



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

PN-Tech Instruments Co., Ltd.
100/64 Moo.6 T.Ladsawai A. Lamlukka
Pathumthani 12150 Thailand

Fulfills the requirements of

ISO/IEC 17025:2017

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

Jason Stine, Vice President

Expiry Date: 14 August 2027

Certificate Number: AC-3407



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory
quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

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CALIBRATION AND TESTING

ISO/IEC 17025 Accreditation Granted: **14 August 2025**

Certificate Number: **AC-3407**

Certificate Expiry Date: **14 August 2027**

Acoustics and Vibration

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Vibration Meter Acceleration Measurement	@ 10 Hz (> 0 to 4) m/s ²	0.68 % of reading	Vibration Calibrator. CP-47-VT: Direct Measurement
	@ 20 Hz (> 0 to 15) m/s ²	0.68 % of reading	
	@ 40 Hz (> 0 to 60) m/s ²	0.68 % of reading	
	@ 80 Hz (> 0 to 100) m/s ²	0.68 % of reading	
	@ 160 Hz (> 0 to 75) m/s ²	0.68 % of reading	
	@ 320 Hz (> 0 to 50) m/s ²	0.68 % of reading	
	@ 640 Hz (> 0 to 30) m/s ²	0.68 % of reading	
	@ 1 280 Hz (> 0 to 23) m/s ²	0.68 % of reading	
Vibration Meter Velocity Measurement ¹	@ 10 Hz (> 0 to 45) mm/s	1.02 % of reading	Vibration Calibrator. CP-47-VT: Direct Measurement
	@ 20 Hz (> 0 to 85) mm/s	1.02 % of reading	
	@ 40 Hz (> 0 to 170) mm/s	1.02 % of reading	

Acoustics and Vibration

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Vibration Meter Velocity Measurement ¹	@ 80 Hz (> 0 to 140) mm/s @ 160 Hz (> 0 to 50) mm/s @ 320 Hz (> 0 to 18) mm/s @ 640 Hz (> 0 to 5) mm/s @ 1 280 Hz (> 0 to 2) mm/s	1.02 % of reading 1.02 % of reading 1.02 % of reading 1.02 % of reading 1.02 % of reading	Vibration Calibrator. CP-47-VT: Direct Measurement
Vibration Meter Displacement Measurement ¹	@ 10 Hz, 40 Hz (> 0 to 2 000) µm @ 20 Hz (> 0 to 1900) µm @ 80 Hz (> 0 to 800) µm @ 160 Hz (> 0 to 150) µm @ 320 Hz (> 0 to 25) µm @ 640 Hz (> 0 to 3) µm	0.065 % of reading 0.068 % of reading 0.16 % of reading 0.49 % of reading 3 % of reading 24.6 % of reading	Vibration Calibrator; CP-47-VT: Direct Measurement
Vibration Transducer ¹ Acceleration Velocity	@ 160 Hz (> 0 to 75) m/s ² @ 160 Hz (> 0 to 50) mm/s	0.68 % of reading 1.02 % of reading	Vibration Calibrator, Digital Multimeter. CP-48-VT: Direct Measurement
Sound Level Meter – Source/Measure ¹	1 kHz 94 dB 114 dB	0.28 dB 0.28 dB	Sound Level Calibrator, Sound Level Meter; CP-43-EL: Comparison Measurement
Sound Environment Room ¹ Sound Level – Measure	(20 to 130) dB	0.28 dB	Sound Level Meter; CP-44-EL: Direct Measurement

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
pH Meter ²	4 pH 7 pH 10 pH	0.02 pH 0.028 pH 0.06 pH	pH Certified Reference Material; CP-67-CQ
Conductivity Meter ²	84 μ S/cm 1 413 μ S/cm 12.88 mS/cm	0.84 μ S/cm 7.1 μ S/cm 0.07 mS/cm	Conductivity Certified Reference Material; CP-67-CQ
Refractometer	10 %Brix 20 %Brix 30 %Brix 40 %Brix 50 %Brix	0.03 %Brix 0.04 %Brix 0.04 %Brix 0.05 %Brix 0.05 %Brix	Accredited Sucrose Solution; CP-69-CQ

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
pH Meter – Simulation ¹	(-414.12 to 414.12) mV (0 to 14) pH	0.011 pH	Document Process Calibrator; CP-45-EL: Direct Measurement
Conductivity Meter – Simulation ¹	(0.001 to 1) μ S/cm (1 to 100) μ S/cm (100 to 1 000) μ S/cm (1 000 to 5 000) μ S/cm (5 to 10) mS/cm (10 to 50) mS/cm (50 to 100) mS/cm	0.11 μ S/cm 0.11 μ S/cm 1.1 μ S/cm 1.1 μ S/cm 0.11 mS/cm 0.11 mS/cm 0.11 mS/cm	Decade Resistance Box, Decade Resistors; CP-46-EL: Direct Measurement
Resistivity – Simulation ¹	(0.001 to 9) M Ω /cm (9 to 10) M Ω /cm (10 to 12) M Ω /cm (12 to 14) M Ω /cm (14 to 16) M Ω /cm (16 to 20) M Ω /cm	0.042 M Ω /cm 0.13 M Ω /cm 0.13 M Ω /cm 0.13 M Ω /cm 0.14 M Ω /cm 0.14 M Ω /cm	Decade Resistance Box, Decade Resistors; CP-46-EL: Direct Measurement
ORP Meter (Simulation) ¹	87 mV 264 mV 470 mV	0.35 mV 0.35 mV 0.35 mV	Multiproduct Calibrator, Document Process Calibrator; CP-01-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Source	0 mV (Shorted) (> 0 to < 330) mV 330 mV to < 3.3 V (3.3 to < 33) V (33 to < 330) V (330 to 1 020) V	47 $\mu\text{V/V} + 2.7 \mu\text{V}$ 47 $\mu\text{V/V} + 2.7 \mu\text{V}$ 39 $\mu\text{V/V} + 4.4 \mu\text{V}$ 39 $\mu\text{V/V} + 42 \mu\text{V}$ 43 $\mu\text{V/V} + 0.41 \text{ mV}$ 43 $\mu\text{V/V} + 1.7 \text{ mV}$	Multiproduct Calibrator; CP-01-EL: Direct Measurement
DC High Voltage – Source ¹	(0.05 to 1) kV (> 1 to 2) kV (> 2 to 3) kV (> 3 to 4) kV (> 4 to 5) kV (> 5 to 6) kV	3.2 mV/V + 0.7 V 1.6 mV/V + 0.7 V 1.7 mV/V + 0.7 V 1.3 mV/V + 0.7 V 1.3 mV/V + 0.7 V 1.2 mV/V + 0.7 V	Hi-Pot Tester, High Voltage Digital meter; CP-15-EL: Direct Measurement
DC Voltage – Measure ¹	Up to 100 mV (> 0.1 to 1) V (> 1 to 10) V (> 10 to 100) V (> 100 to 1 000) V	13 $\mu\text{V/V} + 0.6 \mu\text{V}$ 12 $\mu\text{V/V} + 0.6 \mu\text{V}$ 12 $\mu\text{V/V} + 1 \mu\text{V}$ 14 $\mu\text{V/V} + 60 \mu\text{V}$ 28 $\mu\text{V/V} + 0.2 \text{ mV}$	Digit Multimeter; CP-12-EL: Direct Measurement
DC High Voltage – Measure ¹	50 V to < 2 kV (2 to < 3) kV (3 to < 4) kV (4 to < 5) kV (5 to < 6) kV (6 to < 7) kV (7 to < 8) kV (8 to < 9) kV (9 to < 10) kV (10 to < 15) kV (15 to < 20) kV (20 to < 25) kV (25 to < 30) kV	6.5 mV/V + 0.7 V 6.5 mV/V + 0.7 V 6.3 mV/V + 0.7 V 6.3 mV/V + 0.7 V 6.2 mV/V + 0.7 V 6.2 mV/V + 0.7 V 6.2 mV/V + 0.7 V 6.2 mV/V + 0.7 V 6.2 mV/V + 0.7 V 50 mV/V + 10 V 50 mV/V + 10 V 50 mV/V + 10 V 50 mV/V + 10 V	High Voltage Digital meter, High Voltage Probe, Digital Phosphor Oscilloscope; CP-16-EL: Direct Measurement
DC Current – Source ¹	0 mA (Opened) (0 to < 3.3) mA (3.3 to < 33) mA (33 to < 330) mA 330 mA to < 2.2 A (2.2 to < 11) A	0.11 mA/A + 42 nA 0.11 mA/A + 42 nA 0.1 mA/A + 0.25 μA 0.08 mA/A + 3 μA 0.25 mA/A + 36 μA 0.49 mA/A + 0.28 mA	Multiproduct Calibrator; CP-02-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Source ¹ Clamp-On Ammeter	Via Turns Coil: 10x (0.2 to < 0.33) mA (0.33 to < 3.3) mA (0.0033 to < 2.2) A (2.2 to 11) A Via Turns Coil: 25x (0.5 to < 0.825) A (0.825 to < 8.25) A (8.25 to < 55) A (55 to 275) A Via Turns Coil: 50x (1 to < 1.65) A (1.65 to < 16.5) A (16.5 to < 110) A (110 to 550) A	3.5 mA/A + 15 µA 3.5 mA/A + 0.15 mA 3.5 mA/A + 1.5 mA 3.5 mA/A + 15 mA 3.5 mA/A + 0.15 mA 3.5 mA/A + 1.5 mA 3.5 mA/A + 15 mA 3.5 mA/A + 0.15 A 3.5 mA/A + 0.15 mA 3.5 mA/A + 1.5 mA 3.5 mA/A + 15 mA 3.5 mA/A + 0.15 A	Multiproduct Calibrator, Current Coil; CP-06-EL: Direct Measurement
DC Current – Measure ¹	Up to 1 µA (> 1 to 10) µA (> 10 to 100) µA (> 0.1 to 1) mA (> 1 to 10) mA (> 10 to 100) mA (> 0.1 to 1) A	25 µA/A + 47 pA 25 µA/A + 0.12 nA 25 µA/A + 0.95 nA 25 µA/A + 6 nA 25 µA/A + 60 nA 41 µA/A + 0.6 µA 0.13 mA/A + 6 µA	Digit Multimeter; CP-13-EL: Direct Measurement
DC High Current – Measure ¹	(0 to 3) A (> 3 to 30) A (> 30 to 200) A	0.001 4 A 0.028 A 0.60 A	Digit Multimeter, Current Shunt; CP-13-EL: Direct Measurement
AC Current – Measure ¹	Up to 100 µA 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz (0.1 to 1) mA 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz (1 to 10) mA 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz	4.7 mA/A + 35 nA 1.8 mA/A + 35 nA 0.7 mA/A + 35 nA 0.7 mA/A + 35 nA 4.7 mA/A + 0.25 µA 1.8 mA/A + 0.25 µA 0.7 mA/A + 0.25 µA 0.35 mA/A + 0.25 µA 4.7 mA/A + 2.5 µA 1.8 mA/A + 2.5 µA 0.7 mA/A + 2.5 µA 0.35 mA/A + 2.5 µA	Digit Multimeter, Current Shunt; CP-13-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Measure ¹	(10 to 100) mA 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz (0.1 to 1) A 10 Hz to 20 Hz 20 Hz to 45 Hz 45 Hz to 100 Hz 100 Hz to 1 kHz (Up to 30) A 50 Hz to 400 Hz	4.7 mA/A + 25 μ A 1.8 mA/A + 25 μ A 0.7 mA/A + 25 μ A 0.35 mA/A + 25 μ A 4.7 mA/A + 0.25 mA 1.8 mA/A + 0.25 mA 0.7 mA/A + 0.25 mA 0.35 mA/A + 0.25 mA 0.29 A	Digit Multimeter, Current Shunt; CP-13-EL: Direct Measurement
AC / DC Cutoff Current – Measure ¹	DC: Up to 0.1 mA (> 0.1 to 0.5) mA (> 0.5 to 5) mA (> 2 to 5) mA (> 5 to 50) mA (> 50 to 100) mA AC: @ (50, 60) Hz Up to 0.1 mA (> 0.1 to 0.5) mA (> 0.5 to 5) mA (> 2 to 5) mA (> 5 to 50) mA (> 50 to 100) mA	1.6 mA/A + 8 nA 0.31 mA/A + 8 nA 0.16 mA/A + 80 nA 0.22 mA/A + 0.8 μ A 2.5 mA/A + 8 μ A 2.5 mA/A + 80 μ A 10 mA/A + 8 nA 2 mA/A + 8 nA 15 mA/A + 80 nA 1.2 mA/A + 0.8 μ A 3.7 mA/A + 8 μ A 3.7 mA/A + 80 μ A	Current Leakage Calibrator, Digital Multimeter; CP-14-EL: Direct Measurement
AC Voltage – Source ¹	(1 to 32.999) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz (33 to 329.999) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	2.8 mV/V + 16 μ V 1.2 mV/V + 16 μ V 1.6 mV/V + 16 μ V 2 mV/V + 16 μ V 2.8 mV/V + 26 μ V 7.8 mV/V + 47 μ V 2 mV/V + 41 μ V 0.39 mV/V + 20 μ V 0.78 mV/V + 20 μ V 1.3 mV/V + 34 μ V 1.9 mV/V + 0.14 mV 5.5 mV/V + 0.26 mV	Multiproduct Calibrator; CP-01-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Source ¹	(0.33 to 3.2999 9) V		Multiproduct Calibrator; CP-01-EL: Direct Measurement
	(10 to 45) Hz	1.2 mV/V + 0.2 mV	
	45 Hz to 10 kHz	0.24 mV/V + 48 μV	
	(10 to 20) kHz	0.63 mV/V + 48 μV	
	(20 to 50) kHz	1.1 mV/V + 0.24 mV	
	(50 to 100) kHz	1.9 mV/V + 1.4 mV	
	(100 to 500) kHz	3.9 mV/V + 2.6 mV	
	(3.3 to 32.999 9) V		
	(10 to 45) Hz	1.2 mV/V + 2 mV	
	45 Hz to 10 kHz	0.32 mV/V + 0.48 mV	
	(10 to 20) kHz	0.63 mV/V + 2.1 mV	
	(20 to 50) kHz	1.5 mV/V + 3.9 mV	
	(50 to 100) kHz	1.9 mV/V + 14 mV	
	(33 to 329.999) V		
	45 Hz to 1 kHz	0.39 mV/V + 13 mV	
AC High Voltage – Source ¹	(1 to 10) kHz	0.63 mV/V + 17 mV	Hi-Pot Tester, High Voltage Digital meter; CP-15-EL: Direct Measurement
	(10 to 20) kHz	0.7 mV/V + 29 mV	
	(330 to 1 020) V		
	45 Hz to 1 kHz	0.4 mV/V + 64 mV	
	(1 to 5) kHz	1.6 mV/V + 79 mV	
	(5 to 10) kHz	1.6 mV/V + 0.39 V	
AC Voltage – Measure ¹	(50 to 60) Hz		Digit Multimeter; CP-12-EL: Direct Measurement
	50 V to 0.5 kV	6.4 mV/V + 0.7 V	
	(> 0.5 to 1) kV	4.8 mV/V + 0.7 V	
	(> 1 to 2) kV	4 mV/V + 0.7 V	
	(> 2 to 3) kV	3.7 mV/V + 0.7 V	
	(> 3 to 4) kV	3.6 mV/V + 0.7 V	
	(> 4 to 5) kV	3.2 mV/V + 0.7 V	
	(1 to 10) mV		
	(10 to 40) Hz	0.36 mV/V + 3.7 μV	
	40 Hz to 1 kHz	0.24 mV/V + 1.8 μV	
	(1 to 20) kHz	0.36 mV/V + 1.8 μV	
	(20 to 50) kHz	1.2 mV/V + 2.1 μV	
	(50 to 100) kHz	5.8 mV/V + 2.1 μV	
	(100 to 300) kHz	14 mV/V + 6 μV	
	(300 to 500) kHz	14 mV/V + 6 μV	
	500 kHz to 1 MHz	14 mV/V + 6 μV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	(10 to 100) mV		Digit Multimeter; CP-12-EL: Direct Measurement
	(10 to 40) Hz	0.1 mV/V + 4.7 μ V	
	40 Hz to 1 kHz	0.1 mV/V + 2.5 μ V	
	(1 to 20) kHz	0.18 mV/V + 2.5 μ V	
	(20 to 50) kHz	0.36 mV/V + 2.5 μ V	
	(50 to 100) kHz	0.93 mV/V + 2.5 μ V	
	(100 to 300) kHz	3.5 mV/V + 12 μ V	
	(300 to 500) kHz	12 mV/V + 12 μ V	
	500 kHz to 1 MHz	12 mV/V + 12 μ V	
	(0.1 to 1) V		
	(10 to 40) Hz	0.1 mV/V + 47 μ V	
	40 Hz to 1 kHz	0.1 mV/V + 25 μ V	
	(1 to 20) kHz	0.18 mV/V + 25 μ V	
	(20 to 50) kHz	0.36 mV/V + 25 μ V	
	(50 to 100) kHz	0.93 mV/V + 25 μ V	
	(100 to 300) kHz	3.6 mV/V + 0.12 mV	
	(300 to 500) kHz	12 mV/V + 0.12 mV	
	500 kHz to 1 MHz	12 mV/V + 0.12 mV	
	(1 to 10) V		
	(10 to 40) Hz	0.082 mV/V + 0.47 mV	
	40 Hz to 1 kHz	0.082 mV/V + 0.25 mV	
	(1 to 20) kHz	0.17 mV/V + 0.25 mV	
	(20 to 50) kHz	0.35 mV/V + 0.25 mV	
	(50 to 100) kHz	0.93 mV/V + 0.25 mV	
	(100 to 300) kHz	3.5 mV/V + 1.2 mV	
	(300 to 500) kHz	12 mV/V + 1.2 mV	
	(500 kHz to 1) MHz	12 mV/V + 1.2 mV	
	(10 to 100) V		
	(10 to 40) Hz	0.24 mV/V + 4.7 mV	
	40 Hz to 1 kHz	0.24 mV/V + 2.5 mV	
	(1 to 20) kHz	0.24 mV/V + 2.5 mV	
	(20 to 50) kHz	0.41 mV/V + 2.5 mV	
	(50 to 100) kHz	1.4 mV/V + 2.5 mV	
	(100 to 700) V		
	40 Hz to 1 kHz	0.47 mV/V + 25 mV	
	(1 to 20) kHz	0.7 mV/V + 25 mV	
	(20 to 50) kHz	1.4 mV/V + 25 mV	
	(50 to 100) kHz	3.5 mV/V + 25 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC High Voltage – Measure ¹	(50 to 60) Hz Up to 1 kV (> 1 to 5) kV (> 5 to 10) kV (> 10 to 30) kV > 60 Hz to 10 kHz Up to 1 kV	42 mV/V + 1 V 40 mV/V + 1 V 35 mV/V + 1 V 50 mV/V + 10 V 35 mV/V + 1 V	High Voltage Digital meter, High Voltage Probe, Digital Phosphor Oscilloscope; CP-16-EL: Direct Measurement
AC Current – Source ¹	(29 to 32.999) μ A (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (0.33 to 3.299 9) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (3.3 to 32.999) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (33 to 329.99) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (0.33 to 2.199 99) A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (2.2 to 11) A (45 to 65) Hz (65 to 500) Hz (500 Hz to 1) kHz	2 mA/A + 0.12 μ A 1.1 mA/A + 0.12 μ A 1.1 mA/A + 0.2 μ A 3.2 mA/A + 0.12 μ A 9.7 mA/A + 0.12 μ A 1.6 mA/A + 0.24 μ A 0.79 mA/A + 0.24 μ A 0.79 mA/A + 0.24 μ A 1.6 mA/A + 0.24 μ A 4.7 mA/A + 0.24 μ A 1.6 mA/A + 2.4 μ A 0.8 mA/A + 2.4 μ A 0.73 mA/A + 2.4 μ A 1.6 mA/A + 2.4 μ A 4.7 mA/A + 2.4 μ A 1.6 mA/A + 24 μ A 0.83 mA/A + 24 μ A 0.76 mA/A + 24 μ A 1.6 mA/A + 24 μ A 4.7 mA/A + .4 μ A 1.7 mA/A + 0.24 mA 0.98 mA/A + 0.24 mA 5.6 mA/A + 0.24 mA 0.68 mA/A + 1.6 mA 0.92 mA/A + 1.6 mA 2.7 mA/A + 1.6 mA	Multiproduct Calibrator; CP-02-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Source ¹ Clamp-On Ammeter (45 to 100) Hz	Via Turns Coil: 10x (0.2 to < 0.33) A	3.6 mA/A + 30 μ A	Multiproduct Calibrator, Current Coil; CP-06-EL: Direct Measurement
	(0.33 to < 3.3) A	3.6 mA/A + 0.3 mA	
	(3.3 to < 2.2) A	3.6 mA/A + 3 mA	
	(2.2 to 11) A	3.6 mA/A + 20 mA	
	Via Turns Coil: 25x (0.5 to < 0.825) A	3.6 mA/A + 0.15 mA	
	(0.825 to < 8.25) A	3.6 mA/A + 1.5 mA	
	(8.25 to < 55) A	3.6 mA/A + 15 mA	
	(55 to 275) A	3.6 mA/A + 0.15 A	
	Via Turns Coil: 50x (1 to < 1.65) A	3.6 mA/A + 0.17 mA	
	(1.65 to < 16.5) A	3.6 mA/A + 1.7 mA	
	(16.5 to < 110) A	3.6 mA/A + 17 mA	
	(110 to 550) A	3.6 mA/A + 0.15 A	
Resistance – Source ¹ (Simulation)	(0 to 10.99) Ω	0.14 m Ω / Ω + 6.3 m Ω	Multiproduct Calibrator; CP-03-EL: Direct Measurement
	(11 to 32.999) Ω	0.12 m Ω / Ω + 12 m Ω	
	(33 to 109.999) Ω	76 $\mu\Omega$ / Ω + 12 m Ω	
	(110 to 329.999) Ω	76 $\mu\Omega$ / Ω + 12 m Ω	
	(330 Ω to 1.099 99) k Ω	76 $\mu\Omega$ / Ω + 47 m Ω	
	(1.1 to 3.299 99) k Ω	76 $\mu\Omega$ / Ω + 47 m Ω	
	(3.3 to 10.999 9) k Ω	76 $\mu\Omega$ / Ω + 0.47 Ω	
	(11 to 32.999 9) k Ω	76 $\mu\Omega$ / Ω + 0.47 Ω	
	(33 to 109.999) k Ω	90 $\mu\Omega$ / Ω + 4.7 Ω	
	(110 to 329.999) k Ω	0.1 m Ω / Ω + 4.7 Ω	
	(0.33 to 1.099 99) M Ω	0.12 m Ω / Ω + 43 Ω	
	(1.1 to 3.299 99) M Ω	0.12 m Ω / Ω + 43 Ω	
	(3.3 to 10.999 9) M Ω	0.47 m Ω / Ω + 0.43 k Ω	
	(11 to 32.999 9) M Ω	0.78 m Ω / Ω + 0.43 k Ω	
	(33 to 109.999) M Ω	3.9 m Ω / Ω + 4.5 k Ω	
	(110 to 330) M Ω	3.6 m Ω / Ω + 13 k Ω	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance Source (Simulation) ¹	50 Hz to 10 kHz (0.22 to 0.499 9) nF	4.2 mF/F + 8 pF	Multiproduct Calibrator; CP-04-EL: Direct Measurement
	(0.5 to 1.099 9) nF	4.1 mF/F + 8 pF	
	(1.1 to 3.299 9) nF	4.1 mF/F + 8 pF	
	(3.3 to 10.999) nF	4.1 mF/F + 14 pF	
	(11 to 32.999) nF	2.3 mF/F + 80 pF	
	(33 to 109.99) nF	2.3 mF/F + 0.14 nF	
	(110 to 329.99) nF	2.3 mF/F + 0.26 nF	
	50 Hz to 5 kHz (0.33 to 1.099 9) μ F	2.7 mF/F + 1.4 nF	
	50 Hz to 2 kHz (1.1 to 3.299 9) μ F	3.2 mF/F + 2.6 nF	
	50 Hz to 1.5 kHz (3.3 to 10.999) μ F	3.4 mF/F + 14 nF	
	50 Hz to 800 Hz (11 to 32.999 9) μ F	3.7 mF/F + 26 nF	
	50 Hz to 400 Hz (33 to 109.99) μ F	5.8 mF/F + 0.14 μ F	
	50 Hz to 200 Hz (110 to 329.99) μ F	6.8 mF/F + 0.26 μ F	
	50 Hz to 150 Hz (0.33 to 1.1) mF	8.8 mF/F + 1.2 μ F	
Surface Resistivity, Resistance Meter, Electrostatic Resistance, ESD Checker ¹	Test Voltage $\pm$ (Up to 100) V		Insulation Resistance Box, Decade Resistance Box, Standard Resistor, CP-17-EL: Direct Measurement
	1 k Ω	32 $\mu\Omega/\Omega$ + 7 m Ω	
	10 k Ω	32 $\mu\Omega/\Omega$ + 70 m Ω	
	100 k Ω	32 $\mu\Omega/\Omega$ + 0.7 Ω	
	1 M Ω	0.48 % of reading + 70 Ω	
	5 M Ω	0.51 % of reading + 70 Ω	
	10 M Ω	0.48 % of reading + 0.7 k Ω	
	50 M Ω	0.6 % of reading + 0.7 k Ω	
	100 M Ω	0.57 % of reading + 7 k Ω	
	200 M Ω	0.6 % of reading + 10 k Ω	
	300 M Ω	0.65 % of reading + 10 k Ω	
	400 M Ω	0.6 % of reading + 10 k Ω	
	500 M Ω	0.6 % of reading + 10 k Ω	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Surface Resistivity, Resistance Meter, Electrostatic Resistance, ESD Checker ¹	Test Voltage ± (Up to 100) V 1 GΩ 2 GΩ 3 GΩ 4 GΩ 5 GΩ 6 GΩ 7 GΩ 8 GΩ 9 GΩ 10 GΩ	0.61 % of reading + 70 kΩ 0.65 % of reading + 0.1 MΩ 0.65 % of reading + 0.1 MΩ 0.6 % of reading + 0.1 MΩ 0.6 % of reading + 0.1 MΩ 0.58 % of reading + 0.1 MΩ 0.58 % of reading + 0.1 MΩ 0.58 % of reading + 0.1 MΩ 0.58 % of reading + 0.1 MΩ 0.58 % of reading + 1 MΩ	Insulation Resistance Box, Decade Resistance Box, Standard Resistor, CP-17-EL: Direct Measurement
Resistance – Source ¹ (Variable Artifact)	100 mΩ to 1 Ω (1 to 10) Ω (10 to 100) Ω (100 to 1 000) Ω (1 to 10) kΩ (10 to 100) kΩ	9.2 mΩ/Ω + 7 μΩ 0.94 mΩ/Ω + 70 μΩ 0.13 mΩ/Ω + 0.7 mΩ 32 μΩ/Ω + 7 mΩ 32 μΩ/Ω + 70 mΩ 32 μΩ/Ω + 0.7 Ω	Decade Resistance Box, Standard Resistance Box; CP-17-EL: Direct Measurement
Moisture Meter Instrumentation Simulation ¹	(5 to 50) %	0.13 % of reading	Insulation Resistance Box, Decade Resistance Box, Standard Resistor SR-1; CP-92-EL: Direct Measurement
Static Voltage Tester ¹ DC Voltage	Up to 10 kV	3.5 mV/V + 0.7 V	Hi-pot Tester, High Voltage Digital Meter; CP-93-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
High Resistance – Source ¹ Insulation Resistance, ESD Checker	Test Voltage $\pm$ (25 to 10 000) V		Insulation Resistance Box, Standard Resistor; CP-17-EL: Direct Measurement
	1 M Ω	0.48 % of reading + 70 Ω	
	2.5 M Ω	0.55 % of reading + 0.1 k Ω	
	5 M Ω	0.51 % of reading + 70 Ω	
	10 M Ω	0.48 % of reading + 0.7 k Ω	
	50 M Ω	0.6 % of reading + 0.7 k Ω	
	100 M Ω	0.57 % of reading + 7 k Ω	
	150 M Ω	0.6 % of reading + 10 k Ω	
	200 M Ω	0.6 % of reading + 10 k Ω	
	250 M Ω	0.65 % of reading + 10 k Ω	
	300 M Ω	0.65 % of reading + 10 k Ω	
	350 M Ω	0.65 % of reading + 10 k Ω	
	400 M Ω	0.6 % of reading + 10 k Ω	
	450 M Ω	0.6 % of reading + 10 k Ω	
	500 M Ω	0.6 % of reading + 10 k Ω	
	1 G Ω	0.61 % of reading + 70 k Ω	
	2 G Ω	0.65 % of reading + 0.1 M Ω	
	3 G Ω	0.65 % of reading + 0.1 M Ω	
	4 G Ω	0.6 % of reading + 0.1 M Ω	
	5 G Ω	0.6 % of reading + 0.1 M Ω	
	6 G Ω	0.58 % of reading + 0.1 M Ω	
	7 G Ω	0.58 % of reading + 0.1 M Ω	
	8 G Ω	0.58 % of reading + 0.1 M Ω	
	9 G Ω	0.58 % of reading + 0.1 M Ω	
	10 G Ω	0.58 % of reading + 1 M Ω	
Inductance – Source ¹ 120 Hz, 1 kHz (Fixed Artifacts)	10 μ H	0.99 μ H	Inductor Box; CP-27-EL: Direct Measurement
	100 μ H	6.2 μ H	
	1 mH	65 μ H	
	10 mH	0.6 mH	
	100 mH	5.9 mH	
	1 H	72 mH	
Capacitance – Source ¹ 50 Hz to 1 kHz (Fixed Artifacts)	10 H	0.6 H	Capacitance Box; CP-04-EL: Direct Measurement
	1 nF	0.058 nF	
	10 nF	0.58 nF	
	100 nF	5.8 nF	
	1 μ F	0.058 μ F	
	10 μ F	0.58 μ F	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance – Measure ¹	Up to 10 Ω (> 10 to 100) Ω (> 100 to 1 000) Ω (> 1 to 10) k Ω (> 10 to 100) k Ω (> 0.1 to 1) M Ω (> 1 to 10) M Ω (> 10 to 100) M Ω (> 0.1 to 1) G Ω	21 $\mu\Omega/\Omega$ + 0.25 m Ω 18 $\mu\Omega/\Omega$ + 0.6 m Ω 16 $\mu\Omega/\Omega$ + 0.7 m Ω 16 $\mu\Omega/\Omega$ + 7 m Ω 16 $\mu\Omega/\Omega$ + 0.25 Ω 21 $\mu\Omega/\Omega$ + 2.5 Ω 62 $\mu\Omega/\Omega$ + 0.25 k Ω 0.59 m Ω/Ω + 1.5 k Ω 5.8 m Ω/Ω + 20 k Ω	Digital Multimeter; CP-12-EL: Direct Measurement
Resistance – Measure ¹ (High Value Resistance) Test Voltage: 10 V to 5 kV	(1 to 2) k Ω (> 2 to 20) k Ω (> 20 to 200) k Ω > 200 k Ω to 2 M Ω (> 2 to 20) M Ω (> 20 to 200) M Ω (> 0.2 to 1) G Ω (> 1 to 10) G Ω (> 10 to 100) G Ω (> 0.1 to 1) T Ω (> 1 to 10) T Ω	60 $\mu\Omega/\Omega$ 60 $\mu\Omega/\Omega$ 60 $\mu\Omega/\Omega$ 60 $\mu\Omega/\Omega$ 60 $\mu\Omega/\Omega$ 60 $\mu\Omega/\Omega$ 85 $\mu\Omega/\Omega$ 0.5 m Ω/Ω 0.52 m Ω/Ω 6.9 m Ω/Ω 7.1 m Ω/Ω	Pico-ammeter Voltage Source, Multiproduct Calibrator, Hi-Pot Tester, CP-18-EL: Direct Measurement
DC Power – Source ¹	Voltage: (0.033 to 1 020)V Current: 3.3 mA to 11 A (0.108 9 mW to < 9.18W) (0.297 mW to < 33.65 W) (1.089 mW to < 91.8 W) (2.97 mW to < 336.6 W) (10.89 mW to < 918 W) (29.7 mW to < 2.244 kW) (72.6 mW to < 4.59 kW) (0.148 5 W to 11.22 kW)	0.33 mW/W 0.25 mW/W 0.32 mW/W 0.24 mW/W 0.63 mW/W 0.48 mW/W 0.94 mW/W 0.72 mW/W	Multiproduct Calibrator, 10, 25, 50 Current Coil; CP-07-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Power – Source ¹	Via Turn Coil: 10x Voltage: (0.033 to 1 020)V Current: (0.2 to 110) A 6.6 mW to < 408 W 10.89 mW to < 3.366 kW 0.108 9 W to < 22.44 kW 0.726 W to 112.2 kW	3.5 mW/W 3.5 mW/W 3.6 mW/W 3.6 mW/W	Multiproduct Calibrator, 10, 25, 50 Current Coil; CP-07-EL: Direct Measurement
	Via Turn Coil: 25x Voltage: (0.033 to 1 020)V Current: (0.5 to 275) A 16.5 mW to < 814.5 W 27.225 mW to < 8.415 kW 0.272 25 W to < 56.1 kW 1.815 W to 280.5 kW	3.5 mW/W 3.5 mW/W 3.6 mW/W 3.6 mW/W	
	Via Turn Coil: 50x Voltage: (0.033 to 1 020)V Current: (1 to 550) A 33 mW to < 1.683 kW 54.45 mW to < 16.83 kW 0.544 5 W to < 112.2 kW 3.63 W to 561 kW	3.5 mW/W 3.5 mW/W 3.6 mW/W 3.6 mW/W	
Analog and Digital Oscilloscopes Square Wave Signal ¹ Load Impedance: 1 M Ω	Frequency: (100 Hz, 1 kHz, 10 kHz) 0.25 mVp-p 0.5 mVp-p 1 mVp-p 2.5 mVp-p 5 mVp-p 10 mVp-p 25 mVp-p 50 mVp-p 0.1 Vp-p	2 % of reading + 0.004 2 mV 1.1 % of reading + 0.0043 mV 0.6 % of reading + 0.004 5 mV 0.3 % of reading + 0.005 1 mV 0.3 % of reading + 0.006 mV 0.4 % of reading + 0.007 9 mV 0.4 % of reading + 0.012 mV 0.3 % of reading + 0.016 mV 0.35 % of reading + 0.031 mV	Oscilloscope Calibrator; CP-42-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Analog and Digital Oscilloscopes Square Wave Signal ¹ Load Impedance: 1 MΩ	Frequency: (100 Hz, 1 kHz, 10 kHz) 0.25 Vp-p 0.5 Vp-p 1 Vp-p 2.5 Vp-p 5 Vp-p 10 Vp-p 25 Vp-p 50 Vp-p 100 Vp-p	0.2 % of reading + 0.12 mV 0.15 % of reading + 0.16 mV 0.6 % of reading + 0.31 mV 0.2 % of reading + 1.2 mV 0.2 % of reading + 1.2 mV 0.12 % of reading + 2.5 mV 0.39 % of reading + 13 mV 0.25 % of reading + 19 mV 0.25 % of reading + 31 mV	Oscilloscope Calibrator; CP-42-EL: Direct Measurement
Analog and Digital Oscilloscopes Square Wave Signal ¹ Load Impedance: 50 Ω	Frequency: (1 to 100) kHz 20 mVp-p 40 mVp-p 80 mVp-p	0.75 % of reading + 0.012 mV 0.06 % of reading + 0.015 mV 0.041 % of reading + 0.022 mV	Oscilloscope Calibrator; CP-42-EL: Direct Measurement
Analog and Digital Oscilloscopes Horizontal Deflection ¹ Time Marker	5 s 2 s 1 s 0.5 s 0.2 s 0.1 s 50 ms 20 ms 10 ms 5 ms 2 ms 1 ms 0.5 ms 0.2 ms 0.1 ms 50 μs 20 μs 10 μs	7 μs/s + 0.06 ms 7 μs/s + 0.06 ms 7 μs/s + 0.06 ms 7 μs/s + 6 μs 7 μs/s + 6 μs 7 μs/s + 6 μs 7 μs/s + 0.6 μs 7 μs/s + 0.6 μs 7 μs/s + 0.6 μs 7 μs/s + 60 ns 7 μs/s + 60 ns 7 μs/s + 60 ns 7 μs/s + 6 ns 7 μs/s + 6 ns 7 μs/s + 6 ns 7 μs/s + 0.6 ns 7 μs/s + 0.6 ns 7 μs/s + 0.6 ns	Oscilloscope Calibrator, Time Mark Generator; CP-42-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Analog and Digital Oscilloscopes Horizontal Deflection ¹ Time Marker	5 μ s 2 μ s 1 μ s 0.5 μ s 0.2 μ s 0.1 μ s 50 ns 20 ns 10 ns	7 μ s/s + 60 ps 7 μ s/s + 60 ps 7 μ s/s + 60 ps 7 μ s/s + 6 ps 7 μ s/s + 6 ps 7 μ s/s + 6 ps 7 μ s/s + 0.6 ps 7 μ s/s + 0.6 ps 7 μ s/s + 0.6 ps	Oscilloscope Calibrator, Time Mark Generator; CP-42-EL: Direct Measurement
Analog and Digital Oscilloscope Bandwidth ¹	(REF = 0.05) MHz (0.005 to < 1) Vp-p (> 0.05 to 10) MHz (> 10 to 50) MHz (> 50 to 100) MHz (> 100 to 250) MHz (1 to 5) Vp-p (> 0.05 to 10) MHz (> 10 to 50) MHz (> 50 to 100) MHz (> 100 to 250) MHz	6.1 % of reading + 10 μ V 6.1 % of reading + 10 μ V 6.1 % of reading + 10 μ V 6.1 % of reading + 10 μ V 4 % of reading + 1 mV 4 % of reading + 1 mV 4 % of reading + 1 mV 4 % of reading + 1 mV	Leveled sine wave generator; CP-42-EL: Direct Measurement
AC Power – Source ¹ (45 to 65) Hz	Voltage: (0.33 to 1 020) V Current: 3.3 mA to 11 A Power Factor: 1.000 (1.089 mW to < 9.18 W) (2.97 mW to < 33.65 W) (10.89 mW to < 91.8 W) (29.7 mW to < 336.6 W) (0.1089 W to < 918 W) (0.297 W to < 2.244 kW) (0.726 W to < 4.59 kW) (1.485 W to 11.22 kW) Power Factor: 0.5 to 0.999 (1.089 mW to < 9.18 W) (2.97 mW to < 33.65 W) (10.89 mW to < 91.8 W) (29.7 mW to < 336.6 W) (0.1089 W to < 918 W) (0.297 W to < 2.244 kW) (0.726 W to < 4.59 kW) (1.485 W to 11.22 kW)	2 mW/W 1.2 mW/W 2 mW/W 1.2 mW/W 2.1 mW/W 1.4 mW/W 1.7 mW/W 1.3 mW/W 5.6 mW/W 5.4 mW/W 5.6 mW/W 5.4 mW/W 5.6 mW/W 5.4 mW/W 5.5 mW/W 5.4 mW/W	Multiproduct Calibrator, 10, 25, 50 Current Coil; CP-07-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power – Source ¹ (45 to 65) Hz	Via Turn Coil: 10x Voltage: (0.33 to 1 020) V Current: (0.2 to 110) A Power Factor: 1.000 (66 mW to < 408 W)	3.7 mW/W	Multiproduct Calibrator, 10, 25, 50 Current Coil; CP-07-EL: Direct Measurement
	(108.9 mW to < 3.366kW)	4 mW/W	
	(1.089 W to < 22.44 kW)	4.1 mW/W	
	(7.26 W to 112.2 kW)	3.9 mW/W	
	Via Turn Coil: 25x Voltage: (0.33 to 1 020) V Current: (0.5 to 275) A Power Factor: 1 (0.165 W to < 814.5 W)	3.7 mW/W	
	(0.27225 W to < 8.415 kW)	4 mW/W	
	(2.7225 W to < 56.1 kW)	4.1 mW/W	
	(18.15 W to 280.5 kW)	3.9 mW/W	
	Via Turn Coil: 50x Voltage: (0.33 to 1 020) V Current: (1 to 550) A Power Factor: 1 (0.33 W to < 1.683 W)	3.7 mW/W	
	(0.5445 W to < 16.83 kW)	4 mW/W	
	(5.445 W to < 112.2 kW)	4.1 mW/W	
	(36.3 W to 561 kW)	3.9 mW/W	
	Via Turn Coil: 10x Voltage: (0.33 to 1 020) V Current: (0.2 to 110) A Power Factor: 0.5 to 0.999 (66 mW to < 408 W)	6.4 mW/W	
	(108.9 mW to < 3.366 kW)	6.6 mW/W	
	(1.089 W to < 22.44 kW)	6.6 mW/W	
	(7.26 W to 112.2 kW)	6.5 mW/W	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Power – Source ¹ (45 to 65) Hz	Via Turn Coil: 25x Voltage: (0.33 to 1 020) V Current: (0.5 to 275) A Power Factor: 0.5 to 0.999 (0.165 W to < 814.5 W) (0.27225 W to < 8.415 kW) (2.7225 W to < 56.1 kW) (18.15 W to 280.5 kW) Via Turn Coil: 50x Voltage: (0.33 to 1 020) V Current: (1 to 550) A Power Factor: 0.5 to 0.999 (0.33 W to < 1.683 W) (0.5445 W to < 16.83 kW) (5.445 W to < 112.2 kW) (36.3 W to 561 kW)	6.4 mW/W 6.6 mW/W 6.6 mW/W 6.5 mW/W 6.4 mW/W 6.6 mW/W 6.6 mW/W 6.5 mW/W	Multiproduct Calibrator, 10, 25, 50 Current Coil; CP-07-EL: Direct Measurement
Single Phase Active Energy – Source ¹ (45 to 65) Hz	Voltage: (0.33 to 1 020) V Current: 3.3 mA to 11 A Power Factor: 1 Voltage: 0.33 V to 1020 V Current: 3.3 mA to 11 A Power Factor: 0.5 to 0.999	0.12 % of reading 0.56 % of reading	Multiproduct Calibrator, Stopwatch; CP-08-EL: Direct Measurement
Power Quality ^{1,3} Single and Three Phase AC Voltage – Measure AC Current – Measure Direct (with Clamp CT100AC) Frequency Power Factor	(45 to 65) Hz Up to 150 V (> 150 to 300) V (> 300 to 600) V (0.01 to 0.1) A (> 0.1 to 1) A (> 1 to 12) A (> 12 to 120) A (45 to 65) Hz (0 to 1)	0.48 mV/V + 0.7 mV 0.48 mV/V + 0.7 mV 0.63 mV/V + 0.7 mV 1.1 mA/A + 0.1 µA 0.85 mA/A + 1 µA 0.85 mA/A + 0.1 mA 0.85 mA/A + 1 mA 70 µHz/Hz + 1 µHz 0.007 % of reading + 0.001 2	Power Quality Analyzer; CP-20-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Power Quality ^{1,3} Single and Three Phase Phase – Measure	(45 to 65) Hz (0 to 360)° (0 to 360)°	0.007 % of reading + 0.055° 0.007 % of reading + 0.055°	Power Quality Analyzer; CP-20-EL:
Power and Energy - Measure ¹ Direct with Clamp CT100AC	Voltage: Up to 600 V Current: Up to 120 A Frequency: (45 to 65) Hz Power Factor: 0 to 1 Voltage: Up to 600 V Current: Up to 120 A Frequency: (45 to 65) Hz Power Factor: 0 to 1	0.1 % of reading 0.1 % of reading	Direct Measurement Voltage: Up to 600 V Current: Up to 120 A Frequency: (45 to 65) Hz Power Factor: 0 to 1
Phase – Meter ¹	Up to 360° (10 Hz to 10) kHz (10 to 100) kHz	0.000 6 % of reading + 0.009° 0.000 6 % of reading + 0.07°	Universal Counter; CP-41-EL: Direct Measurement
Earth Ground Continuity, Ground Bond ¹	(3 to 30) A 0.1 Ω 1 Ω 2 Ω	0.45 % of reading + 0.1 mΩ 1.6 % of reading + 0.1 mΩ 2.3 % of reading + 0.1 mΩ	Standard Resistor Box; CP-19-EL: Direct Measurement
DC Magnetic Flux Density Gauss (North and South) – Source ¹	Up to 500 G (> 500 to 3 000) G (> 3 000 to 15 000) G	1.1 % of reading 0.81 % of reading 0.7 % of reading	Standard Tesla Meter; CP-22-EL: Direct Measurement
DC Magnetic Flux Density Gauss – Measure ¹	Up to 500 G (> 500 to 3 000) G (> 3 000 to 15 000) G	1.1 % of reading 0.81 % of reading 0.7 % of reading	Standard Tesla Meter; CP-22-EL: Direct Measurement
Welding Cabinet System – Measure AC Current ¹	(50 & 60) Hz Up to 180 A (> 180 to 300) A (> 300 to 600) A	1.2 % of reading 1.2 % of reading 1.1 % of reading	Digital Multimeter, Current Clamp; CP-21-EL: Direct Measurement
Welding Cabinet System – Measure DC Current ¹	Up to 300 A (> 300 to 500) A (> 500 to 1 000) A	1.1 % of reading 1.1 % of reading 0.8 % of reading	Digital Multimeter, Current Clamp; CP-21-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Power Factor – Source ^{1,3} Phase Angle (ϕ) (0)° (> 0 to 8.111)° (> 8.111 to 60)° (> 60 to 90)°	(45 to 65) Hz Power Factor (Cos ϕ) (1) (0.99 to 0.999) (0.989 to 0.5) (0.499 to 0.001)	0.000 65 0.000 75 0.001 9 0.002 2	Multiproduct Calibrator; CP-09-EL, CP-10-EL: Direct Measurement
Phase Source	Up to 1 MHz Up to 360°	0.000 12°	Arbitrary Waveform Generator; CP-58-RF: Direct Measurement
Electrical Simulation of Thermocouple Indicators – Source ¹	Type K (-200 to -100) °C (> -100 to -25) °C (> -25 to 120) °C (> 120 to 1 000) °C ($> 1 000$ to 1 372) °C Type J (-210 to -100) °C (> -100 to -30) °C (> -30 to 150) °C (> 150 to 760) °C (> 760 to 1 200) °C Type T (-250 to -150) °C (> -150 to 0) °C (> 0 to 120) °C (> 120 to 400) °C Type N (-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1 300) °C Type R (0 to 250) °C (> 250 to 400) °C (> 400 to 1 000) °C ($> 1 000$ to 1 767) °C	0.42 °C 0.19 °C 0.18 °C 0.19 °C 0.22 °C 0.26 °C 0.19 °C 0.18 °C 0.2 °C 0.23 °C 0.51 °C 0.31 °C 0.3 °C 0.35 °C 0.35 °C 0.23 °C 0.21 °C 0.2 °C 0.26 °C 0.47 °C 0.31 °C 0.3 °C 0.35 °C	Multiproduct Calibrator; CP-23-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicators – Source ¹	Type S (0 to 250) °C (> 250 to 1 000) °C (> 1 000 to 1 400) °C (> 1 400 to 1 767) °C Type E (-250 to -100) °C (> -100 to -25) °C (> -25 to 350) °C (> 350 to 650) °C (> 650 to 1 000) °C	0.4 °C 0.32 °C 0.33 °C 0.39 °C 0.41 °C 0.19 °C 0.18 °C 0.19 °C 0.22 °C	Multiproduct Calibrator; CP-23-EL: Direct Measurement
Electrical Simulation of RTD Indicators – Source ¹	Pt 100 (385) (-200 to -80) °C (> -80 to 0) °C (> 0 to 100) °C (> 100 to 300) °C (> 300 to 400) °C (> 400 to 630) °C (> 630 to 800) °C Pt 100 (3916) (-190 to -80) °C (> -80 to 0) °C (> 0 to 100) °C (> 100 to 260) °C (> 260 to 300) °C (> 300 to 400) °C (> 400 to 600) °C (> 600 to 630) °C	0.042 °C 0.042 °C 0.057 °C 0.073 °C 0.081 °C 0.11 °C 0.2 °C 0.035 °C 0.42 °C 0.05 °C 0.057 °C 0.066 °C 0.073 °C 0.094 °C 0.19 °C	Multiproduct Calibrator; CP-24-EL: Direct Measurement
Electrical Simulation of RTD Indicators – Measure ¹	Pt 100 (385) (-200 to 0.0) °C (> 0 to 200) °C (> 200 to 650) °C	0.0019 °C 0.0023 °C 0.0037 °C	Digital Multimeter, Reference Thermometer; CP-25-EL: Direct Measurement

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Electrical Simulation of Thermocouple Indicators – Measure ¹	Type K (-200 to 0) °C	0.5 °C	Reference Thermometer; CP-23-EL: Direct Measurement
	(> 0 to 1 300) °C	0.23 °C	
	Type J (-200 to 0) °C	0.43 °C	
	(> 0 to 1 200) °C	0.23 °C	
	Type T (-200 to 0) °C	0.49 °C	
	(> 0 to 400) °C	0.24 °C	
	Type N (-200 to -100) °C	0.58 °C	
	(> 0 to 1 300) °C	0.26 °C	
	Type R (-20 to 0) °C	0.86 °C	
	(> 0 to 500) °C	0.77 °C	
	(> 500 to 1 750) °C	0.41 °C	
	Type S (-20 to 0) °C	0.83 °C	
	(> 0 to 500) °C	0.75 °C	
	(> 500 to 1 750) °C	0.46 °C	
Pressure Instrument – Electrical Input Simulation ¹	DC Current (4 to 20) mA Up to 1 000 bar	0.36 bar	Documenting Process Calibrator; CP-49-EM: Direct Measurement
	DC Voltage (0 to 10) V Up to 1 000 bar	0.34 bar	
Flow and Control Value Indicator – Electrical Input Simulation ¹	DC Current (4 to 20) mA Up to 2 500 000 kg/h	0.37 kg/h	Documenting Process Calibrator; CP-50-EM: Direct Measurement
	DC Voltage (0 to 10) V Up to 2 500 000 kg/h	0.35 kg/h	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Flow and Control Value Indicator – Electrical Input Simulation ¹	DC Current (4 to 20) mA Up to 600 m ³ /h	0.17 m ³ /h	Documenting Process Calibrator; CP-50-EM: Direct Measurement
	DC Voltage (0 to 10) V Up to 600 m ³ /h	0.13 m ³ /h	

Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RF Power – Source ¹ Power Rates	(-136 to 13) dBm 9 kHz to 3.2 GHz	0.41 dB	Quartz Frequency Standard, Signal Generator; CP-56-RF: Direct Measurement
AC Signal Source: ¹ Sine Wave, Square Wave Triangle Ramps	0.1 mHz to 16 MHz 2.5 mV to 20 Vp-p 0.1 mHz to 100 kHz 2.5 mV to 20 Vp-p 0.1 mHz to 100 kHz 2.5 mV to 20 Vp-p	12 mV 12 mV 12 mV	Arbitrary Waveform Generator; CP-58-RF: Direct Measurement
RF Frequency Modulation – Source ¹	Rates: Up to 200 kHz 9 kHz to 3.2 GHz Audio Rates: 400 Hz or 1 kHz	2.1 kHz	
RF Amplitude Modulation – Source ¹	Rates: (0 to 100) % Depth 9 kHz to 3.2 GHz Audio Rates: 400 Hz or 1 kHz	1.6 % Depth	
RF Power – Measure ¹	9 kHz to 3 GHz (-170 to 40) dBm	0.23 dB	

Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RF Frequency Modulation – Measure ¹ 9 kHz to 3 GHz	Deviation: 1 kHz Rate: 1 kHz to 1 MHz Deviation: 10 kHz Rate: 1 kHz to 1 MHz	0.086 kHz 0.13 kHz	Quartz Frequency Standard, Real-Time Spectrum Analyzer; CP-60-RF: Direct Measurement
RF Power Modulation – Measure ¹ 9 kHz to 3 GHz	Depth: (10 to 90) % Rate: 1 kHz to 100 kHz	0.35 %	Quartz Frequency Standard, Real-Time Spectrum Analyzer; CP-60-RF: Direct Measurement

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Caliper ¹	Up to 200 mm (> 200 to 300) mm (> 300 to 500) mm (> 500 to 600) mm (> 600 to 800) mm (> 800 to 900) mm (> 900 to 1 000) mm	6 µm 7 µm 8 µm 9 µm 10 µm 11 µm 12 µm	Comparison to Gauge Block Set
Depth Gauge ¹	Up to 200 mm (> 200 to 300) mm (> 300 to 500) mm (> 500 to 600) mm (> 600 to 800) mm (> 800 to 900) mm (> 900 to 1 000) mm	6 µm 7 µm 8 µm 9 µm 10 µm 11 µm 12 µm	Comparison to Gauge Block Set Granite Surface Plate
Depth Micrometer ¹	Up to 50 mm (> 50 to 75) mm (> 75 to 100) mm	1.5 µm 1.6 µm 1.8 µm	Comparison to Gauge Block Set
Disk Micrometer ¹	Up to 25 mm (> 25 to 50) mm (> 50 to 75) mm (> 75 to 100) mm	0.6 µm 0.8 µm 1 µm 1.2 µm	Comparison to Gauge Block Set

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Micrometer ¹	Up to 25 mm (25 to 50) mm (> 50 to 75) mm (> 75 to 100) mm (> 100 to 125) mm (> 125 to 150) mm (> 150 to 175) mm (> 175 to 200) mm (> 200 to 225) mm (> 225 to 250) mm (> 250 to 275) mm (> 275 to 300) mm (> 300 to 325) mm (> 325 to 350) mm (> 350 to 375) mm (> 375 to 400) mm (> 400 to 425) mm (> 425 to 450) mm (> 450 to 475) mm (> 475 to 500) mm (> 500 to 525) mm (> 525 to 550) mm (> 550 to 575) mm (> 575 to 600) mm	0.3 µm 0.8 µm 1 µm 1.2 µm 1.8 µm 1.9 µm 2.1 µm 2.4 µm 2.6 µm 2.9 µm 3.1 µm 3.4 µm 3.6 µm 3.9 µm 4.1 µm 4.4 µm 4.6 µm 4.9 µm 5.2 µm 5.4 µm 5.7 µm 6 µm 6.2 µm 6.4 µm	Comparison to Gauge Block Set
Inside Micrometer ¹	Up to 25 mm (> 25 to 50) mm (> 50 to 75) mm (> 75 to 100) mm	0.6 µm 0.8 µm 1 µm 1.2 µm	Comparison to Gauge Block Set
Dial & Digital Indicator Thickness Gauge ¹	Up to 50 mm	5.8 µm	Comparison to Gauge Block Set
Ultrasonic Thickness Gauge ¹	Up to 10 mm (> 10 to 50) mm (> 50 to 75) mm (> 75 to 100) mm (> 100 to 150) mm (> 150 to 200) mm (> 200 to 250) mm	1.4 µm 1.5 µm 1.6 µm 1.7 µm 6.2 µm 6.3 µm 6.5 µm	Comparison to Gauge Block Set

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Digital Linear Gauge ¹	Up to 25 mm (> 25 to 50) mm (> 50 to 75) mm (> 75 to 100) mm (> 100 to 200) mm (> 200 to 300) mm (> 300 to 400) mm (> 400 to 500) mm (> 500 to 600) mm (> 600 to 700) mm (> 700 to 800) mm (> 800 to 900) mm (> 900 to 1 000) mm	0.3 µm 0.53 µm 0.8 µm 1 µm 2.2 µm 3.3 µm 4.3 µm 5.4 µm 6.4 µm 7.6 µm 8.6 µm 9.7 µm 11 µm	Comparison to Gauge Block Set
Caliper Gauge ¹ (Internal and External)	Up to 25 mm (> 25 to 50) mm (> 50 to 75) mm (> 75 to 100) mm	0.65 µm 0.78 µm 1 µm 1.2 µm	Comparison to Gauge Block Set
Height Gauge ¹	Up to 150 mm (> 150 to 200) mm (> 200 to 300) mm (> 300 to 600) mm (> 600 to 700) mm (> 700 to 800) mm (> 800 to 1 000) mm	2.2 µm 2.6 µm 3.6 µm 6.5 µm 7.7 µm 8.7 µm 11 µm	Comparison to Gauge Block Set
Pin Gauge, Pain Plug Gauge ¹	Up to 25 mm	1 µm	Comparison to High Accuracy Digital Micrometer
Coating Thickness Gauge ¹	50 µm 100 µm 250 µm 500 µm 1 000 µm	1.2 µm	Comparison to Film Thickness Standard
Shims / Feeler Gauge ¹	(> 0.05 to 3) mm	1 µm	Comparison to High Accuracy Digital Micrometer

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales and Balances, Load Cell ¹ (0.1 mg resolution)	50 mg to 10 g (10 to 100) g (100 to 150) g (150 to 200) g (200 to 250) g (250 to 300) g	0.2 mg 0.6 mg 1 mg 1.2 mg 1.6 mg 1.8 mg	Comparison to Standard Weight Set (F1)
Scales and Balances, Load Cell ¹ (1 mg resolution)	(300 to 500) g (500 to 1 000) g (1 to 1.5) kg (1.5 to 2) kg (2 to 3) kg (3 to 5) kg (5 to 15) kg (15 to 20) kg	4 mg 6 mg 10 mg 12 mg 18 mg 30 mg 0.6 g 1.2 g	Comparison to Standard Weight Set (M1)
Scales and Balances, Load Cell ¹ (10 g resolution)	(20 to 30) kg (30 to 60) kg (60 to 80) kg (80 to 150) kg (150 to 300) kg	2 g 3 g 5 g 9 g 17 g	Comparison to Standard Weight Set
Moisture Analyzer ^{1,4} Balance (Mass)	Up to 200 g	2 mg	Comparison to Standard Weight Set
Torque Meter, Torque Transducers, Torque Testers ¹	Up to 10 N·m (> 10 to 25) N·m (> 25 to 50) N·m	0.035 % of reading 0.03 % of reading 0.035 % of reading	Comparison to Standard Weight Set, Calibration Arms
Hand Torque Tool	Up to 10 N·m (> 10 to 25) N·m (> 25 to 550) N·m	0.83 % of reading 0.77 % of reading 1.2 % of reading	Comparison to Digital Torque Meter, Digital Torque Tester
Force – Measuring (Tension & Compression)	Up to 4.9 N (> 4.9 to 9.8) N (> 9.8 to 19.6) N (> 19.6 to 29.4) N (> 29.4 to 49) N (> 49 to 98) N (> 98 to 196) N (> 196 to 294) N (> 294 to 490) N	0.009 N 0.011 N 0.011 N 0.011 N 0.011 N 0.012 N 0.015 N 0.020 N 0.028 N	Comparison to Standard Weight Set
Vacuum Gauge ¹	(-13.05 to 0) psi	0.008 5 psi	Comparison to Precision Digital Manometer

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pressure Gauge ¹ (Pneumatic & Hydraulic), Digital Pressure Gauge, Pressure Transducer, Differential Pressure Gauge, Pressure Transmitter, Manometer, Pressure Switch	(0 to 2 900) psi	0.41 psi	Comparison to Precision Digital Manometer Aileike ALKCA00T Pressure Indicator Druck DPI 150, Pressure Module Fluke 700P07
Anemometer Air Velocity	Up to 17 m/s	1.6 % of reading	Standard Anemometer; CP-51-EM: Comparison Measurement
Flow Meter (Air Flow)	Up to 10 L/min (> 10 to 20) L/min (> 20 to 50) L/min	0.42 L/min 0.51 L/min 0.71 L/min	Master Flow Rate Sensor; CP-52-EM: Direct Measurement

Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
UV-A Meter	365 nm Up to 500 m W/cm ² Up to 10 000 m J/cm ²	3.6 % of reading 3.5 % of reading	LED Light Curing Systems, Standard UV Meter
Illuminance Meter, Lux Meter	Up to 5 000 lx (> 5000 to 8 000) lx (> 8 000 to 20 000) lx	2.1 % of reading 4.2 % of reading 7 % of reading	Standard Lux Meter; CP-54-PM: Direct Measurement
Color Light Box ¹ Illuminance	Up to 20 000) lux	7 % of reading	Standard Lux Meter; CP-55-EM: Direct Measurement
Total Solar Irradiance / Pyranometer ¹	Calibration Factor: 0 to 1 or Sensitivity (1 to 200) μ V/W/m ²	1.7 % of reading	Pyranometer Kipp & Zonan CMP 21, Data Acquisition Switch Unit; CP-11-EL: Direct Measurement
Fiber Optic Power – Measure	(-60 to 0) dBm 850 nm 1 310 nm 1 550 nm	0.074 dB 0.075 dB 0.085 dB	Optical Spectrum Analyzer, Attenuator; CP-65-FT: Direct Measurement

Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Fiber Optic Wavelength – Measure	850 nm 1 310 nm 1 490 nm 1 550 nm	0.036 nm 0.037 nm 0.037 nm 0.037 nm	Optical Spectrum Analyzer; CP-65-FT: Direct Measurement
Fiber Optic Power Flatness – Measure	(850, 1310, 1490, 1550) nm -20 dBm	0.12 dB	Optical Spectrum Analyzer; CP-65-FT: Direct Measurement
Fiber Optic Attenuator	(0 to 60) dB 850 nm 1 310 nm 1 550 nm	0.075 dB 0.075 dB 0.065 dB	Optical Spectrum Analyzer; CP-66-FT: Direct Measurement

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Digital Thermometer with Sensor Type ¹ K, J, T, E, N, R, S	(-30 to 0) °C (> 0 to 200) °C (> 200 to 650) °C	0.05 °C 0.055 °C 0.11 °C	Reference PRT, Reference Thermometer; CP-28-EL: Direct Measurement
Digital Thermometer with Sensor Type RTD ¹	(-30 to 0) °C (> 0 to 200) °C (> 200 to 650) °C	0.05 °C 0.055 °C 0.11 °C	Reference PRT, Reference Thermometer; CP-28-EL: Direct Measurement
Temperature Gauge, Dial Thermometer ¹	(-30 to 200) °C (> 200 to 650) °C	0.13 °C 0.16 °C	Reference PRT, Reference Thermometer; CP-29-EL: Direct Measurement
Liquid-in-Glass Thermometer ¹	(-30 to 125) °C	0.13 °C	Reference PRT, Reference Thermometer; CP-30-EL: Direct Measurement
Liquid Bath, Water Bath ¹	(-30 to 0) °C (> 0 to 100) °C (> 100 to 200) °C	0.087 °C 0.089 °C 0.091 °C	Data Acquisition Unit with RTD Probe CP-35-EL: Direct Measurement

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature Block Calibrator, Dry Block, Dry well, Temperature Source	(-30 to 0) °C (> 0 to 100) °C (> 100 to 200) °C (> 200 to 400) °C (> 400 to 650) °C	0.045 °C 0.045 °C 0.05 °C 0.065 °C 0.072 °C	Reference PRT, Reference Thermometer; CP-36-EL: Direct Measurement
Infrared Thermometer ¹	Ambient to 50 °C (> 50 to 100) °C (> 100 to 250) °C (> 250 to 350) °C (> 350 to 500) °C	0.63 °C 0.94 °C 2.1 °C 2.9 °C 4.1 °C	Blackbody Source λ : 8 to 14 μ m, ϵ : 0.95, Micro Bath; CP-31-EL: Direct Measurement
Furnace Oven ¹	(100 to 600) °C	1.9 °C	Datalogger with sensor (at a single spot); CP-32-EL: Direct Measurement
Air Temperature Controller Chamber, Hot Air Oven ¹	(-40 to 100) °C (> 100 to 200) °C (> 250 to 350) °C	0.5 °C 0.6 °C 0.65 °C	Datalogger with Type T & K TC Sensor; CP-33-EL: Direct Measurement
Refrigerator & Freezer ¹	(-40 to 10) °C	0.5 °C	Datalogger with sensor RTD Probe; CP-33-EL: Direct Measurement
Autoclave ¹	(25 to 125) °C	0.3 °C	High Temperature Data logger; CP-34-EL: Direct Measurement
Incubator ¹	(10 to 150) °C	0.6 °C	Datalogger with sensor RTD Probe; CP-33-EL: Direct Measurement
Digital Thermo-Hygrometer/ Thermo-Hygrograph	Temperature: (0 to 50) °C Humidity: (20 to 50) %RH (> 50 to 95) %RH	0.35 °C 0.85 %RH 1.2 %RH	Temp. & Humidity Chamber, Precision Thermo- Hygrometer; CP-38-EL: Direct Measurement
Humidity Controlled Chamber ¹	(0 to 50) °C (20 to 50) %RH (> 50 to 95) %RH	0.8 %RH 1.2 %RH	Precision Thermo- Hygrometer; CP-37-EL: Direct Measurement

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Stroboscopes ^{1,5}	Up to 99.99 rpm (> 100 to 999) rpm (> 1 000 to 9 999) rpm (> 10 000 to 99 999) rpm	0.001 % of reading 0.001 % of reading 0.001 % of reading 0.001 % of reading	Universal Counter; CP-40-EL: Direct Measurement
Tachometer ^{1,5} (Non-Contact)	Up to 99.99 rpm (> 100 to 999) rpm (> 1 000 to 9 999) rpm (> 10 000 to 99 999) rpm	0.002 5 % of reading 0.002 5 % of reading 0.002 5 % of reading 0.002 5 % of reading	Arbitrary Waveform Generator; CP-39-EL: Direct Measurement
Stopwatch, Timer, Sweep Time	(0.5 to 60) s (> 1 to 120) min	58 μ s	Universal Counter, Stopwatch; CP-63-RF: Direct Measurement
RF Frequency – Source ¹	(9 to 99.9) kHz (> 100 to 499.9) kHz > 500 kHz to 1 GHz (> 1 to 2) GHz (> 2 to 3.2) GHz	0.91 mHz 0.91 mHz 0.91 mHz 0.91 mHz 0.91 mHz	Quartz Frequency Standard, Signal Generator; CP-56-RF: Direct Measurement
Pulse – Source ¹	(1 to 500 000) count	0.13 count	Multimode Metering Simulator; CP-57-RF: Direct Measurement
Frequency – Source ¹	Rates: 1 mV to 1 020 V 0.029 mA to 11 A 1 Hz to < 120 Hz 0.12 kHz to < 1.2 kHz 1.2 kHz to < 12 kHz 12 kHz to < 120 kHz 0.12 MHz to < 1.2 MHz 1.2 MHz to 2 MHz	20 μ H/Hz + 0.8 mHz 20 μ H/Hz + 1.4 mHz 20 μ H/Hz + 17 mHz 20 μ H/Hz + 0.12 Hz 20 μ H/Hz + 1.2 Hz 20 μ H/Hz + 1.2 Hz	Multiproduct Calibrator; CP-01-EL, CP-05-EL: Direct Measurement
Frequency – Measure ¹	Rates: 10 mV to 700 V 0.1 mA to 1 A (1 to 40) Hz (> 40 to 100) Hz (> 100 to 1 000) Hz (> 1 to 10) kHz (> 10 to 100) kHz (> 0.1 to 1) MHz (> 1 to 10) MHz	0.58 mH/Hz + 10 μ Hz 0.12 mH/Hz + 0.1 mHz 0.12 mH/Hz + 1 mHz 0.12 mH/Hz + 10 mHz 0.12 mH/Hz + 0.1 Hz 0.12 mH/Hz + 1 Hz 0.12 mH/Hz + 10 Hz	Digital Multimeter; CP-12-EL: Direct Measurement

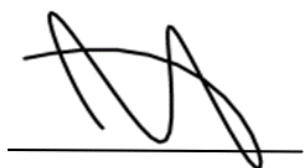
Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RF Frequency – Measure ¹	Up to 225 MHz > 225 MHz to 1 GHz (> 1 to 2) GHz (> 2 to 3) GHz (> 3 to 4) GHz (> 4 to 5) GHz (> 5 to 6) GHz	0.67 mHz 0.67 mHz 0.67 mHz 0.67 mHz 0.67 mHz 0.67 mHz 0.67 mHz	Quartz Frequency Standard, Universal Counter; CP-59-RF: Direct Measurement
Pulse – Measure ¹	(1 to 500 000) count	0.21 count	Quartz Frequency Standard, Universal Counter; CP-61-RF: Direct Measurement
Period – Measure ¹	(1 to 40) Hz 1 s to 25 ms > 40 Hz to 10 MHz > 25 ms to 100 ns	0.043 % of reading 0.012 % of reading	Digital Multimeter; CP-26-EL: Direct Measurement

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. The measurands presented in the Range column are Nominal values. The Certified values will be utilized during calibration along with the inherent uncertainty.
3. Unitless measurement.
4. The CMC for scales and balances is highly dependent upon the resolution of the unit under test. The CMC presented here does not include the resolution of the unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
5. rpm = revolutions per minute.
6. Unless otherwise specified in the far-right column, the calibration method/procedure utilized by the laboratory was developed and validated internally.



Jason Stine, Vice President