



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

ENDRESS+HAUSER, INC.
2350 Endress Place
Greenwood, IN 46143
Helmut Grohnert Phone: 317 535 7138

CALIBRATION

Valid To: January 31, 2019

Certificate Number: 3041.02

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Electrical – DC/Low Frequency⁴

Parameter/Equipment	Range	CMC ² (±)	Comments
DC Current – Measure	(0 to 100) µA 100 µA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (1 to 3) A	0.058 % of rdg + 0.025 % of rng 0.058 % of rdg + 0.006 % of rng 0.058 % of rdg + 0.020 % of rng 0.058 % of rdg + 0.005 % of rng 0.12 % of rdg + 0.010 % of rng 0.17 % of rdg + 0.020 % of rng	Agilent 34410A
	(0 to 50) mA	0.012 % of rdg + 1 µA	Martel 3001
DC Current – Generate	(0 to 100) mA	0.0059 % of rdg + 1 µA	Martel 3001
DC Voltage – Measure	(0 to 100) mV (0 to 1) V (0 to 10) V (0 to 100) V (100 to 1000) V	0.0059 % of rdg + 0.0035 % of rng 0.004 % of rdg + 0.0007 % of rng 0.0035 % of rdg + 0.0005 % of rng 0.0047 % of rdg + 0.0006 % of rng 0.0047 % of rdg + 0.0006 % of rng	Agilent 34410A
	(0 to 100) mV (0 to 1) V (0 to 10) V (0 to 100) V	0.0039 % of rdg + 3 µV 0.0038 % of rdg + 10 µV 0.0038 % of rdg + 100 µV 0.0039 % of rdg + 1 mV	Martel 3001
DC Voltage – Generate	(0 to 100) mV (0 to 1) V (0 to 10) V (0 to 100) V	0.0039 % of rdg + 3 µV 0.0038 % of rdg + 10 µV 0.0038 % of rdg + 100 µV 0.0039 % of rdg + 1 mV	Martel 3001
Thermocouple Output	(-10 to 75) mV	0.0038 % of rdg + 3 µV	Martel 3001

Parameter/Equipment	Range	CMC ² (±)	Comments
Resistance – Measure	(5 to 400) Ω 5 Ω to 4 kΩ	0.0041 % of rdg + 0.004 Ω 0.0041 % of rdg + 0.04 Ω	Martel 3001
Resistance – Generate	(5 to 400) Ω 5 Ω to 4 kΩ	0.026 Ω 0.40 Ω	Martel 3001

II. Fluid Quantities

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Flow Rate – Liquids			
Flowrig FCP1.0US			
Mass	(8 to 100) g/min	0.048 % of rdg	Gravimetric flow rig
Volumetric	(8 to 100) ml/min	0.049 % of rdg	
Flowrig FCP7.1.6US			
Mass	(0.2 to 190) kg/s	0.043 % of rdg	Gravimetric flow rig
Volumetric	(0.2 to 190) l/s	0.045 % of rdg	
Mass	(0.2 to 190) kg/s	0.047 % of rdg	Gravimetric flow rig w/Coriolis reference standards
Volumetric	(0.2 to 190) l/s	0.049 % of rdg	
Flowrate ³ – Liquids (Field)			
Mass	(0.01 to 0.125) kg/s	0.12 %	Inline Coriolis master meter 83A02, 83A04
Volumetric	(0.01 to 0.125) l/s	0.3 %	
Mass	(0.02 to 18) kg/s	0.12 %	Portable flow calibration rig or inline with Coriolis master meters 83F08, 83F25, 83F50
Volumetric	(0.02 to 18) l/s	0.17 %	
Mass	(17 to 50) kg/s	0.12 %	Inline Coriolis master meter 83F80
Volumetric	(17 to 50) l/s	0.17 %	
Volumetric	(2 to 40) l/s	0.32 %	Inline electromagnetic master meter 53H50, 53H80

III. Mechanical

Parameter/Equipment	Range	CMC ² (±)	Comments
Pressure – Gauges and Transducers			
Gauge, Pneumatic	(0.13 to 165) psia (0.13 to 315) psia (0.13 to 1515) psia (atm to 7.5) psig (atm to 15) psig (atm to 30) psig (atm to 60) psig (atm to 165) psig	0.013 % Full Scale (FS) 0.013 % FS 0.013 % FS 0.013 % FS 0.013 % FS 0.013 % FS 0.013 % FS 0.013 % FS	Mensor CPC6000
Differential	(-14.7 to 500) psid	0.013 % FS	
Gauge, Pneumatic/ Hydraulic	(600 to 10,000) psig	0.013 % FS	Mensor CPG2500
Pressure ³ – Gauges and Transducers (Field)			Fluke 74x/75x Series:
Differential	(0 to 1) inH ₂ O (0 to 10) inH ₂ O (0 to 5) psid	0.32 % FS 0.25 % FS 0.072 % FS	w/ 700P00 w/ 700P01 w/ 700P03 / 700P23
Gauge	(-15 to 100) psig (0 to 30) psig (0 to 500) psig	0.044 % FS 0.044 % FS 0.044 % FS	w/ 700PD6 w/ 700P05 w/ 700P07
Gauge, Hydraulic	(0 to 1000) psig (0 to 5000) psig	0.044 % FS 0.1 % FS	w/ 700P08 w/ 700P30
Absolute	(0.75 to 100) psia	0.084 % FS	w/ 700PA6

IV. Thermodynamic

Parameter/Equipment	Range	CMC ² (±)	Comments
Temperature – Measuring Equipment	(-40 to 200) °C (35 to 200) °C (-10 to 125) °C	0.030 °C 0.053 °C 0.07 °C	Liquid bath w/SPRT and thermometer Dry block w/SPRT and thermometer

Parameter/Equipment	Range	CMC ² (±)	Comments
Temperature ³ – Measuring Equipment (Field)	(-5 to 125) °C	0.087 °C	Liquid bath w/SPRT and thermometer
	(35 to 200) °C	0.097 °C	
	(50 to 100) °C	0.30 °C	Dry block w/SPRT and thermometer
	(100 to 375) °C	0.60 °C	

V. Time & Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
Frequency – Measure	1 Hz to 110 kHz	0.0013 % of rdg	Philips PM6671 Agilent 34410A
	(3 to 5) Hz	0.081 % of rdg	
	(5 to 10) Hz	0.047 % of rdg	
	(10 to 40) Hz	0.023 % of rdg	
	40 Hz to 300 kHz	0.0082 % of rdg	
Frequency – Measuring Equipment	10 Hz to 15 MHz	0.0026 % of rdg + 3 pHz	Agilent 33220A

¹ This laboratory offers commercial calibration service and field calibration service.

² Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

³ Field calibration service is available for this calibration and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

⁴ It is common practice for the laboratory to perform calibration of electrical parameters associated with one of the above calibration methods as it is related to the process instrument. In many cases, the calibration of electrical parameters (i.e. voltage, current, frequency, etc.) is required to determine the value of a flow, pressure, or temperature variable in a system where a transmitter or remote indicating device is one component in the whole system being calibrated. It is not the practice of the laboratory to perform calibration of electrical parameters on electrical equipment (i.e. digital multi-meters, oscilloscopes, etc.) for customers and is not intended to be perceived that way in the scope of accreditation.

⁵ In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.



Accredited Laboratory

A2LA has accredited

ENDRESS+HAUSER, INC.

Greenwood, IN

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSLII Z540-1-1994 *and R205 – Specific Requirements: Calibration Laboratory Accreditation Program*. 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 8 January 2009).

Presented this 7th day of October 2016.



A handwritten signature in blue ink, reading "Jim C. Burt".

Senior Director of Quality and Communications
For the Accreditation Council
Certificate Number 3041.02
Valid to January 31, 2019

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.