

# VAriable Speed COntroller

Operating manual

# VASCO



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# 1. VASCO Introduction

VASCO is a variable frequency drive designed to control and protect pumping systems by varying the output frequency to the pump.

VASCO can be applied to both new and existing pumping systems, and provides:

- energy and cost savings
- simplified installation and an overall lower pumping system cost
- longer life of the pumping system and relevant components
- improved reliability

VASCO, when connected to any pump, manages the system operation to maintain a certain constant physical quantity (pressure, differential pressure, flow, temperature, etc.) regardless of the conditions of use. The pump is operated only when needed thus avoiding unnecessary energy consumption.



VASCO at the same time is able to:

- protect the motor from overload and dry running
- implement soft start and soft stop to increase the system life and reduce current peaks
- provide an indication of current consumption, voltage, and power
- maintain a record of run time and display any errors and/or failures reported by the system
- control up to two additional pumps at a constant speed (Direct On Line)
- connect to other VASCO units for combined operation

Through the use of inductive filters (optional) VASCO eliminates dangerous surges that are induced in long cables, making VASCO suitable for control of submersible pumps.

## 2. Safety Instructions

The manufacturer strongly suggests carefully reading this operation manual before using and installing its products. Any operation (installation, maintenance and repair) must be carried out by trained, skilled, and qualified personnel. Failure to observe and follow the instructions in this manual may result in dangerous and potentially lethal electric shock. Pay attention to all standard safety and accident prevention regulations.

	<p><b>The device must be connected to main power supply via a switch to ensure the complete disconnection from the network before any operation on the VASCO itself (including visual inspection) and/or on the connected load.</b></p>
	<p><b>Disconnect VASCO from the main power supply before commencing any work.</b></p> <p><b>Do not remove, for any reason, the cover and the cable plate without having first disconnected the device from the main power supply and having waited at least 5 minutes.</b></p> <p><b>VASCO and pumping system must be grounded properly before operation. For the entire period VASCO is powered, high voltage is present on the output terminals of the inverter whether or not the pump is running.</b></p> <p><b>Tightening all 4 screws on the cover with washers is recommended before powering the device. Otherwise, there may be a failure to connect the cover to ground, creating the risk of electric shock or even death.</b></p>

Avoid any shock or significant impact during transport.

Check the VASCO immediately upon delivery and check for damage and/or missing parts. If either occurs, immediately notify the supplier.

Damages due to transport, incorrect installation, or improper use of the device will null and void the warranty.

Tampering or disassembly of any component will automatically void the warranty.

**The manufacturer cannot be held responsible for any damages to people and/or property due to improper use of its products.**

### 3. Technical Characteristics

Model	Vin +/- 15%	Max Vout	Max line current	Max motor current	Typical P2 motor	
	[V] AC	[V]	[A]	[A]	[KW]	[HP]
VASCO 209	1 x 230 VAC	1 x Vin	15	9	1.1	1.5
		3 x Vin		7	1.5	2
VASCO 214	1 x 230 VAC	1 x Vin	20	9	1.1	1.5
		3 x Vin		11	3	4
VASCO 406	3 x 380-460 VAC	3 x Vin	10	6	2,2	3
VASCO 409	3 x 380-460 VAC	3 x Vin	13,5	9	4	5,5
VASCO 414	3 x 380-460 VAC	3 x Vin	16	14	5,5	7,5
VASCO 418	3 x 380-460 VAC	3 x Vin	21	18	7,5	10
VASCO 425	3 x 380-460 VAC	3 x Vin	31	25	11	15
VASCO 430	3 x 380-460 VAC	3 x Vin	35	30	15	20

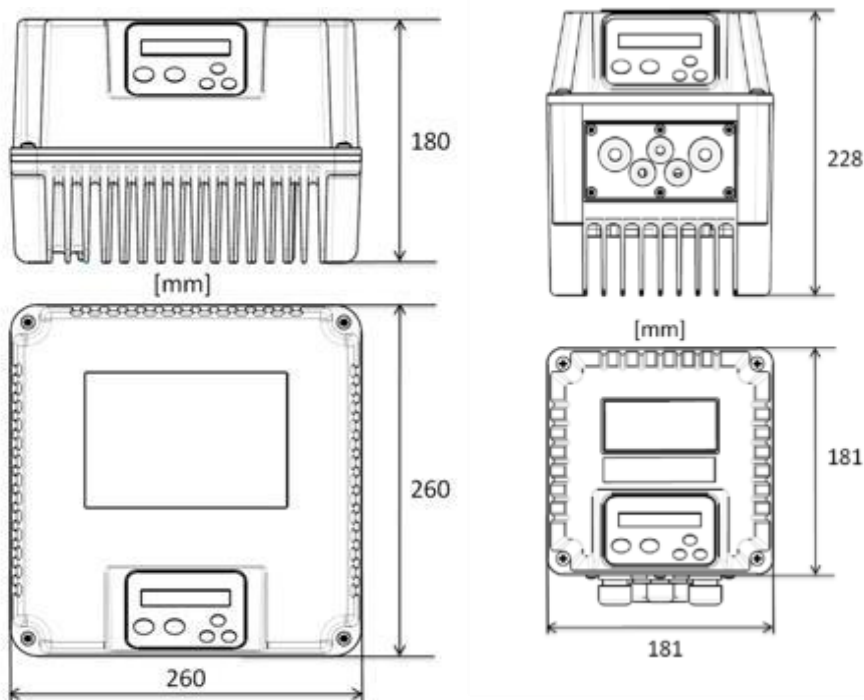
- Power frequency: 50 - 60 Hz (+/- 2%)
- Max. ambient temperature at nominal current: 40°C (104 °F)
- Max. altitude at nominal current: 1000 m
- Grade of protection: IP55 (NEMA 4) \*
- RS485 serial communication
- PWM configurable: 2.5 ,4, 6, 8, 10 kHz

\* auxiliary cooling fan of the VASCO, used in wall mounted applications, has a protection rating of IP20. If you require the version with IP55, please contact the supplier.

**VASCO is able to power the motor with a higher current for a short period of time according to the linear relation: 101% of the nominal current for 10min., 110% nominal current for 1 min.**

#### 3.1 Weight and dimensions

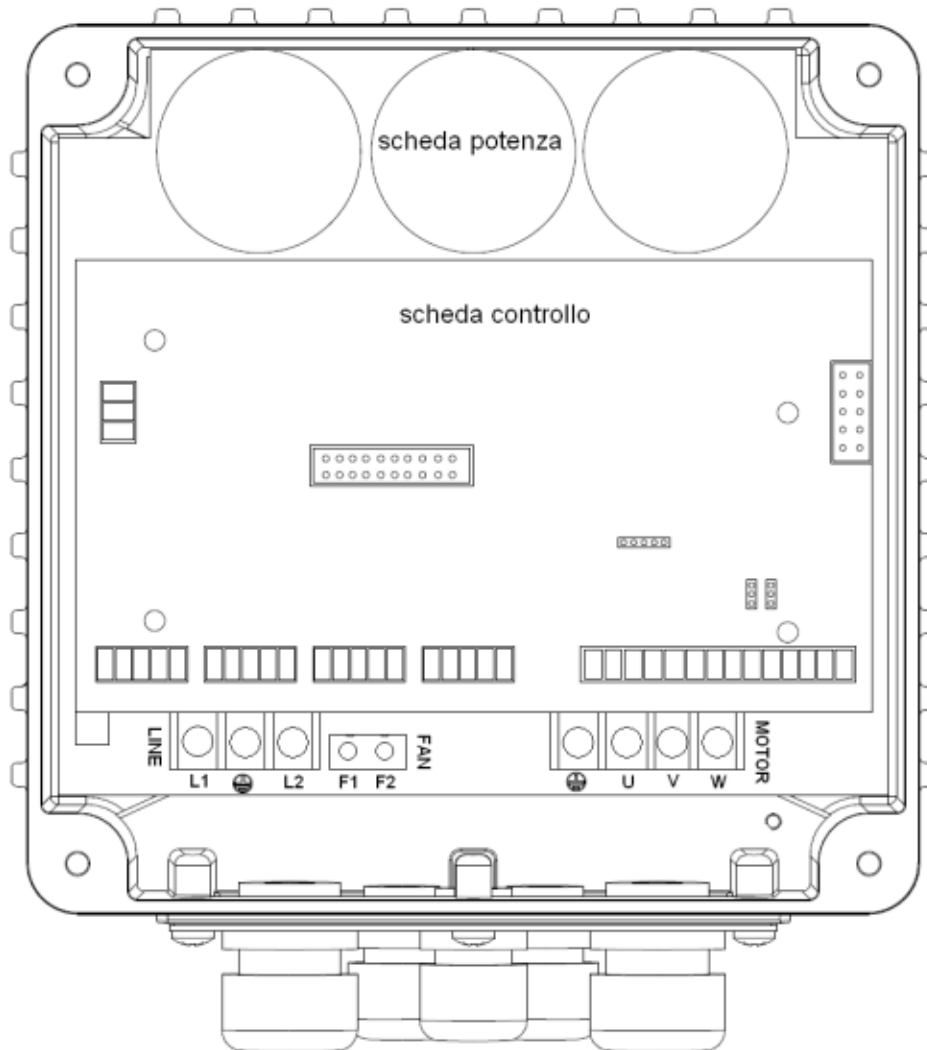
Model	Weight *
	[Kg]
VASCO 209	4
VASCO 214	4,3
VASCO 406	4,4
VASCO 409	4,4
VASCO 414	7
VASCO 418	7
VASCO 425	7
VASCO 430	7,2



\* Weight without auxiliary cooling fans and without packing.

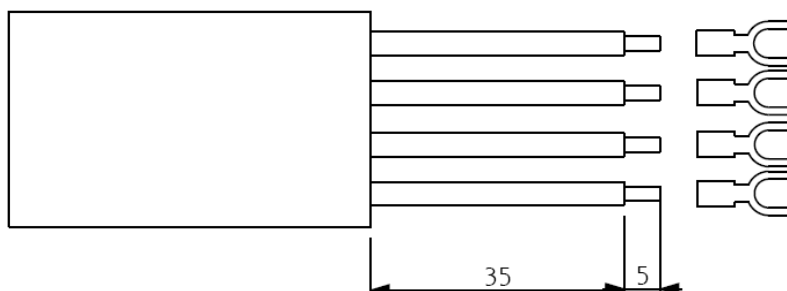
## 4. Electric wiring

### Power board VASCO 209,214

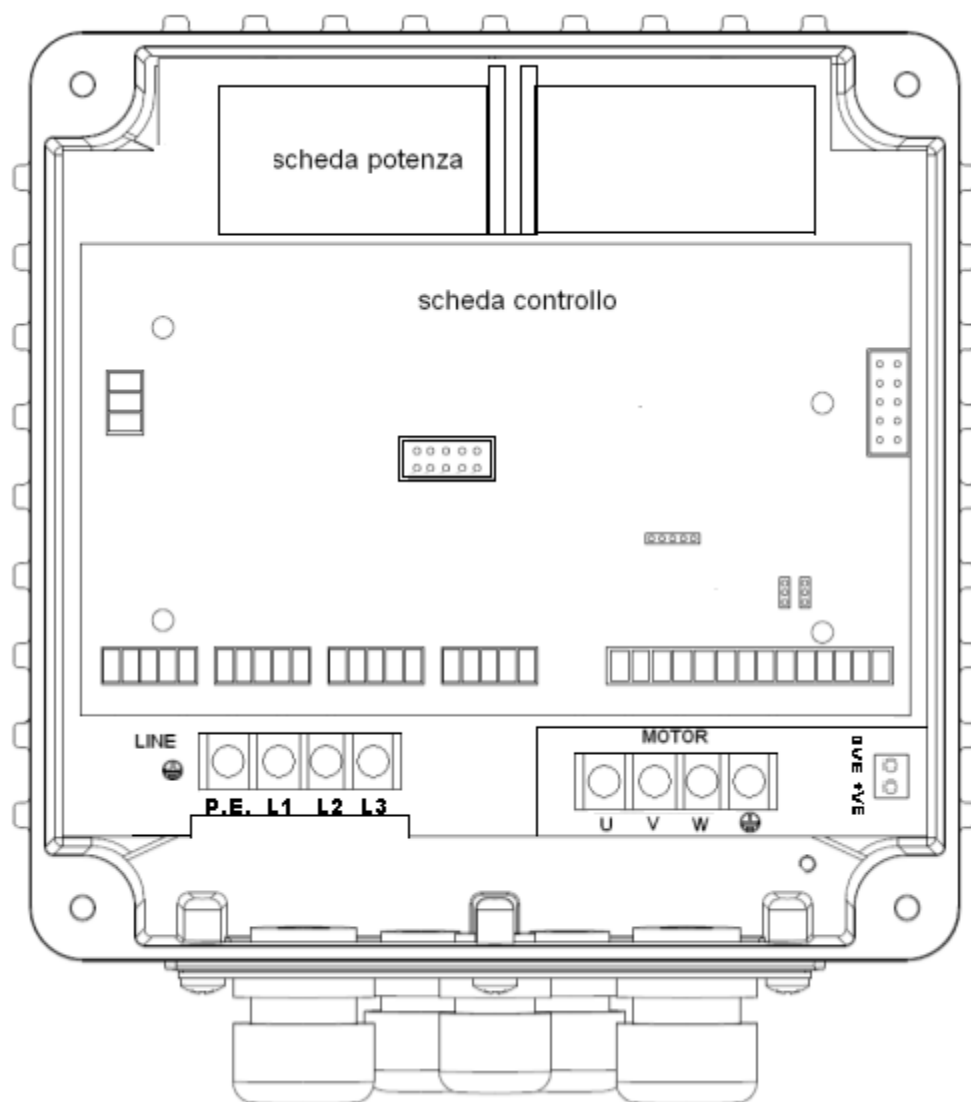


<p>Power supply:  <b>LINE: L1, L2, earth</b>          It is recommended to use cable lugs</p>	<p>Output:  <b>3 ph motor: earth ,U,V,W,</b>  <b>1 ph motor: earth, U (running), V (common)</b>          It is recommended to use cable lugs.</p>	<p>230 V AC auxiliary fans (wall mounting kit)  <b>FAN: F1, F2</b></p>
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### Recommended line and motor cables stripping

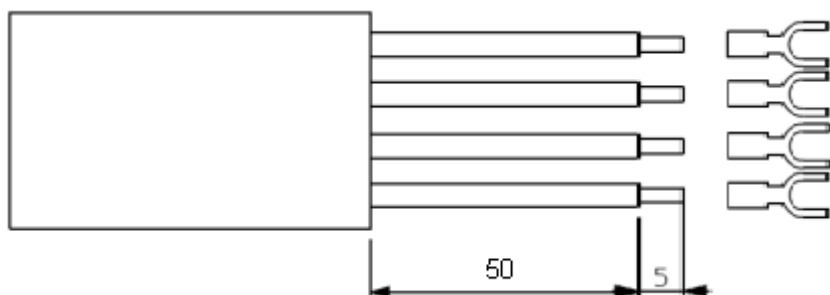


## Power board VASCO 406,409

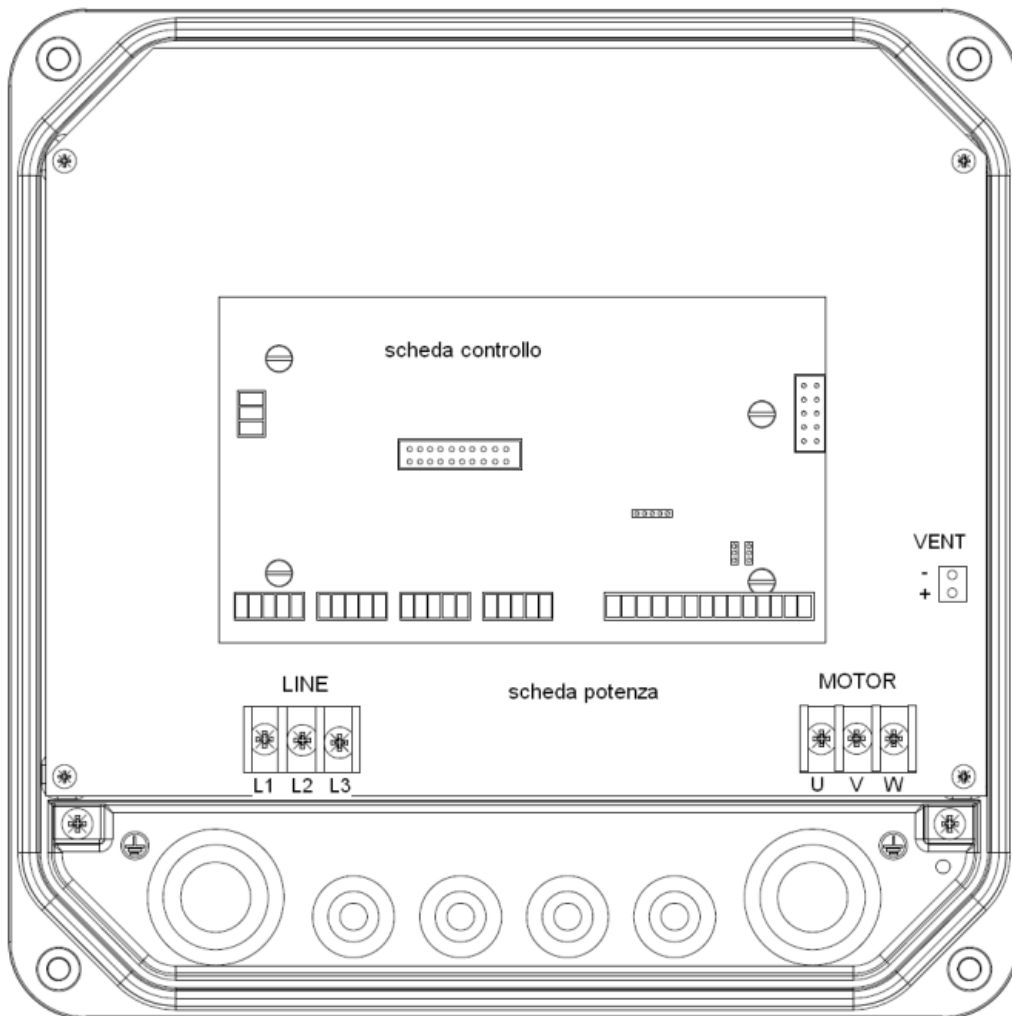


<p>Power supply:  <b>LINE: GND , L1, L2, L3,</b>          It is recommended to use cable lugs.</p>	<p>Motor output:  <b>MOTOR: U, V, W, GND</b>          It is recommended to use cable lugs.</p>	<p>12 V dc auxiliary fan (wall mounting kit) :  <b>0VE, + VE</b>  <b>WARNING: respect the polarity.</b></p>
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**Cable stripping recommended for line input and output to the motor.**

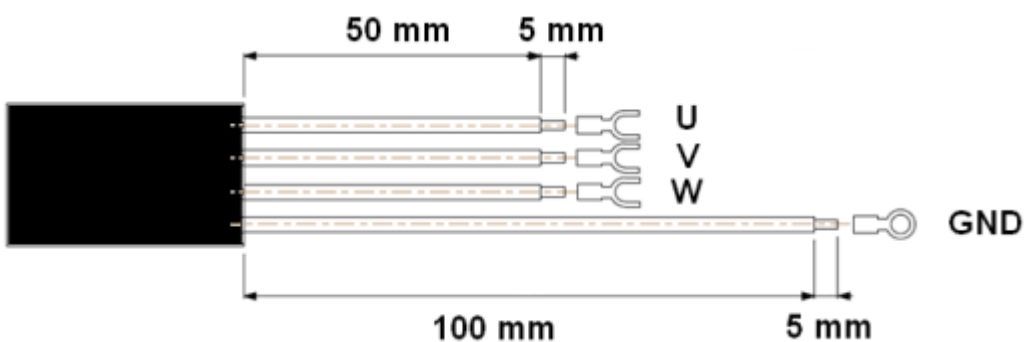


# Power board VASCO 414,418,425,430



<p>Power supply:</p> <p><b>LINE: L1, L2, L3, GND</b></p> <p>It is recommended to use cable lugs.</p>	<p>Motor output:</p> <p><b>MOTOR: U, V, W, GND</b></p> <p>It is recommended to use cable lugs.</p>	<p>12 V dc auxiliary fans (wall mounting kit)</p> <p><b>VENT: +, -</b></p> <p><b>WARNING: respect the polarity.</b></p>
--	--	---

Cable stripping recommended for line input and output to the motor.







## 4.1 Protections

The protections required upstream each VASCOs depends on the type of installation, and local regulations. We recommend to use overload protection with the characteristic curve of type C and type B circuit breaker, sensitive to both AC and DC current.

## 4.2 Electromagnetic compliance

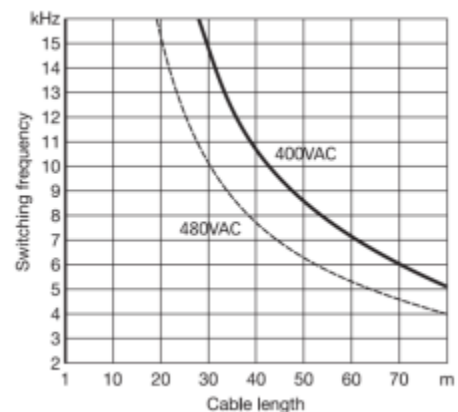
To ensure electromagnetic compatibility (EMC) of the system, it is necessary to apply the following measures:

- Always connect the device to ground
- Use shielded signal cables by placing the screen at one end.
- Use motor cable as short as possible (<1 m / <3 ft). For longer lengths, it is recommended to use shielded cables connecting the screen at both ends.
- Separate signal, motor, and power supply cables.

**Note: To enable the restoration of the display screen when there are electromagnetic interference, VASCO periodically provides some fast "refresh" of the display.**

## 4.3 Installation with long motor cables

With long motor cables it's recommended to decrease the commutation frequency from 10 kHz (default) to 2.5 kHz (advanced parameters). This reduces the probability of voltage spikes in the motor windings which may damage the insulation.



For motor cable lengths up to 50 meters it's recommended to place between VASCO and motor a dv / dt reactance, available on request.



For motor cable lengths greater than 50 meters it's recommended to place between VASCO and motor a sinusoidal filter, available on request.

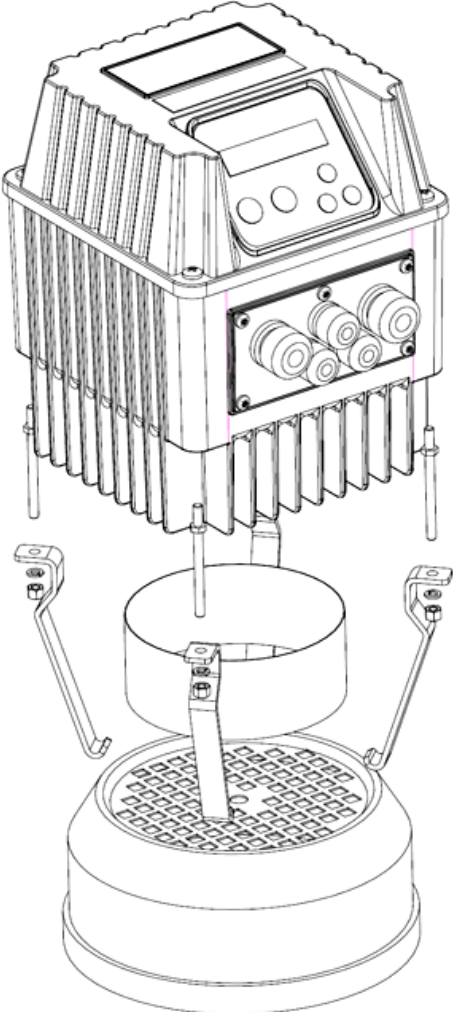
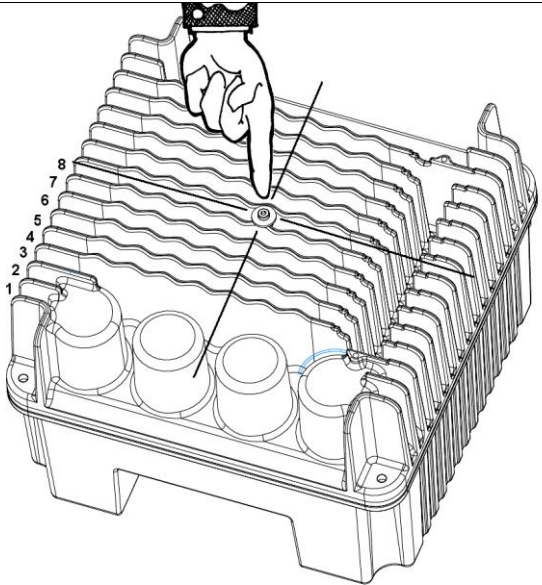
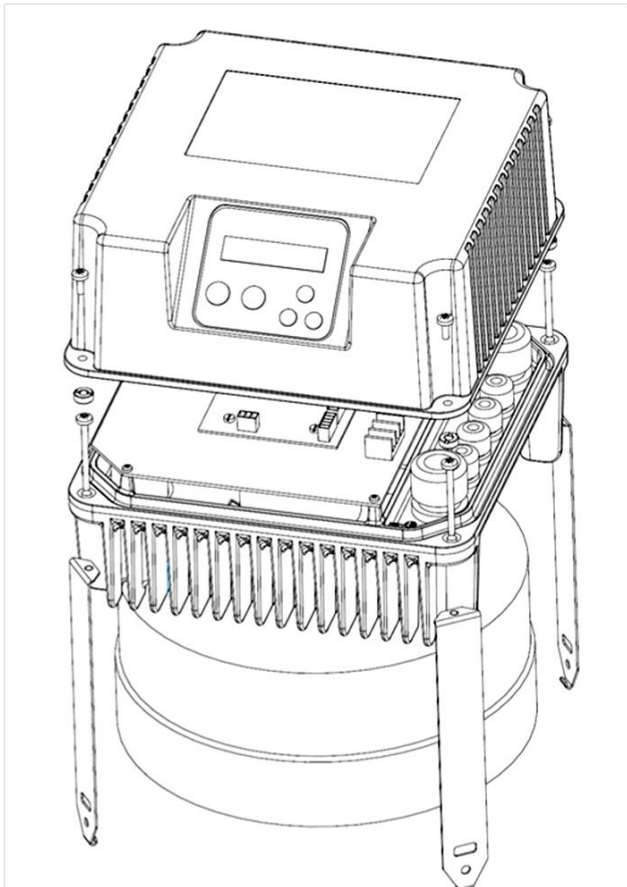


## 5. VASCO installation

VASCO can be installed directly on the fan cover of the motor or mounted on the wall.

### Motor mounting kit

In this application VASCO is cooled by the motor fan. Motor kit (available upon request) allows a solid coupling of the two units and it is composed of:

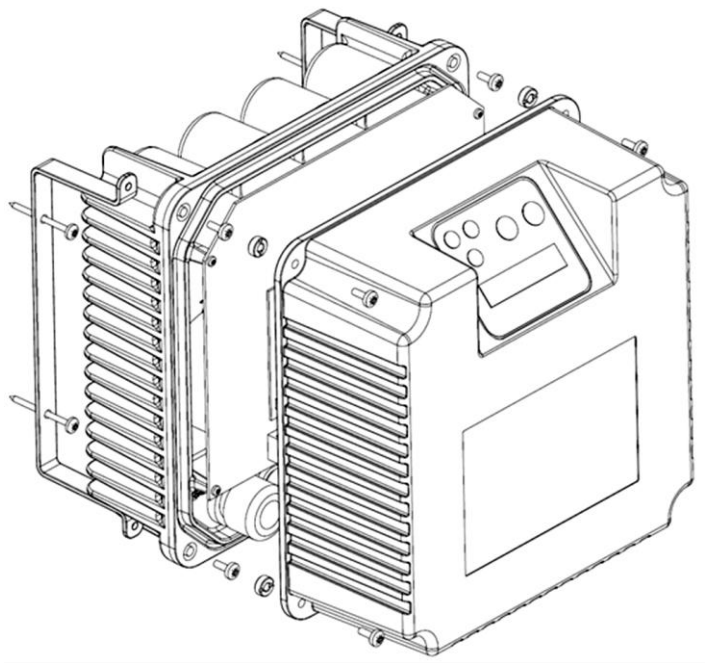
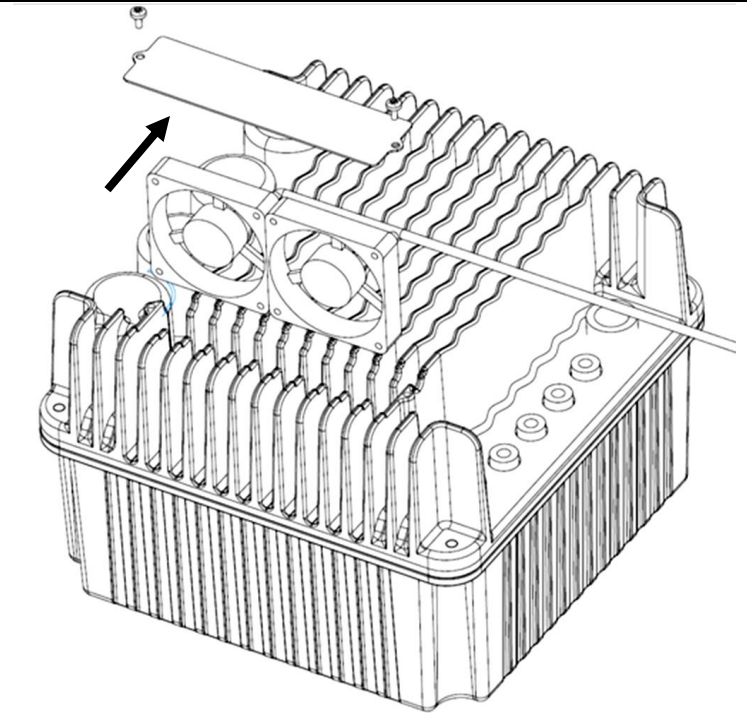
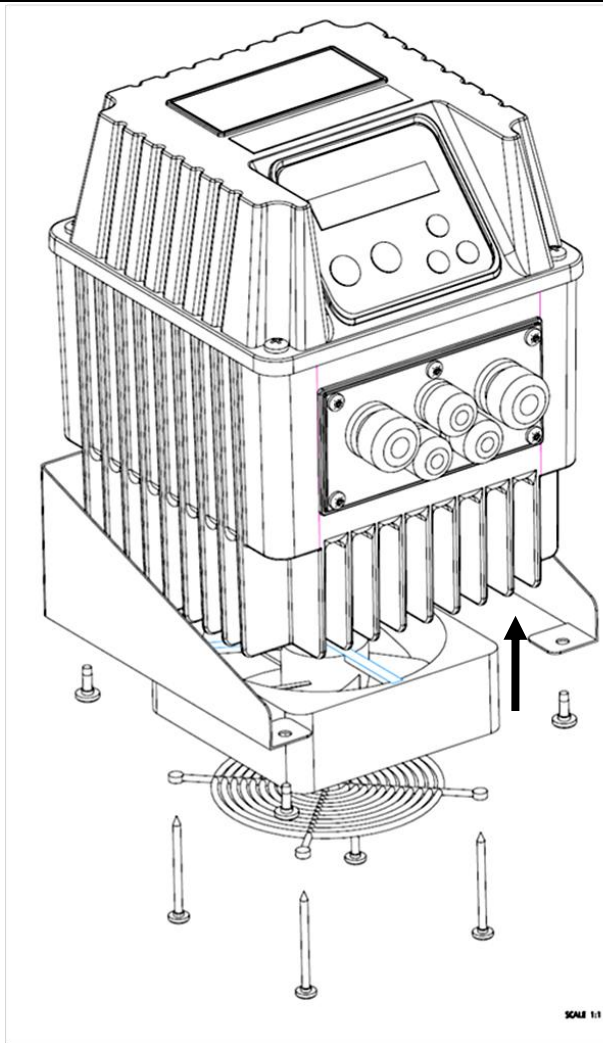
VASCO 209,214,406,409	VASCO 414,418,425,430
<ul style="list-style-type: none"> <li>• n.°4 rods</li> <li>• n.°4 M5 nuts</li> <li>• n.° 4 hooks</li> <li>• n.° 1 cooling ring</li> </ul>	<ul style="list-style-type: none"> <li>• n.° 4 M5 screws.</li> <li>• n.° 4 clamps</li> <li>• n.° 4 clips to add if necessary</li> <li>• n.°1 centre pin</li> </ul>
 <p data-bbox="71 1702 678 1915">Use the cooling ring for best cooling of VASCO during operation. Warning: when using the cooling ring, the cooling air of the motor is slightly warmer than without the VASCO; if the resulting motor temperature exceeds the indicated maximum allowable value, remove the cooling ring, leaving the VASCO to be cooled by itself.</p>	 

## Wall mounting kit

In this application VASCO is cooled independently by its auxiliary cooling fan integrated in the radiator.

Wall-mounted kit is composed of:

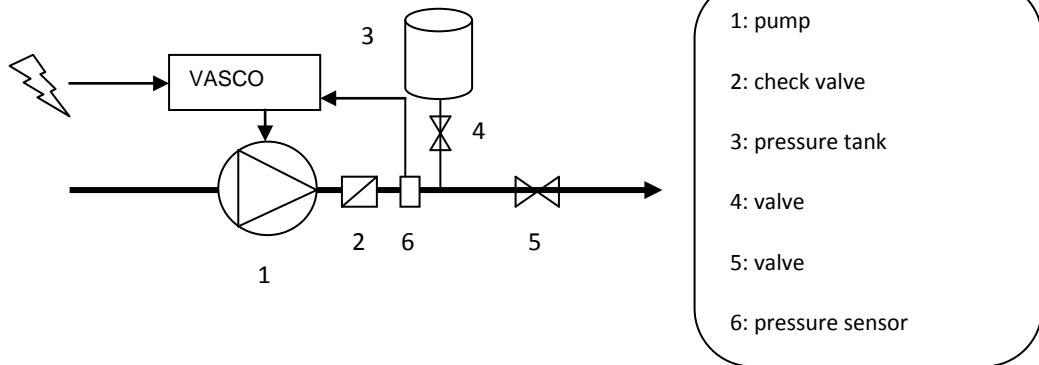
VASCO 209,214,406,409	VASCO 414,418,425
<ul style="list-style-type: none"> <li>• n.° 1 auxiliary fan 230V AC (VASCO 209,214) or 12 VDC (VASCO 406,409)</li> <li>• n.° 4 screws to fix cooling fan</li> <li>• n.° 1 protection grill</li> <li>• n.° 1 metal bracket in AISI 304</li> <li>• n.° 4 screws to fix VASCO to wall bracket</li> </ul>	<ul style="list-style-type: none"> <li>• n.° 2 12 V DC fans.</li> <li>• n.° 1 fans cover.</li> <li>• n.° 2 fans cover fixing screws</li> <li>• n.° 2 wall fixing brackets</li> <li>• n.° 4 M5 screws for VASCO fixing to the brackets</li> <li>• n.°1 holes reference sheet</li> </ul>



**Make sure the manufacturer that the electric motor is suited for operation in the inverter**  
**Make sure to properly attach the grid of the auxiliary cooling fan.**  
**Make sure to remove the auxiliary cooling fan if VASCO is coupled to a motor. Failure to do so creates a high risk of overheating the motor and VASCO unit.**

## 5. VASCO Installation for constant pressure control

VASCO controls the pump speed to maintain constant pressure at a set point independent of the water demand in the system. A basic schematic is shown below:



### 5.1.1 Pressure tank

Installation of a pressure tank in the hydraulic system is recommended to compensate leakage of water in the system (or during minimum water demand) and to avoid continuous start/stop cycling of the pump (check the appendix for more information). Selecting the proper volume and pre-charge pressure of the tank is very important; smaller tank volumes will not compensate adequately for minimum water usage or leakage, while larger volumes make it more difficult for VASCO to control the pressure evenly.

**Recommended tank volume is equal to the 10% of the maximum water flow of the system (expressed in volume unit/min)**

Example: if the max water flow is 50 liters/min, the pressure tank should have a capacity of 5 liters

If the max water flow is 20 gpm, the pressure tank should have a capacity of 2 gallons

**Pre-charge pressure of the pressure tank should be at least 80% than the set-pressure of the system.**

Example: if the set-pressure of the system is 4 bar, the pre-charge pressure of the tank should be 3.2 bar

If the set-pressure of the system is 60 psi, the pre-charge pressure of the tank should be 48 psi

### 5.1.2 Pressure sensor

VASCO requires a pressure sensor with a linear output signal within the range 4 – 20 mA. The pressure transducer can be powered by any range of DC Voltage which includes the value 15 V dc. It is necessary to set the pressure sensor characteristics in the initial configuration menu or in the installer menu (please check the relevant chapter on setting parameters). Connect the sensor cable wires to the analog input terminals as follows:

- 0V: GND signal (if available)
- AN1: signal 4-20 mA (-)
- +15: 15 Vdc (+)

VASCO accepts the signal of a second pressure sensor in order to:

- realize constant differential pressure (AN1 – AN2).
- substitute first pressure sensor when it fails

- 0V: GND signal (if available)
- AN2: signal 4-20 mA (-)
- +15: 15 Vdc (+)

## 6. VASCO Use and Programming

VASCO software is extremely simple to use, but allows a wide variety of parameters to be set for ideal system calibration. Setting Parameters are organized in 2 levels:

### 1: Installer level

A password is required for this level; these parameters are adjustable by trained professionals

Default password: **001**

From the menu a different password can be set up.

### 2. Advanced level

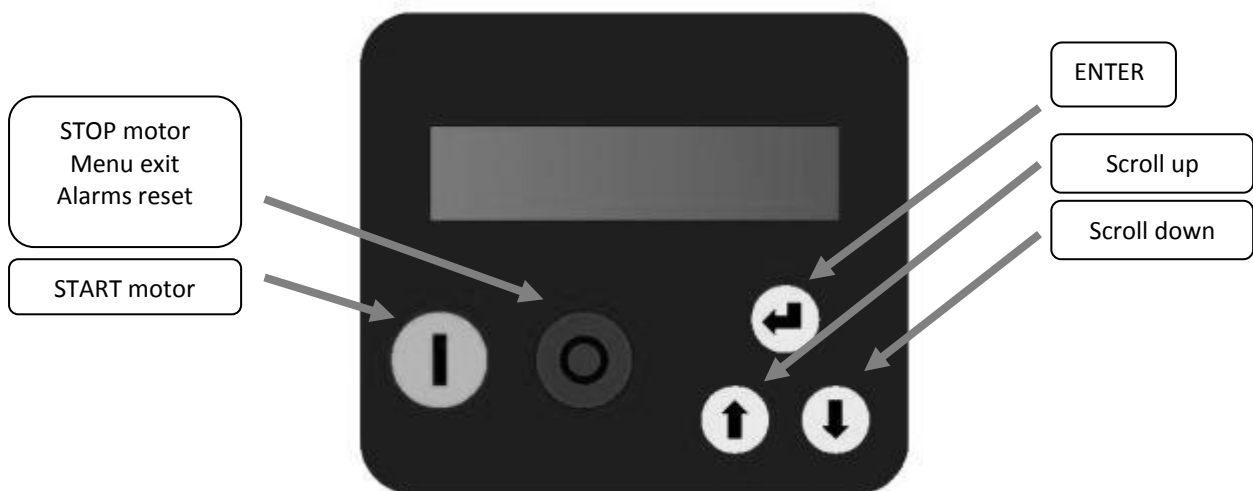
A second and different password is required; improper setting of these advanced parameters could compromise the integrity and the life of VASCO and pump;

Default password **002**

It is possible to set up a different password.

**Installer and Advanced levels can be entered only with the correct password; otherwise, it is impossible to set up and/or modify any parameters (they can be only displayed).**

### 6.1 VASCO display



Screen is a back-lit LCD displaying 2 rows of 16 digits each. Alarms are indicated by an audible signal.

### 6.2 Initial configuration

When VASCO is switched on for the first time, the initial setting menu is displayed for the initial setting of parameters to configure pump characteristics, pressure sensor range, and system characteristics.

If the initial setting procedure is not completed properly, it is impossible to run the pump. Initial setting procedure can be repeated if necessary.

The initial setting procedure can be repeated (by using the 2<sup>nd</sup> level password) to reconfigure VASCO or if VASCO is installed in a different system.

A brief description of parameters and their allowable ranges are listed below:

Parameter		Default	Description
Language XXXXXX		XXXX	End user communication language
Unit bar/psi		bar	Pressure unit
Motor type singlephase/threephase		threephase	Type of motor connected (VASCO 209,214)
Rated motor Amp. I = XX.X [A]		XX	Rated current of the motor per it's nameplate indication increased by 10%. The voltage drop caused by the inverter leads to higher input current than nominal. Make sure motor is capable of accepting increased current.
Rated motor freq f = XXX [Hz]		50	Rated frequency of the motor per its nameplate.
<b>Control mode: Constant pressure</b>			
F.s. press.sensor 20mA = XX.X [bar]		16	Maximum pressure of pressure transducer; Set the pressure value of the transducer when output signal is 20 mA equivalent to the highest value of pressure range (i.e. 0 – 10 bars transducer range) 10 bars = 20 mA
Sensor test Press ENT			If the transducer is not connected or connected improperly, the signal SENS. PRESS OFF is activated when pressing ENTER.
Max alarm press. p = XX.X [bar]		10	Maximum pressure allowed in the system. If the pressure goes over this value, an alarm occurs and the pump is stopped. Pump is automatically restarted if the pressure goes below the maximum value for a period of at least 5 seconds.
Motor test START/STOP			Press START/STOP to run a test at rated frequency <b>Warning: make sure to run the system without damaging pump and system</b>
Rotation sense ---> / <---		--->	If, during the test, the motor runs in reverse, it is possible to change the wiring sequence via software without physically changing wires at the terminals.
Set pressure p = XX.X [bar]		3	The pressure value to be kept constant.
Autorestart ON/OFF		OFF	If ON is selected, after a lack of voltage, VASCO returns to its normal status; if VASCO was powering the pump before the voltage drop, it resumes powering the pump automatically. <u>Warning</u> , review the advice in chapter 1
INITIAL SETUP COMPLETED			Once the Setting procedure is completed you will get this indication on the display; setting parameters are recorded by VASCO; these parameters can be set up individually in the INSTALLER Parameters menu or ADVANCED Parameters menu.

### 6.3 Initial view

When first powering the VASCO, the display shows : release of display software (LCD = X.XX) and the release of inverter software (INV = X.XX) as shown below:

LCD = X.XX  
INV = X.XX

The following End User messages are displayed by pushing the scroll buttons:

<p>Inv: ON/OFF Mot: ON/OFF  p_m = XX.X [bar]</p>	<p><i>p_m is the pressure value read by the pressure transducer By pressing ENTER the pressure set value is displayed. Keeping pressed ENTER button more than 5 second, is possible to modify the set pressure on real time.</i></p>
<p>Inv: ON/OFF Mot: ON/OFF  f = XXX [Hz]</p>	<p>f value is the supply frequency to the motor; by pressing ENTER you can change the f value manually (word "set" is displayed) , press ENTER again to exit parameter setting (word "set" disappeared)</p>
<p>Inv: ON/OFF Mot: ON/OFF  V = X.XX [V] I= XX.X [A]</p>	<p>V is the voltage supplied to the motor. This value is displayed only if motor is OFF; if motor is ON, A value equal to the absorbed motor current is displayed</p>
<p>Inv: ON/OFF Mot: ON/OFF  cosphi = XXX</p>	<p>cosphi index means the angle phi between the voltage and current absorbed by the motor</p>
<p>Inv: ON/OFF Mot: ON/OFF  P = XXXXX [W]</p>	<p>P is the power in Watts supplied to the pump.</p>
<p>Inv: ON/OFF Mot: ON/OFF  STATUS: NORMAL</p> <hr/> <p>Inverter Life xxxxx h : xx m</p> <hr/> <p>Motor Life xxxxx h : xx m</p> <hr/> <p>XXXXXXXXXXXXXXXXXX XXXXXXX h : XX m</p>	<p>NORMAL status means no alarms. If an alarm occurs, a message blinks on the display and an audible signal is activated. Pressing ENTER accesses: VASCO lifetime, PUMP lifetime, alarm list. PUMP lifetime is recorded while pump is powered.  To return to previous views, press ENTER.</p>
<p>Menù  ENT to access</p>	

First row gives the VASCO status:

- **Inv: ON XXX.X Hz** VASCO is powered and is powering the motor showing its frequency.
- **Inv: ON Mot: OFF** VASCO is powered but motor is not running (i.e. motor/pump was stopped due to minimum frequency being reached)
- **Inv: OFF Mot: OFF** VASCO is not powered

If COMBO function is activated, the VASCO address is placed close to indication "Inv".

## 6.4 Menu view

Pressing ENTER when you are in [MENU' / ENT to access] in initial display, will display the following MENUS:

	MENU' Install. param.		Installer password required to enter level 1 (default 001)
	MENU' Advanced. param.		Advanced password required to enter level 2 (default 002)
	MENU' Retrive init.set		Installer password required to enter level 1 (default 001) It is possible to return to original set parameters.
	MENU' Change init.set.		Advanced password required to enter level 2 (default 002)

To exit the Menu level and return to initial display, press STOP button.

## 6.5 Installer parameters

Many of the Installer parameters are set during the Initial Configuration (*chapter 6.2 Initial Configuration*).

However, through the Installer Parameters menu, it is possible to change the set parameters or set others in order to perfect the calibration of VASCO to the pumping system.

parameter	default	description	Constant press.	Fix speed	Const.press.2val	Fix speed 2 val.	External speed	Constant temp.	Constant flow
			<div style="border: 1px solid black; padding: 5px;"> <p>Control mode</p> <ul style="list-style-type: none"> <li>• Constant press.</li> <li>• Fix speed</li> <li>• Const.press.2val</li> <li>• Fix speed 2 val.</li> <li>• External speed</li> <li>• Constant temp.</li> <li>• Const. flow</li> </ul> </div>	Const. press.	<p>Mode of control:</p> <ul style="list-style-type: none"> <li>• Constant pressure: VASCO changes the speed of pump to keep the pressure constant, independent of water demand</li> <li>• Fixed frequency: VASCO feeds the pump a set frequency, so the speed of motor is kept constant.</li> <li>• Constant pressure control with two values; the two values are selected by opening or closing the digital input 2.</li> <li>• Fixed frequency control with two values to be selected by opening or closing the digital input 2.</li> <li>• External speed: control motor frequency by using analogical input .</li> <li>• Constant temp.: VASCO changes the speed of pump to keep the temperature constant. An analogical signal coming from a temperature sensor must be connected.</li> <li>• Constant flow: VASCO changes the speed of pump to keep the flow constant. An analogical signal coming from a flow sensor must be connected.</li> </ul>				

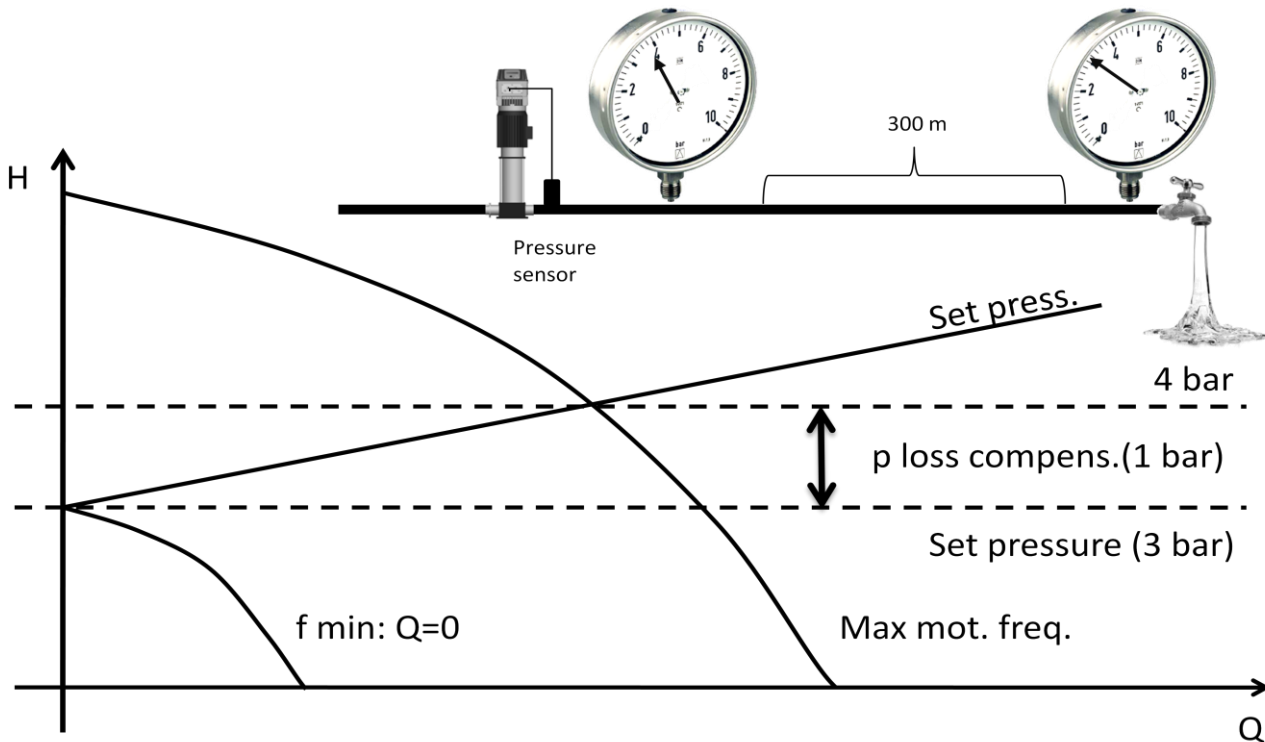


parameter	default	description	Constant press.	Fix speed	Const.press.2val	Fix speed 2 val.	External speed	Constant temp.	Constant flow
Unit bar/psi	bar	Pressure unit	✓	✓	✓				
Unit °C / °F	°C	Temperature unit						✓	
F.s. press.sensor 20mA = XX.X [bar]	16	Maximum pressure of pressure transducer; Set the pressure value of the transducer when output signal is 20 mA equivalent to the highest value of pressure range (i.e. 0 – 10 bars transducer range) 10 bars = 20 mA	✓	✓	✓	✓	✓		
F.s. temp.sensor 20mA = XXX.X [°C]	100	Full scale of the temperature sensor. From the plate data of the sensor can read the temperature at which the sensor provides output 20 mA. (or 10 V)						✓	
Min temp. sensor 4mA = - XXX.X [°C]	0	Full scale of the temperature sensor. From the plate data of the sensor can read the temperature at which the sensor provides output 4 mA. (or 0 V)						✓	
F.s. flow sensor 20mA = XXX.X [m3/h]	100	Full scale of the flow sensor. From the plate data of the sensor can read the flow at which the sensor provides output 20 mA. (or 10 V)							✓
Offset sensors x = XX.X [%]	20%	Zero point adjustment. (20 mA x 20% = 4 mA).	✓	✓	✓	✓	✓	✓	✓
Max alarm pres. p = XX.X [bar]	10	Maximum pressure allowed in the system. If the pressure goes over this value, an alarm occurs and the pump is stopped. Pump is automatically restarted if the pressure goes below the maximum value for a period of at least 5 seconds.	✓	✓	✓	✓	✓	✓	✓
Min alarm pres. p = XX.X [bar]	0	Minimum pressure allowed in the system. If the pressure goes lower than the set value, an alarm occurs and the pump is stopped. Pump is automatically restarted if the pressure goes higher than the minimum value for a period of at least 5 seconds. This parameter is particularly useful in the event a system pipe breaks. It is suggested to set a value higher than 0.	✓	✓	✓	✓	✓	✓	✓
Dry run cosphi cosphi = X.XX	0.65	If the pump goes into dry-running, the cosphi reaches its lowest level. To set this value, contact the pump manufacturer or test by closing the suction and checking the value on the VASCO display; a value can be set by assuming a dry cosphi equivalent to 60% of the rated cosphi specified by the manufacturer.	✓	✓	✓	✓	✓	✓	✓

parameter	default	description	Constant press.	Fix speed	Const.press.2val	Fix speed 2 val.	External speed	Constant temp.	Constant flow
Set pressure $p = XX.X$ [bar]	3	The pressure value to be kept constant.	✓		✓				
p loss compens. $p = XX.X$ [bar]	0	Pressure compensation at the maximum frequency for each pump. Acting on the green button you can reverse the sign.	✓		✓				
Set pressure 2 $p = XX.X$ [bar]	3	The pressure value to be kept constant.			✓				
p loss compens. 2 $p = XX.X$ [bar]	0	Pressure compensation at the maximum frequency for each pump. Acting on the green button you can reverse the sign.			✓				
Press. set update $t = XX$ [s]	5	Time to update p set for losses compensation.	✓		✓				

To ensure proper operation of pressure control is recommended to place the sensor near the pump.

To compensate the pressure loss in the pipes (proportional to flow) it is possible to vary the pressure set in a linear relation with respect to frequency. If  $Q = 0$ , Set pressure is granted while at the max output frequency will be granted the *Set pressure + p loss compens.*



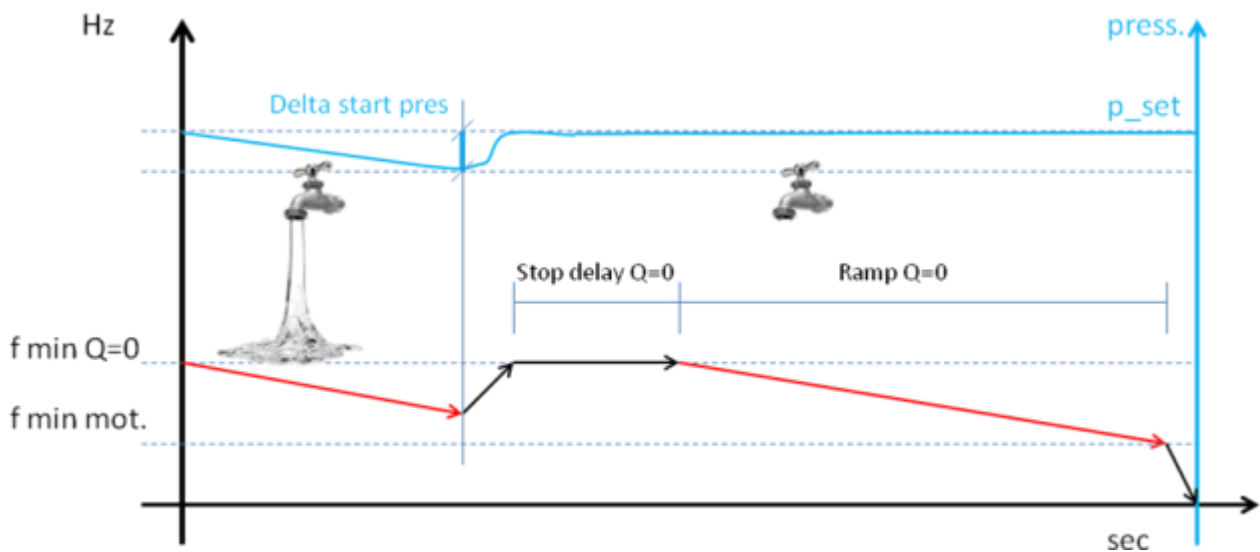
It can perform the following test to verify the correct value of p loss compensation:

1. install a pressure gauge away from the pressure sensor
2. open completely the valve
3. check the pressure gauge

--> Set the value of *p loss compens.* equal to the difference of the values from the two gauges.

When using a group of pumps, the pressure compensation to be applied to each pump is equal to the total pressure compensation (when all the pumps are running at full speed) divided by the number of pumps in the group.

parameter	default	description	Constant press.	Fix speed	Const.press.2val	Fix speed 2 val.	External speed	Constant temp.	Constant flow
Operating freq. f = XXX [Hz]	50	Set the frequency value (or the speed) to feed the pump.		✓		✓			
Operating freq. 2 f = XXX [Hz]	50	Set the frequency value (or the speed) to feed the pump.				✓			
Temperature set T = XXX.X [°C]	25	Temperature value to be maintained constant.						✓	
Flow set Q = XXX.X [m3/h]	10	Flow value to be maintained constant.							✓
Set f. min Q=0 fmin = XXX [Hz]	40	Minimum frequency below which the pump must stop.	✓		✓			✓	
Stop delay Q=0 t = XX [s]	5	Delay for which the pump will stop once the minimum frequency is reached (f min Q=0)	✓		✓			✓	
Ramp Q=0 t = XX [s]	20	Ramp time from freq min Q=0 to motor freq min. If, during this time, the p checked goes below the (p_set - delta start pres), VASCO powers the motor again; otherwise, VASCO will stop the pump following the min freq. of motor ramp.	✓		✓			✓	



Delta start pres p = XX.X [bar]	0.3	This value represents the pressure drop below the set pressure required to start the pump.	✓		✓				
------------------------------------	-----	--	---	--	---	--	--	--	--

parameter	default	description	Constant press.	Fix speed	Const.press.2val	Fix speed 2 val.	External speed	Constant temp.	Constant flow
Delta stop press p = XX.X [bar]	0.5	It's the increase of pressure respect to pressure set which must be passed so that there is a forced shutdown of the pump.	✓		✓				
Delta start temp. T = XXX.X [°C]	0.5	The common parameters than you should get the temperature above the temperature set so that the pump, arrested earlier, are restarted.						✓	
Delta stop temp. T = XXX.X [°C]	1	It's the temperature rise compared to temperature set which must be passed so that there is a forced shutdown of the pump.						✓	
Delta start flow Q = XXX.X [m3/h]	0.5	This value represents the flow drop below the set flow required to start the pump.							✓
Delta stop flow Q = XXX.X [m3/h]	1	It's the increase of flow respect to flow set which must be passed so that there is a forced shutdown of the pump.							✓
Ki XXX		Kp and Ki parameters allow the dynamic control of system by VASCO; set values (Ki=50, Kp=005) are usually enough to get a valid dynamic control; if the set pressure do not consent a valid control, proceed as follows; increase or reduce Ki while keeping Kp constant; if the problem persists, increase Kp value and increase or reduce the Ki value again till a good dynamic control is reached.	✓		✓			✓	✓
Kp XXX									
Pump DOL 1 ON/OFF	OFF	Function to activate (ON) the first auxiliary pump DOL 1 (Direct On Line pump).	✓		✓			✓	
Pump DOL 2 ON/OFF	OFF	Function to activate (ON) the second auxiliary pump DOL 2 (Direct On Line pump).	✓		✓			✓	
Alternance ON/OFF	OFF	Function to allow alternating starting priority between the DOL pumps in order to allow equal use of them.	✓		✓			✓	
Start delay AUX t = XX [s]	1	delay time with which the pumps DOL start after the variable speed pump has reached the maximum frequency and the pressure value has fallen below set pressure – delta start pressure	✓		✓			✓	
COMBO ON/OFF	OFF	Function to enable multiple VASCO's to work in parallel as described in the technical appendix (see the relevant chapter). Up to 8 VASCO units can be connected in parallel. VASCO's communication through RS 485 gates is granted by a private protocol.	✓		✓			✓	✓
PI control Direct/Reverse	Direct	Direct: increasing misured pressure, VASCO decreases motor frequency. Inverse: increasing misured pressure, VASCO increase motor frequency.	✓		✓			✓	✓

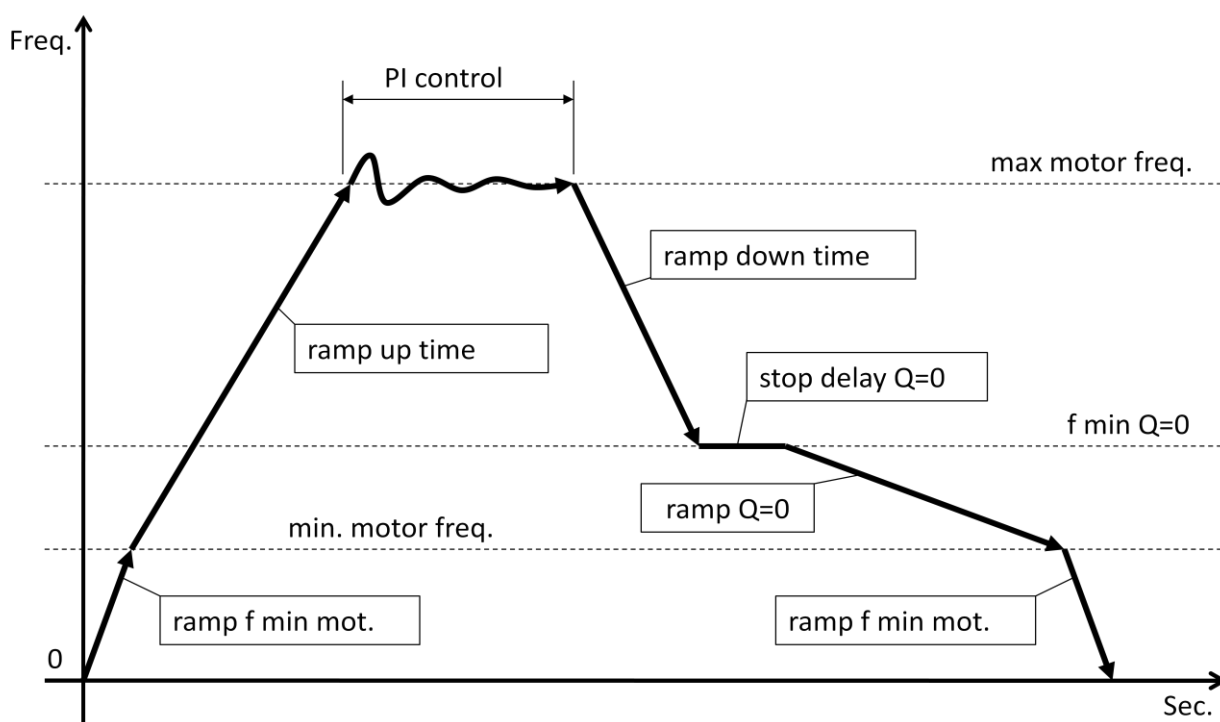
parameter	default	description	Constant press.	Fix speed	Const.press.2val	Fix speed 2 val.	External speed	Constant temp.	Constant flow
Rotation sense ---> / <---	--->	If, during the test, the motor runs in reverse, it is possible to change the wiring sequence via software without physically changing wires at the terminals.	✓	✓	✓	✓	✓	✓	✓
Digital input 1 N.O. / N.C.	N.O.	By selecting N.A. (normally open) VASCO runs the motor if the digital input 1 is open; motor will be stopped if the digital input 1 is closed. By selecting N.C. (normally closed) VASCO runs the motor if the digital input 1 is closed; motor will be stopped if the digital input 1 is opened.	✓	✓	✓	✓	✓	✓	✓
Digital input 2 N.O. / N.C.	N.O.	By selecting N.A. (normally open) VASCO runs the motor if the digital input 2 is open; motor will be stopped if the digital input 2 is closed. By selecting N.C. (normally closed) VASCO runs the motor if the digital input 2 is closed; motor will be stopped if the digital input 2 is opened.	✓	✓	✓	✓	✓	✓	✓
Digital input 3 N.O. / N.C.	N.O.	By selecting N.A. (normally open) VASCO runs the motor if the digital input 3 is open; motor will be stopped if the digital input 3 is closed. By selecting N.C. (normally closed) VASCO runs the motor if the digital input 3 is closed; motor will be stopped if the digital input 3 is opened.	✓	✓	✓	✓	✓	✓	✓
Digital input 4 N.O. / N.C.	N.O.	By selecting N.A. (normally open) VASCO runs the motor if the digital input 4 is open; motor will be stopped if the digital input 4 is closed. By selecting N.C. (normally closed) VASCO runs the motor if the digital input 4 is closed; motor will be stopped if the digital input 4 is opened.	✓	✓	✓	✓	✓	✓	✓
Dig.In.2/3 delay t= XX [s]	1	Digital input IN2 and IN3 delay. Digital input IN1 and IN4 have 1 second fix delay.	✓	✓	✓	✓	✓	✓	✓
Change PASSWORD1 ENT		Pressing ENT allows the installer level password (1st level) (default 001) to be changed.	✓	✓	✓	✓	✓	✓	✓

## 6.6 Advanced parameters

All the advanced parameters, due to their importance, are already set during initial setup (*cap. 6.2 Initial Configuration*). However, it is always possible to modify individual parameters or modify the password 2:

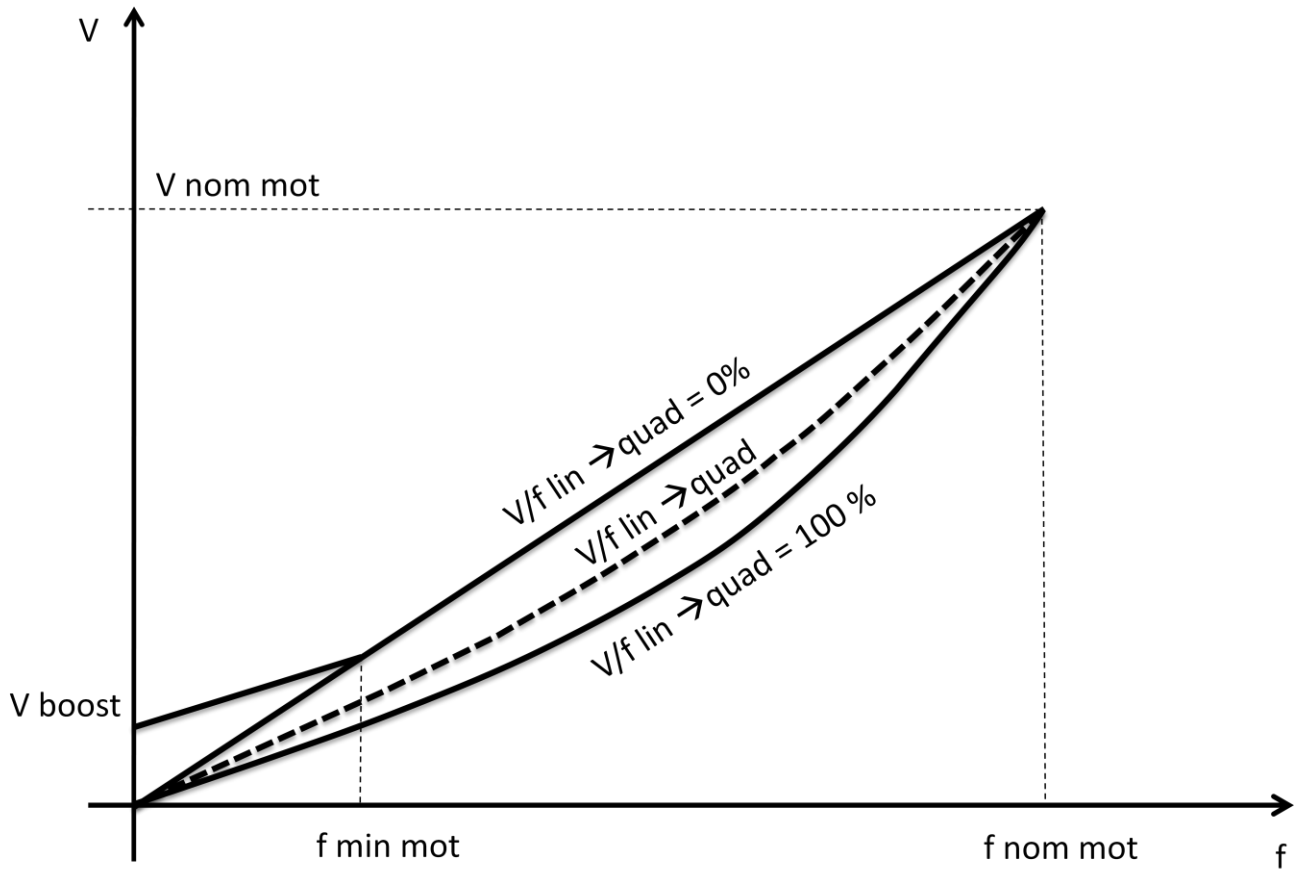
Parameters	Default	Description
Rated motor Volt. V = XXX [V]	XXX	Motor rated voltage (as shown in the motor plate) Average voltage drop due to the inverter is between 20 V and 30 Vrms based on load condition.
Voltage boost V = XX [%]	1%	Refers to the voltage increase during the start up of the motor. Warning: An excessive value can seriously damage the motor. Contact the motor manufacturer for further information. If a single-phase motor is used, a value of 1% is suggested to increase the

		starting torque.
Rated motor Amp. $I = XX.X [A]$	XX	Rated current of the motor per it's nameplate indication increased by 10%. The voltage drop caused by the inverter leads to higher input current than nominal. Make sure motor is capable of accepting increased current.
Rated motor freq $f = XXX [Hz]$	50	Rated frequency of the motor per its nameplate.
Max motor freq. $f = XXX [Hz]$	50	Maximum frequency of the motor. Note: by reducing the maximum frequency of the motor, maximum current will be reduced as well.
Min motor freq. $f = XXX [Hz]$	30	Minimum frequency of the motor. Note: depends on the selected pump type; for submersible pumps with water filled motors, is not advisable to set minimum frequency lower than 30 Hz in order to protect the integrity of the thrust bearings.
Ramp up time $t = XX [sec]$	4	Ramp-up time to reach the speed required to achieve the set pressure (or frequency value). Longer times delay the system reaching the preset value but better protect system components. Excessively long ramp-up times can create difficulties in VASCO setup, and can also cause false overload alarms.
Ramp down time $t = XX [sec]$	2	Ramp-down time to reach zero speed. Longer times keep the system pressurized, while protecting the system components. Excessively long ramp-down times can create difficulties in VASCO setup. Excessively short ramp-down times can cause false overload alarms.
Ramp f min mot. $t = XX [sec]$	1	Time to reach the minimum frequency of the motor and vice versa. When VASCO is used to control a water filled submersible motor it's important to keep this time at 1 second.



PWM $f = XX [kHz]$	10	Carrier frequency (switching frequency). It is possible to chose PWM in the range of 2.5 ,4, 6, 8, 10 kHz . Higher values give a more sinusoidal wave with fewer losses. If long cables are used (>20 m / >76 ft) (submersible pump) it is recommended to install an inductive filter between VASCO and the motor (available upon request) and
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		to set the value of PWM to 2.5 kHz. This reduces the risk of voltage spikes, which can damage motor and cable insulation.
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> V/f lin. --&gt; quad.   XXX % </div>	0%	This parameter allows you to change the V / f characteristic with which VASCO feeds the engine. The linear characteristic corresponds to constant torque with variable speed. The quadratic characteristic is normally used with centrifugal pumps. The selection of torque characteristic should be done ensuring a smooth operation, a reduction of energy consumption and a lower level of heat and acoustic noise.




AN1,AN2 function XXXXXX	Independent	Function logic for analog input AN1,AN2.
Autorestart ON/OFF	OFF	If ON is selected, after a lack of voltage, VASCO returns to its normal status; if VASCO was powering the pump before the voltage drop, it resumes powering the pump automatically. <u>Warning</u> , review the advice in chapter 1.
Change PASSWORD2 ENT		Pressing ENT allows the advanced level password (2st level) (default 002) to be changed.

## 7. Protections and alarms

Anytime a protection occurs a blinking message is displayed together with an audible alarm; on STATUS in the initial view, the protection is displayed; by pressing the STOP button. Only from this position (STATUS) in the initial view is it possible to try to reset the alarm; if VASCO does not reset the alarm it is displayed again together an audible sound.

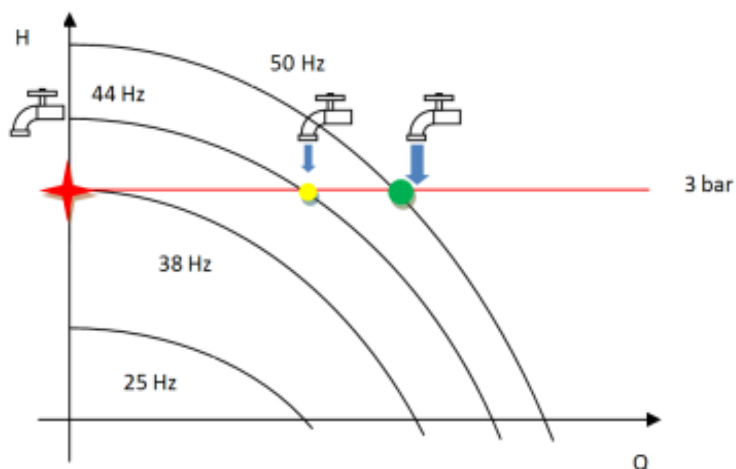
ALARM MESSAGE	ALARM DESCRIPTION	POSSIBLE SOLUTIONS
OVERCURRENT MOT.	<p>Motor overload: input current of the motor is higher than the rated motor current setting parameter.</p> <p>Motor voltage drop caused by the inverter causes the motor input current to be higher than rated. Contact motor manufacturer to check if motor is capable of accepting this current.</p>	<ul style="list-style-type: none"> <li>• Make sure that the motor current setting parameter is higher than rated.</li> <li>• Check other possible causes of over current</li> </ul>
UNDER VOLTAGE	Supply voltage too low	Check possible causes of undervoltage
OVER VOLTAGE	Supply voltage too high	Check possible causes of overvoltage
OVER TEMP. INV.	Inverter over temperature	<ul style="list-style-type: none"> <li>• Make sure than ambient temperature is less than 40 °C (104 °F).</li> <li>• Check if auxiliary cooling fan is working properly and if mounting space is adequate for proper cooling.</li> <li>• Reduce the PWM value (<i>Advance Parameter Menu</i>)</li> </ul>
NO LOAD	No load	<ul style="list-style-type: none"> <li>• Check if load is properly connected to the VASCO terminals</li> </ul>
NO WATER (DRY RUN COSPHI)	Motor cosphi is lower than the set value of dry running cosphi	<ul style="list-style-type: none"> <li>• Check if the pump is primed</li> <li>• Check the set value of dry running cosphi. Dry running cosphi is approximately 60% of the rated cosphi (at rated frequency) listed on the motor plate.</li> </ul> <p>If pump's cosphi is lower than the set dry-running cosphi for at least 2 seconds, VASCO stops the pump. VASCO tries to run the pump every 10, 20, 40, 80, 160 minutes and then the pump is stopped.</p> <p><b>WARNING:</b> if dry running protection occurs, VASCO will try to start the pump automatically. Be sure to cut power supply to VASCO before performing any maintenance.</p>
PRESS.SENS.FAULT	Pressure sensor error	<ul style="list-style-type: none"> <li>• Check the pressure transducer</li> <li>• Check the wiring of transducer</li> </ul>
FLOW SENS. FAULT	flow sensor error	<ul style="list-style-type: none"> <li>• Check the flow transducer</li> <li>• Check the wiring of transducer</li> </ul>
TEMP. SENS. FAULT	temperature sensor error	<ul style="list-style-type: none"> <li>• Check the temperature transducer</li> <li>• Check the wiring of transducer</li> </ul>



OVER PRESSURE	Measured pressure value has reached the maximum pressure accepted by the system.	<ul style="list-style-type: none"> <li>• Check possible causes of reaching max pressure</li> <li>• Check the max pressure value setting</li> </ul>
UNDER PRESSURE	Measured pressure value has reached the lowest pressure accepted by the system.	<ul style="list-style-type: none"> <li>• Check possible causes reaching min pressure (i.e. broken pipe, open pressure relief valve, etc.)</li> <li>• Check the min pressure value setting.</li> </ul>
OVERLOAD INV.	The current drawn by the load exceeds the capacity of VASCO. VASCO is still able to continue to power the load for 10 minutes with an output current of 101% of nominal and for 1 minute with an output current of 110% of nominal	<ul style="list-style-type: none"> <li>• Increase the ramp-up time</li> <li>• Make sure that the load current is at least 10% below the VASCO nominal current</li> <li>• Check the voltage drop along the supply cable to the motor</li> </ul>
NO COMMUNICATION	Communication between Master and slave(s) has been interrupted	<ul style="list-style-type: none"> <li>• Check the wiring connections</li> <li>• Make sure the Master is not in the Menu level; if so, exit from the level.</li> <li>• In the STATUS of the slave (where the alarm is displayed) try to reset the alarm by pushing STOP button.</li> </ul>
ADDRESS ERROR	Same address as other VASCOs in the group	<ul style="list-style-type: none"> <li>• The address of each VASCO needs to be different</li> </ul>
KEYBOARD FAULT	A Button on the keyboard has been pressed for more than 150 seconds	<ul style="list-style-type: none"> <li>• Make sure buttons are not depressed</li> <li>• Call service assistance</li> </ul>
DIGITAL INPUT	Digital input opened /closed	<ul style="list-style-type: none"> <li>• Check the input digital configuration (under Installer Parameters menu )</li> </ul>
ALARM SLAVE XX	slave XX error detected by master	<ul style="list-style-type: none"> <li>• check the status of the slave</li> </ul>
	<p>If pumps cosphi is lower than the dry-running cosphi for at least 2 seconds, VASCO will stop the pump. VASCO will try to run the pump every 10, 20, 40, 80, 160 minutes and then the pump is stopped.</p> <p>ATTENTION: if dry-running protection occurs, VASCO will try to start the pump automatically. Be sure to cut power supply before attempting maintenance</p> <p>VASCO will stop the pump if the input motor current is higher than the set motor current for an extended time. By pressing the START button it is possible to run the pump again.</p> <p>VASCO will stop the pump if the input voltage is higher than the set voltage for an extended time. By pressing the START button it is possible to run the pump again. VASCO will stop the pump if the input voltage is lower than the set voltage for an extended time. By pressing the START button it is possible to run the pump again.</p>	

## 8. Minimum stop frequency at 0 delivery ( $f_{min} Q=0$ ) during constant pressure control.

Minimum stop frequency is the minimum frequency value that, while maintaining the  $p_{set}$ , water delivery is zero. Below scheme graphically shows the function:



Progressively closing the water delivery valve reduces flow, causing VASCO to reduce the pump speed by reducing the output frequency, to maintain a constant pressure (i.e. 3 bar).

Once the water flow stops (output completely closed), pump will run at minimum frequency to maintain the set pressure.

Upon determining that the water requirement has stopped, VASCO stops the pump to save energy. Thus, the pump will be stopped when minimum frequency is reached.

Once the pump is stopped at min. frequency value, set pressure is maintained in the system.

To maintain the pressure on the pump output line, it is necessary to install a small pressure tank able to compensate for minor water leakage and to limit the number of pump restarts.

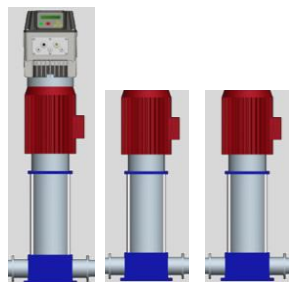
It is important to pinpoint that a particular set pressure corresponds to a single value of min. stop frequency.

So, if the end user wants to change the set pressure, a new value of min. stop frequency should also be set.

## 9. Auxiliary pumps during constant pressure control

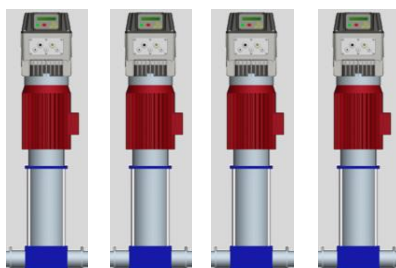
When the water needs vary considerably, it is advisable to share the water request between several pumps ensuring better efficiency and reliability.

A first method consists of a single pump driven directly by VASCO and another 1 or 2 pumps directly connected to the mains DOL (Direct On Line); DOL pumps are controlled by VASCO and connected to the mains through 1 or 2 contactors.

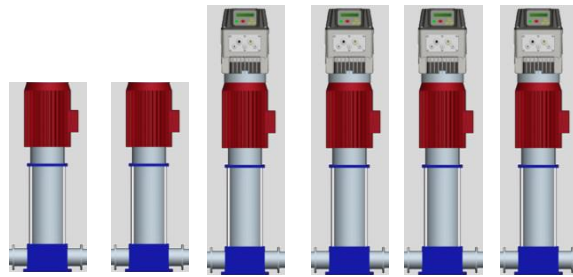


In this method, DOL pumps are not started and stopped smoothly with the corresponding increase in energy consumption and mechanical wear (startup current). Also note that DOL pumps are not protected by VASCO.

A second method of sharing water demand (named COMBO mode) consists of using additional pumps in parallel (up to 8), with each one driven by a VASCO.



In this method, energy consumption and reliability of the pumping system is maximized: VASCO monitors and protects each pump. It is possible to assemble a booster system composed of pumps connected in COMBO mode and another 1 or 2 DOL pumps to cover additional water demand (menaged only by master).



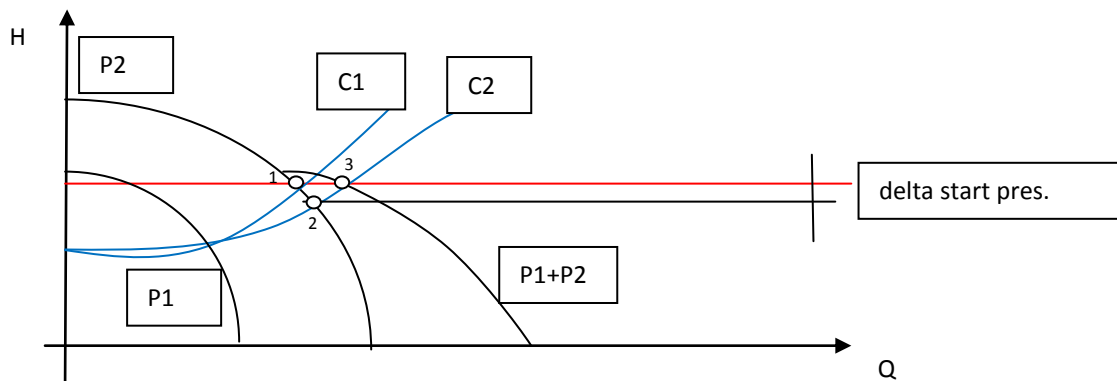
## 9.1 DOL pumps

Each DOL pump is switched on by a contactor controlled by the digital output DOL1 and DOL2 present in the VASCO.



**VASCO relays driving the DOL pumps are relays with no voltage contacts. Max voltage to the contacts is 250 V, max current 5 A.**

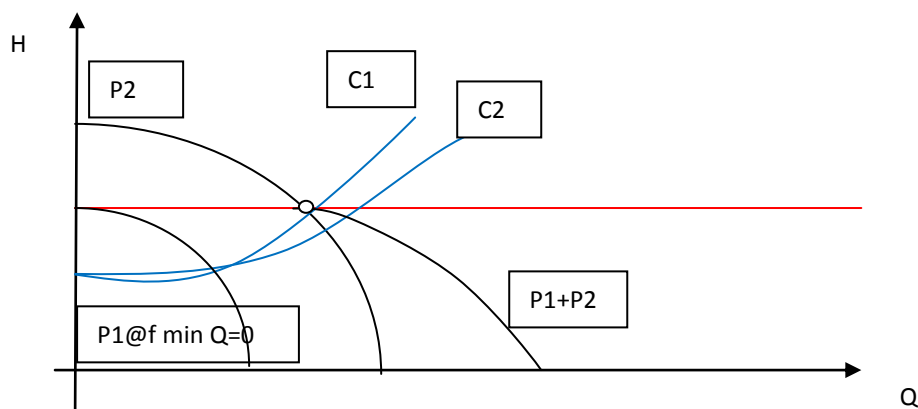
Two pumps are connected in parallel, with one pump (pump 1, P1) run by the inverter, while the second pump (pump 2, P2) is directly connected to the main power ("Direct On Line" connection). Start/Run of the second pump is controlled by the relay DOL1 (allowing a third pump to be controlled by the relay DOL2).



If pump 1 (P1) is already running to maintain the desired set pressure (red line), an additional water request changes the system curve from C1 to C2; since pump 1 (P1) is running at maximum speed, it is not possible to maintain the set pressure by increasing the speed, so the system pressure will drop till reaching the new working point 2.

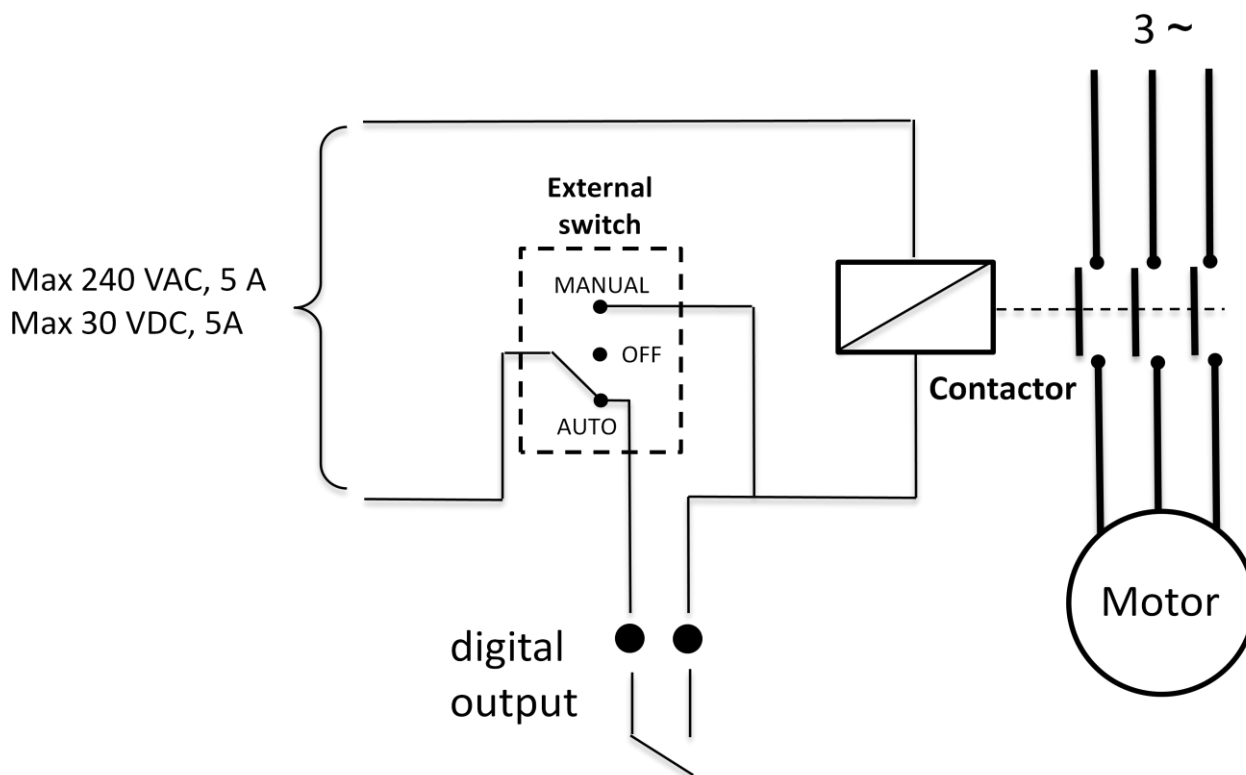
If pressure at the point 2 is ( $p_{set} - \text{delta start pres}$ ), VASCO will run the DOL by relay DOL1. The DOL pump will run at its nominal speed while the pump 1 will drop its speed equal to the P1 pattern to maintain set pressure.

If water demands decrease, returning to the system curve C1, pump 1 will reduce the pump speed to maintain constant pressure in the system. When pump 1 reaches a frequency equivalent to the minimum frequency, while still maintaining set pressure, the DOL pump will be switched off and pump 1 will increase the speed to maintain the  $p_{set}$  in the system.





If two pumps are connected in parallel, the first driven by VASCO and the second with a DOL connection, it is necessary to make sure that the value “delta pressure restart” will be sufficiently high to ensure the first pump, once the DOL pump is switched on, will reach a frequency higher than its minimum frequency value.  
By proper setting of the minimum frequency, excessive pump ON/OFF cycling is avoided, thus preventing damage to the DOL pump.



## 9.2 COMBO function

In the “Installer parameters” menu it is possible to enable the COMBO function that allows serial communication between up to 8 VASCOs, each one connected to a pump. The operating principle (switch on/off) of pumps is similar to as stated in chapter 9.1.

To achieve the COMBO function in a system consisting of several interconnected VASCOs, use a pressure sensor connected to each VASCO. The value of the *set pressure* is communicated to the slaves via the serial port.

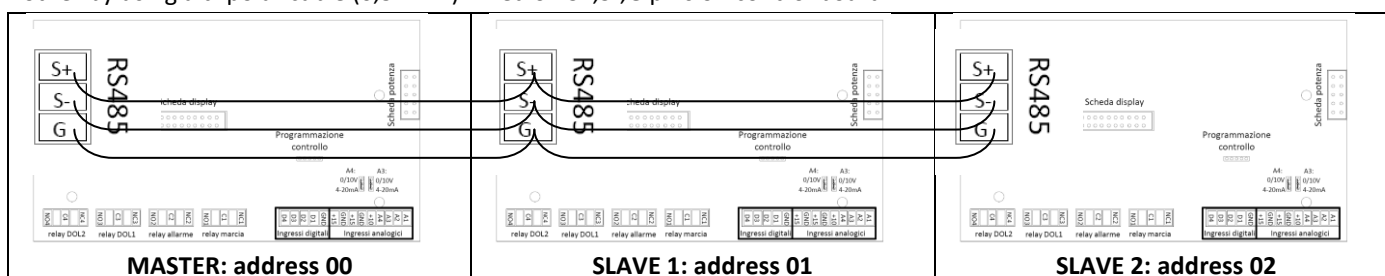
To prevent the shutdown of the system due to pressure sensor failure, connecting a 2nd pressure sensor to the VASCO; make sure that the two pressure sensors are identical.

Remember to perform the offset operation of the sensors in each VASCO (Installer Parameters menu) .

As a further help, you can connect another two DOL pumps to the VASCO Master to cover additional water demand; they will be operated only when all the COMBO pumps are already in operation.

## RS485 serial connection

VASCO’s communication is made through a private protocol using the RS485 port. Each VASCO must be connected to each other by using a tripolar cable (0,5 mm<sup>2</sup>) wired on S+,S-,G pins on control board.



## Master setup

1. Supply power to the VASCO master.
2. If not yet completed, perform the initial configuration as described on chapter 6.2
3. Initial view is shown:

**Inv: ON/OFF Mot: ON/OFF**

p\_mis=XX.X [bar]

4. Scroll until:

**Menù**

ENT to access

5. Press ENT

**MENU'**

Param. install.

6. Press ENT
7. Insert password (default 001).

8. Scroll until:

**Combo**

ON/OFF

9. Set ON
10. Set:

Address XX	00	VASCO's address in parallel operation. <ul style="list-style-type: none"> <li>• 00 : VASCO master</li> </ul>
Alternance ON/OFF	OFF	Function to allow alternating between the VASCOs connected in parallel in order to allow equal use of each pump in the group; in this way Master will reorganize the starting priority of the pumps by checking the life of each of them.
Start delay AUX t = XX [s]	1	Delay time with which the slaves start after the variable speed pump has reached the maximum frequency and the pressure value has fallen below set pressure – delta start pressure

11. Press STOP (red button)
12. Press STOP again

## Slave setup

Follow Master setup until point 11.

**In case of failure of master in a Combo system, will be replaced by slave. As a consequence, all parameters must be setup independently on each inverter, master mode.**

1. Set:

<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">                 Address  XX             </div>	VASCO's address in parallel operation. <ul style="list-style-type: none"> <li>• 01 --&gt; 07: VASCO slaves</li> </ul>
---	---

2. Press STOP (red button).
3. In the *advanced parameters* verify that *Autorestart* is set *ON*.
4. Press STOP (red button).
5. Press STOP again.

**Whenever the user accesses the Menu screen of the VASCO master, the communication between VASCOs is automatically interrupted.**

**In case of alarm or failure of a pump in a Combo system, this pump's operation will be replaced (temporary or permanently) by another pump.**

**In case of failure of master in a Combo system, it will be replaced by the next slave. As a consequence of this, all parameters must be setup independently on each inverter as master mode.**

## 10. Trouble-shooting chart

LCD does not switch on after powering the VASCO	<ul style="list-style-type: none"> <li>• Check the connecting flat cable between the LCD board (attached to the cover) and the control board</li> <li>• Check the fuses</li> <li>• Check that the power cables are properly connected.</li> </ul>
Power line of VASCO is interrupted by the differential protection contactor	<ul style="list-style-type: none"> <li>• Check the leakage current to ground of EMC filter</li> <li>• Following a rapid off/on the power supply, the differential contactor can interrupt the power. After turning off the VASCO it is recommended to wait at least 1 minute before restarting.</li> </ul>
When performing the Offset operation of the pressure device, SENS.PRESS.OFF alarm occurs	<ul style="list-style-type: none"> <li>• Check that the sensor cable is properly connected to the sensor device and to the VASCO.</li> <li>• Make sure that the sensor and its cable are not damaged.</li> <li>• Check that the operating range of pressure sensor is of 4 -20 mA type and the value of 15 V is within the voltage feed range of the sensor</li> </ul>
Frequency and pressure oscillation on constant pressure control mode	<ul style="list-style-type: none"> <li>• Check if the water tank and its air pressure are correctly set. It may be necessary to increase the tank volume or reduce the pre-charge pressure.</li> <li>• Check the ki &amp; kp parameters (Installer Parameters menu). At first, it is suggestable to increase the Ki value. If it not enough reduce of one unit the Kp value.</li> </ul>
During constant pressure control, pump stops and starts continuously.	<ul style="list-style-type: none"> <li>• Make sure that the value f min Q=0 (minimum frequency with Q=0) (Installer Parameters menu) is properly set up. Otherwise repeat the procedure.</li> <li>• Increase the value of parameter stop delay (Installer Parameter menu)</li> </ul>

	<ul style="list-style-type: none"> <li>• Increase the time value ramp Q=0 parameter (Installer Parameters value).</li> </ul>
DOL pump stops and starts continuously	<ul style="list-style-type: none"> <li>• Increase <i>delta start pressure</i> in accordance with chapter 9.1.</li> <li>• Check to see if the water tank and it's air pressure are correctly set. It may be necessary to increase the tank volume or reduce the pre-charge pressure.</li> </ul>
Measured pressure p_mis drops too much before VASCO starts the pump.	<ul style="list-style-type: none"> <li>• Decrease the delta start pressure (Installer Parameters menu) .</li> <li>• Check to see if the water tank and it's air pressure are correctly set. It may be necessary to increase the tank volume or reduce the pre-charge pressure.</li> <li>• Modify the value of ki &amp; kp parameters (Installer Parameters menu). At first, it is suggestable to reduce the Ki value. If it is not enough increase of one unit the Kp value.</li> </ul>

# 11. Technical Assistance

For more technical information contact the authorized reseller providing the following information. The solution to the problem will be found faster and easier if full information is provided.

Model/Serial Code	LCD version (shown when VASCO is power supplied) LCD = _._	INV version (shown when VASCO is power supplied) INV = _._	
Line Voltage: ___ [V]	Line Frequency: <input type="checkbox"/> 50 Hz <input type="checkbox"/> 60 Hz		
description of problem:			
installation type:	<input type="checkbox"/> wall mounted	<input type="checkbox"/> on motor fan cover	
motor type:	<input type="checkbox"/> single phase <input type="checkbox"/> submersible	<input type="checkbox"/> three phase <input type="checkbox"/> surface	
if submersible: cable length [m]: _____		if sommersible: cable section [mm <sup>2</sup> ]: _____	
P2 motor [kW]: _____	rated motor Volt [V]: _____	rated motor Amp [A]: _____	rated motor Hz: _____
if single phase: capacitor _____ [UF]	if singlephase: starting Amp I st = _____ [A]	pump performances Q = _____ [l/min] H = _____ [m]	
tank volume: _____ [liters]		precharge pressure: _____ [bar]	
number of DOL pumps: _____		number of COMBO pumps: _____	
medium ambient temperature: _____ [°C]	pressure sensor 4 mA = _____ [bar] 20 mA = _____ [bar]		
digital inputs used:		digital ouputs used:	
electric and hydraulic scheme of the system (more detailed as possible)			
set parameters: please fill the <b>instal. param.</b> and <b>adv. param columns</b> in the software scheme.			



# **DICHIARAZIONE DI CONFORMITA'**

Secondo:

**Direttiva Macchine 2006/42/CE**

**Direttiva EMC 2004/108/CE**

**VASCO 209,214,406,409,414,418,425,430** è un dispositivo elettronico da collegare ad altre macchine elettriche con le quali viene a formare singole unità. E' necessario, pertanto, che la messa in servizio di questa unità (corredata di tutti i suoi organi ausiliari) sia effettuata da personale qualificato.

Il prodotto è conforme alle seguenti normative:

**EN 55011 Classe A**

**EN 61000**

**EN 60146**

**EN 50178**

**EN 60204-1**

**Ing. Marco Nassuato**

**Operation Manager**



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# **DECLARATION OF CONFORMITY**

In according with:

**Machine Directive 2006/42/EC**

**EMC Directive 2004/108/CE**

**VASCO 209,214,406,409,414,418,425,430** is an electronic device to be connected to other electrical equipment with which it is to form individual units. It must, therefore, that the putting into service of this unit (with all its subsidiary equipments) to be performed by qualified personnel.

The product conforms to the following regulations:

**EN 55011 Class A**

**EN 61000**

**EN 60146**

**EN 50178**

**EN 60204-1**

**Ing. Marco Nassuato**

**Operation Manager**



