SBE 41 CERTIFICATES

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SBE 41 Instrument Configuration

Model Number: SBE 41

Serial Number: 41-6329

Part Number: 90359.073

Description: APEX Standard Configuration

Firmware Version: 3.0

Pressure Type: Druck

Pressure Range: 2000 Dbar

Pressure Serial Number: 3826222

```
SBE 41-STD V 3.0  SERIAL NO. 6329
temperature:  16-jul-13
    TA0 =  4.552582e-05
    TA1 =  2.632742e-04
    TA2 = -1.660017e-06
    TA3 =  1.283310e-07
conductivity:  16-jul-13
    G = -9.807369e-01
    H =  1.398954e-01
    I = -3.337957e-04
    J =  4.403891e-05
    CPCOR = -9.570000e-08
    CTCOR =  3.250000e-06
    WBOTC = -2.512394e-07
pressure S/N = 3826222, range = 2900 psia:  11-jul-13
    PA0 =  3.365351e-02
    PA1 =  1.402362e-01
    PA2 = -3.900167e-08
    PTCA0 =  2.251160e+01
    PTCA1 = -3.544721e-02
    PTCA2 =  1.995700e-03
    PTCB0 =  2.520175e+01
    PTCB1 = -8.500000e-04
    PTCB2 =  0.000000e+00
    PTHA0 = -7.062844e+01
    PTHA1 =  5.035396e-02
    PTHA2 = -1.047709e-07
    POFFSET =  0.000000e+00
```

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SENSOR SERIAL NUMBER: 6329
CALIBRATION DATE: 16-Jul-13

SBE 41 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

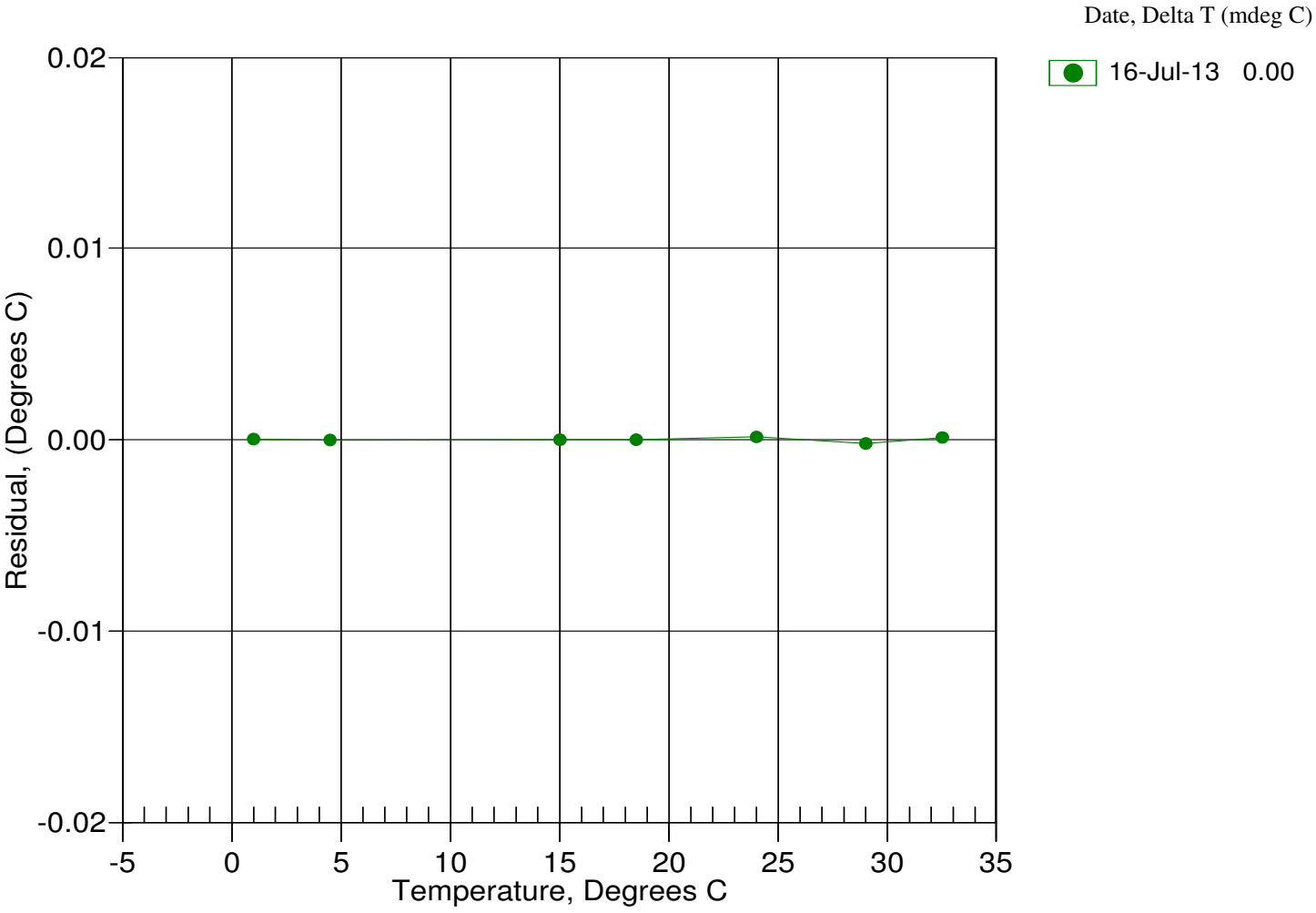
ITS-90 COEFFICIENTS

a0 = 4.552582e-005
a1 = 2.632742e-004
a2 = -1.660017e-006
a3 = 1.283310e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	822472.0	1.0000	0.0000
4.5000	701457.3	4.5000	-0.0000
15.0000	443848.3	15.0000	-0.0000
18.5001	383446.7	18.5001	-0.0000
23.9940	306611.1	23.9941	0.0001
29.0000	251634.4	28.9998	-0.0002
32.5000	219894.1	32.5001	0.0001

Temperature ITS-90 = $1/\{a0 + a1[ln(n)] + a2[ln^2(n)] + a3[ln^3(n)]\} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



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SENSOR SERIAL NUMBER: 6329
CALIBRATION DATE: 16-Jul-13

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

COEFFICIENTS:

```
g = -9.807369e-001
h =  1.398954e-001
i = -3.337957e-004
j =  4.403891e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC = -2.5124e-007
```

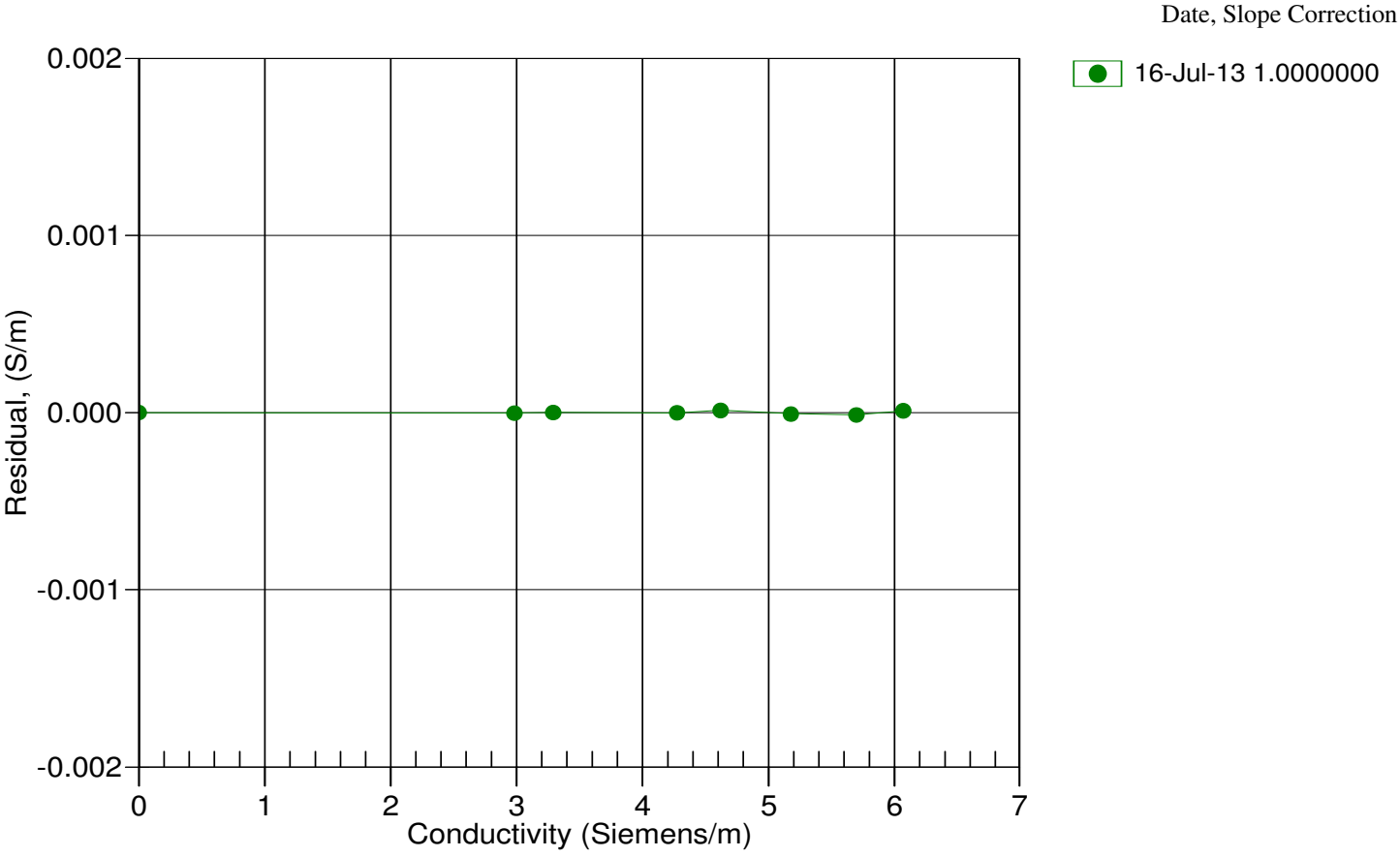
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2653.21	0.00000	0.00000
1.0000	34.8782	2.98075	5331.49	2.98075	-0.00000
4.5000	34.8583	3.28830	5534.02	3.28830	0.00000
15.0000	34.8155	4.27153	6136.03	4.27152	-0.00000
18.5001	34.8064	4.61721	6333.81	4.61722	0.00001
23.9940	34.7963	5.17536	6640.38	5.17535	-0.00001
29.0000	34.7897	5.69845	6915.02	5.69844	-0.00001
32.5000	34.7849	6.07113	7104.01	6.07114	0.00001

f = INST FREQ * sqrt(1.0 + WBOTC * t) / 1000.0

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

t = temperature[°C)]; p = pressure[decibars]; δ = CTcor; ε = CPcor;

Residual = instrument conductivity - bath conductivity



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SENSOR SERIAL NUMBER: 6329
CALIBRATION DATE: 11-Jul-13

SBE 41 PRESSURE CALIBRATION DATA
2900 psia S/N 3826222

COEFFICIENTS:

PA0 =	3.365351e-002	PTCA0 =	2.251160e+001
PA1 =	1.402362e-001	PTCA1 =	-3.544721e-002
PA2 =	-3.900167e-008	PTCA2 =	1.995700e-003
PTHA0 =	-7.062844e+001	PTCB0 =	2.520175e+001
PTHA1 =	5.035396e-002	PTCB1 =	-8.500000e-004
PTHA2 =	-1.047709e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FSR
14.65	127.1	1866.4	14.68	0.00
591.10	4239.2	1868.1	591.10	-0.00
1167.52	8362.0	1869.2	1167.69	0.01
1743.93	12492.7	1870.6	1744.06	0.00
2320.24	16631.8	1871.7	2320.27	0.00
2896.39	20779.9	1872.5	2896.39	-0.00
2320.38	16632.1	1871.8	2320.32	-0.00
1744.28	12493.5	1871.2	1744.18	-0.00
1167.60	8360.7	1870.7	1167.51	-0.00
591.20	4238.8	1870.4	591.04	-0.01
14.65	127.1	1870.2	14.68	0.00

THERMAL CORRECTION

TEMP ITS90	PRESS TEMP	INST OUTPUT
32.50	2056.40	131.11
29.00	1987.40	131.04
23.99	1886.60	130.70
18.50	1776.70	130.26
15.00	1706.20	130.04
4.50	1496.70	130.26
1.00	1426.80	130.20

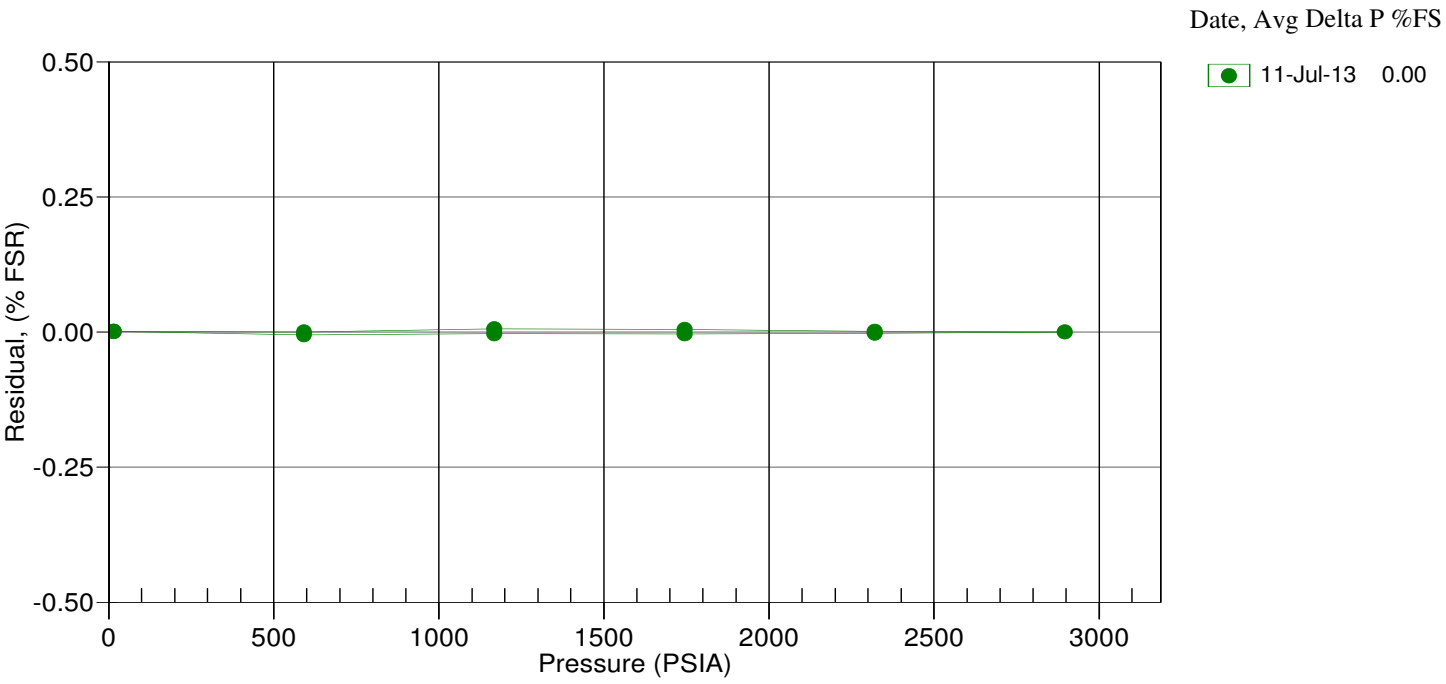
TEMP(ITS90)	SPAN(mV)
-5.00	25.21
35.00	25.17

y = thermistor output; $t = PTHA0 + PTHA1 * y + PTHA2 * y^2$

x = pressure output - $PTCA0 - PTCA1 * t - PTCA2 * t^2$

$n = x * PTCB0 / (PTCB0 + PTCB1 * t + PTCB2 * t^2)$

pressure (psia) = $PA0 + PA1 * n + PA2 * n^2$



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