

# VASCO



NASEC

> we move it faster >

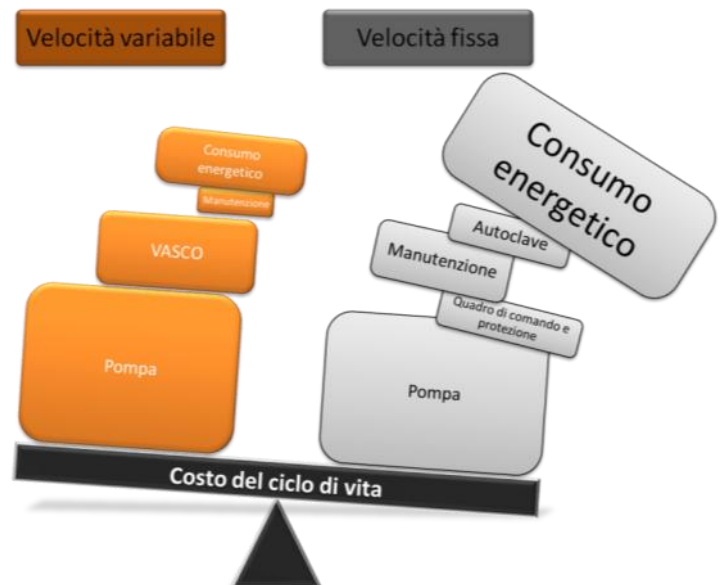


## VASCO

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 loggins 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 **aluminum**, 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 cristal illuminated display** ensures VASCO is easy to operate and a **buzzer** provides an immediate indication of alarm.



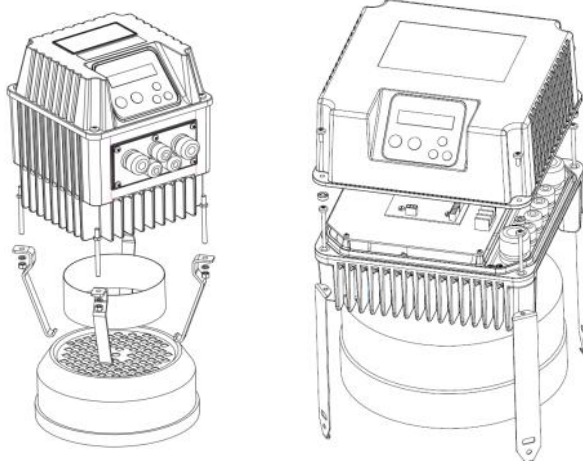
# Quick installation

VASCO can be installed directly on the cooling fan cover of the motor or directly to the wall with a supplied installation kit

## Motor kit

VASCO is cooled by the motor cooling fan.

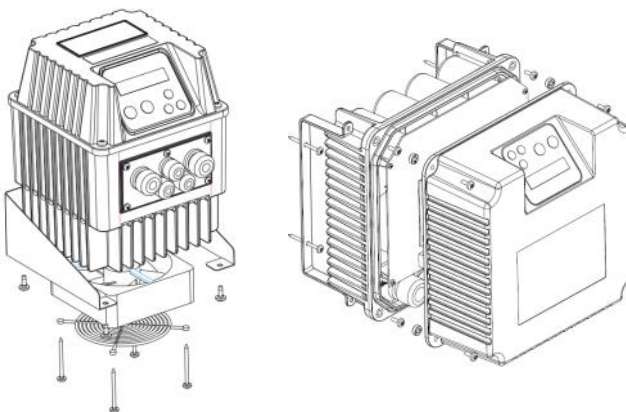
Motor kits consists of 4 special clamps to fix the VASCO to the motor fan cover



## 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.



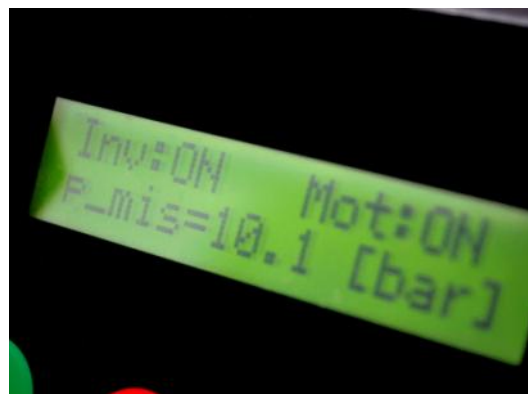
Installing VASCO is simple and intuitive, consisting of a few quick steps:

- 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.

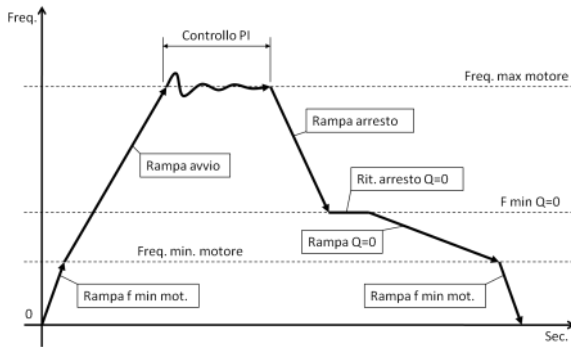
Additional parameters can be configured later by entering three different setting levels:

- **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

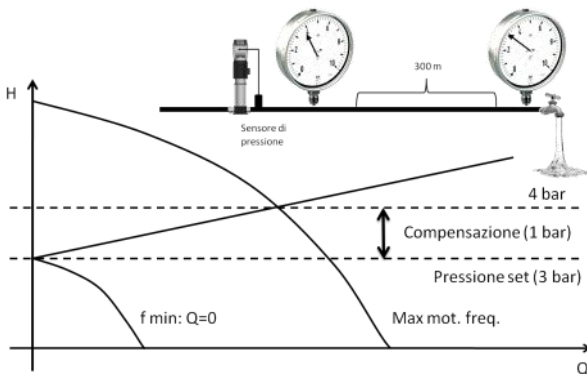
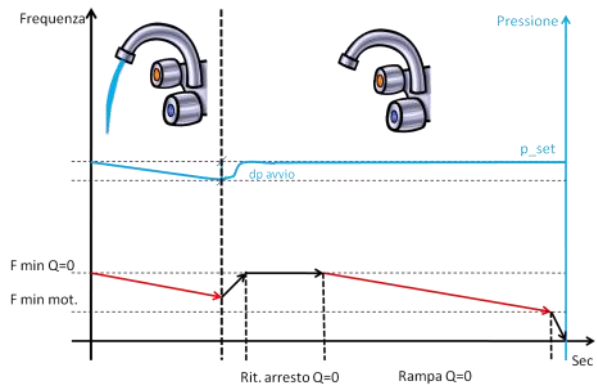
This parameter prevents motor operation below a certain frequency, thus avoiding damage to the thrust bearing of the submersible motors.

## Minimum motor frequency ramp

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

## Clever stop of pump at no flow condition

Once the minimum frequency at zero flow rate ( $F_{min} Q=0$ ) is reached, the VASCO gradually reduces the pumps 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 signal via cosphi value

If pump runs dry, its cosphi value drops below a settable cosphi value, and VASCO stops the pump after 2 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 pressure alarm

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 set pressure an alarms is declared and the pump is stopped.

## V/f programmable curve

Vasco allows to ability 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 pump, energing savings can be obtained by selecting squared V/f control.

## Settable carrier frequency between 2.5, 4, 8, 10, 12 kHz

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

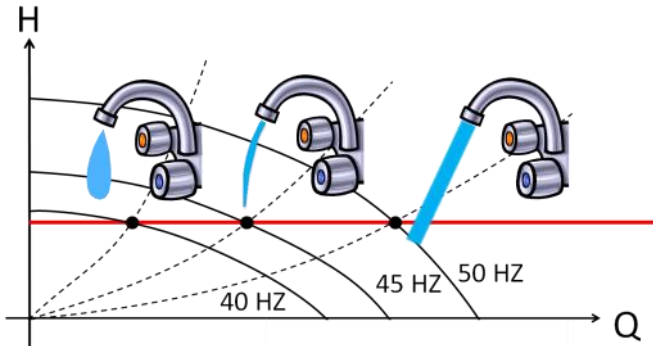
## Several control modes available

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

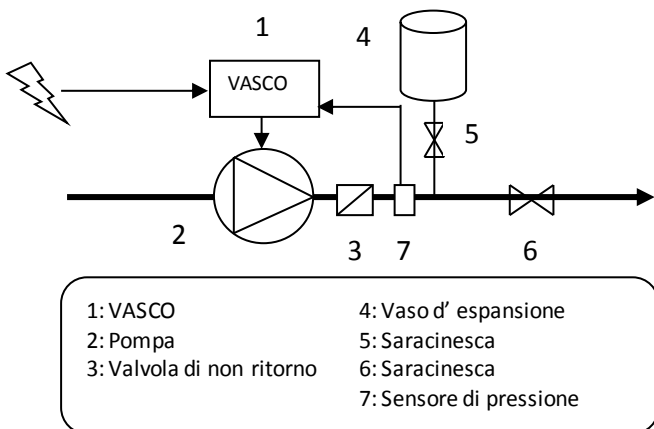
# Several control modes

## Constant pressure

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

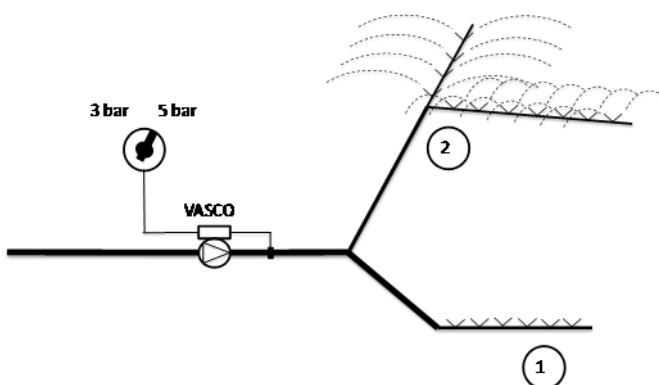


In a hydraulic system equipped with VASCO, the standard pressure tank is replaced by a smaller tank which functions to maintain the set pressure in the system when the pump is stopped.



## Constant set pressure 2 values

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

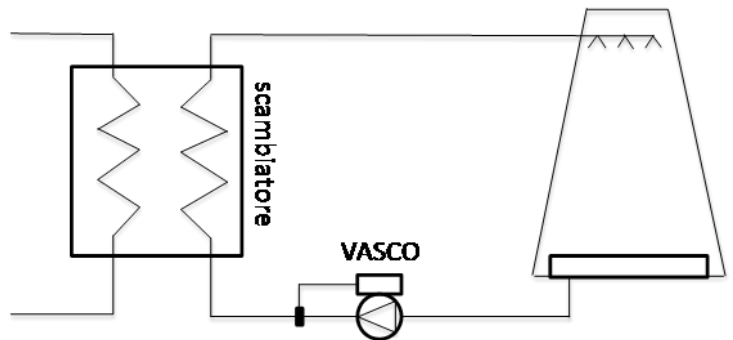


## Fixed frequency 2 value

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

## Constant temperature

The control method at a 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.



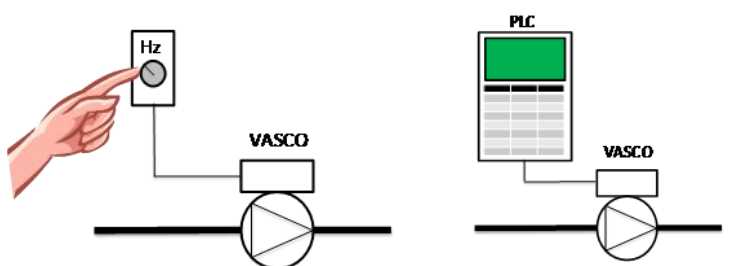
## Constant flow

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 pump 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 increase of the pump speed.

## 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 4–20A 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 controller at constant pressure

Vasco can be mounted directly to the motor fan cover with a proper kit; the extreme strenght 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 lenght 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 feeds 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 preferebly move the operation on the new pumps to equalize the running time .



## 1 VASCO + 1 or 2 DOL

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 (same working time) to average out pump wear.

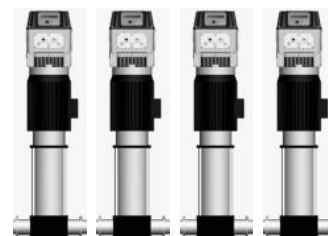


## From 1 to 8 VASCO in COMBO connection

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

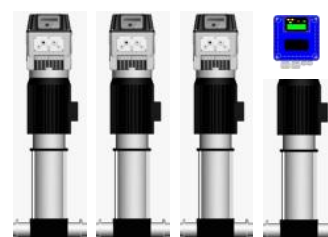
In this way, efficiency and the reliability of the pump group is maximized; Vasco controls and protects each connected pump.

Each VASCO controls and protects it's pump and the operation is shared among all the connected pumps to average out pump wear; in case of failure, the remaining pumps will maintain the pumping operation.



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

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



# Applications: in-line pumps

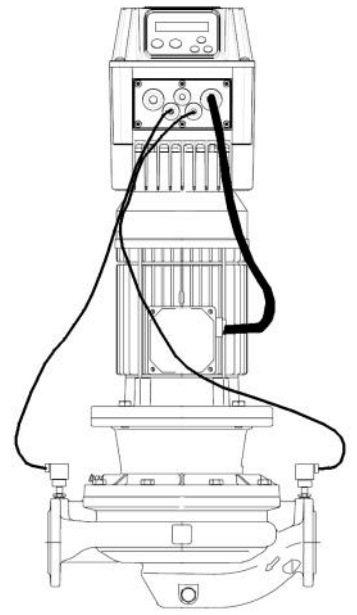
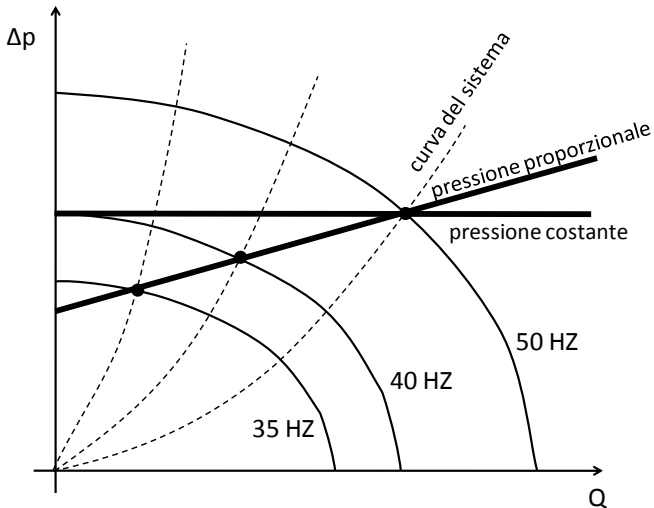
VASCO, in addition to other control modes, performs the operation at constant differential pressure by using a differential pressure sensor or using 2 pressure sensor installed in the suction and delivery sides of pumps. Difference value is calculated by the VADCO itself from the two values read.

This solution enables significant cost savings as well as provide protection against cavitation (by setting a threshold minimum pressure alarm in the sensor on suction side) and against overpressure (by setting a threshold of maximum pressure alarm in the sensor of 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 alterance during the operation to average the pumps wearing and easily plan the maintenance operation.

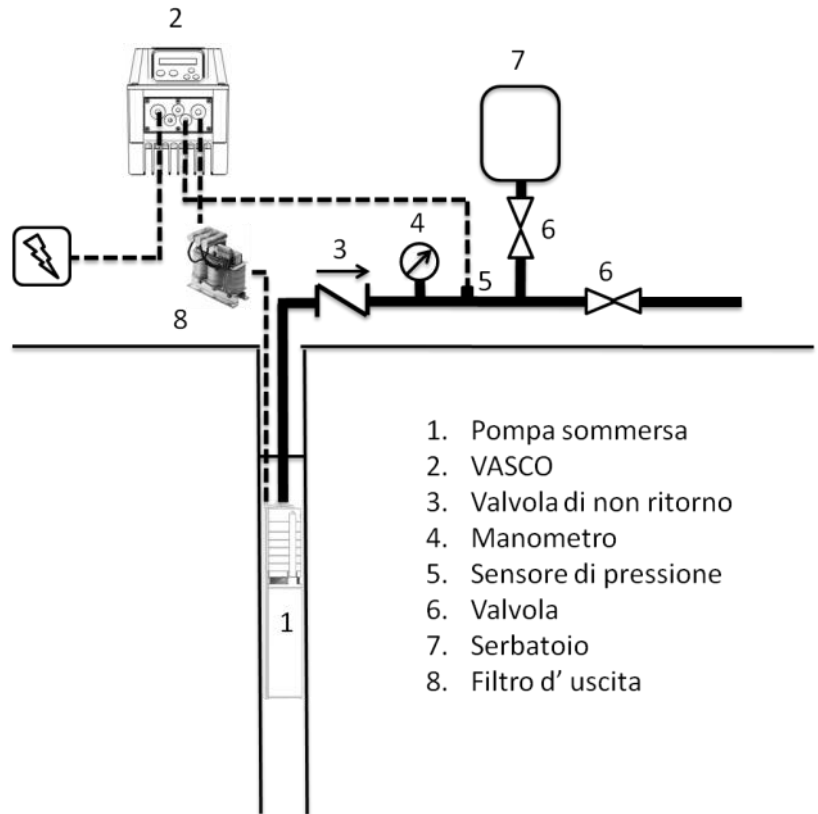
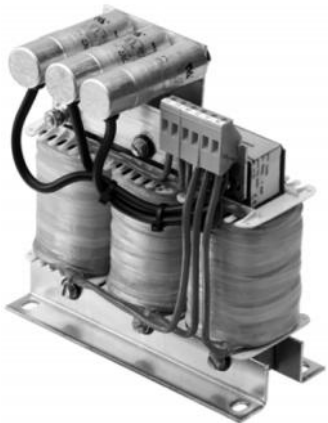
In system characterized by high pressure drop, VASCO performs the proportional differential pressure control, to maximize the energy saving.



## Submersible pump

Submersible pumps of various powers can be powered by VASCO, if it is installed on wall. It is suggested to set to 2.5 kHz the carrier frequency (PWM parameter) and sometimes it is necessary to install some filters between pump and inverter to:

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



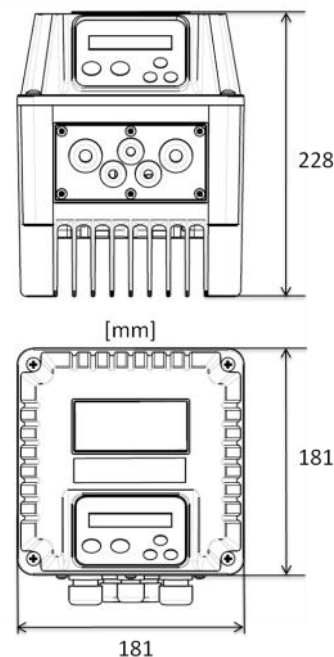
1. Pompa sommersa
2. VASCO
3. Valvola di non ritorno
4. Manometro
5. Sensore di pressione
6. Valvola
7. Serbatoio
8. Filtro d' uscita

It is suggestable to keep separate the motor cable from the others granting a certain distance. Nastec can provide all the filters and shielded cables for a proper pump installation.

# Performances

model	Vin +/- 15% [V]	max Vout [V]	I out [A]	P2 motor power [kW]
VASCO 209	1 x 230	1 x Vin	9	1,1
		3 x Vin	7	1.5
VASCO 214	1 x 230	1 x Vin	9	1,1
		3 x Vin	11	3
VASCO 409	3 x 380 - 460	3 x Vin	9	4
VASCO 414	3 x 380 - 460	3 x Vin	14	5,5
VASCO 418	3 x 380 - 460	3 x Vin	18	7,5
VASCO 425	3 x 380 - 460	3 x Vin	25	11
VASCO 430	3 x 380 - 460	3 x Vin	30	15

VASCO 209/214/409



## 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 (NEMA 4)
- Settable digit output : N.A or N.C
  1. Motor run signal
  2. Alarm signal
  3. DOL 1 pump signal
  4. DOL 2 pump signal
- Analog input, (10 o 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 x Digit inputs, settable as N.A o N.C, for run/stop motor
- RS485 serial communication
- 

Nastec is in position to offer a wide range of accessories including pressure sensors, flow sensors, temperature sensors, shielded cables , input EMC/RFI filters, and output dv/dt filters to protect motor windings in presence of long cables.

For more information , contact our Sales staff .

VASCO 414/418/425/430

