



**SEA-BIRD**  
SCIENTIFIC

**SBE** Sea-Bird  
Electronics

Sea-Bird Electronics  
13431 NE 20<sup>th</sup> Street  
Bellevue, Washington  
98005 USA

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

## SBE41-CP ALACE

### Instrument Configuration

Instrument Serial Number: 41-8468  
Instrument Firmware Version: V 7.2.5  
Zero Conductivity Frequency: 2635.16  
Communications Format: RS232  
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	Kistler	4940397	2000m(2000 dBar)
RS232	Oxygen	SBE 63	63-1370	7000m

# 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: 8468  
CALIBRATION DATE: 10-May-16

SBE 41 TEMPERATURE CALIBRATION DATA  
ITS-90 TEMPERATURE SCALE

## COEFFICIENTS:

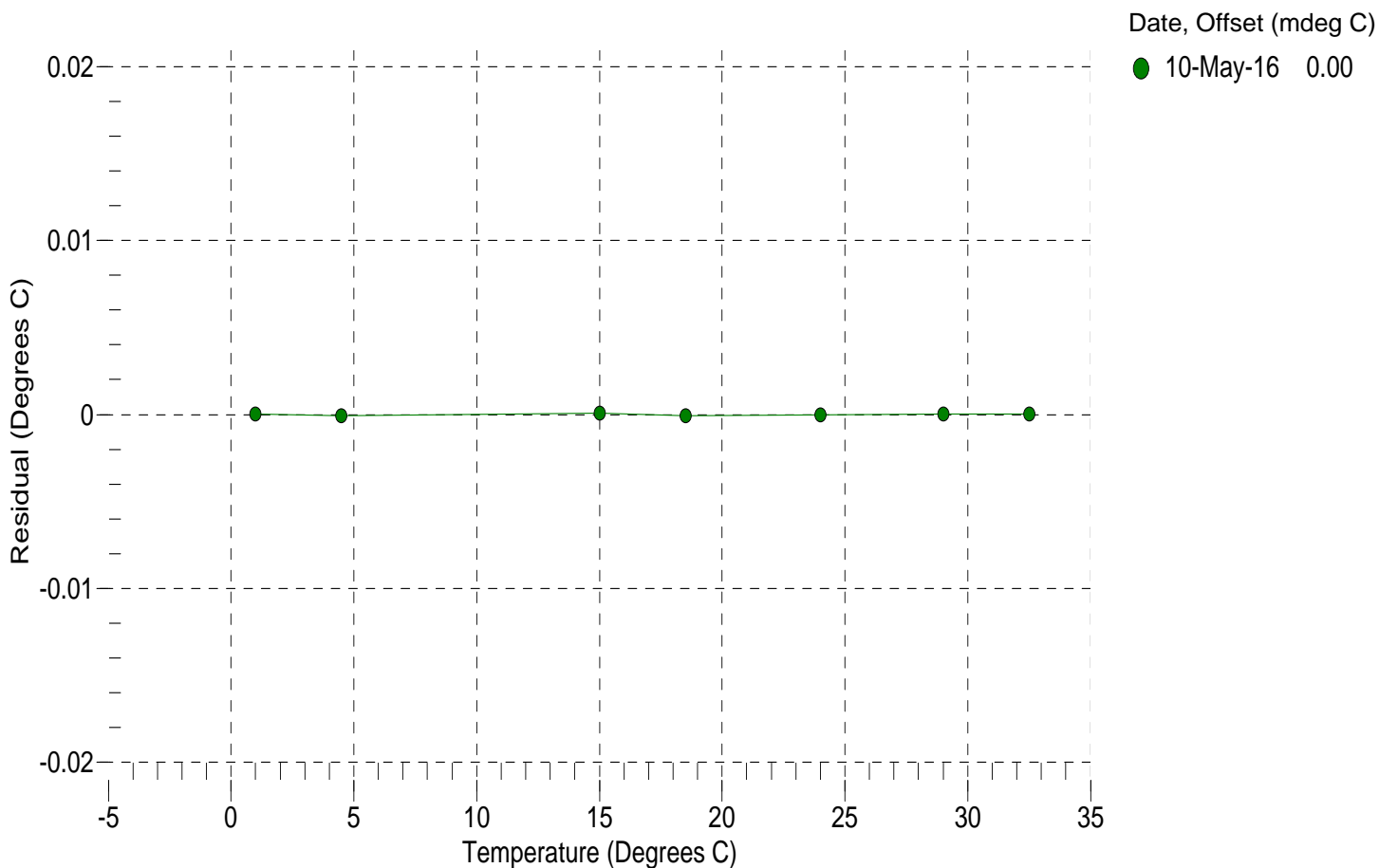
a0 = -7.985505e-004  
a1 = 2.913432e-004  
a2 = -3.725928e-006  
a3 = 1.492569e-007

BATH TEMP (° C)	INSTRUMENT OUTPUT (counts)	INST TEMP (° C)	RESIDUAL (° C)
1.0000	13813371.6	1.0000	0.0000
4.5000	11783436.5	4.4999	-0.0001
15.0000	7460270.8	15.0001	0.0001
18.5000	6446264.8	18.4999	-0.0001
23.9940	5155991.0	23.9940	-0.0000
29.0000	4232500.3	29.0000	0.0000
32.5000	3699323.3	32.5000	0.0000

n = Instrument Output (counts)

Temperature ITS-90 (°C) =  $1 / \{a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)]\} - 273.15$

Residual (°C) = instrument temperature - bath temperature



# 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: 8468  
CALIBRATION DATE: 10-May-16

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

## COEFFICIENTS:

g = -9.824217e-001  
h = 1.420689e-001  
i = -3.435752e-004  
j = 4.539136e-005

CPcor = -9.5700e-008  
CTcor = 3.2500e-006  
WBOTC = -7.5887e-007

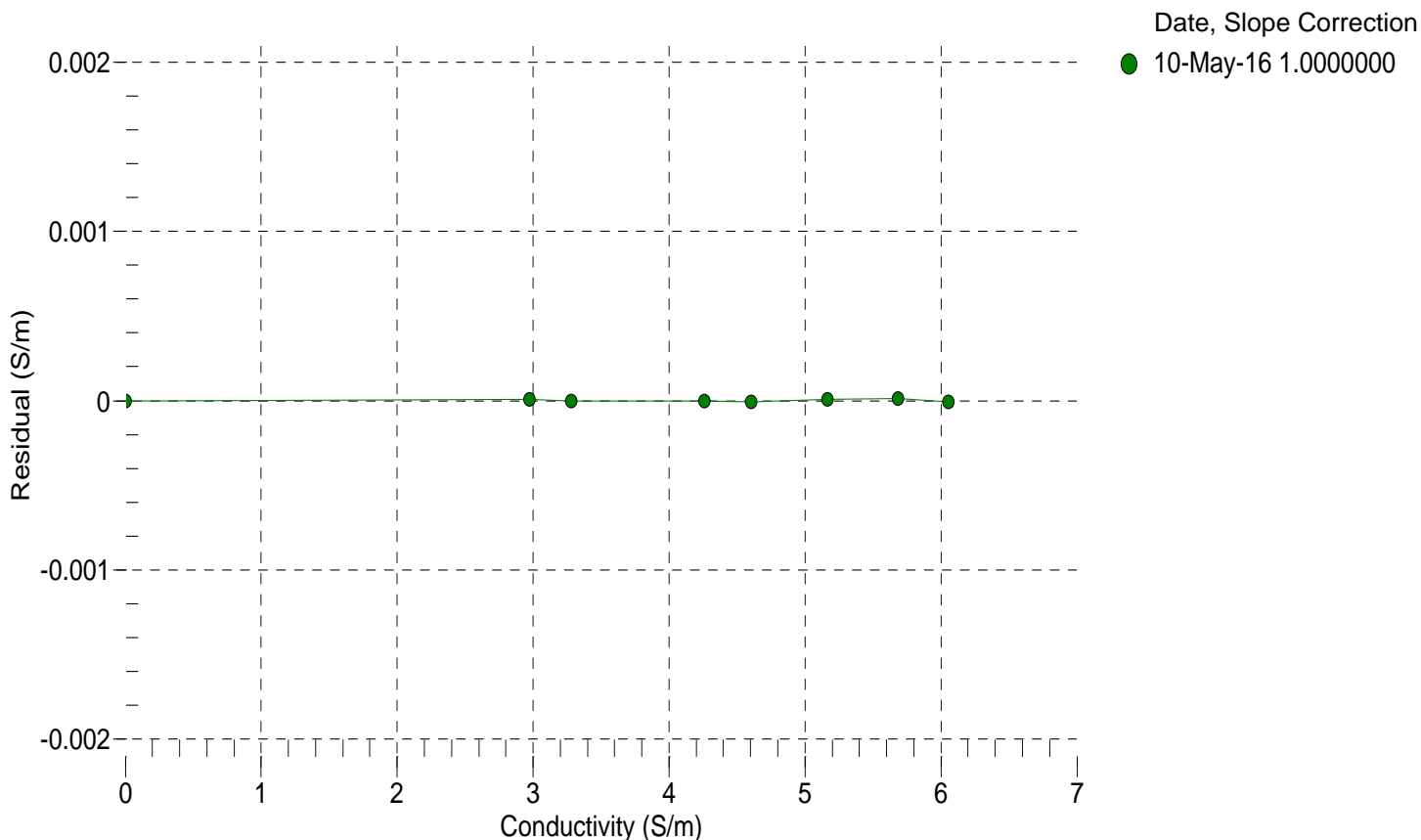
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (Hz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
22.0000	0.0000	0.00000	2635.16	0.00000	0.00000
1.0000	34.7808	2.97322	5286.87	2.97323	0.00001
4.5000	34.7608	3.28000	5487.52	3.28000	-0.00000
15.0000	34.7186	4.26089	6084.04	4.26089	-0.00000
18.5000	34.7098	4.60576	6280.03	4.60576	-0.00001
23.9940	34.7002	5.16264	6583.89	5.16265	0.00001
29.0000	34.6952	5.68471	6856.18	5.68472	0.00001
32.5000	34.6927	6.05687	7043.63	6.05686	-0.00001

$$f = \text{Instrument Output(Hz)} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$$

t = temperature (°C); p = pressure (decibars);  $\delta$  = CTcor;  $\epsilon$  = CPcor;

$$\text{Conductivity (S/m)} = (g + h * f^2 + i * f^3 + j * f^4) / 10 (1 + \delta * t + \epsilon * p)$$

$$\text{Residual (Siemens/meter)} = \text{instrument conductivity} - \text{bath conductivity}$$



# 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: 8468  
CALIBRATION DATE: 06-May-16

SBE 41 PRESSURE CALIBRATION DATA  
2900 psia S/N 4940397

## COEFFICIENTS:

PA0 =	2.167216e-001	PTCA0 =	-1.142511e+004
PA1 =	3.891885e-004	PTCA1 =	-1.660341e+002
PA2 =	1.076008e-013	PTCA2 =	8.812788e+000
PTHA0 =	3.166618e+002	PTCB0 =	1.040210e+002
PTHA1 =	-8.910518e-005	PTCB1 =	-7.437186e-003
PTHA2 =	2.592040e-012	PTCB2 =	0.000000e+000

## PRESSURE SPAN CALIBRATION

## THERMAL CORRECTION

PRESSURE (PSIA)	INSTRUMENT OUTPUT (counts)	THERMISTOR OUTPUT (counts)	COMPUTED PRESSURE (PSIA)	RESIDUAL (%FSR)	TEMP (°C)	THERMISTOR OUTPUT (counts)	INSTRUMENT OUTPUT (counts)
14.65	26303.1	3710235.6	14.71	0.00	32.50	3557155.00	31577.80
591.54	1505459.6	3709584.6	591.52	-0.00	29.00	3606753.20	30263.69
1168.37	2983714.0	3709076.0	1168.46	0.00	23.99	3678026.80	28751.14
1745.24	4460651.5	3708583.2	1745.35	0.00	18.50	3756704.20	27618.80
2322.01	5936179.5	3708091.4	2322.17	0.01	15.00	3807101.20	27161.08
2898.79	7409607.3	3707583.8	2898.64	-0.01	4.50	3959339.00	27080.21
2322.00	5935855.5	3707609.0	2322.05	0.00	1.00	4010418.60	27520.71
1745.29	4460512.0	3707617.8	1745.30	0.00			
1168.36	2982905.6	3707584.8	1168.14	-0.01	TEMPERATURE (°C)		SPAN (mV)
591.37	1504635.8	3707608.8	591.19	-0.01	-4.12		104.05
14.64	26401.8	3707146.6	14.73	0.00	35.68		103.76

y = thermistor output (counts)

$$t = PTHA0 + PTHA1 * y + PTHA2 * y^2$$

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

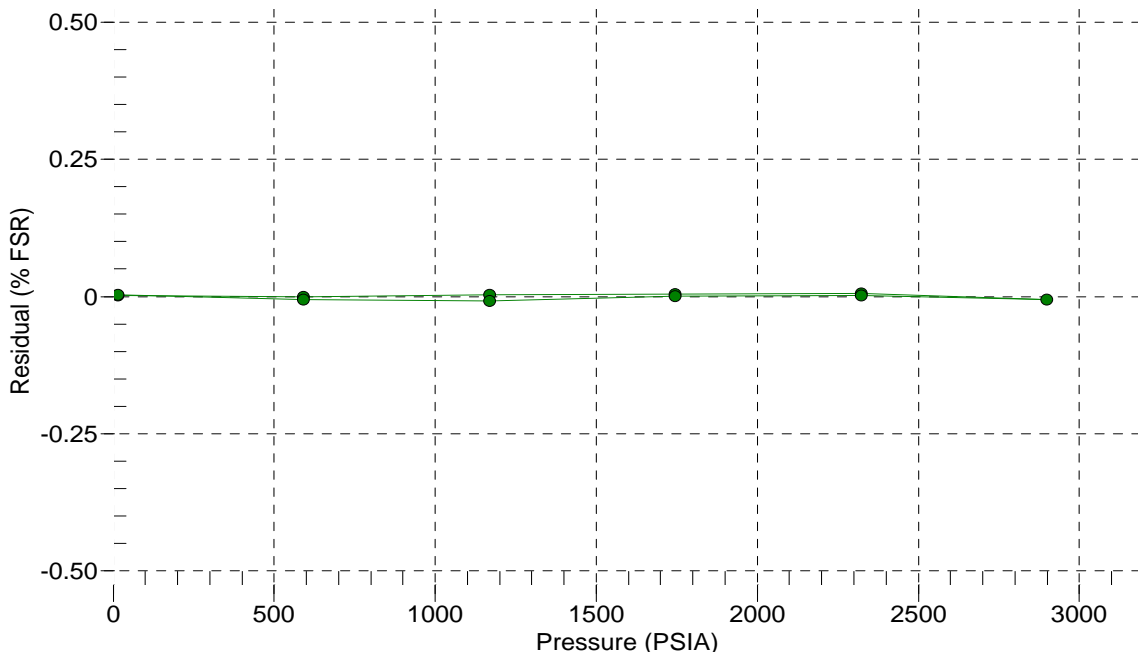
$$n = x * PTCB0 / (PTCB0 + PTCB1 * t + PTCB2 * t^2)$$

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

$$\text{Residual (\%FSR)} = (\text{computed pressure} - \text{true pressure}) * 100 / \text{Full Scale Range}$$

Date, Offset (%FSR)

● 06-May-16 0.00



# 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: 1370  
 CALIBRATION DATE: 23-Apr-16

SBE 63 OXYGEN TEMPERATURE CALIBRATION DATA  
 ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

TA0 = 7.701894e-004    TA2 = 2.604894e-006

TA1 = 2.313275e-004    TA3 = 3.861400e-008

BATH TEMP (° C)	INSTRUMENT OUTPUT(V)	INST TEMP (° C)	RESIDUAL (° C)
2.0000	1.11813	2.0000	0.00003
2.0000	1.11813	2.0000	0.00003
2.0000	1.11813	2.0000	0.00003
2.0000	1.11813	2.0000	0.00003
5.9999	0.99391	5.9999	0.00001
6.0000	0.99391	5.9999	-0.00009
6.0000	0.99391	5.9999	-0.00009
6.0000	0.99391	5.9999	-0.00009
12.0000	0.82808	12.0001	0.00006
12.0000	0.82808	12.0001	0.00006
12.0000	0.82808	12.0001	0.00006
12.0000	0.82808	12.0001	0.00006
19.9999	0.64450	20.0000	0.00010
20.0000	0.64450	20.0000	-0.00000
20.0000	0.64450	20.0000	-0.00000
20.0001	0.64450	20.0000	-0.00010
26.0000	0.53258	25.9998	-0.00018
26.0000	0.53257	26.0004	0.00041
26.0000	0.53258	25.9998	-0.00018
26.0000	0.53258	25.9998	-0.00018
30.0000	0.46881	29.9999	-0.00015
30.0000	0.46880	30.0005	0.00052
30.0000	0.46881	29.9999	-0.00015
30.0000	0.46881	29.9999	-0.00015

V = Instrument Output (Volts)

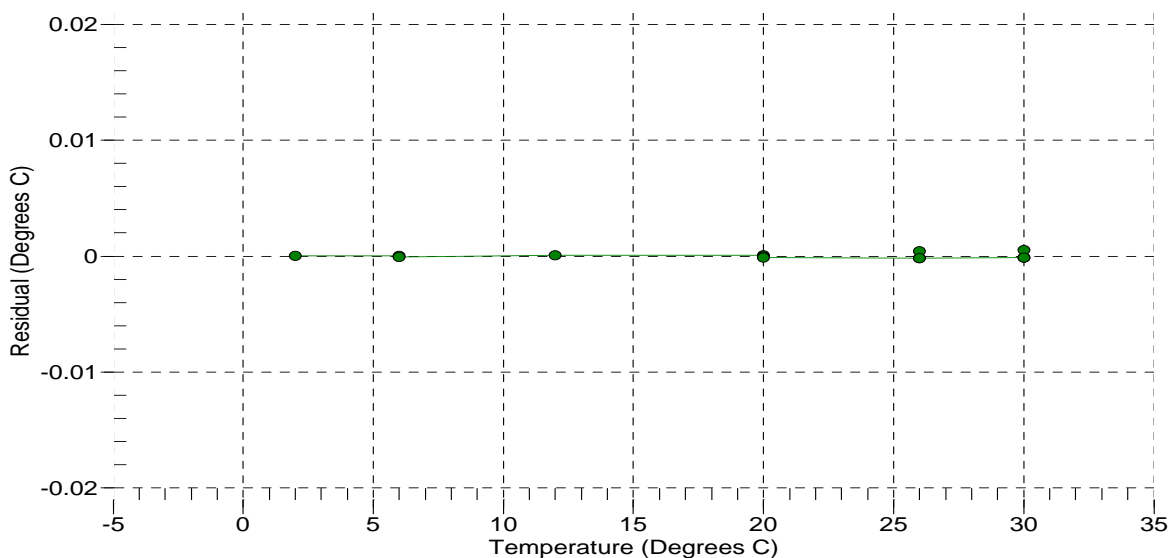
$L = \ln(100000 * V / (3.3 - V))$

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

Residual (°C) = instrument temperature - bath temperature

Date, Offset (mdeg C)

● 23-Apr-16 -0.00



# 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: 1370  
CALIBRATION DATE: 23-Apr-16

## SBE 63 OXYGEN CALIBRATION DATA

### COEFFICIENTS:

A0 = 1.0513e+000    B0 = -2.2825e-001    C0 = 9.8474e-002    E = 1.1000e-002  
A1 = -1.5000e-003    B1 = 1.6441e+000    C1 = 4.1423e-003  
A2 = 4.2435e-001    C2 = 5.5882e-005

BATH OXYGEN (ml/l)	BATH TEMPERATURE (° C)	BATH SALINITY (PSU)	INSTRUMENT OUTPUT (µsec)	INSTRUMENT OXYGEN (ml/l)	RESIDUAL (ml/l)
0.731	30.00	0.00	30.78	0.730	-0.001
0.762	26.00	0.00	31.41	0.762	-0.000
0.816	20.00	0.00	32.38	0.815	-0.001
0.899	12.00	0.00	33.77	0.898	-0.001
1.006	6.00	0.00	34.66	1.008	0.003
1.099	2.00	0.00	35.25	1.103	0.005
2.237	30.00	0.00	22.52	2.240	0.003
2.363	26.00	0.00	23.08	2.371	0.008
2.513	20.00	0.00	24.23	2.512	-0.002
3.015	12.00	0.00	25.16	3.011	-0.003
3.430	6.00	0.00	26.10	3.423	-0.007
3.704	30.00	0.00	18.61	3.704	0.000
3.771	2.00	0.00	26.75	3.764	-0.007
3.938	26.00	0.00	19.06	3.949	0.011
4.366	20.00	0.00	19.80	4.369	0.003
5.105	12.00	0.00	20.85	5.108	0.003
5.276	30.00	0.00	16.08	5.266	-0.010
5.666	26.00	0.00	16.41	5.668	0.002
5.854	6.00	0.00	21.68	5.855	0.001
6.257	20.00	0.00	17.10	6.253	-0.004
6.450	2.00	0.00	22.29	6.447	-0.002
7.295	12.00	0.00	18.07	7.294	-0.000
8.345	6.00	0.00	18.84	8.345	0.000
8.846	2.00	0.00	19.70	8.851	0.005

T = temperature (°C), P = pressure (dbar), U = Instrument output (µsec)

$S_{corr}$  (salinity correction function) = 1.0 for calibration in DI water

See the user manual for more information on  $S_{corr}$  calculation

$$V = U / 39.457071$$

$$\text{Oxygen (ml/l)} = \{((A0 + A1 * T + A2 * V^2) / (B0 + B1 * V) - 1.0) / (C0 + C1 * T + C2 * T^2)\} * S_{corr} * \exp(E * P / T + 273.15)$$

Residual (ml/l) = instrument oxygen - bath oxygen

Date, Slope Correction

● 23-Apr-16 1.0000

