



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Total Calibration Solutions, Inc.

7722 Metric Drive

Mentor, OH 44060

has been assessed by ANAB
and meets the requirements of international standard

ISO/IEC 17025:2005

and national standard

ANSI/NCSL Z540-1-1994

while demonstrating technical competence in the field of

CALIBRATION

Refer to the accompanying Scope of Accreditation for information regarding the types of calibrations to which this accreditation applies.

AC-1994

Certificate Number


ANAB Approval

Certificate Valid: 10/05/2016-10/13/2017
Version No. 002 Issued: 10/05/2016



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. 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 January 2009).



ANSI-ASQ National Accreditation Board

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 AND ANSI/NCSL Z540-1-1994

Total Calibration Solutions, Inc.

7722 Metric Drive
Mentor, OH 44060
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CALIBRATION

Valid to: October 13, 2017

Certificate Number: AC-1994

Electromagnetic – DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
*DC Voltage - Measure	Up to 100 mV (0.1 to 1) V (1 to 10) V (10 to 100) V (0.1 to 1) kV	1.4 μ V 8 μ V 77 μ V 1.1 mV 25 mV	HP 3458A Opt 002
	(1 to 200) kV	400 V	Ross 200K, HP 3458A Opt 002
*DC Voltage - Source	Up to 330 mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (0.330 to 1) kV	8.2 μ V 41 μ V 0.45 mV 6.5 mV 23 mV	Fluke 5522A
*DC Current - Measure	Up to 100 μ A (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	7.4 nA 84 nA 0.7 μ A 9 μ A 0.11 mA	HP 3458A Opt 002
	(1 to 3) A (3 to 11) A (11 A to 20.5) A	11 mA 40 mA 73 mA	HP 34330A Shunt
*DC Current - Source	Up to 330 μ A (0.33 to 3.3) mA (3.3 to 33) mA (33 to 330) mA (0.33 to 1.1) A (1.1 to 3) A (3 to 11) A (11 to 20.5) A	0.11 μ A 0.56 μ A 9.1 μ A 87 μ A 0.29 mA 1.3 mA 7.1 mA 2.5 mA	Fluke 5522A



Electromagnetic – DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
*AC Voltage - Measure	Up to 10 mV (Up to 1) kHz (1 to 20) kHz (20 to 100) kHz (100 to 300) kHz (10 to 100) mV (Up to 1) kHz (1 to 20) kHz (20 to 100) kHz (100 to 300) kHz 100 mV to 1 V (Up to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz (1 to 10) V (Up to 10) Hz (10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (10 to 100) V (Up to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (0.1 to 1) kV (Up to 20) kHz	4.7 μ V 9 μ V 90 μ V 0.72 mV 12 μ V 20 μ V 0.1 mV 0.39 mV 0.12 mV 0.2 mV 0.39 mV 0.97 mV 3.6 mV 12 mV 3.8 mV 1.4 mV 1.2 mV 1.2 mV 2 mV 2 mV 3.9 mV 9.6 mV 27 mV 28 mV 45 mV 0.15 V 0.36 V	HP 3458A Opt 002
	(1 to 100) kV 60 Hz	1.2 kV	
*AC Voltage - Source	Up 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 (33 to 330) mV (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (33 to 3.3) V (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	35 μ V 12 μ V 14 μ V 42 μ V 0.14 mV 0.34 mV 0.12 mV 60 μ V 65 μ V 0.13 mV 0.32 mV 11 mV 0.59 mV 0.73 mV 1.1 mV 2.9 mV 9.1 mV	Fluke 5522A



Electromagnetic – DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
*AC Voltage - Source	(3.3 to 33) V (10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	11 mV 5.9 mV 9.1 mV 13 mV 33 mV	Fluke 5522A
	(33 to 330) V 45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (0.33 to 1.02) kV 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	69 mV 79 mV 94 mV 0.12 V 0.53 V 0.34 V 0.28 V 0.33 V	
	(1.02 to 50) kV 60 Hz	0.58 kV	Hipot with Ross 200K, HP3458A Opt 002
*AC Current - Source	(29 to 330) μ A (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (0.33 to 3.3) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (3.3 to 33) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (33 to 330) mA (10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz (0.33 to 1.1) A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (1.1 to 3) A (10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz	0.82 μ A 0.64 μ A 0.55 μ A 1.2 μ A 3 μ A 6 μ A 7.6 μ A 4.8 μ A 3.9 μ A 8 μ A 19 μ A 38 μ A 66 μ A 34 μ A 17 μ A 32 μ A 74 μ A 0.14 mA 0.65 mA 0.34 mA 0.16 mA 0.41 mA 0.81 mA 1.6 mA 2.2 mA 0.71 mA 8.1 mA 35 mA 6.2 mA 2.2 mA 21 mA	Fluke 5522A

Electromagnetic – DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment	
*AC Current - Source	(3 to 11) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz (11 to 20.5) A (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	10 mA 15 mA 0.38 A 34 mA 41 mA 0.7 A	Fluke 5522A	
*AC Current - Measure	Up to 100 μ A 10 Hz to 5 kHz (0.1 to 1) mA 10 Hz to 5 kHz (1 to 10) mA 10 Hz to 5 kHz (10 to 100) mA 10 Hz to 5 kHz (0.1 to 1.1) A 10 Hz to 5 kHz	0.11 μ A 0.6 μ A 6.1 μ A 61 μ A 1.4 mA	HP 3458A Opt 002	
	(1.1 to 3) A (10 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (3 to 11) A 45 Hz to 1 kHz (1 to 5) kHz (11 to 20.5) A 45 Hz to 1 kHz (1 to 5) kHz	13 mA 12 mA 0.2 A 43 mA 0.64 A 12 mA 0.2 A	HP 3458A Opt 002 with HP 34330A Shunt	
*Inductance - Source	100 μ H to 1 mH (1 to 10) mH (10 to 100) mH 100 mH to 1 H (1 to 10) H	17 μ H 0.14 μ H 0.69 mH 6.9 mH 69 mH	GR 1491D Decade Box, RLC GenRad 1689	
*Inductance - Measure	100 μ H to 1 mH (1 to 10) mH (10 to 100) mH 100 mH to 1 H (1 to 10) H	0.24 μ H 2.4 μ H 24 μ H 0.24 mH 2.3 mH	RLC GenRad 1689	
*Capacitance - Measure	Up to 1 nF (1 to 10) nF (10 to 100) nF 100 nF to 1 μ F (1 to 1.111) μ F	0.64 pF 2.4 pF 26 pF 0.41 nF 0.44 nF	RLC GenRad 1689	
*Capacitance - Source	20 Hz to 1 kHz 20 Hz to 1 kHz 20 Hz to 1 kHz 20 Hz to 1 kHz	100 pF to 1 nF (1 to 10) nF (10 to 100) nF 100 nF to 1 μ F	0.67 pF 6.3 pF 74 pF 0.62 nF	1423A Decade Box

Electromagnetic – DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
*Capacitance - Source 10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz (0 to 50) Hz (0 to 20) Hz (0 to 6) Hz (0 to 2) Hz (0 to 0.6) Hz (0 to 0.2) Hz	(220 to 400) pF (0.4 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF (0.33 to 1.1) μ F (1.1 to 3.3) μ F (3.3 to 11) μ F (11 to 33) μ F (33 to 110) μ F (110 to 330) μ F (0.33 to 1.1) mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	15 pF 18 pF 23 pF 44 pF 0.17 nF 0.44 nF 0.92 nF 4.1 nF 12 nF 44 nF 0.18 μ F 0.7 μ F 2 μ F 12 μ F 20 μ F 89 μ F 0.31 mF 1.4 mF	Fluke 5522A
*DC Resistance - Source	100 Ω in 10 Ω Steps 1 k Ω in 100 Ω Steps 10 k Ω in 1 k Ω Steps 100 k Ω in 10 k Ω Steps 1.1 M Ω in 100 k Ω Steps	3.1 m Ω 27 m Ω 0.26 Ω 2.6 Ω 29 Ω	Fluke 5522A ESI RS925A Resistance Decade Box
	Up to 10 Ω (1.1 to 3.3) M Ω (3.3 to 11) M Ω (11 to 33) M Ω (33 to 110) M Ω (110 to 330) M Ω (0.33 to 1.1) G Ω	1.6 m Ω 0.29 k Ω 0.35 k Ω 12 k Ω 66 k Ω 1.2 M Ω 18 M Ω	Fluke 5522A
*DC Resistance - Measure	Up to 10 Ω (10 to 100) Ω (0.1 to 1) k 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	0.31 m Ω 2.7 m Ω 18 m Ω 0.18 Ω 1.8 Ω 25 Ω 0.78 k Ω 68 k Ω	HP 3458A Opt 002

Electromagnetic – DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment	
* Oscilloscopes Amplitude - DC 50 Ω 1 M Ω	(-6.6 to 6.6) V (-130 to 130) V	20 mV 15 mV	Fluke 5522A/SC1100	
Amplitude - Square Wave 50 Ω 1 M Ω Frequency	1 mV to 6.6 V (p-p) 1 mV to 130 V (p-p) 10 Hz to 10 kHz	13 mV 18 mV 29 Hz		
Time Markers into 50 Ω Load	1 ns to 20 ms 50 ms to 5 s	8.2 μ s 29 ms		
Leveled Sine Wave (5 mV to 5.5 V) p-p (5 mV to 3.5 V) p-p	50 kHz reference 50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz 600 MHz to 1.1 GHz	0.13 V 0.1 V 0.14 V 0.26 V 0.2 V		
Edge Characteristics into 50 Ω Load Rise Time Amplitude Frequency	Up to 300 ps 4.5 mV to 2.75 V 1 kHz to 10 MHz	+0/-120 ps 63 mV 29 Hz		
Wave Generator Square, Sine, Triangle Amplitude Into 50 Ω Load Into 1 M Ω Load Frequency	(1.8 mV to 55 V) p-p (1.8 mV to 55 V) p-p 10 Hz to 100 kHz	88 mV 2 V 0.29 Hz		
Pulse - Source 50 Ω Load Period Width	22 ms to 200 ns 45.5 Hz to 5 MHz (4 to 500) ns	6.1 ns 1.2 ns		
Input Resistance Measurement	(40 to 60) Ω (0.5 to 1.5) M Ω	56 m Ω 2.5 k Ω		
Oscilloscope Capacitance Measurement	(5 to 50) pF	1.3 pF		
* Electrical Simulation of Thermocouple Indicators	Type B (600 to 800) $^{\circ}$ C (800 to 1 000) $^{\circ}$ C (1 000 to 1 550) $^{\circ}$ C (1 550 to 1 820) $^{\circ}$ C Type C (0 to 150) $^{\circ}$ C (150 to 650) $^{\circ}$ C (650 to 1 000) $^{\circ}$ C (1 000 to 1 800) $^{\circ}$ C (1 800 to 2 316) $^{\circ}$ C	0.53 $^{\circ}$ C 0.42 $^{\circ}$ C 0.37 $^{\circ}$ C 0.4 $^{\circ}$ C 0.35 $^{\circ}$ C 0.31 $^{\circ}$ C 0.38 $^{\circ}$ C 0.59 $^{\circ}$ C 0.98 $^{\circ}$ C		Fluke 5522A

Electromagnetic – DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
*Electrical Simulation of Thermocouple Indicators	Type E		
	(-250 to -100) °C	0.58 °C	
	(-100 to -25) °C	0.19 °C	
	(-25 to 350) °C	0.17 °C	
	(350 to 650) °C	0.19 °C	
	(650 to 1 000) °C	0.25 °C	
	Type J		
	(-210 to -100) °C	0.33 °C	
	(-100 to -30) °C	0.20 °C	
	(-30 to 150) °C	0.17 °C	
	(150 to 760) °C	0.21 °C	
	(760 to 1 200) °C	0.27 °C	
	Type K		
	(-200 to -100) °C	0.39 °C	
	(-100 to -25) °C	0.22 °C	
	(-25 to 120) °C	0.19 °C	
	(120 to 1 000) °C	0.31 °C	
	(1 000 to 1 372) °C	0.48 °C	
	Type L		
	(-200 to -100) °C	0.44 °C	
	(-100 to 800) °C	0.32 °C	
	(800 to 900) °C	0.22 °C	
	Type N		
	(-200 to -100) °C	0.47 °C	
(-100 to -25) °C	0.26 °C		
(-25 to 120) °C	0.23 °C		
(120 to 410) °C	0.22 °C		
(410 to 1 300) °C	0.33 °C		
Type R			
(0 to 250) °C	0.67 °C		
(250 to 400) °C	0.42 °C		
(400 to 1 000) °C	0.4 °C		
(1 000 to 1 767) °C	0.48 °C		
Type S			
(0 to 250) °C	0.56 °C		
(250 to 1 000) °C	0.43 °C		
(1 000 to 1 400) °C	0.44 °C		
(1 400 to 1 767) °C	0.54 °C		
Type T			
(-250 to -150) °C	0.74 °C		
(-150 to 0) °C	0.3 °C		
(0 to 120) °C	0.19 °C		
(120 to 400) °C	0.17 °C		
Type U			
(-200 to 0) °C	0.66 °C		
(0 to 600) °C	0.33 °C		
*Electrical Simulation of RTD Indicators	Pt 385, 100 Ω		
	(-200 to -80) °C	0.06 °C	
	(-80 to 0) °C	0.06 °C	
	(0 to 100) °C	0.09 °C	
	(100 to 300) °C	0.11 °C	
	(300 to 400) °C	0.12 °C	
	(400 to 630) °C	0.14 °C	
	(630 to 800) °C	0.27 °C	

Electromagnetic – DC/Low Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
*Electrical Simulation of RTD Indicators	Pt 385, 200 Ω		
	(-200 to -80) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	Fluke 5522A
	(-80 to 0) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(0 to 100) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(260 to 300) $^{\circ}\text{C}$	0.15 $^{\circ}\text{C}$	
	(300 to 400) $^{\circ}\text{C}$	0.18 $^{\circ}\text{C}$	
	(400 to 600) $^{\circ}\text{C}$	0.18 $^{\circ}\text{C}$	
	(600 to 630) $^{\circ}\text{C}$	0.19 $^{\circ}\text{C}$	
	Pt 385, 500 Ω		
	(-200 to -80) $^{\circ}\text{C}$	0.05 $^{\circ}\text{C}$	
	(-80 to 0) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(0 to 100) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$	
	(100 to 260) $^{\circ}\text{C}$	0.07 $^{\circ}\text{C}$	
	(260 to 300) $^{\circ}\text{C}$	0.09 $^{\circ}\text{C}$	
	(300 to 400) $^{\circ}\text{C}$	0.09 $^{\circ}\text{C}$	
	(400 to 600) $^{\circ}\text{C}$	0.11 $^{\circ}\text{C}$	
	(600 to 630) $^{\circ}\text{C}$	0.13 $^{\circ}\text{C}$	
	Pt 385, 1 000 Ω		
	(-200 to -80) $^{\circ}\text{C}$	0.04 $^{\circ}\text{C}$	
	(-80 to 0) $^{\circ}\text{C}$	0.04 $^{\circ}\text{C}$	
(0 to 100) $^{\circ}\text{C}$	0.08 $^{\circ}\text{C}$		
(100 to 260) $^{\circ}\text{C}$	0.06 $^{\circ}\text{C}$		
(260 to 300) $^{\circ}\text{C}$	0.07 $^{\circ}\text{C}$		
(300 to 400) $^{\circ}\text{C}$	0.08 $^{\circ}\text{C}$		
(400 to 600) $^{\circ}\text{C}$	0.08 $^{\circ}\text{C}$		
(600 to 630) $^{\circ}\text{C}$	0.27 $^{\circ}\text{C}$		
*Phase Angle – Source (65 to 500) Hz	(0 to 360) $^{\circ}$	0.29 $^{\circ}$	Fluke 5522A

Electromagnetic – RF/Microwave

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
*RF Power - Measure Up to 18 GHz	(-30 to -20) dBm	0.79 dBm	HP 8902A with HP8481 Power Sensor
*Amplitude Modulation - Measure 150 kHz to 10 MHz Rate: 50 Hz to 10 kHz Rate: 20 Hz to 10 kHz Rate: 50 Hz to 50 kHz	(5 to 99) %Depth Up to 99%Depth (5 to 99) %Depth	2.4 %Depth 3.6 %Depth 1.3 %Depth	HP 8902A
10 MHz to 1.3 GHz Rate: 20 Hz to 100 kHz	Up to 99 %Depth	3.6 %Depth	
*Frequency Modulation - Measure 250 kHz to 10 MHz 10 MHz to 1.3 GHz	Rate: 20 Hz to 10 kHz \leq 40 kHz peak Rate: 50 Hz to 100 kHz \leq 400 kHz peak Rate: 20 Hz to 200 kHz \leq 400 kHz peak	0.25 kHz 1.3 kHz 5.9 kHz	HP 8902A
*Phase Modulation - Measure 150 kHz to 10 MHz 10 MHz to 1.3 GHz	Rate: 200 Hz to 10 kHz Rate: 200 Hz to 20 kHz	0.2 rad 14 rad	HP 8902A

Time and Frequency

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
*Frequency - Source	1 MHz to 3 GHz	29 parts in 10^{10}	HP E4422B Signal Generator locked to EFRATOM Rubidium Frequency Standard
*Frequency - Measure	(0.1 to 3) GHz	29 parts in 10^{10}	HP 53132A

Thermodynamic

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
*Humidity	(10 to 95) %RH	0.71 %	Thunder Scientific 2500
*Temperature	(-196 to -20) °C (-20 to 150) °C (150 to 660) °C	0.021 °C 0.017 °C 0.062 °C	Liquid Nitrogen Temperature Bath Fluke 5681 PRT HP 3458A Opt 002

Dimensional

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
*Calipers	Up to 40 in	(13L+140) μ in	Gage Blocks/ Surface Plate
*Micrometers	Up to 6 in (6 to 20) in	(9.2L + 21) μ in (16L + 180) μ in	
*Indicators, Dial, Test	Up to 4 in	(30L - 5.5) μ in	
*Height Gages	Up to 24 in	200 μ in	
* Optical Comparators			Gage Line Glass Standard
X and Y Axis Linearity	Up to 12 in	200 μ in	Gage Line Glass Standard and Angle Blocks
Angle	(0 to 90) °	0.11 °	

Mechanical

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (±)]	Reference Standard or Equipment
*Pressure Gages & Transducers	(-1 to 1) psig (1 to 5) psig (5 to 190) psig (190 to 200) psig (200 to 20 000) psig	0.00024 psig 0.03 % of reading 0.016 % of reading 0.03 % of reading 0.012 % of reading	Ruska 7250LP Fluke PM600-A1.4M with 6270A Pressure Controller Druck DPI-145 Fluke P3116 Deadweight Tester
*Vacuum	(Up to 15) psia	0.03 % of reading	Druck DPI 145
*Mass Flow	(0.5 to 50) SCCM (50 to 5 000) SCCM (5 to 100) SLPM (100 to 5 000) SLPM	0.31 % of reading 0.16 % of reading 0.18 % of reading 0.28 % of reading	ML-800-3/ML-800-24ML- 800-75 Fluke 5E2-S Molbloc Fluke 2E3-S Molbloc Fluke 1E4-S Molbloc Fluke Molbox and Mass Flow Terminal
* Liquid Flow	(1 to 60) GPM	0.45 % of reading	Cox Liquid Flow Standard
*Torque Source	(2.5 to 500) lbf·in (41.6 to 800) lbf·ft	0.1 % of reading	Torque Arms, F Class Weights
*Torque Tools	(0.12 to 1.25) lbf·in (1.25 to 5) lbf·in (5 to 50) lbf·in (50 to 180) lbf·in (15 to 75) lbf·ft (75 to 700) lbf·ft	0.0075 lbf·in 0.5 lbf·in 0.33 lbf·in 1.2 lbf·in 0.25 lbf·ft 2.3 lbf·ft	Mountz BMX20Z Mountz BMX80Z Mountz BMX50I Mountz BMX250I Norbar 50593 Norbar 50597
* Force - Compression & Tension	(Up to 500) lbf	0.1 lbf	Class F Weights
* Force - Compression & Tension	(500 to 1 000) lbf (1 000 to 2 500) lbf (2 500 to 5 000) lbf (5 000 to 7 500) lbf (7 500 to 10 000) lbf (10 000 to 25 000) lbf (25 000 to 50 000) lbf	0.63 lbf 2.1 lbf 2.7 lbf 5.3 lbf 6.3 lbf 22 lbf 31 lbf	Load Cells

Mechanical

Parameter/ Equipment	Range	Calibration and Measurement Capability [Expressed as Uncertainty (\pm)]	Reference Standard or Equipment
* Laboratory and Precision Balances 0.001 mg resolution 0.01 mg resolution 0.01 mg resolution 0.01 mg resolution 0.01 mg resolution 0.01 mg resolution 0.1 mg resolution 1 mg resolution 1 mg resolution mg resolution 1 mg resolution 1 mg resolution 1 mg resolution 0.1 g resolution	Up to 20 g Up to 40 g Up to 60 g Up to 80g Up to 100 g Up to 200 g Up to 500 g Up to 1 kg Up to 2 kg Up to 4 kg Up to 5 kg Up to 10 kg Up to 15 kg Up to 20 kg	14 μ g 30 μ g 39 μ g 45 μ g 71 μ g 77 μ g 0.89 mg 2.6 mg 2.8 mg 4.3 mg 14 mg 24 mg 99 mg 0.11g	Class 1 Weights
* Bench Scales 0.001 lb resolution 0.01 lb resolution 0.01 lb resolution 0.1 lb resolution 0.1 lb resolution 0.1 lb resolution 0.5 lb resolution 0.5 lb resolution	Up to 20 lb Up to 50 lb Up to 100 lb Up to 600 lb Up to 1 000 lb Up to 2 000 lb Up to 3 000 lb Up to 40 00 lb	0.0011 lb 0.0074 lb 0.0096 lb 0.077 lb 0.12 lb 0.17 lb 0.37 lb 0.48 lb	Class F Weights
* Pipettes	(0.5 to 2) μ L (2 to 10) μ L (10 to 20) μ L (20 to 100) μ L (100 to 200) μ L (200 to 500) μ L (500 to 1 000) μ L (1 000 to 5 100) μ L	0.076 μ L 0.078 μ L 0.08 μ L 0.094 μ L 0.16 μ L 0.4 μ L 0.51 μ L 2.5 μ L	Micro-Balance

Notes:

1. Calibration and Measurement Capabilities (Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of k=2.
2. This laboratory offers in-laboratory calibration service as well as on-site calibrations at customer-designated locations. 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. Parameters identified by an asterisk (*) are accredited for on-site calibration.
3. The use of L in CMC represents length in inches.
4. This scope is formatted as part of a single document including the Certificate of Accreditation No. AC-1994



 Vice President

