

Certificate of Compliance

Applicant: Delta Energy Systems Germany GmbH
Tscheulinstraße 21
79331 Teningen
Germany

Product: Photovoltaic Inverter with integrated automatic disconnection device between a generator and the public low-voltage grid

Model:	SOLIVIA30EUT4TL EOE48030458	SOLIVIA20EUG4TL EOE48010364	SOLIVIA15EUG4TL EOE48010362
Rating:	30,0kVA	21,0kVA	15,75kVA

Intended use:

An automatic disconnection device with three-phase mains surveillance in accordance with Engineering Recommendation G59/2 for photovoltaic systems with a three-phase parallel coupling via an inverter to the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter.

Applied standards and guidelines:

Engineering Recommendation G59 Issue 2 2010

Recommendations for the connection of generating plant to the distribution systems of licensed distribution network operators

The safety concept of an aforementioned representative product corresponds at the time of issue of this certificate to the valid safety specifications for the specified use in accordance with regulations.

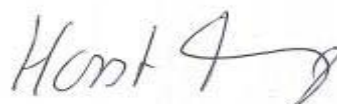
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Certificate No: 13-057-00

Date of issue: 2013-04-04

Valid until:

2016-04-04



Horst Haug
Certification Department



Annex to certificate 13-057-00:

Harmonics Emissions								
SOLVIVIA30EUT4TL								
Minimal Short Circuit Ratio R_{sce} :							33	
Value of Short Circuit Power S_{sc} corresponding to R_{sce} :							990kVA	
Equipment Phases: Three Phase								
Description	Harmonic Current % = $100I_n/I_1$						Harmonic Current Distortion Factors (%)	
Harmonic:	I_3	I_5	I_7	I_9	I_{11}	I_{13}	THD	PWHD
Limit: [%]	21,6	10,7	7,2	3,8	3,1	2,0	23,0	23,0
Actual Value L1: [%]	0,67	0,87	1,18	0,25	0,33	0,17	3,12	7,35
Actual Value L2: [%]	0,76	0,96	1,00	0,11	0,22	0,07	3,16	7,85
Actual Value L3: [%]	0,53	0,82	1,01	0,18	0,64	0,19	3,15	8,49
SOLVIVIA20EUG4TL, SOLVIVIA15EUG4TL								
Minimal Short Circuit Ratio R_{sce} :							33	
Value of Short Circuit Power S_{sc} corresponding to R_{sce} :							6600kVA	
Equipment Phases: Three Phase								
Description	Harmonic Current % = $100I_n/I_1$						Harmonic Current Distortion Factors (%)	
Harmonic:	I_3	I_5	I_7	I_9	I_{11}	I_{13}	THD	PWHD
Limit: [%]	21,6	10,7	7,2	3,8	3,1	2,0	23,0	23,0
Actual Value L1: [%]	0,48	1,24	0,92	0,23	0,60	0,81	2,30	4,18
Actual Value L2: [%]	0,22	1,57	0,79	0,03	0,70	0,70	2,36	3,58
Actual Value L3: [%]	0,14	1,36	0,68	0,02	0,63	0,77	2,15	3,59
Voltage Fluctuations								
SOLVIVIA30EUT4TL								
Equipment meets BSEN 61000-3-3							Yes	
Voltage Disturbance								
	P_{st}						P_{it}	
Limit	1,0						0,65	
Actual Value	0,218						0,224	
SOLVIVIA20EUG4TL, SOLVIVIA15EUG4TL								
Equipment meets BSEN 61000-3-3							Yes	
Voltage Disturbance								
	P_{st}						P_{it}	
Limit	1,0						0,65	
Actual Value	0,091						0,089	
DC Injection								
The limit for dc-injection was assumed as 0,25% of $I_{ac,nom}$ (=55mA) following the modification proposal "Distribution Code: Modification to the Distribution Code to implement a change to Engineering Recommendation G59/2 relating to the limits of DC injection", issued by the Office of Gas and Electricity Markets, 11 April 2011. Implementation date 12 April 2011.								
Power Factor								
G59/2 Limit	0,95 lag – 0,95 lead							
Output Voltage:	212V		230V		248V			
Test Value	0,996		0,996		0,996			

Voltage Monitoring, LV connection

Protection	Setting		Test Results	
	Volts, %	Sec	Volts	Sec
Under Voltage Stage 1				
L-N	-13%	2,5s	201,2V	2,45s
Under Voltage Stage 2				
L-N	-20%	0,5s	185,1V	0,44s
Over Voltage Stage 1				
L-N	+10%	1,0s	253,7V	0,94s
Over Voltage Stage 2				
L-N	+15%	0,5s	265,2V	0,44s

Note:
230V was the nominal grid voltage

Frequency Monitoring

Protection	Setting		Test Results	
	Hz	Sec	Hz	Sec
Over Frequency Stage 1	51,50Hz	90s	51,49Hz	89,6s
Over Frequency Stage 2	52,00Hz	0,5s	52,02Hz	0,50s
Under Frequency Stage 1	47,50Hz	20s	47,53Hz	19,8s
Under Frequency Stage 2	47,00Hz	0,5s	47,02Hz	0,49s

Loss of Mains Test (Method used: frequency shift)

Output power level:	10%	55%	100%
G59/2 Limit:	5s		
Trip value (sec):	0,22	0,61	0,55

Reconnection Times

Reconnection Time	Under/Over voltage	Under/Over Frequency	Loss of mains
Minimum value	180s	180s	180s
Actual Setting	180s	180s	180s
Recorded value	182s	182s	182s

Fault Level Contribution

As SSEGs (small-scale embedded generators) for PV are inverter-connected, they are deemed to automatically comply with regulations and no further tests are required. The max. short circuit current is the max. AC current.

SOLID STATE SWITCHING

It has been verified that in the event of the solid state switching device failing to disconnect the Generating Plant, the voltage on the output side of the switching device is reduced to a value below 50 volt within 0,5s.