

Sea-Bird Electronics, Inc.

13431 NE 20th Street, Bellevue, WA 98005-2010 USA

Phone: (+1) 425-643-9866 Fax (+1) 425-643-9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 9264
CALIBRATION DATE: 09-Jan-15

Slocum Payload CTD PRESSURE CALIBRATION DATA
FSR: 1450 psia S/N 4314201

COEFFICIENTS:

PA0 = 2.025484e-002
PA1 = 4.649743e-003
PA2 = -3.065052e-011
PTempa0 = 1.560579e+002
PTempa1 = -6.775849e-002
PTempa2 = 4.235708e-007

PTCA0 = 5.248585e+005
PTCA1 = -7.320862e-001
PTCA2 = 4.039394e-002
PTCB0 = 2.514187e+001
PTCB1 = -2.250000e-004
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FS
14.61	528024.0	1992.0	14.72	0.01
314.85	592604.0	1989.0	314.92	0.01
614.83	657193.0	1990.0	614.91	0.01
914.84	721842.0	1986.0	914.92	0.01
1214.79	786534.0	1986.0	1214.87	0.01
1464.81	840474.0	1983.0	1464.78	-0.00
1214.80	786507.0	1986.0	1214.75	-0.00
914.79	721799.0	1968.0	914.72	-0.00
614.75	657144.0	1989.0	614.68	-0.00
314.85	592556.0	1988.0	314.70	-0.01
14.61	527985.0	1989.0	14.54	-0.00

THERMAL CORRECTION

TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	1845	528080.40
29.00	1899	528081.00
23.99	1972	528050.40
18.50	2057	528063.60
15.00	2110	528071.80
4.50	2269	528048.40
1.00	2322	528065.60

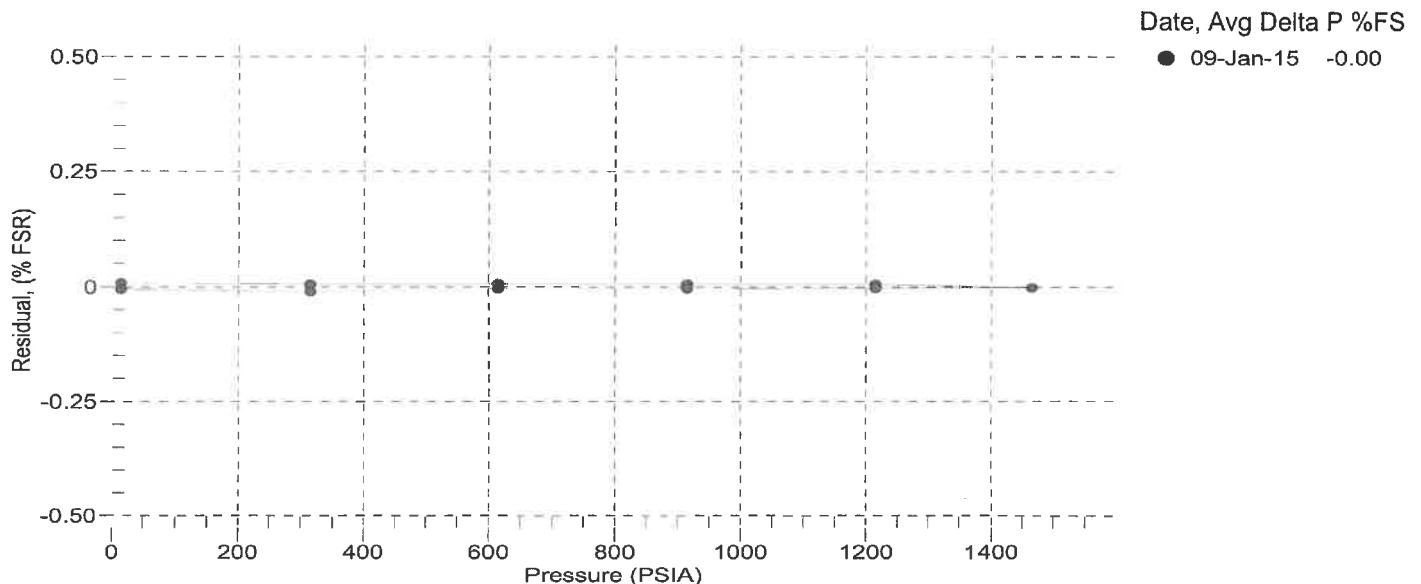
TEMP (ITS90)	SPAN (mV)
-5.00	25.14
35.00	25.13

$y = \text{thermistor output}; t = \text{PTempa0} + \text{PTempa1} * y + \text{PTempa2} * y^2$

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

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

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



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Slocum Payload CTD TEMPERATURE CALIBRATION DATA

ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

a0 = -1.620032e-004

a1 = 3.180104e-004

a2 = -5.279145e-006

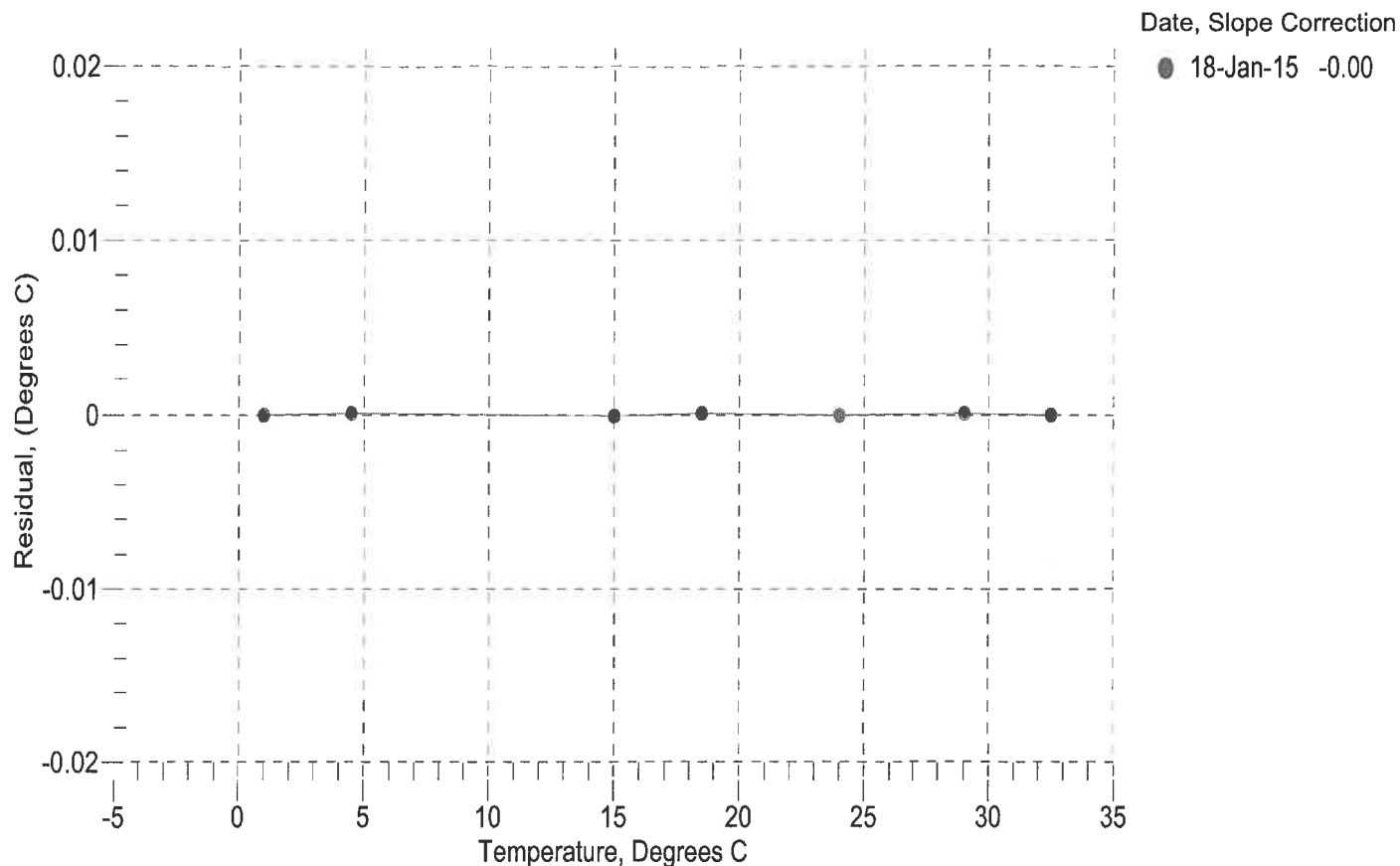
a3 = 2.224149e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	578635.0	1.0000	-0.0000
4.5000	495076.2	4.5001	0.0001
15.0000	316225.0	14.9999	-0.0001
18.5000	274036.6	18.5001	0.0001
23.9940	220186.6	23.9940	-0.0000
29.0000	181496.6	29.0001	0.0001
32.5000	159091.6	32.5000	-0.0000

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

n = instrument output



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Slocum Payload CTD CONDUCTIVITY CALIBRATION DATA

PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -9.839869e-001

h = 1.407165e-001

i = -2.937497e-004

j = 4.202371e-005

CPcor = -9.5700e-008

CTcor = 3.2500e-006

WBOTC = 5.9768e-007

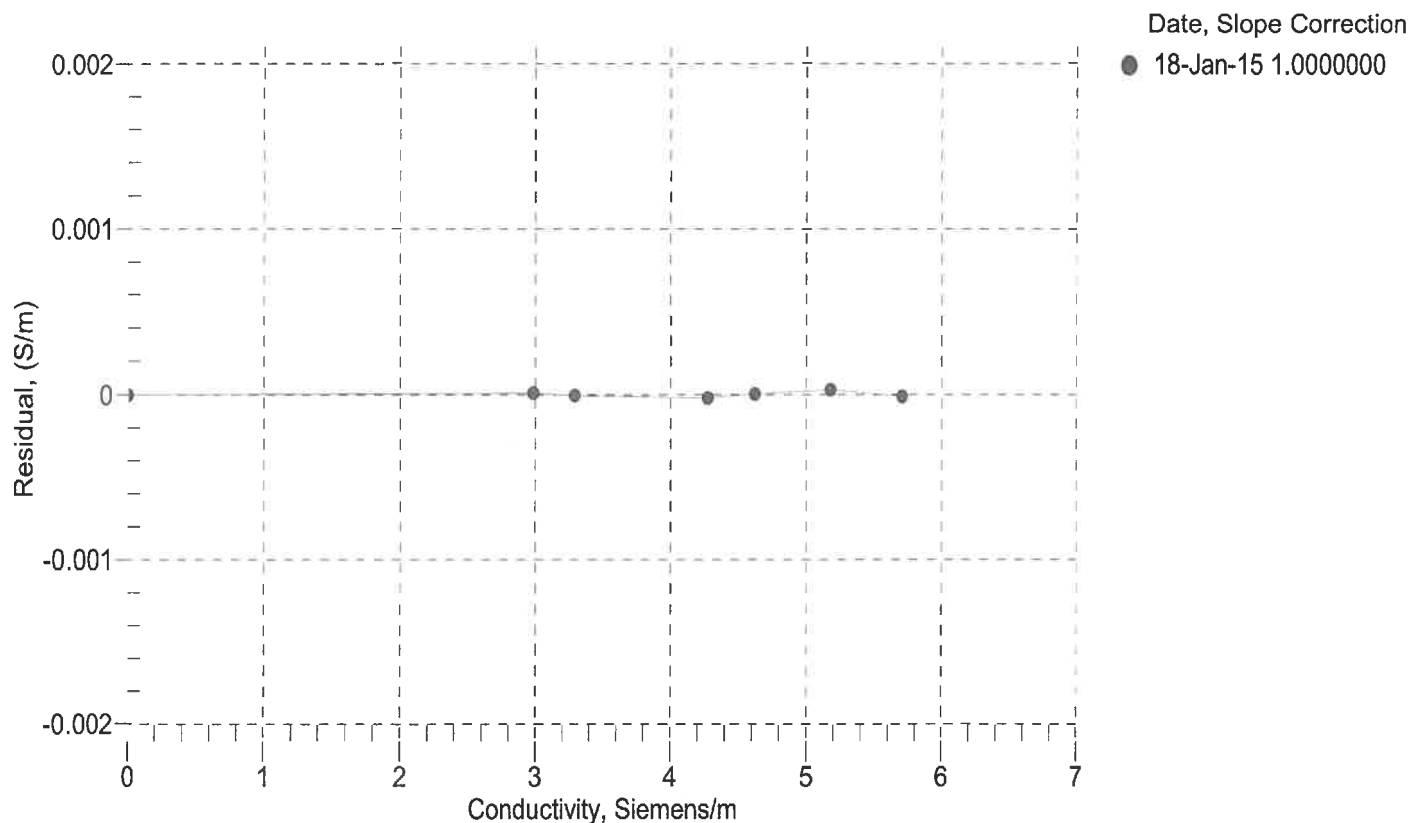
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2648.90	0.00000	0.00000
1.0000	34.9138	2.98350	5316.97	2.98351	0.00001
4.5000	34.8941	3.29134	5518.75	3.29133	-0.00001
15.0000	34.8482	4.27511	6118.36	4.27509	-0.00002
18.5000	34.8392	4.62108	6315.43	4.62108	0.00000
23.9940	34.8293	5.17972	6620.93	5.17975	0.00003
29.0000	34.8234	5.70335	6894.61	5.70334	-0.00001
32.5000	34.8195	6.07648	7082.91	6.07632	-0.00017

$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$

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

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

Residual = instrument conductivity - bath conductivity





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Pressure Test Certificate

Test Date: 01/05/15

Description: Slocum CTD

Sensor Information:

Model Number: Slocum

Serial Number: 9264

Pressure Test Protocol:

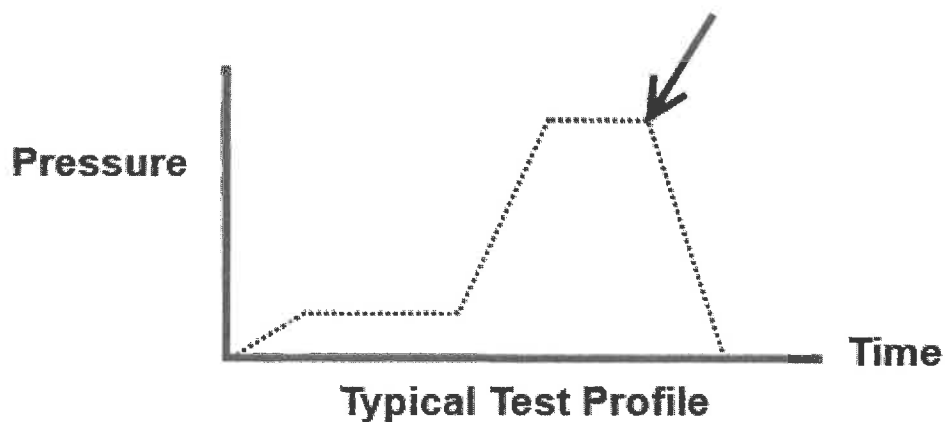
Low Pressure Test: 40 PSI Held For: 15 Minutes

High Pressure Test: 40 PSI Held For: 15 Minutes

Passed Test: Yes

Tested By: ap

High pressure is
generally equal
to the maximum
depth rating of
the instrument



CATEGORY	COMMAND	DESCRIPTION
Pump On/Off	PumpFast	Turn pump on at fast speed.
	PumpSlow	Turn pump on at slow speed.
	PumpOff	Turn pump off.
Coefficients (F=floating point number; S=string with no spaces) Dates shown are when calibrations were performed. Calibration coefficients are initially factory-set and should agree with Calibration Certificates shipped with CTD.	TCalDate=S	S=Temperature calibration date.
	TA0=F	F=Temperature A0.
	TA1=F	F=Temperature A1.
	TA2=F	F=Temperature A2.
	TA3=F	F=Temperature A3.
	CCalDate=S	S=Conductivity calibration date.
	CG=F	F=Conductivity G.
	CH=F	F=Conductivity H.
	CI=F	F=Conductivity I.
	CJ=F	F=Conductivity J.
	CPCor=F	F=Conductivity pcor.
	CTCor=F	F=Conductivity tcor.
	WBOTC=F	F=Conductivity circuit temperature correction.
	PCalDate=S	S=Pressure calibration date.
	PA0=F	F=Pressure A0.
	PA1=F	F=Pressure A1.
	PA2=F	F=Pressure A2.
	PTempA0=F	F=Pressure temperature A0.
	PTempA1=F	F=Pressure temperature A1.
	PTempA2=F	F=Pressure temperature A2.
	PTCA0=F	F=Pressure temperature compensation ptca0.
	PTCA1=F	F=Pressure temperature compensation ptca1.
	PTCA2=F	F=Pressure temperature compensation ptca2.
	PTCB0=F	F=Pressure temperature compensation ptcb0.
	PTCB1=F	F=Pressure temperature compensation ptcb1.
	PTCB2=F	F=Pressure temperature compensation ptcb2.
	POffset=F	F=Pressure offset correction (decibars).