

<b>Laboratory</b>	<b>HTA Instrumentation Pvt. Ltd., 73, Rama Chandra Agrahara, Near T. R. Mills, Chamaraipet, Bangalore, Karnataka</b>		
<b>Accreditation Standard</b>	<b>ISO/IEC 17025: 2005</b>		
<b>Discipline</b>	<b>Electro-Technical Calibration</b>	<b>Issue Date</b>	<b>24.07.2014</b>
<b>Certificate Number</b>	<b>C-0616</b>	<b>Valid Until</b>	<b>23.07.2016</b>
<b>Last Amended on</b>	<b>30.07.2014</b>	<b>Page</b>	<b>1 of 5</b>

	<b>Quantity Measured/ Instrument</b>	<b>Range / Frequency</b>	<b>*Calibration Measurement Capability (<math>\pm</math>)</b>	<b>Remarks</b>
<b>1</b>	<b><u>SOURCE</u> DC VOLTAGE<sup>s</sup></b>	1 mV to 10 mV 10 mV to 330 mV 330 mV to 1000 V	0.36% to 0.045% 0.045% to 0.013% 0.013% to 0.007%	Using Fluke 5500A MPC By Direct Method
<b>2</b>	<b>DC CURRENT<sup>s</sup></b>	0.2 mA to 1 mA 1 mA to 330 mA 330 mA to 2.2A 2.2A to 10 A  10A to 550 A	0.05% to 0.02% 0.02% to 0.05% 0.05% to 0.09% 0.09% to 0.07%  0.65% to 0.35%	Using Fluke 5500A MPC By Direct Method  Using Fluke 5500A & Current Coil
<b>3</b>	<b>AC VOLTAGE<sup>s</sup></b>	<b>45 Hz to 10 kHz</b> 1 mV to 33 mV 33 mV to 33 V  <b>45Hz to 1 kHz</b> 33 V to 750 V	2.5% to 0.15% 0.15% to 0.05% 0.05% to 0.25%  0.24% to 0.25%	Using Fluke 5500A MPC By Direct Method
<b>4</b>	<b>AC CURRENT<sup>s</sup></b>	<b>45 Hz to 1 kHz</b> 100 $\mu$ A to 3.3 mA 3.3 mA to 330 mA 330 mA to 10 A  <b>50 Hz</b> 10 A to 550 A	0.45% to 0.16% 0.16% to 0.12% 0.12% to 0.41%  0.68% to 0.36%	Using Fluke 5500A MPC By Direct Method  Using Fluke 5500A & Current Coil

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**Discipline** Electro-Technical Calibration **Issue Date** 24.07.2014  
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**Last Amended on** 30.07.2014 **Page** 2 of 5

Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability ( $\pm$ )	Remarks
5 RESISTANCE <sup>\$</sup>	2 $\Omega$ to 11 $\Omega$ 11 $\Omega$ to 32 M $\Omega$ 32 M $\Omega$ to 100 M $\Omega$	0.48% to 0.17% 0.17% to 0.13% 0.13% to 0.59%	Using Fluke 5500A MPC By Direct Method
6 CAPACITANCE <sup>\$</sup>	<b>1kHz</b> 350 pF to 1 nF 1 nF to 30 $\mu$ F 30 $\mu$ F to 300 $\mu$ F	3.9% to 1.8% 1.8% to 0.65% 0.65% to 0.95%	Using Fluke 5500A MPC By Direct Method
7 FREQUENCY <sup>\$</sup>	45 Hz to 1 kHz 1 kHz to 1 MHz	1.7% to 0.07% 0.07% to 0.06%	Using Fluke 5500A MPC By Direct Method
8. TEMPERATURE SIMULATION <sup>\$</sup>			Using Fluke 5500A MPC By Direct Method
RTD (PT 100)	-200°C to 600°C	0.09°C to 0.17°C	
TC:			
K TYPE	-200°C to 1370°C	0.47°C	
J TYPE	-200°C to 900°C	0.31°C	
R TYPE	0°C to 1700°C	0.66°C	
S TYPE	0°C to 1700°C	0.57°C	
T TYPE	-200°C to 400 °C	0.28°C	
N TYPE	0°C to 1300 °C	0.32°C	

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	<b>Quantity Measured/ Instrument</b>	<b>Range / Frequency</b>	<b>*Calibration Measurement Capability (<math>\pm</math>)</b>	<b>Remarks</b>
9.	<b>AC POWER<sup>s</sup> (SINGLE PHASE, UPF, 50HZ)</b>	12 W to 2400 W (120V/0.1A to 240V/10A)	0.18% to 0.22%	Using Fluke 5500A MPC By Direct Method
10	<b>DC VOLTAGE*</b>	1 mV to 100 mV 100 mV to 10 V	0.1% to 0.06% 0.06%	Using Fluke 725 Process Calibrator By Direct Method
11.	<b>DC CURRENT*</b>	0.1 mA to 24 mA	7.4% to 0.04%	Using Fluke 725 Process Calibrator By Direct Method
12.	<b>RESISTANCE*</b>	15 $\Omega$ to 500 $\Omega$ 500 $\Omega$ to 3.2 k $\Omega$	1.3% to 0.2% 0.2% to 0.04%	Using Fluke 725 Process Calibrator By Direct Method
13.	<b>FREQUENCY*</b>	45 Hz to 10 kHz	1.5% to 0.3%	Using Fluke 725 Process Calibrator By Direct Method
14.	<b>TEMPERATURE SIMULATION RTD (PT 100) *</b>	-200°C to 800°C	0.72°C	Using Fluke 725 Process Calibrator By Direct Method
	<b>TC: K TYPE</b>	-200°C to 1350°C	1.52°C	
	<b>J TYPE</b>	-200°C to 1200°C	1.30°C	
	<b>R TYPE</b>	500°C to 1750°C	2.26°C	

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	<b>Quantity Measured/ Instrument</b>	<b>Range / Frequency</b>	<b>*Calibration Measurement Capability (<math>\pm</math>)</b>	<b>Remarks</b>
	<b>S TYPE</b>	500°C to 1750°C	2.27°C	
	<b>T TYPE</b>	-200°C to 400 °C	1.57°C	
	<b>N TYPE</b>	-200°C to 1300 °C	1.89°C	
	<b><u>MEASURE</u></b>			
<b>1.</b>	<b>DC VOLTAGE<sup>\$</sup></b>	100 mV to 10 V 10 V to 1000 V	0.01% to 0.041% 0.041% to 0.007%	Using Fluke 8845A DMM By Direct Method
<b>2.</b>	<b>DC CURRENT<sup>\$</sup></b>	100 $\mu$ A to 1 A 1 A to 10 A	0.09% to 0.08% 0.08% to 0.25%	Using Fluke 8845A DMM By Direct Method
<b>3.</b>	<b>AC VOLTAGE<sup>\$</sup></b>	<b>45 Hz to 1 kHz</b> 100 mV to 10 V 10 V to 750 V	0.2 % 0.2% to 0.15%	Using Fluke 8845A DMM By Direct Method
<b>4.</b>	<b>AC CURRENT<sup>\$</sup></b>	<b>45 Hz to 1 kHz</b> 10 mA to 1 A 1 A to 10 A	0.24% to 0.17% 0.17% to 0.26%	Using Fluke 8845A DMM By Direct Method
<b>5.</b>	<b>RESISTANCE<sup>\$</sup></b>	100 $\Omega$ to 1 M $\Omega$ 1 M $\Omega$ to 10 M $\Omega$ 10 M $\Omega$ to 100 M $\Omega$	0.01% 0.01% to 0.05% 0.05% to 1.0%	Using Fluke 8845A DMM By Direct Method
<b>6.</b>	<b>FREQUENCY<sup>\$</sup></b>	10 Hz to 100 kHz	0.06% to 0.01%	Using Fluke 8845A DMM By Direct Method
<b>7.</b>	<b>DC VOLTAGE<sup>*</sup></b>	1 mV to 100 mV 100 mV to 10 V 10 V to 1000 V	3.26% to 0.01% 0.01% 0.01%	Using UNI-T UT-805 DMM By Direct Method

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<b>8.</b>	<b>DC CURRENT*</b>	500 $\mu$ A to 100 mA 100 mA to 1 A 1 A to 10 A	0.34% to 0.05% 0.05% to 1.75% 1.75% to 1.0%	Using UNI-T UT-805 DMM By Direct Method
<b>9.</b>	<b>AC VOLTAGE*</b>	<b>45 Hz to 1 kHz</b> 10 mV to 1 V 1 V to 750 V	2.14% to 0.39% 0.039% to 0.62%	Using UNI-T UT-805 DMM By Direct Method
<b>10.</b>	<b>AC CURRENT*</b>	<b>45 Hz to 1 kHz</b> 1 mA to 10 mA 10 mA to 1 A 1 A to 10 A	0.61% to 1.54% 1.54% to 6.05% 6.05% to 2.57%	Using UNI-T UT-805 DMM By Direct Method
<b>11.</b>	<b>RESISTANCE*</b>	10 $\Omega$ to 100 $\Omega$ 100 $\Omega$ to 1 M $\Omega$ 1 M $\Omega$ to 20 M $\Omega$	0.15% to 0.02% 0.02% to 0.04% 0.04% 0.13%	Using UNI-T UT-805 DMM By Direct Method
<b>12.</b>	<b>FREQUENCY*</b>	100 Hz to 2 MHz	3.76% to 0.53%	Using UNI-T UT-805 DMM By Direct Method
<b>13.</b>	<b>TIMER<sup>\$</sup></b>	60 Sec to 3600 Sec	1.086 Sec	Using Digital Stop Watch

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

<sup>\$</sup>Only in Permanent Laboratory

\*Only for Site Calibration

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