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Accreditation No.	JCSS0119
Date of Initial Accreditation	2002-10-22
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Name and Address of Accredited Organization	Japan Electric Meters Inspection Corporation Kyushu 1-40,2-chome, Shiobaru, Minami-ku, Fukuoka-shi, Fukuoka 815-0032, Japan JCN 4010405002454
Inquiry Point	Calibration Section Tel: +81-92-541-3033      FAX: +81-92-541-3036
Accreditation Standards	ISO/IEC 17025:2005 (Calibration)
Accreditation Scope	As attached

\*JCN: Japan Corporate Number

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 and Measurement Capabilities

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		Expanded Uncertainty (Level of Confidence Approximately 95 %)
Time & Frequency Counter, etc.	Frequency Generator	From 1 Hz up to 10 MHz		$5 \times 10^{-6}$
	Frequency Counter	From 1 Hz up to 10 MHz		$5 \times 10^{-6}$
	Time-Interval Source *1	From 1 s up to 60 s		0.01 s
	Time-Interval Measuring Equipment	Calibration by Time-Interval Measurement	From 100 ms less than 10 s From 10 s up to 60 s More than 60 s up to 3 600 s	0.000 1 s 0.001 s 0.09 s

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

\*1 : Limited to Withstand Voltage tester.

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

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

Calibration and Measurement Capabilities

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		Expanded Uncertainty (Level of Confidence Approximately 95 %)
Time & Frequency Counter, etc.	Frequency Generator	From 1 Hz up to 10 MHz		$5 \times 10^{-6}$
	Frequency Counter	From 1 Hz up to 10 MHz		$5 \times 10^{-6}$
	Time-Interval Source *1	From 1 s up to 60 s		0.01 s
	Time-Interval Measuring Equipment	Calibration by Time-Interval Measurement	From 100 ms less than 10 s From 10 s up to 60 s More than 60 s up to 3 600 s	0.000 1 s 0.001 s 0.09 s

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\*1 : Limited to Withstand Voltage tester.

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

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

Date of Initial Accreditation of the Field: 2002-10-22

Permanent Laboratory/On-site Calibration: Permanent Laboratory

Calibration and Measurement Capabilities

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range	Expanded Uncertainty (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	DC Resistor	0.001 $\Omega$	0.000 03 m $\Omega$
		0.01 $\Omega$	0.000 2 m $\Omega$
		More than 0.01 $\Omega$ less than 0.1 $\Omega$	0.001 $\Omega$
		0.1 $\Omega$	0.001 0 m $\Omega$
		More than 0.1 $\Omega$ less than 1 $\Omega$	0.001 $\Omega$
		1 $\Omega$	0.000 005 $\Omega$
		More than 1 $\Omega$ less than 10 $\Omega$	0.000 2 $\Omega$
		10 $\Omega$	0.05 m $\Omega$
		More than 10 $\Omega$ less than 100 $\Omega$	0.002 $\Omega$
		100 $\Omega$	0.40 m $\Omega$
		More than 100 $\Omega$ less than 1 k $\Omega$	0.02 $\Omega$
		1 k $\Omega$	4.0 m $\Omega$
		More than 1 k $\Omega$ less than 10 k $\Omega$	0.2 $\Omega$
		10 k $\Omega$	0.040 $\Omega$
		More than 10 k $\Omega$ less than 100 k $\Omega$	2 $\Omega$
		100 k $\Omega$	0.40 $\Omega$
		More than 100 k $\Omega$ less than 1 M $\Omega$	0.02 k $\Omega$
		1 M $\Omega$	0.005 0 k $\Omega$
		More than 1 M $\Omega$ less than 10 M $\Omega$	0.000 6 M $\Omega$
		10 M $\Omega$	0.000 3 M $\Omega$
		More than 10 M $\Omega$ less than 19 M $\Omega$	0.020 M $\Omega$
		19 M $\Omega$	0.006 M $\Omega$
		More than 19 M $\Omega$ up to 30 M $\Omega$	0.020 M $\Omega$
		More than 30 M $\Omega$ less than 100 M $\Omega$	0.060 M $\Omega$
100 M $\Omega$	0.010 M $\Omega$		
More than 100 M $\Omega$ less than 1 G $\Omega$	0.10 %		
1 G $\Omega$	1.0 M $\Omega$		
More than 1 G $\Omega$ up to 2 G $\Omega$	4 M $\Omega$		
More than 2 G $\Omega$ up to 3 G $\Omega$	6 M $\Omega$		

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range	Expanded Uncertainty (Level of Confidence Approximately 95 %)	
Direct Current & Low Frequency Measuring Equipment, etc.	DC Resistance Measuring Equipment	0.001 $\Omega$	0.10 $\mu\Omega$	
		0.01 $\Omega$	1.0 $\mu\Omega$	
		0.1 $\Omega$	10 $\mu\Omega$	
			1 $\Omega$	0.10 m $\Omega$
			More than 1 $\Omega$ less than 1.9 $\Omega$	1.0 m $\Omega$
			1.9 $\Omega$	0.20 m $\Omega$
			More than 1.9 $\Omega$ less than 10 $\Omega$	2.0 m $\Omega$
			10 $\Omega$	0.20 m $\Omega$
			More than 10 $\Omega$ less than 19 $\Omega$	2.0 m $\Omega$
			19 $\Omega$	1.0 m $\Omega$
			More than 19 $\Omega$ less than 100 $\Omega$	5.0 m $\Omega$
			100 $\Omega$	1.0 m $\Omega$
			More than 100 $\Omega$ up to 400 $\Omega$	0.008 $\Omega$
			More than 400 $\Omega$ less than 1 k $\Omega$	0.040 $\Omega$
			1 k $\Omega$	10 m $\Omega$
			More than 1 k $\Omega$ less than 1.9 k $\Omega$	0.20 $\Omega$
			1.9 k $\Omega$	0.10 $\Omega$
			More than 1.9 k $\Omega$ less than 10 k $\Omega$	0.40 $\Omega$
			10 k $\Omega$	0.10 $\Omega$
			More than 10 k $\Omega$ less than 19 k $\Omega$	2.0 $\Omega$
			19 k $\Omega$	1.0 $\Omega$
			More than 19 k $\Omega$ less than 100 k $\Omega$	4.0 $\Omega$
			100 k $\Omega$	1.0 $\Omega$
			More than 100 k $\Omega$ less than 190 k $\Omega$	20 $\Omega$
			190 k $\Omega$	10 $\Omega$
			More than 190 k $\Omega$ less than 1 M $\Omega$	50 $\Omega$
			1 M $\Omega$	10 $\Omega$
			More than 1 M $\Omega$ up to 1.9 M $\Omega$	1.0 k $\Omega$
			More than 1.9 M $\Omega$ less than 10 M $\Omega$	2.0 k $\Omega$
			10 M $\Omega$	1.0 k $\Omega$
			More than 10 M $\Omega$ up to 19 M $\Omega$	10 k $\Omega$
			More than 19 M $\Omega$ less than 33 M $\Omega$	20 k $\Omega$
	From 33 M $\Omega$ less than 100 M $\Omega$	80 k $\Omega$		
	100 M $\Omega$	10 k $\Omega$		
	More than 100 M $\Omega$ less than 110 M $\Omega$	1.0 M $\Omega$		
	From 110 M $\Omega$ less than 330 M $\Omega$	5.0 M $\Omega$		
	From 330 M $\Omega$ up to 1 G $\Omega$	14 M $\Omega$		
	More than 1 G $\Omega$ up to 2 G $\Omega$	1 %		

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range	Expanded Uncertainty (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	DC Voltage Source	From 0 V up to 100 mV	0.3 ppm + 2.5 $\mu$ V
		More than 0.1 V up to 1 V	4.0 ppm + 2.5 $\mu$ V
		More than 1 V up to 10 V	5.5 ppm + 2 $\mu$ 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 1 000 V	34 ppm – 12.6 mV
		More than 1 kV up to 4 kV	0.03 kV
		More than 4 kV up to 7 kV	0.04 kV
		More than 7 kV up to 10 kV	0.05 kV
	DC Voltage Measuring Equipment	From 0 V up to 1 V	5.5 ppm + 0.5 $\mu$ V
		More than 1 V up to 10 V	5.5 ppm + 2 $\mu$ 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 1 000 V	34 ppm – 12.6 mV
	Direct Current Source	From 0 $\mu$ A up to 100 $\mu$ A	6 ppm + 0.002 5 $\mu$ A
		More than 0.1 mA up to 1 mA	5 ppm + 0.030 $\mu$ A
		More than 1 mA up to 10 mA	5 ppm + 0.30 $\mu$ A
		More than 10 mA up to 100 mA	10 ppm + 3.0 $\mu$ A
		More than 0.1 A up to 1 A	30 ppm + 0.025 mA
		More than 1 A up to 30 A	75 ppm + 0.20 mA
	Direct Current Measuring Equipment	From 0 $\mu$ A up to 100 $\mu$ A	6 ppm + 0.002 5 $\mu$ A
		More than 0.1 mA up to 1 mA	5 ppm + 0.030 $\mu$ A
		More than 1 mA up to 10 mA	5 ppm + 0.30 $\mu$ A
		More than 10 mA up to 100 mA	10 ppm + 3.0 $\mu$ A
		More than 0.1 A up to 1 A	30 ppm + 0.025 mA
		More than 1 A up to 30 A	75 ppm + 0.20 mA
		More than 30 A up to 40 A	0.40 A
		More than 40 A up to 50 A	0.50 A
More than 50 A up to 500 A		1.0 %	

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		Expanded Uncertainty (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	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		0.025 %
		More than 60 mV up to 200 mV		0.015 %
		More than 200 mV up to 600 mV		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		0.040 %
		More than 200 V up to 1 000 V	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz, 10 kHz	60 ppm
		More than 1 kV up to 4 kV	50 Hz, 60 Hz	0.03 kV
		More than 4 kV up to 7 kV		0.04 kV
	More than 7 kV up to 10 kV	0.05 kV		
	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		0.025 %
		More than 60 mV up to 200 mV		0.015 %
		More than 200 mV up to 600 mV		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		0.040 %
		More than 200 V up to 1 000 V	40 Hz, 50 Hz, 60 Hz, 400 Hz, 1 kHz, 10 kHz	60 ppm

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		Expanded Uncertainty (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 $\mu$ A
		More than 0.006 A less than 0.01 A		0.025 % + 0.5 $\mu$ A
		From 0.01 A up to 0.02 A		0.015 % + 0.3 $\mu$ A
		More than 0.02 A up to 0.2 A		0.015 % + 3 $\mu$ A
		More than 0.2 A up to 2 A		0.028 % + 0.03 mA
		More than 2 A up to 10 A		0.038 % + 0.2 mA
		More than 10 A up to 20 A		0.045 % + 0.5 mA
		More than 20 A up to 60 A		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 $\mu$ A
		From 0.01 A up to 0.02 A		0.015 % + 0.3 $\mu$ A
		More than 0.02 A up to 0.2 A		0.015 % + 3 $\mu$ A
		More than 0.2 A up to 2 A		0.028 % + 0.03 mA
		More than 2 A up to 10 A		0.038 % + 0.2 mA
		More than 10 A up to 20 A		0.15 %
		More than 20 A up to 60 A		0.18 % + 0.01 A
		More than 60 A up to 100 A		0.3 A
		More than 100 A up to 500 A		1.5 %

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		Expanded Uncertainty (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	Temperature Indicator	Thermocouple B, with Reference Junction	From 291 $\mu$ V up to 13820 $\mu$ V (From 250 °C up to 1820 °C)	10 $\mu$ V
		Thermocouple R, with Reference Junction	From -226 $\mu$ V up to 21003 $\mu$ V (From -50 °C up to 1760 °C)	10 $\mu$ V
		Thermocouple S, with Reference Junction	From -236 $\mu$ V up to 18609 $\mu$ V (From -50 °C up to 1760 °C)	10 $\mu$ V
		Thermocouple N, with Reference Junction	From -3990 $\mu$ V up to 47513 $\mu$ V (From -200 °C up to 1300 °C)	22 $\mu$ V
		Thermocouple K, with Reference Junction	From -5891 $\mu$ V up to 54819 $\mu$ V (From -200 °C up to 1370 °C)	23 $\mu$ V
		Thermocouple E, with Reference Junction	From -8825 $\mu$ V up to 76373 $\mu$ V (From -200 °C up to 1000 °C)	28 $\mu$ V
		Thermocouple J, with Reference Junction	From -8095 $\mu$ V up to 69553 $\mu$ V (From -210 °C up to 1200 °C)	24 $\mu$ V
		Thermocouple T, with Reference Junction	From -5603 $\mu$ V up to 20872 $\mu$ V (From -200 °C up to 400 °C)	23 $\mu$ V
		Thermocouple B, without Reference Junction	From 291 $\mu$ V up to 13820 $\mu$ V (From 250 °C up to 1820 °C)	9 $\mu$ V
		Thermocouple R, without Reference Junction	From -226 $\mu$ V up to 21003 $\mu$ V (From -50 °C up to 1760 °C)	9 $\mu$ V
		Thermocouple S, without Reference Junction	From -236 $\mu$ V up to 18609 $\mu$ V (From -50 °C up to 1760 °C)	9 $\mu$ V
		Thermocouple N, without Reference Junction	From -3990 $\mu$ V up to 47513 $\mu$ V (From -200 °C up to 1300 °C)	11 $\mu$ V
		Thermocouple K, without Reference Junction	From -5891 $\mu$ V up to 54819 $\mu$ V (From -200 °C up to 1370 °C)	11 $\mu$ V
		Thermocouple E, without Reference Junction	From -8825 $\mu$ V up to 76373 $\mu$ V (From -200 °C up to 1000 °C)	13 $\mu$ V
		Thermocouple J, without Reference Junction	From -8095 $\mu$ V up to 69553 $\mu$ V (From -210 °C up to 1200 °C)	12 $\mu$ V
		Thermocouple T, without Reference Junction	From -5603 $\mu$ V up to 20872 $\mu$ V (From -200 °C up to 400 °C)	12 $\mu$ V
		Resistance thermometer Sensor	From 18.52 $\Omega$ up to 390.48 $\Omega$ (From -200 °C up to 850 °C)	0.10 $\Omega$

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		Expanded Uncertainty (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	Temperature Indicator calibration equipment	Thermocouple B, with Reference Junction	From 291 $\mu$ V up to 13820 $\mu$ V (From 250 °C up to 1820 °C)	10 $\mu$ V
		Thermocouple R, with Reference Junction	From -226 $\mu$ V up to 21003 $\mu$ V (From -50 °C up to 1760 °C)	10 $\mu$ V
		Thermocouple S, with Reference Junction	From -236 $\mu$ V up to 18609 $\mu$ V (From -50 °C up to 1760 °C)	10 $\mu$ V
		Thermocouple N, with Reference Junction	From -3990 $\mu$ V up to 47513 $\mu$ V (From -200 °C up to 1300 °C)	22 $\mu$ V
		Thermocouple K, with Reference Junction	From -5891 $\mu$ V up to 54819 $\mu$ V (From -200 °C up to 1370 °C)	23 $\mu$ V
		Thermocouple E, with Reference Junction	From -8825 $\mu$ V up to 76373 $\mu$ V (From -200 °C up to 1000 °C)	25 $\mu$ V
		Thermocouple J, with Reference Junction	From -8095 $\mu$ V up to 69553 $\mu$ V (From -210 °C up to 1200 °C)	24 $\mu$ V
		Thermocouple T, with Reference Junction	From -5603 $\mu$ V up to 20872 $\mu$ V (From -200 °C up to 400 °C)	23 $\mu$ V
		Thermocouple B, without Reference Junction	From 291 $\mu$ V up to 13820 $\mu$ V (From 250 °C up to 1820 °C)	9 $\mu$ V
		Thermocouple R, without Reference Junction	From -226 $\mu$ V up to 21003 $\mu$ V (From -50 °C up to 1760 °C)	9 $\mu$ V
		Thermocouple S, without Reference Junction	From -236 $\mu$ V up to 18609 $\mu$ V (From -50 °C up to 1760 °C)	9 $\mu$ V
		Thermocouple N, without Reference Junction	From -3990 $\mu$ V up to 47513 $\mu$ V (From -200 °C up to 1300 °C)	11 $\mu$ V
		Thermocouple K, without Reference Junction	From -5891 $\mu$ V up to 54819 $\mu$ V (From -200 °C up to 1370 °C)	11 $\mu$ V
		Thermocouple E, without Reference Junction	From -8825 $\mu$ V up to 76373 $\mu$ V (From -200 °C up to 1000 °C)	13 $\mu$ V
		Thermocouple J, without Reference Junction	From -8095 $\mu$ V up to 69553 $\mu$ V (From -210 °C up to 1200 °C)	12 $\mu$ V
		Thermocouple T, without Reference Junction	From -5603 $\mu$ V up to 20872 $\mu$ V (From -200 °C up to 400 °C)	12 $\mu$ V
		Resistance thermometer Sensor	From 18.52 $\Omega$ up to 390.48 $\Omega$ (From -200 °C up to 850 °C)	0.10 $\Omega$

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		Expanded Uncertainty (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 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 system (include unbalance load)	Power factor: 1 Power factor: 0.866 lag <sup>*</sup> Power factor: 0.866 lead <sup>*</sup> Power factor: 0.5 lag Power factor: 0.5 lead <sup>*</sup> 110 V only	0.02 %
			Single phase three wire system (include unbalance load)	Power factor: 1 Power factor: 0.5 lag Power factor: 0.5 lead	
Single phase two wire system			Power factor: 1 Power factor: 0.5 lag Power factor: 0.5 lead		

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## Appendix 1

Category	Range						Expanded Uncertainty (Level of Confidence Approximately 95 %)
	Type	Phase wire	Frequency	Voltage	Current	Power factor	
Power Meter	Active power	Single phase two wire	50, 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, 60 Hz	100 V	5 A	1	0.29 mW/VA
		Three phase three wire	50, 60 Hz	100 V	5 A	1	0.29 mW/VA
Reactive Power Meter	Reactiv e power	Single phase two wire	50, 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, 60 Hz	100 V	5 A	0 lag	0.30 mvar/VA
		Three phase three wire	50, 60 Hz	100 V	5 A	0 lag	0.30 mvar/VA

Permanent Laboratory/On-site Calibration: On-site Calibration  
Calibration and Measurement Capabilities

Calibration Procedures# and Type of Instruments/Materials to be calibrated	Range		Expanded Uncertainty (Level of Confidence Approximately 95 %)	
Direct Current & Low Frequency Measuring Equipment, etc.	DC Resistance Measuring Equipment	More than 190 MΩ up to 2 GΩ	1.0 %	
		More than 100 MΩ up to 190 MΩ	2.0 MΩ	
		More than 10 MΩ up to 100 MΩ	1.0 %	
		More than 1 MΩ up to 10 MΩ	0.20 %	
		More than 10 kΩ up to 1 MΩ	0.10 %	
		From 1 Ω up to 10 kΩ	0.050 % (lower limit 10 mΩ)	
	DC Voltage Source	From 0 μV up to 1000 V	0.010 % (lower limit 0.010 mV)	
		More than 1 kV up to 4 kV	0.03 kV	
		More than 4 kV up to 7 kV	0.04 kV	
		More than 7 kV up to 10 kV	0.05 kV	
	DC Voltage Measuring Equipment	From 0 μV up to 1000 V	0.050 % (lower limit 5 μV)	
	Direct Current Source	From 0 μA up to 30 A	0.10 % (lower limit 0.05 μA)	
	Direct Current Measuring Equipment	From 0 μA up to 10 A	0.10 % (lower limit 0.10 μA)	
		More than 10 A less than 16.5 A	1.5 %	
		From 16.5 A up to 23 A	0.30 A	
		More than 23 A up to 40 A	0.40 A	
		More than 40 A up to 50 A	0.50 A	
		More than 50 A up to 500 A	1 %	
	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 1000 V		0.30 %
		More than 1 kV up to 4 kV	50 Hz, 60 Hz	0.03 kV
		More than 4 kV up to 7 kV		0.04 kV
		More than 7 kV up to 10 kV		0.05 kV
	AC Voltage Measuring Equipment	From 10 mV up to 1000 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	0.50 %	
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		0.50 %	
	More than 60 A up to 100 A		0.3 A	
	More than 100 A up to 500 A		1.5 %	

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Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		Expanded Uncertainty (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	Temperature Indicator	Thermocouple B, with Reference Junction	From 291 $\mu$ V up to 13820 $\mu$ V (From 250 °C up to 1820 °C)	10 $\mu$ V
		Thermocouple R, with Reference Junction	From -226 $\mu$ V up to 21003 $\mu$ V (From -50 °C up to 1760 °C)	10 $\mu$ V
		Thermocouple S, with Reference Junction	From -236 $\mu$ V up to 18609 $\mu$ V (From -50 °C up to 1760 °C)	10 $\mu$ V
		Thermocouple N, with Reference Junction	From -3990 $\mu$ V up to 47513 $\mu$ V (From -200 °C up to 1300 °C)	22 $\mu$ V
		Thermocouple K, with Reference Junction	From -5891 $\mu$ V up to 54819 $\mu$ V (From -200 °C up to 1370 °C)	23 $\mu$ V
		Thermocouple E, with Reference Junction	From -8825 $\mu$ V up to 76373 $\mu$ V (From -200 °C up to 1000 °C)	28 $\mu$ V
		Thermocouple J, with Reference Junction	From -8095 $\mu$ V up to 69553 $\mu$ V (From -210 °C up to 1200 °C)	24 $\mu$ V
		Thermocouple T, with Reference Junction	From -5603 $\mu$ V up to 20872 $\mu$ V (From -200 °C up to 400 °C)	23 $\mu$ V
		Thermocouple B, without Reference Junction	From 291 $\mu$ V up to 13820 $\mu$ V (From 250 °C up to 1820 °C)	9 $\mu$ V
		Thermocouple R, without Reference Junction	From -226 $\mu$ V up to 21003 $\mu$ V (From -50 °C up to 1760 °C)	9 $\mu$ V
		Thermocouple S, without Reference Junction	From -236 $\mu$ V up to 18609 $\mu$ V (From -50 °C up to 1760 °C)	9 $\mu$ V
		Thermocouple N, without Reference Junction	From -3990 $\mu$ V up to 47513 $\mu$ V (From -200 °C up to 1300 °C)	11 $\mu$ V
		Thermocouple K, without Reference Junction	From -5891 $\mu$ V up to 54819 $\mu$ V (From -200 °C up to 1370 °C)	11 $\mu$ V
		Thermocouple E, without Reference Junction	From -8825 $\mu$ V up to 76373 $\mu$ V (From -200 °C up to 1000 °C)	13 $\mu$ V
		Thermocouple J, without Reference Junction	From -8095 $\mu$ V up to 69553 $\mu$ V (From -210 °C up to 1200 °C)	12 $\mu$ V
		Thermocouple T, without Reference Junction	From -5603 $\mu$ V up to 20872 $\mu$ V (From -200 °C up to 400 °C)	12 $\mu$ V
		Resistance thermometer Sensor	From 18.52 $\Omega$ up to 390.48 $\Omega$ (From -200 °C up to 850 °C)	0.10 $\Omega$

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

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range		Expanded Uncertainty (Level of Confidence Approximately 95 %)
Direct Current & Low Frequency Measuring Equipment, etc.	Temperature Indicator calibration equipment	Thermocouple B, with Reference Junction	From 291 $\mu\text{V}$ up to 13820 $\mu\text{V}$ (From 250 $^{\circ}\text{C}$ up to 1820 $^{\circ}\text{C}$ )	10 $\mu\text{V}$
		Thermocouple R, with Reference Junction	From -226 $\mu\text{V}$ up to 21003 $\mu\text{V}$ (From -50 $^{\circ}\text{C}$ up to 1760 $^{\circ}\text{C}$ )	10 $\mu\text{V}$
		Thermocouple S, with Reference Junction	From -236 $\mu\text{V}$ up to 18609 $\mu\text{V}$ (From -50 $^{\circ}\text{C}$ up to 1760 $^{\circ}\text{C}$ )	10 $\mu\text{V}$
		Thermocouple N, with Reference Junction	From -3990 $\mu\text{V}$ up to 47513 $\mu\text{V}$ (From -200 $^{\circ}\text{C}$ up to 1300 $^{\circ}\text{C}$ )	22 $\mu\text{V}$
		Thermocouple K, with Reference Junction	From -5891 $\mu\text{V}$ up to 54819 $\mu\text{V}$ (From -200 $^{\circ}\text{C}$ up to 1370 $^{\circ}\text{C}$ )	23 $\mu\text{V}$
		Thermocouple E, with Reference Junction	From -8825 $\mu\text{V}$ up to 76373 $\mu\text{V}$ (From -200 $^{\circ}\text{C}$ up to 1000 $^{\circ}\text{C}$ )	25 $\mu\text{V}$
		Thermocouple J, with Reference Junction	From -8095 $\mu\text{V}$ up to 69553 $\mu\text{V}$ (From -210 $^{\circ}\text{C}$ up to 1200 $^{\circ}\text{C}$ )	24 $\mu\text{V}$
		Thermocouple T, with Reference Junction	From -5603 $\mu\text{V}$ up to 20872 $\mu\text{V}$ (From -200 $^{\circ}\text{C}$ up to 400 $^{\circ}\text{C}$ )	23 $\mu\text{V}$
		Thermocouple B, without Reference Junction	From 291 $\mu\text{V}$ up to 13820 $\mu\text{V}$ (From 250 $^{\circ}\text{C}$ up to 1820 $^{\circ}\text{C}$ )	9 $\mu\text{V}$
		Thermocouple R, without Reference Junction	From -226 $\mu\text{V}$ up to 21003 $\mu\text{V}$ (From -50 $^{\circ}\text{C}$ up to 1760 $^{\circ}\text{C}$ )	9 $\mu\text{V}$
		Thermocouple S, without Reference Junction	From -236 $\mu\text{V}$ up to 18609 $\mu\text{V}$ (From -50 $^{\circ}\text{C}$ up to 1760 $^{\circ}\text{C}$ )	9 $\mu\text{V}$
		Thermocouple N, without Reference Junction	From -3990 $\mu\text{V}$ up to 47513 $\mu\text{V}$ (From -200 $^{\circ}\text{C}$ up to 1300 $^{\circ}\text{C}$ )	11 $\mu\text{V}$
		Thermocouple K, without Reference Junction	From -5891 $\mu\text{V}$ up to 54819 $\mu\text{V}$ (From -200 $^{\circ}\text{C}$ up to 1370 $^{\circ}\text{C}$ )	11 $\mu\text{V}$
		Thermocouple E, without Reference Junction	From -8825 $\mu\text{V}$ up to 76373 $\mu\text{V}$ (From -200 $^{\circ}\text{C}$ up to 1000 $^{\circ}\text{C}$ )	13 $\mu\text{V}$
		Thermocouple J, without Reference Junction	From -8095 $\mu\text{V}$ up to 69553 $\mu\text{V}$ (From -210 $^{\circ}\text{C}$ up to 1200 $^{\circ}\text{C}$ )	12 $\mu\text{V}$
		Thermocouple T, without Reference Junction	From -5603 $\mu\text{V}$ up to 20872 $\mu\text{V}$ (From -200 $^{\circ}\text{C}$ up to 400 $^{\circ}\text{C}$ )	12 $\mu\text{V}$
		Resistance thermometer Sensor	From 18.52 $\Omega$ up to 390.48 $\Omega$ (From -200 $^{\circ}\text{C}$ up to 850 $^{\circ}\text{C}$ )	0.10 $\Omega$

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

Calibration Procedures# and Type of Instruments/Materials to be calibrated		Range	Expanded Uncertainty (Level of Confidence Approximately 95 %)
Electric Power Measuring Equipment, etc.	Power Meter	From 30 V up to 240 V From 250 mA up to 25 A 50 Hz, 60 Hz Power factor; whole range	0.15 W ~ 6×10 W (Appendix 2, 3)

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

## Appendix 2

Category	Range						Expanded Uncertainty (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	240 V	25 A	0 lag~1~0 lead	30 W
					10 A	0 lag~1~0 lead	12 W
					5 A	0 lag~1~0 lead	6 W
					2.5 A	0 lag~1~0 lead	3.0 W
					1 A	0 lag~1~0 lead	1.2 W
				120 V	25 A	0 lag~1~0 lead	15 W
					10 A	0 lag~1~0 lead	6 W
					5 A	0 lag~1~0 lead	3.0 W
					2.5 A	0 lag~1~0 lead	1.5 W
					1 A	0 lag~1~0 lead	0.6 W
				60 V	10 A	0 lag~1~0 lead	3.0 W
					5 A	0 lag~1~0 lead	1.5 W
					2.5 A	0 lag~1~0 lead	0.8 W
					1 A	0 lag~1~0 lead	0.30 W
				30 V	10 A	0 lag~1~0 lead	1.5 W
					5 A	0 lag~1~0 lead	0.8 W
2.5 A	0 lag~1~0 lead	0.38 W					
1 A	0 lag~1~0 lead	0.15 W					

## Appendix 3

Category	Range						Expanded Uncertainty (Level of Confidence Approximately 95 %)
	Type	Phase wire	Frequency	Voltage	Current	Power factor	
Reactive Power Meter	Active Power	Single phase three wire, Three phase three wire	50 Hz 60 Hz	240 V	25 A	0 lag~1~0 lead	6×10 W
					10 A	0 lag~1~0 lead	24 W
					5 A	0 lag~1~0 lead	12 W
					2.5 A	0 lag~1~0 lead	6 W
					1 A	0 lag~1~0 lead	2.4 W
				120 V	25 A	0 lag~1~0 lead	30 W
					10 A	0 lag~1~0 lead	12 W
					5 A	0 lag~1~0 lead	6 W
					2.5 A	0 lag~1~0 lead	3.0 W
					1 A	0 lag~1~0 lead	1.2 W