

SBE 41 CERTIFICATES

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SBE 41 Instrument Configuration

Model Number: SBE 41

Serial Number: 41-6297

Part Number: 90359.073

Description: APEX Standard Configuration

Firmware Version: 3.0

Pressure Type: Druck

Pressure Range: 2000 Dbar

Pressure Serial Number: 3819485

SBE 41-STD V 3.0 SERIAL NO. 6297

temperature: 02-jul-13

TA0 = 7.785185e-05

TA1 = 2.618031e-04

TA2 = -1.531490e-06

TA3 = 1.259402e-07

conductivity: 02-jul-13

G = -9.784135e-01

H = 1.444519e-01

I = -2.502324e-04

J = 3.862539e-05

CPCOR = -9.570001e-08

CTCOR = 3.250000e-06

WBOTC = 3.197271e-08

pressure S/N = 3819485, range = 2900 psia: 26-jun-13

PA0 = 4.549245e-01

PA1 = 1.403232e-01

PA2 = -4.071291e-08

PTCA0 = 6.400446e+01

PTCA1 = 1.741320e-01

PTCA2 = -1.116398e-03

PTCB0 = 2.533912e+01

PTCB1 = -1.750000e-04

PTCB2 = 0.000000e+00

PTHA0 = -6.767030e+01

PTHA1 = 5.334823e-02

PTHA2 = -7.665818e-07

POFFSET = 0.000000e+00

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SENSOR SERIAL NUMBER: 6297
CALIBRATION DATE: 02-Jul-13

SBE 41 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

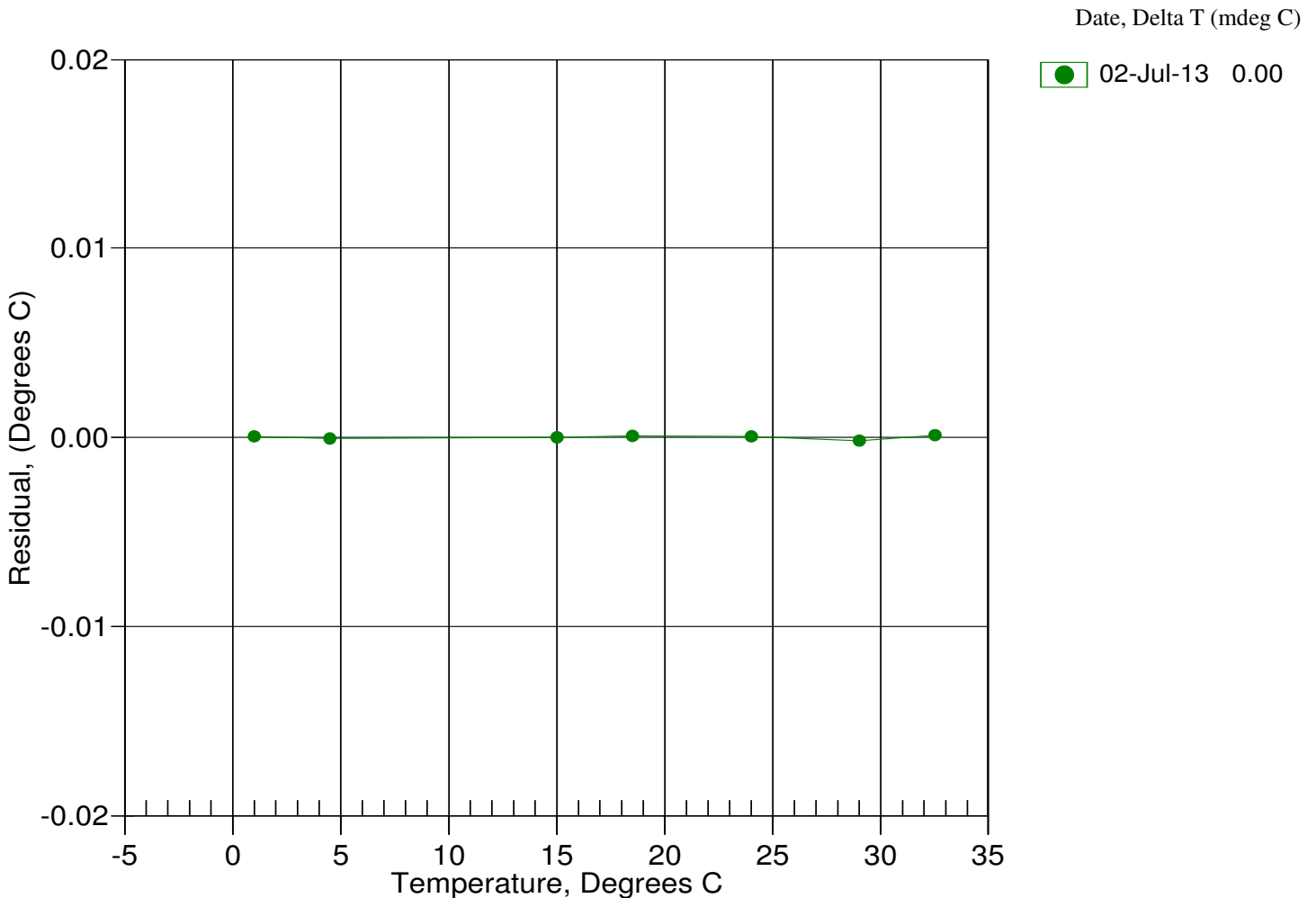
ITS-90 COEFFICIENTS

a0 = 7.785185e-005
a1 = 2.618031e-004
a2 = -1.531490e-006
a3 = 1.259402e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	741354.8	1.0000	0.0000
4.5000	632261.1	4.4999	-0.0001
15.0000	400036.7	15.0000	-0.0000
18.5000	345590.5	18.5001	0.0001
23.9940	276332.9	23.9940	0.0000
29.0000	226778.0	28.9998	-0.0002
32.5001	198168.9	32.5002	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



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 CALIBRATION DATE: 02-Jul-13

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

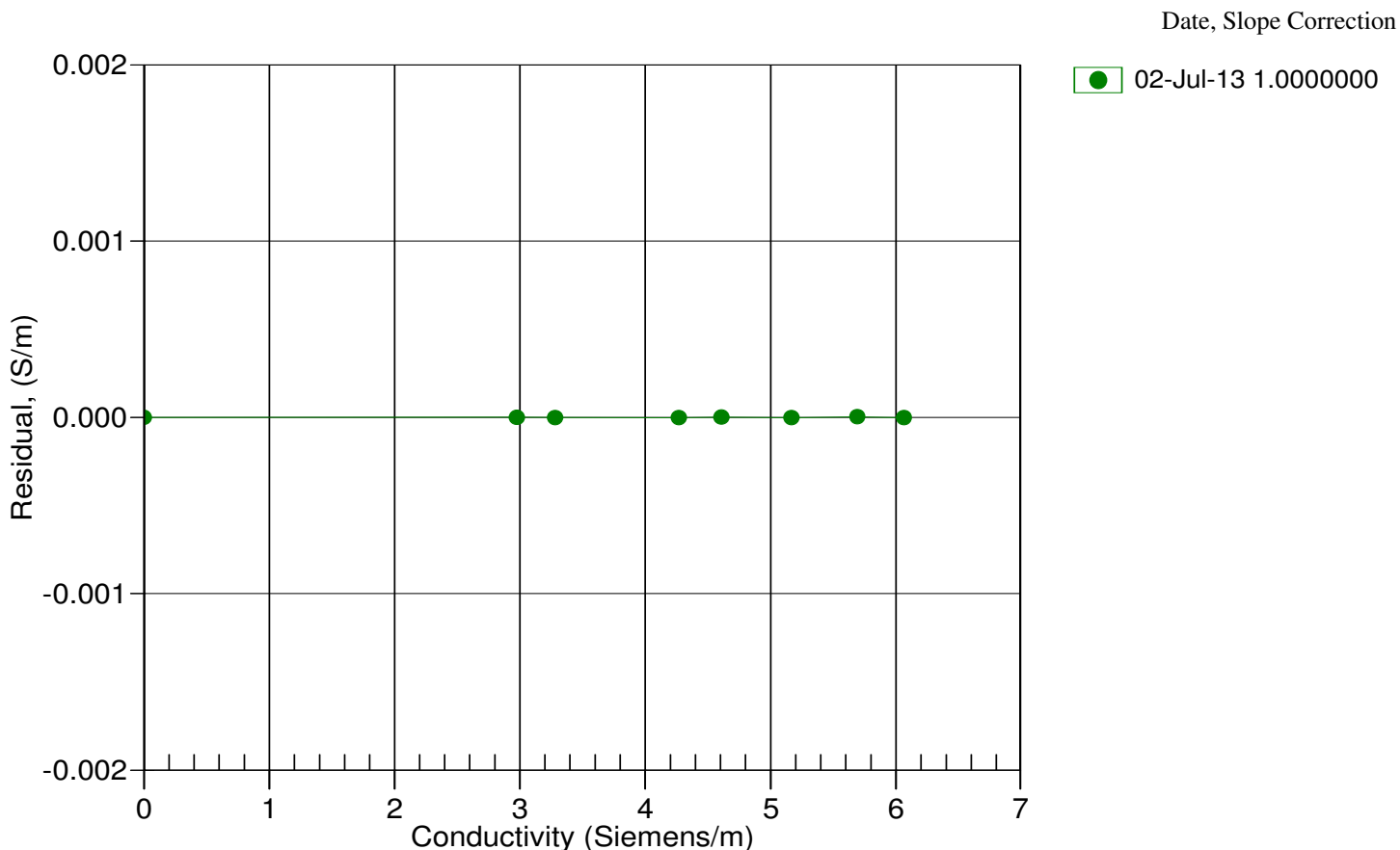
COEFFICIENTS:

g = -9.784135e-001 CPcor = -9.5700e-008
 h = 1.444519e-001 CTcor = 3.2500e-006
 i = -2.502324e-004 WBOTC = 3.1973e-008
 j = 3.862539e-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	2606.07	0.00000	0.00000
1.0000	34.8097	2.97545	5236.34	2.97546	0.00000
4.5000	34.7907	3.28255	5435.31	3.28255	-0.00000
15.0000	34.7497	4.26431	6026.75	4.26430	-0.00000
18.5000	34.7408	4.60943	6221.06	4.60944	0.00000
23.9940	34.7313	5.16676	6522.33	5.16676	-0.00000
29.0000	34.7257	5.68915	6792.28	5.68915	0.00000
32.5001	34.7209	6.06124	6978.01	6.06124	-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



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SENSOR SERIAL NUMBER: 6297
 CALIBRATION DATE: 26-Jun-13

SBE 41 PRESSURE CALIBRATION DATA
 2900 psia S/N 3819485

COEFFICIENTS:

PA0 = 4.549245e-001	PTCA0 = 6.400446e+001
PA1 = 1.403232e-001	PTCA1 = 1.741320e-001
PA2 = -4.071291e-008	PTCA2 = -1.116398e-003
PTHA0 = -6.767030e+001	PTCB0 = 2.533912e+001
PTHA1 = 5.334823e-002	PTCB1 = -1.750000e-004
PTHA2 = -7.665818e-007	PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.57	168.1	1715.8	14.61	0.00
591.32	4282.8	1719.1	591.36	0.00
1167.92	8407.1	1720.9	1168.07	0.01
1744.43	12539.8	1722.8	1744.57	0.00
2321.00	16682.3	1724.5	2321.04	0.00
2897.34	20833.7	1726.1	2897.34	0.00
2321.11	16682.3	1726.1	2321.04	-0.00
1744.79	12540.6	1726.3	1744.68	-0.00
1168.05	8406.5	1726.2	1167.98	-0.00
591.41	4282.0	1726.3	591.24	-0.01
14.57	168.0	1726.6	14.59	0.00

THERMAL CORRECTION

TEMP ITS90	PRESS TEMP	INST OUTPUT
32.50	1931.40	173.31
29.00	1861.80	173.12
23.99	1762.60	172.59
18.50	1654.80	171.75
15.00	1585.80	171.15
4.50	1380.20	169.75
1.00	1311.90	169.09

TEMP (ITS90)	SPAN (mV)
-5.00	25.34
35.00	25.33

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

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

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

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

