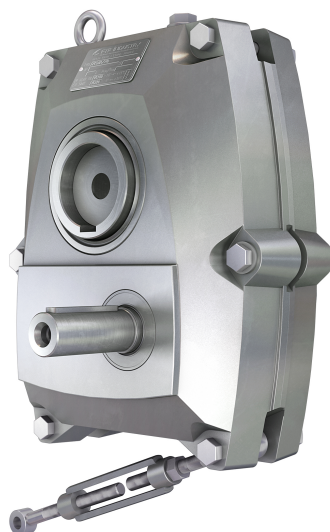



FLOTAX® FC



➔ UNIT SHIPPED WITHOUT OIL

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2. SCOPE

This manual contains the operating, lubrication and maintenance instructions relative to the FLOTAX® Gear Units.

3. SHIPPING

The FLOTAX® gearboxes are shipped without oil. Nevertheless, the grease lubricated bearings are provided with grease for life. The torque arm is delivered separately. The filling, draining or checking plugs are adapted for the A position (See chapter 5 - Installation page 2).

4. MAINTENANCE

Maintenance is limited to the control of the oil level and the normal replacement of the lubricant. Replace the first oil after 800 effective operating hours. This oil could be re-used after an adapted filtering (40 µm filter). Then, renew oil after 8000 hours of service, without this period exceeding 2 years.

★ CAUTION: These intervals of control do not apply if the reducer functions in explosive environment. See paragraph 11 « Use in hazardous areas ».

➔ Check the direction of rotation of the reducers with backstop

5. INSTALLATION

5.1. MOUNTING POSITION

➔ If mounting position is not specified at order, Gear Units are delivered to be used in mounting position A.

Check the mounting position of the reducer. For usual positions see Figure 1 and Figure 2. The plugs locations must in accordance with angular deviations indicated in the 1 & 2.

The reducers with backstop can only be used in positions **A** (with reduced angular deviation), **C & D**.

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For other mounting position ; refer to us.

Change the ventilation and drain plugs according to the selected position of assembly.

According to the great number of possible combinations of position, of speed and direction of rotation, it can be necessary to add standard piping or pipes in order to protect the ventilation plug against the oil projection.

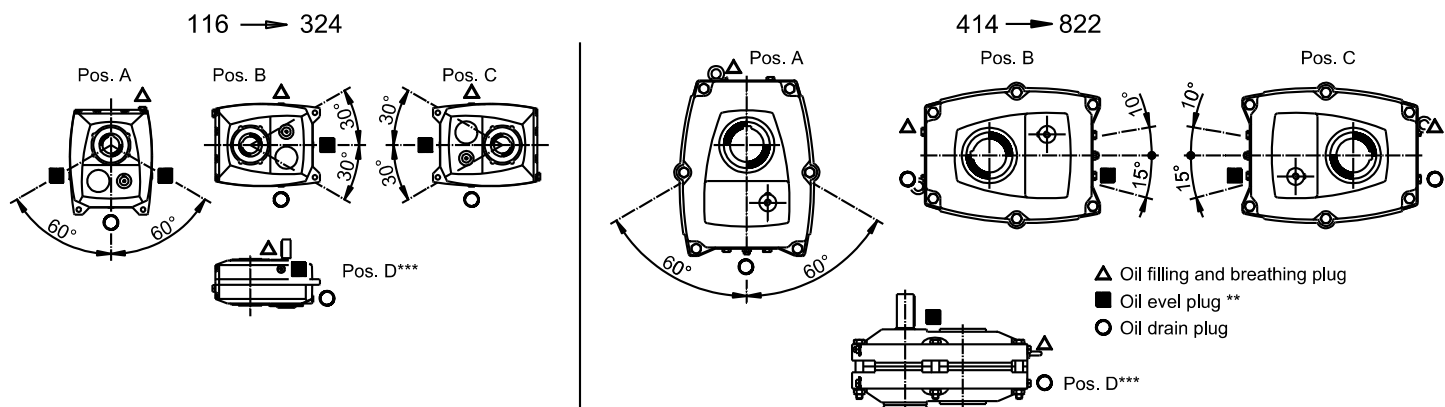


Figure 1: Mounting positions WITHOUT backstop

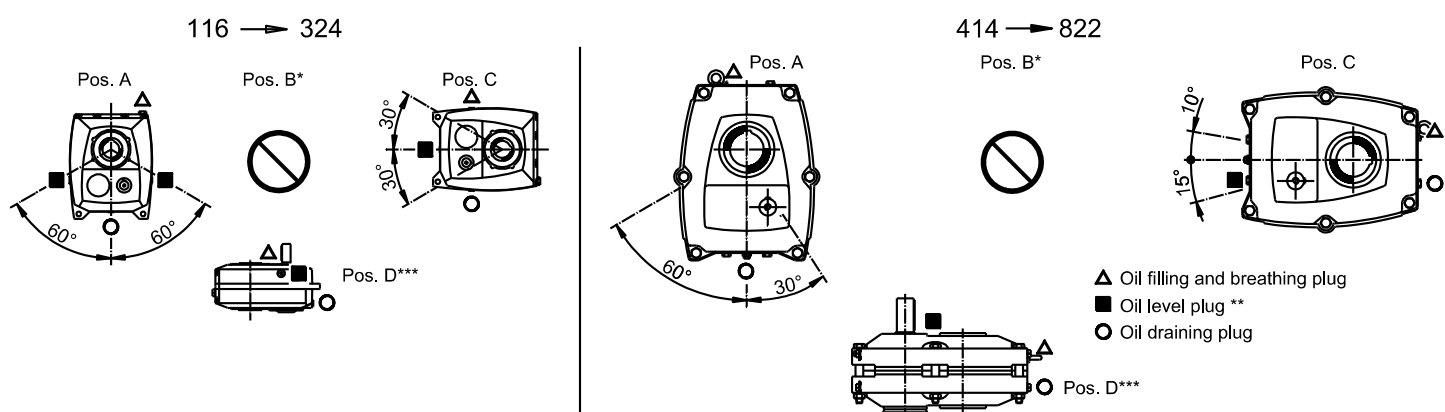


Figure 2: Mounting positions WITH backstop

* : Mounting position B impossible for units with backstop

** : Oil Level Plug for sizes and positions showing one. For other cases, refer to Oil Quantities shown on Tableau 2

*** : This position must be advised on order for adaptation of unit in Factory.


5.2. TORQUE ARM ASSEMBLY

The torque arm must always work in traction. In case of two directions of rotation, two torque arms must be used.

For sizes 414 to 822, it is necessary to dismount the assembling-bolt of the two half-housings to assemble the torque arm between these two half-housings. Reassemble the bolt with a tightening torque indicated in Tableau 1.

➔ Important :Never remove simultaneously more than 2 assembling bolts.

Assemble the torque arm in order that it forms practically a right angle with the axis passing through the low speed shaft and the assembly bolt connecting the housing with the torque arm (see Figure 3).

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Type	FC414 FC422	FC514 FC522	FC614 FC622	FC714 FC722	FC814 FC822
T (Nm)	80	195	195	385	385

Tableau 1: Tightening torques

The axis of the fixed point of the torque arm must be parallel with the axis of the reducer. The torque arm must be assembled without any stress.

The support of the fixed point of the torque arm should not generate any stress other than the torque of the reducer. The stiffness of the support of the fixed point must be enough to ensure the absence of stress during assembly and operation.

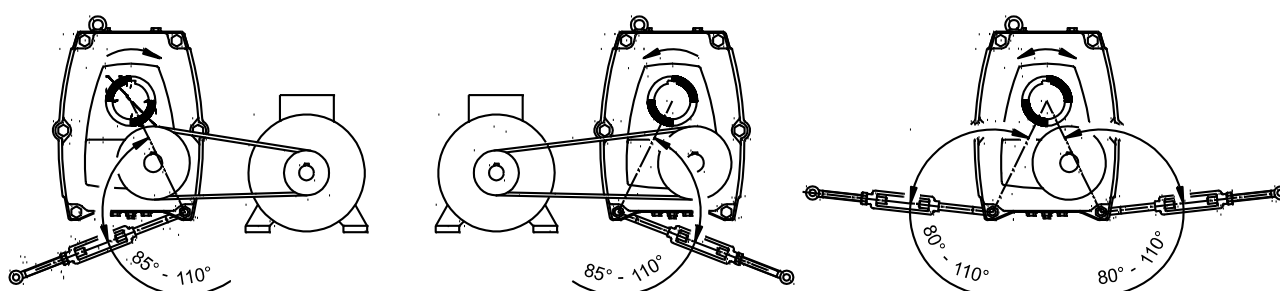


Figure 3: Assembly positions of torque arms

5.3. MOUNTING THE GEARBOX

The reducer must be fitted on the machine shaft with the minimum overhang. The recommended tolerance of the shaft is j6, which allows a loose fit with the hollow shaft provided with H7 tolerance.

5.3.1 Mounting

The unit is directly mounted on the driven shaft by means of a threaded stud (a), a nut (b) and if necessary a spacer (c) holding on a washer (d) supplied with the unit.

➔ **Before mounting the unit, coat the machine shaft (e) with a thin layer of oil or molybdenum disulphide grease.**

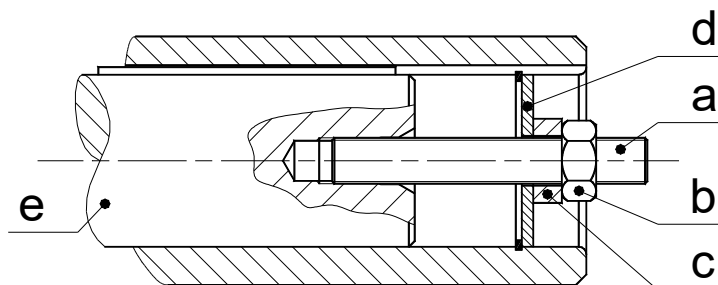


Figure 4: Mounting the gear unit

5.3.2 Securing

After mounting the unit on the shaft, the threaded stud (a) is replaced by a bolt (f) in order to block the gearbox on the machine shaft. When the driven shaft has no collar, an intermediate sleeve (k) is used, its length depending on the position of the gear unit on the shaft.

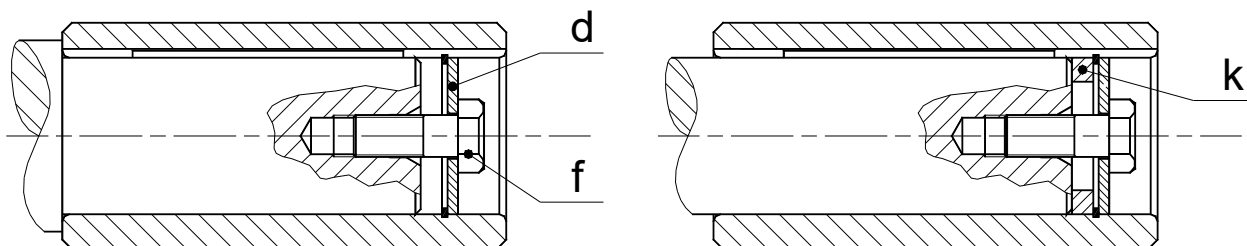


Figure 5: Securing of hollow shaft

5.3.3 Removal

Remove bolt (f), retaining plate (d) and circlip (g). Insert thrust plate (j) to protect the shaft threaded hole. Introduce removal tool (h) and replace circlip (g). Turn bolt till it pushes against machine shaft, further turning will gradually pull gearbox from shaft.

Note: Removal tool kit composed of disc, bolt and thrust plate is not part of the supply but can be ordered separately.

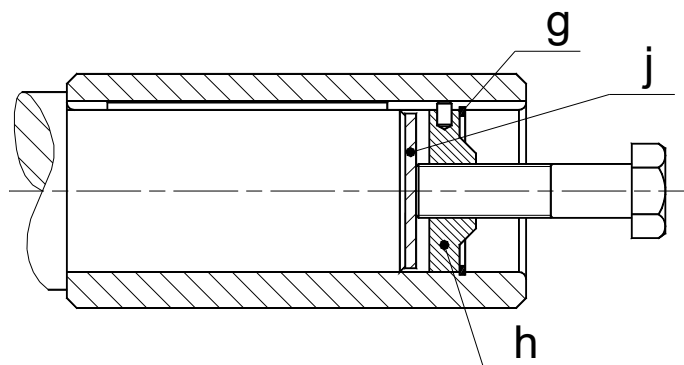


Figure 6: Removal of gear unit

5.3.4 Mounting of the V-Belt drive

Mount the pulley as close as possible of the retaining shoulder of high speed shaft. The V-belt can be assembled in any direction. However, if one wants to use the torque arm to regulate the tension of the belts, the motor must be located in opposite direction of the torque arm.

A protection guard or safety equipment in conformity with the industrial legislation in the country where is installed the gear unit must be supplied by the user or delivered on request.

This device must be designed to prevent the product accumulation on the drive unit and as well to allow an easy cleaning.

6. LUBRICATION

The oil level is indicated by an overflow plug. Its position depends on the mounting position of the reducer (see figures page 2).

116-216-316-324

414 —→ 822

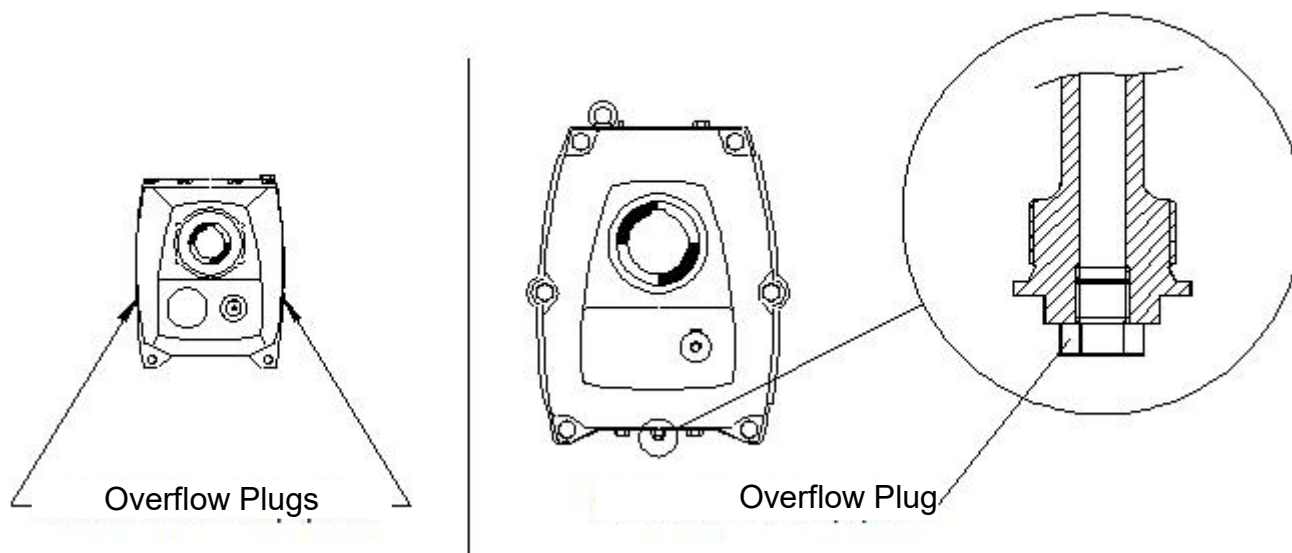


Figure 7: Overflow plugs identification

For sizes 414 to 822 in mounting position A, a special system of overflow is used in bottom of the reducer. It consists of a plug including a tube penetrating inside the reducer to determine the oil level. The overflow plug is screwed in this tube.

For the other mounting positions the overflow system consists in a standard plug screwed in the housing as shown on Figure 1: Mounting positions WITHOUT backstop and Figure 2: Mounting positions WITH backstop page 3.

- ★ ***If mounting position is not indicated at order, Gear Units are supplied to be mounted in Position A. for use in mounting position B or C, plugs must be moved as described in § 5.1 Mounting position page 2.***
- ★ ***If unit size 414 to 822 is not equipped with an overflow plug with tube as shown on Figure 7: Overflow plugs identification above oil levels must be adjusted as per Tableau 2: Oil quantities in liters page 7.***
- ★ ***For usage in position D, the gear units must be ordered mentioning their use in this position.***

6.1. OIL LEVEL

For sizes 116 to 324, oil level is defined by an overflow plug. Its location depends on the assembly position of the gear unit (see figures page 3). If gear unit is inclined, the upper overflow plug is to be used

116-216-316-324

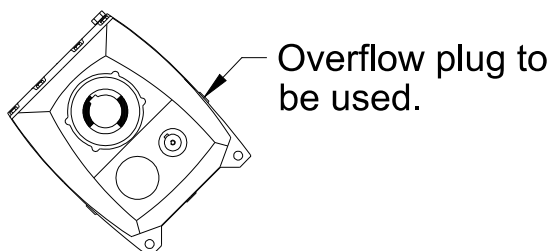


Figure 8: Overflow plugs FC 116 to 324

For sizes 414 to 822, fill the gear unit with quantities stated on Tableau 2 page 7

6.2. OIL QUANTITIES

Tableau 2 Gives required oil quantities in liters

POS.	FC116*	FC216*	FC316* FC324*	FC414 FC422	FC514 FC522	FC614 FC622	FC714 FC722	FC814 FC822
A	0.7*	1.3*	2.1*	1.8	2.8	3.5	5.0	7.5
B	0.9*	1.6*	2.7*	1.8	2.8	3.5	5.0	7.5
C	1.0*	1.7*	2.8*	2.6	4.2	5.0	8.0	10.5
D	1.3*	2.5*	4.2*	3.0	5.0	6.2	9.0	12

Tableau 2: Oil quantities in liters

*: For sizes 116 to 324, oil quantities are indicative only. Unit must be filled up to the overflow plug determining the actual oil level (See § 6.1 page 6)

6.3. OIL QUALITY

Mineral oils with extreme pressure additives must be used. The lubricant must also contain additives preventing the foam formation; it must include an anti-corrosion agent and resist oxidation under high temperatures.

The oil viscosity given on the nameplate is referred to ambient temperatures between 0° and 30°C. For other operating conditions, refer to Tableau 3

Ambient Temp.	mm ² / s / 40° C	AGMA	E / 50° C	SSU / 100° F
-10 °C + 15° C	ISO VG 150	4 EP	11,9	690
+0 °C +40° C	ISO VG 320	6 EP	24,3	1600

Tableau 3: Oil viscosity

6.4. FILLING AND DRAINING

Fill the gearbox in operating position. Remove the overflow plug as well as the filling plug and breather. Fill the gearbox up to the level of the overflow pipe.

Drain while the reducer is still hot. The operation is facilitated by removing the filling plug.

7. BACKSTOPS

For the reducers equipped with a backstop, check if the direction of rotation of the motor is in accordance to the direction of free rotation of the backstop before starting.

7.1. BACKSTOP ASSEMBLY (FOR UNIT TYPE FC116)

- Backstop is integrated to bearing that is opposite to the high speed shaft. Direction of rotation is not modifiable and must be specified at order.

7.2. BACKSTOP ASSEMBLY (FOR UNITS TYPE FC216 TO FC324)

These instructions refer to Figure 9 page 8

- Drain oil from the gear unit before starting assembly of the backstop.
- Remove cover opposite to high speed shaft 1405 and its screws 2425.
- Clean mating surfaces on gear unit housing.
- Check orientation of the backstop rollers is adequate for the required direction of rotation. If it need to be inverted, remove snap ring 5425 and turn backstop element 7400.
- Mount cover 1425 with paper gasket 8825.
- Fit screws 2425.
- Fill the unit with oil (See § 6 - Lubrication page 5).

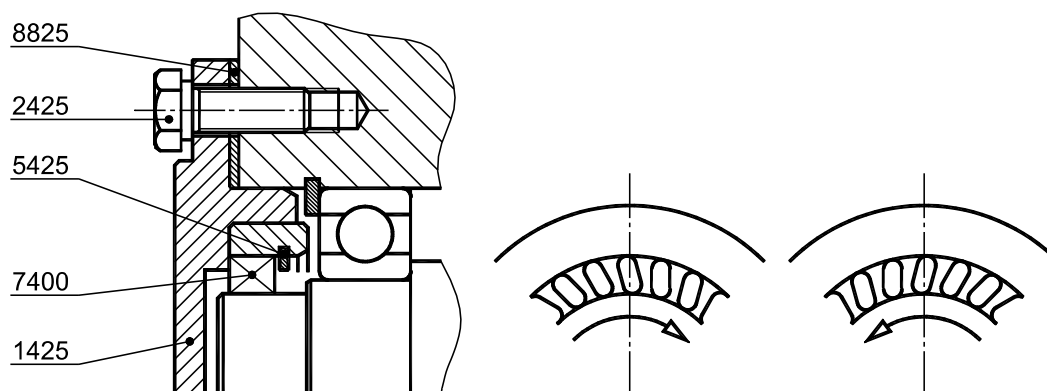


Figure 9: Backstop assembly FC 216 to 324

7.3. BACKSTOP ASSEMBLY (FOR UNITS TYPE FC622, FC714 AND FC822)

These instructions refer to Figure 10 page 9

- Drain oil from the gear unit before starting assembly of the backstop.
- Remove cover opposite to high speed shaft 1405 and its screws 2425.
- Clean mating surfaces on gear unit housing.
- Fit thrust washer 6925.
- Mount key 4144 and then inner bushing 7403 heated at 100°C (212°F). Check that inner bushing is right against the inner ring of bearing. Let inner bush cool down.
- Fit O'Ring 8825 in its groove on cover 1425.
- Fit in place backstop element 7400 taking care that rollers will allow rotation in the required direction
- Mount cover 1425 with screws 1425 supplied with backstop.

- Fill the unit with oil (See § 6 - Lubrication page 5).

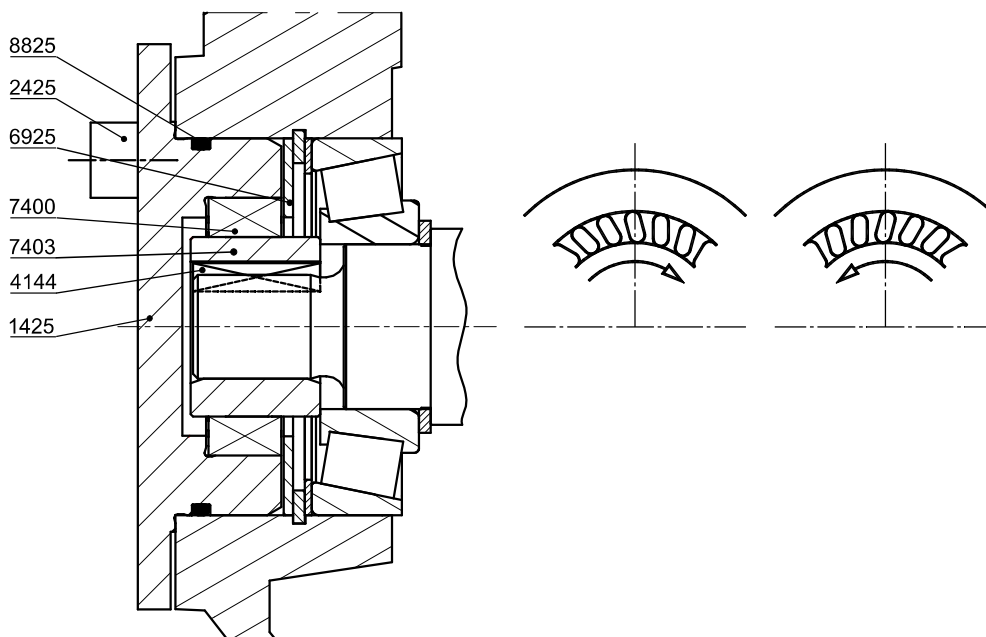


Figure 10: Backstop assembly FC 622, 714 and 822

7.4. BACKSTOP ASSEMBLY (FOR OTHER TYPES OF GEAR UNITS)

These instructions refer to Figure 11 page 10

- Drain oil from the gear unit before starting assembly of the backstop.
- Remove cover opposite to high speed shaft 1405 and its screws 2425.
- Clean mating surfaces on gear unit housing.
- Fit thrust washer 6925.
- Fit O'Ring 8825 in its groove on cover 1425.
- Fit in place backstop element 7400 taking care that rollers will allow rotation in the required direction
- Mount cover 1425 with screws 1425 supplied with backstop.
- Fill the unit with oil (See § 6 - Lubrication page 5).

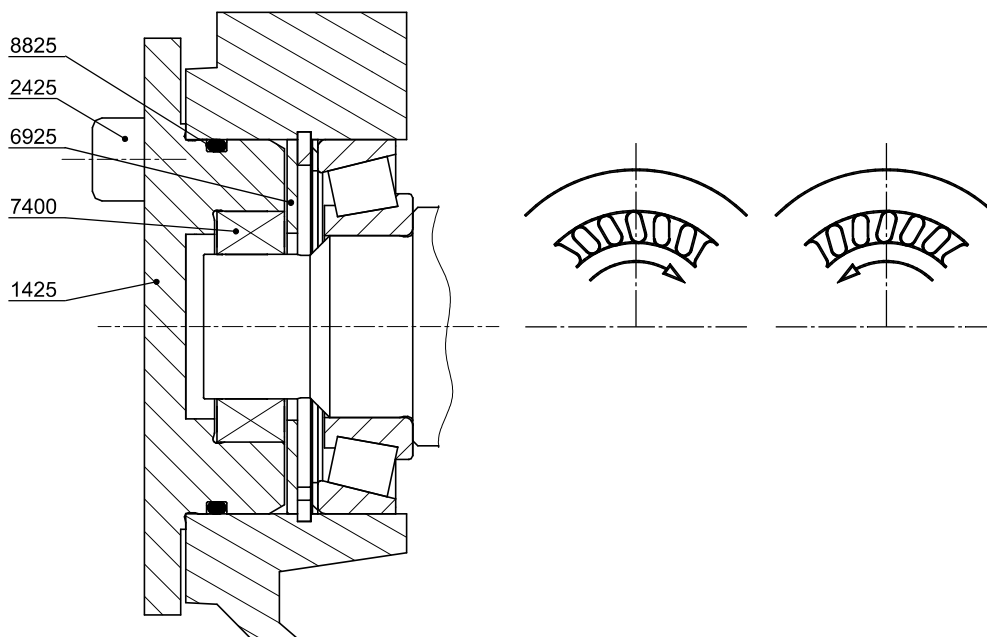


Figure 11: Backstop assembly FC 414 / 422 / 514 / 522 / 614 / 722 / 814

8. MOTOR BASE MOUNTING

8.1. GEAR UNITS TYPE FC116, FC216, FC316 AND FC324

Dismount the upper cover of the housing (Figure 12), and replace it by the support cover (pos. 1). Remove the filling plug and install a standard piping to make the filling plug accessible (pos. 2).

Mount the reducer on the machine shaft and fix the torque arm as indicated in paragraph 5.2.

Screw the 4 threaded rods (pos. 4) in nuts welded onto the base plate (pos. 5) and fix it using locking-nuts (pos. 6).

Screw 4 nuts (pos. 7) on each rod. Put the base plate on the support cover (pos. 1) and fix it with nuts (pos. 8) in its lowest position.

Mount the pulleys on the motor and reducer shafts as close as possible to the collars.

Mount the motor on the base plate and check the alignment of the pulleys.

Adjust the position of one of the pulleys if necessary.

Assemble the V-belts and adjust the distance between axis of motor and reducer shafts by using the nuts on four rods.

To raise the motor, loosen the nuts (pos. 8) and tighten the nuts (pos. 7) alternately in order to get the right belt tension.

Tighten the nuts (pos.8)

Ensure the tightening of each bolts and nuts.

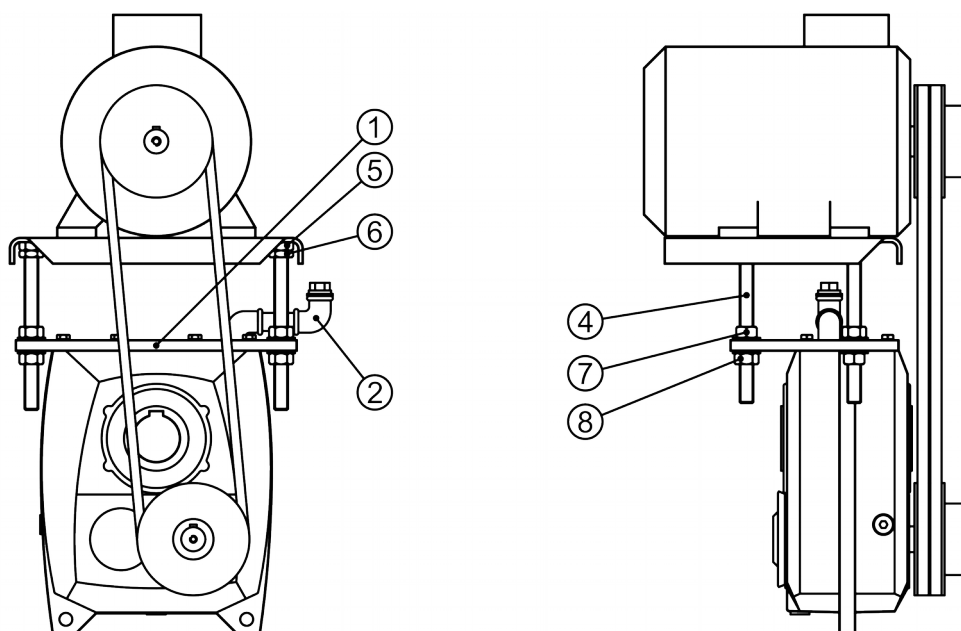


Figure 12: Motor base assembly on units type FC116 to 324

8.2. GEAR UNITS TYPE FC414 TO FC822

➔ Important : Never remove more than 2 assembling-bolts of the housing at the same time. Reassemble the bolts with the necessary tightening torque (Tableau 1 page 4).

Determine the mounting position of the motor base (Figure 14). Dismount two assembling-bolts of the housing and assemble the front and back supports using longer bolts (pos. 3) which are delivered with the motor. For sizes 300, 500 and 800, original bolts are used.

Remove the filling plug and install a standard piping to make filling plug and breather accessible (Figure 15).

Mount the reducer on the machine shaft and fix the torque arm as indicated in paragraph 5.2.

Screw the 4 adjustment rods (pos. 4) in nuts welded onto the base plate (pos. 5) and fix it using counter-nuts (pos. 6)

Screw 4 nuts (pos. 7) on rods. Put the base plate on front and back supports and fix it with nuts (pos. 8) in its lowest position.

Mount the pulleys on the motor and reducer shafts as close as possible to the collars.

Mount the motor on the base plate and check the alignment of the pulleys.

Adjust the position of one of the pulleys if necessary.

Assemble the V-belts and adjust the distance between axis of motor and reducer shafts by using the nuts on four rods.

To raise the motor, loosen the nuts (pos. 8) and tighten the nuts (pos. 7) alternately in order to get the right belt tension.

Tighten the nuts (pos. 8)

Ensure the tightening of each bolts and nuts.

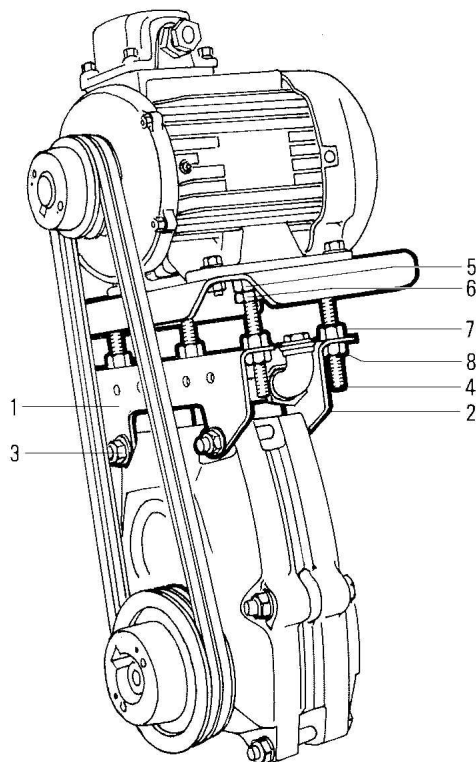


Figure 13: Motor base assembly FC 414 to 822

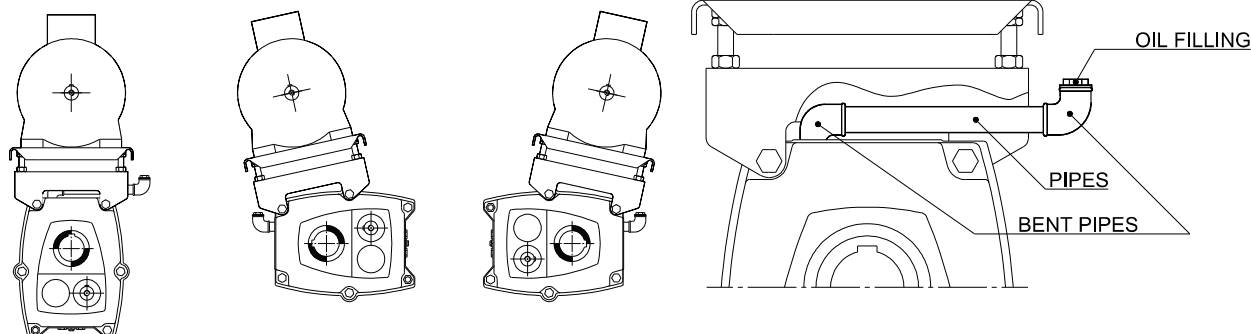


Figure 14: Assembly position of motor base

Figure 15: Fitting of relocated breathing plug

9. GROUNDING

The gearbox or shaft on which it is mounted must be ground connected.

10. GEAR UNIT CLEANING

Do not use pressure cleaner on direct jet on the sealing rings.
Do not use aggressive solvent able to corrupt paint or oil seals.

11. USE IN HAZARDOUS AREAS

Indications & instructions about the use in hazardous areas.

➔ **IMPORTANT** : a unit that is not marked according to paragraph 11.4 must not be used in hazardous areas.

11.1. MONITORING DEVICES CONNECTIONS

The PT100 sensor provided with the gear unit is a 3-wire type :

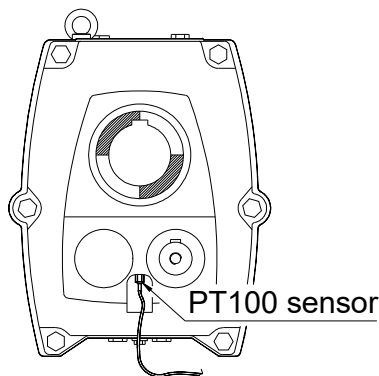


Figure 16: Location of the PT100 sensor

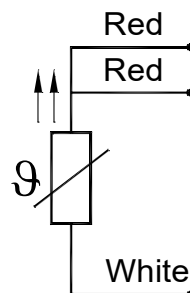


Figure 17: Wiring of the PT100 sensor

- ★ *The monitoring devices must be connected and the information given by these devices must be treated in order to ensure the surfaces temperatures indicated on the nameplate.*
- ★ *The monitoring and control devices provided by the user have to ensure an immediate stop of the installation in case of the surfaces temperatures indicated on the nameplate will be reached. That is saying:*
 - ★ *120°C / 248°F for operation in dust ambience.*
 - ★ *135°C / 275°F for operation in gas ambience..*

- ★ *The surfaces temperatures indicated on the nameplate are stopping values.*
- ★ *The monitoring and control device have to manage the gearbox temperature and point out any increase compare to the usual operation temperature.*
- ★ *Any unusual temperature increase must launch an inspection of the gearbox even if the temperature stays below the limit.*

11.2.CONTROL PERIODICITY FOR USE IN HAZARDOUS AREAS

Explosion group	Control periodicity
II 2D 120°C II 2G T4	<p>The first oil level check must be done after 100 hours of operation or one month at the latest.</p> <p>If there is no oil leakages or level drop the first oil change will be done after 700 hours of operation.</p> <p>The following check must be done every 2000 hours of operation or three months at the latest.</p> <p>The following oil change will be made every 4000 hours of operation or one year maximum.</p> <p>If some oil leakages or level drop have been noticed an oil change and a research of the cause will be done as described in the chapter « Malfunction and remedies ».</p> <p>In dust ambience the non-accumulation of dust or product on the gearbox must be inspected at every oil check. The cleaning must be done and the gear unit protection must be provided.</p> <p>The control periodicity must be started again in case of any modification of operating conditions.</p>

- ★ **CAUTION: To ensure a long and safe operating life in hazardous ambience the gearbox mounting on the machine shaft and the torque arm must be carefully checked.**
- ★ **If the values given at chapter 5.2 are not respected the gearbox must be consider as damaged and replaced.**

11.3.USED MATERIALS

Material for housings: EN-GJL-250 (formerly FGL250).

Material for shafts: Steel

11.4.MARKING OF UNITS FOR HAZARDOUS AREAS

Gear units for use in hazardous areas are marked:

 II 2 D 120°C  II 2 G T4

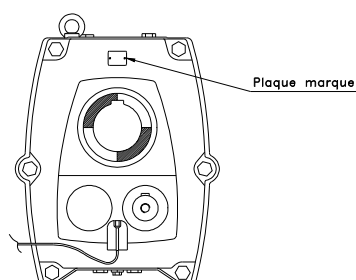


Figure 18: Location of ATEX marking

11.5.STARTING-UP

Before starting-up the tightening of the setscrew (in case of use) and/or the axial blocking screw on machine shaft must be checked.


The angular position and the free-stress mounting of the torque arm must be checked.

Check the tightening of the torque arm bolts.


➔ In hazardous ambience the bolts and screws must be protected from any possible loosening off, for instance, by the application of a “threadlock” product to the threads.

11.6.MALFUNCTION AND REMEDIES

Malfunction	Cause	Risk information in hazardous areas	Solution
Noise and vibration when in operation	Torque arm misalignment	Danger of ignition by sparks	<ol style="list-style-type: none"> 1) Stop the machine. 2) Eliminate the cause of misalignment (loosing of fastening screw, attachment break, thermal expansion, non-respect of parts dimensions, support deflection on load). 3) Check the wear of the parts and replace it if necessary. 4) Verify the torque arm alignment at rest and in operation and correct it if necessary.
Noise and vibration when in operation	Loosening of torque arm bolt	Danger of ignition by sparks	<ol style="list-style-type: none"> 1) Stop the machine. 2) Check the wear of the parts and replace it if necessary. 3) Refit the torque arm. 4) Secure the torque arm bolts by using washer or glue. 5) Verify the torque arm alignment at rest and in operation and correct it if necessary.
Noise and vibration when in operation	Loosening of axial locking screw on machine shaft	Danger of ignition by sparks	<ol style="list-style-type: none"> 1) Stop the machine. 2) Check the wear of the parts and replace it if necessary. 3) Refit the gearbox on machine shaft. 4) Secure the blocking screw by using washer or glue. 5) Verify the torque arm alignment at rest and in operation and correct it if necessary
Quick wear of gearing teeth	Machine Vibration	Danger of ignition by reducer overheating	<ol style="list-style-type: none"> 1) Stop the machine. 2) Search the cause of machine vibration and solve it. 3) Replace the gearbox. 4) Secure the torque arm bolts by using washer or glue. 5) Verify the torque arm alignment at rest and in operation and correct it if necessary

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Malfunction	Cause	Risk information in hazardous areas	Solution
Oil leakage	Loosened plugs	Danger of ignition due to reducer overheating	<ol style="list-style-type: none"> 1) Stop the machine. 2) Check the wear of the parts and replace it if necessary. 3) Make the oil filling(see § 6 page 5). 4) Verify the tightening of the plugs before starting up
Oil leakage	Leakage at mating surfaces level due to impact or over torque	Danger of ignition due to reducer overheating	<ol style="list-style-type: none"> 1) Stop the machine. 2) Identify and eliminate the reason of the overload. 3) Repair or replace the gearbox. 4) Verify the torque arm alignment at rest and in operation and correct it if necessary.
Oil leakage	Oil seal leaking	Danger of ignition due to reducer overheating	<ol style="list-style-type: none"> 1) Stop the machine. 2) Remove and replace the oil seals. 3) Identify and eliminate the cause of oil seal degradation. 4) Verify the torque arm alignment at rest and in operation and correct it if necessary.
Reducer breakage	The operating conditions are not in accordance with the gearbox capacities.	Danger of ignition due to reducer overheating	<ol style="list-style-type: none"> 1) Stop the machine. 2) Verify the operating conditions and select a bigger gearbox. 3) Install the new gearbox. 4) Verify the torque arm alignment at rest and in operation and correct it if necessary.
Reducer breakage	Mistake during start-up	Danger of ignition due to reducer overheating	<ol style="list-style-type: none"> 1) Stop the machine. 2) Change the gearbox. 3) Verify the torque arm alignment at rest and in operation and correct it if necessary. 4) Train the operating and maintenance personnel.
Oil corruption	Ambient temperature outside the limits (see § 6.3 page 7)	Danger of ignition due to reducer overheating	<ol style="list-style-type: none"> 1) Stop the machine. 2) Check the wear of the parts and replace it if necessary. 3) Make the oil filling (see § 6 page 5).in accordance with the viscosity depending of the ambient temperature.
Product accumulation on gear unit	Gear unit not protected from product accumulation.	Danger of ignition by product heating on contact with the gear unit.	<ol style="list-style-type: none"> 1) Stop the machine. 2) Clean the gearbox and accessories. 3) Protect the gear unit from the product accumulation.

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Malfunction	Cause	Risk information in hazardous areas	Solution
Quick deterioration of shafts or oil seals	Contact with aggressive products such as hydrocarbon, ozone, acids...	Danger of ignition by reducer overheating and oil leakages.	1) Stop the machine. 2) Repair or replace the gearbox. 3) Protect the gear unit from the aggressive product.

★ ATTENTION !: PTP INDUSTRY cannot assume any liability or provide guarantee coverage in the event of non-original PTP INDUSTRY parts being used.

12. LUBRICANTS

Tableau 4: Mineral oils and greases recommended by suppliers

mm ² /S 40°C	ISO VG150	ISO VG220	ISO VG320	Bearing grease	Storage oil
AGMA	4 EP	5 EP	6 EP	Graisse pour roulements	Huile antirouille
cSt/50°C	90	126	184	älzlagerfett	Rost-beständiges Öl
E/50°C	11.9	16.6	24,3	Lagervet	Roestwerende Olie
SUS/100°F	690	1100	1600		
AMOCO			Permager EP 320		
ARAL	Degol BG 150	Degol BG 220 Degol BMB 220	Degol BG 320 Degol BMB 320	Aralub HLP 2	Konit 20W-20
BECHEM		Berugear GS 220 BM	Berugear GS 320 BM	Bechem-Rhus L474-3	Bechem Einfettöl KSP
BP	Energol GR XF 150	Energol GR XF 220	Energol GR XF 320	Energrease LS EP 2	Motorenschutzöl MEK 20W 20
CASTROL	Alpha SP 150 Alphamax Premium Gear Oil 150	Alpha SP 220 Alphamax Premium Gear Oil 220	Alpha SP 320 Alphamax Premium Gear Oil 320	Spheerol EPL 2	Alpha SP 220S
CHEVRON			Gear compounds EP 320	Dura lith grease EP 3	Turbine oil GST 68
ESSO EXXON	Spartan EP 150	Spartan EP 220	Spartan EP 320	Beacon EP 2	Rust Ban 623 & 343
FUCHS-DEA	Renolin CLP 150 Plus	Falcon CLP 220 ou Renolin CLP 220 Plus	Renolin CLP 320 Plus	Renolit FEP2	
KLÜBER		Klüberoil GEM 1 220	Klüberoil GEM 1 320	Centoplex 2EP	Contrakor A40

Ref. : 89302e111		FLOTAX® FC Installation & Maintenance Manual	 PTP INDUSTRY <small>All Power Transmission Products know-how</small>
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mm2/S 40°C	ISO VG150	ISO VG220	ISO VG320	Bearing grease	Storage oil
AGMA	4 EP	5 EP	6 EP	Graisse pour roulements	Huile antirouille
cSt/50°C	90	126	184	älzlagerfett	Rost-beständiges Öl
E/50°C	11.9	16.6	24,3	Lagervet	Roestwerende Olie
MOBIL	Mobilgear XMP 150	Mobilgear XMP 220	Mobilgear 632 ou XMP 320	Mobilux EP 3	Mobilarma 524
OPTIMOL	Optigear BM 150	Optigear BM 220	Optigear BM 320	Olista Longtime 3EP	Korrosionsschuttschmieröl 5028 LN 697
SHELL	Omala F 150	Omala F 220	Omala F 320	Alvania EP 2	Ensis engine oil 30
SRS	Wintershall Ersolan G 150	Wintershall Ersolan G 220	Wintershall Ersolan G 320	Wiolub LFP 2	Antikorrol 30
TEXACO	Auriga EP 150 Meropa WM 150	Auriga EP 220 Meropa WM 220	Auriga EP 320 Meropa WM 320	Multifak EP 2	Auriga EP 100 Meropa WM 100
TRIBOL			1100/320	Tribol 3020/1000-2	

★ Lubricant suppliers are responsible for selection and composition of their products.