

Bonfiglioli **Riduttori**

AS- series

Installation, Operation and
Maintenance Manual



USER MANUAL

 **Bonfiglioli**
Forever Forward

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GENERAL INFORMATION:

1.1 PURPOSE OF THIS MANUAL

This manual has been prepared by the manufacturer in order to provide information regarding the safe handling, installation, maintenance, repair, disassembly of the gearbox / geared motor. **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 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 the time the gearbox was introduced.

1.2 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.

1.3 MANUFACTURER'S LIABILITY

The Manufacturer declines all liability in the event of:

- use of the gearbox/geared motor 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 geared motors 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 authorized 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.**

1.4 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/geared motor 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.



If a gearbox must be serviced in a potentially explosive atmosphere, the service engineer must first switch off power to its motor to ensure that it is out of service and must take all necessary precautions against it being accidentally switched on again and against connected parts moving without warning.



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



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/ geared motor 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 downwardssuitable 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.

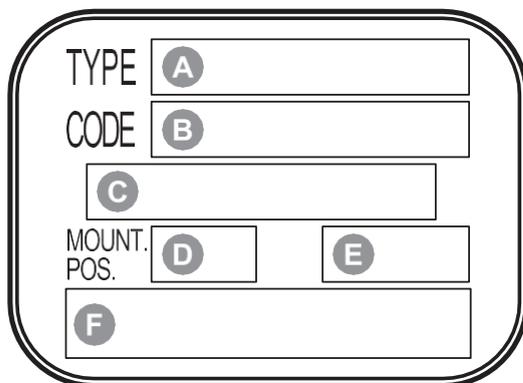
Wait for the gearbox to cool before inspecting it.

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 (geared motor), 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 always be legible. 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.

SAFETY SPECIFICATIONS FOR ATEX-COMPLIANT GEARBOXES



- Use only synthetic lubricants (oil and grease).
- Use only Fluor elastomer seals.
- Apply thread lock to all external bolts and plugs.
- Fit vent plugs with anti-intrusion valves.
- Fit double oil seals on the output shafts of AS Series gearboxes, and oil seals with dust traps on all other types.
- Ensure that all components and products can resist temperatures above the maximum rated operating temperature.
- Ensure that there are no metal parts in sliding contact outside the gearbox.
- Ensure that plastic parts cannot accumulate an electrostatic charge or are shielded if they can.
- Install irreversible heat sensors.
- Installations in zones 21 and 22 require the user to draft and implement a regular cleaning schedule for all surfaces and recesses to avoid the build-up of dust.
- To prevent dust building up in difficult to access areas, sealing devices, mounting flanges and external threads must be provided at all mobile couplings.

3.3 CONFORMITY

All gearboxes or geared motors (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 geared motor motors conform to the provisions of the Low Voltage Directive 2006/95/EC and the Electromagnetic Compatibility Directive 2004/108/EC.



If specified for use in potentially explosive atmospheres, gearboxes must also be designed and constructed to conform with the Essential Health and Safety Requirements (EHSR) of Annex II of the ATEX Directive 2014/34/EU and must conform to the following classification:

- Equipment group: **II**.
- Category: Gas **2G** – Dust **2D**.
- Zone: Gas **1** – Dust **21**.
- Temperature class: **T4** for 2G and **135°C** for 2D.
- Some types of gearbox, as specified in this catalogue, are exceptions to this rule and are marked temperature class **T3** for 2G or **160°C** for 2D.

GEAR UNIT STRUCTURE:

AS...
45 ÷ 110

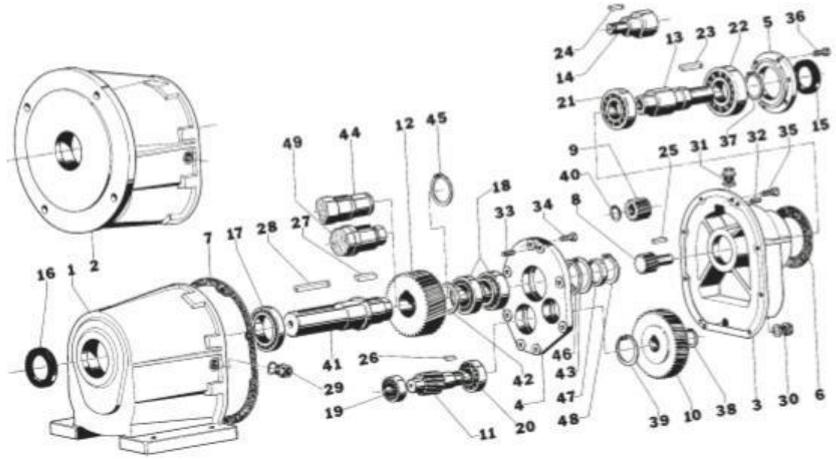


AS.../P



AS.../F

Quantità: 2 - Quantity: 2 - Quantität: 2 - Menge: 2 - Cantidad: 2



AS...	Cuscinetti - Bearings - Roulements - Kugellager - Rodamientos						Anelli di tenuta O-rings Joint d'étanchéité Simmerringe Retén	
	17	18	19	20	21	22	15	16
45	32010 50/80/20	32006 40/68/19	32005 25/47/15	32006 30/55/17	NJ207E 35/72/17	6308 40/90/23	40/62/7	50/72/8
55	32012 60/95/23	32010 50/80/20	32006 30/55/17	32007 35/62/18	NJ307E 35/80/21	6309 45/100/25	45/72/8	60/85/8
60	33013 65/100/27	33109 45/80/26	32207 35/72/24,25	30209 45/85/20,75	NJ309E 45/100/25	6310 50/110/27	50/80/8	65/90/10
80	NJ2216 80/140/33	32012 60/95/23	32209 45/85/24,75	30211 55/100/22,75	22211 55/100/25	6312 60/130/31	60/85/8	90/120/12
90	NJ2218 E 90/160/40	32015 75/115/25	32212 60/110/29,75	32213 65/120/32,75	22214 70/125/31	6314 70/150/35	70/100/10	100/130/12
100	NJ2220 100/180/46	32017 85/130/29	32214 70/125/33,25	32215 75/130/33,25	22217 85/150/36	21316 80/170/39	80/100/10	115/150/12
110	NJ2222 E 110/200/53	32019 95/145/32	32216 80/140/35,25	32218 90/160/42,5	22220 100/180/48	21319 95/200/45	95/120/12	125/160/12

AS...	N.	Denominazione	Description	Dénomination	Benennung	Denominación	
45-55-60-80-90-100-110	1	Cassa con piedi	Casing with feet	Carter avec pattes	Gehäuse mit Füßen	Caja con piés	
	2	Cassa con flangia	Casing with flange	Carter avec bride	Gehäuse mit Flansch	Caja con brida	
	3	Coperchio di chiusura	Cover	Couvercle	Deckel	Tapa	
	4	Supporto interno	Internal support	Support intérieur	Inn. Stütze	Soporte interno	
	5	Cappello	Cap	Capuchon	Abschlußdeckel	Sombbreroete	
	6	Guarnizione	Gasket	Joint d'étanchéité	Simmerringe	Retén	
	7	Guarnizione	Gasket	Joint d'étanchéité	Simmerringe	Retén	
	8	Pignone 1° riduz. con gambo	Extended 1° red. pinion	Pignon 1° red. avec bout	Ritzel 1. Red.	Piñon 1° red.	
	9	Pignone 1° riduz. con foro	Bored 1° red. pinion	Pignon 1° red. avec trou	Ritzel 1. Red. mit Bohrung	Piñon 1° red.	
	10	Corona 1° riduzione	1° red. gearwheel	Couronne 1° red.	Zahnrad 1.Red.	Corona 1° red.	
	11	Pignone 2° riduzione	2° red. pinion	Pignon 2° red.	Ritzel 2. Red.	Piñon 2° red.	
	12	Corona 2° riduzione	2° red. gearwheel	Couronne 2° red.	Zahnrad 2.Red.	Corona 2° red.	
	13	Albero veloce con foro	Bored input shaft	Arbre d'entrée avec trou	Antriebswelle mit Bohrung	Eje de entrada	
	14	Albero veloce con gambo	Extended input shaft	Arbre d'entrée avec bout	Antriebswelle	Eje de entrada	
	15	Anello di tenuta	Oilseal	Joint d'étanchéité	Simmerringe	Retén	
	16	Anello di tenuta	Oilseal	Joint d'étanchéité	Simmerringe	Retén	
	17	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	18	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	19	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	20	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	21	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	22	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	23	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
	24	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
	26	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
	27	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
	28	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
	29	Tappo di livello	Level plug	Niveau	Ölschauglas	Tapón nivel	
	30	Tappo di scarico	Drain plug	Bouchon de vidange	Entleerungsschraube	Tapón vaciado	
	31	Tappo di carico e sfiato	Breather plug	Bouchon de charge	Entleerungsschraube	Tapón de llenado	
	32	Spina cilindrica	Parallel pin	Goupille cylindrique	Zylind. Anzugstift	Perno de centrage	
	33	Spina cilindrica	Parallel pin	Goupille cylindrique	Zylind. Anzugstift	Perno de centrage	
	34	Vite a testa esagonale	Hex. head screw	Vis de fixation	Schraube	Tornillo exg.	
	35	Vite a testa esagonale	Hex. head screw	Vis de fixation	Schraube	Tornillo exg.	
	36	Vite a testa esagonale	Hex. head screw	Vis de fixation	Schraube	Tornillo exg.	
	37	Seeger esterno	Circlip	Seeger ext.	Seeger	Anello elastico esterno	
	38	Seeger esterno	Circlip	Seeger ext.	Seeger	Anello elastico esterno	
	39	Seeger interno	Circlip	Seeger int.	Seeger	Anello elastico interno	
	40	Seeger esterno	Circlip	Seeger ext.	Seeger	Anello elastico esterno	
	43	Seeger interno	Circlip	Seeger int.	Seeger	Anello elastico interno	
	90-100-110	25	Linguetta	Key	Clavette	Einlegekeil	Chaveta
	45-55	41	Albero lento	Output shaft	Arbre de sortie	Abtriebswelle	Eje de salida
		42	Distanziale	Spacer ring	Entretoise	Distanzring	Distanciadior
45-55-60	46	Distanziale	Spacer ring	Entretoise	Distanzring	Distanciadior	
60	45	Seeger esterno	Seeger ext.	Seeger ext.	Seeger	Anello elastico esterno	
	49	Albero lento	Output shaft	Arbre de sortie	Abtriebswelle	Eje de salida	
80-90-100-110	44	Albero lento	Output shaft	Arbre de sortie	Abtriebswelle	Eje de salida	
	45	Seeger esterno	Seeger ext.	Seeger ext.	Seeger	Anello elastico esterno	
	47	Distanziale	Spacer ring	Entretoise	Distanzring	Distanciadior	
	48	Seeger esterno	Circlip	Seeger ext.	Seeger	Anello elastico esterno	

AS.../D 45 ÷ 110

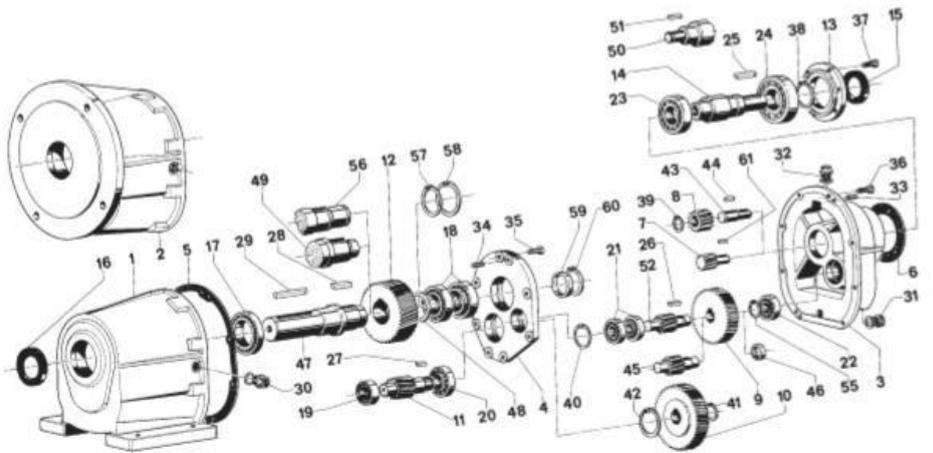


AS.../DP



AS.../DF

Quantità: 2 - Quantity: 2 - Quantidade: 2 - Menge: 2 - Cantidad: 2



AS.../D	Cuscinetti - Bearings - Roulements - Kugellager - Rodamientos										Anelli di tenuta O-rings Joint d'étanchéité Simmerringe Retén	
	17	18	19	20	21	22	23	24	15	16		
45	32010 50/80/20	32008 40/68/19	32005 25/47/15	32006 30/55/17	6303 17/47/14	6303 17/47/14	6206 30/62/16	6206 30/62/16	30/52/7	50/72/8		
55	32012 60/95/23	32010 50/80/20	32006 30/55/17	32007 35/62/18	6304 20/52/15	6304 20/52/15	6207 35/72/17	6308 40/90/23	40/62/7	60/85/8		
60	33013 65/100/23	33109 60/80/20	32207 35/72/24,25	30209 45/85/20,75	3205 25/52/20,5	6305 25/62/17	NJ207E 35/72/17	6308 40/90/23	40/62/7	65/90/10		
80	NJ2216 80/140/33	32012 60/95/23	32209 45/85/24,75	30211 55/100/22,75	32006 30/55/17	NJ2206 30/62/20	NJ307E 35/80/21	6309 45/100/25	45/72/8	90/120/12		
90	NJ2218 E 90/160/40	32015 75/115/25	32212 60/110/29,75	32213 65/120/32,75	32008 40/68/19	NJ2206 40/80/23	NJ309E 45/100/25	6310 50/110/27	50/80/8	100/130/12		
100	NJ2220 100/180/46	32017 85/130/29	32214 70/125/33,25	32215 75/130/33,25	NJ311 55/120/29	NJ310 50/110/27	NJ310E 70/125/31	6314 70/150/35	70/100/10	115/150/12		
110	NJ2222 E 110/200/53	32019 95/145/32	32216 80/140/35,25	32218 90/160/42,5	NJ313 65/140/33	NJ312 60/130/31	NJ313 65/140/33	21316 80/170/39	80/100/10	125/160/12		

AS.../D	N.	Denominazione	Description	Dénomination	Benennung	Denominación	
45-55-60-80-90-100-110	1	Cassa con piedi	Casing with feet	Carter avec pattes	Gehäuse mit Füßen	Caja con piés	
	2	Cassa con flangia	Casing with flange	Carter avec bride	Gehäuse mit Flansch	Caja con brida	
	3	Coperchio di chiusura	Cover	Couvercle	Deckel	Tapa	
	4	Supporto interno	Internal support	Support intérieur	Inn. Stütze	Soporte interno	
	5	Guarnizione	Gasket	Joint d'étanchéité	Simmerringe	Retén	
	6	Guarnizione	Gasket	Joint d'étanchéité	Simmerringe	Retén	
	7	Pignone 1° riduz. con gambo	Extended 1 st red. pinion	Pignon 1 ^{ère} red. avec bout	Ritzel 1. Red.	Piñon 1° red.	
	8	Pignone 1° riduz. con foro	Bored 1 st red. pinion	Pignon 1 ^{ère} red. avec trou	Ritzel 1. Red. mit Bohrung	Piñon 1° red.	
	9	Corona 1° riduzione	Gearwheel 1 st red.	Couronne 1 ^{ère} red.	Zagrad 1. Red.	Corona 1° red.	
	10	Pignone 2° riduzione	Gearwheel 2 nd red.	Couronne 2 ^{ème} red.	Zagrad 2. Red.	Corona 2° red.	
	11	Pignone 3° riduzione	Pinion 3 rd red.	Pignon 3 ^{ème} red.	Ritzel 3. Red.	Piñon 3° red.	
	12	Corona 3° riduzione	Gearwheel 3 rd red.	Couronne 3 ^{ème} red.	Zagrad 3. Red.	Corona 3° red.	
	13	Cappellotto	Cap	Capuchon	Abschlußdeckel	Sombbrero	
	14	Albero veloce con foro	Bored input shaft	Arbre d'entrée avec trou	Antriebswelle mit Bohrung	Eje de entrada	
	15	Anello di tenuta	O-ring	Joint d'étanchéité	Simmerringe	Retén	
	16	Anello di tenuta	O-ring	Joint d'étanchéité	Simmerringe	Retén	
	17	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	18	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	19	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	20	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	21	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	22	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	23	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	24	Cuscinetto	Bearing	Roulement	Kugellager	Rodamiento	
	25	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
	26	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
	27	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
	28	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
	29	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
	30	Tappo di livello	Level plug	Niveau	Ölschauglas	Tapón nivel	
	31	Tappo di scarico	Drain plug	Bouchon de vidange	Entleerungsschraube	Tapón vaciado	
	32	Tappo di carico e sfiato	Breather plug	Bouchon de charge	Entleerungsschraube	Tapón de llenado	
	33	Spina cilindrica	Parallel pin	Goupille cylindrique	Zylinder, Anzugstift	Perno de centrado	
	34	Vite a testa esagonale	Hex. head screw	Vis de fixation	Schraube	Tornillo exg.	
	35	Vite a testa esagonale	Hex. head screw	Vis de fixation	Schraube	Tornillo exg.	
	36	Vite a testa esagonale	Hex. head screw	Vis de fixation	Schraube	Tornillo exg.	
	37	Vite a testa esagonale	Hex. head screw	Vis de fixation	Schraube	Tornillo exg.	
	38	Seeger esterno	Circlip	Seeger ext.	Seeger	Anillo elastico exterior	
	41	Seeger esterno	Circlip	Seeger ext.	Seeger	Anillo elastico exterior	
	42	Seeger interno	Circlip	Seeger int.	Seeger	Anillo elastico interior	
	45	39	Seeger esterno	Circlip	Seeger ext.	Seeger	Anillo elastico exterior
		43	Albero 1° rd.	Shaft 1 st red.	Arbre 1 ^{ère} red.	Welle 1. Red.	Eje 1° red.
44		Linguetta	Key	Clavette	Einlegekeil	Chaveta	
45-55-60-80-90-110	45	Pignone 2° riduzione	2 nd red pinion	Pignon 2 ^{ème} red.	Ritzel 2. Red.	Piñon 2° red.	
60-80-90-110	46	Distanziale	Spacer ring	Entretoise	Distanzring	Distancador	
45-55	47	Albero lento	Output shaft	Arbre de sortie	Antriebswelle	Eje de salida	
	48	Distanziale	Spacer ring	Entretoise	Distanzring	Distancador	
60	49	Albero lento	Output shaft	Arbre de sortie	Antriebswelle	Eje de salida	
	57	Seeger esterno	Circlip	Seeger ext.	Seeger	Anillo elastico exterior	
45-55-60-80-90-100-110	58	Seeger interno	Circlip	Seeger int.	Seeger	Anillo elastico interior	
55-60-80-90-100-110	39	Seeger esterno	Circlip	Seeger ext.	Seeger	Anillo elastico exterior	
	50	Albero veloce con gambo	Extended input shaft	Arbre d'entrée avec bout	Antriebswelle	Eje de entrada	
	51	Linguetta	Key	Clavette	Einlegekeil	Chaveta	
80-90	40	Seeger interno	Circlip	Seeger int.	Seeger	Anillo elastico interior	
80-90-100-110	56	Albero lento	Output shaft	Arbre de sortie	Antriebswelle	Eje de salida	
	57	Seeger esterno	Circlip	Seeger ext.	Seeger	Anillo elastico exterior	
	59	Distanziale	Spacer ring	Entretoise	Distanzring	Distancador	
	39	Seeger esterno	Circlip	Seeger ext.	Seeger	Anillo elastico exterior	
100	52	Pignone 2° riduzione	2 nd red pinion	Pignon 2 ^{ème} red.	Ritzel 2. Red.	Piñon 2° red.	
	55	Seeger esterno	Circlip	Seeger ext.	Seeger	Anillo elastico exterior	
100-110	61	Linguetta	Key	Clavette	Einlegekeil	Chaveta	

3.4 OPERATING LIMITS AND CONDITIONS



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



Changes to the gearbox version or mounting position are only permitted if previously authorized by the manufacturer's technical assistance service.



Failure to obtain this authorization invalidates the ATEX certification.

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 vapors, smoke or dust
- In direct contact with loose food products.

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



The maximum surface temperature specified on the nameplate refers to measurements made in normal ambient and installation conditions.



Even minimal variations in these conditions (e.g. smaller mounting compartments, proximity of external equipment to the gear unit that generates heat and not provided by the manufacturer) may have a significant effect on heat dissipation.

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.

3.6 STORAGE



Place the gearbox/ geared motor 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/geared motor.

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.
5. Coat all external machined surfaces with a protective anti-corrosion product such as Shell Ensic SX (or a product with similar properties and application range). Check the surfaces regularly and re-apply the protective coating as necessary.



If the gearbox/geared motor 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.

1. Coat all external machined surfaces with a protective anti-corrosion product such as Shell Ensic SX (or a product with similar properties and application range). Check the surfaces regularly and re-apply the protective coating as necessary.
2. 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).

PRECAUTIONS TO BE TAKEN WHEN PREPARING GEARBOXES FOR SERVICE AFTER STORAGE.



Thoroughly clean the output shaft and external surfaces to remove all rustproofing products, contaminants and other impurities (using a standard commercial solvent). Do this outside the explosion hazard area.

Do not allow solvent to come into contact with seal rings as this may damage them and cause them to leak.



If the oil or protective product used during storage is not compatible with the synthetic oil required for service clean out the inside of the gearbox thoroughly before filling with the service oil.

Storage for periods of over 1 year reduces the service life of bearing grease. Bearing grease must be synthetic.

4 INSTALLATION

41 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 geared motor, also refer to the instructions contained in the installation and user manual for the electric motor.

Before installing the gearbox:

- 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).
- 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.
- Check that the data on the nameplate correspond to those specified in the order.
- 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.
- Check that the machine in which the gearbox is to be installed is switched off and cannot be accidentally started up.
- Check that all coupling surfaces are flat.
- Check that the shaft/shaft or shaft/ bore are perfectly aligned for coupling.
- Fit suitable guards to prevent accidental contact with rotating parts outside the gearbox.
- 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.
- **We recommend applying a protective paste such as Klüber paste 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.**
- Thoroughly clean all other contact surfaces (feet, flanges, etc.) and apply a suitable protective product to them to prevent oxidation.
- 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.
- 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.
- 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.
- 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.

Proceed as follows to install the gearbox.

1. Place the gearbox in the vicinity of the installation area.
2. 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).
3. Locate the blind service plug fitted for shipping and replace it with the vent plug included in the supply (if relevant). Refer to the plug diagram in the "LUBRICATION" section of this manual.
4. 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	
	+10% / -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 aluminum.
- Fill the gearbox with oil or top up as necessary, as instructed in the "LUBRICATION" section in this manual.
 - Check that all service plugs are tightened to the torque values given in the following table.

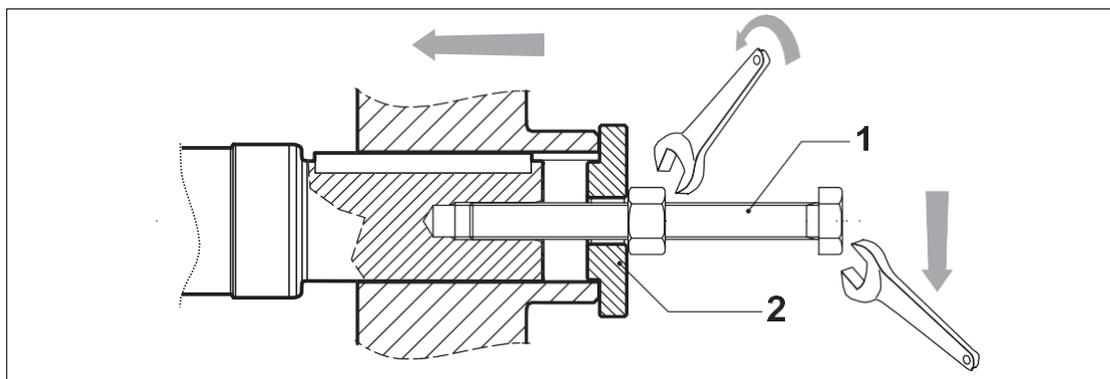
(tab 2)

Plug/vent thread	Pitch (threads per inch)	Tightening torque [Nm]	
		Plugs with non-metallic gasket	Plugs with aluminum or copper 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	—

42 Gearboxes with solid shafts (input and output)

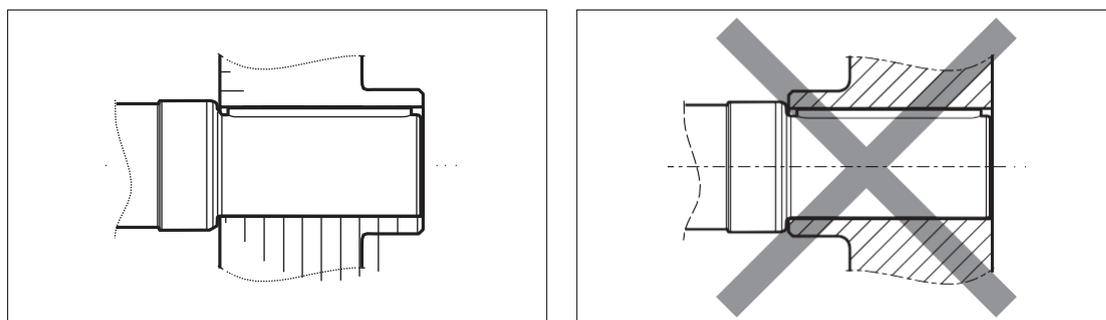


Do not use hammers or other tools which might damage the gearbox shafts or bearings to fit external parts. Proceed as shown below, following the recommendations given in the “INSTALLING CONNECTING ELEMENTS” section in this manual:



Bolt (1) and spacer (2) shown above are not included in the supply.

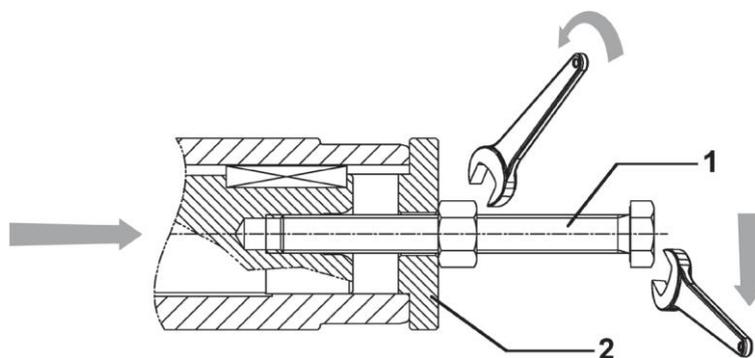
To minimize the loads on the shaft bearings, when mounting transmission mechanisms with asymmetrical hubs use the configuration shown in diagram (A) below:



(A)

4.2.1 Gearboxes with hollow output shaft and keyway or with splined hollow output shaft

Proceed as shown in the following diagram to couple gearboxes with a hollow output shaft to solid machine shafts. See also the “PREPARING CUSTOMER SHAFTS” section in this manual.



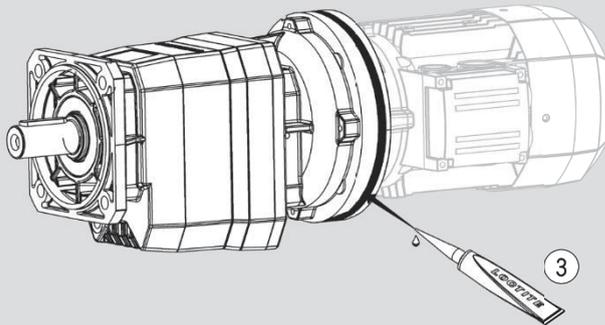
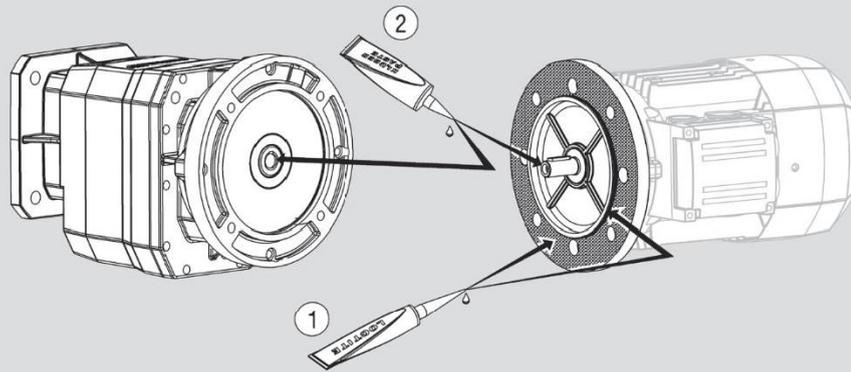
The tie bolt (1) and spacer (2) are not included in the consignment.

43 INSTALLING AN ELECTRIC MOTOR WITH AN IEC STANDARD FLANGE

- 4.3.1 Thoroughly clean and degrease all the mating surfaces between the motor and the gearbox (shafts and flanges).
- 4.3.2 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.
- 4.3.3 Do not strain the coupling shafts with large thrust or overhung loads.
- 4.3.4 To facilitate assembly, use a synthetic oil-based lubricating paste such as Klüber paste 46 MR 401 (or a product with similar properties and application range).
- 4.3.5 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.

When the gearbox is to be coupled to a standard electric motor conforming to IEC 60072-1, proceed as follows.

- Apply a layer of sealant such as Loctite 510 (or a product with similar properties and application range) to the motor/gearbox coupling flanges, to the alignment ring and the frontal mating surfaces as shown in the figure below.



1. Apply Loctite 510 to the flat surface of the flange and to the alignment ring.
2. Apply Klüber paste 46MR401 to the inside of the gearbox input shaft and to the motor shaft.
3. Seal the joint between the gearbox and the motor with Loctite 5366, taking care to fill any gaps between the two flanges (e.g. recesses for decoupling the units).

- With the motor coupled to the gearbox, apply a film of sealant such as Loctite 5366 (or a product with similar properties and application range) around the edges of the flanges to seal any gaps between their surfaces.
- If the output shaft is also equipped with a flange, the user must take similar precautions to prevent dust accumulating in the gaps between the flanges or in the vicinity of moving couplings.

44 LUBRICATION DETAILS:

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.

The charts on the following pages show the position of the service plugs.

The lubricant utilized 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.

Recommended / permitted lubricants

Synthetic oils and mineral oils

Recommended Lubricants:

Type of Lubricant	Application	Type of Oil	Manufacturer
Synthetic Oil	Helical gearboxes/ Worm	OMALA S4 WE 320	SHELL
		TELIUM VSF 320	AGIP
		KL OBERSYNTH GH 320	KLUBER
		CARTER SY 320	TOTAL
		ALPHASYN PG 320	GASTROL
		GLYGOYLE HE 320	MOBIL

Oil change interval:

Oil Temperature	Oil change interval	
	Mineral Oil	Synthetic Oil
< 65	8000	25000
65 - 80	4000	15000
80 - 95	2000	12500

45 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 mid-point of the sight glass, or to the reference notch on the dipstick, or until oil starts to flow out of the plug hole, depending on the type of level plug.

In the case of gearboxes normally supplied lubricated for life (see table -1), but supplied without lubricant and with no level plug, consult the manufacturer's technical assistance service.



1. Oil quantity to be maintained up to mid-level of glass plug
2. First periodical oil change should be done after about 500 hours of operation.

(Table -1)

AS Oil quantity Details (in litter)						
Size/Mounting	B3/B5	B6/B51	B7/B53	B8/B5	V1/V5	V3/V6
AS16	0.36	0.36	0.36	0.36	0.36	0.36
AS20	0.6	0.6	0.6	0.6	0.6	0.6
AS25	0.75	0.75	0.75	0.75	0.75	0.75
AS30	1.5	1.5	1.5	1.5	1.5	1.5
AS35	1.5	1.5	1.5	1.5	1.5	1.5
AS 45	2.4	2.2	2.2	1.8	2.7	3.6
AS 55	2.9	2.8	2.8	3.8	6	5.5
AS 60	5.5	6	6	6.5	9	8
AS 80	10	11.3	11.3	11.4	17.8	17.2
AS 90	15.5	17.3	17.3	17.3	29	26.2
AS 100	30	34	34	34	46	44

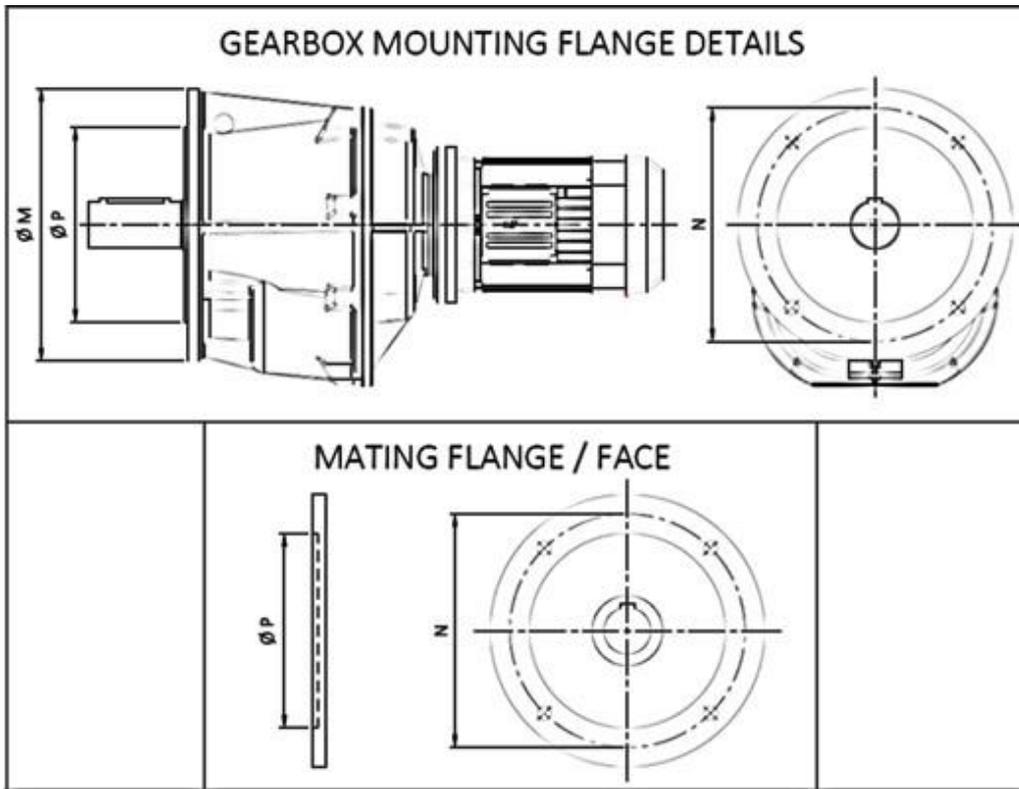
Gearbox with LO options:

1. We can supply the gearbox with Oil (LO options) from AS 45 to AS 100. In this case, the gearbox will be supplied with dummy plug instead of breather plug for ease of transportation. Separate breather plug will be attached to the output of the gearbox.
2. During putting operation, ensure to fit the breather plug after removing the dummy plug irrespective of mounting position

46 Gear box mounting Position:

AS MOUNTING POSITIONS		
B3	B8	V6
B6	B7	V5
B5	B52	V3
B51	B53	V1
<p>① OIL BREATHER / FILLING PLUG</p> <p>② OIL LEVEL PLUG - AS 45, AS 55, AS 60</p> <p>②a OIL LEVEL PLUG - AS 80, AS 90, & AS 100</p> <p>③ OIL DRAIN PLUG</p>		

4.7 Gear box Output flange Mounting Details:

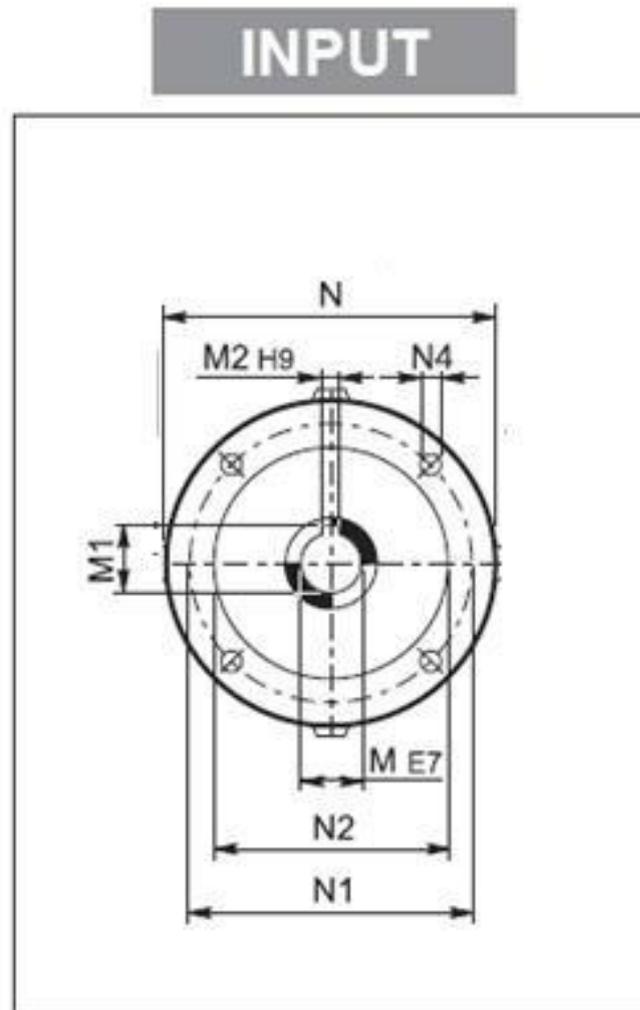


Before place the gear box on the lantern stool to be verified the spigot diameter of gear box and as well as lantern stool.

According to be tolerance to be maintained for both matting parts

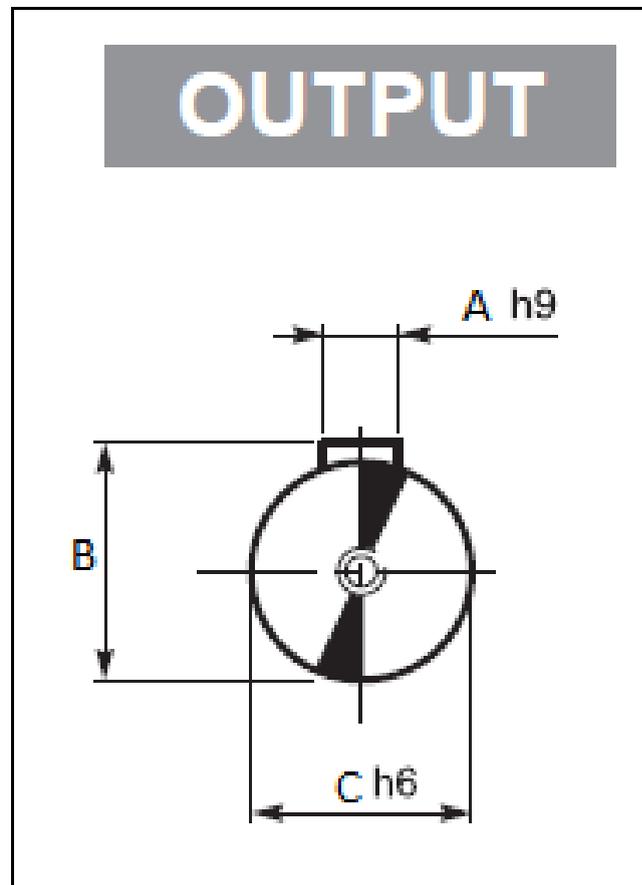
Size	Mouting spigot Diameter in mm (P)	Tolerance		Mounting holes PCD in mm (N)	Outer diameter of mounting flange in mm (M)
		Gearbox Output Spigot Tolerance (f7)	Mating Part Spigot tolerance (H8)		
AS 16	95	-0.036 to -0.071	0 to +0.054	115	140
AS 20	110	-0.036 to -0.071	0 to +0.054	130	160
AS 25	130	-0.043 to -0.083	0 to +0.063	165	200
AS 25 R	110	-0.036 to -0.071	0 to +0.054	130	160
AS 30	180	-0.043 to -0.083	0 to +0.063	215	250
AS 35	180	-0.043 to -0.083	0 to +0.063	215	250
AS 30 R	130	-0.043 to -0.083	0 to +0.063	165	200
AS 35 R	130	-0.043 to -0.083	0 to +0.063	165	200
AS 45	230	-0.050 to -0.096	0 to +0.072	265	300
AS 55	230	-0.050 to -0.096	0 to +0.072	265	300
AS 60	250	-0.050 to -0.096	0 to +0.072	300	350
AS 80	300	-0.056 to -0.108	0 to +0.081	350	400
AS 90	350	-0.062 to -0.119	0 to +0.089	400	450
AS 100	450	-0.068 to -0.131	0 to +0.097	500	550

4.8 Gear box Input Details:



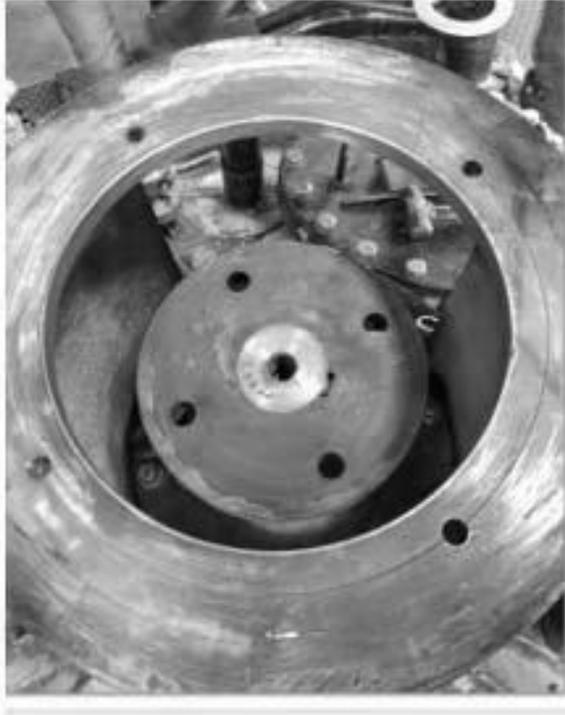
Size	M	M1	M2	N	N1	N2	N4
P63	11(E7)	12.8	4(H9)	140	115	95	M8 X19
P71	14(E7)	16.3	5(H9)	160	130	110	M8 X16
P80	19(E7)	21.8	6(H9)	200	165	130	M10X12
P90	24(E7)	27.3	8(H9)	200	165	130	M10X12
P100	28(E7)	31.3	8(H9)	250	215	180	M12X16
P112	28(E7)	31.3	8(H9)	250	215	180	M12X16
P132	38(E7)	41.3	10(H9)	300	265	230	14
P160	42(E7)	45.3	12(H9)	350	300	250	18
P180	48(E7)	51.8	14(H9)	350	300	250	18
P200	55(E7)	59.3	16(H9)	400	350	300	M16X25
P225	60(E7)	64.4	18(H9)	450	400	350	18
P250	65(E7)	69.4	18(H9)	550	500	450	18

4.9 Gear box Output shaft details:



Size	A	B	C
AS16	5 (h9)	18	16 (h6)
AS20	6 (h9)	22.5	20 (h6)
AS25	8 (h9)	28	25 (h6)
AS30	8 (h9)	33	30 (h6)
AS35	10 (h9)	38	35 (h6)
AS45	14 (h9)	48.8	45 (h6)
AS55	16 (h9)	59.3	55 (h6)
AS60	18 (h9)	64.4	60 (h6)
AS80	22 (h9)	85.4	80 (h6)
AS90	25 (h9)	95.4	90 (h6)
AS100	28 (h9)	106.4	100 (h6)

4.10 Lantern stool Details:



- 1) Gear box mounting Spigot diameter & lantern Stool mounting Spigot diameter / Face out to be maintained as per the values given in tabulation
- 2) Spigot area should not be painted. No damages, No welding Spots.

Lantern stool –Run out and face out:



Verify the run out and face out of lantern stool and ensure that the tolerances are within allowable limits

4.11 Couplings & Accessories Details:

Check shaft and coupling alignment. Run out, axial and radial misalignments, gap between couplings halves are to be maintained within limits should be periodically checked. Also check the following parameters

1. Coupling key and keyway dimensions (width, height etc.)
2. Inner diameter of couplings and relevant tolerances
3. Proper fitment of bolts

4.12 Acceptance of Noise Level:



Allowable Gear box meshing noise is -85 DBA at 1-meter distance

Note:

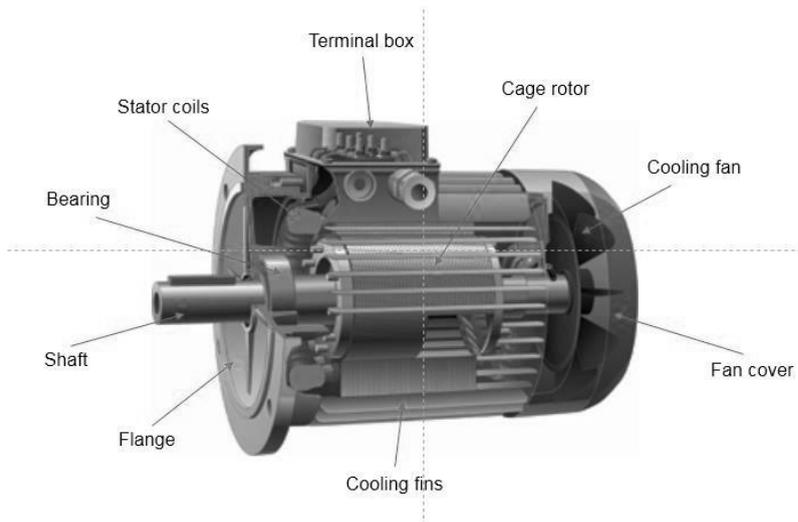
Any abnormal noise should not be accepted

4.13 Acceptance of Vibration Level:

Gear box vibration level can be accepted based on the Below table with respect to shaft rotational speed

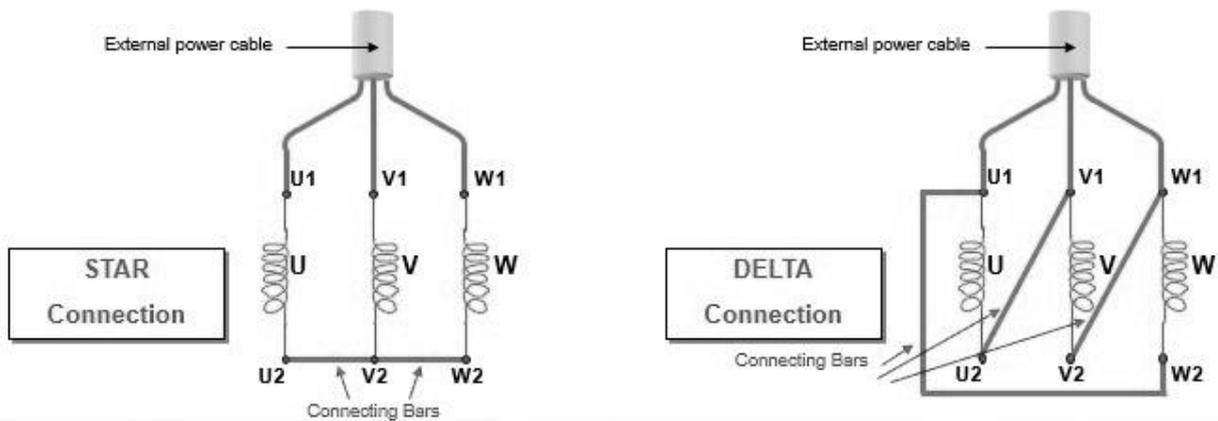
Zone boundary	Shaft rotational speed r/min	
	1 500 or 1 800	3 000 or 3 600
	R.m.s. vibration velocity mm/s	
A/B	2,8	3,8
B/C	5,3	7,5
C/D	8,5	11,8

4.14 Electrical Motor details:



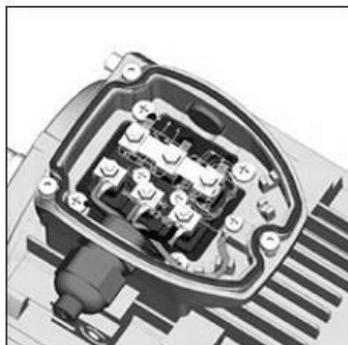
1. Noise & Vibration level of Electrical motor alone should be tested before assembling with Gearbox
2. Check the spigot diameter of motor for damages and ensure no paint on the spigot
3. Ensure right electrical connection of motor with respect to connection (Star/Delta)

In the same motor, there are two possible alternatives connections:

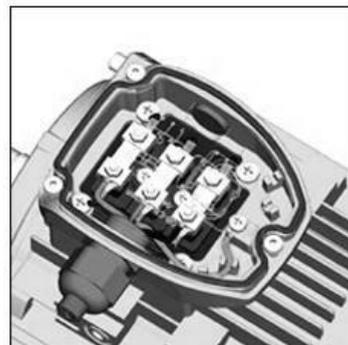


The user must choose one of two possible alternatives for connection inside the terminal box with an awareness of the implications arising therefrom.

Arrangement of bars in STAR connection



Arrangement of bars in DELTA connection



4.15 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 gearbox/geared motor 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 authorization from the manufacturer's technical service. A tolerance of $\pm 5^\circ$ 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 $\pm 10\%$ of the rated value.
- That the oil level in the gearbox/geared motor 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/geared motor:

- 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:
 - machine side flanges
 - motor flanges
 - supports

Before putting the gearbox into service, make sure that:

- Assembly will not be carried out in a potentially explosive atmosphere (oil, acid, gas, vapor, radiation) and that dust deposits on the gearbox do not exceed 5 mm in depth.
- Clean the gearbox thoroughly after installation.
- The oil level, drain and vent plugs are all easily accessible.
- All guards designed to prevent accidental contact between operators and rotating parts, and all oil seals, are fully efficient.
- Gearboxes with hollow shafts, with or without shrink disc, have been correctly mounted.
- All types of accessory installed on the gearbox are ATEX specified and have been installed in accordance with ATEX requirements.

During service make sure that:

- The gearbox is sufficiently ventilated and that it is not subject to radiation from external heat sources.
- The temperature of the cooling air does not exceed 40°C.

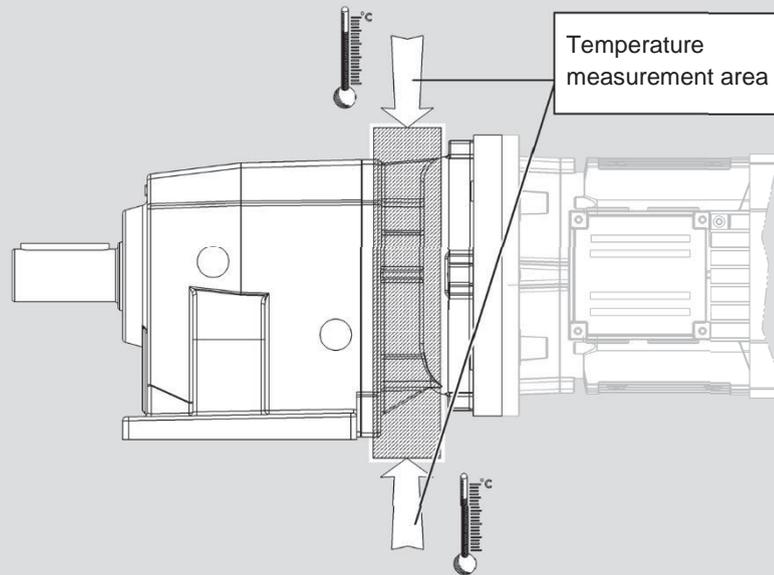


Measuring the gearbox surface temperature

The gearbox maximum surface temperature depends on motor speed, transmission ratio and motor version, but must never exceed the value stated on the nameplate.

The maximum surface temperature specified on the nameplate refers to measurements made in normal ambient and correct installation conditions. Even minimal variations in these conditions (e.g. smaller mounting compartments) may have a significant effect on heat dissipation.

When putting the gearbox into service, the surface temperature must be measured in the same conditions as those in which the gearbox will operate. The surface temperature must be measured at the coupling between the gearbox and motor, and at the points which are most shielded from the forced ventilation provided by the motor fan.



IMPORTANT:

Maximum surface temperature is reached after 3 hours operation at full load. Maximum surface temperature measured at these points must not exceed ambient temperature by more than 75 °C (ΔT).

If the temperature difference exceeds this value, stop the gearbox at once and contact the manufacturer's technical assistance service.

If the temperature difference lies within the above value, wait for the gearbox to cool down and then install the heat sensor included in the supply at the point of maximum temperature.

Example:



4.15.1 Check that the gearbox functions normally (no unusual vibrations and/or noise).

5 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. In order to maintain the proper functioning and safety of the gearbox/geared motor, we recommend that users have non-routine maintenance performed by the Manufacturer or an authorized, specialist service center. Contact the manufacturer's sales network. Failure to comply with this requirement during the warranty period automatically invalidates 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.

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 utilized 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 authorization. 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.



- Respect scheduled inspection and maintenance intervals to ensure the correct functioning of the gearbox and the effectiveness of the explosion protection.
- Allow the gearbox to cool down completely before servicing or repairing internal components in order to avoid burns from hot internal parts.
- On completion of maintenance work, make sure that all safety devices have been applied and reset.
- Clean the gearbox thoroughly after maintenance or repair.
- On completion of maintenance, tighten all vent, filler and level plugs to the torque values specified in the “INSTALLING THE GEARBOX” section of this manual.
- Apply fresh Loctite 510 paste (or a product with similar properties and application range) to all disassembled threads (bolts and plugs).
- On completion of any maintenance work, renew all seals and re-apply sealing compound as specified. On gearboxes with double seal rings, the space between the two rings must be packed with synthetic grease such as Fluorocarbon 880 ITP gel (or a product with similar properties and application range).
- Regardless of the type of gearbox, whenever a seal ring is replaced, its lips should be smeared with a thin layer of grease such as Fluorocarbon 880 ITP gel (or a product with similar properties and application range) before it is fitted.
- Use only original spare parts for repairs.

51 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 indicate 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 necessary.
- 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, rotation 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.

52 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.

Depending on the temperature reached by the lubricant, it should be replaced at the intervals indicated in the table below.

AS45 ... AS100	Interval replacement [h]		
Average oil operating temperature [C°]	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
First oil change after putting into service (excluding gearboxes that are lubricated "for life")	500 h
Subsequent oil changes	see the above table
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
Tightness of fixing bolts, connecting flanges and torque transmission components	2000 h ... 4000 h
Regressed bearings and seals (where required)	2000 h ... 4000 h
Condition of torque arm polymer bushes (aging, cracking)	3000 h
Condition of oil in gearbox (possible presence of contaminants, especially water)	2000 h ... 9000 h
Alignment of gearbox shafts with respect to coupled machine shafts	9000 h ... 18000 h
Cleanliness of electric motor fan and fan cowling (if present) and cleanliness of gearbox body	at each oil change

For installations in zones 21 and 22, the user must schedule and implement a regular cleaning program for all surfaces and recesses to avoid dust build-ups of more than 5 mm in depth.

Every 100 hours of operation or every 2 weeks:

521 Measure the surface temperature at the coupling between the gearbox and motor, and at the points most shielded from the forced ventilation provided by the motor's fan. Maximum surface temperature measured at these points must not exceed ambient temperature by more than 75 °C (ΔT), and this temperature differential must not have been exceeded in service. Check the condition of the heat sensor installed previously.

Example:



Limit temperature exceeded



Limit temperature NOT exceeded

Also check that high temperatures are not being generated at the gearbox bearings.

Every 1000 hours of operation or every 6 months:

522 Check the oil level according to the tables provided in the "LUBRICATION" section of this manual and according to the figures below.

523 Check that there are no signs of lubricant leaks near the gearbox.

524 If any anomalies are found, identify their cause, make the necessary repairs, and top up the lubricant level before putting the gearbox back into service.



Every 3000 hours of operation:

525 On gearboxes with reaction arms, check that the polymer bushes are not aged or damaged. If the bushes show any sign of fatigue or damage, replace them with original spare parts.

Every 5000 hours of operation:

526 Change the synthetic oil and bearing grease if the gearbox is not lubricated for life.

527 Replace all externally accessible seal rings unless this has already been done as a result of problems occurring before the scheduled maintenance was due.

Every 5000 hours of operation at rated torque

(The minimum overhaul interval specified here may increase considerably, depending on actual service cycles. See the table below).

528 General overhaul of the gearbox, if not performed earlier as a result of malfunctioning (*Overhaul consists of the replacement of all bearings and/or other mechanical components showing signs of wear that might compromise the functioning of the gearbox*).

(tab 11)

M_{n2} / M_{r2}	Interval (hours)
1.0	5000
1.25	10000
1.5	17000
1.75	27000
2.0	40000

M_{n2} = Rated torque at output shaft

M_{r2} = Required torque at output shaft

53 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.



Apply Loctite 510 (or a product with similar properties and application range) on the thread of plugs.



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.

54 CLEANING

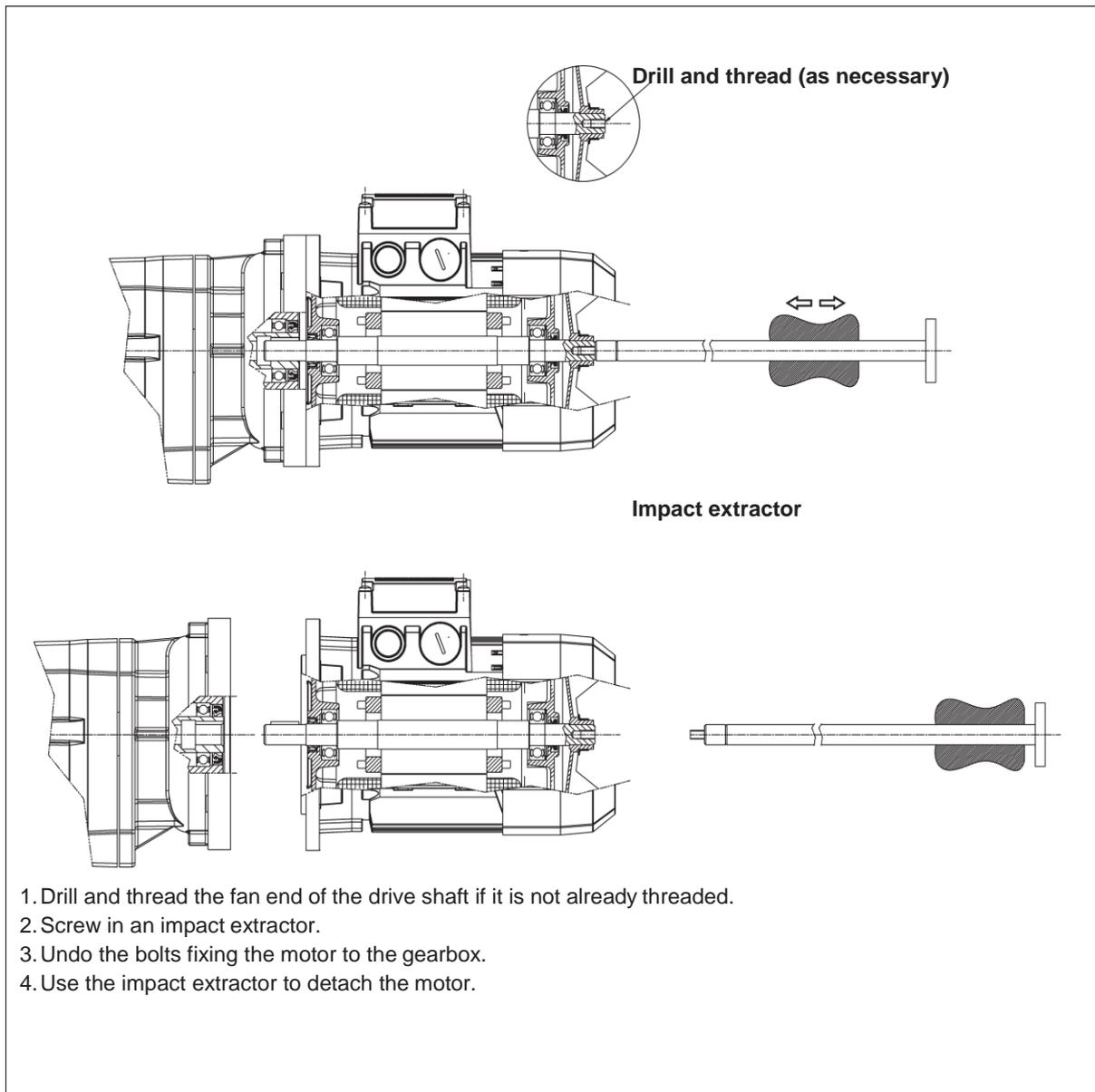
To clean dust, dirt and process residues off the gearbox, do not use solvents or other products that might be incompatible with the materials from which it is made, and do not direct high pressure jets of water on to the gearbox.

6 REMOVAL

6.1 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.



7. TROUBLE SHOOTING:

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 15)

FAULT	CAUSE	REMEDY
Bearing temperature too high.	Oil level too low.	Top up oil level.
	Oil too old.	Change oil.
	Bearings faulty.	Contact authorized 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 authorized workshop.
	Excessive axial play in bearings.	Contact authorized workshop.
	Bearings faulty or worn.	Contact authorized 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 authorized workshop.
	Gaskets worn.	Contact authorized 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 authorized workshop.



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.



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