



SEA-BIRD
SCIENTIFIC

Product Documentation

SBE Sea-Bird
Electronics

Sea-Bird Electronics
13431 NE 20th Street
Bellevue, Washington
98005 USA

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

Product Information Documentation

Contains (as applicable) for each device on this order:

- Configuration
- Calibration Certificates
- Pressure Test Certification

Please see applicable manual for statement of liability
and declaration of conformity

Manuals are located on the CD/DVD provided with your order
and also on our website at www.seabird.com

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SBE 37-IMP-ODO MicroCAT

Instrument Configuration

Instrument Serial Number: 37-13247
Instrument Firmware Version: 2.4.2
Zero Conductivity Frequency: 2550.24
IM Firmware Version: 1.14
Instrument ID#: 47
Communications Format: Inductive Modem
Communications Settings: 9600 baud, 8 Data Bits, No Parity

Installed Devices/Sensors

<i>Data Format</i>	<i>Measurement</i>	<i>Sensor Type</i>	<i>Serial Number</i>	<i>Rating</i>
Count	Temperature	Internal	N/A	N/A
Frequency	Conductivity	Internal	N/A	N/A
Count	Pressure Sensor	Druck	4369700	350m(350 dBar)
RS232	Oxygen		63-1018	600m

Maximum Depth: **350m**

CAUTION - The maximum deployment depth will be limited by the measurement range of the pressure sensor, if installed, an attached sensor, if installed, or the housing.

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SENSOR SERIAL NUMBER: 13247
CALIBRATION DATE: 25-Mar-15

SBE 37 V2 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

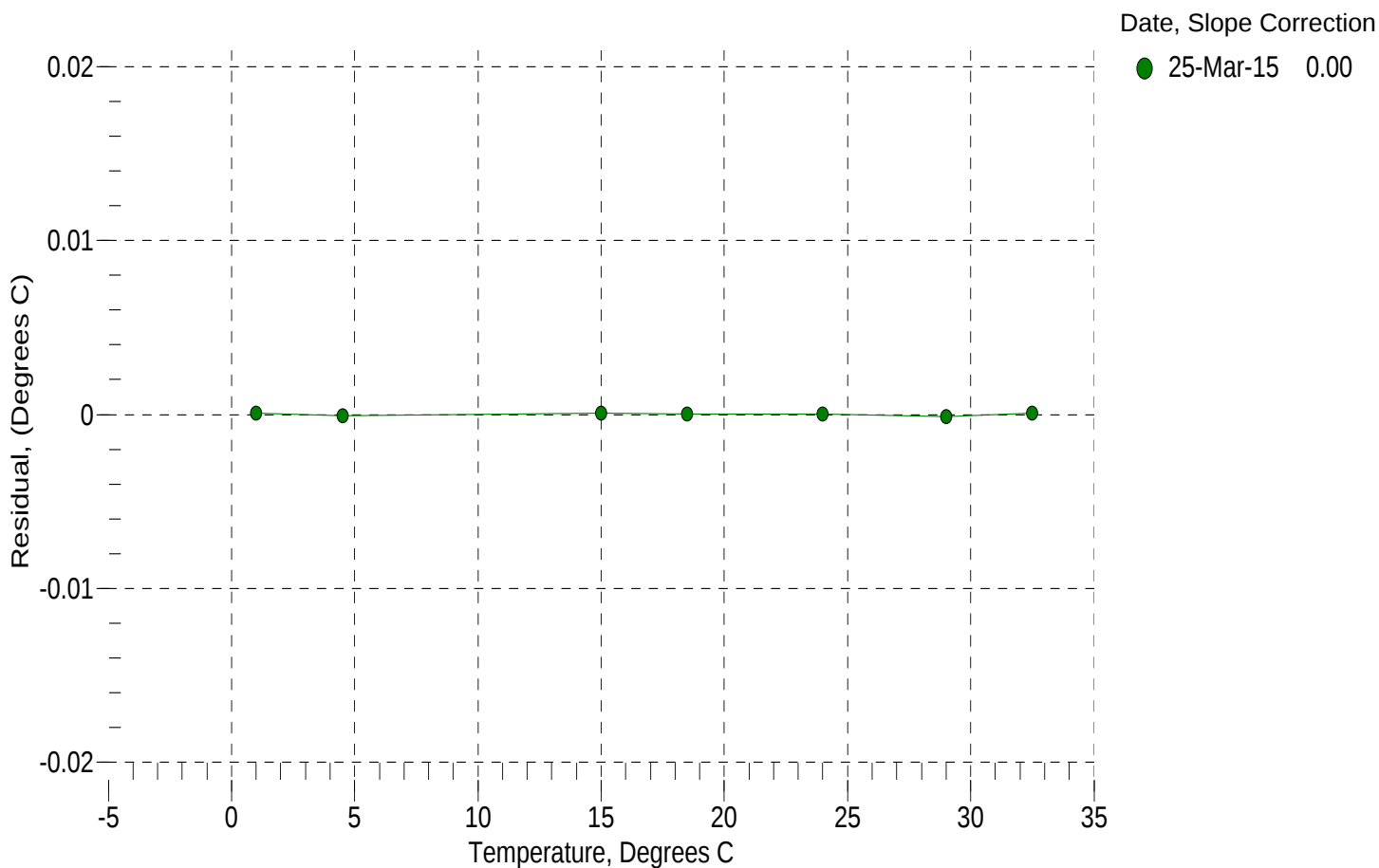
a0 = -1.427886e-004
a1 = 3.166727e-004
a2 = -5.256281e-006
a3 = 2.226878e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
0.9999	566728.0	1.0000	0.0001
4.5000	484701.0	4.4999	-0.0001
15.0000	309234.0	15.0001	0.0001
18.5000	267878.0	18.5000	0.0000
23.9999	215060.0	23.9999	0.0000
29.0000	177219.0	28.9999	-0.0001
32.5000	155283.0	32.5001	0.0001

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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SENSOR SERIAL NUMBER: 13247
CALIBRATION DATE: 25-Mar-15

SBE 37 V2 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -9.726602e-001
h = 1.496773e-001
i = -1.303849e-004
j = 3.202112e-005

CPcor = -9.5700e-008
CTcor = 3.2500e-006
WBOTC = 3.9209e-007

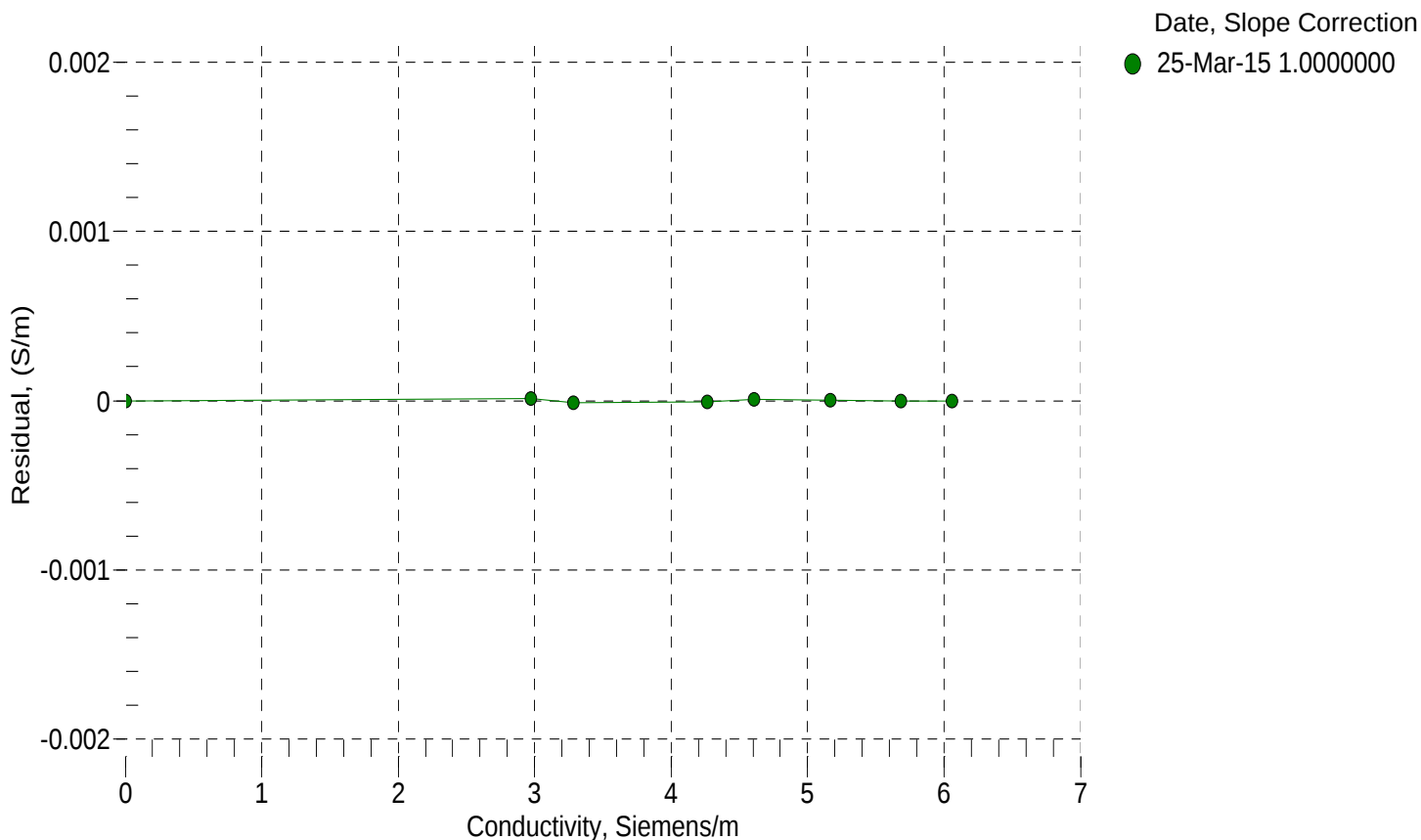
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2550.24	0.00000	0.00000
0.9999	34.7947	2.97429	5132.17	2.97430	0.00001
4.5000	34.7747	3.28119	5327.26	3.28117	-0.00001
15.0000	34.7315	4.26231	5907.22	4.26230	-0.00001
18.5000	34.7223	4.60724	6097.78	4.60725	0.00001
23.9999	34.7123	5.16485	6393.55	5.16486	0.00000
29.0000	34.7071	5.68644	6658.04	5.68644	-0.00000
32.5000	34.7051	6.05879	6840.43	6.05879	-0.00000

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

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

$$t = \text{temperature} [^{\circ}\text{C}]; p = \text{pressure} [\text{decibars}]; \delta = \text{CTcor}; \epsilon = \text{CPcor};$$

$$\text{Residual} = \text{instrument conductivity} - \text{bath conductivity}$$



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SENSOR SERIAL NUMBER: 13247
CALIBRATION DATE: 17-Mar-15

SBE 37 V2 PRESSURE CALIBRATION DATA
FSR: 508 psia S/N 4369700

COEFFICIENTS:

PA0 = -6.360608e-002
PA1 = 1.607762e-003
PA2 = 7.232680e-011
PTempa0 = 2.268599e+002
PTempa1 = -7.847380e-002
PTempa2 = -8.645457e-006

PTCA0 = 5.241481e+005
PTCA1 = 4.556204e-001
PTCA2 = -1.001446e-001
PTCB0 = 2.498288e+001
PTCB1 = -4.250000e-004
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FS
14.63	533259.0	2114.0	14.66	0.00
104.92	589183.0	2114.0	104.91	-0.00
204.92	650828.0	2113.0	204.91	-0.00
304.93	712145.0	2112.0	304.93	0.00
404.93	773128.0	2111.0	404.95	0.00
504.94	833760.0	2108.0	504.92	-0.00
404.94	773130.0	2111.0	404.95	0.00
304.94	712153.0	2112.0	304.94	0.00
204.93	650835.0	2113.0	204.92	-0.00
104.92	589193.0	2113.0	104.92	0.00
14.64	533236.0	2114.0	14.62	-0.00

THERMAL CORRECTION

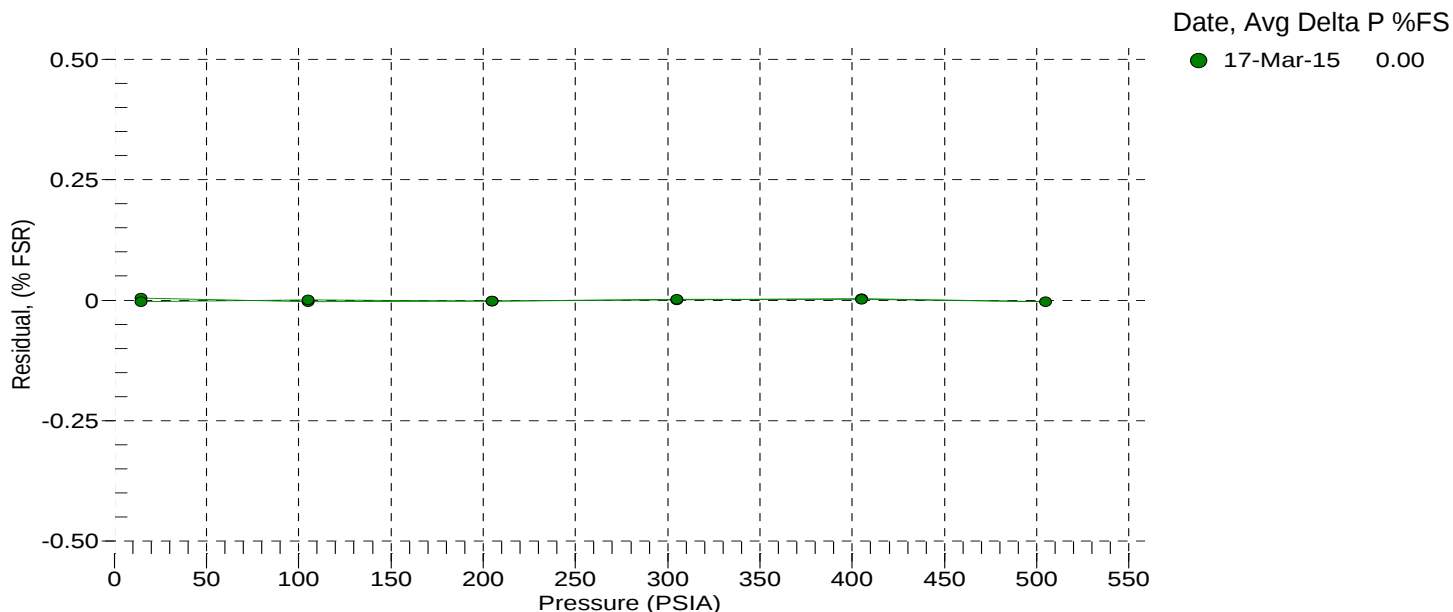
TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	2025	533727.00
29.00	2056	533745.81
24.00	2099	533769.85
18.50	2147	533792.36
15.00	2178	533801.59
4.50	2267	533817.59
1.00	2297	533817.49
TEMP (ITS90)	SPAN (mV)	
-5.00	24.98	
35.00	24.97	

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

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

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

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





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Pressure Test Certificate

Test Date: **03/03/15**

Description: **SBE-37 Microcat**

Sensor Information:

Model Number: **37**

Serial Number: **13247**

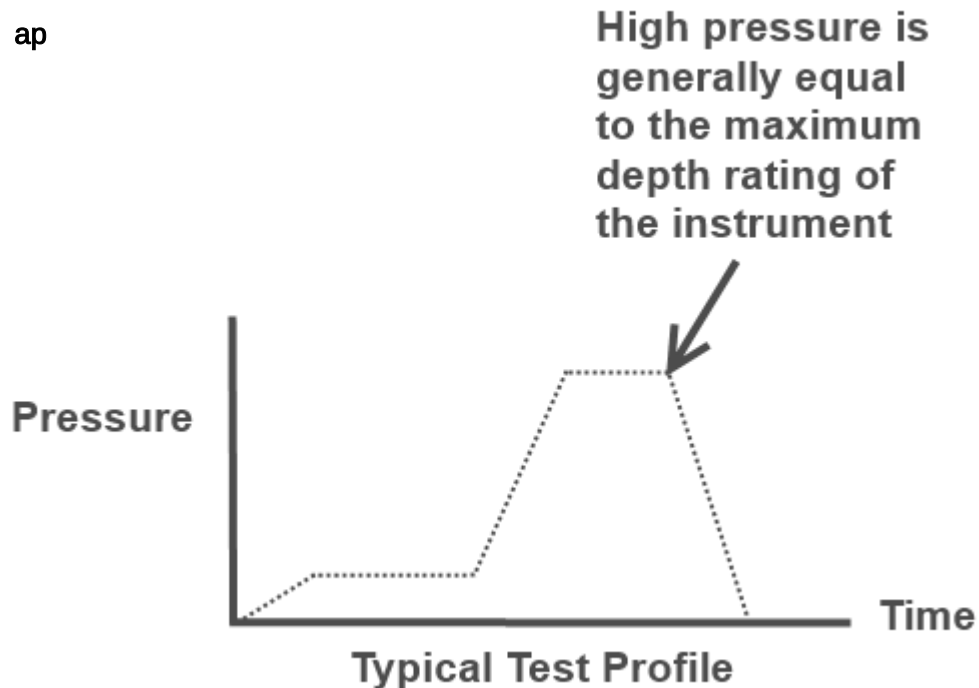
Pressure Test Protocol:

Low Pressure Test: **40** PSI Held For: **15** Minutes

High Pressure Test: **500** PSI Held For: **15** Minutes

Passed Test: **Yes**

Tested By: **ap**



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SENSOR SERIAL NUMBER: 1018
CALIBRATION DATE: 25-Feb-15

SBE 63 OXYGEN TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

TA0 = 7.086099e-004 TA2 = 8.079224e-007

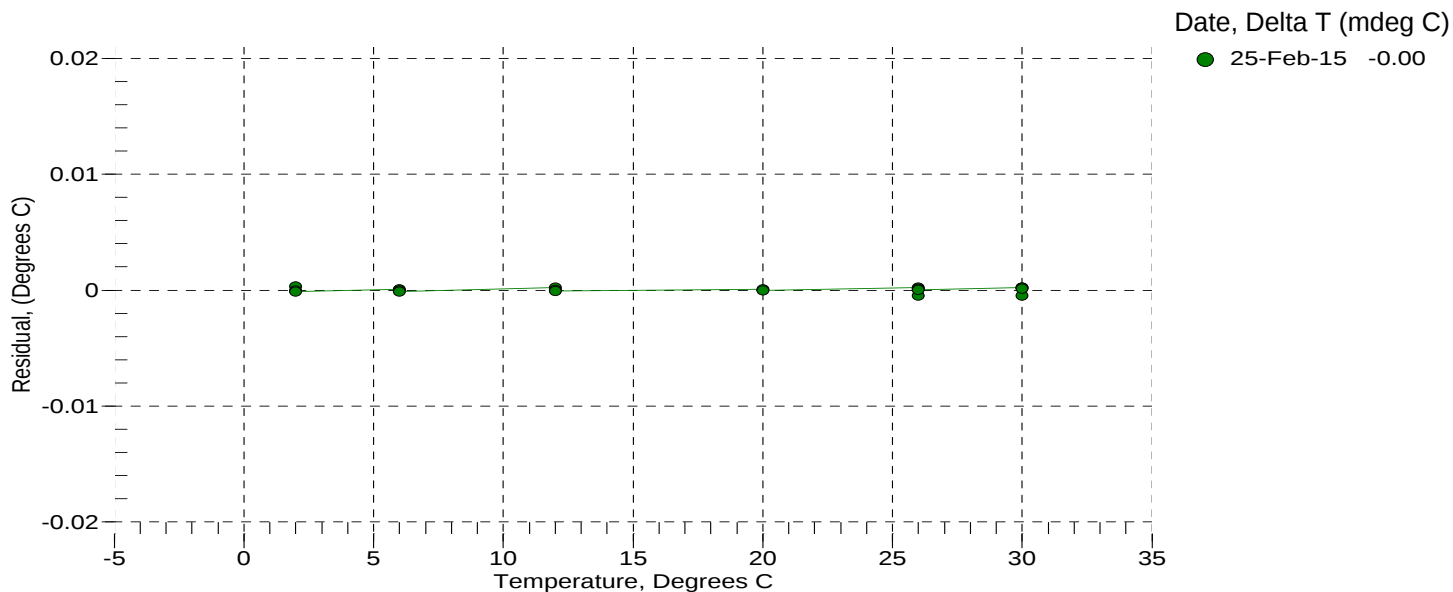
TA1 = 2.492319e-004 TA3 = 9.902187e-008

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT(V)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
2.0000	1.12230	2.0003	0.00030
2.0000	1.12231	2.0000	-0.00001
2.0001	1.12231	2.0000	-0.00011
2.0001	1.12231	2.0000	-0.00011
5.9999	0.99794	6.0000	0.00006
6.0000	0.99794	6.0000	-0.00004
6.0000	0.99794	6.0000	-0.00004
6.0001	0.99794	6.0000	-0.00014
11.9998	0.83179	12.0000	0.00021
12.0000	0.83179	12.0000	0.00001
12.0000	0.83179	12.0000	0.00001
12.0001	0.83179	12.0000	-0.00009
19.9999	0.64769	20.0000	0.00009
20.0000	0.64769	20.0000	-0.00001
20.0000	0.64769	20.0000	-0.00001
20.0000	0.64769	20.0000	-0.00001
25.9999	0.53537	26.0001	0.00021
26.0000	0.53537	26.0001	0.00011
26.0000	0.53538	25.9995	-0.00048
26.0001	0.53537	26.0001	0.00001
30.0000	0.47135	30.0002	0.00021
30.0000	0.47136	29.9995	-0.00045
30.0000	0.47135	30.0002	0.00021
30.0001	0.47135	30.0002	0.00011

Temperature ITS-90 = $1 / (TA0 + TA1 * L + TA2 * L^2 + TA3 * L^3) - 273.15$ (°C)

$L = \ln(100000 * V / (3.3 - V))$; V = thermistor voltage

Residual = instrument temperature - bath temperature



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SBE 63 OXYGEN CALIBRATION DATA

CALIBRATION DATE: 25-Feb-15

COEFFICIENTS:

A0 = 1.0513e+000 B0 = -2.3326e-001 C0 = 1.0008e-001 E = 1.1000e-002
 A1 = -1.5000e-003 B1 = 1.6434e+000 C1 = 4.1863e-003
 A2 = 4.2530e-001 C2 = 5.8165e-005

BATH OX (ml/l)	BATH TEMP (ITS-90)	BATH SAL (PSU)	INSTRUMENT OUTPUT (U)	INSTRUMENT OXYGEN (ml/l)	RESIDUAL (ml/l)
0.846	30.00	0.00	29.86	0.852	0.006
0.867	26.00	0.00	30.65	0.871	0.004
0.924	20.00	0.00	31.72	0.925	0.001
1.024	12.00	0.00	33.14	1.023	-0.002
1.131	6.00	0.00	34.18	1.130	-0.001
1.264	2.00	0.00	34.65	1.265	0.001
2.332	30.00	0.00	22.20	2.340	0.008
2.460	26.00	0.00	22.79	2.467	0.007
2.614	20.00	0.00	23.94	2.617	0.003
3.124	12.00	0.00	24.91	3.125	0.001
3.540	6.00	0.00	25.88	3.540	0.000
3.786	30.00	0.00	18.45	3.789	0.003
3.892	2.00	0.00	26.55	3.886	-0.006
4.039	26.00	0.00	18.91	4.038	-0.001
4.463	20.00	0.00	19.66	4.462	-0.001
5.221	12.00	0.00	20.72	5.214	-0.007
5.300	30.00	0.00	16.06	5.292	-0.008
5.735	26.00	0.00	16.35	5.737	0.002
5.957	6.00	0.00	21.57	5.957	-0.001
6.296	20.00	0.00	17.08	6.292	-0.004
6.566	2.00	0.00	22.19	6.554	-0.012
7.359	12.00	0.00	18.03	7.359	-0.000
8.402	6.00	0.00	18.81	8.410	0.008
9.002	2.00	0.00	19.59	9.010	0.009

$$V = U / 39.457071$$

$$\text{Oxygen (ml/l)} = \{((A0 + A1 \cdot T + A2 \cdot V^2)/(B0 + B1 \cdot V) - 1.0)/(C0 + C1 \cdot T + C2 \cdot T^2)\} \cdot \exp(E \cdot P / K)$$

T = temperature [deg C], K = temperature [Kelvin], P = pressure [dbar]

Residual = instrument oxygen - bath oxygen

