Sea-Bird Scientific
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SENSOR SERIAL NUMBER: 0057
CALIBRATION DATE: 25-Oct-17

SBE 9plus PRESSURE CALIBRATION DATA
10000 psia S/N 34901

DIGIQUARTZ COEFFICIENTS:

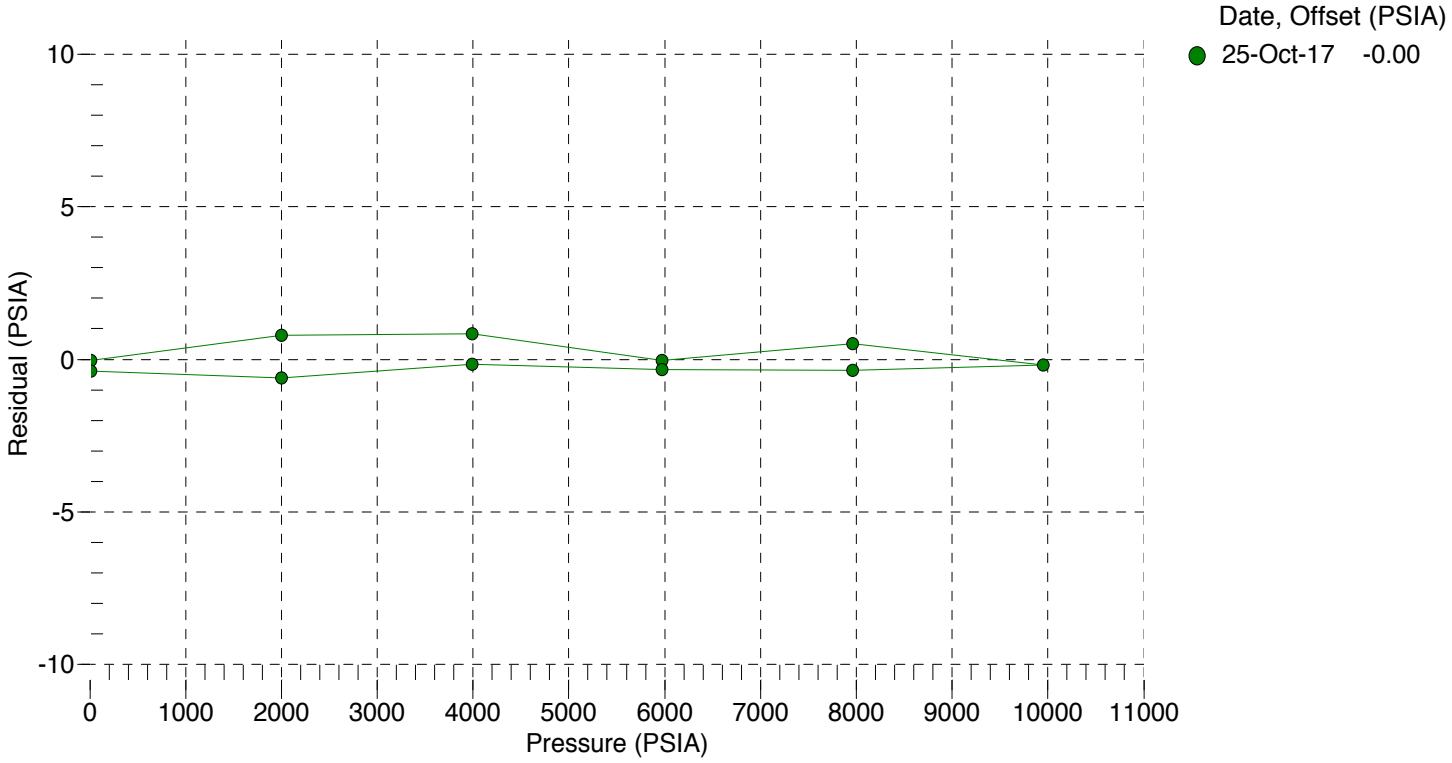
```
C1 =  -2.869955e+004
C2 =  -1.565582e+000
C3 =   9.161829e-003
D1 =   3.074801e-002
D2 =   0.000000e+000
T1 =   3.023683e+001
T2 =  -1.016075e-003
T3 =   4.744095e-006
T4 =   0.000000e+000
T5 =   0.000000e+000
```

AD590M, AD590B, SLOPE AND OFFSET:

```
AD590M =   1.13300e-002
AD590B =  -8.49858e+000
Slope  =   0.99981
Offset =  -7.6055 (dbars)
```

PRESSURE (PSIA)	INSTRUMENT OUTPUT (Hz)	INSTRUMENT TEMPERATURE (°C)	INSTRUMENT PRESSURE (PSIA)	CORRECTED PRESSURE (PSIA)	RESIDUAL (PSIA)
14.673	33107.90	20.8	25.677	14.644	-0.029
2001.203	34230.80	20.9	2013.397	2001.986	0.783
3987.814	35313.10	20.9	4000.437	3988.648	0.834
5975.185	36358.80	20.9	5987.318	5975.151	-0.034
7962.338	37371.70	20.9	7975.386	7962.841	0.503
9949.973	38353.50	20.9	9962.702	9949.780	-0.193
7962.354	37371.30	21.0	7974.531	7961.986	-0.368
5975.189	36358.70	21.0	5987.012	5974.846	-0.343
3988.072	35312.80	21.0	3999.694	3987.905	-0.167
2001.283	34230.20	21.0	2012.080	2000.669	-0.614
14.669	33107.90	21.0	25.307	14.274	-0.395

Residual (PSIA) = corrected instrument pressure - reference pressure



Pressure Calibration Report
STS Calibration Facility

SENSOR SERIAL NUMBER: 0914
CALIBRATION DATE: 10-JAN-2019
Mfg: SEABIRD Model: 09P CTD Prs s/n: 110547

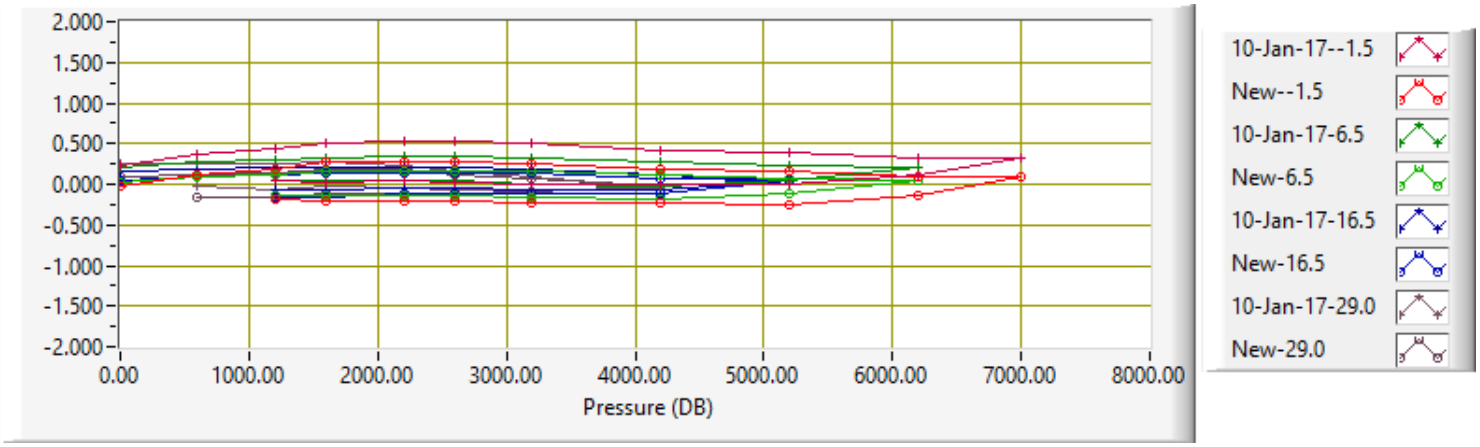
C1= -4.347481E+4
C2= 1.128938E-1
C3= 9.183598E-3
D1= 3.683315E-2
D2= 0.000000E+0
T1= 3.006834E+1
T2= -2.833701E-4
T3= 4.669014E-6
T4= -7.987024E-9
T5= 0.000000E+0
AD590M= 1.28789E-2
AD590B= -8.81353E+0
Slope = 1.00000000E+0
Offset = 0.00000000E+0

Calibration Standard: Mfg: FLUKE Model: P3125 s/n: 70856
t0=t1+t2*td+t3*td*td+t4*td*td*td
w = 1-t0*t0*f*f
Pressure = (0.6894759*((c1+c2*td+c3*td*td)*w*(1-(d1+d2*td)*w)-14.7)

Sensor Output	Standard	Sensor New_Coefs	Standard-Sensor Prev_Coefs	Standard-Sensor NEW_Coefs	Sensor_Temp	Bath_Temp
33263.043	0.27	0.28	0.24	-0.01	-0.95	-1.534
33593.895	600.32	600.20	0.36	0.12	-0.95	-1.534
33921.065	1200.35	1200.17	0.43	0.18	-0.95	-1.534
34137.152	1600.37	1600.10	0.51	0.27	-0.94	-1.534
34458.414	2200.41	2200.13	0.52	0.28	-0.94	-1.533
34670.676	2600.42	2600.14	0.52	0.28	-0.94	-1.534
34986.292	3200.45	3200.20	0.49	0.25	-0.94	-1.534
35505.085	4200.46	4200.29	0.41	0.17	-0.94	-1.534
36015.154	5200.48	5200.32	0.40	0.16	-0.94	-1.534
36516.921	6200.47	6200.38	0.32	0.09	-0.94	-1.534
36912.545	7000.44	7000.36	0.32	0.08	-0.94	-1.534
36517.025	6200.46	6200.59	0.11	-0.13	-0.94	-1.534
36015.357	5200.47	5200.72	-0.01	-0.25	-0.95	-1.534
35505.299	4200.47	4200.71	0.01	-0.23	-0.95	-1.534
34986.548	3200.46	3200.69	0.01	-0.23	-0.95	-1.534
34670.933	2600.43	2600.64	0.03	-0.21	-0.95	-1.534
34458.668	2200.41	2200.61	0.04	-0.21	-0.96	-1.534

Sensor Output	Standard	Sensor New_Coefs	Standard-Sensor Prev_Coefs	Standard-Sensor NEW_Coefs	Sensor_Temp	Bath_Temp
34137.408	1600.37	1600.59	0.03	-0.22	-0.96	-1.534
33921.264	1200.35	1200.54	0.05	-0.19	-0.96	-1.534
33594.070	600.32	600.52	0.04	-0.20	-0.96	-1.534
33265.258	0.27	0.25	0.21	0.02	6.94	6.471
33596.168	600.30	600.22	0.28	0.09	6.94	6.471
33923.385	1200.32	1200.21	0.29	0.11	6.94	6.471
34139.516	1600.33	1600.18	0.33	0.15	6.96	6.471
34460.798	2200.35	2200.19	0.34	0.17	6.96	6.471
34673.075	2600.36	2600.19	0.35	0.17	6.97	6.470
34988.711	3200.37	3200.22	0.33	0.16	6.99	6.471
35507.524	4200.36	4200.25	0.28	0.11	6.99	6.471
36017.634	5200.34	5200.26	0.24	0.08	6.99	6.471
36519.417	6200.30	6200.26	0.20	0.04	6.99	6.470
36017.736	5200.34	5200.46	0.04	-0.12	6.99	6.470
35507.672	4200.35	4200.53	-0.01	-0.18	7.00	6.470
34988.878	3200.37	3200.53	0.01	-0.16	7.01	6.471
34673.244	2600.35	2600.49	0.04	-0.14	7.01	6.471
34460.965	2200.34	2200.47	0.05	-0.13	7.01	6.470
34139.675	1600.33	1600.45	0.05	-0.13	7.01	6.470
33923.532	1200.31	1200.45	0.05	-0.13	7.01	6.471
33596.287	600.30	600.40	0.09	-0.10	7.01	6.471
33267.234	0.27	0.23	0.15	0.04	17.24	16.481
33598.204	600.31	600.22	0.19	0.09	17.24	16.481
33925.473	1200.34	1200.23	0.20	0.11	17.24	16.481
34141.639	1600.36	1600.22	0.22	0.13	17.24	16.481
34462.971	2200.38	2200.24	0.22	0.14	17.24	16.481
34675.283	2600.40	2600.26	0.21	0.14	17.24	16.481
34990.966	3200.43	3200.30	0.18	0.13	17.24	16.481
35509.859	4200.44	4200.36	0.11	0.08	17.24	16.481
36020.045	5200.43	5200.39	0.06	0.04	17.24	16.481
35509.954	4200.43	4200.54	-0.07	-0.11	17.24	16.481
34991.093	3200.43	3200.55	-0.06	-0.11	17.24	16.481
34675.423	2600.41	2600.52	-0.05	-0.12	17.24	16.481
34463.109	2200.39	2200.50	-0.04	-0.11	17.24	16.481
34141.793	1600.36	1600.51	-0.07	-0.16	17.23	16.481
33925.616	1200.34	1200.50	-0.07	-0.16	17.24	16.481
33598.319	600.32	600.43	-0.01	-0.12	17.23	16.481
33268.281	0.27	0.18	0.26	0.09	29.84	28.988
33599.337	600.32	600.21	0.24	0.11	29.85	28.988
33926.662	1200.35	1200.21	0.25	0.14	29.85	28.988
34142.864	1600.38	1600.19	0.27	0.18	29.85	28.988
34464.268	2200.41	2200.24	0.24	0.17	29.85	28.988
34676.650	2600.42	2600.31	0.16	0.11	29.85	28.988
34992.410	3200.46	3200.39	0.08	0.07	29.85	28.988
35511.426	4200.48	4200.51	-0.05	-0.03	29.85	28.988

Sensor Output	Standard	Sensor New_Coefs	Standard-Sensor Prev_Coefs	Standard-Sensor NEW_Coefs	Sensor_Temp	Bath_Temp
34992.495	3200.46	3200.56	-0.08	-0.09	29.84	28.989
34676.770	2600.43	2600.54	-0.07	-0.11	29.84	28.989
34464.420	2200.41	2200.52	-0.05	-0.11	29.84	28.988
34143.026	1600.38	1600.50	-0.03	-0.12	29.84	28.988
33926.827	1200.35	1200.52	-0.06	-0.17	29.84	28.988
33599.486	600.32	600.48	-0.03	-0.16	29.84	28.988
33268.375	0.27	0.35	0.08	-0.08	29.84	28.989



Pressure Calibration Report
STS Calibration Facility

SENSOR SERIAL NUMBER: 0830
CALIBRATION DATE: 10-JAN-2019
Mfg: SEABIRD Model: 09P CTD Prs s/n: 99676

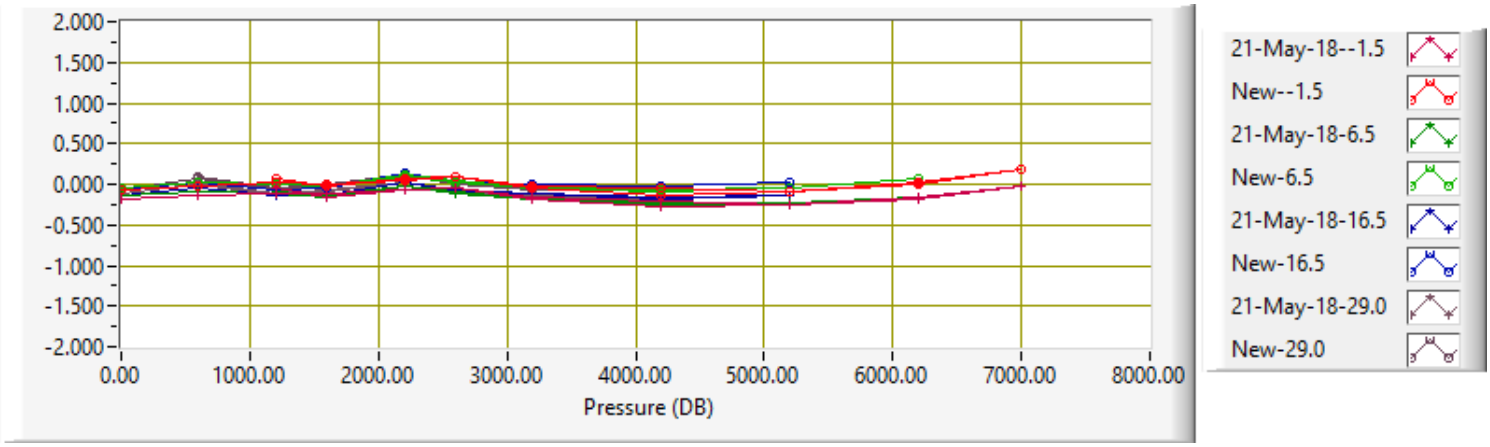
C1= -4.071254E+4
C2= -6.881146E-1
C3= 1.013208E-2
D1= 3.156099E-2
D2= 0.000000E+0
T1= 3.008941E+1
T2= -5.608424E-4
T3= 4.428700E-6
T4= -5.164714E-9
T5= 0.000000E+0
AD590M= 1.29036E-2
AD590B= -8.20188E+0
Slope = 1.00000000E+0
Offset = 0.00000000E+0

Calibration Standard: Mfg: FLUKE Model: P3125 s/n: 70856
t0=t1+t2*td+t3*td*td+t4*td*td*td
w = 1-t0*t0*f*f
Pressure = (0.6894759*((c1+c2*td+c3*td*td)*w*(1-(d1+d2*td)*w)-14.7)

Sensor Output	Standard	Sensor New_Coefs	Standard-Sensor Prev_Coefs	Standard-Sensor NEW_Coefs	Sensor_Temp	Bath_Temp
33239.765	0.27	0.34	-0.19	-0.08	-1.16	-1.534
33592.764	600.32	600.34	-0.14	-0.02	-1.16	-1.534
33941.622	1200.35	1200.33	-0.11	0.01	-1.16	-1.534
34171.986	1600.37	1600.37	-0.12	-0.00	-1.16	-1.534
34514.219	2200.41	2200.35	-0.07	0.06	-1.16	-1.533
34740.253	2600.42	2600.34	-0.05	0.08	-1.16	-1.534
35076.298	3200.45	3200.50	-0.18	-0.04	-1.16	-1.534
35628.272	4200.46	4200.60	-0.29	-0.14	-1.16	-1.534
36170.562	5200.48	5200.57	-0.25	-0.09	-1.16	-1.534
36703.647	6200.47	6200.48	-0.19	-0.01	-1.15	-1.534
37123.704	7000.44	7000.26	-0.02	0.18	-1.16	-1.534
36703.628	6200.46	6200.45	-0.17	0.02	-1.16	-1.534
36170.555	5200.47	5200.55	-0.25	-0.08	-1.16	-1.534
35628.232	4200.47	4200.53	-0.20	-0.06	-1.16	-1.534
35076.293	3200.46	3200.49	-0.16	-0.03	-1.16	-1.534
34740.251	2600.43	2600.34	-0.04	0.09	-1.16	-1.534
34514.215	2200.41	2200.34	-0.07	0.06	-1.16	-1.534

Sensor Output	Standard	Sensor New_Coefs	Standard-Sensor Prev_Coefs	Standard-Sensor NEW_Coefs	Sensor_Temp	Bath_Temp
34172.000	1600.37	1600.40	-0.15	-0.03	-1.16	-1.534
33941.588	1200.35	1200.27	-0.05	0.07	-1.16	-1.534
33592.756	600.32	600.33	-0.12	-0.01	-1.16	-1.534
33244.460	0.27	0.31	-0.15	-0.04	6.80	6.471
33597.455	600.30	600.29	-0.09	0.02	6.80	6.471
33946.344	1200.32	1200.32	-0.12	-0.00	6.80	6.471
34176.715	1600.33	1600.36	-0.15	-0.03	6.81	6.471
34518.914	2200.35	2200.25	-0.03	0.10	6.83	6.471
34745.005	2600.36	2600.32	-0.10	0.03	6.83	6.470
35081.020	3200.37	3200.41	-0.19	-0.04	6.83	6.471
35632.971	4200.36	4200.44	-0.25	-0.08	6.83	6.471
36175.276	5200.34	5200.39	-0.24	-0.05	6.85	6.471
36708.350	6200.30	6200.24	-0.16	0.06	6.86	6.470
36175.273	5200.34	5200.38	-0.23	-0.04	6.86	6.470
35632.967	4200.35	4200.41	-0.23	-0.06	6.86	6.470
35081.028	3200.37	3200.40	-0.18	-0.04	6.86	6.471
34745.016	2600.35	2600.32	-0.11	0.03	6.86	6.471
34518.927	2200.34	2200.24	-0.03	0.10	6.86	6.470
34176.731	1600.33	1600.34	-0.14	-0.02	6.86	6.470
33946.361	1200.31	1200.29	-0.09	0.02	6.87	6.471
33597.477	600.30	600.25	-0.06	0.05	6.88	6.471
33249.678	0.27	0.34	-0.13	-0.08	17.09	16.481
33602.679	600.31	600.30	-0.05	0.01	17.10	16.481
33951.626	1200.34	1200.41	-0.14	-0.07	17.10	16.481
34181.978	1600.36	1600.40	-0.13	-0.04	17.10	16.481
34524.178	2200.38	2200.27	0.02	0.11	17.10	16.481
34750.299	2600.40	2600.38	-0.08	0.02	17.11	16.481
35086.310	3200.43	3200.44	-0.12	-0.00	17.11	16.481
35638.291	4200.44	4200.47	-0.17	-0.03	17.11	16.481
36180.605	5200.43	5200.39	-0.13	0.03	17.11	16.481
35638.287	4200.43	4200.47	-0.17	-0.03	17.10	16.481
35086.301	3200.43	3200.43	-0.11	0.01	17.09	16.481
34750.291	2600.41	2600.38	-0.08	0.03	17.09	16.481
34524.167	2200.39	2200.26	0.03	0.13	17.09	16.481
34181.978	1600.36	1600.41	-0.13	-0.05	17.09	16.481
33951.621	1200.34	1200.40	-0.14	-0.06	17.09	16.481
33602.668	600.32	600.29	-0.04	0.03	17.09	16.481
33254.742	0.27	0.33	-0.12	-0.07	29.76	28.988
33607.745	600.32	600.25	0.01	0.07	29.76	28.988
33956.767	1200.35	1200.43	-0.15	-0.08	29.76	28.988
34187.115	1600.38	1600.38	-0.08	-0.00	29.76	28.988
34529.372	2200.41	2200.30	0.02	0.10	29.76	28.988
34755.519	2600.42	2600.43	-0.10	-0.01	29.76	28.988
35091.587	3200.46	3200.53	-0.17	-0.06	29.76	28.988
35643.604	4200.48	4200.54	-0.19	-0.06	29.76	28.988

Sensor Output	Standard	Sensor New_Coefs	Standard-Sensor Prev_Coefs	Standard-Sensor NEW_Coefs	Sensor_Temp	Bath_Temp
35091.569	3200.46	3200.50	-0.14	-0.03	29.76	28.989
34755.503	2600.43	2600.40	-0.07	0.03	29.76	28.989
34529.368	2200.41	2200.30	0.02	0.11	29.76	28.988
34187.109	1600.38	1600.37	-0.07	0.00	29.76	28.988
33956.748	1200.35	1200.40	-0.12	-0.05	29.76	28.988
33607.731	600.32	600.22	0.03	0.10	29.75	28.988
33254.733	0.27	0.32	-0.11	-0.06	29.75	28.989



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SENSOR SERIAL NUMBER: 0197
CALIBRATION DATE: 21-Feb-19

SBE 43 OXYGEN CALIBRATION DATA

COEFFICIENTS:
Soc = 0.7027
Voffset = -0.7719
Tau20 = 1.28
A = -1.0210e-002
B = 4.2608e-004
C = -4.1978e-006
E nominal = 0.036

NOMINAL DYNAMIC COEFFICIENTS
D1 = 1.92634e-4
D2 = -4.64803e-2
H1 = -3.300000e-2
H2 = 5.00000e+3
H3 = 1.45000e+3

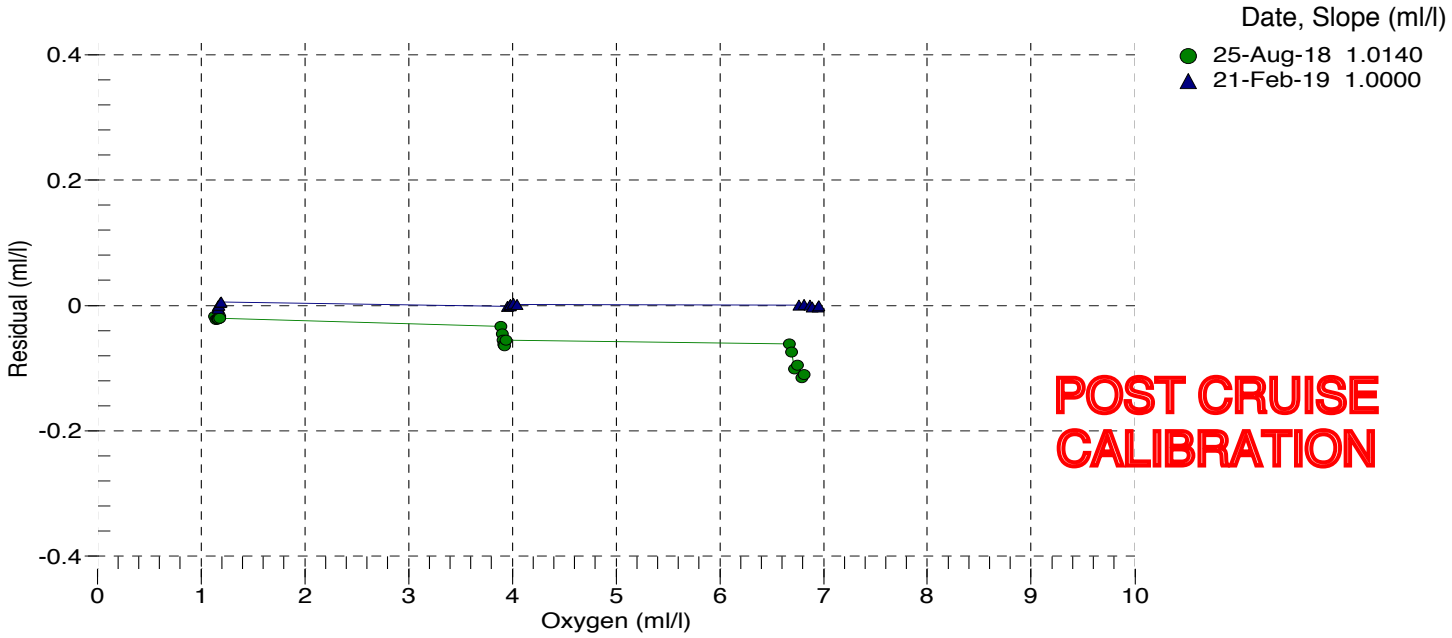
BATH OXYGEN (ml/l)	BATH TEMPERATURE (° C)	BATH SALINITY (PSU)	INSTRUMENT OUTPUT (volts)	INSTRUMENT OXYGEN (ml/l)	RESIDUAL (ml/l)
1.16	2.00	0.00	0.946	1.16	-0.00
1.17	6.00	0.00	0.971	1.16	-0.00
1.17	12.00	0.00	1.009	1.17	-0.00
1.18	20.00	0.00	1.054	1.18	0.00
1.19	26.00	0.00	1.086	1.19	0.00
1.19	30.00	0.00	1.107	1.20	0.01
3.96	2.00	0.00	1.365	3.96	-0.00
3.97	6.00	0.00	1.453	3.97	-0.00
3.98	12.00	0.00	1.578	3.98	-0.00
3.98	20.00	0.00	1.728	3.99	0.00
4.01	26.00	0.00	1.833	4.01	0.00
4.04	30.00	0.00	1.902	4.05	0.00
6.76	2.00	0.00	1.786	6.77	0.00
6.81	6.00	0.00	1.940	6.81	0.00
6.87	12.00	0.00	2.164	6.87	0.00
6.89	20.00	0.00	2.424	6.89	-0.00
6.95	30.00	0.00	2.711	6.95	-0.00
6.95	26.00	0.00	2.609	6.95	-0.00

V = instrument output (volts); T = temperature (°C); S = salinity (PSU); K = temperature (°K)

Oxsol(T,S) = oxygen saturation (ml/l); P = pressure (dbar)

$$\text{Oxygen (ml/l)} = \text{Soc} * (V + \text{Voffset}) * (1.0 + A * T + B * T^2 + C * T^3) * \text{Oxsol}(T,S) * \exp(E * P / K)$$

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



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SENSOR SERIAL NUMBER: 3521
CALIBRATION DATE: 22-Feb-19

SBE 43 OXYGEN CALIBRATION DATA

COEFFICIENTS:	A = -4.4808e-003	NOMINAL DYNAMIC COEFFICIENTS	
Soc = 0.5383	B = 1.8574e-004	D1 = 1.92634e-4	H1 = -3.300000e-2
Voffset = -0.4829	C = -2.5719e-006	D2 = -4.64803e-2	H2 = 5.00000e+3
Tau20 = 1.68	E nominal = 0.036		H3 = 1.45000e+3

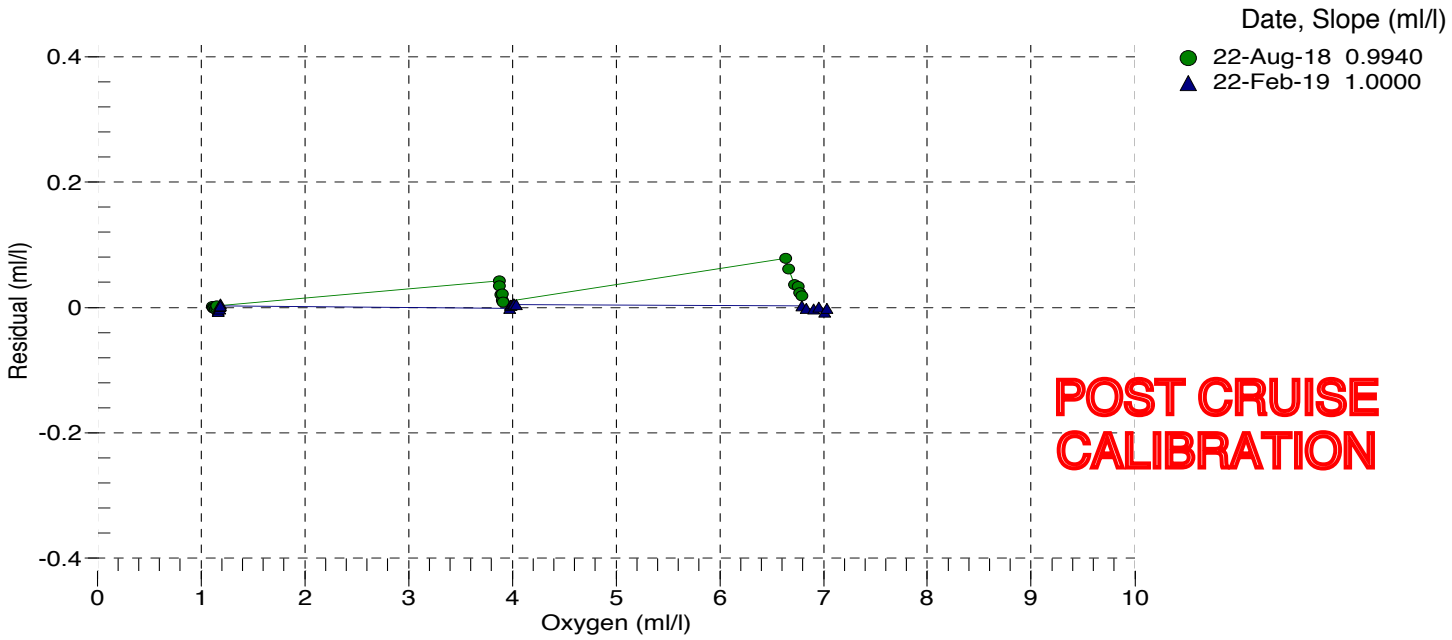
BATH OXYGEN (ml/l)	BATH TEMPERATURE (° C)	BATH SALINITY (PSU)	INSTRUMENT OUTPUT (volts)	INSTRUMENT OXYGEN (ml/l)	RESIDUAL (ml/l)
1.17	6.00	0.00	0.736	1.16	-0.00
1.17	2.00	0.00	0.708	1.16	-0.01
1.18	12.00	0.00	0.782	1.18	-0.00
1.18	20.00	0.00	0.840	1.18	0.00
1.19	30.00	0.00	0.919	1.20	0.01
1.19	26.00	0.00	0.888	1.19	0.00
3.97	2.00	0.00	1.252	3.97	-0.00
3.98	6.00	0.00	1.351	3.98	0.00
3.99	12.01	0.00	1.499	3.99	0.00
4.01	20.00	0.00	1.700	4.02	0.01
4.01	26.00	0.00	1.848	4.02	0.01
4.04	30.00	0.00	1.956	4.04	0.00
6.79	2.00	0.00	1.797	6.79	0.00
6.83	6.00	0.00	1.971	6.83	-0.00
6.91	12.03	0.00	2.240	6.90	-0.00
6.95	20.00	0.00	2.589	6.95	0.00
7.01	26.02	0.00	2.862	7.01	-0.01
7.03	30.00	0.00	3.045	7.03	-0.00

V = instrument output (volts); T = temperature (°C); S = salinity (PSU); K = temperature (°K)

Oxsol(T,S) = oxygen saturation (ml/l); P = pressure (dbar)

$$\text{Oxygen (ml/l)} = \text{Soc} * (V + \text{Voffset}) * (1.0 + A * T + B * T^2 + C * T^3) * \text{Oxsol}(T,S) * \exp(E * P / K)$$

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



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SENSOR SERIAL NUMBER: 2818
CALIBRATION DATE: 27-Feb-19

SBE 4 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

```
g =  -1.02057891e+001
h =   1.39840972e+000
i =   4.29914931e-004
j =   5.57631793e-005

CPcor = -9.5700e-008 (nominal)
CTcor =  3.2500e-006 (nominal)
```

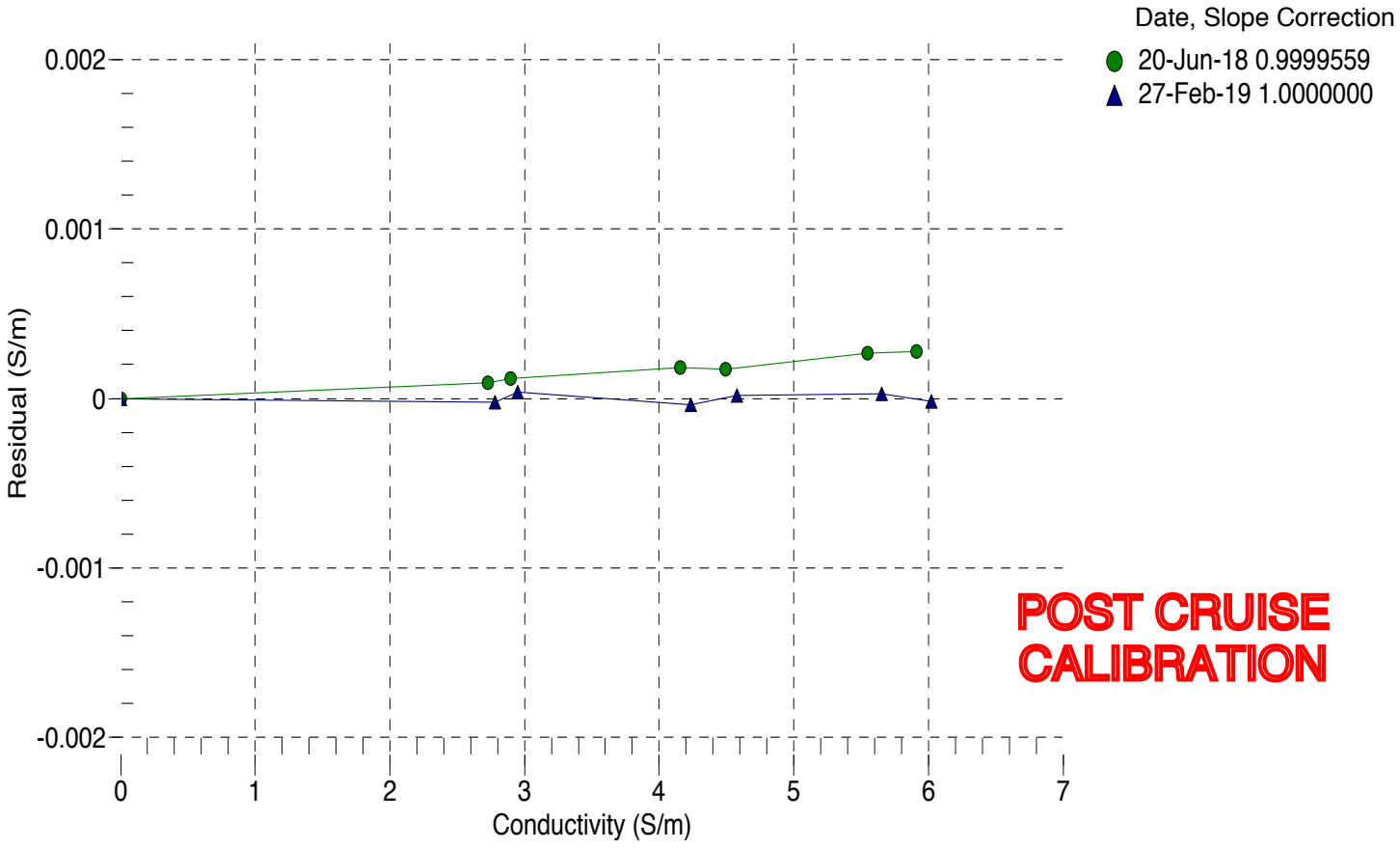
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (kHz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
0.0000	0.0000	0.00000	2.69999	0.00000	0.00000
-1.0001	34.4960	2.78116	5.20703	2.78113	-0.00002
0.9999	34.4948	2.95108	5.32196	2.95112	0.00004
15.0000	34.4931	4.23614	6.12090	4.23610	-0.00004
18.5000	34.4913	4.57988	6.31742	4.57990	0.00002
29.0000	34.4850	5.65413	6.89520	5.65416	0.00003
32.5000	34.4734	6.02292	7.08257	6.02290	-0.00002

f = Instrument Output (kHz)

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

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

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



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SENSOR SERIAL NUMBER: 2659
CALIBRATION DATE: 01-Jun-18

SBE 4 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

```
g =  -9.74805118e+000
h =   1.18346247e+000
i =  -2.95638100e-004
j =   6.57176492e-005

CPcor = -9.5700e-008 (nominal)
CTcor =  3.2500e-006 (nominal)
```

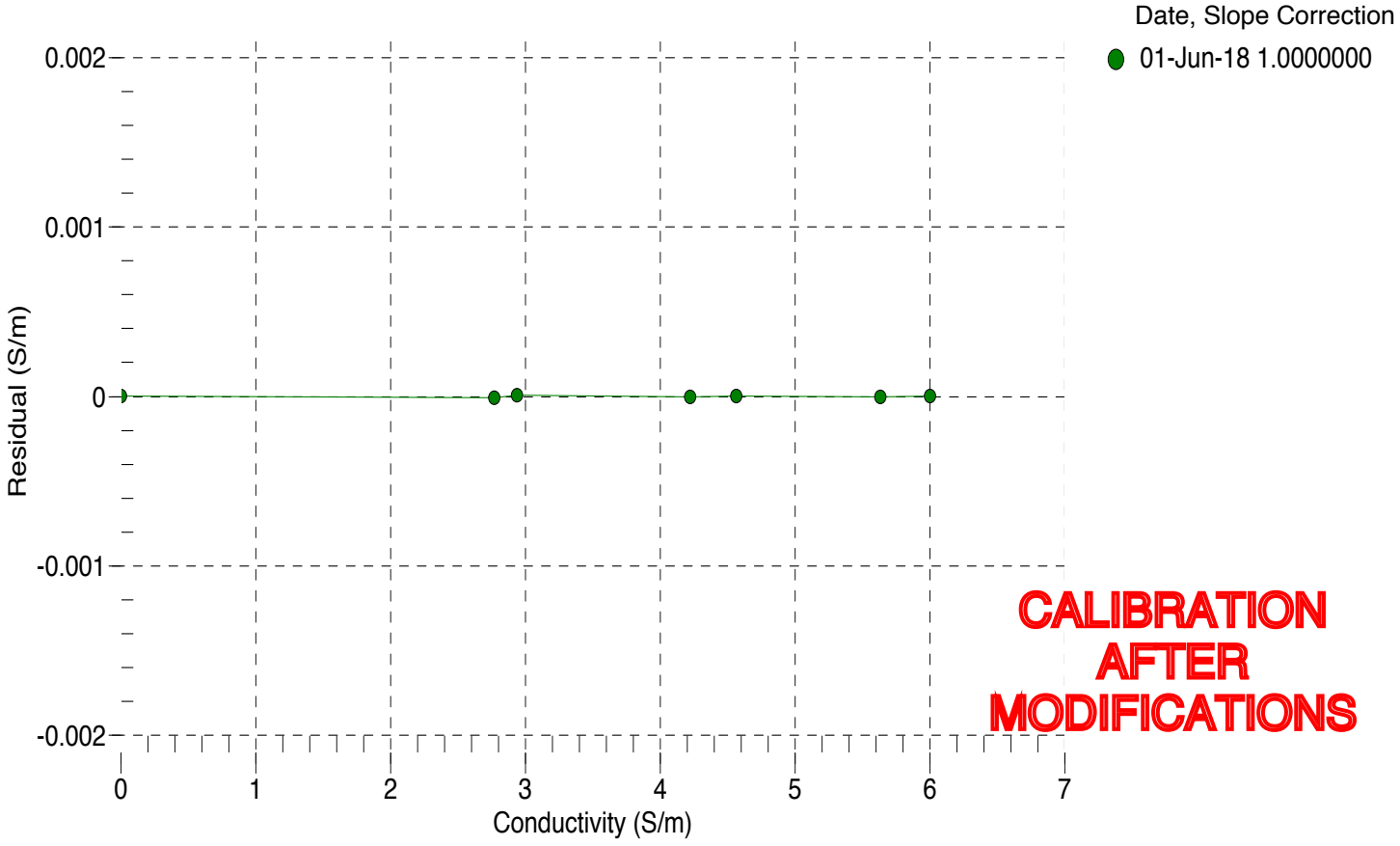
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (kHz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
0.0000	0.0000	0.00000	2.87037	0.00000	0.00000
-1.0001	34.3728	2.77215	5.62580	2.77214	-0.00001
1.0000	34.3732	2.94167	5.75155	2.94168	0.00001
14.9999	34.3728	4.22291	6.62472	4.22291	-0.00000
18.5000	34.3718	4.56572	6.83937	4.56572	0.00000
29.0000	34.3653	5.63670	7.47004	5.63670	-0.00000
32.4999	34.3515	6.00402	7.67432	6.00402	0.00000

f = Instrument Output (kHz)

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

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

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



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SENSOR SERIAL NUMBER: 2319
CALIBRATION DATE: 27-Feb-19

SBE 4 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

```
g =  -1.04151078e+001
h =   1.51411415e+000
i =  -4.18289952e-004
j =   1.13946323e-004

CPcor = -9.5700e-008 (nominal)
CTcor =  3.2500e-006 (nominal)
```

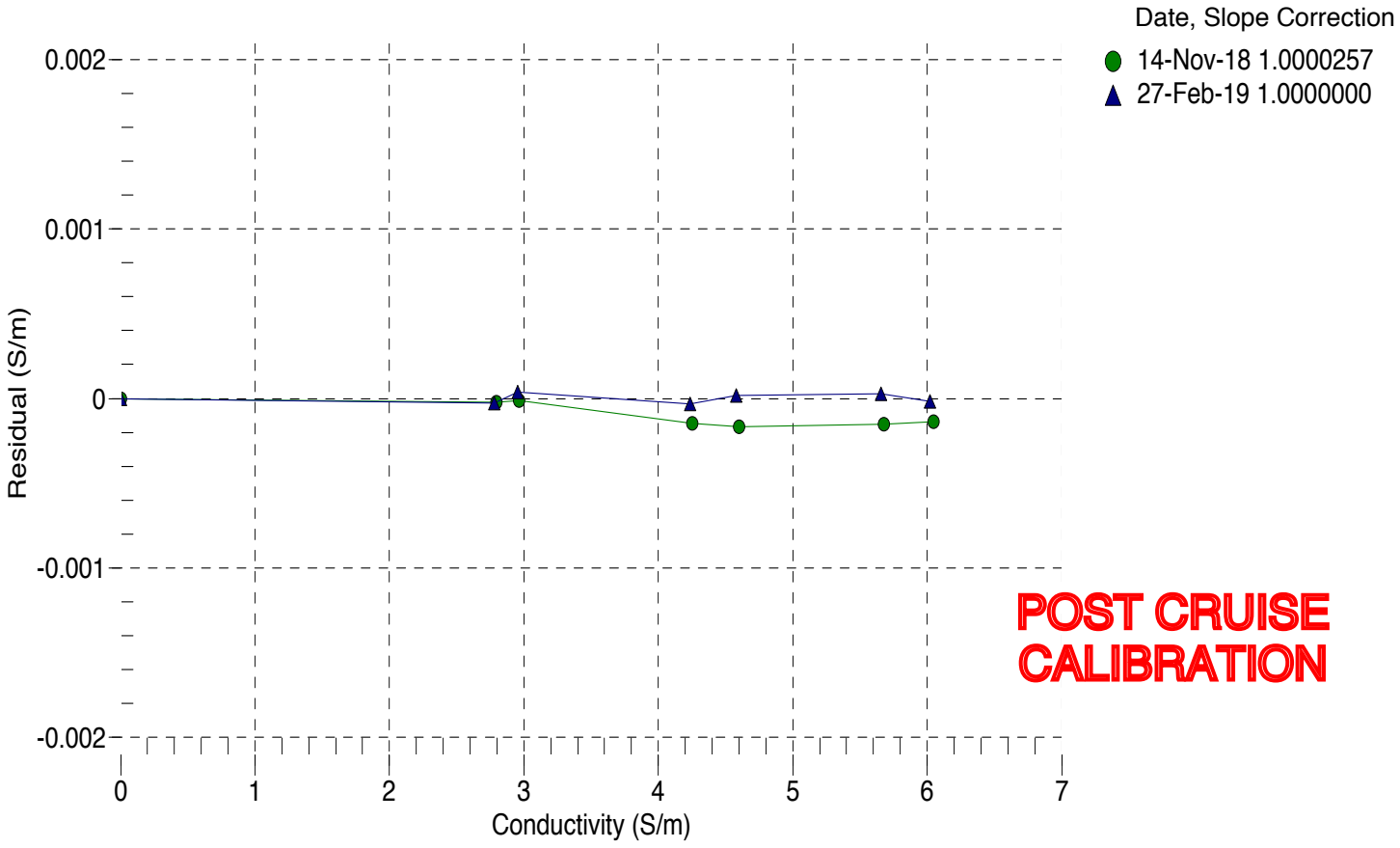
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (kHz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
0.0000	0.0000	0.00000	2.62300	0.00000	0.00000
-1.0001	34.4960	2.78116	5.02332	2.78113	-0.00003
0.9999	34.4948	2.95108	5.13367	2.95112	0.00004
15.0000	34.4931	4.23614	5.90110	4.23610	-0.00003
18.5000	34.4913	4.57988	6.08994	4.57990	0.00002
29.0000	34.4850	5.65413	6.64526	5.65416	0.00003
32.5000	34.4734	6.02292	6.82538	6.02290	-0.00002

f = Instrument Output (kHz)

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

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

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



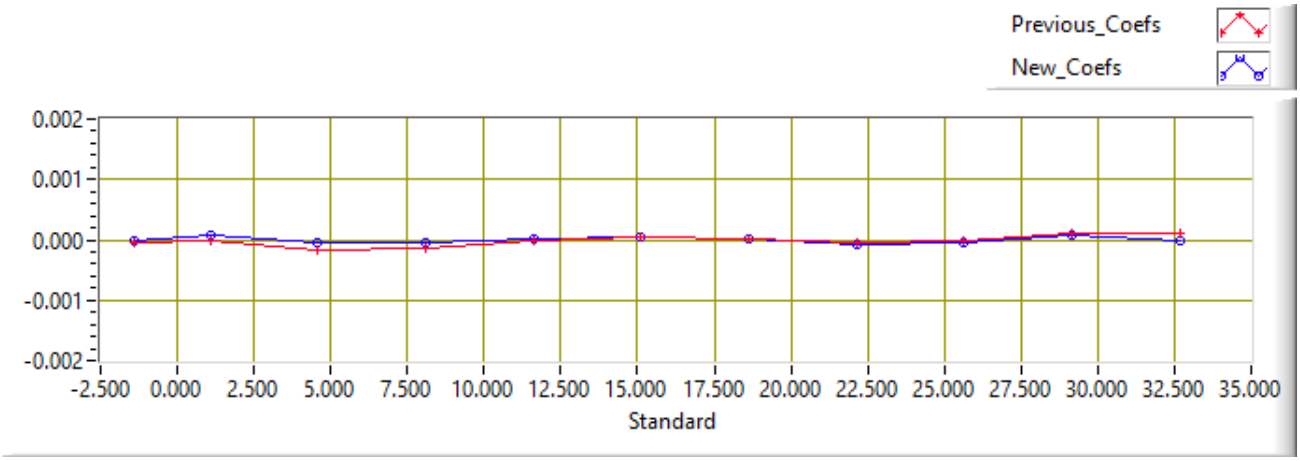
Temperature Calibration Report
STS Calibration Facility

SENSOR SERIAL NUMBER: 0105
CALIBRATION DATE: 04-Mar-2019
Mfg: SEABIRD Model: 35
Previous cal: 29-Aug-18
Calibration Tech: CAL

ITS-90_COEFFICIENTS
a0 = 5.921489433E-3
a1 = -1.661897735E-3
a2 = 2.351748134E-4
a3 = -1.287474061E-5
a4 = 2.691712738E-7
Slope = 1.000000 Offset = 0.000000
Calibration Standard: Mfg: Isotech Model: MicroK100 s/n: 291088-2

Calibration Standard: Mfg: Isotech Model: MicroK100 s/n: 291088-2
Temperature ITS-90 = 1/{a0+a1[ln(f)]+a2[ln2(f)]+a3[ln3(f)]+a4[ln4(f)} - 273.15 (°C)

SBE35 Count	SPRT ITS-T90	SBE35 ITS-T90	SPRT-SBE35 OLD_Coefs	SPRT-SBE35 NEW_Coefs
920470.0482	-1.4127	-1.4127	-0.00006	-0.00003
823375.6818	1.0847	1.0846	-0.00003	0.00008
705619.7740	4.5916	4.5917	-0.00018	-0.00005
606269.5237	8.0993	8.0994	-0.00014	-0.00004
522235.5299	11.6094	11.6094	-0.00002	0.00002
451208.0674	15.1108	15.1108	0.00004	0.00005
390701.1883	18.6230	18.6229	0.00003	0.00002
339233.7454	22.1328	22.1329	-0.00006	-0.00007
295300.4338	25.6443	25.6444	-0.00003	-0.00004
257744.9889	29.1535	29.1534	0.00011	0.00008
225506.1253	32.6661	32.6661	0.00011	-0.00003



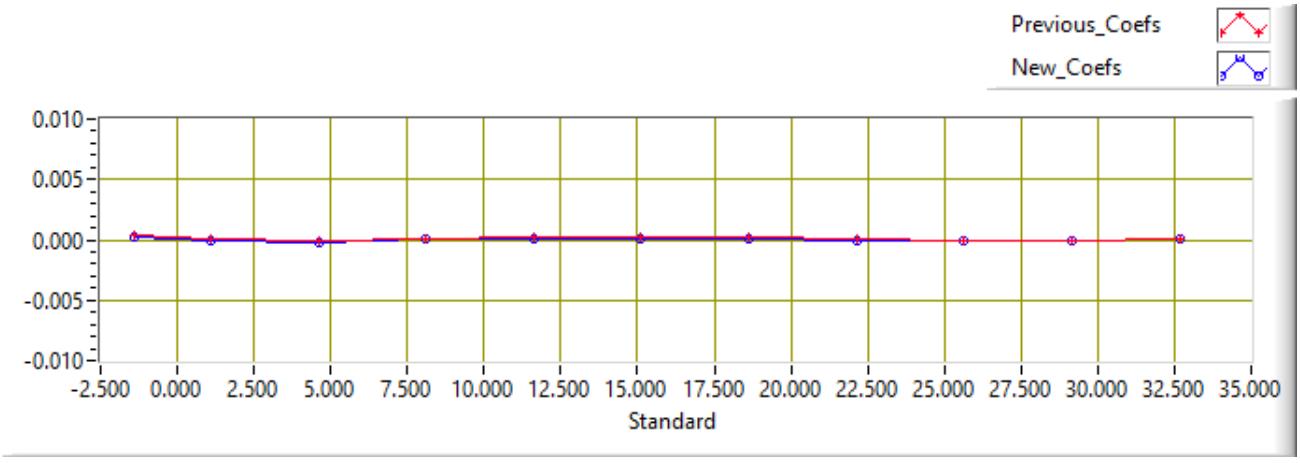
Temperature Calibration Report
STS Calibration Facility

SENSOR SERIAL NUMBER: 5844
CALIBRATION DATE: 11-Feb-2019
Mfg: SEABIRD Model: 03
Previous cal: 22-Aug-18
Calibration Tech: CAL

ITS-90_COEFFICIENTS	IPTS-68_COEFFICIENTS ITS-T90	
g = 4.36555702E-3	a = 4.36575808E-3	
h = 6.30030565E-4	b = 6.30238331E-4	
i = 2.00794160E-5	c = 2.01103820E-5	
j = 1.50503934E-6	d = 1.50638442E-6	
f0 = 1000.0	Slope = 1.0	Offset = 0.0

Calibration Standard: Mfg: Isotech Model: MicroK100 s/n: 291088-2
Temperature ITS-90 = 1/{g+h[ln(f0/f)]+i[ln2(f0/f)]+j[ln3(f0/f)]} - 273.15 (°C)
Temperature IPTS-68 = 1/{a+b[ln(f0/f)]+c[ln2(f0/f)]+d[ln3(f0/f)]} - 273.15 (°C)
T68 = 1.00024 * T90 (-2 to -35 Deg C)

SBE3 Freq	SPRT ITS-T90	SBE3 ITS-T90	SPRT-SBE3 OLD_Coefs	SPRT-SBE3 NEW_Coefs
3079.9071	-1.4182	-1.4184	0.00046	0.00017
3260.5884	1.0867	1.0868	0.00008	-0.00014
3526.3126	4.5938	4.5940	-0.00007	-0.00021
3807.4353	8.1022	8.1022	0.00014	0.00003
4104.4831	11.6121	11.6121	0.00017	0.00008
4416.9426	15.1133	15.1131	0.00022	0.00013
4746.9501	18.6245	18.6244	0.00018	0.00008
5093.6792	22.1321	22.1322	0.00004	-0.00005
5458.3609	25.6446	25.6447	-0.00004	-0.00012
5840.5159	29.1534	29.1535	-0.00007	-0.00011
6241.2069	32.6651	32.6650	0.00009	0.00012



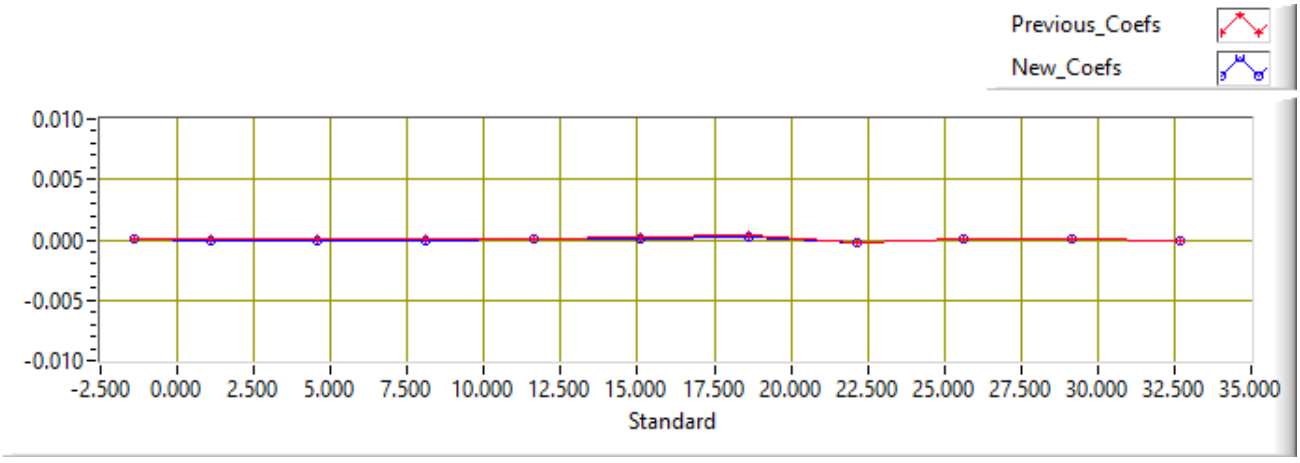
Temperature Calibration Report
STS Calibration Facility

SENSOR SERIAL NUMBER: 2380
CALIBRATION DATE: 12-Feb-2019
Mfg: SEABIRD Model: 03
Previous cal: 02-Jul-18
Calibration Tech: CAL

ITS-90_COEFFICIENTS	IPTS-68_COEFFICIENTS ITS-T90	
g = 4.34120280E-3	a = 4.34139563E-3	
h = 6.42213468E-4	b = 6.42422652E-4	
i = 2.40474717E-5	c = 2.40799887E-5	
j = 2.31110902E-6	d = 2.31269974E-6	
f0 = 1000.0	Slope = 1.0	Offset = 0.0

Calibration Standard: Mfg: Isotech Model: MicroK100 s/n: 291088-2
Temperature ITS-90 = 1/{g+h[ln(f0/f)]+i[ln2(f0/f)]+j[ln3(f0/f)]} - 273.15 (°C)
Temperature IPTS-68 = 1/{a+b[ln(f0/f)]+c[ln2(f0/f)]+d[ln3(f0/f)]} - 273.15 (°C)
T68 = 1.00024 * T90 (-2 to -35 Deg C)

SBE3 Freq	SPRT ITS-T90	SBE3 ITS-T90	SPRT-SBE3 OLD_Coefs	SPRT-SBE3 NEW_Coefs
2908.5057	-1.4218	-1.4218	0.00011	0.00005
3076.7271	1.0830	1.0830	0.00004	-0.00004
3323.9997	4.5902	4.5902	0.00004	-0.00007
3585.3945	8.0984	8.0984	0.00013	0.00000
3861.4170	11.6088	11.6087	0.00015	0.00002
4151.3728	15.1084	15.1084	0.00017	0.00004
4457.6510	18.6217	18.6215	0.00032	0.00019
4779.2928	22.1319	22.1322	-0.00019	-0.00030
5116.9997	25.6445	25.6444	0.00013	0.00006
5470.8469	29.1556	29.1555	0.00007	0.00004
5841.4151	32.6681	32.6681	-0.00004	-0.00001



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Pressure Test Certificate

Test Date: 2018-11-14

Description: SBE-5T Submersible Pump

Sensor Information:

Replaced the main piston "O"-Rings.

Model Number: SBE-5T

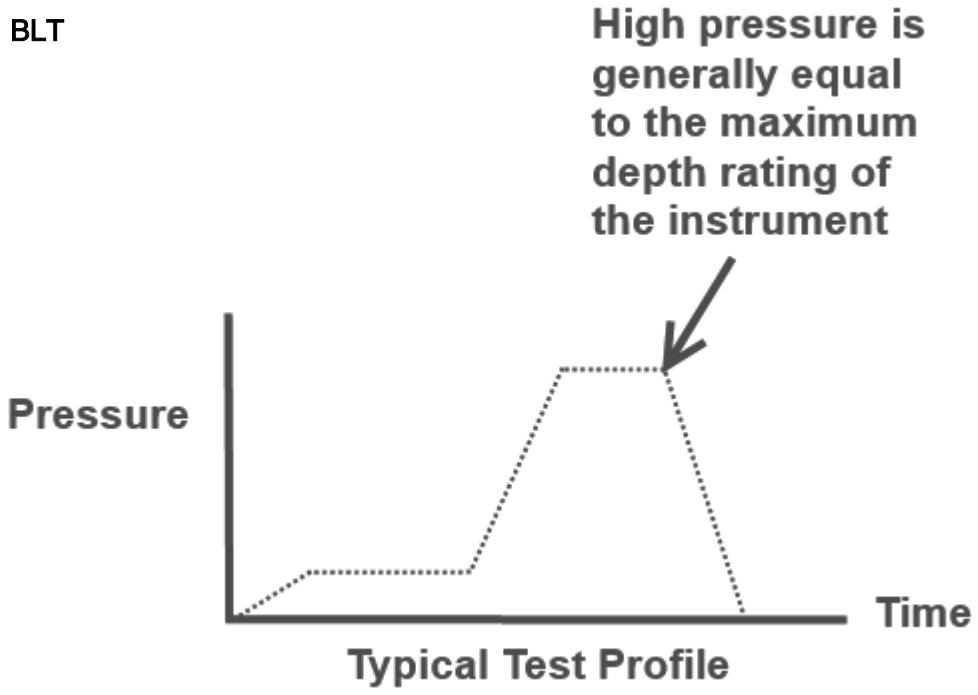
Serial Number: 5124

Pressure Test Protocol:

Low Pressure Test:	50	PSI	Held For:	15	Minutes
High Pressure Test:	10000	PSI	Held For:	30	Minutes

Passed Test: True

Tested By: BLT



Typical Test Profile

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Pressure Test Certificate

Test Date: 2018-11-14

Description: SBE-5T Submersible Pump

Sensor Information:

Model Number: SBE-5T

Serial Number: 1892

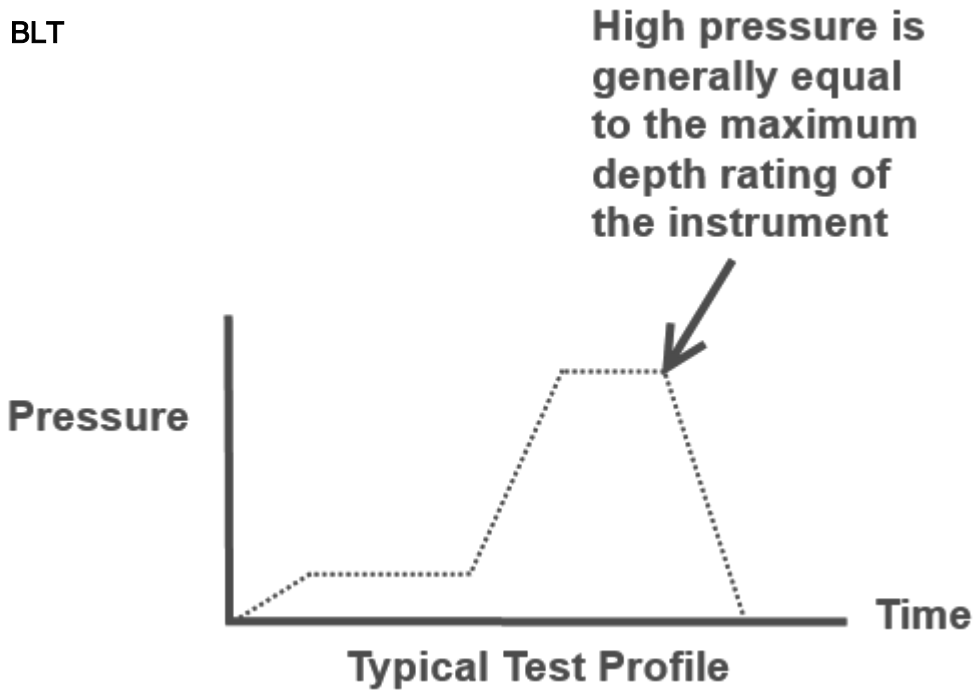
Replaced the main piston "O"-Rings.
Replaced main housing.

Pressure Test Protocol:

Low Pressure Test:	50	PSI	Held For:	15	Minutes
High Pressure Test:	10000	PSI	Held For:	30	Minutes

Passed Test: True

Tested By: BLT



Typical Test Profile

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Fax: (425) 643-9954
Email: seabird@seabird.com

Pressure Test Certificate

Test Date: 04/14/16

Description: SBE-5T Submersible Pump

Sensor Information:

Model Number: 5T

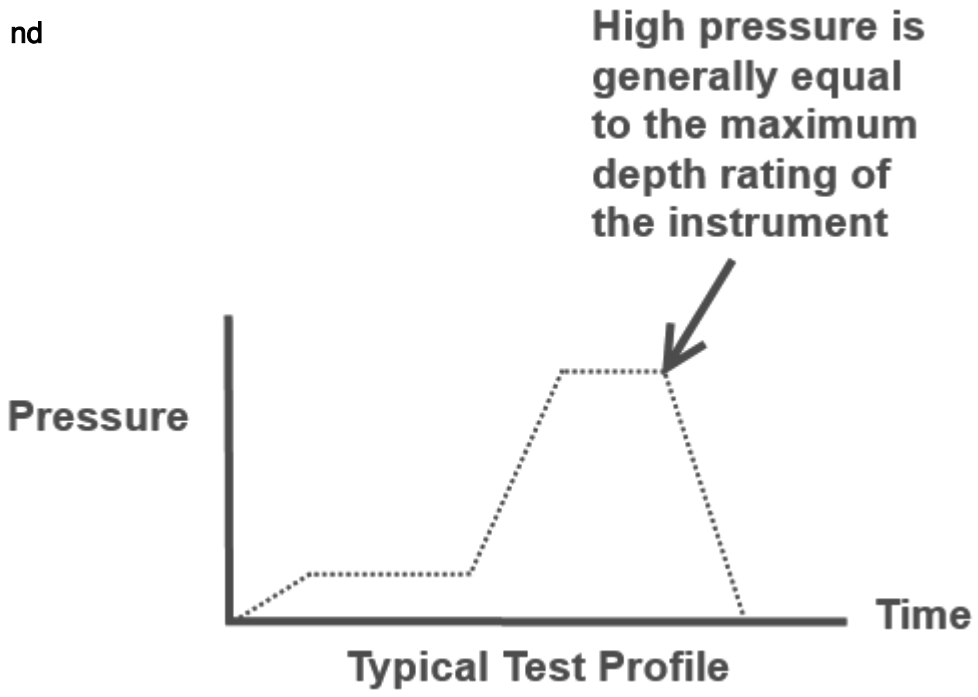
Serial Number: 8692

Pressure Test Protocol:

Low Pressure Test:	40	PSI	Held For:	15	Minutes
High Pressure Test:	10000	PSI	Held For:	15	Minutes

Passed Test: Yes

Tested By: nd



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Pressure Test Certificate

Test Date: 2018-11-14

Description: SBE-5T Submersible Pump

Sensor Information:

Model Number: SBE-5T

Serial Number: 8691

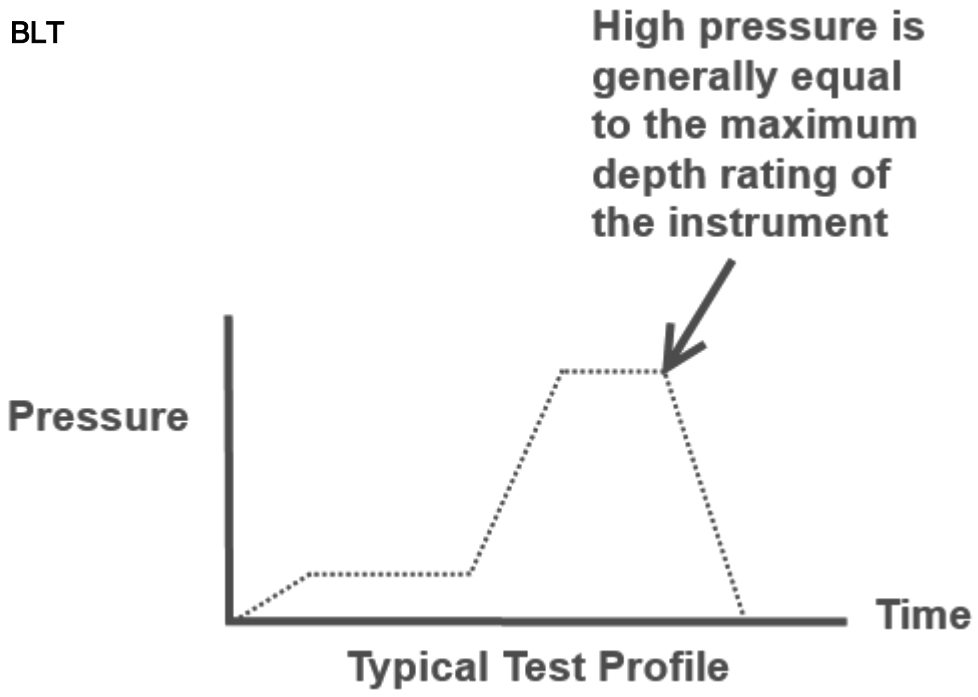
Replaced the main piston "O"-Rings.
Replaced end cap.

Pressure Test Protocol:

Low Pressure Test:	50	PSI	Held For:	15	Minutes
High Pressure Test:	10000	PSI	Held For:	30	Minutes

Passed Test: True

Tested By: BLT



Typical Test Profile