



Tecnoplús de Ing Aldo A. Bruschi

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REV: 4/18

Maestro Alderete 2393.

Neuquén capital.

Prov. de Neuquén.

Tel: 0299-4478540

Certificado de calibración N°: CCTT-0081121

Este certificado de calibración documenta la trazabilidad a los patrones I.N.T.I. / N.I.S.T / UKAS, los cuales representan a las unidades físicas de medida en concordancia con el Sistema Internacional de Unidades (SI).

Este certificado no podrá ser reproducido parcialmente excepto cuando se haya obtenido previamente permiso por escrito del Laboratorio que lo emite.

Certificados de calibración sin firma y aclaración, no serán válidos.

El usuario es responsable de la recalibración del objeto a intervalos apropiados.

1- Información de calibración.

Objeto: Bloque seco Fluke 9146

Fecha de calibración del instrumento: 24/11/2021

N° de Serie / Identificación: B81341

Fecha de emisión del certificado: 25/11/2021

Resultados:	Referencias:
Aceptado: SI	As-Found / As-Left: Como recibido / Como entregado
Estado Found/Left: Found-Left	Found-Left: Entregado como recibido
Estado del sello ajuste: OK	TUR: Relación de incertidumbre de la prueba.
	FDT: Fuera de tolerancia

2- Datos de la calibración.

Datos del cliente	Datos del Laboratorio
Cliente: Emysa SRL	Calibrado por: Guillermo Carlos Pompei
C.U.I.T. 30-71464414-5	Domicilio: Alderete 2393 - Neuquén
Domicilio: Entre Ríos N° 658 - Catriel - Río Negro	Temperatura y humedad ambiente al momento de la calibración: 25,8 °C ± 0,5°C 37,5 % ± 0,3%

Número de páginas del certificado y anexos: 7

3 - Procedimientos aplicados

Eléctricos: NA.

Presión: NA

Temperatura: PCTT-02.

Dimensional: NA

HVAC: NA

PSV: NA

Gases: NA

SH: NA

Los resultados contenidos en el presente certificado se refieren al momento y condiciones en que se realizaron las mediciones. La empresa no se responsabiliza de los perjuicios que puedan derivarse del uso inadecuado de este certificado.

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4 - Características del instrumento.

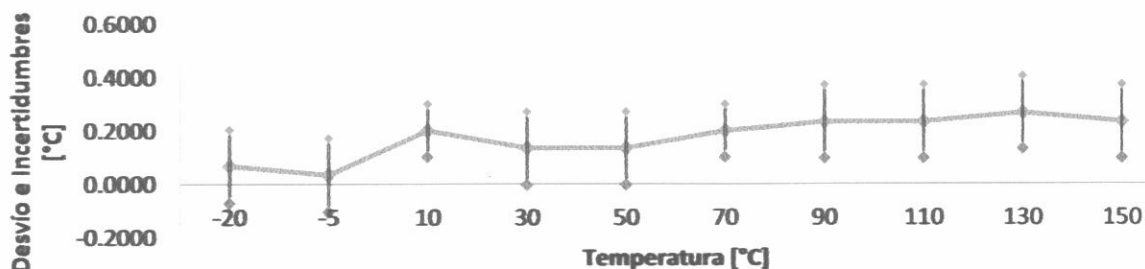
Escala	Rango	Exactitud	Resolución
Temperatura	-25.0 a 150.0 °C	± 0.355 °C.	0.1 °C

5 - Resultados obtenidos.

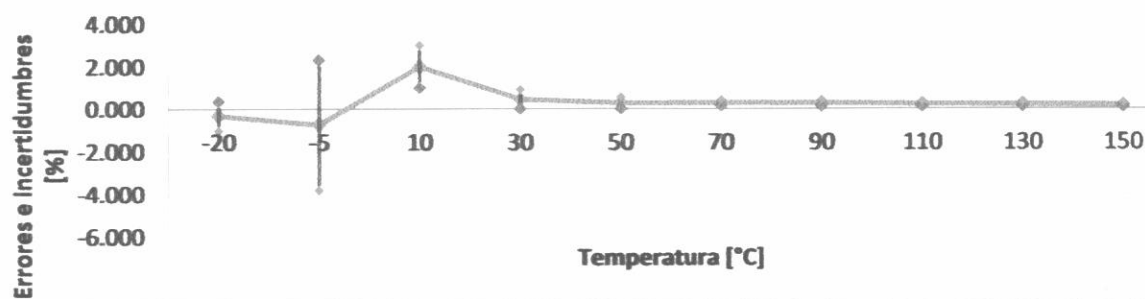
Control de la escala de medición de temperatura -25.0 a 150.0 °C

Lectura del patrón	1ª Medición	2ª Medición	3ª Medición	Promedio	Desvío	Error en el punto	Incertidumbre	Máximo desvío permitido	Cumple espec. del fabricante
°C	°C	°C	°C	°C	°C	%	°C	°C	-
-20.0	-20.00	-20.10	-20.10	-20.0667	0.0667	-0.333	± 0.0688	± 0.335	SI
-4.5	-4.4	-4.5	-4.5	-4.4667	0.0333	-0.741	± 0.0688	± 0.335	SI
10.0	10.2	10.2	10.2	10.2000	0.2000	2.000	± 0.0501	± 0.335	SI
30.0	30.2	30.1	30.1	30.1333	0.1333	0.444	± 0.0688	± 0.335	SI
50.0	50.1	50.2	50.1	50.1333	0.1333	0.267	± 0.0688	± 0.335	SI
70.0	70.2	70.2	70.2	70.2000	0.2000	0.286	± 0.0501	± 0.335	SI
90.0	90.2	90.3	90.2	90.2333	0.2333	0.259	± 0.0688	± 0.335	SI
110.0	110.2	110.3	110.2	110.2333	0.2333	0.212	± 0.0688	± 0.335	SI
130.0	130.3	130.2	130.3	130.2667	0.2667	0.205	± 0.0688	± 0.335	SI
150.0	150.2	150.3	150.2	150.2333	0.2333	0.156	± 0.0688	± 0.335	SI

Desvíos e Incertidumbres vs Temperaturas



Errores e Incertidumbres vs Temperatura



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6 - Patrones utilizados.

Instrumento	Identificación	Certificado	Emitido por:	Fecha de vencimiento
Transmille 3050A	CCP-014-19	37261	Transmille Ltd.	02/11/2023
Fluke 5615	CCP-007-20	626786-260	Bourns Engineering	23/12/2021
Testo 440	CCP-012-20	55128	Testo	22/10/2022

Los certificados de calibración de los patrones utilizados están disponibles para su descarga desde nuestra página web: www.tecnoplusonline.com.ar, ingresando el código correspondiente indicado en la tabla anterior.

 GUILLERMO C. POMPEI Técnico Electrónico Mat. TEC 4050	 TECNOPLUS de ALDO A. BRUSCHI CUT: 20-11500300-5 Maestro 2393 - Neuq
Calibrado por: Guillermo Pompei. Técnico de laboratorio	Aprobado por: Aldo Bruschi. Ingeniero Supervisor

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Anexo I - Referencias

TRUE-RMS: Verdadero valor eficaz.

Ajuste: Corrección de valores típicos al instrumento, debido a excesiva desviación en las mediciones.

AS-FOUND: Calibración inicial, previo al ajuste.

AS-LEFT: Calibración final, luego del ajuste.

FOUND-LEFT: Calibración inicial igual a la calibración final, no requirió ajuste.

Rango: Diferencia entre el valor máximo y el valor mínimo de un instrumento.

Exactitud: (o Clase), es el error cometido por el instrumento luego de repetidas mediciones.

Resolución: Menor división capaz de discriminar un instrumento.

Patrón: Instrumento con una exactitud y resolución mejorada, respecto del instrumento a calibrar.

Constraste: Comparación de mediciones de un instrumento con el patrón, para su verificación.

Calibración: Comparación de mediciones de un instrumento con el patrón, para un certificado.

Valor de referencia: Valor arrojado por el patrón.

Promedio: Media aritmética de las mediciones.

Desviación: diferencia entre los valores patrón y el promedio de las mediciones.

Error %: Error relativo porcentual de las mediciones comparado con el valor patrón.

Incertidumbre: Dispersión de valores medidos atribuible a los errores del patrón, condiciones ambientales, métodos de medidas, etc.

Desvío estándar (S): Promedio cuadrático, entre la medición y el valor patrón.

En todos los casos anteriores la incertidumbre de medición expandida fue estimada empleando un factor de cubrimiento t-Student = 4,303 considerado para tres grados de libertad y para un intervalo de confianza aproximado del 95 %.

	Promedio	Desvío estándar	Incertidumbre
Cálculos estadísticos	$\bar{X} = \sum_{i=1}^n \frac{x_i}{n}$	$s = \sqrt{\frac{1}{n-1} \sum (x_i - \bar{x})^2}$	$It = k * \sqrt{S^2 + I_d^2 + \left(\frac{I_p}{2}\right)^2}$

Dónde:

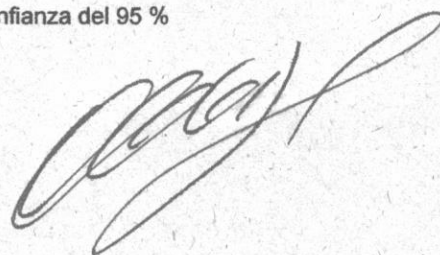
n: Número de mediciones

k: Factor de cubrimiento para una distribución normal para un nivel de confianza del 95 %

Id: Incertidumbre atribuible a la menor división.

Ip: Incertidumbre del Patrón.

It: Incertidumbre total y expandida.



Anexo II- Certificado de calibración Fluke 5615

BURNS
ESTRUTURA

Report of Calibration

NVLAP
CALIBRATION

Model	5615
Serial Number	1000005
PO Number	626706-240
Description	Platinum Resistance Thermometer
Calibration Procedure Number	NIHNE 2nd Rev. B, 5615-207 Rev. B, 5615-208 Rev. B
Calibration Method	Comparison to SPRT
Customer	Fluke Calibration
	700 S. Black Valley Drive
	American Fork, UT 84003
Calibration Range	-190°C to 420°C
Calibration Date	12-29-2019
Attestation Location	NEW
Attestation Condition	EXAMINATION

This platinum resistance thermometer (PRT) was calibrated using a DC bridge at a current of 1mA, at the temperatures reported below by comparison to Standard Platinum Resistance Thermometers (SPRTs). These SPRTs are calibrated to the International Temperature Scale of 1990 (ITS-90) and their calibration is traceable to the National Institute of Standards and Technology.

The combined standard uncertainty of this calibration includes all known sources present at the time of calibration. The uncertainties are reported at the calibration temperature only; the uncertainty at intermediate temperatures can be computed from these values and the ITS-90 interpolation of these curves. The combined standard uncertainty is multiplied by a coverage factor of 2 to give an expanded uncertainty, which defines the interval of having a level of confidence of approximately 95 percent. The expanded uncertainty, presented in this report is consistent with the ISO 10013 Guide to the Expression of Uncertainty in Measurement. (It is not to be confused with an interval for the user during application.)

Temperature (deg C)	Resistance (ohms)	Uncertainty (mK)
-195.978	18.744	± 1.2 mK
-177.822	66.8790	± 1.1 mK
0.000	100.0012	± 0.0 mK
100.000	177.3078	± 1.6 mK
419.615	256.8781	± 2.0 mK

ITS-90 Calibration Coefficients		
$a_0 = -1.7821719 \times 10^{-6}$	$a_1 = -6.84704057 \times 10^{-6}$	
$a_2 = 3.21994949 \times 10^{-11}$	$a_3 = 7.7552619 \times 10^{-15}$	

Comments and Limitations:

The temperature calibration system used by Burns Engineering complies with the requirements of ANSI/ISO 17025:2005, Part 1, and ISO/IEC 17025:2005. This calibration report applies only to the item calibrated. This report shall not be used to claim certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Environmental conditions:

The ambient conditions of the laboratory are controlled to 21 ± 4 degrees C and 50% maximum relative humidity.

The following measuring and test equipment were used in this calibration:

Item	Model	Serial Number	Recall Date
SPRT	722	8412	06-19-2019
SPRT	720	70027772	05-01-2021
SPRT	7162	1106-0031	
Bridge	718	094884	04-25-2020
Standard Resistance	470	9759101	01-13-2020

The attached resistance vs temperature table was generated for this sensor using the ITS-90 interpolation equations and the results of the calibration.

Calibration performed and Approved by:

[Signature]
Maestro Alderete, Terry
Date of Issue: 12-29-2019

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Burns Engineering Calibration Report Number: 87255
Burns Engineering: 1020 Burn Report Rd, Westborough, MA 01581, 508-333-0000, 508-333-0001, 508-333-0002, 508-333-0003, 508-333-0004, 508-333-0005, 508-333-0006, 508-333-0007, 508-333-0008, 508-333-0009, 508-333-0010, 508-333-0011, 508-333-0012, 508-333-0013, 508-333-0014, 508-333-0015, 508-333-0016, 508-333-0017, 508-333-0018, 508-333-0019, 508-333-0020, 508-333-0021, 508-333-0022, 508-333-0023, 508-333-0024, 508-333-0025, 508-333-0026, 508-333-0027, 508-333-0028, 508-333-0029, 508-333-0030, 508-333-0031, 508-333-0032, 508-333-0033, 508-333-0034, 508-333-0035, 508-333-0036, 508-333-0037, 508-333-0038, 508-333-0039, 508-333-0040, 508-333-0041, 508-333-0042, 508-333-0043, 508-333-0044, 508-333-0045, 508-333-0046, 508-333-0047, 508-333-0048, 508-333-0049, 508-333-0050, 508-333-0051, 508-333-0052, 508-333-0053, 508-333-0054, 508-333-0055, 508-333-0056, 508-333-0057, 508-333-0058, 508-333-0059, 508-333-0060, 508-333-0061, 508-333-0062, 508-333-0063, 508-333-0064, 508-333-0065, 508-333-0066, 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Anexo III- Certificado de calibración Transmille 3050A

Instrument Service Log

LUCKYLAB ARGENTINA ALDERETE 2393, NEUQUEN CP 8330



Instrument Description
multi product calibrator
3050A
K1314E18
T00056904
Model Number
Serial Number
System ID
Reference Number
Evid By / Location
Date Acquired
Instrument Cost
Calibration Interval 52 weeks

Date	Details	Calibration
04/07/2018	New Instrument Test UKAS calibration. Certificate number: 36340 Part Used:	by E. Boley
	Customer Order No.: 33571USA Job No.: 0021 New Instrument All tests passed UKAS calibration.	
05/11/2018	Calibration City UKAS Calibration. Certificate number: 37281 Part Used: NONE	by J. O. Bain
	Customer Order No.: 34171 SA Job No.: 70628-1 New Instrument All tests passed UKAS calibration. Metro duty tested.	

Issued by: TRANSMILLE LTD, UNIT 4, SELECT BUSINESS CENTRE DUNDE ROAD STAPLEHURST, RUGBY CV21 3QW TEL: 01827 599000 FAX: 01827 599001
Printed on 05/11/2018

CERTIFICATE OF CALIBRATION

Issued By: Transmille Ltd
Date of Issue: 02 November 2018

Certificate Number: 37281



Transmille Ltd
Unit 4, Select Business Centre
Dunfermline Road
Staplehurst, Kent, TN12 6QW
TEL: 01827 599000 FAX: 01827 599001

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Approved Signature

[Signature]

Customer: TECNOLAB ARGENTINA
ALDERETE 2393, NEUQUEN CP 8330

Date Received: 29 October 2018

Instrument:	System ID: T00056904 Description: 600V Product Calibrator Manufacturer: Transmille Model Number: 3050A Serial Number: K1314E18 Procedure Version: 13.01.01N	Job Number: 70628-1 Ref. Number: Site: Location: Last Calibration Certificate: 36340 Last Calibration Date: 04/07/2018
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Environmental Conditions
Temperature: 20°C ± 1°C
Relative Humidity: 40% ± 20%
Main Voltage: 230V ± 12V
Main Frequency: 50Hz ± 1Hz

Comments

Instrument was allowed to stabilize for at least 12 hours before calibration.
4 Wire Kelvin connections were used for ohms measurements below 10kOhms.
The instrument RS232 interface was used during calibration.
PT100 resistance converted to temperature using BS EN60751:2008 tables.
Tests marked # are not UKAS accredited but have been included for completeness.

Calibration Information

The instrument was calibrated against laboratory standards whose values are traceable to recognised National Standards. The uncertainty limits quoted refer to the measured values only, with no account being taken of the instrument's ability to maintain its calibration.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrated By: J. O. Bain

Date of Calibration: 02 November 2018

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 6324
AFTER ADJUSTMENT RESULTS

Certificate Number: 37281

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Test Title	Applied Value	Reading	Uncertainty
Formulary Variables: 13.1.08			
DC Voltage			
200mV Range	0.000 00mV	0.000 00mV	±0.6uV
200mV Range	100.000 00mV	100.002 00mV	±0.6uV
200mV Range	200.000 00mV	200.003 20mV	±0.6uV
200mV Range	-100.000 00mV	-100.001 10mV	±0.6uV
200mV Range	-200.000 00mV	-200.002 10mV	±0.6uV
2V Range	0.200 000 0V	0.219 997 9V	±0.9uV
2V Range	1.000 000 0V	1.000 006 1V	±0.9uV
2V Range	2.000 000 0V	2.000 006 9V	±0.9uV
2V Range	-0.200 000 0V	-0.220 009 6V	±0.9uV
2V Range	-1.000 000 0V	-1.000 003 7V	±0.9uV
2V Range	-2.000 000 0V	-2.000 009 2V	±0.9uV
20V Range	2.200 000V	2.200 040V	±7uV
20V Range	10.000 00V	10.000 052V	±33uV
20V Range	20.000 00V	20.000 050V	±66uV
20V Range	-2.200 000V	-2.188 960V	±7uV
20V Range	-10.000 00V	-9.999 852V	±33uV
20V Range	-20.000 00V	-19.999 610V	±66uV
200V Range	100.000 00V	99.998 85V	±330uV
200V Range	200.000 00V	199.998 40V	±660uV
200V Range	-100.000 00V	-99.999 61V	±330uV
1kV Range	200.000 0V	219.998 1V	±0.8mV
1kV Range	1.000.000 0V	999.998 4V	±3.3mV
1kV Range	-1000.000 0V	-1000.003 3V	±3.3mV
1kV Range	-200.000 0V	-219.999 6V	±0.8mV
AC Voltage Output Frequency Tests			
10kHz at 2V	10.000 00kHz	10.000 00kHz	±0.01Hz
10kHz at 2V	100.000 00kHz	100.000 00kHz	±0.1Hz
AC Voltage			
200mV A.C. 40Hz	20.000mV	20.009mV	±18uV
200mV A.C. 200Hz	20.000mV	20.006mV	±18uV
200mV A.C. 20kHz	20.000mV	20.007mV	±70uV
200mV A.C. 10Hz #	200.000mV	200.011mV	±80uV
200mV A.C. 40Hz	200.000mV	200.006mV	±34uV
200mV A.C. 50Hz	200.000mV	200.012mV	±34uV
200mV A.C. 200Hz	200.000mV	200.012mV	±34uV
200mV A.C. 1kHz	200.000mV	200.009mV	±46uV
200mV A.C. 10kHz	200.000mV	200.008mV	±46uV
200mV A.C. 20kHz	200.000mV	200.007mV	±70uV
2V Range 40Hz	0.210 00V	0.209 98V	±49uV
2V Range 200Hz	0.210 00V	0.209 98V	±49uV
2V Range 10kHz #	0.210 00V	0.210 10V	±100uV
2V Range 200Hz	1.500 00V	1.500 00V	±180uV
2V Range 10kHz #	2.000 00V	2.000 00V	±900uV

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 6324
AFTER ADJUSTMENT RESULTS

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Test Title	Applied Value	Reading	Uncertainty
2V Range 40Hz	2.000 00V	1.999 98V	±240uV
2V Range 50Hz	2.000 00V	2.000 01V	±240uV
2V Range 200Hz	2.000 00V	1.999 97V	±240uV
2V Range 1kHz	2.000 00V	1.999 97V	±240uV
2V Range 5kHz	2.000 00V	1.999 94V	±400uV
2V Range 10kHz	2.000 00V	1.999 94V	±400uV
2V Range 20kHz	2.000 00V	2.000 48V	±400uV
2V Range 50kHz	2.000 00V	1.999 98V	±400uV
2V Range 100kHz #	2.000 00V	2.000 48V	±610uV
20V Range 40Hz	2.100 0V	2.100 0V	±260uV
20V Range 200Hz	2.100 0V	2.100 0V	±260uV
20V Range 10kHz #	2.100 0V	2.099 8V	±540uV
20V Range 200Hz	10.000 0V	10.000 0V	±1.2mV
20V Range 200Hz	15.000 0V	15.000 0V	±1.8mV
20V Range 10kHz #	20.000 0V	20.000 2V	±4.2mV
20V Range 40Hz	20.000 0V	20.000 1V	±2.4mV
20V Range 50Hz	20.000 0V	20.000 2V	±2.4mV
20V Range 200Hz	20.000 0V	19.999 9V	±2.4mV
20V Range 1kHz	20.000 0V	19.999 9V	±2.4mV
20V Range 5kHz	20.000 0V	19.999 7V	±4mV
20V Range 10kHz	20.000 0V	20.000 7V	±4mV
20V Range 20kHz	20.000 0V	20.005 7V	±4mV
20V Range 100kHz #	20.000 0V	19.998 0V	±6mV
200V Range 40Hz	21.000V	20.999V	±2.6mV
200V Range 200Hz	21.000V	20.999V	±2.6mV
200V Range 20kHz	21.000V	20.999V	±4.2mV
200V Range 200Hz	100.000V	100.000V	±12mV
200V Range 40Hz	200.000V	199.999V	±24mV
200V Range 50Hz	200.000V	199.999V	±24mV
200V Range 200Hz	200.000V	199.999V	±24mV
200V Range 1000Hz	200.000V	200.000V	±24mV
200V Range 10kHz	200.000V	200.000V	±40mV
1kV Range 40Hz	210.000V	209.973V	±45mV
1kV Range 200Hz	210.000V	209.973V	±45mV
1kV Range 10kHz	210.000V	209.936V	±45mV
1kV Range 40Hz	700.000V	699.950V	±91mV
1kV Range 50Hz	700.000V	700.000V	±91mV
1kV Range 1kHz	700.000V	699.919V	±91mV
1kV Range 5kHz	700.000V	700.050V	±148mV
1kV Range 10kHz	700.000V	699.821V	±148mV
1kV Range 50Hz	1.000.000V	999.917V	±130mV
1kV Range 1kHz	1.000.000V	999.759V	±130mV
Linearity - 20V DC Range			
Linearity	19.000 000V	19.999 960V	±63uV
Linearity	18.000 000V	17.999 960V	±63uV
Linearity	17.000 000V	16.999 980V	±57uV
Linearity	16.000 000V	15.999 980V	±53uV
Linearity	15.000 000V	14.999 980V	±50uV



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Anexo III- Certificado de calibración Transmille 3050A

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0324
AFTER ADJUSTMENT RESULTS

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Test Title	Applied Value	Reading	Uncertainties
Linearity	14.000 000V	13.999 982V	$\pm 0.7\mu V$
Linearity	13.000 000V	12.999 970V	$\pm 0.7\mu V$
Linearity	12.000 000V	11.999 980V	$\pm 0.7\mu V$
Linearity	11.000 000V	10.999 980V	$\pm 0.7\mu V$
Linearity	9.000 000V	8.999 975V	$\pm 0.7\mu V$
Linearity	8.000 000V	7.999 985V	$\pm 0.7\mu V$
Linearity	7.000 000V	6.999 985V	$\pm 0.7\mu V$
Linearity	6.000 000V	5.999 981V	$\pm 0.7\mu V$
Linearity	5.000 000V	4.999 987V	$\pm 0.7\mu V$
Linearity	4.000 000V	3.999 987V	$\pm 0.7\mu V$
Linearity	3.000 000V	2.999 987V	$\pm 0.7\mu V$
Linearity	2.100 000V	2.099 987V	$\pm 0.7\mu V$
Linearity	-19.000 000V	-18.999 980V	$\pm 0.7\mu V$
Linearity	-18.000 000V	-17.999 980V	$\pm 0.7\mu V$
Linearity	-17.000 000V	-16.999 980V	$\pm 0.7\mu V$
Linearity	-16.000 000V	-15.999 980V	$\pm 0.7\mu V$
Linearity	-15.000 000V	-14.999 980V	$\pm 0.7\mu V$
Linearity	-14.000 000V	-13.999 980V	$\pm 0.7\mu V$
Linearity	-13.000 000V	-12.999 980V	$\pm 0.7\mu V$
Linearity	-12.000 000V	-11.999 980V	$\pm 0.7\mu V$
Linearity	-11.000 000V	-10.999 980V	$\pm 0.7\mu V$
Linearity	-10.000 000V	-9.999 980V	$\pm 0.7\mu V$
Linearity	-9.000 000V	-8.999 980V	$\pm 0.7\mu V$
Linearity	-8.000 000V	-7.999 980V	$\pm 0.7\mu V$
Linearity	-7.000 000V	-6.999 980V	$\pm 0.7\mu V$
Linearity	-6.000 000V	-5.999 980V	$\pm 0.7\mu V$
Linearity	-5.000 000V	-4.999 980V	$\pm 0.7\mu V$
Linearity	-4.000 000V	-3.999 980V	$\pm 0.7\mu V$
Linearity	-3.000 000V	-2.999 980V	$\pm 0.7\mu V$
Linearity	-2.100 000V	-2.099 980V	$\pm 0.7\mu V$
DC Current	0.000 00A	-0.000 00A	$\pm 0.2\mu A$
200uA Range	100.000 00A	100.000 00A	$\pm 0.2\mu A$
200uA Range	200.000 00A	200.000 00A	$\pm 0.2\mu A$
200uA Range	100.000 00A	99.999 98A	$\pm 0.2\mu A$
200uA Range	0.000 000A	0.000 000A	$\pm 0.2\mu A$
2mA Range	0.210 000mA	0.210 001mA	$\pm 0.2\mu A$
2mA Range	1.000 000mA	1.000 001mA	$\pm 0.2\mu A$
2mA Range	2.000 000mA	2.000 001mA	$\pm 0.2\mu A$
2mA Range	-1.000 000mA	-0.999 999mA	$\pm 0.2\mu A$
2mA Range	-2.000 000mA	-1.999 999mA	$\pm 0.2\mu A$
20mA Range	5.000 00mA	4.999 999mA	$\pm 0.2\mu A$
20mA Range	10.000 00mA	9.999 999mA	$\pm 0.2\mu A$
20mA Range	15.000 00mA	14.999 999mA	$\pm 0.2\mu A$
20mA Range	20.000 00mA	19.999 999mA	$\pm 0.2\mu A$
20mA Range	-5.000 00mA	-4.999 999mA	$\pm 0.2\mu A$
20mA Range	-10.000 00mA	-9.999 999mA	$\pm 0.2\mu A$
20mA Range	-15.000 00mA	-14.999 999mA	$\pm 0.2\mu A$
20mA Range	-20.000 00mA	-19.999 999mA	$\pm 0.2\mu A$
200mA Range	100.000 00mA	99.999 99mA	$\pm 0.2\mu A$

CERTIFICATE OF CALIBRATION

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Test Title	Applied Value	Reading	Uncertainties
200mA Range	200.000 0mA	200.000 0mA	$\pm 0.7\mu A$
200mA Range	100.000 0mA	99.999 98mA	$\pm 0.7\mu A$
200mA Range	-200.000 0mA	-199.999 98mA	$\pm 0.7\mu A$
2A Range	1.000 000A	1.000 000A	$\pm 0.7\mu A$
2A Range	2.000 000A	2.000 000A	$\pm 0.7\mu A$
2A Range	-1.000 000A	-1.000 000A	$\pm 0.7\mu A$
2A Range	-2.000 000A	-2.000 000A	$\pm 0.7\mu A$
22A Range	10.000 00A	10.000 00A	$\pm 0.48\mu A$
22A Range	22.000 00A	21.999 91A	$\pm 0.48\mu A$
22A Range	-22.000 00A	-21.999 91A	$\pm 0.48\mu A$
22A Range	-10.000 00A	-10.000 00A	$\pm 0.48\mu A$
AC Current			
200uA Rng 40Hz	25.000uA	25.014uA	$\pm 15nA$
200uA Rng 200Hz	25.000uA	25.014uA	$\pm 15nA$
200uA Rng 10kHz #	25.000uA	24.997uA	$\pm 15nA$
200uA Rng 10Hz #	200.000uA	199.994uA	$\pm 200nA$
200uA Rng 40Hz	200.000uA	199.995uA	$\pm 200nA$
200uA Rng 200Hz	200.000uA	199.994uA	$\pm 200nA$
200uA Rng 10kHz #	200.000uA	199.994uA	$\pm 200nA$
200uA Rng 10Hz #	200.000uA	199.991uA	$\pm 200nA$
2mA Rng 40Hz	0.210 00mA	0.209 99mA	$\pm 55nA$
2mA Rng 200Hz	0.210 00mA	0.209 99mA	$\pm 55nA$
2mA Rng 10kHz #	0.210 00mA	0.210 00mA	$\pm 10nA$
2mA Rng 10Hz #	2.000 00mA	2.000 01mA	$\pm 1uA$
2mA Rng 40Hz	2.000 00mA	2.000 00mA	$\pm 400nA$
2mA Rng 200Hz	2.000 00mA	2.000 00mA	$\pm 400nA$
2mA Rng 10kHz #	2.000 00mA	2.000 00mA	$\pm 400nA$
2mA Rng 10Hz #	2.000 00mA	2.000 00mA	$\pm 800nA$
20mA Rng 40Hz	2.100 00mA	2.099 99mA	$\pm 430nA$
20mA Rng 200Hz	2.100 00mA	2.100 00mA	$\pm 430nA$
20mA Rng 10kHz #	2.100 00mA	2.100 00mA	$\pm 17uA$
20mA Rng 10Hz #	20.000 00mA	19.999 99mA	$\pm 20uA$
20mA Rng 40Hz	20.000 00mA	19.999 99mA	$\pm 20uA$
20mA Rng 200Hz	20.000 00mA	19.999 99mA	$\pm 20uA$
20mA Rng 10kHz #	20.000 00mA	19.999 99mA	$\pm 18uA$
200mA Rng 40Hz	21.000mA	20.9999mA	$\pm 4.2uA$
200mA Rng 200Hz	21.000mA	21.0000mA	$\pm 4.2uA$
200mA Rng 10kHz #	21.000mA	21.0000mA	$\pm 19uA$
200mA Rng 10Hz #	200.000mA	200.0002mA	$\pm 15uA$
200mA Rng 40Hz	200.000mA	200.0003mA	$\pm 40uA$
200mA Rng 200Hz	200.000mA	200.0003mA	$\pm 40uA$
200mA Rng 10kHz #	200.000mA	199.9999mA	$\pm 40uA$
200mA Rng 10Hz #	200.000mA	200.0002mA	$\pm 180uA$
2A Rng 40Hz	0.210 00A	0.209 99A	$\pm 42uA$
2A Rng 200Hz	0.210 00A	0.210 01A	$\pm 42uA$
2A Rng 10kHz #	0.210 00A	0.209 99A	$\pm 19mA$

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0324
AFTER ADJUSTMENT RESULTS

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Test Title	Applied Value	Reading	Uncertainties
2A Rng 10Hz #	2.000 00A	2.000 28A	$\pm 0.8mA$
2A Rng 40Hz	2.000 00A	2.000 28A	$\pm 0.8mA$
2A Rng 50Hz	2.000 00A	2.000 47A	$\pm 0.5mA$
2A Rng 1kHz	2.000 00A	2.000 16A	$\pm 0.5mA$
2A Rng 2kHz #	2.000 00A	1.999 95A	$\pm 0.8mA$
22A Rng 40Hz	2.100 00A	2.098 81A	$\pm 0.30uA$
22A Rng 200Hz	2.100 00A	2.099 02A	$\pm 0.30uA$
22A Rng 10kHz #	22.000 00A	21.999 04A	$\pm 20nA$
22A Rng 40Hz	22.000 00A	21.999 18A	$\pm 50nA$
22A Rng 50Hz	22.000 00A	21.999 40A	$\pm 50nA$
22A Rng 100Hz	22.000 00A	21.997 80A	$\pm 50nA$
22A Rng 1kHz #	22.000 00A	21.994 60A	$\pm 50nA$

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0324
AFTER ADJUSTMENT RESULTS

Certificate Number
37261

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Test Title	Applied Value	Reading	Uncertainties
2 Wire Resistance measured as value at terminals.			
50x 2 Wire	0.175 00	0.180 80	$\pm 0.8m\Omega$
100x 2 Wire	0.1830	0.1850	$\pm 1m\Omega$
100x 2 Wire	100.1560	100.1560	$\pm 1.3m\Omega$
100x 2 Wire	1.000 1560	1.000 1570	$\pm 3m\Omega$
100x 2 Wire	9.999 790	10.000 010	$\pm 21m\Omega$
100x 2 Wire	100.001 200	100.001 300	$\pm 0.20m\Omega$
100x 2 Wire	1.000 0040	1.000 0030	$\pm 1u\Omega$
100x 2 Wire	10.000 0000	10.000 0700	$\pm 150u\Omega$
100x 2 Wire	99.999 000	99.994 000	$\pm 4.5u\Omega$
4 Wire Resistance measured relative to zero			
100x 4 Wire	10.000 600	10.000 700	$\pm 150u\Omega$
100x 4 Wire	100.003 450	100.003 340	$\pm 0.4m\Omega$
100x 4 Wire	0.999 991 000	0.999 997 000	$\pm 2m\Omega$
100x 4 Wire	9.999 8030	9.999 8080	$\pm 12m\Omega$
100x 4 Wire	100.001 200	100.001 300	$\pm 0.20m\Omega$
Capacitors @ 10Hz Measured Cp up to 1uF, Cs above			
20pF	20.000pF	20.000pF	$\pm 12pF$
20nF	20.000nF	20.000nF	$\pm 20pF$
50nF	50.000nF	50.000nF	$\pm 35pF$
100nF	99.400nF	99.400nF	$\pm 60pF$
1uF	1.014 6uF	1.014 6uF	$\pm 52pF$
Reference Frequency Output			
Frequency	10.000 000MHz	9.999 999MHz	$\pm 2Hz$
Frequency	1.000 000 00MHz	0.999 999 7MHz	$\pm 0.2Hz$
Frequency	100.000 000MHz	99.999 97MHz	$\pm 0.02Hz$
Frequency	50.000 000MHz	49.999 984MHz	$\pm 0.01Hz$
Frequency	20.000 000MHz	19.999 994MHz	$\pm 0.004Hz$
Frequency	10.000 000MHz	9.999 997MHz	$\pm 0.002Hz$
Frequency	1.000 000 00MHz	0.999 999 7MHz	$\pm 0.2mHz$
Frequency	100.000 000MHz	99.999 99Hz	$\pm 0.2mHz$
A/D Input			
10V A/D Input	10.000 0V	10.000 0V	$\pm 100uV$
5V A/D Input	5.000 0V	4.999 9V	$\pm 100uV$
0V A/D Input	0.000 0V	0.000 0V	$\pm 100uV$
-5V A/D Input	-5.000 0V	-4.999 9V	$\pm 100uV$
-10V A/D Input	-10.000 0V	-10.000 0V	$\pm 100uV$

End Of Test Results