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Eurofins Product Testing Italy S.r.l.

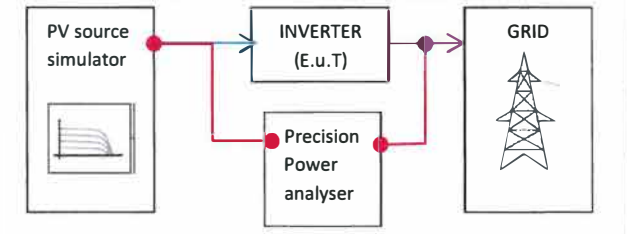
Applicant:	**FIMER S.p.A.** - Via J.F. Kennedy, 26 – 20871 Vimercate (MB) – Italy
Manufacturer:	**FIMER S.p.A.** - Via J.F. Kennedy, 26 – 20871 Vimercate (MB) – Italy
Equipment Under Test:	Solar Photovoltaic Inverter
Type / Serial Number:	R15015TL / S181006092
Ratings:	Rated power = 1410 kW AC side: 550 ±10% V, 3~; 50 Hz DC side: 850 ÷ 1320 VDC (MPPT DC voltage range)

TEST REPORT N° EPT.18.EMC.0256/54154

EN 50530:2010-04 + A1:2013- "Overall efficiency of grid connected photovoltaic inverters"

Scope: measurements of the European Efficiency of a grid connected solar photovoltaic inverter

Test set-up



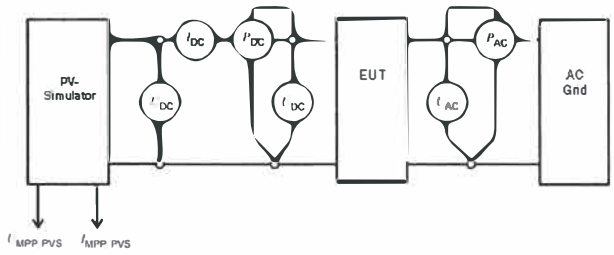


Fig. 1

Test procedure

The E.u.T. has been connected to the test equipment according to set-up shown in Fig. 1. Measurement of the efficiency of DC to AC power conversion (η_{conv}) have been performed at the required levels of the PV simulator power. The ambient temperature during the test was in the range 25°C ± 5°C.

Test Equipment

Type	Manufacturer	Mod.	SN	Calibration date
4 channel (V,I) Precision power analyzer	Yokogawa	WT1600	91J423356	06/2018
Current Transducer	LEM	HAT 1500-S	718147	06/2018
Current Transducer	Carlo Gavazzi	CTD-4X-1500.5A.XXX	BQ04001040012	06/2018
Current Transducer	Carlo Gavazzi	CTD-4X-1500.5A.XXX	B02160290 0012	06/2018
Current Transducer	Carlo Gavazzi	CTD-4X-1500.5A.XXX	B02160285 0012	06/2018

DC Power Steps [%Pn]	P_{DC} bin	P_{DC} [kW]	%P_n	P_{AC} [kW]	Iaux [A]	Weigthing factor – aEU_i	EU-eff [%]
5	0.05	72.12	5.02	70.83	2.3	0.03	97.53
10	0.1	142.92	10.03	141.36	2.5	0.06	98.53
20	0.2	285.2	20.92	282.34	3.5	0.13	98.73
30	0.3	427.1	30.03	423.41	5.6	0.1	98.85
50	0.5	712.0	49.99	704.98	9.2	0.48	98.73
100	1	1419.0	99.13	1397.67	11.1	0.2	98.33

EVALUATION – CALCULATION OF THE STATIC MPPT EFFICIENCY - WEIGHTED EUROPEAN EFFICIENCY:

Efficiency EN 50530 (EU) = 0.03 x η_{MPP_1} + 0.06 x η_{MPP_2} + 0.13 x η_{MPP_3} + 0.1 x η_{MPP_4} + 0.48 x η_{MPP_5} + 0.2 x η_{MPP_6} **98.62**

REMARKS: Measurement have been performed in MPPT static conditions only at the rated frequency 50Hz . Due to set up test condition, the voltage test is 900V DC instead of 850 V DC , this condition represented the worst case instead of 850V DC. The result performed at 850 V DC will be better than that performed at 900 V DC. The expanded uncertainty for this measurement has been evaluated in 0.05% expressed with a confidence level > 95% an coverage factor k=2.

The P_{Aux} measurement has been added to the PDC measurement for the efficiency calculation $\eta = P_{AC}/(P_{DC}+P_{Aux})$

The P_{Aux} is calculated as 220V AC* Iaux

Date:	17.10.2018	Signature:	Giuseppe Lacopo
Test engineer	Giuseppe Lacopo		

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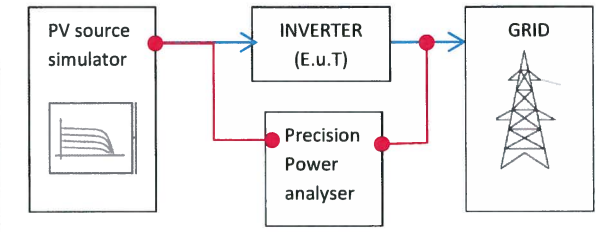
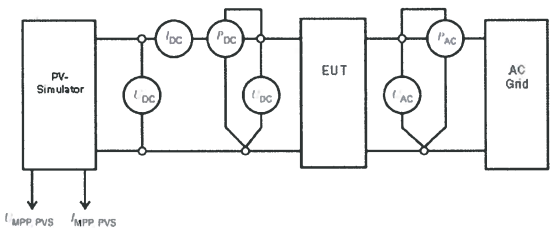
CEI 0-16:2014-09 + V1:2014-12+ V2:2016-07+ V3:2017-07 , cl. N.3 - EN 61400-21, cl. 7.4, 8.3

Scope: measurements of the Current Total Harmonic Distortion of a grid connected solar photovoltaic inverter

Test set-up





Test procedure

The E.u.T. has been connected to the test equipment according to set-up shown in Fig. 1. Measurement of the Total Harmonic Distortion of the current (THDC) has been performed at the required levels of the PV simulator power. The ambient temperature during the test was in the range 25°C ± 5°C.

Test equipment

Type	Manufacturer	Mod.	SN	Calibration date
4 channel (V,I) Precision power analyzer	Yokogawa	WT1600	91J423356	06/2018
Current Transducer	LEM	HAT 1500-S	718147	06/2018
Current Transducer	Carlo Gavazzi	CTD-4X-1500.5A.XXX	BQ04001040012	06/2018
Current Transducer	Carlo Gavazzi	CTD-4X-1500.5A.XXX	B021602900012	06/2018
Current Transducer	Carlo Gavazzi	CTD-4X-1500.5A.XXX	B021602850012	06/2018

MEASUREMENT RESULTS

%Pn	P [kW]	THDC [%]			Repeatability Test THDC[%]*		
--	--	Phase L1	Phase L2	Phase L3	Phase L1	Phase L2	Phase L3
10	141.0	4.47	4.87	4.90			
20	282.0	2.47	2.42	2.53			
25	**352.5**	**2.22**	**1.83**	**2.11**	**2.54**	**2.31**	**2.55**
30	423.0	1.96	1.82	1.95			
40	564.0	1.54	1.50	1.60			
50	705.0	1.47	1.50	1.60			
60	846.0	1.40	1.46	1.53			
70	987.0	1.43	1.55	1.53			
80	1128.0	1.46	1.51	1.56			
90	1269.0	1.42	1.43	1.45			
100	1410.0	1.45	1.48	1.47			

*as required by the customer a repeated measurement has been performed at 25% of the rated power, the first one during the up power ramp , the second one during the down power ramp

Date:	17.10.2018	Signature:	Giuseppe Lacopo
Test engineer	Giuseppe Lacopo		