SEA-BIRD SCIENTIFIC
Sea-Bird Scientific
13431 NE 20th Street
Bellevue, WA 98005
USA

+1 425-643-9866
seabird@seabird.com
www.seabird.com

Pressure Test Certificate

Test Date: 2019-02-13

Description: Slocum CTD

Sensor Information:

Model Number: Slocum

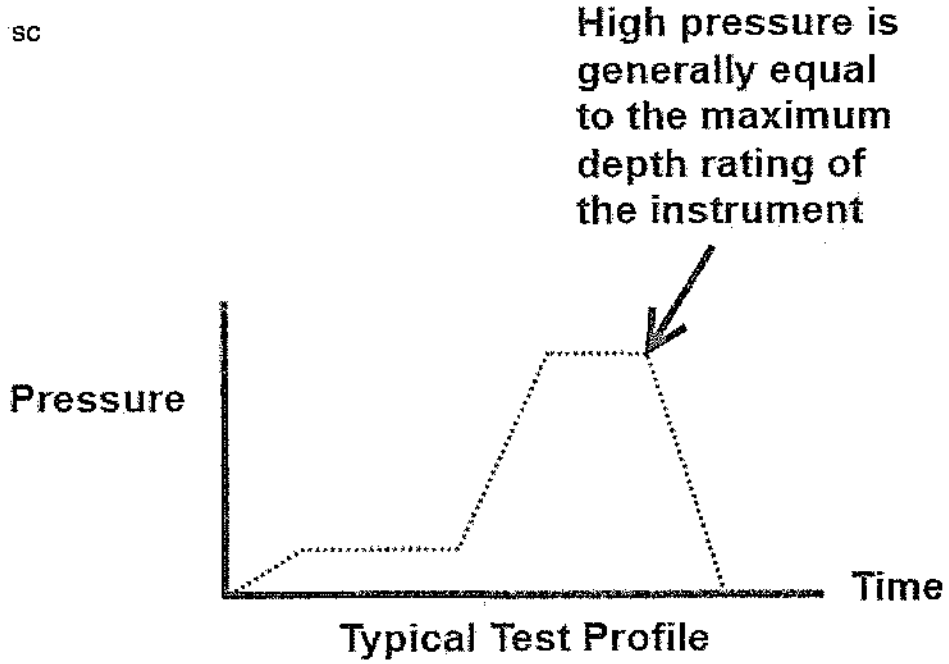
Serial Number: 9546

Pressure Test Protocol:

Low Pressure Test: 40	PSI	Held For: 15	Minutes
High Pressure Test: 1450	PSI	Held For: 15	Minutes

Passed Test: True

Tested By: sc



Typical Test Profile

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SENSOR SERIAL NUMBER: 9546
CALIBRATION DATE: 20-Feb-19

Slocum Payload CTD TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

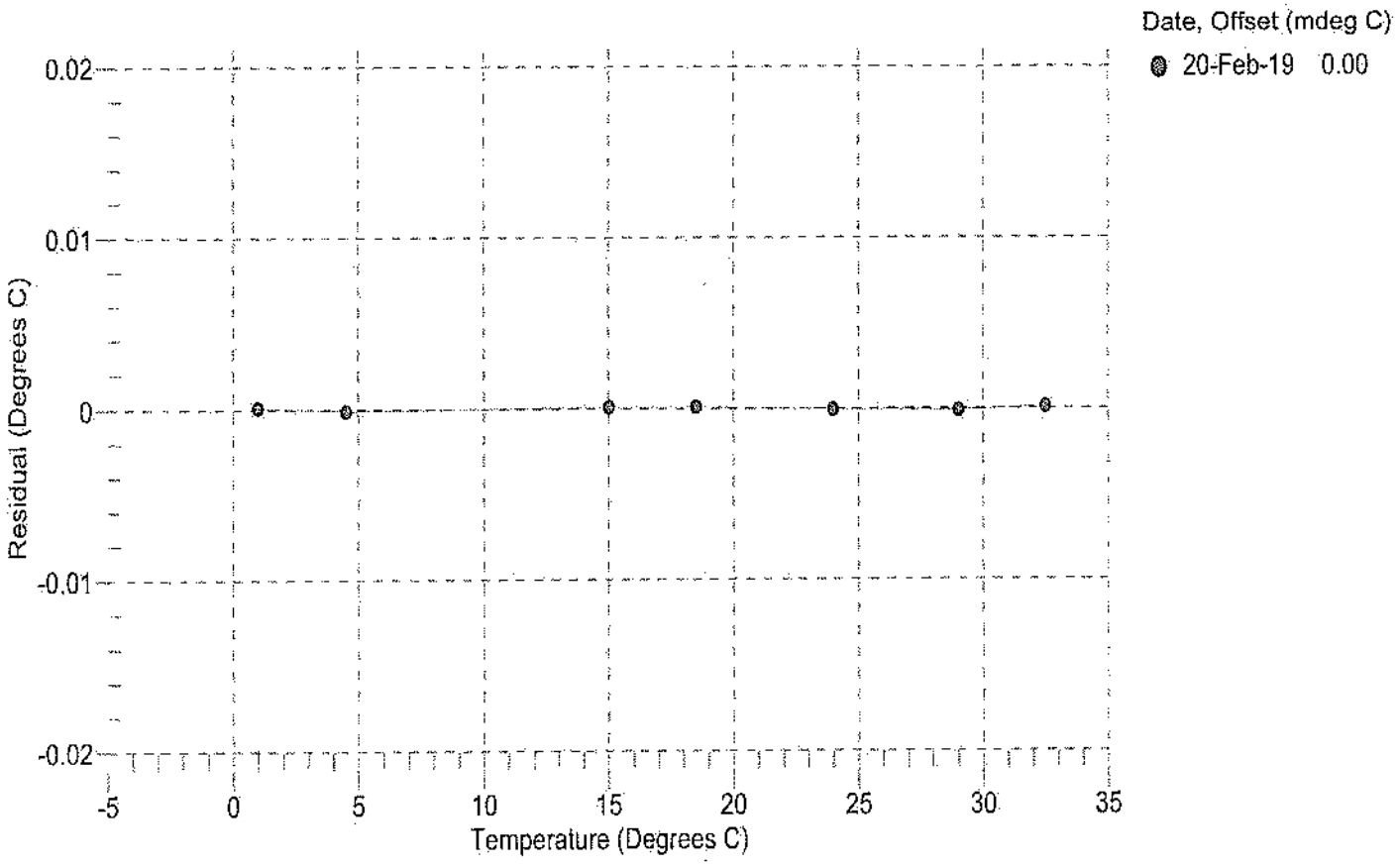
a0 = -8.970152e-005
a1 = 2.987103e-004
a2 = -3.595264e-006
a3 = 1.777333e-007

BATH TEMP (° C)	INSTRUMENT OUTPUT (counts)	INST TEMP (° C)	RESIDUAL (° C)
1.0000	562697.0	1.0001	0.0001
4.5000	481854.4	4.4999	-0.0001
15.0000	308557.4	15.0001	0.0001
18.5000	267616.3	18.5001	0.0001
24.0000	215254.5	23.9999	-0.0001
29.0000	177675.3	28.9999	-0.0001
32.5000	155860.9	32.5001	0.0001

n = Instrument Output (counts)

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

Residual (°C) = instrument temperature - bath temperature



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SENSOR SERIAL NUMBER: 9546
CALIBRATION DATE: 20-Feb-19

Slocum Payload CTD CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -1.003809e+000
h = 1.400513e-001
i = -2.065916e-004
j = 3.377979e-005

CPcor = -9.5700e-008
CTcor = 3.2500e-006
WBOTC = 1.8654e-007

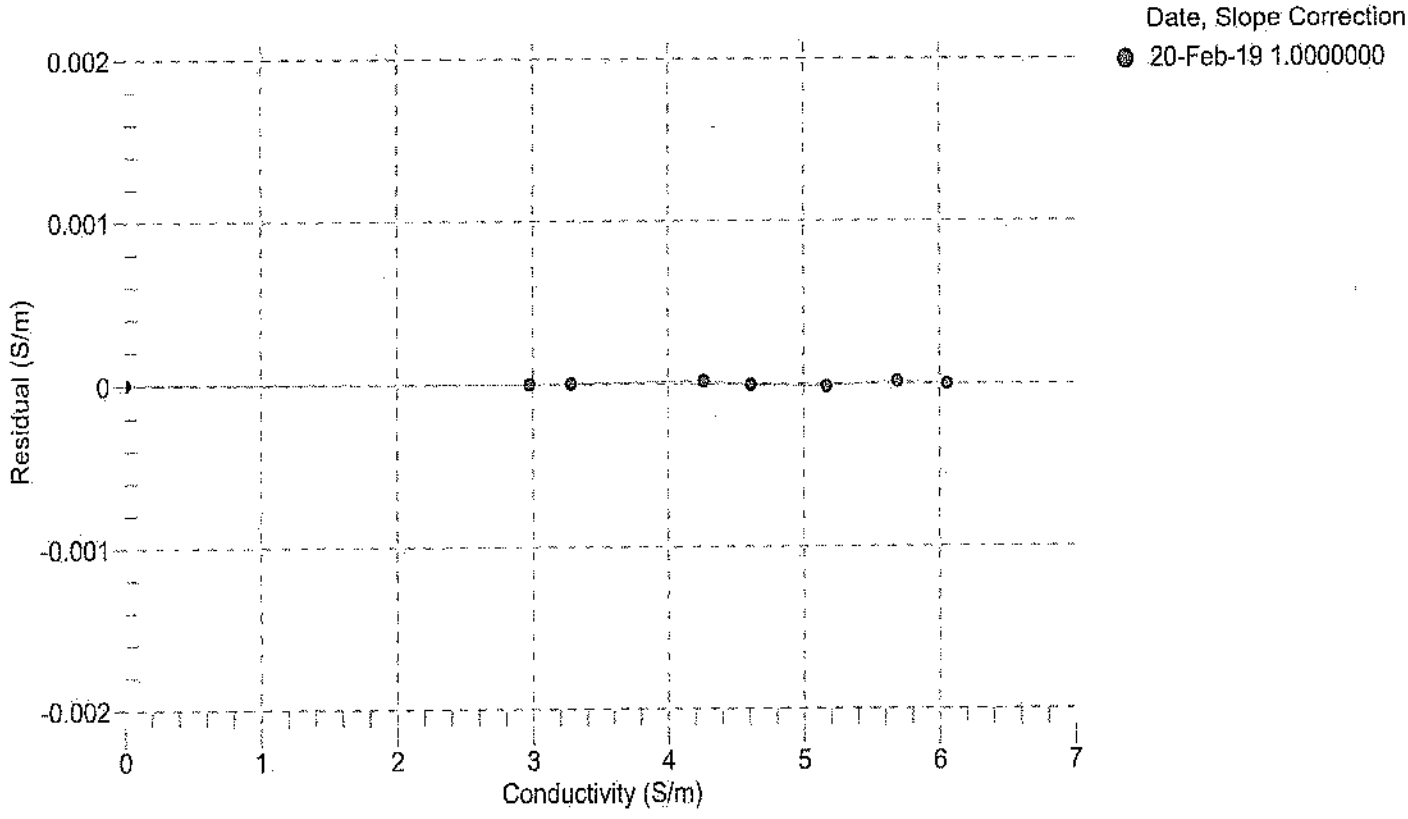
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (Hz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
22.0000	0.0000	0.00000	2680.18	0.00000	0.00000
1.0000	34.7998	2.97469	5332.55	2.97468	-0.00000
4.5000	34.7806	3.28169	5533.86	3.28169	0.00000
15.0000	34.7392	4.26316	6132.53	4.26317	0.00002
18.5000	34.7307	4.60824	6329.31	4.60823	-0.00001
24.0000	34.7215	5.16608	6634.80	5.16606	-0.00002
29.0000	34.7161	5.68775	6907.97	5.68777	0.00001
32.5000	34.7124	6.05992	7096.23	6.05992	-0.00000

f = Instrument Output(Hz) * sqrt(1.0 + WBOTC * t) / 1000.0

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

Conductivity (S/m) = $(g + h * f^2 + i * f^3 + j * f^4) / (1 + \delta * t + \varepsilon * p)$

Residual (Siemens/meter) = instrument conductivity - bath conductivity



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SENSOR SERIAL NUMBER: 9546
CALIBRATION DATE: 13-Feb-19

Slocum Payload CTD PRESSURE CALIBRATION DATA
1450 psia S/N set

COEFFICIENTS:

PA0 =	3.817251e-001	PTCA0 =	5.245309e+005
PA1 =	4.540981e-003	PTCA1 =	5.340758e+000
PA2 =	-9.958163e-012	PTCA2 =	-6.701979e-002
PTEMPA0 =	-6.696222e+001	PTCB0 =	2.518187e+001
PTEMPA1 =	5.204388e-002	PTCB1 =	3.750000e-004
PTEMPA2 =	-5.403889e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE (PSIA)	INSTRUMENT OUTPUT (counts)	THERMISTOR OUTPUT (volts)	COMPUTED PRESSURE (PSIA)	RESIDUAL (%FSR)
14.42	527706.3	1762.8	14.40	-0.00
300.95	590839.8	1757.1	300.95	-0.00
588.04	654088.2	1758.3	587.94	-0.01
875.45	717463.7	1759.3	875.42	-0.00
1162.90	780838.5	1760.6	1162.82	-0.01
1450.04	844193.0	1761.1	1450.05	0.00
1162.77	780834.8	1761.0	1162.80	0.00
875.24	717444.9	1761.0	875.33	0.01
588.28	654169.7	1761.0	588.30	0.00
300.97	590859.3	1763.5	301.03	0.00
14.41	527709.7	1764.3	14.41	-0.00

THERMAL CORRECTION

TEMP (°C)	THERMISTOR OUTPUT (volts)	INSTRUMENT OUTPUT (counts)
32.50	1951	527788.70
29.00	1880	527787.40
24.00	1781	527773.80
18.50	1671	527765.00
15.00	1601	527751.80
4.50	1393	527707.00
1.00	1324	527693.80

TEMPERATURE (°C)	SPAN
-5.00	25.18
35.00	25.20

y = thermistor output (counts)

$t = PTEMPA0 + PTEMPA1 * y + PTEMPA2 * y^2$

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

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

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

Residual (%FSR) = (computed pressure - true pressure) * 100 / Full Scale Range