

CERTIFICATE OF ACCREDITATION

In terms of section 22(2) (b) of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006), read with sections 23(1), (2) and (3) of the said Act, I hereby certify that:-

PRECISION MEASUREMENTS (PTY) LTD

Co. Reg. No.: 2015/168932/07

Accreditation Number: **150**

is a South African National Accreditation System accredited Calibration Laboratory provided that all SANAS conditions and requirements are complied with

This certificate is valid as per the scope as stated in the accompanying scope of accreditation Annexure "A", bearing the above accreditation number for

DC LOW FREQUENCY METROLOGY

The facility is accredited in accordance with the recognised International Standard

ISO/IEC 17025:2017

The accreditation demonstrates technical competency for a defined scope and the operation of a laboratory quality management system

While this certificate remains valid, the Accredited Facility named above is authorised to use the relevant SANAS accreditation symbol to issue facility reports and/or certificates

Mr T Baleni
Acting Chief Executive Officer

Effective Date: 30 September 2021
Certificate Expires: 29 September 2026

ANNEXURE A
SCOPE OF ACCREDITATION
DC LOW FREQUENCY METROLOGY

Accreditation Number: 150

Permanent Address of Laboratory: Precision Measurements (Pty) Ltd Building 8 CSIR Campus Meiring Naude Road Lynnwood 0081 Postal Address: P O Box 39203 Moreleta Park 0044 Tel: (012) 035-0219 Fax: (086) 768-3066 E-mail: willemb@precisiongroup.com		Technical Signatories: Mr W Botha Mr R Singh Nominated Representative: Mr W Botha Issue No.: 05 Date of Issue: 30 September 2021 Expiry Date: 29 September 2026		
ITEM	MEASURED QUANTITY OR TYPE OF GAUGE OR INSTRUMENT AND RANGE OF MEASURED QUANTITY	NOMINAL FREQUENCY	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS UNCERTAINTY (\pm)	METHOD / PROCEDURE
1	DC Voltage (up to 1100 V for higher voltages see 8.1)			
1.1	DC voltage sources			
1.1.2	Low values (≤ 10 V)			
	0 V to 10 V	DC	$3 \cdot 10^{-5} \cdot U + 5 \mu\text{V}$	Direct measurement or comparison with a DC voltage reference standard.
1.1.3	Intermediate Values (> 10 V to 1100 V)			
	10 V to 1 000 V	DC	$3 \cdot 10^{-5} \cdot U + 5 \mu\text{V}$	Direct measurement or comparison with a DC voltage source or multi-function calibrator.
1.2	DC voltage meters			
1.2.1	Very low values (≤ 1 mV)			
	0 V 1 mV	DC DC	$5 \mu\text{V}$ $5 \mu\text{V}$	Direct measurement or comparison with a DC voltage source and short.
1.2.2	Intermediate values (> 1 mV to 1100 V)			
	1 mV to 1 000 V	DC	$3 \cdot 10^{-5} \cdot U + 5 \mu\text{V}$	Direct measurement or comparison with a DC voltage source or multi-function calibrator.

Original Date of Accreditation: 27 May 2016

Page 1 of 3

The CMC, expressed as an expanded uncertainty of measurement, is stated as the standard uncertainty of measurement multiplied by a coverage factor $k = 2$, corresponding to a confidence level of approximately 95%

Accreditation Manager

ANNEXURE A

Facility No.: 150
Date of Issue: 30 September 2021
Expiry Date: 29 September 2026

ITEM	MEASURED QUANTITY OR TYPE OF GAUGE OR INSTRUMENT AND RANGE OF MEASURED QUANTITY	NOMINAL FREQUENCY	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS UNCERTAINTY (\pm)	METHOD / PROCEDURE	
2	DC resistance				
2.1	DC resistance standards and sources				
2.1.1	Low values ($\leq 1\Omega$)				
	1 Ω	DC	$2 \cdot 10^{-4} \cdot R$	Direct, substitution or current volt drop method.	
2.1.2	Intermediate values ($> 1\Omega$ to 1 MΩ)				
	1 Ω to 190 Ω	DC	$1 \cdot 10^{-4} \cdot R$		
	190 Ω to 100 k Ω	DC	$5 \cdot 10^{-5} \cdot R$		
	100 k Ω to 1 M Ω	DC	$1 \cdot 10^{-4} \cdot R$		
2.1.3	High Values ($>1\text{ M}\Omega$)				
	1 M Ω to 1.9 M Ω	DC	$1 \cdot 10^{-4} \cdot R$	Direct or substitution method.	
	1.9 M Ω to 19 M Ω	DC	$2 \cdot 10^{-4} \cdot R$		
	19 M Ω to 100 M Ω	DC	$5 \cdot 10^{-5} \cdot R$		
2.2	DC resistance meters				
2.2.2	Intermediate values ($>1\Omega$ to 1GΩ)				
	1 Ω	DC	$2 \cdot 10^{-4} \cdot R$	Direct or substitution method.	
	1.9 Ω , 10 Ω , 19 Ω , 100 Ω , 190 Ω	DC	$1 \cdot 10^{-4} \cdot R$		
	1 k Ω , 1.9 k Ω , 10 k Ω , 19 k Ω , 100 k Ω	DC	$5 \cdot 10^{-5} \cdot R$		
	190 k Ω , 1 M Ω , 1.9 M Ω	DC	$1 \cdot 10^{-4} \cdot R$		
	10 M Ω , 19 M Ω	DC	$2 \cdot 10^{-4} \cdot R$		
	100 M Ω	DC	$5 \cdot 10^{-5} \cdot R$		
3	DC current (up to 100 A, for higher currents see 8.7)				
3.1	DC current sources				
3.1.1	Low values ($\leq 0,1\text{ mA}$)				
	100 μA	DC	$2 \cdot 10^{-4} \cdot I + 0.02\ \mu\text{A}$	Direct or current volt drop method.	
3.1.2	Intermediate values ($\leq 0,1\text{ mA}$ to 20 A)				
	100 μA to 1 A	DC	$2 \cdot 10^{-4} \cdot I + 0.02\ \mu\text{A}$		
3.2	DC current meters				
3.2.1	Low value ($\leq 0,1\text{ mA}$)				
	100 μA	DC	$2 \cdot 10^{-4} \cdot I + 0.02\ \mu\text{A}$	Direct measurement.	
3.2.2	Intermediate values ($\leq 0,1\text{ mA}$ to 20 A)				
	100 μA to 1 A	DC	$2 \cdot 10^{-4} \cdot I + 0.02\ \mu\text{A}$	Direct measurement.	

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Page 2 of 3

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5	AC voltage (up to the MHz range)				
5.2	AC voltage up to 1000 V (for high voltage see category 8.3)				
5.2.1	Sources				
	10 mV to 30 V 30 V to 100 V 100 V to 1 000 V	50 Hz to 10 kHz 50 Hz to 10 kHz 50 Hz to 1 kHz	$3 \cdot 10^{-3} \cdot U + 10 \mu V$ $2 \cdot 10^{-4} \cdot U$ $2 \cdot 10^{-3} \cdot U$	Direct measurement.	
5.2.2	Meters				
	10 mV to 200 mV 10 mV to 200 mV 200 mV to 2 V 200 mV to 2 V 2 V to 100 V 100 V to 1 000 V	40 Hz to 20 kHz 20 kHz to 100 kHz 40 Hz to 20 kHz 20 kHz to 100 kHz 40 Hz to 20 kHz 50 Hz to 10 kHz	$5 \cdot 10^{-4} \cdot U + 10 \mu V$ $1 \cdot 10^{-3} \cdot U + 30 \mu V$ $2 \cdot 10^{-4} \cdot U$ $4 \cdot 10^{-4} \cdot U$ $2 \cdot 10^{-4} \cdot U$ $3 \cdot 10^{-4} \cdot U$	Direct measurement.	
6	AC current				
6.2	AC current up to 100A (for high current see category 8.6)				
6.2.1	Sources				
	100 μA to 1 A	40 Hz to 5 kHz	$5 \cdot 10^{-4} \cdot I + 2 \mu A$	Direct measurement or volt drop method.	
6.2.2	Meters				
	100 μA to 1 A	40 Hz to 5 kHz	$5 \cdot 10^{-4} \cdot I + 2 \mu A$		
15	Oscilloscopes up to 1,1 GHz				
	Vertical Deflection Horizontal Deflection Bandwidth	2 mV to 5 V/div 1 nS to 5 S/div DC to 250 MHz	$\pm 1 \%$ $\pm 1 \%$ $\pm 7 \%$	Euramet cg-7 or direct comparison with a reference standard or calibrator.	
18	On-site accreditation for items 1, 2, 3, 5, 6 and 15				

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Page 3 of 3

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ISSUED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM

Accreditation Manager