Certificate | SPAIN RD 1699/2011

The results of tests performed according to reference standard SPAIN RD 1699/2011 are summarized in this certificate.
Power-One Italy S.p.a. declares that the units set for SPAIN RD 1699/2011 operations are characterized by the following features:

- The internal specification and parameters are set to be compliant with SPAIN RD 1699/2011 engineering requirements.
- All units have identical internal parameters setting.
- These parameters cannot be changed without the usage of password protected tool.

SSEG DETAILS (Small-Scale Embedded Generator)

SSEG Type Reference:	PHOTO-VOLTAIC GRID TIED INVERTER
SSEG Model Reference:	TRIO-27.6-TL-OUTD-400 TRIO-27.6-TL-OUTD-S2-400 TRIO-27.6-TL-OUTD-S2F-400 TRIO-27.6-TL-OUTD-S2X-400 TRIO-20.0-TL-OUTD-400 TRIO-20.0-TL-OUTD-S2-400 TRIO-20.0-TL-OUTD-S2F-400 TRIO-20.0-TL-OUTD-S2X-400
Maximum export capability (SSEG rating less parasitic load)	30000W (TRIO-27.6-TL-OUTD-400 and derived models) 22000W (TRIO-20.0-TL-OUTD-400 and derived models)
Nominal Output AC Power	27600W (TRIO-27.6-TL-OUTD-400 and derived models) 20000W (TRIO-20.0-TL-OUTD-400 and derived models)

MANUFACTURER and TEST HOUSE DETAILS

Name:	Power-one Italy S.p.A. - R.& D. Department
Address:	Via S. Giorgio 642, 52028 Terranuova Bracciolini Arezzo - Italy
Telephone number:	+39-055-91951
Fax number:	+39-055-9195248
E-mail address	service@power-one.com

TEST RESULTS SUMMARY

Power Quality:

- Harmonic Current Emission as per EN-61000-3-12
- Voltage Fluctuation and Flickers as per EN-61000-3-11
- DC Injection as per VDE 0126
- Power Factor as per VDE 0126

Protection:

- Under/Over Frequency Tests
- Under/Over Voltage Tests
- Reconnection Times
- Loss of Mains Test

Power-One Italy S.p.a.
Terranuova Bracciolini, April 29, 2013

Robert White
(Director Safety & Environmental Compliance)

SPAIN RD 1699/2011 TEST RESULTS DETAILS – TYPE VERIFICATION TEST SHEET

POWER QUALITY

TRIO-27.6-TL-OUTD-400		Value of Short Circuit Power SSC = 0.9108 MVA @ RSCE = 33							
Harmonic Current Emission as per EN-61000-3-12									
Harmonic		3rd [A%]	5rd [A%]	7rd [A%]	9rd [A%]	11rd [A%]	13rd [A%]	THD [A%]	PWHD [A%]
Limit		21.6	10.7	7.2	3.8	3.1	2	13	22
Result	Test value L1	0.459	0.344	0.041	0.039	1.113	0.783	1.617	2.850
	Test value L2	0.270	0.345	0.048	0.085	1.035	0.842	1.573	2.802
	Test value L3	0.234	0.342	0.042	0.087	1.048	0.848	1.561	2.883

TRIO-20.0-TL-OUTD-400		Value of Short Circuit Power SSC = 0.66 MVA @ RSCE = 33							
Harmonic Current Emission as per EN-61000-3-12									
Harmonic		3rd [A%]	5rd [A%]	7rd [A%]	9rd [A%]	11rd [A%]	13rd [A%]	THD [A%]	PWHD [A%]
Limit		21.6	10.7	7.2	3.8	3.1	2	13	22
Result	Test value L1	0.920	0.053	0.038	0.083	1.400	0.932	2.052	2.853
	Test value L2	0.603	0.063	0.034	0.163	1.229	1.011	1.829	2.786
	Test value L3	0.417	0.022	0.050	0.215	1.302	1.027	1.846	2.753

TRIO-27.6-TL-OUTD-400					
Voltage Fluctuation and Flickers as per EN-61000-3-11					
Voltage Disturbance	Pst	Plt	D(t) > 3%	dc (%)	dmax (%)
Limit	1	0.65	0.5	3.3	6
Test Value	0.112	0.056	0.001	0.001	5.629

TRIO-20.0-TL-OUTD-400					
Voltage Fluctuation and Flickers as per EN-61000-3-11					
Voltage Disturbance	Pst	Plt	D(t) > 3%	dc (%)	dmax (%)
Limit	1	0.65	0.5	3.3	6
Test Value	0.205	0.168	0.001	0.029	0.594

TRIO-27.6-TL-OUTD-400							
VDE 0126 Limit	DC injection [A]				Power Factor		
0.5% of 45A	225mA, tested at three power levels				0.95 lag - 0.95 lead at three voltage levels		
Test Level		10%	50%	100%	200 Vac	230 Vac	248 Vac
Test Value	L1	0.007	0.005	0.008	0.998	0.997	0.996
	L2	0.001	-0.002	-0.004			
	L3	-0.007	-0.001	-0.004			

TRIO-20.0-TL-OUTD-400							
VDE 0126 Limit	DC injection [A]				Power Factor		
0.5% of 33A	165mA, tested at three power levels				0.95 lag - 0.95 lead at three voltage levels		
Test Level		10%	50%	100%	200 Vac	230 Vac	248 Vac
Test Value	L1	0.003	0.005	0.007	0.997	0.996	0.995
	L2	0.002	0.000	0.007			
	L3	-0.004	-0.005	-0.011			

PROTECTION

TRIO-27.6-TL-OUTD-400 and TRIO-20.0-TL-OUTD-400

UNDER FREQUENCY TEST						
Fnom=50Hz	SPAIN RD 1699/2011 Limit		Settings		Results	
Under Frequency <	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
	48.00	3.00	48.00	2.92	47.97	2.92

OVER FREQUENCY TEST						
Fnom=50Hz	SPAIN RD 1699/2011 Limit		Settings		Results	
Over Frequency >	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
	50.50	0.50	50.50	0.42	50.02	0.36

UNDER VOLTAGE TEST						
Vφ-n nom =230V	SPAIN RD 1699/2011 Limit		Settings		Results	
Under Voltage <	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
L1-N	195.5	1.50	195.5	1.44	196.0	1.47
L2-N					195.4	1.47
L3-N					195.4	1.47
L1-L2-L3	338.6	1.50	338.6	1.44	340.1	1.46

OVER VOLTAGE TEST						
Vφ-n nom =230V	SPAIN RD 1699/2011 Limit		Settings		Results	
Over Voltage >	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
L1-N	253.0	1.50	253.0	1.44	253.2	1.48
L2-N					253.6	1.49
L3-N					253.2	1.48
L1-L2-L3	438.2	1.50	438.2	1.44	438.4	1.49
Over Voltage >>	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
L1-N	264.5	0.20	264.5	0.16	264.3	0.18
L2-N					264.6	0.18
L3-N					264.8	0.18
L1-L2-L3	458.1	0.20	458.1	0.16	457.6	0.18

RECONNECTION TIMES			
	Under/Over voltage	Under/Over Frequency	Loss of Main
Minimum Value Limit [s]	180	180	180
Actual setting [s]	180	180	180
Recorded value [s]	198	198	198

LOSS OF MAIN TESTS			
Method used	Rate Of Change Of Frequency and Active Power Variation		
Output power Level	10%Prated	55%Prated	100%Prated
SPAIN RD 1699/2011 Limit [s]	5.0	5.0	5.0
Trip setting [s]	4.0	4.0	4.0
Trip value [s]	4.2	4.3	4.3

SSEG Short Circuit Current Contribution Test

RMS Value over 1 Period (Cycle)	58.00	[Aac]
Peak Current	507.0	[A]

SELF MONITORING – SOLID STATE SWITCHING

Not applicable because electro-mechanical relays are used

ACCURACY

Voltage reading accuracy = +/- 1%

Frequency reading accuracy = +/- 0.05Hz

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