SBE 41 CERTIFICATES

SEA-BIRD ELECTRONICS, INC.
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SBE 41 Instrument Configuration

Model Number: SBE 41

Serial Number: 41-7259

Part Number: 41CP.FA200

Description: METOCEAN Standard Configuration

Firmware Version: 3.0C

Pressure Type: Kistler

Pressure Range: 2000 dBar

Pressure Serial Number: 4645067

```
SBE 41 ALACE-CP V 3.0C  SERIAL NO. 7259
TEMPERATURE:  20-MAY-15
    TA0 =  1.020242E-04
    TA1 =  2.587381E-04
    TA2 = -1.278705E-06
    TA3 =  1.199420E-07
CONDUCTIVITY:  20-MAY-15
    G = -9.805769E-01
    H =  1.341203E-01
    I = -2.940315E-04
    J =  3.827573E-05
    CPCOR = -9.570001E-08
    CTCOR =  3.250000E-06
    WBOTC =  3.998434E-07
PRESSURE S/N = 4645067, RANGE = 2900 PSIA:  12-MAY-15
    PA0 = -8.174979E-01
    PA1 =  1.375609E-01
    PA2 =  9.240087E-09
    PTCA0 =  1.663845E+02
    PTCA1 = -7.508758E-01
    PTCA2 =  2.160668E-02
    PTCB0 =  1.064790E+02
    PTCB1 = -1.115113E-02
    PTCB2 =  0.000000E+00
    PTHA0 = -9.787642E+01
    PTHA1 =  4.087029E-02
    PTHA2 =  1.046597E-06
    POFFSET =  0.000000E+00
```

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SENSOR SERIAL NUMBER: 7259
CALIBRATION DATE: 20-May-15

SBE 41 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

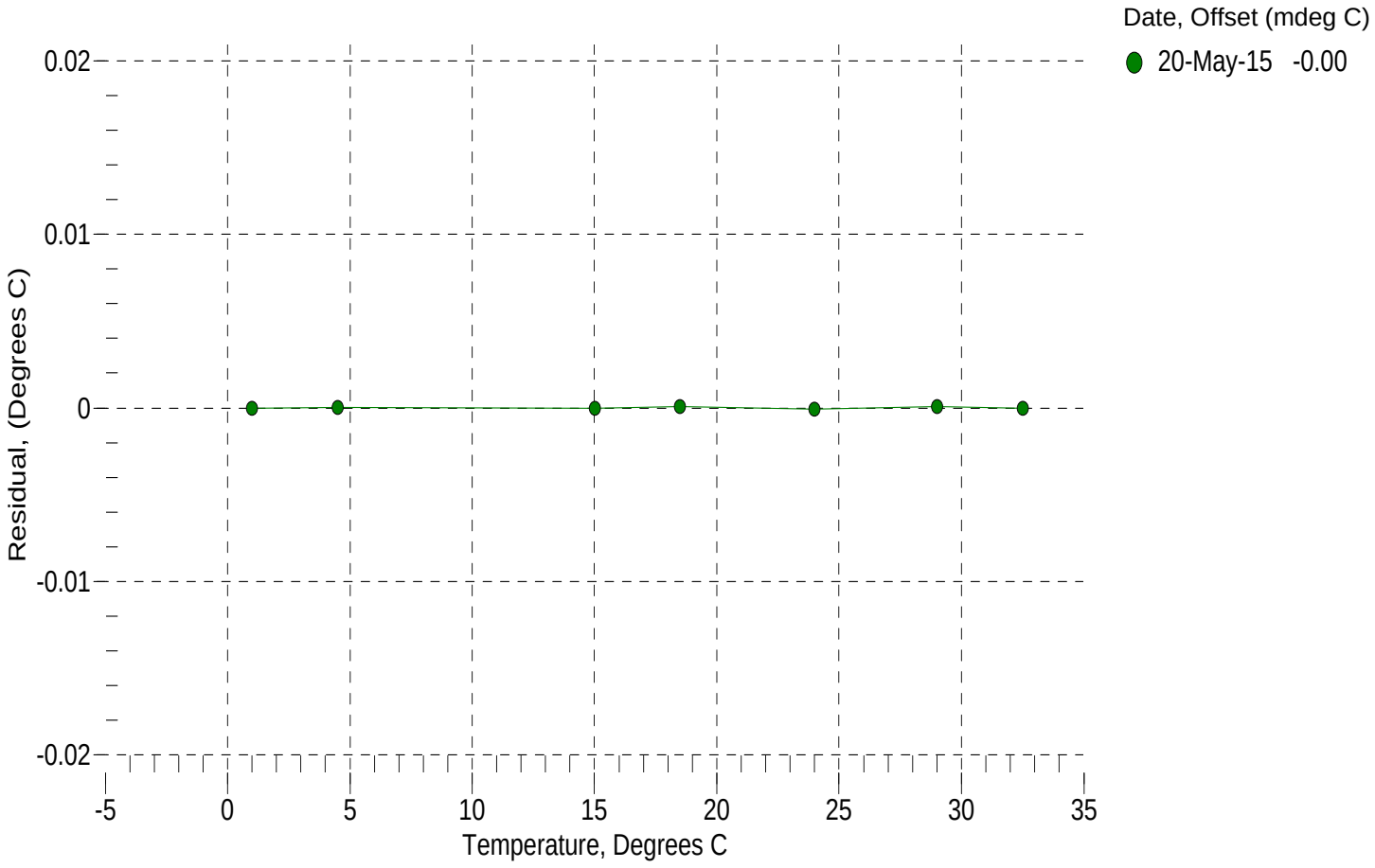
```
a0 =  1.020242e-004
a1 =  2.587381e-004
a2 = -1.278705e-006
a3 =  1.199420e-007
```

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	706105.4	1.0000	-0.0000
4.4999	602242.9	4.4999	0.0000
15.0000	381126.9	15.0000	-0.0000
18.5000	329277.5	18.5001	0.0001
23.9940	263318.6	23.9939	-0.0001
29.0000	216114.0	29.0001	0.0001
32.5000	188865.5	32.5000	-0.0000

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

Residual = instrument temperature - bath temperature

n = instrument output



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SENSOR SERIAL NUMBER: 7259
CALIBRATION DATE: 20-May-15

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

COEFFICIENTS:

```
g = -9.805769e-001
h =  1.341203e-001
i = -2.940315e-004
j =  3.827573e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC =  3.9984e-007
```

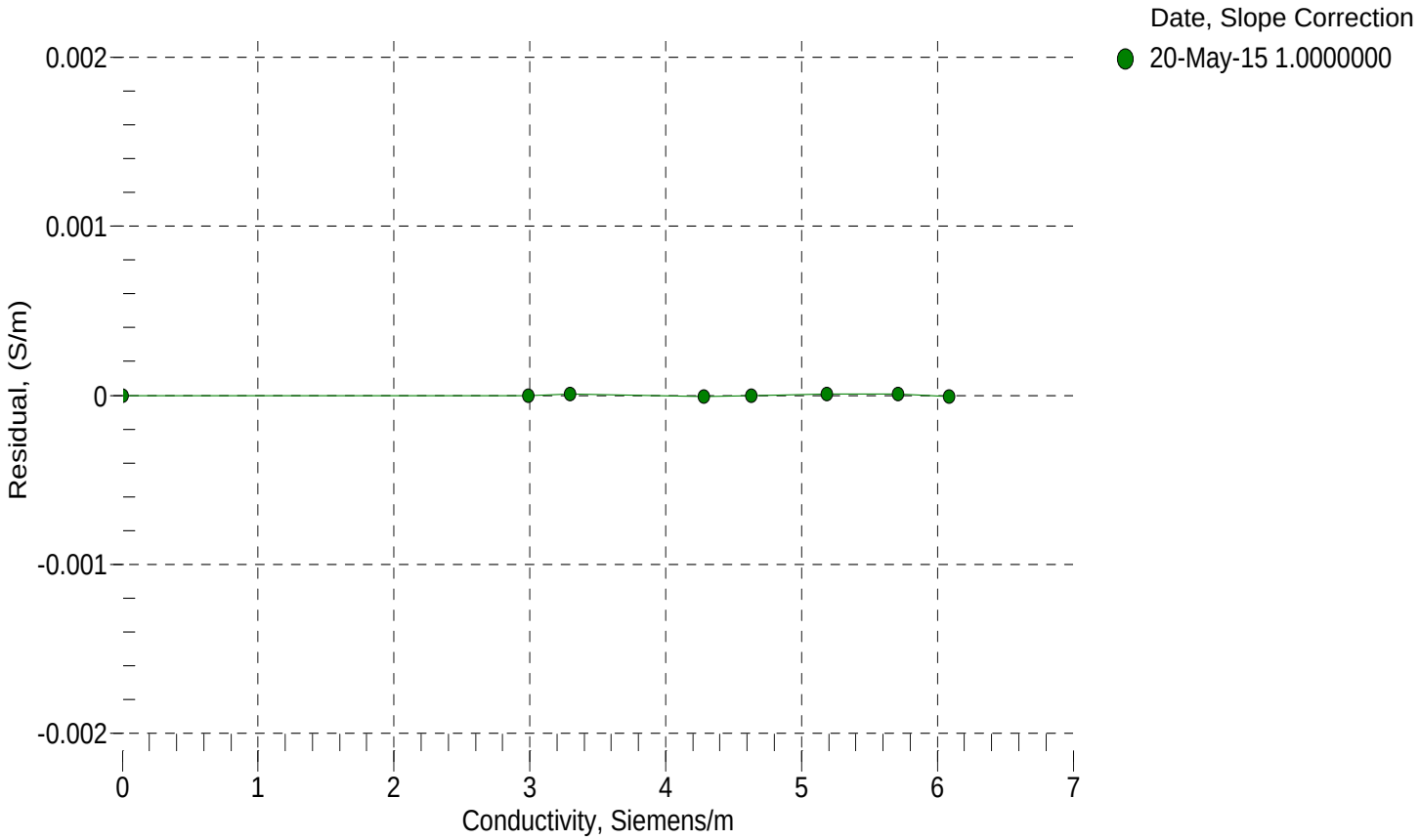
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2709.12	0.00000	0.00000
1.0000	34.9777	2.98844	5449.42	2.98844	-0.00000
4.4999	34.9584	3.29680	5656.59	3.29680	0.00001
15.0000	34.9158	4.28252	6272.33	4.28252	-0.00001
18.5000	34.9062	4.62900	6474.59	4.62900	-0.00000
23.9940	34.8955	5.18848	6788.14	5.18849	0.00001
29.0000	34.8890	5.71288	7069.06	5.71289	0.00001
32.5000	34.8835	6.08638	7262.31	6.08637	-0.00001

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

Conductiv ity = $(g + h * f^2 + i * f^3 + j * f^4) / (1 + \delta * t + \varepsilon * p)$ Siemens / meter

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

Residual = instrument conductivity - bath conductivity



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SENSOR SERIAL NUMBER: 7259
CALIBRATION DATE: 12-May-15

SBE 41 PRESSURE CALIBRATION DATA
2900 psia S/N 4645067

COEFFICIENTS:

PA0 =	-8.174979e-001	PTCA0 =	1.663845e+002
PA1 =	1.375609e-001	PTCA1 =	-7.508758e-001
PA2 =	9.240087e-009	PTCA2 =	2.160668e-002
PTHA0 =	-9.787642e+001	PTCB0 =	1.064790e+002
PTHA1 =	4.087029e-002	PTCB1 =	-1.115113e-002
PTHA2 =	1.046597e-006	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FS
14.52	272.3	2753.7	14.61	0.00
592.45	4461.9	2757.0	592.47	0.00
1169.90	8646.5	2758.1	1169.99	0.00
1747.36	12828.9	2759.2	1747.53	0.01
2324.84	17007.9	2760.9	2324.94	0.00
2902.23	21183.1	2761.8	2902.14	-0.00
2324.82	17007.0	2761.7	2324.82	0.00
1747.40	12827.4	2762.0	1747.34	-0.00
1169.83	8644.3	2762.3	1169.70	-0.00
592.35	4459.3	2762.2	592.12	-0.01
14.52	272.1	2764.1	14.56	0.00

THERMAL CORRECTION

TEMP ITS90	PRESS TEMP	INST OUTPUT
32.50	2964.90	281.20
29.00	2890.40	279.18
23.99	2783.50	277.07
18.50	2665.50	276.24
15.00	2590.10	276.41
4.50	2361.90	279.90
1.00	2285.60	281.95

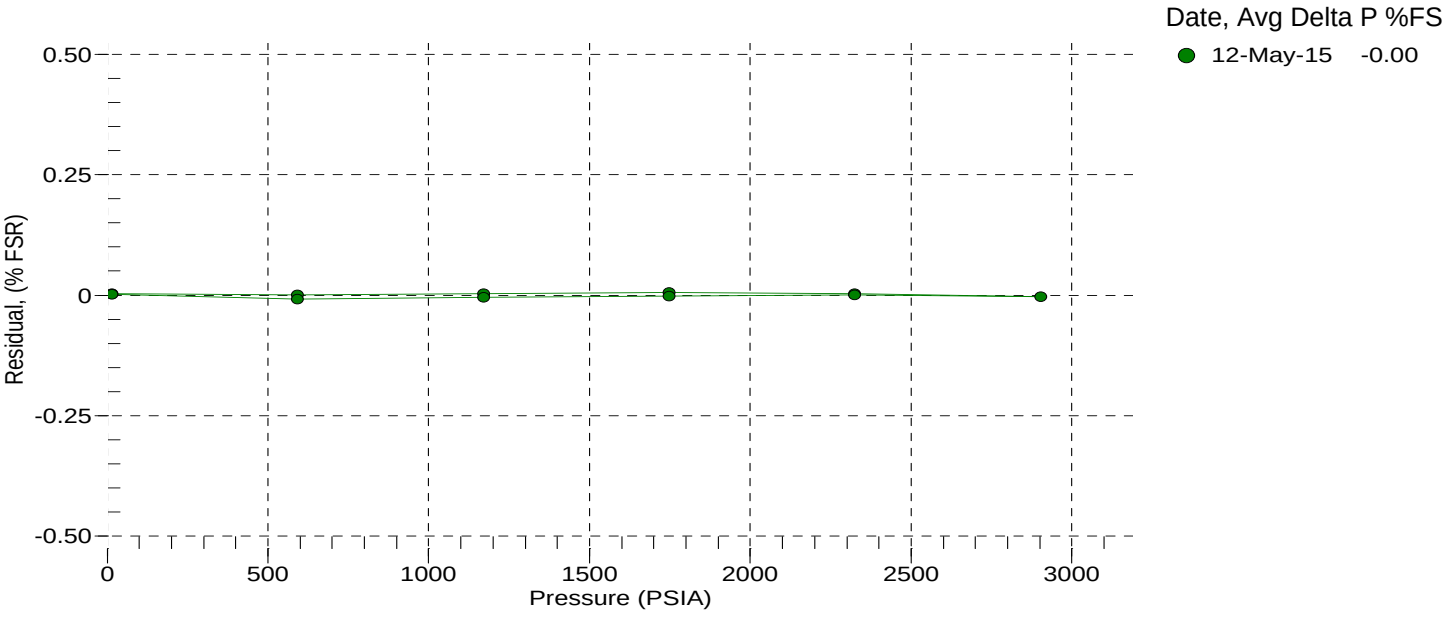
TEMP(ITS90)	SPAN(mV)
-3.92	106.52
35.78	106.08

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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