

Schedule

Supertron Sensing Pte Ltd
Blk 16 Kallang Place
#07-04
Singapore 339156

Certificate No. : LA-2011-0485-C

Issue No. : 8

Date : 09 April 2020

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FIELD OF TESTING : Calibration and Measurement

| MEASURED QUANTITIES/ INSTRUMENTS / RANGE TO BE CALIBRATED | METHOD OF CALIBRATION | CALIBRATION AND MEASUREMENT CAPABILITY (CMC *) |
|---|---|--|
| <p>1. Pressure Measuring Devices</p> <p>i. Calibrator ii. Transducer/ Transmitter iii. Digital Indicator</p> <p><u>Range of Measurement</u></p> <p>a. (10 to 50) psi abs b. (50 to 300) psi abs</p> | <p>In-house Procedure, CP-H, Rev 9</p> | <p>0.025 psi abs 0.06 psi abs</p> |
| <p>2. Humidity Measurement</p> <p>i. Dew/ Frost Point</p> <p><u>Range of Measurement</u></p> <p>a. -90 °C to -85 °C Frost Point b. -85 °C to -75 °C Frost Point c. -75 °C to -60 °C Frost Point d. -60 °C to -30 °C Frost Point e. -30 °C to +70 °C Frost/ Dew Point</p> | <p>In-house Procedure CP-N, Rev 3 CP-M, Rev 4</p> | <p>0.60 °C 0.35 °C 0.20 °C 0.13 °C 0.10 °C</p> |

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| <p>ii. Relative Humidity (Chilled Mirror Hygrometer with air temperature probe)</p> <p>iii. Relative Humidity Sensor/ Instrument</p> <p>iv. Thermo-hygrometer</p> <p><u>Range of Measurement</u></p> <p>a. At -10 °C to 0°C (10 to 30) % relative humidity (30 to 50) % relative humidity (50 to 70) % relative humidity (70 to 95) % relative humidity</p> <p>b. At 0 °C to 23°C (10 to 30) % relative humidity (30 to 50) % relative humidity (50 to 70) % relative humidity (70 to 98) % relative humidity</p> <p>c. At 23 °C to 50°C (10 to 30) % relative humidity (30 to 50) % relative humidity (50 to 70) % relative humidity (70 to 98) % relative humidity</p> <p>d. At 50 °C to 70°C (10 to 30) % relative humidity (30 to 50) % relative humidity (50 to 70) % relative humidity (70 to 98) % relative humidity</p> | <p>In-house Procedure CP-N, Rev 3</p> | <p>Corresponding to above dew-point and temperature uncertainties</p> <p>(0.2 to 0.4) % relative humidity (0.4 to 0.6) % relative humidity (0.6 to 0.8) % relative humidity (0.8 to 1.0) % relative humidity</p> <p>(0.2 to 0.3) % relative humidity (0.3 to 0.4) % relative humidity (0.4 to 0.6) % relative humidity (0.6 to 0.8) % relative humidity</p> <p>(0.2 to 0.3) % relative humidity (0.3 to 0.4) % relative humidity (0.4 to 0.5) % relative humidity (0.5 to 0.6) % relative humidity</p> <p>(0.2 to 0.3) % relative humidity (0.3 to 0.4) % relative humidity (0.4 to 0.5) % relative humidity (0.4 to 0.5) % relative humidity</p> |

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| <p>3. Temperature</p> <p>A. Liquid bath method</p> <p>i. Temperature indicator and Recorders, with temperature sensor(s)</p> <p>ii. Industrial Platinum Resistance Thermometer</p> <p>iii. Thermistor</p> <p><u>Range of Measurement</u></p> <p>a. -196 °C</p> <p>b. (-90 to +5) °C</p> <p>c. (+5 to +250) °C</p> <p>d. Ice Point, 0 °C</p> <p>e. (0 to +30) °C</p> <p>f. Water Triple Point</p> <p>g. Gallium Fixed Point</p> | <p>In-house procedure CP-C, Rev 3</p> <p>} Either by Fixed Point or by } comparison with SPRT In } liquid bath</p> | <p>20 mK</p> <p>20 mK</p> <p>20 mK</p> <p>10 mK</p> <p>10 mK</p> <p>10 mK</p> <p>10 mK</p> |

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| <p>B. Air chamber method</p> <p>i. Temperature sensors incorporated in humidity instruments</p> <p><u>Range of Measurement</u></p> <p>a. (-10 to 70) °C</p> <p>ii. Thermistor</p> <p>iii. Chilled Mirror Hygrometer with air temperature probe</p> <p>iv. Temperature indicator with temperature sensor</p> <p><u>Range of Measurement</u></p> <p>a. (-10 to 0) °C</p> <p>b. (0 to 23) °C</p> <p>c. (23 to 70) °C</p> | <p>In-house procedure CP-N, Rev 3</p> | <p>0.09°C</p> <p>0.08 °C</p> <p>0.07 °C</p> <p>0.08 °C</p> |
| <p>4. On-Site Humidity Measurement</p> <p>i. Temperature & Humidity Generator (-10 to 70) °C</p> <p><u>Range of Measurement</u></p> <p>a. At -10 °C to 0°C (10 to 30) % relative humidity (30 to 50) % relative humidity (50 to 70) % relative humidity (70 to 95) % relative humidity</p> | <p>In-house/Site Procedure CP-N, Rev 3</p> <p>} Comparison with a chilled mirror hygrometer with a temperature probe</p> | <p>0.08 °C</p> <p>(0.2 to 0.4)% relative humidity (0.4 to 0.6)% relative humidity (0.6 to 0.8)% relative humidity (0.8 to 1.0)% relative humidity</p> |

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| <p>b. At 0 °C to 23°C (10 to 30) % relative humidity (30 to 50) % relative humidity (50 to 70) % relative humidity (70 to 98) % relative humidity</p> <p>c. At 23 °C to 50°C (10 to 30) % relative humidity (30 to 50) % relative humidity (50 to 70) % relative humidity (70 to 98) % relative humidity</p> <p>d. At 50 °C to 70°C (10 to 30) % relative humidity (30 to 50) % relative humidity (50 to 70) % relative humidity (70 to 98) % relative humidity</p> <p>ii. Relative Humidity Sensor / Instrument</p> <p>iii. Thermo-hygrometer</p> <p>iv. Hygrometers</p> <p>v. Temperature sensors incorporated in humidity instruments (0 to 25) °C (45 to 60) °C</p> | <p>In-house/Site Procedure CP-N, Rev 3</p> | <p>(0.2 to 0.3)% relative humidity (0.3 to 0.4)% relative humidity (0.4 to 0.6)% relative humidity (0.6 to 0.8)% relative humidity</p> <p>(0.2 to 0.3)% relative humidity (0.3 to 0.4)% relative humidity (0.4 to 0.5)% relative humidity (0.5 to 0.6)% relative humidity</p> <p>(0.2 to 0.3)% relative humidity (0.3 to 0.4)% relative humidity (0.4 to 0.5)% relative humidity (0.4 to 0.5)% relative humidity</p> <p>0.21 °C 0.23 °C</p> |

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| <u>Range of Measurement</u> a. At 0 °C to 25°C (10 to 50) % relative humidity (50 to 85) % relative humidity b. At 25 °C to 45°C (10 to 50) % relative humidity (50 to 95) % relative humidity c. At 45 °C to 60°C (10 to 50) % relative humidity (50 to 90) % relative humidity | } Comparison with a chilled mirror hygrometer with air temperature probe | (0.4 to 1.0)% relative humidity (1.0 to 1.7)% relative humidity (0.3 to 0.7)% relative humidity (0.7 to 1.3)% relative humidity (0.3 to 0.7)% relative humidity (0.7 to 1.2)% relative humidity |
| 5. On-Site Pressure Measurement i. Calibrator ii. Transducer / Transmitter iii. Digital Indicator <u>Range of Measurement</u> a. (10 to 50) psi abs b. (50 to 150) psi abs | In-House/Site Procedure, CP-H, Rev 9 | 0.03 psi abs 0.10 psi abs |
| 6. On-Site Temperature Measurement A. Liquid bath method i. Temperature indicator and Recorders, with temperature sensor (s) ii. Industrial Platinum Resistance Thermometer iii. Thermistor <u>Range of Measurement</u> a. (-10 to +70) °C | In-House/ Site Procedure CP-C, Rev 3 | 0.06 °C |

* CMC is expressed as an expanded uncertainty estimated at a level of confidence of approximately 95%.

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Approved signatories :

Mr Tee Yee Chee @ Mr Zheng Yiqi) All items

Ms Eva Marie Barrera)

Mr Terh Hock Kiong - 1 (Pressure Measuring Devices) and
5 (On-Site Pressure Measurement) only.

Note :

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. A laboratory's fulfilment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and **management system requirements** that are necessary for it to consistently deliver technically valid test results. The **management system requirements** in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001.