



Sea-Bird Electronics, Inc.

Advancing the Science of Ocean Measurement

SBE 37-IMP-ODO MicroCAT

*Conductivity, Temperature, (optional) Pressure
and Optical Dissolved Oxygen Recorder
with Inductive Modem Interface and Integral Pump*

Instrument Configuration

Instrument Serial Number: 37-12120
Instrument Firmware Version: 1.2.0
Zero Conductivity Frequency: 2484.48
IM Firmware Version: 1.14
Instrument ID#: 20
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	4134752	350m(350 dBar)
RS232	Oxygen	SBE 63	63-0765	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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Sea-Bird Electronics, Inc.

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SENSOR SERIAL NUMBER: 12120

CALIBRATION DATE: 02-May-14

SBE 37 V2 TEMPERATURE CALIBRATION DATA

ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

a0 = -1.098681e-004

a1 = 3.085409e-004

a2 = -4.605004e-006

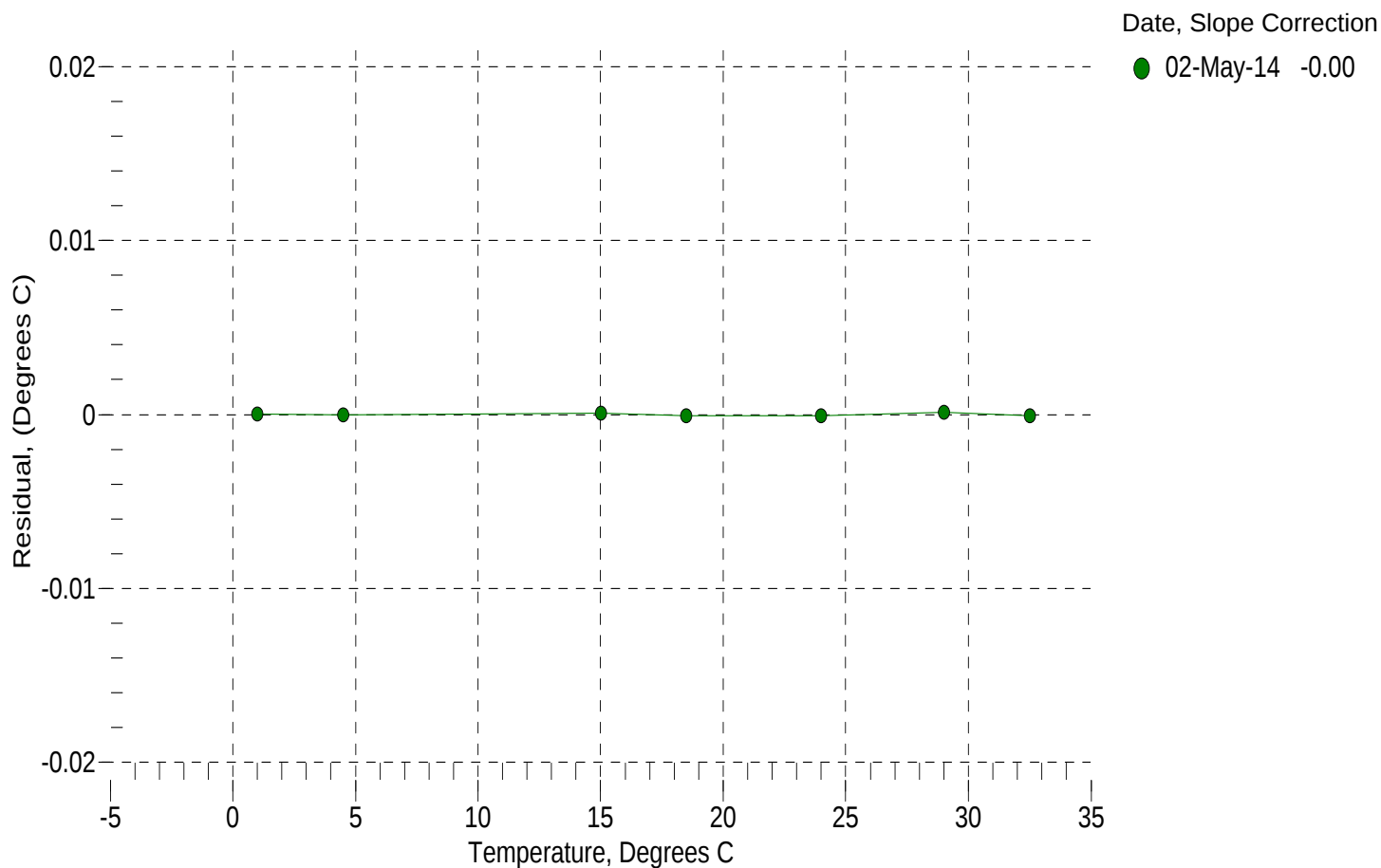
a3 = 2.041107e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	573900.0	1.0000	0.0000
4.5000	490689.0	4.5000	-0.0000
15.0000	312803.0	15.0001	0.0001
18.5000	270905.0	18.4999	-0.0001
24.0000	217409.0	23.9999	-0.0001
29.0000	179096.0	29.0001	0.0001
32.5000	156896.0	32.4999	-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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CALIBRATION DATE: 02-May-14

SBE 37 V2 CONDUCTIVITY CALIBRATION DATA

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

COEFFICIENTS:

g = -9.770222e-001

h = 1.586665e-001

i = -2.648122e-004

j = 4.441361e-005

CPcor = -9.5700e-008

CTcor = 3.2500e-006

WBOTC = 0.0000e+000

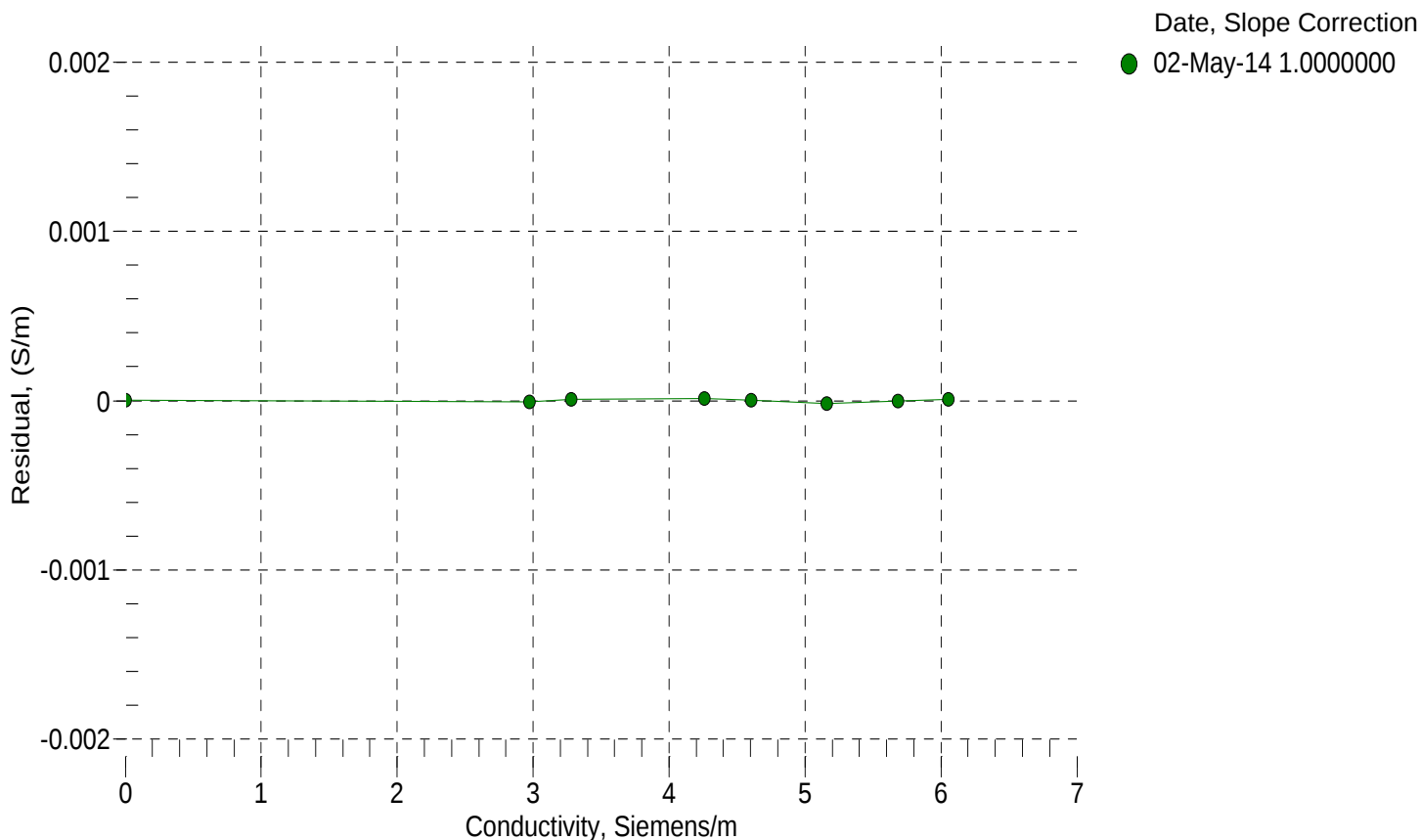
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2484.48	0.00000	0.00000
1.0000	34.7719	2.97253	4992.59	2.97252	-0.00001
4.5000	34.7518	3.27924	5182.27	3.27924	0.00001
15.0000	34.7090	4.25984	5746.16	4.25986	0.00001
18.5000	34.7001	4.60461	5931.44	4.60462	0.00000
24.0000	34.6903	5.16195	6219.02	5.16194	-0.00002
29.0000	34.6848	5.68320	6476.15	5.68320	-0.00000
32.5000	34.6812	6.05509	6653.36	6.05510	0.00001

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

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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SENSOR SERIAL NUMBER: 12120
CALIBRATION DATE: 30-Apr-14

SBE 37 V2 PRESSURE CALIBRATION DATA
FSR: 508 psia S/N 4134752

COEFFICIENTS:

PA0 = 7.220744e-002
PA1 = 1.581173e-003
PA2 = 5.146939e-012
PTempa0 = -8.234812e+001
PTempa1 = 4.834318e-002
PTempa2 = -3.749189e-007

PTCA0 = 5.250727e+005
PTCA1 = 4.259955e+000
PTCA2 = -1.012413e-001
PTCB0 = 2.510263e+001
PTCB1 = -2.750000e-004
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	THERMISTOR OUTPUT	COMPUTED PRESSURE	ERROR %FS
14.78	534428.0	2192.0	14.80	0.00
105.05	591459.0	2193.0	105.02	-0.01
205.05	654661.0	2194.0	205.04	-0.00
305.06	717836.0	2195.0	305.06	0.00
405.06	780975.0	2195.0	405.06	-0.00
505.07	844085.0	2196.0	505.06	-0.00
405.07	780993.0	2196.0	405.09	0.00
305.07	717852.0	2195.0	305.08	0.00
205.06	654679.0	2196.0	205.07	0.00
105.06	591494.0	2196.0	105.07	0.00
14.77	534409.0	2199.0	14.77	-0.00

THERMAL CORRECTION

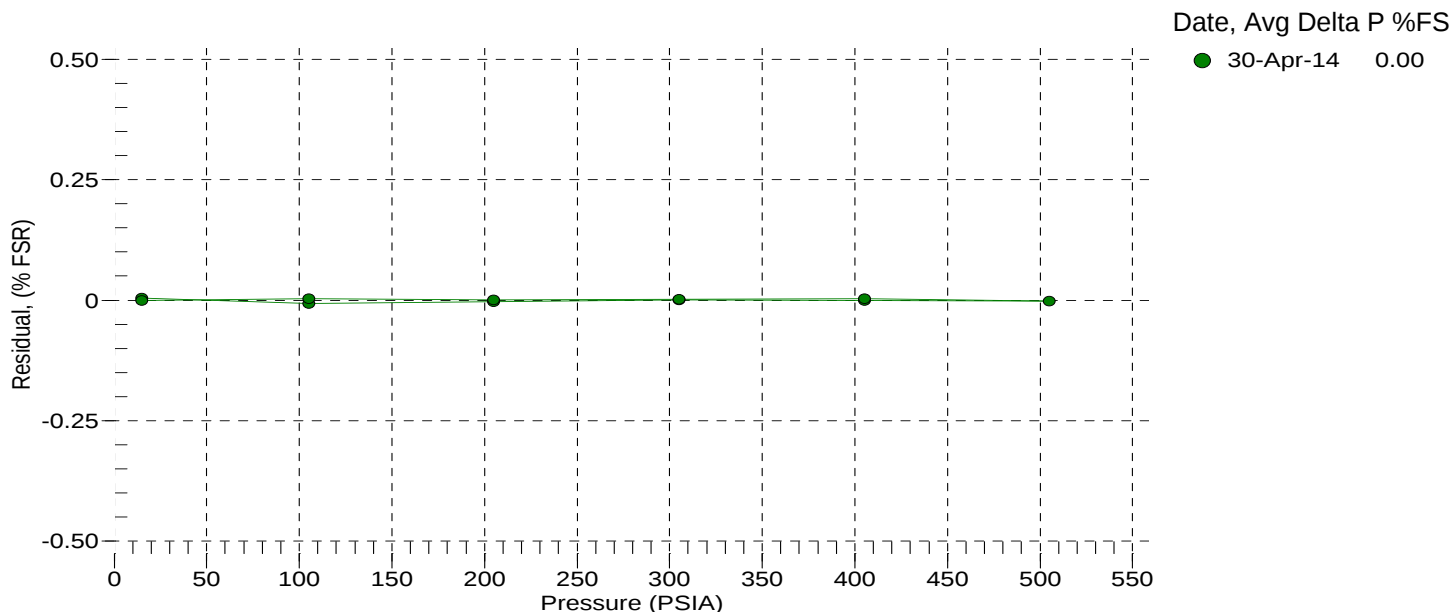
TEMP ITS90	THERMISTOR OUTPUT	INST OUTPUT
32.50	2421	534744.00
29.00	2346	534750.90
24.00	2239	534755.40
18.50	2121	534756.77
15.00	2046	534753.64
4.50	1822	534729.70
1.00	1748	534716.21
TEMP (ITS90)		SPAN (mV)
-5.00		25.10
35.00		25.09

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

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

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

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





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SBE Pressure Test Certificate

Test Date: 4/26/2014 Description SBE-37 Microcat

SBE Sensor Information:

Model Number: 37

Serial Number: 12120

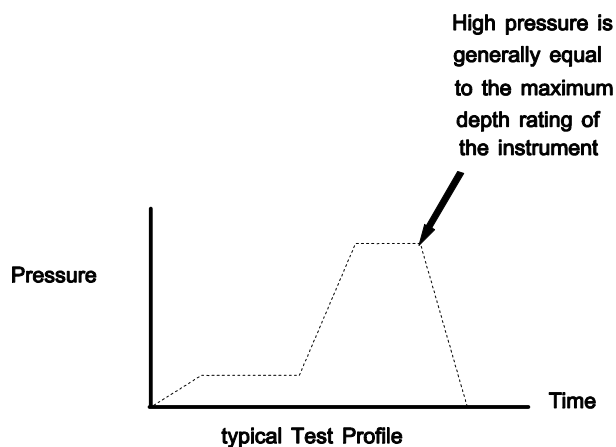
Pressure Test Protocol:

Low Pressure Test: 40 PSI Held For 15 Minutes

High Pressure Test: 500 PSI Held For 15 Minutes

Passed Test: ☒

Tested By: VG



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SENSOR SERIAL NUMBER: 0765

CALIBRATION DATE: 24-Apr-14

SBE 63 OXYGEN TEMPERATURE CALIBRATION DATA

ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

TA0 = 7.567022e-004 TA2 = 1.937131e-006

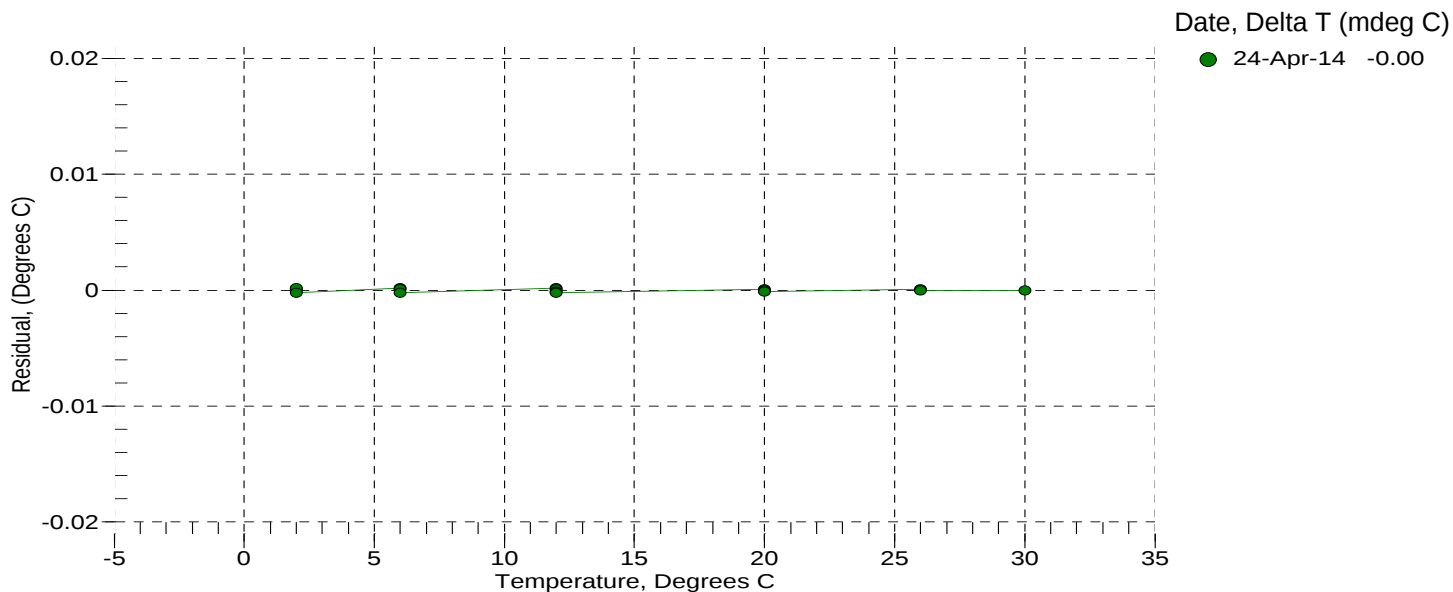
TA1 = 2.374389e-004 TA3 = 5.787432e-008

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT(U)	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
2.0000	1.12104	2.0001	0.00006
2.0001	1.12104	2.0001	-0.00004
2.0002	1.12103	2.0004	0.00016
2.0006	1.12103	2.0004	-0.00024
5.9999	0.99602	6.0001	0.00017
5.9999	0.99602	6.0001	0.00017
6.0000	0.99602	6.0001	0.00007
6.0003	0.99602	6.0001	-0.00023
11.9997	0.82917	11.9999	0.00017
11.9998	0.82917	11.9999	0.00007
12.0000	0.82917	11.9999	-0.00013
12.0001	0.82917	11.9999	-0.00023
19.9998	0.64456	19.9999	0.00009
19.9999	0.64456	19.9999	-0.00001
19.9999	0.64456	19.9999	-0.00001
20.0000	0.64456	19.9999	-0.00011
25.9999	0.53211	26.0000	0.00006
25.9999	0.53211	26.0000	0.00006
25.9999	0.53211	26.0000	0.00006
26.0000	0.53211	26.0000	-0.00004
30.0000	0.46809	30.0000	-0.00002
30.0000	0.46809	30.0000	-0.00002
30.0000	0.46809	30.0000	-0.00002
30.0000	0.46809	30.0000	-0.00002

Temperature ITS-90 = $1 / (TA0 + TA1 * L + TA2 * L^{23}) - 273.15$ (°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: 24-Apr-14

COEFFICIENTS:

A0 = 1.0513e+000 B0 = -2.4152e-001 C0 = 1.0222e-001 E = 1.1000e-002
A1 = -1.5000e-003 B1 = 1.6380e+000 C1 = 4.3003e-003
A2 = 4.1230e-001 C2 = 5.9570e-005

BATH OX (ml/l)	BATH TEMP (ITS-90)	BATH SAL (PSU)	INSTRUMENT OUTPUT (U)	INSTRUMENT OXYGEN (ml/l)	RESIDUAL (ml/l)
0.852	30.00	0.00	29.88	0.857	0.005
0.883	26.00	0.00	30.60	0.885	0.002
0.942	20.00	0.00	31.65	0.942	0.001
1.035	12.00	0.00	33.12	1.034	-0.001
1.136	6.00	0.00	34.19	1.136	-0.000
1.235	2.00	0.00	34.83	1.235	0.000
2.344	30.00	0.00	22.24	2.347	0.003
2.498	26.00	0.00	22.74	2.501	0.003
2.652	20.00	0.00	23.89	2.654	0.002
3.150	12.00	0.00	24.91	3.148	-0.002
3.554	6.00	0.00	25.91	3.554	0.000
3.838	30.00	0.00	18.43	3.838	0.000
3.910	2.00	0.00	26.57	3.905	-0.005
4.091	26.00	0.00	18.88	4.091	-0.000
4.528	20.00	0.00	19.62	4.528	0.001
5.273	12.00	0.00	20.70	5.274	0.000
5.346	30.00	0.00	16.08	5.343	-0.003
5.830	26.00	0.00	16.32	5.833	0.003
5.968	6.00	0.00	21.63	5.970	0.002
6.410	20.00	0.00	17.04	6.403	-0.007
6.591	2.00	0.00	22.22	6.588	-0.003
7.345	12.00	0.00	18.12	7.347	0.002
8.450	6.00	0.00	18.85	8.451	0.000
9.087	2.00	0.00	19.60	9.090	0.003

$$V = U / 39.457071$$

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

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

Residual = instrument oxygen - bath oxygen

