



# Instruction Manual

Alfa Laval GJ BB



Covering:  
Standard Machines  
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Original manual



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

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# EC Declaration of Conformity

The designated company

Alfa Laval Tank Equipment Inc.

Company name

604 Jeffers Circle – Exton, PA – 19341, United States

Address

+1 610 408 9940

Phone no.

hereby declare that

Tank Cleaning Machine

Denomination

Alfa Laval GJ BB

Type

*From serial numbers from H-100 to H-XXXX*

is in conformity with the following regulations and directives with amendments:

**- The 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 an Article 3, paragraph 3 Equipment*

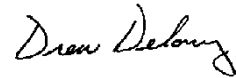
The person authorised to compile the technical file is the signer of this document.

Executive VP Operations

Title

Andrew Delaney

Name



Signature

2015-05-18

Date

Exton, United States

Place



---

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

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## 2.1 Important Information

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**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.

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## 2.2 Warning Signs

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**General warning:**



**Dangerous electrical voltage:**



**Caustic agents:**



## 2 Safety

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*All warnings in the manual are summarized 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.*

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### 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 vapor having a risk of ignition or explosion, it is imperative to have the Alfa Laval Gamajet properly grounded using the provided location 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 Gamajet 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 vapor having a risk of ignition or explosion, it is imperative to have the Alfa Laval Gamajet properly grounded using the provided location 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

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### 3.1 Description

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The Alfa Laval GJ BB is a fluid-driven (turbine-driven) 360° rotary barrel cleaning machine designed to clean the interior surfaces of wine barrels and drums with the bung hole in the downward position. The BB is powered entirely by the cleaning solution and it requires no electricity, compressed air or lubricant for operation.

**Warning: Under no conditions, whatsoever, should the Alfa Laval GJ BB ever be immersed in anything, unless you have prior approval from Alfa Laval Gamajet Equipment. Failure to comply with this restriction will void the warranty!!**

In order to handle a range of operating conditions, the stainless steel Alfa Laval GJ BB is available with several different nozzle sizes, stators (non-rotating turbine), and O-ring materials. The performance capabilities of these options are detailed in Section 7 – Technical Data.

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### 3.2 Intended Use

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It is to be verified by the end-user:

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

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### 3.3 Patents and Trademarks

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

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The Alfa Laval logotype is a trademark or the registered trademark of Alfa Laval Corporate AB. "Gamajet" is a trademark or registered trademark of Alfa Laval Tank Equipment. The Alfa Laval GJ BB product has patent in the US (US 6,123,271). 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

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Alfa Laval Gamajet 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 #: 6,123,271



## 4 Installation

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### 4.1 Unpacking/Delivery

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#### Step 1

**CAUTION**  
Alfa Laval cannot be held responsible for incorrect unpacking.

Check the delivery for:

1. Complete Cleaning Machine
2. Delivery note

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#### Step 2

Remove any packing materials

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#### Step 3

Inspect the tank cleaning machine for visible transport damage

Inspection!

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

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### 4.2 Installation

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#### Step 1



Always read the technical data thoroughly.  
(See chapter 7 Technical Data)

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#### Step 2

##### Assembly

Every Alfa Laval Gamajet is operationally tested before shipment and is ready to run after unpacking. **No assembly is required prior to use.** The Alfa Laval Gamajet has been configured to meet the operating conditions (at the Alfa Laval Gamajet, not at the pump) given to us, e.g. pressure, flow, temperature, cycle time, chemical adders, etc.

**Note:** Any change to the original operating conditions will affect the Alfa Laval Gamajet accordingly

**Warning: Do not force Tee and Nozzle Housings, Pos. 22 and 23, to rotate. Doing so may cause damage to the internal components.**

---

#### Step 3

##### Inlet Connections

The standard inlet connection for the Alfa Laval GJ BB is a 3/8" NPT female or 3/8" BSP female. It is recommended that the mating male thread be wrapped with PTFE pipe joint tape prior to installation. This will minimize any chance of leakage and will make subsequent removal much easier.

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#### Step 4

##### Usage

Before attaching the supply plumbing to the Alfa Laval GJ BB, make sure the supply line has been adequately flushed.

**WARNING: When attaching the Alfa Laval GJ BB onto the supply line, ALWAYS apply the wrench to the Collar Pos. 4 at the top/inlet of the unit. Never use a wrench on any other component or its own body to tighten the unit onto the pipe. Doing so risks internally damaging the machine.**

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#### Step 5

##### Entry Openings

The Tee Housing (spray head) section of the Alfa Laval GJ BB has been designed to fit through a standard 50mm wine barrel and 2" drum bung hole.

---

## 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.*

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### Step 6

#### Filters and Strainers

As an accessory, Alfa Laval Gamajet sells a strainer to be used in conjunction with the BB. The main component is a heavy duty Y-Strainer that allows for on-line cleaning of the screen without disassembly of the surrounding plumbing. By simply opening the included ball valve, the heavy particulate that has collected on the screen can be blown-down. The screen can also be visually inspected by simply removing the cover of the strainer and, again, without disassembly of the piping.

If Alfa Laval Gamajet's strainer is not used, the systems should be equipped with a filter or strainer that will trap solids **0.006" (150 micron, 100 mesh) or larger**. The use of a filter ensures adequate removal of particles and debris that can come from hard water, dirty heating coils, line sediment, and well water. A supply of clean wash fluid to the BB and, more importantly, the barrel is a must.

---

### Step 7

#### Capacity of Supply Pump

In the majority of cases a positive displacement (PD) style pump (i.e. a pressure washer, piston pump, plunger pump, and mechanical diaphragm pump) will supply the wash fluid to the Alfa Laval GJ BB. PD pumps are fixed volume pumps whose flow rate is dependent upon the rotational speed of the pump; the pumps also have a pressure rating which is the **maximum** operating pressure. **Note: Do not confuse the maximum operating pressure of a PD pump with the actual operating pressure, the actual operating pressure is dictated by the fixed flow rate of the pump and the Alfa Laval GJ BB / plumbing system.** If a PD pump is used, the Alfa Laval GJ BB should be sized to, first, match the flow capability of the pump and, second, not exceed the pump's maximum operating pressure (taking the pressure rating of the plumbing system into account, also).

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

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

## 5 Operation

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

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### 5.1 Operation/Control

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#### Step 1



Always read the technical data thoroughly. See chapter 7 Technical Data

#### CAUTION

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

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#### Step 2



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

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#### Step 3

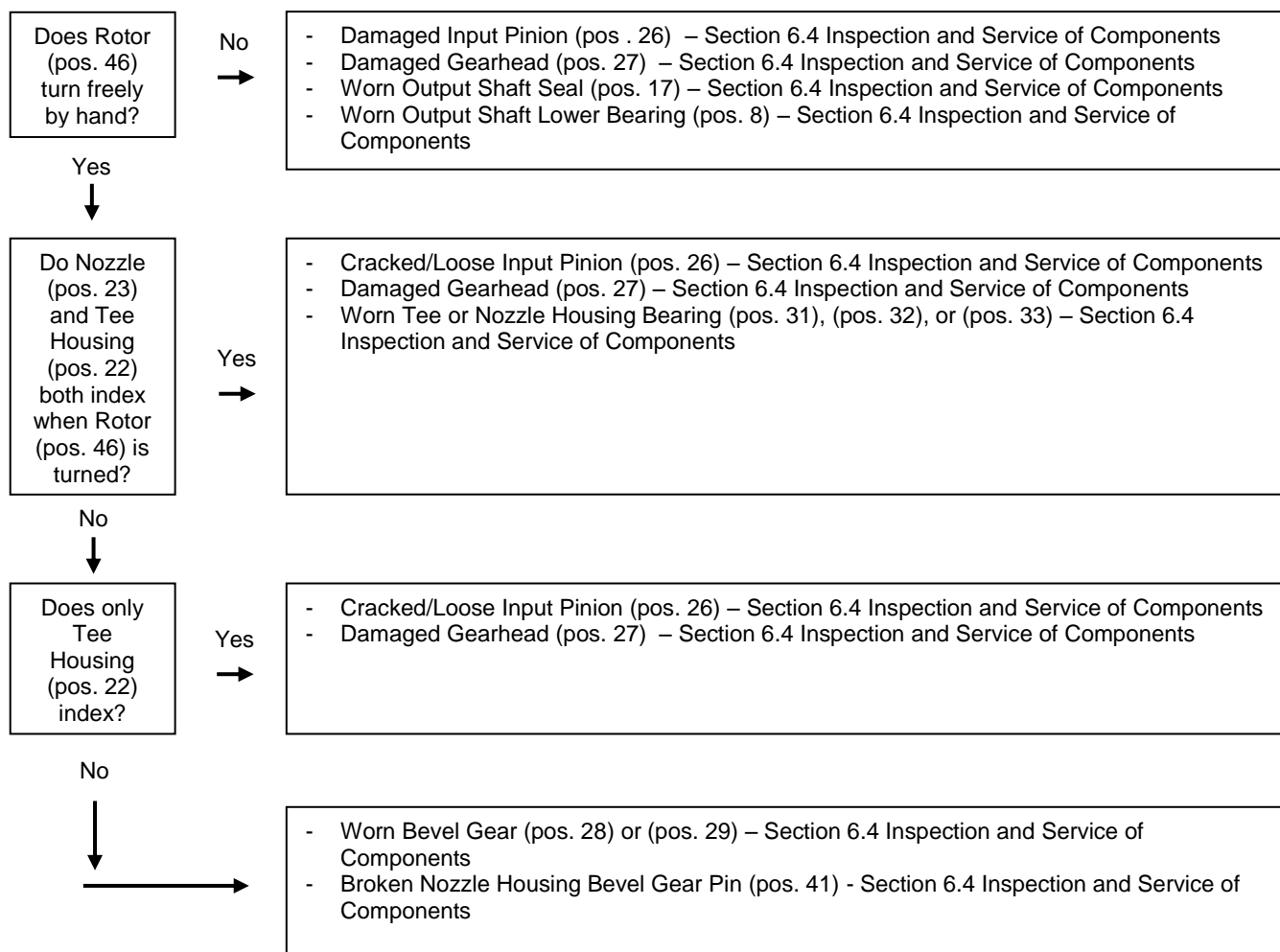
##### Initial Startup

Every BB that ships is accompanied by a Birth Certificate. This document indicates how the BB performed in our testing tank before it shipped based on the operating conditions supplied to The Alfa Laval Gamajet. To ensure the longest possible life of the BB, please verify the operating conditions and, most importantly, the machine's cycle time. The cycle time can be measured by picking a fixed point inside of a vessel as a reference and timing how long it takes the same nozzle to pass back over that point in the vessel. (This, naturally, will not be the exact same spot because the spray pattern is indexing.) To calculate the full cycle time in minutes, multiply this timed value in seconds by 0.75 (3/4).

---

*Pay attention to possible faults  
Read the instructions carefully*

## 5.2 Trouble Shooting



## 5 Operation

---

*Pay attention to possible faults  
Read the instructions carefully*

---

### Step 1

#### Long Term Storage

If the unit has not been used for over a month, it may be reluctant to initially start because of the natural "set" that occurs with the dynamic parts. To remedy this, loosen the Collar Set Screw (52), remove the Collar (4) and lift out the Stator (25). Using something thin, such as a small hex key or a paper clip, manually rotate the Rotor (46) in the clockwise direction for 20 to 30 revolutions. The (46) should become progressively easier to rotate as you spin it. If so, reassembly the unit and attempt to operate it.

---

### Step 2

#### Debris Inside

Loosen the Collar Set Screw (52), remove the Collar (4), and lift out the Stator (25). Look for and remove any debris caught in the Stator and the vanes of the Rotor (46). Remove any material wound around the Input Shaft (30). In addition, check for any debris caught in the outlet holes of the Stem (3), the nose of the Tee Housing (22), and the Nozzle Housing (23).

---

### Step 3

#### Insufficient Flow

The Alfa Laval Gamajet was configured to meet certain operating conditions outlined at the time of the initial sale, such as flow rate (GPM), pressure (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 Stator (25) is too large, the Tee Housing (22) will not turn.

Look for restrictions in the fluid supply such as a clogged filter, kinked hose, or deposits in the piping.

---

### Step 4

#### Tight Clearances

A recently overhauled Alfa Laval GJ BB may fail to operate when first returned to service. If the machine seems otherwise fine, try running it with the Nozzle Housing (23) removed. So as not to loosen it, be sure to remove the Nozzle Housing Cover Plate O-ring (38), as well. The reduction in pressure and additional flow will invariably be enough to overcome the extra resistance of new Bearings and Seals. Twenty minutes of operation should loosen the machine to run normally with the (23) reinstalled.

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*Pay attention to possible faults  
Read the instructions carefully*

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### 5.3 Cleaning Solution Leakage

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#### - **Worn Bearings & Seals**

Some leakage from the Tee Housing / Stem and Tee Housing / Nozzle Housing joints is normal. If the flow rate has noticeably increased, or, the pressure decreased, check the condition of the Tee and Nozzle Housing Bearings, (31), (32), and (33). Specifically, examine the condition of the external ring and internal O-ring.

#### - **Worn Housing Cups**

Inspect the internal bores of the Nozzle and Tee Housings, (23) and (22), for excessive wear (grooved or scored). Replace any that show distinct grooves.

#### - **Worn Drive Body O-Rings**

Although some leakage from components positioned inside of the barrel is normal, it is not for components that make up the external Gear Train.

Leakage between the Collar (4) and Input Cap (2) may indicate worn or damaged Collar O-rings (53) and (54). Remove the (4) as described in Section 6.3 – General Dismantling, and inspect the O-rings for signs of damage or wear.

If the leak is noticed from the lower section of the Drive Body, inspect the Output Cap O-ring (56) and Tube/Housing O-rings (36) as described in Section 6.3 – General Dismantling.

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### 5.4 Poor Cleaning Performance

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#### - **Inadequate Flow and Pressure**

Check the pressure at the Alfa Laval Gamajet 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. If this is the case, the line size must be increased accordingly for long runs. Although the Alfa Laval Gamajet 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)! Contact Alfa Laval Gamajet Equipment if assistance is required.

#### - **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**

Inspect the orifices of the Nozzle Housing (23) and stator holes for debris.

#### - **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 Gamajet Configuration**

Determine if the deposit being cleaned requires greater jet impact or longer jet dwell time (slower rotation) for more thorough scrubbing. Confirm that the Alfa Laval Gamajet nozzle size, turbine, and gearing are correct for the specific application. Refer to the machine's Birth Certificate for specific information regarding its configuration. Contact a Alfa Laval Gamajet Equipment representative if assistance is required.

## 5 Operation

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.

---

### 5.5 Recommended Cleaning

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#### 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 sterilizing.

Danger of burns!

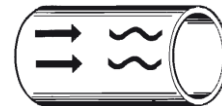
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#### Step 3



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.

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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.*

---

### 6.1 General Maintenance

---

#### Step 1



Always read the technical data thoroughly. (see chapter 7 Technical Data)

---

#### Step 2

Recommended spare parts:

Order service kits from the service kits list

(See 8.7 Minor Service Kit & 8.8 Major Service Kit)

Ordering spare parts:

Contact your local Alfa Laval Sales company.

---

## 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.*

---

### 6.2 General Dismantling Setup

---

#### Step 1

##### Note

*A rigorously implemented preventative maintenance program will significantly reduce repair costs over the life of the Alfa Laval Gamajet. The foundation of such a program 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 2

##### Storage

The Alfa Laval Gamajet 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 Gamajet to seize or lock up. A clean water rinse through the Alfa Laval Gamajet will also wash out any residues of chemical cleaners that could adversely affect the seals and O-rings during prolonged contact in storage.

---

#### Step 3

##### External Inspection Intervals

Before every shift, examine the Stator (25) and the orifices of the Nozzle Housing (23). Inspect the (25) by loosening the Collar Set Screw (52) and removing the Collar (4).

---

#### Step 4

##### Internal Inspection Intervals

An interval of 100 hours is recommended initially. If all of the components are found to be in acceptable condition after the first 100 hours, the Alfa Laval Gamajet may then be inspected and routine preventive maintenance should be performed every 400 to 600 hours of operation, depending on the severity of use. Alfa Laval Gamajet Equipment recommends the following service schedule during the inspections:

Every inspection (about 500 hours):

- Clean and repack the Gearhead, (27)
- Replace the Dynamic Seals: (58), (17), and (48)

Every other inspection (about every 1000 hours):

- Replace all Plastic Bearings and Bushings
- Replace all Static and Dynamic Seals
- Replace all O-rings

Every fourth (4<sup>th</sup>) inspection (about 2000 hours):

- Replace worn Housings and Shaft: (5), (23) and (22)
- 

#### Step 5

##### Tips

All the Bearings, Bushings, Seals and O-rings are wear parts. If just one Bearing or Seal is worn or damaged, replace both it and its mate, not just the worn or damaged part.

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---

Read the instructions carefully. The items refer to the parts list and service kits section.

---

### 6.3 General Dismantling

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#### Step 1

##### **Tee Housing Cap**

Unthread the Tee Housing Cap (6) from the Tee Housing (22; drawing 13) by holding the (6) still and rotating the (22). **Tip:** The (22) is a Left-Hand Thread.

Unscrew the Tee Housing Assembly (drawing 15) from the Supply Tube (drawing 9). **Tip:** Again, this is a Left-Hand Thread.

---

#### Step 2

##### **Tee Housing**

Unscrew the Nozzle Housing Cover Plate (24) with a 1/4" slotted screwdriver.

Pull the Nozzle Housing (23; drawing 12) from the nose of the Tee Housing (22)

Unthread and remove the Stem Cap (12; drawing 11). **Tip:** The Stem Cap (12) is a Left-Hand Thread.

Pull the (22) from the Stem (3; drawing 10).

Remove the Tee Housing Bevel Gear (28) and the Upper Tee Housing Bearing (32) by pulling the (28) from the (3).

---

#### Step 3

##### **Output Shaft and Supply Tube**

Pull the Output Shaft (5) from the remainder of the Drive Body (drawing 11).

---

#### Step 4

##### **Inlet Collar, Cap, and Geartrain**

Loosen the Collar Set Screw (52) with a 5/64" Hex Key, minimum 2 turns.

Remove the Collar (4) and Stator (25).

Using a 7/64" Hex Key, remove the Input Cap Screws (50) from the Geartrain Housing (14).

Remove the Input Cap (2) from the body.

Push the Geartrain (drawing 7) from the (14).

---

## 6 Maintenance

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Read the instructions carefully. The items refer to the parts list and service kits section.

---

### 6.4 Inspection and Service of Components

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#### Drawing 8

##### Inlet Assembly

Inspect the through holes of the Stator (25) to be sure that they are clear.

Inspect the Small and Large Collar O-rings, #9-142-E and #9-141-E, for deterioration (compression set or hardening) or damage and replace if necessary.

---

#### Drawing 7

##### Geartrain Assembly

Remove the Gearhead Lower Bearing Housing (11; drawing 2).

Unscrew the Rotor Nut (43) with an 11/32" socket and remove it with the Rotor Lockwasher (42) from the Input Shaft (30; drawing 4).

Remove the Rotor (46; drawing 5) from the (30). If needed, use a slotted screwdriver for assistance.

Ensuring that the Gear Train is oriented with the (30) up, carefully remove the Input Shaft Upper Bearing Housing (10; drawing 1) by holding down the (30) with one finger and pulling and twisting the (10) from the Gear Train. Applying downward pressure on the (30) ensures that none of the internal gearing is dislodged when the (10) is removed.

Remove the #422 from the Gearhead (27; drawing 3).

Inspect the Gearbox Seal (47) for loss of spring tension (indicated by excessive dry deposits of dirty or abrasive cleaning solution on the spring), replace as required.

---

#### Drawing 3

##### Gearhead Internals

**Tip:** To prevent the internal components of the Planetary Gearhead (27) from unexpected spilling out, make sure that all steps are done with the input side of the assembly facing up.

Using a #1 Phillips screwdriver, unscrew the Planetary Gearhead Screws (51) from the Gearhead (27).

Remove the (27) from the Gearbox (1) by pushing up on the shaft of the (27).

**Warning:** If you suspect that the (27) requires service, proceed with caution. If at any time you do not feel completely comfortable servicing (27), contact Alfa Laval Gamajet Equipment.

Using needle nose pliers carefully remove the internal components of the (27). As they are removed, be sure to arrange them in such a way that they are reinstalled in the same order as they were removed. Examine the gears of the four different stages for any worn or broken teeth. Also, examine the main internal ring gear for bent or sharp teeth. If any damage is found, contact Alfa Laval Gamajet Equipment immediately.

During reassembly, Alfa Laval Gamajet Equipment recommends the gearhead be lightly repacked using food grade grease. Please contact Alfa Laval Gamajet Equipment for a recommendation on the grease.

---

#### Drawings 1, 4-6

##### Input Shaft Housing Assembly

Inspect the Input Pinion (26) for hairline cracks on the end face or for worn, damaged, or sharp/pointed teeth. The (26) should be tight to the Input Shaft (30) and the Input Pinion Spacer (35). The (35) should not be able to spin on the (30). Press the (26) back onto (30) if it has slipped, or replace if cracked or worn.

Inspect the (35) for signs of wear from contacting the carbide (44). Replace if the overall length is **0.123"** or less.

Check for signs of scoring and wear on (30). Replace if the coating has chipped or cracked.

The Planetary Gearhead Pin (55) should be firmly pressed into the Input Shaft Upper Bearing Housing (10).

The through holes of the (10) should be clear and free of debris.

The (44) in the Rotor (46) and (10) should protrude slightly. In addition, their running surfaces should be smooth, flat, and free of chips and cracks.

Inspect the Input Shaft Seal (58) (inside the Input Shaft Lower Bearing Housing (49) for wear by placing the (30) back through it. There will be drag if the (58) is still good. If it needs to be replaced, pry out the old (58), using a brass pick, and replace it with a new one. Ensure that the (58) is as square as possible to the (49) when installing it. The internal spring should be up and visible. **Tip:** Using the eraser of a No. 2 pencil, apply even pressure until it snaps behind the gland's internal lip.

Check the Input Shaft Lower Housing O-ring (57) and Input Shaft Lower Housing Seal (48) for deterioration or damage, replace (using a brass pick to remove the old components) if necessary. The (48) should be installed so its internal spring is up and visible.

---

*Read the instructions carefully. The items refer to the parts list and service kits section.*

---

### Drawings 2, 11

#### **Gearhead Lower Bearing Housing and Output Shaft**

Check the Output Shaft (5) for signs of scoring or wear, especially in the area of contact with the Output Shaft Seal (17) and Lower Bearing (8). Replace if worn.

Examine the (17) for loss of spring tension (indicated by excessive dry deposits of dirty or abrasive cleaning solution on the spring). Also, ensure that it still has interference with the (5) by passing the (5) through the center of the seal. There will be a noticeable drag if the seal is still good. If the (17) must be replaced, remove the Output Shaft Upper Seal Retaining Ring (7) using a small slotted screwdriver and the Output Shaft Upper Seal Spacer (13). Then, pry out the old (7) using a brass pick, and replace it with a new one. The new (7) should be installed with the spring facing down and not visible after it is installed.

Check the inside diameter of the Output Shaft Upper Bearing (15). It should not be greater than **0.334"**. Inspect the face of the (15) for signs of wear from contacting the (5). Replace if necessary.

Check the Bearing Housing O-ring #456 for deterioration or damage, replace (using a brass pick to remove the old components) if necessary.

---

### Drawings 14, 15

#### **Nozzle Housing**

Inspect the orifice openings in the Nozzle Housing (23) for debris. The inside diameter of each opening must be smooth, round, and free of damage (especially any nicks) for maximum jet impact. In order to maintain the original flow rate and pressure, replace the (23) if the openings are deformed or oversized.

Inspect the Nozzle Housing Bevel Gear (29) for wear such as sharp/pointed or worn teeth. If it needs to be replaced, remove the Nozzle Housing Bevel Gear Retaining Ring (39) with a small slotted screwdriver and pry (29) from the (23).

Inspect the Nozzle Housing Bearings (33). Clean any deposits from the exterior of (33) and check their fit in the (23). The external ring may be a tight fit with the inside of the (23). Once installed, however, the body of the (33) should turn freely. Also, the internal O-ring should be free from damage, compression set, or deterioration.

Clean any deposits from inner bore of (23) and examine for excessive wear. Light scoring is acceptable, but the (23) should be replaced if the inside diameter exceeds **0.504"**.

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### Drawing 15

#### **Tee Housing**

Check the water outlets on the nose of the Tee Housing (22); they should be free of debris.

Inspect the Tee Housing Bevel Gear (28) for worn, damaged or sharp/pointed teeth.

Inspect the Tee Housing Bearings (32) and (31). Clean any deposits from the exterior of them and check their fit in the (22). The external ring may be a tight fit with the inside of the (22). Once installed, however, the body of the (22) should turn freely. Also, the internal O-ring should be free from damage, compression set, or deterioration.

Clean any deposits from the internal bore of the (22) and examine for excessive wear. Light scoring is acceptable, but the (22) should be replaced if the inside diameter exceeds **0.928"**.

Inspect the Tee Housing O-ring (37) for deterioration (compression set or hardening) or damage and replace if necessary.

Inspect the Tee Housing Nose O-ring (38) for deterioration (compression set or hardening) or damage and replace if necessary.

---

### Drawings 12, 13

#### **Stem and Stem Cap**

Inspect the water outlets of the Stem (3); they should be free of debris.

The Tee Housing Bevel Gear Pin (34) should be firmly pressed into the (3).

Check the inside diameter of the Output Shaft Lower Bearing (8). It should not be greater than **0.334"**. Replace if necessary. Also, ensure that the Output Shaft (5) still has interference with the internal ring of the (8) by passing the (5) through the center of the part. There will still be a slight drag if the ring is still good. If the (8) must be replaced, make sure that the new bearing is installed with the ring end of the (8) entering the bore of the (3), first.

Inspect the Stem Cap O-ring (40) and Supply Tube O-ring (36) for deterioration (compression set or hardening) or damage and replace if necessary.

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## 6 Maintenance

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*Read the instructions carefully. The items refer to the parts list and service kits section.*

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### 6.5 Reassembly

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#### 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 Gamajet needs to be serviced. Also, it may cause misalignment of parts and the potential for premature failure.

Unless otherwise stated, apply a dab of a **Teflon-based anti-seize compound** to all threads when reassembling; this will prevent galling of threads and ease any future disassembly.

To ease installation of all O-rings, they should be lubricated prior to reassembly. A Silicon based lubricant must be used for EP O-rings. A lithium-based grease is acceptable for Viton® O-rings, however.

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#### Drawings 1-7

##### Geartrain

Install the Gearhead (27) back into the Gearbox (1).

After aligning the screw holes, thread the Planetary Gearhead Screws (51) back into the (27) using a #1 Phillips screwdriver. Make hand tight.

Press the Gearbox Seal (47) onto the Input Shaft Upper Bearing Housing (10). The seal's internal spring should be toward the part and not visible.

Insert the Input Shaft (30) through the Input Shaft Lower Bearing Housing (49).

Insert the (49) into the (10).

To ease installation of this assembly into the (27), extend the (30) slightly so the engagement of the Input Pinion (26) with the top gears of the (27) is visible. Once they are engaged, push the (10) assembly into the (1), making sure to align the Planetary Gearhead Pin (35) with the slot in (1),

Place the Rotor (46) over the end of the (30).

Install the Rotor Lockwasher (42) and Rotor Nut (43) using an 11/32" socket. Hold the (46) stationary with a pair of pliers while tightening the (43).

Push the Gearhead Lower Bearing Housing (11) into the (1).

---

#### Drawing 8

##### Geartrain Housing

Insert the Geartrain (drawing 7) into the Geartrain Housing (14).

Place the Input Cap (2) on top of this assembly..

Screw the Input Cap Screws (50), using a 7/64" Hex Key, and No. 6 Hi Collar Lockwashers (45) into the (14). Hand-tighten in a star pattern.

Place the Stator (25) into the (2).

Thread the Collar (4) onto the (2) until it stops and captures the (25).

Tighten the Collar Set Screw (52) using a 5/64" Hex Key.

---

#### Drawing 11

##### Supply Tube and Output Shaft

Insert the Output Shaft (5), into the end of the Geartrain Housing (14). There will be a slight resistance as it passes through the top seal. The shaft is fully installed when the flange at the end comes to rest on the Output Shaft Upper Bearing (15; drawing 2). Twisting the (5) may be necessary to align the tip with the Gearhead (27; drawing 3).

---

*Read the instructions carefully. The items refer to the parts list and service kits section.*

---

### Drawing 15

#### Tee Housing

Slide the Tee Housing Bevel Gear (28) over the end of the Stem (3; drawing 13). Align the hole in the (28) with the Tee Housing Bevel Gear Pin (34).

Place the Tee Housing Upper Bearing (32) onto the (3). Lubrication of the internal O-ring is recommended.

Push the Tee Housing (22) over it until it is flush and fully seated. If a new (32) has been installed, there will be a slight resistance as the external ring of this part is inserted into the (22).

Place the Tee Housing Lower Bearing (31) over the (3) and push it down into the annular space between the (3) and (22). Lubrication of the internal O-ring is recommended.

Thread the Stem Cap (12; drawing 11) onto the end of the (3). This is a Left-Hand Thread.

Push the first Nozzle Housing Bearing (33) onto the (22). Lubrication of the internal O-ring is recommended. To prevent the internal O-ring from being cut by the windows in the (22), twist the (33) as it slides over the (22).

Push the Nozzle Housing (23; drawing 12) onto the nose of the (22). If a new set of (33) has been installed, there will be a slight resistance as the external ring of the (33) is inserted into the (23).

**Rotate the Tee Housing Assembly slightly to mesh the Bevel Gears (28) and (29). Failure to ensure that the Bevel Gears have properly mated could damage them.**

Place the second (33) onto the nose of the (22). Push it into the annular space between the (22) and (23). Lubrication of the internal O-ring is recommended.

Thread the Nozzle Housing Cover Plate (24) into the nose of the (22) using a 1/4" slotted screwdriver.

---

### Drawing 16

#### Tee Housing Cap

Screw the Stem (3) onto the Supply Tube (9; drawing 9). This is a Left-Hand Thread.

Place the Tee Housing Cap (6) into the Tee Housing (22; drawing 13) and aligned with the slot on the Output Shaft (5). Rotate the (22) until the (6) is fully engaged.

Again, this is a Left-Hand Thread.

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## 7 Technical Data

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

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### 7.1 Technical Data

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The Alfa Laval GJ BB 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.

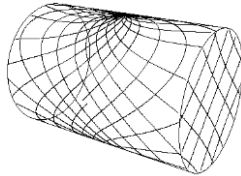
#### TECHNICAL DATA

Lubricant ..... Food grade  
Max. throw length ..... 2.5 m (8 ft.)

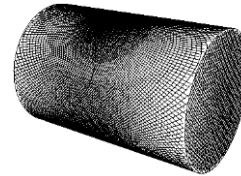
#### Pressure

Working pressure ..... 5.5 - 83 bar (80 – 1,200 PSI)  
Recommended pressure ..... 5.5 - 55 bar (80 - 800 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, EPDM, PFTE (FKM and FFKM available).

##### Temperature

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

Weight ..... 4.5 kg (10 lbs.)

##### Connections

Standard thread ..... 3/4" NPT  
Available option ..... 3/4" NPT, 3/4" BSP

##### Options

Electronic rotation sensor to verify 3D coverage.

##### Caution

Do not use for gas evacuation or air dispersion.

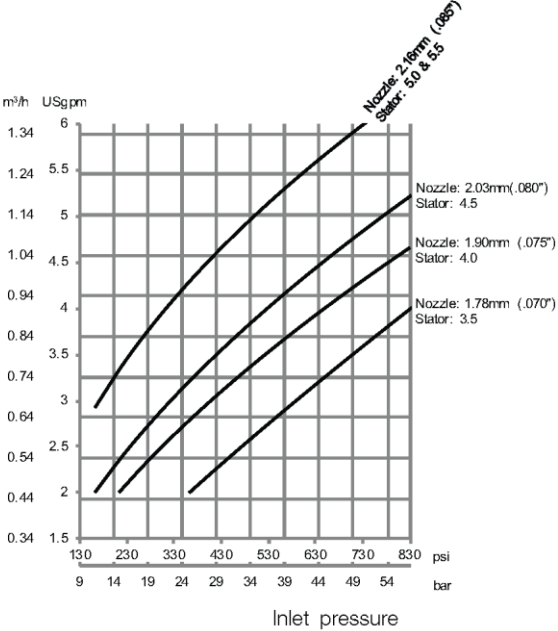


It is important to observe the technical data during installation, operation and maintenance.  
Inform personnel about the technical data.

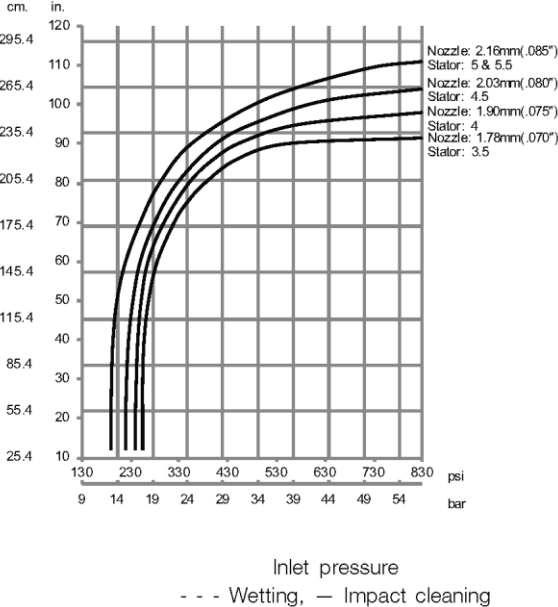
7.2 Performance Data

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

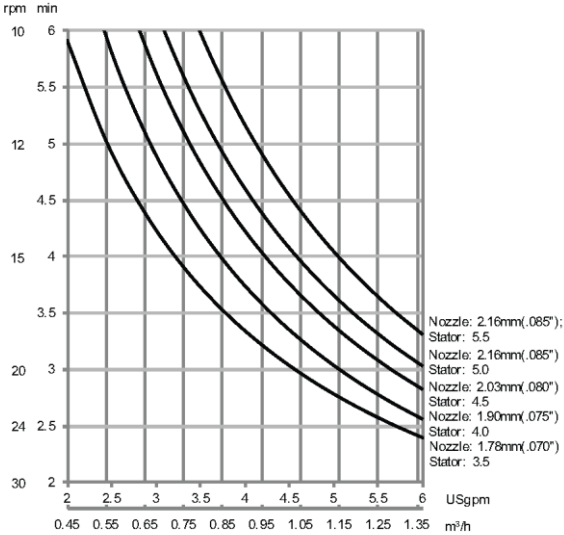
Flow Rate



Impact Throw Length



Cleaning Time



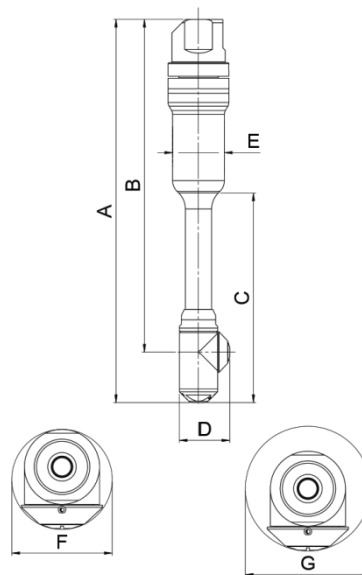
## 7 Technical Data

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

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### 7.3 Dimensions

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#### Dimensions

	A	B	C	D	E	F	G
mm	325	282	178	42	44	43	52
in	12.79	11.1	6.99	1.66	1.7	1.67	2.05

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

7.4 Trax Simulation Tool

**Standard Design**

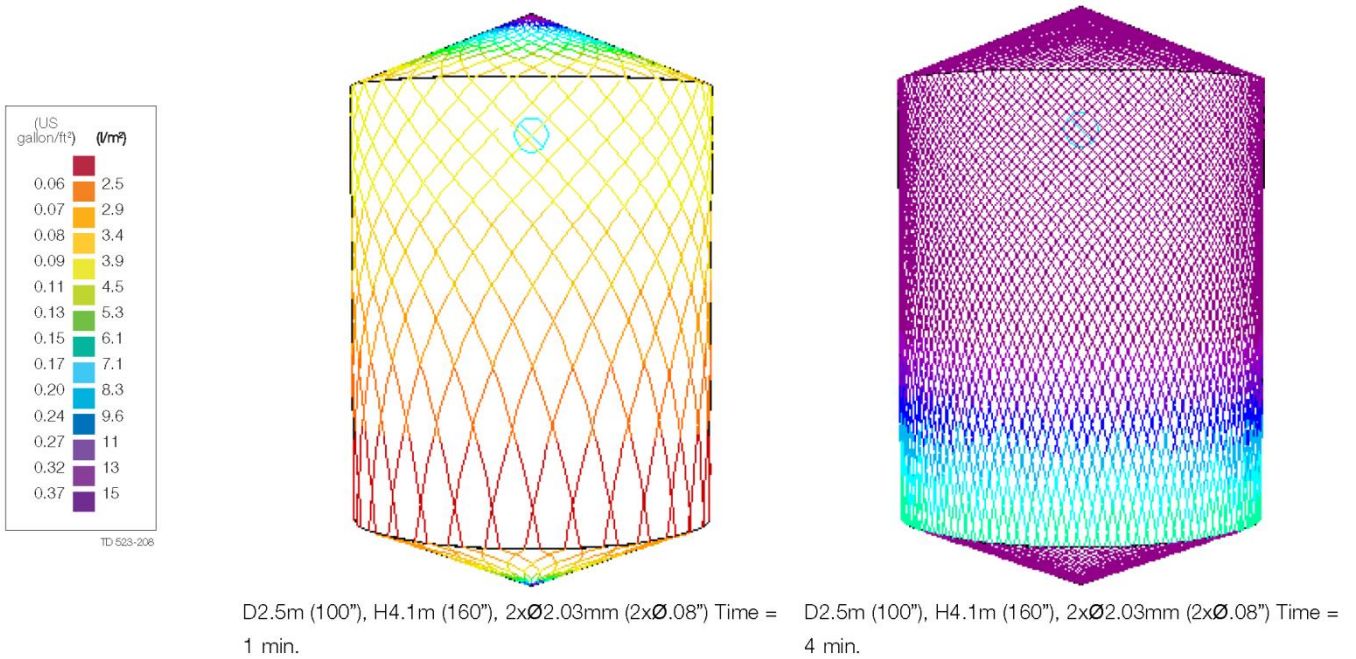
The choice of nozzle diameters can optimize jet impact length and flow rate at the desired pressure. As standard documentation, the Alfa Laval GJ BB can be supplied with a "Declaration of Conformity" for material specifications.

**TRAX Simulation Tool**

TRAX is a unique software that simulates how the Alfa Laval GJ BB performs in a specific tank or vessel. The simulation gives information on wetting intensity, pattern mesh width and cleaning jet velocity. This information is used to determine the best location of the tank cleaning device and the correct combination of flow, time, and pressure to implement.

A TRAX demo containing different cleaning simulations covering a variety of applications can be used as a reference and documentation for tank cleaning applications. The TRAX demo is free and available upon request.

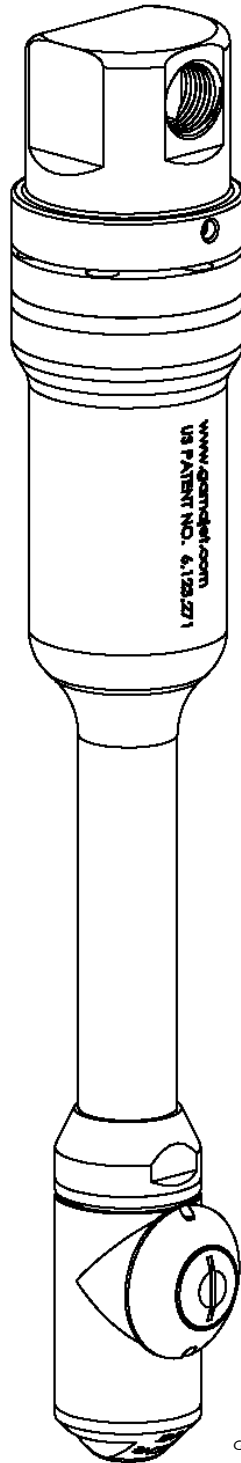
**Wetting Intensity**



## 8 Parts List and Service Kits

*The Drawing shows Alfa Laval GJ BB Tank Cleaning Machine*

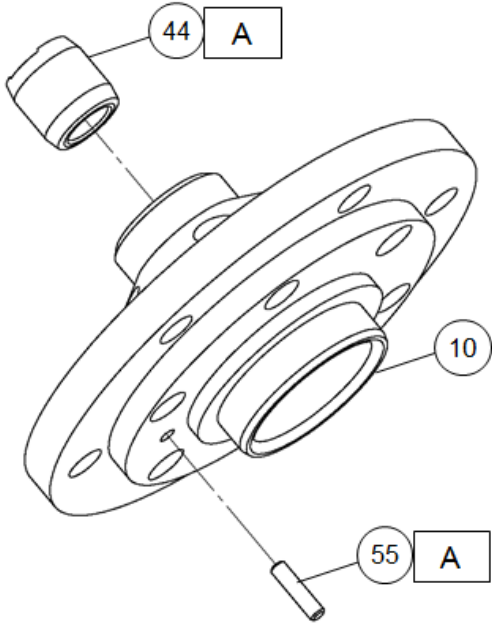
### 8.1 AL GJBB View



GJBB00

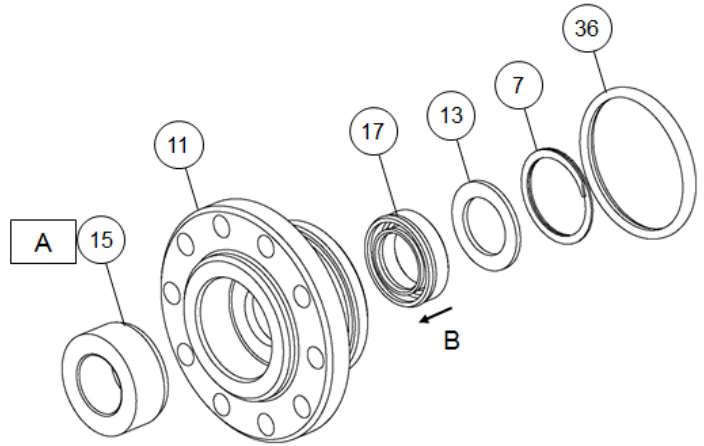
The Drawing shows Alfa Laval GJ BB Tank Cleaning Machine

8.2 Assembly Drawings – 1, 2, 3, 4, 5, 6 & 7



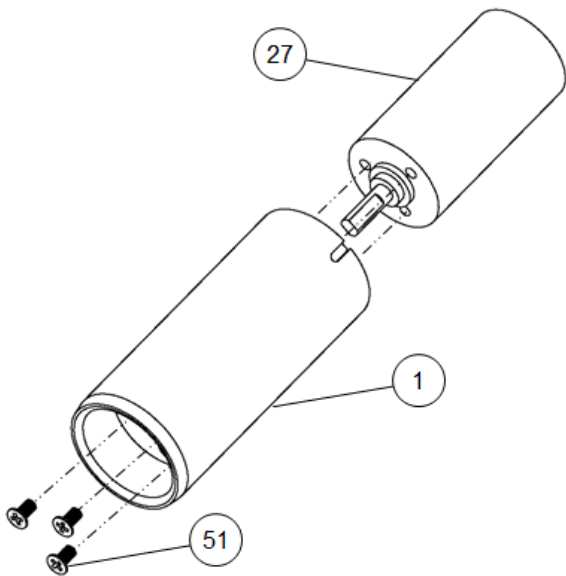
Drawing 1 – Gearhead Upper Bearing Housing

A: Press Fit

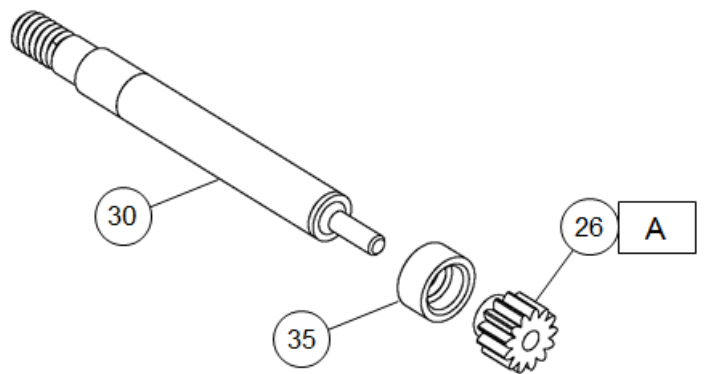


Drawing 2 – Gearhead Lower Bearing Housing

A: Press Fit  
B: Spring



Drawing 3 – Gearhead

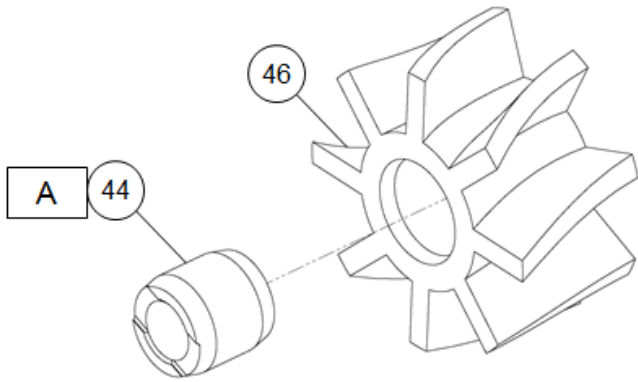


Drawing 4 – Input Shaft

A: Press Fit  
Note: The (26) must be completely perpendicular to the (30) shaft or it will not press on correctly and damage the (26) or the (30)

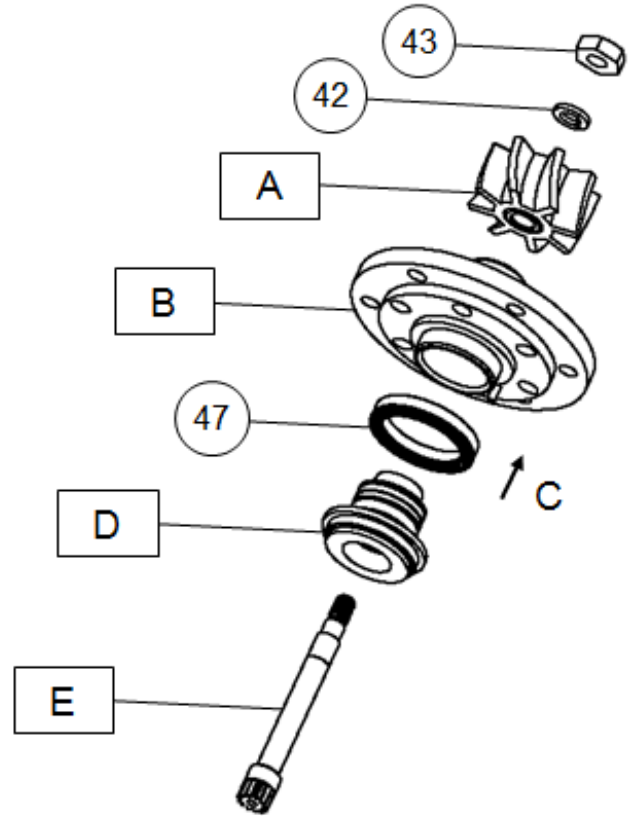
## 8 Parts List and Service Kits

The Drawing shows Alfa Laval GJ BB Tank Cleaning Machine



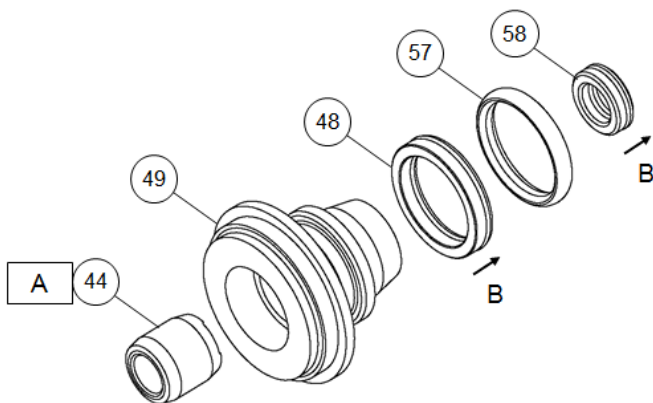
Drawing 5 – Rotor

A: Press Fit



Drawing 7 – Geartrain

A: Drawing 5  
 B: Drawing 1  
 C: Spring  
 D: Drawing 6  
 E: Drawing 4  
 F: Drawing 3  
 G: Drawing 2

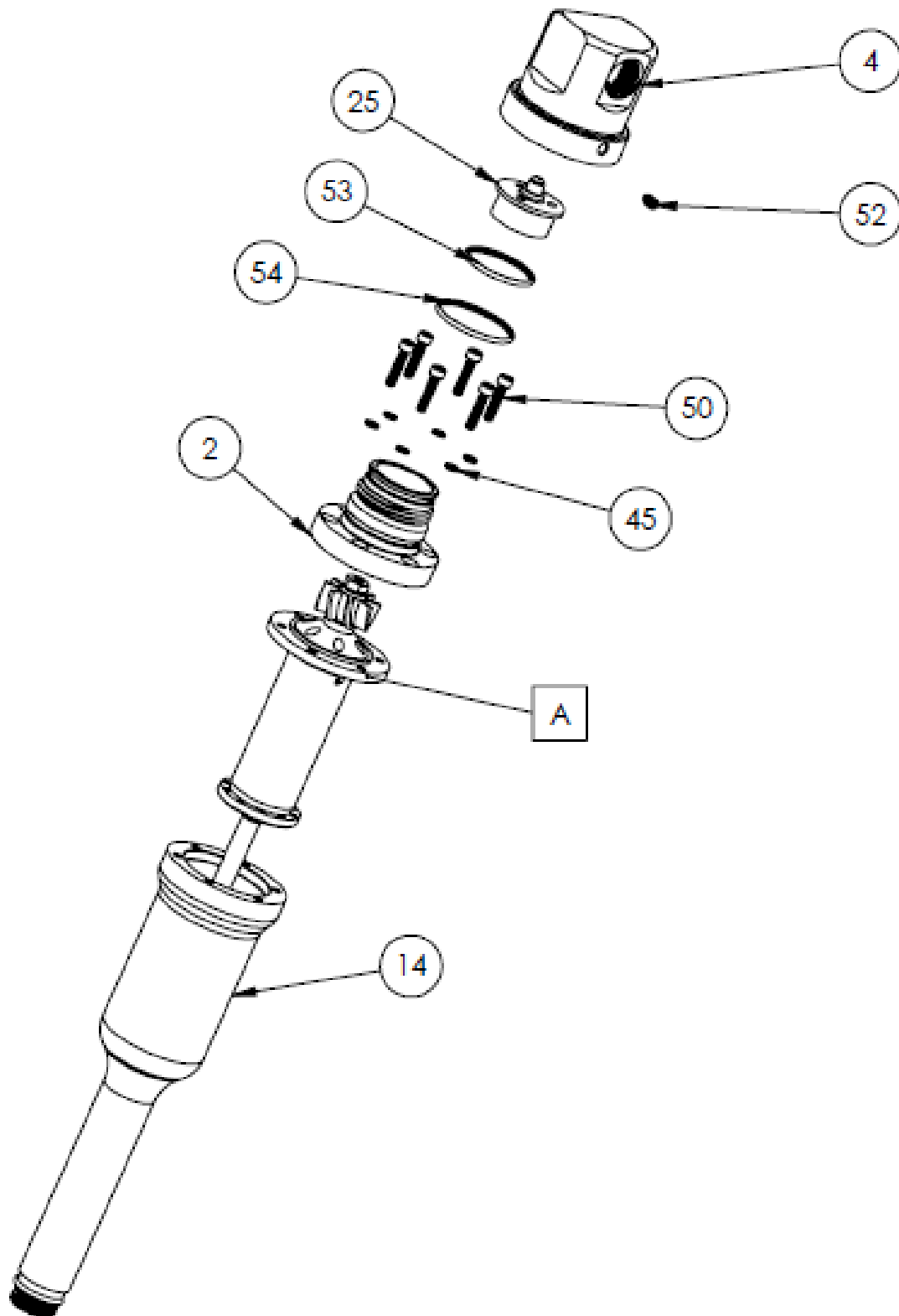


Drawing 6 – Input Shaft Lower Bearing Housing

A: Press Fit  
 B: Spring

The Drawing shows Alfa Laval GJ BB Tank Cleaning Machine

8.3 Assembly Drawing – 8



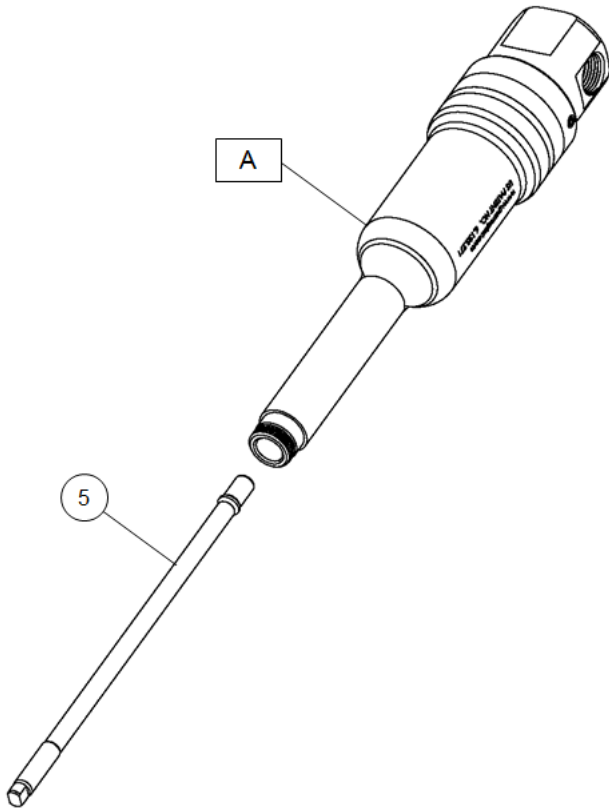
Drawing 8 – Geartrain Housing

A: Drawing 7

## 8 Parts List and Service Kits

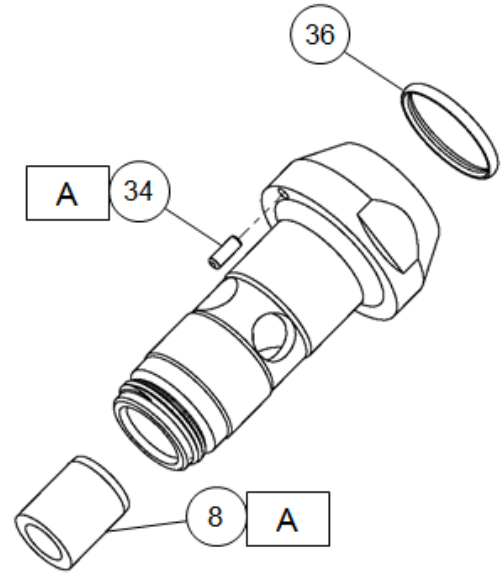
The Drawing shows Alfa Laval GJ BB Tank Cleaning Machine

### 8.4 Assembly Drawings – 9, 10, 11 & 12



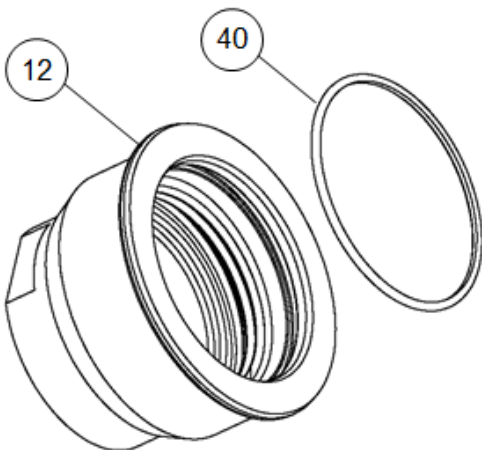
Drawing 9 – Output Shaft

A: Drawing 8

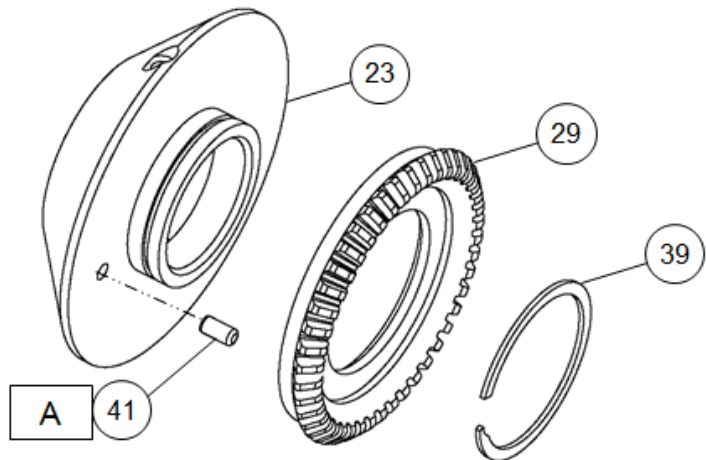


Drawing 10 – Stem

A: Press Fit



Drawing 11 – Stem Cap



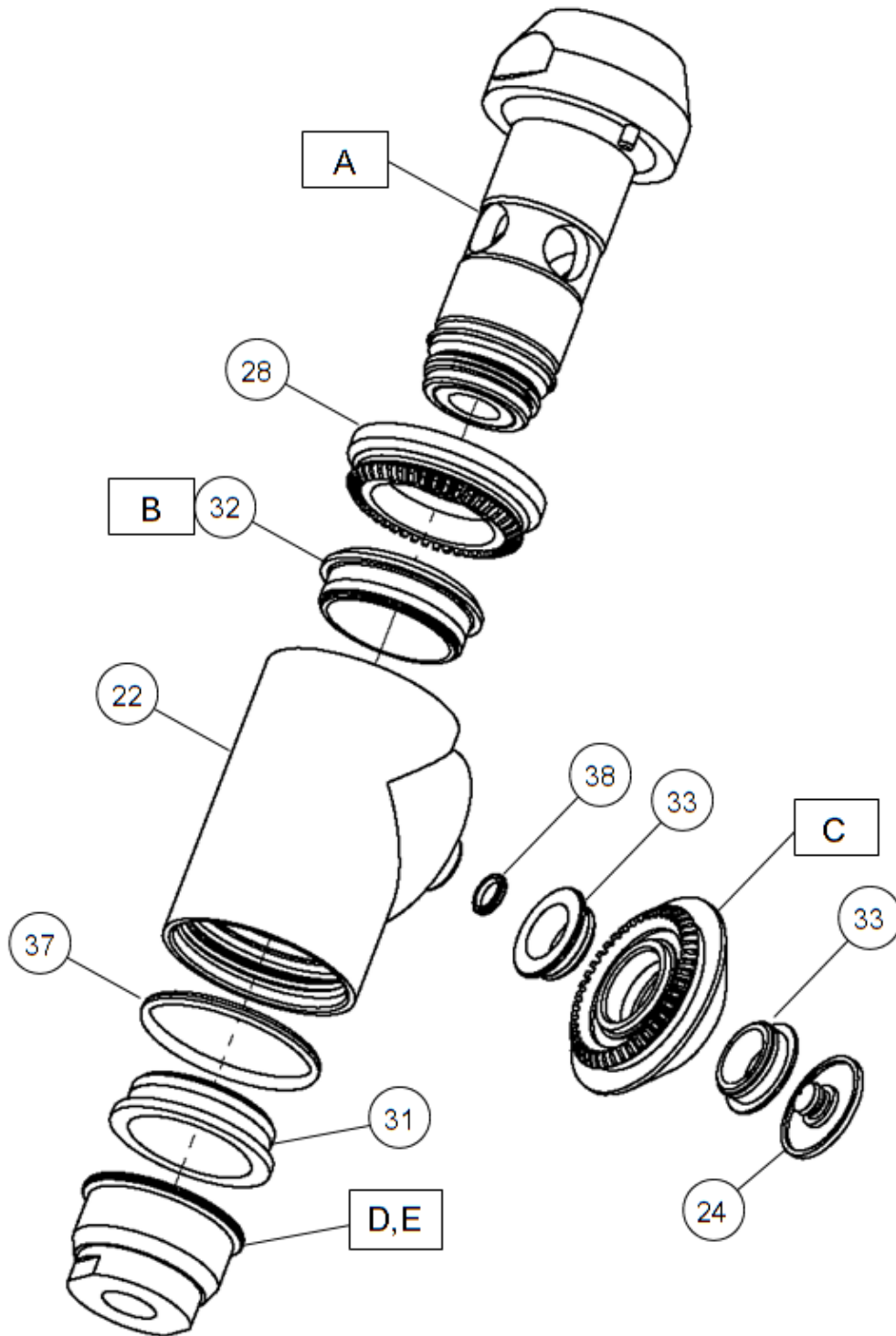
Drawing 12 – Nozzle Housing

A: Press Fit



The Drawing shows Alfa Laval GJ BB Tank Cleaning Machine

8.5 Assembly Drawings – 13 & 14

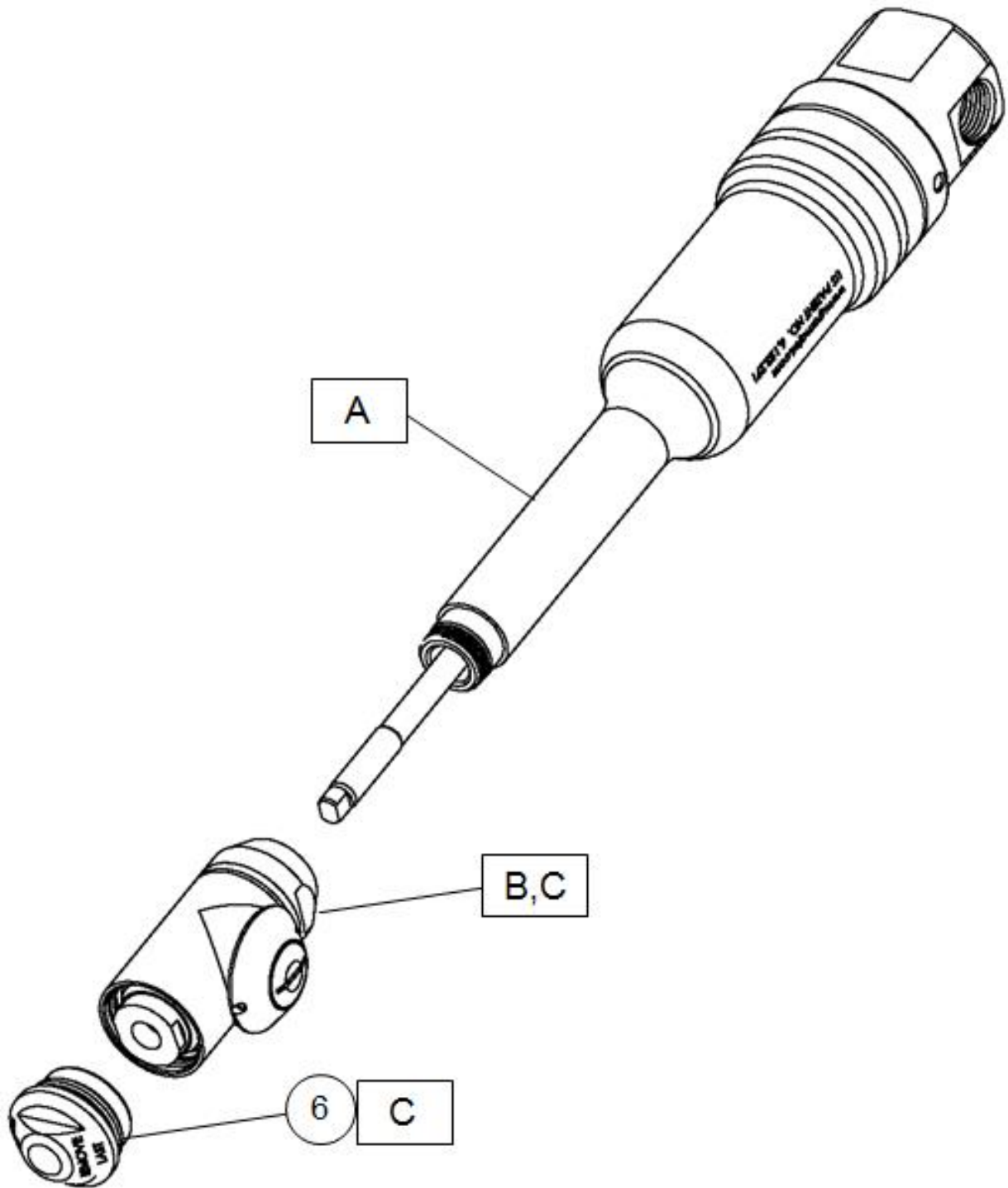


Drawing 13 – Tee Housing

- A: Drawing 10
- B: Large chamfer on flange
- C: Drawing 12
- D: Drawing 11
- E: Left-Handed Thread

## 8 Parts List and Service Kits

The Drawing shows Alfa Laval GJ BB Tank Cleaning Machine



Drawing 14 – Tee Housing

A: Drawing 9

B: Drawing 13

C: Left-Handed Thread

## 8.6 Parts List

Pos.	AL No.	Gamajet No.	Description	No.
1	9614631801	7-101	Gearbox	1
2	9614631901	7-102	Input Cap	1
3	9614632001	7-103	Stem	1
4	9614632301	7-108	Collar (Side Thread)	1
5	9614632501	7-112	Output Shaft	1
6	9614632601	7-114	Tee Housing Cap (Left-Handed Thread)	1
7	9614632801	7-123	Output Shaft Upper Seal Retaining Ring	1
8	9614632901	7-124	Output Shaft Lower Bearing	1
9	9614633101	7-125	Supply Tube	1
10	9614633201	7-128	Input Shaft Upper Bearing Housing	1
11	9614633301	7-129	Gearhead Lower Bearing Housing	1
12	9614633401	7-130	Stem Cap (Left-Handed Thread)	1
13	9614633501	7-136	Output Shaft Upper Seal Spacer	1
14	9614633701	7-144-L	Geartrain Housing	1
15	9614633801	7-145	Output Shaft Upper Bearing	1
16	9614633901	7-146	Output Cap	1
17	9614634001	7-150	Output Shaft Seal	1
18	9614634101	7-152	Output Cap Screw	6
19	9614634201	7-154	Output Cap Screw Lockwasher	6
20	9614634301	7-155	Supply Tube Set Screw	2
21	9614634401	7-158	Supply Tube Retaining Ring	1
22	9614634501	7-404	Tee Housing	1
23	9614699601	7-405	Nozzle Housing	1
24	9614634601	7-406	Nozzle Housing Cover Plate	1
25.1	9614632402	7-109-3.5	Stator 3.5	1
25.2	9614632403	7-109-4.0	Stator 4.0	1
25.3	9614632404	7-109-4.5	Stator 4.5	1
25.4	9614632405	7-109-5.0	Stator 5.0	1
25.5	9614632406	7-109-5.5	Stator 5.5	1
26	9614634701	7-411	Input Pinion	1
27	9614634801	7-413A	Gearhead	1
28	9614634901	7-417	Tee Housing Bevel Gear	1
29	9614635001	7-418	Nozzle Housing Bevel Gear	1
30	9614635101	7-422	Input Shaft	1
31	9614635401	7-431-L	Tee Housing Lower Bearing	1
32	9614635501	7-431-U	Tee Housing Upper Bearing	1
33	9614635801	7-433	Nozzle Housing Bearing	1
34	9614636001	7-440	Tee Housing Bevel Gear Pin	1
35	9614636201	7-447	Input Pinion Spacer	1
36	9614636601	7-456	Tube and Housing O-ring	2
37.1	9614637001	7-461	Tee Housing O-ring – EPDM	1
37.2	9614637101	7-461-K	Tee Housing O-ring – Kalrez	1
37.3	9614637201	7-461-V	Tee Housing O-ring - Viton	4
38	9614637301	7-463	Tee Housing Nose O-ring	1
39	9614637401	7-466	Nozzle Housing Bevel Gear Retaining Ring	1
40.1	9614686501	7-751-E	Stem Cap O-ring – EPDM	1
40.2	9614686502	7-751-K	Stem Cap O-ring – Kalrez	1
40.3	9614686503	7-751-V	Stem Cap O-ring - Viton	1
41	9614687201	7-758	Nozzle Housing Bevel Gear Pin	1
42	9614678201	8-544	Rotor Lockwasher	1
43	9614678301	8-545	Rotor Nut	1
44	9614678601	8-548	Carbide Bearing	3
45	9614678801	8-552	No. 6 Hi Collar Lockwasher	6
46		7-410	Rotor	1
47	9614614701	9-115	Gearbox Seal	1
48	9614614801	9-116	Input Shaft Lower Housing Seal	1
49	9614615801	9-127	Input Shaft Lower Bearing Housing	1
50	9614616901	9-138	Input Cap Screws	6
51	9614617001	9-139	Planetary Gearhead Screw	3
52	9614617101	9-140	Collar Set Screw	1

## 8 Parts List and Service Kits

Pos.	AL No.	Gamajet No.	Description	No.
53.1	9614617202	9-141-E	Collar Small O-ring	1
53.2	9614617201	9-141-V	Collar Small O-ring	1
53.3	9614617203	9-141-K	Collar Small O-ring	1
54.1	9614617302	9-142-E	Collar Large O-ring / Geartrain Housing Flange Outer O-ring - EPDM	2
54.2	9614617301	9-142-V	Collar Large O-ring / Geartrain Housing Flange Outer O-ring - Viton	2
54.3	9614617303	9-142-K	Collar Large O-ring / Geartrain Housing Flange Outer O-ring - Kalrez	2
55	9614625601	6-143	Planetary Gearhead Pin	1
56.1	9614627001	6-154-E	Output Cap O-ring – EPDM	1
56.2	9614627002	6-154-V	Output Cap O-ring – Viton	
56.3	9614627003	6-154-Z	Output Cap O-ring - Zalak	
57.1	9614661902	642-E	Input Shaft Lower Housing O-ring – EPDM	1
57.2	9614661901	642-V	Input Shaft Lower Housing O-ring – Viton	
57.3	9614661903	642-K	Input Shaft Lower Housing O-ring - Kalrez	
58	9614611201	E-867	Input Shaft Seal	1

## 8.7 Minor Service Kit

Article no: 9614638801 7HDBBEKIT ALFA LAVAL GJ BB KIT - EPDM				
Pos. No.	Part No.	Gamajet Part No.	Description	No.
8	9614632901	7124	OUTPUT SHAFT LOWER BEARING	1 pcs.
15	9614633801	7145	OUTPUT SHAFT UPPER BEARING	1 pcs.
17	9614634001	7150	OUTPUT SHAFT LOWER SEAL	1 pcs.
31	9614635401	7431L	LOWER TEE HOUSING LAB SEAL	1 pcs.
32	9614635501	7431U	UPPER TEE HOUSING LAB SEAL	1 pcs.
33	9614635801	7433	NOZZLE HOUSING LAB SEAL	2 pcs.
36	9614636601	7456	GHLBH SMALL O-RING EPDM	4 pcs.
37	9614637001	7461	STEM CAP O-RING EPDM	1 pcs.
38	9614637301	7463	NZL HSG COVER PLATE O-RING	1 pcs.
40	9614686501	7751E	GJ VII STEM CAP SMALL O-RING	1 pcs.
47	9614614701	9115	GEARBOX SEAL	1 pcs.
48	9614614801	9116	INPUT SHAFT LOWER HOUSING SEAL	1 pcs.
53	9614617202	9141E	COLLAR SMALL O-RING EPDM	1 pcs.
54	9614617302	9142E	COLLAR LARGE O-RING EPDM	2 pcs.
56	9614627001	6154E	COLLAR LARGE O-RING - EPDM	1 pcs.
57	9614661902	421170	642-E INSERT CAP ORING II	1 pcs.
58	9614611201	E867	GJ VIII GEARHEAD SEAL	1 pcs.

## 8 Parts List and Service Kits

### 8.8 Major Service Kit

Article no: 9614638901 7HDBBEMAJKIT ALFA LAVAL GJ BB MAJOR KIT - EPDM				
Pos. No.	Part No.	Gamajet Part No.	Description	No.
8	9614632901	7124	OUTPUT SHAFT LOWER BEARING	1 pcs.
15	9614633801	7145	OUTPUT SHAFT UPPER BEARING	1 pcs.
17	9614634001	7150	OUTPUT SHAFT LOWER SEAL	1 pcs.
31	9614635401	7431L	LOWER TEE HOUSING LAB SEAL	1 pcs.
32	9614635501	7431U	UPPER TEE HOUSING LAB SEAL	1 pcs.
33	9614635801	7433	NOZZLE HOUSING LAB SEAL	2 pcs.
36	9614636601	7456	GHLBH SMALL O-RING EPDM	4 pcs.
37	9614637001	7461	STEM CAP O-RING EPDM	1 pcs.
38	9614637301	7463	NZL HSG COVER PLATE O-RING	1 pcs.
40	9614686501	7751E	GJ VII STEM CAP SMALL O-RING	1 pcs.
47	9614614701	9115	GEARBOX SEAL	1 pcs.
48	9614614801	9116	INPUT SHAFT LOWER HOUSING SEAL	1 pcs.
53	9614617202	9141E	COLLAR SMALL O-RING EPDM	1 pcs.
54	9614617302	9142E	COLLAR LARGE O-RING EPDM	2 pcs.
56	9614627001	6154E	COLLAR LARGE O-RING - EPDM	1 pcs.
57	9614661902	421170	642-E INSERT CAP ORING II	1 pcs.
58	9614611201	E867	GJ VIII GEARHEAD SEAL	1 pcs.
5	9614632501	7112	OUTPUT SHAFT	1 pcs.
27	9614634801	7413A	BCM PLANETARY GEARHEAD	1 pcs.
30	9614635101	7422	BCM INPUT SHAFT	1 pcs.
8	9614632901	7124	OUTPUT SHAFT LOWER BEARING	1 pcs.

**How to contact Alfa Laval Tank Equipment:**

For further information, please feel free to contact:

Alfa Laval Tank Equipment

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contact details for all countries are continually updated on our websites.

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