

# CERTIFICATE OF CALIBRATION

Issued By BSRIA Instrument Solutions

Date of Issue 01 November 2017

Certificate Number  
STD92589

Page 1 of 5 Pages



Instrument Solutions

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Approved Signatory

**Customer :** Gemini Data Loggers (UK) Ltd  
Scientific House, Terminus Road  
Chichester, West Sussex PO19 8UJ

Date Received : 31 October 2017

<b>Instrument -</b>	System ID :	114115
	Description :	Energy Logger + clamps
	Manufacturer :	Gemini
	Model Number :	TGE-0001
	Serial Number :	829343
	Procedure Version :	PW297F3

## Environmental Conditions

Temperature : 20°C +/- 4°C  
Relative Humidity : 50% +/- 20%

Mains Voltage : 240V +/- 10V  
Mains Frequency : 50Hz +/- 1Hz

## Comments

Results recorded as received. No adjustment performed.

## Traceability Information

Instrument description	Serial number	Certificate number	Cal. Date	Cal. Period
Fluke 6100A Power Standard (master)	865248414	060525	31/05/2017	52
Fluke 6101A Power Standard (aux)	860948300	060529	01/06/2017	52
Fluke 6101A Power Standard (aux)	860948299	060527	31/05/2017	52

Calibrated By : M. Bray

Date of Calibration : 01 November 2017

This certificate provides traceability of measurement to recognised National Standards, and to the units of measurement realised at the National Physical Laboratory or other recognised National Standards laboratories.  
Copyright of this certificate is owned by the issuing laboratory and may not be reproduced except with the prior written approval of the issuing laboratory.  
This certificate complies with the requirements of BS EN ISO 10012:2003.

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Certificate Number  
STD92589

Page 2 of 5 Pages

Test Title	Tolerance	Applied Value	Recorded Value	% Of Spec.
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## CALIBRATION PROCEDURE

*The instrument was calibrated using a multi-phase Reference Power standard calibrator of known and traceable uncertainty.*

*Results from the reference standard calibrator have been reported within this certificate as the applied value.*

*Unless otherwise stated all AC measurements were performed at 50 Hz using a sinusoidal waveform.*

*Multi turn induction coils were used to produce the applied currents.*

*The instrument being calibrated results were taken from its display.*

*The uncertainties shown refer to the certificate and are not intended to indicate any long term instrument performance.*

## CURRENT COIL DESCRIPTION

**L 1:** Type : Rogowski Diameter : 85mm, SN : BIS18364.

**L 2:** Type : Rogowski Diameter : 85mm, SN : BIS18365.

**L 3:** Type : Rogowski Diameter : 85mm, SN : BIS18366.

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## Uncertainties

AC Volt 45 to 450Hz	78 to 168V $\pm(0.04\% + 4\text{mV})$ , 168 to 336V $\pm(0.04\% + 7\text{mV})$ , 336V to 1kV $\pm(0.04\% + 25\text{mV})$
AC Amps (Direct)	0.1 to 0.5A; $\pm(0.04\% + 10\text{uA})$ , 0.5 to 1A; $\pm(0.04\% + 20\text{uA})$ , 1 to 2A; $\pm(0.04\% + 40\text{uA})$
AC Amps (x50 coils)	7.5 to 10A; $\pm 0.38\%$ , 10 to 25A; $\pm 0.38\%$ , 25 to 50A; $\pm 0.38\%$ , 50 to 100A; $\pm 0.38\%$ 100 to 250A; $\pm 0.38\%$ , 250 to 500A; $\pm 0.38\%$ , 500 to 1050A; $\pm 0.38\%$ .
Phase Angle	$\pm 0.025^\circ$ ; Power Factor; $\pm 0.001$ .
AC Power using coils	Frequency range 45 - 69Hz; For pf=1; $\pm 0.38\%$ , For pf<1 and >0.25; $\pm 0.38\%$
Total uncertainty	Equals the above plus the devices resolution.

# CERTIFICATE OF CALIBRATION

Certificate Number  
STD92589

Page 3 of 5 Pages

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## CALIBRATION RESULTS

### SINGLE PHASE OPERATION

*The instrument was energise from 240.00 V, 50.00 Hz for all tests.*

Voltage	1.2V	240.00V	240.3V	25%
Current L1	0.51A	1.000A	1.1A	20%
Power Factor	0.020PF	1.000PF	1.0PF	0%
Power	0.004 8kW	0.240kW	0.24kW	0%
Current L1	0.60A	10.000A	10.0A	0%
Power Factor	0.020PF	1.000PF	1.00PF	0%
Power	0.048kW	2.400kW	2.41kW	21%
Current L1	3A	250.00A	250.1A	3%
Power Factor	0.020PF	1.000PF	1.00PF	0%
Power	1.2kW	60.000kW	60.12kW	10%
Current L1	7.5A	700.00A	699.1A	12%
Power Factor	0.020PF	1.000PF	1.00PF	0%
Power	3.4kW	168.000kW	167.79kW	6%
Current L1	10.5A	1 000.00A	999.1A	9%
Power Factor	0.020PF	1.000PF	1.00PF	0%
Power	4.8kW	240.000kW	240.25kW	5%

*Page break.*

### Uncertainties

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AC Amps (Direct)	0.1 to 0.5A; $\pm(0.04\% + 10\text{uA})$ , 0.5 to 1A; $\pm(0.04\% + 20\text{uA})$ , 1 to 2A; $\pm(0.04\% + 40\text{uA})$
AC Amps (x50 coils)	7.5 to 10A; $\pm 0.38\%$ , 10 to 25A; $\pm 0.38\%$ , 25 to 50A; $\pm 0.38\%$ , 50 to 100A; $\pm 0.38\%$ 100 to 250A; $\pm 0.38\%$ , 250 to 500A; $\pm 0.38\%$ , 500 to 1050A; $\pm 0.38\%$ .
Phase Angle	$\pm 0.025^\circ$ ; Power Factor; $\pm 0.001$ .
AC Power using coils	Frequency range 45 - 69Hz; For pf=1; $\pm 0.38\%$ , For pf<1 and >0.25; $\pm 0.38\%$
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# CERTIFICATE OF CALIBRATION

Certificate Number  
STD92589

Page 4 of 5 Pages

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## CALIBRATION RESULTS CONTINUED

### Three Phase Operation

Voltage	1.2V	240.00V	240.2V	17%
Current L1	0.51A	1.000A	1.1A	20%
Current L2	0.51A	1.000A	0.8A	39%
Current L3	0.51A	1.000A	0.9A	20%
Power Factor L1	0.020PF	1.000PF	1.0PF	0%
Power Factor L2	0.020PF	1.000PF	1.0PF	0%
Power Factor L3	0.020PF	1.000PF	1.0PF	0%
Power	0.014kW	0.720kW	0.72kW	0%
Current L1	0.60A	10.000A	9.8A	33%
Current L2	0.60A	10.000A	9.8A	33%
Current L3	0.60A	10.000A	9.9A	17%
Power Factor L1	0.020PF	1.000PF	1.00PF	0%
Power Factor L2	0.020PF	1.000PF	0.99PF	50%
Power Factor L3	0.020PF	1.000PF	0.99PF	50%
Power	0.14kW	7.200kW	7.14kW	43%
Current L1	1A	50.00A	50.2A	20%
Current L2	1A	50.00A	49.5A	50%
Current L3	1A	50.00A	49.6A	40%
Power Factor L1	0.020PF	1.000PF	1.00PF	0%
Power Factor L2	0.020PF	1.000PF	0.99PF	50%
Power Factor L3	0.020PF	1.000PF	0.99PF	50%
Power	0.72kW	36.000kW	35.670kW	46%
Current L1	3A	250.00A	252.1A	70%
Current L2	3A	250.00A	249.1A	30%
Current L3	3A	250.00A	249.6A	13%
Power Factor L1	0.020PF	1.000PF	1.00PF	0%
Power Factor L2	0.020PF	1.000PF	0.99PF	50%
Power Factor L3	0.020PF	1.000PF	0.99PF	50%
Power	3.6kW	180.000kW	177.66kW	65%

### Uncertainties

AC Volt 45 to 450Hz 78 to 168V  $\pm(0.04\% + 4\text{mV})$ , 168 to 336V  $\pm(0.04\% + 7\text{mV})$ , 336V to 1kV  $\pm(0.04\% + 25\text{mV})$   
AC Amps (Direct) 0.1 to 0.5A;  $\pm(0.04\% + 10\text{uA})$ , 0.5 to 1A;  $\pm(0.04\% + 20\text{uA})$ , 1 to 2A;  $\pm(0.04\% + 40\text{uA})$   
AC Amps (x50 coils) 7.5 to 10A;  $\pm 0.38\%$ , 10 to 25A;  $\pm 0.38\%$ , 25 to 50A;  $\pm 0.38\%$ , 50 to 100A;  $\pm 0.38\%$   
100 to 250A;  $\pm 0.38\%$ , 250 to 500A;  $\pm 0.38\%$ , 500 to 1050A;  $\pm 0.38\%$ .  
Phase Angle  $\pm 0.025^\circ$ ; Power Factor;  $\pm 0.001$ .  
AC Power using coils Frequency range 45 - 69Hz; For pf=1;  $\pm 0.38\%$ , For pf<1 and >0.25;  $\pm 0.38\%$   
Total uncertainty Equals the above plus the devices resolution.

# CERTIFICATE OF CALIBRATION

Certificate Number  
STD92589

Page 5 of 5 Pages

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## CALIBRATION RESULTS CONTINUED

Current L1	3A	250.00A	250.3A	10%
Current L2	3A	250.00A	250.4A	13%
Current L3	3A	250.00A	249.0A	33%
Power Factor L1	0.020PF	0.866PF	0.85PF	80%
Power Factor L2	0.020PF	0.866PF	0.87PF	20%
Power Factor L3	0.020PF	0.866PF	0.86PF	30%
Power	3.1kW	155.880kW	155.89kW	0%

Current L1	3A	250.00A	249.0A	33%
Current L2	3A	250.00A	250.4A	13%
Current L3	3A	250.00A	249.3A	23%
Power Factor L1	0.020PF	0.500PF	0.49PF	50%
Power Factor L2	0.020PF	0.500PF	0.51PF	50%
Power Factor L3	0.020PF	0.500PF	0.50PF	0%
Power	1.8kW	90.000kW	90.07kW	4%

Current L1	7.5A	700.00A	704.5A	60%
Current L2	7.5A	700.00A	698.8A	16%
Current L3	7.5A	700.00A	696.9A	41%
Power Factor L1	0.020PF	1.000PF	0.99PF	50%
Power Factor L2	0.020PF	1.000PF	0.99PF	50%
Power Factor L3	0.020PF	1.000PF	0.99PF	50%
Power	10.1kW	504.000kW	498.20kW	57%

Current L1	10.5A	1 000.00A	1 001.1A	10%
Current L2	10.5A	1 000.00A	1 002.8A	27%
Current L3	10.5A	1 000.00A	995.9A	39%
Power Factor L1	0.020PF	1.000PF	0.99PF	50%
Power Factor L2	0.020PF	1.000PF	0.99PF	50%
Power Factor L3	0.020PF	1.000PF	0.99PF	50%
Power	14.4kW	720.000kW	724.27kW	30%

**End.**

## Uncertainties

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AC Amps (Direct)	0.1 to 0.5A; $\pm(0.04\% + 10\mu\text{A})$ , 0.5 to 1A; $\pm(0.04\% + 20\mu\text{A})$ , 1 to 2A; $\pm(0.04\% + 40\mu\text{A})$
AC Amps (x50 coils)	7.5 to 10A; $\pm 0.38\%$ , 10 to 25A; $\pm 0.38\%$ , 25 to 50A; $\pm 0.38\%$ , 50 to 100A; $\pm 0.38\%$ 100 to 250A; $\pm 0.38\%$ , 250 to 500A; $\pm 0.38\%$ , 500 to 1050A; $\pm 0.38\%$ .
Phase Angle	$\pm 0.025^\circ$ ; Power Factor; $\pm 0.001$ .
AC Power using coils	Frequency range 45 - 69Hz; For pf=1; $\pm 0.38\%$ , For pf<1 and >0.25; $\pm 0.38\%$
Total uncertainty	Equals the above plus the devices resolution.

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