

Laboratory	ICL Calibration & Testing Services, SCO-37, Ground Floor, Sector-12, Panchkula, Haryana		
Accreditation Standard	ISO/IEC 17025:2005		
Discipline	Electro-Technical Calibration	Issue Date	02.01.2015
Certificate Number	C-0381	Valid Until	19.11.2016
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Quantity Measured / Instrument	Range/ Frequency	* Calibration Measurement Capability (\pm)	Remarks	
<u>SOURCE</u>				
1. DC VOLTAGE[#]	1 mV to 320 mV	0.5 % to 0.01 %	Using Fluke MF Calibrator 9100 By Direct Method	
	0.32 V to 320 V	0.01 %		
	320 V to 1000 V	0.012 %		
2. AC VOLTAGE[#]	10 Hz to 3 kHz		Using Fluke MF Calibrator 9100 Fluke By Direct Method	
	10 mV to 32 mV	4.5 % to 0.45 %		
	32 mV to 320 mV	0.45 % to 0.06 %		
	0.32 V to 32 V	0.06 % to 0.16 %		
	32 V to 105 V	0.16 % to 0.1 %		
	40 Hz to 3 kHz			Using Fluke MF Calibrator 9100 Fluke By Direct Method
	105 V to 320 V	0.1 %		
	40 Hz to 1 kHz		Using Fluke MF Calibrator 9100 Fluke By Direct Method	
	320 V to 1000 V	0.08 %		
3. DC CURRENT[#]	1 μ A to 320 μ A	1.29 % to 0.03 %	Using MF Calibrator 9100 Fluke By Direct Method	
	0.32 mA to 32 mA	0.03 %		
	32 mA to 320 mA	0.03 % to 0.04 %		
	0.32 A to 3.2 A	0.04 % to 0.2 %		
	3.2 A to 20 A	0.2 % to 0.3 %		
	20 A to 1000 A	0.8 %		Using Current Coils By Comparison Method

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Convenor

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Program Manager

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4. AC CURRENT[#]	50 Hz to 1 kHz 32 μ A to 320 μ A	3.3 % to 0.32 %	Using Fluke MF Calibrator 9100 by Direct Method
	10 Hz to 1 kHz 0.32 mA to 3.2 mA	0.32 % to 0.25 %	
	3.2 mA to 32 mA	0.25 % to 0.1 %	
	32 mA to 320 mA	0.1 % to 0.12 %	
	0.32 A to 3.2 A	0.12 % to 0.3 %	
	3.2 A to 20 A	0.3 % to 0.5 %	
5. FREQUENCY[#]	50 Hz 20 A to 1000 A	1.23 %	Using Current Coils By Comparison Method
	20 Hz to 10 MHz	0.03 % to 0.065 %	Using Fluke MF Calibrator 9100 by Direct Method
6. RESISTANCE[#]	1 Ω to 40 Ω	2.5 % to 0.12 %	Using Fluke MF Calibrator 9100 by Direct Method
	40 Ω to 400 Ω	0.12 % to 0.04 %	
	0.4 k Ω to 400 k Ω	0.04 % to 0.03 %	
	400 k Ω to 4 M Ω	0.03 % to 0.07 %	
	4 M Ω to 400 M Ω	0.07 % to 0.12 %	
7. AC POWER[#] (1P2W) UPF @ 50 Hz	100 V to 300 V 0.1 A to 20 A 10 W to 6 kW	0.3 %	Using Fluke MF Calibrator 9100 by Direct Method
	6 kW to 60 kW	1.3 %	Using Current Coils By Comparison Method

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8. INSULATION RESISTANCE^{\$}	100 Ω to 2 G Ω (0 to 1000 V DC)	0.14 % to 0.92 %	Using Fluke MF Calibrator 9100 with IR Option by Direct Method
9. CAPACITANCE[#]	1 kHz 1 nF to 1 mF	0.1 % to 1.0 %	Using Fluke MF Calibrator 9100 by Direct Method
10. TEMPERATURE SIMULATION[#] (Digital Temperature Controller, Indicator, Transmitter, PID Controller, Data logger, RTD and Thermocouple type)	(-) 200 $^{\circ}$ C to 1200 $^{\circ}$ C	0.3 $^{\circ}$ C to 0.43 $^{\circ}$ C	Using MF Calibrator 9100 By Simulation Method
(J Type)	(-) 200 $^{\circ}$ C to 1200 $^{\circ}$ C	0.3 $^{\circ}$ C to 0.43 $^{\circ}$ C	
(K Type)	300 $^{\circ}$ C to 1700 $^{\circ}$ C	0.3 $^{\circ}$ C to 0.43 $^{\circ}$ C	
(R Type)			
(RTD)	(-) 200 $^{\circ}$ C to 800 $^{\circ}$ C	0.25 $^{\circ}$ C to 0.36 $^{\circ}$ C	

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11. OSCILLOSCOPE CALIBRATION^{\$}
DC SIGNAL LOAD

50 Ω to 1 M Ω
5 mV/div. to 20 V/div.

1 %

Using Fluke MF Calibrator
9100 by Direct Method

SINE/SQUARE SIGNAL LOAD

50 Ω to 1 M Ω
5 mV/div. to 20 V/div
pk to pk

0.85 %

TIME PERIOD

5 ns/div to 5 s/div

1.27 %

BAND WIDTH

50 kHz to 250 MHz

5.7 %

MEASURE

1. DC VOLTAGE[#]

1 mV to 100 mV
0.1 V to 1 V
1 V to 10 V
10 V to 100 V
100 V to 1000 V

2 % to 0.03 %
0.03 % to 0.09 %
0.09 % to 0.006 %
0.006 %
0.006 % to 0.007 %

Using 6½ DMM
By Direct Method

1 kV to 20 kV

3.8 %

Using Zeal HV Probe with
DMM 18S by
Comparison Method

2. DC CURRENT[#]

1 μ A to 10 mA
10 mA to 100 mA
0.1 A to 1 A
1 A to 3 A

0.99 % to 0.06 %
0.06 % to 0.16 %
0.16 % to 0.14 %
0.14 % to 0.16 %

Using 6½ DMM/ 5¾ digit
DMM (Metrahit)
By Direct Method

3 A to 30 A

0.16 % to 0.45 %

Using with Shunt & Agilent
Method by V/I Method

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3. RESISTANCE# (4 Wire & 2 Wire)	1 Ω to 100 Ω	2.0 % to 0.03 %	Using 6 ½ DMM Agilent 34401A by Direct Method
	100 Ω to 1 k Ω	0.03 % to 0.014 %	
	1 k Ω to 100 k Ω	0.014 % to 0.017 %	
	100 k Ω to 1 M Ω	0.017 % to 0.014 %	
	1 M Ω to 10 M Ω	0.014 % to 0.05 %	
	10 M Ω to 100 M Ω	0.05 % to 1 %	
4. FREQUENCY#	40 Hz to 100 kHz	0.086 % to 0.023 %	Using 6 ½ DMM Agilent 34401A by Direct Method
5. AC VOLTAGE#	50 Hz 30 mV to 100 mV	0.9 % to 0.11 %	Using 5¾ digit DMM (Metrahit) by Direct Method
	100 mV to 750 V	0.11 % to 0.097 %	
	0.75 kV to 20 kV	4.0 %	Using Zeal HV Probe with DMM 18S by Comparison Method
6. AC CURRENT#	50 Hz 0.1 A to 1 A	0.76 % to 0.17 %	Using 5¾ digit DMM (Metrahit) with Agilent Shunt & DMM by Direct/V/I method
	1 A to 3 A	0.17 % to 0.3 %	
	3 A to 30 A	0.3 % to 0.4 %	
7. CAPACITANCE#	1 kHz 200 pF to 100 μ F	0.75 % to 0.4 %	Using LCR Meter By Direct Method

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8. INDUCTANCE [#]	1 kHz 200 μ H to 10 H	0.75 % to 0.42 %	Using LCR Meter By Direct Method
9. AC RESISTANCE [#]	1 kHz 1 Ω to 100 k Ω	0.3 %	Using LCR Meter By Direct Method
10. STOP WATCH/TIMER [#] (DIGITAL/ MECHANICAL)	10 s to 60 min	0.6 s	Using Digital Stop Watch By Direct Method

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

^{\$}Only in Permanent Laboratory

[#]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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