



OPERATING & MAINTENANCE INSTRUCTION MANUAL

Screw Conveyors, Feeders & Bin Dischargers



The Following disclaimer is extremely Important:

Disclaimer: Spirotech Group Limited do not accept liability for any injury, loss of limb, eye or life that may result from working on our equipment, this operational & maintenance manual has been written to assist the maintenance, operation or fault finding for our equipment. It does not replace any current national or international safety standards or procedures. It has been assumed that any personnel working or proposing to work on this equipment has been trained and certified as competent the equipment has been mechanically and electrically isolated before anything is disconnected from it. If in **DOUBT** do not attempt any maintenance at all.

Risk assessments and method statements **MUST** be in place that address national safety standards prior to any works taking place.

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1: General Introduction:

Screw Conveyors move materials either horizontally or on an incline. They are used to feed, distribute, collect or mix and with proper cover and sealing they are easily made dust or weatherproof.

Their compact design in comparison to other types of conveyors saves valuable space, as no return run is required. Screw Conveyors can fit into fairly cramped areas, are simple to support and easy to install.

Spirotech's performance proven Screw Conveyors are ruggedly constructed and accurately manufactured to ensure complete dependability as well as the versatility required meeting a wide range of applications.

Spirotech have through the years supplied screw conveyors to perform in a diverse number of industries and in addition special designs are constantly being developed for use in components and other machinery, in line with our company strategy of constantly striving to improve our products.

2: Recommended Maintenance Programme:

1. Spirotech SRD Group Offer a full maintenance package for our equipment and Other OEM call 01904 799291 to arrange a free site visit & survey.
2. Always practice good housekeeping.
3. Keep the area around the conveyors clean and free of obstacles to provide easy access and to avoid interference with the function of the conveyor and drive.
4. Establish routine periodic inspections of the entire conveyor to ensure continuous maximum operating performance, and trouble free service.

3: General Procedures:

1. Routine cleaning of the trough is advisable, especially when handling materials that are corrosive, moist or have a tendency to set.
2. Frequent lubrication of moving parts will ensure reduced wear and tear.

Geared motor units are supplied pre-charged with oil or EP semi-fluid grease, and will require an oil change after 500hrs and there after every 6,000 to 8,000 hours of use.

Periodic checks on the gearbox should include the following:

1. Check breather plug is in the uppermost position.
2. Check breather plug air hole is clear.
3. Check motor fan air holes are clear.

If for any reason the gearbox is opened, care should be taken to ensure complete cleanliness



4: Installation Check List:

This list is intended as a guide only, you must ensure that adequate safety measures have been taken that meet national & site standards. This list is not exhasutive.

1. Machine aligned, levelled and plumbed for correct alignment.
2. Assembly and mounted bolts checked for tightness.
3. Connections to other items of process machinery checked for fit prior to tightness of bolts (bad fits can lead to distortion of conveyor body causing twisting and possible interference between screw and casing).
4. Machine checked internally for foreign bodies.
5. All gaskets and seals fitted.
6. Motor & gearbox references checked against drawing.
7. Gearbox filled with oil to the correct level.
8. If Drive chain fitted, aligned and tensioned correctly.
9. Drive Chain lubricated.
10. End bearings greased.
11. Hanger bearing (where fitted) correctly aligned, mounted and greased.
12. Inlet & outlets safe (chutes in place etc). no loose fixings or protrusions.
13. Rotation sensor installed (if applicable).
14. Any Erection damage made good.
15. All guards/inspection doors in place and secure with adequate safety Signs.
16. All bolting up completed to the correct torque settings.
17. Safe access to and from machine.
18. * Electrical Installation see next section.

Never hammer, bang or force any part of the conveyor during Install, operation or maintenance. This can lead to damage that may cause the machine to block or malfunction, warranty may be void.





ELECTRICAL / CONTROL



Spirotech SRD Group limited do not generally 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 17th edition Wiring Regulation (BS 7671:2008) and other local or national codes.

Consideration **MUST** be given to some or all of the following devices and to others which may be appropriate. this list is not exhaustive.

1. OVERLOAD PROTECTION: Devices such as shear pins, torque limiters, etc., to shut off power whenever operation of the conveyor is stopped as a result of excessive material, foreign objects, excessively large lumps, etc.
2. NO-SPEED PROTECTION: Devices such as zero speed switches to shut off power if any incident which might cause a conveyor to cease operating.
3. Safety shut-off switch with power lockout provision at conveyor drive.
4. Emergency stop switches readily accessible wherever required.
5. Electrical interlocking to shut down feeding conveyors whenever a receiving conveyor stops.
6. Signal devices to warn personnel of imminent start up of conveyor, especially if started from a remote location.
7. Special limit enclosures for motors and controls for hazardous atmospheric conditions and surroundings.
8. Limit switches at cover openings.



Our conveyors are designed to operate at a given duty with a small band of operation either side of this (usually within 15%). They are not built to withstand forces that can be generated by the motor when the screw cannot turn freely, resulting damage may shear bolts, shafts and bending of the centre tube which we accept no liability whatsoever for.

Warning: Failure to provide protection will result in a void warranty and you may damage the machine.

Disclaimer: Spirotech SRD Group Limited including any subsidiaries & Holding Companies and company officers do not accept any liability for failure of any components, assemblies or complete screw conveyors that may result in any injuries, loss of limbs or death as a result of any part of any component or complete assembly failing due to lack of safety devices incorporated. It is the full responsibility of the buyer to ensure that adequate safety devices or control equipment limit and/or shutoff electrical power during a blockage, overload etc.

We will not accept any repair costs for this and other damaged machinery and/or liquidated damages for loss of production, product and production costs.



5: Commissioning Check List:

With Power Off

1. Cable installation is completed and fully tested as compliant to national & Site standards.
2. Cables tested for insulation and continuity according to National Standards.
3. Emergency stop checked back to MCC and tested.
4. Fuses, overload ratings checked against motor settings.
5. Rotation sensor operational and cuts power to motor on no rotation.

With Power On (No load)

1. Direction of drive motor checked.
2. Machine first run.
3. Checks made for the following.
 - 3.1 Bearings & Seals Overheating
 - 3.2 Conveyor Unusual noises emanating there from.
 - 3.3 Drive Alignment.
 - 3.4 Geared Motor Unit Overheating.
4. If any point in section 3 above is observed, the following checks should be made.
 - 4.1 Bearings Grease level in end bearings.
Insufficient or excess lubricant can lead to high operating temperature and subsequent break up of bearings.
 - 4.2 Conveyor Alignment of the machine and mounting of supports and interface joints with other items of plant machinery.
 - 4.3 Drive Assembly and mounting bolts - tighten if necessary.
 - 4.4 Geared Motor Unit Alignment and mounting of the hanger bearing where fitted.
5. Screw rotation is correct for feed direction (**refer to diagrams shown on Page 8**).
6. Screw rotational speed correct to drawing.
7. Current reading noted and is within tolerance of shutdown set point.
8. Operation of rotation sensor is proven

Refer to Third party instructions located in the rear of the manual for specific recommendations, i.e. Bearing manufacturer grease grade recommendation etc etc.



UK Head Office:

Brookside Industrial Estate,
Glatton Road, Sawtry,
Cambridgeshire, PE28 5SB

Tel: +44(0)1487 832053
Fax +44(0)1487 832252
sales@spirotechgroup.co.uk

York Office:

Unit 4
London Ebor Business Park,
Millfield Lane, Nether Poppleton,
York, YO26 6PB

Tel: +44(0)1904 799291
gavin@spirotechgroup.co.uk

www.spirotechgroup.co.uk

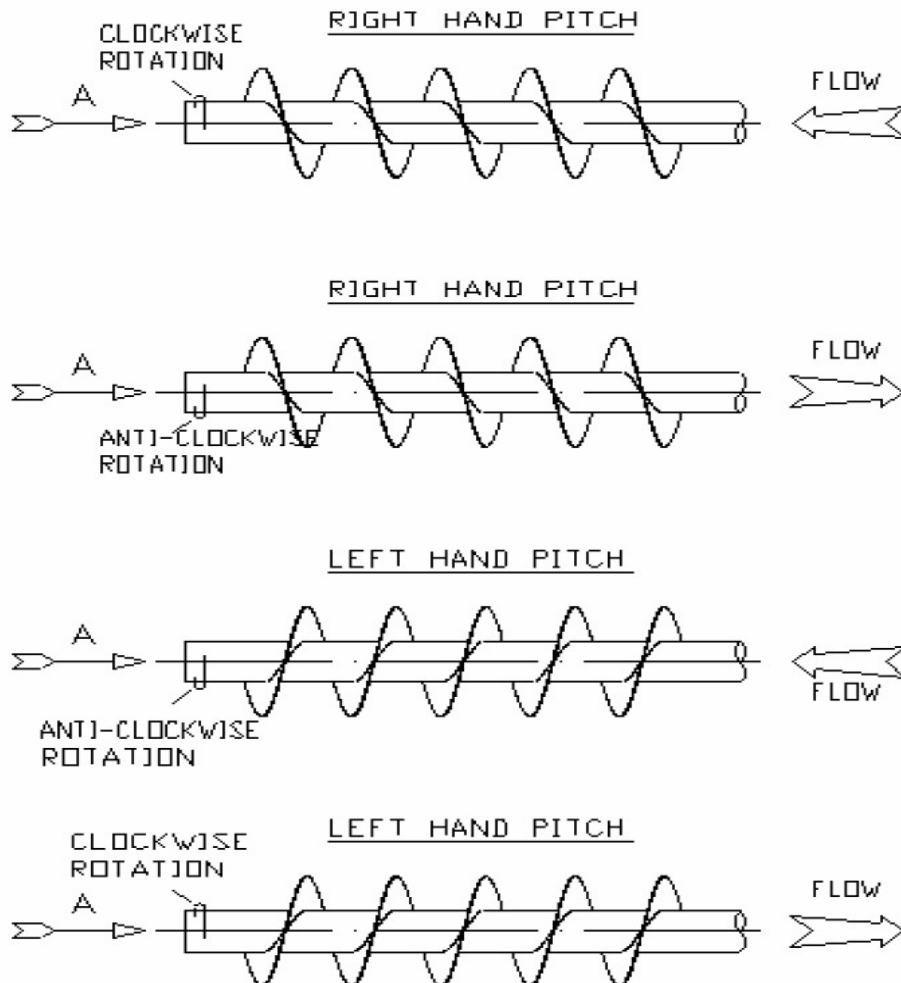
With Electrical Power On (With load)

1. Current reading noted and is within the motor manufacturers recommended range.
2. Screw loading checked. (Please refer to your supplied drawing for machine capacity).
3. Drive chain tension correct.
4. Screw speed checked. (rotation sensor or other means)
5. Bearing temperature normal.(Please refer to third party instructions located in the rear of this manual)
6. Noise and vibration levels acceptable.
7. Machine ready for service.



7: Screw Handing & Rotation:

Diagram showing the effect of flight handing and screw rotation on the direction of material feed.



8: Shutdown:

If the conveyor is to be inoperative for a prolonged period of time, run & operate the machine until cleared of all material. It should be noted, however, that there is a clearance between the screw and the trough casing, which means that a small amount of material will remain. Therefore, if the material being conveyed is corrosive, or hygroscopic, or has a tendency to harden, pack or set, the trough should be completely cleaned down after shutdown, and with the power locked off.

The conveyor must be turned over once a week to stop the bearings from fretting. * Never under any circumstances, jog start the conveyor with direct on line starters. In the event of a blockage, manually un-block the machine before restarting (follow your own site safety & work procedures) before restarting.

9: Precautions:

1. Maintain a safety training and safety equipment operation / maintenance programme for all employees.
2. Screw conveyors shall not be operated unless the conveyor housing completely encloses the moving elements of the conveyor and that power transmission guards are in place.

IF THE CONVEYOR IS TO BE OPENED FOR INSPECTION, CLEANING OUT OR OBSERVATION THE MOTOR DRIVE UNIT SHOULD BE LOCKED OUT ELECTRICALLY IN SUCH A MANNER THAT IT CANNOT BE RESTARTED BY ANYONE; WHERE WORK DICTATES STOPPING AND STARTING OF THE MACHINE FOR THE PURPOSES OF CHECKING THE SCREW ROTATION, DURING THE COMMISSIONING OF THE MACHINE FOR SERVICE, TWO PEOPLE MUST BE IN ATTENDANCE AT ALL TIMES SO THAT THE MACHINE CAN BE STOPPED FROM RUNNING AS QUICKLY AS POSSIBLE IN THE EVENT OF MALFUNCTION OR ENDANGERMENT TO ANY INDIVIDUAL.



ALL WORK UNDERTAKEN BY MAINTENANCE STAFF WILL BE SUBJECT TO ACTUAL SITE CONDITIONS AND THE REQUIREMENTS OF THE HEALTH & SAFETY DIRECTIVE.

3. Practice good house keeping at all times and provide and maintain good lighting around all machines.
4. Keep all operating personnel advised of the location and operation of all emergency controls and devices. Clear access to these controls and devices must be maintained.
5. Frequent inspections of these controls and devices, also covers, guards and equipment to ensure proper working order and correct positioning must be performed.
6. Do not walk on conveyors, guards, or motors.
7. Do not poke or prod material in the conveyor.
8. Do not place hands, feet or allow any item of loose clothing i.e. tie, into the conveyor openings.
9. Do not overload the conveyor or attempt to use it for other than its intended purpose.
10. Inlet and discharge ports shall be securely connected to other equipment to completely enclose the conveyor.
11. Prior to connecting power to the drive a pre-start check should be performed to ensure the equipment and area are safe for operation and all guards are in place and made secure.
12. Upon arrival at site all machinery should be checked for damage:

Under no circumstances should any attempt be made to install any items which show signs of damage.

10: Operating Instructions:

1. Lubricate all Drives as per service instructions.

All geared motor units are filled with EP Semi-fluid grease, or oil. (Refer to the manufacturer's plate)

Refer to service instructions for lubrication.

2. Start Up (No material) (No Product)

- a) In start up of conveyors operate in the empty condition for several hours as a break in period. Observe for bearing heat up, unusual noises or drive misalignment. Should any of these occur check the following and take necessary corrective steps.
- b) Check alignment of machines, casing flange joints, support positions. Correct alignment is essential to ensure that there is no contact of the flight on the inside surfaces of the trough.
- c) Check assembly and mounting bolts and tighten if necessary.
- d) In the case of stuffing box shaft seals it is recommended that the machine be run for increasing periods of time, and the glands tightened as necessary after each period of running; this is to ensure that the gland packing beds in gradually until optimum seating and sealing is obtained.

Start with a short 10-15 minute run, then 30-60 minutes, then slightly longer again, over a total period of ~24 hours. It is essential that this running of the machine takes place with the machine in the empty condition. Care must be taken not to over-tighten the pressure gland, thereby exerting excessive pressure on the gland packing, as this will cause heat to be generated to the detriment of the seal material.

The drive and tail ends both have guards fitted to enclose the rotating parts. The machine should be isolated from the mains supply before the guards are removed to allow the adjustments to be made to the seals, and replaced prior to re-starting the machine.

3. Start Up (With material) (Product)

- a) Check all outlets are free, before feeding conveyor.
- b) Gradually increase feed rate to capacity required.
- c) Allow conveyor to run for several hours, stopping and starting at frequent intervals.
- d) On completion, switch off mains isolator, remove covers and check all gudgeon, drive and tail shafts securing nuts for tightness.
- e) Replace covers.

Do not overload Conveyors by changing the feed condition. All motor powers and gearbox output speeds have been assessed against the capacities, material densities and flow rates given in the specification. Please refer to the supplied assembly drawing for flow rates and product/material data.



11: Electric Motors:

1. Remove the cover and the fan (which is keyed, clamped, pinned, knurled or star tolerance ring located to the shaft extension). Slacken and remove bearing cover screws and end shield bolts/studs. The end shields should then be eased off their spigots.
2. The rotor can now be withdrawn carefully from the stator.
3. Having dismantled the motor, maintenance can be carried out to remove all dirt. Dry compressed air under comparatively low pressure is best as a high velocity stream can force dirt into the spaces between windings etc. Grease removing solvents should only be used very sparingly so as not to damage impregnating varnish or insulation.
4. Bearings are sealed for life.
5. Motors should be re-assembled in the reverse order from dismantling taking care not to damage the windings on insertion of rotor, remembering to ease end shields on bearings and spigots.

!!!!!! ON NO ACCOUNT USE FORCE !!!!!!! you may damage the motor.

6. Before starting, check that the rotor revolves freely. Ensure that the electrical connections are correct and terminal nuts tight. alignment with the driven part, as misalignment will only lead ultimately to bearing trouble and shaft breakage.

Refit any pulley, coupling, sprocket, etc., which has been removed, being particularly careful to ensure correct, If in doubt refer to the motor manufacturers instructions or Spirotech SRD Group Ltd.

12: Bearings:

Spirotech SRD Group limited use three main bearing manufactures, these are:- RHP, SKF & COOPER.

Bearing Maintenance RHP

(Sealed for life)

Self-lube bearings are factory charged with the correct amount of grease and do not require a further grease change when being fitted. Re-lubrication is not normally necessary except when operation at extremes of temperature, speed, loading, extended running or where excessive wet or dirty conditions exist.

SKF

Grease Lubrication:

Re-lubricate the bearing arrangements according to the instructions provided by the machine manufacturer.

Wipe lubricating nipples clean before fresh grease is injected. If the bearing housing is not proved with nipples, requisite re-lubrication should be carried out during a planned stoppage of the machine. The housing cap or end cover must be removed, the used grease taken out and fresh grease added, see 'Application of lubricant' Even where nipples are fitted on the housing, the used grease should be removed and replaced with fresh from time to time.

**UK Head Office:**

Brookside Industrial Estate,
Glatton Road, Sawtry,
Cambridgeshire, PE28 5SB

Tel: +44(0)1487 832053
Fax +44(0)1487 832252
sales@spirotechgroup.co.uk

York Office:

Unit 4
London Ebor Business Park,
Millfield Lane, Nether Poppleton,
York, YO26 6PB

Tel: +44(0)1904 799291
gavin@spirotechgroup.co.uk

www.spirotechgroup.co.uk

Oil Lubrication:

Check the oil level and replenish if necessary. Ensure that the air vent of the oil level gauge is not blocked. When the oil is to be changed, it is drained off and the clean oil of the same type before refilling to the required level. With oil bath lubrication it is generally sufficient to change the oil once a year providing the operation temperature does not exceed +50°C and the oil does not become contaminated. The oil must be changed more frequently when operating temperatures are higher - four times a year up to +100°C, monthly up to +120°C and weekly at +130°C.

COOPER

For most applications, a good lithium based grease, preferably with EP additives and having a base oil viscosity of at least 68cSt is suitable. At slower speeds, a higher viscosity may be required to maintain good lubrication.

Routine Greasing:

If possible it is better to re-grease as the bearing rotates. The grease charges listed below are for bearings up to 75mm bore, use progressively more grease as the bearing size increases.

EXPANSION EX BEARINGS: One or two shots from a grease gun two or three times a year i.e. every 1,000 operating hours is usually sufficient. FIXED GR BEARINGS FOR LOCATION ONLY.

FIXED GR BEARINGS FOR THRUST: One or two shots from a grease gun every two weeks i.e. every 100 operating hours or longer according to duty and experience.

Clean out and replace the grease after several years or as determined by the conditions.

MARINE BEARINGS - See enclosed data. (if applicable).



13: Stuffing Boxes:

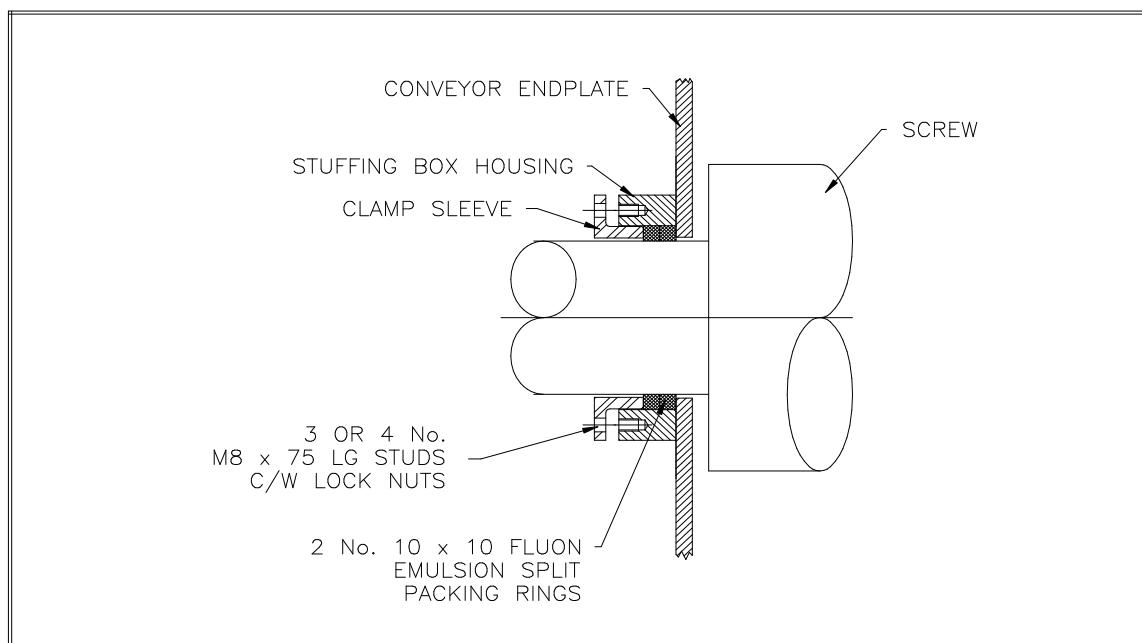
The end sealing arrangement comprises of a machined stuffing box housing with gland packing, the seal being achieved by compression of the gland packing by tightening down the clamp sleeve, to form a seal around the shaft.

The seal should be inspected for its efficiency on a regular basis and if product leakage outside of the outer ring of packing is detected, the clamp sleeve should be evenly tightened down on the packing to re-establish the seal; obviously at some stage, replacement of the packing will be required as a general rule, when no further adjustment of the clamp sleeve is possible, the packing should be removed and inspected and either supplemented with additional rings if possible, or replaced if it is considered that the existing packing has exceeded its useful life.

Inspection interval for inspection of the end seals is suggested once every seven days.

Arrangement comprises of two to three rings of packing:-

SECTION THROUGH STUFFING BOX



14: Stuffing Boxes with Lantern Ring Seals:

The end sealing arrangement comprises of a machined stuffing box housing with gland packing, the seal being achieved by compression of the gland packing by tightening down the clamp sleeve, to form a seal around the shaft.

The seal should be inspected for its efficiency on a regular basis and if product leakage outside of the outer ring of packing is detected the clamp sleeve should be evenly tightened down on the packing to re-establish the seal; obviously at some stage, replacement of the packing will be required as a general rule, when no further adjustment of the clamp sleeve is possible, the packing should be removed and inspected and either supplemented with additional rings if possible, or replaced if it is considered that the existing packing has exceeded its useful life.

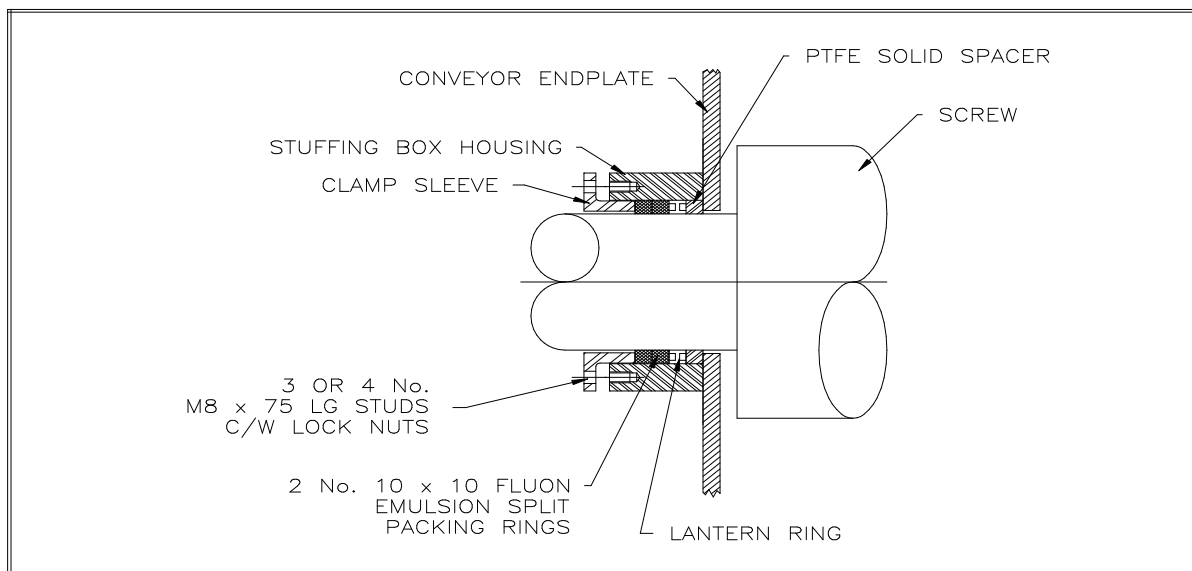
Inspection interval for inspection of the end seals is suggested once every seven days.

The Nitrogen or Air pressure required for purge 1-3 PSIG. (0.07 – 0.2 Bar)

The following page details the correct method to follow, to fit and maintain the gland packing.

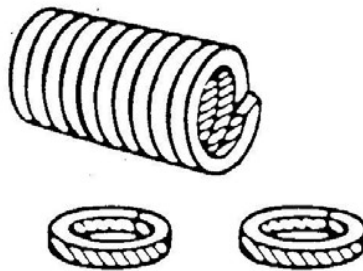
Arrangement comprises of one solid spacer, one lantern ring for nitrogen or air purging and two rings of gland packing.

SECTION THROUGH STUFFING BOX WITH LANTERN RING



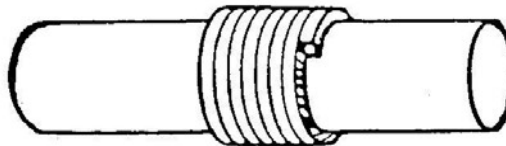
15: Fitting Instructions for Stuffing Gland Seals:

Gland Packing is normally supplied as spirals or on a spool or coil, or as pre-formed rings made to specified dimensions. When supplied as a continuous length, it is necessary first to cut off the length material to make the number of rings.

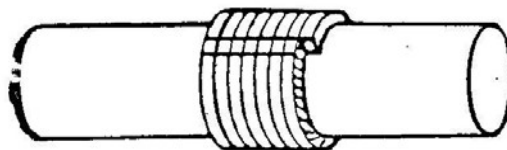


Instructions for the Replacement of Gland Packing

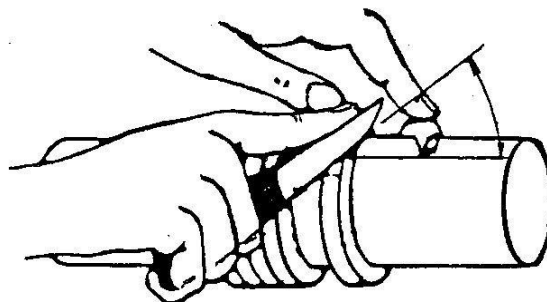
Place the packing around the shaft, or round a mandrel of the specified diameter. (The bore of the metallic and extruded packing spirals should conform to this diameter.)



To assist in cutting rings, two guide lines parallel to the shafts axis and separated by a distance equal to the packing section may be drawn on the spiral.



Cut the rings from the spiral at an angle of 45° diagonally across the guide lines – no gap is left between the ends.

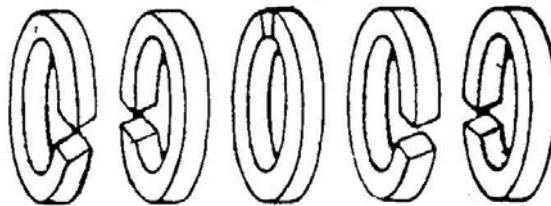




Check the first ring to ensure a correct fit in the stuffing box before cutting further rings in the same way.

Fitting the Packing:

1. Place the first ring over the shaft by opening to an 'S' configuration to ensure that the bending effects are spread over the whole ring.
2. Partially enter both ends of the first ring together into the stuffing box before inserting the remainder of the ring and then lightly bed into the bottom of the box with a split (wooden) distance piece and gland spigot.
3. With the plaited packing, the apices of the 'V' formations of the packing surface in contact with the shaft should face against the direction of the shaft rotation.
4. Repeat 1. and 2. with the remainder of rings, ensuring that each ring is firmly seated and that the butt joints are staggered by at least 90°. Where appropriate, ensure correct positioning of the lantern ring.



N.B. THE RINGS MUST BE FITTED INDIVIDUALLY AND UNDER NO CIRCUMSTANCES SHOULD COMPLETE SETS BE FITTED AS A UNIT.

5. When the requisite number of rings has been fitted, tighten gland nuts until the shaft is lightly gripped. Then slack off gland and pull up to finger tightness only. (If machine is to left stored or un-operational for any period of time, leave the gland slack so that packing resilience is not impaired. Ensure that when machine becomes operational after this period the gland is tightened before running to prevent ingress of product through the seal.)
6. It is important that the gland follower is not over tightened, as this may result in excessive heat generation in the gland area, and eventually seal failure.
7. Fill machine body with product and run for maximum of 10-15 minutes. If heat is generated at gland area, slacken off gland ring slightly to reduce frictional pressure of gland packing. Gland ring may then be adjusted using light adjustments only to prevent leakage.

DO NOT OVER-TIGHTEN

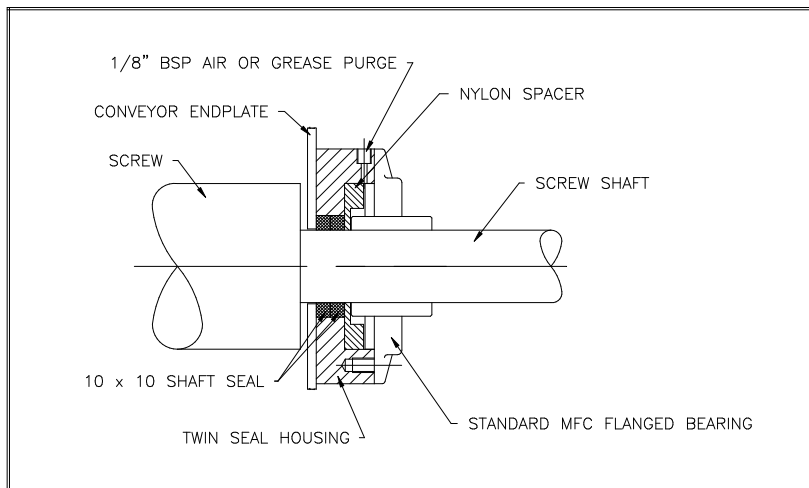
16: Twin Seal Housing Arrangement:

This comprises a machined housing fully seal welded to the end plate, fitted with two lip seals to provide the sealing around the drive and tail shafts of the conveyor.

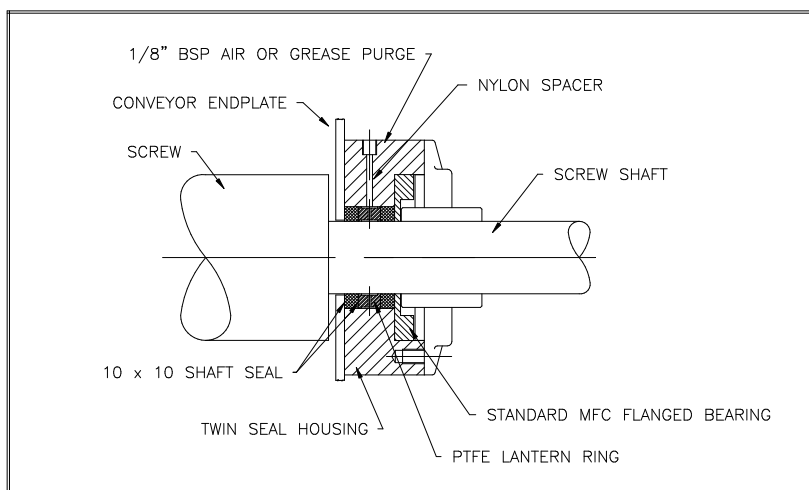
The arrangement is then fitted with a nylon spacer and the housing is capped off with a circular four bolt flange bearing manufactured by RHP, type MFC.

The arrangement can also be supplied with a lantern ring fitted between the two lip seals with a drilled and tapped connection to enable air/gas purging of the seals. The Nitrogen / Air Pressure required is 1-3 PSI (0.07-0.2 Bar)

SECTION THROUGH STANDARD SEAL HOUSING.



SECTION THROUGH LANTERN RING SEAL HOUSING



17: Flights:

All flights should be inspected every twelve months for :

1. Signs of damage caused by foreign bodies.
2. Wear of flight edge (especially when materials handled are of an abrasive nature)

The latter point is especially important, as the eventual result of excessive wear is loss of throughput and efficiency of the conveyor.

To replace conveyor screw section, proceed as follows:

1. Removal of a section, or sections, usually must proceed from the end opposite the drive. Make sure drive and electrical power are disconnected before starting to disassemble. (See pages 16 to 19)
2. Remove the trough end, sections coupling shafts and hanger until all sections have been removed or until the damaged or worn section is reached and removed.
3. To reassemble follow the above steps in reverse order.
4. Quick detachable conveyor screws can be removed at intermediate locations without first removing adjacent sections.

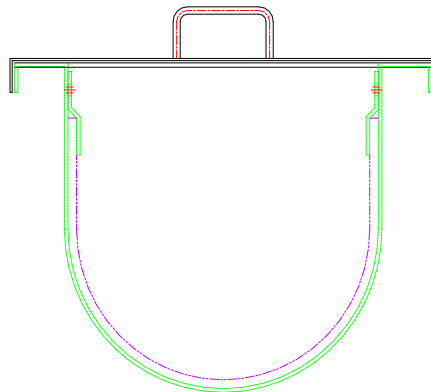
Replacement parts can be identified from a copy of the original packing list or invoice.

The coupling bolt contains a lock nut that may become damaged when removed. It is recommended practice to replace them rather than re-use them when changing conveyor screw sections.



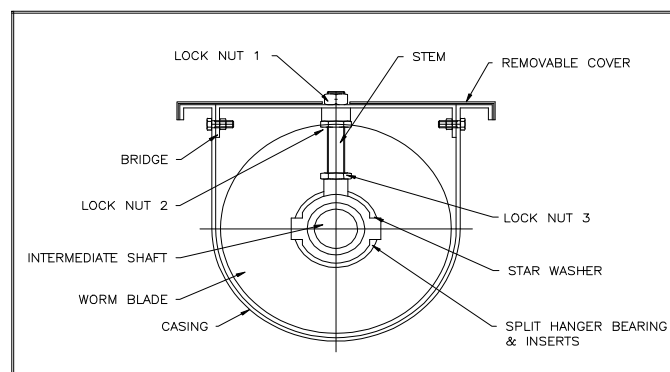
Removal Of Tivar Liners

1. Isolate the conveyor.
2. Remove all of the covers.
3. Remove inlet from conveyor.
4. Un-screw the brackets holding the liners in place.
5. Rotate the liners out of the casing.
6. Rotate new liners into the casing.
7. Screw the brackets back into the casing to hold the liners in place.
8. Re-attach the inlet to the conveyor.
9. Screw down the cover onto the conveyor.
10. Restart the Conveyor.



18: Hanger Bearings:

Only intermediate bearings fitted with grease nipples will require lubricating. A Lithium-based grease, e.g. Shell Alvania, should be used. Re-greasing intervals depend upon the operating conditions and the nature of the materials being conveyed; it is an advantage to over-grease if the material being conveyed is at all abrasive as this will assist to extract and minimise the ingress of material liable to impair the working life and efficiency of the bearing. Regular inspections of the bearing and the coupling shaft should be made for wear and discoloration due to over-heating and parts replaced as necessary



SECTION THROUGH INTERMEDIATE BEARING ASSEMBLY

FITTING

1. Assemble two piece bearing housing to shaft complete with inserts ensuring that internal star washers are fitted under head of Allen head set screws, also ensure that stem is locked firmly into housing by thin nut item No.3.
2. Assemble locking nut item No.2 on stem allowing for bridge assembly.
3. Insert Bridge fixing bolts complete with nuts and washers into slots in casing.
4. Position bearing bridge over stem and fixing bolts flush with top of casing and centrally about worm pipe ends. The bridge should now be bolted securely to the casing sides.
5. Fit top locking nut item No.1 to stem
6. Adjusting locking nut No.1 raise the worm pipe/shaft until nominal clearance of 6mm between worm blading and casing is obtained. When numerous intermediate bearing assemblies are fitted to a conveyor. Ensure that distance from top of conveyor casing to all shaft / worm pipe centres are identical.
7. Adjust locking nut No.2 up to underside of bridge.
8. Using spanner, locking nut item no.1 is tightened down onto bridge and locking nut item No.2
9. Fit Covers.

ADJUSTMENT

1. Covers must be removed.
2. Slacken off top locking nut item No.1.
3. Back off bottom Lock nut item No.2 to allow for movement of bearing stem.
4. Adjust and re-assemble as sections 6,7,8 and 9 of fitting.

19: Drive Transmission Components:

Shaft Mounted Drives

Transmission from the drive to the conveyor is provided through a hollow shaft on the gearbox.

Direct Coupled Drives

Transmission from the drive to the conveyor is provided by means of a coupling comprising flanges mounted on gearbox output shaft and screw conveyor drive shaft, coupling of the two flanges through a flexible element. This element should be regularly inspected for signs of wear and material fatigue and breakdown and replaced as necessary demands. Elements should be inspected on a one to two month basis.

Chain Transmission Drives

Transmission from the drive unit to the conveyor is provided through chain and sprockets. The tension of the chain should be checked after one week in service and adjusted if necessary to accommodate initial "chain stretch"; subsequent adjustments should be made to accommodate normal chain wear. The chain should be grease packed and re-greased at regular intervals, suggested basis every three months.

It should be appreciated that excessive tensioning of the chain will cause undue wear of both chain and sprocket wheel teeth; conversely, too little tensioning may allow a chain to jump the sprocket teeth or cause damage by allowing the links to ride up the teeth.

Spur Gear Drives (Twin Screw Bin Dischargers)

Transmission transfer from the driven screw to the non-driven screw is by means of spur gears. The gears will have been coated with grease during the machine assembly process; regular inspection of the gears is recommended to monitor the condition of the grease and the gear teeth; this is especially important in the event of shaft seal failure which would lead to the conveyed material leaking through the seal housings and adhering to the grease, with the possibility of wear then occurring to the gears.

Removal of the old grease by application of suitable thinners, and replacement with new grease, is recommended at regular three month intervals.

Replacing Drive Units:-

1. Before commencement ensure that you have sufficient means available to support and remove the geared motor unit once its fixings have been released.
2. Lock out electric supply.
3. Disconnect electrical connections on motor.
4. Unscrew the holding bolts. Remove geared motor unit.
5. Put replacement geared motor unit into place, Fit holding bolts and tighten securely.
6. Re-connect electrical connections to motor.
7. Remove supply lock out.

20: Replacement of Direct Drive Transmission Components

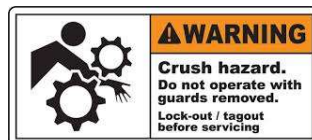
1. Before commencement ensure that you have sufficient means available to support and remove the geared motor unit once its fixings have been released.
2. Lock out electric supply.
3. Disconnect electrical connections on motor.
4. Remove coupling guard.
5. Split coupling as stated in coupling replacement procedure.
6. Unscrew locking nuts on the four holding down bolts. Remove geared motor unit with flange and clamping ring of coupling still in position. Take care not to misplace the packing plates under the feet of the gearbox.
7. With the geared motor unit safely placed on firm surface (i.e. floor or bench) flange and clamping ring of coupling can be removed by withdrawal from gearbox output shaft of taper-lock bush. (See manufacturer's instructions).
8. Taper-lock Bush, flange and clamping ring can be placed on gearbox output shaft of replacement geared motor unit. Be sure to thoroughly clean any dirt, oil or grease from bush or bore of flange hub and gearbox output shaft. (Refer manufacturer's instructions). Do not tighten at this stage.
9. Put replacement geared motor unit into place on motor mounting plate, remembering to fit packer plates under feet of gearbox. Fit four holding down bolts but do not tighten securely at this stage.
10. Bring shaft ends into line and secure coupling flange in accordance with manufacturer's instructions.
11. When the above is accomplished, tighten geared motor unit holding down bolts securely.
12. Refit coupling tyre as stated in coupling tyre replacement procedure.
13. Re-connect electrical connections to motor.
14. Replace coupling guard.
15. Remove supply lock out.

* Be sure to follow national standards and on site method statements & risk assessments. Always **MAKE SURE** that the electrical supply is isolated and locked off and cannot be switched on accidentally. Never take risks with your own safety and the safety of others.



21: Coupling Tyre Replacement.

1. Lock out electric supply.
2. Disconnect electrical connections on motor.
3. Remove coupling guard. So that coupling is visible.
4. Unscrew and remove tyre clamping ring screws, rotating tyre to make lower fittings accessible; clamping rings can then be levered away from tyre which itself can then be removed.
5. It is as well as this stage to check the parallel alignment of the two flanges at several positions around the perimeter, check angular alignment by measuring the gap between flanges at several positions around the circumference.
6. Open out new tyre and fit over the coupling flanges ensuring that the tyre beads seat properly on the flanges and clamping ring when offered up, to ensure proper seating, it may be necessary to strike the outside diameter of the tyre with a small mallet.
7. Tighten clamping ring screws alternately and evenly (one half turn at a time) working round each flange until the required screw torque is achieved.
8. Replace coupling guard.





22: Replacement Of Chain Drive Geared Motor Unit

1. Before commencement make sure that you have sufficient means available to support and remove the geared motor unit once its fixings have been released.
2. Lock out electrical supply.
3. Disconnect electrical connections on motor.
4. Remove chain guard cover; Back plate can be left in position.
5. Extract chain-connecting link. Removing chain from sprockets, Remove sprocket on gearbox output shaft by withdrawal from shaft of taper-lock bush (see manufacturer's instructions).
6. Unscrew locking nuts on the four holding down bolts. Geared motor unit can now be withdrawn.
7. Put replacement geared motor unit in position and fit four holding down bolts but do not tighten securely at this stage.
8. Refit sprocket and taper-lock bush on gearbox output shaft.
9. Ensure sprockets are correctly aligned using straight edge and lock taper-lock bush in position (refer manufacturer's instructions).
10. Fit chain and check tension; Adjust as necessary, taking care to maintain alignment of sprockets in relation to each other; Apply grease if required.
11. Securely tighten gearbox holding down bolts.
12. Reconnect electrical connections on motor.
13. Replace chain guard.
14. Remove supply lock out.

Replacement Sequence:-

1. Lock out electrical supply
2. Remove chain guard cover. So that chain drive is visible.
9. Extract chain-connecting link, removing chain from sprockets; replace with similar chain; check sprockets for wear and if necessary replace at same time as chain.
10. Check chain tension and adjust as necessary, taking care to maintain alignment of sprockets in relation to each other.
11. Grease chain.
12. Replace guard cover.
13. Check chain tension after one week in service and adjust if necessary.



23: Coupling Installation Instruction

Appropriate alignment of the coupled shafts is a fundamental requirement for coupling installation.

The three basic modes of shaft misalignment are shown right.

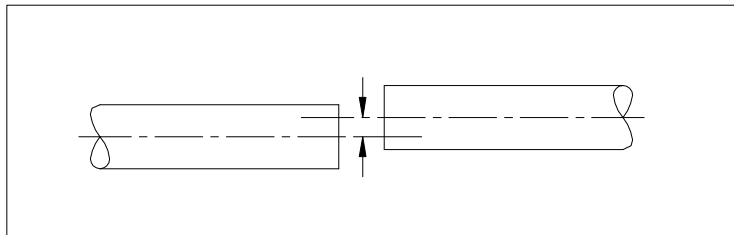
Composite i.e. more than one modes, misalignment is available for some couplings.

Details of the degrees of misalignment that can be tolerated by different types and sizes of coupling are available upon request.

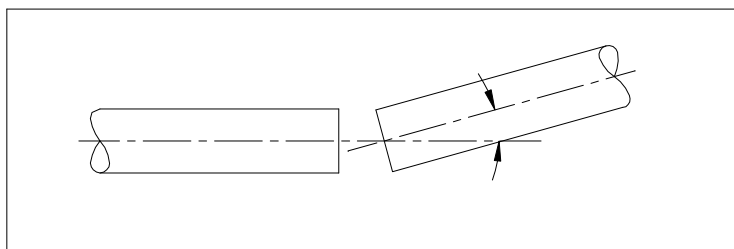
With some couplings, axial shaft orientation is not critical, whereupon coupling component orientation (given as an assembled length or distance between faces) becomes critical.

Excepting universal joints under angular misalignment, it should be remembered that misalignment can cause extra loading on coupled shaft support bearings and can reduce the operational life of couplings. Best alignment is therefore desirable.

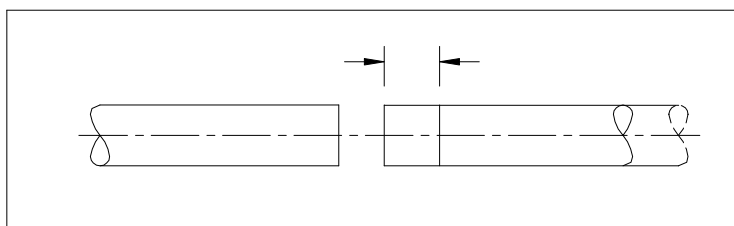
Taper lock rigid couplings cannot accommodate misalignment.



Parallel Misalignment - Shafts are at an angle to one another

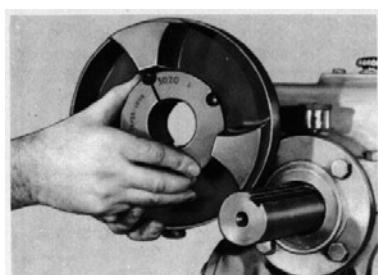


Angular Misalignment - shafts are in line and parallel to each other, but offset.

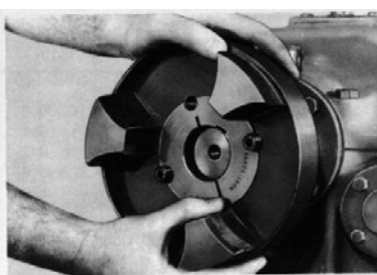


Axial Misalignment - includes application "end float" - shafts move axially increasing or decreasing the distance between shaft ends

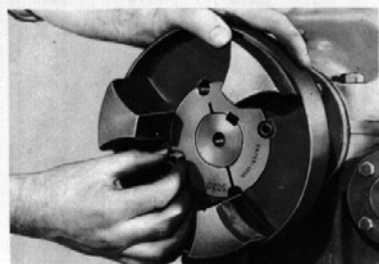
24: Taper lock Bush Instructions



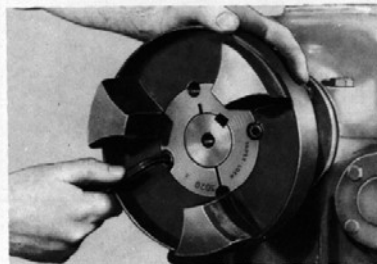
INSERT BUSH



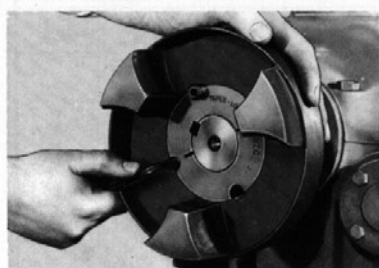
INSERT SCREWS and LOCATE ON SHAFT



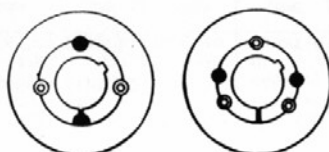
TIGHTEN SCREWS FINGER TIGHT



TIGHTEN SCREWS ALTERNATELY



REMOVING A TAPER LOCK® BUSH



TO INSTALL

1. Remove the protective coating from the bore and outside of bush, and bore of hub. After ensuring that the mating tapered surfaces are completely clean and free from oil or dirt, insert bush in hub so that holes line up.
2. Sparingly oil thread and point of grub screws, or thread and under head of cap screws. Place screws loosely in holes threaded in hub, shown in diagram.
3. Clean shaft and fit hub to shaft as one unit and locate in position desired, remembering that bush will nip the shaft first and then hub will be slightly drawn on to the bush.
4. Using a hexagon wrench tighten screws gradually and alternately to torque shown in table below.
5. Hammer against large-end of bush, using a block or sleeve to prevent damage. (This will ensure that the bush is seated squarely in the bore.) Screws will now turn a little more. Repeat this alternate hammering and screw tightening once or twice to achieve maximum grip on the shaft.
6. If a key is to be fitted place it in the shaft keyway before fitting the bush. It is essential that it is a parallel key and side fitting only and has TOP CLEARANCE.
7. After drive has been running under load for a short time stop and check tightness of screws.
8. Fill empty holes with grease to exclude dirt.

TO REMOVE

1. Slacken all screws by several turns, remove one or two according to number of jacking off holes shown in diagram. Insert screws in jacking off holes after oiling thread and point of grub screws or thread under head of cap screws.
2. Tighten screws alternately until bush is loosened in hub and assembly is free on the shaft. Remove assembly from shaft.

Bush Size		1008	1108	1210	1610	1615	2012	2517	3020	3030	3525	3535	4030	4040	4535	4545	5040	5050
Screw Tightening Torque		5.6	5.6	20	20	20	30	50	90	90	115	115	170	170	190	190	270	270
Screw Details	qty	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
	size	1/4"	1/4"	3/8"	3/8"	3/8"	7/16"	1/2"	5/8"	5/8"	1/2"	1/2"	5/8"	5/8"	3/4"	3/4"	7/8"	7/8"
Large end dia		35.0	38.0	47.5	57	57	70	85.5	108.0	108.0	127.0	127.0	146.0	146.0	162.0	162.0	177.5	177.5
Approx. mass (KG)		0.1	0.1	0.2	0.3	0.5	0.7	1.5	2.7	3.6	3.8	5.0	5.6	7.7	7.5	10.0	11.1	14.0

25: Fault Finding Checklist

SYMPTOM	CHECK
1. Motor fails to start.	1. All isolators and switches. 2. Overloads and reset switches. 3. Electrical supply is available. 4. Conveyor not jammed overfeeding. 5. Blockage indicators not jammed / faulty.
2. Motor functions, but no material conveyed.	1. Material is being fed into conveyor. 2. Screw is rotating in correct direction. 3. No blockages are occurring inside conveyor. 4. Tail shaft is rotating. 5. Tail shaft does not rotate, check drive shaft is rotating.
3. Screw conveyor produces excessive noise.	1. No foreign bodies in conveyor. 2. Alignment of drive unit and transmission components. 3. Bearings worn or breaking down. 4. Gearbox worn or breaking down. 5. Screw rubbing on casing.
4. Screw conveyor produces excessive vibration.	1. Alignment of drive unit and transmission vibration components. 2. Loose or faulty components. 3. Bearings worn or breaking down. 4. Conveyor mountings/support framework insecurely fitted.
5. Bearing failure.	1. Seal failure allowing ingress of dirt/foreign matter into bearing 2. Bearing overload caused by misalignment of screw. 3. Lack of lubrication. 4. Loose mounting bolts.
6. Low material throughput by conveyor.	1. Inadequate feed from feeding equipment. 2. Bridging of material at inlets and outlets.

If the event that you cannot identify any faults please call **01487 832053** for an engineer to assess your problem, Never attempt to rectify a problem that you do not fully understand or that you are not trained or qualified to do.

Please visit our online website spirotechgroup.co.uk for spares, sales etc.