



Instruction Manual

Alfa Laval LeviMag[®] – Alfa Laval LeviMag[®] UltraPure



100001148-EN3 2020-07

Original manual

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

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1 EC/EU Declaration of Conformity

Revision of Declaration of Conformity: 2019-01-01

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

LeviMag®
LeviMag UltraPure®

Designation



II -/2G
Ex h IIC T4-/Gb

ATEX marking options

10.000 - 100.000

Serial no(s)

[1] WP size =	50, 81
[2] Impeller size =	100, 150, 200, 250, 300
[3] Material =	316L
[4] Qdoc =	S (surface roughness), W (weld log), SW
[5] Motor =	IE4, PREM, N56C, IECB5, ATEX, ExUS
[6] Motor surface =	Blue, Cl. room (clean room)
[7] Angle =	0-22°, 23°-45°
[8] Console height =	S (standard), E (extended)

WP[1]-[2]-[3] - Qdoc [4]-[5]-[6][7]-[8]

Type

Type variation

is in conformity with Machinery Directive 2006/42/EC and the following harmonized standard is used:
DS/EN ISO 12100:2011 Safety of Machinery - Risk Assessment

is in conformity with (Ex/ATEX) Directive 2014/34/EU

The following harmonised standards and regulations have been applied for non-electrical equipment for ATEX:

- EN ISO 80079-36: 2016 Basic method and requirements

- EN ISO 80079-37: 2016 Protection by constructional safety 'c' and control of ignition source 'b'

The technical files for the mixer are stored at: Teknologisk Institut, Kongvang Allé 29, 8000 Århus C, Denmark.
Certification body no.: 0396. Archive no.: 2020-1-0338A.

The person authorised to compile the technical file is the signer of this document.

Global Product Quality Manager
Hygienic Fluid Handling

Title

Lars Kruse Andersen

Name

Kolding

Place

2020-02-01

Date (YYYY-MM-DD)

Signature



2 Safety and information

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 mixer!

This instruction manual is the primary document for safety, installation, operation and maintenance of the Alfa Laval LeviMag®. This document does not contain the welding guide for the weld plate. For this information read the "Welding guidelines for Alfa Laval LeviMag®".

2.1 Important information

The following safety terminology is used to indicate the hazard level:

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 mixer.

NOTE

Indicates important information to simplify or clarify procedures.

2.2 Warning signs

The following safety symbols are used to indicate the hazards level:

General warning:



Dangerous electrical voltage:



Caustic agent:



Strong magnetic fields hazard:



Hazard for wearers of electrically controlled medical devices:

(e.g. cardiac pacemaker)



Explosive atmosphere, ATEX:



2 Safety and information

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 mixer are avoided.

2.3 Safety precautions

Installation:

Always follow this manual thoroughly.

Never expose the mixer to undue vibrations or shocks.

Never start the mixer in the wrong rotation direction - see section 3.6 Directions of rotation verification.

Ensure that the tank media is not corrosive to the mixer.

Only install the mixer in environments within temperature limit: -20°C and +40°C.

Only install the mixer in altitudes less than 1000 m above sea level.



Always have the mixer electrically connected by authorized personnel.

Always ensure that the mixer has sufficient cooling around the flange, may not be wrapped with isolating materials.



Ensure that installation is in accordance with EN 60079-14.

Beware of ignition temperature can be decreased when enclosed by the equipment/tank (see EN 14522).

Always keep electrically controlled medical devices away from mixing unit.

(e.g. cardiac pacemaker)




Operation:

Always read this manual thoroughly.

Ensure that gear motor oil does not reach temperatures higher than 105 °C during operation, CIP or SIP.

Always make sure that the mixer corresponds to the category marked on the name plate:

Gas atmosphere:  II -/2G
Ex h IIC T4 -/Gb



Always ensure the mixer is submerged when operating in ATEX - see chapter 7 ATEX specific conditions for safe use.



Never use the mixer for hybrid mixture and dust environment.

Beware of temperature limitations.

Never touch the moving parts while the mixer is connected to the power supply.

Beware of static electricity risk when the media conductivity is below 1000 pS/m. See CLC/TR 50404 or IEC/TS 60079-32.



Always handle CIP and SIP lye and acids with great care.



Always handle hot gear motor with care – use gloves to protect hands.



Maintenance:

Always read this manual thoroughly.

Ensure that maintenance is in accordance with relevant standards EN 60079-17 and EN 60079-19.

Ensure no explosive atmospheres are present during maintenance.

Always disconnect the power supply when servicing the mixer.

Always keep electrically controlled medical devices away from mixing unit.

(e.g. cardiac pacemaker)



2 Safety and information

Transportation:

Always ensure that no leakage of lubricants can occur.

Always ensure that the unit is securely fixed during transportation.

Always use original packaging or similar during transportation.

Avoid drive unit to be attached to weld plate during transportation – if necessary avoid undue vibrations or shocks.

Avoid mixing head and drive rotor to be exposed to magnetic particles as they will stick to the parts and will require manual removal.

Incorrect installation, mounting and use, removal of security elements, lack of inspections, lack of maintenance and improper connections may cause severe personal injury or property damage. Therefore, it is important that the mixer is being transported, handled, installed, started, controlled, serviced and repaired correctly exclusively by qualified personnel.

2.4 Intended use

1. The Alfa Laval LeviMag® is only for mixing/stirring of liquids in a tank.
 2. The mixer is only for mounting positions/angles as specified on the nameplate and in 8.8 Mounting angle.
 3. The different duties and operation like pressure, speed and media temperature which the mixer is designed for must be followed, see section 4.2 Speed and 4.3 Temperature.
 4. If the mixer is installed in pressurized tanks, local regulations and legislations must be met.
-

2.5 Unpacking/delivery

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

Always use adequate lifting equipment when handling the mixer.



CAUTION

Alfa Laval cannot be held responsible for incorrect unpacking.

Step 1

Inspect the delivery for visible transportation damages - all issues to be reported to carrier.

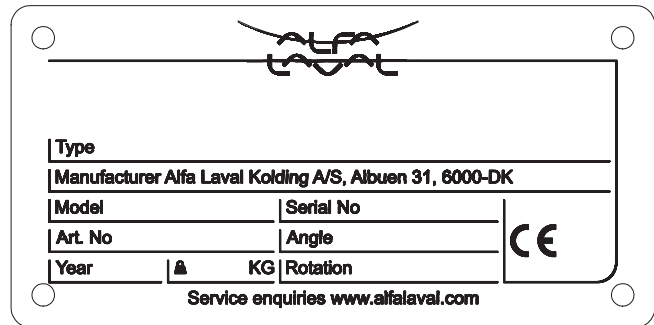
Inspect for oil leaks from gear motor caused by leaking vent valve protection (see section 3.7 Start-up) – if leakage is observed - oil level in gear motor must be verified (total oil amount in gear motor to be found on gear motor name plate).

Step 2

Check the delivery for:

1. Complete mixer
2. Nameplate designations
3. Delivery note

Always make sure that the ATEX category stated on the name plate corresponds with the environment it is installed in.



Step 3

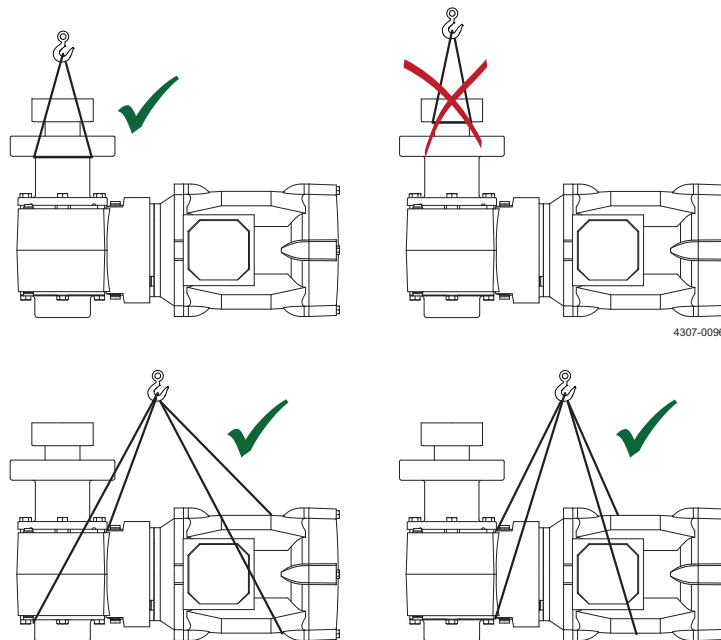
Lifting instructions:

Always use adequate lifting equipment (see mixer weight on name plate).
Locate centre of gravity before moving the mixer.



CAUTION

Alfa Laval recommends **NOT** to use shaft and drive rotor as lifting point.
Gear motor may be used for lifting the assembled drive unit



Always keep electrically controlled medical devices away from mixing unit.

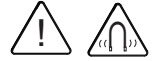


2 Safety and information

Step 4

During transportation:

1. **Always** protect shaft and the drive rotor.
Foreign magnetic particles can be attracted by the drive rotor due to the magnetic field.
2. **Never** expose the mixer to undue vibrations or shocks.
3. Inspect for oil leakage on gear's with vent screw – if leakage due to incorrect position/angle of gear motor, oil level must be verified - total oil quantity in gear motor is to be found on gear motor name plate.



2.6 Recycling information

Unpacking

- Packing material consists of wood, plastics, cardboard boxes and in some cases metal straps.
- Wood and cardboard boxes can be re-used, 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 accordance with local regulations.

Scrapping

- At the end of use, the equipment must be recycled according to the relevant, local regulations.

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

*The instruction manual is part of the delivery.
Study the instructions carefully and pay special attention to the warnings!
The mixer is for permanent fastening.
Make sure that the motor corresponds to the environment.*

Always read the manual thoroughly.

Only install this mixer in mounting angle according to the name plate – see section 2.5 Unpacking/delivery.

Always use lifting equipment when handling the mixer - see section 2.5 Unpacking/delivery.

Always have safety elements removed by authorized personnel.

Never cover or remove the nameplate.



Never connect to power supply during installation or service.

Always have the mixer connected to power supply by authorized personnel.



Install the mixer in following order of assembly:

Step 1

Weld plate - see section 3.1 Weld plate.

Step 2

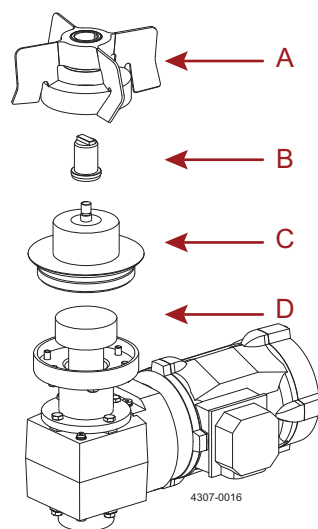
Male bearing - see section 3.2 Male bearing.

Step 3

Impeller - see section 3.3 Impeller.

Step 4

Drive Unit – see section 3.4 Drive Unit - WP50 and section 3.5 Drive Unit - WP81.



A Impeller
B Male bearing
C Weld plate
D Drive Unit

NOTE

Before installing any parts, make sure the tank is clean – rinse thoroughly with clean water and secure that no particles are magnetized onto any surfaces.

Tools used in the sections are optionally available - see section 10.5 Tools.

Spare Parts and tools for Alfa Laval LeviMag® can also be found in the Spare Part list.

3.1 Weld plate

Follow the guide in "Welding guidelines for Alfa Laval LeviMag®" for welding of the weld plate into the tank.

CAUTION

Only use authorized personnel to weld in the weld plate.

Alfa Laval cannot be held responsible for incorrect installation.

3 Installation

The instruction manual is part of the delivery.

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

The mixer is for permanent fastening.

Make sure that the motor corresponds to the environment.

3.2 Male bearing

It is assumed that the weld plate is installed in the tank – if not, follow the guide in "Welding guidelines for Alfa Laval LeviMag®".

CAUTION

Protect the bearing surface from physical damage and keep it free from particles.

Do not use grip tools on the bearing surfaces.

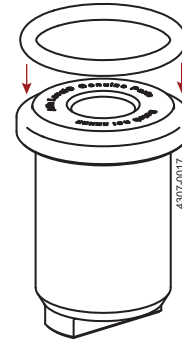
Handle the male bearing with care - Alfa Laval highly recommend use of service tool for the male bearing.

Step 1

Place the O-ring on the male bearing.

For minimal friction, lubricate the O-ring with a small amount of water.

Ensure the bearing surface is clean.



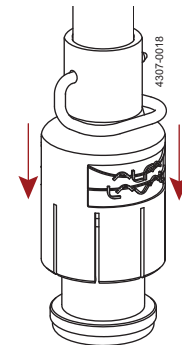
Step 2

(Optional)

Place the male bearing with O-ring in the male bearing tool – rotate the bearing slightly by hand enabling it to go completely into the socket with the O-ring in place.

NOTE

For large tanks, lifting rod may be needed to perform the installation.

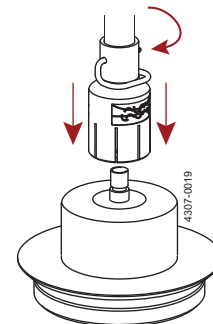


Step 3

Using the male bearing tool (optional with rod), place the male bearing female thread on the weld plate male thread and turn clockwise to install.

CAUTION

Ensure that the thread connection on the weld plate and the male bearing are clean, dry and free from foreign material.



Step 4

Tighten the bearing to a full stop applying torque seen in section 8.9 Tightening torque for screwed connections.

CAUTION

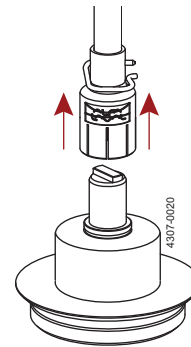
Do not over-tighten.

The instruction manual is part of the delivery.
Study the instructions carefully and pay special attention to the warnings!
The mixer is for permanent fastening.
Make sure that the motor corresponds to the environment.

Step 5

(Optional)

Remove the male bearing tool from the bearing by pulling it upwards.



3.3 Impeller

WARNING

It is important that the impeller is mounted **before** installing the drive unit.
Always keep electrically controlled medical devices away from mixing unit (e.g. cardiac pacemaker).



CAUTION

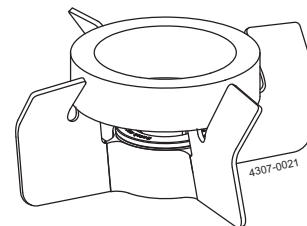
Always be sure that the weld plate is correctly installed in the tank and that it has not been deformed during the welding process.
See guide in "Welding guidelines for Alfa Laval LeviMag®".

Step 1

Remove foreign magnetic particles from the mixing head (can be time consuming or difficult if mixing head has been exposed to magnetic particles which must be removed mechanically and manually).

NOTE

If the mixing head must be placed on a table, place the magnets upward to prevent magnetic particles to stick to the magnetic surface of the mixing head.



Step 2

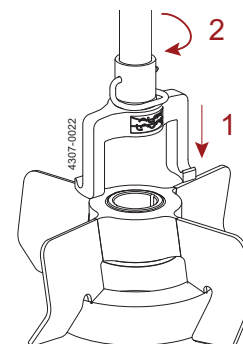
(Optional)

Use the impeller lifting device to install the impeller in the tank.

Lift the impeller carefully with the impeller lifting device.

NOTE

If needed - mount the impeller lifting device to the lifting rod.



3 Installation

The instruction manual is part of the delivery.

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

The mixer is for permanent fastening.

Make sure that the motor corresponds to the environment.

Step 3

Place the impeller carefully on the male bearing.

Rotate the impeller slowly 360 degrees (one rotation) ensuring that there is no collision between the mixing head and tank bottom/weld plate.

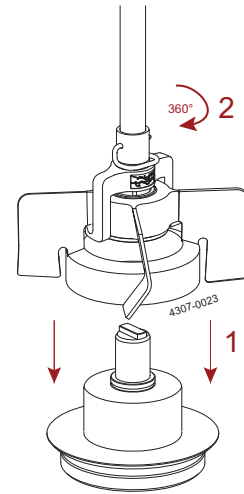
Remove the impeller lifting device by rotating fast 45 degrees in the opposite direction, freeing the arms from the impeller wings.

NOTE

Make sure the female/impeller bearing is fully set onto the male bearing.

WARNING

The impeller must be mounted before installing the drive unit.



3.4 Drive Unit - WP50

CAUTION

Always be sure that the weld plate is correctly installed in the tank and that it has not changed shape during welding – see "Welding guidelines for Alfa Laval LeviMag®".

WARNING

It is critical for the impeller to be mounted **before** installing the drive unit.



Step 1

Ensure the total run-out on the magnetic drive rotor is maximum 0.2 mm. See section 8.11 Measuring of total run-out.

WARNING

Protect the magnetic drive rotor on the drive unit from collecting particles.



*The instruction manual is part of the delivery.
Study the instructions carefully and pay special attention to the warnings!
The mixer is for permanent fastening.
Make sure that the motor corresponds to the environment.*

Step 2

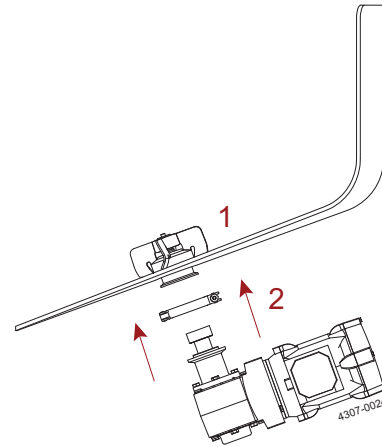
Ensure the bearing and impeller (1) is mounted before mounting the drive unit (2).

WARNING

Beware of risk of crushing fingers due to the strong magnetic forces between the drive unit and the impeller.

NOTE

During the installation, be sure that the drive unit is supported to avoid tipping over or dropping to the floor.



Step 3

Hold the drive unit firmly and align the drive unit with the weld plate. Apply the clamp ring without tightening it fully. The motor must always be pointing upwards.

Step 4

Adjust gear motor orientation in order for this to clear tank legs and according to section 8.8 Mounting angle. The motor must always be pointing upwards. Tighten clamp ring according to section 8.9 Tightening torque for screwed connections.

Step 5

Ensure the upper part of the flange is flush with the lower side of the weld plate.

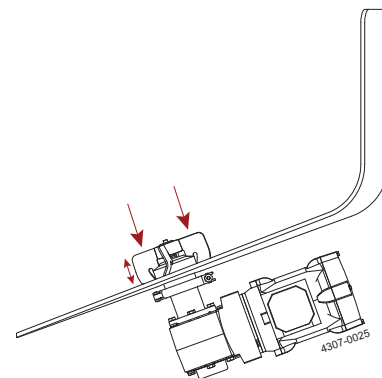
Step 6

CAUTION

Check for levitation!

Push the impeller downwards against the weld plate – possibly using the lifting rod tool – the impeller should travel axially minimum 0.5 mm – otherwise it is not levitated correctly.

If not, ensure both bearings are installed correctly, flange is flush against the bottom of the weld plate. Lubricate the bearings with e.g. water and recheck levitation.



NOTE

For programming and installation of frequency converter see section 8.12 Connection to frequency converter.

3 Installation

The instruction manual is part of the delivery.

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

The mixer is for permanent fastening.

Make sure that the motor corresponds to the environment.

3.5 Drive Unit - WP81

CAUTION

Always be sure that the weld plate is correctly installed in the tank and that it has not changed shape during welding – see "Welding guidelines for Alfa Laval LeviMag®".

WARNING

It is critical for the impeller to be mounted **before** installing the drive unit.



Step 1

Ensure the total run-out on the magnetic drive rotor is maximum 0.2 mm. See section 8.11 Measuring of total run-out.

WARNING

Protect the magnetic drive rotor on the drive unit from collecting particles.



Step 2

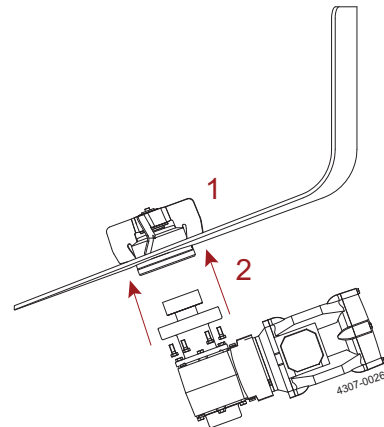
Ensure the bearing and impeller (1) is mounted before mounting the drive unit (2).

WARNING

Beware of risk of crushing fingers due to the strong magnetic forces between the drive unit and the impeller.

NOTE

During the installation be sure that the drive unit is supported to avoid tipping over or dropping to the floor.



Step 3

Hold the drive unit firmly and align the drive unit with the weld plate. Adjust gear motor orientation in order for this to clear tank legs and according to section 8.8 Mounting angle. The motor must always be pointing upwards.

Step 4

Apply mounting bolts without tightening these fully.

Step 5

Making certain the weld plate and drive unit flange are completely flush, tighten the mounting bolts according to section 8.9 Tightening torque for screwed connections.

Step 6

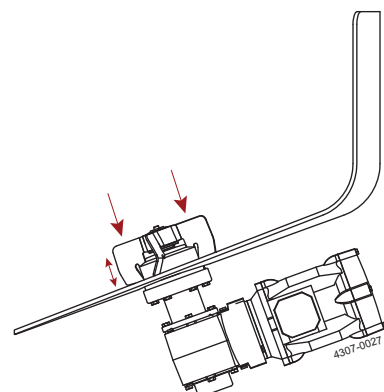
CAUTION

Check for levitation!

Push the impeller downwards against the weld plate – possibly using the lifting rod tool – the impeller should travel axially minimum 0.5 mm – otherwise it is not levitated correctly.

If not, ensure both bearings are installed correctly, flange is flush against the bottom of the weld plate.

Lubricate the bearings with e.g. water and recheck levitation.



*The instruction manual is part of the delivery.
Study the instructions carefully and pay special attention to the warnings!
The mixer is for permanent fastening.
Make sure that the motor corresponds to the environment.*

NOTE

For programming and installation of frequency converter see section 8.12 Connection to frequency converter.

3.6 Directions of rotation verification

It is recommended that the customer install an emergency stopping device and a circuit breaker for their full tank/mixer processing system.

Step 1

After confirming the impeller is levitated, connect motor according to section 8.10 Connection of motor and frequency converter according to section 8.12 Connection to frequency converter.

WARNING

Ensure the correct power is used for the frequency converter. Incorrect power supply can permanently damage components.

Step 2

Start up the mixer running slowly below 5 RPM and verify the impeller is rotating clockwise.

CAUTION

If the impeller is rotating counter-clockwise, the frequency converter must be reprogrammed reversing direction of rotation.

NOISE OR VIBRATION:

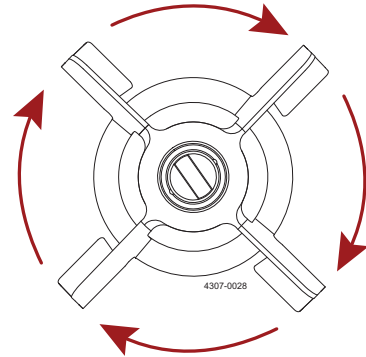
If there is excessive noise or vibration, please ensure:

- impeller is levitated.
- male bearing is seated correctly.
- female bearing is seated correctly.
- drive unit is seated completely and flush with the weld plate.
- impeller is rotating clockwise.
- there is no contact between tank bottom and impeller.
- one of the bearings have not come loose during counterclockwise rotation.

If the noise or vibration persists, please contact your Alfa Laval representative.

CAUTION

Always disconnect drive unit before working with the impeller or bearing.



3 Installation

The instruction manual is part of the delivery.

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

The mixer is for permanent fastening.

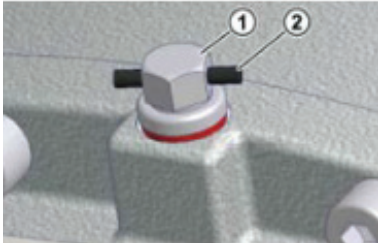
Make sure that the motor corresponds to the environment.

3.7 Start-up

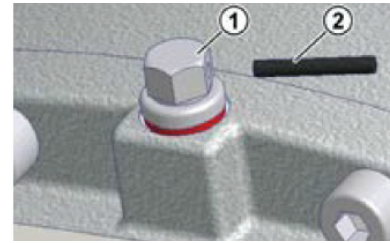
Step 1

CAUTION

Remove the rubber plug in gear.



- 1) Standard vent plug
- 2) Transport securing device to be removed



Step 2

Alfa Laval require that a frequency converter is used running the mixer – please see section 8.12 Connection to frequency converter.

Step 3

1. Always allow at least a 10 sec ramping up to set speed.
2. Always allow at least a 10 sec ramping down to full stop.

CAUTION

The maximum impeller speed – please see section 4.2 Speed and chapter 8 Technical data.

Step 4

Go through chapter 6 Checklists.

Step 5

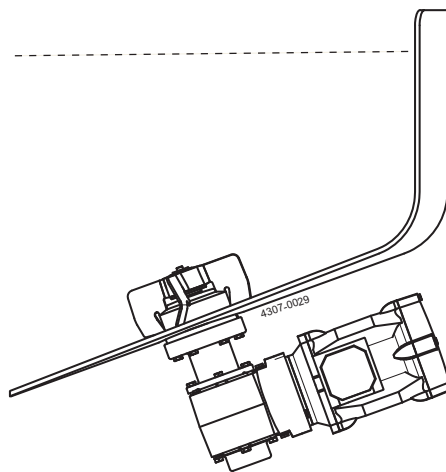
Your Alfa Laval LeviMag® is now ready for operation.

*The mixer should only be operated when mounted in a tank.
Never place objects or tools inside the tank when operating the mixer.*

4.1 Mixing

Step 1

Fill the tank with the desired amount and type of media.



Step 2

Start up the mixer according to your specific mixing requirements.

NOTE

For ATEX - please see section 7 ATEX specific conditions for safe use page 36.



4.2 Speed

The allowable maximum speed for the impeller is depending on several factors such as fluid viscosity, tank dimensions, tank and baffle design and geometry.

The recommended maximum speeds in a fully baffled tank - mixing products with water like viscosity – can be found in section 8.1 Technical data, LeviMag® UltraPure and section 8.2 Technical data, LeviMag®.

CAUTION

Below does **NOT** apply when having an explosive atmosphere above liquid level.
Please see chapter 7 ATEX specific conditions for safe use if there is an explosive atmosphere.



Alfa Laval LeviMag® can run dry once it has been submerged, however it is not recommended to run dry above 50 RPM.
Dry-running below 50 RPM is safe during a complete draining as well as during CIP.

To avoid damage to the bearings when running dry, please do not exceed speeds of 50 RPM.

4 Operation

*The mixer should only be operated when mounted in a tank.
Never place objects or tools inside the tank when operating the mixer.*

4.3 Temperature

During operation:	max. 90°C and ensure that the media is not boiling
Using non-lubricating media (e.g. WFI) up to:	max. 90°C and ensure that the media is not boiling
During CIP (max. 50 RPM):	max. 95°C

CAUTION

The mixer may not run when an ATEX zone is present.



During SIP (do not run):	max. 150°C
Max. allowable ambient temperature:	40°C

4.4 Cleaning

Step 1

For optimal performance and service life of the mixer, proper CIP and SIP procedures should be followed. The mixer is designed for use with CIP, please study the instructions carefully and pay special attention to warnings!

Always handle CIP and SIP lye and acids with great care.



Always use
rubber gloves!



Always use
protective goggles!

Step 2

The mixer can run at 50 RPM or less during cleaning processes. Do **not** run the mixer during SIP. Permanent damage may occur.

NOTE

If CIP or SIP temperatures are more than 150°C, it is important to remove the impeller including the female bearing. The male bearing and elastomers can handle temperatures up to 200°C.

Ensure that gear motor oil does not reach temperatures higher than 105°C during CIP and SIP.

If higher than above stated temperatures are needed, please remove drive unit.

Ensure that the impeller is not exposed to temperature shocks.

CAUTION

The mixer may not run when an ATEX zone is present.



See chapter 5 Maintenance for instructions regarding maintenance.

*It is important that the drive unit is dismantled before removing the impeller.
The maintenance interval for the mixer depends on the application - shorter or longer service interval may appear.
Handle the mixer with care and follow the recommended inspection to prevent unnecessary damage.*

5.1 General maintenance

Before performing any service and maintenance, read and understand below warnings:

Maintenance of the mixer should only be performed by authorised personnel.
Ensure totally clean surfaces before and during maintenance.
Ensure the tank is fully vented from any gases, depressurized and cooled to a temperature which allows acceptable working conditions.
Always use proper tools.
Always replace sealing elements, if necessary, before reassembling.
For maintenance instructions from suppliers see section 11.1 Drive unit instructions.



Always disconnect the power supply when servicing the mixer.
For lifting instructions please refer to section 2.5 Unpacking/delivery.



Be careful, impeller and drive unit include very strong magnets.



Ensure nonexplosive atmosphere during maintenance.



WARNING

Follow the dismantling and assembly instructions to the letter. Ensure the mixer is in a safe state before any service and maintenance. After maintenance section 3.7 Start-up must be read thoroughly before operation.

NOTE

All scrap must be stored/disposed of in accordance with current rules/directives. Always use genuine Alfa Laval spare parts.

Preventive Maintenance

To ensure that your Alfa Laval LeviMag® operates efficiently, it is essential to follow a simple preventive maintenance program, which will keep your machine in good working conditions. Good maintenance requires careful attention at regular intervals!

The following recommended preventive maintenance procedures are based on the average operating conditions of most Alfa Laval machines. A mixer which is subject to abrasive fluids, will need more frequent attention than one working in ideal conditions. The maintenance program should be adjusted to meet the demands of your normal operating condition.

Alfa Laval recommend that bearings and O-rings are inspected every 6th month.

Alfa Laval recommend that bearings and O-rings are replaced every 6000 operating hours or every 3rd year.

NOTE

The gear can have a shorter live time than the mixer. Please pay special attention to the stated maintenance interval of the gearbox.

Typ		No.		iges		085 22550	
n_2	$\text{min}^{-1} n_1$	$\text{min}^{-1} IM$					
M_2	Nm	P_1	kW	Bj			
F_{R2}	kN	F_{R1}	kN	T_u			
F_{A2}	kN		kg	x_{R2}	mm		
Oil			MI		h		
			S				

Getriebebau NORD GmbH & Co. KG
22939 Bargteheide/GERMANY

CE

DRIVESYSTEMS

4307-0102

5 Maintenance

It is important that the drive unit is dismantled before removing the impeller.

The maintenance interval for the mixer depends on the application - shorter or longer service interval may appear.

Handle the mixer with care and follow the recommended inspection to prevent unnecessary damage.

5.2 Inspection

After 25 hours of operation, listen for abnormal sounds. If any, dismantle the mixer and check all parts for scratches and dents.

CAUTION

ATEX zone must only be present after the 25 hours run-in period. For ATEX all parts must be checked for scratches and dents after the 25 hours run-in.



Alfa Laval recommend that the bearings and O-rings should be checked for cleanability and wear after one month of operation. If there is abnormal wear on either component, contact Alfa Laval for further instructions.

After each CIP sequence, check that the mixer and parts are clean - also look for wear, check the gaskets ensuring that it is without tear or cracks.

Regular inspections should be performed at least every 6th months or as according to local Preventative Maintenance plans.

If any component is found damaged during inspection, please contact Alfa Laval for repair and/or replacement parts.

All wear parts or damaged parts should be replaced only with genuine Alfa Laval components.

Beware of special maintenance interval for ATEX option see section 7.7 Additional maintenance for ATEX.



Possible damages on the parts are listed below:

No	Component	Check zone	Description	Control method	Action
1	Impeller	Surfaces and edges	- scratches, foreign particles - tolerance on bearing surface	- visual - measuring	- cleaning - change bearing
2	Female bearing	Surfaces and edges Thread	- scratches - tolerance on surface - damage on thread	- visual - measuring	- change bearing
3	Male bearing	Surfaces and edges Thread	- scratches - tolerance on surface - damage on thread	- visual - measuring	- change bearing
4	O-rings	Surface	- deformed - cracks	- visual	- change O-rings
5	Weld Plate	Surfaces and edges Thread	- damage on thread - damage on outer OD	- visual - measuring	- re-thread, if possible - re-polish, if possible
6	Drive Unit	Drive Rotor Gear motor Motor	- foreign particles on parts - leaks or noises - cable failure	- visual - audible	- cleaning - change gear motor - repair gear motor
7	Drive Rotor	Run-out	- out of balance	- measuring	- align so run-out is maximum 0.2 mm, see section 8.11 Measuring of total run-out

It is important that the drive unit is dismantled before removing the impeller.

The maintenance interval for the mixer depends on the application - shorter or longer service interval may appear.

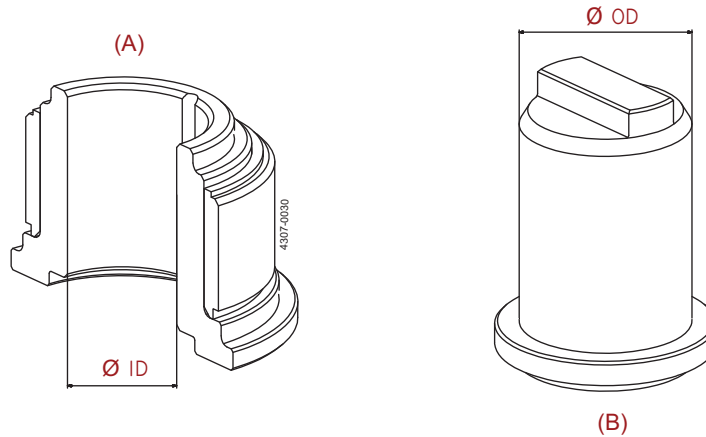
Handle the mixer with care and follow the recommended inspection to prevent unnecessary damage.

The clearance between female and male bearing should not exceed 0.15 mm.

If the value exceeds – Alfa Laval recommend changing both bearings.

A: Female bearing

B: Male bearing



Calculation of clearance:

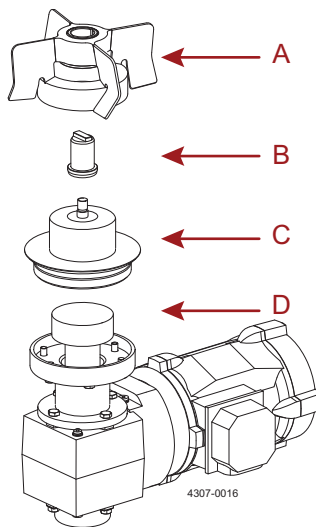
female bearing, inner diameter (ID) – male bearing, outer diameter (OD) = clearance.

The highest wear is normally found at the upper and lower inner surface of the female bearing.

Each of the inspection components requires disassembling of the mixer.

The disassembling must be carried out as listed in the order:

1. Dismount the drive unit, see 5.3 Dismounting of the drive unit.
2. Dismount the impeller and female bearing, see section 5.5 Dismounting of the impeller and section 5.7 Replacement of the female bearing.
3. Dismount the male bearing, see section 5.6 Replacement of the male bearing.



A: Impeller

B: Male bearing

C: Weld plate

D: Drive unit

5 Maintenance

It is important that the drive unit is dismantled before removing the impeller.

The maintenance interval for the mixer depends on the application - shorter or longer service interval may appear. Handle the mixer with care and follow the recommended inspection to prevent unnecessary damage.

5.3 Dismounting of the drive unit

Step 1

Before maintenance, ensure the main power switch is off and power is disconnected.

Step 2

WP 50: Loosen the clamp ring (1) - do not remove.

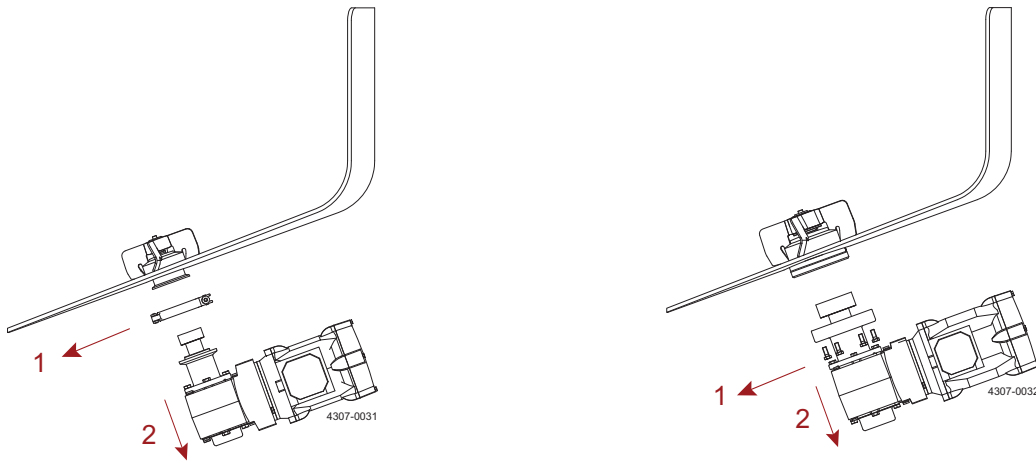
WP 81: Loosen the mounting screws (1) - do not remove.

Step 3

Make preparations for supporting the drive unit and remove clamp ring/screws completely.

CAUTION

The drive unit may be heavier than expected. When it becomes loose (2), be careful not to let it fall, since it may very well become damaged. The magnets will in most cases keep the drive unit in place and forces must be used to pull it down.



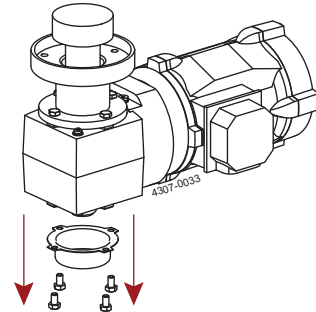
Assembly drawings with position numbers (#) can be found in section 10.3 Drive unit - WP50 and in section 10.4 Drive unit - WP81. Tightening torques can be found in section 8.9 Tightening torque for screwed connections.

5.4 Disassembly of the drive unit

Step 1

Unscrew the four screws (8.3).

Remove the protection cap (8.2).

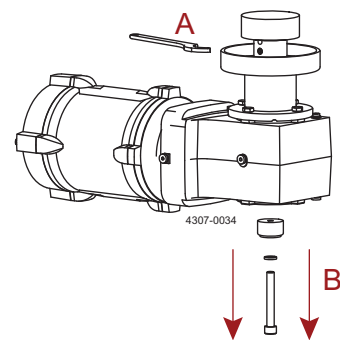


Step 2

Fasten the Drive Rotor with a hook wrench (A) and unscrew the screw (10) and remove washer (9) and Fastening element (8.1) (B).

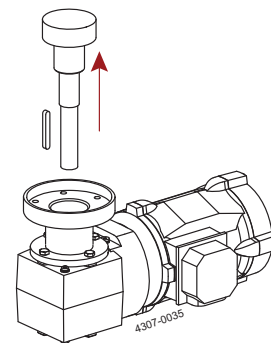
NOTE

The Drive Rotor (1) can be fastened for rotation using a hook wrench that is inserted into the hole (Ø6 for Size WP50 and Ø7 for Size WP81) above the two screws (2).



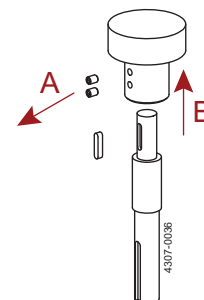
Step 3

Pull out the shaft (6) - including keys (5) and (7) - and Drive Rotor (1) with screws (2).



Step 4

Unscrew the screws (2) (A) and pull of the Drive Rotor (1) (B).



NOTE

Assemble reverse as dismantling.

Ensure clean surfaces during assembling and lubricate shaft fits (gear motor and Drive Rotor) with anti-corrosion grease.

Ensure magnetic drive rotor run-out is maximum 0.2 mm.

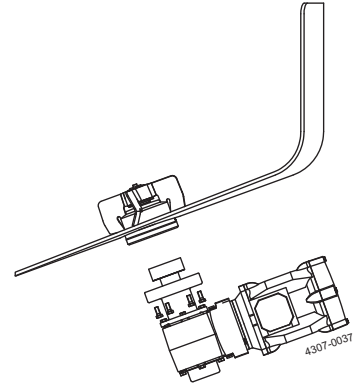
5 Maintenance

Assembly drawings with position numbers (#) can be found in section 10.3 Drive unit - WP50 and in section 10.4 Drive unit - WP81. Tightening torques can be found in section 8.9 Tightening torque for screwed connections.

5.5 Dismounting of the impeller

Step 1

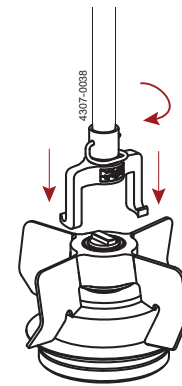
Ensure that the drive unit is removed.



Step 2

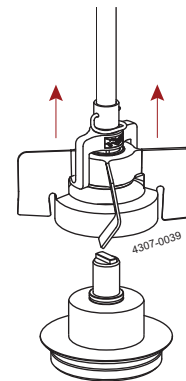
Remove the impeller with the optional lifting device.

Ensure the tool arms are catching a wing on both sides by rotating the tool.



Step 3

Carefully lift the impeller up and out of the tank.



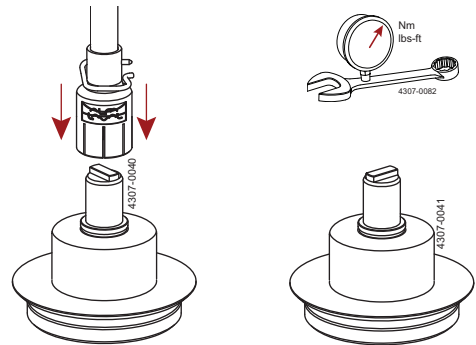
Assembly drawings with position numbers (#) can be found in section 10.3 Drive unit - WP50 and in section 10.4 Drive unit - WP81. Tightening torques can be found in section 8.9 Tightening torque for screwed connections.

5.6 Replacement of the male bearing

Step 1

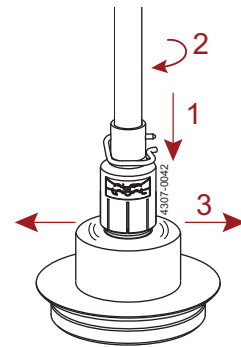
Optionally use the male bearing tool with a lifting rod to remove the male bearing and O-ring in one step.

Or use a standard (adjustable) spanner to loosen the male bearing by turning it counter clockwise.



Step 2

Press the tool down (1) and rotate (2) until the groove inside the tool fit onto the bearing key (flat section on upper part of bearing) and press firmly down until the tool-arms click-out partly (3).



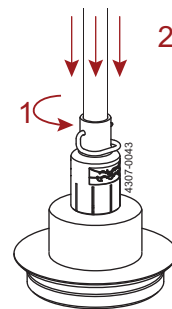
Step 3

Turn the male bearing tool counter-clockwise a 1/4 rotation loosening the bearing part and press down. Continuing rotating the tool enable the tool-arms to catch the O-ring.

The tool has a limited torque capacity and it is not designed for everyday use – therefore it is always a part of the male bearing spare part kit.

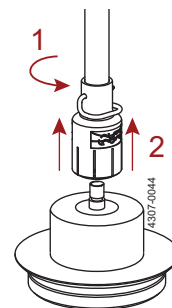
If the male bearing somehow has been tightened too hard during abnormal use or other there is a possibility that the tool cannot handle the torque without damaging the tool.

In these cases a standard (adjustable) spanner must therefore be used instead.



Step 4

Continue turning counter-clockwise (1) to dismount the male bearing and O-ring and lift it up (2) from the tank.



5 Maintenance

Assembly drawings with position numbers (#) can be found in section 10.3 Drive unit - WP50 and in section 10.4 Drive unit - WP81. Tightening torques can be found in section 8.9 Tightening torque for screwed connections.

Step 5

Push the male bearing and O-ring free from the top of the tool with a round stud.



Step 6

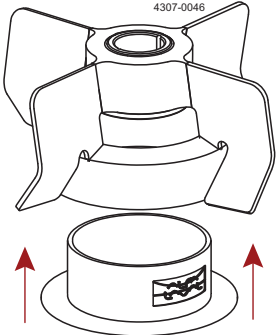
Follow section 3.2 Male bearing for installation of the male bearing.

Assembly drawings with position numbers (#) can be found in section 10.3 Drive unit - WP50 and in section 10.4 Drive unit - WP81. Tightening torques can be found in section 8.9 Tightening torque for screwed connections.

5.7 Replacement of the female bearing

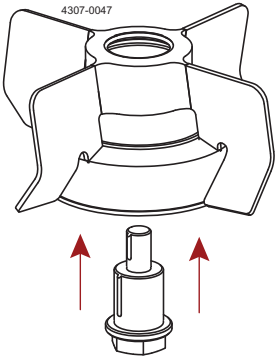
Step 1

Mount the protection shield to protect the impeller surface from possible scratches from the magnetic stainless-steel part on the female bearing. The stainless-steel part on the female bearing catches the magnetic impeller easily.



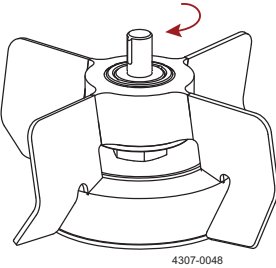
Step 2

Use the female bearing tool to loosen the female bearing and O-rings from the impeller.



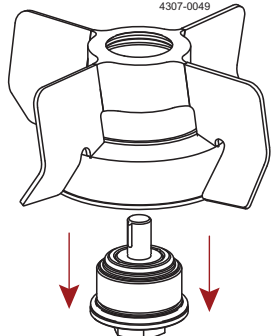
Step 3

Apply torque to the female bearing tool to loosen as shown on illustration. The thread between the female bearing and the impeller is a normal right handed thread - ie. the tool and female bearing must be rotated in the direction of the red arrow to be unscrewed.



Step 4

Unscrew the female bearing completely and remove from impeller.



5 Maintenance

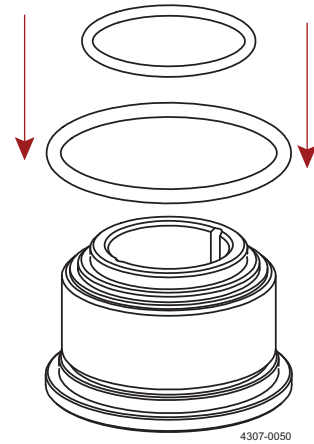
Assembly drawings with position numbers (#) can be found in section 10.3 Drive unit - WP50 and in section 10.4 Drive unit - WP81. Tightening torques can be found in section 8.9 Tightening torque for screwed connections.

Step 5

Mount the new O-rings on the new female bearing.

NOTE

Be careful not to scratch the lower O-ring when moving it over threads on the bearing – the O-ring can be extended a little by pulling in it (max. 5%) before moving it over the threads.

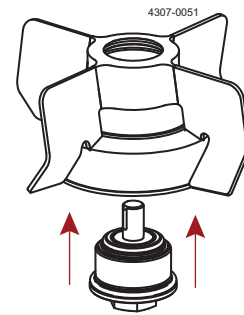


Step 6

NOTE

Ensure the protection shield is mounted onto the impeller.

Place the female bearing from the downside into the impeller using the female bearing tool.



Step 7

Tighten the female bearing to a full stop by applying the recommended torque according to section 8.9 Tightening torque for screwed connections.

CAUTION

Do not over-tighten

Step 8

Remove the female bearing tool and the protection shield.

Step 9

Follow section 3.3 Impeller for installation of the impeller.

CAUTION

Ensure to place the impeller in the tank on the male bearing before mounting the drive unit.

To ensure correct installation, before using the Alfa Laval LeviMag®, make sure to complete each step in the checklists below. Beware of additional checklist for ATEX option see section 7.7 Additional maintenance for ATEX.

6.1 Unpacking/delivery

Step	Description	Checked
1	Read and understand the manual thoroughly.	<input type="checkbox"/>
2	Inspect the delivery for visible transportation damages.	<input type="checkbox"/>
3	Checklist for "Welding guidelines for Alfa Laval LeviMag®" done.	<input type="checkbox"/>
4	Check name plates for data.	<input type="checkbox"/>

6.2 Installation

Step	Description	Checked
1	Ensure all parts are clean, dry and free from foreign material. 1) Weld plate and thread connection. 2) Male bearing and O-ring. 3) Impeller.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2	Install the male bearing and O-ring. 1) Lubricate the O-ring with purified water – mount on the male bearing. 2) Place the male bearing on the tool. 3) Tighten the bearing to metal-to-metal contact. 4) Tighten according to the specified torque – see 8.9 Tightening torque for screwed connections.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3	Install the impeller including female bearing. 1) Mount the impeller on the male bearing. 2) Ensure the impeller rotates smoothly.	<input type="checkbox"/> <input type="checkbox"/>
4	Install the drive unit 1) Ensure all incoming power is connected with an emergency stop or an on/off switch. 2) Install the frequency converter – see 8.12 Connection to frequency converter. 3) Program frequency converter ensuring that maximum speed can never be exceeded - see 8 Technical data. 4) Ensure cables are long enough and shield motor cables. 5) Ensure that the drive rotor rotates in a clockwise direction as seen from above. 6) Ensure the magnetic drive rotor run-out is maximum 0.2 mm.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5	Mount the drive unit including the magnetic drive rotor into the weld plate. 1) Tighten the screws (WP81) or clamp (WP50) according to the specified torque – see 8.9 Tightening torque for screwed connections	<input type="checkbox"/>
6	Check the impeller for levitation after installing the drive unit into the weld plate.	<input type="checkbox"/>
7	Verify the impeller is rotation clockwise 1) Turn on the motor and verify that the impeller rotates smoothly clockwise.	<input type="checkbox"/>

6 Checklists

To ensure correct installation, before using the Alfa Laval LeviMag[®], make sure to complete each step in the checklists below. Beware of additional checklist for ATEX option see section 7.7 Additional maintenance for ATEX.

6.3 Operation

Step	Description	Checked
1	Fill the tank with preferred liquid media.	<input type="checkbox"/>
2	Start the mixer acc. to your specific mixing requirements	<input type="checkbox"/>

To ensure correct installation, before using the Alfa Laval LeviMag[®], make sure to complete each step in the checklists below. Beware of additional checklist for ATEX option see section 7.7 Additional maintenance for ATEX.

6.4 Qualification

Ensure that all important information has been noted for future use.

Use this checklist for each tank and mixer to ensure correct installation qualification.

6.4.1 General information

Name	
Tank number	
Tank type	
Tank manufacturer	
Country	
Site location	
LeviMag [®] type	
Alfa Laval representative	

6.4.2 Alfa Laval LeviMag[®] information

Name	Serial/cert./batch number	Item no.	Notes
Weld plate			
Drive unit			
Impeller			
Male bearing			
Female bearing			
O-rings			

6 Checklists

To ensure correct installation, before using the Alfa Laval LeviMag[®], make sure to complete each step in the checklists below. Beware of additional checklist for ATEX option see section 7.7 Additional maintenance for ATEX.

6.4.3 Check list – Frequency converter settings

Ensure that all motor data from Table 1 in section 8.10 Connection of motor is programmed correctly into the frequency converter.

Parameter	Original value	New value	Notes
Min. freq. (Hz)			
Max. freq. (Hz)			
Acceleration time (sec)			
Deacceleration time (sec)			

Inspected by

Print name _____

Signature _____

Date Inspection completed _____

To ensure correct installation, before using the Alfa Laval LeviMag[®], make sure to complete each step in the checklists below. Beware of additional checklist for ATEX option see section 7.7 Additional maintenance for ATEX.

6.5 Maintenance

The maintenance interval for the mixer depends on the application - shorter or longer service interval may appear. Handle the mixer with care and follow the recommended inspection to prevent unnecessary damage.

All wear parts or damaged parts should be replaced only with genuine Alfa Laval components.

Step	Description	Checked
1	Drive unit 1) Damage on cables 2) Leakage from the gear motor 3) Noise from the gear motor 4) Damage on shaft and drive rotor 5) Damage on flange and screws 6) Check the magnetic drive rotor run-out to maximum 0.2 mm	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2	Impeller including female bearing 1) Check the impeller for easy rotation, noise and damage on surfaces 2) Check wings and bottom of the impeller 3) Check the magnetic rotor for particles 4) Damage on female bearing 5) Thread deformation on impeller and female bearing	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3	Male bearing 1) Check male bearing for scratches 2) Thread deformation	<input type="checkbox"/> <input type="checkbox"/>
4	Weld Plate 1) Contact mark, scratches or damages on the weld plate surfaces 2) Thread deformation	<input type="checkbox"/> <input type="checkbox"/>
5	Measure clearance between female and male bearing (should not exceed 0.15 mm)	<input type="checkbox"/>

Inspected by

Print name _____

Signature _____

Date Inspection completed _____

7 ATEX specific conditions for safe use

7.1 Recommendation

Alfa Laval recommend while operating with ATEX to use an inert gas in the vapor space in the tank to eliminate all possible ignition hazards. The installation must be according to the requirements for safety use of an inert gas.

7.2 Requirements

If is not possible to use an inert gas as recommended - the following requirements must be met before using the mixer in an ATEX classified zone:

- A. The impeller must always be **submerged** during operation since dry running will result in a temperature increase in the bearing surfaces and potential ignition source can become effective. With the impeller submerged, the mixer is not subjected to any gas inside the tank and is therefore outside any classification zone – even though the inside of the tank can be ATEX classified to a zone.

To prevent dry running, a level switch must be installed to shut down the mixer.

Follow section 7.5 Positioning of level switch to install the equipment.

Ensure the liquid level during operation is always above the impeller to prevent dry running.

- B. **The properties of the fluid and the speed of the mixer** are limited to prevent the mixer from losing the magnetic coupling – if the limitations are not followed a potential ignition source can become effective.

The properties of the liquid are limited by the following:

- fluid must be Newtonian
- maximum density: 1.1 g/cm³
- maximum viscosity: 50 cP

Ensure that there is enough conductivity in the liquid to avoid the risk of electrostatic charging and an ignition hazard.

With the above fluid restrictions, the following maximum speed limits must be respected and must not be exceeded in relation to the selected impeller diameter:

Weld plate	Impeller	Maximum speed
50	100	800 RPM (80,8 Hz)
50	150	436 RPM (44,1 Hz)
81	200	446 RPM (76,9 Hz)
81	250	230 RPM (39,6 Hz)
81	300	182 RPM (31,3 Hz)

Ensure the mixer cannot generate mechanical sparks in an ATEX classified zone by hitting the tank wall or other equipment in the tank.

- C. To prevent developing a **vortex** which reaches the impeller when there is an ATEX zone above the media level, the maximum speed must be evaluated depending on the specific tank dimension.

To prevent the mixer operating with a higher speed than specified according to section 7.5 Positioning of level switch make sure to follow section 7.4 Monitoring the frequency converter .

NOTE

If the operating limits are to be exceeded it can lead to an ignition source coming affective, **either** by the mixer loses the magnetic coupling, resulting in mechanical contact to the wall, **otherwise** through a vortex or dry-running heat can buildup in the bearing surfaces, resulting in exceeding the assigned temperature class of the product.

7.3 Equipment Protection Level and safety devices

The Equipment Protection Level (EPL) must be realized and integrated completely in the ignition protection system according to the directives 2014/34/EU, EN ISO 80079-36 and EN ISO 80079-37 §6.

The functions of these ignition protective systems must be checked before start-up according to the manual from the manufacturer of the system.

The EPL for the monitoring must meet the demands of EN ISO 80079-37 §6. The functions of these systems must be checked regularly by the user, according to the manual from the manufacturer of the system.

The reaction time of the ignition protection system must not exceed 0.5 seconds. The reaction time is the period between reaching the shutdown value and until the power is shutoff the machine.

Ensure all electrical installations design in any classification zone are according to EN 60079-14.

7.4 Monitoring the frequency converter

The motor is controlled by a frequency converter. The manual from the motor manufacturer and the information in the certificate for the motor shall be followed.

Temperature monitoring devices must meet the requirements in the directive 2014/34/EU and EN1127-1.

In addition to the speed of the mixer, **the operating limits according to below scheme must not be exceeded.**

If the operating limits are to be exceeded it can lead to an ignition source coming affective, **either** by the mixer loses the magnetic coupling, resulting in mechanical contact to the wall, **otherwise** through a vortex or dry-running heat can buildup in the sealing surfaces, resulting in exceeding the assigned temperature class of the product.

NOTE

The mixer can only operate with a frequency converter and therefore the speed of the mixer must be monitored.

Required measures of the end user to eliminate ignition hazards:

Zone 0 inside and zone 1 outside the tank -	the speed of the mixer must be monitored with an EPL, corresponding to b2 or two b1 according to EN ISO 80079-37 §6.
Zone 1 inside and outside the tank -	the speed of the mixer must be monitored with an EPL, corresponding to b1 according to EN ISO 80079-37 §6.
Zone 2 inside and outside the tank -	no further measures need to be taken.



NOTE

Ensure the frequency converter is installed according to EN 60079-14 §11.2.

NOTE

By monitoring the frequency applied to the motor the speed of the mixer can be ensured.

7 ATEX specific conditions for safe use

7.5 Positioning of level switch

To prevent dry running, a level switch must be installed to shut down the mixer and depending on the ATEX zone classification inside the tank, the level switch must correspond to different safety levels inside the tank:

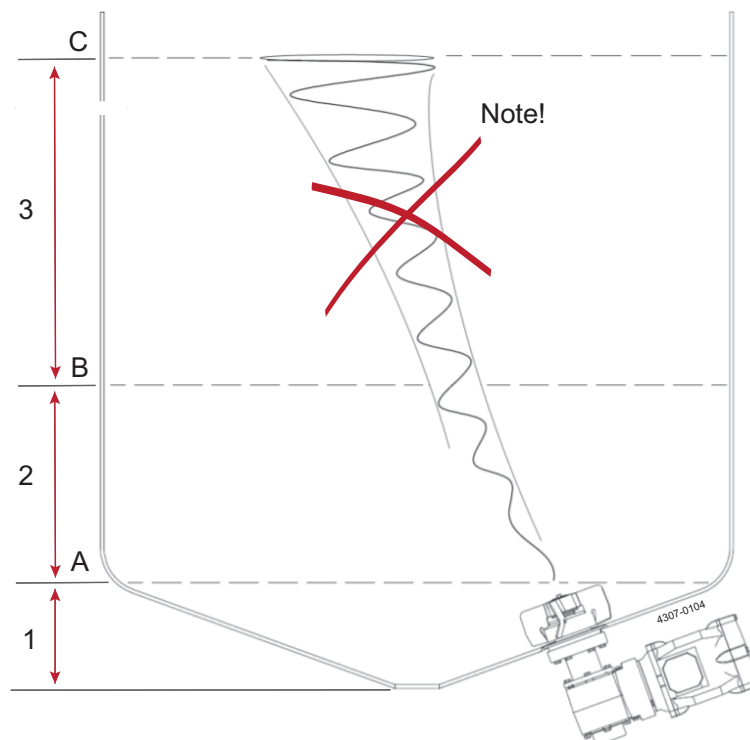
- Zone 0 - the level switch must correspond to b2 according to EN 80079-37.
- Zone 1 - the level switch must correspond to b1 according to EN 80079-37.
- Zone 2 - the level switch does not need to correspond to a specific safety integrity level.

Ensure the liquid level during operation is always above the impeller to prevent dry running.

Tank size, media properties and operating mode have an influence on the operating limits and must not be changed without a new evaluation.

Operating with variable speed please pay special attention to section 7.2 Requirements, section 7.4 Monitoring the frequency converter and section 8.12 Connection to frequency converter.

Media level	A	B (Option)	C
State	Minimum media	"Midway"	Full tank
Level switch requirement	Yes	Yes	Option
Media level on illustration	1	1+2	1+2+3
Media level measured			
Speed Level	Off	Moderate	High
Maximum speed in Hz	0 Hz		



NOTE
NO VORTEX

7 ATEX specific conditions for safe use

To ensure correct installation, before using the Alfa Laval LeviMag®, make sure to complete each step in chapter 6 Checklists and below as additional for ATEX options.

7.6 Additional checklist for ATEX

Unpacking/delivery

Step	Description	Checked
1	Check ATEX marking on below parts: 1. Motor. 2. Gear 3. Flange	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Installation

Step	Description	Checked
2	The oil level in the gear is adjusted to the mixers mounting angle. Ensure the mixer is mounted according to section 8.8 Mounting angle.	<input type="checkbox"/>
3	Ensure monitoring of the frequency converter is installed according to the specified ATEX zone.	<input type="checkbox"/>
4	Ensure positioning of the level switch is installed according to section 7.5 Positioning of level switch .	<input type="checkbox"/>
5	Ensure the total run-out is measured according to section 8.11 Measuring of total run-out.	<input type="checkbox"/>
6	Ensure the mixer has passed the run-in period for at least 25 hours of operation after each installation, maintenance and service see section 5.2 Inspection.	<input type="checkbox"/>
7	Check Impeller and drive rotor for scratches.	<input type="checkbox"/>

Operation

Step	Description	Checked
8	Fill the tank with preferred liquid media.	<input type="checkbox"/>
9	Start the mixer according to your specific mixing requirements.	<input type="checkbox"/>
10	Pay attention to the additional maintenance interval for ATEX option.	<input type="checkbox"/>

7 ATEX specific conditions for safe use

It is important that the drive unit is dismantled before removing the impeller.

The maintenance interval for the mixer depends on the application - shorter or longer service interval may appear.

Handle the mixer with care and follow the recommended inspection to prevent unnecessary damage.

Make sure to follow section 5.2 Inspection and below as additional maintenance for ATEX options.

7.7 Additional maintenance for ATEX

	Inspect/clean/lubricate	
	Supplier instruction	Weekly/ after each 100 hours of operating
Drive rotor		
Before each mounting of drive unit: Check total run-out before every mounting		
Gear	X	
Clean vent screw		X
Check for oil leakage		X
Check temperature sticker		X
Motor	X	
Clean surface to avoid overheating		X

NOTE

Please pay special attention to the stated maintenance interval (MI) of the gearbox. The gear can have a shorter lifetime than the mixer.

Getriebebau NORD GmbH & Co. KG
 22939 Bargteheide/GERMANY
 CE

Typ _____

No. _____

n_2	$\text{min}^{-1} n_1$	$\text{min}^{-1} i_{ges}$	$\text{min}^{-1} i_{IM}$		
M_2	Nm	P_1	kW	Bj	
F_{R2}	kN	F_{R1}	kN	T_u	$^{\circ}C$
F_{A2}	kN		kg	x_{R2}	mm
Oil				MI	h
				S	

085 22550

4307-0102

NOTE

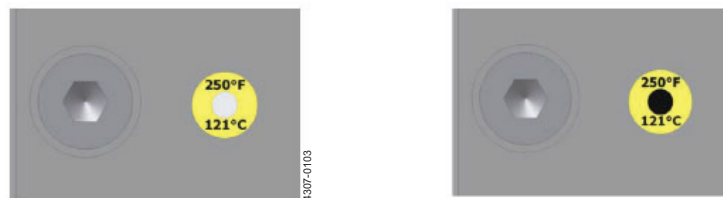
Beware of the color change in the temperature sticker on the gear box.

If the surface temperature gets too high, the sticker will change color to black in the middle.

Stop the gear immediately if the sticker is black in the middle.

CAUTION

The mixer must **NOT** resume operation before cause of overheating has been investigated and found.



8.1 Technical data, LeviMag® UltraPure

Internals:	
Product wetted parts, surface finish:	Ra < 0.5 µm, mechanical & electropolished
Working pressure:	-1 to 7 bar(g)
Impeller diameters:	100, 150, 200, 250 & 300 mm
Weld plate:	
For impeller size 100 & 150 mm:	WP50 (clamp connection)
For impeller size 200, 250 & 300 mm:	WP81 (flange-bolt connection)
Materials:	
Impeller & weld plate:	AISI316L (UNS S31603)
Drive rotor, shaft & console:	AISI304 (UNS S30400)
Bearing, male:	Zirconia YTZP
Bearing, female:	Silicium carbide (EN 12756)
Seals:	FEP/FKM
Temperatures:	
During product mixing, media:	max. 90°C and ensure that the media is not boiling
During product mixing, WFI:	max. 90°C and ensure that the media is not boiling
During CIP (max. 50 RPM):	max. 95 °C
During SIP (0 RPM):	max. 150 °C
Maximum speed:	
Impeller size 100:	800 RPM (80,8 Hz)
Impeller size 150:	480 RPM (48,5 Hz)
Impeller size 200:	480 RPM (82,7 Hz)
Impeller size 250:	230 RPM (39,6 Hz)
Impeller size 300:	200 RPM (34,5 Hz)

8.2 Technical data, LeviMag®

Internals:	
Product wetted parts, surface finish:	Ra < 0.8 µm, mechanical polished
Working pressure:	-1 to 7 bar(g)
Impeller diameters:	100, 150, 200, 250 & 300 mm
Weld plate:	
For impeller size 100 & 150 mm:	WP50 (clamp connection)
For impeller size 200, 250 & 300 mm:	WP81 (flange-bolt connection)
Materials:	
Impeller & weld plate:	AISI316L (UNS S31603)
Drive rotor, shaft & console:	AISI304 (UNS S30400)
Bearing, male:	Zirconia YTZP
Bearing, female:	Silicium carbide (EN 12756)
Seals:	FEP/FKM
Temperatures:	
During product mixing, media:	max. 90°C and ensure that the media is not boiling
During product mixing, WFI:	max. 90°C and ensure that the media is not boiling
During CIP (max. 50 RPM):	max. 95 °C
During SIP (0 RPM):	max. 150 °C
Maximum speed:	
Impeller size 100:	800 RPM (80,8 Hz)
Impeller size 150:	480 RPM (48,5 Hz)
Impeller size 200:	480 RPM (82,7 Hz)
Impeller size 250:	230 RPM (39,6 Hz)
Impeller size 300:	200 RPM (34,5 Hz)

8 Technical data

8.3 Drive unit data – IE4 standard blue

Gear motor:	
Gear:	High efficiency helical bevel right angle gear motor
Surface finish:	Paint coat 3.0 standard RAL 5010 Gentian blue
Maximum mounting angle:	$\alpha = 0^{\circ}$ - 22° or $\alpha = 23^{\circ}$ - 45° Angle intervals based on configuration See section 8.8 Mounting angle
Lubricant:	Note: Motor may not point downwards
Gear motor oil:	Food compatible oil USDA H1
Motor:	
Efficiency class:	IE4
Enclosure/motor protection:	IP66
Country code:	All (one type covers all)
Motor type:	Integrated Permanent Magnet Synchron Motor
Motor data:	See table 1. Motor data in section 8.10 Connection of motor
Frequency converter:	
Integrated Permanent Magnet Synchron Motor (IPMSM) which must be operated with a frequency converter for IE4 motors. The frequency converter (not Alfa Laval supply) must be ordered for the voltage available at the location of operation.	
Supply from frequency converter to motor:	217 VAC, 3.59 A

8.4 Drive unit data – IE4 clean room

Gear motor:	
Gear:	High efficiency helical bevel right angle gear motor
Surface finish:	NSD TupH Advanced
Maximum mounting angle:	$\alpha = 0^{\circ}$ - 22° or $\alpha = 23^{\circ}$ - 45° Angle intervals based on configuration See section 8.8 Mounting angle
Lubricant:	Note: Motor may not point downwards
Gear motor oil:	Food compatible oil USDA H1
Motor:	
Efficiency class:	IE4
Enclosure/motor protection:	IP66
Country code:	All (one type covers all)
Motor type:	Integrated Permanent Magnet Synchron Motor
Motor data:	See table 1. Motor data in section 8.10 Connection of motor
Frequency converter:	
Integrated Permanent Magnet Synchron Motor (IPMSM) which must be operated with a frequency converter for IE4 motors. The frequency converter (not Alfa Laval supply) must be ordered for the voltage available at the location of operation.	
Supply from frequency converter to motor, WP50:	199VAC, 2.53A
Supply from frequency converter to motor, WP81:	195VAC, 3.61A

8.5 Drive unit data – CUS Premium standard blue

Gear motor:

Gear:	High efficiency helical bevel right angle gear motor
Surface finish:	Paint coat 3.0 standard RAL 5010 Gentian blue
Maximum mounting angle:	$\alpha = 0^\circ\text{-}22^\circ$ or $\alpha = 23^\circ\text{-}45^\circ$ Angle intervals based on configuration See section 8.8 Mounting angle Note: Motor may not point downwards
Lubricant:	Food compatible oil
Gear motor oil:	USDA H1

Motor, WP50:

Frequency, nominal:	60Hz
Power, nominal:	0.37kW
Voltage, nominal:	265V
Current, nominal:	1.40A
Efficiency class:	Premium
Enclosure/motor protection:	IP66

Motor, WP81:

Frequency, nominal:	60Hz
Power, nominal:	0.75kW
Voltage, nominal:	265V
Current, nominal:	2.72A
Efficiency class:	Premium
Enclosure/motor protection:	IP66

8.6 Drive unit data – ATEX conform 2G

Gear WP50 & WP81:

Gear:	High efficiency helical bevel right angle gear motor
Surface finish:	Paint coat 3.0 standard RAL 5010 Gentian blue
Maximum mounting angle:	$\alpha = 0^\circ\text{-}22^\circ$ or $\alpha = 23^\circ\text{-}45^\circ$ Angle intervals based on configuration See section 8.8 Mounting angle Note: Motor may not point downwards
Lubricant:	Food compatible oil
Gear motor oil:	USDA H1
ATEX:	II 2G Ex h IIC T4 Gb X

Motor, WP50:

Frequency, nominal:	50Hz
Power, nominal:	0.25kW
Voltage, nominal:	230V
Current, nominal:	1.30A
Efficiency class:	IE1
Enclosure/motor protection:	IP66
ATEX	Zone 1 II2G Ex de IIC T4

Motor, WP81:

Frequency, nominal:	50Hz
Power, nominal:	0.75kW
Voltage, nominal:	230V
Current, nominal:	2.94A
Efficiency class:	IE2
Enclosure/motor protection:	IP66
ATEX	Zone 1 II2G Ex de IIC T4

Frequency converter:

The frequency converter must be set up to nominal data specified above.
The frequency converter must also be able to deliver enough power at increased required frequency found in section 4.2 Speed or 7.2 Requirements (ATEX).

8 Technical data

8.7 Drive unit data – Class1 Div1 Group D

Gear WP50 & WP81:

Gear:	High efficiency helical bevel right angle gear motor
Surface finish:	Paint coat 3.0 standard RAL 5010 Gentian blue
Maximum mounting angle:	$\alpha = 0^{\circ}\text{-}22^{\circ}$ or $\alpha = 23^{\circ}\text{-}45^{\circ}$ Angle intervals based on configuration See section 8.8 Mounting angle Note: Motor may not point downwards
Lubricant:	Food compatible oil
Gear motor oil:	USDA H1
Safety class:	Class1 Div1 Group D

Motor, WP50:

Frequency, nominal:	60Hz
Power, nominal:	0.36kW
Voltage, nominal:	208-230V/460V
Current, nominal:	2.1-2.0A/1.0A
Safety class:	LV Explosion Proof Motor

Motor, WP81:

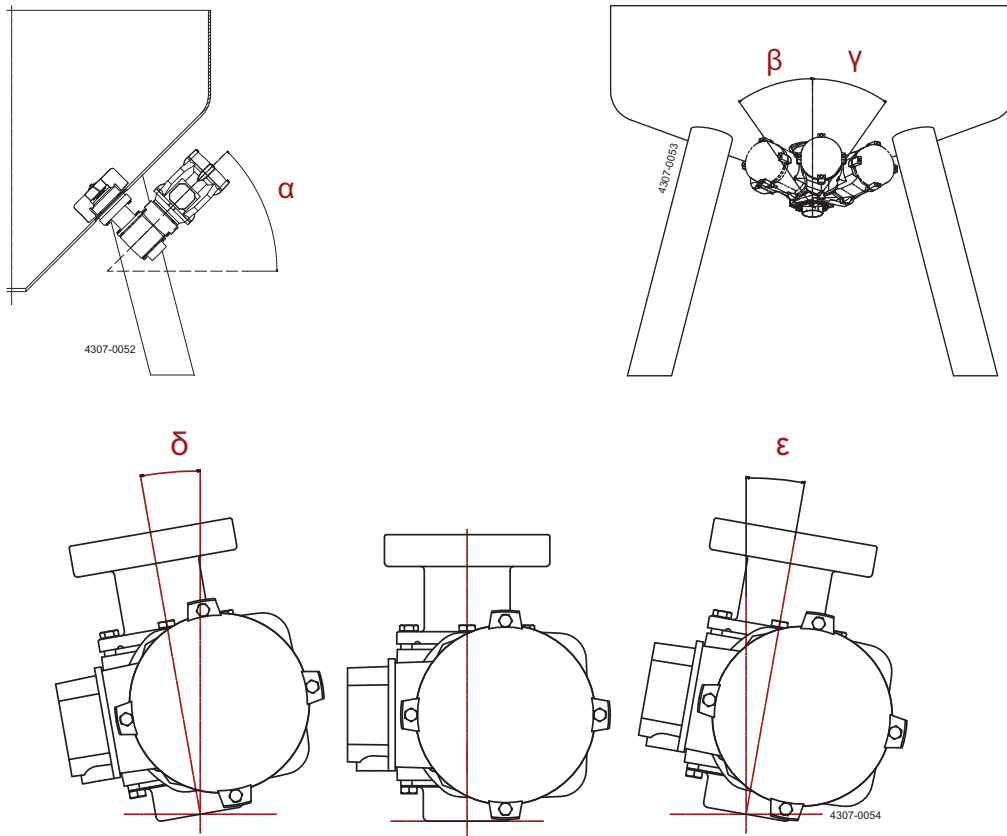
Frequency, nominal:	60Hz
Power, nominal:	1.1kW
Voltage, nominal:	230V/460V
Current, nominal:	4.4A/2.2A
Safety class:	LV Explosion Proof Motor

Frequency converter:

The frequency converter must be set up to nominal data specified above.
The frequency converter must also be able to deliver enough power at increased required frequency found in section 4.2 Speed or 7.2 Requirements (ATEX).

8.8 Mounting angle

The gear motor is filled with oil that enables it to be mounted as described below – please ensure that the position of the weld plate lives up to the requirements below.



The gear motor (position 8 in section 10.3 Drive unit - WP50 and section 10.4 Drive unit - WP81) can be selected in different configurations - and regarding mounting angles in two different configurations for α .

The gear motor should be mounted with motor pointing upwards ($\beta = 0$ and $\gamma = 0$).

If the gear motor has to be positioned slightly to the right or left ($\beta \neq 0$ or $\gamma \neq 0$) to avoid interference with tank legs or other obstructions, angle α together with β or γ will result in that the gear motor are rotated slightly to the right (ϵ) or to the left (δ).

The allowable angles for ϵ and δ are:

Designation	Angle	
	α	0°-22°
δ	max. 5°	max. 5°
ϵ	max. 5°	max. 5°

8 Technical data

8.9 Tightening torque for screwed connections

CAUTION

Do **NOT** use air powered tools.

M4	M8	M10	Clamp	Female Bearing		Male Bearing	
A2/A4-70	A2/A4-70	A2/A4-70	WP50	WP50	WP81	WP50	WP81
3Nm	26Nm	51Nm	20Nm	10Nm	30Nm	5Nm	10Nm

8.10 Connection of motor

CAUTION

The motor is for converter duty only.

CAUTION

The motor must be connected in DELTA (low voltage) to the converter.

The motor may not be started or operated with the mains supply, but may only be operated with a frequency converter.

All NORD frequency converters can operate the motors.

The motors can be operated with converter from other manufacturers. Several devices from other suppliers have been successfully tested with the motors. The user is responsible for the success of commissioning. Also, the performance of the motor, or the achievement of efficiencies which correspond to the classification depends on the converter and its function and settings.

All motor data for IE4 motors are to be found in the table below.

Table 1. Motor data, IE4

CAUTION

The synchronous motor is for converter duty only as they are designed with permanent magnets in the rotor package. The motor can only be operated by converters made for operating a IE4 motor.

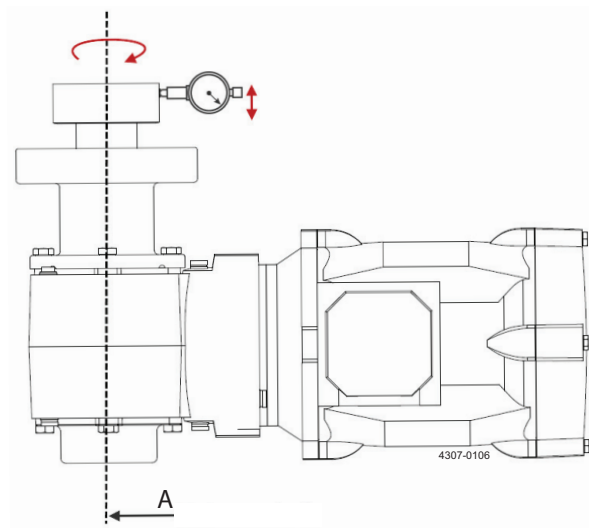
Size	WP50		WP81	
	Blue RAL 5010	Clean Room	Blue RAL 5010	Clean Room
Motor surface	80T1/4	80T1/4HMT	80T1/4	90T3/4HMT
Motor type	80T1/4	80T1/4HMT	80T1/4	90T3/4HMT
Parameter PXXX (Nord parameter number)				
P201 Nominal frequency	70Hz	70Hz	70Hz	70Hz
P202 Nominal speed	2100RPM	2100RPM	2100RPM	2100RPM
P203 Nominal current	3.59A	2.53A	3.59A	3.61A
P204 Nominal voltage	217V	199V	217V	195V
P205 Nominal power	1.1kW	0.75kW	1.1kW	1.1kW
P206 Cos phi	0.92	0.94	0.92	0.95
207 Connection	DELTA	DELTA	DELTA	DELTA
P208 Stator resistance	5.2Ω	5.2Ω	5.2Ω	2.45Ω
P209 No load current	0A	0A	0A	0A
P240 EMF voltage PMSM	186V	186V	186V	189V
P241[1] Inductivity Ld PMSM	63mH	63mH	63mH	27,5mH
P241[2] Inductivity Lq PMSM	133mH	133Mh	133mH	61mH
P243 Reluctance angle, IPMSM	10°	10°	10°	10°
P244 Peak current	10.0A	10.0A	10.0A	20.4A

8 Technical data

8.11 Measuring of total run-out

Before every mounting of the drive unit, installation and maintenance the total run-out on the drive rotor (position 1 on the drive unit) has to be measured.

Make sure the total run-out of the drive rotor surface in the radial direction is not surpassing 0.2 mm at any point on the surface. The indicator must be moved parallel to the datum axis A as the drive rotor is rotated.



A: Datum axis A

8.12 Connection to frequency converter

For programming of frequency converter please follow the converter's manual.

All required data for programming the converter can be found on the name plate of the motor or in section 8.3 Drive unit data – IE4 standard blue.- 8.7 Drive unit data – Class1 Div1 Group D and in Table 1 (section 8.10 Connection of motor).

NOTE

For ATEX option ensure the frequency converter is installed ATEX approved according to EN 60079-14 §11.2.

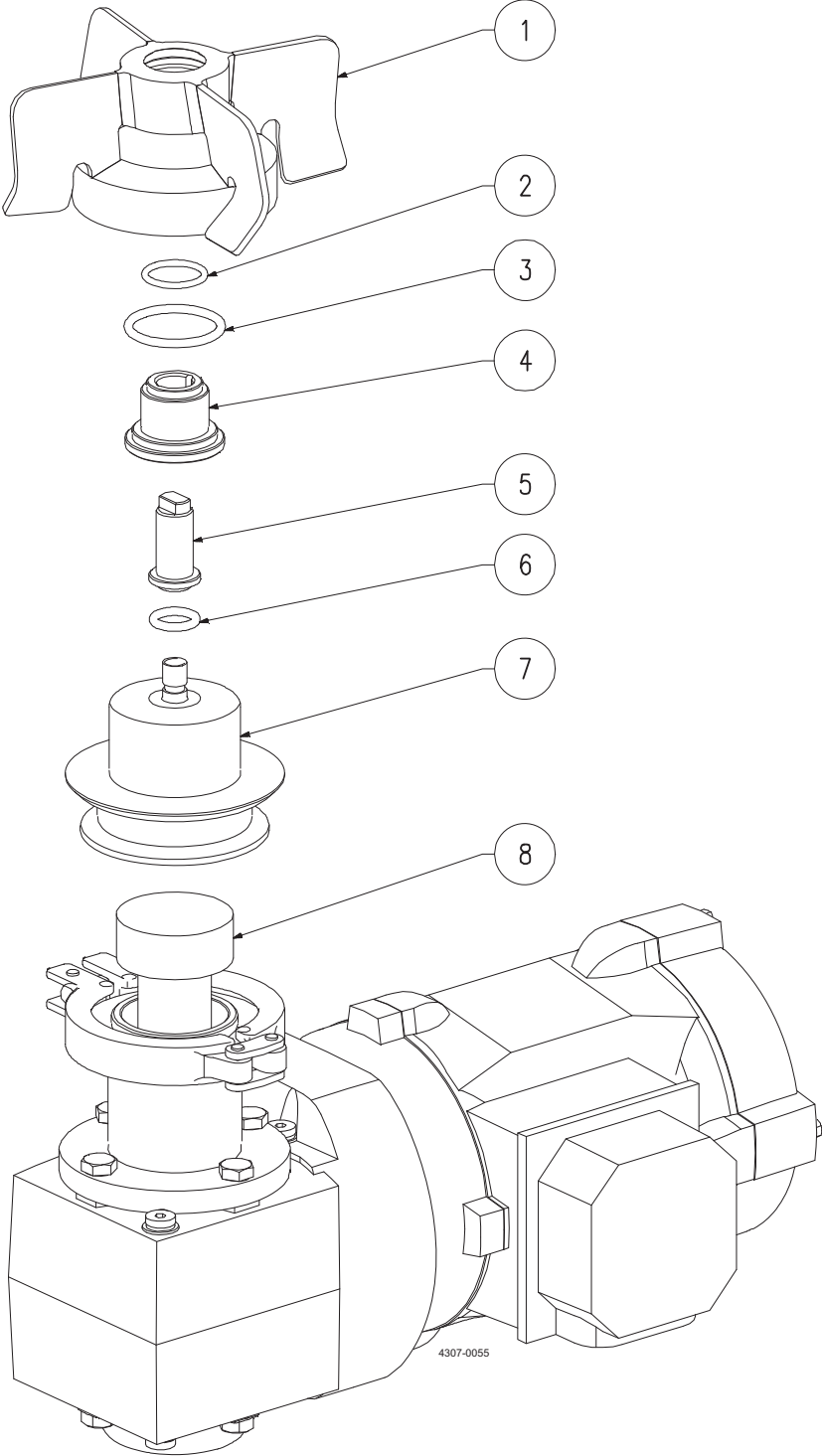
9 Trouble shooting

9.1 Troubleshooting

No	Fault	Possible Causes	Action
1	The mixer does not start.	Fault in power supply.	Check power supply.
2	The impeller does not rotate.	Male bearing or magnetic drive not mounted.	Dismount the drive unit, detach the impeller and mount the male bearing, impeller, magnetic drive and drive unit.
3	Poor motor effect.	Motor incorrectly connected. Incorrect power is connected.	Check the motor connections and that the correct power is being used. Incorrect connections and power can cause damage the motor.
4	Poor mixing.	Impeller rotating in wrong direction.	Check the installation. Check that the impeller rotates clockwise when seen from above.
5	Noise from mixer.	Incorrect installation of mixer, Worn bearings or bearings not tightened correctly to full stop.	1. Check that the impeller is levitated. 2. Check that the male bearing is seated correctly. 3. Check that the motor flange is seated completely and flush to the bottom of the weld plate. 4. Check that the impeller is rotating clockwise.
6	Noise from mixer.	Squeaking noise from bearing.	1. Lower the speed 2. Lower the temperature 3. Check bearings for wear.
7	Noise from drive unit.	Humming sounds and a high pitch sound from the motor is normal.	If there is any clinking, ticking or rattling sounds, change gear motor.
8	Magnetic coupling disconnected.	1. Mixer accelerating too quickly. 2. Speed too high for the current application.	1. Check start up (3.7 Start-up). 2. Reduce maximum speed (see 4.2 Speed).
9	Particles seated on the impeller.	Magnetic particles from associated media.	Check and take action with regard to the presence of particles or contents of associated media and raw materials. Magnetic particles are not removed during normal cleaning. The impeller must be removed and cleaned manually and separately.
10	Insufficient cleaning of the impeller.	1. Due to low fluid level. 2. Due to low speed. 3. Too high speed.	1. Increase the fluid level. 2. Increase RPM. 3. Reduce RPM to prevent vortex.

Product overview - WP50

10.1 Product overview - WP50



10 Parts lists/Service kits

Product overview - WP50

Parts list

Pos.	Qty	Denomination
1	1	Impeller
2 □	1	O-ring
3 □	1	O-ring
4 □	1	Female Bearing
5 ♦	1	Male Bearing
6 ♦	1	O-ring
7	1	Weld Plate
8	1	Drive Unit

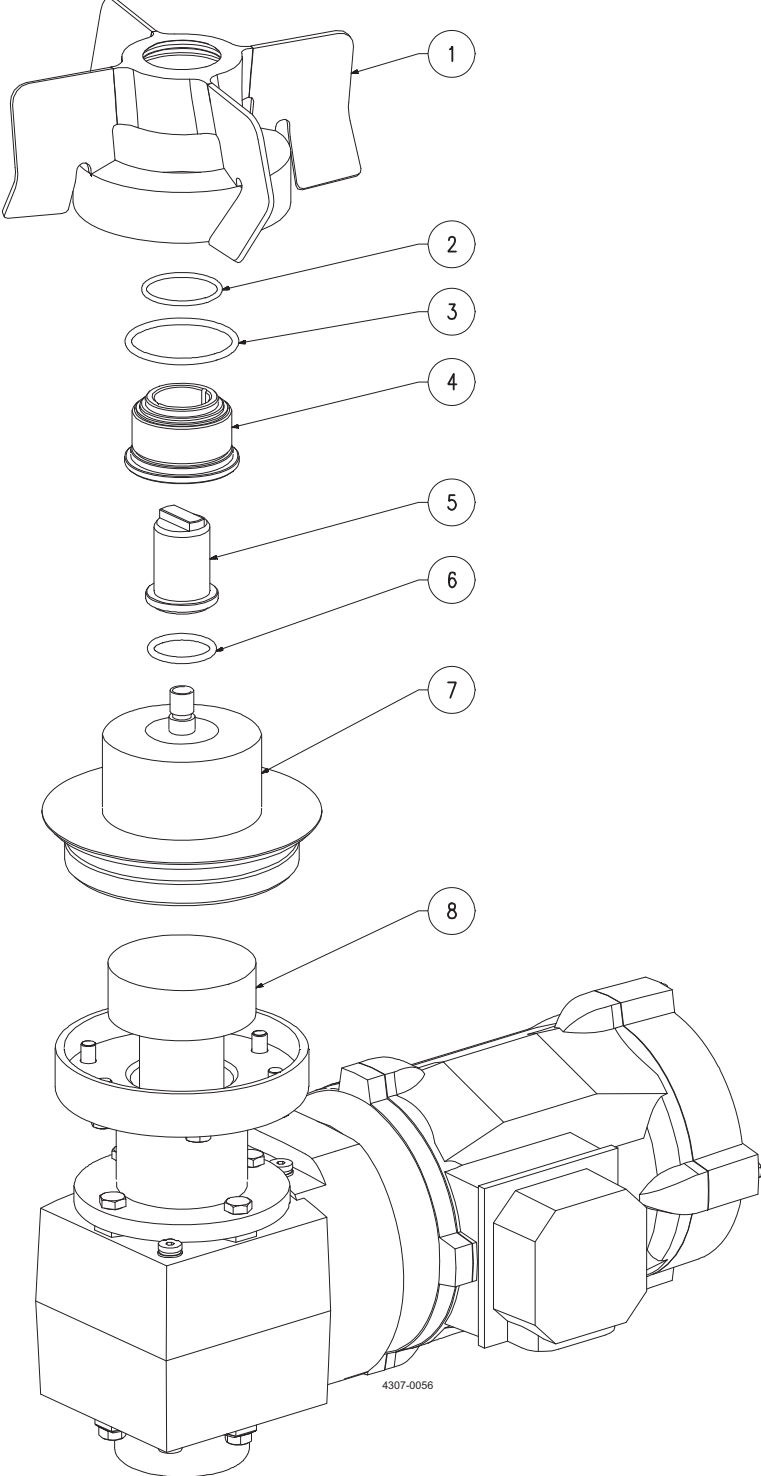
Service kits

Denomination	Item
Service kits	
□ Service kit Female bearing - incl. Female bearing tool, see 10.5 Tools	9615463201
□ Service kit Female bearing, UltraPure (Q-doc) - incl. Female bearing tool, see 10.5 Tools	9615470301
♦ Service kit Male bearing - incl. Male bearing tool, see 10.5 Tools	9615463101
♦ Service kit Male bearing, UltraPure (Q-doc) - incl. Male bearing tool, see 10.5 Tools	9615470201

For information on item numbers, please refer to the Spare part manual, available from the online Alfa Laval product catalogue Anytime or the Close at hand spare part catalogue.

Product overview - WP81

10.2 Product overview - WP81



10 Parts lists/Service kits

Product overview - WP81

Parts list

Pos.	Qty	Denomination
1	1	Impeller
2 □	1	O-ring
3 □	1	O-ring
4 □	1	Female Bearing
5 ♦	1	Male Bearing
6 ♦	1	O-ring
7	1	Weld Plate
8	1	Drive Unit

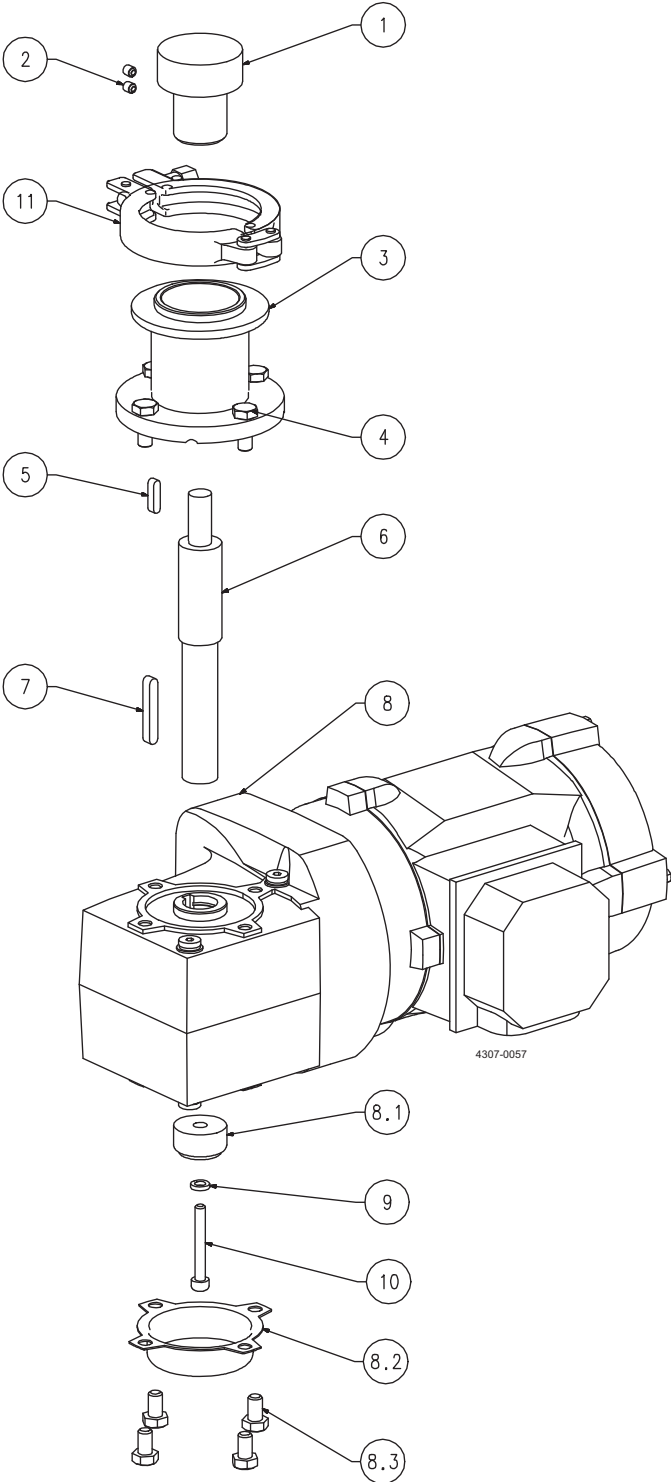
Service kits

Denomination	Item
Service kits	
□ Service kit Female bearing - incl. Female bearing tool, see 10.5 Tools	9615463001
□ Service kit Female bearing, UltraPure (Q-doc) - incl. Female bearing tool, see 10.5 Tools	9615470501
♦ Service kit Male bearing - incl. Male bearing tool, see 10.5 Tools	9615462901
♦ Service kit Male bearing, UltraPure (Q-doc) - incl. Male bearing tool, see 10.5 Tools	9615470401

For information on item numbers, please refer to the Spare part manual, available from the online Alfa Laval product catalogue Anytime or the Close at hand spare part catalogue.

Drive unit - WP50

10.3 Drive unit - WP50



10 Parts lists/Service kits

Drive unit - WP50

Parts list

Pos.	Qty	Denomination
1	1	Drive Rotor
2	2	Screw
3 □	1	Flange, length 70 mm
■	1	Flange, length 120 mm
4	4	Screw
5	1	Parallel Key
6 □	1	Shaft, length 173 mm
■	1	Shaft, length 223 mm
7	1	Parallel Key
8	1	Gear motor
8.1	1	Fastening Element*
8.2	1	Cover*
8.3	4	Screw*
9	1	Washer
10	1	Screw
11	1	Clamp

NOTE

Length "□" and "■" must match each other

NOTE

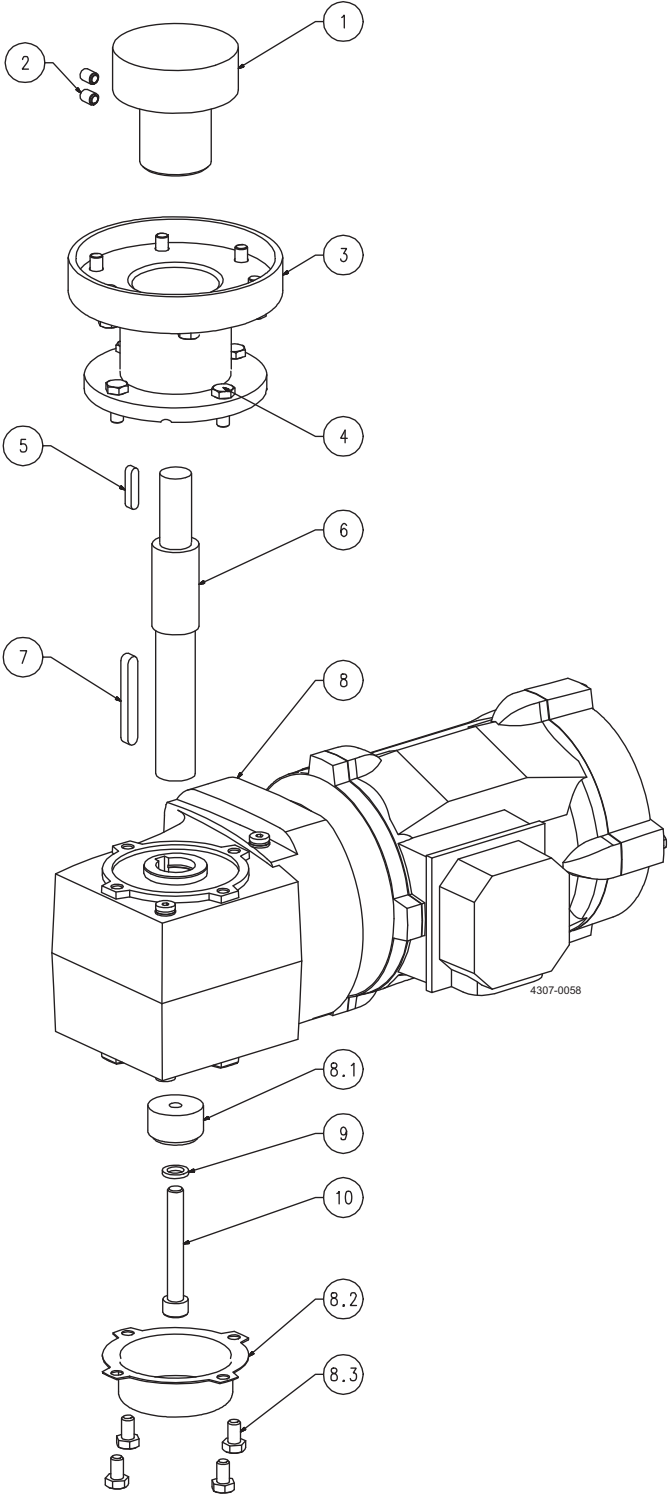
Pos. 8: See 8.8 Mounting angle

* parts are included in the gear motor

For information on item numbers, please refer to the Spare part manual, available from the online Alfa Laval product catalogue Anytime or the Close at hand spare part catalogue.

Drive unit - WP81

10.4 Drive unit - WP81



10 Parts lists/Service kits

Drive unit - WP81

Parts list

Pos.		Qty	Denomination
1		1	Drive Rotor
2		2	Screw
3	□	1	Flange, length 90 mm
	■	1	Flange, length 140 mm
4		10	Screw
5		1	Parallel Key
6	□	1	Shaft, - length 205 mm
	■	1	Shaft, - length 255 mm
7		1	Parallel Key
8		1	Gear motor
8.1		1	Fastening Element*
8.2		1	Cover*
8.3		4	Screw*
9		1	Washer
10		1	Screw

NOTE

Length “□ ” and “■” must match each other

NOTE

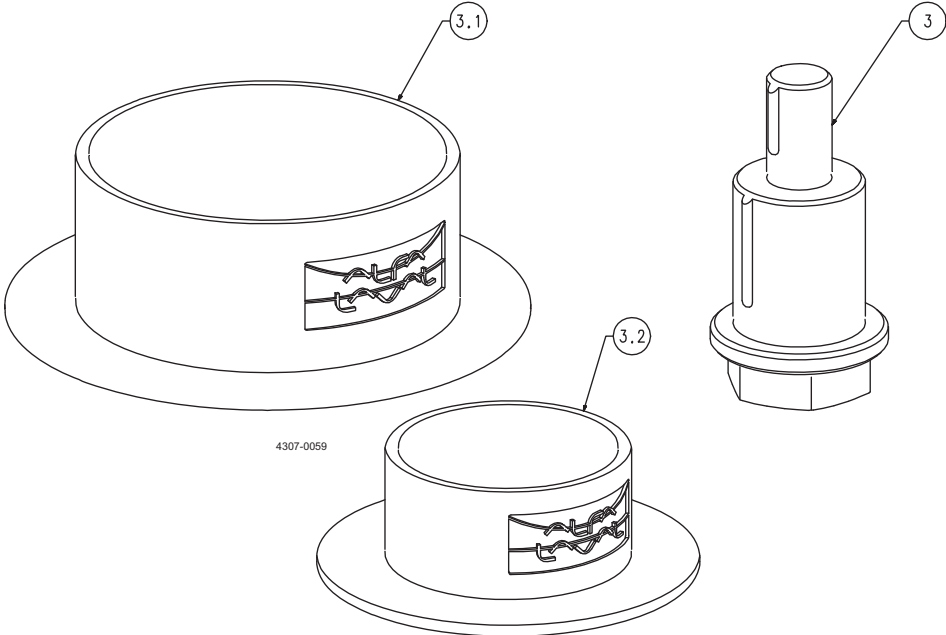
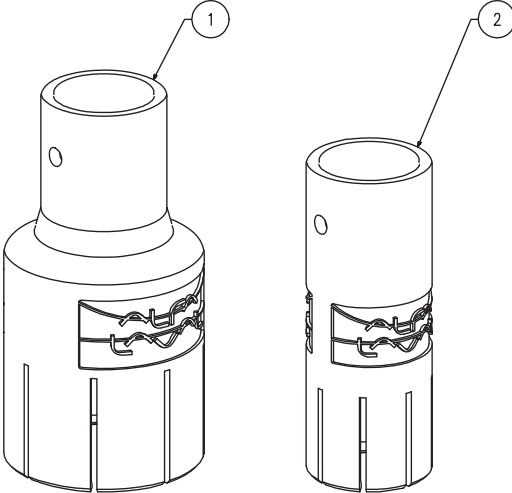
Pos. 8: See 8.8 Mounting angle

* parts are included in the gear motor

For information on item numbers, please refer to the Spare part manual, available from the online Alfa Laval product catalogue Anytime or the Close at hand spare part catalogue.

Tools

10.5 Tools



10 Parts lists/Service kits

Tools

Parts list

Pos.	Qty	Denomination
1	1	Male Bearing Tool - WP81*
2	1	Male Bearing Tool - WP50*

Parts list

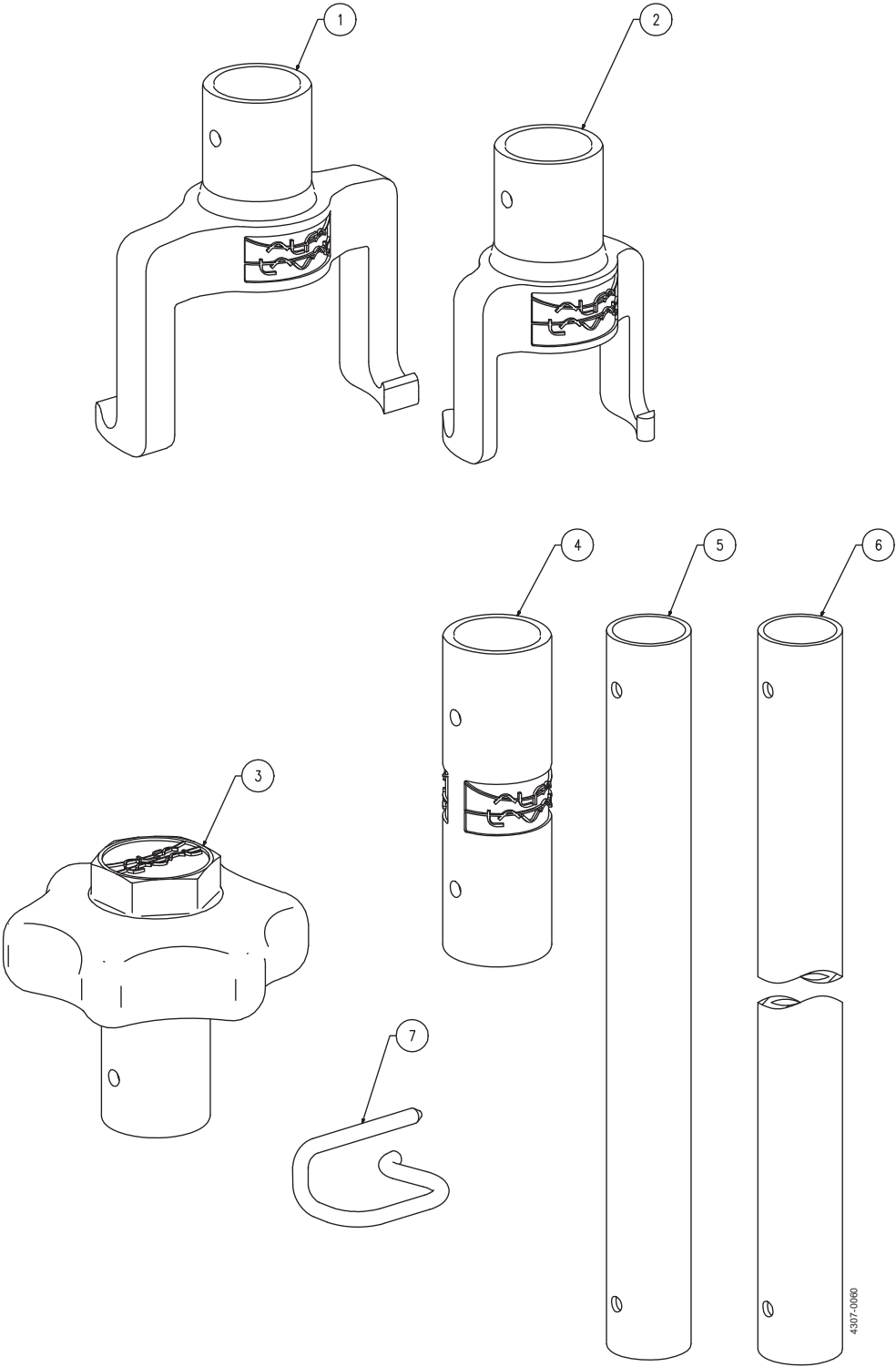
Pos.	Qty	Denomination
3	1	Female Bearing Tool kit - WP81* consisting of: Female Bearing tool
3.1	1	Protection Shield Female Bearing - WP81

Parts list

Pos.	Qty	Denomination
3	1	Female Bearing tool kit - WP50* consisting of: Female Bearing tool
3.2	1	Protection Shield Female Bearing - WP50

* Tools are included when ordering bearing Service kits.

Tools



10 Parts lists/Service kits

Tools

Parts list

Pos.	Qty	Denomination
1	1	Impeller Lifting Device WP81
2	1	Impeller Lifting Device WP50

Parts list

Pos.	Qty	Denomination
3	1	Lifting Rod Handle kit consisting of: Lifting Rod Handle
5	1	Lifting Rod 200 mm
7	2	Clip

Parts list

Pos.	Qty	Denomination
4	1	Lifting Rod kit, 700 mm consisting of: Lifting Rod Connection Piece
6	1	Lifting Rod 700 mm
7	2	Clip

Parts list

Pos.	Qty	Denomination
4	1	Lifting Rod kit, 200 mm consisting of: Lifting Rod Connection Piece
5	1	Lifting Rod 200 mm
7	2	Clip

11.1 Drive unit instructions

The drive unit is supplied by sub supplier and all-important installation requirement is transferred to this manual.

For further information regarding maintenance and storage of the drive unit please find the drive unit instruction manual by below link:

https://www.nord.com/cms/en/documentation/manuals/details_1139/detail_42075.jsp

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.

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