

# **VASCO Solar**

## The inverter for solar pumping applications



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**NASTEC**<sup>®</sup>  
> we move it faster >

**VASCO Solar 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.

VASCO Solar 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.

VASCO Solar also offers complete pump protection against surges, overloads and dry running.



## Designed to resist

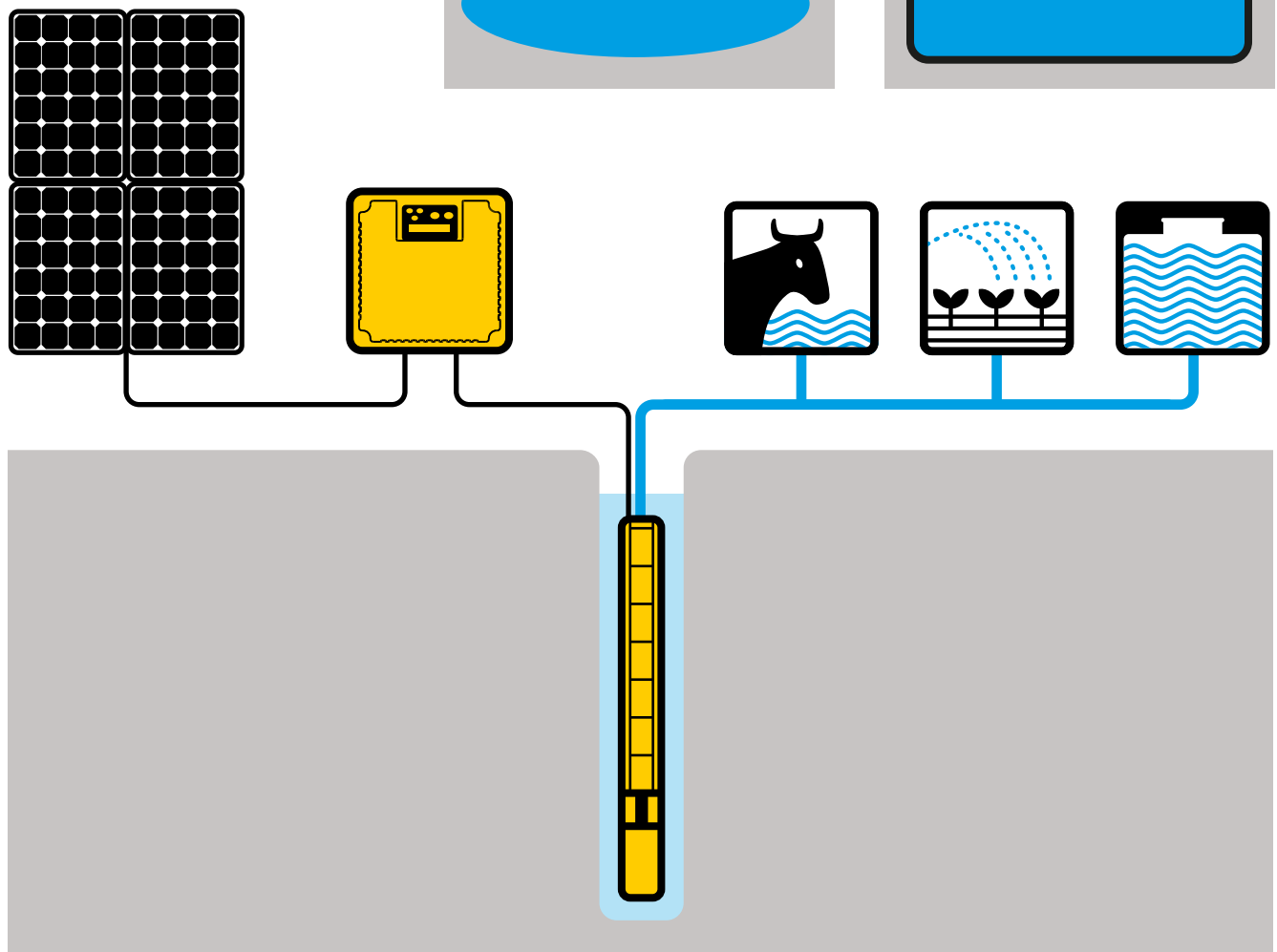
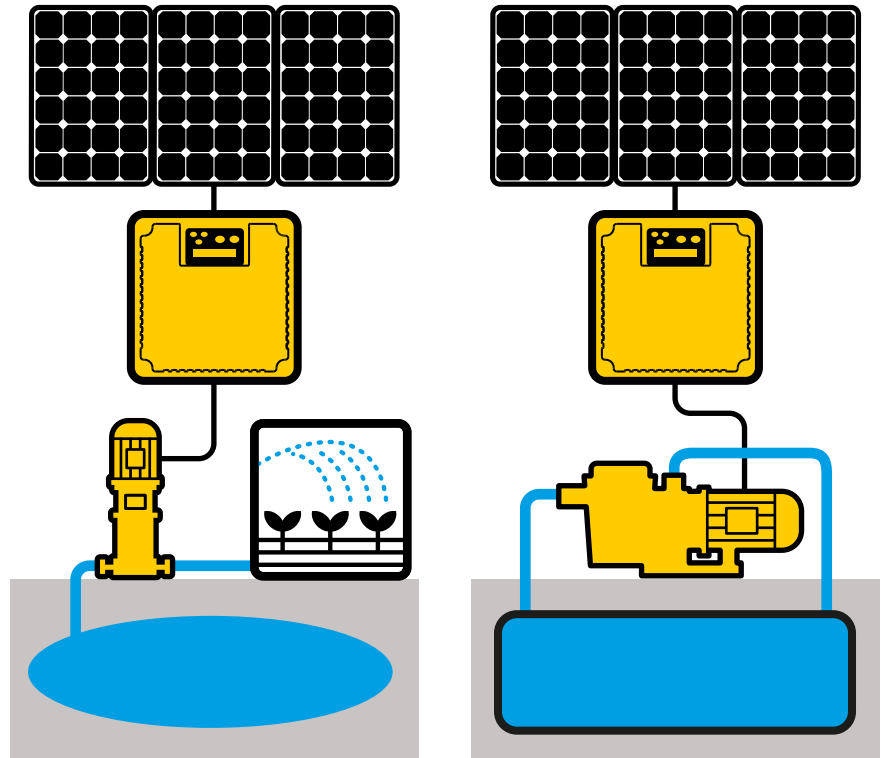
VASCO Solar is built entirely of aluminium to ensure maximum cooling and durability. All other metal parts are made using AISI 304 stainless steel and therefore resistant to corrosion.

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

VASCO Solar can be used with any type of traditional AC pump, thereby offering maximum flexibility in several areas of application.

When using surface pumps, VASCO Solar 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, VASCO Solar can fill tanks for watering livestock or simply irrigate lawns or crops.

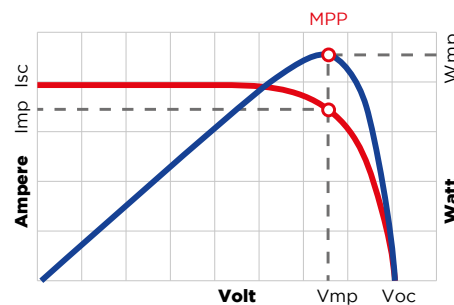


# MPPT: always the maximum power available

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

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

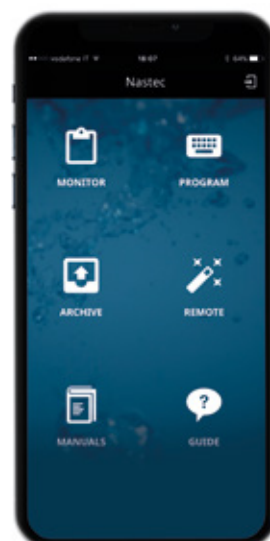
It is also possible to connect a pressure or flow sensor to monitor performance levels.

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.

## Unmatched user experience

Thanks to the Nastec NOW app it is possible to communicate with all Nastec SMART Bluetooth® devices in order to:

- Monitor multiple operating parameters simultaneously on the wide, high-definition colour screen of your smartphone or tablet.
- Get energy consumption statistics and check the alarm log.
- Develop programs, save them in the archive, copy them to other devices and share them among multiple users.
- Create reports with the possibility of adding notes and images, and email or store them in the digital archive.
- Remotely control a Nastec device via Wi-Fi or GSM by tethering to a nearby smartphone.



# Advanced connectivity

VASCO Solar 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

VASCO Solar 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.

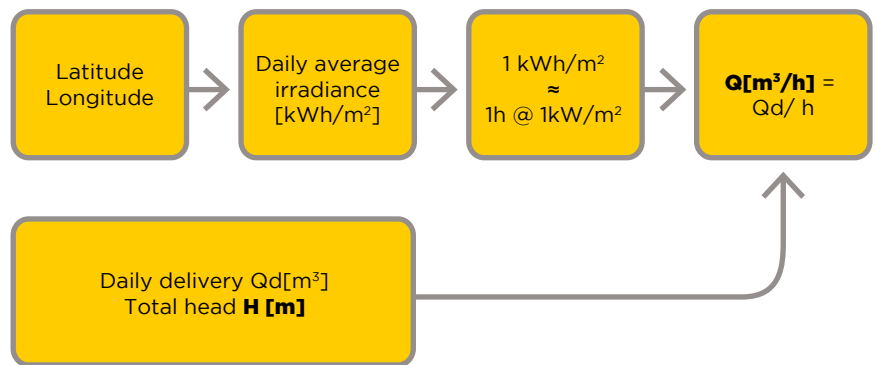
VASCO Solar also protects itself against surges and overheating.



# 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 VASCO Solar 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 VASCO Solar'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

### VASCO Solar selection.

The rated motor voltage being 400 VAC and the rated current 8.3 A, the most suitable model for the application is VASCO Solar 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 VASCO Solar 409 (850 VDC).

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

# Technical specifications

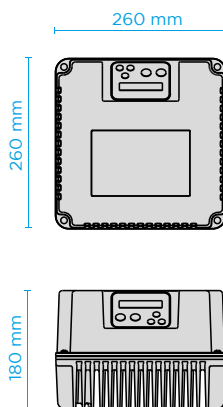
Model	Vin VDC	Vin, P1 nom* VDC	Max Vout VAC	Max I out A	Typical motor P2**		Weight Kg	Size
					VAC	kW		
VASCO Solar 212	160 - 650	> 320	3 x 230	12	3 x 230	2,2	8,2	2
VASCO Solar 409	320 - 850	> 560	3 x 400	9	3 x 400	3	8,3	2
VASCO Solar 412	320 - 850	> 560	3 x 400	12	3 x 400	4	8,5	2
VASCO Solar 415	320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

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

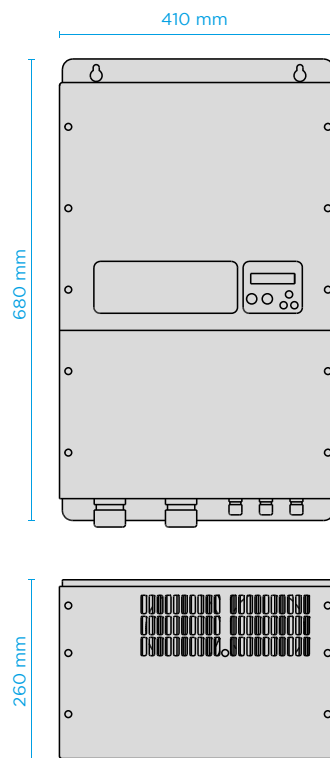
\*\* Typical motor power. It is recommended to refer to the rated motor current when selecting the VASCO Solar model.

## Electrical characteristics

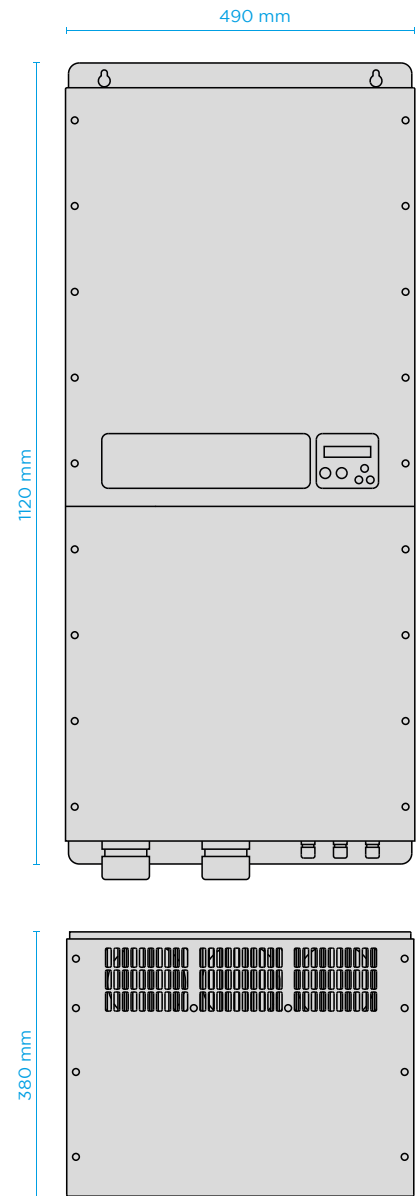
- Ambient temperature: -10 to 50°C (14 to 122°F).
- Max altitude at rated current: 1000 m.
- Protection degree: IP65 (NEMA 4) (Size 2), IP54 (NEMA 12) (Size 3, 4).
- Digital outputs configurable as N.O or N.C:
  1. Motor run signal
  2. Alarm signal
- Analog inputs, (10 or 15 VDC):
  1. 4-20 mA
  2. 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  
Bluetooth® SMART (4.0)



Size 2



Size 3



Size 4

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