

Laboratory Karandikar Laboratories Pvt. Ltd. , Gat No. 142, Boisar Chilhar Road,
At Betegaon, Taluka Palghar Maharashtra

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number CC-2889 (In lieu of C-0149, C-0150, C-0151) **Page** 1 of 13

Validity 07.11.2018 to 06.11.2020 **Last Amended on** 12.11.2018

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
<u>ELECTRO TECHNICAL CALIBRATION</u>				
I.	MEASURE			
1.	DC Voltage [#]	0.1 mV to 1 mV 1 mV to 10 mV 10 mV to 100 mV 100 mV to 10 V 10 V to 1000V	0.3% to 0.01% 0.01 % to 0.005% 0.005% to 0.0014% 0.0014 % to .001% 0.001% to 0.0014%	7 ½ & 8 ½ DMM 3458A Agilent
	DC High Voltage [#]	1 kV to 30 kV	2%	HV Probe/Divider & DMM
2.	DC Current [#]	1 µA to 10 µA	0.06% to 0.007%	8 1/2 DMM 3458A Agilent
		10 µA to 100 µA	0.007 % to 0.004%	
		100 µA to 100 mA	0.004 %	Shunts & DMM 3458A
		100 mA to 1 A	0.004% to 0.01%	
		1 A to 20 A	0.01 % to 0.03%	
		20A to 100A	0.03%	
100A to 500A	0.03% to 1.3%			

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
3.	AC Voltage [#]	50 Hz to 1 kHz 1 mV to 10 mV 10mV to 100mV 100mV to 10V 10V to 100 V 100 V to 700 V	0.33% to 0.04% 0.04% to 0.01% 0.01% 0.01% to 0.02% 0.02% to 0.05%	8 1/2 DMM 3458A Agilent
		10kHz 1mV to 100V	0.2% to 0.04%	
		100kHz 10 mV to 100V	0.2% to 0.1%	
	AC High Voltage [#]	50Hz 1 kV to 25 kV	3%	HV probe/Divider & DMM
		50Hz 25 kV to 100 kV	3%	
4.	AC Current [#]	50Hz to 1KHz 10 μ A to 1 A 1A to 20 A	0.41% to 0.11% 0.11% to 0.3%	8 1/2 DMM 3458A Agilent
		50Hz 1 A to 20A 20A to 100A 100A to 1000A	0.2% 0.2% 1.43%	

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
5.	AC Power/Energy Active/Re-active Single / Three Phase [#]	50Hz/60Hz 0.5 W to 6000 W 40 V to 300 V 0.05 A to 20 A 0.25 Lag, UPF, 0.25Lead	0.5% to 0.2%	Using WT-230
	Power Factor	0.25 lag to UPF to 0.25Lead	0.006pF	
	Harmonics	2 nd to 50 th	0.6%	Using WT-230
6.	Frequency [#]	10 Hz to 1kHz 1 kHz to 10 kHz 10 kHz to 200 MHz	0.01% to 0.006% 0.006% to 0.0006% 0.0006% to 0.0001%	Using 6 1/2 DMM K2000 Universal counter / Timer 9905
7.	DC Resistance [#]	1 m Ω to 10 m Ω 10 m Ω to 100 m Ω 100m Ω to 1 Ω 1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 10 k Ω 10 k Ω to 100 k Ω 100k Ω to 1M Ω 1M Ω to 10 M Ω 10M Ω to 100M Ω 100 M Ω to 1 G Ω	0.6% to 0.02% 0.02% to 0.02% 0.02% to 0.007% 0.007% to 0.002% 0.002% to 0.0013% 0.0013% to 0.0011% 0.0011% to 0.0017% 0.0017% to 0.003% 0.003% to 0.007% 0.007% to 0.06% 0.06% to 0.6%	Using 8 1/2 DMM 3458A Agilent
8.	AC Resistance	1 kHz 1 Ω to 10 k Ω	0.4%	Using Digital LCR Meter

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
9.	Inductance [#]	1 kHz 100 μ H to 10H	0.4%	Using Digital LCR Meter
10.	Capacitance [#]	1 kHz 100 pF to 100 μ F	0.5%	Using Digital LCR Meter
11.	Time [#]	1 s to 24 h	0.06s to 12s	Using Universal Counter/Timer
II.	SOURCE			
1.	DC Voltage [#]	1 mV to 10 mV 10 mV to 320 mV 320 mV to 3.2 V 3.2 V to 32 V 32 to 1000V	0.35% to 0.04% 0.04% to 0.008% 0.008% to 0.006% 0.006% 0.006% to 0.007%	Using Fluke 5502A
2.	DC Current [#]	1 μ A to 10 μ A 10 μ A to 320 μ A 320 μ A to 320 mA 320 mA to 2.9 A 2.9 A to 10 A 10 A to 20 A	2.62% to 0.25 0.25% to 0.024% 0.024% to 0.013% 0.02% to 0.04% 0.04 % to 0.06 % 0.06 to 0.1%	Using Fluke 5502A
		20 A to 1000 A	0.3%	Using Fluke 9100/5502A with CC

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3.	AC Voltage [#]	50Hz to 1kHz 2 mV to 30 mV 30 mV to 300 mV 300 mV to 30 V 30 V to 300 V 300 V to 1000 V	1.2% to 0.17% 0.17% to 0.04% 0.04% 0.04% 0.06% 0.07 %	Using Fluke 5502A
		1kHz to 10kHz 3 mV to 30 mV 30 mV to 300 mV 300 mV to 30 V 30 V to 100 V	1% to 0.17% 0.17% to 0.04% 0.04% 0.04% 0.13%	
4.	AC Current [#]	50 Hz to 1 kHz 33 μ A to 320 μ A 320 μ A to 3.2 mA 3.2 mA to 3.2 A 3.2 A to 20 A	0.5% to 0.13% 0.13% to 0.1% 0.1% to 0.12% 0.12% to 0.2%	Using Fluke 5502A
		50Hz 20 A to 1000 A	0.37%	Using Fluke 5502A/9100 with CC

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
5.	DC Resistance [#]	1 Ω to 32 Ω	0.04%	Using Fluke 5502A Using Decade Resistance Box General Radio Using Shunts/Resistor Vaiseshika
		32 Ω to 32 k Ω	0.009%	
		32 k Ω to 3.2 M Ω	0.009 % to 0.02 %	
		3.2 M Ω to 32 M Ω	0.02 % 0.1 %	
		32 M Ω to 320 M Ω	0.1% to 0.5%	
		320 M Ω to 1 G Ω	0.5 % to 1.5 %	
		1 Ω to 10 Ω	0.03% to 0.004%	
		10 Ω to 100 Ω	0.006%	
		100 Ω to 10 k Ω	0.004%	
		10 k Ω to 100 k Ω	0.01%	
		1 m Ω	0.03%	
		5 m Ω	0.03%	
		10 m Ω	0.03%	
		50 m Ω	0.03%	
		100 m Ω	0.03%	
		500 m Ω	0.01%	
		1 Ω	0.01%	
		1 M Ω	0.03%	
		10 M Ω	0.06%	
100 M Ω	0.5%			
1 G Ω	0.5%			
10 G Ω	0.5%			
100 G Ω	1%			
1 T Ω	4%			
6.	Capacitance [#]	1 kHz		Using Fluke 5502A
		1 nF to 3 nF	1.7%	
		3 nF to 10 μ F	1.7% to 0.3%	
		10 μ F to 1 mF	0.3% to 1.4%	

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
7.	Inductance [#]	1 kHz 1 mH to 10 H	0.3%	Using Inductance box
8.	Frequency [#]	10 Hz to 10 kHz 10kHz to 1GHz	0.0005% 0.0005% to 0.0003%	Using Signal Gen. R& S make SMY01
9.	Oscilloscope [#] Amplitude Time Bandwidth	20 mV/div – 20V/div DC 20 mV/div to 20V/div AC 5 nsec to 100ms/div 5MHz to 1000 MHz	0.4% 0.4% 0.3% 0.01% 3%	Using Fluke 9100 / Signal Gen.
10.	Temperature Simulation [#] RTD T/C K T/C J T/C T T/C E T/C R T/C S	(-)200° to 850°C (-)200 to 1300°C (-)100°C to 1200°C (-)200°C to 400°C (-)100°C to 1000°C 300°C to 1750°C 300°C to 1750°C	0.1°C to 0.4°C 0.3°C 0.1°C to 0.3°C 0.3°C to 0.2°C 0.1°C to 0.2°C 0.5°C to 1°C 1°C	Using Fluke 5502A/Fluke 9100

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
11.	AC Power (Active / Reactive) Single Phase [#]	50 Hz 40 V to 300 V 0.05 A to 20 A 0.25 Lag	0.98%	Using Fluke 5502A
		40 V to 300 V 0.05 A to 20 A 0.5 Lag	0.5%	
		40 V to 300 V 0.05 A to 20 A 0.8 Lag	0.2%	
		40 V to 300 V 0.05 A to 20 A UPF	0.12%	
		40 V to 300 V 0.05 A to 20 A 0.8 Lead	0.2%	
		40 V to 300 V 0.05 A to 20 A 0.5Lead	0.5%	
		40 V to 300 V 0.05 A to 20 A 0.25Lead	0.98%	
		12.	Harmonics [#]	

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>MECHANICAL CALIBRATION</u>				
I.	PRESSURE INDICATING DEVICES			
1.	Magnahelic gauges , Manometers [#]	0 to 240 Pa 0 to 2400 Pa 0 to 10 kPa 0 to 20 mbar	0.5 Pa 3 Pa 0.01kPa 0.2mbar	Using Digital Differential Manometer
2.	Pressure Gauge / Pressure Instruments [#]	0 to 1.5 bar 0 to 6 bar 0 to 40 bar 0 to 300 bar 0 to 700 bar	0.0003 bar 0.003 bar 0.006 bar 0.17 bar 0.17 bar	Using Process Calibrator / Digital Gauge
3.	Vacuum Gauges / Vacuum Instruments [#]	(-)0.95 to 0 bar	0.0003bar	Using Process Calibrator

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
II.	ACCELERATION AND SPEED			
1.	RPM Contact Non-Contact [#]	40 to 3000 RPM 40 to 20000 RPM	1.6% rdg 1.6% rdg	Using RPM Source & Master Tachometer

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
<u>THERMAL CALIBRATION</u>				
I.	TEMPERATURE			
1.	Liquid-in-glass thermometer , Dial Gauge [#]	(-)80 °C to 35°C	0.11°C	Using Semi Standard PRT-PT 100, 7 ½ DMM & Low Temperature Bath
		35°C to 250°C	0.11°C	Using Semi Standard PRT-PT 100,7 ½ DMM and Oil Bath
2.	All type RTD, Thermocouple, thermometer with or without indicator [#]	(-) 80°C to 35 °C	0.11°C	Using Semi standard SPRT, 7 ½ DMM & Low Temperature Bath
3.	All type RTD, Thermocouple, thermometer with or without indicator [#]	35°C to 250 °C	0.05°C	Using Semi standard PRT-PT 100, 7 ½ DMM & Oil Bath
4.	All type RTD, Thermocouple, thermometer with or without indicator [#]	250 °C to 400 °C	0.3°C	Using Semi standard PRT-PT 100 ,7 ½ DMM & Dry block

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (\pm)	Remarks
5.	All type Thermocouple, thermometer with or without indicator [#]	400°C to 1000 °C	2°C	Using R-Type Thermocouple with cold junction, 7 ½ DMM & Dry block
6.	All type Thermocouple with or without indicator [#]	1000 °C to 1200 °C	2.4°C	Using R-Type Thermocouple with cold junction, 7 ½ DMM & Dry block
7.	Temperature & Humidity Sensor with Indicator [#]	20 % RH to 95% RH @ \approx 25°C	1.3 % RH	Using Temp &RH Sensor with data logger , 7 ½ DMM & Humidity Generator Cum Chamber
8.	Non-Contact type Infrared Thermometers, Pyrometers [#]	30 °C to 350 °C	1.8°C	Using Black body and Infrared Thermometer
9.	Temperature Indicator with Sensor of Baths/Oven/Chambers [#]	-80 °C to 250 °C	0.2°C	Using Semi standard PRT-PT 100 ,7 ½ DMM Single Position calibration.
10.	Temperature Indicator with sensor of Muffle Furnace/ Oven/Dry Block [#]	250 °C to 1200 °C	2.5°C	Using R-Type Thermocouple with cold junction, 7 ½ DMM Single Position calibration

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11.	Chambers, Bath, Ovens and Freezer *	(-)80 °C to 250 °C	1.2 °C	Using RTD Sensors (minimum nine) with data logger (Multi Position Calibration)
II.	SPECIFIC HEAT AND HUMIDITY			
1.	Humidity Chambers/ Environmental Chamber*	25 % RH to 95% @ \approx 25°C	2.9 % RH	Using Temp. &RH Sensors (minimum nine) with data logger (Multi Position Calibration)

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

\$ Only in Permanent Laboratory

* Only for Site Calibration

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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