

**Laboratory** Venus Calibration and Instruments, No 16, 6<sup>th</sup> Street, Annai Sathya Nagar, Poothapedu Ramapuram, Chennai, Tamil Nadu

**Accreditation Standard** ISO/IEC 17025: 2005

**Certificate Number** CC-2725

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**Validity** 22.06.2018 to 21.06.2020

**Last Amended on** -

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
<b><u>ELECTRO-TECHNICAL CALIBRATION</u></b>				
<b>I.</b>	<b>SOURCE</b>			
1.	DC Voltage <sup>#</sup>	1 mV to 110 mV 110 mV to 1100 mV	0.014 mV to 0.04 mV 0.04 mV to 0.39 mV	Using Temperature Calibrator by Direct Method
2.	Resistance <sup>#</sup>	4 $\Omega$ to 400 $\Omega$ 400 $\Omega$ to 4 k $\Omega$  1 $\Omega$ 10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 2 M $\Omega$ 20 M $\Omega$	0.012 $\Omega$ to 0.22 $\Omega$ 0.22 $\Omega$ to 0.0035 k $\Omega$  0.015 $\Omega$ 0.081 $\Omega$ 0.76 $\Omega$ 0.0058 k $\Omega$ 0.084 M $\Omega$ 1.027 M $\Omega$	Using Temperature Calibrator by Direct Method  Using Standard Decade Box by Direct Method
3.	Temperature Simulation <sup>#</sup> (Indicator Controller/ Recorder)			Using Temperature Calibrator by Direct Method
	Thermocouple K Type  J Type E Type B Type S Type R Type N Type T Type  Pt 100	(-) 200 °C to 1200 °C 1200 °C to 1350 °C (-) 200 °C to 1200 °C (-) 90 °C to 1000 °C 600 °C to 1820 °C 50 °C to 1767 °C 50 °C to 1767 °C (-) 90 °C to 1250 °C (-) 100 °C to 400 °C  (-) 200°C to 0 °C 0 °C to 400 °C 400 °C to 800 °C	0.93 °C 1.1 °C 0.85 °C 0.74 °C 2 °C 1.92 °C 1.92 °C 1.24 °C 0.74 °C  0.41 °C 0.63 °C 0.94 °C	

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<b>II.</b>	<b>MEASURE</b>			
1.	DC Voltage <sup>§</sup>	10 mV to 30 V	0.03 V to 0.007 V	Using Digital Multimeter
2.	DC Current <sup>§</sup>	10 mA to 5 A	0.0082 mA to 0.04 A	Using Digital Multimeter
3.	Resistance <sup>§</sup>	1 $\Omega$ to 100 $\Omega$ 100 $\Omega$ to 1 k $\Omega$ 1 k $\Omega$ to 20 M $\Omega$	0.025 $\Omega$ to 0.05 $\Omega$ 0.05 $\Omega$ to 0.0007 k $\Omega$ 0.0007 k $\Omega$ to 0.47 M $\Omega$	Using Digital Multimeter
4.	Temperature Simulation (Indicator Controller/ Recorder) # Thermocouple			Using High Precision Digital Thermometer
	K Type	(-) 200 °C to (-)100 °C	0.99 °C	
	J Type	(-) 100 °C to 1350 °C	0.74 °C	
	E Type	200 °C to 1150 °C	0.71 °C	
	B Type	(-) 200 °C to (-)100 °C	0.71 °C	
		(-) 100 °C to 950 °C	0.52 °C	
	S Type	600 °C to 1800 °C	1.2 °C	
		5 °C to 200 °C	1.51 °C	
	R Type	200 °C to 1750 °C	1.5 °C	
		5 °C to 200 °C	1.5 C	
	N Type	200 °C to 1750 C	1.49 °C	
	T Type	(-) 90 °C to 1250 °C	1 °C	
		(-) 100 °C to 350 °C	0.74 °C	
	RTD (PT-100)	(-) 200 °C to 800 °C	0.36 °C	
5.	Time Interval#	1 s to 60 s 60 s to 24 hrs.	0.09 s to 0.095 s 0.095 s to 10.41 s	Using M tec CT 7 Counter Timer

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<b><u>MECHANICAL CALIBRATION</u></b>				
<b>I.</b>	<b>PRESSURE INDICATING DEVICES</b>			
1.	Low Pressure-Dial, Digital Pressure Gauges/ Indicators, Pressure Transducers and Pressure Transmitter Differential Pressure Gauge #	0 to (-344) mbar 0 to 344 mbar	0.58 mbar	Using Digital Manometer By Comparison Method
2.	Vacuum - Industrial Dial, Digital Pressure Gauges/ Indicators, Pressure Switch and Pressure Transmitter Differential Pressure Gauge #	0 to (-0.95) bar	0.003 bar	Using Digital Pressure Gauge
3.	Pressure-Pneumatic Industrial Dial, Digital Pressure Gauges/ Indicators, Pressure Switch and Pressure Transmitter Differential Pressure Gauge #	0 to 35 bar	0.017 bar	Using Digital Pressure Gauge

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
	Standard Weights <sup>§</sup>	1 kg 2 kg  5 kg  10 kg 20 kg 50 kg	11 mg 11 mg  86 mg  1.1 g 1.1 g 2 g	Using F1 Standard Weights, & Electronic Balance (Readability: 10 mg) by ABBA Method as per OIML R-111  Using F1 Standard Weights, & Electronic Balance (Readability: 100 mg) by ABBA Method as per OIML R-111  Using F1 Standard Weights, & Electronic Balance (Readability: 1 g) by ABBA Method as per OIML R-111
<b>III.</b>	<b>WEIGHING SCALE AND BALANCE</b>			
<b>1.</b>	Weighing Balance <sup>#</sup>			
	Readability: 0.01mg Readability: 0.1mg	Up to 50g Up to 200g	0.05mg 0.8mg	Using E2 Standard Weights as per OIML R 76
	Readability: 1mg Readability: 10 mg Readability: 100mg	Up to 1000g Up to 3kg Up to 6kg	3mg 25mg 176mg	Using E2 & F1 Standard Weights as per OIML R 76
	Readability: 1g	Up to 50kg	1.5g	Using F1 Standard Weights as per OIML R 76
	Readability: 20g	Up to 190kg	17g	Using F1 & M1 Standard Weights as per OIML R 76

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<b>IV.</b>	<b>VOLUME</b>			
1.	Micropipette <sup>§</sup>	10 $\mu$ l to 100 $\mu$ l 100 $\mu$ l to 1000 $\mu$ l 1ml to 10ml	0.21 $\mu$ l 1.72 $\mu$ l 22.03 $\mu$ l	Using Precision balance of 50 g capacity and readability 0.01 mg and distilled water By Gravimetric method based on ISO 8655-6
2.	Pipette/Burette/ Measuring Cylinder/Beakers/ Conical Flask/ Volumetric Flask <sup>§</sup>	1ml to 10ml > 10ml to 150ml	42.82 $\mu$ l 42.82 $\mu$ l	Using Precision balance of 200 g capability and 0.1 mg readability and distilled water By Gravimetric method based on ISO 4787
		> 150ml to 250ml	0.42ml	Using Precision balance of 600 g capability and 1 mg readability and distilled water By Gravimetric method based on ISO 4787
		> 250ml to 2ltr	1.8ml	Using Precision balance of 3000 g capability and 10 mg readability and distilled water By Gravimetric method based on ISO 4787
		> 2ltr to 5ltr	9.9ml	Using Precision balance of 6 kg capability and 100 mg readability and distilled water By Gravimetric method based on ISO 4787

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<b>V.</b>	<b>ACOUSTIC</b>			
1.	Sound Level Meter <sup>§</sup>	1 kHz 94 dB & 114 dB	0.21 dB	Using Sound Level Calibrator
<b>VI.</b>	<b>ACCELERATION AND SPEED</b>			
1.	Tachometer <sup>§</sup> (Non-Contact Type)	100 rpm to 60000 rpm	2.2 % to 0.76 %	Using Digital Tachometer
2.	RPM Meter <sup>§</sup>	100 rpm to 6000 rpm	0.75%	Using Digital Tachometer

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<b><u>THERMAL CALIBRATION</u></b>				
<b>I.</b>	<b>TEMPERATURE</b>			
1.	Liquid in Glass Thermometer <sup>§</sup>	(-) 30 °C to 250 °C	0.4 °C	Using RTD and Digital Thermometer by Comparison Method
2.	RTD, Thermometer, Temperature Gauge, Thermocouple, Temperature Switch, Temperature Indicator / Controller with sensor, Transmitter, Thermocouple with & without Indicator <sup>§</sup>	(-) 30 °C to 250 °C 250 °C to 600 °C 600 °C to 1200 °C	0.32 °C 0.35 °C 2.13 °C	Using RTD, Thermocouple Type R, Digital Thermometer by Comparison Method
3.	Temperature Baths, Dry Bath Calibrators <sup>§</sup>	(-) 30 °C to 250 °C 250 °C to 600 °C 600 °C to 1200 °C	0.26 °C 0.36 °C 2.3 °C	Using RTD, Thermocouple Type R, Digital Thermometer by Comparison Method

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4.	RTD, Thermometer, Temperature Gauge, Thermocouple, Temperature Switch, Temperature Indicator / Controller with sensor, Transmitter, Thermocouple with & without Indicator*	(-) 30 °C to 250 °C 250 °C to 600 °C 600 °C to 1200 °C	0.32 °C 0.35 °C 2.13 °C	Using RTD, Thermocouple Type R, Digital Thermometer by Comparison Method
5.	Temperature Indicator / Controller with sensor of Bath, Deep Freezer, Freezer, Refrigerator, Incubator, Autoclave, Water bath, Hot Air oven, Furnace*	(-) 30 °C to 250 °C 250 °C to 600 °C 600 °C to 1200 °C	0.28 °C 0.41 °C 2.3 °C	Using RTD, Thermocouple Type R, Digital Thermometer by Comparison Method  Single Point Calibration
6.	Baths, Deep Freezer, Freezer, Refrigerator, Thermal Chamber, Water bath, Hot air Oven, Furnaces*	(-) 45 °C to 300 °C	5.6 °C	Using Data logger with RTD  Multipoint Calibration

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<b>II. SPECIFIC HEAT AND HUMIDITY</b>				
1.	Humidity Sensor/ Thermo Hygrometer <sup>#</sup>	15% to 90 % RH @25°C	2.6 % RH	Using Humidity Chamber & Using Digital Temperature/Humidity Indicator with sensor
		10°C to 60°C	0.42 °C	
2.	Environmental & Humidity Chambers*	30% to 90% RH @25°C	4.4 % RH	Using Temperature/ Humidity Sensor with data logger Multipoint Calibration

\* Measurement Capability is expressed as an uncertainty ( $\pm$ ) at a confidence probability of 95%

<sup>§</sup>Only in Permanent Laboratory

<sup>^</sup>Only for Site Calibration

<sup>#</sup> The laboratory is also capable for site calibration however, the uncertainty at site depends on the prevailing actual environmental conditions and master equipment used.

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