

CERTIFICATE OF CALIBRATION

ISSUED BY AVON-DYNAMIC CALIBRATION

Date of Issue 11 February 2021

Certificate Number K563753



0199

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CALIBRATE MEASURE INNOVATE

For: Signatrol Ltd
Unit E2
Green Lane Business Park
Tewkesbury
GL20 8SJ

Approved Signatory:
M.Hyde

<u>Customer Ref Number</u> :	CE1013	<u>Date of Calibration</u> :	11 February 2021
<u>Date of Receipt</u> :	08 February 2021	<u>Item Type</u> :	3478A
<u>Item Serial Number</u> :	2911A61208		
<u>Instrument Manufacturer</u> :	Hewlett Packard		
<u>Description</u> :	Digital Multimeter		

Note

Calibrations marked ## (Not UKAS Accredited) in this Certificate have been included for Completeness

Calibrated by : H.Maggs

Procedure: HP 3478A: (1 year) VER IEEE /5720A+

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

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UKAS ACCREDITED CALIBRATION LABORATORY No 0199

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<u>Test Range</u>	<u>Applied Value</u>	<u>Lower limit</u>	<u>Test Result</u>	<u>Upper limit</u>	<u>Uncertainty of Measurement</u>
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Root Difference Square guardbanding method used.

DC VOLTAGE

30 mV Range

30 mV	0.0000 mV	-0.0040 mV	-0.0001 mV	0.0040 mV	500 nV
30 mV	30.0000 mV	29.9855 mV	30.0004 mV	30.0145 mV	770 nV

300 mV Range

300 mV	0.000 mV	-0.005 mV	0.000 mV	0.005 mV	760 nV
300 mV	300.000 mV	299.974 mV	300.005 mV	300.026 mV	2.7 μ V

3 V Range

3 V	0.00000 V	-0.00002 V	0.00000 V	0.00002 V	5.8 μ V
3 V	0.30000 V	0.29996 V	0.30001 V	0.30004 V	6.3 μ V
3 V	1.00000 V	0.99992 V	1.00002 V	1.00008 V	8.9 μ V
3 V	-1.00000 V	-1.00008 V	-1.00003 V	-0.99992 V	8.9 μ V
3 V	-3.00000 V	-3.00020 V	-3.00008 V	-2.99980 V	18 μ V
3 V	3.00000 V	2.99980 V	3.00007 V	3.00020 V	18 μ V
3 V	Autozero Off	2.99980 V	3.00008 V	3.00020 V	18 μ V
3 V	4½ digit	2.9997 V	3.0001 V	3.0003 V	60 μ V
3 V	3½ digit	2.999 V	3.000 V	3.001 V	580 μ V

30 V Range

30 V	0.0000 V	-0.0004 V	0.0000 V	0.0004 V	58 μ V
30 V	3.0000 V	2.9994 V	3.0001 V	3.0006 V	60 μ V
30 V	10.0000 V	9.9989 V	10.0002 V	10.0011 V	75 μ V
30 V	30.0000 V	29.9975 V	30.0007 V	30.0025 V	240 μ V
30 V	Autozero Off	29.9975 V	30.0008 V	30.0025 V	240 μ V

300 V Range

300 V	0.000 V	-0.002 V	0.000 V	0.002 V	580 μ V
300 V	300.000 V	299.977 V	300.005 V	300.023 V	3.0 mV

AC VOLTAGE

300 mV Range

300 mV	28.000 mV @ 20 kHz	27.824 mV	28.075 mV	28.176 mV	12 μ V
300 mV	280.000 mV @ 20 kHz	279.320 mV	280.069 mV	280.680 mV	41 μ V

Procedure: HP 3478A: (1 year) VER IEEE /5720A+5725A

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<u>Test Range</u>	<u>Applied Value</u>	<u>Lower limit</u>	<u>Test Result</u>	<u>Upper limit</u>	<u>Uncertainty of Measurement</u>
300 mV	280.000 mV @ 50 kHz	278.731 mV	280.568 mV	281.269 mV	79 μ V
300 mV	280.000 mV @ 100 kHz	275.800 mV	282.341 mV	284.200 mV	190 μ V
3 V Range					
3 V	2.80000 V @ 20 Hz	2.76706 V	2.79088 V	2.83294 V	510 μ V
3 V	2.80000 V @ 50 Hz	2.76706 V	2.79855 V	2.83294 V	220 μ V
3 V	0.28000 V @ 20 kHz	0.27874 V	0.28027 V	0.28126 V	41 μ V
3 V	1.50000 V @ 20 kHz	1.49630 V	1.49982 V	1.50370 V	180 μ V
3 V	2.80000 V @ 20 kHz	2.79370 V	2.80062 V	2.80630 V	220 μ V
3 V	2.80000 V @ 50 kHz	2.79132 V	2.79991 V	2.80868 V	370 μ V
3 V	0.28000 V @ 100 kHz	0.26976 V	0.28472 V	0.29024 V	190 μ V
3 V	2.80000 V @ 100 kHz	2.76784 V	2.79626 V	2.83216 V	590 μ V
30 V Range					
30 V	2.8000 V @ 20 kHz	2.7874 V	2.8013 V	2.8126 V	230 μ V
30 V	28.0000 V @ 20 kHz	27.9370 V	27.9920 V	28.0630 V	2.5 mV
30 V	28.0000 V @ 50 kHz	27.9132 V	27.9829 V	28.0868 V	4.0 mV
30 V	15.0000 V @ 100 kHz	14.7915 V	15.0054 V	15.2085 V	2.1 mV
30 V	28.0000 V @ 100 kHz	27.6784 V	27.9557 V	28.3216 V	8.0 mV
30 V	25.0000 V @ 300 kHz	22.1030 V	24.9368 V	27.8970 V	48 mV
300 V Range					
300 V	28.000 V @ 20 kHz	27.926 V	28.026 V	28.074 V	2.6 mV
300 V	210.000 V @ 20 kHz	209.489 V	210.047 V	210.511 V	14 mV
300 V	210.000 V @ 50 kHz	209.104 V	210.234 V	210.896 V	22 mV
300 V	210.000 V @ 100 kHz	207.864 V	210.804 V	212.136 V	41 mV
4-WIRE RESISTANCE					
30 \square Range					
30 Ω	10.0000 Ohm	9.9921 Ω	10.0006 Ω	10.0071 Ω	290 $\mu\Omega$
30 Ω	19.0000 Ohm	18.9890 Ω	18.9998 Ω	19.0102 Ω	550 $\mu\Omega$
300 \square Range					
300 Ω	0.000 Ohm	-0.005 Ω	0.001 Ω	0.005 Ω	580 $\mu\Omega$
300 Ω	100.000 Ohm	99.976 Ω	100.008 Ω	100.020 Ω	1.4 m Ω
300 Ω	190.000 Ohm	189.955 Ω	190.011 Ω	190.030 Ω	2.7 m Ω
3 k \square Range					
3 k Ω	0.00000 kOhm	-0.00002 k Ω	0.00000 k Ω	0.00002 k Ω	5.8 m Ω
3 k Ω	1.00000 kOhm	0.99975 k Ω	0.99996 k Ω	1.00011 k Ω	12 m Ω
3 k Ω	1.90000 kOhm	1.89954 k Ω	1.89992 k Ω	1.90019 k Ω	22 m Ω

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30 k Ω Range					
30 k Ω	0.0000 kOhm	-0.0002 k Ω	0.0000 k Ω	0.0002 k Ω	58 m Ω
30 k Ω	10.0000 kOhm	9.9976 k Ω	9.9998 k Ω	10.0012 k Ω	120 m Ω
30 k Ω	19.0000 kOhm	18.9966 k Ω	19.0004 k Ω	19.0031 k Ω	220 m Ω
300 k Ω Range					
300 k Ω	0.000 kOhm	-0.002 k Ω	0.000 k Ω	0.002 k Ω	580 m Ω
300 k Ω	100.000 kOhm	99.976 k Ω	99.997 k Ω	100.012 k Ω	1.5 Ω
300 k Ω	190.000 kOhm	189.966 k Ω	190.005 k Ω	190.031 k Ω	2.7 Ω
3 M Ω Range					
3 M Ω	0.00000 MOhm	-0.00002 M Ω	0.00000 M Ω	0.00002 M Ω	5.8 Ω
3 M Ω	1.00000 MOhm	0.99971 M Ω	0.99991 M Ω	1.00007 M Ω	25 Ω
3 M Ω	1.90000 MOhm	1.89958 M Ω	1.89994 M Ω	1.90023 M Ω	55 Ω
30 M Ω Range					
30 M Ω	0.0000 MOhm	-0.0002 M Ω	0.0000 M Ω	0.0002 M Ω	58 Ω
30 M Ω	10.0000 MOhm	9.9915 M Ω	10.0003 M Ω	10.0075 M Ω	470 Ω
30 M Ω	19.0000 MOhm	18.9835 M Ω	19.0008 M Ω	19.0135 M Ω	1.1 k Ω
DC CURRENT					
300 mA Range					
300 mA	100.000 mA	99.810 mA	99.993 mA	100.190 mA	6.1 μ A
3 A Range					
3 A	0.00000 A	-0.00006 A	-0.00001 A	0.00006 A	5.8 μ A
3 A	1.00000 A	0.99824 A	0.99994 A	1.00176 A	110 μ A
AC CURRENT					
300 mA Range					
300 mA	30.000 mA @ 5 kHz	29.621 mA	30.086 mA	30.379 mA	12 μ A
300 mA	100.000 mA @ 5 kHz	99.117 mA	100.041 mA	100.883 mA	28 μ A
3 A Range					
3 A	1.00000 A @ 5 kHz	0.98417 A	1.00033 A	1.01583 A	620 μ A

Procedure Reference : CLI050, CLI051, CLI052, CLI053 & CLI055.

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Laboratory Ambient Temperature : 20.0°C ± 3°C

Laboratory Humidity : 50% ± 20%rh

Standards Used

ADC2613

End of Report

Procedure: HP 3478A: (1 year) VER IEEE /5720A+5725A

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