



VASCO

Variable Speed Controller
Made In Italy



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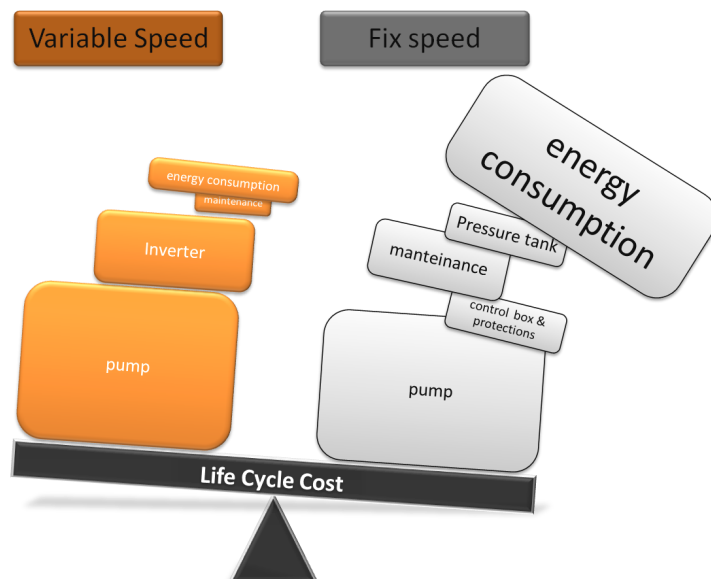
Website: www.sppump.com

Variable Speed Controller

VASCO is a purpose-built family of variable frequency drives, designed to control and protect pumping systems based on changing pump speed.

From water supply for domestic, irrigation, commercial and industrial applications, to heating and air conditioning, from filtering to pressure-washing, the VASCO range perfectly fits any new or existing application ensuring:

- energy and cost saving
- simplified installation
- longevity of pumping system
- greater reliability



VASCO units are extremely compact and, connected to any pump on the market, will manage the operation of the pump to maintain a constant desired physical dimension (such as pressure, flow, temperature or other). The pumping system runs only at the speed necessary to meet user's requirements, ensuring energy savings and extending the life of the system.

VASCO also provides motor protection and monitoring, such as:

- protection against overload and dry running
- integrated soft start and soft stop functions, extending the life of the system and reducing peak absorption
- indication of input current and supply voltage
- recording running hours and logging errors and alarms reported by the system
- VASCO can control a second or third pump at constant speed DOL (DOL: Direct On Line)
- connect to other VASCOs to get combined operation

Body is constructed entirely of aluminium, making VASCO, with its compact dimensions, extremely solid, lightweight and easily cooled, adding to the unit's versatility.

The degree of protection, IP55 makes it possible to install VASCO virtually anywhere, including humid and dusty environments; the liquid crystal illuminated display ensures VASCO is easy to operate and a buzzer provides an immediate indication of alarm.



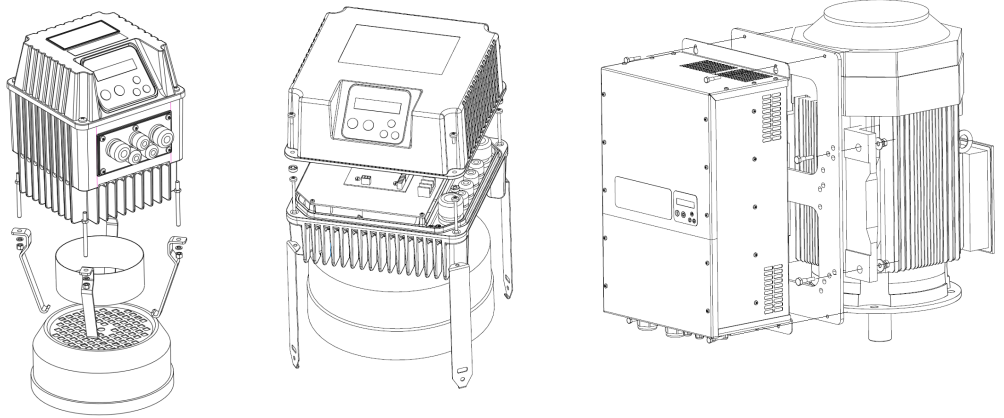
Quick installation

VASCO can be installed directly on the motor or directly to the wall with a supplied installation kit.

Motor kit

VASCO is cooled by the motor cooling fan.

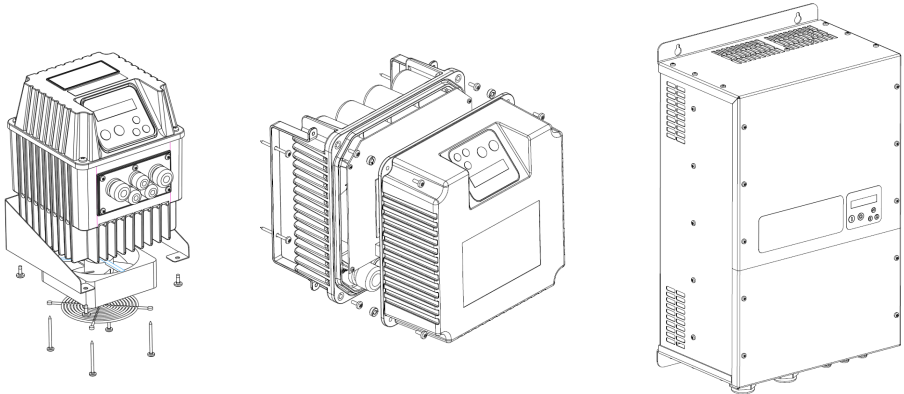
Motor kit consists of 4 special clamps (or flange adapter) to fix the VASCO to the motor fan cover (or motor feet).



Wall kit

VASCO is cooled by an external cooling fan attached to the inverter radiator.

A special metal bracket is supplied for VASCO to be mounted to the wall.



Installing VASCO is simple and intuitive, consisting of a few quick steps:

- Connect VASCO to **power supply**.
- Connect VASCO to **pump**.
- Connect VASCO to the **sensor**, located wherever in the piping you want to maintain the desired constant physical dimension (pressure, flow, liquid temperature, ...).
- Set VASCO to configure the pump to the system and the desired performance.

When first powering the VASCO, a quick initial configuration is required for complete configuration of the drive.

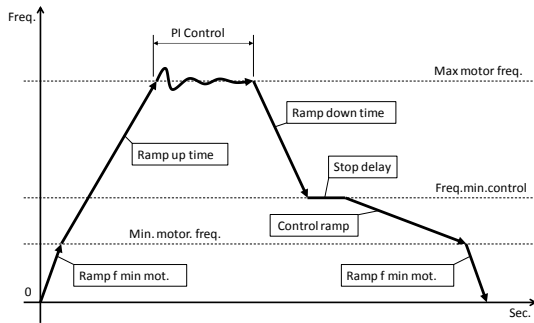
Additional parameters can be configured later by entering three different setting levels:

- **End user level.** The only level which can be accessed without password. It allows the user to monitor electrical and hydraulic parameters and status of the VASCO and pump.
- **Installer level.** In this level the installer can configure the VASCO-pump system to the characteristics of the hydraulic system. An entry password is required.
- **Advanced level.** This level allows the electrical configuration of VASCO to the pump. Another entry password is required.



Software designed for pumps application

Software implemented in each drive of VASCO range is the result of a long-time experience in solving the customer requests and constantly following new drive applications.



Minimum motor frequency

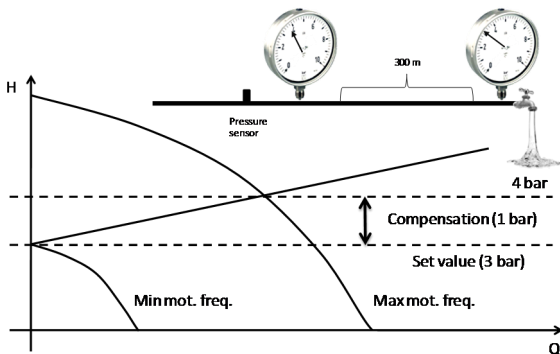
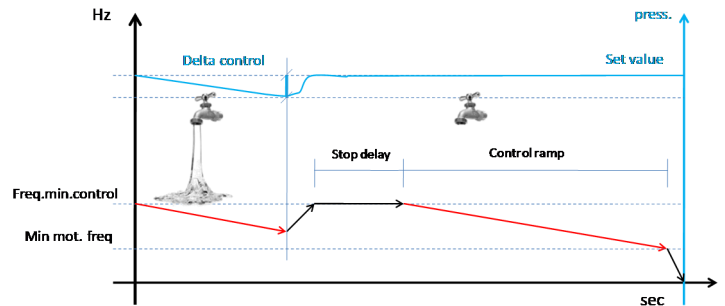
This parameter prevents motor operation below a certain frequency, thus avoiding damage to the thrust bearing of the submersible motors.

Minimum motor frequency ramp

Motor can accelerate from 0 to the minimum motor frequency following a very fast ramp and then go through a slower ramp.

Clever stop of pump at no flow condition

Below minimum control frequency, VASCO gradually reduces the pump speed while monitoring the pressure transducer signal. If this value is maintained close to the set pressure, VASCO will reduce furthermore the output frequency till stopping definitely the pump.



Loss compensation proportional to the water flow

If the pressure sensor is placed near the pump, pressure value on the working point is lower than set pressure due to the loss proportional to the water flow.

It is possible to vary the pressure set in a linear relation with respect to the frequency to compensate pressure loss in the pipes.

Dry running alarm via cosphi value

If pump runs dry, its cosphi value drops below a settable cosphi value, and VASCO stops the pump after 3 seconds. VASCO will try to make 5 attempts every 10,20,40,80 and 160 minutes, after which it will declare an alarm and stop the pump if the condition persists.

Maximum and minimum alarm pressure

When the pressure rises above a certain settable pressure value, VASCO will stop the pump to prevent damages to the hydraulic components in the system. Similarly, if the pressure drops below a certain pressure an alarm is declared and the pump is stopped.

V/f programmable curve

VASCO allows to choose between two different methods of torque control (voltage) versus pumps speed (frequency):

- constant torque (linear V/f)
- quadratic variable torque (squared V/f)

For centrifugal pumps, energy savings can be obtained by selecting squared V/f control.

Settable carrier frequency between 2.5, 4, 6, 8, 10 kHz

If VASCO controls a submersible pump with long cables, it is possible to decrease the carrier frequency value to ensure longer motor life.

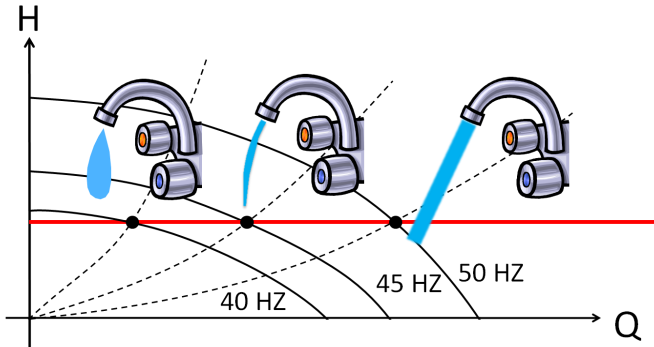
Several control modes available

In addition to constant pressure control, VASCO allows other control modes such as fixed frequency, constant flow, constant temperature.

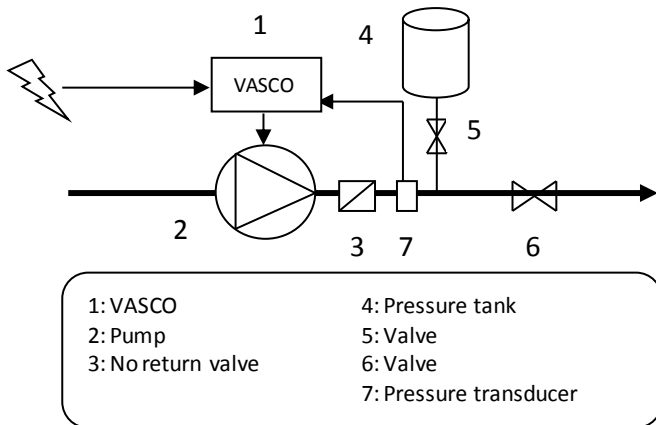
Several control modes

Constant pressure

VASCO controls the pump speed to maintain constant pressure at a set point independent of the water demand in the system



In a hydraulic system equipped with VASCO, the standard pressure tank is replaced by a smaller tank which functions to maintain the set pressure in the system when the pump is stopped.

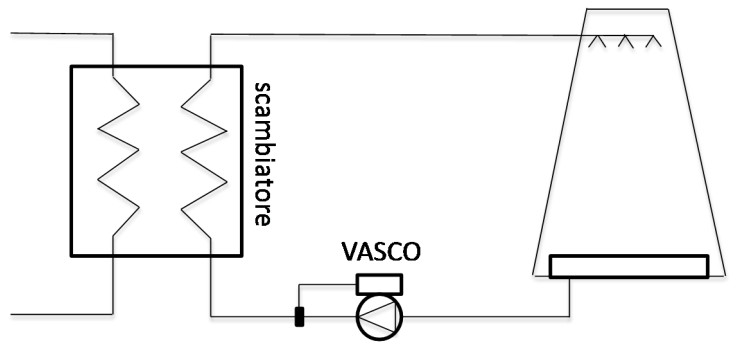


Fixed frequency 2 values

If it is not necessary to operate at constant pressure but is required to select 2 different speeds of pump, by selecting fixed frequency 2 values control mode, it is possible to switch the 2 values by acting on a digit input contact.

Constant temperature

The control method at constant temperature is used to maintain the temperature of the pumped fluid to vary the thermal load. This control system is used in air conditioning or refrigeration and cooling towers. In this last case, for example, is kept constant the temperature measured by a sensor located in correspondence of the return water.



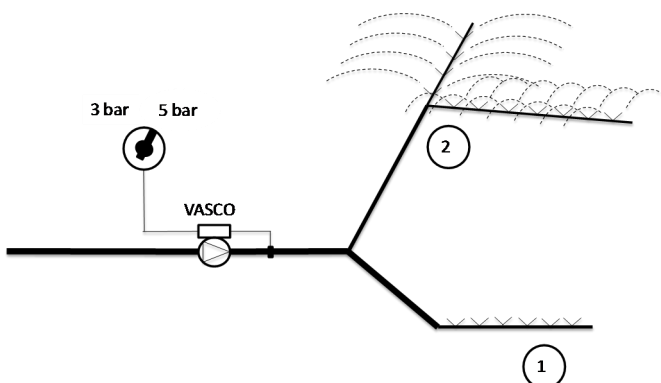
Constant flow

By selecting the constant flow control mode and using a flow transducer, it is possible to control the flow of the pumped liquid to vary the system condition.

This control mode is used, for example, in a system for filtering the pumped fluid in which the obstruction of the filter would lead to a progressive reduction of the flow rate if it is not compensated by an increasing of the pump speed.

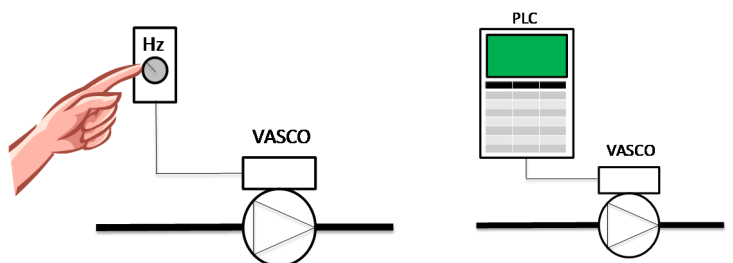
Constant pressure 2 values

By selecting the constant pressure 2 values control mode, in case in irrigation systems, only one pump can serve two zones with different pressure sets. It is possible to switch the two values by acting on a digit input contact.



External frequency

In some application, it is chosen to change the frequency of the pump by using an external signal coming from a trimmer or a PLC. In this case, after selecting the External Frequency control mode, it is enough to connect an input signal 4-20 mA or 0-10V, proportional to the desired frequency, to the AN4 analog contact.



Applications: Pressure Booster Sets

With VASCO inverters is possible to realise booster sets with one or more pumps (up to 8) to be controlled at constant pressure.

VASCO can be mounted directly to the motor fan cover with a proper kit; the extreme strength of the connection allows the VASCO installation even on horizontal pumps.

Screen display can be easily rotated to optimise the parameters view.

Motor mounting application guarantees, as well as the compactness and the saving of additional control panels and wirings, a very good cooling of the inverter and low electromagnetic emissions due to the reduced length of motor cable.

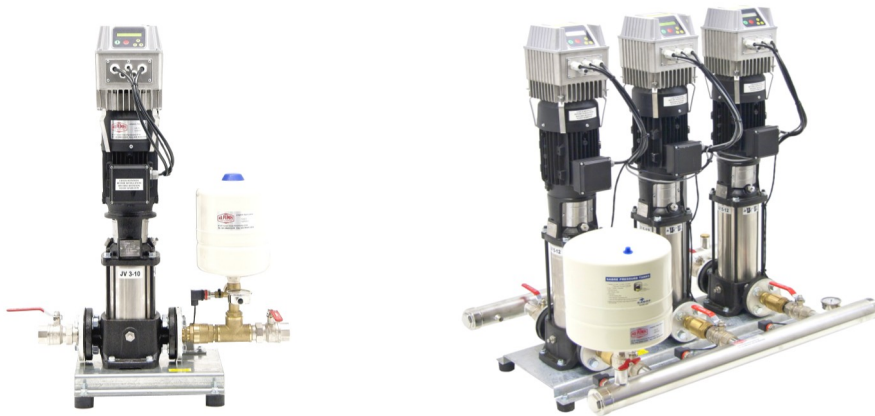
IP55 protection allows the installation in humid and dusty environments.

If VASCO cannot be installed on motor fan cover, it is possible to fix the VASCO to the wall with an optional kit composed by a cooling fan fed by the VASCO itself and a wall metal bracket.

IP 55 protection does not require to include VASCO drive into any additional control box so VASCO can be installed very near to the pump.

COMBO mode control allows to switch the start of pumps based on real working time and, in case of failure, remaining pumps grant the operation to always guarantee the service.

Once the damaged unit is replaced, COMBO will preferably move the operation on the new pumps to equalize the running time.



1 VASCO + 1 or 2 DOL pumps

A first way of splitting consists of installing one pump driven by the VASCO and 1 or 2 DOL pumps directly connected to the main power (Direct On Line) ; VASCO switches on/off the 1 or 2 DOL pumps through contactors.

VASCO alternates the two DOL pumps to average pump wearing.



From 1 to 8 VASCO in COMBO connection

A second way of splitting (named COMBO) consists of using several pumps in parallel (up to 8) each one driven by a VASCO unit.

In this way, efficiency and the reliability of the pump group is maximized.

Each VASCO controls and protects its pump and the operation is shared among all the connected pumps to average pump wearing; in case of failure the remaining pumps will maintain the pumping operation.



From 1 to 8 VASCO in COMBO connection + 1 or 2 DOL pumps

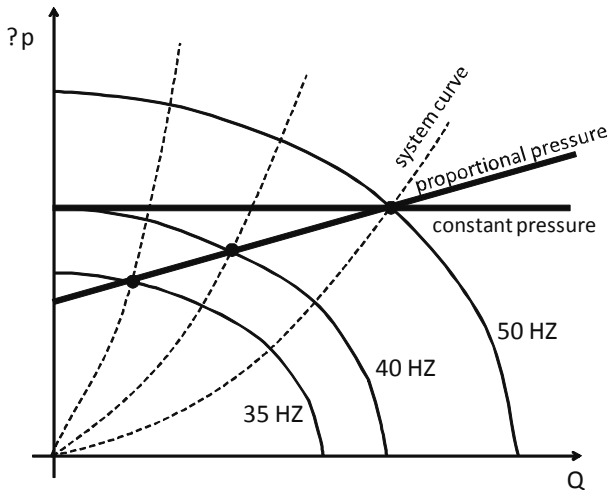
Additionally it is possible to equip the system with pumps connected in COMBO mode plus 1 or 2 DOL pumps to satisfy additional water demand.



Applications: in-line pumps

VASCO, in addition to other control modes, performs the operation at constant differential pressure by using a differential pressure sensor or using 2 pressure sensors installed in the suction and delivery sides of the pump. Difference value is calculated by the VASCO itself from the two read values.

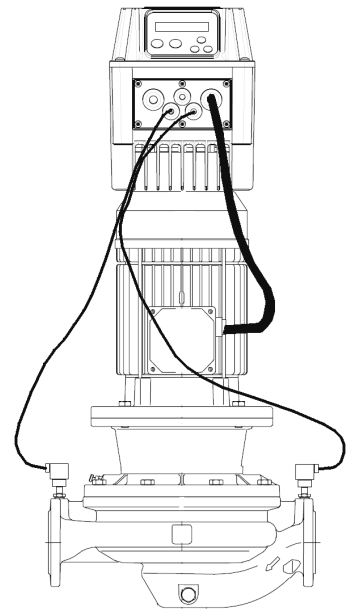
This solution enables significant cost savings as well as provide protection against cavitation (by setting a minimum alarm pressure on suction side) and against overpressure (by setting a maximum alarm pressure on delivery side).



Constant differential pressure control can be extended to the operation in a group, i.e. twin pumps application.

COMBO system ensures the pumps alternance during the operation to average the pumps wearing and easily plan the maintenance operation.

In system characterized by high pressure drop, VASCO performs the proportional differential pressure control, to maximize energy saving.

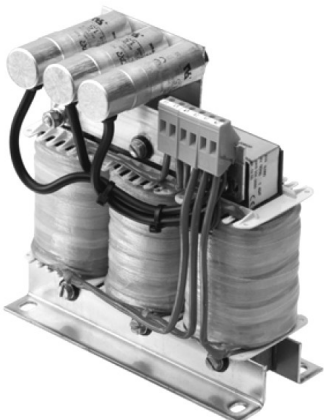


Submersible pumps

Submersible pumps of various powers can be powered by VASCO.

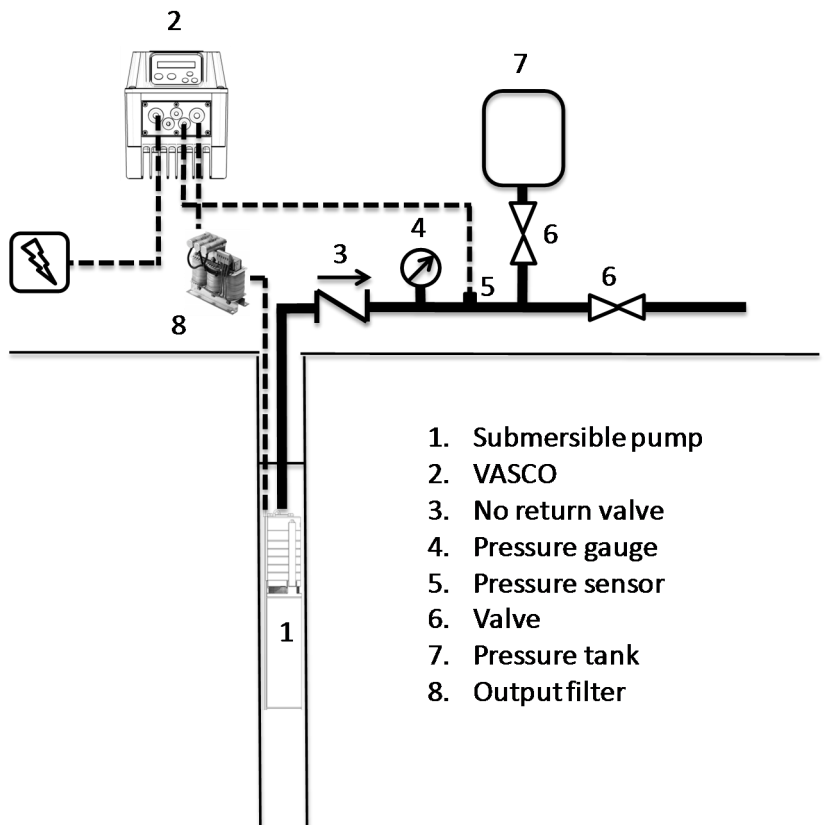
It is suggested to set to 2.5 kHz the carrier frequency (PWM parameter) and sometimes it is necessary to install a filter between pump and inverter to:

- reduce the spikes on the motor windings caused by voltage reflection (dv/dt filters)
- avoid electromagnetic noise in the surrounding environment (sinusoidal filters).



It is recommended to keep separate the motor cable from other cables granting a certain distance.

Nastec can provide filters and shielded cables for a proper pump installation.

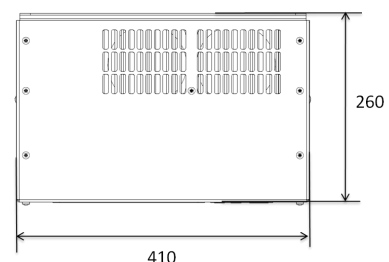
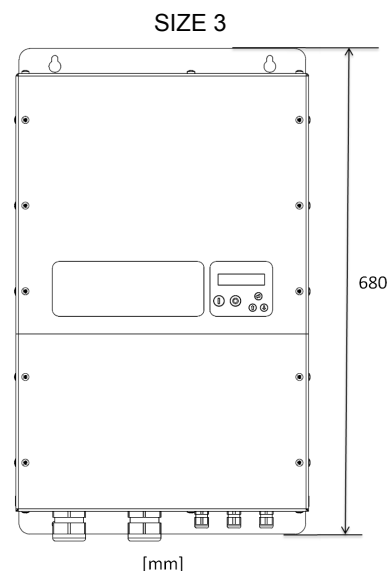
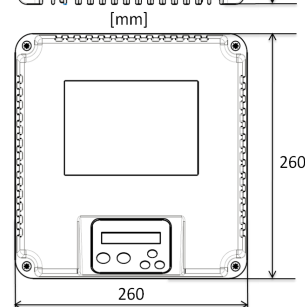
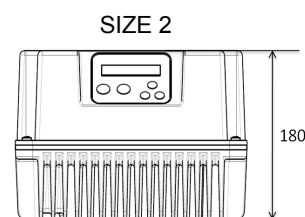
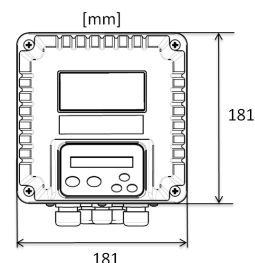
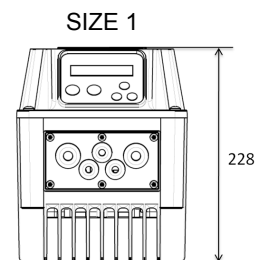


1. Submersible pump
2. VASCO
3. No return valve
4. Pressure gauge
5. Pressure sensor
6. Valve
7. Pressure tank
8. Output filter

Performances

| Model | Vin +/- 15% [V] | Max V out [V] | Max I out [A] | P2 motor power* kW | Size |
|-----------|-----------------|---------------|---------------|--------------------|------|
| VASCO 209 | 1 x 230 | 1 x Vin | 9 | 1,1 | 1 |
| | | 3 x Vin | 7 | 1,5 | 1 |
| VASCO 214 | 1 x 230 | 1 x Vin | 9 | 1,1 | 1 |
| | | 3 x Vin | 11 | 3 | 1 |
| VASCO 218 | 1 x 230 | 3 x Vin | 18 | 4 | 2 |
| VASCO 225 | 1 x 230 | 3 x Vin | 25 | 5,5 | 2 |
| VASCO 306 | 3 x 230 | 3 x Vin | 6 | 1,1 | 1 |
| VASCO 309 | 3 x 230 | 3 x Vin | 9 | 2,2 | 1 |
| VASCO 314 | 3 x 230 | 3 x Vin | 14 | 3 | 2 |
| VASCO 318 | 3 x 230 | 3 x Vin | 18 | 4 | 2 |
| VASCO 325 | 3 x 230 | 3 x Vin | 25 | 5,5 | 2 |
| VASCO 330 | 3 x 230 | 3 x Vin | 30 | 7,5 | 2 |
| VASCO 338 | 3 x 230 | 3 x Vin | 38 | 9,2 | 3 |
| VASCO 348 | 3 x 230 | 3 x Vin | 48 | 11 | 3 |
| VASCO 365 | 3 x 230 | 3 x Vin | 65 | 15 | 3 |
| VASCO 375 | 3 x 230 | 3 x Vin | 75 | 18,5 | 3 |
| VASCO 385 | 3 x 230 | 3 x Vin | 85 | 22 | 3 |
| VASCO 406 | 3 x 380 - 460 | 3 x Vin | 6 | 2,2 | 1 |
| VASCO 409 | 3 x 380 - 460 | 3 x Vin | 9 | 4 | 1 |
| VASCO 414 | 3 x 380 - 460 | 3 x Vin | 14 | 5,5 | 2 |
| VASCO 418 | 3 x 380 - 460 | 3 x Vin | 18 | 7,5 | 2 |
| VASCO 425 | 3 x 380 - 460 | 3 x Vin | 25 | 11 | 2 |
| VASCO 430 | 3 x 380 - 460 | 3 x Vin | 30 | 15 | 2 |
| VASCO 438 | 3 x 380 - 460 | 3 x Vin | 38 | 18,5 | 3 |
| VASCO 448 | 3 x 380 - 460 | 3 x Vin | 48 | 22 | 3 |
| VASCO 465 | 3 x 380 - 460 | 3 x Vin | 65 | 30 | 3 |
| VASCO 475 | 3 x 380 - 460 | 3 x Vin | 75 | 37 | 3 |
| VASCO 485 | 3 x 380 - 460 | 3 x Vin | 85 | 45 | 3 |

* typical motor power. It is recommended refer to rated motor current when selecting VASCO model.



General characteristics

- Rated frequency : 50 - 60 Hz (+/- 2%)
- Max. working temperature : 40°C (104 °F)
- Max. altitude at nominal current: 1000 m
- Grade of protection : IP55 (SIZE 1 -2), IP54 (SIZE 3)
- Settable digital outputs : N.O. or N.C.
 1. Motor run signal
 2. Alarm signal
 3. DOL 1 pump signal
 4. DOL 2 pump signal
- Analog inputs, (10 or 15 Vdc):
 1. 4-20 mA
 2. 4-20 mA
 3. 4-20 mA / 0 - 10 Vdc (settable)
 4. 4-20 mA / 0 - 10 Vdc (settable)
- 4 digital inputs, settable as N.O or N.C, for motor run/stop
- RS485 serial communication + Bluetooth® SMART (4.0) *

Nastec is in position to offer a wide range of accessories including pressure sensors, flow sensors, temperature sensors, shielded cables, input and output filters. For more information, contact our sales staff.

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