



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:

Precision Calibration Systems, LLC
1615 East Andrew Johnson Hwy, Morristown, TN 37814
107 N. Porter Street, Suite 5, Winchester, TN 37398

(Hereinafter called the Organization) and hereby declares that Organization is accredited in accordance with the recognized International Standard:

ISO/IEC 17025:2017
& Meets the Requirements of ANSI/NCSI Z540.1-1994
& ANSI/NCSI Z540.3-2006 sub-clause 5.3

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (as outlined by the joint ISO-ILAC-IAF Communiqué dated April 2017):

Calibration of Dimensional, Electrical, Mass, Force and Weighing Devices
Mechanical, Chemical, Thermodynamic, Optical, and Time & Frequency
Equipment
(As detailed in the supplement)

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

Tracy Szerszen
President

Initial Accreditation Date:

May 19, 2012

Issue Date:

April 27, 2023

Expiration Date:

August 31, 2025

Accreditation No.:

73403

Certificate No.:

L23-346

Perry Johnson Laboratory
Accreditation, Inc. (PJLA)
755 W. Big Beaver, Suite 1325
Troy, Michigan 48084

The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: www.pjlabs.com



Certificate of Accreditation: Supplement

Precision Calibration Systems, LLC

1615 East Andrew Johnson Hwy, Morristown, TN 37814

107 N. Porter Street, Suite 5, Winchester, TN 37398

Contact Name: Mr. Brandon Goodman Phone: 423-278-0946

Accreditation is granted to the facility to perform the following calibrations:

Dimensional

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Micrometer ^{FO}	Up to 60 in	(64.9 + 5.2L) μ in	Gauge Blocks Length Std/Gauge Blocks QS0003JB2010
Caliper ^{FO}	Up to 60 in	(289.9 + 5.2L) μ in	Gauge Blocks Length Std/Gauge Blocks QS0009JB2010
Standard Length ^{FO}	Up to 11.5 in	65 μ in	Universal Supermic P&W Labmaster QS0021JB2010
Standard Diameter ^{FO}	Up to 4 in	590 μ in	Universal Supermic P&W Labmaster QS0022JB2010
Pin and Plug Gauges ^{FO}	Up to 6 in	74 μ in	Universal Supermic P&W Labmaster QS0026JB2010
Feeler Gauges ^{FO}	Up to 0.2 in	28 μ in	Universal Supermic P&W Labmaster QS0024JB2010
External Threads Major Diameter ^{FO}	Up to 6 in	69 μ in	Universal Supermic P&W Labmaster/ Labmasrer Wires QS0019JB2010
External Threads Pitch Diameter ^{FO}	Up to 6 in	111 μ in	Universal Supermic P&W Labmaster/ Labmasrer Wires QS0019JB2010
Snap Gauges ^{FO}	Up to 11.5 in	380 μ in	Universal Supermicrometer P&W Labmaster QS0027JB2010
Ring Gauges ^{FO}	Up to 1 in	9.5 μ in	Universal Supermicrometer P&W Labmaster QS0020JB2010
	1 in to 6 in	14 μ in	
	6 in to 11 in	29 μ in	
Dimensional Measurement Inspection ^F	X Axis up to 12 in	(59.5 + 10.88 L) μ in	Keyence Vision System & Starrett Vision System LH600 2D Height Gauge QS0040JT2015
	Y Axis up to 8 in	(130 + 5 L) μ in	
	Z Axis up to 40 in	(69 + 0.5 L) μ in	
Surface Finish Measurement ^F	0.1 μ in Ra to 400 μ in Ra	2.3 μ in Ra	Profilometer QS0042JT2015
Surface Finish Equipment ^{FO}	0.1 μ in Ra to 400 μ in Ra	2.1 μ in Ra	Master Finish Standards QS0042JT2015



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Height Gauges ^{FO}	Up to 40 in	(69 + 0.51L) μ in	Length Std/ Gauge Blocks QS0029JB2010
Dial/Digital Indicators ^{FO}	Up to 4 in	11 μ in	Universal Supermic P&W Labmaster QS0005JB2010
Vision Machine			Gauge Blocks / Glass Masters QS0049AS2017
X/Y Axis ^{FO}	Up to 12 in	(110 + 10L) μ in	
Z Axis ^{FO}	Up to 8 in	(80 + 35L) μ in	
Gauge Block ^F	Up to 4 in	4.2 μ in	P&W Labmaster QS0008JB2010
	4 in to 8 in	6.8 μ in	
Thread Ring- Pitch Diameter ^F	Up to 6 in	259 μ in	Master Thread Plug / P&W Universal Supermicrometer QS0052AS2019
Thread Ring- Minor Diameter ^F	Up to 6 in	115 μ in	Bore Gauge / Pin Gauge / Universal Supermicrometer QS0052AS2019
NPT Thread Plug ^F	Standoff / Basic Length Up to 6"	490 μ in	Master Ring / Height Gauge QS0039JT2014
Glass Scale ^F	0 in to 12 in	230 μ in	Vision System QS0057AS2019
ULM ^{FO}	0 in to 4 in	9.5 μ in	Gage Blocks & Length Standards QS0041JT2015
	4 in to 12 in	150 μ in	
	12 in to 24 in	500 μ in	
Steel Rules ^{FO}	Up to 72 in	0.005 5 in	Master Steel Rule, Reticle QS0006JB2010
Diameter of Sphere ^{FO}	Up to 3 in	580 μ in	Universal Supermicrometer P&W Labmaster QS0022JB2010
Optical Comparators (X & Y Linearity) ^{FO}	Up to 20 in	0.000 6 in	Glass Master, Gage Blocks QS0004JB2010
Optical Comparators (magnification) ^{FO}	5X to 100X	0.000 6 in	Glass Master, Magnification Glass Scale, Gage Blocks QS0004JB2010
Optical Comparators (Stage squareness) ^{FO}	Up to 12 in	0.000 14 in	Glass Master & Dial Indicator QS0004JB2010
Angle Blocks, Angle Measurements and Protractors ^{FO}	Up to 30°	.006°	10 pc. Standard Angle Blocks Surface Plate Method: QS0034BG2013 (Rev. 2) 08/27/21 QI0082MS2021



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Precision Levels ^F	Up to 0.050" Deviation	61 μ in	Granite Plate, Precision Level, Gage Blocks QS0010JB2010
Crimpers-Crimp Height ^{FO}	Up to 1"	104 μ in	Crimp Micrometer QS0046BG2016
Crimpers-Crimp Die Diameter ^{FO}	Up to 1"	204 μ in	Pin/Plug Sets QS0046BG2016
Coating Thickness Testers ^{FO}	Up to 1 560 μ m	3.31 μ m	Coating Thickness Standards QS0067MS2022
Tape Measures ^{FO}	Up to 50'	0.001 5 in	Tape Measure, Reticle, Push-Pull Block QS0006JB2010

Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Output AC Current ^{FO}	Up to 329.999 μ A	1.7 μ A	Fluke 5522A Electrical Calibrator QS0011JB2010
	329.999 μ A to 3.299 99 mA	9.6 μ A	
	3.299 999 9 mA to 32.999 99 mA	16 μ A	
	32.999 99 mA to 329.999 9 mA	0.57 mA	
	329.999 mA to 1.099 99 A	0.51 mA	
	1.1 A to 2.999 99 A	3.5 mA	
	2.999 99 A to 10.999 9 A	35 mA	
	10.999 9 A to 20 A	46 mA	w/ 50 turn coil
20 A to 1010 A	2.2 A		
Equipment to Output AC Volts ^{FO}	0.1 mV to 32.999 mV	0.1 mV	Fluke 5522A Electrical Calibrator QS0011JB2010
	32.999 mV to 329.999 mV	0.66 mV	
	330 mV to 3.299 999 V	7.9 mV	
	3.299 999 V to 32.999 99 V	32 mV	
	32.999 99 V to 329.999 9 V	0.34 V	
	329.999 9 V to 1020 V	0.31 V	
Equipment to Output DC Current ^{FO}	Up to 329.999 μ A	0.05 μ A	
	329.999 μ A to 3.299 99 mA	0.33 μ A	
	3.299 999 9 mA to 32.999 99 mA	3.3 μ A	
	32.999 99 mA to 329.999 9 mA	36 μ A	
	329.999 mA to 1.099 99 A	0.22 mA	
	1.1 A to 2.999 99 A	1.7 mA	
	2.999 99 A to 10.999 9 A	5.6 mA	
	10.999 9 A to 20 A	36 mA	



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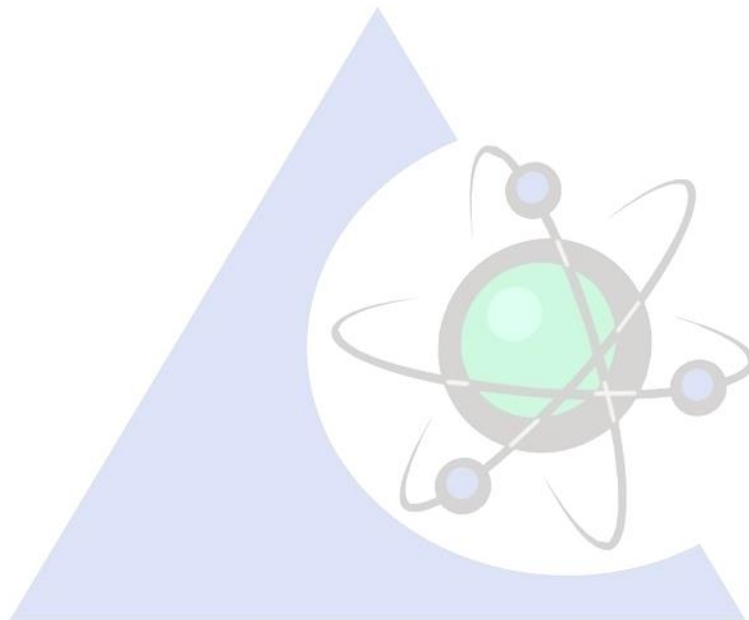
117 East Main Street, Suite 100, Morristown, TN 37814

107 N. Porter Street, Suite 5, Winchester, TN 37398

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	20 A to 1 010 A	2.2 A	w/ 50 turn coil
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Equipment to Output DC Voltage ^{FO}	0.1 mV to 330 mV	22 μ V	Fluke 5522A Electrical Calibrator QS0011JB2010
	330 mV to 3.299 999 V	39 μ V	
	3.299 999 V to 32.999 99 V	0.4 mV	
	32.999 99 V to 329.999 9 V	6.1 mV	
	329.999 9 V to 1 020 V	19.9 mV	
Equipment to Output Capacitance ^{FO}	Up to 399.999 pF	0.02 nF	
	0.4 nF to 10.999 nF	0.07 nF	
	11 nF to 1.099 9 μ F	0.01 μ F	
	1.1 μ F to 32.999 μ F	0.29 μ F	
	33 μ F to 1.099 9 mF	0.02 mF	
	1.1 mF to 32.999 mF	0.53 mF	
	33 mF to 110 mF	2.6 mF	
Equipment to Output Frequency ^{FO}	0.01 Hz to 119.99 Hz	0.54 mHz	
	120 Hz to 1 199.9 Hz	3.4 mHz	
	1 200 Hz to 11.999 kHz	0.05 Hz	
	12 kHz to 119.99 kHz	3.3 Hz	
	120 kHz to 119.99 kHz	3.4 Hz	
	1.2 MHz to 2 MHz	6.9 Hz	
Equipment to Output Resistance ^{FO}	Up to 10.999 Ω	1.1 m Ω	
	11 Ω to 32.999 Ω	1.9 m Ω	
	32.999 Ω to 109.999 Ω	2 m Ω	
	109.999 Ω to 329.999 Ω	9.5 m Ω	
	330 Ω to 1.099 99 k Ω	0.04 Ω	
	1.1 k Ω to 3.299 99 k Ω	0.1 Ω	
	3.3 k Ω to 10.999 k Ω	0.3 Ω	
	11 k Ω to 32.999 k Ω	1 Ω	
	33 k Ω to 109.999 k Ω	3.4 Ω	
	110 k Ω to 329.999 k Ω	11 Ω	
	330 k Ω to 1.099 9 M Ω	0.1 k Ω	
	1.1 M Ω to 3.299 9 M Ω	0.2 k Ω	
	3.3 M Ω to 10.999 9 M Ω	1.4 k Ω	
	11 M Ω to 32.999 M Ω	8.7 k Ω	
33 M Ω to 109.999 M Ω	56 k Ω		
110 M Ω to 329.999 M Ω	1 M Ω		
330 M Ω to 1 100 M Ω	17 M Ω		



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Temperature Calibration, Indication, and Control Equipment used with RTD Cu427 10 Ω ^{FO}	-100 °C to 260 °C	0.32 °C	Fluke 5502A Electrical Simulation of RTD Output QS0011JB2010
Temperature Calibration, Indication, and Control Equipment used with RTD PT 385 100 Ω ^{FO}	-200 °C to 300 °C	0.15 °C	
	300 °C to 630 °C	0.18 °C	
	630 °C to 800 °C	0.26 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD PT 385 200 Ω ^{FO}	-200 °C to 100 °C	0.12 °C	
	100 °C to 630 °C	0.20 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD PT 385 500 Ω ^{FO}	-200 °C to 100 °C	0.13 °C	
	100 °C to 630 °C	0.16 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD PT 385 1 000 Ω ^{FO}	-200 °C to 100 °C	0.12 °C	
	100 °C to 630 °C	0.26 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD PT 3916 100 Ω ^{FO}	-200 °C to 100 °C	0.28 °C	
	100 °C to 630 °C	0.27 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD PT 3926 100 Ω ^{FO}	-200 °C to 100 °C	0.14 °C	
	100 °C to 630 °C	0.18 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD PtNi 385 120 Ω ^{FO}	-80 °C to 100 °C	0.14 °C	
	100 °C to 260 °C	0.18 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD PT 3916 100 Ω ^{FO}	-200 °C to 100 °C	0.28 °C	
	100 °C to 630 °C	0.27 °C	



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Temperature Calibration, Indication, and Control Equipment used with RTD PT 3926 100 Ω ^{FO}	-200 °C to 100 °C	0.14 °C	Fluke 5502A Electrical Simulation of RTD Output QS0011JB2010
	100 °C to 630 °C	0.18 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD PtNi 385 120 Ω ^{FO}	-80 °C to 100 °C	0.14 °C	Fluke 5502A Electrical Simulation of Thermocouple Output QS0011JB2010
	100 °C to 260 °C	0.18 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type B ^{FO}	600 °C to 1 000 °C	0.45 °C	Fluke 5502A Electrical Simulation of Thermocouple Output QS0011JB2010
	1 000 °C to 1 820 °C	0.35 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type E ^{FO}	-250 °C to -25 °C	0.51 °C	Fluke 5502A Electrical Simulation of Thermocouple Output QS0011JB2010
	-25 °C to 1 000 °C	0.24 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type J ^{FO}	-210 °C to -30 °C	0.34 °C	Fluke 5502A Electrical Simulation of Thermocouple Output QS0011JB2010
	-30 °C to 1 200 °C	0.29 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type K ^{FO}	-200 °C to 120 °C	0.35 °C	Fluke 5502A Electrical Simulation of Thermocouple Output QS0011JB2010
	120 °C to 1 372 °C	0.42 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type N ^{FO}	-200 °C to 120 °C	0.42 °C	Fluke 5502A Electrical Simulation of Thermocouple Output QS0011JB2010
	120 °C to 1 300 °C	0.29 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type R ^{FO}	0 °C to 400 °C	0.58 °C	Fluke 5502A Electrical Simulation of Thermocouple Output QS0011JB2010
	400 °C to 1 767 °C	0.42 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type S ^{FO}	0 °C to 1 000 °C	0.62 °C	Fluke 5502A Electrical Simulation of Thermocouple Output QS0011JB2010
	1 000 °C to 1 767 °C	0.48 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type T ^{FO}	-250 °C to 0 °C	0.64 °C	Fluke 5502A Electrical Simulation of Thermocouple Output QS0011JB2010
	Up to 400 °C	0.18 °C	



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Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type U ^{FO}	-250 °C to 0 °C	0.29 °C	Fluke 5502A Electrical Simulation of Thermocouple Output QS0011JB2010
	Up to 600 °C	0.31 °C	
Equipment to Measure AC Current ^{FO}	1 μ A to 100 μ A	0.36 μ A	Fluke 8846A Precision Multimeter QS0011JB2010
	100 μ A to 1 mA	0.002 4 mA	
	1 mA to 10 mA	0.024 mA	
	10 mA to 100 mA	0.24 mA	
	100 mA to 400 mA	0.84 mA	
	400 mA to 1 A	0.002 4 A	
	1 A to 3 A	0.011 A	
	3 A to 10 A	0.036 A	
	10 A to 400 A	7.03 A	Amprobe AMP-330 QS0011JB2010
Equipment to Measure AC Voltage ^{FO}	0.01 mV to 100 mV	0.16 mV	Fluke 8846A Precision Multimeter QS0011JB2010
	100 mV to 1 V	0.0 015 V	
	1 V to 10 V	0.0 017 V	
	10 V to 100 V	0.0 015 V	
	100 V to 1 000 V	1.5 V	Fluke 27 & High Voltage Probe QS0011JB2010
	1 kV to 6 kV	0.07 kV	
	10 kV to 20 kV	0.23 kV	
	1 kV to 10 kV	0.1 V + 0.34 % of Reading	
Equipment to Measure DC Current ^{FO}	1 μ A to 100 μ A	0.12 μ A	Fluke 8846A Precision Multimeter QS0011JB2010
	100 μ A to 1 mA	0.001 mA	
	1 mA to 10 mA	0.013 mA	
	10 mA to 100 mA	0.11 mA	
	100 mA to 400 mA	0.42 mA	
	400 mA to 1 A	0.001 2 A	
	1 A to 3 A	0.006 6 A	
	3 A to 10 A	0.031 A	
	10 A to 400 A	8.4 A	Amprobe AMP-330 QS0011JB2010



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Equipment to Measure Capacitance ^{FO}	1 nF	0.065 nF	Fluke 8846A Precision Multimeter QS0011JB2010
	10 nF	0.028 nF	
	100 nF	2.5 nF	
	1 μ F	0.025 μ F	
	10 μ F	0.25 μ F	
	100 μ F	2.5 μ F	
	1 mF	0.025 mF	
	10 mF	0.25 mF	
Equipment to Measure Frequency ^{FO}	3 Hz to 5 Hz	0.1 % of reading	Fluke 8846A Precision Multimeter QS0011JB2010
	5 Hz to 10 Hz	0.05 % of reading	
	10 Hz to 40 Hz	0.03 % of reading	
	40 Hz to 300 kHz	0.01 % of reading	
	300 kHz to 1 MHz	0.1 % of reading	
Equipment to Measure Resistance ^{FO}	Up to 10 Ω	4 m Ω	
	10 Ω to 100 Ω	14 m Ω	
	100 Ω to 1 k Ω	0.11 Ω	
	1 k Ω to 10 k Ω	1.1 Ω	
	10 k Ω to 100 k Ω	11 Ω	
	100 k Ω to 1 M Ω	110 Ω	
	1 M Ω to 10 M Ω	4.2 k Ω	
	10 M Ω to 100 M Ω	9.1 k Ω	
Equipment to Measure DC Voltage ^{FO}	0.01 mV to 100 mV	0.011 mV	Fluke 8846A Precision Multimeter QS0011JB2010
	100 mV to 1 V	0.58 mV	
	1 V to 10 V	0.000 48 V	
	10 V to 100 V	0.008 2 V	
	100 V to 1 000 V	0.092 V	
	1 kV to 6 kV	0.095 kV	Fluke 27 & High Voltage Probe QS0011JB2010
	10 kV to 20 kV	0.24 kV	
Equipment to Measure DC Voltage ^{FO}	1 kV to 10 kV	0.03 V + 0.23 % of Reading	Vitretek 4700 & High Voltage Probe QS0011JB2010



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Equipment to Source Electrical Resistance ^{FO}	10 M Ω	0.02 M Ω	Megger Insulation Resistance Standard QS0011JB2010
	100 M Ω	0.16 M Ω	
	1 G Ω	0.001 G Ω	
	10 G Ω	0.08 G Ω	
	Up to 1 000 Ω	16 $\mu\Omega/\Omega$ + 0.000 18 Ω	Transfer Standard, Fixed Resistors, Fluke Multimeter

Mass, Force, and Weighing Devices

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Force Gauges ^{FO}	1 lbf to 220 lbf	0.3 % of Reading	Calibrated Weights QS0031BG2013
Load Cells, Load Stands & Tension/Compression Testers ^{FO}	1 lbf to 220 lbf	0.23 % of Reading	Calibrated Weights QS0033BG2013
	220 lbf to 1 000 lbf	0.11 % of Reading	Futek LSB350 Load Cell w/ IHH500 Indicator QS0033BG2013
	1 000 lbf to 5 000 lbf	0.12 % of Reading	Futek LSB453 Load Cell w/ IHH500 Indicator QS0033BG2013
	5 000 lbf to 20 000 lbf	0.39 % of Reading	TT-SWO-20K Load Cell w/ IHH500 Indicator QS0033BG2013
	20 000 lbf to 50 000 lbf	0.26 % of Reading	Futek 50K Load Cell QS0033BG2013
Load Cells, Load Stands, Compression Testers (compression) ^{FO}	20 000 lbf to 300 000 lbf	0.08 % of Reading	TT CLC-300K Load Cell w/ IHH500 Indicator QS0033BG2013
Load Cells (Tension and Compression) ^O	500 lbf to 25 000 lbf	0.025 % of Reading	Morehouse Load Cell w/ Indicator QS0033BG2013
Load Cells (Compression Only) ^O	28 200 lbf to 500 000 lbf	0.032 % of Reading	Strainsense Load Cell w/ Indicator QS0033BG2013
Scales ^{FO}	Up to 100 lb	0.08 lb	ASTM Class 6 Weights QS0045BG2015
	100 lb to 10 000 lb	0.9 lb	Class F Weights QS0045BG2015
Graduated Cylinder/Flask/Beaker ^{FO}	Up to 50 mL	12 μ L	Micro Balance QS0059AS2019
	50 mL to 6 000 mL	64 μ L	Balance QS0059AS2019



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Mass, Force, and Weighing Devices

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Analytical Balance ^{FO}	Up to 1 g	8 μ g	ASTM Class 1 Mass QS0059AS2019
	1 g to 50 g	20 μ g	
	50 g to 220 g	70 μ g	
	220 g to 1k g	0.58 mg	
	1 kg to 10 kg	60 mg	
Crimpers- Pull Force ^{FO}	Up to 500 lbf	3.2 % of Reading	Force Gauge QS0046BG2016
Crimpers- Jaw Force ^{FO}	Up to 15 Tons	2.4 % of Reading	Force Gauge QS0046BG2016
Mass-Fixed Points ^F	1 mg	0.013 mg	Class 1 Weights, Mass Comparator QS0066MS2022
	2 mg	0.012 mg	
	5 mg	0.011 mg	
	10 mg	0.008 8 mg	
	20 mg	0.019 mg	
	50 mg	0.029 mg	
	100 mg	0.016 mg	
	200 mg	0.020 mg	
	500 mg	0.018 mg	
	1 g	0.023 mg	
	2 g	0.023 mg	
	5g	0.024 mg	
	10 g	0.037 mg	
	20 g	0.049 mg	
	50 g	0.045 mg	
	100 g	0.49 mg	
	200 g	0.32 mg	
	500 g	2.6 mg	
	1 000 g	3.3 mg	
	2 000 g	2.7 mg	
5 000 g	6.3 mg		
10 000 g	27 mg		
20 000 g	30 mg		
22 679.62 g	25 mg		



Certificate of Accreditation: Supplement

Precision Calibration Systems, LLC

117 East Main St., Morristown, TN 37814
 107 N. Porter Street, Suite 5, Winchester, TN 37398
 Contact Name: Brandon Goodman Phone: 423-278-0946

Accreditation is granted to the facility to perform the following calibrations:

Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Pressure Gauge ^{FO}	Up to 1 in H ₂ O	0.001 6 in H ₂ O	Additel ADT760-LLP-DL QS0012JB2010
	1 in H ₂ O to 10 in H ₂ O	0.01 in H ₂ O	
	Up to 1 psi	0.001 7 psi	Fluke 744/700PD2 QS0012JB2010
	1 psi to 15 psi	0.003 1 psi	Fluke 2700G-BG100K QS0012JB2010
	15 psi to 300 psi	0.044 psi	Fluke 2700G-BG2M QS0012JB2010
	300 psi to 1 000 psi	0.2 psi	Fluke 2700G-BG7M QS0012JB2010
	1 000 psi to 10 000 psi	1.81 psi	Fluke 2700G-G70M QS0012JB2010
Pressure Gauge ^F	10 psi to 10 000 psi	0.015 % of Reading	Deadweight Tester QS0012JB2010
Pressure Gauge (absolute) ^{FO}	Up to 30 psia	0.012 psia	Pressure Module, Fluke Calibrator QS0012JB2010
Vacuum Gauge ^{FO}	-14 psi to -1 psi	0.0 033 psi	Fluke 744/700PV4 QS0012JB2010
	-1 psi to 0 psi	0.0 013 psi	Fluke 744/700PD2 QS0012JB2010
	-10 in H ₂ O to -1 in H ₂ O	0.01 in H ₂ O	Additel ADT760-LLP-DL QS0012JB2010
	-1 in H ₂ O to 0 in H ₂ O	0.0016 in H ₂ O	
Indirect Verification of Rockwell Hardness Testers HRC ^{FO}	20 HRC to 39 HRC	0.34 HRC	Hardness Test Block Masters QS0015JB2010
	40 HRC to 59 HRC	0.34 HRC	
	60 HRC to 70 HRC	0.32 HRC	
Indirect Verification of Rockwell Hardness Testers HRB ^{FO}	50 HRB to 59 HRB	0.33 HRB	
	60 HRB to 79 HRB	0.34 HRB	
	80 HRB to 89 HRB	0.33 HRB	
Indirect Verification of Rockwell Hardness Testers HRA ^{FO}	20 HRA to 65 HRA	0.34 HRA	
	70 HRA to 78 HRA	0.34 HRA	
	80 HRA to 84 HRA	0.33 HRA	
Indirect Verification of Rockwell Hardness Testers HR15N ^{FO}	70 HR15N to 77 HR15N	0.36 HR15N	
	78 HR15N to 88 HR15N	0.35 HR15N	
	90 HR15N to 92 HR15N	0.35 HR15N	
Indirect Verification of Rockwell Superficial Hardness Testers HR30N ^{FO}	40 HR30N to 59 HR30N	0.34 HR30N	
	60 HR30N to 79 HR30N	0.33 HR30N	
	80 HR30N to 90 HR30N	0.32 HR30N	



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Mechanical

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Indirect Verification of Rockwell Hardness Testers HR15TW ^{FO}	65 HR15TW to 72 HR15TW	0.35 HR15TW	Hardness Test Block Masters QS0015JB2010
	73 HR15TW to 85 HR15TW	0.34 HR15TW	
	86 HR15TW to 93 HR15TW	0.33 HR15TW	
Durometers-Force ^F	Up to 100 Duros	0.6 Duros	A&D Balance, Gage Blocks QS0085MS2022
Durometers-Length ^F	Up to 0.2"	0.00024"	Gage Blocks, Vision System QS0085MS2022
Indirect Verification of Rockwell Hardness Testers HR30TW ^{FO}	43 HR30TW to 56 HR30TW	0.37 HR30TW	Hardness Test Block Masters QS0015JB2010
	57 HR30TW to 69 HR30TW	0.34 HR30TW	
	70 HR30TW to 83 HR30TW	0.34 HR30TW	
Knoop Hardness Testers HK (indirect verification) ^O	100 HK to 200 HK	6.3 HK	
	300 HK to 400 HK	14 HK	
	500 HK to 600 HK	14 HK	
Vickers Hardness Testers HV (indirect verification) ^O	200 HV to 400 HV	9.9 HV	
	400 HV to 750 HV	12 HV	
Brinell Hardness Testers HBW (indirect verification) ^O	200 HBW to 650 HBW	21.9 HBW	Hardness Test Block Masters-Brinell Scope QS0015JB2010
Torque Wrenches ^{FO}	0.25 in·lb to 20 in·lb	1.5% of Reading	Torque Transducers QS0032BG2013
	1.5 ft·lb to 29 ft·lb	1.2 % of Reading	Norbar Pro-Test 40 QS0032BG2013
	29 ft·lb to 1 100 ft·lb	1.1 % of Reading	Norbar Pro-Test 1500 ER QS0032BG2013
Torque Testers ^{FO}	Up to 500 lbf	0.6 % of Reading	Stainless Steel Hanging Weight Set, Lever Arm QS0044JT2015
	Up to 150 in/lbf	0.084 % of Reading	Torque Arm, Weights QS0044JT2015
	Up to 750 lbf	0.044 % of Reading	Torque Arm, Weights QS0044JT2015
Rate of Rotation Source (Contact) ^{FO}	10 RPM to 3 800 RPM	0.017 % of Reading	Monarch Optical Tach QS0050AS2017
Rate of Rotation Measure ^{FO}	1 RPM to 99 999 RPM	0.005 % of Reading	QS0048AS2017
Rate of Rotation Source (non-contact) ^{FO}	5 RPM to 99 999 RPM	0.012 % of Reading	Monarch Strobe QS0048AS2017



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Mechanical

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Liquid Flow Meter ^O	Up to 200 GPM	0.45 % of Reading	Fuji Portaflow FSC3 QS0054AS2019
	200 GPM to 400 GPM	0.68 % of Reading	Fuji Portaflow QS0054AS2019
	400 GPM to 500 GPM	0.87 % of Reading	Fuji Porta Flow QS0054AS2019
Liquid Flow Meter ^{FO}	Up to 30 GPM	0.12 % of Reading	Coriolis Flow Meter QS0054AS2019
	31 GPM to 200 GPM	0.15 % of Reading	Coriolis Flow Meter QS0054AS2019
	Up to 6 000 grams	0.09 % of Reading	Balance QS0054AS2019
Anemometer ^F	445 fpm to 2 680 fpm	1.49 % of Reading	Kanomax Reference Anemometer / Wind Tunnel QS0056AS2019
	452 fpm to 2 800 fpm	1.38 % of Reading	Differential Pressure Transducer, Wind Tunnel, Pitot Tube QS0056AS2019
Extensometer ^{FO}	Up to 2 in	12 μ m	Epsilon 3590VHR QS0055AS2019

Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Pipette ^{FO}	0.3 μ L to 20 μ L	0.13 μ L	A&D Pipette Calibrator QS0035JT2014
	20 μ L to 200 μ L	0.98 μ L	
	200 μ L to 1 000 μ L	1.2 μ L	
	1 000 μ L to 20 000 μ L	7.1 μ L	
Viscometers ^{FO}	Up to 10 000 cP	2.5% of Reading	Viscosity Reference Standards QS0064MS2021



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Accreditation is granted to the facility to perform the following calibrations:

Chemical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
pH Meter ^{FO}	4 pH	0.026 pH	Std Buffer Solution QS0028JT2014
	7 pH	0.026 pH	
	10 pH	0.026 pH	
Conductivity Meter ^{FO}	10 μ S/cm	0.55 μ S/cm	Std Conductivity Solution QS0051AS2017
	100 μ S/cm	2.5 μ S/cm	
	1 000 μ S/cm	5.5 μ S/cm	

Optical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Spectrophotometer-Photometric Accuracy ^{FO}	200 nm to 700 nm	0.0 025 abs%	Neutral Density Filter Holmium Oxide Filter QS0053AS2019
Spectrophotometer-Wavelength Accuracy ^{FO}	240 nm to 640 nm	0.25 nm	Neutral Density Filter Holmium Oxide Filter QS0053AS2019
Measuring Microscope ^{FO}	0.01 mm to 1 mm	8.9 μ m	Glass Scale/Gage Blocks QS0060AS2021
Light Meters/ VIS Light Booth ^{FO}	(400 nm to 700 nm) / (0.003 to 500 000) Lux	4.8 %	ILT2400 Light Meter / Broadband Sensor QS0062AS2021
UVA Light / UVA Light Booth ^{FO}	(315 nm to 390 nm) / (2.0 E-1 to 2.0 E-8) W/cm ²	5.16 %	ILT2400 / UVA Sensor QS0061AS2021

Time & Frequency

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Timers & Stopwatches ^{FO}	0.01 s to 3 600 s	0.094 s	Naval Atomic Clock/ Calibrated Stopwatch QS0036JT2014
	3 600 s to 86 400 s	2.1 s	



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Accreditation is granted to the facility to perform the following calibrations:

Thermodynamic

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Temperature Measuring Equipment- Infrared Thermometers ^{FO}	25 °C to 500 °C	2.2 °C	Black Body Calibrator, Fluke 744 w/ Probe QS0013JB2010
Thermohygrometers – Humidity (%RH) ^{FO}	20 % RH to 95 % RH	2.5 % of Reading	Incubator, Thermohygrometer QS0043JT2015
Thermohygrometers - Temperature ^{FO}	5 °C to 60 °C	2.5 °C	Incubator, Thermohygrometer QS0043JT2015
Temperature Measuring Equipment ^{FO}	-90 °C to 40 °C	0.08 °C	PTC-125 Dry Block Calibrator, Hart 850 w/ PRT Probe QS0013JB2010
	40 °C to 280 °C	0.04 °C	Hart Bath 6022, Hart 850 w/ PRT 5614 Probe QS0013JB2010
	280 °C to 420 °C	0.16 °C	Jofra PTC 660, Hart 850 w/ PRT 5614 Probe QS0013JB2010
	420 °C to 660 °C	0.53 °C	Jofra PTC 660, Fluke 744, K Thermocouple QS0013JB2010
	-200 °C to 420 °C	0.04 °C	Hart 850 w/ PRT 5614 Probe QS0013JB2010
	400 °C to 1 372 °C	1.3 °C	Fluke 744, K Thermocouple QS0013JB2010
Thermohygrometer-Temperature ^{FO}	5 °C to 60 °C	0.15 °C	Vaisala Thermohygrometer QS0043JT2015
Thermohygrometer-Humidity ^{FO}	10 % RH to 95 % RH	1.79 % RH	

- The CMC (Calibration and Measurement Capability) stated for calibrations included on this scope of accreditation represents the smallest measurement uncertainty attainable by the laboratory when performing a more or less routine calibration of a nearly ideal device under nearly ideal conditions. It is typically expressed at a confidence level of 95 % using a coverage factor k (usually equal to 2). The actual measurement uncertainty associated with a specific calibration performed by the laboratory will typically be larger than the CMC for the same calibration since capability and performance of the device being calibrated and the conditions related to the calibration may reasonably be expected to deviate from ideal to some degree.



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Accreditation is granted to the facility to perform the following calibrations:

2. The laboratories range of calibration capability for all disciplines for which they are accredited is the interval from the smallest calibrated standard to the largest calibrated standard used in performing the calibration. The low end of this range must be an attainable value for which the laboratory has or has access to the standard referenced. Verification of an indicated value of zero in the absence of a standard is common practice in the procedure for many calibrations but by its definition it does not constitute calibration of zero capacity.
3. The presence of a superscript F means that the laboratory performs calibration of the indicated parameter at its fixed location. Example: Outside Micrometer^F would mean that the laboratory performs this calibration at its fixed location.
4. The presence of a superscript O means that the laboratory performs calibration of the indicated parameter onsite at customer locations. Example: Outside Micrometer^O would mean that the laboratory performs this calibration onsite at the customer's location.
5. The presence of a superscript FO means that the laboratory performs calibration of the indicated parameter both at its fixed location and onsite at customer locations. Example: Outside Micrometer^{FO} would mean that the laboratory performs this calibration at its fixed location and onsite at customer locations.
6. Measurement uncertainties obtained for calibrations performed at customer sites can be expected to be larger than the measurement uncertainties obtained at the laboratories fixed location for similar calibrations. This is due to the effects of transportation of the standards and equipment and upon environmental conditions at the customer site which are typically not controlled as closely as at the laboratories fixed location.
7. The term L represents length in inches or millimeters as appropriate to the uncertainty statement.