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of SAMM 375 dated 26 March 2025)

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LABORATORY LOCATION/ CENTRAL OFFICE:	UCAL Tech's (M) Sdn Bhd No. 8, 8A, Jalan Shah Bandar 2 Taman Ungku Tun Aminah 81300 Skudai, Johor , 81300, JOHOR MALAYSIA
	
ACCREDITED SINCE :	26 MARCH 2025
FIELD(S) OF CALIBRATION:	DIMENSIONAL ELECTRICAL MASS PRESSURE TEMPERATURE

This laboratory has demonstrated its technical competence to operate in accordance with MS ISO/IEC 17025:2017 (ISO/IEC 17025:2017).

This laboratory's fulfillment of the requirements of ISO/IEC 17025 means the 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. The management system requirements in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001 (see Joint ISO-ILAC-IAF Communiqué dated April 2017).

*** The uncertainty covered by the CMC is expressed as the expanded uncertainty corresponding to a coverage probability of approximately 95 % and have a coverage factor of k=2 unless stated otherwise.**

CENTRAL LOCATION	UCAL Tech's (M) Sdn Bhd No. 8, 8A, Jalan Shah Bandar 2 Taman Ungku Tun Aminah 81300 Skudai, Johor , 81300, Johor
FIELD(S) OF CALIBRATION :	DIMENSIONAL, ELECTRICAL, MASS, PRESSURE, HEAT & TEMPERATURE

SCOPE OF CALIBRATION : DIMENSIONAL

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
(b) Type E	-100 °C to 0 °C 0 °C to 990 °C	0.6 °C 0.5 °C	By electrical simulation using calibrator with reference to ITS-90

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
	-100 °C to 990 °C	0.5 °C	By electrical measurement using Temperature calibrator
	-100 °C to 0 °C to 990 °C	0.6 °C 0.5 °C	By electrical simulation using calibrator with reference to Table ITS-90
(c) Type K	-100 °C to 0 °C to 1300 °C	0.5 °C 0.6 °C	By electrical simulation using calibrator with reference to ITS-90
	-100 °C to 0 °C to 1300 °C	0.5 °C 0.6 °C	By electrical measurement using Temperature calibrator
	-100 °C °C to 1300 °C	0.5 °C 0.6 °C	By electrical simulation using calibrator with reference to Table ITS-90
(d) Type R	0 °C to 1000 °C 1000 °C to 1700 °C	1.4 °C	By electrical simulation using calibrator with reference to ITS-90
	0 °C to 1000 °C 1000 °C to 1700 °C	1.5 °C	By electrical measurement using Temperature calibrator
	to 1000 °C 1000 °C to 1700 °C	1.4 °C	By electrical simulation using calibrator with reference to Table ITS-90
(e) Type J	-100 °C °C to 1100 °C	0.5 °C 0.4 °C	By electrical simulation using calibrator with reference to ITS-90
	-100 °C to 1100 °C	0.5 °C	By electrical measurement using Temperature calibrator

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	-100 °C to 0 °C 0 °C to 1000 °C	0.5 °C 0.4 °C	By electrical simulation using calibrator with reference to Table ITS-90
(f) Type S	0 °C to 1000 °C 1000 °C to 1700 °C	1.5 °C	By electrical simulation using calibrator with reference to ITS-90
	0 °C to 1000 °C 1000 °C to 1700 °C	1.5 °C	By electrical measurement using Temperature calibrator
	to 1000 °C 1000 °C to 1700 °C	1.5 °C	By electrical simulation using calibrator with reference to Table ITS-90
(i) Pt 100	-100 °C to 0 °C to 800 °C	0.6 °C 0.7 °C	By electrical simulation using calibrator with reference to ITS-90
	-100 °C to 800 °C	0.6 °C	By electrical measurement using Temperature calibrator
	-100 °C to 0 °C to 800 °C	0.6 °C 0.7 °C	By electrical simulation using calibrator with reference to Table ITS-90
A) Dc Voltage	0 mV to 320 mV 320 mV to 3.2 V	0.063 0.063 mV/V	
	3.2 V to 32 V	0.063 mV/V	
	32 V to 320 V 320 V to 1050 V	0.063 mV/V 0.070 mV/V	Generation using calibrator model
	1 mV to 100 mV 100 mV to 1 V	0.059 pV/V 0.034 mV/V	
	1Vto10V	0.029 mV/V	Measurement been
	10 V to 100 V 100 V to 1000 V	0.037 mV/V 0.039 mV/V	made by using Fluke 8845A Precision
	10 V to 100 V 100 V to 1000 V	None	Multimeter
	33 V to 330 V 330 V to 1020 V	6.5E-04V 2.6 E-03V	5522A
	0Qto110	1.5E-030	

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	to 33. O	1.9E-030	
	33 Q to 110 QO	3.5 E-030	
	110 to 330 O	8.3 E-030	
	330 Q to 1.1 kO	3.4 E-05 kQ	
	0 to 100 mV 100 mV to 1V 1V to 10V 10 V to 100 V 100 V to 1000 V	0.12 pV 79 + 55 74 + 0.54 mV 83 UV/V + 5.6 mV 86 + 29 mV	Measuring using Fluke 8845A
	0.5 kV to 10 kV	6.0 mV/V + 5.5 mV	Measuring using Kikusui 149-10A
	-0.1 mV to -100 mV -100.1 mV to -1 V to -10 V -10.1 V to -100 V -100.1 V to -1000 V	40 21 18 39 39	Measurement Using Multimeter Keysight 34470A
	0.1 mV to 100 mV	40	
	100.1 mV to 1V	21	
	1.1V to 10V	18	
	10.1 V to 100 V 100.1 V to 1000 V	39 39	
	100.1 nA to 1	510	Measurement
	1.1 10 pA	510	Using Multimeter
	10.1 pA to 100 pA	500 pA/A	Keysight 34470A
	-0.1 mV to -100 mV -100.1 mV to -1 V V -10.1 V to -100 V -100.1 V to -1000 V	40 21 17 39 39	Measurement Using Multimeter Keysight 34470A
	0.1 mV to 100 mV	41	
	100.1 mV to 1V	21	
	1.1V to 10V	18	
	10.1 V to 100 V 100.1 V to 1000 V	39 39	
	100.1 nA to 1 yA	510	Measurement
	1.1 10 pA	510	Using Multimeter
	10.1 pA to 100 pA	500 pA/A	Keysight 34470A
Ac Current	At 1 kHz	None	
	0A to 1A	0.9 mA/A	
	1A to 3A	None	
	None	see Matrix F	Measurement
	30A to 109.999A 45Hz to 1kHz 110A to 205A 45Hz to 1kHz	1.9mA/A + 47mA	Measurement using Fluke 5522A and Fluke 5500A/Coil 50 Turn Coil
	205A to 549.995A	None	
	45Hz to 65Hz	4.7mA/A + 0.78A	
	550A to 1025A	None	

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	45Hz to 65Hz	4.8mA/A+0.69A	
	0.1Ato 100A	None	
	3 Hz to 5 Hz	1 mA/A + + 0.07 LA	
	5 Hz to 10 Hz	1.5 mA/A + + 0.07 HA	
	10 Hz to 5 kHz	None	
	1Ato3A	None	
	3 Hz to 5 Hz	1 mA/A + + 0.72 LA	
	5 Hz to 10 Hz	1.5 MAJA + + 1.17 PA	
	10 Hz to 5 kHz	None	
	to 10 mA 3 Hz to 5 kHz 5 kHz to 10 kHz	1mA/A++7.2 1.5 + + 11.7 PA	Direct measurement with 6 % digit multimeter
	10 mA to 100 mA	None	
	3 Hz to 5 kHz	1 mA/A + 0.07 mA	
	5 kHz to 10 kHz	1.5 + 0.12 mA	
	100 mA	None	
	3 Hz to 5 kHz	1 mA/A + 0.8 mA	
	5 kHz to 10 kHz	1.5 mA/A + 0.1 mA	
	1Ato3A	None	
	3 Hz to 5 kHz	1.5 + 2.3 mA	
	5 kHz to 10 kHz	1.5 + 2.4 mA	
	1Ato50A 10 Hz to 10 kHz	17 mA/A	Direct measurement with
	10 30 kHz to 300 kHz	21 mA/A	current probe and 6 % digit multimeter
	220 to 2.2A (see Matrix B)	(See Matrix B)	
	150 A to 1000 A	None	
	1000 Hz:	None	
	00to10A 10Ato 100A	1.3 mA/A	Calibration using Valhalla 2575A
	5000 Hz:	None	
	00to10A	1.3 mA/A	
	10Ato 100A	None	
	10000 Hz:	None	
	00to10A	1.3 mA/A	
	10Ato 100A	None	
	See Matrix F	None	
	0 to 33 mA 0 to 330 mA 0to22A 0to11A	None	
	0.03 to 0.33 mA	None	
	10 Hz to 20 Hz	0.3 pA	
	20 Hz to 45 Hz	0.3 pA	
	45 Hz to 1 kHz	0.3 pA	
	1 kHz to 5 kHz 5 kHz to 10 kHz	0.3 pA 0.3 pA	
	0.33 to 3.3 mA	None	

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
	10 Hz to 45 Hz	3 yA	
	45 Hz to 1 kHz	3 yA	
	1 kHz to 5 kHz	3 yA	
	5 kHz to 10 kHz	3 yA	
	3.3 to 33 mA	None	
	10 Hz to 45 Hz	28	
	45 Hz to 1 kHz	28	Generation using
	1 kHz to 5 kHz	28	calibrator model
	5 kHz to 10 kHz	28	Fluke 5500A
	33 to 330 mA	None	
	10 Hz to 45 Hz	0.4mA	
	45 Hz to 1 kHz	0.4mA	
	1 kHz to 5 kHz	0.4mA	
	5 kHz to 10 kHz	0.4mA	
	0.33 to 2.2A	None	
	10 Hz to 45 Hz	4mA	
	45 Hz to 1 kHz	4mA	
	1 kHz to 5 kHz	7mA	
	2.2 to 11A	None	
	45 Hz to 65 Hz	None	
	65 Hz to 500 Hz	13 mA	
	500 Hz to 1 KHz	14mA	
	10 Hz to 20 Hz 20 Hz to 45 Hz	None	
	45 Hz to 1 kHz	None	
	1 kHz to 5 kHz	None	
	5 kHz to 10 kHz	5 yA	
	0.33 to 3.3 mA	None	
	10 Hz to 45 Hz	5 yA	
	45 Hz to 1 kHz	5 yA	
	1 kHz to 5 kHz	None	
	5 kHz to 10 kHz	23	
	3.3 to 33 mA	None	
	10 Hz to 45 Hz	49 pA	
	45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	46 pA 83 0.2mA	Generation using calibrator model Fluke 5500A
	33 to 330 mA	None	
	10 Hz to 45 Hz	0.6 mA	
	45 Hz to 1 kHz	0.5mA	
	1 kHz to 5 kHz	0.9mA	
	5 kHz to 10 kHz	2.3mA	
	0.33 to 2.2A	None	
	10 Hz to 45 Hz	6mA	
	45 Hz to 1 kHz	5mA	
	1 kHz to 5 kHz	20 mA	

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	2.2to11A	None	
	45 Hz to 65 Hz	None	
	65 Hz to 500 Hz	20 mA	
	500 Hz to 1	45 mA	
	33 UA to 10A	See Matrix B	reference to EURAMET cg-15, Version 3 (02/2015)
	290 to See Matrix B	See Matrix B	Calibrator Fluke 5520A
	0.1 20A See Matrix D	See Matrix D	Multimeter Fluke 8508A
	0.1 UA to 20A See Matrix H	See Matrix H	Multimeter Fluke 8508A
	See Matrix B	See Matrix B	Direct measurement using
	See Matrix D	See Matrix D	Direct Measurement using Fluke
	100 yA	None	
	10 Hz to 1 kHz 1 kHz to 5 kHz	0.0097 pA 0.016 pA	Direct measurement using Digital Multimeter Datron 1281
	2.2Ato11A 45 Hz to 65 Hz	1.00mA/A	Rev 01 using Direct Method
	65 Hz to 500 Hz	None	
	500 Hz to 1 kHz	None	
	11 A to 550 A (current coil) 45 Hz to 65 Hz 65 Hz to 440 Hz	3.4mA/A	Calibrated according to procedure LCP01705, Rev 01 using Direct Method
	100A	None	Calibrated according to
	1mAto3A	See Matrix D	procedure LCP01703, Rev 01 using Direct
	1mAto3A	None	Method
	3Ato 100A	None	Calibrated according to
	45 Hz to 65 Hz	2.4mA/A	procedure LCP01706, Rev 02 using Method
	45 Hz to 65 Hz	None	Method
	50 to3A	None	
	3Ato 100A	None	Calibrated according to
	45 Hz to 65 Hz	2.5mA/A	procedure LCP01706, Rev 04 using Direct
	45 Hz to 65 Hz	None	Method
	45 Hz to 65 Hz	None	

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Ac Voltage	0 mV to 10 V (Refer The Matrix A)	(Refer The Matrix A)	
	10 V to 750 V	None	
	(Refer The Matrix B)	(Refer The Matrix B)	
	At 50 Hz 1 kV to 10 kV	13 mV/V	
	At 50 Hz 1 kV to 10 kV	16 mV/V	
	2.2 mV to 220 V	See Matrix E	Measurement
	330V to 1020V	None	using Fluke
	45Hz to 1kHz	0.24mV/V + 11mV	5522A
	1kHz to 5kHz	0.21mV/V + 8.6mV	
	5kHz to 10kHz	0.24mV/V +	
	0 mV to 750 V	Refer Matrix A	measurement with 6 % digit multimeter
	2.2 mV to 220 V (See Matrix A)	(See Matrix A)	
	220 V to 1100 V	None	
	15 Hz to 50 Hz	0.30 mV/V + 16 mV	
	220 V to 1100 V	None	
	50 Hz to 1 kHz	77 + 3.2 mV	
	See Matrix E	None	
	0.5 kV to 10 kV	12 mV/V + 13 mV	
	1.0 to 33 mV	None	
	10 Hz to 45 Hz	3.6	
	45 Hz to 10 kHz	43	
	10 kHz to 20	3.6 UV	
	20 kHz to 50 kHz	5.7	
	50 kHz to 100 kHz	11	
	100 kHz to 500 kHz	26	
	33 to 330 mV	None	
	10 Hz to 45 Hz	13	
	45 Hz to 10 kHz	77 uv	
	10 kHz to 20	13	
	20 kHz to 50 kHz	18	
	50 kHz to 100 kHz	45 110	
	100 kHz to 500 kHz		
	0.33 to 3.3 V	None	
	10 Hz to 45 Hz	0.1 mV	
	45 Hz to 10 kHz	0.1 mV	Generation using
	10 kHz to 20 kHz	0.1 mV	calibrator model
	20 kHz to 50 kHz	0.2 mV	Fluke 5500A
	50 kHz to 100 kHz	0.2 mV	
	100 kHz to 500 kHz	1.1 mV	
	3.3 to 33. V	None	
	10 Hz to 45 Hz	1.2mV	

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	45 Hz to 10 kHz	None	
	10 kHz to 20 kHz	1.2mV	
	20 kHz to 50 kHz	2.1mV	
	50 kHz to 100 kHz	2.8 mV	
	33 to 330 V	None	
	10 Hz to 45 Hz	None	
	45 Hz to 10 kHz	14 mV	
	10 kHz to 20 kHz	14 mV	
	330 to 1020 V	None	
	45 Hz to 1 kHz	39 mV	
	1 kHz to 5 kHz	52 mV	
	-1 Ato -100 mA	None	HP 3458A
	10 mV rang	None	
	0 mV to 10 mV	None	
	100 mV rang	None	
	10 mV to 100 mV	None	
	1V rang	None	
	100 mV to 1 V	None	
	10 V range	(See Matrix A)	
	1Vto10V	None	
	100 V rang	None	
	10 V to 100 V	None	
	1000 V rang	None	
	100 V to 700 V	None	
	(See Matrix A)	None	
	10 Hz to 45 Hz	0.14 mV	
	45 Hz to 10 kHz	85	
	10 kHz to 20 kHz 20 kHz to 50 kHz	91 0.11 mV	
	50 kHz to 100 kHz	0.16 mV	
	100 kHz to 500 kHz	0.41 mV	
	33 to 330 mV	None	
	10 Hz to 45 Hz	0.9 mV	
	45 Hz to 10 kHz	0.2 mV	
	10 kHz to 20 kHz	None	
	20 kHz to 50 kHz	0.6 mV	
	50 kHz to 100 kHz	1.0 mV	
	100 kHz to 500 kHz	2.8 mV	
	0.33 to 3.3 V	None	
	10 Hz to 45 Hz	5.9 mV	Generation
	45 Hz to 10 kHz	1.2mV	using
	10 kHz to 20 kHz	3.1 mV	calibrator
	20 kHz to 50 kHz	5.6 mV	model
	50 kHz to 100 kHz	11 mV	Fluke 5500A
	100 kHz to 500 kHz	22 mV	
	3.3 to 33 V	None	

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	10 Hz to 45 Hz	59 mV	
	45 Hz to 10 kHz	16 mV	
	10 kHz to 20 kHz	33 mV	
	20 kHz to 50 kHz	76 mV	
	50 kHz to 100 kHz	110 mV	
	33 to 330 V	None	
	10 Hz to 45 Hz	0.2	
	45 Hz to 10 kHz	0.3	
	10 kHz to 20 kHz	0.3	
	330 to 1020 V	None	
	45 Hz to 1 kHz	0.7	
	1 kHz to 5 kHz	2.3	
	- 1000 V to -100 V	None	HP 3458A
	10 mV rang	None	
	0 mV to 10 mV	None	
	100 mV range	None	
	10 mV to 100 mV	None	
	1V rang	None	
	100 mV to 1V	None	
	10 V rang	(See Matrix B)	
	1V to 10V	None	
	100 V rang	None	
	10 V to 100 V	None	
	1000 V rang	None	
	100 V to 700 V	None	
	(See Matrix B)	None	
	33 mV to 750 V	See Matrix A	reference to EURAMET cg-15,
	33 mV to 750 V	None	Version 3 (02/2015)
	33 mV to 1020 V See Matrix A	See Matrix A	Calibrator Fluke 5520A
	100 to 1050 V See Matrix C	See Matrix C	Multimeter Fluke 8508A
	33 mV to 1020 V See Matrix E	See Matrix E	Calibrator Fluke 5520A
	100 to 1050 V See Matrix G	See Matrix G	Multimeter Fluke 8508A
	See Matrix A	See Matrix A	Direct measurement using
	See Matrix C	See Matrix C	Direct Measurement using Fluke
	10 kHz to 20 kHz	1.0mV/V	Method
	330 V to 1020 V	None	
	45 Hz to 1 kHz	0.67	
	1 kHz to 5 kHz	2.3mV/V	
	5 kHz to 10 kHz	2.3mV/V	

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	1 mV to 750 V	See Matrix C	Calibrated according to procedure LCP01703, Rev 01 using Direct Method
	750 V to 1000 V 45 Hz to 1 kHz 1 kHz to 10 kHz	9.2mV/V 9.2mV/V	Calibrated according to procedure LCP01703, Rev 01 using Direct Method
	45 Hz to 65 Hz	35	procedure LCP01707,
	45 Hz to 65 Hz	None	Rev 01 using Direct
	45 Hz to 65 Hz	None	Method
	1 mA to 10 mA	0.90 mA/A	Calibrated according to
	10 mA to 100 mA	0.77	procedure LCP01703 &
	0.045 kHz to 1 kHz	9.2mV/V	using Direct Method
	1 kHz to 10 kHz	9.2mV/V	
	to 40 kV 45 Hz to 65 Hz	62 mV/V	Calibrated according to procedure LCP01707, Rev 01
	to 40 kV 45 Hz to 65 Hz	None	using Direct Method
Analytical Balances	Up to 100 g Up to 200 g	0.46 mg 0.88 mg	Calibration using Standard weight with reference to ASTM E898:2020 The calibration procedures covers test on instrumental error, repeatability and eccentric.
B) Ac Voltage	0 mV to 105 V (Refer Matrix C)	(Refer Matrix C)	Wavetek 9100 / Fluke 5522 A
	105 V to 1050 V	None	
	(Refer Matrix D)	(Refer Matrix D)	
	1 mV to 750 V (Refer Matrix F)	(Refer Matrix F)	
	1 mV to 1000 V	See Matrix A	
	See Matrix C	None	
C) Dc Current	0 Ato 320 pA 0.32 mA to 3.2 mA 3.2 mA to 32 mA 32 mA to 320 mA 0.32 A to 3.2A 3.2 Ato 10.5A	0.013 0.13 0.13 0.14 0.41 mA/A 0.4 mA/A	Generation using calibrator model Wavetek 9100 / Fluke 5522A

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	OUA to 330 pA 330 UA to 3.3 mA 3.3 mA to 33 mA 33 mA to 330 mA 330 mA to 1.1A 3Ato10A 10Ato20A	5.0E-02 yA 2.7E-04mA 2.5E-03 mA 2.5 E-02mA 1.8E-04A 9.0E-04A 4.2E-02A 16E-02A	Generation using calibrator model Fluke 5522A
C) Resistance	10 to 1002 100 9 to 1 kQ	0.93 MA/Q 0.07 MA/Q	
	1 kQ to 10 kQ	0.072	
	10 kQ to 100 kQ	0.072	
	100 kQ to 1 MQ	0.074 mQ/Q	
	1 MQ to 10 MQ	0.029	
	10 MQ to 100 MQ	4.9	Measurement been
Caliper (external & Internal)	up to 300 mm 300 mm to 600 mm	15 um 18 um	Measurement of instrument error reference to JIS B7507:2016
Capacitance	10 MQ to 100 MQ 100 pF to 900 pF 1 nF to 9nF	1.5 8.3 mF/F 7.2 mF/F	Using decade resistance, decade capacitance and decade inductance
	10 nF to 90 nF	6.1 mF/F	
	100 nF to 900 nF	6.1 mF/F	
	1 UF to 9 UF	8.9 mF/F	
	to	+ 9.0nF	
	to	2.9mF/F + 53nF	
	to 109.999UF	3.5mF/F + 98nF	
	to	3.3mF/F +	
	0.33mF to 1.09999mF	3.5mF/F +	Measurement
	1.1mF to 3.29999mF	3.4mE/F +	using Fluke
	3.3mF to 10.9999mF	3.5mF/F +	5522A
	11mF to 32.9999mF	6.1mF/F +	
	33mF to 110mF	+	
	0Q to	+	
	110 to 32.99990,	+ 1.2mQ	
	33Q to	+	
	110Q to 329.99990	+ 1.7mQ	
	3300 to 1.09999kQ	+ 2.0mQ	
	1.1kQ to	+ 17mQ	
	3.3kQ to 10.99999kO	+ 12mQ	
	11kQ to	+ 0.170	
	100 Hz & 120 Hz	None	
	200 pF to 2000 pF	2.7 pF	
	2 nF to 20 nF	20 pF	
	20 nF to 200 nF	0.13 nF	
	200 nF to 2000 nF	1.3 nF	

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	1 kHz	None	
	20 pF to 200 pF	0.25 pF	
	200 pF to 2000 pF	2.2 pF	
	2 nF to 20 nF	13 pF	
	20 nF to 200 nF	0.13 nF	
	200 nF to 2000 nF	1.3 nF	
	0.4 nF (0.19 nF to 0.4 nF) 10 Hz to 10 kHz	5.7 mF/F + 0.01 nF	Calibrator Fluke 5520A
	1.1 nF (0.4 nF to 1.1 nF) 10 Hz to 10 kHz	5.7 mF/F + 0.01 nF	Calibrator Fluke 5520A
	3.3 nF (1.1 nF to 3.3 nF) 10 Hz to 3 kHz	5.8 mF/F + 0.01 nF	Calibrator Fluke 5520A
	11 nF (3.3 nF to 11 nF) 10 Hz to 1 kHz	2.9 mF/F + 0.01 nF	Calibrator Fluke 5520A
	33 nF (11 nF to 33 nF) 10 Hz to 1 kHz	2.8 mF/F + 0.01 nF	Calibrator Fluke 5520A
	110 nF (33 nF to 110 nF) 10 Hz to 1 kHz	2.9 mF/F + 0.1 nF	Calibrator Fluke 5520A
	330 nF (110 nF to 330 nF) 10 Hz to 1 kHz	2.9 mF/F + 0.3 nF	Calibrator Fluke 5520A
	1.1 uF 0.4 to 1.1 uF 10 Hz to 600 Hz	2.9 MF/F + 1 nF	Calibrator Fluke 5520A
	3.3 uF (1.1 uF to 3.3 uF) 10 Hz to 300 Hz	2.9 MF/F + 3 nF	Calibrator Fluke 5520A
	11 F (3.3 uF to 11 uF) 10 Hz to 150 Hz	2.9 + 12nF	Calibrator Fluke 5520A
	OnF to 1 nF	2.3%of rdg+0.029nF	Direct measurement using
	0.1nF to 1 nF	rdg+0.014nF	Direct Measurement using Fluke
	110 nF to 0.330 uF 0.330 uF to 1.1 uF	4.0 4.0	
	1.1 uF to 3.3 uF	5.1	
	3.3 uF to 11	None	
	11 uF to 33 uF 33 uF to 110	5.7 mF /F 6.8 mF /F	
	110 uF to 330 uF	9.1	
	330 uF to 1.1 mF	12 mF/ F	
	0.01 Hz to 12 kHz	0.062 mHz / Hz	
Cut-off Current	0.5 mA to 10 mA 10 mA to 50 mA	65 14	Direct measurement method
D) Ac Current	10A (Refer Matrix E)	(Refer Matrix E)	
D) Dc Current	100 pA mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 400 mA 400 mA to 1 mA	0.36 PAA 0.44 0.35 0.35 0.49 mA/A	made by using Fluke 8845A Precision Multimeter

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Dc Current	1Ato3A	0.8 mA/A	
	3Ato10A	1.2 mA/A	
	0 to 100 pA 100 pA to 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1A	0.92 mA/A + 42 nA 0.85 mA/A + 0.53 pA 0.80 MAJA + 2.5 0.63 mA/A + 9.6 1.0 + 0.51 mA	Measuring using Fluke 8845A
	1Ato10A	1.9 + 3.0 mA	
	10 mA to 100 mA 100 mA to 1A	0.33 0.66 mA/A	
	1Ato3A	0.87 mA/A	
	0 UA to 220 pA	40 + 6 nA	Measurement
	3.3A to 10.999A 11A to 29.999A 30A to 109.999A 110A to 205A	0.34mA/A + 6OMA 0.75mA/A + 55mA + 41mA 2.5mA/A +	Measurement using Fluke 5522A and Fluke
	205A to 549.995A 550A to 1025A	4.0mA/A + 0.44A 4.4mA/A + 0.20A	5500A/Coil 50 Turn Coil
	3.3A to 10.999A	None	
	45Hz to 1kHz	None	
	11A to 29.999A	None	
	45Hz to 1kHz	None	
	32.9999mA to 329.999mA to 1.0999A	78uA/A+2.0UA 0.16mA/A+31UA	
	1.1A to 2.99999A	None	
	2.99999A to 10.9999A	None	
	11A to 20.5A	None	
	0 mA to 10 mA 10 mA to 100 mA 100 mA to 1A 1Ato3A	0.45 + 5.8 nA 0.45 mA/A + 0.07 pA 0.2 mA/A + 0.66 0.2 + 8.52 0.4 + 0.08 mA	Direct measurement with 6 % digit multimeter
	0 mA to 10 mA 10 mA to 100 mA 100 mA to 1A 1Ato3A	0.5 mAVA + 0.23 mA	
	0 mA to 10 mA 10 mA to 100 mA 100 mA to 1A 1Ato3A	None	Direct
	0 mA to 10 mA 10 mA to 100 mA 100 mA to 1A 1Ato3A	None	measurement with
	0.1Ato 100A	0.07 mA/A + 4.2 mA	DC current shunt
	0.1Ato 100A	None	and 6 % digit
	0.1Ato 100A	None	multimeter
	0 UA to 220 pA	0.94 nA/A + 7.8 nA	
	220 UA to 2.2 mA	8.6 nA/A + 24 nA	

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
	2.2 mA to 22 mA	87 + 0.21	
	22 mA to 220 mA	1.5 + 3.4	
	220 mA to 2.2A	18 + 48 LA	
	10 pA	0.2	
	10 to 100 pA	37 +	
	100 pA to 1mA	30 + 6 nA	
	1 mA to 10 mA	30 + 52 nA	
	10 mA to 100 mA	47 + 0.6	
	100 mA to 1A	0.1 + 5 pA	
	0 to 3.3 mA	0.1 pA	
	0 to 33 mA 0 to 330 mA 0 to 22A 0 to 11A	2.1 0.1mA 1.2mA 7.8mA	Generation using calibrator model Fluke 5500A
	100 pA	None	
	+10 to +100 pA	16 nA	
	-100 pA 10 pA	16 nA	
	+100 to +1 mA	69 nA	
	-1 mA to -100 pA	69 nA	
	10 mA	None	
	+1 +10 mA	0.7	
	-10 mA to -1 mA	0.7 UA	
	100 mA	None	
	+10 mA to +100 mA	None	
	-100 mA to -10 mA	None	
	1A	None	
	+100 mA to +1A	0.1 mA	
	-1 A to -100 mA	0.1 mA	
	110 to 330 MQ	(of reading)	
	0 to 3.3 mA mA 0 to 330 mA 0 to 22A	0.5 pA 0.1mA 1.4mA	Generation using calibrator model Fluke 5500A
	0 to 3.3 mA mA 0 to 330 mA 0 to 22A	11mA	
	+10 to +100 pA -100 pA 10 pA	16 nA 16 nA	
	1mA	None	
	+100 A to +1 mA	74nA	
	mA to -100 pA	74nA	
	10 mA	None	
	+1 mA to +10 mA	0.7 pA	
	-10 mA to -1 mA	0.7 pA	
	100 mA	None	
	+10mA to +100 mA	8 yA	
	-100 mA to -10 mA	8 yA	
	1A	None	
	+100 mA to +1A	0.2mA	

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	-1 A to -100 mA	0.2mA	
	0 to 330 pA	170 + 23 nA	Fluke 5522A with reference to EURAMET cg-15, Version 3 (02/2015)
	330 UA to 3.3 mA	113 + 57 pA	Fluke 5522A with reference to EURAMET cg-15, Version 3 (02/2015)
	3.3 mA to 33 mA	113 + 0.29 PA	Fluke 5522A with reference to EURAMET cg-15, Version 3 (02/2015)
	33 mA to 330 mA	113 PA/A + 2.8 LA	Fluke 5522A with reference to EURAMET cg-15, Version 3 (02/2015)
	330 mA	227 + 45 pA	Fluke 5522A with reference to EURAMET cg-15, Version 3 (02/2015)
	1.1A to 3A	429 + 48 LA	Fluke 5522A with reference to EURAMET cg-15, Version 3 (02/2015)
	3A to 10A	567 + 562 PA	Fluke 5522A with reference to EURAMET cg-15, Version 3 (02/2015)
	3A to 10A	None	Fluke 5522A with
	330 A + (0 pA to 330 A)	+ 0.02	Calibrator Fluke 5520A
	3.3 mA mA to 3.3 mA)	0.12 + 0.05	Calibrator Fluke 5520A
	33 mA + (0 mA to 33 mA)	0.12 mA/A PA	Calibrator Fluke 5520A
	330 mA + (0 mA to 330 mA)	0.12	Calibrator Fluke 5520A
	1.1A +(0A to	0.23 mA/A + 47 PA	Calibrator Fluke 5520A
	3A +(1.1A to 3A)	0.46 mAVA + 0.11 mA	Calibrator Fluke 5520A
	11A	0.58 mA/A + 0.58 mA	Calibrator Fluke 5520A
	20.5A +(11A to 20.5 A)	1.2 mA/A + 0.87 mA	Calibrator Fluke 5520A

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
	200 (0.1 A to 199.99	13 + 0.6 nA	Multimeter Fluke 8508A
	2mA (0.2 mA to 199.99 mA)	13 + 0.006 pA	Multimeter Fluke 8508A
	20 mA (2 mA to 19.999 mA)	16 + 0.06	Multimeter Fluke 8508A
	200 mA (20 mA to 199.99 mA)	55 + 0.98	Multimeter Fluke 8508A
	2A (0.2 A to 1.9999 A)	0.21 mA/A + 18	Multimeter Fluke 8508A
	20A (2 A to 19.999 pA)	0.46 mAVA + 0.46 mA	Multimeter Fluke 8508A
	330 pA + (0 pA to 330 pA)	0.17 mMA/A + 0.02 pA	Calibrator Fluke 5520A
	3.3 mA mA to 3.3 mA)	0.12 + 0.05 pA	Calibrator Fluke 5520A
	33 mA + (0 mA to 33 mA)	0.12 0.3 pA	Calibrator Fluke 5520A
	330 mA + (0 mA to 330 mA)	0.12	Calibrator Fluke 5520A
	1.1A +(0Ato	0.23 mA/A + 47 pA	Calibrator Fluke 5520A
	3A	0.46 + 0.11 mA	Calibrator Fluke 5520A
	11A	0.58 mA/A + 0.58 mA	Calibrator Fluke 5520A
	20.5A +(11A to 20.5A)	+ 0.87 mA	Calibrator Fluke 5520A
	200 pA (0.1 pA to 199.99 yA)	13 nA	Multimeter Fluke 8508A
	2mA (0.2 mA to 199.99 mA)	13 + 0.006	Multimeter Fluke 8508A
	(2 mA to 19.999 mA)	16 + 0.06 pA	Multimeter Fluke 8508A
	200 mA (20 mA to 199.99 mA)	55 + 0.98	Multimeter Fluke 8508A
	2A (0.2 A to 1.9999 A)	0.21 18 pA	Multimeter Fluke 8508A
	20A (2 A to 19.999 pA)	0.46 mA/A + 0.46 mA	Multimeter Fluke 8508A
	0 to 100 pA 0.1 mAto1mA	0.058%of 0.035%of rdg+0.0004mA	Direct measurement using fluke 8846A
	50 to 500 pA	0.06%of rdg+0.21	Direct Measurement using Fluke

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
	0 to 100 pV 0 to 0 to 10 mV 0 to 100 mV 0 to 1V 0 to 10 V 0 to 100 V 0 to 1000 V	None	Direct Measurement Method using Digital Multimeter Datron 1281 > Inoperative
	0 to 100 pA 0 to 1mA 0 to 10 mA 0 to 100 mA 0 to 1A	0.013 pA 0.00013 mA 0.0016 mA 0.028 mA 0.000028 A	\ Generation using calibrator model: > Inoperative Fluke 5700A
	0 mA to 3.3 mA 3.3 mA to 33 mA 33 mA to 0.330 A 0.330 A 2.2A to 11A	0.17 0.13 0.15 mA/A 0.37 mA/A 0.71 mA/A	Calibrated according to procedure LCP01701, Rev 01 using Direct Method
	0 mA to 3.3 mA 3.3 mA to 33 mA 33 mA to 0.330 A 0.330 A 2.2A to 11A	None	Calibrated according to
	11 A to 550 A (current coil)	None	procedure LCP01705, Rev 01 using Direct
	11 A to 550 A (current coil)	None	Method
	0.029 mA to 330 mA	See Matrix B	
	0.33 A to 2.2A	None	
	10 Hz to 45 Hz	2.5mA/A	
	45 Hz to 1 kHz 1 kHz to 5 kHz	None	Calibrated according to procedure LCP01701,
	100 mA to 1A 1A to 3A	1.3mA/A	LCP01715, Rev 01 using Direct Method
	100 mA to 1A 1A to 3A	None	Calibrated according to
	100A	None	procedure LCP01706,
	100A	None	Rev 02 using V/I Method
	0 mA to 24 mA	0.95 mA/A	LCP01701, Rev 01
	0 mA to 24 mA	None	using Direct Method
	0 mA to 24 mA	12mQ/Q	
	10 Q to 100 Q	8.8mQ/Q	
	100 mA to 1A 1A to 3A	1.3mA/A 1.6mA/A	using Direct Method
	100 mA to 1A 1A to 3A	None	Calibrated according to
	100A	2.5mA/A	procedure LCP01706, Rev 04 using Direct
	100A	None	Method
	100A	None	Calibrated according to
	100A	None	procedure LCP01703,

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Dial Gauge	50 to 3A	See Matrix F	Rev 01 using Direct
	Up to 5mm 5mm to 20 mm	2.5 μ m 6.5 μ m	Calibrated by using gauge tester as standards with reference to JIS
	Up to 5mm 5mm to 20 mm	None	B7503:2017
	Up to 5mm 5mm to 20 mm	None	Measurement of error of
	Up to 5mm 5mm to 20 mm	None	indication and
	Up to 5mm 5mm to 20 mm	None	repeatability only.
	Up to 100 mm	(0.3 + 0.06 L) μ m	Calibration by laser
	Up to 100 mm	None	measurement system
	Up to 100 mm	is measurement length	with reference to
	Up to 100 mm	in unit meter	JIS B 7503
	0mm to 50mm	0.5 μ m	Calibrated using i-
	0mm to 50mm	None	Checker with reference
	0mm to 50mm	None	to JIS B 7503:2017
	Up to 25 mm	0.006 mm	Calibrated using
	Up to 25 mm	None	dial gauge tester
	Up to 25 mm	None	with reference to
	Up to 25 mm	None	JIS B 7503:
	Up to 25 mm	None	2017
	Up to 25 mm	None	Measurement of
	Up to 25 mm	None	Indication error
	Up to 25 mm	None	and repeatability
	Up to 25 mm	None	only.
	Up to 100 mm (resolution: 0.01 mm) Up to 5mm (resolution: 0.001 mm) Up to 5mm (resolution: 0.005 mm)	3 μ m 0.4 μ m 2 μ m	Calibrated by using i-checker as standards based on JIS B 7503:2017
	0mm to 50 mm	0.003 mm	B7503:2017 Calibrated by using
	0mm to 50 mm	None	Micrometer Head
	None	None	
	0mm to 10 mm 10 mm to 30 mm 30 mm to 75 mm	4.0 μ m 4.0 μ m 6.5 μ m	Comparison using calibration tester with reference to BS EN ISO 463 : 2006

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Dial Test Indicator	25 mm to 50 mm 50 mm to 75 mm	1.9 μ m	micrometer head as standards according
	75 mm to 100 mm	2.2 μ m	to JIS B7503:2017
	0mm	None	Calibrated using gauge tester as standard with
	0mm	None	reference to JIS
	0mm	None	B7533:1990
	Up to 3 mm	(0.3 + 0.06 L) μ m	Calibration by laser
	Up to 3 mm	None	measurement system
	Up to 3 mm	is measurement length	with reference to
	Up to 3 mm	in unit meter	JIS B 7533
	0mm to 1.6mm	0.7 μ m	Calibrated using i-
	0mm to 1.6mm	None	Checker with
	0mm to 1.6mm	None	reference to JIS B
	0mm to 1.6mm	None	7533:2015
	0mm to 0.28 mm 0.28 mm to 1.0 mm	10 μ m	Calibrate using Calibration Tester. with reference to JIS B 7533: 2015
	Up to 1mm	0.7 μ m	Calibrated by using i-checker as standards based on JIS B 7533:2015
	Up to 0.3 mm 0.3 mm to 0.6 mm 0.6 mm to 2.0 mm	1.4 μ m 1.5 μ m	Calibrate by using micrometer head as standards according to JIS B7533:2015
	Up to 0.3 mm 0.3 mm to 0.6 mm 0.6 mm to 2.0 mm	None	Calibrate by using
Digital Displacement Indicator	up to 50 mm 50 mm to 100 mm	1.8 μ m 12 μ m	Calibrated using gauge block as standard
E) Ac Current	100 10A (Refer Matrix G)	(Refer Matrix G)	
	see Matrix D	None	
E) Resistance	09 to 40 Q to 400 Q	0.63 0.12	
	0.4 kQ to 4 kQ	0.11	
	4 kQ to 40 kQ	0.11	
	40 kQ to 400 kQ	0.12 MA/Q	
	0.4 MQ to 4 MQ	0.14 mA/Q	
	4 MQ to 40 MQ 40 MQ to 400 MQ	0.38 MA/Q 0.45	Generation using calibrator model

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
	200 to 2 KO 2 KQ to 20	0.40 0.06 KO	Calibrated using Multimeter
External Micrometer	25 mm 25 mm spindle travel for 50 mm to 100 mm 100 mm to 175 mm frame	1.0 μ m 1.5 μ m 2.0 μ m	Measurement of instrument error, and parallelism and flatness of measuring faces reference to JIS B7502:2016. Setting rod must be provided by customer.
	Up to 100 mm 100 mm to 275 mm	None	Calibrated by using gauge block as standards based on JIS B 7502:2016
	0~ 25mm	0.002 mm	Gauge Block reference to ISO
	100 mm to 150 mm frame (25 mm traverse)	None	Calibrated using Gauge Block according to
	100 mm to 150 mm frame (25 mm traverse)	None	ISO 3611:2010
	Up to 1 inch	0.0003 inch	
	1 inch to 6 inch frame (1 inch traverse)	0.0003 inch	
	Up to 50 mm	0.003 mm	
	50 mm to 150 mm	0.004 mm	Calibrated using Gauge
F) Capacitance	0.5 nF to 4 nF 4 nF to 40 nF	4.5 mF/F 2.3 mF/F	Wavetek 9100 / Fluke 5522A
	40 nF to 400 nF	2.4 mF/F	
	400 nF to 4 μ F 4 μ F to 40 μ F 40 μ F to 400 pF 400 μ F to 4 mF 4 mF to 40 mF	3 mF/F 3.5 mF/F 3.5 mF/F 3.5 mF/F 7.5 mF/F	
Feeler Gauge	0.005 mm to 3 mm	1.8 μ m	Calibrated using digital displacement indicator as standard with reference to
	0.005 mm to 3 mm	None	JIS B7524:2008
	0.05 mm to 1.0 mm	None	Calibrate using Mu Checker. with reference to JIS B 7524: 2008
Height Gauge	up to 600 mm	20 μ m	Measurement of instrument error and

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	up to 600 mm	None	parallelism of reference surface with measuring surface of scriber
	up to 600 mm	None	reference to JIS
	up to 600 mm	None	B7517:2018
	Up to 300 mm	(1.8 + 0.009 L) μ m	Calibration by gauge block and precision
	Up to 300 mm	is length in mm	
	Up to 300 mm	None	square with reference
	Up to 300 mm	None	to BS EN ISO 13225
	Omm to 600mm	8 μ m	Calibrated using caliper
	Omm to 600mm	None	checker and gauge
	Omm to 600mm	None	block with reference to
	Omm to 600mm	None	JIS B 7517:2018
	Up to 300 mm 300 mm to 1000 mm	6 μ m 13 μ m	Calibrated using Gauge Block, L-square and Dial Gauge. with reference to ISO 13225:2012
	Up to 150 mm 150 mm to 300 mm 300 mm to 600 mm	8 μ m 12 μ m	Calibrated by using caliper checker and gauge block as standards based on JIS B 7517:2018
	Omm to 300 mm 300 mm to 600 mm	11 μ m	caliper checker, gauge block and dial test indicator as
	Omm to 300 mm 300 mm to 600 mm	None	standards according
	Omm to 300 mm 300 mm to 600 mm	None	to JIS B7517:2018
	Omm to 300 mm 300 mm to 600 mm	None	Calibrate by using
	0 mm to 300 mm 300 mm to 600 mm	11 μ m	gauge block and dial test indicator as standards according
	0 mm to 300 mm 300 mm to 600 mm	None	to JIS B7517:2018
	0 inch to 6 inch	0.0003 inch	according to BS EN ISO 13225:2012
	Up to 25 mm	None	
	25 mm to 100 mm frame (25 mm traverse)	None	
High Voltage (measure) Dc Voltage	1 kV to 10 kV	None	

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High Voltage (source) Dc Voltage	1 kV to 10 kV	12 mV/V	
Inductance	100 to 1000 pH 1 mH to 10 mH	7 mH/H 7 mH/H	
	10 mH to 100 mH	7 mH/H	
	100 mH to 1000 mH	0.6 mH/H	
	100 Hz & 120 Hz 200 pH to 2000 pH 2 MH to 20 mH	2.9 19	Direct measurement with LCR meter
	20 mH to 200 mH	0.18 mH	
	200 mH to 2000 mH	None	
	2Hto 20H	41 mH	
	1 kHz	None	
	20 to 200 pH	0.29	
	200 UH to 2000 pH	None	
	2 mH to 20 mH	15	
	20 mH to 200 mH	0.13 mH	
	200 mH to 2000 mH	1.3mH	
	2Hto 20H	44 mH	
	1000 Hz	None	
	100 uH to 1 mH 1 mH to 10 mH 10 mH to 100 mH 100 mH to 1H	23 mH/H + 22 nH 12 mH/H + 25 uH 6 mH/H + 0.1 mH 3 + 0.4 mH	Calibration using Decade Inductor 1491-G
	1Hto10H	3 mH/H + 0.3 mH	
	None	None	
Measuring / Indicating Instruments	None	None	
	None	None	
	None	None	
Measuring / Indicating Instruments (measure) Lcr Indicating Meter A) Resistance B) Capacitance C) Inductance	0Q to 100 Q 100 9 to 1 kQ 1 kQ to 10 kQ 10 kQ to 100 kQ 100 kQ to 1 MQ 1 MQ to 10 MQ 10 MQ to 100 MQ	9.9 0.9 0.8 0.9 1.7 1.5 1.5 MQA/IQ	Direct measurement methods Generation using decade resistors box
	100 pF to 900 pF 1 nF to 9nF 10 nF to 90 nF 100 nF to 900 nF 1 UF to 9 UF	8.3 mF/F 7.2 mF/F 6.1 mF/F 6.1 mF/F 8.9 mF/F	Generation using decade capacitance box
	100 to 1000 pH 1 mH to 10 mH 10 mH to 100 mH 100 mH to 1000 mH	7 mH/H 7 mH/H 7 mH/H 0.6 mH/H	Generation using decade inductance box
Measuring Instruments Lcr Indicating Meter Resistance	to 100 Q	9.9	
	100 to 1 kQ	0.9	
	1 kQ to 10 kQ	0.8	
	10 kQ to 100 kQ	0.9	
	100 kQ to 1 MQ	None	
	1 MQ to 10 MQ	1.5	

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Measuring Microscope (individual Axis Only)	Individual X and Y axis only Up to 300 mm	0.008 mm	Calibrated by using glass scale as standards with reference to JIS B
	Individual X and Y axis only Up to 300 mm	None	7153:1995
Mechanical Thermometer	0°C	1.5°C	Comparison with reference Thermometer with sensor in ice point
	50 °C to 350 °C	2°C	Comparison with reference thermal block calibrator
	-20 ?C to 250 ?C	0.3 ?C	Comparison method using Pt 100 Reference Standard in liquid bath
	-20 ?C to 250 ?C	None	
Plain Plug Gauge / Plain Cylinder Gauge (diameter Only)	0.3 mm to 25 mm 25 mm to 50 mm	3 yum	Calibrated using gauge block as standard and micrometer as comparator with reference to JIS
	0.3 mm to 25 mm 25 mm to 50 mm	None	B7420:1997
Pressure Measuring Devices (pneumatic) Pressure Gauge (hydraulic) Pressure Transmitter & Transducer (pneumatic)	-0.8 bar to 20 bar 20 bar to 700 bar 0 bar to 20 bar	Permanent	1. The pressure devices, gauges are calibrated according to in-house procedure LQP-54 and LQP-56 with reference to OIML R101 2. The calibration procedure covers the increasing and decreasing tests only with reference to JIS C1031:1990

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
	-0.8 bar to 20 bar 20 bar to 700 bar 0 bar to 20 bar	0.05 bar 0.3 bar 0.3 bar	1. The pressure devices, gauges are calibrated according to in-house procedure LQP-54 and LQP-56 with reference to OIML R101 2. The calibration procedure covers the increasing and decreasing tests only with reference to JIS C1031:1990
Radiation Thermometer	0°C	0.8 °C	Comparison with reference Pt 100 in ice point
	30 °C to 400 °C	3.6 °C	Comparison with Blackbody temperature calibrator
	50 °C to 200 °C 200 °C to 400 °C	4.9°C 6.8 °C	Comparison with calibrated Blackbody source
	50 °C to 200 °C 200 °C to 400 °C	None	
	-15 °C to 0 °C to 119 °C 120 °C to 199 °C 200 °C to 299 °C 300 °C to 500 °C	0.7 °C 0.7 °C 1.0°C	Calibrated by using Infrared Calibrator based on ASTM E 1256:2017
Resistance	100 to 1 kQ to 10 kQ 10 kQ to 100 kQ	0.07 mA/Q 0.07 mA/Q 0.07 mA/Q	Direct measurement method
	100 kQ to 1 MQ	0.08 mA/Q	
	1 MQ to 10 MQ	0.3	
	10 MQ to 100 MQ	5 mA/Q	
	10	95	Measurement
	33kQ to 109.9999kQ	+ 0.200	
	110kQ to	+ 5.30	
	to	+ 5.80	
	1.1MQ to	+ 400	
	3.3MQ to	+ 720	
	11MQ to 32.99999MQ	+ 2.2kQ	
	33MQ to	+ 1.6kQ	
	110MQ to 329.9999MQ	2.5mQ/Q + 72kQ	
	to 1100MQ	None	
	00	40	
	0 to 100	24 pO/O + 87 pO	
	10 QO to 1000	20 + 0.7 ma	
	100 © to 1000	12 + 1.9 ma	

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	1 kQ to 10	12 + 0.2 ma	
	10 kQ to 100 kQ	13	
	100 kQ to 1000 kQ	22 + 10.0	
	1000 kQ to 1 MQ	70 + 192.0	
	1 MQ to 10 MO	0.6 + 3.6	
	10 to 100	rdg+0.00350	Direct measurement using
	0.001 Q to 50 O	None	Direct Measurement using Fluke
	1 kQ to 10 kQ 10 kQ to 100 kQ	0.13 mQ/Q 0.13 mQ/Q	Calibrated according
	100 kQ to 1 MQ	0.13 mQ/Q	to procedure
	1 MQ to 10 MQ	0.51 mQ/Q	LCP01703, Rev 01
	10 MQ to 100 MQ	9.4mQ/Q	using Direct Method
	10 kQ to 100 kQ 100 kQ to 1 MQ	0.13mQ/Q	Calibrated according to
	1 MQ to 10 MQ	0.47 mQ/Q	procedure LCP01703,
	10 MQ to 100 MQ	9.4mQ/Q	Rev 01 using Direct Method
	3 Hz to 5 Hz	1.2 mHz/ Hz	Rev 01 using Direct Method
Sourcing Instruments	None	None	Direct measurement methods
	None	None	Direct measurement methods
	Sourcing Instruments (Continued)	None	
	1kV to 5 kV	None	Calibrated according to
	Sourcing Instruments	Sourcing Instruments	Calibrated according to procedure LCP01703 & LCP01715, Rev 01 using Direct Method
Sourcing Instruments Dc Voltage	100 mV to 1 V 1Vto10V	0.030 mV/V 0.025 mV/V	
	10 V to 100 V	0.032 mV/V	
	100 V to 1000 V	0.035 mV/V	
Surface Plate Flatness	500 mm x 500 mm 750 mm x 500 mm 1000 mm x 750 mm 2000 mm x 1000 mm	3 um 4.2 um 5 yum 7.5 ym	Calibrated using Precision Level Meter (Inclinometer) with reference to JIS B7513:1992

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Temperature & Humidity Indicator Or Recoder	to 50 °C 50 °C to 100 °C	0.6 °C 0.8 °C	Comparison with sensor in chamber or temperature/humidity reference meter in chamber.
	Relative humidity at 25 °C 20 %rh to 50 %rh 50 to 95 Yrh	2.2 %rh 2.5 %rh	Comparison with sensor in chamber or temperature/humidity reference meter in chamber.
Temperature Calibrator (a) Type T	-100 °C to 390 °C	0.6 °C	By electrical measurement using Temperature calibrator
Temperature Control Enclosure	-50 °C to 200 °C 200 °C to 400 °C 400 °C to 800 °C 800 °C to 950 °C	0.6 °C 0.8 °C 1.8 °C 2.5 °C	Calibrate using temperature recorder with thermocouple.
Temperature Recorders/indicators (a) Type T	-100 °C to 390 °C	0.6 °C	By electrical simulation using calibrator with reference to ITS-90
	-100 °C to 0 °C to 390 °C	0.7 °C 0.6 °C	By electrical simulation using calibrator with reference to Table ITS-90
Temperature Sensor	0°C	0.8 °C	Comparison with reference Thermometer with sensor in ice point
	50 °C to 350 °C	1°C	Comparison with reference thermal block calibrator
	0 to 250	0.07	Calibrated using
	250 to 400	0.15	PRT and Dry Block
	400 to 650	0.17	by comparison
	400 to 650	None	method
	to 250 °C	0.3 °C	Comparison with
	to 250 °C	0.3 °C	Comparison with
	0°C	0.64 °C	Comparison with
	0°C to 420 °C	0.18 °C	Comparison method using SPRT and
	0°C to 420 °C	0.18 °C	Comparison method using SPRT and

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
	0°C to 420 °C	0.51 °C	Comparison method using SPRT and
	200 °C to 400 °C	0.33 °C	
	400 °C to 600 °C 600 °C to 1200 °C	0.75 °C 2.7 °C	Comparison with reference Pt100/Type R in
	400 °C to 600 °C 600 °C to 1200 °C	None	liquid bath and
	30 °C to 200 °C 200 °C to 400 °C	0.27 °C 0.44 °C	Comparison with reference Pt100 in temperature block calibrator
Temperature Sensor With Indicator	-35 °C to 165 °C	0.1°C	Comparison with Pt100 in Temperature block calibrator
	-30 °C to 20°C 30 °C to 100 °C 100 °C to 300 °C 300 °C to 400 °C	0.91°C 0.48 °C 0.76 °C 1.6°C	Comparison with PRT sensor in Liquid bath and Dry Block
	-40 °C to 0°C 0 °C to 50°C 50 °C to 70 °C	1.0°C 0.49 °C 1.0°C	
	30 °C to 100 °C 100 °C to 300 °C 300 °C to 400 °C	0.48 °C 0.76 °C 1.6°C	Comparison with Pt 100 and thermocouple in temperature block calibrator
	-20 °C to 150 °C 150 °C to 600 °C 600 °C to 800 °C	1.0°C 3.1°C 4.6°C	Calibration using RTD Pt-100 probe and Thermocouple Type R
	800 °C to 1100 °C	None	
	-30 °C to 300 °C 300 °C to 640 °C	1.8°C	Comparison with Pt100 in liquid bath and Dry
	-30 °C to 30 °C 30 °C to 650 °C	0.1 °C 0.3 °C	Comparison with standard resistance thermometer /
	651 °C to 1200 °C	2.7 °C	thermocouple in block temperature bath
	651 °C to 1200 °C	None	
	200 °C to 400 °C	None	
	200 °C to 400 °C	None	
	200 ?C to 400 ?C	None	
	200 ?C to 400 ?C	None	
	-30 °C to 0 °C 0 °C to 200 °C 200 °C to 400 °C 400 °C to 600 °C	0.09 °C 0.083 °C 0.33 °C 0.75 °C	temperature block calibrator
	600 °C to 1200 °C	2.7 °C	

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
	30 °C to 200 °C 200 °C to 400 °C	0.2 °C 0.41 °C	Comparison with reference Pt100 in temperature block calibrator
Thickness Gauge	Up to 15 mm 15 mm to 50 mm	10 um	Calibrated by using gauge block as standard with reference to JIS
	Up to 15 mm 15 mm to 50 mm	None	B7519:1994
	Omm to 50mm	0.7 um	Calibrated using
	Omm to 50mm	None	block with gauge
	Omm to 50mm	None	ASME B
	Omm to 50mm	None	89.1.10M-2001
	Up to 5mm Resolution: 0.002mm Up to 50 mm Resolution: 0.01mm	0.5um 3yum	Calibrated by using gauge block as standards with reference to JIS B 7519:1994
Thread Plug Gauge	0mm to 25 mm 25 mm to 50 mm	Major diameter: 1.8 um Pitch diameter: 2.8 um Major diameter: 2.0 um Pitch diameter: 2.8 um	Calibrated by using three- wire set and micrometer as standards with reference to JIS
	50 mm to 75 mm	Major diameter: 2.5 um Pitch diameter: 3.0 um	B0261:2004
Weighing Balances / Scale (spring / Hanging Scale / Top Pan, Mechanical & Electronic)	Up to 500 g Up to 600 g Up to 1 kg Up to 2 kg Up to 5 kg Up to 6 kg Up to 10 kg Up to 20 kg Up to 30 kg	4.3 mg 4.5 mg 8.7 mg 10 mg 12mg 0.16 g 0.2g 0.25 g	Calibration using Standard weight with reference to ASTM E898:2020 The calibration procedures covers test on instrumental error, repeatability and eccentric.
	Up to 50 kg Up to 60 kg Up to 100 kg	2.69 3.19 59	Calibration using Standard weight with reference to ASTM E898:2020 The calibration procedures covers test on instrumental error, repeatability and eccentric.
Withstanding / Insulation Tester	None	None	

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Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Withstanding / Insulation Tester High Voltage (source) A) Dc Voltage B) Ac Voltage C) Cut-off Current	0 kV to 10 kV 0 kV to 10 kV (at 50 / 60 Hz)	13 mV/V	The measurement are measured using high voltage digital meter TOS-149-10A
	0.5 mA to 1 mA 1mAto2mA 2 mA to 5 mA 5 mA to 10 mA 10 mA to 50 mA	65 65 65 65 14	The measurement are measured using current calibrator TOS-1200

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SCOPE OF CALIBRATION : ELECTRICAL

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
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SCOPE OF CALIBRATION : MASS

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
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SCOPE OF CALIBRATION : PRESSURE

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks

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SCOPE OF CALIBRATION : TEMPERATURE

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
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