

Certificate of Calibration

ISSUED BY: Southern Calibration Laboratories Limited

DATE OF ISSUE: 08/03/12 CERTIFICATE NUMBER: 08669E



0080



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APPROVED SIGNATORY
S. SPARKS

SIGNATURE

Calibrated For:-

Keynes Controls Ltd.
Pakenham House
Riseley Business Park
Riseley
Berkshire
RG7 1NW

Reference:-

12030317

Equipment Calibrated:-

Multifunction Calibrator

Manufacturer:-

Fluke

Model No:-

5100B

Serial No. (Plant No.):-

3255010

Date Received:-

05 March 2012

Date of Calibration:-

08 March 2012

Laboratory Ambient Conditions:-

Temperature $20 \pm 1^{\circ}\text{C}$
Humidity $50 \pm 10\%\text{RH}$

Condition Received:-

Satisfactory, Wideband option has not been calibrated at customer's request.

(Procedure Reference VP53, VP13)

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The instrument was allowed to acclimatise and was energised from a $230V \pm 5\%$, 50Hz mains supply for at least 24 hours prior to calibration. Results are shown inclusive of zero-offsets.

Table I
D.C Voltage

<u>Instrument Setting</u>	<u>Measured Output</u>
00.000 mV	0.000 0 mV
10.000	9.999 7
-10.000	-9.999 7
100.000 mV	99.997 7 mV
-100.000	-99.997 3
1.000 00 V	0.999 979 V
-1.000 00	-0.999 976
2.222 2	2.222 12
3.333 3	3.333 23
4.444 4	4.444 33
5.555 5	5.555 43
6.666 6	6.666 52
7.777 7	7.777 61
8.888 8	8.888 71
9.999 9	9.999 80
10.000 0	9.999 91
12.000 0	11.999 91
14.000 0	13.999 91
16.000 0	15.999 92
18.000 0	17.999 93
19.000 0	18.999 94
-2.222 2	-2.222 24
-3.333 3	-3.333 33
-4.444 4	-4.444 40
-5.555 5	-5.555 46
-6.666 6	-6.666 58
-7.777 7	-7.777 64
-8.888 8	-8.888 73
-9.999 9	-9.999 81
-10.000 0	-9.999 86
-12.000 0	-11.999 90
-14.000 0	-13.999 88
-16.000 0	-15.999 84
-18.000 0	-17.999 81
-19.000 0	-18.999 76
100.000 0 V	99.998 0 V
-100.000 0	-99.998 8
1 000.000 V	999.995 V
-1 000.000	-999.985

The uncertainty in the measured values for Table I was: $\pm (15\text{ppm} + 1 \mu\text{V})$

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Table II
Current Function

<u>Instrument Setting</u>			<u>Measured Output</u>
100.000	uA	d.c	99.999 4 μ A
-100.000		d.c	- 99.997 3
100.000		400Hz	100.022
1.000 00	mA	d.c	1.000 017 mA
-1.000 00		d.c	- 0.999 988
1.000 00		400Hz	1.000 37
10.000 0	mA	d.c	10.000 21
-10.000 0		d.c	- 9.999 96
10.000 0		60Hz	10.002 8
10.000 0		400Hz	10.003 0
10.000 0		1 000Hz	10.002 7
100.000	mA	d.c	100.002 9
-100.000		d.c	- 100.000 0
100.000		400Hz	100.046
1.000 00	A	d.c	1.000 081 A
-1.000 00		d.c	- 1.000 069
1.000 00		400Hz	1.000 42

The uncertainties in the measured values for Table II were:-

DC Current <1A: \pm 90ppm
DC Current at 1A: \pm 140ppm
AC Current <1A: \pm 0.10%
AC Current at 1A: \pm 0.15%

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Table III
A.C Voltage

<u>Instrument Setting</u>			<u>Measured Output</u>
10.000	mV	400Hz	9.999 mV
100.000			99.992
1.000 00	V	60Hz	1.000 11 V
1.000 00		400	1.000 04
1.000 00		10 kHz	1.000 03
1.000 00		50	1.000 09
10.000 0	V	60 Hz	10.001 2 V
2.000 0		400	2.000 3
4.000 0			4.000 4
6.000 0			6.000 2
8.000 0			8.000 3
10.000 0			10.000 3
12.000 0			12.000 4
14.000 0			14.000 4
16.000 0			16.000 5
18.000 0			18.000 4
10.000 0		10 kHz	10.000 8
10.000 0		50	10.003 0
100.000	V	60Hz	100.012 V
100.000		400	100.004
100.000		1kHz	100.006
100.000		10	99.987
1 000.00	V	400Hz	1 000.10 V

The uncertainties in the measured values for Table III were:-

At 10mV: $\pm 0.06\%$
 100mV to 1 000V (10Hz to 30kHz): $\pm 80\text{ppm}$
 100mV to 100V (>30kHz to 100kHz): $\pm 110\text{ppm}$

Table IV
Frequency Accuracy@ 5V RMS

<u>Instrument Setting</u>	<u>Measured Output</u>
50 Hz	49.814 Hz
60	59.768
400	397.76
1000	997.6
5 kHz	5.011 kHz
10	10.020
50	50.303

The uncertainty in the measured values for Table IV was:- $\pm 0.01\%$

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Table V
DC Resistance

<u>Instrument Setting</u>	<u>DC Resistance</u>	<u>Measured Output</u>
1.000 000 Ω (4-wire)		0.999 97 Ω
10.000 00		9.999 60
100.000 0		99.999 5
1 000.000		1 000.004
10.000 00 $k\Omega$		10.000 14 $k\Omega$
100.000 0		99.999 0
1.000 000 $M\Omega$		0.999 981 $M\Omega$
10.000 00		10.002 58

The uncertainties in the measured values for Table V were:-

1 Ω to 100k Ω : \pm (15 ppm + 100 $\mu\Omega$)
1M Ω : \pm 20 ppm
10M Ω : \pm 50ppm

The uncertainties quoted refer to the measured values only, and not to the ability of the instrument to maintain its calibration.

End of Certificate

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.