



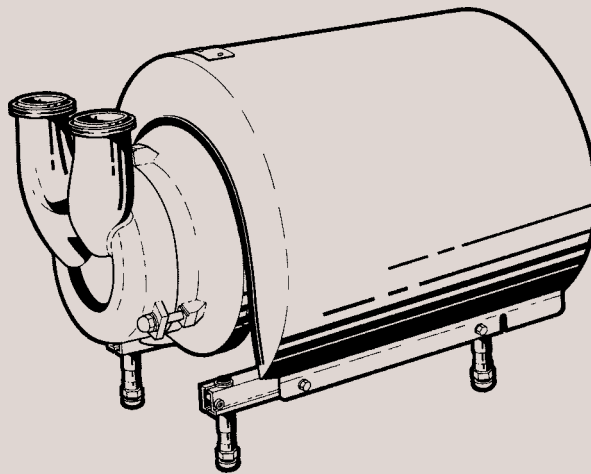
RODEM[®]

PROCESS EQUIPMENT

www.rodem.com 800-543-7312

Instruction Manual

MR-300 Liquid-Ring Pump



IM70719-GB4

2010-02

Original manual

1 EC Declaration of Conformity

The designated company

Alfa Laval

Company Name

Albuen 31, DK-6000 Kolding, Denmark

Address

+45 79 32 22 00

Phone No.

hereby declare that

Pump

Denomination

MR

Type

Year

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



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Safety

Unsafe practices and other important information are emphasized in this manual.

Warnings are emphasized by means of special signs.

1. Important information

Always read the manual before using the pump!

2

- 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.

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

1

NOTE!

We cannot be held responsible for incorrect unpacking.

Check the delivery:

1. Complete pump.
2. Delivery note.
3. Instruction manual.
4. Motor instructions.
5. Test certificate.

3

Inspect the pump for visible transport damages.

5

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

2

Clean the inlet and the outlet for possible packing materials.

4

Avoid damaging the inlet and the outlet.

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.

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.

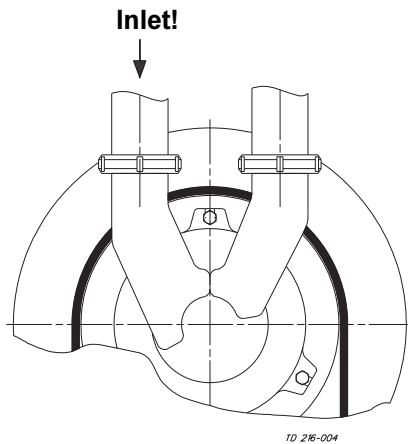


The pump **must** be electrically connected by authorized personnel (see the motor instructions).

NOTE!

We cannot be held responsible for incorrect installation.

3



Ensure that the flow direction is correct.

5

Risk of damage!

Avoid stressing the pump.

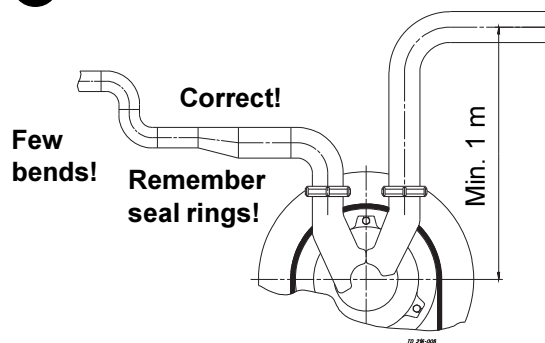
Pay special attention to:

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

2

Ensure at least 0.5m clearance around the pump.

4

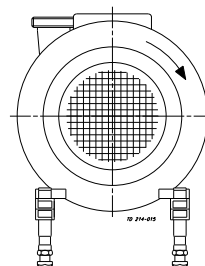


1. Ensure that the pipelines are routed correctly.
2. Ensure that the connections are tight.

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.

Operation


6

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

The pump is fitted with a warning label indicating correct throttling.

1. Operation/Control

1

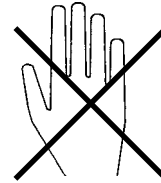
 **Always** observe the technical data (see page 14).

NOTE!

We cannot be held responsible for incorrect operation/control.

2

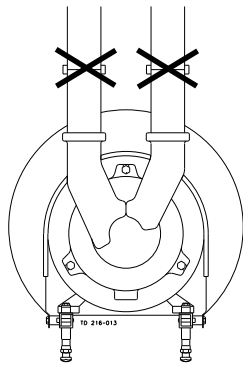
Burning danger!



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

3

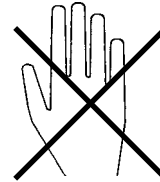
Explosion danger!



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

4

Rotating parts!



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

5

CAUTION!

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

6

Control:

Reduce the capacity by means of:

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

Pay attention to possible faults.

Study the instructions carefully.

2. Fault finding

NOTE!

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

Problem	Cause/result	Repair
Overloaded motor	<ul style="list-style-type: none"> - Pumping of viscous liquids - Pumping of liquids with high density 	<ul style="list-style-type: none"> - 18.5 kW motor if 15 kW is fitted - Increase capacity
Leaking shaft seal	<ul style="list-style-type: none"> - Dry run (See page 6) - Incorrect rubber grade 	<p>Replace: All wearing parts (See page 9)</p> <ul style="list-style-type: none"> - Select a different rubber grade
Leaking seals	Incorrect rubber grade	Select a different rubber grade

Operation

8

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.

HNO₃ = Nitric acid.

3. Recommended cleaning

1

Caustic danger!



Always use
rubber gloves!



Always use
protective goggles!



Always handle lye and acid with great care.

3

Examples of cleaning agents:

Use clean water, free from chlorides.

- 1% by weight NaOH at 70°C.

1 kg NaOH	+	100 l water	= Cleaning agent.
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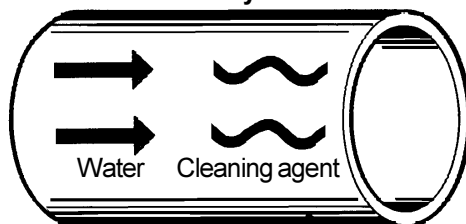
2.2 l 33%NaOH	+	100 l water	= Cleaning agent.
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- 0.5% by weight HNO₃ at 70°C.

0.7 l 53% HNO ₃	+	100 l water	= Cleaning agent.
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5

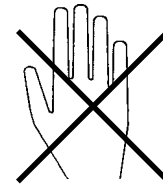
Always!



Always rinse well with clean water after the cleaning.

2

Burning
danger!



Never touch the pump or the pipelines when sterilizing.

4

- Avoid excessive concentration of the cleaning agent

⇒ Dose gradually!

- Adjust the cleaning flow to the process

Milk sterilization/viscous liquids

⇒ Increase the cleaning flow!

6

NOTE!

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

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.

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

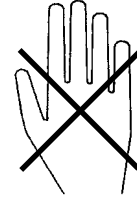
- Contact the Sales Department.
- Order from the Spare Parts List.

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

2

Atmospheric pressure required!

Burning danger!



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

4

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

10

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

See separate motor instructions.
Check the pump for smooth operation after service.

1. General maintenance

	Shaft seal	Rubber seals	Motor bearings
Preventive maintenance	Replace after 12 months: (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"> - Regular inspection for leakage and smooth operation - Keep a record of the pump - Use the statistics for planning of inspections Replace after leakage: Complete shaft seal	Replace when replacing the shaft seal	Yearly inspection is recommended <ul style="list-style-type: none"> - 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

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

Handle scrap correctly.

2. Dismantling of pump/Removing the shaft seal (1-4*)

1 *

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

3 *

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.

5

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

7

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

2 *

1. Remove impeller screw (21), washer (20) and O-ring (22), (counterhold impeller (19), with the tool supplied).
2. Remove the impeller.
NOTE!
Ensure that shims (18) remain in the impeller.

4 *

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

Remove shroud (2).

8

Remove thrower (10) from the motor shaft.

Maintenance

12

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

Handle scrap correctly.

3. Assembly of pump/Fitting of shaft seal (5-8*)

1

2

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).

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

3

4

Fit shroud (2).

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

5



6



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

7



8



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.

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

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

4

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

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

5

6

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.

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.

Technical data

14

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

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.

Size	Tightening torque	
	Nm	lbf-ft
M8	20	14.8
M10	40	29.5
M12	67	49.0
M14	110	81.0

Section 3

Noise

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

Pump Type	Sound pressure level (dBA)
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 LKHP, LKHI, LKH UltraPure, LKHex

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.

Drawing/Parts list

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

16

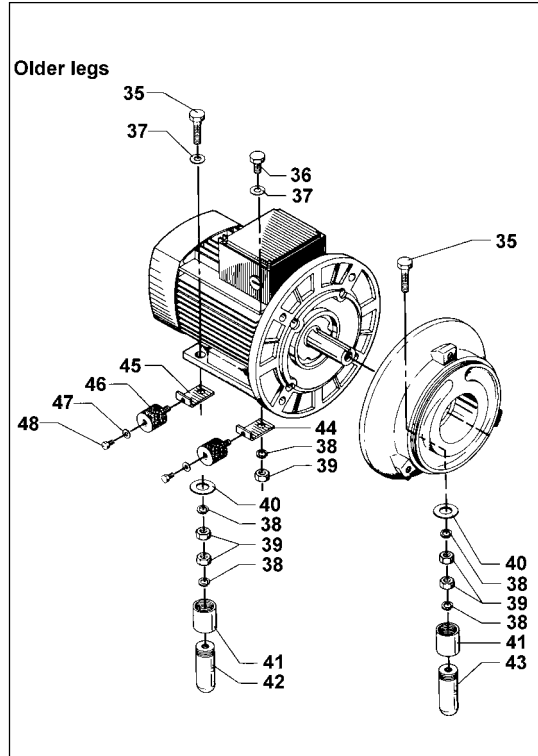
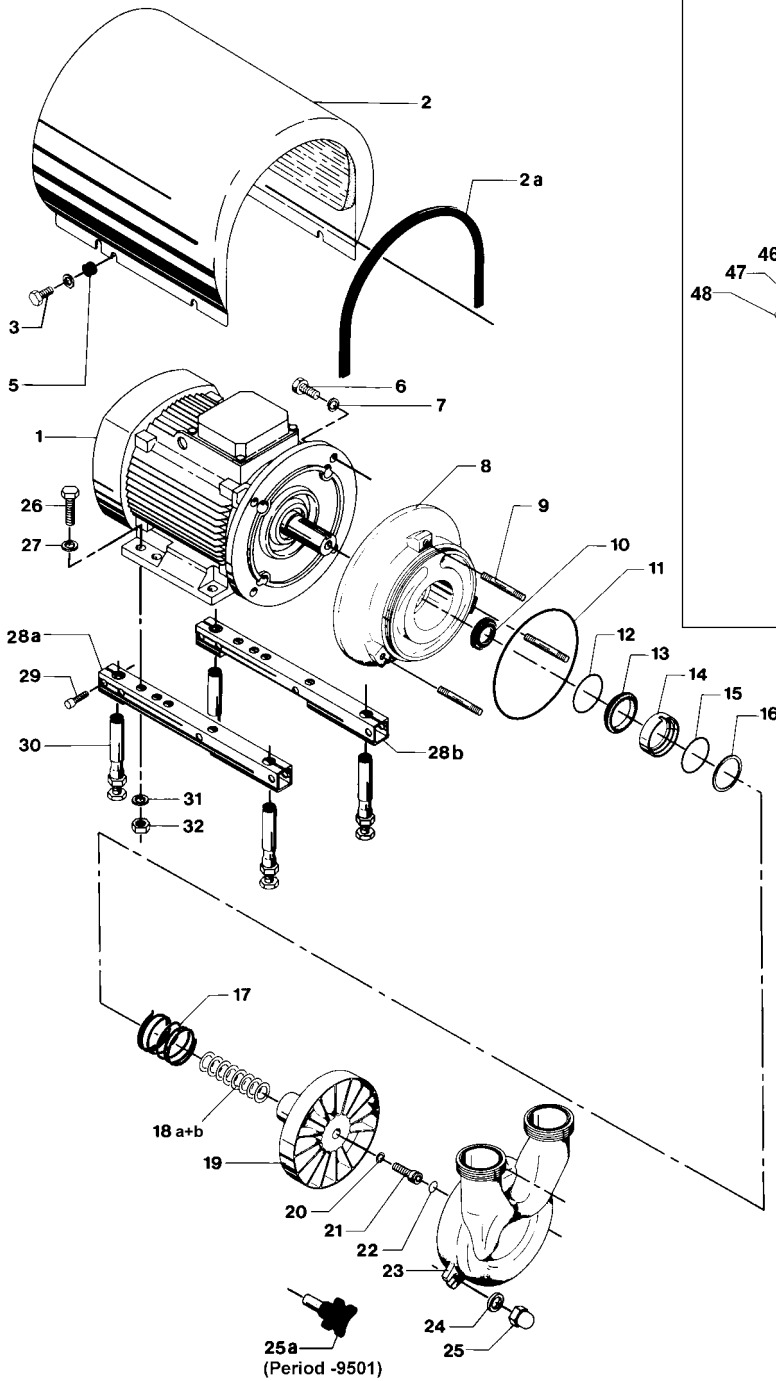
Item	Qty.	Denomination
1	1	Motor
2	1	Shroud
2a	1	Edge list
3	4	Screw
5	4	Distance sleeve
6	4	Screw
7	4	Spring washer
8	1	Pump casing
9	3	Stud bolt
10	1	Thrower
11 Δ	1	O-ring
12 Δ	1	O-ring
13 Δ	1	Stationary seal ring
14 Δ	1	Rotating seal ring
15 Δ	1	O-ring
16 Δ	1	Washer
17 Δ	1	Spring
18a+b	1	Set of shims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

Δ : Service kit - EPDM, NBR, FPM
(See Spare Parts list)

This page shows an exploded drawing of MR-300

The drawing includes all items of the pump.
They are identical with the items in the Spare Parts List.

Exploded drawing



Drawing/Parts list

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Parts list MR-300

18

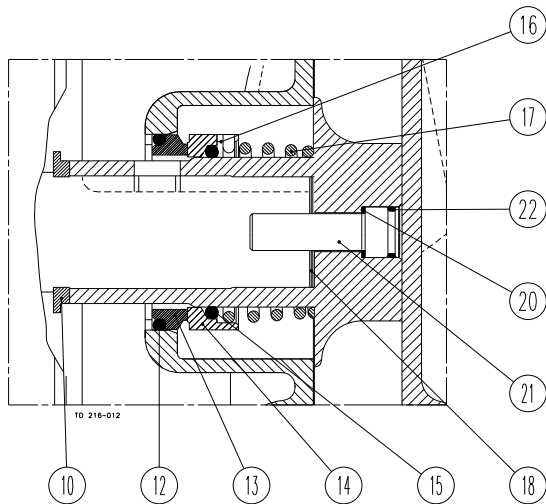
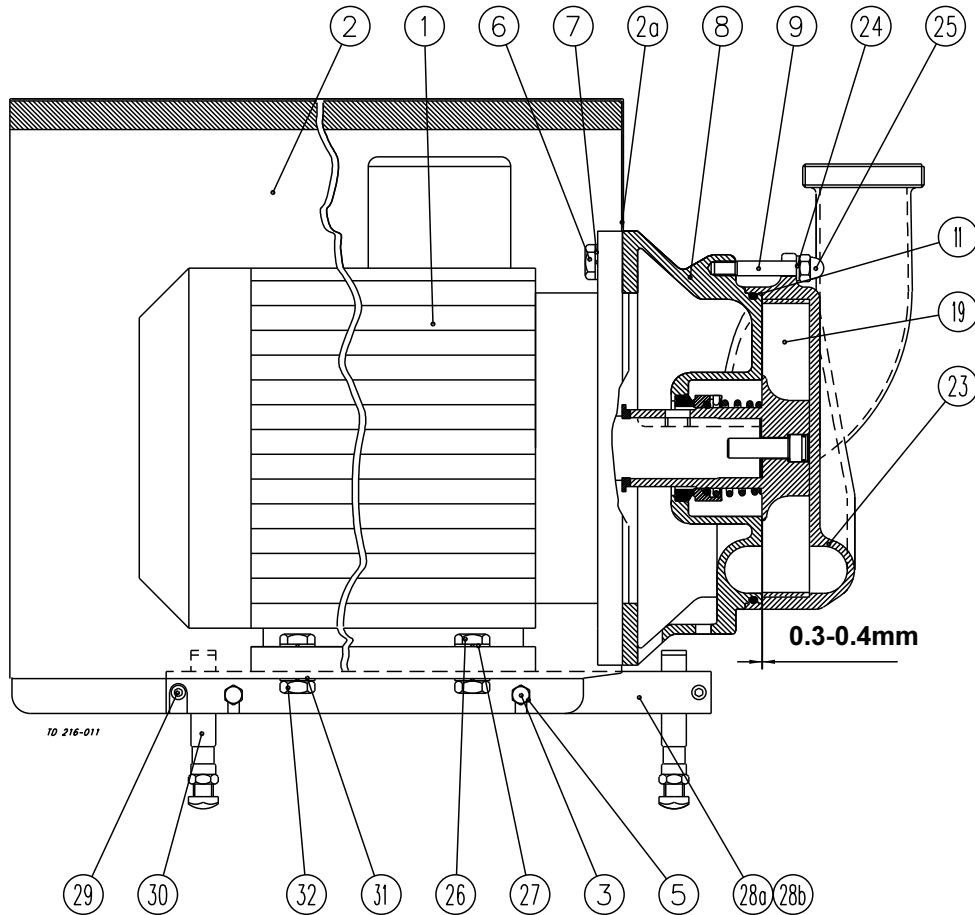
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3	4	Screw
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6	4	Screw
7	4	Spring washer
8	1	Pump casing
9	3	Stud bolt
10	1	Thrower
11 Δ	1	O-ring
12 Δ	1	O-ring
13 Δ	1	Stationary seal ring
14 Δ	1	Rotating seal ring
15 Δ	1	O-ring
16 Δ	1	Washer
17 Δ	1	Spring
18a+b	1	Set of shims
19	1	Impeller
20	1	Washer for impeller screw
21	1	Impeller screw
22 Δ	1	O-ring
23	1	Casing cover
24	3	Washer
25	3	Cap nut
26	4	Screw
27	4	Washer
28a	2	Support bar, right
28b	2	Support bar, left
29	4	Screw
30	4	Adjustable leg
31	4	Spring washer
32	4	Nut

Δ : 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

Contact details for all countries are continually updated on our website. Please visit www.alfalaval.com to access the information direct.