

## Certificate G59/2

The results of the G59/2 test are summarized in this certificate. DELTA ES declares that all devices (with G59/2 setting) that shipped to the UK comply with the requirements defined in engineering recommendation G59/2 (2010). These settings cannot be changed by an installer without the use of specific software. Test details are available with test report ID: 11TH0316-G59/2\_1 (Bureau Veritas).

Hereby tests results for:

- SOLIVIA 2.5 EU G4 TR (EOE45010288)
- SOLIVIA 3.0 EU G4 TR (EOE46010287)
- SOLIVIA 3.3 EU G4 TR (EOE46010252)
- SOLIVIA 3.6 EU G4 TR (EOE46010316)

### 1.) Power Quality

	Harmonic current emissions (%)							
Harmonic	3rd	5th	7th	9th	11th	13th	THD	PWHD
Limit 1	21.6	10.7	7.2	3.8	3.1	2.0	23	23
Test value	0.800	0.223	0.0931	1.10	0.737	0.587	1.74	2.60

<sup>1</sup> Maximum permissible harmonics current as per EN 61000-3-12.

	Voltage fluctuation and Flicker			
Model	SOLIVIA 2.5 EU G4 TR		SOLIVIA 3.6 EU G4 TR	
Parameter Un=230 V Output power: 100 %	Pst	Plt	Pst	Plt
Limit 2	1.0	0.65	1.0	0.65
Test value	0.0578	0.0578	0.18	0.18

<sup>2</sup> Maximum permissible voltage fluctuation (expressed as a percentage of nominal voltage at 100% power) and flicker as per BS EN 61000-3-3 resp. BS EN61000-3-11.

	DC Injection			Power factor		
G 59/2 Limit	0.25 % In			0.95c – 0.95i at three voltages levels		
Test Level	10 %	55 %	100 %	212 V	230 V	248 V
Test value	-2.55 mA	-1.98 mA	5.76 mA	0.995i	0.996i	0.996i

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## 2a.) Under- / Overvoltage Tests (230 V grid)

	Undervoltage		Overvoltage	
Parameter	Voltage	Time	Voltage	Time
<b>G 59/2 limit stage 1</b>	-13% Un	2.5 s	+10% Un	1.0 s
<b>Actual settings</b>	200 V	2.5 s	253 V	1.0 s
<b>Trip value</b>	N/A	2486 ms	N/A	985 ms
	Undervoltage		Overvoltage	
Parameter	Voltage	Time	Voltage	Time
<b>G 59/2 limit stage 2</b>	-20% Un	0.5 s	+15% Un	0.5 s
<b>Actual settings</b>	184 V	0.5 s	264 V	0.5 s
<b>Trip Value</b>	N/A	500 ms	N/A	496 ms

## 2b.) Under- / Overvoltage Tests (240 V grid)

	Undervoltage		Overvoltage	
Parameter	Voltage	Time	Voltage	Time
<b>G 59/2 limit stage 1</b>	-13% Un	2.5 s	+10% Un	1.0 s
<b>Actual settings</b>	208 V	2.5 s	264 V	1.0 s
<b>Trip value</b>	N/A	2497 ms	N/A	998 ms
	Undervoltage		Overvoltage	
Parameter	Voltage	Time	Voltage	Time
<b>G 59/2 limit stage 2</b>	-20% Un	0.5 s	+15% Un	0.5 s
<b>Actual settings</b>	192 V	0.5 s	276 V	0.5 s
<b>Trip Value</b>	N/A	497 ms	N/A	93 ms

## 3.) Under- / Overfrequency Tests

	Underfrequency		Overfrequency	
Parameter	Frequency	Time	Frequency	Time
<b>G 59/2 limit stage 1</b>	47.5 Hz	At least 20 s	51.5 Hz	At least 90 s
<b>Actual settings</b>	N/A	N/A	N/A	N/A
<b>Trip Value</b>	N/A	N/A	N/A	N/A
	Underfrequency		Overfrequency	
Parameter	Frequency	Time	Frequency	Time
<b>G 59/2 limit stage 2</b>	47.0 Hz	Max 0.5 s	52.0 Hz	Max 0.5 s
<b>Actual settings</b>	47.00 Hz	450 ms	52.00 Hz	450 ms
<b>Trip Value</b>	N/A	451 ms	N/A	430 ms



#### 4.) Loss of Mains Tests

Method used	Frequency: 50+/-0.2Hz UN=230+/-3Vac RLC consumes inverter real power within +/- 5% Quality > 2 @ 55% load		
Output Power Level	10%	55%	100%
G 59/2 Limit	5 s		
Actual setting	5000 ms	5000 ms	5000 ms
Trip value	331 ms	570 ms	129 ms

#### 5.) Reconnection Times

Method used	Under-/Overvoltage	Under-/Overfrequency	Loss of Mains
Minimum value	180 s		
Actual setting	180 s	180 s	180 s
Recorded value	181 s	181 s	181 s

#### 6.) Fault Level contribution

##### -Short circuit Current Contribution

As Photovoltaic SSEGs are inverter connected, they are deemed to automatically comply with regulations and no further tests are required.

##### -Over Current Protection

The products have to be installed with appropriate protection according to BS7671. See installation manual.

#### 7.) Self monitoring – solid state switching

Units do not provide solid state switching relays. In case the semiconductor bridge is switched off, then the voltage on the output drops to zero. In this case the relays on the output will also open.

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