Issue date: 06 April 2025
Valid Until: -

NO: SAMM 497

LABORATORY LOCATION/ CENTRAL OFFICE:	H&P Calibration Sdn Bhd No. 25-01, Jalan Harmoni 3/6 Taman Desa Harmoni 81100 Johor Bahru, Johor , 96000, JOHOR MALAYSIA
ACCREDITED SINCE :	06 APRIL 2025
FIELD(S) OF CALIBRATION:	DIMENSIONAL ELECTRICAL FORCE 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	H&P Calibration Sdn Bhd No. 25-01, Jalan Harmoni 3/6 Taman Desa Harmoni 81100 Johor Bahru, Johor , 96000, Johor
FIELD(S) OF CALIBRATION :	DIMENSIONAL, ELECTRICAL, FORCE, MASS, PRESSURE, HEAT & TEMPERATURE

SCOPE OF CALIBRATION : DIMENSIONAL

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
(1b) Dc Current	10 nA to 100 nA 0.100 uA to 1 uA 1 uA to 10 uA 10 uA to 100 uA 0.1 mA to 1 mA 0 to 3.3 mA 3.3 to 33 MA 33 to 330 mA 0.330 2.2to11A	6.4 pA/nA + 1.7 pA 7.3 pA/ nA + 0.19 pA 19 + 3.5nA 22 nA/uA + 0.55 nA 23 nA/uA + 0.06 uA 19 uA/mA + 3.4uUA 0.10 pA/mA + 0.04 pA 0.08 pA/mA + 0.20 pA 0.08 pA/mA + 2.5 pA 0.23 mA 0.46 mA/A_ + 0.26 mA	Generation using calibrator model Fluke 5500A, Shunt
(1c) Ac Voltage See Matrix C	See Matrix C	See Matrix C	Generation using calibrator model Fluke 5500A, Shunt
(1d) Ac Current See Matrix D	See Matrix D	See Matrix D	Generation using calibrator model Fluke 5500A, Shunt
	0to 110	0.09 mO/ QO +6.1mQ	
	11. to 33 O	0.09 mO/Q +12mQ	
	33 Q to 110 QO	0.07 +12mQ	
	110 Q to 330 O	0.07 +12mQ	
	330 to 1.1 kQ	0.07	
	1.1 kQ to 3.3 kO	0.07 Q	
(1e) Resistance	3.3 to 11 kQ 11 to 33 33 to 110 kQ 110 to 330 kO	0.07 +0.460 0.07 +0.460 0.08 +460 0.09 O/KQ +460	Generation using calibrator model Fluke 5500A,
	330 kQ to 1.1 MO	0.11 kKQ/MQ +0.04 kO	
	1.1 MQ to 3.3 MO	0.11 kQ/MQ + 0.04 kQ	
	3.3 MQ to 11 MQ	0.46 kQ/MQ + 0.42 kQ	
	11 MQ to 33 MQ	0.75 kQ/MQ + 0.86 kQ	
	33 MQ to 110 MQ	3.8 kO/MQ + 8.5 kQ	
	110 MQ to 330 MQ	kQ/MQ + 53.2 KO	
(1g) Frequency	0.01 Hz to 120 Hz 120 Hz to 1200 Hz 1200 Hz to 12 kHz 12 kHz to 120 kHz 120 kHz to 1200 kHz 1200 kHz to 2.0 MHz	0.02 mHz/Hz + 0.44 mHz 0.02 mHz/Hz + 0.32 mHz 0.15 Hz/kHz + 0.44 Hz 0.02 Hz/kHz + 0.44 Hz 0.02 Hz/kHz + 0.33 Hz 1.0 Hz/MHz + 0.58 kHz	Generation using calibrator model Fluke 5500A
(2a) Dc Voltage (Hipot)	0 to 1 kV to 2 kV 2 kV to 10 kV	5.3 V/kV + 0.78 V 4.8 V/kV + 14V	Agilent 34401A, Advantest R6871E Kikusui 149-10A

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
(2b) Dc Current	OWA to 200 pA 200 UA to 2000 pA 1mA to 10 mA 10 mA to 100 mA 1A 1Ato3A 4Ato10A 10 Ato 100A	2.4 +18nA 2.4 +0.12 0.58 + 2.3 0.56 pA/mA + 8.0 1.2 +0.12 mA 1.8mA/A +1.7mA 0.17 mA/A 0.20	Agilent 34401A, Advantest R6871E Kikusui 149-10A
(2c) Ac Voltage	0 to 750 V	See Matrix E	Agilent 34401A, Advantest R6871E, Shunt
(2c) Ac Voltage (hipot)	0 to at Frequency (Hz) 50 to 60 1 kV to 2 kV at Frequency (Hz) 50 to 60 2 kV to 10 kV at Frequency (Hz) 50 to 60	11 V/kV + 0.88 V 5.0 V/kV +56 V 7.1 V/kV +	Agilent 34401A, Advantest R6871E, (AC Load 10 A) Kikusui 149-10A
(2d) Ac Current	O0to10A 10 to 100A DC to 1 kHz	See Matrix F 0.96 mA/A + 42 mA	Agilent 34401A, Advantest R6871E, (AC Load 10 A) Kikusui 149-10A
(2f) Dc Resistance	10 kQ to 100 100 kO to 1 MQ	0.07 O/kQ +2.00 0.07 O/kQ	Advantest R6871E
	1 MQ to 10 MQ	0.32 kQ/MQ + 0.04 kQ	
	10 MQ to 100 MO	2.31 + 0.05 kQ	
	100 MQ to 1 GO	0.02	
(2g) Frequency	0 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 10 kHz 10 kHz to 100 kHz 0.1 MHz to 1 MHz 1 MHz to 10 MHz 10 MHz to 100 MHz 100 MHz to 1 GHz 1 GHz to 3 GHz	0.21 + 0.07 pHz 0.21 + 0.67 pHz 0.21 + 6.5 pHz 0.21 wHz/Hz + 65 pHz 0.21 wHz/Hz + 0.65 nHz 0.21 + 6.5 nHz 0.21 wHz/Hz + 65 nHz 0.21 + 0.65 pHz 0.21 + 9.8 pHz	Agilent 53131
(3a) Dc Cutoff Current (hipot)	0 to 30 mA 30 mA to 100 mA 0 mA to 30 mA	0.5 pA/mA + 3 pA 0.5 pA/mA + 2 pA	
	0 to 30 mA 30 mA to 100 mA	0.73 + 2.6 PA 0.76 + 1.1 pA	
	0 mA to 30 mA	None	
	at Frequency (Hz)	None	
(3b) Ac Cutoff Current (hipot)	at Frequency (Hz) 20 to 50 50 to 10 k 10 k to 20 k 30 mA to 100 mA	20 + 10 pA 5.0 + 10 PA 20 + 20 PA	Calibrated using Mulltimeter (Fluke 45) and Decade Resistor (Yokogawa:2793)
	at Frequency (Hz) 20 to 50 50 to 10 k 10 k to 20 k	20 + 10 pA 5.0 + 10 pA 20 + 20	

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	20 to 50 50 to 10 k 10 k to 20k 30 mA to 100 mA at Frequency (Hz)	20 + 10 PA 5.0 + 10 PA 20 + 20 PA	Fluke 45
	20 to 50 50 to 10 k 10 k to 20k	20 + 8.8 PA 5.0 + 10 PA 20 + 20 PA	
(ii) Square Wave Signal (in 1,2,5 Sequence)	50 Q Load to2.2V 1 MQ Load 1.8 mV to 105 V	1.9 mV/V + 0.08 mV 1.9 mV/V + 0.08 mV	Fluke 5500 A (SC 300) Agilent 4425 AP
(il) Measurement A) Type T	-250 °C to -100 °C -100 °C to 400 °C	0.82 °C 0.28 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	-210 °C to -100 °C -100 °C to 400 °C	0.87 °C 0.28 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
100 Mm To 300 Mm Frame 300 Mm To 500 Mm Frame	25 mm travel 25 mm travel	2.9 um 4.6 um	Calibrate using Gauge Block. with reference to ISO 3611:2010
2. Ac Clamp Meter	at 50 Hz/ 60 Hz 10 Ato 500A 300 A to 500 A	0.42A 0.96 A	Generation using Calibrator (Fluke 5500) with 50-turn Current Coil
25 Mm To 100 Mm Frame	25 mm travel	2.0 um	
500 Mm To 700 Mm Frame	25 mm travel	9.7 um	
700 Mm To 800 Mm Frame	25 mm travel	13 um	
A) Dc Voltage	33 V to 330 V 330 V to 1020 V	6.5E-04V 2.6 E-03V	5522A
	0Qto110	1.5E-030	
	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 to1V 1Vto10V 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

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	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 to1V	21	
	1.1Vto10V	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 to1V	21	
	1.1Vto10V	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
A) Type T	-270 °C to -100 °C -100 °C to 400 °C	0.75 °C 0.28 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	- 200 °C to 400 °C	0.52 °C	
	- 270 °C to -100 °C	1.0°C	
	- 200 °C to 400 °C	0.52 °C	
Ac Power	45 Hz to 1 kHz	None	Fluke 5500 A
	29.7 mW to 726 mW	None	
	33 mV to 329.999 mV 0.9 to 2.1999 A	2.2 + 14 UW	
	45 Hz to 1 kHz	None	
	72.6 mW to 1.485 W	None	
	33 mV to 329.999 mV	None	

Instrument Calibrated/Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty (±)*	Remarks
	2.2 to 4.4999 mA 45 Hz to 1 kHz	3.1 +5.3 pW	
	148.5 mW to 3.63 W	None	
	33 mV to 329.999 mV	None	
	4.5to11A 45 Hz to 1 kHz	2.2	
	49.5 mW to 4.59 kW	None	
	33 mV to 1020 V	None	
	1.5 to 4.4999 A	3.1 + 0.15 mW	
	45 Hz to 1 kHz	None	
	148.5 mW to 11.22 kW	None	
	33 mV to 1020 V	None	
	4.5to11A	2.2 + 0.17 mW	
	45 Hz to 1 kHz	None	
	45 Hz to 1 kHz	None	Fluke 5500 A
	108.9 mW to 918 W	None	
	330 mV to 1020 V	2.2 + 0.22 mW	
	0.33 to 0.8999 A	None	
	45 Hz to 1 kHz	None	
	297 mW to 2.244 kw	None	
	330 mV to 1020 V	None	
	0.9 to 2.1999 A	1.3 + 0.14 mW	
	45 Hz to 1 kHz	None	
	726 mW to 4.59 kW	None	
	330 mV to 1020 V	None	
	2.2 to 4.4999 mA	1.8 mW/W + 0.04 mw	
	45 Hz to 1 kHz	None	
	1.485 W to 11.22 kW	None	
	330 mV to 1020 V	None	
	4.5to11A	1.3 + 0.22 mW	
	45 Hz to 1 kHz	None	
Ac/dc Withstand Voltage Tester & Insulation Tester (high-pot Tester) A) Ac Voltage (generating)	at Frequency (Hz) to 1 kV to 2 kV at Frequency (Hz) 50 to 60 2 kV to 10 kV	1.50 + 1.77 V 19.55 V/kV + 0.02 V	Calibrated using Digital High Voltage Meter (Kikusui: 149 -10A)
	at Frequency (Hz) 50 to 60	10.05 V/kV + 25.23 V	
Angle And Bevel Protractor	Up to 360 °	0.82 °	Calibrated using Angle Block. with reference to BS
	Up to 360 °	None	1685:2008

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
B) Capacitance	Up to 10 pF 10 pF to 100 pF 100 pF to 1000 pF 1000 pF to 1nF 1nF to 10nF 10 nF to 100 nF	0.0090 pF 0.056 pF 0.58 pF 5.8 pF 0.0059 nF 0.059 nF	Generation using Decade Capacitance (Genrad: 1412)
	100 nF to	0.59 nF	
	at 100 Hz, 120 Hz, 1 kHz	None	
	1 mH to 10 mH	0.012 mH	
B) Dc Current	OAto0.25A 0.25 Ato 0.75A 0.75Ato1.5A	0.2 mA 0.5 mA 0.0018 A	Calibrate by electrical masurement using Multimeter.
	1.5Ato3A	0.0045 A	(Agilent:34401A)
B) Dc Voltage (generating)	to 2.0 kV 2.0 kV to 4.0 kV 4.0 kV to 10 kV	0.56 V/kV + 1.21 V 0.36 V/kV + 2.75 V 5.14 V/kV + 15.6 V	Calibrated using Digital High Voltage Meter (Kikusui: 149 -10A)
B) Resistance	1.1 kQ to 3.3 kO 3.3 kO to 11	1.0 3.0 E-04	
	11 to 33 33 to 110 kQ	8.0 E-04 2.3 E-03 kQ	Generation using calibrator model Fluke
	110 kQ to 330 kO	9.4 E-03	5522A
	330 kQ to 1.1	1.9E-05 MQ	
	1.1 MQ to 3.3 MO	4.9 E-05 MQ	
	3.3 MO to 11 MQ	1.0 E-03 MQ	
	11 MQ to 33 MQ	7.7E-03 MQ	
	33 MQ to 100 MQ	4.2 E-02 MQ	
	100 MQ to 330 MQ	7.6E-01MQ	
	330 MQ to 1100 MQ	13 MQ	
B) Sweep	1ms 2ms 5 ms to 50 ms	0.057 ps 0.057 ps 0.57 us 0.57 us	using Calibrator (Fluke: 5500A)
	1ms 2ms 5 ms to 50 ms	None	Generation
B) Type E	-250 °C to -100 °C -100 °C to 1000 °C	0.60 °C 0.24 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	-250 °C to -100 °C -100 °C to 1000 °C	0.69 °C 0.24 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	-250 °C to -100 °C -100 °C to 1000 °C	0.61 °C 0.24 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-250 °C to -100 °C -100 °C to 1000 °C	0.61 °C 0.24 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-250 °C to 0 °C	0.2°C	
	0 °C to 1000 °C	0.3 °C	
	- 200 °C to 1000 °C	0.52 °C	
	- 250 °C to -100 °C	1.0°C	
	- 200 °C to 1000 °C	0.52 °C	
Bandwidth	0 to 50 kHz 50 kHz to 100 MHz 100 MHz to 300 MHz 250 kHz to 1MHz 1 MHz to 10 MHz 10 MHz to 100 MHz 100 MHz to 1 GHz 1GHz to 3 GHz	0.02 nHz/Hz + 5.8 Hz 0.03 + 5.8 kHz 0.13 + 5.8 kHz 0.21 + 1.6 mHz 0.21 + 22 mHz 0.21 + 0.22 Hz 0.21 + 2.2 Hz 0.21 + 2.1 Hz	Fluke 5500 A (SC 300) Agilent 4425 AP
Bore Gauge / Cylinder Gauge	18 mm to 150 mm (Resolution 0.001 mm) 18 mm to 150 mm	1.7 um	Calibrated using Calibration Tester and Ring Gauge. with reference to JIS
	(Resolution 0.01 mm)	6.0 um	B7515:1982
C) Ac Voltage	At 60 Hz 0Vto50V 50 V to 100 V 100 V to 200 V 200 V to 300 V	0.36 V 0.71V 1.39 V	Calibrate by electrical masurement using Multimeter. (Agilent:34401A)

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
C) Bandwidth	Up to 250 MHz	5.7 kHz	using Calibrator (Fluke: 5500A)
C) Dc Current	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) Inductance	10 mH to 100 mH 100 mH to 1H	0.12 mH 0.0014 H	Generation using Decade Inductance
	at 100 Hz, 120 Hz, 1 kHz, 10 kHz	None	Box (Lionmount: LD1)
C) Type K	-200 °C to -100 °C -100 °C to 1370 °C	0.52 °C 0.46 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	-200 °C to -100 °C -100 °C to 1370 °C	0.86 °C 0.46 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	-200 °C to -100 °C -100 °C to 1370 °C	1.1°C 0.46 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-200 °C to -100 °C -100 °C to 1370 °C	1.1°C 0.46 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-200 °C to 0 °C 0 °C to 1370 °C	0.05 °C 0.07 °C	

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	-200 °C to 0 °C	0.1 °C	
	0 °C to 1370 °C	0.2 °C	
	-200 °C to 0 °C	0.2°C	
	0 °C to 1300 °C	0.4°C	
	- 200 °C to 1370 °C	0.52 °C	By electrical simulation using
	- 270 °C to -100 °C	2.0 °C	By electrical measurement
Caliper	Up to 300 mm 300 mm to 1000 mm 1000 mm to 2000 mm	17 um 27 um	Calibrated using Gauge Block.with reference to ISO 13385-1:2019
	0 ~ 300 mm	0.02 mm	reference to BS
	0.01 mm to 600 mm	10 um	Caliper Checker JIS B 7507
Coating Thickness Gauge (ultrasonic)	50 um to 1000 um	1.2 um	Calibrate by using thickness foil with reference to in- house method (Calibration on actual thickness
	50 um to 1000 um	None	measurement)
D) Frequency	50 Hz to 100 Hz 100 Hz to 400 Hz 400 Hz to 500 Hz	0.059 Hz 0.074 Hz 0.082 Hz	Calibrate by electrical masurement using Multimeter. (Agilent:34401A)
D) Insulation Resistance	100 © to 1000 Q 1 kQ to 10 kQ 10 kQ to 100 0.1 MQ to 1 MQ 10 MQ to 100 10 MQ to 100	0.58 0 0.48 mQ /Q + 0.85 O 0.57 + 0.55 O 2.3 /MQ + 0.01 kQ 2.3 kQ /MQ + 0.1 kQ 2.3 kQ /MQ + 0.37	Calibrated using Decade Resistor (Yokogawa: 2793)
Dc Power	10.89 mW to 918 W 33 mV to 1020 V	0.70 mW/W + 0.26 mW	Fluke 5500 A
	0.33 to 0.8999 A	None	
	29.7 mW to 2.244 kW 33 mV to 1020 V	0.53 mW/W + 0.23 mW	
	0.9 to 2.1999 A	None	
	72.6 mW to 4.59 kW 33 mV to 1020 V	1.06 + 0.17 mW	
	2.2 to 4.4999 A	None	
	148.5 mW to 11.22 kW 33 mV to 1020 V	0.79 + 0.19 EW	
	11A	None	
Dc Resistance (Ground Bound / Continuity Tester)	100 mQ 500 mQ.	0.16 mQ 5.2 mQ	By comparison with Standard Resistance Max Current 30A

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
Dc Resistance (ground Bound / Continuity Tester)	100 mQ 500 mQ	0.16 mQ 5.2	By comparison with Standard Resistance Max Current 30 A
Dc Resistance (insulation Tester)	100 © to 100 kQ 100 kQ to 1 MQ 1 MQ to 10 10 MQ to 100 MQ	0.052 kQ 0.10 kQ 0.11 MQ	By comparison with Decade Resistance Box Yokogawa 2793-03 Max 2kV
	Fixed Value 500 MQ 1000 MQ 5000 MQ 10 GO 100 GQ	5.0 MQ 10 50 MQ 016 GO	By comparison with Fixed Standard Resistance Mas: Voltage 500 MQ to 1GQ Max Voltage 1 kV for 10 GQ and 100 GO
	100 to 1000 O 1 kQ to 10 kQ 10 kQ to 100 0.1 MQ to 1 MQ 10 MQ to 100 MQ 10 MQ to 100 MQ	0.58 + 0 0.48 mQ /Q + 0.85 O 0.57 + 0.55 O 2.3 /MQ + 0.01 2.3 kQ /MQ + 0.1 kQ 2.3 /MQ + 0.37 kO	By comparison with Decade Resistance Box Yokogawa 2793-03 Max 2 kV
	Fixed Value 500 MQ 1000 MQ 5000 MQ 10 GO 100 GO	5.0 MQ 10 50 MQ 016 GO	By comparison with Fixed Standard Resistance Max : Voltage 5 kV 500 MQ to 1 GO Max Voltage 1 kV for 10 GQ and 100GQ
Dial / Digital Thickness Gauge	0.01 mm to 20 mm 0.001 mm to 20 mm	10 um 1.2 um	Calibrate using Gauge Block. with reference to JIS B 7519:1994
Dial Gauge / Indicator	0.001 mm to 25 mm	2.0 um	Calibrate using Calibration Tester. with reference to JIS B 7503: 2017
	Up to 25 mm	4um	Calibrated using Calibration Tester based JIS B on
	Up to 25 mm	None	7503:2017
Dial Test Indicator	0mm to 0.28 mm 0.28 mm to 1.0 mm	10 um	Calibrate using Calibration Tester. with reference to JIS B 7533: 2015
	Up to 1mm	0.7 um	Calibrated by using i-checker as standards based on JIS B 7533:2015

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	Up to 0.3 mm 0.3 mm to 0.6 mm 0.6 mm to 2.0 mm	1.4 um 1.5 um	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 Length Indicator	0.001 mm to 100 mm 0.0001 mm to 100 mm	1.4 um 0.6 um	Calibrate using Gauge Block. with reference to JIS B 7536: 1982
E) Ac Current (see Matrix B)	See Matrix B	See Matrix B	Generation using calibrator model Fluke 5522A
E) Timer Check	0 sec to 60 sec 1 min to 10 min	0.18 sec 0.2 sec	Calibrated using stop watch
E) Type J	-210 °C to 1200 °C	0.32 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	-210 °C to 1200 °C	0.31 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	-210 °C to 1200 °C	0.32 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	-210 °C to 1200 °C	0.32 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-210 °C °C 0 °C to 1200 °C	0.04 °C 0.05 °C	
	-210 °C to0 °C	0.1 °C	
	0 °C to 1200 °C	0.1 °C	
	-210 °C °C	0.2°C	
	0 °C to 1100 °C	0.4°C	
	- 200 °C to 1200 °C	0.52 °C	ITS 90
	- 210 °C to 1200 °C	0.2°C	using multimeter
Earth Resistance	10 100 100 QO 1000 Q	2mQ 6mQ 0.01 0.120	By comparison with Fixed Standard Resistance Box to 100 kQ)
	10 100	2mQ 6mQ	By comparison with Fixed Standard
	100	0.01	Resistance Box
	1000 Q	0.120	(1.Q and 100 kQ)
Electrostatic Instrument	1000 Q	None	
Electrostatic Instrument -" Electrostatic Voltage	OV to	0.58 V	Fluke 5500 Calibrator
F) Capacitance / Indicating Instrument / Multimeter	220 pF to 400 pF 0.4 nF to 1.1 nF 1.1 nF to 3.3 nF 3.3 nF to 11 nF	9.15 pF 1.1 E-02 nF 1.5 E-02 nF 2.6 02 nF	
	11 nF to 33 nF	1.3 E-01 nF	
	33 nF to 110 nF	2.6 E-01 nF	
	110 nF to 330 nF	nF	
	0.33 UF to 1.1 uF 1.1 UF to 3.3 UF 3.3 UF to 11 11 UF to 33 UF 33 UF to 110 110 UF to 330 UF 0.33 mF to 1.1 mF	2.7 E-03 uF 6.0 E-03 uF 2.6 E-02 uF 1.1E-01 pF 4.2E-01 uF 1.3 4.2 E-03 mF	Generation using calibrator model Fluke 5522A
	1.1 mF to 3.3 mF	5.7 E-03 mF	
	3.3 mF to 11 mF	4.2 E-02 mF	
	11 mF to 33 mF	1.9E-01 mF	
	33 mF to 110 mF	mF	

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
F) Type S	0 °C to 500 °C 500 °C to 1760 °C	0.55°C 0.54 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	0 °C to 500 °C 500 °C to 1760 °C	0.58 °C 0.54 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	0 °C to 500 °C 500 °C to 1760 °C	0.55 °C 0.54 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	0 °C to 500 °C 500 °C to 1760 °C	0.55 °C 0.54 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-20 °C to0°C 0 °C to 1760 °C	0.4 °C	
	-20 °C to 0 °C	0.9 °C	
	0 °C to 1760 °C	0.5 °C	
	-20 °C to0°C	1.5°C	
	0 °C to 1760 °C	1.0°C	
	0 °C to 1760 °C	1.8°C	
	- 50 °C to 500 °C	0.6 °C	table ITS 90
	0 °C to 1760 °C	1.8°C	
Feeler Gauge	0.05 mm to 1.0 mm	None	Calibrate using Mu Checker. with reference to JIS B 7524: 2008

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
Frequency	100 uHz to 1 mHz 1 mHz to 10 mHz 10 mHz to 100 mHz 100 mHz to 1 Hz 1 Hz to 10 Hz 10 Hz to 100 Hz 100 Hz to 1 kHz to 10 kHz 10 kHz to 100 kHz 100 kHz to 1000 kHz 250 kHz to 1 MHz 1 MHz to 10 MHz 10 MHz to 100 MHz 100 MHz to 1 GHz 1 GHz to 3 GHz	0.21 + 0.06 pHz 0.21 + 0.06 pHz 0.21 + 0.65 pHz 0.21 + 6.48 pHz 0.21 + 64.8 pHz 0.21 wHz/Hz + 0.65 nHz 0.21 wHz/Hz + 6.48 nHz 0.21 wHz/Hz + 64.8 nHz 0.21 + 0.65 0.21 + 6.48 pHz 0.21 wHz/Hz + 1.3 mHz 0.21 + 0.02 Hz 0.21 wHz/Hz + 0.22 Hz 0.21 + 2.2 Hz 0.21 + 2.2 Hz	Agilent 33120A Agilent 4425 AP
	1 Hz to 12 GHz 9 kHz to 50 GHz	3.0 x 10° Hz 3.0 x 10° Hz	11722A HP 53132A
	1 Hz to 12 GHz 9 kHz to 50 GHz	None	E4448A
	1 Hz to 12 GHz 9 kHz to 50 GHz	None	(GPS-
	1 Hz to 12 GHz 9 kHz to 50 GHz	None	disciplined)
	-2 ENR to +20 ENR(dB)	None	Comparison
	ENR(dB)	None	
	- 2 ENR to +20	None	
	1 Hz to 12.4 GHz	0.6 mHz	w/11722A
	9 kHz to 50 GHz	4.2 Hz	HP 53132A
	9 kHz to 50 GHz	None	E4448A
	-2 ENR to +20ENR(dB)	None	using
	ENR(dB)	None	
	-2 ENR to +20 ENR(dB)	None	
	1 Hz to 300 MHz	64 pHz/Hz + 11 uHz	Fluke PM6685R(Rubidium)
	100 MHz to 26.5 GHz	0.58 Hz	EIP 548A Referance to Fluke PM6685R (Rubidium)
	1 to 1 MHz (1 mVp-p to 10 Vp-p)	38	HP 3325B Referance to Rubidium Fluke PM6685R
	1 MHz to 20 MHz (1 mVp-p to 10 Vp-p)	0.58 mHz	HP 3325B Referance to Rubidium Fluke PM6685R

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	10 MHz to 1 GHz (-110 dBm to 20 dBm)	58 mHz	Giga Tronics 2426B Referance to Rubidium Fluke PM6685R
	1 Hz to 300 MHz	64 pHz/Hz + 11 uHz	Fluke PM6685R(Rubidium)
	100 MHz to 26.5 GHz	0.58 Hz	EIP 548A Referance to Fluke PM6685R (Rubidium)
	3 5 Hz	rdg+0.00002Hz	
	1 Hz to 100 Hz	rdg+0.003Hz	Direct Measurement using Fluke
	12 kHz to 100 kHz	0.057 mHz / Hz	
	1 Hz to 40 Hz	0.62 mHz/ Hz	using Direct Method
	1 kHz to 10 kHz	1.4 mHz/Hz	to procedure LCP01701, Rev 01 using Direct Method
	5 Hz to 10Hz	0.58 mHz/ Hz	
G) Frequency	0.01 Hz to 120 Hz 120 Hz to 1200 Hz 1.2 kHz to 12 kHz 12 kHz to 120 kHz 120 kHz to 1200 kHz	6.2 E-04 Hz 6.0 E-04 Hz 5.8 E -" 04 kHz 6.2 E -" 04 kHz 2.3 03 kHz	Generation using calibrator model Fluke 5522A
	1.2 MHz to 3.2 MHz	5.7 E-04 MHz	
G) Type B	200 °C to 500 °C 500 °C to 1800 °C	0.92 °C 0.42 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	100 °C to 500 °C 500 °C to 1800 °C	0.66 °C 0.43 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	600 °C to 1200 °C 1200 °C to 1800 °C	0.3 °C 0.3 °C	
	600 °C to 1100 °C 1100 °C to 1800 °C	0.7 °C	
	600 °C to 1200 °C	1.5°C	
	1200 °C to 1800 °C	1.3°C	

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	600 °C to 1800 °C	1.8°C	
	200 °C to 500 °C	1.0°C	
	600 °C to 1800 °C	1.8°C	
Generating Instrument / Source (2a) Dc Voltage	0 to 100 mV 100 mV to1V 1Vto10V 10 V to 100 V 100 V to 1000 V	0.06 + 4.2 UV 0.05 + 0.01 mV 0.04 mV/V + 0.05 mV 0.05 mV/V + 0.74 mV 0.05 mV/V + 12 mV	Agilent 34401A, Advantest R6871E Kikusui 149-10A
H) Type N	-200 °C to -100 °C -100 °C to 1300 °C	0.58 °C 0.32 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	-200 °C to -100 °C -100 °C to 1300 °C	0.90 °C 0.31 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	-200 °C to -100 °C -100 °C to 1300 °C	0.62 °C 0.31 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-200 °C to -100 °C -100 °C to 1300 °C	0.62 °C 0.31 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-200 °C to 0 °C 0 °C to 1300 °C	0.07 °C 0.07 °C	
	-200 °C to 0 °C	0.2 °C	
	0 °C to 1300 °C	0.2 °C	
	- 200 °C to 1300 °C	0.52 °C	
	- 200 °C to 1300 °C	0.3 °C	

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	- 200 °C to 1300 °C	0.52 °C	
Height Gauge	Up to 300 mm 300 mm to 1000 mm	6 um 13 um	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 um 12 um	Calibrated by using caliper checker and gauge block as standards based on JIS B 7517:2018
	0mm to 300 mm 300 mm to 600 mm	11 um	caliper checker, gauge block and dial test indicator as
	0mm to 300 mm 300 mm to 600 mm	None	standards according
	0mm to 300 mm 300 mm to 600 mm	None	to JIS B7517:2018
	0mm to 300 mm 300 mm to 600 mm	None	Calibrate by using
	0 mm to 300 mm 300 mm to 600 mm	11 um	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	
I) Pt 100	-200 °C to 850 °	0.27 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	-200 °C to 850 °C	0.27 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	-200 °C to 850 °	0.27 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-200 °C to 850 °	0.27 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-200 °C to 800 °C	0.1 °C	
	-200 °C to 0 °C	0.05 °C	
	0 °C to 800 °C	0.3 °C	
	-200 °C to 850 °C	0.1 °C	
	-200 °C to 850 °C	0.2 °C	
	-200 °C to 850 °C	None	
	-200 °C to 850 °C	None	
L- Square (outer Squareness Only)	Up to 300 mm	4.1 um	Calibrated using calibrated square. with reference to JIS B 7526 : 1995
Liquid-in-glass Thermometer (total Immersion And Partial Immersion)	-30 °C 0°C to 20 °C 20°C to 100 °C	0.82 °C 0.70 °C	Comparison with Pt100 in liquid bath
Measurement Of Jig And Art (distance, Radius Circle, Straightness, Parallel, Squareness, Perpendicularity)	Up to 300 mm (L) x 300 mm (W) (H)	3.4 um	Measured using Visual Measuring Machine. with reference to NPL Good Practise No 39
Measurement Parameter	Range	Capability Expressed as	Remarks
	Range	an Uncertainty(+)*	

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	Range	Capability Expressed as	Remarks
	Range	an Uncertainty(+)*	
Measuring Instrument (continue) 2. Ac Power	(33 mV to 330 mV / 3.3 mA to 330 mA) 10.89 mW to 3.63 W (33 mV to 330 mV / 0.33 Ato 1.089 mW to 336.6 W	0.0057 W/W 0.43 W/W	Generation using Calibrator (Fluke 5500)
	(330 mV to 1020 V/ 3.3 mA to 330 mA) 1.089 W to 11.22 kW	0.0069 kW/W	
	(330 mV to 1020 0.33A to 11 A)	None	
Measuring Instrument D. Oscilloscope A) Amplitude	20 mV 50 mV 0.2V 1V	0.0058 mV 0.00074mV 0.011 mV 0.011 mV 0.028 mV	Generation using Calibrator (Fluke: 5500A))
	2V	0.028 mV	
	5V	0.028 mV	
	1 us 2 us to 50 us 0.1 ms to 0.5 ms	5.7 ns 57 ns 0.00057 ms	Generation
Measuring Instrument E. 1. Dc Power	0.1089 mW to 336.6 W (33 mV to 1020 V/ 0.33 mA to 330 mA) 0.1089 W to 3.06 kW (33 mV to 1020 0.33 A to 3 A) 0.099 W to 11.2 kW (33 mV to 1020 V/ 3Ato11A)	0.12 0.024 W/W 0.0046 kW/W	Generation using Calibrator (Fluke 5500)
Measuring Instrument F. 1. Dc Clamp Meter	10 Ato 150A 150 Ato 500A	0.42A	Generation using Calibrator (Fluke 5500) with 50-turn Current Coil
Measuring Instrument Lcr Meter A) Resistance	10 O to 100 O 100 © to 1 kQ 1 kQ to 10 10 kQ to 100 100 kQ to 1 MQ 1 MQ to 10 MQ	0.0062 QO 0.00058 kQ 0.0058 kQ 0.058 kQ 0.000062 MQ 0.0022 MQ	Generation using Decade Resistor (Yokogawa:2793) Fixed Resistance
	10 MQ to 100	0.061 MO	
Measuring Instruments (1a) Dc Voltage	330 mV 0.330 to 3.3 V 3.3 to 33 V 33 to 330 V 330 to 1020 V	0.05 mV + 2.3 0.04 mV/V + 0.01 mV 0.04 mV/V + 0.04 mV 0.04 mV/V + 0.38 mV 0.04 mV/V + 1.2 mV	Generation using calibrator model Fluke 5500A, Shunt

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
Measuring Instruments (1f) Capacitance / Indication Instrument / Multimeter	0.33 nF to 0.4999 nF 0.5 nF to 1.1 nF 1.1 nF to 3.3 nF 3.3 nF to 11 nF 11 nF to 33 nF 33 nF to 110 nF 110 nF to 330 nF 0.33 uF to 1.1 uF 1.1uF to 3.3 uF 3.3 uF to 11 uF 11 uF to 33 uF 33 uF to 110 uF 110 uF to 330 uF 330 uF to 1.1 mF	3.8 pF/nF + 7.7 pF 3.8 pF/nF + 7.7 pF 3.8 pF/nF + 7.6 pF 3.8 pF/nF + 7.6 pF 1.9 pF/nF + 76 pF 1.9 pF/nF + 76 pF 1.9 pF/nF + 0.23 nF 1,9 nF/uF + 0.77 nF 2.7 NF/UF + 2.3 nF 2.7 NF/UF + 7.6 nF 3.1 nF/uF + 23 nF 3.8 + 76 nF 5.4 nF/uF + 0.23 uF 7.6 uF/mF + 0.23 mF	Generation using calibrator model Fluke 5500A
Measuring Tape Steel Type	Up to 30 m	(0.23 + 0.016L) mm where = Total length in unit m	Calibrated using Linear Scale. with reference to JIS B 7512:2018
Micrometer (external)	Up to 25 mm	1.9 um	
	0mm to 75 mm 75 mm to 150 mm 150 mm to 200 mm	0.002 mm 0.003 mm 0.004 mm	Calibrated by using gauge block with reference JIS B 7502:2016
	0mm to 75 mm 75 mm to 150 mm 150 mm to 200 mm	0.002 mm 0.003 mm 0.004 mm	Calibrated by using gauge block with reference JIS B 7502:2016
	25, 50	None	optical parallel as
	75, 100, 125, 150	3 um	standards according
	175, 200, 225	4um	to JIS B7502:2016
	250, 275, 300	5 yum	
	250, 275, 300	None	Calibrate by using
	125, 150	5 yum	optical parallel as
	175	None	standards according
	200	None	to JIS B7502:2016
	225, 250	None	
	275	None	
	300	10 um	
	300	None	Calibrate by using
	300	None	caliper checker,
Micrometer (internal)	Up to 100 mm 100 mm to 200 mm 200 mm to 300 mm	2.1 um 3.6 ym 4.4 um	Calibrated using Gauge Block. with reference to JIS B 7502:2016

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
Micrometer Head And Calibration Tester	Up to 25 mm	1.7 um	Calibrated using Gauge Blocks. with reference to
	Up to 25 mm	None	JIS B7504:1980
Multimeter/indicating Meter	0 mV to 330 mV 330 mV to 3.3 V 3.3 V to 33 V	1.5E-03 mv 5.8 E-06 V 5.8 E-05V	Generation using calibrator model Fluke
Multimeter/indicating Meter (cont.) D)ac Voltage (see Matrix A)	See Matrix A	See Matrix A	Generation using calibrator model Fluke 5522A
Non-contact Cmm (x And Y Axis Only)	Up to 300 mm	6.4 um	Calibrated using Glass Scale and Gauge Block. with reference to 1S010360-7:2011
Oscilloscope (i) Dc Signal (in 1,2,5 Sequence)	50 Q Load 0to2.2V 1 MQ Load 0 to 33 V	1.9 mV/V + 0.08 mV 1.9 mV/V + 0.08 mV	Fluke 5500 A (SC 300) Agilent 4425 AP
Plain Plug Gauge Diameter Only	0.25 mm to 25 mm	None	Calibrate using Gauge Block and Snap meter. with reference to JIS B 7420: 1997
Pressure Gauge - Pneumatic - Hydraulic	0 to 14.5 psi 0 psi to 8000 psi	0.028 psi 3.5 psi	Calibrate using Pressure Calibrator. with reference to AS 1349: 1986
	0 to 14.5 psi 0 psi to 8000 psi	0.028 psi 3.5 psi	Calibrate using Pressure Calibrator. with reference to AS 1349: 1986
Profile Projector Individual Measuring Axis: X And Y	Up to 300 mm	6.1 um	Calibrate using Glass Scale with reference to JIS B7184:2021
Push Pull Gauges / Digital Forces Gauges Force Measurement Devices	0.5 kgf to 5 kgf 0 kgf to 100 kgf	1.2 of 6.2 gf	Calibrate using Standard Weight with reference to ISO 376 : 2011
Qd) Type R	-0 °C to 500 °C 500 °C to 1760 °C	0.66 °C 0.47 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	0 °C to 500 °C 500 °C to 1760 °C	0.67 °C 0.47 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
Radiation Thermometer	50 °C to 200 °C 200 °C to 400 °C	4.9°C 6.8 °C	Comparison with calibrated Blackbody
	50 °C to 200 °C 200 °C to 400 °C	None	source
	-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 ASTME 1256:2017
Radius Gauge	Up to 100 mm	3.4 um	Calibrated using Visual Measuring Machine. with reference to IS 5273:1969
Setting Rod	25 mm to 100 mm 100 mm to 300 mm 300 mm to 500 mm 500 mm to 600 mm	2.7 um 4.2 um 5.2 um 7.5 ym	Calibrated using Gauge Block and MU Checker. with reference to BS 870:2008
	Up to 2 inch	0.0001 inch	Block and DTI according to in-house calibration
	2 inch to 6 inch	0.0002 inch	procedure LCP 01403
	25 mm traverse and	None	
	setting rod for length up to	4um	
Soure Instrument Powersource A) Dc Voltage	10 V to 20 V 20 V to 30V	0.0058 V 0.0059 V 0.0060 V	Calibrate by electrical masurement using Multimeter. (Agilent:34401A)
Standard Weight / Dead Weight	1g 2g 5g 10g 20g 50g 100g 200 g 500g 1kg 2kg 10 kg 20 kg 25 kg	0.10 mg 0.12 mg 0.10 mg 0.21 mg 0.35 mg 0.23 mg 0.33 mg 0.56 mg 2.9 mg 12mg 13 mg 0.17g 0.30g	Calibration by comparison with standard weight of same nominal value with reference to OMIL R111-1 (2007)

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
Steel Ruler	0mm to 1500 mm	0.31 mm	Calibrated using Linear Scale. with reference to JIS B7516:2005
	Up to 1000mm	0.1 mm	Calibrated by using Tape and Scale Measuring Machine as standards with reference to JIS B 7516:2005
Stop Watch	10 sec to 3 hour	0.49 sec	Calibration using Function generator (Agilent 33120) & Universal counter
	10 sec to 3 hour	None	(Agilent 53131A)
	5s to 3600s	0.07 s	Calibration using Keysight 53131A Universal Counter
Stopwatch	10 sec to 3 hour	0.69 sec	Calibration using Function Generator (Agilent 33120A) & Universal counter
	10 sec to 3 hour	None	(Agilent 53131A)
	0 sec to 60 sec 1 min to 5 min 5 min to 1 hour 1 hour to 3 hour	0.2 sec 0.2 sec 0.2 sec 0.2 sec	Calibrated by using comparison method according to NIST stop watch and timer calibration
	0 sec to 60 sec 1 min to 5 min 5 min to 1 hour 1 hour to 3 hour	0.2 sec 0.2 sec 0.2 sec 0.2 sec	Calibrated by using comparison method according to NIST stop watch and timer calibration
Surface Plate	300 mm x 300 mm 1000 mm x 1000 mm	3.2 um 6.5 um	Calibrate using Planekator with reference to BS 817:2008
	300 mm x 300 mm 1000 mm x 1000 mm	1.8 um 3.2 um	microindicator and variation gauge as
	300 mm x 300 mm 1000 mm x 1000 mm	None	standards according
	300 mm x 300 mm 1000 mm x 1000 mm	None	to BS 817:2008

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
Tachometer	10 rpm to 60000 rpm	0.19 rpm	Calibration using Function Generator (Agilent 33120A) driven light source.
	60 rpm to 10000 rpm	2.0 rpm	Calibrated using
Temperature And Humidity Chamber @ 25°c	-40 °C to -20 °C -20°C to0°C 10 °C to 60 °C 10 %RH to 50 %RH 50 %RH to 90 %RH	3.6 °C 0.55 °C 4.7 % RH 3.0 % RH	Calibrate using Data Logger. with reference to BS 1339 3 - 2014 & DKD-R-5-7
Temperature And Humidity Indicator	Relative Humidity at 50 % 10 % RH to 20 % RH 20 % RH to 50 % RH 50 % RH to 70 % RH 70 % RH to 90 % RH	4.8 % RH 4.1% RH 3.5 % RH 3.9 % RH	Comparison with temperature and humidity sensor in chamber
	Relative Temperature at 25 °C	None	
	Relative Temperature at 25 °C	None	Direct
Temperature Controlled Enclosure	-80 °C to -40 °C -40°C to 0°C 0°C to 400°C	4.9°C 3.5 °C 1.0°C	Calibrate using Temperature Recorder with Thermocouple sensor with reference to
	-80 °C to -40 °C -40°C to 0°C 0°C to 400°C	None	DKD-R-5-7
	0 °C to 200 °C (Volume	1.5°C	Calibrated by using Temperature Data
	0 °C to 200 °C (Volume	None	Logger with
	0 °C to 200 °C (Volume	None	Thermocouple Type K.
	to 150 °C	1.0°C	recorder with thermocouple
	to 150 °C	None	and PRT with
	to 150 °C	None	reference to AS
	to 150 °C	None	2853-1986
	-40 °C to 250 °C 250 °C to 1300 °C	0.6 °C	Calibrated by using temperature recorder with thermocouple
	-40 ?C to 250 ?C 250 ?C to 1300 ?C	0.6 ?C	Calibrated by using temperature recorder with thermocouple

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	-30 °C to 100 °C 100 °C to 250 °C 250 °C to 600 °C 600 °C to 1200 °C	0.6 °C 0.6 °C 2.5 °C	Calibrate using temperature recorder & thermocouple based on AS 2853-1986
	0?C to 300?C	1.1?C	Temperature Recorder and TC
	0?C to 300?C	None	Wire based on AS
	0?C to 300?C	None	2853:1986
Temperature Recorders / Indicators (by Electrical Simulation)	-270 °C to -100 °C -100 °C to 400 °C	0.75 °C 0.28 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
Temperature Recorders / Indicators (by Electrical Simulation) A) Type T	-210 °C to -100 °C -100 °C to 400 °C	0.87 °C 0.28 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
Temperature Sensor With Indicator	-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 to0°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
	651 °C to 1200 °C	2.7 °C	thermometer /
	651 °C to 1200 °C	None	thermocouple in block temperature bath

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	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	
	30 °C to 200 °C 200 °C to 400 °C	0.2 °C 0.41 °C	Comparison with reference Pt100 in temperature block calibrator
Tension Gauges Force Measurement Devices	0.01 kgf to 0.1 kof 0.1 kgf to 0.5 kgf 1 kgf to 5 kgf	0.66 mgf 4.1 mof 5.8 of	Calibrate using Standard weight. with reference to ISO 376: 2011
Thread Plug Gauge (simple Pitch Diameter Only)	M1 to M20 (or inches equivalent)	3.2 um	Calibrated using 3 wire method. with reference to JIS B 0261:2020 Calibrated using 3 wire method. Based on ANSI/ASME B1.2:1983
Time Base	2 ns to 1000 ns 1 us to 1000 ys 1 ms to 1000 ms 1sto5s	0.018 ps/ns ps 0.019 ns/us + 0.29 ps 0.018 us/ms + 0.29 ms 0.8 ms/s +0.019s	Fluke 5500 A (SC 300) Agilent 4425 AP
Timer Check	0 sec to 60 sec	0.18 sec	Calibrated using stop watch
	0 sec to 10 min	0.2 sec	
Torque Driver / Torque Wrench & Torque Measurement	0.1 to 10 kgf.cm 10 kgf.cm to 100 kgf.cm 100 kgf.cm to 1000 kgf.cm 1000 kgf.cm to 2000 kgf.cm 2000 kgf.cm to 3000 kgf.cm 3000 kgf.cm to 4000 kgf.cm 4000 kgf.cm to 5000 kgf.cm	20 gf.cm 0.30 kgf.cm 9.5 kgf.cm 18 kgf.cm 22 kgf.cm 22 kgf.cm 23 kgf.cm	Calibrate using Torque Meter. with reference to ISO 6789:2017 Part 2
Torque Meter	0.1 kgf.cm to 100 kgf.cm	0.40 kgf.cm	Calibrate using Standard weight with Torque bar. with reference to
	0.1 kgf.cm to 100 kgf.cm	None	BS 7882: 2017

Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
Type B	100 °C to 500 °C 500 °C to 1800 °C	0.60 °C 0.46 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	100 °C to 500 °C 500 °C to 1800 °C	0.66 °C 0.43 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	600 °C to 1820 °C	0.5 °C	
	600 °C to 1820 °C	0.5 °C	EURAMET cg- 11/
	600 °C to 1820 °C	0.5 °C	
Type R	0 °C to 500 °C 500 °C to 1760 °C	0.69 °C 0.47 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5522A)
	0 °C to 500 °C 500 °C to 1760 °C	0.67 °C 0.47 °C	By electrical simulation using calibrator and reference table ITS 90 Calibrate by electrical measurement using Calibrator (Fluke: 5500A)
	-20 °C to 1760 °C	None	
	-20 °C to 1760 °C	0.7 °C	
	-20 °C to 1760 °C	None	
	-20 °C to 1760 °C	None	
	0 °C to 1750 °C	1.5°C	By Electrical Simulation Using Temperature Calibrator and ITS 90 Tables

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Instrument Calibrated/Measurement Parameter	**Range**	**Calibration and Measurement Capability Expressed as an Uncertainty (±)***	**Remarks**
	0 °C to 1750 °C	2.8 °C	By Electrical Measurement Using Temperature Calibrator and ITS 90 Tables
	0 °C to 1750 °C	1.7°C	By Electrical Simulation Using Temperature Calibrator and ITS 90 Tables
Vacuum Gauge	-14 psi to 0 psi	0.0018 psi	Calibrator. with reference to
	-14 psi to 0 psi	None	AS 1349: 1986
	0 to -13.7 psi (0 to -0.95 bar)	0.2 psi	Calibration procedure: NT- MET-CP-01P Reference standard: BS EN 837-1:1998
Vee Block	Up to	5.2 ym	Calibrated using Linear Probe with Indicator and
	220 mm (L)	None	Surface Plate. with reference to JIS B
	468 com (W)	None	7540:1972
	(H)	None	
Weighing Scale Balance	0.1 mg to 200 g 200 g to 1 kg 1 kg to2 kg 2 kg to 6 kg	0.15 mg 10 mg 10 mg	Calibrate using Standard weight. with reference to OIML R76 1, 2006/ v4.0
	6 kg to 100 kg	29	Calibrate using Standard weight. with reference to ASTM E898-88
	6 kg to 100 kg	None	-2020
-" Electrostatic Voltage	OV to	0.04 mV/V +	Fluke 5500 Calibrator

Issue date: 06 April 2025
Valid Until: -

NO: SAMM 497

SCOPE OF CALIBRATION : ELECTRICAL

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

Issue date: 06 April 2025
Valid Until: -

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SCOPE OF CALIBRATION : FORCE

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

Issue date: 06 April 2025
Valid Until: -

NO: SAMM 497

SCOPE OF CALIBRATION : MASS

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

Issue date: 06 April 2025
Valid Until: -

NO: SAMM 497

SCOPE OF CALIBRATION : PRESSURE

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

Issue date: 06 April 2025
Valid Until: -

NO: SAMM 497

SCOPE OF CALIBRATION : TEMPERATURE

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