

Instrument Service Log

TECNOPLUS ARGENTINA, ALDERETE 2393, NEUQUEN CP., 8300



Instrument Description multi
product calibrator
Model Number 3050A
Serial Number K1314E18
System ID T00059694
Reference Number
Used By / Location
Date Acquired
Instrument Cost
Calibration Interval 52 weeks

<i>Date</i>	<i>Details</i>	<i>Calibration</i>
04/07/2018	New Instrument Test; UKAS Calibration; Certificate number : 36340 Parts Used : Customer Order No. : 3357TUSA; Job No. : 69231 New Instrument All tests passed UKAS calibration.	by E. Bailey
02/11/2018	Calibration Only; UKAS Calibration; Certificate number : 37261 Parts Used : NONE Customer Order No. : 3417TUSA; Job No. : 70628-1 New Instrument All tests passed UKAS calibration. Mains safety tested.	by J. O. Bain

CERTIFICATE OF CALIBRATION

Issued By Transmille Ltd.

Certificate Number 37261

Date of Issue 02 November 2018



0324



www.transmille.com

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Approved Signatory

G.A. Shapland M.A. Bailey S.A. Hawkins J.J. Bailey

Customer : TECNOPLUS ARGENTINA
ALDERETE 2393, NEUQUEN CP
8300

Date Received : 29 October 2018

Instrument :	System ID :	T00059694	Job Number :	70628-1
	Description :	Multi Product Calibrator	Ref. Number :	
	Manufacturer :	Transmille	Site :	
	Model Number :	3050A	Location :	
	Serial Number :	K1314E18	Last Calibration Certificate :	36340
	Procedure Version :	13.91.01/N	Last Calibration Date :	04/07/2018

Environmental Conditions

Temperature : 20°C +/- 1°C
Relative Humidity : 40% +/- 20%

Mains Voltage : 230V +/- 12V
Mains Frequency : 50Hz +/- 1Hz

Comments

Instrument was allowed to stabilise 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 instruments 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

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

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UKAS Accredited Calibration Laboratory No. 0324
AFTER ADJUSTMENT RESULTS

Test Title	Applied Value	Reading	Uncertainties
Firmware Version :13.1.06			
DC Voltage			
200mV Range	0.000 0mV	0.000 0mV	±0.6uV
200mV Range	100.000 0mV	100.002 0mV	±0.8uV
200mV Range	200.000 0mV	200.003 2mV	±0.9uV
200mV Range	-100.0000mV	-100.0011mV	±0.8uV
200mV Range	-200.0000mV	-200.0021mV	±0.9uV
2V Range	0.220 000 0V	0.219 997 3V	±0.9uV
2V Range	1.000 000 0V	1.000 006 1V	±2.5uV
2V Range	2.000 000 0V	2.000 009 8V	±7uV
2V Range	-0.2200000V	-0.2200006V	±0.9uV
2V Range	-1.0000000V	-1.0000037V	±2.5uV
2V Range	-2.0000000V	-2.0000092V	±7uV
20V Range	2.200 000V	2.200 040V	±7uV
20V Range	10.000 000V	10.000 052V	±33uV
20V Range	20.000 000V	20.000 050V	±66uV
20V Range	-2.200000V	-2.199906V	±7uV
20V Range	-10.000000V	-9.999892V	±33uV
20V Range	-20.000000V	-19.999910V	±66uV
200V Range	100.000 00V	99.998 85V	±330uV
200V Range	200.000 00V	199.998 40V	±660uV
200V Range	-200.00000V	-200.00030V	±660uV
200V Range	-100.00000V	-99.99968V	±330uV
1kV Range	220.000 0V	219.998 1V	±0.8mV
1kV Range	1 000.000 0V	999.988 4V	±3.3mV
1kV Range	-1000.0000V	-1000.0033V	±3.3mV
1kV Range	-220.0000V	-219.9999V	±0.8mV
AC Voltage Output Frequency Tests			
10kHz at 2V	10.000 00kHz	10.000 00kHz	±0.01Hz
100kHz at 2V	100.000 0kHz	100.000 0kHz	±0.1Hz
AC Voltage			
200mV A.C. : 40Hz	20.000mV	20.006mV	±18uV
200mV A.C. : 206Hz	20.000mV	20.006mV	±18uV
200mV A.C. : 20kHz	20.000mV	20.007mV	±70uV
200mV A.C. : 10Hz #	200.000mV	200.011mV	±60uV
200mV A.C. : 40Hz	200.000mV	200.084mV	±34uV
200mV A.C. : 56Hz	200.000mV	200.012mV	±34uV
200mV A.C. : 206Hz	200.000mV	200.012mV	±34uV
200mV A.C. : 1kHz	200.000mV	200.005mV	±46uV
200mV A.C. : 10kHz	200.000mV	200.084mV	±46uV
200mV A.C. : 20kHz	200.000mV	200.074mV	±70uV
2V Range : 40Hz	0.210 00V	0.209 98V	±49uV
2V Range : 206Hz	0.210 00V	0.209 98V	±49uV
2V Range : 100kHz #	0.210 00V	0.210 16V	±580uV
2V Range. : 206Hz	1.000 00V	1.000 10V	±120uV
2V Range : 206Hz	1.500 00V	1.500 10V	±180uV
2V Range : 10Hz #	2.000 00V	2.000 06V	±600uV

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Test Title	Applied Value	Reading	Uncertainties
2V Range : 40Hz	2.000 00V	1.999 98V	±240uV
2V Range : 56Hz	2.000 00V	2.000 01V	±240uV
2V Range : 206Hz	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 46V	±610uV
20V Range : 40Hz	2.100 0V	2.100 0V	±260uV
20V Range : 206Hz	2.100 0V	2.100 0V	±260uV
20V Range : 100kHz #	2.100 0V	2.099 8V	±640uV
20V Range : 206Hz	10.000 0V	10.000 5V	±1.2mV
20V Range : 206Hz	15.000 0V	15.000 5V	±1.8mV
20V Range : 10Hz #	20.000 0V	20.002 2V	±4.2mV
20V Range : 40Hz	20.000 0V	20.000 1V	±2.4mV
20V Range : 56Hz	20.000 0V	20.000 2V	±2.4mV
20V Range : 206Hz	20.000 0V	19.999 8V	±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 : 206Hz	21.000V	20.998V	±2.6mV
200V Range : 20kHz	21.000V	20.999V	±4.2mV
200V Range : 206Hz	100.000V	100.006V	±12mV
200V Range : 40Hz	200.000V	199.998V	±24mV
200V Range : 56Hz	200.000V	199.999V	±24mV
200V Range : 206Hz	200.000V	199.998V	±24mV
200V Range : 1000Hz	200.000V	200.000V	±24mV
200V Range : 10kHz	200.000V	200.012V	±40mV
200V Range : 20kHz	200.000V	199.987V	±40mV
1kV Range : 40Hz	210.000V	209.973V	±45mV
1kV Range : 206Hz	210.000V	209.970V	±45mV
1kV Range : 10kHz	210.000V	209.936V	±45mV
1kV Range : 40Hz	700.000V	699.965V	±91mV
1kV Range : 56Hz	700.000V	700.027V	±91mV
1kV Range : 1kHz	700.000V	699.918V	±91mV
1kV Range : 5kHz	700.000V	700.053V	±148mV
1kV Range : 10kHz	700.000V	699.831V	±148mV
1kV Range : 56Hz	1 000.000V	999.917V	±130mV
1kV Range : 1kHz	1 000.000V	999.759V	±130mV
Linearity - 20V DC Range			
Linearity	19.000 000V	18.999 960V	±63uV
Linearity	18.000 000V	17.999 960V	±60uV
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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Test Title	Applied Value	Reading	Uncertainties
Linearity	14.000 000V	13.999 990V	±47uV
Linearity	13.000 000V	12.999 970V	±43uV
Linearity	12.000 000V	11.999 980V	±40uV
Linearity	11.000 000V	10.999 960V	±37uV
Linearity	9.000 000V	9.000 075V	±30uV
Linearity	8.000 000V	8.000 065V	±27uV
Linearity	7.000 000V	7.000 068V	±24uV
Linearity	6.000 000V	6.000 061V	±20uV
Linearity	5.000 000V	5.000 057V	±17uV
Linearity	4.000 000V	4.000 057V	±14uV
Linearity	3.000 000V	3.000 052V	±10uV
Linearity	2.100 000V	2.100 059V	±7uV
Linearity	-19.000000V	-18.999900V	±63uV
Linearity	-18.000000V	-17.999940V	±60uV
Linearity	-17.000000V	-16.999930V	±57uV
Linearity	-16.000000V	-15.999910V	±53uV
Linearity	-15.000000V	-14.999930V	±50uV
Linearity	-14.000000V	-13.999920V	±47uV
Linearity	-13.000000V	-12.999920V	±43uV
Linearity	-12.000000V	-11.999930V	±40uV
Linearity	-11.000000V	-10.999920V	±37uV
Linearity	-9.000000V	-8.999915V	±30uV
Linearity	-8.000000V	-7.999917V	±27uV
Linearity	-7.000000V	-6.999923V	±24uV
Linearity	-6.000000V	-5.999923V	±20uV
Linearity	-5.000000V	-4.999925V	±17uV
Linearity	-4.000000V	-3.999927V	±14uV
Linearity	-3.000000V	-2.999926V	±10uV
Linearity	-2.100000V	-2.099929V	±7uV
DC Current			
200uA Range	0.000 0uA	-0.0001uA	±0.2nA
200uA Range	100.000 0uA	100.002 5uA	±0.2nA
200uA Range	200.000 0uA	200.003 0uA	±2.7nA
200uA Range	-100.0000uA	-99.9999uA	±0.2nA
200uA Range	-200.0000uA	-199.9996uA	±2.7nA
2mA Range	0.210 000mA	0.210 001mA	±2.7nA
2mA Range	1.000 000mA	1.000 016mA	±2.7nA
2mA Range	2.000 000mA	2.000 017mA	±34nA
2mA Range	-1.000000mA	-0.999994mA	±2.7nA
2mA Range	-2.000000mA	-1.999984mA	±34nA
20mA Range	5.000 00mA	4.999 92mA	±34nA
20mA Range	10.000 00mA	9.999 85mA	±34nA
20mA Range	15.000 00mA	14.999 77mA	±380nA
20mA Range	20.000 00mA	19.999 70mA	±380nA
20mA Range	-5.000000mA	-4.99995mA	±34nA
20mA Range	-10.000000mA	-10.00001mA	±34nA
20mA Range	-15.000000mA	-15.00004mA	±380nA
20mA Range	-20.000000mA	-20.00009mA	±380nA
200mA Range	100.000 0mA	99.998 7mA	±380nA

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Test Title	Applied Value	Reading	Uncertainties
200mA Range	200.000 0mA	200.000 2mA	±8.7uA
200mA Range	-100.0000mA	-99.9953mA	±380nA
200mA Range	-200.0000mA	-199.9960mA	±8.7uA
2A Range	1.000 000A	1.000 038A	±8.7uA
2A Range	2.000 000A	2.000 044A	±96uA
2A Range	-1.000000A	-1.000011A	±8.7uA
2A Range	-2.000000A	-2.000020A	±96uA
22A Range	11.000 00A	10.999 74A	±0.48mA
22A Range	22.000 00A	21.999 01A	±0.68mA
22A Range	-22.00000A	-22.00064A	±0.68mA
22A Range	-11.00000A	-11.00038A	±0.48mA
AC Current			
200uA Rng: 40Hz	25.000uA	25.014uA	±15nA
200uA Rng: 206Hz	25.000uA	25.016uA	±15nA
200uA Rng: 10kHz #	25.000uA	24.991uA	±49nA
200uA Rng: 10Hz #	200.000uA	199.964uA	±260nA
200uA Rng: 40Hz	200.000uA	199.965uA	±49nA
200uA Rng: 56Hz	200.000uA	199.964uA	±49nA
200uA Rng: 1kHz	200.000uA	199.964uA	±49nA
200uA Rng: 10kHz #	200.000uA	199.961uA	±247nA
2mA Rng: 40Hz	0.210 00mA	0.209 99mA	±55nA
2mA Rng: 206Hz	0.210 00mA	0.209 99mA	±55nA
2mA Rng: 10kHz #	0.210 00mA	0.210 05mA	±0.19uA
2mA Rng: 10Hz #	2.000 00mA	2.000 01mA	±1uA
2mA Rng: 40Hz	2.000 00mA	2.000 00mA	±400nA
2mA Rng: 56Hz	2.000 00mA	2.000 00mA	±400nA
2mA Rng: 1kHz	2.000 00mA	2.000 05mA	±400nA
2mA Rng: 10kHz #	2.000 00mA	2.000 00mA	±1.8uA
20mA Rng: 40Hz	2.100 0mA	2.099 9mA	±430nA
20mA Rng: 206Hz	2.100 0mA	2.100 2mA	±430nA
20mA Rng: 10kHz #	2.100 0mA	2.100 2mA	±1.9uA
20mA Rng: 56Hz	10.000 0mA	10.000 9mA	±2uA
20mA Rng: 10Hz #	20.000 0mA	20.000 2mA	±26uA
20mA Rng: 40Hz	20.000 0mA	20.000 2mA	±4uA
20mA Rng: 1kHz	20.000 0mA	19.999 4mA	±4uA
20mA Rng: 10kHz #	20.000 0mA	19.998 6mA	±18uA
200mA Rng: 40Hz	21.000mA	20.999mA	±4.2uA
200mA Rng: 206Hz	21.000mA	21.000mA	±4.2uA
200mA Rng: 10kHz #	21.000mA	21.003mA	±19uA
200mA Rng: 10Hz #	200.000mA	200.002mA	±75uA
200mA Rng: 40Hz	200.000mA	200.003mA	±40uA
200mA Rng: 56Hz	200.000mA	200.000mA	±40uA
200mA Rng: 1kHz	200.000mA	199.995mA	±40uA
200mA Rng: 10kHz #	200.000mA	200.002mA	±180uA
2A Rng: 40Hz	0.210 00A	0.209 96A	±42uA
2A Rng: 206Hz	0.210 00A	0.210 01A	±42uA
2A Rng: 2kHz #	0.210 00A	0.209 94A	±0.19mA

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2A Rng: 10Hz #	2.000 00A	2.000 28A	±0.9mA
2A Rng: 40Hz	2.000 00A	2.000 09A	±0.5mA
2A Rng: 56Hz	2.000 00A	2.000 07A	±0.5mA
2A Rng: 1kHz	2.000 00A	2.000 16A	±0.5mA
2A Rng: 2kHz #	2.000 00A	1.999 86A	±1.8mA
22A Rng: 40Hz	2.100 00A	2.098 81A	±530uA
22A Rng: 206Hz	2.100 00A	2.099 02A	±530uA
22A Rng: 10Hz #	22.000 00A	21.999 00A	±26mA
22A Rng: 40Hz	22.000 00A	21.999 10A	±5mA
22A Rng: 56Hz	22.000 00A	21.991 90A	±5mA
22A Rng: 100Hz	22.000 00A	21.997 80A	±5mA
22A Rng: 1kHz #	22.000 00A	21.994 60A	±5mA

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Test Title	Applied Value	Reading	Uncertainties
2 Wire Resistance measured as value at terminals.			
0 Ω 2 Wire	0.179 0 Ω	0.180 8 Ω	$\pm 0.8\text{m}\Omega$
10 Ω 2 Wire	10.183 Ω	10.185 Ω	$\pm 1\text{m}\Omega$
100 Ω 2 Wire	100.198 Ω	100.199 Ω	$\pm 1.3\text{m}\Omega$
1k Ω 2 Wire	1.000 195k Ω	1.000 197k Ω	$\pm 3.8\text{m}\Omega$
10k Ω 2 Wire	9.999 79k Ω	10.000 01k Ω	$\pm 21\text{m}\Omega$
100k Ω 2 Wire	100.001 2k Ω	100.001 3k Ω	$\pm 620\text{m}\Omega$
1M Ω 2 Wire	1.000 084M Ω	1.000 083M Ω	$\pm 14\Omega$
10M Ω 2 Wire	10.000 00M Ω	10.000 07M Ω	$\pm 150\Omega$
100M Ω 2 Wire	99.890 0M Ω	99.954 0M Ω	$\pm 4.5\text{k}\Omega$
4 Wire Ohms Measured relative to Zero			
10 Ω 4 Wire	10.006 897 Ω	10.006 798 Ω	$\pm 150\mu\Omega$
100 Ω 4 Wire	100.003 45 Ω	100.003 34 Ω	$\pm 0.4\text{m}\Omega$
1k Ω 4 Wire	0.999 991 6k Ω	0.999 997 6k Ω	$\pm 3\text{m}\Omega$
10k Ω 4 Wire	9.999 803k Ω	9.999 809k Ω	$\pm 12\text{m}\Omega$
100k Ω 4 Wire	100.001 20k Ω	100.001 38k Ω	$\pm 800\text{m}\Omega$
Capacitance @ 1kHz Measured Cp up to 1μF, Cs above			
10nF	10.053nF	10.053nF	$\pm 12\text{pF}$
20nF	20.068nF	20.068nF	$\pm 28\text{pF}$
50nF	50.430nF	50.430nF	$\pm 35\text{pF}$
100nF	99.49nF	99.49nF	$\pm 60\text{pF}$
1 μF	1.014 6 μF	1.014 6 μF	$\pm 0.52\text{nF}$
Reference Frequency Output			
Frequency	10.000 000MHz	9.999 992MHz	$\pm 2\text{Hz}$
Frequency	1.000 000 0MHz	0.999 999 7MHz	$\pm 0.2\text{Hz}$
Frequency	100.000 00kHz	99.999 97kHz	$\pm 0.02\text{Hz}$
Frequency	50.000 000kHz	49.999 984kHz	$\pm 0.01\text{Hz}$
Frequency	20.000 000kHz	19.999 994kHz	$\pm 0.004\text{Hz}$
Frequency	10.000 000kHz	9.999 997kHz	$\pm 2\text{mHz}$
Frequency	1.000 000 0kHz	0.999 999 7kHz	$\pm 0.2\text{mHz}$
Frequency	100.000 00Hz	99.999 98Hz	$\pm 0.02\text{mHz}$
A/D Input			
10V A/D Input	10.000 0V	10.000 0V	$\pm 100\mu\text{V}$
5V A/D Input	5.000 0V	4.999 9V	$\pm 100\mu\text{V}$
0V A/D Input	0.000 0V	0.000 0V	$\pm 100\mu\text{V}$
-5V A/D Input	-5.0000V	-4.9999V	$\pm 100\mu\text{V}$
-10V A/D Input	-10.0000V	-10.0000V	$\pm 100\mu\text{V}$

End Of Test Results