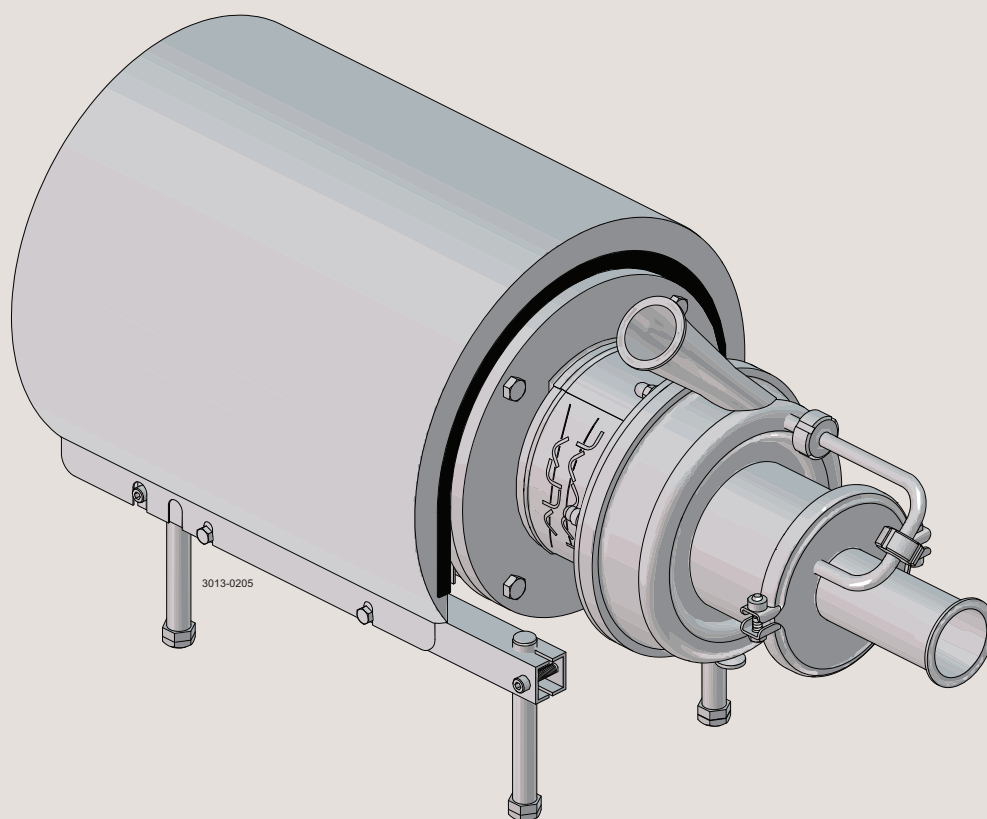




# Instruction Manual

## LKH Prime UltraPure Pump



ESE03177-EN4

2020-06

Original manual



*The information herein is correct at the time of issue but may be subject to change without prior notice*

|   |           |
|---|-----------|
| <b>1. EC Declaration of Conformity</b>              | <b>4</b>  |
| <b>2. Safety</b>                                    | <b>5</b>  |
| 2.1. Important information                          | 5         |
| 2.2. Warning signs                                  | 5         |
| 2.3. Safety precautions                             | 6         |
| <b>3. Installation</b>                              | <b>7</b>  |
| 3.1. Unpacking/delivery                             | 7         |
| 3.2. Installation                                   | 8         |
| 3.3. Pre-check                                      | 15        |
| 3.4. Recycling information                          | 17        |
| <b>4. Operation</b>                                 | <b>18</b> |
| 4.1. Operation/control                              | 18        |
| 4.2. Trouble shooting                               | 20        |
| 4.3. Recommended cleaning                           | 21        |
| <b>5. Maintenance</b>                               | <b>23</b> |
| 5.1. General maintenance                            | 23        |
| 5.2. Cleaning procedure                             | 25        |
| 5.3. Dismantling of pump/shaft seals                | 26        |
| 5.4. Assembly of pump/single shaft seal             | 30        |
| 5.5. Assembly of pump/double mechanical shaft seal  | 33        |
| 5.6. Adjustment of shaft                            | 37        |
| <b>6. Technical data</b>                            | <b>40</b> |
| 6.1. Technical data                                 | 40        |
| 6.2. Relubrication intervals                        | 41        |
| 6.3. Torque specifications                          | 41        |
| 6.4. Weight (kg)                                    | 41        |
| 6.5. Noise emission                                 | 42        |
| <b>7. Part list and service kits</b>                | <b>43</b> |
| 7.1. LKH Prime UltraPure                            | 43        |
| 7.2. LKH Prime UltraPure 20 - Product wetted parts  | 44        |
| 7.3. LKH Prime UltraPure 20 - Motor-dependent parts | 46        |
| 7.4. LKH Prime UltraPure 20 - Shaft seal            | 48        |

# 1 EC Declaration of Conformity

Revision of Declaration of Conformity 2016-02-01

The Designated Company

Alfa Laval Kolding A/S

Company Name

Albuen 31, DK-6000 Kolding, Denmark

Address

+45 79 32 22 00

Phone No.

hereby declares that

Pump

Designation

LKH Prime UP 10, LKH Prime UP 20

Type

from serial number 10.000 to 1.000.000

is in conformity with the following directive with amendments:  
- Machinery Directive 2006/42/EC

The person authorised to compile the technical file is the signer of this document

Global Product Quality Manager  
Hygienic Fluid Handling

Title

Lars Kruse Andersen

Name

Kolding  
Place

2020-06-01  
Date

  
Signature





---

*This manual highlights unsafe practices and other important information.  
Warnings are emphasised by means of special signs.  
Always read the manual before using the pump!*

---

### 2.1 Important information

---

#### **WARNING**

Indicates that special procedures must be followed to avoid serious personal injury.

#### **CAUTION**

Indicates that special procedures must be followed to avoid damage to the pump.

#### **NOTE**

Indicates important information to simplify or clarify procedures.

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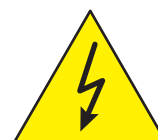
### 2.2 Warning signs

---

General warning:



Dangerous electrical voltage:



Caustic agents:



## 2 Safety

*All warnings in the manual are summarised on this page.*

*Pay special attention to the instructions below in order to avoid severe personal injury and/or damage to the pump.*

### 2.3 Safety precautions

#### Installation:

**Always** read the technical data carefully. (See chapter 6.1 Technical data)

**Always** use a lifting crane when handling the pump.

**Always** remove the air screw and impeller before checking the direction of rotation.

**Never** start the pump if the impeller and air screw are fitted and the pump casing is removed.



#### Operation:

**Always** read the technical data carefully. (See chapter 6.1 Technical data)

**Never** touch the pump or the pipelines when pumping hot liquids or when sterilising.

**Never** run the pump when both the suction side and the pressure side are blocked.

**Never** run the pump when partially installed or not fully assembled.

**Necessary** precautions must be taken if leakage occurs as this can lead to hazardous situations.

**Always** handle lye and acid with great care.

**Never** use the pump for products not listed in the Alfa Laval pump selection program.

The Alfa Laval pump selection program can be acquired from your local Alfa Laval sales company.



#### Maintenance:

**Always** read the technical data carefully. (See chapter 6.1 Technical data)

**Never** service the pump when it is hot.

**Never** service the pump if pressurised.

**Always** use genuine spare parts from Alfa Laval.

#### Motors with grease nipples:

Remember to perform lubrication in accordance with the information plate/label on the motor.

**Always** disconnect the power supply when servicing the pump.



#### Transportation:

##### Transportation of the pump or the pump unit:

**Never** lift or elevate in any way other than that described in this manual

**Always** drain the pump head and accessories of any liquid

**Always** ensure that lubricants are not able to leak

**Always** transport the pump in an upright position

**Always** ensure that the unit is securely fixed during transportation

**Always** use the original packaging or similar during transportation

Read the instructions carefully and pay special attention to the warnings! Always check the pump before operation.

-See pre-use check in section 3.3 Pre-use check

The pump is heavy.

Alfa Laval therefore recommends the use of a lifting crane when handling the pump.

### 3.1 Unpacking/delivery

#### Step 1

Always use a lifting crane when handling the pump (see technical data).

#### CAUTION

Alfa Laval cannot be held responsible for incorrect unpacking.

#### WARNING:

Be aware that certain pump configurations can tilt, and therefore cause injury to feet or fingers. The pump should be supported underneath the adapter, when not installed in the process line.

#### Check the delivery for:

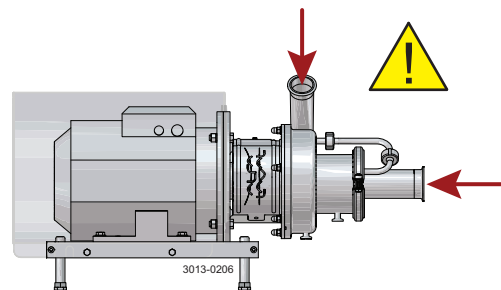
1. Complete pump
2. Delivery note
3. Motor instructions

#### Step 2

Remove any packing materials from the inlet and outlet.

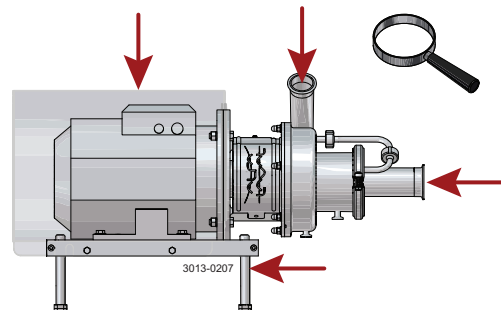
Avoid damaging the inlet and outlet.

Avoid damaging the connections for flushing liquid, if supplied.



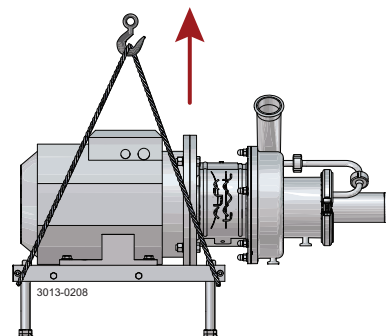
#### Step 3

Inspect the pump for visible transport damage.



#### Step 4

Always remove the shroud, if fitted, before lifting the pump.



## 3 Installation

Read the instructions carefully and pay special attention to the warnings! Always check the pump before operation.

- See pre-use check in section 3.3 Pre-use check

The pump is heavy.

Alfa Laval therefore recommends the use of a lifting crane when handling the pump.

### 3.2 Installation

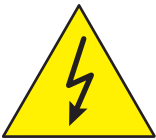
#### Step 1



**Always** read the technical data carefully.  
(See chapter 6.1 Technical data)



**Always** use a lifting crane when handling the pump.



**Always** have the pump electrically connected by authorised personnel. (See the motor instructions).

#### CAUTION

Alfa Laval cannot be held responsible for incorrect installation.

#### WARNING:

Alfa Laval recommends the installation of a lockable repair breaker. If the repair breaker is to be used as an emergency stop, the colours of the repair breaker must be red and yellow.

#### Caution:

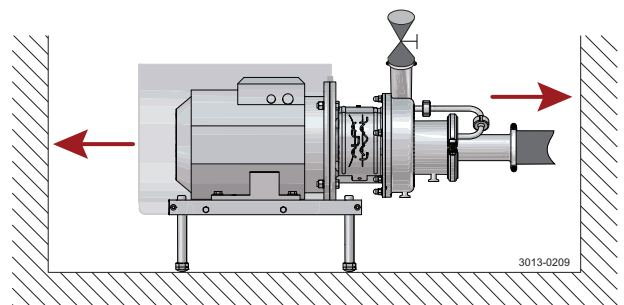
The pump does not prevent back flow when intentionally or unintentionally stopped. If back flow may cause a hazardous situation to arise, precautions must be taken e.g. a check valve can be installed in the system to prevent hazardous situations.

#### Note:

The 3A standard requires minimum clearance between the lowest part of the base, pump, motor or drive and for the floor to be no less than 4 in. (100 mm)

#### Step 2

Ensure at least 0.5 m (1.6 ft) clearance around the pump.

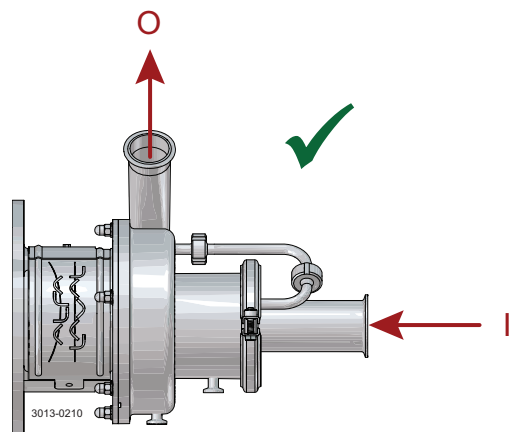


#### Step 3

Check that the flow direction is correct.

O: Outlet

I: Inlet



*Read the instructions carefully and pay special attention to the warnings! Always check the pump before operation.*

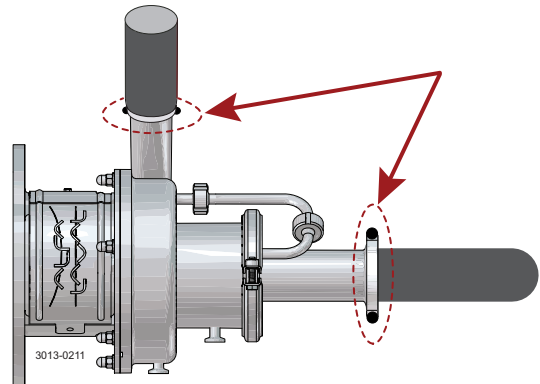
*- See pre-use check in section 3.3 Pre-use check*

*The pump is heavy.*

*Alfa Laval therefore recommends the use of a lifting crane when handling the pump.*

#### Step 4

1. Ensure that the pipelines are routed correctly.
2. Ensure that the connections are tight.
3. Remember seal rings



#### Step 5

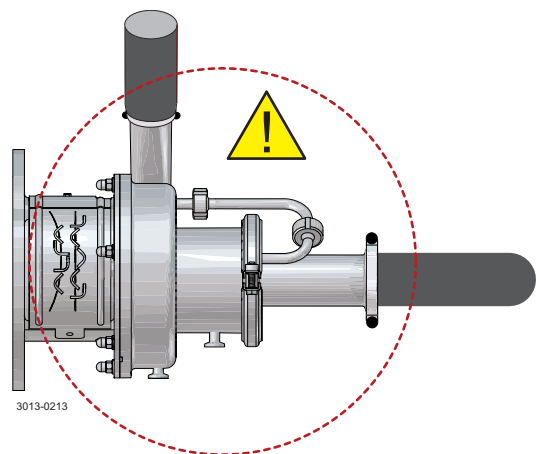
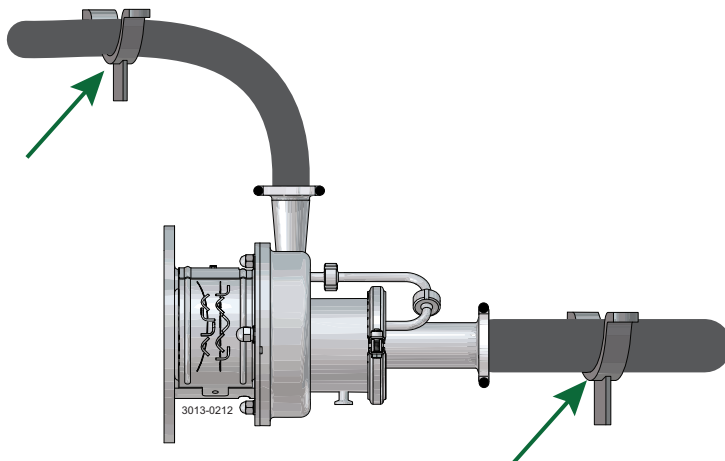
**Avoid stress on the pump.**

**Piping system must be self-supported.**

**Pay special attention to:**

- Vibrations
- Thermal expansion of the tubes
- Excessive welding
- Overloading of the pipelines

Example of piping system self-supported.



### 3 Installation

*Read the instructions carefully and pay special attention to the warnings! Always check the pump before operation.*

*- See pre-use check in section 3.3 Pre-use check*

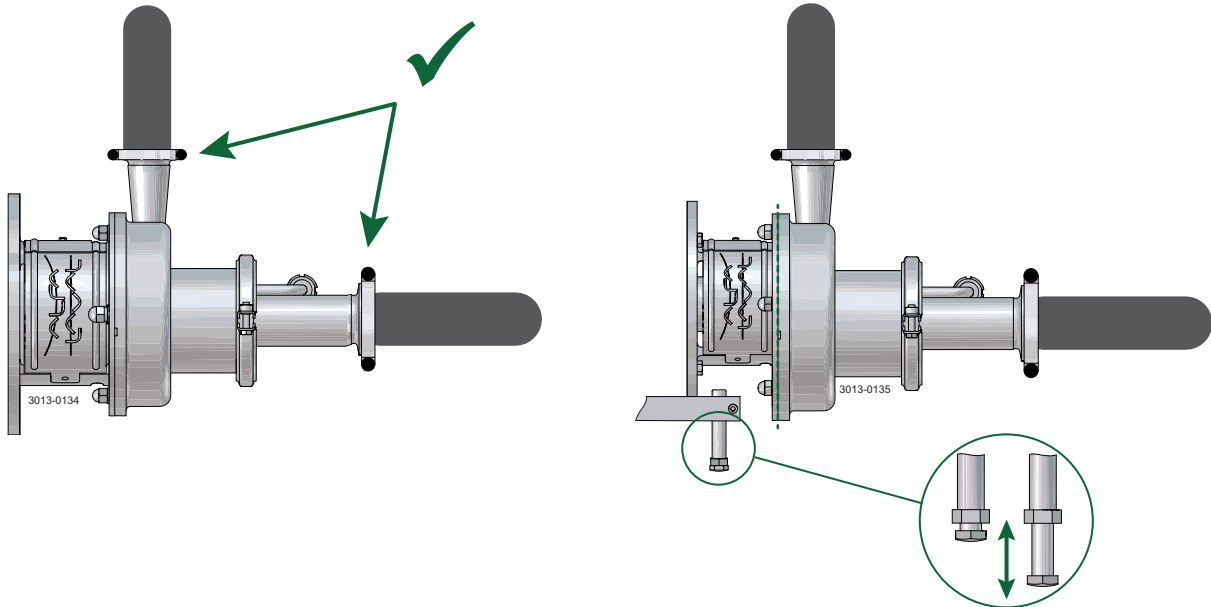
*The pump is heavy.*

*Alfa Laval therefore recommends the use of a lifting crane when handling the pump.*

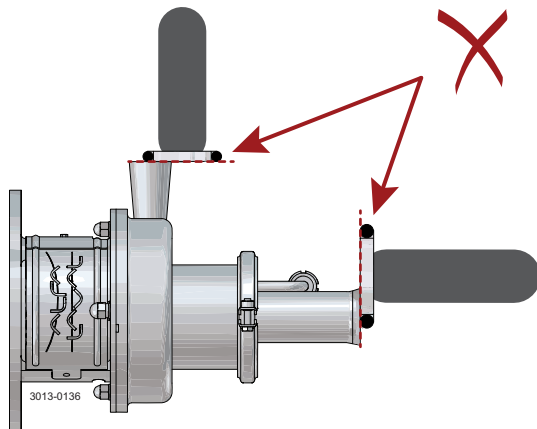
#### Step 6

Ensure correct alignment of pump inlet and outlet with piping system.

Alignment can be done by adjusting the pump legs.



Centre of inlet and outlet to be aligned with centre of piping system.



### 3 Installation

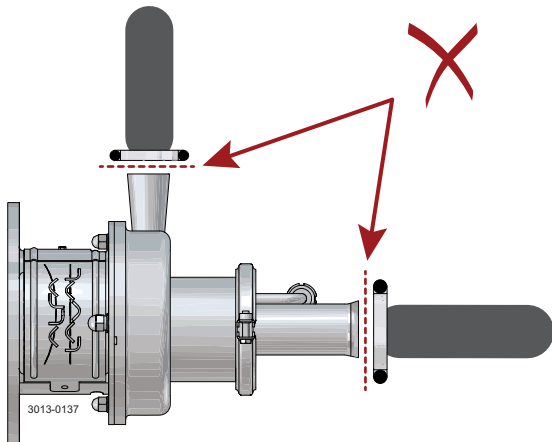
*Read the instructions carefully and pay special attention to the warnings! Always check the pump before operation.*

*- See pre-use check in section 3.3 Pre-use check*

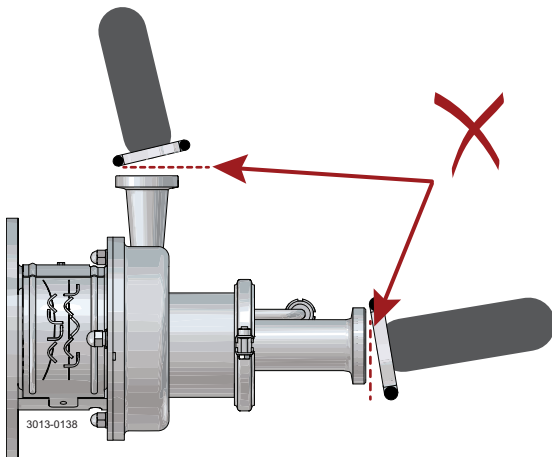
*The pump is heavy.*

*Alfa Laval therefore recommends the use of a lifting crane when handling the pump.*

No gaps between connections on pump inlet and inlet pipe, and pump outlet and outlet pipe.



Angel between connections on pump inler and inlet pipe, pump outlet and outlet pipe not allowed.



### 3 Installation

*Read the instructions carefully and pay special attention to the warnings! Always check the pump before operation.*

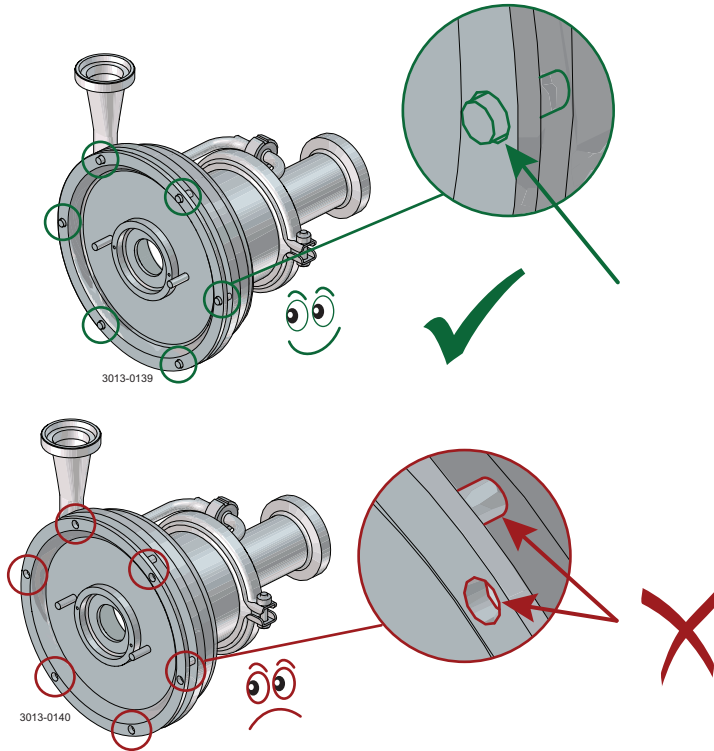
*- See pre-use check in section 3.3 Pre-use check*

*The pump is heavy.*

*Alfa Laval therefore recommends the use of a lifting crane when handling the pump.*

Ensure correct alignment of pump casing and pump backplate. Angle not allowed. Alignment can be done by adjusting the pump legs.

Ensure stud bolts in casings are aligned with holes in backplate.



#### Note

In case of shaft seal leakage, the media will drip from the slot in the bottom of the adaptor. In case of shaft seal leakage, Alfa Laval recommends putting a drip tray underneath the slot to collect the leakage.



### 3 Installation

Read the instructions carefully and pay special attention to the warnings! Always check the pump before operation.

- See pre-use check in section 3.3 Pre-use check

The pump is heavy.

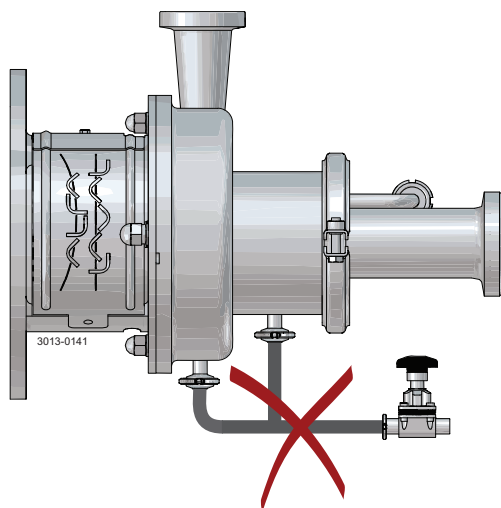
Alfa Laval therefore recommends the use of a lifting crane when handling the pump.

#### Step 7

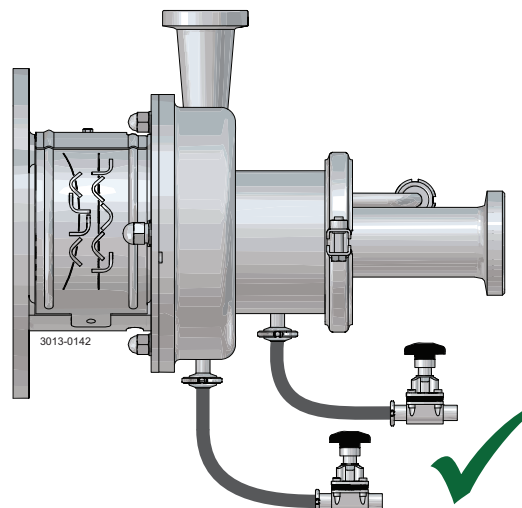
If pump is fitted with drain option;

Never short circuit the drain connections as this will reduce the air release capacity.

Always use two drain valves.



Incorrect



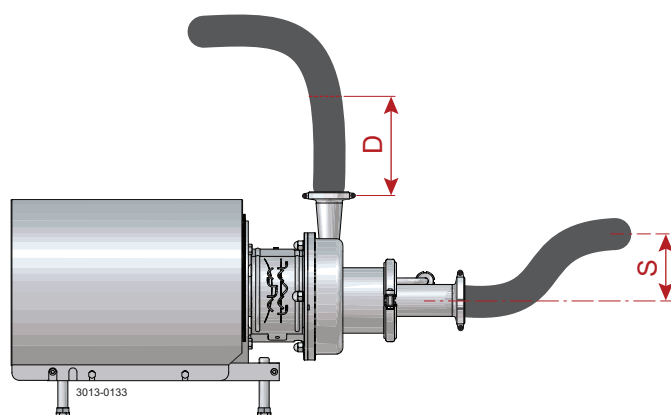
Correct

#### Step 8

To ensure optimal function of the selfpriming capacity, LKH Prime must be installed in such a way that ensures liquid is in the pump on start-up e.g. with a swan neck design as illustrated.

#### Note

Max running time when releasing air only should not exceed 15 min.



|                 | S min  | D min         |
|-----------------|--------|---------------|
| LKH Prime UP 10 | 200 mm | 1.5 m 2" pipe |
| LKH Prime UP 20 |        |               |

### 3 Installation

Read the instructions carefully and pay special attention to the warnings! Always check the pump before operation.

- See pre-use check in section 3.3 Pre-use check

The pump is heavy.

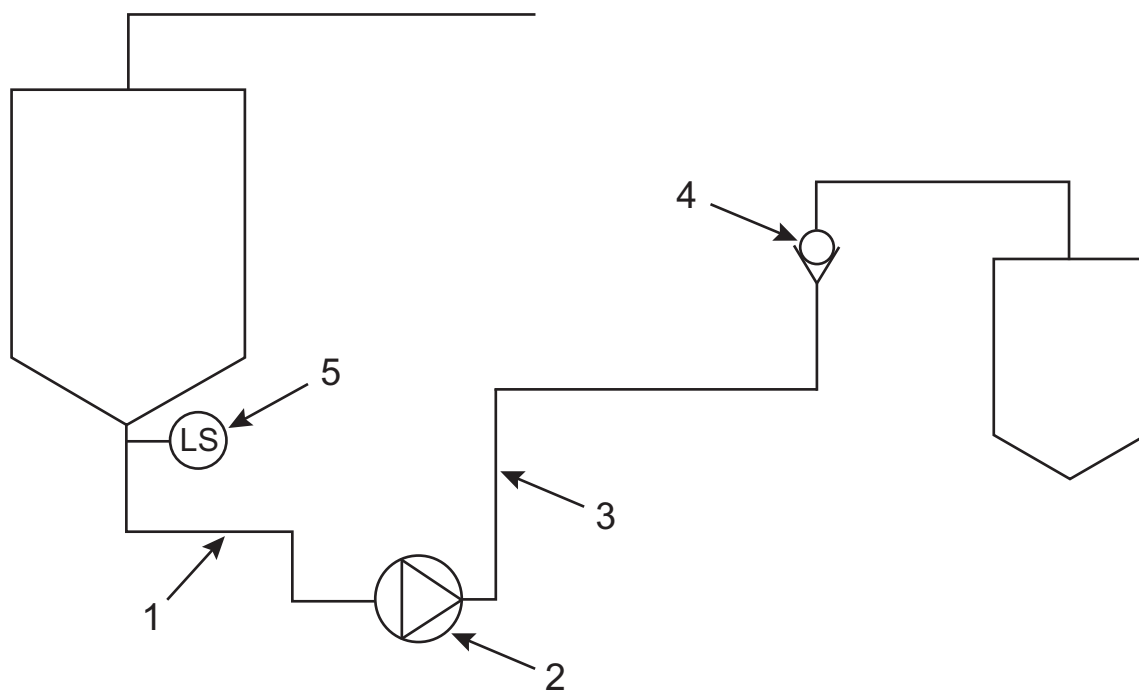
Alfa Laval therefore recommends the use of a lifting crane when handling the pump.

#### Step 9

##### Installation guide lines

1. Suction considerations
  - Installation
    - Ensure the suction line is designed so the Prime UP pump is liquid filled at start up, eg. swan neck. (see table in Step 6)
    - Design suction line with slope down toward the pump to avoid air entrapments
  - NPSH
    - Ensure  $NPSH_a > NPSH_r$  under all duty conditions including all temperatures
  - Air inclusions
    - Controlled start/stop of pump eg. Level Switch (LS)
      - Do not start the LKH Prime UP before tank bottom is liquid filled
      - Stop the LKH Prime UP during phase changes
2. General pump considerations
  - VFD
    - Minimum speed for effective air evacuation is 2800 RPM
    - Air evacuation ability improves with higher speed (Max speed 3600 RPM)
  - Pump sizing
    - The LKH Prime UP must be sized for the specific duty point

**Note: LKH Prime UP is NOT a one-to-one replacement of the MR pump**
3. Discharge considerations
  - Installation
    - Ensure minimum length of vertical pipe after the LKH Prime UP (see table in Step 6)
  - Check valve
    - Place check valve as far away from the pump as possible
    - Replace check valve with automated valve if possible



| Pos |                   |
|-----|-------------------|
| 1   | Suction line      |
| 2   | LKH Prime UP Pump |
| 3   | Discharge line    |
| 4   | Check valve       |
| 5   | Level switch      |

Read the instructions carefully and pay special attention to the warnings!  
Check the direction of rotation of the impeller before operation.  
- See the indication label on the pump.

### 3.3 Pre-check

#### Step 1

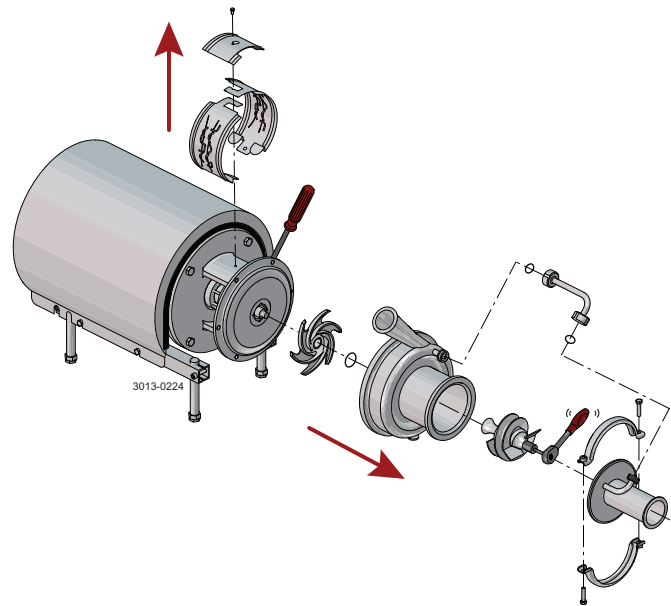


**Always** remove air screw and impeller before checking the direction of rotation.



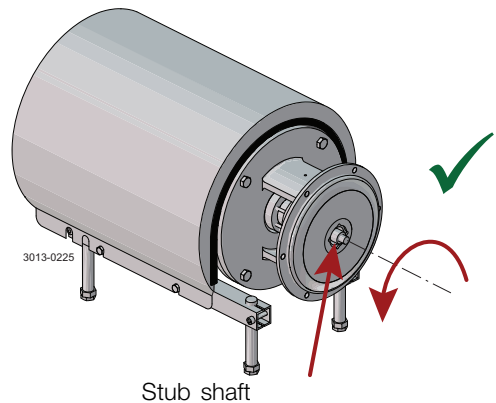
**Never** start the pump if the impeller is fitted and the pump casing is removed.

1. Remove adapter shields (22)
2. Loosen unions and remove recirculation pipe (56)
3. Remove clamp (57) and front cover (60)
4. Remove air screw (58) with a spanner. Counter hold with a screwdriver. (See also instruction in section 5.3)
5. Unscrew cap nuts (24). Remove washers (24a) and pump casing (29)
6. Remove impeller (27). (See also instruction in section 5.3)



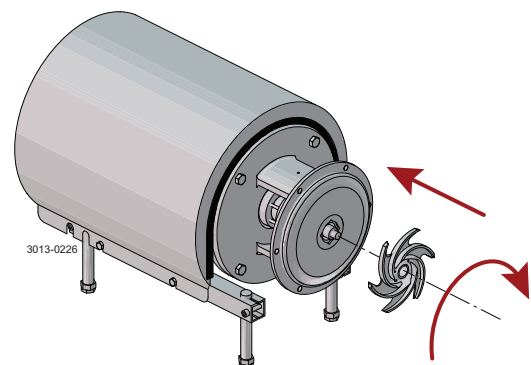
#### Step 2

1. Start and stop the motor momentarily.
2. Ensure that the direction of rotation of the stub shaft (7) is anticlockwise as viewed from the inlet side.



#### Step 3

Fit and tighten the impeller (27).

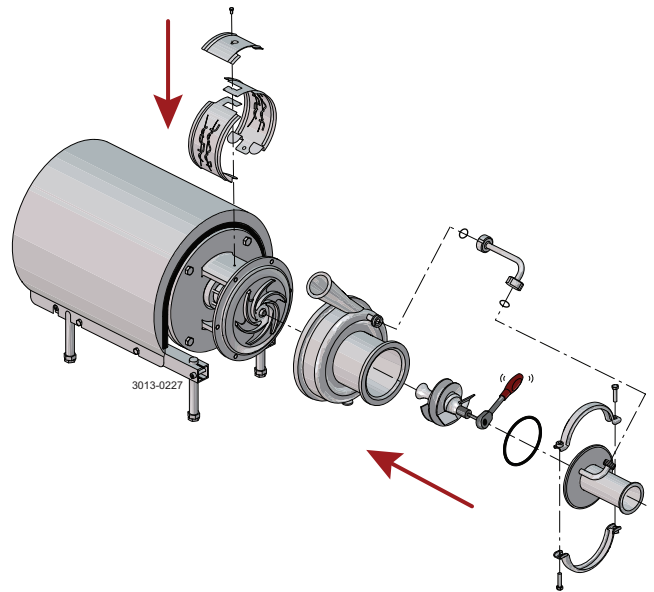


### 3 Installation

*Read the instructions carefully and pay special attention to the warnings!*  
*Check the direction of rotation of the impeller before operation.*  
*- See the indication label on the pump.*

#### Step 4

1. Fit pump casing (29) and washers (24a). Fit and tighten cap nuts (24). Torque = 20Nm/15 lbf-ft
2. Fit air screw (58) and tighten with a spanner (Torque = 20Nm (15 lbf-ft))
3. Fit front cover O-ring (59) and fit and align front cover (60). Fit clamp and tighten screws (57) gently
4. Fit recirculations pipe (56), align front cover (60) and tighten unions
5. Tighten clamp screws (57)
6. Fit the adaptor shields (22)



*Read the instructions carefully and pay special attention to the warnings!*  
*Check the direction of rotation of the impeller before operation.*  
*- See the indication label on the pump.*

---

### 3.4 Recycling information

---

#### Unpacking

- Packing material consists of wood, plastics, cardboard boxes and in some cases metal straps
- Wood and cardboard boxes can be reused, recycled or used for energy recovery
- Plastics should be recycled or burnt at a licensed waste incineration plant
- Metal straps should be sent for material recycling

#### Maintenance

- During maintenance, oil and wearing parts in the machine are replaced
- All metal parts should be sent for material recycling
- Worn or defective electronic parts should be sent to a licensed handler for material recycling
- Oil and all non-metal wearing parts must be disposed of in accordance with local regulations

#### Scrapping

- At the end of use, the equipment must be recycled according to relevant local regulations. In addition to the equipment itself, any hazardous residue from the process liquid must be taken into account and handled in the necessary way. When in doubt, or in the absence of local regulations, please contact your local Alfa Laval sales company.
-

## 4 Operation

*Read the instructions carefully and pay special attention to the warnings!*

### 4.1 Operation/control

#### Step 1



**Always** read the technical data carefully. See chapter 6.1 Technical data

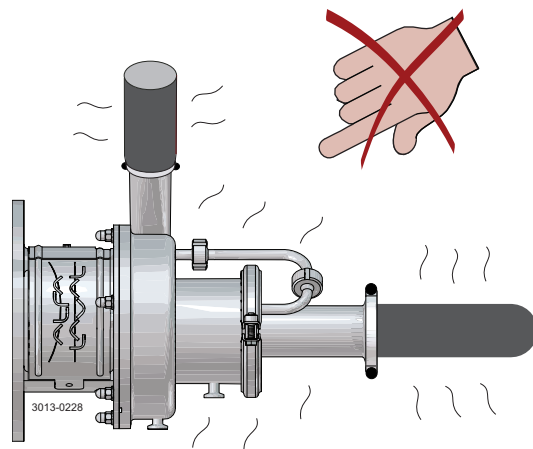
#### CAUTION

Alfa Laval cannot be held responsible for incorrect operation/control.

#### Step 2



**Never** touch the pump or pipelines when pumping hot liquids or when sterilising.

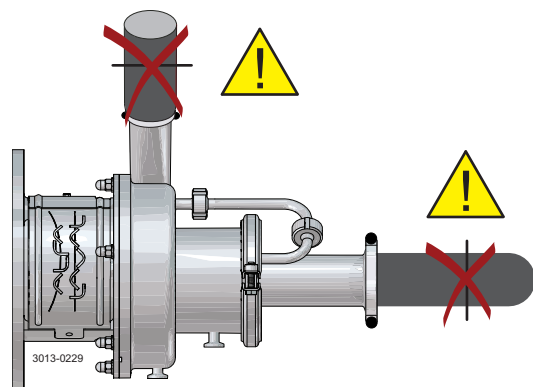


#### Step 3



**Never** run the pump when both the suction side and pressure side are blocked.

**Risk of explosion!**



Read the instructions carefully and pay special attention to the warnings!

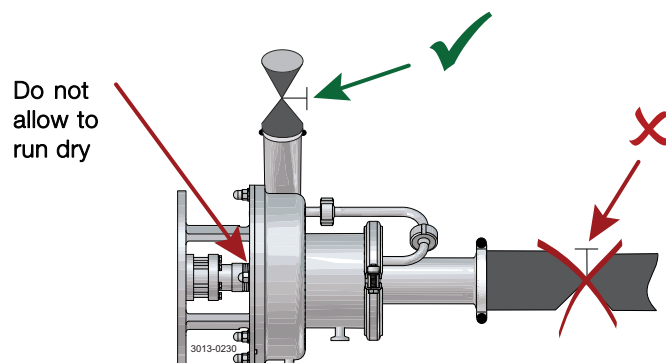
### Step 4

#### CAUTION

The shaft seal must not run dry.

#### CAUTION

Never throttle the inlet side.



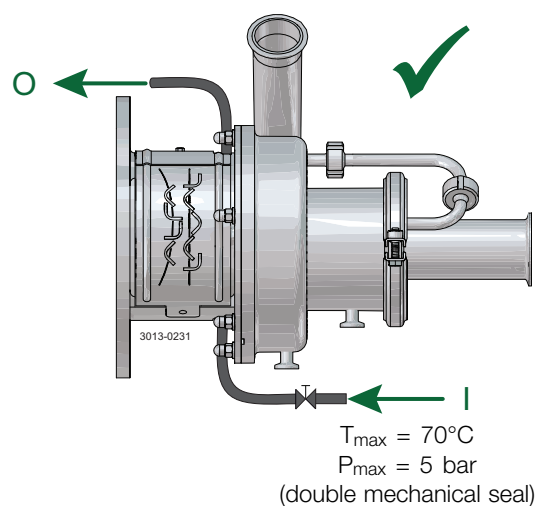
### Step 5

#### Double mechanical shaft seal:

1. Connect the inlet of the flushing liquid correctly. (R1/8")
2. Regulate the water supply correctly

O: Outlet

I: Inlet



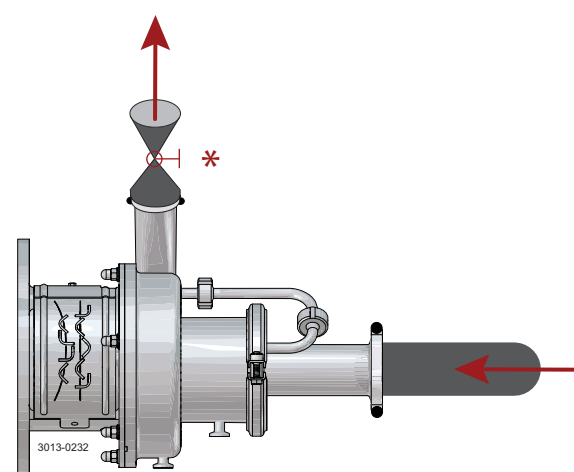
### Step 6

#### Control:

Reduce the capacity and the power consumption by means of:

- Throttling the pressure side of the pump
- Reducing the impeller diameter
- Reducing the speed of the motor (when not releasing air)

\* Throttling!



## 4 Operation

*Pay attention to possible faults.  
Read the instructions carefully.*

### 4.2 Trouble shooting

#### NOTE!

Read the maintenance instructions carefully before replacing worn parts.

| Problem   | Cause/result   | Remedy   |
|---|--|--|
| Motor overloaded  | <ul style="list-style-type: none"><li>- Pumping of viscous liquids</li><li>- Pumping of high density liquids</li><li>- Low outlet pressure (counter pressure)</li><li>- Lamination of precipitates from the liquid</li></ul> | <ul style="list-style-type: none"><li>- Larger motor or smaller impeller</li><li>- Higher counter pressure (throttling)</li><li>- Frequent cleaning</li></ul>  |
| Cavitation: <ul style="list-style-type: none"><li>- Damage</li><li>- Pressure reduction (sometimes to zero)</li><li>- Increase in the noise level</li></ul> | <ul style="list-style-type: none"><li>- Low inlet pressure</li><li>- High liquid temperature</li></ul>   | <ul style="list-style-type: none"><li>- Increase the inlet pressure</li><li>- Reduce the liquid temperature</li><li>- Reduce the pressure drop before the pump</li><li>- Reduce speed</li></ul>  |
| Leaking shaft seal  | <ul style="list-style-type: none"><li>- Running dry</li><li>- Incorrect rubber grade</li><li>- Abrasive particles in the liquid</li><li>- Use of incorrect SiC/SiC single seal</li></ul>                                     | <p>Replace:<br/>All wearing parts</p> <p>If necessary:</p> <ul style="list-style-type: none"><li>- Change rubber grade</li><li>- Select stationary and rotating seal ring in silicon carbide/silicon carbide</li><li>- Change to SiC/SiC seal marked "LKH Prime"</li></ul> |
| Leaking O-ring seals  | Incorrect rubber grade   | Change rubber grade  |
| No/little air release   | <ul style="list-style-type: none"><li>- Pump not properly primed</li><li>- Pump speed too low</li></ul>  | <ul style="list-style-type: none"><li>- Ensure pump is primed</li><li>- Increase pump speed during air release</li></ul>   |



The pump is designed for cleaning in place (CIP). CIP = Cleaning In Place.  
Read the instructions carefully and pay special attention to the warnings!  
NaOH = Caustic Soda.  
HNO<sub>3</sub> = Nitric acid.

### 4.3 Recommended cleaning

#### Step 1



**Always** handle lye and acid with great care.

**Caustic danger!**



Always use rubber gloves!

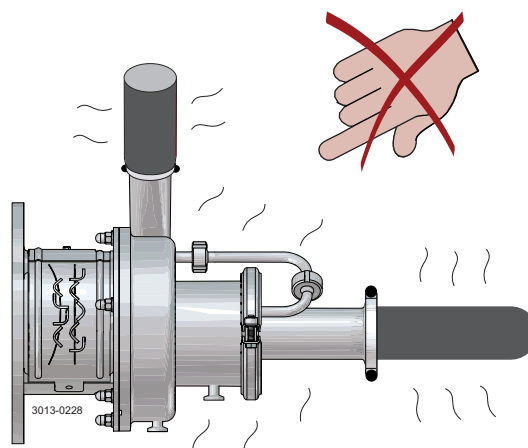


Always use protective goggles!

#### Step 2



**Never** touch the pump or the pipelines when sterilising.



#### Step 3

**Examples of cleaning agents:** Use clean water, free from chlorides.

1. 1% by weight NaOH at 70°C (158°F).

|                       |   |                           |                   |
|-----------------------|---|---------------------------|-------------------|
| 1 kg (2.2 lb)<br>NaOH | + | 100 l (26.4 gal)<br>water | = Cleaning agent. |
|-----------------------|---|---------------------------|-------------------|

|                             |   |                           |                   |
|-----------------------------|---|---------------------------|-------------------|
| 2.2 l (0.6 gal)<br>33% NaOH | + | 100 l (26.4 gal)<br>water | = Cleaning agent. |
|-----------------------------|---|---------------------------|-------------------|

2. 0.5% by weight HNO<sub>3</sub> at 70°C (158°F).

|   |   |                           |                   |
|---|---|---------------------------|-------------------|
| 0.7 l (0.2 gal)<br>53% HNO <sub>3</sub> | + | 100 l (26.4 gal)<br>water | = Cleaning agent. |
|---|---|---------------------------|-------------------|

1. Avoid excessive concentration of the cleaning agent  
⇒ Dispense gradually!
2. Adapt the cleaning flow to the process.  
Sterilisation of milk/viscous liquids  
⇒ Increase the cleaning flow!

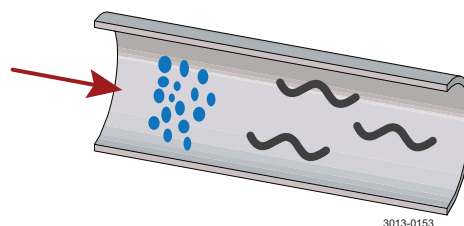
#### Step 4



**Always** rinse well with clean water after using a cleaning agent.

#### NOTE

Cleaning agents must be stored/disposed of in accordance with current regulations/directives.



## 4 Operation

---

*The pump is designed for cleaning in place (CIP). CIP = Cleaning In Place.*

*Read the instructions carefully and pay special attention to the warnings!*

*NaOH = Caustic Soda.*

*HNO<sub>3</sub> = Nitric acid.*

---

**NOTE:**

If pumps are sterilised using steam, standard 3A requires the process system to be designed to automatically shut down if the product pressure in the system becomes less than that of the atmosphere and it cannot be started until the system is re-sterilised.

---

*Maintain the pump with care. Read the instructions carefully and pay special attention to the warnings!*  
*Always have spare shaft seals and rubber seals to hand.*  
*See separate motor instructions.*  
*Check the pump for smooth operation after service.*

### 5.1 General maintenance

#### Step 1



**Always** read the technical data carefully. (See section 6.1)



**Always** disconnect the power supply when servicing the pump.

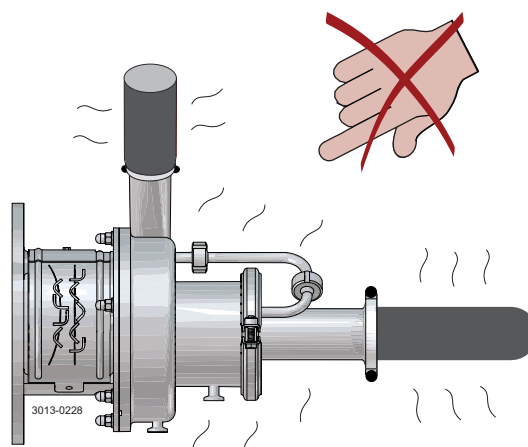
#### NOTE

All scrap must be stored//disposed of in accordance with current regulations/directives.

#### Step 2



**Never** service the pump when it is hot.



#### Step 3



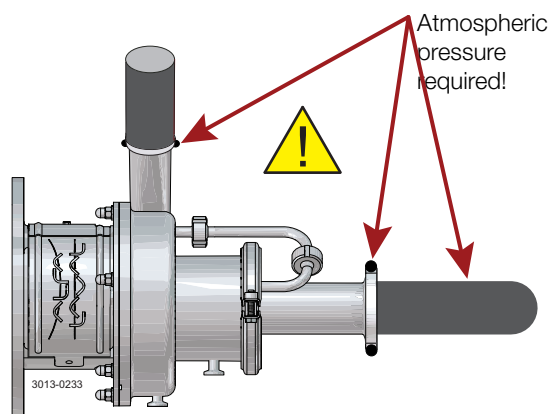
**Never** service the pump if pressurised.

#### CAUTION

Fit the electrical connections correctly if they have been removed from the motor during service.

#### CAUTION

Pay special attention to the warnings!



#### Step 4

##### Recommended spare parts:

Order service kits from the service kits list  
(See section 7).

##### Ordering spare parts

Contact your local Alfa Laval sales company.

## 5 Maintenance

*Maintain the pump with care. Read the instructions carefully and pay special attention to the warnings!*  
*Always have spare shaft seals and rubber seals to hand.*  
*See separate motor instructions.*  
*Check the pump for smooth operation after service.*

|   | Shaft seal  | Rubber seals   | Motor bearings   |
|---|---|--|--|
| Preventive maintenance  | <b>Replace after 12 months:</b><br>(one-shift) complete shaft seal  | Replace when replacing the shaft seal                    |  |
| Maintenance after leakage<br>(leakage normally starts slowly) | <b>Replace at the end of the day:</b> complete shaft seal   | Replace when replacing the shaft seal                    |  |
| Planned maintenance   | <ul style="list-style-type: none"><li>- Regular inspection for leakage and smooth operation</li><li>- Keep a record of the pump</li><li>- Use the statistics for inspection planning</li></ul> <b>Replace after leakage:</b><br>Complete shaft seal | Replace when replacing the shaft seal                    | Yearly inspection is recommended <ul style="list-style-type: none"><li>- Replace complete bearing if worn</li><li>- Ensure that the bearing is axially locked (see motor instructions)</li></ul> |
| Lubrication   | <b>Before fitting</b><br>Lubricate the O-rings with silicone grease or silicone oil   | <b>Before fitting</b><br>Silicone grease or silicone oil |  |

### Pre-use check

#### CAUTION!

Fit the electrical connections correctly if they have been removed from the motor during servicing.  
(See pre-use check in section 3.2 Installation).

### Pay special attention to warnings!

1. Start and stop the motor momentarily
2. Ensure that the pump operates smoothly.

---

*Maintain the pump with care. Read the instructions carefully and pay special attention to the warnings!*  
*Always have spare shaft seals and rubber seals to hand.*  
*See separate motor instructions.*  
*Check the pump for smooth operation after service.*

---

### 5.2 Cleaning procedure

---

#### Step 1

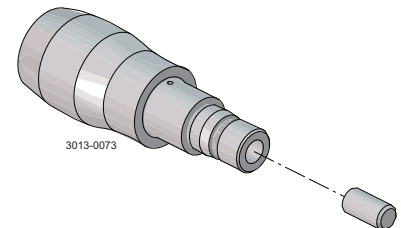
##### **Cleaning procedure for soiled air screw tapped hole:**

1. Remove air screw (58) as per section 5.3 of the Service manual.
  2. Submerge and soak the air screw for 5 minutes in COP tank with 2% caustic wash.
  3. Scrub the blind tapped air screw hole vigorously by plunging a clean 1/2" diameter sanitary bristle pipe brush in and out of the hole for two minutes while submerged.
  4. Soak air screw in acid sanitiser for 5 minutes, then scrub blind tapped hole as described in step 3 above.
  5. Rinse well with clean water and blow-dry blind tapped hole with clean air.
  6. Swab test the inside of the tapped hole to determine cleanliness.
  7. Should the swab test fail, repeat steps 2 to 6 above until the swab test is passed.
- Should swab testing continue to fail, or time is of the essence, install a new (spare) air shaft.
- 

#### Step 2

##### **Cleaning procedure for soiled shaft tapped hole:**

1. Remove shaft (7) as per section 5.3 of the Service manual.
  2. Remove stud bolt (7a) from shaft.
  3. Submerge and soak the shaft for 5 minutes in COP tank with 2% caustic wash.
  4. Scrub the blind tapped shaft hole vigorously by plunging a clean 1/2" diameter sanitary bristle pipe brush in and out of the hole for two minutes while submerged.
  5. Soak shaft in acid sanitiser for 5 minutes, then scrub blind tapped hole as described in step 4 above.
  6. Rinse well with clean water and blow-dry blind tapped hole with clean air.
  7. Swab test the inside of the tapped hole to determine cleanliness.
  8. After approved swab test, assemble stud bolt (7a) in shaft (7) with tightening torque 65Nm
  9. Should the swab test fail, repeat steps 3 to 7 above until the swab test is passed.
- Should swab testing continue to fail, or time is of the essence, install a new (spare) shaft.
- 



## 5 Maintenance

*Read the instructions carefully. The items refer to the parts list and service kits section.*

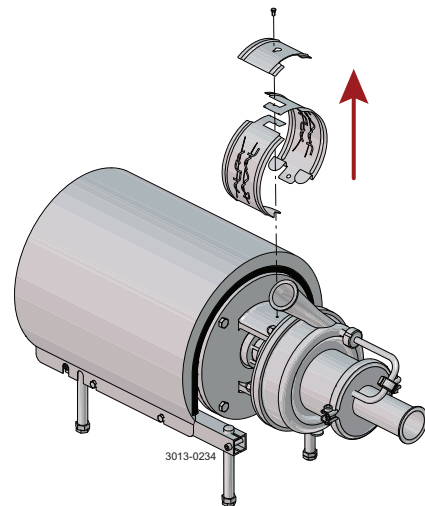
*Handle scrap correctly.*

*\* : Relates to the shaft seal.*

### 5.3 Dismantling of pump/shaft seals

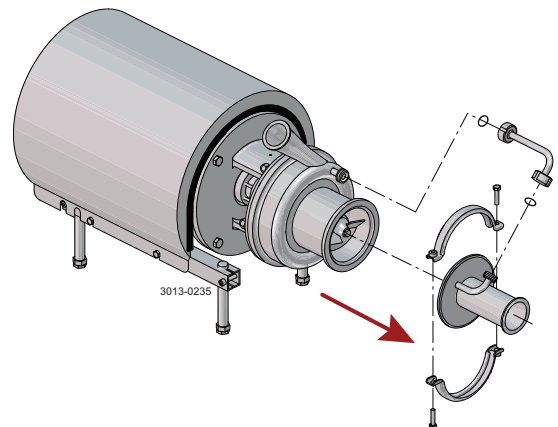
#### Step 1

Remove screw (23) and safety guard (22)



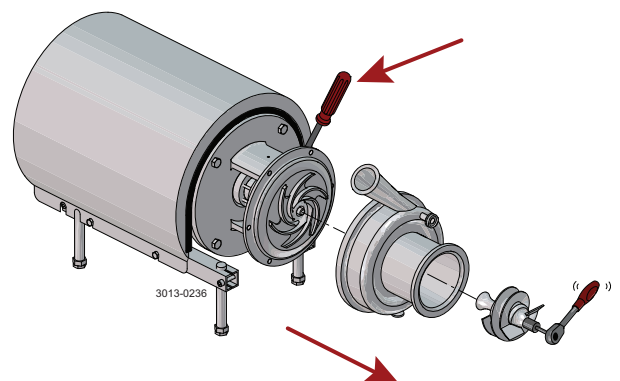
#### Step 2

1. Loosen unions and remove recirculation pipe (56)
2. Remove clamp (57) and front cover (60)



#### Step 3

1. Remove air screw (58) with a spanner. Counter hold with a screwdriver on pump shaft (7)
2. Unscrew cap nuts (24). Remove washers (24a) and pump casing (29)



Read the instructions carefully. The items refer to the parts list and service kits section.

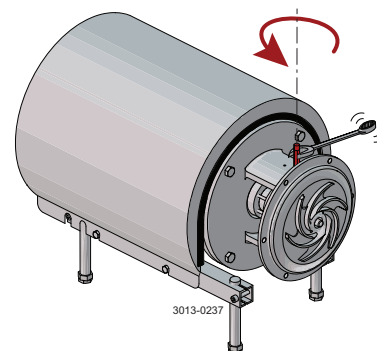
Handle scrap correctly.

\* : Relates to the shaft seal.

### Step 4

#### Double mechanical shaft seal:

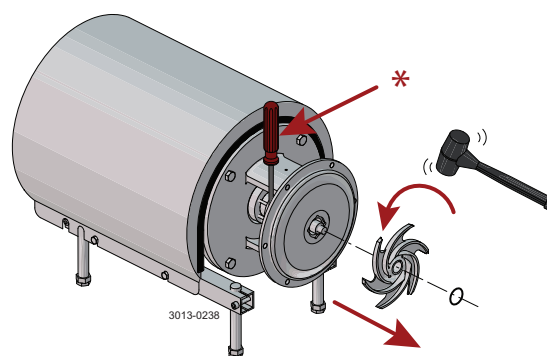
Unscrew tubes (42) using a spanner.



### Step 5

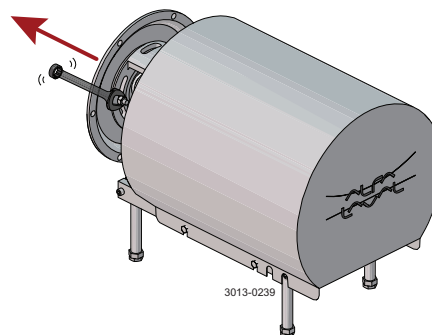
1. Remove impeller (27). If necessary, loosen the impeller by tapping gently on the impeller vanes
2. Remove the O-ring (38) from the impeller

\* Counter hold with a screwdriver



### Step 6

1. Remove the O-ring (26) from the back plate (25)
2. Unscrew the nuts (20) and remove the washers (21) and back plate (25)

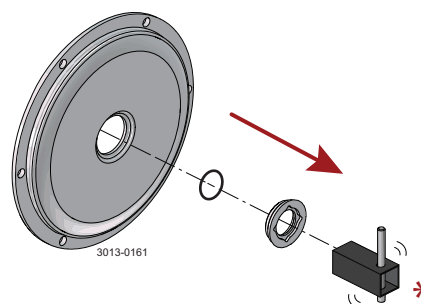


### Step 7

1. Remove the stationary seal ring (11)
2. Remove the O-ring (12) from the back plate (25)

\* Use the tool supplied

\*\* Left-hand thread!



## 5 Maintenance

Read the instructions carefully. The items refer to the parts list and service kits section.

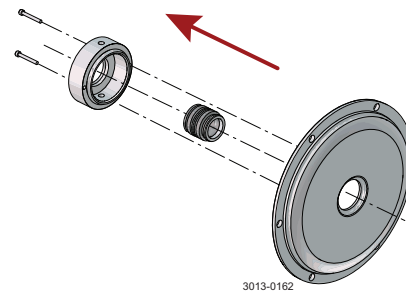
Handle scrap correctly.

\* : Relates to the shaft seal.

### Step 8

#### Double mechanical shaft seal:

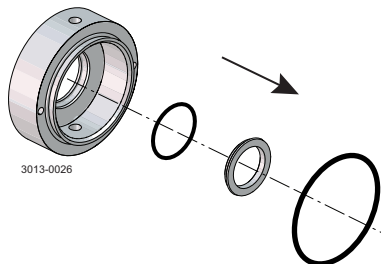
1. Remove screws (41) and seal housing (40a)
2. Remove rotating seal rings (14) and drive ring (52) from spring (13)
3. Remove O-rings (15) from rotating seal rings (14)



### Step 9

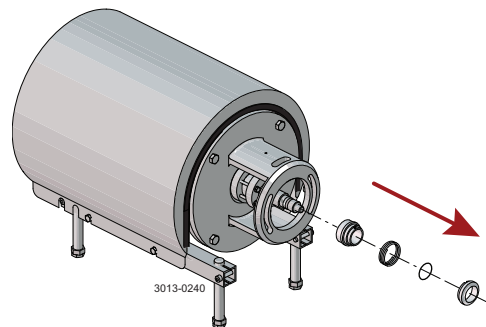
#### Double mechanical shaft seal:

1. Remove stationary seal ring (51) from seal housing (40a)
2. Remove O-ring (50) from stationary seal ring (51)
3. Remove O-ring (44) from seal housing (40a)



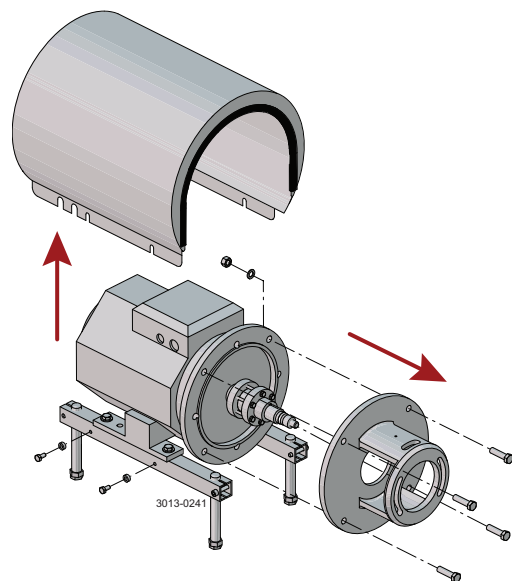
### Step 10

1. Remove the complete shaft seal from stub shaft (7)
2. Remove spring (13) and rotating seal ring (14) from the drive ring (10)



### Step 11

1. Remove shroud (2)
2. Unscrew nuts (18) and remove washers (19), screws (17) and adapter (16)





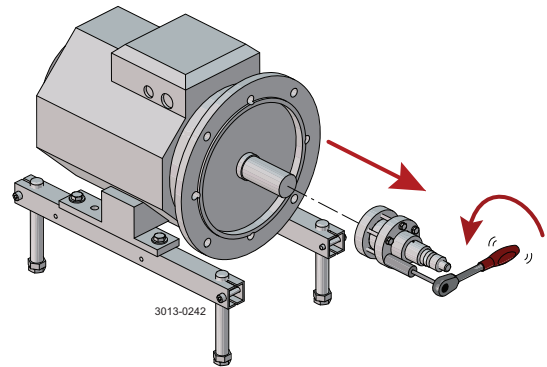
*Read the instructions carefully. The items refer to the parts list and service kits section.*

*Handle scrap correctly.*

*\* : Relates to the shaft seal.*

### Step 12

1. Slide off stub shaft (7) together with compression rings (5a, 5b)



## 5 Maintenance

Read the instructions carefully. The items refer to the parts list and service kits section.

Handle scrap correctly.

\* : Relates to the shaft seal.

### 5.4 Assembly of pump/single shaft seal

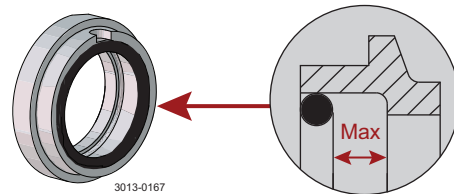
**NOTE:** If fitting SiC/SiC single seal, the static seal face must be marked "LKH Prime".

#### Step 1

1. Remove spring (13)

#### NOTE!

Make sure that O-ring (15) has maximum clearance from the sealing surface.

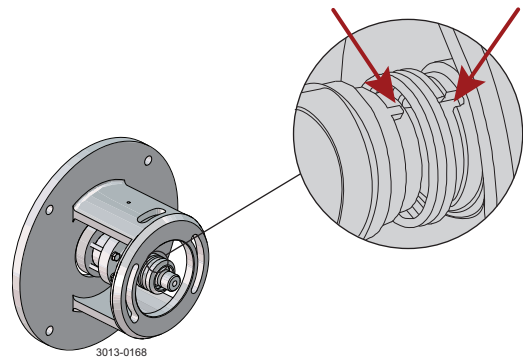


#### Step 2

1. Refit spring (13) on rotating seal ring (14)
2. Fit the spring and the rotating seal ring on drive ring (10)

#### CAUTION

Ensure that the driver on the drive ring is inserted into the notch in the rotating seal ring.

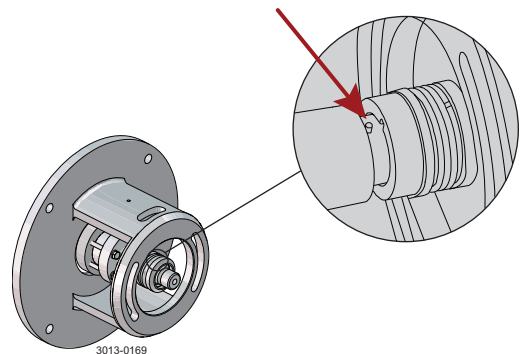


#### Step 3

Fit the complete shaft seal on the stub shaft (7).

#### NOTE!

Make sure that the Connex pin (8) on the stub shaft is inserted into the notch in the drive ring (10).



Read the instructions carefully. The items refer to the parts list and service kits section.

Handle scrap correctly.

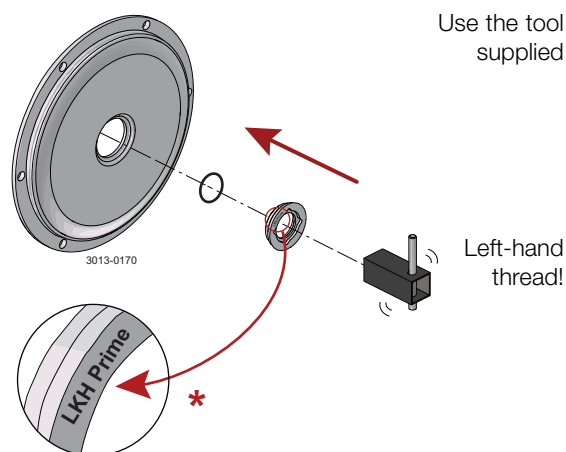
\* : Relates to the shaft seal.

### Step 4

1. Fit O-ring (12) on stationary seal ring (11) and lubricate
2. Screw the stationary seal ring into the back plate (25)

#### CAUTION

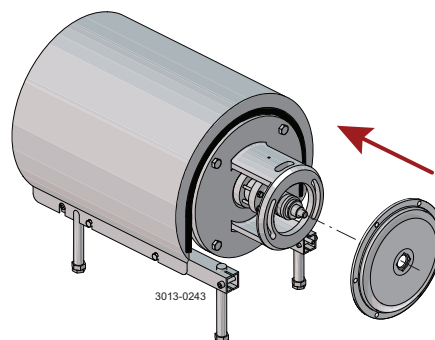
Only tighten by hand to avoid deforming the stationary seal ring.  
(Max. 7 Nm/5 lbf-ft)



\*) **NOTE!** : If fitting SiC/SiC single seal, the static seal face must be marked "LKH Prime".

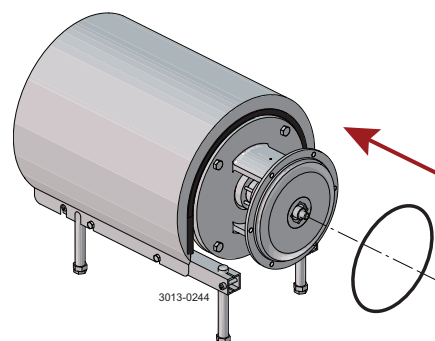
### Step 5

1. Clean the sealing surfaces with contact cleaner before fitting the back plate (25)
2. Carefully guide the back plate onto the adapter (16)
3. Fit washers (21) and nuts (20)



### Step 6

Lubricate O-ring (26) and slide it onto back plate (25).



## 5 Maintenance

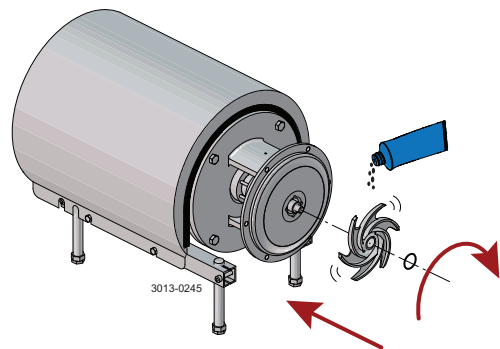
Read the instructions carefully. The items refer to the parts list and service kits section.

Handle scrap correctly.

\* : Relates to the shaft seal.

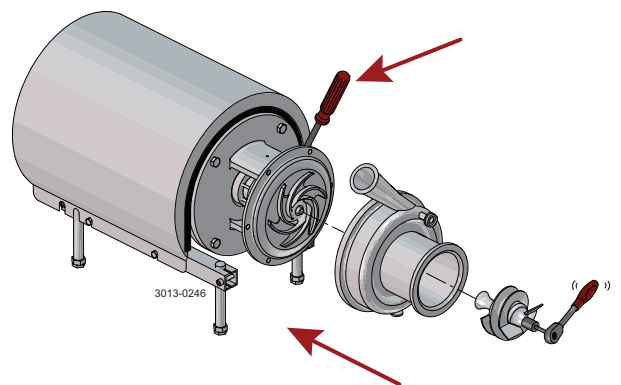
### Step 7

1. Lubricate O-ring (38) and fit into impeller (37)
2. Lubricate impeller hub with silicone grease or oil
3. Screw the impeller onto the stub shaft (7)



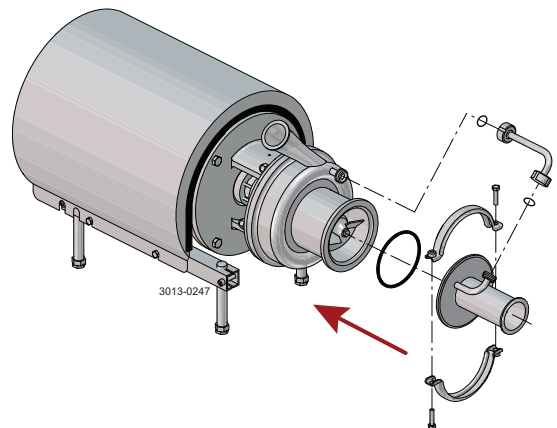
### Step 8

1. Fit pump casing (29) and washers (24a). Fit and tighten cap nuts (24). Torque = 20Nm/15 lbf-ft
2. Adjust pump casing (29) to correct position.
3. Tighten nuts (20) for back plate (25), according to torque values in chapter 6 Technical data
4. Fit air screw (58) and tighten with a spanner (Torque = 20Nm (15 lbf-ft))



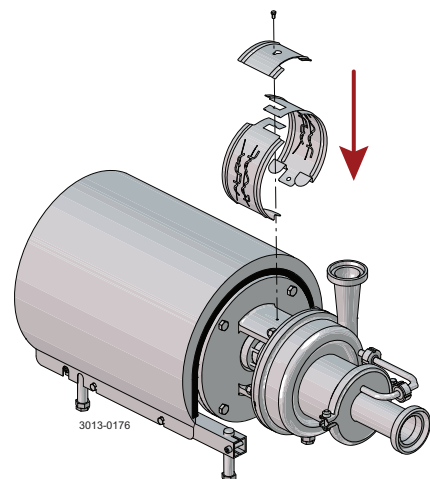
### Step 9

1. Fit front cover O-ring (59) and fit and align front cover (60)
2. Fit clamp and tighten screws (57) gently
3. Fit recirculation pipe (56), align front cover (60) and tighten unions
4. Tighten clamp screws (57)



### Step 10

Fit safety guards (22) and screw (23), then tighten.  
If pump is not supplied with flush connections, the holes in the adapter will be covered by the guard.



*Read the instructions carefully. The items refer to the parts list and service kits section.  
Lubricate the rubber seals before fitting them.  
\* : Relates to the shaft seal.*

### 5.5 Assembly of pump/double mechanical shaft seal

#### Step 1

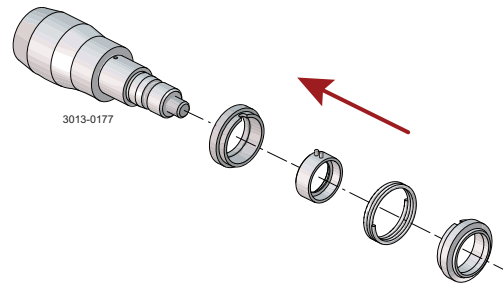
1. Fit O-rings (15) in rotating seal rings (14)
2. Fit spring (13) onto one of the rotating seal rings (14) and place the drive ring (52) in between

#### Step 2

1. Fit the second rotating ring (14) on the other end of the spring
2. Place the parts on the stationary seal ring fitted in the back plate (25)

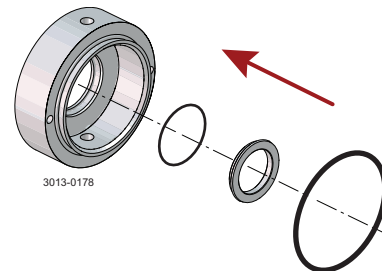
#### NOTE

Ensure that both drive pins on the drive ring are inserted into the notches in the rotating seal rings.



#### Step 3

1. Lubricate O-ring (44) and slide onto seal housing (40a)
2. Lubricate O-ring (50) and fit on stationary seal ring (51), then fit this in the seal housing



## 5 Maintenance

Read the instructions carefully. The items refer to the parts list and service kits section.

Lubricate the rubber seals before fitting them.

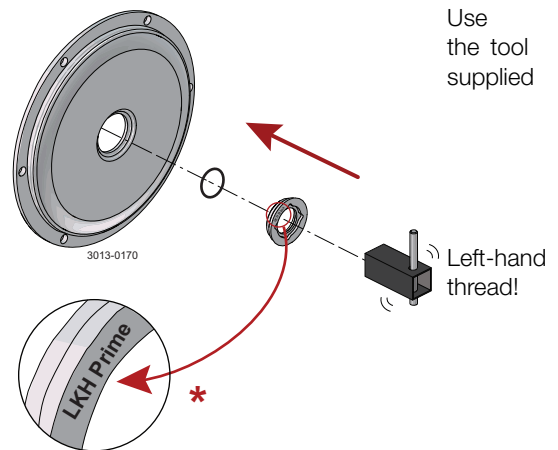
\* : Relates to the shaft seal.

### Step 4

1. Fit O-ring (12) on stationary seal ring (11) and lubricate
2. Screw the stationary seal ring into the back plate (25)

#### CAUTION

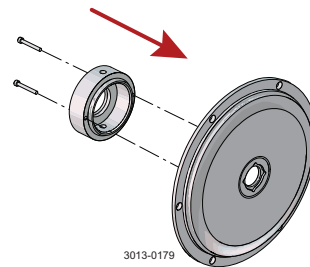
Only tighten by hand to avoid deforming the stationary seal ring.  
(Max. 7 Nm/5 lbf-ft)



\*) **NOTE!** : If fitting SiC/SiC single seal, the static seal face must be marked "LKH Prime".

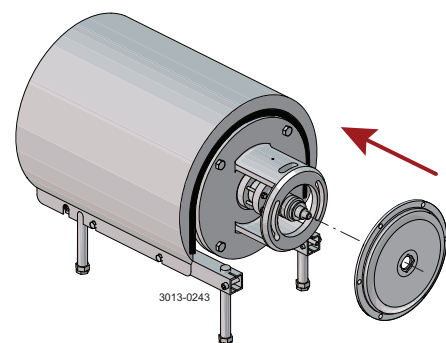
### Step 5

1. Clean the sealing surfaces with contact cleaner
2. Fit seal housing (40a) onto the back plate (25) and tighten screws (41)



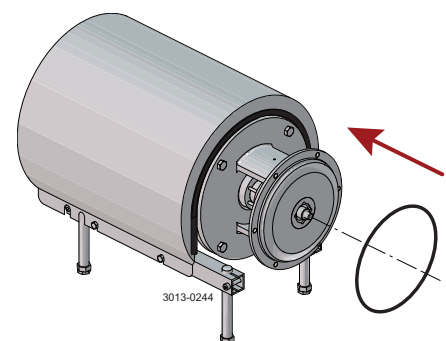
### Step 6

1. To enable the fitting of the back plate (25) with the shaft seal, remove the Connex pin (8) from the stub shaft (7) (if fitted)
2. Carefully guide the back plate onto adaptor (16)
3. Fit washers (21) and nuts (20)



### Step 7

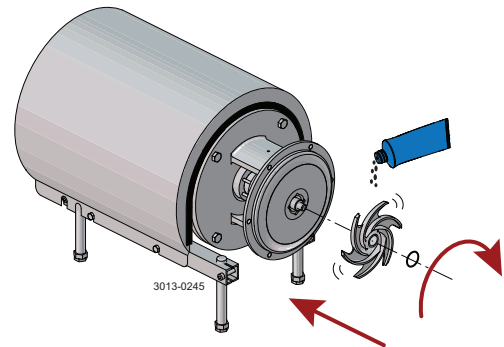
Lubricate O-ring (26) and slide it onto back plate (25)



Read the instructions carefully. The items refer to the parts list and service kits section.  
Lubricate the rubber seals before fitting them.  
\* : Relates to the shaft seal.

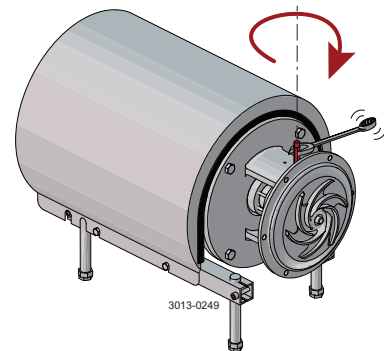
### Step 8

1. Lubricate the O-ring (38) and fit it into the impeller (37)
2. Lubricate the impeller hub with silicone grease or oil
3. Screw impeller (27) onto stub shaft (7)



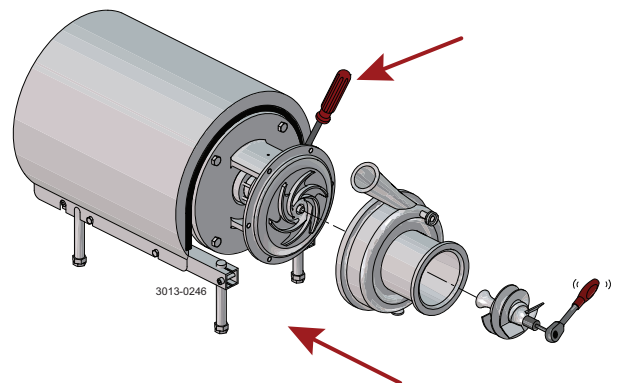
### Step 9

1. Screw tubes (42) into seal housing (40a).
2. Tighten with a spanner.



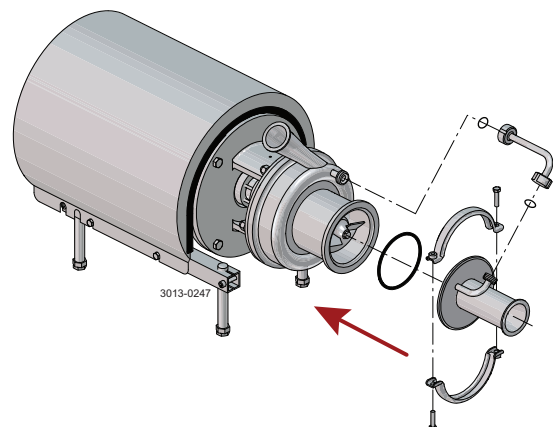
### Step 10

1. Fit pump casing (29) and washers (24a). Fit and tighten cap nuts (24). Torque = 20Nm/15 lbf-ft
2. Adjust pump casing (29) to correct position
3. Tighten nuts (20) for back plate (25), according to torque values in chapter 6, Technical data
4. Fit air screw (58) and tighten with a spanner (Torque = 20Nm (15 lbf-ft))



### Step 11

1. Fit front cover O-ring (59) and fit and align front cover (60)
2. Fit clamp and tighten screws (57) gently
3. Fit recirculations pipe (56), align front cover (60) and tighten unions
4. Tighten clamp screws (57)



## 5 Maintenance

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*Read the instructions carefully. The items refer to the parts list and service kits section.*

*Lubricate the rubber seals before fitting them.*

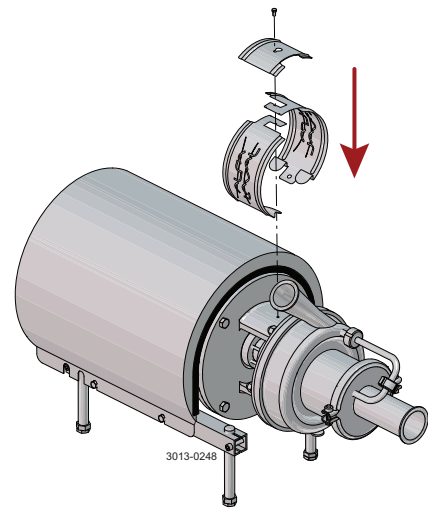
*\* : Relates to the shaft seal.*

---

### Step 12

Fit safety guard (22) and screw (23), then tighten.

If pump is not supplied with flush connections, the holes in the adapter will be covered by the guard.





Read the instructions carefully. The items refer to the parts list and service kits section.

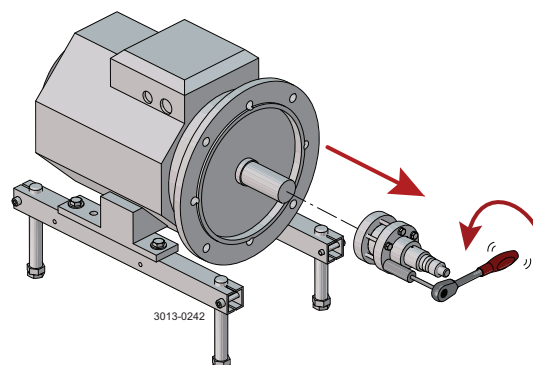
Lubricate the rubber seals before fitting them.

\* : Relates to the shaft seal.

### 5.6 Adjustment of shaft

#### Step 1

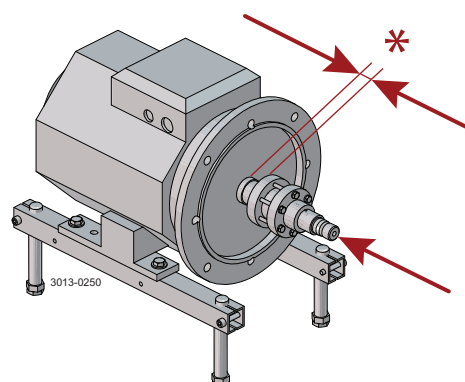
1. Loosen screws (6)
2. Pull off stub shaft (7) together with compression rings (5a, 5b)



#### Step 2

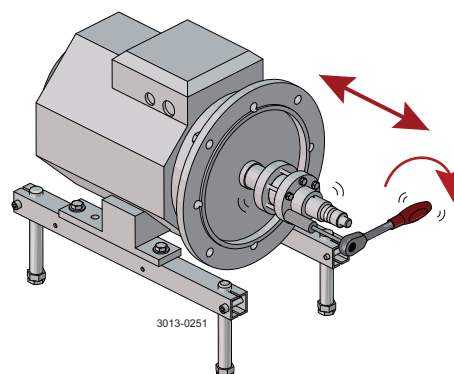
1. Push stub shaft (7) together with compression rings (5a, 5b) onto the motor shaft
2. Check that the clearance between the end of the stub shaft and the motor flange is 10-20 mm (0.39 - 0.78 inch)

\* 10-20 mm  
(0.39-0.78 inch)



#### Step 3

1. Tighten screws (6) gently and evenly
2. Ensure that the stub shaft (7) can be moved on the motor shaft



## 5 Maintenance

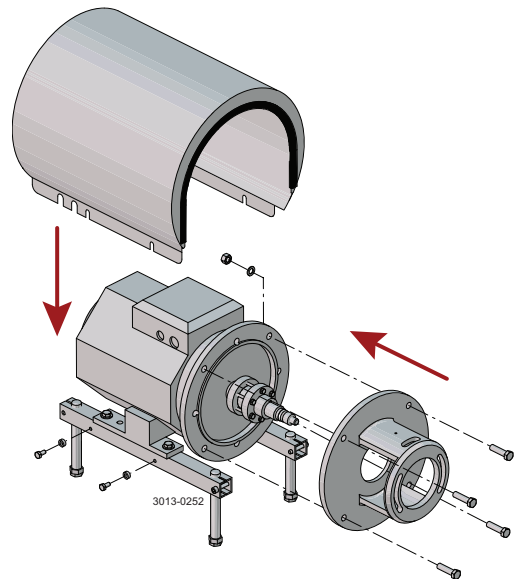
Read the instructions carefully. The items refer to the parts list and service kits section.

Lubricate the rubber seals before fitting them.

\* : Relates to the shaft seal.

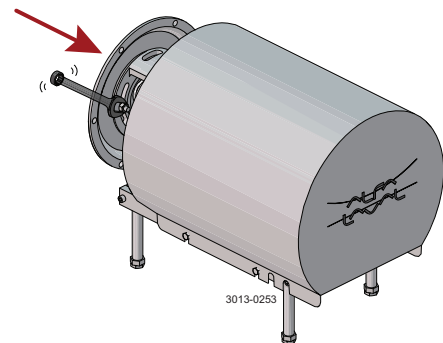
### Step 4

1. Fit shroud (2)
2. Fit adapter (16), screws (17), washers (19) and nuts (18) and tighten



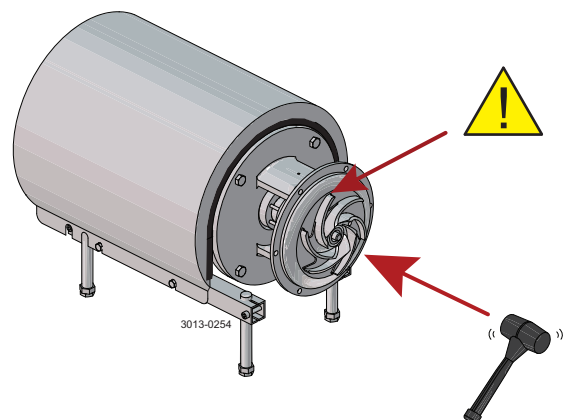
### Step 5

1. **For the double mechanical shaft seal:**  
Fit drive ring (52) on stub shaft (7)
2. Fit back plate (25), washers (21) and nuts (20), then tighten



### Step 6

1. Fit impeller (27) on stub shaft (7)
2. Ensure that the clearance between the impeller and the back plate (25) is correct: 0.5 mm (0.02 inch)
3. Tighten screws (6) evenly until the stub shaft (7) cannot move on the motor shaft



*Read the instructions carefully. The items refer to the parts list and service kits section.*

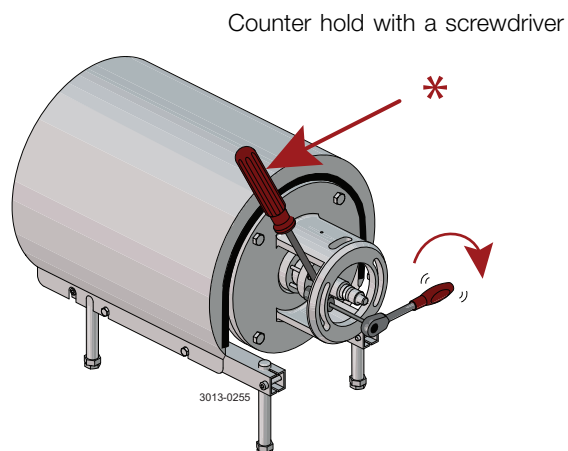
*Lubricate the rubber seals before fitting them.*

*\* : Relates to the shaft seal.*

### Step 7

1. Remove impeller (27), back plate (25) and drive ring (52).
2. Tighten screws (6) evenly to 15 Nm (11 lbf-ft).
3. Pump is assembled according to section 5.4 for single shaft seal and section 5.5 for double mechanical seal.

\* 15Nm  
(11 lbf-ft)



## 6 Technical data

*It is important to observe the technical data during installation, operation and maintenance.  
Inform personnel about the technical data.*

### 6.1 Technical data

The LKH pump is a highly efficient and economical centrifugal pump, which meets the requirements of sanitary and gentle product treatment and chemical resistance. LKH Prime UltraPure is available in the following sizes -20. The instruction manual is part of the delivery: Read the instructions carefully. The pump is very heavy, which is why Alfa Laval recommends the use of a lifting crane when handling the pump.

| Data   |  |
|--|--|
| Max. inlet pressure  | 500 kPa (5 bar) (72.5 psi)                                   |
| Temperature range  | -10°C to +140°C (EPDM) (14 to 284°F)                         |
| Max. speed:  | 3600 rpm   |
| Min. speed, pumping product (no air):  | 900RPM   |
| Min. speed, releasing air:   | 2800RPM (full speed 2 poled motor, 50Hz)                     |
| Materials  |  |
| Product wetted steel parts   | AISI 316L  |
| Other steel parts  | Stainless steel  |
| Finish   | Standard blasted   |
| Product wetted seals   | EPDM (standard)  |
| Other O-rings  | EPDM (standard)  |
| Alternative seals  | Nitrile (NBR) and fluorinated rubber (FPM)                   |
| Shaft seal   |  |
| Seal types   | External single or double mechanical seal                    |
| Max. temperature flush medium  | 70°C   |
| Max. water pressure (DMS)  | Normally atmospheric (max. 5 bar) (max. 72.5 psi)            |
| Water consumption (double mechanical seal)   | 0.25-0.5 l/min. (0.07-0.13 gl)                               |
| Material, stationary seal ring   | Acid-resistant steel with sealing surface of silicon carbide |
| Material, rotating seal ring   | Carbon (standard) or silicon carbide                         |
| Material, O-rings  | EPDM (standard)  |
| Alternative material, O-rings  | Nitrile (NBR) and fluorinated rubber (FPM).                  |
| Air release time (no medium supply)  | Max 15 min   |
| <b>NOTE:</b> If running SiC/SiC single seal, the static seal face must be marked "LKH Prime".                              |  |
| Motor  |  |
| Foot-flanged motor according to IEC metric or NEMA standard, 2 poles = 3000/3600 rpm. at 50/60 Hz IP55, insulation class F |  |

For further information, see PD sheet.

*It is important to observe the technical data during installation, operation and maintenance.  
Inform personnel about the technical data.*

### 6.2 Relubrication intervals

For recommended grease types and general maintenance follow the recommendations in the motor instruction manual.  
For relubrication intervals see motor name plate.  
For further information contact your local Alfa Laval Technical Support.

### 6.3 Torque specifications

The table below specifies the tightening torques for the screws, bolts and nuts in this pump.  
Always use the following torques if no other values are stated. This can be a matter of personal safety.

| Size | Spanner width | Torque values |        |
|------|---------------|---------------|--------|
|      |               | Nm            | lbf-ft |
| M8   | 13mm/0.51"    | 20            | 15     |
| M10  | 17mm/0.67"    | 40            | 30     |
| M12  | 19mm/0.75"    | 67            | 49     |
| M14  | 22mm/0.87"    | 110           | 81     |

### 6.4 Weight (kg)

Pump Type: LKH Prime UltraPure

| Size | Frame size |     |     |     |     |     |
|------|------------|-----|-----|-----|-----|-----|
|      | 90         | 100 | 112 | 132 | 160 | 180 |
| 10   | 65         | 80  | 85  | 110 |     |     |
| 20   |            | 80  | 85  | 110 | 180 |     |
| 40   |            |     |     | 120 | 185 | 220 |

## 6 Technical data

*It is important to observe the technical data during installation, operation and maintenance.  
Inform personnel about the technical data.*

### 6.5 Noise emission

| Pump Type    | Sound pressure level (dBA) |
|--------------|----------------------------|
| LKH-5        | 60                         |
| LKH-10       | 69                         |
| LKH-15       | 72                         |
| LKH-20       | 70                         |
| LKH-25       | 74                         |
| LKH-35       | 71                         |
| LKH-40       | 75                         |
| LKH-45       | 70                         |
| LKH-50       | 75                         |
| LKH-60       | 77                         |
| LKH-70       | 88                         |
| LKH-75       | 79                         |
| LKH-85       | 86                         |
| LKH-90       | 75                         |
| LKH Prime 10 | 69                         |
| LKH Prime 20 | 74                         |
| LKH-112      | 70                         |
| LKH-113      | 69                         |
| LKH-114      | 68                         |
| LKH-122      | 75                         |
| LKH-123      | 77                         |
| LKH-124      | 80                         |
| SolidC-1     | 68                         |
| SolidC-2     | 72                         |
| SolidC-3     | 73                         |
| SolidC-4     | 72                         |
| MR-166       | 76                         |
| MR-185       | 82                         |
| MR-200       | 81                         |
| MR-300       | 82                         |
| GM           | 54                         |
| FM-OS        | 61                         |

The above LKH noise levels are the same for LKHPF, LKHI, LKH UltraPure, LKH Evap and LKHex.

The above LKH Prime is the same for LKH Prime UltraPure.

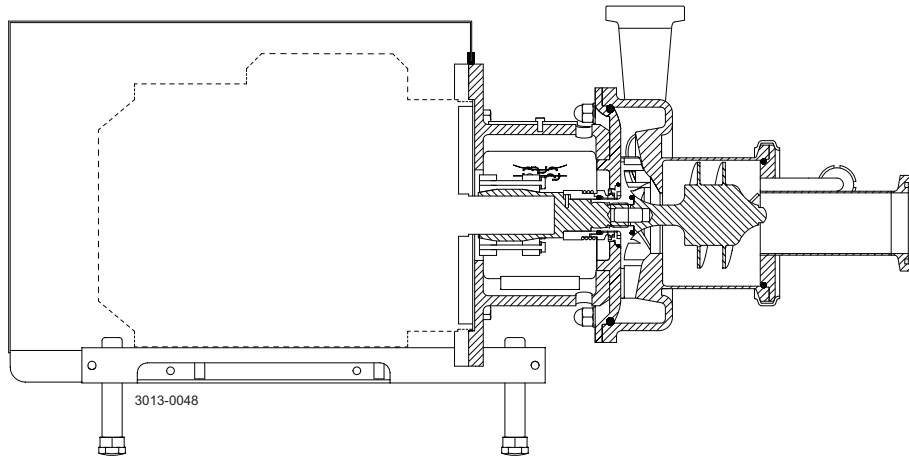
The above SolidC noise levels are the same for SolidC UltraPure.

The noise measurements have been carried out with the original motor and shroud, approximately at the Best Efficiency Point (BEP) with water at ambient temperature and at 50Hz.

Often the noise level generated by the flow through the process system (eg. valves, pipes, tanks etc.) is much higher than that generated by the pump itself. Therefore it is important to consider the noise level from the whole system and take the necessary precautions with regard to personal safety, if required.

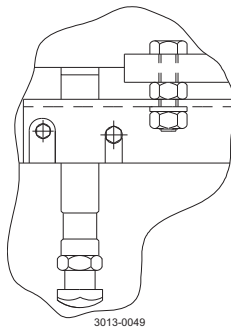
The drawing shows the LKH Prime UltraPure pump.

### 7.1 LKH Prime UltraPure

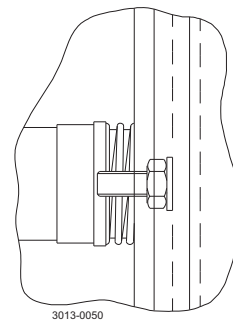


LKH Prime UltraPure

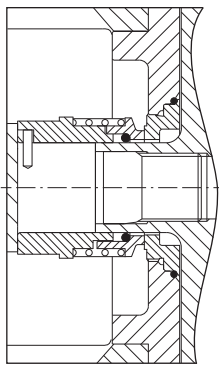
US legs are different to those shown. For further information, see US spare parts.



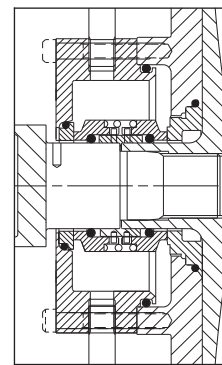
Only used for 3 kW  
Fitting of legs



Fitting of back plate



Single shaft seal

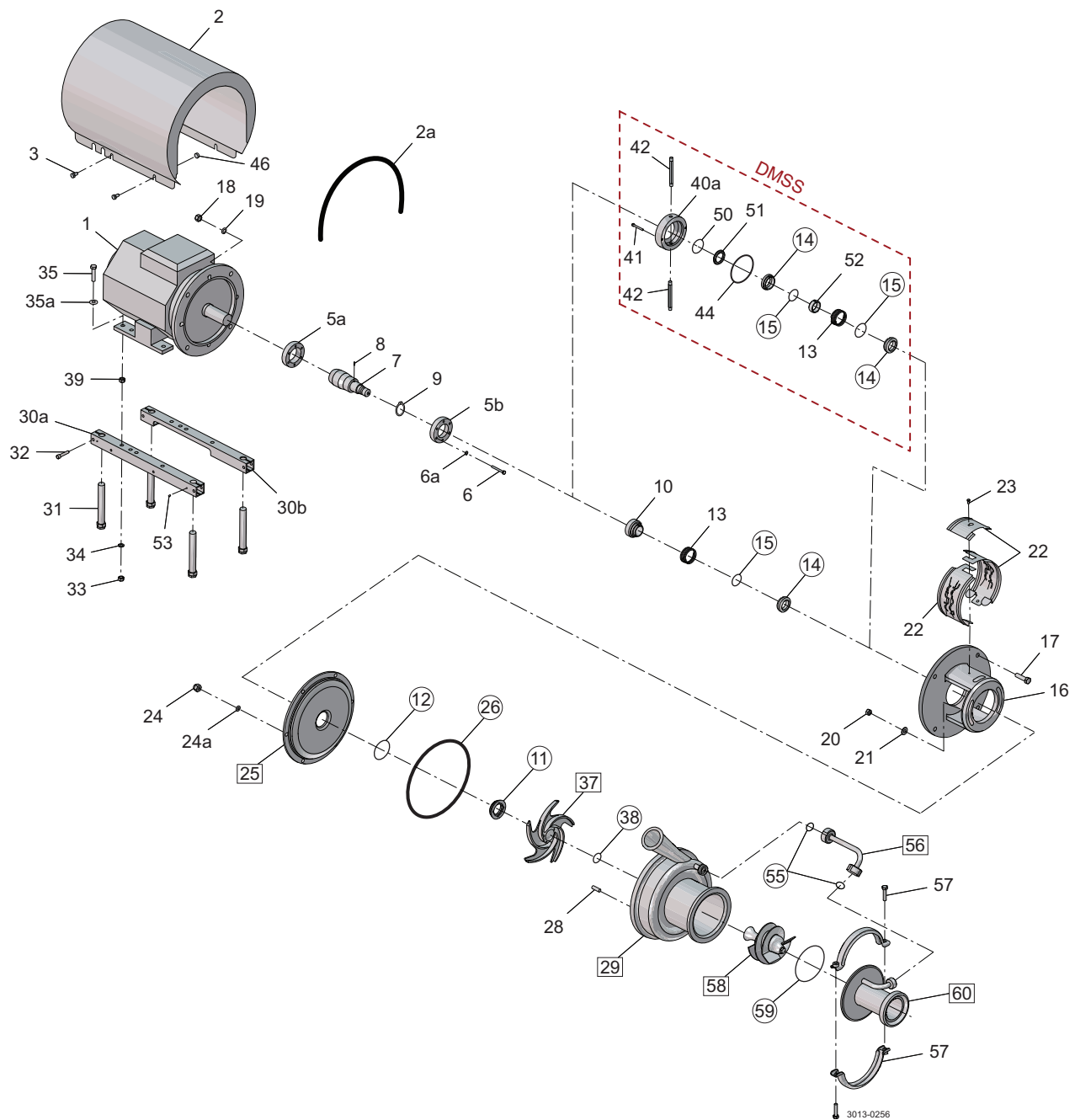


Double mechanical shaft seal

## 7 Part list and service kits

The drawing shows the LKH Prime UltraPure pump.

### 7.2 LKH Prime UltraPure 20 - Product wetted parts



- Product wetted non-metallic parts
- Product wetted metallic parts



## 7 Part list and service kits

*The drawing shows the LKH Prime UltraPure pump.*

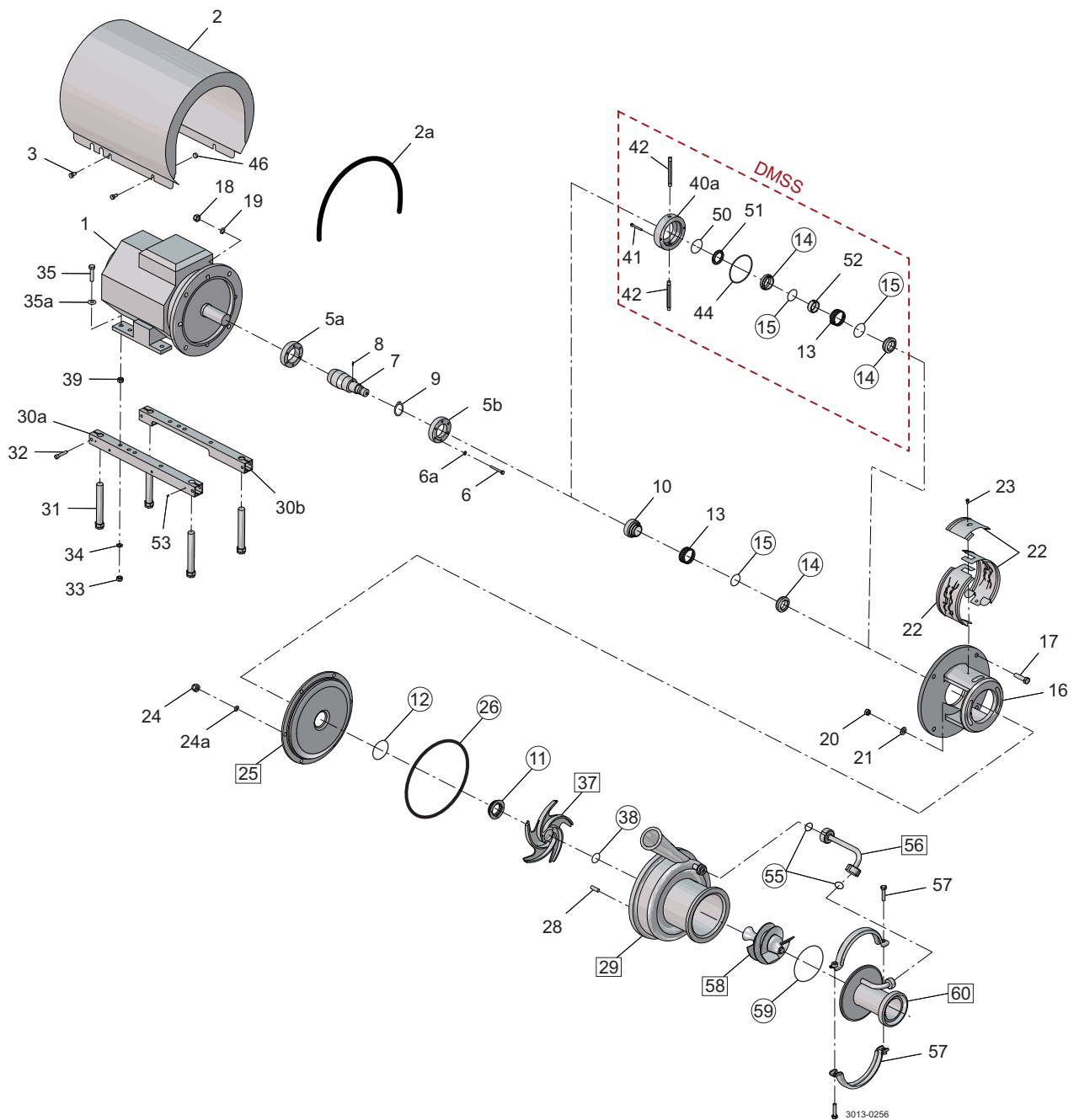
### Parts list

| Pos.  | Qty | Denomination          |
|-------|-----|-----------------------|
| 20    | 1   | Nut                   |
| 21    | 2   | Washer                |
| 24    | 6   | Cap nut               |
| 24a   | 6   | Washer                |
| 25    | 1   | Backplate compl       |
| 26 ♦♦ | 1   | Pump casing O-ring    |
| 28    | 6   | Bolt                  |
| 29    | 1   | Connections and drain |
| 37    | 1   | Impeller              |
| 38 ♦♦ | 1   | O-ring impeller       |
| 55 ♦♦ | 2   | O-ring                |
| 56    | 1   | Recirculation pipe    |
| 57    | 1   | Clamp set             |
| 58    | 1   | Air screw             |
| 59 ♦♦ | 1   | O-ring                |
| 60    | 1   | Ferrule Tri-clamp     |

## 7 Part list and service kits

The drawing shows the LKH Prime UltraPure pump.

### 7.3 LKH Prime UltraPure 20 - Motor-dependent parts



- Product wetted non-metallic parts
- Product wetted metallic parts

## 7 Part list and service kits

*The drawing shows the LKH Prime UltraPure pump.*

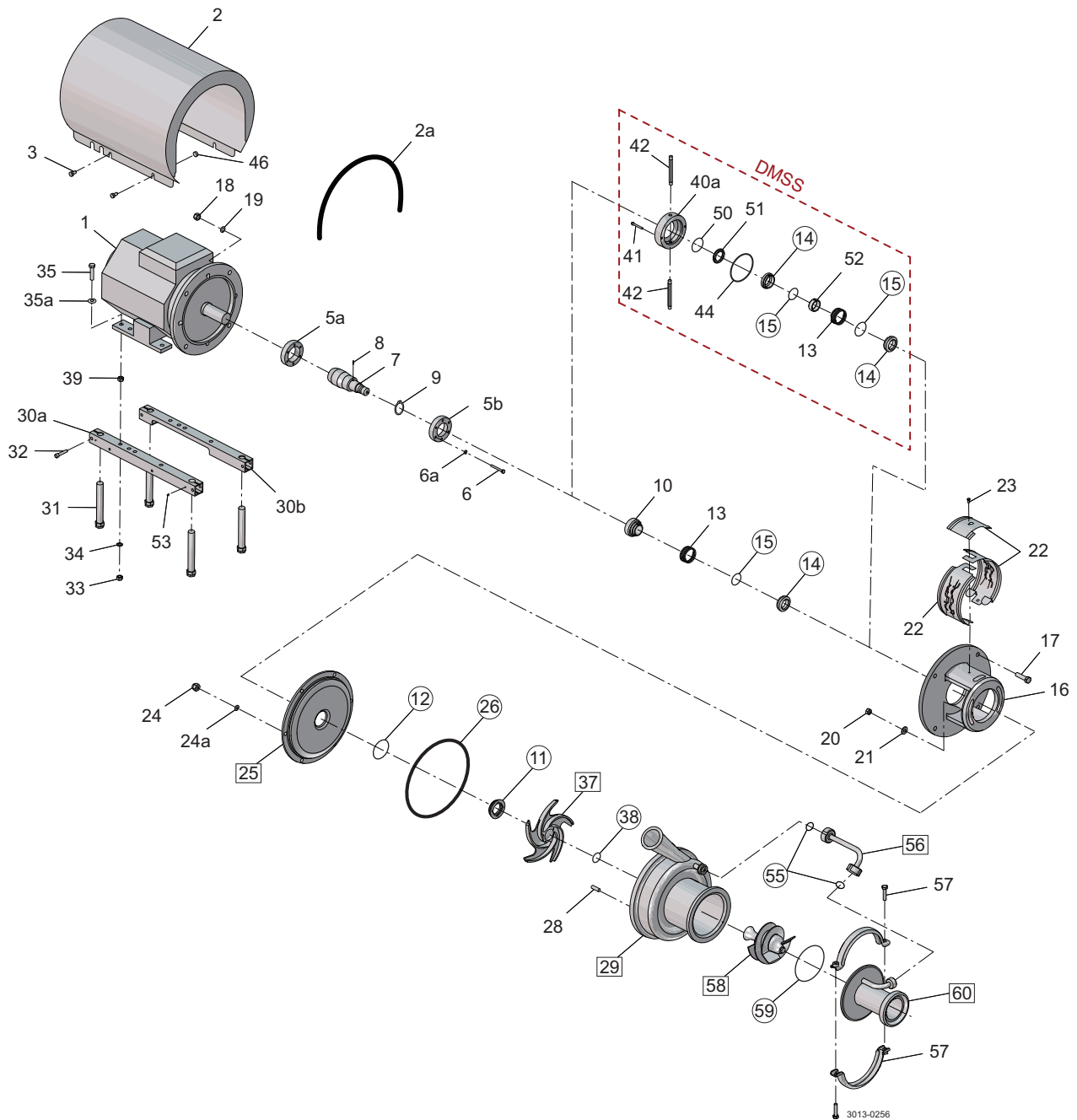
### Parts list



| Pos. | Qty | Denomination           |
|------|-----|------------------------|
| 1    | 1   | Motor ABB              |
| 2    | 1   | Shroud                 |
| 3    | 4   | Screw                  |
| 5a   | 1   | Compression ring       |
| 5b   | 1   | Compression ring       |
| 6    | 6   | Screw                  |
| 6a   | 6   | Washer                 |
| 7    | 1   | Shaft                  |
| 8    | 1   | Connex pin             |
| 9    | 1   | Retaining ring         |
| 16   | 1   | Adapter                |
| 17   | 4   | Screw for adapter      |
| 18   | 4   | Nut for adapter        |
| 19   | 4   | Washer for adapter     |
| 22   | 1   | Safety guard set       |
| 23   | 1   | Screw for safety guard |
| 30a  | 1   | Support bar            |
| 30b  | 1   | Support bar            |
| 31   | 4   | Legs                   |
| 32   | 4   | Screw                  |
| 33   | 4   | Nut                    |
| 34   | 4   | Spring washer          |
| 35   | 4   | Screw                  |
| 35a  | 4   | Washer                 |
| 39   | 4   | Nut                    |
| 46   | 4   | Distance sleeve        |

## 7 Part list and service kits

The drawing shows the LKH Prime UltraPure pump.

### 7.4 LKH Prime UltraPure 20 - Shaft seal



-  Product wetted non-metallic parts
-  Product wetted metallic parts

## 7 Part list and service kits

The drawing shows the LKH Prime UltraPure pump.

### Parts list

| Pos. | Qty | Denomination                 |
|------|-----|------------------------------|
| ♦    | 1   | Tool complete                |
| ♦    | 1   | Single shaft seal            |
|      | 1   | Double mechanical shaft seal |
| 10   | 1   | Drive ring                   |
| 11   | 1   | Stationary seal ring         |
| 12   | 1   | O-ring                       |
| 13   | 1   | Spring                       |
| 14   | 1   | Rotating seal ring           |
| 15   | 1   | O-ring                       |
| 40a  | 1   | Seal housing                 |
| 41   | 2   | Screw for seal housing       |
| 42   | 2   | Fittings                     |
| 44   | 1   | O-ring for seal housing      |
| 50   | 1   | O-ring                       |
| 51   | 1   | Sec. stationary seal ring    |
| 52   | 1   | Drive ring                   |

### Service kits

| Denomination   | EPDM       | FPM        | FEP        |
|--|------------|------------|------------|
| <b>Service kit for single shaft seal</b>                 |            |            |            |
| ♦ Service kit LKH Prime UltraPure 10 (incl. Q-doc) ..... | 8010001223 | 8010001224 | 8010001225 |
| ♦ Service kit LKH Prime UltraPure 20 (incl. Q-doc) ..... | 9611927187 | 9611927188 | 9611927191 |

### Service kit for double mechanical shaft

|  |            |            |            |
|--|------------|------------|------------|
| • Service kit LKH Prime UltraPure 10 (incl. Q-doc) ..... | 8010001226 | 8010001227 | 8010001228 |
| • Service kit LKH Prime UltraPure 20 (incl. Q-doc) ..... | 9611927189 | 9611927190 | 9611927192 |

Note: All service kits are as standard delivered with Q-doc, including 3.1 certification on product wetted steel parts and declarations of conformity.

Parts marked with ♦♦ are included in the service kits.

Conversion kit single to double mechanical shaft seal : Please order double mechanical service kit + pos. 40a + 41 + 42.

Recommended spare parts: Service kits.

(900689/4)

**How to contact Alfa Laval**

Contact details for all countries are continually updated on our website.

Please visit [www.alfalaval.com](http://www.alfalaval.com) to access the information directly.

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