

freesun[®]

HES SERIES



3. TECHNICAL CHARACTERISTICS

FREESUN HES SERIES		FRAME 1 - FS		FRAME 2 - FS			FRAME 3 - FS				
		0250OH	0300OH	0400OH	0500OH	0600OH	0700OH	0800OH	0900OH	1000OH	
OUTPUT	Nominal AC Output Power (kW)	250	300	400	500	600	700	800	900	1000	
	Operating Grid Voltage (VAC) [1]	20kV									
	Operating Range, Grid Frequency	50Hz – 60Hz									
	Voltage Ripple, PV Voltage	< 3%									
	Harmonic Distortion of Grid Current	< 3% at nominal power									
	Power Factor (cosine phi)	0.95 leading ... 0.95 lagging [2]									
INPUT	DC Voltage Range MPP (VDC)	450V – 820V									
	Maximum permissible DC voltage	900V / 1000V Optional									
	Maximum PV Power (kWp) (recommended)	300	360	480	600	720	840	960	1080	1200	
	Maximum permissible DC current (A)	600	720	960	1200	1440	1680	1920	2160	2400	
	Number of DC connections [3]	12		16	20	24	28	32	36	40	
	Recommended cable section (mm ²) [4]	95mm ² per DC connection									
INVERTER EFFICIENCY	Max. Efficiency PAC, nom (η)	97.9%		97.9%			97.9%				
	Euroeta (η)	97.6%		97.7%			97.8%				
AUXILIARY SUPPLY	Auxiliary Voltage Inverter [5]	3 x 400V, 50 / 60Hz									
	Auxiliary transformer Nominal Power [6]	10KVA									
	Max. Power Consumption	1400W			2760W			4600W			
	Standby Operating Consumption (Pnight)	< approx. 100W			< approx. 200W			< approx. 400W			
MEDIUM VOLTAGE	MV Transformer	250 – 400kVA		400 – 630kVA			800 – 1000kVA				
	MV Transformer Efficiency (max)	99.1%									
	MV Switchgear	2L1P configuration [7]									
CABINET	Concrete Cabinet Dimensions [WxHxD] mm [8]	5950x3150x2410		7450x3150x2410			5950x3150x2410 [9] 4450x3150x2410 [10]				
	Total Weight (Inverter + Concrete) [11]	24t		30t			24t + 20t				
	Fresh Air Consumption	3600m ³ /h		7200m ³ /h			12000m ³ /h				
	Inverter Dimensions [WxHxD] mm [12]	1900x2150x1020		3200x2150x1020			5260x2150x1020				
	Inverter Weight (kg)	1200		2400			4000				
	ENVIRONMENT	Protection Rating as per EN 60529	IP54								
Permissible Ambient Temperature [13]		-20°C ... +50°C									
Relative Humidity, non-condensing		10% to 95%									
Max. Altitude (above sea level) [14]		1000m									
CONTROL INTERFACE	Communication	Modbus, CAN, Ethernet (optional GSM / GPRS)									
	Remote Communication	Standard (configuration and monitoring)									
	Digital Inputs	2 programmable inputs. Galvanically isolated.									
	Analogue Inputs	2 programmable and differential inputs									
		Current signal: 0-20mA Voltage signal: full scale configurable (± 10mV to ± 10V)									
	PT100 Input	1 Input									
	String Supervisor Interface	RS485 / Modbus									
	PC or PLC Interface	RS232 / RS485 / USB / Ethernet Modbus Protocol, Modbus TCP									
	Digital Outputs	2 electrically-isolated programmable changeover relays (250VAC, 8A or 30 VDC, 8A)									
	Analogue Outputs	1 Analogue. Output galvanically isolated.									
	Redundancy	Supports inverter module faults									
LV Energy measurement (Italy)	Optional device for Italy										

[1] For other output voltages (15kV, 22kV, 24kV, 30kV) consult with Power Electronics.

[2] Ask for other values.

[3] Four inputs per 100kW module.

[4] For copper conductors. The installer must also consider factors such as length of cable for each installation, environmental conditions, aluminium conductors, installation methods and requirements set out in current regulations applicable in the country of installation.

[5] This voltage is coming from one phase of the auxiliary grid.

[6] For higher power consult with Power Electronics.

[7] Two line cells and one protection cell. Ask for different circuits.

[8] Dimensions will depend on the final product configuration.

[9] Inverter concrete cabinet dimensions

[10] Medium voltage concrete cabinet dimensions

[11] 1t=1000kg

[12] Width may vary depending on which options are selected.

[13] In case other temperature range is required, please, contact with Power Electronics.

[14] For higher altitude consult with Power Electronics.

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		0250OH	0300OH	0400OH	0500OH	0600OH	0700OH	0800OH	0900OH
PROTECTIONS	Ground Fault Monitoring [15]	Standard built in / Optional configurable.							
	Heating (Anti-condensation)	Standard							
	Power Switch AC Side Inverter	Standard							
	Power Switch DC Side Inverter	Motorized standard built in							
	Oversvoltage Protectors AC Inverter	Internal Standard Type II							
	Oversvoltage Protectors DC Inverter	Internal Standard Type II							
	Oversvoltage Protectors for Auxiliary Supply	Internal Standard Type II							
	Lightning Protections	Optional Type I							
	Meteorological Instrumentation	Optional							
STANDARDS	Certification CE	YES							
	Directives	2004/108/CE							
	Safety	EN 62271 – 202, EN 62271 – 200							
	EMC	EN 61000-6-2, EN 61000-6-4							
	Germany	Designed according to BDEW – MV Guideline							
	Italy	Designed according to CEI 0-16 ^[17]							
	Spain	RD1663; P.O. 12.3 ^[18]							

[15] In cases where the installation has the positive pole or the negative pole earth connected, this protection will be disconnected.

[16] On certification process

[17] For the entire fulfilment of regulation CEI 0-16 it is required to add the following external protection devices approved by ENEL, in the medium voltage side:

- General Protection Device (according to DK 5600)
- Interface Protection Device (according to DK 5740)

The customer is responsible of both the correct selection and installation of these devices.

[18] On process.

4. CONFIGURATION TABLE

EXAMPLE

CODE: FS 0250 O T 09 A V 4 F R 20 Y

FS	Freesun Series		
0250	Output Power	0100	100kW
		0080	80kW
	
O	Inverter Location	I	Indoor
		O	Outdoor
T ^[1]	Isolating Transformer	T	Inverter with Low Voltage Transformer (LVT Series)
		H	High Efficiency Inverter (HE and HES Series)
09	Maximum input voltage	09	900VDC
		10	1000VDC
A	Monitoring of the isolation	A	Adjustable isolation between (+), (-) and earth.
		N	Negative of the photovoltaic installation earth connected.
		P	Positive of the photovoltaic installation earth connected.
V	Lightning and overvoltage protections	N	Without overvoltage protection
		V	With AC and DC overvoltage protection
		R	With AC and DC overvoltage protection and lightning protection
4	Maximum power point range (MPP)	4	From 450 to 820V – Transformer connection to 270V
		5	From 405 to 820V – Transformer connection to 240V ^[2]
F	String Supervisor	N	Without auxiliary power supply for String Supervisor connection
		F	With auxiliary power supply for String Supervisor connection
R ^[3]	Heating	N	Not included(Indoor)
		R	Includes heating resistance(Indoor)
20 ^[4]	Medium Voltage Output	15	15kV
		20	20kV
		22	22kV
		24	24kV
		30	30kV
1 ^[5]	MPPT Configuration	1	1MPPT
		2	2MPPT
	
		0	10MPPT

[1] Option H is only suitable for Freesun HE and Freesun HES series (Modular inverter).

[2] Available for LVT Series.

[3] Included in the Outdoor model of the Freesun LVT series.

[4] This option is only suitable for Freesun HES series. For other output voltages consult with Power Electronics.

[5] Onl available for HE and HES series. The maximum number of MPPTs depends on the number of modules implemented in each inverter. One MPPT per module. This is an optional kit configured according to the MPPT number.

5. STANDARD RATINGS

FRAME	REFERENCE	INPUT	INVERTER OUTPUT			MEDIUM VOLTAGE OUTPUT	
		Max. PV Power (P _{PV}) [1]	Nominal AC Output (P _{AC})	Output Voltage 10% (V _{AC})	Nominal AC Current (I _{AC, nom})	Operating Grid Voltage ±10% (V _{AC})	Nominal AC Current (I _{AC, nom})
1	FS0250OH□□□□□□□□	300KWp	250kW	270V	535A	20kV [2]	7.2A
	FS0300OH□□□□□□□□	360KWp	300kW	270V	642A	20kV [2]	8.7A
2	FS0400OH□□□□□□□□	480KWp	400Kw	270V	856A	20kV [2]	11.5A
	FS0500OH□□□□□□□□	600KWp	500kW	270V	1070A	20kV [2]	14.5A
	FS0600OH□□□□□□□□	720KWp	600kW	270V	1284A	20kV [2]	17.3A
3	FS0700OH□□□□□□□□	840KWp	700kW	270V	1498A	20kV [2]	20.2A
	FS0800OH□□□□□□□□	960KWp	800kW	270V	1712A	20kV [2]	23.0A
	FS0900OH□□□□□□□□	1080KWp	900kW	270V	1926A	20kV [2]	25.9A
	FS1000OH□□□□□□□□	1200KWp	1000kW	270V	2140A	20kV [2]	28.8A

[1] The maximum PV Power depends on the geographic location and type of installation.

[2] It is also available for other Operating Grid Voltage (15kV, 22kV, 24kV, 30kV).