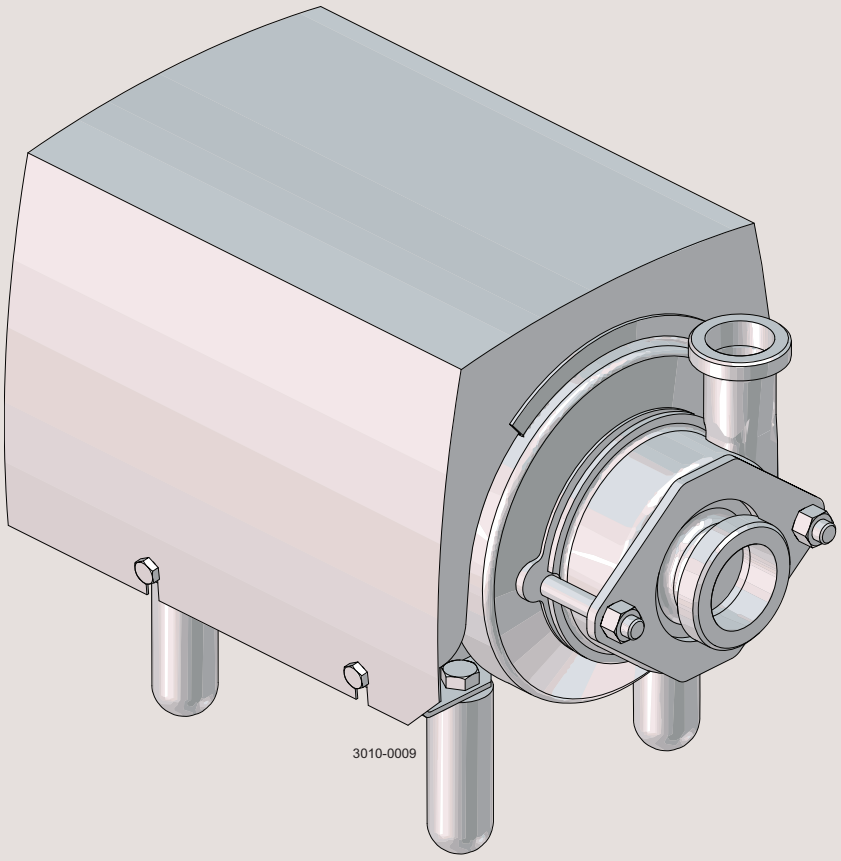
Instruction Manual

FM-OS Centrifugal Pump



ESE02171-EN4 2016-10

Original manual

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

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

FM-OS

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	Lars Kruse Andersen
Title	Name
Kolding	2013-12-03
Place	Date

Signature

Unsafe practices and other important information are emphasised in this manual.
Warnings are emphasised by means of special signs.
Always read the manual before using the pump!

2.1 Important information

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

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

NOTE
Indicates important information to simplify or clarify procedures.

2.2 Warning signs


General warning:


Dangerous electrical voltage:


Caustic agents:

2 Safety

All warnings in this manual are summarised on this page.
Pay special attention to the instructions below so that serious personal injury and/or damage to the pump are avoided.

2.3 Safety precautions

Installation:

Always read the technical data thoroughly. (See chapter 6 Technical data)
Always use a lifting crane when handling the pump.

Pump without impeller screw:
Always remove the impeller before checking the direction of rotation.
Never start the pump if the impeller is fitted and the pump casing is removed.

Pump with Impeller screw:
Never start in the wrong direction of rotation with liquid in the pump.
Always have the pump electrically connected by authorised personnel. (See the motor instruction)

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.
Always use Alfa Laval genuine spare parts.

Motors with grease nipples:
Remember lubrication according to information plate/label on the motor.

Always disconnect the power supply when servicing the pump.

Transportation:
Transportation of the pump or the pump unit:
Never lift or elevate in any way other than 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 original packaging or similar during transportation

3.1 Unpacking/delivery

Step 1
CAUTION
Alfa Laval cannot be held responsible for incorrect unpacking.

Check the delivery for:
1. Complete pump.
2. Delivery note.
3. Instruction manual.
4. Motor instructions.
5. Test certificate, IF ORDERED!

Step 2
Remove any possible packing materials from the inlet and the outlet.
Avoid damaging the inlet and the outlet.
Avoid damaging the connections for flushing liquid, if supplied.

Step 3
Inspect the pump for visible transport damage.

Step 4
Always remove the shroud, if fitted, before lifting the pump.

3 Installation

Study the instructions carefully and pay special attention to the warnings! Always check the pump before operation.
- See pre-use check in section 3.3 Pre-use check.

3.2 Installation

Step 1

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

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

CAUTION
Alfa Laval cannot be held responsible for incorrect installation.

WARNING:
Alfa Laval recommends the installation of 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.

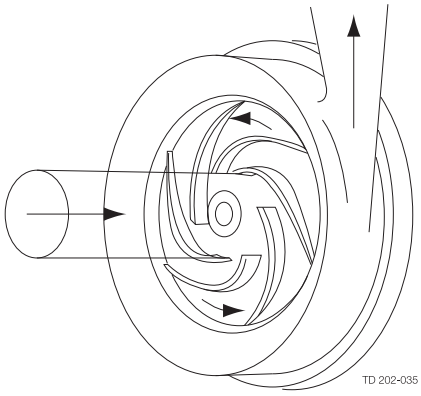
Caution:
The pump does not prevent back flow when intentionally or unintentionally stopped. If back flow can cause any hazardous situations, precautions must be taken e.g. check valve to be installed in the system preventing that described above.

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.

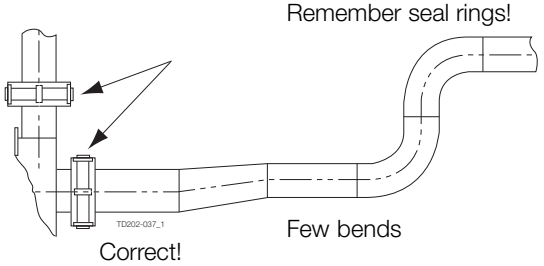
Step 2

Ensure that there is sufficient clearance around the pump.

Step 3
Check that the flow direction is correct.



Step 4
1. Ensure that the pipelines are routed correctly.
2. Ensure that the connections are tight.



Study the instructions carefully and pay special attention to the warnings! Always check the pump before operation.
- See pre-use check in section 3.3 Pre-use check.

Step 5

Risk of damage

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

3 Installation

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

3.3 Pre-use check

Step 1

Always remove the impeller before checking the direction of rotation.

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

Step 2
Dismantle the pump in accordance with instructions in section 5.2 for single shaft seal and 5.3 for flushed shaft seal.

Step 3 See the indication label!
1. Start and stop the motor momentarily.
2. Ensure that the direction of rotation of the stub shaft (7) is anticlockwise as viewed from the inlet side.

Step 4
Assemble the pump in accordance with instructions in section 5.4 for single shaft seal and 5.5 for flushed shaft seal.

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 end of use, the equipment must be recycled according to relevant, local regulations. Beside the equipment itself, any hazardous residues from the process liquid must be taken into consideration 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!

4.1 Operation/control

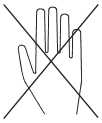
Step 1

Always read the technical data thoroughly. See chapter 6 Technical data

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

Step 2

Danger of burns!



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

Step 3

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

Explosion danger!
=>See the warning label!

Step 4

CAUTION

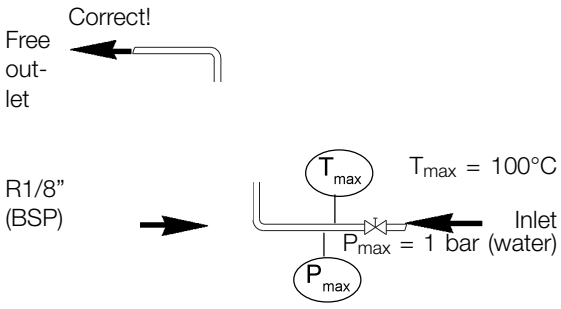
The shaft seal must not run dry.

CAUTION
Never throttle the inlet side.

Step 5

Flushed shaft seal:
1. Connect the inlet of the flushing liquid correctly.
2. Regulate the water supply correctly.
3. Observe the steam data.

O: Free outlet
I: Inlet



Step 6
Control:
Reduce the capacity and the power consumption by means of:

- Throttling the pressure side of the pump.
- Reducing the impeller diameter.
- Reducing the speed of the motor.

Pay attention to possible faults.
Study the instructions carefully.

4.2 Trouble shooting

NOTE!
Study the maintenance instructions carefully before replacing worn parts. - See section 5.1 General maintenance

Problem	Cause/result	Remedy
Overloaded motor	- Pumping of viscous liquids - Pumping of liquids with high density - Low outlet pressure (counter pressure) - Lamination of precipitates from the liquid	- Larger motor or smaller impeller - Higher counter pressure (throttling) - Frequent cleaning
Cavitation: - Damage - Pressure reduction (sometimes to zero) - Increasing of the noise level	- Low inlet pressure - High liquid temperature	- Increase the inlet pressure - Reduce the liquid temperature - Reduce the pressure drop before the pump - Reduce speed
Leaking shaft seal	- Dry run - Incorrect rubber grade - Abrasive particles in the liquid	Replace: All wearing parts If necessary: - Change rubber grade - Select stationary and rotating seal ring in silicon carbide/silicon carbide
Leaking O-ring seals	Incorrect rubber grade	Change 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_3 = Nitric acid.

4.3 Recommended cleaning

Step 1

Always handle lye and acid with great care.

Caustic danger!

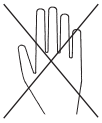
Always use rubber gloves!

Always use protective goggles!

Step 2

Never touch the pump or the pipelines when sterilising.

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.
2.2 l (0.6 gal) 33% NaOH	+	100 l (26.4 gal) water	=	Cleaning agent.

2. 0.5% by weight HNO_3 at 70°C (158°F).

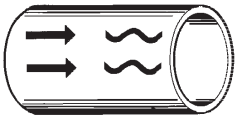
0.7 l (0.2 gal) 53% HNO_3	+	100 l (26.4 gal) water	=	Cleaning agent.

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.

Always rinse!



Clean water Cleaning agent

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

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.
Check the pump for smooth operation after service.

5.1 General maintenance

Step 1

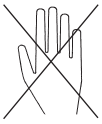
Always read the technical data thoroughly. (See chaper 6 Technical data)

Always disconnect the power supply when servicing the pump.

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

Step 2

Danger of burns!



Never service the pump when it is hot.

Step 3

Atmospheric pressure required!

Never service the pump with pump and pipelines under pressure.

CAUTION
Fit the electrical connections correctly if they have been removed from the motor during service. (see 3.3 Pre-use check)

CAUTION
Pay special attention to the warnings!

Step 4
Recommended spare parts:
Order service kits from the service kits list
See chapter 7 Parts list and service kits

Ordering spare parts
Contact your local Alfa Laval sales company.

Note:
If the pump is supplied with FEP O-rings, Alfa Laval recommends that the casing O-ring is replaced during maintenance of the pump.

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.
Check the pump for smooth operation after service.

	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	- Regular inspection for leakage and smooth operation - Keep a record of the pump - Use the statistics for inspection planning **Replace after leakage:** Complete shaft seal	Replace when replacing the shaft seal	Yearly inspection is recommended - 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	**Before fitting** Lubricate with silicone grease or silicone oil	See section

Pre-use check
CAUTION!
Fit the electrical connections correctly if they have been removed from the motor during service. (See 3.3 Pre-use check).

Pay special attention to warnings!
1. Start and stop the motor momentarily.
2. Ensure that the pump operates smoothly.

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

5.2 Dismantling - single shaft seal

Step 1
Remove nuts (8) and yoke (5).

Step 2
Remove pump casing (7) and O-ring (10) from back plate (9), (use a plastic hammer, if necessary).

Step 3
Turn impeller (6) anticlockwise and remove it from pump shaft (26), (use a plastic hammer, if necessary).

Step 4
1. Remove back plate (9).
2. The shaft seal is now accessible.

Step 5
Turn nut (24) clockwise and remove it from stationary seal ring (23).

Step 6
Remove stationary seal ring (23) and seal (25) from back plate (9).

Step 7
1. Remove rotating seal ring (27) and O-ring (29) from pump shaft (26).
2. Remove spring (22) from the rotating seal ring.

Step 8
1. Remove screws (2) and washers (3).
2. Remove adaptor (4).
3. Remove pin (28) and thrower (21).
4. Remove pump shaft (26) from the motor shaft.

5 Maintenance

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

5.3 Dismantling - flushed shaft seal

Step 1
1. Remove nuts (8) and yoke (5).
2. Remove pump casing (7) and O-ring (10) from back plate (9), (use a plastic hammer, if necessary).
3. Turn impeller (6) anticlockwise and remove it from pump shaft (42), (use a plastic hammer, if necessary).

Step 2
Remove back plate (9) together with the complete shaft seal and intermediate flange (44).

Step 3
1. Remove flushing tubes (45)
2. Turn seal housing (35) clockwise and remove it together with fastening ring (43).
3. Remove O-ring (41) from the fastening ring.

Step 4
Remove stationary seal ring (23) and seal (25) from back plate (9).

Step 5
1. Remove screws (39).
2. Remove fastening ring (43) and O-ring (40) from seal housing (35).
3. The shaft seal is now accessible.

Step 6
Remove rotating seal rings (36), O-rings (29), washers (30), spring (37) and spacer (31) from seal housing (35).

Step 7
Remove stationary seal ring (33) and O-ring (32) from seal housing (35).

Step 8
1. Remove screws (2) and washers (3).
2. Remove adaptor (4).
3. Remove pin (34).
4. Remove pump shaft (42) from the motor shaft.

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 - single shaft seal

Step 1
1. Fit thrower (21) on pump shaft (26).
2. Fit the pump shaft on the motor shaft and lock it with pin (28).
3. Fit adaptor (4), washers (3) and screws (2).
4. Lubricate the external surface of the pump shaft.

Step 2
1. Lubricate O-ring (29).
2. Fit the O-ring on pump shaft (26).

CAUTION
Ensure that the driver on the drive ring enters the notch in the rotating seal ring.

Step 3
1. Lubricate the inner surface of rotating seal ring (27).
2. Fit spring (22) on the rotating seal ring.
3. Push the rotating seal ring over O-ring (29) as far as possible against the shoulder.

Step 4
1. Fit seal ring (25) and stationary seal ring (23) in back plate (9)
2. Fit nut (24), turn it anticlockwise and tighten.

Step 5
Fit back plate (9) together with the stationary shaft seal parts on adaptor (4).

Step 6
1. Fit impeller (6) with the rounded part of the hub outwards and turn it clockwise.
2. Check the clearance between back plate (9) and the impeller (0.8-1 mm).

Step 7
1. Lubricate O-ring (10) and fit it on back plate (9).
2. Fit pump casing (7).

Step 8
Fit yoke (5) and nuts (8).

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 - flushed shaft seal

Step 1
1. Fit pump shaft (42) on the motor shaft and lock it with pin (34).
2. Fit adaptor (4), washers (3) and screws (2).
3. Lubricate the external surface of the pump shaft.

Step 2
1. Fit seal (25) and stationary seal ring (23) on back plate (9)
2. Fit O-ring (41) in fastening ring (43).
3. Fit the fastening ring to the back plate, turn it **anticlockwise** and tighten.

Step 3
1. Push assembly mandrel (46) through the hole in the assembled back plate.
2. Fit rotating seal rings (36), O-rings (29), washers (30), spring (37) and spacer (31).

NOTE! Ensure correct position of the joint if using Teflon O-rings.

Assemble the shaft seal in correct order!

Step 4
1. Fit O-rings (32, 40) and stationary seal ring (33) in seal housing (35).
2. Tighten the seal housing to fastening ring (43) by means of screws (39).
3. Fit intermediate flange (44) on back plate (9).
4. Fit and tighten flushing tubes (45).

Step 5
1. Push mandrel (46) together with the shaft seal parts onto pump shaft (42).
2. Push back plate (9) together with the shaft seal into its correct position.

Step 6
1. Fit impeller (6) with the rounded parts of the hub outwards and turn it clockwise.
2. Check the clearance between back plate (9) and the impeller (0.8-1 mm).

Step 7
1. Lubricate O-ring (10) and fit it on back plate (9).
2. Fit pump casing (7).

Step 8
Fit yoke (5) and nuts (8).

5.6 Assembly - new shaft

Step 1
1. Fit the pump shaft to the motor shaft.
   (Hit a mark in the motor shaft with a chisel before the pump shaft is mounted.
   This way the shaft can be adjusted with a hammer and not move unintentionally)
2. Fit the adaptor part, back plate and impeller.
3. Adjust shaft position so that there is about 1 mm between the impeller and back plate.
4. Remove impeller, back plate and adapter so only the pump shaft is remaining, in the right position.
5. Drill a hole (ø4 +/- 0.2) through both motor shaft and pump shaft with the pump shaft in the right position.
6. The hole must NOT be drilled in the keyway of the motor.
7. Mount ø4x30 pin using a small hammer.

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

6.1 Technical data

Centrifugal pump FM-OS is designed for use in food, pharmaceutical, chemical and other industries where acid-resistant steel is resistant to the products to be pumped. This instruction manual is part of the delivery. Study the instructions carefully. The standard delivery does not include the test certificate. This can be supplied on request.

Data	
Max. inlet pressure	400 kPa (4 bar) (58 psi)
Temperature range	-10°C to +140°C (EPDM) (14 to 284°F)
Impeller diameter, FM-OS/95	95 mm
Impeller diameter, FM-OS/115	115 mm
Max. speed:	4000 rpm
Materials	
Product wetted steel parts	AISI 316L
Other steel parts	Stainless steel
Product wetted seals	Nitrile (NBR), (standard)
Finish	Semi-bright
Alternative seals	EPDM, Viton (FPM) and Teflon (PTFE)
Shaft seal	
Seal types	Mechanical single or flushed seal
Max. water pressure (flushed seal)	Normally atmospheric (max. 1 bar) (max. 14.5 psi)
Water consumption (flushed seal)	0.25 - 0.5 l/min. (0.07-0.13 gl)
Material, stationary seal ring	AISI 329 with sealing surface of silicon carbide
Material, rotating seal ring	Carbon (standard) or silicon carbide
Material, O-rings	Nitrile (NBR), (standard)
Alternative material, O-rings	EPDM, Viton (FPM) and Teflon (PTFE)
Motor	
Standard foot-flanged motor according to IEC metric standard 2 pol = 3000/3600 rpm. at 50/60 Hz IP55 (with drain holes sealed with labyrinth plug), insulation class F	
Motor sizes (kW), 50 Hz	1.1 kW
Motor sizes (kW), 60 Hz	1.3 kW

For further information - see PD sheet.

Transportation of the pump or the pump unit:

- Never lift or elevate the pump 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 original packaging or similar during transportation

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 following 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

6.3 Weight (kg)

Pump Type: FM-OS

Size	Motor 80 1,1kW
FM-OS	34

Weight can vary depending of configuration. Weihgt 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, LKHex.
The above SolidC noise levels are the same for SolidC UltraPure.

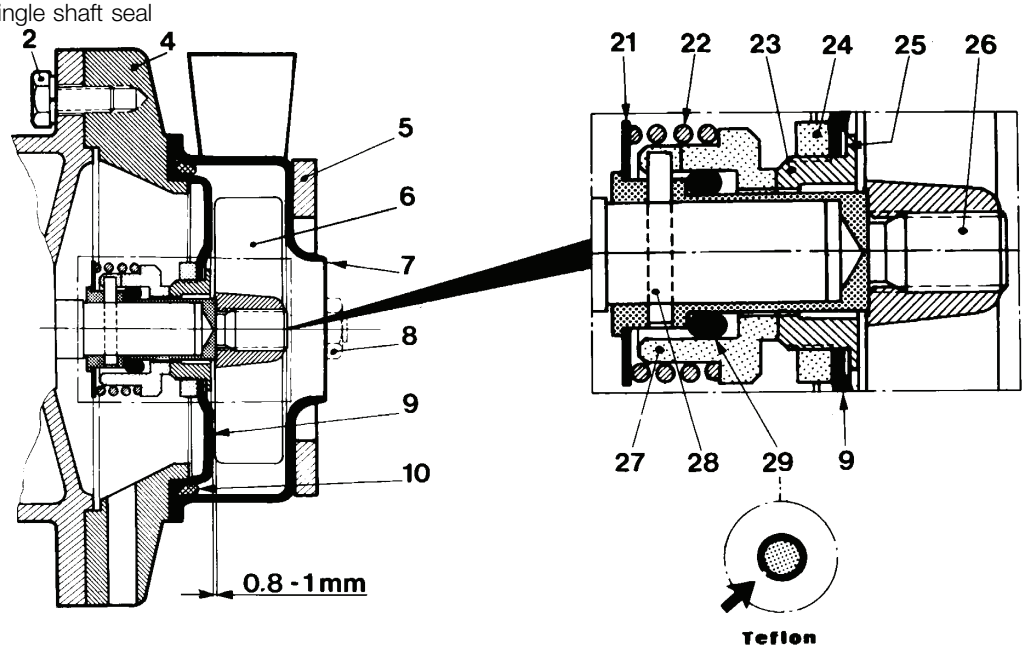
The noise measurements have been carried out using the original motor and shroud at the approximate Best Efficiency Point (BEP) with water at ambient temperature and at 50 Hz.

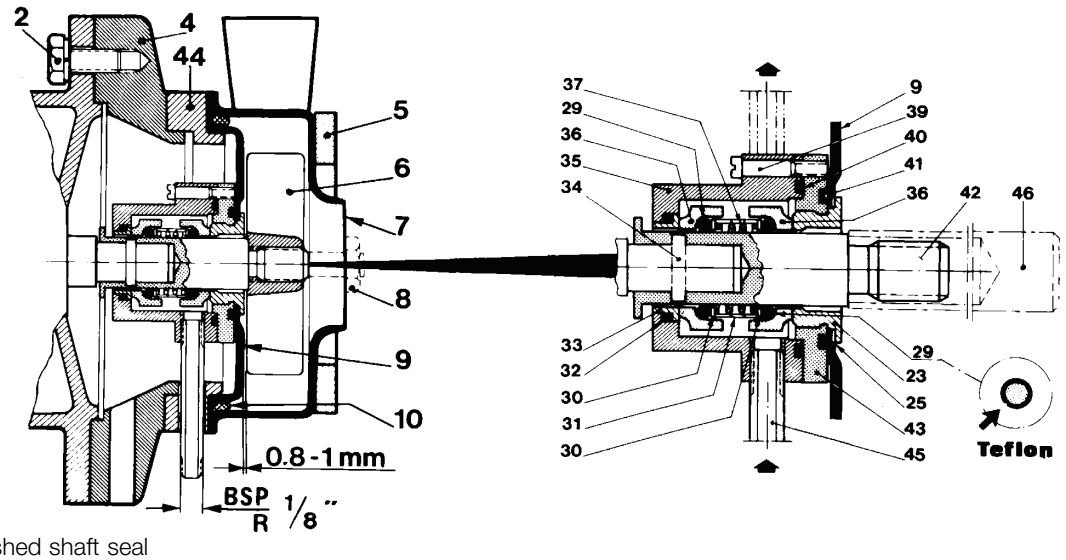
Very often the noise level generated by the flow through the process system (e.g. valves, pipes, tanks etc.) is much higher than that generated by the pump itself. Therefore, it is important to consider the noise level from the total system and take the necessary precautions with regard to personal safety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

The drawing shows FM-OS. The items refer to the parts list on the part on the page.

7.1 Drawings

FM-OS, Single shaft seal



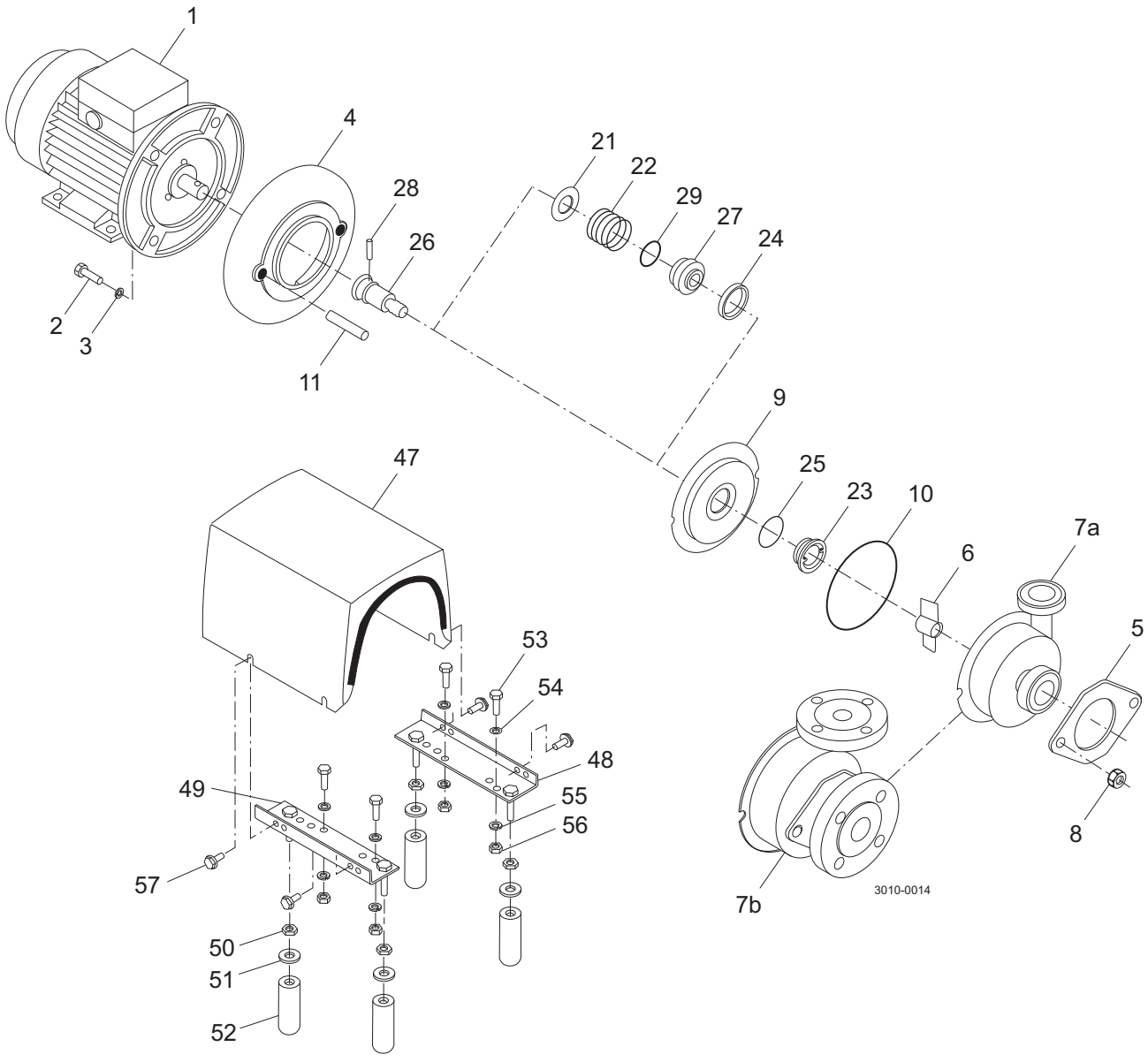


FM-OS, Flushed shaft seal

7 Parts list and service kits

The drawing includes all items of the pump.

7.2 FM-OS Centrifugal pump, single shaft seal



The drawing includes all items of the pump.

Parts list

Pos.	Qty	Denomination
1	1	Motor IEC80
2	4	Screw
3	4	Spring washer
4	1	Adaptor
5	1	Yoke
6	1	Impeller
7a	1	Pump casing with sanitary fittings 51 mm inlet and outlet
	1	ISO male
	1	SMS
	1	DIN
	1	ISO clamp
	1	BS
	1	Pump casing flanges DN 50 inlet and outlet
7b	1	Pump casing flanges DN 50 inlet and DN 40 outlet
8	2	Nut
9	1	Back plate
10	1	O-ring
11	2	Stud bolt
21	1	Thrower
22	1	Spring
23	1	Stationary seal ring, SiC
24	1	Nut
25	1	Seal
26	1	Pump shaft
27	1	Rotating seal ring, carbon
	1	Rotating seal ring, SiC
28	1	Tubular spring pin
29	1	O-ring
47	1	Shroud complete
48	1	Support bar, left
49	1	Support bar, right
50	4	Nut
51	4	Washer
52	4	Leg
53	4	Screw
54	4	Washer
55	4	Washer
56	4	Nut
57	4	Screw

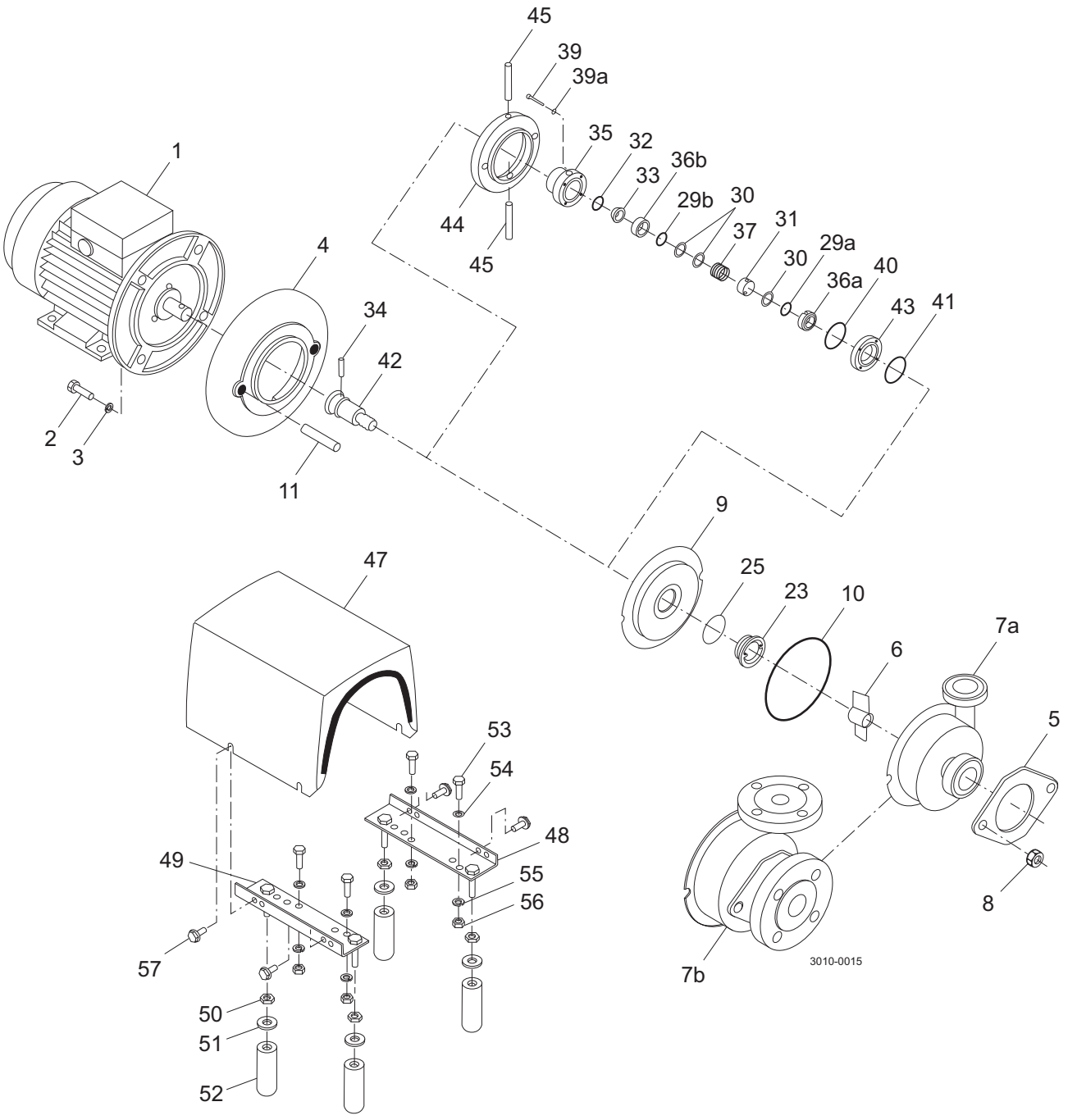
Service kits

Denomination	FM-0S/95 FM-0S/115
Service kit	
Service kit, NBR	9611921050
Service kit, EPDM	9611921051
Service kit, FPM	9611921052
Service kit, PTFE	9611921053

7 Parts list and service kits

The drawing includes all items of the pump.

7.3 FM-OS Centrifugal pump, flushed shaft seal



The drawing includes all items of the pump.

Parts list

Pos.	Qty	Denomination
1	1	Motor IEC
2	4	Screw
3	4	Spring washer
4	1	Adaptor
5	1	Yoke
6	1	Impeller
7a	1	Pump casing with sanitary fittings
	1	ISO male
	1	SMS
	1	DIN
	1	ISO clamp
	1	BS
	1	Pump casing flanges DN 50
7b	1	Pump casing flanges
8	2	Nut
9	1	Back plate
10	1	O-ring
11	2	Stud bolt
23	1	Stationary seal ring, SiC
25	1	Seal
29a	1	O-ring, front
29b	1	O-ring, back
30	3	Washer
31	1	Spacer
32	1	O-ring
33	1	Stationary seal ring
34	1	Tubular spring pin
35	1	Seal housing
36a+b	2	Rotating seal ring, carbon
37	1	Spring
39	4	Screw
39a	4	Washer
40	1	O-ring
41	1	O-ring
42	1	Pump shaft
43	1	Fastening ring
44	1	Intermediate flange
45	2	Flushing tube
46	1	Assembly mandrel (not shown)
47	1	Shroud complete
48	1	Support bar, left
49	1	Support bar, right
50	4	Nut
51	4	Washer
52	4	Leg
53	4	Screw
54	4	Washer
55	4	Washer
56	4	Nut
57	4	Screw

Service kits

Denomination	FM-0S/95 FM-0S/115
Service kit	
Service kit, NBR	9611921054
Service kit, EPDM	9611921055
Service kit, FPM	9611921056
Service kit, PTFE	9611921057

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 directly.