

# Operation



## Verder VA-EH25 Electric-Operated

## Diaphragm Pump

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859.0530  
Rev.E  
EN

**For fluid transfer in sanitary applications. For professional use only.**

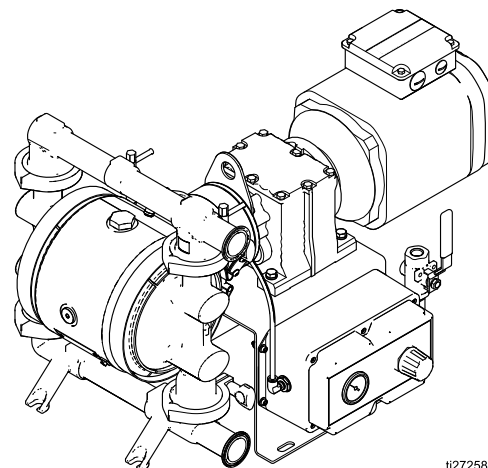


### **Important Safety Instructions**

Read all warnings and instructions in this manual. **Save these instructions.**

*For maximum operating pressures, see the Performance Charts on pages 19 and 20*

*See pages 3 and 4 for model information, including approvals.*



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# Contents

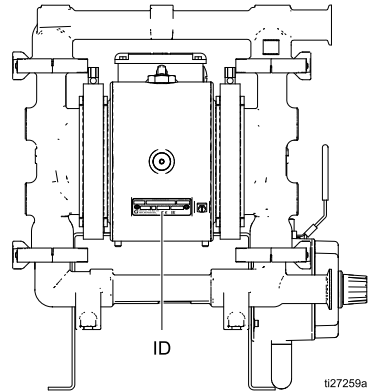
Related Manuals .....	2	Compressor Wiring .....	18
Configuration Number Matrix .....	3	Operation .....	19
Warnings .....	5	Initial Configuration (AC with VFD) .....	19
Overview .....	8	Sanitize the Pump Before First Use .....	19
Installation .....	10	Transfer Mode Vs. Low Pulsation Mode .....	19
General Information .....	10	Start and Adjust the Pump .....	19
Tips to Reduce Cavitation .....	10	Pressure Relief Procedure .....	20
Mount the Pump .....	11	Pump Shutdown .....	20
Grounding .....	12	Maintenance .....	21
Air Line .....	14	Maintenance Schedule .....	21
Fluid Supply Line .....	14	Lubrication .....	21
Fluid Outlet Line .....	14	Tighten Connections .....	21
Leak Sensor .....	15	Flushing and Storage .....	21
Leak Sensor Wiring (AC Models) .....	15	Performance Charts .....	22
Electrical Connections for AC Models .....	16	Dimensions (typical only) .....	26
Wire Connections at the Variable Frequency Drive (VFD) .....	16	Technical Data .....	28
Wire Connections at the Motor .....	16	Customer Services/Guarantee .....	30
Wire Connections at the ATEX Motor .....	17		
Wire Connections at the Explosionproof Motor .....	17		

## Related Manuals

Manual Number	Title
859.0531	Verder VA-EH25 Electric-Operated Diaphragm Pump, Repair/Parts

# Configuration Number Matrix

Check the identification plate (ID) for the Configuration Number of your pump. Use the following matrix to define the components of your pump.






Sample Configuration Number: **VA-EH25SA SE NW SP T4 AC**

<b>VA-EH25</b>	<b>S</b>	<b>A</b>	<b>SE</b>	<b>NW</b>	<b>SP</b>	<b>T4</b>	<b>AC</b>
Pump Model	Wetted Section Material	Center Section Material	Seats	Balls	Diaphragm	Connections	Drive

Pump	Wetted Section Material		Center Section Material		Seat Material		Ball Material	
<b>VA-EH25</b>	<b>S</b>	Sanitary Stainless Steel	<b>A</b>	Aluminum	<b>SE</b>	Sanitary Stainless Steel with EPDM O-rings	<b>NW</b>	Polychloroprene Weighted
			<b>S</b>	Sanitary Stainless Steel	<b>ST</b>	Sanitary Stainless Steel with PTFE O-rings	<b>SP</b>	Santoprene
							<b>TF</b>	PTFE

Diaphragm Material		Connections		Drive	
<b>TO</b>	PTFE/EPDM Overmolded	<b>D4</b>	40 mm DIN 11851	<b>AC</b>	230/460 VAC
<b>TF</b>	2-piece PTFE/EPDM	<b>T4</b>	1.5 in. Tri-Clamp	<b>NG</b> ‡	NEMA Gearbox
<b>SP</b>	Santoprene			<b>IG</b> ‡	IEC Gearbox











## Approvals








Approvals	
All Models are certified to:	
Models which do not contain Santoprene*:	
‡ Pumps with code <b>NG</b> or <b>IG</b> are certified to:	 II 2 G ck IIB T3 Gb











\* EC 1935/2004 compliant pumps may be subject to individual national provisions in addition to those specified in the EC regulation. It is the users responsibility to know and follow local laws.

# 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 symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

 <h1>WARNING</h1>	
 	<p><b>ELECTRIC SHOCK HAZARD</b></p> <p>This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.</p> <ul style="list-style-type: none"> <li>• Turn off and remove power before disconnecting any cables and before servicing or installing equipment. For cart-mounted models, unplug the power cord. For all other units, disconnect power at the main switch.</li> <li>• Connect only to grounded power source.</li> <li>• All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.</li> <li>• Wait five minutes for capacitor discharge before opening equipment.</li> <li>• For cart-mounted models, use only 3-wire extension cords.</li> <li>• For cart-mounted models, ensure ground prongs are intact on any power and extension cords.</li> <li>• For cart-mounted models, do not expose to rain. Store indoors.</li> </ul>
      	<p><b>FIRE AND EXPLOSION HAZARD</b></p> <p>Flammable fumes, such as solvent and paint fumes, in <b>work area</b> can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> <li>• Use equipment only in well ventilated area.</li> <li>• Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).</li> <li>• Ground all equipment in the work area. See <b>Grounding</b> instructions.</li> <li>• Keep work area free of debris, including solvent, rags and gasoline.</li> <li>• Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.</li> <li>• Use only grounded hoses.</li> <li>• <b>Stop operation immediately</b> if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.</li> <li>• Keep a working fire extinguisher in the work area.</li> </ul> <p>Static charge may build up on plastic parts during cleaning and could discharge and ignite flammable vapors. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> <li>• Clean plastic parts only in well ventilated area.</li> <li>• Do not clean with a dry cloth.</li> <li>• Do not operate electrostatic guns in equipment work area.</li> </ul>

 <h1>WARNING</h1>	
  	<p><b>PRESSURIZED EQUIPMENT HAZARD</b></p> <p>Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.</p> <ul style="list-style-type: none"> <li>• Follow the <b>Pressure Relief Procedure</b> when you stop spraying/dispensing and before cleaning, checking, or servicing equipment.</li> <li>• Tighten all fluid connections before operating the equipment.</li> <li>• Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.</li> </ul>
 	<p><b>EQUIPMENT MISUSE HAZARD</b></p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> <li>• Do not operate the unit when fatigued or under the influence of drugs or alcohol.</li> <li>• Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See <b>Technical Data</b> in all equipment manuals.</li> <li>• Use fluids and solvents that are compatible with equipment wetted parts. See <b>Technical Data</b> in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheet (SDS) from distributor or retailer.</li> <li>• Turn off all equipment and follow the <b>Pressure Relief Procedure</b> when equipment is not in use.</li> <li>• Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.</li> <li>• Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.</li> <li>• Make sure all equipment is rated and approved for the environment in which you are using it.</li> <li>• Use equipment only for its intended purpose. Call your distributor for information.</li> <li>• Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.</li> <li>• Do not kink or over bend hoses or use hoses to pull equipment.</li> <li>• Keep children and animals away from work area.</li> <li>• Comply with all applicable safety regulations.</li> </ul>
	<p><b>PRESSURIZED ALUMINUM PARTS HAZARD</b></p> <p>Use of fluids that are incompatible with aluminum in pressurized equipment can cause serious chemical reaction and equipment rupture. Failure to follow this warning can result in death, serious injury, or property damage.</p> <ul style="list-style-type: none"> <li>• Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents.</li> <li>• Do not use chlorine bleach.</li> <li>• Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.</li> </ul>

 <h1>WARNING</h1>	
  	<b>THERMAL EXPANSION HAZARD</b> <p>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.</p> <ul style="list-style-type: none"> <li>• Open a valve to relieve the fluid expansion during heating.</li> <li>• Replace hoses proactively at regular intervals based on your operating conditions.</li> </ul>
  	<b>TOXIC FLUID OR FUMES HAZARD</b> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.</p> <ul style="list-style-type: none"> <li>• Read SDS to know the specific hazards of the fluids you are using.</li> <li>• Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.</li> </ul>
	<b>BURN HAZARD</b> <p>Equipment surfaces and fluid that's heated can become very hot during operation. To avoid severe burns:</p> <ul style="list-style-type: none"> <li>• Do not touch hot fluid or equipment.</li> </ul>
 	<b>PERSONAL PROTECTIVE EQUIPMENT</b> <p>Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• Protective eyewear, and hearing protection.</li> <li>• Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.</li> </ul>

## Overview

The product line offers electric-powered diaphragm pumps in a wide range of models. This section shows the structure of available models.

Center Section	Motor Type	Controller	Gearbox	Compressor	Approval Options	Cart
Aluminum or Stainless Steel	AC	VFD — not included.	Yes – part of motor	No †	CE	No*
	None	None	NEMA	None	ATEX & CE	No*
			IEC			

†Compressor Kits 859.0465 (120V) and 859.0466 (240V) are available

\* Cart Kit 859.0467 is available.

### Key Points:

- Pumps are available with an AC gearmotor or with just a gearbox (for applications where a motor is already available).
- Verder recommends the use of a motor soft starter or a VFD in the electrical circuit for all installations.

See the motor manufacturer's recommendations for proper installation when using either of these components. In all cases, make sure all products are installed in accordance with local codes and regulations.



## Relationship Table

Use this table to locate your pump configuration number. Obtain the configuration number from the designation tag attached to the pump housing. Compare this configuration number against the information provided in the [Configuration Number Matrix, page 3](#) to obtain the types of material being used. Then locate the applicable fluid section repair kit number for the pump.

Fluid Section Repair Kit	Seat Type	Ball Type	Diaphragm Type	Pump Configuration Number
859.0474	SE	NW	SP	VA-EH25SA SE NW SP T4 AC VA-EH25SA SE NW SP D4 AC VA-EH25SA SE NW SP T4 NG VA-EH25SA SE NW SP D4 NG VA-EH25SA SE NW SP T4 IG VA-EH25SA SE NW SP D4 IG
859.0475	ST	TF	TO	VA-EH25SS ST TF TO T4 AC VA-EH25SS ST TF TO D4 AC VA-EH25SS ST TF TO T4 NG VA-EH25SS ST TF TO D4 NG VA-EH25SS ST TF TO T4 IG VA-EH25SS ST TF TO D4 IG
859.0476	ST	TF	TF	VA-EH25SA ST TF TF T4 AC VA-EH25SA ST TF TF D4 AC VA-EH25SS ST TF TF T4 AC VA-EH25SS ST TF TF D4 AC VA-EH25SA ST TF TF T4 NG VA-EH25SA ST TF TF D4 NG VA-EH25SS ST TF TF T4 NG VA-EH25SS ST TF TF D4 NG VA-EH25SA ST TF TF T4 IG VA-EH25SA ST TF TF D4 IG VA-EH25SS ST TF TF T4 IG VA-EH25SS ST TF TF D4 IG
859.0478	SE	SP	SP	VA-EH25SA SE SP SP T4 AC VA-EH25SA SE SP SP D4 AC VA-EH25SS SE SP SP T4 AC VA-EH25SS SE SP SP D4 AC VA-EH25SA SE SP SP T4 NG VA-EH25SA SE SP SP D4 NG VA-EH25SS SE SP SP T4 NG VA-EH25SS SE SP SP D4 NG VA-EH25SA SE SP SP T4 IG VA-EH25SA SE SP SP D4 IG VA-EH25SS SE SP SP T4 IG VA-EH25SS SE SP SP D4 IG

# Installation

## General Information

The Typical Installation shown is only a guide for selecting and installing system components. Contact your Verder distributor 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.

Reference letters in the text, for example (A), refer to the callouts in the figures located near the reference. If a callout is on a figure located elsewhere in the manual, the reference will indicate where to look within the manual.

Pumps with aluminum center sections may exhibit fading or signs of corrosion depending on cleaning solutions used.

## Tips to 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 (NPSH). See [Performance Charts, page 22](#).

**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.

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.

Verder recommends taking 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 distributors can supply site-specific suggestions to improve pump performance and reduce operating costs.

## Mount the Pump

				
<p>To avoid serious injury or death from toxic fluid or fumes:</p> <ul style="list-style-type: none"> <li>• Never move or lift a pump under pressure. If dropped, the fluid section may rupture. Always follow the <a href="#">Pressure Relief Procedure, page 20</a>, before moving or lifting the pump.</li> </ul>				

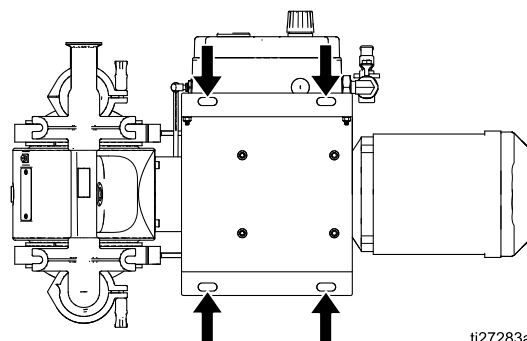
### NOTICE

The pump is heavy. To prevent damage from dropping, always use 2 people or a lift to move the pump. Do not use the manifolds to lift the pump. Use at least one strap or lift ring on the pump.

1. For all mountings, be sure the pump is secured with screws through the mounting bracket on the gear box. See [Dimensions \(typical only\), page 26](#).

### NOTICE

To prevent pump damage, use all four fasteners to attach the bracket to the mounting location. Do not use the feet on the inlet manifold for mounting.







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 easily accessible.
4. **Cart Mounting:** For all models, Cart Mounting Kit 859.0467 is available.

### NOTICE

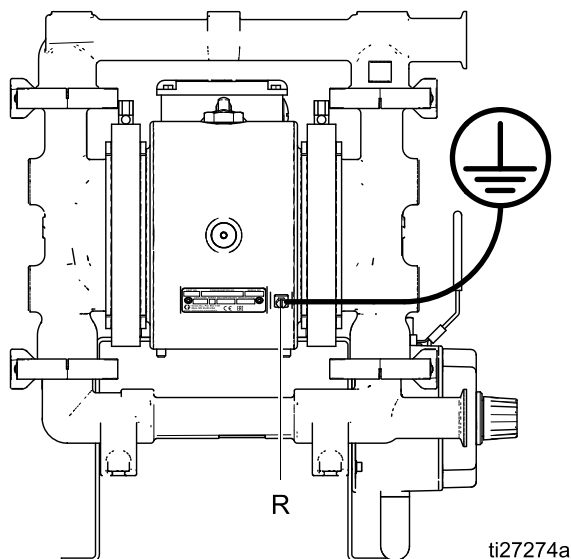
To prevent unstable loading due to an offset center of gravity, lift the cart by using straps attached at multiple points on the cart rather than attempting to lift the pump and cart using only the pump lift ring.

## Grounding

				
<p>The equipment must be grounded to reduce 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.</p> <ul style="list-style-type: none"> <li>• <b>Always</b> ground the entire fluid system as described below.</li> <li>• Follow your local fire codes.</li> </ul>				

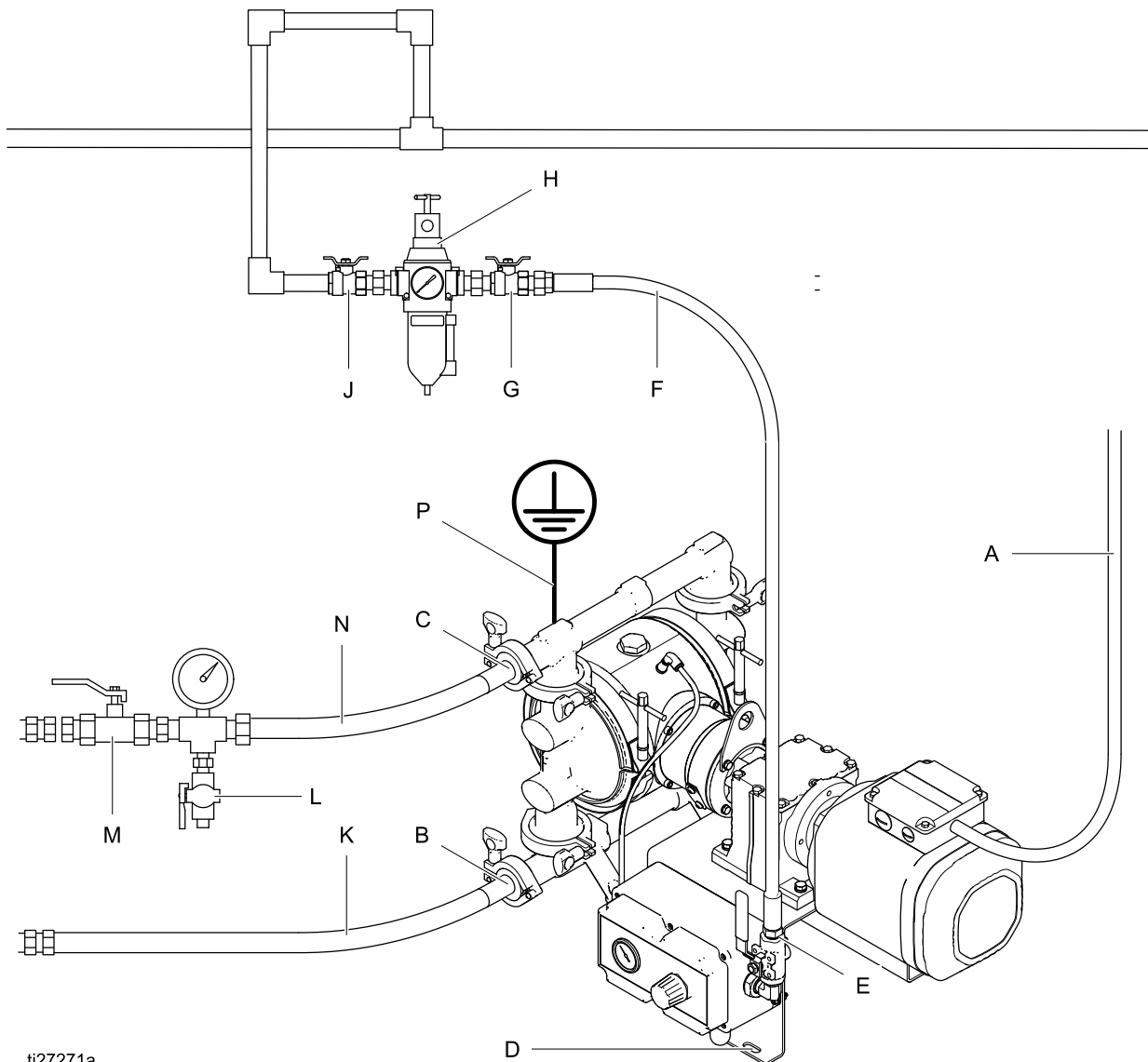
Before operating the pump, ground the system as explained below.

- **Pump:** Loosen the grounding screw (R). Insert one end of a 12-gauge minimum ground wire behind the ground screw and tighten the screw securely. Connect the clamp end of the grounding wire to a true earth ground.



- **Motor:** AC motors have a ground screw in the electrical box. Use it to ground the motor to the VFD.
- **Air Line and Fluid hoses:** Use only grounded hoses with a maximum of 150 m (500 ft) combined hose length to ensure grounding continuity. Check electrical resistance of hoses. If total resistance to ground exceeds 29 megohms, replace hose immediately.
- **Fluid supply container:** Follow local code.
- **Solvent pails used when flushing:** Follow local code. Use only conductive metal pails, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts grounding continuity.
- **VFD:** Ground the variable frequency drive (VFD) through a proper connection to the electrical system. Refer to the VFD manual for grounding instructions.

Check your system ground continuity after the initial installation, and then set up a regular schedule for checking continuity to be sure proper grounding is maintained. The resistance to earth ground should not exceed 1 ohm.



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Figure 1 Typical Installation

### System Components

- A Power cord to VFD
- B Fluid inlet port
- C Fluid outlet port
- D Mounting feet
- E Air inlet valve

### Accessories/Components Not Supplied

- F Grounded, flexible air supply hose
- G Bleed-type master air valve
- H Air filter/regulator assembly
- J Master air valve (for accessories)
- K Grounded, flexible fluid supply hose
- L Fluid drain valve (may be required for your pump installation)
- M Fluid shutoff valve
- N Grounded, flexible fluid outlet hose
- P Ground wire and clamp (required)

## Air Line

### If using a Verder Compressor Kit:

An air line is provided in the kit which must be installed between the compressor and the pump air inlet.

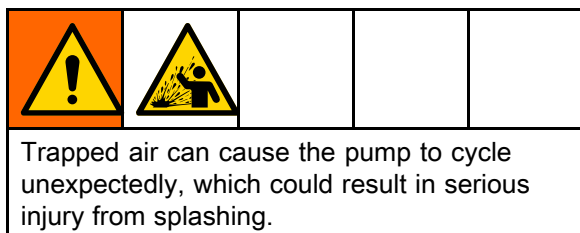
### Using Your Own Compressor:

Connect the air line from the compressor to the inlet valve on the pneumatic enclosure (28).

### Using Shop Air:

NOTE: Callouts are located on Figure 1

1. Install an air filter/regulator assembly (H). The fluid stall pressure will be the same as the setting of the air regulator. The filter removes harmful dirt and moisture from the compressed air supply.
2. Locate a bleed-type master air valve (G) close to the pump and use it to relieve trapped air. Be sure the valve is easily accessible from the pump and located downstream from the regulator.



3. Locate another master air valve (J) upstream from all air line accessories and use it to isolate them during cleaning and repair.

4. Install a grounded, flexible air hose (F) between the accessories and the 3/8 npt(f) pump air inlet.

## Fluid Supply Line

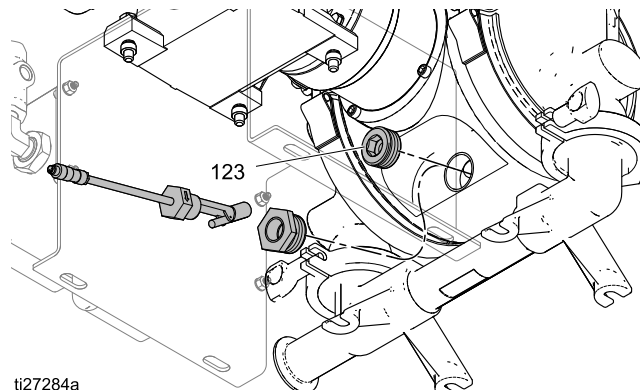
1. Connect a grounded, flexible fluid hose (K) to the fluid inlet port. The port is 3.8 cm (1.5 in.) sanitary Tri-Clamp flange or 40 mm DIN 11851.
2. If the inlet fluid pressure to the pump is more than 25% of the outlet working pressure, the ball check valves will not close fast enough, resulting in inefficient pump operation. Excessive inlet fluid pressure also will shorten diaphragm life. Most materials should require no more than 0.21 bar (0.02 MPa, 3 psi) fluid inlet pressure.
3. For maximum suction lift (wet and dry), see [Technical Data, page 28](#). For best results, always install the pump as close as possible to the material source. Minimize suction requirements to maximize pump performance.

## Fluid Outlet Line

1. Connect a grounded, flexible fluid hose (K) to the fluid inlet port. The port is 3.8 cm (1.5 in.) sanitary flange or 40 mm DIN 11851.
2. Install a fluid drain valve (L) near the fluid outlet.
3. Install a shutoff valve (M) in the fluid outlet line.

## Leak Sensor

The optional leak sensor (Kit 859.0508) is highly recommended to avoid operating the pump with a ruptured diaphragm. To install the leak sensor, remove plug 123. Install the bushing and leak sensor. **NOTE:** The arrow on the leak sensor must point down.



## Leak Sensor Wiring (AC Models)

Follow these instructions to wire the optional Leak Sensor Kit 859.0508 to a VFD.

**NOTE:** The leak sensor is designed to operate as a normally-closed circuit.





1. Select and purchase a cable from the following table.

Part Number	Cable Length
859.0517	3.0 m (9.8 ft)
859.0518	7.5 m (24.6 ft)
859.0519	16 m (52.5 ft)

2. After installing the leak sensor, connect the selected cable to the installed leak sensor.

3. Turn off power to the VFD.
4. Open the access cover on the VFD.
5. Attach the blue and black leads to the detection circuit in the VFD.  
**NOTE:** Refer to the VFD manual for proper connection points.
6. Individually terminate the two remaining leads.
7. Close the access cover.
8. Turn on power to the VFD.
9. Configure the VFD to monitor the leak sensor circuit.

## Electrical Connections for AC Models

				
<p>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.</p>				

Always check the motor manufacturer's manual for the proper technical and installation information.

Follow the instructions in the motor manufacturer's manual. When using a Verder inverter duty-rated motor, use of a properly-sized VFD or a motor soft-starter is recommended. In all cases, wire size, fuse size, and other electrical devices must comply with all local codes and regulations.

### Wire Connections at the Variable Frequency Drive (VFD)

Follow the instructions in the VFD manufacturer's manual.

#### NOTICE

To avoid equipment damage, do not plug the motor directly into a wall socket. The motor must be wired to a VFD.

### Wire Connections at the Motor

Install the wiring at the motor as follows:

1. Open the motor's electrical box.
2. Install wiring system with proper liquid-tight connections in one of the ports at the side of the motor box.
3. Connect the green ground wire to the ground screw.

4. **For 460V Wiring:** The motor comes wired for 460V. If this is the voltage you want, the existing wiring can remain as it is. Connect power wires L1 to U1, L2 to V1 and L3 to W1, as shown.

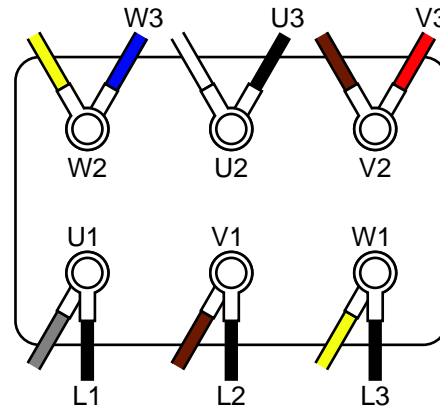


Figure 2 Connections for 460V Wiring

5. **For 230V Wiring:** Move the black wire (U3), the red wire (V3) and the blue wire (W3) as shown. Using the bridges supplied with the motor, bridge W2, U2, and V2. Then connect power wires L1 to U1, L2 to V1 and L3 to W1.

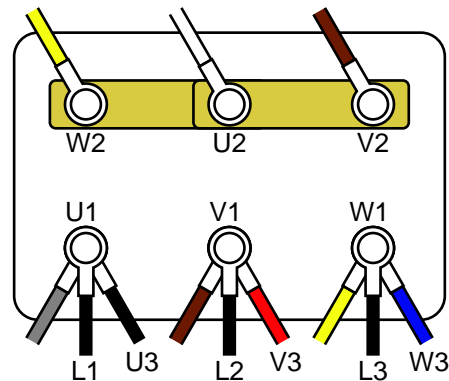


Figure 3 Connections for 230V Wiring

6. Torque terminals to 2.3 N•m (20 in-lb).
7. Close the motor electrical box. Torque the screws to 2.3 N•m (20 in-lb).



## Wire Connections at the ATEX Motor

(Optional kit 859.0523)

Install the wiring at the motor as follows:

1. Open the motor's electrical box.
2. Install wiring system with proper connections to the motor electrical box.
3. Connect the green ground wire to the ground screw.
4. **For 415V Wiring:** Bridge as shown, then connect wire L1 to U1, L2 to V1, and L3 to W1.

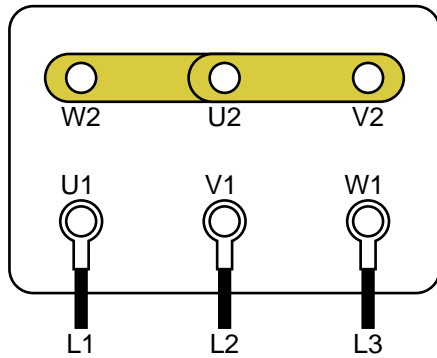


Figure 4 Connections for a 415V Wiring

5. **For 240V Wiring:** Connect wire L1 to U1, L2 to V1, and L3 to W1. Bridge as shown.

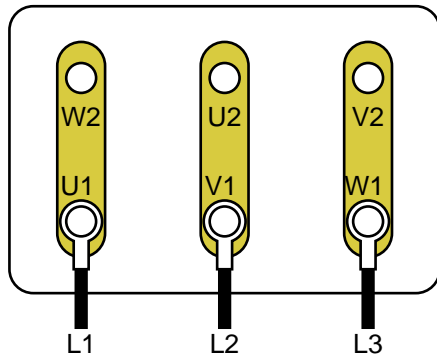


Figure 5 Connections for a 240V Wiring

6. Torque terminals to 20 in-lb (2.3 N•m).
7. Close the motor electrical box. Torque the screws to 20 in-lb (2.3 N•m).

## Wire Connections at the Explosionproof Motor

(Optional kit 859.0522)

Install the wiring at the motor as follows:

1. Open the motor's electrical box.
2. Install wiring system with proper connections to the motor electrical box.
3. Connect the green ground wire to the ground screw.
4. **For 460V Wiring:** Connect wire L1 to T1, L2 to T2, and L3 to T3, and bridge the other wires, as shown.

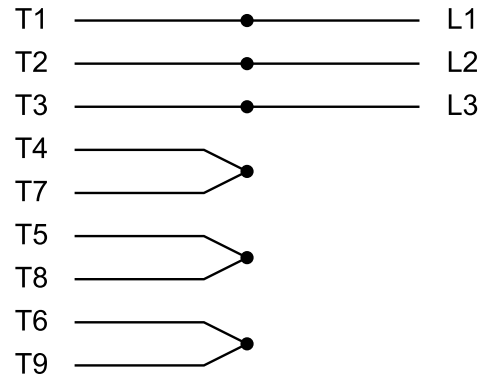


Figure 6 Connections for 460V Wiring

5. **For 230V Wiring:** Bridge the wires as shown. Then, connect L1 to T1/T7, L2 to T2/T8, and L3 to T3/T9.

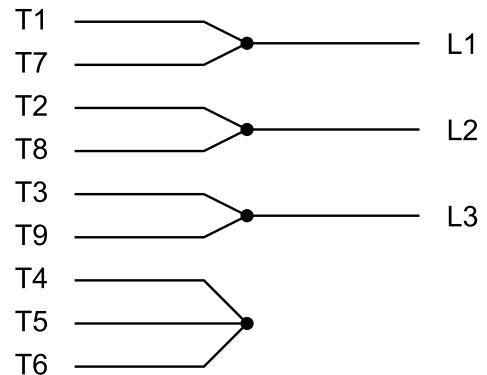
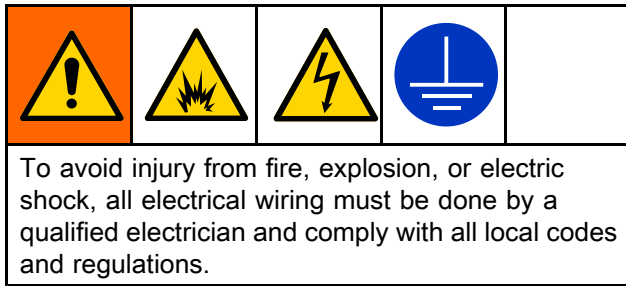


Figure 7 Connections for 230V Wiring

6. **Option:** Connect thermostat wires P1 and P2 to external overload detection. Thermostat is NC (normally closed).
7. Close the motor electrical box. Torque the screws to 20 in-lb (2.3 N•m).

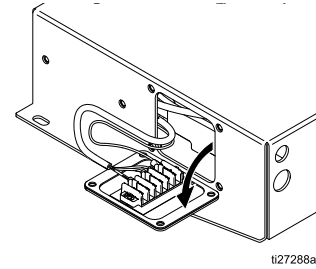
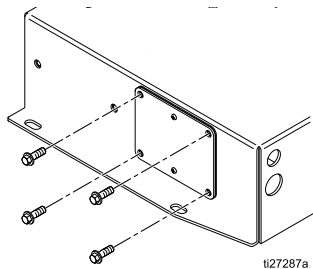
# Compressor Wiring




Follow these instructions to wire Compressor 859.0465 (120V) or 859.0466 (240V).

**NOTE:** Use only copper wire with an insulation rating of 75°C (167°F) or higher.

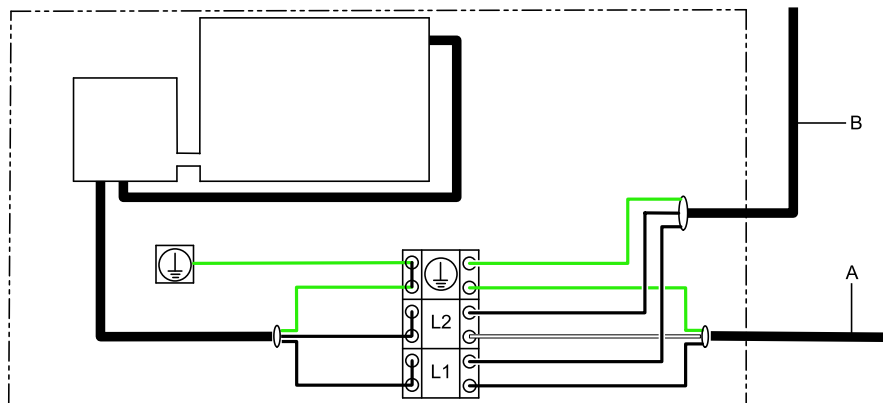
1. Remove the cover from the compressor's electrical box.



2. Install wiring system with proper connections (i.e. conduit/fittings, power cable/cable grip) to the compressor electrical box.
3. Connect line power (120VAC or 240 VAC, depending on your compressor) to L1 and L2/N.

Connect supply ground to . Use minimum 4 mm<sup>2</sup> (12 AWG) wire when the system is configured for a 16A circuit and 2.5 mm<sup>2</sup> (14 AWG) when configured for a 12A circuit. Torque terminals to 2.3 N•m (20 in-lb).

4. When powering the VFD on the same circuit as the compressor, connect branch wiring to L1, L2/N and Ground, then connect to the VFD. Use the same wire sizing as in Step 2.
5. Reinstall the cover of the electrical box. Torque screws to 2.3 N•m (20 in-lb).



## KEY

- A** To power supply  
**B** To controller

Figure 8 Wire Connections at the Compressor

# Operation

## Initial Configuration (AC with VFD)

Configure the VFD according to the motor nameplate information.

## Sanitize the Pump Before First Use

It is the user's responsibility to properly sanitize the pump before first use. It is up to the user whether this will include disassembling and cleaning individual parts or simply flushing pump with a sanitizing solution. As necessary, follow the steps under [Start and Adjust the Pump, page 19](#) or under [Flushing and Storage, page 21](#).

## Transfer Mode Vs. Low Pulsation Mode

When the air pressure is at least 10 psi higher than the desired outlet pressure, the pump is in Transfer Mode and no pulsation damping is occurring. To reduce outlet pulsation, start by setting the air pressure *equal* to the desired outlet fluid pressure. Continue to adjust the air pressure relative to the outlet fluid pressure. Lower relative air pressures produce more pulsation damping. Higher relative air pressures produce better pump efficiency.

**NOTE:** Low pulsation mode may invalidate the system k-factor. See the Low Pulsation chart in [Performance Charts, page 22](#).

## Start and Adjust the Pump

1. Be sure the pump is properly grounded. See [Grounding, page 12](#).
2. Check fittings to be sure they are tight. Use a compatible liquid thread sealant on male threads. Tighten fluid inlet and fluid outlet fittings securely.
3. Place the fluid supply hose in fluid to be pumped.

**NOTE:** If fluid inlet pressure to the pump is more than 25% of outlet working pressure, the ball check valves will not close fast enough, resulting in inefficient pump operation.

### NOTICE

Excessive fluid inlet pressure can reduce diaphragm life.

4. Place the end of the fluid hose into an appropriate container.
5. Close the fluid drain valve.
6. Turn the air regulator knob to match the desired fluid stall pressure. Open all bleed-type master air valves.
7. If the fluid hose has a dispensing device, hold it open. Be sure all fluid shutoff valves are open.
8. **VFD:** Set the desired frequency.
9. Start the VFD.
10. If you are flushing, run the pump long enough to thoroughly clean the pump and hoses.

## Pressure Relief Procedure



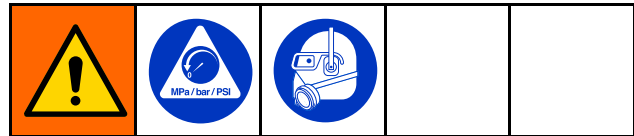
Follow the Pressure Relief Procedure whenever you see this symbol.

<p>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.</p>				

1. Remove power from the system.
2. Open the dispensing valve, if used.





3. Open the fluid drain valve (L) to relieve fluid pressure. Have a container ready to catch the drainage.
4. Close the pump air inlet valve on the pneumatic enclosure.
5. **Units with a compressor:** Cycle the valve to bleed any remaining air.

## Pump Shutdown



At the end of the work shift and before you check, adjust, clean, or repair the system, follow the [Pressure Relief Procedure, page 20](#).

## Maintenance

				
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.				

### Maintenance Schedule

Establish a preventive maintenance schedule based on the pump's service history. Scheduled maintenance is especially important to prevent spills or leakage due to diaphragm failure.

### Lubrication

The pump is lubricated at the factory. It is designed to require no further lubrication for the life of the bearings.

### Tighten Connections

Before each use, check all hoses for wear or damage and replace as necessary. Check to be sure all connections are tight and leak-free.

## Flushing and Storage

				
To avoid fire and explosion, always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at the lowest possible pressure.				

Insert suction tube into cleaning solution. Open air regulator to supply low pressure air to the pump. Run the pump long enough to thoroughly clean the pump and hoses. Close the air regulator. Remove the suction tube from the cleaning solution and drain pump. Place suction tube in the fluid to be pumped.

Flush the pump often enough to prevent the fluid you are pumping from drying or freezing in the pump and damaging it. Flushing schedule will be based on what the pump is being used for. Use a compatible cleaning solution and always cycle the pump during the entire flushing process.

Always flush the pump and relieve the pressure before storing it for any length of time.

### **NOTICE**

Flush the pump often enough to prevent the fluid you are pumping from drying or freezing in the pump and damaging it. Store the pump at 0°C (32°F) or higher. Exposure to extreme low temperatures may result in damage to plastic parts.

# Performance Charts

**Test Conditions:** The pump was tested in water with the inlet submerged. The air pressure was set 0.7 bar (10 psi) higher than the outlet pressure.

## How to Use the Charts

1. Choose a flow rate and outlet pressure that falls below the Power Limit Curve. Conditions outside of the curve will decrease the life of the pump.
2. Set the VFD frequency corresponding to the desired flow rate. Flow rates will increase with

outlet pressure lower than 0.7 bar (10 psi) and with high inlet head pressure.

3. To prevent inlet cavitation erosion, the *Net Positive Suction Head Available (NPSHa)* of your system should be above the *Net Positive Suction Head Required (NPSHr)* line shown on the chart.

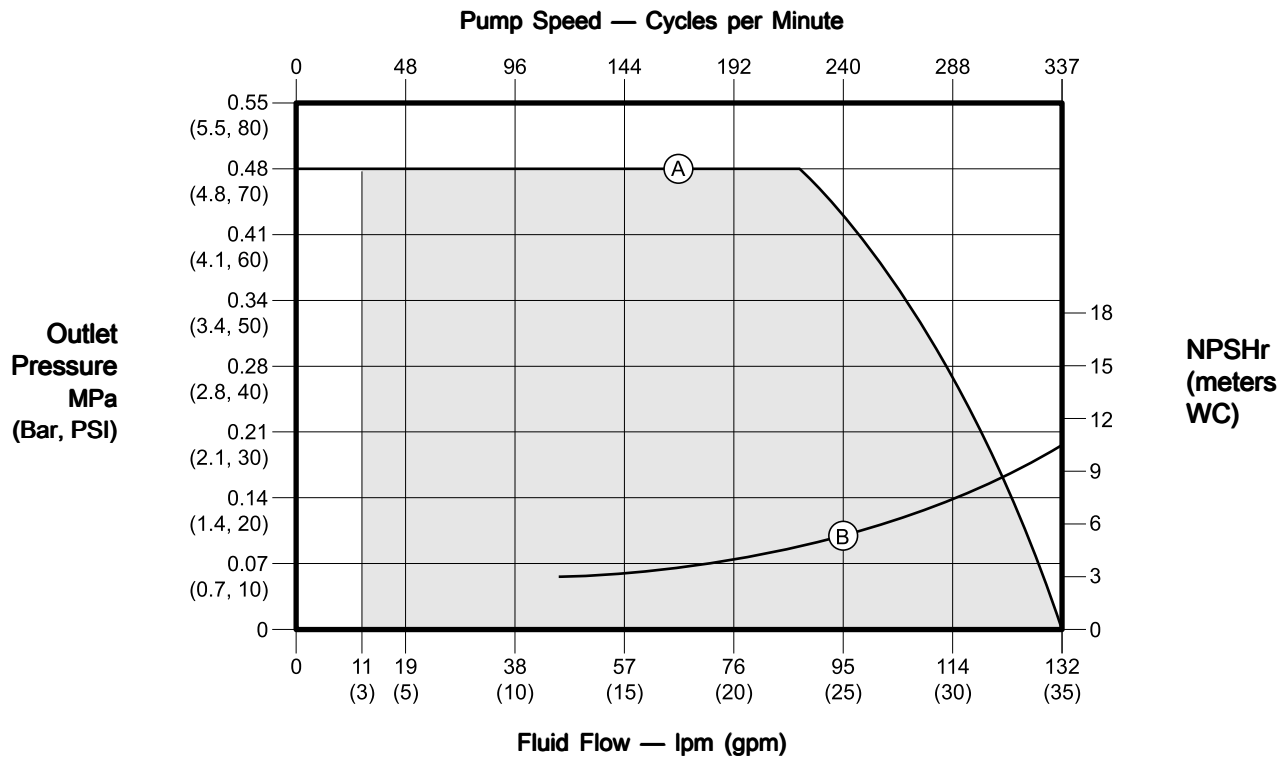
## AC Pump

### KEY

**A** Power Limit Curve

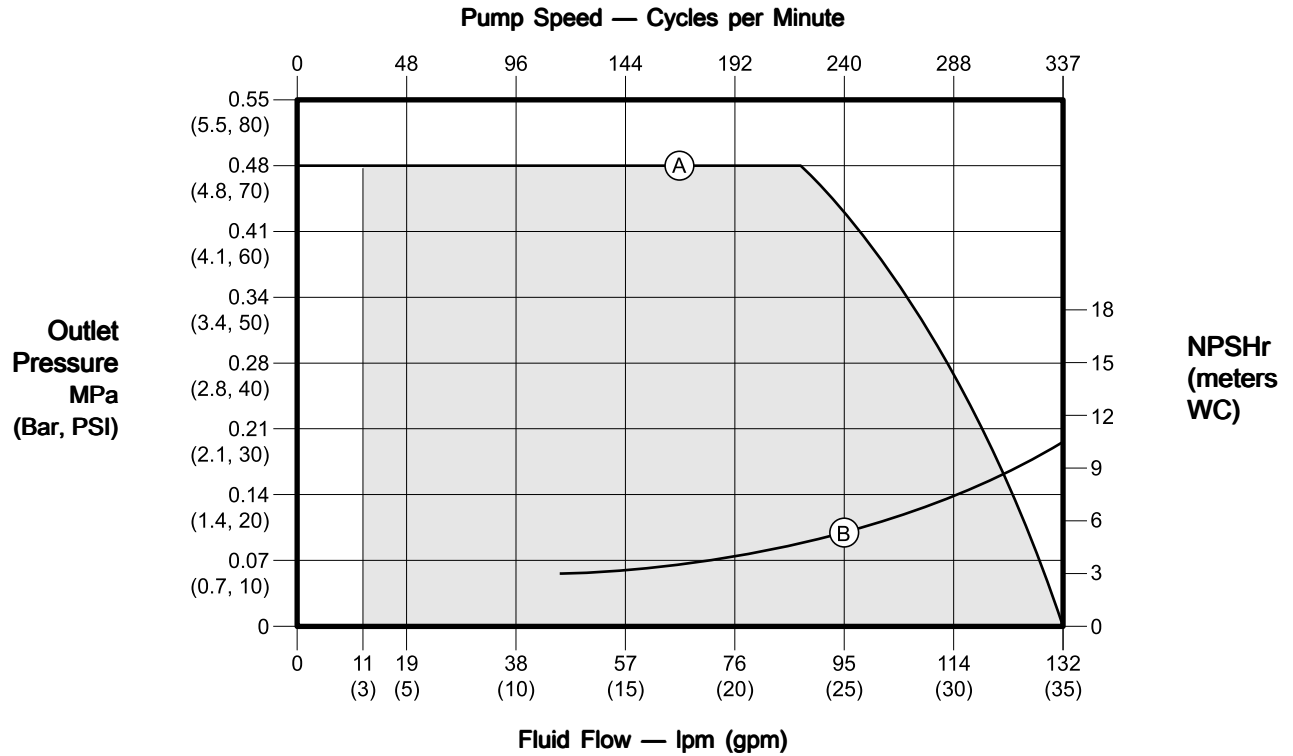
**B** Net Positive Suction Head Required

The shaded area is recommended for continuous duty.



## ATEX Motor and 18:1 Gearbox

Good for 2-pole, 3600 rpm, 1.5 kW motors (pump codes NG, IG)

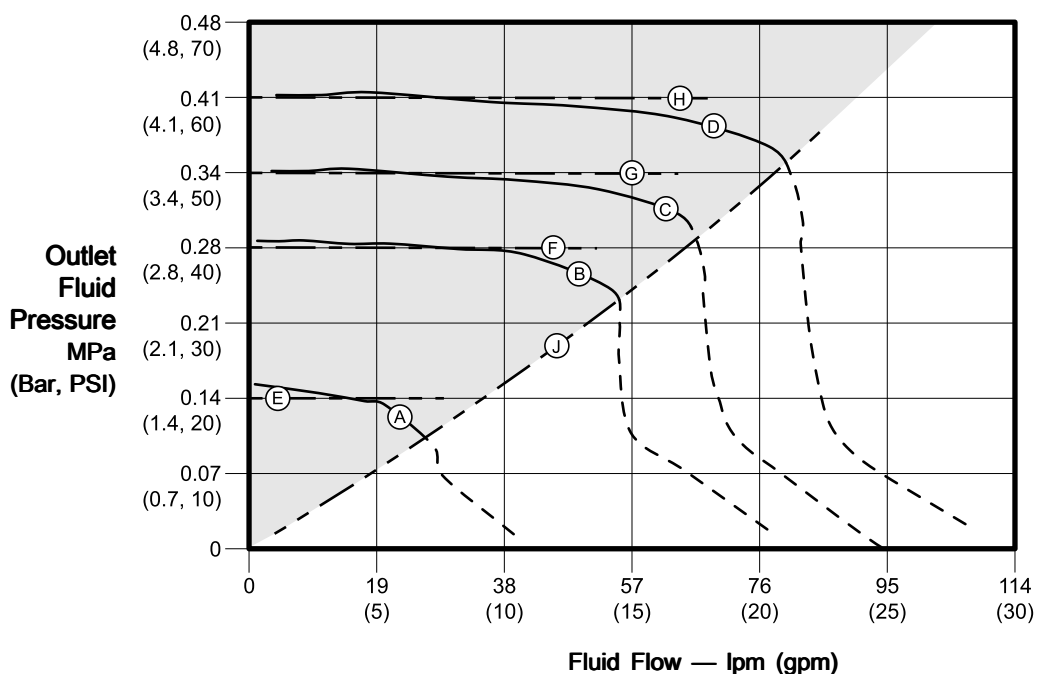


## Low-Pulsation Mode

Four typical running conditions are shown in the curves. The curves show the relationship between outlet pressure and outlet flow during Low Pulsation Mode (above the transition line) and Transfer Mode (below the transition line). Adjust the pump speed and air pressure to achieve the desired result.

### KEY

- A** 73 cycles per minute
- B** 145 cycles per minute
- C** 181 cycles per minute
- D** 217 cycles per minute
- E** 1.4 bar (20 psi) air pressure
- F** 2.8 bar (40 psi) air pressure
- G** 3.4 bar (50 psi) air pressure
- H** 4.1 bar (60 psi) air pressure
- J** Transition line (Low Pulsation Mode is shaded.)





## How to Calculate Your System's Net Positive Suction Head – Available (NPSHa)

For a given flow rate, there must be a minimum fluid head pressure supplied to the pump to prevent cavitation. This minimum head is shown on the Performance Curve, labeled as NPSHr. The units are meters WC (Water Column) absolute. The NPSHa

of your system must be greater than the NPSHr to prevent cavitation and therefore increase efficiency and the life of your pump. To calculate the NPSHa of your system, use the following equation:

$$\text{NPSHa} = H_a \pm H_z - H_f - H_{vp}$$

**Where:**

**H<sub>a</sub>** is the absolute pressure on the surface of the liquid in the supply tank. Typically, this is atmospheric pressure for a vented supply tank, e.g. 10.4 m at sea level.

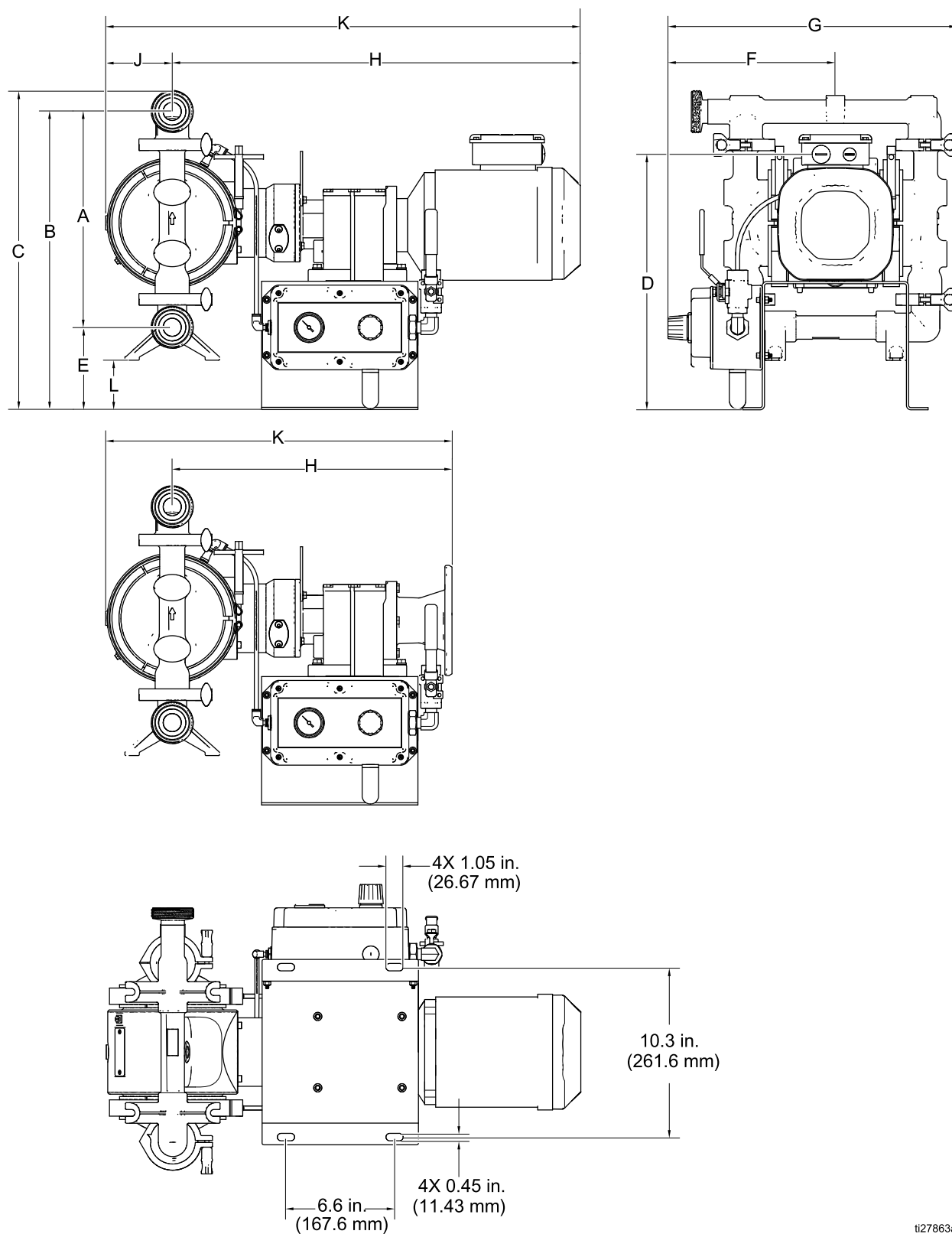
**H<sub>z</sub>** is the vertical distance in meters between the surface of the liquid in the supply tank and the centerline of the pump inlet. Value should be positive if the level is higher than the pump and negative if the level is lower than the pump. Always be sure to use the lowest level the liquid can reach in the tank.

**H<sub>f</sub>** is the total of the friction losses in the suction piping.

**H<sub>vp</sub>** is the absolute vapor pressure of the liquid at the pumping temperature.

Dimensions (typical only)

## Dimensions (typical only)



ti27863a

Figure 9

Table 1 Dimensions for Aluminum Pumps

Ref.	Gearbox and Motor		Gearbox Only	
	in	cm	in	cm
<b>A</b>	13.1	33.3	13.1	33.3
<b>B</b>	18.1	46.0	18.1	46.0
<b>C</b>	19.1	48.5	19.1	48.5
<b>D</b>	15.5	39.4	NA	NA
<b>E</b>	5.0	12.7	5.0	12.7
<b>F</b>	10.2	25.9	10.2	25.9
<b>G</b>	17.6	44.7	17.6	44.7
<b>H</b>	24.9	63.2	17.0	43.2
<b>J</b>	4.0	10.2	4.0	10.2
<b>K</b>	28.9	73.4	21.0	53.3
<b>L</b>	3.0	7.6	3.0	7.6

# Technical Data

	US	Metric
Verder VA-EH25 Electric-Operated Double Diaphragm Pump		
Maximum fluid working pressure	70 psi	4.8 bar, 0.48 MPa
Air pressure operating range	20 to 80 psi	1.4 to 5.5 bar, 0.14 to 0.55 MPa
Air inlet size	3/8 in. npt(f)	
Maximum suction lift (reduced if balls don't seat well due to damaged balls or seats, lightweight balls, or extreme speed of cycling)	Wet: 29 ft Dry: 16 ft	Wet: 8.8 m Dry: 4.9 m
Maximum size pumpable solids	1/8 in.	3.2 mm
Ambient air temperature range for operation and storage. <b>NOTE:</b> Exposure to extreme low temperatures may result in damage to plastic parts.	32° F–104° F	0° C–40° C
Fluid displacement per cycle	0.10 gallons	0.38 liters
Maximum free-flow delivery	35 gpm	132.5 lpm
Maximum pump speed	280 cpm	
Fluid Inlet and Outlet Size	1.5 in. sanitary flange or 40 mm DIN 11851	
Electric Motor		
AC, Standard CE		
Power	1.5 kW	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	
Gear Ratio	8.16	
Voltage	3-phase 230V / 3-Phase 460V	
Motorless Gearbox		
NEMA (NG)		
Mounting Flange	NEMA 56 C	
Gear Ratio	18.08	
IEC (IG)		
Mounting Flange	IEC 90	
Gear Ratio	18.08	
Noise Data		
Sound Power (measured per ISO-9614–2)		
at 4.8 bar fluid pressure and 50 cpm	71 dBa	
at 2.76 bar fluid pressure and 280 cpm (full flow)	94 dBa	
Sound Pressure [tested 1 m (3.28 ft) from equipment]		
at 4.8 bar fluid pressure and 50 cpm	61 dBa	
at 2.76 bar fluid pressure and 280 cpm (full flow)	84 dBa	

### Weights (typical only)

Pump Material		Motor/Gearbox					
Fluid Section	Center Section	AC		NEMA NG		IEC IG	
		lb	kg	lb	kg	lb	kg
Stainless Steel	Aluminum	136	62	99	45	104	47
Stainless Steel	Stainless Steel	166	75	129	58	134	61

Weight		
Compressor	28 lb	13 kg
Cart	33 lb	15 kg
Wetted Parts		
Wetted parts include stainless steel, plus material(s) chosen for seat, ball, and diaphragm options		
Non-wetted parts		
Aluminum, coated carbon steel, bronze		
Stainless Steel, aluminum, coated carbon steel, bronze		

### Fluid Temperature Range

NOTICE
Temperature limits are based on mechanical stress only. Certain chemicals will further limit the fluid temperature range. Stay within the temperature range of the most-restricted wetted component. Operating at a fluid temperature that is too high or too low for the components of your pump may cause equipment damage.

Diaphragm/Ball/Seat Material	Fluid Temperature Range	
	Fahrenheit	Celsius
Polychloroprene check balls (NW)	40° to 200°F	4° to 90°C
PTFE overmolded diaphragm (TO)	40° to 220°F	4° to 104°C
PTFE check balls or two-piece PTFE/EPDM diaphragm (TF)	40° to 220°F	4° to 104°C
Santoprene® check balls or 2-piece PTFE/Santoprene diaphragm (SP)	-40° to 180°F	-40° to 82°C

# **Customer Services/Guarantee**

## **CUSTOMER SERVICES**

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

- Pump Model
- Type
- Serial Number, and
- Date of First Order.

## **GUARANTEE**

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 in the enclosed brochure 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, installation and/or use of products for certain purposes, which may vary from those in neighboring 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 product, installation, and use complies with them.

Original instructions. This manual contains English.

Revision E, February 2017



## EU-DECLARATION OF CONFORMITY

EU-CONFORMITEITSVERKLARING, DÉCLARATION UE DE CONFORMITÉ, EU-KONFORMITÄTSERKLÄRUNG, DICHIARAZIONE DI CONFORMITÀ UE, EU-OVERENSSTEMMELSESERKLÆRING, ΔΗΛΩΣΗ ΣΥΜΜΟΡΦΩΣΗΣ ΕΕ, DECLARAÇÃO UE DE CONFORMIDADE, DECLARACIÓN UE DE CONFORMIDAD, EU-VAATIMUSTENMUKAISUUSVAKUUTUS, EU-FÖRSÄKRAN OM ÖVERENSSTÄMMELSE, EU PROHLÁŠENÍ O SHODĚ, EU VASTAVUSDEKLARATSIOON, EU-MEGFELELŐSÉGI NYILATKOZAT, ES ATBILSTĪBAS DEKLARĀCIJA, ES ATTIKTIKTES DEKLARACIJA, DEKLARACIJA ZGODNOSTI UE, DIKJARAZZJONI TA' KONFORMITÀ TAL-UE, EU IZJAVA O SUKLADNOSTI, EU VYHLÁSENIE O ZHODE, ЕС ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ, DECLARAȚIA UE DE CONFORMITATE

### Model

Modelle, Modell, Modello, Модел, Modello, Modell, Modelis, Model, Model, Samhalla

**Verder HI-CLEAN VA-EH25 Sanitary Electric Double Diaphragm Pumps**

### Part

Bestelnr., Type, Tell, Codice, Del, Μέρος, Peça, Referencia, Osa, Součást, Részegység, Dajla, Dalls, Uprabljani standardi, Použití normy, Vismontsaki standarti, Calghdeain arna n-úsáid, Standarde utilizate

**All pumps with configuration codes:**

**VA-EH25XXXXXXXXXXXXXX**

### Complies With The EC Directives:

Valdoet aan de EG-richtlijn, Conforme aux directives CE, Entspricht den EG-Richtlinien, Conforme alle direttive CE, Overholder EF-direktiverne, Συμμορφώ με τις Οδηγίες της ΕΚ, Em conformidade com as Directivas CE, Cumple las directivas de la CE, Täyttää EY-direktiivien vaatimukset, Uppfyller EG-direktiven, Shoda se smernicami ES, Vastab EU direktividele, Kielegiti az EK irányelvek követelményeit, Atbilst EK direktīvām, Atitinka šias ES direktyvas, Zgodość z Dyrektywami UE, Konformi mač-Direktivi ta-KE, V skladu z direktivami ES, Je v súlade so smernicami ES, Съвместимост с Директивата на ЕО, Та ага теачит ле Треорача на CE, Respectă directivele CE

2006/42/EC Machinery Directive, 2006/95/EC Low Voltage Directive

### Standards Used:

Gebruikte maatstaven, Normes respectées, Verwendete Normen, Norme applicate, Anvendte standarder, Πρότυπα που χρησιμοποιήθηκαν, Normas utilizadas, Normas aplicadas, Sovellettavat standardit, Tillämpade standarder, Použité normy, Rakendatud standardid, Alkalmazott szabványok, Izmantotie standarti, Taisyti standartai, Užyte normy, Standarde Uzati, Uporabljani standardi, Použití normy, Vismontsaki standarti, Calghdeain arna n-úsáid, Standarde utilizate

ISO 12100, ISO 4414, EN 809 :1998

### Notified Body for Directive

Aangemelde Instantie voor richtlijn, Organisme notifié pour la directive, Benannte Stelle für diese Richtlinie, Ente certificatore della direttiva, Bemyndiget organ för direktiv, Διοικητικό όργανο Οδηγίας, Organismo notificado relativamente a directiva, Organismo notificado de la directiva, Direktiivin mukaisesti ilmoitettu tarkastuslaitos, Anmält organ för direktivet, Úředně oznámený orgán pro směrnici, Teavitatud asutus (direktiivi järgi), Az irányelvvel kapcsolatban értesített testület, Pliņvarotā iestāde saskaņā ar direktīvu, Aple direktīvā informuota institūcija, Ciało powiadomione dla Dyrektywy, Korp avizat bîd-Direktiva, Priglašeni organ za direktivo, Notifikovaný orgán pre smernicu, Нотифициран орган за Директивата, Comiliacht ar tugadh fogra do, Organism notificat în conformitate cu directiva

### Approved By:

Goedgekeurd door, Approuvé par, Genehmigt von, Approvato da, Godkendt af, Έγκριση από, Aprobado por, Aprobado por, Hyväksynyt, Intygat av, Schwält, Kinnitand, Jöväähagya, Apstiprināts, Patvirtino, Zatwierdzone przez, Approbat mlm, Odobril, Schválené, Одобрено от, Faota ag, Aprobat de

**Werner Bosman**  
Managing Director

**23 February 2017**

**VERDER BV**  
Leningradweg 5  
9723 TP Groningen  
NETHERLANDS

This declaration of conformity is issued under the sole responsibility of the manufacturer. Deze conformiteitsverklaring wordt verstrekt onder volledige verantwoordelijkheid van de fabrikant. La présente déclaration de conformité est établie sous la seule responsabilité du fabricant. Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. La presente dichiarazione di conformità è rilasciata sotto la responsabilità esclusiva del fabbricante. Denne overensstemmelseserklæring udstedes på fabrikantens ansvar. Η παρούσα δήλωση συμμόρφωσης εκδίδεται με αποκλειστική ευθύνη του κατασκευαστή. A presente declaração de conformidade é emitida sob a exclusiva responsabilidade do fabricante. La presente declaración de conformidad se expide bajo la exclusiva responsabilidad del fabricante. Tämä vaatimustenmukaisuusvakuutus on annettu valmistajan yksinomaalisella vastuulla. Denna försäkran om överensstämmelse utfärdas på tillverkarens eget ansvar. Toto prohlášení o shodě se vydává na výhradní odpovědnost výrobce. Készítve vastavusdeklaratsioon on välja antud tootja ainuvastutuseel. Ezt a megfélelőégi nyilatkozatot a gyártó kizárólagos felelőssége mellett adják ki. Št atbilstības deklarācija ir izdota vienīgi uz ražotāja atbildību. Št atitiktības deklaracija išduota tik gamintojo atsakomybe. Nijiejsza deklaracja zgodności wydana zostaje na wyłączną odpowiedzialność producenta. Din id-dikjarazzjoni ta-konformità qiegħda tinfareg taħt ir-responsabbiltà unika tal-manifattur. Ta izjava o skladnosti je izdana na lastno odgovornost proizvajalca. Toto vyhlásenie o zhode sa vydáva na výhradnú zodpovednosť výrobcu. Настоящая декларация за съответствие е издадена на отговорността на производителя. Prezenta declaratie de conformitate este emisă pe răspunderea exclusivă a producătorului.

**859.0514**

**C**



## DECLARATION OF COMPLIANCE

Statement of compliance with European Union regulation  
(EC) no 1935/2004 on materials and articles intended to come into  
contact with food  
Requirement per Article 16 of EC 1935/2004



Verder BV declares that the equipment listed below contains materials that have been demonstrated to meet the requirements of Regulations: EC 1935/2004 of 27 October 2004 and EC 2023/2006 of 22 December 2006

**Model** Verder VA-EH25 Electric Double Diaphragm Pumps

**Part No** All pumps with configuration codes: VA-EH25XX ST TF TF T4 XX,  
VA-EH25XX ST TF TF D4 XX, VA-EH25XX ST TF TO T4 XX,  
VA-EH25XX ST TF TO D4 XX

Materials used in this equipment that are intended to contact food belong to the groups of materials listed in Annex 1 (EC) 1935/2004 (List of groups of materials and articles which may be covered by specific measures)

- |   |  |
|---|--|
| <input type="checkbox"/> Adhesives (2)                    | <input checked="" type="checkbox"/> Plastics (10)    |
| <input type="checkbox"/> Ceramics (3)                     | <input type="checkbox"/> Printing Inks (11)          |
| <input checked="" type="checkbox"/> Rubbers (5)           | <input type="checkbox"/> Silicones (13)              |
| <input checked="" type="checkbox"/> Metals and Alloys (8) | <input type="checkbox"/> Varnishes and Coatings (15) |

Materials used in this equipment that are intended to contact food were assessed using one or more of the regulations and/or texts referenced in ANNEX 1 of this declaration. Compliance is subject to material and equipment storage, handling and usage recommended by the equipment instruction manual, and supplemental technical publications published by Verder.

The establishment of this declaration is based on the following:

- ☒ Statements of raw material suppliers
- ☐ Analysis of global migration
- ☒ Analysis of materials is subject to limitations (Listed in ANNEX 2)
- ☐ Other (Listed in ANNEX 3)

Verder BV will make available to the competent authorities appropriate documentation to demonstrate this compliance.

APPROVED BY:

Werner Bosman – Managing Director

VERDER BV  
Leningradweg 5  
9723 TP Groningen  
NETHERLANDS

Date: **23 February 2017**

Part Number:

**859.0513**



## ANNEX 1 TO DECLARATION OF COMPLIANCE

### References and Regulations Used

#### All Materials:

Framework Regulation (EC) No 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food and repealing Directives 80/590/EEC and 89/109 EEC

Commission Regulation (EC) No 2023/2006 of 22 December 2006 on good manufacturing practices for materials and articles intended to come into contact with food

#### Metals and Alloys:

Technical Document – Guidelines on Metals and Alloys Used as Food Contact Materials (09.03.2001)

#### Plastics:

Commission Regulation (EU) No 10/2011 on plastic materials and articles intended to come into contact with food

Commission Regulation (EU) No 1282/2011 amending and correcting Commission Regulation (EU) No 10/2011 on plastic materials and articles intended to come into contact with food


#### Rubber and Elastomers:

Council of Europe Committee of Ministers Resolution ResAP(2004)4 on rubber products intended to come into contact with foodstuffs

US Food and Drug Administration 21 CFR Ch.1 Title 177.26 Rubber articles Intended for repeated Use.

## ANNEX 2 TO DECLARATION OF COMPLIANCE

### Analysis of Materials Subject to Limitations

 The following wetted parts have special conditions and are therefore subject to the following limitations.

Part No	Description	Limitation
819.0570	Overmolded Diaphragm	Contact not to exceed 24 hours when temperatures are above 85°C

All wetted parts and/or materials used in this product have not been tested under all conditions using all simulants. It is the responsibility of the end user to assure compliance under the specific conditions used by the end user.

## ANNEX 3 TO DECLARATION OF COMPLIANCE

### Other Items Used to Establish this Declaration

None

Date: **23 February 2017**

Part Number:

**859.0513**

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