



# CERTIFICATE OF ACCREDITATION

**The ANSI National Accreditation Board**

Hereby attests that

**Shepherd Instruments and Controls, Ltd.**  
**103-19705 56<sup>th</sup> 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](http://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 2024

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, 2024**

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	0.007 3 mV	Transmille 4010 Advanced Calibrator
	200 mV to 2 V	0.042 mV	
	(2 to 20) V	0.23 mV	
	(20 to 200) V	6.9 mV	
	200 V to 1 kV	22 mV	
DC Voltage - Measure	100 mV	0.001 5 mV	Transmille 8104 Advanced 8½ digit Multimeter
	1 V	0.003 4 mV	
	10V	0.071 mV	
	100 V	0.88 mV	
	1 000 V	1.9 mV	
	(1 to 40) kV	0.025 kV	Fluke 80k-40 High Voltage Probe
DC Current - Source	(2.2 to 200) µA	0.031 µA	Transmille 4010 Advanced Calibrator
	200 µA to 2 mA	0.11 µA	
	(2 to 20) mA	0.001 2 mA	
	(20 to 200) mA	0.015 mA	
	200 mA to 2 A	0.24 mA	
DC Current - Measure	(2 to 30) A	13 mA	Transmille 8104 Advanced 8½ digit Multimeter
	100 µA	0.002 2 µA	
	1 mA	0.02 µA	
	10 mA	0.21 µA	
	100 mA	5.4 µA	
	1 A	0.23 mA	
AC Voltage - Source	10 A	6.7 mA	Transmille 4010 Advanced Calibrator
	30 A	28 mA	
	(20 to 200) mV	0.073 mV	
	10 Hz to 1 kHz	1.1 mV	
	(1 to 500) kHz		

**Electrical – DC/Low Frequency**

<b>Parameter/Equipment</b>	<b>Range</b>	<b>Expanded Uncertainty of Measurement (+/-)</b>	<b>Reference Standard, Method, and/or Equipment</b>
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 8½ digit Multimeter
	30 Hz to 1 kHz	0.097 V	
	(1 to 40) kHz	0.6 V	
	200 V to 1 kV		
AC Voltage - Measure	30 Hz to 10 kHz	0.75 V	Fluke 80k-40 High Voltage Probe
	(0 to 100) mV		
	10 Hz to 1 kHz	44 µV	
	(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		
AC Current - Source	(10 to 100) V		Transmille 4010 Advanced Calibrator
	10 Hz to 1 kHz	41 mV	
	(1 to 100) kHz	0.22 V	
	100 V to 1 kV		
AC Current - Source	40 Hz to 1 kHz	0.58 V	Transmille 4010 Advanced Calibrator
	(1 to 10) kHz	0.87 V	
	(1 to 10) kV		
	(50 to 60) Hz	0.06 kV	
	(25 to 200) µA		
	10 Hz to 1 kHz	0.36 µA	
	(1 to 30) kHz	4.2 µA	
	(0.2 to 2) mA		
	40 Hz to 1 kHz	1.8 µA	
	(1 to 30) kHz	24 µA	
(2 to 20) mA			
10 Hz to 1 kHz	0.018 mA		
(1 to 30) kHz	0.12 mA		

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current - Source	(20 to 200) mA 40 Hz to 1 kHz (1 to 30) kHz (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	0.15 mA 0.15 mA 2.1 mA 64 mA 0.11 A 0.16 A	Transmille 4010 Advanced Calibrator
AC Current - Measure	(0 to 100) $\mu$ 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 $\mu$ A 0.12 $\mu$ A 0.53 $\mu$ A 1.2 $\mu$ A 5.3 $\mu$ A 12 $\mu$ A 56 $\mu$ A 130 $\mu$ A 0.7 mA 1.5 mA 13 mA 39 mA	Transmille 8104 Advanced 8½ digit Multimeter
Resistance - Source	100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$ 10 M $\Omega$ 100 M $\Omega$ 1 G $\Omega$	2.6 $\Omega$ 2.6 $\Omega$ 2.7 $\Omega$ 11 $\Omega$ 2.4 k $\Omega$ 1.2 k $\Omega$ 0.13 M $\Omega$ 20 M $\Omega$	Transmille 4010 Advanced Calibrator

**Electrical – DC/Low Frequency**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance - Two Wire Source	0 $\Omega$	0.016 $\Omega$	Transmille 4010 Advanced Calibrator
	0.1 $\Omega$	0.017 $\Omega$	
	1 $\Omega$	0.018 $\Omega$	
	10 $\Omega$	0.031 $\Omega$	
	100 $\Omega$	0.029 $\Omega$	
	1 k $\Omega$	0.049 $\Omega$	
	10 k $\Omega$	0.42 $\Omega$	
Resistance - Two Wire Source	100 k $\Omega$	3 $\Omega$	Transmille 4010 Advanced Calibrator
	1 M $\Omega$	42 $\Omega$	
	10 M $\Omega$	2.5 k $\Omega$	
	100 M $\Omega$	0.32 M $\Omega$	
	1 000 M $\Omega$	12 M $\Omega$	
Resistance - Two Wire Measure	100 k $\Omega$	2.3 $\Omega$	Transmille 8104 Advanced 8½ digit Multimeter
	1 M $\Omega$	34 $\Omega$	
	10 M $\Omega$	2.1 k $\Omega$	
	100 M $\Omega$	160 k $\Omega$	
	1 G $\Omega$	3.4 M $\Omega$	
Resistance - Four Wire Source	100 m $\Omega$	0.26 m $\Omega$	Transmille 4010 Advanced Calibrator
	1 $\Omega$	0.006 9 $\Omega$	
	10 $\Omega$	0.006 7 $\Omega$	
	100 $\Omega$	0.017 $\Omega$	
	1 k $\Omega$	0.028 $\Omega$	
	10 k $\Omega$	0.22 $\Omega$	
	100 k $\Omega$	3.4 $\Omega$	
Resistance - Four Wire Measure	1 $\Omega$	27 $\mu\Omega$	Transmille 8104 Advanced 8½ digit Multimeter
	10 $\Omega$	270 $\mu\Omega$	
	100 $\Omega$	2.4 m $\Omega$	
	1 k $\Omega$	20 m $\Omega$	
	10 k $\Omega$	220 m $\Omega$	
	100 k $\Omega$	2.5 $\Omega$	
Electrometer Voltage Output	(10 to 100) V	24 mV	Transmille 8104 Advanced 8½ digit Multimeter
	(100 to 300) V	28 mV	
Electrometer Current Output	10 nA	0.22 nA	Transmille 8104 Advanced 8½ digit Multimeter
	100 nA	0.33 nA	
	1 $\mu$ A	0.41 nA	
	10 $\mu$ A	0.65 nA	
PT100 PRT Resistance	(-100 to 800) $^{\circ}$ C	0.11 $^{\circ}$ C	Transmille 4010 Advanced Calibrator
Capacitance @ 1 kHz	(1 to 10) nF	0.048 nF	Transmille 4010 Advanced Calibrator
	100 nF	0.34 nF	
	(1 to 10) $\mu$ F	0.075 $\mu$ F	

**Electrical – DC/Low Frequency**

<b>Parameter/Equipment</b>	<b>Range</b>	<b>Expanded Uncertainty of Measurement (+/-)</b>	<b>Reference Standard, Method, and/or Equipment</b>
Variable Capacitance	10 $\mu$ F range 100 $\mu$ F range 1 mF range 10 mF range 100 mF range	0.08 $\mu$ F 0.78 $\mu$ F 8.8 $\mu$ F 9.4 $\mu$ F 0.59 mF	Transmille 4010 Advanced Calibrator
Inductance @ 1 kHz	1 mH 10 mH 20 mH 30 mH 50 mH 100 mH 1 H 10 H	0.006 2 mH 0.088 mH 0.18 mH 0.2 mH 0.34 mH 0.68 mH 6.7 mH 78 mH	Transmille 4010 Advanced Calibrator
A/D Input	$\pm$ 10 V	0.001 2 Vdc	Transmille 4010 Advanced Calibrator
Electrical Simulation of Thermocouple Devices	Type K (-190 to 100) $^{\circ}$ C (>100 to 1 370) $^{\circ}$ C Type J (-200 to 1 200) $^{\circ}$ C Type T (-240 to 400) $^{\circ}$ C Type R (0 to 1 760) $^{\circ}$ C Type S (0 to 1 760) $^{\circ}$ C Type N (-190 to 1 300) $^{\circ}$ C Type B (600 to 1 820) $^{\circ}$ C Type E (-240 to 1 000) $^{\circ}$ C	0.014 $^{\circ}$ C 0.036 $^{\circ}$ C 0.25 $^{\circ}$ C 0.14 $^{\circ}$ C 0.61 $^{\circ}$ C 0.61 $^{\circ}$ C 0.3 $^{\circ}$ C 0.64 $^{\circ}$ C 0.22 $^{\circ}$ C	Transmille 4010 Advanced Calibrator & Thermocouple Simulator
Electrical Simulation of Thermocouple Devices	Type L (-200 to 900) $^{\circ}$ C Type U (-200 to 600) $^{\circ}$ C Type C (10 to 2 316) $^{\circ}$ C	0.4 $^{\circ}$ C 0.35 $^{\circ}$ C 0.82 $^{\circ}$ C	Transmille 4010 Advanced Calibrator & Thermocouple Simulator

**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Micrometer	Up to 2 inches	49 $\mu$ in	Gauge Blocks
Calipers	Up to 11 inches	290 $\mu$ in	Gauge Blocks & Micrometer Standards
Gage Blocks	(0.5 to 100) mm (100 to 500) mm (500 to 1 000) mm	0.21 $\mu$ m 2.6 $\mu$ m 7.6 $\mu$ m	Universal Length Measuring Machine
Ring Gauges	up to 10 mm (10 to 50) mm (50 to 100) mm (100 to 200) mm	1.1 $\mu$ m 1.9 $\mu$ m 2 $\mu$ m 3.5 $\mu$ m	Universal Length Measuring Machine
Feeler Gauges	(0.0015 to 0.035) in	59 $\mu$ in	Universal Length Measuring Machine
Test Indicators	up to 0.060 in	59 $\mu$ in	Universal Length Measuring Machine
Plug Gauges	(0.004 to 1.00) in (10 to 100) mm	0.091 $\mu$ m 0.64 $\mu$ m	Universal Length Measuring Machine
Pin Gauges	(0.004 to 1.00) in	59 $\mu$ inches	Universal Length Measuring Machine
Threaded Plug Gauges	up to 1 in (1 to 4) in (4 to 7) in	92 $\mu$ in 96 $\mu$ in 110 $\mu$ in	Universal Length Measuring Machine
Threaded Ring Gauges	up to 1 in (1 to 4) in (4 to 7) in	62 $\mu$ in 68 $\mu$ in 92 $\mu$ in	Universal Length Measuring Machine
Thread Wires	up to 1 in	59 $\mu$ in	Universal Length Measuring Machine
Indicators (Dial, Digital, Drop)	up to 1 in (1 to 4) in (4 to 7) in	60 $\mu$ in 62 $\mu$ in 67 $\mu$ in	Universal Length Measuring Machine
Taper Thread Plug Gauges	up to 1 in (1 to 3) in	100 $\mu$ in 100 $\mu$ in	Universal Length Measuring Machine
Taper Thread Ring Gauges	up to 1 in (1 to 3) in	75 $\mu$ in 79 $\mu$ in	Universal Length Measuring Machine

**Length – Dimensional Metrology**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Universal Length Measuring Machine	up to 1.5 mm	0.22 $\mu\text{m}$	Gauge Blocks (Grade 0)
	(1.5 to 10) mm	0.15 $\mu\text{m}$	
	(10 to 50) mm	0.29 $\mu\text{m}$	
	(50 to 100) mm	1.0 $\mu\text{m}$	
	(100 to 200) mm	1.3 $\mu\text{m}$	
	(200 to 300) mm	3.3 $\mu\text{m}$	
	(300 to 400) mm	3.9 $\mu\text{m}$	
(400 to 1 000) mm	6.3 $\mu\text{m}$		

**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	0.12 N·m	Stahlwille Torque Tester
	(20 to 200) Nm	0.88 N·m	
	(100 to 1 000) Nm	4.1 N·m	
	(300 to 3 000) Nm	13 N·m	
Pressure	(0 to 35) psi	0.004 2 psi	Pressure Monitor DHI RPM4 A3.5Ms/A35OKs
	(35 to 500) psi	0.099 psi	
Pressure	(100 to 1 000) psi	2.1 psi	Pressure Transducer Druck PDCR 2200-A145
	(1 000 to 10 000) psi	26 psi	
Scales and Balances	(1 to 500) mg	0.44 mg	STM Class 5 Weights
	500 mg to 5 g	1.5 mg	
	(5 to 100) g	10 mg	
	(100 to 500) g	35 mg	
	500 g to 1 kg	58 mg	
	(1 to 20) kg	0.29 g	

**Thermodynamic**

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature - Measure	(-50 to 610) °C	0.044 °C	Temperature Probe 935-14-95H & Transmille 8104 Advanced 8½ 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
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 8½ 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