SBE 41CP CERTIFICATES

CTD Serial Number 41CP-5397

SEA-BIRD ELECTRONICS, INC.
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SBE 41CP Instrument Configuration

Model Number: SBE 41CP

Serial Number: 41CP-5397

Part Number: 90377.030

Description : NKE-PROVOR Configuration

Firmware Version: 2.0

Pressure Type: Kistler

Pressure Range: 2000 Dbar

Pressure Serial Number: 2139246

```
SBE 41 ALACE-CP-MO V 2.0  SERIAL NO. 5397
temperature:  16-aug-13
    TA0 =  3.496813e-05
    TA1 =  2.722144e-04
    TA2 = -2.297806e-06
    TA3 =  1.460867e-07
conductivity:  16-aug-13
    G = -9.838007e-01
    H =  1.455068e-01
    I = -3.380367e-04
    J =  4.549974e-05
    CPCOR = -9.570001e-08
    CTCOR =  3.250000e-06
    WBOTC = -3.837799e-07
pressure S/N = 2139246, range = 2900 psia:  09-aug-13
    PA0 = -2.158745e+00
    PA1 =  4.762089e-01
    PA2 =  3.509551e-07
    PTCA0 =  4.449801e+01
    PTCA1 = -5.239824e-01
    PTCA2 =  1.409790e-02
    PTCB0 =  1.021340e+02
    PTCB1 = -8.330946e-03
    PTCB2 =  0.000000e+00
    PTHA0 = -1.008160e+02
    PTHA1 =  4.261657e-02
    PTHA2 =  8.795900e-07
    POFFSET =  0.000000e+00
```

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SENSOR SERIAL NUMBER: 5397
CALIBRATION DATE: 16-Aug-13

SBE 41cp TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

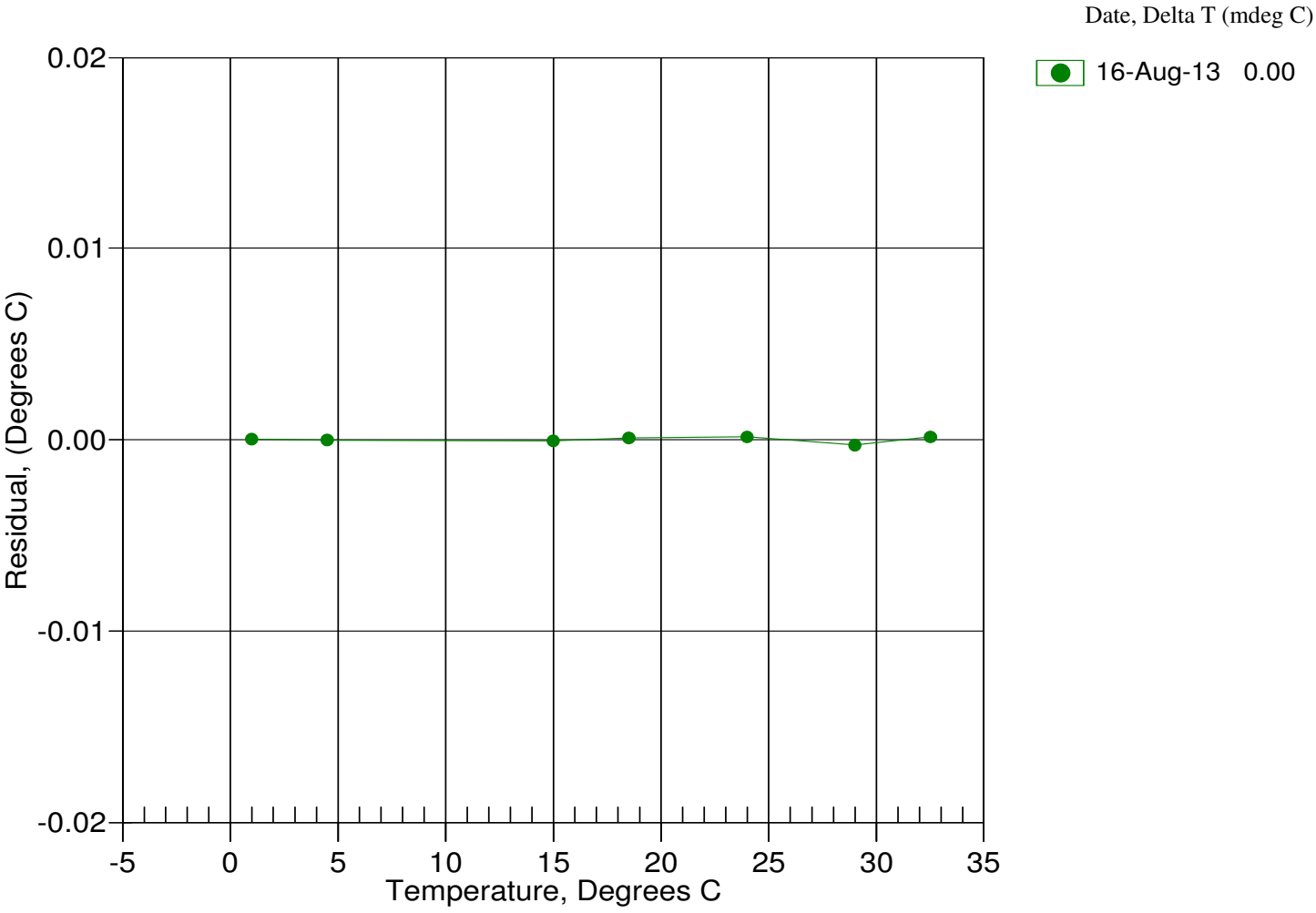
ITS-90 COEFFICIENTS

a0 = 3.496813e-005
a1 = 2.722144e-004
a2 = -2.297806e-006
a3 = 1.460867e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	722214.4	1.0000	0.0000
4.5000	616120.0	4.5000	-0.0000
15.0000	390156.9	14.9999	-0.0001
18.5000	337146.1	18.5001	0.0001
23.9940	269694.0	23.9941	0.0001
29.0000	221416.1	28.9997	-0.0003
32.5000	193534.8	32.5001	0.0001

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: 5397
CALIBRATION DATE: 16-Aug-13

SBE 41cp CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

```
g = -9.838007e-001
h =  1.455068e-001
i = -3.380367e-004
j =  4.549974e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC = -3.8378e-007
```

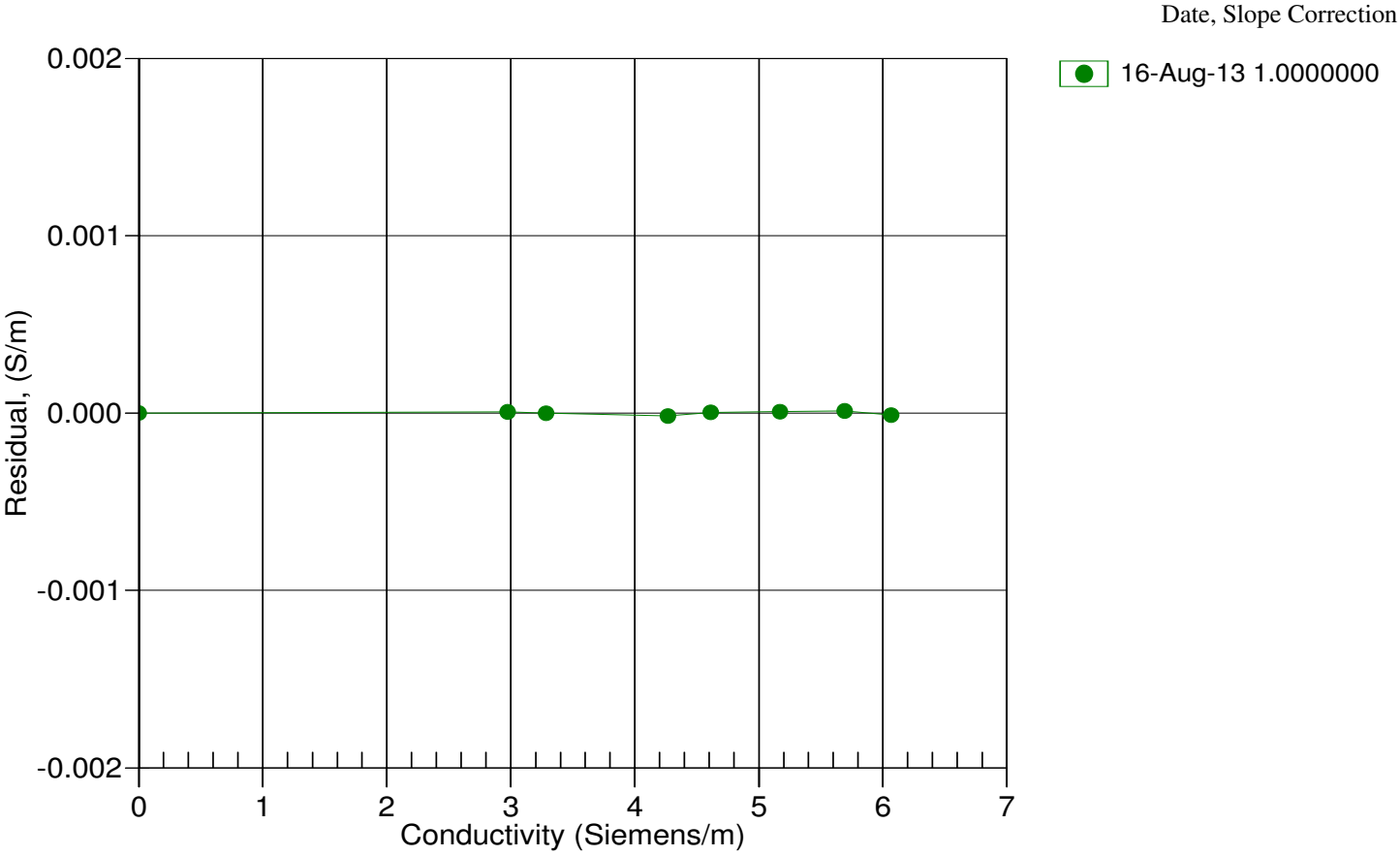
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2605.37	0.00000	0.00000
1.0000	34.8249	2.97663	5226.53	2.97664	0.00001
4.5000	34.8056	3.28381	5424.92	3.28381	-0.00000
15.0000	34.7636	4.26583	6014.65	4.26582	-0.00002
18.5000	34.7549	4.61110	6208.44	4.61111	0.00000
23.9940	34.7457	5.16866	6508.89	5.16867	0.00001
29.0000	34.7412	5.69140	6778.14	5.69141	0.00001
32.5000	34.7399	6.06417	6963.59	6.06416	-0.00001

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: 5397
CALIBRATION DATE: 09-Aug-13

SBE 41cp PRESSURE CALIBRATION DATA
2900 psia S/N 2139246

COEFFICIENTS:

PA0 =	-2.158745e+000	PTCA0 =	4.449801e+001
PA1 =	4.762089e-001	PTCA1 =	-5.239824e-001
PA2 =	3.509551e-007	PTCA2 =	1.409790e-002
PTHA0 =	-1.008160e+002	PTCB0 =	1.021340e+002
PTHA1 =	4.261657e-002	PTCB1 =	-8.330946e-003
PTHA2 =	8.795900e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.55	74.7	2760.4	14.41	-0.00
590.84	1281.4	2760.7	590.70	-0.00
1166.86	2485.5	2761.5	1166.77	-0.00
1742.99	3687.5	2762.0	1742.86	-0.00
2319.06	4887.4	2762.3	2318.96	-0.00
2894.93	6085.0	2762.3	2894.96	0.00
2319.05	4887.7	2761.8	2319.10	0.00
1743.31	3688.7	2762.2	1743.43	0.00
1167.05	2486.4	2761.1	1167.20	0.01
590.92	1282.1	2761.2	591.03	0.00
14.55	75.3	2761.3	14.69	0.00

THERMAL CORRECTION

TEMP ITS90	PRESS TEMP	INST OUTPUT
32.50	2948.60	77.89
29.00	2875.70	76.82
23.99	2770.40	75.66
18.50	2654.40	75.17
15.00	2579.90	75.39
4.50	2356.80	78.02
1.00	2281.60	79.58

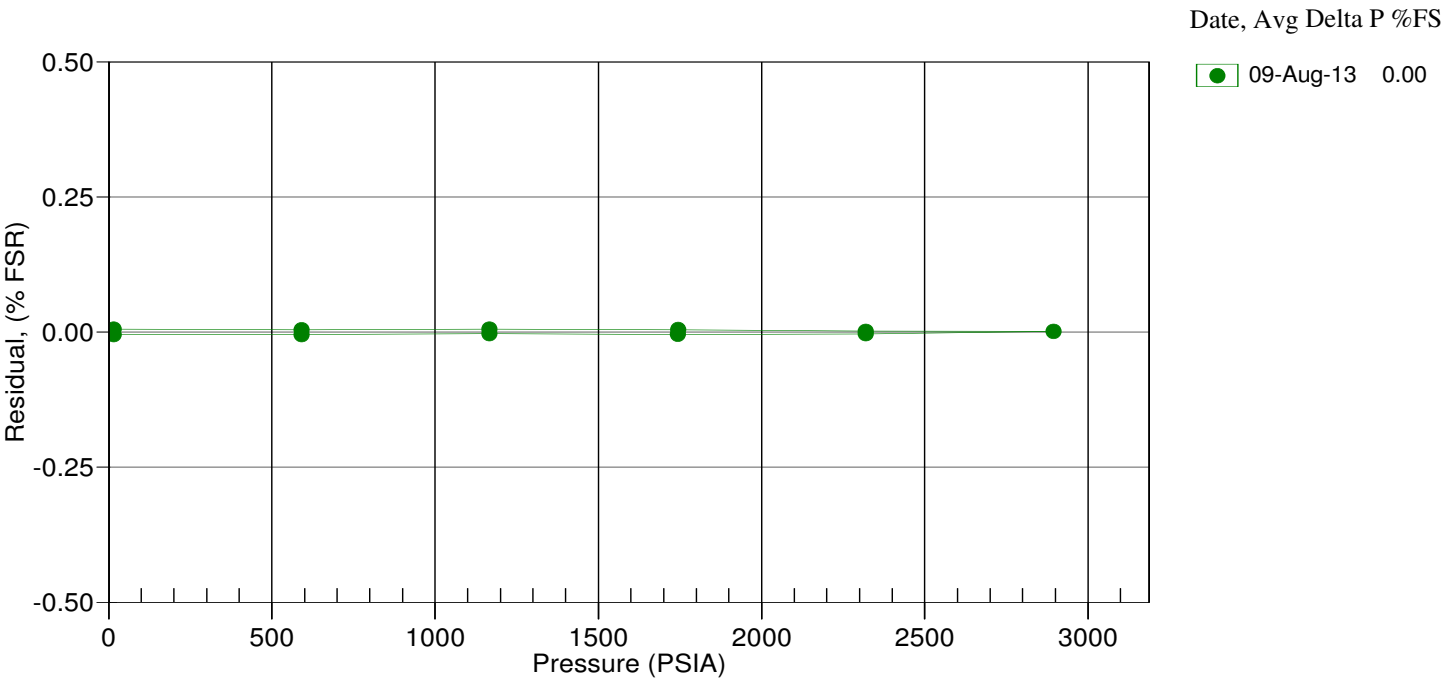
TEMP(ITS90)	SPAN(mV)
-5.70	102.18
36.18	101.83

y = thermistor output; $t = PTHA0 + PTHA1 * y + PTHA2 * y^2$

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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