SBE 41 CERTIFICATES

SEA-BIRD ELECTRONICS, INC.
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SBE 41 Instrument Configuration

Model Number: SBE 41

Serial Number: 41-7172

Part Number: 41CP.FA200

Description: METOCEAN Standard Configuration

Firmware Version: 3.0C

Pressure Type: Kistler

Pressure Range: 2000 dBar

Pressure Serial Number: 4669401

```
SBE 41 ALACE-CP V 3.0C  SERIAL NO. 7172
TEMPERATURE:  15-APR-15
    TA0 =  5.096223E-05
    TA1 =  2.690416E-04
    TA2 = -2.034793E-06
    TA3 =  1.411487E-07
CONDUCTIVITY:  15-APR-15
    G = -9.785383E-01
    H =  1.327226E-01
    I = -3.295651E-04
    J =  4.120937E-05
    CPCOR = -9.570000E-08
    CTCOR =  3.250000E-06
    WBOTC =  2.755721E-07
PRESSURE S/N = 4669401, RANGE = 2900 PSIA:  06-APR-15
    PA0 = -1.511758E-02
    PA1 =  1.394180E-01
    PA2 =  1.589426E-08
    PTCA0 = -1.213198E+02
    PTCA1 = -5.259296E-01
    PTCA2 =  2.273958E-02
    PTCB0 =  1.034770E+02
    PTCB1 = -1.054279E-02
    PTCB2 =  0.000000E+00
    PTHA0 = -9.637022E+01
    PTHA1 =  4.067486E-02
    PTHA2 =  9.971424E-07
    POFFSET =  0.000000E+00
```

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SENSOR SERIAL NUMBER: 7172
CALIBRATION DATE: 15-Apr-15

SBE 41 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

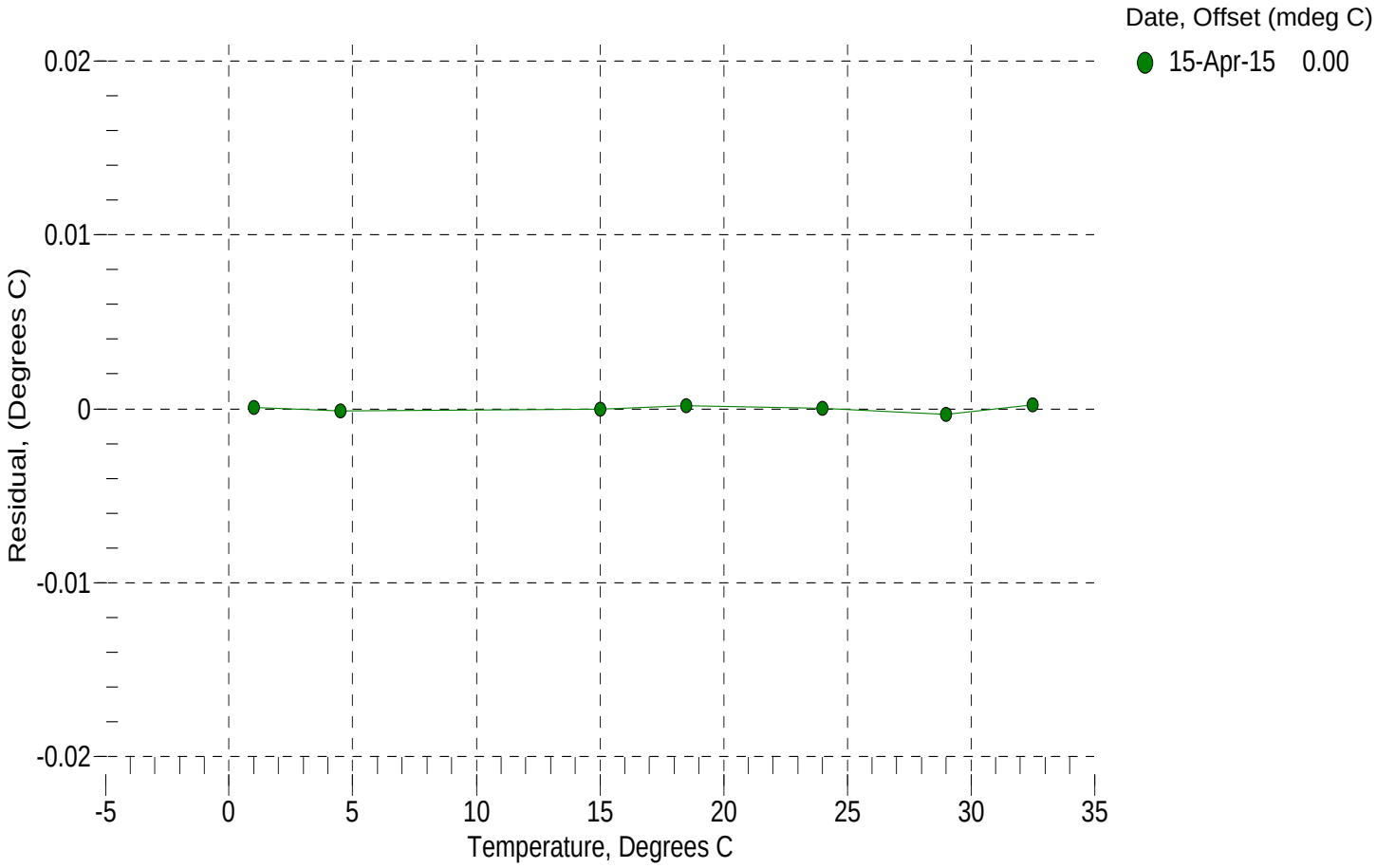
```
a0 =  5.096223e-005
a1 =  2.690416e-004
a2 = -2.034793e-006
a3 =  1.411487e-007
```

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	700384.9	1.0001	0.0001
4.5000	597827.4	4.4999	-0.0001
15.0000	379153.2	15.0000	-0.0000
18.5000	327794.1	18.5002	0.0002
23.9940	262404.7	23.9940	0.0000
29.0000	215566.1	28.9997	-0.0003
32.5000	188499.6	32.5002	0.0002

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: 7172
CALIBRATION DATE: 15-Apr-15

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

COEFFICIENTS:

```
g = -9.785383e-001
h =  1.327226e-001
i = -3.295651e-004
j =  4.120937e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC =  2.7557e-007
```

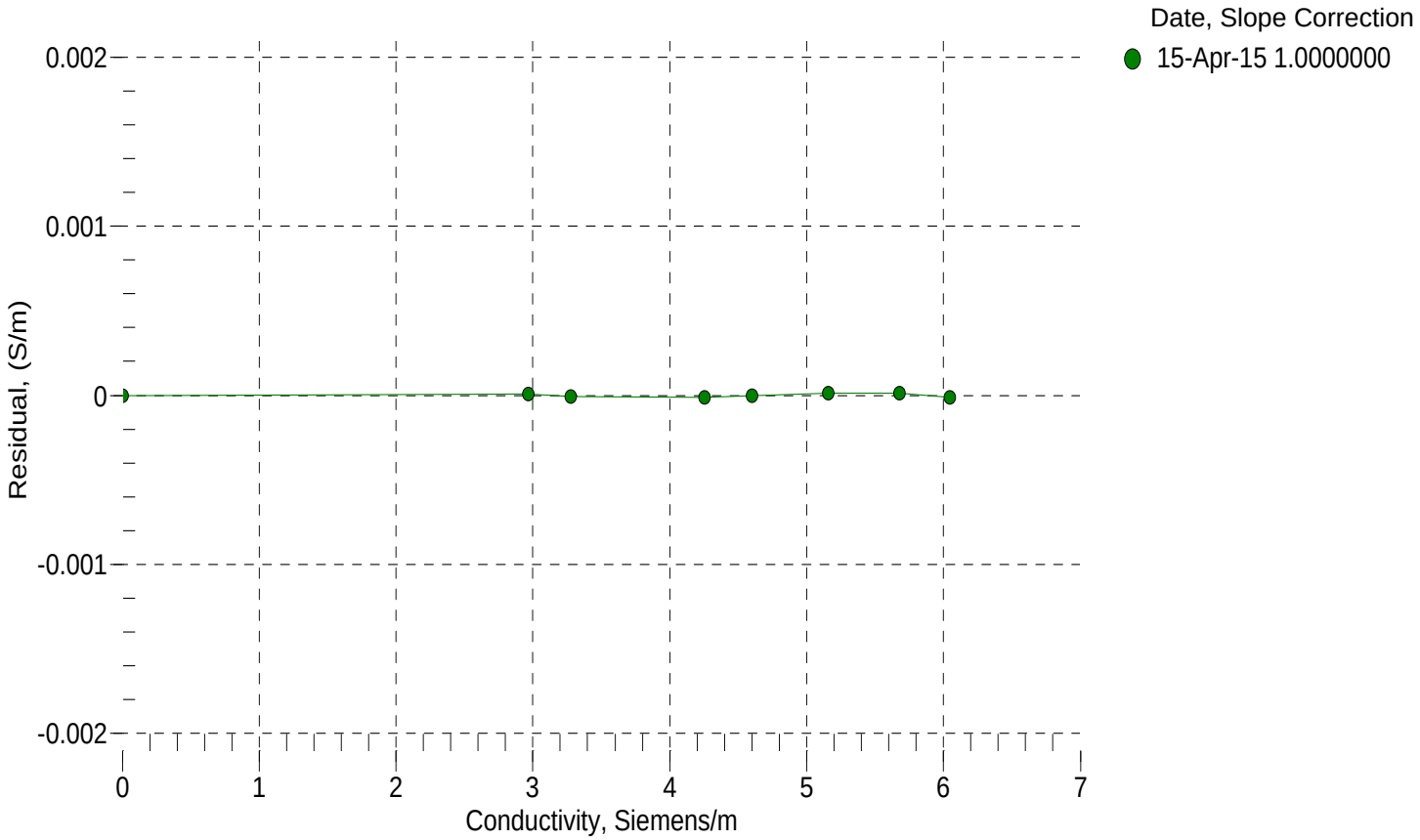
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2721.36	0.00000	0.00000
1.0000	34.7290	2.96921	5465.61	2.96922	0.00001
4.5000	34.7091	3.27561	5673.18	3.27560	-0.00001
15.0000	34.6665	4.25518	6290.21	4.25516	-0.00001
18.5000	34.6572	4.59954	6492.90	4.59953	-0.00000
23.9940	34.6471	5.15561	6807.15	5.15562	0.00001
29.0000	34.6416	5.67692	7088.71	5.67693	0.00001
32.5000	34.6390	6.04856	7282.56	6.04855	-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: 7172
CALIBRATION DATE: 06-Apr-15

SBE 41 PRESSURE CALIBRATION DATA
2900 psia S/N 4669401

COEFFICIENTS:

PA0 =	-1.511758e-002	PTCA0 =	-1.213198e+002
PA1 =	1.394180e-001	PTCA1 =	-5.259296e-001
PA2 =	1.589426e-008	PTCA2 =	2.273958e-002
PTHA0 =	-9.637022e+001	PTCB0 =	1.034770e+002
PTHA1 =	4.067486e-002	PTCB1 =	-1.054279e-002
PTHA2 =	9.971424e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FS
14.53	-17.5	2747.9	14.51	-0.00
592.33	4117.6	2751.9	592.65	0.01
1169.94	8243.3	2753.3	1170.04	0.00
1747.62	12366.4	2755.8	1747.62	-0.00
2325.25	16486.3	2757.5	2325.30	0.00
2902.92	20602.4	2758.9	2903.00	0.00
2325.26	16485.4	2759.4	2325.19	-0.00
1747.66	12365.4	2760.1	1747.50	-0.01
1170.04	8242.0	2761.0	1169.87	-0.01
592.08	4114.0	2761.9	592.14	0.00
14.53	-18.1	2763.6	14.37	-0.01

THERMAL CORRECTION

TEMP ITS90	PRESS TEMP	INST OUTPUT
32.50	2954.20	-4.22
29.00	2879.10	-7.27
23.99	2771.20	-10.80
18.50	2651.70	-13.10
15.00	2575.30	-13.89
4.50	2345.00	-13.05
1.00	2267.90	-11.70

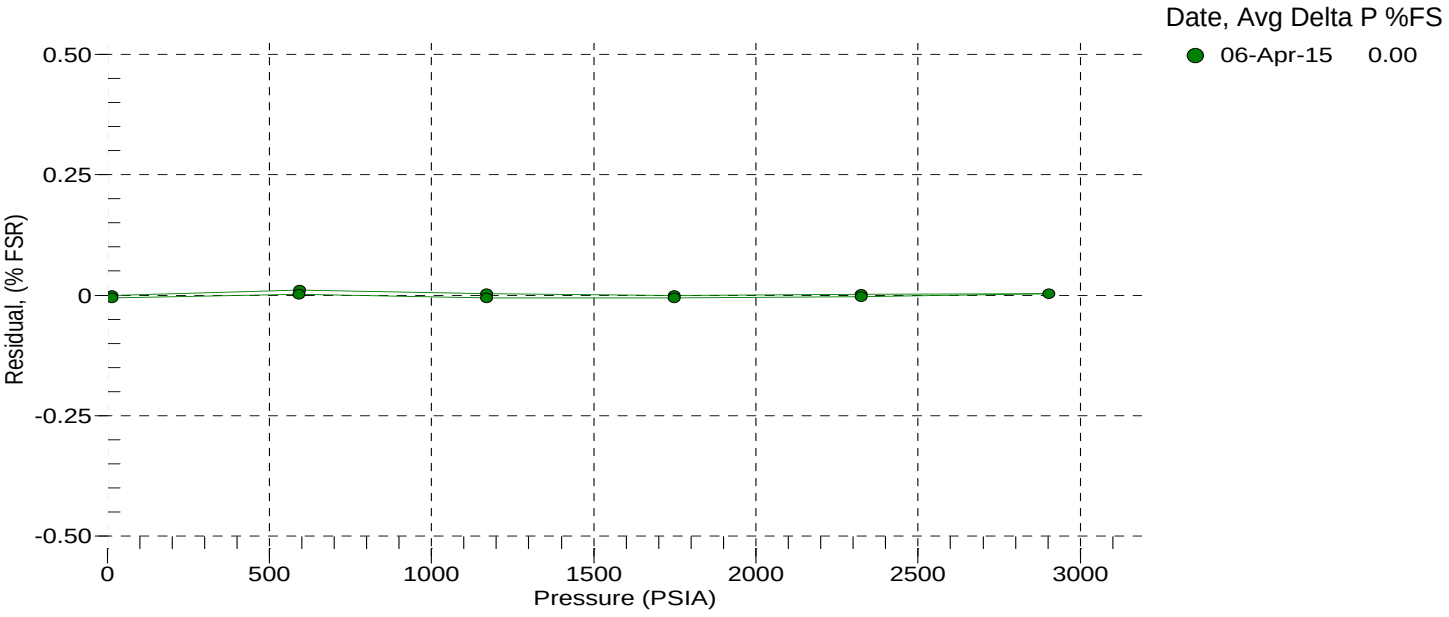
TEMP(ITS90)	SPAN(mV)
-5.38	103.53
35.52	103.10

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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