Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

0616

Accredited to ISO/IEC 17025:2017

Yadav Measurements Private Limited

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Plot No. F-373 - 375
Riico Bhamashah Industrial Area
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Calibration performed by the Organisation at the locations specified

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details	Activity	Location code
Address Post Box 169 Plot No. F-373 – 375 Riico Bhamashah Industrial Area Kaladwas Udaipur 313 003 India **Local contact** Mr B M Vyas Tel: +91 294 265 0127 Fax: +91 294 265 0129 E-Mail: yadav.measurements@ymllabs.com	Calibration: Electrical Flow	P

Site activities performed away from the locations listed above:

Location details	Activity	Location code
The customers' site or premises must be suitable for the nature of the particular calibrations undertaken and will be the subject of contract review arrangements between the laboratory and the customer	Calibration: Electrical	S

DETAIL OF ACCREDITATION

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
Values and uncertainties listed below are applicable for the calibration of both measurement instruments and for instruments with an output. the method used is by direct comparison unless otherwise stated in the remarks column.				
ELECTRICAL MEASUREMENTS				
DC RESISTANCE	0 Ω to 2 Ω 2 Ω to 20Ω 20 Ω to 20 kΩ 20 kΩ to 200 kΩ 200 kΩ to 2 MΩ 2 MΩ to 20 MΩ 20 MΩ to 200 MΩ 200 MΩ to 1 GΩ	0.0047 mΩ to 0.0022 % 0.0019 % to 0.0012 % 0.0012 % to 0.0010 % 0.0013 % to 0.0010 % 0.0013 % to 0.0014 % 0.0082 % to 0.0032 % 0.0072 % to 0.021 % 0.76 % to 0.30 %		P
DC VOLTAGE	0 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 200 V to 1000 V	0.13 µV to 0.00076 % 0.00065 % to 0.00044 % 0.00064 % to 0.00044 % 0.00088 % to 0.00068 % 0.00095 % to 0.00072 %		P
DC CURRENT	0 µA to 200 µA 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A 2 A to 10 A 10 A to 20 A	0.00048 µA to 0.0018 % 0.0038 % to 0.0018 % 0.0040 % to 0.0019 % 0.011 % to 0.0062 % 0.031 % to 0.023 % 0.070 % to 0.051 % 0.58 %		P
AC VOLTAGE	*20 Hz to 1 kHz* 1 mV to 200 mV 200 mV to 200 V 200 V to 1000 V *1 kHz to 300 kHz* 500 mV to 10 V *40 Hz to 70 Hz* 10 V to 480 V *50 Hz* 480 V to 11 kV	 0.48 % to 0.019 % 0.025 % to 0.015 % 0.025 % to 0.015 % 0.81 % to 0.58 % 0.011 % 0.25 %		P
AC CURRENT	*70 Hz to 1 kHz* 1 mA to 10 mA *40 Hz to 70 Hz* 1 mA to 10 mA 10 mA to 50 mA 50 mA to 100 A 100 A to 120 A	 0.040 % to 0.031 % 0.039 % to 0.031 % 0.013 % 0.007 % 0.021 %		P

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
AC CURRENT continued	*40 Hz to 1 kHz* 200 µA to 2 mA 2 mA to 20 mA 20 mA to 200 mA 200 mA to 2 A 2 A to 10 A	 0.070 % to 0.058 % 0.0040 % to 0.0019 % 0.15 % to 0.046 % 0.19 % to 0.090 % 0.21 % to 0.12 %		
AC POWER/ENERGY				P
Frequency 50 Hz				
Voltage range 120 V to 480 V Single and three phase active and reactive power and energy cos or sin *Φ = 0.5 to 1, capacitive and inductive*				
	12 W/Var to 172.8 W/Var	0.0029 % to 0.0045 %	Current range 0.2 A to 120 A	
Single and three phase apparent power and energy				
	24 VA to 172.8 VA	0.0029 % to 0.0045 %		
Frequency range 46 Hz to 65 Hz				
Voltage range 30 V to 320 V Single and three phase active and reactive power and energy cos or sin *Φ = 0.5 to 1, capacitive and inductive*				
	0.075 W/Var to 48 W/Var	0.0032 % to 0.0054 %	Current range 0.005 A to 0.05 A	
	0.75 W/Var to 9.6 kW/kVar	0.0023 % to 0.0029 %	Current range 0.05 A to 10 A	
	150 W/Var to 96 kW/kVar	0.0050 % to 0.0093 %	Current range 10 A to 100 A	
	1.5 kW/Var to 115.2 kW/kVar	0.0073 % to 0.014 %	Current range 100 A to 120 A	
Single and three phase apparent power and energy				
	0.15 VA to 48 VA 2 VA to 9.6 kVA 400 VA to 96 kVA 4 kVA to 115.2 kVA	0.0045 % to 0.0076 % 0.0033 % to 0.0041 % 0.0071 % to 0.013 % 0.00.3 % to 0.020 %		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
Frequency range 40 Hz to 70 Hz Voltage range 30 V to 320 V Single and three phase active and reactive power and energy cos or sin *Φ = 0.5 to 1, capacitive and inductive*				
	0.0004 W/Var to 4.8 W/Var	0.041 %	Current range 0.001 A to 0.01 A	
	0.04 W/Var to 24 kW/kVar	0.0080 %	Current range 0.01 A to 5 A	
	0.20 W/Var to 48 kW/kVar	0.0070 %	Current range 0.05 A to 100 A	
	0.40 kW/Var to 57.6 kW/kVar	0.014 %	Current range 100 A to 120 A	
Single and three phase apparent power and energy				
	0.04 VA to 9.6 VA 0.4 VA to 48 kVA 2.0 VA to 96 kVA 4 kVA to 115.2 kVA	0.058 % 0.013 % 0.013 % 0.021 %		
AC POWER FACTOR	0 to unity, inductive or capacitive	0.0050		P
FREQUENCY	10 Hz to 225 MHz	2.0×10^{-5} to 1.0×10^{-5}		P
Calibration of specific test equipment				
EFT/B Generators				P
Peak voltage into 50 Ω & 1 KΩ Rise and fall time Burst period and period Frequency	0 V to 7 kV 5 ns to 50 ns 15 ms to 300 ms 2.5 kHz, 5 kHz, 100 kHz	3.0 % 5.0 % 5.0 % 5.0 %		
Surge generator				P
Rise and fall time Open circuit Voltage Short circuit Current Phase angle	0.5 µs to 700 µs 0.5 kV to 15 kV 0.2 kA to 7.5 kA 0° to 360°	3.0 % 5.0 % 5.0 % 1.70°		
Damped oscillatory generator				P
Voltage Rise time Frequency Repetition rate	0 V to 4 kV 1.0 ns to 1.0 s 100 kHz to 1 MHz 1.0 µs to 1.0 s	5.0 % 3.5 % 3.0 % 3.0 %		

Measured Quantity Instrument or Gauge	Range	Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty (k = 2)	Remarks	Location Code
High frequency field uniformity calibration in GTEM/Anechoic chamber	GTEM (80 MHz to 1000 MHz) 2 V/m 3 V/m 10 V/m 30 V/m GTEM (1000 MHz to 6000 MHz) 2 V/m 3 V/m 10 V/m 30 V/m	 0.23 V/m 0.69 V/m 2.3 V/m 6.9 V/m 0.30 V/m 0.96 V/m 3.0 V/m 9.0 V/m		S
Three phase voltage dips and interruptions calibration				P
Phase angle Pulse rise/fall time Voltage at no load Inrush current Time interval Overshoot & undershoot	(0 to 360 °) (0.1 to 5) µs Up to 240 VAC (P-N) & 415 VAC (P-P) 30 A 6 ms to 5 min	1.70 ° 5.0 % 1.0 % 3.0 % 3.0 % 5.0 %		
FLOW MEASUREMENTS			Calibration of flow meters using volumetric and reference meter methods	P
Gas quantity passed	0.001 m^3 to 0.01 m^3 0.01 m^3 to 0.08 m^3 At flow rates of: 0.016 m^3/hour to 6.6 m^3/hour	0.31 % 0.13 %	Calibration medium: Air and Methane	
Gas flow-rate	0.016 m^3/hour to 6.6 m^3/hour At quantities passed of 0.001 m^3 to 0.01 m^3 0.01 m^3 to 0.08 m^3	 0.31 % 0.16 %		
Gas flow-rate	0.018 kg/hour to 7.5 kg/hour At quantities passed of 0.0011 kg to 0.011 kg 0.011 kg to 0.090 kg	 0.32 % 0.20 %		

END

Appendix - Calibration and Measurement Capabilities

Introduction

The definitive statement of the accreditation status of a calibration laboratory is the Accreditation Certificate and the associated Schedule of Accreditation. This Schedule of Accreditation is a critical document, as it defines the measurement capabilities, ranges and boundaries of the calibration activities for which the organisation holds accreditation.

Calibration and Measurement Capabilities (CMCs)

The capabilities provided by accredited calibration laboratories are described by the Calibration and Measurement Capability (CMC), which expresses the lowest uncertainty of measurement that can be achieved during a calibration. If a particular device under calibration itself contributes significantly to the uncertainty (for example, if it has limited resolution or exhibits significant non-repeatability) then the uncertainty quoted on a calibration certificate will be increased to account for such factors. The CIPM-ILAC definition of the CMC is as follows:

A CMC is a calibration and measurement capability available to customers under normal conditions:
(a) as published in the BIPM key comparison database (KCDB) of the CIPM MRA; or
(b) as described in the laboratory's scope of accreditation granted by a signatory to the ILAC Arrangement.

The CMC is normally used to describe the uncertainty that appears in an accredited calibration laboratory's schedule of accreditation and is the uncertainty for which the laboratory has been accredited using the procedure that was the subject of assessment. The CMC is calculated according to the procedures given in M3003 and is normally stated as an expanded uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of $k = 2$. An accredited laboratory is not permitted to quote an uncertainty that is smaller than the published CMC in certificates issued under its accreditation.

The CMC may be described using various methods in the Schedule of Accreditation:

As a single value that is valid throughout the range.
As an explicit function of the measurand or of a parameter (see below).
As a range of values. The range is stated such that the customer can make a reasonable estimate of the likely uncertainty at any point within the range.
As a matrix or table where the CMCs depend on the values of the measurand and a further quantity.
In graphical form, providing there is sufficient resolution on each axis to obtain at least two significant figures for the CMC.

Expression of CMCs - symbols and units

In general, only units of the SI and those units recognised for use with the SI are used to express the values of quantities and of the associated CMCs. Nevertheless, other commonly used units may be used where considered appropriate for the intended audience. For example, the term "ppm" (part per million) is frequently used by manufacturers of test and measurement equipment to specify the performance of their products. Terms like this may be used in Schedules of Accreditation where they are in common use and understood by the users of such equipment, providing their use does not introduce any ambiguity in the capability that is being described.

When the CMC is expressed as an explicit function of the measurand or of a parameter, this often comprises a relative term (e.g., percentage) and an absolute term, i.e. one expressed in the same units as those of the measurand. This form of expression is used to describe the capability that can be achieved over a range of values. Some examples are shown below. It should be noted that these expressions are *not* mathematical formulae but are instead written in a commonly used shorthand for expressing uncertainties - therefore, for purposes of clarity, an indication of how they are to be interpreted is also provided below.

DC voltage, 100 mV to 1 V: 0.0025 % + 5.0 µV

Over the range 100 mV to 1 V, the CMC is 0.0025 %·V + 5.0 µV, where V is the measured voltage.

Hydraulic pressure, 0.5 MPa to 140 MPa: 0.0036 % + 0.12 ppm/MPa + 4.0 Pa

Over the range 0.5 MPa to 140 MPa, the CMC is $0.0036\ \%\cdot p + (0.12\cdot 10^{-6}\cdot p\cdot 10^{-6}) + 4.0$ Pa, where p is the measured pressure in Pa.

It should be noted that the percentage symbol (%) simply represents the number 0.01. In cases where the CMC is stated only as a percentage, this is to be interpreted as meaning percentage of the measured value or indication.

Thus, for example, a CMC of 1.5 % means $1.5 \cdot 0.01 \cdot i$, where i is the instrument indication.