HF SERIES

Installation, Operation, Maintenance Manual and Spare parts list

Bonfiglioli

INSTALLATION, OPERATION, MAINTENANCE MANUAL AND SPARE PARTS LIST

General information

For the installer

For the user

For the disposer

For the user

Revisions

The revision list for this manual is given on page 36. The most recent version of this manual is available from www.bonfiglioli.com.

1 GENERAL INFORMATION

1.1 PURPOSE OF THIS MANUAL

This manual has been prepared by the manufacturer in order to provide information regarding the safe transport, handling, installation, maintenance, repair, disassembly and disposal of the gearbox/gearmotor.
All necessary purchasing and design information is provided in the sales catalogue. Follow good engineering practices, read the information in this manual thoroughly and apply it rigorously. Information on any electric motor coupled to the gearbox must be obtained directly from the motor's own installation, operation and maintenance manual.
Failure to observe the information provided in this manual may result in risks to personal health and safety, as well as damage to equipment.
This information is originally provided in the manufacturer's own language (Italian), but may be made available in other languages to meet legal and commercial requirements.
This manual, along with all other relevant documentation, must be stored by personnel appointed to do so, in a suitable location, and in such a way that it is always available in good condition for consultation. In case of loss or damage, request a replacement directly from the manufacturer, quoting the code of this manual.
This manual reflects the conditions prevalent at at the time the gearbox was introduced.
The manufacturer reserves the right to modify, supplement and improve this manual in future, without this present revision being considered inadequate for that reason.

1.2 GLOSSARY, TERMS AND SYMBOLS

Some of the most frequently used terms in this manual are explained below to define their meaning clearly.
Scheduled maintenance: a set of operations required for **maintaining the functionality** and efficiency of the gearbox. These operations are usually scheduled by the manufacturer, who also establishes the competences and procedures required.
Unscheduled maintenance: a set of operations required for **restoring the functionality** and efficiency of the gearbox. These operations are not scheduled maintenance operations. In order to maintain the proper functioning and safety of the gearbox/gearmotor, we recommend that users have unscheduled maintenance performed by the manufacturer or by an authorised, specialist service centre. Contact the manufacturer's technical assistance service. Failure to comply with this requirement during the warranty period automatically invalidates the warranty.
Expert maintenance technician: an authorised technician who has the necessary qualifications, skills and mechanical and electrical training to perform scheduled maintenance on the gearbox.

SYMBOLS:

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

DANGER - WARNING
This symbol indicates situations of danger which, if ignored, may result in risks to personal health and safety.

CAUTION - ATTENTION
This symbol indicates the need to adopt specific precautions to avoid personal injury as well as damage to equipment.

IMPORTANT
This symbol indicates important technical information.

1.3 REQUESTING TECHNICAL ASSISTANCE

For any technical service needs, contact the Manufacturer's sales network (www.bonfiglioli.com) quoting the information indicated on the unit's name plate, the approximate hours of service, the duty cycle and the type of defect.

1.4 MANUFACTURER'S LIABILITY

The Manufacturer declines all liability in the event of:
- use of the gearbox/gearmotor in contravention of local occupational health and safety legislation
- incorrect installation, disregard of or incorrect application of the instructions provided in this manual
- electrical power supply defects (for gearmotors and/or gearboxes with electrical devices)
- modifications or tampering
- work done on the gearbox by unqualified or unsuitable personnel

The functionality and safety of the gearbox also depends on the scrupulous application of the instructions given in this manual, in particular:
- Always operate the gearbox within its operating limits.
- Diligently observe the maintenance schedule.
- Ensure that only trained operators are authorised to inspect and service the gearbox.

- **the configurations given in the gearbox catalogue are the only permitted ones**
- **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.**

1.5 SUPPLEMENTARY INFORMATION

Additional information about the gearboxes described in this manual can be obtained from the sales catalogues, available on the website www.bonfiglioli.com:

2 SAFETY INFORMATION

2.1 SAFETY STANDARDS

Read thoroughly the instructions given in this manual and those printed directly on the gearbox, especially those regarding safety.

- Personnel appointed to work on the gearbox at any time during its service lifetime must be trained specifically for the purpose, must possess the necessary skills and experience, and must also be equipped with and trained to work with the appropriate tools and personal protection equipment required by the safety legislation applicable in the place where the gearbox/gearmotor is installed. Failure to meet these requirements constitutes a risk to personal health and safety.
- Keep the gearbox at its maximum efficiency by scrupulously following the maintenance schedule. Proper maintenance ensures maximum performance, extended service life and continued compliance with safety regulations.
- When working on the gearbox in areas that are difficult to access or hazardous, ensure that adequate safety precautions have been taken for yourself and others in compliance with applicable legislation on occupational health and safety.
- 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 which address potential hazards and their prevention for the entire machine in which the gearbox is installed. Expert maintenance technicians must always work with caution and in observance of applicable safety standards.
- When working on the gearbox, wear the clothing and personal protective equipment specified in the manufacturer's instructions or required by the safety legislation applicable in the place where the gearbox is installed.
- Use only 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 changing lubricants, clean the gearbox and the walk-on surfaces around the work area.
- If the gearbox has to be serviced in a poorly lit area, use additional lamps and ensure that the work is done in compliance with all applicable safety legislation.
- During functional testing at the manufacturer's premises, the acoustic pressure measured under full load at a distance of 1 m from the gearbox and at 1.6 m above ground level, without vibration, was less than 85 dB(A). The gearbox is a component. The constructor of the plant or machine in which the gearbox is installed must therefore measure the level of noise emitted by the complete machine as required by the Machinery Directive 2006/42/EC. The vibrations produced by the gearbox do not constitute a health risk for personnel. Excessive vibration may be the result of a fault, and should be immediately reported and eliminated.

Unless they have backstop devices, gearboxes may reverse direction. If there is any risk of uncontrolled movement occurring in the event of a power failure (for example in load lifting applications), measures must be put in place to prevent such movement occurring (for example by using motors with brakes that engage automatically if the power fails).
If the gearbox is installed in a position that cannot be reached from the floor, the constructor of the plant or machine in which it is installed must provide, as necessary, suitable means for accessing a position from which the gearbox can be serviced.

The user is responsible for using the products recommended for the installation and maintenance of the gearbox in an appropriate manner and in accordance with the Manufacturer's instructions.

Before putting the gearbox 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 constructor of the plant or machine in which the gearbox/gearmotor is installed must protect all rotating parts to prevent personnel coming into accidental contact and incurring a risk of crushing, cutting or entanglement, especially if the gearbox operates automatically and in an accessible area.

- Do not use high pressure jets of water to clean the gearbox.
- Only perform work on the gearbox when it is at a standstill.
- Protect the electric motor against accidental startup (e.g. by padlocking the main power switch or removing the power fuses). For this purpose, also affix a notice to the motor indicating that work is in progress on the gearbox.
- Do not perform welding work on the gearbox. Do not use the gearbox as an earthing post for welding operations because this could damage or destroy parts of the gear teeth and bearings.
- Switch off the motor immediately if any changes are noticed in the normal functioning of the gearbox, such as an abnormal increase in operating temperature or abnormal running noise.
- If the gearbox is to be installed in a plant or machine, the constructor of the said plant or machine is required to include the prescriptions, instructions and descriptions contained in this manual in the operating manual for the plant or machine.
- If the gearbox is installed in situations that are particularly hazardous to personal safety, or that could cause serious damage to equipment, or that involve high inertial loads, vibrations, etc., such as:
  - suspended installations
  - motors supported exclusively by the gearbox
  - output shaft with shrink disc oriented downwards

  suitable safety devices, such as harnesses, safety chains and restraining systems, etc. must be installed.

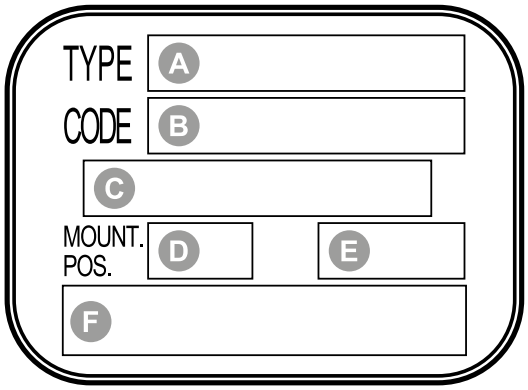
Depending on operating conditions, the outer surfaces of the gearbox may reach very high temperatures. Risk of burns!
When draining spent oil as part of an oil change, always bear in mind that hot oil can cause serious burns!
If the gearbox is equipped with a vent plug that incorporates a pressure relief valve, wait for the oil in the gearbox to cool before removing the plug, and beware of possible jets of oil during transport, lifting, installation, adjustment, operation, cleaning, maintenance, repair, dismantling and scrapping.
Wait for the gearbox to cool before inspecting it.

3 TECHNICAL INFORMATION

3.1 EQUIPMENT IDENTIFICATION

The gearbox bears the following identifying nameplate. The nameplate provides essential information and specifications for correct and safe use. The designation of the gearbox is explained in the sales catalogue. If the gearbox is supplied fitted with a motor (gearmotor), all information regarding the motor itself is provided in the motor's own manual.

Nameplate information



- A Gearbox type
- B Product code
- C Month / Year of manufacture
- D Mounting position
- E Gear ratio
- F Name of manufacturer

Legibility of the nameplate
The nameplate and the information thereon must be legible at all times. The nameplate should therefore be cleaned from time to time.
Always quote the identifying data on the nameplate in all correspondence with the manufacturer, when ordering spare parts, requesting information or arranging technical assistance.

3.2 DESCRIPTION OF THE EQUIPMENT

This gearbox has been designed and made for integration in an assembly of rigidly interconnected parts or mechanisms conceived to perform a specific application in which power may be provided by an electric motor.
Depending on the requirements of the application, the gearbox can be supplied in a variety of versions and configurations.
The gearbox is designed to satisfy specific requirements in the mechanical, chemical, agricultural and food industries, etc.
The manufacturer offers a range of accessories and optional variants to make gearboxes as versatile as possible. For further technical information and descriptions, refer to the relevant catalogue.
The user is responsible for using the products recommended for the installation and maintenance of the gearbox in an appropriate manner and in accordance with the manufacturer's instructions.

3.3 CONFORMITY

All gearboxes or gearmotors (when supplied with motor) are designed as state of the art devices in compliance with the provisions of applicable Essential Health and Safety Requirements.
All gearmotor motors conform to the provisions of the Low Voltage Directive 2006/95/EC and the Electromagnetic Compatibility Directive 2004/108/EC.

3.4 OPERATING LIMITS AND CONDITIONS

The applications permitted by the Manufacturer are the industrial applications for which the gearbox has been designed.

Refer to chapter “ALLOWED TEMPERATURE LIMITS” for the optimum ambient conditions.

The gearbox may not be used in areas and environments:

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

Do not use the gearbox/gearmotor, if not explicitly intended for the purpose, in a potentially explosive atmosphere or where the use of explosion-proof equipment is specified.

3.5 ALLOWED TEMPERATURE LIMITS

Symbols	Description / Condition	Value (*)	
		Synthetic Oil	Mineral Oil
t_a	Ambient temperature		
$t_{au\ min}$	Minimum operating ambient temperature	**-30°C**	**-10°C**
$t_{au\ Max}$	Maximum operating ambient temperature	**+50°C**	**+40°C**
$t_{as\ min}$	Minimum storage ambient temperature	**-40°C**	**-10°C**
$t_{as\ Max}$	Maximum storage ambient temperature	**+50°C**	**+50°C**
t_s	Surface temperature		
$t_{s\ min}$	Minimum gearbox surface temperature starting with partial load (#)	**-25°C**	**-10°C**
$t_{sc\ min}$	Minimum gearbox surface temperature starting with full load	**-10°C**	**-5°C**
$t_{s\ Max}$	Maximum casing surface temperature during continuous operation (measured next to the gearbox input)	**+100°C**	**+100°C** (@)
t_o	Oil temperature		
$t_{o\ Max}$	Maximum oil temperature during continuous operation	**+95°C**	**+95°C** (@)

(*) = For further information about minimum and maximum values of different oil viscosity refer to the table “Selection of the optimal oil viscosity” on the catalog available on www.bonfiglioli.com

(@) = Continuous operation it is not advised if t_s and t_o range is 80°C to 95 °C.

(#) = For full load start-up it is recommended to ramp-up and provide for greater absorption of the motor. If needed, contact Bonfiglioli Technical Service.

4 HANDLING AND TRANSPORT

Personnel authorised to handle packages must take all necessary precautions to safeguard their own safety and that of all other persons involved.

4.1 PACKAGING SPECIFICATIONS

Unless otherwise agreed, standard packaging, if supplied, is not rainproof. This type of packaging is intended for shipping by ground and not by 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 specified in the chapter “ALLOWED TEMPERATURE LIMITS” and at a relative humidity not in excess of 80%. Storage in all other conditions requires specific packaging.
In order to facilitate handling, heavy packages can be loaded on pallets.

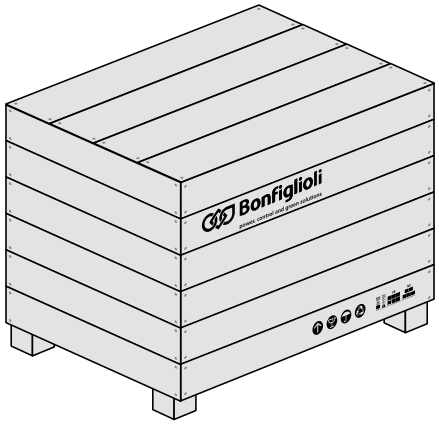
The most frequent types of packaging are shown in the figures below.

Standard carton pallet packaging.

Horizontal packaging

Vertical packaging

Special wooden crates.



On receipt of the gearbox, make sure the delivery corresponds to the purchase order and that it is not damaged or faulty in any way. Report any problems to the Manufacturer’s sales network.

Dispose of packaging materials as stipulated by applicable legislation.

4.2 HANDLING INSTRUCTIONS

Handle packages according to the instructions provided by the manufacturer on the packages themselves, if present. If the weight and shape of the packages makes manual handling unfeasible, use special equipment to avoid damage and injury. Personnel authorised to use lifting and moving equipment must be trained and experienced in the operations required in order to avoid risks to themselves and other persons.

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 for handling 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 specified.
- When handling the load keep it level horizontally to avoid tipping and instability.

4.2.2 Moving the equipment

All the following operations must be carried out with the greatest care and attention to avoid sudden movements during the handling of the gearbox.

When lifting the gearbox, only use accessories such as eyebolts, shackles, safety hooks, straps, ropes and hooks, etc. that are fully certified and adequate for the load to be lifted.
Do not use eyebolts on the motor to lift gearmotors.

Miscellaneous accessories (e.g. connecting flanges, etc.) and/or motors coupled to the gearbox may significantly alter the centre of gravity and impair stability. Use an additional lifting point in such cases, if necessary.

During lifting operations, the load must not be allowed to swing beyond an arc of ± 15°.
If greater swinging movements occur during movement, stop and repeat the operations for the lifting system adopted.

To rotate the gearbox, use the same attachment points used to lift it and proceed as instructed for lifting. Rotate the gearbox as near as possible to a supporting surface. Pay special attention to the location of the centre of gravity to prevent the load from becoming unbalanced as it is being rotated. Lifting gear must be attached in such a way that it cannot slip off or move, as this could cause the load to fall. This is especially important if the gearbox is being rotated using slings or ropes, since these are particularly prone to slipping off their attachment points.

- Identify the attachment points for lifting the gearbox, as shown in the drawings.
- Prepare the gearbox for lifting by attaching straps, hooks, etc. to its attachment points, or alternatively use a pallet for moving the load. When using a crane, first lift the gearbox vertically out of its packaging.
- If using a fork lift or pallet truck, remove the packaging and insert the forks at the positions provided.
- Lift the load very slowly and to a limited height above the ground, and check that it is stable.
- Move the gearbox to the unloading area and lower it gently into position, taking care not to cause sudden oscillations while moving it.

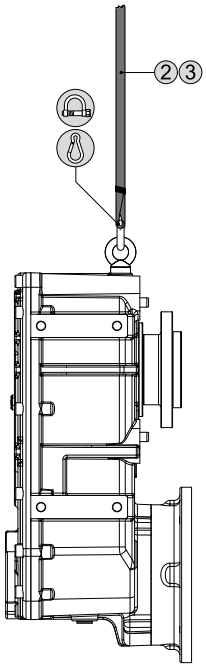
The following pages illustrate in detail the different lifting methods to be adopted for the gearbox series, sizes and configurations described in this manual. The most suitable solution for the safe lifting and moving of each product is shown.

Legend:

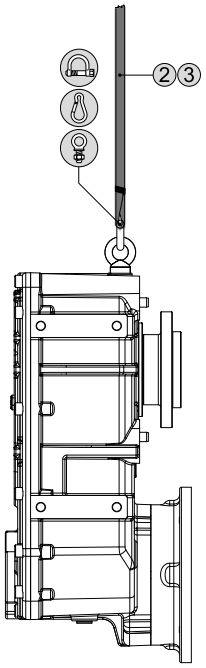
Type of lifting	With mechanical lifting equipment	
Symbol	**A**	**B**
Approx. weight	> 15 kg	
Requirement	Recommended method for positioning	Recommended method for moving and positioning
Warning	The load may be unstable	The load may sway or oscillate
Solution	Slide the lifting ring to align it with the load's centre of gravity as shown in the diagrams below. Lock the ropes below the ring with a cable clamp or similar device to prevent them from sliding, then 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.

HF Series

HF 40
HF 70



HF 125



① Rope and hooks

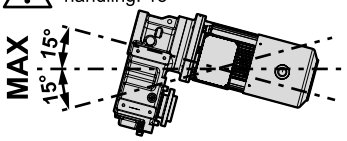
② Open harness with eyelets

Screw clamp (use with harness)

Snap hook (use with rope)

Eyebolt (already fitted to gear units C50...C100)

Maximum permissible tilt during handling: 15°



4.3 STORAGE

Place the gearbox/gearmotor on a stable base and make sure that there is no risk of it moving or falling off.

The following recommendations should be followed when storing the gearbox/gearmotor.

1. Do not store the unit in excessively humid conditions or where it is exposed to the weather (i.e. outdoors).
2. Avoid excessive variations in temperature as this can cause condensation inside the gearbox and its accessories.
3. Do not place the gearbox directly on the ground.
4. Store the packaged gearbox (if allowed) in accordance with the instructions on the packaging itself.

If the gearbox/gearmotor is stored temporarily outdoors it must be protected to ensure that humidity and foreign matters cannot penetrate to the interior.

If the gearbox is to be stored for more than 6 months, the following **additional** precautions must be taken.

5. Coat all external machined surfaces with a protective anti-corrosion product such as Shell Ensis SX (or a product with similar properties and application range). Check the surfaces regularly and re-apply the protective coating as necessary.
6. Fill the gearbox with lubricating oil and replace any vent plugs with blind plugs. This operation does not apply to gearboxes that are lubricated for life (see the “LUBRICATION” section).

4.3.1 Long term stock

Here are reported the appropriate technical prescriptions to be performed to ensure the service LONG TERM STOCK of the unit for a maximum stock up to 2 years.
The service can be extended for another two years before its expiration. To extend this service, contact the Bonfiglioli service center available on the company website.

Conditions of unit's receipt

According to the unit's size, the customer receives the gear unit or gearmotor with the LONG TERM STOCK option inside one of the following two suitable containers:
1) **BBOX**: an adhesive label "OPEN ONLY BEFORE THE INSTALLATION" is applied on each of the 4 outer walls of the box.

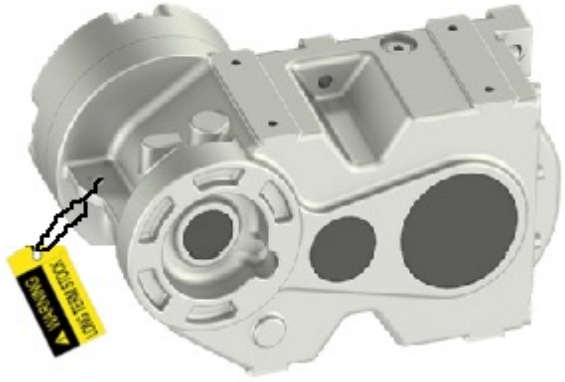
2) **WOODEN CRATE:** the words "LONG TERM STOCK - OPEN ONLY BEFORE THE INSTALLATION" are sprayed on each of the 4 outer walls of the crate.

The container has to be stocked and must not be opened by customer before the need to commission the unit.

Internally to the container the unit is packed inside a VpCI (Vapor phase Corrosion Inhibitor) bag:

The unit packed inside a VpCI is identified by a specific adhesive label **"WARNING LONG TERM STOCK"** placed on the external surface of the VpCI bag.

Internally to the VpCI bag, a tag **"WARNING_LONG TERM STOCK"**, tied to a lanyard ,will be visible on the surface of the gearbox:



The gearbox nameplate will be a conventional nameplate with the addition of the LONG TERM STOCK option in the description.

Proper Long Term Stock activities

· Do not store the container in excessively humid conditions or where it is exposed to the weather (do not store outdoors)
· Do not place the container directly on the ground. Place the container on a pallet
· Do not place the container in conditions of excessive temperature changes for can cause condensation to form inside the gearbox and from the accessories installed
· Store the container in according to these environmental conditions: ambient temperature from min -10°C to max +40°C, dry environment and free from direct sunlight
· The container has to be stocked and must not be opened before the commission of the unit

After 2 years of stock, the unit with the LONG TERM STOCK option needs to be checked in a Bonfiglioli assistance center. In case of a product that hasn't been properly preserved, an offer by Bonfiglioli will be issued for a complete restore.
Subsequently with the recovery activity successfully concluded, the unit with the LONG TERM STOCK option can be stored again in the customer's warehouse for a maximum of other 24 months according to the above precautions.

5 INSTALLATION

5.1 INSTALLING THE GEARBOX

All phases of installation and maintenance must be taken into consideration from the machine design stage. Design personnel must, if necessary, implement a safety plan to protect the health and safety of all persons directly involved and to ensure the rigorous application of all relevant legislation.

It is essential for impact and stress to be avoided during the installation process.

Before installing a gearmotor, also refer to the instructions contained in the installation and user manual for the electric motor.

Before installing the gearbox:

1. Drain out the oil used for storage if it is not the same as the oil used for normal functioning, and flush the inside of the gearbox out thoroughly (see the “LUBRICATION” section in this manual).
2. Carefully remove all packaging and protective coatings from the gearbox suitable solvents. Take special care when cleaning mating surfaces. Avoid getting solvents on the shaft seal rings.
3. Check that the data on the nameplate correspond to those specified in the order.
4. Ensure that the structure in which the gearbox is to be mounted is sufficiently robust and rigid to support its weight and operating forces. If normal service is likely to involve impacts, extended overloads or possible seizures, fit the necessary hydraulic couplings, clutches, torque limiters, etc..
5. Check that the machine in which the gearbox is to be installed is switched off and cannot be accidentally started up.
6. Check that all coupling surfaces are flat.
7. Check that the shaft/shaft or shaft/ bore are perfectly aligned for coupling.
8. Fit suitable guards to prevent accidental contact with rotating parts outside the gearbox.
9. If the work environment is corrosive for the gearbox or any of its parts, follow the special precautions required for aggressive environments. Contact the manufacturer’s technical assistance service for further details.
10. **We recommend applying a protective paste such as Klüberpaste 46 MR 401 (or a product with similar properties and application range) to all key type couplings to ensure optimal coupling and protection against fretting corrosion. Clean all friction couplings thoroughly but do not apply any protective pastes to them.**
11. Thoroughly clean all other contact surfaces (feet, flanges, etc.) and apply a suitable protective product to them to prevent oxidation.
12. Mechanical organs keyed on to the solid gearbox output shafts must be machined to an ISO H7 tolerance to prevent couplings from seizing and to prevent irreparable damage to the gearbox during installation. To ensure effective coupling, driven shafts should be machined to the tolerances specified in the “PREPARING CUSTOMER SHAFTS” section in this manual.
13. In outdoor installations, protect the gearbox and its motor from direct sunlight and inclement weather by means of canopies or covers. Make sure that the assembly is properly ventilated.
14. Make sure that the casing of the gearbox is connected to the equipotential protection (earth/ground) circuit of the machine in which it is installed.
15. Evaluate whether accessible surfaces may exceed the temperature limits established in EN ISO 13732-1 on the basis of the gearbox conditions of use and ambient temperatures; if these limits can be easily reached or exceeded, the surfaces in question must be protected to prevent contact (by means of guards and/or lagging). Wherever impossible, signs bearing symbol 5041 of IEC standard 60417 “Warning! Hot surfaces” must be displayed in such a way that they are clearly visible to machine operators (bearing in mind the position and orientation of the gearbox). Refer to chapter “ALLOWED TEMPERATURE LIMITS” for further details.

Symbol 5041 of IEC standard 60417 “Risk of burns! Hot Parts”

Proceed as follows to install the gearbox.

16. Place the gearbox in the vicinity of the installation area.
17. Mount the gearbox and secure it to the structure at the fixing points provided. Secure the gearbox to the structure using all the fixing points on the relevant mounting (foot or flange).
18. Locate the blind service plug fitted for shipping and replace it with the vent plug or kit included in the supply (if relevant). Refer to the plug diagram in the “LUBRICATION” section of this manual.
19. Tighten the fixing bolts to the torque values given in the following table.

(tab 1)

Bolt size	Fixing bolt tightening torque [Nm]		
	Bolt class		Stainless steel
	8.8	**10.9**	
	+5% /-10%		+5% /-5%
M2.5	0,75	—	—
M3	1,34	—	—
M4	3	4,5	2,1
M5	5.9	8,9	4,2
M6	10.3	15,3	7,3
M8	25.5	37	18
M10	50	73	35
M12	87.3	127	61
M14	138.3	201	150
M16	210.9	314	—
M18	306	435	—
M20	432	615	—
M22	592	843	—
M24	744	1060	—
M27	1100	1570	—
M30	1500	2130	—
M33	1850	2600	—
M36	2350	3300	—
M39x3	3200	4500	—
M42x3	4050	5700	—

In general, 8.8 grade bolts are sufficient for correct installation. Under particularly harsh operating conditions, grade 10.9 bolts can also be used.
If grade 10.9 bolts are used, make sure that the structure in which they are fitted is of adequate strength. Do not use bolts graded higher than 8.8 to install gearboxes with mounting elements (casing, flange or foot) made from aluminium.

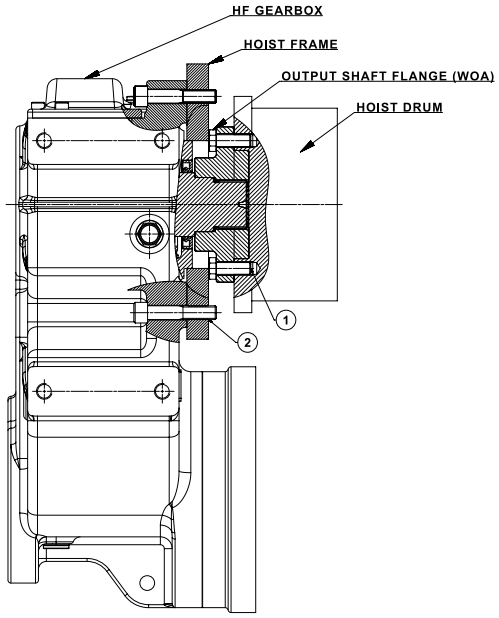
20. Fill the gearbox with oil or top up as necessary, as instructed in the “LUBRICATION” section in this manual.
21. Check that all service plugs are tightened to the torque values given in the following table.

(tab 2)

Plug/vent thread	Pitch (threads per inch)	Tightening torque [Nm]	
		Plugs with non-metallic gasket	Plugs with metallic gasket
		+5%/-5%	
1/8”	28	5	10
1/4”	19	7	10
3/8”	19	7	20
1/2”	14	14	30
3/4”	14	14	40
1”	11	25	40
M14x2	2 [mm]	20	—

5.1.1 Output shaft flange connection with Drum and Gearbox Hoist frame connection

Do not use hammers or other tools which might damage the gearbox shafts or bearings to fit external parts. Proceed as shown below, following the recommendations given in the "INSTALLING CONNECTING ELEMENTS" section in this manual:



screw (1) to connect the Splined output flange to Drum, screw (2) to connect the Gearbox to Hoist frame.

5.2 INSTALLING AN ELECTRIC MOTOR WITH AN IEC STANDARD FLANGE

•Thoroughly clean and degrease all the mating surfaces between the motor and the gearbox (shafts and flanges).

• Do not force the surfaces together or use inappropriate tools to couple them. Take care not to damage the flat and/or cylindrical mating surfaces.

• Do not strain the coupling shafts with large thrust or overhung loads.

• To facilitate assembly, use a synthetic oil-based lubricating paste such as Klüberpaste 46 MR 401 (or a product with similar properties and application range).

• Tighten all the motor/gearbox fixing bolts to their prescribed torques. See the "INSTALLING THE GEAR-BOX" section in this manual for tightening torque values.

5.3 INSTALLING CONNECTING ELEMENTS

Use the utmost caution when installing the various components, to ensure that no damage is caused to the gearbox and its parts, such as oil seals and mating surfaces, or internal parts such as gears and bearings.

Make sure that you have access to suitable lifting equipment to perform the installation operations correctly.

When installing external transmission parts do not use hammers or other unsuitable tools, to avoid the risk of damaging the gearbox shafts or supports.

When installing connecting elements it is advisable to preheat them slightly. Take the following precautions when doing so:

Adopt protection against contact with hot parts: risk of burns!

Protect the oil seals from damage and accidental overheating to avoid impairing their functionality (use a heat shield to protect against radiated heat).

The connecting or transmission elements must not transmit static or dynamic external loads to the shafts unless said loads have been calculated at the time of gearbox selection.

If the element to be coupled to the shaft is not fixed axially by the interference of the coupling, utilise suitable retaining components to prevent axial movement of the element in question on the shaft.

5.4 PAINTING AND SURFACE PROTECTION

Gearboxes when no specific protection class is requested, if equipped with cast-iron housing are supplied with the housing painted in factory (GREY RAL 7042). The painted (ferrous) surfaces are protected to at least corrosivity class C2 (UNI EN ISO 12944-2).

If the gearbox has to be painted, protect the nameplate and seal rings against contact with paint and solvent.
Do not paint the mating surfaces that will be used for the final installation (foot or flanges). If mating surfaces are painted, carefully check that the gearbox is rigidly mounted and that its shafts are correctly aligned on completion of the installation.
Contact the manufacturer's technical assistance service before painting any control devices fitted to the gearbox.

5.5 LUBRICATION.

On gearboxes with an oil level plug, check the oil level before starting up the gearbox. As with filling, this operation must be done with the gearbox in the mounting position in which it will be used in the application. If necessary, fill or top up the lubricant to the half way point in the level window, to the reference notch on the dipstick, or until it starts to flow out of the plug hole.

HF Series Gearboxes normally supplied with lubricant and with LO option specified.
(Gearbox breather plug is replaced with a closed plug. Before dispatch, to avoid oil spillage in transit. Check and ensure the closed plug is replaced again with breather)

The lubricant utilised must be new and uncontaminated and can be poured in through the filler hole or from the inspection cover opening using a filler filter with 25 µm mesh, ensuring that the relative gasket is refitted without damaging it or reapplying the sealant to provide a perfectly oil-tight fit.

Do not mix oils of different makes or specifications. Make sure also that the oil is highly resistant to foaming and is EP (Extreme Pressure) rated.

If you do not have the same type of oil, completely drain the gearbox and flush it out thoroughly with the new oil to remove all traces of the old oil and any contaminants from inside the casing before filling the gearbox with the new oil.

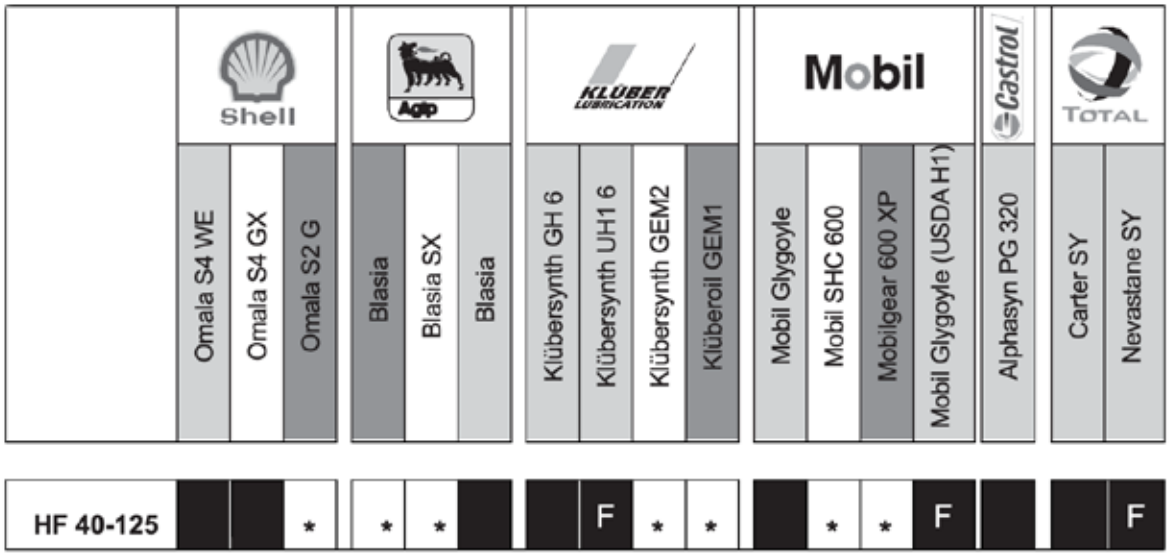
*** The position of the breather, oil level and drain plugs are detailed in customer drawing**

5.5.1 Recommended / Permitted Lubricants.

5.5.1.1 Compatible greases

- Klüber Staburags NBU 8 EP (for bearing)
- Klüberpaste 46 MR 401 (to facilitate the coupling of cyclindrical parts)
- ITP Gasket Seal (to grease contact seals)
- Klüber Petamo GHY 133 N (for Taconite seals)

5.5.1.2 Synthetic oils and mineral oils with EP (Extreme Pressure) additives



5.5.2 Quantity of lubricant

The quantities of lubricant specified in the tables are purely indicative.
Gearboxes with level plugs correctly located for the Mounting Position must be filled to the midpoint of the sight glass, or to the reference notch on the dipstick, or until oil starts to flow out the plug hole, depending on the type of level plug

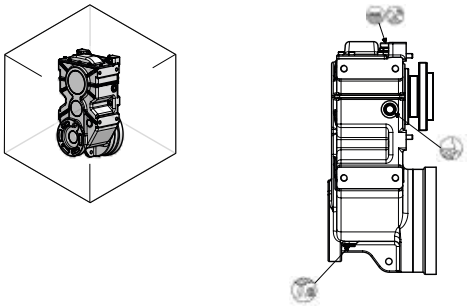
	oil [l]		
	H2	**H3**	**H4**
HF 40	5.0	3.5	3.5
HF 70	8.0	6.0	6.5
HF 125	19.0	14.0	14.5

5.5.3 Mounting positions and service plugs

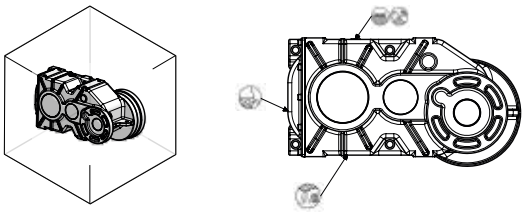
Recommended mounting position and corresponding service plugs, refere to customer drawing or Bonfiglioli technical service assistance. **H2 is Default version**

HF 40 - HF 70

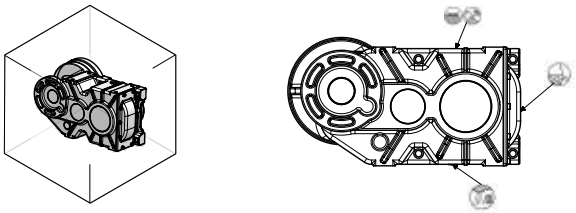
H2



H3

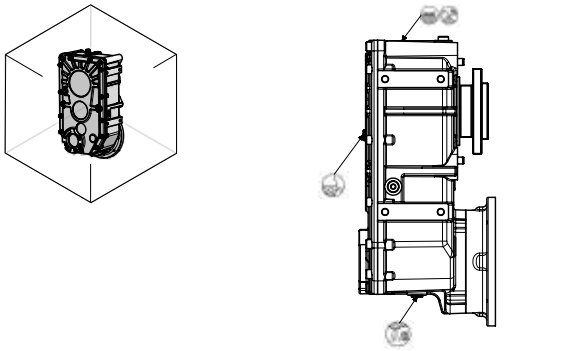


H4

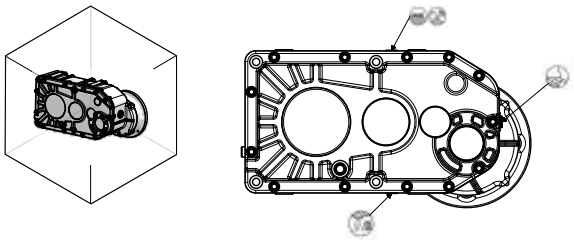


HF 125

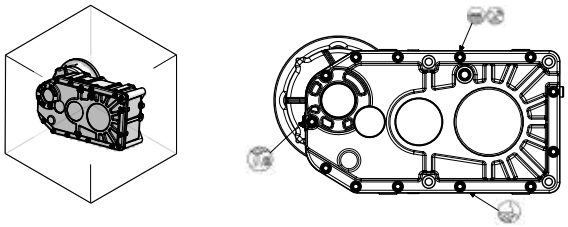
H2



H3



H4



5.6 PUTTING THE GEARBOX INTO SERVICE

The gearbox has been tested in the factory by the manufacturer.

Before starting it up, make sure:

● That the machine or part of the machine in which the the gearbox/gearmotor is to be installed has been declared to conform to the requirements of the Machinery Directive 2006/42/EC and to any other relevant and applicable safety standards.

● That the gearbox mounting position in the installation corresponds to that prescribed and indicated on the nameplate

● It is expressly forbidden to install the gearbox at an angle without having consulted and obtained authorisation from the manufacturer's technical service. A tolerance of ± 5° with respect to the theoretical plane of installation is permitted only for shaft mounted installations.

● That the electrical power supply is suitable and operational as prescribed in EN 60204-1 and is correct grounded

● That the rating of the power supply to the motor and any installed electrical devices corresponds to that prescribed and is within ±10% of the rated value.

● That the oil level in the gearbox/gearmotor and any lubricated accessories is as required and that there are no leaks from any plugs, seals or pipes.

● That any parts and/or accessories disconnected for transport purposes have been reconnected.

● That any of original guards removed for transport purposes have been refitted.

On startup of the gearbox/gearmotor:

● Check that there are no unusual noises and/or vibrations.

● After the first 100 hours of operation, check the tightening torque of all bolt couplings:
- shrink discs
- machine side flanges
- motor flanges
- supports

6 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 ambi- ent problems attendant on the installation. In order to maintain the proper functioning and safety of the gearbox/gearmotor, we recommend that users have non-routine maintenance performed by the Manufacturer or an authorised, specialist service centre. Contact the manufacturer's sales network. Failure to comply with this requirement during the warranty period automatically invali- dates the warranty.

Never improvise repairs.

Before doing any work on the unit, the operator must first switch off power to the gearbox 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.).

● Disconnect power to the machine in which the gearbox is installed before commencing any maintenance work, and secure all switches in the OFF position. All persons performing maintenance must secure the disconnecting switches for themselves, using personal devices (e.g. padlocks) the keys of which they must keep with them for the duration of the work.
● Ensure surfaces have cooled before commencing work. If necessary, wear anti-burn safety gloves when working on gearboxes. Refer to chapter "ALLOWED TEMPERATURE LIMITS" for further details.
● Before commencing any maintenance work, activate all the safety devices provided and, if necessary, inform persons working in the vicinity. Cordon off the area around the gearbox 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.
● Use only recommended lubricants (oil and grease).
● When working on the gearbox, always replace all gaskets and seals with original new ones.
● If a bearing requires replacement, it is good practice to replace the other bearing on the same shaft as well.
● Change the oil after completing maintenance work.
● If, during work, there is any risk of coming into contact with oils and greases, respect the safety precautions provided on the manufacturer's data sheets and use all items of personal protective equipment specified therein.
● When performing any maintenance of repair, always check the tightening torque of shrink disc bolts on the drive shaft. For the correct values, see the "INSTALLING AN ELECTRIC MOTOR WITH A SHRINK DISC" section in this manual.

If the gearbox is not going to be used for a prolonged period following installation or run-in, it must be run at least once a month. If this is not possible, the gearbox must be protected against corrosion with a suitable rust inhibitor, or completely filled with new oil of the type normally utilised for operating duty. (See the "STORAGE" section in this manual.)

The above instructions are aimed at ensuring the efficient and safe operation of the gearbox.
The manufacturer declines all liability for injury to persons or damage to components due to the use of non-original spare parts or non-routine work that compromises safety requirements without express prior authorisation. Refer to the specific spare parts catalogue when ordering spare parts for the gearbox.

Do not disperse contaminant liquids, worn parts and maintenance residues in the environment. Dispose of all such substances in strict compliance with applicable statutory legislation.

6.1 CHECKING OPERATIONAL EFFICIENCY

● Periodically remove any dust from the gearbox and motor casings.
● Check that the noise generated at constant load does not vary. Excessive vibration or noise can indi- cate wear of the gear train or failure of a bearing.
● Check power absorption and voltage against the nominal values given on the motor's nameplate.
● On brake motors, check the friction surfaces and friction material for wear and adjust the gap if neces- sary.
● Check for lubricant leaks from the gaskets/seals, plugs, casings and pipes.
● Check that temperature does not rise above normal operating levels (refer to chapter "ALLOWED TEMPERATURE LIMITS") unless this is justified by a corresponding increase in the applied load, rota- tion speed, ambient temperature or other factor. If temperature rises, stop the gearbox immediately and identify the cause of the fault.
● Check all bolt couplings for wear, deformation and corrosion and tighten the bolts correctly, without exceeding the torque values specified in the "INSTALLING THE GEARBOX" section in this manual

6.2 ROUTINE MAINTENANCE

Respect the manufacturer's routine maintenance schedule to keep the gearbox at peak efficiency. Good maintenance ensures maximum gearbox performance, extended service life and continued compliance with safety regulations.

List of routine checks
We recommend keeping a checklist of inspections so that any changes in individual control parameters can be identified rapidly and easily.

The times indicated in the following tables vary significantly in relation to the conditions of use of the gearbox and must be construed as valid in the absence of other types of problems.

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

(*) = Replacement within 1 year

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

(#) = Recommended checking every 6 months

Inspection parameter	Frequency
Oil changes	see specific table
Oil pressure (if there are a circuits)	24 h
Noise, vibration	24 h
External condition of gearbox (fouling, oil deposits)	170 h ... 720 h
Oil leaks, external seals and gaskets	720 h
Oil level	720 h
Oil filter contamination indicator (where required)	720 h
Vent filter (where required)	2200 h
Tightness of fixing bolts, connecting flanges and torque transmission components	2000 h ... 4000 h
Check the elastic elements in all joints for wear (where required)	2000 h ... 4000 h
Alignment of gearbox shafts with respect to coupled machine shafts at each oil change	9000 h ... 18000 h
Cleanliness of electric motor fan and fan cowling (if present) and cleanliness of gearbox body	at each oil change

6.3 OIL CHANGES

1. Place a suitable container under the drain plug.
2. Remove the filler and drain plugs and allow the oil to drain out.
3. Wait for a few minutes to ensure all the oil has drained out. Thoroughly clean the drain plug magnet (if fitted), fit a new seal and refit the drain plug.
4. With the gearbox installed in its final mounting position, fill it with oil to the mid point of the sight glass, or to the reference notch on the dipstick, or until oil starts to flow out of the level hole. Restore the type of oil indicated on the nameplate. Refer to chapter “Lubrication” for further details.
5. Fit a new seal, replace and tighten the filler plug.

See the “Lubrication” section in this manual for details of the quantity of oil required. Specified quantities are only approximate. Gearboxes must be filled to the mid point of the sight glass, or to the reference notch on the dipstick, or until oil starts to flow out of the oil level hole, according to the mounting position specified on 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 may be fatal if swallowed.
Handle them with care using suitable personal protection equipment. Do not dump them into the environment and dispose of in accordance with applicable legislation.

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

6.4 CLEANING

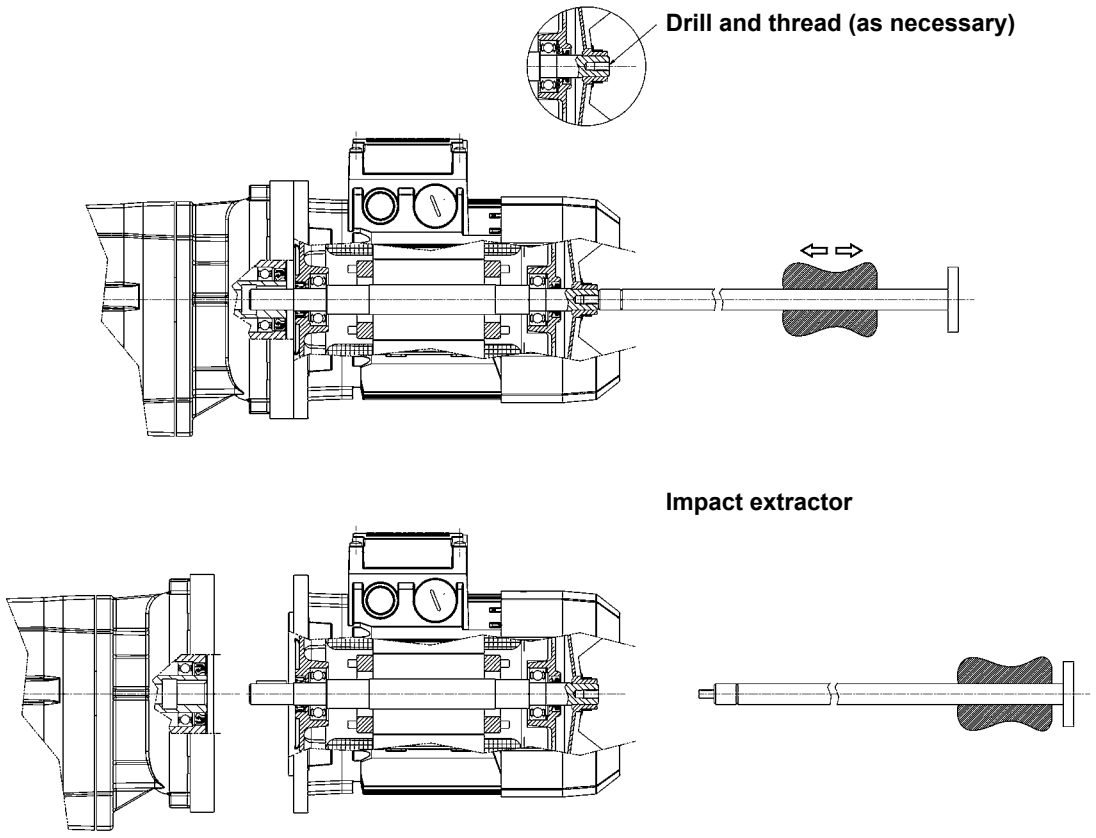
To clean dust, dirt and process residues off the gearbox, do not use solvents or other products that might be incompatible with the materials from which it is made, and do not direct high pressure jets of water on to the gearbox.

7 REMOVAL

7.1 REMOVING A MOTOR WITH AN IEC STANDARD FLANGE

If the mobile coupling between the motor and the gearbox has not rusted badly during service, it should be possible to remove the motor without applying excessive force once the screws coupling it to the gearbox have been removed.

If it proves difficult to remove the motor, do not use screwdrivers or levers to apply force as this may damage the flanges and mating surfaces. Proceed as illustrated below instead.



1. Drill and thread the fan end of the drive shaft if it is not already threaded.
2. Screw in an impact extractor.
3. Undo the bolts fixing the motor to the gearbox.
4. Use the impact extractor to detach the motor.

8 TROUBLESHOOTING

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

If any components fail or require replacement as a result of levels of wear likely to compromise the functioning of the gearbox, contact the Manufacturer's sales network.

(tab 3)

FAULT	CAUSE	REMEDY
Bearing temperature too high.	Oil level too low.	Top up oil level.
	Oil too old.	Change oil.
	Bearings faulty.	Contact authorised workshop.
Operating temperature too high.	Oil level too high.	Check oil level.
	Oil too old.	Change oil.
	Oil contaminated.	Change oil.
Abnormal running noise.	Gears damaged.	Contact authorised workshop.
	Excessive axial play in bearings.	Contact authorised workshop.
	Bearings faulty or worn.	Contact authorised workshop.
	Excessive load applied.	Bring external loads into conformity with rated values specified in sales catalogue.
	Oil contaminated.	Change oil.
Abnormal noise at gearbox mounting.	Mounting bolts loose.	Tighten bolts to specified torque.
	Mounting bolts worn.	Replace mounting bolts.
Oil leaks.	Oil level too high.	Check oil level.
	Casing/coupling seals inadequate.	Contact authorised workshop.
	Gaskets worn.	Contact authorised workshop.
Gearbox does not run or runs with difficulty.	Oil viscosity too high.	Change oil (see recommended lubricant table).
	Oil level too high.	Check oil level.
	Excessive load applied.	Redesign transmission system to suit actual load.
Output shaft does not turn with motor running.	Gears damaged.	Contact authorised workshop.

9 DISPOSING OF THE GEARBOX

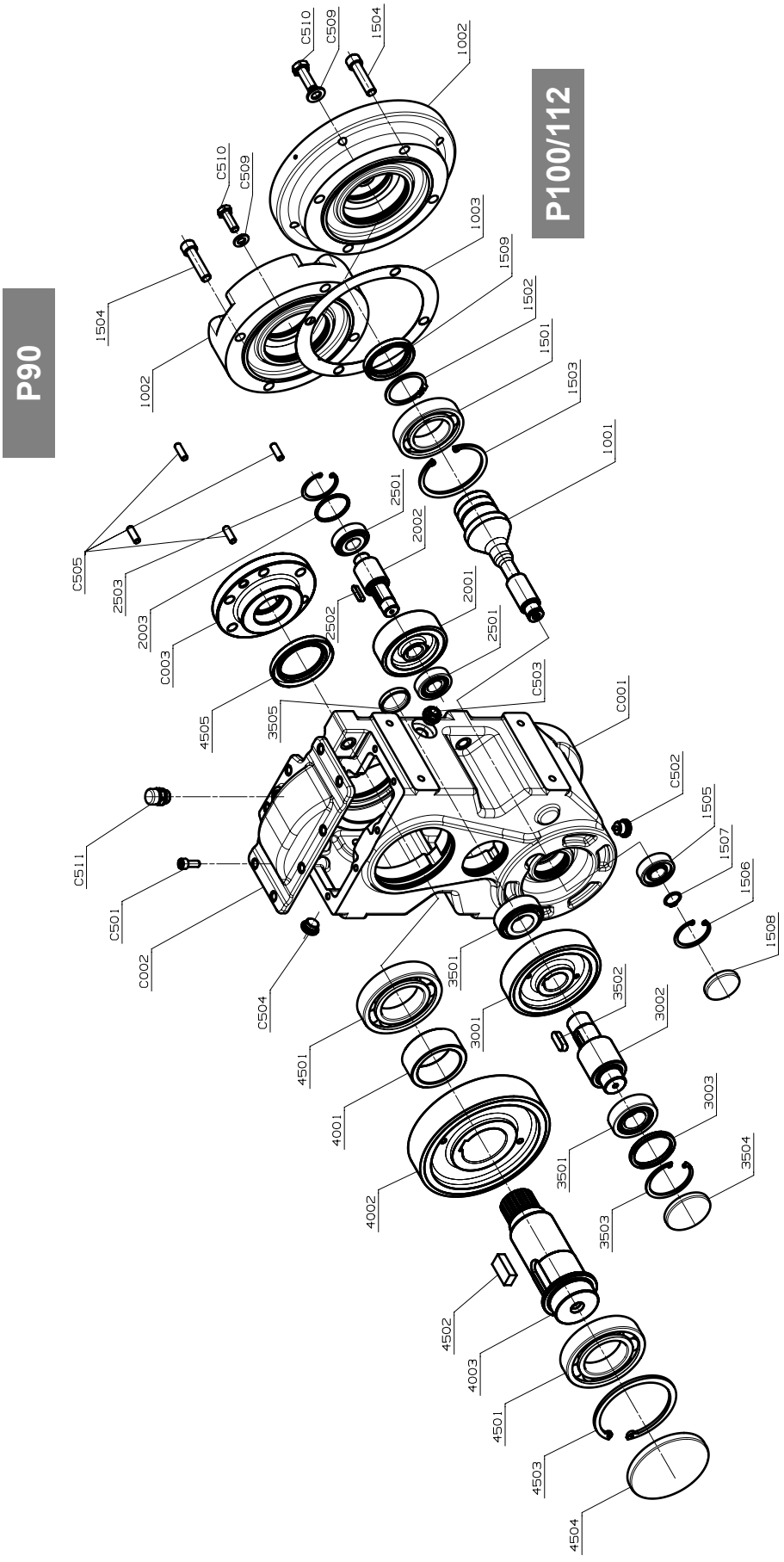
Make sure that the gearbox cannot function accidentally while it is being taken out of service.

The gearbox/gearmotor must be disposed of in compliance with environmental legislation, and the various materials used in its manufacture must be delivered to an authorised disposal/recycling centre.

The gearbox 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 current environment protection laws.

Do not 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 EXPLODED VIEW & SPARE PARTS LIST



Bonfiglioli Riduttori

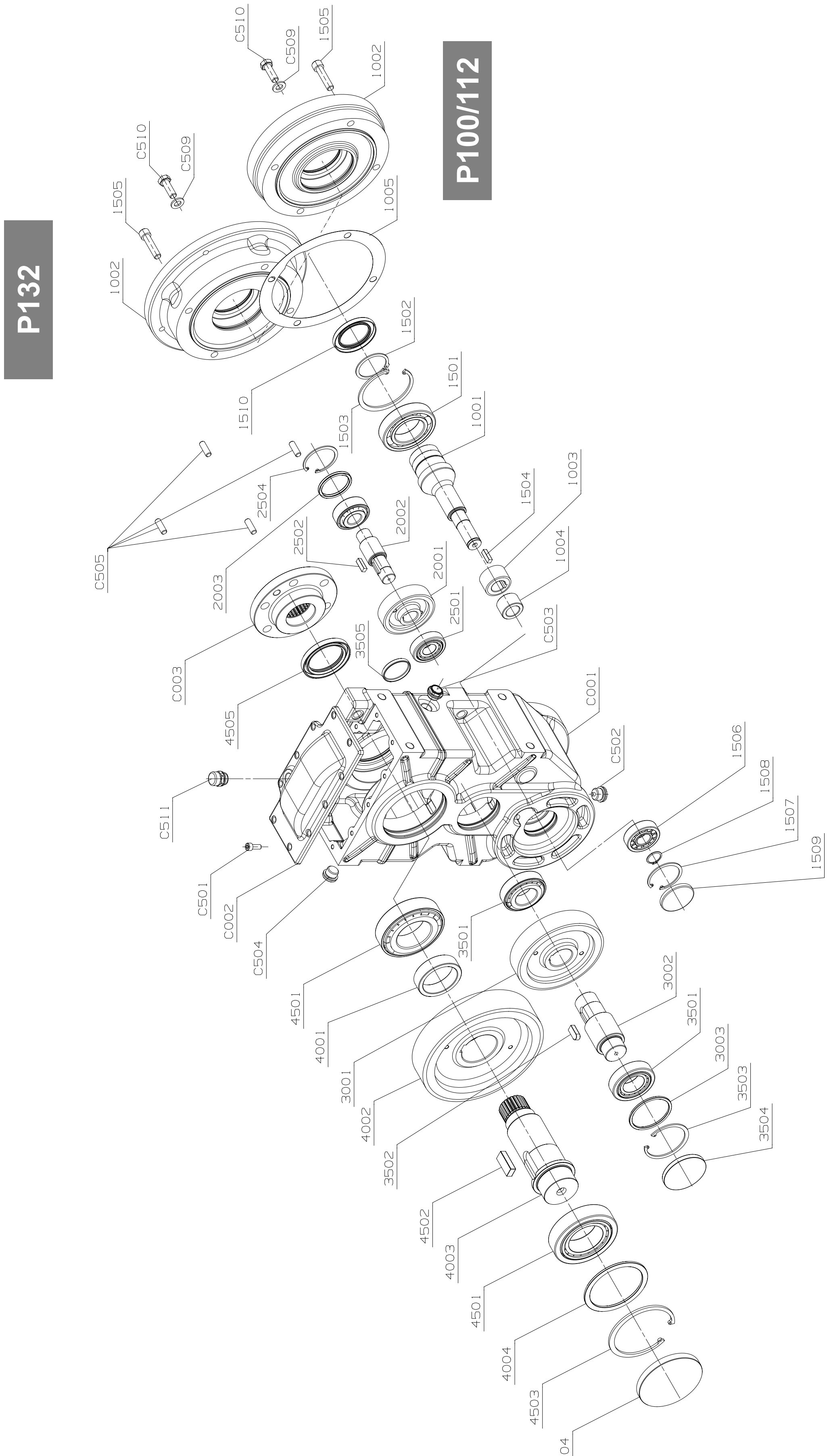
HF ...	POS.	DESCRIPTION
HF 40	1001	SOLID INPUT SHAFT
	1002	MOTOR FLANGE
	1003	GASKET
	2001	1ST REDUCTION WHEEL
	2002	2ND REDUCT PINION
	2003	SPACER RING
	3001	2ND REDUCTION WHEEL
	3002	3RD REDUCTION PINION
	3003	SPACER RING
	4001	SPACER RING

HF ...	POS.	DESCRIPTION
HF 40	4002	3RD REDUCTION WHEEL
	4003	OUTPUT SHAFT
	C001	HOUSING
	C002	INSPECTION COVER
	C003	SHAFT FLANGE
	C502	CLOSING PLUG
	C503	LEVEL PLUG
	C504	DRAIN PLUG
	C511	BREATHER PLUG

HF 40	**1501**	**1505**	**2501**	**3501**	**4501**	**1503**	**1506**	**2503**	**3503**	**4503**	**1502**	**1507**	**2502**	**3502**	**4502**
	6210	NJ204	30204	32206	6212	90	47	47	62	110	50	20	6X6X25 A	10X8X30 A	18X11X38 B

						P 90	P 100/112	P 90	P 100/112						
HF 40	**C505**	**1509**	**4505**	**C501**	**1504**	**C510**		**C509**		**1508**	**3504**	**3505**	**4504**		
	Ø8X25	50X68X8 DL	60X85X8 DL	M8X20	M12X50	M10X30	M12X35	Ø10.5	Ø13	Ø47X7	Ø62X7	Ø40X7	110X10		

HF 70

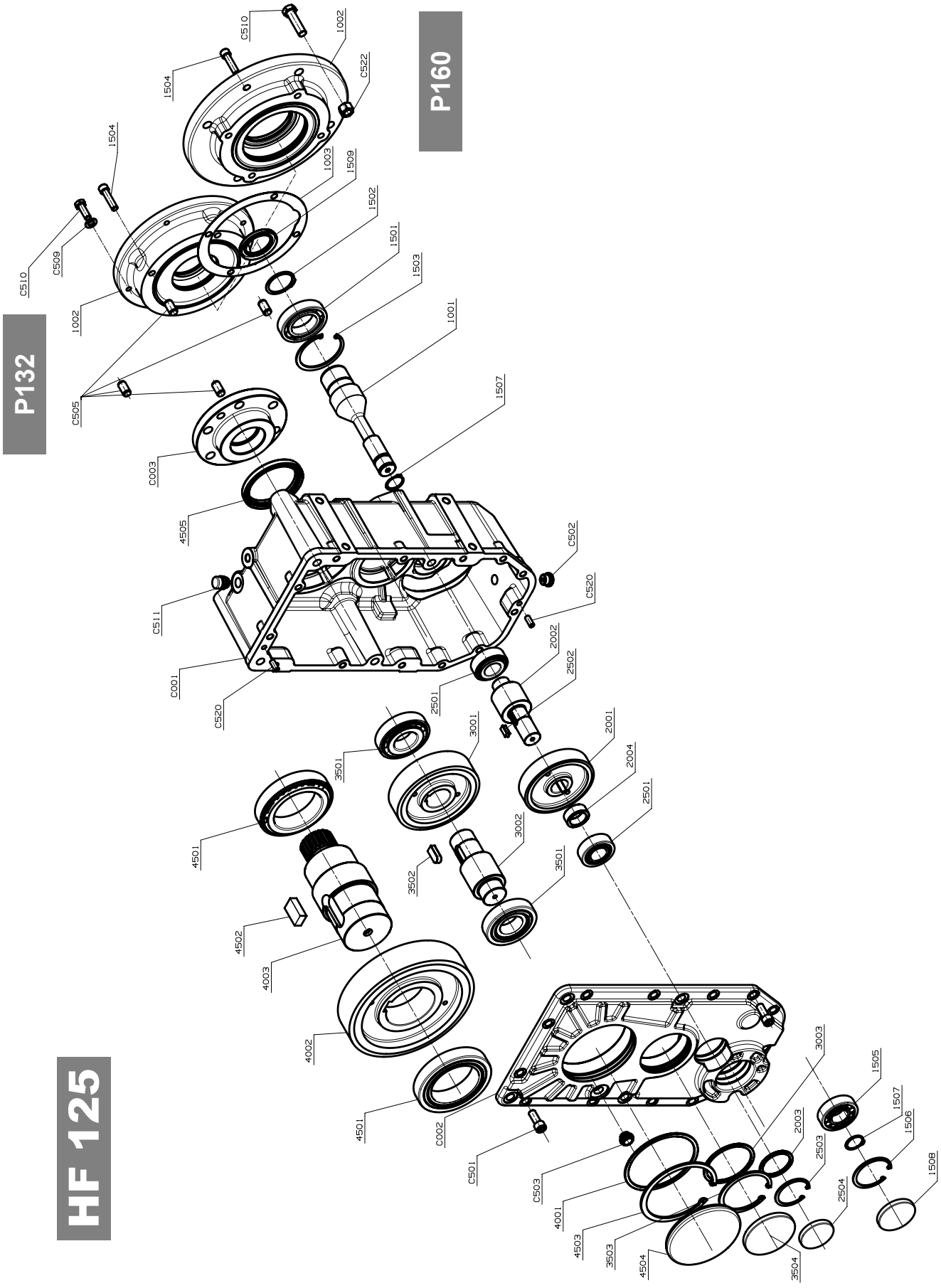


HF ...	POS.	DESCRIPTION
HF 70	1001	SOLID INPUT SHAFT
	1002	MOTOR FLANGE
	1003	1ST REDUCTION PINION
	1005	GASKET
	2001	1ST REDUCTION WHEEL
	2002	2ND REDUCTION PINION
	3001	2ND REDUCTION WHEEL
	3002	3RD REDUCTION PINION

HF ...	POS.	DESCRIPTION
HF 70	4001	SPACER RING
	4002	3RD REDUCTION WHEEL
	4003	OUTPUT SHAFT
	4004	SPACER RING
	C001	HOUSING
	C002	INSPECTION COVER
	C003	SHAFT FLANGE

																
HF 70	**1501**	**1506**	**2501**	**2503**	**3501**	**4501**	**1507**	**2504**	**3503**	**4503**	**1502**	**1508**	**1504**	**2502**	**3502**	**4502**
	6211	NJ305E	30305	32305	32208	32213	62	62	80	120	55	25	8X7X25 B	8X7X25 B	12X8X28 C	18X11X44 B

														
							P112	P132	P112	P132				
HF 70	**C505**	**1510**	**4505**	**C501**	**1505**	**C510**			**C509**		**1509**	**3504**	**3505**	**4504**
	Ø10X30	55X80X8 DL	65X90X10 DL	M8X20	M12X50	M12X35		Ø13			Ø62X7	Ø80X8	Ø52X7	Ø120X12


HF 125
P132
P160
C510
1002
C522
1504
1504
1003
1509
C509
1502
C510
1501
1503
1002
1001
C505
1507
C003
4505
C502
C511
C520
C001
2002
2502
C520
2501
3001
2001
3501
2004
2501
4501
3002
3502
3501
4502
4003
4002
4501
C002
3003
1505
C501
2003
1507
C503
2503
1506
4001
2504
1508
4503
3503
4504
3504

HF ...	POS.	DESCRIPTION
HF 125	1001	SOLID INPUT SHAFT
	1002	MOTOR FLANGE
	1003	GASKET
	2001	1ST REDUCTION WHEEL
	2002	2ND REDUCTION PIN
	2003	SPACER RING
	2004	SPACER RING
	3001	2ND REDUCTION WHEEL
	3002	3RD REDUCTION PINION
	3003	SPACER RING

HF ...	POS.	DESCRIPTION
HF 125	4001	SPACER RING
	4002	3RD REDUCTION WHEEL
	4003	OUTPUT SHAFT
	C001	LOWER HOUSING
	C002	UPPER HOUSING
	C003	SHAFT FLANGE
	C502	DRAIN PLUG
	C503	LEVEL PLUG
	C511	BREATHER PLUG

																		
	P132	P160					P132	P160					P132	P160				
HF 125	**1501**		**1505**	**2501**	**3501**	**4501**	**1503**		**1506**	**2503**	**3503**	**4503**	**1502**		**1507**	**2502**	**3502**	**4502**
	6211	6216	NJ307E	33207	30310	32021 X	100	140	80	75	110	160	55	80	35	10X8X23 B	16X10X38 C	28X16X50 B

																
			P132	P160				P132	P160	P160	P132					
HF 125	**C505**	**C520**	**1509**		**4505**	**1504**	**C501**	**C510**		**P160**	**P132**	**1508**	**2504**	**3504**	**4504**	
	Ø16X30	Ø10X25	55X80X8 DL	80X110X10 DL	105X130X12 DL	M12X50	M14X35	M12X35	M16X60	C522	C509	Ø80X10	Ø72X10	Ø110X10	Ø160X15	

INDEX OF REVISIONS (R)

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Bonfiglioli

We have a relentless commitment to excellence, innovation & sustainability. Our team creates, distributes and services world-class power transmission & drive solutions to keep the world in motion.

HEADQUARTERS
Bonfiglioli S.p.A
Via Cav. Clementino Bonfiglioli, 1
40012 Calderara di Reno - Bologna (Italy)
Tel. +39 051 6473111