Laboratory	**Hi Physix Laboratory India Private Limited, B-32/1/2, MIDC Industrial Area, Ranjangaon, Pune, Maharashtra**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Certificate Number	**CC-2165**	**Page**	**1 of 16**
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Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		ELECTRO TECHNICAL CALIBRATION		
I.	**SOURCE**			
1.	DC Voltage#	1mV to 300 mV 300 mV to 100 V 100 V to 1000 V	0.7% to 0.055% 0.055% to 0.015% 0.015% to 0.01%	Using Fluke 9100 MFC by Direct Method
2.	AC Voltage#	**10Hz to 100kHz** 10 mV to 32 mV 32 mV to 320 mV 320 mV to 1000 V	 4.56% to 0.55% 0.55% to 0.25% 0.25% to 0.2%	Using Fluke 9100 MFC by Direct Method
	AC Voltage#	**50Hz** 0.5 V to 560 V	0.043% to 0.049%	Using CALMET C300 Power/Energy Calibrator by Direct Method
3.	DC Current#	10 µA to 300 mA 300 mA to 20 A	0.59% to 0.035% 0.035% to 0.35%	Using Fluke 9100 MFC by Direct Method
		20 A to 1000 A	0.8%	Using Fluke 9100 with Current coils by Direct Method

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Program Manager

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
4.	AC Current#	**50 Hz to 5 kHz** 10 µA to 300 µA 300 µA to 300 mA 300 mA to 20 A **50Hz** 20 A to 1000 A	 4.1% to 0.25% 0.25% 0.25% to 0.3% 0.76%	Using Fluke 9100 MFC by Direct Method Using Fluke 9100 with Current coils by Direct Method
	AC Current#	**50Hz** 20 A to 120 A	 0.3%	Using CALMET C300 Power/Energy Calibrator by Direct Method
5.	Resistance# (2w)	3 Ω to 10 Ω 10 Ω to 100 kΩ 100 kΩ to 1MΩ 1MΩ to 10 MΩ 10 MΩ to 300 MΩ	0.46% to 0.20% 0.20% to 0.035% 0.032% to 0.076% 0.076% to 0.20% 0.02% to 0.59%	Using Fluke 9100 MFC by Direct Method
	Low Resistance# (4w)	0.1mΩ 1mΩ 10 mΩ 100 mΩ 1 Ω 2 Ω	0.96% 0.79% 0.31% 0.31% 0.31% 0.31%	Using OSAW Standard Resistance (Direct Values) by Direct Method
6.	Capacitance#	**1kHz** 1nF to 100 nF 100 nF to 1mF	 2.04% to 0.55% 0.55% to 1.85%	Using Fluke 9100 MFC by Direct Method

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
7.	Frequency[#]	1Hz to 100 Hz 100 Hz to 1MHz	0.6 % to 0.006% 0.006% to 0.003%	Using Fluke 9100 MFC by Direct Method
8.	High Resistance[#] (I.R Option)	1MΩ to 1.8 GΩ (at 250 V to 1kV)	0.2% to 1.1%	Using Fluke 9100 MFC by Direct Method
9.	Power Factor[#]	**50Hz** 0.1PF lag – UPF- 0.1PF lead	0.002% to 0.001%	Using Fluke 9100 MFC by Direct Method
10.	AC Power (1Φ) [#] UPF	**50Hz** 30 V to 560 V 0.1A to 20 A 3 W to 11.2 kW	0.06% to 0.6%	Using Fluke 9100 MFC by Direct Method
	P.F. 0.5 Lag to 0.5 Lead	1.5 W to 5.6 kW	0.08% to 0.65%	
	P.F. 0.8 Lag to 0.8 Lead	2.4 W to 8.96 kW	0.08% to 0.65%	
11.	DC Power (1Φ)) [#]	10 V to 600 V 0.1A to 20 A 1W to 12 kW	6.3% to 0.2%	Using Fluke 9100 MFC by Direct Method
	AC Power (3Φ)) [#] (UPF)	**50Hz** 10 V to 500 V 0.1A to 100 A 1W to 50 Kw	1.5%	Using CALMET C300 Power/Energy Calibrator by Direct Method
12.	AC Energy [#] (1Φ & 3Φ) (Active/Reactive) UPF to 0.25PF Lead/Lag	**50Hz** 63.5 V to 240 V 0.05 A to 120 A 0.79 Wh to 28.8 kWh	0.68% to 0.06%	Using CALMET C300 Power/Energy Calibrator by comparison method

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
13.	Temperature)[#] Indicator, Controller, Recorders (By simulation method) RTD Type Thermocouple J -TYPE K -TYPE	 (-) 200°C to 800°C (-) 200°C to 1200°C (-) 200°C to 1300°C	 0.2°C 0.3°C 0.3°C	Using Fluke 9100 MFC by Direct Method
14.	Harmonics)[#] (1 Phase & 3 Phase)	2nd to 31st 10V to 300V 0.5A to 100A	0.6%	Using CALMET C300 Power/Energy Calibrator by Direct Method
II.	**MEASURE**			
1.	DC Voltage[#]	0.1mV to 1mV 1mV to 100 mV 100 mV to 1V 1V to 1000 V	4.0% to 0.4% 0.4% to 0.0085% 0.0085% to 0.0045% 0.0045% to 0.006%	Using Fluke 8846A, 6½ DMM by Direct Method
	DC High Voltage[#]	1kV to 40 kV	2.38%	Using H.V. Probe & DMM Fluke by Direct Method
2.	AC Voltage (1Φ))[#]	**50Hz to 5kHz** 1mV to 100 mV 100 mV to 1V 1V to 1000 V **100kHz** 10 mV to 100 V	 4.7% to 0.12% 0.12% to 0.1% 0.1% 6% to 0.8%	Using Fluke 8846A, 6½ DMM by Direct Method

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	AC Voltage (3Φ)) #	**50Hz** 0.1V to 1000 V	0.7% to 0.06%	Using HIOKI Digital Power Meter/Harmonic Analyzer by Direct Method
	AC High Voltage) #	**50Hz** 1kV to 28 kV	2.33%	Using H.V. Probe & DMM Fluke by Direct Method
3.	DC Current) #	1µA to 100 µA 0.10 mA to 10mA 10 mA to 10 A 10 A to 65 A	3.06% to 0.085% 0.085% to 0.065% 0.065% to 0.8% 0.13% to 0.12%	Using Fluke 8846A, 6½ DMM by Direct Method Using HIOKI Digital Power Meter/Harmonic Analyzer by Direct Method
4.	AC Current (1Φ)) #	**50Hz to 5kHz** 10µA to 1mA 1mA to 10 mA 10 mA to 10 A **50Hz** 10 mA to 65 A	 0.85% to 0.16% 0.16% 0.16% to 0.25% 0.06%	 Using Fluke 8846A, 6½ DMM by Direct Method Using HIOKI Digital Power Meter/ Harmonic Analyzer by Direct Method
	AC Current) # (3Φ)	**50Hz** 10 mA to 50 A	0.13% to 0.034%	Using HIOKI Digital Power Meter/ Harmonic Analyzer by Direct Method

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
5.	Resistance) #	**1 kHz** 0.01 Ω to 100 Ω 0.1Ω to 100 kΩ 100 kΩ to 10 MΩ 10 MΩ to 1GΩ	0.6% to 0.07% 3.6% to 0.013% 0.013% to 0.05% 0.05% to 2.5%	Using LCR Meter by direct method Using Fluke 8846A, 6½ DMM by Direct Method
6.	Temperature) # Simulation (By Simulation Method) RTD Type J Type Thermocouple K Type Thermocouple	 (-) 200°C to 600°C (-) 200°C to 1200°C (-) 200°C to 1300°C	 0.2°C 0.55°C 0.52°C	 Using Cropico digital thermometer By Direct Method
7.	Frequency (1φ)) #	10 Hz to 1MHz	0.17% to 0.011%	Using Fluke 8846A, 6½ DMM by Direct Method
	Frequency (3φ)) #	**240V** 50 Hz to 50 kHz	0.02%	Using HIOKI Digital Power Meter/Harmonic Analyzer by Direct Method
8.	Power Factor) #	0.1PF lag – UPF- 0.1PF lead	0.007PF	Using Yokogawa/HIOKI Digital Power Meter/ Harmonic Analyzer by Direct Method

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
9.	AC Power (1Φ))#	**50 Hz** 10V to 600 V 0.1A to 65 A **UPF** 0.1W to 39 kW	0.9%	Using Yokogawa/HIOKIDigital Power Meter/ Harmonic Analyzer by Direct Method
	AC Power (3Φ))#	**50Hz, At UPF** 10 V to 600 V 0.01A to 50 A 0.1W to 30 kW	0.13% to 0.034%	Using HIOKI Digital Power Meter/Harmonic Analyzer by Direct Method
10.	DC Power)#	**10 V to 600 V** 0.01A to 65 A 0.1W to 39 kW	0.2%	Using HIOKI Digital Power Meter/Harmonic Analyzer by Direct Method
11.	Harmonics)# (1 Φ,3 Φ)	**50Hz** 200 V to 240 V, 0.5 A to 10 A 3rd to 39th Order	0.51%	Using Yokogawa/HIOKI Digital Power Meter/ Harmonic Analyzer by Direct Method
	Harmonics)# (1 Φ,3 Φ)	**50Hz** 200V, 10A, 3rd to 49th Order	0.51%	
12.	Time Interval)#	0.1s to 999.99 s 1000 s to 24 hrs	0.002sec to 1.13sec 0.002 sec to 1.61 sec	Using Time Interval Meter & Digital Stop Watch by Comparison Method
13.	Surge Tester)#	Upto 10 kV	1.6% to 3.69%	Using Oscilloscope with HV Probe by Direct/Comparison method as per IEC 60060-2, IEC 61180, IS 2071 Part 1

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
14.	Impulse) #			
	Voltage Magnitude: Front Time: Duration (Half pulse width):	1kVp to 17 kVp 0.8 µS to 100 µS, 10 µS to 1000 µS,	3.69% 1.6% to 2.5% 1.6% to 2.5%	Using Oscilloscope with HV Probe by Direct/Comparison method as per IEC 60060-2, IEC 61180, IS 2071 Part 1
15.	Capacitance) #	**1kHz** 1 pF to 1000 pF 1 nF to 1000 nF 1µF to 1011µF	 0.96% to 0.06% 0.91% to 0.06% 0.91% to 0.31%	 Using LCR Meter by Direct method
16.	Inductance) #	**1kHz** 99 µH to 999.9 µH 1mH to 1003 mH 1H to 10 H	 0.28% to 0.28% 0.06% to 0.28% 0.061%To 0.06%	 Using LCR Meter by Direct method

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	MECHANICAL CALIBRATION			
I.	**DIMENSION (BASIC MEASURING INSTRUMENT, GAUGE ETC.)**			
1.	Calipers[$] (Vernier / Digital /Dial) L.C.: 0.01 mm	0 to 300 mm	13 µm	Using Gauge Block / Caliper Checker by Comparison method (IS 3651)
2.	External Micrometer[$] L.C.: 0.001 mm	0 to 100 mm	2.7 µm	Using Gauge Block Set by Comparison method (IS 2967)
3.	Feeler Gauge[$]	0.01 to 2 mm	2.7 µm	Using Digital Micrometer by Comparison method (IS 3179)
II.	**PRESSURE INDICATING DEVICES**			
1.	(Pneumatic–Gauge Pressure) Digital & Dial Pressure Gauge[#]	(-) 0.90 to 0 bar	0.01% of rdg	Using Digital Vacuum Gauge & Vacuum Comparator by Comparison Method as per DKD- R - 6 -1
		0 to 10 bar	0.20 % of rdg	Using Digital Pressure Gauge & Comparator by Comparison Method as per DKD- R - 6 -1

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
2.	Hydraulic Pressure[#] (Analog / Digital Gauges)	0 to 700 bar	0.1% of rdg	Using Digital Pressure Gauge with Hydraulic Comparator by Comparison Method as per DKD- R - 6 -1
3.	Hydraulic Pressure[$] (Analog / Digital Gauges)	0.1 to 700 bar	0.076% of rdg	Using Dead weight Tester by Comparison Method as per DKD- R - 6 -1
III.	**WEIGHING SCALE AND BALANCE**			
1.	Mass-Electronic [♣] weighing balances with readability d=1mg	Maximum capacity up to 200g	1 mg	Using E2 class weights by Calibration of electronic weighing balance and comparator of Class I and coarser as per OIML R-76- 1
	d=10g	Maximum capacity up to 20kg	1.2 g	Using M1 class weights by Calibration of electronic weighing balance and comparator of Class III and coarser as per OIML R-76- 1
	d=10g	Maximum capacity up to 60kg	3 g	
	d=10g	Maximum capacity up to 100kg	12.9 g	

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
IV.	**UTM, TENSION CREEP AND TORSION TESTING MACHINE**			
1	Force Measuring ♣ System of UTM			
	Compression Tension	1kN to 10 kN 1kN to 10 kN	0.24% 0.59%	Using Load cell with indicator of Class 0.5 and Class 1 accuracy by UTM of accuracy Class I and coarser based on ISO 1828,Part1
V.	**WEIGHTS**			
1.	Mass-weights#	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g	0.11mg 0.11mg 0.11mg 0.11mg 0.11mg 0.11mg 0.11mg 0.11mg 0.11mg 0.11mg 0.11mg 0.11mg 0.11mg 0.12mg 0.12mg 0.12mg 0.16mg	Using E2 class weights and balance of readability 0.1mg by Calibration of weights of Class M1 accuracy and coarser as per OIML R-111

Sl.	Quantity Measured/ Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
VI.	**VOLUME**			
1.	Micro-pipette[$]	100µl to 200µl @ 27°C	0.21µl	Using Weighing balance of 200g capacity and 0.1mg readability and distilled water Gravimetric method based on ISO 8655 part6
2.	Glassware like pipettes, burettes, measuring cylinder, volumetric flask etc[$]	1ml to 50ml @ 27°C >50ml to100ml @ 27°C	0.1ml 0.5ml	Using Weighing balance of 200g capacity and 0.1mg readability and distilled water Gravimetric method based on IS/ISO 4787
		>2000ml to 5000ml @ 27°C	1.33ml	Using Weighing balance of 10kg capacity and 0.1g readability and distilled water Gravimetric method based on IS/ISO 4787

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
		THERMAL CALIBRATION		
I.	**TEMPERATURE**			
1.	Calibration of Contact type temp. sensor[#] (RTDs, Thermocouples, Temp. indicators with Sensors)	(-) 40°C to 100 °C 100°C to 200°C 200°C to 600°C 600°C to 1000°C	0.11°C 0.14°C 0.32°C 1.55°C	Using Standard RTD, S- Type T/C Sensor with Standard Digital Thermometer and Low Temperature Bath & Dry Block Calibrators By Comparison Method
2.	Glass Thermometer, Dial Gauge[#]	(-) 40°C to 200 °C	0.65°C	Using Standard RTD Sensor with Standard Digital Thermometer and Low Temperature Bath by Comparison Method
3.	Calibration of Furnace, Freezer, Oven ,Chamber[#]	(-) 40°C to 140°C 140°C to 250°C	1.7°C 1.7°C	Using 16-Channel Temperature Scanner with minimum 9 RTD Sensors by Multi Position Calibration
4.	Temperature Indicator with sensor of Freezer, Chamber, Bath, Oven, & Furnace[#]	(-) 50°C to 200°C 200°C to 600°C 600°C to 1000°C	0.2°C 0.48°C 1.6°C	Using Standard RTD, S-Type Sensor with Digital Thermometer by Single Position Calibration

Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
	OPTICAL CALIBRATION			
1.	**LUMINOUS FLUX**			
	Tungsten Filament Lamps [$]	15 W to 200 W (115 lm to 3400 lm)	3.0%	Using standard lamps & integrating sphere with standard spectrophoto colorimeter by ab-initio Method & Substitution method
	Compact Fluorescent Lamps (CFL) [$]	5 W to 26 W (200 lm to1600 lm)	3.0%	
	TFL	6 W to 40 W (150 lm to 4000 lm)	3.0%	
	HPMVL	80 W to 400 W (2000 lm to 30000 lm)	3.2%	
	HPSVL	70 W to 400 W (4800 lm to 60000 lm)	3.2%	
	MHL	70 W to 400 W (4800 lm to 60000 lm)	3.5%	
2.	Correlated Color Temperature [#]	1500 K to 25000 K	1.5%	Using THL lamps at 50W & integrating sphere with standard spectrophoto colorimeter by ab-initio Method & Substitution method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
3.	Color Coordinates #	x=0.005, y=0.005	1.0%	Using THL lamps at 50W & integrating sphere with standard spectrophoto colorimeter by ab-initio Method & Substitution method
4.	Illuminance #	1lux to 25000 lux	2.1%	Using Illuminance meter with Intensity Standard Lamp WI 41G Lamp by Direct Method
5.	Luminous Intensity $	1cd to 10000 cd	2.1%	Using Illuminance meter with Intensity Standard Lamp WI 41G Lamp by Direct Method
6.	Luminous Flux Of Led Lamp $	0.5 W to 23 W (20 lm to 3000 lm)	2.2%	Using C-Type mirror Goniometer with Spectroradiometer and integrating sphere with standard spectroradiometer/ Spectrophotocolorimeter and Standard light source by Obsolete & Substitution method

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Sl.	Quantity Measured / Instrument	Range/Frequency	*Calibration Measurement Capability (±)	Remarks
7.	Correlated Color Temperature Of LED Lamp #	1500 K to 25000 K	1.2%	Using C-Type mirror Goniometer with Spectroradiometer and integrating sphere with standard spectroradiometer/ Spectrophotocolorimeter and Standard light source by Obsolete & Substitution method
8.	Chromaticity Coordinates Of LED Lamp #	x=0.005, y=0.005	1.0%	Using C-Type mirror Goniometer with Spectroradiometer and integrating sphere with standard spectroradiometer/ Spectrophotocolorimeter and Standard light source by Obsolete & Substitution method

*** Measurement Capability is expressed as an uncertainty (±) 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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