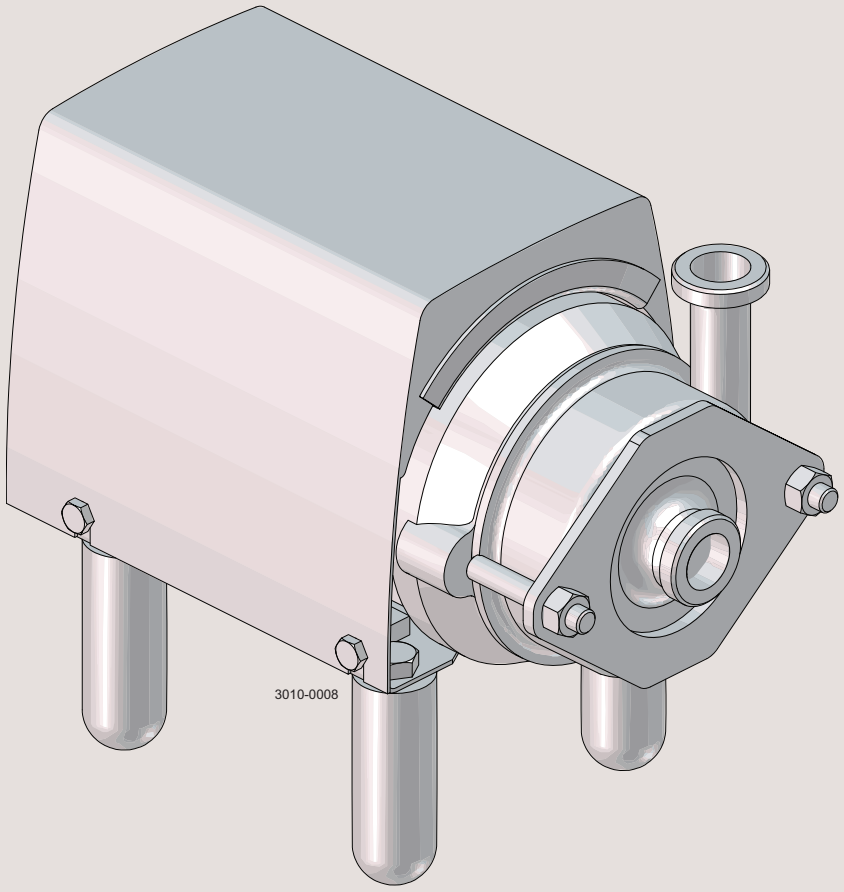
Instruction Manual

GM Centrifugal Pump



ESE02002-EN4 2017-06

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

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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

GM, GM-A

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 the manual are summarised on this page.
Pay special attention to the instructions below so that severe 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)

GM-A:
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.

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

Maintenance:

Always read the technical data 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.

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 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 the 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. Motor instructions.
4. Test certificate, IF ORDERED!

Step 2
Remove any 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 damages.

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 - GM-A.

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.

CAUTION
Alfa Laval cannot be held responsible for incorrect installation.

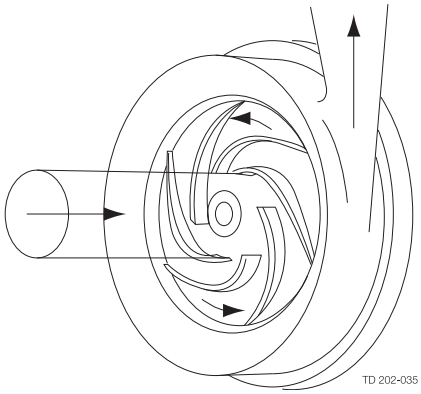
WARNING:
Alfa Laval recommend the installation of a lockable repair breaker. If the repair breaker is to be used as an emergency stop, the colours of the repair breaker must be red and yellow.

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 to prevent that described above.

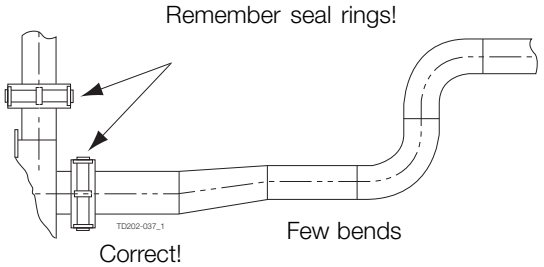
Note
In case of shaft seal leakage, the media will drip from the slot in the bottom of the adaptor. In case of shaft seal leakage, Alfa Laval recommend placing a drip tray underneath the slot for collecting the leakage.

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 - GM-A.

Step 5
Avoid stressing 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!
GM: Impeller and collets of glassfibre reinforced plastic. GM-A: Impeller and yoke of stainless steel.
Check the direction of rotation of pump shaft/motor fan before operation. - See the indication label on the pump.

3.3 Pre-use check - GM-A

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 the instructions in section 5.2.

Step 3
GM-A
1. Start and stop the motor momentarily.
2. Ensure that the direction of rotation of the motor fan is **clockwise** as viewed from the back of the motor.

Step 4
Assemble the pump in accordance with the instructions in section 5.3.

Pre-use check GM

See the indication label

1. Start and stop the motor momentarily.
2. Ensure that the direction of rotation of the motor fan 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 disposed 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 your local Alfa Laval sales company.

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

4.1 Operation/control

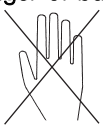
Step 1

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

Explosion danger!
=>See the warning label!

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

Step 4

CAUTION
The shaft seal must not run dry.

CAUTION
Never throttle the inlet side.

Step 5
Control:
Reduce the capacity and the power consumption by means of:

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

4 Operation

Pay attention to possible faults.
Study the instructions carefully.

4.2 Trouble shooting

NOTE!
Study the maintenance instructions carefully before replacing worn parts.

Problem	Cause/result	Remedy
Overloaded motor	- Pumping of viscous liquids - Pumping of high-density liquids - Low outlet pressure (counter pressure)	- Smaller impeller - Higher counter pressure (throttling)
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
Leaking shaft seal	- Dry run	Replace: All wearing parts
	- Incorrect rubber grade	If necessary: - Change rubber grade
	- Abrasive particles in the liquid	- Select stationary and rotating seal ring in Silicon Carbide/Silicon Carbide
Leaking O-ring seals	Incorrect rubber grade	Change rubber grade

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.

Danger, caustic

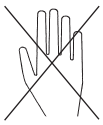
Always wear rubber gloves!

Always wear 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).

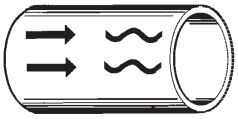
0.7 l (0.2 gal) 53% HNO_3	+	100 l (26.4 gal) water	= Cleaning agent.

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 chapter 6 Technical data)

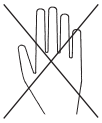
Always disconnect the power supply when servicing the pump.

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

Step 2

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

Danger of burns!



Step 3

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

Step 4

CAUTION

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

CAUTION
Pay special attention to the warnings!

Step 5
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 recommend the casing O-ring is replaced when the pump is maintained.

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 planning of inspections **Replace after leakage:** Complete shaft seal	Replace when replacing the shaft seal	Yearly inspection is recommended - Replace complete bearing if worn
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

5 Maintenance

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

5.2 Dismantling of pump/shaft seals

Step 1 *

1. Remove cap nuts (13).
2. Remove collets (14a) (GM only) or yoke (14b) (GM-A only).
3. Remove pump casing (11) and O-ring (10) (use a plastic hammer if necessary).

Step 2 *

1. Remove impeller (9) by pulling it off the pump shaft (7) (GM only).
2. Turn impeller (9) anticlockwise and remove it from the pump shaft (only GM-A). Use a plastic hammer if necessary.

Step 3 *

1. Remove back plate (8).
2. The shaft seal is now accessible.

Step 4 *

1. Turn nut (22) clockwise and remove it from stationary seal ring (23).
2. Remove stationary seal ring (23) and seal (26) from back plate (8).
3. Remove the rest of the shaft seal from pump shaft (7).

Step 5

If fitted, remove the shroud.

Step 6

1. Remove nuts (2).
2. Remove adaptor (4) from the motor.
3. Remove thrower (5) from pump shaft (7).
4. Knock out pin (6).
5. Pull off pump shaft (7).

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

5.3 Assembly of pump/shaft seal

Step 1
1. Fit pump shaft (7) on the motor shaft.
2. Lock the pump shaft with pin (6).
3. Fit adaptor (4) on the motor.
4. Fit and tighten nuts (2).

NOTE! Ensure that the adaptor drain hole is turned downwards.

Step 2
If supplied, fit the shroud.

Step 3
1. Fit thrower (5) on pump shaft (7).
2. Lubricate the external surface of the pump shaft.
3. Fit spring (19), spacer (20) and washer (21) on pump shaft (7).
4. Fit O-ring (24) on pump shaft (7).

NOTE! Ensure correct position of the joint when Teflon O-rings are used.

Step 4
Push seal ring (25) as far as possible over O-ring (24).
NOTE! Push and pull until the O-ring is correctly positioned.
1. Fit seal (26) and stationary seal ring (23) in back plate (8).
2. Fit nut (22), turn it anticlockwise and tighten.
3. Fit the back plate on adaptor (4).

Step 5
1. Push impeller (9) on pump shaft (7) (GM only).
2. Fit impeller (9) on pump shaft (7), turn it clockwise and tighten (GM-A only).

Step 6
1. Fit O-ring (10) and pump casing (11) on back plate (8).
2. Fit collets (14a) (GM only) or yoke (14 b) (GM-A only).
3. Fit and tighten cap nuts (13).

5.4 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.

6 Technical data

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

6.1 Technical data

The GM centrifugal pump is specially designed for food, chemical, pharmaceutical and other industries where acid-resistant steel is resistant to the product to be pumped. The instruction manual is part of the delivery. Study the instructions carefully. GM: Impeller and collets of glassfibre reinforced plastic. GM-A: Impeller and yoke of stainless steel. 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	GM	-10°C to +80°C	
	GM-A	-10°C to +140°C (EPDM)	
Impeller diameter	GM-1/1A	95 mm	
	GM-2/2A	115 mm	
Max. speed:		4000 rpm	

Materials	
Product wetted steel parts	AISI 316L
Other steel parts	Stainless steel
Impeller, GM	Glassfibre reinforced Nylon (std.) or Polypropylene
Impeller, GM-A	AISI 316L
Adapter, GM	Plastic (POM)
Adapter, GM-A	AISI 304
Collets, GM	Glassfibre reinforced Noryl
Product wetted seals	Nitrile (standard)
Alternative seals	EPDM, Viton (FPM) and Teflon (PTFE)
Finish	Semi-bright

Shaft seal	
Seal types	Mechanical single seal
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 (standard)
Alternative material, O-rings	EPDM, Viton (FPM) and Teflon (PTFE)

Motor	
Foot-flanged motor acc. to IEC metric standard, 2 poles = 3000/3600 rpm. at 50/60 Hz IP55 (drain hole with labyrinth plug), insulation class F	
Motor sizes (kW), 50 Hz	0.55
Motor sizes (kW), 60 Hz	0.65

For further information, see PD sheet.

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

6.2 Torque specifications

The table below 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

6.3 Weight (kg)

Pump Type: GM, GM-A

Size	Motor 70 0.55kW
GM-1	15
GM-1A	17
GM-2	15
GM-2A	17

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

6 Technical data

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

6.4 Noise emission

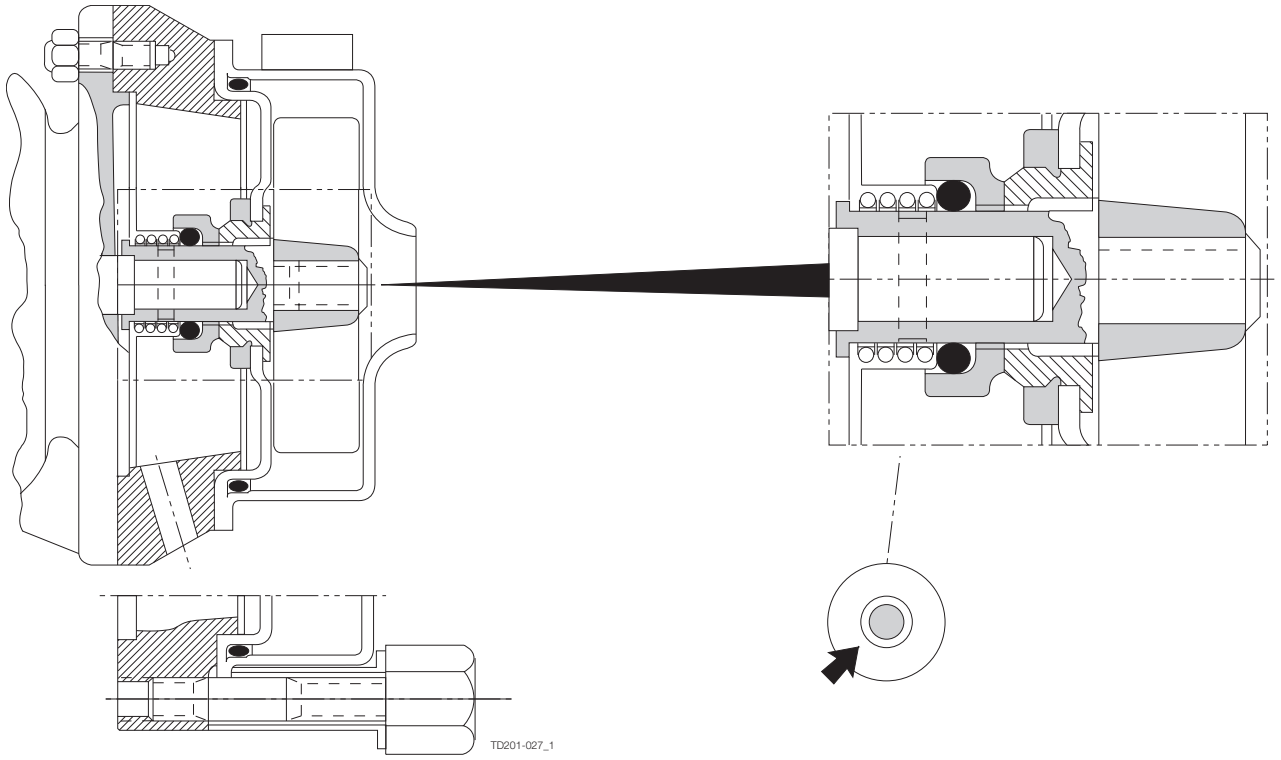
Pump Type	Sound pressure level (dBA)
LKH-5	60
LKH-10	69
LKH-15	72
LKH-20	70
LKH-25	74
LKH-35	71
LKH-40	75
LKH-45	70
LKH-50	75
LKH-60	77
LKH-70	88
LKH-75	79
LKH-85	86
LKH-90	75
LKH-112	70
LKH-113	69
LKH-114	68
LKH-122	75
LKH-123	77
LKH-124	80
SolidC-1	68
SolidC-2	72
SolidC-3	73
SolidC-4	72
MR-166	76
MR-185	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 and LKHex
The above SolidC noise levels are the same for SolidC UltraPure.

The noise measurements have been carried out with the original motor and shroud, approximately at the Best Efficiency Point (BEP) with water at ambient temperature and at 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 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 shows GM/GM-A pump, sanitary version.
The items refer to the parts lists in the following sections

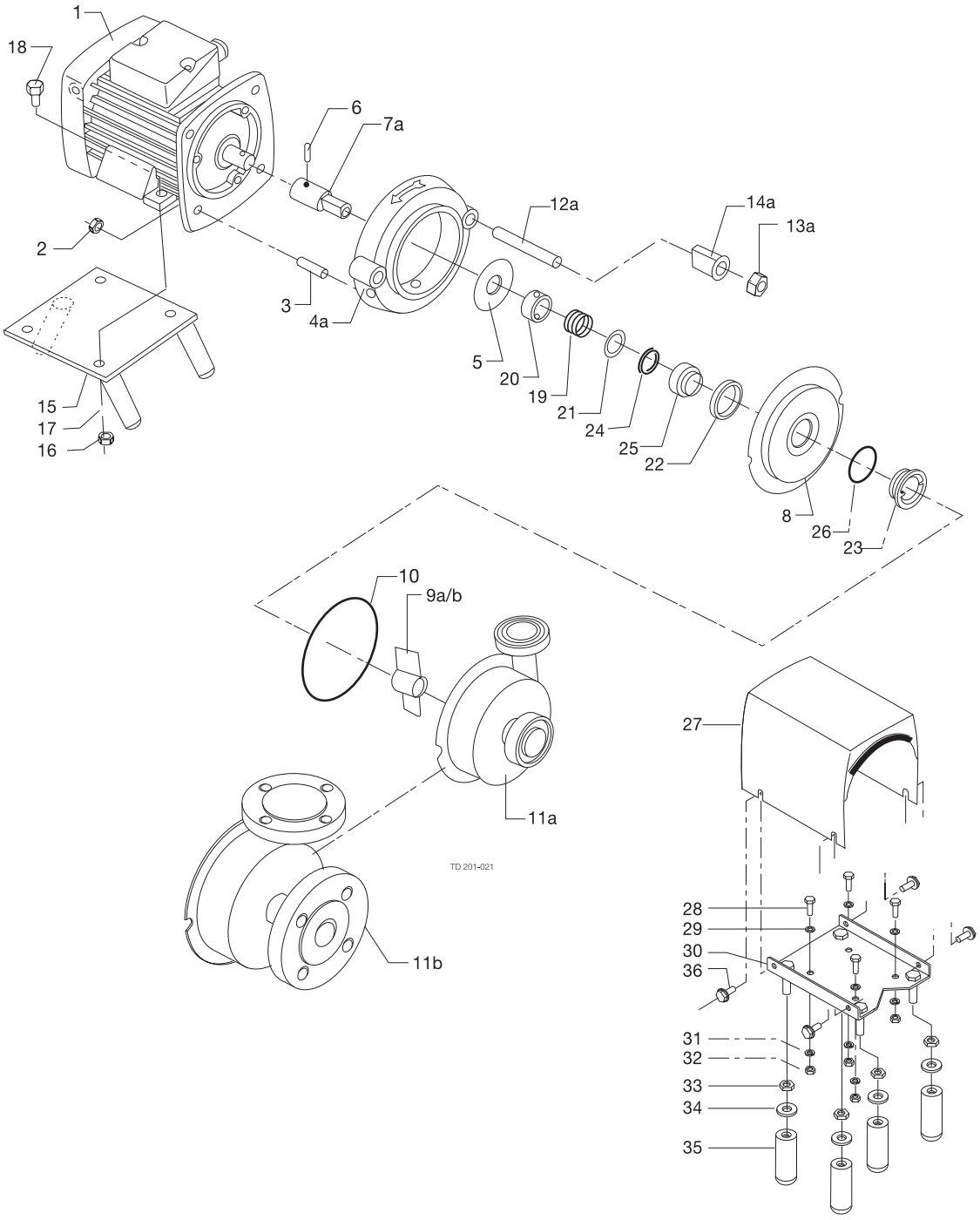
7.1 GM/GM-A



7 Parts list and service kits

The drawing shows GM pump, sanitary version.
The items refer to the parts lists in the following sections

7.2 GM Centrifugal Pump



7 Parts list and service kits

The drawing shows GM pump, sanitary version.
The items refer to the parts lists in the following sections

Parts list

Pos.	Qty	Denomination
1	1	Motor 0.55 kW 220-240/380-420 V (Standard)
2	4	Nut
	4	Nut
3	4	Stud bolt
	4	Stud bolt
4a	1	Adaptor
	1	Adaptor
5	1	Thrower
6	1	Tubular spring pin
7a	1	Pump shaft
8	1	Black plate
9a	1	Impeller GM-1, ø95 mm
9b	1	Impeller GM-2, ø115 mm
10	1	O-ring
11a	1	ISO male
	1	SMS
	1	DIN
	1	ISO clamp
	1	BS
11b	1	Pump casing with flanges DN 32 inlet/DN 25 outlet
12a	2	Stud bolt
13a	2	Cap nut
14a	2	Collet
15	1	Legs, complete (not standard.)
16	4	Nut
17	4	Washer
18	4	Screw
19	1	Spring
20	1	Spacer
21	1	Washer
22	1	Nut
23	1	Stationary seal ring SiC.
24	1	O-ring
25	1	Rotating seal ring
26	1	Seal
27	1	Shroud complete
28	4	Screw
29	4	Washer
30	1	Mounting frame complete
31	4	Washer
32	4	Nut
33	4	Nut
34	4	Washer
35	4	Legs
36	4	Screw

Recommended spare parts: service kits.

(900451/5)

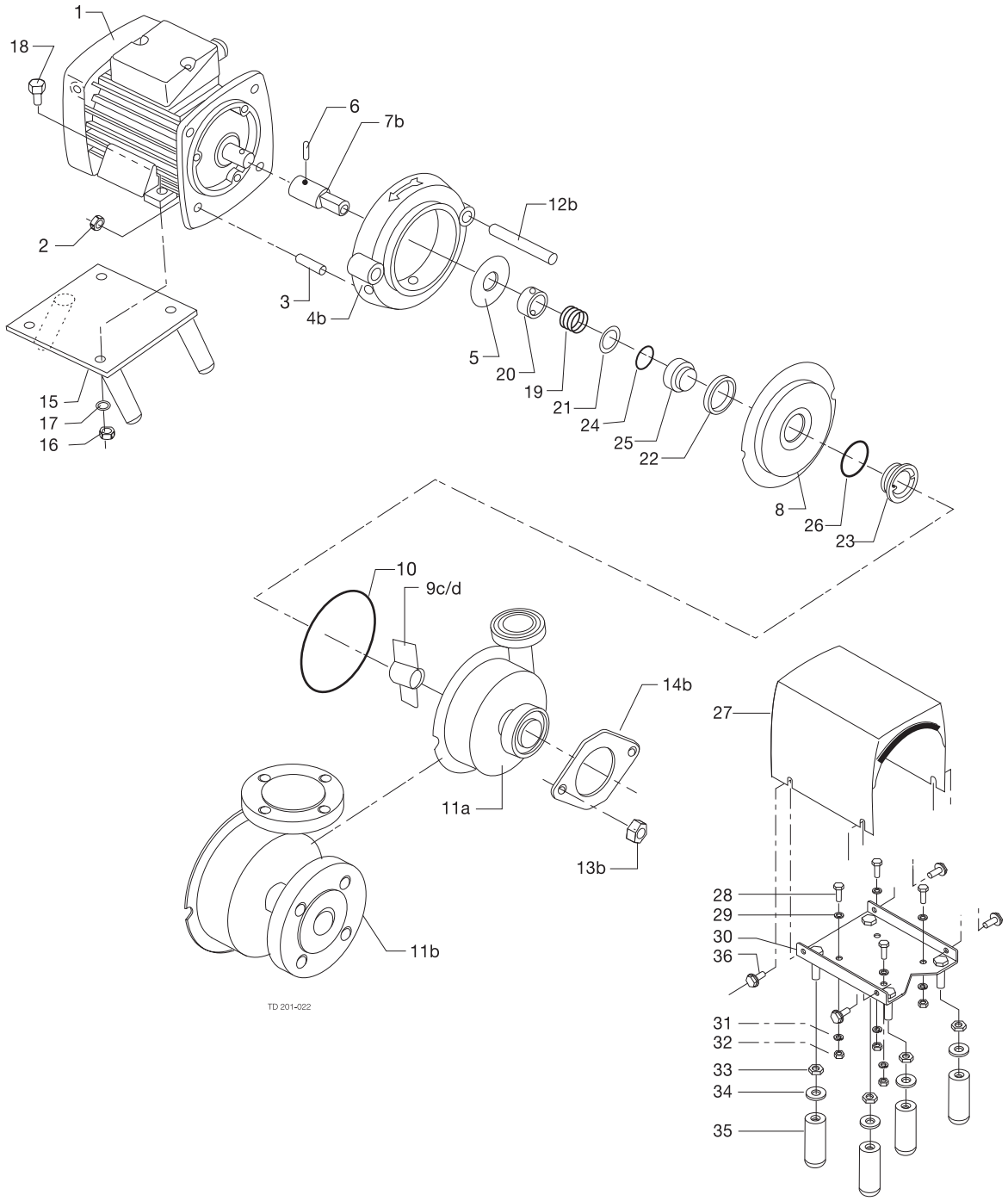
Service kits

Denomination	GM-1 & 2
Service kit	
Service kit, NBR	9611921046
Service kit, EPDM	9611921047
Service kit, FPM	9611921048
Service kit, PTFE	9611921049

7 Parts list and service kits

The drawing shows GM-A pump, sanitary version.
The items refer to the parts lists in the following sections

7.3 GM-A Centrifugal Pump



The drawing shows GM-A pump, sanitary version.
The items refer to the parts lists in the following sections

Parts list

Pos.	Qty	Denomination
1	1	Motor IEC71
2	4	Nut
3	4	Stud bolt
4b	1	Adaptor
5	1	Thrower
6	1	Tubular spring pin
7b	1	Pump shaft
8	1	Back plate
9c	1	Impeller GM-1A, ø95 mm
9d	1	Impeller GM-2A, ø115 mm
10	1	O-ring
11a	1	ISO male
	1	SMS
	1	DIN
	1	ISO clamp
	1	BS
11b	1	Pump casing with flanges DN 32 inlet/DN 25 outlet
12b	2	Stud bolt
13b	2	Cap nut
14b	1	Yoke
15	1	Legs, complete (Not standard)
16	4	Nut
17	4	Washer
18	4	Screw
19	1	Spring
20	1	Spacer
21	1	Washer
22	1	Nut
23	1	Stationary seal ring SiC.
24	1	O-ring
25	1	Rotating seal ring
26	1	Seal
27	1	Shroud complete
28	4	Screw
29	4	Washer
30	1	Mounting frame complete
31	4	Washer
32	4	Nut
33	4	Nut
34	4	Washer
35	4	Legs
36	4	Screw

Recommended spare parts: service kit.

(900155/3)

Service kits

Denomination	GM-1A & 2A
Service kit	
Service kit, NBR	9611921046
Service kit, EPDM	9611921047
Service kit, FPM	9611921048
Service kit, PTFE	9611921049

How to contact Alfa Laval
Contact details for all countries are
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