

VERDERAIR E-PURE

The most efficient electric diaphragm pumps

OPERATION MANUAL VERDERAIR E-PURE_v1

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VERDER 
passion for pumps

TABLE OF CONTENTS

Pump matrix	3
Warnings	4
Installation	7
Operation	11
Maintenance / repair	13
Troubleshooting	18
Parts & kits	19
Exploded views	20
Dimensions	21
Technical data	28
Torque values	30
Drive options	30
Optional equipment	30
Customer services & guarantee	31

PUMP MATRIX

Before putting your pump in operation remove all packing materials after reception. Check the consignment for damage at once and make sure that the name plate / type designation is in accordance with the packing slip and your order. All pumps have identification plate (ID) located on the pump housing. The ID is mentioning the year of construction, the serial number and the construction code of the pump.

Use the matrix below to define the components of your pump. Make sure the wetted parts of the pump are compatible to the pumped liquid.

NOTE:

In case of doubt, please contact your local supplier (www.verderliquids.com). To build a pump code, please see the below coding system.

PUMPCODING VA-EP				
Pump size	Housing and center Section		Shafts & diaphragm plate	Valve
	Housing	Drive section	-	
30 : 3/4"	T : PTFE	B : POM -C	SS Stainless steel 316L	FP : Flapper PEEK
50 : 3/4"	E: PE		DS Duplex SS	
100 : 1 1/4"			HS Hastelloy C	
Diaphragm	Connections	Options		
TO : PTFE Overmolded	TN : Threated NPT TB : Threated BSPP FD-P: Flanged DIN in PVC FD-S: Flanged DIN in SS304 FD : Full steel flange DIN in SS316	O3 - Standard AC drive 230/400V F3 - O3 drive with frequency inverter 3ph (VFD) L3: F3 + leak detection automatic shutdown of the pump O1 : Drive with frequency inverter 1ph (VDF) P1 : O1 + potentiometer outside control box L1 : O1 + leak detection automatic shutdown of the pump IG : Gearbox i=7.5 with flange IEC 90 – B14 C140 NG: Gearbox i=7,5 with flange NEMA 140TC		
		OO : standard, right suction port SS : stroke sensor LS : leak detection, sensor only LP : left suction port DM: Draining manual		
Example : VA-EP100EB SS FP TO TN OOSS				

Notes:

- Not all combinations are available, contact your local supplier for more info.

STORAGE

If the pump is not installed immediately it is recommended to store it in a dry, clean and cool location. Verderair e-Pure pump is tested with water as liquid according to the test report.

Note: Rest water from the test may stay behind in the pump.

WARNINGS

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbol refers to procedure specific risk. When these symbols appear in the body of this manual, refer back to these warnings. Additional, product-specific warnings may be found throughout the body of this manual where applicable.

WARNING



ELECTRIC SHOCK HAZARD

This equipment must be grounded. Improper, setup, or usage of the system can cause electric shock.

- Turn off and disconnect power at main switch before disconnecting any cables before servicing or installing equipment.



- Connect only to grounded power source.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.
- Wait five minutes for capacitor discharge before opening equipment.



FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in work area can ignite or explode.

To help prevent fire and explosion:



- Use equipment only in well ventilated area.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).



- Keep work area free of debris, including solvent, rags and gasoline.
- Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.



- Ground all equipment in the work area. See grounding instructions.



- Use only grounded hoses.
- If there is static sparking or you feel a shock, stop operation immediately.



- Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.

Static charge may build up on plastic parts during cleaning and could discharge and ignite flammable materials and gases. To help prevent fire and explosion:



- Clean plastic parts in a well ventilated area.
- Do not clean with a dry cloth.

WARNING



PLASTIC PARTS CLEANING SOLVENT HAZARD

Use only compatible water-based solvents to clean plastic structural or pressure-containing parts. Many solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage. See Technical Data in this and all other equipment instruction manuals. Read fluid and solvent manufacturer's warnings.



TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.



- Read MSDS's to know the specific hazards of the fluids you are using.
- Route exhaust away from work area. If diaphragm ruptures, fluid may be exhausted with air.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.
- Always wear impervious gloves when cleaning equipment.



BURN HAZARD

Equipment surfaces and fluid that's heated can become very hot during operation. To avoid severe burns:

- Do not touch hot fluid or equipment.
- Wait until equipment/fluid has cooled completely.



PERSONAL PROTECTIVE EQUIPMENT

You must wear appropriate protective equipment when operating, servicing, or when in the operating area of the equipment to help protect you from serious injury, including eye injury, inhalation of toxic fumes, burns, and hearing loss.



This equipment includes but is not limited to:

- Protective eyewear, gloves, and hearing protection
- Protective clothing

WARNING**EQUIPMENT MISUSE HAZARD**

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See Technical Data in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See Technical Data in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure. Turn off all equipment and follow the Pressure Relief Procedure in this manual when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.

**PRESSURIZED EQUIPMENT HAZARD**

Fluid from dispense valve, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.

- Follow Pressure Relief Procedure in this manual, when you stop the pump and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.

**THERMAL EXPANSION HAZARD**

Fluids subjected to heat in confined spaces, including hoses, can create a rapid rise in pressure due to the thermal expansion. Over-pressurization can result in equipment rupture and serious injury.



- Open a valve to relieve the fluid expansion during heating.
- Replace hoses proactively at regular intervals based on your operating conditions.

INSTALLATION

PLEASE CHECK THE ADDITIONAL DELIVERED EXPLODED VIEW FOR ALL POSITION NUMBERS

NOTE: Installation of this equipment involves potentially hazardous procedures. Only trained and qualified personnel who have read and who understand the information in this manual should install this equipment.

- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations

General Information

The typical installation is only a guide for selecting and installing system components. Contact your Verder representative for assistance in planning a system to suit your needs. Always use genuine Verder parts and accessories. Be sure all accessories are adequately sized and pressure rated to meet the system's requirements.

Reduce Cavitation

Cavitation in a double diaphragm pump is the formation and collapse of bubbles in the pumped liquid. Frequent or excessive cavitation can cause serious damage, including pitting and early wear of fluid chambers, balls, and seats. It may result in reduced efficiency of the pump. Cavitation damage and reduced efficiency both result in increased operating costs.

Cavitation depends on the vapor pressure of the pumped liquid, the system suction pressure, and the velocity pressure. It can be reduced by changing any of these factors.

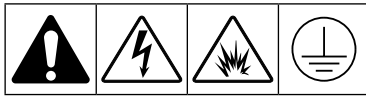
1. Reduce vapor pressure: Decrease the temperature of the pumped liquid.
2. Increase suction pressure:
 - a. Lower the installed position of the pump relative to the liquid level in the supply.
 - b. Reduce the friction length of the suction piping. Remember that fittings add friction length to the piping. Reduce the number of fittings to reduce the friction length.
 - c. Increase the size of the suction piping.
 - d. Increase the Net Positive Suction Head Available (NPSHa).
NOTE: Be sure the inlet fluid pressure does not exceed 25% of the outlet working pressure.
3. Reduce liquid velocity: Slow the cyclic rate of the pump.

- a. Pumped liquid viscosity is also very important but normally is controlled by factors that are process dependent and cannot be changed to reduce cavitation. Viscous liquids are more difficult to pump and more prone to cavitation.
- Take all of the above factors into account in system design. To maintain pump efficiency, supply only enough power to the pump to achieve the required flow.
- Verder representatives can supply site specific suggestions to improve pump performance and reduce operating costs.

Tighten fasteners before setup

Before using the pump for the first time, check and retorque the housing bolts (23). Also after the first day of operation, after periods of important temperature fluctuations, after transport, after dismantling of the pump and after periods when the pump hasn't been working the stops, housing bolts have to be checked. Please use the torque values as mentioned on page 27.

Electrical Connections



NOTE: Follow the instructions in the motor manufacturer’s manual. Use the main power switch with the lockable position 0 to connect the electric motor or frequency inverter. If you have pump with O3 option use a frequency regulator with overload protection. Wire size, fuse size, and other electrical devices must comply with all local codes and regulations.

Connection of the pump with frequency regulator VFD (Option F3):

3ph 380-20%...480+10% VAC 47-63Hz.

Connection electric motor (Option O3):

230/400V AC 50Hz, 265/460V AC 60Hz.

Connection of the pump with frequency regulator (Option O1) 1-Phase 200-240V (+10%, -15%) AC 50/60 Hz 11A with grounding!

NOTE: To avoid equipment damage, do not plug the motor directly into a wall socket.

NOTE: Drive option O3 recommended be connected to a suitable frequency inverter. Before starting the engine, read the motor ID plate and the manufacturer’s instructions. Only the right connection of the drive ensures that the pump operates in accordance with the performance charts.

Recommended selection of frequency inverter (VFD) for the e-PURE pump:

VA-EP 30

Drive option O3, frequency inverter power minimum 0.75 kW. Output current (A) 2.3, vector control in 87Hz technology.

VA-EP 50

Drive option O3, frequency inverter power minimum 1.1 kW. Output current (A) 3.1, vector control in 87Hz technology.

VA-EP 100

Drive option O3, frequency inverter power minimum 1.5 kW. Output current (A) 4.0, vector control in 87Hz technology.

Wire Connections

Option F3:

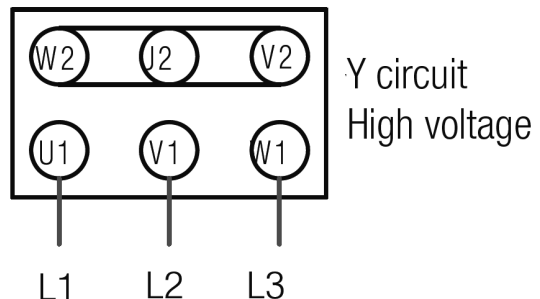
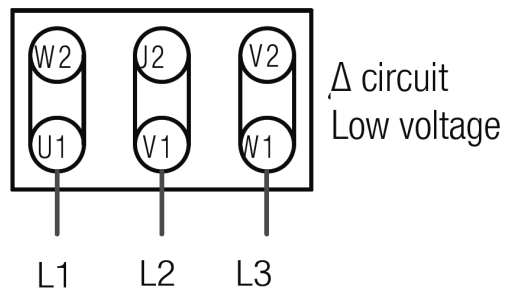
Follow the instructions in the frequency inverter (VFD) manufacturer’s manual.

Option O3:

NOTE: Ensure before connecting to the power supply that the wired connection of the motor is correct according to the markings on the motor plate:

Drives in version O3 are supplied with connection Δ (circuit low voltage).

If the motor is connected to a variable frequency drive (VFD) follow the instructions in the frequency inverter (VFD) manufacturer’s manual.



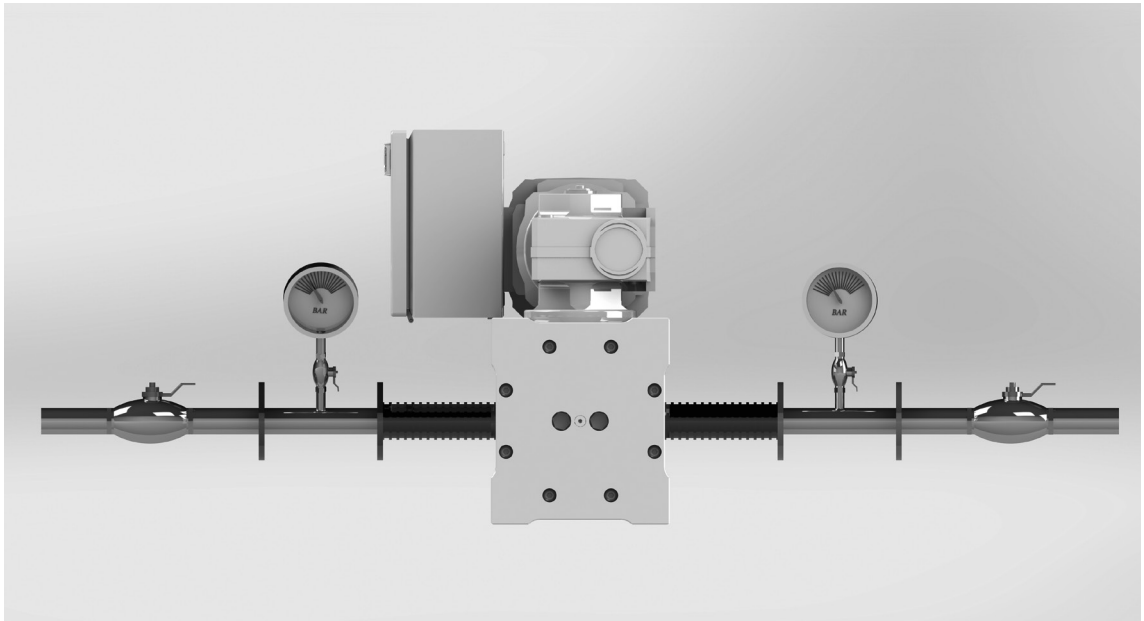
All motors are equipped with Temperature Sensor (TF): PTC-Thermistor. Drive option F3 are fitted with motor temperature protection. Drive option O1 is not fitted. with motor temperature protection Drive option O3 must be properly connected with the motor temperature sensor to avoid possible overheating or burning!

The PTC temperature sensor only performs its protective function when connected to a trigger device! A triggering device evaluates the resistance increase and switches the drive off. Trigger temperature: 155° C Max. voltage: 30 V Terminals TP2+ TP2.

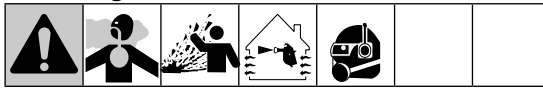
Pump with drive DOES NOT include cable and plug!

Wiring guidelines

- The connection cables must be fed into the terminal box using cable glands.
- The terminal box must be enclosed in a dustproof and watertight manner.
- Use a grounded or shielded metal cable power wiring.
- Use the shortest possible cables or wires of the incoming power.
- Use the shortest possible cables or wires between the controller and motor.
- Route low-voltage cables away from high-voltage cables or wires or other known electromagnetic sources of EMI interference. If cables must cross, cross at a 90° angle.

Recommended installation drawing

Mounting

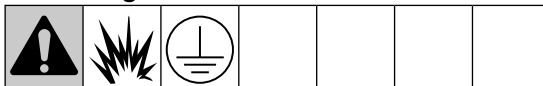


To avoid serious injury or death from toxic fluid or fumes:

- Never move or lift a pump under pressure. If dropped, the fluid section may rupture. Always follow the Pressure Relief Procedure on page 11 before moving or lifting the pump.

1. Be sure the mounting surface can support the weight of the pump, hoses and accessories, as well as the stress causes during operation.
2. Make sure the surface is flat and that the pump doesn't wobble.
3. For ease of operation and service, mount the pump so fluid inlet and fluid outlet ports are easy accessible.

Grounding



The equipment must be grounded. Grounding reduces the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Grounding provides an escape wire for the electric current. Check your system electrical continuity after the initial installation. Set up a regular schedule for checking continuity to be sure proper grounding is maintained.

Never use a non-conductive pump with non-conductive flammable fluids. Follow your local fire codes. When pumping flammable fluids, always ground the entire fluid system as described.

Fluid suction line

1. A shut of valve should be installed just before the pump to isolate the pump from the system for maintenance and installation.
2. Always use a flexible connection to avoid vibrations being brought into the piping system. The hoses should be grounded.
3. For sealing use an appropriate gasket compatible with the connections of pump.
4. Use a suction line which can stand vacuum. By the pumping action, vacuum will be created at the suction side of the pump.

Fluid outlet line

1. A shut of valve should be installed just after the pump isolate the pump from the system for maintenance and installation. A drain valve should be installed to relief the pressure of the pump.
2. Always use a flexible connection to avoid vibrations being brought into the piping system. The hoses should be grounded.
3. For sealing use an appropriate gasket compatible with the connections of the pump.

Fluid inlet and outlet ports

1. VA-EP series of pump are having the suction and discharge connections integrated in the center block. The pumps are delivered as standard with inlet port on the same side as drive terminal box.
2. By changing the ports you need rotating vertical the center housing 180°.

Installation remarks

1. VA-EP pumps must be installed load free to avoid possible damage of pumps and/or installation. There must be no external force on any connection part of the pump. Be especially careful not to have the pump support part of the weight of the hose and the piping.
2. Use a sturdy hose that will not collapse under the strong suction of the pump. The hose must be of more than sufficient pressure rating.
3. Use a hose of a diameter the same as or larger than the pump's ports. If the diameter of a hose is smaller, it will affect the pump's performance or cause its malfunction.
4. VA-EP pumps will be delivered with blind plugs to prevent dust or other materials to enter the pump. Those plugs have to be removed before installing the pump.
5. As UV – radiation can damage Polyethylene. This must taken in account by installing VA-EP pumps made out of PE (pump code VA-EPxx Ex)
6. VA-EP pumps are dry self-priming. So they don't need to be filled before first use. The figures of the possible suction heights can be found in the technical information (see page 23).

OPERATION

Flush the pump before first use

The pump was tested before leaving the factory. Residue of the testing water can be left in the pump. To avoid contamination, flush the pump before first use.

Starting and adjusting the pump

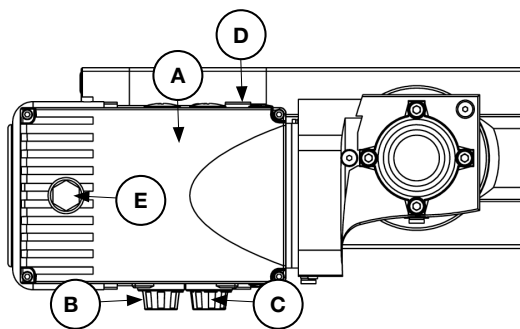
Before using the pump for the first time, check and retorque the housing bolts (23). Also after the first day of operation 8h, after periods of important temperature fluctuations, after transport, after dismantling of the pump and after periods when the pump hasn't been working the stops, housing bolts have to be checked. Please use the torque values as mentioned on page 24.

1. Be sure the pump is properly grounded.
See page 9 for proper grounding.
2. Check fittings to be sure they are tight. Tighten fluid inlet and outlet fittings securely.

Notice:

■ **Excessive fluid inlet pressure can reduce diaphragm life.**

VA-EP30/50 (option F3)



3. Place the suction tube in fluid to be pumped.
4. Place the end of the fluid hose into an appropriate container.
5. Check that both suction and discharge valves are opened.
6. (F3 drive option) Make sure that the inverter box is connected to the appropriate power supply.
(O1 drive option) Make sure that the inverter box is connected to the appropriate power supply. Turn the OFF-ON switch to the ON position.
7. (F3 drive option) Turn the "OFF" - "L/P" switch to the ON: "L" position. Start the pump slowly, during operation increase the capacity to Max. till the moment liquid comes into the pump and adjust the needed capacity.
(O1 drive option) Press the start (run) button. Start the pump slowly, during operation increase the capacity to Max. till the moment liquid comes into the pump and adjust the needed capacity.
8. Set the desired frequency on the potentiometer.
9. If fluid is not discharged after you start the pump, or if you hear an abnormal noise or notice any irregularity, shut down the pump immediately.
10. If you are flushing, run the pump long enough to thoroughly clean the pump and hoses.

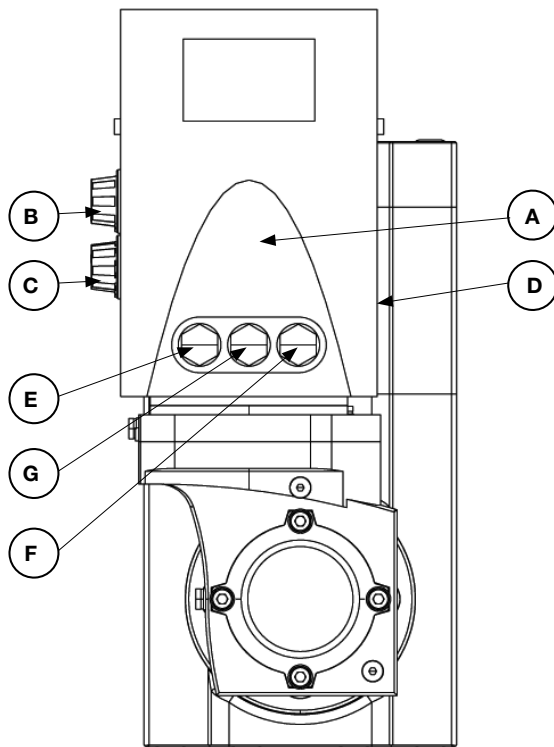
Notice:

■ **During operation of the VA-EP pump, it is inadmissible to completely close the flow on the pump discharge and stop the pump in this way.**

VA-EP 30/50

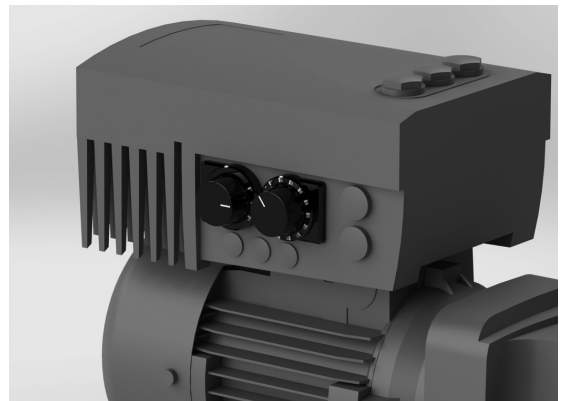
- A Frequency inverter door
- B Power ON/OFF switch
- C External potentiometer
- D Input for power supply cable (cable gland M25x1,5)
- E RJ12 connection/ Diagnostic LEDs

VA-EP100 (option F3)

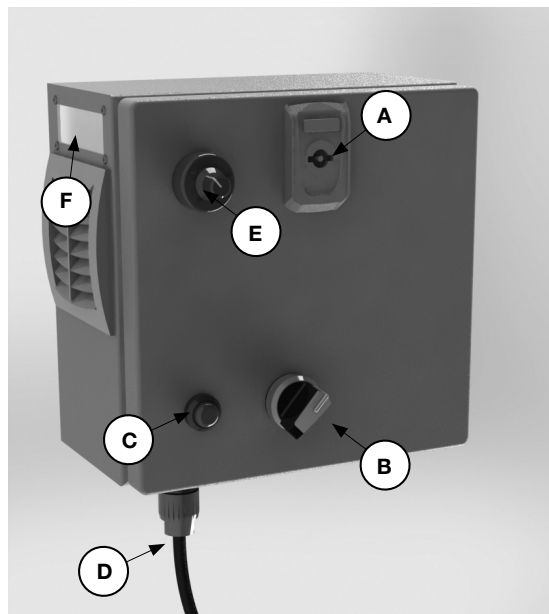


VA-EP100

- A Frequency inverter door
- B Power ON/OFF switch
- C External potentiometer
- D Input for power supply cable (cable gland M25x1,5)
- E RJ12 connection
- F Diagnostic LEDs
- G DIP – Switch AIN.



VA-EP30 / VA-EP30 (option O1)



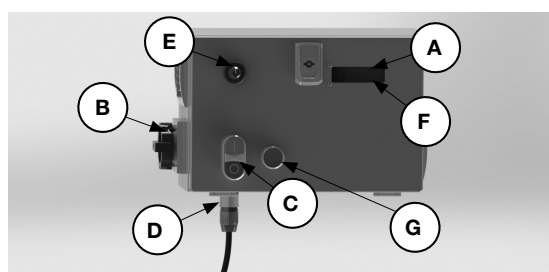
VA-EP30 / VA-EP30 (option O1)

- A Door lock
- B ON/OFF switch
- C START/STOP switch
- D Power plug connection
- E External potentiometer (option P1)
- F Capacity controller parameters preview window

VA-EP100 (option O1)

- A Door lock
- B ON/OFF switch
- C START/STOP switch
- D Power plug connection
- E External potentiometer (option P1)
- F Capacity controller parameters preview window
- G RESET button.

VA-EP100 (option O1)



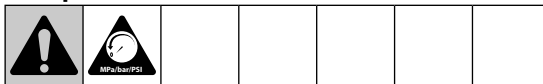
Pressure Relief Procedure

Follow the pressure relief procedure whenever you see this symbol.

This equipment stays pressurized until pressure is relieved manually. To help prevent serious injury from pressurized fluid, such as splashing in the eyes or on skin, follow the Pressure Relief Procedure when you stop pumping and before you clean, check, or service the equipment.

1. Remove power from the system.
2. Open the dispensing valve, if used.
3. Open the fluid drain valve to relive fluid pressure. Have a container ready to catch the drainage.

Pump shutdown



At the end of the work shift and before you check, adjust, clean or repair the system, follow Pressure relief procedure page 11.

Special precautions

1. When medium is left in the pump chambers, this can generate chemical reactions when pumping another fluid. Always flush pumps with a neutral fluid before changing from medium.
2. Take care liquids left in the pump chamber can't freeze, this can damage the pump.
3. In case of big changes in temperature while operating, it is necessary to control the tension on the bolts carefully. Sudden big temperature shocks can cause over on under tightening of the pump and will lead to leaks and/or damage the pump.

Flushing

The pump can be shut down with the medium inside. However, do not leave the pump in this condition for many hours without supervision - there is a risk of a leak from the pump or piping, and fluid may continue flowing out of the position of leakage.

When the pump is shut down while pumping slurry, particulate matter contained in the slurry will be deposited and get stuck inside the out chamber. Therefore, after finishing work the pump must be purged of the remaining fluid. Flush the pump long enough to be sure it is completely free from any previously pumped liquid. Otherwise, when starting the pump again, the diaphragm may get damaged and the center rod may bend. Also the solid particles found in the while pumping slurry can get under the flap valves that will remain open. This may result in a lack of suction or a decrease in pump performance.

Flush the pump often enough to prevent fluid you are pumping from drying or freezing in the pump and damage it. Always flush the pump follow the Pressure relief procedure on page 11 before storing it for any length of time. Use a compatible flushing agent.

Tightening treaded connections

Before each use, check all hoses for wear or damage and replace when necessary. Check all threaded connections are tight and leak-free. Tighten and retorque the pump if necessary. Use torque values on page 27.

MAINTENANCE / REPAIR

NOTE: During maintenance / repair work, the power supply should be completely disconnected and secured against inadvertent connection. To avoid injury from fire, explosion, or electric shock, all electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

Cleaning the pump

1. Remove the hose from the suction side of the pump.
2. Remove the hose from the discharge side, and attach different hoses to the suction side and the discharge side for cleaning.
3. Be ready with a vessel with cleaning solution, the kind appropriate for the type of fluid pumped. Next connect the suction-side and the discharge-side hoses of the pump.
4. Start the pump and let the cleaning solution circulate for sufficient cleaning.
5. Flush with clean water.
6. Remove the hose from the suction side of the pump, run the pump for a while to purge the pump of remaining fluid as much as possible.

Daily check

Before starting pump operation, conduct the following check procedures every day. In case there appears any irregularity, do NOT start running the pump until the cause of the irregularity has been determined and corrective measures have been taken.

- a) Make sure that there is no leakage of fluid from any connection part or the pump.
- b) Make sure that there are no cracks in the pump body or piping.
- c) Check the tightness of every bolt of the pump. (page 24)
- d) Make sure that the connection parts of the piping and peripheral equipment are not loose.
- e) Make sure that any parts of the pump that are to be replaced at regular intervals have been changed.

Safety check

1. Make sure that voltage is not supplied to the electronic driver BEFORE you start cleaning the pump.
2. Make sure that the pump is not pressurized BEFORE you start cleaning the pump.
3. Be extremely careful when removing piping - the fluid will gush out.

Important:

To protect the pump from leakage and to protect the drive section from ingress of the pumped substance, the use of a leakage detector is recommended (option LS, L3, L1).

Preventive maintenance schedule

Establish a preventive maintenance schedule, based on the pump's service history. This is especially important for prevention of spoils or leakage due to diaphragm failure.

Remember to observe the procedures and service intervals for the drives, refer to the drive manual. Check the pump drive section components and carry out the ellipse lubrication procedure (19) each time the diaphragms in the pump are serviced.

Procedure for lubricating the ellipse without replacing it:

Pull out the drive housing cap (39). Clean the ellipse (19) of old grease, clean the ellipse chamber and the guide shaft (20) and drive shaft (14) of dust generated by the sliding sleeves. Visually inspect the bearing and any damage to the drive section parts. Check the inner surface of the ellipse (19) for gouges and deformations. Check the anti-friction bearing (17) for excessive play and correct positioning - the outer bearing ring is perpendicular to the inner surface of the ellipse.

If there are any irregularities, use PARTS & KITS spare parts page. 19.

Lubricate the inner surface of the ellipse (19) with Gulf CROWN USG 2.5, apply a thin layer of grease around the entire inner circumference of the ellipse (19).

During the ellipse lubrication procedure (page: 13), carry out regular efficiency assessments of the drive components: ellipse (19), eccentric shaft, cylindrical bearing (17), ball bearing (16). Check the correct seating of the sliding sleeves (12) and the drive shaft (14) and guide shafts (20), the parts must not have excessive play.

Disassembly

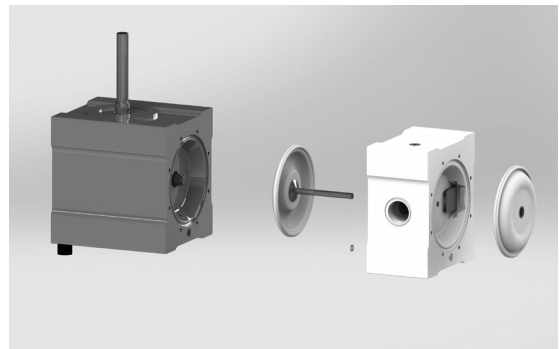
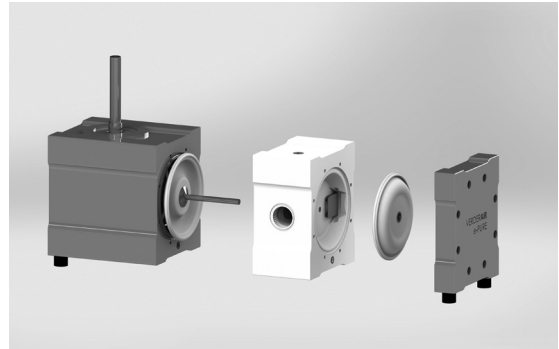
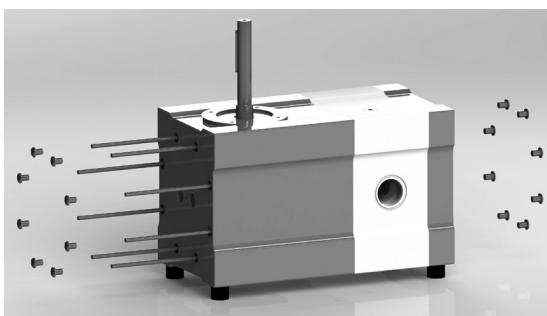
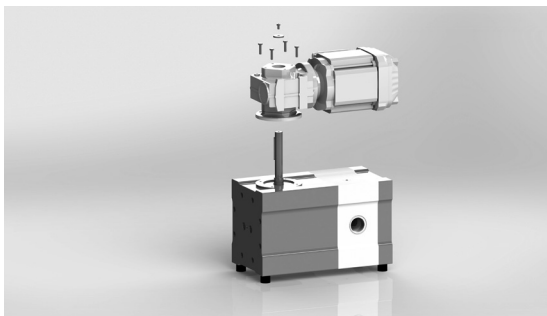
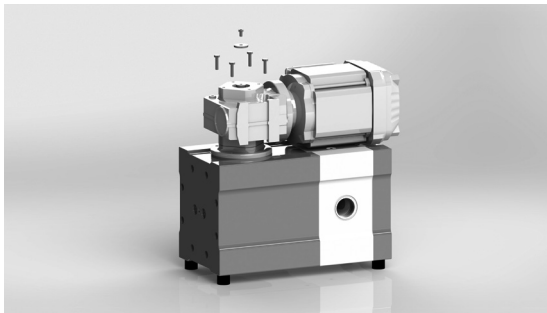
Important:

- **Follow the pressure relief procedure at page 11 before starting to work at the pump!**
- **Clean the pump before disassembly.**
- **Make sure that voltage is not supplied to the electronic driver!**

The fluid side of the complete range of VA-EP pumps are built together the same way. The center section has the same built up for VA-EP30 to VA-EP100. Every VA-EP pump is delivered with a drive.

Disassembly of the drive and side housing

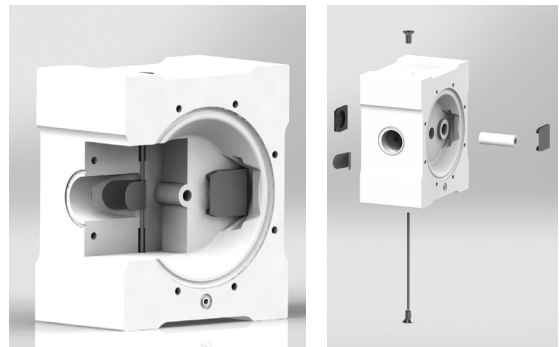
To have access the internal parts of the pump, it must be dismantled first. Unscrew the bolts (44) on the shaft cover (43), then unscrew screw of eccentric shaft (31) and remove the spacer (30). Unscrew the bolts (35) on the drive flange, remove the washers (36) and take off the drive (33). Unscrew the bolts on the assembly pins (29) on one side using the allen key. Remove the side housing (03), than the assembly pins (27) from the other side housing.



Remove the o-rings (28) from the center housing (if disassembled, they need to be replaced!).

Disassembly of the flapper valves

To have access to the discharge flapper valve you need to disassembly of the drive first. To get the flapper valve (05), unscrew the bolts (07) and push the valve pin (06). Carefully remove the discharge flapper valve.



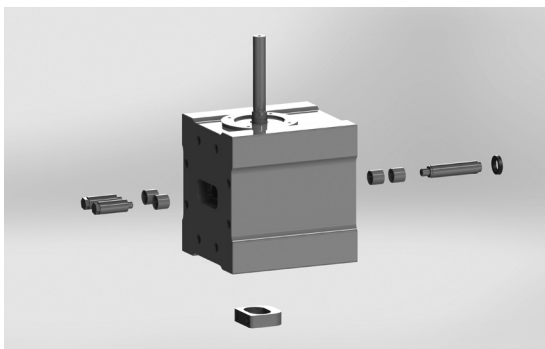
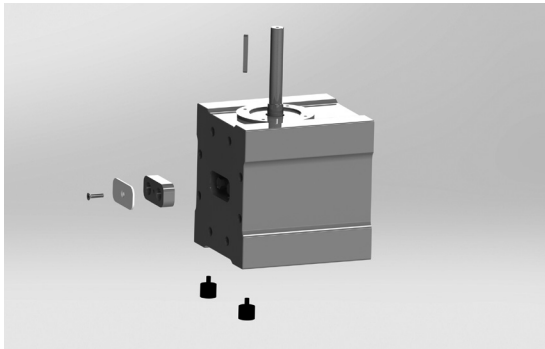
Disassembly of the center housing and diaphragms

Diaphragms (25) are bolted to the diaphragm shaft (26). Unscrew one diaphragm (left turning) of the diaphragm shaft. Remove the center housing (01) and unscrew the second diaphragm from drive shaft (14) then unscrew the diaphragm shaft (26) from the diaphragm.

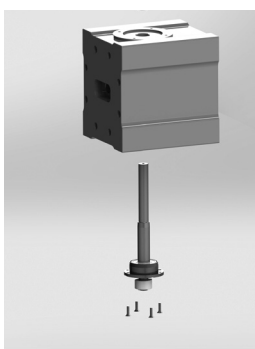
To have access to the suction flapper valves you need to disassembly of the side housings first and then the diaphragms. To get the flapper valves (04) hold the flap of the valve and lift it up. Then use a flat screwdriver to pry the valve "whiskers" around the sides of the hole. Remove the valve. Do the same on the other side. Unscrew the diaphragm shaft bearing (08) when needed.

Disassembly of the drive side

Eccentric shaft moves in the ellipse (19) which is bolted to the guide shafts (20) and drive shaft (14). Unscrew the bolt (23) and take off the guide shaft cover (42) and guide shaft cap (22). If you meet a problem with removing the cap, use the M8 screw to screw it to max 2 cm into the cap and then remove the whole unit. Remove the parallel key (32).



Unscrew both guide shafts (20) and drive shaft (14) from the ellipse (19). To have access to shafts you can help yourself by turning the eccentric shaft (15). Remove carefully the drive shaft seal (13) and sliding sleeves drive shaft (12). Unscrew the screws (10) from the bearing holder (09) and push out the eccentric shaft (15) with bearings (16, 17) and holder (09). You can help yourself by screwing two M6 pins or long bolts into the bearing holder (09) and using them to pull out the bearing holder (09) with eccentric shaft (15).



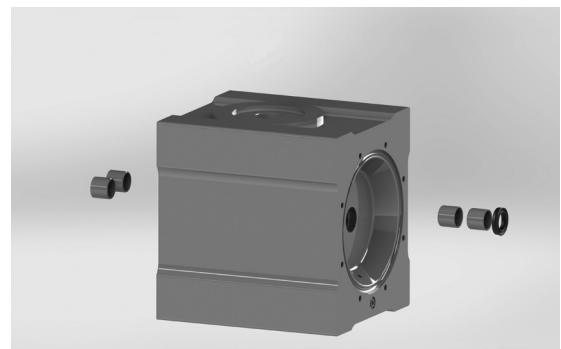
If the eccentric shaft with bearings and holder have been dismantled, they must be replaced! Never use the same set!

Assembly

Before starting to assemble please check all parts on possible damages. Especially the sealing area of the diaphragms have to be free from scratches.

Assembly of the drive housing

Push the sliding sleeves drive shaft (12) the beveled edge into the drive housing.



Put the drive shaft seal (13) in the groove of the drive housing by forming them as "0". Push them into the groove by a flat surface.

Place the eccentric shaft with bearings and holder into the drive housing on right position (look at the screw holes in holder and housing) and push the bearing holder to the housing. Screw the bearing holder screws (10 to the torque values as mentioned on page 27). Put the drive shaft (14) and both guide shafts (20) into drive housing until you can see the thread. Then place the ellipse (19) on the cylindrical bearing (17). Hold the ellipse to tighten the drive shaft first and then the guide shafts up to the torque values as mentioned on page 27. Install the cap (22) and tighten it with the screw (23). Place the parallel key (32) in the groove of the eccentric shaft.



Assembly of the flapper valves

Insert the discharge flapper valve (05) into the center housing (01) and push discharge valve pin (06). Screw the discharge valve pin bolts (07). Put the suction flapper valve (04) into the center housing groove (see figure below). Hold the flap and by using screwdriver push the flap valve “whiskers” into groove. Take care not to damage the edges of the groove. Do the same on the other side.

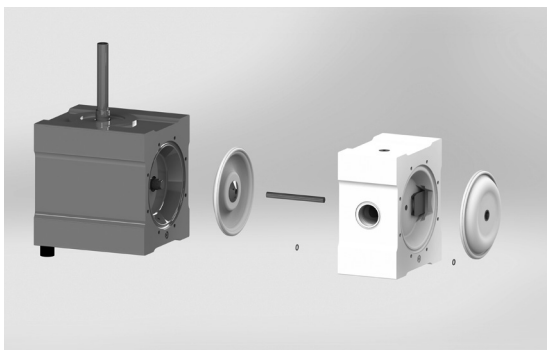


ATTENTION

After assembly the discharge flapper valve (05) and both suction flapper valve (04) check that valves fit closely to the surface of the center housing.

Assembly of the diaphragms and the diaphragm shafts

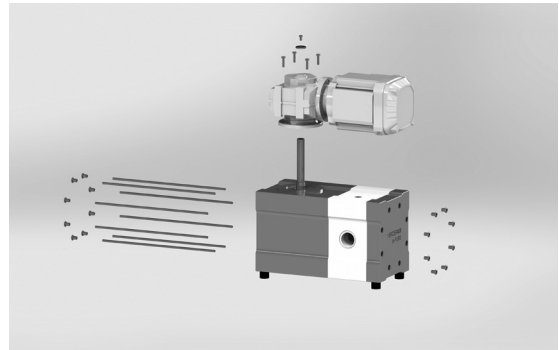
Screw the diaphragm shaft bearing (08) into the center housing (01). Screw one diaphragm (25) completely into the diaphragm shaft (26) and then into the drive shaft (14). Apply the o-ring (28) on the drive housing and push the center housing in the diaphragm shaft and screw the second diaphragm completely into the shaft.



Adjust when necessary the position of the diaphragm by turning the eccentric shaft.

Assembly of the pump

Apply the second o-ring (28) on the side housing end plate (03). Slide the set of assembly pins (27) into the side housings. Put the nuts on (29). Fasten the nuts crosswise up to the torque values as mentioned on page 27.



The shock absorbers (36) are bolted from the bottom.

Carefully find the right place and put the drive with gearbox (33) on the eccentric shaft. Tighten the screws drive (35) with washers (36) to the torque values as mentioned on page 27. Place the eccentric shaft spacer (30) on top of the eccentric shaft and tighten with the screw (31). Finally, place the shaft cover and screw with two bolts.

TROUBLESHOOTING

Problem	Cause	Solution
Drive will not operate	<ul style="list-style-type: none"> - No power on the line - The frequency controller is turned off or not set - The wires are unconnected 	<ul style="list-style-type: none"> - Check the connection of the electric plug and the general power supply - Switch on or/and set the frequency controller - Check all electric wires are correct connected
Pumps cycles at stall or falls to hold pressure at stall	<ul style="list-style-type: none"> - Worn check valves - Solid parts entered the pump 	<ul style="list-style-type: none"> - Replace worn parts - Clean or replace valves
Pump will not cycle or cycle once and stops	<ul style="list-style-type: none"> - Check if valve is not sticked - Discharge line is closed - Suction line closed - Diaphragm rapture - Suction line is too long before liquid can enter the pump - Liquid viscosity is too high 	<ul style="list-style-type: none"> - Replace valve balls - Open valve in the discharge line and/or check on blockage - Open valve in the suction line and/or check on blockage - Replace the diaphragms and clean the pump - Reduce the suction line - Higher the pump speed
Pumps operates erratically	<ul style="list-style-type: none"> - Clogged suction line - Check valves sticky or blocked - Diaphragm rapture 	<ul style="list-style-type: none"> - Check suction line - Clean or replace valves - Replace the diaphragms and clean the pump
Air bubbles in fluid	<ul style="list-style-type: none"> - Suction line is loose - Diaphragm rapture - Suction container empty - Cavitation - The nuts are loose 	<ul style="list-style-type: none"> - Tighten - Replace the diaphragms and clean the pump - Fill or replace suction container - Check suction condition and adapt when necessary or lower the pump speed (to match the viscosity of the liquid) - Tighten all nuts
Fluid in drive side	<ul style="list-style-type: none"> - Diaphragm rapture 	<ul style="list-style-type: none"> - Replace the diaphragms and clean the pump
Discharge is decreasing	<ul style="list-style-type: none"> - Suction strainer is blocking - Discharge strainer is blocking - Medium becomes more viscous 	<ul style="list-style-type: none"> - Clean suction strainer - Clean discharge strainer - Check why
Pump is running but not enough suction capability	<ul style="list-style-type: none"> - Pump is running to fast - Cavitation - Suction strainer is blocking - Suction line closed - Worn check valves - Leak in suction line and/or suction connections - The suction tube is bigger than port size 	<ul style="list-style-type: none"> - Starting-up pump slow running. Once pump is filled with liquid you can run the pump faster - Check suction condition and adapt when necessary - Clean suction strainer - Open valve in the suction line and/or check on blockage - Replace worn parts - Repair and make leak tight - Change the tube size

PARTS & KITS

Parts

SEE SEPERATE PARTS LIST

Kits

In case of break down, we recommended to have a spare part kit for your pump on stock.

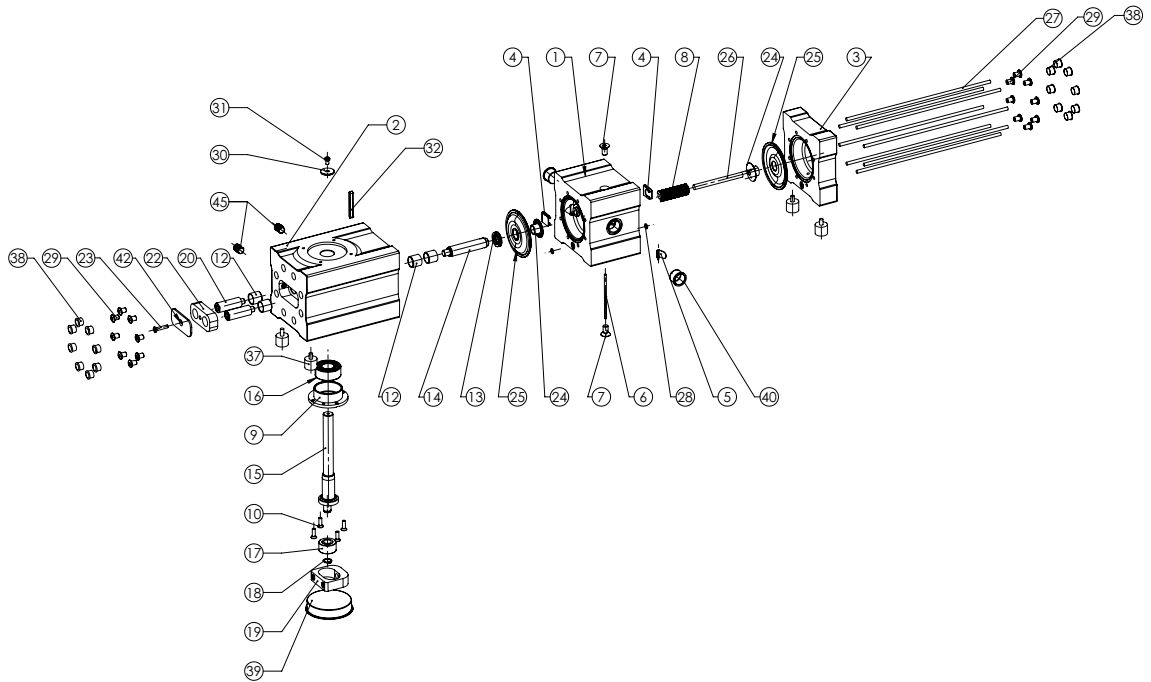
SET OF ECCENTRIC SHAFT WITH BEARINGS AND HANDLE VA-EP:	Quantity
Bearing holder (9)	1
Bearing holder screws (10)	2
Eccentric shaft (15)	1
Ball bearing (16)	1
Cylindrical bearing (17)	1
Circlip (18)	1
Other components:	
Parallel key (32)	1
Bearing holder screws (10)	4
Elipse (19)	1
Drive shaft seal (13)	1

WET PART SET, CONTENT	Quantity
Flapper valve suction (4)	2
Flapper valve discharge (5)	1
Diaphragm (25) with diaphragm plate (24)	2
Diaphragm shaft, VA-EP (26)	1
Diaphragm shaft bearing (8)	1
Discharge valve pin (6)	1

Please check the separate spare parts list for the order nr. for the kit you need for your pump.

EXPLODED VIEWS

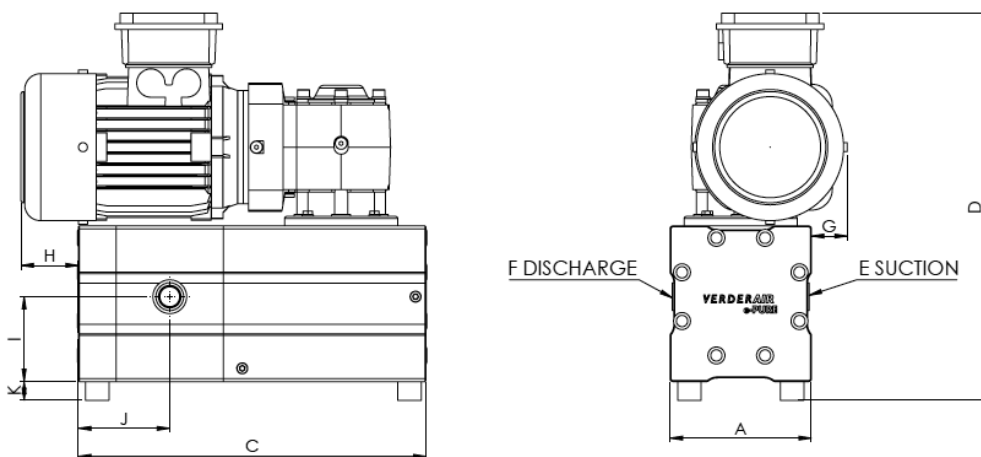
VA-EP30/50/100



POS.	PART NAME	QUANTITY
1	CENTER HOUSING, VA-EP	1
2	DRIVE HOUSING, VA-EP	1
3	HOUSING END PLATE, VA-EP	1
4	FLAPPER VALVE SUCTION, VA-EP	2
5	FLAPPER VALVE DISCHARGE, VA-EP	1
6	DISCHARGE VALVE PIN	1
7	DISCHARGE VALVE PIN BOLT	2
8	DIAPHRAGM SHAFT BEARING	1
9	BEARING HOLDER	1
10	BEARING HOLDER SCREWS	4
12	SLIDING SLEEVE DRIVE SHAFT	4
13	DRIVE SHAFT SEAL	1
14	DRIVE SHAFT	1
15	ECCENTRIC SHAFT, VA-EP	1
16	BALL BEARING	1
17	CYLINDRICAL BEARING	1
18	CIRCLIP	1
19	ELLIPSE	1
20	GUIDE SHAFT	2
22	GUIDE SHAFT CAP	1
23	GUIDE SHAFT CAP SCREW	1
24	DIAPHRAGM PLATE, VA-EP	18

POS.	PART NAME	QUANTITY
25	DIAPHRAGM PTFE/SS, VA-EP	2
26	DIAPHRAGM SHAFT	1
27	ASSEMBLY PIN	8
28	O-RING CENTER HOUSING	2
29	ASSEMBLY PIN NUTS	16
30	SPACER ECCENTRIC SHAFT	1
31	SCREW ECCENTRIC SHAFT	1
32	PARALLEL KEY	2
37	SHOCK ABSORBER	4
38	ASSEMBLY PIN CAP	16
39	DRIVE HOUSING CAP, VA-EP	1
40	CENTER SECTION CAP, VA-EP	2
42	GUIDE SHAFT COVER	1
45	POM CAP VA-EP	2

DIMENSIONS (DRIVES OPTION O3)



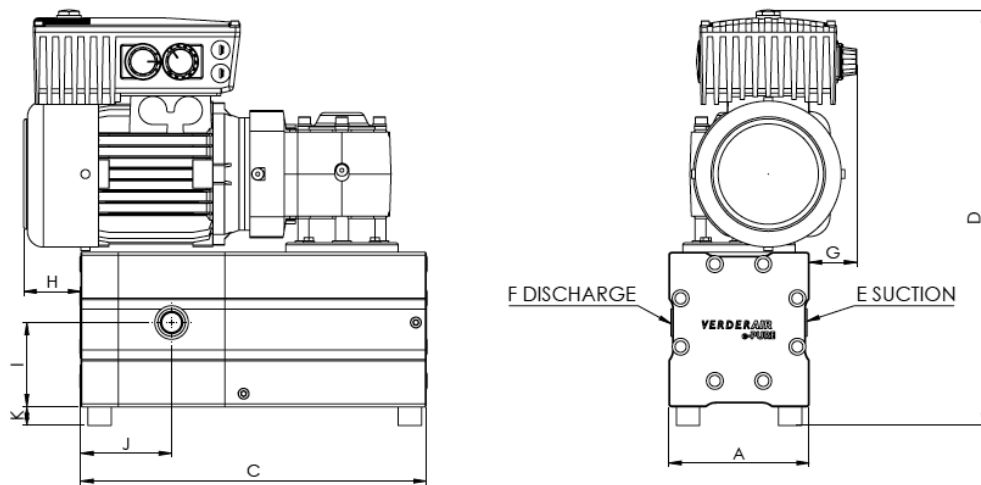
TYPE	A	B	C	D	E	F	G	H	I	J	K
30	150	170	369	395,5	¾"	¾"	38,12	60,98	75	97	20
50	150	185	369	410,5	¾"	¾"	38,12	60,98	90	97	20
100	190	240	369	465	1 ¼"	1 ¼"	18,13	74,98	110	97	20

in mm

TYPE	A	B	C	D	E	F	G	H	I	J	K
30	5,90	6,69	14,53	15,57	¾"	¾"	1,50	2,4	2,95	3,82	0,79
50	5,90	7,28	14,53	16,16	¾"	¾"	1,50	2,4	3,54	3,82	0,79
100	7,48	9,45	14,53	18,31	1 ¼"	1 ¼"	0,72	2,95	4,33	3,82	0,79

in inches

PUMP WITH DRIVE AND FREQUENCY REGULATOR (DRIVES OPTION F3)



PUMP + BOX ASSEMBLY DIMENSIONS

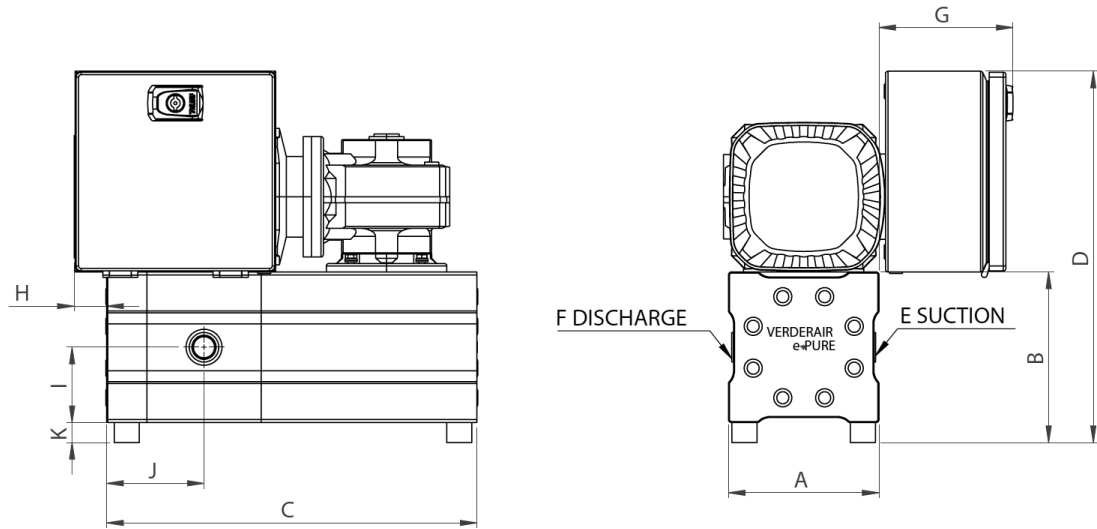
TYPE	A	B	C	D	E	F	G	H	I	J	K
30	150	170	369	428,7	¾"	¾"	50,65	60,98	75	97	20
50	150	185	369	442,5	¾"	¾"	50,65	60,98	90	97	20
100	190	240	369	517,5	1 ¼"	1 ¼"	32,35	80,50	110	97	20

in mm

TYPE	A	B	C	D	E	F	G	H	I	J	K
30	5,90	6,69	14,53	16,88	¾"	¾"	1,99	2,4	2,95	3,82	0,79
50	5,90	7,28	14,53	17,42	¾"	¾"	1,99	2,4	3,54	3,82	0,79
100	7,48	9,45	14,53	20,37	1 ¼"	1 ¼"	1,27	3,17	4,33	3,82	0,79

in inches

PUMP WITH DRIVE AND FREQUENCY REGULATOR (OPTION O1, P1, L1)



PUMP + BOX ASSEMBLY DIMENSIONS

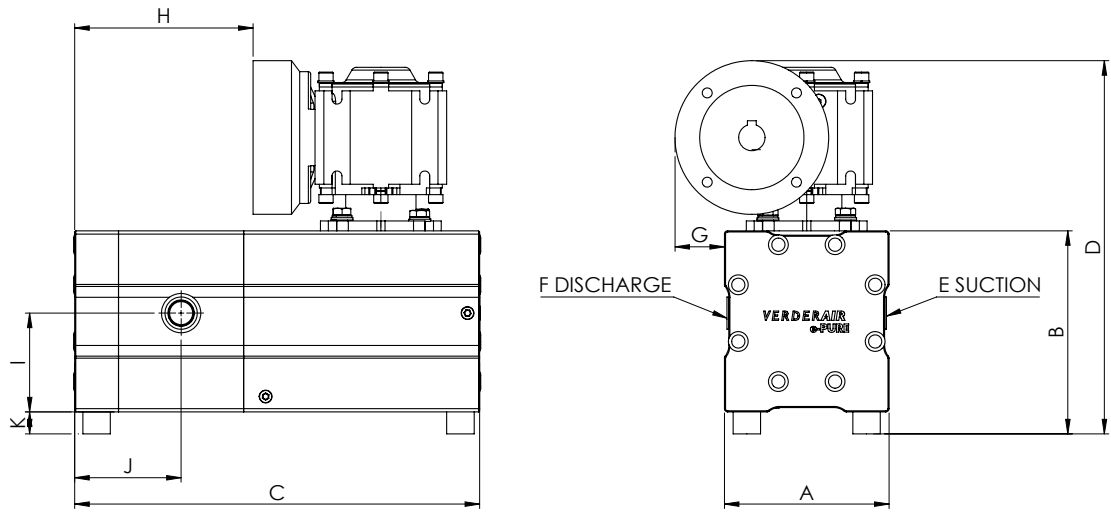
TYPE	A	B	C	D	E	F	G	H	I	J	K
30	150	170	369	370	¾"	¾"	133,70	32,50	75	97	20
50	150	185	369	385	¾"	¾"	133,70	32,50	90	97	20
100	190	240	369	440	1 ¼"	1 ¼"	147,70	32,50	110	97	20

in mm

TYPE	A	B	C	D	E	F	G	H	I	J	K
30	5,90	6,69	14,53	14,57	¾"	¾"	5,26	1,28	2,95	3,82	0,79
50	5,90	7,28	14,53	15,16	¾"	¾"	5,26	1,28	3,54	3,82	0,79
100	7,48	9,45	14,53	17,32	1 ¼"	1 ¼"	5,81	1,28	4,33	3,82	0,79

in inches

PUMP WITH REDUCER WITH FLANGE (DRIVES OPTION IG)



PUMP + BOX ASSEMBLY DIMENSIONS

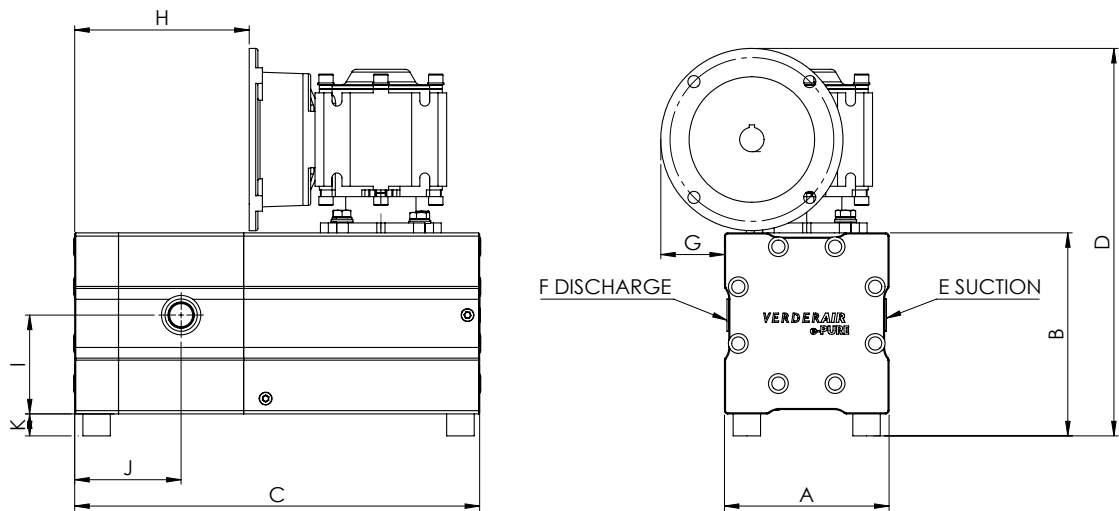
TYPE	A	B	C	D	E	F	G	H	I	J	K
30	150	170	369	325	¾"	¾"	45	162,5	75	97	20
50	150	185	369	340	¾"	¾"	45	162,5	90	97	20
100	190	240	369	395	1 ¼"	1 ¼"	25	162,5	110	97	20

in mm

TYPE	A	B	C	D	E	F	G	H	I	J	K
30	5,90	6,69	14,53	12,80	¾"	¾"	1,77	6,4	2,95	3,82	0,79
50	5,90	7,28	14,53	13,39	¾"	¾"	1,77	6,4	3,54	3,82	0,79
100	7,48	9,45	14,53	15,55	1 ¼"	1 ¼"	0,98	6,4	4,33	3,82	0,79

in inches

PUMP WITH REDUCER WITH FLANGE (DRIVES OPTION NG)



PUMP + BOX ASSEMBLY DIMENSIONS

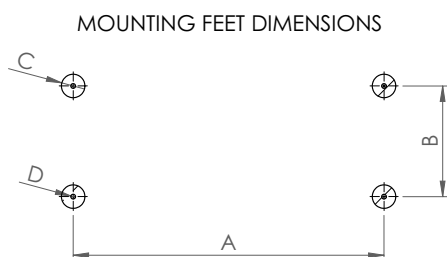
TYPE	A	B	C	D	E	F	G	H	I	J	K
30	150	170	369	338	¾"	¾"	58	159	75	97	20
50	150	185	369	353	¾"	¾"	58	159	90	97	20
100	190	240	369	408	1 ¼"	1 ¼"	38	159	110	97	20

in mm

TYPE	A	B	C	D	E	F	G	H	I	J	K
30	5,90	6,69	14,53	13,30	¾"	¾"	2,28	6,26	2,95	3,82	0,79
50	5,90	7,28	14,53	13,90	¾"	¾"	2,28	6,26	3,54	3,82	0,79
100	7,48	9,45	14,53	16,06	1 ¼"	1 ¼"	2,28	6,26	4,33	3,82	0,79

in inches

MOUNTING FEET DIMENSIONS



TYPE	A	B	C	D
30	331,50	118	25	M6
50	331,50	109	25	M6
100	331,50	150	25	M6

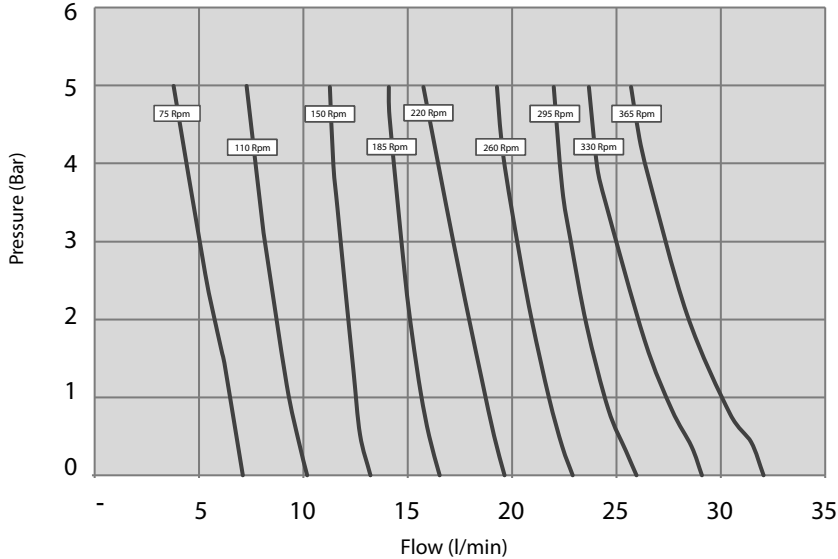
in mm

TYPE	A	B	C	D
30	13,05	4,65	0,98	M6
50	13,05	4,29	0,98	M6
100	13,05	5,91	0,98	M6

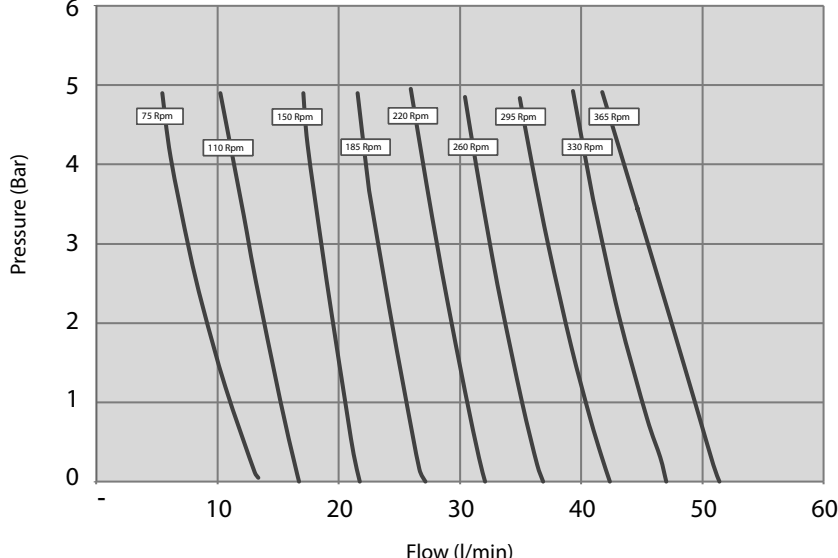
in inches

PERFORMANCE CHARTS

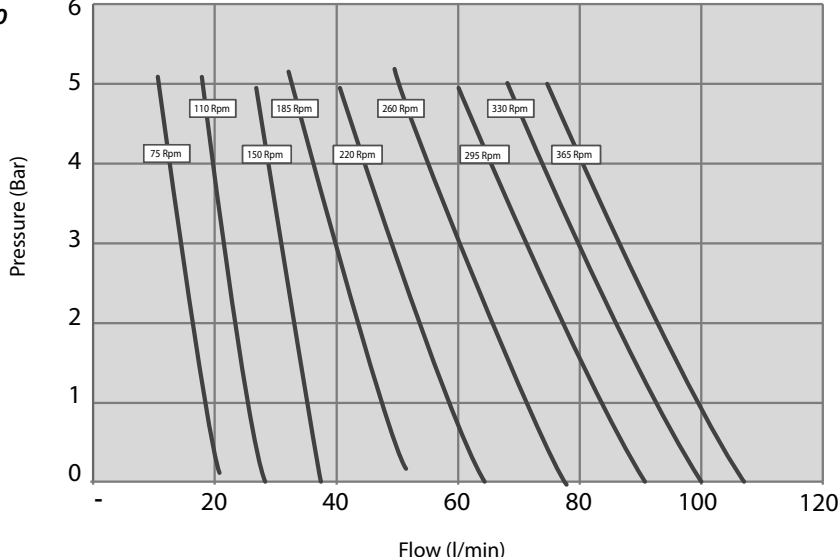
VA-EP30



VA-EP50



VA-EP100



TECHNICAL DATA

ISO measurements					
DEVICE MODEL		VA-EP30	VA-EP50	VA-EP100	
	Drive options	Center			
Max. flow rate (l/min)			30.	50.	100.
Nominal port size (in)			3/4"	3/4"	1 1/4"
Weight (kg)	O1/P1/L1	PE1000	32	33	43
		PTFE	34	36	46
	O3	PE1000	26	28	39
		PTFE	28	31	42
	F3/L3	PE1000	29	31	43
		PTFE	31	34	46
	IG/NG	PE1000	18	19	27
		PTFE	20	22	30
Suctionlift (mwc)	dry		1,6	2,2	5
	wet		8,5	9	9
Max. operating pressure (bar)			5	5	5
Max. operating fluid temperature (°C)	PE1000		70	70	70
	PTFE		95	95	95
Min. operating fluid temperature (°C)	PE1000		-15	-15	-15
	PTFE		-15	-15	-15
Ambient air temperature range for operation and storage (°C)			-15 - 40	-15 - 40	-15 - 40
Electric motor	O1		133/230V AC 3-Phase 50 Hz		
	O3		230/400V AC 50Hz, 265/460V AC 60Hz		
	F3		230/400V AC 50Hz, 265/460V AC 60Hz		
Control box (with VFD)	O1		1-Phase 200-240V (+10%,-15%) AC 50/60 Hz 11A		
	F3		3ph 380-20%...480+10% VAC 47-63Hz		
Installed motor power (kW)	O1		0.55	0.55	0.55
	O3		0.55	0.55	0.75
	F3		0.55	0.55	0.75
Installed inverter (VFD) power (kW)	O1		0.75	0.75	1.5
	F3		1.1	1.1	1.50
Maximum pump speed (RPM)	+/- 2%		365	365	365
Rated pump speed for 50Hz (RPM)	+/- 2%		185	185	185
Drive power (kW) VFD 87Hz technology	O1		0.75	0.75	0.95
	F3		0.95	0,95	1,3
Max. particle size of solids (mm)			2	2	4
IP ratings	O1		IP22		
	O3		IP55		
	F3		IP55		
Max. recommended viscosity (mPas)			2000	2000	2000
Theoretical displacement volume (single stroke) (in liters)			0,1	0,18	0,31
Max noise level (dBa)			73,9	74,1	76,4

US measurements					
DEVICE MODEL			VA-EP30	VA-EP50	VA-EP100
	Drive options	Center			
Max. flow rate (GPM)			7.9	13.2	26.4
Nominal port size (in)			3/4"	3/4"	1 1/4"
Weight (lb)	O1/P1/L1	PE1000	71	73	95
		PTFE	75	78	101.4
	O3	PE1000	58	62	86
		PTFE	62	69	93
	F3/L3	PE1000	64	69	95
		PTFE	69	75	102
IG/NG	PE1000	40	42	60	
	PTFE	45	49	67	
Suctionlift (feet wc)		dry	5.3	7.2	16
		wet	27.9	72	72
Max. operating pressure (PSI _r)			72	72	72
Max. operating fluid temperature (°F)	PE1000		158	158	158
	PTFE		203	203	203
Min. operating fluid temperature (°F)	PE1000		5	5	5
	PTFE		5	5	5
Ambient air temperature range for operation and storage (°F)			5 - 104	5 - 104	5 - 104
Electric motor	O1		133/230V AC 3-Phase 50 Hz		
	O3		230/400V AC 50Hz, 265/460V AC 60Hz		
	F3		230/400V AC 50Hz, 265/460V AC 60Hz		
Control box (with VFD)			1-Phase 200-240V (+10%,-15%) AC 50/60 Hz 11A		
	F3		3ph 380-20%...480+10% VAC 47-63Hz		
Installed motor power (HP)	O1		0.73	0.73	0.73
	O3		0.73	0.73	1
	F3		0.73	0.73	1
Installed inverter (VFD) power (HPW)	O1		1	1	2
	F3		1,47	1,47	2
Maximum pump speed (RPM)	+/- 2%		365	365	365
Rated pump speed for 50Hz (RPM)	+/- 2%		185	185	185
Drive power (HP) VFD 87Hz technology	O1		1	1	1.47
	F3		1.27	1.27	1.74
Max. particle size of solids (in)			0.08	0.08	0.16
IP ratings	O1			IP22	
	O3			IP55	
	F3			IP55	
Max. recommended viscosity (mPas)			2000	2000	2000
Theoretical displacement volume (single stroke) (in US gallons)			0,026	0,048	0,082
Max noise level (dBa)			73,9	74,1	76,4

TORQUE VALUES

Torque values in Nm			
Device model	VA-EP30	VA-EP50	VA-EP100
Housing bolts assembly (29)	8,0	8,0	8,0
Drive bolts assembly (drive coding O3)	7,0	7,0	9,0
Drive bolts assembly (drive option IG, NG)	9,0	9,0	9,0
Drive bolts assembly (drive coding O1)	7,0	7,0	7,0
Guide shafts assembly (20)	30,0	30,0	30,0
Drive shaft assembly (14)	30,0	30,0	30,0
Bearing holder screws assembly (10)	7,0	7,0	7,0
Screw eccentric shaft assembly (31)	7,0	7,0	7,0

Torque values in lb			
Device model	VA-EP30	VA-EP50	VA-EP100
Housing bolts assembly (29)	70,8	70,8	70,8
Drive bolts assembly (drive coding O3)	61,9	61,9	79,6
Drive bolts assembly (drive option IG, NG)	79,6	79,6	79,6
Drive bolts assembly (drive coding O1)	61,9	61,9	61,9
Guide shafts assembly (20)	265,5	265,5	265,5
Drive shaft assembly (14)	265,5	265,5	265,5
Bearing holder screws assembly (10)	61,9	61,9	61,9
Screw eccentric shaft assembly (31)	35,4	35,4	35,4

DRIVE OPTIONS

Coding	Description
O3	Standard standard AC drive 230/400V adapted to work in the 87Hz technique. Does not include frequency inverter
F3	AC drive 230/400V with frequency inverter 3-ph in control box. Pump is ready for operation.
L1..	While the sensor installed in the pump detects a leak, the pump is automatically stopped.
O1..	AC Drive 133/230 with frequency inverter (1-ph) in control box. Pump is ready for operation.
L3..	While the sensor installed in the pump detects a leak, the pump is automatically stopped.
IG..	The pump is equipped with a gearbox and IEC 90 connect flange. They allow the connection of a motor with a B14 flange according to the IEC technical standards. Gear ratio i=7.5, flange IEC 90 – B14 C140.
NG..	The pump is equipped with a gearbox and NEMA connect flange. They allow the connection of a motor with a N140TC flange according to the NEMA technical standards. Gear ratio i=7.5, flange NEMA N140TC

OPTIONAL EQUIPMENT

For instructions on the use and maintenance of the below options, we are referring to the specific instruction manuals of the optional equipment.

Coding	Description
...00	Standard pump, left suction port
...SS	A stroke sensor will generate a pulse by every complete stroke of the pump. This sensor have to be connected to a controller with Namur inlet to read the pulses.
...LP	Left suction port
...LS	Leak detection sensor will react at any liquid which comes into the channel vent (in case of diaphragm rapture!).
...DM	Manual draining: the side housings are having a by-pass system integrated which can be manually operated to drain the pump.

CUSTOMER SERVICES & GUARANTEE

Customer services

If you require spare parts, please contact your local distributor, providing the following details:

- Pump Model
- Type
- Serial Number
- Date of First Order

Customer services

All Verder pumps are warranted to the original user against defects in workmanship or materials under normal use (rental use excluded) for two years after purchase date. This warranty does not cover failure of parts or components due to normal wear, damage or failure which in the judgement of Verder arises from misuse.

Parts determined by Verder to be defective in material or workmanship will be repaired or replaced.

Limitation of liability

To the extent allowable under applicable law, Verder's liability for consequential damages is expressly disclaimed. Verder's liability in all events is limited and shall not exceed the purchase price.

Warranty disclaimer

Verder has made an effort to illustrate and describe the products accurately; however, such illustrations and descriptions are for the sole purpose of identification and do not express or imply a warranty that the products are merchantable, or fit for a particular purpose, or that the products will necessarily conform to the illustration or descriptions.

Product suitability

Many regions, states and localities have codes and regulations governing the sale, construction, illustration and/or use of products for certain purposes, which may vary from those in neighbouring areas. While Verder attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchasing and using a product, please review the product application as well as the national and local codes and regulations, and be sure that the product, installation, and use complies with them.

End of product life dispose of / reprocess in accordance with local regulations or return to a specialized disposal facility.”

In accordance to Machinery Directive 2006/42/WE

