CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Instech Calibration Services cc
5 Marignane Drive, Bonaero Park
Kempton Park, South Africa, 1619

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.

Jason Stine, Vice President

Expiry Date: 25 September 2024

Certificate Number: L2428

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

Instech Calibration Services cc

5 Marignane Drive, Bonaero Park
Kempton Park, South Africa, 1619
Riaan van Niekerk, sales@instech.co.za Tel: +27 (11) 973 4176

CALIBRATION

Valid to: **September 25, 2024** Certificate Number: **L2428**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Capacitance – Measure [1]	(1 to 20) nF (20 to 200) nF 200 nF to 2 µF (2 to 20) µF (20 to 200) µF 200 µF to 2 mF (2 to 10) mF	23 pF 0.16 nF 1.6 nF 0.10 µF 1.1 µF 11 µF 51 µF	Fluke 8588A Reference Multimeter
Capacitance – Source [1]	(220.0 to 399.9) pF (0.4 to 10.999) nF (11 to 32.999) nF (33 to 109.99) nF (110 to 329.99) nF (0.33 to 1.099 9) µF (1.1 to 3.299 9) µF (3.3 to 10.999) µF (11 to 32.999) µF (33 to 109.99) µF (110 to 329.99) µF (0.33 to 1.099 9) mF (1.1 to 3.299 9) mF (3.3 to 10.999) mF	12 pF 3 pF 0.15 nF 0.29 nF 1.1 nF 2.9 nF 10 nF 29 nF 0.23 µF 0.79 µF 1.5 µF 6 µF 0.03 mF 0.08 mF	Fluke 5502A Multiproduct Calibrator
DC Current – Measure [1]	(0 to 200) µA 200 µA to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A	2.5 pA 24 pA 0.32 µA 13 µA 0.36 mA	Fluke 8588A Reference Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Measure [1]	(2 to 10) A (10 to 20) A	2.8 mA 16 mA	Fluke 8588A Reference Multimeter
	(10 to 1 025) A	2.3 % of Reading	Fluke 376 Clamp Meter
	(10 to 600) A	0.22 % of reading	Fluke 8846A Multimeter with DC Shunt
DC Current – Generate [1]	(0 to 329.999) µA (330 to 3.299 99) mA (3.3 to 32.999 9) mA (33 to 329.999) mA (0.33 to 1.099 99) A (1.1 to 2.999 99) A (3.3 to 10.999 9) A (11 to 20.5) A	0.06 µA 0.32 µA 2.9 µA 29 µA 0.4 mA 10 mA 5.1 mA 17 mA	Fluke 5502A Multiproduct Calibrator
DC Current – Simulate [1] Clamp Meters	(20.5 to 1 025) A	0.48 % of output	Fluke 5502A Multiproduct Calibrator & Current Coil
AC Current – Measure [1]	10 Hz to 5 kHz (0 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A (1 to 10) A (10 to 20) A	 2.1 µA 2.4 µA 7.7 µA 66 µA 0.72 mA 11 mA 20 mA	Fluke 8588A Reference Multimeter
	(10 to 1 025) A (10 to 100) Hz	2.3 % of reading	Fluke 376 Clamp Meter
	(10 to 1 500) A (10 to 100) Hz	0.38 % of reading	Current Transformer with Fluke 8846A Multimeter
AC Current – Generate [1]	(0.03 to 0.33) mA (10 to 20) Hz (20 to 45) Hz (45 Hz to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	 3.1 µA 2.2 µA 2.2 µA 2.3 µA 3.1 µA 4.9 µA	Fluke 5502A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Generate [1]	(0.33 to 3.3) mA		Fluke 5502A Multiproduct Calibrator
	(10 to 20) Hz	5.2 µA	
	(20 to 45) Hz	6 µA	
	(45 Hz to 1) kHz	4.1 µA	
	(1 to 5) kHz	6.1 µA	
	(5 to 10) kHz	14 µA	
	(10 to 30) kHz	26 µA	
	(3.3 to 33) mA		
	(10 to 20) Hz	52 µA	
	(20 to 45) Hz	32 µA	
	45 Hz to 1 kHz	17 µA	
	(1 to 5) kHz	25 µA	
	(5 to 10) kHz	55 µA	
	(10 to 30) kHz	0.11 mA	
	(33 to 330) mA		
	(10 to 20) Hz	0.5 mA	
	(20 to 45) Hz	0.3 mA	
	(45 Hz to 1) kHz	0.17 mA	
	(1 to 5) kHz	0.36 mA	
	(5 to 10) kHz	0.6 mA	
	(10 to 30) kHz	1.2 mA	
	(0.33 to 1.1) A		
	(10 to 45) Hz	1.7 mA	
	(0.45 to 1) Hz	0.59 mA	
	(1 to 5) kHz	5.9 mA	
	(5 to 10) kHz	25 mA	
	(1.1 to 3) A		
	(10 to 45) Hz	4.7 mA	
	(0.45 to 1) Hz	2.1 mA	
	(1 to 5) kHz	15 mA	
	(5 to 10) kHz	62 mA	
	(3 to 11) A		
	45 to 100 Hz	8.3 mA	
	100 Hz to 1 kHz	11 mA	
	1 kHz to 5 kHz	0.24 A	
	(11 to 20.5) A		
	45 to 100 Hz	0.02A	
	100 Hz to 1 kHz	0.16A	
	1 kHz to 5 kHz	0.47A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current – Simulate [1] Clamp Meters	(20.5 to 1025) A (45 to 65) Hz (65 to 440) Hz	 0.3 % of reading 0.7 % of reading	Fluke 5502A Multiproduct Calibrator & Current Coil
DC Power – Generate [1]	33 mV to 1 020 V 3.3 mA to 20.5 A	 0.1 % of reading	Fluke 5502A Multiproduct Calibrator
AC Power – Generate [1] PF = 1	33 mV to 1 020 V 3.3 mA to 20.5A (45 to 65) Hz	 0.2 % of reading	Fluke 5502A Multiproduct Calibrator
Resistance – Measure [1]	(0 to 20) Ω (20 to 200) Ω (0.2 to 2) kΩ (2 to 20) kΩ (20 to 200) kΩ (0.2 to 2) MΩ (2 to 20) MΩ (20 to 200) MΩ (0.2 to 2) GΩ	0.62 mΩ 2.2 mΩ 22 mΩ 0.24 Ω 6.1 Ω 40 Ω 2.1 kΩ 40 kΩ 4.5 MΩ	Fluke 8588A Reference Multimeter
HV Resistance Measure [1]	(1 to 20) MΩ (20 to 200) MΩ (0.2 to 2) GΩ (2 to 20) GΩ	5.3 kΩ 20 kΩ 1.4 MΩ 30 MΩ	Fluke 8588A Reference Multimeter
Resistance – Generate [1]	(0.001 to 33) Ω (33 to 330) Ω 330 Ω to 3.3 kΩ (3.3 to 33) kΩ (33 to 330) kΩ 330 kΩ to 3.3 MΩ (3.3 to 33) MΩ (33 to 330) MΩ (330 to 1 100) MΩ	0.013 % of reading 0.007 % of reading 0.01 % of reading 0.007 % of reading 0.01 % of reading 0.012 % of reading 0.08 % of reading 0.4 % of reading 1.2 % of reading	Fluke 5502A Multiproduct Calibrator
	(0.1 to 100) MΩ 1 GΩ 10 GΩ	1.4 % of reading 12 MΩ 28 MΩ	High Voltage Reference Resistance Box
Temperature Simulation for RTD Temperature Indicators [1]	PT385, 100 Ω (-200 to 100) °C (100 to 630) °C (630 to 800) °C PT385, 1 000 Ω (-200 to 100) °C (100 to 600) °C	 0.06 °C 0.1 °C 0.18 °C 0.04 °C 0.06 °C	Fluke 5502A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage – Measure [1]	(0 to 200) mV (0.2 to 2) V (2 to 20) V (20 to 200) V (200 to 1 000) V	3.1 µV 14 µV 0.15 mV 1.6 mV 7.6 mV	Fluke 8588A Reference Multimeter
High DC Voltage – Measure [1]	(1 to 40) kV	1.7 % of reading	Fluke 80k-40 High Voltage Probe with Multimeter
High DC Voltage – Measure [1]	(20 to 200) kV	0.8 % of reading	High Voltage Divider
DC Voltage – Generate [1]	(0 to 330) mV (0.33 to 3.3) V (3.3 to 33) V (33 to 330) V (100 to 1 020) V	18 µV 0.14 mV 1.4 mV 15 mV 45 mV	Fluke 5502A Multiproduct Calibrator
High DC Voltage – Measuring Systems/Devices [1]	(1 to 30) kV	2.6 % of reading	Fluke 80k-40 with Multimeter and Power Supply
AC Voltage – Measure [1]	10 Hz to 30 kHz (0 to 10) mV (10 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1 000) V 30 kHz to 100 kHz (0 to 10) mV (10 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V 100 kHz to 300 kHz (0 to 10) mV (10 to 100) mV (0.1 to 1) V (1 to 10) V	 7.8 µV 27 µV 0.25 mV 2.5 mV 25 mV 0.31 V 32 µV 0.06 mV 0.59 mV 5.9 mV 0.06 V 0.11 mV 0.24 mV 2.4 mV 31 mV	Fluke 8588A Reference Multimeter
High AC Voltage – Measure [1]	(1 to 28) kV 50 Hz	 5.9 % of reading	Fluke 80k-40 High Voltage Probe with Multimeter
High AC Voltage – Measure [1]	50 Hz (20 to 200) kV	 1.3 % of reading	High Voltage Divider

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Generate [1]	(1 to 33) mV		Fluke 5502A Multiproduct Calibrator
	(10 to 45) Hz	54 µV	
	45 Hz to 10 kHz	37 µV	
	(10 to 20) kHz	56 µV	
	(20 to 50) kHz	69 µV	
	(50 to 100) kHz	0.12 mV	
	(100 to 500) kHz	0.33 mV	
	(33 to 330) mV		
	(10 to 45) Hz	0.15 mV	
	45 Hz to 10 kHz	0.09 mV	
	(10 to 20) kHz	0.2 mV	
	(20 to 50) kHz	0.29 mV	
	(50 to 100) kHz	0.72 mV	
	(0.33 to 3.3) V		
	(10 to 45) Hz	1.4 mV	
	45 Hz to 10 kHz	0.82 mV	
	(10 to 20) kHz	1.9 mV	
	(20 to 50) kHz	2.6 mV	
	(50 to 100) kHz	6 mV	
	(100 to 500) kHz	14 mV	
	(3.3 to 33) V		
	(10 to 45) Hz	14 mV	
	45 Hz to 10 kHz	8.4 mV	
	(10 to 20) kHz	19 mV	
	(20 to 50) kHz	26 mV	
	(50 to 100) kHz	60 mV	
	(33 to 330) V		
	45 Hz to 1 kHz	0.13 V	
	(1 to 10) kHz	0.21 V	
	(10 to 20) kHz	0.24 V	
	(20 to 50) kHz	0.32 V	
	(50 to 100) kHz	0.67 V	
	(330 to 1 020) V		
	45 Hz to 1 kHz	0.42 V	
	(1 to 5) kHz	0.65 V	
	(5 to 10) kHz	0.73 V	
High AC Voltage – Measuring Systems/Devices [1]	50 Hz (1 to 28) kV	5.9 % of reading	Fluke 80k-40 High Voltage Probe with Multimeter and Power Supply
High AC Voltage – Measuring Systems/Devices [1]	50 Hz (20 to 130) kV	1.3 % of reading	High Voltage Divider and Power Supply

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature Simulation for Thermocouple Temperature Indicators, Controllers, Recorders, and Simulators [1]	Type K (-100 to 1 000) °C (1000 to 1 372) °C Type J (-100 to 600) °C Type T (-250 to 0) °C (0 to 400) °C Type S (0 to 1 767) °C Type R (0 to 250) °C (250 to 1 767) °C	 0.23 °C 0.33 °C 0.16 °C 0.5 °C 0.16 °C 0.38 °C 0.46 °C 0.33 °C	Fluke 5502A Multiproduct Calibrator

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thickness Gauges [1,4]	11 µm 21 µm 49 µm 75 µm 128 µm 189 µm 475 µm 603 µm 1 045 µm 1 570 µm	2.1 µm 2.1 µm 2.2 µm 2.2 µm 2.7 µm 2.7 µm 6.3 µm 8.1 µm 12 µm 12 µm	Calibration Foils
Thickness Gauges [1,2] (Ultrasonic, Magnetic and Eddy Current)	(2 to 25) mm	0.002*L* mm	Grade 1 Gauge Blocks and Micrometer

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pneumatic Absolute Pressure [1]	(1 to 200) kPa	36 Pa	Druck Digital Absolute Pressure Indicator/Gauge and Vacuum Pump

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pneumatic Gauge Pressure [1]	(-80 to 0) kPa (0 to 20) kPa (20 to 700) kPa (0.7 to 6) MPa	0.11 kPa 12 Pa 0.18 kPa 1 kPa	Druck Pressure Gages and Pneumatic Pump
Hydraulic Gauge Pressure [1]	(-80 to 0) kPa (0 to 700) kPa (0.7 to 7) MPa (7 to 60) MPa (60 to 70) MPa	0.11 kPa 0.18 kPa 1 kPa 10 kPa 35 kPa	Druck Pressure Gages and Comparator
Autoclave Gauge Pressure [1]	(0 to 700) kPa	0.18 kPa	Druck Pressure Gages and Pneumatic Pump
Mass Pieces [1]	(0.1 to 1) g (1.000 1 to 10) g (10.000 1 to 50) g (50.000 1 to 100) g (100.000 1 to 200) g (200.000 1 to 500) g (500.01 to 2 000) g (2 000.01 to 3 000) g (3 000.01 to 5 000) g (5.01 to 20.000) kg (20.01 to 100.000) kg (100.01 to 200.00) kg (200.01 to 300.00) kg (300.01 to 400.00) kg	0.16 mg 0.27 mg 0.39 mg 0.63 mg 1.3 mg 8.8 mg 15 mg 21 mg 0.24 g 4.3 g 48 g 58 g 72 g 87 g	Calibration Procedure based on OIML R111-1 with OIML Class F1 and OIML M2 Mass Standards
Scales and Balances [1,3]	(0 to 100) g (0 to 200) g (0 to 500) g (0 to 1 000) g (0 to 3 000) g (0 to 5 000) g	0.63 mg 1.3 mg 8.8 mg 11 mg 21 mg 0.24 g	OIML Class F1 1 Standards
Scales and Balances [1,3]	(0 to 10) kg (0 to 20) kg (0 to 100) kg (0 to 200) kg (0 to 300) kg (0 to 400) kg	3.8 g 4.3 g 48 g 58 g 72 g 87 g	OIML Class M2 Mass Standards
Torque Screwdrivers and Wrenches [1,2] (CW Only)	(1 to 10) N·m (10 to 50) N·m (50 to 1 000) N·m	0.15 N·m 0.68 N·m 0.004*T* N·m	Torque Analyser, Torque Transducer with Display

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thermo-Hygrometers - Loggers and Indicators	(11, 33, 53, 75, 90) %RH (18 to 28) °C	1.3 %RH 0.4 °C	Reference Hygrometer and Chambers
Humidity and Temperature Indicators [1]	(11 to 90) %RH (10 to 50) °C	2.7 %RH 1.1 °C	Reference Datalogger
Radiation (IR) Temperature Measuring Equipment [1]	50 °C 100 °C 150 °C 200 °C 250 °C 300 °C 350 °C 400 °C 450 °C 500 °C	2.2 °C 2.3 °C 2.7 °C 2.7 °C 5.8 °C 5.9 °C 5.9 °C 6.6 °C 6.6 °C 6.6 °C	Portable IR Calibrator $\varepsilon = 0.95$, $\lambda = (8 \text{ to } 14)$ µm
Liquid in Glass Thermometers [1] (Partial/Total Immersion)	0 °C	0.31 °C	PRT with Multimeter and ice point
	(10 to 90) °C	0.31 °C	PRT with Multimeter and water bath
Digital and Mechanical Thermometers and Temperature Measuring Systems [1]	(-80 to -40) °C	0.18 °C	Dry Ice and Alcohol
	(-15 to -20) °C	0.1 °C	PRT and Alcohol NaCl slurry
	0 °C	0.07 °C	PRT and ice point
	(10 to 90) °C	0.09 °C	PRT and water bath
	(50 to 400) °C	0.07 °C	PRT and dry block
	(400 to 1 200) °C	2.8 °C	Type R TC and dry block
Temperature Uniformity Survey [1]	(-70 to 1 000) °C	2.8 °C	Type K TC and display unit
	(-20 to 200) °C	0.4 °C	RTD and display unit
System Accuracy Test [1]	(-70 to 1 000) °C	3.8 °C	Type K TC and display unit
Autoclave Temperature Uniformity Survey & Accuracy Test [1]	(0 to 200) °C	3.8 °C	Type K TC and display unit

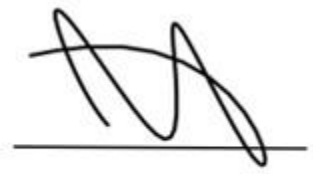
Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Measure [1]	(0.1 to 10) Hz 10 Hz to 100 MHz	0.06 % of reading 0.01 % of reading	Fluke 8588A Reference Multimeter
Frequency – Generate [1]	(0.01 to 120) Hz (0.12 to 1.2) kHz (1.2 to 12) kHz (12 to 120) kHz (0.12 to 1.2) MHz	7 mHz 63 mHz 0.63 Hz 6.3 Hz 62 Hz	Fluke 5502A Multiproduct Calibrator
Stopwatches and Timers [1]	(1 to 86 400) s	0.08 s	HP 5328A Counter
Autoclave Timers [1]	(1 to 120) minutes	1 s	Stopwatch
Tachometers [1] Contact Type	(10 to 500) rpm (501 to 2 999) rpm	0.5 rpm 1.9 rpm	VSD Motor and Process Calibrator
Tachometers [1] Non-Contact Type	(10 to 100) rpm (100 to 1 000) rpm (1 001 to 6 000) rpm (6 001 to 20 000) rpm (20 001 to 50 000) rpm	0.08 rpm 0.14 rpm 0.31 rpm 1.2 rpm 2.8 rpm	

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. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. L = length in mm, T = Torque in N·m.
3. The uncertainties for scales and balances is highly dependent upon the resolution of the unit under test. The uncertainties presented here does not include the resolution of the unit under test. The resolution will be included in the reported measurement uncertainty at the time of calibration.
4. The nominal values listed are approximate.
5. This scope is formatted as part of a single document including Certificate of Accreditation No. L2428.



Jason Stine, Vice President