



Diseño integrado de un bombeo de agua de 850 kW con energía solar fotovoltaica en el término municipal de Benifaió (Valencia).

ANEJO Nº 4:

ESPECIFICACIONES TÉCNICAS

PURE ENERGY

SOLAR SOLUTIONS

HEC PLUS 1000V INVERTER



HEC PLUS

UTILITY SCALE SOLAR INVERTER



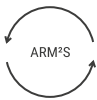
OUTDOOR DURABILITY



iCOOL



ACTIVE HEATING



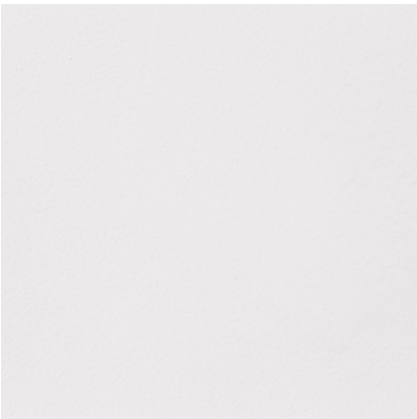
**AUTOMATIC REDUNDANT
MODULAR MULTI-MASTER SYSTEM**

THE MOST POWERFUL AND RELIABLE UTILITY-SCALE PV INVERTER ON THE MARKET

Power Electronics' HEC PLUS outdoor modular and redundant inverters are the most powerful and reliable Utility Scale PV Inverters on the market. The upgraded 1000Vdc class inverters offer an extended MPPT voltage range and maximum efficiency in AC output voltages ranging from 400Vac to 460Vac, covering all commercial and utility-scale PV facilities.

The HEC PLUS is based on a modular & redundant topology with up to 10 modules that provide the competitiveness of central inverters and the availability of string inverters. The HEC PLUS is featured with an outdoor stainless steel enclosure, 50mm mineral isolation panel and the most advanced iCOOL filter-less system that makes it suitable for the most demanding conditions.

ROBUST DESIGN



Polymeric Painting



Mineral Panel



Galvanized Steel | Stainless Steel (Optional)

HEC PLUS inverters have been designed to last for more than 25 years of operation in harsh environments and extreme weather conditions. HEC PLUS units are tested and ready to withstand conditions from the frozen siberian tundra to the californian Death Valley, featuring:

Totally sealed electronics cabinet protects electronics against dust and moisture.

Conformal coating on electronic boards shields PCBs from harsh atmospheres.

Temperature and humidity controlled active heating prevents internal water condensation.

Galvanized Steel construction with 2mm thickness for maximum enclosure longevity.

50mm mineral panel isolates the cabinet from solar heat gains.

Roof cover designed to dissipate solar radiation, reduce heat build-up and avoid water leakages.

The solid HEC PLUS structure avoids the need of additional external structures.

Random units selected to pass a Factory Water Tightness Test ensuring product quality.

Anti-corrosive polymeric C4 paint coat according to ISO 9223 used in the most unforgiving environments. The HEC PLUS is also available in a C5-M degree of protection by request.

TOPOLOGY

STAINLESS STEEL ENCLOSURE

Inox construction with 2mm thickness for maximum enclosure longevity.

SPECIAL PAINT

Anti-corrosive polymeric paint (C4) ISO-9223 is used on all HEC inverters.

INSULATION

50mm of insulation material protects internal components from external solar heat gains.

NO CONDENSATION

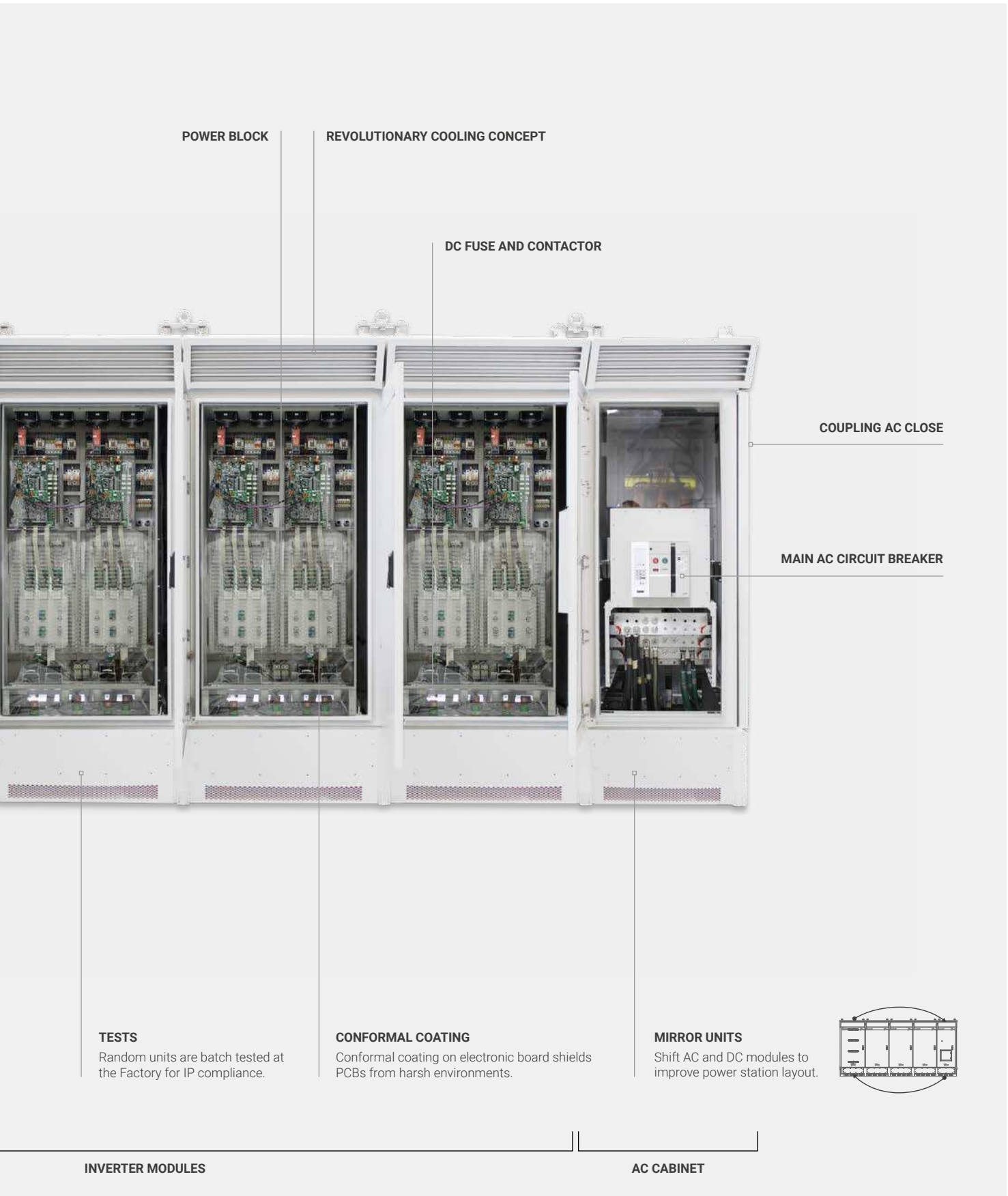
The active cabinet heating regulates temperature and prevents internal water condensation.

DOUBLE GASKETED DOORS

IP54 rated electronic area, protected from dust and moisture.

FSDK Recombiner

- Up to 32 fuse protected inputs.
- Zone monitoring. CT's in each input.
- Up to 32 contactors with lockout/ tagout safety features.



POWER BLOCK

REVOLUTIONARY COOLING CONCEPT

DC FUSE AND CONTACTOR

COUPLING AC CLOSE

MAIN AC CIRCUIT BREAKER

TESTS

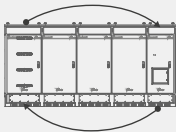
Random units are batch tested at the Factory for IP compliance.

CONFORMAL COATING

Conformal coating on electronic board shields PCBs from harsh environments.

MIRROR UNITS

Shift AC and DC modules to improve power station layout.



INVERTER MODULES

AC CABINET

AUTOMATIC REDUNDANT MODULAR MULTI-MASTER SYSTEM

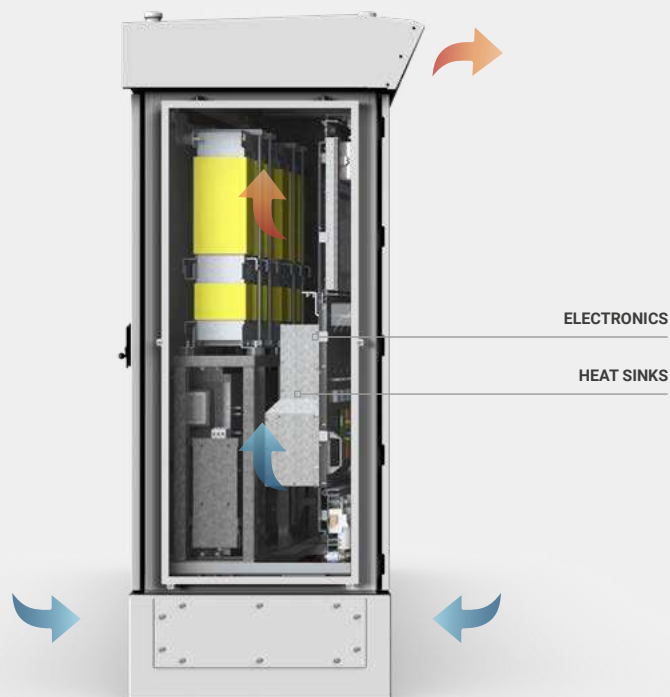
The HEC PLUS is a central inverter based on an Automatic Redundant Modular Multi-Master System (200kVA to 250kVA per module). The unit's redundant multi-master capability translates into more availability and therefore more power

production. Modularity allows for the use of fewer type of components throughout the product range, reducing maintenance costs and simplifying the stock of spare parts.

INNOVATIVE COOLING SYSTEM

In Power Electronics we don't believe in cost cutting when it affects the quality of the product and that's why we oversize sensitive components and improve the sophisticated iCOOL performance that allow HEC PLUS to work at 50°C. Our know how in mining, water treatment plants and CSP facilities located in the most demanding locations all over the world have given us the necessary experience to develop the perfect technical solution for our outdoor solar inverters.

HEC PLUS modules are divided into two main areas: clean area (electronics) and hot area (filters and heat sink). The electronics are totally sealed and use a temperature control low flow cooling system that reduces filters clogging and maintenance intervals. The hot area integrates independent and speed controlled fans per each module, reducing to the maximum the Stand-by consumption at low capacity and boosting the cooling capacity for PV installation situated at higher altitudes than 3000 meters above sea level.



EASY TO SERVICE

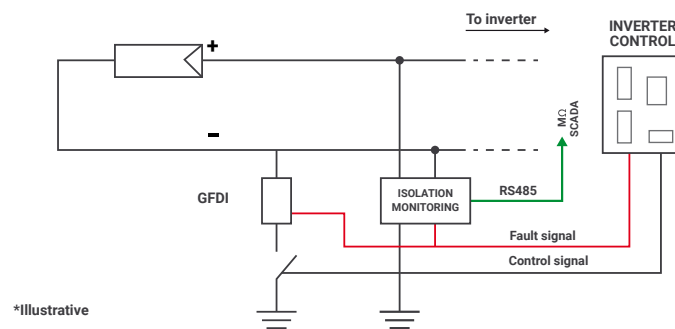
By providing full front and rear access the HEC series simplifies the maintenance tasks. The frontal access allows the checking of the whole electronic cabinet (electronics boards, semiconductors, power supply, contactors...) while the rear access permits the revision of AC fuses and LCL filter.



PV ARRAY TRANSFER KIT

By mounting this kit, the inverter and the PV plant will be able to shift its running conditions from negative grounded array to floating array and viceversa. Under regular conditions the inverter will be running with a negative pole grounded and therefore, a GDFI will provide protection against unlikely ground fault defects and the solar cells will not suffer a nega-

tive voltage relative to their surroundings at any time. This running mode can be transferred to a floating array configuration enabling an isolation monitoring device that the O&M can use for: regular PV plant isolation control, identification of the array affected by a ground fault defect and most important, increase the operator safety under O&M service activities.



EXTENDED MPPT

Using the latest modulation techniques, inspired by the most accurate and powerful motor control applications, has lead to the widest MPPT full power window in the solar market. It allows optimal PV plant design and boosted performance rates.

ACTIVE HEATING

At night, when the unit is not actively exporting 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

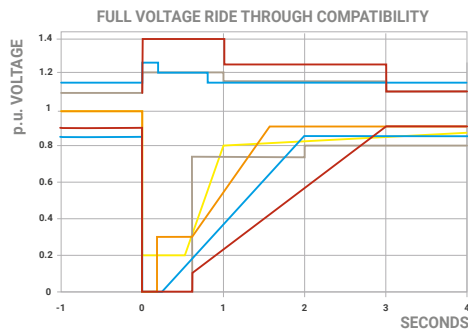
the most efficient and homogeneous way to prevent condensation, increasing the inverters availability and reducing the maintenance. **PATENTED**

VAR AT NIGHT

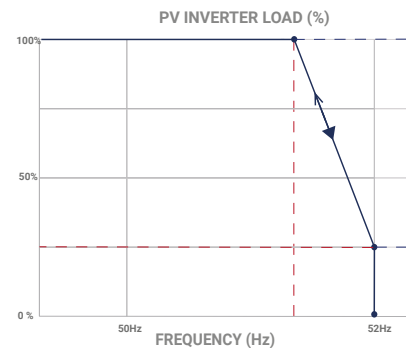
At night, the HEC PLUS inverter can shift to reactive power compensation mode. The inverter can respond to an external dynamic signal, a Power Plant Controller command or pre-set reactive power level (kVAr).

DYNAMIC GRID SUPPORT

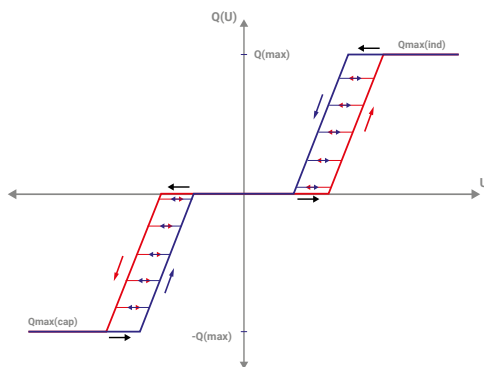
HEC PLUS firmware includes the latest utility interactive features (LVRT, OVRT, FRS, FRT, Anti-islanding, active and reactive power curtailment...), and can be configured to meet specific utility requirements.



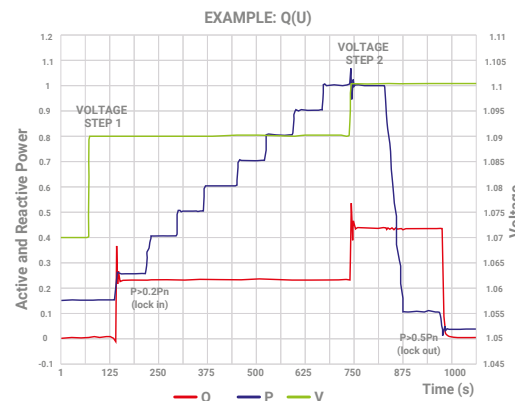
Low Voltage Ride Through (LVRT or ZVRT). Inverters can withstand any voltage dip or profile required by the local utility. The inverter can immediately feed the fault with full reactive current, as long as the protection limits are not exceeded.



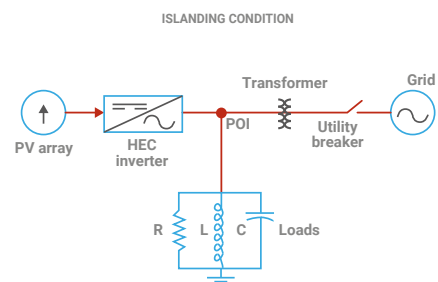
Frequency Regulation System (FRS). Frequency droop algorithm curtails the active power along a preset characteristic curve supporting grid stabilization.



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.



Anti-islanding. This protection combines passive and active methods that eliminates nuisance tripping and reduces grid distortion according to IEC 62116 and IEEE1547.

DISCONNECTION AND PROTECTION

HEC PLUS is available with an external DC disconnection and protection unit (DU unit) that will be coupled together with the inverter by a mounting kit. The DC subsystems are fully customizable and can be featured with up to 40 inputs. The disconnecting unit goes one step further by improving the PV plant safety and operation for those who apply the best engineering.



TECHNICAL INFORMATION

Maximum DC Current (A):	According to fuse rating
Maximum Continuous current (A)	According to fuse rating
Max. Positive and Negative input Wire size	600kcmil / 300mm ²
Max. Input wires	2 x 600kcmil per input
Operating Temperature	-20°C to 60°C
Zone Monitoring	Optional in each positive input
Lockout-tagout	One general as standard, other configurations optional
Fuse mounting	40xBusbar Bolted (US), 32xNH fuse base (IEC)
Terminals	Lugs Rated 90°C with 2 holes – 1.75" hole spacing
Cooling	Forced air cooling, temperature controlled, optional heating resistors
Avg. Consumption	82W (230Vac)

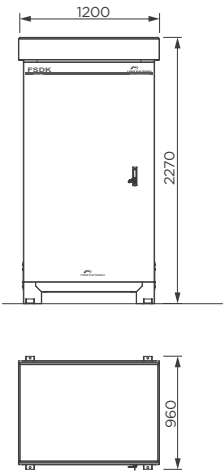
CONFIGURATION TABLE

FAMILY	FSDK Recombiner											
SERIES	C	HEC Series										
TYPE	U	UL	J	JAPAN	H	IEC						
MAXIMUM VOLTAGE	10	1000V										
FRAME	1	Frame 1	2	Frame 2								
INPUTS PER POLE	01	1 Input	40	40 Inputs						
STRING LOCKOUT AND TAGOUT	A	Standard (1 input per tray)	B	3 Push buttons	C	4 Push buttons	Z	1 Push button per Input		
LIGHTNING AND OVERVOLTAGE PROTECTIONS	O	Type 2	L	Type 1 + Type 2								
ZONE MONITORING	N	Not included	C	Voltage and Current Monitoring	I	Voltage and Current Monitoring + Low String Insulation Detector						
INSULATION MONITORING	I	Basic Insulation Monitoring Device	M	Insulation Monitoring and Measurement Device	G	GFDI	N	GFDI + Insulation Monitoring and Measurement Device				
	Floating array				Negative grounding							
PAINT AND CORROSION PROTECTION	A	C4 - RAL7035	B	C4 - RAL6013	C	C4 - RAL6005	M	C5M - RAL7035	N	C5M - RAL6013	O	C5M - RAL6005
INVERTER CONNECTION	S	Standard		Y	Symmetrical							
EXTERNAL METERING	N	Not Included		I	Included							

DIMENSIONS & DIAGRAM

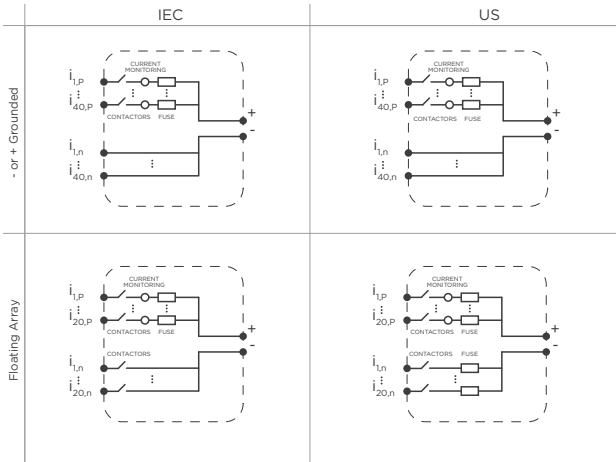
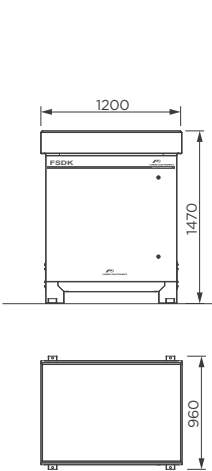
FRAME 2

(21 to 40 fuse protected input)



FRAME 1

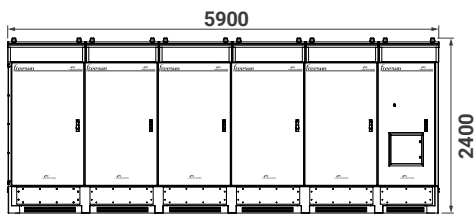
(1 to 20 fuse protected input)



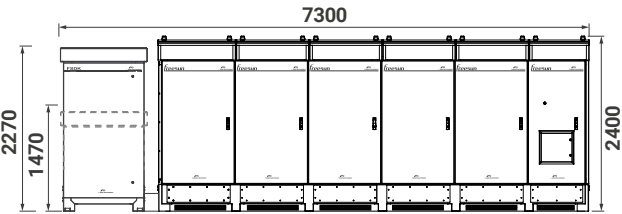
FRAMES AND DIMENSIONS

HEC PLUS

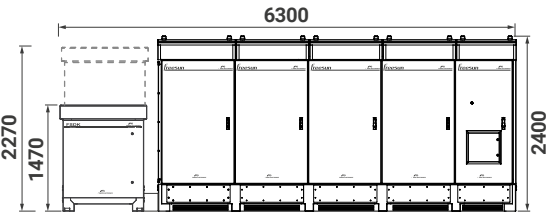
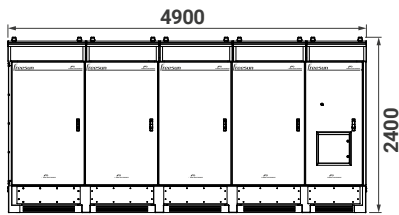
FRAME 4



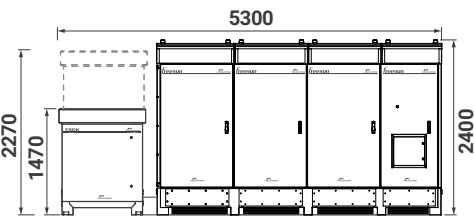
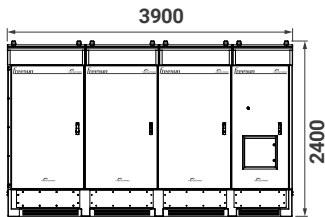
HEC PLUS + FSDK



FRAME 3



FRAME 2



Depth of all units is 1020mm.

TECHNICAL CHARACTERISTICS

HEC PLUS - 460V

		FRAME 2		FRAME 3		FRAME 4	
NUMBER OF MODULES		5	6	7	8	9	10
REFERENCE		FS1162CH	FS1391CH	FS1620CH	FS1850CH	FS2081CH	FS2300CH
OUTPUT	AC Output Power(kVA/kW) @50°C ^[1]	1160	1390	1620	1850	2080	2300
	AC Output Power(kVA/kW) @25°C ^[1]	1270	1530	1780	2040	2290	2550
	Max. AC Output Current (A) @25°C	1600	1920	2240	2560	2880	3200
	Operating Grid Voltage(VAC)	460Vac					
	Operating Range, Grid Frequency	50Hz/60Hz					
	Current Harmonic Distortion(THDi)	< 3% at any load condition					
	Power Factor (cosine phi) ^[2]	0.00 leading ... 0.00 lagging adjustable / Reactive Power injection at night					
	Power Curtailment	0...100%/0.1% Steps					
INPUT	MPPT Voltage Window (VDC) ^[1]	651V-900V					
	MPPT window @full power (VDC) ^[1]	671V–820V @50°C / 744V–820V @25°C					
	Maximum DC and Starting voltage	1000V					
	Max. DC continuous current (A)	1750	2100	2450	2800	3150	3500
	Max. DC short circuit current (A)	2275	2730	3185	3640	4095	4550
EFFICIENCY & AUXILIARY SUPPLY	Max. Efficiency PAC, nom (η)	98.6%		98.6%		98.6%	
	Euroeta (η)	98.3%		98.4%		98.4%	
	Max. Standby Consumption (Pnight)	< approx. 40W/per module					
	Control Power Supply	400V/230VAC–1kVA user power supply available, Optional 6kVA					
	Max. Power Consumption	2300W	2760W	3220W	3680W	4140W	4600W
	Max. Apparent Power (VA)	4800VA	5600VA	6500VA	7300VA	8200VA	9000VA
CABINET	Dimensions [WxDxH] [mm]	3900x1050x2400		4900x1050x2400		5900x1050x2400	
	Weight (kg)	3540	3850	4590	4900	5640	5950
	Air Flow	Intake through lower part blown out through upper side					
	Type of ventilation	Forced air cooling					
ENVIRONMENT	Degree of protection	IP54					
	Permissible Ambient Temperature	-30°C ^[3] to +60°C / >50°C Active Power derating					
	Relative Humidity	0% to 100% non condensing					
	Max. Altitude (above sea level)	4000m; >1000m power derating					
	Noise level ^[4]	< 79 dBA					
CONTROL INTERFACE	Interface	Alphanumeric Display / Optional Freesun App					
	Communication	RS232 / RS485 / USB / Ethernet, (Modbus RTU Protocol, Modbus TCP/IP)					
	Analogue Inputs	1 programmable and differential inputs; (0-20mA or ± 10mV to ± 10V) and PT100					
	String Supervisor Communication	RS485 / Modbus RTU					
	Plant Controller Communication	Ethernet / Modbus TCP/IP					
	Digital Outputs	1 electrically-isolated programmable switched relays (250VAC, 8A or 30VDC, 8A)					
	PROTECTIONS	Humidity control	Active Heating				
ON / OFF Pushbutton		Standard					
General AC Protection & Disconn.		Circuit Breaker					
General DC Protection & Disconn.		Optional External Disconnecting Unit Cabinet					
Module AC Protection & Disconn.		AC contactor & fuses					
Module DC Protection & Disconn.		DC contactor & DC fuses					
Overvoltage Protection		AC, DC Inverter and auxiliary supply type 2 - Internal Standard					
DC Lightning Protections		Optional (Integrated in the inverter)					

[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] Heating resistors kit option below -20°C.

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

TECHNICAL CHARACTERISTICS

HEC PLUS - 440V

		FRAME 2		FRAME 3		FRAME 4	
NUMBER OF MODULES		5	6	7	8	9	10
REFERENCE		FS1112CH	FS1331CH	FS1550CH	FS1770CH	FS1991CH	FS2200CH
OUTPUT	AC Output Power(kVA/kW) @50°C ^[1]	1110	1330	1550	1770	1990	2200
	AC Output Power(kVA/kW) @25°C ^[1]	1220	1460	1710	1950	2190	2440
	Max. AC Output Current (A) @25°C	1600	1920	2240	2560	2880	3200
	Operating Grid Voltage(VAC)	440Vac					
	Operating Range, Grid Frequency	50Hz/60Hz					
	Current Harmonic Distortion (THDi)	< 3% at any load condition					
	Power Factor (cosine phi) ^[2]	0.00 leading ... 0.00 lagging adjustable / Reactive Power injection at night					
	Power Curtailment	0...100%/0.1% Steps					
INPUT	MPPt Voltage Window (VDC) ^[1]	623V-900V					
	MPPt window @full power (VDC) ^[1]	642V-820V @50°C / 712V-820V @25°C					
	Maximum DC and Starting voltage	1000V					
	Max. DC continuous current (A)	1750	2100	2450	2800	3150	3500
	Max. DC short circuit current (A)	2275	2730	3185	3640	4095	4550
	EFFICIENCY & AUXILIARY SUPPLY	Max. Efficiency PAC, nom (η)	98.6%		98.6%		98.6%
Euroeta (η)		98.3%		98.4%		98.4%	
Max. Standby Consumption (Pnight)		< approx. 40W/per module					
Control Power Supply		400V/230VAC-1kVA user power supply available, Optional 6kVA					
Max. Power Consumption		2300W	2760W	3220W	3680W	4140W	4600W
Max. Apparent Power (VA)		4800VA	5600VA	6500VA	7300VA	8200VA	9000VA
CABINET		Dimensions [WxDxH] [mm]	3900x1050x2400		4900x1050x2400		5900x1050x2400
	Weight (kg)	3540	3850	4590	4900	5640	5950
	Air Flow	Intake through lower part blown out through upper side					
	Type of ventilation	Forced air cooling					
ENVIRONMENT	Degree of protection	IP54					
	Permissible Ambient Temperature	-30°C ^[3] to +60°C / >50°C Active Power derating					
	Relative Humidity	0% to 100% non condensing					
	Max. Altitude (above sea level)	4000m; >1000m power derating					
	Noise level ^[4]	< 79 dBA					
CONTROL INTERFACE	Interface	Alphanumeric Display / Optional Freesun App					
	Communication	RS232 / RS485 / USB / Ethernet, (Modbus RTU Protocol, Modbus TCP/IP)					
	Analogue Inputs	1 programmable and differential inputs; (0-20mA or ± 10mV to ± 10V) and PT100					
	String Supervisor Communication	RS485 / Modbus RTU					
	Plant Controller Communication	Ethernet / Modbus TCP/IP					
	Digital Outputs	1 electrically-isolated programmable switched relays (250VAC, 8A or 30VDC, 8A)					
PROTECTIONS	Ground Fault Protection	Floating PV array: Isolation Monitoring per MPP Grounded PV array (Positive pole and negative pole): GFDI protection PV Array transfer kit: GFDI and Isolation monitoring device (requires 1 Digital Output)					
	Humidity control	Active Heating					
	ON / OFF Pushbutton	Standard					
	General AC Protection & Disconn.	Circuit Breaker					
	General DC Protection & Disconn.	Optional External Disconnecting Unit Cabinet					
	Module AC Protection & Disconn.	AC contactor & fuses					
	Module DC Protection & Disconn.	DC contactor & DC fuses					
	Overvoltage Protection	AC, DC Inverter and auxiliary supply type 2 - Internal Standard					
	DC Lightning Protections	Optional (Integrated in the inverter)					

[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] Heating resistors kit option below -20°C.

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

TECHNICAL CHARACTERISTICS

HEC PLUS - 420V

		FRAME 2		FRAME 3		FRAME 4	
NUMBER OF MODULES		5	6	7	8	9	10
REFERENCE		FS1051CH	FS1271CH	FS1480CH	FS1690CH	FS1901CH	FS2200CH
OUTPUT	AC Output Power(kVA/kW) @50°C ^[1]	1050	1270	1480	1690	1900	2110
	AC Output Power(kVA/kW) @25°C ^[1]	1160	1400	1630	1860	2100	2330
	Max. AC Output Current (A) @25°C	1600	1920	2240	2560	2880	3200
	Operating Grid Voltage(VAC)	420Vac					
	Operating Range, Grid Frequency	50Hz/60Hz					
	Current Harmonic Distortion (THDi)	< 3% at any load condition					
	Power Factor (cosine phi) ^[2]	0.00 leading ... 0.00 lagging adjustable / Reactive Power injection at night					
	Power Curtailment	0...100%/0.1% Steps					
INPUT	MPPT Voltage Window (VDC) ^[1]	623V-900V					
	MPPT window @full power (VDC) ^[1]	616V–820V @50°C / 680V–820V @25°C					
	Maximum DC and Starting voltage	1000V					
	Max. DC continuous current (A)	1750	2100	2450	2800	3150	3500
	Max. DC short circuit current (A)	2275	2730	3185	3640	4095	4550
EFFICIENCY & AUXILIARY SUPPLY	Max. Efficiency PAC, nom (η)	98.6%		98.6%		98.6%	
	Euroeta (η)	98.3%		98.4%		98.4%	
	Max. Standby Consumption (Pnight)	< approx. 40W/per module					
	Control Power Supply	400V/230VAC–1kVA user power supply available, Optional 6kVA					
	Max. Power Consumption	2300W	2760W	3220W	3680W	4140W	4600W
	Max. Apparent Power (VA)	4800VA	5600VA	6500VA	7300VA	8200VA	9000VA
CABINET	Dimensions [WxDxH] [mm]	3900x1050x2400		4900x1050x2400		5900x1050x2400	
	Weight (kg)	3540	3850	4590	4900	5640	5950
	Air Flow	Intake through lower part blown out through upper side					
	Type of ventilation	Forced air cooling					
ENVIRONMENT	Degree of protection	IP54					
	Permissible Ambient Temperature	-30°C ^[3] to +60°C / >50°C Active Power derating					
	Relative Humidity	0% to 100% non condensing					
	Max. Altitude (above sea level)	4000m; >1000m power derating					
	Noise level ^[4]	< 79 dBA					
CONTROL INTERFACE	Interface	Alphanumeric Display / Optional Freesun App					
	Communication	RS232 / RS485 / USB / Ethernet, (Modbus RTU Protocol, Modbus TCP/IP)					
	Analogue Inputs	1 programmable and differential inputs; (0-20mA or ± 10mV to ± 10V) and PT100					
	String Supervisor Communication	RS485 / Modbus RTU					
	Plant Controller Communication	Ethernet / Modbus TCP/IP					
	Digital Outputs	1 electrically-isolated programmable switched relays (250VAC, 8A or 30VDC, 8A)					
PROTECTIONS		Floating PV array: Isolation Monitoring per MPP					
	Ground Fault Protection	Grounded PV array (Positive pole and negative pole): GFDI protection PV Array transfer kit: GFDI and Isolation monitoring device (requires 1 Digital Output)					
	Humidity control	Active Heating					
	ON / OFF Pushbutton	Standard					
	General AC Protection & Disconn.	Circuit Breaker					
	General DC Protection & Disconn.	Optional External Disconnecting Unit Cabinet					
	Module AC Protection & Disconn.	AC contactor & fuses					
	Module DC Protection & Disconn.	DC contactor & DC fuses					
	Overvoltage Protection	AC, DC Inverter and auxiliary supply type 2 - Internal Standard					
DC Lightning Protections	Optional (Integrated in the inverter)						

[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] Heating resistors kit option below -20°C.

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

TECHNICAL CHARACTERISTICS

HEC PLUS - 400V

		FRAME 2		FRAME 3		FRAME 4	
NUMBER OF MODULES		5	6	7	8	9	10
REFERENCE		FS1003CH	FS1201CH	FS1401CH	FS1600CH	FS1800CH	FS2000CH
OUTPUT	AC Output Power(kVA/kW) @50°C ^[1]	1000	1200	1400	1600	1800	2000
	AC Output Power(kVA/kW) @25°C ^[1]	1110	1330	1550	1770	2000	2220
	Max. AC Output Current (A) @25°C	1600	1920	2240	2560	2880	3200
	Operating Grid Voltage(VAC)	400Vac					
	Operating Range, Grid Frequency	50Hz/60Hz					
	Current Harmonic Distortion (THDi)	< 3% at any load condition					
	Power Factor (cosine phi) ^[2]	0.00 leading ... 0.00 lagging adjustable / Reactive Power injection at night					
	Power Curtailment	0...100%/0.1% Steps					
INPUT	MPPt Voltage Window (VDC) ^[1]	566V-900V					
	MPPt window @full power (VDC) ^[1]	584V–820V @50°C / 648V–820V @25°C					
	Maximum DC and Starting voltage	1000V					
	Max. DC continuous current (A)	1750	2100	2450	2800	3150	3500
	Max. DC short circuit current (A)	2275	2730	3185	3640	4095	4550
	EFFICIENCY & AUXILIARY SUPPLY	Max. Efficiency PAC, nom (η)	98.6%		98.6%		98.6%
Euroeta (η)		98.3%		98.4%		98.4%	
Max. Standby Consumption (Pnight)		< approx. 40W/per module					
Control Power Supply		400V/230VAC–1kVA user power supply available, Optional 6kVA					
Max. Power Consumption		2300W	2760W	3220W	3680W	4140W	4600W
Max. Apparent Power (VA)		4800VA	5600VA	6500VA	7300VA	8200VA	9000VA
CABINET		Dimensions [WxDxH] [mm]	3900x1050x2400		4900x1050x2400		5900x1050x2400
	Weight (kg)	3540	3850	4590	4900	5640	5950
	Air Flow	Intake through lower part blown out through upper side					
	Type of ventilation	Forced air cooling					
ENVIRONMENT	Degree of protection	IP54					
	Permissible Ambient Temperature	-30°C ^[3] to +60°C / >50°C Active Power derating					
	Relative Humidity	0% to 100% non condensing					
	Max. Altitude (above sea level)	4000m; >1000m power derating					
	Noise level ^[4]	< 79 dBA					
CONTROL INTERFACE	Interface	Alphanumeric Display / Optional Freesun App					
	Communication	RS232 / RS485 / USB / Ethernet, (Modbus RTU Protocol, Modbus TCP/IP)					
	Analogue Inputs	1 programmable and differential inputs; (0-20mA or ± 10mV to ± 10V) and PT100					
	String Supervisor Communication	RS485 / Modbus RTU					
	Plant Controller Communication	Ethernet / Modbus TCP/IP					
	Digital Outputs	1 electrically-isolated programmable switched relays (250VAC, 8A or 30VDC, 8A)					
PROTECTIONS		Floating PV array: Isolation Monitoring per MPP					
	Ground Fault Protection	Grounded PV array (Positive pole and negative pole): GFDI protection PV Array transfer kit: GFDI and Isolation monitoring device (requires 1 Digital Output)					
	Humidity control	Active Heating					
	ON / OFF Pushbutton	Standard					
	General AC Protection & Disconn.	Circuit Breaker					
	General DC Protection & Disconn.	Optional External Disconnecting Unit Cabinet					
	Module AC Protection & Disconn.	AC contactor & fuses					
	Module DC Protection & Disconn.	DC contactor & DC fuses					
	Overvoltage Protection	AC, DC Inverter and auxiliary supply type 2 - Internal Standard					
	DC Lightning Protections	Optional (Integrated in the inverter)					

[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] Heating resistors kit option below -20°C.

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

TECHNICAL CHARACTERISTICS

HEC-US PLUS - 440V

NORTH AMERICA

		FRAME 2		FRAME 3		FRAME 4	
NUMBER OF MODULES		5	6	7	8	9	10
REFERENCE		FS1112CU	FS1331CU	FS1550CU	FS1770CU	FS1991CU	FS2200CU
OUTPUT	AC Output Power(kVA/kW) @50°C	1110	1330	1550	1770	1990	2200
	AC Output Power(kVA/kW) @25°C	1220	1460	1710	1950	2190	2440
	Max. Power (kW@PF=0.9, @50°C)	1000	1190	1390	1590	1790	1980
	Max. AC Output Current (A) @25°C	1600	1920	2240	2560	2880	3200
	Operating Grid Voltage(VAC)	440Vac ±10%					
	Operating Grid Frequency	60Hz					
	Current Harmonic Distortion (THDi)	< 3% per IEEE519					
	Power Factor (cosine phi) ^[1]	0.00 leading ... 0.00 lagging adjustable/ Reactive Power injection at night					
	Power Curtailment	0...100%/0.1% Steps					
INPUT	MPPt Voltage Window (VDC) ^[2]	623V-900V					
	MPPt window @full power (VDC) ^[2]	642V–820V @50°C / 712V–820V @25°C					
	Maximum DC Voltage	1000V					
	Minimum Start Voltage	700V - User configurable					
	Max. DC continuous current (A)	1750	2100	2450	2800	3150	3500
	Max. DC short circuit current (A)	2275	2730	3185	3640	4095	4550
EFFICIENCY & AUXILIARY SUPPLY	Max. Efficiency / CEC (η)	98.6% / 98.0%					
	Euroeta (η)	98.3%		98.4%			
	Max. Standby Consumption (Pnight)	< approx. 40W/per module					
	Control Power Supply	120V / 208VAC–1kVA power supply available for external equipment					
	Max. Power Consumption	2300W	2760W	3220W	3680W	4140W	4600W
CABINET	Dimensions [WxDxH] [ft]	153.5"x40.12"x94.5"		192.9"x40.12"x94.5"		232.3"x40.12"x94.5"	
	Dimensions [WxDxH] [mm]	3900x1050x2400		4900x1050x2400		5900x1050x2400	
	Weight (lbs)	7804	8487	10119	10802	12434	13117
	Weight (kg)	3540	3850	4590	4900	5640	5950
	Air Flow	Bottom intake. Exhaust top vent (Front or Rear option)					
	Type of ventilation	Forced air cooling					
ENVIRONMENT	Degree of protection	NEMA 3R					
	Permissible Ambient Temperature	-22°F to +122°F, -30°C ^[3] to +50°C / Active Power derating >50°C/122°F					
	Relative Humidity	0% to 100% non condensing					
	Max. Altitude (above sea level)	1000m; >1000m power derating 1% Sn (kVA) per 100m					
	Noise level ^[4]	< 79 dBA					
CONTROL INTERFACE	Interface	Alphanumeric Display (inside cabinet) / Optional Freesun App					
	Communication Protocol	RS232 / RS485 / USB / Ethernet, (Modbus RTU, Modbus TCP/IP)					
	Power Plant Controller	Optional					
	Keyed ON/OFF switch	Standard					
PROTECTIONS	Ground Fault Protection	Floating PV array: Isolation Monitoring per MPP NEC2014 Grounded PV Array: GFDI protection Optional PV Array transfer kit: GFDI and Isolation monitoring device					
	Humidity control	Active Heating					
	General AC Protection & Disconn.	Circuit Breaker					
	General DC Protection & Disconn.	External Disconnecting Unit Cabinet (FSDK)					
	Module AC Protection & Disconn.	AC contactor & fuses					
	Module DC Protection & Disconn.	DC contactor & DC fuses					
	Overvoltage Protection	AC and DC protection (type 2)					
	Safety	UL 1741; CSA 22.2 No.107.1-01					
	Utility interconnect	IEEE 1547 with Utility Interactive Control functions					

[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] Heating resistors kit option below -20°C.

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

TECHNICAL CHARACTERISTICS

HEC-US PLUS - 420V

		NORTH AMERICA						
		FRAME 2		FRAME 3		FRAME 4		
NUMBER OF MODULES		5	6	7	8	9	10	
REFERENCE		FS1051CU	FS1271CU	FS1480CU	FS1690CU	FS1901CU	FS2110CU	
OUTPUT	AC Output Power(kVA/kW) @50°C	1050	1270	1480	1690	1900	2110	
	AC Output Power(kVA/kW) @25°C	1160	1400	1630	1860	2100	2330	
	Max. Power (kW@PF=0.9, @50°C)	940	1140	1330	1520	1710	1900	
	Max. AC Output Current (A) @25°C	1600	1920	2240	2560	2880	3200	
	Operating Grid Voltage(VAC)	420Vac ±10%						
	Operating Grid Frequency	60Hz						
	Current Harmonic Distortion (THDi)	< 3% per IEEE519						
	Power Factor (cosine phi) ^[1]	0.00 leading ... 0.00 lagging adjustable/ Reactive Power injection at night						
	Power Curtailment	0...100%/0.1% Steps						
INPUT	MPPt Voltage Window (VDC) ^[2]	594V-900V						
	MPPt window @full power (VDC) ^[2]	616V–820V @50°C / 680V–820V @25°C						
	Maximum DC Voltage	1000V						
	Minimum Start Voltage	700V - User configurable						
	Max. DC continuous current (A)	1750	2100	2450	2800	3150	3500	
	Max. DC short circuit current (A)	2275	2730	3185	3640	4095	4550	
EFFICIENCY & AUXILIARY SUPPLY	Max. Efficiency / CEC (η)	98.6% / 98.0%						
	Euroeta (η)	98.3%		98.4%				
	Max. Standby Consumption (Pnight)	< approx. 40W/per module						
	Control Power Supply	120V / 208VAC–1kVA power supply available for external equipment						
	Max. Power Consumption	2300W	2760W	3220W	3680W	4140W	4600W	
CABINET	Dimensions [WxDxH] [inches]	153.5"x40.12"x94.5"		192.9"x40.12"x94.5"		232.3"x40.12"x94.5"		
	Dimensions [WxDxH] [mm]	3900x1050x2400		4900x1050x2400		5900x1050x2400		
	Weight (lbs)	7804	8487	10119	10802	12434	13117	
	Weight (kg)	3540	3850	4590	4900	5640	5950	
	Air Flow	Bottom intake. Exhaust top vent (Front or Rear option)						
	Type of ventilation	Forced air cooling						
ENVIRONMENT	Degree of protection	NEMA 3R						
	Permissible Ambient Temperature	-22°F to +122°F, -30°C ^[3] to +50°C / Active Power derating >50°C/122°F						
	Relative Humidity	0% to 100% non condensing						
	Max. Altitude (above sea level)	1000m; >1000m power derating 1% Sn (kVA) per 100m						
	Noise level ^[4]	< 79 dBA						
CONTROL INTERFACE	Interface	Alphanumeric Display (inside cabinet) / Optional Freesun App						
	Communication Protocol	RS232 / RS485 / USB / Ethernet, (Modbus RTU, Modbus TCP/IP)						
	Power Plant Controller	Optional						
	Keyed ON/OFF switch	Standard						
PROTECTIONS	Ground Fault Protection	Floating PV array: Isolation Monitoring per MPP NEC2014 Grounded PV Array: GFDI protection Optional PV Array transfer kit: GFDI and Isolation monitoring device						
	Humidity control	Active Heating						
	General AC Protection & Disconn.	Circuit Breaker						
	General DC Protection & Disconn.	External Disconnecting Unit Cabinet (FSDK)						
	Module AC Protection & Disconn.	AC contactor & fuses						
	Module DC Protection & Disconn.	DC contactor & DC fuses						
	Overvoltage Protection	AC and DC protection (type 2)						
	CERTIFICATIONS	Safety	UL 1741; CSA 22.2 No.107.1-01					
		Utility interconnect	IEEE 1547 with Utility Interactive Control functions					

[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] Heating resistors kit option below -20°C.

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

TECHNICAL CHARACTERISTICS

HEC-US PLUS - 400V

NORTH AMERICA

		FRAME 2		FRAME 3		FRAME 4	
NUMBER OF MODULES		5	6	7	8	9	10
REFERENCE		FS1004CU	FS1201CU	FS1401CU	FS1600CU	FS1801CU	FS2000CU
OUTPUT	AC Output Power(kVA/kW) @50°C	1000	1200	1400	1600	1800	2000
	AC Output Power(kVA/kW) @25°C	1110	1330	1550	1770	2000	2220
	Max. Power (kW@PF=0.9, @50°C)	900	1080	1260	1440	1620	1800
	Max. AC Output Current (A) @25°C	1600	1920	2240	2560	2880	3200
	Operating Grid Voltage(VAC)	400Vac ±10%					
	Operating Grid Frequency	60Hz					
	Current Harmonic Distortion (THDi)	< 3% per IEEE519					
	Power Factor (cosine phi) ^[1]	0.00 leading ... 0.00 lagging adjustable/ Reactive Power injection at night					
	Power Curtailment	0...100%/0.1% Steps					
INPUT	MPPt Voltage Window (VDC) ^[2]	566V-900V					
	MPPt window @full power (VDC) ^[2]	584V–820V @50°C / 648V–820V @25°C					
	Maximum DC Voltage	1000V					
	Minimum Start Voltage	700V - User configurable					
	Max. DC continuous current (A)	1750	2100	2450	2800	3150	3500
	Max. DC short circuit current (A)	2275	2730	3185	3640	4095	4550
EFFICIENCY & AUXILIARY SUPPLY	Max. Efficiency / CEC (η)	98.6% / 98.0%					
	Euroeta (η)	98.3%		98.4%			
	Max. Standby Consumption (Pnight)	< approx. 40W/per module					
	Control Power Supply	120V / 208VAC–1kVA power supply available for external equipment					
	Max. Power Consumption	2300W	2760W	3220W	3680W	4140W	4600W
CABINET	Max. Power Consumption	153.5"x40.12"x94.5"		192.9"x40.12"x94.5"		232.3"x40.12"x94.5"	
	Dimensions [WxDxH] [mm]	3900x1050x2400		4900x1050x2400		5900x1050x2400	
	Weight (lbs)	7804	8487	10119	10802	12434	13117
	Weight (kg)	3540	3850	4590	4900	5640	5950
	Air Flow	Bottom intake. Exhaust top vent (Front or Rear option)					
	Type of ventilation	Forced air cooling					
ENVIRONMENT	Degree of protection	NEMA 3R					
	Permissible Ambient Temperature	-22°F to +122°F, -30°C ^[3] to +50°C / Active Power derating >50°C/122°F					
	Relative Humidity	0% to 100% non condensing					
	Max. Altitude (above sea level)	1000m; >1000m power derating 1% Sn (kVA) per 100m					
	Noise level ^[4]	< 79 dBA					
CONTROL INTERFACE	Interface	Alphanumeric Display (inside cabinet) / Optional Freesun App					
	Communication Protocol	RS232 / RS485 / USB / Ethernet, (Modbus RTU, Modbus TCP/IP)					
	Power Plant Controller	Optional					
	Keyed ON/OFF switch	Standard					
PROTECTIONS	Ground Fault Protection	Floating PV array: Isolation Monitoring per MPP NEC2014 Grounded PV Array: GFDI protection Optional PV Array transfer kit: GFDI and Isolation monitoring device					
	Humidity control	Active Heating					
	General AC Protection & Disconn.	Circuit Breaker					
	General DC Protection & Disconn.	External Disconnecting Unit Cabinet (FSDK)					
	Module AC Protection & Disconn.	AC contactor & fuses					
	Module DC Protection & Disconn.	DC contactor & DC fuses					
	Overvoltage Protection	AC and DC protection (type 2)					
	Safety	UL 1741; CSA 22.2 No.107.1-01					
	Utility interconnect	IEEE 1547 with Utility Interactive Control functions					

[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] Heating resistors kit option below -20°C.

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

PURE ENERGY

SOLAR SOLUTIONS

MV SKID STATION



MV SKID

UTILITY SCALE SOLAR STATION



TURN-KEY SOLUTION



HIGH RELIABILITY



EASY TO INSTALL



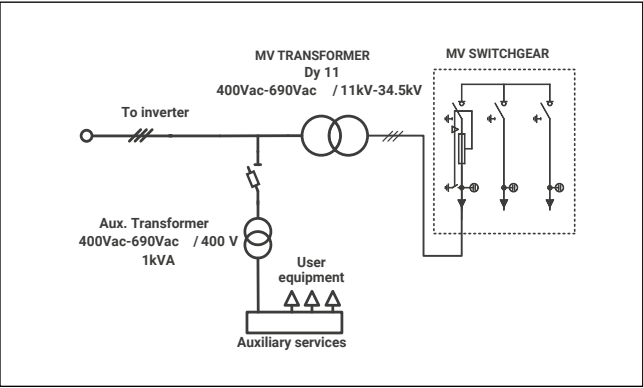
OUTDOOR DURABILITY

SIMPLIFY YOUR COMMISSIONING WITH THE MOST COMPETITIVE SOLUTION INTEGRATED WITH ALL THE MEDIUM VOLTAGE EQUIPMENT

The MV Skid is a compact turnkey outdoor platform made from high resistance galvanized steel with all the medium voltage equipment integrated, including an outdoor power transformer, MV switchgear, oil tank, filter and built in fast power connection to any HEC and HEMK solar inverter. With between 400V-460V and 565V-690V in the low voltage range and 12kV to 36kV in the high voltage range, this compact platform achieves power outputs between 1050kVA and 3800kVA when combined with the HEC and HEMK solar inverter series. This compact solution also allows the installation of a low voltage cabinet that is fully configurable to the customer needs as well as different types of cells and even an enclosure fence among other options. The MV SKID simplifies the project design of the PV plant, reducing installation costs and the amount of resources needed. The benefits of the MV Skid and the fact that it is also easier to transport and deliver into remote sites makes it the optimal solution for EPC's (engineering, procurement and construction).

MODEL NUMBERS AND OPERATIONAL DIAGRAM

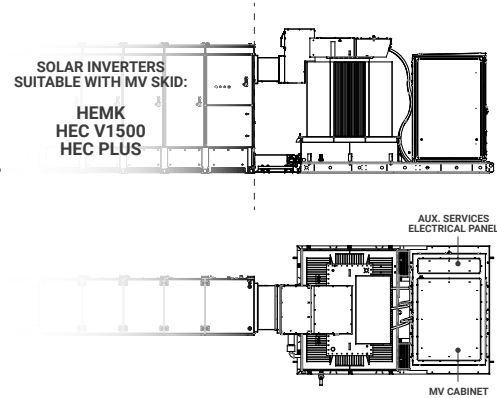
REFERENCE		RATED POWER (kVA)
FRAME 1 AND FRAME 2 ^[1]	MVS1050[]	1050
	MVS1100[]	1110
	MVS1220[]	1220
	MVS1335[]	1335
	MVS1440[]	1440
	MVS1550[]	1550
	MVS1630[]	1630
	MVS1710[]	1710
	MVS1800[]	1800
	MVS1900[]	1900
	MVS2000[]	2000
	MVS2110[]	2110
	MVS2225[L]	2225
	MVS2330[L]	2330
FRAME 2	MVS2440[L]	2440
	MVS2550[L]	2550
	MVS2660[L]	2660
	MVS2860[L]	2860
	MVS3000[L]	3000
	MVS3110[L]	3110
	MVS3345[L]	3345
	MVS3500[L]	3500
	MVS3630[L]	3630
	MVS3800[L]	3800



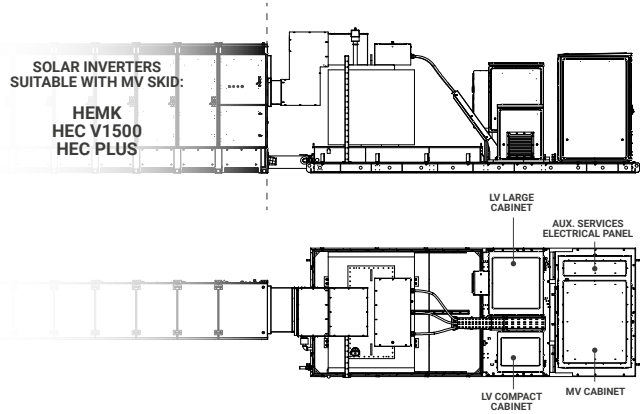
[1] Example: MVS1050S for Frame 1 / MVS10050L for Frame 2

SECTIONS

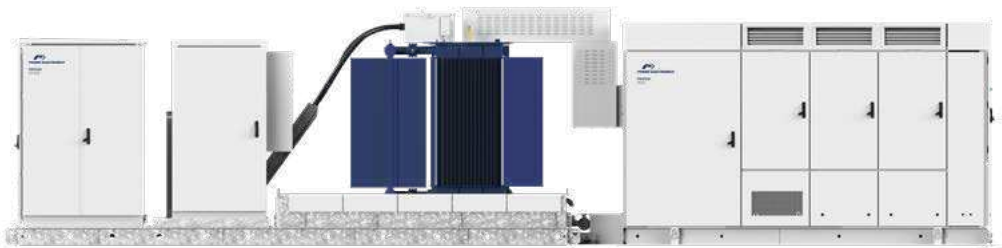
FRAME 1



FRAME 2



For customized solutions, contact Power Electronics.



TECHNICAL CHARACTERISTICS

MV SKID

MV SKID	FRAME 1		FRAME 2
MEDIUM VOLTAGE EQUIPMENT	Rated Power range	1050kVA - 2110kVA	2220kVA - 3800kVA
	MV Voltage range	11kV / 20kV / 22kV / 23kV / 33kV / 34.5kV	
	LV Voltage range	400V / 420V / 440V / 460V - HEC PLUS inverters 565V / 600V / 615V / 630V / 645V / 660V / 690V - HEC V1500 and HEMK inverters	
	Type of tank	Oil-sealed	
	Cooling	ONAN (KNAN optional)	
	Vector Group	Dy11	
	Transformer protection	DGPT-2 (PT100 optional)	
	Oil tank	Integrated with valve and filter	
	Transformer protection rate	IP54	
	Switchgear configuration	Single feeder (L) or Double feeder (2L)	
	Switchgear protection ^[1]	Fuses (P) / Automatic circuit breaker (V)	
CONNECTIONS	Inverter AC connection	Close couple solution (Plug & Play)	
	LV protection	Circuit breaker included in the inverter	
	HV AC wiring	MV Bridge between transformer and protection switchgear prewired	
ENVIROMENT	Ambient Temperature	-20°C...+50°C (t>50°C power derating)	
	Extended Temperature ^{[2] [3]}	-35°C...+50°C (t>50°C power derating)	
	Max. Altitude (above sea level)	>2000m power derating	
	Relative Humidity	4% to 95% Non condensing	
MECHANICAL CHARACTERISTICS	Skid Dimensions (WxHxD) mm	3690x2340x2235	5640x2340x2235
	Skid weight with MV equipment ^[1]	< 8 Tn	
	Oil tank material	Galvanized Steel	
	Skid Body material	Galvanized Steel	
	Cabinet type	Outdoor	
	Anti-rodent protection	✓	
AUXILIARY SERVICES ELECTRICAL PANEL	Auxiliary supply	3x400V, 50/60Hz	
	User power supply available	1kVA or 6kVA	
	Additional auxiliary transformer ^[4]	10kVA / 15kVA / 25kVA	
	Cooling	Air	
	Auxiliary supply protection	✓	
	Communication ^[4]	Ethernet (Fiber optic or RJ45)	
	UPS system for monitoring ^[4]	1kVA / 3kVA, 10 minutes	
AUXILIARY OUTDOOR TRANSFORMER	Rated Power (Voltage)	-	30kVA / 40kVA / 50kVA (3x400V)
	Cooling	-	Air
	Protection	-	Circuit breaker
	Cabinet type	-	Outdoor
LV COMPACT CABINET	Additional indoor auxiliary transf. ^[4]	-	10kVA / 25kVA / 40kVA / 50kVA (3x400V)
	UPS system for monitoring ^[4]	-	1kVA / 3kVA, 10 minutes
	Cooling	-	Air forced
	Auxiliary supply protection	-	✓
	Cabinet type	-	Outdoor
LV LARGE CABINET	Additional indoor auxiliary transf. ^[4]	-	25kVA / 40kVA / 50kVA (3x400V)
	UPS for trackers ^[4]	-	20kVA / 40kVA, 10 minutes
	Cooling	-	Air forced
	Auxiliary supply protection	-	✓
	Cabinet type	-	Outdoor
OTHER EQUIPMENT	Safety mechanism	Trapped key safety interlock	
	Safety perimeter	Transformer access protection fence	
	Cabinet heating	Heating resistors	
	Interior lighting	Fluorescent lamp	
	Emergency lighting	Electronic supplier for emergency lighting (1h autonomy)	
	Air conditioner	UPS batteries cooling	
	Communication ^[4]	Splice box / MV Switchgear monitoring	
STANDARDS	Medium Voltage	IEC 62271-202, IEC 62271-200, IEC 60076, IEC 61439-1	

[1] Depending on customer configuration.

[2] Optional. For additional information or available configurations, please consult Power Electronics.

[3] Other temperature range, consult Power Electronics.

[4] By demand.

JAP60S01

260-280 1000V Cypress Series

MULTICRYSTALLINE SILICON SOLAR MODULE



JA Solar Holdings Co., Ltd.

JA Solar Holdings Co., Ltd. is a world leading manufacturer of high-performance solar power products that convert sunlight into electricity for residential, commercial and utility-scale power generation. The company was founded in May 2005 and publicly listed on NASDAQ in February 2007. JA Solar has been the world's leading cell producer since 2010, and has firmly established itself as a tier 1 module supplier since 2012. Capitalizing on our strength in solar cell technology, we are committed to provide modules with unparalleled conversion efficiency, yield efficiency, and reliability to enable you to maximize your returns on PV projects. With its leading industry experience, continuous effort on R&D, customer-oriented service and solid financial status, JA Solar is your best choice of long-term trustworthy partner.

Address: Building No.8, Nuode Center, Automobile Museum East Road, Fengtai District, Beijing, China

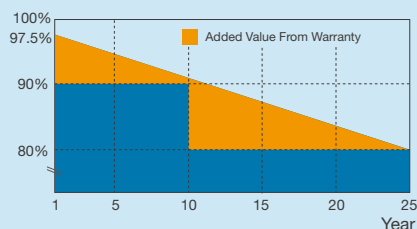
Telephone: +86 (10) 63611888

Fax: +86 (10) 63611999

Email: sales@jasolar.com market@jasolar.com

Superior Warranty

- 12-year product warranty
- 25-year linear power output warranty



Key Features



5BB design reduces cell series resistance and stress between cell interconnectors to improve module reliability and conversion efficiency



High output, up to 17.12% module conversion efficiency



Certified with 1000V DC IEC standard



Anti-soiling surface reduces power loss from dirt and dust



Outstanding performance in low-light irradiance environments



Excellent mechanical load resistance: Certified to withstand high wind loads (2400Pa) and heavy snow loads (5400Pa)



Strong salt and ammonia resistance certified by TÜV NORD

Reliable Quality

- Positive power tolerance: 0~+5W
- Modules binned by current to improve system performance
- Potential Induced Degradation (PID) Resistant in accordance to IEC62804

Comprehensive Certificates

- IEC 61215, IEC 61730, UL1703, CEC Listed, MCS and CE
- ISO 9001: 2008: Quality management systems
- ISO 14001: 2004: Environmental management systems
- BS OHSAS 18001: 2007: Occupational health and safety management systems
- Environmental policy: The first solar company in China to complete Intertek's carbon footprint evaluation program and receive green leaf mark verification for our products



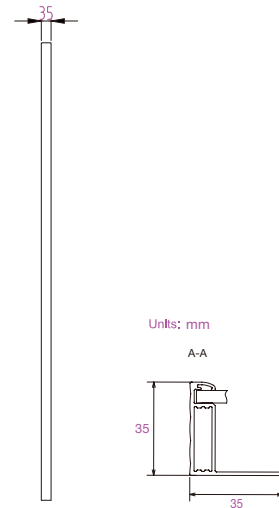
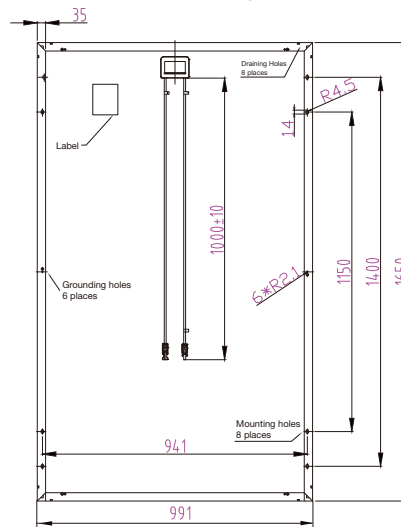
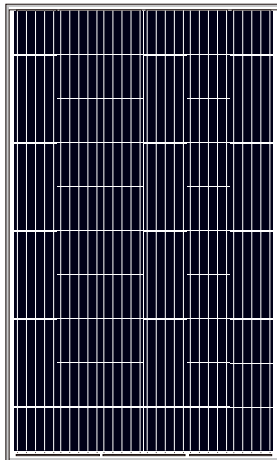
Specifications subject to technical changes and tests. JA Solar reserves the right of final interpretation.

JAP60S01

260-280/SC
1000V Cypress Series

JA SOLAR

MECHANICAL DIAGRAMS



Units: mm

A-A

SPECIFICATIONS

Cell	Poly 156.75×156.75mm
Weight	18.2kg±3%
Dimensions	1650×991×35mm
Cable Cross Section Size	4mm ²
No. of Cells	60 (6×10)
Junction Box	IP67, 3 diodes
Connector	MC4 Compatible
Packaging Configuration	30 Per Pallet

OPERATING CONDITIONS

Maximum System Voltage	1000V DC (IEC)
Operating Temperature	-40°C~+85°C
Maximum Series Fuse	20A
Maximum Static Load, Front Maximum Static Load, Back	5400Pa 2400Pa
NOCT	45±2°C
Application Class	Class A

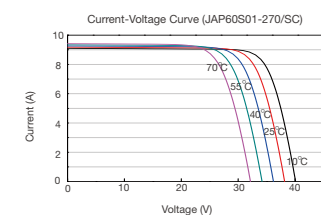
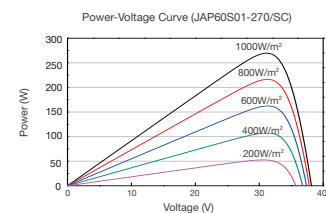
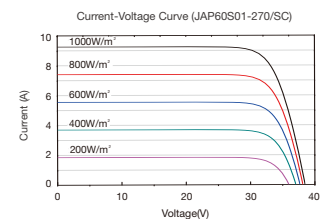
ELECTRICAL PARAMETERS AT STC

TYPE	JAP60S01 -260/SC	JAP60S01 -265/SC	JAP60S01 -270/SC	JAP60S01 -275/SC	JAP60S01 -280/SC
Rated Maximum Power (P _{max}) [W]	260	265	270	275	280
Open Circuit Voltage (V _{oc}) [V]	37.74	37.95	38.17	38.38	38.65
Maximum Power Voltage (V _{mp}) [V]	30.71	30.92	31.13	31.34	31.61
Short Circuit Current (I _{sc}) [A]	9.04	9.11	9.18	9.29	9.37
Maximum Power Current (I _{mp}) [A]	8.47	8.57	8.67	8.77	8.86
Module Efficiency [%]	15.90	16.21	16.51	16.82	17.12
Power Tolerance	-0~+5W				
Temperature Coefficient of I _{sc} (α _{Isc})	+0.058%/°C				
Temperature Coefficient of V _{oc} (β _{Voc})	-0.330%/°C				
Temperature Coefficient of P _{max} (γ _{Pmp})	-0.410%/°C				
STC	Irradiance 1000W/m ² , cell temperature 25°C, AM 1.5G				

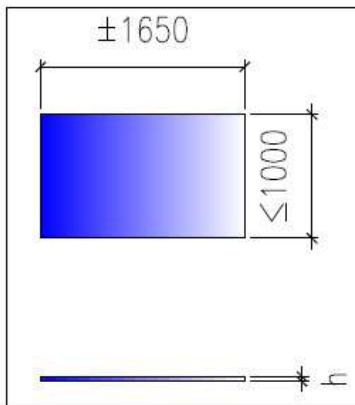
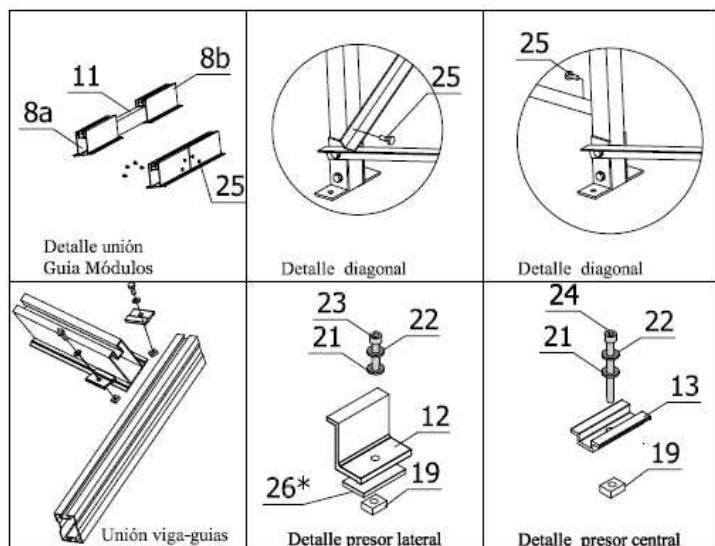
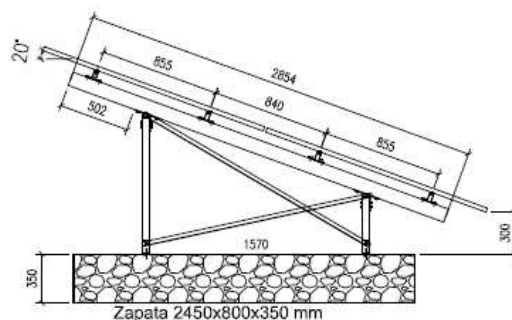
ELECTRICAL PARAMETERS AT NOCT

TYPE	JAP60S01 -260/SC	JAP60S01 -265/SC	JAP60S01 -270/SC	JAP60S01 -275/SC	JAP60S01 -280/SC
Rated Max Power (P _{max}) [W]	192	196	200	204	207
Open Circuit Voltage (V _{oc}) [V]	35.70	35.94	36.25	36.56	36.85
Max Power Voltage (V _{mp}) [V]	28.87	29.09	29.29	29.48	29.69
Short Circuit Current (I _{sc}) [A]	7.20	7.23	7.27	7.33	7.40
Max Power Current (I _{mp}) [A]	6.66	6.74	6.82	6.90	6.98
NOCT	Irradiance 800W/m ² , ambient temperature 20°C, wind speed 1m/s, AM 1.5G				

CHARACTERISTICS



Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.



26		Suplemento	60	4
25		Autorrosc.M6.3x19	19	264
24		Tornillo Allen M8	h+15	68
23		Tornillo Allen M8	25	8
22		Grower M8	-	166
21		Arandela M8	-	76
20		Tuerca hex. M8	-	90
19		Tuerca cuadrada M8	-	76
18		Arandela M8 (3d)	-	180
17		Tuerca M10	-	108
16		Arandela M10	-	108
15		Tornillo M8L80	80	90
14		Tornillo M10L30	30	108
13		Presor Interior	60	68
12		Presor Extremo	60	8
11		Unión guías	200	32
10		Unión guía-viga	50	72
9b		Diagonal Trasera	2700	2
9a		Diagonal Delantera	2400	2
8b		Guía módulos	1690	4
8a		Guía módulos	2100	32
7		Tirante de presión	1866	9
6		Tirante de succión	1675	9
5		Unión viga-pilar	50	18
4		Viga	2854	9
3		Pilar trasero	968	9
2		Pilar delantero	397	9
1		Fijación	50	18
Nº pórticos				9
Nº módulos por fila				18
Elemento	Detalle	Descripción	Longitud mm.	unidades

Espejor módulo	Longitud Tornillo	Montaje presor lateral	Longitud Tornillo	Montaje presor central
31 mm	25 mm	Montaje sin arandela M8 (Pieza 21)	45 mm	Montaje sin arandela M8 (Pieza 21)
33 mm	25 mm	Montaje estándar	50 mm	Montaje estándar
35 mm	25 mm	Montaje estándar	50 mm	Montaje estándar
38 mm	25 mm	Montaje sin arandela M8 (Pieza 22), y con suplemento (pieza 26)	50 mm	Montaje sin arandela M8 (Pieza 22)
40 mm	25 mm	Montaje estándar	53 mm	Montaje estándar
45 mm	25 mm	Montaje estándar	60 mm	Montaje estándar
50 mm	25 mm	Montaje estándar	65 mm	Montaje estándar

