Certificate of compliance

Applicant: **Delta Electronics, Inc.Xxx**
39, Sec.2, Huandong Road, Shanhua Dist.
Tainan City 74144
Taiwan

Product: **Grid-tied photovoltaic (PV) inverter**

Model: **H2.5_210**
H2.5_211
H3_210
H3_211
H3A_220
H3A_221
H4A_220
H4A_221
H5A_220
H5A_221

Use in accordance with regulations:

Automatic disconnection device with single-phase mains surveillance in accordance with DANSK ENERGI:2019 for photovoltaic systems with a single-phase parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter.

Applied rules and standards:

DANSK ENERGI:2019
Technical requirements for connection of power-generating plants to the low-voltage grid (≤1kV)
Type A

DIN V VDE V 0126-1-1:2006-02 (4.1 Functional safety)
Automatic disconnection device between a generator and the public low-voltage grid

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

Report number: **PV190614C41_1**
Certificate number: **U19-0564** **Date of issue:** **2019-10-14**

Certification body

Holger Schaffer

Certification body Bureau Veritas Consumer Products Services Germany GmbH accreditation to DIN EN ISO/IEC 17065

Type Verification Test Report	
Extract from test report according to DANSK ENERGI	**Nr. PV190614C41_1**

Type Approval and declaration of compliance with the requirements of DANKS ENERGI				
Manufacturer / applicant:	Delta Electronics, Inc.Xxx 39, Sec.2, Huandong Road, Shanhua Dist. Tainan City 74144 Taiwan			
Micro-generator Type	Grid-tied photovoltaic inverter			
Rated values	H2.5_210 H2.5_211	H3_210 H3_211	H3A_220 H3A_221	H4A_220 H4A_221
MPP DC voltage range [V]	240-470	290-500	180-500	240-500
Input DC voltage range [V]	30-500 max. 500	30-550, max. 600	30-550 max. 600	30-550, max. 600
Input DC current [A]	11 (1 MPP tracker)	11 (1 MPP tracker)	11 for each / 18 for total (2 MPP tracker)	11 for each 18 for total (2 MPP tracker)
Output AC voltage [V]	230	230	230	230
Output AC current [A]	13,9	14,3	14,3	18,6
Output power [VA]	2500	3000	3000	3680*
Rated values	H5A_220 H5A_221			
MPP DC voltage range [V]	240-500Vdc			
Input DC voltage range [V]	30-550, max. 600			
Input DC current [A]	11 for each 22 for total (2 MPP tracker)			
Output AC voltage [V]	230			
Output AC current [A]	24A			
Output power [VA]	3680*			
*Note. Output power of inverters limited to 3680VA.				
Firmware version	DSP: V3.50, V4.00, V4.50, V5.00, V5.50 DISPLAY: V2.19, V2.20, V2.21, V2.22, V2.23			
Measurement period:	2019-06-19 to 2019-07-11 2019-07-01 to 2019-07-24			

Description of the structure of the power generation unit:

The power generation unit is equipped with a PV and line-side EMC filter. The power generation unit has no galvanic isolation between DC input and AC output. Output switch-off is performed with single-fault tolerance based on two series-connected relays in line and neutral. This enables a safe disconnection of the power generation unit from the network in case of error.

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Setting of the parameter values for DK1 and DK2:		
	Settings for DK1	**Setting for DK2**
	LFSM-O	
Threshold frequency [Hz]	50,2	50,5
Droop [% of Pn]	5% (40% Pn/Hz)	4% (50% Pn/Hz)
Intentional Delay	500ms	500ms
	Reactive Power	
	Q fix	Q fix
Active/disabled [On/Off]	On	On
Q setpoint [VAr]	0	0
	cos φ fix	
Active/disabled [On/Off]	Off	Off
PF setpoint [PF]	1	1
	Settings for DK1	**Setting for DK2**
	cos φ (P)	
Active/disabled [On/Off]	Off	Off
Cos φ (P) P1 [% of P_n]	0	0
Cos φ (P) PF1 [PF]	1	1
Cos φ (P) P2 [% of P_n]	50	50
Cos φ (P) PF2 [PF]	1	1
Cos φ (P) P3 [% of P_n]	100	100
Cos φ (P) PF3 [PF]	0,9 inductive	0,9 inductive
Cos φ (P) Lockin [% of U_n]	105	105
Cos φ (P) Lockout [% of U_n]	100	100
	Connection and Reconnection	
Gradient [% of P_n/min]	20	20
Observation time [seconds]	180	180
U_{min} [% of U_n]	85	85
U_{max} [% of U_n]	110	110
f_{min} [Hz]	47,5	47,5
f_{max} [Hz]	50,2	50,5

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	System Protection	
f> [s]	0,2	0,2
f> [Hz]	51,5	51,5
f< [s]	0,2	0,2
f< [Hz]	47,5	47,5
U> [s]	60	60
U> [% of U_n]	110	110
U>> [s]	0,2	0,2
U>> [% of U_n]	115	115
U< [s]	50	50
U< [% of U_n]	85	85
	Loss of Mains Detection	
U<< [s]	0,2	0,2
U<< [% of U_n]	80	80
ROCOF [s]	0,08	0,08
ROCOF [Hz/s]	2,5	2,5

Note.

Inverter is able to provide both options for loss of mains detection (Undervoltage (step 2) and Frequency change (RoCoF) can be used).