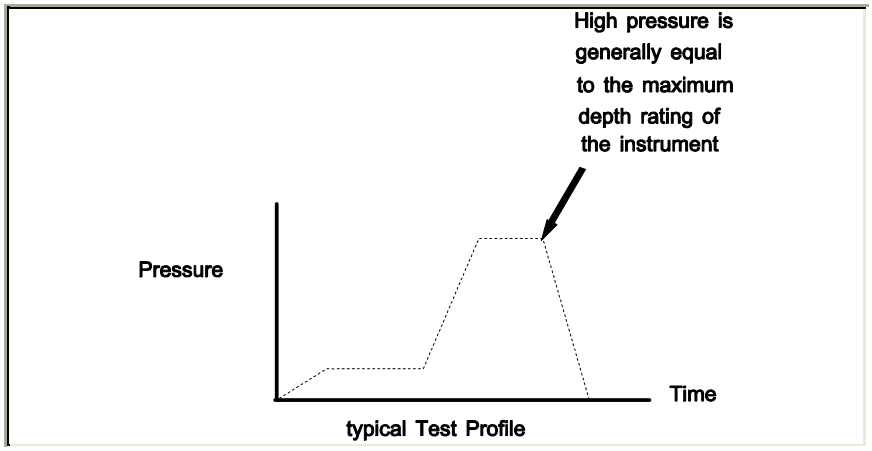
Pressure Test Protocol:

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

High Pressure Test: **10000** PSI Held For **15** Minutes

Passed Test: ☑

Tested By: VG



typical Test Profile