



# PERRY JOHNSON LABORATORY ACCREDITATION, INC.

## Certificate of Accreditation

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

***Precision Instrument Correction, Inc.***  
933 Mariner Street. Brea, CA 92821

*(Hereinafter called the Organization) and hereby declares that Organization 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  
(as outlined by the joint ISO-ILAC-IAF Communiqué dated January 2009):

***Time & Frequency, Mechanical, Dimensional, Electrical, Mass, Force, and Weighing Devices***  
*(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:

<i>Initial Accreditation Date:</i>	<i>Issue Date:</i>	<i>Expiration Date:</i>
January 16, 2003	August 28, 2015	September 30, 2017

<i>Accreditation No.:</i>	<i>Certificate No.:</i>
59282	L15-285

Tracy Szerszen  
President/Operations Manager

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.pjllabs.com](http://www.pjllabs.com)*



# Certificate of Accreditation: Supplement

## Precision Instrument Correction

933 Mariner Street, Brea CA 92821  
 Laura Camacho Phone: 714-671-6018

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

### 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 Measure DC Voltage <sup>FO</sup>	Up to 2.2 V	6 $\mu$ V/V + 1 $\mu$ V	Fluke 5700A
	2.2 V to 11 V	5 $\mu$ V/V + 3 $\mu$ V	
	11 V to 22 V	6 $\mu$ V/V + 1 $\mu$ V	
	22 V to 220 V	6 $\mu$ V/V + 78 $\mu$ V	
	220 V to 1 100 V	10 $\mu$ V/V + 468 $\mu$ V	
Equipment to Output DC Voltage <sup>FO</sup>	Up to 100 mV	6 $\mu$ V + 0.4 $\mu$ V	HP 3458A
	100 mV to 1 V	5 $\mu$ V + 0.4 $\mu$ V	
	1 V to 10 V	5 $\mu$ V + 0.6 $\mu$ V	
	10 V to 100 V	7 $\mu$ V + 59 $\mu$ V	
	100 V to 1 000 V	12 $\mu$ V + 128 $\mu$ V	
Equipment to Measure AC Voltage <sup>FO</sup> at Listed Frequencies			Fluke 5700A
20 Hz to 20 kHz	Up to 2.2 mV	0.08% of output + 4 $\mu$ V	
20 kHz to 50 kHz	Up to 2.2 mV	0.13% of output + 4 $\mu$ V	
50 kHz to 100 kHz	Up to 2.2 mV	0.25% of output + 7 $\mu$ V	
100 kHz to 300 kHz	Up to 2.2 mV	0.51% of output + 12 $\mu$ V	
300 kHz to 500 kHz	Up to 2.2 mV	0.64% of output + 23 $\mu$ V	
500 kHz to 1 MHz	Up to 2.2 mV	0.73% of output + 31 $\mu$ V	
20 Hz to 20 kHz	2.2 mV to 22 mV	0.03% of output + 5 $\mu$ V	
20 kHz to 50 kHz	2.2 mV to 22 mV	0.03% of output + 5 $\mu$ V	
50 kHz to 100 kHz	2.2 mV to 22 mV	0.07% of output + 6 $\mu$ V	
100 kHz to 300 kHz	2.2 mV to 22 mV	0.18% of output + 12 $\mu$ V	
300 kHz to 500 kHz	2.2 mV to 22 mV	0.27% of output + 23 $\mu$ V	
500 kHz to 1 MHz	2.2 mV to 22 mV	0.38% of output + 31 $\mu$ V	
20 Hz to 20 kHz	22 mV to 220 mV	0.01% of output + 8 $\mu$ V	
20 kHz to 50 kHz	22 mV to 220 mV	0.02% of output + 8 $\mu$ V	
50 kHz to 100 kHz	22 mV to 220 mV	0.05% of output + 24 $\mu$ V	
100 kHz to 300 kHz	22 mV to 220 mV	0.08% of output + 24 $\mu$ V	
300 kHz to 500 kHz	22 mV to 220 mV	0.12% of output + 32 $\mu$ V	
500 kHz to 1 MHz	22 mV to 220 mV	0.26% of output + 78 $\mu$ V	



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Equipment to Measure AC Voltage <sup>FO</sup> at Listed Frequencies			Fluke 5700A
20 Hz to 20 kHz	220 mV to 2.2 V	0.005% of output + 6 $\mu$ V	
20 kHz to 50 kHz	220 mV to 2.2 V	0.01% of output +16 $\mu$ V	
50 kHz to 100 kHz	220 mV to 2.2 V	0.01% of output +62 $\mu$ V	
100 kHz to 300 kHz	220 mV to 2.2 V	0.04% of output +118 $\mu$ V	
300 kHz to 500 kHz	220 mV to 2.2 V	0.09% of output +314 $\mu$ V	
500 kHz to 1 MHz	220 mV to 2.2 V	0.14% of output +785 $\mu$ V	
20 Hz to 20 kHz	2.2 V to 22 V	0.004% of output + 119 $\mu$ V	
20 kHz to 50 kHz	2.2 V to 22 V	0.01% of output +157 $\mu$ V	
50 kHz to 100 kHz	2.2 V to 22 V	0.01% of output +314 $\mu$ V	
100 kHz to 300 kHz	2.2 V to 22 V	0.03% of output +1331 $\mu$ V	
300 kHz to 500 kHz	2.2 V to 22 V	0.09% of output +3897 $\mu$ V	
500 kHz to 1 MHz	2.2 V to 22 V	0.13% of output +7011 $\mu$ V	
20 Hz to 40 Hz	22 V to 220 V	0.03% of output + 300 mV	
40 Hz to 50 kHz	22 V to 220 V	0.03% of output +1.4 mV	
50 kHz to 100 kHz	22 V to 220 V	0.03% of output +12 mV	
50 Hz to 1 kHz	220 V to 1 100 V	0.02% of output +3 mV	
Equipment to Measure AC Voltage <sup>FO</sup> at Listed Frequencies			HP 3458A
20 Hz to 100 Hz	Up to 10 mV	0.04% of output + 3 $\mu$ V	
100 Hz to 50 kHz	Up to 10 mV	0.1% of output + 6 $\mu$ V	
50 kHz to 100 kHz	Up to 10 mV	0.4% of output + 8 $\mu$ V	
100 kHz to 300 kHz	Up to 10 mV	5% of output + 14 $\mu$ V	
300 kHz to 1 MHz	Up to 10 mV	2% of output + 14 $\mu$ V	
20 Hz to 100 Hz	10 mV to 100 mV	0.01% of output + 3 $\mu$ V	
100 Hz to 1 kHz	10 mV to 100 mV	1.2% of output + 6 $\mu$ V	
1 kHz to 50 kHz	10 mV to 100 mV	0.02% of output + 6 $\mu$ V	
50 kHz to 100 kHz	10 mV to 100 mV	1% of output + 8 $\mu$ V	



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Equipment to Measure AC Voltage <sup>FO</sup> at Listed Frequencies			HP 3458A
100 kHz to 300 kHz	10 mV to 100 mV	0.4% of output + 14 $\mu$ V	
300 kHz to 500 kHz	10 mV to 100 mV	0.4% of output + 29 $\mu$ V	
500 kHz to 1 MHz	10 mV to 100 mV	1.4% of output + 29 $\mu$ V	
1 MHz to 2 MHz	10 mV to 100 mV	2% of output + 29 $\mu$ V	
20 Hz to 40 Hz	100 mV to 300 mV	0.04% of output + 8 $\mu$ V	
40 Hz to 1 kHz	100 mV to 300 mV	0.04% of output + 9 $\mu$ V	
1 kHz to 50 kHz	100 mV to 300 mV	0.01% of output + 10 $\mu$ V	
50 kHz to 100 kHz	100 mV to 300 mV	0.3% of output + 29 $\mu$ V	
100 kHz to 300 kHz	100 mV to 300 mV	0.1% of output + 29 $\mu$ V	
300 kHz to 500 kHz	100 mV to 300 mV	0.1% of output + 42 $\mu$ V	
500 kHz to 1 MHz	100 mV to 300 mV	0.5% of output + 95 $\mu$ V	
20 Hz to 40 Hz	300 mV to 1 V	0.1% of output + 48 $\mu$ V	
40 Hz to 1 kHz	300 mV to 1 V	0.1% of output + 29 $\mu$ V	
1 kHz to 50 kHz	300 mV to 1 V	0.1% of output + 19 $\mu$ V	
50 kHz to 100 kHz	300 mV to 1 V	0.1% of output + 81 $\mu$ V	
100 kHz to 300 kHz	300 mV to 1 V	0.4% of output + 151 $\mu$ V	
300 kHz to 1 MHz	300 mV to 1 V	1% of output + 407 $\mu$ V	
1 MHz to 2 MHz	300 mV to 1 V	2% of output + 988 $\mu$ V	
20 Hz to 100 kHz	1 V to 3 V	0.1% of output + 504 $\mu$ V	
20 Hz to 40 Hz	3 V to 10 V	0.06% of output + 476 $\mu$ V	
40 Hz to 20 kHz	3 V to 10 V	0.06% of output + 70 $\mu$ V	
20 kHz to 50 kHz	3 V to 10 V	0.07% of output + 186 $\mu$ V	
50 kHz to 100 kHz	3 V to 10 V	0.1% of output + 407 $\mu$ V	
100 kHz to 300 kHz	3 V to 10 V	0.4% of output + 1 741 $\mu$ V	
300 kHz to 1 MHz	3 V to 10 V	1% of output + 4 977 $\mu$ V	
1 MHz to 2 MHz	3 V to 10 V	1.5% of output + 9 832 $\mu$ V	



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Equipment to Measure AC Voltage <sup>FO</sup> at Listed Frequencies			HP 3458A
20 Hz to 40 Hz	10 V to 100 V	0.1% of output + 5 mV	
40 Hz to 1 kHz	10 V to 100 V	0.1% of output + 1 mV	
1 kHz to 20 kHz	10 V to 100 V	0.1% of output + 4 mV	
20 kHz to 50 kHz	10 V to 100 V	0.1% of output + 9 mV	
50 kHz to 100 kHz	10 V to 100 V	0.2% of output + 104 mV	
20 Hz to 40 Hz	100 V to 700 V	0.1% of output + 9 mV	
40 Hz to 1 kHz	100 V to 700 V	0.1% of output + 19 mV	
1 kHz to 50 kHz	100 V to 700 V	0.1% of output + 4 mV	
50 kHz to 100 kHz	100 V to 700 V	0.3% of output + 4 mV	
Equipment to Measure DC Current <sup>FO</sup>			Fluke 5700A
	Up to 2.2 mA	48 $\mu$ A/A + 8 nA	
	2.2 mA to 22 mA	48 $\mu$ A/A + 78 nA	
	22 mA to 220 mA	57 $\mu$ A/A + 1 $\mu$ A	
	220 mA to 2.2 A	84 $\mu$ A/A + 23 $\mu$ A	
	0.33 A to 3.3 A	210 $\mu$ A/A + 27 $\mu$ A	
	3.3 A to 11 A	450 $\mu$ A/A + 340 $\mu$ A	
Equipment to Output DC Current <sup>FO</sup>			HP 3458A
	Up to 100 nA	39 pA + 46 pA	
	100 nA to 1 $\mu$ A	25 pA + 46 pA	
	1 $\mu$ A to 10 $\mu$ A	25 pA + 115 pA	
	10 $\mu$ A to 100 $\mu$ A	23 pA + 1 pA	
	100 $\mu$ A to 1 mA	23 pA + 6 nA	
	1 mA to 10 mA	23 pA + 58 nA	
	10 mA to 100 mA	40 pA + 1 $\mu$ A	
	100 mA to 1 A	149 pA + 16 $\mu$ A	



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Equipment to Measure AC Current <sup>FO</sup> at Listed Frequencies			Fluke 5700A
20 Hz to 100 Hz	Up to 220 $\mu$ A	0.01% of output + 8 nA	
100 Hz to 1 kHz	Up to 220 $\mu$ A	0.01% of output + 16 nA	
1 kHz to 5 kHz	Up to 220 $\mu$ A	0.01% of output + 39 nA	
5 kHz to 10 kHz	Up to 220 $\mu$ A	0.2% of output + 139 nA	
20 Hz to 100 Hz	220 $\mu$ A to 2.2 mA	0.01% of output + 16 nA	
100 Hz to 1 kHz	220 $\mu$ A to 2.2 mA	0.01% of output + 31 nA	
1 kHz to 5 kHz	220 $\mu$ A to 2.2 mA	0.05% of output + 405 nA	
5 kHz to 10 kHz	220 $\mu$ A to 2.2 mA	0.14% of output + 904 nA	
20 Hz to 100 Hz	2.2 mA to 22 mA	0.01% of output + 156 nA	
100 Hz to 1 kHz	2.2 mA to 22 mA	0.01% of output + 311 nA	
1 kHz to 5 kHz	2.2 mA to 22 mA	0.05% of output + 3 909 nA	
5 kHz to 10 kHz	2.2 mA to 22 mA	0.14% of output + 7 850 nA	
20 Hz to 100 Hz	22 mA to 220 mA	0.02% of output + 2 $\mu$ A	
100 Hz to 1 kHz	22 mA to 220 mA	0.02% of output + 3 $\mu$ A	
1 kHz to 5 kHz	22 mA to 220 mA	0.05% of output + 39 $\mu$ A	
5 kHz to 10 kHz	22 mA to 220 mA	0.14% of output + 78 $\mu$ A	
20 Hz to 100 Hz	220 mA to 2.2 A	0.06% of output + 16 $\mu$ A	
100 Hz to 1 kHz	220 mA to 2.2 A	0.06% of output + 31 $\mu$ A	
1 kHz to 5 kHz	220 mA to 2.2 A	0.07% of output + 78 $\mu$ A	
5 kHz to 10 kHz	220 mA to 2.2 A	0.8% of output + 156 $\mu$ A	
20 Hz to 1 kHz	0.33 A to 3.0 A	0.14% of output + 13 $\mu$ A	Fluke 5500A
1 kHz to 30 kHz	0.33 A to 3.0 A	0.92% of output + 13 $\mu$ A	
20 Hz to 1 kHz	3.0 A to 11 A	0.29% of output + 0.06 mA	
1 kHz to 30 kHz	3.0 A to 11 A	2% of output + 0.06 mA	





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Equipment to Output AC Current <sup>FO</sup> at Listed Frequencies			HP 3458A
20 Hz to 100 Hz	Up to 100 $\mu$ A	0.1% of output + 13 nA	
100 Hz to 1 kHz	Up to 100 $\mu$ A	0.1% of output + 16 nA	
1 kHz to 5 kHz	Up to 100 $\mu$ A	0.1% of output + 39 nA	
20 Hz to 100 Hz	100 $\mu$ A to 1 mA	0.1% of output + 20 nA	
100 Hz to 1 kHz	100 $\mu$ A to 1 mA	0.04% of output + 31 nA	
1 kHz to 5 kHz	100 $\mu$ A to 1 mA	0.04% of output + 405 nA	
5 kHz to 10 kHz	100 $\mu$ A to 1 mA	0.1% of output + 904 nA	
20 Hz to 100 Hz	1 mA to 10 mA	0.1% of output + 0.2 $\mu$ A	
100 Hz to 1 kHz	1 mA to 10 mA	0.04% of output + 0.3 $\mu$ A	
1 kHz to 5 kHz	1 mA to 10 mA	0.04% of output + 4 $\mu$ A	
5k Hz to 10k Hz	1 mA to 10 mA	0.1% of output + 8 $\mu$ A	
20 Hz to 100 Hz	10 mA to 100 mA	0.1% of output + 2 $\mu$ A	
100 Hz to 1 kHz	10 mA to 100 mA	0.04% of output + 4 $\mu$ A	
1 kHz to 5 kHz	10 mA to 100 mA	0.04% of output + 39 $\mu$ A	
5 kHz to 10 kHz	10 mA to 100 mA	0.1% of output + 78 $\mu$ A	
20 Hz to 100 Hz	100 mA to 1 A	0.1% of output + 16 $\mu$ A	
100 Hz to 1 kHz	100 mA to 1 A	0.1% of output + 39 $\mu$ A	
1 kHz to 5 kHz	100 mA to 1 A	0.1% of output + 78 $\mu$ A	
5 kHz to 10 kHz	100 mA to 1 A	0.4% of output + 156 $\mu$ A	



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Equipment to Measure Resistance <sup>FO</sup>	Up to 1 $\Omega$	96 $\mu\Omega/\Omega$ + 86 $\mu\Omega$	Fluke 5700A
	1 $\Omega$ to 1.9 $\Omega$	91 $\mu\Omega/\Omega$ + 85 $\mu\Omega$	
	1.9 $\Omega$ to 19 $\Omega$	31 $\mu\Omega/\Omega$ + 26 $\mu\Omega$	
	19 $\Omega$ to 190 $\Omega$	16 $\mu\Omega/\Omega$ + 16 $\mu\Omega$	
	190 $\Omega$ to 19 k $\Omega$	12 $\mu\Omega/\Omega$ + 12 $\mu\Omega$	
	19 k $\Omega$ to 190 k $\Omega$	14 $\mu\Omega/\Omega$ + 12 $\mu\Omega$	
	190 k $\Omega$ to 1 M $\Omega$	19 $\mu\Omega/\Omega$ + 18 $\mu\Omega$	
	1 M $\Omega$ to 1.9 M $\Omega$	143 $\mu\Omega/\Omega$ + 19 $\mu\Omega$	
	1.9 M $\Omega$ to 10 M $\Omega$	135 $\mu\Omega/\Omega$ + 36 $\mu\Omega$	
	10 M $\Omega$ to 19 M $\Omega$	69 $\mu\Omega/\Omega$ + 43 $\mu\Omega$	
	19 M $\Omega$ to 100 M $\Omega$	178 $\mu\Omega/\Omega$ + 102 $\mu\Omega$	
	33 M $\Omega$ to 330 M $\Omega$	0.6% + 6 k $\Omega$	Fluke 5500A
Equipment to Output Resistance <sup>FO</sup>	Up to 1 $\Omega$	40 $\mu\Omega/\Omega$ + 6 $\mu\Omega$	HP 3458A
	1 $\Omega$ to 10 $\Omega$	18 $\mu\Omega/\Omega$ + 6 $\mu\Omega$	
	10 $\Omega$ to 100 $\Omega$	14 $\mu\Omega/\Omega$ + 2 $\mu\Omega$	
	100 $\Omega$ to 1 k $\Omega$	12 $\mu\Omega/\Omega$ + 1 $\mu\Omega$	
	1 k $\Omega$ to 10 k $\Omega$	12 $\mu\Omega/\Omega$ + 1 $\mu\Omega$	
	10 k $\Omega$ to 100 k $\Omega$	12 $\mu\Omega/\Omega$ + 1 $\mu\Omega$	
	100 k $\Omega$ to 1 M $\Omega$	19 $\mu\Omega/\Omega$ + 3 $\mu\Omega$	
	1 M $\Omega$ to 10 M $\Omega$	135 $\mu\Omega/\Omega$ + 14 $\mu\Omega$	
	10 M $\Omega$ to 100 M $\Omega$	602 $\mu\Omega/\Omega$ + 33 $\mu\Omega$	
	100 M $\Omega$ to 1 G $\Omega$	5783 $\mu\Omega/\Omega$ + 291 $\mu\Omega$	
Equipment to Output Capacitance <sup>FO</sup>	0.33 nF to 0.6 nF	3.68 % of output + 3.9 pF	Fluke 5500A
	0.6 nF to 3.0 nF	1.12 % of output + 7.8 pF	
	3.0 nF to 12 nF	1.20 % of output + 7.8 pF	
	12 nF to 300 nF	0.22 % of output + 78 pF	
	0.3 $\mu$ F to 1.09 $\mu$ F	0.56 % of output + 0.78 nF	
	1.09 $\mu$ F to 3.3 $\mu$ F	0.37 % of output + 0.78 nF	
	3.3 $\mu$ F to 10.9 $\mu$ F	1.78 % of output + 7.7 nF	





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Temperature Calibration, Indication and Control Equipment used with Thermocouple Type B <sup>FO</sup>	600 °C to 800 °C	0.53 °C	Electrical Simulation of Thermocouple Output Multiproduct - Calibrator (Fluke 5500A)
	800 °C to 1 000 °C	0.51 °C	
	1 000 °C to 1 550 °C	0.49 °C	
	1 500 °C to 1 820 °C	0.49 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type C <sup>FO</sup>	0 °C to 150 °C	0.46 °C	
	150 °C to 650 °C	0.4 °C	
	650 °C to 1 000 °C	0.47 °C	
	1 000 °C to 1 800 °C	0.61 °C	
	1 800 °C to 2 316 °C	0.86 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type E <sup>FO</sup>	-250 °C to 100 °C	0.62 °C	
	-100 °C to -25 °C	0.4 °C	
	-25 °C to 350 °C	0.4 °C	
	350 °C to 650 °C	0.41 °C	
	650 °C to 1 000 °C	0.43 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type J <sup>FO</sup>	-210 °C to -100 °C	0.46 °C	
	-100 °C to -30 °C	0.4 °C	
	-30 °C to 150 °C	0.39 °C	
	150 °C to 760 °C	0.4 °C	
	760 °C to 1 200 °C	0.43 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type K <sup>FO</sup>	-200 °C to -100 °C	0.5 °C	
	-100 °C to -25 °C	0.41 °C	
	-25 °C to 120 °C	0.4 °C	
	120 °C to 1 000 °C	0.45 °C	
	1 000 °C to 1 372 °C	0.55 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type N <sup>FO</sup>	-200 °C to -100 °C	0.55 °C	
	-100 °C to -25 °C	0.43 °C	
	-25 °C to 120 °C	0.42 °C	
	120 °C to 410 °C	0.42 °C	
	410 °C to 1 300 °C	0.44 °C	



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Temperature Calibration, Indication and Control Equipment used with Thermocouple Type R <sup>FO</sup>	0 °C to 250 °C	0.68 °C	Electrical Simulation of Thermocouple Output Multiproduct - Calibrator (Fluke 5500A)
	250 °C to 400 °C	0.52 °C	
	400 °C to 1 000 °C	0.51 °C	
	1 000 °C to 1 767 °C	0.56 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type S <sup>FO</sup>	0 °C to 250 °C	0.4 °C	
	250 °C to 1 000 °C	0.27 °C	
	1 000 °C to 1 400 °C	0.49 °C	
	1 400 °C to 1 767 °C	0.52 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type T <sup>FO</sup>	-250 °C to -150 °C	0.71 °C	
	-150 °C to 0 °C	0.44 °C	
	0 °C to 120 °C	0.4 °C	
	120 °C to 400 °C	0.4 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type U <sup>FO</sup>	-200 °C to 0 °C	0.66 °C	
	0 °C to 600 °C	0.47 °C	
Temperature Calibration, Indication and Control Equipment used with RTD Type Pt 385, 100 $\Omega$ <sup>FO</sup>	-200 °C to 0 °C	0.04 °C	
	0 °C to 100 °C	0.06 °C	
	100 °C to 300 °C	0.07 °C	
	300 °C to 400 °C	0.08 °C	
	400 °C to 630 °C	0.09 °C	
	630 °C to 800 °C	0.18 °C	
Temperature Calibration, Indication and Control Equipment used with RTD Type Pt 3916, 100 $\Omega$ <sup>FO</sup>	-200 °C to 0 °C	0.04 °C	
	0 °C to 100 °C	0.06 °C	
	100 °C to 300 °C	0.06 °C	
	300 °C to 400 °C	0.07 °C	
Temperature Calibration, Indication and Control Equipment used with RTD Type Pt 3926, 100 $\Omega$ <sup>FO</sup>	400 °C to 630 °C	0.09 °C	
	-200 °C to 0 °C	0.04 °C	
	0 °C to 100 °C	0.06 °C	
	100 °C to 300 °C	0.07 °C	
	300 °C to 400 °C	0.08 °C	
400 °C to 630 °C	0.09 °C		



# Certificate of Accreditation: Supplement

## Precision Instrument Correction

933 Mariner Street, Brea CA 92821  
Laura Camacho Phone: 714-671-6018

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

### 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
Temperature Calibration, Indication and Control Equipment used with RTD Type Pt 385, 500 $\Omega$ <sup>FO</sup>	-200 °C to 0 °C	0.03 °C	Electrical Simulation of Thermocouple Output Multiproduct - Calibrator (Fluke 5500A)
	0 °C to 100 °C	0.04 °C	
	100 °C to 300 °C	0.06 °C	
	300 °C to 400 °C	0.06 °C	
	400 °C to 630 °C	0.08 °C	
Temperature Calibration, Indication and Control Equipment used with RTD Type Pt 385, 1 000 $\Omega$ <sup>FO</sup>	-200 °C to 0 °C	0.02 °C	
	0 °C to 100 °C	0.04 °C	
	100 °C to 400 °C	0.06 °C	
	400 °C to 600 °C	0.06 °C	
	600 °C to 630 °C	0.18 °C	
Temperature Calibration, Indication and Control Equipment used with RTD Type NI 120. 120 $\Omega$ <sup>FO</sup>	-80 °C to 0 °C	0.08 °C	
	-0 °C to 100 °C	0.06 °C	
	100 °C to 260 °C	0.04 °C	
Temperature Calibration, Indication and Control Equipment used with RTD Type Ni 120, 120 $\mu$ <sup>FO</sup>	-80 °C to 0 °C	0.08 °C	
	0 °C to 100 °C	0.06 °C	
	100 °C to 260 °C	0.04 °C	
Temperature Calibration, Indication and Control Equipment used with RTD Type Ni 120, 120 <sup>FO</sup>	-100 °C to 200 °C	0.1 °C	



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## Precision Instrument Correction

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### 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
Gage Block <sup>F</sup>	0.05 in to 1 in	(5 + 0.42L) $\mu$ in	Grade 0 reference Gage Block Gage Block Comparator
	1 in to 4 in	(10 + 0.421L) $\mu$ in	
Length Bars/End Standard <sup>F</sup>	0.1 to 20 in	(19 + 0.42L) $\mu$ in	Grade 0 reference Gage Block LVDT with Amplifier
Cylindrical Plug Gages <sup>F</sup>	0.005 in to 10 in	(30 + 2.2L) $\mu$ in	Grade 0 reference Gage Block Supermicrometer
Cylindrical Ring Gages <sup>F</sup>	0.0625 in to 10 in	(25 + 18L) $\mu$ in	Grade 0 reference Gage Block Supermicrometer
Thread Plug Major Diameter <sup>F</sup>	0.05 in to 4 in	(32 + 7.6L) $\mu$ in	Grade 0 reference Gage Block Supermicrometer
	4 in to 10 in	(32 + 2.2L) $\mu$ in	
Thread Plug Pitch Diameter <sup>F</sup>	0.05 in to 10 in	(100 + 7.5L) $\mu$ in	Grade 0 reference Gage Block Super Micrometer Master Wires
Thread Ring Gages <sup>F</sup>	0.05 in to 10 in	(100 + 6.5L) $\mu$ in	Grade 0 reference Gage Block Super Micrometer Set Thread Plug Gages
Digital Indicators <sup>FO</sup>	0.05 in to 4 in	38 $\mu$ in	Grade 0 Gage Blocks Indicator Calibrator
Dial Indicators <sup>FO</sup>	0.05 in to 4 in	630 $\mu$ in	
Test Indicators <sup>FO</sup> 0.000 05 in Res.	0.005 to 0.060 in	47 $\mu$ in	Calibration Tester Grade 0 Gage Blocks
	0.000 1 in Res.	69 $\mu$ in	
	0.000 5 in Res.	300 $\mu$ in	
	0.001 in Res.	580 $\mu$ in	
Height Gages <sup>FO</sup>	0.1 to 60 in	(150 + 2.3L) $\mu$ in	Grade 0 reference Gage Block, Flatness Table
Heights Masters <sup>F</sup>	0.05 in to 24 in	(21 + 2.3L) $\mu$ in	Gage Block
Square/Parallel <sup>F</sup>	4 in to 48 in	(22 + 2.3L) $\mu$ in	LVDT with Amplifier
Angle Blocks <sup>F</sup>	0° to 45°	(190 + 2.3L) $\mu$ in	Square and Angle Blocks LVDT with Amplifier Flatness Table
	45° to 90°	(140 + 2.3L) $\mu$ in	
Protractors <sup>FO</sup>	0° to 90°	(660 + 2.3L) $\mu$ in	Angle Blocks
External Micrometers <sup>FO</sup>	0.05 in to 60 in	(160 + 6.1L) $\mu$ in	Gage Blocks



# Certificate of Accreditation: Supplement

## Precision Instrument Correction

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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
Optical Comparator <sup>FO</sup> X and Y Stage Movement	0.5 to 12 in	(210 + 16L) $\mu$ in	Gage Blocks Glass Scale
Optical Comparator <sup>FO</sup> Angularity	0° to 360°	0.096°	Angle Blocks
Optical Comparator <sup>FO</sup> Squareness of Y axis to X axis	(12 in of Y axis travel or maximum Y axis travel if maximum is less than 12 in)	(200 + 16L) $\mu$ in	Gage Block Parallel/Angle Blocks
Optical Comparator <sup>FO</sup> Magnification	10X	0.02 %	Gage Blocks Glass Scale
	20X		
	31.25X		
	50X		
	62.5X		
100X			
Calipers Res. 0.001 <sup>FO</sup>	0.1 in to 60 in	(759 + 1.6L) $\mu$ in	Gage Blocks
Calipers Res. 0.0005 <sup>FO</sup>	0.1 in to 60 in	(291 + 6.0L) $\mu$ in	Gage Blocks
Surface Plates <sup>FO</sup> Flatness	12 in to 114 in	(20 + 13D) $\mu$ in	Auto Collimator
Surface Plates <sup>FO</sup> Repeat Readings	0.002 in	50 $\mu$ in	Repeat O Meter W/indicator
Glass Scale/Stage Micrometer <sup>FO</sup>	Up to 6 in	(260 + 13L) $\mu$ in	Microscope and Gage Block

### 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
Force Compression <sup>FO</sup>	0.01 lbf to 5 lbf	0.000 2 lbf	ASTM Class 1 Weights
	5 lbf to 10 lbf	0.11 lbf	
	10 lbf to 100 lbf	0.12 lbf	NIST Class F Weights
	100 lbf to 1 000 lbf	0.21% of applied force	Load Cell with Indicator
	1 000 lbf to 10 000 lbf	0.6% of applied force	
Force Tension <sup>FO</sup>	0.01 lbf to 5 lbf	0.000 2 lbs	ASTM Class 1 Weights
	5 lbf to 10 lbf	0.11 lbf	
	10 lbf to 100 lbf	0.12 lbf	NIST Class F Weights
	100 lbf to 200 lbf	0.09% of applied force	Load Cell with Indicator
	200 lbf to 300 lbf	0.07% of applied force	
	300 lbf to 1 000 lbf	0.06% of applied force	



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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
Class F Weights and Non Classified Weights <sup>F</sup>	1 g	0.02 mg	Comparison Method using Class 1 Standard Weights and Balances: Sartorius MC 5  AND HR-202E
	2 g	0.02 mg	
	3 g	0.02 mg	
	5 g	0.02 mg	
	10 g	0.02 mg	
	20 g	0.02 mg	
	30 g	0.02 mg	
	50 g	0.03 mg	
	100 g	0.05 mg	
	200 g	0.18 mg	
	300 g	2.7 mg	Sartorius LC12015
	500 g	2.8 mg	
	1 kg	2.8 mg	
	2 kg	65 mg	Sartorius E5500S
	3 kg	66 mg	
	5 kg	65 mg	
	Electronic Balances <sup>FO</sup>	1 g to 5 g	0.025 mg
5 g to 10 g		0.05 mg	
10 g to 20 g		0.07 mg	
Electronic Balances <sup>FO</sup>	20 g to 30 g	0.08 mg	
	30 g to 50 g	0.12 mg	
	50 g to 100 g	0.25 mg	
Weighing Scales <sup>FO</sup>	100 g to 1 000 g	$(1.0 \times 10^{-3} + 2.2 \times 10^{-6}Wt) \text{ g}$	Class 1 Standard Weights
	1 000 g to 5 000 g	$(1.2 \times 10^{-1} + 2 \times 10^{-7}Wt) \text{ g}$	
	5 kg to 30 kg	$(1.5 \times 10^{-2} + 1.2 \times 10^{-4}Wt) \text{ g}$	Class F Standard Weights





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## Precision Instrument Correction

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### 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
Indirect Verification of Rockwell Hardness Testers HRA <sup>FO</sup>	20 HRA to 66 HRA	0.59 HRA	ASTM E18 and calibrated Rockwell Hardness Test Blocks
	66 HRA to 79 HRA	1.43 HRA	
	79 HRA to 84 HRA	0.61 HRA	
Indirect Verification of Rockwell Hardness Testers HRB <sup>FO</sup>	40 HRB to 59 HRB	0.60 HRB	
	60 HRB to 79 HRB	0.52 HRB	
	80 HRB to 100 HRB	0.52 HRB	
Indirect Verification of Rockwell Hardness Testers HRC <sup>FO</sup>	20 HRC to 31 HRC	0.51 HRC	
	31 HRC to 55 HRC	0.54 HRC	
	56 HRC to 65 HRC	0.52 HRC	
Indirect Verification of Rockwell Hardness Testers HREW <sup>FO</sup>	70 HREW to 80 HREW	0.52 HREW	
	80 HREW to 91 HREW	0.52 HREW	
	91 HREW to 150 HREW	0.52 HREW	
Indirect Verification of Rockwell Hardness Testers HR15N <sup>FO</sup>	70 HR15N to 77 HR15N	0.52 HR15N	
	77 HR15N to 88 HR15N	0.79 HR15N	
	89 HR15N to 92 HR15N	0.65 HR15N	
Indirect Verification of Rockwell Hardness Testers HR30N <sup>FO</sup>	42 HR30N to 50 HR30N	0.65 HR30N	
	51 HR30N to 73 HR30N	0.56 HR30N	
	74 HR30N to 82 HR30N	0.67 HR30N	
Indirect Verification of Rockwell Hardness Testers HR45N <sup>FO</sup>	20 HR45N to 32 HR45N	1.6 HR45T	
	32 HR45N to 62 HR45N	1.1 HR45T	
	62 HR45N to 72 HR45N	1.1 HR45T	
Indirect Verification of Rockwell Hardness Testers HR15T <sup>FO</sup>	74 HR15T to 80 HR15T	1.2 HR15T	
	81 HR15T to 86 HR15T	1.6 HR15T	
	87 HR15T to 93 HR15T	1.6 HR15T	
Indirect Verification of Rockwell Hardness Testers HR30T <sup>FO</sup>	43 HR30T to 57 HR30T	1.2 HR30T	
	57 HR30T to 70 HR30T	1.2 HR30T	
	70 HR30T to 83 HR30T	1.2 HR30T	
Indirect Verification of Rockwell Hardness Testers HR45T <sup>FO</sup>	13 HR45T to 33HR45T	1.6 HR45T	
	33 HR45T to 53HR45T	1.1 HR45T	
	53 HR45T to 73HR45T	1.1 HR45T	



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## Precision Instrument Correction

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### 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 Source/Measure <sup>FO</sup>	0.2 psi to 15 psi	33 $\mu$ psi/psi + 0.00005 psi	Ruska 2465, 2460 and 2481-700
	2 psi to 600 psi	59 $\mu$ psi/psi + 0.0035 psi	
	100 psi to 3 000 psi	0.011% of reading + 0.10 psi	
	1 000 psi to 30 000 psi	0.012% of reading + 1.1 psi	
	-5 psi to 5 psi	0.007 psi	Omega DPI-610
	-14 psi to -5 psi	0.07 psi	Ashcroft PTE-1, HQS-2
Torque Measure <sup>F</sup>	20 ozf•in to 80 ozf•in	0.6 ozf•in	Mountz BMX80Z BMX80Z50i BMX80250i BMX500F BMX1500F
	10 lbf•in to 50 lbf•in	0.4 lbf•in	
	50 lbf•in to 250 lbf•in	2 lbf•in	
	250 lbf•in to 500 lbf•in	4 lbf•in	
	50 lbf•ft to 1 500 lbf•ft	12 lbf•ft	
Torque Source <sup>F</sup>	10 lbf•in to 50 lbf•in	0.095% of reading + 0.001 5 lbf•in	Torque Wheel/Arm 5" & 10" Class F Weights
	50 lbf•in to 250 lbf•in	0.12% of reading - 0.011 lbf•in	
	250 lbf•in to 500 lbf•in	0.096% of reading + 0.050 lbf•in	
	50 lbf•ft to 250 lbf•ft	0.091% of reading + 0.003 8 lbf•ft	

### 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
Stop Watches/Timer <sup>FO</sup>	60 s to 86 400 s	0.6 s	NIST Broadcast Frequency Characteristics SP-960
Equipment to Measure Frequency <sup>FO</sup>	1 Hz to 40 Hz	0.02 Hz	Fluke 5500A
	40 Hz to 300 kHz	5 Hz	
	300 kHz to 1 MHz	0.4 kHz	
	1 MHz to 100 MHz	2 kHz	HP 8648A
	100 MHz to 500 MHz	0.01 MHz	
500 MHz to 1 GHz	0.02 MHz		



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## Precision Instrument Correction

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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
Humidity <sup>FO</sup>	Up to 40 % RH	1.2 % RH	Vaisala M170/HMP77
	40 % RH to 98 % RH	1.3 % RH	
Temperature Source <sup>FO</sup>	-25 °C to 140 °C	0.13 °C	EInst TCS140, w/ PRT 8167-25
	50 °C to 420 °C	0.29 °C	Techne DB700A w/ PRT 8167-25
Temperature Measure <sup>FO</sup>	-25 °C to 0 °C	0.089 °C (-) 0.028% of reading	Omega CL3001 with PRT 8167-25
	0 °C to 420 °C	0.014 % of reading + 0.082 °C	

1. 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.
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<sup>F</sup> 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<sup>O</sup> 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<sup>FO</sup> would mean that the laboratory performs this calibration at its fixed location and onsite at customer locations.



## *Certificate of Accreditation: Supplement*

### **Precision Instrument Correction**

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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.

