

VSC Solar MP

The inverter for solar pumping applications



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VSC Solar MP - Variable Speed Controller inverters are designed to power traditional pumping systems using solar energy. This way it is possible to convert old systems into renewable energy installations or to use the same AC pumps to create independent, cost-saving and environmentally sustainable water systems.

The device is able to convert DC voltage coming from solar panels into AC voltage for powering any pump driven by a three-phase motor.

Pump speed is constantly adapted to available solar irradiation thus maximising the amount of pumped water and making possible operation even in conditions of low sunlight.

The device also offers complete pump protection against surges, overloads and dry running.



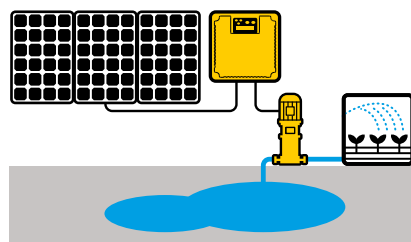
Designed to resist

VSC Solar MP - Variable Speed Controller is built entirely of aluminium to ensure maximum cooling and durability. All other metal parts are made using AISI 304 stainless steel and therefore resistant to corrosion.

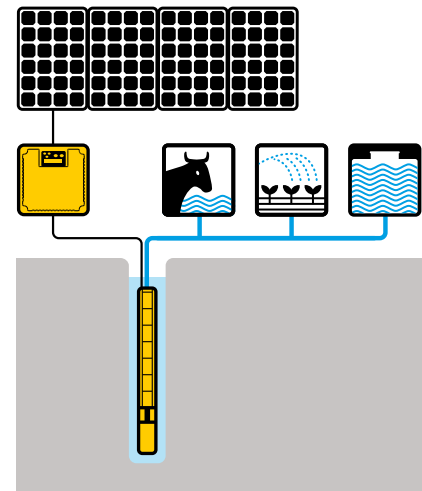
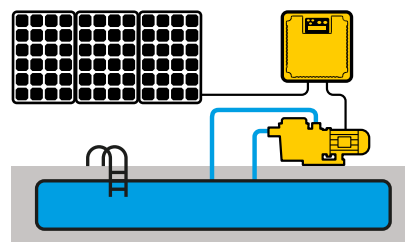
Two independent external fans and an internal fan provide perfect cooling. Their operation is adjusted according to actual thermal conditions, thus extending life.

VSC Solar MP - Variable Speed Controller can be used with any type of traditional AC pump, thereby offering maximum flexibility in several areas of application.

When using surface pumps, device can be used for an irrigation system drawing water from a nearby water supply, or powering a pool pump at no cost.



When using submersible pumps, it is possible to fill tanks for watering livestock or simply irrigate lawns or crops.

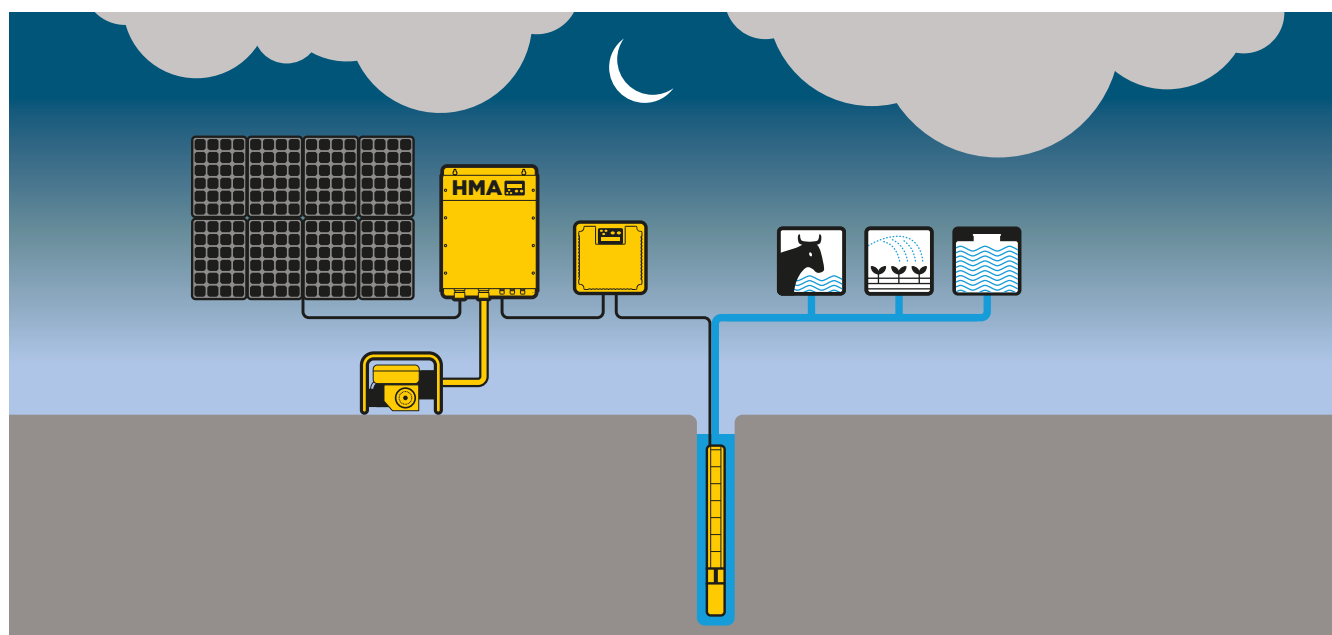


The inverter, in MP (MultiPower) version, can be powered in DC by solar panels or in AC by network or generator

to ensure the functioning of the pump at any hour of the day. This controls the peaks of water demand using AC input to avoid the oversizing of the photovoltaic system. HMA accessory,

used in combination with Solar MP models, manages independently the exchange from a source of energy to another on the basis of several options that can be select by the user:

- irradiance level
- hour of the day
- achievement of the requested daily range
- remote control trough digital command

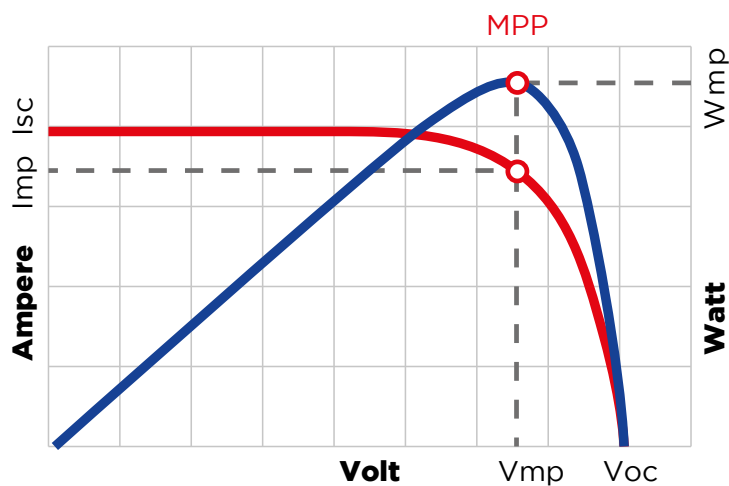


MPPT: always the maximum power available

Based on the varying conditions of solar irradiation and temperature, MPPT (Maximum Power Point Tracking) maximises the electrical power drawn from the panels and therefore the amount of water pumped.

The greater the solar irradiation the faster the pump's rotation speed, and consequently water flow increases.

When solar irradiation decreases (due to clouds or the different times of day), the pump reduces frequency and therefore the flow, but it continues to provide water until the irradiation falls below a minimum level necessary to ensure operation.



Monitoring parameters

VSC Solar MP is equipped with a backlit alphanumeric display and is designed to monitor key electrical parameters like input voltage, power, current and motor power factor.

It is also possible to connect a pressure or flow sensor to monitor performance levels.

In the diagnosis menu are recorded inverter and motor hours, operation statistics, and the last eight alarms occurred. The programming menus are password-protected to prevent unwanted tampering.

Advanced connectivity

VSC Solar MP can be connected to:

- An alarm
- A motor run/stop signal
- A pressure sensor or a flow sensor for monitoring
- Up to four digital inputs for pump start and stop (float switch, level sensors, etc.)
- Modbus RTU



Complete pump protection

VSC Solar MP is able to protect the pump against overload and dry running.

Dry running protection is performed by monitoring the motor's power factor and therefore probes are not required.

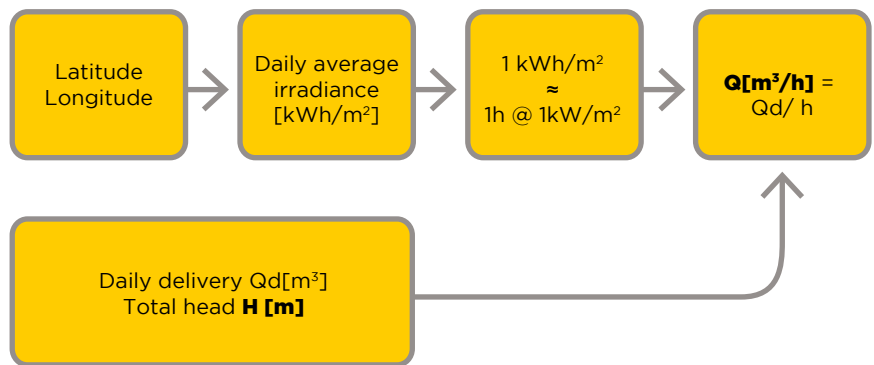
VSC Solar MP also protects itself against surges and overheating.



PV system sizing

The pumping system must be designed taking into account the required daily flow rate, total head and the installation site.

In particular, the choice of the pump must be made considering the average daily solar irradiation.



Once the appropriate pump has been identified, it is necessary to know:

- Rated pump power (P2)
- Electrical motor power (P1). P1 can be derived by dividing P2 by motor efficiency.
- Rated motor current
- Rated motor voltage
3 x 230 VAC or
3 x 400 VAC

The VSC Solar MP model to be used is determined by considering voltage and rated motor current.

To ensure maximum performance, the solar system - consisting of one or more strings of solar panels connected in series - must provide:

Electrical motor power (P1). The photovoltaic power (Wp) must be at least equal to the electric motor power (P1). Typically, taking into account

the efficiency loss due to panel temperature, it is recommended to increase Wp by 15% with respect to P1.

Rated motor voltage. The rated voltage of each string of solar panels (Vmp) must be at least equal to the rated motor voltage multiplied by the factor 1.4.

The open-circuit voltage of each string (Voc) must be less than VSC Solar MP's maximum operating voltage.

Example

Pump nameplate.

- Rated motor power:
P2 = 3 kW
- Electric motor power:
P1 = 4 kW
- Rated motor current:
8.3 A
- Rated motor voltage:
3 x 400 VAC

VSC Solar MP selection.

The rated motor voltage being 400 VAC and the rated current 8.3 A, the most suitable model for the application is VSC Solar MP 409.

PV system sizing.

PV panels used:

- Wp = 240 W
- Vmp = 30 VDC
- Voc = 37 VDC
- Imp = 8 A

Since P1 = 4 kW the required electrical power is increased by 15% so Wp = 4.6 kW.

To develop 4.6 kW 19 panels of 240 W are needed.

Vmp = 19 x 30 = 570 VDC is greater than the rated motor voltage multiplied by 1.4 (400 x 1.4 = 560 VDC) and Voc = 19 x 37 = 703 VDC is less than the maximum voltage of VSC Solar MP 409 (850 VDC).

For this reason a single string of 19 panels can be installed.

Technical specifications

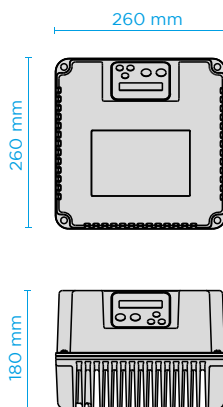
| Model | Vin VDC | Vin, P1 nom* VDC | Max Vout VAC | Max I out A | Typical motor P2** | | Weight Kg | Size |
|-------------------|-----------|------------------|--------------|-------------|--------------------|------|-----------|------|
| | | | | | VAC | kW | | |
| VSC Solar MP 212 | 160 - 650 | > 320 | 3 x 230 | 12 | 3 x 230 | 2,2 | 8,2 | 2 |
| VSC Solar MP 409 | 320 - 850 | > 560 | 3 x 400 | 9 | 3 x 400 | 3 | 8,3 | 2 |
| VSC Solar MP 412 | 320 - 850 | > 560 | 3 x 400 | 12 | 3 x 400 | 4 | 8,5 | 2 |
| VSC Solar MP 415 | 320 - 850 | > 560 | 3 x 400 | 15 | 3 x 400 | 5,5 | 8,5 | 2 |
| VSC Solar MP 418 | 320 - 850 | > 560 | 3 x 400 | 18 | 3 x 400 | 7,5 | 8,5 | 2 |
| VSC Solar MP 425 | 320 - 850 | > 560 | 3 x 400 | 25 | 3 x 400 | 11 | 8,5 | 2 |
| VSC Solar MP 430 | 320 - 850 | > 560 | 3 x 400 | 30 | 3 x 400 | 15 | 8,7 | 2 |
| VSC Solar MP 438 | 320 - 850 | > 560 | 3 x 400 | 38 | 3 x 400 | 18,5 | 28 | 3 |
| VSC Solar MP 448 | 320 - 850 | > 560 | 3 x 400 | 48 | 3 x 400 | 22 | 28 | 3 |
| VSC Solar MP 465 | 320 - 850 | > 560 | 3 x 400 | 65 | 3 x 400 | 30 | 28 | 3 |
| VSC Solar MP 485 | 320 - 850 | > 560 | 3 x 400 | 85 | 3 x 400 | 37 | 28 | 3 |
| VSC Solar MP 4100 | 320 - 850 | > 560 | 3 x 400 | 100 | 3 x 400 | 45 | 87 | 4 |
| VSC Solar MP 4118 | 320 - 850 | > 560 | 3 x 400 | 118 | 3 x 400 | 55 | 87 | 4 |
| VSC Solar MP 4158 | 320 - 850 | > 560 | 3 x 400 | 158 | 3 x 400 | 75 | 87 | 4 |
| VSC Solar MP 4198 | 320 - 850 | > 560 | 3 x 400 | 198 | 3 x 400 | 93 | 87 | 4 |
| VSC Solar MP 4228 | 320 - 850 | > 560 | 3 x 400 | 228 | 3 x 400 | 110 | 87 | 4 |
| VSC Solar MP 4268 | 320 - 850 | > 560 | 3 x 400 | 268 | 3 x 400 | 132 | 87 | 4 |

* Input voltage necessary to obtain 100% of rated motor power.

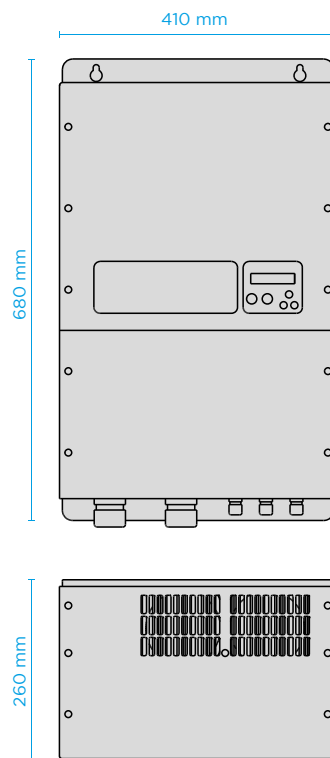
** Typical motor power. It is recommended to refer to the rated motor current when selecting the VSC Solar MP model.

Electrical characteristics

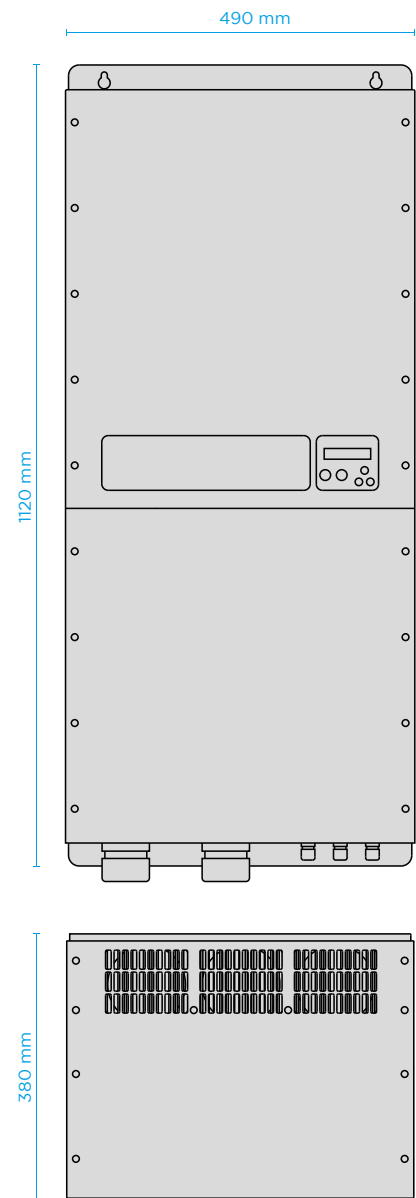
- Ambient temperature: -10 to 50°C (14 to 122°F).
- Max altitude at rated current: 1000 m.
- Protection degree: IP65 (NEMA 4) (Size 2), IP54 (NEMA 12) (Size 3, 4).
- Digital outputs configurable as N.O or N.C:
 1. Motor run signal
 2. Alarm signal
- Analog inputs, (10 or 15 VDC):
 1. 4-20 mA
 2. 4-20 mA
 3. 4-20 mA or 0-10 VDC
 4. 4-20 mA or 0-10 VDC
- 4 digital inputs, configurable as N.O or N.C, for motor start/stop
- MODBUS RTU RS485



Size 2



Size 3



Size 4



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