



Instruction Manual

Gunclean Toftejorg T-82

IM-TE91A052-EN1
June, 2005

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Introduction

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

It is in your own interest to get the best and most economical performance from your tank cleaning machine. Neglect of maintenance means poor performance, unscheduled stoppages, shorter life and expense. Good maintenance means good performance; no unscheduled stoppages and better total economy.

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

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

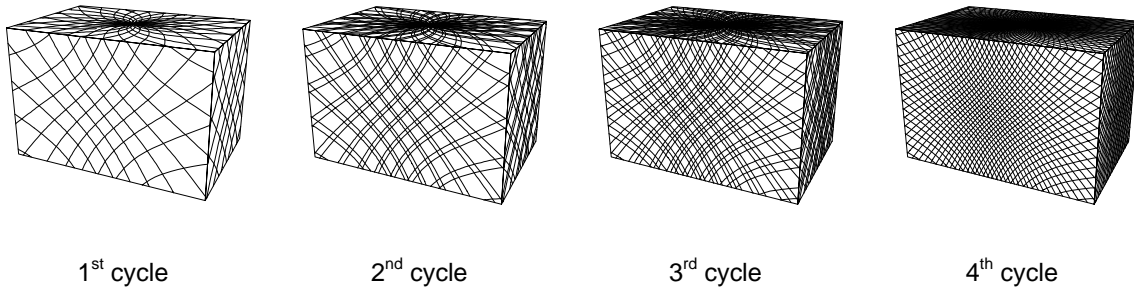
General Description

The Gunclean Toftejorg T-82 is a media driven tank cleaning machine. The internal mechanical parts are isolated by seals and lubricated by pre-packed grease.

Functioning

The flow of the cleaning fluid into the machine passes through a turbine, which is set into rotation. The impeller rotation is through a gearbox transformed into a combined horizontal rotation of the machine body and a vertical rotation of the nozzles.

The combined motion of the machine body and the nozzles ensures a fully indexed tank cleaning coverage. After $11\frac{1}{4}$ revolutions of Hub with nozzles ($10\frac{3}{4}$ revolutions of the machine body), one coarse cleaning pattern is laid out on the tank surface. During the following rounds, this pattern is repeated 3 times, each of which is displaced $\frac{1}{4}$ of the mesh in the pattern. After a total of 45 revolutions of the Hub with nozzles (43 revolutions of the machine body), a complete cleaning pattern has been laid out, and the first pattern is repeated.



The speed of rotation of the impeller depends on the flow rate through the machine, which in turn primarily depends on the nozzle diameter chosen. The higher the flow rate is, the higher the speed of rotation will be. For a given flow rate, the RPM of the machine can be controlled by installing a stator or no stator in front of the Impeller and by the gear configuration. No stator (0%) and E-gearing will give the slowest rotation and longest jet throw length for a given flow rate.

General description (continued)

Standard configurations

Connection	Turbine/Inlet Guide	Nozzles (mm) (3/4" thread conn.)	Article/Ref. No.
Without flange	50%	2xø7	TE21F032
	100%	2xø8	TE21F042
		2xø9	TE21F044
0 %	2xø10	TE21F050	

Connection	Turbine/Inlet Guide	Nozzles (mm) (3/4" thread conn.)	Article/Ref. No.
Fixed with 127mm o.d. Flange	50%	2xø7	TE21F002
	100%	2xø8	TE21F012
		2xø9	TE21F014
0%	2xø10	TE21F020	

Connection	Turbine/Inlet Guide	Nozzles (mm) (3/4" thread conn.)	Article/Ref. No.
Portable with 1½" BSP Nipple	50%	2xø7	TE21F202
	100%	2xø8	TE21F212
		2xø9	TE21F214
0 %	2xø10	TE21F230	

Connection	Turbine/Inlet Guide	Nozzles (mm) (3/4" thread conn.)	Article/Ref. No.
Portable with 1½" NPT Nipple	50%	2xø7	TE21F262
	100%	2xø8	TE21F272
		2xø9	TE21F274
0 %	2xø10	TE21F280	

The hub of the machine is equipped with a clutch in the hub, which gives the possibility of rotation by hand the nozzles, when the machine is to be lifted out through a tank opening.

Standard Options

Machines with nozzle extensions for longer throw length can be supplied as an option. Same article no. with index no. -22. e.g. TE21F002-22.

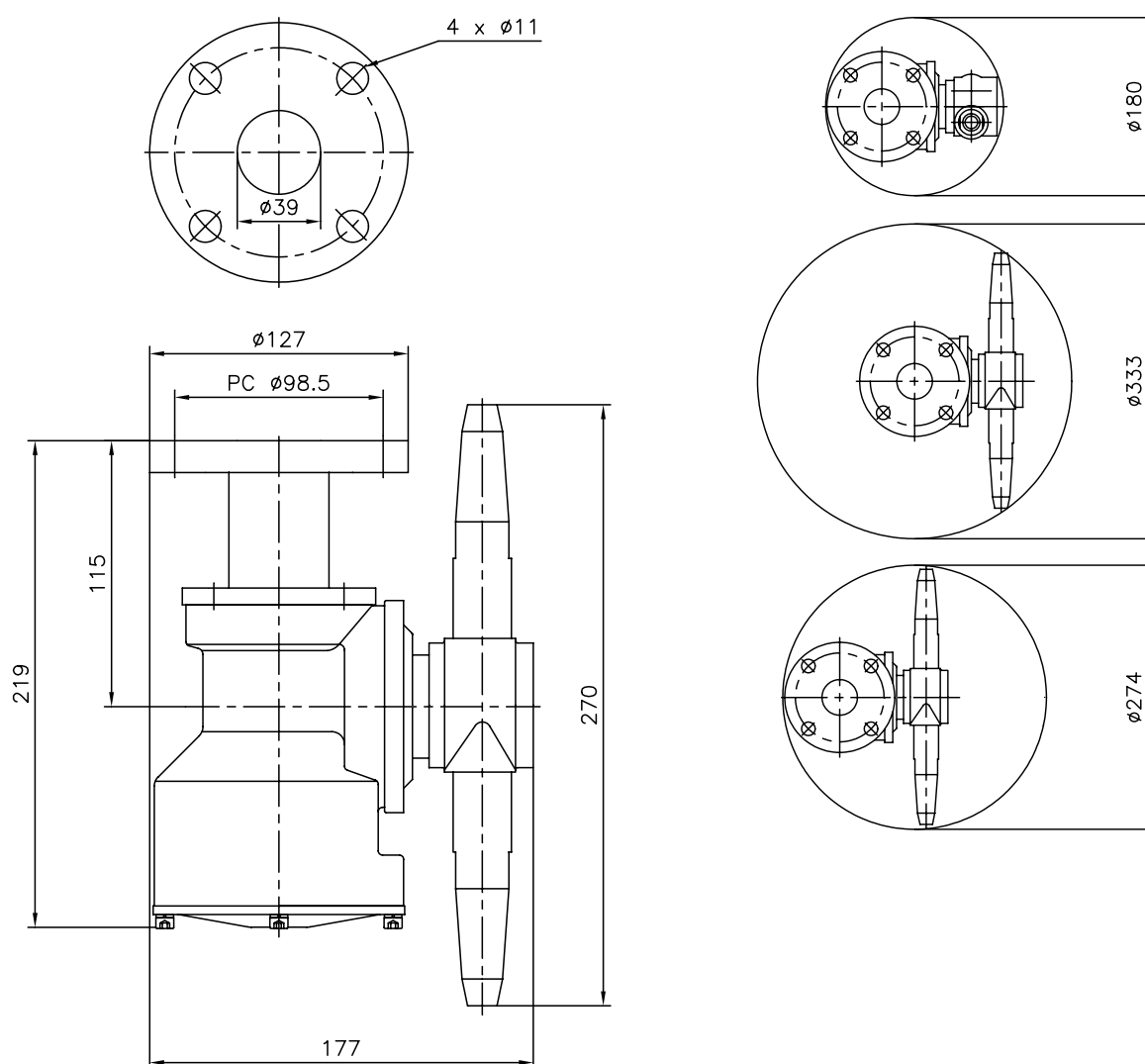
Machines with e-gear and nozzle extension: Same article no. with index no. -62, e.g. TE21F002-62.

Technical data

For Gunclean Toftejorg T-82 Fixed

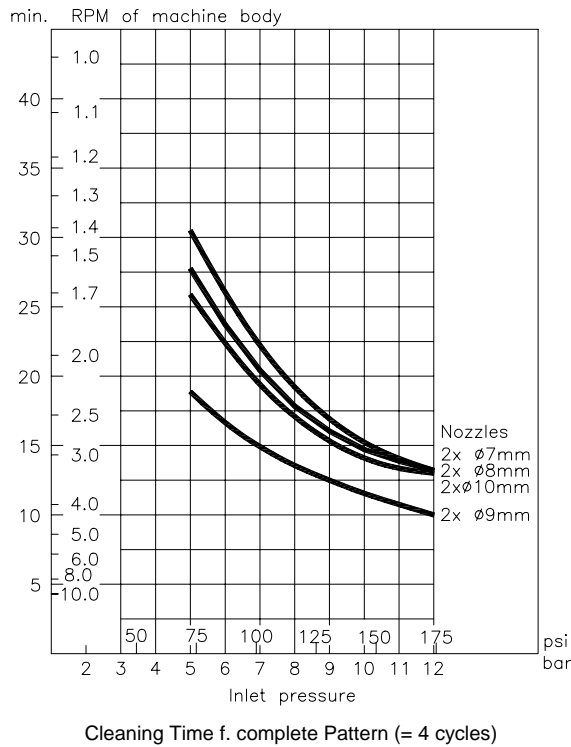
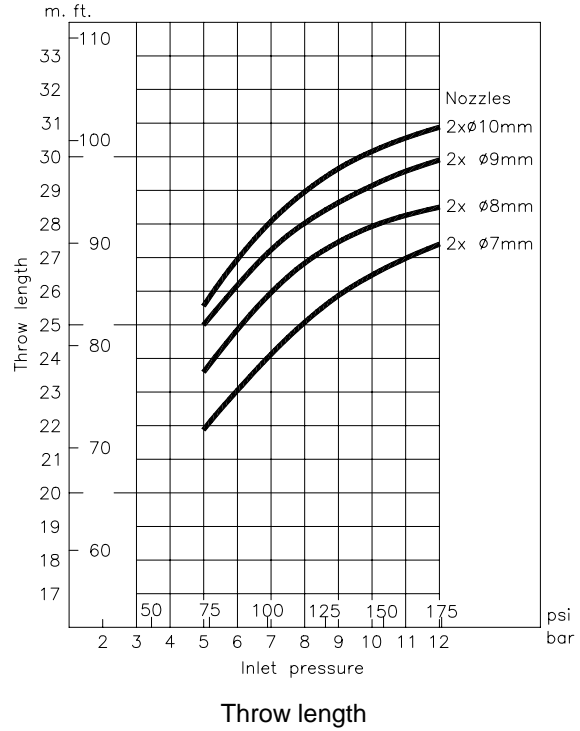
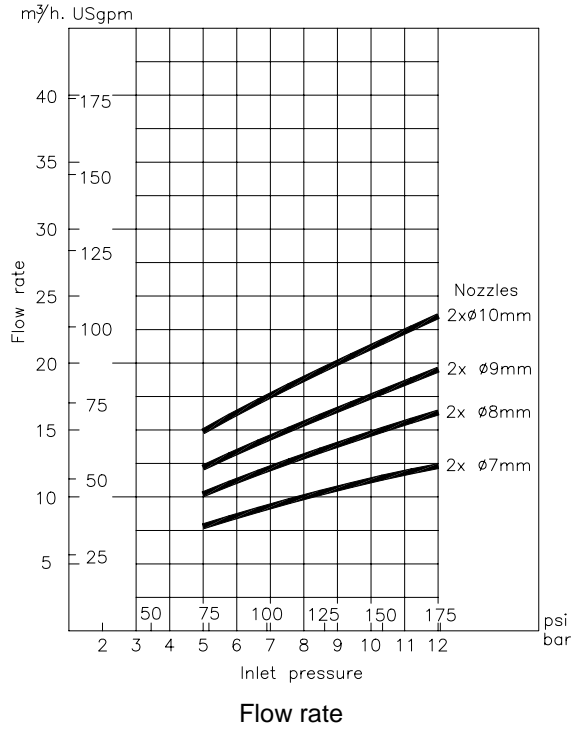
Weight of machine	:	7.0 kgs (15,4 lb)
Working pressure	:	5-12 bar (75-175 psi)
Recommended inlet pressure	:	5-10 bar (75-150 psi)
Working temperature max.	:	78° (173° F)
Materials	:	Stainless steel, polymer, elastomer, carbon

Principal dimensions in mm



Technical data (continued)

For Gunclean Toftejorg T-82 Fixed



Note: Throw lengths are measured as max. horizontal throw length at static condition.

Vertical throw length upwards is approx. 1/3 less.

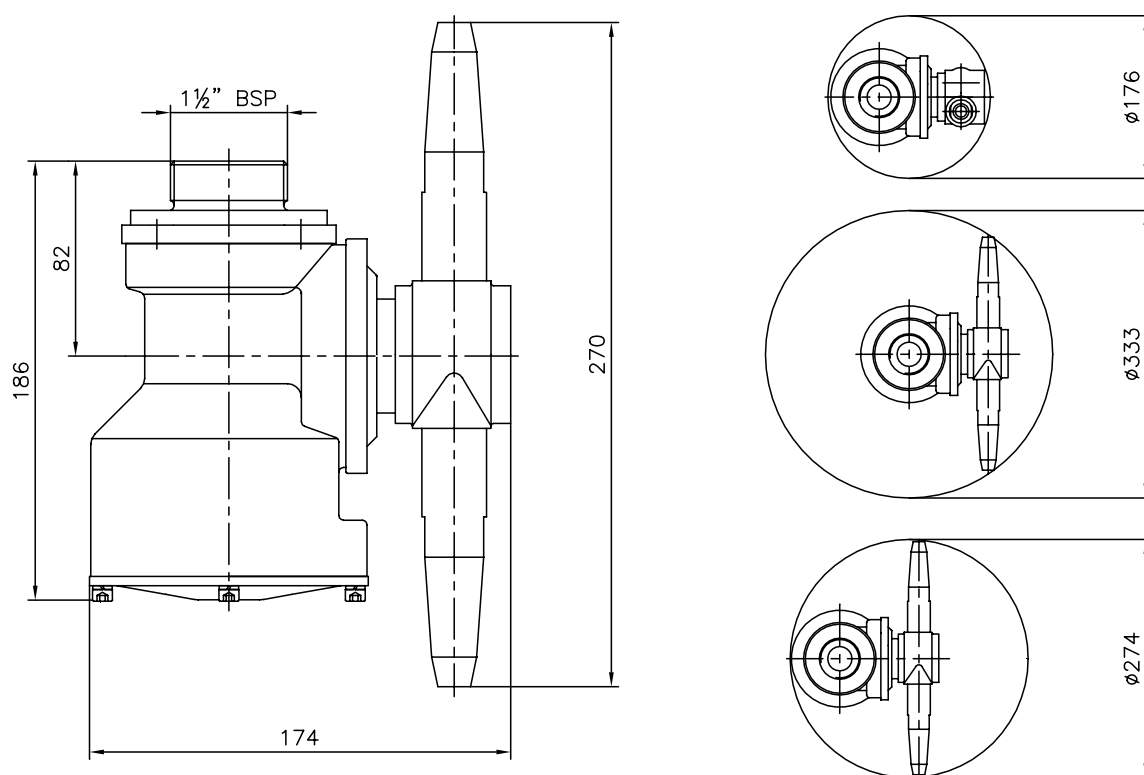
Effective throw length varies depending on jet transverse speed over surface, substance to be removed, cleaning procedure and agent. The inlet pressure has been taken immediately before the machine inlet. In order to achieve the performance indicated in the curves, the pressure drop in the supply lines between pump and machine must be taken into consideration.

Technical data (continued)

For Gunclean Toftejorg T-82 Portable

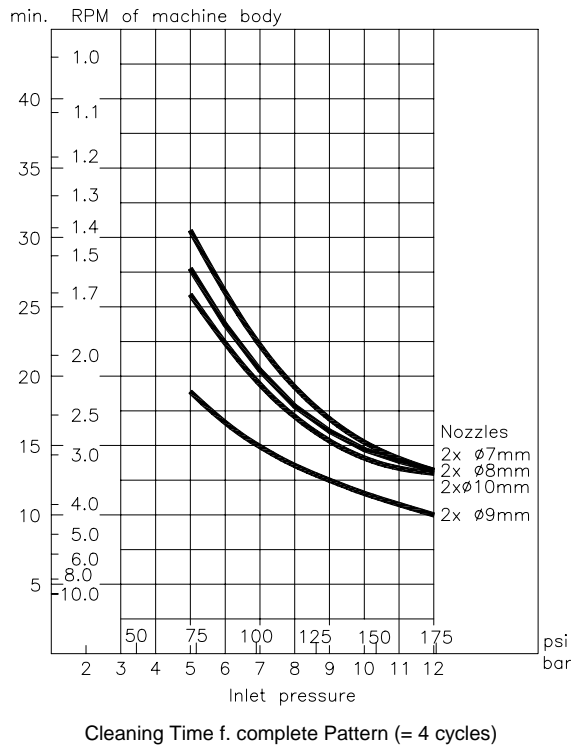
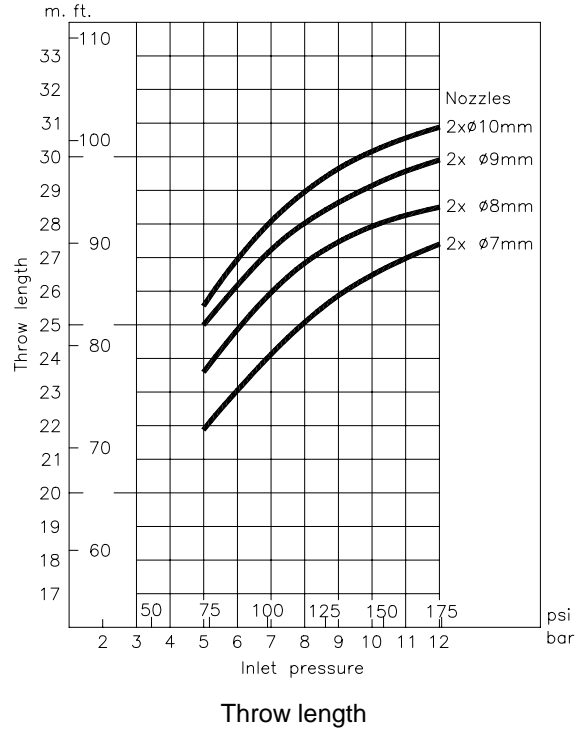
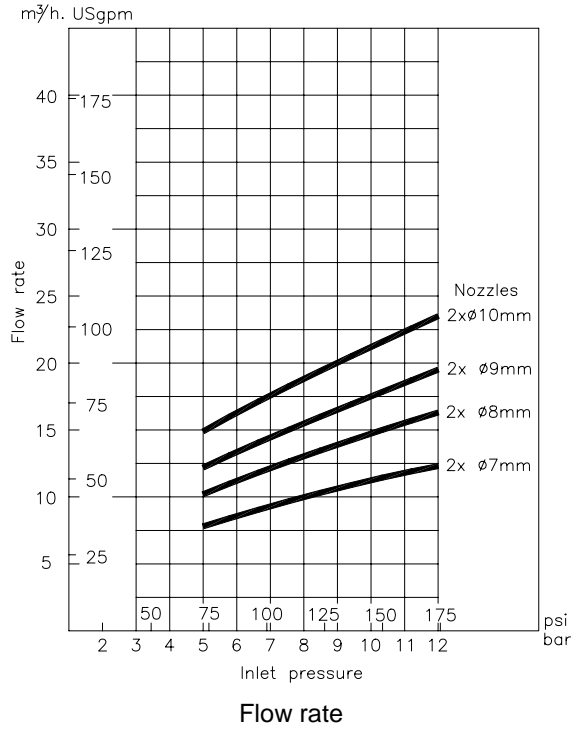
Weight of machine	:	7.0 kgs (15,4 lb)
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Working temperature max.	:	78° (173° F)
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Principal dimensions in mm



Technical data (continued)

For Gunclean Toftejorg T-82 Portable



Note: Throw lengths are measured as max. horizontal throw length at static condition.

Vertical throw length upwards is approx. 1/3 less.

Effective throw length varies depending on jet transverse speed over surface, substance to be removed, cleaning procedure and agent. The inlet pressure has been taken immediately before the machine inlet. In order to achieve the performance indicated in the curves, the pressure drop in the supply lines between pump and machine must be taken into consideration.

Installation and Normal Operation

General Installation Instructions

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

For fixed machines it is recommended to secure bolted connection between machine and down pipe against loosening to vibrations. Use locking wire, naps or equivalent for the actual application.

Warning:



If the machine is used in potential explosive atmospheres, tapes or joint sealing compounds which are electrical insulators must not be used on threads or joints. In addition, connecting pipe work must be electrically conductive and earthed to the tank structure.

This is essential to avoid the build-up of static electricity on the machine.

Note: The machine shall be installed in accordance with national regulations for safety and other relevant regulations and standards.

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

In EU-countries the complete system must fulfil the EU-machine directive and shall be CE-marked.

It is recommended to mount bumpers on portable tank cleaning machines.

The machine as delivered has been tested at the factory before shipping. For transportation reasons, the nozzles have been removed prior to shipment. Before installation and use, the nozzles should be attached and secured appropriately for the application intended.

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

Installation and Normal Operation (continued)

Normal Operation

Cleaning Media

Use only media compatible with stainless steel, elastomer, polymer and carbon. Please note that some of the polymer parts are in PEEK, which is not resistant to concentrated sulfuric acid. Normal detergents, moderate solutions of acids and chemicals at elevated temperatures, as well as hypochlorids should be avoided. If you are in doubt, contact your local Alfa Laval Tank Equipment sales office.

After Use Cleaning

After use flush the machine with fresh water. Cleaning solutions should never be allowed to dry or set-up in the system due to possible "salting out" or "scaling" of the cleaning ingredient. If cleaning media contains volatile chloride solvents, it is recommended not to flush with water after use, in case this can create hydrochloric acid.

Pressure

Avoid Hydraulic shocks. Put on pressure gradually. Do not exceed 12 bar inlet pressure. Recommended inlet pressure appears from Technical Data (page 8-11). High pressure in combination with high flow rate will increase consumption of wear parts.

Maintenance and repair

Preventive Maintenance Guidelines and Service Kits

By using Alfa Laval Tank Equipment Preventive Maintenance Guidelines and Service Kits you are enabled to ensure the availability of your equipment at all times. You are able to plan your operating budget and your downtime. The risk of breakdowns due to component failure is virtually eliminated and in the long term your operating costs are reduced.

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

Maintenance intervals and Service Kits selection

Alfa Laval Service Kits for Tank Cleaning Machine type, T-82 are available in two levels: Minor Service and Major Service.

Minor Service kit is recommended to be replaced every 250 working hours or 2 ½ years, whichever comes first.

TE55J000 Minor Service Kit T-82 contains:

Pos.	Qty x P/n	Description
5	1 x TE51T153	Mechanical Seal
6	2 x TE825	O-ring
8	1 x TE21F507	Bushing
11	3 x TE21A585	Collar Bush
12	2 x TE21A367	Worm Wheel
15	1 x TE21D563	Packing
25	1 x TE21B549	Lip Seal
30	2 x TE829	Ball Bearing
35	1 x TE807	O-ring
37	3 x TE651	Locking Wire

Major Service kit is recommended to be replaced every 1000 working hours or 10 years, whichever comes first.

TE55J010 Major Service Kit T-82 contains:

Pos	Qty x P/n	Description
7	1 x TE21F510	Turbine Shaft
9.1	1 x TE826-1	Ball race
19.1	1 x TE826-1	Ball race
21	1 x TE826-1	Ball race
33	1 x TE826-1	Ball race
23	1 x TE448	Cotter Pin
27	2 x TE21A380	Ball retainer with balls
29	1 x TE828Z	Horizontal Shaft
34	1 x TE827G2	Main Collar, Lower
36	1 x TE827G1	Main Collar, Upper
-	1 x TE55J000	Service Kit Minor T-82

Maintenance and repair (continued)

All Major Service kits includes the corresponding Minor Service Kits parts. Each kit contains a maintenance guide.

The above recommended preventive maintenance is based on one machine working under average conditions. However, a system that has a rough and dirty job to do, will need more frequent attention than one working under ideal conditions. We trust that you will adjust your maintenance programme accordingly.

General recommendations

- Always read the instruction and maintenance manuals before undertaking the service.
- Some kits contain a small quantity of parts not needed for each tank cleaning machine model. These are not included in the price and may be disregarded.
- Always replace all parts included in the Service Kit.

Additional maintenance recommendations

Good maintenance is careful and regular attention!

Always use only proper tools. Use standard tool kit. Never force, hammer or pry components together or apart. Always perform all assembly/disassembly steps in the order described in this manual.

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

1. Clean the machine with White spirit/kerosene or similar.
2. Disassemble machine as described on the following pages.
3. Clean material build-up and deposits from internal parts with Scotchbrite, S-Ultrafine, eventually chemical cleaner and fine abrasive cloth.
4. Replenish Lubricant: The quantity of grease required to reach Normal Filling is 0.75 l, whereby the gear frame is just covered. The quality of lubricant is grease of grade 2. (The machine is delivered lubricated with grease Shell Alvania WR 2).
5. Assemble machines as described in the following pages.
6. Check that the machine is in operating condition by inserting 3/16" hex Screwdriver (tool No. TE134A) in screw in top of Turbine shaft and easily turn Turbine shaft clockwise. If any resistance is recognized, the machine should be disassembled to localize the cause.

Service Card

For your registration of maintenance carried out, fill in service card which you will find at the back of this manual.

Maintenance and repair (continued)

Top Assembly

Disassembly

1. Remove Screw (pos. 17). Loosen with Key (tool No. TE134) and unscrew with Screwdriver (tool No. TE134A).
2. Lift off Nipple (pos. 1).
3. Remove Guide/Guide ring (pos. 2). The Guide has a groove in the outer diameter. The Guide is easily lifted out of the Stem by means of two ordinary Screwdrivers inserted into the groove.
4. Remove Screw (pos. 17), Spring washer (pos. 18) and Washer (pos. 14). To secure Impeller against rotation, insert carefully Screwdriver (tool No. TE134A), through Impeller (pos. 4) into a hole in the Stem.
5. Pull off Impeller (pos. 4) by means of two Screwdrivers (tool No. TE134A), inserted in the two holes on side of Impeller.
6. Carefully draw out the "rotating" part (including Spring and O-ring) of Mechanical Seal (5).

Note:: Take care not to damage the Sliding faces on Mechanical seal

Reassembly

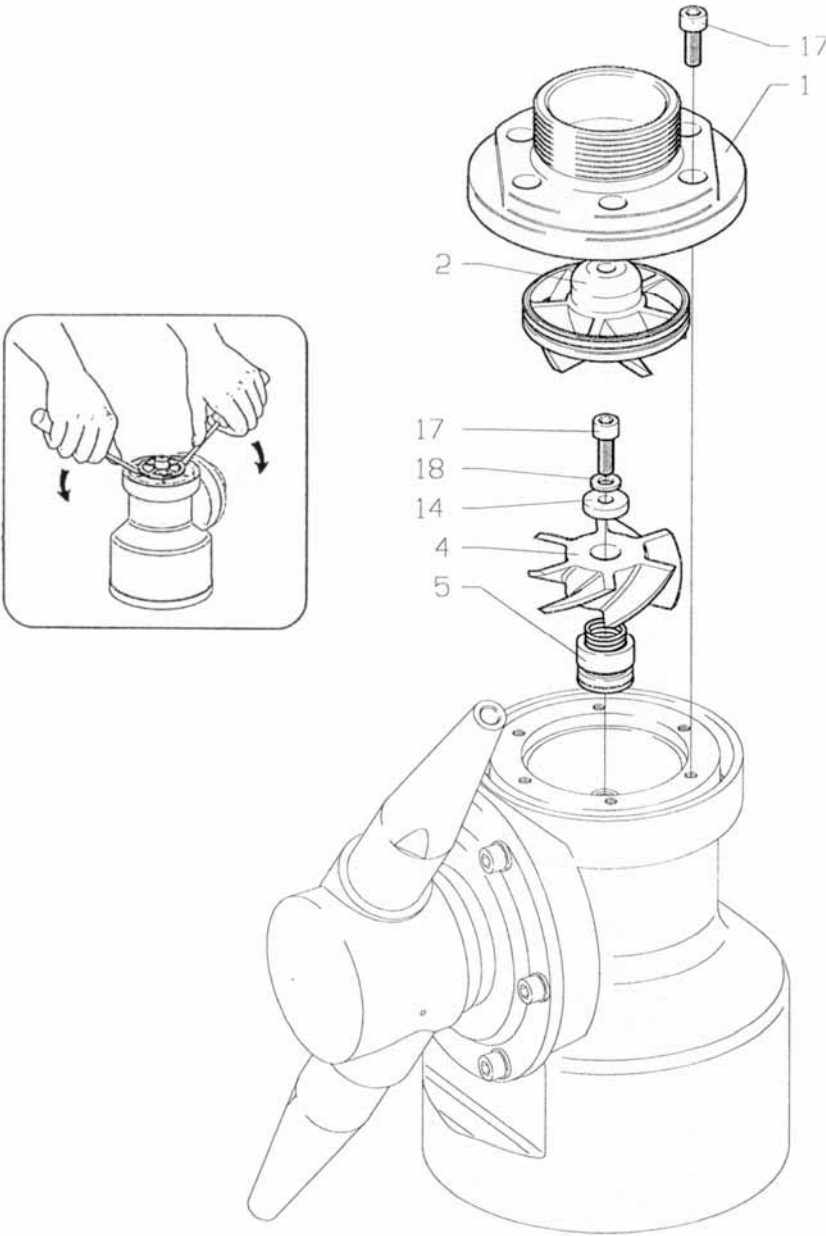
1. Carefully put on the stationary seat of Mechanical seal (including O-ring) into the house. When inserting the stationary seats, be careful to apply even pressure and use only water or alcohol to reduce O-ring friction.

Note:: Absolute cleanliness and care is essential when fitting mechanical seals. Dirt and damage to sliding faces and O-rings jeopardise the function of a seal. Never put lubricant on the sliding faces – mount only in a completely dry, dust free and clean state.

2. Reinstall Impeller (pos. 4). Make sure that Impeller is correctly rotated to be pushed onto Turbine shaft. Do not try to hammer Impeller in position, as this will damage Ball bearing under the Turbine shaft.
3. Mount Washer (pos. 14), Spring washer (pos. 18) and Screw (pos. 17) and tighten. To secure Impeller against rotation insert carefully Screwdriver (tool No. TE134A) through Impeller (pos. 4) into a hole in the Stem.
4. Reinstall Guide/Guide ring (pos. 2).
5. Mount Nipple (pos. 1). Make sure that it is in correct position over Guide/Guide ring (pos. 2). Rotate Nipple to align holes in Nipple and Stem.
6. Mount Screws (pos. 17) with Screwdriver (tool No. TE134A). Tighten with Key (tool No. TE134).

Maintenance and repair (continued)

Top Assembly



Maintenance and repair (continued)

Bottom Assembly

Disassembly

1. Turn machine upside down.
2. Remove Screws (pos. 17) and Spring washer (pos. 18) from Bottom cover (pos. 32).
3. Remove Bottom cover (pos. 32).
4. Remove Screws (pos. 17) in Bearing cover (pos. 16). Carefully push out Turbine shaft (pos. 7) from opposite end. Do not try to hammer out Turbine shaft, since this can damage Ball bearing.
5. Remove Screws (pos. 17) and Spring washers (pos. 18) along the circumference of Gear frame (pos. 31). Turn Gear frame clockwise about 1 cm ($\frac{1}{2}$ "). Draw out Gear Subassembly (holes in Gear frame are excellent for holding Gear Subassembly).

Reassembly

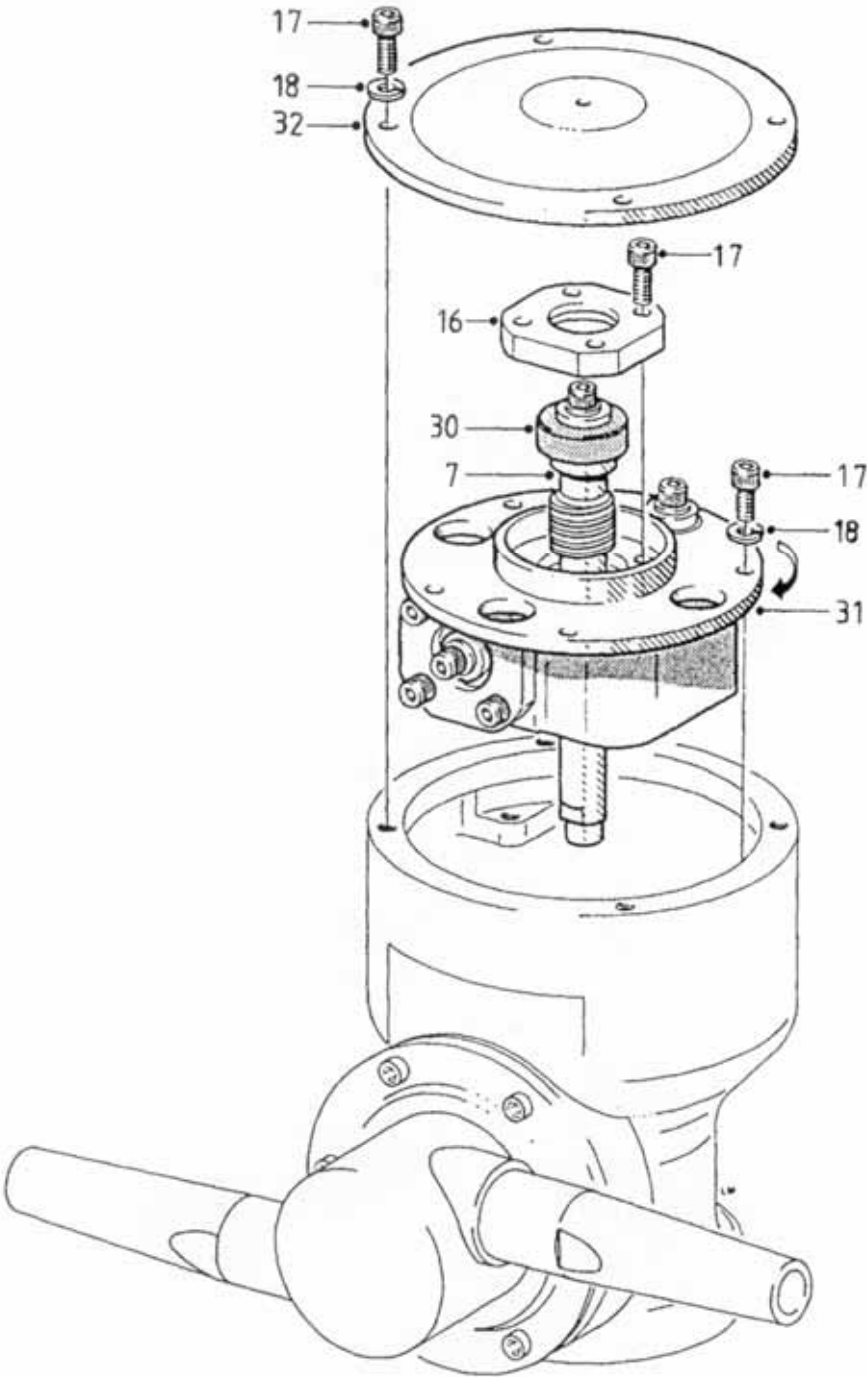
1. Reinsert Gear subassembly in bottom of machine body. Turn Gear Frame (pos. 31) to align holes in Gear frame and 3/16" threads in Body. Mount Spring washers (pos. 18) and Screws (pos. 17) along circumference of Gear frame (pos. 31). Tighten screws crosswise.

Note:: To secure meshing between Gear wheel (pos. 9) and Pinion (pos. 10), it might be necessary to rotate slightly either the whole Gear Subassembly or the Gear wheel.

2. Reinsert Turbine shaft (pos. 7) with Ball bearing carefully through Gear wheel (pos. 9). Push carefully Ball bearing (pos. 30) into position. Mount Bearing cover (pos. 16) with Screws (pos. 17). Tighten crosswise.
3. Pump grease (Shell Alvania WR 2 or equivalent) into the three access holes in the gear frame (pos. 31). Ensure that the grease is clearly visible the whole way around the edge of the gear frame.
4. Place Bottom cover (pos. 32).
5. Mount Spring washers (pos. 18) and Screws (pos. 17) and tighten crosswise.

Maintenance and repair (continued)

Bottom Assembly



Maintenance and repair (continued)

Hub Subassembly

Disassembly

1. Remove Nozzles (pos. 22). Nozzles are untightened with a wrench on the faces of the nozzles.
2. Remove Screws (pos. 17) and Spring washers (pos. 18) from Hub cover (pos. 20).
3. Draw out Hub Subassembly. If Hub cover (pos. 20) clings into Body, knock carefully with plastic hammer on outer diameter to loosen.
4. Remove Cotter pin (pos. 23). Unscrew contra clockwise Hub conical part (pos. 24) freeing Hub cover (pos. 20), Ball retainer w. balls (pos. 27) and Bevel gear (pos. 19). To unscrew Hub conical part (pos. 24), Hub nozzle part (pos. 26) is held in a vice. Caliper (tool No. TE369) is used for the unscrewing using the two holes in end face of Hub conical part.

Note: Left-hand thread

If Ball races in Hub cover (pos. 21) and in Bevel gear (pos. 19.1) are extremely worn, they should be replaced as well as the Ball retainer with balls (pos. 27). How to replace Ball races see page 28.

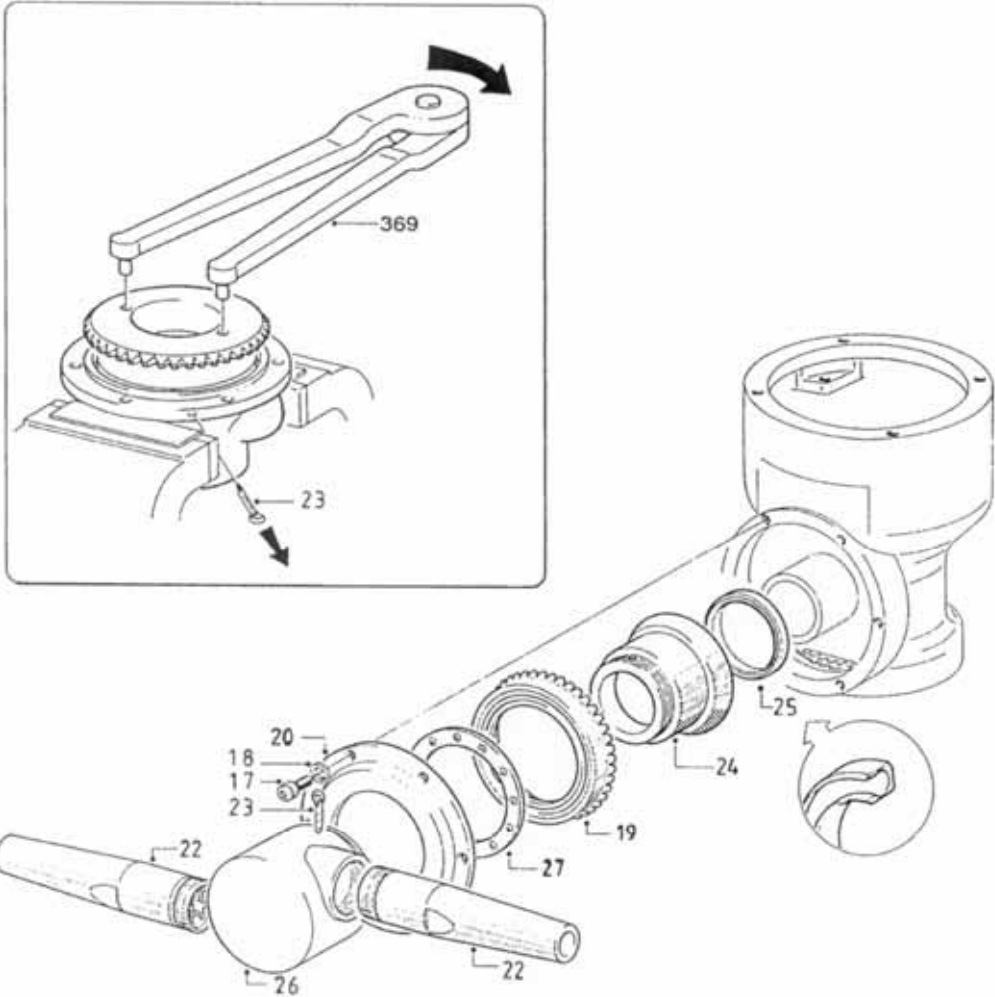
5. Remove Lipseal (pos. 25) and check for wear. If the lipseal is worn, it has to be replaced.

Reassembly

1. Mount the Lipseals (pos. 25).
2. Mount Bevel gear (pos. 19), Ball retainer with balls (pos. 27) and Hub cover (pos. 20) on Hub conical part (pos. 24). Screw on Hub nozzle part (pos. 26). Note: Left-handed thread. To tighten, place Hub nozzle part in a vice and use Caliper (tool No. TE369). Tighten until holes are aligned to pass Cotter pin (pos. 23). Insert Cotter pin and split (preferably new Cotter pin).
3. Slide on Hub Subassembly, fit Hub cover (pos. 20) into Body and mount Spring washers (pos. 18) and Screws (pos. 17).
4. Screw on Nozzles (pos. 22) and tighten with wrench.

Maintenance and repair (continued)

Hub Assembly



Maintenance and repair (continued)

Stem Subassembly

Disassembly

1. Place machine in upside-down position. Remove and discard the grease. Clean internal surfaces to allow inspection.
2. Remove Screws (pos. 17) in Gear wheel (pos. 10). To prevent rotation of Stem (pos. 3) mount two 3/16" screws in two holes opposite one another in BIG end of Stem. Place Stem in a vice held by the heads of the two screws.
3. Draw out Gear wheel with ball race (pos. 10) and Ball retainer with balls (pos. 29).
4. Push out Stem (pos. 3).
5. If worn, press out Main bush (pos. 8).

If Ball races in Body (pos. 26.3) and on Gearwheel (pos. 9.1) are extremely worn they should be replaced together with Ball retainer with balls (pos. 29). How to replace Ball races see page 28.

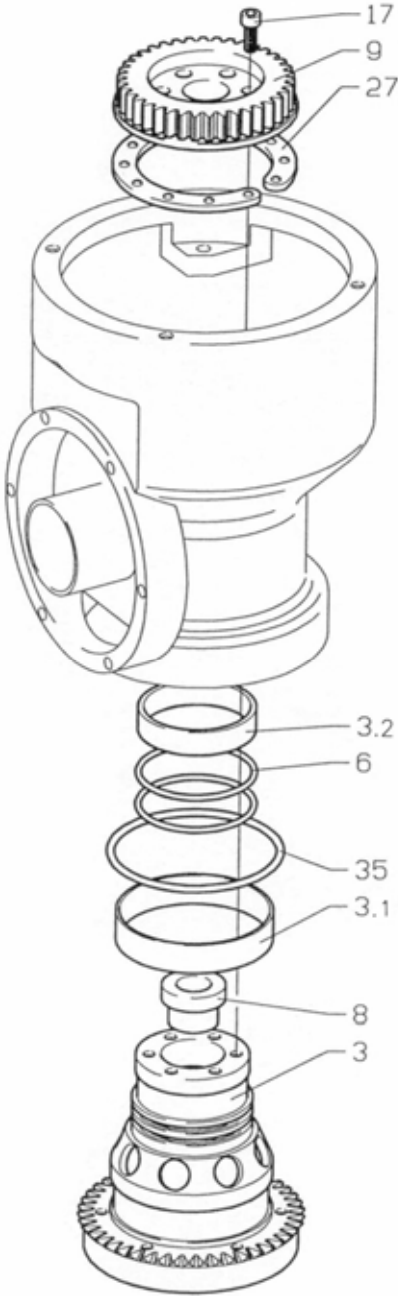
If Liners on Stem are extremely worn, they can be replaced. This part requires that a precise procedure is followed to accomplish installation. It is suggested that an authorised Alfa Laval Tank Equipment Service Centre perform the replacement if necessary. However, should the customers insist that they perform the installation, please contact your nearest Service Centre for a copy of the procedure.

Reassembly

1. Replace O-ring seals (pos. 35) located in the upper collar, and (pos. 6) on Stem (pos. 3) lubricate the seals slightly with the recommended grease.
2. If replaced, press Bush (pos. 8) into Stem (pos. 3).
3. Push Stem into Body. Turn machine upside-down.
4. Place Ball retainer with balls (pos. 29) and Gearwheel (pos. 10) into Body on Ball race. Rotate gearwheel to check free rotation. Mount gearwheel with Screws (pos. 17) and tighten crosswise. To prevent rotation of Stem (pos. 3) mount two 3/16" screws in two holes opposite one another in BIG end of Stem. Place Stem in a vice held by the heads of the two screws.

Maintenance and repair (continued)

Stem Subassembly



Maintenance and repair (continued)

Gear Subassembly

Disassembly

1. To make a backstop, remount Turbine shaft (pos. 7) with Slide bearing (pos. 30) into Gear frame (pos. 31). Mount Bearing cover (pos. 16) with Screws (pos. 17).
2. Hold Turbine shaft (pos. 7) against 1st stage Worm wheel (pos. 12) with one hand and loosen Screws (pos. 17) in Pinion (pos. 10) and Horizontal shaft (pos. 29) with the other hand.
3. Remove Screws (pos. 17) in Bearing cover (pos. 16) and take out Turbine shaft (pos. 7).
4. Draw out Horizontal shaft (pos. 29) and 1st stage Worm wheel (pos. 12) after removal of Screw (pos. 17), Spring washer (pos. 18) and Washer (pos. 14).
5. Draw out Pinion (pos. 10) and 2nd stage Worm wheel (pos. 12), also freeing Journal (pos. 13) after removal of Screw (pos. 17), Spring washer (pos. 18) and Washer (pos. 14).
6. Remove Bearing cover (pos. 16) and Ball bearing (pos. 30) after removal of Screws (pos. 17).
7. Remove Screw (pos. 17), Spring washer (pos. 18), Washer (pos. 14) and Ball bearing (pos. 30) from Turbine shaft (pos. 7). Use faces on Turbine shaft to hold against rotation.

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



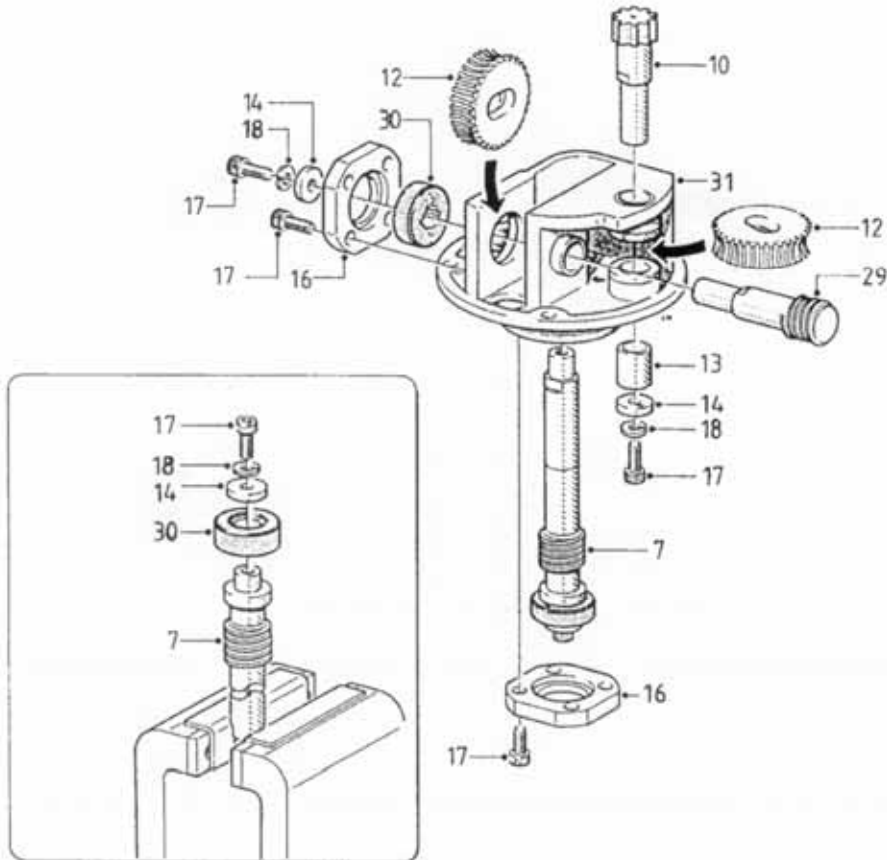
How to replace Collar bushes (pos. 11), see page 26.

Reassembly

1. Mount Ball bearing (pos. 30) on Turbine shaft (pos. 7) and secure with Washer (pos. 14), Spring washer (pos. 18) and Screw (pos. 17). Hold Turbine shaft in vice or with wrench on driver faces and tighten screw.
2. Push Ball bearing (pos. 30) for Horizontal shaft (pos. 29) into Gear frame (pos. 31) and fix Bearing cover (pos. 16) with Screws (pos. 17). Tighten crosswise.

Maintenance and repair (continued)

Gear Subassembly



3. Insert 2nd stage Worm wheel (pos. 12), Pinion (pos. 10) and Journal (pos. 13). Mount Washer (pos. 14), Spring washer (pos. 18) and fix with screw (pos. 17). Check rotation.
4. Insert 1st stage Worm wheel (pos. 12) and Horizontal shaft (pos. 29). Mount Washer (pos. 14). Spring washer (pos. 18) and fix with Screw (pos. 17). Check rotation.
5. Reinstall Turbine shaft (pos. 7) in Gear frame as mentioned under Disassembly, point 1.
6. Hold Turbine shaft (pos. 7) against 1st stage Worm wheel and tighten Screws (pos. 17) in Horizontal shaft (pos. 29) and Pinion (pos. 10).
7. Remove Turbine shaft (pos. 7) with Ball bearing (pos. 30) before Gear subassembly is inserted in machine body.

Maintenance and repair (continued)

Replacement of Collar Bushes

1. Place Gear frame (pos. 31) upside down with a firm support under the flange. Use for instance jaws of a vice. Do not clamp on machined surfaces. With Pusher (tool No. TE81B033, see page 32) knock out Collar bush.
2. Turn Gear frame to upright position and hold over support such as flat steel bar clamped in a vice. Knock out Collar bush with Pusher.
3. Turn Gear frame 90° and hold over support. Knock out Collar bush with Pusher.

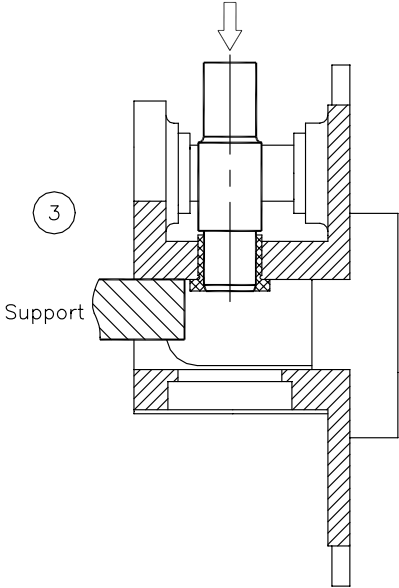
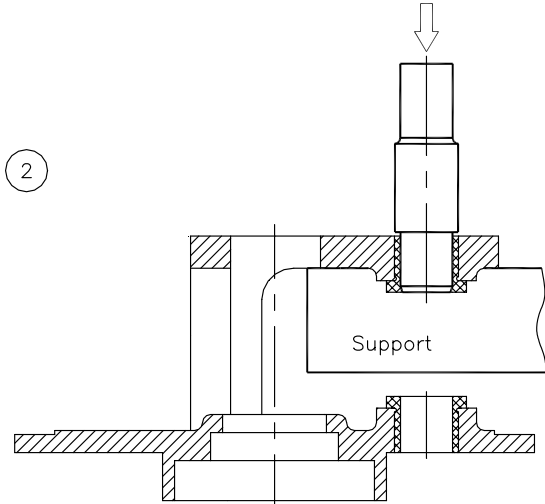
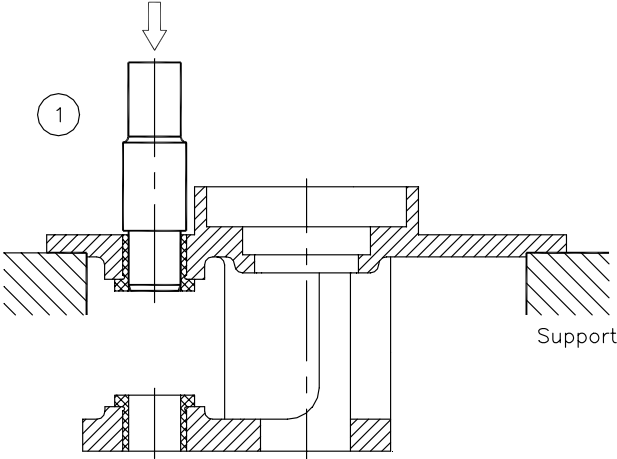
Warning: To avoid risk of deforming Gear frame, it is utmost important that it is supported while the Collar bushes are being knocked out.



4. Clean holes and push in new Collar bushes into Gear frame

Maintenance and repair (continued)

Replacement of Collar Bushes



Maintenance and repair (continued)

Replacement of Ball Races

In Body

1. A. With big end downwards knock several times Body with bearings (pos. 28) hard against firm wooden support until Ball race (pos. 33) drops out.
1. B. If it is not possible to knock out Ball race in this way, it is necessary first to screw out Main collar lower (pos. 34) - see page 30. Carefully push off old Ball race without damaging Main collar lower. Use mandrel and firm support.

Before mounting of new Ball race, main collar lower (pos. 34) must be remounted into Body - see page 30.

2. Clean surfaces and place Ball race (pos. 33) on Main collar lower (pos. 34). Press by hand as long as possible. By means of a tube mandrel or if desired wooden block, carefully hammer Ball race home.

Ball race must not project over of Main collar lower. To avoid tilting mandrel must push along the whole circumference of Ball race. Do not damage surface of Ball race.

On Gear wheel

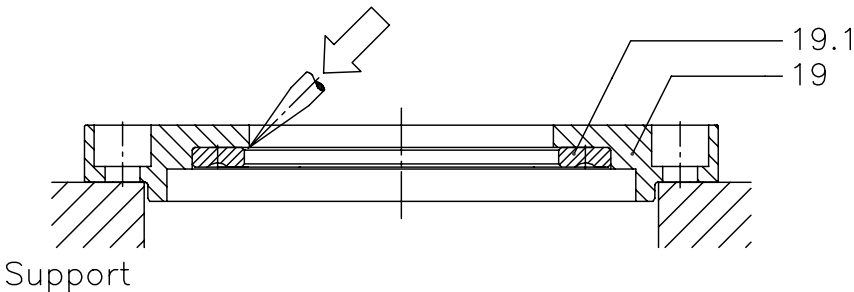
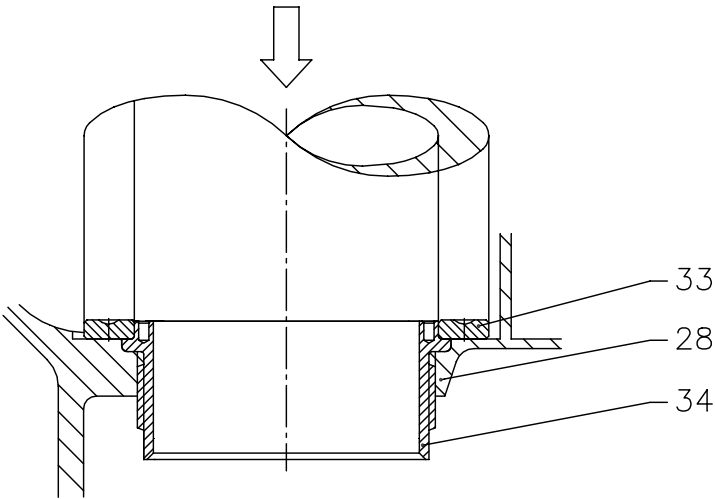
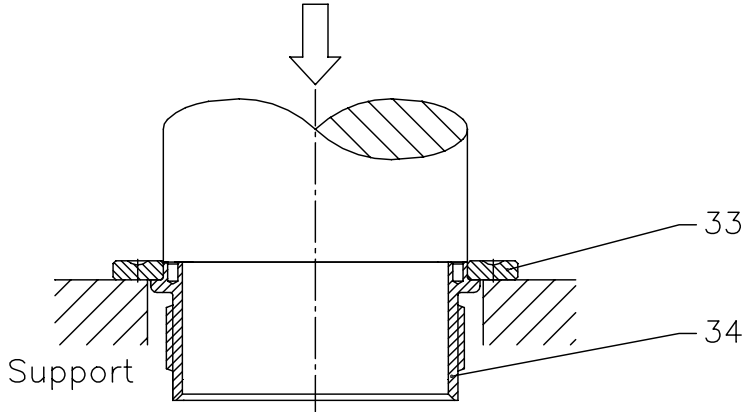
1. Place Gear wheel with ball race (pos. 9 and 9.1) on support. Support only under Ball race (pos. 9.1). With mandrel press off old Ball race.
2. Clean surfaces and press on new Ball race. Ball race must be pressed fully home on Gear. Press parallel. Use press or vice. Do not damage surface of Ball race.

In Hub cover

1. Place Hub cover with ball race (pos. 19) on support. Carefully knock out old Ball race by means of small mandrel or if desired screwdriver. Knock several times around the circumference to avoid tilting.
2. Clean surfaces and press in new Ball race. Ball race must be pressed fully home. Press parallel. Do not damage surface of Ball race.

Maintenance and repair (continued)

Replacement of Ball races



Maintenance and repair (continued)

Replacement of Main Collars

Although normally exposed to very limited wear, it is possible to replace Main collars (pos. 36 and 34) in Body. The procedure to do this is described below.

Main collar upper

1. Place Body (pos. 28) in a vice in upright position. Do not clamp on machined faces. Insert Tool (see page 33) into Main collar upper (pos. 36). Unscrew Main collar.
2. Carefully clean thread and recess in Body. Do not damage special thread in Body. Recess must be absolutely clean.
3. Make sure that new Main collar is clean and free from impurities.
4. Screw in new Main collar. Attention should be given to make sure that thread is in correct engagement before screwing in Main collar.
5. Tighten Main collar fully home, and tighten up.
6. Check that main collar is fully home: Install Stem, Ball retainer with balls and Gear wheel (see page 22). Check that there is sufficient axial clearance to allow for free rotation of Stem.

Main Collar Lower

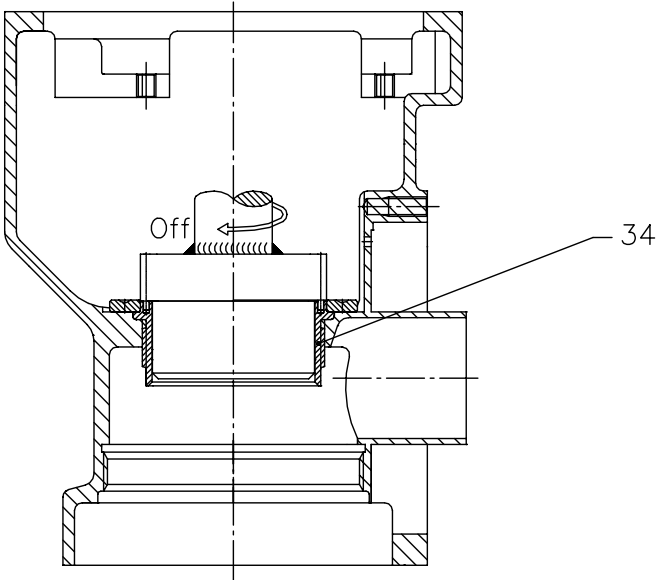
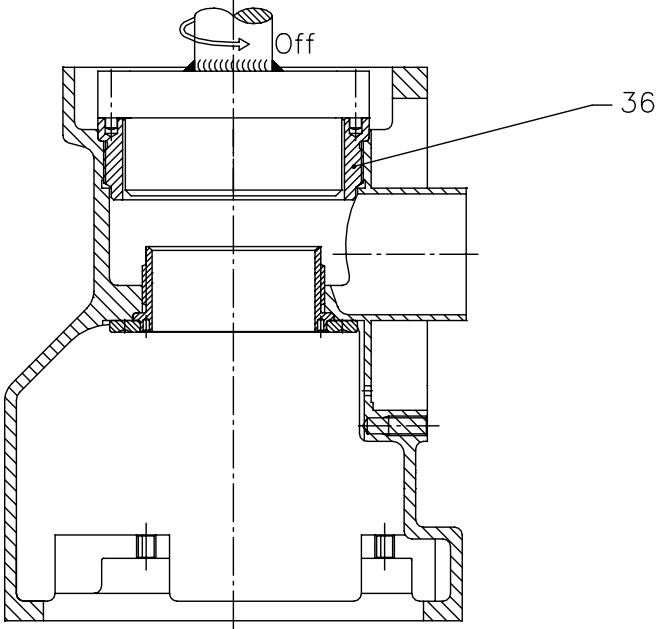
Place Body in a vice in upside down position, and repeat procedure described above.

Warning: Thread on Main collar lower is left-handed.



Maintenance and repair (continued)

Replacement of Main Collars



Tools

Standard Tool kit for Gunclean Toftejorg T-82, Article No. TE81B060

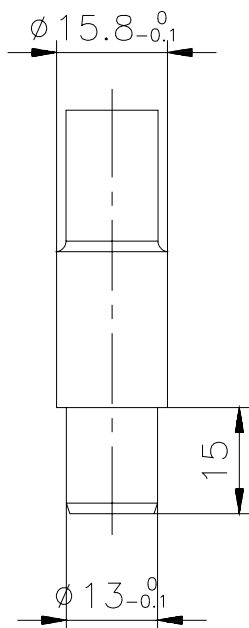
Tool No.	Description	Number
TE134	Unbraco key for Screw	1 pcs.
TE134A	Unbraco screw driver	2 pcs.
TE369	5 mm Caliper	1 pcs.

Available on request:

TE81B033 Pusher for 1½" Collar bush

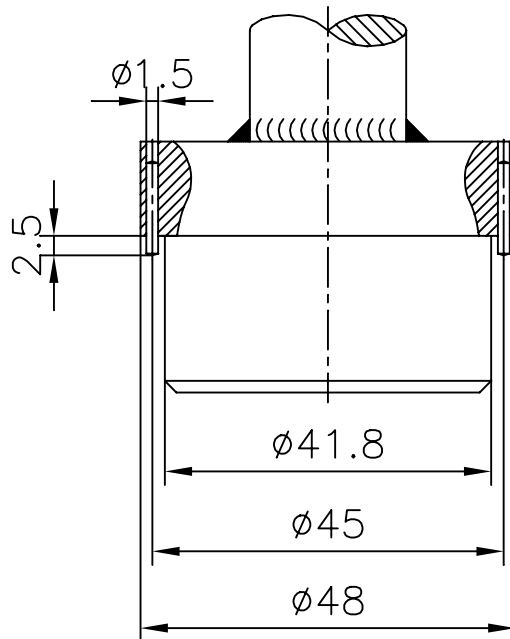
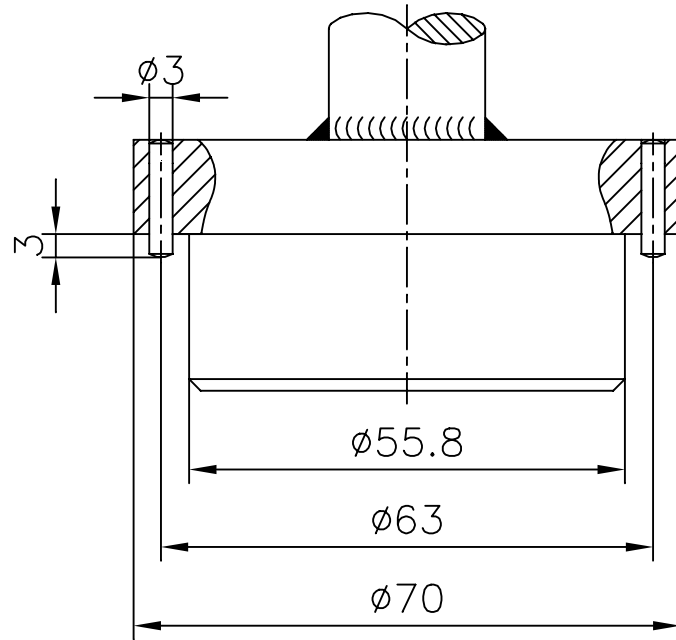
Sketch of Tools for replacement of Collar bush:

81B033 Pusher for 1½" Collar bush:



Tools (continued)

Sketch of Tools for Replacement of Main Collars



Trouble Shooting Guide

Symptom: Slow rotation or failure of the machine to rotate

Possible causes	Action
No or insufficient liquid flow	<p>a). Check if supply valve is fully open.</p> <p>b). Check if inlet pressure to machine is correct.</p> <p>c). Check supply line/filter for restrictions/clogging.</p> <p>d). Remove nozzles and check for clogging. If blocked, carefully clean nozzle without damaging stream straighteners and nozzle tip.</p> <p>e). Remove Flange/Nipple, Guide and Impeller (see page 16) and check for clogging in Impeller area.</p> <p>If large particles repeatedly get jammed in the machine, install filter or reduce mesh size of installed filter in supply line.</p>
Foreign Material or Material Build-up	<p>Insert hex Screwdriver in screw in top of Turbine shaft and easily turn Turbine shaft clockwise. If any resistance is recognized, disassemble machine to localize the cause.</p>
a). Impeller jammed	Remove Guide and Impeller (see page 16) and remove foreign material.
b). Turbine shaft sluggish in Bush or Ball bearing	Remove Turbine shaft (see page 18) and clean Bush. Check Ball bearing. Replace, if necessary.
c). Bevel gears jammed	Remove Flange/Nipple and Hub Subassembly (see page 20). Clean teeth on Stem and Bevel gear.
d). Stem jammed/sluggish	Remove Gear subassembly (see page 18). Check free rotation of Stem. Remove Stem (see page 22). Remove foreign material/material build-up on Stem and inside Main Collars. Clean Ball Races and Ball retainer with balls. Also clean Bush in Stem.

Trouble Shooting Guide (continued)

Possible causes	Action
e). Gearbox jammed/sluggish	Remove foreign material from Gearbox. Check rotation of shafts. If restriction is recognized, disassemble gearbox (see page 24) and remove material build up, especially on 2nd stage Worm wheel and mating Collar bushes. Also check Ball bearing.
f). Hub jammed/sluggish	Disassemble Hub Subassembly (see page 20). Remove foreign material inside Hub. Clean Ball races and Ball retainer with balls. Also clean nose of Body.

Wear

a). Ball bearings	Check that Ball bearings have only minor axial or radial movement and can be rotated freely without any resistance.
b). Bush in Stem	See page 14 - 15.
c). Worm wheels	See page 14 - 15.
d). Collar bushes	See page 14 - 15.
e). Turbine shaft	Check clearance in Bush and in Ball bearing. Transverse movement in Bush should not exceed 0.5 mm. Also inspect worm for wear.
f). Horizontal shaft	Check clearance in Collar bushes. Transverse movement should not exceed 0.5 mm. Also inspect worm for wear.

Mechanical defects

a). Worm wheel/Teeth broken	Replace Worm wheel.
b). Worm wheel can rotate on Horizontal shaft/Pinion due to damaged driver faces.	Replace Worm wheel.
c). Damaged teeth on Gear	Inspect teeth on Stem and Bevel gear for deformation. Mount Hub and Stem in Body (see page 20 and 22). Hold Body in upside down position and rotate Hub to check that Bevel gears can work together. If damaged: Replace Stem and/or Bevel gear.

Reference List of Parts, Gunclean Toftejorg T-82 Fixed

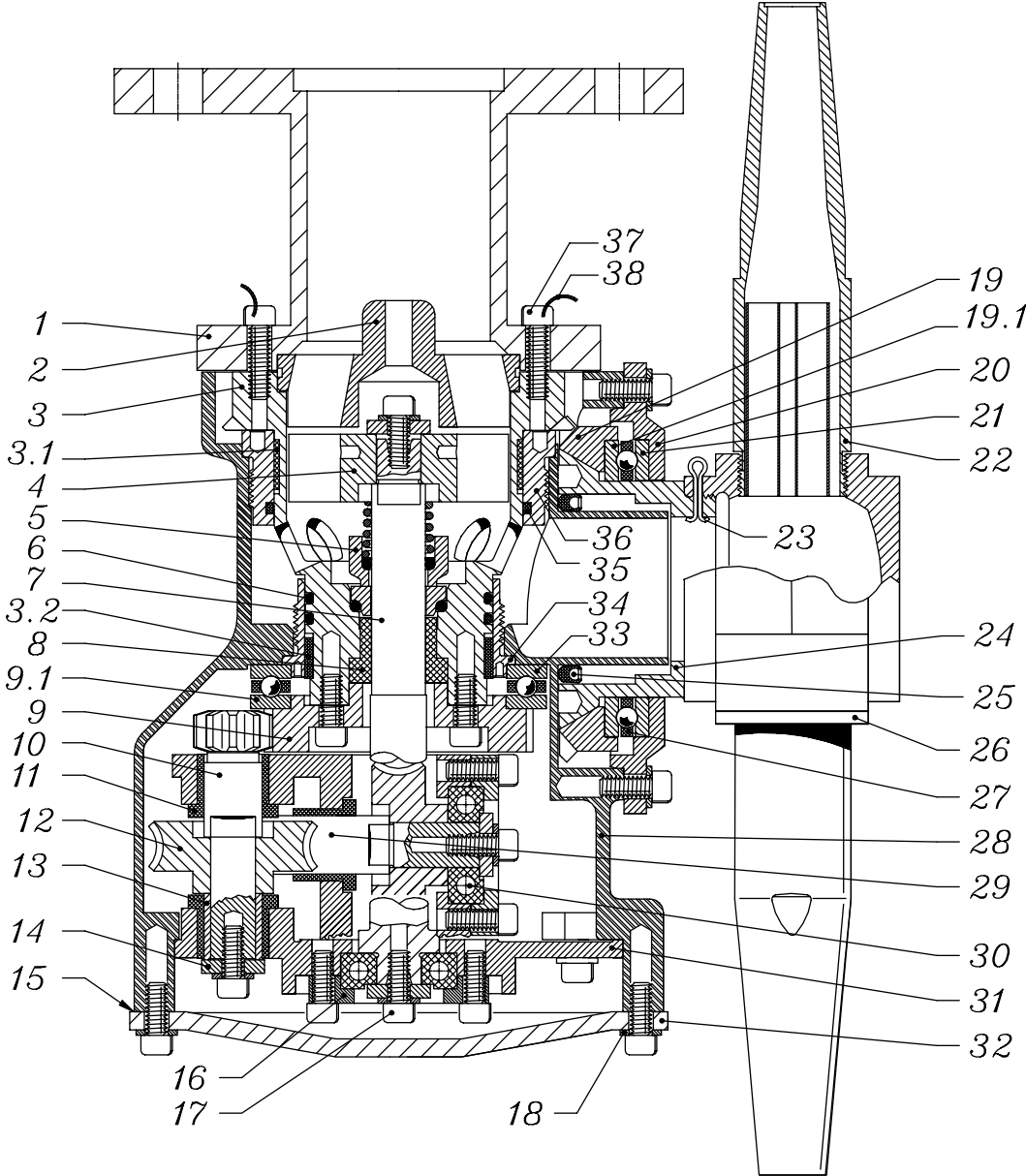
Pos.	Ref. No.	No/ Unit	Description	Material	Remarks
1	<input type="checkbox"/> TE21B510	1	Flange	Stainless steel	Spare part
	<input type="checkbox"/>		Without flange		
2	<input type="checkbox"/> TE703	1	Guide 100%	Stainless steel	Spare part
	<input type="checkbox"/> TE703-50	1	Guide 50%	Stainless steel	Spare part
	<input type="checkbox"/> TE803-0	1	Guide ring 0%	Stainless steel	Spare part
3	TE21F328	1	Stem f. mech. seal	Stainless steel	Spare part
3.1	TE21F505		Top liner	Polymer	Wear part
3.2	TE21F506		Bottom liner	Polymer	Wear part
4	<input type="checkbox"/> TE705	1	Impeller 100%	Stainless steel	Spare part
	<input type="checkbox"/> TE705-50	1	Impeller 50%	Stainless steel	Spare part
5	TE51T153	1	Mechanical shaft seal	Carbon/Stainless steel	Wear part
6	TE825	2	O-ring	Elastomer	Wear part
7	TE21F510	1	Turbine shaft	Stainless steel	Wear part
8	TE21F507	1	Bush	Polymer	Wear part
9	TE21F330	1	Gear wheel w. ball race	Stainless steel	Wear part
9.1	TE826-1		Ball race	Stainless steel	Wear part
10	TE814	1	Pinion	Stainless steel	Spare part
11	TE21A585	3	Collar bush	Polymer	Wear part
12 + 39	<input type="checkbox"/> TE21A367	2	Worm wheel w. reinf..	Polymer/Stainless steel	Wear part
	<input type="checkbox"/> TE21A364	2	Worm wheel w. reinf. E-gear	Polymer	Wear part
13	TE817	1	Journal	Stainless steel	Spare part
14	TE719A	4	Washer	Stainless steel	Spare part
15	TE21D563	1	Bottom gasket	Polymer	Spare part
16	TE731	2	Bearing cover	Stainless steel	Spare part
17	TE118	38	Screw	Stainless steel	Spare part
18	TE156	18	Spring washer	Stainless steel	Spare part
19	TE722S	1	Bevel gear w. ball race	Stainless steel	Spare part
19.1	TE826-1		Ball race	Stainless steel	Wear part
20	TE21B340	1	Hub cover w. ball race	Stainless steel	Spare part
21	TE826-1		Ball race	Stainless steel	Wear part
22	<input type="checkbox"/> TE50B007	2	Nozzle \varnothing 7	Stainless steel	Spare part
	<input type="checkbox"/> TE50B008	2	Nozzle \varnothing 8	Stainless steel	Spare part
	<input type="checkbox"/> TE50B009	2	Nozzle \varnothing 9	Stainless steel	Spare part
	<input type="checkbox"/> TE50B010	2	Nozzle \varnothing 10	Stainless steel	Spare part
23	TE448	1	Cotter pin	Stainless steel	Spare part
24	TE21B536	1	Hub conical part	Stainless steel	Spare part
25	TE21B549	1	Lip seal	Polymer	Wear part
26	TE724-2-15	1	Hub nozzle part	Stainless steel	Spare part
27	TE21A380	2	Ball retainer w. balls	Polymer/Stainless steel	Wear part
28	TE21F500	1	Body	Stainless steel	Not available
29	<input type="checkbox"/> TE828Z	1	Horizontal shaft	Stainless steel	Wear part
	<input type="checkbox"/> TE21A550	1	Horizontal shaft, E-gear	Stainless steel	Wear part
30	TE829	2	Ball bearing	Stainless steel/Polymer	Wear part
31	TE730	1	Gear frame	Stainless steel	Spare part
32	TE21F504	1	Bottom cover	Stainless steel	Spare part
33	TE826-1	1	Ball race	Stainless steel	Spare part
34	TE827G2	1	Main collar lower	Stainless steel	Spare part
35	TE807	1	O-ring	Elastomer	Wear part
36	TE827G1	1	Main collar upper	Stainless steel	Wear part
37	TE164	6	Screw	Stainless steel	Spare part
38	TE651	3	Locking wire	Stainless steel	Wear part
40	<input type="checkbox"/> TE50B101	2	Nozzle extension	Stainless steel	Spare part

Please note that some of the polymer parts are in PEEK material. PEEK is not resistant to concentrated sulfuric acid

Configuration as delivered marked

**) See remarks page 22.

Cross Sectional Drawing, Gunclean Toftejorg T-82 Fixed



Reference List of Parts, Gunclean Toftejorg T-82 Portable

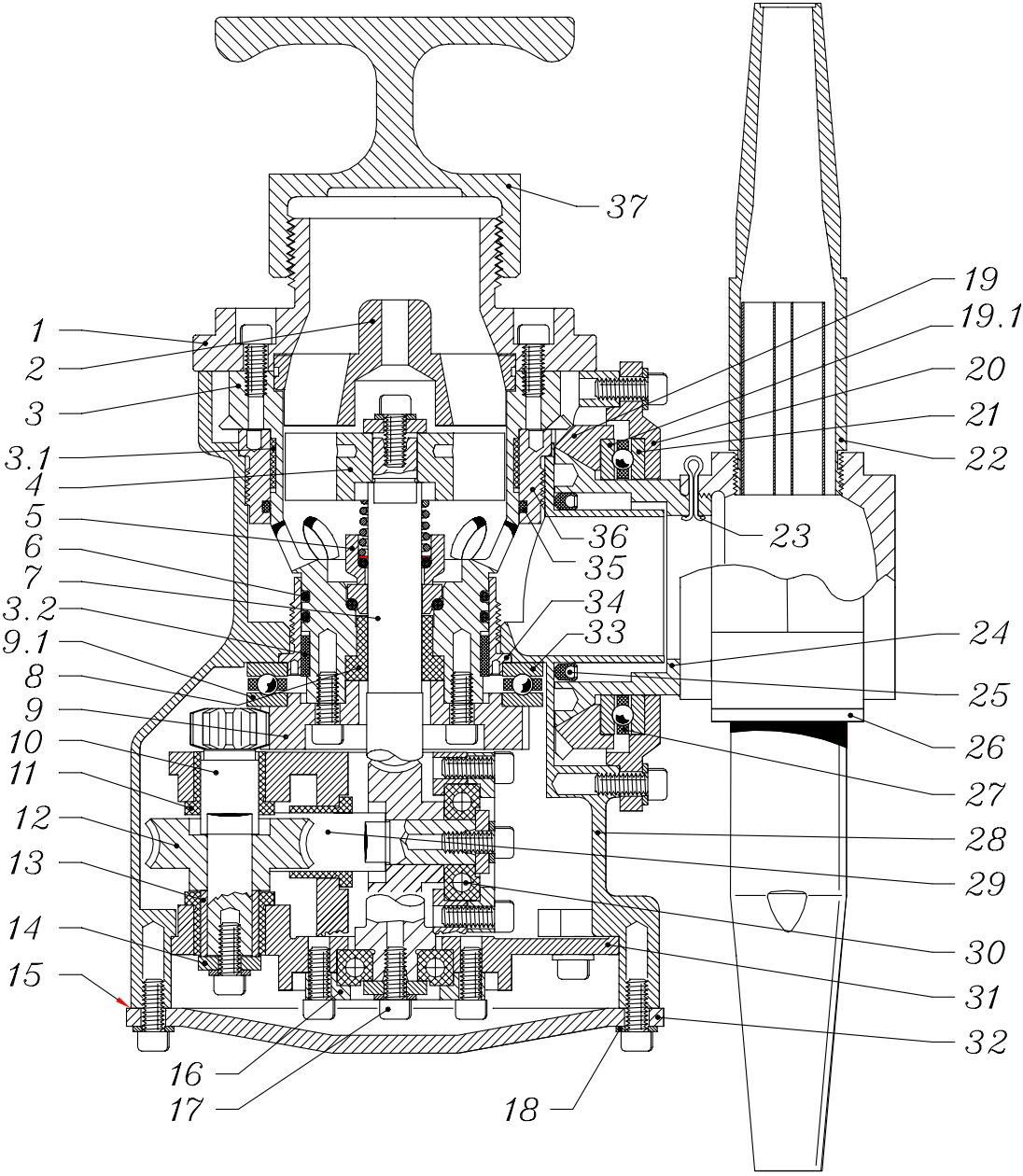
Pos.	Ref. No.	No/ Unit	Description	Material	Remarks
1	<input type="checkbox"/> TE21B500	1	Nipple 1½" BSP	Stainless steel	Spare part
	<input type="checkbox"/> TE21B501	1	Nipple 1½" NPT	Stainless steel	Spare part
2	<input type="checkbox"/> TE703	1	Guide 100%	Stainless steel	Spare part
	<input type="checkbox"/> TE703-50	1	Guide 50%	Stainless steel	Spare part
	<input type="checkbox"/> TE803-0	1	Guide ring 0%	Stainless steel	Spare part
3	TE21F328	1	Stem f. mech. seal	Stainless steel	Spare part
3.1	TE21F505		Top liner	Polymer	Wear part
3.2	TE21F506		Bottom liner	Polymer	Wear part
4	TE705	1	Impeller 100%	Stainless steel	Spare part
5	TE51T153	1	Mechanical shaft seal	Carbon/Stainless steel	Wear part
6	TE825	2	O-ring	Elastomer	Wear part
7	TE21F510	1	Turbine shaft	Stainless steel	Wear part
8	TE21F507	1	Bush	Polymer	Wear part
9	TE21F330	1	Gear wheel w. ball race	Stainless steel	Wear part
9.1	TE826-1		Ball race	Stainless steel	Wear part
10	TE814	1	Pinion	Stainless steel	Spare part
11	TE21A585	3	Collar bush	Polymer	Wear part
12	TE21A367	2	Worm wheel w. reinforcem.	Polymer /Stainless steel	Wear part
13	TE817	1	Journal	Stainless steel	Spare part
14	TE719A	4	Washer	Stainless steel	Spare part
15	TE21D563	1	Bottom gasket	Polymer	Spare part
16	TE731	2	Bearing cover	Stainless steel	Spare part
17	TE118	38	Screw	Stainless steel	Spare part
18	TE156	18	Spring washer	Stainless steel	Spare part
19	TE722S	1	Bevel gear w. ball race	Stainless steel	Spare part
19.1	TE826-1		Ball race	Stainless steel	Wear part
20	TE21B340	1	Hub cover w. ball race	Stainless steel	Spare part
21	TE826-1		Ball race	Stainless steel	Wear part
22	<input type="checkbox"/> TE50B007	2	Nozzle ø 7	Stainless steel	Spare part
	<input type="checkbox"/> TE50B008	2	Nozzle ø 8	Stainless steel	Spare part
	<input type="checkbox"/> TE50B009	2	Nozzle ø 9	Stainless steel	Spare part
	<input type="checkbox"/> TE50B010	2	Nozzle ø 10	Stainless steel	Spare part
23	TE448	1	Cotter pin	Stainless steel	Spare part
24	TE21B536	1	Hub conical part	Stainless steel	Spare part
25	TE21B549	1	Lip seal	Polymer	Wear part
26	TE724-2-15	1	Hub nozzle part	Stainless steel	Spare part
27	TE21A380	2	Ball retainer w. balls	Polymer/Stainless steel	Wear part
28	TE21F500	1	Body	Stainless steel	Not available
29	TE828Z	1	Horizontal shaft	Stainless steel	Wear part
30	TE829	2	Ball bearing	Stainless steel/Polymer	Wear part
31	TE730	1	Gear frame	Stainless steel	Spare part
32	TE21F504	1	Bottom cover	Stainless steel	Spare part
33	TE826-1	1	Ball race	Stainless steel	Spare part
34	TE827G2	1	Main collar lower	Stainless steel	Spare part
35	TE807	1	O-ring	Elastomer	Wear part
36	TE827G1	1	Main collar upper	Stainless steel	Wear part
37	TE801A	1	Handle 1½" BSP	Bronze	Wear part
38	<input type="checkbox"/> TE50B101	1	Nozzle extension	Stainless steel	Spare part

Please note that some of the polymer parts are in PEEK material. PEEK is not resistant to concentrated sulfuric acid

Configuration as delivered marked

**) See remarks page 22.

Cross Sectional Drawing, Gunclean Toftejorg T-82 Portable



Service Kits

TE55J000 Minor Service Kit T-82PT/FIX/MUD

Pos.	Part number	No./kit	Description
5	TE51T153	1	Mechanical Seal
6	TE825	2	O-ring
8	TE21F507	1	Bushing
11	TE21A585	3	Collar Bush
12	TE21A367	2	Worm Wheel
15	TE21D563	1	Packing
25	TE21B549	1	Lip Seal
30	TE829	2	Ball Bearing
35	TE807	1	O-ring
37	TE651	3	Locking Wire

TE55J010 Major Service Kit T-82PT/FIX/MUD

Pos	Part number	No./kit	Description
7	TE21F510	1	Turbine Shaft
9.1	TE826-1	1	Ball race
19.1	TE826-1	1	Ball race
21	TE826-1	1	Ball race
33	TE826-1	1	Ball race
23	TE448	1	Cotter Pin
27	TE21A380	2	Ball retainer with balls
29	TE828Z	1	Horizontal Shaft
34	TE827G2	1	Main Collar, Lower
36	TE827G1	1	Main Collar, Upper
-	TE55J000	1	Service Kit Minor T-82PT/FIX/MUD

How to order spare parts and claim procedure

How to Order Spare Parts

On the Cross Sectional Drawings as well as on all instruction drawings, the individual parts have a position number, which is the same on all drawings. From the position number the part is easily identified in the Reference Lists of Parts, page 36-38.

Individual parts should always be ordered from the Reference Lists of Parts, page 36-38. Ref. number and Description should be clearly stated.

Please also quote the type of machine and serial number. This will help us to help you. The type and serial numbers are stamped on the body of the tank cleaning machine.

Claim Procedure

In case of failure that needs assistance from Alfa Laval Tank Equipment A/S, it is essential for our evaluation that the problem, as well as the working conditions of the machine are described as detailed as possible.

For description of the working conditions, fill in copy of Claim Report - Working Conditions, which you will find at the back of this manual.

How to contact Alfa Laval Tank Equipment A/S

For further information please feel free to contact:

Alfa Laval Tank Equipment A/S
Baldershoej 19
P.O. Box 1149
2635 Ishoej
Denmark

Phone no.: +45 43 55 86 00
Fax no.: +45 43 55 86 01
www.alfalaval.com
www.toftejorg.com

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

Service Card

Type of Machine : _____

Serial No. : _____

Configuration : Nozzle diameter : _____ mm
 Impeller : _____ %
 Guide : _____ %

Date	No. of Working Hours	Maintenance Actions/ Exchanged Parts	Remarks	Sign.
	0	Machine put into operation		

V. 94.2

Claim Report Working Conditions

Page 1/2

Ref. Claim Case : _____

Machine/Cleaner Type : _____ **Serial No.:** _____

Configuration

- Nozzles : _____ x \varnothing _____ mm
 - Turbine/Inlet Guide : _____ % _____

Working Conditions

Inlet pressure at machine/cleaner : _____

Type of Valve in inlet line : _____

Can hydraulic shock be disregarded: : Yes No

Inlet line flushed before installation of tank cleaner? : Yes No

Working hours before failure : _____ hours

Cleaning Programme

Cleaning media and conc.	Temperature	Time	Recirculation?

Is sterilising being used? : Yes No

Procedure (media/temp.)? : _____

Is steam injection being used for heating? : Yes No

Time: _____

Temperature: _____

V. 98.1

Claim Report Working Conditions (continued)

Page 2/2

Condition of Cleaning Media

- | | |
|---------------------------------------------------------------------|-------------------------------------------|
| <input type="checkbox"/> Clean | |
| <input type="checkbox"/> Contaminated with (nature and description) | |
| <input type="checkbox"/> Chemicals/Solvents _____ | <input type="checkbox"/> High viscous |
| <input type="checkbox"/> Soluble | <input type="checkbox"/> Sticky/tenacious |
| <input type="checkbox"/> Low viscous | <input type="checkbox"/> Solidifying |
| <input type="checkbox"/> Hard particles/size _____ | <input type="checkbox"/> Crystallizing |
| <input type="checkbox"/> Soft particles/size _____ | |

Has filter been installed in inlet line?

- | | |
|------------------------------|----------|
| <input type="checkbox"/> Yes | |
| Mesh size: | _____ mm |
| <input type="checkbox"/> No | |

Is tank cleaner flushed with clean water after tank cleaning?

- | | |
|------------------------------|-----------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No |
|------------------------------|-----------------------------|

Type of Soilage/Tank Contents to be removed

Name, formula/concentration of material to be removed from tank : _____

What is material soluble in : _____

Nature of material:

- | | | |
|---------------------------------------------|-------------------------------------------|---------------------------------------------------------|
| <input type="checkbox"/> Volatile/explosive | <input type="checkbox"/> Sticky/tenacious | <input type="checkbox"/> Contains soft particles |
| <input type="checkbox"/> Low viscous | <input type="checkbox"/> Solidifying | <input type="checkbox"/> Contains hard particles/fibres |
| <input type="checkbox"/> High viscous | <input type="checkbox"/> Crystallizing | |

Is tank cleaner submerged in material?

- | | |
|------------------------------|-----------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No |
|------------------------------|-----------------------------|

Other information/Remarks

Date: _____ Sign.: _____