Rotary Jet Mixer IM-15

Tank mixers



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Instruction manual

British English

Published by
Alfa Laval Kolding A/S
Albuen 31
DK-6000 Kolding, Denmark
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The original instructions are in English

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1 Declarations of Conformity

EU Declaration of Conformity

The designated company

Alfa Laval Kolding A/S, Albuen 31, DK-6000 Kolding, Denmark, +45 79 32 22 00

Company name, address and phone number

Hereby declare that

Rotary Jet Mixer

Designation

IM15

Type

2019-0001 - 2030-99999, AAX000000001-AAX999999999

Serial number

is in conformity with the following directives with amendments:

- Machinery Directive 2006/42/EC
- ATEX Directive 2014/34/EU

The following harmonized standards are used: EN ISO 80079-36:2016, EN ISO 80079-37:2016, DS/EN ISO/IEC 80079-34:2011, Annex A, paragraph A.5.3 Rotating machines

EC Type Examination Certificate number Baseefa10ATEX0188X and IECEx BAS 19.0087X.

Marking:

II 1G Ex h IIC 85°C... 175°C Ga

II 1D Ex h IIIC T85°C... T140°C Da

The QAN (Quality Assurance Notification) is carried out by SGS Fimko Oy, Särkiniementie 3, Helsinki 00211, Finland. Notified Body No. 0598. EU Type Examination Certification is carried out by SGS Fimko Oy, Särkiniementie 3, Helsinki 00211, Finland. Notified Body no. 0598. IECEx Certificate of Conformity is carried out by Baseefa Ltd., Rockhead Business Park, Staden Lane, Buxton, Derbyshire SK17 9RZ, United Kingdom. IECEx Accepted Certification Body (ExCB).

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

Vice President Business Unit Hygienic Fluid Handling and Heat Transfer Technologies, Head of Product Management	Mikkel Nordkvist
Title	Name
Kolding, Denmark	2026-10-20
Place	Date (YYYY-MM-DD)



Signature

DoC Revison_ 01_102026 / This Declaration of Conformity replaces Declaration of Conformity dated 2022-11-08

EU Declaration of Conformity

The designated company

Alfa Laval Kolding A/S, Albuen 31, DK-6000 Kolding, Denmark, +45 79 32 22 00

Company name, address and phone number

Hereby declare that

Rotary Jet Mixer

Designation

IM15

Type

2019-0001 - 2030-99999, AAX000000001-AAX999999999

Serial number

is in conformity with the following directives with amendments:

- Regulation (EU) 2023/1230 on machinery
- ATEX Directive 2014/34/EU

The following harmonized standards are used: EN ISO 80079-36:2016, EN ISO 80079-37:2016, DS/EN ISO/IEC 80079-34:2011, Annex A, paragraph A.5.3 Rotating machines

EC Type Examination Certificate number Baseefa10ATEX0188X and IECEx BAS 19.0087X.

Marking:

II 1G Ex h IIC 85°C... 175°C Ga

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

Vice President Business Unit Hygienic Fluid Handling and Heat Transfer Technologies, Head of Product Management	Mikkel Nordkvist
Title	Name
Kolding, Denmark	2027-01-20
Place	Date (YYYY-MM-DD)

DoC Revison_02_012027

UK Declaration of Conformity

The designated company

Alfa Laval Kolding A/S, Albuen 31, DK-6000 Kolding, Denmark, +45 79 32 22 00

Company name, address and phone number

Hereby declare that

Rotary Jet Mixer

Designation

IM15

Type

2019-0001 - 2030-99999, AAX000000001-AAX999999999

Serial number

is in conformity with the following directives with amendments:

- The Supply of Machinery (Safety) Regulations 2008
- The Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016

The following harmonized standards are used: EN ISO 80079-36:2016, EN ISO 80079-37:2016, DS/EN ISO/IEC 80079-34:2011, Annex A, paragraph A.5.3 Rotating machines

UKEx Type Examination Certificate number BAS22UKEX0071X and IECEx BAS 19.0087X.

Marking:

II 1G Ex h IIC 85°C... 175°C Ga

II 1D Ex h IIIC T85°C... T140°C Da

The QAN (Quality Assurance Notification) is carried out by SGS Fimko Oy, Särkiniementie 3, Helsinki 00211, Finland. Notified Body No. 0598. EU Type Examination Certification is carried out by SGS Fimko Oy, Särkiniementie 3, Helsinki 00211, Finland. Notified Body no. 0598. IECEx Certificate of Conformity is carried out by Baseefa Ltd., Rockhead Business Park, Staden Lane, Buxton, Derbyshire SK17 9RZ, United Kingdom. IECEx Accepted Certification Body (ExCB).

Signed on behalf of: Alfa Laval Kolding A/S.

Vice President Business Unit Hygienic Fluid Handling and Heat Transfer Technologies, Head of Product Management	Mikkel Nordkvist
Title	Name
Kolding, Denmark	2026-10-20
Place	Date (YYYY-MM-DD)

Signature

DoC Revison_02_102026

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2 Safety

Read this first





This Instruction Manual is designed for operators and service engineers working with the supplied Alfa Laval product.

Operators must read and understand the ***Safety, Installation and Operating*** instructions of the supplied Alfa Laval product before carrying out any work or before you put the supplied Alfa Laval product into service!

Not following the instructions can result in serious accidents.

This documentation describes the authorized way to use the supplied Alfa Laval product. Alfa Laval will take no responsibility for injury or damage if the equipment is used in any other way.

This Instruction Manual is designed to provide the user with the information to perform tasks safely for all phases in the lifetime of the supplied Alfa Laval product.

The operator shall always read the chapter ***Safety*** first. Hereafter the operator can skip to the relevant section for the task to be carried out or for the information needed.

Always read the chapter ***Technical Data*** thoroughly.

This is the complete Instruction Manual for the supplied Alfa Laval product.

NOTE

The illustrations and specifications in this Instruction Manual were effective at the date of printing. However, as continuous improvements are our policy, we reserve the right to alter or modify the Instruction Manual without prior notice or any obligation.

The English version of the Instruction Manual is the original manual. Alfa Laval cannot be held responsible for incorrect translations. In case of doubt, the English version applies.

2.1 Safety signs

Mandatory action signs

	General mandatory action sign.
	Refer to instruction manual.
	Use eye protection - safety glasses.
	Use protective hand wear - safety gloves.
	Wear protective equipment - safety helmet.
	Use ear protection in noisy environments - noise protector.
	Wear protective equipment - safety shoes.

Warning Signs

	General warning.
	Corrosive substance.
	Hot surface and burning danger.
	Cutting danger.
	Heavy object lifting.
	Transportation with forklift truck or other industrial vehicles if heavy.
	Explosive material.
	Electricity.
	Sharp element.
	Crushing of hands.

2.2 Safety precautions

All warnings in the Instruction manual are summarised in this section. Pay special attention to the instructions below so that severe personal injury and/or damage to the supplied Alfa Laval Product is avoided.

Transportation and lifting

 	**Always** ensure that personnel must have experience with lifting operations. **Always** ensure that the personnel use the correct protective equipment.
	**Always** ensure that compressed air is released.
	**Always** ensure that all connections are disconnected before attempting to remove the machine from the installation.
 	**Always** use predesigned lifting points if defined. Ensure that the lifting equipment is suitable for the machine. **Always** ensure the lifting point to be in line with centre of gravity. Adjust lifting point if necessary. **Always** use appropriate lifting equipment for heavy parts when relevant. Use lifting logs when available.
	**Always** keep an eye on the load and stay clear during the lifting operation.
	**Always** drain liquid out of the machine before transportation.
	**Always** ensure sufficient fixing of the machine during transportation - if specially designed packaging material is available, it must be used.
	**Always** use original packaging or similar during transportation.

Installation

	**Always** follow this Instruction manual thoroughly. Before installing the machine and setting it into operation carefully read *Safety* on page 9, *General safety and installation instructions* and *Operation* on page 35.
	**Ensure** that the machine is compatible with the product and CIP media.
	**Never** dismantle or touch the machine or pipelines when processing hot fluids or when sterilising.
	**Ensure** that the tank being cleaned does not contain a combustible liquid or vapor having a risk of ignition or explosion. Any tank cleaning machine can develop a static electricity charge while in operation.
	**Always** ensure all pipelines (product, air, and water) are depressurized and emptied before installation, inspection, assembling and disassembling. **Always** assemble the machine completely before start and make sure everything is in place and properly tightened.

Operation

	**Always** follow this Instruction manual thoroughly. Before installing the machine and setting it into operation carefully read *Safety* on page 9, *General safety and installation instructions* and *Operation* on page 35.
	**Ensure** that the machine is compatible with the product and CIP media. **Always** take necessary precautions if leakage occurs as this can lead to hazardous situations. If the liquid or vapor is hot, corrosive, or toxic, a leak would present a serious hazard to any personnel in the immediate vicinity or to any exposed electrical equipment. **Always** rinse well with clean water after cleaning. **Always** handle lye and acid with great care. **Always** follow the instructions in the safety data sheets from the suppliers of cleaning agents, detergents, oils etc.
	**Never** operate the machine unless it is properly mounted or installed.
	**Never** dismantle or touch the machine or pipelines when processing hot fluids or when sterilising.
	**Ensure** every tank opening is covered before operating the tank cleaning device. These covers should be sealed well enough to withstand the full force of the liquid hitting the covers.

Maintenance

	**Always** follow this Instruction manual thoroughly. Before maintaining the machine, carefully read *Maintenance* on page 37.
	**Always** rinse well with clean water prior to maintenance.
	**Always** ensure all pipelines (product, air, and water) are depressurized and emptied before installation, inspection, assembling and disassembling. **Always** assemble the machine completely before start and make sure everything is in place and properly tightened.
	**Never** dismantle or touch the machine or pipelines when processing hot liquids or when sterilising.

Storage

	Alfa Laval recommends: • Store the supplied Alfa Laval product as supplied in original packaging • Port opening(s) should be protected against ingress • Bare steel (not stainless) should be lightly oiled/greased • Store in a clean, dry place without direct sunlight or UV light • Temperature range -5°C to +40°C (23°F - 104°F) • Relative humidity less than 60%
	• No exposure to corrosive substances (including contained air) • Rinse the supplied Alfa Laval product with clean water before storage

Hazards

 	**Burn Hazard** Various surfaces of the supplied Alfa Laval product and CIP supply line can be hot and cause burns. Wear protective gloves.

  	**Corrosive Hazard** **Always** handle cleaning liquids (e.g., lye and acid) with great care and in accordance with separate instructions for those fluids. **Always** follow the general rules and recommendations regarding ventilation, personnel protection etc. when using chemical cleaning agents and lubricants.

Safety check

	A visual inspection of any protective device (shield, guard, cover or other) on the supplied Alfa Laval product shall be carried out at least every 12 months. If the protective device is lost or damaged, especially when this leads to deterioration of safety performance, it shall be replaced. The fixing of the protective device should only be replaced with fixings of the same or an equivalent type. **Inspection acceptance criteria:** • It should not be possible to reach moving parts originally protected by a protective device • The protective device must be securely mounted • Ensure that screws for the protective device are securely tightened **Procedure in case of non-acceptance:** • Fix and/or replace the protective device

2.3 Warning Signs in Text

Pay attention to the safety instructions in this Instruction Manual.

Below are definitions of the four grades of warning signs used in the text where there is a risk for injury to personnel or damage to the supplied Alfa Laval product.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate damage to the supplied Alfa Laval product.

NOTE

Indicates important information to simplify or clarify procedures.

2.4 Requirements of personnel

Operators

The operators shall read and understand this Instruction Manual.

Maintenance personnel

The maintenance personnel shall read and understand this Instruction Manual. The maintenance personnel or technicians shall be skilled within the field required to carry out the maintenance work safely.

Trainees

Trainees can perform tasks under the supervision of an experienced employee.

People in general

The public shall not have access to the supplied Alfa Laval product.

In some cases, specially skilled personnel may need to be hired (i.e. electricians, welders). In some cases the personnel has to be certified according to local regulations with experience of similar types of work.

2.5 Recycling information

Unpacking

Packing material may consist 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 (if used) and wear parts in the supplied Alfa Laval product should be replaced.

- Oil and all non-metal wear parts must be disposed of in accordance with local regulations
- Rubber and plastics should be burnt at a licensed waste incineration plant. If not available they should be disposed of in accordance with local regulations
- Bearings and other metal parts should be sent to a licensed handler for material recycling
- Seal rings and friction linings should be disposed of to a licensed land fill site. Check your local regulations
- All metal parts should be sent for material recycling
- Worn out or defected electronic parts should be sent to a licensed handler for material recycling

Scrapping

At end of use, the equipment must be recycled in accordance with 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.

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.

3 Introduction

The Alfa Laval IM 15 Rotary Jet Mixer effectively handles liquid mixing, gas dispersion, powder mixing, and tank cleaning while reducing mixing time, energy consumption and costs.

Patented technology based on proven Rotary Jet Head technology, it provides quick, efficient and uniform mixing without any batch rotation or the use of baffles. It also ensures greater process flexibility, making it easy to switch to new product formulations with diverse viscosities, densities and volumes.

3.1 Introduction

This manual has been prepared as a guide for the persons who will be operating and maintaining your Rotary Jet Mixer IM-15. The key to long life for your mixer will always be a system of carefully planned maintenance procedures; you will appreciate that a mixer which has a rough job to do will need more frequent attention than one working in ideal conditions.

NOTE

Get the best and most economical performance from your tank cleaning machine. Insufficient preventive maintenance means poor performance, unscheduled stops, shorter lifetime and extra costs. Good preventive maintenance on the contrary means good performance, no unscheduled stops and superior total economy.

You will find the information contained in this manual simple to follow, but should you require further assistance, our Technical Department will be pleased to help you. Please quote the type and serial number with all your enquiries; this will help us to help you. The type and serial number are placed on the gear house of the mixer.

NOTE

The illustrations and specifications contained in this manual were effective at the date of printing. However, as continuous improvements are our policy, we reserve the right to alter or modify any unit specification on any product without prior notice or any obligation.

WARNING

Before installing the machine and setting it into operation carefully read *General safety and installation instructions*, *Specific conditions for safe use in accordance with ATEX* on page 30 and *Safety precautions* on page 12 and take all necessary precautions according to your application and local regulations.

The English version of the instruction manual is the original manual. We make reservations in regard to possible mistranslations in language versions of the instruction manual. In case of doubt, the English version of the instruction manual applies.

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3.2 Marking

Alfa Laval Rotary Jet Mixers are marked to allow for recognition of type of machine, machine name, serial number and manufacturing address. The marking is placed on the gear house of the mixer.



OR



Serial number designation

Machines supplied with standard documentation:

yyyy-xxxxx: serial number

yyyy: year

xxxxx: 5 digit sequential number

OR

Serial number designation

AAXxxxxxxxxx

(three letters plus up to nine digits)

3.3 ATEX/IECEx marking

The Rotary Jet Mixer IM-15 is certified as category I component. The ATEX certification is carried out by the Notified Body SGS Fimko Oy, who has issued the certificate no. Baseefa10ATEX0188X.

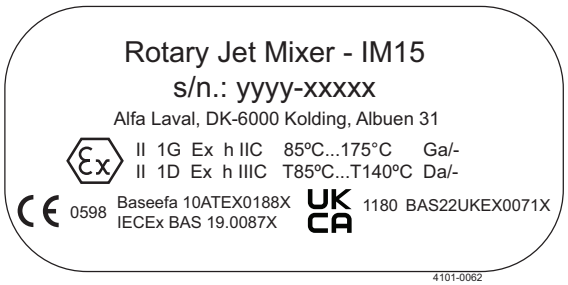
The IECEx certification is carried out by the Certification Body SGS Baseefa Ltd., who has issued the certificate no. IECEx BAS 19.0087X.

The UKEx certification is carried out by the Certification Body SGS Baseefa Ltd., who has issued the certificate number BAS22UKEX0071X.

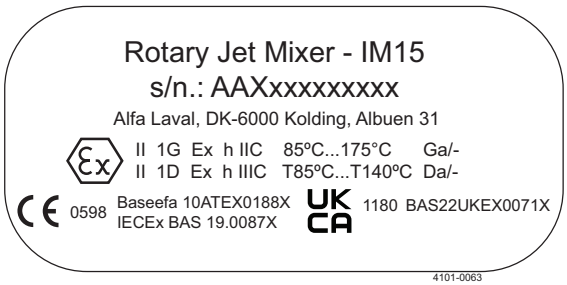
NOTE **Note!**

Explosion protection type is constructional safety "c".

The marking on the ATEX/IECEx certified Rotary Jet Mixer IM-15 is as follows (for information on marking position and serial number designation see *Marking* on page 20):



OR



3.4 ATEX/IECEx temperature class and code

The maximum surface temperature depends mainly on operating conditions which are the temperature of the cleaning/mixing fluid and the ambient temperature.

Group II EPL Ga

The gas temperature class is corrected with a safety margin of 80% due to a requirement for Group II EPL Ga equipment. The gas temperature class depends on the cleaning/mixing fluid temperature or the ambient temperature, whichever of the two is the highest.

Table for determining temperature class (gas atmospheres)

Gas **Temperature class**	**Cleaning/mixingfluid temperature,** **T_p (°C)**	**Ambient temperature,** **T_{amb} (°C)**
85°C (T6)	≤ +68°C	≤ +68°C
100°C (T5)	≤ +80°C	≤ +80°C
135°C (T4)	≤ +108°C	≤ +108°C
175°C	≤ +140°C	≤ +140°C

Group III EPL Da

The dust temperature class depends on the cleaning/mixing fluid temperature or the ambient temperature, whichever of the two is the highest.

No dust layer is considered.

Table for determining temperature class (dust atmospheres)

Dust **Temperature code**	**Cleaning/Mixingfluid temperature,** **T_p (°C)**	**Ambient temperature,** **T_{amb} (°C)**
T85°C	≤ +85°C	≤ +85°C
T100°C	≤ +100°C	≤ +100°C
T135°C	≤ +135°C	≤ +135°C
T140°C	≤ +140°C	≤ +140°C

Example of gas class determination

Cleaning/mixing fluid temperature is 67°C and ambient temperature is 75°C.

Gas class = T5

ATEX/IECEx marking on the equipment:

II 1G Ex h IIC 85°C... 175°C Ga

II 1D Ex h IIIC T85°C... T140°C Da

3.5 Intended use

It is to be verified by the end-user:

- that the rotary jet mixer is in conformity with respect to tank, vessel or container size in which it will be used.
- that the construction materials (both metallic and non-metallic) are compatibility with product, flushing media, cleaning media, temperatures and pressure under the intended use.

The rotary jet mixer is intended for use in closed tank, vessel or container. If used in open environment see *General safety and installation instructions*.

3.6 Patents and trademarks

This Instruction Manual is published by Alfa Laval Kolding A/S without any warranty. Improvements and changes to this Instruction Manual may at any time be made by Alfa Laval Kolding A/S without prior notice. Such changes will, however, be incorporated in new editions of this Instruction Manual.

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4 Installation

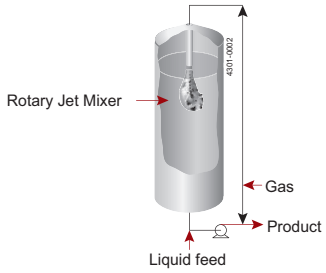
4.1 General description

The Rotary Jet Mixer IM-15 is a media driven and media lubricated tank/reactor mixer. All materials are selected for contact with food, and the machine is self-cleaning i.e. all internal and external surfaces are cleaned.

For use in explosive hazard zones the Rotary Jet Mixer IM-15 ATEX/IECEx version can be used, provided it is installed according to safety instructions in local regulations.

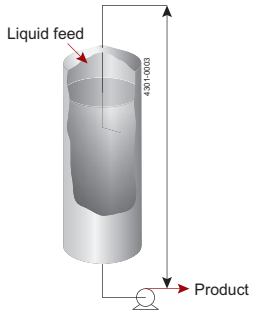
The Rotary Jet

Mixing technology

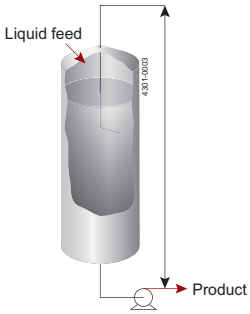


Traditional Mixing technology

Round pumping



Propeller mixing

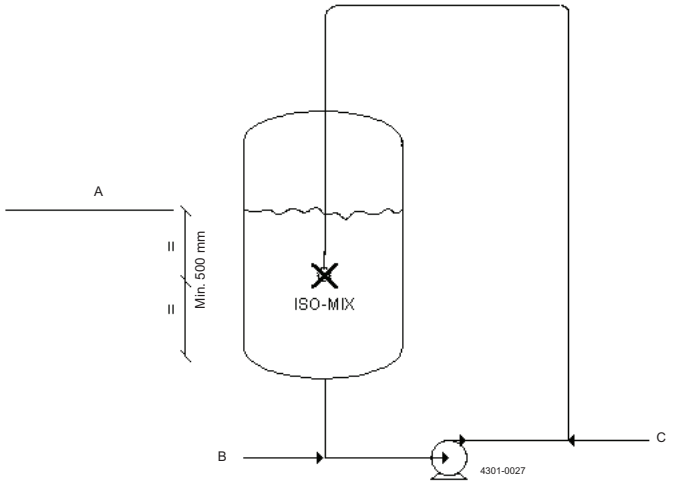


4.2 Functioning

The Rotary Jet Mixer IM-15 is placed inside the tank/reactor under the liquid surface of the liquid volume to be mixed.

The mixer is combined with an external recirculation loop. The fluid of the tank/reactor is recirculated through this loop and reintroduced in the tank/reactor through the Rotary Jet Mixer IM-15. The more fluid being recirculated, the more effective mixing is obtained.

The mixer should be placed in the centre of the fluid to be mixed. Minimum ½ m under the liquid surface.



A: normal liquid level

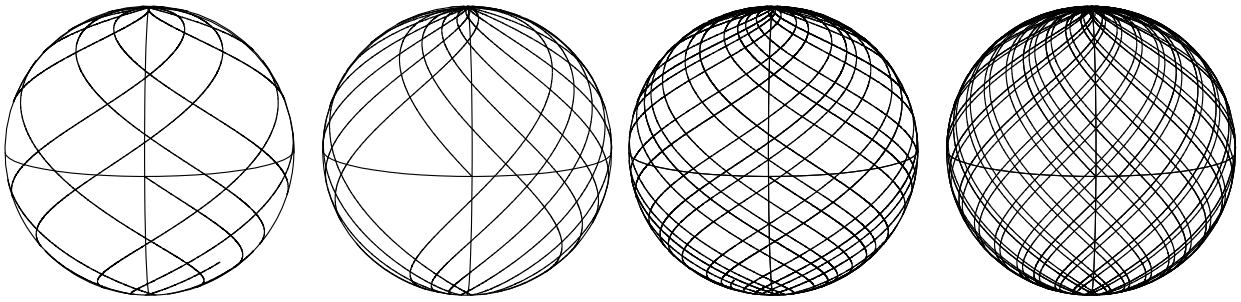
B: Possible liquid or powder supply

C: Possible gas supply

The flow of fluid to be mixed passes from the tank into the mixer through a turbine, which is set into rotation. The turbine rotation is through a gearbox transformed into a combined horizontal rotation of the mixer body and a vertical rotation of the nozzles.

Machines with 2 nozzles

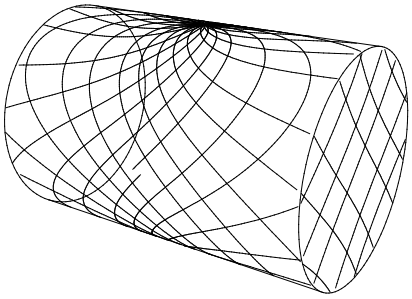
The combined motion of the mixer body and the nozzles ensures a fully indexed tank mixing. After 11¼ revolutions of the Hub with nozzles (10¾ revolutions of the mixer body), one coarse movement pattern has been established which when projected on the tank surface looks as Figure 1. During the following cycles, this pattern is repeated 3 times, each of which is displaced ¼ of the mesh in the pattern. After a total of 45 revolutions of the Hub with nozzles (43 revolutions of the machine body), a complete "mixing pattern" has been laid out, and the first pattern is repeated. This feature eliminates "dead volumes" in the tank, and makes the Rotary Jet Mixer IM-15 very efficient automatic tank cleaning machine, when the tank is empty.



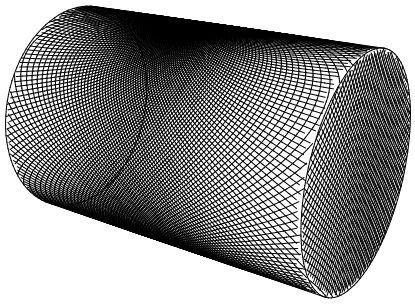
First cycle Second cycle Third cycle Forth cycle

Machines with 4 nozzles

The combined motion of the mixer body and the nozzles ensures a fully indexed tank mixing. After 5⅝ revolutions of hub with nozzles (5⅝ revolutions of the mixer body), one coarse movement pattern has been established which when projected on the tank surface looks as figure 1. During the following cycles, this pattern is repeated 7 times, each of which is displaced ⅛ of the mesh in the pattern. After a total of 45 revolutions of the hub with nozzles (43 revolutions of the mixer body), a complete mixing pattern has been established, and the first pattern is repeated. This feature eliminates "dead volumes" in the tank, and makes the Rotary Jet Mixer IM-15 a very efficient automatic tank cleaning machine, when the tank is empty.



First cycle



Full pattern

General for both 2 and 4 nozzle machines

The speed of rotation of the turbine depends on the flow rate through the mixer. The higher the flow rate is, the higher the speed of rotation will be. In order to control the RPM of the mixer for a wide range of flow rates, the efficiency of the turbine can be changed by using 100% or 0% turbine/inlet guide.

Apart from the jet flow through the nozzles, fluid is leaking through the top of the mixer, at the hub and through the bottom cover. The leakages between the moving parts at the top and at the hub are cleaning the gabs and thus preventing build-up of material that might cause extra friction. The flow through the bottom cover is required to ensure proper lubrication of the gearbox.

The number of rotations required for a satisfactory mixing of a given tank volume depends on the energy input (kw/m^3 tank volume), the viscosity of the liquid, required mixing time, and number of mixers per tank.

It is possible to add fluid, gas or solids in the recirculation loop. These ingredients will very effectively be mixed into the entire tank/reactor volume.

When the tank/reactor is empty the Rotary Jet Mixer IM-15 can be used as a tank cleaning machine.

4.3 General safety and installation instructions

The Rotary Jet Mixer IM-15 should be installed in vertical position (upright or upside down). It is recommended to install a filter in the supply line in order to avoid large particles to clog inside the machine. Before connecting the mixer into the system, all supply lines and valves should be flushed to remove foreign matter.

For devices with tapered thread connections to the down pipe, it is recommended that you secure the connection in a manner appropriate for the application. Subject to the intended use environment and any inhouse user requirements or policies, a liquid thread locking adhesive such as Loctite No. 243 or equivalent could be used. Other methods could be acceptable and subject to customer preference.

NOTE

The machine shall be installed in accordance with national regulations for safety and other relevant regulations and standards. In EU-countries the complete system must fulfil the EU-Machine Directive and depending of application, the EU-Pressure Equipment Directive, the EU-ATEX/IECEx Directive and other relevant Directives and shall be CE-marked before it is set into operation.

Electrical equipment such as magnetic valves and electric actuators must not be installed in Ex-zones without type approval and marking, corresponding to the EX-class in question.

WARNING

Precautions shall be made to prevent starting of the mixing operation, while personnel are inside the tank or otherwise can be hit by jets from the nozzles.



For information on use in potential explosive atmospheres see *Specific conditions for safe use in accordance with ATEX* on page 30.

The Rotary Jet Mixer IM-15 as delivered has been tested at the factory before shipping. For transportation reasons, the nozzles have been screwed off after the test. In order to secure the nozzles against falling off during normal cause of service due to vibrations and other external strains it is important that the nozzles are tightened properly after mounting. If not, the nozzles may be blown off during mixing and cause damage on tank, valves and pump. This is especially important if mixers are installed in tanks and vessels within the transportation sector in trucks, railcars and onboard ships.

Normally, it is sufficient to tighten the nozzles with the specified torque. However, depending on the application and local policies extra securing may be preferred.

With 2 Nozzles:

Clamp machine firmly in a vice:

1. Place machine on top of vice with Hub w. nozzles down wards as illustrated on the figure. Clamp on the Hub. To protect machine use rubber jaws on the vice.
2. Set torque wrench at the specified tightening torque.
3. Tighten nozzle with the torque.



TD523569



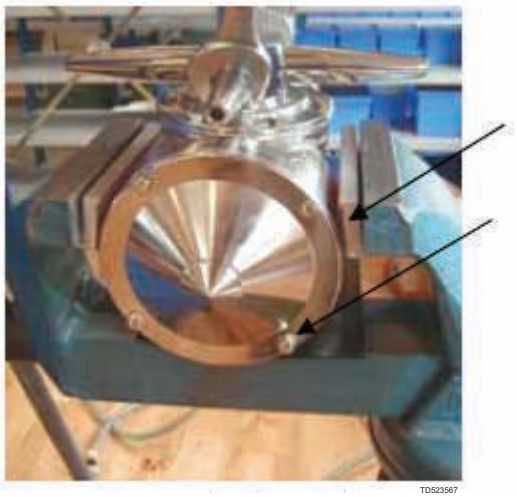
TD523570

Recommended tightening torque: 50 Nm.

With 4 Nozzles:

Clamp machine firmly in a vice:

1. Place machine on top of vice with Hub w. nozzles down wards as illustrated on the figure. Clamp on the Hub. To protect machine use rubber jaws on the vice.
2. Set torque wrench at the specified tightening torque.
3. Hold one nozzle with flat spanner to counteract while tightening the opposite nozzle with the torque wrench.



TD523567

Rubber jaw mounted upside down

Protect with rubber pad



TD523568

Recommended tightening torque: 50 Nm.

Method for tightening the nozzles

Check that the machine is in operating condition by inserting 3/16" hex Screwdriver (tool No. TE134A) in screw in top of Turbine shaft and easily turn Turbine shaft clockwise. If any resistance is recognised, the machine should be disassembled to localise the cause.

4.4 Specific conditions for safe use in accordance with ATEX

Directive 2014/34/EU

NOTE **Explosion protection type**

Explosion protection type is constructional safety "c".

Warning: **Operated in a hazardous area**

The unit may be operated in a hazardous area only when completely filled with cleaning/mixing fluid/steam.

If a medium other than the mixing/cleaning fluid/steam is passed through the equipment the flow must not be high enough to cause the equipment to operate.

Warning: **Operating guidance**

The unit shall be operated in line with guidance provided by IEC/TS 60079-32-1 for tank cleaning.

Warning: **Temperature class and ambient temperature range**

The maximum surface temperature depends mainly on operating conditions which are the temperature of the mixing/cleaning fluid and ambient temperature.

The temperature class and ambient temperature range are shown in *ATEX/IECEx temperature class and code* on page 22.

Warning: **Max. permitted temperature**

When working: The maximum permitted cleaning fluid temperature and ambient temperature is 95°C.

When not working: The maximum permitted ambient temperature is 140°C.

Warning: **Draining using compressed air**

Draining using compressed air must not be done in ex classified zone.

Draining using compressed air is possible in non ex classified zone, see *Normal operation* on page 35

Warning: **Earthing**

All metal and other conductive or dissipative material should be connected to earth except for very small items.

For further information see IEC/TS 60079-32-1:2013 Explosive atmospheres – Part 32-1: Electrostatic hazards, guidance.

With focus on clause 6.2.3, 7.2.1, 7.3, 7.9.2, 13.

Warning: **Earthed when in use**

The unit must be effectively earthed at all times when in use.

Warning:



Max. permitted steaming temperature

The maximum permitted steam temperature through the machine and ambient temperature is 140°C.

Warning:



Steaming tanks larger than 100 m^3

Tanks with capacities larger than 100 m^3 that could contain a flammable atmosphere should not be steam cleaned, as steam cleaning tanks produces an electrostatically charged mist.

Tanks smaller than 100 m^3 may be steam cleaned.

For further information see IEC/TS 60079-32-1:2013 Explosive atmospheres – Part 32-1: Electrostatic hazards, guidance.

With focus on clause 7.10.5 and 8.5.

Warning:



Tank size information

The tank cleaning machine has been certified by accredited notified body and can operate in tanks having an enclosed volume up to 100 m^3 as long as all ATEX warnings in the instruction manual are complied with.

General guidelines for tanks larger than 100 m^3:

Tanks larger than 100 m^3 must not be steam cleaned – See guide IEC/TS 60079-32-1:2013 clause 7.10.5 and 8.5.

To use the unit in tanks larger than 100m^3 is possible under certain conditions.

It is necessary to know the current factors such as tank size, cleaning solvent and product.

Additives can be used in the cleaning solvent, or, for example, the tank can be filled with nitrogen. The basic guidelines are described in the guide IEC/TS 60079-32-1:2013.

It must be ensured that the equipotential bonding of all conductive metal objects is in accordance with national regulations for use.

The cleaning fluid conductivity must correspond to the products in the group "High conductivity", cf. IEC/TS 60079-32-1:2013 clause 7.1 and 7.2.

high conductivity > 10 000 pS/m;

medium conductivity between 25 × εr pS/m and 10 000 pS/m;

low conductivity < 25 × εr pS/m.

For liquids with a dielectric constant of around 2, (e.g. hydrocarbons), these classifications reduce to:

high conductivity > 10 000 pS/m;

medium conductivity between 50 pS/m and 10 000 pS/m;

low conductivity < 50 pS/m.

Following a guidance document such as IEC/TS 60079-32-1:2013 to establish safe use of machinery and process is the users own responsibility and is not covered by the ATEX certification for this unit except for tanks up to 100m^3.

For further information see IEC/TS 60079-32-1:2013 Explosive atmospheres – Part 32-1: Electrostatic hazards, guidance with focus on clause 7.1.3, 7.1.4, 7.2.1, 7.2.4.

Warning:



Process generated electrostatic

The user must address the electrostatic hazards generated from the process of the equipment in accordance with guidance document IEC/TS 60079-32-1:2013.

Warning:



Electrostatically charged liquid

Liquids can become electrostatically charged when they move relative to contacting solids or the spraying of liquids can also create a highly charged mist or spray. The liquid must be made electrically conductive by additives or otherwise.

For further information see IEC/TS 60079-32-1:2013 Explosive atmospheres – Part 32-1: Electrostatic hazards, guidance.

With focus on clause 7.1.3, 7.1.4, 7.2.1, 7.2.4.

Warning:



Appropriate cleaning fluid

The cleaning fluid should be appropriate for the application (e.g. so no chemical reaction can take place between the cleaning fluid and the residue of process fluid/powder/compound which can generate heat or a hybrid mixture).

Chemical reactions in Zone 20 - Hybrid mixtures:

End-user must ensure that the cleaning fluid used does not create a hybrid mixture according to IEC 60079-10-1:2015 Annex I.1 in connection with powder / dust residues in the tank in zone 20.

This should ensure that the atmosphere does not change to a classification that lies outside the machine's certified scope. When the machine is used for cleaning tanks containing potentially flammable dust atmospheres, and a potentially flammable fluid is used as the cleaning fluid then an assessment of the hybrid mixture shall be undertaken by the user, prior to operation.

For further information see IEC 60079-10-1:2015 Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas atmospheres.

With focus on clause 3.6.6 and Annex I – Hybrid mixtures.

Warning:



Appropriate mixing fluid

The mixing fluid should be appropriate for the application (e.g. so no chemical reaction can take place between the mixing fluid and the residue of process fluid/compound which can generate heat).

Warning:



Mixing conditions

When the IM machine is used for mixing, it shall be fully submerged in the tank liquid and it shall only be used for submerged mixing/blending of liquids.

Warning:



Fluid pressure

The maximum permitted cleaning/mixing fluid pressure is 12 bar.

Warning:



Risk due to tank liquid surface potential

When jet mixing there is a risk for the jet to break the liquid surface in the tank with a vapour space where a high field strength could occur.

If the jet breaks the liquid surface there is a risk due to the surface potential of the liquid in the tank.

The tank liquid and mixing fluid must be made electrically conductive by additives or otherwise.

For further information see IEC/TS 60079-32-1:2013 Explosive atmospheres – Part 32-1: Electrostatic hazards, guidance.

With focus on clause 7.9.5 – Jet mixing.

In addition to the above mentioned precautions relating to the ATEX guidelines Directive 2014/34/EU, *Safety precautions* on page 12 must be observed.

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5 Operation

5.1 Normal operation

Media to be mixed

The Rotary Jet Mixer IM-15 should be used only in fluids compatible with Stainless Steel AISI 316/316L, SAF2205, PTFE, PEEK and EPDM. Please note that PEEK is not resistant to concentrated sulfuric acid. Furthermore, the fluids to be mixed should not contain abrasive materials and fibrous material and the viscosity should not be above 450 cP. Aggressive chemicals, excessive concentrations of chemicals at elevated temperatures, as well as certain hydrochlorides should be avoided. If you are in doubt, contact your local Alfa Laval sales office.

Pressure

Avoid hydraulic shocks. Increase pressure gradually. Do not exceed 12 bar inlet pressure. Recommended inlet pressure: 5-8 bar (73-116 PSI). High pressure in combination with high flow rate increase consumption of wear parts. It is recommended to install a hydrofor in the system, if a positive pump is used for recirculation.

Draining using compressed air

If the machine is drained using compressed air, then the compressed air pressure must not cause the machine body rotation to exceed 1.5 RPM (corresponding to approx. 40 sec. per rev of the body) in order to avoid risk of machine breakdown. Draining should always be done inside the tank. See *Specific conditions for safe use in accordance with ATEX* on page 30.

Steam cleaning

If stream cleaning is done through the machine, the steam pressure must not cause the machine body rotation to exceed 15 RPM (corresponding to approx. 4 sec. per rev of the body) in order to avoid risk of machine breakdown. See *Specific conditions for safe use in accordance with ATEX* on page 30.

Temperature

The maximum recommended cleaning fluid temperature is 95°C. The maximum recommended steam temperature is 140°C. The maximum ambient temperature is 140°C. See *Specific conditions for safe use in accordance with ATEX* on page 30.

After use cleaning

After use flush the mixer with fresh water. Fluids should never be allowed to dry or set-up in the Rotary Jet Mixer IM-15 system due to possible "salting out" or "scaling" of the ingredient.

5.2 Safety precautions

The machine is intended for use inside a tank only. As peak velocity of main jets reaches 40 m/s, Rotary Jet Mixer IM-15 must not be operated in open air or when tank is open.

WARNING

Hot chemicals and steam under pressure may be used for cleaning and sterilising. Protect against scalding and burning. Never tamper with or try to open clamps or other connections while system is in operation. Make sure that system is depressurised and drained before disassembly.



The cleaning jets impinging the tank surface are a source of noise. Depending on pressure and distance to the tank walls, noise level may reach up to 85 dB.

WARNING

Tanks may contain poisonous/hazardous products or products which represent an environmental or safety risk. Never open tank and dismount the machine without checking previous tank contents and necessary precautions.



See also *ATEX/IECEx temperature class and code* on page 22.

6 Maintenance

6.1 Service and repair of ATEX/IECEx certified machines

WARNING

All service and repair of ATEX/IECEx certified machines can be performed by Alfa Laval Kolding A/S, Denmark, or by an Alfa Laval service center approved by Alfa Laval Kolding A/S.

Changes to the machine are not allowed without approval by the person responsible for the ATEX/IECEx certification at Alfa Laval. If changes are made – or spare parts other than Alfa Laval original spare parts are used - the EC Type Examination certification (the ATEX/IECEx Directive) is no longer valid.

In order to ensure compliance with the ATEX/IECEx regulations and keep the machine ATEX/IECEx certification valid, the service or repair must be performed by an authorized person with knowledge of the ATEX/IECEx requirements and regulations. All spare parts must be original Alfa Laval spare parts and the repair or service must be done according to the instructions in this manual.

If a customer wishes to carry out service or repair himself, it is the responsibility of the repair shop to ensure that the ATEX/IECEx requirements are met in any way possible. After performing service or repair, the repair shop thus carries the full responsibility for traceability of all relevant documents in order to ensuring the retention of the ATEX/IECEx certification of the machine.

6.2 Preventive maintenance

In order to keep your Rotary Jet Mixer IM-15 servicing you as an efficient tool in your mixing operations, it is essential to maintain its high performance by following a simple preventive maintenance programme, which will always keep your mixer in good condition.

Good maintenance is careful and regular attention!

The following recommended preventive maintenance is based on a Rotary Jet Mixer IM-15 working in average conditions. However, you will appreciate that a mixer, which has a rough and dirty job to do, will need more frequent attention than one working in ideal conditions. We trust that you will adjust your maintenance programme to suit.

Alfa Laval Tank Cleaning Equipment Service Kits contain all you need. They comprise genuine Alfa Laval spare parts, manufactured to the original specifications.

NOTE

Always use only proper tools. Use standard tool kit for Rotary Jet Mixer IM-15. If not stated otherwise never use unnecessary force (i.e. hammer or pry) components together or apart.

Always perform all assembly/disassembly steps in the order described in this manual.

Never assemble components without previous cleaning. This is especially important at all mating surfaces. Work in a clear well lighted work area.

Every 4000 working hours (depending on working conditions)

1. Disassemble mixer as described on the following pages.
2. Clean material build-up and deposits from internal parts with chemical cleaner and/or desired fine abrasive cloth.

3. Check slide bearings (28) for wear. If hole is worn oval to max diameter of 10.4 mm, slide bearing should be replaced. if end face of slide bearing is worn more than x mm into slide bearing, it should be replaced.

Under turbine shaft:	x = 1.5 mm
At horizontal shaft:	x = 0.5 mm

4. Check collar bushes (10) in gear frame. If holes are worn oval to max diameter of more than 13.4 mm, collar bush should be replaced. How to replace collar bushes, see *Replacement of collar bushes* on page 49.

> **NOTE**
>
> Timely replacement of ball bearings and collar bushes will prevent costly damage to the gearbox.

5. Check worm wheels (11 and 33). If extremely worn, they should be replaced.
6. Check main bush (5). If worn it should be replaced.
7. Assemble machines as described in the following pages.
8. Check that the machine is in operating condition by inserting 3/16" Hex screwdriver (tool no. 134A) in screw in top of turbine shaft, and easily turn turbine shaft clockwise. If any resistance is recognised, the mixer should be disassembled in order to localise the cause.

Apart from the parts specifically mentioned above, all the remaining wear parts should regularly be inspected for wear. Wear parts are specified in *Parts lists and exploded views* on page 65.

6.2.1 Maintenance product contact parts made of plastic

These plastic parts are designed for safe contact with food and should only be used as intended, as stated in the product Instruction Manual provided with this product. Using these parts outside their intended purpose (e.g., exposure to excessive heat, harsh chemicals, or incompatible foods) may increase the risk of harmful substances migrating into food. Always use the product as intended to avoid risks.

Normal Usage Changes:

Minor scratches, slight discolouration over time, fading of printed markings, deformation

Changes Affecting Safety:

Cracks or chalkiness, blisters or chips, sticky or tarnished surfaces, unusual odours.

How to Prevent/Slow Down Deterioration:

- Use it within the permitted temperature limits and limits for CIP[1]
- Do not use abrasive cleaners or scouring pads
- Do not use in contact with foods for which it is not intended (See: product Instruction Manual)

Handling, Cleaning, and Storing Instructions

- Follow the recommended cleaning procedure and only use permitted chemicals or detergents in correct concentrations and temperatures
- Store in a cool, dry place, protected from UV-light

[1] Cleaning In Place

When to Replace

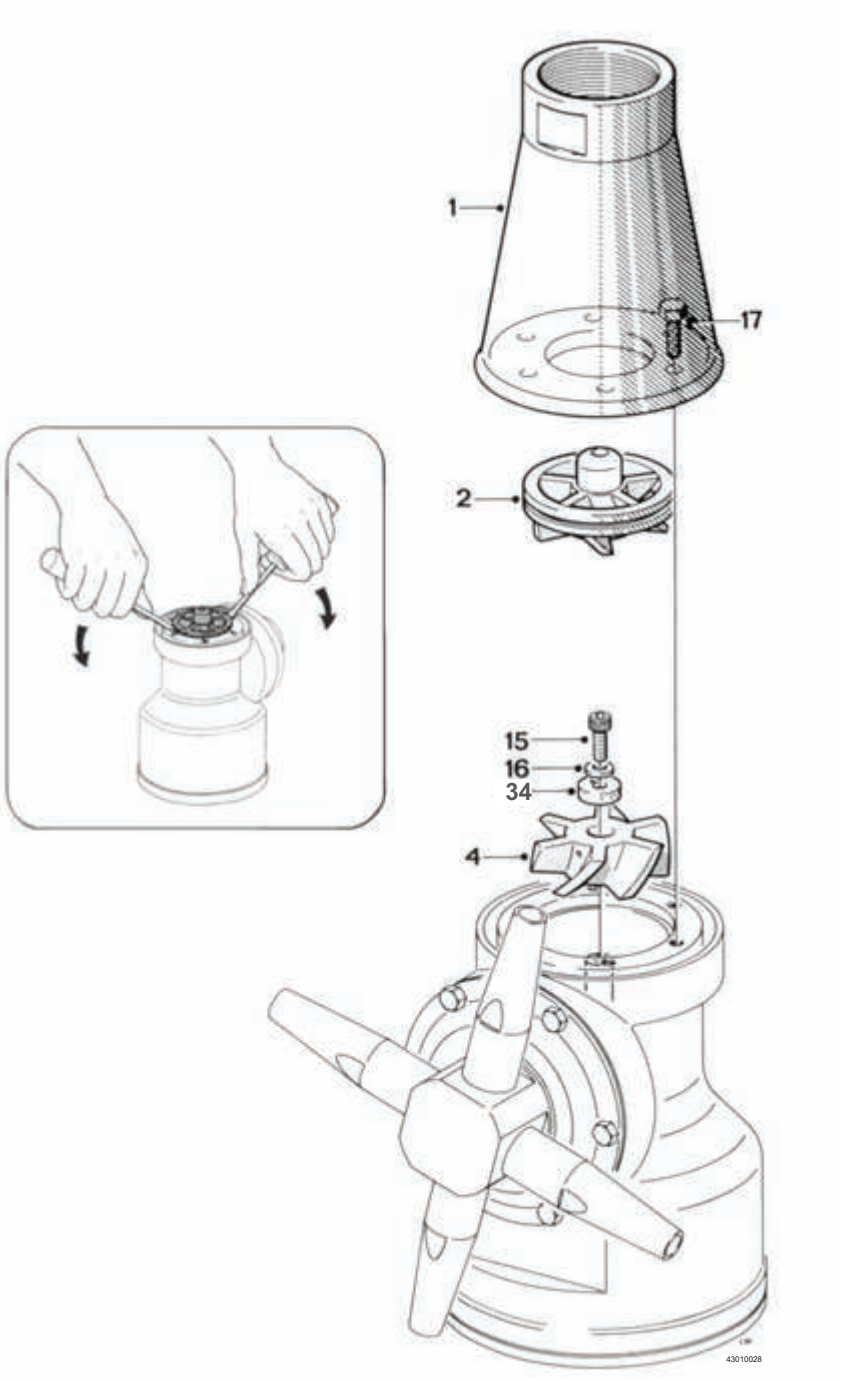
Replace the plastic part if you notice:

- Cracks, chalkiness, blisters, chips or sticky surface, discolouration (if it does not come from the media itself)
- Any change in appearance that raises doubts about safety

Conditions for Discontinuing Use

- If the part shows any of the safety-related deterioration signs above
- After a recommended period of use (see service interval)
- If the part has been exposed to conditions outside the product's (manufacturer's) instructions (e.g., high heat, harsh chemicals, excessive concentration/temperatures of CIP[1])

6.3 Top assembly



(1) **Disassembly**

a) Remove 3/16" screws (17). Loosen and unscrew with a socket wrench (tool no. 462A).

b) Lift off top cone (1).

c) Remove guide/guide ring (2). The guide has a groove in the outer diameter. The guide is easily lifted out of the stem by means of two ordinary screwdrivers inserted into the groove.

d) Remove 3/16" screw (15), spring washer (16) and washer (34). To secure impeller against rotation, insert carefully screwdriver (tool no. 134A), through impeller (4) into a hole in the stem.

e) Pull off impeller (4).

(2) **Reassembly**

a) Reinstall impeller (4). Make sure that impeller is correctly rotated to be pushed onto turbine shaft. Do not try to hammer impeller in position, as this will damage slide bearing under turbine shaft.

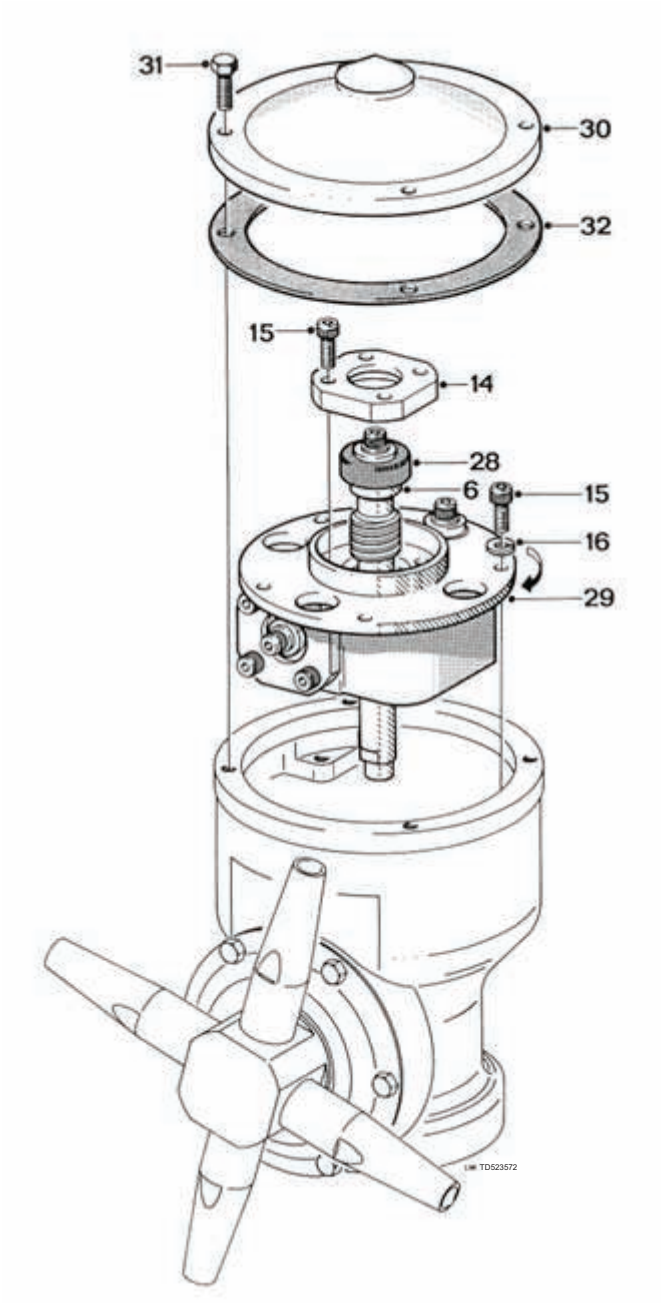
b) Mount washer (34), spring washer (16) and 3/16" screw (15) and tighten. To secure impeller against rotation insert carefully screwdriver (tool no. 134A) through impeller (4) into a hole in the stem..

c) Reinstall guide/guide ring (2).

d) Mount top cone (1). Make sure that it is in correct position over guide/guide ring (2). Rotate top cone to align holes in top cone and stem.

e) Mount and tighten 3/16" screws (17) with a socket wrench (tool no. 462A).

6.4 Bottom assembly



1 **Disassembly**

a) Turn machine upside down.

b) Remove 3/16" screws (31) from bottom cover (30).

c) Remove bottom cover (30) and gasket (32).

d) Remove 3/16" screws (15) in bearing cover (14). Carefully push out turbine shaft (6) from opposite end. Do not try to hammer out turbine shaft, since this can damage slide bearing.

e) Remove 3/16" screws (15) and spring washers (16) along the circumference of gear frame (29). Turn gear frame about 1 cm (½"). Draw out gear subassembly (holes in gear frame are excellent for holding gear subassembly).

2 **Reassembly**

a) Reinsert gear subassembly in bottom of machine body. Turn gear frame (29) to align holes in gear frame and 3⁄16" threads in body. Mount spring washers (16) and 3⁄16" screws (15) along circumference of gear frame (29). Tighten screw crosswise.

b) Reinsert turbine shaft (6) with slide bearing carefully through gear wheel (7). Push carefully slide bearing (28) into position. Mount bearing cover (14) with 3⁄16" screws (15). Tighten crosswise.

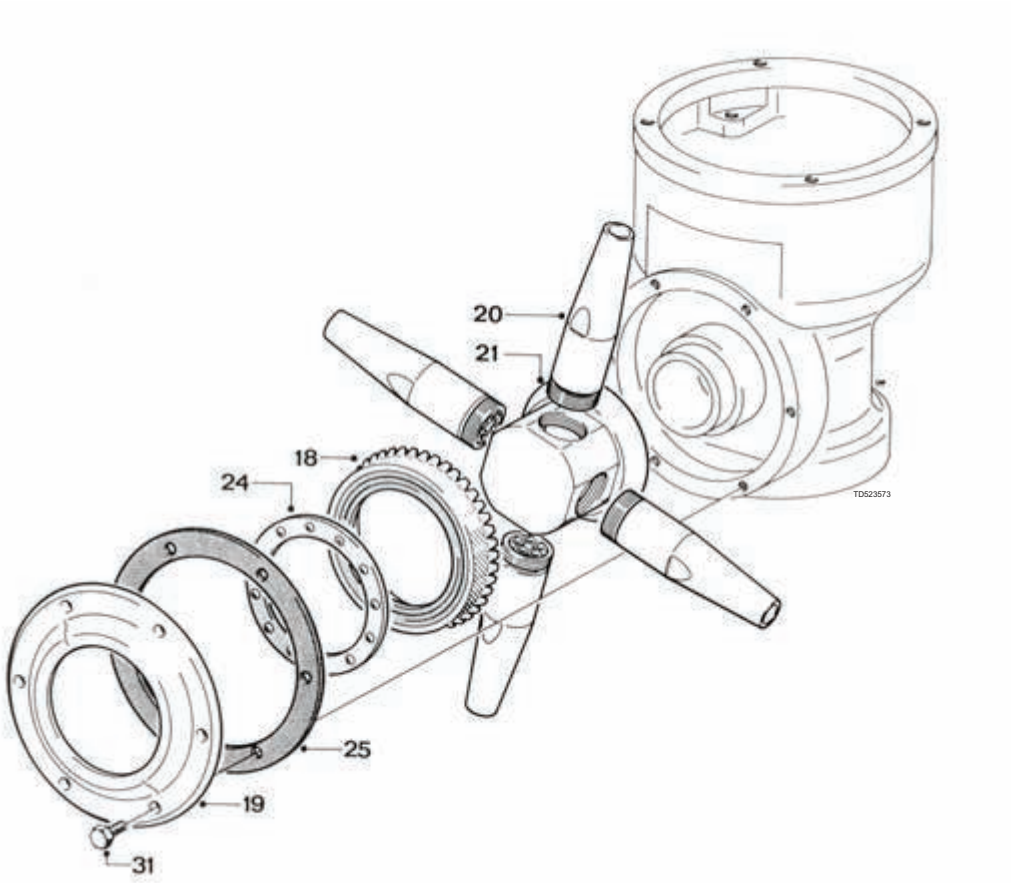
c) Place bottom gasket (32) and bottom cover (30).

d) Mount 3⁄16" screws (31) and tighten crosswise.

NOTE

To secure meshing between gear wheel (7) and pinion (9), it might be necessary to rotate slightly either the whole gear subassembly or the gear wheel.

6.5 Hub subassembly



1 **Disassembly**

a) Remove nozzles (20). Nozzles are untightened with a wrench on the faces of the nozzles.

b) Remove 3/16" screws (31), hub cover (19), and gasket (25).

c) Draw out hub (21) together with ball retainer with balls (24) and bevel gear (18).

d) If ball races (18.1 and 19.1) in hub cover and in bevel gear are extremely worn, they should be replaced as well as the ball retainer with balls (24). How to replace ball races see *Replacement of ball races* on page 50.

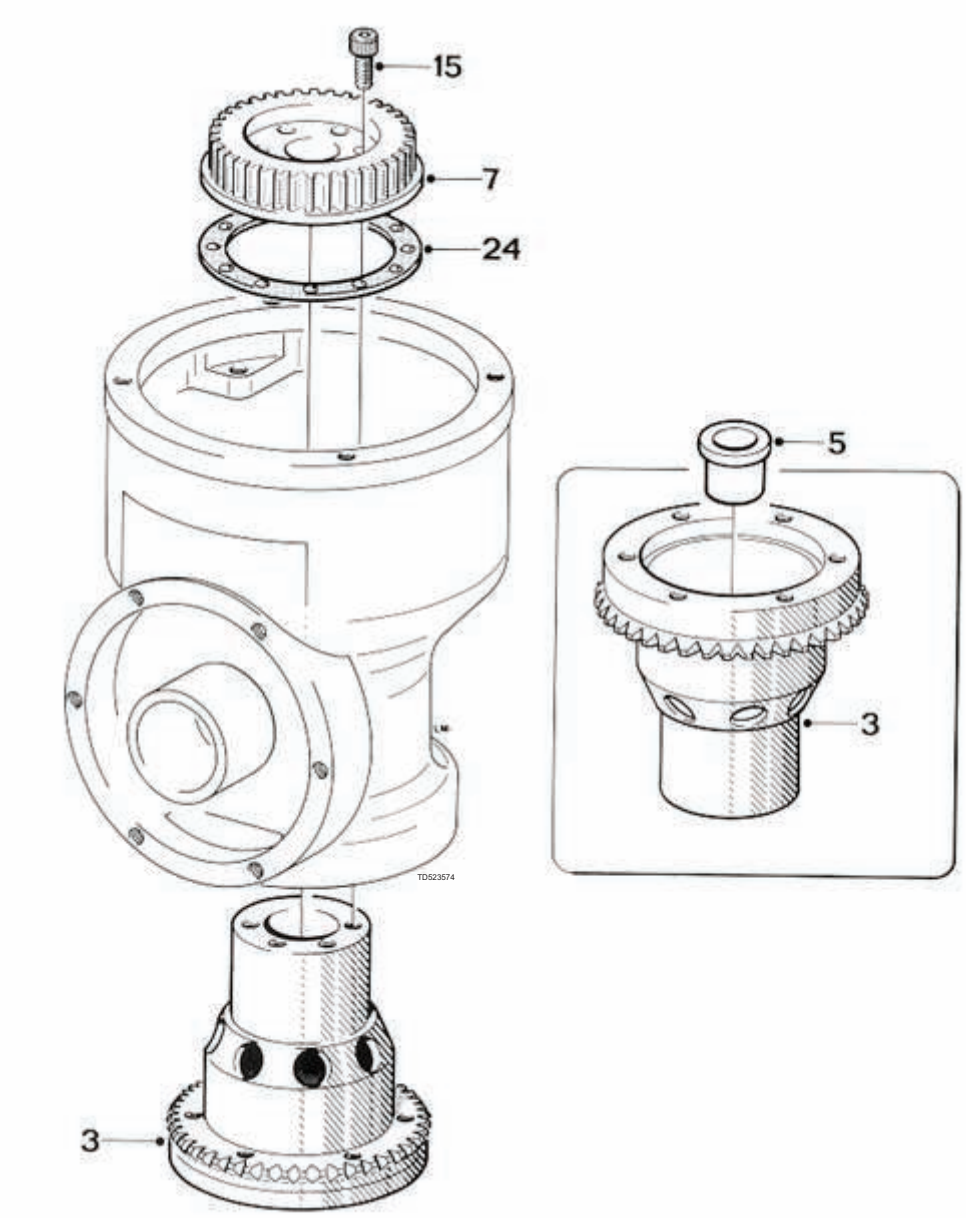
2 **Reassembly**

a) Slide on hub (21). Reinsert bevel gear with race (18) and ball retainer with balls (24).

b) Mount gasket (25) and hub cover with race (19), and set with 3/16" screws (31). Tighten clockwise.

c) Screw on nozzles (20) and tighten with wrench.

6.6 Stem subassembly



1 **Disassembly**

a) Place machine in upside-down position.

b) Remove 3/16" screws (15) in gear wheel (7). To prevent rotation of stem (3) mount two 3/16" screws in two holes opposite one another in BIG end of stem. Place stem in a vice held by the heads of the two screws.

c) Draw out gear wheel with ball races (7) and ball retainer with balls (24).

d) Push out stem (3).

e) If worn, press out main bush (5).

If ball races in body (26.3) and on gear wheel (7.1) are extremely worn they should be replaced together with ball retainer with balls (24). How to replace ball races see *Replacement of ball races* on page 50.

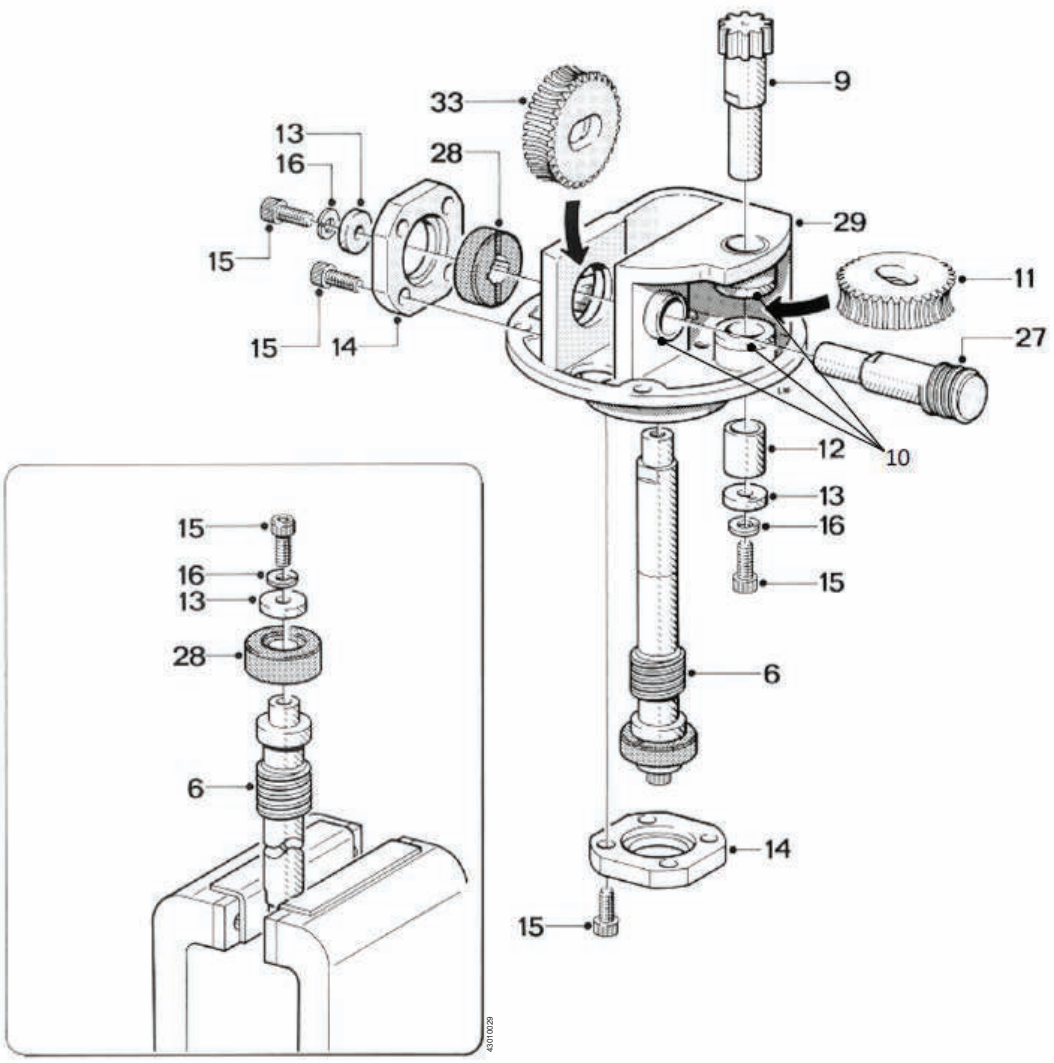
(2) **Reassembly**

a) If replaced press main bush (5) into stem (3).

b) Push stem into body. Turn mixer upside-down.

c) Place ball retainer with balls (24) and gear wheel (7) into body on ball race. Rotate gear wheel to check free rotation. Mount gear wheel with 3/16" screws (15) and tighten crosswise. To prevent rotation of stem (3) mount two 3/16" screws in two holes opposite one another in BIG end of stem. Place stem in a vice held by the heads of the two screws.

6.7 Gear subassembly



1 **Disassembly**

a) To make a backstop, remount turbine shaft (6) with slide bearing (28) into gear frame (29). Mount bearing cover (14) with 3/16" screws (15).

b) Hold turbine shaft (6) against 1st stage worm wheel (33) with one hand and loosen 3/16" screws (15) in pinion (9) and horizontal shaft (27) with the other hand.

c) Remove 3/16" screws (15) in bearing cover (14) and take out turbine shaft (6).

d) Draw out horizontal shaft (27) and 1st stage worm wheel (33) after removal of 3/16" screw (15), spring washer (16) and washer (34).

e) Draw out pinion (9) and 2nd stage worm wheel (11), also freeing journal (12) after removal of 3/16" screw (15), spring washer (16) and washer (34).

f) Remove bearing cover (14) and slide bearing (28) after removal of 3/16" screw (15).

g) Remove 3/16" screw (15), spring washer (16), washer (34) and slide bearing (28) from turbine shaft (6). Use faces on turbine shaft to hold against rotation.

WARNING

Do not damage driver faces on turbine shaft. Use only proper tools providing a firm grip such as a wrench or a vice.



How to replace collar bushes (10), see *Replacement of collar bushes* on page 49.

2 **Reassembly**

a) Mount slide bearing (28) on turbine shaft (6) and secure with washer (34), spring washer (16) and 3/16" screw (15). Hold turbine shaft in a vice or with wrench on driver faces and tighten.

b) Push slide bearing (28) for horizontal shaft (27) into gear frame (29) and fix bearing cover (14) with 3/16" screws (15). Tighten crosswise.

c) Insert 2nd stage worm wheel (11), pinion (9) and journal (12). Mount washer (34), spring washer (16) and fix with 3/16" screw (15). Check rotation.

NOTE

It is important that the screw holding the pinion is fastened to a torque moment of 5 Nm, to secure it from loosening.

d) Insert 1st stage worm wheel (33) and horizontal shaft (27). Mount washer (34), spring washer (16) and fix with 3/16" screw (15). Check rotation.

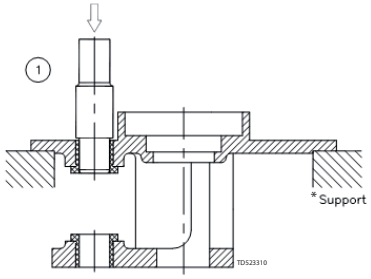
e) Reinstall turbine shaft (6) in gear frame as mentioned under disassembly, point 1.

f) Hold turbine shaft (6) against 1st stage worm wheel and tighten 3/16" screws (15) in horizontal shaft (27) and pinion (9).

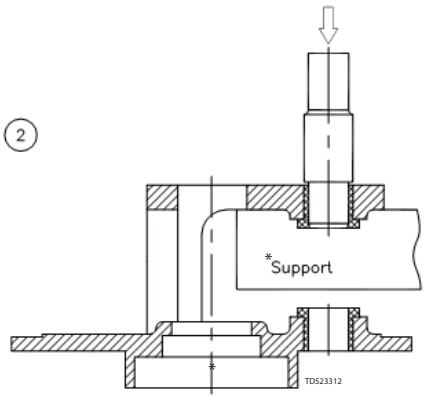
g) Remove turbine shaft (6) with slide bearing (28) before gear subassembly is inserted in mixer body.

6.8 Replacement of collar bushes

1. Place gear frame (29) upside down with a firm support under the flange. Use for instance jaws of a vice. Do not clamp on machined surfaces. With pusher (tool no. TE81B033) knock out collar bush.



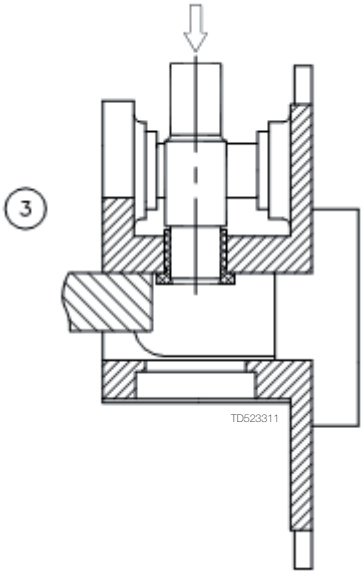
2. Turn gear frame to upright position and hold over support such as flat steel bar clamped in a vice. Knock out collar bush with pusher.



3. Turn gear frame 90° and hold over support. Knock out collar bush with pusher.

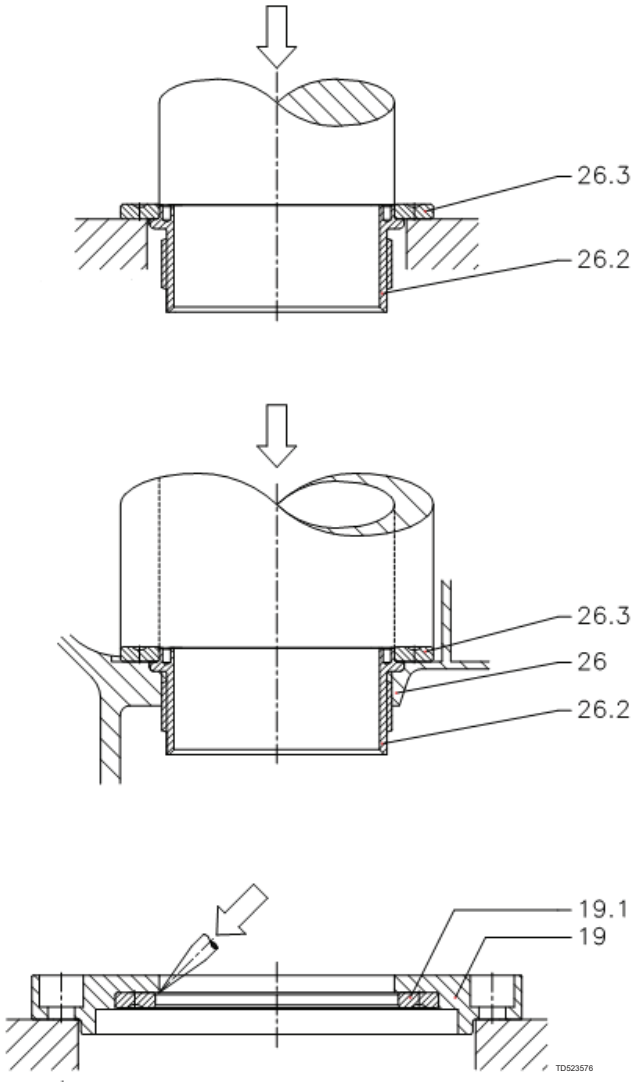
WARNING

To avoid risk of deforming gear frame, it is utmost important that it is supported while the collar bushes are being knocked out.



4. Clean holes and push in new collar bushes into gear frame.

6.9 Replacement of ball races



1 **In body**

a) A. With big end downwards knock several times body with bearings (26) hard against firm wooden support until ball race (26.3) drops out.

b) B. If it is not possible to knock out ball race in this way, it is necessary first to screw out main collar lower (26.2). Carefully push off old ball race without damaging main collar lower. Use mandrel and firm support. Before mounting of new ball race, main collar lower (26.2) must be remounted into body – see *Replacement of main collars* on page 52.

c) Clean surfaces and place ball race (26.3) on main collar lower (26.2). Press by hand as long as possible. By means of a tube mandrel or if desired wooden block, carefully hammer ball races home.

Ball races must not project over end face of main collar lower. To avoid tilting mandrel must push along the whole circumference of ball race. Do not damage surface of ball race.

2 **On Gear wheel**

a) Place gear wheel with ball race (7) on support. Support only under ball race (7.1). With mandrel press off old ball race.

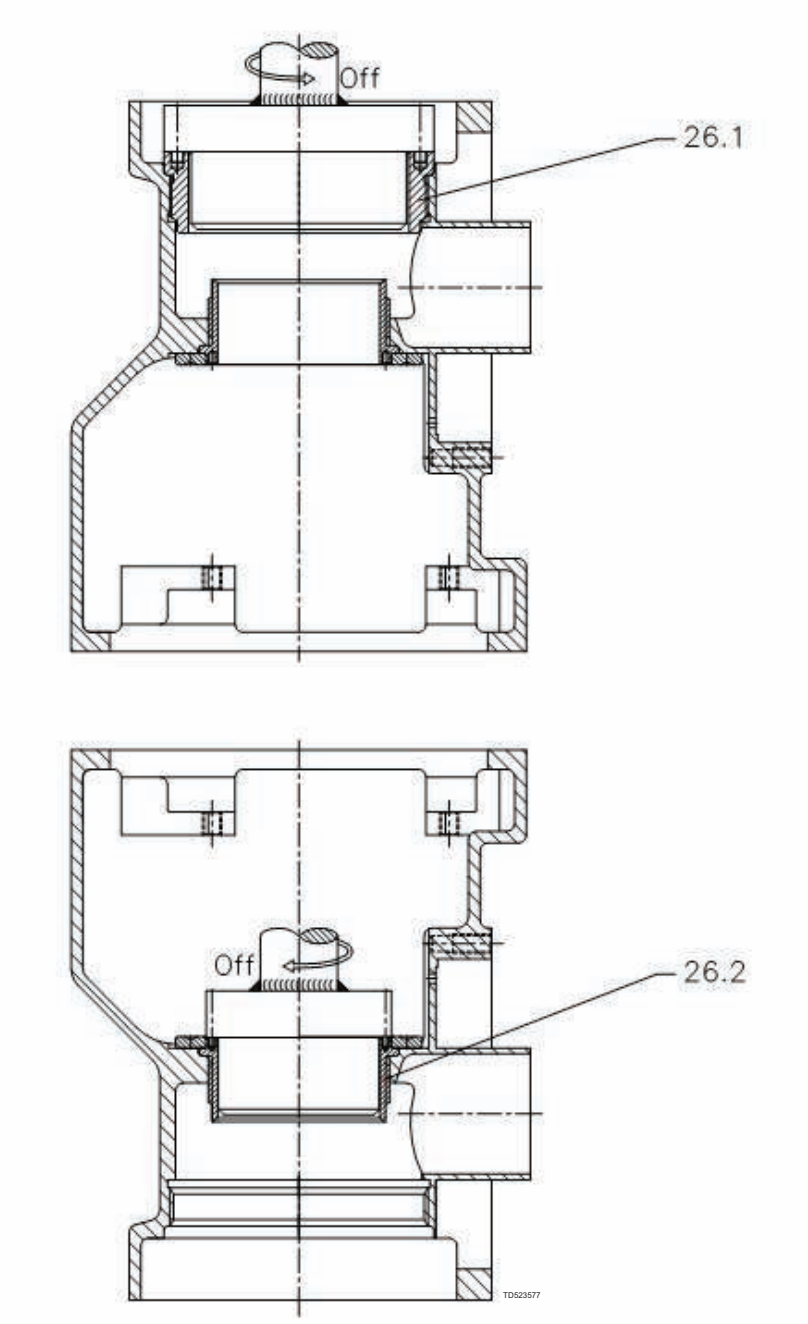
b) Clean surfaces and press on new ball race. Ball race must be pressed fully home on gear. Press parallel. Use press or vice. Do not damage surface of ball race.

3 **In Hub cover**

a) Place hub cover with ball race (19) on support. Carefully knock out old ball race by means of small mandrel or if desired screwdriver. Knock several times around the circumference to avoid tilting.

b) Clean surfaces and press in new ball race. Ball race must be pressed fully home. Press parallel. Do not damage surface of ball race.

6.10 Replacement of main collars



Although normally exposed to very limited wear, it is possible to replace main collars (26.1 and 26.2) and hub liner (26.4) in body. The procedure to do this is described below.

1 **Main collar upper**

a) Place body (26) in a vice upright position. Do not clamp on machined faces. Insert tool into main collar upper (26.1). Unscrew main collar.

b) Carefully clean thread and recess in body. Do not damage special thread in body. Recess must be absolutely clean.

c) Make sure that new main collar is clean and free from impurities.

d) Screw in new main collar. Attention should be given to make sure that thread is in correct engagement before screwing in main collar.

e) Tighten main collar fully home and tighten up.

f) Check that main collar is fully home: install stem, ball retainer with balls and gear wheel (see *Gear subassembly* on page 47). Check that there is sufficient axial clearance to allow for free rotation of stem.

2 **Main Collar lower**

a) Place body in a vice in upside down position, and repeat procedure described above.

> **WARNING**
>
> Thread on main collar lower is left-handed.
>
> 

3 **Hub liner**

a) Place body in a vice. Insert two ordinary screwdrivers behind hub liner and press it out.

b) Push on new hub liner.

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7 Troubleshooting

7.1 Troubleshooting guide

Symtom: Slow or no rotation of machine

Possible Causes	Fault finding
No or insufficient liquid flow	
	1. Check if supply valve is fully open. **2.** Check if inlet pressure to mixer is correct. **3.** Check supply line/filter for restrictions/clogging. **4.** Remove nozzles and check for clogging. If blocked, carefully clean nozzle without damaging nozzle vanes and nozzle tip. **5.** Remove Top cone guide and impeller (see *Top assembly* on page 40) and check for clogging in impeller area. **6.** If large particles repeatedly get jammed in the mixer, install filter or reduce mesh size of installed filter in supply line.
Foreign material or material build-up	
	Insert Hex screwdriver in screw in top of turbine shaft and easily turn turbine shaft clockwise. If any resistance is recognised, disassemble machine in order to localise the cause.
Impeller jammed.	Remove guide and impeller (see *Top assembly* on page 40) and remove foreign material.
Turbine shaft - sluggish in main bush.	Remove turbine shaft (see *Bottom assembly* on page 42) and clean main bush.
Bevel gear jammed.	Remove top cone and hub subassembly (*Hub subassembly* on page 44). Clean teeth on stem and bevel gear.
Stem jammed/sluggish.	Remove gear subassembly (see *Bottom assembly* on page 42). Check free rotation of stem. Remove stem (see *Stem subassembly* on page 45). Remove foreign material/ material build-up on stem and inside main collars. Clean ball races and ball retainer with balls. Also clean main bush.
Gearbox jammed/sluggish.	Remove foreign material from gearbox. Check rotation of shafts. If restriction is recognized, disassemble gearbox (see *Gear subassembly* on page 47) and remove material build up, especially on 2nd stage worm wheel and mating collar bushes.
Hub jammed/sluggish.	Disassemble hub subassembly (see *Hub subassembly* on page 44). Remove foreign material inside hub. Clean ball races and ball retainer with balls. Also clean nose of body.
Wear	
Slide bearings.	See *Preventive maintenance* on page 37.
Main bush.	See *Preventive maintenance* on page 37.
Worm wheels.	See *Preventive maintenance* on page 37.
Collar bushes.	See *Preventive maintenance* on page 37.

Wear	
Turbine shaft.	Check clearance in main bush and in slide bearing. Transverse movement should not exceed 0.5 mm. Also inspect worm wheel for wear.
Horizontal shaft.	Check clearance in collar bushes. Transverse movement should not exceed 0.5 mm. Also inspect worm for wear.

Mechanical defects	
Worm wheels. Teeth broken.	Replace worm wheel.
Worm wheel cannot rotate on horozontal shaft/pinion due to damaged driver faces.	Replace worm wheel.
Damaged teeth on bevel gear.	Inspect teeth on stem and bevel gear for deformation. Mount hub and stem in body (see *Hub subassembly* on page 44 and *Stem subassembly* on page 45). Hold body in upside down position and rotate hub to check that bevel gears can work together. If damaged: Replace stem and/or bevel gear.

8 Technical Data

> **NOTE**
>
> Technical data must be observed during installation, operation and maintenance.
>
> All personnel should be informed about the technical data.

8.1 Technical data

Lubricant:	Self-lubricating with the mixing/cleaning fluid
Connection:	Standard thread 1½" BSP or NPT, female
Min. tank opening:	See dimension drawings

Pressure	
Working pressure:	2-12 bar / 28-171 psi
Recommended pressure during mixing:	2-6 bar / 28-85 psi
Recommended pressure during CIP:	5-6.5 bar / 72-94 psi

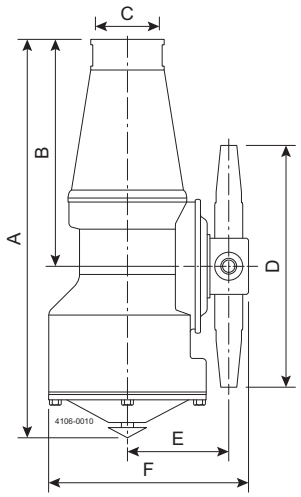
8.2 Physical data

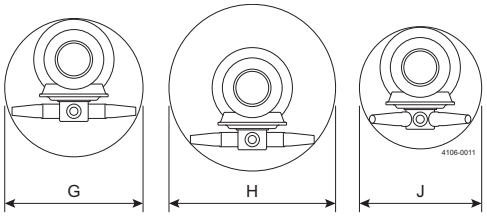
Materials	
Materials:	AISI 316L, AISI 316, SAF 2205, PTFE, PEEK, Tefzel, Ceramics

Weight	
Weight:	6.1 kg / 13.6 lbs

Temperature	
Working temperature max.:	95°C / 203°F
Ambient temperature max.:	140°C / 284°F

8.3 Dimensions (mm) (inch)

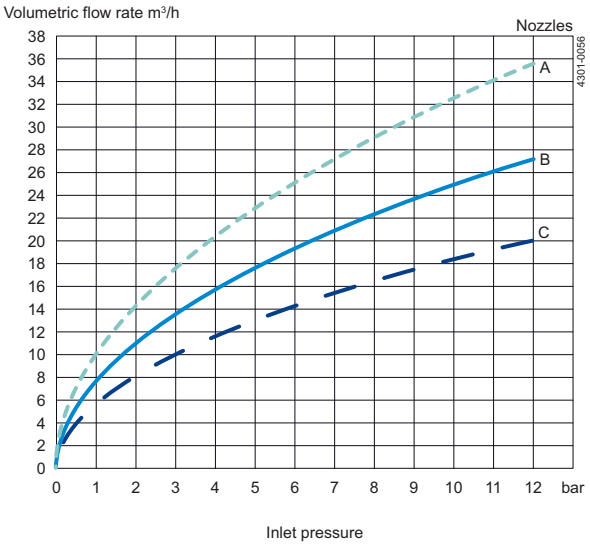




	2 nozzles		4 nozzles	
	mm	**inch**	**mm**	**inch**
A	297	11.70	297	11.70
B	170	6.69	170	6.69
C	*50*	1½" BSP or 1½" / 2" NPT	*50*	1½" BSP or 1½" / 2" NPT
D	270		*204*	8.03
E			78	3.07
F	174		152	5.98
G	Ø274		Ø216	Ø8.50
H	Ø333		Ø264	Ø10.39
J	Ø176		Ø180	Ø7.09

8.4 Flow rate

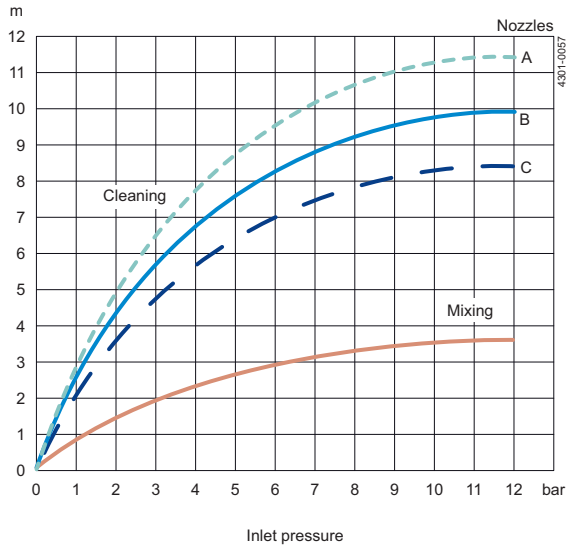
Relationship between inlet pressure and flow rate for liquids with waterlike properties for the IM 15 Rotary Jet Mixer.



A = 8 mm
B = 7 mm
C = 6 mm

8.5 Reach of jet

Reach of jet for the IM 15 during cleaning, and indicative reach of jet for mixing of liquids with water-like properties.



A = 8 mm
B = 7 mm
C = 6 mm

NOTE

The distance (reach) of the jet from the rotary nozzles at which the jets still have a reasonable mixing effect depends i.a. of pressure, the diameter of the nozzles, the viscosity of the fluid, the desired mixing time and various other parameters.

The effective reach of the jets as indicated above is in a fluid with a viscosity of 1 cP.

The pressure is measured at the mixer. This means that due consideration shall be taken to pressure drops in the recirculation line from the pump to the mixer as well as to static pressure differences, when the jet mixing system is being dimensioned.

9 Product programme

9.1 Standard configuration for Alfa Laval IM 15 Rotary Jet Mixer

Connection	Turbine/Inlet Guide	Nozzles (mm), 1 ½ thread conn.	Standard	With e-gear
			Item no.	Item no.
Top Cone: 1½" BSP, Female	100%	4 x ø6	TE31B061	TE31E061
		4 x ø7	TE31B071	TE31E071
		2 x ø8	TE31B081	TE31E081
		2 x ø8	TE31B181	TE31E181
	0%	4 x ø7	TE31B070	TE31E070
		4 x ø8	TE31B080	TE31E080
		4 x ø9	TE31B184	TE31E184
		2 x ø10	TE31B182	TE31E182
		2 x ø11	TE31B183	TE31E183
Top Cone: 1½" NPT, Female	100%	4 x ø6	TE31B166	TE31E166
		4 x ø7	TE31B167	TE31E167
		2 x ø8	TE31B168	TE31E168
		2 x ø8	TE31B281	TE31E281
	0%	4 x ø7	TE31B177	TE31E177
		4 x ø8	TE31B178	TE31E178
		4 x ø9	TE31B284	TE31E284
		2 x ø10	TE31B282	TE31E282
		2 x ø11	TE31B283	TE31E283

The mixer is equipped with a clutch in the hub, which gives the possibility of rotating the nozzles by hand, when the mixer is not under pressure and first has to be lifted out or in through a tank opening.

9.2 Available add-ons

TE31XXX70	ATEX/IECEx

Explanation to Add-ons		
ATEX/IECEx		ATEX/IECEx includes: ATEX/IECEx approved machine for use in explosive atmospheres. Category 1 for installation in zone 0/20 (inside tank) in accordance with ATEX Directive 2014/34/EU. II 1G Ex h IIC 85°C... 175°C Ga II 1D Ex h IIIC T85°C... T140°C Da

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10 Spare parts

For every delivered Alfa Laval Product, a spare part list is available.

This spare part list contains a range of the most common wear parts for the machinery. If any component not mentioned is required, please contact your local Alfa Laval representative for availability.

You can find our spare part catalogue at *https://hygienicfluidhandling-catalogue.alfalaval.com*.

Always use Alfa Laval genuine spare parts. The warranty of Alfa Laval products is dependent on use of Alfa Laval genuine spare parts.

10.1 Ordering spare parts

When ordering spare parts, please always state:

1. Serial number (if available)
2. Item number/spare part number (if available)
3. Capacity or other relevant identification

10.2 Alfa Laval service

Alfa Laval is represented in all larger countries of the world.

Do not hesitate to contact your local Alfa Laval representative, with any questions or requirement of spare parts for Alfa Laval equipment.

10.3 Warranty - Definition

WARNING

The rules of Intended use are absolute. Use of the supplied Alfa Laval product is allowed only when in compliance with the technical data supplied with the Intended use.

Differing utilisation, other than agreed with Alfa Laval Kolding A/S, exclude any liability and warranty.

No modification or alteration of the supplied Alfa Laval product is allowed, unless explicit permission is granted by Alfa Laval Kolding A/S.



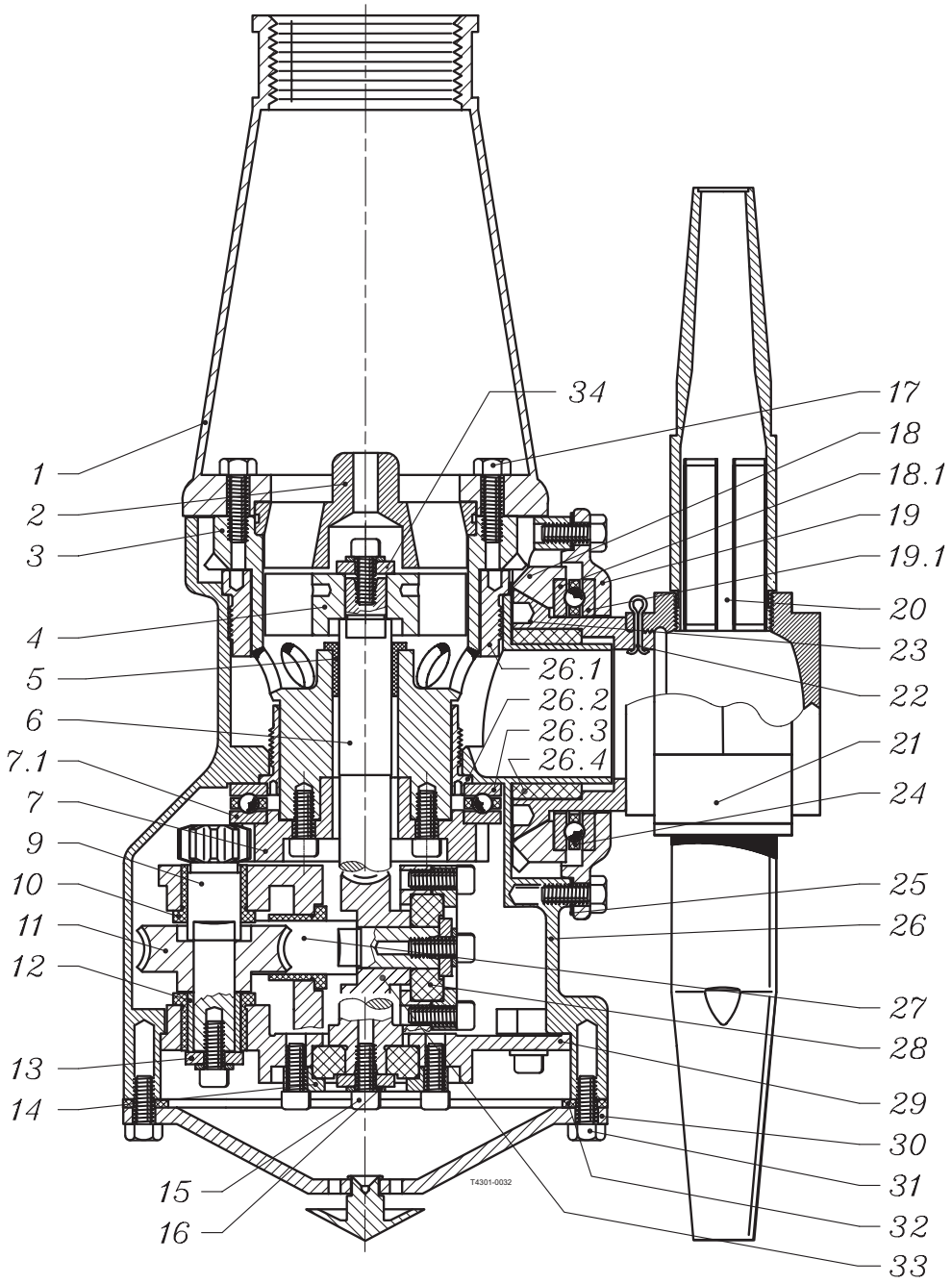
Liability and warranty are excluded:

- If advice and instruction of operating instructions are ignored
- For incorrect operation or for insufficient maintenance of the supplied Alfa Laval product
- For any kind of change of function of the supplied Alfa Laval product without prior written agreement by Alfa Laval Kolding A/S
- If supplied Alfa Laval product is modified by non-authorised persons
- If using the supplied Alfa Laval product without attention of appropriate safety regulations, (see *Safety* on page 9)
- If protection equipment is not used and vessel process / ancillary equipment is not brought to a standstill
- If the supplied Alfa Laval product and ancillary parts are not properly maintained (to be executed in intervals and including fitting of prescribed replacement parts)

When exchanging parts, only original replacement parts, released from the manufacturer, must be used.

11 Parts lists and exploded views

11.1 IM 15 with 2 nozzles

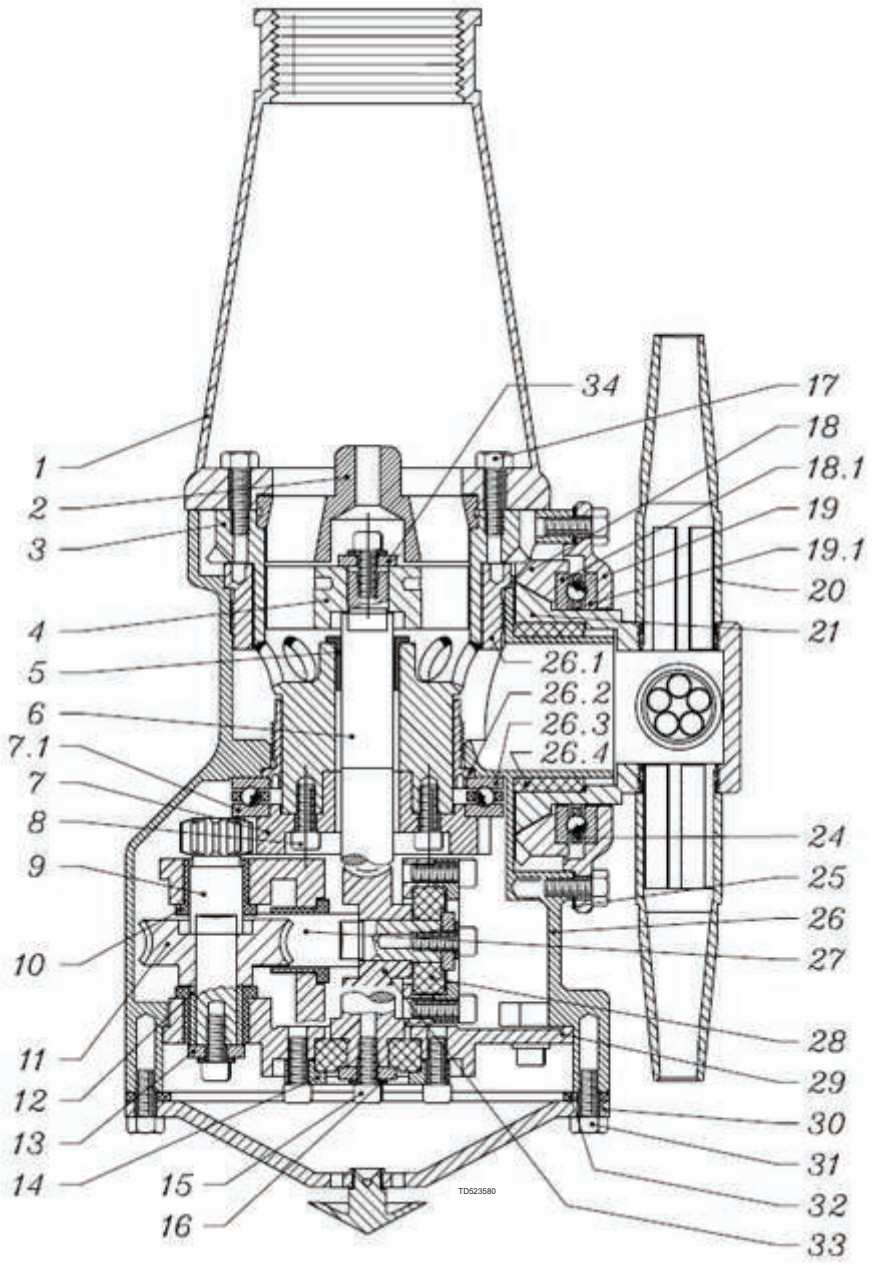


Pos.	Qty.	Denomination
1	1	Top Cone
2	1	Guide
3	1	Stem
4	1	Impeller
5	1	Main bush
6	1	Turbine shaft
7	1	Gear wheel w. ball race
7.1	1	Ball race
9	1	Pinion
10	3	Collar bush
11	1	Worm wheel
12	1	Journal
13	3	Washer
14	2	Bearing cover
15	22	Screw
16	8	Spring washer
17	6	Screw
18	1	Bevel gear w. ball race
18.1	1	Ball race
19	1	Hub cover w. ball race
19.1	1	Ball race
20	2	Nozzle
21	1	Hub
22	1	Split pin for 2 nozzle
23	1	Hub conical part
24	2	Ball retainer with balls
25	1	Hub gasket
26	1	Body
26.1	1	Main collar upper
26.2	1	Main collar lower
26.3	1	Ball race
26.4	1	Hub collar
27	1	Horizontal shaft
28	2	Slide bearing
29	1	Gear frame
30	1	Bottom cover compl.
31	10	Hex Screw
32	1	Bottom gasket
33	1	Worm wheel w. reinforcement
34	1	Washer

NOTE

Find unique item numbers and item numbers for Spare parts, Service kits and Tools in the Spare part manual available from the on-line *Alfa Laval product catalogue Anytime* or in the *Close at hand spare part catalogue*.

11.2 IM 15 with 4 nozzles



Pos.	Qty.	Denomination
1	1	Top Cone
2	1	Guide
3	1	Stem
4	1	Impeller
5	1	Main bush
6	1	Turbine shaft
7	1	Gear wheel w. ball race
7.1	1	Ball race
9	1	Pinion
10	3	Collar bush
11	1	Worm wheel
12	1	Journal
13	3	Washer
14	2	Bearing cover
15	22	Screw
16	8	Spring washer
17	6	Screw
18	1	Bevel gear w. ball race
18.1	1	Ball race

Pos.	Qty.	Denomination
19	1	Hub cover w. ball race
19.1	1	Ball race
20	4	Nozzle
21	1	Hub for 4 nozzle
24	2	Ball retainer with balls
25	1	Hub gasket
26	1	Body
26.1	1	Main collar upper
26.2	1	Main collar lower
26.3	1	Ball race
26.4	1	Hub collar
27	1	Horizontal shaft
28	2	Slide bearing
29	1	Gear frame
30	1	Bottom cover compl.
31	10	Hex Screw
32	1	Bottom gasket
33	1	Worm wheel w. reinforcement
34	1	Washer

NOTE

Find unique item numbers and item numbers for Spare parts, Service kits and Tools in the Spare part manual available from the on-line *Alfa Laval product catalogue Anytime* or in the *Close at hand spare part catalogue*.