



**The Government of the Hong Kong Special Administrative Region –
Standards and Calibration Laboratory**

香港特別行政區政府 – 標準及校正實驗所

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ACCREDITED TEST : Calibration Services 校正服務
CATEGORY Proficiency Testing Provider 能力驗證提供者
認可測試類別

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Calibration Services 校正服務		
ITEM TESTED OR MEASURED 測試或量度項目	SPECIFIC TEST OR PROPERTY MEASURED® 特定測試或量度的特性®	CALIBRATION AND MEASUREMENT CAPABILITY (CMC)* 校準和測量能力*
Acoustic and vibration measurements		
- Acoustic measurements		
- 1 inch laboratory standard microphone (LS1P)	Calibration for pressure field open-circuit sensitivity in accordance with IEC 61094-2: 1992 over the following frequency ranges: 63 Hz to 4 kHz Above 4 kHz to 6 kHz Above 6 kHz to 8 kHz Above 8 kHz to 10 kHz Calibration for pressure field open-circuit sensitivity in accordance with IEC 61094-2: 2009 over the following frequency ranges: 20 Hz to 6.3 kHz Above 6.3 kHz to 8 kHz Above 8 kHz to 10 kHz	0.04 dB 0.05 dB 0.06 dB 0.08 dB 0.04 dB 0.05 dB 0.08 dB
- ½ inch laboratory standard microphone (LS2P)	Calibration for pressure field open-circuit sensitivity in accordance with IEC 61094-2: 1992 over the following frequency ranges: 63 Hz to 12 kHz Above 12 kHz to 16 kHz Above 16 kHz to 20 kHz Above 20 kHz to 25 kHz Calibration for pressure field open-circuit sensitivity in accordance with IEC 61094-2: 2009 over the following frequency ranges: 20 Hz Above 20 Hz to 25.1 Hz Above 25.1 Hz to 12.6 kHz Above 12.6 kHz to 16 kHz Above 16 kHz to 20 kHz Above 20 kHz to 25 kHz	0.04 dB 0.05 dB 0.08 dB 0.14 dB 0.08 dB 0.06 dB 0.05 dB 0.06 dB 0.09 dB 0.13 dB

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Acoustic and vibration measurements - Acoustic measurements - ½ inch working grade microphone	<p>Calibration for pressure field open-circuit sensitivity by comparison with the laboratory standard microphone in accordance with IEC 61094-5: 2001 over the following frequency ranges:</p> <p>63 Hz to 125 Hz Above 125 Hz to 10 kHz Above 10 kHz to 20 kHz</p> <p>Calibration for pressure field open-circuit sensitivity by comparison with the laboratory standard microphone in accordance with IEC 61094-5: 2016 over the following frequency ranges:</p> <p>20 Hz to 40 Hz Above 40 Hz to 125 Hz Above 125 Hz to 10 kHz Above 10 kHz to 20 kHz</p> <p>Calibration for pressure field open-circuit sensitivity using sound calibrator in accordance with in-house procedure TPA029 over the following frequency ranges:</p> <p>63 Hz to 8 kHz Above 8 kHz to 12.6 kHz Above 12.6 kHz to 16 kHz Above 16 kHz to 20 kHz</p> <p>Calibration for relative frequency response using electrostatic actuator in accordance with IEC 61094-6: 2004 over the following frequency ranges:</p> <p>63 Hz to 10 kHz Above 10 kHz to 20 kHz</p>	<p>0.10 dB 0.07 dB 0.20 dB</p> <p>0.15 dB 0.10 dB 0.07 dB 0.20 dB</p> <p>0.2 dB 1.0 dB 1.5 dB 2.5 dB</p> <p>0.1 dB 0.2 dB</p>

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Acoustic and vibration measurements		
- Acoustic measurements		
- ½ inch working grade microphone in combination with constant current line drive (CCLD) microphone preamplifier	Calibration for pressure field open-circuit sensitivity in accordance with IEC 61094-5: 2016 over the following frequency ranges: 63 Hz to 4 kHz Above 4 kHz to 8 kHz Above 8 kHz to 10 kHz Above 10 kHz to 12.5 kHz	0.07 dB 0.10 dB 0.43 dB 1.2 dB
- ½ inch working grade microphone in combination with microphone preamplifier	Calibration for pressure field open-circuit sensitivity by comparison with the laboratory standard microphone in accordance with in-house procedure TPA031 over the following frequency ranges: 63 Hz to 126 Hz Above 126 Hz to 10 kHz Above 10 kHz to 20 kHz Above 20 kHz to 25 kHz	0.10 dB 0.08 dB 0.20 dB 0.40 dB
- 1/4 inch working grade microphone (WS3P)	Calibration for pressure field open-circuit sensitivity in accordance with IEC 61094-5:2016 over the following frequency ranges: 63 Hz to 4 kHz Above 4 kHz to 10 kHz Above 10 kHz to 20 kHz	0.10 dB 0.15 dB 0.35 dB
- 1 inch working grade microphone	Calibration for pressure field open-circuit sensitivity by comparison with the laboratory standard microphone in accordance with in-house procedure TPA028 over the following frequency ranges: 63 Hz to 4 kHz Above 4 kHz to 8 kHz Above 8 kHz to 10 kHz	0.07 dB 0.12 dB 0.15 dB

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Acoustic and vibration measurements - Acoustic measurements - Audio network analyzer	Calibration for the following parameters in accordance with in-house procedure TPA023: - Amplitude accuracy over the following ranges: 20 Hz and 100 kHz 0.02 V to 10 V 3 mV to 20 mV - Amplitude linearity - Frequency accuracy over the following frequency ranges: 20 Hz to 20 kHz Above 20 kHz to 50 kHz Above 50 kHz to 100 kHz - Ratio between channels - Phase between channels over the following frequency ranges: 20 Hz to 1 kHz Above 1 kHz to 6.25 kHz Above 6.25 kHz to 50 kHz Above 50 kHz to 100 kHz	0.1 % to 0.3 % 0.2 % to 1 % 0.02 dB 1 Hz 2 Hz 3 Hz 0.002 0.007° 0.013° 0.032° 0.064°

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Acoustic and vibration measurements - Acoustic measurements - Hearing aid analyzer	Calibration for sound pressure level in accordance with in-house procedure TPA037 over the following range: 200 Hz to 2 kHz 55 dB to 85 dB	1 dB
- Measuring amplifier	Calibration for the following parameters in accordance with IEC 60651: 2001 and IEC 60804: 2000: - Frequency weighting A test - Frequency weighting Linear test - Level linearity test - Time weighting F test - Time weighting S test	0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB

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Acoustic and vibration measurements		
- Acoustic measurements		
- Microphone preamplifier	Calibration for the following parameters in accordance with in-house procedure TPA032:	
	- Gain	0.0003
	- Frequency response	0.01 dB
	- Input capacitance	0.05 pF
- Mouth simulator	On-site calibration for the following parameters using the laboratory standard microphone in accordance with in-house procedure TPA030:	
	- Sound pressure level over the following frequency ranges:	
	100 Hz to 1 kHz	1.5 dB
	Above 1 kHz to 8 kHz	2.0 dB
	- Distortion at 94 dB over the following frequency ranges:	
	100 Hz to 200 Hz	0.2 %
	Above 200 Hz to 8 kHz	0.1 %
- Octave filter	Calibration for the following parameters in accordance with in-house procedure TPA008:	
	- Pass-band attenuation	0.02 dB
	- Stop-band attenuation	1 dB

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Acoustic and vibration measurements - Acoustic measurements - Otoacoustic emissions (OAE) analyzer	Calibration for the following parameters in accordance with in-house procedure TPA038: - Frequency of stimulus signal over the following range: 500 Hz to 8 kHz - Sound pressure level of stimulus signal over the following range: 65 dB to 75 dB - Harmonic distortion of stimulus signal over the following frequency range: 500 Hz to 8 kHz	0.5 Hz 1 dB 0.05 %
- Personal sound exposure meter, noise dose meter, noise dosimeter	Calibration for the following parameters in accordance with IEC 61252: 1993 + A1: 2000 + A2: 2017: - Absolute acoustic sensitivity sound exposure - Electrical Tests - Frequency weighting - Linearity of response to steady signals over the following frequencies: 63 Hz 1 kHz Below 80 dB 80 dB to 100 dB Above 100 dB to 130 dB Above 130 dB to 140 dB 8 kHz - Response to short-duration signals - Response to unipolar pulse - Latching overload indicator	6.8 % 0.5 % 2.0 % 20 % 5.0 % 1.0 % 2.0 % 1.0 % 1.1 % 1.4 % 0.2 dB

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Acoustic and vibration measurements - Acoustic measurements - Sound calibrator	Calibration for the following parameters in accordance with IEC 60942: 2000: - Sound pressure level over the following ranges: 63 Hz to 4 kHz 94 dB to 124 dB Above 4 kHz to 16 kHz 94 dB to 124 dB - Frequency accuracy over the following frequency range: 63 Hz to 16 kHz - Distortion over the following range: 63 Hz to 16 kHz 94 dB to 114 dB Calibration for the following parameters in accordance with IEC 60942: 2003: - Sound pressure level over the following ranges: 63 Hz to 4 kHz 94 dB to 124 dB Above 4 kHz to 8 kHz 94 dB to 124 dB Above 8 kHz to 16 kHz 94 dB to 124 dB - Frequency accuracy over the following frequency range: 63 Hz to 16 kHz - Distortion over the following range: 63 Hz to 16 kHz 94 dB to 114 dB	0.06 dB 0.09 dB 1 x 10 ⁻⁵ of result 0.5 % 0.06 dB 0.10 dB 0.16 dB 1 x 10 ⁻⁵ of result 0.5 %

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Acoustic and vibration measurements - Acoustic measurements - Sound calibrator	Calibration for the following parameters in accordance with IEC 60942: 2017: - Sound pressure level over the following ranges: 63 Hz to 4 kHz 94 dB to 124 dB Above 4 kHz to 8 kHz 94 dB to 124 dB Above 8 kHz to 16 kHz 94 dB to 124 dB - Frequency accuracy over the following frequency range: 63 Hz to 16 kHz - Total distortion and noise over the following ranges: 63 Hz to 16 kHz: 94 dB to 114 dB 250 Hz 124 dB	0.06 dB 0.10 dB 0.16 dB 1 x 10 ⁻⁵ of result 0.5 % 0.5 %

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Acoustic and vibration measurements - Acoustic measurements - Sound level meter	Calibration for the following parameters in accordance with IEC 61672-3: 2006: - Indication at the calibration check frequency - Self-generated noise - Acoustical signal tests of a frequency weighting over the following frequency ranges: 63 Hz to 4 kHz Above 4 kHz to 8 kHz - Electrical signal tests of frequency weighting - Frequency and time weightings at 1 kHz - Level linearity on the reference level range - Level linearity including the level range control - Toneburst response - Peak C sound level - Overload indication Calibration for the following parameters in accordance with IEC 61672-3: 2013: - Indication at the calibration check frequency - Self-generated noise - Acoustical signal tests of a frequency weighting over the following frequency ranges: 63 Hz to 1 kHz Above 1 kHz to 8 kHz - Electrical signal tests of frequency weighting - Frequency and time weightings at 1 kHz - Long-term stability - Level linearity on the reference level range - Level linearity including the level range control - Toneburst response - C-weighted peak sound level - Overload indication - High-level stability	0.1 dB 0.1 dB 0.1 dB 0.2 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.2 dB 0.1 dB 0.2 dB 0.3 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB 0.1 dB

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Acoustic and vibration measurements - Acoustic measurements - Tympanometer	Calibration for the following parameters in accordance with in-house procedure TPA035: - Frequency of probe tone over the following range: 226 Hz to 1 kHz - Sound pressure level of probe tone at 85 dB - Harmonic distortion of probe tone over the following frequency range: 226 Hz to 1 kHz	0.6 Hz 0.7 dB 0.05 %
- Type 1 ear simulator	Calibration for the following parameters in accordance with IEC 60318-1: 2009: - Relative sound pressure response over the following frequency ranges: 40 Hz to 63 Hz Above 63 Hz to 80 Hz Above 80 Hz to 4 kHz Above 4 kHz to 8 kHz - Relative transfer impedance over the following frequency ranges: 40 Hz to 63 Hz Above 63 Hz to 80 Hz Above 80 Hz to 4 kHz Above 4 kHz to 8 kHz	2.0 dB 1.0 dB 0.7 dB 1.0 dB 2.0 dB 1.0 dB 0.7 dB 1.0 dB

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Acoustic and vibration measurements - Acoustic measurements - Type 3.2 ear simulator	Calibration for the following parameters in accordance with ITU-T P.57: 2005: - Relative frequency sensitivity response over the following frequency ranges: 40 Hz to 63 Hz Above 63 Hz to 80 Hz Above 80 Hz to 4 kHz - Acoustic impedance over the following frequency ranges: 40 Hz to 63 Hz Above 63 Hz to 80 Hz Above 80 Hz to 4 kHz	2.0 dB 1.0 dB 0.7 dB 2.0 dB 1.0 dB 0.7 dB
- Head and Torso Simulator (HATS)	Calibration for the following parameters in accordance with ITU-T P.58: 2013: - Maximum deliverable sound pressure level of HATS mouth over the following frequency range: 100 Hz to 10 kHz - Harmonic distortion of HATS mouth over the following frequency range: 100 Hz to 10 kHz - Sound pick-up free field frequency response of HATS over the following frequency ranges: 100 Hz to 8 kHz Above 8 kHz to 20 kHz	0.5 dB 1.5 % 1.5 dB 2.9 dB

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Acoustic and vibration measurements - Vibration measurements - Accelerometer	<p>Calibration for the following parameters using the laboratory standard laser vibrometer in accordance with in-house procedure TPV101:</p> <ul style="list-style-type: none"> - Charge sensitivity (modulus) over the following range: 10 Hz to 10 kHz 1 m/s² to 350 m/s² - Charge sensitivity (phase shift) over the following range: 0° to 360° <p>Calibration for the following parameters by comparison with the laboratory standard accelerometer in accordance with ISO 16063-21:2003:</p> <ul style="list-style-type: none"> - Charge sensitivity (modulus) over the following range: 10 Hz to 10 kHz 1 m/s² to 350 m/s² - Charge sensitivity (phase shift) over the following range: 0° to 360° <p>Calibration for the following parameter by comparison with the laboratory standard accelerometer in accordance with in-house procedure TPV002:</p> <ul style="list-style-type: none"> - Charge sensitivity (modulus) over the following range: 40 Hz to 4 kHz 10 m/s² to 100 m/s² 	<p>1.1 %</p> <p>2°</p> <p>1.5 %</p> <p>3°</p> <p>1.5 %</p>

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Acoustic and vibration measurements		
- Vibration measurements		
- Charge amplifier	Calibration for gain magnitude by comparison with standard air capacitor and AC voltmeter in accordance with in-house procedure TPV003 over the following range: 50 Hz and 10 kHz 1 mV/pC to 1 V/pC	0.4 %
- Vibration calibrator	Calibration for continuous sinusoidal vibration range by comparison with standard accelerometer in accordance with in-house procedure TPV104 over the following range: 10 Hz to 10 kHz 1 m/s ² to 350 m/s ²	1.5 %

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Acoustic and vibration measurements - Vibration measurements - Vibration meter	<p>Calibration for the following parameters of continuous sinusoidal vibration by using the laboratory standard laser vibrometer in accordance with in-house procedure TPV103:</p> <p>- Displacement over the following range: 10 Hz to 10 kHz 0.0001 mm to 79 mm</p> <p>- Acceleration over the following range: 10 Hz to 10 kHz 1 m/s² to 350 m/s²</p> <p>- Velocity over the following range: 10 Hz to 10 kHz 0.5 mm/s to 500 mm/s</p> <p>Calibration for the following parameters of continuous sinusoidal vibration by using the laboratory standard accelerometer in accordance with in-house procedure TPV103:</p> <p>- Displacement over the following range: 10 Hz to 10 kHz 0.0001 mm to 79 mm</p> <p>- Acceleration over the following range: 10 Hz to 10 kHz 1 m/s² to 350 m/s²</p> <p>- Velocity over the following range: 10 Hz to 10 kHz 0.5 mm/s to 500 mm/s</p>	<p>1.1 %</p> <p>1.1 %</p> <p>1.1 %</p> <p>1.5 %</p> <p>1.5 %</p> <p>1.5 %</p>

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Electrical measurements and magnetism - Direct Current (DC) and Low Frequency (LF) measurements - DC voltage source: standard cell, solid state voltage standard, multifunction calibrator	Calibration for DC voltage using the Josephson array voltage standard in accordance with in-house procedure TPD031 at the following values: 1 V 1.018 V 10 V Calibration for DC voltage using the programmable Josephson array voltage standard in accordance with in-house procedure TPD091 at the following values: 1 V 1.018 V 10 V Calibration for DC voltage using the electronic reference standards in accordance with in-house procedure TPD032 at the following values: 1 V 1.018 V 10 V	Q[60 nV, N] Q[60 nV, N] Q[120 nV, N] where $Q[a, b] = [a^2 + b^2]^{1/2}$, N is the source noise Q[60 nV, N] Q[60 nV, N] Q[120 nV, N] where $Q[a, b] = [a^2 + b^2]^{1/2}$, N is the source noise 0.44 μV 0.44 μV 2.4 μV

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<p>Electrical measurements and magnetism</p> <p>- DC & LF measurements</p> <p>- DC voltage source: standard cell, solid state voltage standard, multifunction calibrator</p>	<p>Calibration for DC voltage using potentiometer in accordance with in-house procedure TPD007 over the following ranges:</p> <p>1 μV to 20 mV Above 20 mV to 200 mV Above 200 mV to 2 V</p> <p>Calibration for DC voltage using voltage ratio box in accordance with in-house procedure TPD016 over the following ranges:</p> <p>2 V to 10 V Above 10 V to 1000 V</p> <p>Calibration for DC voltage using multi-function calibrator in accordance with in-house procedure TPD042 over the following ranges:</p> <p>0.1 V to 10 V Above 10 V to 1000 V</p>	<p>0.12 μV 0.13 μV to 0.18 μV 0.26 μV to 1.3 μV</p> <p>1.5 μV to 8.5 μV 8.5 μV to 1.1 mV</p> <p>0.17 μV to 8.5 μV 8.5 μV to 1.1 mV</p>

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Electrical measurements and magnetism(cont'd)		
- DC & LF measurements		
- DC voltage ratio device: resistive divider, ratio meter	Calibration for DC voltage ratio in accordance with in-house procedure TPD038 over the following ranges: 20 V: 10 V to 100 V: 10 V 100 V: 10 V 200 V: 10 V to 1000 V: 10 V 800 V: 10 V 900 V: 10 V 1000 V: 10 V 2 V: 1 V to 5 V: 1 V 10 V: 1 V 20 V: 1 V to 50 V: 1 V 100 V: 1 V 200 V: 1 V to 700 V: 1 V 800 V: 1 V 900 V: 1 V 1000 V: 1 V Calibration for DC voltage ratio in accordance with in-house procedure TPD048 over the following ranges: 20 V: 10 V to 100 V: 10 V 200 V: 10 V to 1000 V: 10 V Calibration for DC voltage ratio in accordance with in-house procedure TPD022 over the following ranges: 0.00001 to 0.0001 Above 0.0001 to 0.001 Above 0.001 to 0.01 Above 0.01 to 0.1 Above 0.1 to 1	0.25 x 10 ⁻⁶ 0.40 x 10 ⁻⁶ 0.55 x 10 ⁻⁶ 0.60 x 10 ⁻⁶ 0.70 x 10 ⁻⁶ 0.80 x 10 ⁻⁶ 0.30 x 10 ⁻⁶ 0.45 x 10 ⁻⁶ 0.50 x 10 ⁻⁶ 0.55 x 10 ⁻⁶ 0.65 x 10 ⁻⁶ 0.70 x 10 ⁻⁶ 0.80 x 10 ⁻⁶ 0.90 x 10 ⁻⁶ 0.20 x 10 ⁻⁶ 0.40 x 10 ⁻⁶ 0.90 x 10 ⁻⁶ 0.90 x 10 ⁻⁶ 0.95 x 10 ⁻⁶ 0.82 x 10 ⁻⁶ 0.87 x 10 ⁻⁶
- DC voltage ratio device for input voltage from 1 V to 100 V: voltage ratio divider, voltage ratio box		

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<p>Electrical measurements and magnetism</p> <p>- DC & LF measurements</p> <p>- DC resistance standard and source: fixed resistor, resistance box, three-terminal resistor</p>	<p>Calibration for DC resistance in accordance with in-house procedure TPD006 at the following values or over the following range:</p> <p>1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 kΩ to 100 kΩ</p> <p>Calibration for DC resistance in accordance with in-house procedure TPD005 at the following values:</p> <p>1 MΩ 10 MΩ 100 MΩ</p> <p>Calibration for DC resistance in accordance with in-house procedure TPD025 over the following ranges:</p> <p>100 MΩ to 10 GΩ Above 10 GΩ to 100 GΩ Above 100 GΩ to 1 TΩ Above 1 TΩ to 10 TΩ</p>	<p>6.8 mΩ 68 mΩ 0.68 Ω 6.8 Ω 68 Ω 0.68 kΩ 6.8 mΩ to 0.68 Ω</p> <p>1.0 Ω 10 Ω 0.50 kΩ</p> <p>4.6 kΩ to 0.46 MΩ 0.78 MΩ to 7.8 MΩ 57 MΩ to 0.57 GΩ 1.4 GΩ to 14 GΩ</p>

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<p>Electrical measurements and magnetism</p> <p>- DC & LF measurements</p> <p>- DC resistance standard for high current: DC shunt</p>	<p>Calibration for DC resistance in accordance with in-house procedure TPD015 at the following values or over the following ranges:</p> <p>1 mΩ 10 mΩ 100 mΩ 0.1 mΩ to 1 mΩ Above 1 mΩ to 10 mΩ Above 10 mΩ to 100 mΩ Above 0.1 Ω to 1 Ω</p> <p>Calibration for DC resistance in accordance with in-house procedure TPD035 at the following values or over the following ranges:</p> <p>1 mΩ 10 mΩ 100 mΩ 0.1 mΩ to 1 mΩ Above 1 mΩ to 10 mΩ Above 10 mΩ to 100 mΩ Above 0.1 Ω to 1 Ω</p>	<p>3.1 nΩ 19 nΩ 0.15 μΩ 0.39 nΩ to 3.9 nΩ 3.9 nΩ to 19 nΩ 19 nΩ to 0.15 μΩ 0.15 μΩ to 1.4 μΩ</p> <p>3.1 nΩ 19 nΩ 0.15 μΩ 0.39 nΩ to 3.9 nΩ 3.9 nΩ to 19 nΩ 19 nΩ to 0.15 μΩ 0.15 μΩ to 1.4 μΩ</p>

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Electrical measurements and magnetism - DC resistance standard and source: multifunction calibrator	Calibration for DC resistance in accordance with in-house procedure TPD037 at the following values or over the following ranges: 1 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω 100 M Ω 1 G Ω 1 Ω to 10 Ω Above 10 Ω to 100 Ω Above 100 Ω to 1.0 k Ω Above 1.0 k Ω to 100 k Ω Above 100 k Ω to 1 M Ω Above 1 M Ω to 10 M Ω Above 10 M Ω to 100 M Ω Above 100 M Ω to 1 G Ω	30 $\mu\Omega$ 50 $\mu\Omega$ 0.50 m Ω 1.0 m Ω 30 m Ω 0.30 Ω 3.0 Ω 30 Ω 3.0 k Ω 80 k Ω 30 $\mu\Omega$ to 50 $\mu\Omega$ 50 $\mu\Omega$ to 0.50 m Ω 0.50 m Ω to 3.0 m Ω 3.0 m Ω to 0.40 Ω 0.40 Ω to 3.0 Ω 3.0 Ω to 30 Ω 30 Ω to 3.0 k Ω 3.0 k Ω to 0.1 M Ω

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Electrical measurements and magnetism - DC & LF measurements - DC resistance meter: multimeter, multifunction transfer standard, resistance bridge, microohmmeter, ohmmeter, teraohmmeter	On-site calibration for DC resistance in accordance with in-house procedure TPL038 at the following values: 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ 100 MΩ Calibration for DC resistance in accordance with in-house procedure TPD006 over the following range: 1 kΩ to 100 MΩ Calibration for DC resistance in accordance with in-house procedure TPD025 over the following ranges: Above 100 MΩ to 1000 MΩ Above 1 GΩ to 10 GΩ Above 10 GΩ to 100 GΩ Above 100 GΩ to 1 TΩ Above 1 TΩ to 10 TΩ	0.50 mΩ 2.0 mΩ 0.020 Ω 0.20 Ω 2.0 Ω 0.020 kΩ 0.50 kΩ 50 kΩ 6.8 mΩ to 0.68 kΩ 5.0 kΩ to 50 kΩ 50 kΩ to 6.0 MΩ 6.0 MΩ to 10 MΩ 90 MΩ to 0.90 GΩ 1.4 GΩ to 31 GΩ

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Electrical measurements and magnetism - DC & LF measurements - DC current source: current generator, multifunction calibrator	Calibration for DC current in accordance with in-house procedure TPD058 at the following values or over the following ranges: 0.1 pA 1 pA 10 pA 100 pA 0.1 pA to 1 pA Above 1 pA to 10 pA Above 10 pA to 100 pA Calibration for DC current in accordance with in-house procedure TPD076 over the following ranges: 0.1 nA to 1 nA Above 1 nA to 10 nA Above 10 nA to 100 nA	0.30 fA 1.0 fA 5.0 fA 20 fA 0.4 fA to 4.0 fA 1.0 fA to 10 fA 5.0 fA to 40 fA 38 fA to 0.38 pA 0.15 pA to 1.5 pA 1.5 pA to 15 pA

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Electrical measurements and magnetism - DC & LF measurements - DC current meter: multimeter, picoammeter, nanoammeter, multifunction transfer standard, current comparator, current transducer, dedicated equipment for heavy current measurement	Calibration for DC current in accordance with in-house procedure TPD056 at the following values or over the following ranges: 0.1 pA 1 pA 10 pA 100 pA 0.1 pA to 1 pA Above 1 pA to 10 pA Above 10 pA to 100 pA Calibration for DC current in accordance with in-house procedure TPD076 over the following ranges: 0.1 nA to 1 nA Above 1 nA to 10 nA Above 10 nA to 100 nA Calibration for DC current by measuring voltage-drop with standard resistor and reference multimeter in accordance with in-house procedure TPD008 over the following ranges: 0.1 μA to 1 μA Above 1 μA to 10 μA Above 10 μA to 100 μA Above 0.1 mA to 1 mA Above 1 mA to 10 mA Above 10 mA to 100 mA Above 0.1 A to 1 A Above 1 A to 10 A Above 10 A to 20 A Above 20 A to 30 A Above 30 A to 100 A	0.30 fA 1.0 fA 5.0 fA 11 fA 0.30 fA to 3.0 fA 1.0 fA to 5.0 fA 5.0 fA to 30 fA 36 fA to 0.36 pA 0.14 pA to 1.4 pA 0.8 pA to 8 pA 5 pA to 25 pA 25 pA to 30 pA 0.030 nA to 0.30 nA 0.30 nA to 3.0 nA 3.0 nA to 30 nA 30 nA to 0.30 μA 1.0 μA to 10 μA 10 μA to 0.10 mA 0.10 mA to 0.40 mA 0.40 mA to 0.90 mA 0.90 mA to 4.5 mA

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Electrical measurements and magnetism - DC & LF measurements - DC power source	On-site calibration for DC power in accordance with in-house procedure TPD081 over the following range: Voltage: 1 V to 1 kV Current: 0.1 A to 100 A Power: 0.1 W to 20 kW	30 µW/W
	Calibration for DC power in accordance with in-house procedure TPD081 over the following range: Voltage: 1 V to 1 kV Current: 0.1 A to 100 A Power: 0.1 W to 20 kW	30 µW/W
- DC power meter	Calibration for DC power in accordance with in-house procedure TPD080 over the following ranges: Voltage: 1 V to 1 kV Current: 0.1 A to 100 A Power: 0.1 W to 1 W Above 1 W to 10 kW Above 10 kW to 20 kW	70 µW 70 µW to 0.70 W 0.70 W

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<p>Electrical measurements and magnetism</p> <p>- DC & LF measurements</p> <p>- AC high voltage source: AC high voltage generator</p> <p>- AC high voltage meter: AC high voltage meters, dedicated setup for high voltage measurement</p>	<p>Calibration for AC voltage at 50 Hz in accordance with in-house procedure TPD103 over the following ranges:</p> <p>1 kV to 11 kV</p> <p>Calibration for AC voltage at 50 Hz in accordance with in-house procedure TPD105 over the following ranges:</p> <p>Above 11 kV to 30 kV Above 30 kV to 44 kV</p> <p>Calibration for AC voltage at 50 Hz in accordance with in-house procedure TPD103 over the following ranges:</p> <p>1 kV to 11 kV</p> <p>Calibration for AC voltage at 50 Hz in accordance with in-house procedure TPD105 over the following ranges:</p> <p>Above 11 kV to 30 kV Above 30 kV to 44 kV</p>	<p>0.26 V to 2.9 V</p> <p>5.1 V to 14 V 26 V to 38 V</p> <p>0.26 V to 2.9 V</p> <p>5.1 V to 14 V 27 V to 40 V</p>

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Electrical measurements and magnetism - DC & LF measurements - AC voltage generator/source	Calibration for AC voltage in accordance with in-house procedure TPL017 at the following values: 40 Hz, 1 kHz, 10 kHz, 20 kHz 0.1 mV 0.2 mV 0.5 mV 1 mV 2 mV 5 mV 10 mV 20 mV 50 mV 100 mV 200 mV 50 kHz 0.1 mV 0.2 mV 0.5 mV 1 mV 2 mV 5 mV 10 mV 20 mV 50 mV 100 mV 200 mV	3000 $\mu\text{V/V}$ 1000 $\mu\text{V/V}$ 1000 $\mu\text{V/V}$ 300 $\mu\text{V/V}$ 200 $\mu\text{V/V}$ 60 $\mu\text{V/V}$ 40 $\mu\text{V/V}$ 30 $\mu\text{V/V}$ 20 $\mu\text{V/V}$ 13 $\mu\text{V/V}$ 13 $\mu\text{V/V}$ 3000 $\mu\text{V/V}$ 1000 $\mu\text{V/V}$ 1000 $\mu\text{V/V}$ 300 $\mu\text{V/V}$ 200 $\mu\text{V/V}$ 120 $\mu\text{V/V}$ 40 $\mu\text{V/V}$ 40 $\mu\text{V/V}$ 30 $\mu\text{V/V}$ 19 $\mu\text{V/V}$ 19 $\mu\text{V/V}$

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Electrical measurements and magnetism - DC & LF measurements - AC voltage generator/source	Calibration for AC voltage by direct measurement in accordance with in-house procedure TPL030 at the following values: 1 kHz 1 mV 2 mV 5 mV 10 mV 20 mV 50 mV 100 mV 200 mV 0.5 V 1 V 2 V 5 V 10 V 20 V 50 V 100 V 200 V 500 V 700 V 1000 V	500 µV/V 300 µV/V 100 µV/V 50 µV/V 30 µV/V 30 µV/V 15 µV/V 15 µV/V 15 µV/V 11 µV/V 13 µV/V 12 µV/V 13 µV/V 14 µV/V 15 µV/V 18 µV/V 16 µV/V 18 µV/V 20 µV/V 20 µV/V

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Electrical measurements and magnetism - DC & LF measurements - AC voltage generator/source	Calibration for AC voltage by direct measurement in accordance with in-house procedure TPL030 at the following values: 50 kHz 1 mV 2 mV 5 mV 10 mV 20 mV 50 mV 100 mV 200 mV 0.5 V 1 V 2 V 5 V 10 V 20 V 50 V 100 V 200 V 500 V 700 V	500 μV/V 300 μV/V 200 μV/V 80 μV/V 50 μV/V 40 μV/V 25 μV/V 25 μV/V 15 μV/V 13 μV/V 13 μV/V 12 μV/V 15 μV/V 14 μV/V 15 μV/V 20 μV/V 25 μV/V 40 μV/V 50 μV/V

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Electrical measurements and magnetism - DC & LF measurements - AC voltage generator/source	On-site calibration for AC voltage by direct measurement in accordance with in-house procedure TPL030 at the following values and ranges: 40 Hz to 20 kHz 1 mV to 2 mV Above 2 mV to 6 mV Above 6 mV to 20 mV Above 20 mV to 60 mV Above 60 mV to 200 mV Above 200 mV to 600 mV Above 0.6 V to 1000 V 20 kHz to 50 kHz 1 mV to 2 mV Above 2 mV to 6 mV Above 6 mV to 20 mV Above 20 mV to 60 mV Above 60 mV to 200 mV Above 200 mV to 200 V Above 200 V to 700 V 20 kHz to 30 kHz 700 V to 1000 V 50 kHz to 100 kHz 1 mV to 2 mV Above 2 mV to 6 mV Above 6 mV to 20 mV Above 20 mV to 60 mV Above 60 mV to 200 mV Above 200 mV to 200 V Above 200 V to 600 V	2000 $\mu\text{V/V}$ to 1300 $\mu\text{V/V}$ 1000 $\mu\text{V/V}$ to 500 $\mu\text{V/V}$ 380 $\mu\text{V/V}$ to 210 $\mu\text{V/V}$ 170 $\mu\text{V/V}$ to 110 $\mu\text{V/V}$ 75 $\mu\text{V/V}$ to 70 $\mu\text{V/V}$ 70 $\mu\text{V/V}$ 40 $\mu\text{V/V}$ to 90 $\mu\text{V/V}$ 3300 $\mu\text{V/V}$ to 2100 $\mu\text{V/V}$ 1700 $\mu\text{V/V}$ to 850 $\mu\text{V/V}$ 630 $\mu\text{V/V}$ to 360 $\mu\text{V/V}$ 270 $\mu\text{V/V}$ to 190 $\mu\text{V/V}$ 120 $\mu\text{V/V}$ to 110 $\mu\text{V/V}$ 90 $\mu\text{V/V}$ to 130 $\mu\text{V/V}$ 150 $\mu\text{V/V}$ 150 $\mu\text{V/V}$ 4300 $\mu\text{V/V}$ to 2900 $\mu\text{V/V}$ 2200 $\mu\text{V/V}$ to 1200 $\mu\text{V/V}$ 840 $\mu\text{V/V}$ to 510 $\mu\text{V/V}$ 450 $\mu\text{V/V}$ to 350 $\mu\text{V/V}$ 240 $\mu\text{V/V}$ to 200 $\mu\text{V/V}$ 170 $\mu\text{V/V}$ to 400 $\mu\text{V/V}$ 580 $\mu\text{V/V}$

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Electrical measurements and magnetism - DC & LF measurements - AC voltage generator/source	Calibration for AC voltage by direct measurement in accordance with in-house procedure TPL036 at the following values : 20 kHz 1 mV 2 mV 5 mV 10 mV 20 mV 50 mV 100 mV 200 mV 0.5 V 1 V 2 V 5 V 10 V 20 V 50 V 100 V 200 V 500 V 700 V 1000 V 30 kHz 100 V 200 V 500 V 700 V 1000 V	500 μV/V 400 μV/V 200 μV/V 100 μV/V 60 μV/V 40 μV/V 30 μV/V 30 μV/V 15 μV/V 13 μV/V 12 μV/V 13 μV/V 14 μV/V 13 μV/V 15 μV/V 16 μV/V 19 μV/V 30 μV/V 35 μV/V 35 μV/V 16 μV/V 19 μV/V 40 μV/V 50 μV/V 45 μV/V

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Electrical measurements and magnetism - DC & LF measurements - AC voltmeter	Calibration for AC voltage in accordance with in-house procedure TPL038 over the following ranges: 40 Hz to 20 kHz 10 mV to 20 mV Above 20 mV to 60 mV Above 60 mV to 200 mV Above 200 mV to 600 mV Above 0.6 V to 2 V Above 2 V to 6 V Above 6 V to 20 V Above 20 V to 60 V Above 60 V to 200 V Above 200 V to 600 V Above 600 V to 1000 V 20 kHz to 50 kHz 10 mV to 20 mV Above 20 mV to 60 mV Above 60 mV to 200 mV Above 200 mV to 600 mV Above 0.6 V to 2 V Above 2 V to 6 V Above 6 V to 20 V Above 20 V to 60 V Above 60 V to 200 V Above 200 V to 600 V Above 600 V to 700 V 20 kHz to 50 kHz 700 V to 1000 V	1300 $\mu\text{V/V}$ 1100 $\mu\text{V/V}$ 600 $\mu\text{V/V}$ 210 $\mu\text{V/V}$ 140 $\mu\text{V/V}$ 210 $\mu\text{V/V}$ 140 $\mu\text{V/V}$ 230 $\mu\text{V/V}$ 150 $\mu\text{V/V}$ 380 $\mu\text{V/V}$ 300 $\mu\text{V/V}$ 1800 $\mu\text{V/V}$ 1500 $\mu\text{V/V}$ 1100 $\mu\text{V/V}$ 270 $\mu\text{V/V}$ 200 $\mu\text{V/V}$ 260 $\mu\text{V/V}$ 180 $\mu\text{V/V}$ 400 $\mu\text{V/V}$ 290 $\mu\text{V/V}$ 190 $\mu\text{V/V}$ 180 $\mu\text{V/V}$ 180 $\mu\text{V/V}$

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Electrical measurements and magnetism - DC & LF measurements - AC voltmeter	Calibration for AC voltage in accordance with in-house procedure TPL038 over the following ranges: 50 kHz to 100 kHz 10 mV to 20 mV Above 20 mV to 60 mV Above 60 mV to 200 mV Above 200 mV to 600 mV Above 0.6 V to 2 V Above 2 V to 6 V Above 6 V to 20 V Above 20 V to 60 V Above 60 V to 200 V Above 200 V to 600 V 100 kHz to 300 kHz 0.2 V to 0.6 V Above 0.6 V to 2 V Above 2 V to 6 V Above 6 V to 20 V 300 kHz to 500 kHz 0.2 V to 0.6 V Above 0.6 V to 2 V Above 2 V to 6 V Above 6 V to 20 V 500 kHz to 1 MHz 0.2 V to 0.6 V Above 0.6 V to 2 V Above 2 V to 6 V Above 6 V to 20 V	1800 $\mu\text{V}/\text{V}$ 1500 $\mu\text{V}/\text{V}$ 1100 $\mu\text{V}/\text{V}$ 270 $\mu\text{V}/\text{V}$ 200 $\mu\text{V}/\text{V}$ 260 $\mu\text{V}/\text{V}$ 180 $\mu\text{V}/\text{V}$ 400 $\mu\text{V}/\text{V}$ 290 $\mu\text{V}/\text{V}$ 190 $\mu\text{V}/\text{V}$ 1.2 mV/V 0.81 mV/V 1.0 mV/V 0.62 mV/V 570 $\mu\text{V}/\text{V}$ 500 $\mu\text{V}/\text{V}$ 520 $\mu\text{V}/\text{V}$ 500 $\mu\text{V}/\text{V}$ 1.1 mV/V 1.1 mV/V 1.1 mV/V 1.1 mV/V

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Electrical measurements and magnetism - DC & LF measurements - AC voltmeter	On-site calibration for AC voltage in accordance with in-house procedure TPL038 Over the following ranges: 50 kHz to 100 kHz 10 mV to 20 mV Above 20 mV to 60 mV Above 60 mV to 200 mV Above 200 mV to 600 mV Above 0.6 V to 2 V Above 2 V to 6 V Above 6 V to 20 V Above 20 V to 60 V Above 60 V to 200 V Above 200 V to 600 V 100 kHz to 300 kHz 0.2 V to 0.6 V Above 0.6 V to 2 V Above 2 V to 6 V Above 6 V to 20 V 300 kHz to 500 kHz 0.2 V to 0.6 V Above 0.6 V to 2 V Above 2 V to 6 V Above 6 V to 20 V 500 kHz to 1 MHz 0.2 V to 0.6 V Above 0.6 V to 2 V Above 2 V to 6 V Above 6 V to 20 V 500 kHz to 1 MHz 0.2 V to 0.6 V Above 0.6 V to 2 V Above 2 V to 20 V	1800 µV/V 1500 µV/V 1100 µV/V 270 µV/V 200 µV/V 260 µV/V 180 µV/V 400 µV/V 290 µV/V 190 µV/V 1.2 mV/V 0.81 mV/V 1.1 mV/V 0.62 mV/V 570 µV/V 500 µV/V 520 µV/V 500 µV/V 1.1 mV/V 1.1 mV/V 1.1 mV/V 1.1 mV/V 1200 µV/V 1100 µV/V 1400 µV/V

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Electrical measurements and magnetism - DC & LF measurements - AC three phase voltmeter	Calibration for AC voltage in accordance with in-house procedure TPL102 over the following range of parameters: 45 Hz to 65 Hz 50 V to 500 V	60 μ V/V

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Electrical measurements and magnetism - DC & LF measurements - AC/DC voltage transfer instrument	Calibration for AC/DC voltage difference in accordance with in-house procedure TPL006 at the following values: 1 MHz 0.5 V 1 V 2 V 3 V 5 V 10 V 20 V Calibration for AC/DC voltage difference in accordance with in-house procedure TPL032 at the following values: 20 Hz 0.5 V 1 V 2 V 3 V 5 V 10 V 20 V 50 V 100 V 200 V 500 V	160 μ V/V 160 μ V/V 120 μ V/V 120 μ V/V 120 μ V/V 120 μ V/V 120 μ V/V 12 μ V/V 8.0 μ V/V 9.0 μ V/V 9.0 μ V/V 8.0 μ V/V 9.0 μ V/V 12 μ V/V 11 μ V/V 10 μ V/V 12 μ V/V 16 μ V/V

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Electrical measurements and magnetism - DC & LF measurements - AC/DC voltage transfer instrument	Calibration for AC/DC voltage difference in accordance with in-house procedure TPL145 at the following values: 1 kHz 0.5 V 1 V 2 V 3 V 5 V 10 V 20 V 50 V 100 V 200 V 500 V 700 V 1000 V 10 kHz 0.5 V 1 V 2 V 3 V 5 V 10 V 20 V 50 V 100 V 200 V 500 V 700 V 1000 V	11 µV/V 8.0 µV/V 8.0 µV/V 8.0 µV/V 8.0 µV/V 8.0 µV/V 9.0 µV/V 9.0 µV/V 10 µV/V 10 µV/V 11 µV/V 12 µV/V 12 µV/V 12 µV/V 10 µV/V 8.0 µV/V 8.0 µV/V 8.0 µV/V 8.0 µV/V 10 µV/V 10 µV/V 10 µV/V 10 µV/V 12 µV/V 14 µV/V 15 µV/V 15 µV/V

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Electrical measurements and magnetism - DC & LF measurements - AC/DC voltage transfer instrument	Calibration for AC/DC voltage difference in accordance with in-house procedure TPL145 at the following values: 1 MHz 0.5 V 1 V 2 V 3 V 5 V 10 V 20 V Calibration for AC/DC voltage difference in accordance with in-house procedure TPL148 at the following values: 20 Hz 1 V 2 V 3 V 5 V 10 V 20 V 50 V 100 V 200 V 500 V 40 Hz 1 V 3 V 700 V 1000 V	120 μV/V 92 μV/V 78 μV/V 78 μV/V 68 μV/V 68 μV/V 70 μV/V 13 μV/V 9.0 μV/V 10 μV/V 12 μV/V 11 μV/V 15 μV/V 13 μV/V 12 μV/V 13 μV/V 17 μV/V 12 μV/V 10 μV/V 17 μV/V 18 μV/V

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Electrical measurements and magnetism - DC & LF measurements - AC current generator/source	On-site calibration for AC current in accordance with in-house procedure TPL044 over the following ranges: 40 Hz, 1 kHz 100 μ A to 1 mA Above 1 mA to 100 mA Above 100 mA to 1 A 3 kHz, 5 kHz 100 μ A to 1 mA Above 1 mA to 100 mA Above 100 mA to 1 A 10 kHz 100 μ A to 1 mA Above 1 mA to 100 mA Above 100 mA to 1 A Calibration for AC current in accordance with in-house procedure TPL044 over the following ranges: 40 Hz, 1 kHz 100 μ A to 1 mA Above 1 mA to 100 mA Above 100 mA to 1 A 3 kHz, 5 kHz 100 μ A to 1 mA Above 1 mA to 100 mA Above 100 mA to 1 A 10 kHz 100 μ A to 1 mA Above 1 mA to 100 mA Above 100 mA to 1 A	65 μ A/A 40 μ A/A 65 μ A/A 83 μ A/A 40 μ A/A 81 μ A/A 190 μ A/A 40 μ A/A 200 μ A/A 65 μ A/A 40 μ A/A 65 μ A/A 83 μ A/A 40 μ A/A 81 μ A/A 190 μ A/A 40 μ A/A 200 μ A/A

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Electrical measurements and magnetism - DC & LF measurements - AC current generator/source	Calibration for AC current in accordance with in-house procedure TPL046 at the following values or over the following ranges: 10 kHz 100 µA to 10 mA Above 10 mA to 100 mA Above 100 mA to 1 A 1 mA 10 mA 100 mA 1 A 2 A 5 A 10 A 40 Hz to 1 kHz 2.5 mA to 2 A Above 2 A to 20 A 1 kHz to 5 kHz 2.5 mA to 100 mA Above 100 mA to 1 A Above 1 A to 20 A 5 kHz to 10 kHz 2.5 mA to 100 mA Above 100 mA to 10 A	190 µA/A 300 µA/A 500 µA/A 190 µA/A 75 µA/A 185 µA/A 230 µA/A 500 µA/A 500 µA/A 500 µA/A 80 µA/A 120 µA/A 100 µA/A 150 µA/A 300 µA/A 300 µA/A 500 µA/A

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Electrical measurements and magnetism - DC & LF measurements - AC ammeter	On-site calibration for AC current in accordance with in-house procedure TPL049 over the following ranges: 40 Hz to 1 kHz 1 A to 20 A 1 kHz to 5 kHz 1 A to 20 A 5 kHz to 10 kHz 1 A to 10 A Calibration for AC current in accordance with in-house procedure TPL049 over the following ranges: 40 Hz to 1 kHz 1 A to 20 A 1 kHz to 5 kHz 1 A to 20 A 5 kHz to 10 kHz 1 A to 10 A	240 μA/A 360 μA/A 400 μA/A 240 μA/A 360 μA/A 400 μA/A

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Electrical measurements and magnetism - DC & LF measurements - AC three phase ammeter	Calibration for AC current in accordance with in-house procedure TPL102 over the following ranges of parameters: 45 Hz to 65 Hz 0.1 A to 150 A	50 μ A/A

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Electrical measurements and magnetism - DC & LF measurements - AC single phase wattmeter	<p>Calibration for active power in accordance with in-house procedure TPL105 over the following ranges of parameters:</p> <p>Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Voltage: 110 V to 120 V / 220 V to 240 V Current: 1 A, 5 A, 10 A 50 A 100 A 160 A</p> <p>Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Voltage: 24 V to 480 V Current: 0.1 A to 10 A Above 10 A to 50 A Above 50 A to 100 A Above 100 A to 160 A</p> <p>Calibration for active power in accordance with in-house procedure TPL012 over the following ranges of parameters:</p> <p>Frequency: 400 Hz Voltage: 75 V to 300 V Current: 0.5 A to 20 A Power factor: 0.5 lead/lag Power factor: 0.5 lead/lag to unity Power factor: unity</p>	<p>30 μW/VA 35 μW/VA 40 μW/VA 50 μW/VA</p> <p>50 μW/VA 60 μW/VA 70 μW/VA 80 μW/VA</p> <p>0.037 % 0.050 % 0.020 %</p>

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Electrical measurements and magnetism - DC & LF measurements - AC single phase varmeter	Calibration for reactive power in accordance with in-house procedure TPL105 over the following ranges of parameters: Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Voltage: 110 V to 120 V / 220 V to 240 V Current: 1 A, 5 A, 10 A 50 A 100 A 160 A Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Voltage: 24 V to 480 V Current: 0.1 A to 10 A Above 10 A to 50 A Above 50 A to 100 A Above 100 A to 160 A	30 μ var/VA 35 μ var/VA 40 μ var/VA 50 μ var/VA 50 μ var/VA 60 μ var/VA 70 μ var/VA 80 μ var/VA
- AC single phase VA meter	Calibration for apparent power in accordance with in-house procedure TPL105 over the following ranges of parameters: Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Voltage: 110 V to 120 V / 220 V to 240 V Current: 1 A, 5 A, 10 A 50 A 100 A 160 A Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Voltage: 24 V to 480 V Current: 0.1 A to 10 A Above 10 A to 50 A Above 50 A to 100 A Above 100 A to 160 A	30 μ VA/VA 35 μ VA/VA 40 μ VA/VA 50 μ VA/VA 50 μ VA/VA 60 μ VA/VA 70 μ VA/VA 80 μ VA/VA

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Electrical measurements and magnetism - DC & LF measurements - AC three phase VA meter	Calibration for apparent power in accordance with in-house procedure TPL102 over the following ranges of parameters: Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Voltage: 110 V to 120 V / 220 V to 240 V Current: 1 A, 5 A, 10 A 50 A 100 A 160 A Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Voltage: 24 V to 480 V Current: 0.1 A to 10 A Above 10 A to 50 A Above 50 A to 100 A Above 100 A to 160 A	50 μVA/VA 60 μVA/VA 70 μVA/VA 80 μVA/VA 70 μVA/VA 80 μVA/VA 90 μVA/VA 100 μVA/VA

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Electrical measurements and magnetism - DC & LF measurements - AC single phase watt-hour meter	Calibration for AC energy in accordance with in-house procedure TPL125 over the following ranges of parameters: Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Measuring time: 1 s to 1 h Voltage: 24 V to 480 V Current: 1 A to 55 A Above 55 A to 160 A	2.0 mWh/VAh 6.0 mWh/VAh
- AC single phase var-hour meter	Calibration for AC energy in accordance with in-house procedure TPL125 over the following ranges of parameters: Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Measuring time: 1 s to 1 h Voltage: 24 V to 480 V Current: 1 A to 55 A Above 55 A to 160 A	2.0 mvarh/VAh 6.0 mvarh/VAh
- AC single phase VA-hour meter	Calibration for AC energy in accordance with in-house procedure TPL125 over the following ranges of parameters: Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Measuring time: 1 s to 1 h Voltage: 24 V to 480 V Current: 1 A to 55 A Above 55 A to 160 A	2.0 mVAh/VAh 6.0 mVAh/VAh

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Electrical measurements and magnetism - DC & LF measurements - AC three phase watt-hour meter	Calibration for AC energy in accordance with in-house procedure TPL101 over the following ranges of parameters: Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Measuring time: 1 s to 1 h Voltage: 24 V to 480 V Current: 1 A to 55 A Above 55 A to 160 A	2.0 mWh/VAh 6.0 mWh/VAh
- AC three phase var-hour meter	Calibration for AC energy in accordance with in-house procedure TPL101 over the following ranges of parameters: Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Measuring time: 1 s to 1 h Voltage: 24 V to 480 V Current: 1 A to 55 A Above 55 A to 160 A	2.0 mvarh/VAh 6.0 mvarh/VAh
- AC three phase VA-hour meter	Calibration for AC energy in accordance with in-house procedure TPL101 over the following ranges of parameters: Frequency: 45 Hz to 65 Hz Power factor: 0 lead/lag to unity Measuring time: 1 s to 1 h Voltage: 24 V to 480 V Current: 1 A to 55 A Above 55 A to 160 A	2.0 mVAh/VAh 6.0 mVAh/VAh

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Electrical measurements and magnetism - DC & LF measurements - Capacitor	<p>Calibration for capacitance in accordance with in-house procedure TPL065 at the following values or over the following ranges:</p> <p>100 Hz to 1 kHz 10 μF</p> <p>400 Hz to 1 kHz 10 pF to 1 μF</p> <p>1 kHz to 10 kHz 10 pF to 0.05 μF Above 0.05 μF to 1 μF</p> <p>Calibration for capacitance in accordance with in-house procedure TPL004 over the following ranges:</p> <p>50 Hz to 100 Hz 10 pF to 100 pF Above 100 pF to 1.11 μF</p> <p>100 Hz to 1 kHz 10 pF to 1.11 μF</p> <p>1 kHz to 10 kHz 10 pF to 100 pF Above 100 pF to 0.05 μF Above 0.05 μF to 1.11 μF</p> <p>Calibration for capacitance in accordance with in-house procedure TPL060 over the following ranges:</p> <p>1 kHz 10 pF to 1 nF Above 1 nF to 1 μF</p>	<p>700 μF/F</p> <p>700 μF/F</p> <p>700 μF/F 2000 μF/F</p> <p>1000 μF/F 100 μF/F</p> <p>100 μF/F</p> <p>200 μF/F 250 μF/F 2000 μF/F</p> <p>15 μF/F 100 μF/F</p>

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Electrical measurements and magnetism - DC & LF measurements - Harmonics source	<p>Calibration for harmonic voltage in accordance with in-house procedure TPL116 over the following ranges of parameters:</p> <p>Frequency: 50 Hz / 60 Hz Harmonic order: 2nd to 100th Phase: ±(0 to 180)°</p> <p>Harmonic voltage: 10 V to 12 V 20 V to 24 V</p> <p>Calibration for harmonic voltage in accordance with in-house procedure TPL128 over the following ranges of parameters:</p> <p>Frequency: 50 Hz / 60 Hz Harmonic order: 2nd to 100th Phase: ±(0 to 180)°</p> <p>Harmonic voltage: 10 V to 12 V 20 V to 24 V</p>	<p>0.030 % 0.030 %</p> <p>0.030 % 0.030 %</p>

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Electrical measurements and magnetism - DC & LF measurements - Harmonics source	<p>Calibration for harmonic current in accordance with in-house procedure TPL117 over the following ranges of parameters:</p> <p>Frequency: 50 Hz / 60 Hz Harmonic order: 2nd to 100th Phase: $\pm(0 \text{ to } 180)^\circ$</p> <p>Harmonic current: 10 mA to 20 mA Above 20 mA to 0.2 A Above 0.2 A to 6 A</p> <p>Calibration for harmonic current in accordance with in-house procedure TPL129 over the following ranges of parameters:</p> <p>Frequency: 50 Hz / 60 Hz Harmonic order: 2nd to 100th Phase: $\pm(0 \text{ to } 180)^\circ$</p> <p>Harmonic current: 10 mA to 20 mA Above 20 mA to 0.2 A Above 0.2 A to 6 A</p>	<p>0.24 % 0.18 % 0.24 % 0.24 % 0.18 % 0.24 %</p>

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Electrical measurements and magnetism - DC & LF measurements - Harmonics analyzer	<p>Calibration for harmonic voltage in accordance with in-house procedure TPL114 over the following ranges of parameters:</p> <p>Frequency: 50 Hz / 60 Hz Harmonic order: 2nd to 45th Phase: $\pm(0 \text{ to } 180)^\circ$</p> <p>Harmonic voltage: 10 V to 12 V 20 V to 24 V</p> <p>Calibration for harmonic current in accordance with in-house procedure TPL110 over the following values of parameters:</p> <p>Frequency: 50 Hz / 60 Hz Harmonic order: 2nd to 45th Phase: $\pm(0 \text{ to } 180)^\circ$</p> <p>Harmonic current: 4 A</p> <p>Calibration for harmonic current in accordance with in-house procedure TPL115 over the following ranges of parameters:</p> <p>Frequency: 50 Hz / 60 Hz Harmonic order: 2nd to 45th Phase: $\pm(0 \text{ to } 180)^\circ$</p> <p>Harmonic current: 3 mA to 75 mA Above 75 mA to 3 A Above 3 A to 6 A</p>	<p>0.30 % 0.30 %</p> <p>0.80 %</p> <p>3.0 % 0.50 % 0.80 %</p>

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Electrical measurements and magnetism		
- DC & LF measurements		
- Electrocardiograph (ECG) analyser	Calibration for voltage level in accordance with in-house procedure TPL143 over the following ranges of parameters: Waveform: Sinusoidal Frequency: 10 Hz to 200 Hz Voltage level: 1 mV to 5 mV	0.30 %
- Electrical safety analyzer	Calibration for the following parameters in accordance with in-house procedure TPL141: - Accessible voltage: 50 Hz 1 V to 300 V - Mains voltage: 50 Hz 1 mV to 0.1 V 220 V 230 V 240 V - Protective earth resistance: 0.5 Ω to 2 Ω - Insulation resistance: 1 MΩ to 23 MΩ Above 23 MΩ to 100 MΩ - Leakage current: 50 Hz 10 μA to 199.9 μA 200 μA to 1999 μA 2 mA to 10 mA - Equipment current: 50 Hz 1 A to 6.5 A	0.10 V 0.10 V 0.20 V 0.20 V 0.20 V 0.0030 Ω 0.10 MΩ 0.20 MΩ 0.10 μA 1.0 μA 10 μA 0.10 A

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Electrical measurements and magnetism - Time and frequency measurements - Period source	Calibration for period in accordance with in-house procedure TPR073 over the following range: 25 ps to 81 ps Calibration for period in accordance with in-house procedure TPR004 over the following ranges: Above 38 ps to 100 ps Above 100 ps to 769 ps Above 769 ps to 1 μs Above 1 μs to 1 ms Above 1 ms to 1 s	1 x 10 ⁻¹⁰ of result 1 x 10 ⁻¹⁰ to 2 x 10 ⁻¹⁰ of result 2 x 10 ⁻¹⁰ to 6 x 10 ⁻¹⁰ of result 5 x 10 ⁻¹¹ of result 5 x 10 ⁻¹¹ to 3 x 10 ⁻⁹ of result 3 x 10 ⁻⁹ to 4 x 10 ⁻⁶ of result
- Period meter	Calibration for period in accordance with in-house procedure TPR081 over the following range: 25 ps to 56 ps Calibration for period in accordance with in-house procedure TPR003 over the following ranges: 38 ps to 100 ps Above 100 ps to 769 ps Above 769 ps to 1 μs Above 1 μs to 1 ms Above 1 ms to 1 s	1 x 10 ⁻¹⁰ of result 1 x 10 ⁻¹⁰ to 2 x 10 ⁻¹⁰ of result 2 x 10 ⁻¹⁰ to 6.1 x 10 ⁻¹⁰ of result 6.1 x 10 ⁻¹¹ of result 6.1 x 10 ⁻¹¹ to 3 x 10 ⁻⁹ of result 3 x 10 ⁻⁹ to 4 x 10 ⁻⁶ of result

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Electrical measurements and magnetism - Time and frequency measurements - Time difference source - Time difference meter	Calibration for time interval in accordance with in-house procedure TPR005 over the following ranges: 1 ns to 1 s Above 1 s to 999 s Calibration for time interval in accordance with in-house procedure TPR005 over the following ranges: 1 ns to 1 s Above 1 s to 999 s	1 ns 1 ns to 3 ns 1 ns 1 ns to 15 ns

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Electrical measurements and magnetism - RF measurements - Power source fitted with 50 Ω type N connector	Calibration for power in accordance with in-house procedure TPR010 over the following ranges: 10 kHz to 30 MHz 10 nW to 10 μ W Above 10 μ W to 100 mW 30 MHz to 3 GHz 10 nW to 10 μ W Above 10 μ W to 100 mW 3 GHz to 18 GHz 10 nW to 10 μ W Above 10 μ W to 100 mW Calibration for power in accordance with in-house procedure TPR025 over the following ranges: 100 Hz to 3 GHz -100 dBm to +20 dBm 3 GHz to 18 GHz -100 dBm to +20 dBm	1.3 % to 4.5 % 1.3 % to 4.0 % 1.0 % to 3.8 % 1.0 % to 3.1 % 2.3 % to 7.7 % 2.3 % to 7.4 % 1.2 dB 2.0 dB
- High Level RF Power source fitted with 50 Ω type N connector	Calibration for power in accordance with in-house procedure TPR036 over the following ranges: 1 MHz to 1 GHz 1 W to 30 W 1 GHz to 4.2 GHz 1 W to 5 W 4.2 GHz to 18 GHz 1 W to 10 W	2.8 % to 5.3 % 2.4 % to 3.2 % 3.2 % to 4.1 %

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Electrical measurements and magnetism		
- RF measurements		
- Power meter fitted with 50 Ω type N connector	Calibration for power in accordance with in-house procedure TPR009 over the following ranges: 10 kHz to 30 MHz 10 nW to 10 μW Above 10 μW to 100 mW 30 MHz to 3 GHz 10 nW to 10 μW Above 10 μW to 100 mW 3 GHz to 18 GHz 10 nW to 10 μW Above 10 μW to 100 mW Calibration for power in accordance with in-house procedure TPR025 over the following ranges: 100 Hz to 3 GHz -100 dBm to +20 dBm 3 GHz to 18 GHz -100 dBm to +20 dBm	1.4 % to 4.5 % 1.4 % to 4.0 % 1.0 % to 3.8 % 1.0 % to 3.1 % 1.9 % to 7.4 % 1.9 % to 7.0 % 1.2 dB 2.0 dB
- High level RF power meter fitted with 50 Ω type N connector	Calibration for power in accordance with in-house procedure TPR035 over the following ranges: 1 MHz to 1 GHz 23 dBm to 44 dBm 1 GHz to 4.2 GHz 23 dBm to 37 dBm 4.2 GHz to 18 GHz 23 dBm to 40 dBm	0.60 dB 0.60 dB 0.60 dB

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Electrical measurements and magnetism		
- RF measurements		
- Power meter fitted with 50 Ω 3.5 mm connector	Calibration for power in accordance with in-house procedure TPR045 over the following range: 50 MHz to 26.5 GHz 10 nW to 1 mW	5.7 % to 7.0 %
- Power source fitted with 50 Ω 3.5 mm connector	Calibration for power in accordance with in-house procedure TPR046 over the following range: 50 MHz to 26.5 GHz 10 nW to 1 mW	1.3 % to 4.5 %
- Power meter fitted with 50 Ω 2.4 mm connector	Calibration for power in accordance with in-house procedure TPR082 over the following range: 50 MHz to 100 MHz 10 μW to 1 mW 100 MHz to 10 GHz 10 μW to 1 mW 10 GHz to 26.5 GHz 10 μW to 1 mW 26.5 GHz to 40 GHz 10 μW to 1 mW	3.1 % to 3.4 % 4.0 % to 4.9 % 5.3 % to 7.0 % 9.0 % to 9.7 %
- Power source fitted with 50 Ω 2.4 mm connector	Calibration for power in accordance with in-house procedure TPR078 over the following range: 50 MHz to 40 GHz 10 μW to 100 mW	1.1 % to 8.2 %

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Electrical measurements and magnetism - RF measurements - Power amplifier with input and output ports fitted with 50 Ω type N / 3.5 mm / 2.4 mm connectors	Calibration for power gain in accordance with in-house procedure TPR402 over the following ranges: 10 kHz to below 1 MHz -100 dBm to 20 dBm 1 MHz to 50 MHz -100 dBm to 44.8 dBm Above 50 MHz to 1 GHz -100 dBm to 44.8 dBm Above 1 GHz to 3 GHz -100 dBm to 44.8 dBm Above 3 GHz to 4.2 GHz -100 dBm to 37 dBm Above 4.2 GHz to 18 GHz -100 dBm to 40 dBm Above 18 GHz to 26.5 GHz -50 dBm to 20 dBm Above 26.5 GHz to 40 GHz -50 dBm to 20 dBm	0.10 dB to 2.6 dB 0.07 dB to 2.6 dB 0.09 dB to 2.6 dB 0.12 dB to 2.6 dB 0.12 dB to 7.7 dB 0.19 dB to 7.7 dB 0.21 dB to 0.44 dB 0.23 dB to 0.59 dB

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Electrical measurements and magnetism - RF measurements - Coaxial power sensor fitted with 50 Ω type N connector	Calibration for power in accordance with in-house procedure TPR008 at the following values: 10 kHz to 30 MHz 10 μW 10 mW 30 MHz to 3 GHz 10 μW 10 mW 3 GHz to 18 GHz 10 μW 10 mW	1.0 % to 3.2 % 1.0 % to 3.2 % 1.0 % to 1.8 % 0.8 % to 1.2 % 1.8 % to 3.9 % 1.2 % to 3.3 %
- Coaxial power sensor fitted with 50 Ω 2.4 mm connector	Calibration for calibration factor at 1 mW in accordance with in-house procedure TPR074 over the following ranges: 50 MHz to 2 GHz 0.8 to 1.2 Above 2 GHz to 40 GHz 0.8 to 1.2	2.3 % 3.7 %

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Electrical measurements and magnetism - RF measurements - Oscilloscope	<p>Calibration for the following parameters in accordance with in-house procedure TPR016:</p> <ul style="list-style-type: none"> - Peak to Peak voltage of 1 kHz square waveform over the following range: 40 μV to 40 V - Period of triangular waveform over the following range: 0.5 ns to 5 s - Bandwidth over the following range: 1 MHz to 2 GHz <p>Calibration for rise time in accordance with in-house procedure TPR024: over the following range:</p> <p>0.5 ns to 900 μs</p> <p>Calibration for the following parameters in accordance with in-house procedure TPC101:</p> <ul style="list-style-type: none"> - Peak to Peak voltage of 1 kHz square waveform over the following range: 40 μV to 200 V - Period of triangular waveform over the following range: 0.2 ns to 50 s - Bandwidth over the following range: 0.1 MHz to 6.4 GHz - Rise time over the following range: 300 ps to 1 ms 	<p>0.0032v + 3 μV where v is nominal test voltage in V</p> <p>0.060 %</p> <p>4.3 % of applied voltage level and it will be expressed in term of frequency for the UUT</p> <p>0.03 ns to 23 μs</p> <p>0.0032v + 3 μV where v is nominal test voltage in V</p> <p>0.060 %</p> <p>4.3 % of applied voltage level and it will be expressed in term of frequency for the UUT</p> <p>8.0 ps to 20 μs</p>

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Electrical measurements and magnetism		
- RF measurements		
- Oscilloscope	Calibration for the following parameters in accordance with in-house procedure TPC105: - Bandwidth: 6 GHz to 20 GHz - Rise time: 20 ps to 300 ps	0.25 % 0.25 ps
- Oscilloscope calibrator	Calibration for square wave output amplitude in accordance with in-house procedure TPC102 over the following ranges: 50 Hz to 1 kHz 50 Ω 0.4 mV to 4 V 1 MΩ 0.4 mV to 200 V	0.90 % to 0.002 % 0.90 % to 0.002 %
- Amplitude modulation generator and meter	Calibration for modulation index in accordance with in-house procedure TPR013 over the following range of parameters: Carrier frequency: 150 kHz to 1.3 GHz Modulating frequency: 100 Hz to 200 kHz Modulation index: 0.01 to 0.99	3.4 % to 4.3 %
- Frequency modulation generator and meter	Calibration for frequency deviation in accordance with in-house procedure TPR014 over the following range of parameters: Carrier frequency: 150 kHz to 1.3 GHz Modulating frequency: 100 Hz to 400 kHz Frequency deviation at: 100 Hz to 400 kHz	0.80 %

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Electrical measurements and magnetism - RF measurements - Power splitter fitted with 50 Ω type N connector	Calibration for the following parameters in accordance with in-house procedure TPR041: - Equivalent output VRC magnitude (linear) over the following ranges: 50 MHz to 2 GHz 0.000 to 1.000 2 GHz to 8 GHz 0.000 to 1.000 8 GHz to 18 GHz 0.000 to 1.000 - Tracking (dB) over the following range: 50 MHz to 18 GHz -80 dB to 80 dB Calibration for the following parameters in accordance with in-house procedure TPR054 using Juroshek direct method: - Equivalent output VRC (real part and imaginary part) over the following range: 50 MHz to 18 GHz -1.000 to 1.000 - Equivalent output VRC magnitude (linear): over the following range: 50 MHz to 18 GHz 0.000 to 1.000	0.020 0.030 0.050 0.20 dB 0.010 + 0.0016 x f where f is the frequency in GHz 0.010 + 0.0016 x f where f is the frequency in GHz

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Electrical measurements and magnetism		
- RF measurements		
- Loop antenna		
	Calibration for antenna factor in accordance with CISPR 16-1-6: 2014 + A1: 2017 at the following frequency ranges:	
- Active loop antenna	1 kHz to 30 MHz -40 dB (S/m) to 10 dB (S/m)	1.2 dB
- Passive loop antenna	1 kHz to 1 MHz 10 dB (pT/μV) to 110 dB (pT/μV)	1.2 dB
	Calibration for antenna factor in accordance with in-house procedure TPR201 at the following frequency ranges:	
- Active loop antenna	1 kHz to 30 MHz -40 dB (S/m) to 10 dB (S/m)	1.9 dB
- Passive loop antenna	1 kHz to 1 MHz 10 dB (pT/μV) to 110 dB (pT/μV)	1.9 dB

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Electrical measurements and magnetism - RF measurements - 1.2/50 µs voltage surge generator	Calibration for the following parameters in accordance with IEC 61000-4-5: 2005: - Front time at 1.2 µs - Time to half-value at 0 µs - Voltage surge peak over the following range: 0.5 kV to 7.4 kV	5.0 % 5.0 % 2.0 %
	Calibration for the following parameters in accordance with IEC 61000-4-5: 2014: - Front time at 1.2 µs - Duration at 50 µs - Voltage surge peak over the following range: 0.5 kV to 4 kV	5.0 % 2.0 % 3.0 %
- 10/700 µs voltage surge generator	Calibration for the following parameters in accordance with IEC 61000-4-5: 2005: - Front time at 10 µs - Time to half-value at 700 µs - Voltage surge peak over the following range: 0.5 kV to 7.4 kV	5.0 % 5.0 % 2.0 %
	Calibration for the following parameters in accordance with IEC 61000-4-5: 2014: - Front time at 10 µs - Duration at 700 µs - Voltage surge peak over the following range: 0.5 kV to 4 kV	5.0 % 2.0 % 3.0 %

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Electrical measurements and magnetism - RF measurements - 8/20 µs current surge generator	Calibration for the following parameters in accordance with IEC 61000-4-5: 2005: - Front time at 8 µs - Time to half-value at 20 µs - Current surge peak over the following range: 0.25 kA to 3.7 kA Calibration for the following parameters in accordance with IEC 61000-4-5: 2014: - Front time at 8 µs - Duration at 20 µs - Current surge peak over the following range: 0.25 kA to 2.0 kA	5.0 % 5.0 % 2.8 % 5.0 % 5.0 % 2.8 %
- 5/320 µs current surge generator	Calibration for the following parameters in accordance with IEC 61000-4-5: 2005: - Front time at 5 µs - Time to half-value at 320 µs - Current surge peak over the following range: 12.5 A to 185 A Calibration for the following parameters in accordance with IEC 61000-4-5: 2014: - Front time at 5 µs - Duration at 20 µs - Current surge peak over the following range: 12.5 A to 100 A	5.0 % 5.0 % 2.8 % 5.0 % 5.0 % 2.8 %

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Electrical measurements and magnetism - Magnetism - Gaussmeter, Teslameter	Calibration for DC magnetic flux density and applied magnetic field strength in axial and transverse directions in accordance with in-house procedure TPD301 over the following ranges: 0.3 mT to 0.5 mT Above 0.5 mT to 50 mT Calibration for DC magnetic flux density and applied magnetic field strength in transverse direction in accordance with in-house procedure TPD302 over the following range: 50 mT to 1.5 T Calibration for DC magnetic flux density and applied magnetic field strength in axial direction in accordance with in-house procedure TPD303 over the following range: 50 mT to 1.0 T	2.0 % 1.0 % 0.1 % 0.1 %
- Reference magnet	Calibration for magnetic flux density in axial and transverse directions in accordance with in-house procedure TPD307 over the following ranges: 0.3 mT to 0.5 mT Above 0.5 mT to 50 mT Above 50 mT to 1.5 T	2.0 % 1.0 % 0.1 %

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Length and related quantities		
- Length		
- Stabilised laser of the <i>mise en pratique</i> (wavelength at 633 nm)	Calibration for optical frequency at 474 THz by using an acousto-optic modulator in accordance with in-house procedure TPM706	25 kHz
- Red He-Ne laser (wavelength at 633 nm)	Calibration for optical frequency at 474 THz in accordance with in-house procedure TPM702	2 MHz
- Comparator	Calibration for length in accordance: with in-house procedure TPM111 over the following range: 0.3 μm to 60 mm	0.13 μm

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Length and related quantities		
- Length		
- Gauge block	Calibration for length by comparison with a reference gauge block (grade 0, 1 or 2) in accordance with in-house procedure TPM101 over the following range: 0.5 mm to 100 mm	$Q[60 \text{ nm}, 1.3e-6l]$ where $Q[a, b] = [a^2 + b^2]^{1/2}$, l is the length
- Long gauge block and length bar	Calibration for length using comparator in accordance with in-house procedure TPM153 over the following range: Above 100 mm to 600 mm	$Q[400 \text{ nm}, 4e-6l]$ where $Q[a, b] = [a^2 + b^2]^{1/2}$, l is the length
- Long gauge block, step gauge, fixture, work piece and component	Calibration for length using coordinate measuring machine by non-substitution method in accordance with ISO 15530-3: 2011 over the following ranges: 20 mm to 100 mm Above 100 mm to 300 mm Above 300 mm to 420 mm	0.5 μm 0.9 μm 1.1 μm

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Length and related quantities - Length - Calliper checker	Calibration for distance between a measuring face and the datum face (bottom) in accordance with in-house procedure TPM172 over the following ranges: 10 mm to 300 mm Above 300 mm to 600 mm Calibration for distance between any measuring face and the datum face for internal measurement in accordance with in-house procedure TPM172 over the following ranges: 10 mm to 300 mm Above 300 mm to 600 mm	Q[0.5 μm, 3.4e-6l] Q[1.2 μm, 3.1e-6l] where Q[a, b] = [a ² + b ²] ^{1/2} , l is the distance between a measuring face and the datum face (bottom)
- Micrometer setting rod	Calibration for central length in accordance with in-house procedure TPM153 over the following ranges: 25 mm to 100 mm Above 100 mm to 500 mm	1.6 μm 3.4 μm Q[260 nm, 4e-6l] Q[400 nm, 4e-6l] where Q[a, b] = [a ² + b ²] ^{1/2} , l is the length

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Length and related quantities - Length - Length gauge (flat ended) and micrometer extension rod - Length gauge (spherical ended) - Internal micrometer - Three-point micrometer	Calibration for length in accordance with in-house procedure TPM153 over the following range: 1 mm to 1000 mm Calibration for length in accordance with in-house procedure TPM153 over the following range: 1 mm to 600 mm Calibration for length in accordance with in-house procedure TPM114 over the following range: 5 mm to 1 m Calibration for diameter in accordance with in-house procedure TPE801 over the following range: 12 mm to 20 mm	0.3 $\mu\text{m} + 4\text{e-}6l$ where l is the length 0.3 $\mu\text{m} + 4\text{e-}6l$ where l is the length Q[2.4 $\mu\text{m}, 9\text{e-}6l$] where $Q[a, b] = [a^2 + b^2]^{1/2}$, l is the length 3.2 μm

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Length and related quantities - Length - Coordinate measuring machine (CMM)	Verification for the following parameter of CMM stylus contacting probing system in accordance with ISO 10360-5: 2010: - single probe probing error - multiple probes probing error Verification for the following parameters of CMM stylus contacting probing system in accordance with ISO 10360-5: 2020: - single probe probing error - scanning mode size error - scanning mode form error Verification for test length of CMM stylus contacting probing system in accordance with ISO 10360-2: 2009 - by comparison with a length artefact 1 mm to 1540 mm - by comparison with a laser interferometer 1 mm to 4000 mm	0.03 µm 0.04 µm 0.03 µm 0.8 µm 1.6 µm Q[0.25 µm, 0.7e-6l] where Q[a, b] = [a ² + b ²] ^{1/2} , l is the length Q[0.25 µm, 1.3e-6l] where Q[a, b] = [a ² + b ²] ^{1/2} , l is the length
- Coordinate table	On-site calibration for travel distance in accordance with in-house procedure TPM133 over the following range: 1 mm to 600 mm	0.3 µm + 4e-6l where l is the travel distance

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Length and related quantities - Length - Measuring microscope and profile projector	On-site calibration for travel distance in accordance with in-house procedure TPM145 over the following range: 0.1 mm to 600 mm On-site calibration for magnification factor in accordance with in-house procedure TPM145 over the following range: 1 to 100	0.3 $\mu\text{m} + 4\text{e-}6l$ where l is the travel distance 0.07 % of magnification factor
- Gauge, jig, fixture, work piece and component (with dimensions of 1 mm x 1 mm x 1 mm to 250 mm x 250 mm x 200 mm)	Calibration for dimensions by optical method in accordance with in-house procedure TPM132 Calibration for dimensions by mechanical comparison or by direct measurement in accordance with in-house procedure TPM153	0.3 $\mu\text{m} + 4\text{e-}6l$ where l is the length 0.3 $\mu\text{m} + 4\text{e-}6l$ where l is the length

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Length and related quantities		
- Length		
- Plain plug gauge, cylindrical setting standard, gear measuring cylinder, pin gauge and roller	Calibration for diameter in accordance with in-house procedure TPM139 over the following range: 0.05 mm to 150 mm	$Q[0.4 \mu\text{m}, 9e-6d]$ where $Q[a, b] = [a^2 + b^2]^{1/2}$, d is the diameter
- Plain ring gauge	Calibration for diameter in accordance with in-house procedure TPM151 over the following range: 1 mm to 250 mm	$Q[0.5 \mu\text{m}, 10e-6d]$ where $Q[a, b] = [a^2 + b^2]^{1/2}$, d is the diameter
- Precision ball	Calibration for diameter in accordance with in-house procedure TPM159 over the following range: 1 mm to 25 mm	0.5 μm
- Radius gauge	Calibration for radius in accordance with in-house procedure TPE802 over the following range: 0.25 mm to 25 mm	7 μm
- Ring size measuring stick	Calibration for diameter in accordance with in-house procedure TPM188 over the following range: 10 mm to 25 mm	0.03 mm

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Length and related quantities - Length - Extensometer calibrator	Calibration for travel in accordance with standard method ISO 9513: 2012 over the following range: 0.01 mm to 0.333 mm Above 0.333 mm to 50 mm Calibration for travel in accordance with in-house procedure TPE103 over the following range: 0.01 mm to 0.333 mm Above 0.333 mm to 50 mm	0.23 μm + 0.5e-3/ 0.49 μm + 4e-6/ where l is the length 0.23 μm + 0.5e-3/ 0.49 μm + 4e-6/ where l is the length
- Laser distance meter (LDM/EDM)	Calibration for travel distance in accordance with in-house procedure TPE102 over the following range: 0.3 m to 20 m	1.0 mm
- Precision line scale	Calibration for interval length in accordance with in-house procedure TPE301 over the following range: 0.01 mm to 600 mm	Q[0.15 μm , 0.5e-6] where $Q[a, b] = [a^2 + b^2]^{1/2}$, l is the length

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Length and related quantities - Length - Laser interferometry length measuring system - Universal length measuring system	Calibration for travel distance in accordance with in-house procedure TPE105 over the following range: 0.01 mm to 20 m On-site calibration for travel distance in accordance with in-house procedure TPE106 over the following range: 0.01 mm to 20 m	2.7 x 10 ⁻⁷ of result Q[0.41 μm, 3.3e-6] where Q[a, b] = [a ² + b ²] ^{1/2} , <i>l</i> is the travel distance

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ITEM TESTED OR MEASURED 測試或量度項目	SPECIFIC TEST OR PROPERTY MEASURED[®] 特定測試或量度的特性 [®]	CALIBRATION AND MEASUREMENT CAPABILITY (CMC)* 校準和測量能力*
Length and related quantities		
- Angle		
- Precision index table	Calibration for angle in accordance with in-house procedure TPE502 over the following range: 0° to 360°	0.16 second of arc
- Rotary table	Calibration for angle in accordance with in-house procedure TPM126 over the following range: 0° to 360°	1 second of arc
- Rotary axis, spindle of machine table and head	On-site calibration for angle in accordance with in-house procedure TPE503 over the following range: 0° to 360°	1 second of arc

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Length and related quantities		
- Angle		
- Angle gauge	Calibration for angle in accordance with in-house procedure TPM134 over the following range: 0° to 90°	0.6 second of arc
- Bevel protractor	Calibration for angle in accordance with in-house procedure TPM121 over the following range: 5 minute of arc to 360°	2 minute of arc
- Protractor	Calibration for angle in accordance with in-house procedure TPM198 over the following range: 0° to 180°	0.1°
- Electronic level	Calibration for angle in accordance with in-house procedure TPM131 over the following range: 0 second of arc to 200 second of arc Above 200 second of arc to 1200 second of arc	0.3 second of arc 0.8 second of arc
- Laser level	Calibration for the following parameters in accordance with in-house procedure TPE501: - Horizontal line (0°) - Vertical line (90°)	41 second of arc 38 second of arc

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Length and related quantities		
- Angle		
- Polygons up to 36 sides	Calibration for angle in accordance with in-house procedure TPM128 by direct comparison with a precision index table over the following range: 0° to 360°	0.6 second of arc
	Calibration for angle in accordance with in-house procedure TPE504 by circle closure method over the following range: 0° to 360°	0.16 second of arc
- Sine bar	Calibration for distance between the roller axes in accordance with in-house procedure TPM183 over the following range: 10 mm to 254 mm	2.1 μm
- Square		
- cylindrical type square	Calibration for squareness in accordance with in-house procedure TPM157 over the following range: 5 mm to 300 mm	0.6 μm
- Squareness tester	Calibration for squareness for travel distance in accordance with in-house procedure TPM118 over the following range: 5 mm to 300 mm	1 μm + 8e-6l where <i>l</i> is the travel distance

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Length and related quantities - Form - Optical flat and optical parallel (10 mm to 200 mm diameter) - Surface plate (made of granite and cast iron, with dimensions of 160 mm x 100 mm to 2500 mm x 1600 mm) - Toolmaker's flat (60 mm to 150 mm diameter)	Calibration for flatness in accordance with in-house procedure TPM186 over the following range of diameter: 10 mm to 150 mm Above 150 mm to 200 mm Calibration for parallelism in accordance with in-house procedure TPM113 over the following range of diameter: 10 mm to 200 mm Calibration for thickness in accordance with in-house procedure TPM186 over the following range of diameter: 10 mm to 200 mm Calibration for the following parameters in accordance with in-house procedure TPM130: - Local flatness - Overall flatness On-site calibration for the following parameters in accordance with in-house procedure TPM130: - Local flatness - Overall flatness Calibration for the following parameters in accordance with in-house procedure TPM112 - Flatness - Parallelism	0.04 µm 0.11 µm 0.15 µm 0.25 µm 0.6 µm 0.4 µm + 0.5e-6l where <i>l</i> is the diagonal length 0.6 µm 0.4 µm + 0.5e-6l where <i>l</i> is the diagonal length 0.04 µm 0.3 µm

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Length and related quantities		
- Form		
- Parallel (with dimensions of 5 mm x 10 mm x 100 mm to 50 mm x 100 mm x 400 mm)	Calibration for parallelism in accordance with in-house procedure TPM124	2 µm
- Roundness sample (with internal diameter from 3 mm to 200 mm and external diameter from 1 mm to 200 mm)	Calibration for roundness in accordance with in-house procedure TPM160 over the following range: 0 to 2000 µm	0.09 µm
- Hemisphere (with external diameter from 1 mm to 200 mm)	Calibration for roundness in accordance with in-house procedure TPM171 over the following range: 0 to 2000 µm	0.1 µm
- Sphere (with external diameter from 1 mm to 200 mm)	Calibration for roundness in accordance with in-house procedure TPM171 over the following range: 0 to 2000 µm	0.2 µm
	Calibration for diameter in accordance with in-house procedure TPM159 over the following range: 1 mm to 200 mm	0.5 µm

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Length and related quantities		
- Form		
- Straight edge made of cast iron, steel and granite (with length from 0.03 mm to 2 m)	Calibration for straightness in accordance with in-house procedure TPM117	$0.5 \mu\text{m} + 0.1e-6l$ where l is the length
- Toolmaker's straight edge (with length from 50 mm to 500 mm)	Calibration for straightness in accordance with in-house procedure TPM116	$0.4 \mu\text{m}$
- Surface texture sample	Calibration for the following parameters in accordance with in-house procedure TPE702:	
	- Depth, d from $0.26 \mu\text{m}$ to $12.00 \mu\text{m}$	$Q[0.026 \mu\text{m}, 0.01d]$
	- Roughness Pt from $0.26 \mu\text{m}$ to $12.00 \mu\text{m}$	$Q[0.026 \mu\text{m}, 0.01Pt]$
	- Roughness Ra from $0.10 \mu\text{m}$ to $6.30 \mu\text{m}$	$Q[0.011 \mu\text{m}, 0.03Ra]$
	- Roughness Rq from $0.10 \mu\text{m}$ to $6.30 \mu\text{m}$	$Q[0.011 \mu\text{m}, 0.03Rq]$
	- Roughness Rt from $1.10 \mu\text{m}$ to $23.00 \mu\text{m}$	$Q[0.03 \mu\text{m}, 0.27Rt]$
	- Roughness Rz from $0.40 \mu\text{m}$ to $20.10 \mu\text{m}$	$Q[0.03 \mu\text{m}, 0.27Rz]$
	- Roughness RSm from $80.0 \mu\text{m}$ to $140.0 \mu\text{m}$	$Q[0.036 \mu\text{m}, 0.12RSm]$ where $Q[a, b] = [a^2 + b^2]^{1/2}$,
- Ultrasonic calibration block No. 2	Calibration for the following parameters in accordance with standard method ISO7963: 2006	
	- Length	$0.95 \mu\text{m}$
	- Angle	0.0076°
	- Roughness	$Ra: 0.046 \mu\text{m}$

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Length and related quantities		
- Rotational speed		
- Rotational speed standard		
- Variable speed drive	Calibration for rotational speed in accordance with in-house procedure TPM805 over the following ranges: 2 r/min to 8000 r/min Above 8000 r/min to 40000 r/min	0.1 r/min 0.3 r/min to 0.4 r/min
- Rotational speed measuring device		
- Frequency meter	Calibration for rotational speed in accordance with in-house procedure TPM802 over the following range: 1 r/min to 120000 r/min	0.01 r/min to 0.4 r/min
- Stroboscope	Calibration for rotational speed in accordance with in-house procedure TPM804 over the following ranges: 40 r/min to 4000 r/min Above 4000 r/min to 35000 r/min	0.2 r/min 1 r/min

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Length and related quantities		
- Tachometer	Calibration for rotational speed by comparison with a standard rotational speed setup in accordance with in-house procedure TPM801 over the following ranges: 6 r/min to 18,000 r/min	1.0 r/min
	Calibration for rotational speed by using function generator and laser diode in accordance with in-house procedure TPM803 over the following ranges: 6 r/min to 100,000 r/min	1.0 r/min
- Rotational equipment	On-site calibration for rotational speed in accordance with in-house procedure TPM806 over the following ranges: - using frequency meter 1 r/min to 120000 r/min - using stroboscope 40 r/min to 4000 r/min Above 4000 r/min to 35000 r/min - using tachometer 6 r/min to 10000 r/min Above 10000 r/min to 100000 r/min	0.01 r/min to 0.4 r/min 0.2 r/min 1 r/min 1 r/min 4 r/min

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Mass and related quantities - Density - Density of solid (stainless steel)	Calibration for density in the range of 7700 kg/m ³ to 8400 kg/m ³ in accordance with in-house procedure TPM503 for the following ranges of mass: 20 g Above 20 g up to 50 g Above 50 g up to 100 g Above 100 g up to 1000 g	5 kg/m ³ 2 kg/m ³ 1 kg/m ³ 0.5 kg/m ³

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Mass and related quantities		
- Flow speed		
- Anemometer		
- All types	Calibration for air velocity by comparison with pitot tube in accordance with in-house procedure TPM412 over the following ranges:	
	0.2 m/s to 0.5 m/s	9 %
	Above 0.5 m/s to 35 m/s	3 %
- Thermal type	Calibration for air velocity by comparison with laser Doppler anemometer (LDA) in accordance with in-house procedure TPM407 over the following ranges:	
	0.2 m/s to 1 m/s	5 %
	Above 1 m/s to 35 m/s	2 %
- Vane type	Calibration for air velocity by comparison with laser Doppler anemometer (LDA) in accordance with in-house procedure TPM409 over the following ranges:	
	0.2 m/s to 1 m/s	5 %
	Above 1 m/s to 35 m/s	2 %
- Pitot-static type	Calibration for air velocity by comparison with laser Doppler anemometer (LDA) in accordance with in-house procedure TPM411 over the following ranges:	
	3 m/s to 35 m/s	2 %
- Fume hood	On-site calibration for air velocity using anemometers in accordance with in-house procedure TPM410 over the following ranges:	
	0.2 m/s to 1 m/s	6 %
	Above 1 m/s to 35 m/s	3 %

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Mass and related quantities		
- Volume		
- Volumetric glassware and containers	Calibration for volume in accordance with in-house procedure TPM401 over the following ranges: 0.1 mL to 5 mL Above 5 mL to 200 mL Above 200 mL to 1000 mL Above 1 L to 5 L Above 5 L to 20 L Above 20 L to 50 L	5 µL 5 µL 50 µL to 130 µL 0.13 mL to 0.5 mL 1.5 mL 5 mL
- Proving tank	Calibration for volume in accordance with in-house procedure TPM404 over the following ranges: 20 L to 50 L	5 mL
- Syringe	Calibration for volume in accordance with in-house procedure TPM413 over the following ranges: 1 µL to 10 µL Above 10 µL to 100 µL Above 100 µL to 1000 µL	0.05 µL 0.4 µL 4 µL

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Mass and related quantities		
- Pressure		
- Hydraulic pressure balance	Calibration for the following parameters in accordance with in-house procedure TPM201 - Hydraulic pressure over the following range: 2 MPa to 100 MPa - Area of piston-cylinder assembly over the following range: 3 mm ² to 3500 mm ² - Distortion coefficient over the following range: 0.5 x 10 ⁻⁹ /kPa to 1 x 10 ⁻⁷ /kPa	0.004 % 0.004 % 20 %
- Pressure gauge, transducer and transmitter	Calibration for hydraulic pressure in accordance with in-house procedure TPM202 over the following range: 2 MPa to 100 MPa	0.004 %
- Sphygmomanometer	Calibration for gauge pressure in accordance with in-house procedure TPM210 over the following range : 50 hPa to 400 hPa	0.5 hPa

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Mass and related quantities		
- Force		
- Push-pull type force gauge (spring tester)	Calibration for force by using deadweight in accordance with in-house procedure TPM605 over the following range: 0.5 N to 500 N	0.1 %
- Torque		
- Torque meter and transducer	Calibration for torque in accordance with in-house procedure TPM603 over the following range: 0.1 N·m to 1000 N·m	0.1 %
- Torque wrench and screwdriver	Calibration for torque in accordance with in-house procedure TPM601 over the following range: 0.1 N·m to 1000 N·m	1 %

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Photometry and radiometry - Photometry - Tungsten standard lamp (AC, constant current)	Calibration for luminous flux in accordance with in-house procedure TPP601 over the following range: 20 lm to 10000 lm	2.6 %
- Tungsten standard lamp (DC, constant current)	Calibration for luminous flux in accordance with in-house procedure TPP601 over the following range: 20 lm to 10000 lm	1.0 %
- Tungsten standard lamp (DC, constant current)	Calibration for luminous intensity at colour temperature of 2856 K in accordance with in-house procedure TPP201 over the following range: 35 cd to 3500 cd	1.5 %
- White LED standard lamp (AC, constant voltage)	Calibration for luminous flux in accordance with in-house procedure TPP601 over the following range: 20 lm to 10000 lm	2.2 %

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Photometry and radiometry		
- Photometry		
- Illuminance meter / lux meter	Calibration for illuminance at colour temperature of 2856 K in accordance with standard method BS667:2005 Annex B Calibration B.2.2 over the following range: 1 lx to 3000 lx	1.5 %
- Luminance meter	Calibration for luminance at colour temperature of 2856 K in accordance with in-house procedure TPP401 over the following range: 10 cd/m ² to 4000 cd/m ²	1.5 %
	Calibration for luminance at colour temperature of 2856 K in accordance with in-house procedure TPP402 over the following range: 10 cd/m ² to 23000 cd/m ²	1.4 %

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Photometry and radiometry - Spectral emission properties of sources - Irradiance light source	Calibration for spectral irradiance below $250 \text{ mWm}^{-2}\text{nm}^{-1}$ in accordance with in-house procedure TPP505 at wavelength at the following value or over the following ranges: 300 nm 310 nm to 330 nm 340 nm to 430 nm 440 nm to 690 nm 700 nm to 850 nm	3.3 % 3.0 % 3.0 % 2.1 % 2.1 %
- Tungsten standard lamp	Calibration for spectral irradiance below $300 \text{ mWm}^{-2}\text{nm}^{-1}$ in accordance with in-house procedure TPP502 at wavelength over the following ranges: 250 nm to 290 nm Above 290 nm to 410 nm Above 410 nm to 950 nm Above 950 nm to 1800 nm	3.0 % 2.5 % 1.5 % 2.0 %
- Tungsten standard lamp	Calibration for spectral radiance below $150 \text{ mWm}^{-2} \text{sr}^{-1}\text{nm}^{-1}$ in accordance with in-house procedure TPP503 at wavelength over the following ranges: 300 nm to 400 nm Above 400 nm to 999 nm Above 999 nm to 1800 nm	3.4 % 2.4 % 2.8 %

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Photometry and radiometry - Spectral emission properties of sources - Tungsten standard lamp (DC, constant current)	Calibration for spectral radiant flux in the range of 10 μ W/nm to 200 mW/nm using spectrometer with measurement bandwidth from 2 nm to 5 nm in accordance with in-house procedure TPP602 at wavelength at the following value or over the following ranges: 365 nm 370 nm to 380 nm 385 nm to 390 nm 395 nm to 405 nm 410 nm to 450 nm 455 nm to 730 nm 735 nm to 790 nm 795 nm to 835 nm 840 nm to 850 nm	3.7 % 3.6 % 3.1 % 3.0 % 2.6 % 2.2 % 2.5 % 3.0 % 3.3 %
- Tungsten standard lamp (AC, constant current)	Calibration for spectral radiant flux in the range of 10 μ W/nm to 200 mW/nm using spectrometer with measurement bandwidth from 2 nm to 5 nm in accordance with in-house procedure TPP602 at wavelength at the following value or over the following ranges: 365 nm 370 nm to 380 nm 385 nm to 405 nm 410 nm to 450 nm 455 nm to 730 nm 735 nm to 790 nm 795 nm to 835 nm 840 nm to 850 nm	5.1 % 5.0 % 4.6 % 4.3 % 4.1 % 3.1 % 3.5 % 3.7 %

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Calibration Services 校正服務		
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Photometry and radiometry - Spectral properties of materials - Optical filter and spectrally neutral material	Calibration for regular spectral transmittance in accordance with in-house procedure TPP504 at wavelength of 400 nm to 1000 nm over the following ranges: 1.00 to 0.10 below 0.10 to 0.05 below 0.05 to 0.01	0.50 % 0.55 % 1.8 %
- Spectrally-selective transmitting material	Calibration for wavelength in accordance with in-house procedure TPP506 over the following ranges: 260 nm to 536 nm above 536 nm to 650 nm	0.15 nm 0.20 nm

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Temperature and humidity measurements - Temperature measurements - Items used for defining ITS-90 - Primary fixed-point cell	Calibration for temperature in accordance with in-house procedure TPT014 at the following values: Triple-point of argon (-189.3442 °C) Triple-point of mercury (-38.8344 °C) Triple-point of water (0.01 °C) Melting-point of gallium (29.7646 °C) Freezing-point of indium (156.5985 °C) Freezing-point of tin (231.928 °C) Freezing-point of zinc (419.527 °C) Freezing-point of aluminium (660.323 °C) Freezing-point of silver (961.78 °C)	0.3 mK 0.6 mK 0.2 mK 0.5 mK 2.0 mK 2.0 mK 2.0 mK 6.0 mK 10 mK
- Complete apparatus realising fixed point	Calibration for temperature in accordance with in-house procedure TPT014 at the following values: Triple-point of argon with bath (-189.3442 °C) Triple-point of mercury with bath (-38.8344 °C) Triple-point of water with bath (0.01 °C) Melting-point of gallium with furnace (29.7646 °C) Freezing-point of indium with furnace (156.5985 °C) Freezing-point of tin with furnace (231.928 °C) Freezing-point of zinc with furnace (419.527 °C) Freezing-point of aluminium with furnace (660.323 °C) Freezing-point of silver with furnace (961.78 °C)	0.3 mK 0.6 mK 0.2 mK 0.5 mK 2.0 mK 2.0 mK 2.0 mK 6.0 mK 10 mK

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Temperature and humidity measurements - Temperature measurements - Items used for defining ITS-90 - Liquid in glass thermometer	Calibration for temperature in accordance with in-house procedure TPT009 at the following point or over the following ranges: -80 °C to below -50 °C -50 °C to -30 °C Above -30 °C to below 0 °C Ice-point (0 °C) Above 0 °C to 100 °C Above 100 °C to 250 °C Above 250 °C to 300 °C Above 300 °C to 450 °C Above 450 °C to 550 °C	500 mK 200 mK 30 mK 7.0 mK 20 mK 30 mK 50 mK 200 mK 300 mK
- Thermistor	Calibration for temperature in accordance with in-house procedure TPT037 over the following range: -50 °C to 90 °C	6 mK

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Temperature and humidity measurements		
- Temperature measurements		
- Radiation thermometry		
- Infrared ear thermometer	Calibration for temperature by using a black body radiator which is designed to EN 12470-5 in accordance with in-house procedure TPT018 over the following range: 34 °C to 43 °C	0.2 K
- Infrared ear thermometer calibrator	Calibration for temperature in accordance with in-house procedure TPT019 over the following range: 34 °C to 43 °C	0.15 K

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Temperature and humidity measurements - Temperature measurements - Digital thermometer or temperature indicator	<p>Calibration for temperature in accordance with in-house procedure TPT028 at the following value: -196 °C</p> <p>Calibration for temperature in accordance with in-house procedure TPT010 over the following ranges: -80 °C to 230 °C Above 230 °C to 550 °C</p> <p>Calibration for temperature in accordance with in-house procedure TPT013 over the following ranges: 500 °C to 1100 °C</p> <p>Calibration for temperature in accordance with in-house procedure TPT021 over the following range: 500 °C to 1200 °C</p>	<p>20mK</p> <p>6.0 mK 10 mK</p> <p>1.0 K</p> <p>2.0 K</p>

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Temperature and humidity measurements - Temperature measurements - Digital thermometer or temperature Indicator	Calibration for temperature in accordance with in-house procedure TPT030 over the following range: -30 °C to 75 °C On-site calibration for temperature in accordance with in-house procedure TPT030 over the following range: -30 °C to 75 °C Calibration for temperature in accordance with in-house procedure TPT027 over the following range: 50 °C to 650 °C On-site calibration for temperature in accordance with in-house procedure TPT027 over the following range: 50 °C to 650 °C	0.10 K 0.10 K 0.45 K 0.45 K
- Thermometer with analogue display	Calibration for temperature in accordance with in-house procedure TPT010 over the following ranges: -80 °C to 230 °C Above 230 °C to 550 °C	0.5 K 1 K

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Temperature and humidity measurements		
- Temperature measurements		
- Thermocouple simulator	Calibration for temperature by converting measured thermal EMF to equivalent temperature in accordance with in-house procedure TPT029	0.15K
- Resistance Temperature Detector (RTD) simulator	Calibration for temperature by converting measured resistance to equivalent temperature in accordance with in-house procedure TPT034	0.10 K
- Constant temperature bath	Calibration for temperature in accordance with in-house procedure TPT006 over the following ranges:	
	-80 °C to -75 °C	6 mK
	Above -75 °C to 0 °C	12 mK
	Above 0 °C to 70 °C	5 mK
	Above 70 °C to 230 °C	30 mK
	On-site calibration for temperature in accordance with in-house procedure TPT006 over the following ranges:	
	-80 °C to -75 °C	6 mK
	Above -75 °C to 0 °C	12 mK
	Above 0 °C to 70 °C	5 mK
	Above 70 °C to 230 °C	30 mK

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Temperature and humidity measurements - Temperature measurements - Psychrometer, relative humidity sensor and other relative humidity measurement instrument (excluding thermohygrograph) - Thermohygrograph / Temperature and humidity chart recorder	Calibration for air temperature in accordance with in-house procedure TPH102 over the following ranges: for relative humidity from 8 %rh to 95 %rh 5 °C to 40 °C Above 40 °C to 70 °C Calibration for air temperature in accordance with in-house procedure TPH103 over the following ranges: for relative humidity from 8 %rh to 95 %rh 5 °C to 40 °C Above 40 °C to 70 °C	(0.068 + 0.0008 x (t-5)) °C (0.096 + 0.002 x (t-40)) °C where t is measured air temperature in °C (0.068 + 0.0008 x (t-5)) °C (0.096 + 0.002 x (t-40)) °C where t is measured air temperature in °C

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Provision of Proficiency Testing Schemes 提供能力驗證

PROFICIENCY TESTING SCHEME AND ITEM 能力驗證計劃及項目	MEASURAND OR CHARACTERISTIC MEASURED 測試參數或特質	PROFICIENCY TESTING SCHEME PROCEDURE 能力驗證計劃程序
Calibration Services Acoustic Measurements - Sound calibrator - Sound level meter - Audiometer	Calibration for the following parameters: - Sound pressure level over the following range: 94 dB and 114 dB - Frequency at the following value 1000 Hz - Total distortion and noise over the following range: 0 to 3.0 % Calibration for relative frequency weighting C normalised to the response at 1 kHz over the following range: 125 Hz, 1 kHz, 4kHz and 8 kHz -3.0 dB to 0 dB Calibration for the following parameters: - Sound pressure level over the following range: 125 Hz to 8 kHz 77 dB to 115 dB - Force level over the following range: 250 Hz to 8 kHz 71 dB to 107 dB (re 1 μ N) - Attenuator steps at the following value: 5 dB	PTA001: PT Plan for sound calibrator PTA002: PT Plan for sound level meter PTA003: PT Plan for audiometer

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Calibration Services Electricity - Digital multimeter	Calibration for the following parameters: - DC voltage over the following range: 0.1 mV to 1000V - DC current over the following range: 10 μ A to 100 A - DC resistance over the following range: 1 m Ω to 1 G Ω - AC voltage over the following range: 40 Hz to 10 kHz 10 mV to 1000 V 10 kHz to 100 kHz 10 mV to 300 V 100 kHz to 500 kHz 0.2 V to 3 V - AC current over the following range: 40 Hz to 10 kHz 100 μ A to 1 A 45 Hz to 65 Hz 1 A to 200 A	PTL001: PT plan for digital multimeter

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Calibration Services Electricity - Oscilloscope	Calibration for the following parameters: - Peak to peak voltage of 1 kHz square waveform over the following range: 40 μ V to 40 V - Bandwidth over the following range: 1 MHz to 300 MHz - Period of triangular waveform over the following range: 0.5 ns to 5 s	PTR006: PT plan for oscilloscope
Time and frequency - Stopwatch	Calibration for relative correction of time interval	PTR005: PT plan for stopwatch

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Calibration Services Length and related quantities - Calliper - Engineer's steel rule - Square Mass and related quantities - Standard weight - Electronic balance - Piston-operated pipette Photometry and radiometry - Illuminance meter	Calibration for length over the following range: 0.5 mm to 1 m Calibration for length over the following range: 0.5 mm to 1 m Calibration for squareness for travel over the following range: 5 mm to 500 mm Calibration for mass over the following range: 1 mg to 50 kg Calibration for mass over the following range: 1 mg to 50 kg Calibration for contained or delivered volume over the following range: 1 µl to 5 ml Calibration for illuminance at colour temperature of 2856 K over the following range: 1 lx to 3000 lx	PTM008: PT scheme for calliper PTM006: PT scheme for engineer's steel rule PTM004: PT scheme for square PTM001: PT scheme for standard weights PTM002: PT scheme for electronic balances PTM003: PT scheme for piston-operated pipettes PTP001: PT plan for illuminance meter

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<p>Mass and related quantities</p> <p>- Force</p> <p>- Force proving instruments, load cells, proving rings, load columns and other force measuring devices in tension and compression modes</p> <p>- Universal testing machines in tension and compression modes</p>	<p>Calibration for force using a deadweight or hydraulic force standard machine in accordance with standard methods BS EN ISO 376: 2011, EN ISO 376: 2011 or ISO 376: 2011 over the following ranges :-</p> <p>50 N to 60 kN Above 60 kN to 600 kN</p> <p>On-site calibration for force using indicated or true force method in accordance with standard methods BS EN ISO 7500-1: 2018, EN ISO 7500-1: 2018 or ISO 7500-1: 2018, over the following ranges :-</p> <p>50 N to 60 kN Above 60 kN to 600 kN Above 600 kN to 3000 kN</p>	<p>0.01 % 0.05 %</p> <p>(Class 00 load cell with a maximum uncertainty of 0.08 %) (Class 0.5 load cell with a maximum uncertainty of 0.16 %) (Class 1 load cell with a maximum uncertainty of 0.32 %)</p>

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