

1 Extended technical Data

1.1 KACO blueplanet hybrid 6.0 NH3 M2

AC-Power								
Inverter power nominal	6 kVA							
Inverter power maximal	6,6 kVA							
Rated current (In)	8,7 A (400V)							
Short circuit current continous (max output fault current)	9,6 A							
Power electronics type	IGBT-MLI (self-commutated)							
Rated operating voltage	220V / 380V [3/N/PE], 230V / 400V [3/N/PE], 240V / 415V [3/N/PE]							
cos phi nominal	≈ 0,8							
Grid connection	Three-phase							
Operating behaviour in the event of a short circuit at the inverter output								
Contribution to peak short-circuit current (îp)	60 A							
Contribution to the initial short-circuit alternating current (Ik" first single period effective value)	9,6 A							
Flicker								
Grid impedance angle	30°	50°	70°	85°				
Flicker step factor	0,125	0,062	0,064	0,114				
Short term flicker	0,112	0,055	0,057	0,102				
Note: $S_{k, fic}/S_n$ in the fictitious grid was set to								
Injection of DC currents								
A converter must not feed in more than 0.5% of its rated current or a maximum of 20 mA (whichever is higher) as direct current.								
$P_{bin} [\% P_n]$	$P_{bin, eval} [\% P_n]$	$P [kW]$	$I_{DCcmp L1} [mA]$	$I_{DCcmp L2} [mA]$	$I_{DCcmp L3} [mA]$	$I_{DCcmp L1} [\% I_n]$	$I_{DCcmp L2} [\% I_n]$	$I_{DCcmp L3} [\% I_n]$
30	3,6	3,6	-15,6960	21,4720	25,3230	-0,09%	0,123%	0,146%
40	4,8	4,8	-31,1630	-16,8380	42,9600	-0,179%	-0,097%	0,247%
60	7,2	7,2	-28,6470	-39,7220	43,4130	-0,165%	-0,228%	0,250%
70	8,4	8,4	-35,7940	-41,2840	60,6100	-0,206%	-0,237%	0,349%
100	12	12	-46,7230	-35,9800	61,1580	-0,269%	-0,207%	0,352%
[% von Imax] % rated AC current						0,27%	0,23%	0,35%

Tab. 1: DC-Injection measurement values

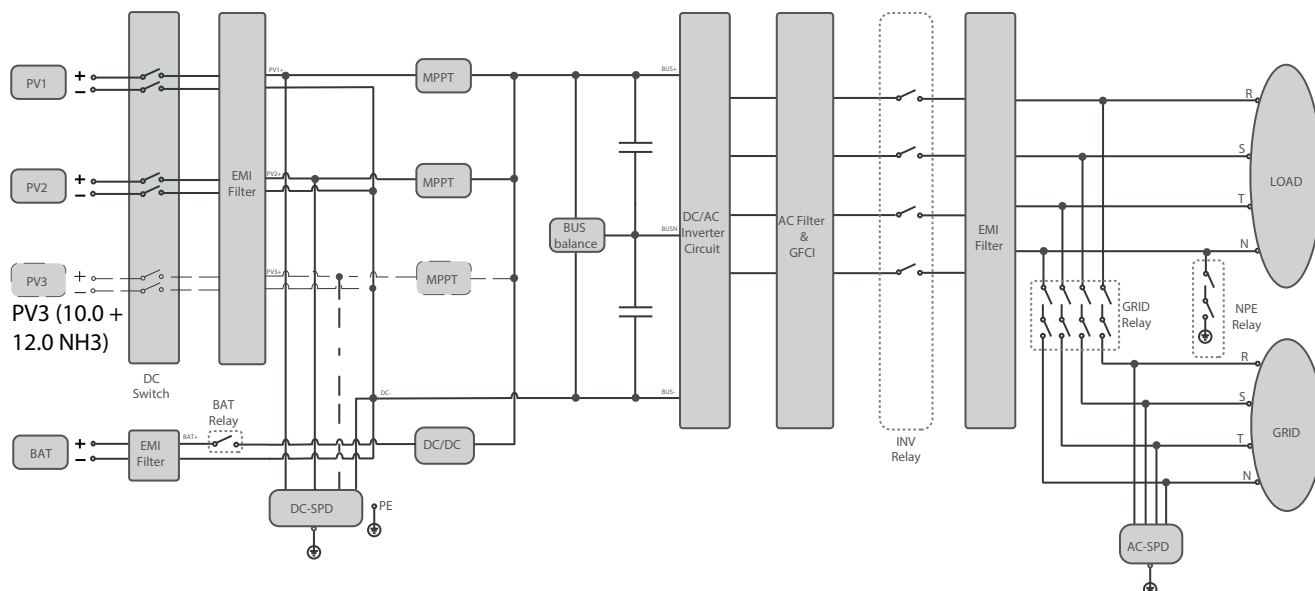


Fig. 1: Block schema blueplanet 6.0 – 12.0 NH3

Harmonics 50 Hz	[A]	[% In]
1	8,773	100,89
2	0,076	0,87
3	0,026	0,30
4	0,010	0,11
5	0,028	0,32
6	0,006	0,07
7	0,021	0,25
8	0,013	0,14
9	0,026	0,29
10	0,017	0,19
11	0,107	1,23
12	0,005	0,06
13	0,140	1,62
14	0,011	0,13
15	0,018	0,21
16	0,016	0,19
17	0,042	0,48
18	0,004	0,04
19	0,061	0,70
20	0,008	0,09
21	0,012	0,14
22	0,012	0,14
23	0,014	0,16
24	0,002	0,03
25	0,007	0,08
26	0,004	0,05
27	0,006	0,07
28	0,007	0,08
29	0,008	0,09
30	0,001	0,02

Harmonics 50 Hz	[A]	[% In]
31	0,020	0,23
32	0,003	0,03
33	0,003	0,03
34	0,005	0,06
35	0,010	0,11
36	0,001	0,01
37	0,017	0,20
38	0,003	0,04
39	0,002	0,02
40	0,004	0,05
41	0,010	0,11
42	0,001	0,01
43	0,012	0,13
44	0,003	0,04
45	0,003	0,03
46	0,004	0,04
47	0,008	0,09
48	0,001	0,01
49	0,010	0,11
50	0,003	0,03

Tab. 2: Harmonics 50 Hz blueplanet hybrid 6.0 NH3 M2

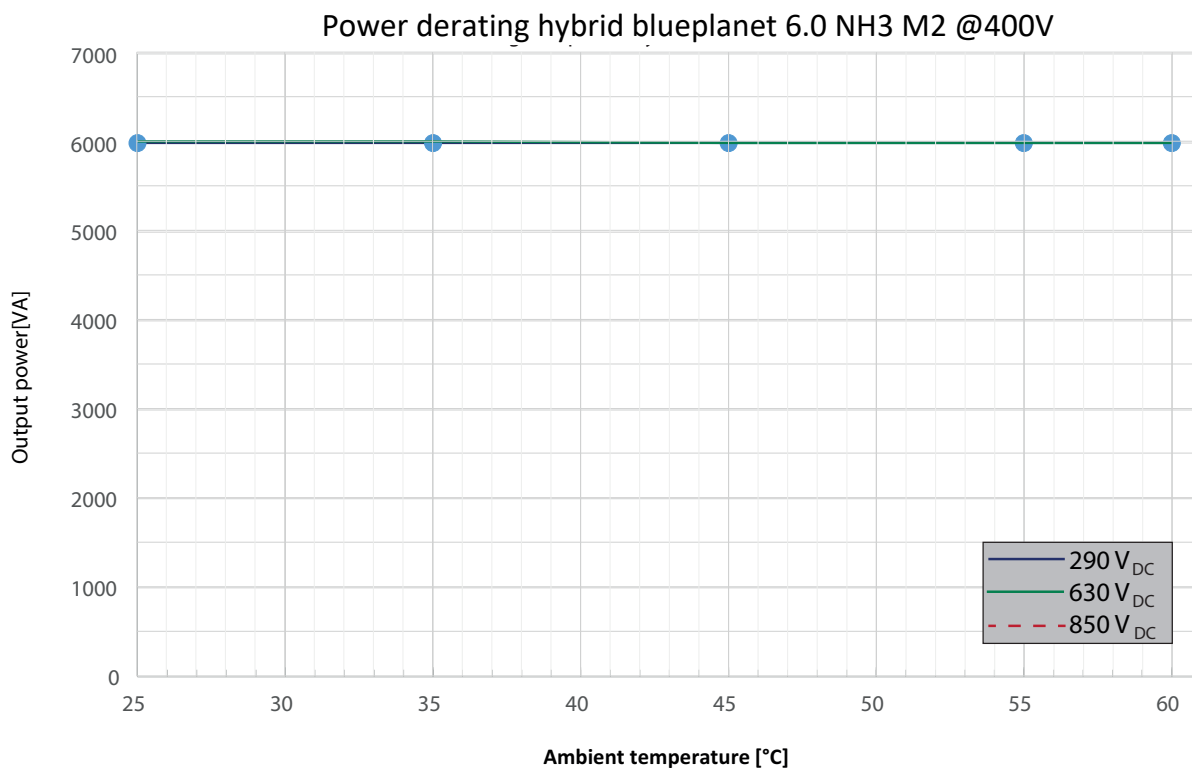


Fig. 2: Power derating blueplanet hybrid 6.0 NH3 M2

Efficiency characteristic

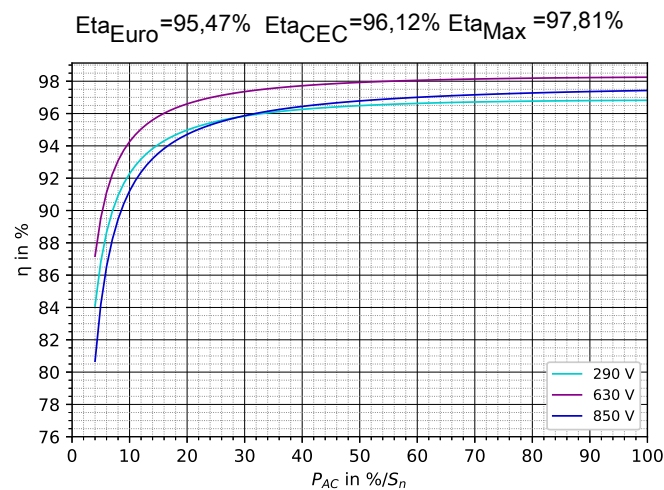


Fig. 3: 2D Diagram blueplanet 6.0 NH3 M2

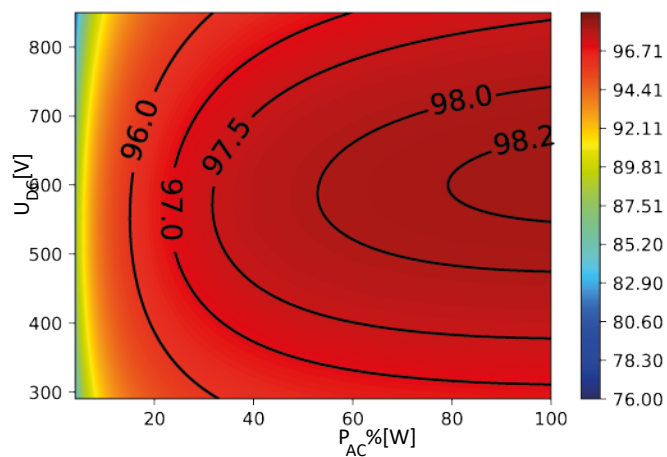


Fig. 4: 3D diagram blueplanet 6.0 NH3 M2

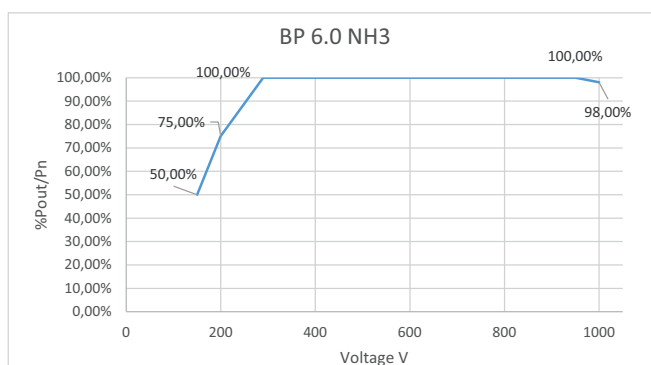


Fig. 5: 2D Diagram %Pout/Pn vs Voltage 6.0NH3

1.2 KACO blueplanet hybrid 8.0 NH3 M3

AC-Power	
Inverter power nominal	8 kVA
Inverter power maximal	8,8 kVA
Rated current (I _n)	11,6 A (400V)
Short circuit current continous (max output fault current)	12,8 A
Power electronics type	IGBT-MLI (self-commutated)
Rated operating voltage	220V / 380V [3/N/PE], 230V / 400V [3/N/PE], 240V / 415V [3/N/PE]
cos phi nominal	≈ 0,8
Grid connection	Three-phase

Operating behaviour in the event of a short circuit at the inverter output

Contribution to peak short-circuit current (i_p) 60 A

Contribution to the initial short-circuit alternating current (I_k" first single period effective value) 12,8 A

Flicker

Grid impedance angle	30°	50°	70°	85°
Flicker step factor	0,120	0,056	0,054	0,104
Short term flicker	0,107	0,050	0,048	0,093

Note: $S_{k, fic}/S_n$ in the fictitious grid was set to

Injection of DC currents

A converter must not feed in more than 0.5% of its rated current or a maximum of 20 mA (whichever is higher) as direct current.

P _{bin} [% P _n]	P _{bin, eval} [% P _n]	P [kW]	I _{DCcmp L1} [mA]	I _{DCcmp L2} [mA]	I _{DCcmp L3} [mA]	I _{DCcmp L1} [% I _n]	I _{DCcmp L2} [% I _n]	I _{DCcmp L3} [% I _n]
30	3,6	3,6	-15,6960	21,4720	25,3230	-0,09%	0,123%	0,146%
40	4,8	4,8	-31,1630	-16,8380	42,9600	-0,179%	-0,097%	0,247%
60	7,2	7,2	-28,6470	-39,7220	43,4130	-0,165%	-0,228%	0,250%
70	8,4	8,4	-35,7940	-41,2840	60,6100	-0,206%	-0,237%	0,349%
100	12	12	-46,7230	-35,9800	61,1580	-0,269%	-0,207%	0,352%
[% von I _{max}] % rated AC current						0,27%	0,23%	0,35%

Tab. 3: DC-Injection measurement values

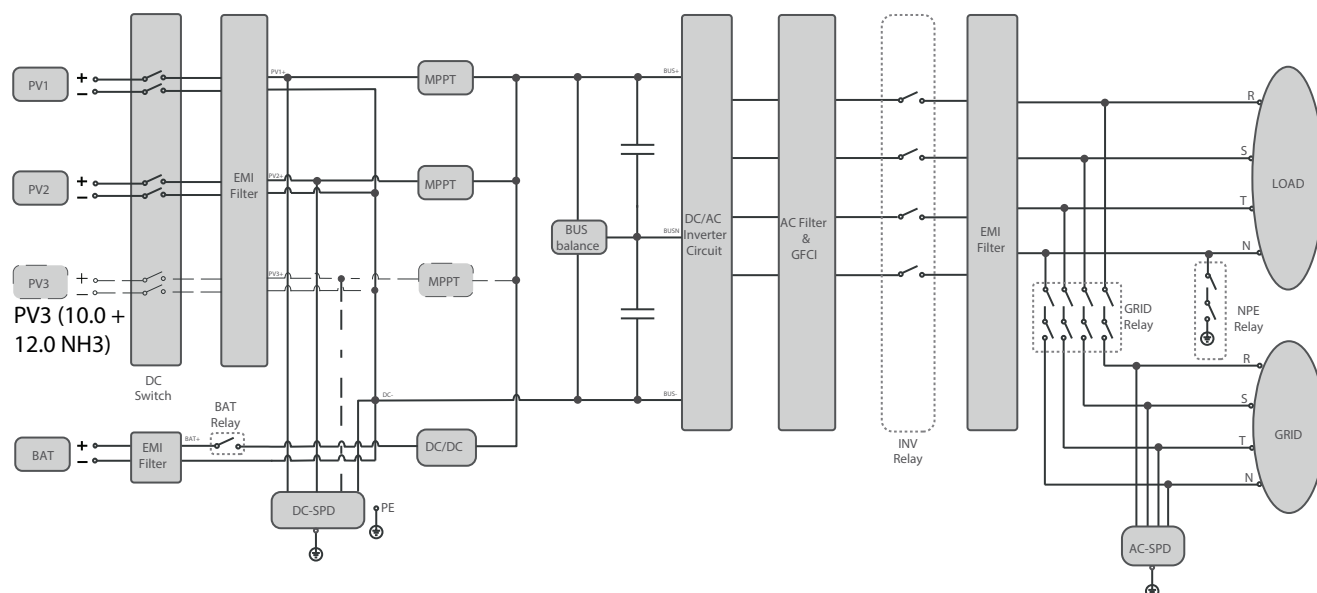


Fig. 6: Block schema blueplanet 6.0 – 12.0 NH3

Harmonics 50 Hz	[A]	[% In]
1	11,539	99,52
2	0,089	0,77
3	0,037	0,31
4	0,009	0,08
5	0,031	0,27
6	0,005	0,04
7	0,024	0,21
8	0,011	0,10
9	0,026	0,23
10	0,015	0,13
11	0,121	1,04
12	0,005	0,04
13	0,164	1,41
14	0,012	0,10
15	0,022	0,19
16	0,017	0,15
17	0,057	0,49
18	0,004	0,03
19	0,093	0,80
20	0,010	0,09
21	0,019	0,16
22	0,016	0,14
23	0,026	0,22
24	0,003	0,02
25	0,037	0,32
26	0,007	0,06
27	0,012	0,10
28	0,011	0,10
29	0,014	0,12
30	0,002	0,02

Harmonics 50 Hz	[A]	[% In]
31	0,011	0,10
32	0,005	0,04
33	0,006	0,05
34	0,006	0,05
35	0,009	0,08
36	0,002	0,01
37	0,017	0,14
38	0,003	0,03
39	0,004	0,03
40	0,003	0,03
41	0,010	0,08
42	0,001	0,01
43	0,013	0,11
44	0,002	0,02
45	0,003	0,02
46	0,003	0,02
47	0,010	0,09
48	0,001	0,01
49	0,011	0,10
50	0,002	0,02

Tab. 4: Harmonics 50 Hz blueplanet hybrid 8.0 NH3 M3

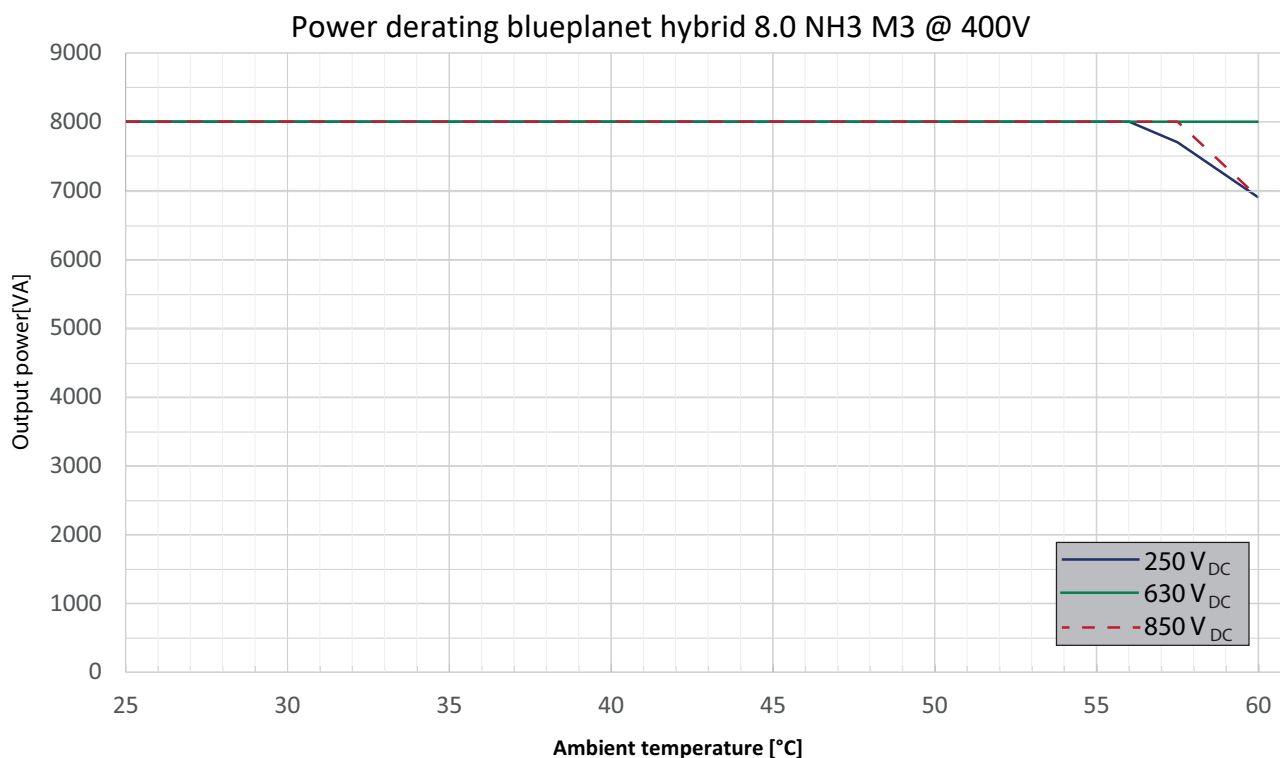


Fig. 7: Power derating blueplanet hybrid 8.0 NH3 M3

Efficiency characteristic

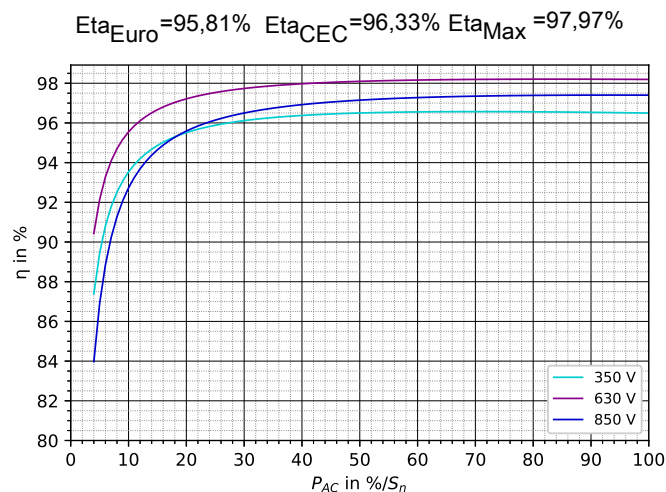


Fig. 8: 2D Diagram blueplanet 8.0 NH3 M3

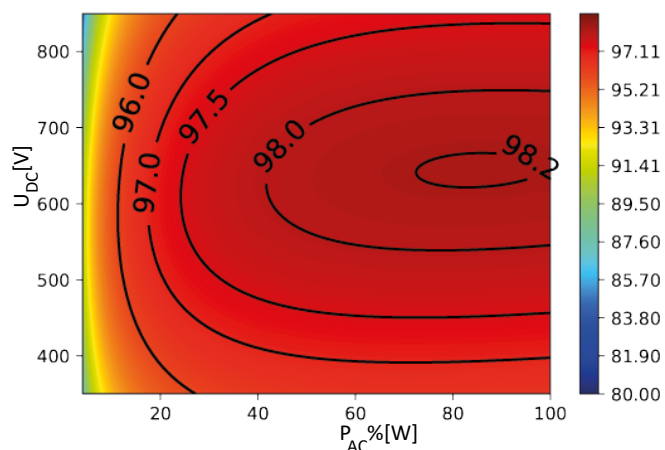


Fig. 9: 3D diagram blueplanet 8.0 NH3 M3

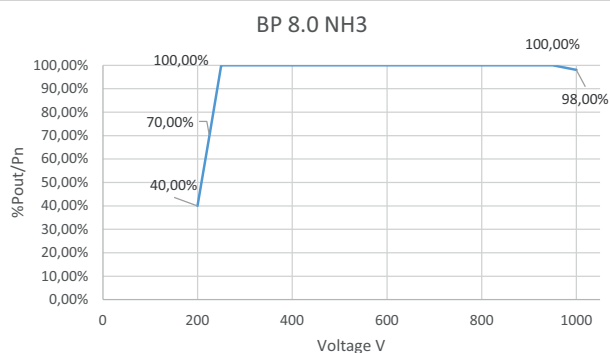


Fig. 10: 2D Diagram $\%P_{out}/P_n$ vs Voltage 8.0NH3

1.3 KACO blueplanet hybrid 10.0 NH3 M3

AC-Power	
Inverter power nominal	10 kVA
Inverter power maximal	10 kVA
Rated current (I _n)	14,5 A (400V)
Short circuit current continous (max output fault current)	16,0 A
Power electronics type	IGBT-MLI (self-commutated)
Rated operating voltage	220V / 380V [3/N/PE], 230V / 400V [3/N/PE], 240V / 415V [3/N/PE]
cos phi nominal	≈ 0,8
Grid connection	Three-phase

Operating behaviour in the event of a short circuit at the inverter output

Contribution to peak short-circuit current (î_p) 60 A

Contribution to the initial short-circuit alternating current (I_k" first single period effective value) 16,0 A

Flicker

Grid impedance angle	30°	50°	70°	85°
Flicker step factor	0,012	0,011	0,011	0,011
Short term flicker	0,010	0,010	0,010	0,010

Note: $S_{k, fic}/S_n$ in the fictitious grid was set to

Injection of DC currents

A converter must not feed in more than 0.5% of its rated current or a maximum of 20 mA (whichever is higher) as direct current.

P _{bin} [% P _n]	P _{bin, eval} [% P _n]	P [kW]	I _{DCcmp L1} [mA]	I _{DCcmp L2} [mA]	I _{DCcmp L3} [mA]	I _{DCcmp L1} [% I _n]	I _{DCcmp L2} [% I _n]	I _{DCcmp L3} [% I _n]
30	3,6	3,6	-15,6960	21,4720	25,3230	-0,09%	0,123%	0,146%
40	4,8	4,8	-31,1630	-16,8380	42,9600	-0,179%	-0,097%	0,247%
60	7,2	7,2	-28,6470	-39,7220	43,4130	-0,165%	-0,228%	0,250%
70	8,4	8,4	-35,7940	-41,2840	60,6100	-0,206%	-0,237%	0,349%
100	12	12	-46,7230	-35,9800	61,1580	-0,269%	-0,207%	0,352%
[% von I _{max}] % rated AC current						0,27%	0,23%	0,35%

Tab. 5: DC-Injection measurement values

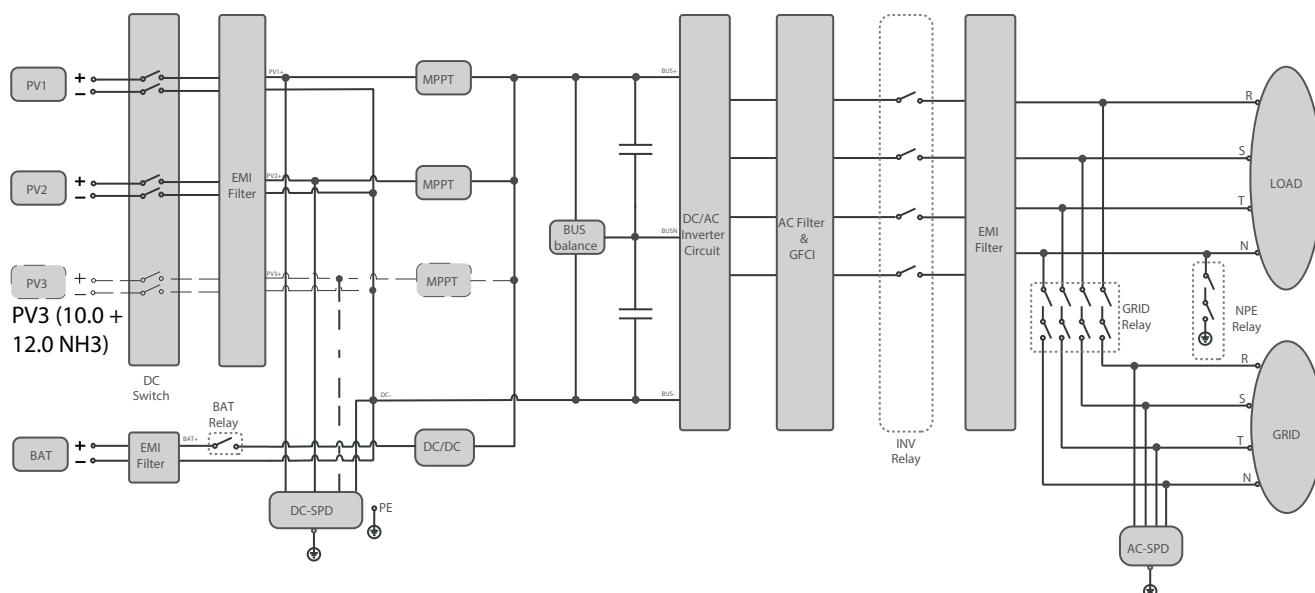


Fig. 11: Block schema blueplanet 6.0 – 12.0 NH3

Harmonics 50 Hz	[A]	[% In]
1	14,456	99,74
2	0,116	0,80
3	0,041	0,28
4	0,010	0,07
5	0,033	0,23
6	0,005	0,03
7	0,025	0,17
8	0,011	0,07
9	0,029	0,20
10	0,015	0,11
11	0,129	0,89
12	0,005	0,03
13	0,173	1,19
14	0,012	0,08
15	0,026	0,18
16	0,018	0,13
17	0,069	0,48
18	0,004	0,03
19	0,114	0,79
20	0,011	0,08
21	0,023	0,16
22	0,020	0,13
23	0,036	0,25
24	0,003	0,02
25	0,066	0,45
26	0,009	0,06
27	0,017	0,12
28	0,017	0,12
29	0,021	0,15
30	0,003	0,02

Harmonics 50 Hz	[A]	[% In]
31	0,017	0,12
32	0,007	0,05
33	0,010	0,07
34	0,009	0,07
35	0,011	0,08
36	0,003	0,02
37	0,013	0,09
38	0,005	0,04
39	0,006	0,04
40	0,005	0,04
41	0,010	0,07
42	0,002	0,01
43	0,014	0,09
44	0,004	0,02
45	0,004	0,03
46	0,003	0,02
47	0,009	0,06
48	0,002	0,01
49	0,011	0,08
50	0,002	0,02

Tab. 6: Harmonics 50 Hz blueplanet hybrid 10.0 NH3 M3

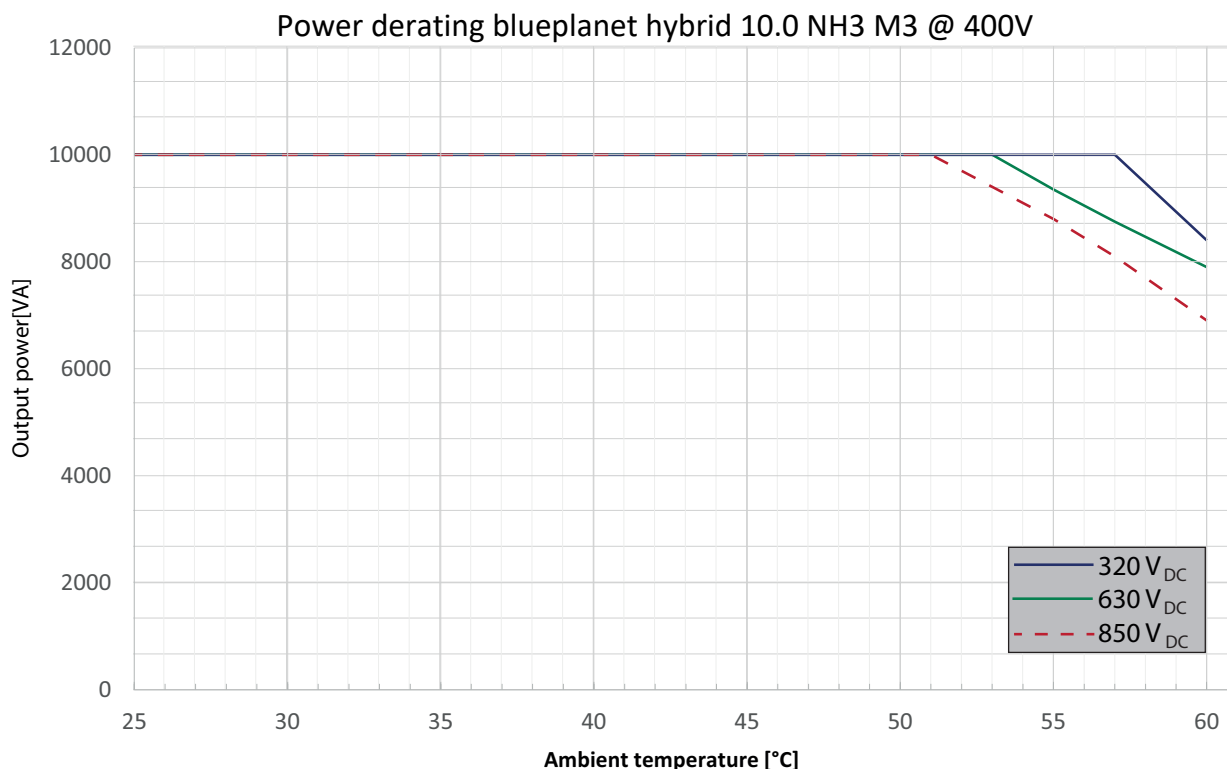


Fig. 12: Power derating blueplanet hybrid 10.0 NH3 M3

Efficiency characteristic

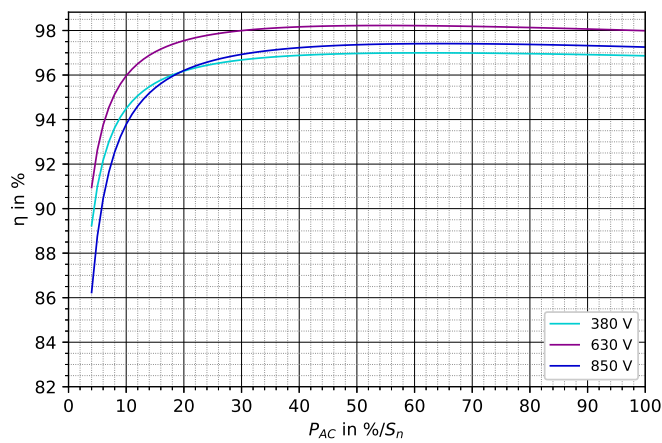
 $\eta_{\text{Euro}} = 96,46\%$ $\eta_{\text{CEC}} = 96,66\%$ $\eta_{\text{Max}} = 98,11\%$


Fig. 13: 2D Diagram blueplanet 10.0 NH3 M3

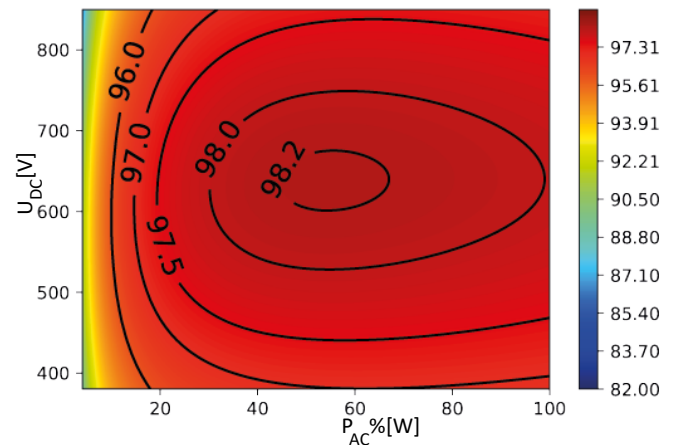


Fig. 14: 3D diagram 10.0 NH3 M3

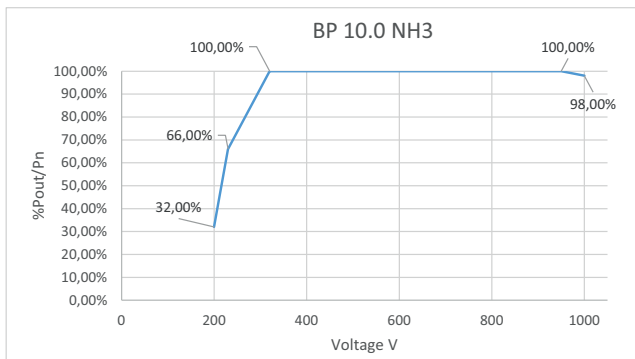


Fig. 15: 2D Diagram %Pout/Pn vs Voltage 10.0NH3

1.4 KACO blueplanet hybrid 12.0 NH3 M3

AC-Power	
Inverter power nominal	12 kVA
Inverter power maximal	13,2 kVA
Rated current (I _n)	17,4 A (400V)
Short circuit current continous (max output fault current)	19,2 A
Power electronics type	IGBT-MLI (self-commutated)
Rated operating voltage	220V / 380V [3/N/PE], 230V / 400V [3/N/PE], 240V / 415V [3/N/PE]
cos phi nominal	≈ 0,8
Grid connection	Three-phase

Operating behaviour in the event of a short circuit at the inverter output

Contribution to peak short-circuit current (î_p) 60 A

Contribution to the initial short-circuit alternating current (I_k" first single period effective value) 19,2 A

Flicker

Grid impedance angle	30°	50°	70°	85°
Flicker step factor	0,037	0,035	0,035	0,034
Short term flicker	0,033	0,031	0,032	0,030

Note: $S_{k, fic}/S_n$ in the fictitious grid was set to

Injection of DC currents

A converter must not feed in more than 0.5% of its rated current or a maximum of 20 mA (whichever is higher) as direct current.

P _{bin} [% P _n]	P _{bin, eval} [% P _n]	P [kW]	I _{DCcmp L1} [mA]	I _{DCcmp L2} [mA]	I _{DCcmp L3} [mA]	I _{DCcmp L1} [% I _n]	I _{DCcmp L2} [% I _n]	I _{DCcmp L3} [% I _n]
30	3,6	3,6	-15,6960	21,4720	25,3230	-0,09%	0,123%	0,146%
40	4,8	4,8	-31,1630	-16,8380	42,9600	-0,179%	-0,097%	0,247%
60	7,2	7,2	-28,6470	-39,7220	43,4130	-0,165%	-0,228%	0,250%
70	8,4	8,4	-35,7940	-41,2840	60,6100	-0,206%	-0,237%	0,349%
100	12	12	-46,7230	-35,9800	61,1580	-0,269%	-0,207%	0,352%
[% von I _{max}] % rated AC current						0,27%	0,23%	0,35%

Tab. 7: DC-Injection measurement values

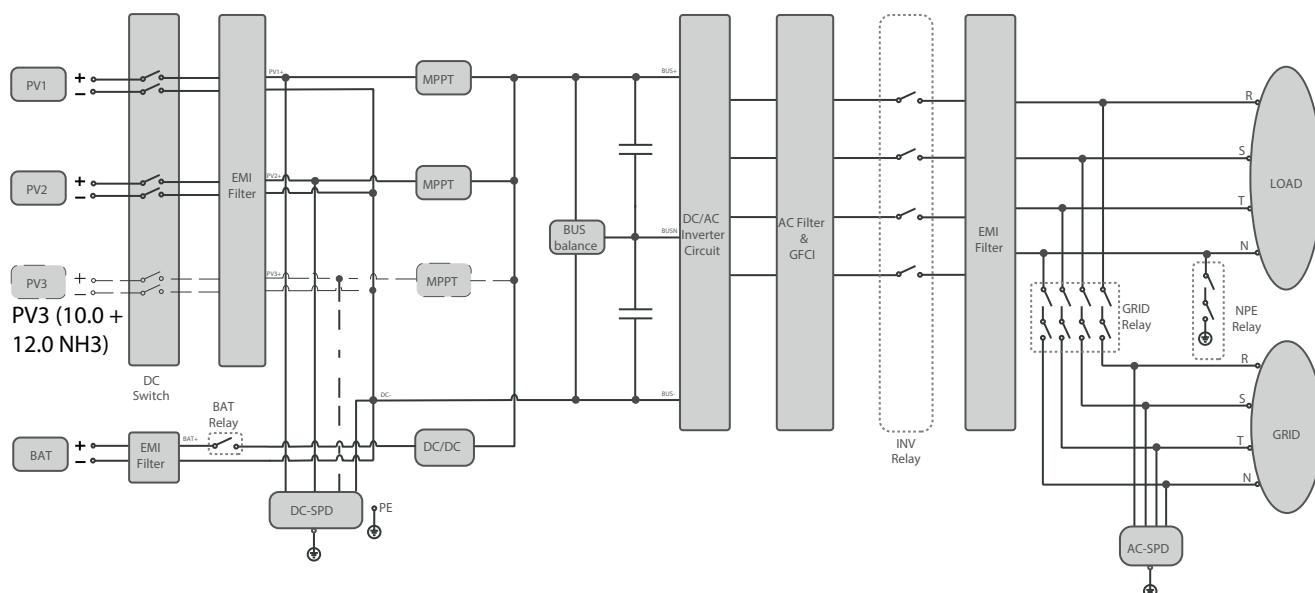


Fig. 16: Block schema blueplanet 6.0 – 12.0 NH3

Harmonics 50 Hz	[A]	[% In]
1	17,347	99,74
2	0,139	0,80
3	0,039	0,22
4	0,085	0,49
5	0,049	0,28
6	0,008	0,04
7	0,045	0,26
8	0,040	0,23
9	0,031	0,18
10	0,020	0,12
11	0,202	1,16
12	0,010	0,06
13	0,087	0,50
14	0,027	0,15
15	0,033	0,19
16	0,026	0,15
17	0,082	0,47
18	0,017	0,10
19	0,101	0,58
20	0,018	0,10
21	0,025	0,14
22	0,060	0,35
23	0,031	0,18
24	0,014	0,08
25	0,088	0,51
26	0,015	0,09
27	0,033	0,19
28	0,058	0,34
29	0,059	0,34
30	0,020	0,11

Harmonics 50 Hz	[A]	[% In]
31	0,039	0,22
32	0,036	0,21
33	0,043	0,25
34	0,036	0,21
35	0,019	0,11
36	0,010	0,05
37	0,039	0,22
38	0,012	0,07
39	0,017	0,10
40	0,024	0,14
41	0,013	0,07
42	0,019	0,11
43	0,025	0,14
44	0,013	0,08
45	0,006	0,03
46	0,024	0,14
47	0,021	0,12
48	0,017	0,10
49	0,004	0,02
50	0,021	0,12

Tab. 8: Harmonics 50 Hz blueplanet hybrid 12.0 NH3 M3

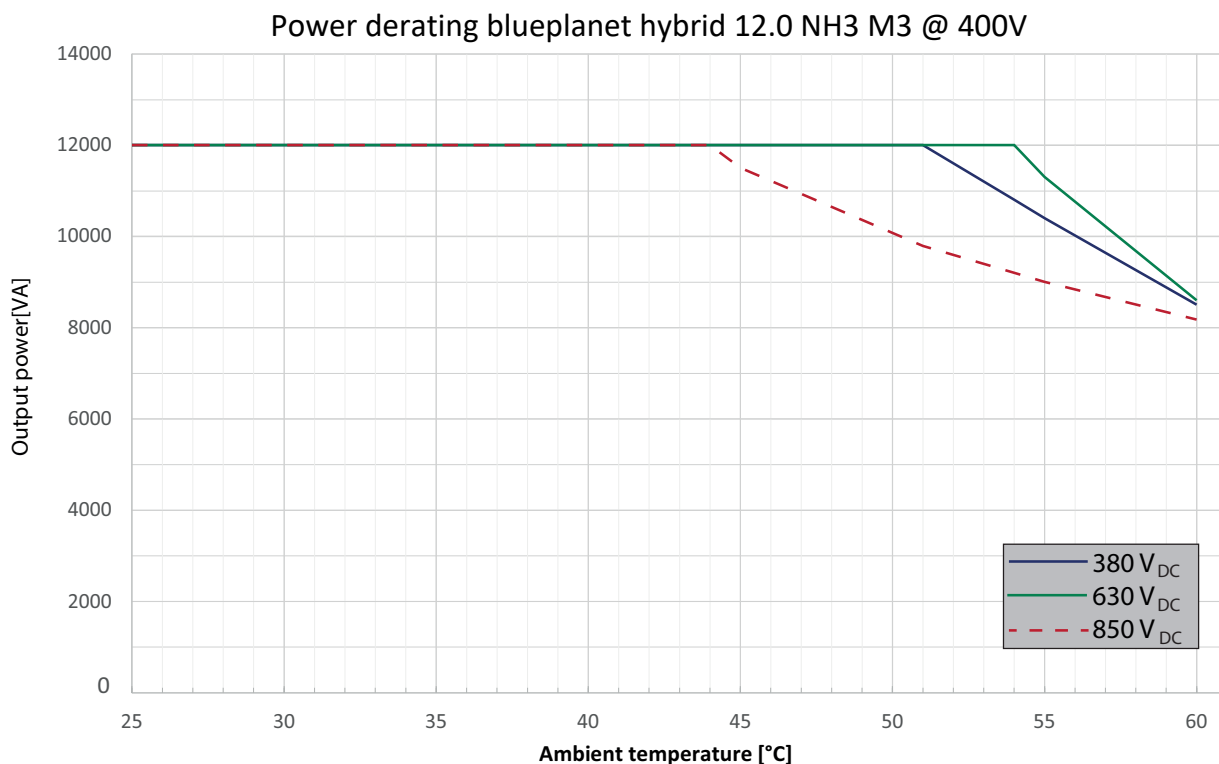


Fig. 17: Power derating blueplanet hybrid 12.0 NH3 M3

Efficiency characteristic

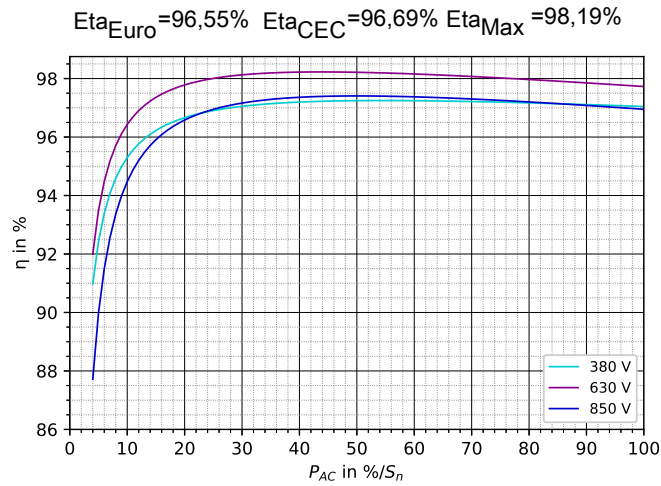


Fig. 18: 2D Diagram blueplanet 12.0 NH3 M3

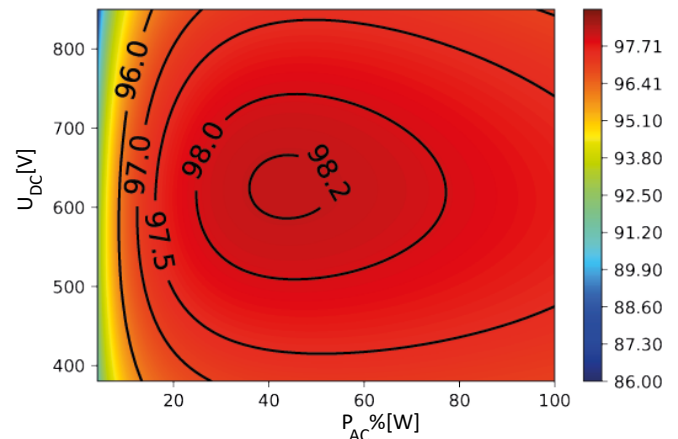
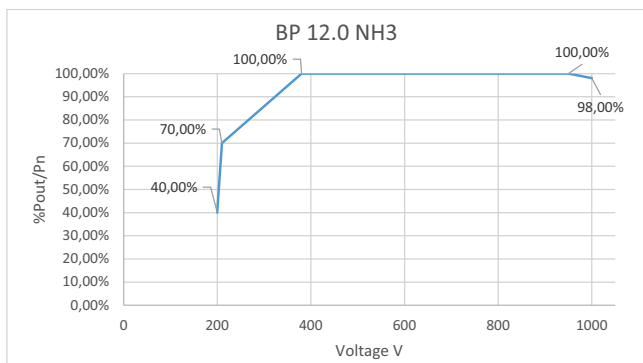


Fig. 19: 3D diagram 12.0 NH3 M3

Fig. 20: 2D Diagram $\%P_{out}/P_n$ vs Voltage 12.0NH3



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