Brochure 21/22

Battery Inverters

Storage Solutions

STORAGE

POWER ELECTRONICS

CONTENTS

Imagine all the storage powering the world

#1
World Storage Leader

+150 storage projects around the world

10 GW
of installed storage power

#1 Manufacturer of storage inverters in America, Europe and Oceania.

We handle everything in-house: from design and manufacture to testing.

More than

+60 GW
of installed AC power
Solar + Storage

+30 GW
of annual production capacity

+35
years of excellence

+25
International delegations

Our energy storage applications

This is how all our products are:

Our vertical integration gives us the flexibility and specialization to adapt customer requirements and still provide very short delivery times.

Our products control the ramp rate at which power is injected into the grid, attenuating the intermittent nature of renewable energy sources, to provide a smoother power output.

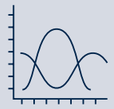
The inverters can store energy in batteries during low-demand periods from the grid, in order to later supply the energy when there is a higher demand, selling the energy at a higher market price during peak demand periods.

Our storage products reduce the burden on the distribution network and increase significantly its efficiency.

The result is a more flattened demand curve avoiding switching on more expensive and polluting generators.

VAR

Our products can help to support the grid voltage by generating capacitive or inductive reactive power.



And also, regulate grid frequency injecting or absorbing active power.

References

Our success around the world

DC-COUPLING SOLUTIONS

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DC/DC BIDIRECTIONAL CONVERTER

Freemaq
DC/DC

Storage for solar and EV chargers
Fits everything

The multi-fitting product

Modular Outdoor Solution

From 1200 kW to 4800 kW

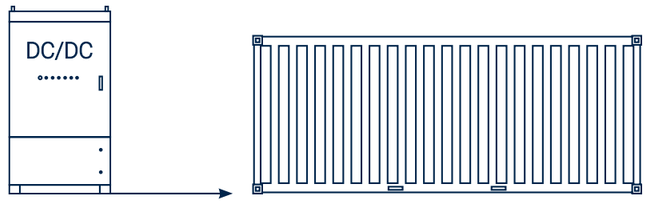
Up to 1500 Vdc

The most efficient bidirectional DC/DC converter.

Maximize the benefits of solar plants with our Freemaq DC/DC.

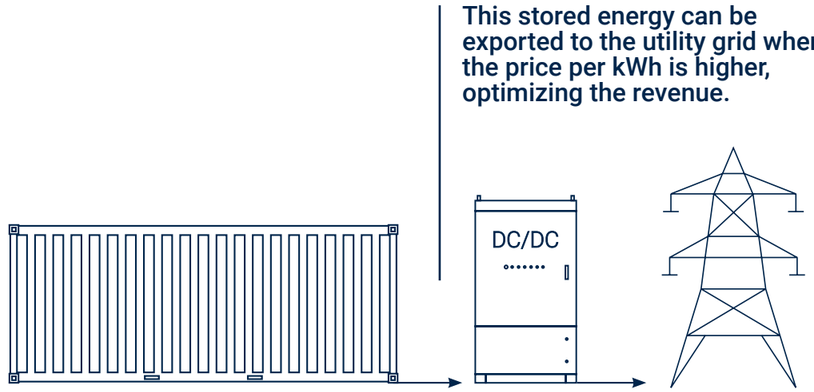
How?

1. With the DC-coupled energy storage system, the excess energy from the PV plant can be stored in the Battery Energy Storage System (BESS) and then delivered when needed.



2. It also gets the maximum revenue from the PV generator, by charging the battery storage system when there is an inverter power curtailment.

This stored energy can be exported to the utility grid when the price per kWh is higher, optimizing the revenue.



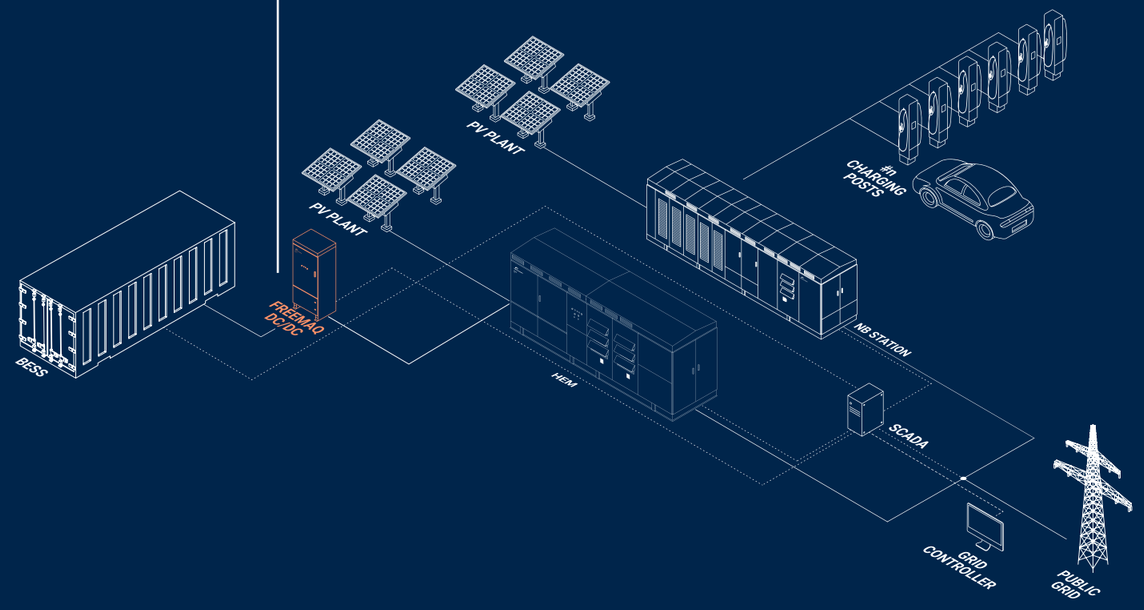
DC/DC

REFERENCES		FD1200
DC INPUT & OUTPUT	DC Rated Power (kW) @ 30 °C	1200
	DC Rated Power (kW) @ 40 °C	1120
	DC Rated Power (kW) @ 50 °C	1000
	Max. DC Output Current (A) @ 40 °C	1100
	DC PV Voltage Range (Vdc) [1]	850 - 1500
	DC ESS Voltage Range (Vdc) [1]	850 - 1500
	Maximum DC PV Input Voltage (Vdc)	1500
	DC Voltage Ripple	< 3%
	Battery Technology	Compatible with all battery technologies
EFFICIENCY	Efficiency (Max)	98.9%
	Max. Standby Consumption	< 50 W
CABINET	Cooling	Forced air
	Enclosure Protection Degree	NEMA 3R / IP54
CONNECTIONS	Number of PV connections	2 negative / 2 positive
ENVIRONMENT	Operating Temperature Range	From -35 ºC to 50 ºC
	Relative Humidity	From 4% to 100% non-condensing
	Max. Altitude (above sea level)	4000 m (> 2000 m power derating)
	Noise level	<79dBA
CONTROL INTERFACE	Interfaces	Emergency stop pushbutton and indicator lights
	Communications Protocol	Modbus TCP
PROTECTIONS	Ground Fault Protection	Insulation monitoring device
	PV Disconnection	Switch
	BESS Disconnection	Contactors
CERTIFICATIONS	Safety	UL1741, IEC 62109

NOTES

[1] Consult Power Electronics for derating curves.

Easy to integrate.



UTILITY SCALE

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PCSK BATTERY

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MULTI PCSK INVERTERS

The utility-scale battery inverters

Freemaq

PCSK & Multi PCSK

Powerful and flexible

Prepared for the most *extreme* environments

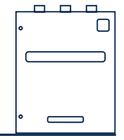
These products share the following characteristics

Scan me!

1 Easy maintenance

Designed to be easily replaceable on the field with a safe, reliable, and fast Plug&Play assembly system.

Includes up to 4 FRUs (Field Replaceable Units).



2 Modularity, synonymous with *availability*

Modularity, synonymous with availability. It allows the DC power redistribution when one module fails.

Lower energy losses = higher availability and efficiency.

3 Multilevel topology

The 3 level IGBT topology reduces stage losses, increases inverter efficiency and minimizes total harmonic distortion.

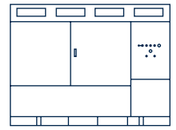
4 Advanced grid support

Capable of operating on any power system.

Different operation modes available depending on the aplication: grid forming or grid following.

5 Adaptive capacity

Choose your model depending on your requirements.



Freemaq

PCSK

One system, one battery

Maximum power up to 1500 Vdc

9 **Nine different voltage DC windows**

Maximum power up to 40°C

Up to 4390 kVA

Freemaq

Multi PCSK

More batteries at the same time

Maximum power up to 1500 Vdc

9 Nine different voltage DC windows

Up to four independent BESS

x4

Maximum power up to 40 °C

Up to 4390 kVA

Higher battery capacity due to the short circuit current divided into the different DC inputs.

Short circuit current reduction per DC input which enables a better electrical design.

Higher availability as a battery fault will only remove the affected power modules from the system.

Freemaq PCSK

COMMON FEATURES PCSK		FRAME 2	FRAME 3	FRAME 4
AC	Max. AC Output Current (A) @40°C	1837	2756	3674
	Operating Grid Frequency (Hz)	50/60Hz		
	Current Harmonic Distortion (THDi)	< 3% per IEEE519		
	Power Factor (cosine phi) [1]	0.5 leading ... 0.5 lagging		
	Reactive Power Compensation	Four quadrant operation		
DC	DC Voltage Ripple	< 3%		
	Max. DC Continuous Current (A)	2295	3443	4590
	Battery Technology	All type of batteries (BMS required)		
CABINET	Dimensions [WxDxH] (ft)	9.8 x 6.5 x 7.2		
	Dimensions [WxDxH] (m)	3.0 x 2.0 x 2.2		
	Weight (lbs)	11465	11795	12125
	Weight (kg)	5200	5350	5500
	Type of Ventilation	Forced air cooling		
ENVIRONMENT	Degree of Protection	NEMA 3R / IP55		
	Permissible Ambient Temperature [2]	-25°C to +60°C, >50°C / Active power derating		
	Relative Humidity	4% to 100% non-condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
CONTROL INTERFACE	Communication Protocol	Modbus TCP		
	Power Plant Controller	Optional. Third party SCADA systems supported.		
	Keyed ON/OFF Switch	Standard		
PROTECTIONS	Ground Fault Protection	Insulation monitoring device		
	Humidity Control	Active heating		
	General AC Protection & Disconn.	Circuit breaker		
	General DC Protection & Disconn.	DC switch-disconnectors[3]		
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2)		
CERTIFICATIONS & STANDARDS	Safety	UL 1741 / CSA 22.2 No.107.1-16 / IEC 62109-1 / IEC 62109-2		
	Utility Interconnect[4]	IEEE 1547:2018 / UL 1741 SB/ IEC 62116:2014		

NOTES

[1] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[2] Consult Power Electronics for temperatures below -25°C.
[3] Battery short circuit disconnection has to be done on the battery side.
[4] Consult Power Electronics for other applicable standards/grid codes.

Freemaq Multi PCSK

COMMON FEATURES MULTI PCSK		FRAME 2	FRAME 3	FRAME 4	
AC	Max. AC Output Current (A) @40°C	1837	2756	3674	
	Operating Grid Frequency (Hz)	50/60Hz			
	Current Harmonic Distortion (THDi)	< 3% per IEEE519			
	Power Factor (cosine phi)[1]	0.5 leading ... 0.5 lagging			
	Reactive Power Compensation	Four quadrant operation			
DC	DC Voltage Ripple	< 3%			
	Max. DC Continuous Current per Input (A)	1148	1148	2295	1148
	Battery Technology	All type of batteries (BMS required)			
	Number of Separate DC Inputs	2	3	2	4
CABINET	Dimensions [WxDxH] (ft)	9.8 x 6.5 x 7.2			
	Dimensions [WxDxH] (m)	3.0 x 2.0 x 2.2			
	Weight (lbs)	11465	11795	12125	
	Weight (kg)	5200	5350	5500	
	Type of Ventilation	Forced air cooling			
ENVIRONMENT	Degree of Protection	NEMA 3R / IP55			
	Permissible Ambient Temperature [2]	-25 C to +60 C, >50 C / Active power derating			
	Relative Humidity	4% to 100% non-condensing			
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)			
CONTROL INTERFACE	Communication Protocol	Modbus TCP			
	Power Plant Controller	Optional. Third party SCADA systems supported			
	Keyed ON/OFF Switch	Standard			
PROTECTIONS	Ground Fault Protection	Insulation monitoring device			
	Humidity Control	Active heating			
	General AC Protection & Disconn	Circuit breaker			
	General DC Protection & Disconn	DC switch-disconnectors[3]			
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2)			
CERTIFICATIONS & STANDARDS	Safety	UL 1741 / CSA 22.2 No.107.1-16 / IEC 62109-1 / IEC 62109-2			
	Utility Interconnect [4]	IEEE 1547:2018 / UL 1741 SB/ IEC 62116:2014			

NOTES

[1] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[2] Consult Power Electronics for temperatures below -25°C.
[3] Battery short circuit disconnection has to be done on the battery side.

Freemaq PCSK

690 V		FRAME 2	FRAME 3	FRAME 4
REFERENCES		FP2195K	FP3290K	FP4390K
AC	AC Output Power (kVA/kW) @40°C[1]	2195	3290	4390
	AC Output Power (kVA/kW) @50°C[1]	2035	3055	4075
	Operating Grid Voltage (VAC)		690V ±10%	
DC	DC Voltage Range[2]		976V - 1500V	
	Maximum DC Voltage		1500V	
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.84%	98.87%	98.93%
	Euroeta (η) (preliminary)	98.45%	98.48%	98.65%
660 V		**FRAME 2**	**FRAME 3**	**FRAME 4**
REFERENCES		FP2101K	FP3151K	FP4200K
AC	AC Output Power (kVA/kW) @40°C[1]	2100	3150	4200
	AC Output Power (kVA/kW) @50°C[1]	1950	2925	3900
	Operating Grid Voltage (VAC)		660V ±10%	
DC	DC Voltage Range[2]		934V - 1500V	
	Maximum DC Voltage		1500V	
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.81%	98.84%	98.90%
	Euroeta (η) (preliminary)	98.45%	98.48%	98.65%
645 V		**FRAME 2**	**FRAME 3**	**FRAME 4**
REFERENCES		FP2055K	FP3080K	FP4105K
AC	AC Output Power (kVA/kW) @40°C[1]	2055	3080	4105
	AC Output Power (kVA/kW) @50°C[1]	1905	2855	3810
	Operating Grid Voltage (VAC)		645V ±10%	
DC	DC Voltage Range[2]		913V - 1500V	
	Maximum DC Voltage		1500V	
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.78%	98.81%	98.87%
	Euroeta (η) (preliminary)	98.40%	98.43%	98.60%
630 V		**FRAME 2**	**FRAME 3**	**FRAME 4**
REFERENCES		FP2005K	FP3005K	FP4010K
AC	AC Output Power (kVA/kW) @40°C[1]	2005	3005	4010
	AC Output Power (kVA/kW) @50°C[1]	1860	2790	3720
	Operating Grid Voltage (VAC)		630V ±10%	
DC	DC Voltage Range[2]		891V - 1500V	
	Maximum DC Voltage		1500V	
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.79%	98.85%
	Euroeta (η) (preliminary)	98.39%	98.42%	98.59%
615 V		**FRAME 2**	**FRAME 3**	**FRAME 4**
REFERENCES		FP1955K	FP2935K	FP3915K
AC	AC Output Power (kVA/kW) @40°C[1]	1955	2935	3915
	AC Output Power (kVA/kW) @50°C[1]	1815	2725	3635
	Operating Grid Voltage (VAC)		615V ±10%	
DC	DC Voltage Range[2]		870V - 1500V	
	Maximum DC Voltage		1500 V	
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.79%	98.84%
	Euroeta (η) (preliminary)	98.38%	98.41%	98.57%

NOTES

[1] Values at 1.00·Vac nom and cosφ=1. Consult Power Electronics for charging mode and derating curves.
[2] Consult Power Electronics for derating curves.

Freemaq PCSK

600 V		FRAME 2	FRAME 3	FRAME 4
REFERENCES		FP1910K	FP2865K	FP3820K
AC	AC Output Power (kVA/kW) @40°C[1]	1910	2865	3820
	AC Output Power (kVA/kW) @50°C[1]	1775	2660	3545
	Operating Grid Voltage (VAC)		600V ±10%	
DC	DC Voltage Range[2]		849V - 1500V	
	Maximum DC Voltage		1500V	
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98.84%
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%
530 V		**FRAME 2**	**FRAME 3**	**FRAME 4**
REFERENCES		FP1685K	FP2530K	FP3370K
AC	AC Output Power (kVA/kW) @40°C[1]	1685	2530	3370
	AC Output Power (kVA/kW) @50°C[1]	1565	2350	3130
	Operating Grid Voltage (VAC)		530V ±10%	
DC	DC Voltage Range[2]		750V - 1300V	
	Maximum DC Voltage		1300V	
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98.84%
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%
500 V		**FRAME 2**	**FRAME 3**	**FRAME 4**
REFERENCES		FP1590K	FP2385K	FP3180K
AC	AC Output Power (kVA/kW) @40°C[1]	1590	2385	3180
	AC Output Power (kVA/kW) @50°C[1]	1475	2215	2955
	Operating Grid Voltage (VAC)		500V ±10%	
DC	DC Voltage Range[2]		708V - 1250V	
	Maximum DC Voltage		1250V	
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98.84%
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%
480 V		**FRAME 2**	**FRAME 3**	**FRAME 4**
REFERENCES		FP1525K	FP2290K	FP3055K
AC	AC Output Power (kVA/kW) @40°C[1]	1525	2290	3055
	AC Output Power (kVA/kW) @50°C[1]	1415	2125	2840
	Operating Grid Voltage (VAC)		480V ±10%	
DC	DC Voltage Range[2]		679V - 1200V	
	Maximum DC Voltage		1200V	
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98.84%
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%

NOTES

[1] Values at 1.00·Vac nom and cosφ=1. Consult Power Electronics for charging mode and derating curves.
[2] Consult Power Electronics for derating curves.

Freemaq Multi PCSK

690 V		FRAME 2	FRAME 3	FRAME 4	
REFERENCES		FP2195K2	FP3290K3	FP4390K2	FP4390K4
AC	AC Output Power (kVA/kW) @40°C[1]	2195	3290	4390	
	AC Output Power (kVA/kW) @50°C[1]	2035	3055	4075	
	Operating Grid Voltage (VAC)	690V ±10%			
DC	DC Voltage Range[2]	976V - 1500V			
	Maximum DC Voltage	1500V			
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.84%	98.87%	98,93%	
	Euroeta (η) (preliminary)	98.45%	98.48%	98.65%	
660 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		FP2101K2	FP3151K3	FP4200K2	FP4200K4
AC	AC Output Power (kVA/kW) @40°C[1]	2100	3150	4200	
	AC Output Power (kVA/kW) @50°C[1]	1950	2925	3900	
	Operating Grid Voltage (VAC)	660V ±10%			
DC	DC Voltage Range[2]	934V - 1500V			
	Maximum DC Voltage	1500V			
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.81%	98.84%	98,90%	
	Euroeta (η) (preliminary)	98.45%	98.48%	98,65%	
645 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		FP2055K2	FP3080K3	FP4105K2	FP4105K4
AC	AC Output Power (kVA/kW) @40°C[1]	2055	3080	4105	
	AC Output Power (kVA/kW) @50°C[1]	1905	2855	3810	
	Operating Grid Voltage (VAC)	645V ±10%			
DC	DC Voltage Range[2]	913V - 1500V			
	Maximum DC Voltage	1500V			
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.78%	98.87%	98,87%	
	Euroeta (η) (preliminary)	98.40%	98.60%	98,60%	
630 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		FP2005K2	FP3080K3	FP4010K2	FP4010K4
AC	AC Output Power (kVA/kW) @40°C[1]	2005	3005	4010	
	AC Output Power (kVA/kW) @50°C[1]	1860	2790	3720	
	Operating Grid Voltage (VAC)	630V ±10%			
DC	DC Voltage Range[2]	891V - 1500V			
	Maximum DC Voltage	1500V			
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.79%	98,85%	
	Euroeta (η) (preliminary)	98.39%	98,42%	98,59%	
615 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		FP1955K2	FP2935K3	FP3915K2	FP3915K4
AC	AC Output Power (kVA/kW) @40°C[1]	1955	2935	3915	
	AC Output Power (kVA/kW) @50°C[1]	1815	2725	3635	
	Operating Grid Voltage (VAC)	615V ±10%			
DC	DC Voltage Range[2]	870V - 1500V			
	Maximum DC Voltage	1500V			
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.79%	98,84%	
	Euroeta (η) (preliminary)	98.38%	98,41%	98,57%	

NOTES

[1] Values at 1.00·Vac nom and cosφ=1. Consult Power Electronics for charging mode and derating curves.
[2] Consult Power Electronics for derating curves.

Freemaq Multi PCSK

600 V		FRAME 2	FRAME 3	FRAME 4	
REFERENCES		FP1910K2	FP2865K3	FP3820K2	FP3820K4
AC	AC Output Power (kVA/kW) @40°C[1]	1910	2865	3820	
	AC Output Power (kVA/kW) @50°C[1]	1775	2660	3545	
	Operating Grid Voltage (VAC)	600V ±10%			
DC	DC Voltage Range[2]	849V - 1500V			
	Maximum DC Voltage	1500V			
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98,94%	
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%	
530 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		FP1685K2	FP2530K3	FP3370K2	FP3370K4
AC	AC Output Power (kVA/kW) @40°C[1]	1685	2530	3370	
	AC Output Power (kVA/kW) @50°C[1]	1565	2350	3130	
	Operating Grid Voltage (VAC)	530V ±10%			
DC	DC Voltage Range[2]	750V - 1300V			
	Maximum DC Voltage	1300V			
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98,94%	
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%	
500 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		FP1590K2	FP2385K3	FP3180K2	FP3180K4
AC	AC Output Power (kVA/kW) @40°C[1]	1590	2385	3180	
	AC Output Power (kVA/kW) @50°C[1]	1475	2215	2955	
	Operating Grid Voltage (VAC)	500V ±10%			
DC	DC Voltage Range[2]	708V - 1250V			
	Maximum DC Voltage	1250V			
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98,94%	
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%	
480 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		FP1525K2	FP2385K3	FP3055K2	FP3180K4
AC	AC Output Power (kVA/kW) @40°C[1]	1525	2290	3055	
	AC Output Power (kVA/kW) @50°C[1]	1415	2125	2840	
	Operating Grid Voltage (VAC)	480V ±10%			
DC	DC Voltage Range[2]	679V - 1200V			
	Maximum DC Voltage	1200V			
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98,84%	
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%	

NOTES

[1] Values at 1.00·Vac nom and cosφ=1. Consult Power Electronics for charging mode and derating curves.
[2] Consult Power Electronics for derating curves.

MEDIUM VOLTAGE STATIONS

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MV SKID

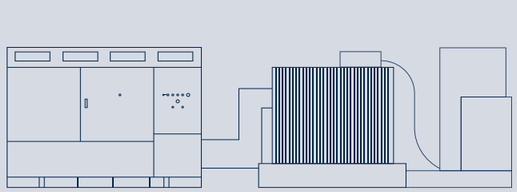
Page. 34 — 35

TWIN SKID

Combine the Freemaq PCSK & Multi PCSK with our MV solutions.

MV Skid Compact & Twin Skid Compact

From low to medium voltage



MV SKID COMPACT
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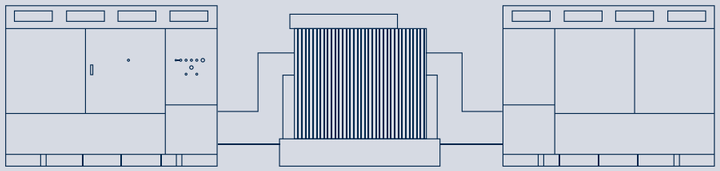
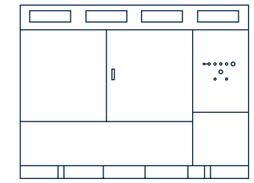


TWIN SKID COMPACT
Page. 34 — 35

Turn-key solution

The SKID family facilitates the project design and reduces the installation costs.



The fastest connection with any PCSK

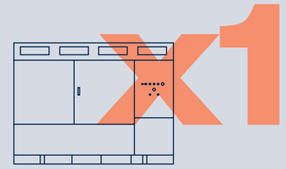
Simplify your commissioning

All the medium voltage equipment is already integrated.

MV Skid Compact

Easy to transport anywhere

480 V - 690 V in the low voltage range



For one PCSK

6.6 kV to 34.5 kV in the high voltage range

Choose the power you need

Integrated oil retention tank

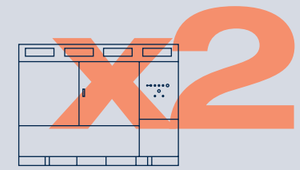
Power outputs from 1525 kVA to 4390 kVA

Twin Skid Compact

For the largest storage plants
Extra high power density

480 V - 690 V in the low voltage range

11 kV to 34.5 kV in the high voltage range



For two PCSK

Integrated oil retention tank

Power outputs from 3050 kVA to 8780 kVA

MV Skid Compact

RATINGS	Power range @ 40 °C	1910 kVA - 4390 kVA
	Power range @ 50 °C	1775 kVA - 4075 kVA
MEDIUM VOLTAGE EQUIPMENT	MV voltage range	6.6 kV / 11 kV / 13.2 kV / 13.8 kV / 15 kV / 20 kV / 22 kV / 23 kV / 25 kV / 30 kV / 33 kV / 34.5 kV
	LV voltage range	600 V /615 V /630 V / 645 V / 660 V / 690 V
	Transformer cooling	ONAN
	Transformer vector group	Dy11
	Transformer protection	Protection relay for pressure, temperature (two levels) and gassing Monitoring of dielectric level decrease PT100 optional.
	Transformer index of protection	IP54
	Transformer losses	IEC standard or IEC Tier-2
	Oil retention tank	Galvanized steel. Integrated with hydrocarbon filter. Optional
	Switchgear configuration	Double feeder (2L)
	Switchgear protection	Circuit breaker (V)
	Switchgear short circuit rating [1]	16 kA 1 s
	Switchgear IAC [1]	A FLR 16 kA 1 s
CONNECTIONS	LV-MV connections	Close coupled solution (plug & play)
	LV protection	Motorized circuit breaker included in the inverter
	HV AC wiring	MV bridge between transformer and protection switchgear prewired
ENVIRONMENT	Ambient temperature range [2]	-10 °C… +50 °C (T > 50 °C power derating)
	Maximum altitude (above sea level) [1]	Up to 1000 m
	Relative humidity	4% to 95% non condensing
AUXILIARY SERVICES	User power supply options	5 kVA / 40 kVA at 400 V (3-phase), 50 / 60 Hz (Integrated in the inverter)
	User cabinet	Integrated in the inverter (by default). Optionally, LV cabinet in the skid.
	Cooling	Forced air
	HW communication	Ethernet (fiber optic or RJ45)
	UPS system [1]	1 kVA/0.8 kW (10 minutes). Optional.
OTHER EQUIPMENT	Safety mechanism	Interlocking system
	Fire extinguishing system	Transformer oil tank retention accessory. Optional.
STANDARDS	Compliance	IEC 62271-212, IEC 62271-200, IEC 60076, IEC 61439-1

NOTES

[1] Consult with Power Electronics for other options.
[2] For lower temperatures, consult with Power Electronics.

Twin Skid Compact

RATINGS	Power range @ 40 °C	3820 kVA - 8780 kVA
	Power range @ 50 °C	3550 kVA - 8150 KVA
MEDIUM VOLTAGE EQUIPMENT	MV voltage range	11 kV / 13.2 kV/ 13.8 kV/ 15 kV / 20 kV / 22 kV / 23 kV / 25 kV / 30 kV / 33 kV / 34.5 kV
	LV voltage range	600 V /615 V /630 V / 645 V / 660 V / 690 V
	Transformer cooling	ONAN
	Transformer vector group	Dy11y11
	Transformer protection	Protection relay for pressure, temperature (two levels) and gassing. Monitoring of dielectric level decrease. PT100 optional.
	Transformer index of protection	IP54
	Transformer losses	IEC standard or IEC Tier-2.
	Oil retention tank	Galvanized steel. Integrated with hydrocarbon filter. Optional
	Switchgear configuration	Double feeder (2L)
	Switchgear protection	Circuit breaker (V)
	Switchgear short circuit rating [1]	16 kA 1 s
	Switchgear IAC [1]	A FLR 16 kA 1 s
CONNECTIONS	LV-MV connections	Close coupled solution (plug & play)
	LV protection	Motorized circuit breaker included in the inverter
	HV AC wiring	MV bridge between transformer and protection switchgear prewired
ENVIRONMENT	Ambient temperature range [2]	-10 °C… +50 °C (T > 50 °C power derating)
	Maximum altitude (above sea level) [1]	Up to 1000 m
	Relative humidity	4% to 95% non condensing
AUXILIARY SERVICES	User power supply options	5 kVA / 40 kVA at 400 V (3-phase), 50 / 60 Hz (Integrated in the inverter)
	User cabinet	Integrated in the inverter (by default). Optionally, LV cabinet in the skid.
	Cooling	Forced air
	HW communication	Ethernet (fiber optic or RJ45)
	UPS system [1]	1 kVA/0.8 kW (10 minutes). Optional
OTHER EQUIPMENT	Safety mechanism	Interlocking system
	Fire extinguishing system	Transformer oil tank retention accessory. Optional.
STANDARDS	Compliance	IEC 62271-212, IEC 62271-200, IEC 60076, IEC 61439-1

NOTES

[1] Consult with Power Electronics for other options.
[2] For lower temperatures, consult with Power Electronics.

THE AMERICAN IDOLS

Page. 44 — 45

PCSM

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MULTI PCSM

The utility-scale MV battery inverters

Freemaq

PCSM & Multi PCSM

Robust and durable

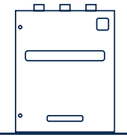
Prepared for the most *extreme* environments.

These products share the following characteristics

1 Integrated MV solution in the same enclosure

The storage turn-key solution that simplifies the installation design.

2 Easy maintenance



Designed to be easily replaceable on the field with a safe, reliable and fast Plug&Play assembly system.

Includes up to 4 FRUs (Field Replaceable Units).

3 Modularity, synonymous with *availability*

It allows the DC power redistribution when one module fails.

Lower energy losses = higher availability and efficiency.

4 ECON MODE, remove no-load losses

Disconnecting the power station from the grid and, taking the medium-voltage transformer out of the circuit, eliminating the continuous energy cost of no-load losses.

5 iCOOL 3, the most *innovative* cooling system

Our own air ventilation system provides a constant flow of clean air inside the equipment, without the need of liquid cooling.

6 Three-level topology

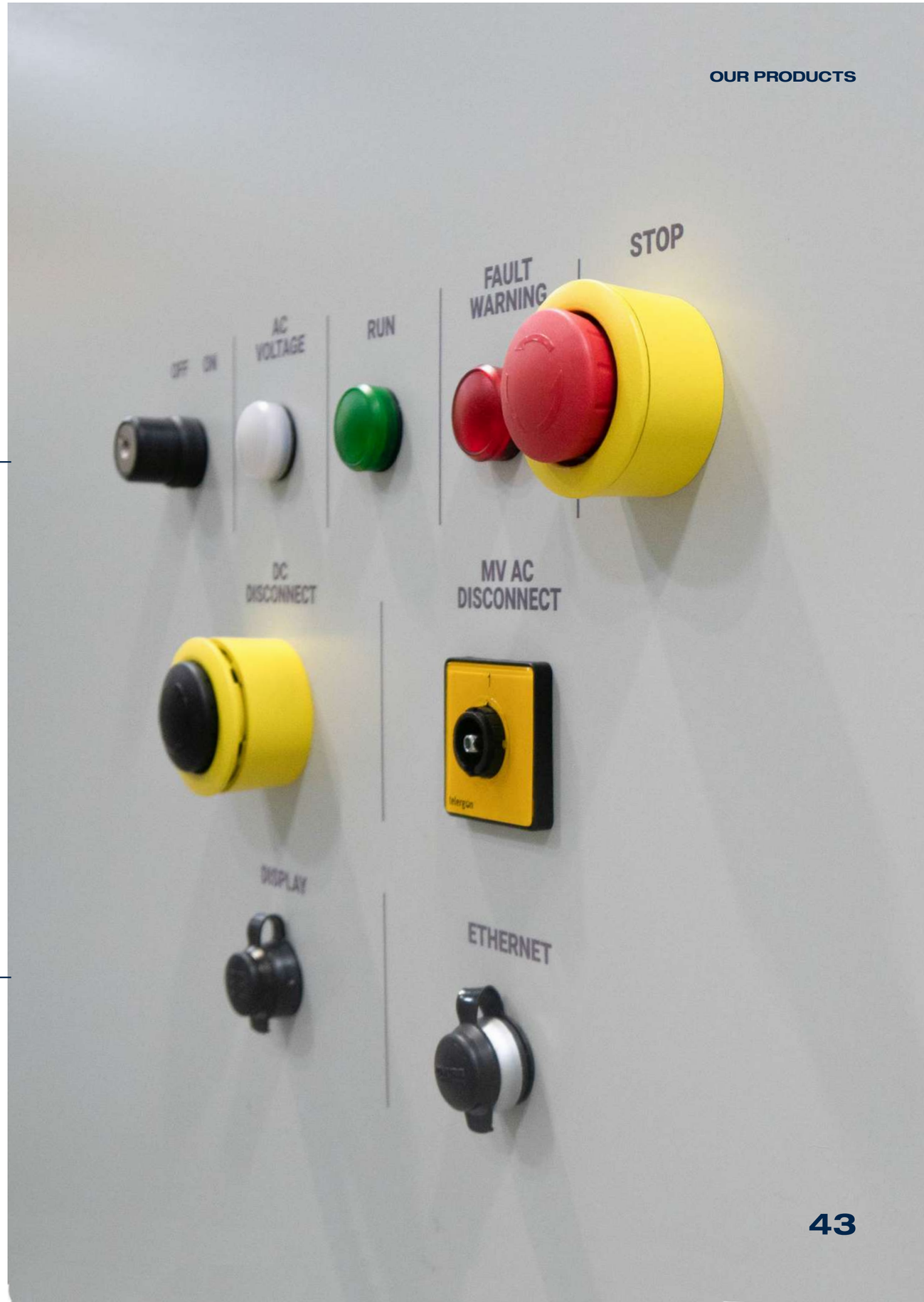
The 3 level IGBT topology reduces stage losses, increases inverter efficiency, and minimizes total harmonic distortion. High efficiency to deliver the lowest cost of energy.

7 Advanced grid support

Capable of operating on any power system.Different operation modes available depending on the aplication: grid forming or grid following

8 Adaptative capacity

Choose your model depending on your requirements.



Freemaq

PCSM

Compatible with all battery technology

3 Three different DC voltage windows

Easy replaceable power modules

DC voltage up to 1500 Vdc

Full grid support capability

Up to 4200 kVA

Maximum power up to 40 °C

Freemaq

Multi PCSM

Best solution for high-capacity storage applications

Up to four independent BESS

x4

3 Three different DC voltage windows

Easy replaceable power modules

DC voltage up to 1500 Vdc

Full grid support capability

Up to 4200 kVA

Maximum power up to 40 °C

Freemaq PCSM

US

REFERENCES		FP4200M
AC	AC Output Power (kVA/kW) @40°C [1]	4200
	AC Output Power (kVA/kW) @50°C [1]	3900
	Operating Grid Voltage (kV)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) [2]	0.5 leading ... 0.5 lagging
	Reactive Power Compensation	Four quadrant operation
DC	DC Voltage Range [3]	934V - 1500V
	Maximum DC Voltage	1500V
	DC Voltage Ripple	< 3%
	Max. DC Continuous Current (A)	4590
	Battery Technology	All type of batteries (BMS required)
EFFICIENCY	Efficiency (Max) (η) (preliminary)	97.80% including MV transformer
	Euroeta (η) (preliminary)	97.51% including MV transformer
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2
	Weight (lbs)	30865
	Weight (kg)	14000
	Type of Ventilation	Forced air cooling
ENVIRONMENT	Degree of Protection	NEMA 3R
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active Power derating
	Relative Humidity	4% to 100% non-condensing
	Max. Altitude (above sea level) [5]	2000m
CONTROL INTERFACE	Communication Protocol	Modbus TCP
	Power Plant Controller	Optional. Third party SCADA systems supported.
	Keyed ON/OFF Switch	Standard
PROTECTIONS	Ground Fault Protection	Insulation monitoring device
	Humidity Control	Active heating
	General AC Protection & Disconn.	MV switchgear (20 or 25 kA)
	General DC Protection & Disconn.	DC switch-disconnectors [6]
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)
CERTIFICATIONS & STANDARDS	Safety	UL 1741 / CSA 22.2 No.107.1-16
	Utility Interconnect [7]	IEEE 1547:2018 / UL 1741 SB

NOTES

[1] Values at 1.00·Vac nom and cosφ=1.Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25ºC.
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.
[7] Consult Power Electronics for other applicable standards / grid codes.

IEC

REFERENCES		FP4200MH
AC	AC Output Power (kVA/kW) @40°C [1]	4200
	AC Output Power (kVA/kW) @50°C [1]	3900
	Operating Grid Voltage (kV)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) [2]	0.5 leading ... 0.5 lagging
	Reactive Power Compensation	Four quadrant operation
DC	DC Voltage Range [3]	934V - 1500V
	Maximum DC Voltage	1500V
	DC Voltage Ripple	< 3%
	Max. DC Continuous Current (A)	4590
	Battery Technology	All type of batteries (BMS required)
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) (preliminary)	97.80% including MV transformer
	Euroeta (η) (preliminary)	97.51% including MV transformer
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2
	Weight (lbs)	30865
	Weight (kg)	14000
	Type of Ventilation	Forced air cooling
ENVIRONMENT	Degree of Protection	IP55
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active Power derating
	Relative Humidity	4% to 100% non-condensing
	Max. Altitude (above sea level) [5]	2000m
CONTROL INTERFACE	Communication Protocol	Modbus TCP
	Power Plant Controller	Optional. Third party SCADA systems supported.
	Keyed ON/OFF Switch	Standard
PROTECTIONS	Ground Fault Protection	Insulation monitoring device
	Humidity Control	Active heating
	General AC Protection & Disconn.	MV switchgear (2L+V)
	General DC Protection & Disconn.	DC switch-disconnectors [6]
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)
CERTIFICATIONS & STANDARDS	Safety	IEC 62477-2

NOTES

[1] Values at 1.00·Vac nom and cosφ=1.Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25ºC.
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.

Freemaq PCSM

US

REFERENCES		FP4105M
AC	AC Output Power (kVA/kW) @40°C [1]	4105
	AC Output Power (kVA/kW) @50°C [1]	3810
	Operating Grid Voltage (kV)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) [2]	0.5 leading ... 0.5 lagging
	Reactive Power Compensation	Four quadrant operation
DC	DC Voltage Range [3]	913V - 1500V
	Maximum DC Voltage	1500V
	DC Voltage Ripple	< 3%
	Max. DC Continuous Current (A)	4590
	Battery Technology	All type of batteries (BMS required)
EFFICIENCY	Efficiency (Max) (η) (preliminary)	97.76% including MV transformer
	Euroeta (η) (preliminary)	97.50% including MV transformer
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2
	Weight (lbs)	30865
	Weight (kg)	14000
	Type of Ventilation	Forced air cooling
ENVIRONMENT	Degree of Protection	NEMA 3R
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active Power derating
	Relative Humidity	4% to 100% non-condensing
	Max. Altitude (above sea level) [5]	2000m
CONTROL INTERFACE	Communication Protocol	Modbus TCP
	Power Plant Controller	Optional. Third party SCADA systems supported.
	Keyed ON/OFF Switch	Standard
PROTECTIONS	Ground Fault Protection	Insulation monitoring device
	Humidity Control	Active heating
	General AC Protection & Disconn.	MV switchgear (20 or 25 kA)
	General DC Protection & Disconn.	DC switch-disconnectors [6]
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)
CERTIFICATIONS & STANDARDS	Safety	UL 1741 / CSA 22.2 No.107.1-16
	Utility Interconnect [7]	IEEE 1547:2018 / UL 1741 SB

NOTES

[1] Values at 1.00·Vac nom and cosφ=1.Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25ºC.
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.
[7] Consult Power Electronics for other applicable standards / grid codes.

IEC

REFERENCES		FP4105MH
AC	AC Output Power (kVA/kW) @40°C [1]	4105
	AC Output Power (kVA/kW) @50°C [1]	3810
	Operating Grid Voltage (kV)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) [2]	0.5 leading ... 0.5 lagging
	Reactive Power Compensation	Four quadrant operation
DC	DC Voltage Range [3]	913V - 1500V
	Maximum DC Voltage	1500V
	DC Voltage Ripple	< 3%
	Max. DC Continuous Current (A)	4590
	Battery Technology	All type of batteries (BMS required)
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) (preliminary)	97.76% including MV transformer
	Euroeta (η) (preliminary)	97.50% including MV transformer
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2
	Weight (lbs)	30865
	Weight (kg)	14000
	Type of Ventilation	Forced air cooling
ENVIRONMENT	Degree of Protection	IP55
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active Power derating
	Relative Humidity	4% to 100% non-condensing
	Max. Altitude (above sea level) [5]	2000m
CONTROL INTERFACE	Communication Protocol	Modbus TCP
	Power Plant Controller	Optional. Third party SCADA systems supported.
	Keyed ON/OFF Switch	Standard
PROTECTIONS	Ground Fault Protection	Insulation monitoring device
	Humidity Control	Active heating
	General AC Protection & Disconn.	MV switchgear (20 or 25 kA)
	General DC Protection & Disconn.	DC switch-disconnectors [6]
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)
CERTIFICATIONS & STANDARDS	Safety	IEC 62477-2

NOTES

[1] Values at 1.00·Vac nom and cosφ=1.Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25ºC.
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.

Freemaq PCSM

US

REFERENCES		FP4010M
AC	AC Output Power (kVA/kW) @40°C [1]	4010
	AC Output Power (kVA/kW) @50°C [1]	3720
	Operating Grid Voltage (kV)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) [2]	0.5 leading ... 0.5 lagging
	Reactive Power Compensation	Four quadrant operation
DC	DC Voltage Range [3]	891V - 1500V
	Maximum DC Voltage	1500V
	DC Voltage Ripple	< 3%
	Max. DC Continuous Current (A)	4590
	Battery Technology	All type of batteries (BMS required)
EFFICIENCY	Efficiency (Max) (η) (preliminary)	97.75% including MV transformer
	Euroeta (η) (preliminary)	97.48% including MV transformer
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2
	Weight (lbs)	30865
	Weight (kg)	14000
	Type of Ventilation	Forced air cooling
ENVIRONMENT	Degree of Protection	NEMA 3R
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active power derating
	Relative Humidity	4% to 100% non-condensing
	Max. Altitude (above sea level) [5]	2000m
CONTROL INTERFACE	Communication Protocol	Modbus TCP
	Power Plant Controller	Optional. Third party SCADA systems supported.
	Keyed ON/OFF Switch	Standard
PROTECTIONS	Ground Fault Protection	Insulation monitoring device
	Humidity Control	Active heating
	General AC Protection & Disconn.	MV switchgear (20 or 25 kA)
	General DC Protection & Disconn.	DC switch-disconnectors[6]
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)
CERTIFICATIONS & STANDARDS	Safety	UL 1741 / CSA 22.2 No.107.1-16
	Utility Interconnect [7]	IEEE 1547:2018 / UL 1741 SB

NOTES

[1] Values at 1.00·Vac nom and cosφ=1.Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25ºC.
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.
[7] Consult Power Electronics for other applicable standards / grid codes.

IEC

REFERENCES		FP4010MH
AC	AC Output Power (kVA/kW) @40°C [1]	4010
	AC Output Power (kVA/kW) @50°C [1]	3720
	Operating Grid Voltage (kV)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) [2]	0.5 leading ... 0.5 lagging
	Reactive Power Compensation	Four quadrant operation
DC	DC Voltage Range [3]	891V - 1500V
	Maximum DC Voltage	1500V
	DC Voltage Ripple	< 3%
	Max. DC Continuous Current (A)	4590
	Battery Technology	All type of batteries (BMS required)
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) (preliminary)	97.75% including MV transformer
	Euroeta (η) (preliminary)	97.48% including MV transformer
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2
	Weight (lbs)	30865
	Weight (kg)	14000
	Type of Ventilation	Forced air cooling
ENVIRONMENT	Degree of Protection	IP55
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active power derating
	Relative Humidity	4% to 100% non-condensing
	Max. Altitude (above sea level) [5]	2000m
CONTROL INTERFACE	Communication Protocol	Modbus TCP
	Power Plant Controller	Optional. Third party SCADA systems supported.
	Keyed ON/OFF Switch	Standard
PROTECTIONS	Ground Fault Protection	Insulation monitoring device
	Humidity Control	Active heating
	General AC Protection & Disconn.	MV switchgear (2L+V)
	General DC Protection & Disconn.	DC switch-disconnectors[6]
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)
CERTIFICATIONS & STANDARDS	Safety	IEC 62477-2

NOTES

[1] Values at 1.00·Vac nom and cosφ=1.Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25ºC.
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.

Freemaq Multi PCSM

US

REFERENCES		FP4200M2	FP4200M4
AC	AC Output Power (kVA/kW) @40°C[1]	4200	
	AC Output Power (kVA/kW) @50°C[1]	3900	
	Operating Grid Voltage (kV)	34.5kV ±10%	
	Operating Grid Frequency (Hz)	60Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi)[2]	0.5 leading ... 0.5 lagging	
	Reactive Power Compensation	Four quadrant operation	
DC	DC Voltage Range[3]	934V - 1500V	
	Maximum DC Voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC Continuous Current per Input (A)	2295	1148
	Battery Technology	All type of batteries (BMS required)	
	Number of Separate DC Inputs	2	4
EFFICIENCY	Efficiency (Max) (η)	97.80% including MV transformer	
	Euroeta (η)	97.51% including MV transformer	
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2	
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2	
	Weight (lbs)	30865	
	Weight (kg)	14000	
	Type of Ventilation	Forced air cooling	
ENVIRONMENT	Degree of Protection	NEMA 3R	
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active power derating	
	Relative Humidity	4% to 100% non-condensing	
	Max. Altitude (above sea level)[5]	2000m	
CONTROL INTERFACE	Communication Protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported.	
	Keyed ON/OFF Switch	Standard	
PROTECTIONS	Ground Fault Protection	Insulation monitoring device	
	Humidity Control	Active heating	
	General AC Protection & Disconn.	MV switchgear (20 or 25 kA)	
	General DC Protection & Disconn.	DC switch-disconnectors[6]	
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)	
CERTIFICATIONS & STANDARDS	Safety	UL 1741 / CSA 22.2 No.107.1-16	
	Utility Interconnect[7]	IEEE 1547:2018 / UL 1741 SB	

NOTES

[1] Values at 1.00 Vac nom and cosφ=1.
Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25 C.
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.
[7] Consult Power Electronics for other applicable standards / grid codes.

IEC

REFERENCES		FP4200MH2	FP4200MH4
AC	AC Output Power (kVA/kW) @40°C[1]	4200	
	AC Output Power (kVA/kW) @50°C[1]	3900	
	Operating Grid Voltage (kV)	34.5kV ±10%	
	Operating Grid Frequency (Hz)	60Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi)[2]	0.5 leading ... 0.5 lagging	
	Reactive Power Compensation	Four quadrant operation	
DC	DC Voltage Range[3]	934V - 1500V	
	Maximum DC Voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC Continuous Current per Input (A)	2295	1148
	Battery Technology	All type of batteries (BMS required)	
	Number of Separate DC Inputs	2	4
EFFICIENCY	Efficiency (Max) (η)	97.80% including MV transformer	
	Euroeta (η)	97.51% including MV transformer	
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2	
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2	
	Weight (lbs)	30865	
	Weight (kg)	14000	
	Type of Ventilation	Forced air cooling	
ENVIRONMENT	Degree of Protection	IP55	
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active power derating	
	Relative Humidity	4% to 100% non-condensing	
	Max. Altitude (above sea level)[5]	2000m	
CONTROL INTERFACE	Communication Protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported.	
	Keyed ON/OFF Switch	Standard	
PROTECTIONS	Ground Fault Protection	Insulation monitoring device	
	Humidity Control	Active heating	
	General AC Protection & Disconn.	MV switchgear (2L+V)	
	General DC Protection & Disconn.	DC switch-disconnectors[6]	
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)	
CERTIFICATIONS & STANDARDS	Safety	IEC 62477-2	

NOTES

[1] Values at 1.00·Vac nom and cosφ=1.Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25ºC
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.

Freemaq Multi PCSM

US

REFERENCES		FP4105M2	FP4105M4
AC	AC Output Power (kVA/kW) @40°C[1]	4105	
	AC Output Power (kVA/kW) @50°C[1]	3810	
	Operating Grid Voltage (kV)	34.5kV ±10%	
	Operating Grid Frequency (Hz)	60Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi)[2]	0.5 leading ... 0.5 lagging	
	Reactive Power Compensation	Four quadrant operation	
DC	DC Voltage Range[3]	913V - 1500V	
	Maximum DC Voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC Continuous Current per Input (A)	2295	1148
	Battery Technology	All type of batteries (BMS required)	
	Number of Separate DC Inputs	2	4
EFFICIENCY	Efficiency (Max) (η)	97.76% including MV transformer	
	Euroeta (η)	97.50% including MV transformer	
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2	
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2	
	Weight (lbs)	30865	
	Weight (kg)	14000	
	Type of Ventilation	Forced air cooling	
ENVIRONMENT	Degree of Protection	NEMA 3R	
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active power derating	
	Relative Humidity	4% to 100% non-condensing	
	Max. Altitude (above sea level)[5]	2000m	
CONTROL INTERFACE	Communication Protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported.	
	Keyed ON/OFF Switch	Standard	
PROTECTIONS	Ground Fault Protection	Insulation monitoring device	
	Humidity Control	Active heating	
	General AC Protection & Disconn.	MV switchgear (20 or 25 kA)	
	General DC Protection & Disconn.	DC switch-disconnectors[6]	
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)	
CERTIFICATIONS & STANDARDS	Safety	UL 1741 / CSA 22.2 No.107.1-16	
	Utility Interconnect[7]	IEEE 1547:2018 / UL 1741 SB	

NOTES

[1] Values at 1.00 Vac nom and cosφ=1.
Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25 C.
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.
[7] Consult Power Electronics for other applicable standards / grid codes.

IEC

REFERENCES		FP4105MH2	FP4105MH4
AC	AC Output Power (kVA/kW) @40°C[1]	4105	
	AC Output Power (kVA/kW) @50°C[1]	3810	
	Operating Grid Voltage (kV)	34.5kV ±10%	
	Operating Grid Frequency (Hz)	60Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi)[2]	0.5 leading ... 0.5 lagging	
	Reactive Power Compensation	Four quadrant operation	
DC	DC Voltage Range[3]	913V - 1500V	
	Maximum DC Voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC Continuous Current per Input (A)	2295	1148
	Battery Technology	All type of batteries (BMS required)	
	Number of Separate DC Inputs	2	4
EFFICIENCY	Efficiency (Max) (η)	97.76% including MV transformer	
	Euroeta (η)	97.50% including MV transformer	
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2	
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2	
	Weight (lbs)	30865	
	Weight (kg)	14000	
	Type of Ventilation	Forced air cooling	
ENVIRONMENT	Degree of Protection	IP55	
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active power derating	
	Relative Humidity	4% to 100% non-condensing	
	Max. Altitude (above sea level)[5]	2000m	
CONTROL INTERFACE	Communication Protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported.	
	Keyed ON/OFF Switch	Standard	
PROTECTIONS	Ground Fault Protection	Insulation monitoring device	
	Humidity Control	Active heating	
	General AC Protection & Disconn.	MV switchgear (2L+V)	
	General DC Protection & Disconn.	DC switch-disconnectors[6]	
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)	
CERTIFICATIONS & STANDARDS	Safety	IEC 62477-2	

NOTES

[1] Values at 1.00·Vac nom and cosφ=1. Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25ºC.
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.

Freemaq Multi PCSM

US

REFERENCES		FP4010M2	FP4010M4
AC	AC Output Power (kVA/kW) @40°C[1]	4010	
	AC Output Power (kVA/kW) @50°C[1]	3720	
	Operating Grid Voltage (kV)	34.5kV ±10%	
	Operating Grid Frequency (Hz)	60Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi)[2]	0.5 leading ... 0.5 lagging	
	Reactive Power Compensation	Four quadrant operation	
DC	DC Voltage Range[3]	891V - 1500V	
	Maximum DC Voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC Continuous Current per Input (A)	2295	1148
	Battery Technology	All type of batteries (BMS required)	
	Number of Separate DC Inputs	2	4
EFFICIENCY	Efficiency (Max) (η)	97.80% including MV transformer	
	Euroeta (η)	97.51% including MV transformer	
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2	
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2	
	Weight (lbs)	30865	
	Weight (kg)	14000	
	Type of Ventilation	Forced air cooling	
ENVIRONMENT	Degree of Protection	NEMA 3R	
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active power derating	
	Relative Humidity	4% to 100% non-condensing	
	Max. Altitude (above sea level)[5]	2000m	
CONTROL INTERFACE	Communication Protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported.	
	Keyed ON/OFF Switch	Standard	
PROTECTIONS	Ground Fault Protection	Insulation monitoring device	
	Humidity Control	Active heating	
	General AC Protection & Disconn.	MV switchgear (20 or 25 kA)	
	General DC Protection & Disconn.	DC switch-disconnectors[6]	
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)	
CERTIFICATIONS & STANDARDS	Safety	UL 1741 / CSA 22.2 No.107.1-16	
	Utility Interconnect[7]	IEEE 1547:2018 / UL 1741 SB	

NOTES

[1] Values at 1.00 Vac nom and cosφ=1.Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25 C.
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.
[7] Consult Power Electronics for other applicable standards / grid codes.

IEC

REFERENCES		FP4010MH2	FP4010MH4
AC	AC Output Power (kVA/kW) @40°C[1]	4010	
	AC Output Power (kVA/kW) @50°C[1]	3720	
	Operating Grid Voltage (kV)	34.5kV ±10%	
	Operating Grid Frequency (Hz)	60Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi)[2]	0.5 leading ... 0.5 lagging	
	Reactive Power Compensation	Four quadrant operation	
DC	DC Voltage Range[3]	891V - 1500V	
	Maximum DC Voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC Continuous Current per Input (A)	2295	1148
	Battery Technology	All type of batteries (BMS required)	
	Number of Separate DC Inputs	2	4
EFFICIENCY	Efficiency (Max) (η)	97.80% including MV transformer	
	Euroeta (η)	97.51% including MV transformer	
CABINET	Dimensions [WxDxH] (ft)	21.3 x 6.5 x 7.2	
	Dimensions [WxDxH] (m)	6.5 x 2.0 x 2.2	
	Weight (lbs)	30865	
	Weight (kg)	14000	
	Type of Ventilation	Forced air cooling	
ENVIRONMENT	Degree of Protection	IP55	
	Permissible Ambient Temperature [4]	-25°C to +60°C, >50°C / Active power derating	
	Relative Humidity	4% to 100% non-condensing	
	Max. Altitude (above sea level)[5]	2000m	
CONTROL INTERFACE	Communication Protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported.	
	Keyed ON/OFF Switch	Standard	
PROTECTIONS	Ground Fault Protection	Insulation monitoring device	
	Humidity Control	Active heating	
	General AC Protection & Disconn.	MV switchgear (2L+V)	
	General DC Protection & Disconn.	DC switch-disconnectors[6]	
	Overvoltage Protection	Type 2 protection for AC and DC (optionally, Type 1+2 for DC side)	
CERTIFICATIONS & STANDARDS	Safety	IEC 62477-2	

NOTES

[1] Values at 1.00·Vac nom and cosφ=1. Consult Power Electronics for charging mode and derating curves.
[2] Consult P-Q charts available: Q(kVAr)=√(S(kVA)2-P(kW)2).
[3] Consult Power Electronics for derating curves.
[4] Consult Power Electronics for temperatures below -25ºC
[5] Consult Power Electronics for altitudes above 1000m.
[6] Battery short circuit disconnection must be done on the battery side.

THE STATIC COMPENSATOR

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STATCOM

Freemaq
Statcom

Utility-scale static compensator

The Freemaq Statcom dynamically injects the required amount of reactive power into the grid.
Perfect solution for installations with the most demanding reactive capability requirements.

3 different frames
ranging from 1900 kVAr to 3800 kVAr

1 Easy maintenance

Designed to be easily replaceable on the field with a safe, reliable and fast Plug&Play assembly system.

Includes up to 4 FRUs (Field Replaceable Units).

2 Modularity, synonymous of availability

It allows the power block to keep running even when one module fails.

Lower energy losses = higher availability and efficiency.

3 Three-level topology

The 3 level IGBT topology reduces stage losses, increases efficiency, and minimizes total harmonic distortion.

Freemaq Statcom

		FRAME 2	FRAME 3	FRAME 4
REFERENCES		FT1900	FT2850	FT3800
NUMBER OF MODULES		2	3	4
	AC Output Power (kVA/kW) @50°C [1]	1900	2850	3800
	Max. AC Output Current (A) @50°C	1590	2385	3180
	Operating Grid Voltage (VAC)	690V ±10%		
	Operating Grid Frequency (Hz)	50/60Hz		
	Current Harmonic Distortion (THDi)	< 3% per IEEE519		
EFFICIENCY	Efficiency (Max) (η)	98.84%	98.87%	98.93%
CABINET	Dimensions [WxDxH] (ft)	9.8 x 6.5 x 7.2		
	Dimensions [WxDxH] (m)	3.0 x 2.0 x 2.2		
	Weight (lbs)	11465	11795	12125
	Weight (kg)	5200	5350	5500
	Type of Ventilation	Forced air cooling		
ENVIRONMENT	Degree of Protection	NEMA 3R / IP55		
	Permissible Ambient Temp.	-35°C to +60°C, >50°C / Active Power derating		
	Relative Humidity	4% to 100% non-condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
CONTROL INTERFACE	Communication Protocol	Modbus TCP		
	Power Plant Controller	Optional		
	Keyed ON/OFF Switch	Standard		
PROTECTIONS	Ground Fault Protection	Isolation monitoring device		
	Humidity Control	Active Heating		
	General AC Protection & Disconn.	Circuit Breaker		
	Overvoltage Protection	Type 2		

NOTES

[1] Values at 1.00•Vac nom. Consult Power Electronics for derating curves.

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BPC PRO

EVERYTHING IN VIEW

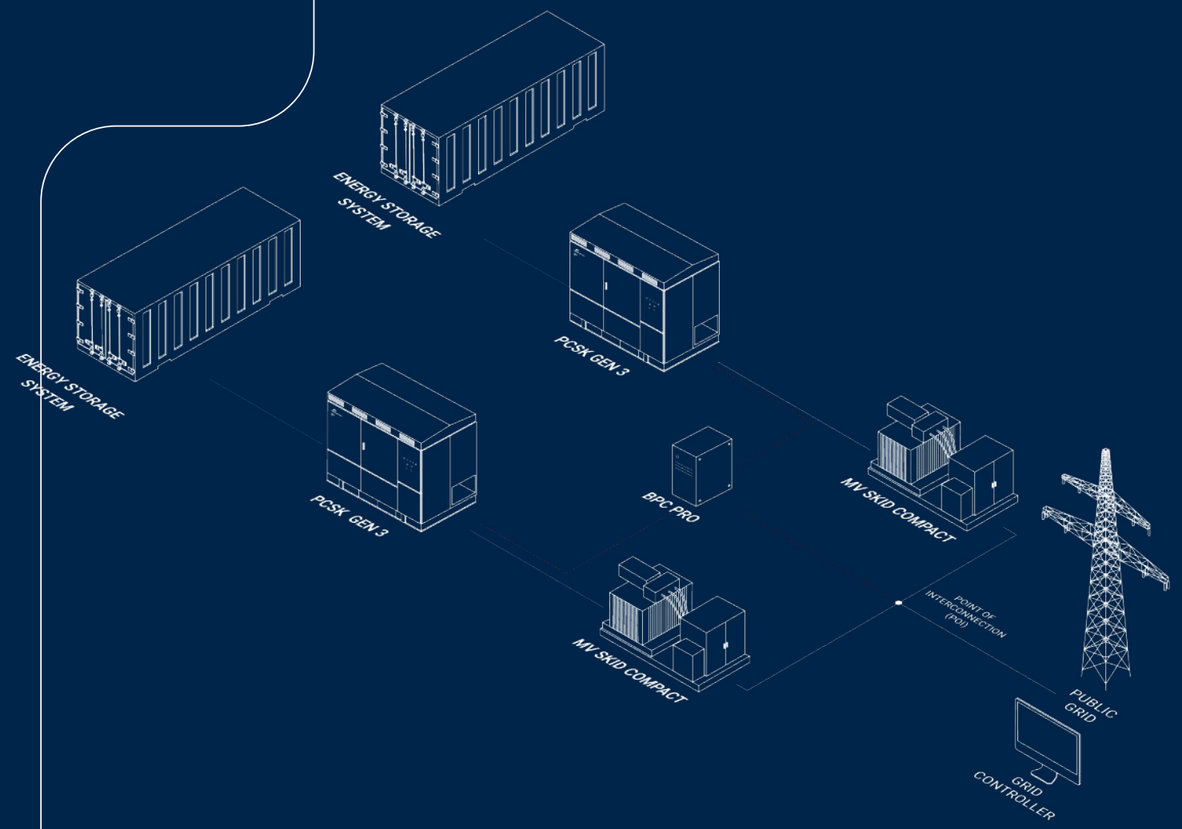
ADVANCED CONTROL SOLUTIONS

BPC PRO

The Battery Plant Controller is the interface between the grid operator and the inverters, designed to meet the most demanding grid connection requirements.

Regardless of where you are.

The governor



O&M diagnosis functions

Reports warning / fault messages and enables user management...

Common Technical Characteristics

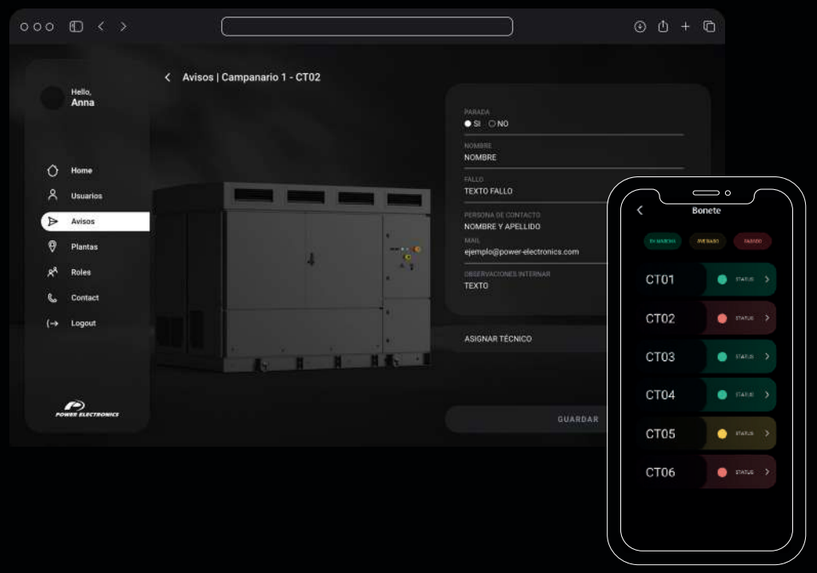
GENERAL DATA	Material	Polycarbonate
	Assembly	Wall or struture mounted
	Flammability	Halogen-free, self-extinguishing enclosure material (UL94-5V)
	Power Supply	80 W. [220/240 Vac (IEC) - 110/115 Vac (UL)]. [110-290 Vdc].
	Compatible inverters	PCSK, PCSM, STATCOM
COMMUNICATIONS	Communication protocols	Modbus TCP. Consult with Power Electronics for other options
	Fiber optic switch	RJ45 by default. Fiber optic depending on the model
ENVIRONMENTAL CONDITIONS	Temperature range	From -20°C to +50°C
	Humidity	From 15 to 95 % (0 to 95 % non-condensing)
	Protection degree	IP54 / NEMA 3
	Pollution degree	Type II
	Maximum altitude	4000 m
CERTIFICATIONS	Marking	CE
FUNCTIONALITIES[1]	Active power control	Active power control, frequency response (with /without reserve), ramp rate.
	Reactive power control	Reactive power control, power factor control, voltage control, Q(V) curve, cosphi(P) curve, ramp rate, statcom control,capacitor bank control, negative and positive active power setpoints
	Diagnosis functions	Warning / fault messages, user management, real-time data monitoring, change log
	Others	Internal measurement, compatibility with power analyzers, SQL data base. Consult Power Electronics for other functionalities
OTHERS	Web server	For local and remote monitoring / control
	Customizable solution	Flexible solution based on a powerful modular and programmable controller

NOTES

[1] Consult Power Electronics for functionalities and availability.

ON POWER SUPPORT

BY POWER ELECTRONICS



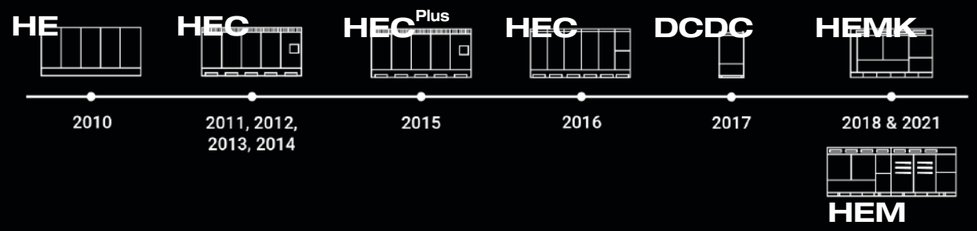
Our secret

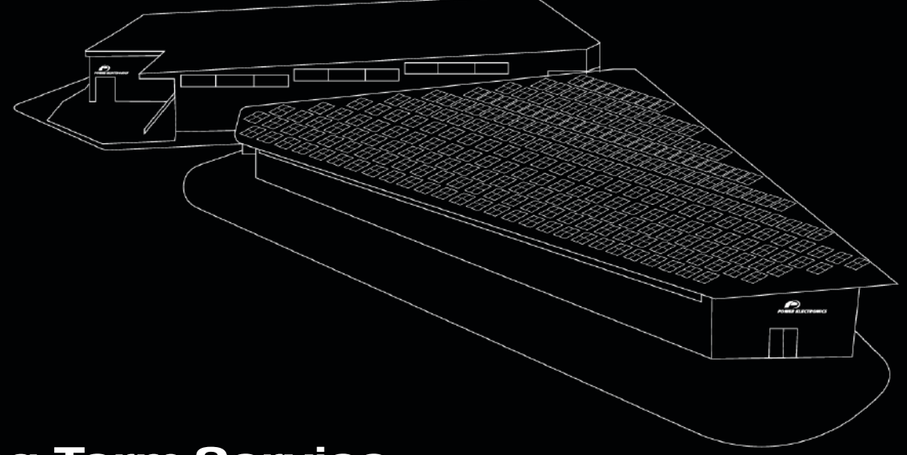
The key of our success for more than 35 years, our 24/7 after sales service, Power On Support.

We take care

of the legacy generations

Each new generation of inverters involves adapting the manufacturing lines to optimize the production of these new devices. Power Electronics has a facility optimized facilities for the production of limited units from previous generations, where we manufacture current subcomponents adapted to equipment that is no longer in production, but which allows for an extended life.





Long Term Service

We repare subcomponents or even manufacture equivalent units in our Dedicated Service Factory located near our Production Plant.

Power Electronics has experience in repowering old photovoltaic plants, where we supply state-of-the-art equipment adapting its electrical characteristics to be compatible with the existing configuration, while providing all the advantages of the latest generation inverters.

We are here to help you

Scan me!

Vertical Integration

throughout the entire process

We complement your spare parts strategy with our own thanks to our Dedicated Service Factory warehouse, informing you when any of them is going to be discontinued so you can plan accordingly.

Before commissioning

· Technical applications & design requirement review
· Dedicated Project Management Support
· Hands on functional & safety product training

During commissioning

· Dedicated commissioning teams
· Rigorous execution on through site operation

After commissioning

· Support 24/7, 365 days a year.
· Full warranty coverage with options for extension and full preventative maintenance packages
· Advanced offerings for remote monitoring, detailed performance reporting, and interactive portals for tracking metrics direct with the PE Service Org

You have the control

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WARRANTY

Power Electronics (the Seller) warrants that their products storage inverters are free of faults and defects for a period of 5 years, valid from the date of delivery to the Buyer. It shall be understood that a product is free of faults and defects when its condition and performance is in compliance with its specification.

The warranty shall not extend to any Products whose defects are due to (i) careless or improper use, (ii) failure to observe the Seller's instructions regarding the transport, installation, functioning, maintenance and the storage of the Products, (iii) repairs or modifications made by the Buyer or third party without prior written authorization of the Seller, (iv) negligence during the implementation of authorized repairs or modifications, (v) if serial numbers are modified or illegible, (vi) anomalies caused by, or connected to, the elements coupled directly by the Buyer or by the final customer, (vii) accidents or events that place the Product outside its storage and operational specification, viii) continued use of the Products after identification of a fault or defect.

The warranty excludes components that must be replaced periodically such as Fuses + DC switch, lamps & air filters or consumable materials subject to normal wear and tear.

The warranty excludes external parts that are not manufactured by the Seller under the brand of Power Electronics.

The Seller undertakes to replace or to repair, himself, at their discretion, any Product or its part that demonstrates a fault or defect, which is in conformance with the aforementioned terms of the warranty.

Reasonable costs associated with the disassembly/ assembly, transport and customs of equipment will also be undertaken by the Seller except in cases of approved intervention by the Buyer and/or their representative where cost allocation has been previously agreed.

5 YEARS

POWER ELECTRONICS

power-electronics.com

CONTACT

English April 2022
Printed in Spain
www.power-electronics.com