



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Thai Aviation Industries Co., Ltd. (TAI)
171 Bldg.2025 Phaholyothin Rd., Sanambin, Donmuang
Bangkok, 10210 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.

A handwritten signature in black ink, appearing to read 'R. Douglas Leonard Jr.', is positioned above a horizontal line.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 01 February 2024
Certificate Number: AC-3069



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

Thai Aviation Industries Co., Ltd (TAI)
171 Bldg.2025 Phaholyothin Rd., Sanambin, Donmuang
Bangkok 10210, Thailand
Mr. Uthid Ridgunto

CALIBRATION

Valid to: **February 1, 2024**

Certificate Number: **AC-3069**

Acoustics and Vibration

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Vibration Balance/Analyzer Calibration Velocity (IPS) Phase Speed	1 in/sec 180 ° 600 000 RPM	0.009 in/sec 1 ° 900 RPM	8904A Multifunction Synthesizer 5522A Multifunction Calibrator 3458A Digital Multimeter TM720-VB-004

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ DC Voltage – Measure	(0 to 220) mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1 100) V	8.6 μV/V + 1.7 μV 7 μV/V + 1.9 μV 7 μV/V + 3.9 μV 7 μV/V + 3.9 μV 8 μV/V + 80 μV 9.1 μV/V + 0.51 mV	Fluke 5700A Multi-Product Calibrator TM720-DA-012
¹ DC Voltage – Measure	(0 to < 330) mV 330 mV to < 3.3 V (3.3 to < 33) V (33 to < 330) V (330 to 1 020) V	8.6 μV/V + 1.7 μV 7 μV/V + 1.9 μV 7 μV/V + 3.9 μV 7 μV/V + 3.9 μV 8 μV/V + 80 μV	Fluke 5522A Multi-Product Calibrator TM720-DA-013
¹ DC Voltage – Source	(0 to < 100) mV 100 mV to < 1V (1 to < 10) V (10 to < 100) V (100 to 1 000) V	7.1 μV/V + 1.2 μV 4.8 μV/V + 1.2 μV 4.7 μV/V + 1.4 μV 7.1 μV/V + 36 μV 7.2 μV/V + 0.12 mV	HP 3458A Digital Multimeter TM-720-DA-015



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ DC Voltage – Source	(0 to 1) mV (> 1 to 10) mV (> 10 to 100) mV > 100 mV to 1) V (> 1 V to 10) V (> 10 V to 100) V	59 μ V/V + 1.2 μ V 59 μ V/V + 1.2 μ V 48 μ V/V + 1.2 μ V 41 μ V/V + 4.8 μ V 35 μ V/V + 46 mV 41 μ V/V + 0.58 mV	HP 34420A Nano-Volt/Micro-Ohm Meter TM-720-DA-016
¹ DC High Voltage – Source	(0.5 to 1.0) kV (1.0 to 1.5) kV (1.5 to 2.0) kV (2.0 to 2.5) kV (2.5 to 3.0) kV (3.0 to 6.0) kV (6.0 to 10.0) kV	0.012 kV 0.023 kV 0.035 kV 0.058 kV 0.07 kV 0.14 kV 0.23 kV	Fluke 87 Digital Multimeter, Fluke 80K-40 High Voltage Probe TM-720-DA-017
¹ DC Voltage – Source	(> 0 to < 330) mV 330 mV to < 3.3 V (3.3 to < 33) V (33 to < 330) V (330 to 1 020) V	4.8 μ V/V + 1.2 μ V 4.8 μ V/V + 1.2 μ V 4.8 μ V/V + 1.3 μ V 5.2 μ V/V + 2 mV 5.4 μ V/V + 2.2 mV	Fluke 752A Reference Divider, HP 3458A Digital Multimeter TM720-DA-011
¹ DC Current – Measure 34470A	(0 to 220) μ A (> 220 μ to 2.2 m) A (>2.2 to 22) mA (>22 to 220) mA (>220 m to 2.2) A (>2.2 to 11) A	41 μ A/A + 0.01 μ A 36 μ A/A + 0.01 μ A 36 μ A/A + 0.04 μ A 46 μ A/A + 0.76 μ A 82 μ A/A + 13 μ A 0.36 mA/A + 0.49 mA	Fluke 5700A Multifunction Calibrator, Fluke 5725A Amplifier TM720-DA-021
¹ DC Current – Measure 34470A	(0 to 330) μ A (> 330 μ to 3.3 m) A (>3.3 to 33) mA (>33 to 330) mA (>330 m to 1.1) A (>1.1 to 3.0) A (>3.0 to 20.5) A	173 μ A/A + 24 nA 115 μ A/A + 0.1 μ A 115 μ A/A + 0.1 μ A 115 μ A/A + 7 μ A 231 μ A/A + 11 μ A 0.44 mA/A + 0.11 mA 0.58 mA/A + 0.75 mA	Fluke 5522A Multifunction Calibrator TM720-DA-022
¹ DC Current – Source 5700A	0 to 220 μ A (>0.22 to 2.2) mA (>2.2 to 22) mA (>22 mA to 220) mA (>220 mA to 2.2) A (>2.2 A to 11) A	4.8 μ A/A + 5 nA 4.6 μ A/A + 51 nA 4.6 μ A/A + 0.53 μ A 4.6 μ A/A + 2.8 μ A 4.6 μ A/A + 83 μ A 4.6 μ A/A + 0.41 mA	HP 3458A Digital Multimeter /Current Shunt Set TM720-DA-023



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ DC Current Shunt– Measure 2575A	100 Ω (> 0 to < 2) mA 10 Ω (2 to < 20) mA 1 Ω (20 to < 200) mA 0.1 Ω (200 to < 2000) mA 0.01 Ω (2 to < 20) A 0.001 Ω (20 to < 100) A	4.8 μΩ/Ω+ 1.5 mΩ 4.8 μΩ/Ω+ 0.17 mΩ 4.8 μΩ/Ω+ 16 μΩ 4.8 μΩ/Ω+ 3.6 μΩ 4.8 μΩ/Ω+ 0.36 μΩ 4.8 μΩ/Ω+ 0.14 μΩ	HP 3458A Digital Multimeter, Fluke 5522A Multifunction Calibrator, Valhalla 2555A Current Calibrator, Resistance shunt set TM720-DA-027
¹ DC Current – Source 2555A	(> 0 to < 2) mA (2 to < 20) mA (20 to < 200) mA (200 to < 2000) mA (2 to < 20) A (20 to < 100) A	4.6 μA /A + 52 nA 4.6 μA /A + 0.53 μA 4.6 μA /A + 5.3 μA 4.6 μA /A + 84 μA 4.6 μA /A + 0.98 mA 4.6 μA /A + 61 mA	Valhalla 2575A Active Current Shunt, HP 3458A Digital Multimeter TM720-DA-029
¹ DC Current – Source 5500A	0 to 100 μA (>0.1 to 1) mA (>1 to 10) mA (>10 to 100) mA (>0.1 to 1) A	24 μA /A + 0.1 nA 24 μA /A + 6 nA 24 μA /A + 6 nA 42 μA /A + 8 μA 128 μA /A + 11.6 μA	HP/Agilent 3458A Digital Multimeter TM720-DA-028
¹ DC Current – Source 5522A	0 to 330 μA (> 0.33 to 3.3) mA (> 3.3 to 33) mA (> 33 mA to 330) mA (> 330 mA to 1.1) A (> 1.1 A to 3.0) A (> 3.0 A to 11) A (> 11 A to 20.5) A	4.6 μA /A + 30 nA 4.6 μA /A + 90 nA 4.6 μA /A + 1 μA 4.6 μA /A + 8.6 μA 4.6 μA /A + 45 μA 4.6 μA /A + 123 μA 4.6 μA /A + 0.44 mA 4.6 μA /A + 0.81 mA	HP 3458A Digital Multimeter, Current Shunt Set TM720-DA-030
DC Resistance – Source	0.1 to 100 MΩ (>100 to 200) MΩ (>200 to 300) MΩ (>300 to 400) MΩ (>400 to 500) MΩ (>500 to 600) MΩ (>600 to 700) MΩ (>700 to 800) MΩ (>800 to 900) MΩ (>900 to 1 000) MΩ (>1 000 to 10 000) MΩ	10 μΩ/Ω 10 μΩ/Ω 10 μΩ/Ω 10 μΩ/Ω 10 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω 11 μΩ/Ω	DMM-DC Voltage Measurement Method HP 3458A Digital Multimeter, Fluke 5700A Multifunction Calibrator, Standard Resistor Set TM720-DA-034



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Resistance – Source Voltage 10 V to 5 kV	Up to 1 kV 10 MΩ 100 MΩ 1000 MΩ 10 GΩ	0.02 MΩ 0.2 MΩ 3 MΩ 0.09 GΩ	Megger CB101 TM720-DA-024
¹ AC Voltage – Source	Up to 2.2 mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (2.2 to 22) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz (>22 to 220) mV (10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	1.1 mV/V + 4.5 μV 0.49 mV/V + 4.5 μV 0.46 mV/V + 4.5 μV 0.72 mV/V + 4.5 μV 1.3 mV/V + 7 μV 1.6 mV/V + 13 μV 2 mV/V + 80 μV 2.7 mV/V + 80 μV 0.56 mV/V + 5 μV 0.23 mV/V + 5 μV 0.13 mV/V + 5 μV 0.38 mV/V + 5 μV 0.86 mV/V + 7 μV 1.2 mV/V + 12 μV 1.7 mV/V + 25 μV 3.5 mV/V + 25 μV 0.56 mV/V + 13 μV 0.23 mV/V + 8 μV 0.13 mV/V + 8 μV 0.33 mV/V + 8.1 μV 0.86 mV/V + 25 μV 1.2 mV/V + 26 μV 1.8 mV/V + 35 μV 3.5 mV/V + 80 μV	Fluke 5700A Multifunction Calibrator, 5725A Amplifier Direct measurement against Multi-Function Calibrator TM720-DA-041
¹ AC Voltage – Source	(1 to 33) 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	0.8 mV/V + 7.8 μV 0.16 mV/V + 7.8 μV 0.21 mV/V + 7.8 μV 1 mV/V + 7.8 μV 0.35 mV/V + 15 μV 0.8 mV/V + 55 μV	Fluke 5522A Multifunction Calibrator Direct measurement against Multi-Product Calibrator TM720-DA-042



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment		
¹ AC Voltage – Source	(>33 to 330) mV		Fluke 5522A Multifunction Calibrator Direct measurement against Multi-Product Calibrator TM720-DA-042		
	(10 to 45) Hz	0.31 mV/V + 14 μV			
	45 Hz to 10 kHz	0.16 mV/V + 14 μV			
	(10 to 20) kHz	0.17 mV/V + 14 μV			
	(20 to 50) kHz	0.36 mV/V + 18 μV			
	(50 to 100) kHz	0.8 mV/V + 39 μV			
	(100 to 500) kHz	2 mV/V + 0.12 mV			
	>330 mV to 3.3 V				
	(10 to 45) Hz	0.31 mV/V + 0.12 mV			
	45 Hz to 10 kHz	0.16 mV/V + 0.12 mV			
	(10 to 20) kHz	0.2 mV/V + 0.12 mV			
	(20 to 50) kHz	0.31 mV/V + 0.15 mV			
	(50 to 100) kHz	0.7 mV/V + 0.26 mV			
	(100 to 500) kHz	2.4 mV/V + 1.4 mV			
	(>3.3 to 33) V				
(10 to 45) Hz	0.31 mV/V + 1.2 mV				
45 Hz to 10 kHz	0.16 mV/V + 1.2 mV				
(10 to 20) kHz	0.25 mV/V + 1.0 mV				
(20 to 50) kHz	0.36 mV/V + 1.7 mV				
(50 to 100) kHz	0.9 mV/V + 3.1 mV				
¹ Capacitance – Source @ 1 kHz	Up to 0.1 nF	0.000 73 nF	ARCO SS-32 Precision Standard Capacitor Kit TM720-DA-061		
	(0.1 to 1) nF	0.002 1 nF			
	(1 to 10) nF	0.017 nF			
	(10 to 100) nF	0.12 nF			
	(100 to 1 000) nF	1.3 nF			
	(1 to 1.4) μF	1.8 nF			
	¹ Capacitance – Source	10 pF			ARCO SS-32 Precision Standard Capacitor Kit TM720-DA-062
		100 kHz		0.63 pF	
		100 pF			
		100 Hz		0.73 pF	
1 kHz		0.73 pF			
	10 kHz	0.71 pF			

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Capacitance – Source	1 000 pF		ARCO SS-32 Precision Standard Capacitor Kit TM720-DA-062
	20 kHz	2.1 pF	
	100 kHz	2.1 pF	
	0.01 μF		
	100 Hz	0.000 022 μF	
	120 Hz	0.000 018 μF	
	1 kHz	0.000 018 μF	
	10 kHz	0.000 018 μF	
	20 kHz	0.000 019 μF	
	100 kHz	0.000 019 μF	
	0.1 μF		
	1 kHz	0.000 17 μF	
	100 kHz	0.000 24 μF	
	1 μF		
	100 Hz	0.001 3 μF	
	120 Hz	0.001 3 μF	
	1 kHz	0.001 3 μF	
10 kHz	0.001 3 μF		
20 kHz	0.001 3 μF		
100 kHz	0.001 3 μF		
^{1,3} Dissipation Factor – Source	10 pF		ARCO SS-32 Precision Standard Capacitor Kit TM720-DA-063
	100 kHz	0.000 25	
	100 pF		
	100 Hz	0.000 25	
	1 kHz	0.000 25	
	10 kHz	0.000 25	
	1000 pF		
	20 kHz	0.001 6	
	100 kHz	0.001 6	
	0.01 μF		
	100 Hz	0.000 82	
	120 Hz	0.000 82	
	1 kHz	0.000 82	
	10 kHz	0.000 82	
	20 kHz	0.000 82	
	100 kHz	0.000 82	
	0.1 μF		
1 kHz	0.000 82		
100 kHz	0.000 82		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
^{1,3} Dissipation Factor – Source	1 μ F		ARCO SS-32 Precision Standard Capacitor Kit TM720-DA-063
	100 Hz	0.000 82	
	120 Hz	0.000 82	
	1 kHz	0.000 82	
	10 kHz	0.000 82	
	20 kHz	0.000 82	
	100 kHz	0.000 82	
¹ Capacitance – Measure	(50 to 100) Hz		HP 4263B LCR Bridge TM720-DA-064
	(1 to 10) pF	0.02 pF	
	(10 to 100) pF	0.15 pF	
	(100 to 1 000) pF	1.5 pF	
	(1 to 10) nF	0.015 nF	
	(10 to 100) nF	0.15 nF	
	(100 to 1 000) nF	1.5 nF	
	(1 to 10) μ F	0.015 μ F	
	(10 to 100) μ F	0.15 μ F	
	(100 to 1 000) μ F	2.5 μ F	
	(1 to 10) mF	0.025 mF	
	100 Hz to 1 kHz		
	(1 to 10) pF	0.02 pF	
	(10 to 100) pF	0.15 pF	
	(100 to 1 000) pF	1.5 pF	
	(1 to 10) nF	0.015 nF	
	(10 to 100) nF	0.15 nF	
	(100 to 1 000) nF	1.5 nF	
	(1 to 10) μ F	0.015 μ F	
	(10 to 100) μ F	0.15 μ F	
	(100 to 1 000) μ F	2.5 μ F	
	(1 to 10) mF	0.025 mF	
	(1 to 10) kHz		
	(1 to 10) pF	0.02 pF	
	(10 to 100) pF	0.15 pF	
	(100 to 1 000) pF	1.5 pF	
	(1 to 10) nF	0.015 nF	
	(10 to 100) nF	0.15 nF	
	(100 to 1 000) nF	1.5 nF	
	(1 to 10) μ F	0.015 μ F	
(10 to 100) μ F	0.15 μ F		
(100 to 1 000) μ F	2.5 μ F		
(1 to 10) mF	0.025 mF		



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Capacitance – Measure (10 to 100) kHz	(10 to 100) kHz (1 to 10) pF (10 to 100) pF (100 to 1 000) pF (1 to 10) nF (10 to 100) nF (100 to 1 000) nF (1 to 10) μF (10 to 100) μF	0.02 pF 0.15 pF 1.5 pF 0.015 nF 0.15 nF 1.5 nF 0.015 μF 0.15 μF	HP 4263B LCR Bridge TM720-DA-064
¹ Oscilloscope – DCV 50 Ω Load Impedance	(0 to 25) mV (25 to 110) mV 110 mV to 2.2 V (2.2 to 6.6) V	0.29 % of reading + 0.18 mV 0.29 % of reading + 0.87 mV 0.29 % of reading + 8.9 mV 0.29 % of reading + 18 mV	Fluke 5522A/SC600 Multifunction Calibrator TM720-OS-001
¹ Oscilloscope – DCV 1 MΩ Load Impedance	(0 to 25) mV (25 to 110) mV 110 mV to 2.2 V (2.2 to 11) V (11 to 33) V (33 to 130) V	0.058 % of reading + 59 μV 0.058 % of reading + 0.2 mV 0.058 % of reading + 3.6 mV 0.058 % of reading + 18 mV 0.058 % of reading + 36 mV 0.058 % of reading + 0.1 V	Fluke 5522A/SC600 Multifunction Calibrator TM720-OS-001
¹ Oscilloscope – AC Square Wave 50 Ω Load Impedance	10 Hz to 10 kHz (0 to 25) mVp-p (25 to 110) mVp-p 110 mVp-p to 2.2 Vp-p (2.2 to 6.6) Vp-p	0.29 % of reading + 0.18 mV 0.29 % of reading + 0.87 mV 0.29 % of reading + 8.9 mV 0.29 % of reading + 8.9 mV	Fluke 5522A/SC600 Multifunction Calibrator TM720-OS-001
¹ Oscilloscope – AC Square Wave 1 MΩ Load Impedance	10 Hz to 10 kHz (0 to 25) mVp-p (25 to 110) mVp-p 110 mVp-p to 2.2 Vp-p (2.2 to 11) Vp-p (11 to 33) Vp-p (11 to 130) Vp-p	0.058 % of reading + 59 μV 0.058 % of reading + 0.2 mV 0.058 % of reading + 3.6 mV 0.058 % of reading + 18 mV 0.058 % of reading + 18 mV 0.058 % of reading + 18 mV	Fluke 5522A/SC600 Multifunction Calibrator TM720-OS-001
¹ Oscilloscope – Time Marker	2 ns 4 ns 10 ns 20 ns 40 ns 100 ns 200 ns 400 ns 1 μs	0.058 ns 0.058 ns 0.12 ns 0.58 ns 0.58 ns 1.2 ns 5.8 ns 5.8 ns 0.012 μs	Fluke 5522A/SC600 Multifunction Calibrator TM720-OS-001

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Oscilloscope – Time Marker	2 μ s 4 μ s 10 μ s 20 μ s 40 μ s 100 μ s 200 μ s 400 μ s 1 ms 2 ms 4 ms 10 ms 20 ms 40 ms 100 ms 200 ms 400 ms 1 s 2 s 4 s	0.058 μ s 0.058 μ s 0.12 μ s 0.58 μ s 0.58 μ s 1.2 μ s 5.8 μ s 5.8 μ s 0.012 ms 0.058 ms 0.058 ms 0.12 ms 0.58 ms 0.58 ms 1.2 ms 5.8 ms 5.8 ms 12 ms 58 ms 58 ms	Fluke 5522A/SC600 Multifunction Calibrator TM720-OS-001
¹ Oscilloscope – Bandwidth	3 dB drop (5 to 12) mVp-p 50 kHz to 100 MHz (100 to 300) MHz (300 to 500) MHz (500 to 600) MHz 3 dB drop 12 mVp-p to 5.5 Vp-p 50 kHz to 100 MHz (100 to 300) MHz (300 to 500) MHz (500 to 600) MHz	0.33 dB 0.33 dB 0.33 dB 0.33 dB 0.33 dB 0.33 dB 0.33 dB 0.33 dB 0.33 dB 0.33 dB	Fluke 5522A/SC600 Multifunction Calibrator TM720-OS-001
¹ Wrist Strap Tester	750 k Ω 900 k Ω 9 M Ω 11 M Ω	0.76 k Ω 0.19 k Ω 0.11 M Ω 0.19 M Ω	ZM-16B/U Decade Resistor, TM720-DA-035, TI lamp indication observed when tested with a known resistance value.



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Ground Resistance Measure	(0.001 to 1.999) Ω (2 to 19.99) Ω (20 to 199.9) Ω (200 to 1 999) Ω (2 000 to 19 990) Ω	1.2 % of reading 2.3 % of reading 2.3 % of reading 2.3 % of reading 2.3 % of reading	Earth Tester R1L-C Ground Resistance Test System, TM720-DA-036, Compare to an earth tester
¹ Magnetic Particle Tester DC Current	(200 to 500) A (500 to 1 000) A (1 000 to 2 000) A (2 000 to 3 000) A (3 000 to 4 000) A (4 000 to 5 000) A (5 000 to 6 000) A	15 A 26 A 48 A 70 A 93 A 116 A 139 A	Amp Meter 622350, TM720-DA-037, Direct Measurement
¹ Magnetic Particle Tester AC Current	50 to 60 Hz (200 to 500) A (500 to 1 000) A (1 000 to 2 000) A (2 000 to 3 000) A (3 000 to 4 000) A (4 000 to 5 000) A (5 000 to 6 000) A	19 A 36 A 70 A 104 A 139 A 173 A 208 A	

Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Frequency Counter – Frequency Sensitivity	-50 to 5 dBm 10 Hz to 100 MHz 100 MHz to 200 MHz (200 to 225) MHz 100 MHz to 3 GHz	1.2 dBm 1.2 dBm 1.2 dBm 1.2 dBm	HP 83732A Synthesizer, HP E4418B Power Meter, HP E4412A Power Meter, HP 11667B Power Splitter TM720-FC-001
¹ Phase Modulation - Measure Frequency Carrier (>150 kHz to 1.3 GHz) Modulation Rate 200 Hz to 10 kHz	Deviation ≤ 100 rad	0.39 rad	Signal Generator HP 8642B TM720-SG-005
¹ RF Signal Harmonics and Non- Harmonics	(-75 to 10) dBc Freq: 100 kHz to 26 GHz Harmonics Non-Harmonics	0.38 dB 0.38 dB	Spectrum Analyzer HP 4407B TM720-SG-024



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Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ RF Absolute Power-Measure	(> -110 to -10) dBm		Spectrum analyzer HP E4407B TM720-SG-017
	9 kHz to 2 GHz	0.38 dB	
	(2 to <6) GHz	0.38 dB	
	(6 to <14) GHz	0.38 dB	
	(14 to <16) GHz	0.38 dB	
(16 to 18) GHz	0.38 dB		
¹ RF Absolute Power-Measure	(-10 to 20) dBm		Spectrum analyzer HP E4407B TM720-SG-017
	(10 to <30) MHz	0.38 dB	
	30 MHz to <2 GHz	0.38 dB	
	(2 to <6) GHz	0.38 dB	
	(6 to <11) GHz	0.38 dB	
(11 to 26.5) GHz	0.38 dB		
¹ Relative Tuned RF Power - Measure	2.5 MHz to 1.3 GHz		Power sensor 11722A and 11792A, Measuring receiver 8902A TM720-SG-018
	0 dB	0.11 dB	
	(-10 to < 0) dB	0.13 dB	
	(-20 to < -10) dB	0.15 dB	
	(-30 to < -20) dB	0.17 dB	
	(-40 to < -30) dB	0.19 dB	
	(-50 to < -40) dB	0.21 dB	
	(-60 to < -50) dB	0.23 dB	
	(-70 to < -60) dB	0.25 dB	
	(-80 to < -70) dB	0.27 dB	
	(-90 to < -80) dB	0.33 dB	
	(-100 to < -90) dB	0.38 dB	
	(-110 to < -100) dB	0.43 dB	
	50 MHz to 26.5 GHz		
	0 dB	0.12 dB	
	(-10 to < 0) dB	0.13 dB	
	(-20 to < -10) dB	0.15 dB	
	(-30 to < -20) dB	0.17 dB	
	(-40 to < -30) dB	0.19 dB	
	(-50 to < -40) dB	0.21 dB	
	(-60 to < -50) dB	0.23 dB	
	(-70 to < -60) dB	0.25 dB	
	(-80 to < -70) dB	0.27 dB	
	(-90 to < -80) dB	0.33 dB	
(-100 to < -90) dB	0.38 dB		
(-110 to < -100) dB	0.44 dB		
(-120 to < -110) dB	0.5 dB		
(-127 to < -120) dB	0.55 dB		

Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ RF Absolute Power- Source	(0 to 20) dBm		8642B Signal Generator TM720-SG-019
	100 kHz to 100 MHz	0.35 dB	
	100 MHz to 1 GHz	0.35 dB	
	(1 to 2.1) GHz	0.35 dB	
	(-70 to 0) dBm		
	100 kHz to 100 MHz	0.43 dB	
¹ RF Absolute Power- Source	100 MHz to 1 GHz	0.43 dB	8642B Signal Generator TM720-SG-019
	(1 GHz to 2.1) GHz	0.43 dB	
	(0 to 10) dBm		
	(10 to 1 000) MHz	0.23 dB	
	1 000 MHz to 10 GHz	0.23 dB	
	(10 to 20) GHz	0.23 dB	
¹ RF Absolute Power- Source	(-70 to 0) dBm		8642B Signal Generator TM720-SG-019
	(10 to 1 000) MHz	0.49 dB	
	1 000 MHz to 10 GHz	0.49 dB	
	(10 to 20) GHz	0.49 dB	

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Vernier Caliper Dial and Digital (Internal/External/Depth)	Up to 150 mm	0.005 9 mm	Gauge Block Set TM720-DM-004
	(>150 to 300) mm	0.006 2 mm	
	(>300 to 400) mm	0.006 4 mm	
	(>400 to 500) mm	0.006 8 mm	
	(>500 to 600) mm	0.007 1 mm	
	(>600 to 700) mm	0.007 5 mm	
	(>700 to 800) mm	0.008 mm	
	(>800 to 900) mm	0.008 5 mm	
	(>900 to 1 000) mm	0.009 mm	
	(>1 000 to 2 000) mm	0.015 mm	
	¹ Ultrasonic Thickness Gauge	Up to 25 mm	
(>25 to 50) mm		0.000 71 mm	
(>50 to 75) mm		0.000 82 mm	
(>75 to 100) mm		0.000 95 mm	

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Internal Micrometer All type Snap Micrometer	Up 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	0.73 μm 0.82 μm 0.95 μm 1.1 μm 1.2 μm 1.4 μm 1.6 μm 1.7 μm 1.9 μm 2 μm 2.2 μm 2.4 μm 2.5 μm	Gauge Block Set TM720-DM-006
¹ Internal Micrometer All type Snap Micrometer	(>350 to 375) mm (>375 to 400) mm (>400 to 425) mm (>425 to 450) mm (>450 to 475) mm (>475 to 500) mm	2.7 μm 2.9 μm 3.1 μm 3.2 μm 3.4 μm 3.5 μm	Gauge Block Set TM720-DM-006
¹ Caliper Gauge External	Up to 50 mm	0.005 8 mm	Gauge Block Set TM720-DM-007
¹ Thickness Gauge	Up to 0.5 mm (>0.5 to 25) mm	0.000 2 mm 0.000 3 mm	Gauge Block Set TM720-DM-009
¹ Granite/Cast Iron Surface Plate – Overall Flatness/ Specified Area Flatness	(150 x 150) mm (≤ 300 x 300) mm (≤ 300 x 450) mm (≤ 450 x 600) mm (≤ 600 x 600) mm (≤ 500 x 750) mm (≤ 750 x 1 000) mm (≤ 1 000 x 1 000) mm (≤ 1 000 x 1 500) mm (≤ 1 000 x 2 000) mm (≤ 1 500 x 2 000) mm (≤ 2 000 x 2 000) mm (≤ 1 500 x 3 000) mm (≤ 2 000 x 3 000) mm (≤ 5 000 x 10 000) mm	0.8 μm 1 μm 1.4 μm 1.9 μm 1.9 μm 2.5 μm 3.4 μm 3.4 μm 5.2 μm 6.6 μm 6.6 μm 6.6 μm 12 μm 12 μm 12 μm	Electronic Level Meter based on JIS B 7513:1992 TM720-DM-020
¹ Dial Indicator	(0 to 5) mm (0 to 100) mm	1.2 μm 2.4 μm	RC112MLM, SS8MAAX, ULM TM720-DM-015

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Steel Ruler	Up to 150 mm (>150 to 300) mm (>300 to 450) mm (>450 to 600) mm (>600 to 1 000) mm (>1 000 to 2 000) mm	0.021 mm 0.024 mm 0.026 mm 0.026 mm 0.03 mm 0.04 mm	Measuring Scale & Tape Calibration System TM720-DM-017 base on JIS B 7516
¹ Check Master / Depth Micro Checker	(0 to 150) mm (>150 to 300) mm	0.001 1 mm 0.002 2 mm	Gauge Block Set RC112MLM TM720-DM-019
Measuring Foil Standard Foil	Up to 1 mm (1 to 5) mm	0.21 μm 0.22 μm	ULM TM720-DM-014
Plain Plug Gauge	(1 to 200) mm	1.6 μm	ULM /Gauge Block Based on JIS B 7420 TM720-DM-021
Plain Ring Gauge	(1 to 150) mm	1.6 μm	ULM / Gauge Block Based on JIS B 7420 TM720-DM-022
¹ Plain Snap Gauge/Gap Gauge (Internal)	Up to 40 mm (>40 to 60) mm (>60 to 80) mm (>80 to 100) mm (>100 to 300) mm	0.000 5 mm 0.000 6 mm 0.000 7 mm 0.000 8 mm 0.005 mm	ULM / Gauge Block TM720-DM-027
¹ Plain Snap Gauge/Gap Gauge (External)	Up to 10 mm (>10 to 30) mm (>30 to 40) mm (>40 to 60) mm (>60 to 70) mm (>70 to 90) mm (>90 to 100) mm (>100 to 200) mm (>200 to 300) mm (>300 to 400) mm (>400 to 500) mm	0.000 1 mm 0.000 2 mm 0.000 3 mm 0.000 4 mm 0.000 5 mm 0.000 6 mm 0.000 7 mm 0.001 4 mm 0.002 1 mm 0.002 7 mm 0.003 4 mm	ULM / Gauge Block TM720-DM-027
¹ Dial Test Indicator	(0 to 0.2) mm (>0.2 to 3) mm	1.4 μm 1.9 μm	RC112MLM, SS8MAAX, ULM TM720-DM-030
¹ Universal Length Measuring Machine	Up to 25 mm (>25 to 50) mm (>50 to 75) mm (>75 to 100) mm	0.052 μm 0.081 μm 0.11 μm 0.15 μm	Gauge Block TM720-DM-031



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Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Riser Block	150 mm 300 mm 600 mm	1 μm 2.1 μm 4 μm	Electronic Height Gage/ Gauge Bloc TM720-DM-033
Bore Gauge / Cylinder Gauge	(0 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	0.24 μm 0.25 μm 0.26 μm 0.27 μm 0.27 μm 0.27 μm 0.27 μm	ULM TM720-DM-034
¹ Coating Thickness Gauge	(30 to 1 536) μm	1.2 μm	ULM, Gauge Block Set, Standard Foil Set TM720-DM-041
Combination Square Angle of Centering Head and Squaring Head	(45 to 90) °	2.2 ‘	Electronic Height Gages, Gauge Block Set TM720-DM-054
Combination Square Scale Measurement Length	Up to 500 mm	26 μm	

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Push-Pull Gauge/ Force Gauge/ Tension Gauge	Up to 10 N (>10 to 20) N (>20 to 30) N (>30 to 50) N (>50 to 100) N (>100 to 200) N (>200 to 300) N (>300 to 500) N (>500 to 1 000) N	0.012 N 0.024 N 0.047 N 0.058 N 0.12 N 0.24 N 0.47 N 0.58 N 1.2 N	Standard Weight TM720-FR-003

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Load Cell and Force (Compression & Tension)	Up to 25 N (>25 to 50) N (>50 to 75) N (>75 to 100) N (>100 to 125) N (>125 to 150) N (>150 to 175) N (>175 to 200) N (>200 to 225) N (>225 to 250) N	0.14 N 0.097 N 0.071 N 0.056 N 0.050 N 0.049 N 0.051 N 0.053 N 0.053 N 0.048 N	Load Cell with Indicator TM720-FR-006
¹ Aircraft Platform Scale	(1.0 to 10) kN (>10 to 100) kN (>100 to 250) kN	0.14 % of reading 0.17 % of reading 0.18 % of reading	Load Cell with Indicator TM720-FR-008
¹ Torque Transducer, Torque Tester	(136 to 678) N m (678 to 2 712) N m (2 712 to 9 491) N m	0.6 % of reading 0.1 % of reading 0.05 % of reading	Calibration Arm, A.K.O 60 Inch and Weight Set TM720-TQ-004
^{1,2} Gauge/Absolute Pressure (Pneumatic Type), Pressure Calibrator, Pressure Module, Pressure Transducer, Pressure Transmitter with Digital Reading/Electrical Output, Digital Pressure Gauge, Bourdon Tube Pressure Gauge Positive Gauge Pressure	(5 to 175) kPa (>175 to 700) kPa (>700 to 7 000) kPa	$5.5 \times 10^{-5} \times P_e + 0.0076 \text{ kPa}$ $5.3 \times 10^{-5} \times P_e + 0.0076 \text{ kPa}$ $5.8 \times 10^{-5} \times P_e + 0.0076 \text{ kPa}$	Compare with a Gas Pressure Balance TM720-PR-010
^{1,2} Gauge/Absolute Pressure (Liquid Type), Pressure Calibrator, Pressure Module, Pressure Transducer, Pressure Transmitter with Digital Reading/Electrical Output, Digital Pressure Gauge, Bourdon Tube Pressure Gauge, Negative Gauge Pressure	(1 000 to 10 000) psi	$4.2 \times 10^{-2} \times P_e + 1.1 \text{ psi}$	Compare with a Hydraulic Pressure Balance TM720-PR-011

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Pressure Transducer, Pressure Transmitter, Vacuum Transmitter Liquid Type	(0 to 100) psi (100 to 1 000) psi (1 000 to 10 000) psi	0.047 psi 0.047 % of reading + 0.006 psi 5.9 psi	Pressure Module, 750R06 /Digital Pressure Gauge 700RG08 Digital Pressure Gauge DPI104-IS TM720-PR-004
^{1,2} Air Data Calibrator, Air Data Test Set, Pitot Static Tester,	(5 to 400) kPa	$4.6 \times 10^{-5} \times P_e + 0.0025$ inHg	Compare with a Gas Pressure Balance TM720-PR-012
¹ Barometer	(22 to 31.5) inHg	0.01 inHg	Air Data Calibrator, ADC2500 TM720-PR-008
¹ Tire Gage/Tire Inflator	(0 to 200) psi (200 to 600) psi	1.2 psi 5.8 psi	Digital Pressure Gauge 700RG08 TM720-PR-009

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thermo Hygrometer Temperature	(-20 to 120) °C	0.5 °C	Thermo-Hygrometer Model: Dracal Sensor Temp/Humidity Chamber TM720-TP-010
Thermo Hygrometer Humidity	(20 to 50) % RH (>50 to 70) % RH (>70 to 95) % RH	1.6 % RH 1.8 % RH 2 % RH	Thermo-Hygrometer Model: Dracal Sensor Temp/Humidity Chamber TM720-TP-010
Thermo Hygrometer Temperature Chamber	(-20 to 120) °C	0.5 °C	Thermo-Hygrometer Model: Dracal Sensor Temp/Humidity Chamber TM720-TP-017
Thermo Hygrometer Humidity Chamber	(20 to 50) % RH (>50 to 70) % RH (>70 to 95) % RH	1.6 % RH 1.9 % RH 2 % RH	Thermo-Hygrometer Model: Dracal Sensor Temp/Humidity Chamber TM720-TP-017

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Digital Tachometer Photo Type	(1 to 999.9) rpm (> 999.9 to 9 999.9) rpm (> 9 999.9 to 60 000) rpm	0.088 rpm 0.64 rpm 1.5 rpm	Hewlett-Packard HP 33220A Waveform Generator, Fluke 743B Process Calibrator and LED TM720-RT-001
Digital Tachometer Contact Type	(10 to 100) rpm (>100 to 24 000) rpm	0.008 rpm 0.58 rpm	Tachometer Tester 160-01 and Universal Counter 53132A TM720-RT-001
Digital Tachometer Linear Speed Indication	(0.05 to 2 000) m/min	0.058 m/min	
¹ Stopwatch/Timer – With Human Interaction	Up to 24 hours	0.04 sec	Frequency Counter HP 53132A TM720-FC-002
¹ Frequency - Source	(0.1 to 1) Hz (>1 to 10) Hz (>10 to 100) Hz >100 Hz to 1000 Hz (>1 to 10) kHz (>10 to 100) kHz >100 kHz to 1 MHz (>1 to 10) MHz	10 µHz/Hz 1 µHz/Hz 0.1 µHz/Hz 0.1 µHz/Hz 1 µHz/Hz 0.1 µHz/Hz 10 nHz/Hz 1 nHz/Hz	Fluke 5522A Multifunction Calibrator TM720-FC-011
¹ Centrifuge/Stirrer/ Rotation Speed of Instrument	(0 to 99 000) rpm	12 rpm	Digital Tachometer DT 6236B TM720-RT-002
¹ Frequency – Measure	(0.1 to 1) Hz (>1 to 10) Hz (>10 to 100) Hz	0.1 nHz/Hz 0.1 nHz/Hz 0.1 nHz/Hz	HP 33220A Waveform Generator Fluke 910R GPS TM720-FC-003
¹ Frequency – Measure	(0.1 to 1) Hz (>1 to 10) Hz (>10 to 100) Hz >100 Hz to 1 kHz (>1 to 100) kHz >100 kHz to 1 MHz (>1 to 10) MHz	0.1 mHz/Hz 10 µHz/Hz 1 µHz/Hz 1 µHz/Hz 1 µHz/Hz 1 µHz/Hz 1 µHz/Hz	HP 33220A Waveform Generator (Internal time-base) TM720-FC-004
¹ Frequency – Measure	(>10 to 100) MHz (>100 to 500) MHz (>500 to 1 000) MHz (>1 to 5) GHz (>5 to 10) GHz (>10 to 20) GHz	5.8 mHz/Hz 1.2 mHz/Hz 5.8 mHz/Hz 0.12 Hz/Hz 0.58 Hz/Hz 0.29 Hz/Hz	HP 83732A Synthesizer (Internal time-base) TM720-FC-004



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Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Frequency – Source	(0.1 to 1) Hz (>1 to 10) Hz (>10 to 100) Hz >100 Hz to 1 kHz (>1 to 10) kHz (>10 to 100) kHz >100 kHz to 1 MHz (>1 to 10) MHz (>10 to 100) MHz >100 MHz to 1 GHz	0.1 μHz/Hz 0.1 μHz/Hz 0.1 μHz/Hz 0.1 μHz/Hz 0.1 μHz/Hz 0.1 μHz/Hz 0.1 μHz/Hz 0.1 μHz/Hz 0.1 Hz/Hz 0.1 Hz/Hz	HP 53132A (Opt.010) Counter (Internal time-base) HP 5350B Counter (Internal time-base) TM720-FC-008
¹ AC Voltage Frequency – Measure	(1 to 10) Hz (>10 to 100) Hz >100 Hz to 1 kHz (>1 to 10) kHz (>10 to 100) kHz >100 kHz to 1 MHz (>1 to 10) MHz	0.12 mHz/Hz 0.12 mHz/Hz 0.12 mHz/Hz 0.12 mHz/Hz 0.12 mHz/Hz 0.12 mHz/Hz 0.12 mHz/Hz	HP/Agilent 3458A Digital Multimeter TM720-FC-013
¹ Stroboscope	(120 to 15 0000) rpm	0.12 rpm	HP 53132A Counter TM720FC-010
¹ Magnetic Particle Tester	(0 to 5.0) sec	0.05 sec	Timer 1568
¹ Frequency – Source	10 MHz	2.1 E-10 MHz	GPS 910R TM720-FC-006



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Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Flight Line Test Set			
Pulse Spacing	(2 ns to 100) ns	0.006 3 ns	Digital Oscilloscope TDS3052B Direct measurement based on Service Manual IFR6015 TM720-SG-023
	(0.1 to 100) μs	0.006 3 μs	
	(0.1 to 100) ms	0.006 3 ms	
– Pulse width	(2 to 100) ns	0.006 3 ns	
	(0.1 to 100) μs	0.006 3 μs	
	(100 to 400) μs	0.01 μs	
– Rise Time	(2 to 100) ns	0.006 3 μs	
	(100 to 400) ns	0.01 ns	
– Fall Time	(2 to 100) ns	0.006 3 μs	
	(100 to 400) ns	0.01 ns	
– AUX OUT 2 (15Hz) Falling edge to MRB 10 th (T/R X)	0 μs	0.005 9 μs	
	16 666.67 μs	0.38 μs	
	33 333.34 μs	0.77 μs	
	50 000 μs	1.2 μs	
	66 574.07 μs	1.5 μs	
– Aux 2 (135Hz) Rising edge to MRB 12 th (T/R Y)	0 μs	0.005 9 μs	
	1 851.85 μs	0.043 μs	
	3 703.7 μs	0.086 μs	
	5 555.56 μs	0.13 μs	
	7 314.81 μs	0.17 μs	



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Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
¹ Flight Line Test Set – Aux 2 (15Hz) Rising edge to MRB 6 th (T/R Y)	0 μ s	0.005 9 μ s	Digital Oscilloscope TDS3052B Direct measurement based on Service Manual IFR6015 TM720-SG-023
– Aux 2 (15Hz) Rising edge to MRB 10 th (T/R X)	16 666.72 μ s	0.38 μ s	
	33 333.39 μ s	0.77 μ s	
	50 000.05 μ s	1.2 μ s	
	66 574.12 μ s	1.5 μ s	
– Aux out 1 (135 Hz) Falling edge to ARB 12 th (T/R Y)	0 μ s	0.005 9 μ s	
	1 851.85 μ s	0.043 μ s	
	3 703.7 μ s	0.086 μ s	
	5 555.56 μ s	0.13 μ s	
– Aux 2 (15 Hz) Rising edge to MRB 6 th (A/A Beacon)	7 314.81 μ s	0.17 μ s	
	0 μ s	0.005 9 μ s	
	16 666.72 μ s	0.38 μ s	
	33 333.39 μ s	0.77 μ s	
50 000.05 μ s	50 000.05 μ s	1.2 μ s	
	66 574.12 μ s	1.5 μ s	

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. P_e = applied pressure.
3. Unitless linear measure
4. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-3069.

R. Douglas Leonard Jr., VP, PILR SBU