

SEA-BIRD ELECTRONICS, INC.

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SENSOR SERIAL NUMBER = 6047
 CALIBRATION DATE: 4sett2013

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

GHIJ COEFFICIENTS

g = -8.40480762e+00
 h = 1.19098021e+00
 i = 5.11997930e-02
 j = -2.85331948e-03
 CPcor = -9.57e-08 (nominal)
 CTcor = 3.25e-06 (nominal)

ABCDM COEFFICIENTS

a = 5.72046119e-01
 b = 7.26886536e-01
 c = -8.95687254e+00
 d = -1.17199127e-03
 m = 2.1
 CPcor = -9.57e-08 (nominal)

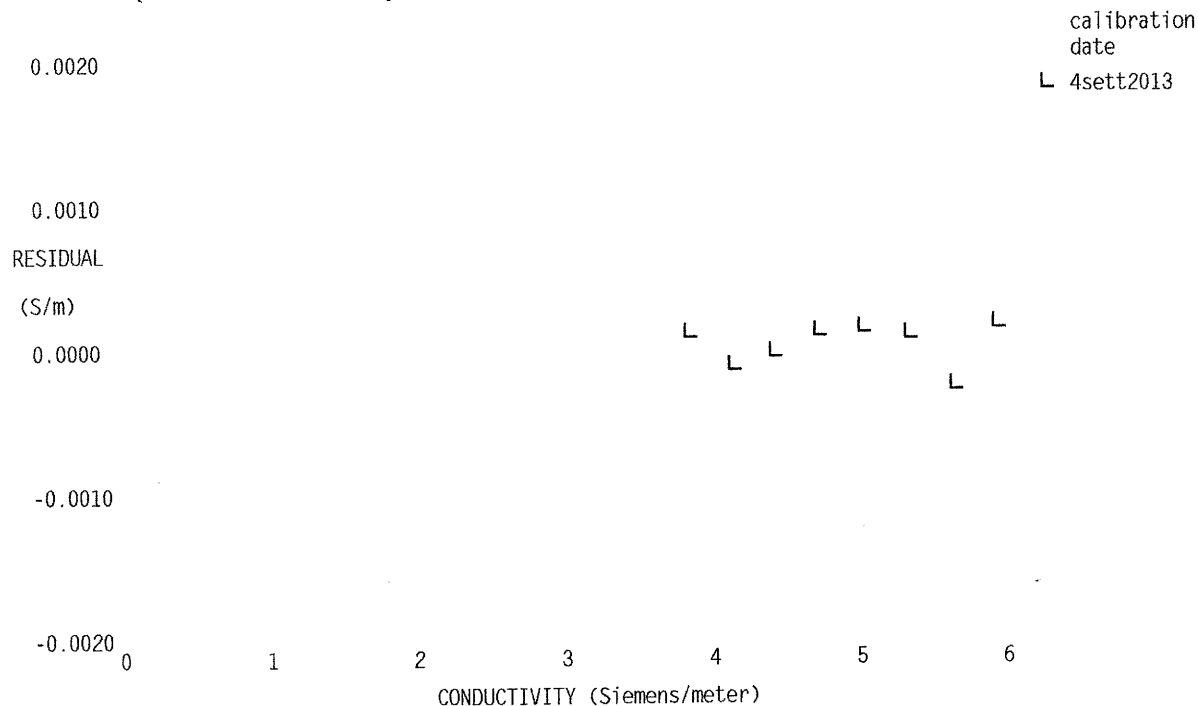
BATH TEMP (ITS-90 °C)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (kHz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
9.0499	35.2730	3.74538	5.74212	3.74546	0.00008
12.1752	35.2660	4.04407	5.91930	4.04393	-0.00014
15.0113	35.2615	4.32152	6.07926	4.32147	-0.00005
18.0720	35.2578	4.62725	6.25067	4.62734	0.00009
21.0461	35.2539	4.93005	6.41576	4.93016	0.00011
24.0828	35.2509	5.24473	6.58284	5.24480	0.00007
27.0296	35.2470	5.55475	6.74321	5.55446	-0.00029
29.7641	35.2376	5.84544	6.89058	5.84558	0.00014

$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / [10(1 + dt + ep)] \text{ Siemens/meter}$$

$$\text{Conductivity} = (af^m + bf^2 + c + dt) / [10(1 + ep)] \text{ Siemens/meter}$$

t = temperature [deg C]; p = pressure [decibars]; d = CTcor; e = CPcor;

Residual = (instrument conductivity - bath conductivity) using g, h, i, j coefficients



**Notes on calibration of CTD SBE 16Plus s/n. 6047
4 Sett 2013 at CMRE- NATO La Spezia**

Conductivity

GHIL coefficients computed by SBE software (see calibration report on previous page) must be divided by a factor 10 because the SBE 16 plus s/n 6047 uses the following formula to compute conductivity (see calibration certificate of 11-May-2008 – Device manual, Calibration sheets pag. 2):

$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / (1 + dt + ep) \quad \text{Siemens/meter}$$

while calibration program, used to compute new calibration coefficients in today (4Sett2013) test at CMRE, adopted the following formula:

$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / [10(1 + dt + ep)] \quad \text{Siemens/meter}$$

Thus the new coefficients configured on the sensor are:

g	-0.840480762
h	0.119098021
l	0.0051199793
j	-0.0002853319

Temperature

No change in calibration coefficients needed.

Pressure

A verification of pressure measurements with respect to external known values was performed as described in the table:

External Pressure [dbar]	Pressure [dbar]	Sigma [dbar]	P-P ₀ [dbar]	Sigma (P-P ₀) [dbar]	Residual [dbar]	Residual/Sigma (P-P ₀)
0	-1.078	0.011				
50	48.890	0.024	49.968	0.026	-0.032	1
100	98.849	0.014	99.927	0.018	-0.073	4
150	148.792	0.020	149.870	0.023	-0.130	5
200	198.727	0.040	199.805	0.042	-0.195	4
250	248.667	0.050	249.745	0.052	-0.255	4
500	498.359	0.146	499.437	0.146	-0.563	3
1000	997.702	0.439	998.780	0.439	-1.220	2

where

Sigma = std of pressure device data (estimated error on device measurements)

P0 = measured pressure with external pressure equal to 0 (offset): (-1.078 ± 0.011)dbar

Residual= External Pressure – Pressure (P-P0, measured by device)

Sigma (P-P0) = estimated error (uncertainty) on (P-P0)

La Spezia, 4 Sett 2013

Davide Embriaco