

Operation



# VERDERAIR Electric-Operated

## Diaphragm Pumps

859.0769  
Rev.C  
EN

**Models VA-EH50, VA-E2H52, VA-E2H53, VA-E2H54**  
2-inch, 3-inch, and 4-inch pumps with electric drive for fluid transfer applications. Not approved for use in explosive atmospheres or hazardous (classified) locations unless otherwise stated. See Approvals page for more information. For professional use only.

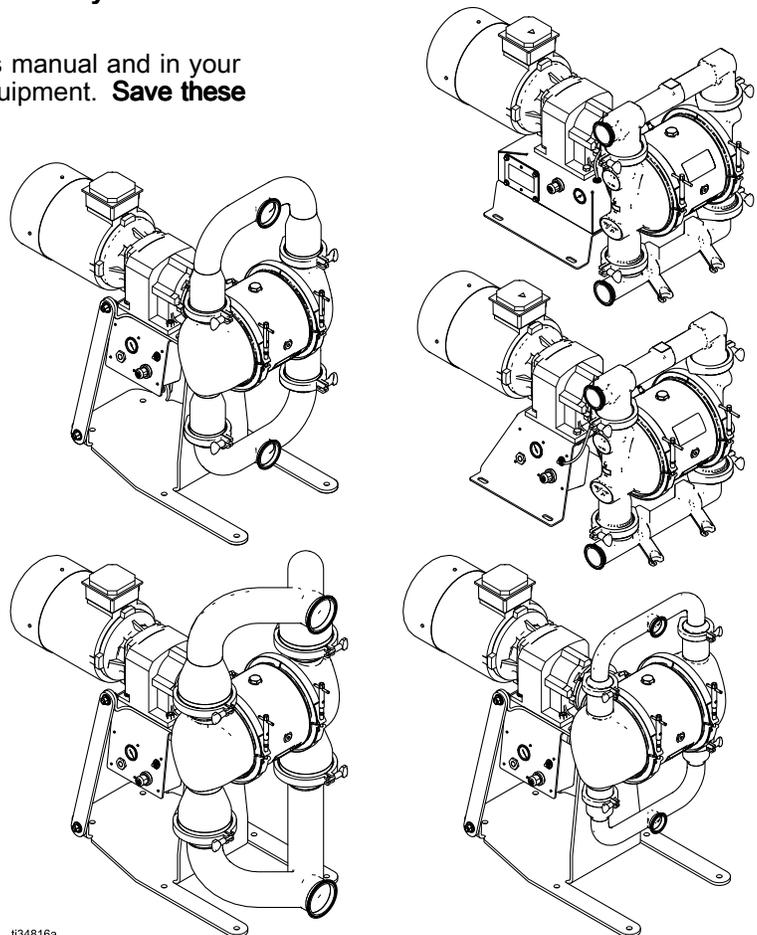


### Important Safety Instructions

Read all warnings and instructions in this manual and in your Repair/Parts manual before using the equipment. **Save these instructions.**

*See Technical Data on page 45 for model information, including Maximum Working Pressure.*

*See page 10 for approvals.*



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# Contents

Related Manuals .....	2	Leak Sensor Wiring .....	18
Warnings .....	3	Compressor Wiring .....	19
Pump Matrix for VA-EH50 Food Grade Pumps .....	6	Operation .....	20
Pump Matrix for VA-E2H52, VA-E2H53, and VA-E2H54 High Sanitary Pumps .....	8	Initial Configuration (AC with VFD) .....	20
Approvals .....	10	Sanitize the Pump Before First Use .....	20
Installation .....	11	Transfer Mode vs. Low Pulsation Mode .....	20
General Information .....	11	Start and Adjust the Pump .....	20
Tighten Connections Before First Use .....	11	Pressure Relief Procedure .....	21
Tips to Reduce Cavitation .....	11	Pump Shutdown .....	21
Typical Installation .....	12	Maintenance .....	22
Mount the Pump .....	14	Maintenance Schedule .....	22
Mount a Pump Without a Gearmotor .....	15	Lubrication .....	22
Ground The System .....	15	Tighten Connections .....	22
Air Line .....	16	Flushing and Storage .....	22
Fluid Suction and Outlet Lines .....	16	Performance Charts .....	23
Electrical Connections .....	17	Dimensions .....	35
		Technical Data .....	44

## Related Manuals

Manual Number	Title
859.0773	VERDERAIR Electric-Operated Diaphragm Pumps, Models VA-EH50, VA-E2H52, VA-E253, VA-E2H54, Repair/Parts

# 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.

 <span style="font-size: 2em; font-weight: bold; color: white;">DANGER</span>	
 	<p><b>SEVERE ELECTRIC SHOCK HAZARD</b></p> <p>This equipment can be powered by more than 240 V. Contact with this voltage will cause death or serious injury.</p> <ul style="list-style-type: none"> <li>Turn off and disconnect power at main switch before disconnecting any cables and before servicing equipment.</li> <li>This equipment must be grounded. 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> </ul>

 <span style="font-size: 2em; font-weight: bold; color: black;">WARNING</span>	
    	<p><b>FIRE AND EXPLOSION HAZARD</b></p> <p>Flammable fumes, such as solvent, in <b>work area</b> can ignite or explode. 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 sparking).</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 lines.</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> </ul>

 <h1 style="margin: 0;">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 fluid lines, 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 fluid lines and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.</li> <li>• Do not kink or over bend fluid lines or use fluid lines 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 style="margin: 0;">WARNING</h1>	
	<p><b>THERMAL EXPANSION HAZARD</b></p> <p>Fluids subjected to heat in confined spaces, including lines, 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 lines proactively at regular intervals based on your operating conditions.</li> </ul>
	<p><b>PLASTIC PARTS CLEANING SOLVENT HAZARD</b></p> <p>Many solvents can degrade plastic parts and cause them to fail, which could cause serious injury or property damage.</p> <ul style="list-style-type: none"> <li>• Use only compatible solvents to clean plastic structural or pressure-containing parts.</li> <li>• See <b>Technical Specifications</b> in all equipment manuals for materials of construction. Consult the solvent manufacturer for information and recommendations about compatibility.</li> <li>• See <b>Technical Data</b> in this and all other equipment instruction manuals. Read fluid and solvent manufacturer's Safety Data Sheet (SDS) and recommendations.</li> </ul>
	<p><b>TOXIC FLUID OR FUMES HAZARD</b></p> <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 Safety Data Sheet (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>
	<p><b>BURN HAZARD</b></p> <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>
	<p><b>PERSONAL PROTECTIVE EQUIPMENT</b></p> <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>

# Pump Matrix for VA-EH50 Food Grade Pumps

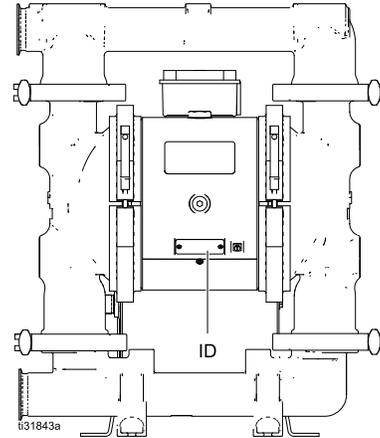
Check the identification plate (ID) for the Configuration Number of your pump. Use the following matrix to define the components of your pump.

When you receive your pump, record the 8 character part number found on the shipping box (e.g., 811.0018):

\_\_\_\_\_

Also record the configuration number on the pump ID plate to assist you when ordering replacement parts:

\_\_\_\_\_



Sample Configuration Number: **VA-EH50SA-STSPFT6ACFD21**

<b>VA-EH</b>	<b>50</b>	<b>S</b>	<b>A</b>	<b>ST</b>	<b>SP</b>	<b>TF</b>	<b>T6</b>	<b>AC</b>	<b>FD</b>	<b>21</b>
Pump Model	Pump Size	Wetted Parts	Center Section	Seats	Balls	Diaphragms	Connections	Drive	Options	Certifications

**NOTE:** Some combinations are not possible. Please check with your local supplier or the pump configurator on [www.verdeair.com](http://www.verdeair.com).

Pump	Pump Size		Wetted Parts		Center Section Material		Seat Material		Ball Material	
	<b>VA-EH</b>	<b>50</b>	50 mm	<b>S</b>	Stainless Steel	<b>A</b>	Aluminum	<b>SE</b>	Stainless Steel with EPDM o-rings	<b>NW</b>
					<b>S</b>	Stainless Steel	<b>ST</b>	Stainless Steel with PTFE o-rings	<b>SP</b>	Santoprene
									<b>TF</b>	PTFE

*Continued on next page*

Pump Matrix for VA-EH50 Food Grade Pumps

Diaphragm Material		Connections		Drive		Options		Certifications	
<b>SP</b>	Santoprene	<b>D6</b>	Stainless Steel, DIN 11851, 65 mm	<b>A1</b>	Standard AC Induction Motor (High Speed Gear Ratio) with 120V Air Compressor	<b>FD</b>	Food Grade	<b>21</b>	EN 10204 type 2.1
<b>TF</b>	PTFE/EPDM 2-Piece	<b>T6</b>	Stainless Steel, tri-clamp, 2.5 in.	<b>A2</b>	Standard AC Induction Motor (High Speed Gear Ratio) with 220V Air Compressor			<b>31</b>	EN 10204 type 3.1
				<b>AC</b>	Standard AC Induction Motor (High Speed Gear Ratio)				
				<b>AF★</b>	Flameproof AC Induction Motor (High Speed Gear Ratio)				
				<b>AX◆</b>	ATEX AC Induction Motor (High Speed Gear Ratio)				
				<b>B1</b>	Standard AC Induction Motor (Medium Speed Gear Ratio) with 120V Compressor				
				<b>B2</b>	Standard AC Induction Motor (Medium Speed Gear Ratio) with 220V Compressor				
				<b>BC</b>	Standard AC Induction Motor (Medium Speed Gear Ratio)				
				<b>BF★</b>	Flameproof AC Induction Motor (Medium Speed Gear Ratio)				
				<b>BX◆</b>	ATEX AC Induction Motor (Medium Speed Gear Ratio)				
				<b>C1</b>	Standard AC Induction Motor (Low Speed Gear Ratio) with 120V Compressor				
				<b>C2</b>	Standard AC Induction Motor (Low Speed Gear Ratio) with 220V Compressor				
				<b>CC</b>	Standard AC Induction Motor (Low Speed Gear Ratio)				
				<b>CF★</b>	Flameproof AC Induction Motor (Low Speed Gear Ratio)				
				<b>CX◆</b>	ATEX AC Induction Motor (Low Speed Gear Ratio)				
				<b>WG+</b>	No Motor, No Gearbox				

# Pump Matrix for VA-E2H52, VA-E2H53, and VA-E2H54 High Sanitary Pumps

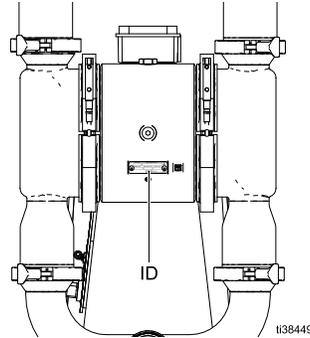
Check the identification plate (ID) for the Configuration Number of your pump. Use the following matrix to define the components of your pump.

When you receive your pump, record the 8 character part number found on the shipping box (e.g., 811.0018):

\_\_\_\_\_

Also record the configuration number on the pump ID plate to assist you when ordering replacement parts:

\_\_\_\_\_



Sample Configuration Number: **VA-E2H52XS-STTFTST5AXSB21**

<b>VA-E2H</b>	<b>52</b>	<b>X</b>	<b>S</b>	<b>ST</b>	<b>TF</b>	<b>TS</b>	<b>T5</b>	<b>AX</b>	<b>SB</b>	<b>21</b>
Pump Model	Pump Size	Wetted Parts	Center Section	Seats	Checks	Diaphragms	Connections	Drive	Options	Certifications

**NOTE:** Some combinations are not possible. Please check with your local supplier or the pump configurator on [www.verderair.com](http://www.verderair.com).

Pump	Pump Size		Wetted Parts		Center Section Material		Seat Material		Check Material	
	<b>VA-E2H</b>	<b>52</b>	50 mm (2-inch port)	<b>X</b>	High Sanitary, 3-A 0.8 µm	<b>S</b>	Stainless Steel	<b>SE</b>	Stainless Steel with EPDM seals	<b>BN</b>
	<b>53</b>	50 mm (3-inch port)	<b>Y</b>	Pharmaceutical 0.5 µm			<b>ST</b>	Stainless Steel with TF-EP seals	<b>NW</b>	Polychloroprene Weighted Ball
	<b>54</b>	50 mm (4-inch port)					<b>SB</b>	Stainless Steel with Buna-N seals	<b>FL</b>	Stainless Steel Flapper
							<b>SV</b>	Stainless Steel with FKM seals	<b>SP</b>	Santoprene Ball
									<b>TF</b>	PTFE Ball
									<b>VT</b>	FKM Ball

*Continued on next page*

Pump Matrix for VA-E2H52, VA-E2H53, and VA-E2H54 High Sanitary Pumps

Diaphragm Material		Connections		Drive		Options		Certifications			
<b>BN</b>	Buna-N	<b>D5</b>	Stainless Steel, DIN 11851, 50 mm	<b>A1</b>	Standard AC Induction Motor (High Speed Gear Ratio) with 120V Air Compressor	<b>3A</b>	3-A	<b>21</b>	EN 10204 type 2.1		
<b>EO</b>	EPDM Overmolded	<b>T5</b>	Stainless Steel, tri-clamp, 2.0 in.	<b>A2</b>	Standard AC Induction Motor (High Speed Gear Ratio) with 220V Air Compressor	<b>SB</b>	Hygienic ball	<b>31</b>	EN 10204 type 3.1		
<b>SP</b>	Santoprene	<b>D8</b>	Stainless Steel, DIN 11851, 80 mm	<b>AC</b>	Standard AC Induction Motor (High Speed Gear Ratio)	<b>SF</b>	Hygienic flapper				
<b>TS</b>	PTFE/Santoprene 2-Piece	<b>T8</b>	Stainless Steel, tri-clamp, 3.0 in.	<b>AF★</b>	Flameproof AC Induction Motor (High Speed Gear Ratio)						
<b>VT</b>	FKM	<b>D1</b>	Stainless Steel, DIN 11851, 100 mm	<b>AX◆</b>	ATEX AC Induction Motor (High Speed Gear Ratio)						
				<b>T1</b>	Stainless Steel, tri-clamp, 4.0 in.					<b>B1</b>	Standard AC Induction Motor (Medium Speed Gear Ratio) with 120V Compressor
				<b>B2</b>	Standard AC Induction Motor (Medium Speed Gear Ratio) with 220V Compressor						
				<b>BC</b>	Standard AC Induction Motor (Medium Speed Gear Ratio)						
				<b>BF★</b>	Flameproof AC Induction Motor (Medium Speed Gear Ratio)						
				<b>BX◆</b>	ATEX AC Induction Motor (Medium Speed Gear Ratio)						
				<b>C1</b>	Standard AC Induction Motor (Low Speed Gear Ratio) with 120V Compressor						
				<b>C2</b>	Standard AC Induction Motor (Low Speed Gear Ratio) with 220V Compressor						
				<b>CC</b>	Standard AC Induction Motor (Low Speed Gear Ratio)						
				<b>CF★</b>	Flameproof AC Induction Motor (Low Speed Gear Ratio)						
<b>CX◆</b>	ATEX AC Induction Motor (Low Speed Gear Ratio)										
				<b>WG+</b>	No Motor, No Gearbox						

# Approvals

Approvals		
◆ Pumps with motor code <b>X</b> are approved to:		II 2 G Ex h d IIB T3 Gb
✚ Pumps with motor code <b>WG</b> are approved to:		II 2 G Ex h IIB T3 Gb
★ Motors coded <b>F</b> are approved to:	 	Class I, Div 1, Group D, T3B Class II, Div 1, Group F & G, T3B
Diaphragm materials coded <b>EO</b> , <b>TF</b> , or <b>TS</b> combined with check materials coded <b>FL</b> or <b>TF</b> comply with:		EC 1935/2004
All Models (except gearbox and compressor code 1, or motor code <b>F</b> ) are approved to:		
Diaphragm materials coded <b>EO</b> or <b>TS</b> combined with check materials coded <b>FL</b> or <b>TF</b> comply with:		Class VI
All fluid contact materials are FDA-compliant and meet the United States Code of Federal Regulations (CFR)		

# Installation

				
<p>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.</p> <ul style="list-style-type: none"> <li>All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations</li> </ul>				

## General Information

Typical Installations are shown in [Figure 1, page 12](#) and [Figure 2](#). They are 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.

## Tighten Connections Before First Use

After you unpack the pump, and before you use it for the first time, check and tighten all pump clamps and fluid connections before operating the equipment. Replace worn or damaged parts as necessary.

## 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.

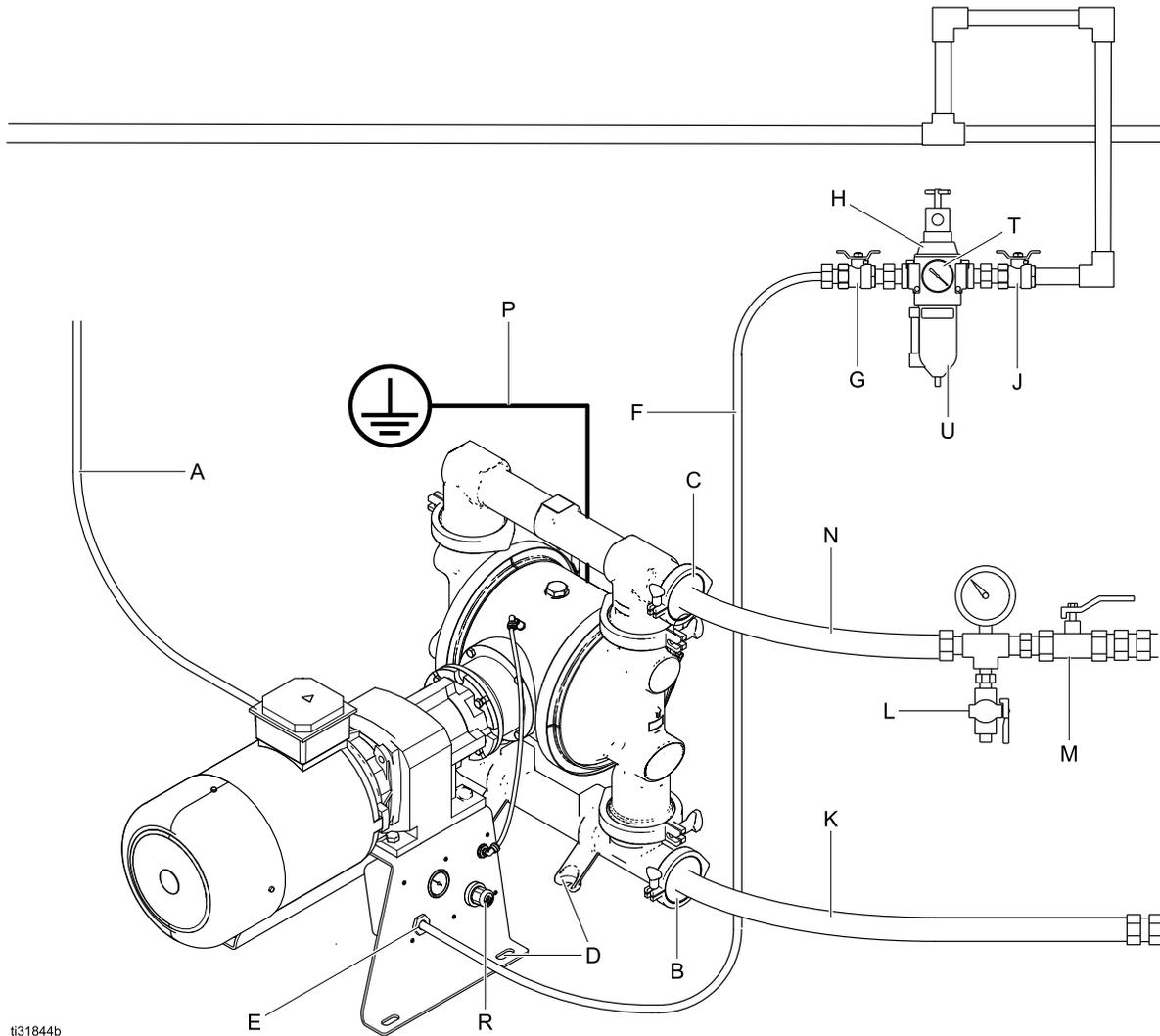
1. Reduce vapor pressure: Decrease the temperature of the pumped liquid.
2. Increase suction pressure:
  - a. Lower the installed position of the pump relative to the liquid level in the supply.
  - b. Reduce the friction length of the suction lines. Remember that fittings add friction length to the lines. Reduce the number of fittings to reduce the friction length.
  - c. Increase the diameter of the suction lines.
  - d. Ensure 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.

## Typical Installation



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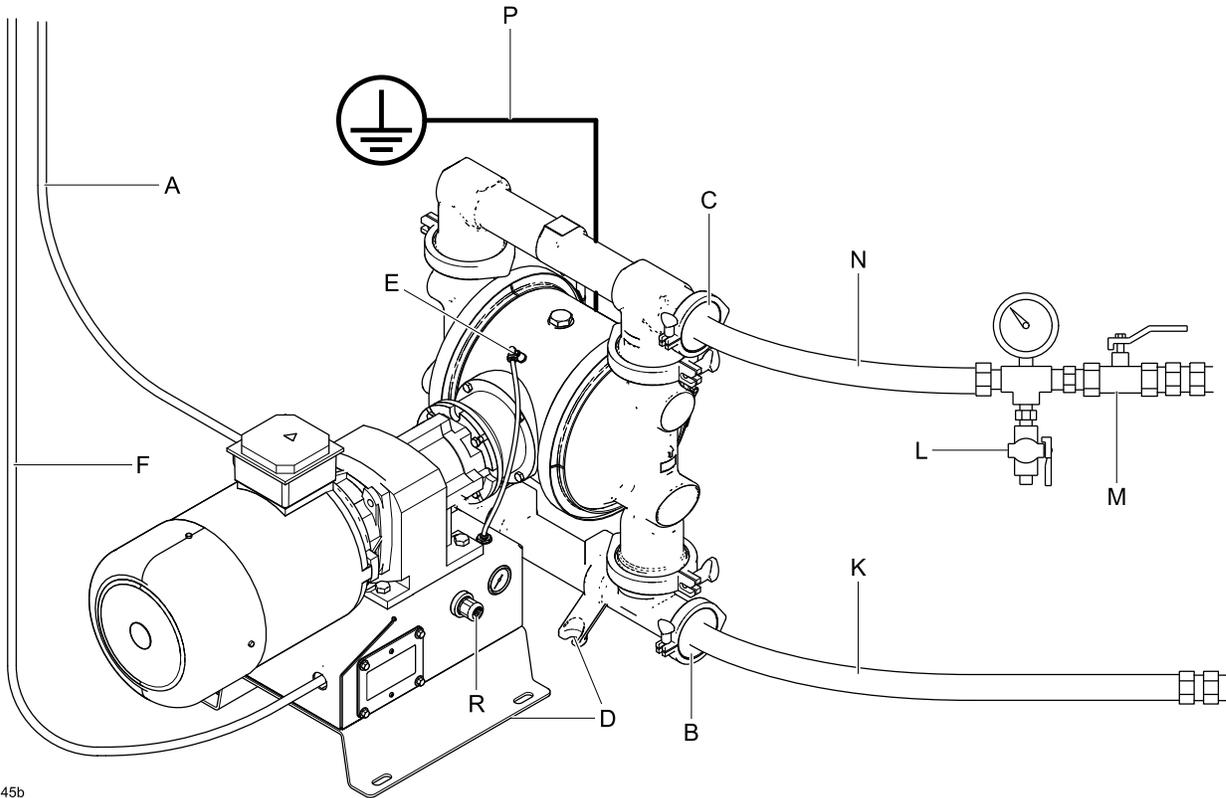
Figure 1 Typical Installation

### System Components

- B Fluid inlet port
- C Fluid outlet port
- D Mounting feet
- E Air inlet valve
- P Ground Screw
- R Center Section Regulator

### Accessories/Components Not Supplied

- A Power cord to VFD (required, not supplied)
- F Grounded, flexible air supply line (required, not supplied)
- G Bleed-type master air valve
- H Air regulator (required, not supplied)
- J Master air valve (for accessories)
- K Flexible fluid suction line (required, not supplied)
- L Fluid drain valve (may be required for your pump installation, not supplied)
- M Fluid shutoff valve (required, not supplied)
- N Flexible fluid outlet line (required, not supplied)
- T Air pressure gauge (required, not supplied)
- U Air line filter



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Figure 2 Typical installation of a pump with compressor

**System Components**

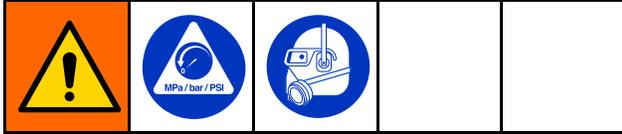
- B Fluid inlet port
- C Fluid outlet port
- D Mounting feet
- E Air inlet port
- P Pump Ground
- R Center section regulator

**Accessories/Components Not Supplied**

- A Power cord to VFD (required, not supplied)
- F Grounded, flexible air supply line (required, not supplied)
- K Flexible fluid suction line (required, not supplied)
- L Fluid drain valve (may be required for your pump installation, not supplied)
- M Fluid shutoff valve (required, not supplied)
- N Flexible fluid outlet line (required, not supplied)

## Mount the Pump

For pumps that are provided with a stand, the pump must be mounted to the stand before securing the pump to the mounting surface. Ensure that the pump is securely mounted to the stand.



The pump may be very heavy (see [Technical Data, page 44](#), for specific weights). If the pump must be moved, follow the [Pressure Relief Procedure, page 21](#), and have two people lift the pump by grasping the outlet manifold securely, or use appropriate lifting equipment. Never have one person move or lift the pump.

1. All pump models must be securely mounted to the floor. Ensure that the mounting surface is level and can support the weight of the pump, lines, and accessories, as well as the stress caused during operation.

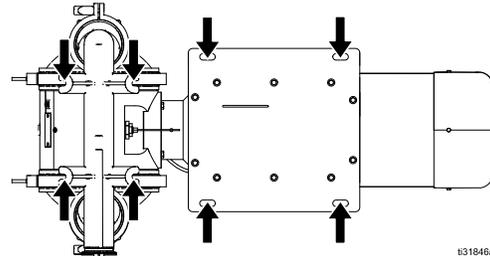
2. **VA-EH pumps:** Secure the pump with screws through the mounting feet and through the mounting bracket or compressor box on the gear box. See [Dimensions, page 35](#) for dimensions of mounting holes for your pump.

**VA-E2H pumps:** Ensure that the pump is securely mounted to the stand. Secure the pump with screws through the mounting bracket. Mount the pump and stand assembly on a level surface and secure the assembly to the mounting surface. See [Dimensions for VA-E2H52 Pumps](#), [Dimensions for VA-E2H53 Flapper Pumps](#), or [Dimensions for VA-E2H54 Flapper Pumps](#) as appropriate for dimensions of mounting holes for your pump.

**NOTE:** For ease of operation and service, mount the pump so the air valve cover, air inlet, and fluid inlet and outlet ports are easily accessible.

### NOTICE

To prevent pump damage, use all fasteners in all mounting holes.

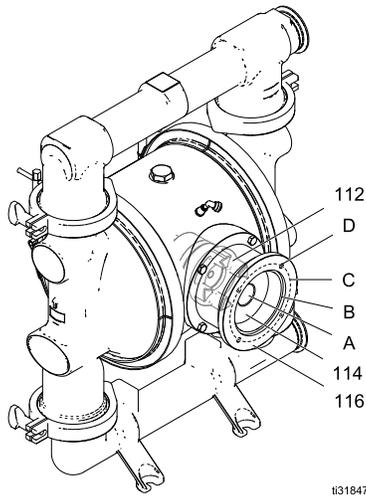


VA-EH pump fasteners shown

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## Mount a Pump Without a Gearmotor

A pump without a Verder gearbox and motor will require a mounting platform to provide support for the customer-supplied motor and gearbox and provide alignment with the pump alignment housing (116) and drive shaft (112) without putting strain on the mounting platform or pump. See [Dimensions, page 35](#) for assistance in fabricating a mounting platform.



REF	DESCRIPTION	DIMENSION
A	Gearbox coupler bore and keyway	35 mm/10 mm keyway
B	Flange pilot diameter	110 mm
C	Bolt circle diameter	130 mm
D	Mounting hole thread size	M8 x 1.25

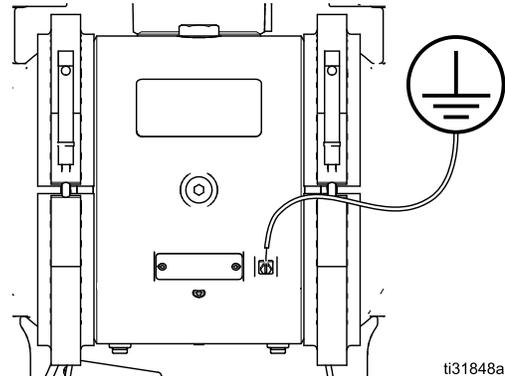
To specify a non-Verder gearbox, refer to the figure and table above.

## Ground The System

<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 codes and regulations.</li> </ul>				

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

- **Pump:** All pumps have a ground screw (P). Loosen the grounding screw. Insert one end of a 4 mm<sup>2</sup> (12 AWG) or thicker ground wire behind the ground screw and tighten the screw securely. Connect the clamp end of the grounding wire to a true earth ground. To order a ground wire and clamp, order part number 819.0157.



- **Motor:** Motors have a ground screw in the electrical box. Use it to ground the motor to the controller.
- **Air and Fluid Lines:** Use only conductive lines with a maximum of 150 m (500 ft) combined line length to ensure grounding continuity. Check electrical resistance of lines. If total resistance to ground exceeds 29 megohms, replace line immediately.
- **Fluid supply container:** Follow local codes and regulations.
- **Pails for solvents and sanitizing solution used when flushing:** Follow local codes and regulations. 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 a power source. Refer to the VFD manual for grounding instructions.

## Air Line

				
<p>A bleed-type master air valve (G) is required in the system to relieve air trapped between this valve and the pump. Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury, including splashing in the eyes or on the skin. See <a href="#">Typical Installation</a>.</p>				

### Models that Include a Compressor:

An air line is already connected from the compressor to the pump air inlet.

### Using Your Own Compressor:

Install a conductive, flexible air hose from the compressor to the pump air inlet (E).

### Using Shop Air:

1. Install an air regulator (H) and air line filter (U). 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 the other master air valve (J) upstream from all air line accessories and use it to isolate them during cleaning and repair.
4. Install a conductive, flexible air hose (F) between the accessories and the pump air inlet.

## Fluid Suction and Outlet Lines

For best sealing results, use a standard tri-clamp or DIN style sanitary gasket of a flexible material such as EPDM, Buna-N, fluoroelastomer, or silicone.

**NOTE:** Compliance with 3A sanitary standards requires DIN connections to use certain gaskets. See CCE Coordination Bulletin Number 2011-3.

1. Use flexible, conductive fluid lines (K and N).
2. Install a fluid drain valve (L) close to the fluid outlet. See [Typical Installation](#).

				
<p>A fluid drain valve (L) is required to relieve pressure in the fluid outlet line if it is plugged. The drain valve reduces the risk of serious injury, including splashing in the eyes or on the skin, when relieving pressure.</p>				

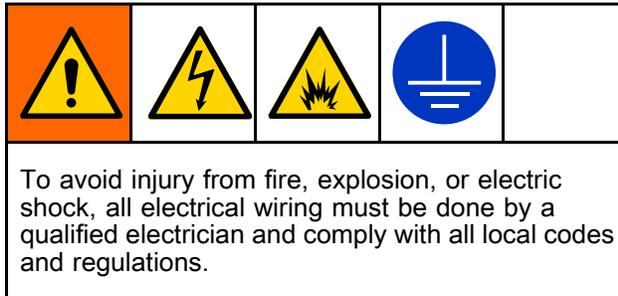
3. Install a shutoff valve (M) in the fluid outlet line (N) downstream from the fluid drain valve (L)..

**NOTE:** For best results, always install the pump as close as possible to the material source. See the [Technical Data, page 44](#) for maximum suction lift (wet and dry).

## NOTICE

The pump can be damaged if flexible fluid lines are not used. If hard-plumbed fluid lines are used in the system, use a short length of flexible, conductive fluid line to connect to the pump.

## Electrical Connections



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

Follow the instructions in the motor manufacturer's manual. Wire size, fuse size, and other electrical devices must comply with all local codes and regulations. The motor must be wired to the Variable Frequency Drive (VFD).

### Wire Connections at the Motor (Motor Code 1, 2, C)

Install the wiring at the motor as follows:

1. Open the motor's electrical box.
2. Install a strain relief in one of the ports at the bottom of the junction box.

3. Connect the green ground wire to the ground screw.
4. **NOTE:** For specific wiring instructions, see the instruction manual supplied with your drive.
5. Close the motor electrical box. Torque the bolts to 2.2 N•m (20 in-lb).

### Wire Connections at the ATEX Motor (Motor Code X)

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. **NOTE:** For specific wiring instructions, see the instruction manual supplied with your drive.
5. Torque terminals to 2.3 N•m (20 in-lb).
6. Close the motor electrical box. Torque the screws to 2.3 N•m (20 in-lb).
7. Connect thermostat wires P1 and P2 to external overload detection. Thermostat is NC (normally closed).

## Wire Connections at the Explosionproof Motor (Motor Code F)

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.

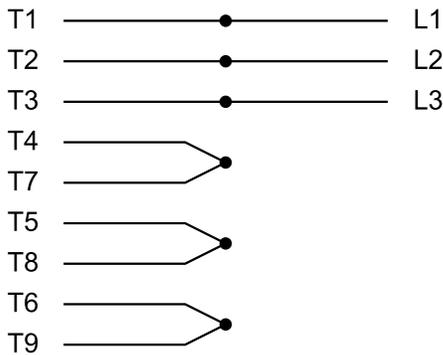


Figure 3 Connections for 460V Wiring

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

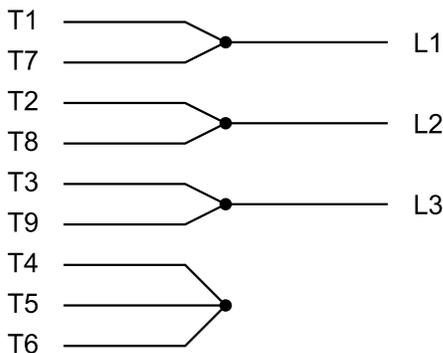


Figure 4 Connections for 230V Wiring

6. 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 2.3 N•m (20 in-lb).

## Leak Sensor Wiring

Follow these instructions to wire the Leak Sensor to a VFD.

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

1. Turn off power to the VFD.
2. Open the access cover on the VFD.
3. For a Verder VFD, perform the following:
  - a. Wire one lead to terminal 4 on the rail.
  - b. Wire a second lead to terminal 13A on the rail.
  - c. Close the access cover.
  - d. Turn on power to the VFD.
  - e. Go to screen P121.
  - f. Change the value to 21 and press the Mode button.
4. For a non-Verder VFD, perform the following:
  - a. Attach the two leads to the detection circuit in the VFD.
  - NOTE:** Refer to the VFD manual for proper connection points.
  - b. Close the access cover.
  - c. Turn on power to the VFD.
  - d. Configure the VFD to monitor the leak sensor circuit.
5. Refer to the VFD manual for information on how to configure the VFD to generate a fault or stop the pump when a leak is detected.

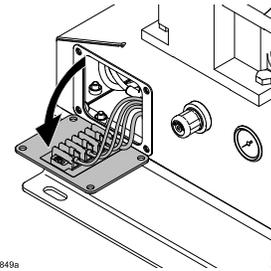
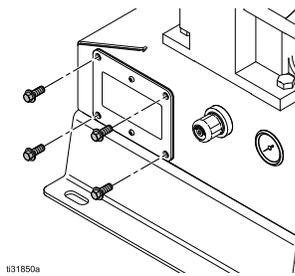
## Compressor Wiring

				
<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>				

Follow these instructions to wire Verder Compressor 859.0504 (120V) or 859.0505 (240V).

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

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

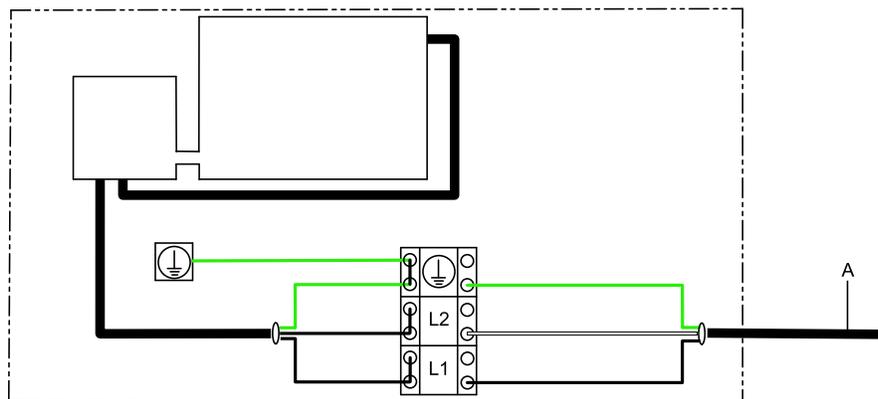


2. Install wiring system with proper connections (i.e. conduit/fittings, power cable/cable grip) to the compressor electrical box.
3. Connect line power (120VAC or 240 VAC, depending on your compressor) to L1 and L2/N.

Connect supply ground to . Torque terminals to 1.2 N•m (10 in-lb).

4. Reinstall the cover of the electrical box. Torque screws to 6.8 N•m (60 in-lb).

Figure 5



### KEY

A To power supply

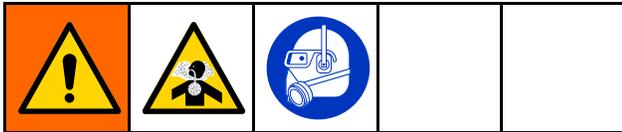
# Operation



## Initial Configuration (AC with VFD)

Configure the VFD according to the motor nameplate information.

## Sanitize the Pump Before First Use



**NOTE:** The pump was built and tested using a food grade lubricant.

Properly sanitize the pump before first use. The user must determine whether to disassemble and clean individual parts or simply flush the pump with a sanitizing solution.

To simply flush the pump with a sanitizing solution, follow the steps under [Start and Adjust the Pump, page 20](#) and [Flushing and Storage, page 22](#). To disassemble and clean individual parts, refer to the appropriate Repair manual.

## Transfer Mode vs. Low Pulsation Mode

When the center section air pressure is at least 0.7 bar (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 center section air pressure *equal* to the desired outlet fluid pressure. Use the center section regulator (R) to continue to adjust the center section air pressure relative to the outlet fluid pressure. Lower relative center section air pressures produce more pulsation damping. Higher relative center section 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 23](#).

## Start and Adjust the Pump

1. Confirm that the pump is properly grounded. See [Ground The System, page 15](#).
2. Check and tighten all pump clamps and fluid connections before operating the equipment. Replace worn or damaged parts as necessary.
3. Connect a flexible fluid suction line (K) from the fluid to be pumped to the pump fluid inlet port (B).
4. Connect the flexible fluid outlet line (N) to the pump fluid outlet port (C) and route the line to the end container.
5. Close the fluid drain valve (L).
6. Turn the air regulator (H) and center section regulator (R) knob to the lowest air pressure setting and open the bleed-type master air valve (G).
7. If the fluid outlet line (N) has a dispensing device, hold it open while continuing with the following step.
8. **VFD:** Set the desired frequency and press the start (run) button on the VFD.
9. To prime the pump, slowly increase air pressure with the air regulator (H) and center section regulator (R) until the pump starts to cycle. Do not exceed the maximum operating air pressure as listed in the [Technical Data, page 44](#). Allow the pump to cycle slowly until all air is pushed out of the fluid lines and fluid exits the outlet line (N).

**NOTE:** If the fluid inlet 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. Inlet fluid pressure higher than 25% of the outlet working pressure will also shorten diaphragm life. Approximately 0.21-0.34 bar (0.02-0.03 MPA, 3-5 psi) fluid inlet pressure should be adequate for most materials.

## Pressure Relief Procedure



Follow the Pressure Relief Procedure whenever you see this symbol.

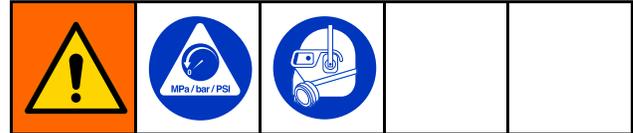


This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as splashing fluid, follow the Pressure Relief Procedure when you stop dispensing and before cleaning, checking, or servicing the equipment.

1. Turn off the pump and disconnect power to the system.
2. Close the master air valve (J) to shut off the air to the pump.

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 port (E) on the pneumatic enclosure.

## Pump Shutdown



At the end of the work shift, follow the [Pressure Relief Procedure, page 21](#).

Flush the pump if necessary. See [Flushing and Storage, page 22](#).

# Maintenance

## 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 pump. There is no need to add an inline lubricator under normal operating conditions.

The air valve is designed to operate unlubricated. If lubrication is desired, every 500 hours of operation (or monthly), remove the line from the pump air inlet and add two drops of machine oil to the air inlet. The pump is lubricated at the factory. It is designed to require no further lubrication for the life of the bearings.

### NOTICE

Do not over-lubricate the pump. Lubricant is exhausted through the muffler and could contaminate your fluid supply or other equipment. Excessive lubrication can also cause the pump to malfunction.

## Tighten Connections

Before each use, check and tighten all pump clamps and fluid connections before operating the equipment. Replace worn or damaged parts as necessary.

## 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.

- Flush before fluid can dry or freeze in the equipment, at the end of the day, before storing, and before repairing equipment.
- Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.
- Flush with a sanitizing solution that is compatible with the fluid being dispensed and the equipment wetted parts.
- Flushing schedule will vary based on particular uses.
- Always cycle the pump during the entire flushing process.

Always perform the [Pressure Relief Procedure, page 21](#) and flush the pump before storing it for any length of time.

1. Insert the suction tube into sanitizing solution.
2. Open air regulator (H) to supply low pressure air to the pump. Use the and center section regulator (R) to adjust the center section air pressure relative to the fluid outlet pressure.
3. **VFD:** Set the desired frequency and press the start (run) button on the VFD.
4. Run the pump for enough time to thoroughly clean the pump and lines.
5. Close the air regulator.
6. Turn off the pump and perform the [Pressure Relief Procedure, page 21](#).

### NOTICE

Store the pump at 0°C (32°F) or higher. Exposure to extreme low temperatures may result in damage to plastic parts.

# Performance Charts

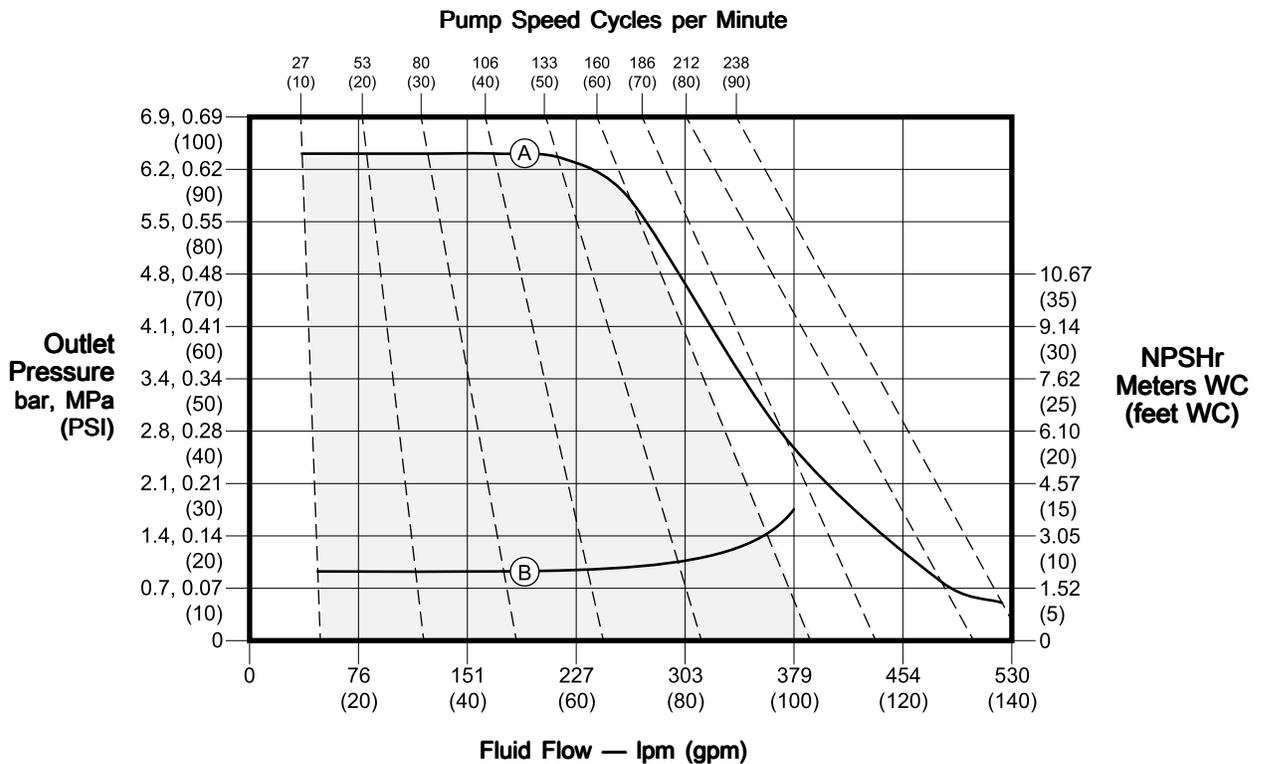
**Test Conditions:** The pump was tested in water with the inlet submerged. The air pressure was set at 7 bar (100 psi).

**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.

## High speed gear ratio VA-EH50 pumps with option AC, A1, A2, AX

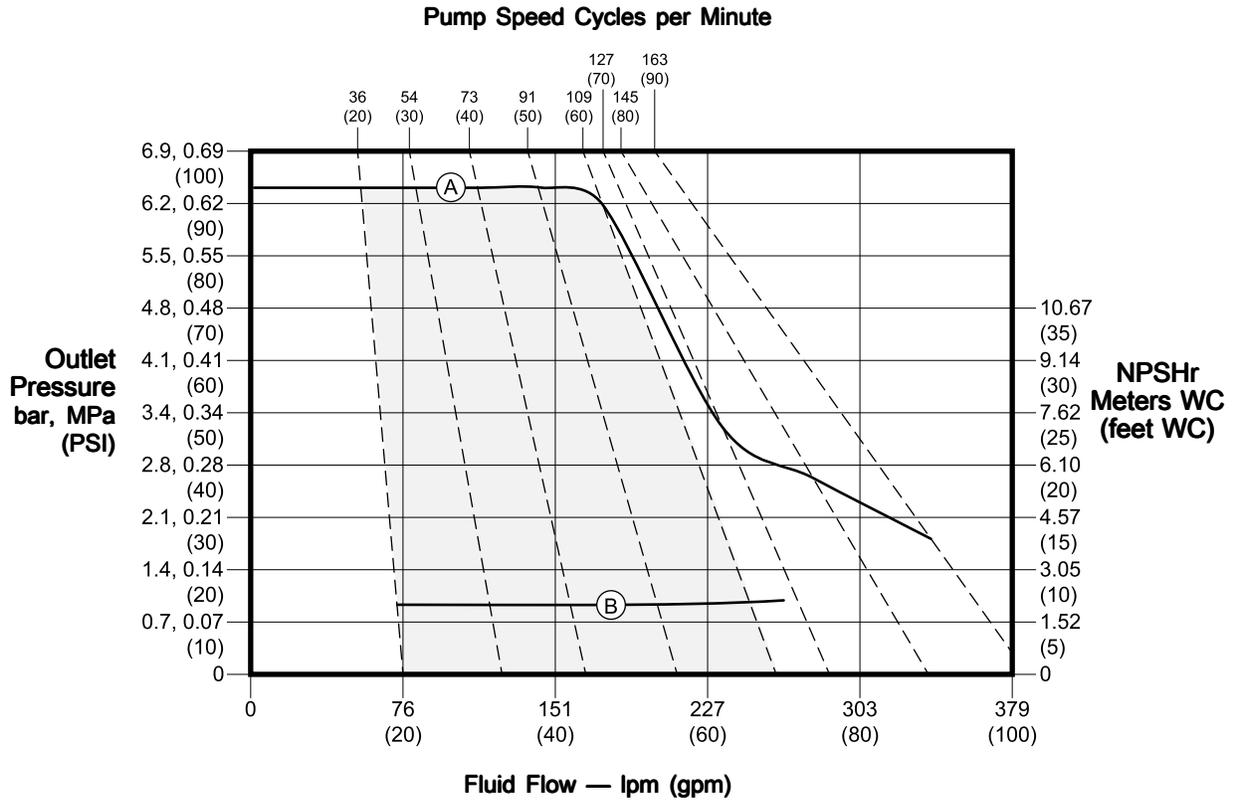


**KEY**

- A** Power Limit Curve
- B** Net Positive Suction Head Required

The shaded area is recommended for continuous duty.

### Medium speed gear ratio VA-EH50 pumps with option BC, B1, B2, BX

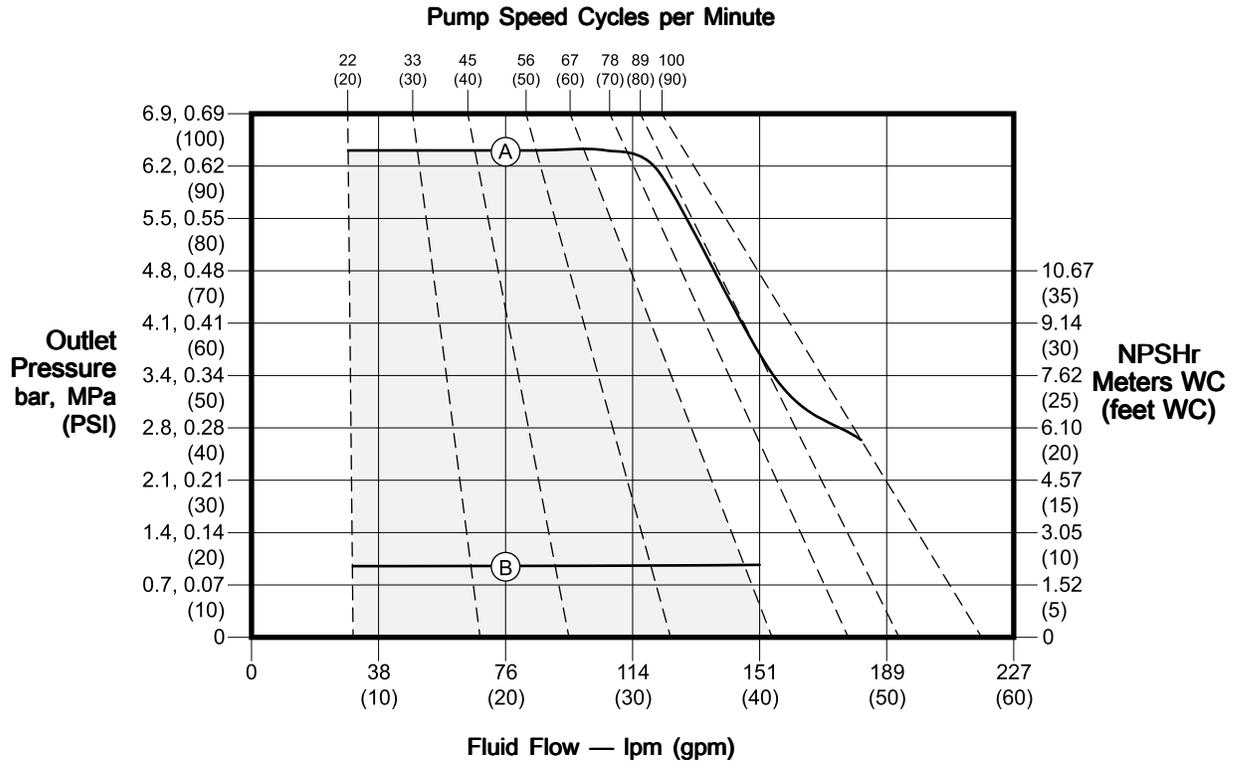


**KEY**

- A** Power Limit Curve
- B** Net Positive Suction Head Required

The shaded area is recommended for continuous duty.

### Low speed gear ratio VA-EH50 pumps with option CC, C1, C2, CX

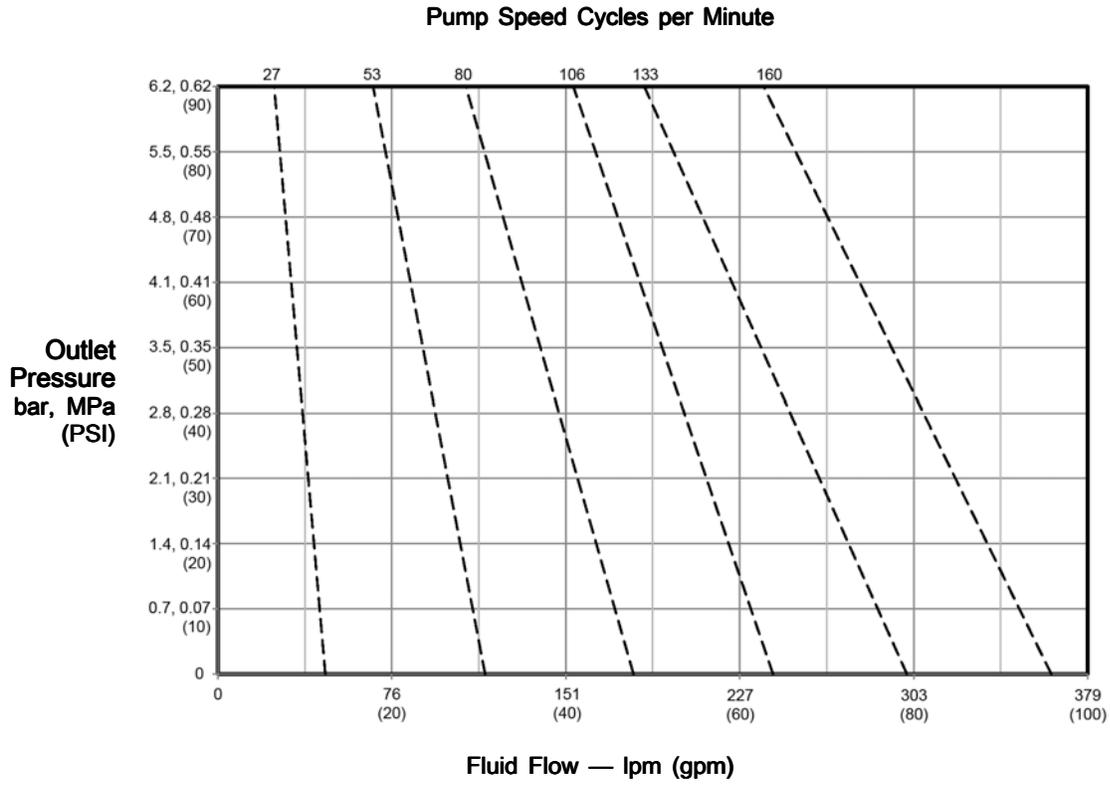


**KEY**

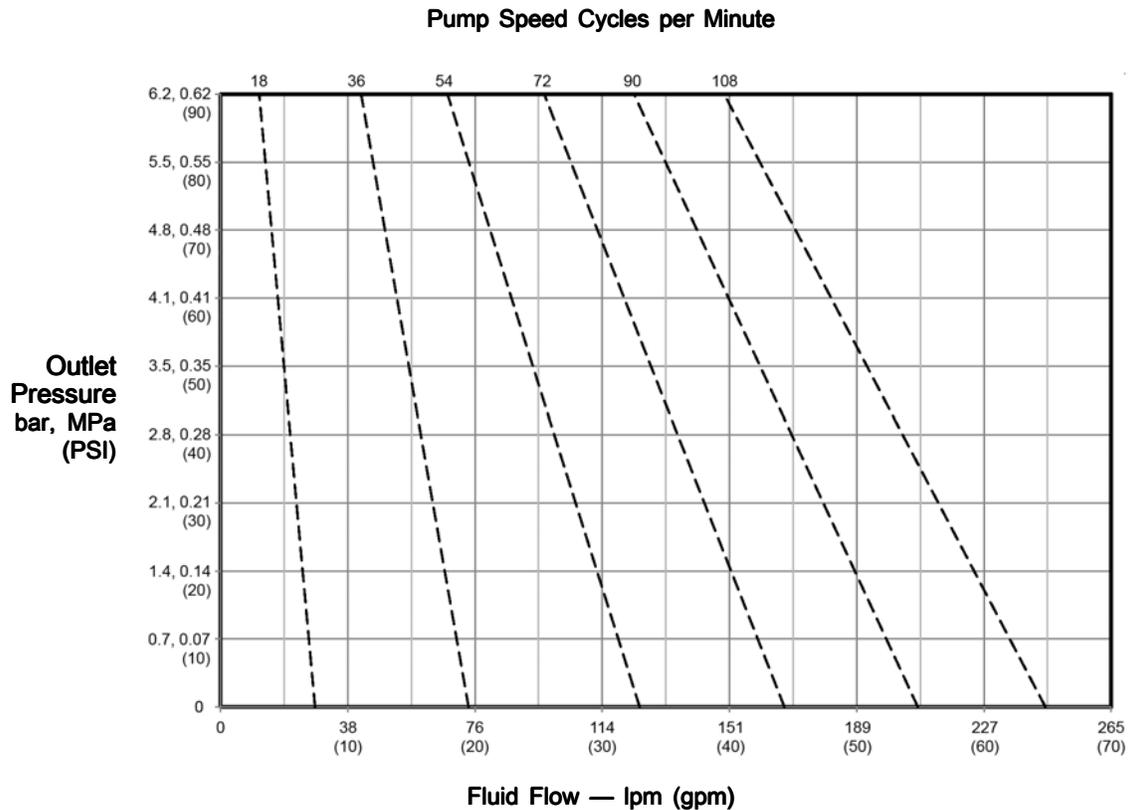
- A** Power Limit Curve
- B** Net Positive Suction Head Required

The shaded area is recommended for continuous duty.

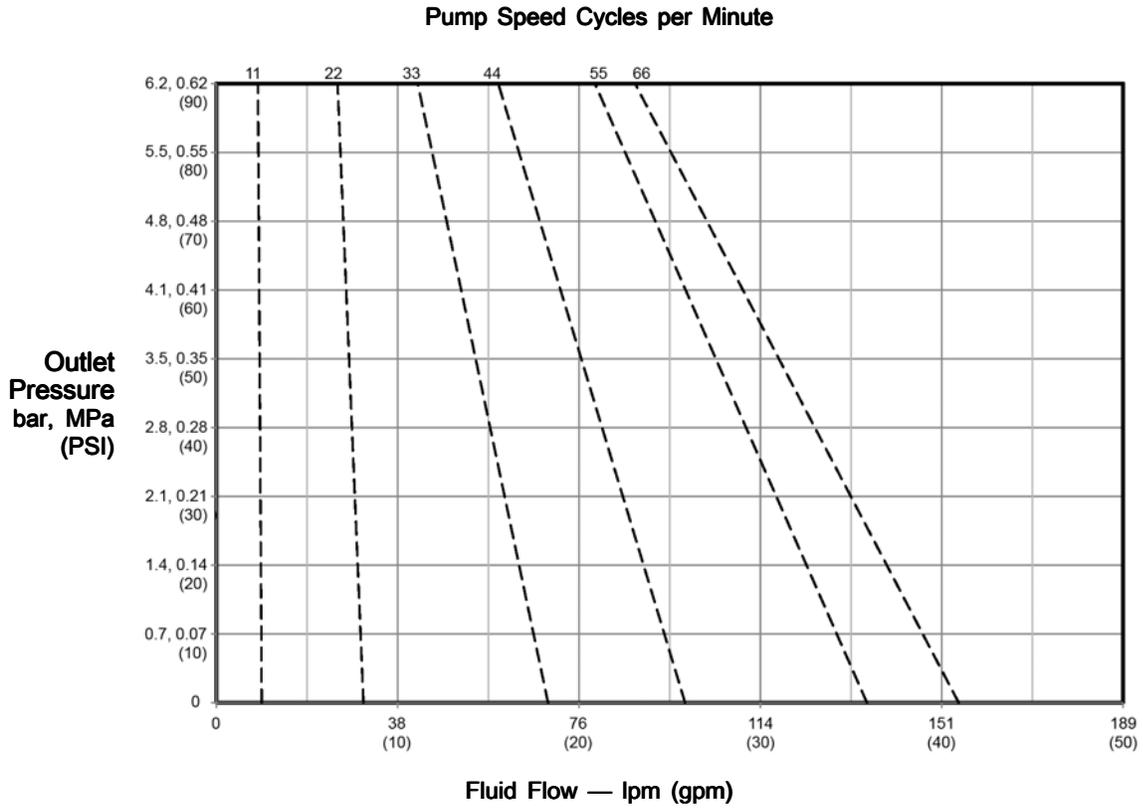
### High speed gear ratio VA-E2H52 pumps with option AC, A1, A2, AX



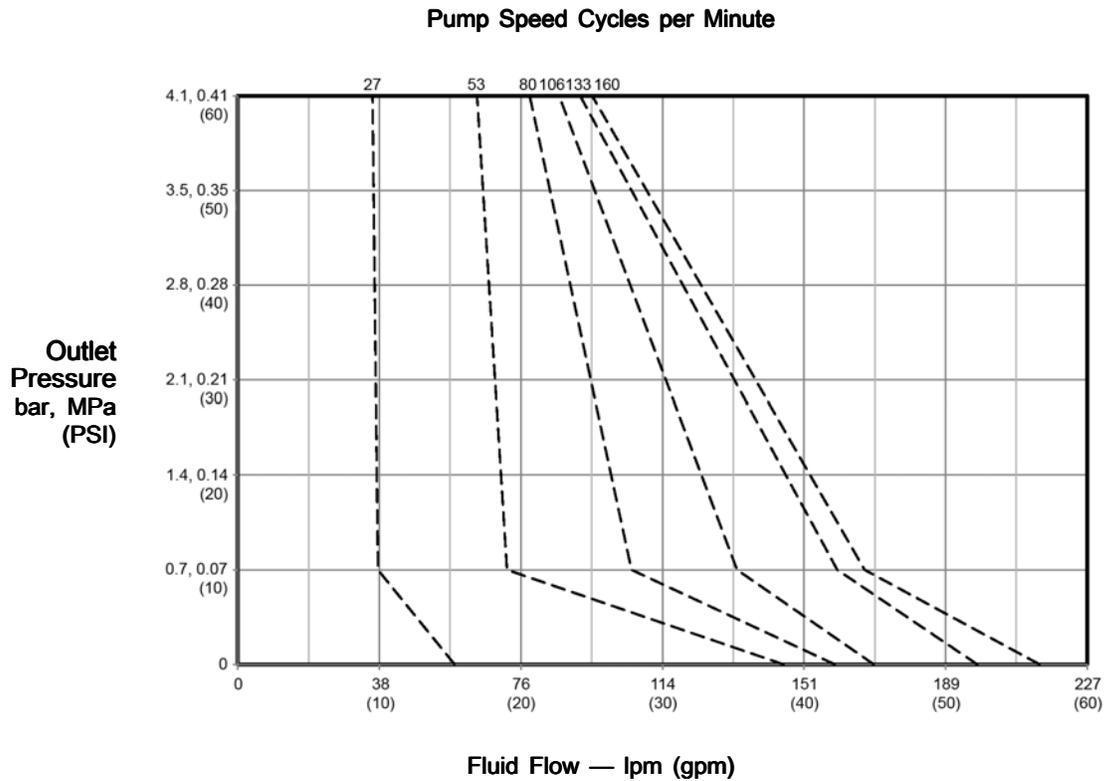
### Medium speed gear ratio VA-E2H52 pumps with option BC, B1, B2, BX



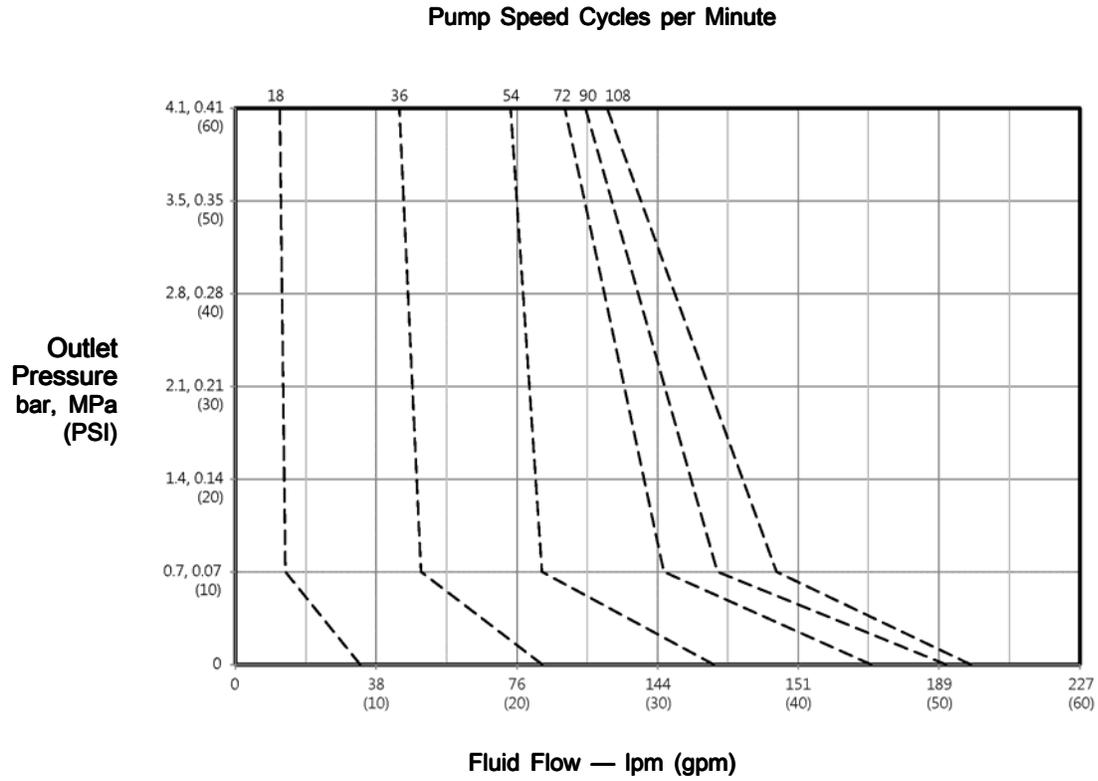
### Low speed gear ratio VA-E2H52 pumps with option CC, C1, C2, CX



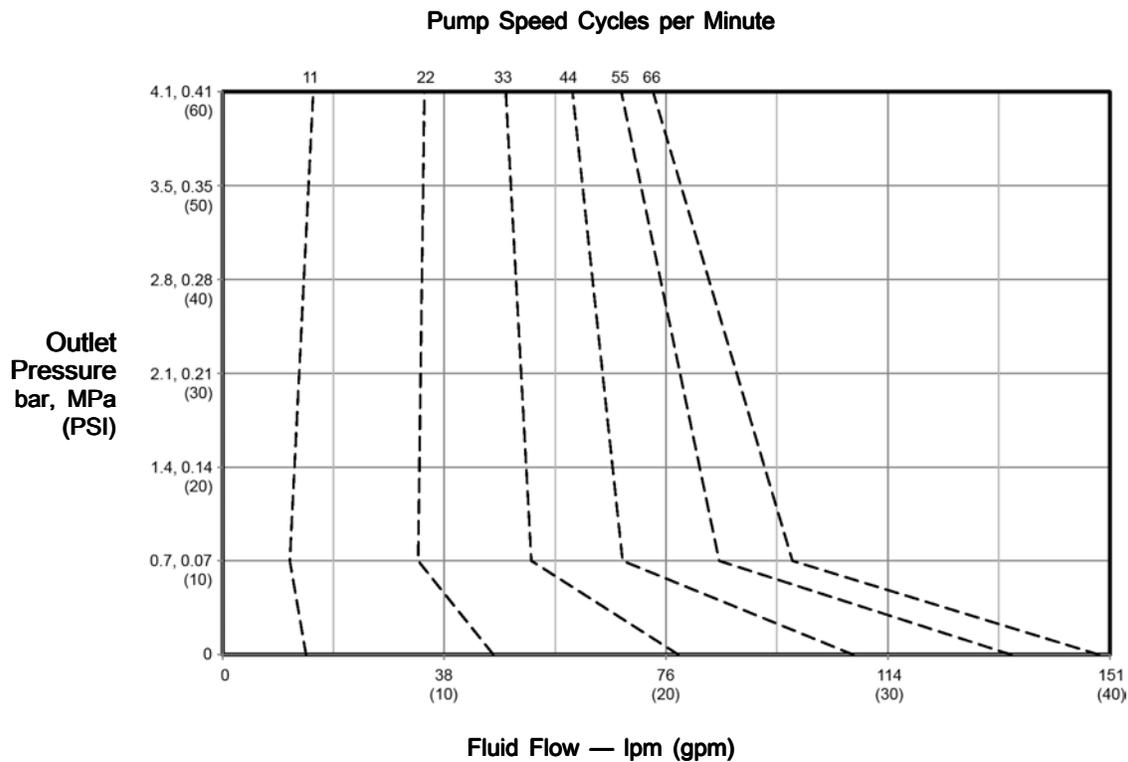
### High speed gear ratio VA-E2H53 pumps with option AC, A1, A2, AX



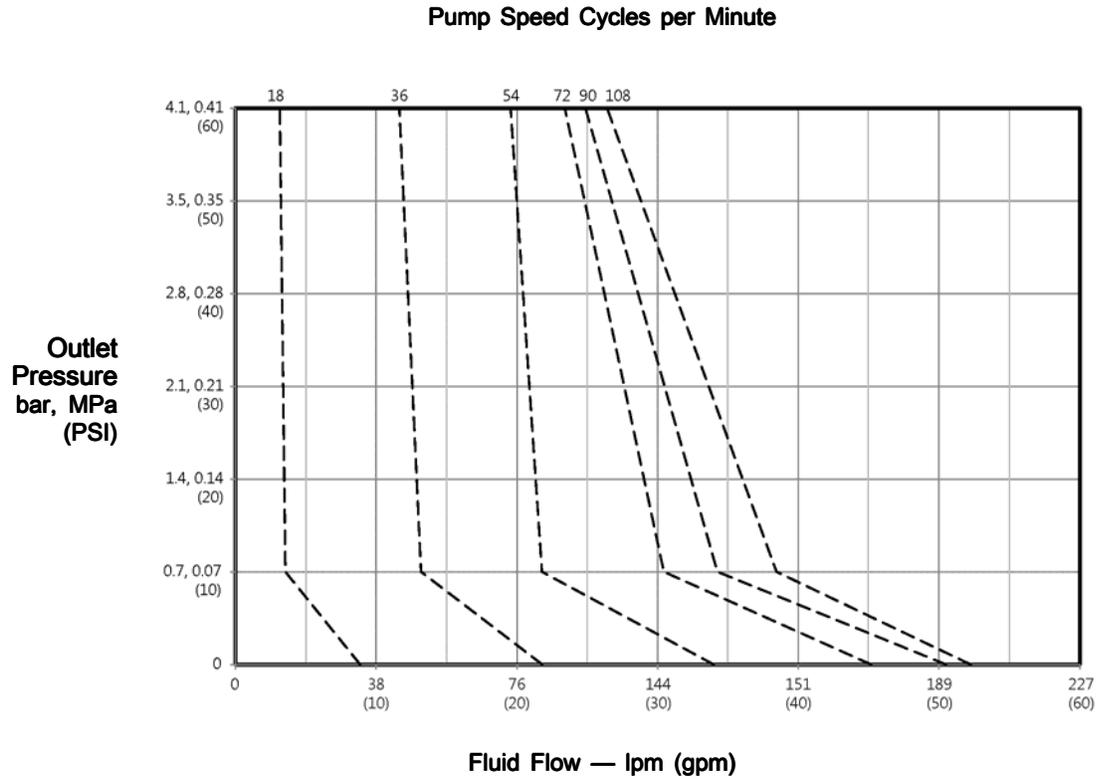
### Medium speed gear ratio VA-E2H53 pumps with option BC, B1, B2, BX



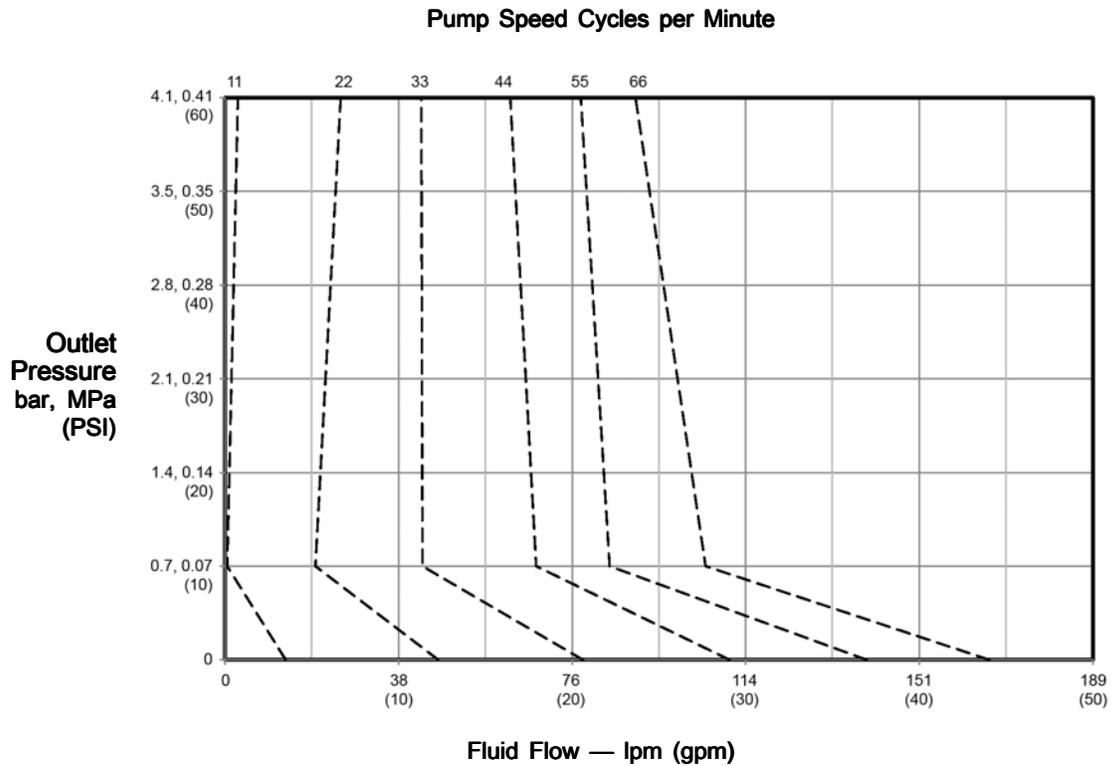
### Low speed gear ratio VA-E2H53 pumps with option CC, C1, C2, CX



### Medium speed gear ratio VA-E2H54 pumps with option BC, B1, B2, BX



### Low speed gear ratio VA-E2H54 pumps with option CC, C1, C2, CX



## 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 feet 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 you 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. 34 feet at sea level.

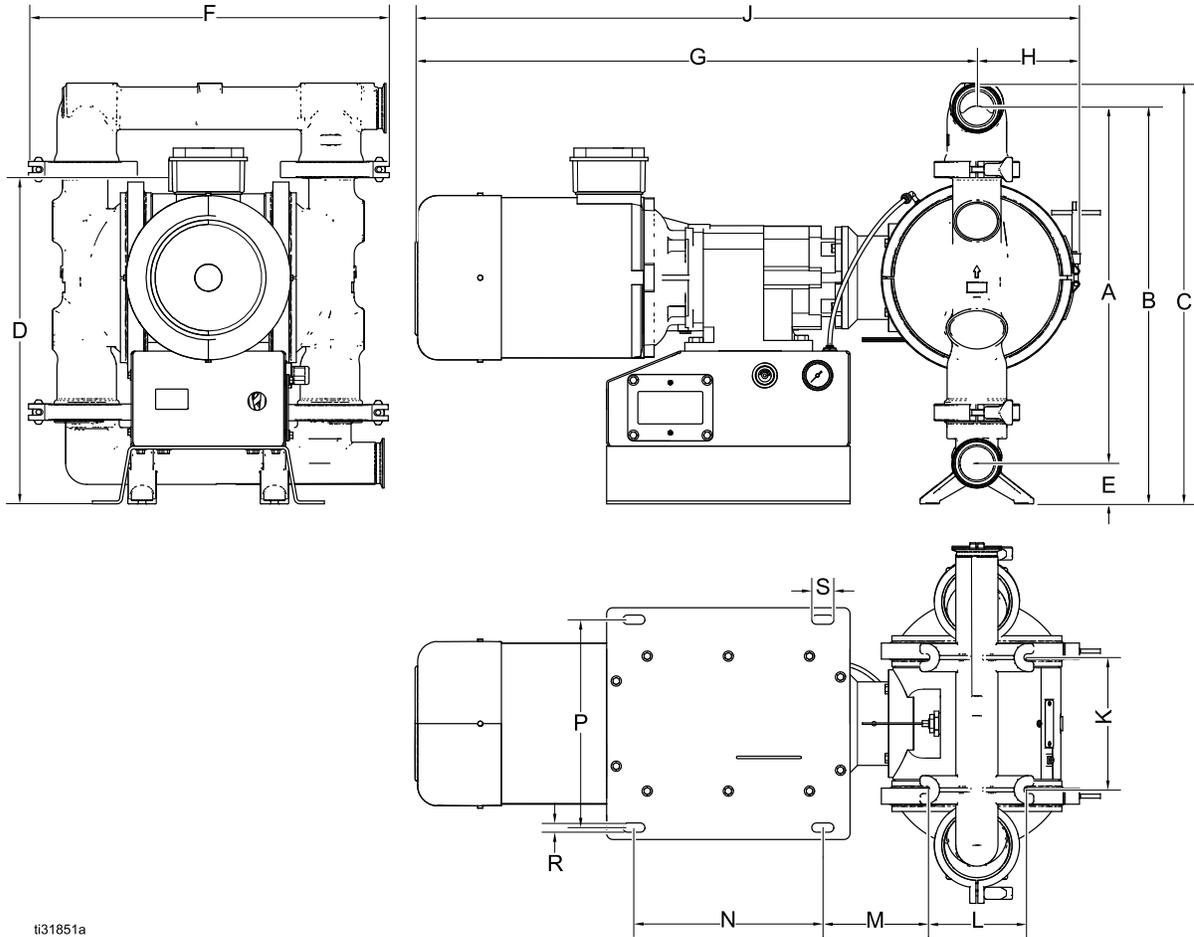
**H<sub>z</sub>** is the vertical distance in feet between the surface of the liquid in the supply tank and the centerline of the pump inlet. Value should be positive if the level is higher than the pump and negative if the level is lower than the pump. Always be sure to use the lowest level the liquid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

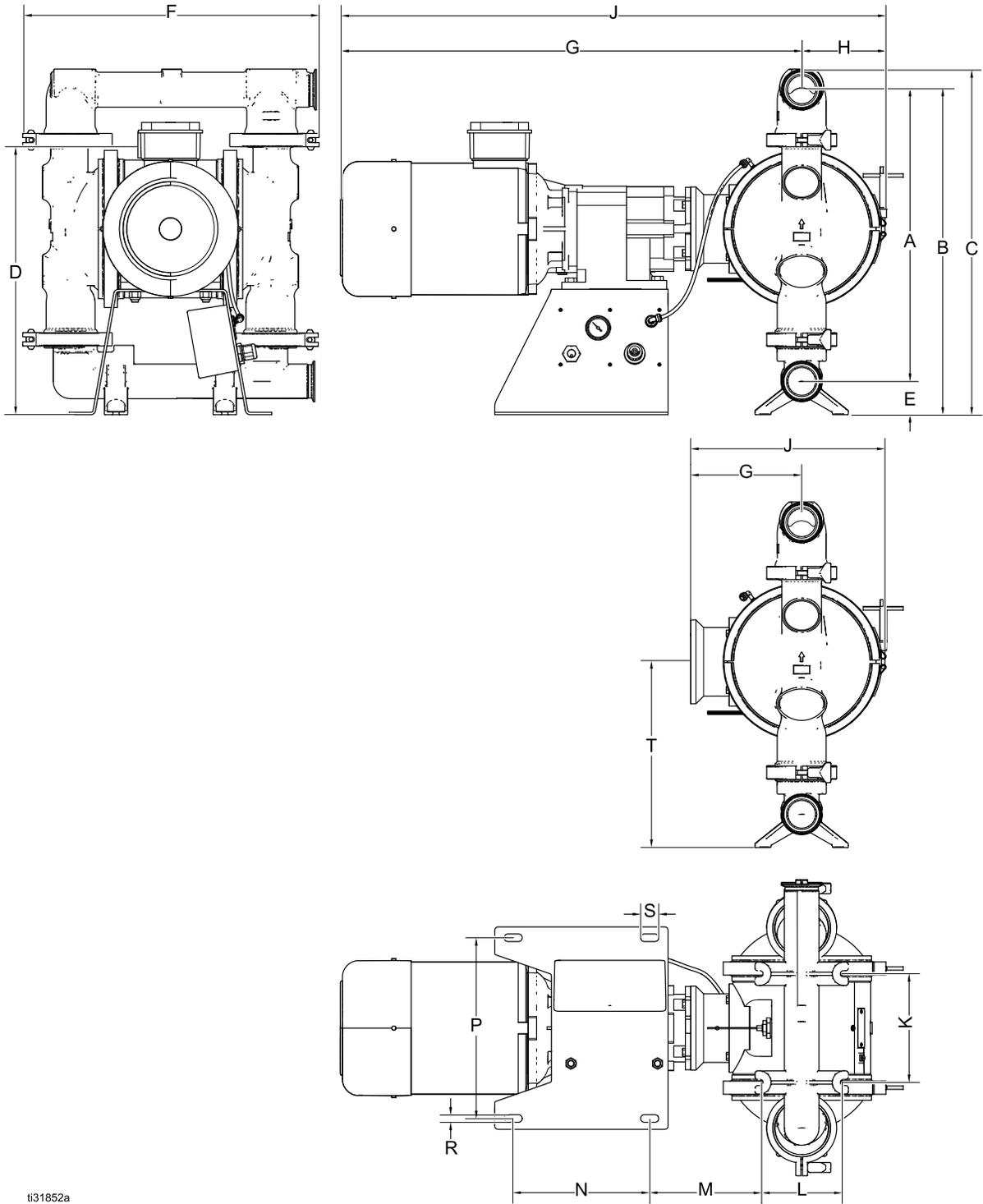
## Dimensions for VA-EH50 Pumps



ii31851a

Stainless steel VA-EH50 pump with compressor

Dimensions



ii31852a

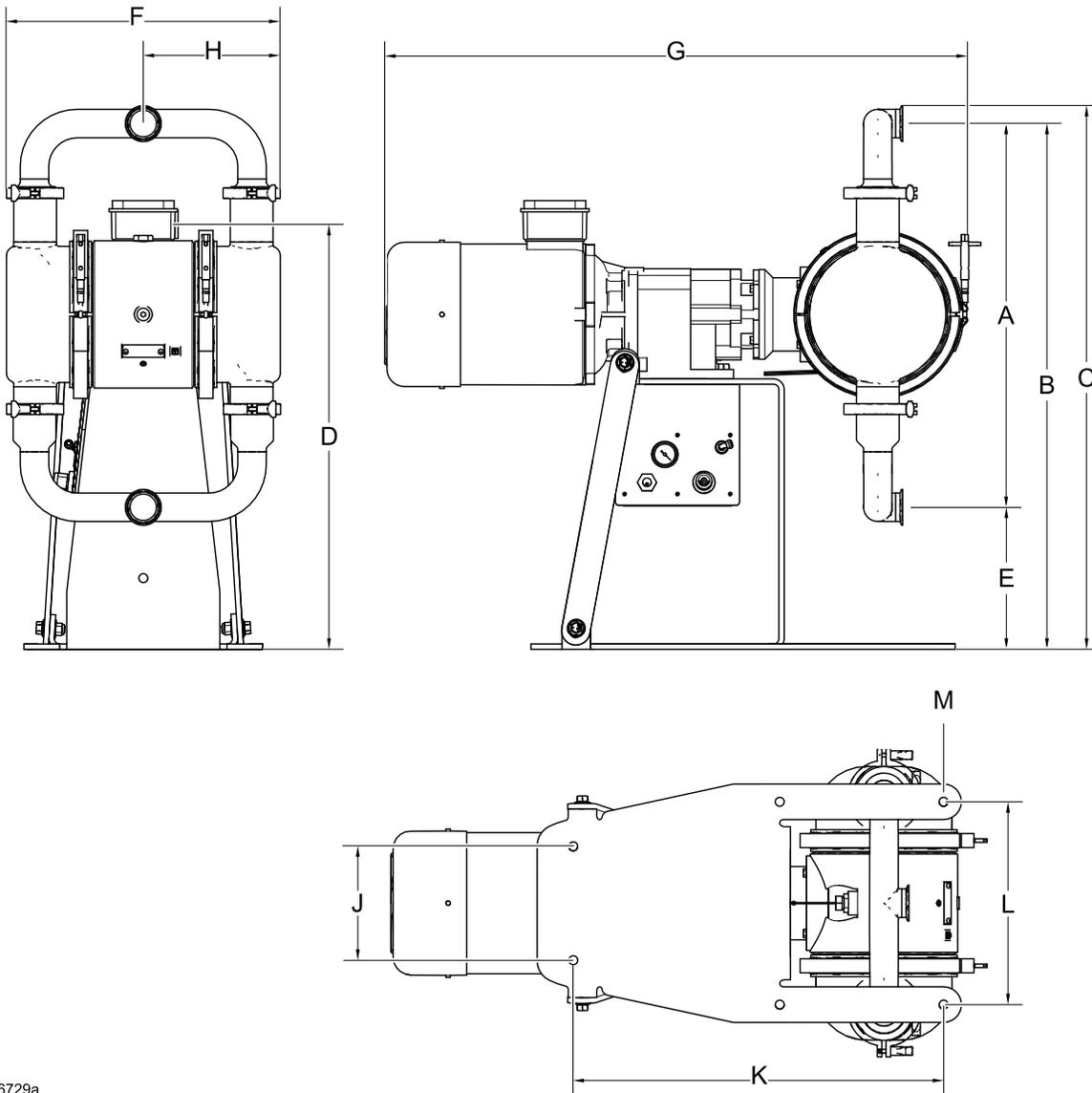
Stainless steel VA-EH50 pump without compressor

Table 1 Dimensions for VERDEAIR VA-EH50 Pumps

Ref.	Motor and Gearbox Code – Dimensions shown in cm (inches)												
	WG	AC	A1, A2	BC	B1, B2	CC	C1, C2	AX	BX	CX	AF	BF	CF
<b>A</b>	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)	55.6 (21.9)
<b>B</b>	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)	62.0 (24.4)
<b>C</b>	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)
<b>D</b>	---	51.3 (20.2)	51.3 (20.2)	49.3 (19.4)	49.3 (19.4)	48.3 (19.0)	48.3 (19.0)	53.8 (21.2)	51.8 (20.4)	51.8 (20.4)	34.3 (13.5)	35.3 (13.9)	26.4 (10.4)
<b>E</b>	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)	6.4 (2.5)
<b>F</b>	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)	55.9 (22.0)
<b>G</b>	21.1 (8.3)	87.9 (34.6)	87.9 (34.6)	81.8 (32.2)	81.8 (32.2)	77.2 (30.4)	77.2 (30.4)	105.2 (41.4)	88.6 (34.9)	86.1 (33.9)	111.3 (43.8)	95.3 (37.5)	95.0 (37.4)
<b>H</b>	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)
<b>J</b>	37.1 (14.6)	103.9 (40.9)	103.9 (40.9)	97.8 (38.5)	97.8 (38.5)	93.0 (36.6)	93.0 (36.6)	121.2 (47.7)	104.6 (41.2)	102.1 (40.2)	127.3 (50.1)	111.0 (43.7)	111.0 (43.7)
<b>K</b>	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)	20.8 (8.2)
<b>L</b>	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)	16.0 (6.3)
<b>M</b>	---	21.1 (8.3)	16.3 (6.4)	21.1 (8.3)	16.3 (6.4)	21.1 (8.3)	16.3 (6.4)	21.1 (8.3)	21.1 (8.3)	21.1 (8.3)	21.1 (8.3)	21.1 (8.3)	21.1 (8.3)
<b>N</b>	---	25.9 (10.2)	29.5 (11.6)	25.9 (10.2)	29.5 (11.6)	25.9 (10.2)	29.5 (11.6)	25.9 (10.2)	25.9 (10.2)	25.9 (10.2)	25.9 (10.2)	25.9 (10.2)	25.9 (10.2)
<b>P</b>	---	34.5 (13.6)	32.5 (12.8)	34.5 (13.6)	32.5 (12.8)	34.5 (13.6)	32.5 (12.8)	32.5 (12.8)	32.5 (12.8)	32.5 (12.8)	32.5 (12.8)	32.5 (12.8)	32.5 (12.8)
<b>R</b>	---	1.5 (0.6)	1.5 (0.6)	1.5 (0.6)	1.5 (0.6)	1.5 (0.6)	1.5 (0.6)	1.5 (0.6)	1.5 (0.6)	1.5 (0.6)	1.5 (0.6)	1.5 (0.6)	1.5 (0.6)
<b>S</b>	---	3.6 (1.4)	3.6 (1.4)	3.6 (1.4)	3.6 (1.4)	3.6 (1.4)	3.6 (1.4)	3.6 (1.4)	3.6 (1.4)	3.6 (1.4)	3.6 (1.4)	3.6 (1.4)	3.6 (1.4)
<b>T</b>	35.3 (13.9)	---	---	---	---	---	---	---	---	---	---	---	---

Dimensions

Dimensions for VA-E2H52 Pumps



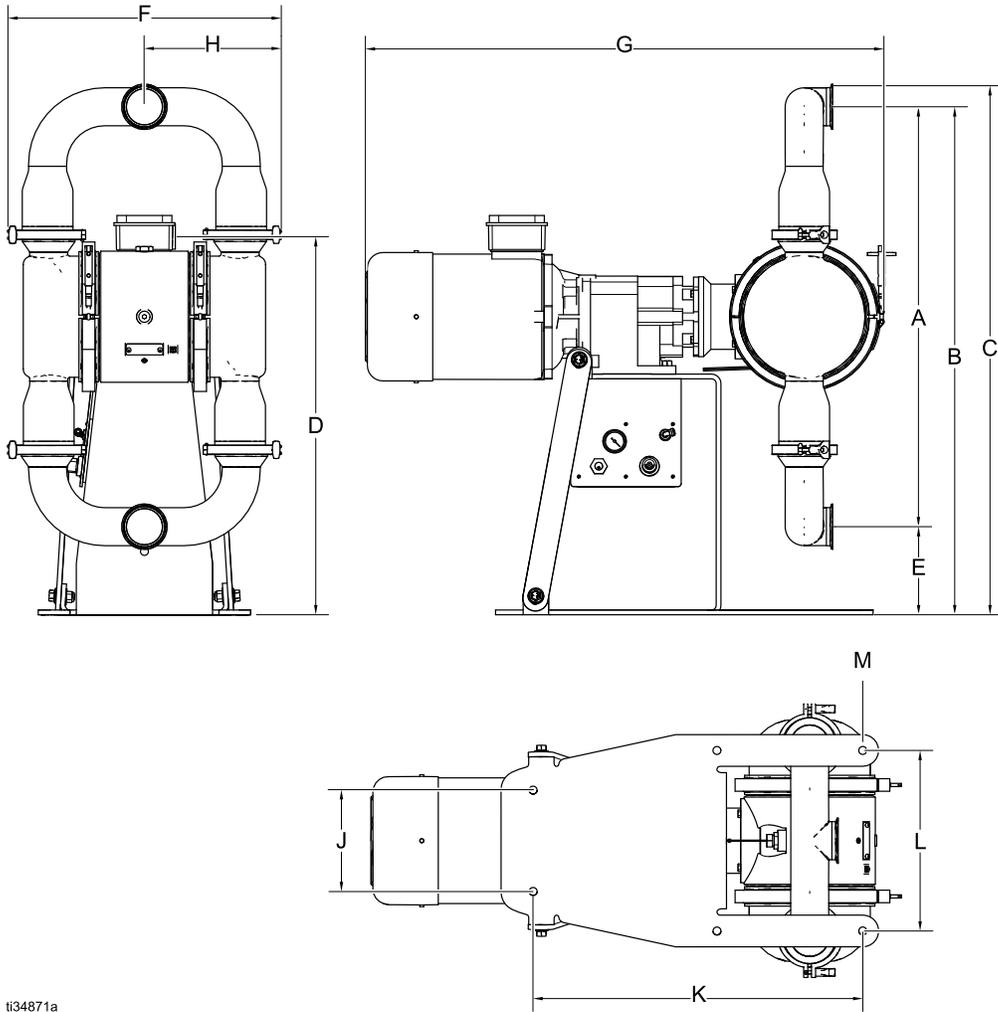
ti36729a

Stainless steel VA-E2H52 pump without compressor

Table 2 Dimensions for VERDERAIR VA-E2H52 Pumps

Ref.	Motor and Gearbox Code – Dimensions shown in cm (inches)					
	AC, A1, A2	BC, B1, B2	CC, C1, C2	AX	BX	CX
<b>A</b>	68.3 (26.9)	68.3 (26.9)	68.3 (26.9)	68.3 (26.9)	68.3 (26.9)	68.3 (26.9)
<b>B</b>	93.7 (36.9)	93.7 (36.9)	93.7 (36.9)	93.7 (36.9)	93.7 (36.9)	93.7 (36.9)
<b>C</b>	97.0 (38.2)	97.0 (38.2)	97.0 (38.2)	97.0 (38.2)	97.0 (38.2)	97.0 (38.2)
<b>D</b>	76.0 (29.8)	73.7 (29.0)	72.6 (28.6)	76.2 (30.0)	76.2 (30.0)	76.2 (30.0)
<b>E</b>	25.4 (10.0)	25.4 (10.0)	25.4 (10.0)	25.4 (10.0)	25.4 (10.0)	25.4 (10.0)
<b>F</b>	48.8 (19.2)	48.8 (19.2)	48.8 (19.2)	48.8 (19.2)	48.8 (19.2)	48.8 (19.2)
<b>G</b>	104.1 (41.0)	98.0 (38.6)	94.0 (37.0)	121.4 (47.8)	104.9 (41.3)	102.4 (40.3)
<b>H</b>	24.4 (9.6)	24.4 (9.6)	24.4 (9.6)	24.4 (9.6)	24.4 (9.6)	24.4 (9.6)
<b>J</b>	20.3 (8.0)	20.3 (8.0)	20.3 (8.0)	20.3 (8.0)	20.3 (8.0)	20.3 (8.0)
<b>K</b>	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)
<b>L</b>	36.3 (14.3)	36.3 (14.3)	36.3 (14.3)	36.3 (14.3)	36.3 (14.3)	36.3 (14.3)
<b>M</b>	Ø1.6 (0.63)	Ø1.6 (0.63)	Ø1.6 (0.63)	Ø1.6 (0.63)	Ø1.6 (0.63)	Ø1.6 (0.63)

### Dimensions for VA-E2H53 Flapper Pumps



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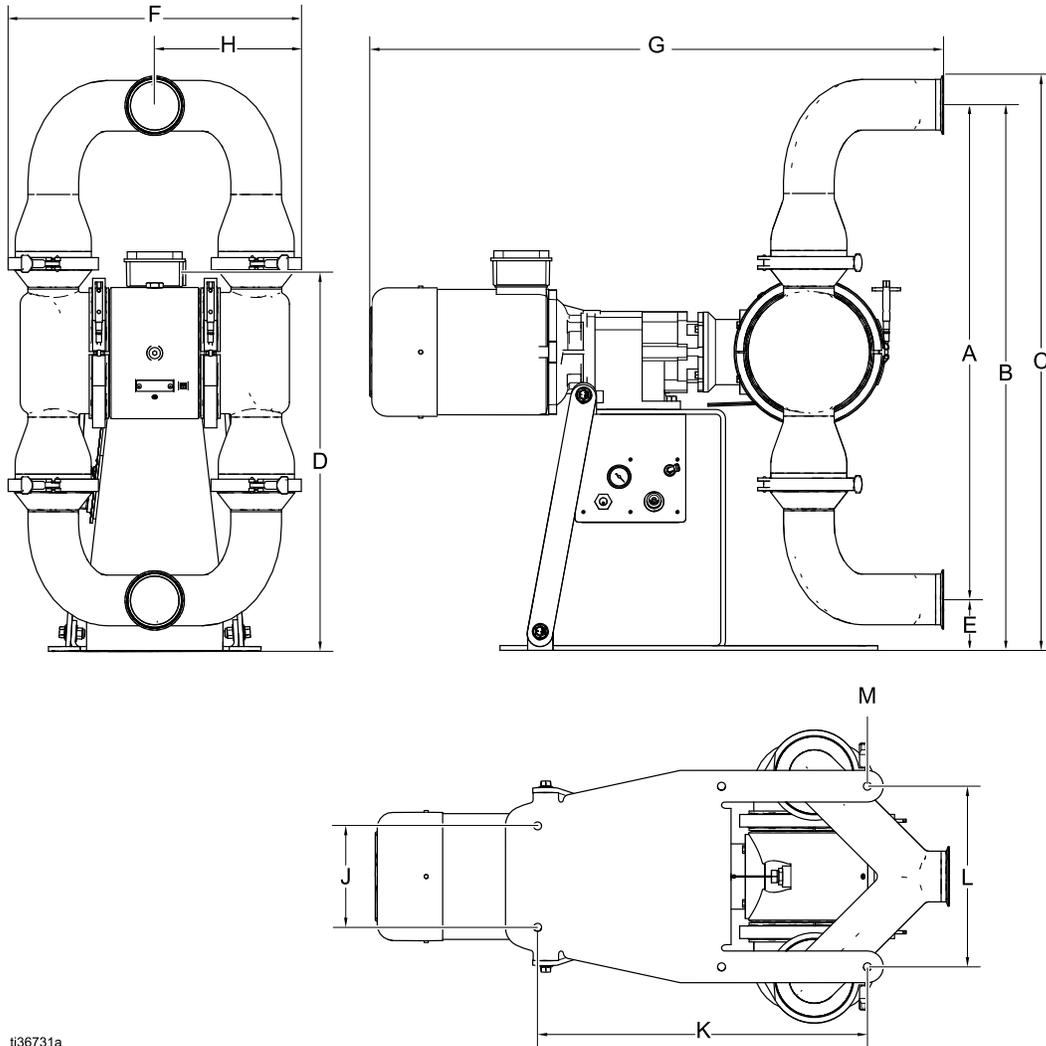
VA-E2H53 Pump without compressor

Table 3 Dimensions for VERDERAIR VA-E2H53 Pump

Ref.	Motor and Gearbox Code – Dimensions shown in cm (inches)					
	AC, A1, A2	BC, B1, B2	CC, C1, C2	AX	BX	CX
<b>A</b>	84.0 (33.1 )	84.0 (33.1 )	84.0 (33.1 )	84.0 (33.1)	84.0 (33.1)	84.0 (33.1)
<b>B</b>	101.9 (40.1)	101.9 (40.1)	101.9 (40.1)	101.9 (40.1)	101.9 (40.1)	101.9 (40.1)
<b>C</b>	106.4 (41.9)	106.4 (41.9)	106.4 (41.9)	106.4 (41.9)	106.4 (41.9)	106.4 (41.9)
<b>D</b>	76.0 (29.8)	73.7 (29.0 )	72.6 (28.6)	78.2 (30.8)	76.2 (30.0)	76.2 (30.0)
<b>E</b>	17.8 (7.0)	17.8 (7.0)	17.8 (7.0)	17.8 (7.0)	17.8 (7.0)	17.8 (7.0)
<b>F</b>	52.1 (20.5)	52.1 (20.5)	52.1 (20.5)	52.1 (20.5)	52.1 (20.5)	52.1 (20.5)
<b>G</b>	104.1 (41.0)	98.0 (38.6)	94.0 (37.0)	121.4 (47.8)	104.9 (41.3)	102.4 (40.3)
<b>H</b>	26.2 (10.3)	26.2 (10.3)	26.2 (10.3)	26.2 (10.3)	26.2 (10.3)	26.2 (10.3)
<b>J</b>	20.3 (8.0)	20.3 (8.0)	20.3 (8.0)	20.3 (8.0)	20.3 (8.0)	20.3 (8.0)
<b>K</b>	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)
<b>L</b>	36.3 (14.3)	36.3 (14.3)	36.3 (14.3)	36.3 (14.3)	36.3 (14.3)	36.3 (14.3)
<b>M</b>	Ø1.6 (0.63)	Ø1.6 (0.63)	Ø1.6 (0.63)	Ø1.6 (0.63)	Ø1.6 (0.63)	Ø1.6 (0.63)

Dimensions

Dimensions for VA-E2H54 Flapper Pumps



ti36731a

VA-E2H54 pump without compressor

Table 4 Dimensions for VERDERAIR VA-E2H54 Flapper Pump

Ref.	Motor and Gearbox Code – Dimensions shown in cm (inches)			
	BC, B1, B2	CC, C1, C2	BX	CX
<b>A</b>	99.1 (39.0)	99.1 (39.0)	99.1 (39.0)	99.1 (39.0)
<b>B</b>	109.2 (43.0)	109.2 (43.0)	109.2 (43.0)	109.2 (43.0)
<b>C</b>	115.3 (45.4)	115.3 (45.4)	115.3 (45.4)	115.3 (45.4)
<b>D</b>	73.7 (29.0)	72.6 (28.6)	76.2 (30.0)	76.2 (30.0)
<b>E</b>	10.2 (4.0)	10.2 (4.0)	10.2 (4.0)	10.2 (4.0)
<b>F</b>	58.7 (23.1)	58.7 (23.1)	58.7 (23.1)	58.7 (23.1)
<b>G</b>	98.0 (38.6 )	94.0 (37.0)	104.9 (41.3)	102.4 (40.3)
<b>H</b>	29.5 (11.6)	29.5 (11.6)	29.5 (11.6)	29.5 (11.6)
<b>J</b>	20.3 (8.0)	20.3 (8.0)	20.3 (8.0)	20.3 (8.0)
<b>K</b>	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)	66.0 (26.0)
<b>L</b>	36.3 (14.3 )	36.3 (14.3 )	36.3 (14.3)	36.3 (14.3)
<b>M</b>	Ø1.6 (0.63)	Ø1.6 (0.63)	Ø1.6 (0.63)	Ø1.6 (0.63)

# Technical Data

VERDERAIR Electric-Operated Diaphragm Pumps, Models VA-EH50, VA-E2H52, VA-E2H53, VA-E2H54		
	US	Metric
Maximum fluid working pressure		
VA-EH50, VA-E2H52	100 psi	0.69 MPa, 6.9 bar
VA-E2H53, VA-E2H54	60 psi	0.41 MPa, 4.1 bar
Air pressure operating range		
VA-EH50, VA-E2H52	20 to 100 psi	0.14 to 0.69 MPa, 1.4 to 6.9 bar
VA-E2H53, VA-E2H54	20 to 60 psi	0.14 to 0.41 MPa, 1.4 to 4.1 bar
Air inlet size	3/8 in. npt(f)	
Maximum suction lift (reduced if checks don't seat well due to damage, blockage, or extreme speed of cycling)		
VA-EH50, VA-E2H52 (@ 22 Hz)	Wet: 30 ft Dry: 14 ft	Wet: 9.1 m Dry: 4.3 m
VA-E2H53, VA-E2H54	Wet: 30 ft Dry: 4.5 ft	Wet: 9.1 m Dry: 1.4 m
Maximum size pumpable solids		
VA-EH50, 2 in. balls	0.25 in.	6.3 mm
VA-E2H52, 2 in. balls	0.5 in.	12.7 mm
VA-E2H53, 3 in. flapper	2.5 in.	62.5 mm
VA-E2H54, 4 in. flapper	3.8 in.	96.5 mm
Minimum ambient air temperature for operation and storage. <b>NOTE:</b> Exposure to extreme low temperatures may result in damage to plastic parts.	32° F	0° C
Fluid displacement per cycle (free-flow)		
VA-EH50, VA-E2H52	0.6 gallons	2.3 liters
VA-E2H53, VA-E2H54	0.4 gallons	1.5 liters
Maximum free-flow delivery (continuous duty)		
VA-EH50, VA-E2H52	100 gpm	378 lpm
VA-E2H53	56 gpm	212 lpm
VA-E2H54	52 gpm	197 lpm
Maximum pump speed (continuous duty)	160 cpm	
<b>Fluid Inlet and Outlet Size</b>		
VA-EH50	65 mm DIN 11851 or 2.5 in. sanitary connection	
VA-E2H52	50 mm DIN 11851 or 2 in. sanitary connection	
VA-E2H53	80 mm DIN 11851 or 3 in. sanitary connection	
VA-E2H54	100 mm DIN 11851 or 4 in. sanitary connection	
<b>Electric Motor</b>		
AC (A1), AC Standard CE (AC, A2)		
Power	7.5 HP	5.5 kW
Number of Motor Poles	4-Pole	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	
Constant Torque	6:1	

<b>VERDERAIR Electric-Operated Diaphragm Pumps, Models VA-EH50, VA-E2H52, VA-E2H53, VA-E2H54</b>		
	<b>US</b>	<b>Metric</b>
Gear Ratio	11.25	
Voltage	3-phase 230V / 3-Phase 460V	
Maximum Amperage Load	19.5 A (230V) / 9.75 A (460V)	
IE Rating	IE3	
<b>AC (B1), AC Standard CE (BC, B2)</b>		
Power	5.0 HP	3.7 kW
Number of Motor Poles	4-Pole	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	
Constant Torque	6:1	
Gear Ratio	16.46	
Voltage	3-phase 230V / 3-Phase 460V	
Maximum Amperage Load	13.0 A (230V) / 6.5 A (460V)	
<b>AC (C1), AC Standard CE (CC, C2)</b>		
Power	3.0 HP	2.2 kW
Number of Motor Poles	4-Pole	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	
Constant Torque	6:1	
Gear Ratio	26.77	
Voltage	3-phase 230V / 3-Phase 460V	
Maximum Amperage Load	7.68 A (230V) / 3.84 A (460V)	
IE Rating	IE3	
<b>AC, ATEX (AX)</b>		
Power	7.5 HP	5.5 kW
Number of Motor Poles	4-Pole	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	
Constant Torque	6:1	
Gear Ratio	11.88	
Voltage	3-phase 240V / 3-Phase 415V	
Maximum Amperage Load	20 A (230V) / 11.5 A (460V)	
<b>AC, ATEX (BX)</b>		
Power	5.0 HP	4.0 kW
Number of Motor Poles	4-Pole	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	
Constant Torque	6:1	
Gear Ratio	16.46	
Voltage	3-phase 240V / 3-Phase 415V	
Maximum Amperage Load	14.7 A (230V) / 8.5 A (460V)	
<b>AC, ATEX (CX)</b>		
Power	3.0 HP	2.2 kW
Number of Motor Poles	4-Pole	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	

Technical Data

<b>VERDERAIR Electric-Operated Diaphragm Pumps, Models VA-EH50, VA-E2H52, VA-E2H53, VA-E2H54</b>		
	<b>US</b>	<b>Metric</b>
Constant Torque	6:1	
Gear Ratio	26.77	
Voltage	3-phase 240V / 3-Phase 415V	
Maximum Amperage Load	8.5 A (230V) / 5.0 A (460V)	
<b>AC, Explosionproof (AF)</b>		
Power	7.5 HP	5.5 kW
Number of Motor Poles	4-Pole	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	
Constant Torque	6:1	
Gear Ratio	11.88	
Voltage	3-phase 230V / 3-Phase 460V	
Maximum Amperage Load	20.0 A (230V) / 10.0 A (460V)	
<b>AC, Explosionproof (BF)</b>		
Power	5.0 HP	3.7 kW
Number of Motor Poles	4-Pole	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	
Constant Torque	6:1	
Gear Ratio	16.46	
Voltage	3-phase 230V / 3-Phase 460V	
Maximum Amperage Load	13.0 A (230V) / 6.5 A (460V)	
<b>AC, Explosionproof (CF)</b>		
Power	3.0 HP	2.2 kW
Number of Motor Poles	4-Pole	
Speed	1800 rpm (60 Hz) or 1500 rpm (50 Hz)	
Constant Torque	6:1	
Gear Ratio	26.77	
Voltage	3-phase 230V / 3-Phase 460V	
Maximum Amperage Load	8 A (230V) / 4 A (460V)	

VERDERAIR Electric-Operated Diaphragm Pumps, Models VA-EH50, VA-E2H52, VA-E2H53, VA-E2H54	
<b>Leak Sensor</b>	
Contact Ratings:	
State	Normally closed
Voltage	240V Max (AC/DC)
Current	0.28 A max at 120 VAC 0.14 A max at 240 VAC 0.28 A max at 24 VDC 0.07 A max at 120 VDC
Power	30 W max
Ambient Temperature	-20° to 40°C (-4° to 104°F)
Ex Ratings:	
Classification: "simple apparatus" in accordance with UL/EN/IEC 60079-11, clause 5.7 Class I, Div 1, Group D, T3B Class II, Div 1, Group F&G, T3B	
 II 2 G Ex ib IIC T3	
Parameters	$U_i = 24 \text{ V}$ $I_i = 280 \text{ mA}$ $P_i = 1.3 \text{ W}$ $C_i = 2.4 \text{ pF}$ $L_i = 1.00 \text{ }\mu\text{H}$
<b>Noise Data</b>	
Sound Power (measured per ISO-9614-2)	
at 90 psi fluid pressure and 80 cpm	84 dBa
at 60 psi fluid pressure and 160 cpm (full flow)	92 dBa
Sound Pressure [tested 3.28 ft (1 m) from equipment]	
at 90 psi fluid pressure and 80 cpm	74 dBa
at 60 psi fluid pressure and 160 cpm (full flow)	82 dBa
<b>Wetted Parts</b>	
Wetted parts include material(s) chosen for seat, ball, and diaphragm options, <b>plus the pump's material of construction: Stainless Steel</b>	
<b>Non-wetted parts</b>	
Non-wetted parts include aluminum, coated carbon steel, PTFE, stainless steel, polypropylene	

**Pump Weights\***

Model	Pump Material	Motor/Gearbox																			
	Center Section	Standard AC						ATEX AC						Flameproof AC						No Gear-motor	
		AC		BC		CC		AX		BX		CX		AF		BF		CF		WG	
		lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
VA-EH50	Aluminum	360	163	328	149	308	139	475	215	351	159	325	147	517	234	427	194	418	190	217	98
	Stainless Steel	442	200	410	186	390	177	557	253	433	196	407	185	599	271	509	231	500	227	299	136
VA-E2H52	Aluminum	358	162	326	148	306	139	473	215	349	158	323	146	515	234	425	193	416	189	215	98
	Stainless Steel	440	200	408	185	388	176	555	252	431	195	405	184	597	271	507	230	498	226	297	135
VA-E2H53	Aluminum	365	166	333	151	313	142	480	218	356	161	330	150	522	237	432	196	423	192	222	101
	Stainless Steel	447	203	415	188	395	179	562	255	438	199	412	187	604	274	514	233	505	229	304	138
VA-E2H54	Aluminum	407	185	375	170	355	161	522	237	398	180	372	169	564	256	474	215	465	211	264	120
	Stainless Steel	489	222	457	207	437	198	604	274	480	218	454	206	646	293	556	252	547	248	346	157

\*For compressor codes 1 or 2, add 13 kg (28 lb)

Component/Model	U.S.	Metric
Compressor	28 lb	13 kg

## 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	Stainless Steel Pump Fluid Temperature Range	
	Fahrenheit	Celsius
Polychloroprene check balls (NW)	0° to 180°F	-18° to 82°C
Santoprene check balls or diaphragm (SP)	-40° to 180°F	-40° to 82°C
PTFE check balls or 2-piece PTFE/EPDM diaphragm (TF)	40° to 220°F	4° to 104°C
2-piece PTFE/Santoprene diaphragm (TS)	40° to 180°F	4° to 82°C
Buna-N check balls (BN)	10° to 180°F	-12° to 82°C
FKM Fluorelastomer check balls (VT)	-40° to 275°F	-40° to 135°C
EPDM overmolded diaphragms (EO)	-40° to 250°F	-40° to 121°C

\* The maximum temperature listed is based on the ATEX standard for T4 temperature classification.



# 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 C, September 2020

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