

SBE 41 CERTIFICATES

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

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SBE 41 Instrument Configuration

Model Number: SBE 41

Serial Number: 41-6301

Part Number: 90359.073

Description: APEX Standard Configuration

Firmware Version: 3.0

Pressure Type: Druck

Pressure Range: 2000 Dbar

Pressure Serial Number: 3847191

SBE 41-STD V 3.0 SERIAL NO. 6301

temperature: 30-jun-13

TA0 = 5.076883e-05

TA1 = 2.778361e-04

TA2 = -2.751843e-06

TA3 = 1.595946e-07

conductivity: 30-jun-13

G = -9.882268e-01

H = 1.451174e-01

I = -3.542904e-04

J = 4.692975e-05

CPCOR = -9.570001e-08

CTCOR = 3.250000e-06

WBOTC = -1.593143e-07

pressure S/N = 3847191, range = 2900 psia: 25-jun-13

PA0 = 3.926066e-01

PA1 = 1.405353e-01

PA2 = -4.192168e-08

PTCA0 = 3.159650e+01

PTCA1 = 1.828051e-01

PTCA2 = -2.604333e-03

PTCB0 = 2.534525e+01

PTCB1 = -1.150000e-03

PTCB2 = 0.000000e+00

PTHA0 = -7.310030e+01

PTHA1 = 5.290226e-02

PTHA2 = -8.640462e-07

POFFSET = 0.000000e+00

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SENSOR SERIAL NUMBER: 6301
CALIBRATION DATE: 30-Jun-13

SBE 41 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

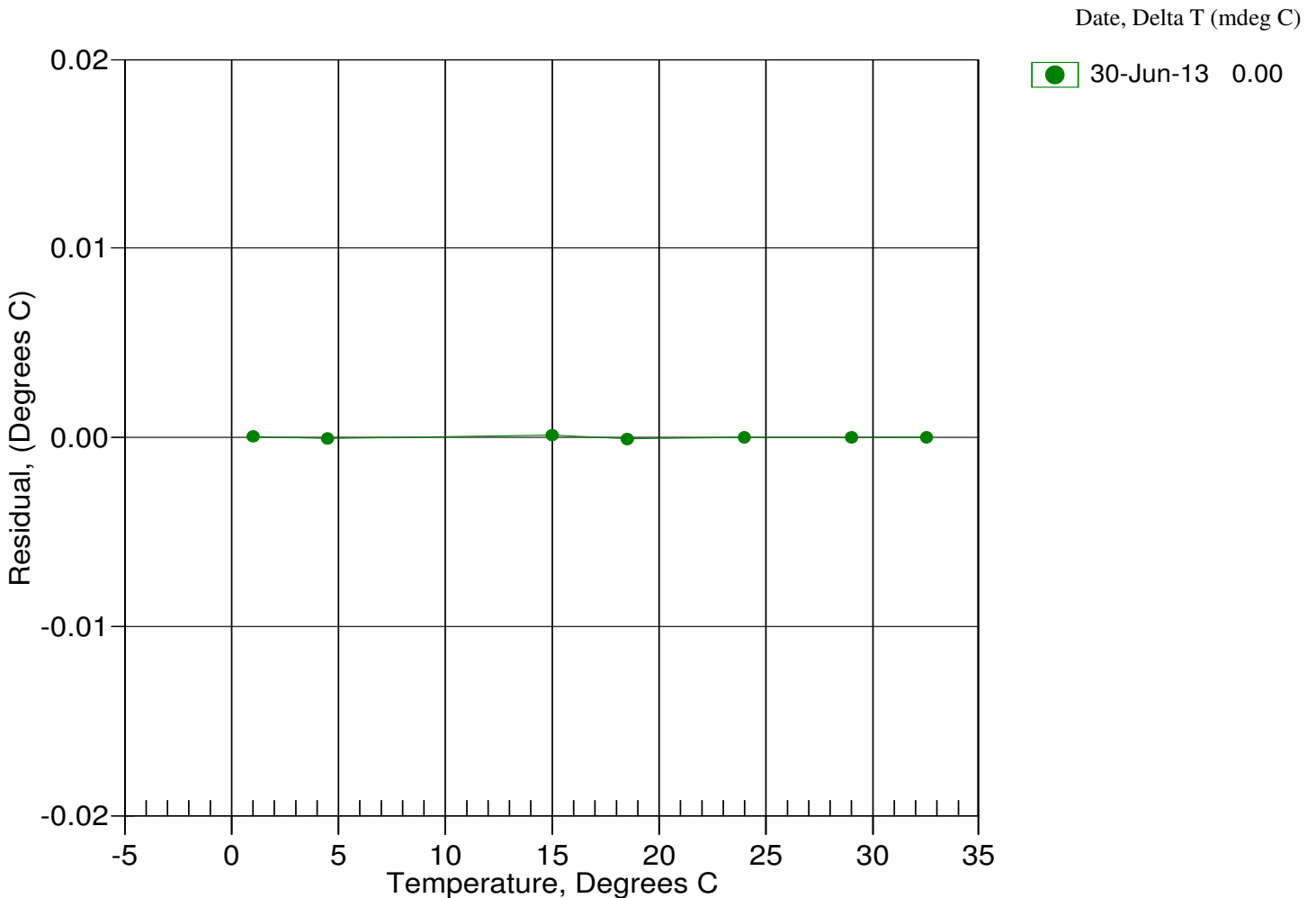
ITS-90 COEFFICIENTS

a0 = 5.076883e-005
a1 = 2.778361e-004
a2 = -2.751843e-006
a3 = 1.595946e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	624524.3	1.0000	0.0000
4.5000	532686.6	4.4999	-0.0001
15.0000	337139.7	15.0001	0.0001
18.5000	291286.1	18.4999	-0.0001
23.9940	232947.0	23.9940	-0.0000
29.0000	191199.8	29.0000	-0.0000
32.5000	167100.2	32.5000	0.0000

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



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

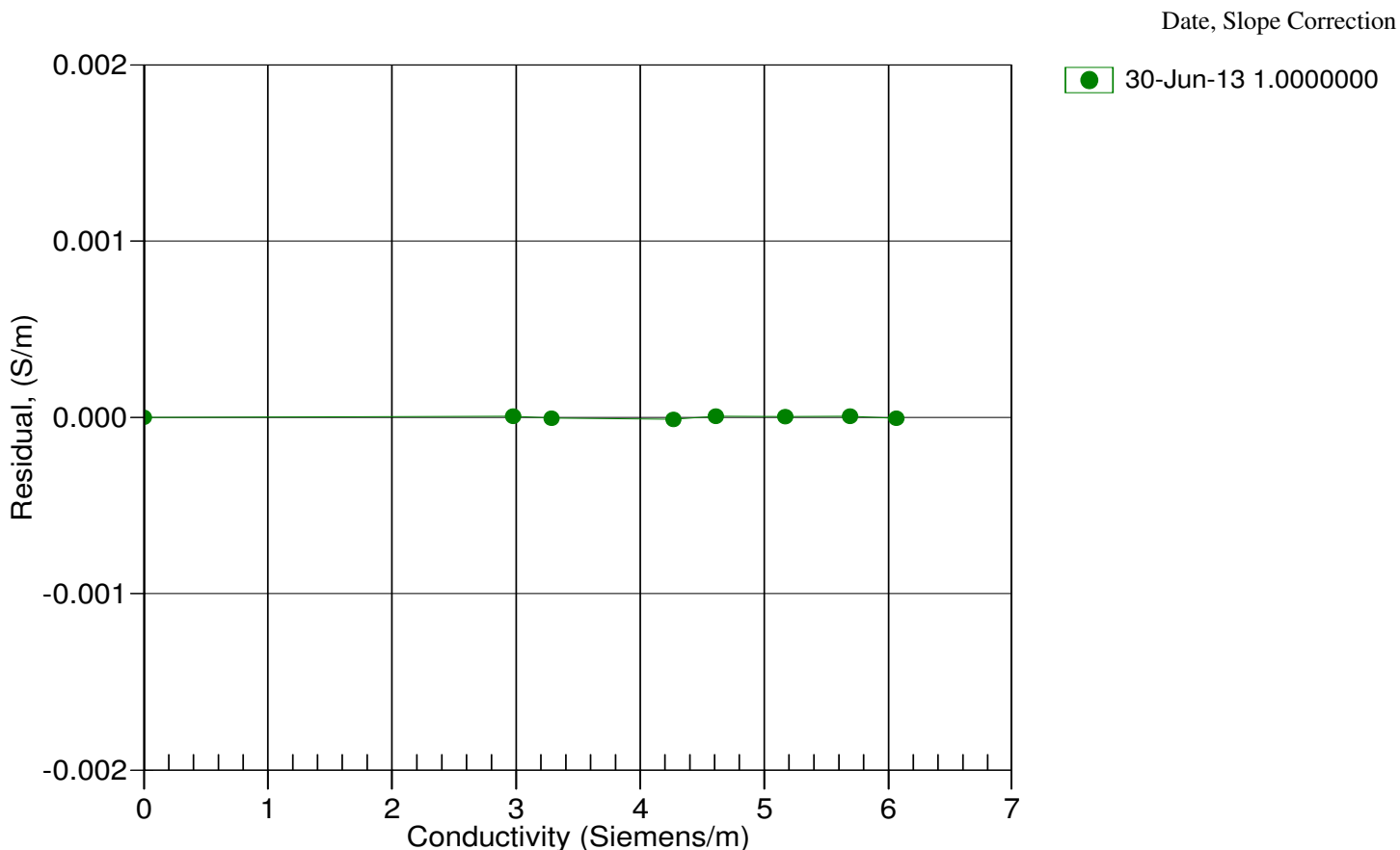
COEFFICIENTS:

g = -9.882268e-001	CPcor = -9.5700e-008
h = 1.451174e-001	CTcor = 3.2500e-006
i = -3.542904e-004	WBOTC = -1.5931e-007
j = 4.692975e-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	2615.03	0.00000	0.00000
1.0000	34.8290	2.97695	5237.50	2.97695	0.00001
4.5000	34.8095	3.28415	5436.07	3.28414	-0.00000
15.0000	34.7674	4.26625	6026.42	4.26624	-0.00001
18.5000	34.7586	4.61154	6220.40	4.61155	0.00001
23.9940	34.7493	5.16914	6521.15	5.16914	0.00000
29.0000	34.7446	5.69190	6790.68	5.69190	0.00001
32.5000	34.7330	6.06311	6975.54	6.06310	-0.00001

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

Residual = instrument conductivity - bath conductivity



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 CALIBRATION DATE: 25-Jun-13

SBE 41 PRESSURE CALIBRATION DATA
 2900 psia S/N 3847191

COEFFICIENTS:

PA0 = 3.926066e-001	PTCA0 = 3.159650e+001
PA1 = 1.405353e-001	PTCA1 = 1.828051e-001
PA2 = -4.192168e-008	PTCA2 = -2.604333e-003
PTHA0 = -7.310030e+001	PTCB0 = 2.534525e+001
PTHA1 = 5.290226e-002	PTCB1 = -1.150000e-003
PTHA2 = -8.640462e-007	PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.48	134.8	1862.6	14.52	0.00
590.68	4236.0	1864.5	590.73	0.00
1166.67	8346.4	1866.2	1166.82	0.01
1742.77	12466.8	1867.5	1742.89	0.00
2318.78	16596.4	1868.6	2318.82	0.00
2894.57	20735.1	1869.8	2894.58	0.00
2318.83	16595.9	1869.3	2318.75	-0.00
1743.10	12467.6	1869.4	1743.01	-0.00
1166.88	8346.1	1869.3	1166.78	-0.00
590.84	4235.7	1868.8	590.69	-0.01
14.48	134.5	1868.9	14.47	-0.00

THERMAL CORRECTION

TEMP ITS90	PRESS TEMP	INST OUTPUT
32.50	2065.40	140.91
29.00	1995.80	141.19
23.99	1893.70	140.99
18.50	1783.30	140.36
15.00	1713.10	139.84
4.50	1504.30	138.76
1.00	1434.00	138.08

TEMP (ITS90)	SPAN (mV)
-5.00	25.35
35.00	25.31

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

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

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

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

Date, Avg Delta P %FS

25-Jun-13 0.00

