

Exhibit B

Manufacturer Specifications

Battery Energy Storage Systems

- 1. Sungrow – Samsung
SDI Energy Storage
Power Supply Co.
Ltd.**
- 2. Sungrow Power
Supply Co., Ltd.**
- 3. Power Electronic**

Inverters

- 4. TMEIC**

Modules

- 5. Jinko**
- 6. Longi**
- 7. Risen**
- 8. Trina**

Trackers

- 9. Array Technologies**
- 10. NEXTracker**

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Manufacturer Specifications

Battery Energy Storage Systems

1. Sungrow – Samsung SDI Energy Storage Power Supply Co. Ltd.

ST5246KWH-2500U

Storage System

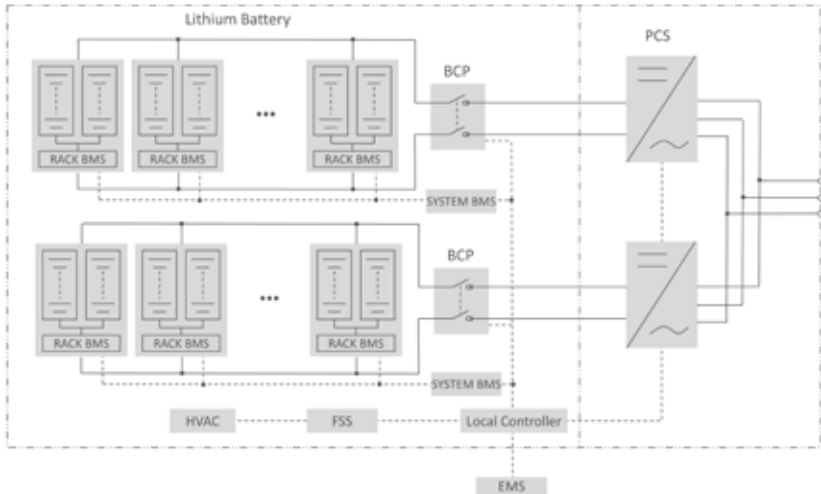
ST5246KWH-2500U



SYSTEM FEATURES

- Highly integrated system with separate inverter and battery sections to allow flexible transportation and on-site installation
- Higher energy density system with Samsung latest E3 battery, higher efficiency and longer cycle life
- Integrated with local controller, HVAC and FSS to enable unified communication, ensure system safety and maximize system efficiency

CIRCUIT DIAGRAM



System Type	ST5246KWH-2500U
Battery Data	
Cell type	Samsung SDI Mega E3, 3.68V/100Ah
Configuration of system	324S44P
Battery capacity (BOL)	5246 kWh
Battery voltage range	1037 ~ 1345 V
BMS communication interfaces	RS485, Ethernet
BMS communication protocols	Modbus RTU, Modbus TCP
AC Data	
Nominal AC power	2500 kVA
Max. AC power	2750 kVA
Max.THD of current	< 3 % (at nominal power)
DC component	< 0.5 % (at nominal power)
Nominal grid voltage	550 V
Grid voltage range	484 ~ 605 V
Power factor	> 0.99 (at nominal power)
Adjustable power factor	1 leading ~ 1 lagging
Nominal grid frequency	60 Hz
Grid frequency range	55 ~ 65 Hz
Isolation method	Transformerless
Nominal output voltage of off-grid	484 ~ 605 V
Max.THD of off-grid output voltage	< 3 % (linear load)
General Data	
Dimensions of PCS unit (W * H * D)	2,991 * 2,591 * 2,438 mm / 117.8" * 102.0" * 96.0"
Dimensions of battery unit (W * H * D)	12,192 * 2,896 * 2,438 mm / 480.0" * 114.0" * 96.0"
Weight of PCS unit	6.0 T / 13227.8 lbs
Weight of battery unit (with / without battery)	48.5 T / 16.2 T 106,924 lbs / 35,715 lbs
Degree of protection	IP54 / NEMA 3R
Operating temperature range	-30 to 50 °C / -22 to 122 °F
Relative humidity	0 ~ 95 % (non-condensing)
Max. working altitude	2,000 m / 6,561 ft
Cooling concept of battery chamber	Heating, Ventilation and Air Conditioning
Cooling concept of PCS chamber	Temperature controlled forced air cooling
Fire suppression system of battery unit	FM-200 extinguishment system
Communication interfaces	RS485, Ethernet
Communication protocols	Modbus RTU, Modbus TCP, IEC 104
Compliance	UL 9540, UL 9540A

Exhibit B
Manufacturer Specifications
Battery Energy Storage Systems

2. Sungrow Power Supply Co., Ltd.

SC2750/3150/3450UD-MV-US Preliminary

SUNGROW
Clean power for all

Power Conversion System



HIGH YIELD

- Advanced three-level technology, max. efficiency 98.9%
- Effective forced air cooling, no derating up to 45 °C (113 °F)
- Wide DC voltage operation range, full power operation at 1500V

EASY O&M

- Modular design, easy for maintenance
- NEMA 4X protection degree, easy for outdoor installation
- C5 anti-corrosion degree, suitable for applications close to the sea

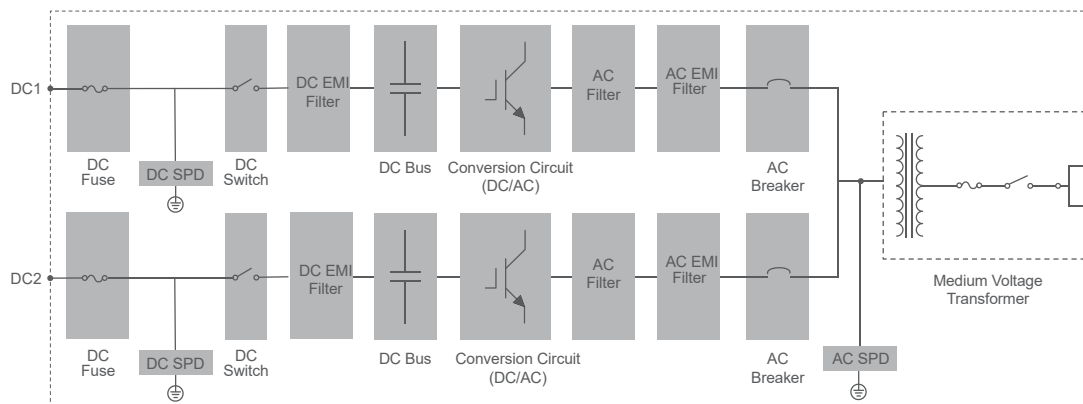
ESS APPLICATIONS

- Bidirectional power conversion system with full four-quadrant operation
- Compatible with high voltage battery system, low system cost
- Battery charge & dis-charge management and black start function integrated

GRID SUPPORT

- Compliant with UL1741, IEEE1547, UL1741 SA and Rule 21
- Fast active/reactive power response
- L/HVRT, L/HFRT, soft start/stop, specified power factor control and reactive power support

CIRCUIT DIAGRAM



SC2750UD-MV-US / SC3150UD-MV-US / SC3450UD-MV-US

System Type	SC2750UD-MV-US	SC3150UD-MV-US	SC3450UD-MV-US
DC Side			
Max. DC voltage		1500 V	
Min. DC voltage	800 V	915 V	1000 V
DC voltage range for nominal power	800 – 1500 V	915 – 1500 V	1000 – 1500 V
Max. DC current		3520 A	
No. of DC inputs		2	
AC Side (Grid)			
AC output power	2750 kVA @ 45 °C (113 °F)	3150 kVA @ 45 °C (113 °F)	3450 kVA @ 45 °C (113 °F)
Max.inverter output current		2886 A @ 45 °C (113 °F)	
AC voltage range		10 – 34.5 kV	
Nominal grid frequency / Grid frequency range		60 Hz / 55 – 65 Hz	
THD		< 3 % (at nominal power)	
DC current injection		< 0.5 % In	
Power factor at nominal power / Adjustable power factor		> 0.99 / 1 leading – 1 lagging	
Adjustable Reactive power		-100% – 100%	
Feed-in phases / Connection phases		3 / 3	
AC Side (Off-Grid)			
Inverter port nominal AC voltage	550 V	630 V	690 V
Inverter port AC voltage range	484 – 605 V	554 – 693 V	607 – 759 V
AC voltage Distortion		< 3 % (Linear load)	
DC voltage component		< 0.5 % Un (Linear balance load)	
Unbalance load Capacity		100%	
Nominal Voltage frequency / Voltage frequency range		60 Hz / 55 – 65 Hz	
Efficiency			
Inverter Max. efficiency		98.9 %	
Transformer			
Transformer rated power	2750kVA	3150kVA	3450kVA
Transformer max. power	2750kVA	3150kVA	3450kVA
LV/MV voltage	0.55 kV / (10 – 34.5) kV	0.63 kV / (10 – 34.5) kV	0.69 kV / (10 – 34.5) kV
Transformer vector		Dy1 or Dy11	
Transformer cooling type		ONAN (optional: KNAN)	
Oil type		Mineral oil(PCB free) or degradable oil on request	
Protection			
DC input protection		Load break switch + fuse	
inverter output protection		Circuit breaker	
AC output protection		Circuit breaker	
Overvoltage protection		DC Type II / AC Type II	
Grid monitoring / Ground fault monitoring		Yes / Yes	
Insulation monitoring		Yes	
Overheat protection		Yes	
General Data			
Dimensions (W*H*D)		6058 * 2896 * 2438 mm	238.5" * 114.0" * 96.0"
Weight		16000 kg	35274 lbs
Degree of protection		NEMA 4X	
Operating ambient temperature range		-30 to 60 °C (> 45 °C derating)	-22 to 140 °F (> 113 °F derating)
Allowable relative humidity range		0 – 100 % (non-condensing)	
Cooling method		Temperature controlled forced air cooling	
Max. operating altitude		1000 m(standard) / > 1000 m (optional)	
		3280.8 ft (Standard) / > 3280.8 ft (Customized)	
Display		LED, WEB HMI	
Communication		RS485, CAN, Ethernet	
Compliance		UL1741, UL1741 SA, IEEE 1547, Rule 21, CSA C22.2 No.107.1-01	
Grid support		L/HVRT, L/HFRT, active & reactive power control and power ramp rate control, Volt-var, Volt-watt, Frequency-watt	

Exhibit B

Manufacturer Specifications

Battery Energy Storage Systems

3. Power Electronics



FREEMAQ PCSK

FREEMAQ MULTI PCSK

UTILITY SCALE BATTERY INVERTER



POWER CONVERSION SYSTEM



FIELD REPLACEABLE UNITS



MODULAR DESIGN



UP TO 3 INDEPENDENT BESS INPUTS



ICool 3



4 QUADRANT



3 LEVEL TOPOLOGY



NEMA 3R / IP55

PROVEN HARDWARE AND ROBUST OUTDOOR DESIGN FEATURED WITH THE LATEST CONTROL

The Freemaq PCSK is a modular solution from 1700 kW to 3800 kW with configurable DC and AC voltages making it compatible with all battery technology and manufacturers. Power Electronics is a proven partner in the solar and energy storage market. The PCSK has been designed to be the lowest LCOE solution in the market for storage applications.

The Power Electronics Freemaq PCSK offers proven hardware to meet storage and grid support challenges. The energy production industry is embracing renewable energy sources. However, high penetration creates power transmission instability challenges, thus Grid Operators require stringent dynamic and static grid support features for solar inverters and Power Conversion Systems (PCS).

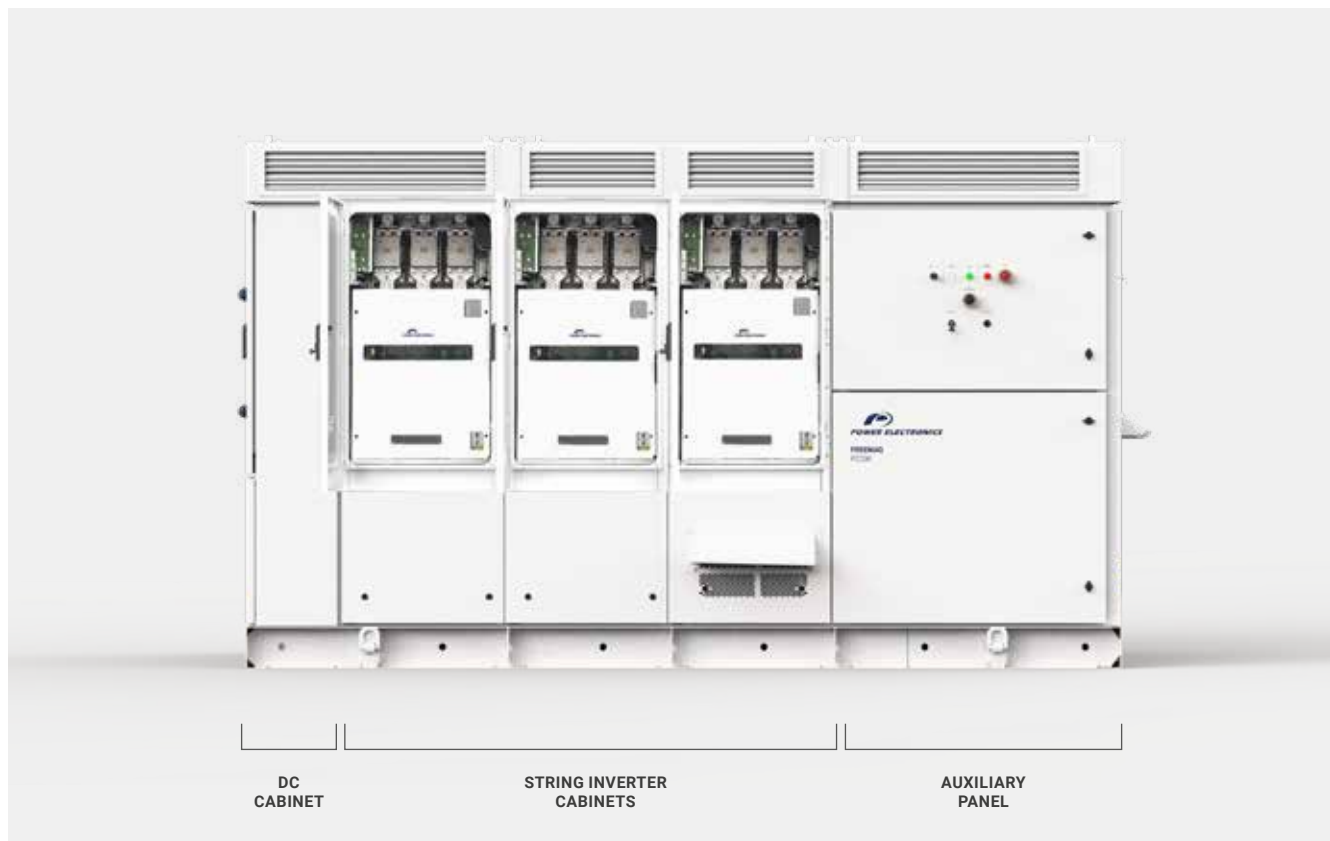
The MULTI PCSK can support two or three independent battery systems and optimize the storage facility.

The converters can perform grid support functions such as: Peak Shaving, Ramp Rate Control, Frequency Regulation, Load Leveling and Voltage Regulation, controlled by a Power Plant Controller or SCADA. The converters stations are turn-key solutions ready for connection to the battery container and MV power distribution wiring. Units are designed for concrete pads or piers, open skids or integrated into full container solutions.

COMPACT DESIGN - EASY TO SERVICE

By providing full front access the Freemaq PCSK series simplifies the maintenance tasks, reducing the MTTR (and achieving a lower OPEX). The total access allows a fast swap of the FRUs without the need of qualified technical personnel.

With the Freemaq PCSK, Power Electronics offers its most compact solution, achieving 3.8MW in just 12ft long, reducing installation costs and labor time, and therefore will minimize the LCOE.



STRING CONCEPT POWER STAGES

The Freemaq PCSK combines the advantages of a central inverter with the modularity of the string inverters. Its power stages are designed to be easily replaceable on the field without the need of advanced technical service personnel, providing a safe, reliable and fast Plug&Play assembly system. Following the modular philosophy of the Freemaq series, the unit is composed of 6 FRUs (field replaceable units).



INNOVATIVE COOLING SYSTEM

Based on more than 3 years of experience with our MV Variable Speed Drive, the iCOOL3 system allows to get IP55 degree of protection in an outdoor converter. iCOOL3 delivers a constant stream of clean air to the FRUs, being the most effective way of reaching up to IP55 degree of protection,

without having to maintain cumbersome dust filters or having to use liquid-cooling systems, avoiding the commonly known inconveniences of it (complex maintenance, risk of leaks, higher number of components...), therefore resulting in an OPEX cost reduction and a LCOE improvement.



ACTIVE HEATING

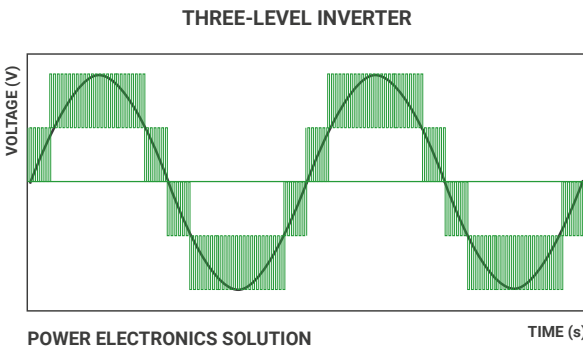
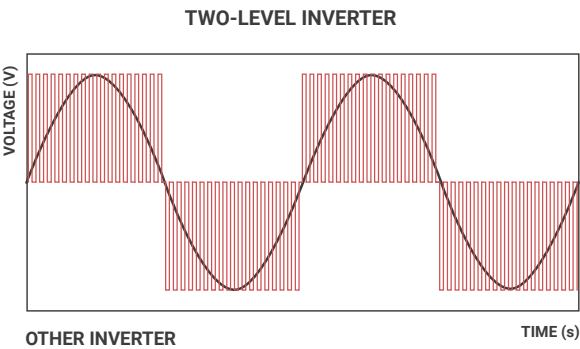
When the unit is not actively exporting/importing power, the inverter can import a small amount of power to keep the inverter internal ambient temperature above -20°C, without using external resistors.

This autonomous heating system is the most efficient and homogeneous way to prevent condensation, increasing the inverters availability and reducing the maintenance. **PATENTED**

MULTILEVEL TOPOLOGY

The multilevel IGBT topology is the most efficient approach to manage high DC link voltages and makes the difference in the 1500 Vdc design. Power Electronics has many years of power design in both inverters and MV drives and the

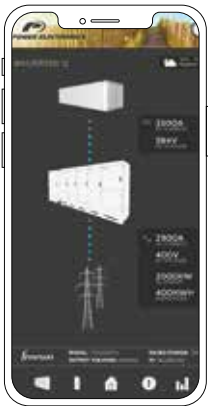
Freemaq PCSK design is the result of our experience with 3 level topologies. The 3 level IGBT topology reduces stage losses, increases inverter efficiency and minimizes total harmonic distortion. High efficiency to deliver the lowest LCOE.



EASY TO MONITOR

The Freesun app is the easiest way to monitor the status of our inverters. All our inverters come with built-in wifi, allowing remote connectivity to any smart device for detailed updates and information without the need to open cabinet doors.

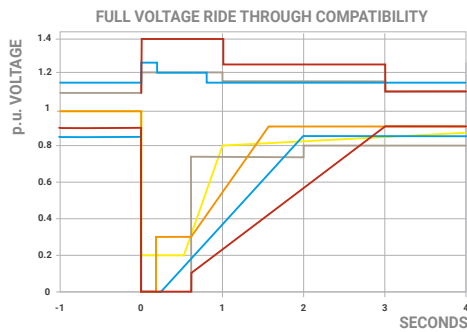
The app user friendly interface allows quick and easy access to critical information (energy registers, production and events).



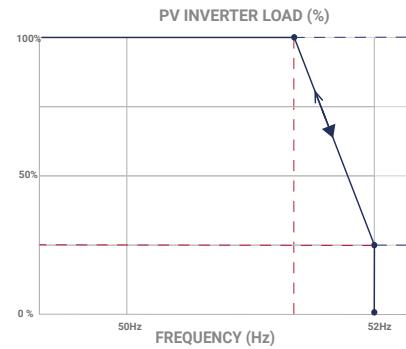
AVAILABLE INFORMATION	Grid and DC side data. Inverter and Power module data (Vol- tages, currents, power, temperatures, I/O status...). Weather conditions. Alarms and warnings events. Energy registers. Others.
FEATURES	Easy Wireless connection. Comprehensive interface. Real time data. Save and copy settings.
LANGUAGE	English, Spanish.
SYSTEM REQUIREMENTS	iOS or Android devices.
SETTINGS CONTROL	Yes

DYNAMIC GRID SUPPORT

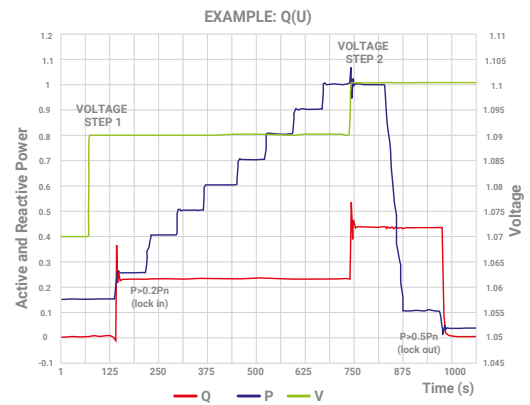
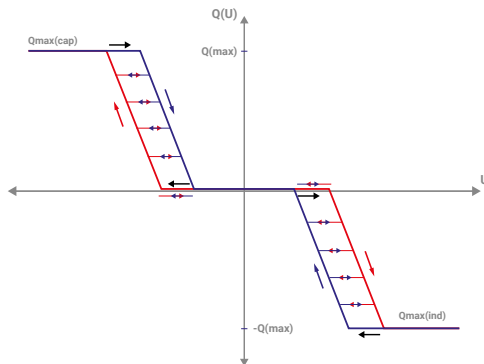
Freemaq PCSK firmware includes the latest utility interactive features (LVRT, OVRT, FRS, FRT, Anti-islanding, active and reactive power curtailment...), and can be configured to meet specific utility requirements.



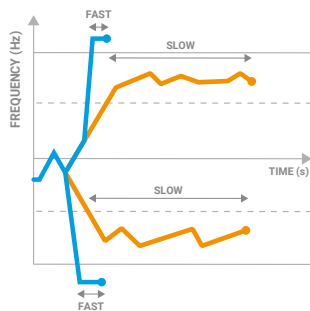
Low Voltage Ride Through (LVRT or ZVRT). Inverters can withstand any voltage dip or profile required by the local utility. In this situation, the inverter can inject current up to the nominal value.



Frequency Regulation System (FRS). Frequency droop algorithm curtails the active power along a preset characteristic curve supporting grid stabilization.

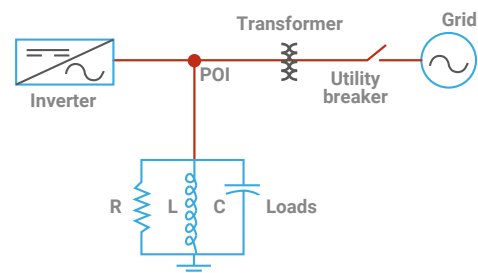


Q(V) curve. It is a dynamic voltage control function which provides reactive power in order to maintain the voltage as close as possible to its nominal value.



Frequency Ride Through (FRT). Freesun solar inverters have flexible frequency protection settings and can be easily adjusted to comply with future requirements.

ISLANDING CONDITION



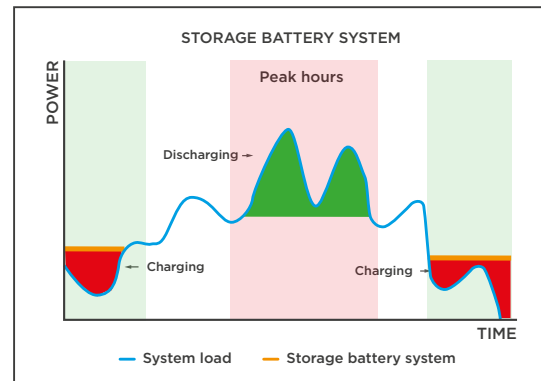
Anti-islanding. This protection combines passive and active detection methods that eliminate nuisance tripping and allow to comply with the IEC 62116 and IEEE 1547 standards.

ENERGY STORAGE APPLICATIONS



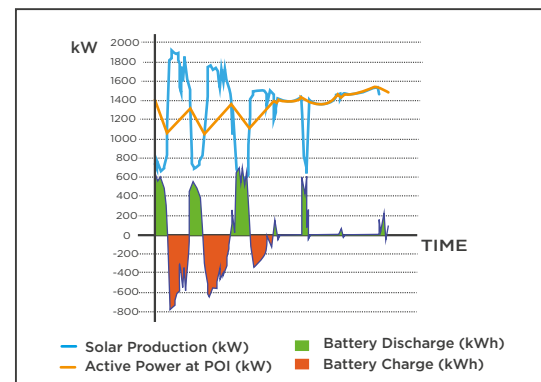
LOAD LEVELING

Freemaq PCSK series are able to store energy during periods of low demand from the grid, in order to later supply this energy when there is a higher demand. This has the benefit of selling the energy at a higher market price during peak periods. It also allows grid operators to supply electricity with a higher renewable origin. Since PV generation may not be at the same time as peak demand, this facilitates the flexibility and integration of renewable generation into the grid.



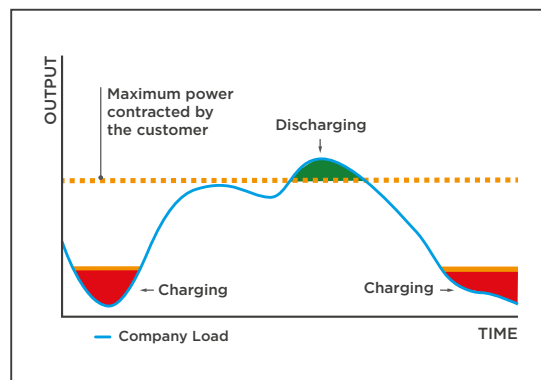
RENEWABLE INTEGRATION

The Freemaq PCSK series attenuates the intermittent nature of renewable energy sources, to provide a smoother power output. The Freemaq PCSK controls the ramp rate at which power is injected into the grid, and thus reduces the impact of rapid power fluctuations due to sudden or transient conditions experienced by the PV array. The system monitors the PV inverter output to inject or consume power accordingly to ensure the output remains within the ramp requirements.



PEAK POWER SHAVING

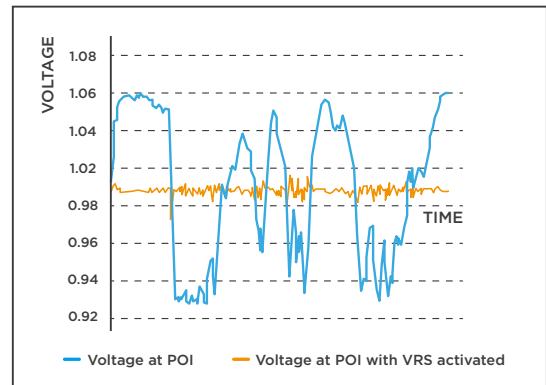
By delivering stored energy to the grid during periods of high demand, it reduces the burden on the distribution network and increases significantly its efficiency. Energy is stored instead of injected into the grid during periods of low demand, which as a result increases the load on the grid. However, during peak periods this stored energy is then injected into the grid, which reduces the demand at this time. The result is a more flattened demand curve which means the grid can avoid switching on more expensive and polluting generators.





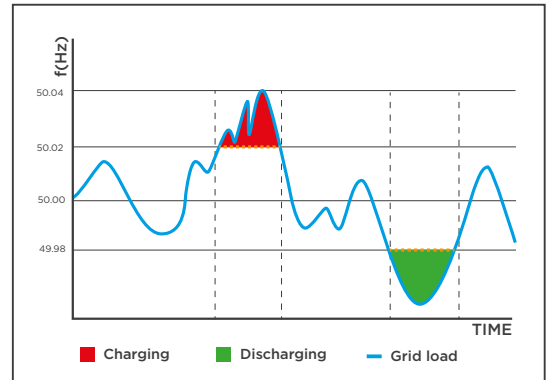
GRID SUPPORT

Freemaq PCSK series helps the integration of renewable sources, by helping to maintain grid stability and power quality. It can help support the grid voltage by generating capacitive or inductive current. Other features include Voltage Control, Reactive Power Control and Fault Ride Through Support.



FREQUENCY REGULATION SYSTEM

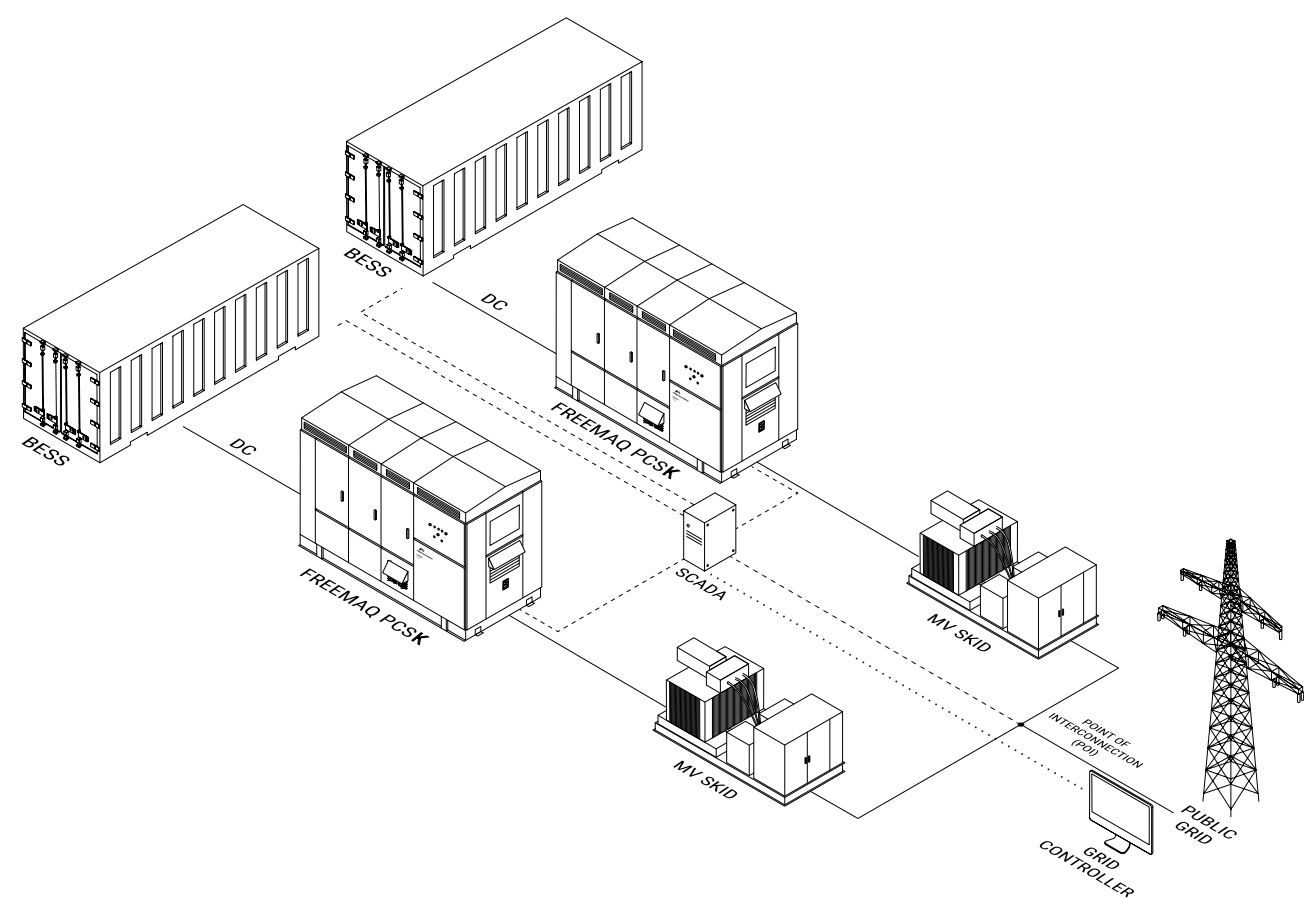
Freemaq PCSK provides ability to regulate grid frequency in both directions. When there is a grid overfrequency (generation > demand) inverter power output is curtailed and this energy is stored through charging batteries. When there is a grid under-frequency (generation < demand) inverter power output is increased by discharging the batteries and injecting more power to the grid.



BATTERY ENERGY STORAGE SYSTEM

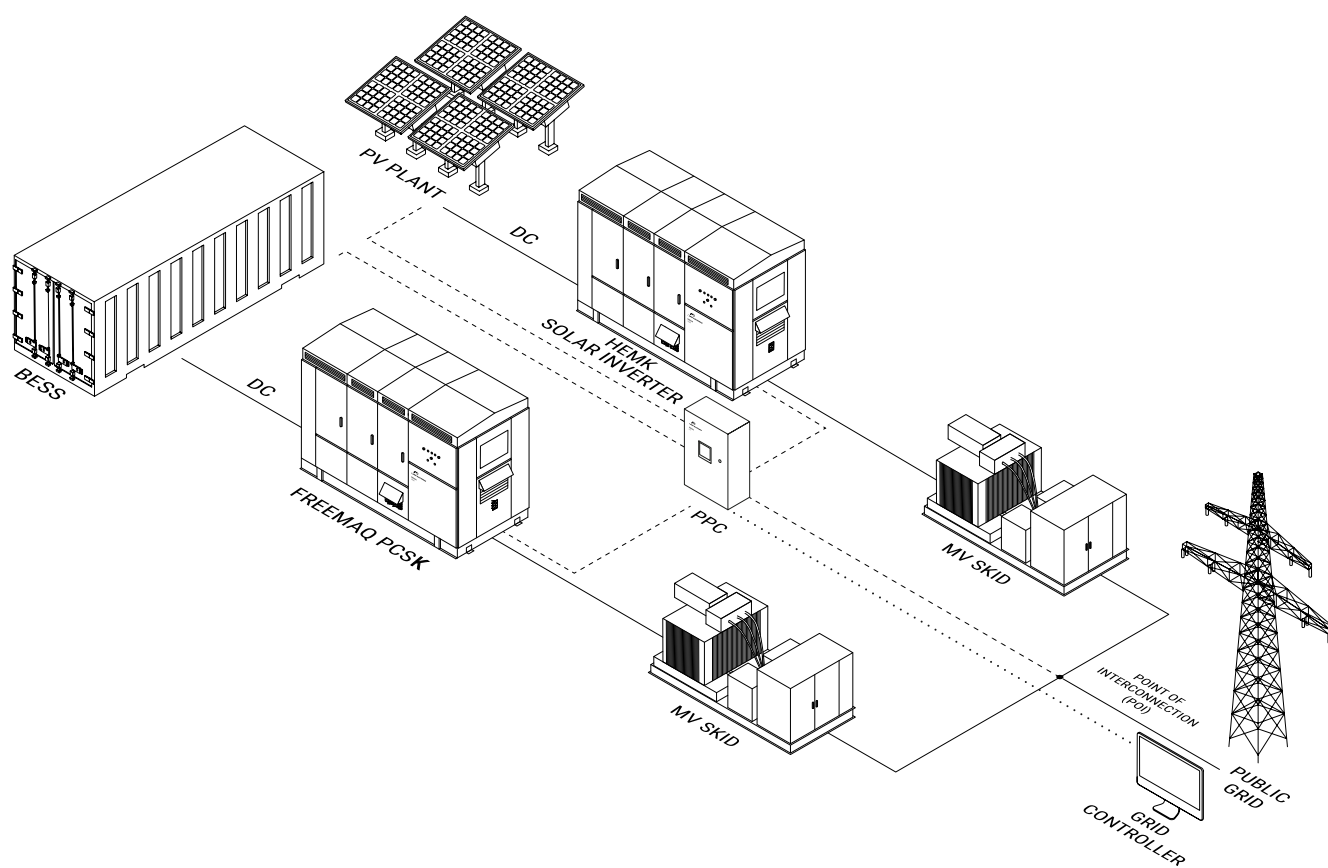
A BESS comprises a battery container connected to a Freemaq PCSK (Power Conversion System) that follows the instruction of the main governor of the plant, the PPC (Power Plant Controller) or SCADA.

EXAMPLE 1



- Power connections
- Plant communications
- Grid controller communication

EXAMPLE 2



TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 690V

		FRAME 1	FRAME 2
NUMBER OF MODULES		4	6
REFERENCES		FP2445K	FP3670K
AC	AC Output Power (kVA/kW) @50°C ^[1]	2445	3670
	AC Output Power (kVA/kW) @40°C ^[1]	2530	3800
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3179
	Operating Grid Voltage (VAC)	690V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	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]	976V-1500V	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 64 positive and 64 negative connections (2 cables per terminal)	
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.87%	98.93%
	Euroeta (η) ^[4]	98.48%	98.65%
	Max. Power Consumption (kVA)	8	10
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
ENVIROMENT	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level ^[5]	< 79 dBA	
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 ^[6]	
	Overvoltage Protection	AC and DC protection (type 2)	
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 660V

		FRAME 1	FRAME 2
NUMBER OF MODULES		4	6
REFERENCES		FP2340K	FP3510K
AC	AC Output Power (kVA/kW) @50°C ^[1]	2340	3510
	AC Output Power (kVA/kW) @40°C ^[1]	2420	3630
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3175
	Operating Grid Voltage (VAC)	660V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	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)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 64 positive and 64 negative connections (2 cables per terminal)	
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.84%	98.90%
	Euroeta (η) ^[4]	98.48%	98.65%
	Max. Power Consumption (kVA)	8	10
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
ENVIROMENT	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level ^[5]	< 79 dBA	
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 ^[6]	
	Overvoltage Protection	AC and DC protection (type 2)	
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.

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[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 645V

		FRAME 1	FRAME 2
NUMBER OF MODULES		4	6
REFERENCES		FP2285K	FP3430K
AC	AC Output Power (kVA/kW) @50°C ^[1]	2285	3430
	AC Output Power (kVA/kW) @40°C ^[1]	2365	3550
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3178
	Operating Grid Voltage (VAC)	645V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	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)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 64 positive and 64 negative connections (2 cables per terminal)	
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.81%	98.87%
	Euroeta (η) ^[4]	98.43%	98.60%
	Max. Power Consumption (kVA)	8	10
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
ENVIROMENT	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level ^[5]	< 79 dBA	
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 ^[6]	
	Overvoltage Protection	AC and DC protection (type 2)	
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 630V

		FRAME 1	FRAME 2
NUMBER OF MODULES		4	6
REFERENCES		FP2235K	FP3350K
AC	AC Output Power (kVA/kW) @50°C ^[1]	2235	3350
	AC Output Power (kVA/kW) @40°C ^[1]	2310	3465
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3175
	Operating Grid Voltage (VAC)	630V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	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)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 64 positive and 64 negative connections (2 cables per terminal)	
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.79%	98.85%
	Euroeta (η) ^[4]	98.42%	98.59%
	Max. Power Consumption (kVA)	8	10
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
ENVIROMENT	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level ^[5]	< 79 dBA	
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 ^[6]	
	Overvoltage Protection	AC and DC protection (type 2)	
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 615V

		FRAME 1	FRAME 2
NUMBER OF MODULES		4	6
REFERENCES		FP2180K	FP3270K
AC	AC Output Power (kVA/kW) @50°C ^[1]	2180	3270
	AC Output Power (kVA/kW) @40°C ^[1]	2255	3380
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3173
	Operating Grid Voltage (VAC)	615V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	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]	870V-1500V	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 64 positive and 64 negative connections (2 cables per terminal)	
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.79%	98.84%
	Euroeta (η) ^[4]	98.41%	98.57%
	Max. Power Consumption (kVA)	8	10
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
ENVIROMENT	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level ^[5]	< 79 dBA	
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 ^[6]	
	Overvoltage Protection	AC and DC protection (type 2)	
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 600V

		FRAME 1	FRAME 2
NUMBER OF MODULES		4	6
REFERENCES		FP2125K	FP3190K
AC	AC Output Power (kVA/kW) @50°C ^[1]	2125	3190
	AC Output Power (kVA/kW) @40°C ^[1]	2200	3300
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3175
	Operating Grid Voltage (VAC)	600V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	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]	849V-1500V	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 64 positive and 64 negative connections (2 cables per terminal)	
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.78%	98.84%
	Euroeta (η) ^[4]	98.39%	98.56%
	Max. Power Consumption (kVA)	8	10
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
ENVIROMENT	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level ^[5]	< 79 dBA	
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 ^[6]	
	Overvoltage Protection	AC and DC protection (type 2)	
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 530V

		FRAME 1	FRAME 2
NUMBER OF MODULES		4	6
REFERENCES		FP1875K	FP2820K
AC	AC Output Power (kVA/kW) @50°C ^[1]	1875	2820
	AC Output Power (kVA/kW) @40°C ^[1]	1940	2915
	Max. AC Output Current (A) @50°C	2045	3070
	Max. AC Output Current (A) @40°C	2113	3175
	Operating Grid Voltage (VAC)	530V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	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]	750V-1500V	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 64 positive and 64 negative connections (2 cables per terminal)	
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.78% (preliminary)	98.84% (preliminary)
	Euroeta (η) ^[4]	98.39% (preliminary)	98.56% (preliminary)
	Max. Power Consumption (kVA)	8	10
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
ENVIROMENT	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level ^[5]	< 79 dBA	
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 ^[6]	
	Overvoltage Protection	AC and DC protection (type 2)	
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 500V

		FRAME 1	FRAME 2
NUMBER OF MODULES		4	6
REFERENCES		FP1770K	FP2660K
AC	AC Output Power (kVA/kW) @50°C ^[1]	1770	2660
	AC Output Power (kVA/kW) @40°C ^[1]	1830	2750
	Max. AC Output Current (A) @50°C	2045	3070
	Max. AC Output Current (A) @40°C	2113	3175
	Operating Grid Voltage (VAC)	500V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	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]	708V-1500V	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
EFFICIENCY & AUX. SUPPLY	Battery Connections	Up to 64 positive and 64 negative connections (2 cables per terminal)	
	Efficiency (Max) (η) ^[4]	98.78% (preliminary)	98.84% (preliminary)
	Euroeta (η) ^[4]	98.39% (preliminary)	98.56% (preliminary)
	Max. Power Consumption (kVA)	8	10
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
ENVIROMENT	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level ^[5]	< 79 dBA	
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 ^[6]	
	Overvoltage Protection	AC and DC protection (type 2)	
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ PCSK 480V

		FRAME 1	FRAME 2
NUMBER OF MODULES		4	6
REFERENCES		FP1700K	FP2550K
AC	AC Output Power (kVA/kW) @50°C ^[1]	1700	2550
	AC Output Power (kVA/kW) @40°C ^[1]	1760	2640
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3175
	Operating Grid Voltage (VAC)	480V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	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]	679V-1500V	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 64 positive and 64 negative connections (2 cables per terminal)	
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.78% (preliminary)	98.84% (preliminary)
	Euroeta (η) ^[4]	98.39% (preliminary)	98.56% (preliminary)
	Max. Power Consumption (kVA)	8	10
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
ENVIROMENT	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level ^[5]	< 79 dBA	
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 ^[6]	
	Overvoltage Protection	AC and DC protection (type 2)	
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

FRONT VIEW



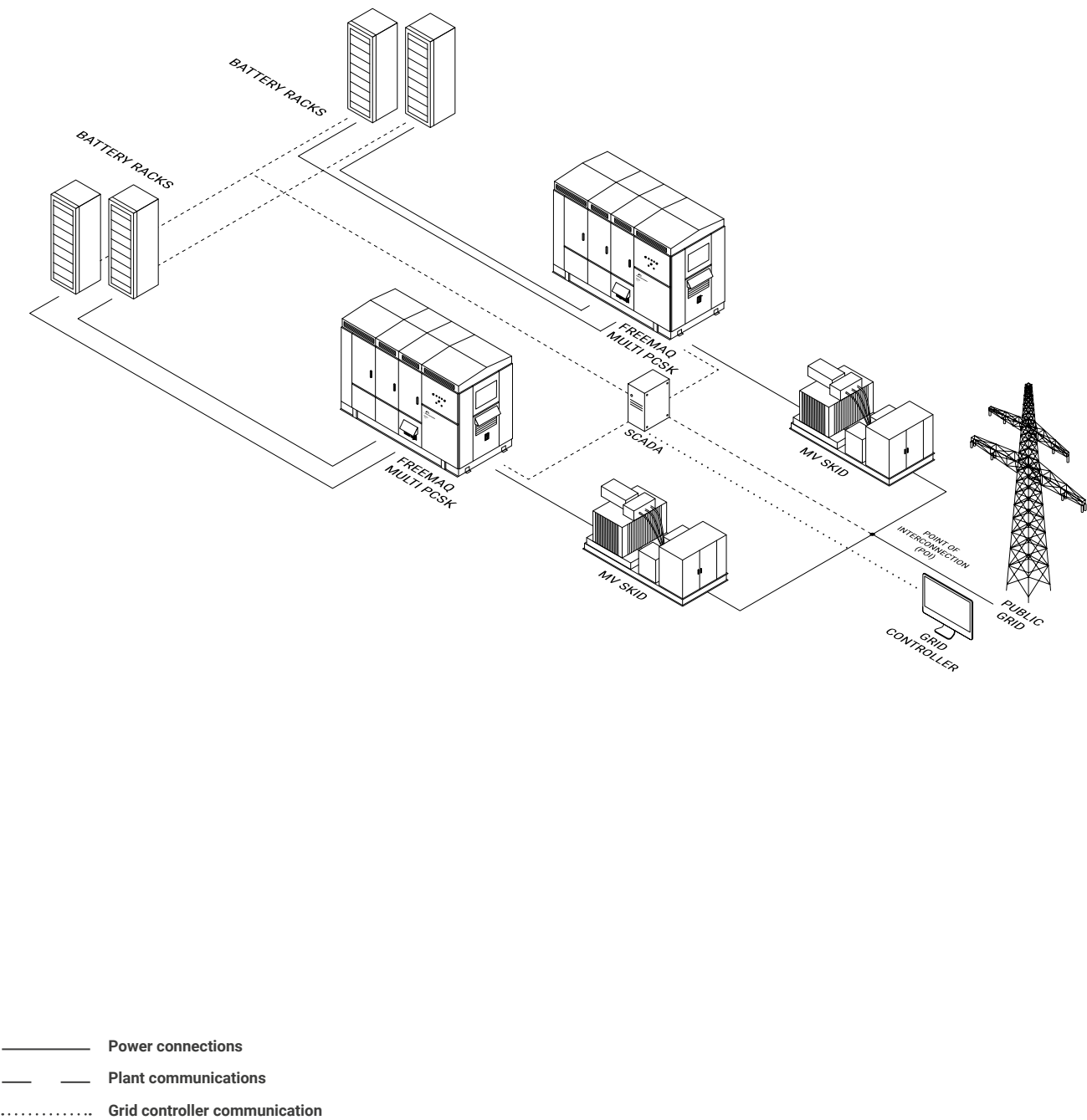
BACK VIEW



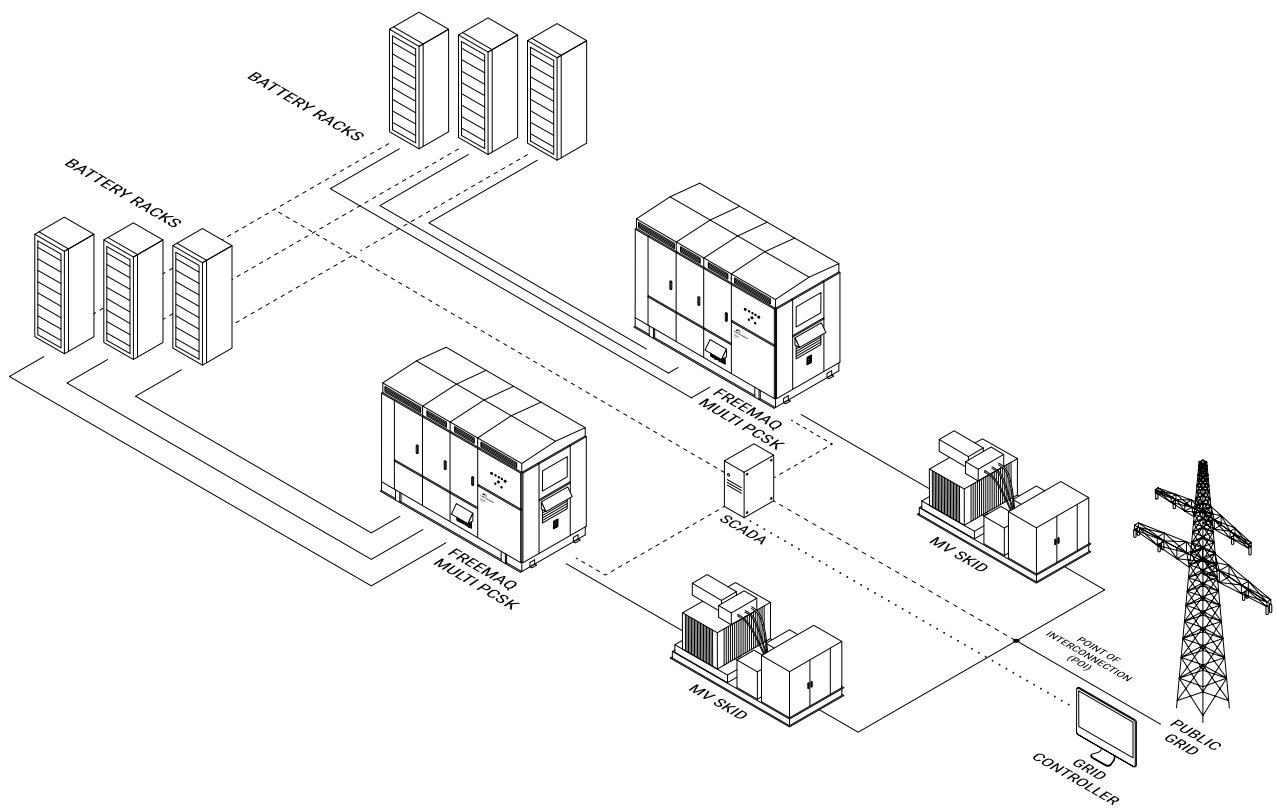
MULTI BATTERY ENERGY STORAGE SYSTEM

The Freemaq MULTI PCSK can support two or three independent battery systems. A BESS comprises a battery containers connected to a Freemaq MULTI PCSK (Power Conversion System) that follows the instruction of the main governor of the plant, the PPC (Power Plant Controller) or SCADA.

EXAMPLE 1



EXAMPLE 2



- Power connections
- - - Plant communications
- Grid controller communication

TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCSK 690V

		FRAME 1	FRAME 2	
NUMBER OF MODULES		4	6	
REFERENCES		FP2445K2	FP3670K2	FP3670K3
AC	AC Output Power (kVA/kW) @50°C ^[1]	2445	3670	
	AC Output Power (kVA/kW) @40°C ^[1]	2530	3800	
	Max. AC Output Current (A) @50°C	2047	3070	
	Max. AC Output Current (A) @40°C	2117	3179	
	Operating Grid Voltage (VAC)	690V ±10%		
	Operating Grid Frequency (Hz)	50/60 Hz		
	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]	976V-1500V		
	Maximum DC voltage	1500V		
	DC Voltage Ripple	< 3%		
	Max. DC continuous current (A)	2646	3969	
	Max. DC shortcircuit current (A)	180kA / 5ms		
	Battery Technology	All type of batteries (BMS required)		
	Number of separate DC inputs	2	2	3
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.87%	98.93%	
	Euroeta (η) ^[4]	98.48%	98.65%	
	Max. Power Consumption (kVA)	8	10	
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7		
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2		
	Weight (lbs)	12125	12677	
	Weight (kg)	5500	5750	
	Type of ventilation	Forced air cooling		
ENVIROMENT	Degree of protection	NEMA 3R / IP55		
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)		
	Relative Humidity	4% to 100% non condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
	Noise level ^[5]	< 79 dBA		
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 ^[6]		
	Overvoltage Protection	AC and DC protection (type 2)		
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2		
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005		

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCSK 660V

		FRAME 1	FRAME 2	
NUMBER OF MODULES		4	6	
REFERENCES		FP2340K2	FP3510K2	FP3510K3
AC	AC Output Power (kVA/kW) @50°C ^[1]	2340	3510	
	AC Output Power (kVA/kW) @40°C ^[1]	2420	3630	
	Max. AC Output Current (A) @50°C	2047	3070	
	Max. AC Output Current (A) @40°C	2117	3175	
	Operating Grid Voltage (VAC)	660V ±10%		
	Operating Grid Frequency (Hz)	50/60 Hz		
	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)	2646	3969	
	Max. DC shortcircuit current (A)	180kA / 5ms		
	Battery Technology	All type of batteries (BMS required)		
	Number of separate DC inputs	2	2	3
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.84%	98.90%	
	Euroeta (η) ^[4]	98.48%	98.65%	
	Max. Power Consumption (kVA)	8	10	
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7		
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2		
	Weight (lbs)	12125	12677	
	Weight (kg)	5500	5750	
	Type of ventilation	Forced air cooling		
ENVIROMENT	Degree of protection	NEMA 3R / IP55		
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)		
	Relative Humidity	4% to 100% non condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
	Noise level ^[5]	< 79 dBA		
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 ^[6]		
	Overvoltage Protection	AC and DC protection (type 2)		
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2		
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005		

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCSK 645V

		FRAME 1	FRAME 2	
NUMBER OF MODULES		4	6	
REFERENCES		FP2285K2	FP3430K2	FP3430K3
AC	AC Output Power (kVA/kW) @50°C ^[1]	2285	3430	
	AC Output Power (kVA/kW) @40°C ^[1]	2365	3550	
	Max. AC Output Current (A) @50°C	2047	3070	
	Max. AC Output Current (A) @40°C	2117	3178	
	Operating Grid Voltage (VAC)	645V ±10%		
	Operating Grid Frequency (Hz)	50/60 Hz		
	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)	2646	3969	
	Max. DC shortcircuit current (A)	180kA / 5ms		
	Battery Technology	All type of batteries (BMS required)		
	Number of separate DC inputs	2	2	3
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.81%	98.87%	
	Euroeta (η) ^[4]	98.43%	98.60%	
	Max. Power Consumption (kVA)	8	10	
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7		
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2		
	Weight (lbs)	12125	12677	
	Weight (kg)	5500	5750	
	Type of ventilation	Forced air cooling		
ENVIROMENT	Degree of protection	NEMA 3R / IP55		
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)		
	Relative Humidity	4% to 100% non condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
	Noise level ^[5]	< 79 dBA		
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 ^[6]		
	Overvoltage Protection	AC and DC protection (type 2)		
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2		
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005		

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCSK 630V

		FRAME 1	FRAME 2	
NUMBER OF MODULES		4	6	
REFERENCES		FP2235K2	FP3350K2	FP3350K3
AC	AC Output Power (kVA/kW) @50°C ^[1]	2235	3350	
	AC Output Power (kVA/kW) @40°C ^[1]	2310	3465	
	Max. AC Output Current (A) @50°C	2047	3070	
	Max. AC Output Current (A) @40°C	2117	3175	
	Operating Grid Voltage (VAC)	630V ±10%		
	Operating Grid Frequency (Hz)	50/60 Hz		
	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)	2646	3969	
	Max. DC shortcircuit current (A)	180kA / 5ms		
	Battery Technology	All type of batteries (BMS required)		
	Number of separate DC inputs	2	2	3
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.79%	98.85%	
	Euroeta (η) ^[4]	98.42%	98.59%	
	Max. Power Consumption (kVA)	8	10	
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7		
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2		
	Weight (lbs)	12125	12677	
	Weight (kg)	5500	5750	
	Type of ventilation	Forced air cooling		
ENVIROMENT	Degree of protection	NEMA 3R / IP55		
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)		
	Relative Humidity	4% to 100% non condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
	Noise level ^[5]	< 79 dBA		
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 ^[6]		
	Overvoltage Protection	AC and DC protection (type 2)		
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2		
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005		

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCSK 615V

		FRAME 1	FRAME 2	
NUMBER OF MODULES		4	6	
REFERENCES		FP2180K2	FP3270K2	FP3270K3
AC	AC Output Power (kVA/kW) @50°C ^[1]	2180	3270	
	AC Output Power (kVA/kW) @40°C ^[1]	2255	3380	
	Max. AC Output Current (A) @50°C	2047	3070	
	Max. AC Output Current (A) @40°C	2117	3173	
	Operating Grid Voltage (VAC)	615V ±10%		
	Operating Grid Frequency (Hz)	50/60 Hz		
	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]	870V-1500V		
	Maximum DC voltage	1500V		
	DC Voltage Ripple	< 3%		
	Max. DC continuous current (A)	2646	3969	
	Max. DC shortcircuit current (A)	180kA / 5ms		
	Battery Technology	All type of batteries (BMS required)		
	Number of separate DC inputs	2	2	3
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.79%	98.84%	
	Euroeta (η) ^[4]	98.41%	98.57%	
	Max. Power Consumption (kVA)	8	10	
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7		
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2		
	Weight (lbs)	12125	12677	
	Weight (kg)	5500	5750	
	Type of ventilation	Forced air cooling		
ENVIROMENT	Degree of protection	NEMA 3R / IP55		
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)		
	Relative Humidity	4% to 100% non condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
	Noise level ^[5]	< 79 dBA		
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 ^[6]		
	Overvoltage Protection	AC and DC protection (type 2)		
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2		
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005		

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCSK 600V

		FRAME 1	FRAME 2	
NUMBER OF MODULES		4	6	
REFERENCES		FP2125K2	FP3190K2	FP3190K3
AC	AC Output Power (kVA/kW) @50°C ^[1]	2125	3190	
	AC Output Power (kVA/kW) @40°C ^[1]	2200	3300	
	Max. AC Output Current (A) @50°C	2047	3070	
	Max. AC Output Current (A) @40°C	2117	3175	
	Operating Grid Voltage (VAC)	600V ±10%		
	Operating Grid Frequency (Hz)	50/60 Hz		
	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	849V-1500V		
	Maximum DC voltage	1500V		
	DC Voltage Ripple	< 3%		
	Max. DC continuous current (A)	2646	3969	
	Max. DC shortcircuit current (A)	180kA / 5ms		
	Battery Technology	All type of batteries (BMS required)		
	Number of separate DC inputs	2	2	3
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.78%	98.84%	
	Euroeta (η) ^[4]	98.56%	98.39%	
	Max. Power Consumption (kVA)	8	10	
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7		
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2		
	Weight (lbs)	12125	12677	
	Weight (kg)	5500	5750	
	Type of ventilation	Forced air cooling		
ENVIROMENT	Degree of protection	NEMA 3R / IP55		
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)		
	Relative Humidity	4% to 100% non condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
	Noise level ^[5]	< 79 dBA		
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 ^[6]		
	Overvoltage Protection	AC and DC protection (type 2)		
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2		
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005		

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCSK 530V

		FRAME 1	FRAME 2	
NUMBER OF MODULES		4	6	
REFERENCES		FP1875K2	FP2820K2	FP2820K3
AC	AC Output Power (kVA/kW) @50°C ^[1]	1875	2820	
	AC Output Power (kVA/kW) @40°C ^[1]	1940	2915	
	Max. AC Output Current (A) @50°C	2045	3070	
	Max. AC Output Current (A) @40°C	2113	3175	
	Operating Grid Voltage (VAC)	530V ±10% ^[3]		
	Operating Grid Frequency (Hz)	50/60 Hz		
	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]	750V-1500V		
	Maximum DC voltage	1500V		
	DC Voltage Ripple	< 3%		
	Max. DC continuous current (A)	2646	3969	
	Max. DC shortcircuit current (A)	180kA / 5ms		
	Battery Technology	All type of batteries (BMS required)		
	Number of separate DC inputs	2	2	3
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.78% (preliminary)	98.84% (preliminary)	
	Euroeta (η) ^[4]	98.39% (preliminary)	98.56% (preliminary)	
	Max. Power Consumption (kVA)	8	10	
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7		
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2		
	Weight (lbs)	12125	12677	
	Weight (kg)	5500	5750	
	Type of ventilation	Forced air cooling		
ENVIROMENT	Degree of protection	NEMA 3R / IP55		
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)		
	Relative Humidity	4% to 100% non condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
	Noise level ^[5]	< 79 dBA		
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 ^[6]		
	Overvoltage Protection	AC and DC protection (type 2)		
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2		
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005		

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCSK 500V

		FRAME 1	FRAME 2	
NUMBER OF MODULES		4	6	
REFERENCES		FP1770K2	FP2660K2	FP2660K3
AC	AC Output Power (kVA/kW) @50°C ^[1]	1770	2660	
	AC Output Power (kVA/kW) @40°C ^[1]	1830	2750	
	Max. AC Output Current (A) @50°C	2045	3070	
	Max. AC Output Current (A) @40°C	2113	3175	
	Operating Grid Voltage (VAC)	500V ±10%		
	Operating Grid Frequency (Hz)	50/60 Hz		
	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]	708V-1500V		
	Maximum DC voltage	1500V		
	DC Voltage Ripple	< 3%		
	Max. DC continuous current (A)	2646	3969	
	Max. DC shortcircuit current (A)	180kA / 5ms		
	Battery Technology	All type of batteries (BMS required)		
	Number of separate DC inputs	2	2	3
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.78% (preliminary)	98.84% (preliminary)	
	Euroeta (η) ^[4]	98.39% (preliminary)	98.56% (preliminary)	
	Max. Power Consumption (kVA)	8	10	
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7		
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2		
	Weight (lbs)	12125	12677	
	Weight (kg)	5500	5750	
	Type of ventilation	Forced air cooling		
ENVIROMENT	Degree of protection	NEMA 3R / IP55		
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)		
	Relative Humidity	4% to 100% non condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
	Noise level ^[5]	< 79 dBA		
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 ^[6]		
	Overvoltage Protection	AC and DC protection (type 2)		
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2		
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005		

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

TECHNICAL CHARACTERISTICS

FREEMAQ MULTI PCSK 480V

		FRAME 1	FRAME 2	
NUMBER OF MODULES		4	6	
REFERENCES		FP1700K2	FP2550K2	FP2550K3
AC	AC Output Power (kVA/kW) @50°C ^[1]	1700	2550	
	AC Output Power (kVA/kW) @40°C ^[1]	1760	2640	
	Max. AC Output Current (A) @50°C	2047	3070	
	Max. AC Output Current (A) @40°C	2117	3175	
	Operating Grid Voltage (VAC)	480V ±10%		
	Operating Grid Frequency (Hz)	50/60 Hz		
	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]	679V-1500V (optional)		
	Maximum DC voltage	1500V		
	DC Voltage Ripple	< 3%		
	Max. DC continuous current (A)	2646	3969	
	Max. DC shortcircuit current (A)	180kA / 5ms		
	Battery Technology	All type of batteries (BMS required)		
	Number of separate DC inputs	2	2	3
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (η) ^[4]	98.78% (preliminary)	98.84% (preliminary)	
	Euroeta (η) ^[4]	98.39% (preliminary)	98.56% (preliminary)	
	Max. Power Consumption (kVA)	8	10	
CABINET	Dimensions [WxDxH] (ft)	12 x 7 x 7		
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2		
	Weight (lbs)	12125	12677	
	Weight (kg)	5500	5750	
	Type of ventilation	Forced air cooling		
ENVIROMENT	Degree of protection	NEMA 3R / IP55		
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)		
	Relative Humidity	4% to 100% non condensing		
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)		
	Noise level ^[5]	< 79 dBA		
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 ^[6]		
	Overvoltage Protection	AC and DC protection (type 2)		
CERTIFICATIONS	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2		
	Utility interconnect ^[7]	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005		

[1] Values at 1.00•Vac nom and cos Φ= 1.

Consult Power Electronics for derating curves.

[2] Consult P-Q charts available: $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$.

[3] Consult Power Electronics for derating curves.

[4] Consult Power Electronics for the extended DC voltage range option efficiency data.

[5] Readings taken 1 meter from the back of the unit.

[6] Battery short circuit disconnection has to be done on the battery side.

[7] Consult Power Electronics for other applicable standards / grid codes.

FRONT VIEW



BACK VIEW



Exhibit B

Manufacturer Specifications

Inverters

4. TMEIC

Solar Ware Ninja™

TMEiC
We drive industry

Multiple Configurations for Maximum Flexibility

TMEiC's Solar Ware Ninja is the latest evolution of the highly successful Solar Ware family of inverters, joining over 20GW of TMEiC's globally installed photovoltaic inverters. Continuing the legacy of high efficiency, cutting-edge features, and unmatched reliability, the new Ninja modular inverter system is the culmination of input from utilities, developers, and technicians.

The Ninja is a global product, performing the duties of both generation and energy storage. The modular system introduces multiple layers of flexibility to allow designers an almost unlimited number of options for every project. The advanced controls system is packed with features to meet not only today's smart inverter requirements, but also new requirements as they are introduced. Like the award-winning Samurai series of inverters, the Ninja utilizes the same highly reliable IGBT based power conversion system.



Customizable Block

Up to 6 Ninja units on the same skid. Able to combine PV and ESS inverters in the same lineup. A skid controller will manage output of the Ninja power station.

- Fully Modular design means:
 - Completely independent inverters for increased availability
 - Individual MPPT for greater energy yield
 - Latest generation of Smart Inverter controls platform
 - Multiple output options with various MPPT ranges
- DC Zone monitoring is standard
- UL or IEC certified global design
- PV or Energy Storage (bi-directional)
- Outdoor rated enclosure



TMEiC is Bankable

- Stable, with multi billion \$USD revenue
- Diversified, with decades of power electronics experience in a variety of heavy industries, including metals, oil & gas, mining, and container cranes industries
- Manufacturing in the US and several other locations

TMEiC is Reliable

- Over 20GW of PV and ESS inverters globally
- Own exclusive use of Mitsubishi Electric's 3 level NPS technology
- Industry leading fleet availability

TMEiC is Support

- Award winning service
- 24/7 US based hot line
- Over 30 years PV inverter manufacturing and R&D experience
- Comprehensive customer training programs
- Authorized Service Provider program available

		PV-PCS			ESS-PCS		
Type		PVU-L0800GR	PVU-L0840GR	PVU-L0880GR	BSU-L0640GR	BSU-L0800GR	BSU-L0840GR
Output side (AC)	Rated Power@25°C	800kW	840kW	880kW	640kW	800kW	840kW
	Rated Power@50°C	730kW	765kW	800kW	550kW	730kW	765kW
	Rated Voltage	600V +10%, -12%	630V +10%, -12%	660V +10%, -12%	480VAC	600VAC	630VAC
	Rated Frequency	50Hz / 60Hz (+0.5Hz, -0.7Hz)					
	Rated Power Factor	>0.99					
	Reactive Capability	±421 kVAR	±442 kVAR	±464 kVAR	±448 kVAR	±560 kVAR	±588 kVAR
	Rated Current	702 Arms @50 °C					
	Maxium Current	770 Arms @25 °C					
	Maximum Efficiency	98.72% *	98.72%	98.72% *	98.72% *	98.72% *	98.72% *
	CEC Efficiency	98% *	98%	98% *	98% *	98% *	98% *
Input side (DC)	Maximum Voltage	1500 Vdc					
	MPPT Operation Range	875-1300VDC	915-1300VDC	960-1300VDC	710-1100VDC	875-1300VDC	915-1300VDC
Environ. Conditions	Ingress Protection Ratings	IP54 / NEMA3R					
	Installation	Outdoor					
	Ambient Temperature Range	-25° to 50°C					
	Maximum Altitude	>2000 m power derating (Max. 4000m)					
Protective Functions	Input (DC) Side	DC Protection: Input Fuses, Ground Fault Detection, DC Reverse Current, Over Voltage, Over Current					
	Grid (AC) Side	AC Protection: Disconnect Switch and Fuse, Anti-islanding, Over/Under Voltage, Over/Under Frequency, Over Current					
	Grid Assistance	Reactive/Active Power Control, Power Factor Control, Fault Ride Through (optional)					
Harmonic Distortion of AC Current		≤ 3% THD (at rated power)			≤ 5% THD (at rated power)		
Communication		Modbus/TCP					
Fault Analysis		Fault Event Log, Waveform Acquisition via memory card					
Compliance		UL1741, UL174SA / IEEE1547 / NEC2017 / IEC62109-1,2 / IEC61000-6-2,4 / IEC61727, IEC62116 / IEC61400, BDEW / IEC61683 / IEC60068					
Cooling Method		Heat Pipes and Forced Air Cooling					
Number of Inputs		Standard 6 inputs for PV (maximum 8 per inverter)			1 per Inverter		
Standard Control Power Supply		Control Power Supply from Inverter output and Capacitor backup circuit (3 sec. compensation)					
Short Circuit Withstand Current		AC side – 65kA; DC side – 30kA			AC side – 65kA; DC side – 100kA		
Weight		<1000kgs					
Dimensions (H x W x D)		1100 X 1100 X 1900 mm (L x W x H)					
Floor Space		1875.5 sq. in. (1.21 m²)					
Color		Cabinet: Munsell N7.0, Roof: Munsell N4.5					

Note: Standard configuration not limited configuration. Contact TMEIC for detailed information.

*Preliminary specification

WWW.TMEIC.COM

Exhibit B

Manufacturer Specifications

Modules

- 5. Jinko**
- 6. Longi**
- 7. Risen**
- 8. Trina**

Exhibit B

Manufacturer Specifications

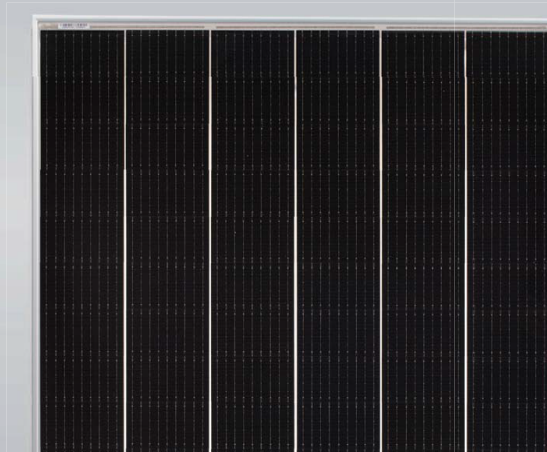
Modules

5. Jinko

Tiger Mono-facial 455-475 Watt

Tiling Ribbon (TR) Technology

Positive power tolerance of 0~+3%



KEY FEATURES



TR technology + Half Cell

TR technology with Half cell aims to eliminate the cell gap to increase module efficiency (mono-facial up to 21.16%)



9BB instead of 5BB

9BB technology decreases the distance between bus bars and finger grid line which is benefit to power increase.



Higher lifetime Power Yield

2.5% first year degradation,
0.6% linear degradation



Best Warranty

12 year product warranty,
25 year linear power warranty



Avoid debris, cracks and broken gate risk effectively

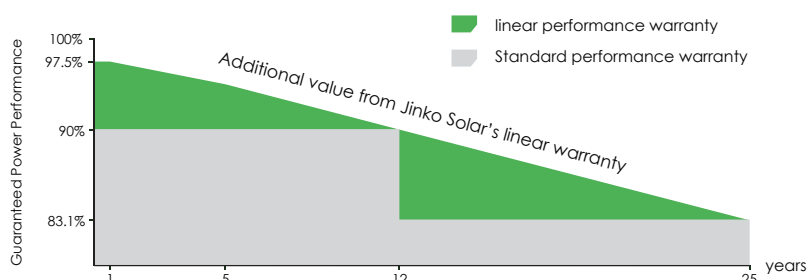
9BB technology using circular ribbon that could avoid debris, cracks and broken gate risk effectively



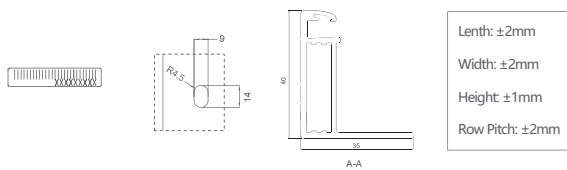
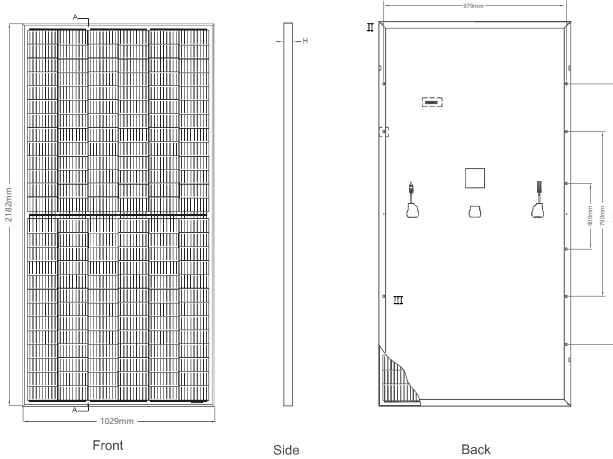
- ISO9001:2015, ISO14001:2015, OHSAS18001 certified factory
- IEC61215, IEC61730 certified product

LINEAR PERFORMANCE WARRANTY

12 Year Product Warranty • 25 Year Linear Power Warranty
0.6% Annual Degradation Over 25 years



Engineering Drawings

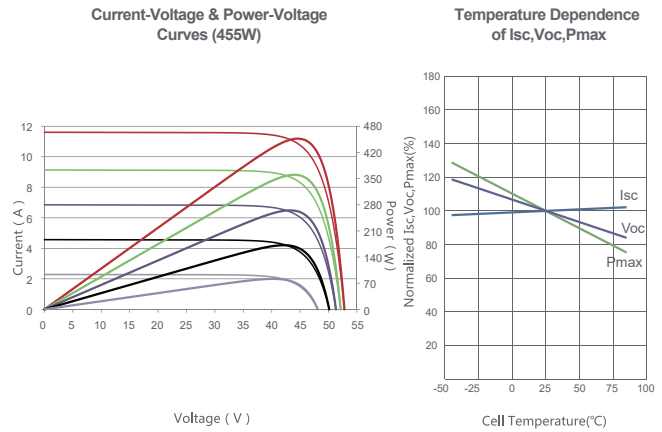


Packaging Configuration

(Two pallets = One stack)

27pcs/pallets, 54pcs/stack, 540pcs/ 40'HQ Container

Electrical Performance & Temperature Dependence



Mechanical Characteristics

Cell Type	P type Mono-crystalline
No. of cells	156 (2×78)
Dimensions	2182×1029×40mm (85.91×40.51×1.57 inch)
Weight	25.1 kg (55.12 lbs)
Front Glass	3.2mm, Anti-Reflection Coating, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP67 Rated
Output Cables	TUV 1×4.0mm ² (+): 290mm, (-): 145 mm or Customized Length

SPECIFICATIONS

Module Type	JKM455M-7RL3		JKM460M-7RL3		JKM465M-7RL3		JKM470M-7RL3		JKM475M-7RL3	
	JKM455M-7RL3-V		JKM460M-7RL3-V		JKM465M-7RL3-V		JKM470M-7RL3-V		JKM475M-7RL3-V	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	455Wp	339Wp	460Wp	342Wp	465Wp	346Wp	470Wp	350Wp	475Wp	353Wp
Maximum Power Voltage (Vmp)	43.13V	39.69V	43.24V	39.75V	43.34V	39.86V	43.44V	39.92V	43.54V	40.02V
Maximum Power Current (Imp)	10.55A	8.53A	10.64A	8.61A	10.73A	8.68A	10.82A	8.76A	10.91A	8.83A
Open-circuit Voltage (Voc)	51.80V	48.79V	51.90V	48.88V	52.00V	48.98V	52.10V	48.07V	52.20V	49.17V
Short-circuit Current (Isc)	11.41A	9.22A	11.50A	9.29A	11.59A	9.36A	11.68A	9.43A	11.77A	9.51A
Module Efficiency STC (%)	20.26%		20.49%		20.71%		20.93%		21.16%	
Operating Temperature(°C)	-40°C~+85°C									
Maximum system voltage	1000/1500VDC (IEC)									
Maximum series fuse rating	20A									
Power tolerance	0~+3%									
Temperature coefficients of Pmax	-0.35%/°C									
Temperature coefficients of Voc	-0.28%/°C									
Temperature coefficients of Isc	0.048%/°C									
Nominal operating cell temperature (NOCT)	45±2°C									

* STC: Irradiance 1000W/m² Cell Temperature 25°C

AM=1.5

NOCT: Irradiance 800W/m² Ambient Temperature 20°C

AM=1.5

Wind Speed 1m/s

* Power measurement tolerance: ± 3%

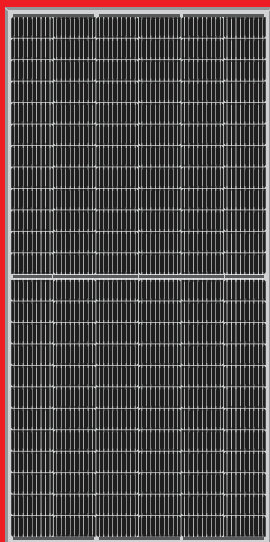
The company reserves the final right for explanation on any of the information presented hereby. T JKM455-475M-7RL3-(V)-D4-EN

Exhibit B

Manufacturer Specifications

Modules

6. Longi

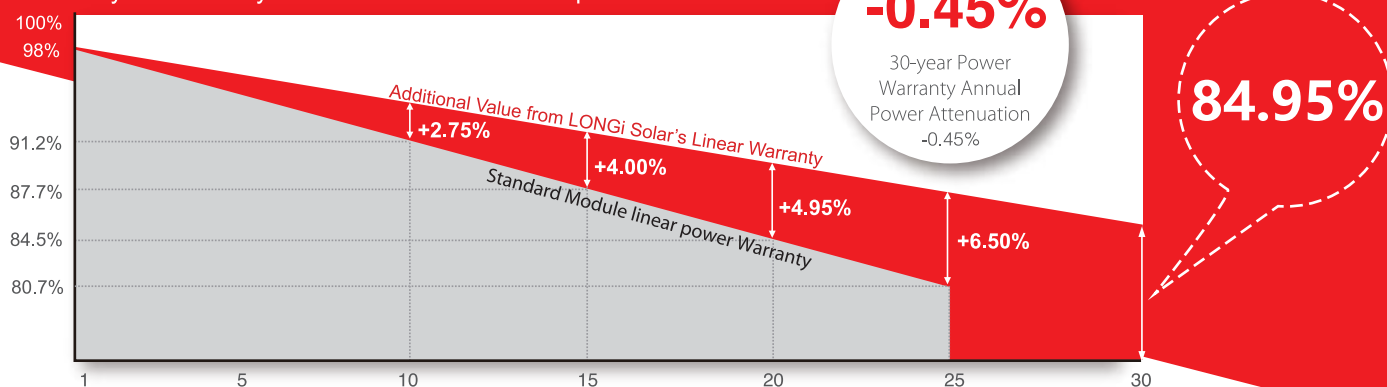


LR5-72HBD 520~540M

Hi-MO 5

**High Efficiency
Low LID Bifacial PERC with
Half-cut Technology**

12-year Warranty for Materials and Processing;
30-year Warranty for Extra Linear Power Output



Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730

ISO 9001:2008: ISO Quality Management System

ISO 14001: 2004: ISO Environment Management System

TS62941: Guideline for module design qualification and type approval

OHSAS 18001: 2007 Occupational Health and Safety



* Specifications subject to technical changes and tests. LONGi Solar reserves the right of interpretation.

Front side performance equivalent to conventional low LID mono PERC:

- High module conversion efficiency (up to 21.1%)
- Better energy yield with excellent low irradiance performance and temperature coefficient
- First year power degradation <2%

Bifacial technology enables additional energy harvesting from rear side (up to 25%)

Glass/glass lamination ensures 30 year product lifetime, with annual power degradation < 0.45%, 1500V compatible to reduce BOS cost

Solid PID resistance ensured by solar cell process optimization and careful module BOM selection

Reduced resistive loss with lower operating current

Higher energy yield with lower operating temperature

Reduced hot spot risk with optimized electrical design and lower operating current

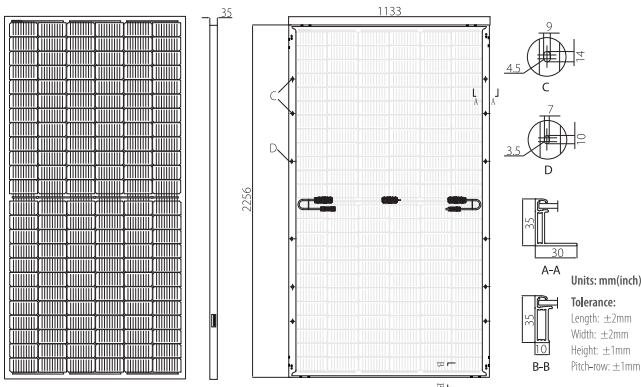
LONGi

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Note: Due to continuous technical innovation, R&D and improvement, technical data above mentioned may be of modification accordingly. LONGi have the sole right to make such modification at anytime without further notice; Demanding party shall request for the latest datasheet for such as contract need, and make it a consisting and binding part of lawful documentation duly signed by both parties.

LR5-72HBD 520~540M

Design (mm)



Mechanical Parameters

Cell Orientation: 144 (6×24)
Junction Box: IP68, three diodes
Output Cable: 4mm², 300mm in length,
length can be customized
Glass: Dual glass
2.0mm coated tempered glass
Frame: Anodized aluminum alloy frame
Weight: 32.3kg
Dimension: 2256×1133×35mm
Packaging: 31pcs per pallet
155pcs per 20'GP
620pcs per 40'HC

Operating Parameters

Operational Temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
 Power Output Tolerance: $0 \sim +5\text{ W}$
 Voc and Isc Tolerance: $\pm 3\%$
 Maximum System Voltage: DC1500V (IEC/UL)
 Maximum Series Fuse Rating: 30A
 Nominal Operating Cell Temperature: $45 \pm 2^{\circ}\text{C}$
 Safety Protection Class: Class II
 Fire Rating: UL type 3
 Bifaciality: $70 \pm 5\%$

Electrical Characteristics

Test uncertainty for Pmax: $\pm 3\%$

Model Number	LR5-72HBD-520M		LR5-72HBD-525M		LR5-72HBD-530M		LR5-72HBD-535M		LR5-72HBD-540M	
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	520	388.3	525	392.1	530	395.8	535	399.5	540	403.3
Open Circuit Voltage (Voc/V)	48.90	45.75	49.05	45.89	49.20	46.03	49.35	46.17	49.50	46.31
Short Circuit Current (Isc/A)	13.57	10.97	13.65	11.03	13.71	11.08	13.78	11.14	13.85	11.19
Voltage at Maximum Power (Vmp/V)	41.05	38.27	41.20	38.41	41.35	38.55	41.50	38.69	41.65	38.83
Current at Maximum Power (Imp/A)	12.67	10.15	12.75	10.21	12.82	10.27	12.90	10.33	12.97	10.39
Module Efficiency(%)	20.3		20.5		20.7		20.9		21.1	

STC (Standard Testing Conditions): Irradiance 1000W/m², Cell Temperature 25 °C, Spectra at AM1.5

NOCT (Nominal Operating Cell Temperature): Irradiance 800W/m², Ambient Temperature 20 °C, Spectra at AM1.5, Wind at 1m/S

Electrical characteristics with different rear side power gain (reference to 530W front)

Pmax /W	Voc/V	Isc /A	Vmp/V	Imp /A	Pmax gain
557	49.20	14.40	41.35	13.46	5%
583	49.20	15.08	41.35	14.10	10%
610	49.30	15.77	41.45	14.74	15%
636	49.30	16.46	41.45	15.38	20%
663	49.30	17.14	41.45	16.02	25%

Temperature Ratings (STC)

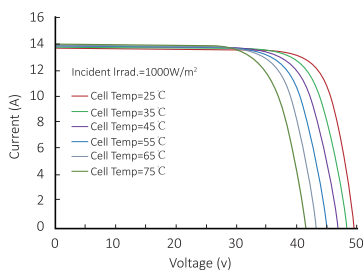
Temperature Coefficient of Isc	+0.050%/°C
Temperature Coefficient of Voc	-0.284%/°C
Temperature Coefficient of Pmax	-0.350%/°C

Mechanical Loading

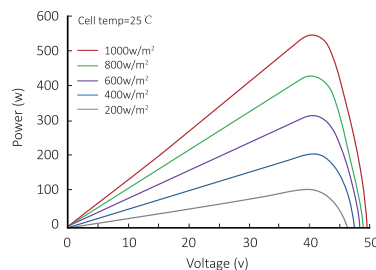
Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

I-V Curve

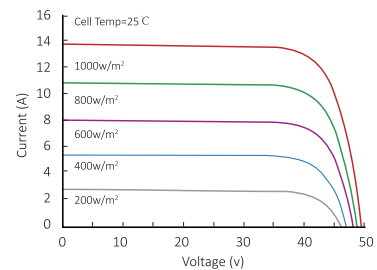
Current-Voltage Curve (LR5-72HBD-530M)



Power-Voltage Curve (LR5-72HBD-530M)



Current-Voltage Curve (LR5-72HBD-530M)



LONGi

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Exhibit B

Manufacturer Specifications

Modules

7. Risen

HIGH PERFORMANCE BIFACIAL PERC MONOCRYSTALLINE MODULE

RSM144-6-370BMDG-390BMDG

144 CELL MONOCRYSTALLINE MODULE

370-390Wp POWER OUTPUT RANGE

1500VDC MAXIMUM SYSTEM VOLTAGE

19.5% MAXIMUM EFFICIENCY



About Risen Energy

Risen Energy is a leading, global tier 1 manufacturer of high-performance solar photovoltaic products and provider of total business solutions for residential, commercial and utility-scale power generation. The company, founded in 1986, and publicly listed in 2010, compels value generation for its chosen global customers. Techno-commercial innovation, underpinned by consummate quality and support, encircle Risen Energy's total Solar PV business solutions which are among the most powerful and cost-effective in the industry. With local market presence and strong financial bankability status, we are committed, and able, to building strategic, mutually beneficial collaborations with our partners, as together we capitalise on the rising value of green energy.

KEY SALIENT FEATURES



Global, Tier 1 bankable brand, with independently certified state-of-the-art automated manufacturing



Bifacial technology enables additional energy harvesting from rear side (up to 25%)



Industry leading lowest thermal co-efficient of power



Industry leading 12 years product warranty



Excellent low irradiance performance



Excellent PID resistance



Positive tight power tolerance



Dual stage 100% EL Inspection warranting defect-free product



Module Imp binning radically reduces string mismatch losses



Warranted reliability and stringent quality assurances well beyond certified requirements



Certified to withstand severe environmental conditions

- ♦ Anti-reflective & anti-soiling surface minimise power loss from dirt and dust
- ♦ Severe salt mist, ammonia & blown sand resistance, for seaside, farm and desert environments
- ♦ Excellent mechanical load 2400Pa & snow load 5400Pa resistance



ISO9001
ISO14001
OHSAS18001

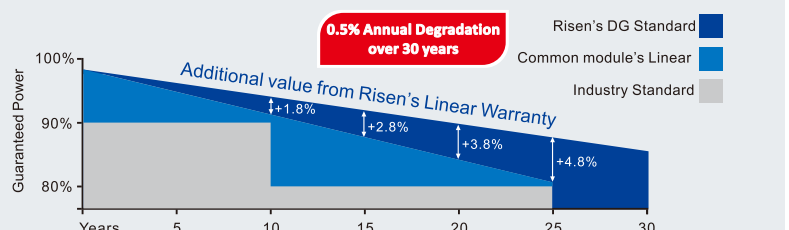


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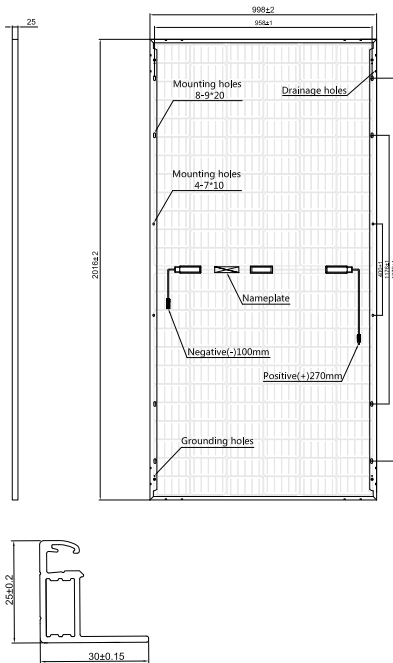
LINEAR PERFORMANCE WARRANTY

12 year Product Warranty / 30 year Linear Power Warranty



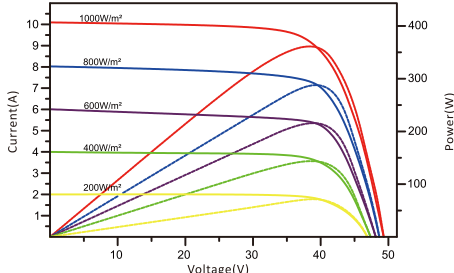
THE POWER OF RISING VALUE

Dimensions of PV Module Unit: mm

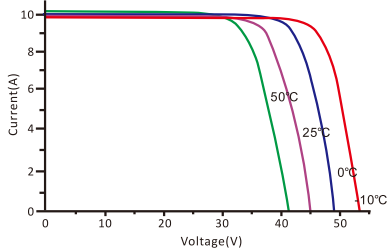


RSM144-6-390BMDG

I-V characteristics at different irradiances



I-V characteristics at different temperatures (AM1.5, 1000W/m²)



ELECTRICAL DATA (STC)

Model Number	RSM144-6-370BMDG	RSM144-6-375BMDG	RSM144-6-380BMDG	RSM144-6-385BMDG	RSM144-6-390BMDG
Rated Power in Watts-Pmax(Wp)	370	375	380	385	390
Open Circuit Voltage-Voc(V)	47.60	47.75	48.00	48.15	48.30
Short Circuit Current-Isc(A)	9.90	10.00	10.10	10.20	10.30
Maximum Power Voltage-Vmpp(V)	39.80	39.90	40.05	40.15	40.25
Maximum Power Current-Imp(A)	9.30	9.40	9.50	9.60	9.70
Module Efficiency (%)	18.5	18.8	19.0	19.3	19.5
Encapsulated Cell Efficiency (%)	20.8	21.1	21.4	21.6	21.9

STC: Irradiance 1000 W/m², Cell Temperature 25°C, Air Mass AM1.5 according to EN 60904-3.
Power production tolerance: 0~+3%

REARSIDE POWER GAIN BIFACIAL FACTOR:75%±5

Model Number	RSM144-6-370BMDG	RSM144-6-375BMDG	RSM144-6-380BMDG	RSM144-6-385BMDG	RSM144-6-390BMDG
10% Power Output(Wp)	407	413	418	424	429
15% Power Output(Wp)	426	431	437	443	449
20% Power Output(Wp)	444	450	456	462	468
25% Power Output(Wp)	463	469	475	481	488

ELECTRICAL DATA (NMOT)

Model Number	RSM144-6-370BMDG	RSM144-6-375BMDG	RSM144-6-380BMDG	RSM144-6-385BMDG	RSM144-6-390BMDG
Maximum Power-Pmax (Wp)	276.7	280.3	284.4	288.1	291.8
Open Circuit Voltage-Voc (V)	43.8	43.9	44.2	44.3	44.4
Short Circuit Current-Isc (A)	8.12	8.20	8.28	8.36	8.45
Maximum Power Voltage-Vmpp (V)	36.5	36.6	36.7	36.8	36.9
Maximum Power Current-Imp (A)	7.59	7.67	7.75	7.83	7.92

NMOT: Irradiance at 800 W/m², Ambient Temperature 20°C, Wind Speed 1 m/s.

MECHANICAL DATA

Solar cells	Monocrystalline, 6" half cell
Cell configuration	144 cells (6×12×6×12)
Module dimensions	2016×998×25mm
Weight	26kg
Superstrate	2.0 mm, ARC Glass
Substrate	2.0 mm, Glazed Glass
Frame	Anodized Aluminium Alloy type 6063T5, Silver Color
J-Box	Potted, IP68, 1500VDC, 3 Schottky bypass diodes
Cables	4.0mm² (12AWG), positive 270mm length, negative 100mm length
Connector	Risen Twinsel PV-SY02, IP68

TEMPERATURE & MAXIMUM RATINGS

Nominal Module Operating Temperature (NMOT)	45°C±2°C
Temperature Coefficient of Voc	-0.29%/°C
Temperature Coefficient of Isc	0.06%/°C
Temperature Coefficient of Pmax	-0.37%/°C
Operational Temperature	-40°C~+85°C
Maximum System Voltage	1500VDC
Max Series Fuse Rating	20A
Limiting Reverse Current	20A

PACKAGING CONFIGURATION

	40ft	20ft
Number of modules per container	880	400
Number of modules per pallet	40	40
Number of pallets per container	22	10
Packaging box dimensions (LxWxH) in mm	2110×1130×1140	2110×1130×1140
Box gross weight[kg]	1100	1100

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

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THE POWER OF RISING VALUE

Exhibit B

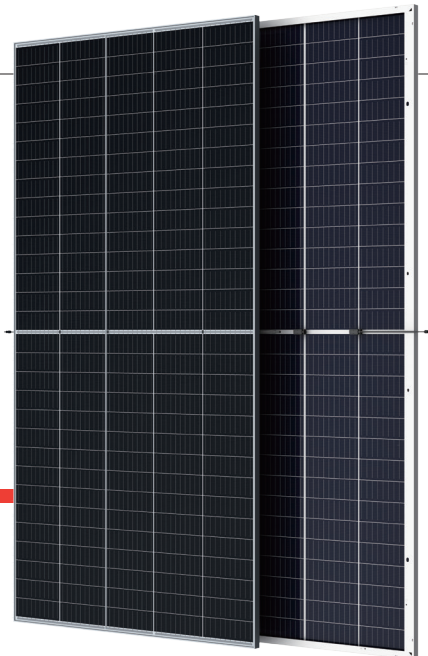
Manufacturer Specifications

Modules

8. Trina

THE Vertex

BIFACIAL DUAL GLASS MONOCRYSTALLINE MODULE



500W+

MAXIMUM POWER OUTPUT

21.0%

MAXIMUM EFFICIENCY

0~+5W

POSITIVE POWER TOLERANCE

Founded in 1997, Trina Solar is the world's leading total solution provider for solar energy. With local presence around the globe, Trina Solar is able to provide exceptional service to each customer in each market and deliver our innovative, reliable products with the backing of Trina as a strong, bankable brand. Trina Solar now distributes its PV products to over 100 countries all over the world. We are committed to building strategic, mutually beneficial collaborations with installers, developers, distributors and other partners in driving smart energy together.

Comprehensive Products and System Certificates

IEC61215/IEC61730/IEC61701/IEC62716/UL1703
 ISO 9001: Quality Management System
 ISO 14001: Environmental Management System
 ISO14064: Greenhouse Gases Emissions Verification
 ISO45001: Occupational Health and Safety Management System



PRODUCTS

TSM-DEG18MC.20(II)

POWER RANGE

475-505W



High customer value

- Lower LCOE (Levelized Cost Of Energy), reduced BOS (Balance of System) cost, shorter payback time
- Lowest guaranteed first year and annual degradation; extended 30-year warranty
- Designed for compatibility with existing mainstream system components
- Higher return on Investment



High power up to 505W

- Large area cells based on 210mm silicon wafers and 1/3-cut cell technology
- Up to 21.0% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection



High reliability

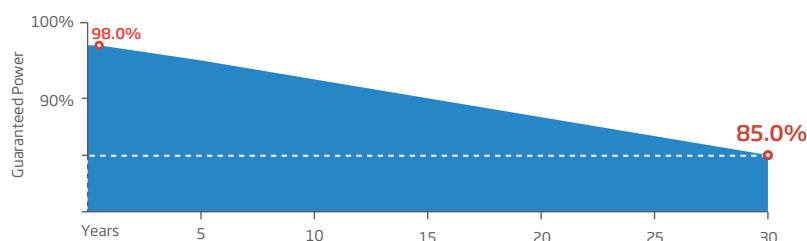
- Minimized micro-cracks with innovative non-destructive cutting technology
- Ensured PID resistance through cell process and module material control
- Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity areas
- Mechanical performance up to 5400 Pa positive load and 2400 Pa negative load
- Certificated to fire class A



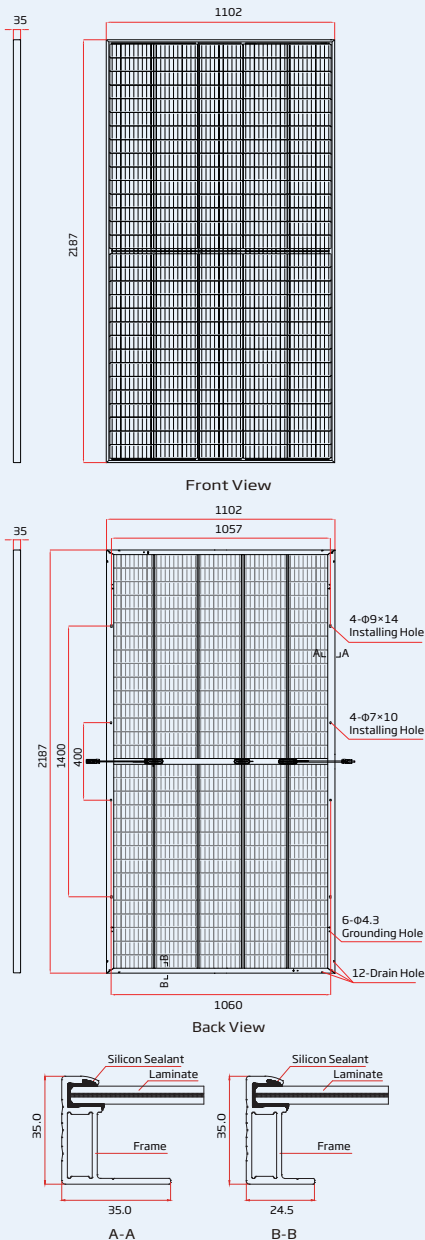
High energy yield

- Excellent IAM (Incident Angle Modifier) and low irradiation performance, validated by 3rd party certifications
- The unique design provides optimized energy production under inter-row shading conditions
- Lower temperature coefficient (-0.35%) and operating temperature
- Up to 25% additional power gain from back side depending on albedo

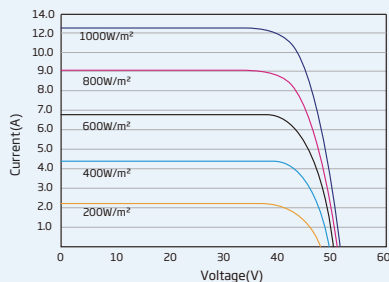
Trina Solar's VERTEX Bifacial Dual Glass Performance Warranty



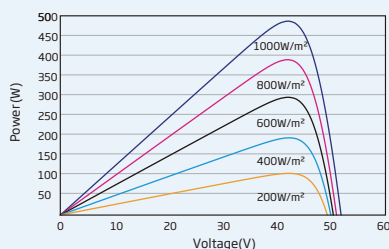
DIMENSIONS OF PV MODULE(mm)



I-V CURVES OF PV MODULE(490 W)



P-V CURVES OF PV MODULE(490W)



ELECTRICAL DATA (STC)

Peak Power Watts- P_{MAX} (Wp)*	475	480	485	490	495	500	505
Power Tolerance- P_{MAX} (W)	0 ~ +5						
Maximum Power Voltage- V_{MPP} (V)	41.9	42.2	42.5	42.8	43.1	43.4	43.7
Maximum Power Current- I_{MPP} (A)	11.34	11.38	11.42	11.45	11.49	11.53	11.56
Open Circuit Voltage- V_{OC} (V)	50.5	50.7	50.9	51.1	51.3	51.5	51.7
Short Circuit Current- I_{SC} (A)	11.93	11.97	12.01	12.05	12.09	12.13	12.17
Module Efficiency η_m (%)	19.7	19.9	20.1	20.3	20.5	20.7	21.0

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5.

*Measuring tolerance: $\pm 3\%$.

Electrical characteristics with different power bin (reference to 10% Irradiance ratio)

Total Equivalent power - P_{MAX} (Wp)	508	514	519	524	530	535	540
Maximum Power Voltage- V_{MPP} (V)	41.9	42.2	42.5	42.8	43.1	43.4	43.7
Maximum Power Current- I_{MPP} (A)	12.13	12.18	12.22	12.24	12.29	12.34	12.37
Open Circuit Voltage- V_{OC} (V)	50.5	50.7	50.9	51.1	51.3	51.5	51.7
Short Circuit Current- I_{SC} (A)	12.77	12.81	12.85	12.89	12.94	12.98	13.02
Irradiance ratio (rear/front)	10%						

ELECTRICAL DATA (NMOT)

Maximum Power- P_{MAX} (Wp)	360	363	367	371	374	378	382
Maximum Power Voltage- V_{MPP} (V)	39.5	39.8	40.0	40.2	40.5	40.8	41.0
Maximum Power Current- I_{MPP} (A)	9.09	9.13	9.18	9.21	9.25	9.28	9.33
Open Circuit Voltage- V_{OC} (V)	47.7	47.9	48.1	48.3	48.5	48.7	48.8
Short Circuit Current- I_{SC} (A)	9.61	9.64	9.67	9.70	9.73	9.77	9.80

NMOT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline
No. of cells	150 cells
Module Dimensions	2187×1102×35 mm (86.10×43.39×1.38 inches)
Weight	30.1 kg (66.4 lb)
Front Glass	2.0 mm (0.08 inches), High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	POE/EVA
Back Glass	2.0 mm (0.08 inches), Heat Strengthened Glass (White Grid Glass)
Frame	35mm(1.38 inches) Anodized Aluminium Alloy
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm ² (0.006 inches ²), Portrait: 280/280 mm(11.02/11.02 inches) Landscape: 2000/2000 mm(78.74/78.74 inches)
Connector	MC4 EVO2 / TS4*

*Please refer to regional datasheet for specified connector.

TEMPERATURE RATINGS

NMOT (Nominal Module Operating Temperature)	41°C ($\pm 3^\circ\text{C}$)
Temperature Coefficient of P_{MAX}	- 0.35%/°C
Temperature Coefficient of V_{OC}	- 0.25%/°C
Temperature Coefficient of I_{SC}	0.04%/°C

(Do not connect Fuse in Combiner Box with two or more strings in parallel connection)

WARRANTY

12 year Product Workmanship Warranty
30 year Power Warranty
2% first year degradation
0.45% Annual Power Attenuation

(Please refer to product warranty for details)

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC (IEC)
Max Series Fuse Rating	25A

PACKAGING CONFIGURATION

Modules per box: 30 pieces
Modules per 40' container: 600 pieces

Exhibit B

Manufacturer Specifications

Trackers

9. Array Technologies

10. NEXTracker

Exhibit B

Manufacturer Specifications

Trackers

9. Array Technologies

**99.996%
UPTIME.
ENGINEERED
SIMPLICITY.**

**7%
LOWER
LCOE**

**31%
LOWER
LIFETIME
O&M**

DuraTrack® HZ v3

Three decades of field-tested design improvements have resulted in the DuraTrack® HZ v3 — the most durable, reliable tracking system under the sun. While our single-bolt module clamp and forgiving tolerances streamline installation, and our flexibly linked architecture maximizes power density, it's our innovative use of fewer components and a failure-free wind management system that makes Array Technologies the best choice for solar trackers. **Better. Stronger. Smarter.**



HIGHEST POWER DENSITY.

Higher density means more power and more profit. DuraTrack HZ v3 offers the unique ability to maximize the power density of each site, boasting 100 modules per row and higher density than our closest competition.



LEADING TERRAIN ADAPTABILITY.

Our flexibly linked architecture, with articulating driveline joints and forgiving tolerances, creates the most adaptable system on the market for following natural land contours while creating the greatest power generation potential from every site.



FEWER COMPONENTS. GREATER RELIABILITY.

Array was founded on a philosophy of engineered simplicity. Minimizing potential failure points (167 times fewer components than competitors), DuraTrack HZ v3 consistently delivers higher reliability and superior uptime.



FAILURE-FREE WIND DESIGN.

DuraTrack HZ v3 was designed and field tested to withstand some of the harshest conditions on the planet. It is the only tracker on the market that reliably handles wind events with a fully integrated, fully mechanical, passive wind-load mitigation system without the need for complex communication systems, batteries, or power.



ZERO SCHEDULED MAINTENANCE.

Maintenance-free motors and gears, fewer moving parts, and industrial-grade components—what does this mean for our customers? No scheduled maintenance required. While our competitors average two unscheduled maintenance events per day, we average only one per year.

COST VERSUS VALUE

We believe value is more than the cost of a tracking system. It's about building with forgiving tolerances and fewer parts so construction crews can work efficiently. It means protecting your investment with a failure-free wind management system. It also includes increasing power density. But most of all, value is measured in operational uptime, or reliability.

THE GLOBAL LEADER IN RELIABILITY

Array has spent decades designing and perfecting the most reliable tracker on the planet. Fewer moving parts, stronger components and intelligent design that protects your investment in the harshest weather are but a few of the innovative differences that keep your system running flawlessly all day and you resting easy at night.

ARRAY TECHNOLOGIES, INC.

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30 GW YEARS OF
OPERATION

167x FEWER COMPONENTS THAN
COMPETITIVE TRACKERS

STRUCTURAL & MECHANICAL FEATURES/SPECIFICATIONS

Tracking Type	Horizontal single axis
Less than 1 drive motor /MW	Up to 1.559 MW DC
String Voltage	Up to 1,500V DC
Maximum Linked Rows	32
Maximum Row Size	116 modules crystalline, and bifacial: 240 modules First Solar 4; 90 modules First Solar 6 and 6 Plus
Drive Type	Rotating gear drive
Motor Type	2 HP, 3 PH, 480V AC
East-West/North-South Dimensions	Site / module specific
Array Height	54" standard, adjustable (48" min height above grade)
Ground Coverage Ratio (GCR)	Flexible, 28–45% typical, others supported on request
Terrain Flexibility	N-S tolerance: 0-15% standard, 26% optional; Driveline: 40° in all directions
Modules Supported	Most commercially available, including frameless crystalline, thin film, and bifacial
Tracking Range of Motion	± 52° standard, ± 62° optional
Operating Temperature Range	-30°F to 140°F (-34°C to 60°C)
Module Configuration available.	Single-in-portrait standard, including bifacial. Four-in-landscape (thin film)
Module Attachment	Single fastener, high-speed mounting clamps with integrated grounding. Traditional rails for crystalline in landscape, custom racking for thin film and frameless crystalline and bifacial per manufacturer specs.
Materials	Pre-galv steel, HDG steel and aluminum structural members, as required
Allowable Wind Load (ASCE 7-10)	140 mph, 3-second gust exposure C
Wind Protection	Failure free passive mechanical system protects against wind damage without the use of complex communications systems, batteries — no power required

ELECTRONIC CONTROLLER FEATURES/SPECIFICATIONS

Solar Tracking Method	Algorithm with GPS input
Control Electronics	MCU plus Central Controller
Data Feed	MODBUS over Ethernet to SCADA system
Night-time Stow	Yes
Tracking Accuracy	± 2° standard, field adjustable
Backtracking	Yes

INSTALLATION, OPERATION & MAINTENANCE

Software	SmarTrack optimization available
PE Stamped Structural Calculations & Drawings	Yes
On-site Training and System Commissioning	Yes
Connection Type	Fully bolted connections, no welding
In-field Fabrication Required	No
Dry Slide Bearings and Articulating Driveline Connections	No lubrication required
Scheduled Maintenance	None required
Module Cleaning Compatibility	Robotic, Tractor, Manual

GENERAL

Annual Power Consumption (kWh per 1 MW)	400 kWh per MW per year, estimate
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Exhibit B

Manufacturer Specifications

Trackers

10. NEXTracker

A photograph of the NX Horizon Self-Powered Tracker solar panel system. It shows two rows of blue solar panels mounted on a silver metal tracking structure. The panels are tilted at an angle, and the tracking mechanism is visible in the center. The background is a clear blue sky and green grass.

NX Horizon Self-Powered Tracker

Our most amazing tracker yet.

In our mission to make solar a mainstream energy source, NEXTracker has engineered the most intelligent and flexible tracking technology yet. Using sustainable design methods with outcomes that benefit people and the planet, we bring you: NX Horizon™.

NX Horizon (formerly referred to as the Self-Powered Tracker or SPT), brings self-contained motor power to each row, eliminating power wiring and trenching. Our advanced horizontal tracker has the widest rotational range available, lowest O&M costs, and requires far less power to operate than other trackers. By offering more powerful systems at a greater value, NEXTracker enables greater deployment of renewable energy worldwide.

NX Horizon key features and benefits include:

- Self-powered system with smart performance communications: Self-contained units on each row include a dedicated PV panel to provide power to the controller which drives the motor and hosts intelligent control electronics to position each tracker. With smart communications built in, NX Horizon systems can be accessed remotely, providing customers with a granular view to optimize tracker performance, operations and maintenance.
- Independent balanced rows with 120 degree rotational range: Each NX Horizon row has its own controlled motor with rotational range that delivers up to 2% more energy than typical linked row trackers. These agile, independent rows stop in less than 90 seconds to reduce wind forces

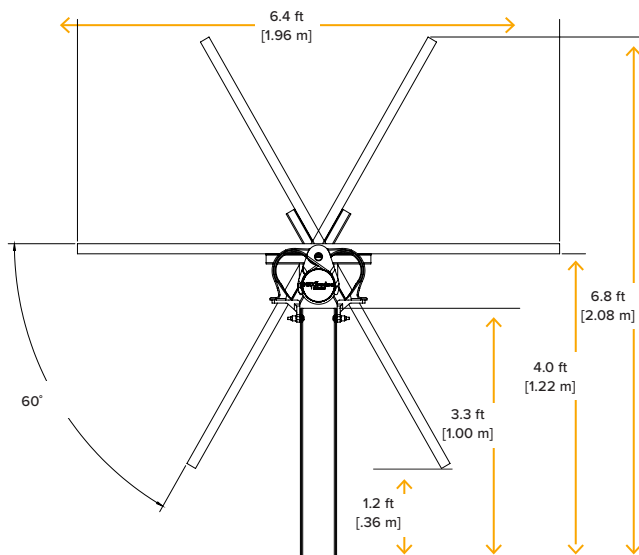
on the array, protecting the PV modules in harsh environments. NX Horizon solar trackers also have a mechanically balanced row design that aligns PV panels with the tracker's axis of rotation – which greatly reduces row torque, using less energy from the motor to track throughout the day.

- Self-grounded system with theft-proof fasteners: NX Horizon is the world's first horizontal tracker with an entirely self-grounded design. This means no separate bonding hardware is required. You save on material and associated costs by eliminating grounding washers, braided straps, bare copper wire, and grounding rods. What's more, we've designed our own fasteners that can only be removed with special tools – deterring PV theft.

NX Horizon Specifications

Tracking Technology	Horizontal single-axis balanced-mass tracker with independently-driven rows
Tracking Range	Up to 120° ($\pm 60^\circ$)
Control System	1 Self-Powered Controller (SPC) per tracker; 1 Network Control Unit (NCU) per 100 SPCs
Communications	Wireless ZigBee® mesh network/SCADA; no communication wiring required
Drive System	One slew gear, 24 VDC motor and self-powered controller w/dedicated solar panel per row
DC Capacity	23-35kWp per tracker row, depending on panel type. Row length up to 90 panels.
System Voltage	1,500 volt or 1,500 volt
Power Consumption	No grid power required
Ground Coverage Ratio	Fully configurable by customer; typical range 33%-50%
Installation Method	Rapid field assembly, no welding required
Foundation Types	Compatible with all major foundation types (driven pier, concrete foundation, ground screw)
Standard Wind Design	100 mph/161 kph, 3 second gust per ASCE7-10; configurable for higher wind speeds
Safety Stowing	Automated wind and snow stowing with self-contained backup power; no external power required
Torsional Limiter	Included at each foundation/bearing for additional wind and snow load protection
Principal Materials	Galvanized and stainless steel
Grounding Method	Self-grounding structure; separate materials and labor not required
Compliance	Grounding/bonding: UL2703; structural design: ASCE7-10
Other Available Options	Snow and flood sensors
Warranty	10 years on structural components; 5 years on drive and control systems
Typical Dimensions	Height 2.1 m/6.8 ft (@ 60°), Width 2.0 m/6.4 ft, Length 85 m/283 ft

Typical 72-cell c-Si configuration: 85 m row with 80 panels mounted in portrait:



NEXTracker

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nextracker.com



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Case No(s). 21-0036-EL-BGN

Summary: Application - 4 of 30 (Exhibit B - Manufacturer Specifications) electronically filed by Christine M.T. Pirik on behalf of Marion County Solar Project, LLC