

e-SVI Series

Immersible Multistage Pumps

Table of Contents

1	Introduction and Safety.....	3
1.1	Introduction.....	3
1.2	Safety terminology and symbols.....	3
1.3	User safety.....	4
1.4	Protecting the environment.....	4
1.5	Spare parts.....	5
2	Transportation and Storage.....	6
2.1	Examine the delivery.....	6
2.1.1	Examine the package.....	6
2.1.2	Examine the unit.....	6
2.2	Lifting guidelines.....	6
2.2.1	Lifting.....	6
2.3	Storage guidelines.....	8
2.3.1	Long-term storage.....	9
3	Product Description.....	10
3.1	General description.....	10
3.2	Applications.....	10
3.3	Nameplate.....	10
3.4	Major components.....	11
3.5	Nomenclature.....	12
4	Installation.....	13
4.1	Mechanical installation.....	13
4.1.1	Precautions.....	13
4.1.2	Requirements.....	13
4.1.3	Assemble the motor (for coupled pumps).....	15
4.1.4	Typical pump installation.....	18
4.1.5	Dimensions of the mounting flanges.....	19
4.1.6	Permitted positions.....	19
4.1.7	Horizontal mounting.....	20
4.1.8	Tanks under pressure.....	20
4.1.9	Positioning measurements.....	20
4.1.10	Install the unit.....	21
4.1.11	Connect the piping.....	21
4.2	Electrical installation.....	21
4.2.1	Precautions.....	21
4.2.2	Requirements.....	22
4.2.3	Install the safety device.....	22
4.2.4	Position the terminal box.....	22
4.2.5	Connect the motor.....	22
5	Operation.....	24
5.1	Operation precautions.....	24
5.2	Startup.....	24
5.2.1	Prepare the unit.....	24
5.2.2	Check the rotation of the motor.....	24
5.2.3	Final operation.....	25
5.3	Set the mechanical seal.....	25

5.4 Stop the unit.....	25
6 Maintenance.....	26
6.1 Precautions.....	26
6.2 Maintenance intervals.....	26
6.2.1 Periodic maintenance.....	26
6.2.2 Long periods of inactivity.....	26
6.3 Replace the standard mechanical seal.....	26
6.3.1 Coupled configurations.....	26
6.3.2 Close-coupled configurations.....	29
6.4 Replace the cartridge mechanical seal.....	36
7 Troubleshooting.....	41
7.1 Precautions.....	41
7.2 The unit does not start.....	41
7.3 The differential protection device has tripped.....	41
7.4 The unit stops and starts cyclically.....	41
7.5 The motor protector on the control panel trips.....	42
7.6 The motor becomes too hot.....	42
7.7 Little or no hydraulic performance.....	42
7.8 The unit turns in the opposite direction.....	43
7.9 The unit starts and stops.....	43
7.10 The unit does not stop.....	43
7.11 The unit produces excessive noise or vibration.....	44
7.12 Leak at the mechanical seal.....	44
8 Technical Specification.....	45
8.1 Environmental requirements.....	45
8.2 Torque specification.....	45
8.3 Elevation.....	45
8.4 Temperature of the pumped liquid.....	45
8.5 Maximum head and maximum operating pressure.....	45
9 Product Warranty.....	47

1 Introduction and Safety

1.1 Introduction

Purpose of this manual

The purpose of this manual is to provide necessary information for:

- Installation
- Operation
- Maintenance



CAUTION:

Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.

NOTICE:

Save this manual for future reference, and keep it readily available at the location of the unit.

Supplementary instructions

The instructions and warnings provided below concern the standard version, as described in the sale documents. Special versions may be supplied with supplementary instructions leaflets. Please refer to the sale contract for any modifications or special version characteristics. Always specify the exact pump type and identification code when requesting technical information or spare parts from our Sales and Service department. For instructions, situations or events not considered in this manual or in the sale documents, please contact your distributor.

Intended use



WARNING:

Operating, installing, or maintaining the unit in any way that is not covered in this manual could cause death, serious personal injury, or damage to the equipment and the surroundings. This includes any modification to the equipment or use of parts not provided by Xylem. If there is a question regarding the intended use of the equipment, please contact a Xylem representative before proceeding.

Other manuals

See also the safety requirements and information in the original manufacturer's manuals for any other equipment furnished separately for use in this system.




1.2 Safety terminology and symbols

About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards:



- Personal accidents and health problems
- Damage to the product and its surroundings
- Product malfunction

Hazard levels

Hazard level	Indication
 DANGER:	A hazardous situation which, if not avoided, will result in death or serious injury
 WARNING:	A hazardous situation which, if not avoided, could result in death or serious injury
 CAUTION:	A hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE:	Notices are used when there is a risk of equipment damage or decreased performance, but not personal injury.

Special symbols

Some hazard categories have specific symbols, as shown in the following table.

Electrical hazard	Magnetic fields hazard
 Electrical Hazard:	 CAUTION:

1.3 User safety

All regulations, codes, and health and safety directives must be observed.

The site

- Observe lockout and tagout procedures before starting work on the product, such as transportation, installation, maintenance, or service.
- Pay attention to the risks presented by gas and vapors in the work area.
- Always be aware of the area surrounding the equipment, and any hazards posed by the site or nearby equipment.

Qualified personnel

This product must be installed, operated, and maintained by qualified personnel only.

Protective equipment and safety devices

- Use personal protective equipment as needed. Examples of personal protective equipment include, but are not limited to, hard hats, safety goggles, protective gloves and shoes, and breathing equipment.
- Make sure that all safety features on the product are functioning and in use at all times when the unit is being operated.

1.4 Protecting the environment

Emissions and waste disposal

Observe the local regulations and codes regarding:

-
- Reporting of emissions to the appropriate authorities
 - Sorting, recycling and disposal of solid or liquid waste
 - Clean-up of spills

Exceptional sites



CAUTION: Radiation Hazard

Do NOT send the product to Xylem if it has been exposed to nuclear radiation, unless Xylem has been informed and appropriate actions have been agreed upon.

Recycling guidelines

Always follow local laws and regulations regarding recycling.

1.5 Spare parts



CAUTION:

Only use the manufacturer's original spare parts to replace any worn or faulty components. The use of unsuitable spare parts may cause malfunctions, damage, and injuries as well as void the warranty.

2 Transportation and Storage

2.1 Examine the delivery

2.1.1 Examine the package

1. Examine the package for damaged or missing items upon delivery.
2. Record any damaged or missing items on the receipt and freight bill.
3. If anything is out of order, then file a claim with the shipping company.
If the product has been picked up at a distributor, make a claim directly to the distributor.

2.1.2 Examine the unit

1. Remove packing materials from the product.
Dispose of all packing materials in accordance with local regulations.
2. To determine whether any parts have been damaged or are missing, examine the product.
3. If applicable, unfasten the product by removing any screws, bolts, or straps.
Use care around nails and straps.
4. If there is any issue, then contact a sales representative.

2.2 Lifting guidelines

2.2.1 Lifting

Always inspect the lifting equipment and tackle before starting any work.



WARNING: Crush Hazard

Always lift the unit by its designated lifting points.
Use suitable lifting equipment and ensure that the product is properly harnessed.
Wear personal protective equipment.
Stay clear of cables and suspended loads.

NOTICE:

Never lift the unit by its cables or hose.

Lifting equipment

Lifting equipment is always required to handle the unit. The lifting equipment must fulfill the following requirements:

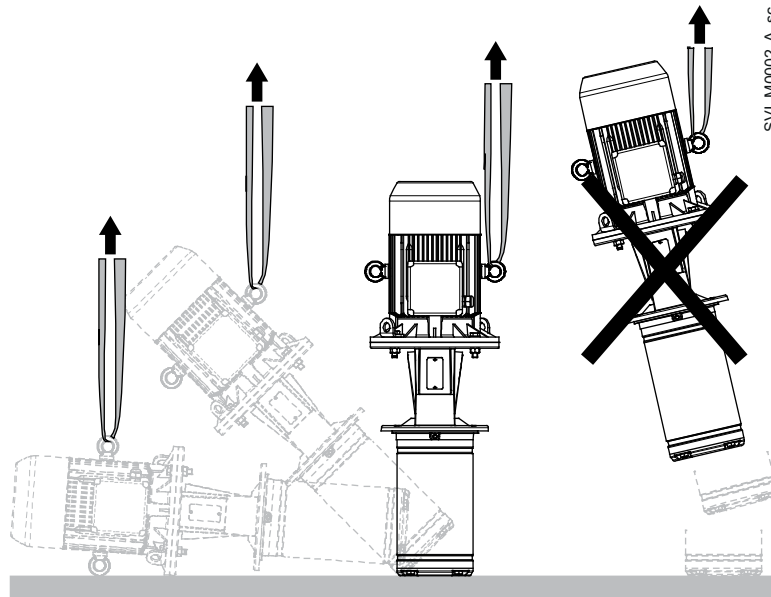
- The minimum height between the lifting hook and the floor must be sufficient to lift the unit.
- The lifting equipment must be able to hoist the unit straight up and down, preferably without the need for resetting the lifting hook.
- The lifting equipment must be correctly anchored and in good condition.
- The lifting equipment must support the weight of the entire assembly.
- Only authorized personnel may use the lifting equipment.

Empty the unit before lifting

The unit must be emptied of liquid before lifting.

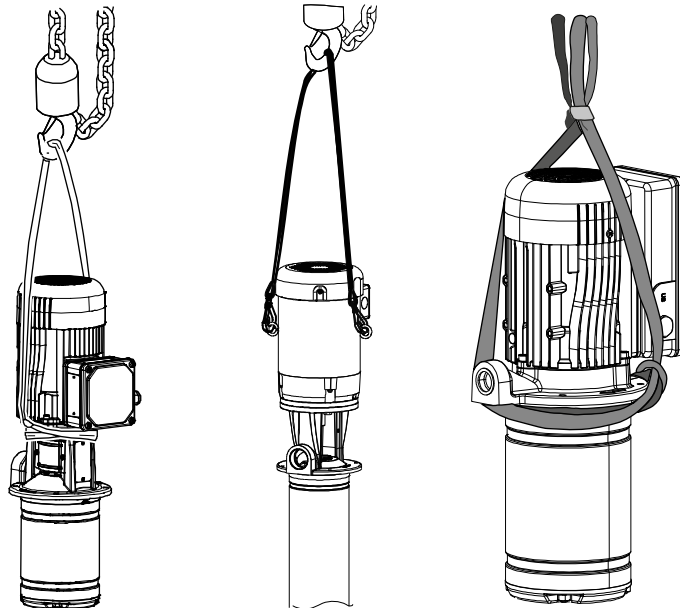
2.2.1.1 Prepare the unit for lifting

1. Move the unit from the horizontal to the vertical position, only by using the motor lifting eye bolts or brackets if necessary.

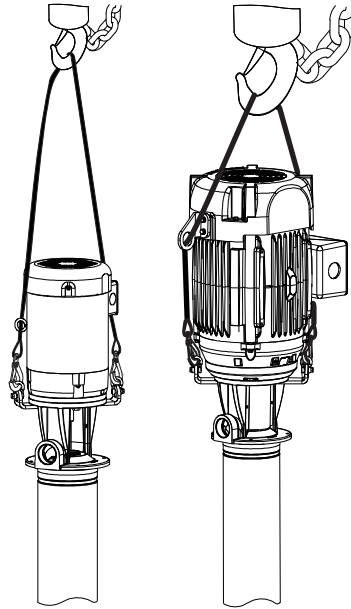


2. Depending on the motor used:

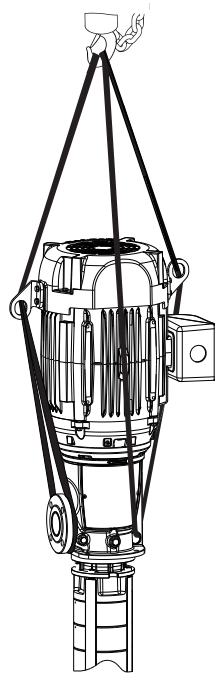
- a) For pumps that use a 56TC to 184TC NEMA motor frame or a 71 or 80 IEC motor frame: use the ropes to make a harness and secure it under the upper flange of the motor's adapter or through the motor's eye bolts or lifting brackets as shown in the next figures.



- b) For pumps that use a 213TC or higher motor frame: attach the ropes through the shackles of the pump lifting brackets provided with the pump assembly. To limit movement, the ropes used for lifting should be also restrained by the motor's eye bolt or lifting bracket.



- c) For sizes 33-92 use the ropes to make a harness and secure it under the discharge neck and limit the movement by restraining the ropes through the motor adaptor's opening (opposite to the discharge flange) and the motor's lifting brackets.



3. Fix the ropes to the crane.
4. Lift the crane and tension the ropes before lifting the pump assembly.

2.3 Storage guidelines

Storage location

The product must be stored in a covered and dry location free from heat, dirt, and vibrations.

NOTICE:

Protect the product against humidity, heat sources, and mechanical damage.

NOTICE:

Do not place heavy weights on the packed product.

Stacking limit

The stacking limit of the packaging material is printed on the packaging material and given on the packing list.

2.3.1 Long-term storage

If the unit is stored for more than 6 months, these requirements apply:

- Store in a covered and dry location.
- Store the unit free from heat, dirt, and vibrations.
- Rotate the pump shaft by hand several times at least every three months.

Treat bearings and machined surfaces so that they are well preserved. Refer to the drive unit and coupling manufacturers for their long-term storage procedures.

For questions about possible long-term storage treatment services, please contact your local sales and service representative.

Ambient condition

NOTICE:

Protect the unit from freezing temperature.

Temperature	23°F (-5°C) to 104°F (+40°C)
Humidity	5% to 95%

3 Product Description

3.1 General description

The e-SVI pump is a non-self priming vertical immersible multistage pump coupled to a standard motor. It is available in several hydraulic sizes and can be built with a variable number of stages to cover a wide range of duty points. The e-SVI pump is configured to allow an additional number of blank stages so that the height of the immersed part can accommodate different suction depths. A special version is available, in which all the metal parts in contact with the pumped liquid are made of stainless steel. If you purchase a pump without the electric motor, make sure that the motor you use is suitable for coupling to the pump. Models 1-22 coupled can either be built with a standard mechanical seal or with a seal cartridge. Models 33-92 can be built with a standard mechanical seal. The standard mechanical seal can be replaced without removing the motor.



WARNING:

This product can expose you to chemicals including Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov.

3.2 Applications

- Tool cooling and lubrication
- Cooling systems
- Tooling
- Process temperature control
- Industrial washing systems
- Pressurization of clean liquids
- Transfer of condensation
- Filtering systems
- Heat exchangers
- Washing and cleaning systems
- Electronics circuit washing
- Commercial washing machines

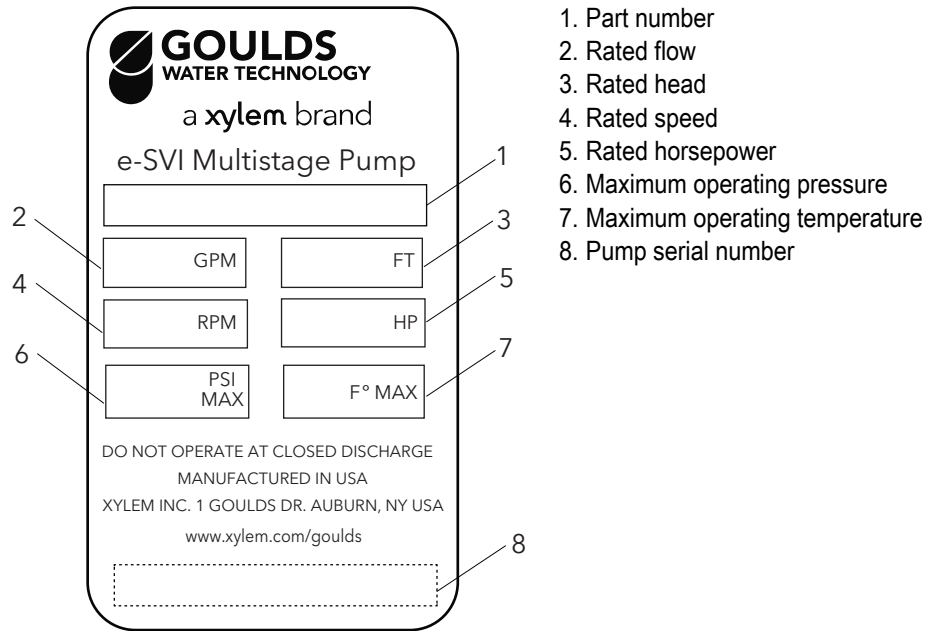
For any specialty uses, consult the factory.

3.3 Nameplate



WARNING:

- Do not use this pump to handle flammable and/or explosive liquids.
 - Do not use this pump to handle liquids containing abrasive, solid, or fibrous substances.
-



3.4 Major components

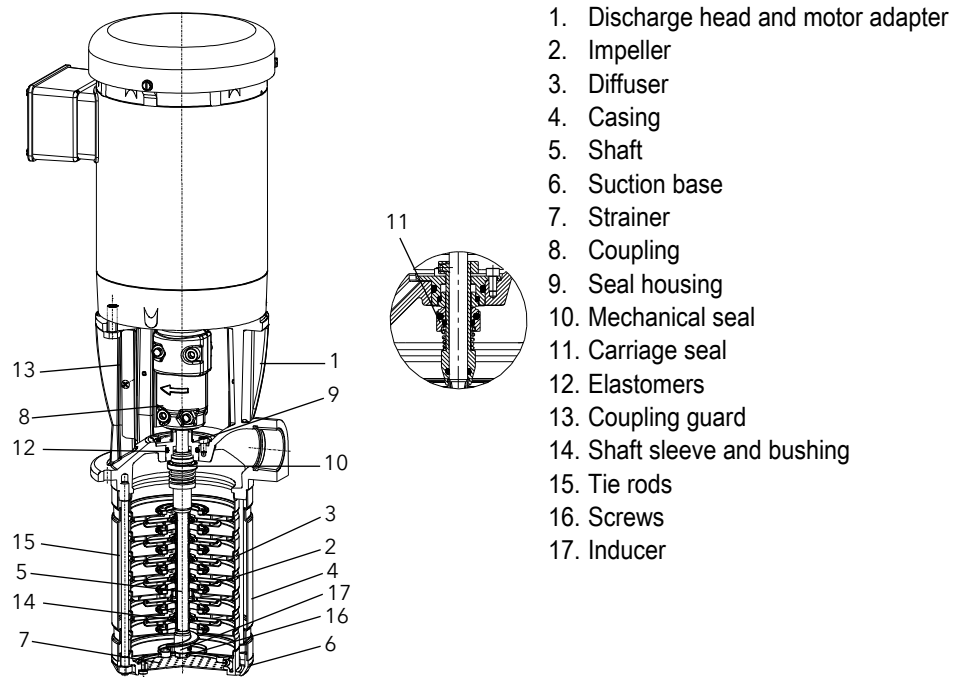


Figure 1: 1-22 e-SVI coupled

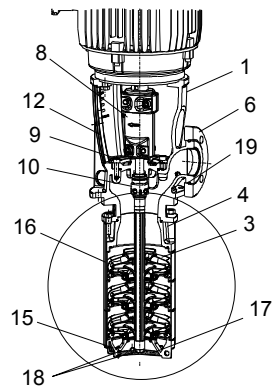


Figure 2: 33-92 e-SVI coupled

1. Discharge head and motor adapter
2. Impeller
3. Diffuser
4. Casing adapter
5. Shaft
6. Discharge flange
7. Wear ring
8. Coupling
9. Seal housing
10. Mechanical seal
11. Elastomers
12. Coupling guard
13. Shaft sleeve and bushing
14. Bushing for Diffuser
15. Suction base
16. Tie rods
17. Strainer
18. Fasteners
19. Snap ring

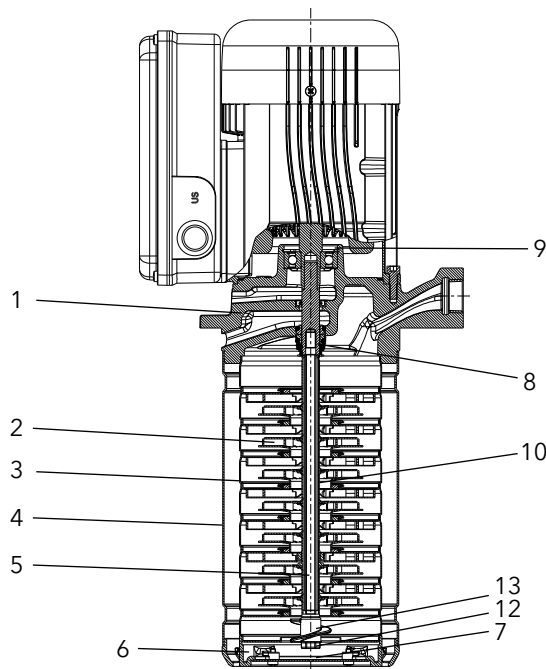


Figure 3: 1, 3, 5 close-coupled

1. Discharge head and motor adapter
2. Impeller
3. Diffuser
4. Casing
5. Shaft
6. Suction base
7. Strainer
8. Mechanical seal
9. Sealing ring
10. Shaft sleeve and bushing
11. Tie rods (not shown)
12. Fasteners
13. Inducer

3.5 Nomenclature

For product nomenclature description and available options please reference the technical brochure.

4 Installation

4.1 Mechanical installation

4.1.1 Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* on page 3 have been read and understood.



WARNING:

All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of the equipment.



CAUTION:

Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.



CAUTION:

The operator must be aware of safety precautions to prevent physical injury.

4.1.2 Requirements

The pump must follow the required operating conditions.

Minimum suction pressure

The required NPSHR, expressed in feet, can be found on the performance curve for the pump at the specific duty point. It is recommended that the NPSHA is more than the NPSHR by a minimum of two feet (0.61 m) as a safety margin and to maintain long-term and reliable performance.

$$P_{\text{SMIN}} = \text{NPSHR} + 2 \text{ ft}$$

NOTICE:

The NPSH_A must be calculated for the specific system to which the pump is to be installed. Contact the dealer or distributor for help.

Maximum operating pressure

Staging at 3500 rpm

Pump Size	Psi
1	362
3	
5	
10	
15	
22	
33	435
46	362
66	232
92	

Temperature capability

Temperature of the pumped liquid with standard mechanical seal	<ul style="list-style-type: none"> • from 14°F to 194°F(-10°C to +90°C) for coupled versions • from 14°F to 140°F(-10°C to +60°C) for close-coupled version
Operating temperature for close-couple motor configurations	<ul style="list-style-type: none"> • Single-phase: from 32 to 104°F (0 to 40°C) • Three-phase: from 32 to 131°F (0 to 55°C)

Minimum nominal flow rate

To prevent overheating of the internal pump components, make sure that a minimum water flow is always guaranteed when the pump is running. If this cannot be achieved, then a bypass/ recirculate line is recommended.



WARNING:

Do not run the pump against a closed discharge for longer than a few seconds.

For continuous operation the minimum flow rate recommended is specified in the following table.

Pump Size	Minimum flow gpm			
	3500 RPM	1750 RPM	2900 RPM	1450 RPM
1SVI	2	1	2	1
3SVI	3	2	3	2
5SVI	7	4	6	3
10SVI	9	5	8	4
15SVI	18	9	15	7
22SVI	21	11	18	9
33SVI	35	18	8	4
46SVI	40	20	10	5
66SVI	70	35	14	7
92SVI	100	50	20	10

Starts per hour

For electric pumps coupled to motors supplied by Goulds Water Technology, the maximum number of work cycles in one hour are as follows:

Hp	Maximum starts per hour*	Minimum runtime between starts in seconds
0.5	24	120
0.75	24	120
1	15	75
1.5	13	76
2	12	77
3	9	30
5	8	83
7.5	7	88
10	6	92
15	5	100

Hp	Maximum starts per hour*	Minimum runtime between starts in seconds
20	5	110
25	5	115
30	4	120
40	4	130

* For more details, refer to the technical manual.



WARNING:

If you use a different motor from the standard one supplied with the electric-pump, check the relevant instructions to find out the permitted number of starts per hour.

Power supply requirements



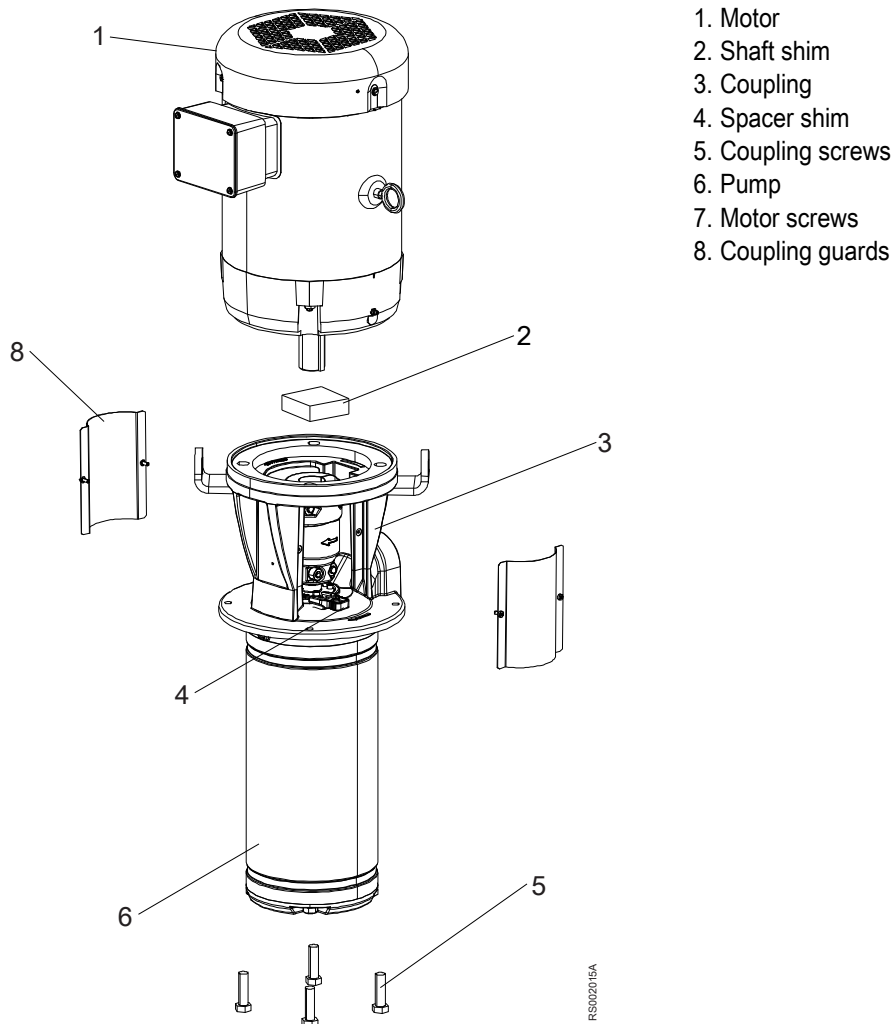
WARNING:

Make sure that the supply voltages and frequencies are suited to the characteristics of the electric motor. This information is on the motor rating plate.

Hz	Phase	U _N	
		V	±%
60	1	230	10
60	3	230/460	10
60	3	460	10

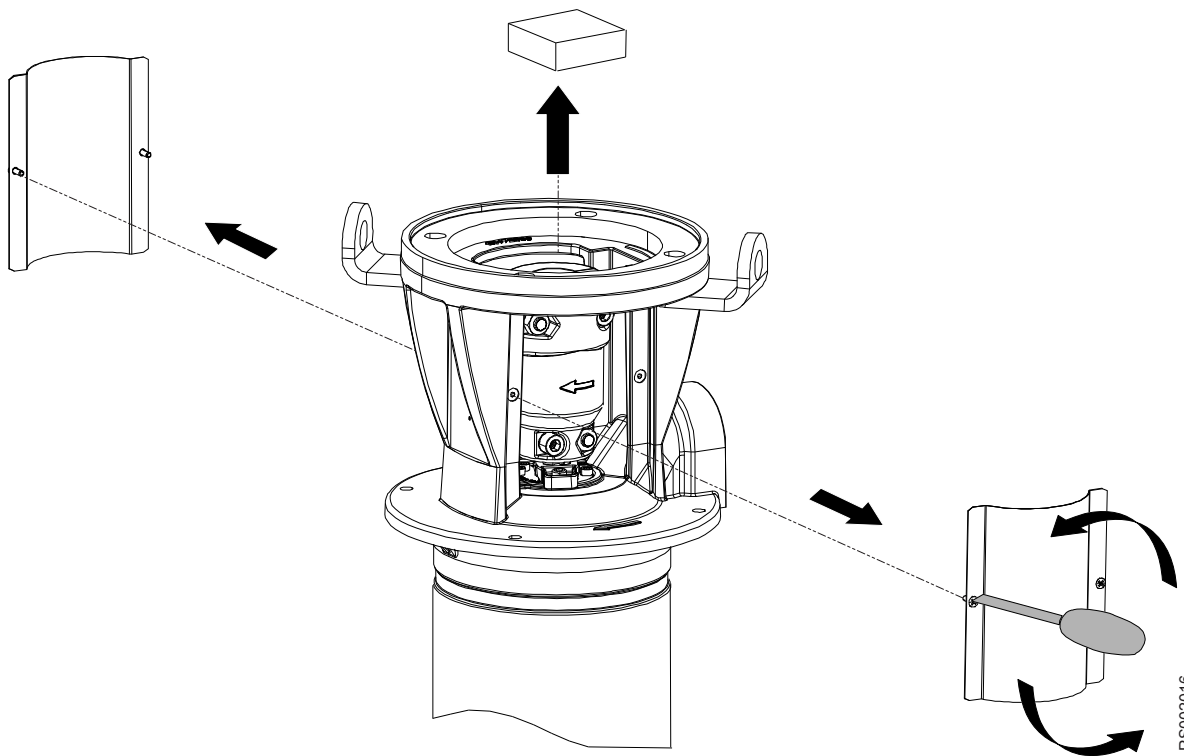
4.1.3 Assemble the motor (for coupled pumps)

1. Remove the shaft shim.

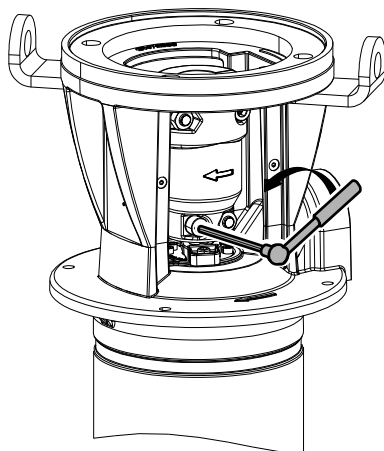


- 1. Motor
- 2. Shaft shim
- 3. Coupling
- 4. Spacer shim
- 5. Coupling screws
- 6. Pump
- 7. Motor screws
- 8. Coupling guards

2. Remove the coupling guards.

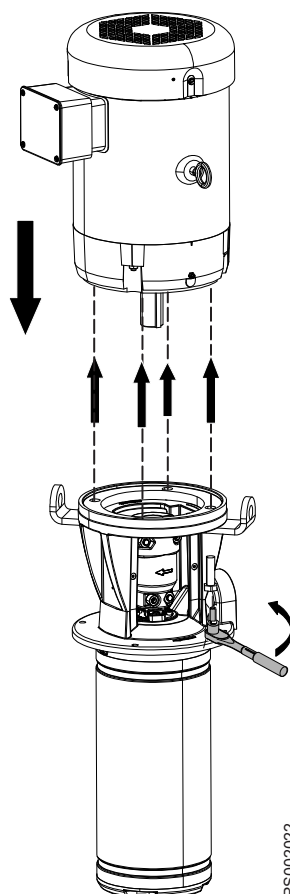


3. Loosen the coupling screws.



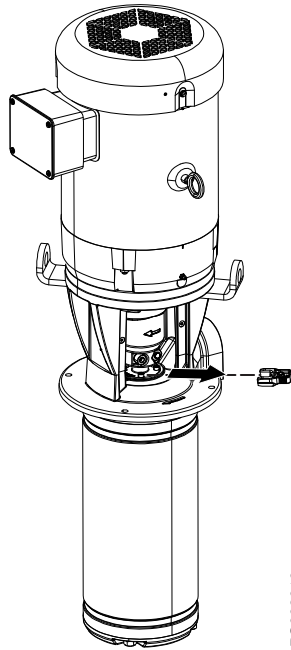
RS002017

4. Use the screws to attach the motor to the adapter.



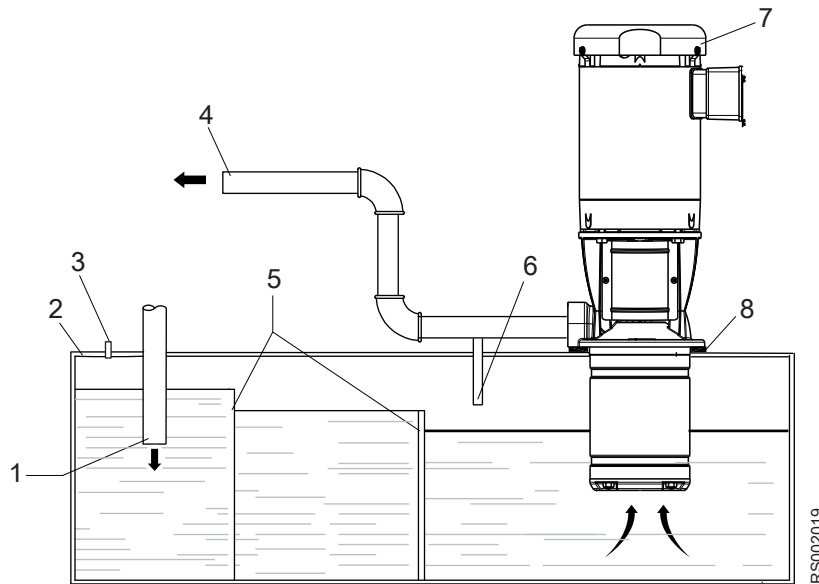
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5. Tighten the coupling screws.
See [Torque specification](#) on page 45 for the correct torque value.
6. Remove the spacer shim.



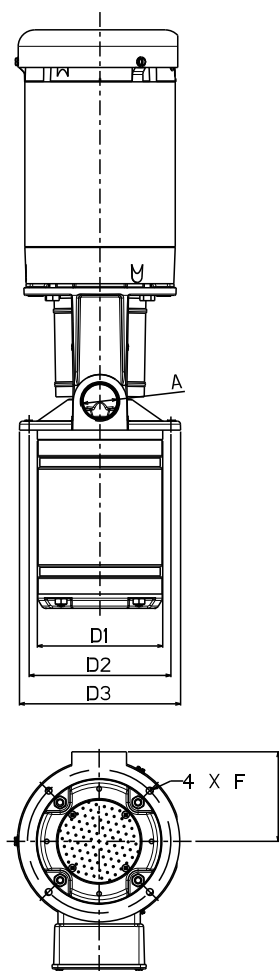
7. Install the coupling guards.
8. Tighten the coupling guard screws.
See [Torque specification](#) on page 45 for the correct torque value.

4.1.4 Typical pump installation



1. Return line
2. Tank
3. Air vent
4. Discharge pipe
5. Bulkheads
6. Bypass pipe
7. Pump unit
8. Seal

4.1.5 Dimensions of the mounting flanges

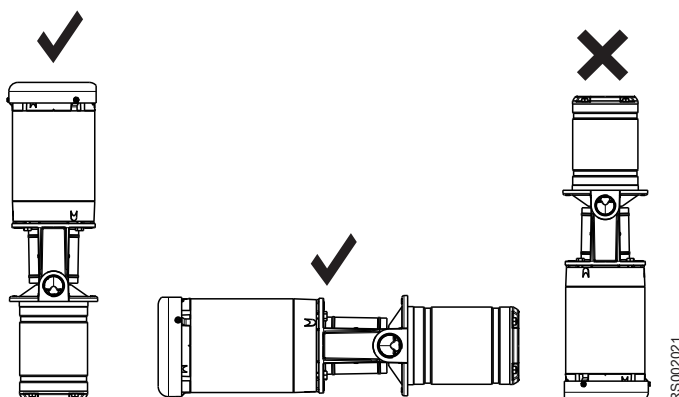


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Dimensions are in (mm).

Model	D1	D2	D3	F
1, 3 and 5 SVI	5.51 (140)	6.30 (160)	7.09 (180)	19/64
10, 15 and 22 SVI	7.87 (200)	8.86 (225)	9.84 (250)	3/8
33 SVI	9.84 (250)	8.67 (220)	7.48 (190)	35/64
46, 66 and 92 SVI	11.41 (290)	10.43 (265)	9.44 (240)	35/64

4.1.6 Permitted positions



RS002021

4.1.7 Horizontal mounting

For horizontal mounting position plug in the drainage opening as shown in *Figure 4* on page 20.

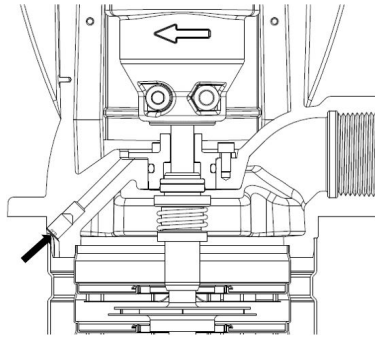


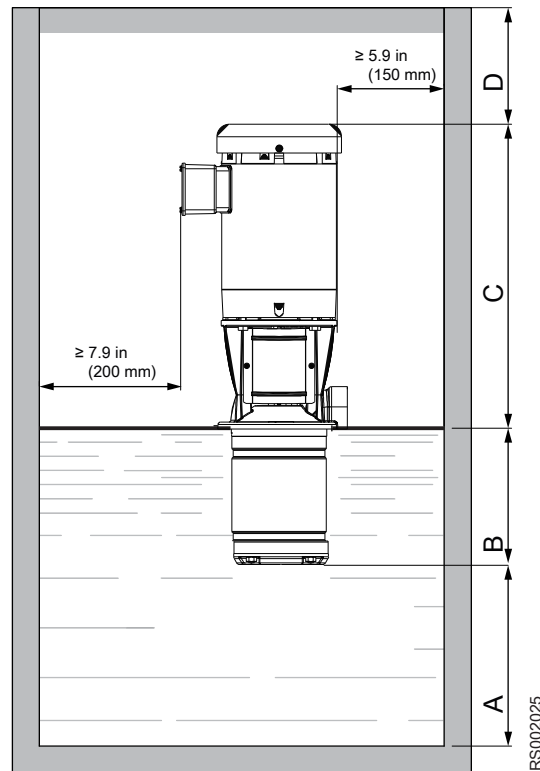
Figure 4: Drainage opening

Pumps with motors above 5 HP require extra support.

4.1.8 Tanks under pressure

For applications where the tank is going to be under pressure install the plug in the drainage opening as shown in *Figure 4* on page 20.

4.1.9 Positioning measurements



Dimensions are in in (mm).

Model	A	B	C	D
1, 3 and 5	0.79 (20)	Dimension depends on the configuration used. See the Technical Brochure for more information.		Minimum 1.18 (30) ¹
10, 15 and 22	1.38 (35)			
33, 46, 66 and 92	1.00 (25)			

¹ Dimension D has to be established based on the clearance needed to extract the pump.

4.1.10 Install the unit

1. Install the gasket.
2. Remove the discharge port plug.
3. Remove all the welding residue, deposits, and impurities from the tank.
4. Insert the unit in the hole.
5. Check that the minimum distance from the bottom of the tank is maintained.
6. Secure the unit with bolts.

4.1.11 Connect the piping

1. Support the piping independently to prevent them from weighing on the unit
2. On the discharge pipes, install the following components:
 - Anti-vibration joint
 - Check valve
 - Pressure gauge with intercept valve
 - On-Off valve
 - Downstream check valve
 - Pressure gauge
 - Automatic relief valve at the highest point of the system
 - Minimum pressure device (or level probes inside the tank)
3. Remove the welding residue, deposits, and impurities in the pipes.
4. If necessary, install the filter.
5. Connect the piping to the unit port.
6. Install the return piping away from the suction.

The return piping must be immersed in the liquid to prevent turbulence and air bubbles.

4.2 Electrical installation

4.2.1 Precautions

Before starting work, make sure that the safety instructions have been read and understood.



DANGER: Electrical Hazard

Before starting work on the unit, make sure that the unit and the control panel are isolated from the power supply and cannot be energized. This applies to the control circuit as well.



DANGER: Crush Hazard

Moving parts can entangle or crush. Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.



WARNING: Electrical Hazard

Risk of electrical shock or burn. A certified electrician must supervise all electrical work. Comply with all local codes and regulations.



WARNING: Electrical Hazard

There is a risk of electrical shock or explosion if the electrical connections are not correctly carried out, or if there is fault or damage on the product. Visually inspect equipment for damaged cables, cracked casings or other signs of damage. Make sure that electrical connections have been correctly made.

**CAUTION: Electrical Hazard**

Prevent cables from becoming sharply bent or damaged.

4.2.1.1 Grounding (earthing)

Grounding (earthing) must be done in compliance with all local codes and regulations. If necessary, a grounded metal conduit must be used.

**DANGER: Electrical Hazard**

All electrical equipment must be grounded (earthed). Test the ground (earth) lead to verify that it is connected correctly and that the path to ground is continuous.

**WARNING: Electrical Hazard**

Risk of electrical shock. The ground (earth) lead must be sufficiently longer than the phase leads to make sure that the ground lead is the last to become disconnected if the cable is jerked loose.

4.2.2 Requirements

- The electrical cables must be protected from the following conditions:
 - High temperatures
 - Vibrations
 - Collisions
 - Liquids
- The power supply line must be connected to the following components:
 - A short-circuit protection device of an applicable size
 - A mains disconnection device with a contact opening distance to disconnect for the overvoltage III category conditions.

4.2.3 Install the safety device

1. Install the safety devices to protect the motor from overload and short circuits.
2. If necessary, install the phase failure sensitive thermal relays.

**WARNING:**

Motors equipped with automatic thermal protectors open the motor's electrical circuit when an overload exists. This can cause the pump to start unexpectedly and without warning.

4.2.4 Position the terminal box

1. Remove the motor screws.
2. Rotate the motor in the correct position without removing the couplings.
3. Position the terminal box.
4. Use a torque wrench to tighten the screws of the motor.

For more information, see [Torque specification](#) on page 45.

4.2.5 Connect the motor

1. Remove the screws of the terminal box cover.
2. Open the terminal box cover.
3. Connect the protection conductor (ground).

The length of protection conductor must be longer than the phase conductor.
4. Connect the phase leads.

Motors should be wired according to the motor manufacturer's instructions.

5. Use a torque wrench to tighten the terminal screws.
6. Install the cover of terminal box.
7. Tighten the screws.

5 Operation

5.1 Operation precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* on page 3 have been read and understood.



DANGER:

Never operate a pump without a properly installed coupling guard. Personal injury will occur if you run the pump without a coupling guard.



WARNING:

- Install, earth (ground), and wire the equipment according to the local and National Electrical Code Requirements.
 - Install an all leg disconnect switch near pump.
 - Disconnect and lock out electrical power before installing or servicing the unit.
 - Electrical supply must be in accordance with the specifications given on the pump's nameplate.
 - Motors equipped with automatic thermal protectors open the motor's electrical circuit when an overload exists. This can cause the pump to start unexpectedly and without warning.
-

Use only stranded copper wire to motor and ground. Wire size MUST limit the maximum voltage drop to 10% of the motor nameplate voltage, at the motor terminals. Excessive voltage drop will affect performance and void motor warranty. The ground wire must be at least as large as the wires to the motor. Wires should be color coded for ease of maintenance.

Three phase motors require all leg protection with properly sized magnetic starters and thermal overloads.



Electrical Hazard:

Make sure that you have grounded (earthed) the pump, the drive unit, and the controls before connecting the electrical power.

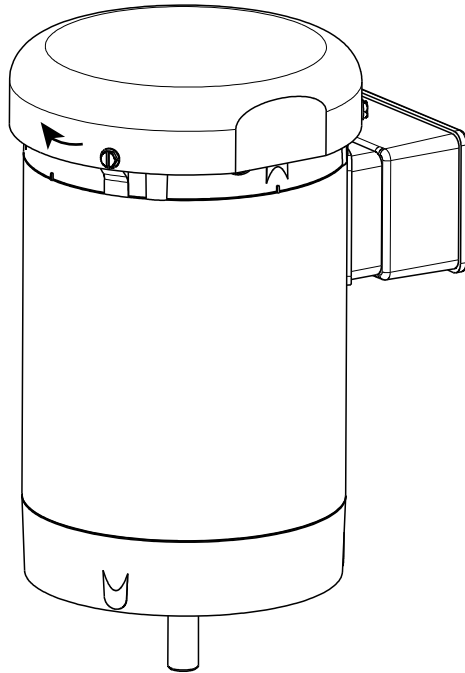
5.2 Startup

5.2.1 Prepare the unit

1. Check that the level of the liquid inside the tank is above the minimum level.
2. Open the on-off valve on the discharge line.
3. If present, open the air relief valve on the unit flange.
4. Check that the shaft can turn smoothly by rotating it with the cooling fan.

5.2.2 Check the rotation of the motor

1. Locate the arrow on the adapter, the coupling, or the cover, to find the correct direction of rotation of the motor.
2. Start the unit.
3. Check the rotation direction through the motor cover.



4. If the rotation direction of motor is incorrect, follow these steps.
 - a) Stop the unit.
 - b) Disconnect the power supply.
 - c) Invert two of the three wires of the power supply cord.

5.2.3 Final operation

1. If installed, close the relief valve.
2. With the unit in operation, check that:
 - No liquid is leaking from the unit or piping
 - The nominal pressure is higher than the maximum pressure delivered by the unit
 - At zero flow rate, the rated pressure is the same as the discharge pressure
 - There are no unwanted noise or vibrations
 - The current absorbed is in the rated limits
 - The status of the protection device against dry running, if present
 - The liquid is free of:
 - Vortex through which air could enter the unit
 - Foam that could cause unit fault
 - Turbulence that is caused by the return piping or the bypass.

5.3 Set the mechanical seal

1. Close and open the on-off valve on the discharge side two or three times with the unit running.
2. Stop and start the unit two or three times.

5.4 Stop the unit

1. Stop the unit.
2. Check that the motor stops.
3. Check that the motor does not turn in the opposite direction.

6 Maintenance

6.1 Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* on page 3 have been read and understood.



Electrical Hazard:

Disconnect and lock out electrical power before installing or servicing the unit.



WARNING:

- Always wear protective gloves when handling the pumps and motor. When pumping hot liquids, the pump and its parts may exceed 40°C (104°F).
 - Maintenance and service must be performed by skilled and qualified personnel only.
 - Observe accident prevention regulations in force.
-

6.2 Maintenance intervals

6.2.1 Periodic maintenance

Do the following checks in the unit for every 4000 hours of operation or every year:

1. Measure the pressure at zero flow rate.
2. Check the pressure value with the value measured at the first start.
If the pressure decreases more than 15%, internal components have to be checked for excessive wear.
For more information, contact local sales and service representative.
3. Check for the abnormal noises or vibrations.
4. Check for leaks from the unit and the piping
5. Re-tighten all the bolts
6. Check if the motor cooling fan functions properly.
7. Check that the insulation resistance of the motor is greater than 500 MΩ by applying a test voltage of 500 VDC for 1 minute.
8. Check for signs of overheating and electric arcs on the terminal box.
9. Check for integrity of the power cable

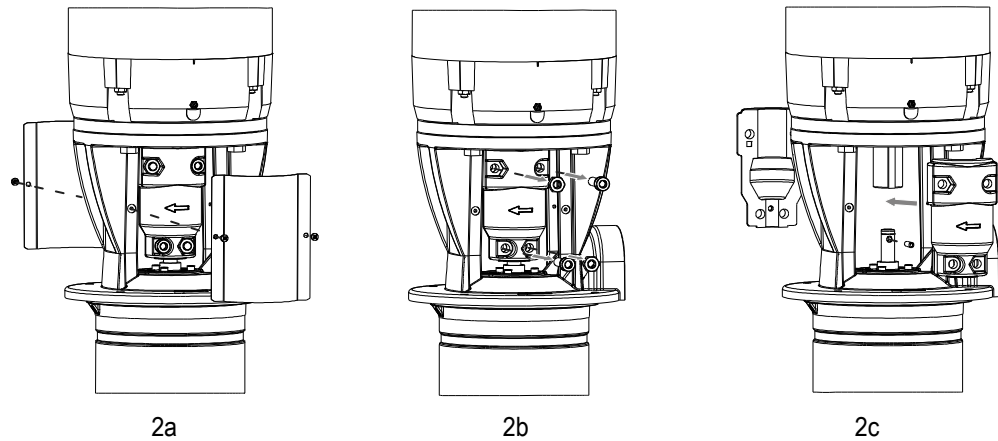
6.2.2 Long periods of inactivity

1. Shut the on-off valve on the discharge line.
2. Before starting the unit, follow these steps:
 1. Clean the filter.
 2. Check the status of the connections of the electric conductors on the unit and the control panel.
3. Start the unit.

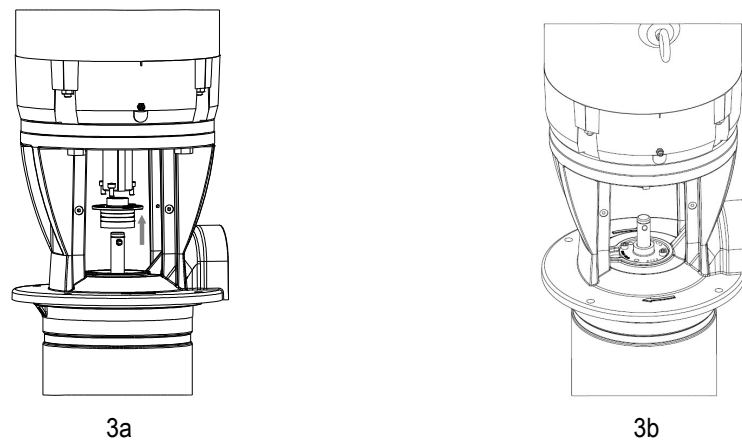
6.3 Replace the standard mechanical seal

6.3.1 Coupled configurations

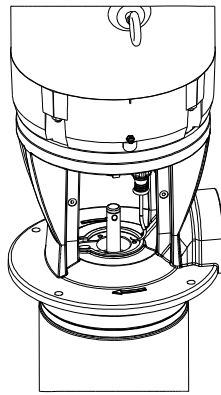
1. Turn off the pump, close all necessary discharge valves to isolate the pump from the system and make sure that the pump is not under pressure.
2. Remove the coupling guards (2a), the 4 coupling hex cap screws (2b), the coupling and coupling drive pin (2c).



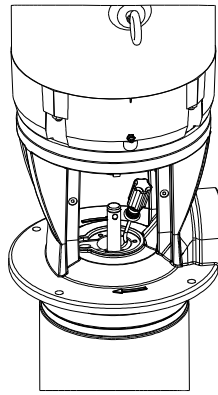
- Remove the 3 motor hex cap screws (inner screws) on the seal housing and lift the seal housing (3a). To ease the removal of the seal housing mount two of the screws removed in the previous step in the two threaded holes of the seal housing (simultaneously or alternating 2-3 turns at a time for each of them) (3b).



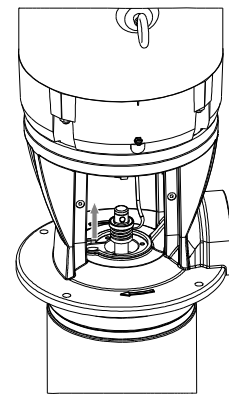
- Turn the seal housing upside down and remove the stationary seat and O-ring. Remove and discard the large O-ring used to seal between the seal housing and the pump discharge head. Inspect the old seal seat before removal for any burrs or debris. Lubricate the seat O-ring with a lubricant compatible with the seal elastomer and install the new seat into the housing by pressing the seal housing with your thumb. **DO NOT USE EXCESSIVE FORCE** and, if possible, place a clean soft cloth over the seal face to protect the seal faces during installation.
- Lubricate the shaft lightly with a water-based lubricant (e.g. P-80 lubricants). Insert the small hook tool provided with the seal kit (5a) and rotate it in order to grab the seal with the end hook (5b). Pull the rotary unit along the shaft (5c). Inspect the pump shaft for any burrs or debris. Any burrs should be ground smooth with (fine grit) emery paper.



5a

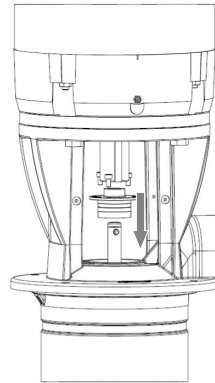


5b

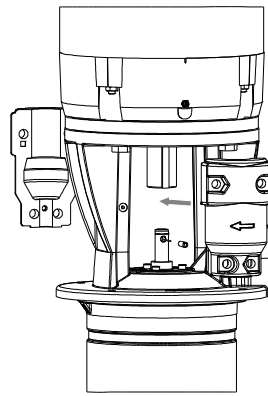


5c

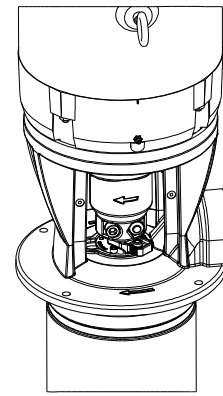
6. Lubricate the elastomer bellow located in the ID of the rotary unit of the mechanical seal replacement with a lubricant compatible with the seal elastomers. Carefully slide the rotary unit of the mechanical seal down the shaft.
7. Install a new seal housing O-ring on the seal housing. A compatible lubricant can be used to hold the O-ring on the diameter of the seal housing. Carefully reinstall the seal housing between the pump and motor shaft and slide the seal housing down the shaft into position. Use caution when mounting the seal housing between the pump/motor shaft so that the seal face on the stationary seat is not damaged. Align the holes of the seal housing with the threaded holes in the discharge head and reinstall the 3 hex cap screws by tightening evenly. Use the values given in [Torque specification](#) on page 45 for the final torque.



8. Reinstall the coupling pin and locate the spacer shim provided on the shaft on the seal housing. Reinstall the coupling halves and evenly tighten the coupling bolts and torque them to the values given in [Torque specification](#) on page 45 (the final space between the two halves should be approximately equal). Remove the spacer shim and save for future use.

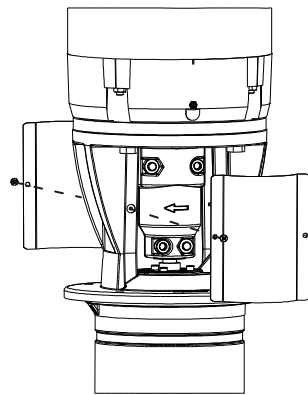


8a



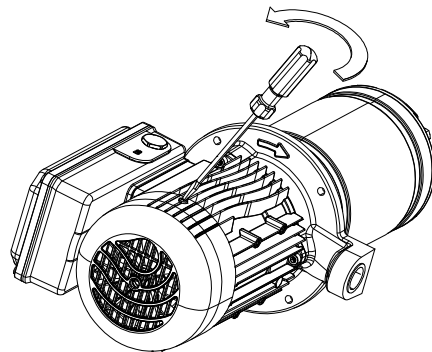
8b

9. Rotate the coupling by hand to insure that the pump and motor rotate freely. Reinstall the coupling guard.

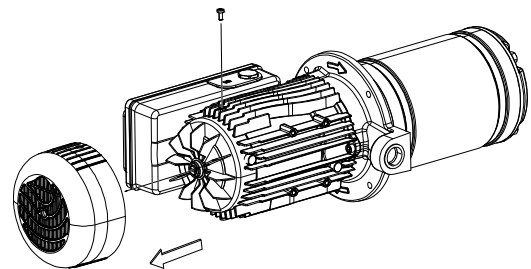


6.3.2 Close-coupled configurations

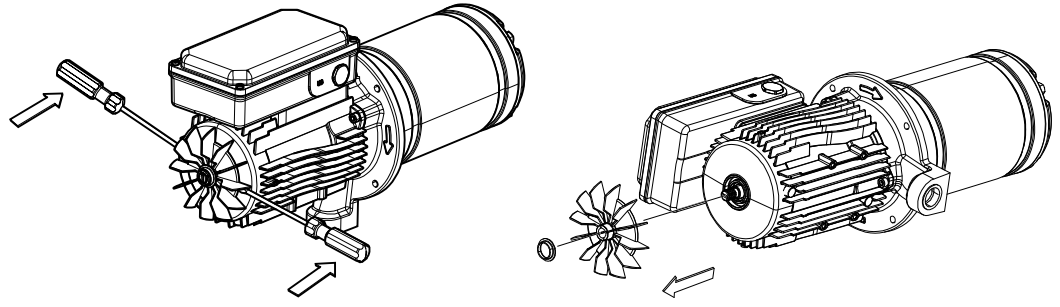
1. Turn off the pump, close all necessary discharge valves to isolate the pump from the system and make sure that the pump is not under pressure.
2. Remove the two motor fan cover screws. Remove the motor's fan cover (2b) and fan (2c).



2a

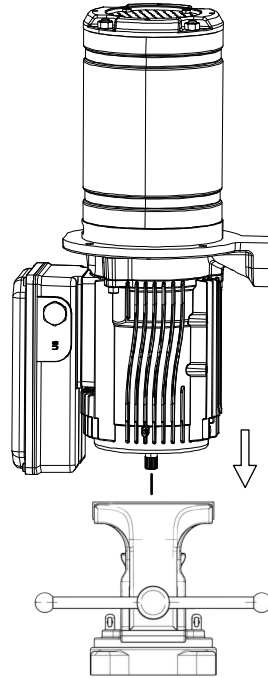


2b

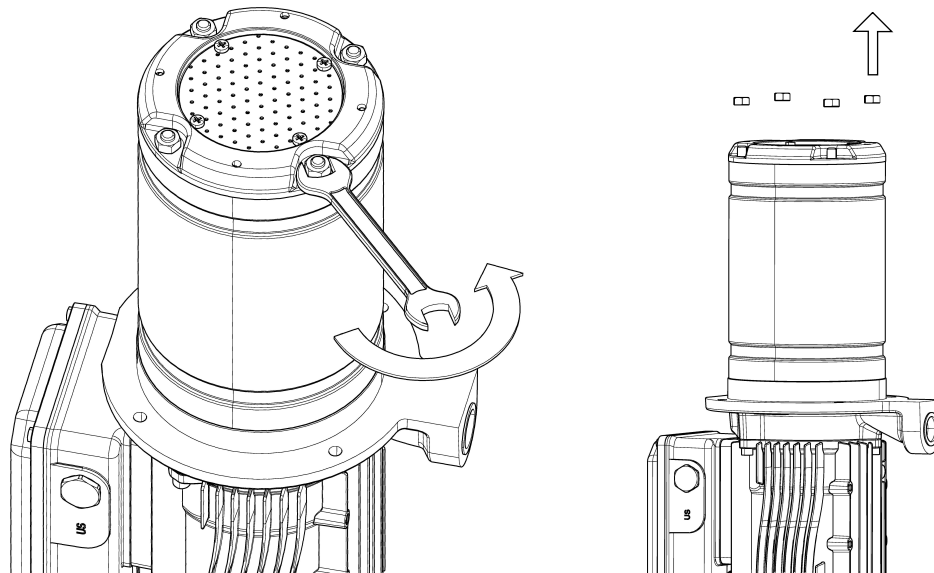


2c

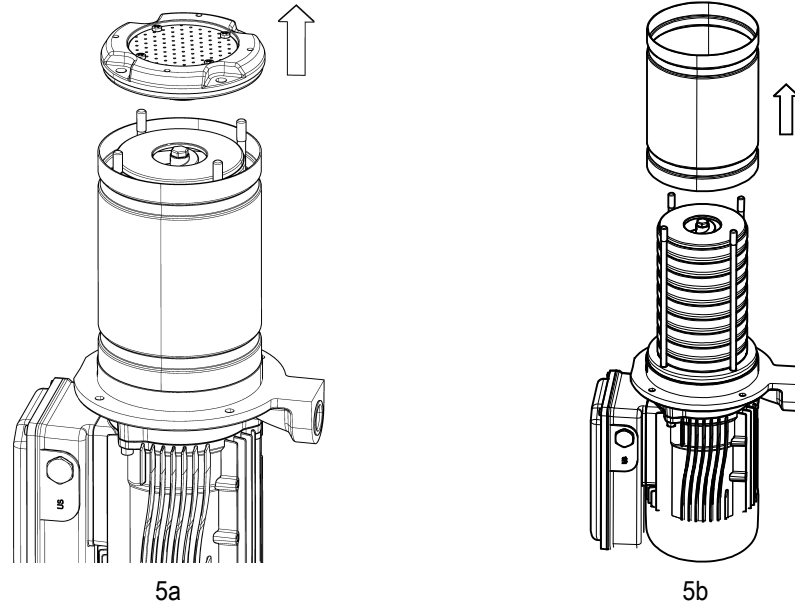
3. Lock the motor's shaft with a screwdriver or using a soft jaw vice.



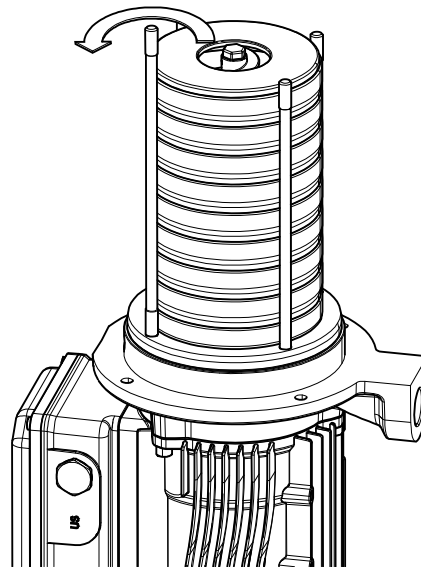
4. Remove the four (4) tie rod nuts and washers.



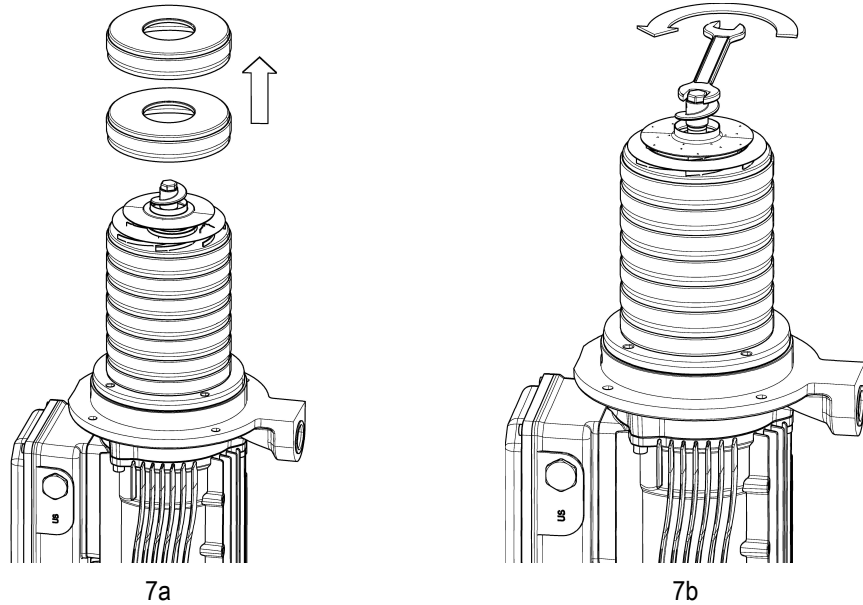
5. Remove the suction base (5a) and casing (5b)



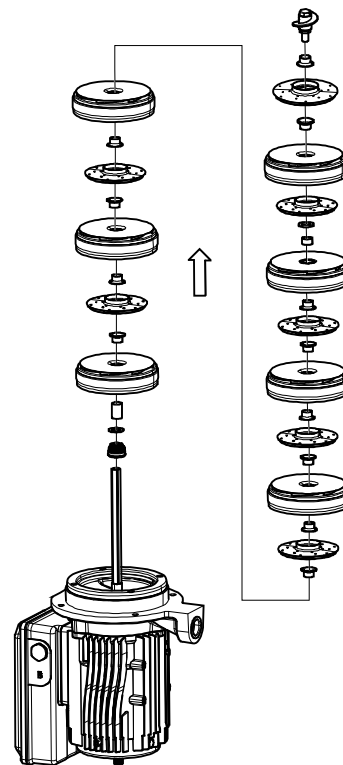
6. Remove the tie rod(s).



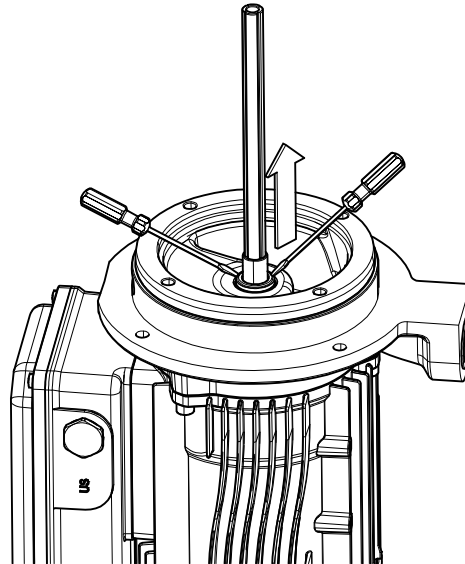
7. Remove the inducer housing, the initial stage diffuser (7a) and the inducer screw (7b)



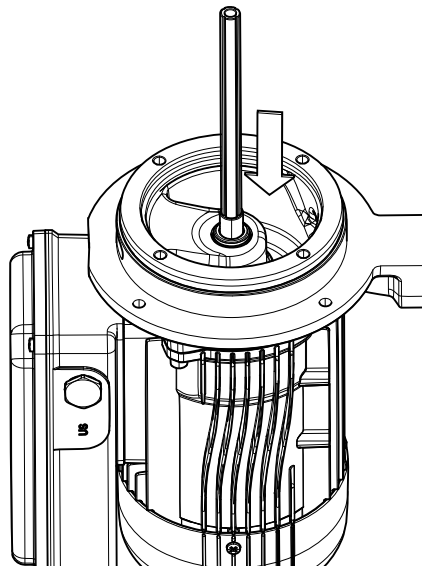
8. Remove the inducer and all the stages components (impellers, diffusers, bearings, washers). Parts removed should be arranged in the order they are being removed to assure that their re-assembly will be done in correct order. Pull the rotary unit of the seal along the shaft. Inspect the pump shaft for any burrs or debris. Any burrs should be ground smooth with (fine grit) emery paper.



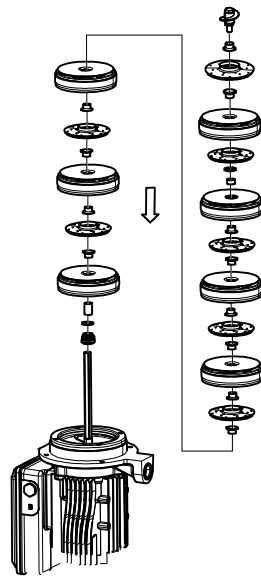
9. Inspect the old stationary unit before removal for any burrs or debris. Remove the stationary unit of the seal and pull it out along the shaft. Inspect and clean the inside of the discharge head and the bore where the stationary unit of the new seal will be installed.



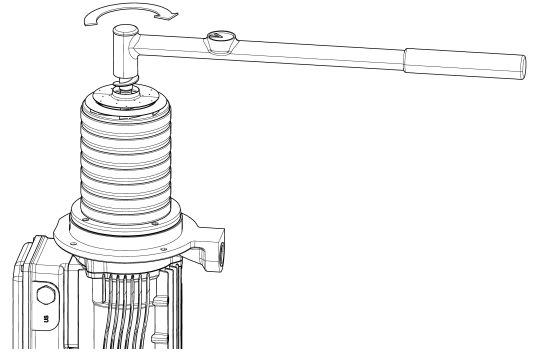
10. Remove the rotating and stationary units of the new seal from packaging and inspect for damage. Lubricate the elastomer of the stationary unit and the shaft with a water-based lubricant (e.g. P-80 lubricant) and install the new seal into the seal housing by pressing the seal uniformly with your thumbs. **DO NOT USE EXCESSIVE FORCE** and, if possible, place a clean soft cloth over the face of the seal face to protect it during installation.



11. Install the rotary unit of the seal along the shaft. Reinstall all the stage components (impellers, diffusers, bearings, washers) (11a). Reinstall the inducer and use the final value given in this IOM for the final torque (11b).

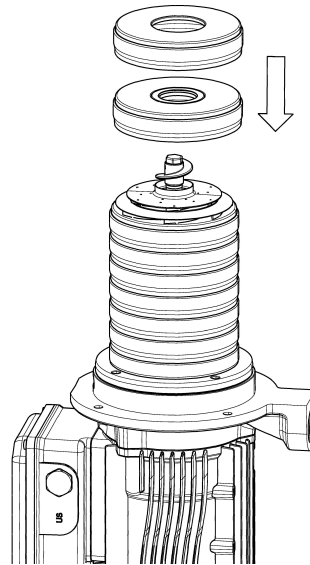


11a

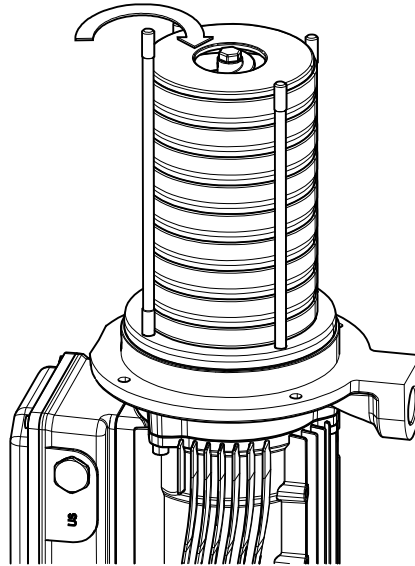


11b

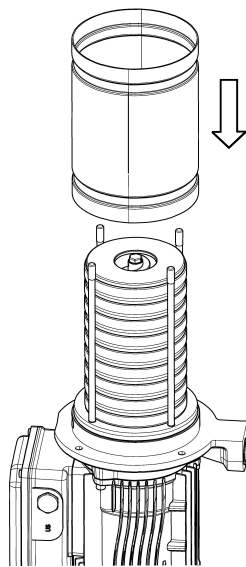
12. Reinstall the initial stage diffuser and the inducer housing.



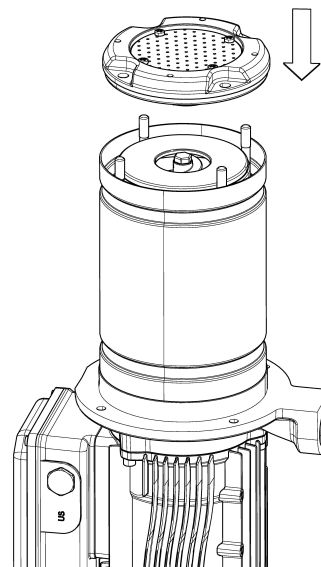
13. Reinstall the tie rods



14. Reinstall the casing (14a) and suction base (14b)

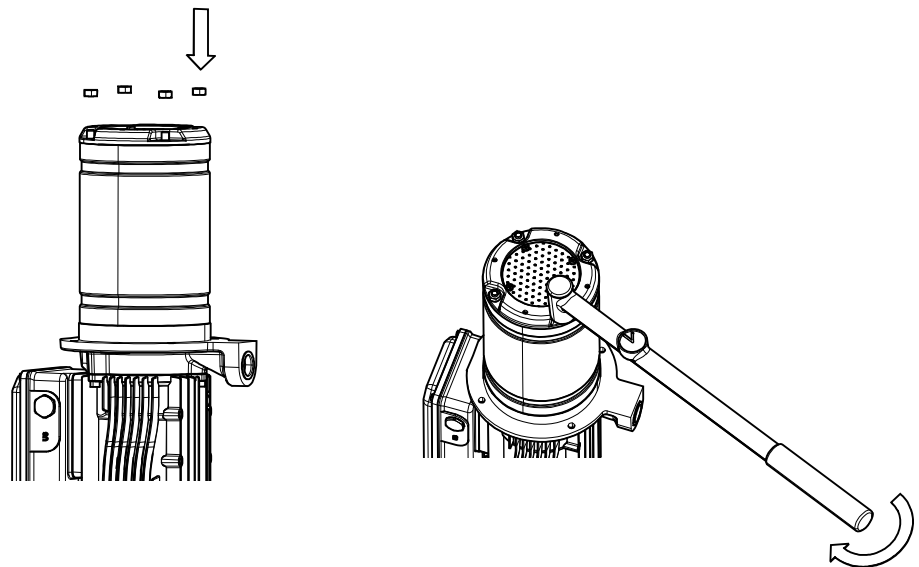


14a

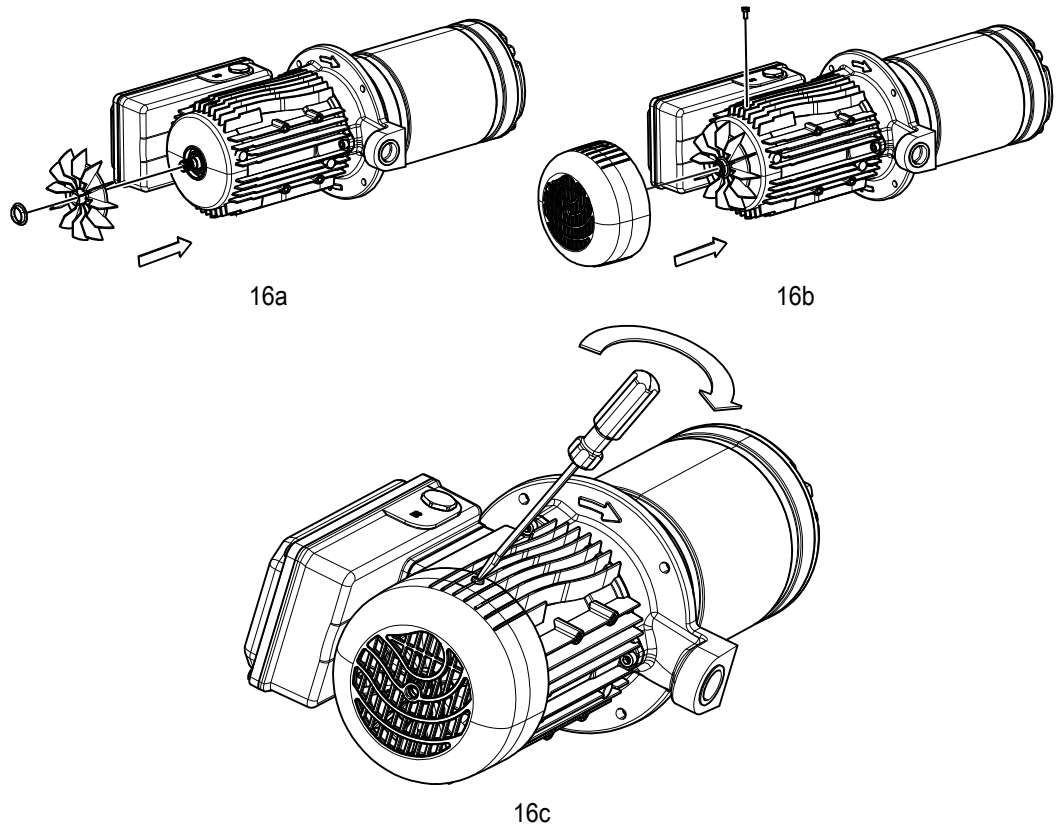


14b

15. Reinstall the four (4) washers and tie rod nuts by tightening evenly. Use the values given in this IOM for the final torque.

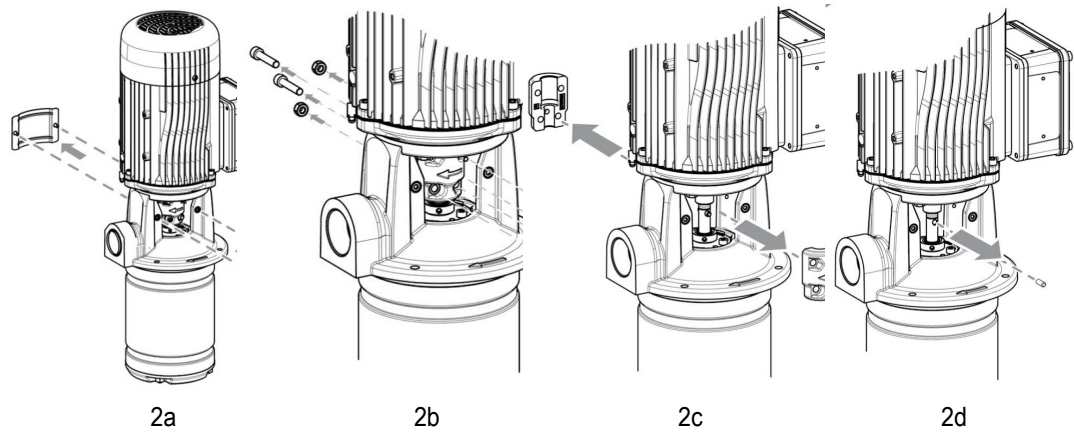


16. Remove the motor from the vice. Reinstall the motor's fan onto motor shaft (16a). Using a rubber mallet tap gently the fan into its place against the motor housing. Reinstall the fan cover and tighten its screw (16b and 16c).

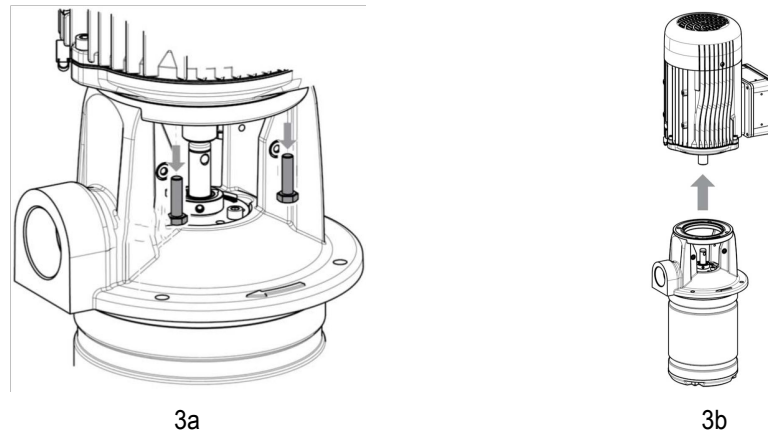


6.4 Replace the cartridge mechanical seal

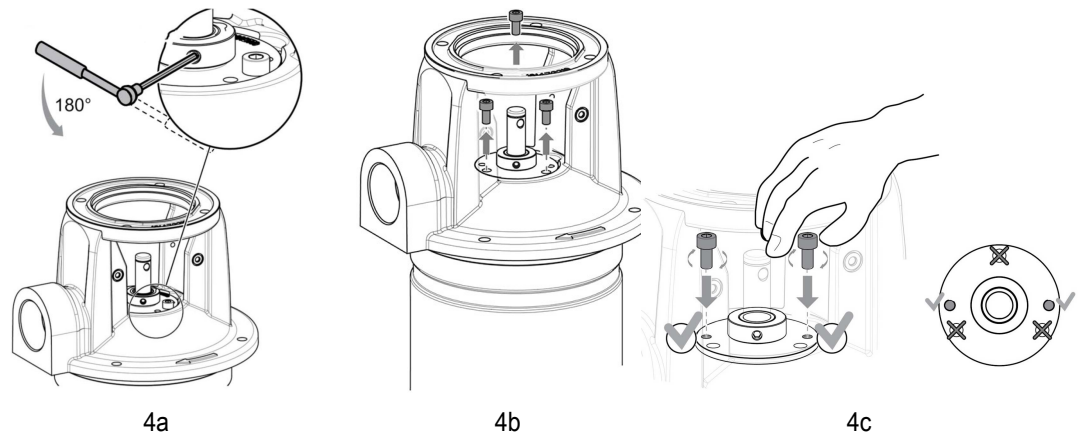
1. Turn off the pump, close all necessary discharge valves to isolate the pump from the system and make sure that the pump is not under pressure.
2. Remove the coupling guards (2a), the 4 coupling hex cap screws (2b), the coupling (2c) and coupling drive pin (2d).

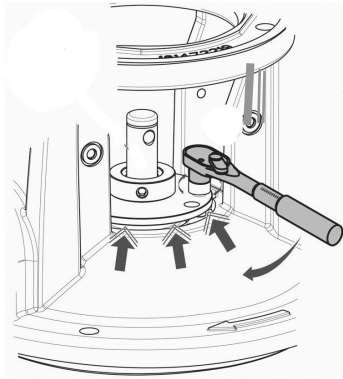


3. Remove the 4 motor hex cap screws (3a) and the motor (3b).

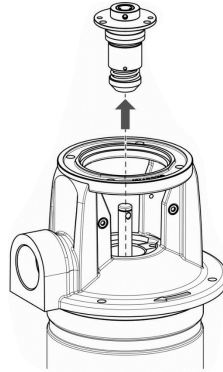


4. Loosen the 3 set screws used to secure the cartridge seal on the shaft (4a). Remove the 3 motor hex cap screws (inner screws) on the cartridge (4b). To ease the removal of the cartridge seal housing lubricate the shaft lightly with a water-based lubricant (e.g. P-80 lubricants) and mount two of the screws removed in the previous step in the two threaded holes of the seal housing (simultaneously or alternating 2-3 turns at a time for each of them) (4c and 4d). Remove and discard the cartridge seal (4e). Inspect the pump shaft for any burrs or debris. Any burrs should be ground smooth with (fine grit) emery paper.



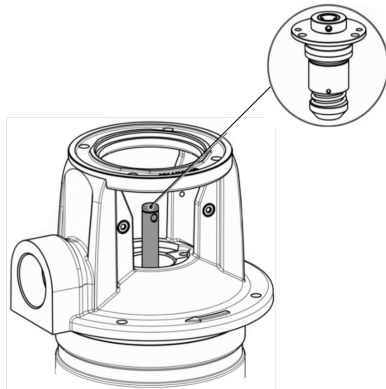


4d

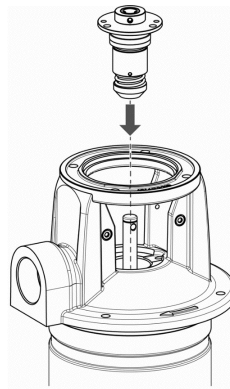


4e

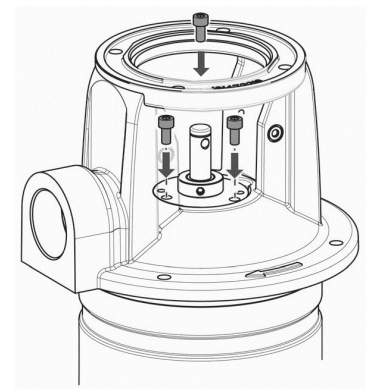
5. Lubricate the Cartridge O-ring and the pump shaft with a lubricant compatible with the elastomer (5a). Insert the new cartridge and carefully slide it down the shaft (5b). Align the holes of the cartridge seal with the threaded holes in the discharge head and reinstall the 3 hex cap screws by tightening evenly (5c). Use the values given in [Torque specification](#) on page 45 for the final torque.



5a



5b

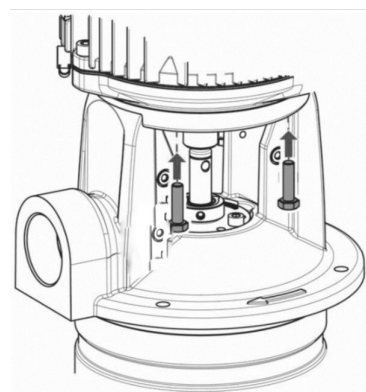


5c

6. Install the motor (6a) and tighten the 4 screws (6b) to the values specified in [Torque specification](#) on page 45.

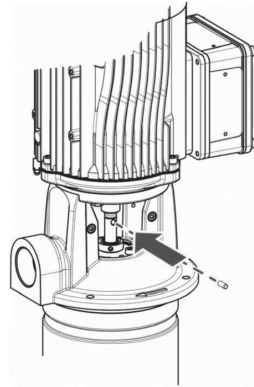


6a

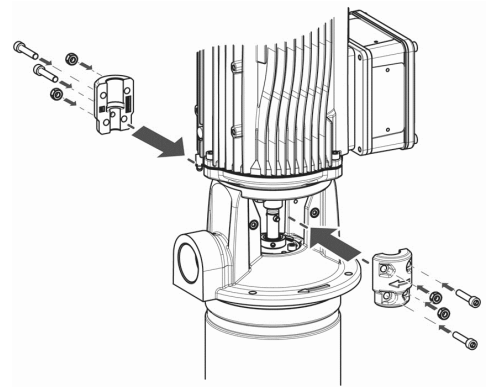


6b

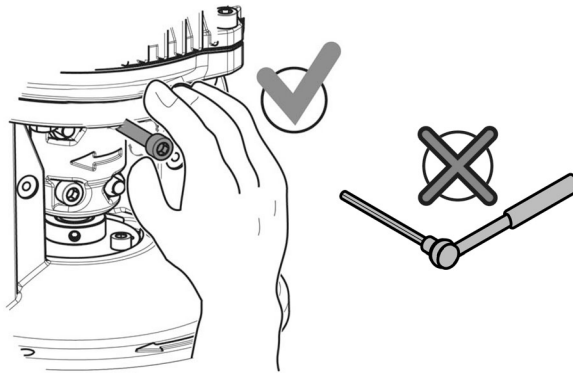
7. Reinstall the coupling pin (7a) and install the coupling halves (7b). Tighten the 4 coupling bolts by hand (7c). Locate the spacer supplied in between the coupling and the cartridge flange (7d). Continue tightening evenly the coupling bolts and torque them to the values given in the coupling section (the final space between the two halves should be approximately equal) (7e). Remove the spacer shim and save for future use (7f). Tighten the 3 set screws of the ring nut to the values given in [Torque specification](#) on page 45 (7g).



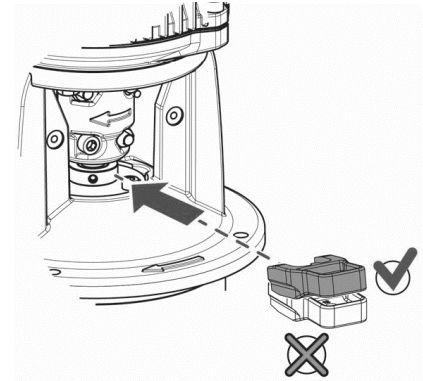
7a



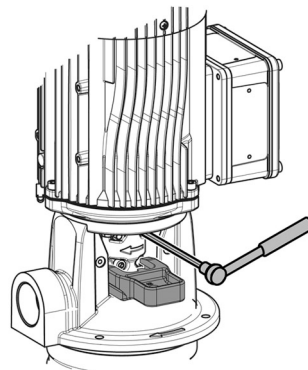
7b



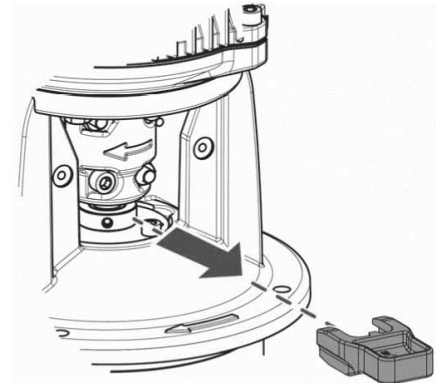
7c



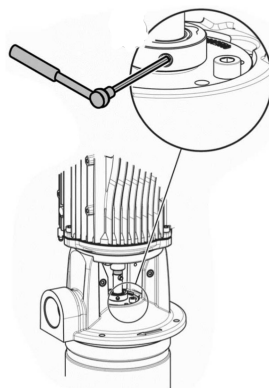
7d



7e

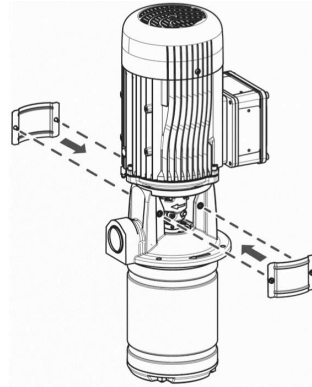


7f



7g

8. Rotate the coupling by hand to insure that the pump and motor rotate freely. Reinstall the coupling guard.



Additional service

All additional unit service or maintenance, not addressed in this manual, should be performed at a qualified service location. Contact your local dealer or Goulds Water Technology distributor for assistance.

7 Troubleshooting

7.1 Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* on page 3 have been read and understood.



DANGER: Electrical Hazard

Troubleshooting a live control panel exposes personnel to hazardous voltages. Electrical troubleshooting must be done by a qualified electrician.



DANGER: Crush Hazard

Moving parts can entangle or crush. Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.

7.2 The unit does not start

Cause	Remedy
Electric power supply cutoff	Restore the electric power supply.
The device for protection against the absence of liquid has tripped	<ol style="list-style-type: none"> 1. Check the liquid level in the tank. 2. Adjust the device 3. If the problem continues, replace the device.
Starter set incorrectly fitted or defective	<ol style="list-style-type: none"> 1. Adjust the starter set. 2. If the problem continues, replace the starter set.
The motor protector on the control panel has tripped (three-phase version)	See <i>Starts per hour</i> on page 14.
Power supply cord is damaged	Replace the cable.
Defective capacitor (single-phase version)	Contact the local sales and service representative.
Control panel defective	Contact the local sales and service representative.
Unit defective	Contact the local sales and service representative.

7.3 The differential protection device has tripped

Cause	Remedy
Differential of unsuitable type or defective	<ol style="list-style-type: none"> 1. Check the type of differential. 2. Replace the differential.
Low insulation unit	Contact the local sales and service representative.

7.4 The unit stops and starts cyclically

Cause	Remedy
Unit that is blocked or partially blocked	Contact the local sales and service representative.
Unit mechanically seized	Contact the local sales and service representative.
Undervoltage	Check the power supply voltage.
Liquid is too thick	Check the liquid.
Incorrect duty point, flow rate below or above the permitted limits	Contact the local sales and service representative.

Cause	Remedy
Ambient temperature is too high	Decrease the temperature.
If available, the frequency converter is wrongly calibrated	See the frequency converter manual.
Unit is defective	Contact the local sales and service representative.

7.5 The motor protector on the control panel trips

Cause	Remedy
The motor is calibrated at a value too low in relation to the rated current of the motor.	Recalibrate
The motor protector is defective or incorrectly sized.	1. Replace the motor protector. 2. Install a correctly sized motor protector.
The power supply voltage is incorrect.	Check the power supply voltage.
The power supply phase is missing.	Check the power supply and restore the phase.
The connections of motor protector are loose or defective.	Tighten or replace the clamps and terminals.
The connections of motor terminal box are loose or defective.	Tighten or replace the clamps and terminals.
The unit is blocked or partially blocked	Contact the local sales and service representative.
The connection of star-triangle is not connected correctly in the motor terminal box.	Check the connection and correct it as required based on the intended power supply voltage.
The power supply cord is damaged	Replace the cable.
The frequency converter is wrongly calibrated (if present)	See the frequency converter manual.
The liquid is too thick.	Check the liquid.
The ambient temperature is too high.	Decrease the temperature.
Too many starts	See Starts per hour on page 14.
Incorrect duty point, flow rate below or above the permitted limits	Bring back the flow rate in the permitted limits.
The unit is defective.	Contact the local sales and service representative.

7.6 The motor becomes too hot

Cause	Remedy
The ambient temperature is too high.	Decrease the temperature.
The positioning measurements of the unit are not in limits.	Change the mechanical installation.
The motor fan guard is obstructed.	Clean the fan guard.
The motor cooling fan is damaged.	Replace the cooling fan.
Too many starts	See Starts per hour on page 14.
If available, the frequency converter is not calibrated correctly	See the frequency converter manual.

7.7 Little or no hydraulic performance

Cause	Remedy
The three-phase motor turns in the incorrect direction.	1. Check the direction of rotation. 2. If necessary, change the three-phase motor.

Cause	Remedy
The presence of air in the unit	<ol style="list-style-type: none"> 1. Bleed the unit. 2. Check the suction conditions. 3. Increase the liquid level inside the tank. 4. Remove the foam. 5. Remove any turbulences in the suction area.
The check valve is blocked or partially clogged.	Replace the check valve.
The pipes, on-off valves, or filter clogged with impurities	Remove the impurities.
There are leaks in the following components: <ul style="list-style-type: none"> • Gaskets • Unit • Bypass pipe 	<ol style="list-style-type: none"> 1. Replace the gaskets. 2. Check the flow rate of the bypass pipe. 3. If the problem continues, contact the local sales and service representative.
The unwanted materials in the unit	Remove the unwanted materials.
If available, the frequency converter is not correctly calibrated	For more information, see the frequency converter manual.
The unit is undersized.	Contact the local sales and service representative.
The wear of the unit components	Contact the local sales and service representative.
The unit is defective.	Contact the local sales and service representative.

7.8 The unit turns in the opposite direction

When the power switched off, the unit turns in the opposite direction.

Cause	Remedy
The check valve is defective.	Replace the check valve.

7.9 The unit starts and stops

The unit with automatic start and stop device starts and stops too frequently.

Cause	Remedy
The check valve that is locked in closed or partially closed position.	Replace the check valve.
The piping is chocked or obstructed.	Remove all the chocking or obstructions.
The starter is set incorrectly or defective.	<ol style="list-style-type: none"> 1. Adjust the starter. 2. If the problem continues, replace the starter.
Protection device against lack of liquid set incorrectly or defective	<ol style="list-style-type: none"> 1. Adjust the device. 2. If the problem continues, replace the device.

7.10 The unit does not stop

The unit with the automatic start and stop device never stops.

Cause	Remedy
The required flow rate is greater than the one expected.	Decrease the required flow rate.
The three-phase motor turns in the incorrect direction.	<ol style="list-style-type: none"> 1. Check the direction of rotation. 2. If necessary, change three-phase motor.
The pipes, on-off valves, or filter is clogged with impurities	Remove the impurities.

Cause	Remedy
The starter is set incorrectly or starter is defective.	Adjust or replace the starter.
The unit runs but there is little or no flow rate.	See Little or no hydraulic performance on page 42.

7.11 The unit produces excessive noise or vibration

Cause	Remedy
Plant resonance	Check the installation of the unit.
Unwanted materials in the unit	Remove the unwanted materials.
The unit is mechanically seized	Contact the local sales and service representative.
Incorrect duty point, flow rate below or above the permitted limits	Bring back the flow rate in the permitted limits.
Presence of air in the unit	<ol style="list-style-type: none"> 1. Bleed the unit. 2. Check the suction conditions. 3. Increase the liquid level inside the tank. 4. Remove the foam. 5. Remove the turbulences in the suction area.
The unit is not correctly attached to the tank.	Check the fastening.
The coupling of motor-pump is not correctly adjusted.	Adjust the coupling.
The anti-vibration joint on the piping not applicable or not available	<ol style="list-style-type: none"> 1. Check the anti-vibration joint. 2. If not available, install the anti-vibration joint
If available, the frequency converter is not calibrated correctly	See the frequency converter manual
The unit is defective.	Contact the local sales and service representative.

7.12 Leak at the mechanical seal

Cause	Remedy
The seal is damaged because of following causes: <ul style="list-style-type: none"> • Wear • Thermal shock • Chemical incompatibility • Other 	<ol style="list-style-type: none"> 1. Replace the seal and check it to identify the cause of the damage. 2. Contact the local sales and service representative.
The height of pump shaft is not sufficient.	Adjust the height by using the shim.

8 Technical Specification

8.1 Environmental requirements

Feature	Value
Operating environment	Non-aggressive and nonexplosive atmosphere
Operating temperature	32°F to 104°F (0°C to 40°C)
Relative humidity	< 50% at 104°F (40°C)

8.2 Torque specification

Hp	Motor screw	Adapter flange	Coupling bolt		
			1-5SVI	10-22SVI	33-92SVI
0.75-7.5 hp	20 lbf-ft (27 N·m)	-	15 lbf-ft (20 N·m)	40 lbf-ft (54 N·m)	37 lbf-ft (50 N·m)
10-40 hp	45 lbf-ft (61 N·m)	48 lbf-ft (65 N·m)*	15 lbf-ft (20 N·m)	40 lbf-ft (54 N·m)	48 lbf-ft (65 N·m)

*213TC and 215TC Adapter Flange use 30 lbf-ft (40 N·m)

Pump size	Tie rod nuts	Inducer screw
1-5SVI	15 lbf-ft (20 N·m)	15 lbf-ft (20 N·m)
10-22SVI	22 lbf-ft (30 N·m)	26 lbf-ft (35 N·m)
33-92SVI	52 lbf-ft (70 N·m)	-

8.3 Elevation

Altitude, ft (m)	Power reduction coefficient
3300 to 4900 (1000 to 1500)	0.97
4900 to 6600 (1500 to 2000)	0.95

8.4 Temperature of the pumped liquid

Seal material	Temperature, °F (°C)
FKM	14 to 194 (-10 to 90)
EPDM	-22 to 194 (-30 to 90)

8.5 Maximum head and maximum operating pressure

Pump size	Configuration	Maximum TDH (ft)	Maximum allowable pressure (psi)
1	Coupled	813	362
	Close-coupled	364	145
3	Coupled	804	362
	Close-coupled	244	145
5	Coupled	830	362
	Close-coupled	139	145

Pump size	Configuration	Maximum TDH (ft)	Maximum allowable pressure (psi)
10	Coupled	819	362
15	Coupled	739	362
22	Coupled	771	362
33	Coupled	435	435
46	Coupled	368	362
66	Coupled	400	232
92	Coupled	414	232

9 Product Warranty

Commercial warranty

Warranty. For goods sold to commercial buyers, Seller warrants the goods sold to Buyer hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other "wear parts" or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) will be (i) be built in accordance with the specifications referred to in the quotation or sales form, if such specifications are expressly made a part of this Agreement, and (ii) free from defects in material and workmanship for a period of one (1) year from the date of installation or twelve (12) months from the date of shipment (which date of shipment shall not be greater than eighteen (18) months after receipt of notice that the goods are ready to ship), whichever shall occur first, unless a longer period is specified in the product documentation (the "Warranty").

Except as otherwise required by law, Seller shall, at its option and at no cost to Buyer, either repair or replace any product which fails to conform with the Warranty provided Buyer gives written notice to Seller of any defects in material or workmanship within ten (10) days of the date when any defects or non-conformance are first manifest. Under either repair or replacement option, Seller shall not be obligated to remove or pay for the removal of the defective product or install or pay for the installation of the replaced or repaired product and Buyer shall be responsible for all other costs, including, but not limited to, service costs, shipping fees and expenses. Seller shall have sole discretion as to the method or means of repair or replacement. Buyer's failure to comply with Seller's repair or replacement directions shall terminate Seller's obligations under this Warranty and render the Warranty void. Any parts repaired or replaced under the Warranty are warranted only for the balance of the warranty period on the parts that were repaired or replaced. Seller shall have no warranty obligations to Buyer with respect to any product or parts of a product that have been: (a) repaired by third parties other than Seller or without Seller's written approval; (b) subject to misuse, misapplication, neglect, alteration, accident, or physical damage; (c) used in a manner contrary to Seller's instructions for installation, operation and maintenance; (d) damaged from ordinary wear and tear, corrosion, or chemical attack; (e) damaged due to abnormal conditions, vibration, failure to properly prime, or operation without flow; (f) damaged due to a defective power supply or improper electrical protection; or (g) damaged resulting from the use of accessory equipment not sold or approved by Seller. In any case of products not manufactured by Seller, there is no warranty from Seller; however, Seller will extend to Buyer any warranty received from Seller's supplier of such products.

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Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

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