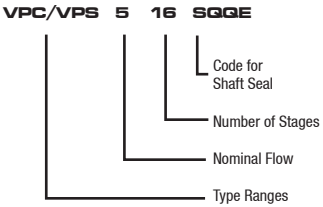
INSTALLATION AND OPERATING INSTRUCTIONS

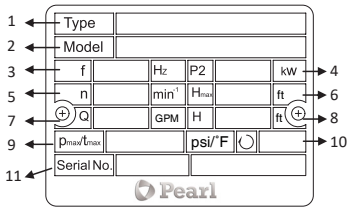


1. MODEL NUMBERING AND NAMEPLATE INFORMATION

1.1 Model numbering



1.2 Nameplate format



1. Pump Type – Seal Type
2. Pump Model
3. Frequency
4. Rated Power
5. Speed
6. Maximum Head
7. Capacity
8. Head Range
9. Maximum Operating Pressure
10. Rotating Direction
11. Serial Number

2. HANDLING

Read these instructions carefully before beginning installation. Lift and handle these pumps carefully. VPC & VPS series are vertical multi-stage non-self priming pumps coupled with standard electric motors. This manual applies to standard version pumps and for standard applications. Contact your supplier or the factory for information about special pump versions and applications.

3. APPLICATIONS

VPC & VPS series in-line pumps booster pumps are designed for a wide range of applications in various industries – for water treatment, water boosting, water supply, cooling, cleaning, etc.

3.1 Pumped liquids

The pumps are designed for use with clean, viscous and non-explosive liquids that do not contain abrasive matter.

> ⚠ *These pumps are not designed to be used with abrasive, solid containing, explosive and corrosive liquids.*
> *For special application, please contact your supplier or the factory.*

4. TECHNICAL DATA

4.1 Temperatures

Ambient temperature: 32 F to +104 F

> ⚠ *If ambient temperatures are above +104° F or if the pump is located at elevations more than 3,000 feet above sea level, the motor's output must be decreased to compensate for less effective cooling, and may have to be replaced with a stronger motor.*

Liquid temperature: -5 F to +248 F

4.2 Maximum operating pressure

Refer to page 8

4.3 Minimum inlet pressure-NPSH

To avoid cavitation, make sure that there is a minimum pressure on the suction side of the pump.

NPSHA: Net Positive Suction head Available

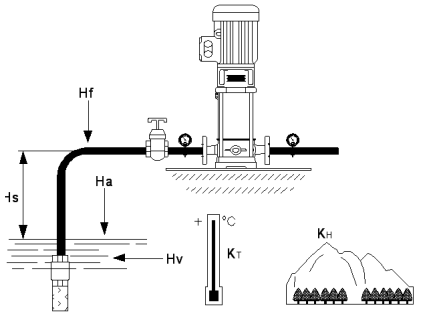
The net positive suction head available is a function of the pump suction system.

NPSHR: Net Positive Suction head required

The net positive suction head required is a function of the pump design at the operating point on the pump performance curve.

NPSHA=Ha-Hs-Hf-Hv-Hst (in meters head)

Ha: Barometric pressure. (That can be set to 15 psi.)
Hs: Suction lift.
Hf: Friction loss in suction pipe.
Hv = KT+KH: Vapor pressure
KT: Flow resistance due to liquid temperature.
KH: Flow resistance due to elevation above sea level.



If the liquid is water, you can consult the tables to determine the values of KT and KH.

T(F)	68	86	104	122	140	158	176	194	212	230	248
KT (Ft)	0.7	1.3	2.6	4.3	7.2	11	16.4	24	36	49	72
H (Ft)	0	1640	3280	4921	6461	8202	9842				
KH (Ft)	0	1.80	3.61	5.41	7.22	9.02	10.8				

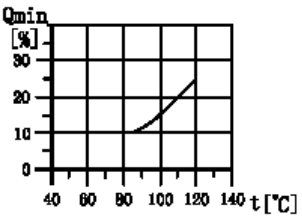
Hst: Safety margin. (minimum: 7 FEET head)
NPSHA ≧ NPSHR: Pump running will be fine.
NPSHA < NPSHR: The pump will be dry running or cavitating.

Stop operation of the pump if cavitation occurs. Cavitation will cause pump damage and the resultant damage is not subject to warranty

4.4 Minimum nominal flow rate

To prevent overheating of the internal pump components, the pump should not be used at flows below the minimum flow rate.

Do not run the pump against a closed discharge valve for longer than a few seconds. The curve below shows the minimum flow rate as a percentage of the nominal flow rate in relation to the liquid temperature.



4.6 Electrical data

See the motor nameplate.

Make sure that the supply voltages, phase and frequencies correspond to the motor specifications.

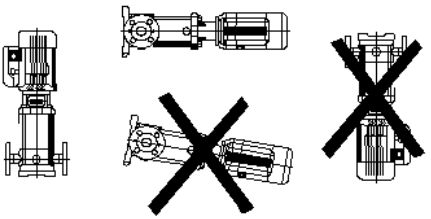
4.7 Number of starts per hour

Motors up to and including 5 HP: Maximum 100 times per hour.
Motors of 7.5 HP and up: Maximum 40 times per hour.

If you use another brand of motor then check the manufacturer's instructions for the maximum frequency of starts.

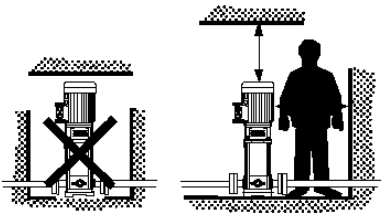
5. INSTALLATION

Always refer to the local or national regulations and codes relating to the selection of the installation site, the water and power connections, etc.



5.1 Position

Pumps should be installed in a protected environment – not exposed to weather. Make sure that there are no obstructions to prevent proper motor cooling.

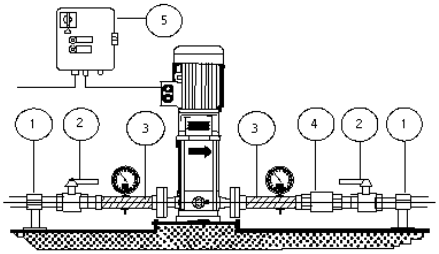


5.2 Anchoring

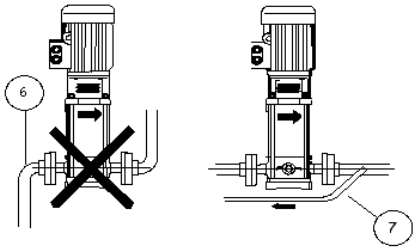
The pump must be secured to a solid foundation by bolts through the holes in the flange or base plate. An illustration of page 9 shows the bolt location and the pipe connections.

5.3 Installation example

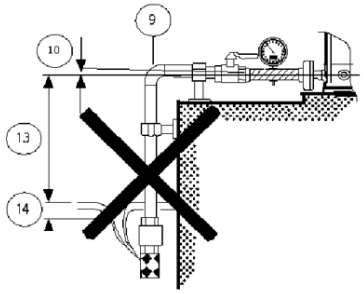
When positioning and installing the pump, follow the installation examples next page in order to avoid damaging the pump.



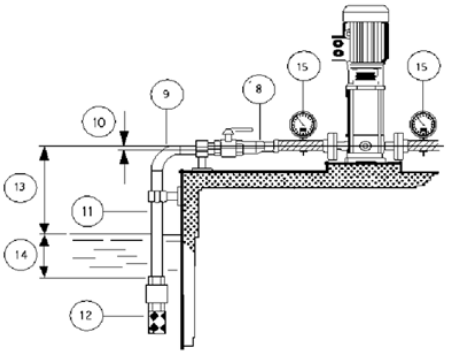
Pos.	DESCRIPTION
1	Pipe support: Support piping system properly to avoid stresses on connections.
2	On-off valves: Install on-off valves for easy access- before the pump intake and after the pump discharge.
3	Use flexible piping on both input and output sides of the pump to reduce vibration and transmission of noise.
4	Check valves will prevent return flow of pumped liquid when pump is stopped, reducing the danger of pump damage.
5	Control Panel: Use high quality components. Make sure that the panel conforms to local standards and regulations.
6	Do not place elbows next to the pump intake and discharge.
7	If pump needs to be operated with on-off valve closed, install a by-pass line to avoid damaging the pumping system.



8	If it is necessary to increase the diameter of the suction pipe, place an eccentric reducer between the check valve and the flexible pipe section.
9	Using elbows will increase the flow resistance. Wide bends will result in lesser flow resistance.
10	The piping must have a level or positive gradient to prevent the formation of air pockets.
11	The diameter of the drop pipe must be bigger than the diameter of the pump's suction port.
12	Use a foot valve in case of negative suction head.



13	Size pump for correct head.
14	Place the intake of the suction pipe so that the intake is always submerged to prevent entry of air.
15	Install a compound gauge at the pump suction and a pressure gauge at the pump discharge.



6. ELECTRICAL CONNECTION

- All electrical connection should be in accordance with the local regulations and made by a qualified electrician.
- Make sure that the supply voltages and frequencies, and phase are suitable for the motor used.
- Before proceeding, make sure that all the connections are grounded and well insulated.
- Overload protection should be provided.
- To connect, proceed as shown on the inside of the terminal board cover.
- The terminal box can be turned to four positions.
- Check the direction of rotation (Three-phase motor only).
- Make sure that the controls are properly grounded.
- To avoid the possibility of dry running, we strongly recommend installing dry running protection.

7. START-UP

The pump and suction pipe should be filled with the liquid to be pumped before start-up to prevent dry running at start-up.

Dry running can damage the pump bearing and shaft seal.

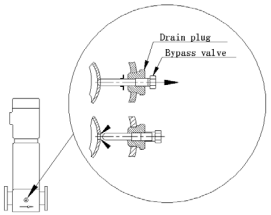
7.1 Operation

- Start the pump and check the direction of rotation of the motor (Three –Phase motors).
- Start the pump, keeping the on-off valve of the discharge side of the pump closed. Then, open the on-off valve slowly. The pump must run smoothly and noiselessly. If not, then it may be necessary re-prime the pump.
- Check the current drawn of the motor. If necessary, adjust the setting of the thermal relay.
- Any air pockets trapped inside the pump may be released by adjusting the air screw.

If the pump is installed in a location where it is subject to freezing when not in operation, then the pump and the pipe system should be drained to prevent damage from freezing.

7.2 Others (Only for VPC, VPS 1, 3, 5 series)

- For these pumps, it is advisable to open the bypass valve during start-up. The bypass valve connects the suction and discharge sides of the pump, thus making the filling procedure easier. When the operation is stable, the bypass valve can be closed.
- If the pumped liquids contain air, it is advisable to leave the bypass valve open if the operating pressure is lower than 85 psi. If the operating pressure constantly exceeds 85 psi, the bypass valve must be closed. Otherwise the material at the opening will be worn because of the high liquid velocity.

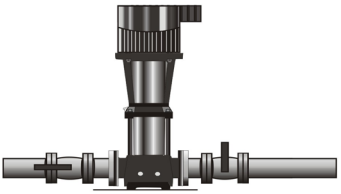


8. MAINTENANCE

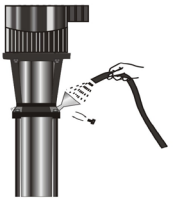
Before starting maintenance work on the pump, the motor, or other parts of the system, make sure that the power supply has been switched off.

- The pump does not have a recommended scheduled maintenance schedule.
- If the motor is fitted with grease nipples, then the motor should be lubricated with a high temperature lithium-based grease. If not, then the motor does not require regular maintenance.
- If the pump and motor are used infrequently with long intervals of non-operation, then we recommend that the motor be greased.
- Coupling adjustment: Refer to page 7.

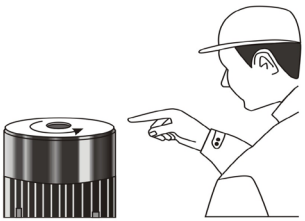
1



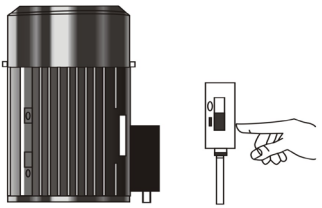
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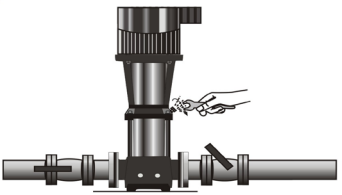
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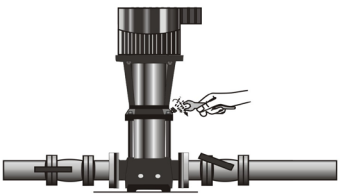
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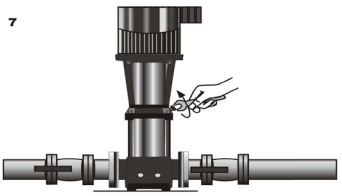
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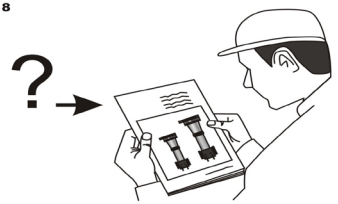
6



7



8



9. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Pump does not run when the motor starter is activated.	Supply failure or no power supply.	Check connections or restart the power supply.
	Main contacts in motor starter are not making contact or the motor coils are defective	Reconnect or replace contacts or magnetic coil.
	Pump or auxiliary circuits protection fuses blown.	Replace fuses.
	Pump or piping system may be obstructed causing a jam.	Clean the obstruction and restart pump.
	Motor may have failed.	Replace the motor.
	Motor protector or thermal relay has tripped out.	Reset the motor or thermal protector.
	Tripping of anti-dry running protection.	Check the water level in the tank or the water system pressure. If everything is in order, check the protection device and its connection cables.
Starter overload trips immediately when the power is switched on.	Overload setting is too low.	Set the motor starter correctly.
	The cable connection is loose or faulty.	Fasten or replace the cable connection.
	One fuse is blown.	Replace fuse and try starting again.
	Pump is jammed by an obstruction	Check and clean obstruction from system.
	Contacts in overload are faulty.	Replace motor starter contacts.
	The motor winding is defective.	Replace the motor.
	Low voltage (Especially at peak time).	Check the power supply.
The pump starts but, after a short time, the thermal protector trips out or the fuses blow.	The voltage is not within the motor's operating limits.	Check the operating conditions of the pump.
	The control panel is situated in an excessively heated area or is exposed to direct sunlight.	Protect the control panel from heat sources and from the sun.
	A phase in the power supply is missing.	Check the power supply.
The pump starts up but, after a period of time, the thermal protector trips.	Worn motor bearings causing motor to overheat.	Replace motor bearings.
	The pump's delivery rate is higher than the specified rate on the pump nameplate.	Partially close the on-off valve located discharge side until the delivery rate returns to within the specified limits.
	There are obstructions inside the pump or pumping system.	Disassemble and clean the pump and piping.
	Less viscous liquids may cause the motor to work too hard and overload the motor, causing the motor to overheat	Check the actual power requirements based on the characteristics of the liquid being pumped, and replace the motor accordingly.

PROBLEM	POSSIBLE CAUSE	REMEDY
Pump runs but no water delivered.	Pump is not primed with liquid.	Fill the pump with the liquid to be pumped.
	The pump, suction or discharge pipes are blocked by solids in the liquid being pumped.	Clean the pump, suction or discharge pipe.
	The foot or check valve is blocked or has failed.	Replace the foot or check valve.
	The suction pipe leaks.	Repair or replace the suction pipe.
	The air is in the suction pipe or pump.	Remove trapped air from system..
	Motor operating in wrong direction (three-phase motor).	Change the direction of rotation of the motor by reversing motor connections.
The pump capacity is not constant.	The pump draws in air or the inlet pressure is too low.	Improve the suction conditions.
	The pump or the suction side of the piping system partly blocked by foreign bodies.	Clean the pump or suction pipe.
The system's general protection cuts in.	Short circuit.	Check electrical system.
The pump rotates in the wrong direction when switched off.	The foot or the check valve has failed.	Check and replace check valve.
	Leakage in the suction pipe.	Repair or replace the suction pipe.
The frequency of Pump start-up is too high.	Leakage in the foot valve, check valve or system.	Repair or replace the components.
	Ruptured membrane or no air pre-charge in surge tank.	See relevant instructions in surge tank's manual.
Vibration and noise	Cavitation	Reduce the required flow or improve the operating conditions of the pump (suction conditions, head, flow resistance, liquid temperature, viscosity,…etc.).
	Make sure that pump and motor shafts are properly aligned.	Adjust the pump and/or motor shafts.
	Worn motor bearings.	Replace the bearings or the motor.
	Operation with frequency converter.	Consult a qualified engineer form the supplier of the frequency converter.
	Check vibration and noise damping devices	Replace vibration & noise dampers, if worn.

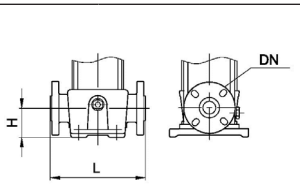
Maximum Operating Pressures

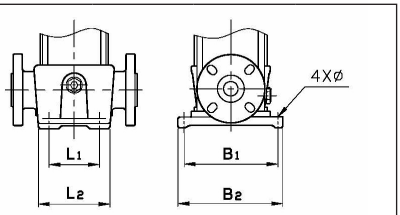
	STAGES	MAXIMUM OPERATING PRESSURE [PSI]
VPS-VPC 1	2-27	350
VPS-VPC 3	2-25	350
VPS-VPC 5	2-24	350
VPS-VPC 10	1-10	230
	12-17	350
VPS-VPC 15	1-8	230
	9-12	350
VPS-VPC 20	1-7	230
	8-10	350
VPS-VPC 32	(1-1)-5	230
	(6-2)-(10-2)	425
VPS-VPC 45	(1-1)-4	230
	(5-2)-7	425
VPS-VPC 64	(1-1)-3	230
	(4-2)-(5-2)	425
VPS-VPC 90	(1-1)-3	230
	(4-2)	425
VPS-VPC 120	1 - (5-2)	425
VPS-VPC 150	(1-1) - (4-2)	425

Maximum Inlet Pressures

	STAGES	MAXIMUM INLET PRESSURES [PSI]
VPS-VPC 1	2-25	142
	27	210
VPS-VPC 3	2-15	142
	17-25	210
VPS-VPC 5	2-9	142
	10-24	210
VPS-VPC 10	1-5	110
	6-18	142
VPS-VPC 15	1-2	110
	3-12	142
VPS-VPC 20	1	110
	2-10	142
VPS-VPC 32	(1-1)-(2)	55
	(3-2)-(6)	142
	(7-2)-(10-2)	210
VPS-VPC 45	(1-1)-1	55
	(2-2)-3	142
	(4-2)-7	210
VPS-VPC 64	(1-1)	55
	1-(2-1)	142
	2-(5-2)	210
VPS-VPC 90	(1-1)-(2-2)	142
	(2-1)-(4-2)	210
VPS-VPC 120	1	142
	(2-2) - (3-1)	210
	3 - (5-2)	280
VPS-VPC 150	(1-1)	142
	(1-2)	210
	(3-2) - (4-2)	280

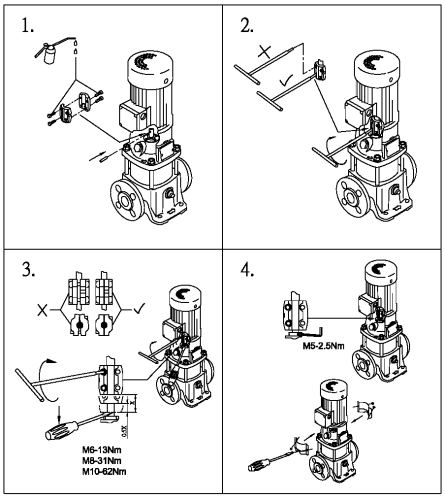
DIN Flange Connections



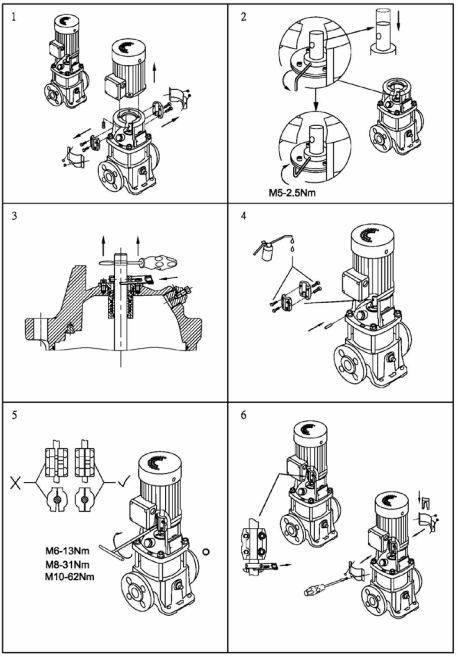


Pump Type	L	H	DN	L1	L2	B1	B2	Ø
	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]	[inch]
VPC 1	9.8	3.0	1/1 ¼	3.94	5.55	7.09	8.66	0.55
VPS 1	9.8	3.0	1/1 ¼	3.94	5.91	7.09	8.66	0.55
VPC 3	9.8	3.0	1/1 ¼	3.94	5.55	7.09	8.66	0.55
VPS 3	9.8	3.0	1/1 ¼	3.94	5.91	7.09	8.66	0.55
VPC 5	9.8	3.0	1/1 ¼	3.94	5.55	7.09	8.66	0.55
VPS 5	9.8	3.0	1/1 ¼	3.94	5.91	7.09	8.66	0.55
VPC 10	11.0	3.1	1 ½	5.12	6.81	8.46	10.08	0.57
VPS 10	11.0	3.5	2	5.12	7.87	8.46	9.76	0.55
VPC 15	11.8	3.5	2	5.12	6.81	8.46	10.08	0.59
VPS 15	11.8	3.5	2	5.12	7.87	8.46	9.76	0.55
VPC 20	11.8	3.5	2	5.12	6.81	8.46	10.08	0.59
VPS 20	11.8	3.5	2	5.12	7.87	8.46	9.76	0.55
VPC 32	12.6	4.1	2 ½	6.69	8.86	9.45	11.69	0.55
VPS 32	12.6	4.1	2 ½	6.69	8.94	9.45	11.77	0.55
VPC 45	14.4	5.6	3	7.40	9.72	10.55	12.99	0.55
VPS 45	14.4	5.5	3	7.48	9.88	10.43	12.99	0.55
VPC 64	14.4	5.6	4	7.40	9.72	10.55	12.99	0.55
VPS 64	14.4	5.5	4	7.48	9.88	10.43	12.99	0.55
VPC 90	15.0	5.5	4	7.83	10.35	11.02	13.62	0.55
VPS 90	15.0	5.5	4	7.83	10.24	11.02	13.58	0.55
VPS 120	15.0	5.5	5	7.83	10.24	15	18.56	0.69
VPS 150	15.0	7.1	5	10.81	10.24	15	18.56	0.69

VPC-VPS 1, 3, 5 coupling adjustments



VPC-VPS 10, 15, 20 Coupling adjustments



VPC-VPS 32, 45, 64, 90 Coupling adjustments

