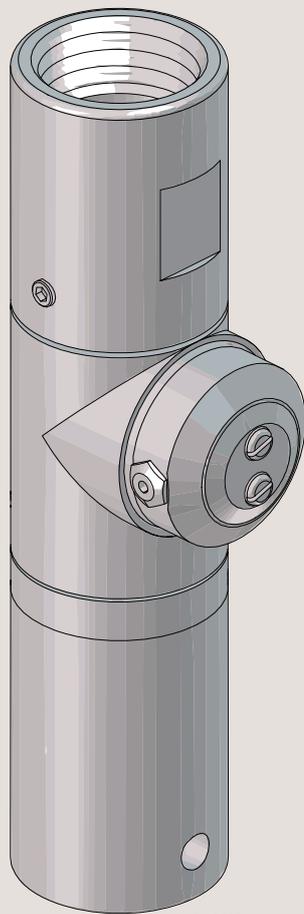




# Instruction Manual

## Alfa Laval GJ 5



Covering: Standard machines  
First published: 2015-08

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Original manual



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

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# 1 EC Declaration of Conformity

The Designated Company

Alfa Laval Kolding A/S

Company Name

Albuen 31, DK-6000 Kolding, Denmark

Address

+45 79 32 22 00

Phone No.

hereby declares that

Tank Cleaning Machine

Designation

Alfa Laval GJ 5

Type

*From serial numbers from V-0001 to V-XXXX*

is in conformity with the following directive with amendments:  
Machinery Directive 2006/42/EC  
- DS/EN ISO 12100:2011

The Pressure Directive 97/23/EC

- According to its own volume and the rated pressure range, the product is regarded as Article 3, paragraph 3 Equipment

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

Global Product Quality Manager  
Pumps, Valves, Fittings and Tank Equipment

Title

Lars Kruse Andersen

Name

Kolding

Place

2015-05-18

Date

Signature



---

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

---

### 2.1 Important information

---

#### **WARNING**

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

#### **CAUTION**

Indicates that special procedures must be followed to avoid damage to the tank cleaning machine.

#### **NOTE**

Indicates important information to simplify or clarify procedures.

---

### 2.2 Warning signs

---

General warning:



Dangerous electrical voltage:



Caustic agents:



## 2 Safety

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All warnings in the manual are summarised on this page.

Pay special attention to the instructions below so that severe personal injury and/or damage to the tank cleaning machine are avoided.

---

### 2.3 Safety precautions

---

#### Installation:

**Always** read the technical data thoroughly, see chapter 7 Technical data.

Any tank cleaning machine can develop a static electricity charge while in operation.



If the tank being cleaned contains a combustible liquid or vapour with a risk of ignition or explosion, it is imperative that the Alfa Laval GJ is properly grounded using the location provided on the unit.

---

#### Operation:

**Always** read the technical data thoroughly, see chapter 7 Technical data.

Necessary precautions must be taken if leakage occurs as this can lead to hazardous situations.



Always handle lye and acid with great care.



When an Alfa Laval GJ is operating, there should be covers over every tank opening. These covers should be sealed well enough to withstand the full force of the jet striking the cover plate.

If the cleaning solution were hot, corrosive, or toxic, a leak would present a serious hazard to any personnel in the immediate vicinity or to any exposed electrical equipment.



#### Warning:

**Any tank-cleaning machine can develop a static electricity charge while in operation. If the tank being cleaned contains a combustible liquid or vapour with a risk of ignition or explosion, it is imperative that the Alfa Laval GJ is properly grounded using the location provided on the unit.**



#### Maintenance:

**Always** read the technical data thoroughly, see chapter 7 Technical data.

**Never** service the tank cleaning machine when it is hot.

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



#### Transportation of the tank cleaning machine:

**Always** drain the tank cleaning machine head and accessories of any liquid

**Always** use original packaging or similar during transportation

---

All warnings in the manual are summarised on this page.

Pay special attention to the instructions below so that severe personal injury and/or damage to the tank cleaning machine are avoided.

---

### 3.1 Description

---

The Alfa Laval GJ 5 is a fluid-driven (turbine-driven) 360° or 180° directional rotary nozzle machine designed for cleaning the interior surfaces of a wide variety of small process, transport and storage tanks or tanks with a minimum opening of 3 inches (76.2 mm) in diameter. It is powered entirely by the cleaning solution; it requires no electricity or compressed air or lubricant for operation. The Alfa Laval GJ 5 is designed primarily for portable service; the unit may also be permanently installed in a vessel. If the Alfa Laval GJ 5 is permanently mounted inside a tank, we strongly recommend that you inspect the unit every few hundred hours of operation (see chapter 6 Maintenance for details on preventative maintenance).



**Under no conditions whatsoever should the Alfa Laval GJ 5 ever be immersed in anything. Failure to comply with this restriction will void the warranty!!**

To handle the broadest possible range of applications, the Alfa Laval GJ 5 is available in stainless steel construction with dual and triple nozzles, and an extensive selection of nozzle sizes, guides, O-ring material and gear ratios. Alfa Laval GJ nozzles are available in seven interchangeable sizes - 0.125", 0.135", 0.150", 0.165", 0.187", 0.200" and 0.250" (3.2 mm, 3.4 mm, 3.8 mm, 4.2 mm, 4.7 mm, 5 mm and 6.3 mm).

Longer nozzles are available for tougher deposits but require a 3-1/2" (88.9mm) opening; optional smaller and larger orifice diameters are also available. The standard 0.187" (4.7 mm) nozzle is recommended for standard use in tank cleaning. The Alfa Laval GJ wash cycle time can be adjusted for special applications by changing the guides, nozzle sizes and gears. Interchangeable guides (non-rotating turbine), nozzle sizes, and gears are available for either low or high pressures and/or flow rates. The performance capabilities of these options are detailed in chapter 7 Technical data.

---

### 3.2 Intended use

---

It is to be verified by the end-user:

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

### 3.3 Patents and trademarks

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This instruction manual is published by Alfa Laval without any warranty. Improvements and changes to this instruction manual may at any time be made by Alfa Laval without prior notice. Such changes will, however, be incorporated into new editions of this instruction manual.

©Alfa Laval Tank Equipment. All rights reserved.

The Alfa Laval logotype is a trademark or a registered trademark of Alfa Laval Corporate AB. "Gamajet" is a trademark or registered trademark of Alfa Laval Tank Equipment. The Alfa Laval GJ™ 5 product is patented in the US (US 5.954.271). Other products or company names mentioned herein may be the trademarks of their respective owners. Any rights not expressly granted herein are reserved.

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### 3.4 Marking

---

Alfa Laval tank cleaning machines are all marked to allow recognition of machine type, machine name, serial number and manufacturing address. The marking is placed on the body of the tank cleaning machine.

Alfa Laval Tank Equipment — Exton, PA  
Patent #: 5.954.271

---

## 4 Installation

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Read the instructions carefully and pay special attention to the warnings!  
**Always** check the tank cleaning machine before operation.

---

### 4.1 Unpacking/delivery

---

#### Step 1

##### CAUTION

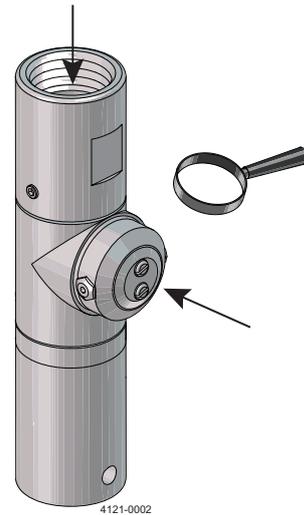
Alfa Laval cannot be held responsible for incorrect unpacking.

Check the delivery for:

1. Complete cleaning machine
  2. Delivery note
- 

#### Step 2

1. Remove any packing material.
2. Inspect the tank cleaning machine for visible transport damage.



### 4.2 Installation

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#### Step 1



Always read the technical data thoroughly, see chapter7 Technical data.

---

#### Step 2

##### Assembly

Every Alfa Laval GJ is operationally tested before shipment and is ready to run after unpacking. No assembly is required prior to use. Your Alfa Laval GJ has also been configured to meet the operating conditions that you have given us, e.g. pressure, flow, temperature, cycle time etc.

---

#### Step 3

##### Inlet connections

The Alfa Laval GJ 5 is supplied with a 1-1/4" NPT/ BSP female inlet connection. It is recommended that the mating male thread should be wrapped with PTFE pipe joint tape prior to mounting. This will minimise any chance of leakage and will make subsequent removal much easier.

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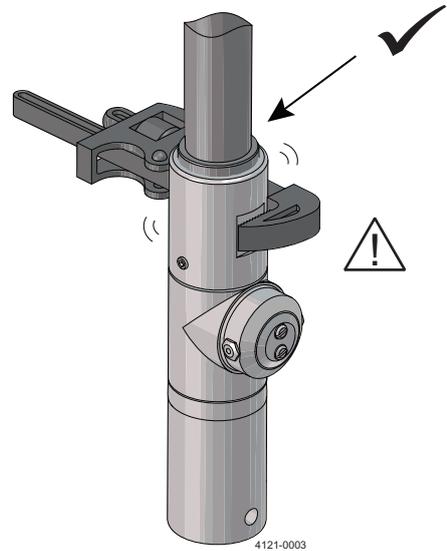
Read the instructions carefully and pay special attention to the warnings!  
**Always** check the tank cleaning machine before operation.

### Step 4 Mounting

While the dual nozzle unit is hydraulically balanced, the Alfa Laval GJ 5 should be mounted on a rigid pipe. In most applications, the Alfa Laval GJ 5 will be mounted in the "upright" position (inlet connection pointing up); however, if required, the Alfa Laval GJ will function equally well inverted or horizontally. We do not recommend this form of mounting since the hose is not rigid and, thus, will not maintain the Alfa Laval GJ's position should it become unbalanced due to clogging of the nozzles.



When attaching the Alfa Laval GJ 5 onto the supply pipe, **ALWAYS** use the wrench on the collar at the top/inlet of the unit. Never place the wrench on the outside of the gearbox, or bottom of the unit to tighten the unit onto the pipe. If you do, you will unscrew the unit or break internal screws or both.



### Step 5 Location inside tank

Generally, a single Alfa Laval GJ should be positioned in the approximate centre of the tank in order to equalise the cleaning radius in all directions. Some tanks may have specific cleaning problems such as coils or heavy deposits such as the liquid level line (bathtub ring). In these situations the Alfa Laval GJ 5 will need to be located closer to the difficult area for the best cleaning results. Tanks with internal mechanisms or structures such as an agitator shaft or impellers or baffles will require careful positioning to minimise the "shadow" on areas that do not receive direct jet impact. Sometimes, more than one machine or more than one placement of a single machine may be necessary to completely avoid shadow problems or "striping." Refer to chapter 8 Parts list and service kits for dimensions describing the Alfa Laval GJ's operating clearances.

### Step 6 Entry openings

When using the Alfa Laval GJ 5, the tanks being cleaned must provide entry openings large enough to avoid interference during insertion and removal. The minimum opening size required for the Alfa Laval GJ 5 is 76.2 mm (3.0 inches) in diameter.

### Step 7 Vessel drainage

If it is necessary to clean the floor of a tank, remember that standing liquid will diminish the effectiveness of the jet by covering any soils underneath. Wherever possible, the tank floor should be pitched towards the drain and the drainage opening should be large enough to eliminate or reduce any liquid buildup or puddling. If gravity alone is insufficient, a scavenger or stripper pump should be connected to the drain to suck out the wash fluid as fast as the Alfa Laval GJ is putting it in. In extreme cases, it may be necessary to mount smaller nozzles on the Alfa Laval GJ, or even to operate it intermittently to allow time for draining.

### Step 8 Filters and strainers

All tank cleaning systems should be equipped with a filter or strainer that will trap solids 1.5 mm/1500 micron or larger, as these will not pass through the Alfa Laval GJ. These large particles will not harm the machine, but they can become caught in the turbines or nozzles and cause it to stop turning or to reduce its cleaning effectiveness due to loss of flow. It will then be necessary to disassemble the Alfa Laval GJ and remove the blockage.

In recirculating cleaning or any other application where the cleaning solution may carry abrasive solids in suspension, adequate filtration is a must. These particles can be extremely destructive to the Alfa Laval GJ, as well as pumps, valves, and other system components. Filters, properly installed and maintained, will more than pay for themselves with lower overall operating costs in these applications. Furthermore, to ensure that clogged filters or strainers are cleaned, we recommend that you use automatic self-cleaning models.

## 4 Installation

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*Read the instructions carefully and pay special attention to the warnings!*

**Always** check the tank cleaning machine before operation.

---

### Step 9

#### Capacity of supply pump

The Alfa Laval GJ 5 should be sized to match the pressure and flow capability of the supply pump at its best efficiency point (BEP). For example, if the pump is rated for 23 GPM at 250 PSI, then the nozzles for the Alfa Laval GJ 5 must be configured for the same 23 GPM at 250 PSI. If not, then you will increase the probability of experiencing premature failure of Alfa Laval GJ 5 parts as well as shaft seals on the pump the further away from the BEP that you operate the pump. You may void the Alfa Laval GJ 5 warranty. For high-pressure applications (over 17 bar/250 PSI), the pump must “ramp up” slowly (at least 15 seconds) to its operating pressure. If the pump goes from a standstill to operating pressure in about 1 second or less and if there is no dampening or slow-opening valve between the pump and the Alfa Laval GJ, you will experience premature failure of Alfa Laval GJ 5 parts (most likely, certain gears). This is because of a water hammer effect or a pressure spike.

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### 4.3 Recycling information

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#### Unpacking

- Packing material consists of wood, plastics, cardboard boxes and, in some cases, metal straps.
- Wood and cardboard boxes can be reused, recycled or used for energy recovery.
- Plastics should be recycled or burnt at a licenced waste incineration plant.
- Metal straps should be sent for material recycling.

#### Maintenance

- All metal parts should be sent for material recycling.

#### Scrapping

- At end of use, the equipment must be recycled according to relevant, local regulations. In addition to the equipment itself, any hazardous residues from the process liquid must be taken into account and dealt with accordingly. When in doubt, or in the absence of local regulations, please contact your local Alfa Laval sales company.
-

*Read the instructions carefully and pay special attention to the warnings!  
Always check the tank cleaning machine before operation.*

### 5.1 Operation/control

#### Step 1



**Always** read the technical data thoroughly, see chapter 7 Technical data.

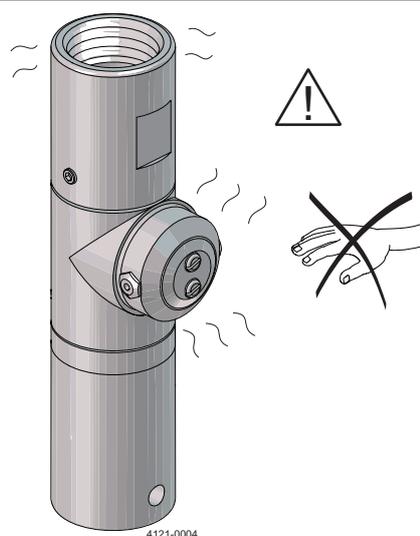
#### CAUTION

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

#### Step 2



**Never** touch the tank cleaning machine or the pipelines when pumping hot liquids.



#### Step 3

##### Initial start-up

Every Alfa Laval GJ 5 that ships is accompanied by a birth certificate. This document indicates how the Alfa Laval GJ 5 performed in our testing tank before it shipped based on the operating conditions supplied to Alfa Laval. To ensure the longest possible life of the Alfa Laval GJ 5, please verify the operating conditions and, most importantly, the machine's cycle time. The cycle time can be measured by, first, picking a fixed point inside of a vessel as a reference and, second, timing how long it takes the same nozzle to pass back over that point in the vessel. (Obviously this will not be the exact same spot because the spray pattern is indexing.) The measured time in seconds directly corresponds to the machine's full cycle time in minutes. In other words, a single 10-second rotation translates to a 10-minute full cycle time.

## 5 Operation

*Pay attention to possible faults.  
Read the instructions carefully.*

### 5.2 Tee housing rotation problems

#### Step 1

##### Insufficient flow

Are the assumed operating conditions being met?

Your Alfa Laval GJ was built to meet certain operating conditions that your firm supplied to us. These are conditions such as m<sup>3</sup>/Hr/ GPM, bar/ PSI, temperature, chemical content of the wash fluid, cycle time, etc. If the nozzle size is too small and/or the opening at the bottom of the guide is too large, the tee housing will not turn.

Look for restrictions in the fluid supply such as a clogged filter, kinked hose, or deposits in the piping. Inspect also for partially plugged nozzle tips, as that will have the same effect.

#### Step 2

##### Tight clearances

In low-flow applications (below 2.27 m<sup>3</sup>/Hr /10 GPM), a newly-overhauled Alfa Laval GJ 5 may fail to operate when first returned to service. If the machine seems otherwise fine, try running it with at least one nozzle tip removed. The additional flow will invariably be enough to overcome the extra resistance of new bearings and seals. A few minutes of operation should loosen the clearances enough for the machine to run normally with the nozzle(s) remounted.

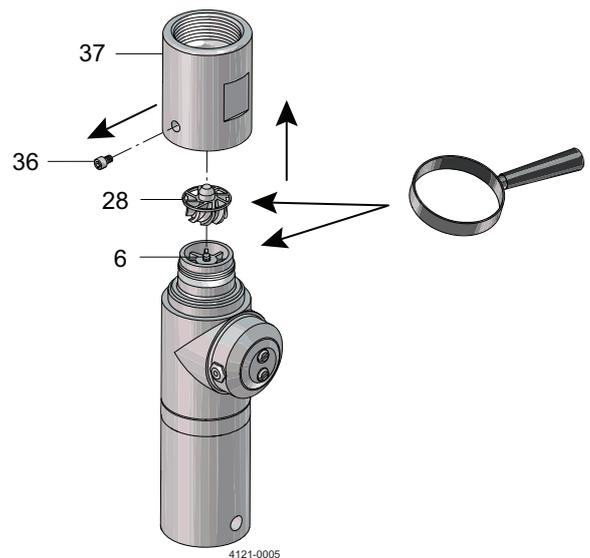
##### NOTE

When following the corrective actions in steps 4.1.1 and 4.1.2, be sure to allow enough time (about 1/2 to 2 minutes) for any accumulated liquid to drain completely from the inside of the Alfa Laval GJ 5 before resuming operation.

#### Step 3

##### Debris inside

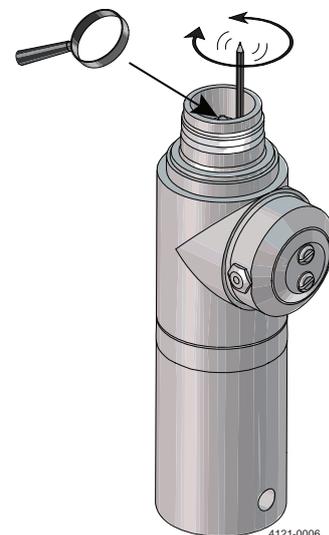
Loosen the stem collar retainer screw (36), and remove the inlet stem collar (37), then lift out the guide (28). Look for and remove any debris caught between the guide and impeller vanes. Remove any material wound around the input shaft (6).



#### Step 4

##### Input shaft binding

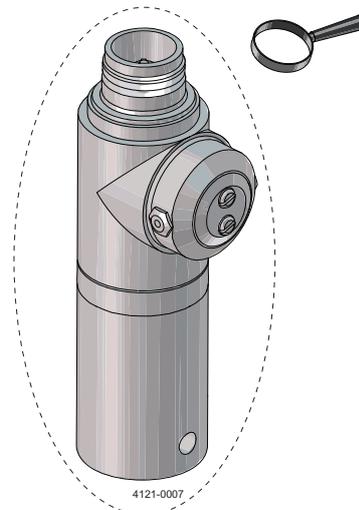
After completing the above step, try to spin the impeller (25) by hand. The input shaft should turn very easily with a pencil and should be approximately centered in the stem bore. If the impeller is difficult to turn or is visibly off-centre, look for a bent gearbox nose (14) or stem (24). This kind of damage is particularly likely if the Alfa Laval GJ has been struck hard or dropped. If the shaft will turn freely in one direction, but not the reverse, check inside the planetary gearhead (4) for damaged or broken gears.



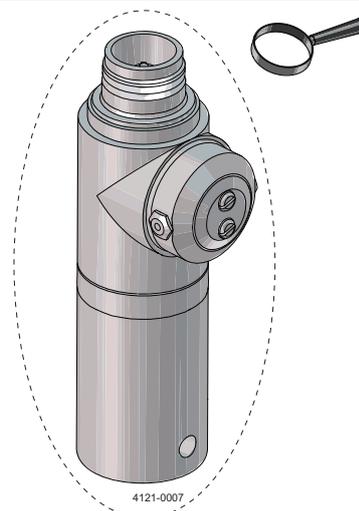
*Pay attention to possible faults.  
Read the instructions carefully.*

**Step 5****Gear train damage**

If the input shaft (6) turns freely (from section above) continue turning it to see if the tee housing (35) also rotates. Failure to rotate may indicate worn or damaged parts inside the planetary gearhead (4) or to the idler gear (16) or the input or output pinion gears. Another check on the gear train can be made by trying to rotate the tee housing directly by hand. It should have a small amount of free play (just a few degrees), but it should not turn in a full circle. If the tee housing can be rotated in a full circle, make sure that the tee housing bevel gear (31) is engaged in the key slot of the gearbox nose (14) and that the set screw at the bottom of the gearbox is tight and on the flat of the shaft. Also check to see if the key has shorn off the tee housing bevel gear. Correct the problem or replace the parts as needed.

**Step 6****Damaged tee housing key slot**

If the tee housing (35) rotates freely (from section above), also look for damage to the key slot that engages the ring gear (30). Inspect the ring gear for damage where it contacts the tee housing key slot.



## 5 Operation

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*Pay attention to possible faults.  
Read the instructions carefully.*

---

### 5.3 Nozzle carrier rotation problems

---

#### Step 1

- **Bearings binding**

Grasp the nozzle housing (43) and try to rotate it in both directions; it should have just a few degrees of free play. Do not be alarmed if you can manually turn the nozzle housing by hand; it is a clutch drive and will turn by hand when "broken in." If there is no free play, remove the housing and check the fit of the bearings (38) in the cups (40). If the bearings do not spin freely in their cups, look for a deposit build-up or damaged parts and correct as required.

- **Clutch damage [not used in new production]**

If the nozzle housing rotates very freely (when "broken in," you will be able to turn the nozzle housing since it is a friction or clutch drive; however, you should feel some resistance), remove the housing and disassemble the bevel gear retaining ring (41) and nozzle housing bevel gear (42). Look for a damaged clutch O-ring. The clutch O-ring should be flush with the surface of the housing or slightly protruding. If it is deeply sunken into its groove, it may be frozen in place and unable to engage the bevel gear. Remove the O-ring, taking care not to scratch the groove walls. The O-ring should be replaced with a new one if it is hard or deformed. Install the O-ring so that it protrudes slightly; it will be compressed when the bevel gear and retaining ring are reinstalled.

- **Worn housing bearings**

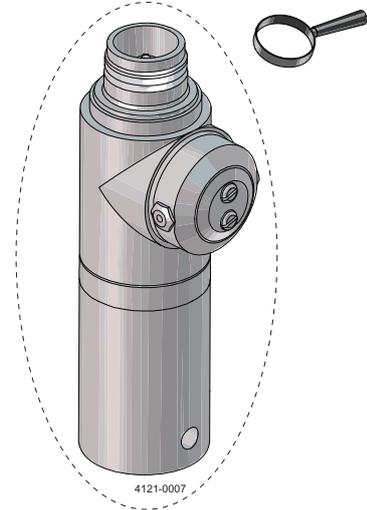
Look for excessive wear on the nozzle and tee housing bearings and (38/59) and (32). An excessive clearance (over 0.015") between the tee housing bearing cup and the nozzle housing bearing cup (34) and (40/60) can allow the bevel gears to disengage under load. Replace worn parts as required.

- **Worn bevel gear**

Examine the bevel gears (31) and (42) for worn, damaged or sharp/pointed teeth, and replace as required.

- **Damaged gearbox nose slot key**

Remove the nozzle housing (43). Using a screwdriver, try to rotate the tee housing bevel gear (31) where it is exposed near the bottom of the tee housing. If the gear can be turned more than a few degrees, look for a worn key slot that engages the bevel gear (31) on the gearbox nose (14). Inspect the bevel gear (31) for damage to its key where it engages the slot.



*Pay attention to possible faults.  
Read the instructions carefully.*

## 5.4 Cleaning solution leakage

### Step 1

#### - Worn or improperly installed seals

Excessive leakage from the tee housing or nozzle housing usually indicates worn housing seals (33) and (39). Inspect the seals for wear (sealing lips are worn to a smooth surface) or damaged lips or loss of spring tension (indicated by excessive dry deposits of dirty or abrasive cleaning solution on the spring), and replace as required.

If the seals were recently replaced, verify that they are installed in the correct direction. These seals are designed to seal in one direction only and, therefore, must be installed with their sealing lips facing toward the pressure. They are also installed correctly when the side of the seal with the exposed spring faces away from the adjacent bearing.

#### - Worn bearing cups

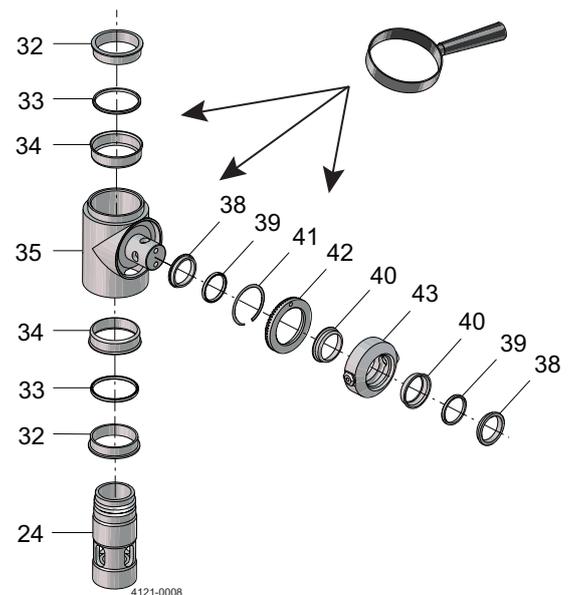
Inspect the bearing cups (34) and (40) for excessive wear (grooved or scored), particularly near the inside flange where they contact seals (33) and (39/50). Replace any that show distinct grooves.

#### - Worn bearings

Inspect the bearings (32) and (38) and replace any that are excessively worn (clearance between the bearing and the new bearing cup is more than 0.015"). Bearing clearances greater than 0.015" can prevent the seals from functioning properly.

#### - Worn or eroded castings

Inspect the seal contact surfaces of the stem (24) and the tee housing (35). If these are worn or grooved, new seals will be ineffective. Replace the damaged parts as required.



## 5 Operation

---

*Pay attention to possible faults.  
Read the instructions carefully.*

---

### 5.5 Poor cleaning performance

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- **Inadequate flow and pressure**

Check the pressure at the Alfa Laval GJ inlet under actual operating conditions. The supply piping and hoses must be large enough to handle the flow rate required for the nozzle size being used to ensure adequate pressure. Insufficient pressure may also result from line losses when the machine is far from the pump, so the line size must be increased accordingly for long runs. Although the Alfa Laval GJ will rotate at low flow rates, effective cleaning may require considerably more flow. Proper mechanical operation (the unit turns) is **NOT** the same thing as effective cleaning (the soils have been removed)!

- **Chemical concentration and temperature**

Verify that the cleaning solution is the correct compound and in the concentration needed for the deposit being cleaned. If heating is necessary, also check that the solution is at the proper temperature.

- **Plugged nozzles**

Unscrew the nozzles to see if there is any debris caught in the nozzle vane (49). If removal is required for cleaning, the straighteners may be driven out with a rod through the nozzle bore. These straighteners are an essential part of the nozzle design and must be reinstalled in the nozzles to ensure proper jet impact and integrity.

- **Slow or no rotation of the housings**

This will result in partial or erratic washing coverage. Refer to previous sections for more information.

- **Alfa Laval GJ configuration**

Determine whether the deposit being cleaned requires greater jet impact or longer jet dwell time (slower rotation) for more thorough scrubbing. Confirm that the Alfa Laval GJ nozzle size, turbine and gearing are correct for the specific application. Alfa Laval GJ performance tables are available, which show flow rate, cycle time and jet impact force for various combinations of pressure, flow rate, nozzle size, guide, and gear ratio. Contact an Alfa Laval Tank Equipment Inc. representative if assistance is required. See also, the first paragraph of chapter 5.2 Tee housing rotation problems with regard to the suitability of the Alfa Laval GJ's configuration to the actual (not estimated) operating conditions.

- **Inadequate drainage**

Refer to chapter 4.2 Installation, Step 7. Ensure that the vessel drains the effluent or used wash fluid as fast as it is being sprayed in through the Alfa Laval GJ. The floor of the vessel should be sloped or pitched towards the drain and the drainage opening should be large enough to gravity-drain the effluent from the vessel. If you still have puddling (build-up of the wash fluid so it covers the floor and shields the residues underneath), use some form of pump to suck out the effluent.

---

The tank cleaning machine is designed for cleaning in place (CIP). CIP = Cleaning In Place.  
 Study the instructions carefully and pay special attention to the warnings!  
 NaOH = Caustic soda  
 HNO<sub>3</sub> = Nitric acid.

### 5.6 Recommended cleaning

#### Step 1



**Always** handle lye and acid with great care.

Caustic danger!



**Always** use rubber gloves!



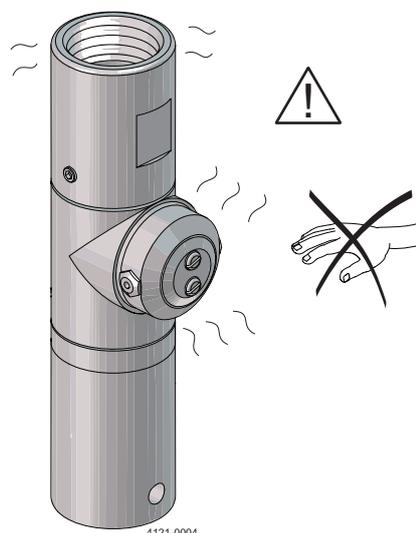
**Always** use protective goggles!

#### Step 2



**Never** touch the pump or the pipelines when sterilising.

Danger of burns!

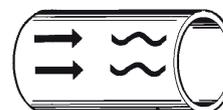


#### Step 3



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

**Always** rinse!



Clean water

Cleaning agent

#### NOTE

Cleaning agents must be stored/disposed of in accordance with current regulations/directives.

## 6 Maintenance

---

*Maintain the tank cleaning machine with care.  
Read the instructions carefully and pay special attention to the warnings!  
Always keep minor spare parts kit in stock.*

---

### 6.1 General maintenance

---

#### Step 1



**Always** read the technical data thoroughly, see chapter7 Technical data.

---

#### Step 2

Recommended spare parts: order service kits from the service kits list - see chapter8 Parts list and service kits  
Ordering spare parts: contact your local Alfa Laval sales company.

---

### 6.2 General dismantling set-up

---

#### NOTE:

A rigorously implemented preventative maintenance programme will significantly reduce repair costs over the life of the Alfa Laval GJ 5. The foundation of such a programme is regularly scheduled inspections to discover and replace worn or damaged parts before they can cause the failure of other, more costly, components. The inspection intervals required will depend on the severity of the application, but a complete internal inspection at 100 hours of operation is recommended initially.

---

#### Step 1

##### STORAGE

The Alfa Laval GJ should be washed out with clean water after each use to remove any foreign material or soft substances left in the machine that may harden during storage and cause the Alfa Laval GJ to seize or lock up. A clean water rinse through of the Alfa Laval GJ will also wash out any residue of chemical cleaners or recirculated wash water that could adversely affect the seals and O-rings during prolonged contact in storage. The best position to store the Alfa Laval GJ is to stand it upside down with the inlet connection facing down.

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#### Step 2

##### GEARBOX MAINTENANCE

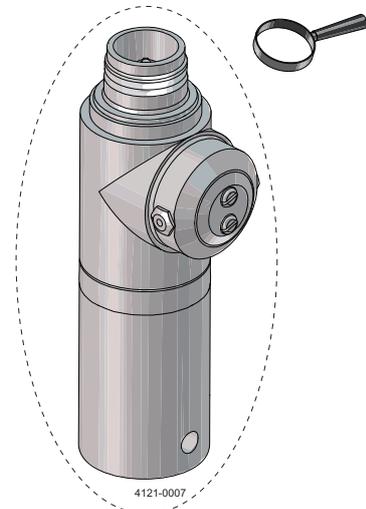
Disassemble the machine by following the instructions in chapter 6.2 General dismantling set-up.  
Inspect the condition of the gearbox. If cleaning solution is present, refer to chapter6.4 Inspection and servicing of components under gearbox title and disassemble the Alfa Laval GJ to replace the seal (12) and other parts as required. If the gearbox is free of contamination, reassemble the machine and return the machine to service.

---

#### Step 3

##### INSPECTION INTERVALS

The Alfa Laval GJ 5 should be inspected every 300-500 hours of operation, depending on the severity of use. An interval of 100 hours is recommended initially.



Maintain the tank cleaning machine with care.  
Read the instructions carefully and pay special attention to the warnings!  
Always keep minor spare parts kit in stock.

### Step 4

#### TIPS

All the bearings, bushings, seals and O-rings are wear parts. Ideally, they should all be replaced, as a group, every 300-500 hours of operation, depending on the severity of use. At first, an interval of 300 hours is recommended. If just one bearing or seal is worn or damaged, replace both this and its mate, not just the worn or damaged part. Remember never to retighten gearbox nose-stem & gearbox screws (9) & (22). **ALWAYS** use new screws. Also, always resplit or use new lockwashers (51).



### 6.3 General dismantling

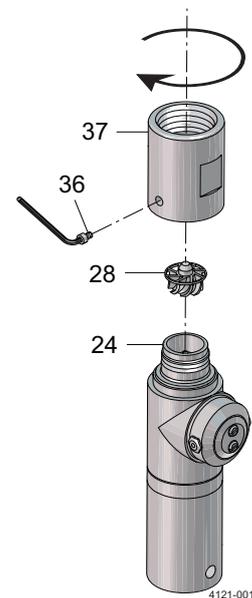
#### Step 1

1. Remove the stem collar retainer screw (36) using the appropriate hex ball-point L-wrench. If not removed, be sure to unscrew the retainer screw far enough so that its top extends beyond the surface of the inlet stem collar.  
Do not mistake or confuse the gearhead retainer screw (2), at the bottom of the unit, with the stem collar retainer screw (36), at the top. If you do, immediately tighten the gearhead retainer screw before twisting or rotating any parts of the unit.
2. Unscrew the inlet stem collar (37) from the stem (24).



This is a left-hand thread, so turn the collar **CLOCKWISE** to unscrew it! The unit must be in the vertical position, standing on its base when unscrewing the inlet stem collar; otherwise, the threads will gall.

If the collar feels like it is binding on the threads, do **NOT** force the collar to turn by applying more force with a wrench as you will damage the threads; rather, keep spraying a Teflon-based penetrating solution into the threads and work the solution into the threads by turning the collar back and forth until it loosens. Lift out the guide (28).



#### Step 2

Insert a screwdriver between the vanes of the impeller (25) (to prevent it from turning) and unscrew the impeller retaining nut (27) with 1 1/32" deep socket and 2" extension. Lift out the impeller with the pliers or invert the machine and shake it out.

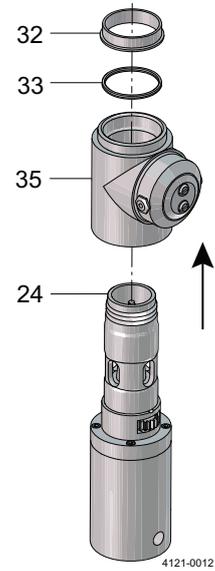


## 6 Maintenance

Maintain the tank cleaning machine with care.  
Read the instructions carefully and pay special attention to the warnings!  
Always keep minor spare parts kit in stock.

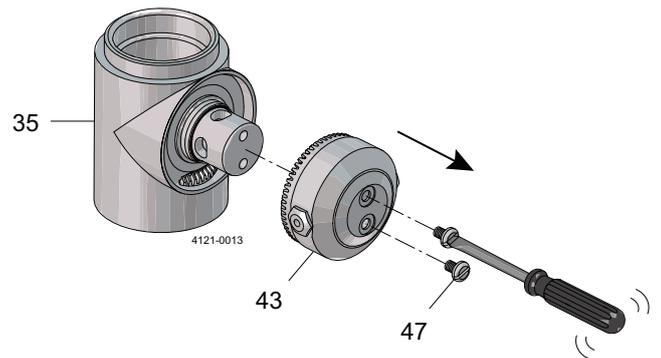
### Step 3

Lift the tee housing (35) off the stem (24). If the tee housing cannot be removed easily, pry carefully at the gap between the tee housing and the gearbox nose (14).



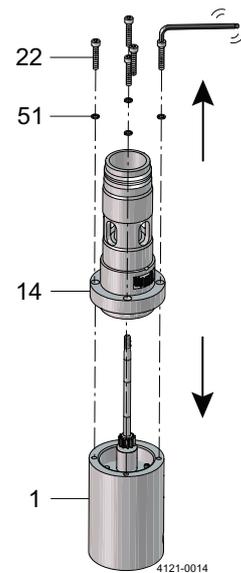
### Step 4

Remove the two nameplate screws (47) with a slotted screwdriver and pull the nozzle housing (43) off the tee housing (35). If tight bearings prevent removal, pry carefully between the nozzle housing and tee housing.



### Step 5

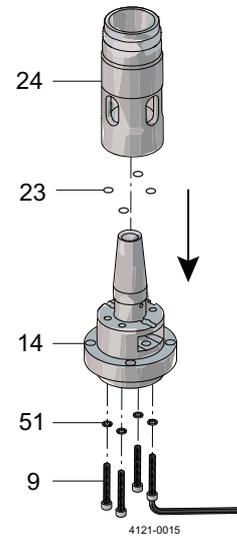
Unscrew the four gearbox screws (22) with a 7/64" hex ball-point L-wrench and pull the gearbox (1) off the gearbox nose (14).



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### Step 6

Unscrew the four gearbox nose-stem screws (9) with a 7/64" hex ball-point L-wrench and pull the gearbox nose (14) off the stem (24).



## 6.4 Inspection and servicing of components

### NOZZLE HOUSING

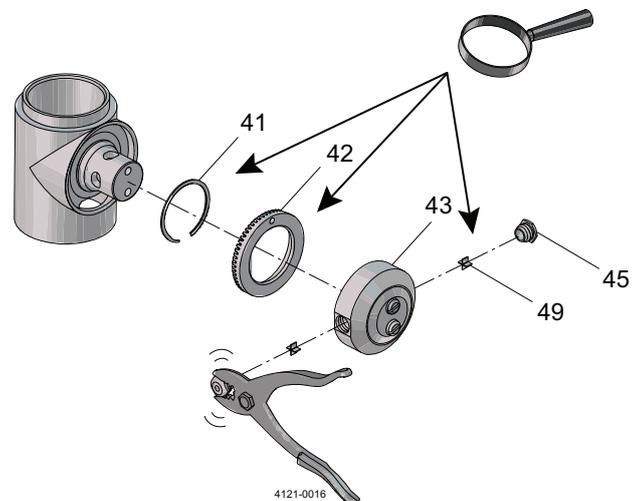
#### Step 1

##### Nozzle

Unscrew the nozzle tips with a pair of pliers and inspect for debris plugging the nozzle vane (49). Remove the nozzle vanes for cleaning by pressing them out with a small rod inserted through the nozzle bore. The nozzle bores must be smooth, round and free of damage (especially any nicks) for maximum jet impact. Replace worn or oversized nozzles if the original flow rate is required. The nozzle vanes must be reinstalled in the nozzle tips if they were removed for cleaning.

##### Bevel gear

Remove the bevel gear retaining ring (41) with a slotted screwdriver and lift off the nozzle housing bevel gear (42/58). Inspect the bevel gear for wear such as sharp/pointed or broken teeth, and replace as required.



## 6 Maintenance

Maintain the tank cleaning machine with care.

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

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### Step 2

#### Nozzle housing bearings

##### Self-rinse nozzle

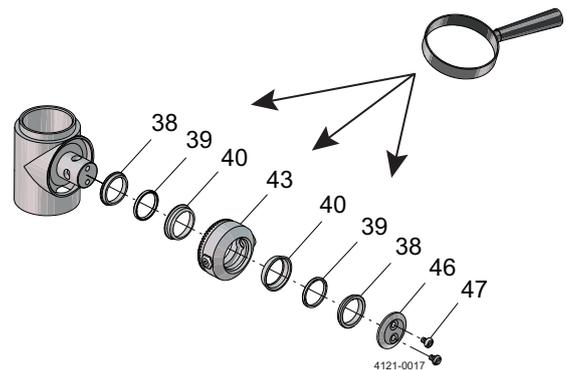
1. Inspect the nozzle housing bearings (38) and discard any that are broken, cracked or deeply scored.
2. Clean any deposits from the bearings and check their fit in the nozzle housing cup (40).
3. While they should turn freely in their cups, the nozzle housing bearings should be replaced if the diameter of the outside wall is less than 0.990" to avoid shortening the life of the seals or bevel gear

#### Nozzle housing seals

1. Examine the nozzle housing seals (39) for loss of spring tension (indicated by excessive dry deposits of dirty or abrasive cleaning solution on the spring) or excessive wear on the sealing lips (the sealing lips are worn smooth) and replace as required.
2. When installing the seal, make sure that the spring side of the seal faces towards the nozzle housing cup (40).

#### Nozzle housing cups

1. Clean any deposits from the nozzle housing cups (40) and examine for excessive wear. Light scoring is acceptable, but the cups should be replaced if they are grooved in the seal contact area or if the diameter of their inside wall is greater than 1.020".
2. If you have many Alfa Laval GJ units (about 2 dozen or more), you will be replacing many cups as part of a good maintenance programme. Therefore, it may be worthwhile to make or obtain press tools for pressing the cups off the nozzle housing. The press tools are available from Alfa Laval Tank Equipment Inc. as part of the repair kit. Before installing new cups, clean the housing bores and remove any burrs resulting from cup removal. Lubricate the outside of the new cups and press them in so that their flanges are fully and flush-seated against the housing (43).

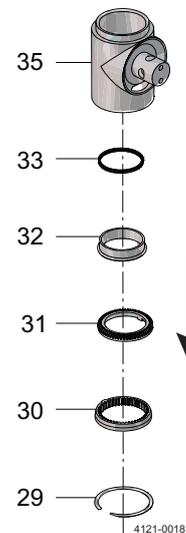


## TEE HOUSING

### Step 1

#### Disassembly

1. Remove the ring gear retaining ring (29) using a slotted screwdriver and lift out the ring gear (30). If the gear is tight in the tee housing (35), carefully pry it out with a flat screwdriver.
2. Next, lift out the tee housing bevel gear (31), tee housing bearings (32) and tee housing seals (33).



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Read the instructions carefully and pay special attention to the warnings!  
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### Step 2

#### 1. Tee housing

Inspect the tee housing (35) for damage to the tee housing key way that engages the ring gear (30). If the ring gear was difficult to remove, check to see if the tee housing is out-of-round (as the result of an external blow, such as dropping) where the gear sits.

#### 2. Bevel gear

Inspect the tee housing bevel gear (31) for worn, damaged or sharp/pointed teeth, and for damage to the key that engages the slot on the gearbox nose (14).

#### 3. Ring gear

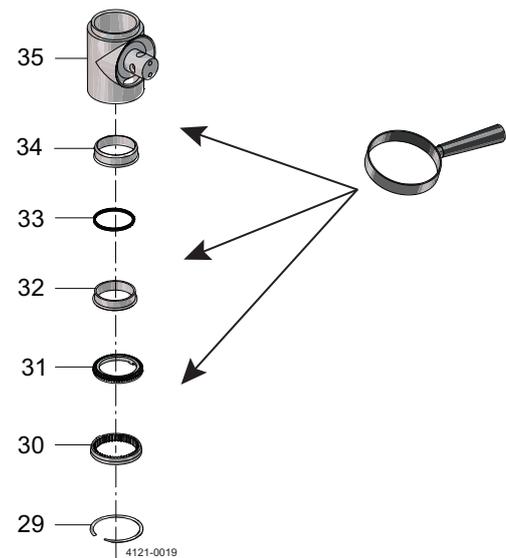
Inspect the ring gear (30) for worn, damaged or sharp/pointed teeth, and for damage to the key that engages the slot on the tee housing (35).

#### 4. Tee housing bearing

Inspect the tee housing bearings (32) and discard any that are broken, cracked or deeply scored. Clean any deposits from the bearings and check their fit in the tee housing bearing cups (34). While they should turn freely in their cups, the tee housing bearings should be replaced if the diameter of the outside wall is less than 1.490" to avoid shortening the life of the seals or bevel gears.

#### 5. Tee housing seals

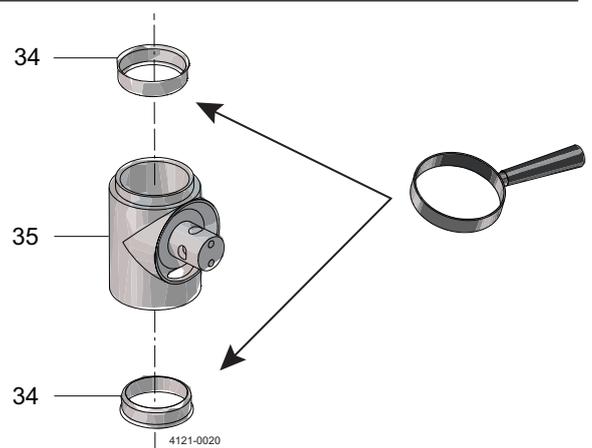
Examine the tee housing seals (33) for loss of spring tension (indicated by excessive dry deposits of dirty or abrasive cleaning solution on the spring) or excessive wear on the sealing lips (the sealing lip is worn to a smooth surface) and replace as required. When installing the seals, make sure that the spring side of the seal faces towards the tee housing bearing cup (34).



### Step 3

#### Tee housing bearing cups

Clean any deposits from the tee housing bearing cups (34) and examine for excessive wear. Light scoring is acceptable, but the cups should be replaced if they are grooved in the seal contact area or if the diameter of their inside wall is greater than 1.520". If the bearing cups require replacement, follow the procedure provided for the nozzle housing cups (40) on previous page. Replacement cups must be fully seated in order for the tee housing (35) to turn freely when the machine is reassembled.



## 6 Maintenance

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Maintain the tank cleaning machine with care.  
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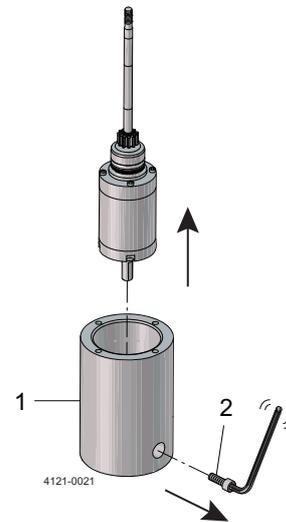
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### GEARBOX

#### Step 1

##### Disassembly

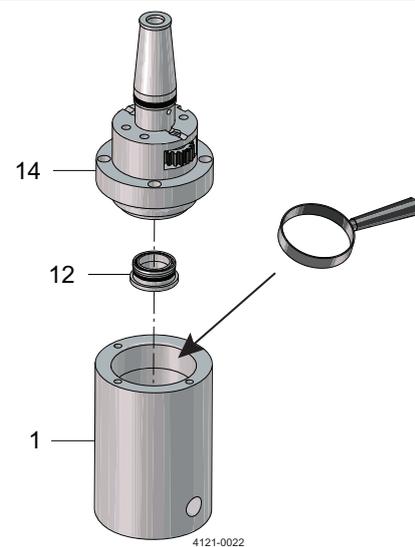
Unscrew the gearhead retainer screw (2) using the appropriate hex ball-point L-wrench and pull the gear train assembly out of the gearbox (1).



#### Step 2

##### Inspection

Check for liquid (wash fluid, water etc.) in the gearbox (1). If there is just a slight amount (dampness or vapour) of liquid in the gearbox, wipe out the water with a towel or paper towel and replace the output pinion seal (12) in the gearbox nose (14). (Refer to next page gearbox nose for replacement of the output pinion seal (12)). If the gearbox is much more than damp (about 1/4 or more filled with liquid), it is possible that the liquid will get inside the planetary gearhead (4).

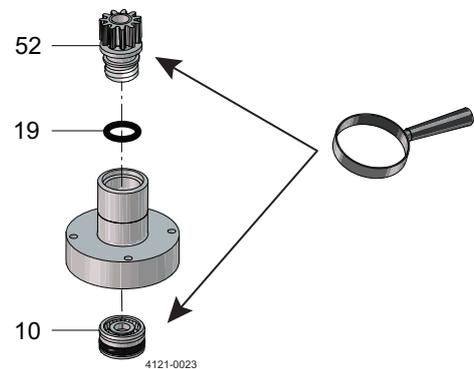


Maintain the tank cleaning machine with care.  
Read the instructions carefully and pay special attention to the warnings!  
Always keep minor spare parts kit in stock.

### Step 3

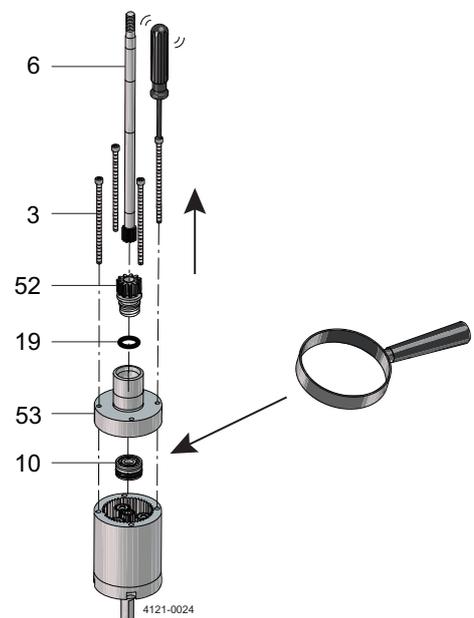
#### Output pinion

1. Inspect the output pinion (52) for worn, damaged or sharp/pointed teeth. Check for any wear, such as scoring, or cracks in the seal contact area (Chromium Oxide coating area).
2. Examine the input shaft seal (10) for loss of spring tension (indicated by excessive dry deposits of dirty or abrasive cleaning solution on the spring) or excessive wear on the back of the seal and the sealing lips (the sealing lips are worn smooth), and replace as required.



3. To replace the output pinion, remove the four planetary gearhead screws (3) using a Phillips screwdriver and pull out the output pinion assembly.
4. Remove the input shaft (6) from the old output pinion.
5. Inspect the input shaft seal (10) for damage or wear (the sealing lips are worn smooth/there is no drag between the seal (10) and the input shaft (6)) and replace as needed.

In the new version (Alfa Laval GJ 5 with Serial No.V700 or later), the output pinion has two components, the output pinion housing assembly (53) and the output pinion gear (52). Therefore, if the gear of the output pinion assembly is worn out, unscrew the gear (52) and replace the gear only.

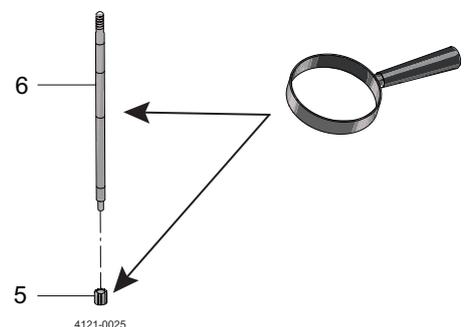


### Step 4

#### Input shaft & input pinion

1. Inspect the input pinion (5) for worn, damaged or sharp/pointed teeth.
2. Check for any wear (scoring) or cracks on the input shaft (6), especially in the seal contact area.

The pinion is both pressed on tightly and then welded onto the shaft and should not be able to be rotated around the shaft.



## 6 Maintenance

Maintain the tank cleaning machine with care.

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

Always keep minor spare parts kit in stock.

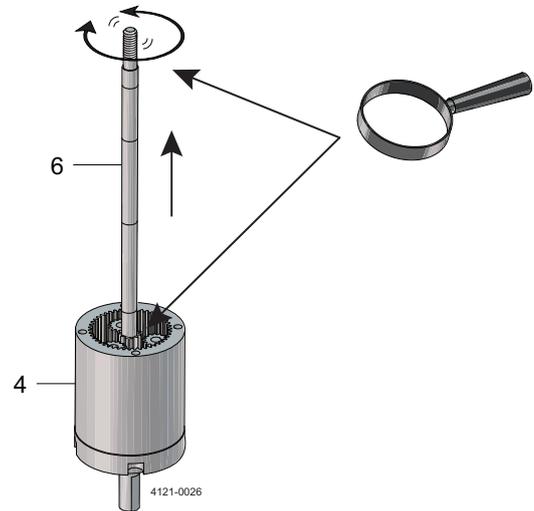
### Step 5

#### Planetary gearhead



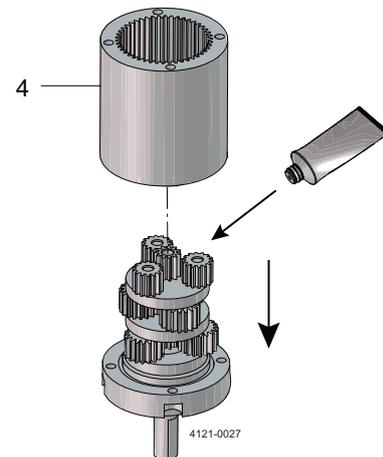
Proceed in a cautious manner when performing any work on the planetary gearhead (4) due to the complexity and size of the internal parts.

1. Inspect the planetary gearhead (4) by rotating the input shaft (6) by hand. If the input shaft does not turn smoothly in both directions and feels stuck, return the entire Alfa Laval GJ unit to Alfa Laval Tank Equipment, Inc. for servicing.
2. The planetary gears can be inspected by loosening the planetary gearhead screws (3) and lifting the output pinion assembly (7) from the gearhead. If the grease inside the gearhead is completely or partially filled with liquid (cleaning fluid, water, etc.) or if the inside of the gearhead is dry, the grease lubricant inside the gearhead may have dissolved. If this is the case, please refer to the below steps for adding grease to the gearhead. In this case, it is also recommended that the output pinion seal (12) be checked for failure.
3. If the gearhead rotates freely and is adequately greased, the gearhead can be reassembled by lining up and tightening the planetary gearhead screws (3).
4. If the gearhead rotates freely but lacks adequate grease as lubrication, the following steps can be taken to adequately grease the planetary gearhead.



Please note that the following steps must be taken in a cautious manner. If you have any concerns, please return the unit to Alfa Laval Tank Equipment, Inc. for servicing.

5. In order to adequately grease the planetary gears, the planetary ring gear must be removed. When removing the planetary ring gear, the top tier of planetary gears must be held in place with downward pressure.
6. The planetary ring gear can then be pulled away.
7. The internal components (three individual tiers of planetary gears) of the planetary gearhead must remain together as a single unit. If the planetary gears are removed as a single unit, any debris can be loosened and removed using an aerosol degreaser and air to dry.
8. Once dry, the planetary gears can be lightly hand packed with grease. Alfa Laval Tank Equipment Inc. recommends Jax Haloguard FG-2 food grade grease. Please consult your lubricant specialist for compatibility.
9. Once the planetary gears are packed with grease, the planetary ring gear can be reinstalled by aligning the planetary gears with the planetary ring gear one tier at a time.
10. The output pinion assembly (7) can then be secured using the planetary gearhead screws (3).



If any of the planetary gears are damaged, Alfa Laval Tank Equipment can supply reconditioned individual gears.

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## GEARBOX NOSE

### Step 1

#### Disassembly

1. Remove the idler shaft (18) with a slotted screwdriver and take out the idler gear (16) and the idler gear thrust washer (15).
2. Pull the impeller shaft upper bearing (20) off the gearbox nose (14) with the pliers.

#### Inspection

1. Inspect the gearbox nose (14) for any sign of bentness.
2. Check for any sign of damage to the key slot that engages the tee housing bevel gear (31).

#### Idler gear

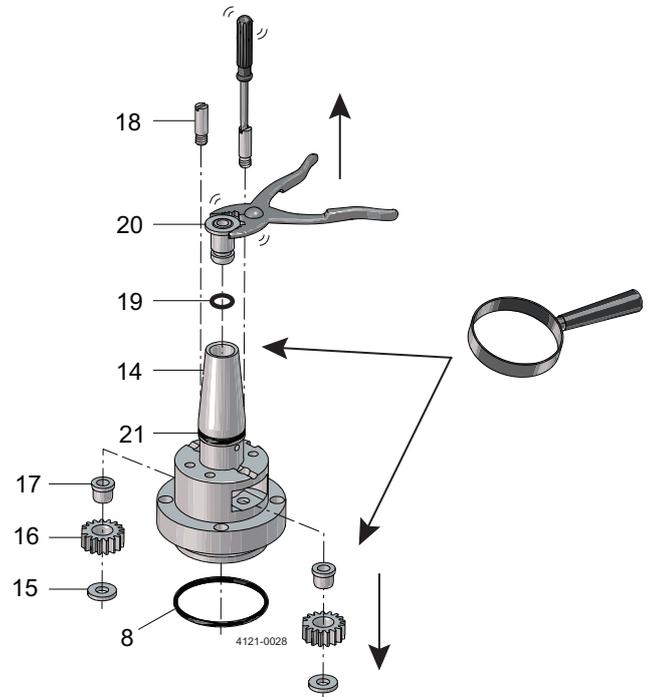
1. Inspect the idler gear (16) for any worn, damaged or sharp/pointed teeth, or worn bushing flanges (the thickness of the flange or the lip should be no less than 0.050").
2. Check the idler bushings (17) for looseness. If the diameter of the inside wall of the bushing is greater than 0.215", replace the bushing.
3. Also, check the thrust washer (15) for wear (the thickness of the washer should be no less than 0.050") and replace if necessary.

#### Idler shaft

1. Examine the idler shaft (18) for damage or wear (scoring) and replace if the outside diameter of the shaft is less than 5 mm/0.196". The original O.D. of the shaft is  $5 \pm 0.025$  mm/0.200"  $\pm 0.001$ ".

#### O-rings

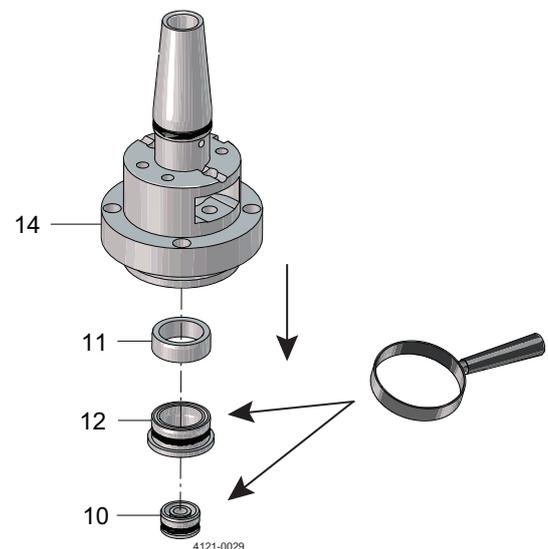
1. Inspect the O-rings (8, 19 & 21) for deterioration (they have become hardened or deformed) or damage and replace if necessary.



### Step 2

#### Output pinion bearing and seal

1. If the output pinion seal (12) needs to be replaced (the seal is loose (it should not be able to be rotated in the bore without any resistance) in the gearbox nose bore or if the sealing lip has worn smooth), carefully pry the output pinion seal (12) out of the gearbox nose.
2. Check the seal (12) for wear or damage and replace if necessary.
3. The carbide bearing (11) should not be loose in the gearbox nose.
4. Replace the bearing if it is cracked or worn.
5. Check the input shaft seal (10) in the bottom of the output pinion housing (53) for wear and replace if the I.D. of the seal is worn smooth.



## 6 Maintenance

Maintain the tank cleaning machine with care.

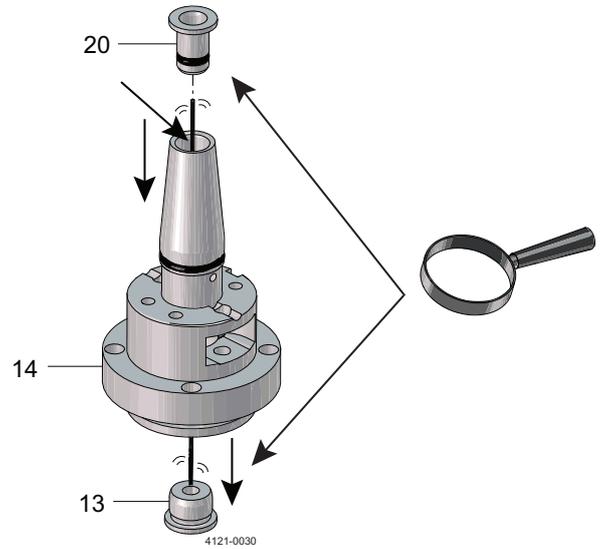
Read the instructions carefully and pay special attention to the warnings!

Always keep minor spare parts kit in stock.

### Step 3

#### Impeller shaft upper bearing & lower bearing

1. Check both impeller shaft upper (20) & lower bearings (13) for wear, damage or looseness. If the inside diameter of either bearing is greater than 4.8 mm/ 0.190" or either bearing is cracked, they should be replaced.
2. To replace the lower bearing, insert a small rod (with an O.D. of 5 to 5.7 mm/ 0.200" to 0.250") in the gearbox nose (14), support the gearbox nose on its thick base (the base that has four holes) against the arbor press base, and carefully press the bearing out with the arbor press. If the bearing is extremely tight and resists removal, lubricate the bearing before pressing it out. If an arbor press is not available, press the bearing out by gently tapping the small rod above with a hammer.



### STEM

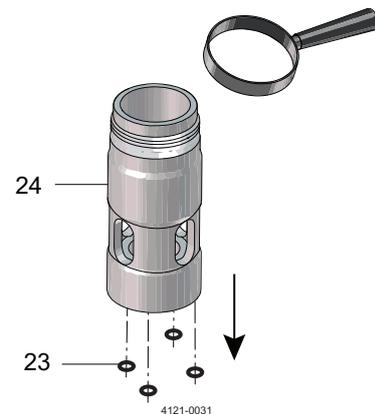
#### Step 1

##### Inspection

1. Inspect the stem (24) for damaged threads and wear.
2. The stem should be replaced if it is grooved in the seal contact area or bent or its threads are damaged.

##### Gearbox nose screw O-ring

1. Remove the four O-rings (23) from their seats around the screw holes in the bottom of the stem and discard them. These should always be replaced with new ones whenever the machine is disassembled.



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### 6.5 Reassembly

#### General notes

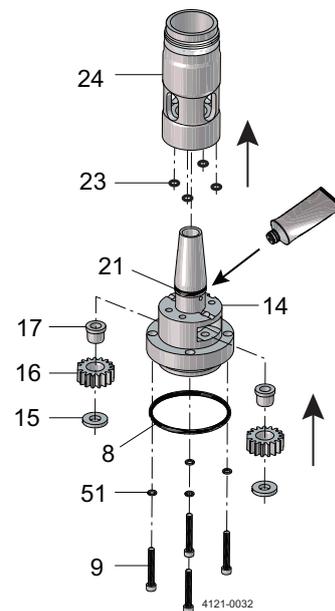
All parts must be cleaned thoroughly before reassembling. Any deposits remaining on the parts can cause difficult disassembly the next time the Alfa Laval GJ 5 needs servicing.

Apply a dab of a Teflon-based anti-seize compound to all threads (especially the threads on the stem) when reassembling; this will prevent galling of threads and ease any future disassembly. .

Whenever lubrication of parts is required for assembly, foodgrade Jax Haloguard FG2 is satisfactory.

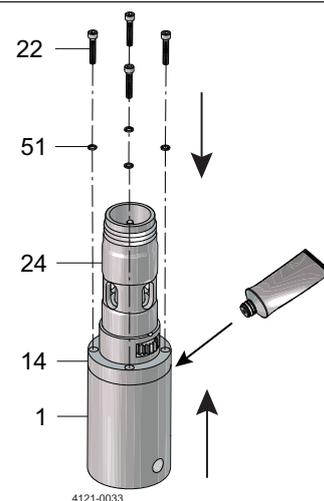
#### Step 1

1. Lubricate the gearbox-nose stem O-ring (21) on the gearbox nose (14).
2. Place the four gearbox nose screw O-rings (23) on their seats at the bottom of the stem (24).
3. Slide the assembled gearbox nose into the stem.
4. Rotate one of them until the four holes line up.
5. Attach the gearbox nose to the stem with the four gearbox nose-stem screws (9) and lockwashers (51).



#### Step 2

1. Lubricate the gearbox O-ring (8) on the gearbox nose (14).
2. Slide the assembled gearbox (1) into the assembled stem-gearbox nose.
3. Rotate the gearbox to line up the four holes.
4. Fasten the assembly with the four gearbox screws (22) and lockwashers (51).



## 6 Maintenance

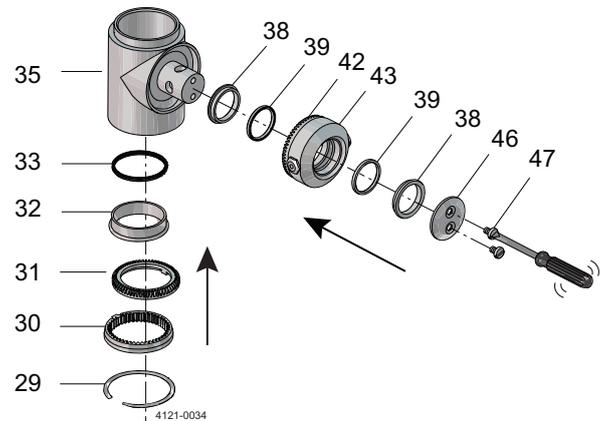
Maintain the tank cleaning machine with care.

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### Step 3

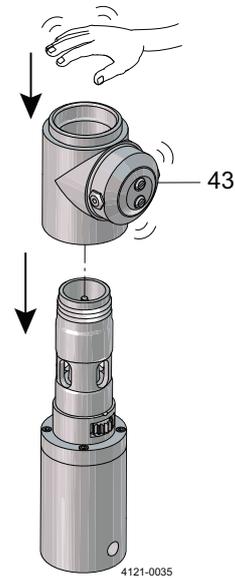
1. Install the nozzle bearing (38) on the tee housing (35).
2. Place the first nozzle housing seal (39) next to the bearing with its spring side facing away from the tee housing body.
3. Place the assembled nozzle housing (43) onto the tee housing (35).
4. Rotate the nozzle housing slightly to mesh the bevel gears (31) and (42).
5. Install the second nozzle housing seal (39) onto the tee housing with its spring side facing the nozzle housing bearing cup (40).
6. Insert the nozzle housing bearing (38) into the nameplate (46).
7. While keeping the nameplate and bearing together, push them all the way onto the tee housing (35).
8. Rotate the nameplate to align the two screw holes.
9. Install the two nameplate screws (47) and tighten with a slotted screwdriver.



Maintain the tank cleaning machine with care.  
Read the instructions carefully and pay special attention to the warnings!  
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### Step 4

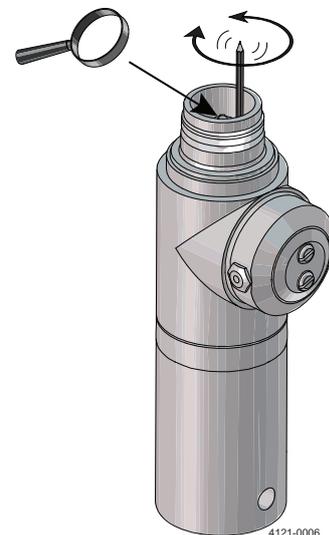
1. Slide the above assembly onto the gearbox-stem assembly.
2. While firmly pressing down the above assembly, rotate the nozzle housing (43/56) until the tee housing bevel gear (31) engages with the key slot on the gearbox nose (14) (you'll feel it click or engage).
3. Now that everything is properly lined up, press the above assembly all the way down until it is firmly seated. You will know you've got it seated properly when the gap between the tee housing and the base of the gearbox nose is about 0.050", and the nozzle housing cannot be rotated more than a few degrees.



4. Stand the machine upright.
5. Place the impeller (25) on the input shaft (6) followed by the impeller shaft lockwasher (26) and impeller retaining nut (27).
6. Insert a screwdriver downward through its blades to prevent the impeller from turning, and then tighten the nut, very tightly, using an 11/32" hex deep socket and 2" extension. If you do not hold the impeller still using this method, you run the risk of not tightening the impeller tight enough, which will eventually allow the impeller to turn freely on the input shaft. This means both that the unit will not rotate properly and the tee housing seals may become damaged.



7. Test for proper assembly by turning the impeller with a pencil or screwdriver. The input shaft should turn very easily and the impeller vanes must not strike the stem wall.
8. Continue turning and check to ensure that the tee housing also turns.



## 6 Maintenance

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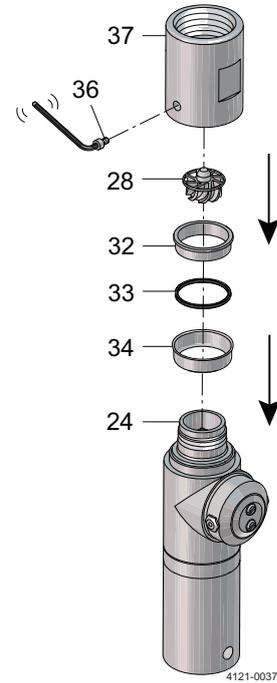
Maintain the tank cleaning machine with care.

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

Always keep minor spare parts kit in stock.

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9. Place the second tee housing seal (33) onto the stem (24) with its spring side facing the tee housing bearing cup (34).
10. Then place the tee housing bearing (32) above it.
11. Drop the guide (28) onto the top of the stem (24). Make sure that the guide doesn't touch any part of the input shaft assembly when it is fully seated.
12. Screw the inlet stem collar (37) onto the stem (24) until the guide (28) stops it. The collar only needs to be hand-tight; do **NOT** tighten by using a wrench as you will damage the threads. Insert and tighten the stem-collar retainer screw (36) using the appropriate hex ball-point L-wrench to lock the collar.



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This completes the assembly process.

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

### 7.1 Technical data

The Alfa Laval GJ 5 Tank Cleaning Machine is a highly efficient machine at a range of pressures and flows. The instruction manual is part of the delivery. Read the instructions carefully.

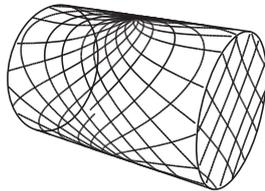
#### TECHNICAL DATA

Lubricant ..... Food grade  
Max. throw length ..... 1.2 - 7.5m (4 - 24 ft.)

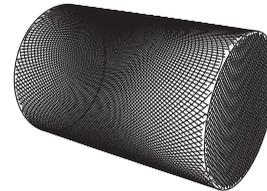
#### Pressure

Working pressure ..... 3 - 70 bar (40 - 1,000 PSI)  
Recommended pressure ..... - 40 bar (50 - 600 PSI)

#### Cleaning pattern



First cycle



Full pattern

The above drawings show the cleaning pattern achieved on a cylindrical horizontal vessel. The difference between the first cycle and the full pattern represents the number of additional cycles available to increase the density of the cleaning.

#### Certificate

2.1 material certificate

#### PHYSICAL DATA

##### Materials

1.4404 (316L), PPS, PTFE, FKM (EPDM and FFKM available).

##### Temperature

Max. working temperature ..... 95°C (203°F)  
Max. ambient temperature ..... 140°C (284°F)

Weight ..... 3.2 kg (7 lbs.)

#### Connections

Standard thread ..... 1½" Rp, NPT female  
Available option ..... 1½" tube weld on

#### Options

Electronic rotation sensor to verify 3D coverage.

#### Caution

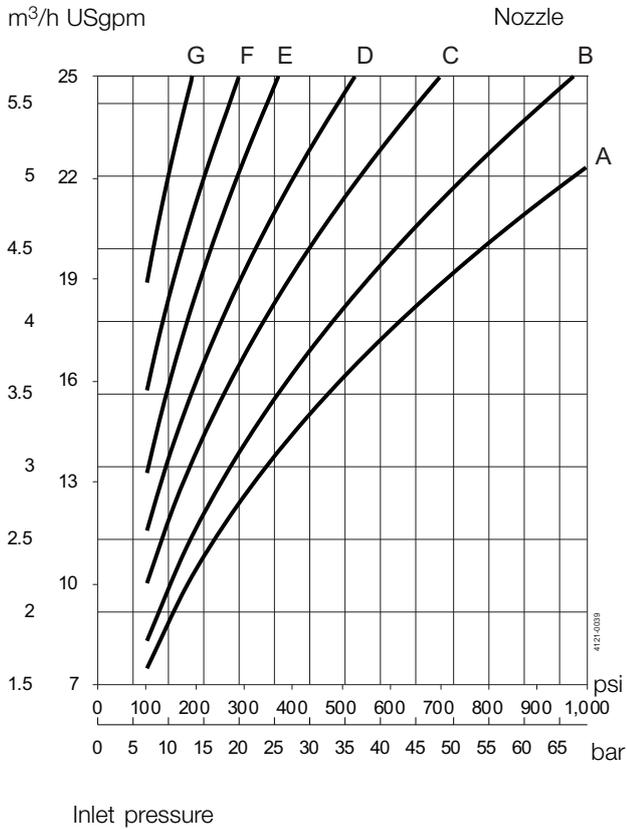
Do not use for gas evacuation or air dispersion.

## 7 Technical data

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

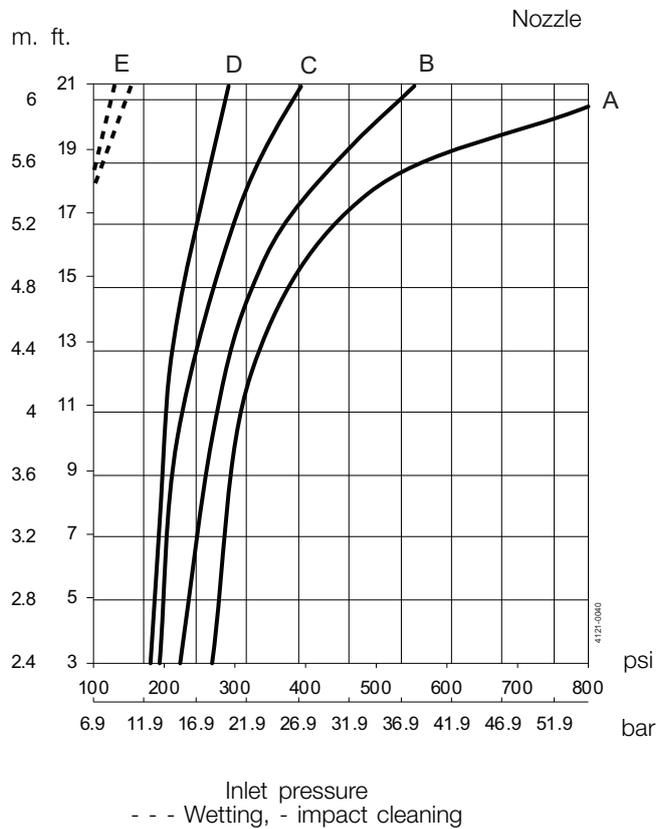
### 7.2 Performance data

#### Flow rate



- A. = 3.2 mm (.125 in)
- B. = 3.4 mm (.135 in)
- C. = 3.8 mm (.150 in)
- D. = 4.2 mm (.165 in)
- E. = 4.7 mm (.187 in)
- F. = 5.1 mm (.200 in)
- G. = 6.4 mm (.250 in)

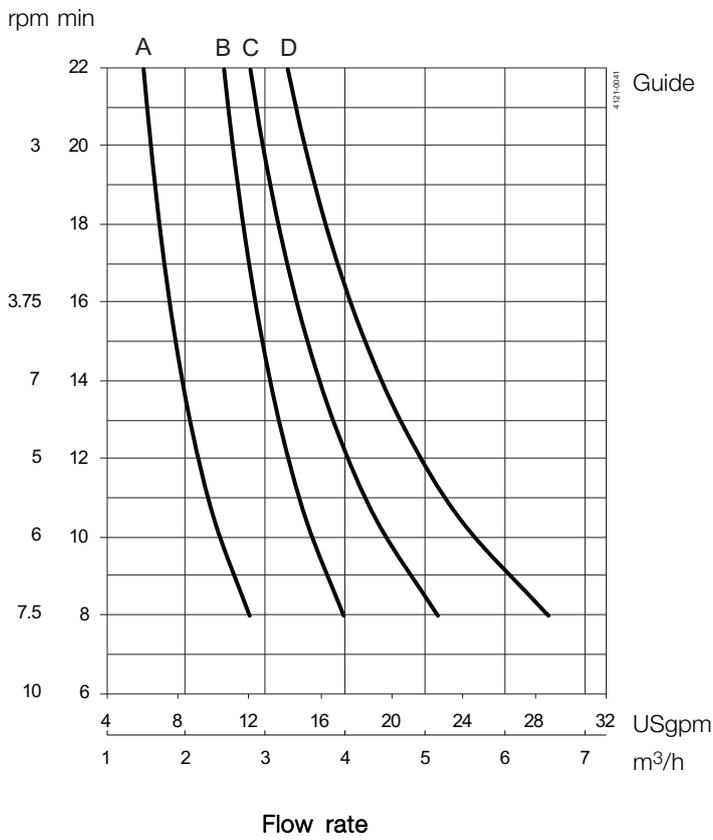
#### Impact throw length



- A. = 3.2 mm (.125 in)
- B. = 3.4 mm (.135 in)
- C. = 3.8 mm (.150 in), 4.2 mm (.165 in), 4.7 mm (.187 in)
- D. = 5.1 mm (.200 in), 6.4 mm (.250 in)
- E. = Nozzle

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

**Cleaning time**

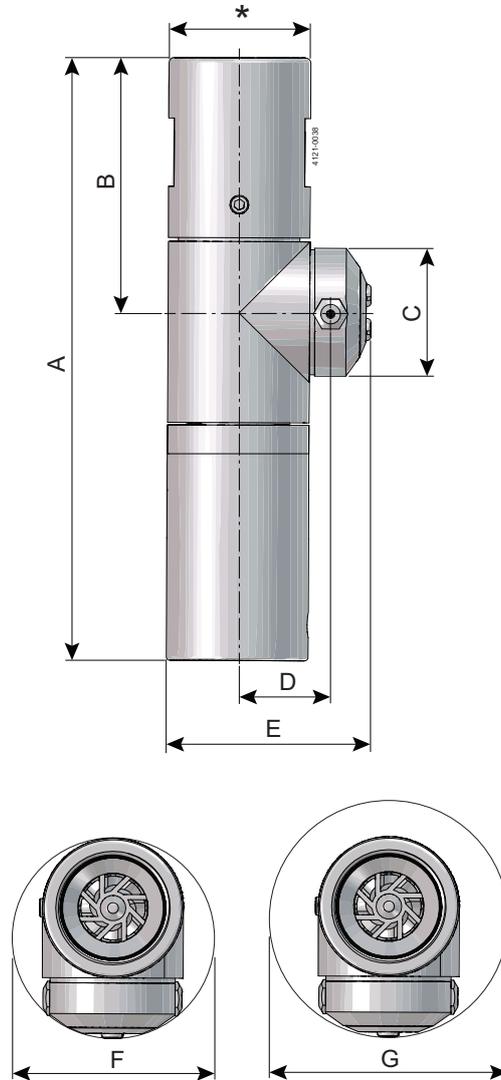


- A. = LV
- B. = STD
- C. = MV
- D. = HV

## 7 Technical data

*It is important to observe the technical data during installation, operation and maintenance.  
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### 7.3 Dimensions



\* = 1-1/4 FNPT or 1-1/2 BSP

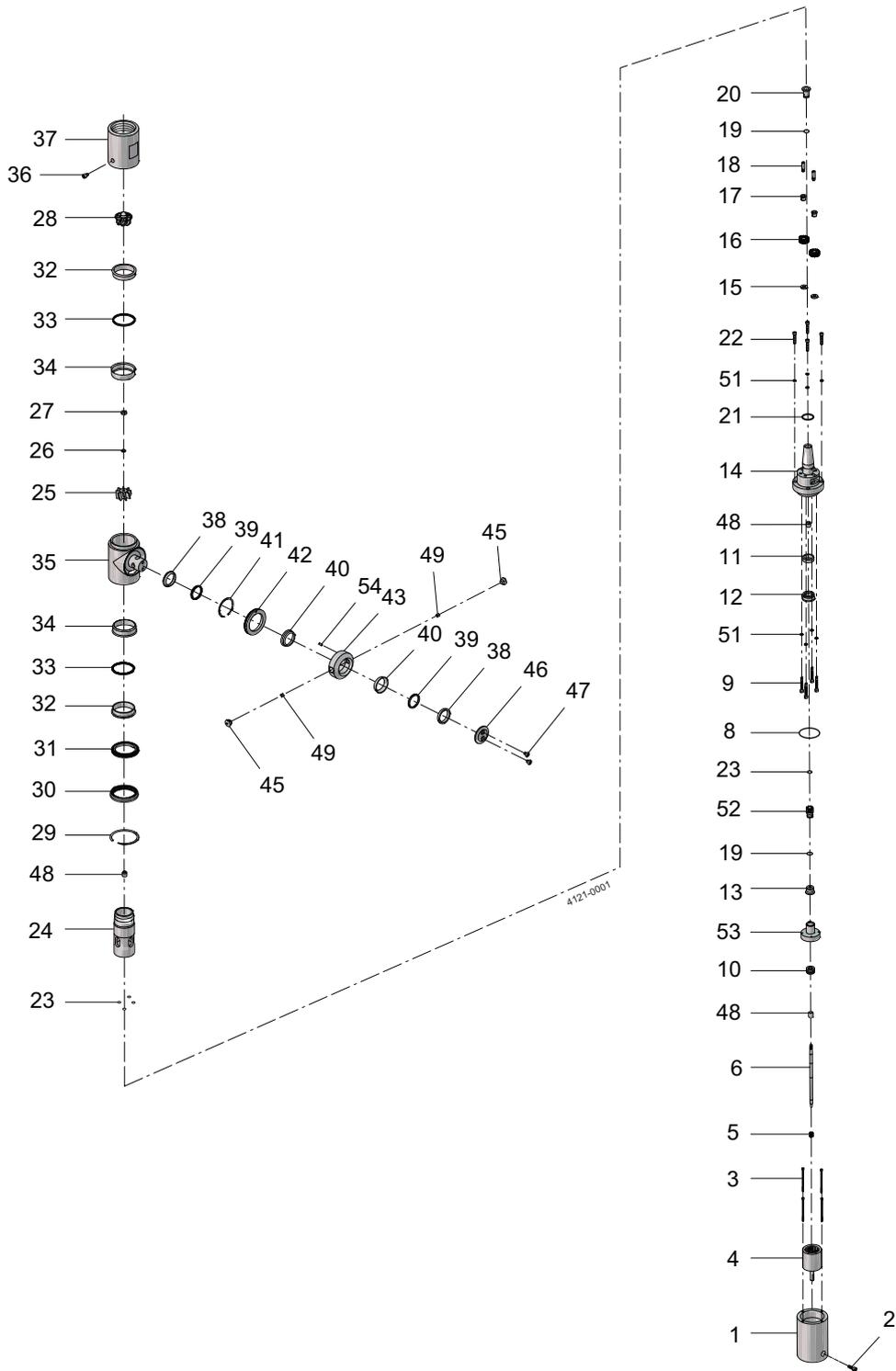
#### Dimensions

	A	B	C	D	E	F	G
mm	224	95	48	34	75	75	98
in	8.8	3.7	1.9	1.3	3	3	3.9

## 8 Parts list and service kits

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

### 8.1 Parts list and service kits



## 8 Parts list and service kits

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

### Parts list

Pos.	Qty	Denomination
1	1	Gearbox
2	1	Gearhead retainer screw
3	4	Planetary gearhead screw
4	1	Planetary gearhead
5	1	Input pinion
6	1	Input shaft
7	1	Output pinion assembly
8.1	1	Gearbox O-ring, Viton
8.2	1	Gearbox O-ring, - EPDM
8.3	1	Gearbox O-ring, Kalrez
9	4	Gearbox nose-stem screw
10	1	Input shaft lower seal
11	1	Output pinion bearing
12	1	Output pinion seal
13	1	Impeller shaft lower bearing
14	1	Gearbox nose
15	2	Idler gear thrust washer
16	2	Idler gear
17	2	Idler gear bushing
18	2	Idler shaft
19.1	1	Upper bearing O-ring, Viton
19.2	1	Upper bearing O-ring, EPDM
19.3	1	Upper bearing O-ring, Kalrez
20	1	Impeller shaft upper bearing
21.1	1	Gearbox nose-stem O-ring, Viton
21.2	1	Gearbox nose-stem O-ring, EPDM
21.3	1	Gearbox nose-stem O-ring, Kalrez
22	4	Gearbox screw
23.1	5	Gearbox nose screw O-ring, Viton
23.2	5	Gearbox nose screw O-ring, EPDM
23.3	5	Gearbox nose screw O-ring, Kalrez
24	1	Stem
25	1	Impeller
26	1	Impeller shaft lockwasher
27	1	Impeller retaining nut
28.1	1	Guide, HV
28.2	1	Guide, LV
28.3	1	Guide, MV
28.4	1	Guide, STD
29	1	Ring gear retaining ring
30	1	Ring gear
31	1	Tee-housing bevel gear
32	2	Tee-housing bearing

### Parts list

Pos.	Qty	Denomination
33	2	Tee-housing seal
34	2	Tee-housing bearing cup
35	1	Tee housing
36	1	Stem-collar retainer screw
37	1	Inlet stem collar
38	2	Nozzle housing bearing
39	2	Nozzle housing seal
40	2	Nozzle housing bearing cup
41	1	Bevel gear retaining ring
42	1	Nozzle-housing bevel gear
43.1	1	Nozzle housing, double
43.2	1	Nozzle housing, triple
44	1	Nozzle housing gear drive pin
45.1	2/3	Nozzle assembly, short, 125 bore size
	2/3	Nozzle assembly, long, 165 bore size
45.11	2/3	Nozzle assembly, long, 187 bore size
45.12	2/3	Nozzle assembly, long, 200 bore size
45.13	2/3	Nozzle assembly, long, 250 bore size
45.2	2/3	Nozzle assembly, short, 135 bore size
45.3	2/3	Nozzle assembly, short, 150 bore size
45.4	2/3	Nozzle assembly, short, 165 bore size
45.5	2/3	Nozzle assembly, short, 187 bore size
45.6	2/3	Nozzle assembly, short, 200 bore size
45.7	2/3	Nozzle assembly, long, 125 bore size
45.8	2/3	Nozzle assembly, long, 135 bore size
45.9	2/3	Nozzle assembly, long, 150 bore size
46	1	Nameplate
47	2	Nameplate screw
48	3	Carbide bushing
49.1	2/3	Nozzle vane
49.2	2/3	Nozzle vane, long
50	2	Nozzle housing seal
51	8	Lockwashers
52	1	Output pinion gear
53	1	Output pinion housing
54	1	Drive pin
55	1	Directional tee housing
56.1	1	Directional nozzle housing, dual
56.2	1	Directional nozzle housing, quad
57	1	Directional nameplate
58	1	Directional nozzle housing gear
59	2	Nozzle housing bearing
60	2	Nozzle housing bearing cup

## 8 Parts list and service kits

*It is important to observe the technical data during installation, operation and maintenance.  
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### Service kits

Denomination	Item no.	Gamajet no.
<b>Minor service kits</b>		
◆ Service kit, viton (FKM) .....	9614679001	8ML1MIN
▲ Service kit, EPDM .....	9614679601	8ML1EPMIN
■ Service kit, Kalrez (FFKM) .....	9614679801	8ML1KMIN
<b>Directional</b>		
⊙ Service kit, viton (FKM) .....	9614679201	8ML1DIRMIN
⊗ Service kit, Kalrez (FFKM) .....	9614679401	8ML1DIRKMIN
<b>Major service kits</b>		
□ Service kit, viton (FKM) .....	9614679101	8ML1MAJ
○ Service kit, EPDM .....	9614679701	8ML1EPMAJ
◇ Service kit, Kalrez (FFKM) .....	9614630004	8ML1KMAJ
<b>Directional</b>		
★ Service kit, viton (FKM) .....	9614679901	8ML1DIRMAJ
◇ Service kit, Kalrez (FFKM) .....	9614679501	8ML1DIRKMAJ

Parts marked with □◆○★▲◇◇■⊗⊙ are included in the service kits.

**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.

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