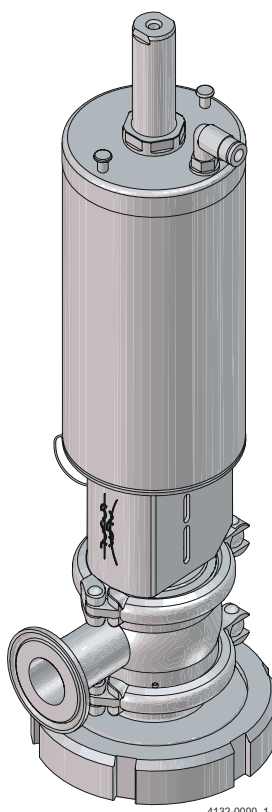


# Alfa Laval Free Rotating Retractor and Free Rotating Retractor UltraPure

Wall Mounted Cleaning Devices

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Instruction Manual



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

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# 1 Declarations of Conformity

## 1.1 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

Wall Mounted Cleaning Device

Designation

Free Rotating Retractor, Free Rotating Retractor UltraPure

Type

Serial number from 2023-0001 to 2030-99999

is in conformity with the following directives with amendments:

- Machinery Directive 2006/42/EC
- ATEX Directive 2014/34/EU and 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 no. SGS24ATEX0001X

Marking:



II 1G/- Ex h IIB 85°C...188°C Ga/-

II 1D/- Ex h IIIC T85°C...T150°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.

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

Vice President BU Hygienic Fluid Handling

Head of Product Management

Title

Mikkel Nordkvist

Name

Kolding, Denmark

Place

2024-03-01

Date (YYYY-MM-DD)

Signature

DoC Revison\_ 02\_032024





## 1.2 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

Wall Mounted Cleaning Device

Designation

Free Rotating Retractor, Free Rotating Retractor UltraPure

Type

Serial number from 2023-0001 to 2030-99999

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 *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 no. SGS24UKEX0002X

Marking:



II 1G/- Ex h IIB 85°C...188°C Ga/-

II 1D/- Ex h IIIC T85°C...T150°C Da/-

The UK QAN (Quality Assurance Notification) is carried out by SGS United Kingdom Ltd., Rockhead Business Park, Staden Lane, Buxton, Derbyshire SK17 9RZ, United Kingdom, Notified Body No. 1180. UKType Examination Certification is carried out by SGS United Kingdom Ltd., Rockhead Business Park, Staden Lane, Buxton, Derbyshire SK17 9RZ, United Kingdom, Notified Body No. 1180. ECEX Certificate of Conformity is carried out by SGS United Kingdom Ltd., Rockhead Business Park, Staden Lane, Buxton, Derbyshire SK17 9RZ, United Kingdom.

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

Vice President BU Hygienic Fluid Handling

Head of Product Management

Title

Mikkel Nordkvist

Name

Kolding, Denmark

Place

2024-03-01

Date (YYYY-MM-DD)

Signature



DoC Revison\_ 02\_032024





## 2 Safety

### Read this first

 	<p>This Instruction Manual is designed for operators and service engineers working with the supplied Alfa Laval product.</p> <p>Operators must read and understand the <b>Safety, Installation and Operating</b> instructions of the supplied Alfa Laval product before carrying out any work or before you put the supplied Alfa Laval product into service!</p> <p>Not following the instructions can result in serious accidents.</p> <p>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.</p> <p>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.</p> <p>The operator shall always read the chapter <b>Safety</b> first. Hereafter the operator can skip to the relevant section for the task to be carried out or for the information needed.</p> <p><b>Always</b> read the chapter <b>Technical Data</b> thoroughly.</p> <p>This is the complete Instruction Manual for the supplied Alfa Laval product.</p>
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#### 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.
 DO NOT DISASSEMBLE	Danger of injury (lasermarked on the actuator). Do <b>not</b> attempt to disassemble the actuator due to spring under load danger! (The lock wire opening is blocked).
 SPRING UNDER LOAD Do not attempt to cut open	Danger of injury (lasermarked on the actuator). Do <b>not</b> attempt to cut open actuator due to spring under load danger! (The lock wire opening is blocked).
	Danger of injury (label marked on actuator). Do <b>not</b> attempt to cut the actuator open due to spring under load (the lock wire opening is locked).
	ATEX/UKEx/IECEx.



## 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

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













## Installation

	<p><b>Always</b> follow this Instruction Manual thoroughly.</p> <p>Before installing the machine and setting it into operation carefully read <a href="#">Safety</a> on page 9, <a href="#">General Installation</a> on page 28 and <a href="#">Operation</a> on page 39.</p>
	<p><b>Ensure</b> that the machine is compatible with the product and CIP media.</p>
	<p><b>Never</b> dismantle or touch the machine or pipelines when processing hot fluids or when sterilising.</p>
	<p><b>Ensure</b> 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.</p>
	<p><b>Always</b> ensure all pipelines (product, air, and water) are depressurized and emptied before installation, inspection, assembling and disassembling.</p> <p><b>Always</b> assemble the machine completely before start and make sure everything is in place and properly tightened.</p>
	<p><b>Ensure</b> that the tank cleaning machine is properly grounded if the tank being cleaned contains 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.</p>
	<p><b>Always</b> release compressed air after use.</p>
	<p><b>Never</b> work on the machine or touch moving parts if the actuator is supplied with compressed air.</p>
	<p>Do <b>NOT</b> attempt to disassemble the actuator due to spring under load danger!</p> <p>Do <b>NOT</b> attempt to cut the actuator open due to spring under load.</p>
	<p>Before installing the machine and setting it into operation carefully read <a href="#">Safety</a> on page 9 and <a href="#">General Installation</a> on page 28, including <a href="#">Specific Conditions for Safe Use in Accordance with ATEX/UKEx/IECEx Certification</a> on page 36 and take all necessary precautions according to your application and local regulations.</p>
	<p><b>Ensure</b> that the tank cleaning device is properly grounded if the tank being cleaned contains a combustible liquid or vapor having a risk of ignition or explosion. Any tank cleaning device can develop a static electricity charge while in operation.</p>










## Operation

	<p><b>Always</b> follow this Instruction Manual thoroughly.</p> <p>Before installing the machine and setting it into operation carefully read <a href="#">Safety</a> on page 9, <a href="#">General Installation</a> on page 28 and <a href="#">Operation</a> on page 39.</p>
	<p><b>Ensure</b> that the machine is compatible with the product and CIP media.</p> <p><b>Always</b> 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.</p> <p><b>Always</b> rinse well with clean water after cleaning.</p> <p><b>Always</b> handle lye and acid with great care.</p> <p><b>Always</b> follow the instructions in the safety data sheets from the suppliers of cleaning agents, detergents, oils etc.</p>
	<p><b>Never</b> operate the machine unless it is properly mounted or installed.</p>
	<p><b>Never</b> dismantle or touch the machine or pipelines when processing hot fluids or when sterilising.</p>
	<p><b>Ensure</b> 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.</p>
	<p><b>Always</b> release compressed air after use.</p>
	<p><b>Never</b> work on the machine or touch moving parts if the actuator is supplied with compressed air.</p>
	<div style="border: 1px solid black; padding: 5px; display: inline-block;">  <b>CAUTION</b> </div> <p>Do <b>not</b> operate actuator with cleaning media pressure on.</p>
	<p>Before installing the machine and setting it into operation carefully read <a href="#">Safety</a> on page 9 and <a href="#">General Installation</a> on page 28, including <a href="#">Specific Conditions for Safe Use in Accordance with ATEX/UKEx/IECEX Certification</a> on page 36 and take all necessary precautions according to your application and local regulations.</p>





## Maintenance


	<p><b>Always</b> follow this Instruction Manual thoroughly.</p> <p>Before maintaining the machine, carefully read <a href="#">Maintenance</a> on page 43.</p>
	<p><b>Always</b> rinse well with clean water prior to maintenance.</p>
	<p><b>Always</b> ensure all pipelines (product, air, and water) are depressurized and emptied before installation, inspection, assembling and disassembling.</p> <p><b>Always</b> assemble the machine completely before start and make sure everything is in place and properly tightened.</p>
	<p><b>Never</b> dismantle or touch the machine or pipelines when processing hot liquids or when sterilising.</p>

	<p><b>Always</b> release compressed air after use.</p>
	<p><b>Never</b> work on the machine or touch moving parts if the actuator is supplied with compressed air.</p>
	<p>Do <b>NOT</b> attempt to disassemble the actuator due to spring under load danger!</p> <p>Do <b>NOT</b> attempt to cut the actuator open due to spring under load.</p>

## Storage

	<p>Alfa Laval recommends:</p> <ul style="list-style-type: none"> <li>• Store the supplied Alfa Laval product as supplied in original packaging</li> <li>• Port opening(s) should be protected against ingress</li> <li>• Bare steel (not stainless) should be lightly oiled/greased</li> <li>• Store in a clean, dry place without direct sunlight or UV light</li> <li>• Temperature range -5° C to +40° C (23° F - 104° F)</li> <li>• Relative humidity less than 60%</li> </ul>
	<ul style="list-style-type: none"> <li>• No exposure to corrosive substances (including contained air)</li> <li>• Rinse the supplied Alfa Laval product with clean water before storage</li> </ul>

## Noise


	<p>One meter from and 1.6 meter above the exhaust, the noise level of an actuator is approximately 77 dB(A) without noise damper and approximately 72 dB(A) with damper – measured at 7 bar air-pressure.</p>
---	---



## Hazards

	<p><b>Burn Hazard</b></p> <p>Various surfaces of the supplied Alfa Laval product and CIP supply line can be hot and cause burns. Wear protective gloves.</p>
	<p><b>Corrosive Hazard</b></p> <p><b>Always</b> handle cleaning liquids (e.g., lye and acid) with great care and in accordance with separate instructions for those liquids.</p> <p><b>Always</b> follow the general rules and recommendations regarding ventilation, personnel protection etc. when using chemical cleaning agents and lubricants.</p>
	<p><b>Cut Hazard</b></p> <p>Sharp edges, especially on the spray orifice, can cause cuts. Wear protective gloves.</p> <p>Avoid placing hands into machine orifice pinch points.</p>

## Safety check

	<p>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.</p> <p><b>Inspection acceptance criteria:</b></p> <ul style="list-style-type: none"> <li>• It should not be possible to reach moving parts originally protected by a protective device</li> <li>• The protective device must be securely mounted</li> <li>• Ensure that screws for the protective device are securely tightened</li> </ul> <p><b>Procedure in case of non-acceptance:</b></p> <ul style="list-style-type: none"> <li>• Fix and/or replace the protective device</li> </ul>
---	--



## 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



### DANGER

If the actuator is marked with one of the below warnings, do **NOT** attempt to disassemble it.

The spring inside is under load — any type of breakage or attempt to open the actuator can lead to severe injury or even death!



### 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](http://www.alfalaval.com) to access the information directly.

## 2.6 How to Contact Alfa Laval

Contact details for all countries are continually updated on our website.

Please visit [www.alfalaval.com](http://www.alfalaval.com) to access the information directly.



## 3 Introduction

### Free Rotating Retractor

Safeguard product quality, prevent contamination, and meet hygienic processing standards with the Alfa Laval Free Rotating Retractor. This high-efficiency, retractable cleaning device prepares vessels for production quickly and economically. It removes residues from the interior surfaces of ducts, tanks, and other hard-to-clean confined spaces. Boost process uptime with this dynamic, resource-efficient retractable cleaning device.

### Free Rotating Retractor UltraPure

When high-purity pharmaceutical processing is a must, select the Alfa Laval Free Rotating Retractor UltraPure. This wall-mounted cleaning device lets manufacturers spend less time cleaning and more time producing. Lift uptime and productivity with cleaner ducts and tanks, especially in those hard-to-reach shadow areas. This dynamic, resource-efficient, retractable cleaning device removes contaminants from the interior surfaces of processing vessels while reducing the total cost of ownership.



### 3.1 General Description

This Instruction Manual has been prepared as a guide for installing, operating, and maintaining the supplied Alfa Laval product. Should you require further assistance, Alfa Laval Technical Sales Support department and worldwide network of sales offices are pleased to help you. Please quote the type, article, and serial numbers with all your enquiries; this helps us to help you.

Refer to [Marking](#) on page 24 for placement of type and serial number.

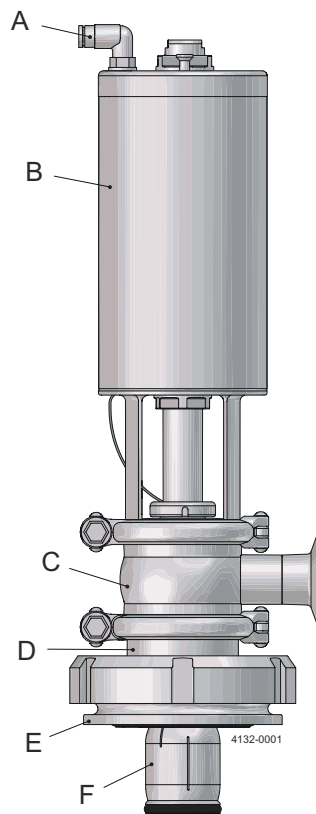
Preventive maintenance gives the best and most economical performance from the machine. For maintenance recommendation see [Maintenance](#) on page 43.

#### NOTE

If the supplied Alfa Laval product stops working unintentionally within the warranty period, please contact Alfa Laval Technical Sales Support department or worldwide network of sales offices. Please do not try to fix any mechanical problems on your own.

The Alfa Laval ThinkTop range can be mounted on the machine as a sensor and/or for control purposes.

The drawing indicates the main components of the supplied Alfa Laval product.



- A: Air supply inlet
- B: Actuator
- C: Inlet house
- D: Process adaptor
- E: Process connection
- F: Spray head



### 3.1.1 Intended Use

For the purpose of this Instruction Manual, tanks are defined as any compartment e.g., vessels, containers, semi-closed equipment ducts.

The end-user should verify:

- that the tank cleaning device is in conformity with respect to tank size in which it is used
- that the construction materials (both metallic and nonmetallic) are compatibility with product, flushing media, cleaning media, temperatures, and pressure under the intended use

The tank cleaning device is intended for use in closed tanks. If used in open environment see instructions in [Safety](#) on page 9 and section [General Installation](#) on page 28.

The wetted parts (see [ATEX/UKEx/IECEX Marking](#) on page 25 of the machine can be used in explosive hazard zones (ATEX/UKEx/IECEX), provided it is installed according to safety instructions in local regulations.

The Alfa Laval Free Rotating Retractor is designed for closed tanks and process equipment with moving internals, and processes where permanently installed tank cleaning devices may have an undesired influence on the process or product. For larger tanks, multiple Alfa Laval Free Rotating Retractors may be applied.

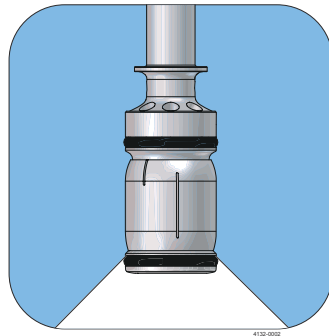


### 3.1.2 Working Principle

The Alfa Laval tank cleaning device is media driven and media lubricated.

The Alfa Laval Free Rotating Retractor functions as a pneumatic open and a spring close seat valve. Applying air to the actuator extended the spray head out of the Inlet house.

The Alfa Laval Free Rotating Retractor is a sanitary tank cleaning device of the rotating spray type for permanent installation. In the closed position, the installation forms a flush design with the tank wall and the spray head is out of the product. It provides a 310 degrees cleaning pattern.



Spray pattern 310°

The cleaning media is directed through the 1" tri-clamp inlet connection into the inlet house. Adaptors for other inlet connections are available (see [Inlet Connection Adaptors](#) on page 68). The liquid passes through holes in the connector to the spray head and out through the orifices and hydro bearings.

The spray head rotates between the two hydro bearings due to the reaction forces of the cleaning media expelled from the orifices. The spray head expels a swirling pattern of cleaning media throughout the closed tank which generates a vibrating impact and cascading flow coverage of the targeted surfaces of the closed tank.

The spray head is retracted by spring action to its closed position when diverting the air pressure away from the actuator.

The actuator can remain extended during a draining or purging phase.

Application assistance and optimal position recommendation is available by contacting Alfa Laval Technical Sales Support department or worldwide network of sales offices.



### 3.1.3 Design Principle

The supplied Alfa Laval product is designed in accordance with the 3-A Sanitary Standards No. 78-04 as well as the guidelines of the European Hygienic Design Group (EHEDG) wherever feasible and thus complies with requirements to design, materials, surface finish and documentation.

The machine is completely self-cleaning except for the part of the plug facing towards the product. This surface is normally cleaned by a second tank cleaning device. When properly installed the machine is self-draining, see [Draining](#) on page 31.

- All permanent assemblies are fully welded
- No threads have been used in the product and cleaning media contact area
- Gaskets and seals are exposed to cleaning liquid

The product contact surface materials are (for specific information see [Technical Data](#) on page 61):

- Metals: AISI 316 stainless steel (or better corrosion vice)
- Elastomers: complies with relevant food contact legislation (e.g. FDA, EU regulation) and pharma standards (e.g. USP 87, USP 88 Class VI, ISO 10993). For detailed information see Alfa Laval Anytime for specific Part ID's
- Polymers: complies with relevant food contact legislation (e.g. FDA, EU 10/2011) and pharma standards (e.g. USP 87, USP 88 Class VI, ISO 10993). For detailed information see Alfa Laval Anytime for specific Part ID's

The tank cleaning device is lubricated by the cleaning media. No oil, grease or other lubricants are used in the product contact area.

## 3.2 Patents and Trademarks

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

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The Alfa Laval logotype is a trademark or a registered trademark of Alfa Laval Corporate AB. Other products or company names mentioned herein may be the trademarks of their respective owners. Any rights not expressly granted herein are reserved.



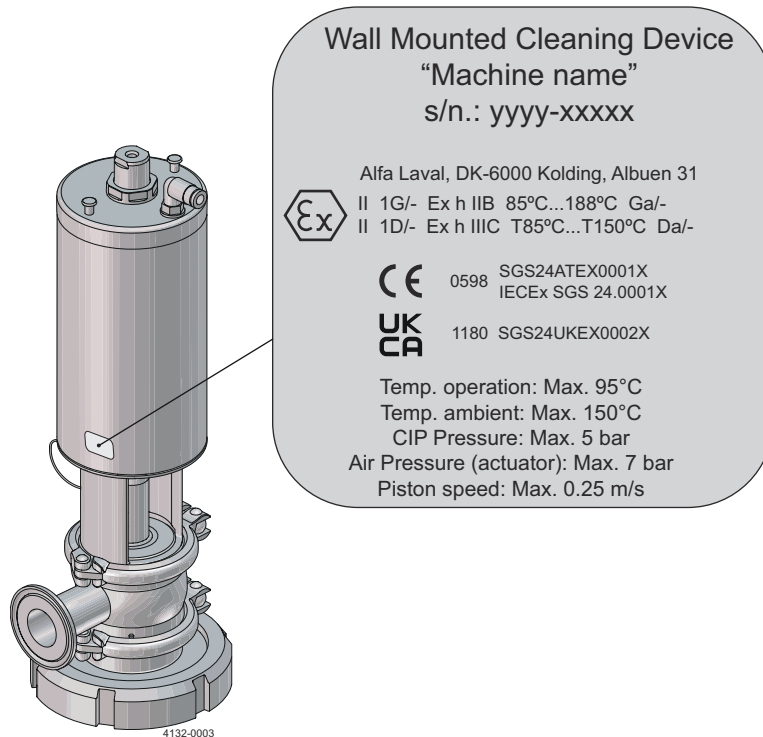
### 3.3 Quality System

The supplied Alfa Laval product is produced according to Alfa Laval Kolding's ISO 9001 international standard certified quality system.

### 3.4 Marking

Alfa Laval tank cleaning devices are marked to allow for recognition of machine designation, machine type, serial number and manufacturing address.

The marking is placed on the tank cleaning device as shown below.



#### Serial number explanation

Machines supplied with standard documentation or with Q-doc:

yyyy-xxxxx: serial number

yyyy: year

xxxxx: 5 digit sequential number

\*\*\*\*\*: Art. No.



### 3.5 ATEX/UKEx/IECEX Marking

The Alfa Laval Free Rotating Retractor is certified as category I component for the liquid contact part and no category for the non-liquid contact surfaces (see figure below). The ATEX certification is carried out by the Notified Body SGS Fimko Oy, who has issued the certificate no. SGS24ATEX0001X.

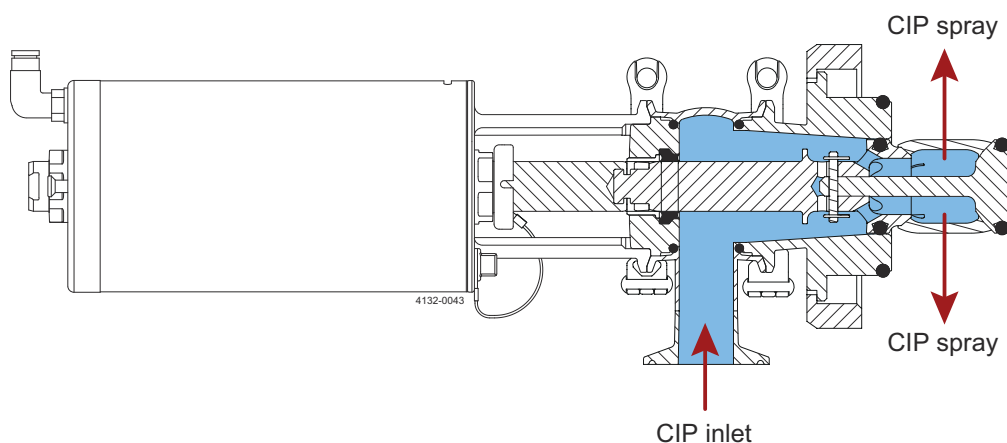
The IECEx certification is carried out by the Certification Body SGS Baseefa Ltd., who has issued the certificate no. IECEx SGS 24.0001X.

The UKEx certification is carried out by the Certification Body SGS Baseefa Ltd., who has issued the certificate no. SGS24UKEX0002X.

**NOTE** Explosion protection type

**Explosion protection type is constructional safety “c”.**

The marking on the ATEX/UKEx/IECEX certified Alfa Laval Free Rotating Retractor is shown in [Marking](#) on page 24.





### 3.6 ATEX/UKEx/IECEx Temperature Class and Code

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

#### Group III 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 fluid temperature or the ambient temperature, whichever of the two is the highest.

Table for determining temperature class (gas atmospheres)		
Gas Temperature class	Cleaning fluid temperature $T_p$ (°C)	Ambient temperature In operation $T_{amb}$ (°C)
85 °C (T6)	$0 \leq T_p \leq +68$	$0 \leq T_{amb} \leq +68$
100 °C (T5)	$+68 \leq T_p \leq +80$	$+68 \leq T_{amb} \leq +80$
135 °C (T4)	$+80 \leq T_p \leq +95$	$+80 \leq T_{amb} \leq +95$

#### Group III EPL Da

The dust temperature class depends on the cleaning 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 fluid temperature $T_p$ (°C)	Ambient temperature In operation $T_{amb}$ (°C)
T85 °C	$0 \leq T_p \leq +85$	$0 \leq T_{amb} \leq +85$
T100 °C	$+85 \leq T_p \leq +95$	$+85 \leq T_{amb} \leq +95$

#### Example of gas class determination

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

Gas class = T5

ATEX/UKEx/IECEx marking on the equipment:



II 1G/- Ex h IIB 85°C...188°C Ga/-

II 1D/- Ex h IIIC T85°C...T150°C Da/-



## 4 Installation

Every machine is operationally tested before shipment and is ready to run after unpacking. No assembly is required prior to use. Any change to the operating conditions provided in this Instruction Manual affects the performance of the machine.

### 4.1 Unpacking/Delivery

#### NOTE

Alfa Laval cannot be held responsible for incorrect unpacking.

**Always** read [Safety Precautions](#) on page 11.

**Always** read [Technical Data](#) on page 61.



#### WARNING

##### Air supply

**Always** connect air supply hose to push-in fitting. Make sure that the air supply hose is fitted properly. To reduce risk of whiplash, fasten air supply hose to other supply lines as close to the push-in fitting as practically possible.

### Unpacking and Initial Inspection

- Check delivery note
- Remove packing material from the machine
- Inspect the machine for visible transport damage
- Avoid damaging the machine

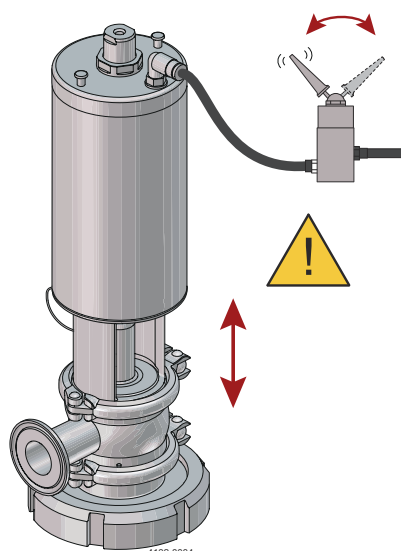
During handling and installation, handle the machine with care to not damage the surface finish of the machine.

The machine has been tested at the factory before shipping in accordance with the Test Specifications.

Upon arrival, check that the machine is in operating condition.

1. Supply compressed air to the actuator.
2. Open and close the valve several times to ensure it operates smoothly.
3. When in open position, spin the spray head with your fingers to ensure there is no restriction to rotation.

If the spray head does not extend or the spray head does not turn freely, contact Alfa Laval Technical Sales Support department or worldwide network of sales offices.





## 4.2 General Installation

### NOTE

Alfa Laval cannot be held responsible for incorrect installation.

**Always** read [Safety Precautions](#) on page 11.

**Always** read [Technical Data](#) on page 61.

**Always** release compressed air after use.

**Always** thoroughly flush supply lines and machines before installation to remove scale, remains from welding and grinding and other foreign matter.

**Always** install the machine in accordance with national regulations for safety and other relevant regulations and standards. In EU-countries the complete system must fulfil the EU-Machinery Directive and depending on application, the EU-Pressure Equipment Directive, the EU-ATEX/UKEx/IECEX Directive and other relevant Directives and shall be CE-marked before it is set into operation.

For information on use in potential explosive atmospheres see [Specific Conditions for Safe Use in Accordance with ATEX/UKEx/IECEX Certification](#) on page 36.

### WARNING Prevent startup

Precaution shall be made to prevent starting the cleaning operation, while personnel are inside the tank or otherwise can be hit by water jets from the cleaner head.

### DANGER

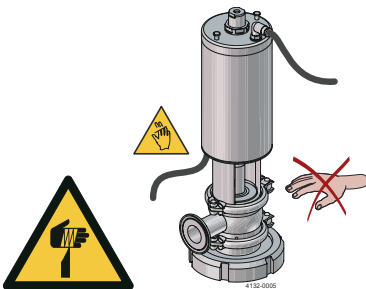
If the actuator is marked with one of the below warnings, do **NOT** attempt to disassemble it.

The spring inside is under load — any type of breakage of the actuator can lead to severe injury or even death!



### WARNING

During operation, **never** touch moving parts if the actuator is supplied with compressed air.

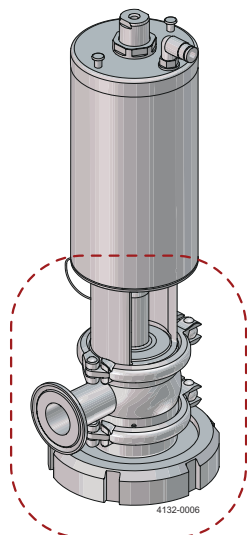




**CAUTION** Avoid stressing the valve.

Pay special attention to:

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

**WARNING** Air supply

**Always** connect air supply hose to push-in fitting. Make sure that the air supply hose is fitted properly. To reduce risk of whiplash, fasten air supply hose to other supply lines as close to the push-in fitting as practically possible.



### 4.2.1 Installation Orientation

To be operational, the machine should be installed in the recommended orientation, as provided below. If required, the installation shall be made so that self-draining properties (see [Draining](#) on page 31) of the machine is ensured.

**NOTE Recommended installation orientation**

Any orientation

### 4.2.2 Process Setup Recommendation

To separate the CIP system from the process it is recommended to install a shutoff valve close to the machine inlet.

**CAUTION**

It is recommended that the liquid valve fitted is of a type that prevents hydraulic shocks. Hydraulic shocks may cause severe damage to the machine and/or the entire installation. Ideally, use a frequency controlled pump with a ramp function for start-up to supply the cleaning liquid.

### 4.2.3 Strainer Recommendations

Larger particles may get trapped by the spray orifice, while smaller particles (e.g., fine sand) may be trapped by the smaller clearances of the machine and increase wear. Magnitude of the issues relies on the particle shape and properties (e.g., soft vs. hard). Experience shows that Alfa Laval tank cleaning devices may operate with strainer sizes larger than recommended below. Contact Alfa Laval Technical Sales Support department or worldwide network of sales offices.

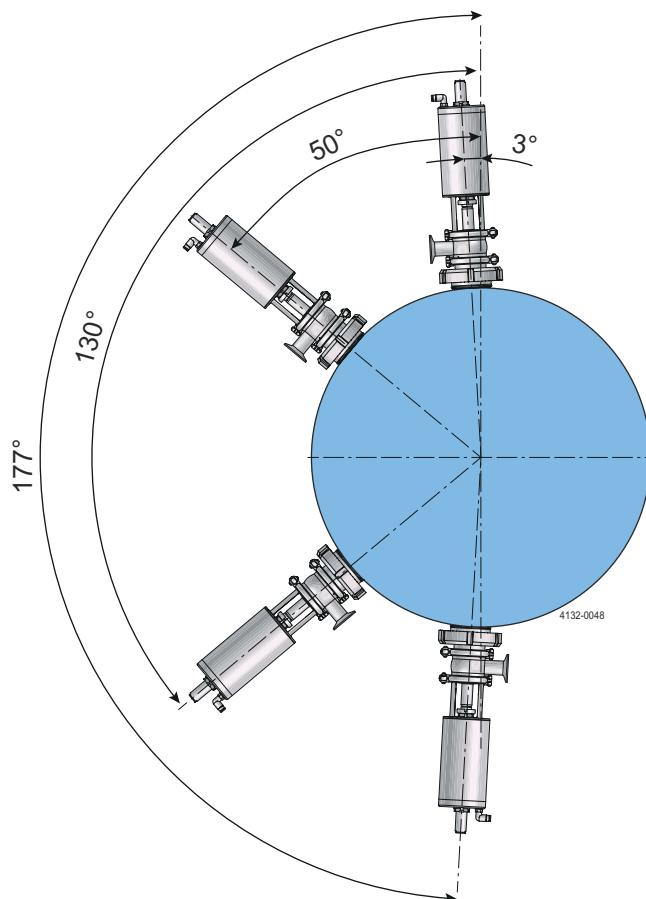
For low amounts of particles in the recirculating CIP liquid, larger particles should be avoided and in this case a 0.250 mm strainer may be sufficient for a reliable operation. However, particles up to 0.8 mm can pass the spray orifice in the spray head.

For high amounts of particles in the recirculating CIP liquid, it is recommended to install a strainer according to the smallest clearance in the machines. For the Alfa Laval Free Rotating Retractor, a strainer of 0.1 mm is recommended.



#### 4.2.4 Draining

The supplied Alfa Laval product is drainable by gravity when positioned from 3 degrees to 50 degrees and from 130 degrees to 177 degrees to vertical upwards. From 50 degrees to 130 degrees up to 2.3 ml +/-0.2 ml may be retained (the volume depends on the stop position of the spray head and the process connection).



##### 4.2.4.1 2 inch Clamp Connection

Closing process performed will results in:

3 - 50 degrees:	Drainable
50 - 60 degrees:	0.2 ml +/-0.2 ml (maximum in horizontal position)
60 - 105.5 degrees:	0.2 - 2.3 ml +/-0.2 ml
105.5 - 130 degrees:	0.2 ml +/-0.2 ml (maximum in horizontal position)
130 - 177 degrees:	Drainable



#### **WARNING Improved draining**

Operation for improved draining for orientation between 3 degrees and 90 degrees.

If dried in open position before closing the Alfa Laval Free Rotating Retractor, liquid may get trapped within the Alfa Laval Free Rotating Retractor. Closing and opening the retractor before drying is highly recommended. For further information contact Alfa Laval.



#### 4.2.4.2 3 inch RJT, DN80 Clamp and 3 inch Clamp

Closing process performed will results in:

3 - 50 degrees:	Drainable
50 - 86.3 degrees:	0.2 ml +/-0.2 ml (maximum in horizontal position)
86.3 - 90 degrees:	0.2 ml - 0.23 ml +/-0.2 ml
90 - 130 degrees:	0.2 ml +/-0.2 ml (maximum in horizontal position)
130 - 177 degrees:	Drainable

#### **WARNING** Improved draining

Operation for improved draining for orientation between 3 degrees and 90 degrees.

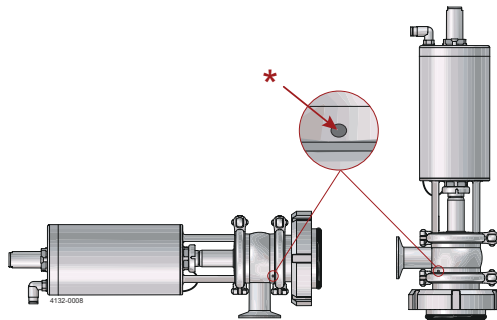
If dried in open position before closing the Alfa Laval Free Rotating Retractor, liquid may get trapped within the Alfa Laval Free Rotating Retractor. Closing and opening the retractor before drying is highly recommended. For further information contact Alfa Laval.

#### Leak detection hole on inlet house

Make sure that the leak detection hole in the inlet house:

1. is visible, when mounting the retractor vertically.
2. is pointing downwards to allow leaking liquid do drain by gravity, when mounting the retractor horizontally.

\* = Indicates leakage detection hole





### 4.2.5 Welding Recommendation

For welding recommendations see Instruction Manual for Alfa Laval Retractor series Weld plates.

#### NOTE

For installation of weld plate see [Appendix A - Weld Plate Installation](#) on page 77.

### 4.2.6 Attachment to Supply Line

#### NOTE

It is recommended to have a separate CIP supply line for each machine. If installed on a common CIP supply line, make sure that either:

1. each machine has the correct pressure at the inlet to each machine, or
2. only one of the machines runs at a time with the correct inlet pressure.

The machine is attached to the CIP supply line using the inlet connection.

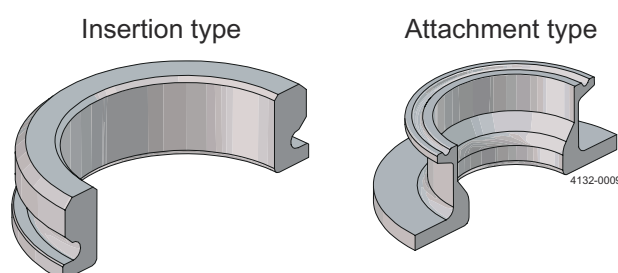
For rigid supply lines, the inlet connection should align with the CIP supply line. Alternatively, flexible supply lines can be used.

### 4.2.7 Installation of Externally Mounted Tank Cleaning Devices

The machine shall be mounted into or onto the designate welded process connection (see [Weld Plates](#) on page 68) using appropriate fasteners.

Alfa Laval Free Rotating Retractor fits into several types of weld plates. See [Weld Plates](#) on page 68.

In principle, there are two different types of weld plates:

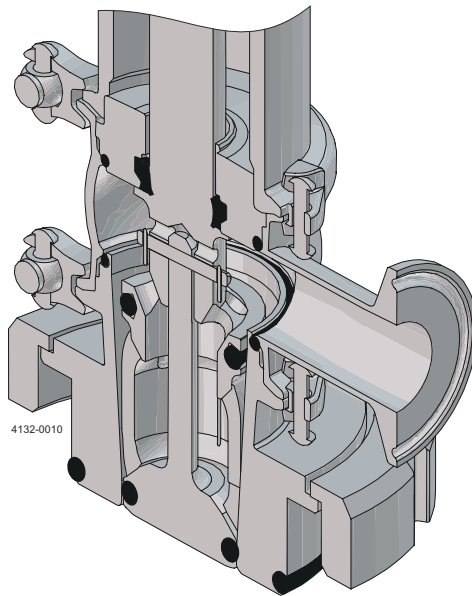


#### NOTE

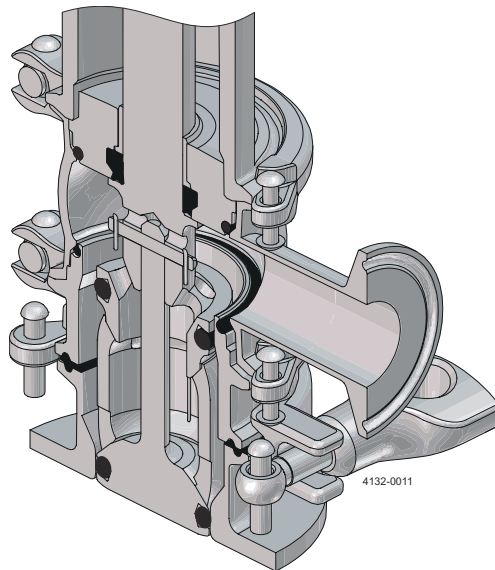
For installation of weld plate please refer to [Appendix A - Weld Plate Installation](#) on page 77.

For the insertion type, the machine comes with a fully integrated home chamber (process adapter attached to the inlet house) that is inserted into the weld plate and attached by either a nut or a clamp connection. This nut or clamp is neither in product- nor cleaning media-contact. Before insertion, wet the O-ring going into the weld flange.





For the attachment type, the machine and the weld adaptor create the home chamber when the process adapter is attached to the weld plate. Attachment is done by a clamp connection. The gasket in this connection is in cleaning media-contact.



**WARNING**

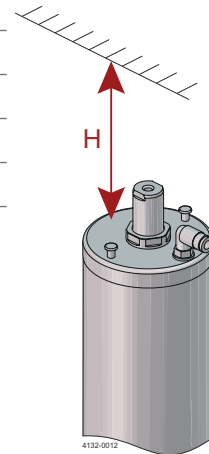
**Minimum free space above actuator**

When installing the device with actuator without indication unit (for example a ThinkTop® unit), a minimum clearance (H) in continuation of the actuator is required to avoid pinching of body parts when the machine closes.

Dimensions based on ISO 13854.



Installation orientation:	Clearance (H) [mm/inch]:	Body part:
Vertical up	161 / 6.34	Hand
Vertical down	181 / 7.13	Foot
Horizontal	561 / 22.09	Body



#### 4.2.8 Recommended Installation (spacing)

Reserved for future content.



### 4.3 Specific Conditions for Safe Use in Accordance with ATEX/UKEx/IECEX Certification



#### NOTE Explosion protection type

Explosion protection type is constructional safety “c”.

#### Warning: Operated in a hazardous area



The part of the unit located inside the tank may be operated in a hazardous area, only when filled with cleaning fluid.

If a medium other than the cleaning fluid is passed through the unit the flow must not be high enough to cause the unit to operate. If this cannot be avoided the spray part must be removed or secured to prevent rotation.

#### Warning: Operating guidance



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

After the units' spray part is moved into the product contact area the first cleaning step shall not be an air purging.

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



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

The temperature class and ambient temperature range are shown in section [ATEX/UKEx/IECEX Temperature Class and Code](#) on page 26.

#### Warning: Max. permitted temperature



Unit not in operation: Ambient Temperature Range of 0 °C to +150 °C.

Unit in operation: The upper ambient shall not exceed 95 °C, and the maximum permitted cleaning fluid temperature shall not exceed 95 °C.

#### Warning: Draining using compressed air



The unit shall be drained only using inert gas or clean air. The drain process shall not cause the unit to rotate.

#### Warning: Earthed when in use



The unit shall be effectively earthed at all times when in use maintaining metal to metal continuity, via the grounding wire between the actuator and the shaft of the spray part, and via the units' installation.

#### Warning: Steaming



Steaming must not be done in ex classified zone.

Steaming is possible in non ex classified zone (see [Normal Operation](#) on page 40).



**Warning: Tank size information**

The unit shall not be operated in a vessel having an enclosed volume of greater than 100 m<sup>3</sup>.

**Warning: Process generated electrostatic**

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

**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 shall be made electrically conductive by additives or otherwise.

For further information see IEC/TS 60079-32-1

**Warning: Appropriate cleaning fluid**

The cleaning fluid shall be either a non-flammable liquid, or a liquid that does not give off a flammable vapour.

When used for cleaning tanks containing potentially flammable liquids and/or 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.

**Warning: Fluid pressure**

The maximum permitted cleaning fluid pressure in ex classified zone is 3 bar.

The maximum permitted cleaning fluid pressure in non-ex classified zone is 5 bar.

**Warning: Piston speed**

The air pressure for the actuator shall not exceed 7 bar, ensuring the axial movement of the spray head shall not exceed 0.25 m/s.

**Warning: Tanks containing mixers**

For tanks with internal moving parts the unit shall be fully retracted from the tank before the tank goes back into service.

**Warning: Dust layers**

Do not allow dust layers to build up on the unit.



**Warning: Actuator**

Only a pneumatic actuator supplied by Alfa Laval Kolding A/S shall be used. The actuator shall only be mounted in a safe area.

In addition to the above mentioned precautions relating to the ATEX/UKEx/IECEx guidelines Directive 2014/34/EU, the [Safety Precautions](#) on page 11 must be observed.



## 5 Operation

### NOTE

Alfa Laval cannot be held responsible for incorrect operation.

**Always** read [Safety Precautions](#) on page 11.

**Always** read [Technical Data](#) on page 61.

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



### WARNING

#### Prevent startup

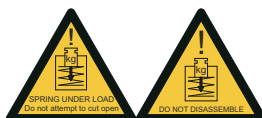
Precaution shall be made to prevent starting the cleaning operation, while personnel are inside the tank or otherwise can be hit by water jets from the cleaner head.



### DANGER

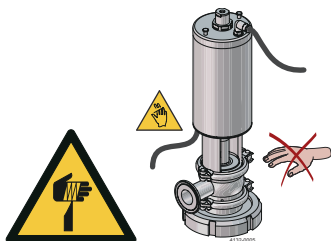
If the actuator is marked with one of the below warnings, do **NOT** attempt to disassemble it.

The spring inside is under load — any type of breakage of the actuator can lead to severe injury or even death!



### WARNING

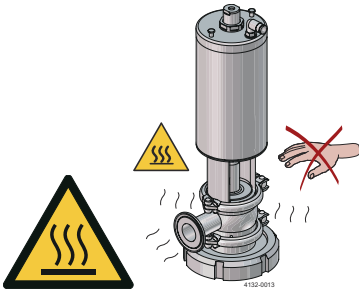
During operation, **never** touch moving parts if the actuator is supplied with compressed air.





**! WARNING**

**Never** touch the supplied Alfa Laval product and the pipelines when processing hot fluids or when sterilising.

**! CAUTION**

**Always** handle CIP and SIP chemicals with great care.

**Always** use rubber gloves!

**Always** use protective goggles!

**Always** rinse with clean water after using a cleaning agent.

**! NOTE**

**Always** store/dispose cleaning agents in accordance with current regulations/directives.

## 5.1 Normal Operation

**! NOTE Media**

**Only** use media compatible with materials shown in [Technical Data](#) on page 61.

**Never** use aggressive chemicals, excessive concentrations of chemicals at elevated temperatures, as well as certain solvents hydrochlorides. If you are in doubt, contact your local Alfa Laval sales office.

PEEK is not resistant to concentrated sulfuric acid. Normal detergents, moderate solutions of acids and alkalis are acceptable.

EPDM exposed to fatty materials may swell significantly.

**! NOTE Temperature**

**Never** exceed 95° C (203° F) when flowing cleaning media through the machine. However, the machine stands surrounding temperatures of up to 150° C (302° F).

Steaming is not supported (contact Alfa Laval for recommendations).



**CAUTION Steam cleaning**

If steam cleaning is done through the machine, the steam pressure must not cause the machine to rotate.

See [Specific Conditions for Safe Use in Accordance with ATEX/UKEx/IECEX Certification](#) on page 36.

**NOTE Pressure**

**Always** check that the CIP process connections are correctly mounted.

**Always** apply media pressure gradually to avoid hydraulic shocks. Hydraulic shocks might stress mechanical parts.

**Always** see [Technical Data](#) on page 61 for recommended and maximum operating parameters.

**WARNING Air supply**

**Always** connect air supply hose to push-in fitting. Make sure that the air supply hose is fitted properly. To reduce risk of whiplash, fasten air supply hose to other supply lines as close to the push-in fitting as practically possible.

## 5.2 Recommended Cleaning

The internal surfaces of the tank cleaning device are cleaned by the cleaning liquid passing through the tank cleaning device. The external surfaces of the tank cleaning device are cleaned by cleaning liquid expelled from the tank cleaning device itself, either as targeted cleaning or free falling film cleaning. The surfaces of the tank cleaning device exposed to the inside of the tank not targeted by cleaning liquid from the tank cleaning device itself are cleaned by the cleaning liquid sprayed on the surfaces from a second tank cleaning device.

- After use, flush the machine with fresh water
- Cleaning media should never be allowed to dry or remain in the system due to possible "salting out" or "scaling" of the cleaning media. If cleaning media contains volatile chloride solvents, it is recommended not to flush with water after use, as this might create hydrochloric acid
- Hot chemical may be used for cleaning and sterilization. If steaming is needed, contact your local Alfa Laval office for recommendation.
- Protect against scalding and burning



## 5.3 Troubleshooting

### NOTE

Study the maintenance instructions carefully before replacing worn parts – see [Maintenance](#) on page 43.

### DANGER

If the actuator is marked with one of the below warnings, do **NOT** attempt to disassemble it.

The spring inside is under load — any type of breakage of the actuator can lead to severe injury or even death!



Problem	Possible causes	Action
Leakage at piston	<ul style="list-style-type: none"> <li>Worn or damaged lipseal</li> </ul>	<ul style="list-style-type: none"> <li>Replace lipseal</li> </ul>
Leakage at clamp connections	<ul style="list-style-type: none"> <li>Worn or damaged O-rings</li> </ul>	<ul style="list-style-type: none"> <li>Replace O-ring</li> </ul>
Leakage at seal towards product zone	<ul style="list-style-type: none"> <li>Worn or product affected plug seal</li> <li>Product deposit on seal and or seat</li> </ul>	<ul style="list-style-type: none"> <li>Replace seal</li> <li>More frequent cleaning</li> </ul>
Piston is not restoring to original position	<ul style="list-style-type: none"> <li>Damaged actuator</li> <li>Foreign objects in inlet house</li> </ul>	<ul style="list-style-type: none"> <li>Replace actuator</li> <li>Inspect inlet house and remove foreign objects</li> </ul>
Poor cleaning performance	<ul style="list-style-type: none"> <li>Insufficient flow/pressure</li> </ul>	<ul style="list-style-type: none"> <li>Refer to the pressure-flow graph to reconfirm the recommended operating conditions at the device</li> <li>Reconfirm minimum flow rate recommended for size of surface being cleaned (e.g., based on ASME BPE recommendations)</li> </ul>
	<ul style="list-style-type: none"> <li>Incorrect cleaning media</li> </ul>	<ul style="list-style-type: none"> <li>Verify temperature and concentration of the cleaning media</li> </ul>
	<ul style="list-style-type: none"> <li>Insufficient time</li> </ul>	<ul style="list-style-type: none"> <li>Verify cleaning time</li> </ul>
	<ul style="list-style-type: none"> <li>Debris in the orifice</li> </ul>	<ul style="list-style-type: none"> <li>Inspect orifice and remove debris</li> </ul>
	<ul style="list-style-type: none"> <li>Poor drainage of tank</li> </ul>	<ul style="list-style-type: none"> <li>Ensure the tank drains cleaning liquid at a rate equal to or higher than the flow rate of all tank cleaning devices.</li> </ul>



## 6 Maintenance

### NOTE

Alfa Laval cannot be held responsible for incorrect maintenance.

**Always** read [Safety Precautions](#) on page 11.

**Always** read [Technical Data](#).

**Always** use Alfa Laval genuine spare parts. The warranty of Alfa Laval products depends on use of Alfa Laval genuine spare parts.

Alfa Laval recommend keeping service kits in stock to optimise uptime of your equipment.

### DANGER

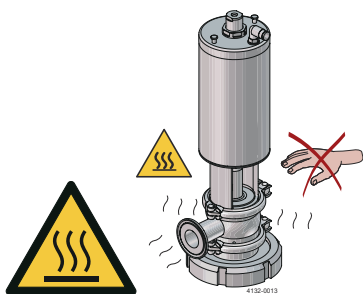
If the actuator is marked with one of the below warnings, do **NOT** attempt to disassemble it.

The spring inside is under load — any type of breakage of the actuator can lead to severe injury or even death!



### WARNING

**Never** touch the supplied Alfa Laval product and the pipelines when processing hot fluids or when sterilising.



### WARNING

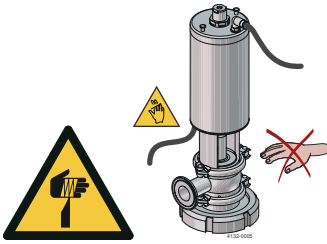
#### Air supply

**Always** connect air supply hose to push-in fitting. Make sure that the air supply hose is fitted properly. To reduce risk of whiplash, fasten air supply hose to other supply lines as close to the push-in fitting as practically possible.



### CAUTION

During maintenance, caution is needed when the actuator is supplied with compressed air. Only touch moving parts with tools.



## 6.1 Preventive Maintenance

### NOTE

**Always** handle the machine with care. Take proper action to protect fine surfaces from being damaged.

Use only proper tools (e.g., the Alfa Laval standard tool kit). **Never** force or hammer components together or apart. Always perform all assembly/disassembly steps in the order described in this Instruction manual.

**Never** assemble components without previous cleaning. This is especially important at mating surfaces.

Work in a clear well-lighted work area.

To optimise the operation of the machine and to minimize the down time due to repair activities, the maintenance should consist of:

- **Inspection and maintenance:** Strictly follow the technical documentation
- **Preventive maintenance:** Visual inspection of the supplied Alfa Laval product followed by necessary adjustments and planned periodic replacement of wear and tear parts
- **Repairs:** Unscheduled break-down of a component, often causing the system to stop. Damaged components shall be replaced or repaired
- **Stock of Alfa Laval genuine spare parts:** Alfa Laval recommends keeping a stock of genuine spare parts facilitating preventive maintenance and reducing down time in case of unplanned breakdowns

**Always** use Alfa Laval genuine spare parts.

### NOTE

According to "Regulation (EC) No 1935/2004 - Article 17" effective from 27th of October 2006, producers of food shall ensure traceability of the materials and articles intended to come into contact with foodstuffs. It is recommended that a traceability system is setup for replacement of wear parts and spare parts. This makes it possible to identify into which machine a given wear part or spare part has been inserted.

The recommended preventive maintenance program provided in [Recommended Service Intervals](#) on page 46 is based on tank cleaning devices working in average conditions. However, a tank cleaning device, exposed to heavy soiling and recirculation CIP liquid containing abrasives



and/or particulates needs more frequent attention than one exposed to light/no soiling and recirculation with ordinary CIP liquid. Alfa Laval Kolding A/S recommends that you adjust the maintenance program to suit the cleaning task in hand. Contact your local Alfa Laval sales office for discussion.

For further information regarding Alfa Laval Service Kits and service intervals, see [Recommended Service Intervals](#) on page 46.



**NOTE** Please note that the guidelines are for normal working conditions in one shift.

	Product wetted seals	Actuator bushings complete
Preventive maintenance	Replace after 12 months depending on working conditions. When opening and closing the retractor in dry conditions, plug shall be replaced after 60 CIPs.	Replace after 5 years depending on working conditions.
Maintenance after leakage (leakage normally starts slowly)	Replace at the end of the day.	Replace when possible.
Planned maintenance	<ul style="list-style-type: none"> <li>Regular inspection for leakage and smooth operation</li> <li>Keep a record of the machine</li> <li>Use the statistics for inspection planning</li> </ul> <b>Replace after leakage</b>	<ul style="list-style-type: none"> <li>Regular inspection for leakage and smooth operation</li> <li>Keep a record of the machine</li> <li>Use the statistics for inspection planning</li> </ul> <b>Replace after leakage</b>
Lubrication	<b>Before fitting:</b> Wet O-rings with water or, if accepted by end user, Alfa Laval Silicon based Food-grade Lubricant USDA H1 approved grease.	<b>Before fitting:</b> Molykote Longterm 2 plus



## 6.2 Service and Repair of ATEX/UKEx/IECEX Certified Machines

### WARNING

All service and repair of ATEXUKEx/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 ATEXUKEx/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 ATEXUKEx/IECEX Directive) is no longer valid.

In order to ensure compliance with the ATEXUKEx/IECEX regulations and keep the machine ATEXUKEx/IECEX certification valid, the service or repair must be performed by an authorized person with knowledge of the ATEXUKEx/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 ATEXUKEx/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 ensure the retention of the ATEXUKEx/IECEX certification of the machine.



## 6.3 Recommended Service Intervals

It is recommended that the wear parts are checked every 500 working hours (after 2000 working hours: inspection every 200 working hours) for machine working under normal conditions.

Recommended spare parts and service kits: See [Spare Parts](#) on page 71.

(#) refers to position numbers, see [Part Lists and Exploded Views](#) on page 73.

### WARNING

Use only pure water at normal temperature for safety reasons.

Use goggles when checking rotation.



An inspection consists of:

1. At a pressure of 0.3 bar (4.4 psi) open a hatch in the tank to verify rotation and liquid is expelled from all orifices. If needed proceed to next step.
2. Un-install the machine as described in [Uninstall for Maintenance](#) on page 49.



3. Visual inspection for foreign objects. Remove any objects and clean before rotation verification.
4. Rotation verification as described in [Unpacking/Delivery](#) on page 27.
5. Disassemble the machine as described in [Dismantling](#) on page 48.
  - a. Check lipseal (12) for visible wear
  - b. Check plug seals (9) for visible wear
  - c. Check spray head (7) for wear on bearing
6. Reassemble the machine as described in [Assembly](#) on page 60.
7. Rotation verification as described in [Unpacking/Delivery](#) on page 27.
8. Reinstall machine as the reverse of [Uninstall for Maintenance](#) on page 49.
9. Fill in service log



## 6.4 Dismantling

### NOTE

Handle scrap correctly – See [Recycling Information](#) on page 17.

### NOTE

Alfa Laval Kolding A/S do not recommend or support disassembly of the actuator in the field due to spring under load danger. Please return the actuator to us for disassembly and repair. Replacement of bushings (21) and O-rings (20) (22) on the actuator is possible without opening the actuator (see [Actuator Bushing Replacement \(Non-maintainable Actuator\)](#) on page 57).

### DANGER

If the actuator is marked with one of the below warnings, do **NOT** attempt to disassemble it.

The spring inside is under load – any type of breakage of the actuator can lead to severe injury or even death!

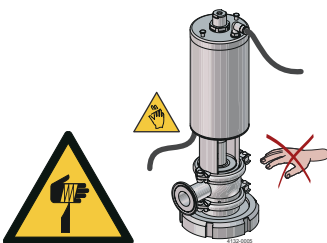


### WARNING Air supply

**Always** connect air supply hose to push-in fitting. Make sure that the air supply hose is fitted properly. To reduce risk of whiplash, fasten air supply hose to other supply lines as close to the push-in fitting as practically possible.

### CAUTION

During maintenance, caution is needed when the actuator is supplied with compressed air. Only touch moving parts with tools.





### 6.4.1 Uninstall for Maintenance

Disconnect the machine from the CIP supply line by loosening the cleaning media inlet connection (clamp or nut) and remove the gasket.

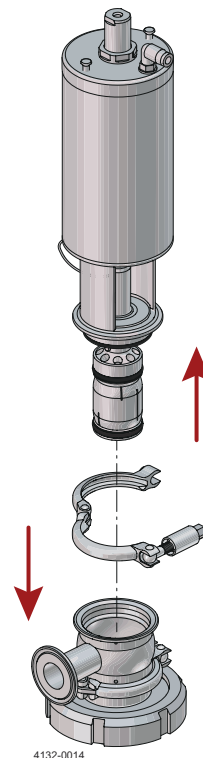
Uninstall machine as the reverse of [Installation of Externally Mounted Tank Cleaning Devices](#) on page 33.

Clean material build-up and deposits from external parts with water or suitable chemical cleaner, possibly Scotch-brite, S-Ultrafine.

#### 1 **Option 1 – remove only actuator and spray part**

The design of the Alfa Laval retractable allows the user to only remove the actuator (B) and the spray part assembly in an easy operation to inspect the actuator (1), the spray head (7) and the plug seals (9). The inlet house (14) and process adaptor (16) then remain attached to the process connection (E). This significantly reduces the weight of the removed parts and save time as the supply line does not need to be removed for maintenance.

- a) Loosen and remove upper clamp (15) on inlet house (14).
- b) Withdraw the actuator (1) including connector (4), sealing element (10), spray head (7) and stator (8) from the inlet house (14).

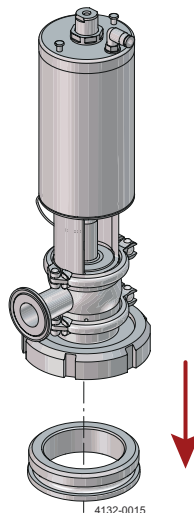




## 2 **Option 2 – remove the entire retractable device from the process connection**

The design of the Alfa Laval Free Rotating Retractor allows the user to remove the entire retractor to inspect all parts.

- a) Dismount the connection (17) from the process connection (E) on the processing equipment.
- b) Withdraw the machine from the process connection (E).





## 6.4.2 Disassembly

### NOTE

Before disassembly, **always** thoroughly read the disassembly instructions and the Spare Part manual available on [anytime.alfalaval.com/alweb/](http://anytime.alfalaval.com/alweb/).

**Always** replace all parts included in the Service Kit.

**Always** clean all tools and fixtures prior to assembly/disassembly to ensure that scratches and marks and trace of soil/corrosion from tools are avoided.

**Never** scratch or damage the surfaces of the machine.

**Always** place components on soft material.

**Always** check surfaces for product residues and clean all parts before assembly.

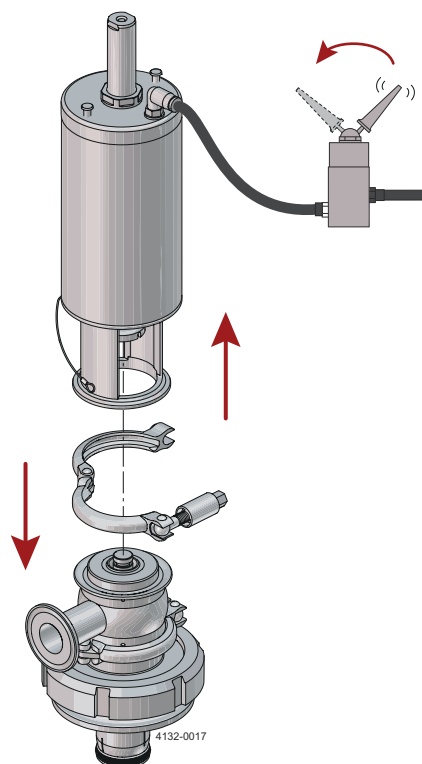
**Always** assemble the machine as described on the following pages.

### CAUTION

During disassembly and assembly, the threads can gall. If any resistance is felt when screwing/unscrewing parts, proceed with caution.

1

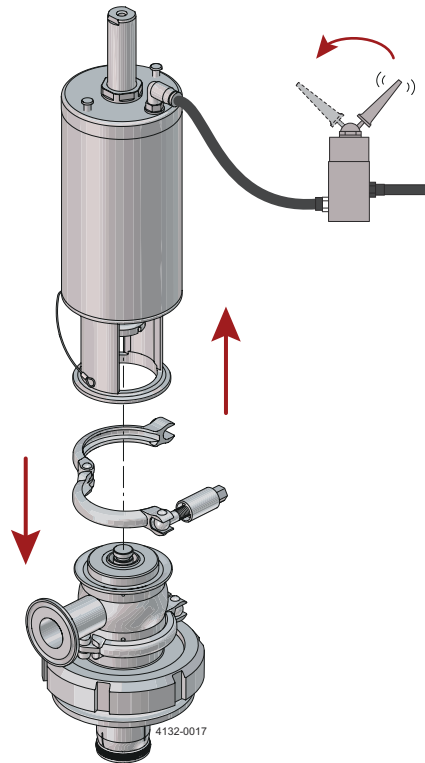
1. Add air supply to actuator (1) through air fitting (24) on the top of the actuator (1).
2. Open air supply and the output shaft of the actuator moves forward.
3. Release the lock ring (2) located between the inlet house (14) top and the actuator (1) bottom.
4. Remove the clip (3) connecting the output shaft of the actuator (1) and the connector (4).





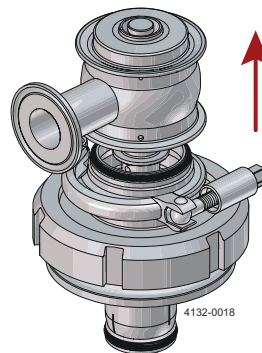
2

1. Close air supply and the output shaft of the actuator moves backwards.
2. Loosen and remove the upper clamp (15) on inlet house (14).
3. Remove actuator (1) from the inlet house (14).



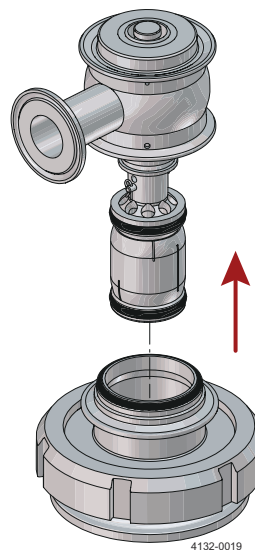
3

1. Wet plug seal with water.
2. Loosen and remove lower clamp (15) on inlet house (14).
3. Pull inlet house (14) apart from Process adaptor (16).



4

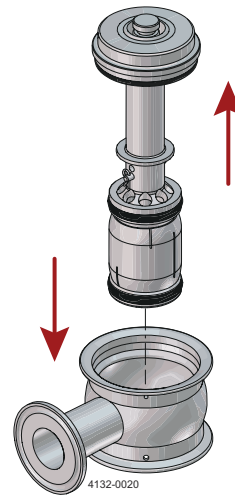
1. Pull inlet house (14) until spray head (7) is out of the Process adaptor (16). NB: for some adaptors some force is needed to pull the O-ring (9) pass the valve seat in the Process adaptor (16).





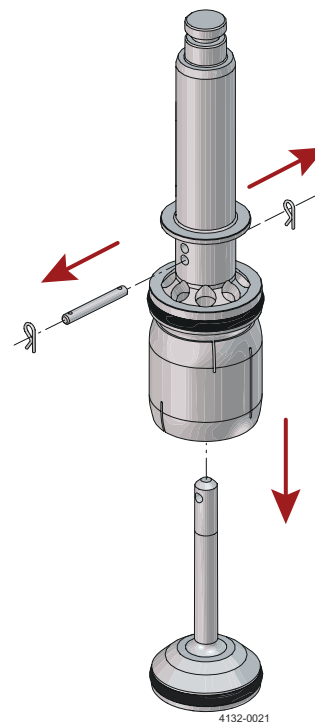
5

1. Push the spray head (7) through the inlet house (14).
2. Remove sealing element (10) from the Connector (4).



6

1. Remove clip (5) from pin (6).
2. Remove pin (6) from connector (4).
3. Withdraw stator (8) from connector (4) and spray head (7).



## 6.5 Lipseal Replacement and Bushing Replacement

### 6.5.1 Removal of Lipseal and Bushing

1

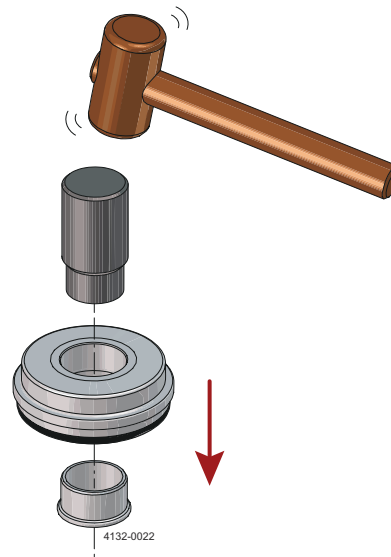
1. Remove lip seal (12) from sealing element (10) using a small flat headed screw driver.



- 2 Remove bushing (11) from sealing element (10) using bushing tool (9613160901) and rubber mallet.

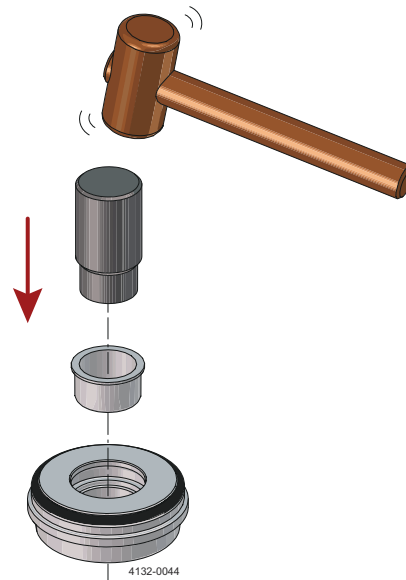


**Be careful not to damage the bushing.**



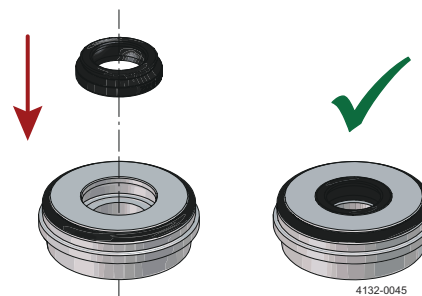
### 6.5.2 Mounting Bushing

- 1 Orientated the bushing (11) as shown. Press it slightly into the sealing element (10). Insert bushing tool (9613160901) into the bushing (11) and hammer the bushing (11) in place using the rubber mallet.



### 6.5.3 Mounting Lipseal

- 1 Orientate the lipseal (12) as shown. Squeeze the lipseal (12) to fit the cylindrical part of the lipseal (12) into the lipseal groove in the sealing element (10).





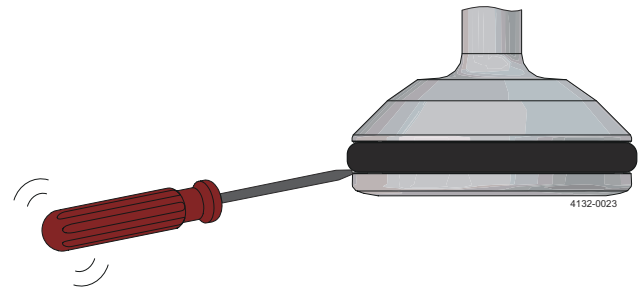
## 6.6 Static O-ring Replacement

- 1 Remove static O-rings (13) from sealing element (10) and process adaptor (16) and static O-ring (18) from process adaptor (16).
- 2 Insert static O-rings (13) on sealing element (10) and process adaptor (16) and static O-ring (18) on process adaptor (16). Make sure the O-rings are completely mounted in the O-ring grooves.

## 6.7 Plug Seal Replacement

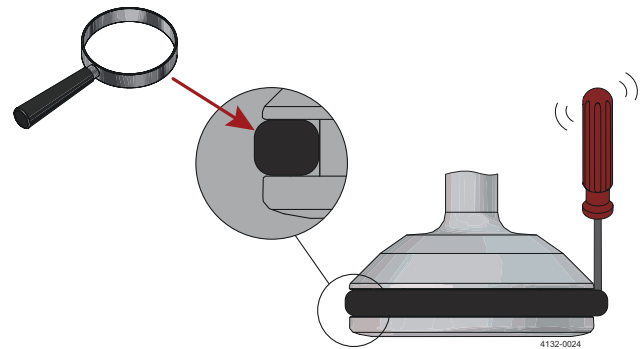
### 6.7.1 Removal of Plug Seal

- 1 Remove old plug seal (9) using a knife, a small flat headed screwdriver or similar. Be careful not to damage the stator (8) or connector (4) surface.



### 6.7.2 Mounting Plug Seal

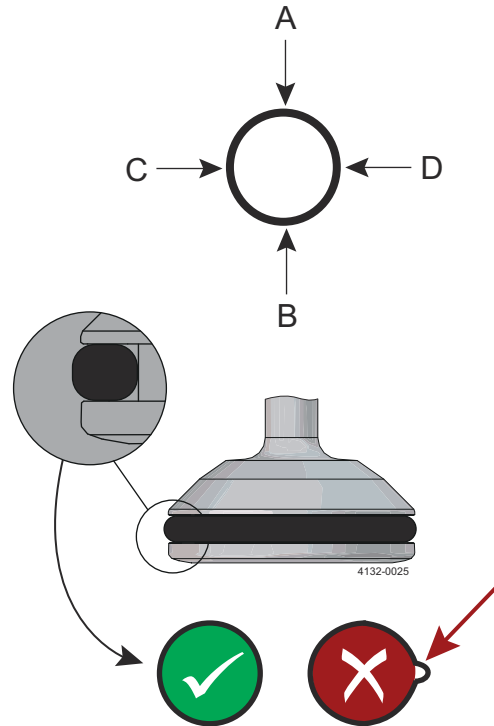
- 1 Fit the plug seal (9) on the stator (8) or connector (4) without pressing into the groove.  
Be careful not to twist the plug seal (9).  
Use a small flat headed screwdriver (two turns) to fit the plug seal (9) properly and ensure it is not twisted.





2

1. Wet plug seal (9) with a little water.
2. To ensure correct mounting, press with your thumb on the plug seal (9), which must be done approximately 10 times and always with the opposite pressure points, from A to B and C to D.
  - a. The rest of the plug seal (9) can now be pressed into the groove so the whole plug seal (9) is mounted. Check that there are NO "bulge".
  - b. If there is little bulge – then use the screwdriver to eliminate the bulge.
  - c. Again, press with the thumb on the plug seal (9) and keep the pressure while rotating 360°.
  - d. Alternatively, press the plug seal and stator/connector into the plugseat of the process connector.



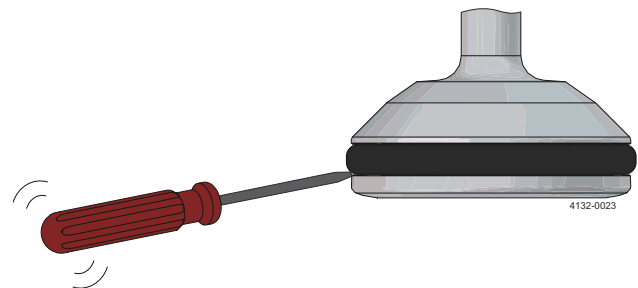
3

It is important to release compressed air behind the plug seal (9).

This is done with a small flat headed screwdriver.

It must be done in one or two different points on the circumference.

Be careful not to make marks on the surface of the stator (8) or connector (4) and plug seals (9).





## 6.8 Actuator Bushing Replacement (Non-maintainable Actuator)



If the actuator is marked with one of the below warnings, do **NOT** attempt to disassemble it.

The spring inside is under load — any type of breakage of the actuator can lead to severe injury or even death!



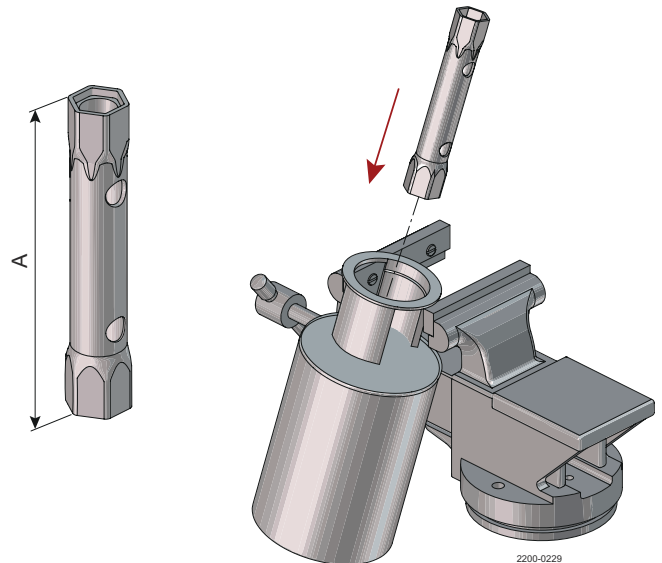
### Tools needed for replacement:

1)

Use a 27 mm (1 1/16") tubular box wrench to unscrew and fasten the bushings (21).

This tool allows the actuator stem to fit inside and provide good access to the bushing (21) placed in the actuator yoke end.

The tubular box wrench can be bought from Alfa Laval as part of 9614198401.



2)

The actuator spindle can in some cases be forced off-center by the internal spring (see drawing).

If misaligned the spindle can be aligned with the bushing (21) thread using an aligning spindle and the thread adaptor.

The aligning spindle and thread adaptor can be bought from Alfa Laval as part of 9614198401. This also include the 27 mm (1 1/16") tubular box wrench with bushing inserted for the aligning spindle.

The aligning spindle can also be manufactured locally using below dimensions.

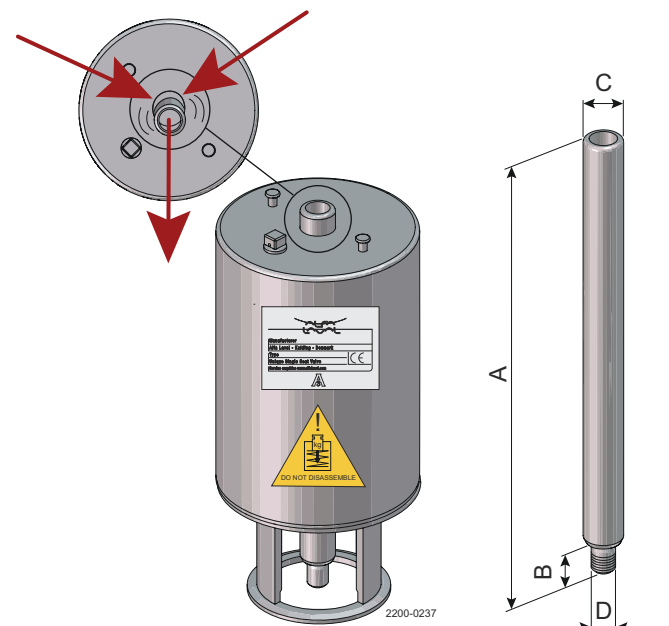
### Dimensions

A = 280 mm (11")

B = 6 mm (0.63")

C = Rod Ø20 mm (0.79")

D = M6x1



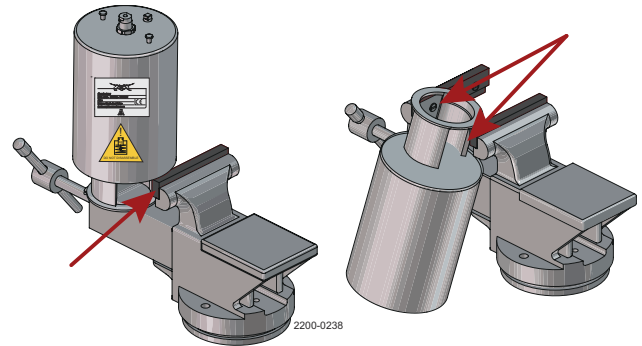
Spindle forced off centre by spring inside actuator



- 1 The actuator service kit contains two bushings (21) and four O-rings (20) (22).

Mount the thick O-ring (20) inside and the thin O-ring (22) outside the bushing (21).

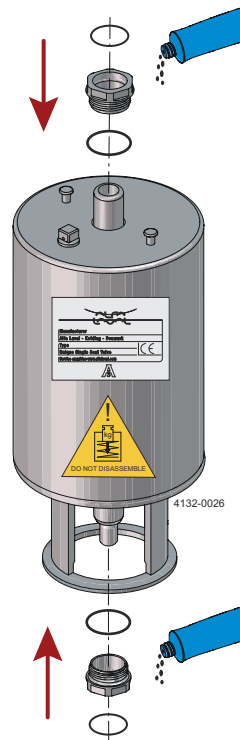
- 2 The actuator must be fixed in a vise. Alfa Laval recommend use of soft jaws.  
Be careful not to damage the yoke by over tightening and only fix carefully on the yoke "leg" (see drawing).



- 3 Unscrew and remove the bushing (21) with the two O-rings (20) (22).

- 4 Lubricate the stem and O-rings (20) (22) with "Muolykote Longterm 2 Plus" or an equivalent grease before sliding the new bushings (21) onto the actuator stem.

Slide the lubricated bushing (21) with the two O-rings (20) (22) onto the actuator stem.



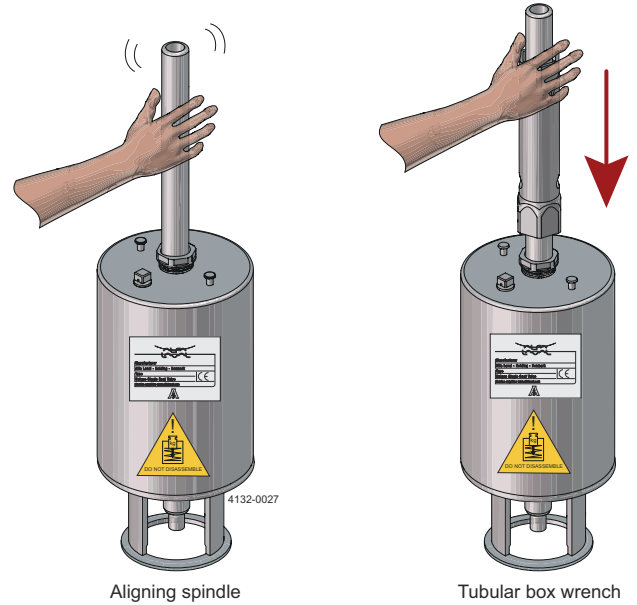


5

Fit the aligning spindle to the actuator stem and slide the tubular box wrench onto the aligning spindle.

Move the tubular box wrench so the thread on the bushing aligns with the thread in the actuator.

When aligned, initial fasten the bushing using the fingers. Ensure the thread engages easily.

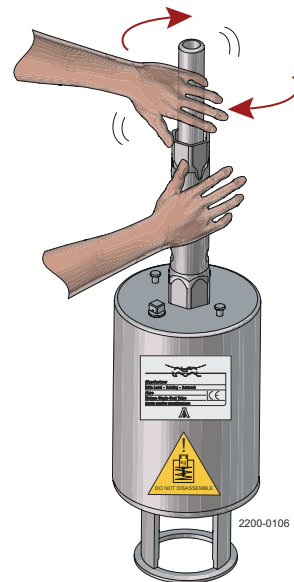


6

Lower the tubular box wrench onto the bushing.

Fasten the bushing (21).

Recommended torque is 10 Nm (7 lb-ft) which is achievable by hand tightening only.





## 6.9 Assembly

### NOTE

All parts shall be cleaned thoroughly before reassembling.

Any deposit remaining on the parts can cause difficulty disassembling again.

Reverse order of *Disassembly* on page 51.

Lubricate lip seal and plug seal with water.

Remember to mount the spray head (7) in the correct orientation otherwise the pin (6) for assembly cannot be mounted.

The clamp (15) threads must be lubricated before tightening – max. torque for the clamps is 10-12 Nm (8-9 lbf – ft).



## 7 Technical Data

### NOTE

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

### 7.1 Alfa Laval Free Rotating Retractor

#### 7.1.1 Technical Data

##### Temperature/pressure – process contact

Temperature range – liquid service	-10° C to 95° C (14° F to 284° F)
Temperature max. – steam/gas service	Max. 121° C (250° F) <sup>1</sup>
Temperature max. – ambient	Max. 150° C (304° F)
Pressure range – liquid service	1-3 bar (14.5 psi to 43.5 psi)
Pressure max. – liquid service	5 bar (72.5 psi) <sup>1</sup>
Pressure max. – steam/gas	Contact Alfa Laval for information
Pressure min. – vessel	Full Vacuum

<sup>1</sup> See [Specific Conditions for Safe Use in Accordance with ATEX/UKEx/IECEx Certification](#) on page 36

##### Temperature/pressure – actuator

Temperature range	-10° C to 60° C (14° F to 140° F)
Pressure range - supply	5-7 bar (72.5 psi to 101.5 psi)

##### Miscellaneous

Wetting radius <sup>1</sup>	900 mm (35.5 inch)
Cleaning radius <sup>1</sup>	800 mm (31.5 inch)
Lubrication – product contact	Cleaning media
Air supply connection	6 mm (0.24 inch)

<sup>1</sup> see [Performance Data](#) on page 64



## 7.1.2 Physical Data

### Materials

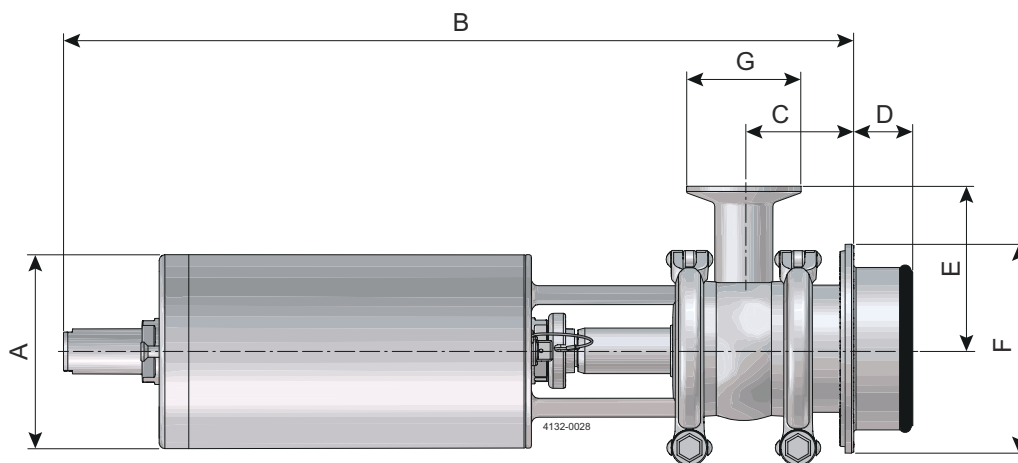
Steel parts – product wetted	AISI 316
Steel parts – non-product wetted	AISI 304, AISI 304L, AISI 302, Brass
Seal parts – product wetted	EPDM
Seal parts – non-product wetted exposed	NBR, FPM
Polymer parts – product wetted	PEEK
Polymer parts – non-product wetted exposed	Igildur, PP

### Surface roughness

External surface finish	Bead blasted
Internal surface finish – cleaning media	Ra 0.8 µm / Ra 32 µi
Internal surface finish - product	Free Rotating Retractor: Ra 0.8 µm / Ra 32 µi Free Rotating Retractor UltraPure: Ra 0.38 µm EP / Ra 15 µi EP

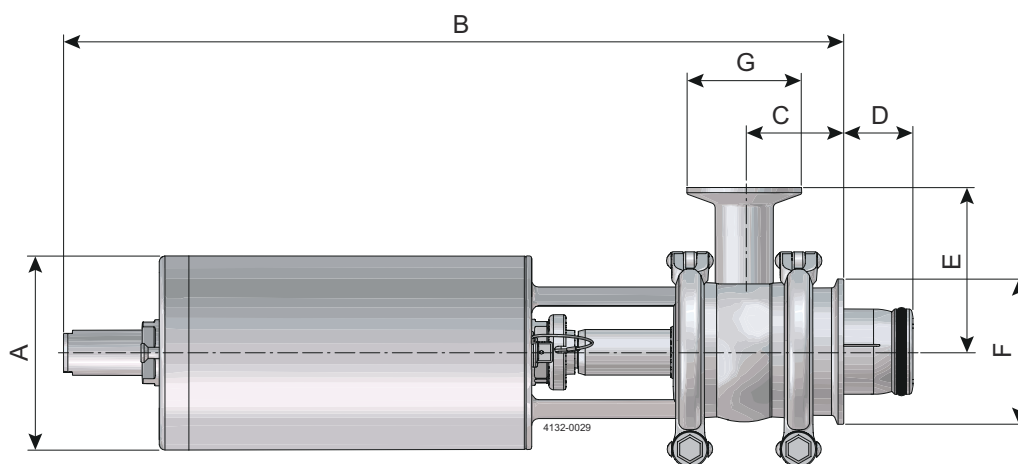


### 7.1.3 Dimensions



Tank connection	Inlet connection	Dimension mm / inch					Weight
F	G	A	B	C	D	E	Kg / lb
3 inch RJT	1 inch Clamp	85 / 3.3	365.4 / 14.39	48.4 / 1.91	26.0 / 1.02	71.5 / 2.81	5.3 / 11.7
DN80 Clamp <sup>1</sup>			361.8 / 14.24	44.9 / 1.77	29.5 / 1.16		4.7 / 10.4
3 inch Clamp <sup>2</sup>			368.4 / 14.50	51.4 / 2.02	23.0 / 0.91		4.5 / 10.0

<sup>1</sup> DIN 11866

<sup>2</sup> ISO 2852


Tank connection	Inlet connection	Dimension mm / inch					Weight
F	G	A	B	C	D	E	Kg / lb
2 inch Clamp <sup>1</sup>	1 inch Clamp	85 / 3.3	361 / 14.21	44 / 1.73	30.5 / 1.20	71.5 / 2.81	4.0 / 8.8

<sup>1</sup> ISO 2852

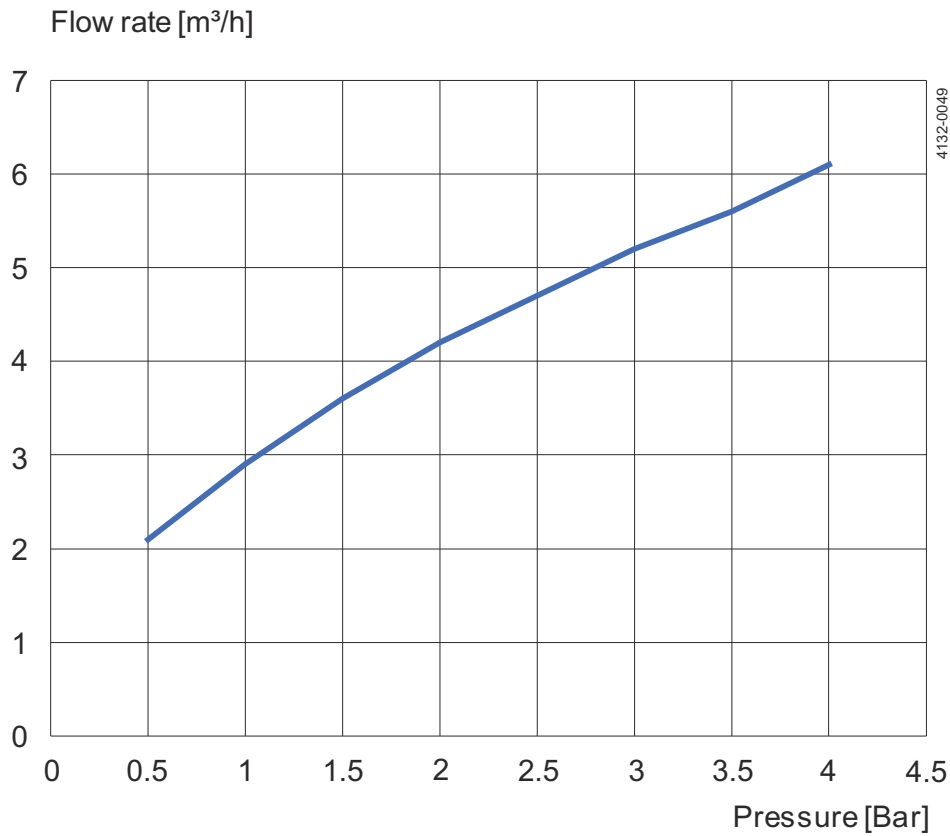


7.1.4 Performance Data

! NOTE

The inlet pressure has been measured immediately before the machine inlet. To achieve the performance indicated in the curves, the pressure drop in the supply lines between pump and machine must be taken into consideration.

7.1.4.1 Flow Rate



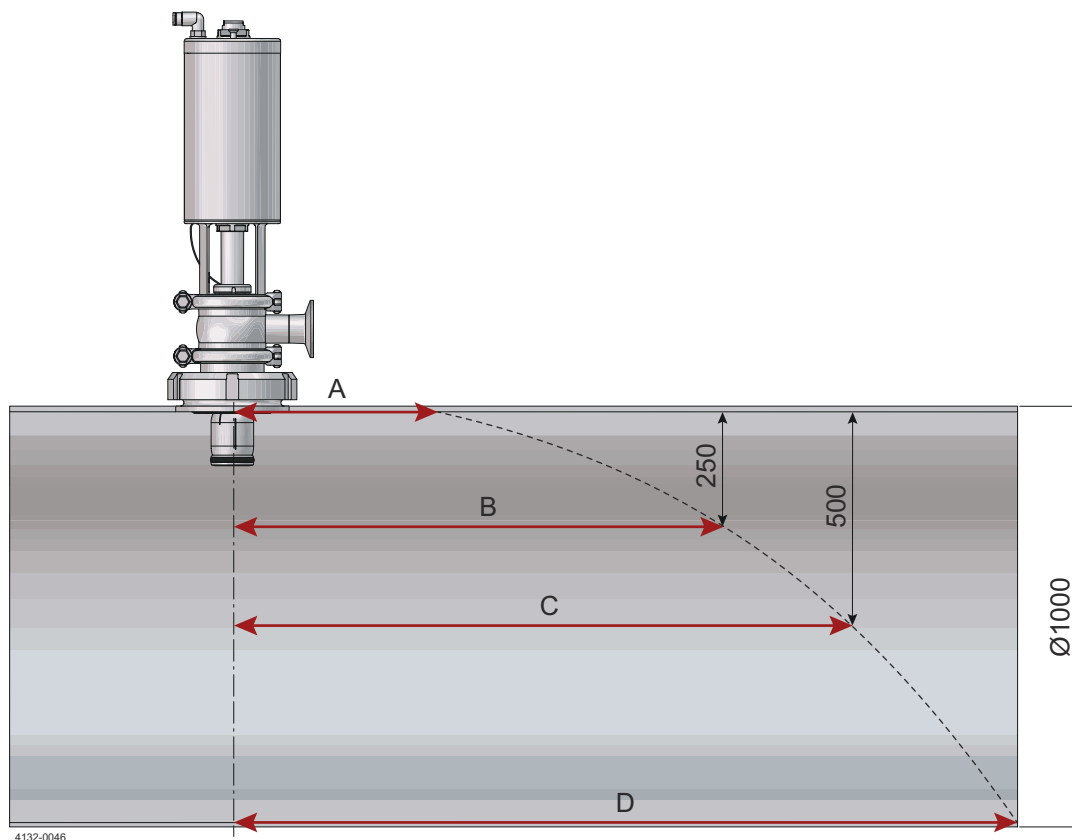


### 7.1.4.2 Throw Length



**NOTE**  
Throw lengths are measured as horizontal throw length. Effective throw length varies depending on substance to be removed, cleaning procedure and agent.

Throw length distance of the machine installed vertically at the top to the circular duct. Along the top wall, throw lengths are smallest. Further down the side of the circular duct, the throw length increases.



**Wetting distance mm / inch**

Pressure	A	B	C	D
2 bar	900 / 35.5	3300 / 130	4000 / 158	4800 / 189

**Cleaning distance mm / inch**

Pressure	A	B	C	D
2 bar	800 / 31.5			



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## 8 Product Programme

Please go to <https://hygienicfluidhandling-catalogue.alfalaval.com> for possible configurations and item numbers.

### 8.1 Qualification Documentation

#### Documentation specification

##### Standard version

ATEX/ UKEx/ IECEX	ATEX/UKEx/IECEX approved machine for use in explosive atmospheres INSIDE MACHINE: Category 1 for installation in zone 0/20 OUTSIDE MACHINE: Safe area only II 1G/- Ex h IIB 85°C...188°C Ga/- II 1D/- Ex h IIIC T85°C...T150°C Da/-
Q-doc	Equipment Documentation includes: <ul style="list-style-type: none"> <li>• EN 1935/2004 DoC</li> <li>• EN 10204 type 3.1 inspection Certificate and DoC</li> <li>• FDA DoC</li> <li>• GMP EC 2023/2006 DoC</li> <li>• EU 10/2011 DoC</li> <li>• ADI DoC</li> <li>• QC DoC</li> </ul>

##### UltraPure version

ATEX/ UKEx/ IECEX	ATEX/UKEx/IECEX approved machine for use in explosive atmospheres INSIDE MACHINE: Category 1 for installation in zone 0/20 OUTSIDE MACHINE: Safe area only II 1G/- Ex h IIB 85°C...188°C Ga/- II 1D/- Ex h IIIC T85°C...T150°C Da/-
Q-doc	Equipment Documentation includes: <ul style="list-style-type: none"> <li>• EN 1935/2004 DoC</li> <li>• EN 10204 type 3.1 inspection Certificate and DoC</li> <li>• FDA DoC</li> <li>• GMP EC 2023/2006 DoC</li> <li>• EU 10/2011 DoC</li> <li>• ADI DoC</li> <li>• QC DoC</li> <li>• USP 87 and 88 Class VI or ISO 10993-5 and ISO 10993-6, 10, 11</li> </ul>



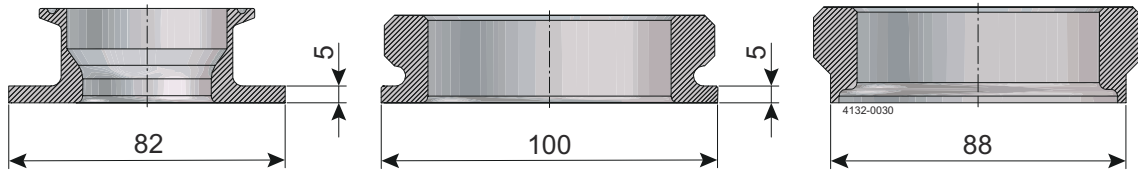
## 8.2 Accessories

### 8.2.1 Weld Plates

#### Process connections

Item no:	Denomination
8010013956	2 inch Clamp weld adaptor
8010019832	3 inch RJT weld adaptor, for hole in duct
8010019833	3 inch RJT weld adaptor, for pull out on duct

For more information see manual for Alfa Laval Retractor series Weld plates.

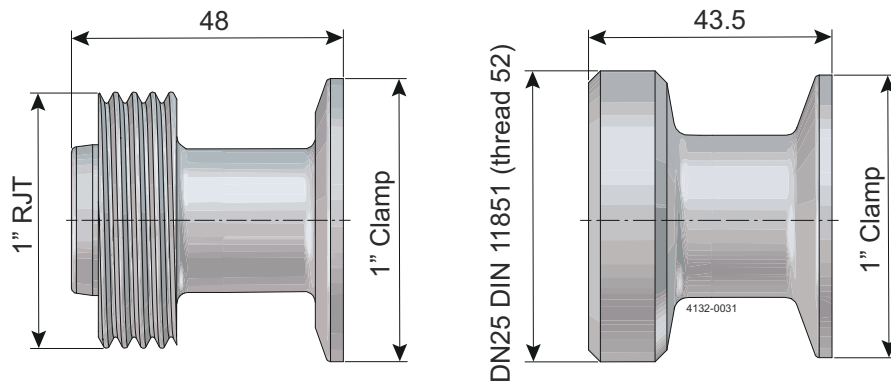


### 8.2.2 Inlet Connection Adaptors

Item no:	Denomination
8010019834	1 inch Clamp <sup>1</sup> to 1 inch RJT (male part)
8010027772	1 inch Clamp <sup>1</sup> to DN25 DIN (male part)

<sup>1</sup> ISO 2852

Gasket (9611991358) and clamp (211053) to be ordered separately.





### 8.2.3 Sensor and Control Units

The Alfa Laval Free Rotating Retractor can work with or without a sensor or a control unit. Alfa Laval ThinkTop V20 and V50 series fit onto the actuator of the Alfa Laval Free Rotating Retractor if sensor or control unit is needed.

Please go to [Anytime](#) for possible configurations and item numbers.

### 8.2.4 Tools and Installation Material

#### Tools available for assembly and disassembly

Item no.	Denomination
9614198401	Actuator tool for mounting of bushing
9613160901	Sealing element tool for mounting bushing
Commodity	Rubber Mallet
Commodity	M10 fork/ring key or similar
Commodity	Nose-pliers
Commodity	Small flat headed screw driver

#### Installation material for connecting Alfa Laval machine to the process

Item no.	Denomination
9611991358	Gasket for 1"Clamp ISO 2852
211053	Clamp or 1"-1½" ISO 2852
290043	Gasket for 2"Clamp ISO 2852
211054	Clamp for 2" ISO 2852
9611992017	Gasket for DN80 Clamp DIN11866
9611994459	Clamp for DN80 DIN11866
9611990769	Gasket for 3"Clamp ISO 2852
211056	Clamp for 3" ISO 2852
9611992821	Gasket for 1"RJT
9611991269	Gasket for DN25 DIN11851



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## 9 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.

### 9.1 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

### 9.2 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.

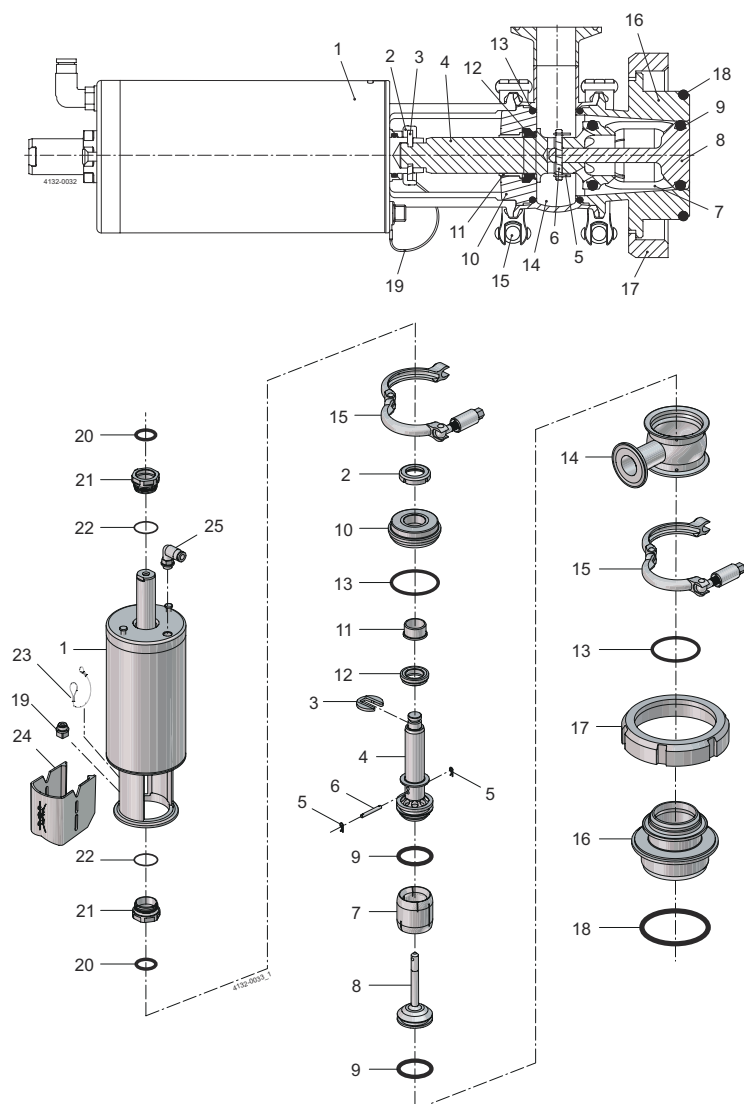


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## 10 Part Lists and Exploded Views

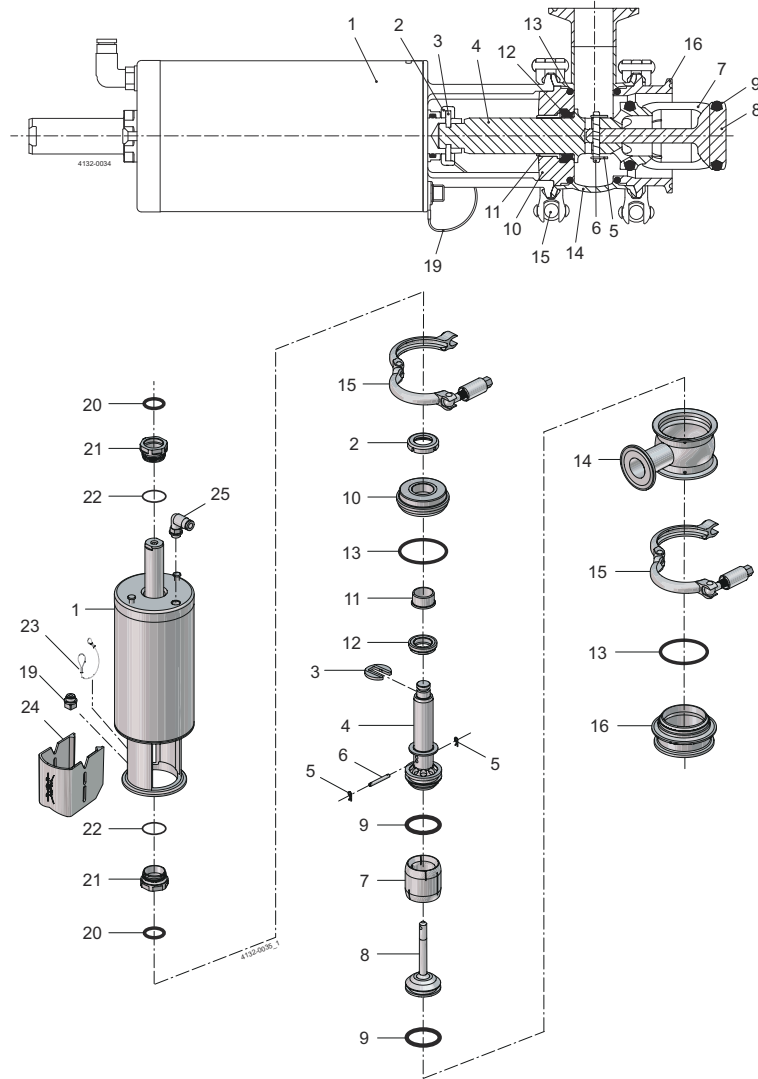
### 10.1 Standard Version - RJT Connection



Pos.	Qty.	Denomination	Pos.	Qty.	Denomination
1	1	Actuator	14	1	Inlet house
2	1	Lock ring	15	2	Clamp
3	1	Clip	16	1	Process adaptor
4	1	Connector	17	1	Nut
5	2	Clip	18	1	O-ring
6	1	Pin	19	1	Grounding wire
7	1	Spray head	20	2	O-ring
8	1	Stator	21	2	Bushing
9	2	Plug seal	22	2	O-ring
10	1	Sealing element	23	1	Plug
11	1	Bushing	24	1	Shield
12	1	Lipseal	25	1	Air fitting
13	2	O-ring			



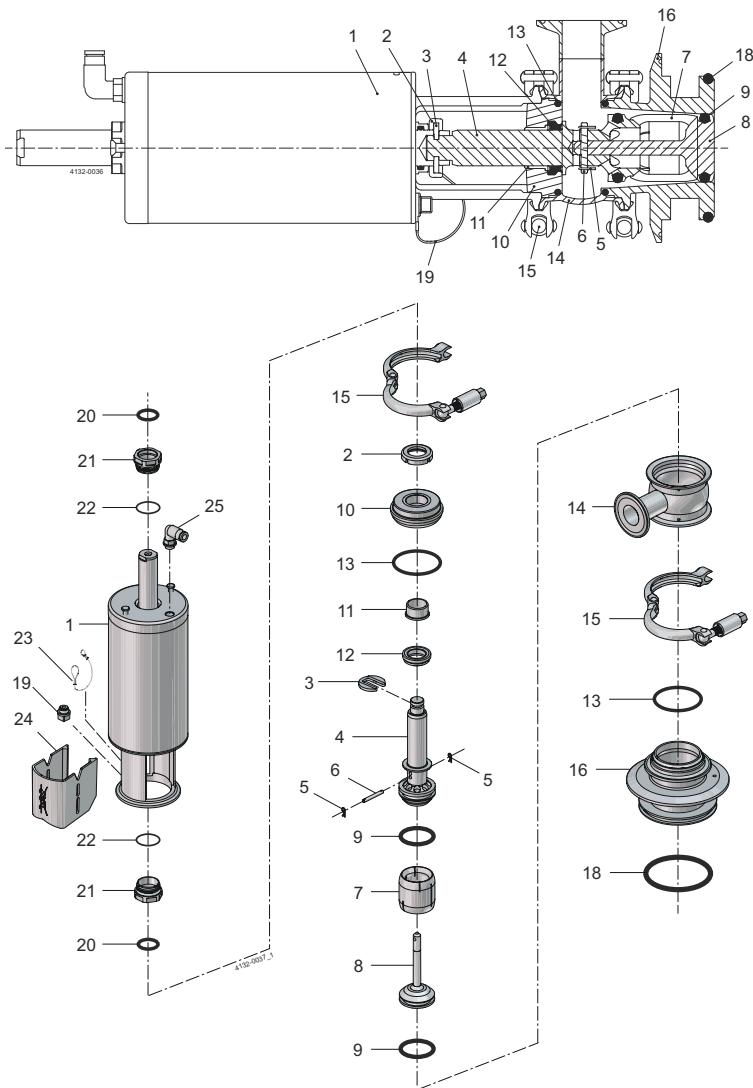
## 10.2 Standard Version - 2 inch Clamp Connection



Pos.	Qty.	Denomination	Pos.	Qty.	Denomination
1	1	Actuator	14	1	Inlet house
2	1	Lock ring	15	2	Clamp
3	1	Clip	16	1	Process adaptor
4	1	Connector			
5	2	Clip			
6	1	Pin	19	1	Grounding wire
7	1	Spray head	20	2	O-ring
8	1	Stator	21	2	Bushing
9	2	Plug seal	22	2	O-ring
10	1	Sealing element	23	1	Plug
11	1	Bushing	24	1	Shield
12	1	Lipseal	25	1	Air fitting
13	2	O-ring			



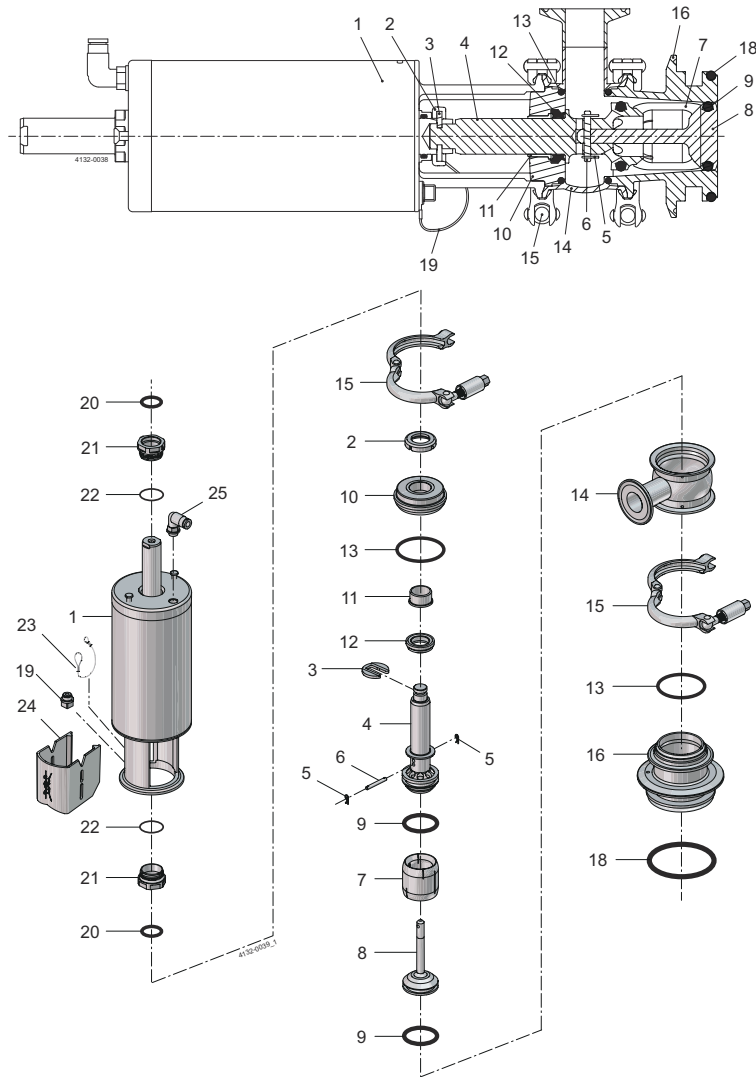
### 10.3 Standard Version - DN80 Connection



Pos.	Qty.	Denomination	Pos.	Qty.	Denomination
1	1	Actuator	14	1	Inlet house
2	1	Lock ring	15	2	Clamp
3	1	Clip	16	1	Process adaptor
4	1	Connector			
5	2	Clip	18	1	O-ring
6	1	Pin	19	1	Grounding wire
7	1	Spray head	20	2	O-ring
8	1	Stator	21	2	Bushing
9	2	Plug seal	22	2	O-ring
10	1	Sealing element	23	1	Plug
11	1	Bushing	24	1	Shield
12	1	Lipseal	25	1	Air fitting
13	2	O-ring			



## 10.4 Standard Version - 3 inch Clamp Connection



Pos.	Qty.	Denomination	Pos.	Qty.	Denomination
1	1	Actuator	14	1	Inlet house
2	1	Lock ring	15	2	Clamp
3	1	Clip	16	1	Process adaptor
4	1	Connector			
5	2	Clip	18	1	O-ring
6	1	Pin	19	1	Grounding wire
7	1	Spray head	20	2	O-ring
8	1	Stator	21	2	Bushing
9	2	Plug seal	22	2	O-ring
10	1	Sealing element	23	1	Plug
11	1	Bushing	24	1	Shield
12	1	Lipseal	25	1	Air fitting
13	2	O-ring			



# 11 Appendix

## 11.1 Appendix A - Weld Plate Installation

### WARNING

**Always** pay special attention to the instructions below so that severe personal injury and/or damage to the weld plate and device is avoided.

**Always** read this Instruction manual thoroughly.

**Only** install the device when the tank is depressurized and cooled down.

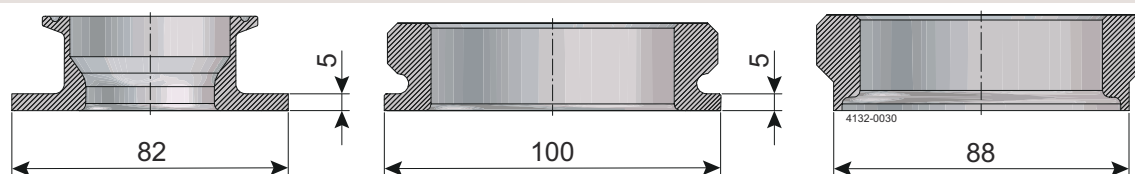
**Only** use qualified technical personnel to install the weld plate. They shall have read and understood the Instruction manual!

### NOTE

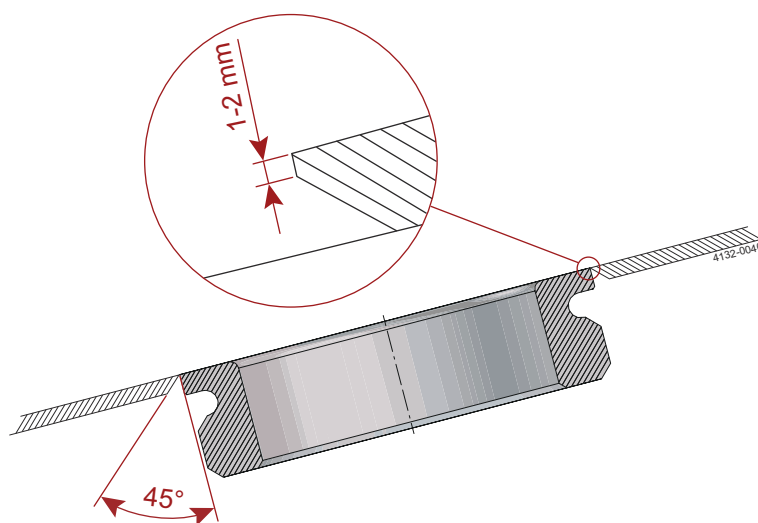
To ensure a hygienic weld (avoid or remove discoloration) it is recommended to use either shielding gas or post-treatment of the welding zone.

Incorrect welding procedures may deform and warp the weld plate - therefore, it is recommended to use a heat sink during welding to dissipate heat from the welding area.

### Dimensional information



1. Cut a hole in the tank sized to the diameter of the weld plate (the gap between the hole and weld plate must be as small as possible).
2. Chamfer the outer edges by 45 degrees, leaving a 1-2 mm (0.039"-0.078") opening with the original diameter toward the inside of the tank.



3. Align the inside of the weld plate with the inside of the tank surface.



4. Using appropriate filler, tack weld the weld plate to the tank in positions 1 and 2 from inside of the tank if possible as shown (Image 1). Ensure the weld plate is level; adjust if needed, and then tack weld it at positions 3 and 4. Ensure the weld zone is cooled down with compressed air between each point.
5. Continue tack welding the weld plate at positions 5 through 8, preferable from the inside of the tank if possible as shown (Image 2).
6. Allow the weld plate and welded areas to cool, using compressed air to speed the process as needed. Do not quench with water, as this may cause warping due to material shrinkage.
7. Weld between positions 3 and 4 from the outside, and then cool the welded section using compressed air. Continue welding between the tack weld points 3 and 4 in opposite direction. Ensure that the welded sections are cooled down with compressed air after each welding.
8. Allow the region to cool, then repeat step 7 from inside of the tank, if possible.
9. Once the welding is complete, allow the weld plate to cool completely to room temperature. Do not quench the area with water, as this may cause warping of due to material shrinkage.
10. If grinding and polishing is performed, the area should be allowed to cool between grinding and polishing.

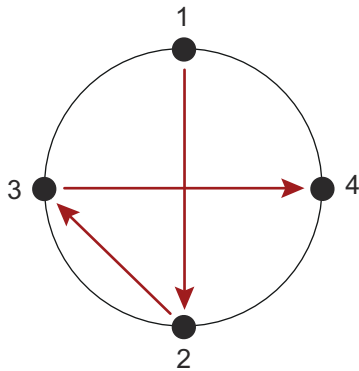


Image 1

From inside the  
tank if possible

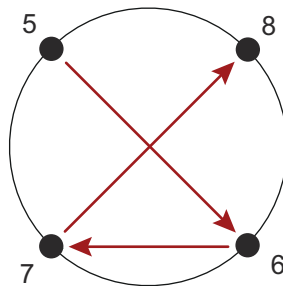


Image 2

From inside the  
tank if possible

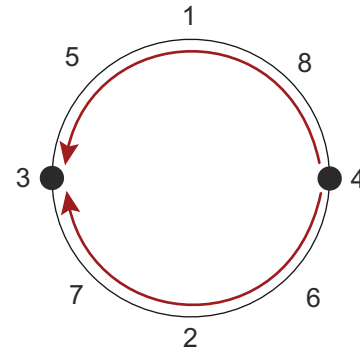


Image 3

First from outside the  
tank if possible

4132-0041