

OPERATION & MAINTENANCE MANUAL

FOR SHARPE MIXERS LIQUID AGITATION EQUIPMENT



READ BEFORE UNPACKING MIXER



YOUR MIXER HAS BEEN TESTED AND SHAFT STRAIGHTNESS VERIFIED PRIOR TO SHIPMENT. CAREFUL HANDLING OF SHAFT PRIOR TO AND DURING INSTALLATION WILL ENSURE PROPER OPERATION. THE FOLLOWING CRITERIA MUST BE ADHERED TO IN ORDER TO PREVENT DAMAGE TO EQUIPMENT OR SERIOUS INJURY TO OPERATING PERSONNEL:

WARNING

- HIGH VOLTAGE AND ROTATING PARTS CAN CAUSE SERIOUS OR FATAL INJURY. ONLY EXPERIENCED PERSONNEL MUST OPERATE OR SERVICE THIS EQUIPMENT.
- **NEVER** ENTER TANK WITHOUT LOCKING-OUT POWER TO MIXER.
- LOCKOUT POWER PRIOR TO REMOVING ANY GUARDS OR SERVICING ANY PART OF THIS EQUIPMENT, INCLUDING INITIAL INSTALLATION AND/OR INSPECTION.
- THIS MANUAL MUST FIRST BE FULLY READ AND UNDERSTOOD PRIOR TO INSTALLATION BY ALL PERSONNEL INSTALLING AND/OR OPERATING THIS, OR NEAR THIS EQUIPMENT.
- **NEVER** USE THIS EQUIPMENT FOR ANY USE OTHER THAN DESCRIBED IN THE ORIGINAL PROPOSAL AND APPLICATION BOX ON THE DATA SHEET.
- MODIFICATIONS UNAUTHORIZED BY SHARPE MIXERS TO THIS EQUIPMENT MAY DAMAGE EQUIPMENT OR CAUSE SERIOUS INJURY TO PERSONNEL.

CAUTION

- **ALWAYS** READ THE SERVICE MANUAL THOROUGHLY BEFORE INSTALLATION AND START-UP.
- OPERATION OF MIXER IN AIR IS NOT RECOMMENDED.
- **ALWAYS** FOLLOW MOUNTING RECOMMENDATIONS DESCRIBED IN ORIGINAL PROPOSAL. MIXER PLATFORM MUST BE STABLE.
- EXTENDED OPERATION OF MIXER WHEN LIQUID LEVEL IS AT OR NEAR BOTTOM IMPELLER IS NOT RECOMMENDED.
- **ALWAYS** ROTATE THE SHAFT BY HAND TO VERIFY STRAIGHTNESS PRIOR TO OPERATION IN LIQUID.
- **ALWAYS** CHECK ASSEMBLY DRAWING AND DATA SHEET FOR SPECIAL OPERATING SPEED REQUIREMENTS IF USING A VARIABLE SPEED DRIVE.
- **ALWAYS** FLUIDIZE SETTLED SOLIDS BEFORE STARTING MIXER.
- **NEVER** LIFT MIXER BY SHAFT.

ANY EXCEPTIONS TO THE ABOVE MUST BE AGREED UPON IN WRITING BY **SHARPE MIXERS** AND NOTED ON THE ASSEMBLY DRAWING.

SHARPE MIXERS
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(206) 767-5660 • FAX (206) 767-9170
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SERIAL NO.:

SHARPE MIXERS

STANDARD TERMS & CONDITIONS OF SALE

In consideration of the mutual promises and agreements contained herein, the buyer ("Buyer") and SHARPE MIXERS, INC. ("SHARPE" or "WE") hereby agree to the following terms and conditions; provided, that the terms and conditions (including the price quotations) shall only become binding on SHARPE upon the mailing or other transmission of SHARPE's Acknowledgment Form as described in Section 6 Below.

1. Warranty

We warrant that we shall repair or replace, without additional charge, or refund the price of, the products provided to the Buyer herewith (collectively "Mixer") if the Mixer (a) is defective in materials or workmanship, (b) fails to provide the process results specified in SHARPE's proposal ("Proposal"), or (c) if no process results are specified in SHARPE's proposal, Mixer fails to provide the process results described in Buyer's written specifications. While we warrant that the Mixer is made from the materials specified in the Proposal or its commercial equivalent, WE DO NOT GUARANTEE THE MIXER AGAINST CHEMICAL ATTACK OR OTHER DETERIORATION DUE TO EXPOSURE.

THE FOREGOING WARRANTIES EXTEND ONLY FOR TWELVE (12) MONTHS AFTER FIRST INSTALLATION OF THE MIXER AT BUYER'S FACILITY OR FOR EIGHTEEN (18) MONTHS AFTER ITS SHIPMENT FROM SHARPE'S FACILITY, WHICHEVER PERIOD IS SHORTER. ADDITIONALLY, SUCH WARRANTIES ARE EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ORAL OR WRITTEN, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND OF ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF SHARPE. THESE WARRANTIES SHALL NOT APPLY TO FAILURES RESULTING FROM (A) NORMAL WEAR AND TEAR, (B) ACCIDENT, NEGLIGENCE, ALTERATION, ABUSE, MISUSE OR USE INCONSISTENT WITH ANY INSTRUCTIONS PROVIDED AS TO STORAGE, HANDLING, MAINTENANCE, LUBRICATION, INSTALLATION, STARTUP, OPERATION AND SAFETY, (C) IMPROPER INSTALLATION AND/OR (D) INACCURATE AND/OR INCOMPLETE SPECIFICATIONS, DESIGN CONDITIONS OR OTHER DATA FURNISHED BY OR ON BEHALF OF BUYER. WE MAKE NO WARRANTY WHATSOEVER WITH RESPECT TO ACCESSORIES OR PARTS NOT SUPPLIED BY SHARPE.

2. LIMITATION OF REMEDIES

Buyer's remedy for breach of any of the foregoing warranties shall be limited to those set forth in Section 1 above; provided, WE will not be responsible for removal, loading, installation, freight or similar related expenses in connection with any replacement, repair or return. The determination of which such remedy shall be applicable shall be determined by SHARPE, in its sole discretion. THE ABOVE STATED REMEDIES ARE SHARPE'S ENTIRE AND EXCLUSIVE LIABILITIES AND BUYER'S EXCLUSIVE REMEDIES FOR ANY CLAIM FOR DAMAGES IN CONNECTION HERewith. By way of illustration and not limitation, in no event shall we be liable for any direct, indirect, special or consequential damages or delay whatsoever or loss of use, and SHARPE'S liability under no circumstance will exceed the contract price for the Mixer for which liability is claimed. All claims for breach of any of SHARPE'S warranties shall be barred unless Buyer notifies SHARPE in writing within 30 days of discovery of the breach. WE shall not be responsible for any repairs performed by third parties unless the extent, terms and costs of such repairs are authorized by SHARPE in writing in advance. Buyer shall be solely responsible for any agreement that Buyer makes with its customers which is contrary to the foregoing provisions.

3. DELIVERY / SHIPMENTS

Unless otherwise quoted, shipments are F.O.B. shipping point. Risk of loss and damage to the Mixer shall pass to Buyer upon delivery to the carrier and at such time, Buyer shall be solely responsible for the Mixer. We will make every effort to ship on the date specified in the contract; provided, that such dates are approximations only. We will not be liable for or penalized as a result of delays in shipment, for any cause, including but not limited to delays that are beyond our control.

Shipments may not be deferred by Buyer beyond the specified shipment date after commencement of manufacture without SHARPE's written consent. When shipping is deferred for Buyer's convenience, due to lack of shipping instructions, failure to complete credit arrangements satisfactory to SHARPE or late delivery of customer supplied material, Buyer agrees to pay reasonable storage charges, interest and any other expenses incurred by SHARPE due to the delay. Orders on which delivery is deferred shall be invoiced upon completion of manufacture and are subject to finance charges of 1.5% per month.

4. CHANGES

Any changes requested by Buyer and approved by SHARPE with respect to the Mixers shall be subject to adjustments to the delivery schedule and/or price of the Mixer, as shall be determined by SHARPE, in its sole discretion.

5. PRICES / PAYMENT

Price quotations set forth on any Proposals from SHARPE are for informational purposes only and represent an estimate of the prices that will be available to Buyer. Such price quotations are not binding upon SHARPE until an authorized representative of SHARPE (at SHARPE's home office in Seattle, Washington) accepts and confirms in writing any offer to purchase submitted by the Buyer by way of a Contract Acknowledgment. Prices set forth on SHARPE's Acknowledgment Form shall be binding with respect to the order described therein; provided, that orders placed "on-hold" or held over 3 months or more (i.e., awaiting Buyers approval) are subject to price adjustments.

Upon approval of Buyer's credit by SHARPE, unless stated otherwise on the face hereof (in which case such terms shall control), terms are net 30 days, F.O.B. Seattle, WA-Freight Collect; provided, that if, in the sole discretion of SHARPE, (a) the order is for a customized or otherwise unique Mixer or is of a substantial magnitude or for any other reason, or (b) Buyer's credit is not approved or the financial condition of Buyer becomes such that it does not justify continuance of production, shipment or delivery on the terms of payment specified, we may require full or partial payment in advance or payment upon delivery. Prices do not include customs, duties or taxes such as sales, use, excise, retailer's occupation or similar taxes, and if, in connection with this transaction, SHARPE is subject to any such customs, duties or taxes, the same will be added to the purchase price to be paid by Buyer. If payment is not made when due, Buyer shall pay SHARPE a finance charge of 1.5% per month and (ii) ALL WARRANTIES PROVIDED BY SHARPE HEREUNDER SHALL IMMEDIATELY BE NULL AND VOID. All price lists and discount schedules are subject to change without notice.

6. ACCEPTANCE

All orders by Buyer are subject to acceptance by SHARPE's authorized representative at SHARPE's main office; provided, that any terms or conditions which are additional or different to the terms and conditions set forth herein or which may have been included in any communication between Buyer and SHARPE, whether written or oral, are hereby objected to by SHARPE and shall not be effective or binding upon SHARPE unless specifically assented to by a duly authorized officer of SHARPE in Writing. No waiver, alteration or modification of any of the provisions hereof shall be binding on SHARPE unless made in writing and signed by a duly authorized officer of SHARPE. Buyer's acceptance of delivery of the Mixer shall constitute full acceptance of all of the terms and conditions set forth herein. The failure of either party to enforce any of its rights hereunder shall not constitute a waiver of such rights or of any other rights hereunder. The terms and conditions of the Acknowledgment contain the entire agreement of the parties. Clerical and typographical errors are subject to correction.

7. CANCELLATION CHARGES

Orders placed by Buyer may not be canceled without SHARPE's written consent. Buyer agrees to indemnify SHARPE against all loss, damage or expense incurred due to cancellation including, but not limited to the cost of special materials, non-resalable goods, completed or in process, labor, freight, engineering time, overhead and profit. A minimum charge of 20% will be applied in the event of a cancellation.

8. OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

WE do not warrant or represent that any of SHARPE's products by themselves or in a system or with other equipment will conform to or comply with the provisions of the Occupational Safety and Health Act of 1970 and the standards and regulations thereunder, or any other federal, state, or local law or regulation of the same or similar nature.

9. PATENTS

SHARPE certifies that to its knowledge the Mixer does not infringe upon any patents granted to others by the United States of America. WE do not assume any responsibility or liability for any claim of infringement brought against the Buyer, its successors, assigns, customers or users of the Mixer.

10. ATTORNEY FEES

In the event an arbitration, suit or action is brought by any party under this agreement to enforce or interpret any of its terms, or in any appeal therefrom, it is agreed that the prevailing party shall be entitled to reasonable attorneys fees to be fixed by the arbitrator, trial court, and/or appellate court. Buyer shall be responsible for any and all costs of collection incurred by SHARPE in connection herewith, including attorneys fees and costs.

11. JURISDICTION/VENUE

This agreement shall be binding upon the successors and assigns of SHARPE and Buyer, and shall be deemed entered into at Seattle, Washington, and shall be governed by and construed in accordance with the laws of the State of Washington. In the event of litigation between the parties to enforce any terms of the agreement, the parties agree that venue shall be the Superior Court of the State of Washington for King County. -----

OPERATION & MAINTENANCE INSTRUCTIONS SHARPE MIXERS TOP ENTRY WITH MECHANICAL SEAL

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SECTION B

INITIAL INSPECTION, RECEIVING AND STORAGE

B1.1 Immediately upon receipt of the equipment check the crating and contents for any damage that may have occurred in transit. Report any damage immediately to the carrier and to *Sharpe Mixers*. Check against the packing slip to be sure that all parts were received. Report missing items to the carrier and *Sharpe Mixers*.

B1.2 The drive unit, impellers and the mixer shaft are normally packed in a separate containers. If space allows, keep shipping containers for possible future use.

B1.3 Mechanical Seal receiving and inspection: Thoroughly review the drawings in the service manual against the equipment and inspect the mechanical seal housing and parts for possible damage during shipment. Mechanical seals are easily damaged by improper handling, often undetected until the tank contents leak through the seal. **NEVER LIFT MIXER BY THE MIXER SHAFT.** When lifting the equipment with a lifting strap, never allow the strap to come in contact with the mixer shaft, mechanical seal housing, piping or related components. Study carefully the mechanical seal drawing to determine whether seal is a single, or double mechanical seal design. Double mechanical seals are pressure tested at the factory using air. It is recommended that double mechanical seals be

pressure tested again using air or water pressure prior to installing the equipment on your tank. When using air, the seal faces may need to be coated with lubricant to achieve a static seal.

B1.4 **Storage:** Storage is when a) mixer has been delivered to the job site and is awaiting installation, b) mixer has been installed, but regular operation is delayed, c) there are long idle periods between operating cycles, d) plant/department operation is shut down. Store mixer in a clean, dry location, with circulating air, free from wide variations in temperature. Electric motors are easily damaged by moisture. Store the entire unit off the floor, covered with plastic, and use desiccants to reduce moisture buildup. Do not seal the plastic cover as this traps moisture. If the motor shows signs of moisture absorption before start-up, dry the motor out by applying 10% voltage on two leads (if in doubt, measure resistance in windings, one to three megohms is normal). This will give approximately 50% rated current. There are also sprays available to help dry out motors. Relubricate motor before start-up when in storage six months or more. Storage of mixers over six months must have gear reducers filled completely with storage oil. Do not install vent plug when in storage. Spray oil on exposed lip seals and unpainted carbon steel parts. Rotate motor and gearbox shafts periodically. When returning to service, drain storage oil, clean with mineral spirits, and replace with correct lubricant (see Section C).

MOUNTING THE DRIVE

B2.1 Mounting structure must be stable and strong enough to handle torque, bending moment, and weight specified on assembly drawing. The structure must not flex or vibrate when the mixer is in operation. If mounting to an unstable support, mixer loads may cause damage to the equipment, tank, or other hazards.

CAUTION: DO NOT LIFT MIXER BY THE SHAFT. DO NOT LIFT THE MIXER USING THE LIFTING LUG OF THE MOTOR ALONE. USE SLINGS TIGHTENED AROUND THE MIXER DRIVE.

B2.2 Mixer drives with mounting plates may need to be shimmed for shaft to be vertically aligned and then bolted securely to the mounting structure. Flange mounts must have gaskets between flanges before bolting securely for proper sealing. When a remote seal is used, seal must be concentric and perpendicular to mixer shaft. Using lock washers or double nutting the mounting bolts is recommended to prevent bolts from loosening by equipment vibration.

B2.3 When foot mounted motors are supplied, readjust the motor after installation for proper alignment of the flexible coupling (see Paragraph B8.9).

INSTALLING THE MIXER SHAFT

WARNING: Always lockout power before installing or removing mixer shaft.

B3.1 If the mixer shaft is a two-piece design, the upper shaft is normally installed at the factory. If not, mixers with shaft seals must have the mixer shaft raised through the seal area carefully. Some seals will have parts (shipped separately from the drive) which need to be installed in sequence while installing the mixer shaft. Refer to the detail drawings in front of the manual. If your mixer has a split mechanical seal (see data sheet) the seal must be installed after the mixer shaft is in place. Split seal assembly instructions will be included in Section D. Note the type of shaft coupling to the drive on the assembly drawings and install the shaft by one of the following steps:

B3.2 Hollow bore drive: Remove cover over hollow bore on drive (when supplied). Remove hold washer and protective wrap on top of mixer shaft. Clean machined section of shaft of any rust/grit and lubricate lightly with NEVER-SEEZ® compound. Raise mixer shaft from below and through seal. Install the shaft into the drive (see Figure B3.1). Be sure key is in place. Do not hammer parts in place. If keys do not fit, grind to size. Before bolting hold washer in place, add NEVER-SEEZ® compound (supplied) to the top of shaft. The top hold bolt must be installed dry, and threaded into top of shaft a distance equal to at least one bolt diameter. Tighten the hold washer bolt to the torque ratings listed in table B3.1 using a torque wrench / socket combination for best results. Reinstall the hollow bore cover (when supplied).

B3.3 Split coupling drive: Remove split coupling from drive shaft. Raise mixer shaft from below and through seal (see Paragraph B3.1). Bolt hold washer to top of mixer shaft (if not already done). Install keys on both shafts. Do not hammer parts in place. If keys do not fit, grind to size. Make sure all parts are clean, and assemble split coupling halves onto shafts (see Figure B3.2). The split coupling has one end marked "drive" on each half. This end must face the gearbox for proper alignment. Replace split

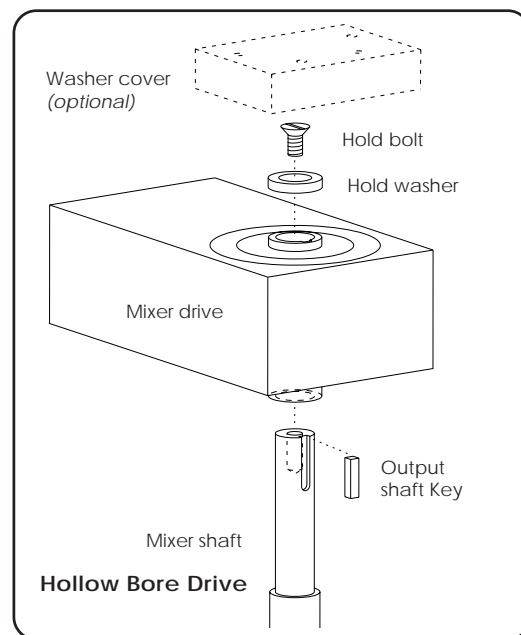


FIGURE B3.1

Bolt Torque Ratings

5/16" bolt @ 10 ft.-lbs.	3/8" bolt @ 25 ft.-lbs.
7/16" bolt @ 35 ft.-lbs.	1/2" bolt @ 45 ft.-lbs.
5/8" bolt @ 75 ft.-lbs.	3/4" bolt @ 130 ft.-lbs.
7/8" bolt @ 200 ft.-lbs.	

Table B3.1

coupling. Be sure gap is even on both sides of coupling. Tighten split coupling bolts to the torque ratings listed in Table B3.1. Tighten from the center out, in an opposite/diagonal sequence. It is critical that shaft alignment be checked closely after installation with split couplings. Improper torquing, an oversize key, or eccentric washers can cause misalignment and problems during operation. See B3.5.

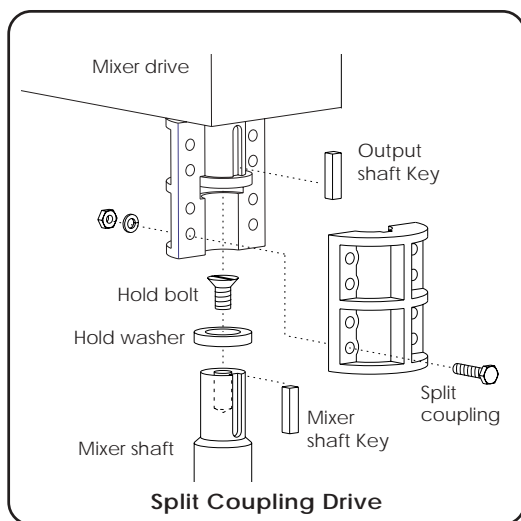


FIGURE B3.2

B3.4 Flange coupling (optional): Clean mating surfaces of any nicks or grit which may cause misalignment. Raise mixer shaft to mate to flange coupling. Bolt flanges securely together (see Figure B3.3). Be sure flanges mount flush.

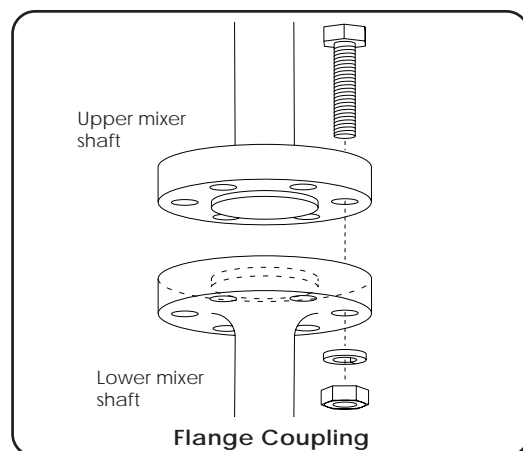


FIGURE B3.3

B3.5 Remove motor fan guard and turn fan by hand to check that mixer shaft turns freely and alignment is true. Repeat once impellers are installed.

INSTALLING THE MIXER IMPELLER

WARNING: Always lockout power before installing or removing impeller.

B4.1 Refer to mixer assembly and impeller detail drawings for proper impeller rotation, positioning, and placement.

B4.2 1-Piece Impellers: Slide the impeller on the shaft facing the correct way (according to the assembly drawings). Impellers without keys setscrew directly onto shaft. When divots are in the shaft, bolt the setscrew directly into divot. For impellers with keys, position the key with pin (if present) below the impeller. Tighten the setscrew securely.

B4.3 Split Hub Impellers: Clamp split hub impellers to shaft. If impellers were shipped with shims, discard prior to assembly, do not use to assemble on mixer shaft. Be sure to maintain 1/4"

gap between hubs (except 2-blade split which the gap will be shown on the impeller detail drawing) to insure correct blade alignment and vibration free operation. When torque pins are present on mixer shaft, clamp so the socket in the hub fits over the shaft pin. Tighten split hub impeller bolts to the following torque ratings:

Bolt Torque Ratings (split impeller bolts only)

1/2" bolt @ 29 ft.-lbs.	5/8" bolt @ 54 ft.-lbs.
3/4" bolt @ 96 ft.-lbs.	7/8" bolt @ 150 ft.-lbs.

Table B4.1

B4.4 Other types of impellers are: Bolted blades in which blades must be securely bolted to the tabs welded to the shaft; Welded blades in which require no special installation work.

INSTALLING THE STEADY BEARING (optional equipment)

WARNING: Always lockout power before installing or servicing the steady bearing. Never run mixer without the steady bearing installed.

B5.1 This section is for mixers which include an optional steady bearing to accommodate longer than standard mixer shafts. A steady bearing must be installed only after the drive assembly and lower mixer shaft have been assembled and firmly bolted in place. DO NOT predetermine the bearing location

from tank and mixer outline dimension drawings. The vertical center line of the steady bearing must coincide with the shaft's natural axis of rotation to minimize bearing preload (see Figure B5.1). This axis may not necessarily be at the center of the tank. The mixer shaft must be hand rotated (using input shaft coupling or motor fan) with a fixture attached to the shaft to mark a line on the tank bottom. The center of this inscribed area will be the location for the center of the steady bearing.

B5.2 The steady bearing must be securely

installed with its vertical centerline aligned with the axis of rotation of the shaft, as described in paragraph B5.1. The amount of lateral movement required to bring the shaft into proper alignment with the final steady bearing location will vary depending upon the shaft length and diameter.

B5.3 The shaft/wear sleeve must be fully engaged with the bearing.

B5.4 The steady bearing and wear sleeve are wearing parts and should be checked periodically. It is recommended that a spare bearing and wear sleeve be kept in stock at all times.

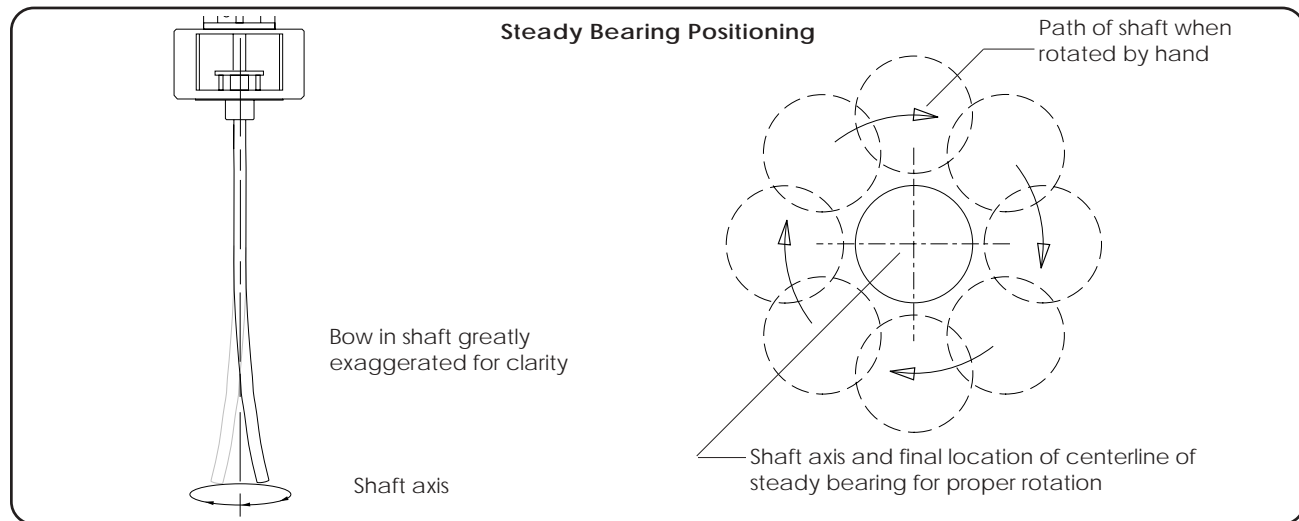


FIGURE B5.1

MECHANICAL SEAL PREPARATION & LUBRICATION

B6.1 **Mechanical seals** are precision machined, fragile components that are easily damaged by careless handling. Any servicing of mechanical seal must be handled in a clean "white coat" manner. Even a fingerprint on the mating seal faces can cause premature leakage. Most premature seal failures are due to lack of lubrication or improper installation. Seal manufacturers offer mechanical seal maintenance seminars or seal schools to help service personnel understand seal operation. The minimal cost and time required for this education is easily justified when the expense of down time and loss of product which occurs when mechanical seals fail prematurely is considered.

B6.1.1 **Do not allow the mixer to be wired before preparing the seal for operation.** The electrician may "bump start" the mixer to check for rotation and ruin the seal in the process. Many double mechanical seals have assembly positioning tabs which hold the seal wear sleeve on center in position or compress the seal to running height during shipping and assembly. These tabs must be rotated out of the way or removed completely before start-up.

B6.1.2 If the seal has not been installed at the factory, install seal over shaft at time of shaft installation in correct position. Use a light vegetable oil to aid in installation over shaft. Compress seal to height shown in seal detail drawing in front of this manual once shaft installation is complete. Split seals must be fully installed after shaft installation is complete. See

specific seal details elsewhere in this manual.

B6.1.3 The mechanical seal housing or gland plate will have one or more tapped holes for lubrication, ventilation, and draining, which will be plugged from the factory with temporary plastic plugs. These plugs must be replaced with the proper flush/lube/recirculating lines or dead end plugged as described below (Paragraph B6.4).

B6.1.4 Make sure all valves are open to insure the seal receives a positive flow of liquid at all times. **Bleed all gases** trapped in the seal cavity before start-up, or the cavity may vapor lock and the seal will burn up by running dry. Open valves slowly once the lubrication system has been pressurized. Opening inlet valves too quickly may cause a "water hammer" effect that could crack or shatter the seal faces. On high speed (above 350 rpm) and high temperature applications the mechanical seal housing must be constantly flushed with a cooling lubricant before applying power to the mixer, or heat will quickly build and destroy the seal. Where colder ambient temperatures will cause thickening of the lubricant, the seal housing and lubricant lines must be preheated to allow free flowing lubricant to seal before start-up. **Never allow the seal or lubrication lines to freeze.**

B6.2 Tank liquid level must be filled to at least one prop diameter above the impeller elevation before starting mixer. Mixer must never run when liquid level drops below this point. A low liquid alarm or shut-off switch is recommended if low liquid levels are likely to occur.

B6.3 SEALING ABRASIVE LIQUIDS: As used here “abrasives” is a broad term intended to cover the problem of sealing against slurries, congealing liquids, crystallizing salts and the like. They cause the greatest damage to equipment, and present difficulties for mechanical seals. In general, the cure involves flushes, purges, and temperature controls. See mechanical seal lubrication (Paragraph B6.4) for more information on lubrication and flushing of mechanical seals.

B6.3.1 SUSPENDED SOLIDS: Solids which are suspended in liquids and which are an inherent part of their structure would include starch, contaminated or muddy water, sand, and other slurries. This is best handled by an external flush of clean liquid through a throttle. Flushing pressure needs to be 15 - 30 psi greater than tank pressure.

B6.3.2 PRECIPITATING LIQUIDS: Solids which precipitate out of a liquid do so by reason of either an increase in concentration, or because of a lowering (or in some cases a raising) of temperature beyond that at which it is proper to operate. Illustrations are caustic soda and calcium hydroxide. With ammonium nitrate, for example, temperature must be controlled at an optimum level in relation to its concentration. If the temperature rises above the optimum, it will boil and form crystals, and conversely if temperature drops, it will become saturated and salt out.

B6.3.3 EVAPORATING LIQUIDS: Solids can form as a result of heat which promotes evaporation. Examples include any of the hot chemical salts - the chlorides, chlorates, sulfates, sulfides. Cool by flushing or by utilizing water jackets.

B6.3.4 CONGEALING LIQUIDS: Generally speaking, these liquids congeal either because of a drop in temperature, or as a result of drying out after exposure to air. Sugar syrups fall into both categories.

A good rule is to keep the fluid moving before congealing can take place. Control with heat and/or by flush or purge. Clean liquid flush pressure needs to be 25 psi greater than tank pressure. Asphalt is a typical case of a liquid which congeals as it cools, and this can be controlled by heat. Some sugar syrups fall under this category. Be sure to heat thoroughly before start-up, during operation, and after shutdown if followed by a purge. Some products harden to a solid state when exposed to air. Glue, molasses, paint, sugars are examples. An effective flush is a dead end lubricator. This will keep out the air. Note that this type of flush does not enter the product, but only mixes with the product leakage. It may also be desirable to purge utilizing a solvent of the liquid being mixed. Periodically vent dead end lubricated seals to clean chamber.

B6.4 Lubrication of mechanical seals is required at all times during operation of the mixing equipment. The only exception are “dry running” seals which are clearly stated in the seal description in the data sheet and assembly drawings. See specific seal data (Section D) in this manual for more information on dry running seals.

B6.5 Lubrication system designs are as varied as customers applications. Listed below are some typical application designs. Study the seal drawing and description in this manual and circle the lubrication system that best describes your application. Reservoirs, filters, rotameters, flow and pressure control valves and gauges as required, may be purchased from Sharpe Mixers.

B6.6 SINGLE EXTERNALLY MOUNTED SEAL: This design positions the rotating elements of the seal outboard from the tank contents and is lubricated by one of the following means:

B6.6.1 Seal flushing - (see Figure B6.1) requires a line of lubricant (usually water) plumbed to the seal housing and a line from the seal housing to a drain. In this design, the seal housing will usually incorporate a lip seal to contain the lubricant in the housing, but will not hold pressure within the seal housing. Therefore, a flow restriction and pressure reducing valve must be incorporated in the supply line to the seal. An in-line filter is also recommended. Never allow pressure to build within the seal housing or you may blowout the lip seal. The drainage line must rise above the elevation of the seal housing by a few inches to guarantee seal will be lubricated without siphoning and must be free flowing to prevent pressure buildup.

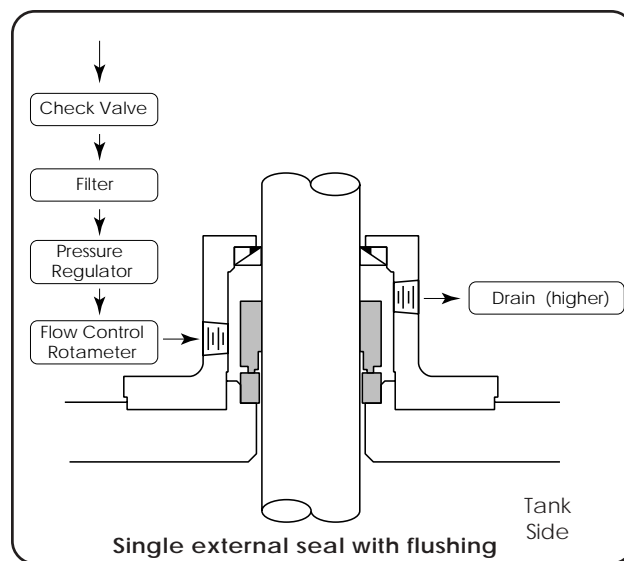


FIGURE B6.1

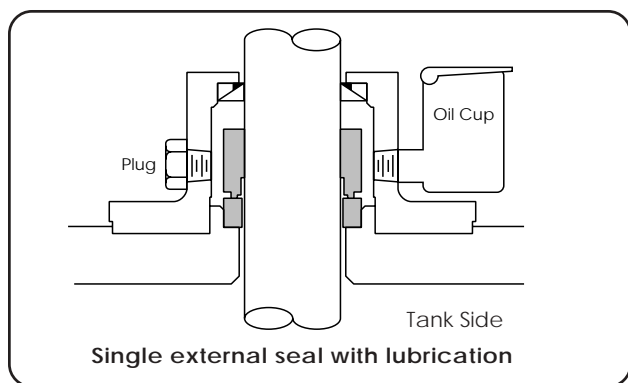


FIGURE B6.2

B6.6.2 **Oil Cup** - (see Figure B6.2) requires a light oil or other compatible lubricating liquid to completely fill the small external cup. This cup must be checked periodically. If lubricant has drained, mechanical seal must be checked for possible leakage.

B6.7 DOUBLE MECHANICAL SEAL WITH THROUGH FLUSHING: (see Figure 6.3) This system requires a lubricant line plumbed to the seal (usually water) and another line from the seal housing to the drain. A flow control valve on the inlet, and a pressure regulating valve on the drainage line, must be installed on the seal to maintain a pressure in the seal housing 15-30 pounds higher than the tank pressure. A filter on the inlet to the seal is recommended. It is also recommended that a check valve be installed on the inlet line to prevent back flow of tank contents in case of loss of pressure in the flushing line. Pay special attention to seal housing temperature during operation. Never allow heat buildup in seal housing. Increase flow of flushing water to cool the seal.

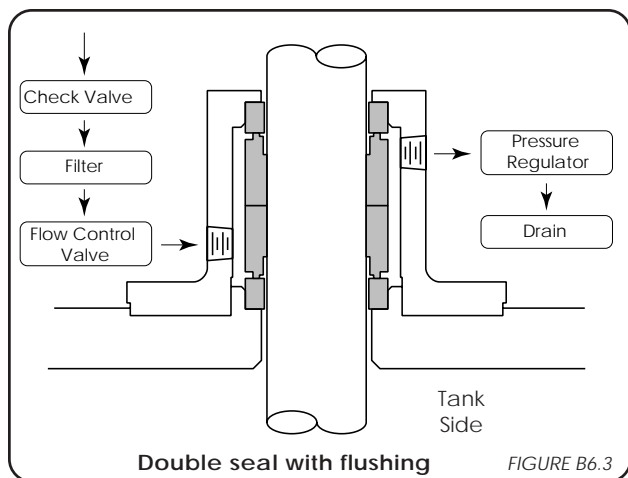


FIGURE B6.3

B6.8 DOUBLE MECHANICAL SEAL WITH NATURAL CONVECTION LUBRICANT RESERVOIR: (see Figure 6.4) This design requires a lubricant reservoir (usually 2-5 gallon capacity) mounted 6"-18" above, and no more than 3 ft. away from the mechanical seal. These systems are often furnished by Sharpe Mixers, mounted on the agitator and fully plumbed to the seal housing.

Lubricant circulation occurs when the lubricating fluid, heated by the seal, expands and becomes lighter and rises out of the seal to the top of the lubricant reservoir. Once in the reservoir the fluid cools becoming heavier and returns to the mechanical seal housing. This process may be aided by cooling coils in the reservoir. As natural convection requires low restriction plumbing, Sharpe Mixers recommends 1/2" diameter tubing. Route the tubing from the upper most port in the seal housing to the upper port in the lubricant reservoir. The return line runs from the bottom of the reservoir to the lower port in the seal housing. Care must be taken not to attach the return line to the cooling coil inlet or outlet (if present) which are also in the bottom of the reservoir. Refer to the reservoir drawing for the orientation of the inlets and outlets. Keep horizontal runs to a minimum.

B6.8.1 Fill the seal reservoir until liquid level is higher than upper most plumbing line. Recheck level after mixer has run a few minutes and replenish if necessary. Operating liquid must be thin (water like) since thicker materials will not flow, creating heat buildup and premature seal failure. If tank is pressurized, maintain 15 - 30 psi above tank pressure in the lubricant reservoir. This is accomplished by either a permanent air line to the top of the reservoir with a pressure regulating valve, a nitrogen tank or other compatible pressurized medium. A "back pressure" valve may be incorporated to prevent the back flow of tank contents in case of seal failure during a loss of pressure in the supply system. A low pressure shut off switch may also be used to shut down the mixer in case of a seal system failure.

B6.8.2 Many lubrication reservoirs incorporate alarms and other integrated systems which require thorough understanding prior to start-up. Sharpe Mixers recommends consulting with the mechanical seal / lubrication system representative for assistance with these complex systems.

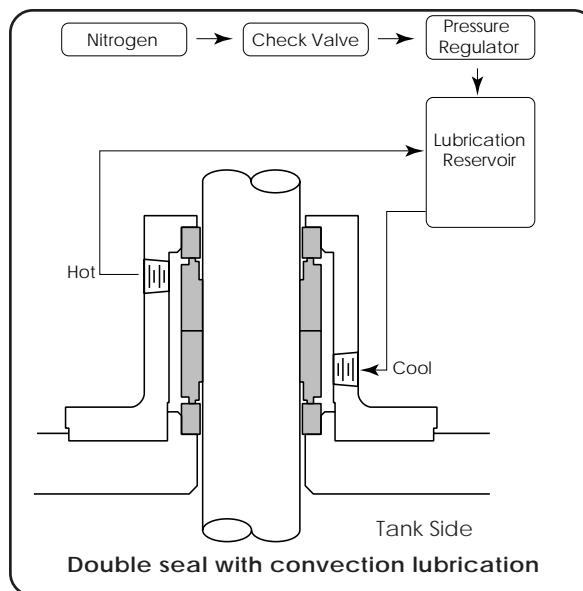


FIGURE B6.4

B6.8.3 A 10 weight oil (or other thin noncorrosive lubricating liquid) is recommended rather than water when the lubrication reservoir is carbon steel.
NOTE: Friction based (non setscrew driven) seals require a non lubricating barrier fluid.

B6.9 DOUBLE MECHANICAL SEAL WITH POSITIVE FLOW LUBRICATION SYSTEM: This system uses a pump supplying positive flow to and from the seal.

These systems often have a cooling system, pressure and flow control valves, low level alarms, and other components which require a thorough understanding before startup. Sharpe Mixers recommends consulting with the mechanical seal / lubrication system representative for assistance with these complex systems.

MOTOR CONNECTIONS & LUBRICATION

WARNING: High voltage and rotating parts can cause serious or fatal injury. Electric machinery can be hazardous. Installation, operation, and maintenance of electric machinery should be performed by qualified personnel. Familiarity with NEMA safety standards, National Electrical Code and local building codes are required.

B7.2 Wiring: Starting and overload control devices must be matched to motor rating. Follow control manufacturer's instructions for proper connections and installation.

B7.3 Electrical connections must conform to National Electrical code and all local regulations. Line voltage and wire capacity must match motor rating stamped on motor nameplate.

B7.4 Electric motors - Single phase: If the mixer is supplied with a single phase motor it may be wired by the factory with a ten foot cord and an on/off switch. If no cord or switch is provided refer to the wiring diagram on the motor for correct connections. Check that the switch is in the off position before plugging the cord into a 110 volt outlet. *Check for proper rotation!* Interchange lines if necessary for proper rotation (see assembly drawing).

B7.5 Electric motors - 3 phase: Motors requiring 3 phase power must be wired according to the wiring diagrams on the motor. Rotation of the impeller must be according to the assembly drawing and data sheet. Interchange lines if necessary for proper rotation.

B7.6 Electric DC Variable Speed: Direct current variable speed electric motors using an SCR controller must be wired following the instructions supplied with the controller.

Many adjustments are often required to the SCR controller and instructions must be read carefully before applying power. See data sheet and assembly drawings for possible RPM lockout ranges. Operate only at speeds outlined on those sheets. Damage to equipment or serious injury to personnel can result, if speed limitations are not followed.

B7.7 Electric AC Variable Speed: Electric motors using an AC variable frequency controller must be wired following the instructions supplied with the controller. Many adjustments are often required to the controller and instructions must be read result, if speed limitations are not followed.

B7.8 WARNING: Ground the mixer motor properly to avoid serious injury to personnel. Grounding needs to be in accordance with the National Electrical Code and consistent with local building codes.

B7.9 Other types of motors (e.g.: hydraulic) must be installed per the motor manufacturer instructions. See data sheet and assembly drawings for possible RPM lockout ranges. Operate only at speeds outlined on those sheets. Damage to equipment or serious injury to personnel can result, if speed limitations are not followed.

B7.10 Motor lubrication: Electric motor bearings are often sealed and need no relubrication. When zirc fittings are present, relubricate with a No. 2 consistency lithium soap base and petroleum compound. Relubricate every 6 months to 3 years depending on usage. Open and clean drains. Add grease until new grease is forced out drain. Remove excess grease and replace input plugs. Run motor one half hour before replacing drain plugs.

START UP & OPERATION

B8.1 WARNING: High voltage and rotating parts can cause serious or fatal injury. Lockout/Tagout power before servicing.

B8.2 Some models may be shipped "dry" (without lubricant) and must be filled with the proper lubricant before start-up. Refer to Section C for the proper type and amount of lubricant. Units shipped with oil will have the gearbox vent has been replaced with a temporary plug for shipment.

Vent must be reinstalled prior to start-up or damage may occur. Check that the oil level is at the proper level (see Section C) before start-up.

B8.3 Prior to applying power, test line resistance to check for possible moisture in the motor. Refer to Paragraph B1.3. Do not apply power if any resistance exceeds one to three meg-ohms.

B8.4 Rotate mixer shaft by hand to check shaft straightness and assure that the impeller is free of any obstructions in the tank.

B8.5 Extended operation of the mixer when liquid level is at or near the bottom impeller is not recommended.

B8.6 The impeller rotates in the direction shown in the assembly drawing. Opposite rotation may cause overload and inefficient mixing.

B8.7 Vortexing may occur if liquid level is too close to the upper impeller. This will cause aeration of the product and excessive vibration of the equipment. When mixing products of dissimilar viscosities and/or specific gravities the lighter or less viscous material should be introduced first. Gradually add the heavier material or powders into the center of the tank while the agitator is running. Never dump large amounts of powder or solids into the mixing tank. This may create clotting or "sanding in" of impeller and cause damage to the equipment.

CAUTION: DO NOT START MIXER WITH IMPELLER BURIED IN SOLIDS OR WITH LIQUID SOLUTION SOLIDIFIED. DAMAGE WILL OCCUR.

B8.8 If impeller is buried in solids prior to starting mixer, solids must be dispersed. This may be achieved with an air hose, a recirculating pump, or a large stirring stick if necessary (depending on tank size).

B8.9 Align flexible motor coupling (**on foot mounted motors only**), to reduce wear of flexible insert of coupling. Check parallel alignment by placing a straight edge across the two coupling flanges and measuring the maximum offset at various points around the coupling (See Figure B10.1). DO NOT rotate the coupling. This dimension must be less than 0.015". Check angular alignment with a micrometer or caliper. Measure the outside of one flange to the outside of the other at intervals around the coupling (See Figure B8.2). Find the maximum and minimum dimensions. DO NOT rotate the coupling. The difference between the maximum and minimum dimensions must not exceed 0.015". Recheck both parallel and angular alignments again. Shims may be required to adjust properly.

B8.10 Shaft seal must be lubricated/flushed during operation of mixer.

B8.11 When variable speed drives are used (AC variable frequency, air or hydraulic motors, & mechanical variable drives) run only at speeds set forth on the data sheet and drawings in front of this manual. DO NOT RUN ABOVE OR BELOW SPEEDS LISTED ON THE DATA SHEET OR ASSEMBLY DRAWINGS. Specific data on these special drive components are located elsewhere in this manual (Section D).

B8.12 Keep motors free from oil, dust, dirt, water, and chemicals. Keep air intakes and outlets free from foreign material. Electric motors supplied, although designed for outdoor use, may be damaged due to weather. A rain hood or other protection may be necessary to prolong motor life. Consult factory for recommendations.

B8.13 Regular maintenance is the best assurance of trouble free, long life mixer operation. Inspect and relubricate at regular intervals. Frequency and thoroughness depends on operation, nature of service, and environment.

CAUTION: Before start-up, replace OSHA guards provided. Serious injury may occur if not replaced.

B8.14 In the event of a break down within the warranty period, Sharpe Mixers must be notified within 30 days if it is intended that the warranty is to cover the problem. When requesting spare/replace-ment parts anytime, have serial number and model number off mixer nameplate readily available. Do not disassemble components or otherwise modify equipment without prior authorization from Sharpe Mixers or warranty will be voided.

Note: Sharpe Mixers will not accept back charges for any repair work that has not been previously authorized.

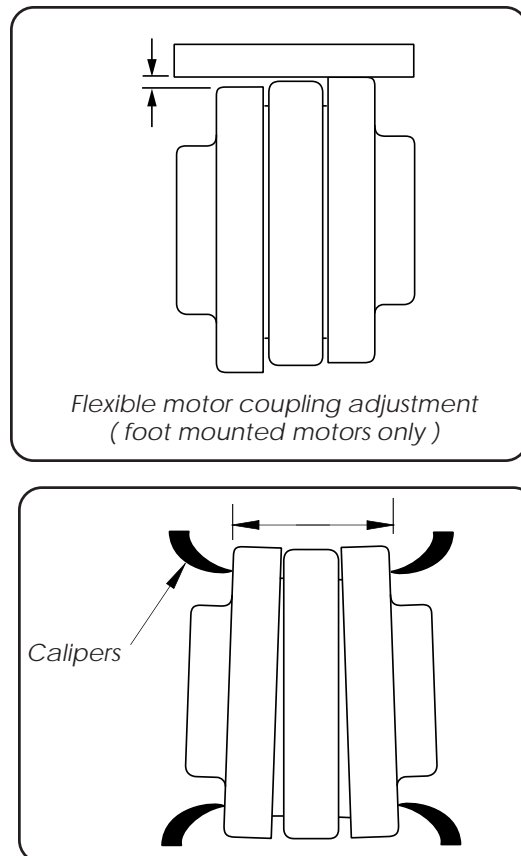


FIGURE B8.2

B8.15 Start-Up Checklist

Prior and during start-up please check that the following things have been done:

- | | | |
|----|---|--|
| a. | Manual has been read and followed | <input type="checkbox"/> |
| b. | Coupling bolts torqued to specifications | <input type="checkbox"/> |
| c. | Hold washer tight (when applicable) | <input type="checkbox"/> |
| d. | Proper shaft rotation (see drawings & data sheet) | <input type="checkbox"/> |
| e. | Shaft alignment confirmed with hand rotation | <input type="checkbox"/> |
| f. | Steady bearing installed properly (when applicable) | <input type="checkbox"/> |
| g. | Impeller is immersed in liquid. | <input type="checkbox"/> |
| h. | Sufficient protection for motor (if outdoors) | <input type="checkbox"/> |
| i. | Impeller(s) installed correctly (see assembly drawings) | <input type="checkbox"/> |
| j. | Gearbox vented | <input type="checkbox"/> |
| k. | Mounting / Impeller bolts tight | <input type="checkbox"/> |
| l. | All guards in place | <input type="checkbox"/> |
| m. | Proper type and amount of lubricant (see Section C) | <input type="checkbox"/> |
| n. | Motor checked for moisture absorption
Resistance (less than 3 meg-ohms): | <input type="checkbox"/> |
| o. | Wiring correctly installed, grounded and insulated | <input type="checkbox"/> |
| p. | Correct voltage/ampereage @ start-up: _____
Motor nameplate F.L.A.: _____
F.L.A. measured with ampmeter: _____
Actual line voltage measured: _____ | <input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/> |
| q. | Excessive vibration of mixer support ? | |
| r. | Speed limitations set on variable speed controller
(when applicable) | <input type="checkbox"/> |
| s. | Proper seal lubrication (when applicable) | <input type="checkbox"/> |
| t. | Proper seal run-in time allowed | <input type="checkbox"/> |

INSPECTOR

DATE

TROUBLE SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	SOLUTION
<ul style="list-style-type: none"> • Shaft will not fit into drive or coupling 	<ul style="list-style-type: none"> • Set screws extend into bore • Shaft over size (proper dia. 0.001" - 0.002" under nominal dia.) • Damaged shaft • Oversize key 	<ul style="list-style-type: none"> • Loosen set screws • Measure and consult factory • Consult factory • Grind key to fit
<ul style="list-style-type: none"> • Mixer will not start 	<ul style="list-style-type: none"> • Incorrect wiring • Loose connections • Blown fuse • Incorrect voltage • Impeller interference • Water damage to motor • Wrong size heaters in starter 	<ul style="list-style-type: none"> • Check wiring diagram and wire correctly • Check and tighten connections • Replace fuse • Wire for correct voltage • Free all debris for rotation • Service or replace motor (consult factory) • Replace heaters
<ul style="list-style-type: none"> • Mixer will not reach correct speed 	<ul style="list-style-type: none"> • Overload of motor • Loose drive coupling bolts • See "Mixer will not start" 	<ul style="list-style-type: none"> • Check amperage against nameplate data • Check coupling bolt tension (coupling and/or shaft maybe damaged if mixer has been run with slipping coupling)
<ul style="list-style-type: none"> • Motor runs hot / • Amperage overload 	<ul style="list-style-type: none"> • Low or high voltage • Product too viscous • Restricted ventilation • Frequent starting and stopping • Unbalanced voltage between phases • Incorrect rotation • Product too viscous • Incorrect rotation or upside-down impeller • Impeller too close to tank floor • Lack of/improper lubricant • Improper output speed • Build up of sediment on tank bottom • Undersized heaters • Variable frequency drive incompatible with motor 	<ul style="list-style-type: none"> • Wire for correct voltage • Check viscosity and specific gravity of product (consult factory) • Clear vents • Check with factory - a special motor may be required • Consult electrician • Change motor leads per nameplate instructions • Check viscosity and specific gravity - consult factory • Check against assembly drawings - correct if required • Raise impeller • Add or change lubricant (see Section C) • Confirm speed - consult factory • Clean or irrigate sediment • Replace with correct heaters • Consult VF drive manufacturer for motor recommendation

PROBLEM	POSSIBLE CAUSE	SOLUTION
• Noisy	<ul style="list-style-type: none"> • Insufficient lubricant • Foreign material in lubricant • Incorrect lubricant • Worn or faulty bearings or gears • Incorrect coupling alignment • Bent/broken guards 	<ul style="list-style-type: none"> • Fill proper amount of lubricant • Change lubricant • Change to correct lubricant <ul style="list-style-type: none"> • Check bearings/gears replace if necessary • adjust/align coupling • Straighten/replace guard
• Bearing failure	<ul style="list-style-type: none"> • High temperature product • Excessive overhung load • Water damage • See all items under "Noisy" 	<ul style="list-style-type: none"> • Provide heat shield • Consult factory • Replace bearing (check all other parts)
• Gear failure	<ul style="list-style-type: none"> • Excessive loading (check amps) • Lack of (or improper) lubrication • Start-stop-start loading (product burying impeller with solids) • Foreign material in lubricant 	<ul style="list-style-type: none"> • Consult factory • Fill with recommended lubricant or equivalent (see Section C) • Free impeller of any solids at start-up (pre stir with air hose or paddle) • Replace lubricant
• Oil leakage	<ul style="list-style-type: none"> • Excessive lubricant • Damaged/broken gasket • Loose bolts around side plates • Seals worn or damaged • Vent not installed/clogged 	<ul style="list-style-type: none"> • Check manual for proper amount lubricant and drain excess • Replace gasket • Check and tighten bolts • Replace seals • Replace seals - install/unclog vent
• Shaft vibration	<ul style="list-style-type: none"> • Impeller not immersed in liquid • Impeller too close to surface • Bent mixer shaft • Unstable mounting platform • Loose or improperly assembled coupling • Debris in coupling • Damaged gearbox bearings • Debris on impeller • Loose or bent impeller blades • Operating over maximum shaft rpm 	<ul style="list-style-type: none"> • Fill tank • Fill tank or lower impeller (see Paragraph B4) • Consult factory • Reinforce platform • Assemble securely (see Para. B4) (shaft runout adjacent to coupling should be $\leq 0.005"$) • Clean and reassemble • Check and replace if necessary • Clean impeller • Tighten or straighten (consult factory) • Reduce motor speed (variable speed only)

PROBLEM	POSSIBLE CAUSE	SOLUTION
Seal leakage	<ul style="list-style-type: none"> • Insufficient/incorrect lubrication • Worn mechanical seal • Damaged mating ring • Solids in seal gland • Scored shaft • Insufficient/incorrect lubrication • Excessive heat • Incorrect seal position • Excessive shaft runout 	<ul style="list-style-type: none"> • Lubricate properly (see Paragraph B7) check for scoring - replace if necessary • Replace seal • Replace mating ring • Flush properly (see Paragraph B8) • Replace shaft and seal; lubricate/flush seal • Lubricate properly (see Paragraph B8) • Lubricate properly or consult factory, a special seal may be required • See drawings in front of manual for correct position • See "Shaft vibration" above

Note: Other trouble shooting guides for special optional equipment will be located in Section D (when present).

A NOTE ON RECOMMENDED SPARE PARTS

B9.1 Recommended spare parts are different for individual needs. The main factor affecting which parts should be kept as spares on the users shelf is downtime (allowable time period the mixer can be out of service). This list shows acceptable downtime and parts to stock as spares which, under normal circumstances, Sharpe Mixers cannot supply in less time. Note that the less downtime that is acceptable, the more spare parts that will be required to be stocked. If this equipment is critical to the plant operation, Sharpe Mixers recommends the purchase of a complete agitator to prevent extended downtime.

Allowable Downtime	Recommended parts to stock for repair due to long delivery times	Typical shipment (varies)
3 weeks	-Steady bearing bushings, wear sleeves, stuffing gland throttles/bushings, side entry mixer shafts, special alloy seals, special motors.	4 weeks
2 weeks	-Above parts, plus: gearbox gear sets, motors, and mechanical seals.	4 weeks
1 weeks	-Above parts, plus: gearbox seals, bearings, gaskets, shims, motors, flexible couplings.	4 weeks
3 days	-Above parts, and/or: complete gearbox, gland packing, and v-belts.	4 - 6 weeks
1 day	-Complete agitator.	4 - 12 weeks

Note: Shafts and impellers, although not normally wearing parts, may be damaged and require repair/ replacement. These parts are long delivery items and should be considered if extended down time is unacceptable.

For any downtime, all wearing parts are normally recommended spares. These include: bearings, seals, gears, input couplings, and shims/gaskets. V-belts, steady bearing bushings, and wear sleeves are also recommended when present. Closed tank mixers will often require seal shaft repair/ replacement if seal problems are encountered. Seal shafts are typically 4 week shipment items and should be considered a recommended spare parts item if downtime is critical.

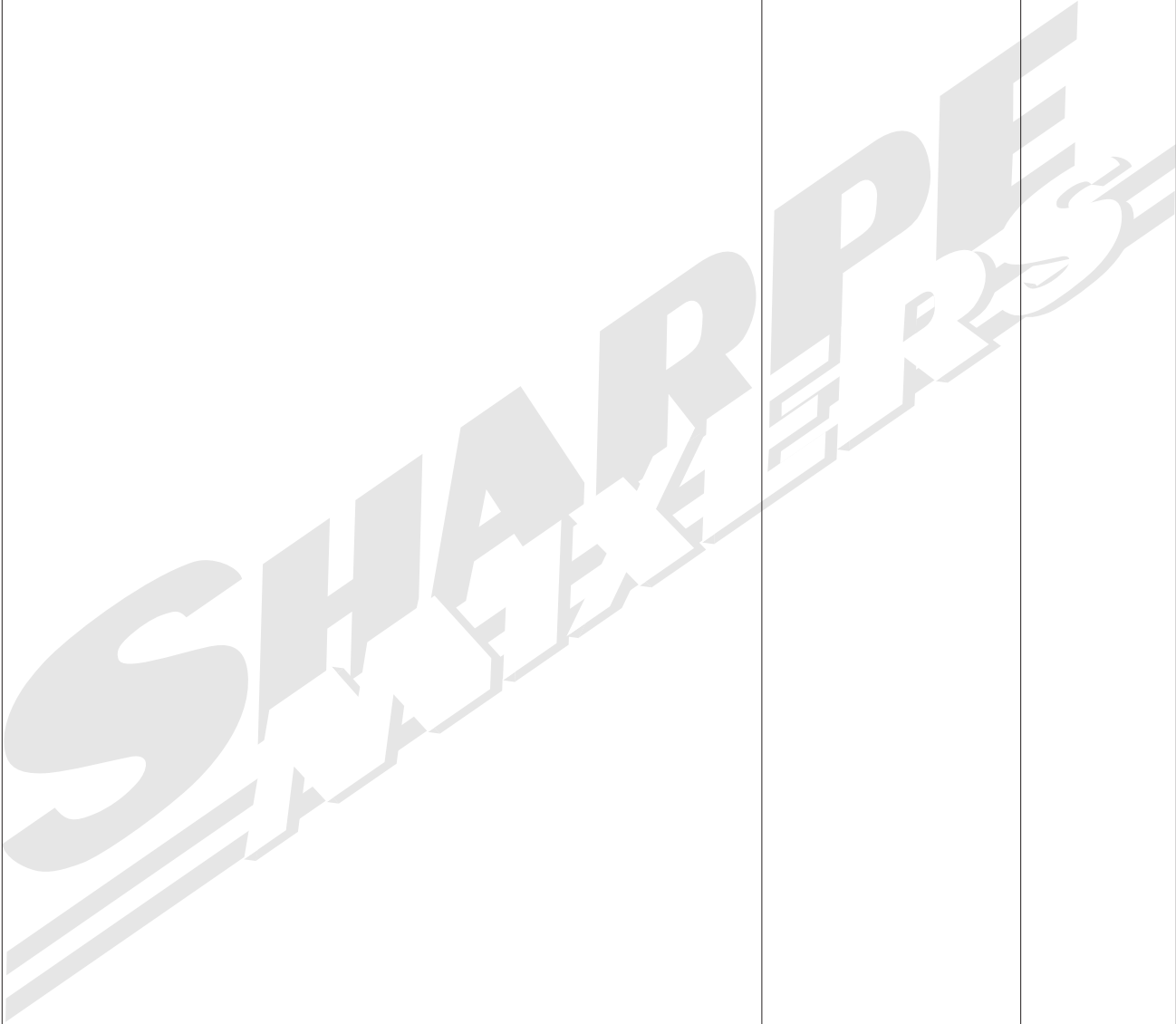
NOTE: Replacement gearboxes should be purchased through SHARPE MIXERS. SHARPE MIXERS incorporates several modifications to the gearbox casing and internal parts to make the gearbox suitable for operation as an agitator drive. Purchasing the gearbox from other suppliers may result in incorrect selection and possible gearbox failure.

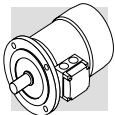
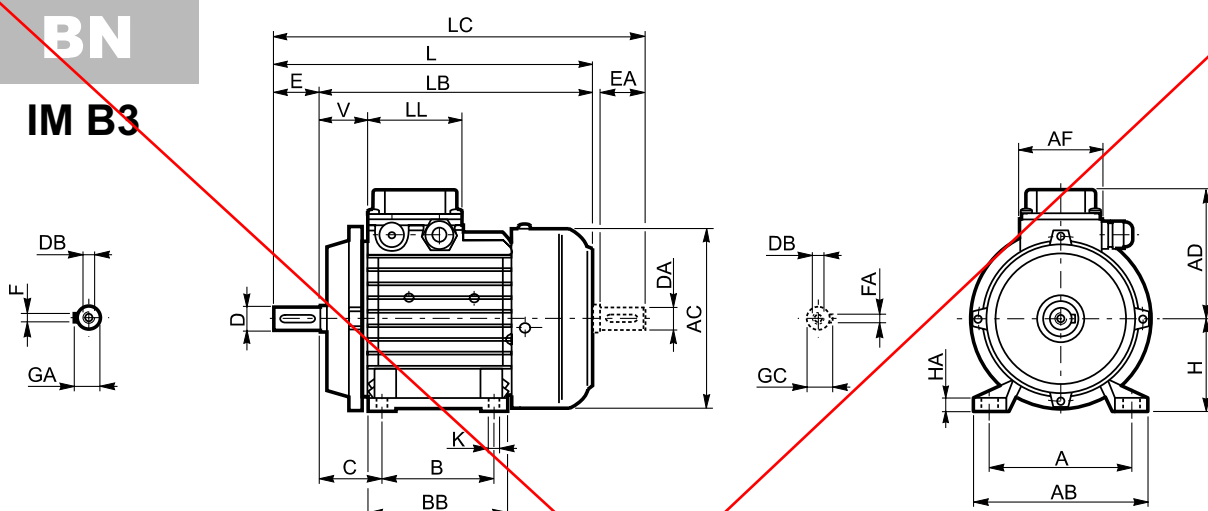
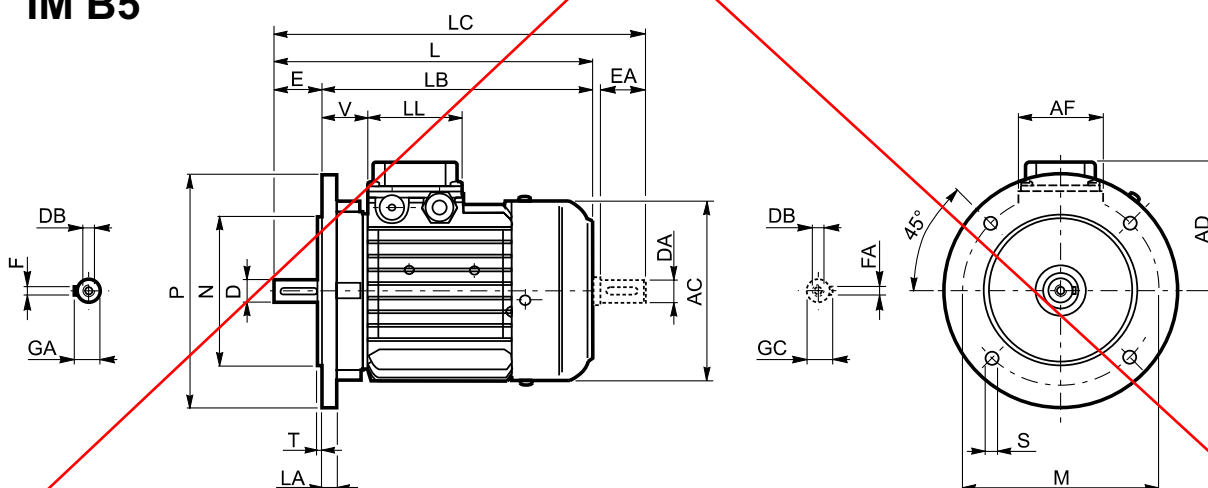
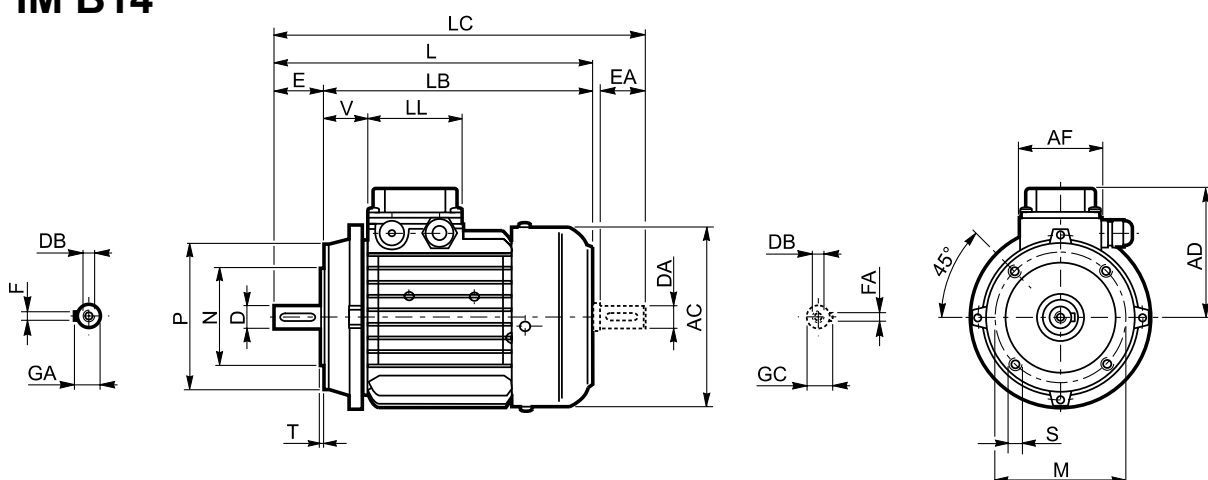
WARRANTY

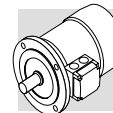
For standard terms and conditions of sale including warranty, please refer to the inside front cover of this manual.

The expressed warranty implies that MIXER was purchased through SHARPE MIXERS. Warranties for MIXERS purchased through distributors must be handled through original distributor.

MAINTENANCE NOTES:

Description	Date	By
		

**BN****IM B3****IM B5****IM B14**



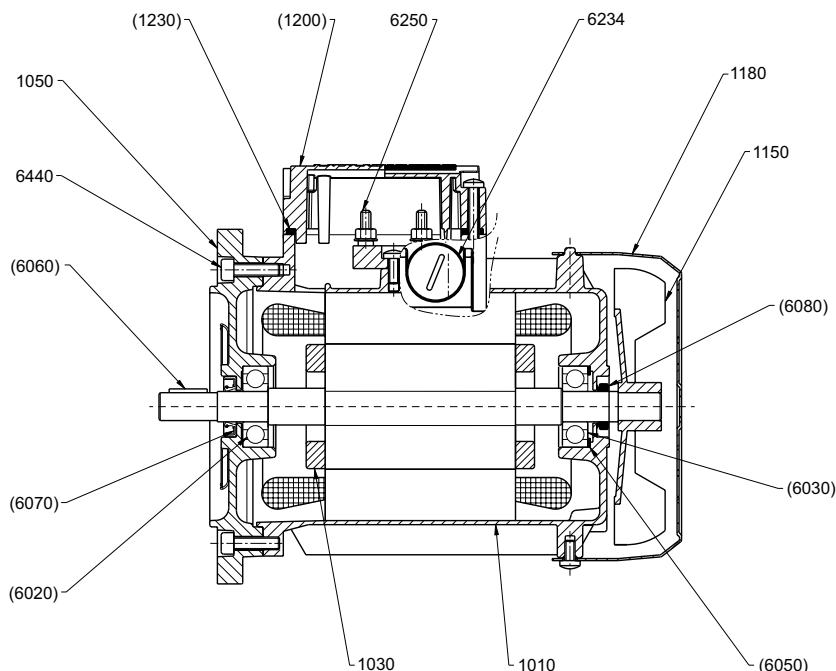
**M30 - LISTA PARTI
DI RICAMBIO**

M30 - SPARE PARTS LIST

M30 - ERSATZTEILLISTE

**M30 - LISTE DES PIECES
DETACHÉE**

BN 63



kit	ref.				
KSM	1010	Statore completo	<i>Stator winding complete</i>	Stator	<i>Stator</i>
	1030	Rotore completo	<i>Rotor shaft</i>	Läufer komplett	<i>Rotor</i>
	1050	Flangia (IM B5/IM B14)	<i>Mounting flange (IM B5/IM B14)</i>	Flansch (IM B5/IM B14)	<i>Bride (IM B5/IM B14)</i>
	1150	Ventola	<i>Fan</i>	Lüfter	<i>Ventilateur</i>
	1180	Copriventola	<i>Fan cover</i>	Lüfterhaube	<i>Couvre ventilateur</i>
	(1200)	Scatola coprimorsettiera	<i>Terminal box lid</i>	Klemmenkastendeckel	<i>Couvercle boîte a bornes</i>
KSA	(1230)	Guarnizione scatola coprimorsettiera	<i>Terminal box gasket</i>	Klemmenkastendeckeldichtung	<i>Joint de la boîte a bornes</i>
	6234	Tappo filettato	<i>Blank plug</i>	Gewindestöpsel	<i>Bouchon taraudé</i>
	6250	Morsettiera	<i>Terminal board</i>	Klemmenplatte	<i>Boîte à bornes</i>
	6440	Vite serraggio flangia	<i>Bolt</i>	Schraube	<i>Vis</i>
	(6020)	Cuscinetto	<i>Bearing</i>	Kugellager	<i>Roulement</i>
	(6030)	Cuscinetto	<i>Bearing</i>	Kugellager	<i>Roulement</i>
	(6050)	Anello di compensazione	<i>Compensation ring</i>	Federring	<i>Bague de compensation</i>
	(6060)	Linguetta	<i>Key</i>	Paßfeder	<i>Clavette</i>
	(6070)	Anello di tenuta	<i>Seal ring</i>	Dichtring	<i>Bague d'étanchéité</i>
	(6080)	Anello V-ring	<i>V-ring</i>	V-ring	<i>Bague V-ring</i>

(####) Disponibile SOLO in kit

(####) Only available as a complete kit

(####) Nür lieferbar als Kit



(####) Disponible seulement en kit


4 P



1500 min⁻¹ - S1

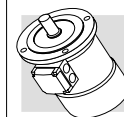
50 Hz

NOTE: INFORMATION IS FOR 50 Hz

Pn kW		n min ⁻¹	Mn Nm	η %	$\cos \varphi$	In A (400V)	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	Jm x 10 ⁻⁴ kgm ²	IM B5 
0.06	BN 56A	4	1350	0.42	47	0.62	0.30	2.6	2.3	2.0	3.1
0.09	BN 56B	4	1350	0.64	52	0.62	0.40	2.6	2.5	2.4	3.1
0.12	BN 63A	4	1310	0.88	51	0.68	0.50	2.6	1.9	1.8	3.5
0.18	BN 63B	4	1320	1.30	53	0.68	0.72	2.6	2.2	2.0	3.9
0.25	BN 63C	4	1320	1.81	60	0.69	0.87	2.7	2.1	1.9	5.1
0.25	BN 71A	4	1375	1.74	62	0.77	0.76	3.3	1.9	1.7	5.1
0.37	BN 71B	4	1370	2.6	65	0.77	1.07	3.7	2.0	1.9	5.9
0.55	BN 71C	4	1380	3.8	69	0.74	1.55	4.1	2.3	2.3	7.3
0.55	BN 80A	4	1390	3.8	72	0.77	1.43	4.1	2.3	2.0	8.2
0.75	BN 80B	4	1400	5.1	75	0.78	1.85	4.9	2.7	2.5	9.9
1.1	BN 80C	4	1400	7.5	75	0.79	2.68	5.1	2.8	2.5	11.3
1.1	BN 90S	4	1400	7.5	73	0.77	2.82	4.6	2.2	2.2	12.2
1.5	BN 90LA	4	1410	10.2	77	0.77	3.7	5.3	2.8	2.4	13.6
1.85	BN 90LB	4	1400	12.6	77	0.78	4.4	5.2	2.8	2.6	15.1
2.2	BN 100LA	4	1410	14.9	78	0.76	5.4	4.5	2.2	2.0	18.3
3	BN 100LB	4	1410	20	80	0.78	6.9	5	2.3	2.2	22
4	BN 112M	4	1420	27	83	0.78	8.9	5.6	2.7	2.5	30
5.5	BN 132S	4	1440	36	84	0.80	11.8	5.5	2.3	2.2	44
7.5	BN 132MA	4	1440	50	85	0.81	15.7	5.7	2.5	2.4	53
9.2	BN 132MB	4	1440	61	86	0.81	19.1	5.9	2.7	2.5	59
11	BN 160MR	4	1440	73	87	0.82	22.3	5.9	2.7	2.5	70
15	BN 160L	4	1460	98	89	0.82	29.7	5.9	2.3	2.1	99
18.5	BN 180M	4	1460	121	89	0.81	37.0	6.2	2.6	2.5	115
22	BN 180L	4	1465	143	89	0.82	45	6.5	2.5	2.5	135
30	BN 200L	4	1465	196	90	0.83	58	7.1	2.7	2.8	1650

freno c.c. / d.c. brake G.S.-bremse / frein c.c.					
FD					
Mod	Mb Nm	Z _o 1/h NB SB	Jm x 10 ⁻⁴ kgm ²	IM B5 	
FD 02	1.75	10000	13000	2.6	5.2
FD 02	3.5	10000	13000	3.0	5.6
FD 02	3.5	7800	10000	3.9	6.8
FD 03	3.5	7700	11000	6.9	7.8
FD 03	5.0	6000	9400	8.0	8.6
FD 53	7.5	4300	8700	10.2	10
FD 04	10	4100	8000	16.6	12.1
FD 04	15	4100	7800	22	13.8
FD 04	15	2600	5300	27	15.2
FD 14	15	4800	8000	23	16.4
FD 05	26	3400	6000	32	19.6
FD 05	26	3200	5900	34	21.1
FD 15	40	2600	4700	44	25
FD 15	40	2400	4400	58	28
FD 06S	60	—	1400	107	40
FD 56	75	—	1050	223	57
FD 06	100	—	950	280	66
FD 07	150	—	900	342	75
FD 07	150	—	850	382	86
FD 08	200	—	750	725	129
FD 08	250	—	700	865	145
FD 09	300	—	400	1450	175
FD 09	400	—	300	1850	197

freno c.a. / a.c. brake W.S.-bremse / frein c.a.									
FA					BA				
Mod.	Mb Nm	Z _o 1/h	Jm x 10 ⁻⁴ kgm ²	IM B5 	Mod.	Mb max Nm	Z _o 1/h	Jm x 10 ⁻⁴ kgm ²	IM B5 
FA 02	1.75	13000	2.6	5.0	BA 60	5	9000	4.0	5.8
FA 02	3.5	13000	3.0	5.4	BA 60	5	9000	4.3	6.2
FA 02	3.5	10000	3.9	6.6	BA 60	5	8500	5.3	7.4
FA 03	3.5	11000	6.9	7.5	BA 70	8	9700	7.8	9.0
FA 03	5.0	9400	8.0	8.3	BA 70	8	8500	8.9	9.8
FA 03	7.5	8700	10.2	9.7	BA 70	8	8000	11.1	11.2
FA 04	10	8000	16.6	12.0	BA 80	18	7400	18	13.5
FA 04	15	7800	22	13.7	BA 80	18	7400	23	15.2
FA 04	15	5300	27	15.1	BA 80	18	5100	28	16.6
FA 14	15	8000	23	16.3	BA 90	35	6500	28	19.5
FA 05	26	6000	32	20.3	BA 90	35	5400	35	21
FA 05	26	5900	34	21.8	BA 90	35	5400	37	22
FA 15	40	4700	44	25	BA 100	50	4000	52	29
FA 15	40	4400	58	29	BA 100	50	3800	66	32
FA 06S	60	2100	107	42	BA 110	75	2000	114	43
FA 06	75	1200	223	58	BA 140	150	1200	263	76
FA 07	100	1000	280	71	BA 140	150	1000	320	85
FA 07	150	900	342	77	BA 140	150	900	369	91
FA 07	150	850	382	88					
FA 08	200	750	710	128					
FA 08	250	700	850	144					

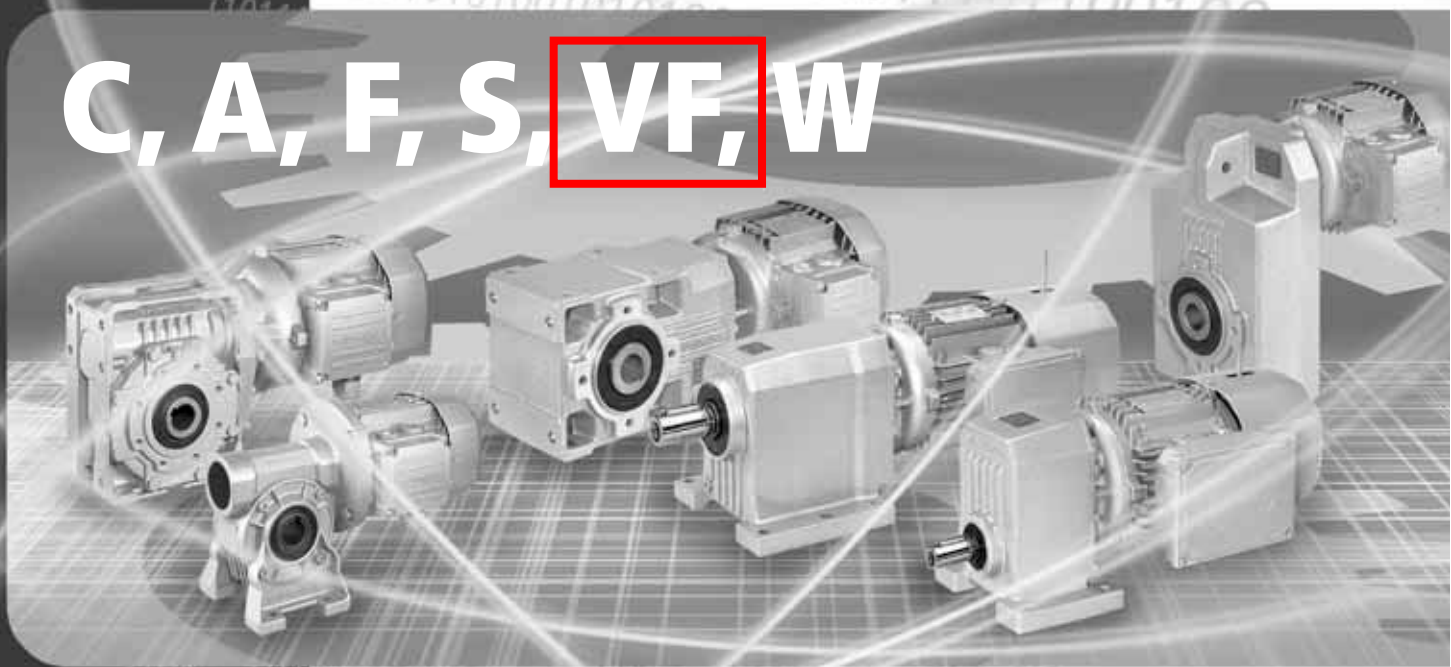




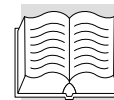
Installation, use and service manual



C, A, F, S, VF, W



BONFIGLIOLI



INSTALLATION, USE AND SERVICE MANUAL



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Revisions

Refer to page 50 for the catalogue revision index. Visit www.bonfiglioli.com to search for catalogues with up-to-date revisions.



1.0 - GENERAL INFORMATION

1.1 - PURPOSE OF THE MANUAL

This manual has been compiled by the Manufacturer to provide information on the safe transport, handling, installation, maintenance, repair, disassembly and dismantling of the gear units.

All purchasing and design criteria is provided in the Sales Catalogue. Apart from adhering to established engineering practices, the information given in this manual must be carefully read and applied rigorously.

The information regarding the electric motor that can be found matching the speed reducer is supplied with the owner's manual relevant to the specific electric motor.

Failure to adhere to the information provided herein may result in risk to personal health and safety, and may incur economic damages.

This information, provided in the original language (Italian) of the Manufacturer, may also be made available in other languages to meet legal and/or commercial requirements.

The documentation must be stored by a person with the correct authority and must always be made available for consultation.

In case of loss or damage, replacement documentation must be requested directly from the Manufacturer, quoting the code of this manual.

The manual reflects the state of the art at the time of commercialisation of the gear unit.

The Manufacturer reserves the right to modify, supplement and improve the manual, without the present publication being for that reason considered inadequate.

Particularly significant sections of the manual and important specifications are highlighted by symbols whose meanings are given below.

SYMBOLS:



DANGER - WARNING

This symbol indicates situations of serious danger which, if ignored, may result in serious risks to the health and safety of personnel.



CAUTION - ATTENTION

This symbol indicates the need to adopt specific precautions to avoid risks to the health and safety of personnel and possible economic damages.



IMPORTANT

This symbol indicates important technical information.



The instructions indicated on a yellow background next to these symbols refer exclusively to equipment conforming to the "ATEX" Directive 94/9/EC.

The operations highlighted by these symbols must be carried out by qualified professionals specially trained in the safety requirements for zones characterised by potentially explosive atmospheres.

Failure to observe these instructions may result in serious risks to personal and environmental safety



1.3 - GLOSSARY AND TERMINOLOGY

Some of the frequently occurring terms used in this manual are described below so as to unequivocally define their meaning.

Routine maintenance: the set of operations required for maintaining the functionality and efficiency of the gear unit. These operations are usually scheduled by the Manufacturer, who defines the qualifications required and tasks in question.

Non-routine maintenance: the set of operations required for maintaining the functionality and efficiency of the gear unit. These operations are not scheduled by the Manufacturer and must be done by an expert maintenance technician.

Expert maintenance technician: an authorised technician selected by means of having the qualifications, skills and mechanical and electrical training to do repairs and non-routine maintenance work on the gear unit.

Overhaul: an overhaul consists in the replacement of bearings and/or other mechanical components which have worn to such an extent as to compromise the operation of the gear unit. The overhaul also includes verification of the condition of all gear unit components (keys, seals, gaskets, vents, etc.). If any such components are damaged they must be replaced and the reason for the damage identified.

1.4 - REQUESTING TECHNICAL ASSISTANCE

For any technical service needs, contact the Manufacturer's sales network, quoting the information on the unit's nameplate, the approximate hours of service and the type of defect.

1.5 - MANUFACTURER'S LIABILITY

The Manufacturer declines all liability for cases of:

- use of the gear unit in violation of local laws on safety and accident prevention at work.
- incorrect installation, disregard or incorrect application of the instructions provided in this manual.
- incorrect or defective power supply (garmotors).
- modifications or tampering.
- work done on the unit by unqualified or unsuitable persons.

The safety of the gear unit also depends on scrupulous observance of the instructions given in this manual, in particular:

- always operate the unit within its operating limits.
- diligently observe the routine maintenance schedule.
- only authorise trained operators to inspect and service the unit.
- use only original spare parts.



- the configurations given in the gear unit catalogue are the only ones permitted.
- do not attempt to use the unit contrary to the instructions supplied.
- the instructions given in this manual do not substitute but summarise the provisions of applicable safety legislation.



2.0 - TECHNICAL INFORMATION



2.1 - GEAR UNIT DESCRIPTION

The gear unit has been designed and constructed for integration, if required, driven by an electric motor, into an assembly of interlocking parts or mechanisms as part of a specific application.

Depending on the requirements of the application, the gear unit can be supplied in a variety of executions and configurations. It is capable of satisfying a range of specific requirements in the mechanical, chemical, agricultural and food industries, etc.

BONFIGLIOLI RIDUTTORI supplies a range of accessories and optionals to make their products as versatile as possible. For further technical information and descriptions, refer to the Sales Catalogue.



The User is responsible for using the products recommended for installation and maintenance of BONFIGLIOLI gear units in an appropriate manner and in accordance with instructions.

 	<p>SAFETY SPECIFICATIONS FOR ATEX SPECIFIED GEAR UNITS</p> <ul style="list-style-type: none">• use of synthetic lubricants only (oil and grease)• VITON[®] seal rings• thread locker on all external bolts• vent caps with anti-intrusion valve• double oil seals on series C gear units, and oil seals with dust traps on all other types• components and products operable at above the maximum rated operating temperature• no metal moving parts external to the gear unit• no plastic parts capable of building up electrostatic charge• irreversible temperature indicator supplied along with each unit• for installations in zones 21 and 22 the User must schedule and implement a regular cleaning programme of all surfaces and recesses to avoid a build up of dust of more than 5 mm in depth• to prevent dust build-ups in difficult to access areas, the units are equipped with a variety of seals in proximity to the couplings of moving parts, mounting flanges and external threaded holes.
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2.2 - CONFORMITY TO STANDARDS

All gear units or gearmotors (when supplied complete with electric motor) are designed in compliance with the provisions of all applicable Essential Health and Safety Requirements, "Machinery Directive" 98/37/EC and, if requested, can be supplied complete with Manufacturer's Declaration – Annex IIB as provided by said directive.

The electric motors of all BONFIGLIOLI RIDUTTORI gearmotors conform to the provisions of Low Voltage Directive 73/23/EEC and Electromagnetic Compatibility Directive 89/336/EEC.

 	<p>Furthermore, if specified for use in potentially explosive atmospheres, the gear units are designed and constructed to conform with the Essential Health and Safety Requirements (EHSR) of Annex II of ATEX Directive 94/9/EC and conform to the following classification:</p> <ul style="list-style-type: none">• Equipment group: II.• Class: Gas 2G – Dust 2D.• Zone: Gas 1 – Dust 21.• Maximum surface temperature: temperature class T4 for 2G and 130°C for 2D. <p>Some types of gear units, given in the catalogue, are exceptions to this rule and are marked temperature class T3 for 2G or 160°C for 2G and 2D.</p>
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2.3 - OPERATING LIMITS AND CONDITIONS



Modification of the gearbox configuration or mounting position is only permitted if previously authorised by the BONFIGLIOLI RIDUTTORI technical service.



Failure to obtain said authorisation voids the ATEX certification.

Ambient conditions

- Ambient temperature: min. - 20°C; max. + 40°C.
- Do not use the gear unit, if not explicitly intended for the purpose, in a potentially explosive atmosphere or where the use of explosion-proof equipment is specified.



The nameplate data on the maximum surface temperature, refer to measurements made in normal ambient and installation conditions. Even minimal variations to said conditions (e.g. smaller mounting cabinet) could have a significant impact on the build up of heat.



- Lighting



If the unit is to be serviced in a poorly lit area, use additional lamps and ensure that the work is done in compliance with applicable safety legislation.

- Noise - Vibration

During operational testing at the Manufacturer's premises, the acoustic pressure measured under full load at a distance of 1 m from the unit and 1.6 m above ground level without vibration was less than 85 dB(A).

The vibrations produced by the gear unit do not constitute a health risk for personnel. Excessive vibration may be the result of a fault and should be immediately reported and eliminated.

3.0 - SAFETY INFORMATION

3.1 - SAFETY STANDARDS

- Carefully read the instructions given in this manual and those posted directly on the gear unit, especially those regarding safety.
- Persons charged with working on the gear unit at any time in its service life must be trained specifically for the purpose with special abilities and experience in this area as well as being equipped with the appropriate tools and individual safety equipment (as per Legislative Decree 626/94). Failure to meet these requirements constitutes a risk to personal health and safety.
- Use the gear unit only for the applications envisaged by the Manufacturer. Improper use can result in risks to personal health and safety and economic damages.



The applications defined by the Manufacturer are those industrial applications for which the gear unit has been developed.

- Keep the gear unit at its maximum efficiency by following the routine maintenance schedule. Good maintenance enables the unit to operate at maximum performance over a long service life in compliance with safety regulations.
- When working on the unit in areas which are difficult to access or hazardous, ensure that adequate safety precautions have been taken for the operator and others in compliance with the provisions of law on health and safety at work.
- All maintenance, inspection and repairs must only be done by an expert maintenance technician fully familiar with the attendant hazards. It is, therefore, essential to implement operating procedures which address potential hazards and their prevention for the entire machine. The expert maintenance technician must always work with extreme caution in full compliance with applicable safety standards.



If the gear unit is to be serviced in a potentially explosive atmosphere, the operator must first switch off power to the gear unit and ensure that it is out of service, as well as taking all necessary precautions against it being accidentally switched on again or its parts moving without warning.



Furthermore, all additional environmental safety precautions must be taken (e.g. elimination of residual gas or dust, etc.).

- During operation wear only the apparel and safety equipment indicated in the User instructions provided by the Manufacturer or laid down by applicable laws on safety at work.
- Replace worn components with original spare parts. Use the lubricants (oil and grease) recommended by the Manufacturer.
- Do not dump polluting materials into the environment. Dispose of all such materials as stipulated by applicable legislation.
- After replacing lubricants clean the gear unit's surfaces and the walk-on surfaces around the work area.





4.3 - STORAGE

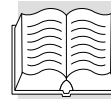
Some recommendations for storing the gear unit are indicated below.

1. Do not store the unit in excessively humid conditions or where it is exposed to the weather (do not store outdoors).
2. Do not place the gear unit directly on the ground.
3. Place the gear unit on a stable base and make sure that it is not subjected to accidental displacement.
4. Store the packaged gear unit (if allowed) in accordance with the instructions on the packaging itself.

If the gear unit is stored for more than 6 months, the following **additional** precautions must be taken:

5. Cover all machined external surfaces with a rustproofing product such as Shell Ensio or equivalent product with similar properties and application range.
6. Fill the unit with lubricating oil.

 	<p>SAFETY PRECAUTIONS to be taken when returning the gear unit to service after storage.</p> <p>The output shafts and external surfaces must be thoroughly cleaned of all rustproofing product, contaminants and other impurities (use a standard commercial solvent). Do this outside any explosion hazard area.</p> <p>The solvent must not touch the seal rings as this can damage them and render them ineffective.</p> <p>If the oil or protective material used during storage is not compatible with the synthetic oil used during the machine's operation, the interior of the unit must be thoroughly cleaned before filling with the operating oil.</p> <p>The service life of bearing grease is reduced if the unit is stored for more than 1 year. The bearing grease must be synthetic.</p>
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5.0 - INSTALLATION

5.1 - INSTALLING THE GEAR UNIT



The entire installation process must be planned based on the general design of the machine. The person authorised to do the work must, if necessary, implement a safety plan to safeguard all persons directly involved and rigorously apply all applicable legislation.

If a gearmotor is going to be installed, please consult the owner's manual of the electric motor on beforehand.

1. Thoroughly clean all packaging materials and protective product residue from the gear unit. Pay particular attention to the coupling surfaces.
2. Check that the data on the nameplate corresponds to that which is specified on the order.
3. Ensure that the structure to which the gear unit is to be mounted is sufficiently robust and rigid to support its weight and operating stresses.
4. Check that the machine on which the gear unit is to be installed is switched off and cannot be accidentally switched on again.
5. Check that all coupling surfaces are flat.
6. Check that the shaft/shaft or shaft/bore are perfectly aligned for coupling.
7. Fit suitable guards to protect against the external moving parts of the gear unit.
8. If the work environment is corrosive for the gear unit or any of its parts, take the special precautions required for aggressive environments. In this case, contact the BONFIGLIOLI RIDUTTORI sales service.
9. We recommend applying a protective paste to all couplings between the gear unit/motor and other parts (Klüberpaste 46 MR 401 or equivalent product with similar properties and application range) to ensure optimal coupling and protection against fretting corrosion.
10. To ensure effective coupling, the driven shafts should be machined to the tolerances given in tables (A16), (A17), (A18), (A19), (A20) and (A21) in Annex 3 of this Manual.
11. In case of installation outdoors and when fitted with an electric motor, protect the latter from direct sunlight and the weather by means of guards or a casing. Also make sure that the assembly is properly ventilated.

Now proceed with the installation as follows:

1. Place the gear unit in the vicinity of the installation area.
2. Mount the gear unit and secure it to the structure at the points provided. The gear unit should be secured to the structure through all mounting points on the mount specified (feet or flange).
3. Locate the closed plug used for transportation (usually red) and replace it with the vented plug provided.
4. Tighten down the mounting bolts and check that the oil plugs are screwed down to the torque given in table (A0).



(A0)

Bolt size	Tightening torque [Nm] +5% /-10%	
	Bolt class	
	8.8	10.9
M4	3	3.8
M5	5.9	8.0
M6	10.3	13.0
M8	25.5	32
M10	50	64
M12	87.3	110
M14	138.3	180
M16	210.9	275
M18	306	390
M20	432	540
M22	592	720
M24	744	930
M27	1100	1400
M30	1500	1850

Cap/vent thread	Pitch	Tightening torque [Nm]
1/8"	28	5
1/4"	19	7
3/8"	19	7
1/2"	14	14
3/4"	14	14
1"	11	25

5. Charge the gear unit with oil or top it up with reference to the method in which gear units of the type covered by this manual are filled in the factory. The standard charge of synthetic life-time lubricant is as follows:

(A1)

C 05	C 11	C 21	C 31	C 35	C 41	C 51	C 61	C 70	C 80	C 90	C 100
A 10	A 20	A 30	A 41	A 50	A 60	A 70	A 80	A 90			
F 10	F 20	F 30	F 40	F 50	F 60	F 70	F 80	F 90			
S 10	S 20	S 30	S 40	S 50							
VF 27	VF 30	VF 44	VF 49	VF 130	VF 150	VF 185	VF 210	VF 250			
W 63	W 75	W 86	W 110								

 Life-time lubrication.

 Life-time lubrication with ATEX-specified unit only.



Helical in-line gear units C 11, C 21 and C 31 are not equipped with service plugs for direct oil level checks.

Bevel helical gear units A 10, A 20 and A 30 are not equipped with service plugs for direct oil level checks in mounting positions B6 and B7 only.

For these types of gear units, refer to Annex 1 of this Manual.

Before installing, check the unit as follows:

1. Place the gear unit in the mounting position indicated for the gear unit in question in Annex 1. Wait 10 minutes for the oil level to stabilise inside the gear unit's casing.
2. Insert a dipstick through the hole shown in drawing (S4) or (S5) and measure the distance between the oil level and the exterior of the casing. This value must be compared with the **values in mm** given in Annex 1, tables (A7) and (A8), depending on the mounting position for the gear unit in question.
3. If the measurement gives a higher value than that prescribed, top up the oil to the correct level as indicated in the catalogue.

For all other types of gear unit the oil level must be checked via the oil plug (spill type) using the tool (out of scope for supply) described in Annex 1.

For the first charge and subsequent top ups, only use the recommended oils.



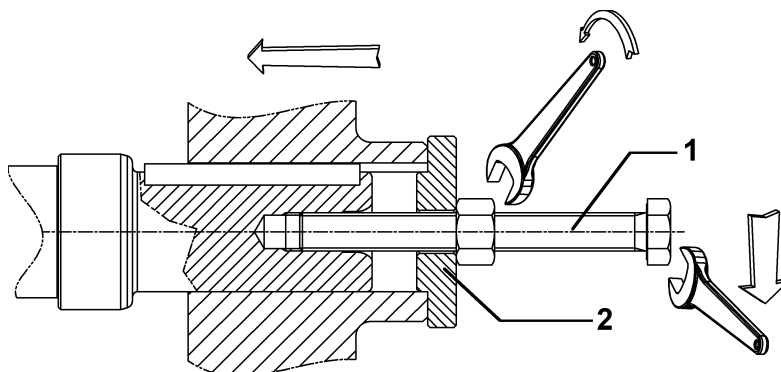
Installation of gear units classified under Directive 94/9/EC

- Category 2D gear units must be installed in compliance with the provisions of standards EN 1127-1 and EN 50281-1-2. The installer must, therefore, be fully informed and trained for this application.
- The installation technician must be aware of the ATEX class of the installation area, as well as the risks associated with the presence of a potentially explosive atmosphere, with particular attention to explosion and fire hazards, and thereby adopt the necessary safety precautions.
- All maintenance, assembly and disassembly work must be done **outside the explosion hazard area** by trained personnel.
- Check that all accessory components (cables, joints, cable glands, cooling units, etc.) comply with the Essential Health and Safety Requirements of the ATEX directives. Handle them with extreme care to avoid altering their characteristics.
- Remove the bolts sealing the threaded holes if provided for securing the gear unit. Do not damage the coupling surfaces.
- When assembling gear units with a torque arm, make sure that during operation, the metal parts which move relative to each other do not come into contact. If necessary, insert non-metal anti-friction elements in compliance with Directive 94/9/EC.
- Do not connect any object with electrical resistance greater than $10^9 \Omega$ to the product.
- Install guards to prevent the hazardous accumulation of dust and liquids on the seals of the solid shafts and to protect them mechanically.
- In case of installation of the gearmotor in a vertically downward orientation, the electric motor must be equipped with a drip cover.
- The output shaft and any pulleys or other transmission components must be perfectly aligned.
- Only install the gear unit in the motor execution and mounting position specified on the order. Shaft-mounted gear units can be installed with a tolerance relative to the theoretical plane of installation of $\pm 5^\circ$.
- If the gear unit is supplied without lubricant it must be installed as such and only filled with lubricant thereafter.
- Secure the gear unit to a flat, vibration-free surface capable of bearing the torsional stresses it produces in operation. Make sure not to deform the contact surfaces, mounting feet and/or flanges by overtightening the bolts.
- Use bolts of quality no lower than 8.8 for mounting the gear unit, and for heavy-duty installations use 10.9 bolts. For the tightening torque refer to table (A0). To prevent bolts from unscrewing, apply a thin film of Loctite 510, or equivalent, on threads of all bolts used to assemble the gear unit onto the structure and/or to the electric motor.
- Make sure that the radial/thrust loads and operating torques do not exceed those specified for the unit.
- The vent caps and oil level caps must be easy to access for inspection.
- Clean the gear unit thoroughly after installation.

5.1.1 - Gear units with solid output shaft

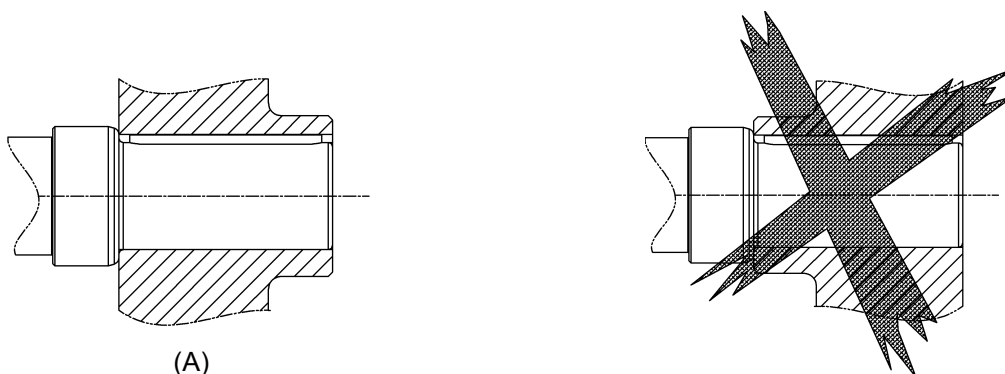


For mounting external parts do not use hammers or other tools which might damage the gear unit's shafts or bearings. Instead, proceed as indicated in the diagram below:



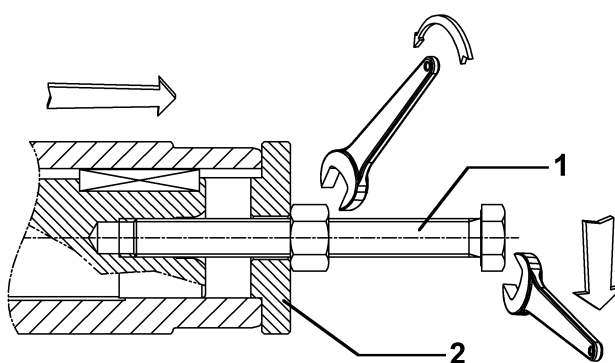
Bolt (1) and spacer (2) are to be supplied by customer.

To minimise the loads on the shaft bearings, when mounting transmission elements with asymmetrical hubs, the preferred layout is shown in diagram (A) below:



5.1.2 - Gear units with hollow output shaft

To facilitate mounting hollow shaft gear units onto the machine's driven shaft, proceed as indicated in the diagram below. Also refer to Annex 3 of this Manual for dimension information on customer's shaft.



The bolt (1) and spacer (2) are to be supplied by customer.



5.2 - INSTALLING AN IEC-STANDARD FLANGED MOTOR

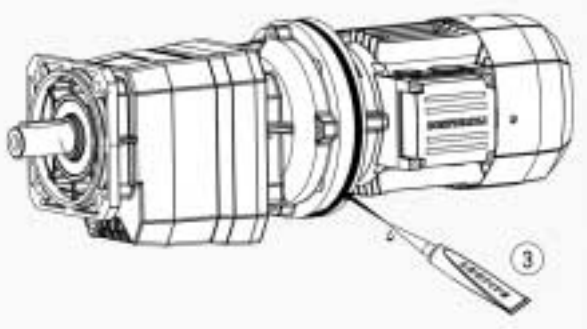
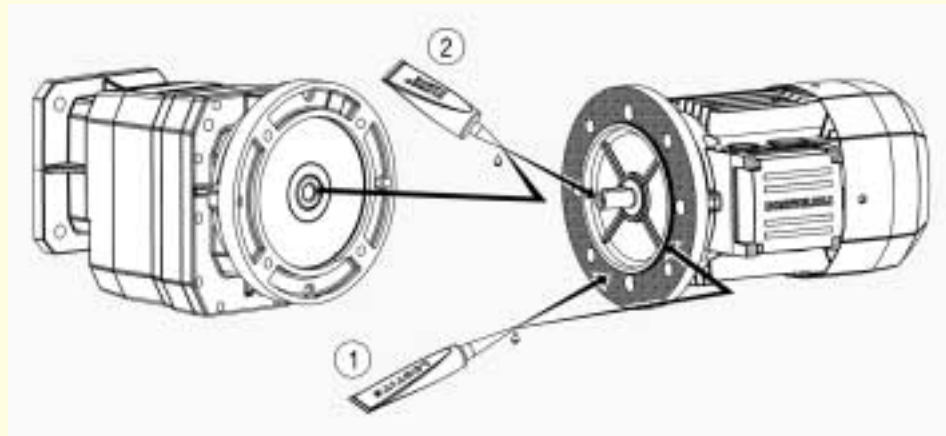
Further to all the precautions indicated above, when installing a IEC-flange mount electric motor the following precautions must also be observed:

- Do not force the coupling and do not use inappropriate tools during assembly. Take care not to damage the flat and/or cylindrical coupling surfaces.
- Do not force the shaft with large radial and/or thrust loads.
- To facilitate assembly, use a lubricating synthetic oil paste such as Klüberpaste 46 MR 401 or equivalent product with similar properties and application range.
- Tighten down all motor/gear unit mounting bolts to their prescribed torque. For the tightening torques, refer to table (A0).

When the gear unit is mounted to an IEC electric motor, proceed as follows:

- Apply a layer of sealant (Loctite 510 or equivalent product with similar properties and application range) to the motor/gear unit mounting flanges, spigot and frontal coupling surfaces as shown in diagram (S1).

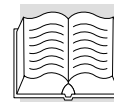
(S1)



- 1 - Apply "Loctite 510" to both the flange surface and spigot.
- 2 - Apply "Klüberpaste 46MR401" to the input shaft bore and motor shaft.
- 3 - Use "Loctite 5366" to seal the area of contact between the gear unit and motor, taking care to fill in any gaps between the two flanges (e.g. disassembly slots).

- After mounting the motor, apply a layer of sealant (Loctite 5366 or equivalent product with similar properties and application range) around the edges of the flanges so as to close any gaps between their surfaces.
- If the gearbox is of the flanged type, the User must take similar precautions to prevent dust deposits forming in the gaps between the flanges or in the vicinity of the couplings.







6.0 - TESTING THE GEAR UNIT

The gear unit has been factory tested by the Manufacturer.

Before starting the unit, check that:

- The machine incorporating the gear unit complies with the provisions of the “Machinery Directive” 98/37/EC and any other applicable safety legislation.
- The gear unit’s mounting position in the installation corresponds to that prescribed and indicated on the nameplate.
- The electrical power supply and control systems are suitable and operational as stipulated in standard EN 60204-1, and grounded as per standard EN 50014.
- The motor power supply corresponds to that prescribed and is within $\pm 5\%$ of the rated value.
- The oil level is as prescribed and that there are no leaks from the caps or gaskets.
- The unit does not run noisily or with excessive vibration.

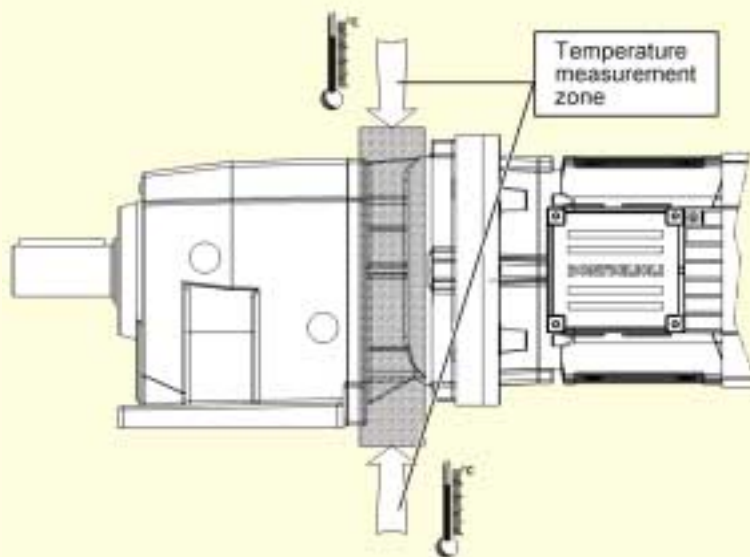
 	<p>Before starting up the unit, check and ensure that:</p> <ul style="list-style-type: none">• Assembly is not carried out in a potentially explosive atmosphere (oil, acid, gas, vapour or radiation) and that there is no dust deposits thicker than 5 mm on the gear unit.• During service the gear unit is sufficiently ventilated and that it is not subject to radiation from external heat sources.• During service the cooling air does not exceed 40 °C.• The oil level, drain and vent plugs are all easily accessible.• All accessories of any type mounted onto the gear unit are ATEX compliant.• Gear units with hollow shafts, with or without shrink disk, have been correctly mounted.• The gear unit is thoroughly cleaned after installation.• All guards installed to prevent accidental contact between operators and the gear unit’s moving parts or seals, are effective.
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Measuring the gear unit's surface temperature

- The gear unit's maximum surface temperature depends on the motor speed, gear ratio and motor execution and must never exceed 130 °C (160 °C if so specified on the nameplate).
- The nameplate specifications regarding the maximum surface temperature, refer to measurements made in normal ambient and installation conditions. Even minimal variations to said conditions (e.g. smaller mounting cabinet) could have a significant impact on the build up of heat.
- When commissioning the gear unit, the surface temperature must be measured in the same operating conditions as for the final application.
The surface temperature must be measured at the coupling between the gear unit and motor, and at the points which are most shielded from the motor's fan cooling.

(S2)



IMPORTANT:

The maximum surface temperature is reached after 3 hours' operation at full load. The temperature measured in these conditions must not differ (ΔT) from the ambient temperature by more than the following values:

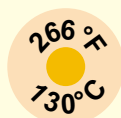
(A3)

	ΔT [°C]
C 11...C 61	75
A 10...A 60	75
F 10...F 60	75
VF 44, VF 49	75
W 63...W 86	75
W 110	90

Should the temperature differential exceed these values, stop the gear unit at once and contact the BONFIGLIOLI RIDUTTORI technical service.



- If the temperature differential is within the above values, wait for the gear unit to cool down and then install the temperature indicator supplied with the gear unit at the point of maximum temperature.

Example:



- At the same time, check for excessive running noise and vibration.



 	<ul style="list-style-type: none">• Provided all the above checks have been passed and that all other instructions in this manual have been strictly observed, an electric motor with ATEX rating equal or greater than that of the gear unit may be installed, thus forming a gearmotor which itself complies with the provisions of Directive 94/9/EC. <p>If, on the other hand, the installation of the motor to the gear unit requires actions other than those prescribed in this Manual and/or one or more of the manual's prescriptions has not been satisfied, the User shall be responsible for analysing the risks attendant on this particular motor/gear unit combination. The risk analysis is in any case mandatory if the motor is driven through an inverter.</p> <p>Only in this way, and subject to certification by the assembler, shall the assembly, including the gear unit itself, be compliant with the requirements of Directive 94/9/EC.</p>
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7.0 - USING THE EQUIPMENT

Before putting the gear unit into service, the User must ensure that the plant in which it is installed complies with all applicable directives, especially those regarding health and safety at work.



The gear unit may not be used in areas and environments:

- with highly corrosive and/or abrasive vapours, smoke or dust
- in direct contact with loose food products.



Danger zones and exposed persons:

The danger zone of the gear unit is the protrusion of the shaft which constitutes a hazard for exposed persons in direct contact with it (crushing, cutting, trapping). In particular, when the gear unit is operating in automatic mode and in an accessible area, the shaft must be protected by a guard.



8.0 - MAINTENANCE



Maintenance and replacement work must be done by expert maintenance technicians trained in the observance of applicable laws on health and safety at work and the special ambient problems attendant on the installation.



Before doing any work on the unit, the operator must first switch off power to the gear unit and ensure that it is out of service, as well as taking all necessary precautions against it being accidentally switched on again or its parts moving without warning (due to suspended loads or similar external factors).

Furthermore, all additional environmental safety precautions must be taken (e.g. elimination of residual gas or dust, etc.).

- Before doing any maintenance work, activate all safety equipment and, if necessary, inform persons working in the vicinity. In particular, mark off the area around the unit and prevent access to any equipment which, if activated, might be the cause of unexpected health and safety hazards.
- Replace worn components with original spare parts only.
- Use the lubricants (oil and grease) recommended by the Manufacturer.
- When working on the gear unit always replace gaskets and seals with new original ones.
- If a bearing requires replacement, it is good practice to also replace the other bearing supporting the same shaft.
- We recommend replacing the lubricating oil after all maintenance work.

The above instructions are aimed at ensuring efficient and safe operation of the gear unit.

The Manufacturer declines all liability for injury and damage to components due to the use of non-original spare parts and non-routine work which modifies the safety requirements without the express prior authorisation of the Manufacturer.

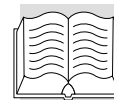
Refer to the specific spare parts catalogue when ordering spare parts for the gear unit.



Do not dump polluting liquids, worn parts and maintenance waste into the environment. Dispose of all such materials as stipulated by applicable legislation.



- Observe the routine inspection and maintenance schedule to ensure suitable operating conditions and the effective explosion protection of the unit.
- Always apply fresh Loctite 510 paste or equivalent product with similar properties and application range to all disassembled threads.
- Before servicing or repairing internal components, allow the gear unit to cool down completely before opening the casing so as to avoid burns from parts which are still hot.
- Make sure, on completion of maintenance work, that all safety measures and equipment have been applied and reset.
- Clean the gear unit thoroughly after maintenance work and repairs.
- On completion of maintenance work, tighten all vent, filler and level plugs to their specified torque (table A0).
- On completion of any maintenance work, all seals must be refitted and sealed as prescribed. On gear units with double seal rings, the cavity between the two rings must be packed with synthetic grease (Fluorocarbon gel 880 ITP or equivalent product with similar properties and application range) before assembly.
- Regardless of the type of gear unit, whenever a seal ring is replaced its lips should be smeared with a thin layer of grease (Fluorocarbon gel 880 ITP or equivalent product with similar properties and application range) before assembly.
- Use only original spare parts for repairs.



8.1 - ROUTINE MAINTENANCE



Keep the gear unit at its maximum efficiency by following the routine maintenance schedule specified by the Manufacturer.

Good maintenance enables the unit to operate at its maximum performance over a long service life in compliance with safety regulations.

Frequency	Component	Type of work	Operation
1000 h	External seals and gaskets	Check oil level Check for leaks by eye	Maintain or replace components as required
3000 h	For gear units with torque arm: polymer bushings	Check for cracks/ageing	Replace if no longer fully effective
5000 h	Gear unit seals and gaskets	Inspect carefully for wear/ageing of external seals.	Replace if aged/worn

Depending on the temperature reached by the lubricant, it should be replaced at the intervals indicated in table (A4) below:

(A4)

Oil temperature t [°C]	Hours
$t < 65$	25000
$65 \leq t < 80$	15000
$80 \leq t \leq 95$	12500

For installations in zones 21 and 22 the User must schedule and implement a regular cleaning programme for all surfaces and recesses to avoid build up of dust more than 5 mm in depth.

Every 1000 h of operation or after 6 months:

- Measure the surface temperature of the coupling between the gear unit and motor, at the points most shielded from the motor's fan cooling. The maximum temperature must not differ (ΔT) from the ambient temperature by more than the following values, nor may this differential be exceeded during operation.

(A3)

	ΔT [°C]
C 11...C 61	75
A 10...A 60	75
F 10...F 60	75
VF 44, VF 49	75
W 63...W 86	75
W 110	90



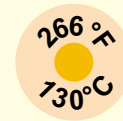


Check the condition of the temperature indicator previously installed on the gear unit during commissioning.

Example:



Limit temperature exceeded



Limit temperature NOT exceeded

Also check that the temperature is not excessive around the gear unit's bearings.

- Check the oil levels with reference to the tables and diagrams given in Annexes 1 and 2.
- Check that there are no signs of lubricant leaks near to the gear unit.
- **If any anomalies are found, identify their cause, repair the unit accordingly and top up the lubricant before putting the gear unit back into service.**

Every 3000 h of operation:

- For gear units with torque arm, check that the polymer bushings are not aged or damaged. If they are at all compromised, replace with original spare parts.

Every 5000 h of operation:

- Change the synthetic oil and bearing grease if the gear unit is not life-time lubricated.
- Replace all externally accessible seal rings unless this has already been done as a result of problems occurring before the scheduled maintenance deadline.



Every 5000 h of operation at rated torque:

(The minimum overhaul interval indicated here may increase considerably depending on actual conditions of service; see table (A5)).

- Overhaul the gear unit, unless this has already been done as a result of problems occurring before the specified deadline.

(An overhaul involves the replacement of bearings and/or other mechanical components which have worn to such an extent as to compromise the operation of the gear unit).

(A5)

$\frac{M_{n2}}{M_{r2}}$	Interval hours
1.0	5000
1.25	10000
1.5	17000
1.75	27000
2.0	40000

M_{n2} = nominal torque at output shaft

M_{r2} = required torque at output shaft



8.2 - LUBRICANTS

Before putting the gear unit into service, check the oil level. This must be done with the gear unit in the mounting position in which it will be used in the application. If necessary, if or top up the lubricant to the filling mark on the level cap which may be transparent or of the spill type.



Life-time lubricated gear units which are not subject to external contamination do not normally require periodic lubricant changes.



Do not mix oils of different nature or specifications and check that the oil is highly resistant to foaming and is EP rated.

If the same type of oil as that already in use is not available, drain the gear unit completely and flush its interior thoroughly with a light solvent before refilling with a new lubricant.

8.3 - OIL CHANGE

1. Place an adequate container under the drain plug.
2. Remove the filler and drain plugs and allow the oil to drain out.



The oil will drain better if it is warm.

3. Wait for a few minutes until all the oil has drained out, then screw the drain plug back on with a new gasket.
4. Fill the gear unit with the new oil (in its actual mounting position) to the centre of the level plug.
5. Tighten down the filler plug after fitting a new gasket.



The gear unit may be supplied with or without lubricant, as specified by the User. The quantity of oil to be filled is specified in the Sales Catalogue. This specification is, however, approximate, and reference must always be made to the centre of the level plug, the placement of which depends on the mounting position specified in the order.

Lubricants, solvents and detergents are toxic/harmful to health:



- they may cause irritation in direct contact with the skin
- they may cause intoxication if inhaled
- they can be fatal if swallowed.



Handle them with care using suitable individual safety equipment. Do not dump into the environment and dispose of in compliance with applicable legislation.

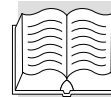


If a leak is found, identify the cause of the fault, repair it and refill with lubricant before operating the gear unit.



8.4 - RECOMMENDED/PERMITTED OILS

 	<p>OILS AND GREASES COMPATIBLE with ATEX-certified gear units</p> <p>Greases:</p> <ul style="list-style-type: none">• Klüber Asonic GHY 72 (for bearings)• Shell TVX Compound B (for greased gear trains)• Shell Tivela GL 00 (alternative for greased gear trains)• Klüberpaste 46 MR 401 (to facilitate coupling of cylindrical parts)• ITP Fluorocarbon gel 880 (for greasing contact seals) <p>Oils (as alternatives to Shell Tivela Oil S 320):</p> <ul style="list-style-type: none">• Shell: Tivela Oil SC320• Aral: Degol GS 320• IP: Telium Oil VSF 320 (o Agip)• Klüber: Klübersynth GH 6 320• Total: Carter SY 320• Mobil: Glygoyle HE 320
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		C	S	F	A	A	VF	VF R	VF_L	VF-EP	V		VR
		11...100	10...50	10...90	70...90	10...60	W	W R	W_L	W-EP	0.25-0.5	1...10	0.25...10
	Tivela S 220												
	Tivela S 320												
	Tivela S 460												
	Donax TX												
	Donax TA												
	Cassida Fluid WG 460	F	F	F	F	F	F	F		F			
	Cassida Fluid HF 46										F	F	
	TVX Compound B							G					G
	Telium VSF 220												
	Telium VSF 320												
	Spartan EP 220												
	Spartan EP 320												
	Klübersynth GH 6 220												
	Klübersynth GH 6 320												
	Klübersynth UH1 6-460	F	F	F	F	F	F	F		F			
	Glygoyle HE 320												
	Glygoyle HE 460												
	Mobilgear SHC XMP 220												
	Mobilgear SHC XMP 320												
	Mobil SHC 630												
	Mobil SHC 632												
	DTE FM 460												
	Alphasyn PG 220												
	Alphasyn PG 320												
	Carter SY 220												
	Carter SY 320												
	Carter SY 460												
	Degol GS 220												
	Degol GS 320												
	Degol PAS 220												
	Synlube CLP 220												
	Synlube CLP 320												
	Renoling PG 220												
	Renoling PG 320												

G = Grease Recommended
F = Food grade Permitted



8.5 - CHECKING EFFICIENCY

- Remove dust deposits from the gear unit and motor casings.
- Check that noise at constant load does not vary. Excessive vibration or noise can indicate wear of the gear train or failure of a bearing.
- Check the power absorption and voltage against the nominal values given on the motor's nameplate.
- Check the wear of linings on the brake motor (if used) and, if necessary, adjust the gap.
- Check for lubricant leaks from the gaskets/seals, caps and casings.
- Check all bolted couplings for wear, deformation or corrosion and tighten them down fully without overtightening.

8.6 - CLEANING

Clean all dust and process waste off the gear unit. Do not use solvents or other products which are incompatible with the construction material and do not direct high-pressure jets of water at the gear unit.

8.7 - PAINT COATING

In the factory, the cast-iron casing of the gear unit is magnetised and sprayed with polyester heat-setting resin which is then baked on. Aluminium casings are not paint coated.

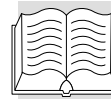
Table (A6) shows in colour the types and gear frame sizes of gear units which are generally painted.

(A6)

C 05	C 11	C 21	C 31	C 35	C 41	C 51	C 61	C 70	C 80	C 90	C 100
A 10	A 20	A 30	A 41	A 50	A 60	A 70	A 80	A 90			
F 10	F 20	F 30	F 40	F 50	F 60	F 70	F 80	F 90			
S 10	S 20	S 30	S 40	S 50							
VF 27	VF 30	VF 44	VF 49	VF 130	VF 150	VF 185	VF 210	VF 250			
W 63	W 75	W 86	W 110								



If the gear unit is to be painted, tape the nameplate and seal rings to prevent contact with solvent.



9.0 - REPLACING PARTS



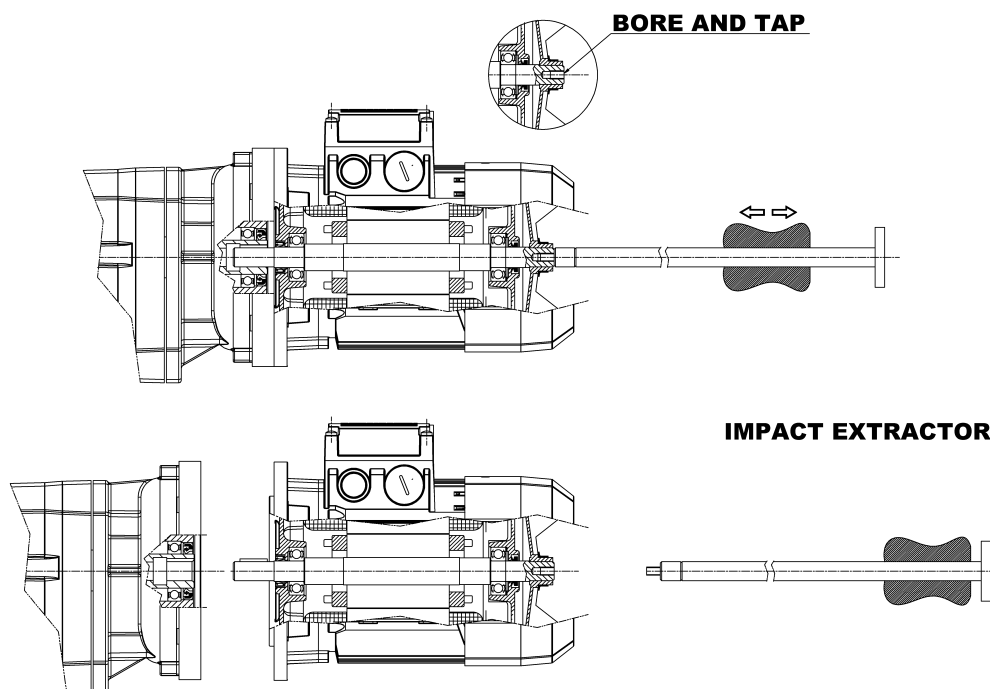
- Do not hesitate to replace parts and/or components if they are not able to guarantee safe and reliable operation.
- Never improvise repairs.
- The use of non-original spare parts not only voids the warranty but can compromise gear unit operation.

9.1 - TAKING APART OF THE IEC-STANDARD FLANGED MOTOR

If, during operation, the coupling area of the motor and gear unit has not rusted significantly, it should be possible to remove the motor without applying excessive force.

If, on the other hand, it proves difficult to remove the motor, do not use screwdrivers or levers to apply force as this can damage the flanges and coupling surfaces, but proceed as indicated below.

(S3)



1. Drill and thread the motor shaft (fan side).
2. Screw an impact extractor tool into the tap.
3. Undo the screws fixing the motor to the gear unit.
4. Remove the motor by means of the inertial force of the extractor.

9.2 - SCRAPPING THE GEAR UNIT

This must only be done by operators trained in the observance of applicable laws on health and safety at work.

Do not dump non-biodegradable products, lubricants and non-ferrous materials (rubber, PVC, resins, etc.) into the environment. Dispose of all such materials as stipulated by applicable environmental protection legislation.



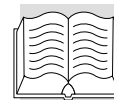
Do not attempt to re-use parts or components which appear to be in good condition after they have been checked and/or replaced by qualified personnel and declared unsuitable for use.



10.0 - TROUBLESHOOTING

The following information is intended to serve as an aid in identifying and correcting defects and faults. In some cases, such problems may be caused by the plant or machine onto which the gear unit is assembled, and hence, the cause and eventual solution can be found in the Manufacturer's technical documentation for the machine/plant in question.

PROBLEM	CAUSE	SOLUTION
Bearing temperature too high	Oil level too low	Top up oil level
	Oil too old	Replace oil
	Defective bearings	Contact authorised workshop
Operating temperature too high	Oil level too high	Check oil level
	Oil too old	Replace oil
	Impurities in oil	Replace oil
Abnormal running noise	Gears damaged	Contact authorised workshop
	Bearing axial backlash too high	Contact authorised workshop
	Bearings defective or worn	Contact authorised workshop
	Service load too high	Correct service load to nominal values given in Sales Catalogue
	Impurities in oil	Replace oil
Abnormal noise at gear unit mounting	Mounting bolts loose	Tighten down to specified torque
	Mounting bolts worn	Replace bolts
Oil leaks	Oil level too high	Check oil level
	Casing/coupling seals inadequate	Contact authorised workshop
	Gaskets worn	Contact authorised workshop
Gear unit does not run or runs with difficulty	Oil viscosity too high	Replace oil (see table of recommended lubricants)
	Oil level too high	Check oil level
	Service load too high	Redesign drive for actual service load
Output shaft does not turn with motor running	Gears damaged	Contact authorised workshop



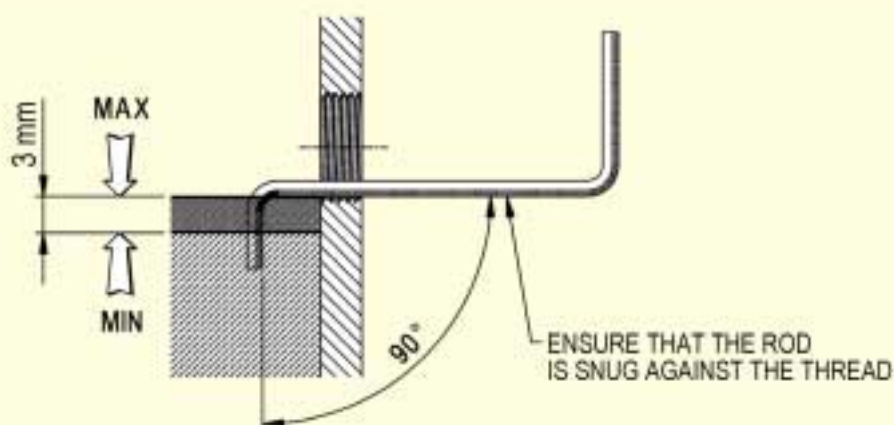
ANNEX 1 - CHECKING OIL LEVEL ON ATEX-SPECIFIED GEAR UNITS

Gear units are normally supplied with a yellow oil level plug of the spill type.

To check the oil level, first identify the yellow level plug.

Remove the plug and insert a bar of the right size for the hole and of the shape shown in the figure below.


If the level is more than 3 mm below the overflow level, top up and check the reason for the drop in oil level.



Helical in-line gear units C11, C21 and C31 (all mounting positions) and bevel helical gear units A10, A20 and A30 in mounting positions B6 and B7 only do not feature a level plug. The oil level must therefore be checked, not as described above, but via a hole provided for the purpose in the manner described hereafter.

Worm gear units, series VF:

(A14)

								
			B3	B6	B7	B8	V5	V6
VF 27	N - A - V - F	HS - P(IEC)	0.025	0.025	0.025	0.025	0.025	0.025
VF 30	N - A - V - F - P	HS - P(IEC)	0.045	0.045	0.045	0.045	0.045	0.045
VF 44	N - A - V - F - FA - P	HS - P(IEC)	0.075	0.075	0.075	0.075	0.075	0.075
VFR 44	N - A - V - F - FA - P	P(IEC)	0.050	0.050	0.050	0.050	0.050	0.050
VF 49	N - A - V - F - FA - P	HS - P(IEC)	0.12	0.12	0.12	0.12	0.12	0.12
VFR 49	N - A - V - F - FA - P	HS - P(IEC)	0.065	0.065	0.065	0.065	0.065	0.065
VF 130	N	HS - P(IEC)	2.3	2.5	2.5	3.0	3.2	3.4
VFR 130	N	HS - P(IEC)	0.70	0.50	0.50	0.40	0.40	0.50
VF 130	V	HS - P(IEC)	3.4	2.5	2.5	3.1	3.0	2.5
VFR 130	V	HS - P(IEC)	0.50	0.50	0.50	0.40	0.40	0.70
VF 130	A - F - FC - FR - P	HS	3.9	2.5	2.5	2.3	3.3	3.3
VF 130	A - F - FC - FR - P	P(IEC)	3.0	2.5	2.5	2.3	3.3	3.3
VFR 130	A - F - FC - FR - P	HS - P(IEC)	0.40	0.50	0.50	0.70	0.40	0.50
VF 150	N	HS - P(IEC)	3.0	3.5	3.5	4.3	3.8	4.0
VFR 150	N	HS - P(IEC)	1.0	0.80	0.80	0.60	0.40	1.0
VF 150	V	HS - P(IEC)	4.0	3.5	3.5	3.6	4.3	3.0
VFR 150	V	HS - P(IEC)	1.0	0.80	0.80	0.40	0.60	1.0
VF 150	A - F - FC - FR - P	HS	4.5	3.5	3.5	3.0	3.9	3.9
VF 150	A - F - FC - FR - P	P(IEC)	4.3	3.5	3.5	3.0	3.9	3.9
VFR 150	A - F - FC - FR - P	HS - P(IEC)	0.60	0.80	0.80	1.0	0.40	1.0
VF 185	N	HS - P(IEC)	5.0	5.5	5.5	7.8	6.6	6.8
VFR 185	N	HS - P(IEC)	1.0	0.80	0.80	0.60	0.40	1.0
VF 185	V	HS - P(IEC)	6.8	5.5	5.5	6.4	7.8	5.4
VFR 185	V	HS - P(IEC)	1.0	0.80	0.80	0.40	0.60	1.0
VF 185	A - F - FC - FR - P	HS	9.6	5.5	5.5	5.0	6.7	6.7
VF 185	A - F - FC - FR - P	P(IEC)	7.8	5.5	5.5	5.0	6.7	6.7
VFR 185	A - F - FC - FR - P	HS - P(IEC)	0.60	0.80	0.80	1.0	0.40	1.0
VF 210	N	HS - P(IEC)	7.5	9.5	9.5	7.3	9.2	9.0
VFR 210	N	HS - P(IEC)	1.3	1.1	1.1	0.80	0.70	1.3
VF 210	V	HS - P(IEC)	8.9	9.5	9.5	7.3	11	8.0
VFR 210	V	HS - P(IEC)	1.3	1.1	1.1	0.60	0.90	1.3
VF 210	A - F - FC - FR - P	HS	15	9.5	9.5	7.5	9.4	8.9
VF 210	A - F - FC - FR - P	P(IEC)	11	9.5	9.5	7.5	9.4	8.9
VFR 210	A - F - FC - FR - P	HS - P(IEC)	0.80	1.1	1.1	1.3	0.70	1.3
VF 250	N	HS - P(IEC)	11	17	17	11	17	17
VFR 250	N	HS - P(IEC)	1.3	1.1	1.1	0.80	0.70	1.3
VF 250	V	HS - P(IEC)	17	17	17	11	23	11
VFR 250	V	HS - P(IEC)	1.3	1.1	1.1	0.60	0.90	1.3
VF 250	A - F - FC - FR - P	HS	28	17	17	11	18	17
VF 250	A - F - FC - FR - P	P(IEC)	23	17	17	11	18	17
VFR 250	A - F - FC - FR - P	HS - P(IEC)	0.80	1.1	1.1	1.3	0.70	1.3

 VF permanent lubrication.

 VFR permanent lubrication.

For VFR units the lubricant charge refers only to the additional helical reduction.



ANNEX 4 - LIFTING



When lifting, use accessories such as eyebolts, snap hooks, screw clamps, straps, ropes, hooks etc. which are certified and adequate for the load.

The weight of the product to be lifted is given in the Sales Catalogue.

The method of attachment for the products covered by this Manual are detailed below according to the various product series, sizes and configurations.

The most suitable type of solution for safely lifting and handling each is indicated below.

Symbols:

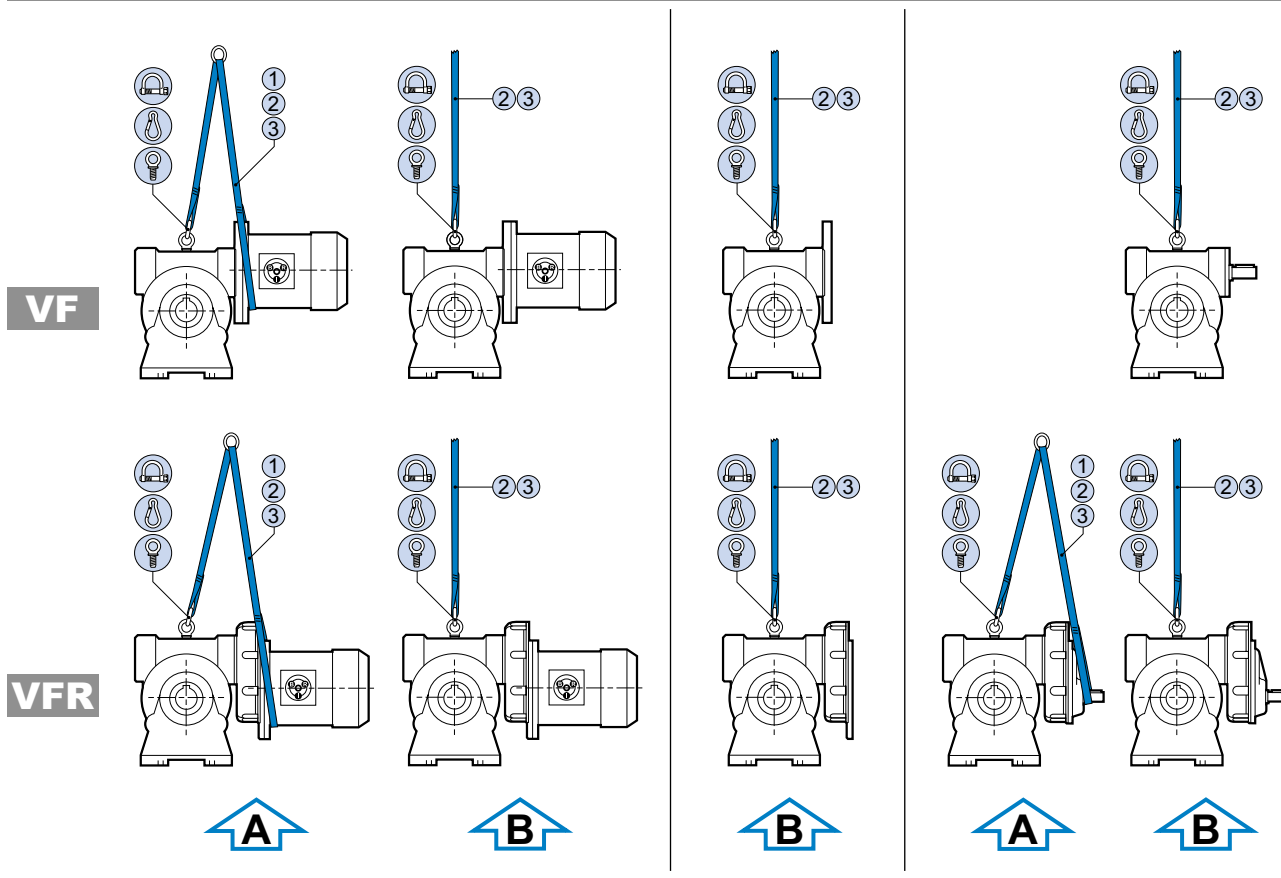
Lifting method	Manual	Through mechanical equipment	
Simbol	M	A	B
Approximate weight	≤ 15 Kg	> 15 Kg	
Instruction	—	Recommended method for positioning	Recommended method for handling and positioning
Warning	—	The load may be unstable	The load may sway or oscillate.
Solution	—	Slide the lifting ring to align it with the load's centre of gravity as shown in the diagrams below Lock the ropes under the ring with a cable clamp or similar device so as to prevent them sliding, and lift the load Observe all precautions regarding the handling of loads	Stabilise the moving load by hand. Observe all precautions regarding the handling of loads

The load must not be allowed to sway or oscillate by more than 15° in any direction when being lifted.

If the oscillation exceeds this limit, stop and repeat the lifting operation as instructed.



Series VF



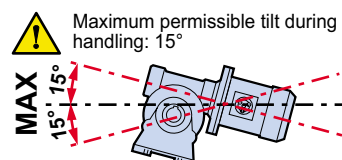
VF 30	M		
VF 44 VFR 44			
VF 49 VFR 49			
VF 130 VFR 130	A - B	A - B	A - B
VF 150 VFR 150			
VF 185 VFR 185			
VF 210 VFR 210			
VF 250 VFR 250			

Recommended:
solution A for positioning; solution B for positioning and handling.

- ① Ring harness
- ② Rope and hooks
- ③ Open harness with eyelets

- Screw clamp (use with harness)
- Snap hook (use with rope)
- Eyebolt (already fitted to gear units VF130...VF250)

- M** Lift manually (weight ≤ 15 kg)
- A** Lift as per diagram A
- B** Lift as per diagram B





Lista parti di ricambio - Spare parts list
Ersatzteilliste - Liste des pieces detachees

VF

VFR

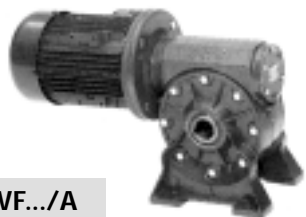
VF/VF



VF.../N



VF.../A



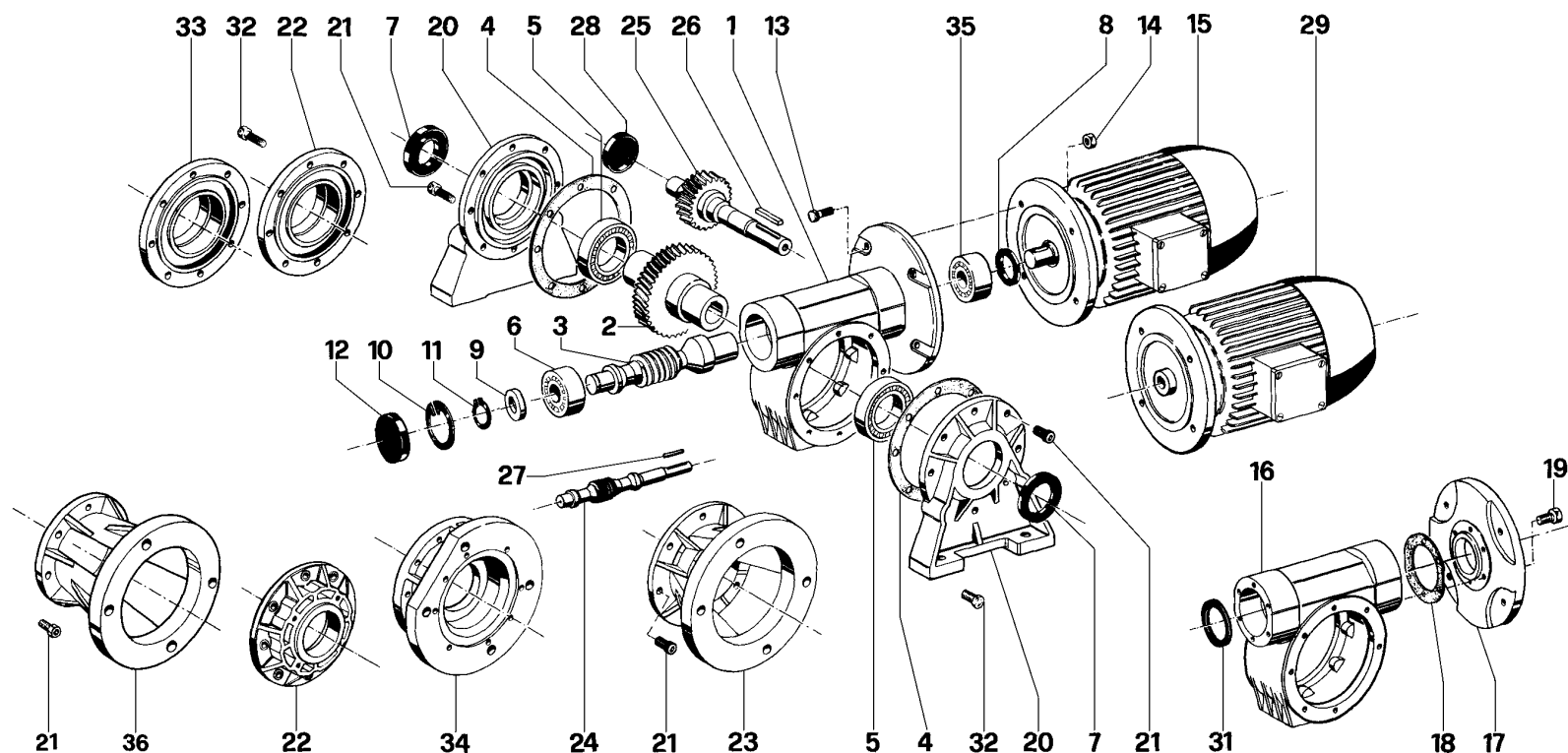
VF.../F-FA



VF.../FC



VF.../P



Cuscinetti Bearings Roulements Kugellager Rodamientos	VF...			
	27	30	44	49
5	6000 10x26x8	16005 25x47x8	6006 35x55x13	16008 40x68x9
6	608 8x22x7	6200 10x30x9	6301 12x37x12	BAK3903 17x47x14
35	608 8x22x7	61804 20x32x7	61805 25x37x7	61908 - 25x42x9 (PAM 63/71) 61806 - 30x42x7 (PAM 80)

Anelli di tenuta Oilseals Joint d'étanchéité Simmerringe Retén	VF...			
	27	30	44	49
7	10x19x7	25x40x7	30x40x7	40x55x7
8	8x16x7	20x32x7	35x37x7 (PAM 63)	30x42x7 (PAM 80) 25x42x7 (PAM 63/71)

	VF...	N.	Denominazione	Description	Dénomination	Benennung	Denominación
N - A - P F - FC	27-30-44-49	4	Guarnizione cassa	Gasket	Joint	Dichtung	Junta
		5	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento
		6	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento
		7	Anello di tenuta	Oilseal	Joint d'étanchéité	Simmering	Retén
		8	Anello di tenuta	Oilseal	Joint d'étanchéité	Simmering	Retén
		10	Seeger Ø i	Circlip Ø i	Seeger Ø i	Seeger Ø i	Seeger Ø i
		12	Cappello in gomma	Rubber cap	Capouchon en caoutchouc	Gummideckel	Sombrero de caucho
		13	Vite a testa esagonale	Hexagonal head screw	Vis de fixation	Schraube	Tornillo exagonal
		14	Dado alto	Nut	Ecrou	Mutter	Tuerca
		35	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento
	30-44-49	2	Corona elicoidale	Wormwheel	Couronne	Schneckenrad	Corona
		3	Vite senza fine	Wormshaft	Vis sans fin	Schnecke	Vis sin fin
		9	Ralla	Spacer ring	Entretoise	Lagerschale	Distanciador
		11	Seeger Ø e	Circlip Ø e	Seeger Ø e	Seeger Ø e	Seeger Ø e
		15	Motore elettrico	Electric motor	Moteur électrique	El. motor	Motor eléctrico
	27	24	Vite senza fine	Wormshaft	Vis sans fin	Schnecke	Vis sin fin
		28	Cappello in gomma	Rubber cap	Capouchon en caoutchouc	Gummideckel	Sombrero de caucho
		27	Linguetta	Key	Clavette	Einlegekeil	Chaveta
		25	Corona elicoidale	Wormwheel	Couronne	Schneckenrad	Corona
		26	Linguetta	Key	Clavette	Einlegekeil	Chaveta
		29	Motore elettrico	Electric motor	Moteur électrique	El. motor	Motor eléctrico
	30-44-49	1	Cassa integrale	Housing with integrated flange	Carter avec bride	Gehäuse mit flansch	Caja con brida integrada
	27 49 Gr. 63B14	16	Cassa	Housing	Carter	Getriebehäuse	Caja
		17	Flangia attacco motore	Motorflange	Bride moteur	Motorflansch	Brida para motor
		18	Guarnizione flangia	Gasket	Joint	Dichtung	Junta
		19	Vite a testa esagonale	Hexagonal head screw	Vis de fixation	Schraube	Tornillo exagonal
N - A	27-30-44-49	20	Coperchio con piedi	Foot cover	Couvercle avec pied	Fußdeckel	Tapa con pies
	30-44-49	21	Vite a testa cava esagonale	Socket head screw	Vis de fixation	Schraube	Tornillo exagonal
	27	32	Vite a testa esagonale	Hexagonal head screw	Vis de fixation	Schraube	Tornillo exagonal
F	27-30-44-49	23	Coperchio con flangia	Flange cover	Couvercle avec pied	Flanschdeckel	Tapa con brida
		21	Vite a testa cava esagonale	Socket head screw	Vis de fixation	Schraube	Tornillo exagonal
	30-44-49	22	Coperchio pendolare	P Cover	Couvercle P	P Deckel	Tapa P
	27	33	Coperchio di chiusura	Plain cover	Couvercle de fermeture	Verschlussdeckel	Tapón
		32	Vite a testa esagonale	Hexagonal head screw	Vis de fixation	Schraube	Tornillo exagonal
P	30-44-49	22	Coperchio pendolare	Side cover	Couvercle P	P Deckel	Tapa P
	30-44-49	21	Vite a testa cava esagonale	Socket head screw	Vis de fixation	Schraube	Tornillo exagonal
FA	44-69	36	Coperchio con flangia FA	FA cover	Couvercle avec bride FA	FA deckel	Tapa con brida FA

La lubrificazione dei riduttori a vite senza fine viene divisa in due distinti gruppi:

A) VF27 - VF30 - VF44 - VF49 - VF63 - VF72 - VF86.

B) VF110 - VF130 - VF150 - VF185 - VF210 - VF250.

Nel primo gruppo che comprende riduttori di bassa e media potenza viene adottata la lubrificazione permanente con olio sintetico e questo ne consente l'installazione in tutte le posizioni di montaggio (fatta eccezione per le posizioni di montaggio V5-V6 per le quali è necessario valutare le condizioni d'impiego con il nostro UFF. TECNICO). I suddetti riduttori sono sprovvisti dei tappi di carico, livelli e scarico e non hanno perciò necessità di alcuna manutenzione essendo già dosati nella giusta quantità di olio.

Nel secondo gruppo che comprende riduttori di media e alta potenza si è adottata la lubrificazione ad olio. I riduttori sono forniti dei tappi di carico, livello e scarico olio ed, a tal proposito, è importante specificare, in fase di ordine, la posizione di montaggio se diversa dalla B3. I suddetti riduttori sono forniti sprovvisti di lubrificante e sarà cura del cliente, prima della messa in opera, introdurre la giusta quantità di olio.

Different patterns have been followed depending on size of worm gearboxes.

Two main groups include:

A) VF27- VF30- VF44- VF49- VF 63- VF72 and VF86.

B) VF110 - VF 130 - VF 150 - VF 185 - VF210 and VF250.

Small and medium size gearboxes belonging to first group are maintenance free, being filled with synthetic oil which also allows installation in any mounting positions. However, in case of V5 and V6 mounting position kindly contact our Technical Service for careful assessment of working conditions. Above gearboxes have no filling, level and drain plugs being the proper quantity of oil filled from the factory and for life.

Medium and large size gearboxes belonging to second group require lubrication with oil. No lubricant is supplied from factory and they therefore must be filled before use with the proper quantity of oil. Quantity shown on catalogue is indicative only. For adequate filling refer always to level gauge centerline. Above gearboxes are provided with filling, level and drain plugs. To allow right positioning of plugs kindly specify actual mounting position when ordering, whenever different from B3.

La lubrification des réducteurs à vis sans fin est scindée en deux groupes:

A) VF27-VF30-VF49-VF63-VF72-VF86
B) VF110-VF130-VF150-VF185-VF210-VF250

Le premier groupe qui comprend des réducteurs de faible et moyenne puissance est prévu avec lubrification permanente c'est-à-dire graissage à vie, en permettant l'installation en toutes les positions de montage (sauf pour positions V5-V6 pour lesquelles on devra contacter notre Bureau Technique). Les réducteurs susmentionnés ne nécessitent aucun entretien et sont donc dépourvus de bouchons de remplissage, de vidange et de niveau, ayant reçu au montage la quantité de graisse nécessaire.

Le deuxième groupe qui comprend des réducteurs de moyenne et forte puissance est prévu avec lubrification à l'huile. Dans ce cas les réducteurs sont livrés sans huile et il appartiendra au client lors de la mise en service de les pourvoir de la quantité d'huile nécessaire. A cette fin ces réducteurs sont munis de bouchons de remplissage, de niveau et de vidange. Il est nécessaire à la commande spécifier la version si différente de B3.

Bezüglich der Schmierung sind die Getriebe in zwei Gruppen zu unterteilen:

A) VF27 - VF30 - VF44 - VF49 - VF 63 - VF72 - VF 86

B) VF 110 - VF 130 - VF 150 - VF 185 - VF210 - VF 250.

Die unter Pos. 1 aufgeführten getriebe sind auf Lebensdauer durch synt. Öl geschmiert. Die exakte Ölmenge wird bei der Montage eingefüllt. Die unter Pos. 2 aufgeführten Getriebe werden bei mittleren und schweren Einsatzbedingungen mit Öl geschmiert. Bei Verwendung von Ölschmierung müssen die Getriebe vor Inbetriebnahme gefüllt werden.

Zu diesem Zweck sind sie mit Einfüll- und Ablassschraube sowie Schauglas versehen. Sollte eine andere Einbaulage als B3 benötigt werden, ist dies bei der Bestellung unbedingt anzugeben, da sich nachfolgende Ölmengen nur auf B3 beziehen. Sie gelten auch für die entsprechenden Baureihen RVF (ausgenommen Eingangsstirnradstufe) und VF/VF.

Respecto de la lubricación, los reductores de tornillo sin fin son divididos en dos grupos:

A) VF27-VF30-VF44-VF49-VF 63-VF 72 - VF 86

B) VF 110-VF 130-VF 150-VF 185-VF210 - VF 250.

En el primer grupo, que comprende reductores de baja y media potencia, ha sido adoptado el sistema de lubricación permanente con aceite sintético y esto permite que puedan ser instalados en cualquier posición de montaje (con excepción de las posiciones de montaje V 5 - V 6, para las cuales es necesario evaluar las condiciones de empleo con nuestra OFICINA TECNICA). Los citados reductores están desprovistos de los tapones de carga, nivel y descarga y, por lo tanto, no necesitan mantenimiento dado que contienen ya la necesaria cantidad de aceite.

En el segundo grupo, que comprende reductores de media y alta potencia, ha sido adoptada la lubricación con aceite de recambio. Los reductores están provistos de tapas de carga, nivel y descarga aceite y, a este respecto, al momento de efectuar el pedido es importante especificar la posición de montaje en caso de ser diferente de B3. Estos reductores son suministrados desprovistos de lubricante por lo que el cliente deberá introducir la necesaria cantidad de aceite antes de la puesta en funcionamiento.

Versione / Version Version / Ausführung Version	Lubrificazione a olio sintetico (litri) / Synthetic oil lubrication (litres) / Lubrification à huile synthétique (litres) / Synthetische Öl (Liter) / Lubricacion con aceite sintético (litros)							Lubrificazione a olio (litri) / Oil lubrication (litres) / Lubrification à huile (litres) / Ölschmierung (liter) / Lubricación con aceite (litros)					
	VF 27	VF 30	VF 44	VF 49	VF 63	VF 72	VF 86	VF 110	VF 130	VF 150	VF 185	VF 210	VF 250
N								1,7	2,3	3	5	7,5	10,7
A - V	0,025	0,045	0,075	0,120	0,320	0,50	0,870	2,8 (PAM 2,4)	3,9 (PAM 3)	4,5 (PAM 4,3)	9,6 (PAM 7,8)	15 (PAM 11)	28,4 (PAM 22,6)
FR - FC F - P								2,4	3	4,3	7,8	11	22,6

Le quantità riportate nella tab. A sono quelle introdotte all'assemblaggio del riduttore e sono valide per tutte le posizioni di montaggio. Le quantità nella tab. B sono indicative e sono relative alla posizione di montaggio B3.

The quantities shown in table A refer to amounts filled when assembling the gearbox and are valid for all mounting positions. The quantities in table B are indicative and relevant to mounting position B3 only.

Les quantités réperées au tableau (A) sont celles introduites à l'assemblage du réducteur et sont valides pour toutes les positions de montage. Les quantités réperées au tableau (B) sont indicatives et se rapportent à la position de montage B3.

Die in Tabelle (A) angegebenen Mengen sind Montagefüllmengen. Sie sind für alle Einbaulagen gültig. Hingegen die in Tabelle (B) angegebenen Mengen sind für Einbaulage B3 gültig und stellen nur Richtwerte für die anderen Einbaulagen dar.

Las cantidades indicadas en la tabla A son aquellas relativas al aceite sintético introducido en el reductor al momento del montaje y son válidas para todas las posiciones de instalación. Las cantidades de la tabla B son aproximadas y corresponden a la posición de instalación B3.

Tipo di lubrificante <i>Type of lubricant</i> Type de lubifiant <i>Schmiermittel</i> Tipo de lubricante	Applicazione <i>Application</i> Application <i>Einsatzbereich Schmieröltyp</i> Aplicación	Tipo di olio / <i>Type of oil</i> / Type d'huile <i>Hersteller</i> / Tipo de aceite	Casa produttrice <i>Manufacturer</i> Fabricant <i>Hersteller</i> Casa productora
Olio sintetico <i>Synthetic oil</i> Huile synthétique <i>Synthetisches Schmieröl</i> Aceite sintético	Riduttori ad ingranaggi e riduttori a vite senza fine <i>Helical-gearboxes and worm gearboxes</i> Réducteurs à engrenages et réducteurs à vis sans fin <i>Zahnradgetriebe und Schneckengetriebe</i> Reductores de engranajes y reductores de tornillo sin fin	TELUM OIL VSF 320	AGIP
		TIVELA OIL S 320	SHELL
		SYNTHESO D220EP KLÜBERSYNTH GH 6 320	KLÜBER
		GLYGOYLE HE 320	MOBIL
		ALPHASYN PG 320	CASTROL
		CARTER SY 320	TOTAL
	Riduttori a vite senza fine con limitatore di coppia <i>Worm gearbox with torque limiter</i> Réducteurs à vis sans fin avec limiteur de couple <i>Schneckengetriebe mit Drehmomentbegrenzer</i> Reductores de tornillo sin fin con limitador de par	TIVELA OIL S 460	SHELL

QUANTITÀ DI LUBRIFICANTE CONTENUTE NELLE PRECOPPIE DEI RIDUTTORI SERIE RVF	LUBRICANT QUANTITY OF THE PRIMARY REDUCTION OF GEARBOXES SERIES RVF	QUANTITÉ DE LUBRIFIANT DU PRÉ-RÉDUCTEUR	FÜLLMENGEN DER RVF SERIE	CANTIDAD DE LUBRIFICANTE CONTENIDA EN LOS PRE- PARES DE LOS REDUCTORES DE LA SERIE RVF
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N.B. - Nei riduttori forniti con predisposizione per attacco motore è necessario introdurre lubrificante nella precoppia prima del funzionamento. Le quantità sono riportate nella tabella sotto indicata.

N.B. - In the gearboxes supplied with motor mounting flange is necessary to fill the primary reduction housing with lubricant before use. The table below indicates the right quantities of lubricant.

N.B. - Nous ne pouvons pas lubrifier le pré-réducteur de la version motorisable si nous ne livrons pas le moteur; il y a donc lieu de le munir d'une charge de lubrifiant lors de la mise en service. Voir quantité dans le tableau sous indiqué.

Bei Getrieben mit Motoreingangsflansch ist es notwendig, die erste Untersetzungsstufe vor Benutzung mit Schmiermittel zu versehen.

Nota: En el caso de los reductores con predisposición para el montaje al motor, se debe introducir el lubricante en el preparar antes de ponerlos en funcionamiento. En la tabla siguiente se indican las cantidades adecuadas.

A Lubrificazione a olio sintetico (litri) / <i>Synthetic oil lubrication (litres)</i> Lubrification a l'huile (litres) / <i>Ölschmierung (Liter)</i> / Lubricación con aceite sintético (litros)					B Lubrificazione a olio (litri) / <i>Oil lubrication (litres)</i> Lubrification a l'huile (litres) <i>Ölschmierung (Liter)</i> / Lubricación con aceite (litros)					
VFR 44	VFR 49	VFR 63	VFR 72	VFR 86	VFR 110	VFR 130	VFR 150	VFR 185	VFR 210	VFR 250
0,050	0,065	0,150	0,50	0,320	0,200	0,300	0,500	0,700	1,000	1,200
Le quantità di lubrificante indicate sono relative alle precoppie nella posizione di montaggio B3. N.B.: Specificare sempre la pos. di montaggio.		<i>The lubricant quantities indicated refer to the primary-reductions in mounting position B3. N.B.: Please always specify mounting position.</i>		Les quantités de lubrifiant indiquées concernent les pré-réducteurs en position de montage B3. N.B. - Indiquer toujours la position de montage.		<i>Sollte eine andere Einbaulage als B3 benötigt werden, ist dies bei der Bestellung unbedingt anzugeben. N.B.-Bei Bestellung bitte immer die Einbaulage angeben.</i>		Las cantidades de lubricante indicadas corresponden a los prepares en la posición de montaje B3. Nota: especificar siempre la posición de montaje.		
I lubrificanti sintetici possono essere impiegati per temperature ambiente da -20°C a +40°C.		<i>The synthetic lubricants can be used with ambient temperature from -20°C to +40°C.</i>		Les lubrificants synthétiques peuvent être utilisés pour des températures ambiantes dans une plage de -20°C a +40°C.		<i>Synthetische Schmiermittel können in Umgebungstemperaturen von -20°C bis +40°C eingesetzt werden.</i>		Los lubricantes sintéticos pueden ser empleados para temperaturas ambientales entre -20°C y +40°C.		

È molto importante, per l'installazione del riduttore:

- Assicurarsi che il fissaggio del riduttore sia stabile onde evitare qualsiasi vibrazione.
- Installare se si prevedono urti, sovraccarichi prolungati o possibili bloccaggi, giunti idraulici, frizioni, limitatori di coppia, ecc.
- Durante la verniciatura si consiglia di proteggere il bordo esterno degli anelli di tenuta per evitare che la vernice ne essicchi la gomma, pregiudicando la tenuta del paraolio stesso.
- Gli organi che vanno calettati sugli alberi del riduttore devono essere lavorati con tolleranza ISO H7 per evitare accoppiamenti troppo bloccati che, in fase di montaggio, potrebbero danneggiare irreparabilmente il riduttore stesso. Inoltre, per il montaggio e lo smontaggio di tali organi si consiglia l'uso di adeguati tiranti ed estrattori utilizzando il foro filettato posto in testa alle estremità degli alberi.
- Per gli stessi motivi di cui sopra gli organi che vanno calettati sugli alberi di uscita del variatore devono essere lavorati con tolleranze ISO F7.
- Le superfici di contatto dovranno essere pulite e trattate con adeguati protettivi prima del montaggio, onde evitare l'ossidazione e il conseguente bloccaggio delle parti.
- L'accoppiamento all'albero cavo del riduttore (tolleranza H7) viene normalmente eseguito con perni lavorati con tolleranza h6. Dove il tipo di applicazione lo richieda si può prevedere un accoppiamento con una leggera interferenza (H7-J6).
- Prima della messa in funzione della macchina accertarsi che la posizione del livello del lubrificante sia conforme alla posizione di montaggio del riduttore e che la viscosità del lubrificante sia adeguata al tipo del carico.

For the installation of the gearboxes the following guidelines should be followed:

- *The gearbox to be securely bolted to a rigid base to avoid vibrations.*
- *If shocks, extended overloads or jamming is expected, hydraulic couplings, torque limiters, clutches etc. should be fitted.*
- *In case the gearbox is to be painted use adhesive tape to prevent contact of paint with the oil seals.*
Painting of oil seals may lead to premature drying of rubber and result into oil leakage.
- *Any gears, sprockets or pilleys being fitted to the input or output shafts must have their bores machined to ISO H7 tolerance. The shafts are provided with threaded hole to facilitate the use of tierods with backplate and nut to push on the gear or sprockets being fitted.*
- *For the same reasons all units keyed onto the variator output shaft must be machined to ISO F7 tolerance.*
- *In order to avoid oxidation and the possible seizing of the above parts, clean mating surface before assembly and apply water repellent grease or similar material.*
- *Bore of hollow shaft of gearbox has tolerance H7, all shafts being fitted usually are machined to h6. If required for the application an interference fit (H7-J6) can be used.*
- *Before operating the machine check that the lubricant level is correct for the mounting position of the gearbox and the lubricant viscosity is correct for the kind of load.*

Il est important pour l'installation du réducteur de suivre les conseils suivants:

- S'assurer que la fixation du réducteur soit rigide afin d'éviter les vibrations.
- Installer suivant nécessité, par exemple en cas de chocs, de surcharges prolongées ou de blocage possible, un coupleur hydraulique, un embrayage ou un limiteur de couple, etc.
- Pendant les opérations de peinture il est conseillé de protéger les joint d'étanchéité pour éviter que la peinture ne les assèche et soit ainsi préjudiciable à leur bonne tenue.
- Les organes montés sur les arbres du réducteur doivent être alésés aux tolérances ISO H7 pour éviter des ammanchements trop serrants qui pourraient endommager le réducteur lors du montage. De même, il est conseillé pour le montage et le démontage des mêmes organes, d'utiliser un outillage adapté et de se servir du trou taradé existant en bout d'arbre.
- Pour les mêmes raisons ci-dessus les organes devant être calés sur les arbres de sortie du variateur doivent être travaillés avec une tolérance ISO F7.
- Les surfaces de contact doivent être nettoyées et protégées contre l'oxydation pour éviter le blocage des parties.
- La liaison avec l'arbre creux du réducteur tolérance H7 doit normalement s'effectuer avec des arbres usinés à la tolérance h6. Là où l'application l'exige, il est possible de réaliser un ajustement plus serré (H7-J6).
- Vérifier le niveau d'huile avant la mise en service (fonction de la position de montage). Le viscosité de l'huile doit être adaptée au type de service.

Bei der Installation des Getriebes müssen folgende Anweisuggen unbedingt beachtet werden:

- *Das Getriebe muß stabil befestigt werden, um Vibrationen zu vermeiden.*
- *Sollte vorauszusehen sein, daß am Antrieb Schläge, längere Überlastungen oder Blockierungen auftreten können, dann Drehmomentbegrenzer, usw. einbauen.*
- *Bei der Lackierung sollte der Außenrand der Dichtringe geschützt werden, um zu vermeiden, daß der Gummi durch den Lack austrocknet. Dies würde zu mangelnder Dichte führen.*
- *Die Einheiten, die mit der Abtriebswelle des Getriebes verbunden werden, müssen mit einer Toleranz ISO H7 bearbeitet werden, um zu starre Verbindungen zu vermeiden, die während der Montage zu irreparablen Schäden am Getriebe führen können. Ferner sollte der Ein- und Ausbau dieser Einheiten mit Hilfe geeigneter Zugbolzen und Auszieher an der Gewindebohrung am Ende der Wellen erfolgen.*
- *Auch die Einheiten, die mit der Abtriebswelle des Drehzahlwandlers verbunden werden, sollten aus obengenannten Gründen mit einer Toleranz ISO F7 bearbeitet werden.*
- *Die Kontaktflächen müssen vor der Montage sauber sein und mit angemessenen Schutzmitteln behandelt werden, damit eine Oxydation und in Folge eine Blockierung der Teile vermieden wird.*
- *Der Anschluß and die Abtriebs-hohlwelle des Getriebes (Toleranz H7) erfolgt normalerweise mit Stiften, die mit einer Toleranz h6 bearbeitet werden. Falls erforderlich kann die Verbindung mit einer leichten Tolleranz (H7-J6) erfolgen.*
- *Vor Inbetriebnahme der Maschine kontrollieren, ob das Schmiermittelniveau der Einbauposition des Getriebes entspricht und ob die Schmiermittelsviskosität sich für die vorgesehene Belastung eignet.*

Para la instalación del reductor es muy importante atenerse a las siguientes normas:

- Asegurar un correcto anclaje del reductor a fin de evitar cualquier vibración.
- Si se prevén golpes, sacudidas, sobrecargas prolongadas, o posibles blocajes, instalar acoplamiento hidráulicos, embragues, limitadores de par, etc.
- En el pintado debe protegerse el labio exterior del retén de aceite, para evitar que la pintura reseque el caucho, perjudicando su capacidad de cierre.
- Las piezas que vayan montadas sobre los ejes del reductor deben mecanizarse con una tolerancia ISO H7 a fin de evitar montajes demasiado fuertes que puedan dañar de forma importante el reductor. Además, para el montaje y desmontaje de tales piezas, se aconseja el uso de extractores adecuados utilizándose el agujero roscado situado en la punta de los ejes.
- Por los mismos motivos recién citados, los órganos que deben ser ensamblados en los ejes de salida del variador deben ser maquinados con tolerancia ISO F7.
- Las superficies de contacto deberán estar limpias y protegidas antes del montaje para evitar la oxidación y el consecuente deterioro de las piezas.
- El acoplamiento al eje hueco del reductor (tolerancia HT) debe efectuarse con ejes maquinados con tolerancia h6. Cuando el tipo de aplicación lo requiera, pueden prevalecer acoplamientos con una ligera interferencia (H7-J6).
- Antes de la puesta en marcha de la máquina comprobar que la posición del nivel de aceite sea adecuada a la posición de montaje del reductor y que la viscosidad del lubricante sea idónea para el tipo de carga a soportar.

RODAGGIO / RUNNING-IN PERIOD / RODAGE / EINLAUFEN / RODAJE

Generalmente è consigliabile guardare nel tempo l'aumento della potenza trasmessa, partendo da valori minimi, oppure porre ad essa un limite (50÷70% della potenza massima) per le prime ore di funzionamento.

Whenever putting a band new mit into operation a progressive increase of transmitted power is advisable. Alternatively, limiting of transmitted power to 50-70% of max rating for the first running hours is also suggested.

Généralement il est conseillé de graduer dans le temps l'augmentation de la puissance transmise en partant des valeurs mini, ou lui imposer un limite (50÷70% de la puissance maxi) pendant les premières heures de fonctionnement.

Während der Einlaufphase ist es besser, die Abtriebsleistung stufenweise bis zur max. Leistung anzuheben oder für die ersten Stunden auf 50-70% die Maximalleistung zu begrenzen.

Generalmente es aconsejable graduar el aumento de la potencia transmitida, partiendo de valores minimos y limitando la potencia transmitida (50÷70% de la potencia máxima) durante las primeras horas de funcionamiento.

MANUTENZIONE / MAINTENANCE / ENTRETIEN / WARTUNG / MANTENIMIENTO

I riduttori lubrificati con olio sintetico non necessitano di alcuna manutenzione. Quando il riduttore, resta per lungo tempo inattivo in ambiente con una elevata percentuale di umidità, consigliamo di riempirlo totalmente di olio; logicamente il livello del lubrificante dovrà essere ripristinato quando il gruppo sarà messo in funzione.

Gearboxes supplied with synthetic oil from factory do not require further maintenance. Should the gearbox be sitting standstill for a long time in a very humid environment we suggest to full it up with oil. The proper level must be restored when the gearbox is newly put back into operation.

Les réducteurs lubrifiés à l'huile synthétique ne nécessitent aucun entretien. Lorsque le réducteur, reste longtemps inutilisé dans un milieu très humide, nous conseillons de le remplir totalement d'huile: il est évident que le niveau de lubrifiant doit être rétabli lorsque le groupe sera mis en fonction.

Die mit synthetischem Schmieröl arbeitenden Getriebe erfordern keinerlei Wartung. Sollte das Getriebe über längere Zeit nicht laufen und in einer Umgebung mit hoher Feuchtigkeit stehen, dann empfehlen wir, es vollständig mit Öl zu füllen. Selbstverständlich muß wieder auf korrekten Ölstand vor erneuter Inbetriebnahme aufgefüllt werden.

Los reductores, lubricados con aceite sintético no requieren mantenimiento. Cuando el reductor deba permanecer por largo tiempo inactivo en ambiente excesivamente húmedo, aconsejamos llenarlo totalmente con aceite; obviamente, el nivel del lubricante deberá ser controlado y restablecido al momento de poner nuevamente en funcionamiento el grupo.

N.B. - Al fine di consentire una rapida evasione degli ordini di ricambi, vi preghiamo di indicare sempre tipo, versione e rapporto di trasmissione del riduttore a cui essi sono riferiti

N.B. - *We kindly ask you to specify always type, ratio and version of the gearbox the required spare parts refers to.*

N.B. - Afin d'être en mesure de livrer rapidement les pièces de réchange commandées, nous vous prions d'indiquer le type, la version et le rapport du réducteur auquel elles sont destinées.

N.B. - *Um kürzeste Lieferzeiten für Ersatzteilbestellungen zu gewährleisten, sind jeweils Type, Ausführung und Untersetzung des betreffenden Getriebes genau zu spezifizieren.*

N.B. - Con el fin de conseguir una mayor rapidez en la complementación de los pedidos de recambios, rogamos indicar siempre tipo, versión y relación de reducción del reductor al cual se refieren.

