

SBE 41CP CERTIFICATES

CTD Serial Number 41CP-5398

Instrument Configuration.....	1
DC - Coefficient Output File.....	2
Temperature Calibration Sheet.....	3
Conductivity Calibration Sheet.....	4
Pressure Calibration Sheet.....	5

SEA-BIRD ELECTRONICS, INC.
13431 NE 20th Street
Bellevue, Washington 98005 USA
Phone: (425) 643 9866
Fax: (425) 643 9954
Email: seabird@seabird.com

SBE 41CP Instrument Configuration

Model Number: SBE 41CP

Serial Number: 41CP-5398

Part Number: 90377.030

Description : NKE-PROVOR Configuration

Firmware Version: 2.0

Pressure Type: Kistler

Pressure Range: 2000 Dbar

Pressure Serial Number: 2142631

SBE 41 ALACE-CP-MO V 2.0 SERIAL NO. 5398
temperature: 16-aug-13
TA0 = 6.032699e-06
TA1 = 2.832490e-04
TA2 = -3.149471e-06
TA3 = 1.691058e-07
conductivity: 16-aug-13
G = -9.694422e-01
H = 1.437393e-01
I = -3.654804e-04
J = 4.796342e-05
CPCOR = -9.570001e-08
CTCOR = 3.250000e-06
WBOTC = -3.201483e-07
pressure S/N = 2142631, range = 2900 psia: 09-aug-13
PA0 = 4.065472e-01
PA1 = 1.391074e-01
PA2 = 1.525664e-08
PTCA0 = 4.169974e+01
PTCA1 = -2.906136e-01
PTCA2 = 1.816750e-02
PTCB0 = 1.047175e+02
PTCB1 = -5.332717e-03
PTCB2 = 0.000000e+00
PTHA0 = -9.856990e+01
PTHA1 = 4.123284e-02
PTHA2 = 1.112942e-06
POFFSET = 0.000000e+00

Sea-Bird Electronics, Inc.

13431 NE 20th Street, Bellevue, WA 98005-2010 USA
Phone: (+1) 425-643-9866 Fax (+1) 425-643-9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5398
CALIBRATION DATE: 16-Aug-13

SBE 41cp TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

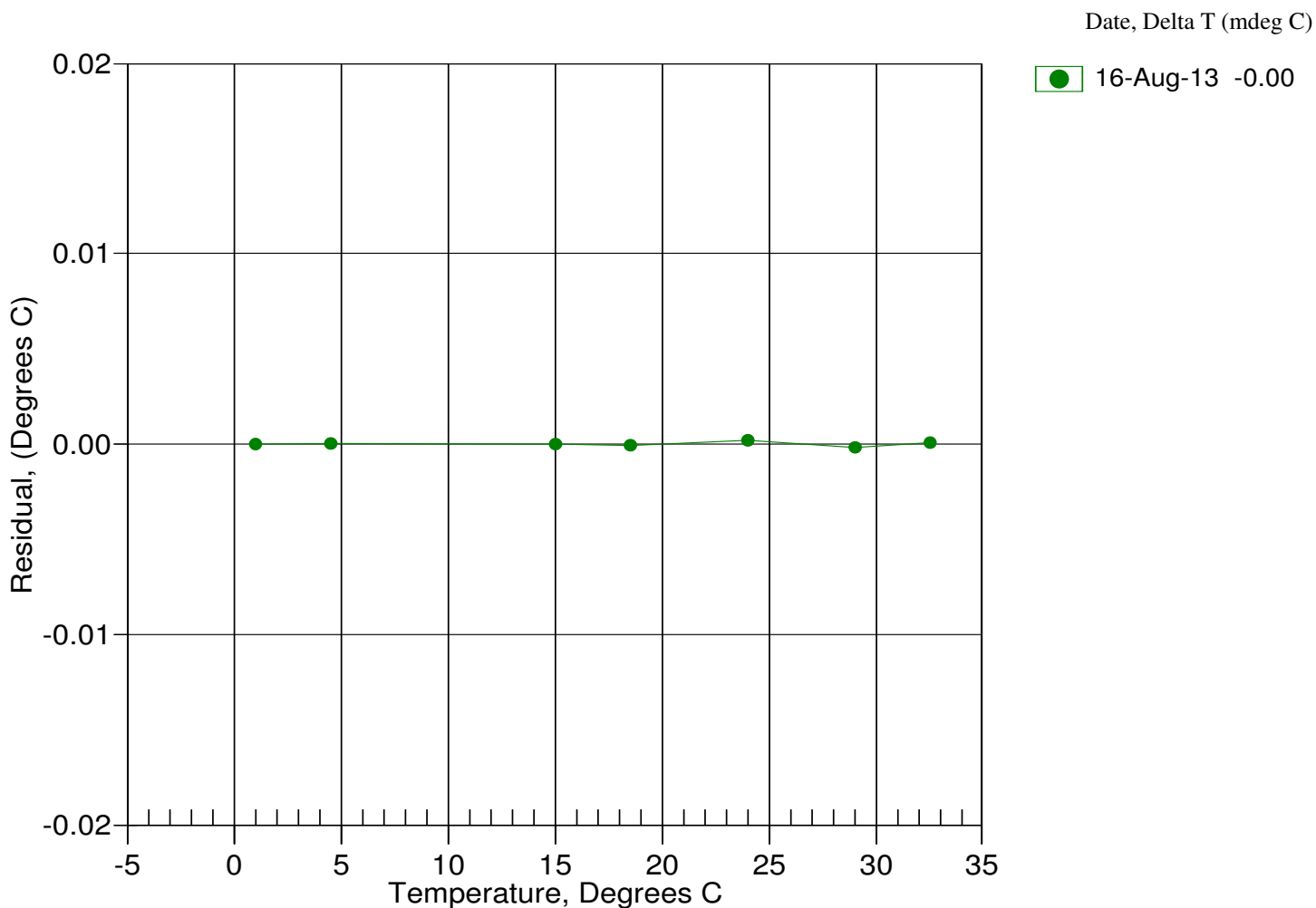
ITS-90 COEFFICIENTS

a0 = 6.032699e-006
a1 = 2.832490e-004
a2 = -3.149471e-006
a3 = 1.691058e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	670791.5	1.0000	-0.0000
4.5000	572272.3	4.5000	0.0000
15.0000	362425.1	15.0000	-0.0000
18.5000	313194.0	18.4999	-0.0001
23.9940	250543.8	23.9942	0.0002
29.0000	205703.8	28.9998	-0.0002
32.5000	179809.6	32.5001	0.0001

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

Residual = instrument temperature - bath temperature



Sea-Bird Electronics, Inc.

13431 NE 20th Street, Bellevue, WA 98005-2010 USA
 Phone: (+1) 425-643-9866 Fax (+1) 425-643-9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5398
 CALIBRATION DATE: 16-Aug-13

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

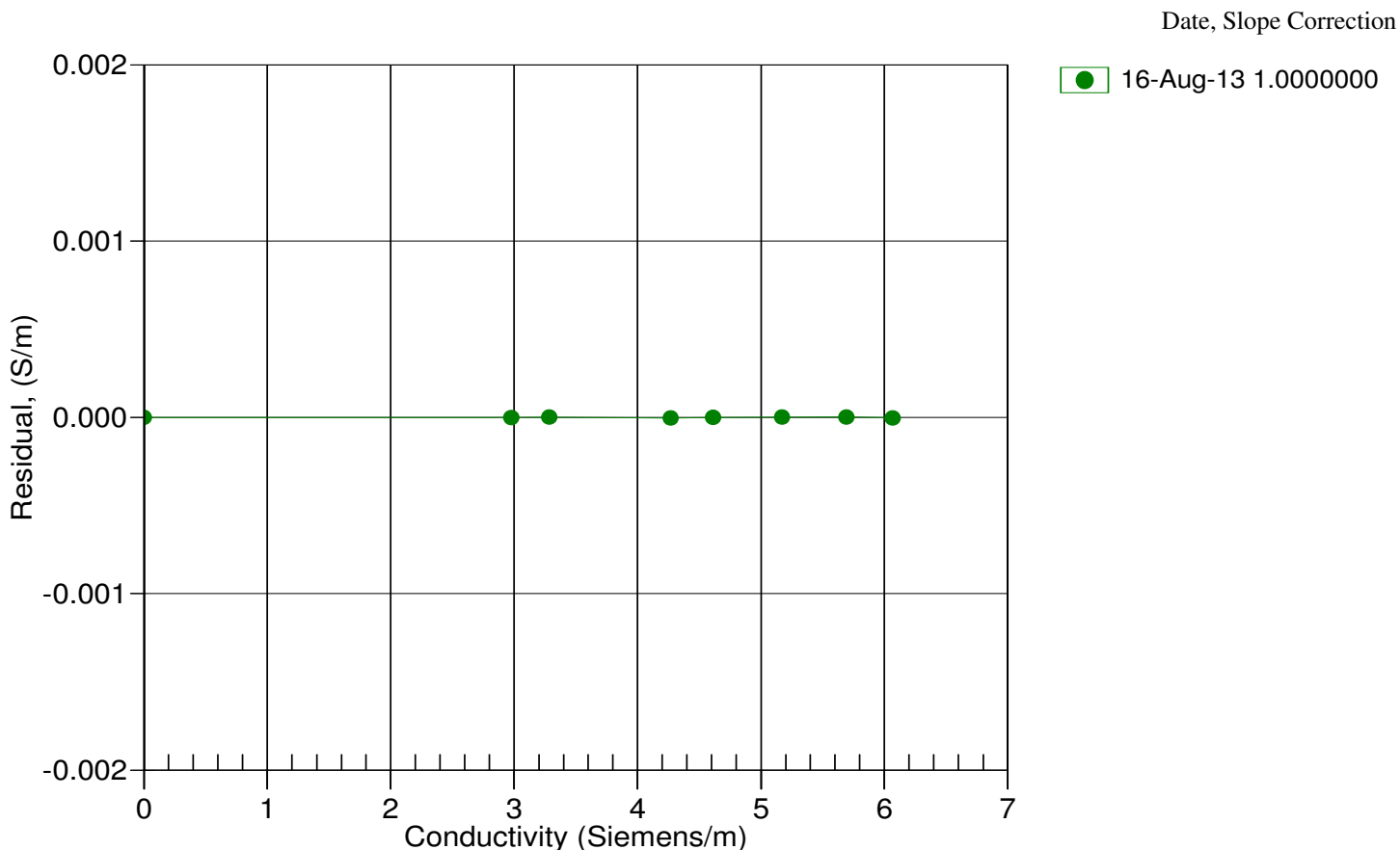
COEFFICIENTS:

g = -9.694421e-001 CPcor = -9.5700e-008
 h = 1.437393e-001 CTcor = 3.2500e-006
 i = -3.654804e-004 WBOTC = -3.2015e-007
 j = 4.796342e-005

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	2602.69	0.00000	0.00000
1.0000	34.8384	2.97767	5251.17	2.97767	-0.00000
4.5000	34.8185	3.28491	5451.18	3.28491	0.00000
15.0000	34.7756	4.26715	6045.56	4.26714	-0.00000
18.5000	34.7665	4.61248	6240.80	4.61247	-0.00000
23.9940	34.7568	5.17013	6543.47	5.17013	0.00000
29.0000	34.7511	5.69284	6814.62	5.69284	0.00000
32.5000	34.7480	6.06543	7001.26	6.06542	-0.00000

$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$
 Conductivity = $(g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p)$ Siemens/meter
 t = temperature[°C]; p = pressure[decibars]; $\delta = \text{CTcor}$; $\epsilon = \text{CPcor}$;

Residual = instrument conductivity - bath conductivity



Sea-Bird Electronics, Inc.

13431 NE 20th Street, Bellevue, WA 98005-2010 USA
 Phone: (+1) 425-643-9866 Fax (+1) 425-643-9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5398
 CALIBRATION DATE: 09-Aug-13

SBE 41cp PRESSURE CALIBRATION DATA
 2900 psia S/N 2142631

COEFFICIENTS:

PA0 = 4.065472e-001	PTCA0 = 4.169974e+001
PA1 = 1.391074e-001	PTCA1 = -2.906136e-001
PA2 = 1.525664e-008	PTCA2 = 1.816750e-002
PTHA0 = -9.856990e+001	PTCB0 = 1.047175e+002
PTHA1 = 4.123284e-002	PTCB1 = -5.332717e-003
PTHA2 = 1.112942e-006	PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.56	146.5	2744.7	14.60	0.00
591.16	4285.1	2746.3	591.25	0.00
1167.60	8419.0	2746.7	1167.78	0.01
1744.11	12548.9	2747.2	1744.28	0.01
2320.60	16674.5	2747.5	2320.69	0.00
2896.85	20794.5	2747.8	2896.85	-0.00
2320.71	16673.8	2747.3	2320.59	-0.00
1744.35	12548.6	2746.8	1744.23	-0.00
1167.66	8417.1	2746.8	1167.52	-0.00
591.17	4283.1	2746.5	590.97	-0.01
14.56	146.4	2749.2	14.57	0.00

THERMAL CORRECTION

TEMP ITS90	PRESS TEMP	INST OUTPUT
32.50	2944.60	158.59
29.00	2871.60	155.61
23.99	2765.90	152.28
18.50	2649.70	149.65
15.00	2575.20	148.50
4.50	2350.90	147.99
1.00	2274.90	148.44

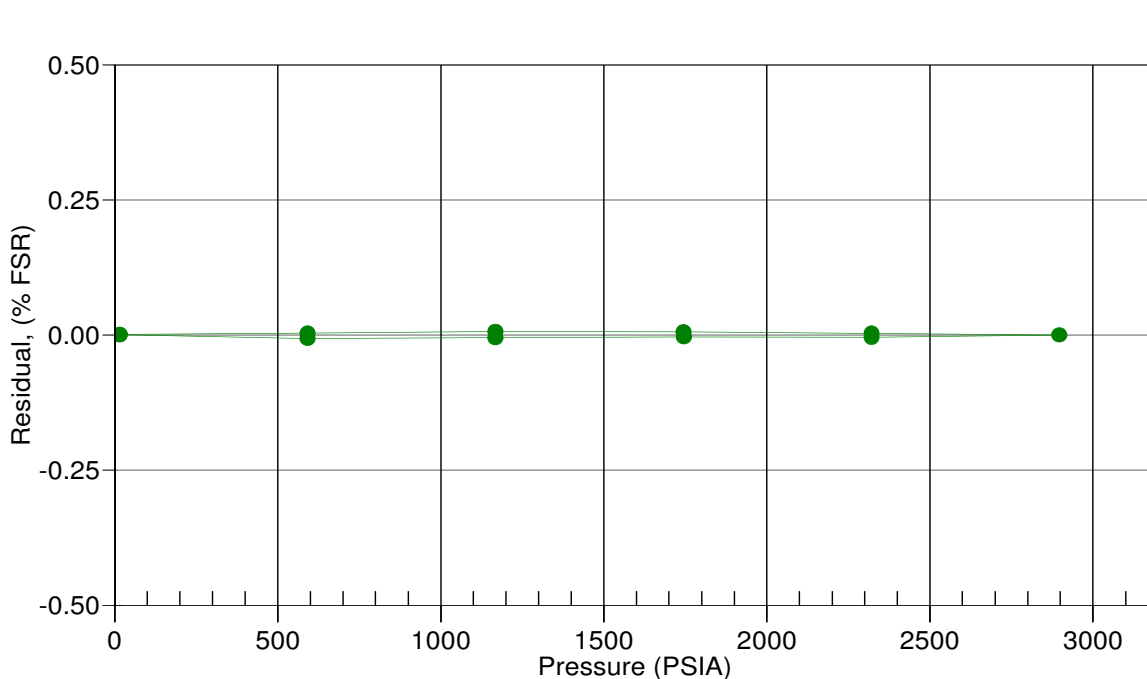
TEMP (ITS90)	SPAN (mV)
-6.49	104.75
36.80	104.52

$$y = \text{thermistor output}; t = \text{PTHA0} + \text{PTHA1} * y + \text{PTHA2} * y^2$$

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

$$n = x * \text{PTCB0} / (\text{PTCB0} + \text{PTCB1} * t + \text{PTCB2} * t^2)$$

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



Date, Avg Delta P %FS

09-Aug-13 -0.00