



Certificate of Accreditation

IAJapan hereby accredits the following conformity assessment body as a calibration laboratory of Japan Calibration Service System (JCSS).

Accreditation Identification: JCSS 0049 Calibration

Name of Conformity Assessment Body:

Japan Electric Meters Inspection Corporation Chubu

Name of Legal Entity:

Japan Electric Meters Inspection Corporation

Location of Conformity Assessment Body:

5-7, 3-chome, Kibuki-cho, Kasugai-shi, Aichi 487-0014,
Japan

Scope of Accreditation: Time & Frequency & Rotational speed,
Electricity (Direct Current & Low Frequency),
Temperature (as attached)

Accreditation Requirement:

ISO/IEC 17025: 2017

Accreditation Requirements in the Section 6 of
Accreditation Scheme (JCSS) 2nd Edition

Effective Date of Accreditation: 2019-08-01

Expiry Date of Accreditation: 2023-07-31

(Date of Initial Accreditation: 1995-06-21)

YAMAMOTO Kenichi

Chief Executive, IAJapan

National Institute of Technology and Evaluation

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- International Accreditation Japan (IAJapan) is a laboratory accreditation body which has signed MRAs of ILAC (International Laboratory Accreditation Cooperation) and APAC (Asia Pacific Accreditation Cooperation).
 - MRA requirements are, in addition to relevant international standards and guides, requirements for participation in proficiency testing programs, surveillance and reassessment, and the policy for the traceability of measurement for MRA purpose.
 - This laboratory fulfills ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation means this laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

General Field of Calibration : Time & Frequency & Rotational speed

Date of Initial Accreditation of the Field : 2018-06-21

Permanent Laboratory/On-site Calibration : Permanent Laboratory

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Time & Frequency Counter, etc.	Frequency Generator	From 1 Hz up to 10 MHz		2.4×10^{-7}
	Frequency Counter	From 1 Hz up to 10 MHz		2.4×10^{-7}
	Time-Interval Source *1	From 1 s up to 60 s		0.01 s
	Time-Interval Measuring Equipment	Calibration by Frequency Measurement (rate) *2	Up to 9.999 s	0.05 s
		Calibration by Time-Interval Measurement	From 10 ms up to 100 s	4.0×10^{-6}
			More than 100 s up to 3 600 s	0.10 s
	Tachometer	From 60 rpm up to 100 000 rpm		4 ppm + 0.02 rpm

*1 : Limited to Withstand Voltage tester or Insulation tester .

*2 : Limited to the frequency of Crystal oscillator is 32.768 kHz.

Note: In the CMC column, the values include sources of uncertainty attributed to a unit under test.

#All Calibration Procedures are in-house procedures developed by this laboratory.

Permanent Laboratory/On-site Calibration : On-site Calibration

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Time & Frequency Counter, etc.	Frequency Generator	From 1 Hz up to 10 MHz		4.0×10^{-6}
	Frequency Counter	From 1 Hz up to 10 MHz		4.0×10^{-6}
	Time-Interval Source *1	From 1 s up to 60 s		0.01 s
	Time-Interval Measuring Equipment	Calibration by Time-Interval Measurement	From 10 ms up to 100 s	4.0×10^{-6}
			More than 100 s up to 3 600 s	0.10 s
	Tachometer	From 60 rpm up to 100 000 rpm		4 ppm + 0.02 rpm

*1 : Limited to Withstand Voltage tester or Insulation tester.

Note: In the CMC column, the values include sources of uncertainty attributed to a unit under test.

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General Field of Calibration : Electricity (Direct Current & Low Frequency)

Date of Initial Accreditation of the Field : 1995-06-21

Permanent Laboratory/On-site Calibration : Permanent Laboratory

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range	CMC (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	DC Resistor	0.001 Ω	0.000 03 m Ω
		0.01 Ω	0.000 2 m Ω
		More than 0.01 Ω less than 0.1 Ω	0.001 Ω
		0.1 Ω	0.001 0 m Ω
		More than 0.1 Ω less than 1 Ω	0.10 m Ω
		1 Ω	0.005 m Ω
		More than 1 Ω less than 10 Ω	0.000 20 Ω
		1.9 Ω	0.000 10 Ω
		10 Ω	0.05 m Ω
		More than 10 Ω less than 100 Ω	0.002 0 Ω
		19 Ω	0.001 0 Ω
		100 Ω	0.40 m Ω
		More than 100 Ω less than 1 k Ω	0.020 Ω
		190 Ω	0.010 Ω
		1 k Ω	4.0 m Ω
		More than 1 k Ω less than 10 k Ω	0.20 Ω
		1.9 k Ω	0.10 Ω
		10 k Ω	0.040 Ω
		More than 10 k Ω less than 100 k Ω	2.0 Ω
		19 k Ω	1.0 Ω
		100 k Ω	0.40 Ω
		More than 100 k Ω less than 1 M Ω	0.020 k Ω
		190 k Ω	0.010 k Ω
		1 M Ω	0.005 0 k Ω
		More than 1 M Ω up to 10 M Ω	0.000 3 M Ω
		1.9 M Ω	0.000 2 M Ω
		More than 10 M Ω up to 11 M Ω	0.002 M Ω
		More than 11 M Ω up to 60 M Ω	0.1 %
		19 M Ω	0.006 M Ω
		More than 60 M Ω less than 100 M Ω	0.060 M Ω
		100 M Ω	0.005 M Ω
		More than 100 M Ω less than 1 G Ω	0.1 %
		1 G Ω	1.0 M Ω
		More than 1 G Ω up to 2 G Ω	4 M Ω
		More than 2 G Ω up to 3 G Ω	6 M Ω

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range	CMC (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	DC Resistance Measuring Equipment	0.001 Ω	0.10 $\mu\Omega$
		0.01 Ω	0.50 $\mu\Omega$
		0.1 Ω	2.0 $\mu\Omega$
		1 Ω	7.0 $\mu\Omega$
		More than 1 Ω less than 10 Ω	0.20 m Ω
		10 Ω	40 $\mu\Omega$
		More than 10 Ω less than 100 Ω	1.0 m Ω
		100 Ω	0.40 m Ω
		More than 100 Ω up to 400 Ω	4.0 m Ω
		More than 400 Ω less than 1 k Ω	10 m Ω
		1 k Ω	4.0 m Ω
		More than 1 k Ω less than 10 k Ω	0.10 Ω
		10 k Ω	40 m Ω
		More than 10 k Ω up to 19 k Ω	1.0 Ω
		More than 19 k Ω less than 100 k Ω	2.0 Ω
		100 k Ω	0.40 Ω
		More than 100 k Ω up to 190 k Ω	10 Ω
		More than 190 k Ω less than 1 M Ω	20 Ω
		1 M Ω	5.0 Ω
		More than 1 M Ω up to 1.9 M Ω	0.4 k Ω
		More than 1.9 M Ω up to 10 M Ω	0.5 k Ω
		More than 10 M Ω less than 11 M Ω	2 k Ω
		From 11 M Ω up to 19 M Ω	10 k Ω
		More than 19 M Ω less than 33 M Ω	20 k Ω
		From 33 M Ω less than 100 M Ω	30 k Ω
		100 M Ω	5 k Ω
		More than 100 M Ω less than 110 M Ω	0.1 M Ω
		From 110 M Ω less than 330 M Ω	2.0 M Ω
		From 330 M Ω less than 500 M Ω	1 %
		From 500 M Ω less than 1 G Ω	5.0 M Ω
		1 G Ω	1.0 M Ω
		More than 1 G Ω up to 2 G Ω	1 %
	DC Voltage Source	From 0 V up to 100 mV	4.5 ppm + 0.7 μ V
		More than 0.1 V up to 1 V	5.5 ppm + 0.6 μ V
		More than 1 V up to 10 V	5.5 ppm + 2 μ V
		More than 10 V up to 100 V	7.5 ppm + 0.05 mV
		More than 100 V up to 600 V	13 ppm
		More than 600 V up to 1000 V	34 ppm – 12.6 mV
		More than 1 kV up to 1.9 kV	0.004 0 kV
		More than 1.9 kV up to 10 kV	0.020 kV

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	DC Voltage Measuring Equipment	From 0 V up to 1 V		5.5 ppm + 0.5 μ V
		More than 1 V up to 10 V		5.5 ppm + 2 μ V
		More than 10 V up to 100 V		7.5 ppm + 0.05 mV
		More than 100 V up to 600 V		13 ppm
		More than 600 V up to 1000 V		34 ppm – 12.6 mV
		More than 1 kV up to 10 kV		0.09 % + 1 V
		More than 10 kV up to 50 kV		0.12 % + 2 V
	Direct Current Source	From 0 μ A up to 100 μ A		10 ppm + 0.001 0 μ A
		More than 0.1 mA up to 1 mA		10 ppm + 0.015 μ A
		More than 1 mA up to 10 mA		10 ppm + 0.15 μ A
		More than 10 mA up to 100 mA		10 ppm + 2.0 μ A
		More than 0.1 A up to 1 A		30 ppm + 0.010 mA
		More than 1 A up to 30 A		35 ppm + 0.15 mA
	Direct Current Measuring Equipment	From 0 μ A up to 100 μ A		10 ppm + 0.001 0 μ A
		More than 0.1 mA up to 1 mA		10 ppm + 0.015 μ A
		More than 1 mA up to 10 mA		10 ppm + 0.15 μ A
		More than 10 mA up to 100 mA		10 ppm + 2.0 μ A
		More than 0.1 A up to 1 A		30 ppm + 0.010 mA
		More than 1 A up to 30 A		35 ppm + 0.15 mA
	Direct Current Standard Shunt	0.1 Ω	10 A, 8 A, 6 A, 4 A, 2 A, 1 A	0.000 004 0 Ω
		0.01 Ω	100 A, 60 A, 50 A, 40 A, 30 A, 20 A, 10 A	0.000 000 80 Ω
	AC Voltage Source	From 10 mV up to 20 mV	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz	0.005 mV
		More than 20 mV up to 60 mV	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz	0.025 %
		More than 60 mV up to 200 mV	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz	0.015 %
		More than 200 mV up to 600 mV	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz	95 ppm
		From 300 mV up to 600 mV	10 kHz	95 ppm
		300 mV, 600 mV	100 kHz	0.015 %
		More than 600 mV up to 200 V	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz, 10 kHz	50 ppm
		1 V, 2 V, 6 V, 10 V, 20 V, 60 V, 100 V, 200 V	100 kHz	0.010 %
		600 V	100 kHz	0.040 %
		More than 200 V up to 1000 V	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz, 10 kHz	60 ppm
		More than 1 kV up to 1.9 kV	50 Hz, 60 Hz	0.004 0 kV
		More than 1.9 kV up to 10 kV	50 Hz, 60 Hz	0.020 kV

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	AC Voltage Measuring Equipment	From 10 mV up to 20 mV	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz	0.005 mV
		More than 20 mV up to 60 mV	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz	0.025 %
		More than 60 mV up to 200 mV	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz	0.015 %
		More than 200 mV up to 600 mV	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz	95 ppm
		From 300 mV up to 600 mV	10 kHz	95 ppm
		300 mV, 600 mV	100 kHz	0.015 %
		More than 600 mV up to 200 V	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz, 10 kHz	50 ppm
		1 V, 2 V, 6 V, 10 V, 20 V, 60 V, 100 V, 200 V	100 kHz	0.010 %
		600 V	100 kHz	0.040 %
		More than 200 V up to 1000 V	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz, 10 kHz	60 ppm
		More than 1 kV up to 2 kV	50 Hz, 60 Hz	0.07 % + 0.8 V
		More than 2 kV up to 10 kV	50 Hz, 60 Hz	0.07 % + 4 V
		More than 10 kV up to 30 kV	50 Hz, 60 Hz	0.14 % + 8 V

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	Alternating Current Source	From 0.001 A up to 0.006 A	50 Hz, 60 Hz	0.025 % + 0.1 μ A
		More than 0.006 A less than 0.01 A	50 Hz, 60 Hz	0.025 % + 0.5 μ A
		From 0.01 A up to 0.02 A	50 Hz, 60 Hz	0.015 % + 0.3 μ A
		More than 0.02 A up to 0.2 A	50 Hz, 60 Hz	0.015 % + 3 μ A
		More than 0.2 A up to 2 A	50 Hz, 60 Hz	0.028 % + 0.03 mA
		More than 2 A up to 10 A	50 Hz, 60 Hz	0.038 % + 0.2 mA
		More than 10 A up to 20 A	50 Hz, 60 Hz	0.045 % + 0.5 mA
		More than 20 A up to 60 A	50 Hz, 60 Hz	0.045 % + 1 mA
	Alternating Current Measuring Equipment	From 0.001 A less than 0.01 A	50 Hz, 60 Hz	0.030 % + 0.5 μ A
		From 0.01 A up to 0.02 A	50 Hz, 60 Hz	0.015 % + 0.3 μ A
		More than 0.02 A up to 0.2 A	50 Hz, 60 Hz	0.015 % + 3 μ A
		More than 0.2 A up to 2 A	50 Hz, 60 Hz	0.028 % + 0.03 mA
		More than 2 A up to 10 A	50 Hz, 60 Hz	0.038 % + 0.2 mA
		More than 10 A up to 20 A	50 Hz, 60 Hz	0.15 %
		More than 20 A up to 60 A	50 Hz, 60 Hz	0.18 % + 0.01 A
		More than 60 A up to 100 A	50 Hz, 60 Hz	0.2 %
		More than 100 A less than 150 A	50 Hz, 60 Hz	0.7 % + 0.3 A
		From 150 A up to 500 A	50 Hz, 60 Hz	0.7 % + 1 A

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	Temperature Indicator	Thermocouple B, with Reference Junction	From 291 μ V up to 13820 μ V (From 250 °C up to 1820 °C)	4 μ V
		Thermocouple R, with Reference Junction	From -226 μ V up to 21103 μ V (From -50 °C up to 1768.1 °C)	4 μ V
		Thermocouple S, with Reference Junction	From -236 μ V up to 18694 μ V (From -50 °C up to 1768.1 °C)	4 μ V
		Thermocouple N, with Reference Junction	From -3990 μ V up to 47513 μ V (From -200 °C up to 1300 °C)	20 μ V
		Thermocouple K, with Reference Junction	From -5891 μ V up to 54886 μ V (From -200 °C up to 1372 °C)	21 μ V
		Thermocouple E, with Reference Junction	From -8825 μ V up to 76373 μ V (From -200 °C up to 1000 °C)	25 μ V
		Thermocouple J, with Reference Junction	From -8095 μ V up to 69553 μ V (From -210 °C up to 1200 °C)	23 μ V
		Thermocouple T, with Reference Junction	From -5603 μ V up to 20872 μ V (From -200 °C up to 400 °C)	22 μ V
		Thermocouple B, without Reference Junction	From 291 μ V up to 13820 μ V (From 250 °C up to 1820 °C)	2 μ V
		Thermocouple R, without Reference Junction	From -226 μ V up to 21103 μ V (From -50 °C up to 1768.1 °C)	2 μ V
		Thermocouple S, without Reference Junction	From -236 μ V up to 18694 μ V (From -50 °C up to 1768.1 °C)	2 μ V
		Thermocouple N, without Reference Junction	From -3990 μ V up to 47513 μ V (From -200 °C up to 1300 °C)	4 μ V
		Thermocouple K, without Reference Junction	From -5891 μ V up to 54886 μ V (From -200 °C up to 1372 °C)	4 μ V
		Thermocouple E, without Reference Junction	From -8825 μ V up to 76373 μ V (From -200 °C up to 1000 °C)	6 μ V
		Thermocouple J, without Reference Junction	From -8095 μ V up to 69553 μ V (From -210 °C up to 1200 °C)	5 μ V
		Thermocouple T, without Reference Junction	From -5603 μ V up to 20872 μ V (From -200 °C up to 400 °C)	5 μ V
		Resistance thermometer Sensor : Pt100	From 18.52 Ω up to 390.48 Ω (From -200 °C up to 850 °C)	0.010 Ω
		Resistance thermometer Sensor : JPt100	From 17.14 Ω up to 317.28 Ω (From -200 °C up to 600 °C)	0.010 Ω

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	Temperature Indicator calibration equipment	Thermocouple B, with Reference Junction	From 291 μV up to 13820 μV (From 250 $^{\circ}\text{C}$ up to 1820 $^{\circ}\text{C}$)	4 μV
		Thermocouple R, with Reference Junction	From -226 μV up to 21103 μV (From -50 $^{\circ}\text{C}$ up to 1768.1 $^{\circ}\text{C}$)	4 μV
		Thermocouple S, with Reference Junction	From -236 μV up to 18694 μV (From -50 $^{\circ}\text{C}$ up to 1768.1 $^{\circ}\text{C}$)	4 μV
		Thermocouple N, with Reference Junction	From -3990 μV up to 47513 μV (From -200 $^{\circ}\text{C}$ up to 1300 $^{\circ}\text{C}$)	20 μV
		Thermocouple K, with Reference Junction	From -5891 μV up to 54886 μV (From -200 $^{\circ}\text{C}$ up to 1372 $^{\circ}\text{C}$)	21 μV
		Thermocouple E, with Reference Junction	From -8825 μV up to 76373 μV (From -200 $^{\circ}\text{C}$ up to 1000 $^{\circ}\text{C}$)	25 μV
		Thermocouple J, with Reference Junction	From -8095 μV up to 69553 μV (From -210 $^{\circ}\text{C}$ up to 1200 $^{\circ}\text{C}$)	23 μV
		Thermocouple T, with Reference Junction	From -5603 μV up to 20872 μV (From -200 $^{\circ}\text{C}$ up to 400 $^{\circ}\text{C}$)	22 μV
		Thermocouple B, without Reference Junction	From 291 μV up to 13820 μV (From 250 $^{\circ}\text{C}$ up to 1820 $^{\circ}\text{C}$)	2 μV
		Thermocouple R, without Reference Junction	From -226 μV up to 21103 μV (From -50 $^{\circ}\text{C}$ up to 1768.1 $^{\circ}\text{C}$)	2 μV
		Thermocouple S, without Reference Junction	From -236 μV up to 18694 μV (From -50 $^{\circ}\text{C}$ up to 1768.1 $^{\circ}\text{C}$)	2 μV
		Thermocouple N, without Reference Junction	From -3990 μV up to 47513 μV (From -200 $^{\circ}\text{C}$ up to 1300 $^{\circ}\text{C}$)	2 μV
		Thermocouple K, without Reference Junction	From -5891 μV up to 54886 μV (From -200 $^{\circ}\text{C}$ up to 1372 $^{\circ}\text{C}$)	2 μV
		Thermocouple E, without Reference Junction	From -8825 μV up to 76373 μV (From -200 $^{\circ}\text{C}$ up to 1000 $^{\circ}\text{C}$)	2 μV
		Thermocouple J, without Reference Junction	From -8095 μV up to 69553 μV (From -210 $^{\circ}\text{C}$ up to 1200 $^{\circ}\text{C}$)	2 μV
		Thermocouple T, without Reference Junction	From -5603 μV up to 20872 μV (From -200 $^{\circ}\text{C}$ up to 400 $^{\circ}\text{C}$)	2 μV
		Resistance thermometer Sensor : Pt100	From 18.52 Ω up to 390.48 Ω (From -200 $^{\circ}\text{C}$ up to 850 $^{\circ}\text{C}$)	0.010 Ω
		Resistance thermometer Sensor : JPt100	From 17.14 Ω up to 317.28 Ω (From -200 $^{\circ}\text{C}$ up to 600 $^{\circ}\text{C}$)	0.010 Ω

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Electric Power Measuring Equipment, etc.	AC Voltage Transformer	50 Hz, 60 Hz (Input voltage is from 5 % up to 120% of the rated voltage)	Primary voltage 110 V , 220 V, 440 V 1 100 V, 2 200 V 3 300 V	Ratio error 0.02 % Phase angle 0.6'
		50 Hz, 60 Hz (Input voltage is from 5 % up to 120% of the rated voltage)	Primary voltage 6 600 V, 11 000 V 22 000 V, 33 000 V	Ratio error 0.02 % Phase angle 0.8'
		50 Hz, 60 Hz (Input voltage is from 5 % up to 120% of the rated voltage)	Primary voltage 66 kV, 77 kV, 110 kV	Ratio error 0.03 % Phase angle 0.8'
		50 Hz, 60 Hz (Input voltage is from 5 % up to 120% of the rated voltage)	Primary voltage 110/√3 kV 154/√3 kV 187/√3 kV	Ratio error 0.04 % Phase angle 0.8'
		50 Hz, 60 Hz (Input voltage is from 5 % up to 110% of the rated voltage)	Primary voltage 220/√3 kV	Ratio error 0.04 % Phase angle 0.8'
	Alternating Current Transformer	50 Hz, 60 Hz (Input current is from 2.5 % up to 120% of the rated current)	Primary current From 0.1 A up to 200 A 250 A, 300 A	Ratio error 0.02 % Phase angle 0.6'
		50 Hz, 60 Hz (Input current is from 2.5 % up to 120% of the rated current)	Primary current 400 A, 500 A, 600 A 750 A, 800 A, 1000 A 1200 A, 1500 A, 2000 A 2500 A, 3000 A, 4000 A	Ratio error 0.02 % Phase angle 0.9'

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range			CMC (Level of Confidence Approximately 95 %)
Electric Power Measuring Equipment, etc.	Power Meter	From 10 V up to 300 V From 250 mA up to 30 A 50 Hz, 60 Hz Power factor, whole range			0.28 mW/VA ~ 0.32 mW/VA (Appendix 1)
	Reactive Power Meter	From 10 V up to 300 V From 250 mA up to 30 A 50 Hz, 60 Hz Power factor, whole range			0.30 mvar/VA ~ 0.38 mvar/VA (Appendix 1)
	Energy Meter	110 V, 100 V 5 A 50 Hz, 60 Hz	Three phase three wire *include a unbalanced load	Power factor 1 Power factor 0.866 lag* Power factor 0.866 lead* Power factor 0.5 lag Power factor 0.5 lead *110V only	0.02 %
			Single phase three wire *include a unbalanced load	Power factor 1 Power factor 0.5 lag Power factor 0.5 lead	
			Single phase two wire	Power factor 1 Power factor 0.5 lag Power factor 0.5 lead	

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Appendix 1

Category	Range						CMC (Level of Confidence Approximately 95 %)
	Type	Phase wire	Frequency	Voltage	Current	Power factor	
Power Meter	Active Power	Single phase two wire	50 Hz 60 Hz	100 V	5 A	1	0.30 mW/VA
						0.5 lag	0.28 mW/VA
						0.5 lead	0.28 mW/VA
						0 lag	0.28 mW/VA
						0 lead	0.28 mW/VA
				300 V	5 A	1	0.31 mW/VA
				100 V	0.5 A	1	0.32 mW/VA
		Single phase three wire	50 Hz 60 Hz	100 V	5 A	1	0.29 mW/VA
		Three phase three wire	50 Hz 60 Hz	100 V	5 A	1	0.29 mW/VA
Reactive Power Meter	Reactive power	Single phase two wire	50 Hz 60 Hz	100 V	5 A	1	0.30 mvar/VA
						0.5 lag	0.30 mvar/VA
						0.5 lead	0.30 mvar/VA
						0 lag	0.30 mvar/VA
						0 lead	0.30 mvar/VA
				300 V	5 A	0 lag	0.38 mvar/VA
				100 V	0.5 A	0 lag	0.32 mvar/VA
		Single phase three wire	50 Hz 60 Hz	100 V	5 A	0 lag	0.30 mvar/VA
		Three phase three wire	50 Hz 60 Hz	100 V	5 A	0 lag	0.30 mvar/VA

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Low Frequency Impedance Measuring Equipment, etc.	AC Resistor	0.01 Ω , 0.02 Ω , 0.05 Ω	50 Hz, 60 Hz	0.042 %
		0.1 Ω , 0.2 Ω	50 Hz, 60 Hz	0.032 %
		1 Ω , 10 Ω	50 Hz, 60 Hz	0.020 %
		100 Ω	50 Hz, 60 Hz	0.016 %
	AC Resistance Measuring Equipment	From 0.001 Ω up to 2 Ω (From 3 A up to 60 A)	50 Hz, 60 Hz	0.5 % + 0.001 Ω

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Permanent Laboratory/On-site Calibration : On-site Calibration

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	DC Resistance Measuring Equipment	From 1 Ω up to 10 k Ω		0.050 % (lower limit 10 m Ω)
		More than 10 k Ω up to 1 M Ω		0.10 %
		More than 1 M Ω up to 10 M Ω		0.20 %
		More than 10 M Ω up to 100 M Ω		1.0 %
		More than 100 M Ω up to 190 M Ω		2.0 M Ω
		More than 190 M Ω up to 2 000 M Ω		1.0 %
	DC Voltage Source	From 0 V up to 100 mV		0.006 % + 0.005 mV
		More than 0.1 V up to 1 V		0.005 % + 0.000 01 V
		More than 1 V up to 10 V		0.005 % + 0.000 1 V
		More than 10 V up to 100 V		0.006 % + 0.001 V
		More than 100 V up to 1 000 V		0.006 % + 0.02 V
		More than 1 kV up to 1.9 kV		0.004 kV
		More than 1.9 kV up to 10 kV		0.02 kV
	DC Voltage Measuring Equipment	From 0 V up to 100 mV		0.004 % + 0.005 mV
		More than 0.1 V up to 1 V		0.004 % + 0.000 01 V
		More than 1 V up to 10 V		0.004 % + 0.000 1 V
		More than 10 V up to 100 V		0.005 % + 0.001 V
		More than 100 V up to 1 000 V		0.005 % + 0.01 V
	Direct Current Source	From 0 μ A up to 30 A		0.10 % (lower limit 0.05 μ A)
	Direct Current Measuring Equipment	From 0 μ A up to 10 A		0.10 % (lower limit 0.05 μ A)
	AC Voltage Source	From 10 mV up to 40 mV	50 Hz, 60 Hz, 400 Hz, 1 kHz	0.10 mV
		More than 40 mV up to 1 000 V	50 Hz, 60 Hz, 400 Hz, 1 kHz	0.20 %
		More than 1 kV up to 1.9 kV	50 Hz, 60 Hz	0.004 kV
		More than 1.9 kV up to 10 kV	50 Hz, 60 Hz	0.02 kV
	AC Voltage Measuring Equipment	From 10 mV up to 1 000 V	50 Hz, 60 Hz, 400 Hz, 1 kHz	0.10 % (lower limit 0.10 mV)
	Alternating Current Source	From 1 mA up to 60 A	50 Hz, 60 Hz	0.20 %
	Alternating Current Measuring Equipment	From 1 mA up to 10 A	50 Hz, 60 Hz	0.30 %
		More than 10 A up to 60 A	50 Hz, 60 Hz	0.50 %
		More than 60 A less than 150 A	50 Hz, 60 Hz	0.7 % + 0.3 A
		From 150 A up to 500 A	50 Hz, 60 Hz	0.7 % + 1 A

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	Temperature Indicator	Thermocouple B, with Reference Junction	From 291 μ V up to 13820 μ V (From 250 °C up to 1820 °C)	10 μ V
		Thermocouple R, with Reference Junction	From -226 μ V up to 21103 μ V (From -50 °C up to 1768.1 °C)	10 μ V
		Thermocouple S, with Reference Junction	From -236 μ V up to 18694 μ V (From -50 °C up to 1768.1 °C)	10 μ V
		Thermocouple N, with Reference Junction	From -3990 μ V up to 47513 μ V (From -200 °C up to 1300 °C)	22 μ V
		Thermocouple K, with Reference Junction	From -5891 μ V up to 54886 μ V (From -200 °C up to 1372 °C)	23 μ V
		Thermocouple E, with Reference Junction	From -8825 μ V up to 76373 μ V (From -200 °C up to 1000 °C)	27 μ V
		Thermocouple J, with Reference Junction	From -8095 μ V up to 69553 μ V (From -210 °C up to 1200 °C)	25 μ V
		Thermocouple T, with Reference Junction	From -5603 μ V up to 20872 μ V (From -200 °C up to 400 °C)	24 μ V
		Thermocouple B, without Reference Junction	From 291 μ V up to 13820 μ V (From 250 °C up to 1820 °C)	10 μ V
		Thermocouple R, without Reference Junction	From -226 μ V up to 21103 μ V (From -50 °C up to 1768.1 °C)	10 μ V
		Thermocouple S, without Reference Junction	From -236 μ V up to 18694 μ V (From -50 °C up to 1768.1 °C)	10 μ V
		Thermocouple N, without Reference Junction	From -3990 μ V up to 47513 μ V (From -200 °C up to 1300 °C)	11 μ V
		Thermocouple K, without Reference Junction	From -5891 μ V up to 54886 μ V (From -200 °C up to 1372 °C)	12 μ V
		Thermocouple E, without Reference Junction	From -8825 μ V up to 76373 μ V (From -200 °C up to 1000 °C)	14 μ V
		Thermocouple J, without Reference Junction	From -8095 μ V up to 69553 μ V (From -210 °C up to 1200 °C)	13 μ V
		Thermocouple T, without Reference Junction	From -5603 μ V up to 20872 μ V (From -200 °C up to 400 °C)	12 μ V
		Resistance thermometer Sensor : Pt100	From 18.52 Ω up to 390.48 Ω (From -200 °C up to 850 °C)	0.10 Ω
		Resistance thermometer Sensor : JPt100	From 17.14 Ω up to 317.28 Ω (From -200 °C up to 600 °C)	0.10 Ω

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		CMC (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	Temperature Indicator calibration equipment	Thermocouple B, with Reference Junction	From 291 μ V up to 13820 μ V (From 250 °C up to 1820 °C)	10 μ V
		Thermocouple R, with Reference Junction	From -226 μ V up to 21103 μ V (From -50 °C up to 1768.1 °C)	10 μ V
		Thermocouple S, with Reference Junction	From -236 μ V up to 18694 μ V (From -50 °C up to 1768.1 °C)	10 μ V
		Thermocouple N, with Reference Junction	From -3990 μ V up to 47513 μ V (From -200 °C up to 1300 °C)	22 μ V
		Thermocouple K, with Reference Junction	From -5891 μ V up to 54886 μ V (From -200 °C up to 1372 °C)	23 μ V
		Thermocouple E, with Reference Junction	From -8825 μ V up to 76373 μ V (From -200 °C up to 1000 °C)	27 μ V
		Thermocouple J, with Reference Junction	From -8095 μ V up to 69553 μ V (From -210 °C up to 1200 °C)	25 μ V
		Thermocouple T, with Reference Junction	From -5603 μ V up to 20872 μ V (From -200 °C up to 400 °C)	24 μ V
		Thermocouple B, without Reference Junction	From 291 μ V up to 13820 μ V (From 250 °C up to 1820 °C)	10 μ V
		Thermocouple R, without Reference Junction	From -226 μ V up to 21103 μ V (From -50 °C up to 1768.1 °C)	10 μ V
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		Resistance thermometer Sensor : Pt100	From 18.52 Ω up to 390.48 Ω (From -200 °C up to 850 °C)	0.10 Ω
		Resistance thermometer Sensor : JPt100	From 17.14 Ω up to 317.28 Ω (From -200 °C up to 600 °C)	0.10 Ω

#All Calibration Procedures are in-house procedures developed by this laboratory.

General Field of Calibration : Temperature

Date of Initial Accreditation of the Field : 2019-08-01

Permanent Laboratory/On-site Calibration : Permanent Laboratory

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range	CMC (Level of Confidence Approximately 95 %)
Contact Type Thermometer	Temperature sensors with display unit (Comparison calibration)	From 0 °C up to 250 °C	0.050 °C
	Thermometer calibration equipment	From 0 °C up to 200 °C	0.050 °C
		More than 200 °C up to 250 °C	0.060 °C

#All Calibration Procedures are in-house procedures developed by this laboratory.

Permanent Laboratory/On-site Calibration : On-site Calibration

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range	CMC (Level of Confidence Approximately 95 %)
Contact Type Thermometer	Temperature sensors with display unit (Comparison calibration)	From 40 °C up to 250 °C	0.20 °C
	Thermometer calibration equipment	From 0 °C up to 250 °C	0.080 °C

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