



Instruction Manual

Gunclean Toftejorg TZ-82 Portable

IM-TE91A051-EN1
October 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.

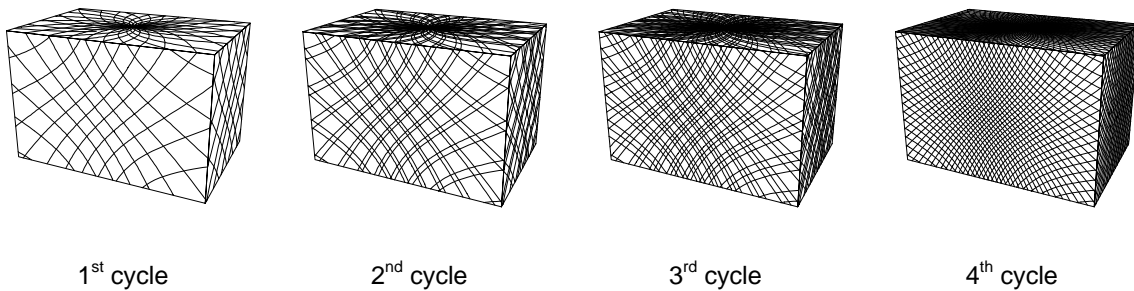
General Description

The Gunclean Toftejorg TZ-82 is a media driven and media lubricated tank cleaning machine. As it is self-lubricating, there is no lubricating substance such as oil, grease etc. in the machine which needs to be regularly changed.

Functioning

The flow of the cleaning fluid into the machine passes through a guide and a turbine, which is set into rotation. The turbine 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 turbine depends on the flow rate through the machine. The higher the flow rate is, the higher the speed of rotation will be. In order to control the RPM of the machine for a wide range of flow rates, the efficiency of the turbine can be changed (50% - 100% - 0% Turbine/Inlet guide).

Apart from the jet flow through the nozzles, fluid is leaking through the top of the machine, at the hub and through the bottom cover. The leakages between the moving parts at the top and at the hub are cleaning the gabs and thus preventing build-up of material that might cause extra friction. The flow through the bottom cover is due to the fact that the machine is media lubricated, and that accordingly a flow through the gearbox is needed.

General description (continued)

Standard configurations

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.

Connection	Turbine/Inlet Guide	Nozzles (mm) (3/4" thread conn.)	Article/Ref. No.
<u>Nipple:</u> 1½" BSP, Male d: ø38mm	50%	2xø7	TE21B202
	100%	2xø7 2xø8	TE21B210 TE21B212
	0 %	2xø9 2xø10	TE21B228 TE21B230

Connection	Turbine/Inlet Guide	Nozzles (mm) (3/4" thread conn.)	Article/Ref. No.
<u>Nipple:</u> 1½" NPT, Male d: ø38mm	50%	2xø7	TE21B102
	100%	2xø7 2xø8	TE21B110 TE21B112
	0%	2xø9 2xø10	TE21B128 TE21B130

Options

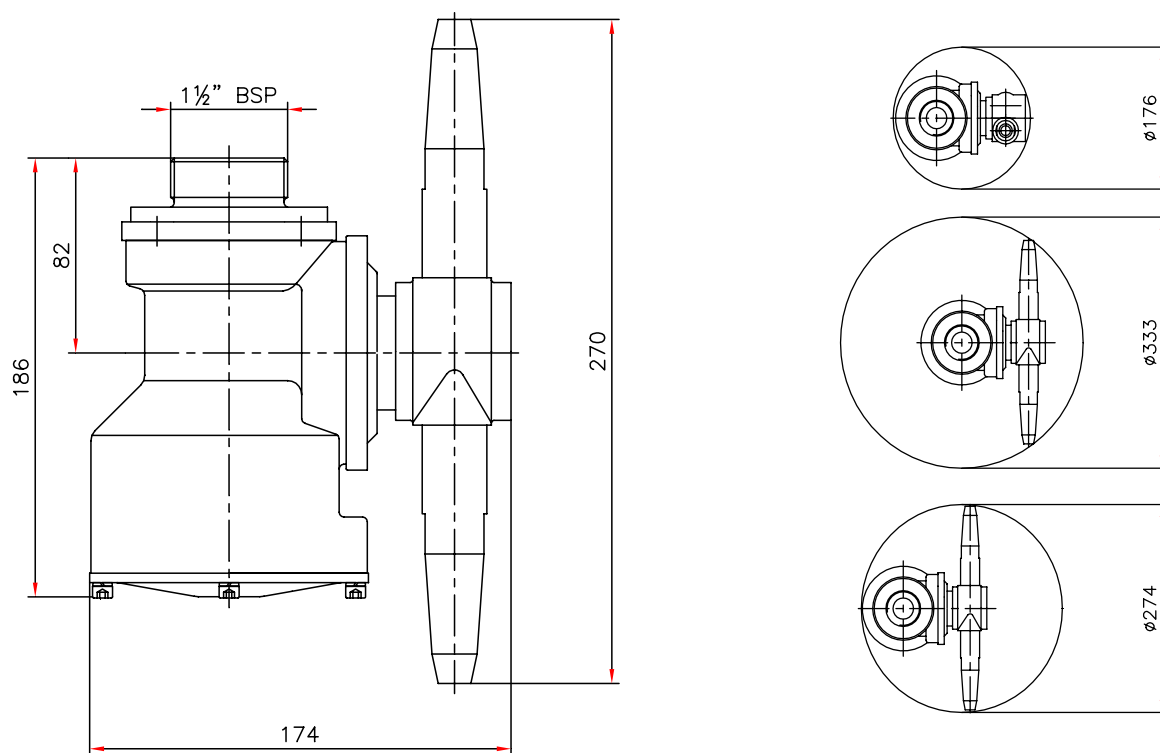
Machines with nozzle extensions for longer throw length can be supplied as an option. Same article no. with index no. -22, e.g. TE21B202-22.

Machines with Nozzle extensions and E-gear can be supplied as an option with index number -62, e.g. TE21B202-62.

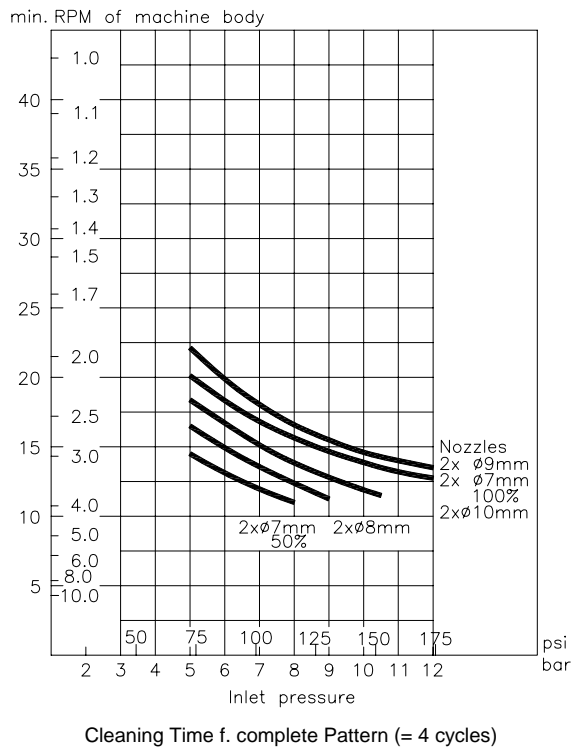
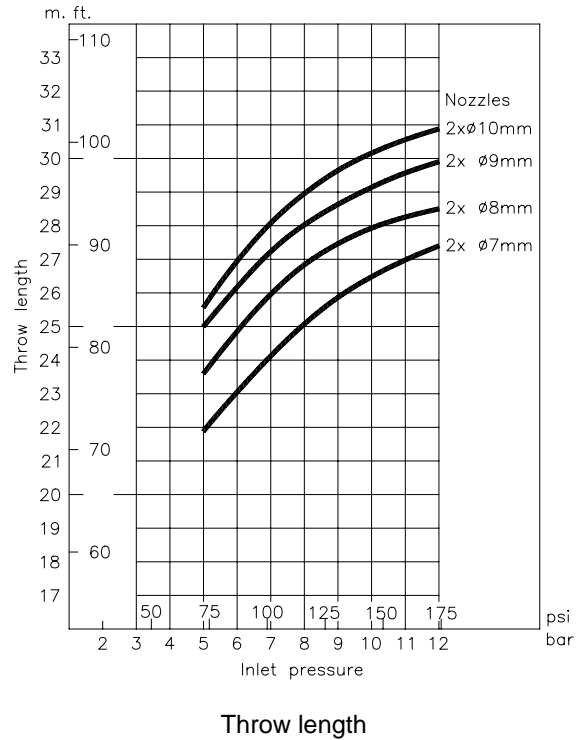
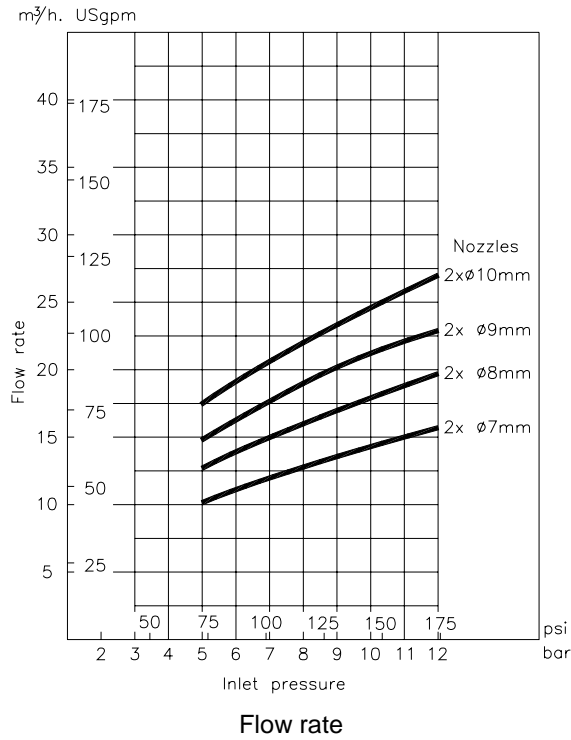
Technical data

Weight of machine	:	6,5 kgs (14,3 lb)
Working pressure	:	2-12 bar (30-175 psi)
Recommended inlet pressure	:	5-10 bar (75-150 psi)
Working temperature max.	:	95° (200° F)
Materials	:	Stainless steel, bronze, polymer

Principal dimensions in mm



Technical data (continued)



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.

Option: The Gunclean Toftejorg TZ-82 Portable can be supplied with nozzle extensions and E-gearing for longer throw length.

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.

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, unless an electrical connection is otherwise established to ensure an effective earthing. In addition, connecting pipe work, must be electrically conductive and earthed to the tank structure. The resistance between the nozzles and the tank structure should not exceed 20,000 Ohm. This is essential to avoid the build-up of static electricity on the machine.

For further information see CENELEC R044-001 Safety of Machinery, guidance and recommendations for the avoidance of hazards due to static electricity.

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.

To protect your tank coating it is recommended to mount bumpers on the tank cleaning machine.

The machine as delivered has been tested at the factory before shipping. For transportation reasons, the nozzles have been screwed off after the test. All you will have to do to make the machine ready for use is to refit the nozzles and tighten with wrench. Secure with Loctite No. 243 or equivalent.

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, bronze and polymer. Please note that some of the polymer parts are in PEEK, which is not resistant to concentrated sulphuric acid. 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 6-7). 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, TZ-82PT is available in two levels: Minor Service and Major Service.

Minor Service Kit is recommended to be replaced every 250 working hours or 2½ years, whichever comes first.

TE55H000 Minor Service Kit contains:

Pos.	Qty x P/n	Description	
5	1 x TE21A525	Main bush	
10	3 x TE21A585	Collar bush	
11	1 x TE21A367	Worm wheel	
33	1 x TE21A367	Worm heel	
17	3 x TE651*	Locking wire	*TE651, Locking wire only used in fixed
22	1 x TE21B549	Lip seal	version of TZ-82 and may be disregarded
28	2 x TE21A570	Slide bearing	

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

TE55H010 Major Service Kit contains:

Pos.	Qty x P/n	Description
6	1 x TE411K	Turbine shaft
7.1	1 x TE826-1	Ball race
18.1	1 x TE826-1	Ball race
19.1	1 x TE826-1	Ball race
26.3	1 x TE826-1	Ball race
24	2 x TE21A380	Ball retainer with balls
25	1 x TE448	Cotter pin
26.1	1 x TE21B520	Main collar, upper
26.2	1 x TE21B521	Main collar, lower
27	1 x TE828Z	Horizontal shaft
	1 x TE55H000	Service Kit Minor

Maintenance and repair (continued)

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

The following recommended preventive maintenance programme is based on tank cleaning machines working in average conditions. However, 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. We trust that you will adjust your maintenance programme to suit.

General recommendations

- Always read the instruction and maintenance manuals before undertaking the service.
- Some kit contains 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.

Disassemble machine as described on the following pages.

1. Disassemble machine as described on the following pages.
2. Clean material build-up and deposits from internal parts with Scotchbrite, S-Ultrafine, eventually chemical cleaner and fine abrasive cloth.
3. Assemble machines as described in the following pages.
4. Check that the machine is in operating condition by inserting 3/16" hex Screw-driver (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, see page 36.

Maintenance and repair (continued)

Top Assembly

Disassembly

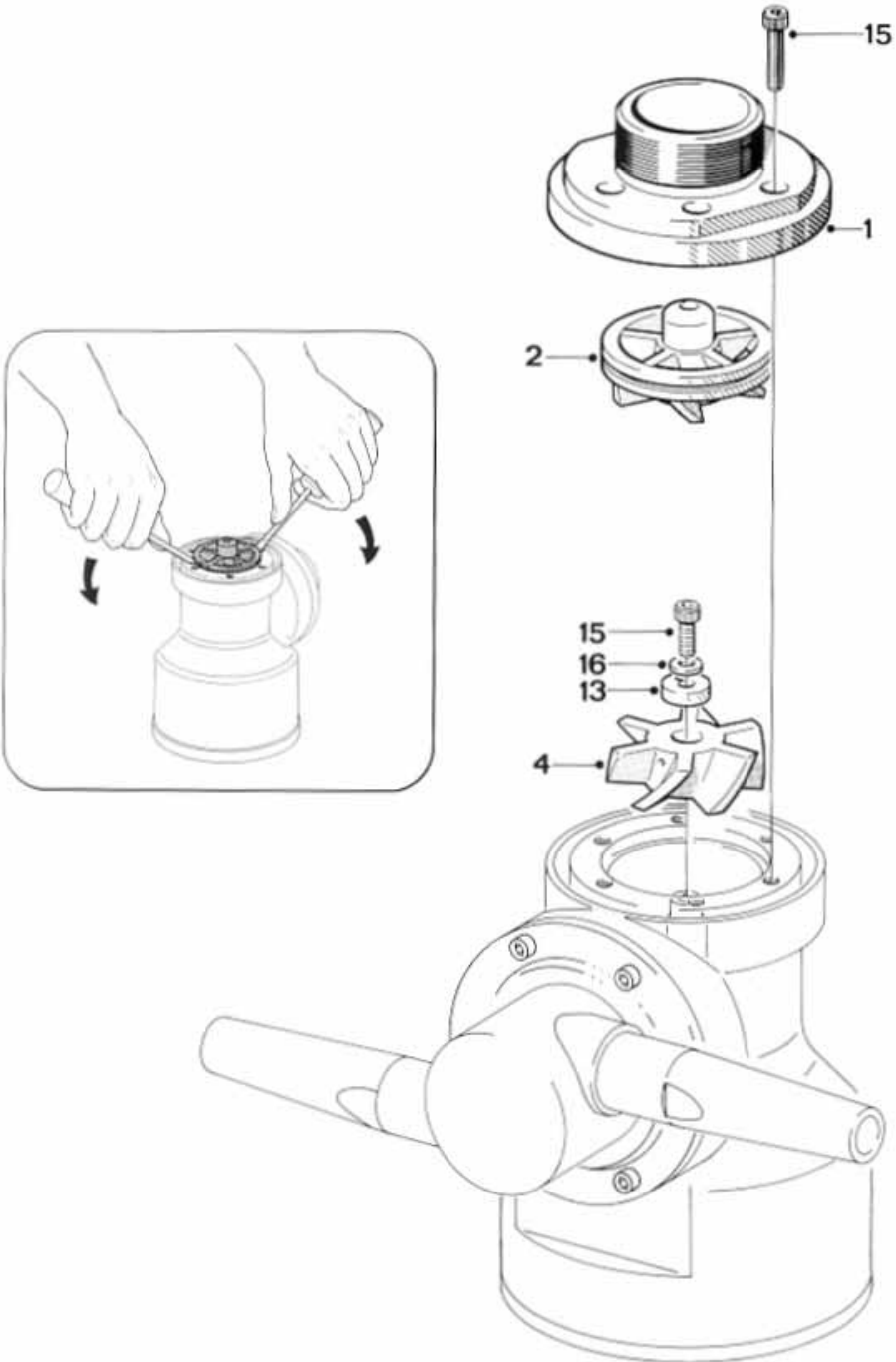
1. Remove Screw (pos. 15). Loosen with Key (tool No. TE134) and unscrew with Screwdriver (tool No. TE134A).
2. Lift off Nipple (pos. 1).
3. Remove Guide/Guide ring (pos. 2). The Guide has a groove in the outer diameter. The Guide is easily lifted out of the Stem by means of two ordinary Screwdrivers inserted into the groove.
4. Remove Screw (pos. 15), Spring washer (pos. 16) and Washer (pos. 13). 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.

Reassembly

1. 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 Slide bearing under the Turbine shaft.
2. Mount Washer (pos. 13), Spring washer (pos. 16) and Screw (pos. 15) and tighten. To secure Impeller against rotation insert carefully Screwdriver (tool No. TE134A) through Impeller (pos. 4) into a hole in the Stem.
3. Reinstall Guide/Guide ring (pos. 2).
4. 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.
5. Mount 3/16" Screws (pos. 31) 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. 15) and Spring washer (pos. 16) from Bottom cover (pos.30).
3. Remove Bottom cover (pos. 30).
4. Remove Screws (pos. 15) in Bearing cover (pos. 14). Carefully push out Turbine shaft (pos. 6) from opposite end. Do not try to hammer out Turbine shaft, since this can destroy Slide bearing.
5. Remove Screws (pos. 15) and Spring washers (pos. 16) along the circumference of Gear frame (pos. 29). 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

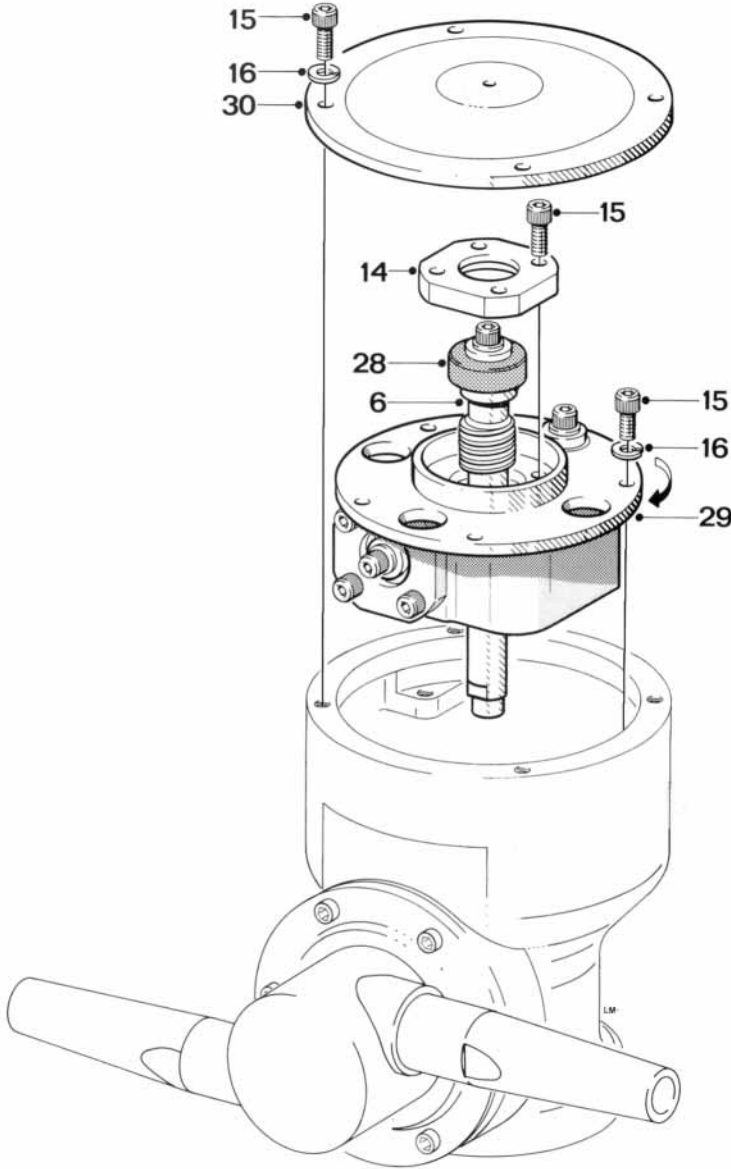
1. Reinsert Gear subassembly in bottom of machine body. Turn Gear Frame (pos. 29) to align holes in Gear frame and 3/16" threads in Body. Mount Spring washers (pos. 16) and Screws (pos. 15) along circumference of Gear frame (pos. 29). Tighten screws crosswise.

Note: To secure meshing between Gear wheel (pos.7) and Pinion (pos. 9), it might be necessary to rotate slightly either the whole Gear Subassembly or the Gear wheel.

2. Reinsert Turbine shaft (pos. 6) with Slide bearing carefully through Gear wheel (pos. 7). Push carefully Slide bearing (pos. 28) into position. Mount Bearing cover (pos. 14) with Screws (pos. 15). Tighten crosswise.
3. Place Bottom cover (pos. 30).
4. Mount Spring washers (pos. 16) and Screws (pos. 15) and tighten cross-wise.

Maintenance and repair (continued)

Bottom Assembly



Maintenance and repair (continued)

Hub Subassembly

Disassembly

1. Remove Nozzles (pos. 20). Nozzles are untightened with a wrench on the faces of the nozzles.
2. Remove Screws (pos. 15) and Spring washers (pos. 16) from Hub cover (pos. 19).
3. Draw out Hub Subassembly. If Hub cover (pos. 19) clings into Body, knock carefully with plastic hammer on outer diameter to loosen.
4. Remove Cotter pin (pos. 25). Unscrew contra clockwise Hub conical part (pos. 21) freeing Hub cover (pos. 19), Ball retainer w. balls (pos. 24) and Bevel gear (pos. 18). To unscrew Hub conical part (pos. 21), Hub nozzle part (pos. 23) 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. 19.1) and in Bevel gear (pos. 18.1) are extremely worn, they should be replaced as well as the Ball retainer with balls (pos. 24). How to replace Ball races see page 24.

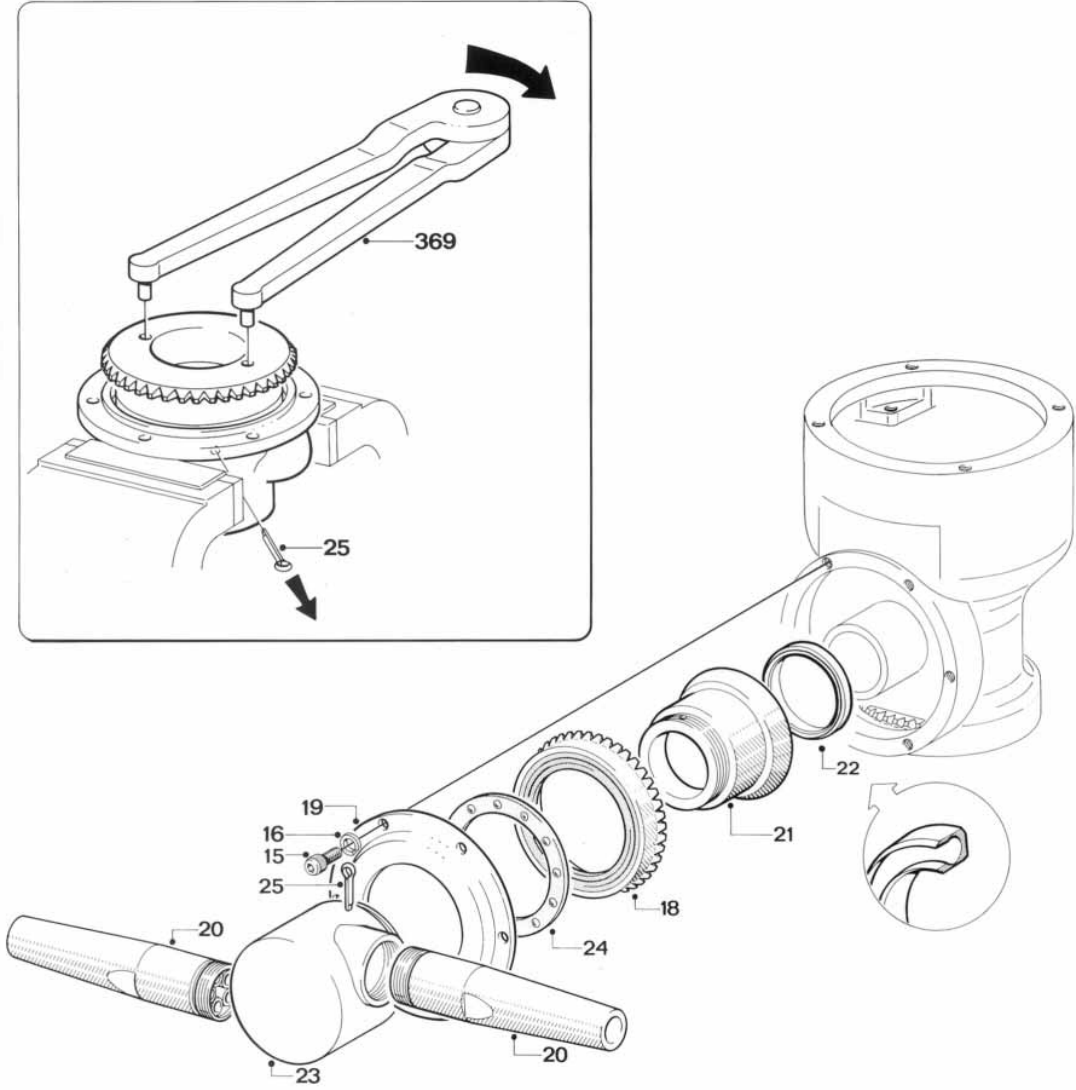
5. Remove Lipseal (pos. 22) and check for wear. If the lipseal is worn, it has to be replaced.

Reassembly

1. Mount the lip seals (pos. 22).
2. Mount Bevel gear (pos. 18), Ball retainer with balls (pos. 24) and Hub cover (pos. 19) on Hub conical part (pos. 21). Screw on Hub nozzle part (pos. 23). 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. 25). Insert Cotter pin and split (preferably new cotter pin).
3. Slide on Hub Subassembly, fit Hub cover (pos. 19) into Body and mount Spring washers (pos. 16) and Screws (pos. 15).
4. Screw on Nozzles (pos. 20) and tighten with wrench.

Maintenance and repair (continued)

Hub Assembly



Maintenance and repair (continued)

Stem Subassembly

Disassembly

1. Place machine in upside-down position.
2. Remove Screws (pos. 15) in Gear wheel (pos. 7). 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. 7) and Ball retainer with balls (pos. 24).
4. Push out Stem (pos. 3).
5. If worn, press out Main bush (pos. 5).

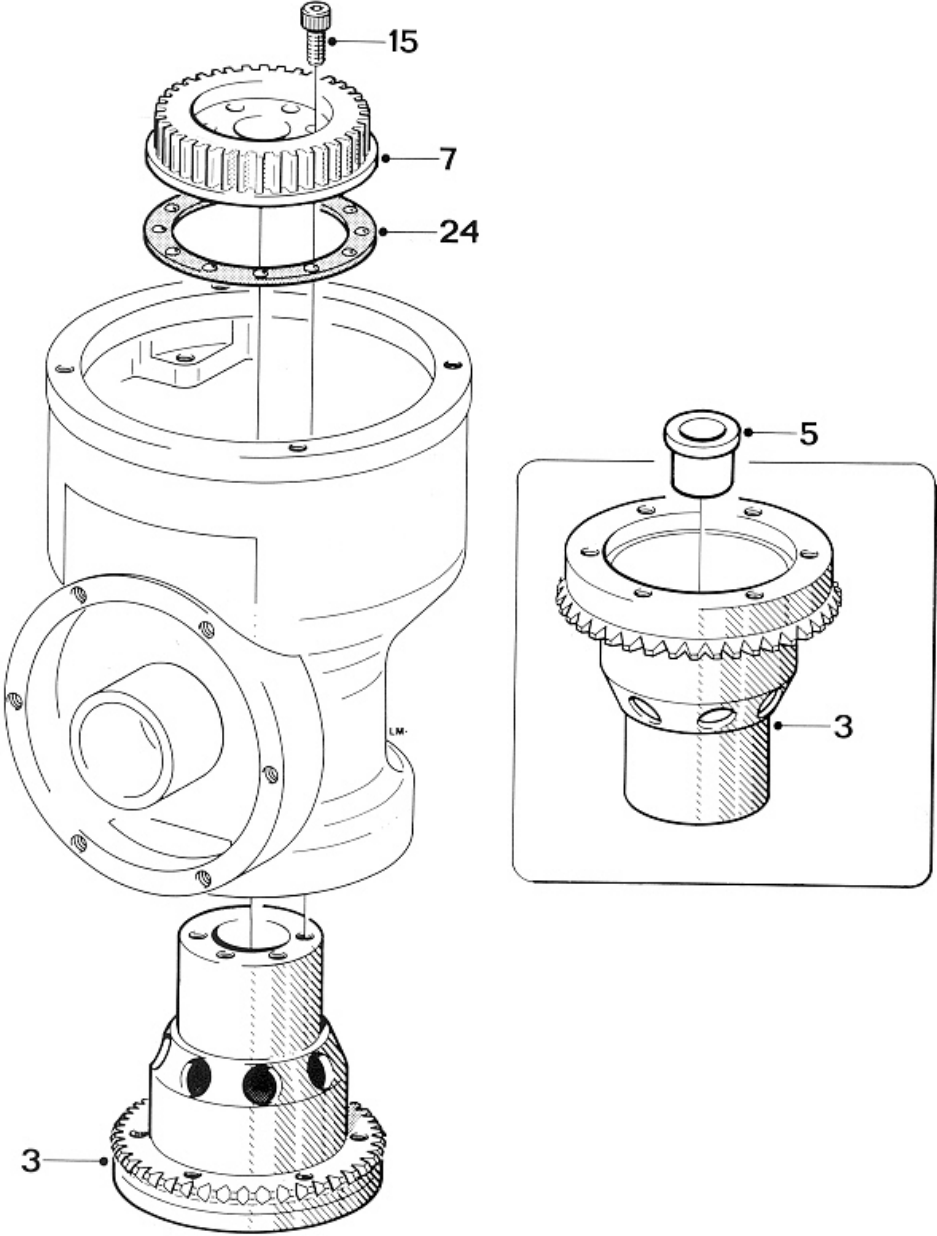
If Ball races in Body (pos. 26.3) and on Gearwheel (pos.7.1) are extremely worn they should be replaced together with Ball retainer with balls (pos. 24). How to replace Ball races see page 24.

Reassembly

1. If replaced, press Main bush (pos. 5) into Stem (pos.3).
2. Push Stem into Body. Turn machine upside-down.
3. Place Ball retainer with balls (pos. 24) and Gearwheel (pos. 7) into Body on Ball race. Rotate gearwheel to check free rotation. Mount gearwheel with Screws (pos. 15) 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. 6) with Slide bearing (pos. 28) into Gear frame (pos. 29). Mount Bearing cover (pos. 14) with Screws (pos. 15).
2. Hold Turbine shaft (pos. 6) against 1st stage Worm wheel (pos. 33) with one hand and loosen Screws (pos. 15) in Pinion (pos. 9) and Horizontal shaft (pos. 27) with the other hand.
3. Remove Screws (pos. 15) in Bearing cover (pos. 14) and take out Turbine shaft (pos. 6).
4. Draw out Horizontal shaft (pos. 27) and 1st stage Worm wheel (pos. 33) after removal of Screw (pos. 15), Spring washer (pos. 16) and Washer (pos. 13).
5. Draw out Pinion (pos. 9) and 2nd stage Worm wheel (pos. 11), also freeing Journal (pos. 12) after removal of Screw (pos. 15), Spring washer (pos. 16) and Washer (pos. 13).
6. Remove Bearing cover (pos. 14) and Slide bearing (pos. 28) after removal of Screws (pos. 15).
7. Remove Screw (pos. 15), Spring washer (pos. 16), Washer (pos. 13) and Slide bearing (pos. 28) from Turbine shaft (pos. 6). Use faces on Turbine shaft to hold against rotation.

Warning:

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



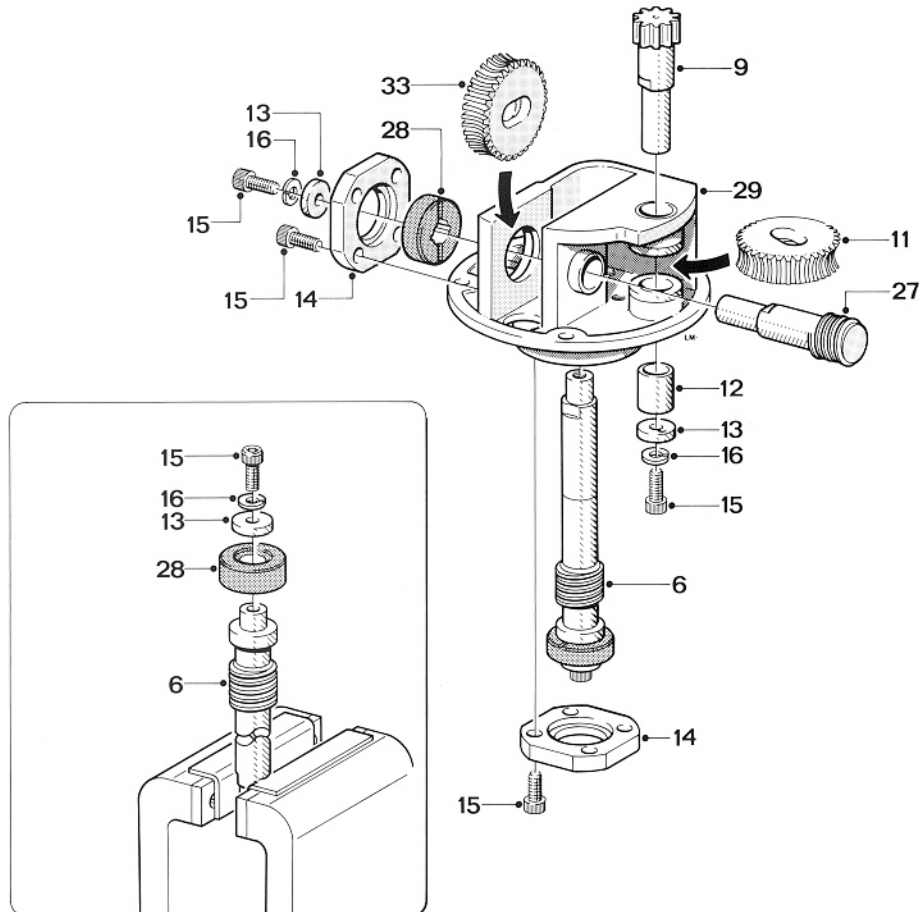
How to replace Collar bushes (pos. 10), see page 22.

Reassembly

1. Mount Slide bearing (pos. 28) on Turbine shaft (pos. 6) and secure with Washer (pos. 13), Spring washer (pos. 16) and Screw (pos. 15). Hold Turbine shaft in vice or with wrench on driver faces and tighten screw.
2. Push Slide bearing (pos. 28) for Horizontal shaft (pos. 27) into Gear frame (pos. 29) and fix Bearing cover (pos. 14) with Screws (pos. 15). Tighten crosswise.

Maintenance and repair (continued)

Gear Subassembly



3. Insert 2nd stage Worm wheel (pos. 11), Pinion (pos. 9) and Journal (pos. 12). Mount Washer (pos. 13), Spring washer (pos. 16) and fix with screw (pos. 15). Check rotation.
4. Insert 1st stage Worm wheel (pos. 33) and Horizontal shaft (pos. 27). Mount Washer (pos. 13), Spring washer (pos. 16) and fix with Screw (pos. 15). Check rotation.
5. Reinstall Turbine shaft (pos. 6) in Gear frame as mentioned under Disassembly, point 1.
6. Hold Turbine shaft (pos. 6) against 1st stage Worm wheel and tighten Screws (pos. 15) in Horizontal shaft (pos. 27) and Pinion (pos. 9).
7. Remove Turbine shaft (pos. 6) with Slide bearing (pos. 28) before Gear subassembly is inserted in machine body.

Maintenance and repair (continued)

Replacement of Collar Bushes

1. Place Gear frame (pos. 29) upside down with a firm support under the flange. Use for instance jaws of a vice. Do not clamp on machined surfaces. With Pusher (tool No. TE81B033, see page 28) 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.

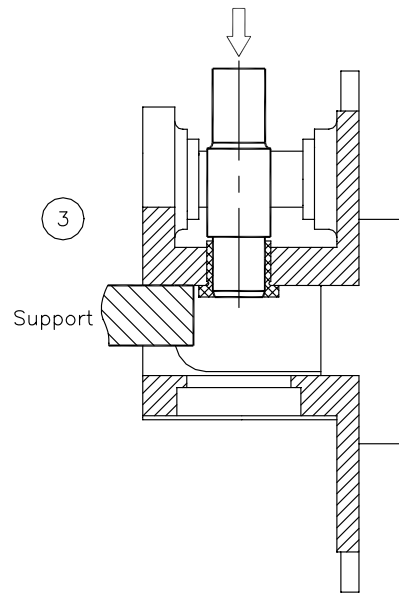
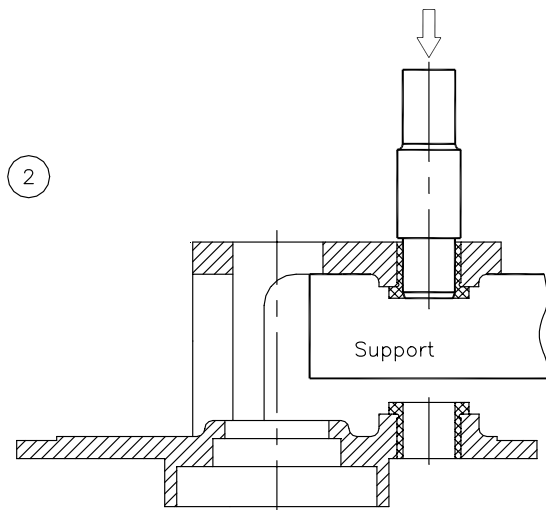
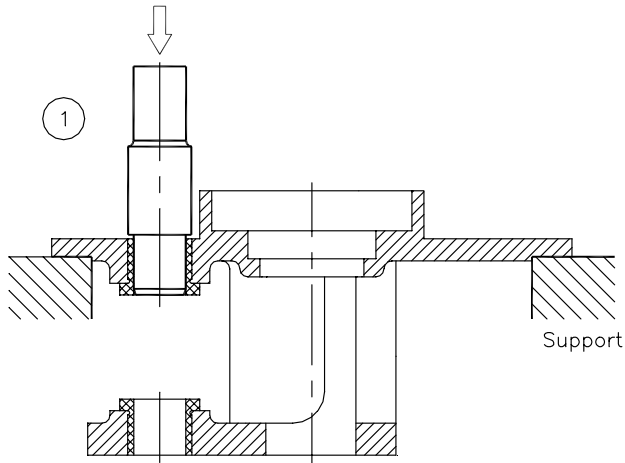
Warning: To avoid risk of deforming Gear frame, it is utmost important that it is supported while the Collar bushes are being knocked out.



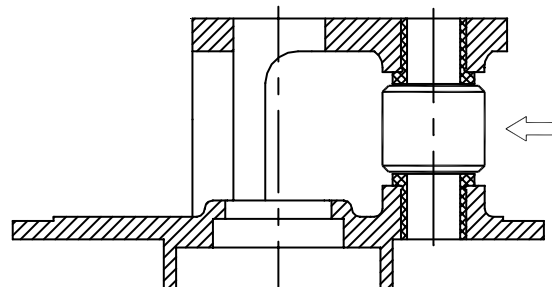
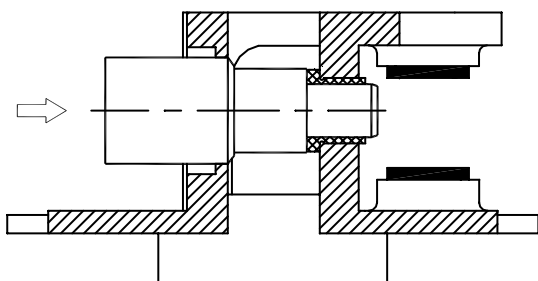
4. Clean holes and push in new Collar bushes into Gear frame

Maintenance and repair (continued)

Replacement of Collar Bushes



Removal of old Collar bushes



Mounting of new 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. 26) hard against firm wooden support until Ball race (pos. 26.3) 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. 26.2) - see page 26. 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. 26.2) must be remounted into Body - see page 26.
2. Clean surfaces and place Ball race (pos.26.3) on Main collar lower (pos. 26.2). 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

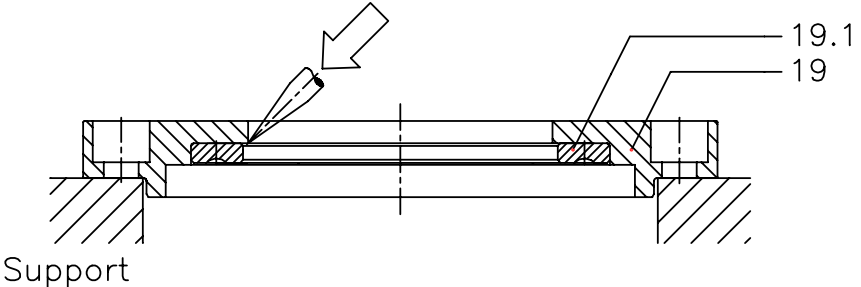
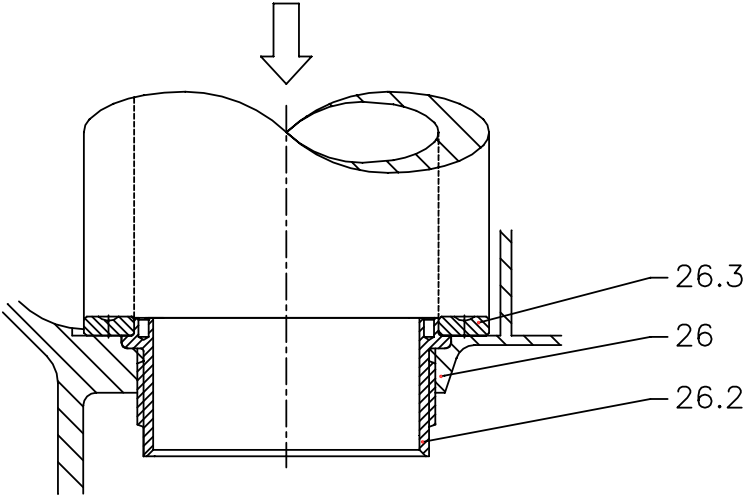
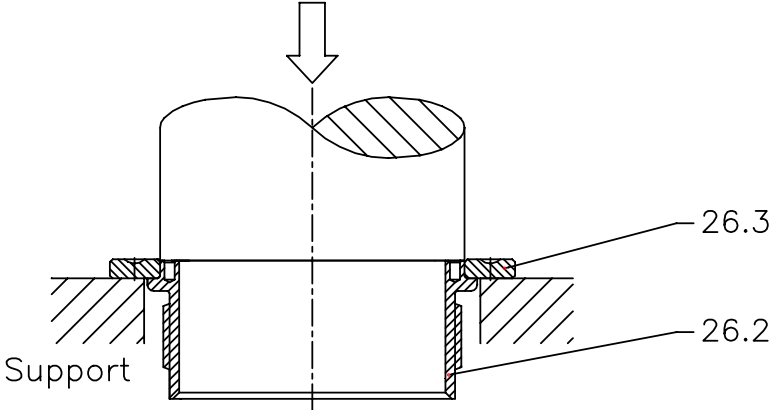
1. Place Gear wheel with ball race (pos. 7) on support. Support only under Ball race (pos. 7.1). With mandrel press off old Ball race.
2. Clean surfaces and press on new Ball race. Ball race must be pressed fully home on Gear. Press parallel. Use press or vice. Do not damage surface of Ball race.

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. 26.1 and 26.2) in Body. The procedure to do this is described below.

Main collar upper

1. Place Body (pos. 26) in a vice in upright position. Do not clamp on machined faces. Insert Tool (see page 29) into Main collar upper (pos. 26.1). 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 18). Check that there is sufficient axial clearance to allow for free rotation of Stem.

Main Collar Lower

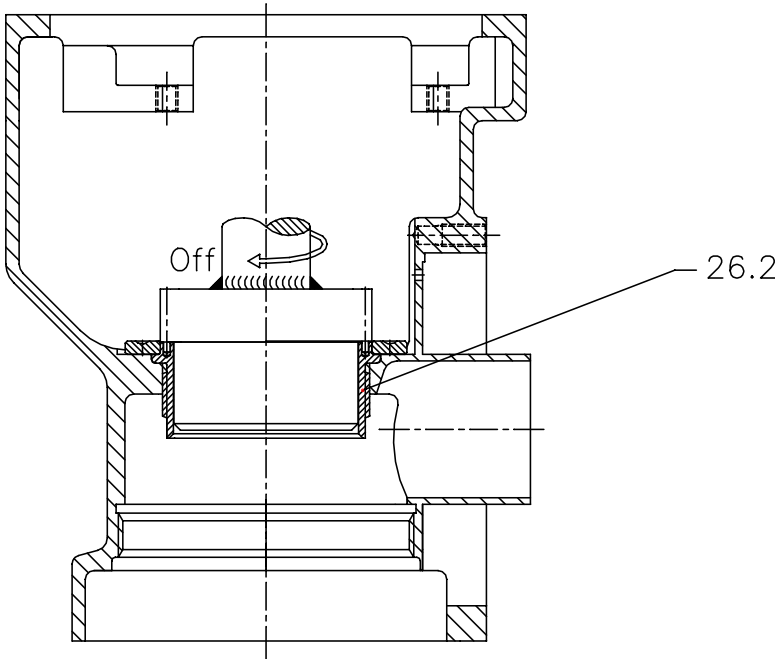
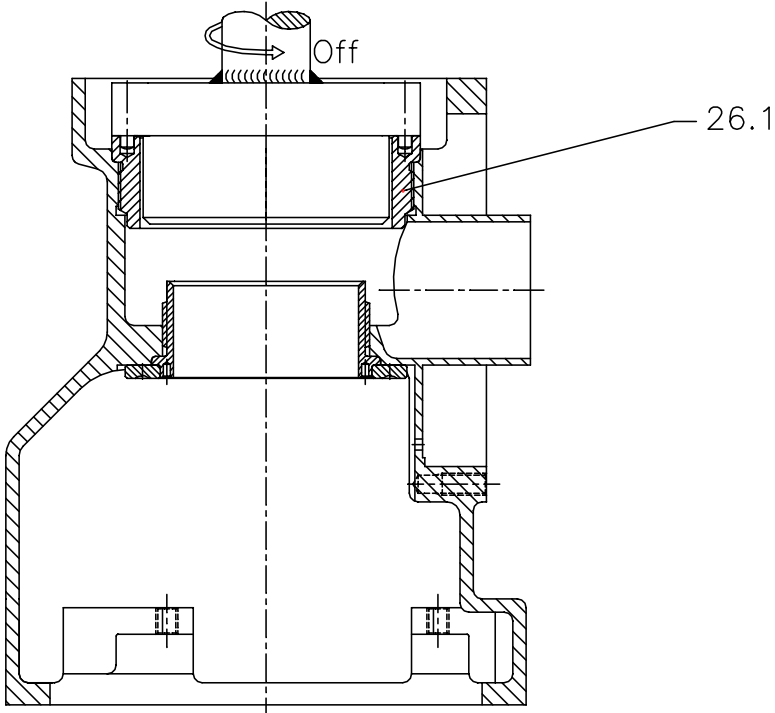
Place Body in a vice in upside down position, and repeat procedure described above.

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



Maintenance and repair (continued)

Replacement of Main Collars



Tools

Standard Tool kit for Gunclean Toftejorg TZ-68/82, Article No. TE81B060

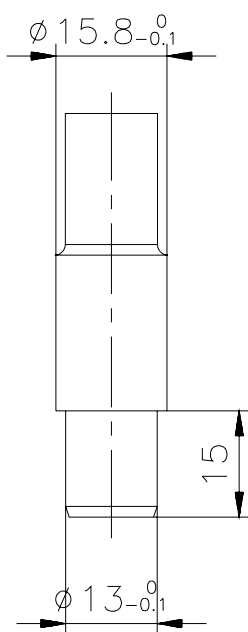
Tool No.	Description	Number
TE134	Hex Key for 3/16" Screw	1 pcs.
TE134A	Hex Screwdriver for 3/16" Screw	2 pcs.
TE369	5 mm Caliper	1 pcs.

Available on request:

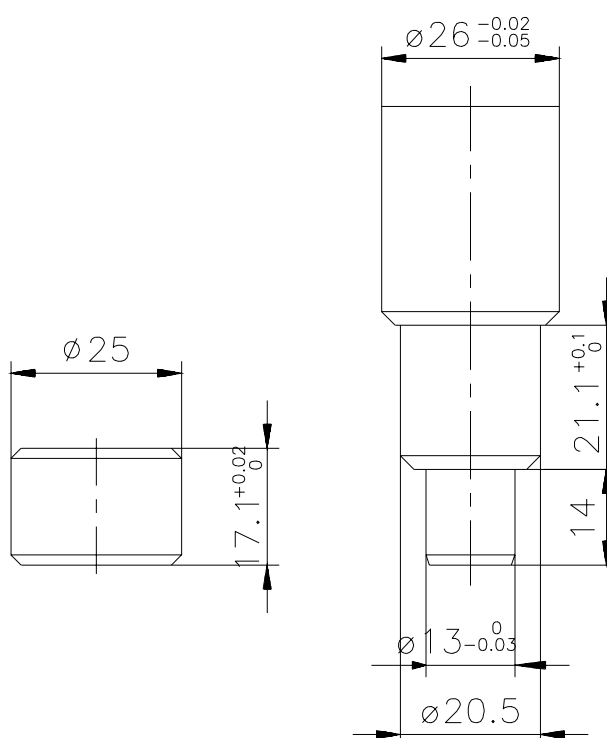
TE81B033	Pusher for Collar bush, 1½"
TE81B034	Fixture set for Collar bush, 1½"

Sketch of Tools for replacement of Collar bush:

TE81B033 Pusher:

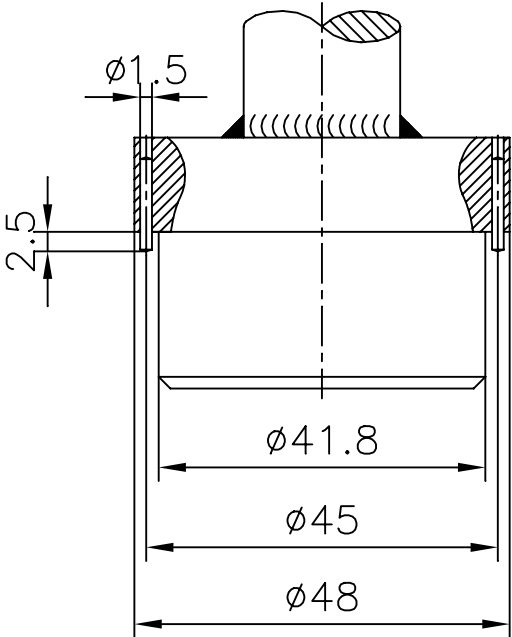
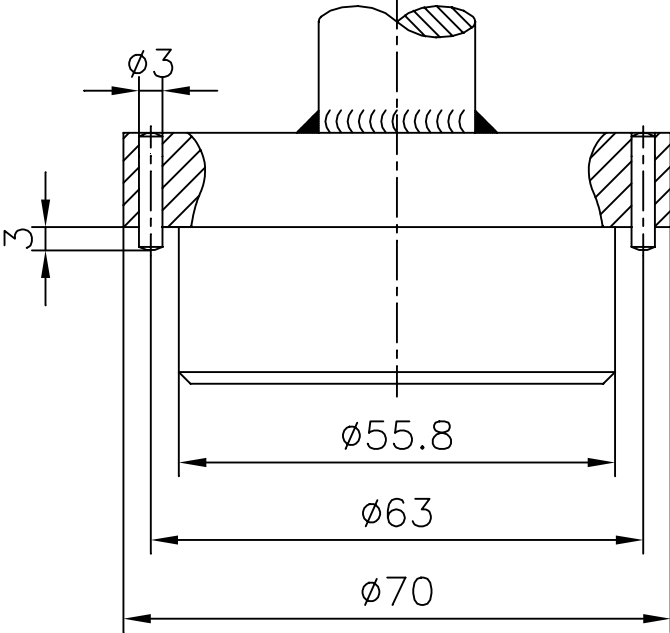


TE81B034 Fixture set:



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/filler 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 12) 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 12) and remove foreign material.
b). Turbine shaft sluggish in Main Bush	Remove Turbine shaft (see page 14) and clean Main bush
c). Bevel gears jammed	Remove Flange/Nipple and Hub Subassembly (see page 16). Clean teeth on Stem and Bevel gear.
d). Stem jammed/sluggish	Remove Gear subassembly (see page 14). Check free rotation of Stem. Remove Stem (see page 18). Remove foreign material/material build-up on Stem and inside Main Collars. Clean Ball Races and Ball retainer with balls. Also clean Main bush.

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 20) and remove material build up, especially on 2nd stage Worm wheel and mating Collar bushes.
f). Hub jammed/sluggish	Disassemble Hub Subassembly (see page 16). Remove foreign material inside Hub. Clean Ball races and Ball retainer with balls. Also clean nose of Body.

Wear

a). Slide bearings	See page 10.-11.
b). Main bush	See page 10.-11.
c). Worm wheels	See page 10.-11.
d). Collar bushes	See page 10.-11.
e). Turbine shaft	Check clearance in Main bush and in Slide bearing. Transverse movement should not exceed 0.5 mm. Also inspect worm wheel for wear.
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 Bevel Gear	Inspect teeth on Stem and Bevel gear for deformation. Mount Hub and Stem in Body (see page 16 and 18). 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.

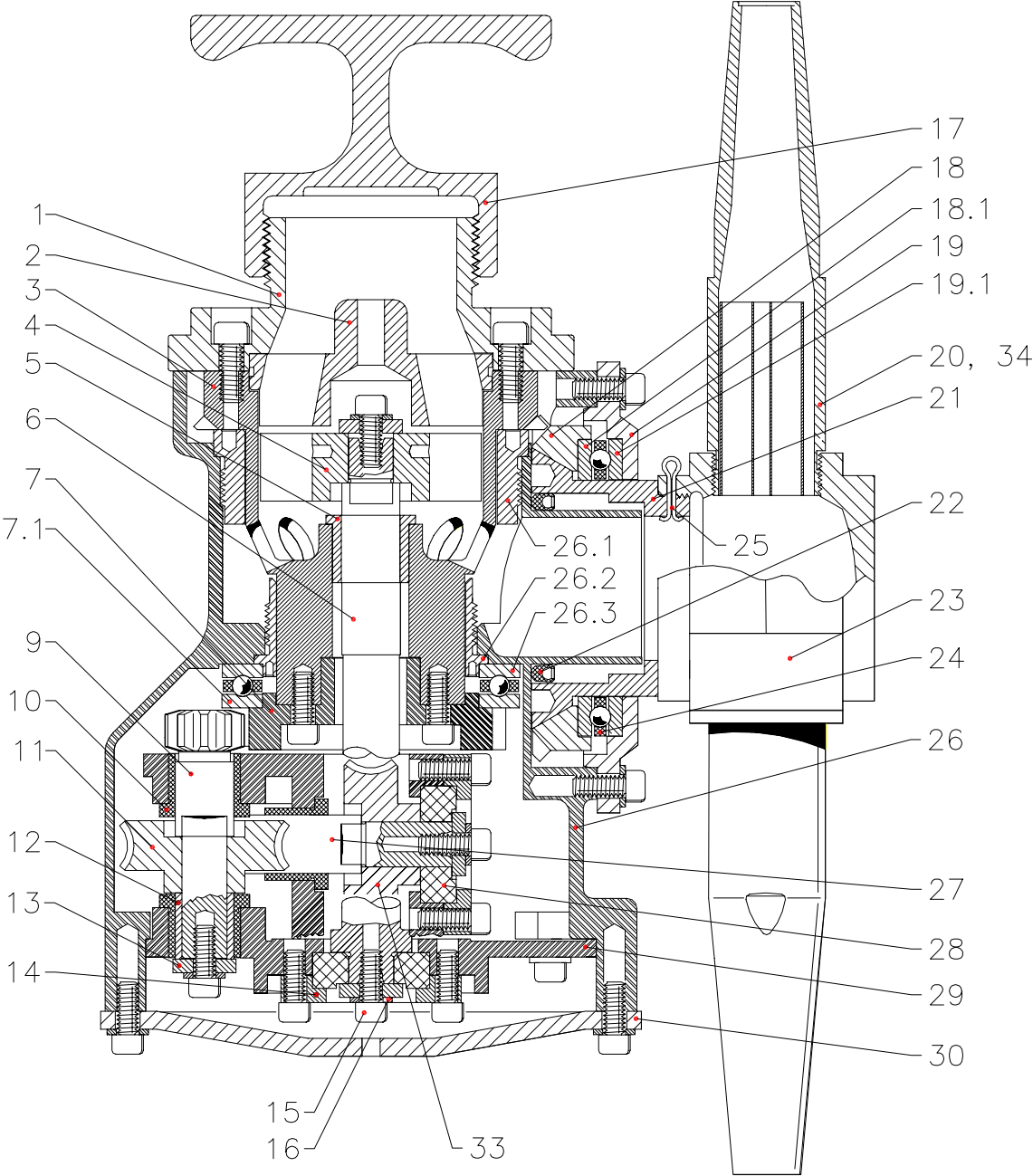
Reference List of Parts

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	TE21B526	1	Stem	Stainless steel	Spare 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	TE21A525	1	Main bush	Polymer	Wear part
6	TE411K	1	Turbine shaft	Stainless steel	Wear part
7	TE712-13	1	Gear wheel w. ball race	Stainless steel	Spare part
7.1	TE826-1	(1)	Ball race	Stainless steel	Wear part
9	TE814	1	Pinion	Stainless steel	Spare part
10	TE21A585	3	Collar bush	Polymer	Wear part
11	<input type="checkbox"/> TE21A367	1	Worm wheel w. reinforcem.	Polymer/Stainless steel	Wear part
	<input type="checkbox"/> TE21A564	1	Worm wheel, E-gear	Stainless steel	Wear part
12	TE817	1	Journal	Stainless steel	Spare part
13	TE719A	4	Washer	Stainless steel	Spare part
14	TE731	2	Bearing cover	Stainless steel	Spare part
15	TE118	38	Screw	Stainless steel	Spare part
16	TE156	18	Spring washer	Stainless steel	Spare part
17	TE801A	1	Handle 1½" BSP	Bronze	Spare part
18	TE722S	1	Bevel gear w. ball race	Stainless steel	Spare part
18.1	TE826-1	(1)	Ball race	Stainless steel	Wear part
19	TE21B340	1	Hub cover w. ball race	Stainless steel	Spare part
19.1	TE826-1	(1)	Ball race	Stainless steel	Wear part
20	TE50B007	2	Nozzle, ø7 mm	Stainless steel	Spare part
	TE50B008	2	Nozzle, ø8 mm	Stainless steel	Spare part
	TE50B009	2	Nozzle, ø9 mm	Stainless steel	Spare part
	TE50B010	2	Nozzle, ø10 mm	Stainless steel	Spare part
21	TE21B536	1	Hub conical part	Stainless steel	Spare part
22	TE21B549	1	Lip seal	Polymer	Wear part
23	TE724-2-15	1	Hub nozzle part	Stainless steel	Spare part
24	TE21A380	2	Ball retainer w. balls	Polymer/Stainless steel	Wear part
25	TE448	1	Cotter pin	Stainless steel	Spare part
26	TE727Z4	1	Body	Stainless steel	Not available
26.1	TE21B520	1	Main collar upper	Polymer	Wear part
26.2	TE21B521	1	Main collar lower	Polymer	Wear part
26.3	TE826-1	1	Ball race	Stainless steel	Wear part
27	<input type="checkbox"/> TE828Z	1	Horizontal shaft	Stainless steel	Wear part
	<input type="checkbox"/> TE21A550	1	Horizontal shaft, e-gear	Stainless steel	Wear part
28	TE21A570	2	Slide bearing	Polymer	Wear part
29	TE730	1	Gear frame	Stainless steel	Spare part
30	TE733-5	1	Bottom cover	Stainless steel	Spare part
33	TE21A367	1	Worm wheel w. reinforcem.	Polymer/Stainless steel	Wear part
34	<input type="checkbox"/> TE50B101	2	Nozzle extension	Stainless steel	Spare part

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

Configuration as delivered marked

Cross Sectional Drawing



Service Kits

TE55H000 Minor Service Kit TZ-82PT

Pos	Part number	No./kit	Description
5	TE21A525	1	Main bush
10	TE21A585	3	Collar bush
11	TE21A367	1	Worm wheel
33	TE21A367	1	Worm wheel
17	TE651	3	Locking wire
22	TE21B549	1	Lip seal
28	TE21A570	2	Slide bearing

TE55H010 Major Service Kit TZ-82PT

Pos	Part number	No./kit	Description
6	TE411K	1	Turbine shaft
7.1	TE826-1	1	Ball race
18.1	TE826-1	1	Ball race
19.1	TE826-1	1	Ball race
26.3	TE826-1	1	Ball race
24	TE21A380	2	Ball retainer with balls
25	TE448	1	Cotter pin
26.1	TE21B520	1	Main collar, upper
26.2	TE21B521	1	Main collar, lower
27	TE828Z	1	Horizontal shaft
-	TE55H000	1	Service Kit Minor TZ-82PT

How to order spare parts and claim procedure

How to Order Spare Parts

On the Cross Sectional Drawing 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 List of Parts, page 32.

Individual parts should always be ordered from the Reference List of Parts, page 32. 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		

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Claim Report Working Conditions

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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: _____

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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.: _____