SAMPLE CALIBRATION CERTIFICATE

Certificate Number	**L1000410C**
Customer	SE Australia
Model	S-NA-BSPP
Calibrated by	Ben Nguyen
Calibration Date	05/05/2021
Manufacturer	SE Australia
Manufacture Date	10/05/2021
Sensor Number	1000410
Items	☑ External temperature sensor ☑ Internal temperature sensor ☑ Moisture sensor
Signature	X  Product Development Engineer

The EcoStruxure Transformer Sensor is factory calibrated and does not require field calibration. A calibration interval is therefore not applicable for this product. The EcoStruxure Transformer Sensor is offered with a standard lifetime hardware warranty while covered by a EcoStruxure Transformer Expert subscription.
The temperature and moisture sensors are calibrated in accordance with relevant international standards as described in the Calibration Process. If not already provided, this document can be requested from support.dts@se.com.

Calibration of External Temperature Sensor

Configuration:

The external temperature sensor on the Printed Circuit Board Assembly (PCBA) is calibrated by connecting the PCBA to a jig that simulates a range of resistances that covers -34°C to 100°C. Note, to improve the resistance resolution during the calibration the jig includes a 4700Ω parallel resistor.

Calibration process:

The 11 data points are used to determine a 3rd order calibration polynomial. The temperatures post calibration are confirmed to be in accordance with -34°C to 100°C, +/-3°C.

Table 1: External Temperature Sensor Calibration Summary

Reference Resistance (Ω)	Reference temperature (°C)	Measured resistance (Ω)	Resistance Post Calibration (Ω)	Temperature Post Calibration(°C)	Temperature Variation (°C)	Temperature Variation In Spec (True/False)
46.93	113.35	47.47	45.19	115.15	-1.7991	True
98.54	87.00	98.89	99.75	87.29	-0.2937	True
142.87	74..98	142.40	146.68	75.12	-0.1398	True
234.74	59.91	233.38	247.18	59.90	0.0118	True
323.04	50.71	324.35	351.14	50.38	0.3218	True
424.87	43.05	423.24	468.39	42.98	0.0692	True
522.30	37.38	522.13	590.46	37.26	0.1175	True
863.13	23.76	862.31	1054.13	23.83	-0.0667	True
1,430.70	9.71	1431.90	2046.83	9.81	-0.0978	True
1,850.93	1.98	1851.19	3063.42	1.92	0.0623	True
4,016.73	-34.40	3623.27	27621.73	-34.40	-0.0043	True

Calibration of Internal Temperature Sensor

Configuration:

The internal temperature sensor on the Printed Circuit Board Assembly (PCBA) is calibrated by connecting the PCBA to a jig that simulates a range of resistances that correspond to a temperature range that covers of 0°C to 95°C.

Calibration process:

The 9 data points are used determine a 3rd order calibration polynomial. The temperatures post calibration are confirmed to be in accordance with the specifications of 0°C to 95°C, +/-0.5°C.

Table 2: Internal Temperature Sensor Calibration Summary

Reference Resistance (Ω)	Reference temperature (°C)	Measured resistance (Ω)	Resistance Post Calibration (Ω)	Temperature Post Calibration(°C)	Temperature Variation (°C)	Temperature Variation In Spec (True/False)
1365.5	94.85	1360.17	1365.385585	94.82	0.0301	True
1245.4	63.38	1240.75	1245.354329	63.37	0.0119	True
1145.7	37.49	1141.72	1145.801476	37.51	-0.0263	True
1098.8	25.37	1095.12	1098.948451	25.41	-0.0383	True
1051.8	13.28	1048.52	1052.092467	13.36	-0.0751	True
1005.4	1.38	1001.92	1005.233523	1.34	0.0426	True
948.3	-10.65	955.32	958.3716204	-10.63	-0.0183	True
858.3	-36.09	855.36	857.8386726	-36.18	0.0915	True
469.0	-133.24	468.92	469.0738758	-133.22	-0.0182	True

Calibration of Moisture Sensor

Configuration:

To account for the various sources of capacitance the moisture sensor is calibrated after the assembly is complete. The probe is introduced into one of 2 sealed equilibrium environments during calibration.

Calibration process:
The moisture sensor reports a direct relationship between capacitance and humidity and a tolerance over the 0 to 100% Relative Humidity (RH) working range of <2%RH therefore a two-point calibration is used.

One of the calibration conditions corresponds to 11.31%RH and is produced by exposing the sensor to a closed equilibrium environment above a Lithium Chloride solution at 24°C. The second calibration point corresponds to 33.07%RH and is produced by exposing the sensor to a closed equilibrium environment above a magnesium chloride solution at 24°C. A datapoint from each calibration condition is used to calculate the gain and offset parameters.

Table 3: Moisture Sensor Calibration Summary

Reference RH (%)	Reference Capacitance (pF)	Measured Capacitance (pF)	Gain Parameter Determined (Y/N)	Offset Parameter Calculated (Y/N)
11.3	193.805259	231.93	Y	Y
32.8	200.9101737	238.91		