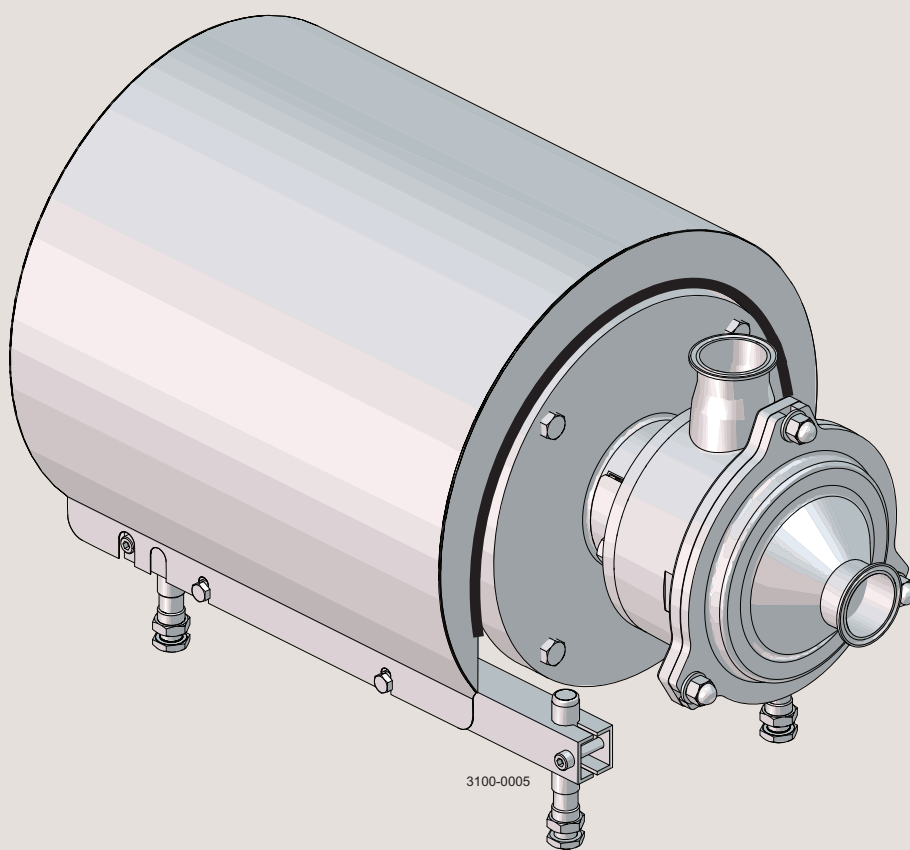




# Instruction Manual

## MR-166S, -185S, -200S Liquid-Ring Pump



ESE00675-EN5

2017-03

Original manual



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

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# 1 EC Declaration of Conformity

Revision of Declaration of Conformity 2009-12-29

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 declare that

Pump

Designation

MR-166S, MR-185S, MR-200S

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  
Pump, Valves, Fittings and Tank Equipment

Title

Lars Kruse Andersen

Name

Kolding  
Place

2016-02-01  
Date

Signature





---

*Unsafe practices and other important information are emphasised in this manual.  
Warnings are emphasised by means of special signs. All warnings in this manual are summarised on this page.  
Pay special attention to the instructions below so that serious personal injury or damage to the pump are avoided.*

---

### 2.1 Important information

---

**Always read the manual before using the pump!**

**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.

---

### 2.2 Warning signs

---

General warning:



Dangerous electrical voltage:



Caustic agents:



## 2 Safety

---

*Unsafe practices and other important information are emphasised in this manual.*

*Warnings are emphasised by means of special signs. All warnings in this manual are summarised on this page.*

*Pay special attention to the instructions below so that serious personal injury or damage to the pump are avoided.*

---

### 2.3 Safety precautions

---

#### Installation:

**Always** read the technical data thoroughly. (See chapter 6 Technical data).

**Never** stick your fingers or any tool through the adaptor or the drain hole in the pump casing when the pump is running.

**Never** test the direction of rotation with liquid in the pump.



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

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



---

#### Operation:

**Always** read the technical data thoroughly. (See chapter 6 Technical data).

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

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

**Never** run the pump when partially installed or not completely 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 mentioned in 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 thoroughly. (See chapter 6 Technical data).

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

**Never** service the pump if pressurised.



#### Motors with grease nipples:

Remember lubrication according to the information plate/label on the motor.

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

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



---

#### Transportation:

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

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

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

**Always** ensure that no leakage of lubricants can occur

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

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

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

---

### 3.1 Unpacking/delivery

#### Step 1

##### CAUTION

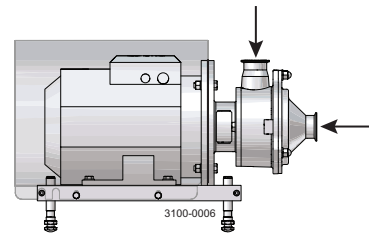
Alfa Laval cannot be held responsible for incorrect unpacking.  
Inspect the pump for visible transport damage.

##### Check the delivery for:

1. Complete pump, MR-166S, MR-185S or MR-200S.
2. Delivery note.
3. Motor instructions.

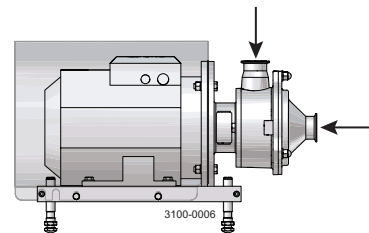
#### Step 2

Clean the inlet and the outlet of all possible packing materials.



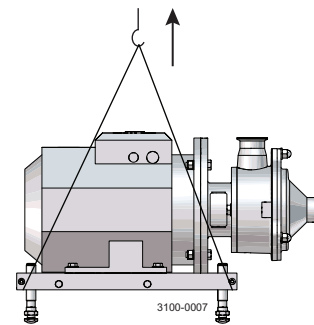
#### Step 3

Avoid damaging the inlet and the outlet.



#### Step 4

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



### 3 Installation

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

*The direction of rotation of the impeller can be checked by observing the direction of rotation of the motor fan.*

*- See the indication label on the pump.*

#### 3.2 Installation/Pre-use check - MR-166S

##### Step 1



**Always** read the technical data carefully.

See chapter 6 Technical data

##### CAUTION

Alfa Laval cannot be held responsible for incorrect installation.



**Never** stick your fingers or any tool through the adaptor or the drain hole in the pump casing when the pump is running.

##### 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

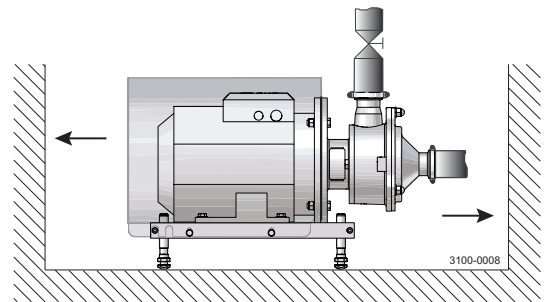
The pump does not prevent back flow when intentionally or unintentionally stopped. If back flow can cause any hazardous situations, precautions must be taken e.g. check valve to be installed in the system preventing the problems described above.

##### 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 placing a drip tray underneath the slot to collect the leakage.

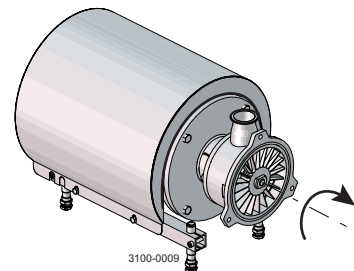
##### Step 2

Ensure a clearance of at least 0.5 m around the pump.



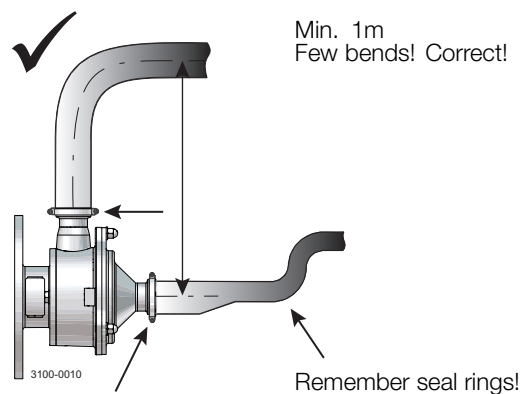
##### Step 3

Ensure that the flow direction is correct.



##### Step 4

1. Ensure that the pipelines are correctly routed.
2. Ensure that connections are tight.



### 3 Installation

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

*The direction of rotation of the impeller can be checked by observing the direction of rotation of the motor fan.*

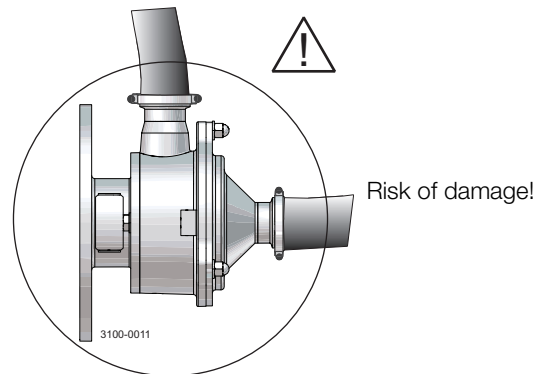
*- See the indication label on the pump.*

#### Step 5

Avoid stresses to the pump

Pay special attention to:

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



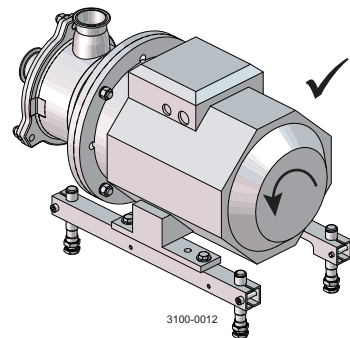
#### Step 6



**Never** test the direction of rotation with liquid in the pump.

**Pre-use check:**

1. Start and stop the motor momentarily.
2. Ensure that the direction of rotation of the motor is **anti-clockwise** as viewed from the back of the motor.



### 3 Installation

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

*The direction of rotation of the impeller can be checked by observing the direction of rotation of the motor fan.*

*- See the indication label on the pump.*

#### 3.3 Installation/Pre-use check - MR-185S and MR-200S

##### Step 1



**Always** read the technical data carefully.



**Never** stick your fingers or any tool through the adaptor or the drain hole in the pump casing when the pump is running.



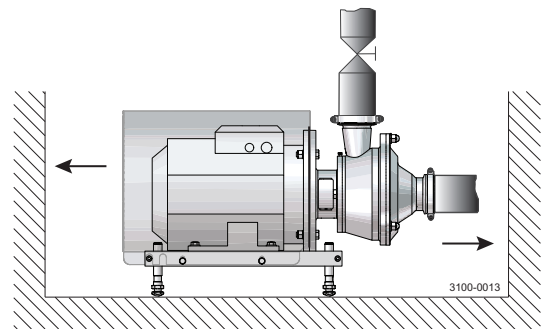
**Always** have the pump electrically connected by authorised personnel.

##### CAUTION

Alfa Laval cannot be held responsible for incorrect installation.

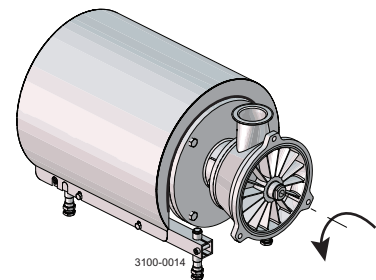
##### Step 2

Ensure a clearance of at least 0.5 m around the pump.



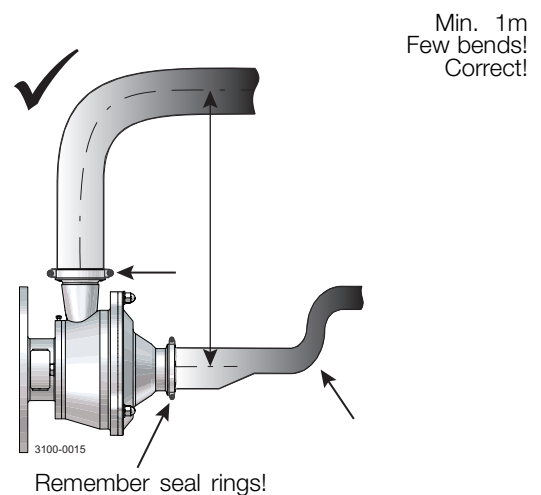
##### Step 3

Ensure that the flow direction is correct.



##### Step 4

1. Ensure that pipelines are routed correctly.
2. Ensure that connections are tight.

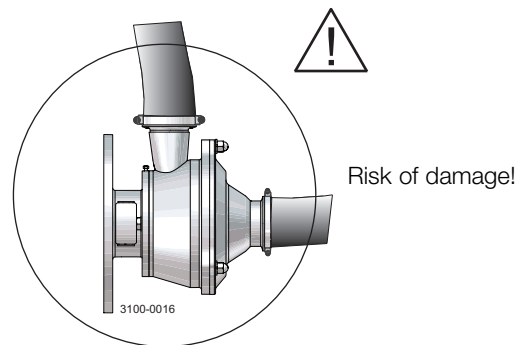


### Step 5

Avoid stresses to the pump.

Pay special attention to:

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



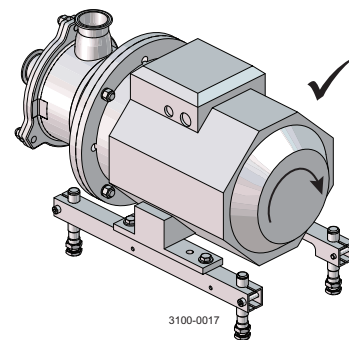
### Step 6



**Never** test the direction of rotation with liquid in the pump.

**Pre-use check:**

1. Start and stop the motor momentarily.
2. Ensure that the direction of rotation of the motor is **clockwise** as viewed from the back of the motor.



## 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 wear parts in the machine are replaced.
- All metal parts should be sent for material recycling.
- Worn out or defective electronic parts should be sent to a licensed handler for material recycling.
- Oil and all non-metal wear parts must be taken care of in accordance with local regulations.

### • Scrapping

- At the end of use, the equipment shall be recycled according to the relevant, local regulations. Besides the equipment itself, any hazardous residues from the process liquid must be considered and dealt with in a proper manner. When in doubt, or in the absence of local regulations, please contact your local Alfa Laval sales company.

## 4 Operation

*Study the instructions carefully and pay special attention to the warnings!  
The pump is fitted with a warning label indicating correct throttling.*

### 4.1 Operation/Control

#### Step 1



**Always** read the technical data carefully.

#### CAUTION

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

#### Step 2

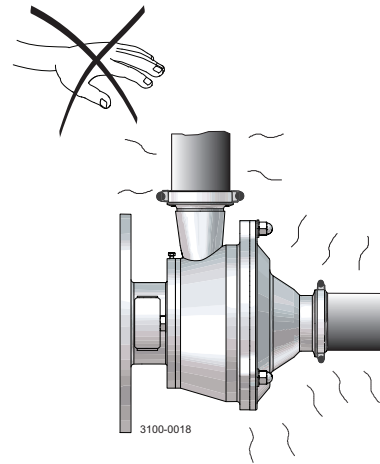


**Never** touch the pump or the pipelines when pumping hot liquids or when sterilising.



**Never** stick your fingers or any tool through the adaptor or the drain hole in the pump casing when the pump is running.

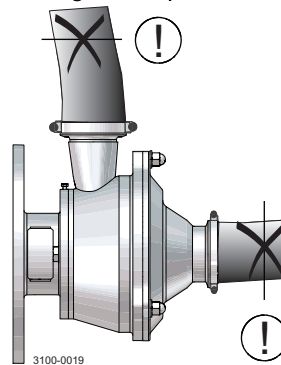
**Danger of burns!  
Rotating parts!**



#### Step 3

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

**Danger of explosion!**



**See the  
warning label!**

#### Step 4

#### CAUTION

The shaft seal must not run dry.

#### CAUTION

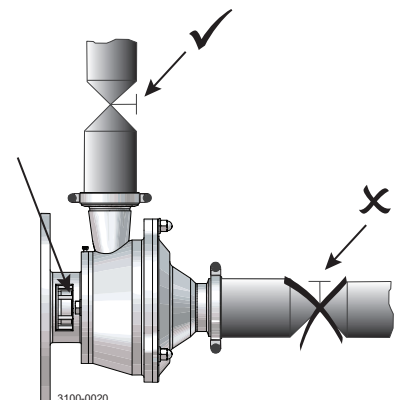
**Never** throttle the inlet side.

#### Control:

Reduce the capacity by means of:

- Throttling the pressure side of the pump.
- Speed control of the motor.

**Do not allow  
to run dry**





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

## 4.2 Trouble shooting and remedy

### Step 1

#### NOTE

Study the maintenance instructions carefully before replacing worn parts.

Problem	Cause/result	Remedy
Leaking shaft seal	<ul style="list-style-type: none"> <li>- Dry run (see section 3.1)</li> <li>- Incorrect rubber grade</li> <li>- Abrasive particles in the liquid</li> </ul>	<b>Replace:</b> All wearing parts (see section 4.3) <ul style="list-style-type: none"> <li>- Select a different rubber grade</li> <li>- Select stationary and rotating seal ring in silicon carbide/silicon carbide (only MR-185S, -200S)</li> </ul>
Leaking seals	Incorrect rubber grade	Select a different rubber grade

## 4 Operation

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

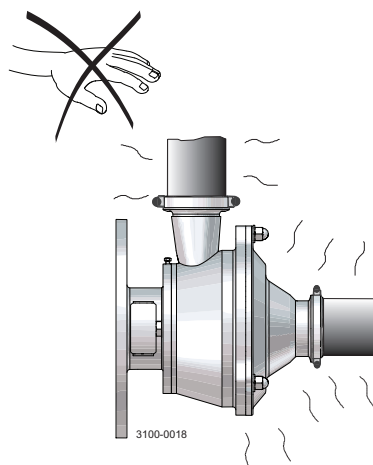


Always use protective goggles!

#### Step 2



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



**Danger of burns!**

#### 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) NaOH	+	100 l (26.4 gal) water	= Cleaning agent.
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2.2 l (0.6 gal) 33% NaOH	+	100 l (26.4 gal) water	= Cleaning agent.
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2. 0.5% by weight HNO<sub>3</sub> at 70°C (158°F).

0.7 l (0.2 gal) 53% HNO <sub>3</sub>	+	100 l (26.4 gal) water	= Cleaning agent.
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1. Avoid excessive concentration of the cleaning agent  
⇒ Dose gradually!
2. Adjust 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

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

**Always rinse!**



Clean water      Cleaning agent

Maintain the pump carefully. Study the instructions carefully and pay special attention to the warnings! Always keep spare shaft seals and rubber seals in stock. See separate motor instructions.

### 5.1 General maintenance

#### Step 1



**Always** read the technical data carefully.



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

#### NOTE

All scrap must be stored/discharged in accordance with current rules/directives.

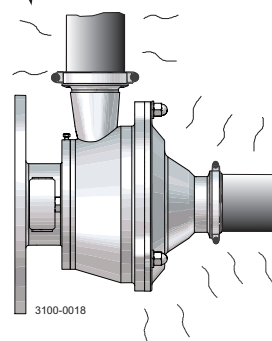
#### Step 2



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



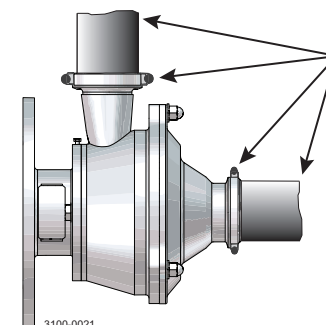
**Danger of burns!**



#### Step 3



The pump and the pipelines must **never** be pressurised when the pump is serviced.



**Atmospheric pressure required!**

#### Step 4

##### CAUTION

**Always** ensure that the impeller rotates smoothly after service.

##### CAUTION

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

**Pay special attention to the warnings!**

1. Rotate impeller (11) through the inlet.
2. Ensure that the impeller does not come into contact with pump casing (9) or casing cover (10).
3. Adjust the impeller position if necessary (see section 4.4 for MR-166S and section 4.5 for MR-185S and MR-200S).

#### Step 5

##### Ordering spare parts

Contact your local Alfa Laval sales company.

##### Recommended spare parts:

Order service kits from the service kits list (see chapter 7 Parts list and service kits.)

## 5 Maintenance

Maintain the pump carefully. Study the instructions carefully and pay special attention to the warnings! Always keep spare shaft seals and rubber seals in stock. See separate motor instructions.

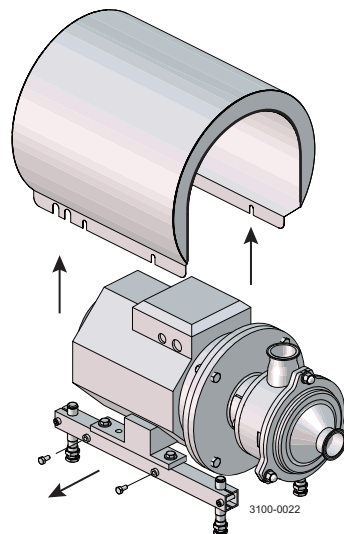
	Shaft seals	Rubber seals	Motor bearings
Preventive maintenance	<b>Replace after 12 months</b> (one-shift) Complete shaft seal	Replace when replacing the shaft seal	
Maintenance after leakage (leakage normally starts slowly)	Replace at the end of the day: Complete shaft seal	Replace when replacing the 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> Complete shaft seal	Replace when replacing the shaft seal	Yearly inspection is recomm. <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> Lubricate the O-rings with silicone grease or silicone oil (not the sealing surfaces)	<b>Before fitting</b> Silicone grease or silicone oil	<b>None</b> The bearings are permanently lubricated

*Study the instructions carefully. The items refer to the parts list and service kits section. Handle scrap correctly.*

### 5.2 Dismantling of pump - MR-166S

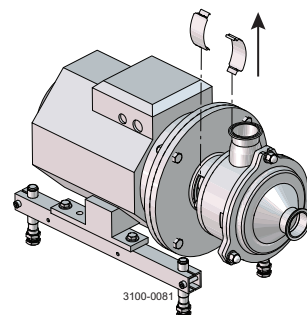
#### Step 1

Loosen screws (43) and remove shroud (5).



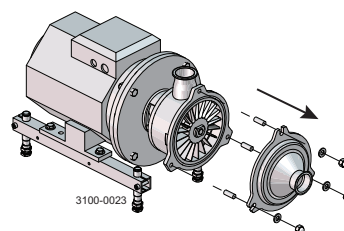
#### Step 2

Remove covers (2a)



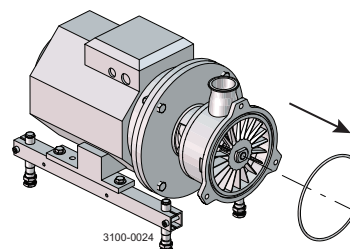
#### Step 3

Remove cap nuts (14), washers (15a) and casing cover (10).



#### Step 4

Remove O-ring (8) from pump casing (9).

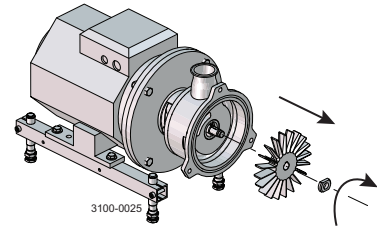


## 5 Maintenance

Study the instructions carefully. The items refer to the parts list and service kits section. Handle scrap correctly.

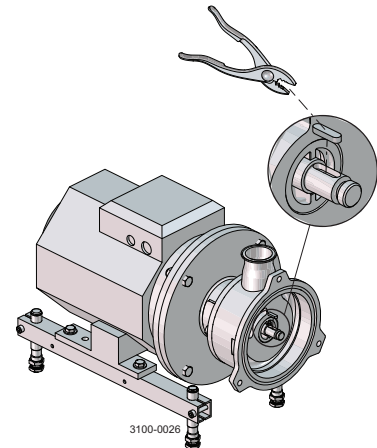
### Step 5

1. Remove impeller nut clockwise (13), (counterhold stub shaft (3)).
2. Remove impeller (11) from the stub shaft.



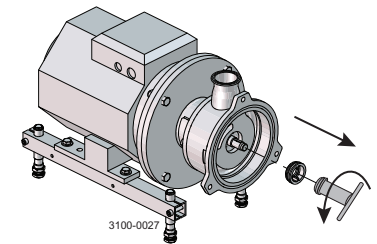
### Step 6

Remove key (12) from stub shaft (3) using a pair of pliers.



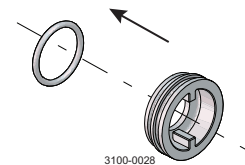
### Step 7

Turn stationary seal ring (29) anti-clockwise and remove it from pump casing (9) (use the tool supplied).



### Step 8

Remove O-ring (30) from stationary seal ring (29).

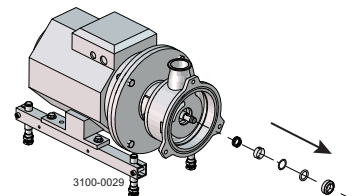


### Step 9

Remove rotating seal ring (28), O-ring (27), washer (26), spacer ring (25) and spring (24) from stub shaft (3).

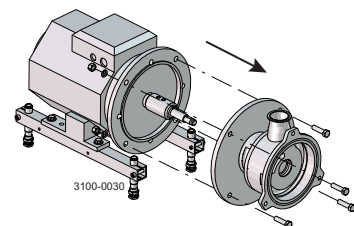
#### NOTE!

If necessary, insert a screwdriver through the hole in the pump casing (9) and push the seal parts out.



### Step 10

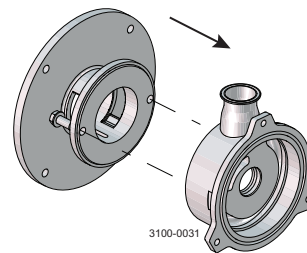
1. Remove screws (45) and washers (46).
2. Remove bracket (2) together with pump casing (9).



*Study the instructions carefully. The items refer to the parts list and service kits section. Handle scrap correctly.*

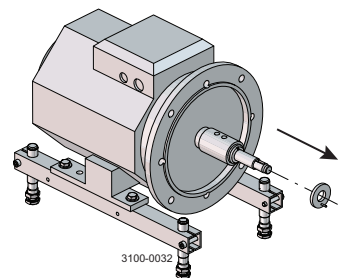
### Step 11

1. Remove screws (40).
2. Remove pump casing (9) from bracket (2).



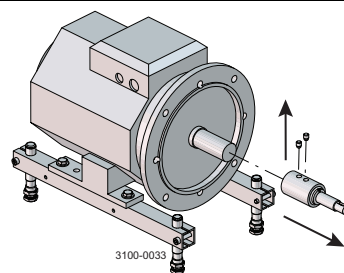
### Step 12

- Remove thrower (21) from stub shaft (3).



### Step 13

1. Loosen screws (4)
2. Remove stub shaft (3).



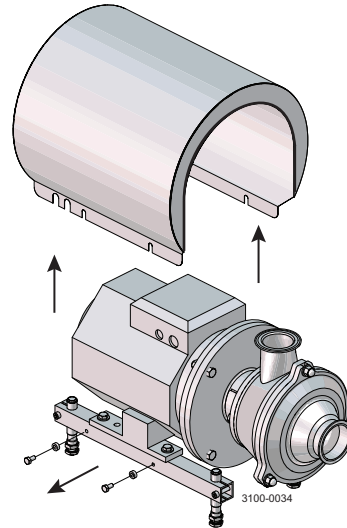
## 5 Maintenance

*Study the instructions carefully. The items refer to the parts list and service kits section. Handle scrap correctly.*

### 5.3 Dismantling of pump - MR-185S and MR-200S

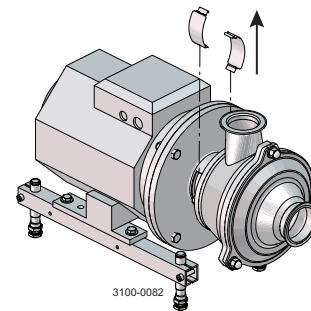
#### Step 1

Remove screws (34), shroud (31) and distance sleeve (42).



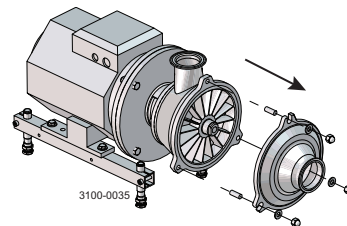
#### Step 2

Remove covers (2a)



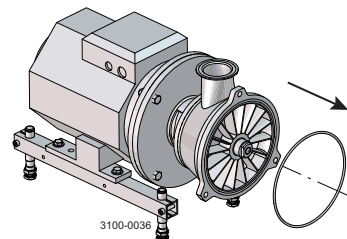
#### Step 3

Remove cap nuts (14), washers (15a) and casing cover (10).



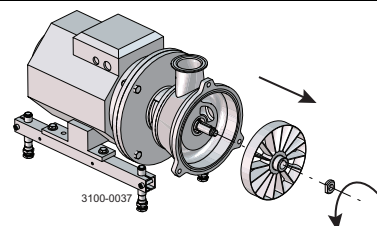
#### Step 4

Remove O-ring (8) from pump casing (9).



#### Step 5

1. Remove impeller nut (13) anti-clockwise, (counterhold stub shaft (3)).
2. Remove impeller (11) from the stub shaft.

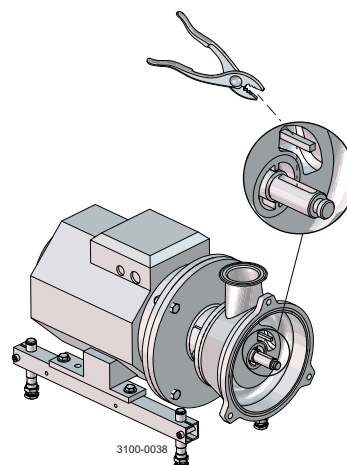




Study the instructions carefully. The items refer to the parts list and service kits section. Handle scrap correctly.

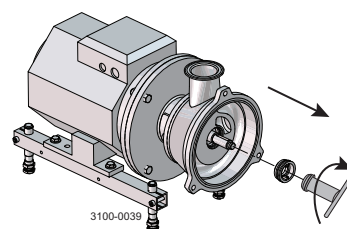
### Step 6

Remove key (12) from stub shaft (3) using a pair of pliers.



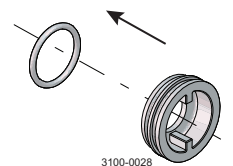
### Step 7

Turn stationary seal ring (28) clockwise and remove it from pump casing (9) (use the tool supplied).



### Step 8

Remove O-ring (30) from stationary seal ring (29).

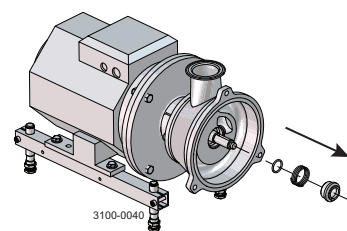


### Step 9

Remove rotating seal ring (27), spring (25) and O-ring (26) from stub shaft (3).

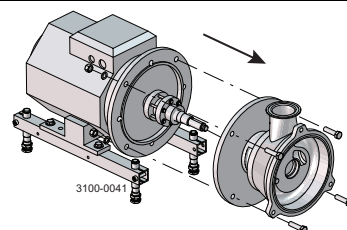
#### NOTE!

If necessary, place a screwdriver through the hole in pump casing (9) and push the seal parts out.



### Step 10

1. Remove screws (6) and washers (7).
2. Remove adaptor (2) together with pump casing (9).

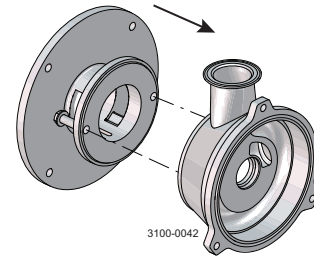


## 5 Maintenance

*Study the instructions carefully. The items refer to the parts list and service kits section. Handle scrap correctly.*

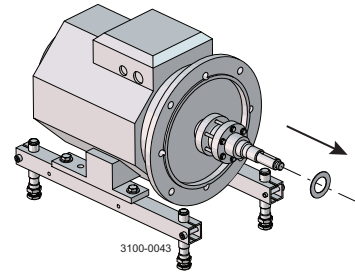
### Step 11

1. Remove screws (16) and washers (17).
2. Remove pump casing (9) from adaptor (2).



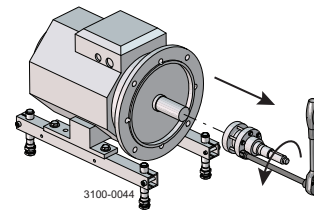
### Step 12

- Remove thrower (24) from stub shaft (3).



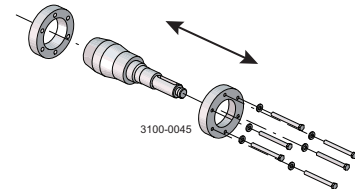
### Step 13

1. Loosen screws (5).
2. Remove stub shaft (3) together with compression rings (4a+b).



### Step 14

- Remove screws (5), washer (5a) and compression rings (4a+b) from stub shaft (3).

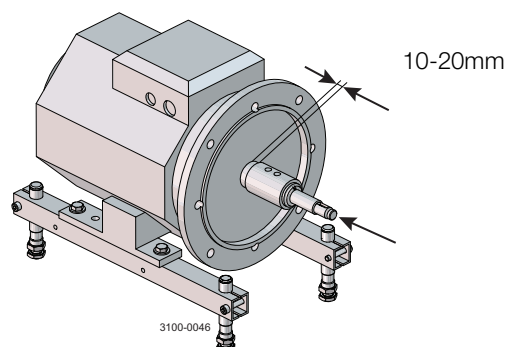


Study the instructions carefully. The items refer to the parts list and service kits section. Lubricate the rubber seals before fitting them.

### 5.4 Assembly of pump - MR-166S

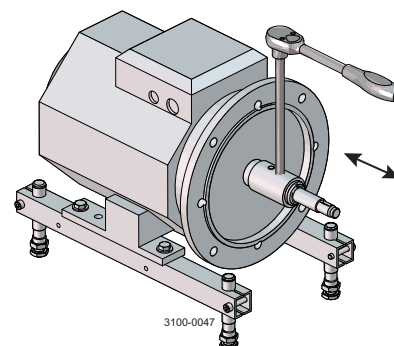
#### Step 1

1. Fit stub shaft (3) on the motor shaft.
2. Check the clearance between the end of the stub shaft and the motor flange (10-20 mm)



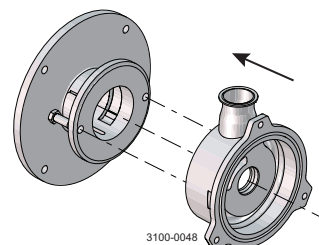
#### Step 2

1. Tighten screws (4) lightly and evenly.
2. Ensure that the stub shaft (3) can be moved on the motor shaft.



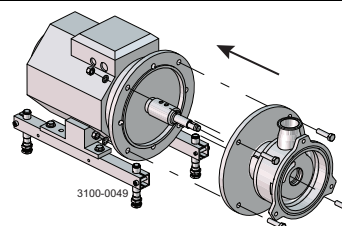
#### Step 3

1. Fit pump casing (9) on bracket (2).
2. Fit washers (41) and screws (40).
3. Tighten the screws.



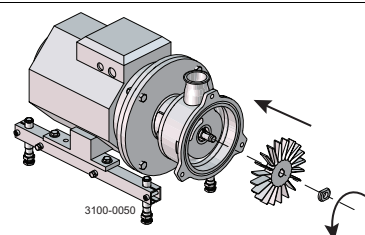
#### Step 4

1. Fit bracket (2) on the motor.
2. Fit washers (46) and screws (45).
3. Tighten the screws.



#### Step 5

1. Fit impeller (11) on stub shaft (3).
2. Fit impeller nut anti-clockwise (13) on the shaft and tighten lightly.

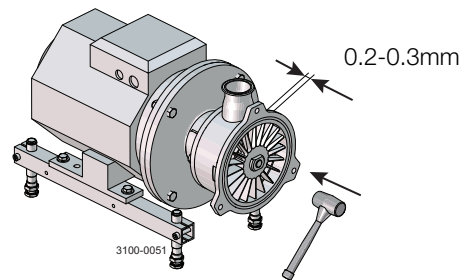


## 5 Maintenance

Study the instructions carefully. The items refer to the parts list and service kits section. Lubricate the rubber seals before fitting them.

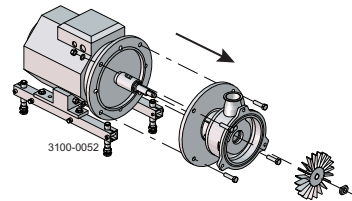
### Step 6

Ensure that the clearance between impeller (11) and pump casing (9) is 0.2-0.3 mm (tap gently with a plastic hammer).



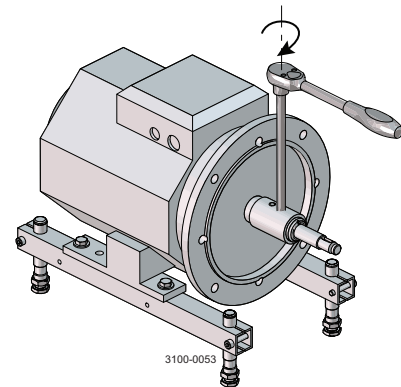
### Step 7

Remove impeller (11), pump casing (9) and bracket (2) without moving stub shaft (3) on the motor shaft.



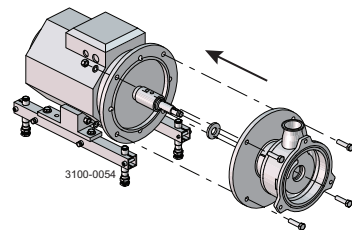
### Step 8

Torque tighten screws (4) evenly to 15 Nm



### Step 9

1. Fit thrower (21) on stub shaft (3).
2. Fit bracket (2) together with pump casing (9) on the motor.
3. Fit washers (46) and screws (45).

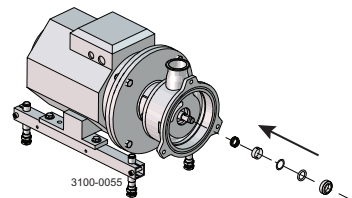


### Step 10

#### CAUTION!

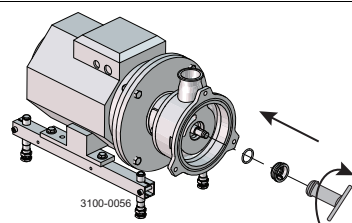
Ensure that the notch in the seal ring is opposite the driving pin on thrower (21).

1. Fit spring (24), spacer ring (25) and washer (26) on the stub shaft.
2. Lubricate O-ring (27) and fit it on the stub shaft.
3. Fit rotating seal ring (28) on the stub shaft.



### Step 11

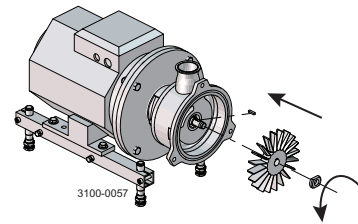
1. Fit O-ring (30) on stationary seal ring (29).
2. Fit the seal ring in pump casing (9), turn it clockwise and tighten (use the tool supplied).



Study the instructions carefully. The items refer to the parts list and service kits section. Lubricate the rubber seals before fitting them.

### Step 12

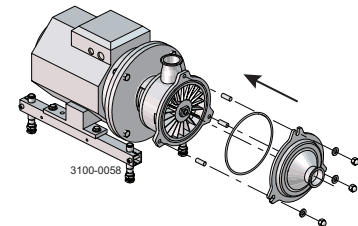
1. Place key (12) in the groove of stub shaft (3).
2. Fit impeller (11) on the shaft.
3. Fit and tighten impeller nut (13) anti-clockwise on the shaft.
4. Check that the clearance between the impeller and the pump casing (9) is 0.2 - 0.3 mm (adjust if necessary).



### Step 13

1. Fit O-ring (8) in pump casing (9).
2. Fit casing cover (10).
3. Fit washers (15a) and cap nuts (14).
4. Tighten the cap nuts firmly.
5. Ensure that impeller (11) rotates smoothly (see section 2.3).

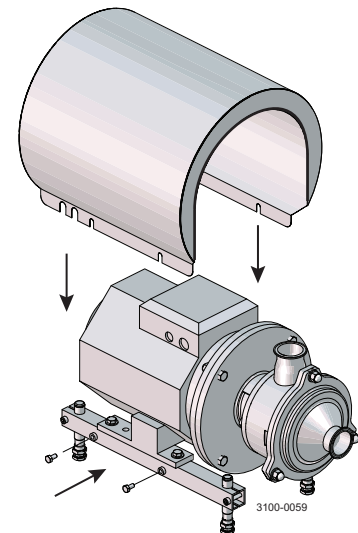
**Note!** Pay special attention to warnings.



### Step 14

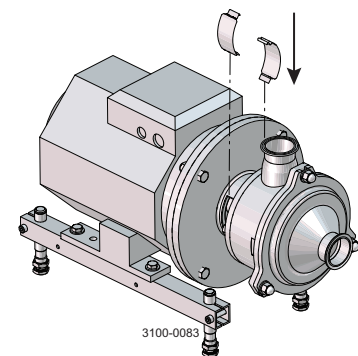
1. Fit shroud (5).
2. Fit distance sleeve (44) and screws (43).

**CAUTION!** Ensure that the notch in the seal ring is opposite the driving pin on thrower (21).



### Step 15

Fit covers (2a)



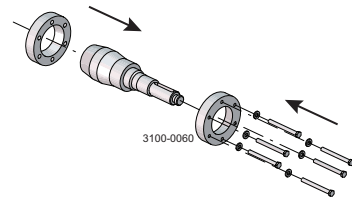
## 5 Maintenance

Study the instructions carefully. The items refer to the parts list and service kits section. Lubricate the rubber seals before fitting them.

### 5.5 Assembly of pump - MR-185S and MR-200S

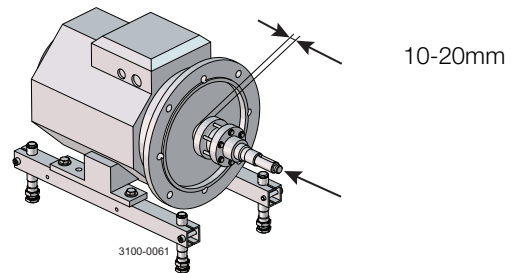
#### Step 1

Fit compression rings (4a+b), screws (5) and washer (5a) correctly on stub shaft (3).



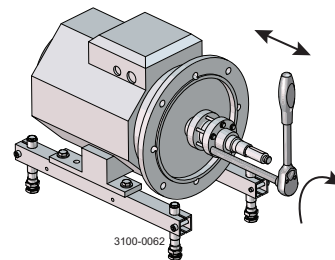
#### Step 2

1. Fit stub shaft (3) on the motor shaft.
2. Check the clearance between the end of the stub shaft and the motor flange (10-20 mm)



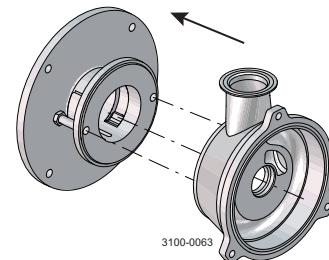
#### Step 3

1. Tighten screws (5) lightly and evenly.
2. Ensure that stub shaft (3) can be moved on the motor shaft.



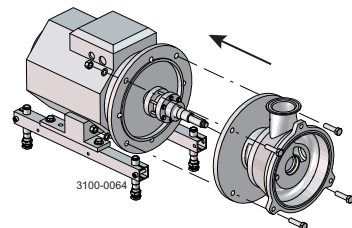
#### Step 4

1. Fit pump casing (9) on adaptor (2).
2. Fit washers (17) and screws (16).
3. Tighten the screws.



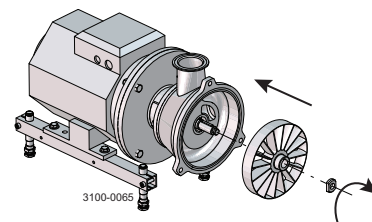
#### Step 5

1. Fit adaptor (2) on the motor.
2. Fit washers (7) and screws (6).
3. Tighten the screws.



#### Step 6

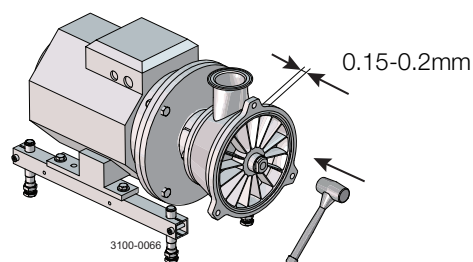
1. Fit impeller (11) on stub shaft (3).
2. Fit impeller nut (13) clockwise on the shaft and tighten lightly.



Study the instructions carefully. The items refer to the parts list and service kits section. Lubricate the rubber seals before fitting them.

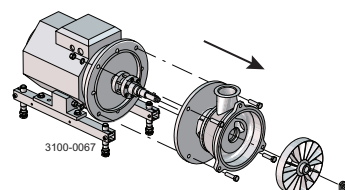
### Step 7

Ensure that the clearance between impeller (11) and pump casing (9) is 0.15-0.20 mm (tap gently with a plastic hammer).



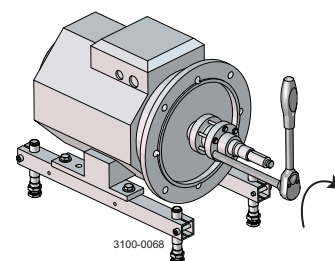
### Step 8

Remove impeller (11), pump casing (9) and adaptor (2) without moving stub shaft (3) on the motor shaft.



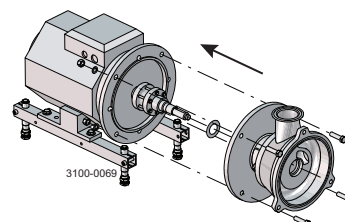
### Step 9

Torque tighten screws (5) evenly to 15 Nm (counterhold stub shaft (3)).



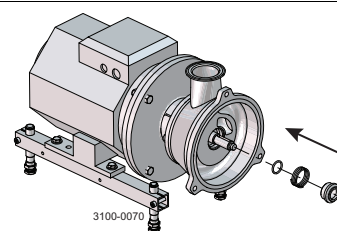
### Step 10

1. Fit thrower (24) on stub shaft (3).
2. Fit adaptor (2) together with pump casing (9) on the motor.
3. Fit washers (7) and screws (6).



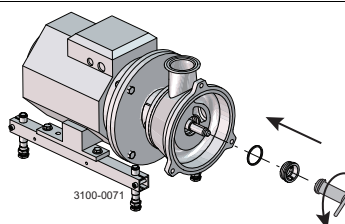
### Step 11

1. Lubricate O-ring (26) and push it on stub shaft (3) and position it correctly.
2. Place spring (25) on rotating seal ring (27).
3. Push the seal ring over the O-ring as far as possible against the shoulder.



### Step 12

1. Fit O-ring (29) on stationary seal ring (28).
2. Fit the seal ring in pump casing (9), turn anti-clockwise and tighten (use the tool supplied).

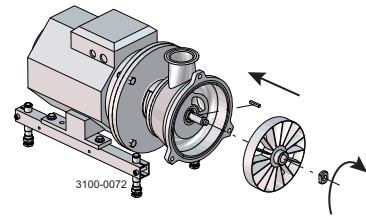


## 5 Maintenance

*Study the instructions carefully. The items refer to the parts list and service kits section. Lubricate the rubber seals before fitting them.*

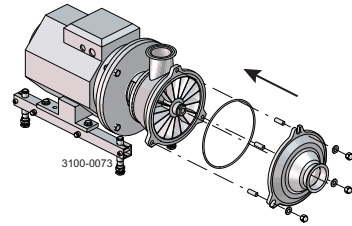
### Step 13

1. Place key (12) in the groove of stub shaft (3).
2. Fit impeller (11) and impeller nut (13) on the shaft.
3. Tighten the nut clockwise.



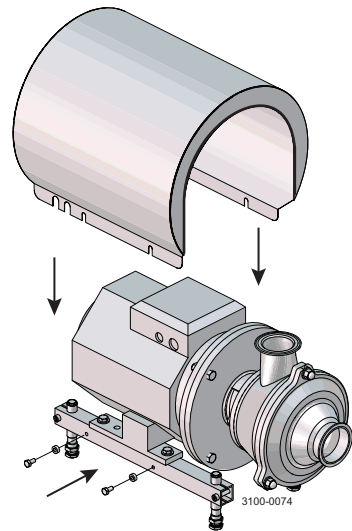
### Step 14

1. Fit O-ring (8) in pump casing (9).
2. Fit casing cover (10).
3. Fit washers (15a) and cap nuts (14).



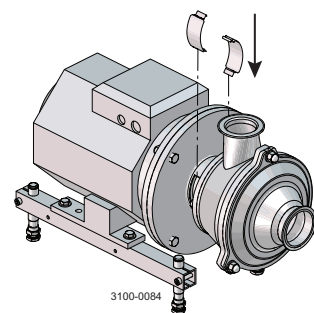
### Step 15

1. Fit shroud (31).
2. Fit distance sleeve (42), washers (33) and screws (34).



### Step 16

Fit covers (2a)





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

## 6.1 Technical data

MR is a liquid-ring pump specially designed for pumping liquids containing air or gas. The pump is for use in the food, chemical, pharmaceutical and similar industries. The pump is mainly used for CIP-return application. This instruction manual is part of the delivery. Study the instructions carefully. The pump is available in the following sizes, MR-166S, MR-185S and MR-200S.

Data	
Max. inlet pressure	400 kPa (4 bar)
Temperature range	-10°C to +140°C (EPDM)
Max. speed	1800 rpm
Materials	
Product wetted steel parts	AISI 316L
Other steel parts	Stainless steel
Product wetted seals	EPDM (standard)
Alternative seals	Nitrile (NBR) and flourinated rubber (FPM)
Finish	Standard blasted
Shaft seal	
Seal type	Mechanical single seal
Material, stationary seal ring	Acid resistant steel, duplex grade (standard) or Acid resistant steel, duplex grade 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 flourinated rubber (FPM)
Motor	
Standard foot-flanged motor according to IEC metric standard	
4 pol = 1500/1800 rpm. at 50/60 Hz	
IP55 (with drain holes with labyrinth plug), insulation class F	
IEC motors (kW)	
Motor sizes, 50 Hz	2.2 Frame size 100 (MR-166S)
Motor sizes, 60 Hz	2.5 Frame size 100 (MR-166S)
Motor sizes, 50 Hz	5.5 Frame size 132 (MR-185S)
	7.5 Frame size 132 (MR-200S)
	11 Frame size 132 (MR-200S)
Motor sizes, 60 Hz	6.3 Frame size 132 (MR-185S)
	8.6 Frame size 132 (MR-200S)
	12.5 Frame size 132 (MR-200S)
NEMA motors (Hp)	
Motor sizes, 60 Hz	3.35 (MR-166S)
Motor sizes, 60 Hz	8.44 (MR-185S)
Motor sizes, 60 Hz	11.5 (MR-200S), 16.75 (MR-200S)
* Only MR-185S and MR-200S.	

## 6 Technical data

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

### 6.2 Torque specifications

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

Size	Tightening torque	
	Nm	lbf-ft
M8	20	15
M10	40	30
M12	67	49
M14	110	81

### 6.3 Weight (kg)

Pump Type: MR

Size	Motor					
	90 2.2kW	132 5.5kW	132 7.5kW	160 11kW	160 15kW	18.5kW
166S	74					
185S		104				
200S			119	160		
300					188	217

Weight can vary depending of configuration. Weight is only to be seen as a reference value during handling, transporting and packaging.

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

## 6.4 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-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, LKH Hex.  
The above SolidC noise levels are the same for SolidC UltraPure.

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

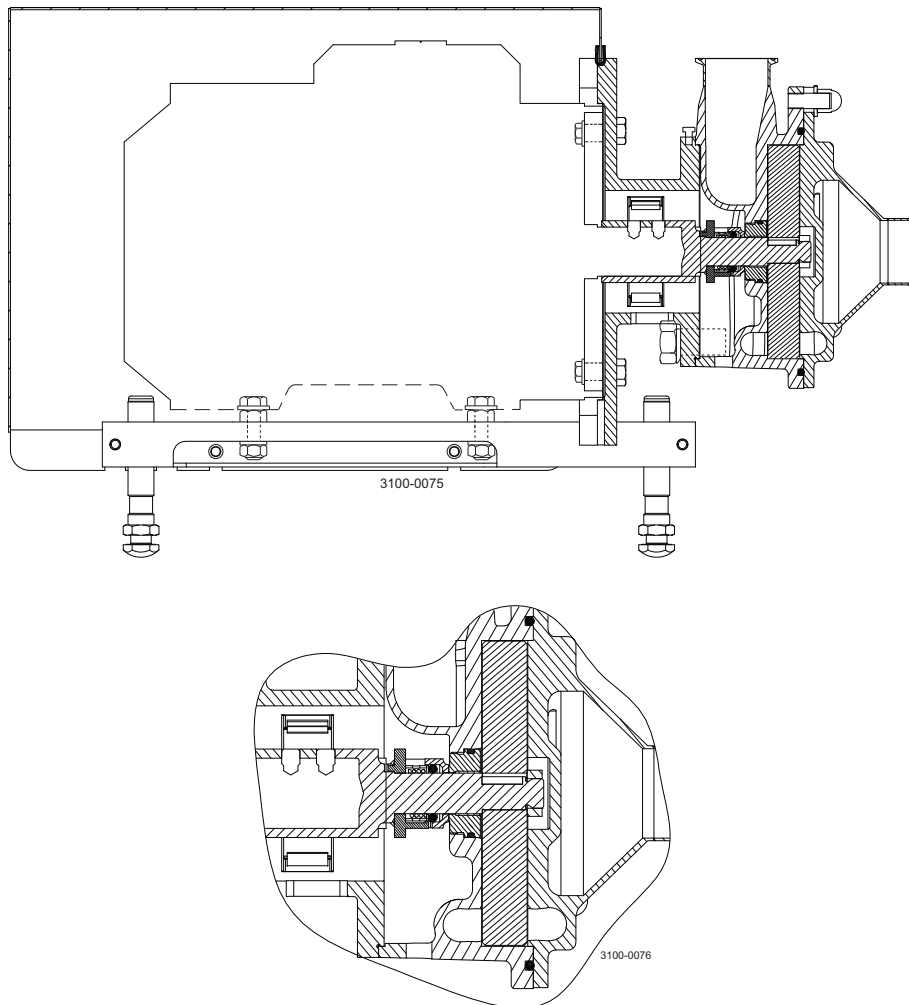
Very often, the noise level generated by the flow through the process system (e.g. valves, pipes, tanks etc.) is much higher than what generated by the pump itself. Therefore, it is important to consider the noise level from the total system and take the necessary precautions with regards to personal safety if required.

## 7 Parts list and service kits

*The drawings show MR-166S, -185S and -200S and include all items.  
The items refer to the parts lists in the following sections.*

### 7.1 Drawings MR 166

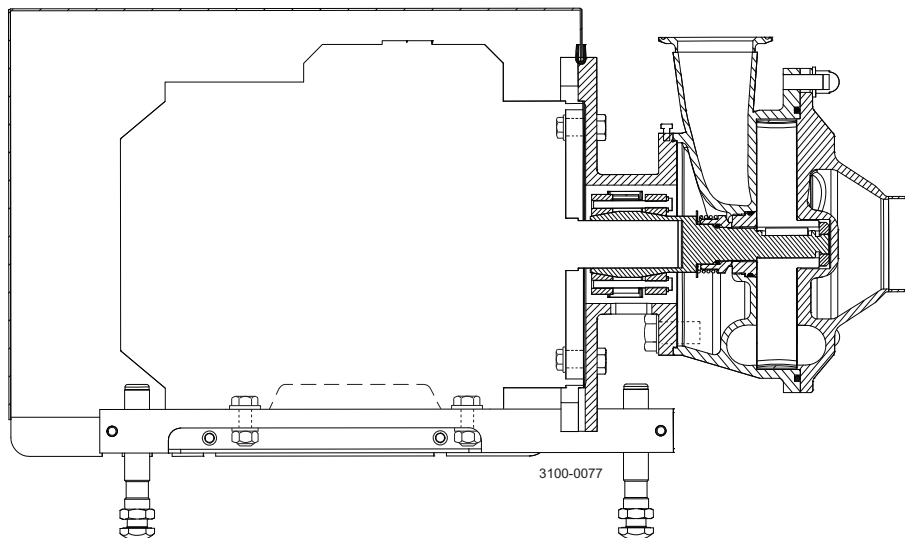
For further information, see parts list section 6.2.



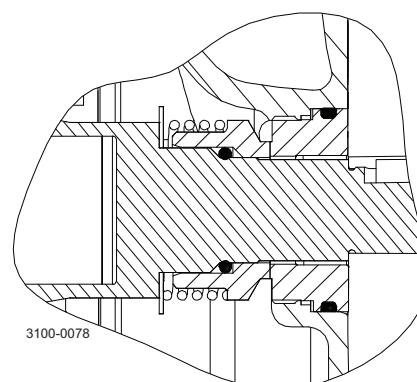
The drawings show MR-166S, -185S and -200S and include all items.  
The items refer to the parts lists in the following sections.

### 7.2 Drawings MR 185/200

For further information, see parts list section 6.3



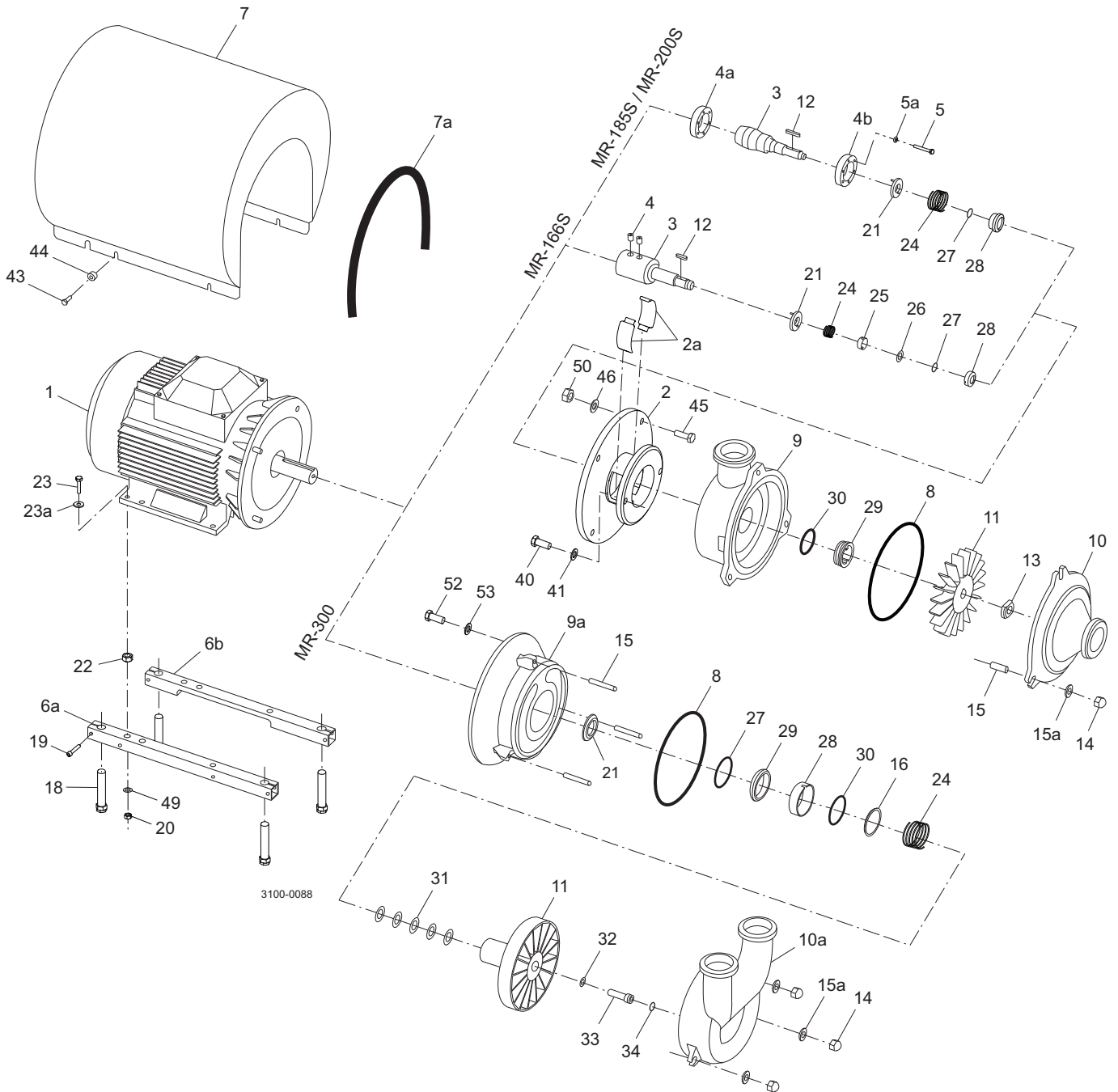
Shaft seal



## 7 Parts list and service kits

The drawing shows the MR-166S, sanitary version. The items refer to the parts lists in the following sections.

### 7.3 MR - Wet end



## 7 Parts list and service kits

The drawing shows the MR-166S, sanitary version. The items refer to the parts lists in the following sections.

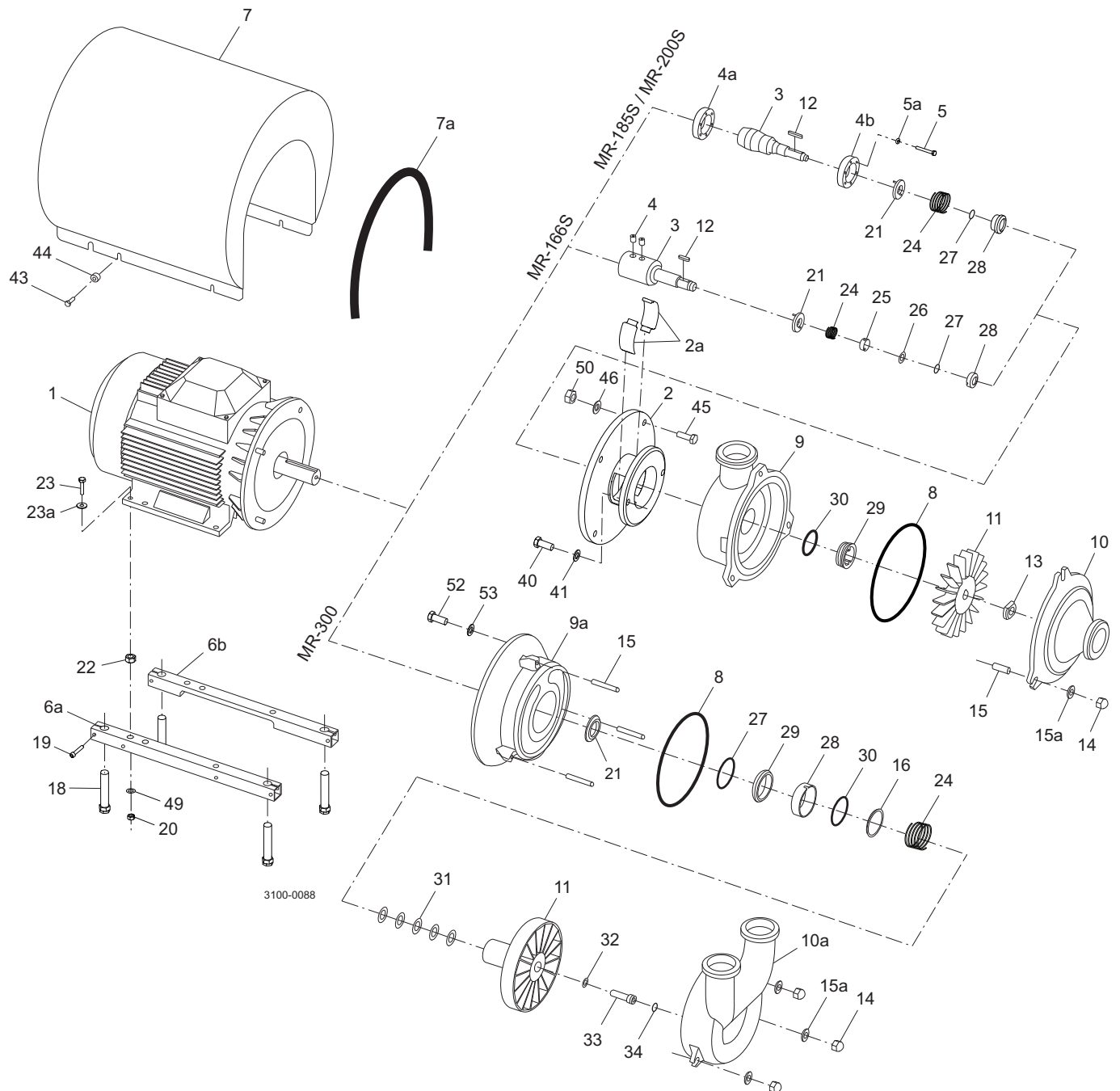
### Parts list

Pos.	Qty	Denomination
		ISO male
		SMS
		DIN
		ISO clamp
		BS
8 □	1	O-ring, EPDM (Standard)
9	1	Pump casing
10	1	Casing cover
10a	1	Casing cover
11	1	Impeller
13		Impeller screw
14	3	Cap nut
15	3	Stud bolt
15a	3	Washer
21	1	Thrower
31	1-2	Shims, 0.1 mm
32	1	Washer for impeller screw
33	1	Impeller nut
34 □	1	O-ring, EPDM (Standard)

## 7 Parts list and service kits

The drawing shows the MR-185S -200S, sanitary version. The items refer to the parts lists in the following sections

#### 7.4 MR - Motor dependent parts





## 7 Parts list and service kits

The drawing shows the MR-185S -200S, sanitary version. The items refer to the parts lists in the following sections

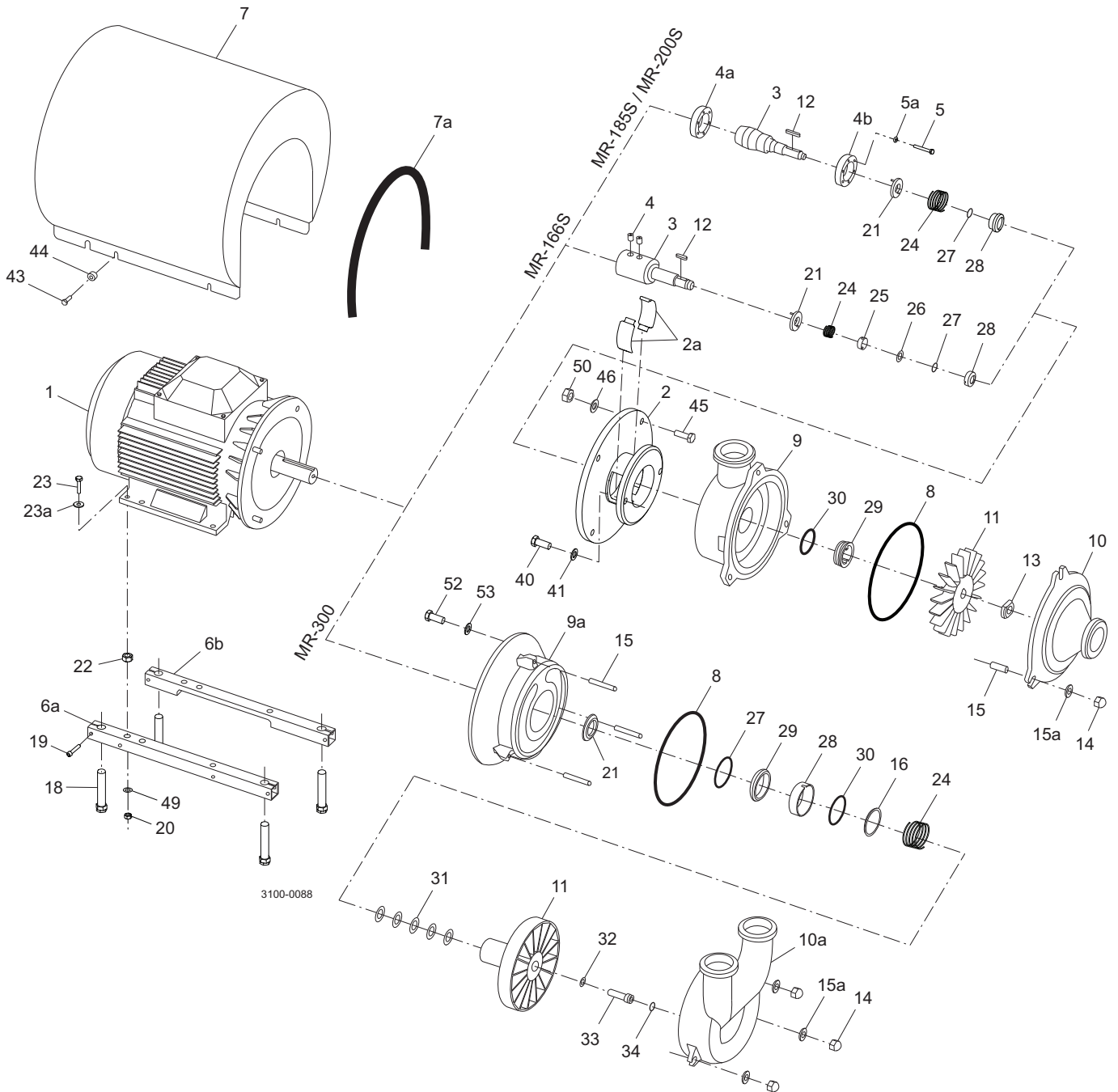
### Parts list

Pos.	Qty	Denomination
1	1	Motor ABB
2	1	Bracket
2a	2	Bracket cover
3	1	Shaft
4	2	Screw
4a	1	Compression ring
4b	1	Compression ring
5	6	Screw
5a	6	Washer
6a	1	Support bar, right
6b	1	Support bar, left
7	1	Shroud complete
7a	1	Edge list
12	4	Key
18	4	Legs
19	4	Screw
20	4	Nut
22	4	Nut
23	4	Screw
23a	4	Washer
40	2	Screw
41	2	Spring washer
43	4	Screw
44	4	Distance sleeve
45	4	Screw
46	4	Washer
49	4	Spring washer
50	4	Nut
52	4	Screw
53	4	Spring washer

## 7 Parts list and service kits

The drawing shows the MR-185S -200S, sanitary version. The items refer to the parts lists in the following sections

### 7.5 MR - Shaft seal



## 7 Parts list and service kits

The drawing shows the MR-185S -200S, sanitary version. The items refer to the parts lists in the following sections

### Parts list

Pos.	Qty	Denomination
	1	Spanner for stationary seal ring
	1	Key for hexagonal socket
	1	Impeller tool
	1	Shaft seal tool
□		Shaft seal
□		Shaft seal
□		Shaft seal
24	1	Spring
25	1	Space ring
26	1	Washer
27	1	O-ring
28	1	Rotating seal ring
29	1	Stationary seal ring
30	1	O-ring

### Service kits

	Denomination	MR-166S	MR-185S/ 200S	MR-300
□	Service kit, EPDM .....	9611921078	9611921081	9611921084
□	Service kit, NBR .....	9611921079	9611921082	9611921085
□	Service kit, FPM .....	9611921080	9611921083	9611921086

Parts marked with □ are included in the service kits.

Recommended spare parts: Service kits.

(900692/2)

**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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