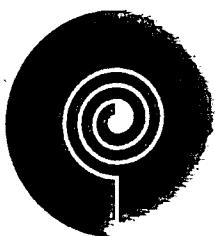


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SPIRAC

SPIRAC CONVEYOR

INSTALLATION, OPERATION & MAINTENANCE MANUAL

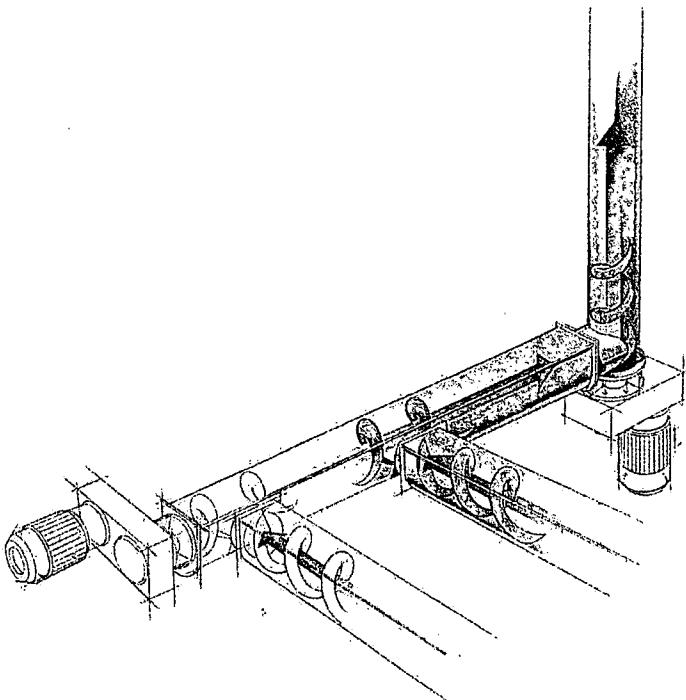
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1.0 INTRODUCTION

1.1 GENERAL

We welcome you as a user of SPIRAC conveyors. Your conveyor is a product of careful engineering and skilled workmanship. We believe you have the best conveyor possible for the service intended. With reasonable care and preventive maintenance it will give you long, efficient, trouble-free service.

Refer to Safety Sheet in section 7.SAFETY.

This manual is furnished to acquaint you with some of the practical ways to install, operate and maintain this conveyor. Read it completely before doing any work on your unit and keep it handy for future reference.

All SPIRAC conveyors are built to convey different types of materials that may be wet, half fluid, sludgy, uneven or hygienically demanding etc. However every conveyor is custom built to give maximum efficiency for the specified material being conveyed. It is not acceptable to convey any product other than that noted in the Specification Sheets.

Any modification, change or rebuilding of the conveyor must be approved in writing by SPIRAC so that machine damage and personal injury are avoided and that documentation is relevant.

Only trained or instructed staff with clearly defined responsibilities for the operation, set up, maintenance or repair on the conveyor should be used.

In the event of any queries please contact your nearest SPIRAC representative.

1.2 PRODUCT IDENTIFICATION

There is one identification plate (ID) on each conveyor. *Figure 1.2a* shows an example of a typical ID plate.

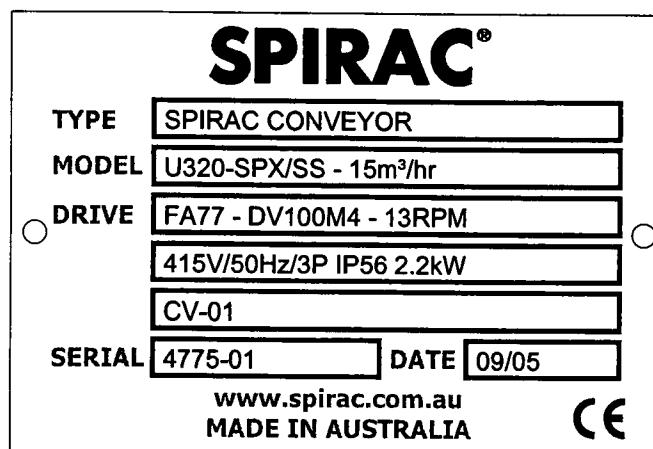


Figure 1.2a

Permanent records for this conveyor are kept by Serial Number and it must, therefore, be used with all correspondence and spare parts orders. The last sequence of numbers is specific to that conveyor and is utilised on orders of more than one conveyor. This sequence of numbers is also the end users equipment tag numbers

1.3 PRODUCT DESCRIPTION

The conveyors' parts can vary in appearance due to the fact that all SPIRAC conveyors are custom built. The figure below (*Figure 1.3a*) shows the principal parts of the conveyor. Drawings of each particular conveyor can be found in Appendix 'General Arrangement Drawings'.

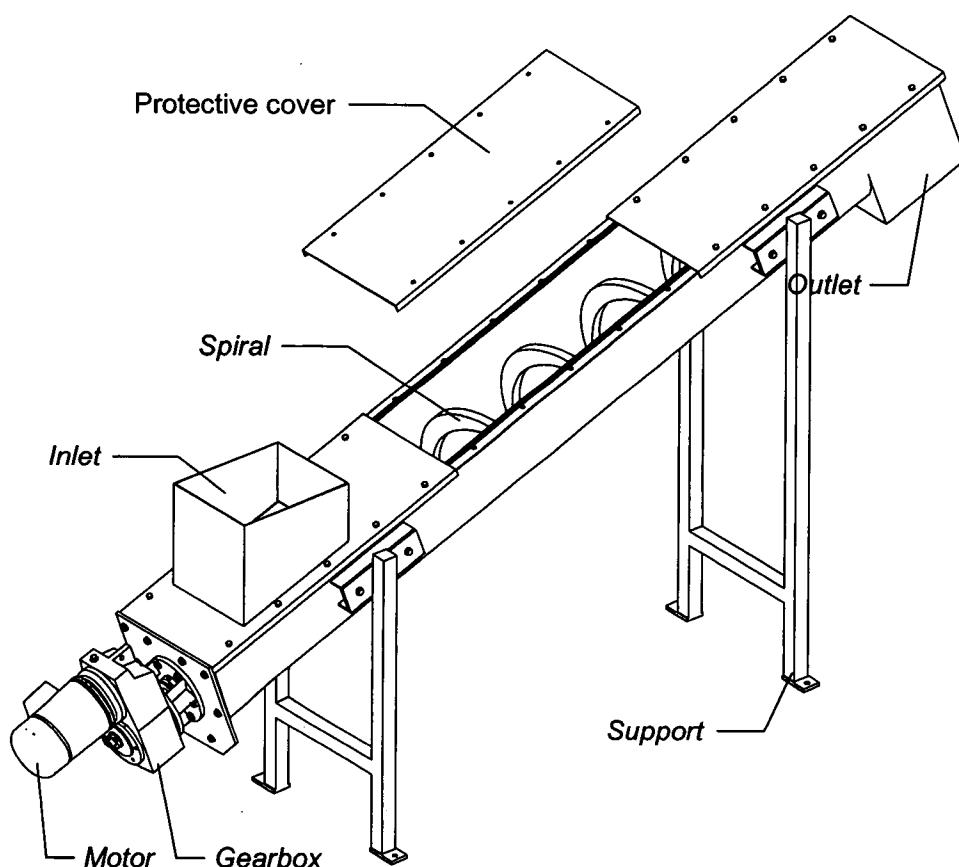


Figure 1.3a - Principal Parts of the Conveyor

The material is fed in/out via one or more inlets/outlets. These can be fitted with covers or slide gates if so required. The inlets/outlets can be mounted to face any direction.

The conveyor moves the material with a rotating steel spiral. The spiral's inclination and diameter are relevant to the material being conveyed. The steel spiral has only one bearing, at the drive end. The spiral is a helix without a centre shaft. This gives the conveyor more space for and less sensitivity to the material being conveyed.

The drive unit can either be pushing or pulling. A pushing drive enables the conveyor to work with materials that tend to snag.

Because the spiral has no centre shaft it is always in contact with the trough when it rotates. A replaceable liner therefore protects the trough. The liners are available in several different materials (plastic, steel, etc.) depending on the material being conveyed. To reduce wear the conveyor should be driven as full as possible.

2.0 INSTALLATION

2.1 GENERAL

These instructions must be carried out in the order stated to prevent machine damage and personal injury.

Check conveyor for shortages and damage immediately upon arrival (an absolute must!). Prompt reporting to the carriers agent, with notations on the freight bill, will expedite satisfactory adjustment by the carrier.

Conveyors are normally shipped from the factory within open sided crates. Gearboxes may either be completely assembled or packed separately for shipping. When the gearbox has been sent separately, fixing bolts will be packaged in a separate container and shipped with the conveyor or attached to the gearbox. Recommended torque settings for the spiral coupling disc and the drive shaft are as follows:

Torque Settings for the Coupling Disc	
A4/70 M12x55	62Nm (oiled thread)
A4/70 M16x55	152Nm (oiled thread)
A4/70 M20x60	296Nm (oiled thread)
Torque Settings for the Drive Shaft	
A4/70 M12x60	20Nm (oiled thread)
A4/70 M16x70	40Nm (oiled thread)
A4/70 M20x80	80Nm (oiled thread)
A4/70 M24x90	200Nm (oiled thread)

Before the conveyor is installed its dimensions must be checked against the dimensions on the installation drawing.

Make sure the inlets/outlets to the conveyor are angled to suit the conveyors inlets/outlets.

The foundation must be substantial enough to absorb vibration (recommendations of the foundation to weigh at least 5 times the weight of the conveyor). The foundation must form a permanent and rigid base for the conveyor supports. This is important in maintaining the alignment of the conveyor trough.

Check to make sure that there are drains if these are required.

2.2 ASSEMBLING THE TROUGH

If the conveyor is so long that the trough has been delivered in several sections these should be assembled first. If the trough is already assembled then continue to Sect. 2.3.

1. Lay out the trough sections in a straight line on a flat surface.
2. Check that the trough-sections are positioned in the correct order. The trough-ends are marked with letters to show the order in which they should be assembled.
3. Make sure that the sealing strip or gasket is placed between the trough-sections.
4. Fix the trough-sections together with the bolts, nuts and washers provided (see *Figure 2.2a*)

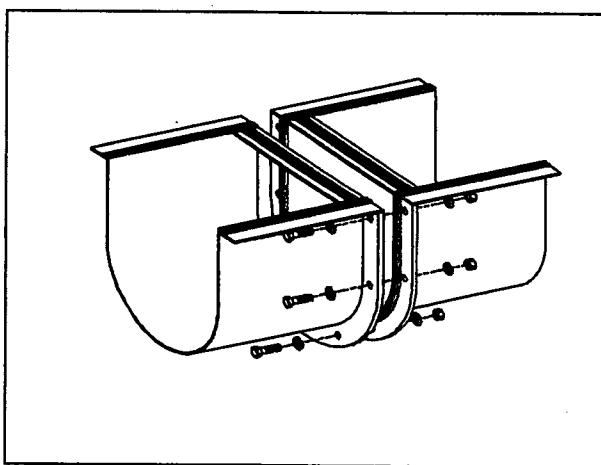


Figure 2.2a - Assembling the trough

2.3 CONNECTION OF SPIRALS

This procedure requires welding, see Section 2.7 "Welding" before commencing to weld. Sometimes the spirals are delivered longer than required and must therefore be cut to the length specified in the drawing. The spiral should be cut at right angles to its axis. After this the edges should be ground and angles cut where needed (see Appendix 'Welding Procedure' if applicable).

If the spiral is delivered in several sections it must be welded together. If the spiral does not need welding go onto Sect. 2.4.

1. Centre the spiral sections in the trough using heavy wooden blocks or steel profiles. Check e.g. with a tri-square that the spiral sections are in line before they are welded together.
2. Weld alternately on both sides of the join.
3. Grind the weld carefully to remove sharp edges and uneven-ness.
4. Prime coat (steel spiral) or passivate (if SS spiral) weld area as detailed in Sect. 4.4.
5. Replace the trough's protective cover.

2.4 MOUNTING THE DRIVE ASSEMBLY

Occasionally the drive assembly is delivered not attached to the conveyor. If your conveyor has the drive assembly sent separately, it is delivered ready to be attached. If the conveyor is to work in a raised position it is better to mount the drive unit with the conveyor on the ground.

1. Remove the transport lock from the spirals' drive shaft.
2. Remove the tape holding the key to the drive shaft.
3. If the drive shaft is not stainless steel it is treated with rust inhibitor. Use degreaser to remove this.
4. Remove the cover from the motors cooling fan so that the drive shaft can be turned using the fan.
5. Turn the drive shaft so that the key-way comes to the right position for the spirals' drive shaft and then push the gearbox onto the drive shaft.
6. Bolt the gearbox to the bell housing flange with the bolts, nuts and washers provided (see *Figure 2.4a*).

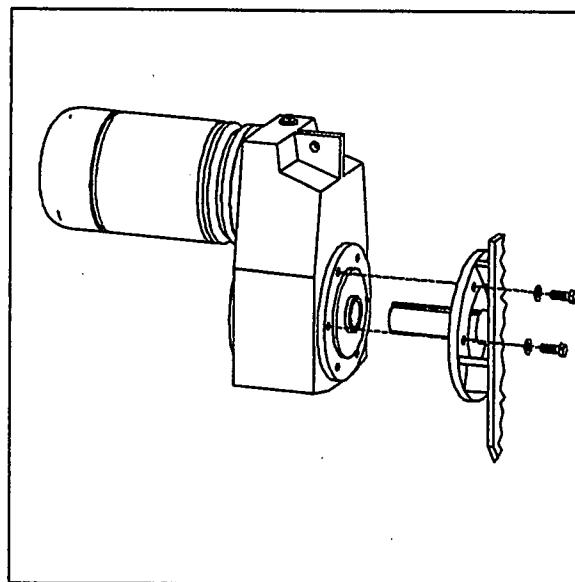


Figure 2.4a - Mounting the Drive Assembly

7. Fasten the locking bolt, spring washer and stepped spacer to the spirals drive shaft in order to fasten this in the gearboxes drive bore (see Fig 2.4b). When the spiral's drive shaft is firmly positioned in the drive bore the locking bolt should be tightened to the torque specified (refer Sect. 2.1).

NOTE - The spiral must be pushed back towards the drive so that the locking bolt can be threaded into the drive shaft.

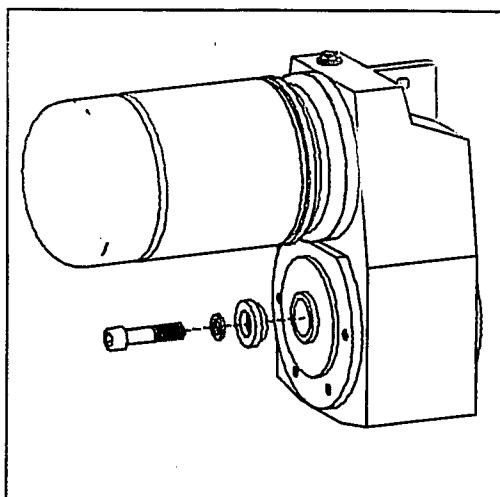


Figure 2.4b - Fastening the Motor

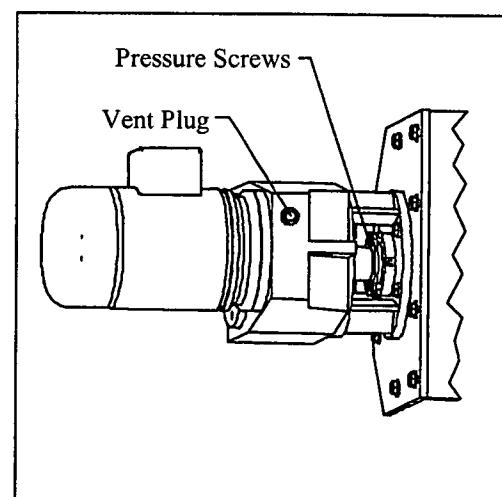


Figure 2.4c-Tightening the Pressure Screws

8. Tighten the pressure screws until the gap between the packing box and the gland is only about 7mm wide. Tighten the screws alternately and check the gap is even after the screws are tightened (see Fig 2.4c).
9. Fill the packing box with grease (see Sect. 4.3).
10. Replace the cooling fan cover to the motor.
11. Remove the screw on the top of the gearbox and attach the vent plug that is provided. (If not already done so.)
12. Check level of oil in the gearbox (see Appendix 'Lubrication Check Sheet' for position of filler plug).

2.5 CONNECTION TO SUPPORT STRUCTURE

All conveyors are fitted with support brackets welded to each side of the conveyor trough. These brackets are pre-slotted and positioned in the factory prior to shipment. If supports are supplied with the conveyor –

1. Make sure no one is standing beneath the trough while it is being lifted or mounted.
2. Lift the conveyor so that it assumes its operating position.
3. Fasten the supports to the support brackets (numbered for identification) utilising the bolts, nuts and washers provided.
4. Make sure the conveyor is sufficiently anchored to the floor to withstand any working loads.

NOTE - If the conveyor is supplied with slide gates they should be attached before the conveyor is raised. If the conveyor is at working height it is possible to attach the slidegate after the supports are attached.

2.6 ELECTRICAL

Conveyor component manufacturers generally do not provide electrical equipment to control the conveyors. In selecting electrical control equipment to be used with any conveyor installation, the purchaser must use equipment conforming to the local electrical regulations. Consideration should be given to some or all of the following devices and to others that may be appropriate.

- Overload Protection - Devices such as electronic shear pins, torque limiters and so forth are used to shut off power whenever operation of the conveyor is stopped as a result of excessive material, foreign objects, excessively large lumps and so on.
- No-Speed Protection - Devices such as zero speed switches to shut off the power in the event of any incident that might cause the conveyor to stop operating.
- Safety shut off switch with power lock-out provision at conveyor drive.
- Emergency stop switches readily accessible whenever required.
- Electrical inter-locking to shut down feeding conveyors whenever a receiving conveyor stops.
- Signal devices to warn personnel of imminent start-up of conveyor, especially if started from a remote location.
- Special enclosures for motors and controls for hazardous atmospheric conditions.

2.7 WELDING

Steel is affected by heat take care to avoid overheating when welding. If welding stainless steel, ensure that the consumable material is as resistant to corrosion as the parent metal. The consumable should therefore contain as much alloy as the parent metal. Welding together two dissimilar materials should be avoided due to the risks for hair-line fractures, reduced weld strength and a greater propensity to corrode due to electrolytic action.

The weld surfaces should be degreased with acetone (or an equivalent solvent) immediately prior to welding. The material should be degreased at least 60mm from the weld surface.

The following electrodes should be used for arc welding;

ELECTRODE TYPES	
OK 4800	For spirals of special steel (the electrode dimension should be at least 2mm to avoid overheating).
OK 4800	For mild steel or HTMAS.
OK 6130	For stainless steel.
OK 6330	For acid resistant stainless steel to mild steel (or to HTMAS).
OK 6333	For stainless to mild steel (or to HTMAS).

Suitable electrode sizes are 2.0 to 3.25mm depending on where the weld is placed.

If your conveyor is delivered in sections, it will be necessary to weld the spiral. Refer to instructions in 2.3 and Appendix 'Welding Procedure' for the correct procedure.

For weights of conveyors see Appendix 'General Arrangement Drawings'. Weights are shown under Notes on each Drawing.

3.0 OPERATION

3.1 PRE-START CHECKS

Only persons completely familiar with the safety aspects (as detailed in Sect. 7.0) should be permitted to operate the conveyor. The operator should thoroughly understand these instructions before attempting to use the conveyor. Failure to follow these precautions may result in serious personal injury or damage to equipment.

Before the initial start-up of the conveyor, make the following inspections;

1. Check to make sure the gearbox is securely fastened to the conveyor drive plate.
2. Check all connections to the motor and starting device with the wiring diagram. Check the voltage, phase and frequency on motor nameplate.

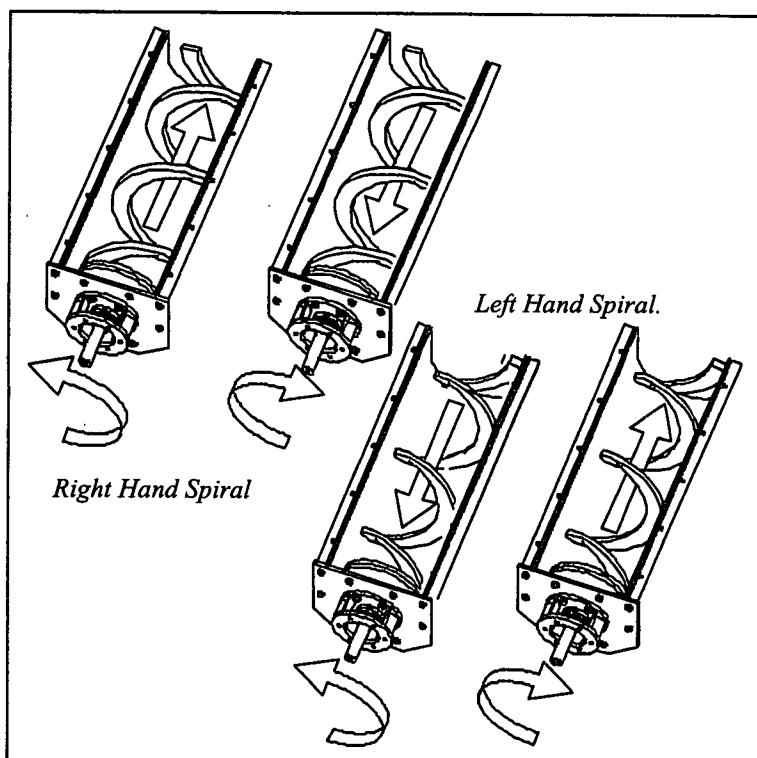


Figure 3.1a - Direction of Rotation

3. Remove motor cooling fan cowling and rotate spiral via fan to ensure that it rotates freely. At the same time check spiral rotation and that material will flow towards outlet.
4. Check gland packing box adjustment, lubrication and piping (if supplied).
5. Check gearbox lubrication level.
6. Make sure all covers, guards and safety equipment are properly installed.

3.2 OPERATIONAL CHECK-LIST

The following should be used upon initial start-up and after extended shut-down periods.

1. Operate conveyor empty for 1-2 hours, making a continuous check for heating of gearbox bearings and noisy operation.
2. Check that the discharge of the conveyor is clear before feeding any material.
3. Increase feed rate gradually until rated capacity is attained.
4. Stop and start conveyor several times, and allow to operate for several hours.
5. Shut off conveyor and lock out power supply. Remove covers and check coupling bolts for tightness.
6. Replace covers.
7. Ensure material is "flowing" in the correct direction.
8. Make certain that the conveyor controls (e.g. motion sensor, slide gates) are interlocked correctly and functional.

3.3 EXTENDED SHUT-DOWN

If the conveyor is to be inoperative for a long period of time, it is advisable to permit it to operate for a period of time after the feed has been cut-off in order to discharge as much material as possible from the trough. The trough should be cleaned completely after the conveyor is shut down and the power locked out.

Conveyors that are shut down during freezing conditions should be protected by one of the following methods;

- Empty the trough completely.
- Insulate the conveyor to prevent the material from freezing.

4.0 MAINTENANCE

4.1 GENERAL

Generally it is necessary to establish routine periodic inspections of the entire conveyor to ensure continuous maximum operating performance. Practice good house keeping. Keep the area around the conveyor and drive assembly clean and free of obstacles to provide easy access and to avoid interference with the function of the conveyor or drive.

Always –

1. Follow the established local regulations and/or procedures for isolation of equipment.

Or-

2. Lock-out power to motor before doing any maintenance work preferably with a padlock on control panel or isolator.
3. Do not remove padlock from control, nor operate conveyor, until covers and guards are securely in place.

4.2 PACKING GLAND ADJUSTMENT

Packing gland bolts should be evenly adjusted so they are little more than finger tight. Over tightening of the packing gland may result in premature packing failure and possible damage to the shaft and gland.

When packing is new, frequent minor adjustments during the first few hours (if material being conveyed is very fluid) of operation are recommended in order to compress and seal the packing.

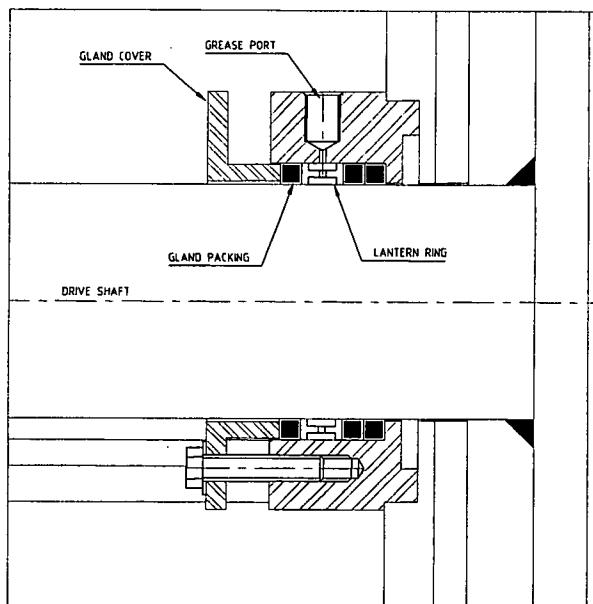


Figure 4.2a - Packing Box Arrangement

4.3 LUBRICATION

Please refer to the Appendix 'Lubrication Check Sheets' for Grease and Oil types for your particular conveyor.

4.4 SURFACE COATING

This section describes how the conveyors surfaces should be treated, if made of stainless steel or not. The materials of construction for your particular conveyor are specified in the Appendix 'Conveyor Data Sheets'.

Operation in sewage treatment plant or damp environments exposes the conveyor to air that may contain chemically or biologically corrosive particles. In these cases painted, galvanised and stainless steel surfaces can be damaged. It is therefore important that personnel follow the operating instructions and remedy any corrosion or damage to coatings as soon as they occur.

Standard Procedure for Surface Repair

- **Painted**

In the standard manufacturing procedure the conveyors trough and protective cover are sandblasted to Class 2½ as per AS1627.4 and then prime coated with a two component red oxide zinc phosphate epoxy polyamide to give a dry film thickness (DFT) of no less than 75µm. The final coat shall be a two component epoxy polyamide to give a DFT of no less than 175µm. The coating shall be sufficiently cured for re-coating within 24 hours at 25°C.

Final colour to be Blue Grey N53 (or as specified by client) as shown in AS2700.

To ensure long equipment life it is important that the coated surfaces are maintained to prevent rust that can cause serious damage in a short space of time.

Rust may be ground back to bare metal and the surface carefully cleaned before it is covered by the above or an equivalent rust protective coating.

- **Hot Dip Galvanised.**

The conveyor trough and protective cover have been Hot Dip Galvanised to AS1650 and AS1214.

Rust may be ground back to bare metal and the surface carefully cleaned before application of a suitable "Cold Galvanising" agent.

- **Stainless Steel.**

The materials used are 304 or 316SS (refer to Appendix 'Conveyor Data Sheets'). These materials do not need any special treatment but the following should be observed.

Grinding or welding in close vicinity of the conveyor must be avoided. Showering sparks onto the stainless steel can cause a rust brown discolouration.

All stainless steel surfaces must be handled so that the corrosive resistance is not impaired. As a minimum the stainless steel should not come into contact with steel of other qualities during transportation or assembly. Wood, cloth or plastic should be used to pad the stainless steel when lifting or transporting the conveyor.

The heat input during welding leads to the formation of chromium oxides on the steel surface. The underlying material is depleted of chromium, increasing the risk for corrosion. Passivating removes the oxides, scale and slag. The surface is cleaned to bare metal and a thin protective layer, or "passive" layer, is built up. This restores optimal corrosion resistance and ensures that the weld will have the longest possible life.

4.5 MAINTENANCE TIME TABLE

The following checks outlined below are recommendations only. They can be adjusted to suit the operation time of the conveyor or incorporated into existing site maintenance procedures.

PREVENTIVE MAINTENANCE	
PERIOD	ACTIVITY
Weekly	Check bell housing packing box temperature with a thermometer, not by hand. If over 60°C it may be due to lack of grease.
	Check for any unusual vibration or noise. Locate and rectify.
Monthly	Clean the conveyor inside and outside (if necessary). This is usual if the conveyor has been standing idle for long periods.
	Check the liner for wear. If yellow backing is showing through replace damaged section.
Half Yearly	Check gland packing box for leaks (if very moist materials). Re-tighten if necessary.
	Check the spiral for any excessive wear or unusual damage. A maximum of 20% of the spirals original sectional dimension can be worn away before it requires replacement. If the spiral is extremely long (>15m) it should be replaced before this level is reached.
	Check all fasteners (supports, trough connections etc.).
	Check all trough welds.
	Check the oil level in the gearbox and its colour. If the oil is heavily emulsified (cream-like) there is water in the oil. Rectify and replace.
	Check the control system, i.e. emergency stops, sequential control etc.

5.0 SERVICE

5.1 REPLACING THE GLAND PACKING

1. Empty conveyor of all material.

Unscrew the gland cover screws and slide the cover back along the drive shaft.

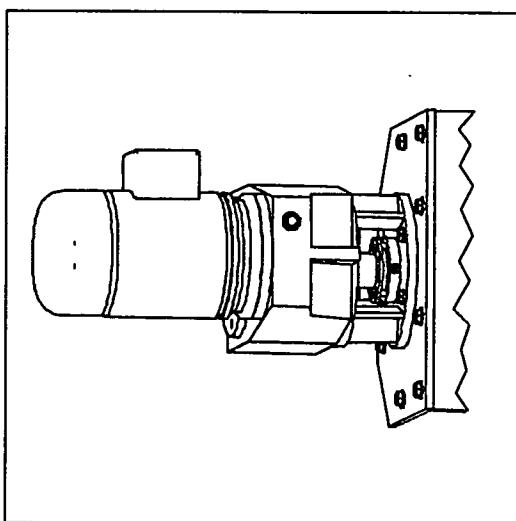


Figure 5.1a - Gland Cover Screws

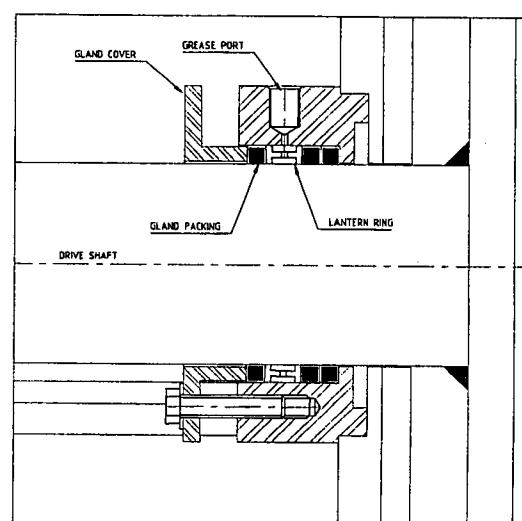


Figure 5.1b - Packing Box Assembly

2. Remove the packing and clean the packing box seats.
3. Cut the new packing with an angle (45 Degrees). Put tape around the packing before it is cut to prevent the ends from fraying.
4. Push the new packing into the packing box seat cut ends first.
5. Repeat this process for the other packs. Check that each is in place before the next is put in. The packs should be rotated by 90° to each other so that the joins are in different places.
6. Replace the gland cover and tighten the screws so that the packing is properly formed in the packing box seats.
7. Lubricate as per the Appendix 'Lubrication Check Sheets'.
8. Test run the conveyor with material to make sure the packing box does not leak.

5.2 REPLACING THE LINERS

Depending on what is to be conveyed the conveyor can be lined with different materials. There are three different types of liners -

- Plastic or UHMW Polyethylene
- Steel Bar
- Steel Plate

Technical data concerning the liners steel and plastic qualities is specified on the drawings.

Liners can often be replaced without the spiral being totally removed. However servicing is easier without the spiral in the trough.

Replacing the Plastic Liner -

The new plastic liners are either delivered ready shaped or flat. The shaped liners should not be removed from their packaging until immediately before they are to be fitted. Once the liner has been removed from its packaging it takes only one hour for it to become flat and needs reshaping.

1. Empty the conveyor of material. Unfasten the lid and remove or push it back from the trough (see Fig 5.2a).
2. Unfasten the nuts on the coupling disc bolts holding the spiral to the coupling disc.
3. Remove the spiral from the trough or lift it to increase accessibility (see Fig 5.2b).

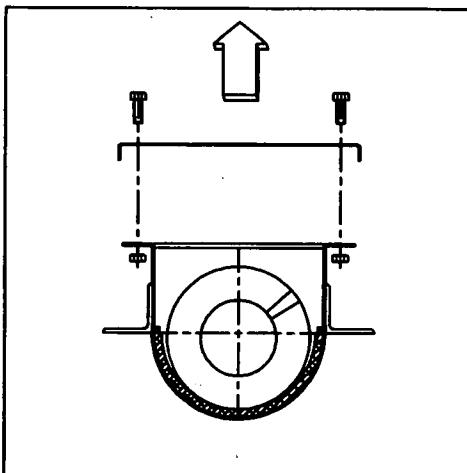


Figure 5.2a - Taking off the Cover

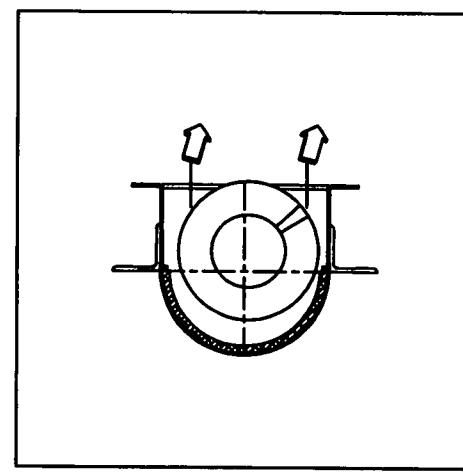


Figure 5.2b - Lifting the Spiral

4. Insert a heavy duty screw driver or lever down between the trough and the plastic liner so that it releases from its steel block retainers (see Fig 5.2c).
5. Take hold of the liner and pull it out (see Fig 5.2d).

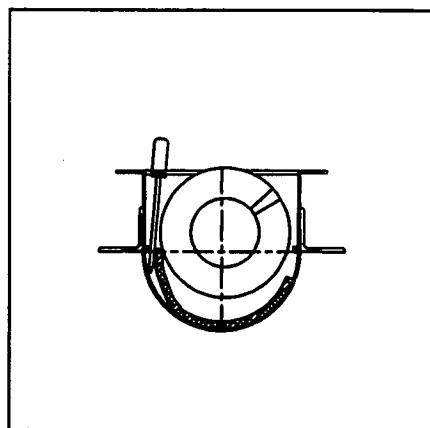


Figure 5.2c - Levering Out the Liner

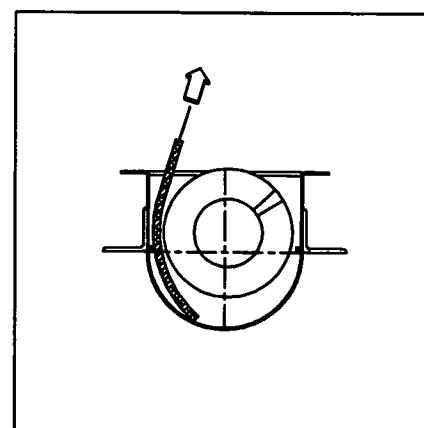


Figure 5.2d - Pulling Out the Liner

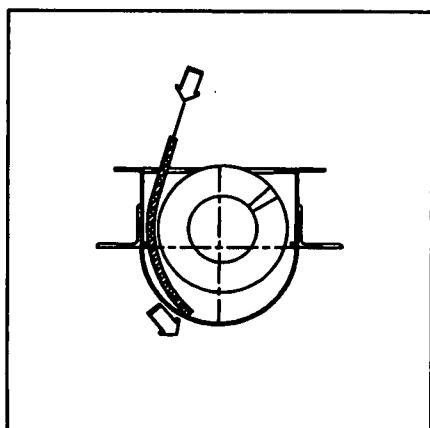


Figure 5.2e

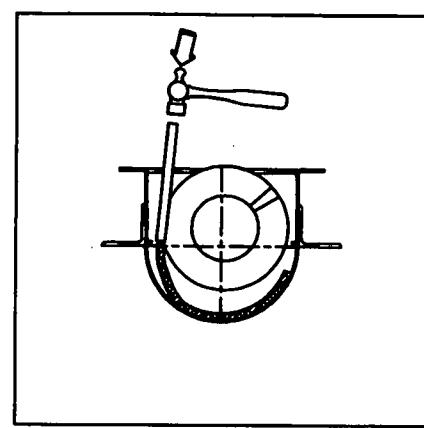


Figure 5.2f

6. Push the new liner under the spiral, making sure the wear indicator strip is at the bottom. It is important to secure the liner under the retainer blocks on each side of the trough (Figure 5.2e & 5.2f).
7. Replace the bolts holding the spiral to the coupling disc.
8. Replace the lid to the trough (Figure 5.2g).

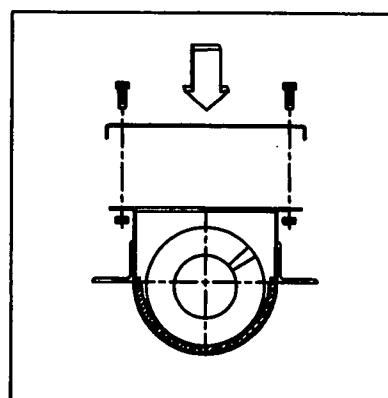


Figure 5.2g Replacing the Liner

Replacing the Steel Bar and Steel Plate Liner -

This section describes the replacement of both steel bar and steel plate liners.

The majority of the steps are common to both procedures. Where the steps differ, this is noted in the text. This procedure requires welding. See *Section 2.8 "Welding"* before commencing to weld.

1. Unfasten the lid and remove or push back from the trough.
2. Unfasten the nuts on the coupling disc bolts holding the spiral to the coupling disc.
3. Remove the spiral from the trough or lift it to increase accessibility (fig 5.2h).

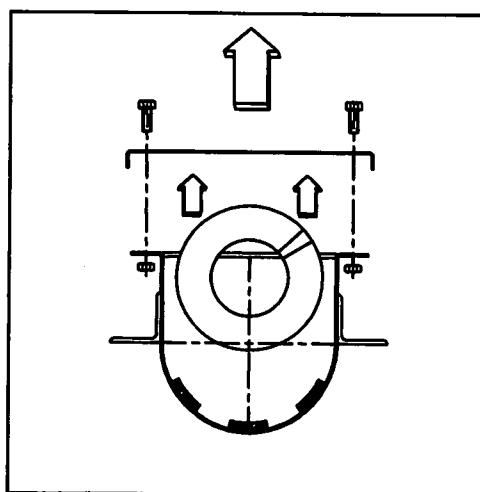


Figure 5.2h - Taking off the Cover, Removing the Spiral

4. Use a grinder to grind away the welds from both sides of the steel bars (or steel plate liner) and remove the bars (liner) from the trough.

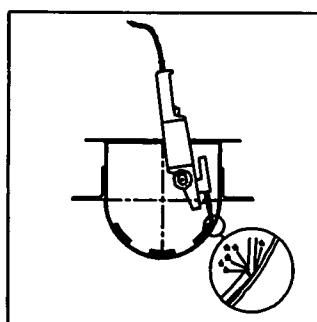


Figure 5.2i

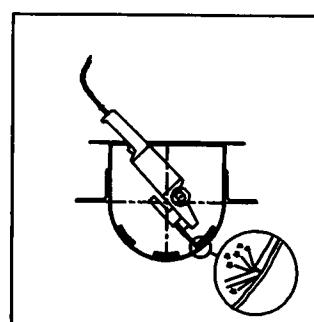


Figure 5.2j

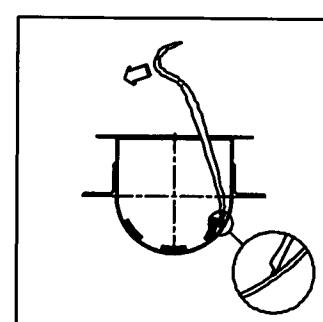


Figure 5.2k

5. Grind the surfaces clean where the old welds were positioned.
6. Degrease the surfaces (with acetone or a similar solvent) to prepare for the new steel bars (liners).
7. Take a new steel bar (steel plate liner) and fasten it in the position of the old one.
8. Check that the bars are all in line.

9. For steel plate liner:-place welds opposite each other along the length of the trough.
For steel bars:- Put welds (75run/250pitch) along the length of the bar. The welds should alternate from the left to the right hand side of the bar (125pitch). Make sure the ends of the bars are welded to the trough (fig. 5.2l).
10. Repeat this procedure for the other steel bar liners.
11. Replace the spiral to the trough and fasten it to the coupling disc.
12. Replace the protective cover to the trough (fig. 5.2m).

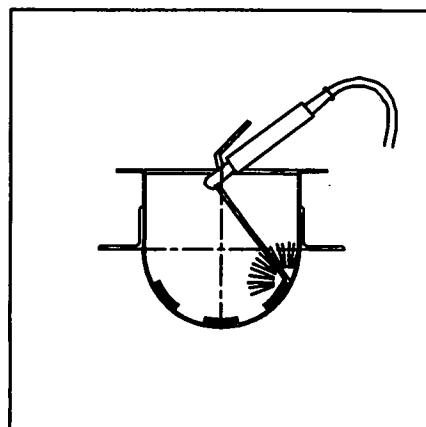


Figure 5.2l

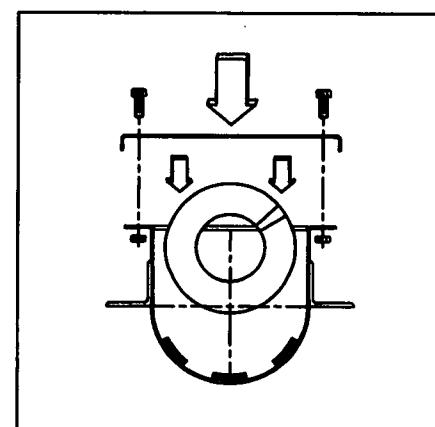


Figure 5.2m

5.3 REPLACING THE SPIRAL

There should be no welded joints in the spiral closer than 4 spiral-turns to the spirals coupling disc.

1. Undo the bolts holding the protective cover and remove it from the trough.
2. Check the new spiral has the dimensions given on the drawing and check against the existing spiral.
3. Un-bolt the spirals coupling disc from the drive shafts coupling disc.

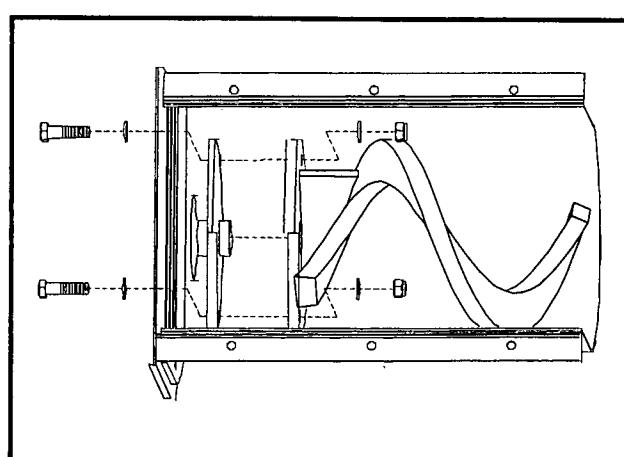


Figure 5.3a - Removing the Spiral

4. Lift the spiral from the trough. Depending on the local facilities the spiral can be removed in several ways. The spiral can be either lifted, pushed out through the troughs opening or cut into sections etc.
5. Place the new spiral in the trough.
6. Fasten the coupling discs together (use new locking nuts each time).
7. Replace the protective cover to the trough.

5.4 REPLACING THE DRIVE SHAFT

1. Undo the bolts holding the protective cover and remove it from the trough.
2. Un-bolt the spirals coupling disc from the drive shafts coupling disc.
3. Remove the spiral from the trough or move it forward enough so that the drive shaft can be removed via the trough.
4. Unscrew the locking bolt, spring washer and stepped spacer from the drive shaft, located at the rear of the gearbox (see fig. 5.4a).
5. Remove the gland cover screws from the packing box (see Fig 5.4b).

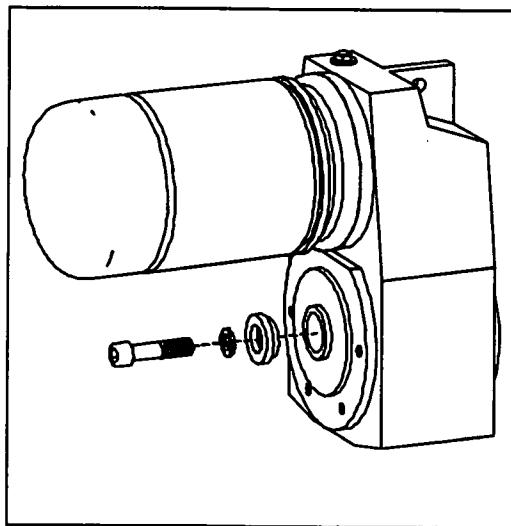
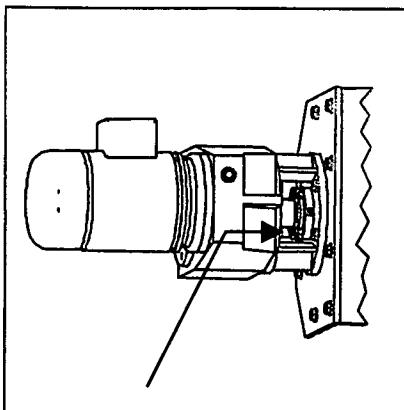
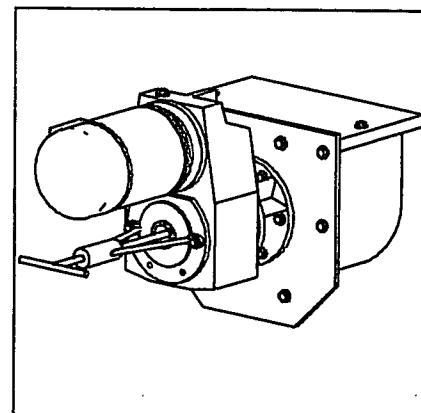


Figure 5.4a - Remove the Locking Bolt, Spring Washer and Stepped Spacer

6. Use an extractor tool to push the drive shaft into the trough. Remove the key from the gearbox keyway before the drive shaft goes through the packing box.

NOTE - The end of the drive shaft must be protected so that the threads are not damaged. A screw can be threaded into the end of the shaft before this is placed under pressure.

7. Remove the old drive shaft from the trough and lift in the new one.

*Figure 5.4b - Gland Cover Screws**Figure 5.4c - Using an Extractor Tool*

8. Turn the gearbox hollow shaft so that the key way is in the correct position in relation to the spirals drive shaft. Push the new drive shaft in so that it takes the place of the old shaft. Place the key in the key way before the drive shaft goes into the gearboxes hollow shaft.

9. Screw the locking bolt, spring washer and stepped spacer into the new drive shaft.

NOTE - The spiral must be pushed towards the drive end in order for the locking bolt to thread into the drive shaft.

10. Tighten the gland cover screws so that only a 7mm (approx.) gap remains between the packing box seat and the gland. Tighten the screws alternately and check the remaining gap after each turn.

11. Fasten the coupling discs together (use locking nuts).

12. Replace the protective cover to the trough.

13. Lubricate packing box as per Appendix 'Lubrication Check Sheets'.

14. Test run conveyor with material to make sure that the packing box does not leak. If there is heavy leakage tighten the gland cover screws.

NOTE - DO NOT OVERTIGHTEN.

5.5 REPLACING THE SPIRAL BRUSH

This procedure involves welding. See *Section 2.7 "Welding instructions"* before commencing to weld.

1. Remove the spiral as described in *Section 5.3*.
2. Grind away the welds holding the spiral brush.
3. Remove the spiral brush.
4. Form the new spiral brush around the spiral. The new brush should stick out from the spiral by about 5 mm.

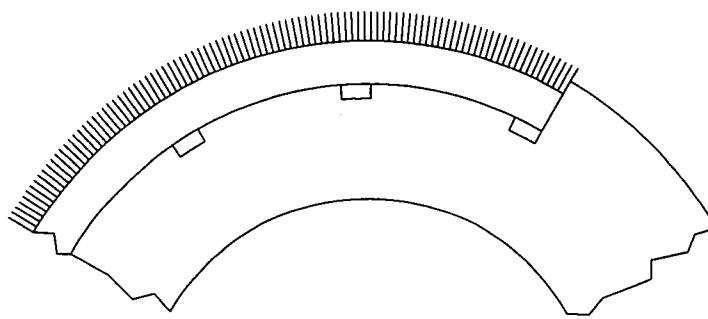


Figure 5.5a. Mounting the spiral brush.

5. Weld the new spiral brush to the same side as the previous brush.
6. Replace the spiral to the trough as described in *Section 5.3*.

6.0 TROUBLESHOOTING

6.1 GENERAL

Between regular maintenance inspections, be alert for signs of motor or Conveyor trouble. Common symptoms are listed below.

Correct any trouble immediately and AVOID COSTLY REPAIR AND SHUTDOWN.

Troubleshooting shall be done with the power supply disconnected and locked off, except for those checks which cannot be performed without voltage.

Always make sure there is no one near the conveyor when the power supply is turned on. Use the following table as an aid to troubleshooting. It is assumed the conveyor and installation have formerly functioned satisfactorily.

6.2 TROUBLESHOOTING CHART

PROBLEM	CAUSE	REMEDY
Conveyor Fails to Start	Blown Fuse	Determine and correct cause of failure and replace fuse
	Motor protection device activated	Reset protective device. Identify and correct cause for failure
	Motor protection device faulty or will not reset	Check protection device for faults
	Motor not connected for proper voltage	Check connection diagram in conduit box cover and correct the wiring.
Conveyor starts but motor protection device trips immediately	Spiral jam from foreign object entering trough.	Remove object and restart
	Gearbox seizure due to no oil	Remove gearbox and service
	Settings on motor protection incorrect	Check and re-set
	Motor improperly connected	Check connection diagram in conduit box cover and correct the wiring
Excessive vibration	Loose drive station	Check and re-tighten fixing bolts
	Unstable ground conditions	Rectify
	Loose support/trough connections	Check and re-tighten
Conveyor output is too low	Worn spiral screw	Replace spiral
	Material being conveyed is not as originally specified	Contact SPIRAC

TROUBLESHOOTING CHART cont.....

PROBLEM	CAUSE	REMEDY
Motor overheats	Motor not connected for proper supply voltage	Check connection diagram on conduit box cover and correct wiring
	Insufficient cooling air volume due to obstructed air flow	Provide clearance around fan area
	Motor allowable duty cycle is exceeded. Too many starts per hour	The problem may not be solved by a larger unit. Review with manufacturer
	Single phasing due to break or loose connection in supply line or blown fuse	Repair supply line. Replace fuse
Spiral screw jamming	Excess material causing spiral to rise and interfering with lids/cross bars	Reduce material inflow. Install anti-lift bars
	Foreign object in conveyor	Remove object
	Liner has come loose and wedged itself inside the spiral	Remove and replace liner
	Incorrect alignment of screw when welding causing eccentric rotation	Confirm and replace/re-weld
Conveyor runs in wrong direction	Electrical cable leads wired incorrectly	Reconnect two phase wires.

7.0 SAFETY

7.1 GENERAL

The following instructions should always be observed when handling or working with the conveyor –

1. SPIRAC equipment is supplied conforming to AS 4024.1 - 1996 - Safeguarding of Machinery and complies providing all guards remain locked in place with the bolts supplied. Any work that necessitates removal of any guarding must be carried out in strict accordance with the SPIRAC Operation and Maintenance manual supplied. However Local work practices and regulations should be applied to the selection of any protective equipment or labeling that may be required.
2. Ensure the conveyor is maintained in accordance with section 4. MAINTENANCE of this manual.
3. Any person who will install, operate, service, repair or supervise the operation of this equipment must be trained and informed in accordance with local regulations and legislation.
4. Where local regulations dictate that Work method statements, Safe working practice statements, Job Safety Analysis, Pre-commencement Hazard checks and attendance to tool box meeting be adhered to, it is the responsibility of the owner/operator of this equipment to ensure the forenoted is actioned and recorded.
5. Always isolate the conveyor main power source and ensure that the conveyor cannot be started before commencing any servicing work.
6. Ensure that all service equipment, such as but not restricted to, chain blocks, slings, staging is well maintained and is in accordance with local regulation and legislation.
7. Never try to lift more than one item at a time i.e. protective covers (or lids).
8. Take care to avoid compression injuries when removing or replacing the spiral. Note that the spiral can slide out of the trough when the conveyor is inclined.
9. Personnel operating or servicing the conveyor should be equipped with the correct protective wear should a biological or mechanical hazard be present. Local work practices and regulations should be applied to the selection of the protective equipment.
10. Personnel working frequently in these areas where conveyors have remote control or automatic start/stop, must be informed of the operation.
11. On completion of any service work, please refer to this manuals section 3. OPERATION, for the necessary instruction on re-starting.
12. Ensure that no one is working on the conveyor before it is started.
13. Never use the conveyor for other purposes other than which it is designed or above its given capacity.
14. Personnel should never use the conveyor as a walkway to go to other areas.

7.2 NOISE

The equivalent continual A-wave noise level during normal operation is <70dB.

In cases where the equivalent continual A-wave noise level exceeds 70 dB, ear protection must be worn.

8.0 SPARE PARTS

8.1 CONVEYOR PARTS DESCRIPTION

The list of spare parts gives the correct names for the parts of the conveyor and therefore eases the ordering of spare parts.

The dimensions and technical data for your conveyor are specified in Appendix 'General Arrangement Drawings'. Make sure you have the drawing available when ordering parts by telephone. Also refer to Technical Specifications in Appendix 'Conveyor Data Sheets'.

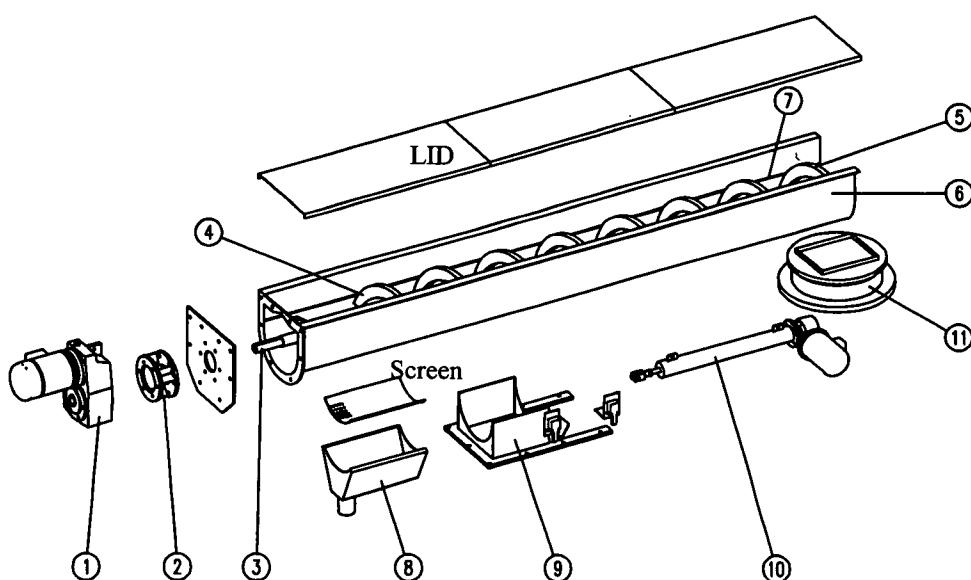


Figure 8-1. Conveyor Parts

Conveyor Standard Parts		Accessories	
1	Motor and gearbox	8	Draining section with screen
2	Bell Housing	9	Slidegate (Knifetype)
3	Drive shaft and coupling disc	10	Electronic linear actuator / pneumatic cylinder
4	Spiral and coupling disc	11	Longopac holder with adapter
5	Spiral		
6	Trough		
7	Liner		

Recommended Spare Parts

SPIRAC have endeavoured to provide you with equipment that will give you continued and long lasting service. However, we recommend that the following wear items be kept as a minimum to ensure uninterrupted service:

Drive Station	Gland Packing	1 Set (for each size gearbox supplied)
Conveyor	Liners – Duraflo (with coloured wear backing) or Steel	Depends on conveyor length and type of liner originally supplied - Refer to Drawing
Instrumentation (Where applicable)	Motion Sensing Probe	1 required (for each area)

For actual part numbers and descriptions, please refer to Technical Specifications in Appendix 'Conveyor Data Sheets' and the Appendix 'General Arrangement Drawings', also quoting the drawing number.

8.2 SUPPLIER CONTACT

SPIRAC ENGINEERING has Sales Offices throughout the world. Manufacturing is undertaken in Australia and Sweden. If you are unsure of your Agent, please make your initial contact to –

SPIRAC Pty Ltd
 PO Box 1216
BIBRA LAKE, DC WA 6965
 Western Australia
 Ph : +61 (08) 9434 0777
 Fax : +61 (08) 9434 0778
 Email: info@spirac.com.au

Or-

SPIRAC Pty Ltd
 32/8 Victoria Avenue
CASTLE HILL NSW 2154
 Sydney
 Ph : +61 (02) 9680 9381
 Fax : +61 (02) 9680 9382

APPENDIX A
CONVEYOR DATA SHEETS

 SPIRAC®	Document Number :	5317-CDS-01
	Project :	Goodna STP
	SPIRAC Client :	Aquatec_Maxcon (Qld) Pty Ltd
	Conveyor Type :	OK420-SPX/SS
	SPIRAC Conveyor Tag :	5317-01 (CV-01)
	Drawing No :	5317-01

Rev : 0

CONVEYOR DATA SHEET

Application Details	
Material to Convey	Dewatered sludge
Capacity (m3/hr)	15
Density (kg/m3)	1000 Approx

Spiral Details	
Spiral Designation:	AB365/398-70x25+40x15
Direction of wind	Right hand wound
Pushing / Pulling	Pushing
Material	HTMAS

Construction Details	
Trough / Lid Material	3mm Thk 316SS
Liner(Material/Thkness)	SPX /15mm
Packing Gland	Buraflon 5846 / 6.35
Dry Conveyor weight (kg)	2200

Optional	
Local Control Panel	N/A
Slidegates	N/A
Washdown Nozzles	N/A
Load Monitor	N/A
Motion Sensor	N/A

Motor Details	
Manufacturer	SEW
Frame Size / Poles	DV132ML4
Rated Power (kW)	9.2
Rated Current (A)	18.7
Motor Speed (rpm)	1440
Voltage / Hertz / Phase	415 / 50 / 3
IP Rating	IP56
Finish	Standard

Gearbox Details	
Manufacturer	SEW
Model	KA97
Ratio (i)	47.93:1
Output Speed (rpm)	30
Mounting Position	M2-M5B
Oil Capacity (litres)	15.2
Anti-Condensation Heater (230V)	N/A
Oil Level Sight Gauge	N/A
Torque Limiter	N/A
Finish	Standard
Drive Serial No.	

 SPIRAC®	Document Number :	5317-CDS-02
	Project :	Goodna STP
	SPIRAC Client :	Aquatec_Maxcon (Qld) Pty Ltd
	Conveyor Type :	U420-SPX/SS
	SPIRAC Conveyor Tag :	5317-02 (CV-02)
	Drawing No :	5317-02

Rev : 0

CONVEYOR DATA SHEET

Application Details	
Material to Convey	Dewatered sludge
Capacity (m3/hr)	15
Density (kg/m3)	1000 Approx

Spiral Details	
Spiral Designation:	AB365/398-70x25+40x15
Direction of wind	Right hand wound
Pushing / Pulling	Pushing Reversing
Material	HTMAS

Construction Details	
Trough / Lid Material	3mm Thk 316SS
Liner(Material/Thkness)	SPX /12mm
Packing Gland	Buraflon 5846 / 6.35
Dry Conveyor weight (kg)	500

Optional	
Local Control Panel	N/A
Slidegates	N/A
Washdown Nozzles	N/A
Load Monitor	N/A
Motion Sensor	N/A

Motor Details	
Manufacturer	SEW
Frame Size / Poles	DRE90L4/DH
Rated Power (kW)	1.5
Rated Current (A)	3.7
Motor Speed (rpm)	1435
Voltage / Hertz / Phase	415 / 50 / 3
IP Rating	IP56
Finish	Standard

Gearbox Details	
Manufacturer	SEW
Model	FA77B
Ratio (i)	108.46:1
Output Speed (rpm)	13
Mounting Position	M1
Oil Capacity (litres)	5.9
Anti-Condensation Heater (230V)	N/A
Oil Level Sight Gauge	N/A
Torque Limiter	N/A
Finish	Standard
Drive Serial No.	

 SPIRAC®	Document Number :	5317-CDS-03
	Project :	Goodna STP
	SPIRAC Client :	Aquatec_Maxcon (Qld) Pty Ltd
	Conveyor Type :	U320-SPX/SS
	SPIRAC Conveyor Tag :	5317-03 (CV-03)
	Drawing No :	5317-03

Rev : 0

CONVEYOR DATA SHEET

Application Details	
Material to Convey	Dewatered sludge
Capacity (m3/hr)	8
Density (kg/m3)	1000 Approx

Spiral Details	
Spiral Designation:	AB280/330-60x25+40x8
Direction of wind	Right hand wound
Pushing / Pulling	Pushing
Material	HTMAS

Construction Details	
Trough / Lid Material	3mm Thk 316SS
Liner(Material/Thkness)	SPX /12mm
Packing Gland	Buraflon 5846 / 6.35
Dry Conveyor weight (kg)	

Optional	
Local Control Panel	N/A
Slidegates	N/A
Washdown Nozzles	N/A
Load Monitor	N/A
Motion Sensor	N/A

Motor Details	
Manufacturer	SEW
Frame Size / Poles	DRE100LC4/DH
Rated Power (kW)	3
Rated Current (A)	6.5
Motor Speed (rpm)	1455
Voltage / Hertz / Phase	415 / 50 / 3
IP Rating	IP56
Finish	Standard

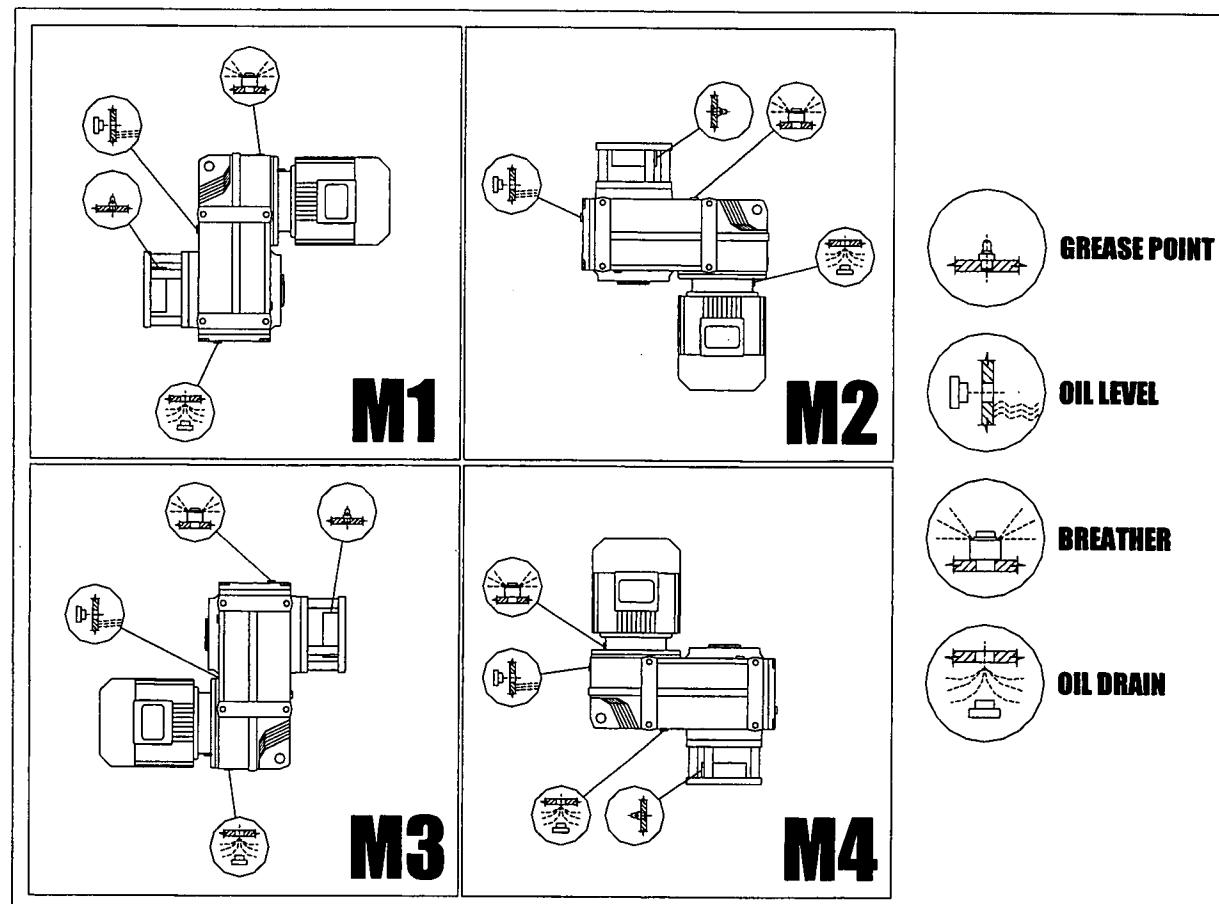
Gearbox Details	
Manufacturer	SEW
Model	FA87B
Ratio (i)	109.49:1
Output Speed (rpm)	13
Mounting Position	M1
Oil Capacity (litres)	10.8
Anti-Condensation Heater (230V)	N/A
Oil Level Sight Gauge	N/A
Torque Limiter	N/A
Finish	Standard
Drive Serial No.	

APPENDIX B
LUBRICATION CHECK SHEETS

LUBRICANT CHECK SHEET

Part to be lubricated	Gearbox
Recommended lubricant	BP Energol GR-XP 220 (or equiv)
Change Frequency	6 - 12 months
Oil Volume	Refer Conveyor Specification Sheet
Part to be lubricated	Bell Housing Gland Packing – Buraflon 5846 / 6.35
Recommendable lubricant	Castrol Grease EPL2 Multi Purpose Extreme Pressure
Change Frequency	Every 6 months
Filling method	Grease Gun

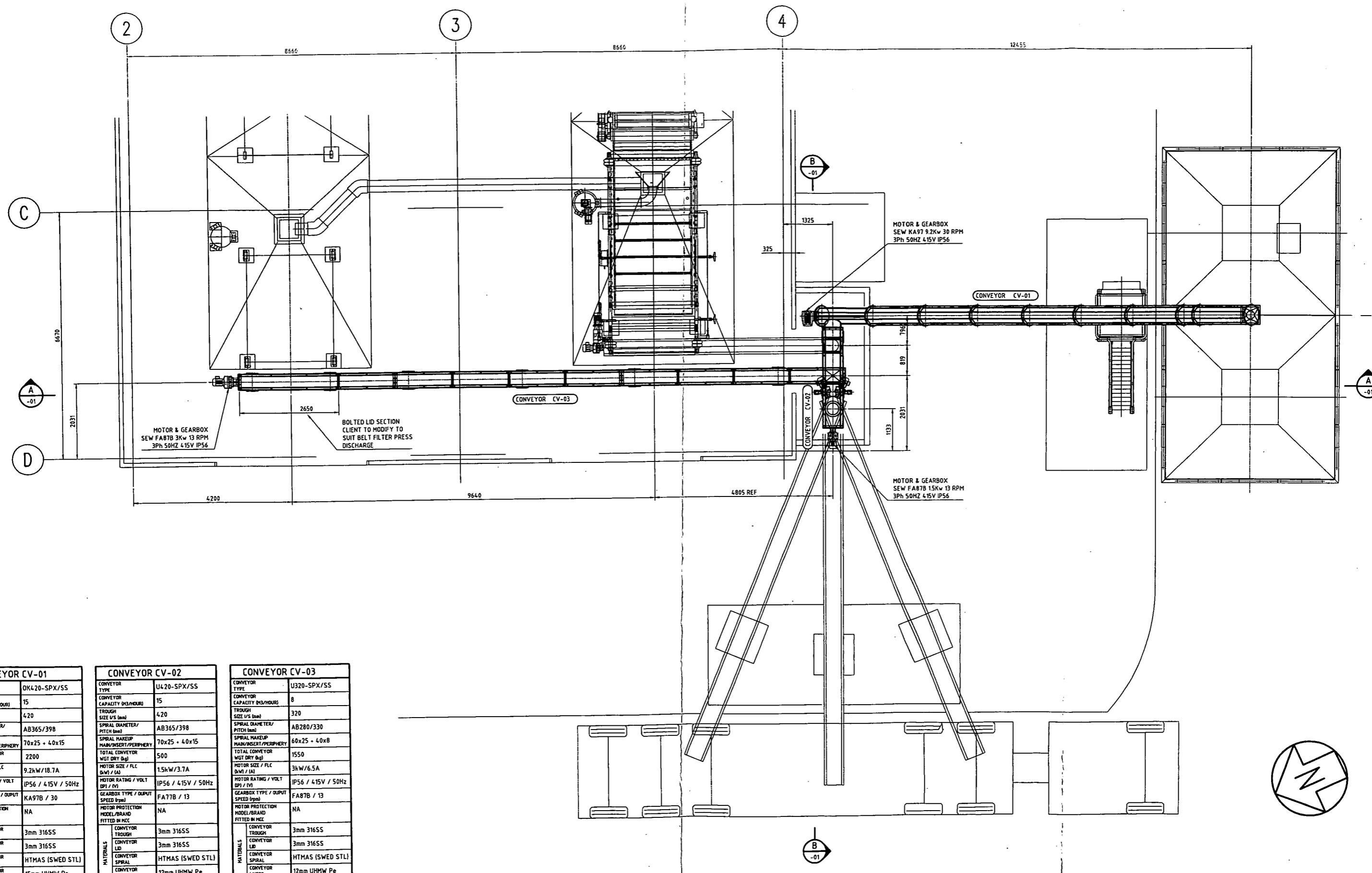
Gearbox Mounting Positions and Relevant Lubrication Points



APPENDIX C

DRAWINGS

IF IN DOUBT - ASK



CONVEYOR CV-01	
CONVEYOR TYPE	OK420-SPX/SS
CONVEYOR CAPACITY (t/h)	15
TRough SIZE U/S (mm)	420
SPIRAL DIAMETER/ PITCH (mm)	AB365/398
SPIRAL MAKEUP MAN/INSERT/PERIPHERY	70x25 + 40x15
TOTAL CONVEYOR WT DRY (kg)	2200
MOTOR SIZE / FLC (kW / lA)	9.2kW/18.7A
MOTOR RATING / VOLT (kW / V)	IP56 / 415V / 50Hz
GEARBOX TYPE / INPUT SPEED (r/min)	KA97B / 30
MOTOR PROTECTION MODEL/BRAND FITTED IN MCC	NA
CONVEYOR TROUGH	3mm 316SS
CONVEYOR LID	3mm 316SS
CONVEYOR SPIRAL	HTMAS (SWED STL)
CONVEYOR LINERS	15mm UHMW Pe

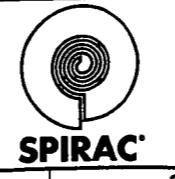
CONVEYOR CV-02	
CONVEYOR TYPE	U420-SPX/SS
CONVEYOR CAPACITY (t/h)	15
TRough SIZE U/S (mm)	420
SPIRAL DIAMETER/ PITCH (mm)	AB365/398
SPIRAL MAKEUP MAN/INSERT/PERIPHERY	60x25 + 40x15
TOTAL CONVEYOR WT DRY (kg)	500
MOTOR SIZE / FLC (kW / lA)	1.5kW/3.7A
MOTOR RATING / VOLT (kW / V)	IP56 / 415V / 50Hz
GEARBOX TYPE / INPUT SPEED (r/min)	FA77B / 13
MOTOR PROTECTION MODEL/BRAND FITTED IN MCC	NA
CONVEYOR TROUGH	3mm 316SS
CONVEYOR LID	3mm 316SS
CONVEYOR SPIRAL	HTMAS (SWED STL)
CONVEYOR LINERS	12mm UHMW Pe

CONVEYOR CV-03	
CONVEYOR TYPE	U320-SPX/SS
CONVEYOR CAPACITY (t/h)	8
TRough SIZE U/S (mm)	320
SPIRAL DIAMETER/ PITCH (mm)	AB280/330
SPIRAL MAKEUP MAN/INSERT/PERIPHERY	70x25 + 40x15
TOTAL CONVEYOR WT DRY (kg)	1550
MOTOR SIZE / FLC (kW / lA)	3kW/6.5A
MOTOR RATING / VOLT (kW / V)	IP56 / 415V / 50Hz
GEARBOX TYPE / INPUT SPEED (r/min)	FA87B / 13
MOTOR PROTECTION MODEL/BRAND FITTED IN MCC	NA
CONVEYOR TROUGH	3mm 316SS
CONVEYOR LID	3mm 316SS
CONVEYOR SPIRAL	HTMAS (SWED STL)
CONVEYOR LINERS	12mm UHMW Pe

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A	ISSUED FOR APPROVAL	S.B.	REV DATE
REV	DATE	DESCRIPTION	BY CHK APP

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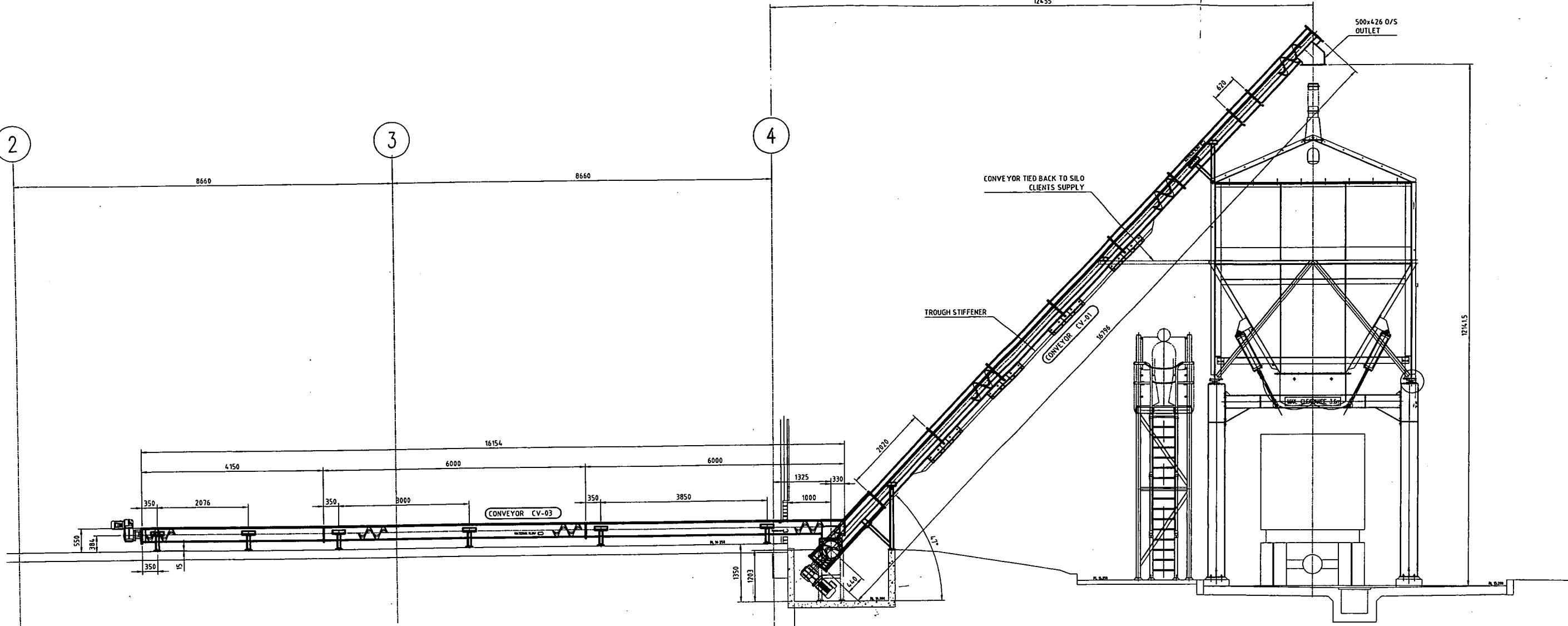
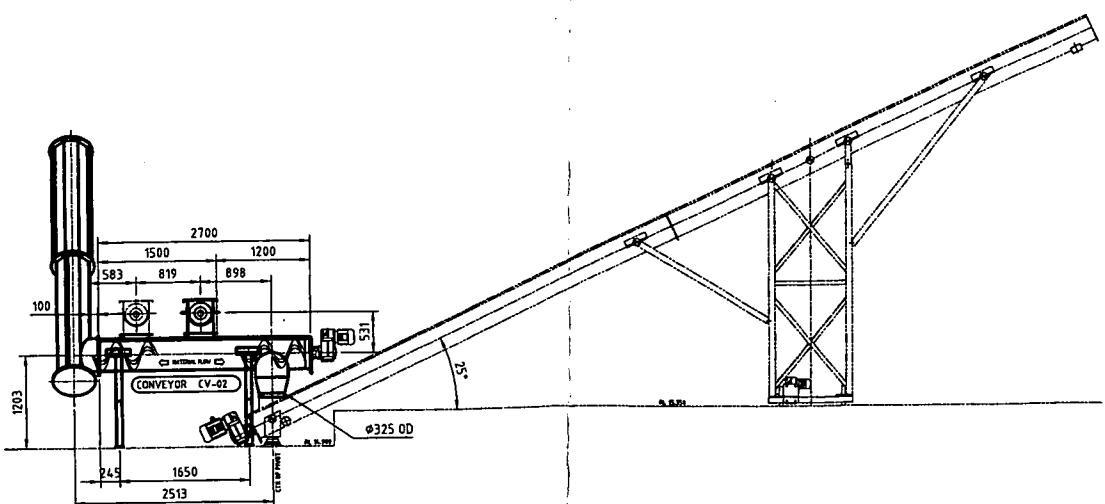
SPIRAC Pty Ltd
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WA 6965 Australia
30 Cocos Drive, Bibra Lake,
WA 6163 Australia
Tel +61 8 9434 0777
Fax +61 8 9434 0778
ABN 69 119 874 038

TOLERANCES EXCEPT WHERE OTHERWISE STATED:
UP TO 300mm 2.0mm
300mm AND OVER ±5.0mm
HOLE CENTRES ±0.5mm
CLEARANCE HOLE DIA ±0.5mm
ALL ANGLES ±1°

PROJECT: AQUATEC-MAXCON (Qld) Pty Ltd
GOODNA STP BRISBANE
TITLE: SPIRAC SLUDGE HANDLING CONVEYORS
TYPE: U320 / U420 / OK420
OVERALL LAYOUT

FILE: KAPROJECT200715317/5317-00
DRAWN: S.B. CHECKED:
DATE: 31/07/07 APPROVED:
SHEET: 1 OF 2 SCALE: 1:50
DRG. No.: 5317-00 REV. 0

IF IN DOUBT - ASK

SECTION A-ASECTION B-B

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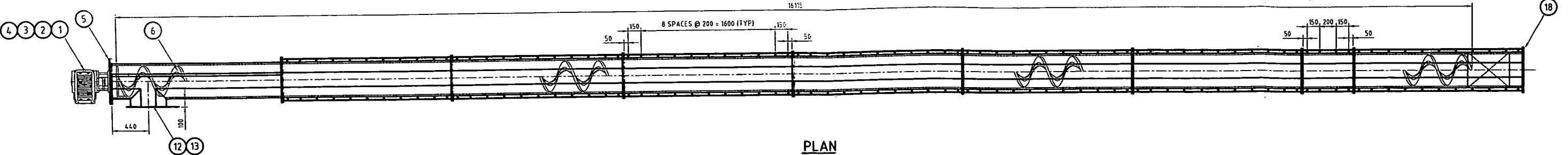
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P.O. Box 1216, Bibra Lake, DC
WA 6965 Australia
30 Coosie Drive, Bibra Lake,
WA 6163 Australia
Tel +61 8 9434 0777
Fax +61 8 9434 0778
ABN 69 119 874 038

TOLERANCES EXCEPT WHERE OTHERWISE STATED:-
UP TO 3000mm $\pm 2.0\text{mm}$
3001mm AND OVER $\pm 2.0\text{mm}$
HOLE CENTRES $\pm 0.5\text{mm}$
CLEARANCE HOLE DIA $\pm 0.5\text{mm}$
ALL ANGLES $\pm 1^\circ$

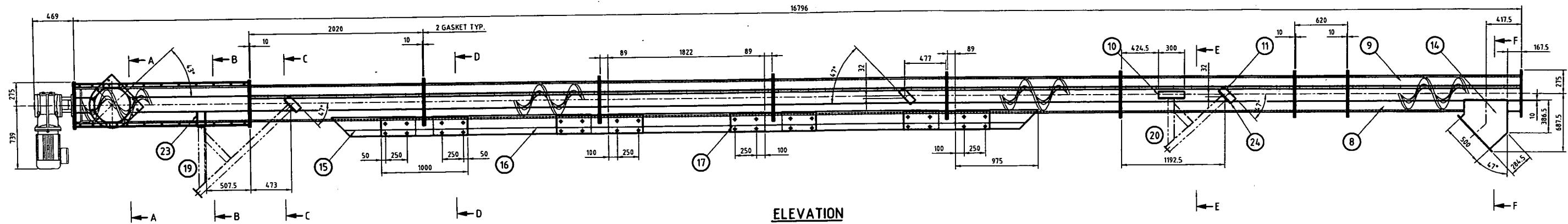
PROJECT: AQUATEC-MAXCON (Qld) Pty Ltd
GOODNA STP BRISBANE
TITLE: SPIRAC SLUDGE HANDLING CONVEYORS
TYPE: U320 / U420 / OK420
SECTIONS

FILE: KAPROJECT2007/5317/5317-01
DRAWN: S.B. **CHECKED:**
DATE: 31/07/07 **APPROVED:**
SHEET: 2 OF 2 **SCALE:** 1:50
DRG. No.: 5317-00 **REV.:** 0

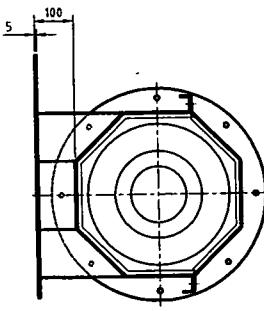
IF IN DOUBT - ASK



PLAN

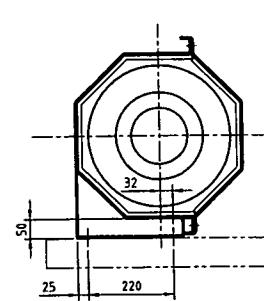


ELEVATION



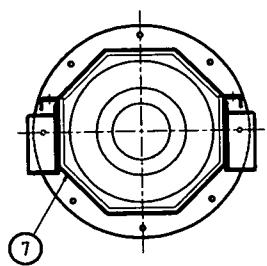
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SCALE 1:10



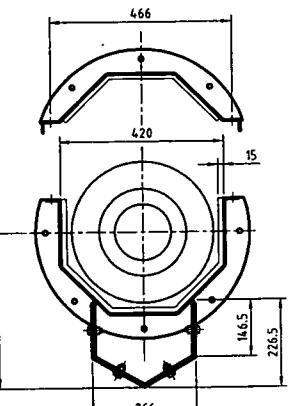
SECTION B-B

SCALE 1:10



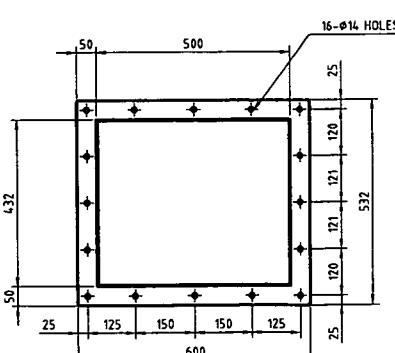
SECTION C-C

SCALE 1:10



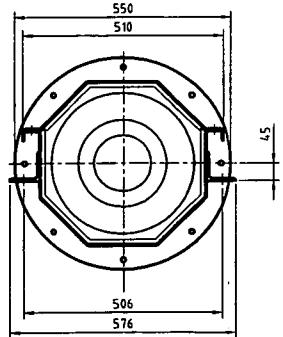
SECTION D-D

SCALE 1:10



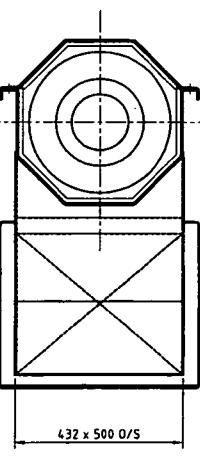
DISCHARGE FLANGE DETAIL

SCALE 1:10



SECTION E-E

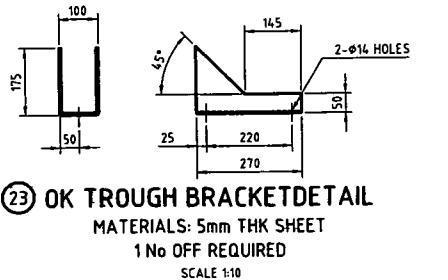
SCALE 1:10



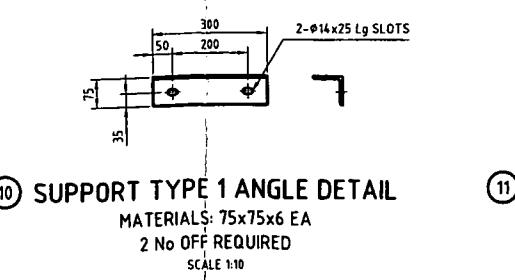
SECTION F-F

SCALE 1:10

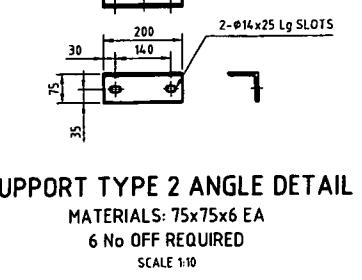
24	SUPPORT STAND ISOLATION GASKETS	NEOPRENE	B	EA	
23	OK TROUGH BRACKET 5mm SHEET	316SS	1	EA	
22	ALL BOLTS, NUTS & WASHERS	316SS	1	SET	
21	ALL GASKETS	NEOPRENE	1	SET	
20	SUPPORT STAND (S2) 75x75x6 EA + 100x10 FB + 75x10 FB	MSHDG	5317-01-03	1	EA
19	SUPPORT STAND (S1) 75x75x6 EA + 100x10 FB + 75x10 FB	MSHDG	5317-01-02	1	EA
18	OK-TROUGH END PLATE 5mm THK PLATE OKP4.20	316SS	1	EA	
17	OK-TROUGH STIFFENER 3mm THK SHEET	316SS	5317-01-01	4	EA
16	OK-TROUGH STIFFENER 3mm THK SHEET	316SS	5317-01-01	3	EA
15	OK-TROUGH STIFFENER END 3mm THK SHEET	316SS	5317-01-01	2	EA
14	DUTLET CHUTE 3mm SHEET + FLANGE 50x5 FB	316SS	1	EA	
13	TRANSFER FLANGE TF4.20 5mm THK PLATE	316SS	2	EA	
12	INLET CHUTE 3mm SHEET	316SS	2	EA	
11	SUPPORT ANGLE TYPE Z 75x75x6 EA 200 LG	316SS	6	EA	
10	SUPPORT ANGLE TYPE 1 75x75x6 EA 300 LG	316SS	2	EA	
9	OK-FLANGE OK4.20 EX 10mm PLATE	316SS	18	EA	
8	OK-TROUGH OK4.20 3mm THK SHEET 16796 Lg 1	SPX	1	EA	
7	LINER SPX 15mm THK (16x1000 Lg + 1x620 Lg)	HTMAS	1	EA	
6	SPIRAL AB365/398 70x25 + 40x15 C/W COUPLING DISC (16115 Lg)	316SS	1	EA	
5	DRIVE PLATE DPOK4.20 16mm THK PLATE	316SS	1	EA	
4	DRIVE SHAFT DS97 C/W COUPLING DISC	316S	1	EA	
3	BELL HOUSING BH97 30 RPM	MSHDG	1	EA	
2	GEARBOX KA97 30 RPM	SEW	-	1	EA
1	MOTOR ELECTRIC DV132ML4 9.2kW 415V 3Ph/50Hz/IP56	SEW	-	1	EA
ITEM	DESCRIPTION	MADE / MAKE	DRG # / REV	DTY UOM	A



②3 OK TROUGH BRACKET DETAIL

MATERIALS: 5mm THK SHEET
1 No OFF REQUIRED
SCALE 1:10

⑩ SUPPORT TYPE 1 ANGLE DETAIL

MATERIALS: 75x75x6 EA
2 No OFF REQUIRED
SCALE 1:10

⑪ SUPPORT TYPE 2 ANGLE DETAIL

MATERIALS: 75x75x6 EA
6 No OFF REQUIRED
SCALE 1:10

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ABN 69 118 674 038

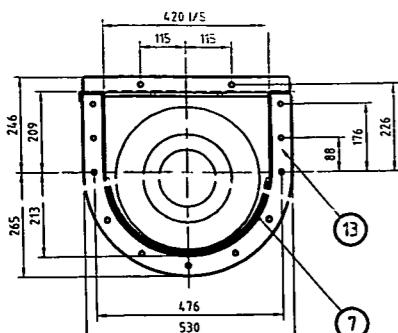
TOLERANCES EXCEPT WHERE OTHERWISE STATED:
UP TO 3000mm $\pm 2.0\text{mm}$
3001mm AND OVER $\pm 2.5\text{mm}$
HOLE CENTRES $\pm 0.5\text{mm}$
CLEARANCE HOLE DIA $\pm 0.5\text{mm}$
ALL ANGLES $\pm 1^\circ$
DIMENSIONS IN MILLIMETRES
DO NOT SCALE

PROJECT: AQUATEC-MAXCON QLD Pty. Ltd.
GOODNA STP BRISBANE
TITLE: SPIRAC CONVEYOR
TYPE: OK4.20-SPX/316SS
CV-01 GENERAL ARRANGEMENT

FILE: KAPROJECT/2007/5317/5317-01
DRAWN: S.B. **CHECKED:**
DATE: 03/08/07 **APPROVED:**
SHEET: 1 OF 1 **SCALE:** 1:25
DRG. NO.: 5317-01 **REV.:** 0

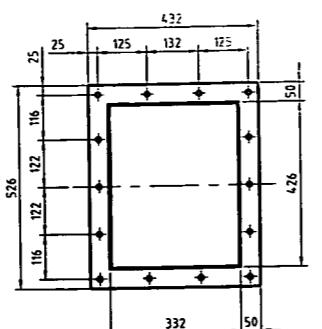
CONVEYOR WEIGHT APPROX 2200 Kg

IF IN DOUBT - ASK

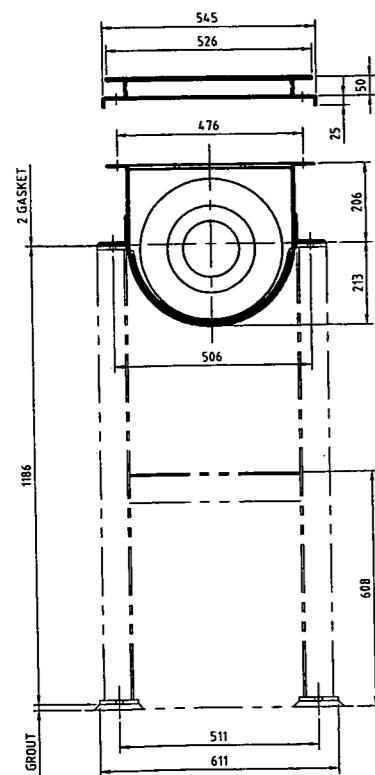


SECTION A-A

SCALE 1:10

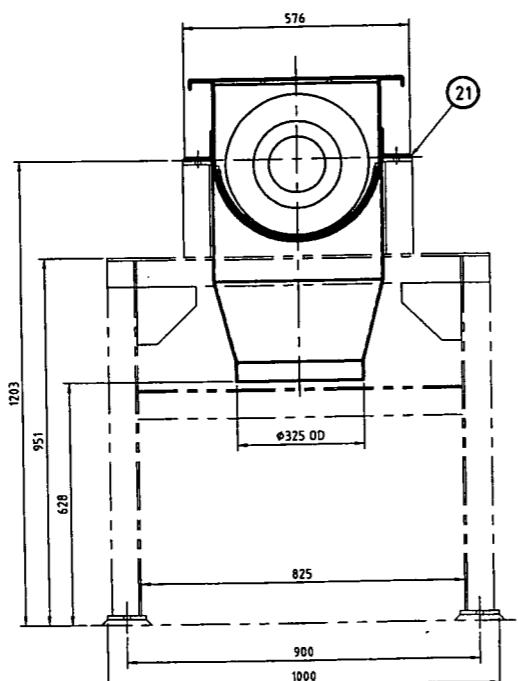


INLET FLANGE DETAIL

2 NO OFF REQUIRED
SCALE 1:10

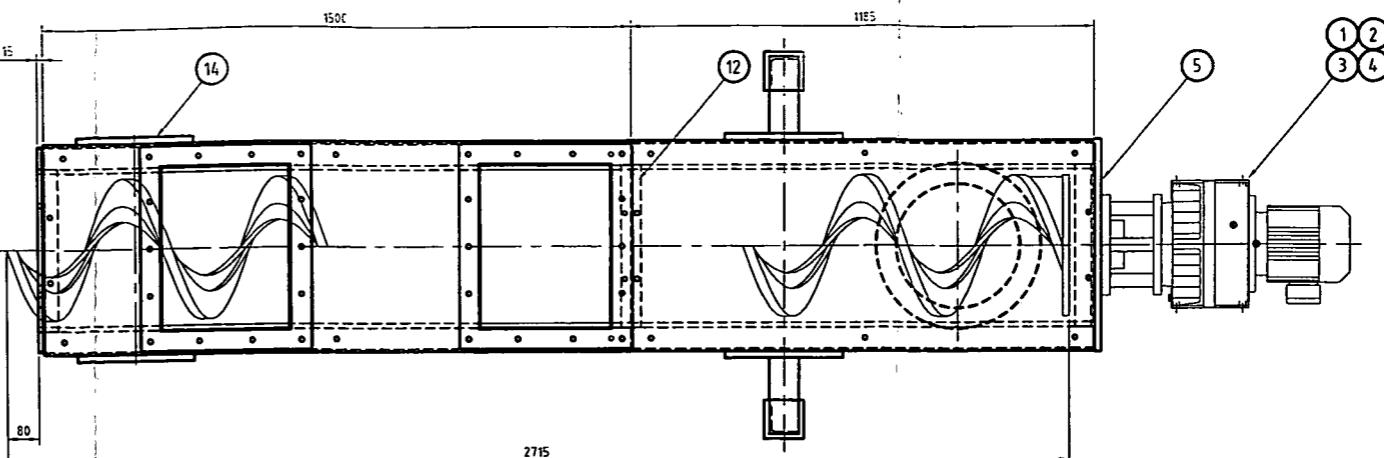
SECTION B-B

SCALE 1:10

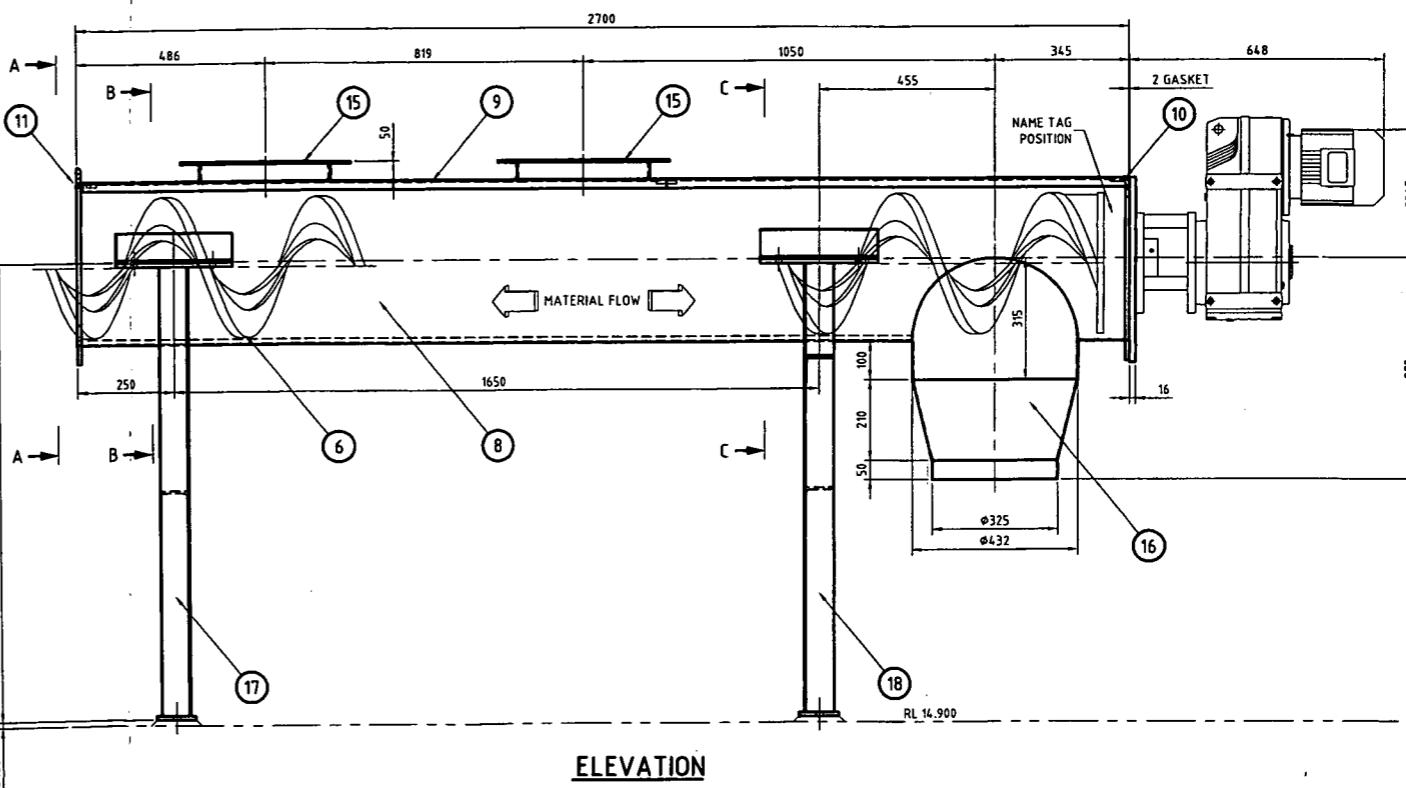


SECTION C-C

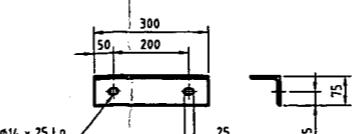
SCALE 1:10



PLAN



ELEVATION



⑯ SUPPORT ANGLE DETAIL

MATERIALS: 75x75x6 EA
4 NO OFF REQUIRED
SCALE 1:10

21	SUPPORT STAND ISOLATION GASKETS	NEOPRENE	4	EA			
20	ALL BOLTS, NUTS & WASHERS	316SS	1	SET			
19	ALL GASKETS	NEOPRENE	1	SET			
18	SUPPORT STAND (S4) 75x75x6 EA + 100x10 FB + 75x10 FB	MSHDG	5317-02-02	1	EA		
17	SUPPORT STAND (S3) 75x75x6 EA + 100x10 FB + 75x10 FB	MSHDG	5317-02-01	1	EA		
16	OUTLET CHUTE 3mm SHEET	316SS	1	EA			
15	INLET CHUTE 3mm SHEET + FLANGE 50x5 FB	316SS	2	EA			
14	SUPPORT ANGLE 75x75x6 EA (300 Lg)	316SS	2	EA			
13	U-FLANGE U420 EX 50x10 FB	316SS	1	EA			
12	CROSS BAR U420 50x10 FB	316SS	1	EA			
11	CONNECTION ANGEL U420 50x50x8 EA	316SS	1	EA			
10	END ANGLE U420 50x50x8 EA	316SS	1	EA			
9	U-TRough LID U420 3mm THK SHEET (1x1500 + 1x1185)	316SS	1	SET			
8	U-TRough U420 3mm THK SHEET (2700 Lg)	316SS	1	EA			
7	Liner SPX 15mm THK (2x1000 Lg + 1x700 Lg)	SPX	1	SET			
6	Spiral AB365/398 70x25 + 40x15 C/W COUPLING DISC (2715 Lg)	HTMAS	1	EA			
5	DRIVE PLATE DPU420 16mm THK PLATE	316SS	1	EA			
4	DRIVE SHAFT DS77 C/W COUPLING DISC	316S	1	EA			
3	BELL HOUSING BH77 C/W PCKER AND GUARD	MSHDG	1	EA			
2	GEARBOX FA77B 13 RPM	SEW	-	1	EA		
1	MOTOR ELECTRIC DT90L4 15kW 415V/3Ph/50Hz/IP56	SEW	-	1	EA	0	
ITEM	DESCRIPTION	MATL / MAKE	DRG # / REV	QTY	UDM	A	

BILL OF MATERIAL

2

3

4

5

6

7

8

9

10

11

A1

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ABN 69 118 674 038

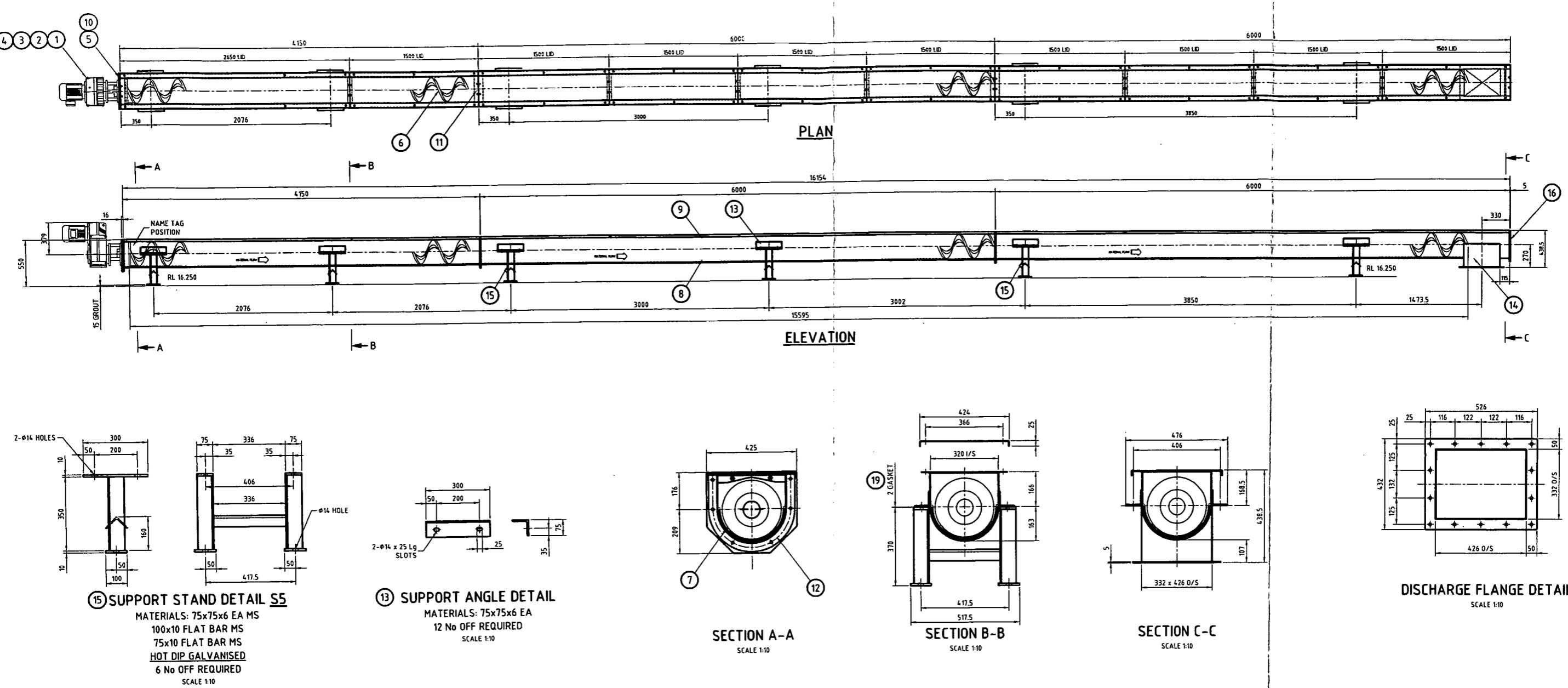
TOLERANCES EXCEPT WHERE OTHERWISE STATED:-
UP TO 3000mm ±2.0mm
3001mm AND OVER ±3.0mm
HOLE CENTRES ±0.5mm
CLEARANCE HOLE DIA ±0.2mm
ALL ANGLES ±1°
DIMENSIONS IN MILLIMETRES
DO NOT SCALE

PROJECT: AQUATEC-MAXCON QLD Pty. Ltd.
GOODNA STP BRISBANE
TITLE: SPIRAC CONVEYOR
TYPE: U420-SPX/316SS
CV-02 GENERAL ARRANGEMENT

FILE: KAPROJET/2007/5317-02-02
DRAWN: S.B. CHECKED:
DATE: 03/08/07 APPROVED:
SHEET: 1 OF 1 SCALE: 1:10
DRG. No.: 5317-02 REV. 0
MADE IN AUSTRALIA CE
www.spirac.com.au

CONVEYOR WEIGHT APPROX 500 Kg

IF IN DOUBT - ASK



ITEM	DESCRIPTION	MATL / MAKE	DRG # / REV	QTY	UOM	A	APPROVED FOR CONSTRUCTION	S.B.	COPYRIGHT	SPIRAC Pty Ltd	TOLERANCES EXCEPT WHERE OTHERWISE STATED:	PROJECT:	FILE:
1	MOTOR ELECTRIC DV100L4 3kW 415V 3Ph/50Hz/IP56	SEW	-	1	EA	0	APPROVED FOR CONSTRUCTION	S.B.	THIS DRAWING AND DESIGN IS SUPPLIED AS CONFIDENTIAL INFORMATION AS SPECIFIED IN THE CONTRACT OR AS DEFINED IN SPIRAC PTY LTD TERMS AND CONDITIONS OF COMPONENT SALES	P.O. Box 1216, Bibra Lake, DC WA 6985 Australia	UP TO 300mm ±2.0mm	AQUATEC-MAXCON QLD Pty. Ltd.	KA PROJECT/2007/5317-03
2	GEARBOX FA87B 13 RPM	SEW	-	1	EA	0	ISSUED FOR APPROVAL	S.B.	IS COVERED BY COPYRIGHT AND IS NOT TO BE USED OR IN ANY WAY COPIED TO ANY THIRD PARTY WITHOUT THE WRITTEN CONSENT OF SPIRAC PTY LTD	30 Cocos Drive, Bibra Lake, WA 6163 Australia	300mm AND OVER ±3.0mm	GOODNA STP BRISBANE	DRAWN: S.B. CHECKED:
3	BELL HOUSING BH87 C/W PACKER AND GUARD	MSHDG	-	1	EA				Tel +61 8 9434 0777	HOLE CENTRES ±0.5mm	TITLE:	DATE: 03/08/07 APPROVED:	
4	DRIVE SHAFT DS87 C/W COUPLING DISC	316SS	-	1	EA				Fax +61 8 9434 0778	ALL ANGLES ±1°	SPIRAC CONVEYOR	SHEET: 1 OF 1 SCALE: 1:25	
5	DRIVE PLATE DPU320 16mm THK PLATE	316SS	-	1	EA				ABN 69 119 874 038	DIMENSIONS IN MILLIMETRES DO NOT SCALE	TYPE: U320-SPX/316SS	DRG. No.: 5317-03 REV. 0	
6	SPIRAL AB280/330 60x25 + 40x8 C/W COUPLING DISC (15595 Lg)	HHTMAS	-	1	EA						CV-03 GENERAL ARRANGEMENT		
7	LINER SPX 12mm THK (16 x 1000 Lg)	SPX	-	1	SET								
8	U-TRough U320 3mm THK SHEET (2700 Lg)	316SS	-	1	EA								
9	U-TRough U320 3m THK SHEET (9x1500 + 1x2650)	316SS	-	1	SET								
10	END ANGLE U320 40x40x6 EA	316SS	-	1	EA								
11	CROSS BAR U320 40x6 FB	316SS	-	1	EA								
12	U-FLANGE U320 EX 40x6 FB	316SS	-	6	EA								
13	SUPPORT ANGLE 75x75x6 EA (300 Lg)	316SS	-	12	EA								
14	OUTLET CHUTE 3mm SHEET + FLANGE 50x5 FB	316SS	-	1	EA								
15	SUPPORT STAND (SS) 75x75x6 EA + 100x10 FB + 75x10 FB	MSHDG	-	6	EA								
16	U-TRough END PLATE U320	316SS	-	1	EA								
17	ALL GASKETS	NEOPRENE	-	1	SET								
18	ALL BOLTS, NUTS & WASHERS	316SS	-	1	SET								
19	SUPPORT STAND ISOLATION GASKETS	NEOPRENE	-	12	EA								
20	DISCHARGE FLANGE GASKET 3mm THK	NEOPRENE	-	1	EA								



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ABN 69 119 874 038

TOLERANCES EXCEPT WHERE OTHERWISE STATED:
UP TO 300mm ±2.0mm
300mm AND OVER ±3.0mm
HOLE CENTRES ±0.5mm
CLEARANCE HOLE DIA ±0.5mm
ALL ANGLES ±1°

PROJECT: AQUATEC-MAXCON QLD Pty. Ltd.
GOODNA STP BRISBANE

SPIRAC®
TYPE: SPIRAC CONVEYOR
MODEL: TYPE: U420 - SPX/316SS
DRIVE: FA87B DV100L4 13 RPM 8m3/Hr
415V 3Ph 50Hz IP56 3kW
SERIAL: 5317-03 DATE: 10/07
www.spirac.com.au MADE IN AUSTRALIA CE

CONVEYOR WEIGHT APPROX 1550 Kg

APPENDIX D
GEARBOX PARTS LISTS



Parts List

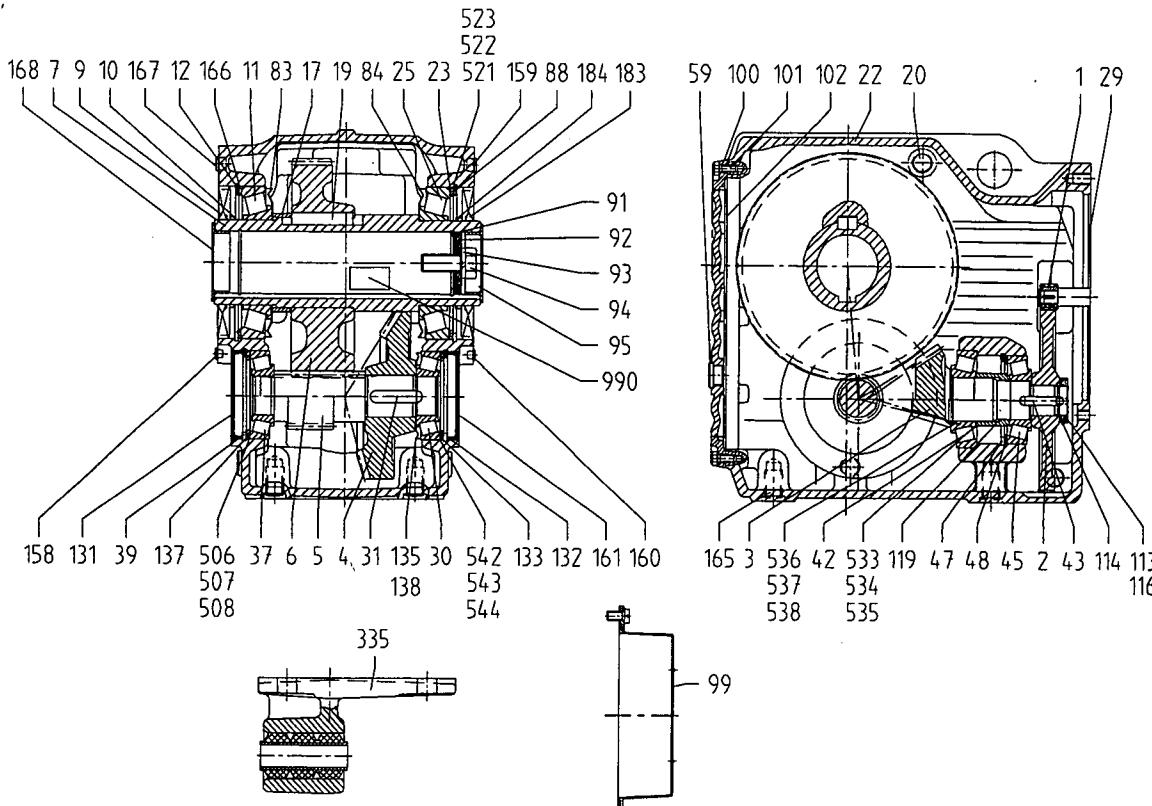
Helical-bevel gear unit

KA97A

Reinforced bearing

38 260 397

Page 1 of 2



No.	Description	DIN standard label	Part No.	Qty	No.	Description	DIN standard label	Part No.	Qty
1	Pinion		*	1	31	Key	DIN6885 AB14x9x50-55HRC	0 013 548 8	1
2	Gear Wheel 2		*	1	37	Tapered Roller Bear.	DIN720 303 09	0 013 929 7	1
3	Pinion shaft		*	1	39	Circlip/Snap r.	DIN472 100x4	0 013 021 4	1
4	Gear wheel		*	1	42	Tapered Roller Bear.	DIN720 303 10	0 012 469 9	1
5	Pinion Shaft 5		*	1	43	Key	DIN6885 B10x8x40-55HRC	0 013 509 7	1
6	Gear Wheel 6		*	1	45	Tapered Roller Bear.	DIN720 303 09	0 013 929 7	1
7	Hollow. Shaft Key	Ø 70 mm	0 044 470 7	1	47	Circlip/Snap r.	DIN472 100x4	0 013 021 4	1
9	Oil Seal	BA-SF95x170x13/10-NBR	0 017 772 5	1	48	Spacer	DIN988 S80x100x3,5	0 012 028 6	1
9	Oil Seal a) h)	BA-SF95x170x13/10-FKM	0 017 812 8	1	59	Screw Plug	M22x1,5	0 011 431 6	7
10	Oil Seal b) h)	B1-SF95x163x10/16,5-FKM	0 017 372 X	1	83	Nilos Ring	30219 AV	0 013 717 0	1
11	Tapered Roller Bear.	DIN720 302 19	0 013 920 3	1	84	Nilos Ring	30219 AV	0 013 717 0	1
12	Circlip/Snap r.	DIN472 170x4	0 013 020 6	1	88	Circlip/Snap r.	DIN472 170x4	0 013 020 6	1
17	Distance Piece	Ø101x Ø110x22 mm	0 042 821 3	1	91	Circlip/Snap r.	DIN472 70x2,5	0 010 337 3	1
19	Key	DIN6885 B22x14x70-55HRC	0 011 607 6	1	92	Disc	22x69,5x10	0 103 465 0	1
20	Vent Valve	M22x1,5-MS	0 013 032 X	1	93	Lock Washer	DIN128 A 20	0 010 996 7	1
22	Gear Housing		0 643 073 2	1	94	Hexagon Head Screw	ISO4017 M20x50-8.8	0 010 128 1	1
23	Spacer	DIN988 S 150x170x3,5	0 017 920 5	1	95	Protection Cap	70,8	0 114 081 7	1
25	Tapered Roller Bear.	DIN720 302 19	0 013 920 3	1	100	Gear Cover Plate		0 643 184 4	1
29	Surface sealing compound		0 910 255 8 X)	1	101	Hexagon Head Screw	ISO4017 M8x20-8.8	0 011 025 6	10
30	Tapered Roller Bear.	DIN720 303 09	0 013 929 7	1	102	Surface sealing compound		0 910 255 8 X)	

* Gearing parts have embossed part numbers which must always be quoted.

X As required

a) optional oil seal in FKM (Viton)

b) double sealing

e) Only for mounting position M5A (or mounting position M5B with inverted rotating direction)

f) Only for mounting position M6B (or mounting position M6A with inverted rotating direction)

h) ATEX model according to category II2G, II2D, II3G, II3D

When ordering spare parts please quote designation with part number and nameplate data with serial number!

Built-on gear units have motors, variable speed gear units or special input shaft assemblies mounted at the drive end. For parts see appropriate parts list.

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Parts List

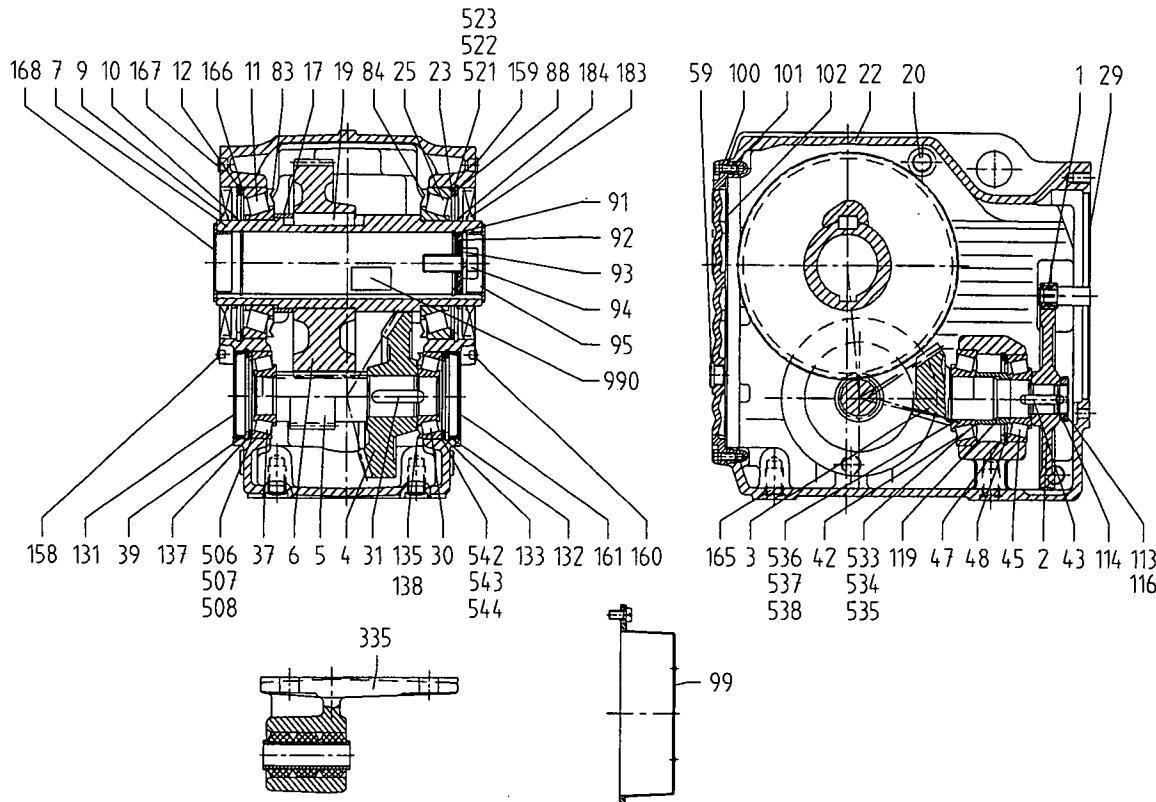
Helical-bevel gear unit

KA97A

Reinforced bearing

38 260 397

Page 2 of 2



No.	Description	DIN standard label	Part No.	Qty	No.	Description	DIN standard label	Part No.	Qty
99	Fixed Hood Cover cpl compl.		0 643 518 1	1	183	Oil Seal a) h)	BA-SF95x170x13/10-FKM	0 017 812 8	1
113	Slotted Round Nut	DIN981 KM7	0 012 170 3	1	184	Oil Seal b) h)	B1-SF95x163x10/16,5-FKM	0 017 372 X	1
114	Multi-Tang Washer	DIN5406 MB7	0 012 164 9	1	335	Torque Arm Cpl.		0 643 440 1	1
116	Thread lock pin		0 910 242 6	X)	506	Shim	DIN988 80x100x0,1	0 010 381 0	X)
119	Distance Piece	Ø50,5x Ø60x39 mm	0 643 346 4	1	507	Shim	DIN988 80x100x0,3	0 010 405 1	X)
131	Closing Cap	100x12	0 010 686 0	1	508	Shim	DIN988 80x100x0,5	0 010 427 2	X)
132	Circlip/Snap r.	DIN472 100x4	0 013 021 4	1	521	Shim	DIN988 150x170x0,1	0 017 916 7	X)
133	Spacer	DIN988 S80x100x3,5	0 012 028 6	1	522	Shim	DIN988 150x170x0,3	0 017 917 5	X)
135	Nilos Ring e)	30309AV	0 013 721 9	1	523	Shim	DIN988 150x170x0,5	0 017 918 3	X)
137	Spacer	DIN988 S80x100x3,5	0 012 028 6	1	533	Shim	DIN988 50x62x0,1	0 010 376 4	X)
138	Nilos Ring f)	30309 AV	0 013 721 9	1	534	Shim	DIN988 50x62x0,3	0 010 400 0	X)
158	Closing Plug	9,5	0 011 371 9	2	535	Shim	DIN988 50x62x0,5	0 010 418 3	X)
159	Closing Plug	14,5	0 011 374 3	8	536	Shim	DIN988 50x62x0,1	0 010 376 4	X)
160	Closing Plug	9,5	0 011 371 9	2	537	Shim	DIN988 50x62x0,3	0 010 400 0	X)
161	Closing Cap	100x12	0 010 686 0	1	538	Shim	DIN988 50x62x0,5	0 010 418 3	X)
165	Closing Plug	17,8	0 011 383 2	4	542	Shim	DIN988 80x100x0,1	0 010 381 0	X)
166	Spacer	DIN988 S 150x170x3,5	0 017 920 5	1	543	Shim	DIN988 80x100x0,3	0 010 405 1	X)
167	Closing Plug	14,5	0 011 374 3	8	544	Shim	DIN988 80x100x0,5	0 010 427 2	X)
168	Protection Cap	70,8	0 114 081 7	1	990	Contactcorros.Inhib.		0 910 503 4	2
183	Oil Seal	BA-SF95x170x13/10-NBR	0 017 772 5	1					

* Gearing parts have embossed part numbers which must always be quoted.

X) As required

a) optional oil seal in FKM (Viton)

b) double sealing

e) Only for mounting position M5A (or mounting position M5B with inverted rotating direction)

f) Only for mounting position M6B (or mounting position M6A with inverted rotating direction)

h) ATEX model according to category II2G, II2D, II3G, II3D

When ordering spare parts please quote designation with part number and nameplate data with serial number

Built-on gear units have motors, variable speed gear units or special input shaft assemblies mounted at the drive end. For parts see appropriate parts list.

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Parts List

Parallel-shaft helical gear units

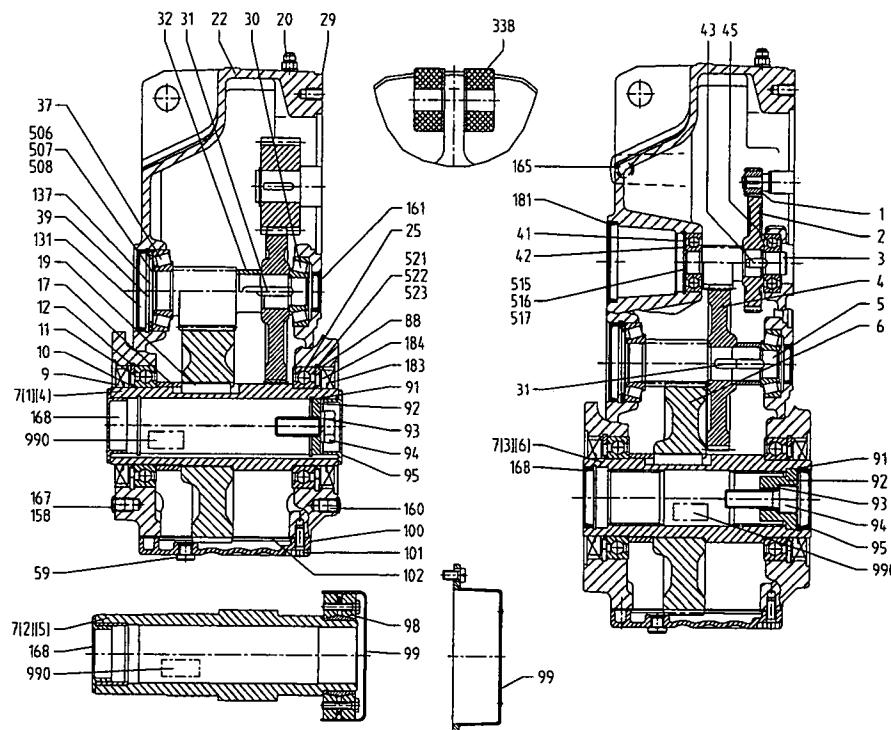
**FA77A [1], FH77A [2], FV77A [3], FA77BA [4],
FH77BA [5], FV77BA [6]**

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Page 1 of 2

2-stage

3-stage



No.	Description	DIN standard label	Part No.	Qty
1	Pinion		*	1
2	Gear wheel		*	1
3	Pinion shaft		*	1
4	Gear wheel		*	1
5	Pinion shaft		*	1
6	Gear wheel		*	1
7	Hollow Shaft Key [1] [4]	$\emptyset 50$ mm	0 643 045 7	1
7	Holl.Shaft Key [1] [4]	$\emptyset 2,000$ in/mm	0 643 281 6	1
7	Holl.Shaft Shr.Disc [2] [5]	$\emptyset 50$ mm	0 643 176 3	1
7	Holl.Shaft Shr.Disc [2] [5]	$\emptyset 50/52$ mm	0 042 451 X	1
7	Spli.Hollow Shaft [3] [6]	50x2x30x24	0 643 399 5	1
9	Oil Seal	BA-SF70x110x12/8-NBR	0 017 766 0	1
9	Oil Seal a) h)	BA-SF70x110x12/8-FKM	0 017 806 3	1
10	Oil Seal b) h)	B1-SF70x104x10/14,5-FKM	0 017 366 5	1
11	Deep Groove Ball Brg	DIN625 6014-Z	0 011 729 3	1
12	Circlip/Snap r.	DIN472 110x4	0 010 328 4	1
17	Distance Piece	$\emptyset 71 \times \emptyset 80 \times 23$ mm	0 643 011 2	1
19	Key	DIN6885 B16x10x45-C45K	0 013 479 1	1
20	Vent Valve	M12x1,5-MS	0 013 031 1	1
22	Gear Housing [1] [2] [3]		0 642 150 4	1
22	Gear Housing [4] [5] [6]		0 642 015 X	1
25	Deep Groove Ball Brg	DIN625 6014-Z	0 011 729 3	1
29	Sealing Compound		0 910 255 8	X
30	Tapered Roller Bear.	DIN720 303 05	0 013 938 6	1
31	Key 2-stage	DIN6885 B8x7x25-55HRC	0 010 055 2	1
31	Key 3-stage	DIN6885 AB8x7x20-55HRC	0 013 543 7	1
32	Distance Piece c)	$\emptyset 31 \times \emptyset 38 \times 23$ mm	0 642 063 X	1
37	Tapered Roller Bear.	DIN720 302 07	0 012 480 X	1
39	Circlip/Snap r.	DIN472 72x2,5	0 010 322 5	1
41	Circlip/Snap r.	DIN472 52x2	0 010 319 5	1
42	Deep Groove Ball Brg	DIN625 6304	0 010 508 2	1
43	Key	DIN6885 B8x7x12-55HRC	0 013 491 0	1
45	Deep Groove Ball Brg	DIN625 6304	0 010 508 2	1
59	Screw Plug	M12x1,5	0 011 430 8	5
88	Circlip/Snap r.	DIN472 110x4	0 010 328 4	1
91	Circlip/Snap r. [1] [4]	DIN472 50x2	0 010 338 1	1
91	Circlip/Snap r. [1] [4]	DIN472 50x2	0 010 338 1	1
91	Circlip/Snap r. [3] [6]	DIN472 55x2	0 010 335 7	1
92	Disc [1] [4]	17x49,5x8	0 103 974 1	1
92	Disc [1] [4]	11/16x198x3/8/in	0 086 044 3	1
92	Disc [3] [6]		0 117 405 3	1

Parts with dimensions given in Imperial System units are written in **italics** and highlighted in **grey**.

* The gearing parts have embossed part numbers. These must always be quoted.

X) As required

a) optional oil seal in FKM (Viton)

b) double sealing

c) for i = 10,93 to 281,71

h) ATEX model according to category II2G, II2D, II3G, II3D

When ordering spare parts please quote designation with part number and nameplate data with serial number!

Built-on gear units have motors, variable speed gear units or special input shaft assemblies mounted at the drive end. For parts see appropriate parts list.

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Parts List

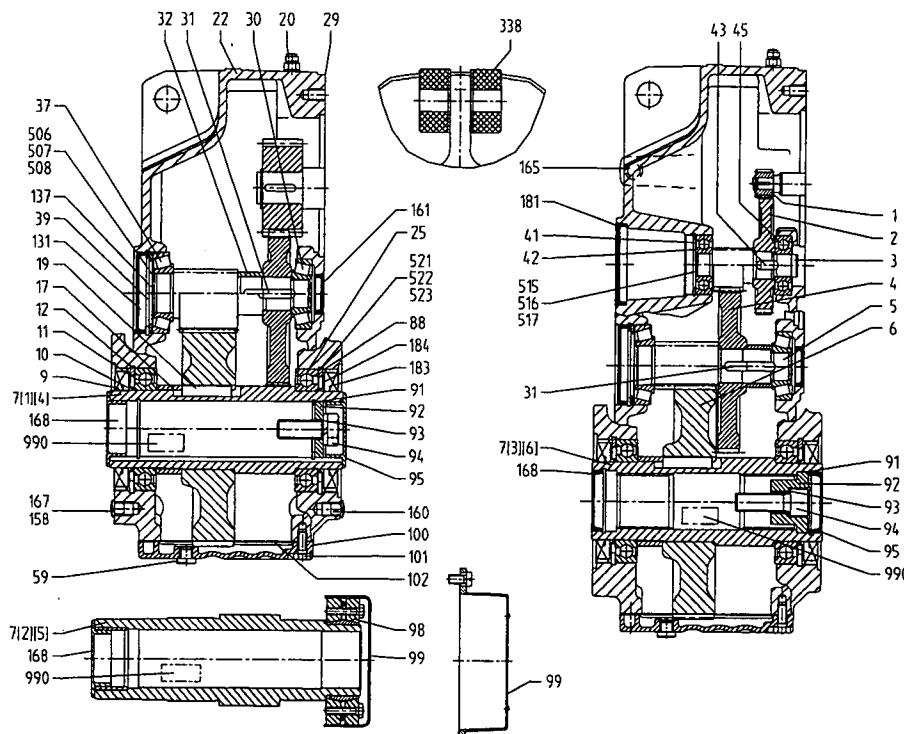
Parallel-shaft helical gear units
FA77A [1], FH77A [2], FV77A [3], FA77BA [4],
FH77BA [5], FV77BA [6]

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Page 2 of 2

2-stage

3-stage



No.	Description	DIN standard label	Part No.	Qty
93	Lock Washer [1] [4]	DIN128 A 16	0 010 995 9	1
93	Lock Washer [1] [4]	DIN128A16	0 010 995 9	1
93	Spacer [3] [6]	DIN988 S17x24x1,5	0 010 341 1	1
94	Hexagon Head Screw [1] [4]	ISO4017 M16x45-8.8	0 011 024 8	1
94	Hexagon Head Screw [1] [4]	ISO4017/5,8x11x53/4/5,5	0 006 957 3	1
94	Slotted Head Screw [3] [6]	DIN912 M16x50-8.8	0 012 330 7	1
95	Protection Cap [1] [4]	50,5	0 114 095 7	1
95	Protection Cap [1] [4]	50,5	0 114 095 7	1
95	Closing Cap [3] [6]	55x10	0 012 441 9	1
98	Shrink Disc	62x110	0 643 466 5	1
99	Hood Cover	70	0 114 096 5	1
99	Fixed Hood Cover cpl Compl.		0 643 516 5	1
99	Fixed Hood Cover cpl. [2] [5] h)		0 643 587 4	1
100	Gear Cover Plate		0 642 098 2	1
101	Hexagon Head Screw	ISO4017 M8x20-8.8	0 011 025 6	10
102	Gasket		0 642 095 8	1
131	Closing Cap	72x9	0 010 692 5	1
137	Spacer	DIN988 S56x72x3	0 010 356 X	1
158	Closing Plug	7,1	0 013 604 2	2
160	Closing Plug	7,1	0 013 604 2	2
161	Closing Cap	35x8	0 011 164 3	1

Parts with dimensions given in Imperial System units are written in **Imperial System** and highlighted in grey.

* The gearing parts have embossed part numbers. These must always be quoted.

X) As required

a) optional oil seal in FKM (Viton)

b) double sealing

c) for i = 10,93 to 281,71

h) ATEX model according to category II2G, II2D, II3G, II3D

When ordering spare parts please quote designation with part number and nameplate data with serial number!

Built-on gear units have motors, variable speed gear units or special input shaft assemblies mounted at the drive end. For parts see appropriate parts list.

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Parts List

Parallel-shaft helical gear units

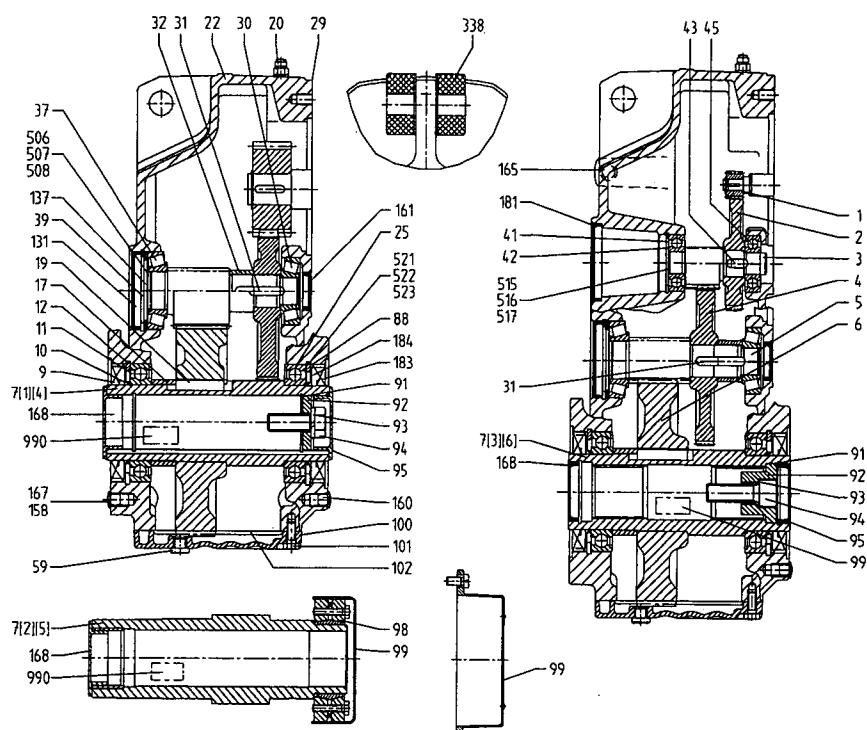
**FA87A [1], FH87A [2], FV87A [3], FA87BA [4],
FH87BA [5], FV87BA [6]**

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Page 1 of 2

2-stage

3-stage



No.	Description	DIN standard label	Part No.	Qty	No.	Description	DIN standard label	Part No.	Qty
1	Pinion		*	1	25	Deep Groove Ball Brdg	DIN625 6018-Z	0 011 730 7	1
2	Gear wheel		*	1	29	Sealing Compound		0 910 255 8	X)
3	Pinion shaft		*	1	30	Tapered Roller Bear.	DIN720 303 06	0 012 477 X	1
4	Gear wheel		*	1	31	Key 2-stage	DIN6885 B10x8x32-55HRC	0 010 057 9	1
5	Pinion shaft		*	1	31	Key 3-stage	DIN6885 AB10x8x30-55HRC	0 013 545 3	1
6	Gear wheel		*	1	32	Distance Piece c)	Ø36x Ø45x29 mm	0 642 064 8	1
7	Hollow. Shaft Key [1] [4]	Ø 60 mm	0 643 261 1	1	37	Tapered Roller Bear.	DIN720 303 08	0 010 604 6	1
7	Hollow. Shaft Key [1] [4]	Ø 22.375 in	0 643 282 1	1	39	Circlip/Snap r.	DIN472 90x3	0 010 326 8	1
7	Holl. Shaft Shr.Disc [2] [5]	Ø 65 mm	0 643 177 1	1	41	Circlip/Snap r.	DIN472 62x2	0 010 321 7	1
7	Holl. Shaft Shr.Disc [2] [5]	Ø 65/66 mm	0 042 452 8	1	42	Deep Groove Ball Brdg	DIN625 6305	0 010 509 0	1
7	Spli.Hollow Shaft [3] [6]	65x2x30x31	0 643 400 2	1	43	Key	DIN6885 B8x7x20-55HRC	0 011 599 1	1
9	Oil Seal	BA-SF85x140x12/10-NBR	0 017 769 5	1	45	Deep Groove Ball Brdg	DIN625 6305	0 010 509 0	1
9	Oil Seal a) h)	BA-SF85x140x12/10-FKM	0 017 809 8	1	59	Screw Plug	M12x1,5	0 011 430 8	5
10	Oil Seal b) h)	B1-SF85x134x10/16,5-FKM	0 017 369 X	1	88	Circlip/Snap r.	DIN472 140x4	0 010 331 4	1
11	Deep Groove Ball Brdg	DIN625 6018-Z	0 011 730 7	1	91	Circlip/Snap r. [1] [4]	DIN472 60x2	0 010 336 5	1
12	Circlip/Snap r.	DIN472 140x4	0 010 331 4	1	91	Circlip/Snap r. [1] [4]	DIN472 60x2	0 010 336 5	1
17	Distance Piece	Ø91x Ø100x22 mm	0 643 012 0	1	91	Circlip/Snap r. [3] [6]	DIN472 72x2,5	0 010 322 5	1
19	Key	DIN6885 B20x12x56-55HRC	0 013 492 9	1	92	Disc [1] [4]	22x59,5x8	0 103 391 3	1
20	Vent Valve	M12x1,5-MS	0 013 031 1	1	92	Disc [1] [4]	22x59,5x8	0 103 391 3	1
22	Gear Housing [1] [2] [3]		0 642 151 2	1	92	Disc [3] [6]		0 117 406 1	1
22	Gear Housing [4] [5] [6]		0 642 016 8	1					

Parts with dimensions given in Imperial System units are written in italics and highlighted in grey.

* The gearing parts have embossed part numbers. These must always be quoted.

X) As required

a) optional oil seal in FKM (Viton)

b) double sealing

c) for i = 9,58 to 270,68

h) ATEX model according to category II2G, II2D, II3G, II3D

When ordering spare parts please quote designation with part number and nameplate data with serial number!

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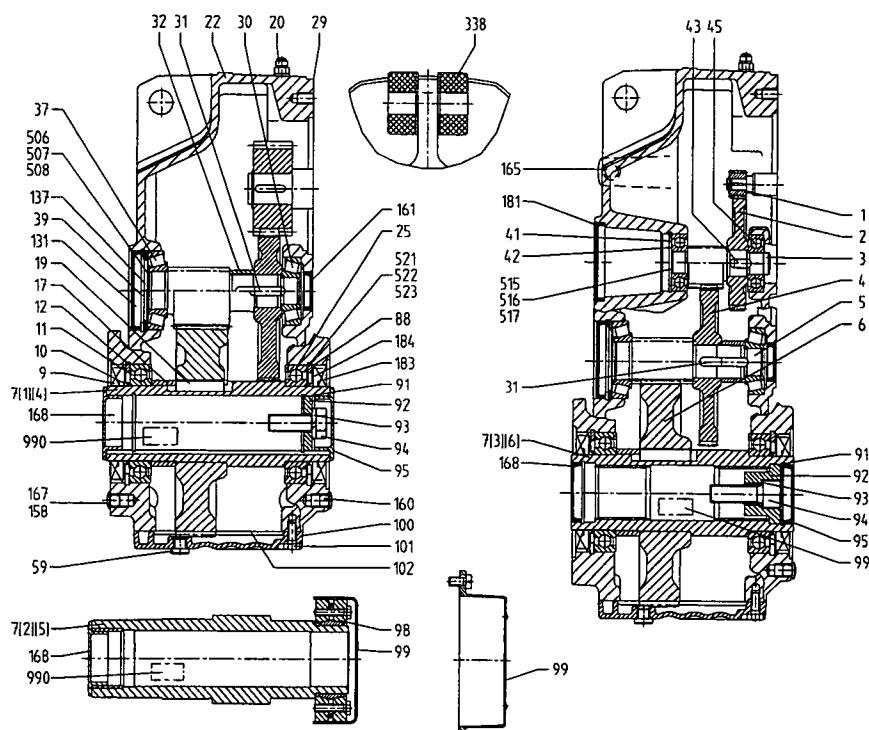
Parts List

Parallel-shaft helical gear units
FA87A [1], FH87A [2], FV87A [3], FA87BA [4],
FH87BA [5], FV87BA [6]

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2-stage

3-stage



No.	Description	DIN standard label	Part No.	Qty	No.	Description	DIN standard label	Part No.	Qty
93	Lock Washer [1] [4]	DIN128 A 20	0 010 996 7	1	165	Closing Plug	14,5	0 011 374 3	8
93	Lock Washer [1] [4]	DIN128 A 20	0 010 996 7	1	167	Closing Plug	14,5	0 011 374 3	6
93	Spacer [3] [6]	DIN988 S22x32x2	0 010 344 6	1	168	Protection Cap [1] [4]	60,8	0 114 097 3	1
94	Hexagon Head Screw [1] [4]	ISO4017 M20x60-8.8	0 010 128 1	1	168	Protection Cap [1] [4]	60,8	0 114 097 3	1
94	Hexagon Head Screw [1] [4]	ISO4017 M20x60-8.8	0 006 958 1	1	168	Blanking cap [2] [5]	65,5	0 012 668 3	1
94	Slotted Head Screw [3] [6]	DIN912 M20x60-8.8	0 012 331 5	1	168	Closing Cap [3] [6]	72x9	0 010 692 5	1
95	Protection Cap [1] [4]	60,8	0 114 097 3	1	181	Closing Cap	90x12	0 011 162 7	1
95	Protection Cap [1] [4]	60,8	0 114 097 3	1	183	Oil Seal	BA-SF85x140x12/10-NBR	0 017 769 5	1
95	Closing Cap [3] [6]	72x9	0 010 692 5	1	183	Oil Seal a) h)	BA-SF85x140x12/10-FKM	0 017 809 8	1
98	Shrink Disc	85x72	0 122 633 9	1	184	Oil Seal b) h)	B1-SF85x134x10/16,5-FKM	0 017 369 X	1
99	Hood Cover	80	0 114 098 1	1	338	Rubber Buffer	21x60x30	0 013 349 3	2
99	Fixed Hood Cover cpl Compl.		0 643 517 3	1	506	Shim	DIN988 75x90x0,1	0 012 054 5	X)
99	Fixed Hood Cover cpl. [2] [5] h)		0 643 588 2	1	507	Shim	DIN988 75x90x0,3	0 012 055 3	X)
100	Gear Cover Plate		0 642 005 2	1	508	Shim	DIN988 75x90x0,5	0 012 056 1	X)
101	Hexagon Head Screw	ISO4017 M8x20-8.8	0 011 025 6	10	515	Shim	DIN988 50x62x0,1	0 010 376 4	X)
102	Sealing Compound		0 910 255 8	X)	516	Shim	DIN988 50x62x0,3	0 010 400 0	X)
131	Closing Cap	90x12	0 011 162 7	1	517	Shim	DIN988 50x62x0,5	0 010 418 3	X)
137	Spacer	DIN988 S75x90x3,5	0 012 034 0	1	521	Shim	DIN988 110x140x0,1	0 011 326 3	X)
158	Closing Plug	9,5	0 011 371 9	2	522	Shim	DIN988 110x140x0,3	0 011 340 9	X)
160	Closing Plug	5,4	0 011 382 4	2	523	Shim	DIN988 110x140x0,5	0 011 351 4	X)
161	Closing Cap	40x7	0 011 165 1	1	990	Contactcorros.inhib.		0 910 503 4	1

Parts with dimensions given in Imperial System units are written in italics and highlighted in grey.

* The gearing parts have embossed part numbers. These must always be quoted.

X) As required

a) optional oil seal in FKM (Viton)

b) double sealing

c) for i = 9,58 to 270,68

h) ATEX model according to category II2G, II2D, III3G, III3D

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APPENDIX E
MOTOR PARTS LISTS



Parts List

AC squirrel-cage motors

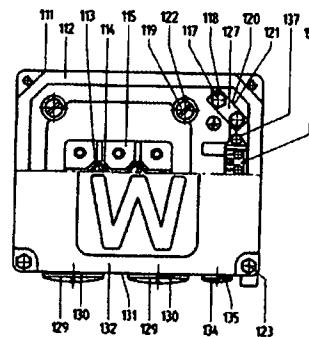
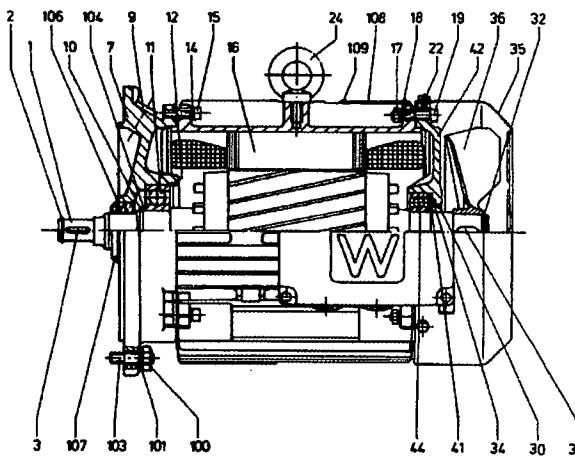
DFV132M-DFV132ML, 160M

To be mounted to all gear unit types

- ① size 70, ② size 80, ③ size 90, ④ size 100,
- ⑤ size 130, ⑥ sizes 120,140, ⑦ sizes 150,160+K180

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No.	Description	DIN standard label	Part No.	Qty	No.	Description	DIN standard label	Part No.	Qty
1	Rotor compl. DFV132M-4		136 513 4	1	9	Screw plug ⑦	M4x2x2	011 427 8	1
1	Rotor compl. DFV132M-6		181 323 4	1	10	Circlip/snap ring	DIN471 45x1,75	010 286 5	1
1	Rotor compl. DFV132M-8/2		136 514 2	1	11	Deep groove ball bearing	DIN625 6309-Z-J-C3	011 733 1	1
1	Rotor compl. DFV132ML-4		136 516 9	1	12	Circlip/snap ring	DIN472 100x3	010 327 6	1
1	Rotor compl. DFV132ML-6		181 329 3	1	14	Lock washer	DIN7980 8-phr.	010 257 1	4
1	Rotor compl. DFV132ML-8/2		136 517 7	1	15	Cheese head screw	DIN912 M8x35-8.8	012 304 8	4
1	Rotor compl. DFV160M-4		136 518 5	1	16	Stator compl.			1
1	Rotor compl. DFV160M-6		181 335 8	1	17	Hexagon nut	DIN934 M8-8	010 199 0	4
1	Rotor compl. DFV160M-8/2		136 519 3	1	18	Lock washer	DIN7980 8-phr.	010 257 1	4
2	Circlip/snap ring DFV132M	DIN471 22x1,2	010 272 5	1	19	Cheese head screw	DIN912 M8x40-8.8	012 305 6	4
2	Circlip/sn.r.DFV132ML/160M	DIN471 28x1,5	010 276 8	1	22	Hexagon head cap screw	DIN933 M6x10Z1-8.8-A2C	013 631 X	4
3	Key DFV132M	DIN6885 A5x5x25	010 008 0	1	24	Lifting eyebolt	DIN580 M12	010 230 X	1
3	Key DFV132ML/160M	DIN6885 A6x6x28	010 014 5	1	30	Oil seal without spring	DIN3760 A45x62x8-NB	011 208 9	1
7	fl. d end shield ①		136 451 0	1	31	Key	DIN6885 A12x8x28	010 031 5	1
7	fl. d end shield ②		136 453 7	1	32	Circlip/snap ring	DIN471 40x1,75	010 283 0	1
7	fl. d end shield ③		136 166 X	1	34	Shim	DIN988-St 65x85x0,1	011 328 X	X)
7	fl. d end shield ④		136 457 X	1	34	Shim	DIN988-St 65x85x0,3	010 412 4	X)
7	fl. d end shield ⑤		136 461 8	1	34	Shim	DIN988-St 65x85x0,5	010 420 5	X)
7	fl. d end shield ⑥		135 459 6	1	35	Fan guard		182 452 X	1
7	fl. d end shield ⑦		136 466 9	1	36	Fan		182 325 6	1
9	Screw plug ① ②	M12x1,5	011 430 8	1	41	Cup spring	84,5x60,5x09x2,5	012 418 4	2
9	Screw plug ③ ④ ⑤	M22x1,5	011 431 6	1	42	B side brg. end shield		136 401 4	1
9	Screw plug ⑥	M33x2	011 432 4	1	44	Deep groove ball bearing	DIN625 6209-2Z-J-C3-EUN3	011 731 5	1

X)As required

When ordering spare parts always quote nameplate data with serial number and designation with part number!

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Parts List

AC squirrel-cage motors

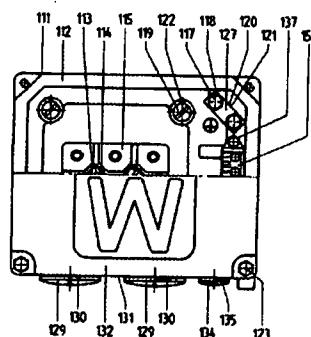
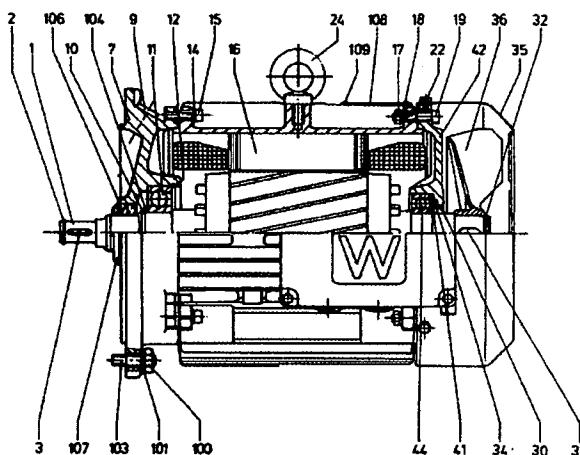
DFV132M-DFV132ML, 160M

To be mounted to all gear unit types

- ① size 70, ② size 80, ③ size 90, ④ size 100,
- ⑤ size 130, ⑥ sizes 120, 140, ⑦ sizes 150, 160+K180

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No.	Description	DIN standard label	Part No.	Qty	No.	Description	DIN standard label	Part No.	Qty
100	Hexagon nut ①	DIN934 M10-8	010 200 8	4	113	Cheese head screw	DIN84 AM6x20-4.8	010 190 7	2
100	Hexagon nut ② ③	DIN934 M12-8	010 201 6	4	114	Lock washer	DIN7980 6-phr.	010 256 3	2
100	Hexagon nut ④ ⑤	DIN934 M16-8	010 203 2	4	115	Terminal block	DIN46294 K1M6	010 798 0	1
100	Hexagon nut ⑥ ⑦	DIN934 M16-8	010 203 2	8	117	Hexagon head cap screw	DIN933 M6x20-A2-70	011 855 9	2
101	Lock washer ①	DIN127 B10-phr.	010 992 4	4	118	Lock washer	DIN7980 6-vn	011 821 4	2
101	Lock washer ② ③	DIN127 B12-phr.	010 993 2	4	119	Cheese head screw	DIN84 AM8x20-4.8	010 193 1	4
101	Lock washer ④ ⑤	DIN127 B16-phr.	010 995 9	4	120	Earth terminal bottom		180 169 4	1
101	Lock washer ⑥ ⑦	DIN127 B16-phr.	010 995 9	8	121	Countersunk pin	DIN1477 4x12-4.8-E3E	011 905 9	1
103	Stud ①	DIN939 M10x25-8.8	010 079 X	4	122	Lock washer	DIN7980 8-phr.	010 257 1	4
103	Stud ② ③	DIN939 M12x30-8.8	010 081 1	4	123	Hexagon head cap screw	DIN933 M6x20Sp-8.8-A2C	012 292 0	4
103	Stud ④	DIN939 M16x35-8.8	010 085 4	4	127	Earth terminal top		180 136 8	1
103	Stud ⑤	DIN939 M16x40-8.8	010 086 2	4	129	Screw plug DFV132M/132ML	DIN46320 NPg21-FS	010 832 4	2
103	Stud ⑥	DIN939 M16x40-8.8	010 086 2	8	129	Screw plug DFV160M	DIN46320 NPg29-FS	010 833 2	2
103	Stud ⑦	DIN939 M16x45-8.8	011 261 5	8	130	Seal. ring DFV132M/132ML	DIN7603 A28x33-Gi	011 913 X	2
104	Spacer	DIN988-St S45x55x3	010 353 5	1	130	Sealing ring DFV160M	DIN7603 A38x44-Gi	011 914 8	2
106	Oil seal	DIN3760 A40x62x7-NB	012 069 3	1	131	Gasket f. p. 132		180 019 1	1
107	Oil flinger	40	011 665 3	1	132	Terminal box cover		180 014 0	1
108	Nameplate			1	134	Screw plug	DIN46320 NPg11-FS	010 828 6	2
109	Round head pin	DIN1476 2x4-X5CrNi19.11	010 764 6	2	135	Sealing ring	DIN7603 A18x22-Gi	011 911 3	2
111	Gasket f. p. 112		136 415 4	1	137	Screw a)	DIN7500-St-A2C CM4x20	013 107 5	2
112	Terminal box bottom	DFV132M/132ML	180 012 4	1	153	Connect. terminal cpl. a)		183 060 0	1
112	Terminal box bottom	DFV160M	180 016 7	1					

a)Parts for TF version

When ordering spare parts always quote nameplate data with serial number and designation with part number!

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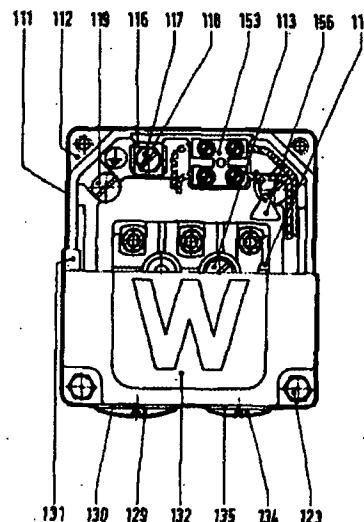
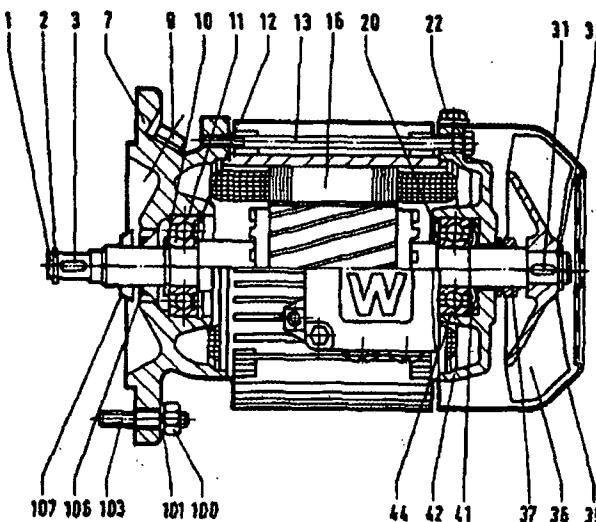
Parts List

AC squirrel-cage motors DFT90L and S; DFT100L and LS

08 830 47
Page 1 of 2

To be mounted to all gear unit types

- ① sizes 40, 50 and S32DT90, ② size 60,
- ③ size 70, ④ size 80, ⑤ size 90,
- ⑥ size 100



No.	Description	DIN standard label	Part No.	Qty	No.	Description	DIN standard label	Part No.	Qty
1	Rotor compl. DFT90L-4		135 351 9	1	10	Circlip/Snap r.	DIN983 30x1,5	011 462 6	1
1	Rotor compl. DFT90S-4		135 465 5	1	11	Deep Groove Ball Brdg	DIN625 6306-Z-J	010 523 6	1
1	Rotor compl. DFT100L-4		135 363 2	1	12	Circlip/Snap r.	DIN472 72x2,5	010 322 5	1
1	Rotor compl. DFT100LS-4		135 473 6	1	13	Hexagon Head Screw DFT90	ISO4014 M6x155-6.8-A1C	011 870 2	4
2	Circlip/Snap r. DFT90	DIN471 14x1	010 266 0	1	13	Hexagon screw DFT100	ISO4014 M6x205-6.8-A1C	011 871 0	4
2	Circlip/Snap r. DFT100	DIN471 16x1	010 268 7	1	16	Stator compl.			1
3	Key DFT90	DIN6885 A3x3x14	010 069 2	1	16	Stator compl. b)	abgeflacht		1
3	Key DFT100	DIN6885 A4x4x18	011 438 3	1	20	Nilos-Rg.No Pretens.	6205 ZAV	010 714 X	1
7	Flanged End Shield Ø	DFT90	135 176 1	1	22	Hexagon Head Screw	DIN933-8.8-A2C M5x7 Z1	013 630 1	4
7	fl. d end shield Ø	DFT100	181 406 0	1	31	Key	DIN6885 A6x6x22	010 013 7	1
7	Flanged End Shield Ø		135 178 8	1	32	Circlip/Snap r.	DIN471 22x1,2	010 272 5	1
7	Flanged End Shield Ø		135 180 X	1	35	Fan Guard		135 198 2	1
7	Flanged End Shield Ø		135 182 6	1	35	Fan Guard W.Flat. b)	abgeflacht	135 199 0	1
7	Flanged End Shield Ø		135 184 2	1	36	Fan (small)		135 482 5	1
7	fl. d end shield Ø		135 301 2	1	37	V-Seal	V-25	011 769 2	1
9	Screw Plug Ø Ø	M10x1	011 426 X	1	41	Equalizing ring	44x51x0,4 K3	011 583 5	1
9	Screw Plug Ø Ø	M12x1,5	011 430 8	1	42	End Shield B-Side		135 192 3	1
9	Screw Plug Ø Ø	M22x1,5	011 431 6	1					

a) Parts for TF version

b) Only in combination with foot-mounted gear unit sizes 40 and 50

When ordering spare parts always quote nameplate data with serial number and designation with part number!



Parts List

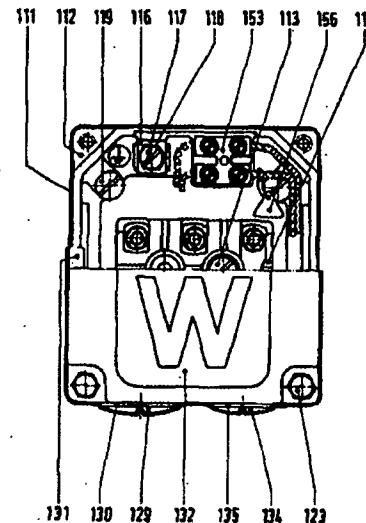
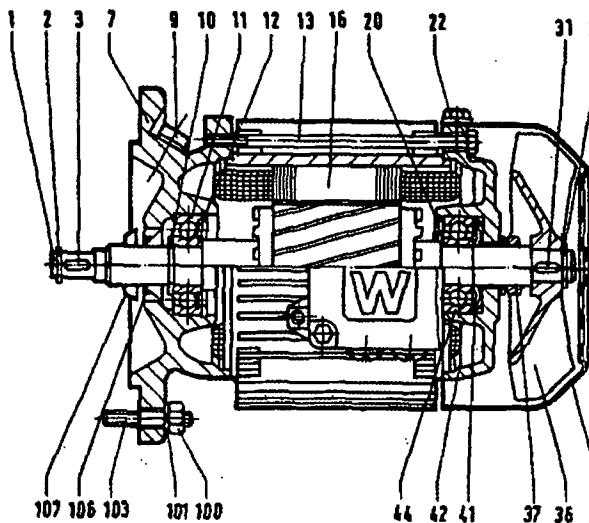
AC squirrel-cage motors DFT90L and S; DFT100L and LS

To be mounted to all gear unit types

- ① sizes 40, 50 and S32DT90, ② size 60,
- ③ size 70, ④ size 80, ⑤ size 90,
- ⑥ size 100

08 830 47

Page 2 of 2



No.	Description	DIN standard label	Part No.	Qty	No.	Description	DIN standard label	Part No.	Qty
44	Deep Groove Ball Brdg	DIN625 6205-J	010 488 4	1	112	Term. Box Lower Part	DFT90	135 096 X	1
100	Hexagon Nut ①	ISO4032 M6-10	012 867 8	4	112	Terminal box bottom	DFT100	135 560 0	1
100	Hexagon Nut ②	ISO4032 M8-8	010 199 0	4	113	Cheese head screw	DIN84-4.8 AM5x16Sp	012 962 3	1
100	Hexagon Nut ③	ISO4032 M10-8	010 200 8	4	115	Terminal block	KTM4	011 759 5	1
100	Hexagon Nut ④ ⑤	ISO4032 M12-8	010 201 6	4	116	Terminal clamp	DIN46282CuZn40F42vn C10	010 442 6	2
100	Hexagon nut ⑥	ISO4032 M16-8	010 203 2	4	117	Hexagon head cap screw	DIN933-Cu3-E2E M5x12Sz	011 217 8	1
101	Lock Washer ①	DIN127 B6	010 990 8	4	118	Lock Washer	DIN7980 5	011 820 6	1
101	Lock Washer ②	DIN127 B8	010 991 6	4	119	Slotted Head Screw	DIN84 AM5x16SP-4.8	012 962 3	4
101	Lock Washer ③	DIN127 B10	010 992 4	4	123	Hexagon Head Screw	ISO40117 M5x16SP-8.8-A2C	012 291 2	4
101	Lock Washer ④ ⑤	DIN127 B12	010 993 2	4	129	Screw Plug DFT90	DIN46320-FS NPg16-FS	010 831 6	1
101	Lock washer ⑥	DIN127 B16	010 995 9	4	129	Screw Plug DFT100	DIN46320-FS NPg21-FS	010 832 4	1
103	Stud ①	DIN939 M10x25-8.8	010 079 X	4	130	Sealing Ring DFT90	DIN7603 A22x27-GI	011 912 1	1
103	Stud ②	DIN939 M8x20-8.8	010 074 9	4	130	Sealing Ring DFT100	DIN7603 A28x33-GI	011 913 X	1
103	Stud ③	DIN939 M6x18-8.8	013 407 4	4	131	Gasket f. p. 132	DFT90	135 101 X	1
103	Stud ④ ⑤	DIN939 M12x30-8.8	010 081 1	4	131	Gasket f. p. 132	DFT100	132 562 7	1
103	Stud ⑥	DIN939-8.8 M16x35	010 085 4	4	132	Terminal box cover	DFT90	135 098 6	1
106	Oil Seal	DIN3760 A 30x47x7-NB	010 617 8	1	132	Terminal box cover	DFT100	135 558 9	1
107	Oel Flinger	30	011 663 7	1	134	Screw Plug	DIN46320 N PG11-FS	010 828 6	1
108	Nameplate			1	135	Sealing Ring	DIN7603-GI A18x22	011 911 3	1
109	Round head pin	DIN1476-X5CrNi1911 2x4	010 764 6	2	153	Connecting terminal a)		182 333 7	1
111	Gasket Term. BoxBase f. p. 112	DFT90	135 100 1	1	156	Label plate a)		136 681 5	1
111	Gasket f. p. 112	DFT100	135 563 5	1					

a) Parts for TF version

b) Only in combination with foot-mounted gear unit sizes 40 and 50

When ordering spare parts always quote nameplate data with serial number and designation with part number!

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APPENDIX F

MOTOR TYPE TEST CERTIFICATES

Typ-Test

type-test



Motortyp: **DV 132ML 4** Bemessungsleistung: 9,2 kW
 type: rated power:

Spannung: 400V Frequenz: 50Hz Schaltung: Y
 voltage: frequency: connection:

Wicklungswiderstand kalt: 0,825/0,819/0,820Ω bei: 24,3°C
 winding resistance cold: at: 24,3°C

Leerlaufmessung bei Bemessungsspannung*No load measurement at rated voltage*

Leerlaufstrom: 7,0A
 No load current:

Reibungsverluste: 73W Eisenverluste: 236W
 Friction losses: Core losses:

Erwärmungslauf*Heat run*

Spannung: voltage:	399V	Strom: current:	18,04A
Drehzahl: speed:	1440,7min ⁻¹	aufgenommene Leistung: input power:	10504W
Abgabeleistung output power (nach / in accordance to IEC 60034-2:1972 + IEC 60034-2A:1974 + A1:1995 + A2:1996; Einzelverlustverfahren/separated losses method):	9276W	Wicklungsübertemperatur: winding temperature rise:	66,7K

Belastungsmessung*load test*

	25% Last 25% load	50% Last 50% load	75% Last 75% load	100% Last 100% load	125% Last 125% load
Strom: current:	7,9A	10,7A	14,0A	17,9A	22,2A
cos φ: p.f.:	0,50	0,71	0,80	0,84	0,86
Wirkungsgrad: efficiency:	84,8%	88,5%	89,1%	88,3%	86,9%
Drehzahl: speed:	1485min ⁻¹	1471min ⁻¹	1456min ⁻¹	1440min ⁻¹	1422min ⁻¹

Kurzschlussmessung*locked rotor test*

Spannung: voltage:	364V	Strom: current:	109A
aufgenommene Leistung: input power:	41,9kW	Drehmoment: torque:	121Nm

Drehmoment-Messung*torque measurement*

Sattelmoment: pull up torque:	131Nm	Kippmoment: breakdown torque:	169Nm
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Datum/date: 8.7.1996
 Ort/location: Bruchsal



Typ - Test

type - test

Motortyp :	DRE 90 L 4	Bemessungsleistung : rated power :	1,5 kW
type :			
Spannung : voltage :	400 V	Frequenz : frequency :	50 Hz

Wicklungswiderstand kalt :
winding resistance cold : 6.812/6.811/6.809 Ω bei :
at : 23,3 °C

Leerlaufmessung bei Bemessungsspannung

No load measurement at rated voltage

Leerlaufstrom : no load current :	1,92 A	Eisenverluste : core losses :	50 W
Reibungsverluste : friction losses :	11 W		

Erwärmungslauf

Heat run

Spannung : voltage :	400 V	Strom : current :	3,33 A
Drehzahl : speed :	1436 min ⁻¹	aufgenommene Leistung : input power :	1762 W
Abgabeleistung output power (nach / in accordance to IEC 60034-2:1972 + IEC 60034-2A:1974 + A1:1995 + A2:1996; Einzelverlustverfahren / separated losses method) :	1491 W	Wicklungsübertemperatur : winding temperature rise :	42,8 K

Belastungsmessung load test	nach : CSA - C390 in acc.:
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	25% Last 25% load	50% Last 50% load	75% Last 75% load	100% Last 100% load	125% Last 125% load
Strom : current : [A]	1,97	2,30	2,76	3,33	3,99
cos φ : p.f. :	0,36	0,56	0,69	0,77	0,82
Wirkungsgrad : efficiency : [%]	77,0%	84,0%	85,2%	84,5%	82,8%
Drehzahl : speed : [min ⁻¹]	1484	1470	1452	1432	1411

Kurzschlussmessung

locked rotor test

Spannung : voltage :	400 V	Strom : current :	21,7 A
aufgenommene Leistung : input power :	11,82 kW	Drehmoment : torque :	32,1 Nm

Drehmoment - Messung

torque measurement

Sattelmoment : pull up torque :	27,9 Nm	Kippmoment : breakdown torque :	33,6 Nm
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Datum / date : 08.08.06
Ort / location : Bruchsal



Typ - Test

type - test

Motortyp : type :	DRE 100 LC 4	Bemessungsleistung : rated power :	3,0 kW
Spannung : voltage :	400 V	Frequenz : frequency :	50 Hz
Wicklungswiderstand kalt : winding resistance cold :	3.447/3.447/3.449	Ω	bei : at : 26,8 °C

Leerlaufmessung bei Bemessungsspannung

No load measurement at rated voltage

Leerlaufstrom : no load current :	3,07 A	Eisenverluste : core losses :	92 W
Reibungsverluste : friction losses :	11 W		

Erwärmungslauf

Heat run

Spannung : voltage :	400 V	Strom : current :	6,18 A
Drehzahl : speed :	1449 min⁻¹	aufgenommene Leistung : input power :	3485 W
Abgabeleistung output power (nach / in accordance to IEC 60034-2:1972 + IEC 60034-2A:1974 + A1:1995 + A2:1996; Einzelverlustverfahren / separated losses method) :	3015 W	Wicklungsübertemperatur : winding temperature rise :	53,3 K

Belastungsmessung <i>load test</i>	nach : in acc. : CSA - C390
--	--------------------------------

	25% Last 25% load	50% Last 50% load	75% Last 75% load	100% Last 100% load	125% Last 125% load
Strom : current : [A]	3,32	4,03	5,00	6,17	7,49
cos φ : p.f. :	0,40	0,62	0,74	0,81	0,85
Wirkungsgrad : efficiency : [%]	81,0%	86,8%	87,6%	86,8%	85,3%
Drehzahl : speed : [min ⁻¹]	1489	1478	1467	1454	1439

Kurzschlussmessung

locked rotor test

Spannung : voltage :	400 V	Strom : current :	46,2 A
aufgenommene Leistung : input power :	24,56 kW	Drehmoment : torque :	53,4 Nm

Drehmoment - Messung

torque measurement

Sattelmoment : pull up torque :	47,6 Nm	Kippmoment : breakdown torque :	65,0 Nm
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Datum / date : **25.07.06**
Ort / location : **Bruchsal**

APPENDIX G

WELDING PROCEDURES

SPIRAC engineering pty ltd	WELDING PROCEDURE SPECIFICATION		
	STD SPIRAL + INSERT	Rev: A	Page 1 of 2
Welding Code :	AS 1554 - 1991 - Part 1 (SP)		
Welding Process :	Gas Metal Arc Welding Process		
Edge Preparation :	By Flame Cutting and Grinding		
Joint Type :	Double Vee Butt Joint		
Joint Position :	1G (or Downhand Position)		
Weld Progression :	Right to Left		

JOINT TOLERANCES		MATERIAL SPECIFICATION		THERMAL TREATMENT	
DIMENSION		AS DETAILED			
ROOT OPENING 'RO'	3mm Approx	GRADE	HTMAS	PREHEAT	20°C Approx
ROOT FACE 'RF'	2mm Approx	PLATE THICKNESS	25mm	MAX INTERPASS	300°C
GROOVE ANGLE '0C'	50° Approx	RANGE QUAL	18.75 to 37.5mm	P.W.H.T.	Not Required

WELD PASS DETAILS			ELECTRODE DESCRIPTION			FLUX / GAS	WELDING PARAMETERS				INTER PASS temp	HEAT INPUT KJ/mm
No	Side	Pos	Type	Size	Spec.		Amps	Volts	Pol	Speed		
1	1	1G	1-LM	0.9	ER70S-4	10 Lit	170	25	DC+	180	100°C	1.41
2	1	1G	1-LM	0.9	ER70S-4	10 Lit	170	24	DC+	160	110°C	1.53
3	2	1G	1-LM	0.9	ER70S-4	10 Lit	185	23	DC+	160	120°C	1.59
4-5	2	1G	1-LM	0.9	ER70S-4	10 Lit	185	22	DC+	200	150°C	1.22
6-7	2	1G	1-LM	0.9	ER70S-4	10 Lit	185	22	DC+	195	180°C	1.25
8-9	1	1G	1-LM	0.9	ER70S-4	10 Lit	185	22	DC+	200	140°C	1.22
10-11	1	1G	1-LM	0.9	ER70S-4	10 Lit	185	22	DC+	190	185°C	1.28

CONSUMABLE DETAILS			N.D.E		
Stickout	10mm Approximately		Visual		1
Shield Gas	Liquid Arc Welding Grade		M.T.		N/R
Flux	Mixture		R.T.		N/R
Electrode	Liquid Arc Steelmig 1-LM ER70S-4		U.T.		N/R

FORM No. : WS-0003



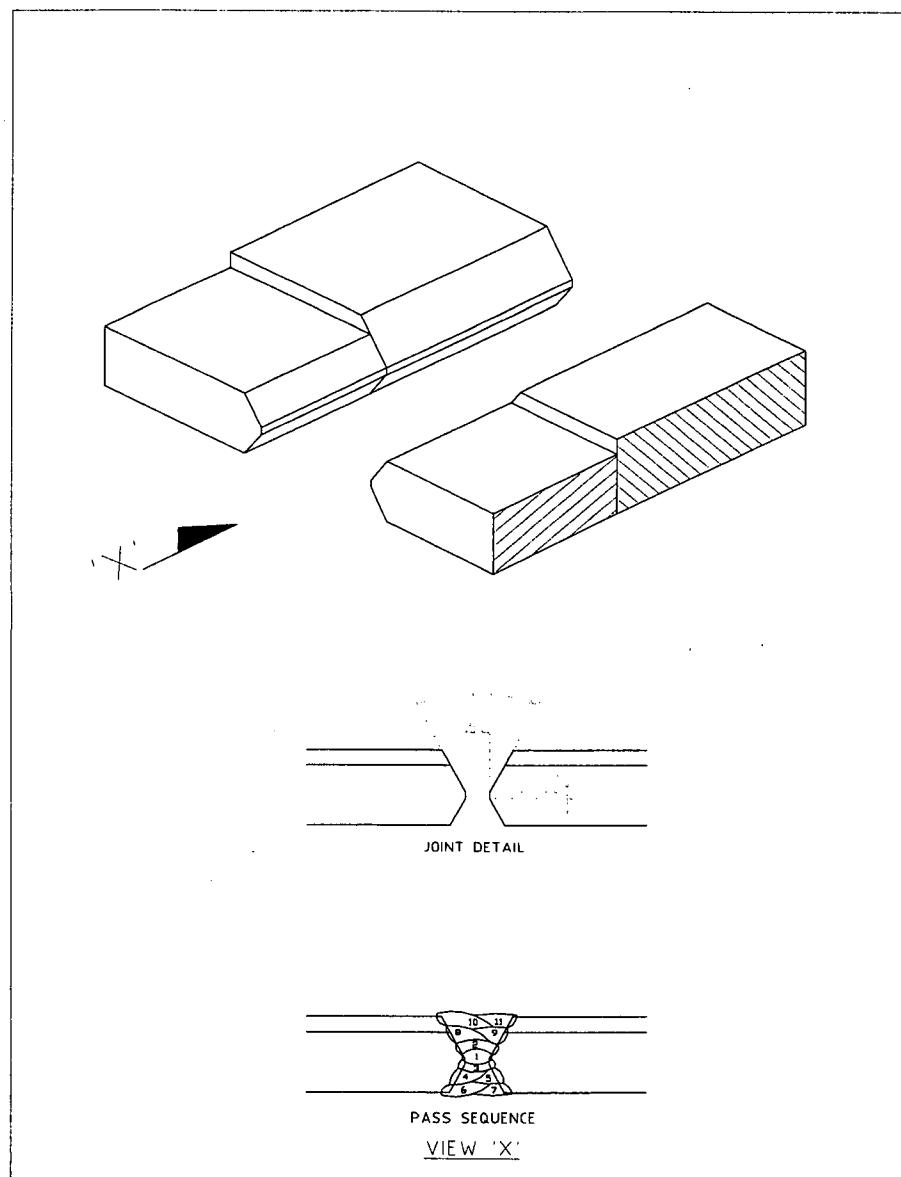
WELDING PROCEDURE SPECIFICATION

STD SPIRAL + INSERT

Rev: A

Page 2 of 2

Preparation of Standard Spiral with Insert prior to welding -



NOTE : 1. All the production welding to be carried out by qualified welders only.

FORM No. : WS-0003

APPENDIX H

OK CONVEYOR LINER REPLACEMENT

REPLACING P.E. LINERS OF INCLINED OCTAGONAL TROUGHS:

Octagonal troughs using a UHMW Polyethylene Liner, are to be replaced when the yellow wear indicator strip becomes visible through a liner. Regular checks should be made on the conveyors liners to ensure that wear doesn't proceed past the wear indicator strip.

Replacing the UHMW Polyethylene Liner -

The new liners are delivered ready shaped. Once the liner has been removed from its packaging it starts to become flat. For this reason the shaped liners should not be removed from their packaging until immediately before they are to be fitted.

1. Empty the conveyor of material & clean thoroughly. Unbolt all octagonal lids and remove from the trough.
2. Ensure that the spiral is secured, so it will not slide down the incline. Unfasten the nuts on the coupling disc bolts holding the spiral to the coupling disc.
3. Remove the spiral from the octagonal trough or lift it to allow accessibility to the liners.

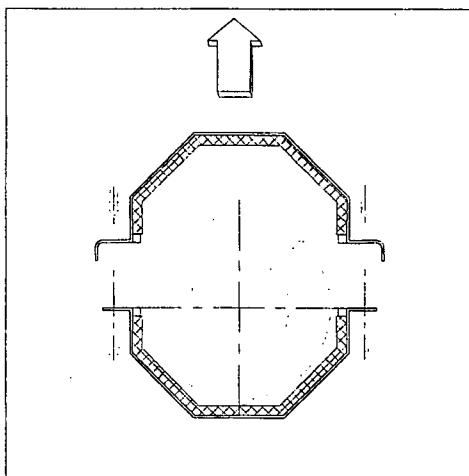


Figure 5.2a - Taking off the Cover

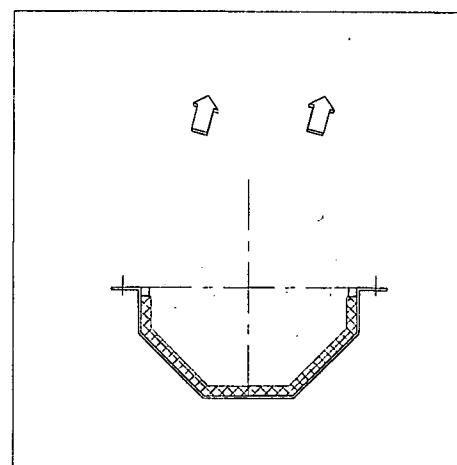


Figure 5.2b - Lifting the Spiral

4. Insert a heavy duty screw driver or lever down between the octagonal trough and the UHMW P.E. liner so that it releases from its steel block retainers (see fig 5.2c).
5. Take hold of the liner and pull it out (see fig 5.2d).

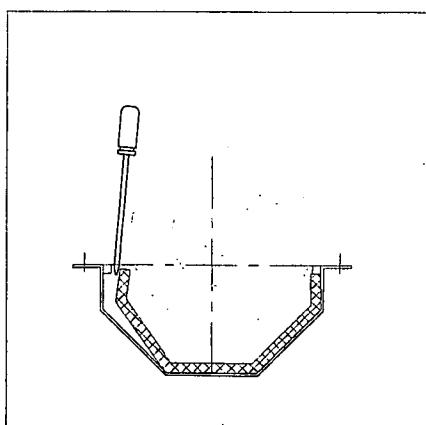


Figure 5.2c - Levering Out the Liner

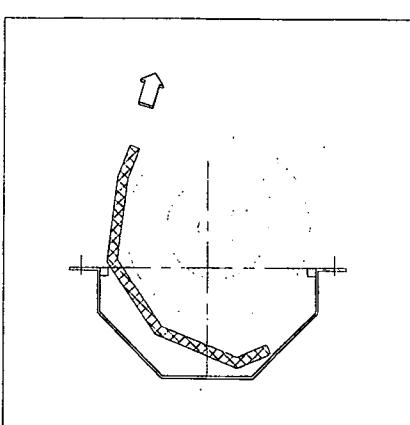


Figure 5.2d - Pulling Out the Liner

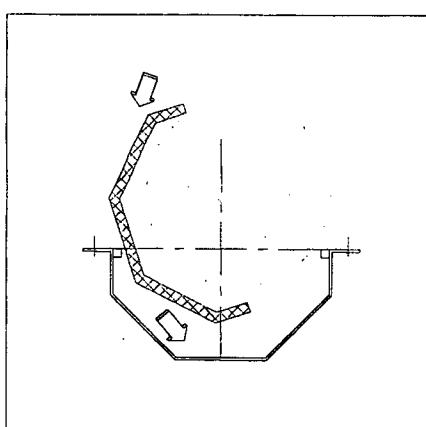


Figure 5.2e

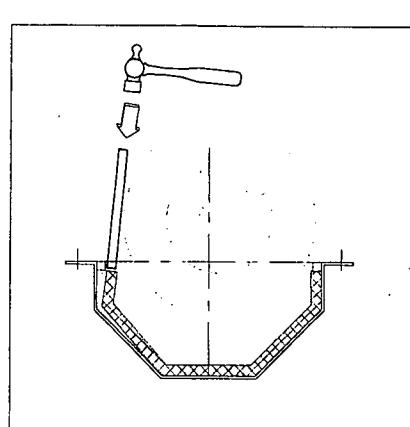


Figure 5.2f

6. Repeat sets 4/ & 5/ for the octagonal lids, removing the liner.
7. Push the new liner onto the octagonal trough & octagonal lid, making sure the wear indicator strip is at the outside. It is important to secure the liner under the retainer blocks on each side. (Figure 5.2e & 5.2f).
7. After ensuring the liners are secure and flush, lower the spiral into the trough. Replace the bolts holding the spiral to the coupling disc.

8. Bolt the octagonal lids back onto the octagonal trough (*Figure 5.2g*).

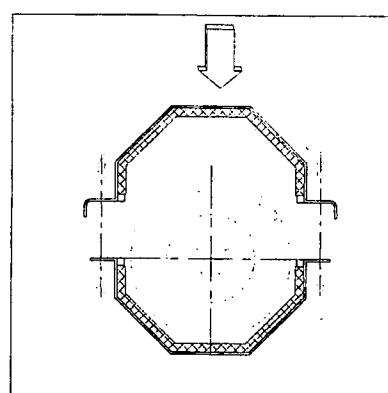


Figure 5.2g

APPENDIX I

OTHER EQUIPMENT