Capability Curves: ZCS Power Magic

General information of the generator(s)				
Manufacturer	Zucchetti Centro Sistemi SpA Via Lungarno 305/A 52028 Terranuova Bracciolini(AR),Italy			
Equipment type	Energy Storage System			
☐ Interface device (DDI)	☐ Interface protection (PI)	☒ Static conversion device	☒ Storage system	☐Rotary generating device
Trademark				
User-side connection:	☐ Three-phase with neutral Frequency [Hz]: 50	☒ Three-phase without neutral Voltage[V]: 400		
Primary energy used:	☐ Solar (testing acc. Annex N) ☐ Hydroelectric (testing acc. Annex N/Nter)	☒ Storage (testing acc. Annex Nbis) ☐ CHP (testing acc. Annex N/Nter)	☐ Wind (testing acc. Annex N/Nter) ☐ Other:	
Generator model(s):	**ZPM-215KLA-SC1**	**ZPM-258KLA-SC1**		
Nominal power [kW]	125,0			
Note: The basic configuration of the Generator (Energy Storage Cabinet: *ZPM-215KLA-SC1* or *ZPM-258KLA-SC1*) includes a Power Conversion System (static converter: *ZPM-PCS125K-R*) and 5 battery packs or 6 battery packs (equivalent to the capacity of one Battery Cabinets: *ZPM-215KLA-BC1* or *ZPM-258KLA-BC1*) and an HV switchgear box. The Energy Storage Cabinet can be expanded in capacity through parallel connection with additional Battery Cabinets.				
The generator(s):	☒ is suitable for installation in systems with a power ≤ 400kW ☒ is suitable for installation in systems with a power > 400kW			

Characteristics of the static converter	
Model / Type reference:	**ZPM-PCS125K-R**
Manufacturer	Zucchetti Centro Sistemi SpA Via Lungarno 305/A 52028 Terranuova Bracciolini(AR),Italy.
Firmware version:	V00001
AC Output Rated Power P_{NINV} [1] [kW]:	125,0
Max. Active power P_{MAXINV} [1] [kW]:	138
Nominal apparent power S_{NINV} [1] [kVA]:	138
Reactive power Q_{MAX} [1] [kVar]:	125

Zucchetti Centro Sistemi S.p.A. - Green Innovation Division
Via Lungarno, 248 - 52028 Terranuova Bracciolini - Arezzo, Italy
tel. +39 055 91971 - fax. +39 055 9197515
innovation@zcscompany.com - zcs@pec.it - zcsazzurro.com

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Note: For more details on the technical data of the generator model(s) see section *5. General product information* on p. 17.

[1)] Corresponding to definition according to section 8.8.5.3, CEI 0-16:

$P_{NINV} = P_n$

$P_{MAXINV} = P_{max}$

$S_{NINV} = S_n$

S_n: nominal apparent power that can be supplied to the AC grid.

Characteristics of the Storage System (SdA)		
Model / Type reference:	**ZPM-215KLA-SC1**	**ZPM-258KLA-SC1**
Type	☒ Bidirectional	☐ Unidirectional
P_{SN} [kW] [2)]	125,0	
P_{CN} [kW] [2)]	125,0	
P_{SMAX} [kW] [2)]	125,0	
P_{CMAX} [kW] [2)]	125,0	

Batteries can be used with the static converters listed above		
Brand	Zucchetti Centro Sistemi SpA	
Technology	LiFePO4	
Model	ZPM-215KLA-BC1	ZPM-258KLA-BC1
CUS module [kWh]	215	258
Firmware version BMS	BMU M-3-7.1, BCU C-3-5.0.1	
No. modules	1~4 [3)]	
Note	The above information corresponds to: 5 battery packs or 6 battery packs included in the basic configuration of the Energy StorageCabinet or information for the expandable Battery Cabinets. The batteries must be installed according to local regulations.	

Note (Parameter definitions):

CUS =	(Useful Capacity of storage system): the amount of energy available to the terminals of the storage system between the minimum and maximum charge states of the system itself.
P_{SN} =	(Power of nominal discharge): the maximum power that the system can discharge throughout CUS.
P_{CN} =	(Power of nominal charge): the maximum power that the system can charge throughout the CUS.
P_{SMAX} =	(Power of maximum discharge): discharge power of which the system must ensure within the range 10% -90% of the CUS.
P_{CMAX} =	(Power of maximum charge): charge power of which the system must ensure within the range10% -90% of the CUS.
P_{NINV} =	(Nominal power of inverter / bidirectional converter): the nominal power of the inverter or of the bidirectional converter which connects the storage system to the network.

Note:

For more details on the technical data of the generator model(s) see section *5. General product information on p. 17*.

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Via Lungarno, 248 - 52028 Terranuova Bracciolini - Arezzo, Italy
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innovation@zcscompany.com - zcs@pec.it - zcsazzurro.com

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2) The bidirectional converter communicates with the battery BMS via the integrated BMS port. Number / capacity of the batteries connected will be identified and P_{NINV}, P_{MAXINV}, S_{MAXINV} (and hence the P_{SN}, P_{CN}, P_{SMAX} and P_{CMAX}) will be limited accordingly as follows:

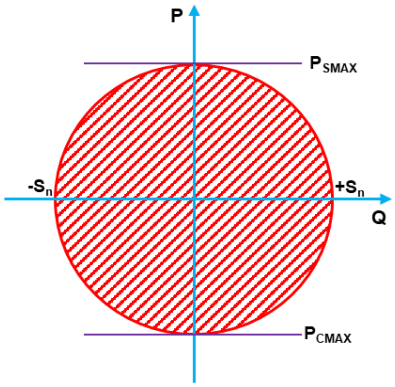
3) Number of battery modules: 1 to 4. Here, the capacity of one Battery Cabinet is taken as a unit, and 5 battery packs or 6 battery packs (equivalent to the capacity of one Battery Cabinet) are already included in the basic configuration of the Energy Storage Cabinet. The Energy Storage Cabinet can expand its capacity by parallel connecting additional Battery Cabinets (up to a maximum of 3 Battery Cabinets, i.e., the maximum possible battery capacity of the Energy Storage Cabinet is equivalent to the capacity of 4 Battery Cabinets).

Model / Type reference:	**Energy Storage Cabinet: ZPM-215KLA-SC1**	**Energy Storage Cabinet: ZPM-258KLA-SC1**
Type of Battery Cabinet	**ZPM-215KLA-BC1**	**ZPM-258KLA-BC1**
No. of ***extended*** Battery Cabinet	0~3 4)	0~3 4)
P_{NINV} [kW]	125	125
P_{MAXINV} [kW]	125	125
S_{MAXINV} [kVA]	125	125
P_{SN} [kW]	125	125
P_{CN} [kW]	125	125
P_{SMAX} [kW]	125	125
P_{CMAX} [kW]	125	125

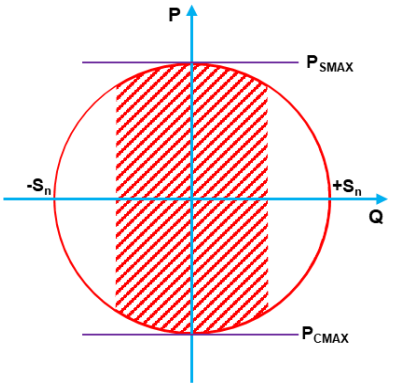
Note:

4) Number of extended Battery Cabinets: 0 to 3. Here, only expandable Battery Cabinets are considered, and 5 battery packs or 6 battery packs (equivalent to the capacity of one Battery Cabinet) are already included in the basic configuration of the Energy Storage Cabinet.

PQ-Capability of the system



PQ- capability (> 400kW): combination of bi-directional converter and storage in Non-Limitation mode (see 2) above)



PQ- capability (≤ 400kW): combination of bi-directional converter and storage in Non-Limitation mode (see 2) above)

Note:

The generator(s) considered in this report also suitable for installation in systems with an output of 400 kW or less. The reactive power output can be limited accordingly if required.

Zucchetti Centro Sistemi S.p.A. - Green Innovation Division
Via Lungarno, 248 - 52028 Terranuova Bracciolini - Arezzo, Italy
tel. +39 055 91971 - fax. +39 055 9197515
innovation@zcscompany.com - zcs@pec.it - zcsazzurro.com

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Nbis.6 Verification of construction requirements regarding reactive power exchange	P

Conditions for laboratory tests

The following tests were performed in laboratory environment under the following conditions:

Influencing factors	Reference value	Remarks
Ambient temperature	25°C ± 5°C	Average value during testing: 24,5°C
Atmospheric pressure	96kPa ± 10kPa	Average value during testing: 97 kPa
Relative humidity	65%RH ±10%RH	Average value during testing: 72%RH
Equipment location	According to the manufacturer's statement	Testing done in laboratory environment, see *Testing Location* on p.1
Frequency	50 Hz (in the range 47,5 Hz - 51,5 Hz, where applicable)	50 Hz
Waveform of the reference voltage	Compliant with CEI EN 50160	Stable AC source (see *Annex 5 – Test equipment list*) used for testing. Requirements of CEI EN 50160 are met.

Nbis.6.1 Verification of reactive power capability	P

Note:

for *PQ-Capability of the system* considered in this report see on p.4.

Test results showed in section *Nbis.6.2 Procedure for performing and recording the test for static generators*.

Nbis.6.2 Procedure for performing and recording the test for static generators	P

Test conditions

Test setup	See section *4. General remarks for testing*
Operating mode of the PGU during the measurement	According to test requirements
Q-Setpoint	According to test requirements

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Via Lungarno, 248 - 52028 Terranuova Bracciolini - Arezzo, Italy
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innovation@zcscompany.com - zcs@pec.it - zcsazzurro.com

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Requirements on testing and recording:

- The storage system must be set up so that it can respectively absorb (inductive behaviour) and deliver (capacitive behaviour) the maximum available reactive power at each level of the active power delivered/absorbed according to its capability.
- At this point, the EESS (and DC source, if any) is adjusted so that the entire available input/output power is available: in the case of full power tests, P_{SMAX} (for integrated storage systems, P_{NINV}) or P_{CMAX}.
- Adjust (via the control logic of the EESS and/or via source control) the active power for the values within the 6 ranges 0%; 20%; ...; 100% of the P_{SMAX} (for integrated storage systems, P_{NINV}) and, if the system is connected to a bidirectional converter, within the 5 power withdrawal ranges 20%; ...; 100% of the P_{CMAX}. A tolerance of the active power delivered/absorbed by the storage system of ± 5%S_n, where S_n is to be understood as the nominal power of the converter, is permissible. The active power is measured under steady-state conditions, approx. 1 min after setting of the adjustment (average values at 1 min. calculated from the values measured at the fundamental frequency over a 200 ms window).
- For each of the active power levels (amounting to 11 levels, in the case of full power tests with bidirectional storage systems) one value for the inductive and one for the capacitive reactive power must be recorded, as average values at 1 min. calculated from the measurements at the fundamental frequency over a 1 s window. The power factor must also be recorded and reported as a 1-minute average.
- In addition to the measurements at the reactive power setting limit values, the measured values are to be recorded by setting the reactive power output to 0 (cos = 1).

The maximum capability in absorption (Q_{min}) and output (Q_{max}) of reactive power resulting from the above sequence of measurements and that for Q = 0 must be documented in a tabular form by stating, for each level of delivered active power between 0% and the maximum available discharge power and, if applicable, between 0% and the maximum available charging power, the corresponding absorbed (and delivered) reactive power level, expressed both in absolute value and in p.u. of the nominal power of the converter and in terms of cosφ.

Assessment criterion:

- (Measured PQ-Capability) ≥ (PQ-Capability showed in Figure 92 or 93, CEI 0-16:2022-03)
  (*PQ-Capability of the system* on p.4 needs to be considered.)
- For each measured point, a maximum deviation of the reactive power $\Delta Q \leq \pm 5\%S_n$
- For values of $P \leq 10\%S_n$
  - Power plants <400 kW:
    maximum deviation of the reactive power $\Delta Q \leq \pm 10\%S_n$
  - Power plants ≥400 kW:
    recording of the available capability values for delivered active power values lower than $10\%S_n$ is required, but the results do not constitute a prescriptive performance constraint.

Test results

☒ static generator in power plants <400 kW ☒ static generator in power plants ≥400 kW

Test 1: 1xC+ PMAX (1 Battery Cabinet parallel (ZPM-215KLA-SC1)

Zucchetti Centro Sistemi S.p.A. - Green Innovation Division
Via Lungarno, 248 - 52028 Terranuova Bracciolini - Arezzo, Italy
tel. +39 055 91971 - fax. +39 055 9197515
innovation@zcscompany.com - zcs@pec.it - zcsazzurro.com

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-Q_{max} (inductive)							
Power-Bin	Active power		Reactive power		DC power		Power factor (cosφ)
	[W]	p.u. (based P_{CMAX} / P_{SMAX})	[Var]	p.u. (based P_{CMAX} / P_{SMAX})	[W]	p.u. (based P_{CMAX} / P_{SMAX})	
100%*P_{CMAX} ± 5%*S_n	-125100	-1,001	238	0,002	-121308	-0,970	-0,999
90%*P_{CMAX} ± 5%*S_n	-112749	-0,902	-54291	-0,434	-108760	-0,870	-0,900
80%*P_{CMAX} ± 5%*S_n	-100014	-0,800	-75250	-0,602	-95933	-0,767	-0,798
70%*P_{CMAX} ± 5%*S_n	-87657	-0,701	-89349	-0,715	-83760	-0,670	-0,699
60%*P_{CMAX} ± 5%*S_n	-75389	-0,603	-99914	-0,799	-71502	-0,572	-0,602
50%*P_{CMAX} ± 5%*S_n	-62910	-0,503	-108191	-0,866	-58738	-0,470	-0,502
40%*P_{CMAX} ± 5%*S_n	-50425	-0,403	-114524	-0,916	-46491	-0,372	-0,402
30%*P_{CMAX} ± 5%*S_n	-37933	-0,303	-119228	-0,954	-33892	-0,271	-0,303
20%*P_{CMAX} ± 5%*S_n	-25437	-0,203	-122486	-0,980	-21417	-0,171	-0,203
10%*P_{CMAX} ± 5%*S_n	-12938	-0,104	-124408	-0,995	-9201	-0,074	-0,103
0%*P_{CMAX} ± 5%*S_n	-430	-0,003	-125057	-1,000	-146	-0,001	-0,003
10%*P_{SMAX} ± 5%*S_n	12085	0,097	-124446	-0,996	15202	0,122	0,097
20%*P_{SMAX} ± 5%*S_n	24606	0,197	-122567	-0,981	27744	0,222	0,197
30%*P_{SMAX} ± 5%*S_n	37130	0,297	-119356	-0,955	40129	0,321	0,297
40%*P_{SMAX} ± 5%*S_n	49659	0,397	-114703	-0,918	52535	0,420	0,397
50%*P_{SMAX} ± 5%*S_n	62188	0,498	-108414	-0,867	65043	0,520	0,498
60%*P_{SMAX} ± 5%*S_n	74723	0,598	-100189	-0,802	77526	0,620	0,598
70%*P_{SMAX} ± 5%*S_n	87267	0,698	-89484	-0,716	90062	0,720	0,698
80%*P_{SMAX} ± 5%*S_n	99825	0,799	-75244	-0,602	102761	0,822	0,798
90%*P_{SMAX} ± 5%*S_n	112401	0,899	-54766	-0,438	115371	0,923	0,899
100%*P_{SMAX} ± 5%*S_n	125080	1,001	-281	-0,002	128213	1,026	0,944

+Q_{max} (capacitive)							
Power-Bin	Active power		Reactive power		DC power		Power factor (cosφ)
	[W]	p.u. (based P_{CMAX} / P_{SMAX})	[Var]	p.u. (based P_{CMAX} / P_{SMAX})	[W]	p.u. (based P_{CMAX} / P_{SMAX})	
100%*P_{CMAX} ± 5%*S_n	-125111	-1,001	235	0,002	-121207	-0,970	-0,999
90%*P_{CMAX} ± 5%*S_n	-112515	-0,900	54712	0,438	-108536	-0,868	-0,898
80%*P_{CMAX} ± 5%*S_n	-99975	-0,800	75214	0,602	-96050	-0,768	-0,798
70%*P_{CMAX} ± 5%*S_n	-87441	-0,700	89464	0,716	-83584	-0,669	-0,698
60%*P_{CMAX} ± 5%*S_n	-74912	-0,599	100175	0,801	-71232	-0,570	-0,598

Zucchetti Centro Sistemi S.p.A. - Green Innovation Division
Via Lungarno, 248 - 52028 Terranuova Bracciolini - Arezzo, Italy
tel. +39 055 91971 - fax. +39 055 9197515
innovation@zcscompany.com - zcs@pec.it - zcsazzurro.com

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50%*P_{CMAX} ± 5%*S_n	-62388	-0,499	108404	0,867	-58682	-0,469	-0,498
40%*P_{CMAX} ± 5%*S_n	-49866	-0,399	114694	0,918	-46038	-0,368	-0,398
30%*P_{CMAX} ± 5%*S_n	-37348	-0,299	119348	0,955	-33715	-0,270	-0,298
20%*P_{CMAX} ± 5%*S_n	-24834	-0,199	122557	0,980	-21511	-0,172	-0,198
10%*P_{CMAX} ± 5%*S_n	-12321	-0,099	124434	0,995	-9062	-0,072	-0,098
0%*P_{CMAX} ± 5%*S_n	-182	-0,001	125037	1,000	-86	-0,001	0,001
10%*P_{SMAX} ± 5%*S_n	12713	0,102	124385	0,995	15392	0,123	0,102
20%*P_{SMAX} ± 5%*S_n	25229	0,202	122456	0,980	28075	0,225	0,202
30%*P_{SMAX} ± 5%*S_n	37742	0,302	119193	0,954	40539	0,324	0,302
40%*P_{SMAX} ± 5%*S_n	50246	0,402	114485	0,916	53145	0,425	0,402
50%*P_{SMAX} ± 5%*S_n	62744	0,502	108146	0,865	65450	0,524	0,502
60%*P_{SMAX} ± 5%*S_n	74720	0,598	100185	0,801	77523	0,620	0,598
70%*P_{SMAX} ± 5%*S_n	87723	0,702	89105	0,713	90663	0,725	0,702
80%*P_{SMAX} ± 5%*S_n	100206	0,802	74804	0,598	103012	0,824	0,801
90%*P_{SMAX} ± 5%*S_n	112665	0,901	50055	0,400	115814	0,927	0,901
100%*P_{SMAX} ± 5%*S_n	125081	1,001	-281	-0,002	128279	1,026	0,999

Q = 0							
Power-Bin	Active power		Reactive power		DC power		Power factor (cosφ)
	[W]	p.u. (based P_{CMAX} / P_{SMAX})	[Var]	p.u. (based P_{CMAX} / P_{SMAX})	[W]	p.u. (based P_{CMAX} / P_{SMAX})	
100%*P_{CMAX} ± 5%*S_n	-125132	-1,001	283	0,002	-121249	-0,970	0,999
90%*P_{CMAX} ± 5%*S_n	-112694	-0,902	169	0,001	-109132	-0,873	-0,998
80%*P_{CMAX} ± 5%*S_n	-100189	-0,802	134	0,001	-97333	-0,779	-0,998
70%*P_{CMAX} ± 5%*S_n	-87682	-0,701	108	0,001	-85161	-0,681	-0,997
60%*P_{CMAX} ± 5%*S_n	-75173	-0,601	87	0,001	-72962	-0,584	-0,996
50%*P_{CMAX} ± 5%*S_n	-62660	-0,501	72	0,001	-60516	-0,484	-0,995
40%*P_{CMAX} ± 5%*S_n	-50143	-0,401	66	0,001	-48373	-0,387	-0,992
30%*P_{CMAX} ± 5%*S_n	-37605	-0,301	68	0,001	-36154	-0,289	-0,986
20%*P_{CMAX} ± 5%*S_n	-25116	-0,201	45	0,000	-23931	-0,191	-0,969
10%*P_{CMAX} ± 5%*S_n	-12569	-0,101	-3	0,000	-11580	-0,093	-0,892
0%*P_{CMAX} ± 5%*S_n	-973	-0,008	-49	0,000	-128	-0,001	-0,160
10%*P_{SMAX} ± 5%*S_n	12530	0,100	-32	0,000	12919	0,103	0,992
20%*P_{SMAX} ± 5%*S_n	24986	0,200	-87	-0,001	25561	0,204	0,999
30%*P_{SMAX} ± 5%*S_n	37497	0,300	-96	-0,001	38320	0,307	0,999
40%*P_{SMAX} ± 5%*S_n	49977	0,400	-98	-0,001	51120	0,409	0,999

Zucchetti Centro Sistemi S.p.A. - Green Innovation Division
Via Lungarno, 248 - 52028 Terranuova Bracciolini - Arezzo, Italy
tel. +39 055 91971 - fax. +39 055 9197515
innovation@zcscompany.com - zcs@pec.it - zcsazzurro.com

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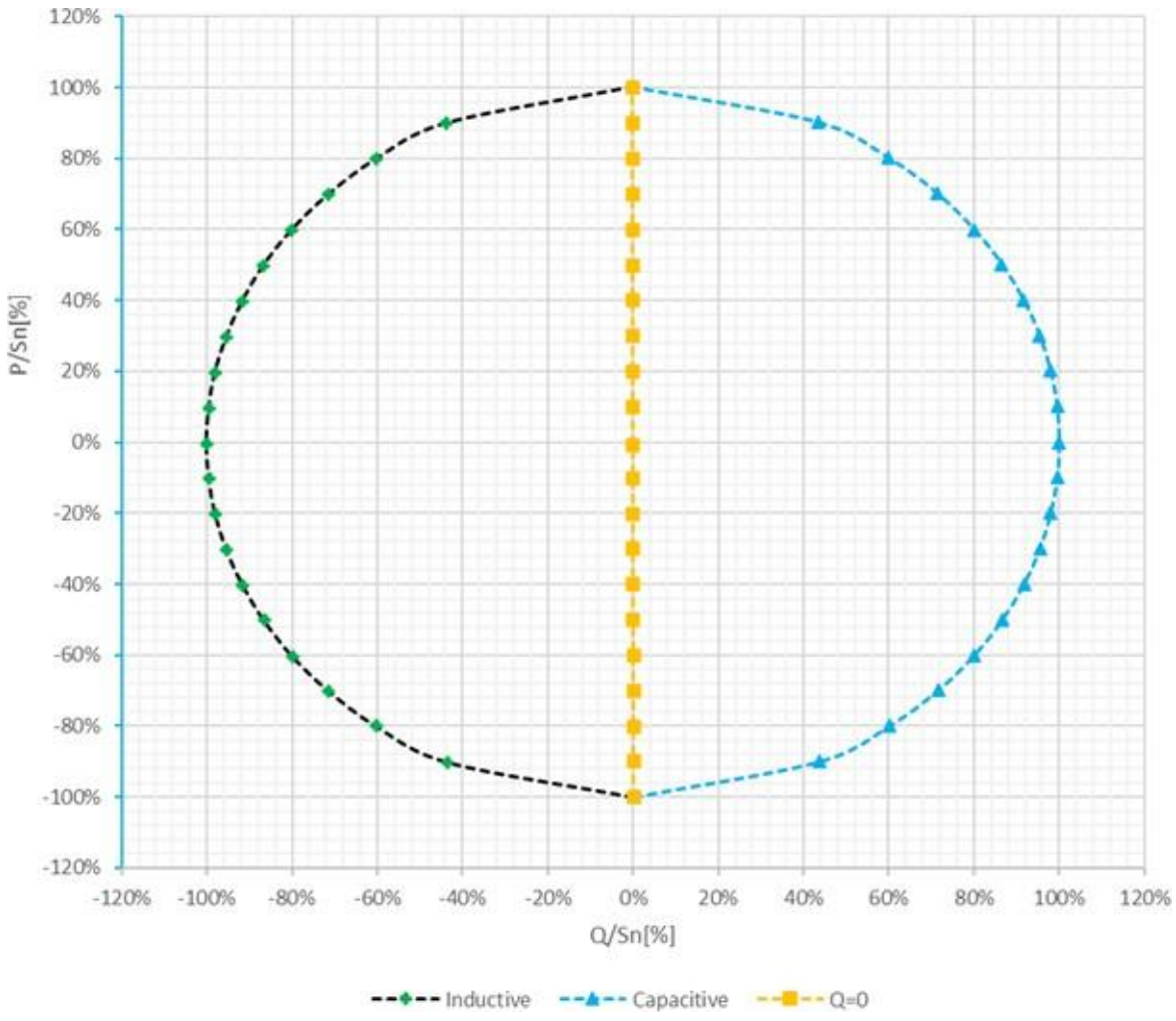
50%*P_{SMAX} ± 5%*S_n	62465	0,500	-108	-0,001	63926	0,511	0,999
60%*P_{SMAX} ± 5%*S_n	74971	0,600	-127	-0,001	76977	0,616	0,999
70%*P_{SMAX} ± 5%*S_n	87494	0,700	-151	-0,001	89755	0,718	0,999
80%*P_{SMAX} ± 5%*S_n	100016	0,800	-180	-0,001	102545	0,820	0,999
90%*P_{SMAX} ± 5%*S_n	112546	0,900	-217	-0,002	115581	0,925	0,999
100%*P_{SMAX} ± 5%*S_n	125322	1,003	2	0,000	127841	1,023	0,999



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tel. +39 055 91971 - fax. +39 055 9197515
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Test 3: 4xC+ PMAX (4 Battery Cabinet parallel (ZPM-258KLA-BC1 + ZPM-258KLA-SC1)							
-Q_{max} (inductive)							
Power-Bin	Active power		Reactive power		DC power		Power factor (cosφ)
	[W]	p.u. (based P_{CMAX} / P_{SMAX})	[Var]	p.u. (based P_{CMAX} / P_{SMAX})	[W]	p.u. (based P_{CMAX} / P_{SMAX})	
100%*P_{CMAX} ± 5%*S_n	-125046	-1,000	236	0,002	-121215	-0,970	-0,999
90%*P_{CMAX} ± 5%*S_n	-112713	-0,902	-54329	-0,435	-108920	-0,871	-0,900
80%*P_{CMAX} ± 5%*S_n	-100039	-0,800	-75261	-0,602	-95946	-0,768	-0,798
70%*P_{CMAX} ± 5%*S_n	-87600	-0,701	-89255	-0,714	-84035	-0,672	-0,700
60%*P_{CMAX} ± 5%*S_n	-75377	-0,603	-99906	-0,799	-71383	-0,571	-0,602
50%*P_{CMAX} ± 5%*S_n	-62771	-0,502	-108205	-0,866	-58562	-0,468	-0,501
40%*P_{CMAX} ± 5%*S_n	-50414	-0,403	-114461	-0,916	-46363	-0,371	-0,403
30%*P_{CMAX} ± 5%*S_n	-38003	-0,304	-119194	-0,954	-33954	-0,272	-0,303
20%*P_{CMAX} ± 5%*S_n	-25391	-0,203	-122530	-0,980	-21554	-0,172	-0,203
10%*P_{CMAX} ± 5%*S_n	-12940	-0,104	-124385	-0,995	-9147	-0,073	-0,103
0%*P_{CMAX} ± 5%*S_n	-446	-0,004	-125104	-1,001	-1224	-0,010	-0,004
10%*P_{SMAX} ± 5%*S_n	12015	0,096	-124461	-0,996	15045	0,120	0,096
20%*P_{SMAX} ± 5%*S_n	24610	0,197	-122653	-0,981	27436	0,219	0,197
30%*P_{SMAX} ± 5%*S_n	37156	0,297	-119276	-0,954	39983	0,320	0,297
40%*P_{SMAX} ± 5%*S_n	49615	0,397	-114664	-0,917	52318	0,419	0,397
50%*P_{SMAX} ± 5%*S_n	62188	0,498	-108438	-0,868	65176	0,521	0,497
60%*P_{SMAX} ± 5%*S_n	74692	0,598	-100182	-0,801	77446	0,620	0,598
70%*P_{SMAX} ± 5%*S_n	87177	0,697	-89453	-0,716	90064	0,721	0,698
80%*P_{SMAX} ± 5%*S_n	99844	0,799	-75252	-0,602	102913	0,823	0,798
90%*P_{SMAX} ± 5%*S_n	112433	0,899	-54694	-0,438	115002	0,920	0,899
100%*P_{SMAX} ± 5%*S_n	125117	1,001	-270	-0,002	127947	1,024	0,999

+Q_{max} (capacitive)							
Power-Bin	Active power		Reactive power		DC power		Power factor (cosφ)
	[W]	p.u. (based P_{CMAX} / P_{SMAX})	[Var]	p.u. (based P_{CMAX} / P_{SMAX})	[W]	p.u. (based P_{CMAX} / P_{SMAX})	
100%*P_{CMAX} ± 5%*S_n	-125095	-1,001	234	0,002	-121153	-0,969	-0,999
90%*P_{CMAX} ± 5%*S_n	-112526	-0,900	54735	0,438	-108442	-0,868	-0,898
80%*P_{CMAX} ± 5%*S_n	-100012	-0,800	75165	0,601	-96101	-0,769	-0,799
70%*P_{CMAX} ± 5%*S_n	-87394	-0,699	89479	0,716	-83517	-0,668	-0,698

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innovation@zcscompany.com - zcs@pec.it - zcsazzurro.com

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60%*P_{CMAX} ± 5%*S_n	-74943	-0,600	100147	0,801	-71169	-0,569	-0,598
50%*P_{CMAX} ± 5%*S_n	-62449	-0,500	108367	0,867	-58826	-0,471	-0,499
40%*P_{CMAX} ± 5%*S_n	-49845	-0,399	114696	0,918	-46089	-0,369	-0,398
30%*P_{CMAX} ± 5%*S_n	-37432	-0,299	119334	0,955	-33941	-0,272	-0,299
20%*P_{CMAX} ± 5%*S_n	-24873	-0,199	122494	0,980	-21638	-0,173	-0,199
10%*P_{CMAX} ± 5%*S_n	-12280	-0,098	124402	0,995	-9023	-0,072	-0,098
0%*P_{CMAX} ± 5%*S_n	-169	-0,001	124979	1,000	-1564	-0,013	0,001
10%*P_{SMAX} ± 5%*S_n	12794	0,102	124351	0,995	15263	0,122	0,102
20%*P_{SMAX} ± 5%*S_n	25178	0,201	122394	0,979	28082	0,225	0,201
30%*P_{SMAX} ± 5%*S_n	37680	0,301	119249	0,954	40393	0,323	0,301
40%*P_{SMAX} ± 5%*S_n	50194	0,402	114493	0,916	53238	0,426	0,401
50%*P_{SMAX} ± 5%*S_n	62738	0,502	108120	0,865	65118	0,521	0,502
60%*P_{SMAX} ± 5%*S_n	74723	0,598	100189	0,802	77526	0,620	0,598
70%*P_{SMAX} ± 5%*S_n	87739	0,702	89101	0,713	90276	0,722	0,702
80%*P_{SMAX} ± 5%*S_n	100225	0,802	74777	0,598	102986	0,824	0,801
90%*P_{SMAX} ± 5%*S_n	112678	0,901	54205	0,434	115845	0,927	0,901
100%*P_{SMAX} ± 5%*S_n	125108	1,001	-239	-0,002	127936	1,023	0,999

Q = 0							
Power-Bin	Active power		Reactive power		DC power		Power factor (cosφ)
	[W]	p.u. (based P_{CMAX} / P_{SMAX})	[Var]	p.u. (based P_{CMAX} / P_{SMAX})	[W]	p.u. (based P_{CMAX} / P_{SMAX})	
100%*P_{CMAX} ± 5%*S_n	-125080	-1,001	265	0,002	-121097	-0,969	-0,999
90%*P_{CMAX} ± 5%*S_n	-112577	-0,901	118	0,001	-109202	-0,874	-0,998
80%*P_{CMAX} ± 5%*S_n	-100205	-0,802	202	0,002	-97317	-0,779	-0,998
70%*P_{CMAX} ± 5%*S_n	-87624	-0,701	140	0,001	-85272	-0,682	-0,997
60%*P_{CMAX} ± 5%*S_n	-75091	-0,601	149	0,001	-72987	-0,584	-0,996
50%*P_{CMAX} ± 5%*S_n	-62656	-0,501	102	0,001	-60589	-0,485	-0,995
40%*P_{CMAX} ± 5%*S_n	-50177	-0,401	22	0,000	-48496	-0,388	-0,992
30%*P_{CMAX} ± 5%*S_n	-37589	-0,301	64	0,001	-36316	-0,291	-0,987
20%*P_{CMAX} ± 5%*S_n	-25229	-0,202	74	0,001	-23913	-0,191	-0,969
10%*P_{CMAX} ± 5%*S_n	-12679	-0,101	24	0,000	-11623	-0,093	-0,889
0%*P_{CMAX} ± 5%*S_n	-938	-0,008	26	0,000	-400	-0,003	-0,147
10%*P_{SMAX} ± 5%*S_n	12542	0,100	-22	0,000	12864	0,103	0,993
20%*P_{SMAX} ± 5%*S_n	24978	0,200	-75	-0,001	25554	0,204	0,999
30%*P_{SMAX} ± 5%*S_n	37474	0,300	-92	-0,001	38088	0,305	0,999

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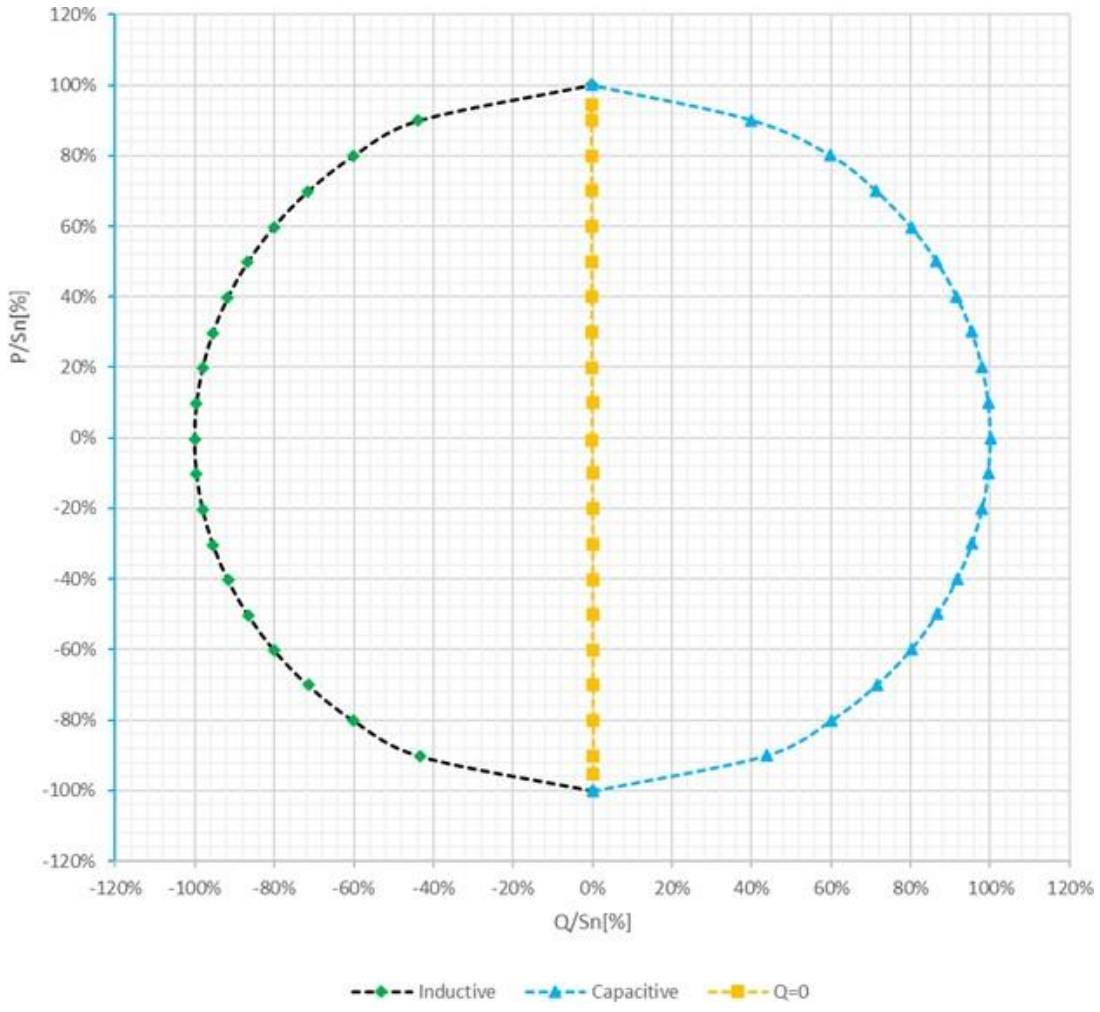
40%*P_{SMAX} ± 5%*S_n	50041	0,400	-93	-0,001	51140	0,409	0,999
50%*P_{SMAX} ± 5%*S_n	62409	0,499	-162	-0,001	63951	0,512	0,999
60%*P_{SMAX} ± 5%*S_n	74823	0,599	-123	-0,001	77013	0,616	0,999
70%*P_{SMAX} ± 5%*S_n	87446	0,700	-166	-0,001	89696	0,718	0,999
80%*P_{SMAX} ± 5%*S_n	100002	0,800	-128	-0,001	102504	0,820	0,999
90%*P_{SMAX} ± 5%*S_n	112511	0,900	-197	-0,002	115479	0,924	0,999
100%*P_{SMAX} ± 5%*S_n	125098	1,001	-241	-0,002	128494	1,028	0,999



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Test results							
☒ static generator in power plants <400 kW ☒ static generator in power plants ≥400 kW							
-Q_{max} (inductive)							
Power-Bin (based S_n)	Active power		Reactive power		DC power		Power factor (cosφ)
	[kW]	p.u. (based S_n)	[kvar]	p.u. (based S_n)	[kW]	p.u. (based S_n)	
0% ± 5%	0,797	0,006	-125,132	-1,001	3,761	0,030	0,006
10% ± 5%	12,599	0,101	-124,389	-0,995	15,527	0,124	0,101
20% ± 5%	25,024	0,200	-122,569	-0,981	27,905	0,223	0,200
30% ± 5%	37,629	0,301	-119,296	-0,954	40,468	0,324	0,301
40% ± 5%	50,006	0,400	-114,657	-0,917	52,799	0,422	0,400
50% ± 5%	62,626	0,501	-108,305	-0,866	65,387	0,523	0,501
60% ± 5%	75,199	0,602	-100,006	-0,800	77,926	0,623	0,601
70% ± 5%	87,705	0,702	-89,241	-0,714	90,415	0,723	0,701
80% ± 5%	99,997	0,800	-75,188	-0,602	102,689	0,822	0,799
90% ± 5%	112,492	0,900	-54,782	-0,438	115,195	0,922	0,899
100% ± 5%	125,083	1,001	-2,161	-0,017	127,487	1,020	0,999

+Q_{max} (capacitive)							
Power-Bin (based S_n)	Active power		Reactive power		DC power		Power factor (cosφ)
	[kW]	p.u. (based S_n)	[kvar]	p.u. (based S_n)	[kW]	p.u. (based S_n)	
0% ± 5%	1,145	0,009	125,111	1,001	4,644	0,037	0,009
10% ± 5%	12,481	0,100	124,493	0,996	15,948	0,128	0,100
20% ± 5%	25,094	0,201	122,588	0,981	28,509	0,228	0,201
30% ± 5%	37,687	0,301	119,318	0,955	41,065	0,329	0,301
40% ± 5%	50,070	0,401	114,670	0,917	53,396	0,427	0,400
50% ± 5%	62,634	0,501	108,306	0,866	65,913	0,527	0,501
60% ± 5%	75,067	0,601	100,141	0,801	78,284	0,626	0,600
70% ± 5%	87,514	0,700	89,449	0,716	90,673	0,725	0,699
80% ± 5%	100,088	0,801	75,121	0,601	103,162	0,825	0,800
90% ± 5%	112,642	0,901	54,575	0,437	115,639	0,925	0,900
100% ± 5%	125,071	1,001	1,336	0,011	127,482	1,020	0,999

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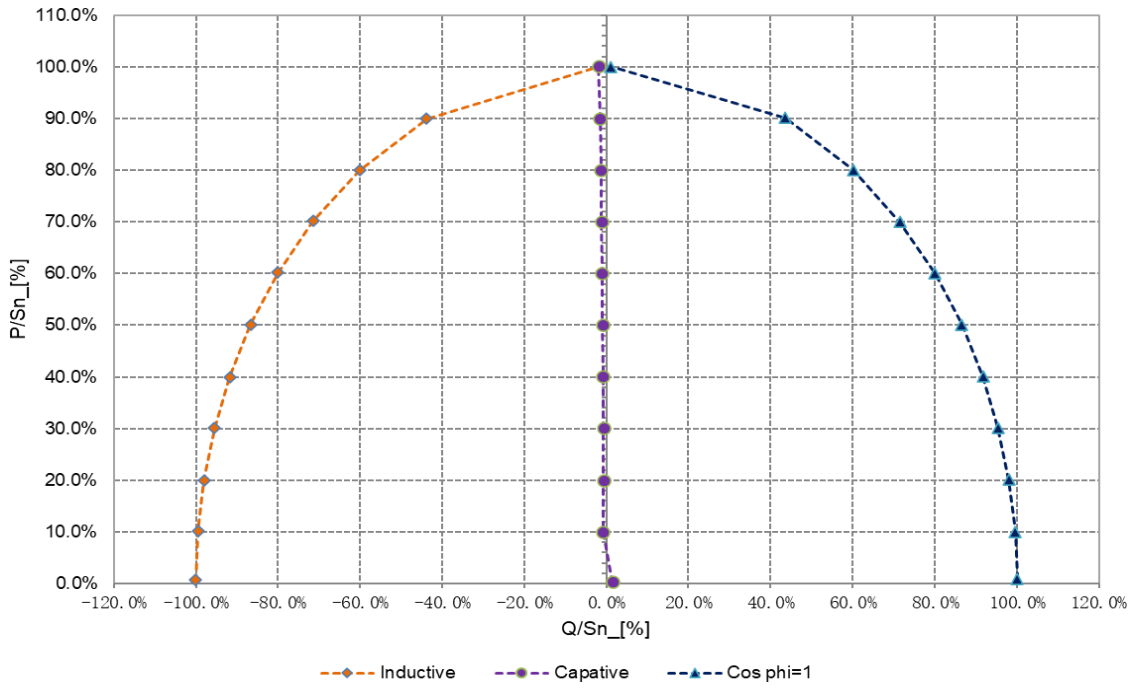
Q = 0							
Power-Bin (based S_n)	Active power		Reactive power		DC power		Power factor (cosφ)
	[kW]	p.u. (based S_n)	[kvar]	p.u. (based S_n)	[kW]	p.u. (based S_n)	
0% ± 5%	0,348	0,003	1,897	0,015	0,548	0,004	0,177
10% ± 5%	12,563	0,101	-1,062	-0,008	12,844	0,103	0,999
20% ± 5%	25,029	0,200	-0,924	-0,007	25,478	0,204	0,999
30% ± 5%	37,631	0,301	-0,821	-0,007	38,284	0,306	0,999
40% ± 5%	50,079	0,401	-1,094	-0,009	50,956	0,408	0,999
50% ± 5%	62,634	0,501	-1,151	-0,009	63,797	0,510	0,999
60% ± 5%	75,156	0,601	-1,294	-0,010	76,621	0,613	0,999
70% ± 5%	87,620	0,701	-1,456	-0,012	89,380	0,715	0,999
80% ± 5%	100,094	0,801	-1,658	-0,013	102,180	0,817	0,999
90% ± 5%	112,529	0,900	-1,877	-0,015	114,946	0,920	0,999
100% ± 5%	125,195	1,002	-2,313	-0,019	127,932	1,023	0,999



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