The designated company

Alfa Laval
Company Name

Albuæn 31, DK-6000 Kolding, Denmark
Address

+45 79 32 22 00
Phone No.

hereby declare that

Pump
Denomination

MR
Type

is in conformity with the following directives with amendments:
- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- Machinery Directive 2006/42/EC

The technical construction file is retained at the above address

Manager, Product Centres & Fluid Handling
Title

Bjarne Søndergaard
Name

Alfa Laval Kolding
Company

Signature

Designation

CE

Food Contact
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Always read the manual before using the pump!

WARNING!
Indicates that special procedures must be followed to avoid severe personal injury.

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

NOTE!
Indicates important information to simplify practices or to make them clearer.

1. Important information

2. Warning signs

General warning.

Dangerous electrical voltage.

Caustic agents.

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 agreement with local regulations.

* Scrapping
  - At end of use, the equipment shall be recycled according to relevant, local regulations. Beside 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 the local Alfa Laval sales company.
All warnings in the manual are summarized on this page.

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

3. Safety precautions

Installation:

- **Always** observe the technical data (see page 14).
- **Never** stick your fingers or any tool through the drain hole in the pump casing when the pump is running.

- The pump must be electrically connected by authorized personnel (see the motor instructions).

- **Always** disconnect the power supply before dismantling the pump.

Operation:

- **Always** observe the technical data (see page 14).

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

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

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

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

Maintenance:

- **Always** observe the technical data (see page 14).

- **Always** disconnect the power supply when the pump is serviced.

- **Always** disconnect the power supply when checking the impeller position.

- The pump must **never** be hot when serviced.

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

The instruction manual is part of the delivery. Study the instructions carefully.

1. Unpacking/Delivery

NOTE!
We cannot be held responsible for incorrect unpacking.

Check the delivery:
1. Complete pump.
2. Delivery note.
3. Instruction manual.
5. Test certificate.

Clean the inlet and the outlet for possible packing materials.

Inspect the pump for visible transport damages. Avoid damaging the inlet and the outlet.

Always remove the shroud, if fitted, before lifting the pump.
Study the instructions carefully and pay special attention to the warnings!

2. Installation/Pre-use check

1 - Always observe the technical data (see page 14).
   - Never stick your fingers or any tool through the drain hole in the pump casing when the pump is running.

The pump must be electrically connected by authorized personnel (see the motor instructions).

NOTE!
We cannot be held responsible for incorrect installation.

3 Ensure that the flow direction is correct.

4 Ensure at least 0.5m clearance around the pump.

5 Risk of damage!

Avoid stressing the pump.
Pay special attention to:
- Vibrations.
- Thermal expansion of the tubes.
- Excessive welding.
- Overloading of the pipelines.

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

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.

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.
Operation

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

1. Operation/Control

1 Always observe the technical data (see page 14).

NOTE!
We cannot be held responsible for incorrect operation/control.

2 Burning danger!

3 Explosion danger!

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

4 Rotating parts!

Never touch the pump or the pipelines when pumping hot liquids or when sterilizing.

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

6

CAUTION!
- The shaft seal must not run dry.
- Never throttle the inlet side.

Control:
Reduce the capacity by means of:
- Throttling the pressure side of the pump.
- Speed control of the motor.
## 2. Fault finding

**NOTE!**
Study the maintenance instructions carefully before replacing worn parts. - See page 9!

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause/result</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overloaded motor</td>
<td>- Pumping of viscous liquids</td>
<td>- 18.5 kW motor if 15 kW is fitted</td>
</tr>
<tr>
<td></td>
<td>- Pumping of liquids with high density</td>
<td>- Increase capacity</td>
</tr>
<tr>
<td>Leaking shaft seal</td>
<td>- Dry run (See page 6)</td>
<td>Replace:</td>
</tr>
<tr>
<td></td>
<td>- Incorrect rubber grade</td>
<td>All wearing parts (See page 9)</td>
</tr>
<tr>
<td>Leaking seals</td>
<td>Incorrect rubber grade</td>
<td>- Select a different rubber grade</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select a different rubber grade</td>
</tr>
</tbody>
</table>
Operation

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

3. Recommended cleaning

1. Caustic danger!
   Always use rubber gloves!
   Always use protective goggles!

2. Burning danger!
   Never touch the pump or the pipelines when sterilizing.

3. Always handle lye and acid with great care.
   Examples of cleaning agents:
   Use clean water, free from chlorides.

   1. 1% by weight NaOH at 70°C.
      \[
      \begin{align*}
      \text{1 kg NaOH} & + \text{100 l water} = \text{Cleaning agent.} \\
      \text{2.2 l 33%NaOH} & + \text{100 l water} = \text{Cleaning agent.}
      \end{align*}
      \]

   2. 0.5% by weight HNO₃ at 70°C.
      \[
      \begin{align*}
      \text{0.7 l 53% HNO₃} & + \text{100 l water} = \text{Cleaning agent.}
      \end{align*}
      \]

4. 1. Avoid excessive concentration of the cleaning agent
   ⇒ Dose gradually!

   2. Adjust the cleaning flow to the process
   Milk sterilization/viscous liquids
   ⇒ Increase the cleaning flow!

5. Always! Water → Cleaning agent → Water

6. NOTE!
   The cleaning agents must be stored/discharged in accordance with current rules/directives.

Always rinse well with clean water after the cleaning.
**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.

**1. General maintenance**

1. **Always** observe the technical data (see page 14).
   - **Always** disconnect the power supply when the pump is serviced.
   - **Always** disconnect the power supply when checking the impeller position.

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

2. **Atmospheric pressure required!**

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

3. **CAUTION!**
Always ensure that the impeller rotates smoothly after service.

   1. Ensure that impeller (19) does not contact pump casing (8) or casing cover (23).
   2. Adjust the impeller position, if necessary (see page 14).

**Ordering spare parts**
- Contact the Sales Department.
- Order from the Spare Parts List.

**Recommended spare parts:** Service kits (see Spare Parts List).

**CAUTION!**
Fit the electrical connections correctly if they have been removed from the motor during service (see pre-use check on page 5).

**Pay special attention to the warnings!**
## Maintenance

Maintain the pump carefully.  
Study the instructions carefully.  
Always keep spare shaft seals and rubber seals in stock.

### 1. General maintenance

<table>
<thead>
<tr>
<th></th>
<th>Shaft seal</th>
<th>Rubber seals</th>
<th>Motor bearings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventive maintenance</td>
<td>Replace after 12 months: (one-shift) Complete shaft seal</td>
<td>Replace when replacing the shaft seal</td>
<td></td>
</tr>
<tr>
<td>Maintenance after leak-</td>
<td>Replace at the end of the day: Complete shaft seal</td>
<td>Replace when replacing the shaft seal</td>
<td></td>
</tr>
<tr>
<td>age (leakage normally starts slowly)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Planned maintenance       | - Regular inspection for leakage and smooth operation  
                          | - Keep a record of the pump  
                          | - Use the statistics for planning of inspections | Replace when replacing the shaft seal | Yearly inspection is recommended  
                          | Replace after leakage: Complete shaft seal |                                      | - Replace complete bearing if worn  
                          |                                                                 |                                      | - Ensure that the bearing is axially locked (see motor instructions) |
| Lubrication              | **Before fitting**  
                          | Lubricate the O-rings with silicone grease or silicone oil (not the sealing surfaces) | **Before fitting** Silicone grease or silicone oil | None  
                          | The bearings are permanently lubricated |                                      |                                      |

See separate motor instructions.  
Check the pump for smooth operation after service.
2. Dismantling of pump/Removing the shaft seal (1-4●)

1. Remove rotating seal ring (14) from impeller (19) by turning it clockwise and pulling it simultaneously.
2. Remove O-ring (15), washer (16) and spring (17) from the rotating seal ring.

Remove cap nuts (25), washers (24) and casing cover (23).

3. 

4. NOTE!
Ensure that shims (18) remain in the impeller.

5. 1. Remove impeller screw (21), washer (20) and O-ring (22), (counterhold impeller (19), with the tool supplied).
2. Remove the impeller.

1. Remove stationary seal ring (13) from pump casing (8) by hooking the tool supplied to the rear edge of the seal ring and pulling it out.
2. Remove O-ring (12) from the stationary seal ring.

6. 

7. Remove O-ring (11) from pump casing (8).

8. Remove shroud (2).

1. Remove screws (6) and washers (7).
2. Remove pump casing (8).

9. Remove thrower (10) from the motor shaft.
3. Assembly of pump/Fitting of shaft seal (5-8#)

**NOTE!**
The impeller position may have to be adjusted if:
- The motor has been replaced.
- Shims (18) are missing in impeller (19).
(For impeller adjustment, see page 14).

---

Fit shroud (2).

1. Lubricate O-ring (12) and fit it on stationary seal ring (13).
2. Fit the stationary seal ring in pump casing (8).

---

Fit O-ring (11) on pump casing (8).

1. Lubricate O-ring (15).
2. Fit the O-ring, washer (16) and spring (17) in rotating seal ring (14).
3. Fit the rotating seal ring by turning it clockwise and pressing it simultaneously.

---

1. Check that shims (18) are positioned correctly in impeller (19).
2. Fit the impeller.
3. Fit O-ring (22) on impeller screw head (21).
4. Fit washer (20) and the impeller screw (tighten firmly while counterholding the impeller with the tool supplied)
5. Check that the clearance between the impeller and pump casing (8) is 0.3-0.4 mm.

---

1. Fit casing cover (23), washers (24) and cap nuts (25).
2. Tighten the cap nuts firmly.
3. Ensure that impeller (19) rotates smoothly (see page 5).

**Pay special attention to the warnings!**
Adjustment of the impeller position is normally only carried out when the motor has been replaced.

4. Adjustment of impeller position

1. **NOTE!**
   - Adjust the impeller position with **only** the pump casing, the thrower and the impeller fitted on the motor.
   - Fit all other parts after the adjustment.

2. 1. Fit thrower (10) on the motor shaft.
    2. Fit pump casing (8) on the motor.
    3. Fit washers (7) and screws (6).

3. Place some shims (18) in impeller (19).

4. 1. Fit impeller (19) on the motor shaft.
    2. Fit impeller screw (21) and tighten firmly.

5. Adjust the impeller position by adding or removing shims (18) until the clearance between impeller (19) and pump casing (8) is 0.3-0.4 mm.

6. **CAUTION!**
   Ensure that the correct number of shims (18) are fitted.
   Too few or too many shims cause the impeller to come into contact with the pump casing or the casing cover and damage them.
   The efficiency of the pump may also be affected.

Study the instructions carefully.
The items refer to the drawings and the parts list on pages 16-19.
1. Technical data

Data
Max. inlet pressure ........................................ 400 kPa (4 bar)
Temperature range ........................................... -10°C to +140°C (EPDM)

Materials
Product wetted steel parts ...................... AISI 316
Other steel parts ............................................ AISI 304
Product wetted seals ................................. EPDM (standard)
Alternative seals ........................................... Nitrile (NBR) and Viton (FPM)
Finish ......................................................... Semi bright

Shaft seal
Seal type .................................................. Mechanical single seal
Material, stationary seal ring .................. AISI 329
Material, rotating seal ring ..................... Carbon
Material, O-rings ............................................ EPDM (standard)
Alternative material, O-rings ................. Nitrile (NBR) and Viton (FPM)

Motor
Direct coupled standard foot-flanged motor acc. to IEC metric standard
4 pol = 1500/1800 rpm. at 50/60 Hz
IP55 (with drain holes with labyrinth plug), insulation class F

Voltage and frequency .................................................. (3~, 50 Hz, 380-420V/Δ/660-690VY)
................................................................. (3~, 60 Hz, 440-480V/Δ)

Motor sizes (kW), 50 Hz ......................................... 15, 18.5
Motor sizes (kW), 60 Hz ......................................... 17, 21

Tightening torques: See addendum

Noise: See addendum
Addendum

Section 1

Transportation Transportation of the pump or the pump unit:
- Never lift or elevate in any way other than 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 it’s upright position
- Always ensure that the unit is securely fixed during transportation
- Always use original packaging or similar during transportation

Section 2

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

<table>
<thead>
<tr>
<th>Size</th>
<th>Tightening torque Nm</th>
<th>Tightening torque lbf-ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6</td>
<td>20</td>
<td>14.8</td>
</tr>
<tr>
<td>M10</td>
<td>40</td>
<td>29.5</td>
</tr>
<tr>
<td>M12</td>
<td>67</td>
<td>49.0</td>
</tr>
<tr>
<td>M14</td>
<td>110</td>
<td>81.0</td>
</tr>
</tbody>
</table>

Section 3

Noise

<table>
<thead>
<tr>
<th>Pump Type</th>
<th>Sound pressure level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LKH-5</td>
<td>60</td>
</tr>
<tr>
<td>LKH-10</td>
<td>69</td>
</tr>
<tr>
<td>LKH-15</td>
<td>72</td>
</tr>
<tr>
<td>LKH-20</td>
<td>70</td>
</tr>
<tr>
<td>LKH-25</td>
<td>74</td>
</tr>
<tr>
<td>LKH-35</td>
<td>71</td>
</tr>
<tr>
<td>LKH-40</td>
<td>75</td>
</tr>
<tr>
<td>LKH-45</td>
<td>70</td>
</tr>
<tr>
<td>LKH-50</td>
<td>75</td>
</tr>
<tr>
<td>LKH-60</td>
<td>77</td>
</tr>
<tr>
<td>LKH-70</td>
<td>88</td>
</tr>
<tr>
<td>LKH-75</td>
<td>79</td>
</tr>
<tr>
<td>LKH-85</td>
<td>86</td>
</tr>
<tr>
<td>LKH-90</td>
<td>75</td>
</tr>
<tr>
<td>LKH-112</td>
<td>70</td>
</tr>
<tr>
<td>LKH-113</td>
<td>69</td>
</tr>
<tr>
<td>LKH-114</td>
<td>68</td>
</tr>
<tr>
<td>LKH-122</td>
<td>75</td>
</tr>
<tr>
<td>LKH-123</td>
<td>77</td>
</tr>
<tr>
<td>LKH-124</td>
<td>80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump Type</th>
<th>Sound pressure level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SolidC-1</td>
<td>68</td>
</tr>
<tr>
<td>SolidC-2</td>
<td>72</td>
</tr>
<tr>
<td>SolidC-3</td>
<td>73</td>
</tr>
<tr>
<td>SolidC-4</td>
<td>72</td>
</tr>
<tr>
<td>MR-166</td>
<td>76</td>
</tr>
<tr>
<td>MR-185</td>
<td>82</td>
</tr>
<tr>
<td>MR-200</td>
<td>81</td>
</tr>
<tr>
<td>MR-300</td>
<td>82</td>
</tr>
<tr>
<td>GM</td>
<td>54</td>
</tr>
<tr>
<td>FM-OS</td>
<td>61</td>
</tr>
</tbody>
</table>

The above LKH noise levels are the same for LKHP, LKH, LKH UltraPure, LKHlex
The above SolidC noise levels are the same for SolidC UltraPure
The above MR noise levels are the same for MR UltraPure

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

Very often the noise level generated by the flow through the process system (eg. valves, pipes, tanks etc.) is much higher than what is 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.
The drawing and the parts list include all items of the pump.

The items are identical with the items in the Spare Parts List. When ordering spare parts, please use the Spare Parts List!

**Parts list**

**MR-300**

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty.</th>
<th>Denomination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Motor</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Shroud</td>
</tr>
<tr>
<td>2a</td>
<td>1</td>
<td>Edge list</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Screw</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Distance sleeve</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Screw</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>Spring washer</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Pump casing</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>Stud bolt</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>Thrower</td>
</tr>
<tr>
<td>11 △</td>
<td>1</td>
<td>O-ring</td>
</tr>
<tr>
<td>12 △</td>
<td>1</td>
<td>O-ring</td>
</tr>
<tr>
<td>13 △</td>
<td>1</td>
<td>Stationary seal ring</td>
</tr>
<tr>
<td>14 △</td>
<td>1</td>
<td>Rotating seal ring</td>
</tr>
<tr>
<td>15 △</td>
<td>1</td>
<td>O-ring</td>
</tr>
<tr>
<td>16 △</td>
<td>1</td>
<td>Washer</td>
</tr>
<tr>
<td>17 △</td>
<td>1</td>
<td>Spring</td>
</tr>
<tr>
<td>18a+b</td>
<td>1</td>
<td>Set of shims</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
<td>Impeller</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>Washer for impeller screw</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>Impeller screw</td>
</tr>
<tr>
<td>22 △</td>
<td>1</td>
<td>O-ring</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>Casing cover</td>
</tr>
<tr>
<td>24</td>
<td>3</td>
<td>Washer</td>
</tr>
<tr>
<td>25</td>
<td>3</td>
<td>Cap nut</td>
</tr>
<tr>
<td>26</td>
<td>4</td>
<td>Screw</td>
</tr>
<tr>
<td>27</td>
<td>4</td>
<td>Washer</td>
</tr>
<tr>
<td>28a</td>
<td>2</td>
<td>Support bar, right</td>
</tr>
<tr>
<td>28b</td>
<td>2</td>
<td>Support bar, left</td>
</tr>
<tr>
<td>29</td>
<td>4</td>
<td>Screw</td>
</tr>
<tr>
<td>30</td>
<td>4</td>
<td>Adjustable leg</td>
</tr>
<tr>
<td>31</td>
<td>4</td>
<td>Spring washer</td>
</tr>
<tr>
<td>32</td>
<td>4</td>
<td>Nut</td>
</tr>
</tbody>
</table>

△: Service kit - EPDM, NBR, FPM

(See Spare Parts list)
Exploded drawing
The drawing and the parts list include all items of the pump.

The items are identical with the items in the Spare Parts List.
When ordering spare parts, please use the Spare Parts List!

### Parts list
#### MR-300

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty.</th>
<th>Denomination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Motor</td>
</tr>
<tr>
<td>2</td>
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</tr>
<tr>
<td>2a</td>
<td>1</td>
<td>Edge list</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Screw</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>Distance sleeve</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>Screw</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>Spring washer</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Pump casing</td>
</tr>
<tr>
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</tr>
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</tr>
<tr>
<td>13  *</td>
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</tr>
<tr>
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</tr>
<tr>
<td>15  *</td>
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<td>O-ring</td>
</tr>
<tr>
<td>16  *</td>
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<td>Washer</td>
</tr>
<tr>
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<td>Spring</td>
</tr>
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<tr>
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<td>22  *</td>
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<td>2</td>
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<tr>
<td>29</td>
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<td>Screw</td>
</tr>
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<td>Adjustable leg</td>
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<td>31</td>
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<td>Spring washer</td>
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<tr>
<td>32</td>
<td>4</td>
<td>Nut</td>
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\*: Service kit - EPDM, NBR, FPM
(See Spare Parts list)
The drawings show MR-300. The items refer to the parts list on the opposite part of the page.

Drawings

Shaft seal
How to contact Alfa Laval
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