

SBE 41 CERTIFICATES

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SBE 41 Instrument Configuration

Model Number: SBE 41

Serial Number: 41-6312

Part Number: 90359.073

Description: APEX Standard Configuration

Firmware Version: 3.0

Pressure Type: Druck

Pressure Range: 2000 Dbar

Pressure Serial Number: 3819191

SBE 41-STD V 3.0 SERIAL NO. 6312

temperature: 03-jul-13

TA0 = 5.307438e-05

TA1 = 2.772657e-04

TA2 = -2.661287e-06

TA3 = 1.586376e-07

conductivity: 03-jul-13

G = -9.931052e-01

H = 1.424024e-01

I = -3.105311e-04

J = 4.191389e-05

CPCOR = -9.570001e-08

CTCOR = 3.250000e-06

WBOTC = -1.574678e-07

pressure S/N = 3819191, range = 2900 psia: 28-jun-13

PA0 = 1.210359e+00

PA1 = 1.407133e-01

PA2 = -3.976192e-08

PTCA0 = 6.230358e+01

PTCA1 = 3.130151e-01

PTCA2 = 2.978286e-03

PTCB0 = 2.519813e+01

PTCB1 = -1.750000e-04

PTCB2 = 0.000000e+00

PTHA0 = -6.811325e+01

PTHA1 = 5.157663e-02

PTHA2 = -2.729408e-07

POFFSET = 0.000000e+00

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SENSOR SERIAL NUMBER: 6312
CALIBRATION DATE: 03-Jul-13

SBE 41 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

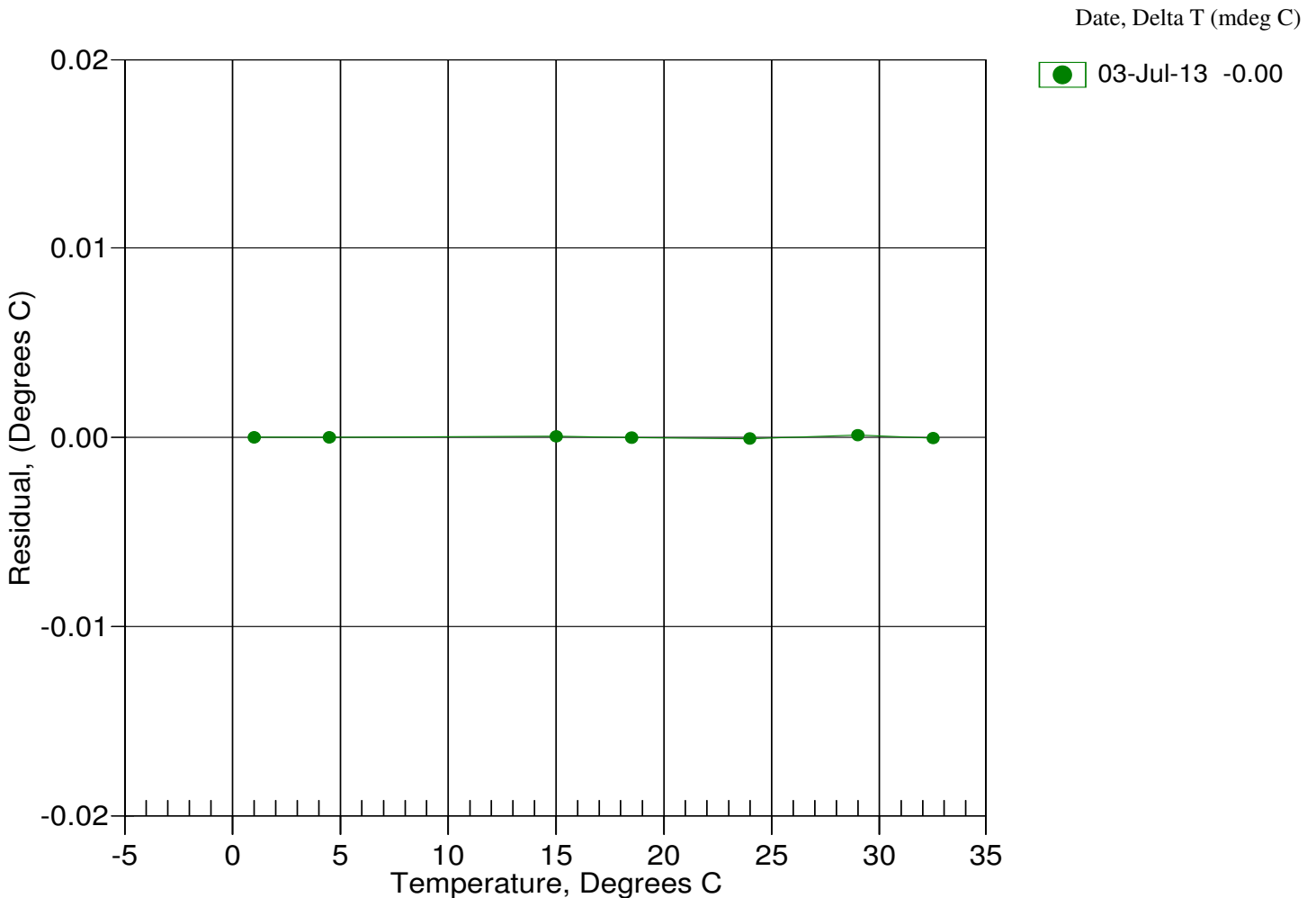
ITS-90 COEFFICIENTS

a0 = 5.307438e-005
a1 = 2.772657e-004
a2 = -2.661287e-006
a3 = 1.586376e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	606446.1	1.0000	0.0000
4.4999	517583.4	4.4999	-0.0000
15.0000	328153.4	15.0000	0.0000
18.5000	283677.3	18.5000	-0.0000
23.9940	227054.3	23.9939	-0.0001
29.0000	186499.2	29.0001	0.0001
32.5000	163074.7	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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CALIBRATION DATE: 03-Jul-13

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

COEFFICIENTS:

g = -9.931052e-001	CPcor = -9.5700e-008
h = 1.424024e-001	CTcor = 3.2500e-006
i = -3.105311e-004	WBOTC = -1.5747e-007
j = 4.191389e-005	

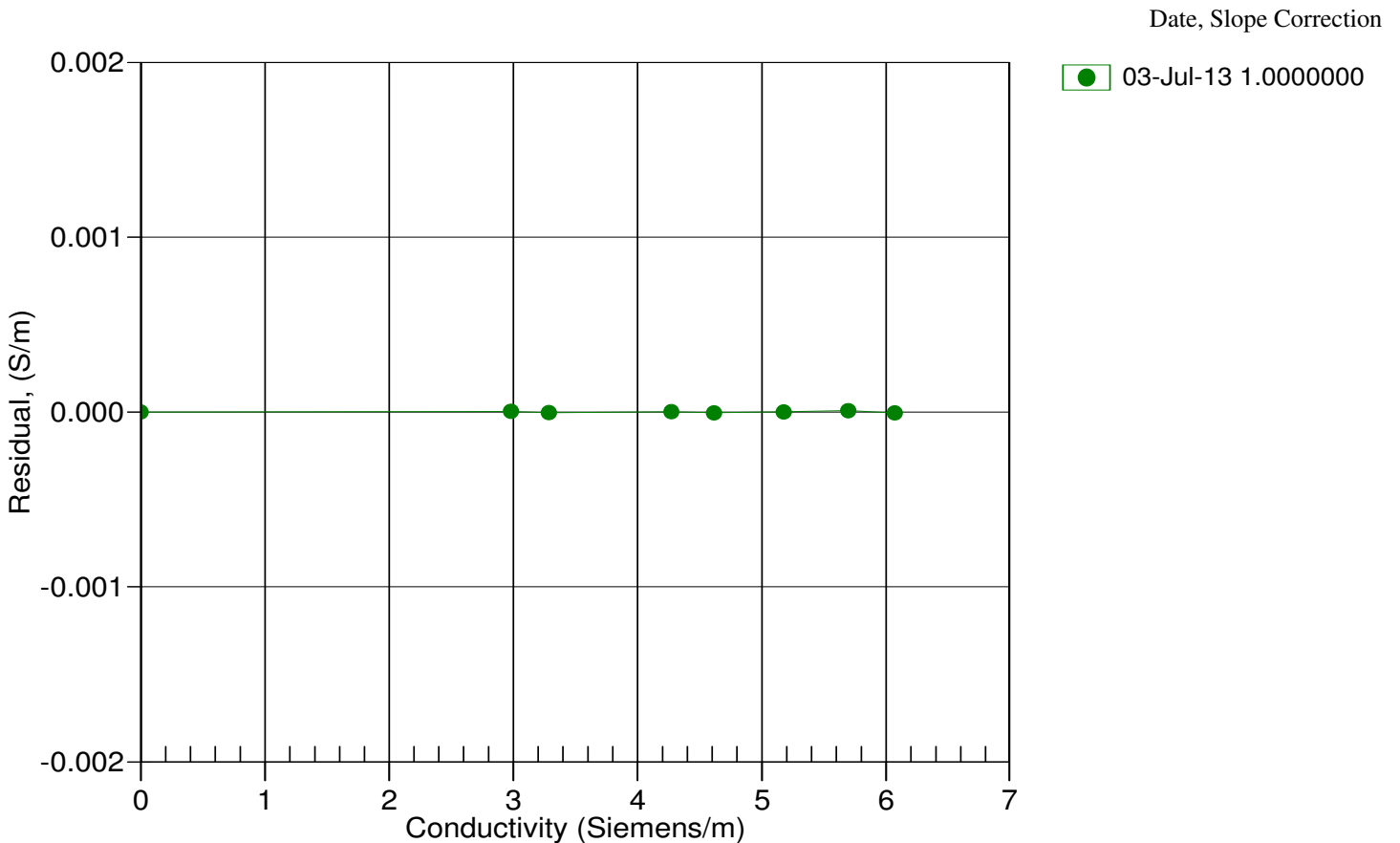
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2645.74	0.00000	0.00000
1.0000	34.8597	2.97932	5290.39	2.97932	0.00000
4.4999	34.8401	3.28674	5490.75	3.28674	-0.00000
15.0000	34.7976	4.26956	6086.51	4.26956	0.00000
18.5000	34.7887	4.61510	6282.28	4.61510	-0.00000
23.9940	34.7788	5.17304	6585.82	5.17304	0.00000
29.0000	34.7734	5.69608	6857.86	5.69609	0.00001
32.5000	34.7705	6.06891	7045.15	6.06890	-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: 6312
 CALIBRATION DATE: 28-Jun-13

SBE 41 PRESSURE CALIBRATION DATA
 2900 psia S/N 3819191

COEFFICIENTS:

PA0 = 1.210359e+000	PTCA0 = 6.230358e+001
PA1 = 1.407133e-001	PTCA1 = 3.130151e-001
PA2 = -3.976192e-008	PTCA2 = 2.978286e-003
PTHA0 = -6.811325e+001	PTCB0 = 2.519813e+001
PTHA1 = 5.157663e-002	PTCB1 = -1.750000e-004
PTHA2 = -2.729408e-007	PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.66	166.8	1775.7	14.71	0.00
591.40	4270.1	1778.1	591.48	0.00
1168.04	8382.7	1779.5	1168.22	0.01
1744.63	12503.7	1780.8	1744.78	0.01
2321.25	16634.0	1782.0	2321.30	0.00
2897.63	20772.7	1783.4	2897.62	-0.00
2321.30	16633.5	1783.1	2321.23	-0.00
1744.91	12503.8	1782.6	1744.79	-0.00
1168.08	8380.9	1782.5	1167.96	-0.00
591.42	4268.5	1782.2	591.24	-0.01
14.66	166.6	1782.4	14.66	-0.00

THERMAL CORRECTION

TEMP ITS90	PRESS TEMP	INST OUTPUT
32.50	1970.50	175.94
29.00	1902.90	174.35
23.99	1803.60	172.04
18.50	1694.60	169.51
15.00	1624.40	167.88
4.50	1418.90	164.34
1.00	1349.60	162.93

TEMP (ITS90)	SPAN (mV)
-5.00	25.20
35.00	25.19

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

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

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

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

