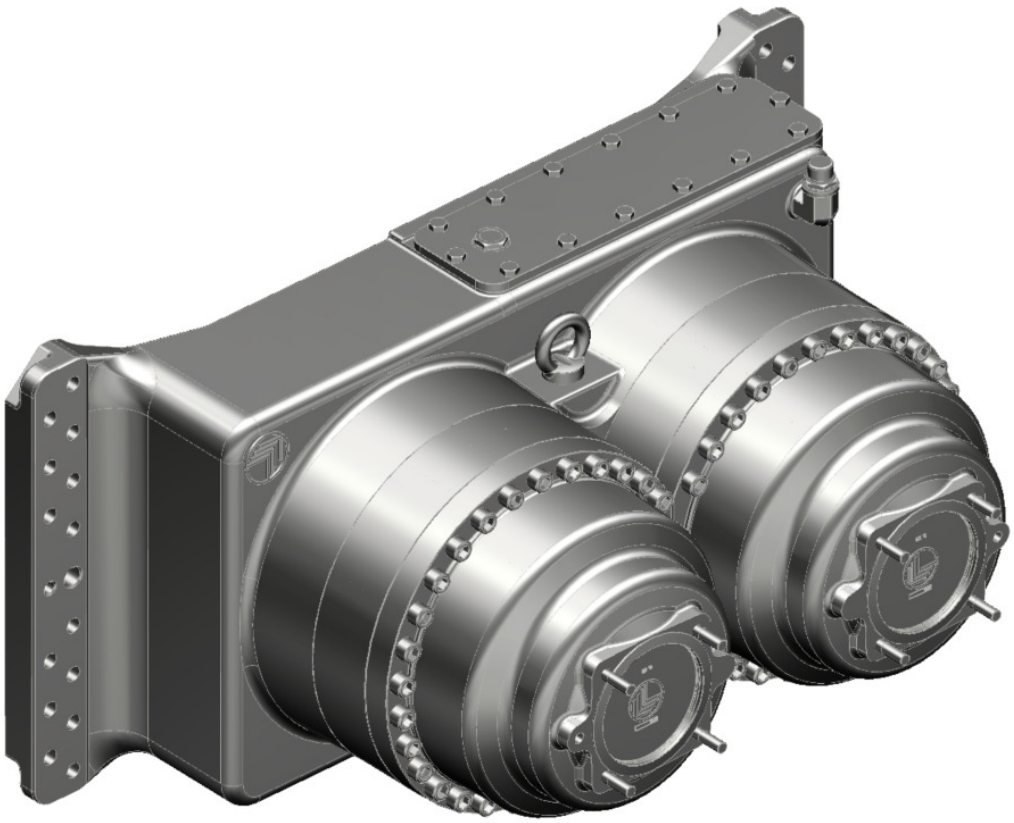
Bonfiglioli
Riduttori



GEARBOXES FOR SHREDDER

Bonfiglioli
Forever Forward

USE, INSTALLATION AND MAINTENANCE MANUAL

1.0 GENERAL INFORMATION

1.1 PURPOSE OF THE MANUAL

This owner's manual provides information regarding the installation, use, safety regulation, mounting instruction and maintenance operation for the gearboxes for shredder.
The information given in this manual must be read carefully and rigorously applied.
Failure to observe the information provided herein may result in risks to personal health and safety, as well as economic damages.
The documentation must be stored by a person charged to do so in a suitable location so as to be always available in good condition for consultation.
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 explained below.

SYMBOLS:

DANGER - WARNING
This symbol indicates situations of danger, which if ignored, may result in serious injury to the operator.

CAUTION - ATTENTION
This symbol indicates the need to adopt specific precautions to avoid personal injury and damage, as well as economic damages.

IMPORTANT
This symbol indicates important technical information.

1.2 PRODUCT IDENTIFICATION

The information identifying the product is shown on its nameplate.

- Product code
- Customer code
- Date of the manufacture (batch)

Readability of the nameplate
The nameplate and the information on it must be readable and, consequently must be cleaned from time to time.
Quote the nameplate data in all communications with the manufacturer, for example, when requesting spare parts, information and assistance.

1.3 GLOSSARY AND TERMINOLOGY

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

Routine maintenance
The set of operations required to preserve the functionality and efficiency of the gear unit. These operations are usually scheduled by the Manufacturer, who defines the qualifications and tasks involved.

Reactive maintenance
The set of operations required to preserve the functionality and efficiency of the gear unit. These operations are not scheduled by the Manufacturer and must be carried out by an expert maintenance technician.

Expert maintenance technician
An authorized technician with the qualifications, skills and mechanical and electrical training required to do repairs and non-routine maintenance work on the gear unit.

Overhaul
An overhaul consists in the replacement of bearings and other mechanical components which have worn to such an extent as to compromise the operation of the gear unit. An 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 indicated 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 in the event of:
- use of the gear unit in contravention of local safety at work legislation
- incorrect installation, disregard or incorrect application of the instructions provided in this manual
- incorrect or defective electrical/hydraulic power supply
- 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, and in particular:
- always operate the unit within its operating limits
- diligently observe the routine maintenance schedule
- only allow trained operators to inspect and service the unit
- only use original spare parts
- the configurations given in the gear unit catalogue are the only ones permitted
- do not attempt to use the unit in any other way
- the instructions given in this manual do not substitute but rather supplement the provisions of established safety legislation.

2.0 TECHNICAL INFORMATION

2.1 DESCRIPTION OF THE GEAR UNIT

The gear unit, driven by hydraulic motor, has been designed and constructed for integration 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 motor executions and configurations.
The User is responsible for using the products recommended for installation and maintenance of BONFIGLIOLI RIDUTTORI gear units in an appropriate manner and in accordance with instructions.
The gearboxes have basically three-stage layout with the first stage as spur gears or planetary gear, the second and third stage is a planetary gear. So the transmission consists of a three-stage gearbox group, that could be connected at the output by two synchronizing wheels on the output axles. For some models the group are two per gearbox. In any cases there are two parallel output axles of special shape.

2.2 OPERATING LIMITS AND CONDITIONS

Ambient conditions

- 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.

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 the safety requirements of established legislation.

Working enviroment

- The gearboxes can operate in a dusty and wet enviroment, but chemical-free. The gearboxes have all connection surfaces sealed and are provided with a vent plugs with spring-loaded anti-intrusion valve to compensate the internal overpressure.

Working position

- The gearboxes are designed to work with output shafts in horizontal position.

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 the 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.
- The gear unit must only be used for the applications permitted by the Manufacturer. Improper use can result in risks to personal health and safety and economic damages.

- Keep the gear unit at its maximum efficiency by following the routine maintenance schedule. Good maintenance ensures the unit's maximum performance, extended service life and continued 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 established legislation on health and safety at work.
- All maintenance, inspection and repairs must only be carried out by an expert maintenance technician fully familiar with the attendant hazards. It is therefore essential to implement operating procedures that address potential hazards and their prevention for the entire machine. The expert maintenance technician must always work with caution in observance of applicable safety standards.
- During operation wear only the apparel and safety equipment indicated in the User Instructions provided by the Manufacturer or stipulated by legislation 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.

4.0 HANDLING AND TRANSPORT

4.1 PACKAGING

The standard packaging, if supplied and unless otherwise agreed, is not proofed against rainfall and is intended for shipping by ground and not sea, and for storage in areas which are under cover and not humid. The material can be stored in suitable conditions for a period of two years under cover at a temperature within the limits of -40°C/+50°C with synthetic oil or -10°C/+50°C with mineral oil and at a relative humidity not in excess of 80%. Storage in all other conditions requires specific packaging.

4.2 HANDLING INSTRUCTIONS

Handle packages as per the Manufacturer's instructions and those marked on the packages themselves. Since the weight and shape of the packages may make manual handling unfeasible, special equipment must be used to avoid damage and injury. Persons authorised for this purpose must be trained and experienced in the work in question to avoid risks to themselves and others.

The person authorised to handle the product must take all necessary precautions to safeguard his safety and that of all other persons involved.

4.2.1 Moving the packages

- Prepare a suitable, delimited area with a level floor or surface for unloading the packages.
- Prepare the equipment required to handle the package. The lifting and handling equipment (e.g. crane or lift truck) must be of adequate capacity for the weight and size of the load, taking into account its attachment points and centre of gravity. If required, this information is indicated on the package itself. Harness heavy packages with chains, belts and steel ropes after checking that they are suitable for the weight of the load, which is always indicated.
- When handling the load keep it level to avoid tipping and instability.

4.2.2 Moving the equipment

All the following operations must be carried out with care and caution and without sudden movements.

When lifting, use accessories such as eyebolts, screw clamps, snap hooks, straps, ropes and hooks etc. which are certified and adequate for the load in question.
The weight of the product to be lifted is given in the customer drawing.

The following pages illustrate in detail the different attachment methods for the various product series, sizes and configurations described in this Manual.
The most suitable solution for lifting and handling the product in safety is indicated for each.

The load must not be allowed to sway by more than 15° in any direction when being lifted. If swaying exceeds this amount, stop and repeat the lifting operation as instructed.

Prepare the gear unit for lifting by attaching straps, hooks and screw clamps etc. to its attachment points. Alternatively, use a pallet to move the load. If using a crane, first lift the gear unit vertically out of its packaging.

If using a lift truck or pallet truck, remove the packaging and insert the truck's forks at the indicated positions.

First lift the load very slowly to check that it is stable.

Move the gear unit to the unloading area and lower it gently into position, taking care not to tip it suddenly in transit.

Identify the attachment points for lifting the gear unit. Refer to the diagrams given below.

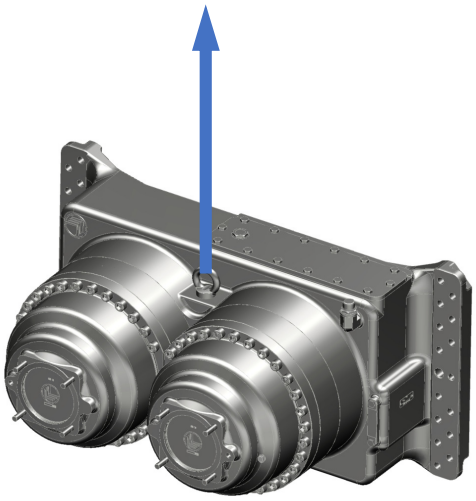


Figure 1

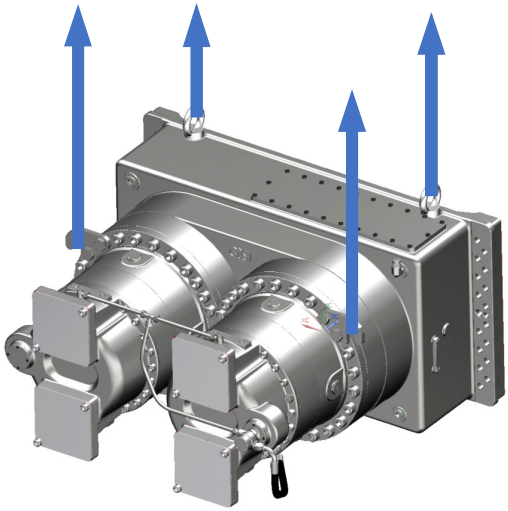


Figure 2

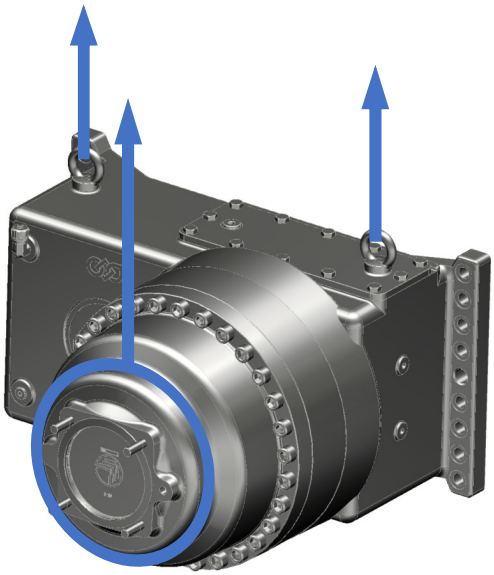


Figure 3

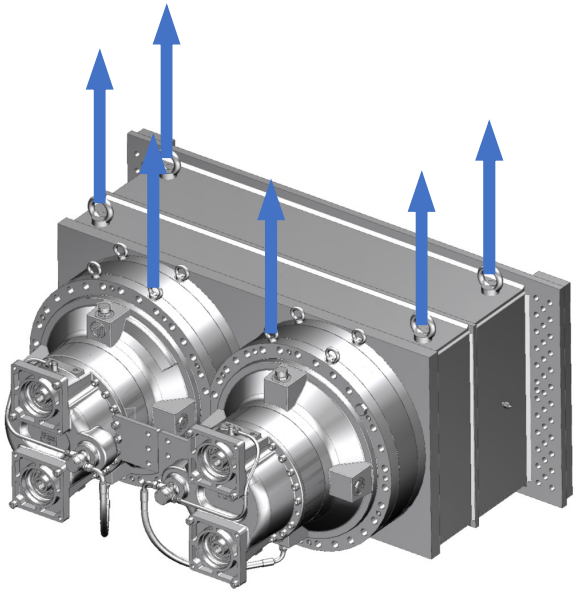


Figure 4

4.3 STORAGE

The following recommendations should be followed when storing the gear unit.
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 subject 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 to be 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 Ensis or other product with similar properties and application range.
6. Fill the unit with lubricating oil and make sure the vent plug is positioned uppermost. Before putting the unit into service, the oil used for storage must be drained and replaced with the correct quantity of recommended operating lubricant.

5.0 INSTALLATION

5.1 INSTALLING THE GEAR UNIT

The entire installation process must be planned as early as the general design phase of the machine. The person authorised to do the work must, if necessary, set out a safety plan to protect the health and safety of all persons directly involved and apply all applicable legislation.

1. Carefully remove all packaging and protective product residue from the gear unit.
Pay particular attention to the mating surfaces.
2. Check that the data on the nameplate correspond to those specified in the purchase 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 to which the gear unit is to be installed is switched off and cannot be accidentally switched on again.
5. Make sure all mating surfaces are flat.
6. Make sure the shaft/shaft or shaft/ bore are perfectly aligned for coupling.
7. Fit suitable guards to protect against the gear unit's external moving parts.
8. If the work environment is corrosive for the gear unit or any of its parts, follow 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 gear unit/motor mating surfaces and other parts (Klüberpaste 46 MR 401 or other product with similar properties and application range) to ensure optimal coupling and protection against fretting corrosion.

5.1.2 Installation on the machine

The coupling of the unit with the driven machine is obtained by a certain number of bolts. Depending on model there also may be some pins or extraction threaded holes. The transmission of torque is assured by two special shape output flanged shafts. See CD drawing for bolt sizes and position.

Bolts and pins for mounting flange

Fixing elements as pins and bolts are located on opposite sides of the housing like shown by red arrows in below image

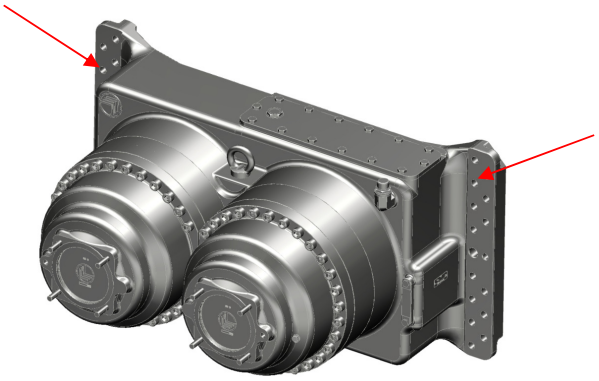


Image as example

Output shafts

The output axles are specially shaped flanged shafts. Depending on product there may be different number of lobes.

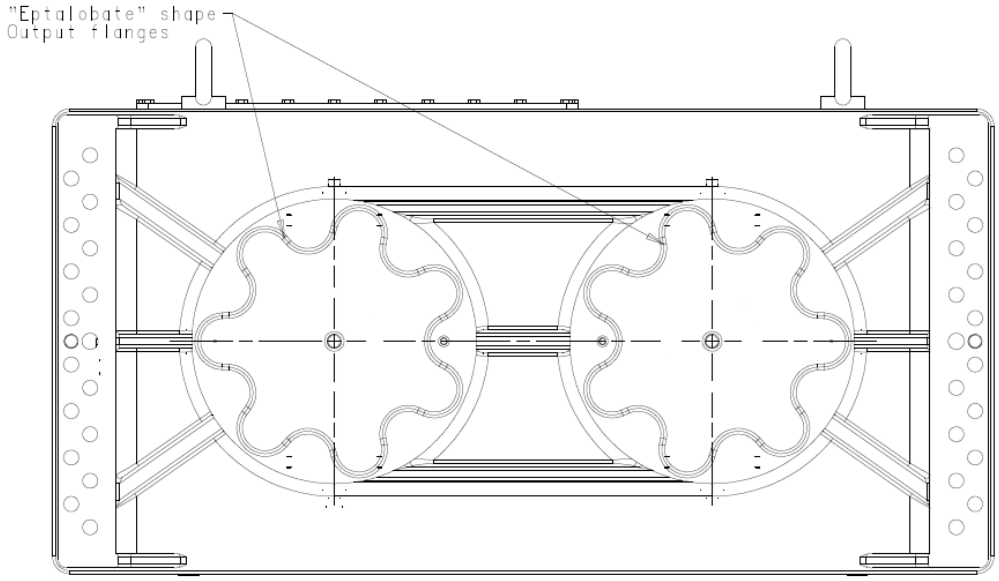


Image as example

There are two different versions of output shaft configuration:

- Output shaft are synchronized so the rotation of shafts are not independent of each other ;
- Output shaft not synchronized so the shaft can rotate independently

The use of the right version is strictly related to the characteristic of the driven machine.

Check the output shaft configuration system is suitable for the characteristics of driven machine.

When installing the unit in the axles coupling with driven machine, the following precautions must also be observed:

• Do not force the coupling and do not use inappropriate tools during assembly or disassembly. Take care not to damage the coupling surfaces.
• Do not force the coupling mechanisms with heavy overhung or thrust loads.
• To facilitate assembly, use a lubricating synthetic oil paste such as Klüberpaste 46 MR 401 or another product with similar properties and application range.

Do not use hammers or other tools that might damage the gear unit's shafts or bearings.

Be sure that the mechanism of driven machine has an acceptable value of maximum misalignment

Be sure the maximum misalignment doesn't exceed the value of 0.06mm every 100mm

Thermostat

Depending on configuration, thermostat may be installed on board the gear unit and normally is not supplied with the gearbox.

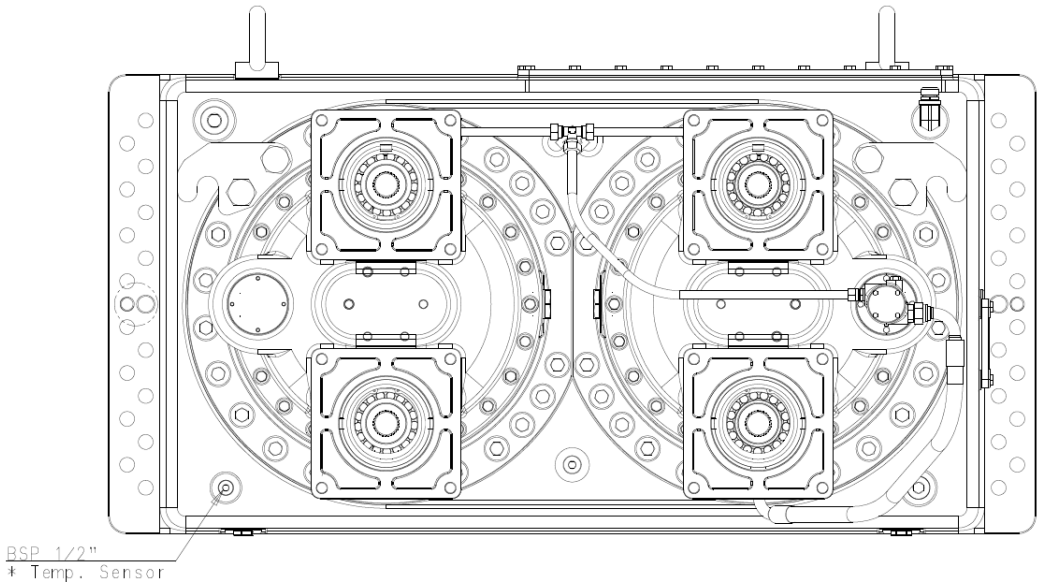


Image as example

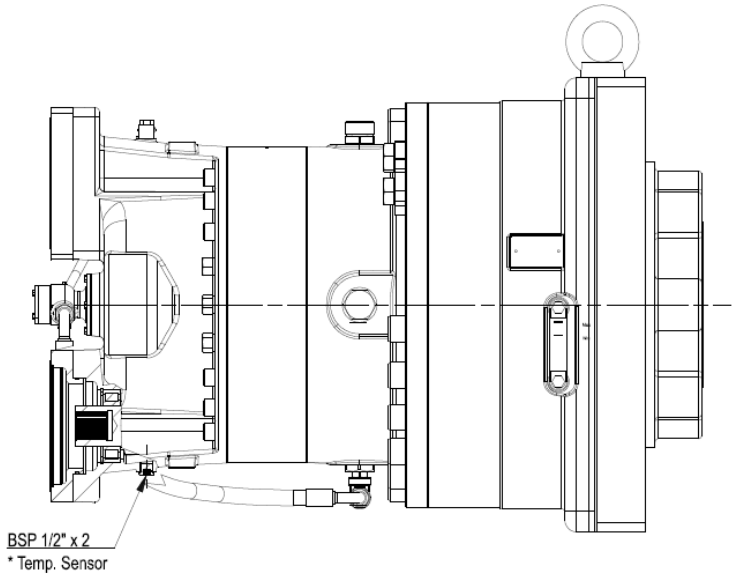


Image as example

To install the thermostat, remove the blind plug (be sure there's no oil in the unit), and fit the thermostat in its place. Pay attention to avoid oil leakages during unit functioning using a proper gasket or a proper sealant on the thread.

Installation of thermostat on the unit and related electrical connections and/or cabling to user points are the responsibility of the Customer and must be completed prior to start-up.

5.1.4 Oil Pump

Gear unit can be provided of a forced lubrication system, with one or more pumps, to assure oil flow to bearings and gears on the upper zone of the unit.

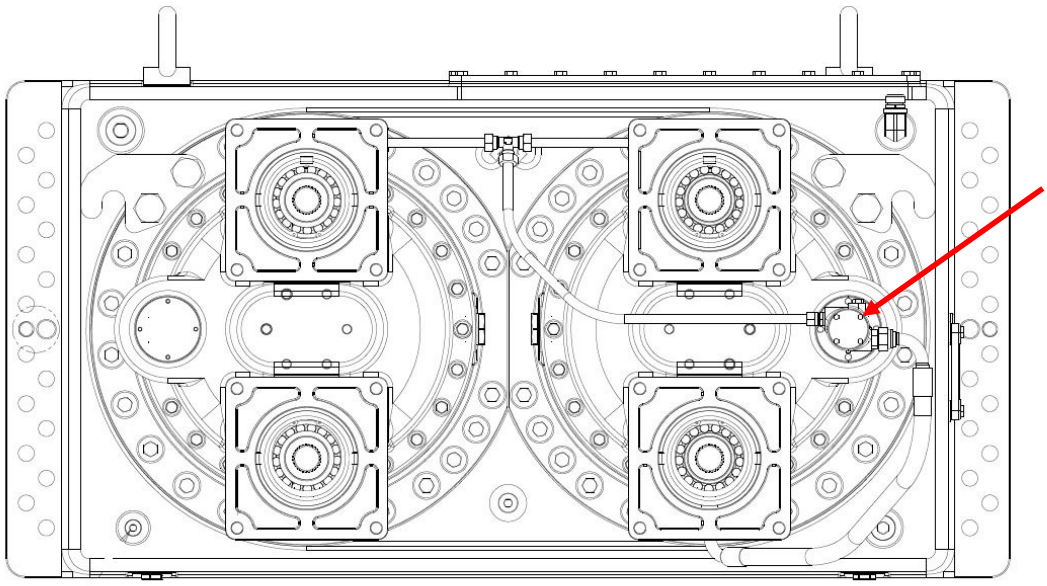


Image as example – single pump

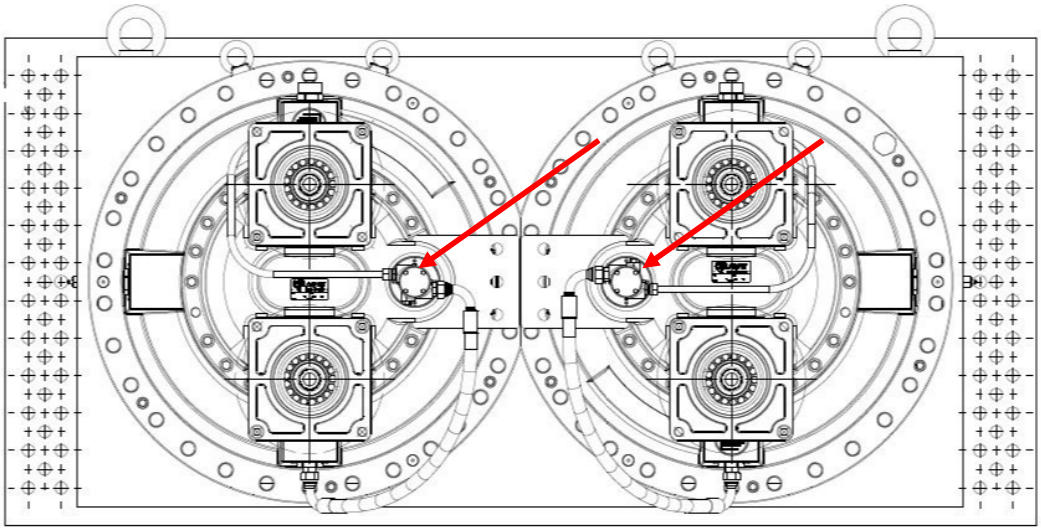


Image as example – double pump

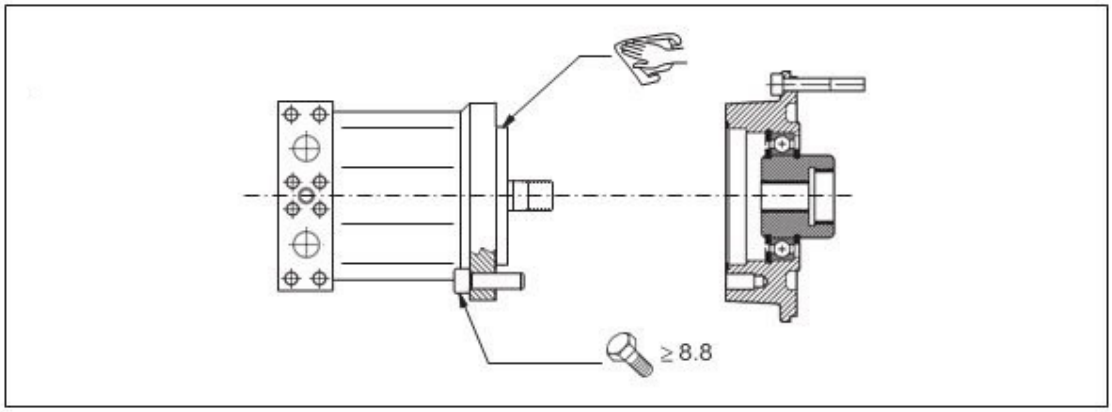
Oil flow is directly related to input speed of motors, because the pump shaft is geared to the input axis of planetary group through a spur gear. Because of this, please be careful to not exceed the maximum input speed.

Don't exceed the maximum input speed given in CD drawing if oil viscosity is above 500 cSt

5.2 HYDRAULIC MOTOR

5.2.1 Installing the Hydraulic motor

- Remove the protective plug on the unit;
- Mount the provided O-ring oil gasket to ensure an oil tight seal between the motor and gear unit, taking care to fit it correctly in its seat without damaging it;
- Clean the spigot and the coupling where the motor is to be fitted, fit the motor and tighten down the flange mounting bolts;
- fit the motor and tighten down the flange mounting bolts.
  Always use bolts rated to at least class 8.8 .



Installation of hydraulic motor, related connections, and the realization of a proper hydraulic circuit to ensure the right functioning of motors are under customer responsibility.

Check that no additional axial loading on input shaft of the gearbox arises after tightening the bolts: this could damage seriously the gearbox

5.3 LUBRICATION

Oil lubrication

Before starting up the gear unit, it must be charged with lubricant to the right level and quantity depending on the gearbox model and configuration, please see CD drawing for oil quantity reference value.

Refer to the CD drawing for oil to be employed, anyway always use an API GL5 PAO/PAG and EPI certified oil type.

To fill the gearbox of the right quantity of oil please proceed as follows:

- Remove the filling plug from the unit, the position of this one can change depending on the gearbox and in some cases can be the same as the breather;
- Fill the gearbox until the oil appears through level plug or, for unit provided of oil level indicator, the level is between “min” and “max”;

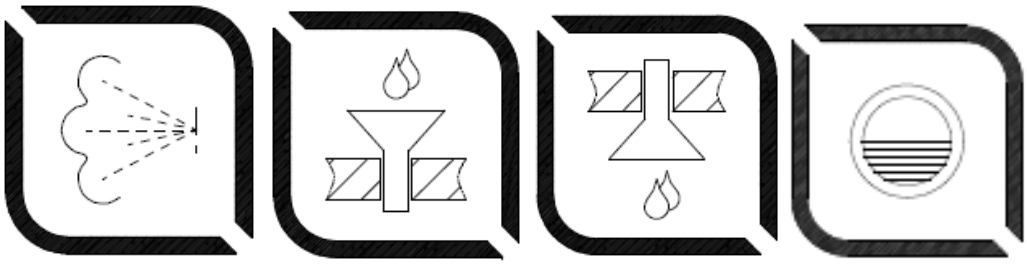
- Install the filling plug respecting the follow tightening torques

Plug thread	Pitch	Tightening torque [Nm]
1/8"	28	10 - 15
1/4"	19	10 - 15
3/8"	19	15 - 20
1/2"	14	20 - 30
3/4"	14	20 - 30
1"	11	30 - 40

Plug thread	Pitch	Tightening torque [Nm]
M14	1.5	15 - 20
M16	1.5	15 - 20
M18	1.5	15 - 20
M20	1.5	20 - 30
M22	1.5	20 - 30
M24	1.5	20 - 30
M30	2	30 - 40
M42	3	40 - 50

5.3.1 Plugs displacement

The position of plugs depends on size of gearbox, here below there are some recap scheme with a short legenda for the meaning of the stickers employed. Please refer to the CD drawing for plug positions.



Breather plug | Filling plug | Draining plug | Oil level plug

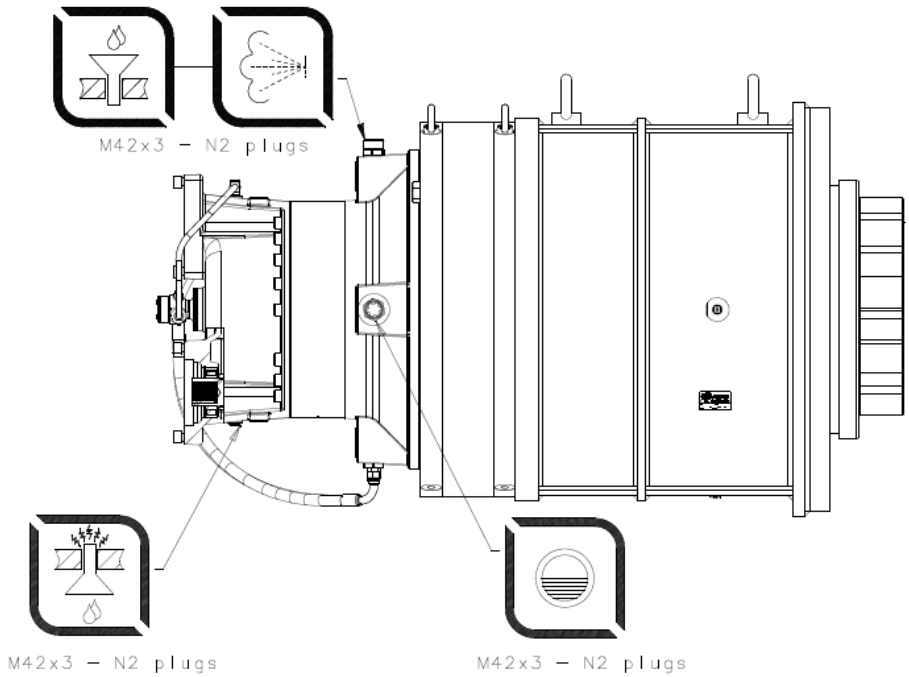


Image as example

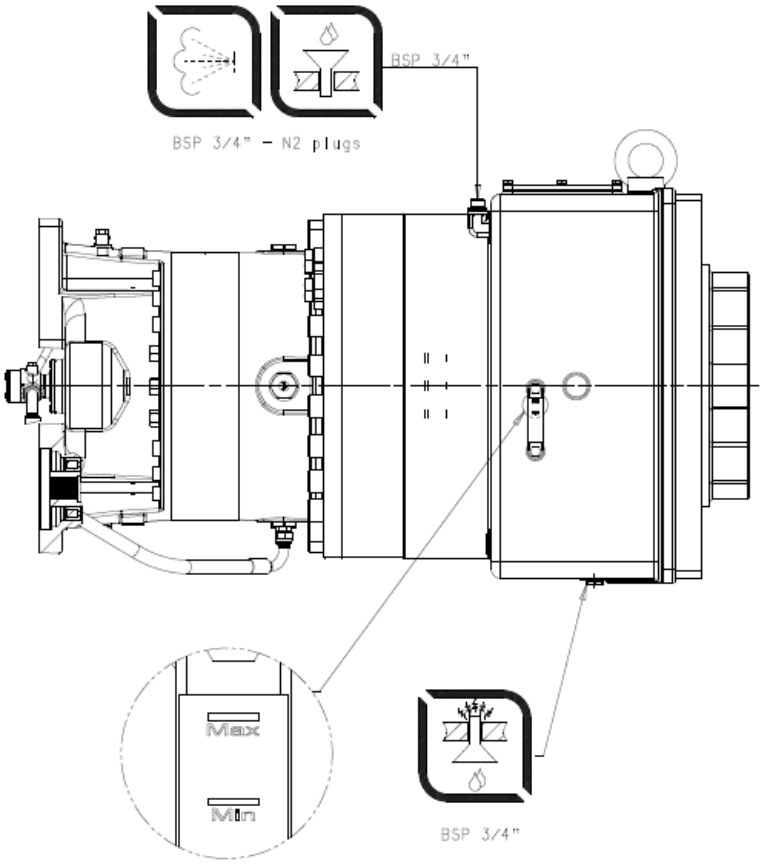


Image as example

5.4 COOLING

Normally, no cooling device is provided with the gearbox unit.

The surface temperature of gearbox cannot exceed 100°C measured near the input zone. The realization of an eventual necessary cooling system is under responsibility of customer.

6.0 TESTING THE GEAR UNIT

The gear unit has been factory tested by the Manufacturer. Before start-up, make sure that:
• this partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the “Machinery Directive” 2006/42/EC
• the gear unit’s mounting position in the installation corresponds to that prescribed and indicated on the nameplate
• the electrical power supply is suitable and operational as prescribed in EN 60204-1, and is grounded as per EN 50014
• there are no signs of lubricant leaks from the plugs or gaskets
• the vent plug is not obstructed by dirt or paint
• the unit does not run noisily or with excessive vibration.

7.0 USING THE EQUIPMENT

Before putting the gear unit into service, the User must ensure that the shredder machine 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/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, shearing, trapping). In particular, when the gear unit is operating in automatic mode in an accessible area, the shaft must be protected by a guard.

8.0 MAINTENANCE

Maintenance and replacement work must be carried out 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 the safety devices provided and, if necessary, inform persons working in the vicinity. Cordon off the area around the unit and prevent access to any equipment which, if activated, might be the cause of unexpected health and safety hazard.

• Replace worn components with original spare parts.
• Use the lubricants (oil and grease) recommended by the Manufacturer.
• When working on the gear unit always replace all gaskets and seals with original new 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 to persons and damage to components due to the use of non-original spare parts and non-routine work that modifies the safety requirements without the Manufacturer's express prior authorisation.
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 specified by applicable legislation.

8.1 ROUTINE MAINTENANCE

Keep the gear unit at its maximum efficiency by following the routine maintenance schedule. Good maintenance ensures the unit's maximum performance, extended service life and continued compliance with safety regulation

Frequency	Component	Type of check	Action
at start	Gear unit casing	Check that the external temperature does not exceed the max. permitted values	Stop the machine and contact Bonfiglioli Riduttori Technical Service
after 200 hrs	Original consignment lubricant	Replace	Replace with new lubricant
	External fasteners	Check locking torque	Tighten down to specified torque
1000 h	External seals and gaskets	Check oil level Check for leaks by eye	Service or replace components as required
See table in next page	Lubricant	Replace	Replace with new lubricant
2000-4000h	Grease	Replace	Replace with new grease
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 the table below.

Average oil operating temperature [C°]	*Interval replacement [h]		
	mineral oil	synthetic oil	
	EP	PAO	PAG
$t_o < 65$	8000	25000	25000
$65 < t_o < 80$	4000	15000	15000
$80 < t_o < 95$	2000 (@) (#)	12500	12500

**In any case replace the oil at least once a year*

(@) = It is not advised continuous operation in this range of oil temperature: 80°C to 95 °C (#) =

82 OIL CHANGES

1. Place an adequate container under the drain plug.
2. Remove the filler and drain plugs and allow the oil to drain out (see CD drawing for plug position). Clean the magnetic part of plug from metal deposits and check there are not metal chips.

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 after first changing the plug seal.
4. Fill with new oil until it reaches the level mark (see chapter 5.3 for plug position and filling procedure). **Do not mix oils of different makes or specifications and check that the oil is highly resistant to foaming and is EP rated.**
5. Tighten down the filler plug after changing its seal.

If a leak is found, identify the cause of the fault and repair it before topping up the lubricant and operating the unit.

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 may be fatal if swallowed

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

8.3 GREASE REPLACE

For some models shafts bearings are grease lubricated, so there is a grease chamber each output shaft. Grease should be replaced respecting the frequency and intervals specified in paragraph 8.1 Routine Maintenance. To replace the grease proceed as follows:

1. Remove the exhaust grease plug, position is shown on CD drawing;
2. Place an adequate container under the grease plug;
3. Fill the grease chamber through the proper grease nipples of the required quantity specified on CD drawing;
4. Install the exhaust plug again respecting the tightening torques given in table of chapter 5.3.

Use the type of grease indicated on cd drawing to lubricate bearings

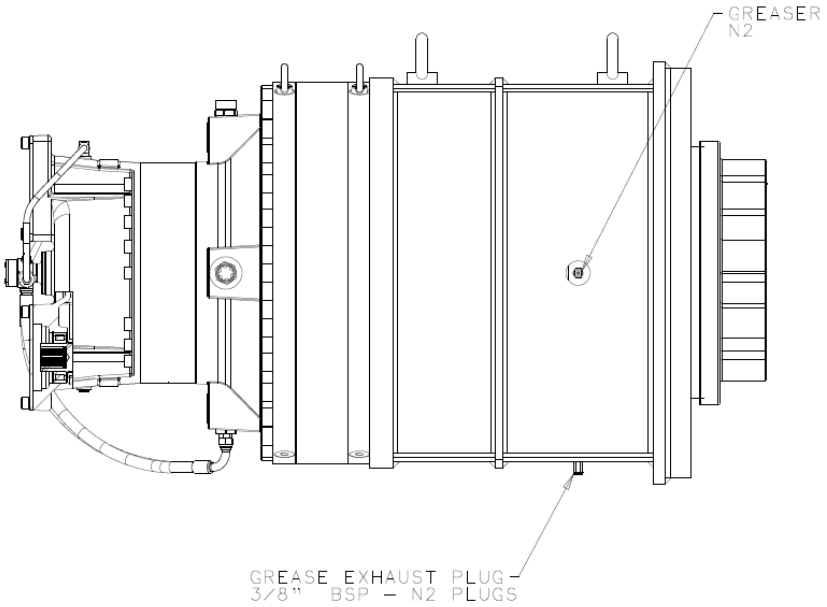


Image as example - grease plugs position

8.4 CHECKING OPERATIONAL EFFICIENCY

Remove any dust from the gear unit and motor casings.
Check that the noise generated at continuous 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 rated values given on the motor's nameplate.
Check the wear of the friction surfaces and braking gasket on the brake motors (if fitted) and, if necessary, adjust the gap.
Check for lubricant leaks from the gaskets/seals, plugs and casings.
Check all bolted couplings for wear, deformation and corrosion and tighten them down fully, but without over tightening.

8.5 CLEANING

Remove all dust and process waste from the gear unit. Do not use solvents or other products that are incompatible with the unit's construction material and do not direct high pressure jets of water at the gear unit.

9.0 REPLACING PARTS

• Immediately replace parts and components if they are not able to guarantee safe and reliable operation.
• Never improvise repairs.
• The use of non-original spare parts not only renders the warranty null and void but can jeopardise the gear unit's operation.

9.1 DECOMMISSIONING THE GEAR UNIT

The unit must only be taken out of service 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 established environmental legislation.

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

10.0 TROUBLESHOOTING

The following information is intended to serve as an aid in locating and eliminating defects and faults. In some cases, problems may be caused by the plant or machine to which the gear unit is assembled and hence, the cause and remedy will be described in the Manufacturer's technical documentation for the machine/plant in question.

FAULT	CAUSE	REMEDY
Bearing temperature too high	Oil level too low	Top up oil level
	Oil spent	Replace oil
	Defective bearings	Contact authorised workshop
Operating temperature too high	Oil level too high	Check oil level
	Oil spent	Replace oil
	Contaminant 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
	Excessive load applied	Correct load to rated values given in CD drawing
	Contaminant in oil	Replace oil

Abnormal noise at gear unit mounting	Mounting bolts loose	Tighten bolts 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 recommended lubricant chart)
	Oil level too high	Check oil level
	Excessive load applied	Redesign drive for actual load required
Output shaft does not turn with motor running	Gears damaged	Contact authorised workshop

INDEX OF REVISIONS (R)

BR_IOM_Shredder_ENG_R01	
	Description
8,10	Modified product reference images.