



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Shepherd Instruments and Controls, Ltd.
103-19705 56th Ave.
Langley, BC V3A 3X7

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: 29 September 2022

Certificate Number: AC-2910



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

Shepherd Instruments and Controls, Ltd.

103-19705 56th Ave.
Langley, BC V3A 3X7
Claudio UGO 604-299-6300

CALIBRATION

Valid to: **September 29, 2022**

Certificate Number: **AC-2910**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage - Source	(2.2 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V 200 V to 1 kV	0.0073 mV 0.042 mV 0.23 mV 6.9 mV 22 mV	Transmille 4010 Advanced Calibrator
DC Voltage - Measure	100 mV 1 V 10V 100 V 1 000 V	0.0015 mV 0.0034 mV 0.071 mV 0.88 mV 1.9 V	Transmille 8104 Advanced 8.5-digit Multimeter
DC Current - Source	(2.2 to 200) μ A 200 μ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 30) A	0.031 μ A 0.11 μ A 0.0012 mA 0.015 mA 0.24 mA 13 mA	Transmille 4010 Advanced Calibrator
DC Current - Measure	100 μ A 1 mA 10 mA 100 mA 1 A 10 A 30 A	0.0022 μ A 0.02 μ A 0.21 μ A 5.4 μ A 0.23 mA 6.7 mA 28 mA	Transmille 8104 Advanced 8.5-digit Multimeter
AC Voltage - Source	(20 to 200) mV 10 Hz to 1 kHz (1 to 500) kHz	0.073 mV 1.1 mV	Transmille 4010 Advanced Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage - Source	200 mV to 2 V		Transmille 4010 Advanced Calibrator
	10 Hz to 1 kHz	0.57 mV	
	(1 to 100) kHz	1.9 mV	
	100 kHz to 1 MHz	7.9 mV	
	2 V to 20 V		
	10 Hz to 1 kHz	5 mV	
	(1 to 100) kHz	17 mV	
AC Voltage - Measure	20 V to 200 V		Transmille 8104 Advanced 8.5-digit Multimeter
	30 Hz to 1 kHz	0.097 V	
	(1 to 40) kHz	0.6 V	
	200 V to 1 kV		
AC Current - Source	30 Hz to 10 kHz	0.75 V	Transmille 4010 Advanced Calibrator
	(0 to 100) mV		
	10 Hz to 1 kHz	44 μ V	
	(1 to 100) kHz	0.17 mV	
	(0.1 to 1) V		
	10 Hz to 1 kHz	0.33 mV	
	(1 to 100) kHz	1.6 mV	
	100 kHz to 1 MHz	42 mV	
	(1 to 10) V		
	10 Hz to 1 kHz	2.8 mV	
	(1 to 100) kHz	16 mV	
	(10 to 100) V		
	10 Hz to 1 kHz	41 mV	
(1 to 100) kHz	0.22 V		
100 V to 1 kV			
40 Hz to 1 kHz	0.58 V		
(1 to 10) kHz	0.87 V		
AC Current - Source	(25 to 200) μ A		Transmille 4010 Advanced Calibrator
	10 Hz to 1 kHz	0.36 μ A	
	(1 to 30) kHz	4.2 μ A	
	(0.2 to 2) mA		
	40 Hz to 1 kHz	1.8 μ A	
	(1 to 30) kHz	24 μ A	
	(2 to 20) mA		
	10 Hz to 1 kHz	0.018 mA	
	(1 to 30) kHz	0.12 mA	
	(20 to 200) mA		
40 Hz to 1 kHz	0.15 mA		
(1 to 30) kHz	0.15 mA		

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current - Source	(0.2 to 2) A 10 Hz to 1 kHz (1 to 30) kHz (2 to 30) A 30 Hz to 1 kHz (1 to 10) kHz	2.1 mA 64 mA 0.11 A 0.16 A	Transmille 4010 Advanced Calibrator
AC Current - Measure	(0 to 100) μ A 10 Hz to 1 kHz (1 to 10) kHz (0.1 to 1) mA 10 Hz to 1 kHz (1 to 10) kHz (1 to 10) mA 10 Hz to 1 kHz (1 to 10) kHz (10 to 100) mA 10 Hz to 1 kHz (1 to 10) kHz (0.1 to 1) A 10 Hz to 1 kHz (1 to 10) kHz (1 to 10) A 10 Hz to 1 kHz (10 to 30) A 10 Hz to 1 kHz	0.053 μ A 0.12 μ A 0.53 μ A 1.2 μ A 5.3 μ A 12 μ A 56 μ A 130 μ A 0.7 mA 1.5 mA 13 mA 39 mA	Transmille 8104 Advanced 8.5-digit Multimeter
Resistance - Source	100 Ω 1 k Ω 10 k Ω 100 k Ω 1 M Ω 10 M Ω 100 M Ω 1 G Ω	2.6 Ω 2.6 Ω 2.7 Ω 11 Ω 2.4 k Ω 1.2 k Ω 0.13 M Ω 20 M Ω	Transmille 4010 Advanced Calibrator
Resistance - Two Wire Source	0 Ω 0.1 Ω 1 Ω 10 Ω 100 Ω 1 k Ω 10 k Ω	0.016 Ω 0.017 Ω 0.018 Ω 0.031 Ω 0.029 Ω 0.049 Ω 0.42 Ω	Transmille 4010 Advanced Calibrator



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Electrical – DC/Low Frequency

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Resistance - Two Wire Source	100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 000 MΩ	3.0 Ω 42 Ω 2.5 k Ω 0.32 M Ω 12 M Ω	Transmille 4010 Advanced Calibrator
Resistance - Two Wire Measure	100 kΩ 1 MΩ 10 MΩ 100 MΩ 1 GΩ	2.3 Ω 34 Ω 2.1 k Ω 160 k Ω 3.4 M Ω	Transmille 8104 Advanced 8.5 digit Multimeter
Resistance - Four Wire Source	100 mΩ 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ	0.26 mΩ 0.0069 Ω 0.0067 Ω 0.017 Ω 0.028 Ω 0.22 Ω 3.4 Ω	Transmille 4010 Advanced Calibrator
Resistance - Four Wire Measure	1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ	27 μΩ 270 μΩ 2.4 mΩ 20 mΩ 220 mΩ 2.5 Ω	Transmille 8104 Advanced 8.5 digit Multimeter
Electrometer Voltage Output	(10 to 100) V (100 to 300) V	24 mV 28 mV	Transmille 8104 Advanced 8.5 digit Multimeter
Electrometer Current Output	10 nA 100 nA 1 μA 10 μA	0.22 nA 0.33 nA 0.41 nA 0.65 nA	Transmille 8104 Advanced 8.5 digit Multimeter
PT100 PRT Resistance	(-100 to 800) °C	0.11 °C	Transmille 4010 Advanced Calibrator
Capacitance @ 1 kHz	(1 to 10) nF 100 nF (1 to 10) μF	0.048 nF 0.34 nF 0.075 μF	Transmille 4010 Advanced Calibrator
Variable Capacitance	10 μF range 100 μF range 1 mF range 10 mF range 100 mF range	0.08 μF 0.78 μF 8.8 μF 9.4 μF 0.59 mF	Transmille 4010 Advanced Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Inductance @ 1 kHz	1 mH	0.006 2 mH	Transmille 4010 Advanced Calibrator
	10 mH	0.088 mH	
	20 mH	0.18 mH	
	30 mH	0.2 mH	
	50 mH	0.34 mH	
	100 mH	0.68 mH	
	1 H	6.7 mH	
	10 H	78 mH	
A/D Input	± 10 V	0.001 2 Vdc	Transmille 4010 Advanced Calibrator
Electrical Simulation of Thermocouple Devices	Type K (-190 to 100) °C	0.014 °C	Transmille 4010 Advanced Calibrator & Thermocouple Simulator
	(>100 to 1 370) °C	0.036 °C	
	Type J (-200 to 1 200) °C	0.25 °C	
	Type T (-240 to 400) °C	0.14 °C	
	Type R (0 to 1 760) °C	0.61 °C	
	Type S (0 to 1 760) °C	0.61 °C	
	Type N (-190 to 1 300) °C	0.30 °C	
	Type B (600 to 1 820) °C	0.64 °C	
	Type E (-240 to 1 000) °C	0.22 °C	
	Type L (-200 to 900) °C	0.40 °C	
	Type U (-200 to 600) °C	0.35 °C	
	Type C (10 to 2 316) °C	0.82 °C	

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Micrometer	(0 to 2) inches	49 μ inches	Gauge Blocks

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers	up to 11 inches	290 μ inches	Gauge Blocks & Micrometer Standards

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Torque Tools	(0.4 to 20) N·m (20 to 200) Nm (100 to 1 000) Nm (300 to 3 000) Nm	0.12 N·m 0.88 N·m 4.1 N·m 13 N·m	Stahlwille Torque Tester
Pressure	(0 to 35) psi (35 to 500) psi	0.004 2 psi 0.099 psi	Pressure Monitor DHI RPM4 A3.5Ms/A35OKs
Pressure	(100 to 1 000) psi (1 000 to 10 000) psi	2.1 psi 26 psi	Pressure Transducer Druck PDCR 2200-A145

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature - Measure	(-50 to 610) °C	0.055 °C	Temperature Probe 935-14-95H & Transmille 8104 Advanced 8.5 digit Multimeter

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency - Generate	100 Hz 1 kHz 10 kHz 20 kHz 50 kHz 100 kHz 1 MHz 10 MHz	0.000 43 Hz 0.002 Hz 0.011 Hz 0.071 Hz 0.059 Hz 0.11 Hz 1.6 Hz 12 Hz	Transmille 4010 Advanced Calibrator

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency - Measure	10 Hz @ 1V 100 Hz @ 1V 1 kHz @ 1V 10 kHz @ 1V 100 kHz @ 1V 1 MHz @ 1V	01 Hz 0.1 Hz 0.1 Hz 0.11 Hz 0.15 Hz 2.8 Hz	Transmille 8104 Advanced 8.5-digit Multimeter
Tachometers	(60 to 3 000) rpm (> 3 000 to 60 000) rpm	0.18 rpm 2.6 rpm	Transmille Optical Tachometer

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. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2910.



R. Douglas Leonard Jr., VP, PILR SBU

