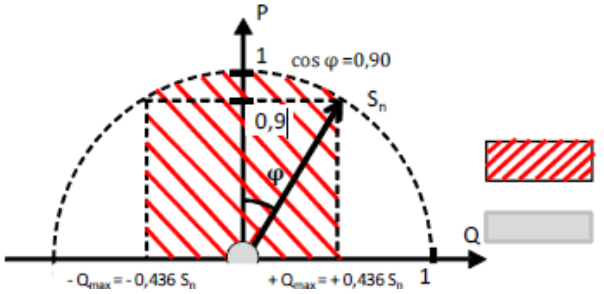
N.6.1 Test on the capability to supply reactive power	**P**

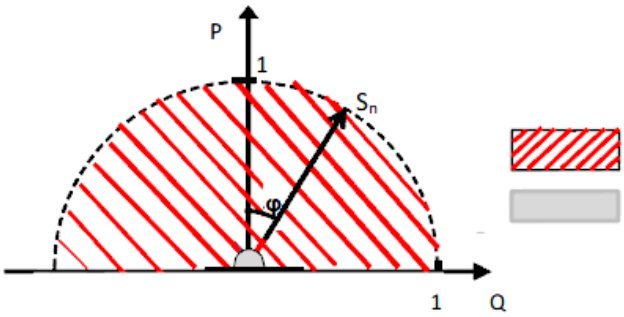
For static generators are planned capabilities differ depending on the total power:

- for generators in power plants less than 400 kW: The inverter must have a minimum capability of type 'semicircular limited' with cosφ between 0.90 in absorption and 0.90 in supply (See. Figure 15 , the characteristics of the type of Figure 16, however, are recommended as they allow to provide grid services, may be subject to compensation) The Q measured on the limit of capability curve in correspondence with a predetermined value of P. For low values of the active power generated (P ≤ 10% * Sn) are allowed deviations in the supply of reactive power measured at the limit of capability curve in correspondence with a predetermined value of P, up to a maximum of 10% of Sn.
- for generators in power plants totaling more than or equal to 400 kW: the inverter must have a capability of type 'semicircular' whose area of work is internal to the diagram of Figure 16. At the time of compliance with the performance requirements of specific capability in the band P≤10%*Sn is not required as it will be subject to appropriate regulation by the Authority.

For both types of static generators, the active power that can be delivered by them in the basic condition of operation at nominal voltage and cosφ=1 coincides with the rated apparent power of the generator itself.



Capability for static generators in power plants < 400 kW (limited semicircular characteristic).



Picture 16-Capability for static generators in power plants > 400 kW (circular characteristic).

S_n: nominal apparent power which can be supplied to Un nominal voltage.

Q_{max}: maximum reactive power which can be supplied at nominal apparent power

N.6.1.1 Execution and registration proof applicable to static generators	**P**

Measurements can be made either through acquisition campaign in the field (p.es on a test system) or on a test bench, provided it is representative of the actual operating conditions of the generator (availability of primary source simulated as shown in Annex Q).

For the execution of the test are given the following requirements.

- The drive must be set so that it can absorb respectively (inductive behavior) and supply (capacitive behavior), the maximum reactive power available at each level of the active power output according to your capability.
- It regulates at this point the source d.c. in order to make available at least the full rated active power of the generator under test; further adjustments are possible during the test, so that the source is not limiting for the performance to be measured.
- It regulates (either through source control or by setting in the control system of the converter under test), the active power for values in the 11 intervals [0 ± 5]%, [10 ± 5]%; ...; [100 ± 5]% of rated apparent power, you make the measurement of active power in steady state after about 1 minute after completion of the adjustment (1-min average values calculated based on the measured values of the frequency of fundamental window of 200 ms).
- For each of the 11 levels of active power will have to record a value of the reactive power inductive and capacitive 1 for that, as average values for 1 min calculated on the basis of the measures at the fundamental frequency of the window of 1s. Also, the power factor must be detected and reported as an average for 1 minute.

In addition to measures of setting the limit values of the reactive power, you will have to record the measured values by setting the reactive power delivered to 0 ($\cos \varphi = 1$).

N.6.1.1 Execution and registration proof applicable to static generators Systems with < 400kW	**P**

-Qmax (inductive)

Power-BIN	Active power		Reactive power		DC power		Power factor (cos φ)
	[kW]	p.u.	[kVA]	p.u.	[kW]	p.u.	
0% ±5%	1,674	0,051	-11,716	-0,355	1,827	0,055	0,1414
10% ±5%	3,060	0,093	-16,263	-0,493	3,438	0,104	0,1849
20% ±5%	6,598	0,200	-16,645	-0,504	7,020	0,213	0,3685
30% ±5%	9,924	0,301	-16,807	-0,509	10,399	0,315	0,5085
40% ±5%	13,219	0,401	-16,876	-0,511	13,758	0,417	0,6166
50% ±5%	16,497	0,500	-16,903	-0,512	17,111	0,519	0,6985
60% ±5%	19,839	0,601	-16,907	-0,512	20,550	0,623	0,7611
70% ±5%	23,093	0,700	-16,925	-0,513	23,911	0,725	0,8066
80% ±5%	26,429	0,801	-16,567	-0,502	27,366	0,829	0,8473
90% ±5%	29,713	0,900	-16,589	-0,503	30,782	0,933	0,8731
100% ±5%	32,826	0,995	-16,645	-0,504	34,041	1,032	0,8919

+Qmax (capacitive)

Power-BIN	Active power		Reactive power		DC power		Power factor (cos φ)
	[kW]	p.u.	[kVA]	p.u.	[kW]	p.u.	
0% ±5%	1,491	0,045	10,397	0,315	1,606	0,049	0,1419
10% ±5%	3,283	0,099	16,836	0,510	3,642	0,110	0,1914
20% ±5%	6,610	0,200	16,563	0,502	7,000	0,212	0,3706
30% ±5%	9,903	0,300	16,513	0,500	10,342	0,313	0,5143
40% ±5%	13,188	0,400	16,506	0,500	13,691	0,415	0,6242
50% ±5%	16,532	0,501	16,506	0,500	17,112	0,519	0,7076
60% ±5%	19,825	0,601	16,494	0,500	20,496	0,621	0,7687
70% ±5%	23,143	0,701	16,475	0,499	23,914	0,725	0,8146
80% ±5%	26,454	0,802	16,483	0,499	27,339	0,828	0,8487
90% ±5%	29,421	0,892	16,496	0,500	30,423	0,922	0,8719
100% ±5%	32,597	0,988	16,493	0,500	33,753	1,023	0,8923

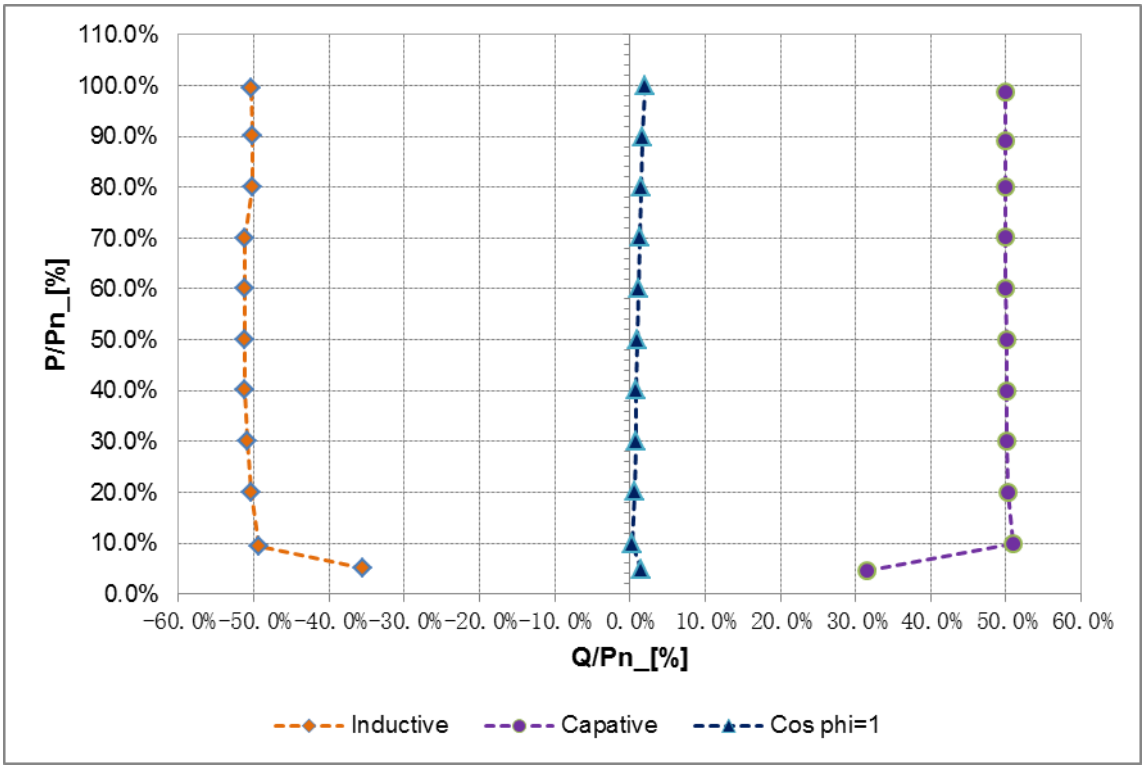
Q=0

Power-BIN	Active power		Reactive power		DC power		Power factor (cos φ)
	[kW]	p.u.	[kVA]	p.u.	[kW]	p.u.	
0% ±5%	1,611	0,049	0,484	0,015	1,631	0,049	0,9574
10% ±5%	3,299	0,100	0,071	0,002	3,412	0,103	0,9976
20% ±5%	6,640	0,201	0,236	0,007	6,814	0,206	0,9994
30% ±5%	9,939	0,301	0,252	0,008	10,185	0,309	0,9997
40% ±5%	13,233	0,401	0,286	0,009	13,558	0,411	0,9998
50% ±5%	16,545	0,501	0,332	0,010	16,959	0,514	0,9998
60% ±5%	19,847	0,601	0,381	0,012	20,363	0,617	0,9998
70% ±5%	23,141	0,701	0,439	0,013	23,768	0,720	0,9998
80% ±5%	26,425	0,801	0,504	0,015	27,176	0,824	0,9998
90% ±5%	29,693	0,900	0,572	0,017	30,577	0,927	0,9998
100% ±5%	33,031	1,001	0,652	0,020	34,074	1,033	0,9998

Note:
The inverter produceses reactive power according to the circular chratcteristic. The priority is always given by the reactive power.
The test results refer to the test report "18TH0561-CEI 0-16_0" issued by Bureau Veritas Comsumer Products Services Germany GmbH, dated on 2019-01-25.

The tests had been performed on the AZZURRO 3PH 33000TL-V2 is valid for the and AZZURRO 3PH 20000TL-V2, AZZURRO 3PH 25000TL-V2 and AZZURRO 3PH 30000TL-V2, since it is similar in hardware and just power derated by software.

Graph of capability curves valid for inverter : AZZURRO 3PH 33000TL-V2



N.6.1.1 Execution and registration proof applicable to static generators Systems with ≥ 400kW — **P**

Test result: AZZURRO 3PH 33000TL-V2

-Qmax (inductive)

Power-BIN	Active power		Reactive power		DC power		Power factor (cos φ)
	[kW]	p.u.	[kVA]	p.u.	[kW]	p.u.	
0% ±5%	0,202	0,006	-0,915	-0,028	0,332	0,010	0,2158
10% ±5%	3,107	0,094	-26,680	-0,808	3,350	0,102	0,4189
20% ±5%	5,957	0,181	-33,944	-1,029	6,774	0,205	0,1731
30% ±5%	9,302	0,282	-34,429	-1,043	10,154	0,308	0,2608
40% ±5%	12,668	0,384	-33,661	-1,020	13,528	0,410	0,3522
50% ±5%	16,043	0,486	-32,306	-0,979	16,907	0,512	0,4448
60% ±5%	19,433	0,589	-30,499	-0,924	20,301	0,615	0,5374
70% ±5%	22,814	0,691	-28,198	-0,854	23,682	0,718	0,6290
80% ±5%	26,190	0,794	-25,345	-0,768	27,063	0,820	0,7186
90% ±5%	29,569	0,896	-21,594	-0,654	30,444	0,923	0,8076
100% ±5%	32,943	0,998	-16,514	-0,500	33,822	1,025	0,8940

+Qmax (capacitive)

Power-BIN	Active power		Reactive power		DC power		Power factor (cos φ)
	[kW]	p.u.	[kVA]	p.u.	[kW]	p.u.	
0% ±5%	0,206	0,006	-0,897	-0,027	0,338	0,010	0,2238
10% ±5%	3,120	0,095	29,888	0,906	3,385	0,103	0,4040
20% ±5%	6,032	0,183	35,089	1,063	6,773	0,205	0,1704
30% ±5%	9,424	0,286	33,519	1,016	10,156	0,308	0,2711
40% ±5%	12,786	0,387	32,960	0,999	13,529	0,410	0,3617
50% ±5%	16,138	0,489	32,225	0,977	16,906	0,512	0,4478
60% ±5%	19,520	0,592	30,315	0,919	20,297	0,615	0,5414
70% ±5%	22,896	0,694	28,029	0,849	23,680	0,718	0,6326
80% ±5%	26,267	0,796	24,979	0,757	27,061	0,820	0,7247
90% ±5%	29,615	0,897	21,190	0,642	30,421	0,922	0,8132
100% ±5%	32,993	1,000	15,642	0,474	33,818	1,025	0,9036

Q=0

Power-BIN	Active power		Reactive power		DC power		Power factor (cos φ)
	[kW]	p.u.	[kVA]	p.u.	[kW]	p.u.	
0% ±5%	0,256	0,008	0,324	0,010	0,301	0,009	0,6188
10% ±5%	3,299	0,100	0,071	0,002	3,412	0,103	0,9976
20% ±5%	6,640	0,201	0,236	0,007	6,814	0,206	0,9994
30% ±5%	9,939	0,301	0,252	0,008	10,185	0,309	0,9997
40% ±5%	13,233	0,401	0,286	0,009	13,558	0,411	0,9998
50% ±5%	16,545	0,501	0,332	0,010	16,959	0,514	0,9998
60% ±5%	19,847	0,601	0,381	0,012	20,363	0,617	0,9998
70% ±5%	23,141	0,701	0,439	0,013	23,768	0,720	0,9998
80% ±5%	26,425	0,801	0,504	0,015	27,176	0,824	0,9998
90% ±5%	29,693	0,900	0,572	0,017	30,577	0,927	0,9998
100% ±5%	33,031	1,001	0,652	0,020	34,074	1,033	0,9998

Note:
The inverter produceses reactive power according to the circular chratcteristic. The priority is always given by the reactive power.
The tests had been performed on the AZZURRO 3PH 33000TL-V2 is valid for the and AZZURRO 3PH 20000TL-V2, AZZURRO 3PH 25000TL-V2 and AZZURRO 3PH 30000TL-V2, since it is similar in hardware and just power derated by software.

Graph of capability curves valid for inverter :