

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: 41-6317

Part Number: 90359.073

Description: APEX Standard Configuration

Firmware Version: 3.0

Pressure Type: Druck

Pressure Range: 2000 Dbar

Pressure Serial Number: 3847914

SBE 41-STD V 3.0 SERIAL NO. 6317

temperature: 09-jul-13

TA0 = 2.335756e-05

TA1 = 2.664310e-04

TA2 = -1.933043e-06

TA3 = 1.350562e-07

conductivity: 09-jul-13

G = -9.804593e-01

H = 1.412905e-01

I = -2.213885e-04

J = 3.697675e-05

CPCOR = -9.570001e-08

CTCOR = 3.250000e-06

WBOTC = 1.895653e-07

pressure S/N = 3847914, range = 2900 psia: 03-jul-13

PA0 = 2.617577e+00

PA1 = 1.407704e-01

PA2 = -4.075639e-08

PTCA0 = 3.709768e+01

PTCA1 = 8.321774e-01

PTCA2 = -4.649752e-04

PTCB0 = 2.529150e+01

PTCB1 = 5.000000e-04

PTCB2 = 0.000000e+00

PTHA0 = -6.890626e+01

PTHA1 = 5.219730e-02

PTHA2 = -5.083972e-07

POFFSET = 0.000000e+00

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SENSOR SERIAL NUMBER: 6317
CALIBRATION DATE: 09-Jul-13

SBE 41 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

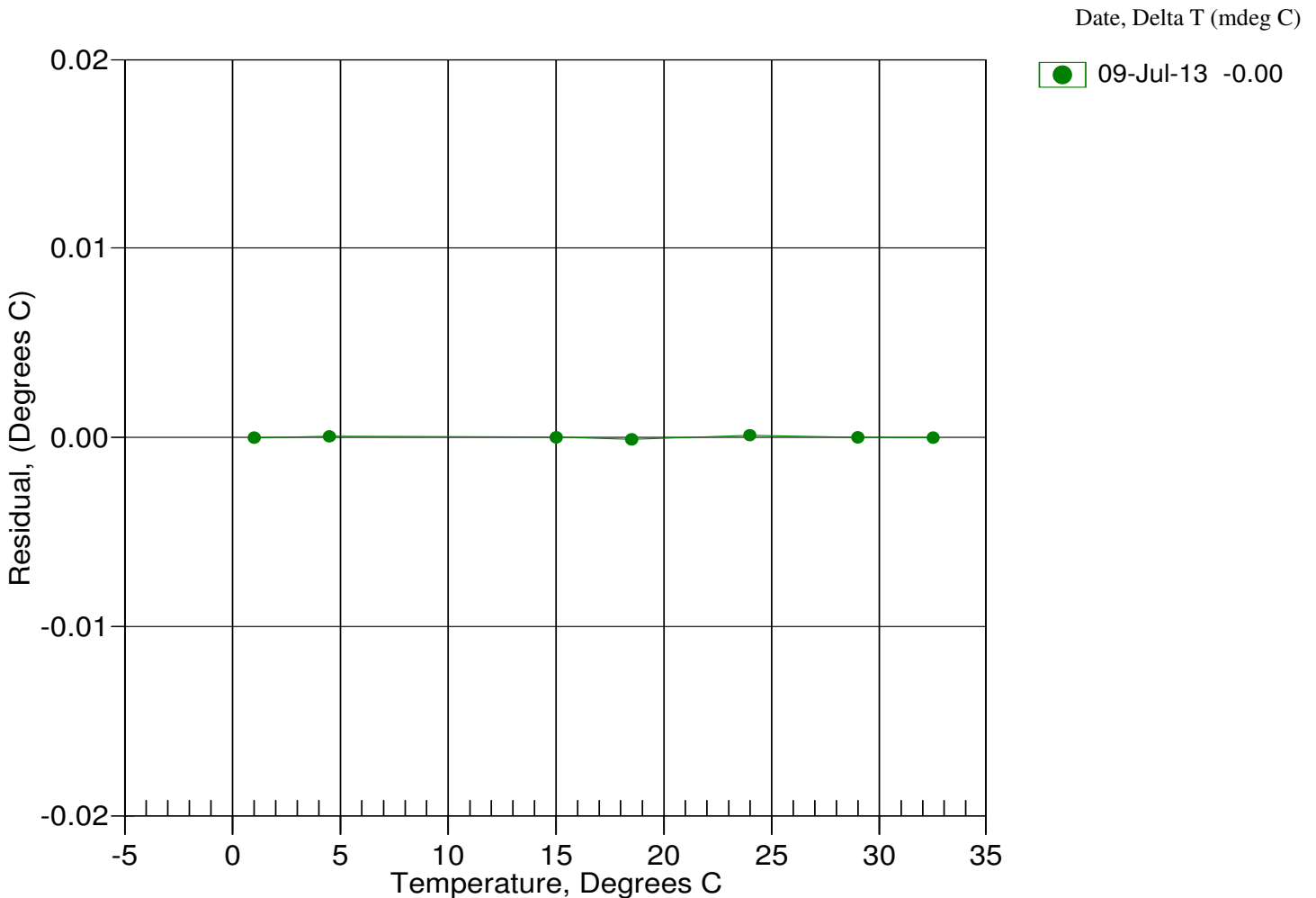
ITS-90 COEFFICIENTS

a0 = 2.335756e-005
a1 = 2.664310e-004
a2 = -1.933043e-006
a3 = 1.350562e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	859792.1	1.0000	-0.0000
4.5000	733192.1	4.5001	0.0001
15.0000	463757.6	15.0000	0.0000
18.5000	400600.5	18.4999	-0.0001
23.9939	320265.5	23.9940	0.0001
29.0001	262791.1	29.0001	-0.0000
32.5000	229620.6	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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SENSOR SERIAL NUMBER: 6317
CALIBRATION DATE: 09-Jul-13

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

COEFFICIENTS:

g = -9.804593e-001	CPcor = -9.5700e-008
h = 1.412905e-001	CTcor = 3.2500e-006
i = -2.213885e-004	WBOTC = 1.8957e-007
j = 3.697675e-005	

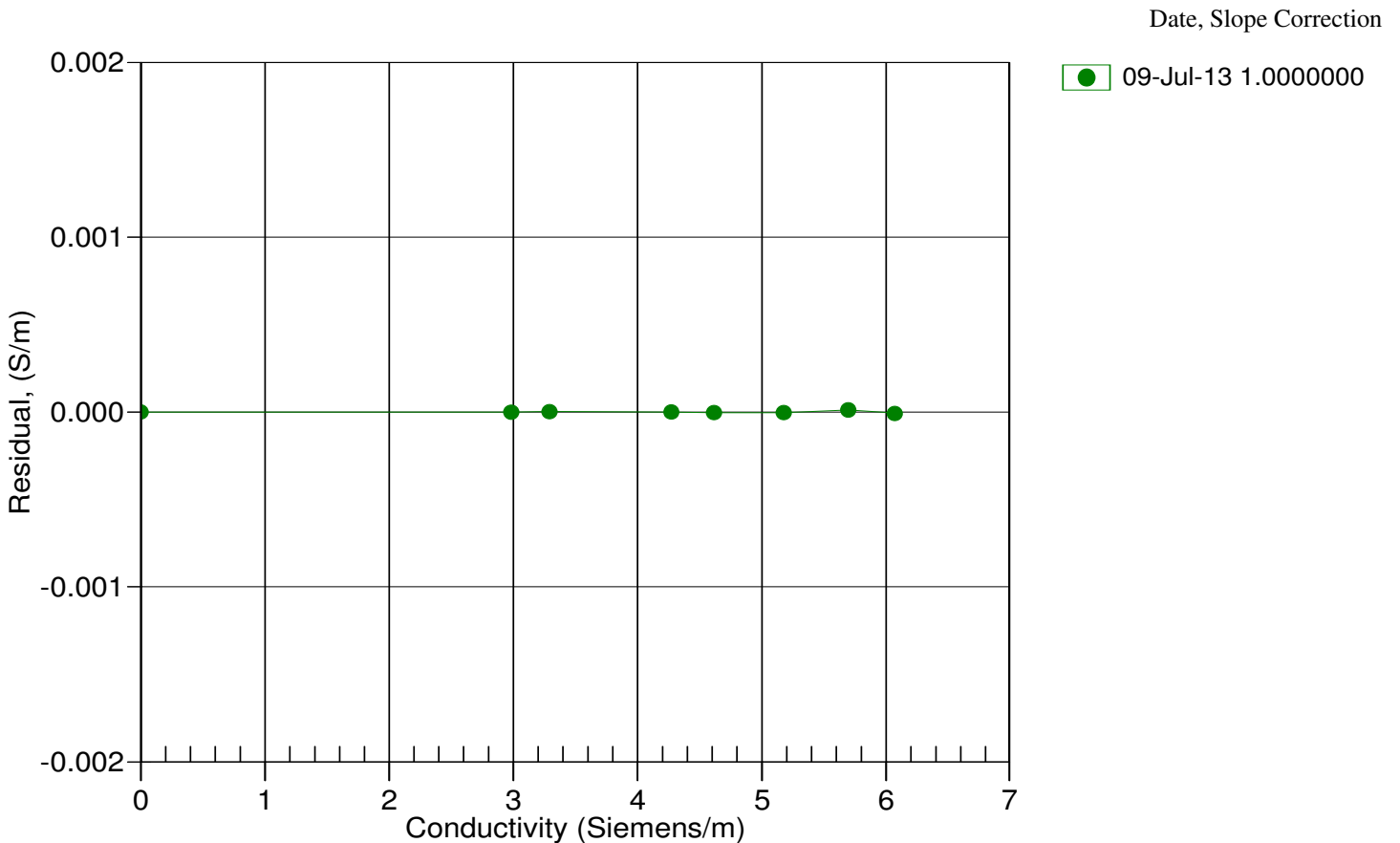
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2637.30	0.00000	0.00000
1.0000	34.8679	2.97995	5296.90	2.97995	-0.00000
4.5000	34.8483	3.28745	5498.02	3.28745	0.00000
15.0000	34.8062	4.27051	6095.84	4.27051	0.00000
18.5000	34.7972	4.61611	6292.24	4.61610	-0.00000
23.9939	34.7872	5.17414	6596.72	5.17414	-0.00000
29.0001	34.7806	5.69714	6869.52	5.69715	0.00001
32.5000	34.7754	6.06966	7057.18	6.06966	-0.00001

$$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$$

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

$$t = \text{temperature}[^{\circ}\text{C}]; p = \text{pressure}[\text{decibars}]; \delta = \text{CTcor}; \epsilon = \text{CPcor};$$

$$\text{Residual} = \text{instrument conductivity} - \text{bath conductivity}$$



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SENSOR SERIAL NUMBER: 6317
CALIBRATION DATE: 03-Jul-13

SBE 41 PRESSURE CALIBRATION DATA
2900 psia S/N 3847914

COEFFICIENTS:

PA0 = 2.617577e+000	PTCA0 = 3.709768e+001
PA1 = 1.407704e-001	PTCA1 = 8.321774e-001
PA2 = -4.075639e-008	PTCA2 = -4.649752e-004
PTHA0 = -6.890626e+001	PTCB0 = 2.529150e+001
PTHA1 = 5.219730e-002	PTCB1 = 5.000000e-004
PTHA2 = -5.083972e-007	PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.58	141.1	1784.9	14.63	0.00
590.95	4242.4	1786.8	590.99	0.00
1167.25	8353.9	1788.0	1167.41	0.01
1743.48	12474.0	1789.4	1743.65	0.01
2319.71	16603.4	1790.9	2319.80	0.00
2895.68	20740.6	1791.8	2895.65	-0.00
2319.75	16602.4	1791.4	2319.66	-0.00
1743.72	12473.9	1791.1	1743.62	-0.00
1167.37	8352.7	1791.0	1167.22	-0.01
590.96	4241.0	1790.9	590.77	-0.01
14.58	141.1	1790.3	14.60	0.00

THERMAL CORRECTION

TEMP ITS90	PRESS TEMP	INST OUTPUT
32.50	1980.80	152.76
29.00	1911.50	150.14
23.99	1811.60	146.16
18.50	1703.40	141.57
15.00	1632.90	138.53
4.50	1426.10	130.06
1.00	1357.30	127.18

TEMP (ITS90)	SPAN (mV)
-5.00	25.29
35.00	25.31

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

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

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

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

