



## **Operating instructions Helical in line gearmotors**



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This document provides information about handling, installation and maintenance of helical and bevel helical gear reducers and gearmotors (iFIT series).

**All the people handling with these activities must carefully read all the following instructions and apply them rigorously.** Information and data contained in this document correspond to the technical level reached at the moment the catalog is printed. Rossi reserves the right to introduce, without notice, the necessary changes to improve efficiency and safety of its products.

## 1.1

### Recycling

Observe the established legislation concerning waste treatment and recycling of exhaust material:



- the elements of housing, gear pairs, shafts and bearings of gear reducer must be transformed into steel scraps as well as cast iron elements, subject to other specific requirements;
- for other non-metallic components (seal rings, covers, etc.) comply with applicable regulations;
- waste oils must be recovered and treated in accordance with applicable legal requirements.

## 1.2

### Safety

The paragraphs marked with symbols shown below contain dispositions to be strictly respected in order to assure **personal safety** and to avoid **any heavy damages** to the machine or to the system.

(Electric or mechanical) danger, such as:



- live parts;
- temperature higher than 50 °C;
- components rotating during operation;
- suspended loads (lifting and transport);
- eventual high sound level ( $> 85$  dB(A));



- lifting instructions.

**IMPORTANT:** gear reducers and gearmotors supplied by Rossi S.p.A. are "**partly completed machinery**" and as such they **must be** incorporated in finished appliances or systems and **should not be commissioned before the machinery in which the component has been incorporated conforms to:**

- Machinery directive 2006/42/EC and subsequent updatings; in particular, possible safety guards for shaft ends not being used and for eventually accessible fan cover passages (or other) are the Buyer's responsibility;**
- «Electromagnetic compatibility (EMC)» 2004/108/EC and subsequent updatings.**

#### Attention!



**All instructions in this manual, all applicable installation regulations, as well as all applicable safety regulations must be duly followed.**

**Whenever personal injury or property damage, due to falling or projecting parts of gear reducer or of its parts, may occur, foresee adequate supplementary protection devices against:**

- release or breakage of fastening screws;**
- rotation or unthreading of the gear reducer from shaft end of driven machine following to accidental breakage of the reaction arrangement;**
- accidental breakage of shaft end of driven machine.**

**If deviations from normal operation occur (temperature increase, unusual noise, etc.) immediately switch off the machine.**

## Safety during installation

An incorrect installation, an improper use, the removing or disconnection of protection devices, the lack of inspections and maintenance, improper connections may cause severe personal injury or property damage. Therefore the component must be moved, installed, commissioned, handled, controlled, serviced and repaired **exclusively by responsible qualified personnel**. Qualified personnel must be **specifically trained** and have the necessary experience to **recognize any risks** (see section 1.2.1 - Residual risks) related to these products, avoiding possible emergency situations.

Gear reducers and gearmotors in this manual are normally intended for installations in **industrial areas** : additional protection measures that may be necessary must be adopted and ensured by the personnel responsible for the installation.

### Attention!



Motors in non-standard design or with constructive variations may differ in the details from the ones described here following and may require additional information.

### Attention!



For the installation use and maintenance of the **electric motor** (standard, brake, or non-standard motor) or the possible motor-variator and/or the electric supply device (frequency converter, soft-start, etc.), and/or any optional electric devices (e.g.: independent cooling unit, etc.), consult the specific attached documentation. Request it if necessary.

## Maintenance safety

When operating on a gear reducer or components connected to it, the machine must be **at rest, disconnected from the power supply, and cold** : disconnect the motor (including auxiliary equipment) from the power supply, gear reducer from the load, be sure that safety systems are on against any accidental starting and, if necessary, pre-arrange mechanical locking devices (to be removed before commissioning).

### Attention!



During the running the gear reducers could have **hot surfaces**; Always wait that the gear reducer or the gearmotor to cool before carrying out any operations.

Further technical documentation (e.g. catalogs) can be downloaded from our website **www.rossi.com** or can be directly required to Rossi S.p.A. For any clarification and/or information, please contact Rossi S.p.A. specifying all data found on the name plate.

## Residual risks

The products supplied by Rossi S.p.A. have been designed and manufactured according to the essential health and safety requirements provided for by Machine Directive 2006/42/EC - Annex I.

The following table lists the residual risks that the user is required to handle in accordance with the instructions contained in this document and in those, if any, enclosed with the shipment.

Table 1.2.1 Residual risks

Nature/Cause of risk	Countermeasures
Installation and maintenance operations	<p><b>The component must be handled, installed, commissioned, operated, inspected, maintained, and repaired only by qualified, responsible personnel who must carefully read and strictly follow all instructions in this document, including any instructions enclosed with the shipment. They shall also be specifically instructed and have the necessary experience to recognize the hazards and potential hazards (electrical or mechanical) associated with these products, such as, but not limited to:</b></p> <ul style="list-style-type: none"> <li>- presence of electrical voltage;</li> <li>- presence of temperature higher than 50 °C;</li> <li>- presence of moving parts during operation;</li> <li>- presence of suspended loads;</li> <li>- presence of possible high sound level (&gt; 85 dB (A)).</li> </ul> <p><b>It must be equipped with appropriate personal protective equipment (PPE) and be familiar with and comply with all applicable regulations regarding proper installation and current safety laws in order to ensure the safety of persons and avoid significant damage to the machine or system.</b></p>
Falling or projecting objects	<p>For gearboxes equipped with a <b>backstop</b>, provide a protection system against the projection of objects resulting from the breaking of the backstop</p> <p>For gearboxes equipped with a <b>coupling</b> (high or low speed shaft), provide protections against the projection of objects resulting from breakage of the coupling itself.</p> <p>For <b>shaft-mounted</b> gear units, provide appropriate safety devices against:</p> <ul style="list-style-type: none"> <li>- loosening or breaking of the mounting screws;</li> <li>- rotation or loosening of the gear unit from the machine pin due to accidental breakage of the reaction constraint;</li> <li>- accidental breakage of the machine pin.</li> </ul>
Movable elements	<p>Provide safety guards for <b>unused shaft ends</b> and accessible fan cover passages (or others).</p> <p>Any operation on the gear reducer or gearmotor must be carried out with the machine stopped and disconnected from the power supply, after the gear reducer or gearmotor have cooled down.</p>
Extreme temperatures	<p>During operation, the gear reducers may have <b>hot surfaces</b> (&gt; 50 °C); before starting any operation, always wait for the gearbox or gearmotor to cool down (wait about 1 to 3 hours depending on the size); if necessary carry out a temperature measurement on the surface of the gearbox or gearmotor near the high speed shaft. The same applies to the hydraulic coupling, if present.</p> <p>After a period of operation, the gear reducer will undergo a slight internal overpressure that can result in the leakage of burning fluid.</p> <p>Therefore, wait until the gear reducer has cooled down before loosening the caps (of any kind); alternatively, use appropriate protections (PPE) against burns resulting from accidental contact with hot oil.</p> <p>In all cases, always proceed with great care.</p>
Noise	<p>Depending on the size, gear ratio, transmission ratio, duty cycle type, and mounting system of the gear reducer or gearmotor, the noise emission level may exceed 85 dB(A). Perform field measurements and, if necessary, equip the personnel concerned with appropriate personal protective equipment (PPE).</p>
Changes that may affect the safety of the equipment	<p>Do not make any structural modification to the products supplied by Rossi (reducers, gearmotors, control group, etc.) without prior approval by Rossi S.p.A.</p>
Use of replacement components with characteristics unsuitable for the application	<p>Spare parts must be those authorized by Rossi S.p.A.</p>

Gear reducers are designed for industrial applications according to catalog data, ambient temperature  $0 \div +40$  °C (with peaks at  $-10$  °C and  $+50$  °C), maximum altitude 1 000 m.

Not allowed running conditions: application in aggressive environments having explosion danger, etc. Ambient conditions must comply with specifications stated on name plate.

## How supplied and product designation

### 3.1

#### Receipt

Upon receipt **check** that the goods correspond to the order specifications and that **they have not suffered damage during transport**; in this event, immediately contest such damage to the carrier.

**Do not commission gear reducers and gearmotors that are even slightly damaged.**

Report any non-compliance to Rossi

### 3.2

#### Name plate

Each gear reducer is provided with a name plate in anodized aluminium containing main informations necessary for a correct identification of the product (see ch. 3.6); the name plate must not be removed and must be kept integral and readable.

All name plate data must be specified on eventual spare part orders.

Rossi S.p.A.  
Via Emilia Ovest, 915/A  
41123 Modena (MO) - Italy  
Made in Italy - www.rossi.com

Type (1)  
i (2) Date (3)  
M.P. (4)  
Code (5)  
S.N. (6)  
WA (7)  
ITEM (8)

- (1) Gear reducer type
- (2) Transmission ratio
- (3) Production date
- (4) Gear reducer mounting position
- (5) Product code
- (6) Serial number
- (7) Production batch
- (8) Customer code <sup>(1)</sup>

<sup>(1)</sup> On request



Unless otherwise stated, the gear reducers are supplied **complete** with synthetic oil for long-life lubrication. For V6 mounting position, the upper bearing and metal shield are lubricated with grease. In detail, see page 19.

Standard paint unless otherwise indicated.

Table 3.4.1 Standard painting

Frame size gear reducer	Painting Internal	External painting		Notes
		Final color Blue RAL 5010	Features	
2...9	Epoxy powder (preainted)	Epoxy powder (preainted)	Resistant to atmospheric and aggressive agents. (corrosivity class <b>C3</b> according to ISO 12944-2) Overpaintable only with dual-compound products <sup>1)</sup>	Machined parts remain unpainted; they are protected with an easily removable antitrust oil (before painting remove the protective oil).

For special paintings, please request additional information.

<sup>(1)</sup> Before overpainting, suitably protect the seal rings and degrease and sand the gear reducer surfaces (as an alternative to sanding, a coat of solvent-based primer can be applied).

Overhanging free shaft ends and hollow shafts are treated with protective anti-rust long-life oil and protected with a plastic (polyethylene) cap. All internal parts are protected with protective anti-rust oil.

Unless otherwise agreed in the order, products are adequately packed: on pallet, protected with a polyethylene film, wound with adhesive tape and strap (bigger sizes); in carton pallet, wound with adhesive tape and strap (smaller sizes); in carton boxes wound with tape (for small dimensions and quantities).

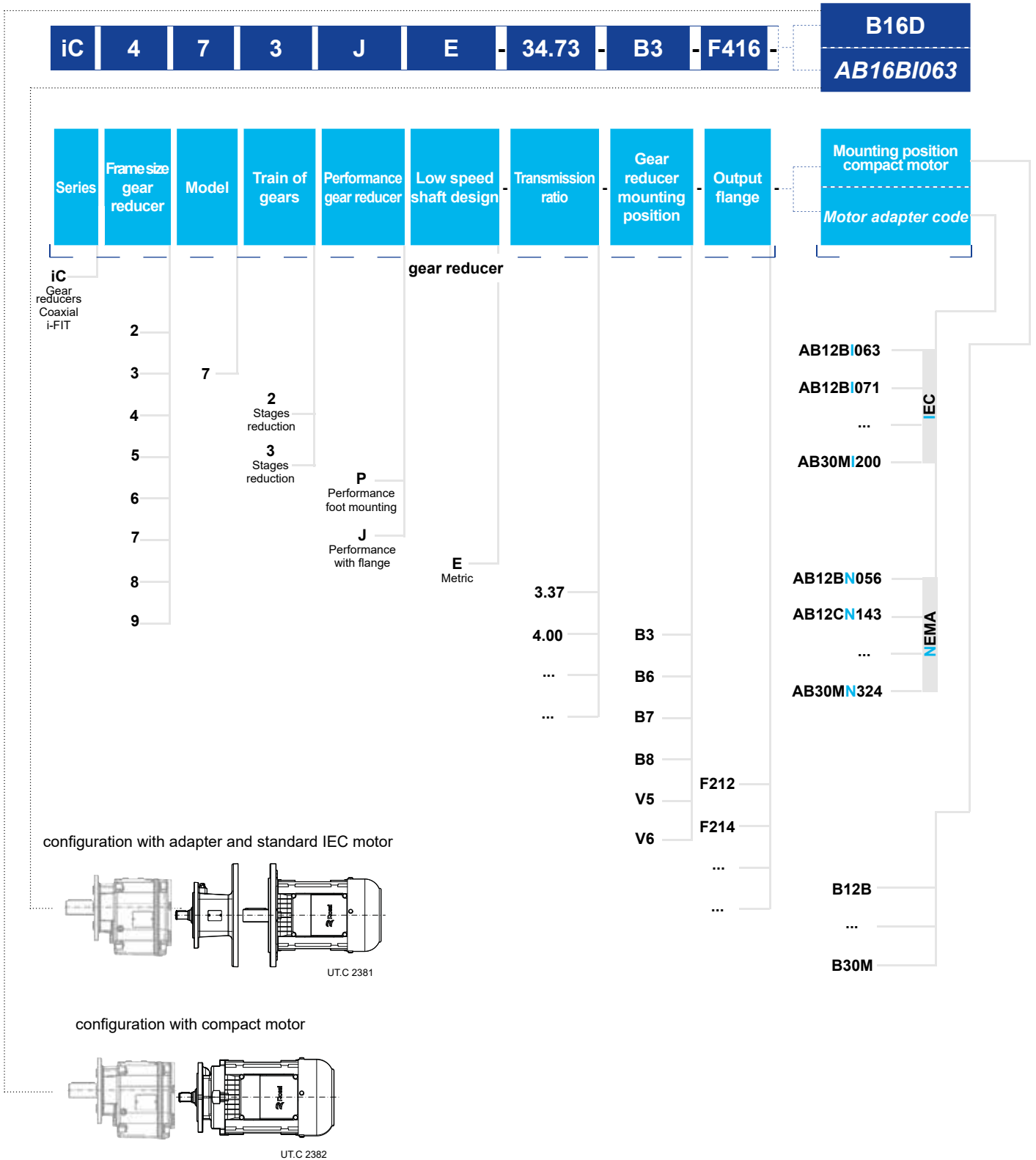
If necessary, gear reducers are conveniently separated by means of anti-shock foam cells or of filling cardboard.

**Do not stock packed products on top of each other.**

## 3.6

### Designation

#### Gearmotor designation

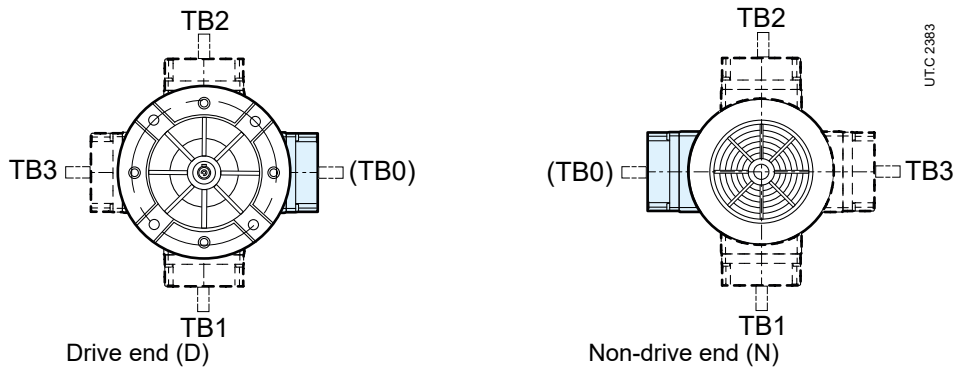


## Motor designation

HB	3	Z	90S	-	4	230,400	50	-	B16D	-	TB2 <sup>(1)</sup>
----	---	---	-----	---	---	---------	----	---	------	---	--------------------

Series	Class energy	Brake Integrated	Motor size	N. poles	Voltage supply	Frequency supply	Motor mounting position		Position terminal block
							compact	IEC	
HB	2 efficiency IE2	-	63A	2	230,400	50	B12B	B5	TB1
		Z	63B	4	400	60	...		TB2
	3 efficiency IE3		71B	6	...		B30C		TB3
			...						

## Motor terminal block position



The designation is to be completed with the statement of motor terminal box position if differing from the standard one TB0. The release lever (for brake motor) follows the position of the terminal box.

The cable entry is the responsibility of the Buyer: the terminal box is integral with housing with knockout cable openings on both sides (one for power cable and one for auxiliary equipment).

<sup>(1)</sup> For standard terminal box position TB0, no indication in motor designation is necessary.

## 4.1

### Lifting and handling

Make sure that the lifting equipment (e.g.: crane, hook, eye bolt, straps, etc.) are suitable for the weight and size of the gear reducer (consult Rossi technical catalog for dimensions and weight).

For the lifting and transport of gear reducer (or gearmotor) use through holes or threads on the gear reducer housing feet as stated in the figures below.

Avoid unbalanced lifting (during the movement, inclination must not exceed max  $\pm 15^\circ$  as to mounting position) and, if necessary, use additional belts to balance the weight.

**Do not use any shaft ends.**

**Do not use motor eyebolts.**

**Do not use front threads of shaft ends or eventual external pipes.**

**Do not add supplementary loads to the gear reducer or gearmotor mass.**



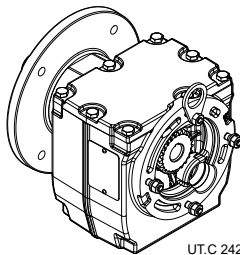
**Attention!**

**During the lifting and handling:**

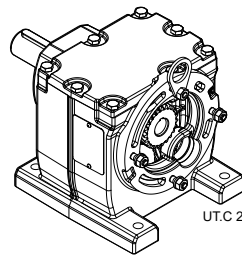
- do not stand under the suspended loads;
- do not damage the gear reducer with an inadequate transport;
- keep the gear reducers filled with oil in the mounting position foreseen in the order.

**Gear reducers**

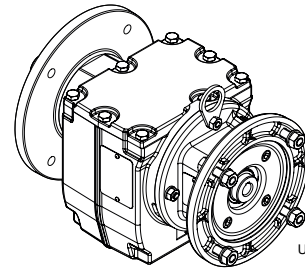
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UT.C 2427

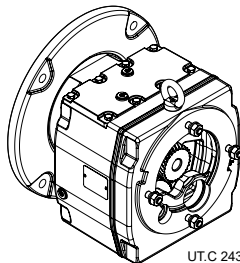


UT.C 2428

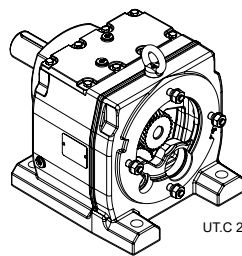


UT.C 2429

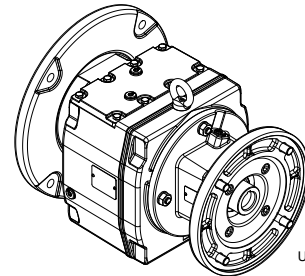
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UT.C 2430

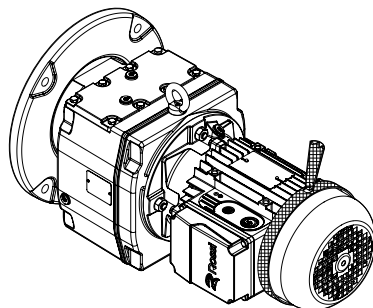


UT.C 2431

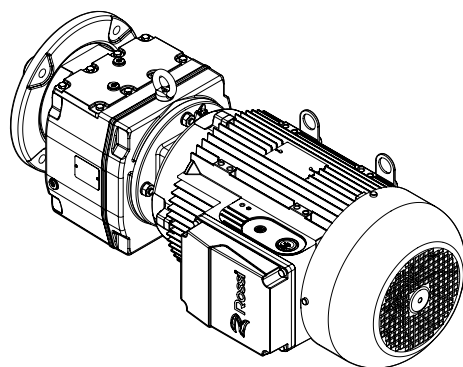


UT.C 2432

**Gearmotors**

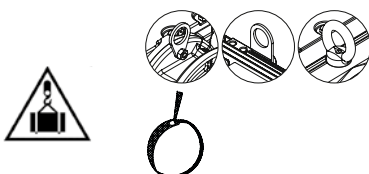


UT.C 2433



UT.C 2434

**Lifting point**



Belt to be used **exclusively** to ensure the motor, when directly mounted, against oscillations due to transport; **not to be used for the lifting of entire gearmotor group.**

Surroundings should be sufficiently clean, dry (relative humidity < 50%), free from excessive vibrations ( $v_{eff} \leq 0,2$  mm/s) not to damage the bearings (vibrations must be limited, although within a wider range, also during transport) and must have a temperature of  $0 \div +40$  °C: peaks of 10 °C above or below this temperature range are allowed.

The gear reducers filled with oil must be positioned according to the mounting position stated on name plate during transport and storage.

**Do not stack units.**

Every six months rotate the shafts (some revolutions are sufficient) to prevent damage to bearings and seal rings.

Assuming normal surroundings and the provision of adequate protection during transit, the unit is protected for storage up to 1 year.

**Do not, under any circumstances, loosen the closed plugs or activate the drain plug before commissioning.**

In the event of "**Long germ storage**" option, for a storage period from 12 to 24 months in normal environments, the following is envisaged:

- gear reducer delivered without oil filling;
- internal volume of the gear reducer protected by VCI lubricant coating;
- application of a layer of special anti-corrosive oil to all unpainted external parts (shafts, feet, flanges), including galvanized components (screws, nuts, washers, eyebolts, etc.);
- application of an adhesive label indicating the type of protection used;
- single packaging with sealed VCI bag.
- washing the reducer with the same oil as the filling oil, before final filling.

For longer periods please contact Rossi S.p.A.

## 5.1

### General

Before installing, **check that:**

- the shafts and contact surfaces are not damaged;
- gear reducer specifications are suitable for ambient conditions (temperature, atmosphere, etc.);
- the structure on which the gear reducer is secured is flat, levelled and sufficiently dimensioned to ensure installation stability and absence of vibrations, (vibration speed  $v_{eff} \leq 3,5$  mm/s for  $P_N < 15$  kW and  $v_{eff} < 4,5$  mm/s for  $P_N > 15$  kW are acceptable), taking into account all transmitted forces due to masses, torque, radial and axial loads;
- the mounting position intended use corresponds to that indicated on name plate.



#### Attention!

Take the greatest care when aligning the gearmotor with the machine to be driven (use shims if necessary).

**Incorrect alignment may cause breakdown of shafts and/or bearings (which may cause overheatings) which may represent heavy danger for people.**

Position the gear reducer so as to allow a free passage of air for cooling both gear reducer and motor (especially at their fan side); Avoid any obstruction to the air flow; heat sources near the gear reducer that might affect the temperature of cooling air and of gear reducer (for radiation); insufficient air recycle and applications hindering the steady dissipation of heat; Verify that the gear reducer housing is dust-free in order to achieve an efficient heat dispersal.



**Place the supplied adhesive pictogram identifying the risk associated with hot surfaces on the surface of the gearbox in a position visible to personnel involved in the operation and maintenance of the machine (taken from UTD189).**

Mating surfaces (of gear reducer and machine) must be clean and sufficiently rough to provide a good friction coefficient (indicatively  $Ra\ 3,2 \div 6,3\ \mu m$ ).

Remove by a scraper or solvent the eventual paint of gear reducer coupling surfaces

When external loads are present use pins or locking blocks, if necessary.

When fitting gear reducer and machine and/or gear reducer and eventual flange **B5** it is recommended to use **locking adhesives** such as LOCTITE on the fastening screws (also on flange mating surfaces).

For accessories not supplied by Rossi, pay attention to their dimensioning; consult us, if need be.

Before wiring-up the gearmotor make sure that motor voltage corresponds to input voltage. If direction of rotation is not as desired, invert two phases at the terminals.

Y- $\Delta$  starting should be adopted for no-load starting (or with a very small load) and for smooth starts, low starting current or other similar devices should be fitted.

If overloads are imposed for long periods or if shocks or danger of jamming are envisaged, then motor-protection, electronic torque limiters, fluid couplings, safety couplings, control units or other similar devices should be fitted.

**Usually protect the motor with a thermal cut-out** however, where duty cycles involve a high number of on-load starts, it is necessary to utilise **thermal probes** for motor protection (fitted on the wiring); magnetothermic breaker is unsuitable since its threshold must be set higher than the motor nominal current of rating.

**Connect thermal probes, if any, to auxiliary safety circuits.**

Use varistors and/or RC filters to limit voltage peaks due to contactors.

Whenever a leakage of lubricant could cause heavy damages, increase the frequency of inspections and/or envisage appropriate control devices (e.g.: remote level gauge, etc.).

In polluting surroundings, take suitable precautions against lubricant contamination through seal rings or other.

For outdoor installations or aggressive environments, paint the gear reducer or gearmotor with a suitable anti-corrosive paint (see ch. 3.4), protecting it with water-repellent grease (especially in position with the rotating seats of the seal rings and the access areas on the shaft ends).

Gearmotors should be protected wherever possible, and by whatever appropriate means, from solar radiation and extremes of weather; weather protection **becomes essential for V5 and V6 mounting positions.**

For ambient temperature greater than +40 °C or less than 0 °C, consult Rossi.



**Attention!**

During the running the gear reducers could have hot surfaces; Always wait that the gear reducer or the gearmotor to cool before carrying out any operations.

Further technical documentation can be downloaded from our website [www.rossi.com](http://www.rossi.com).

**Fitting of components to shaft ends**

It is recommended that the bore of parts keyed to low speed shaft ends is machined to K7 tolerance (H7 when load is uniform and light).

Before mounting, thoroughly clean mating surfaces with proper antirust products, and lubricate against seizure and fretting corrosion.

Installing and removal operations should be carried out with pullers and jacking screws using the tapped hole at the shaft butt-end.

## 5.2

### Tightening torques for fastening bolts (feet, flange, accessories) and for plugs

Unless otherwise specified, it is normally sufficient to use class 8.8 screws; the following cases are an exception, for which screws with strength class 10.9 must be used:

- iC 372 - iC 373 FE with flange F312
- iC 472 - iC 473 FE with flange F414
- iC 572 - iC 573 FE with flange F516

Before tightening, carefully degrease the screws; in the event of heavy vibrations, heavy duties, frequent drive inversions apply a thread-braking seal type LOCTITE or similar.

Table 5.2.1 Tightening torque for fastening bolts

Fastening bolts	Tightening torque <i>Ms</i> for bolts for foot and flange fastening N m	
	cl. 8.8	cl. 10.9
<b>M4</b>	2.9	4
<b>M5</b>	6	8.5
<b>M6</b>	11	15
<b>M8</b>	25	35
<b>M10</b>	50	70
<b>M12</b>	85	120
<b>M14</b>	135	190
<b>M16</b>	205	290
<b>M18</b>	280	400
<b>M20</b>	400	560
<b>M22</b>	550	770
<b>M24</b>	710	1000

Table 5.2.2 Tightening torques for oil drain and filler plugs

Frame size gear reducer	Tightening torque <i>Ms</i> for oil drain and breather plugs	
	Plug threading dimension	<i>Ms</i> N m
<b>iC 27 ... iC 67</b>	M10 x 1	8
<b>iC 77, iC 87</b>	M12 x 1,5	14
<b>iC 97</b>	M22 x 1,5	45

## 5.3

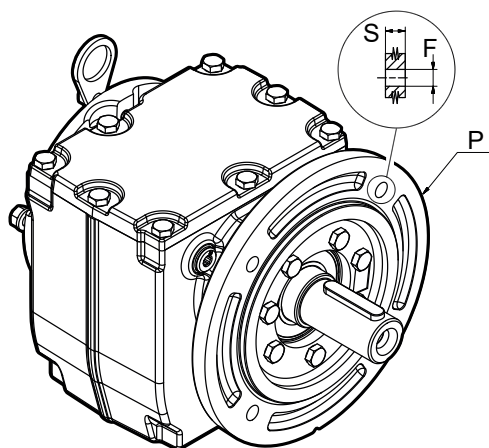
### Flange mounting

If through-holes ( flange B5) are used for fastening, carefully select the length of the fastening screws, which must be long enough to ensure a sufficiently extended clamping section to ensure correct fastening of the gearbox to the machine.

Before tightening the bolt be sure that the eventual centering of flanges is inserted properly

Screws must be tightened diagonally with the maximum torque indicated in Table 5.2.1.

In the fastening screws and in the flange mating surfaces use **locking adhesives**.



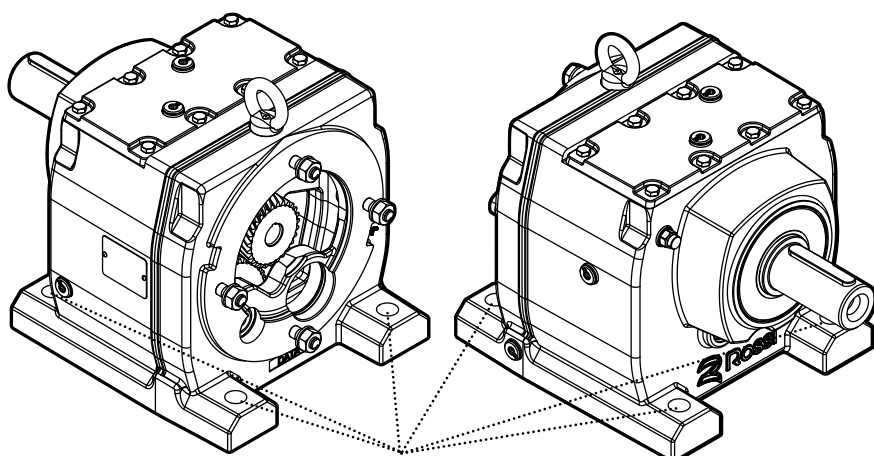
UTC. 2435

Table 5.3.1 B5 flange hole dimensions

Frame size gear reducer	Dimensions B5 flange mm			Tightening torque $M_s \pm 10\%$ Strength class 10.9 N m
	$\varnothing P$	$\varnothing F$	S	
iC 27, iC 37	120	M6	8	15
iC 27	140	M8	9	35
iC 37, iC 47	140	M8	10	35
iC 27 ... iC 57	160	M8	10	35
iC 37 ... iC 67	200	M10	12	70
iC 57 ... iC 77	250	M12	15	120
iC 77	300	M12	15	120
iC 87	300	M12	16	120
iC 87	350	M12	15	120
iC 97	350	M16	18	290
iC 97	450	M16	22	338

## 5.4

### Foot mounting



Housing for 4 screws or nuts  
(minimum length indicated in the table)

Table 5.4.1 Foot mounting screw dimensions

Frame size gear reducer	Foot mounting screw UNI5737 (minimum length in mm)
iC 27, iC 37	M8 x 18
iC 47, iC 57	M12 x 24
iC 67	M12 x 30
iC 77	M16 x 30
iC 87	M16 x 45
iC 97	M20 x 55



#### Attention!

Thoroughly degrease the screws before tightening.

In the event of strong vibrations, heavy-duty cycles, frequent motion reversals, it is always advisable to apply a suitable threadlocker adhesive such as LOXAEI 23-18 or equivalent on the thread.



### Fitting of components to shaft ends

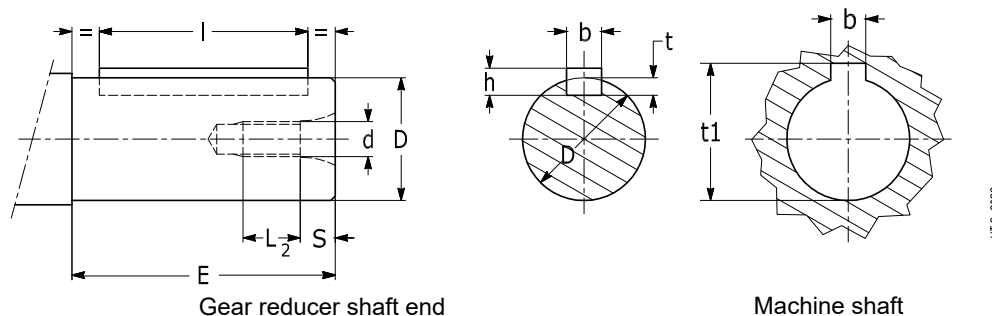


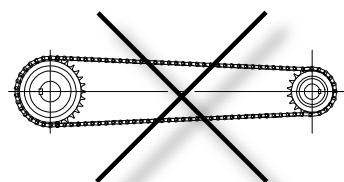
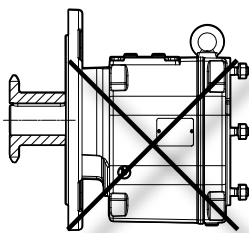
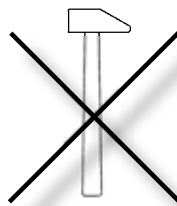
Table 5.5.1 Shafts in metres

Ø D k6	Shaft end mm				Key mm b x h x l h9 h11	Key mm		
	E	Ø d	S	L		b H9 hub N9 shaft	t shaft	t <sub>1</sub> hub
25	50	M10	7.6	18.4	8 x 7 x 40	8	4	28.3
30	60	M10	7.6	18.4	8 x 7 x 50	8	4	33.3
35	70	M12	9.5	22.5	10 x 8 x 56	10	5	38.3
40	80	M16	12.7	27.3	12 x 8 x 70	12	5	43.3
50	100	M16	12.7	27.3	14 x 9 x 80	14	5.5	53.8
60	120	M20	16	34	18 x 11 x 110	18	7	64.4

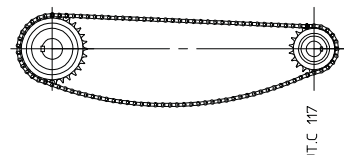
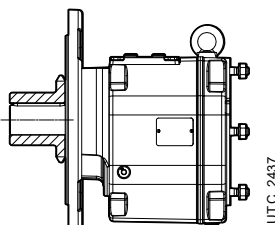
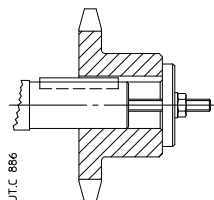
Table 5.5.2 Shaft in inches

Ø D	Shaft end at (mm)				Key at (mm)			Key at (mm)		
	E	Ø d	S (mm)	L	b	h	l	b	t shaft	t <sub>1</sub> hub
1 (25,4)	1.93 (50)	3/8-16 (7,9)	7.5	14.5 (22,9)	0.25 <sup>+0,000</sup> -0,002 (6,35)	0.25 <sup>+0,000</sup> -0,002 (6,35)	1.313 (33,34)	0.25 <sup>+0,002</sup> -0,000 (6,35)	0.141 (3,58)	1.114 (28,3)
1,25 (31,75)	2.36 (60)	1/2-13 (10,7)	10	18.5 (29,5)	0.25 <sup>+0,000</sup> -0,002 (6,35)	0.25 <sup>+0,000</sup> -0,002 (6,35)	1.688 (42,86)	0.25 <sup>+0,002</sup> -0,000 (6,35)	0.141 (3,58)	1.367 (34,72)
1,375 (34,93)	2.76 (70)	1/2-13 (10,7)	10	18.5 (29,5)	0.313 <sup>+0,000</sup> -0,002 (7,94)	0.313 <sup>+0,000</sup> -0,002 (7,94)	1.813 (46,04)	0.313 <sup>+0,002</sup> -0,000 (7,94)	0.174 (4,42)	1.518 (38,56)
1,625 (41,28)	3.15 (80)	5/3-11 (13,5)	50	23 (36,8)	0.375 <sup>+0,000</sup> -0,002 (9,52)	0.375 <sup>+0,000</sup> -0,002 (9,52)	2.25 (57,15)	0.375 <sup>+0,002</sup> -0,000 (9,52)	0.209 (5,31)	1.796 (45,62)
2,125 (53,93)	3.94 (100)	3/4-10 (16,5)	15	26 (42,2)	0.50 <sup>+0,000</sup> -0,002 (12,7)	0.50 <sup>+0,000</sup> -0,002 (12,7)	2.625 (66,68)	0.50 <sup>+0,002</sup> -0,000 (12,7)	0.28 (7,11)	2.35 (59,69)
2,375 (60,33)	4.72 (120)	3/4-10 (16,5)	15	26 (42,2)	0.625 <sup>+0,000</sup> -0,002 (15,88)	0.625 <sup>+0,000</sup> -0,002 (15,88)	3.625 (92,08)	0.625 <sup>+0,002</sup> -0,000 (15,88)	0.354 (8,99)	2.651 (67,34)

Incorrect



Correct



Generally, it is recommended to machine the hole of parts keyed onto shaft end, tolerance **H7**.

For low speed shaft ends, provided that load is not uniform and light, tolerance must be **K7**.

Before mounting, thoroughly clean mating surfaces with proper antirust products, and lubricate against seizure and fretting corrosion.



### Attention!

Assemble and disassemble with the aid of **jacking screws** and **pullers** using tapped holes at shaft butt-end, taking care to avoid impacts and shocks which may **irremediably damage the bearings, the circlips or other parts**.

For couplings H7/m6 and K7/j6 it is advisable that the part to be keyed is preheated to a temperature of  $80 \div 100$  °C.

The couplings having a tip speed on external diameter up to 20 m/s must be statically balanced; for higher tip speeds they must be dynamically balanced.

Where the transmission link between gear reducer and machine or motor generates shaft end loads, ensure that: loads do not rise above catalog values:

- loads do not rise above catalog values;
- transmission overhang is kept to a minimum;
- drive-chains should not be tensioned (if necessary – alternating loads and/or motion – foresee suitable chain tighteners);
- in the gear transmission systems there is a proper backlash ( $\approx 0,03 \div 0,04$  mm) between pinion and rack;
- drive-belts should not be over-tensioned.

The gear pairs and the bearings are oil bathed, splashed or lubricated «for life» with grease (with or without NILOS ring).

Unless otherwise stated, gearmotors are supplied **FILLED WITH POLYGLYCOL BASIS SYNTHETIC OIL** (KLÜBER Klübersynth GH 6-220, MOBIL Glygoyle 220, SHELL Omala S4 WE 220), providing lubrication – assuming pollution-free surroundings – “for life”.

We recommend that you check the oil level; each gear reducer is equipped with a lubrication plate.

For lubricant type, gear reducer delivery condition, plugs, filling instructions, lubrication intervals, etc., see ch. 6.2 and 6.3.

**Attention!**



Ensure that the gear reducer is complete with oil and (metal) breather plug mounted in the correct position as per required mounting position; for BX mounting positions, it is supplied loose and must be mounted in the position corresponding to the desired mounting position.

**The breather plug must be activated prior to commissioning by removing the tab provided (see fig. 6.1.1).**

**It is necessary to keep the breather free from dirt that could compromise its functionality.**

**If this is not possible, please contact Rossi S.p.A. to find a different solution**

The lubricant quantity to add shall be the one that will allow you **to reach the required level, with the gear reducer not running, according to instructions at ch. 6 of present handbook**, and not the indicative quantity mentioned in the catalog.

Fig. 6.1.1 Activating the breather



The bearings are normally automatically and continuously lubricated (oil bath, splash method) by the gear reducer lubricant or by “lifetime” grease with or without a metal shield.

For gear reducers in vertical V6 mounting position, the upper bearings are independently lubricated with special grease for “lifetime” lubrication, if no external pollution is present

(the outer bearing on the low speed shaft is always grease lubricated).

**Make sure that the gear reducer is fitted according to the mounting position specified in the order - including inclined mounting positions (e.g. B3 38° V5) - as indicated on the name plate (see ch. 3.2).**

**For mounting positions, oil quantity and plug position, see ch. 6.3 and 6.4.**

## 6.2

### Lubricant table

Using **synthetic oil is always recommended**, especially if you want to increase the lubrication interval, ambient temperature range and/or reduce the oil temperature.

**Important:**

**Inappropriate lubricants can cause damage to the gear reducer.**

Viscosity and type of lubricating oil used for filling **are indicated on the gear reducer name plate.**

Rossi S.p.A. declines any responsibility for damages deriving from the use of other lubricants or from the use outside the expected ambient temperature range. The indications on lubricants do not bind Rossi S.p.A. on the quality of the lubricant supplied by each individual manufacturer. Do not mix different lubricating oils; do not mix synthetic oils with mineral oils.

Manufacturer	Oil synthetic PAO	Oil synthetic PAG	Oil mineral	Manufacturer	Oil synthetic PAO	Oil synthetic PAG	Oil mineral
<b>AGIP</b>	Blasia SX	Blasia S	Blasia	<b>KLÜBER</b>	Klübersynth GEM4	Klübersynth GH6	Klübersynth GEM1
<b>ARAL</b>	Degol PAS	Degol GS	Degol BG	<b>MOBIL</b>	Mobil SHC Gear	Mobil Glygoyle	Mobilgear 600 XP
<b>BP</b>	Enersyn EPX	Enersyn SG-XP	Energol GR-XP	<b>SHELL</b>	Omala S4 GX	Omala S4 WE	Omala S2 G
<b>CASTROL</b>	Alphasyn EP	Optiflex A	Alpha SP	<b>TEXACO</b>	Pinnacle	Synlube CLP	Meropa
<b>FUCHS</b>	Renolin Unisys	Renolin PG	Renolin CLP	<b>TOTAL</b>	Carter SH	Carter SY	Carter EP

### ISO viscosity grade

Unless otherwise specified, the gearmotors are **supplied complete with synthetic oil** of viscosity grade ISO VG 220 suitable for most applications in normal industrial environments. For different application conditions or specific needs, please contact Rossi S.p.A.

The following table provides a general guideline for lubricant viscosity selection (average cSt value of kinematic viscosity at 40 °C).

Speed $n_2$ [min <sup>-1</sup> ]	Ambient temperature $T_{amb}$ [C°]		
	Mineral Oil		Synthetic oil
	0 ÷ 20	10 ÷ 40	0 ÷ 40
<b>&gt; 224</b>	150	150	150
<b>224 ÷ 22,4</b>	150	220	220
<b>22,4 ÷ 5,6</b>	220	320	320
<b>&lt; 5,6</b>	320	460	460

Ambient temperature peaks of  $\pm 10$  °C for mineral oils and  $\pm 20$  °C for synthetic oils are permissible with respect to the conditions given in the table.

## Oil change interval

An overall guide to oil-change interval is given in the table, and assumes pollution-free surroundings. When heavy overloads are present, halve the values.

Oil temperature [C °]	Oil-change interval [h]	
	<i>Mineral Oil</i>	<i>Synthetic oil</i>
≤ 65	8000	25000
65 ÷ 80	4000	18000
80 ÷ 95	2000	12500

### Seal rings:

Duration depends on several factors such as dragging speed, temperature, ambient conditions, etc.; as a rough guide it can vary from 3150 to 25000 h.

### Grease-lubricated bearings:

Lubrication is «for life» assuming uniform load and pollution-free environment.

If these conditions are not met, replace the grease every year in the event of operation time up to 12 h/d and every 6 months if the operation time is 12 ÷ 24 h/d.

Ball bearings must be completely filled with ESSO Gadus S2 V100 bearing grease, roller bearings with KLÜBER STABURAGS NBU 8 EP.



### Attention!

Refer to ch. 6.4 for bearings requiring greasing and contact Rossi in case of doubt.

## 6.3

### Oil (quantity) levels

**Important!** Check the mounting position, taking into account that if the gear reducer is installed in a mounting position other than that indicated on the name plate, this may require topping up through the hole provided, the quantity of lubricant corresponding to size x and indicated in the following tables.

Measure x as shown in fig. 6.3.1, after ensuring that you have removed any air pockets in the oil inside the gear reducer.

For iC 27 (always) and iF 47, iC 57 gear reducers in B6 mounting position, the oil level will be identified by removing the cover (see fig. 6.3.1), positioning the gear reducer in the B3 mounting position. Calculate distance "x" between the oil level and the cover resting surface. When the operation is completed, clean the coupling surfaces of the cover and the gearbox housing from residues of grease and polymerized sealant; restore the seal to the cover by applying a continuous bead of LOXEAL 58-14 liquid sealant all around the perimeter, without interruption and surrounding the holes; then position the cover, apply the screws and tighten at the tightening torque indicated in chapter 5.2.

Fig. 6.3.1 Gear reducer oil quantity

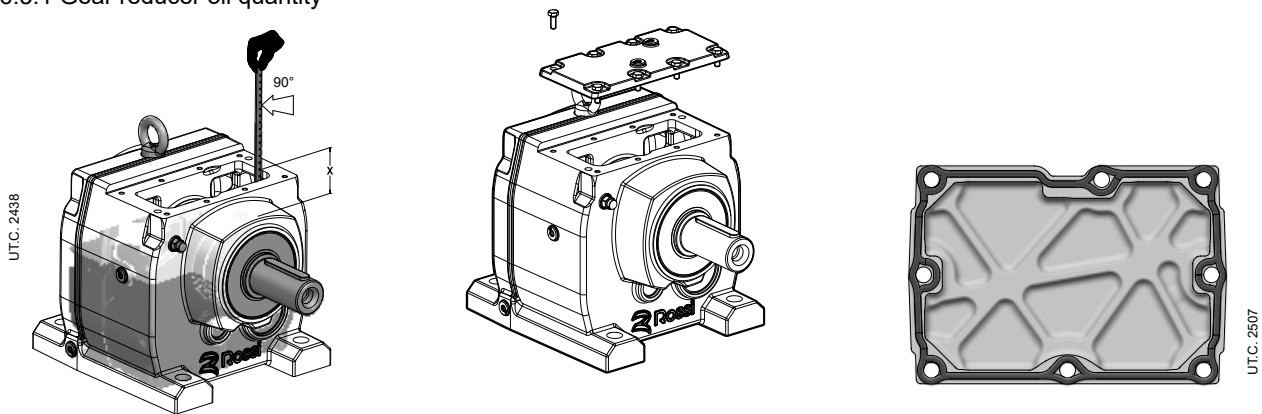


Table 6.3.1 Gear reducer oil quantity

Frame size gear reducer	Oil quantity [l]					
	B3	B6	B7	B8	V5	V6
iC 272 - iC 273	0.45	0.6	0.6	0.55	0.9	0.8
iC 372 - iC 373	0.3	0.75	0.95	0.95	1.05	0.85
iC 472 - iC 473	0.7	1.5	1.5	1.5	1.65	1.6
iC 572 - iC 573	0.8	1.7	1.7	1.7	2.1	1.9
iC 672 - iC 673	1.1	1.8	2.0	2.8	2.9	2.4
iC 772 - iC 773	1.2	2.5	3.4	3.6	3.8	3.3
iC 872 - iC 873	2.3	6.3	6.5	7.2	7.2	6.4
iC 972 - iC 973	4.6	11.3	11.7	11.7	13.4	11.7

Compare the "x" value measured (as in Fig. 6.3.1) with the max value provided by table 6.3.2.

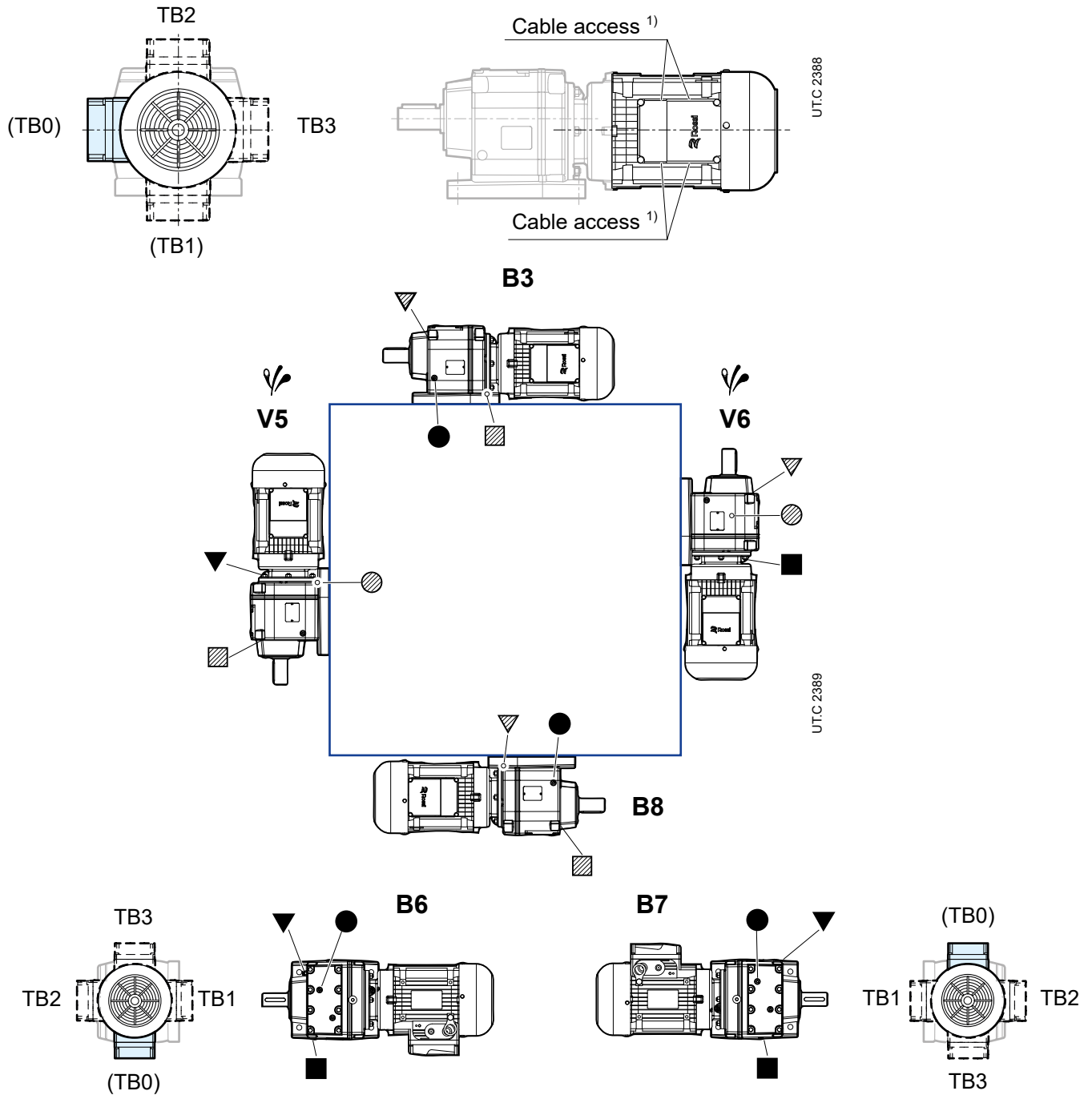
Adjust the amount of oil if necessary.

Table 6.3.2 Maximum distance "x" measurement

Gear reducer type		Maximum distance "x" [mm] between oil level and gear reducer cover resting surface					
Gear reducer size	No. of reduction stages	B3	B6	B7	B8	V5	V6
iC 27	2	74 ± 1	45 ± 1	45 ± 1	45 ± 1	22 ± 1	22 ± 1
	3	76 ± 1	42 ± 1	42 ± 1	42 ± 1	19 ± 1	19 ± 1
iC 47	2	-	39 ± 1	-	-	-	-
	3	-	32 ± 1	-	-	-	-
iC 57	2	-	32 ± 1	-	-	-	-
	3	-	28 ± 1	-	-	-	-

## Foot mounted gearmotors iC 272 / 273 PE ... iC 972 / 973 PE

### Mounting positions and plug position



iC 27... : breather plugs not present for B3, B8, B6, B7

iC 27... : oil level and drain plugs not present

iC 47..., iC 57... : level plug not present for B6

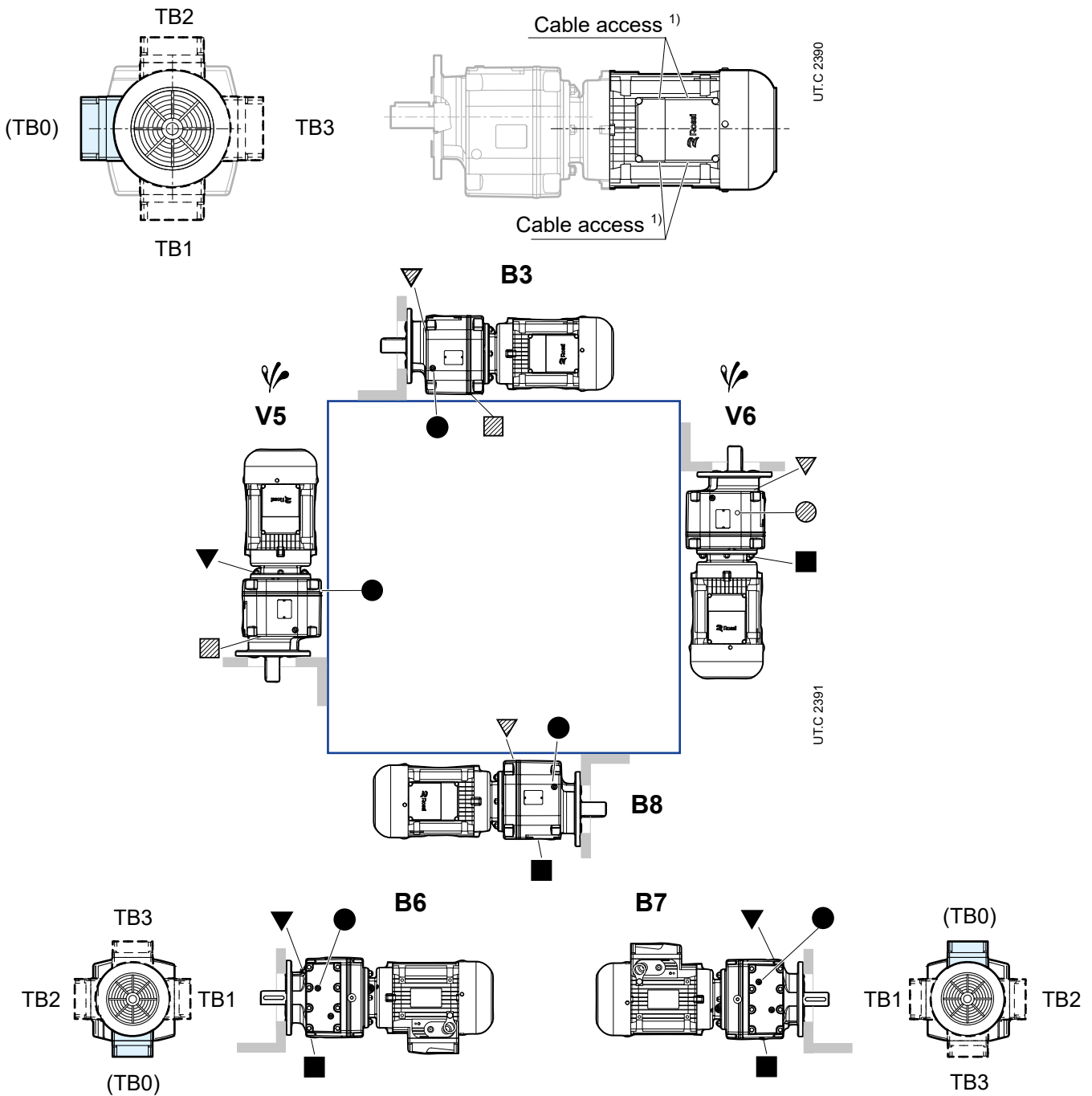
- ▼ breather plug
- oil level plug
- oil drain plug

- ▽ breather plug on opposite side (not in view)
- ◐ oil level plug on opposite side (not in view)
- ▨ oil drain plug on opposite side (not in view)

☼ Possible high oil splash: for the corrective factor  $f_{13}$  of nominal thermal power  $P_{TN}$ .

<sup>1)</sup> The customer is responsible for cable connection: the terminal box is incorporated with the motor housing and is equipped with bilateral cable access with pre-set cutting (one for the power cable and one for the auxiliary devices).

## Flange mounted garmotors iC 272 / 273 FE ... iC 972 / 973 FE



iC 27... : breather plugs not present for B3, B8, B6, B7

iC 27... : oil level and drain plugs not present

iC 47..., iC 57... : oil level plug not present for B6

- ▼ breather plug
- oil level plug
- oil drain plug
- ▼ (hatched) breather plug on opposite side (not in view)
- (hatched) oil level plug on opposite side (not in view)
- (hatched) oil drain plug on opposite side (not in view)
- ☹ Possible high oil splash: for the corrective factor  $f_{i3}$  of nominal thermal power  $P_{TN}$

<sup>1)</sup> The customer is responsible for cable connection: the terminal box is incorporated with the motor housing and is equipped with bilateral cable access with pre-set cutting (one for the power cable and one for the auxiliary devices).



For assembly or replacement, simply follow the rules outlined below:

- make sure that the couplings of the motor, IEC or NEMA standard on Adapter, are machined based on a precise class (IEC 60072-1);
- thoroughly clean the coupling surfaces;
- check that the motor is centered in the corresponding gear reducer flange seat;
- Tighten the motor fastening screws to gear reducer flange in order to achieve a tightening torque as per ch. 5.2.
- coat the coupling surfaces with a thread-braking seal type LOXEAL 58-14 to prevent contact oxydation;

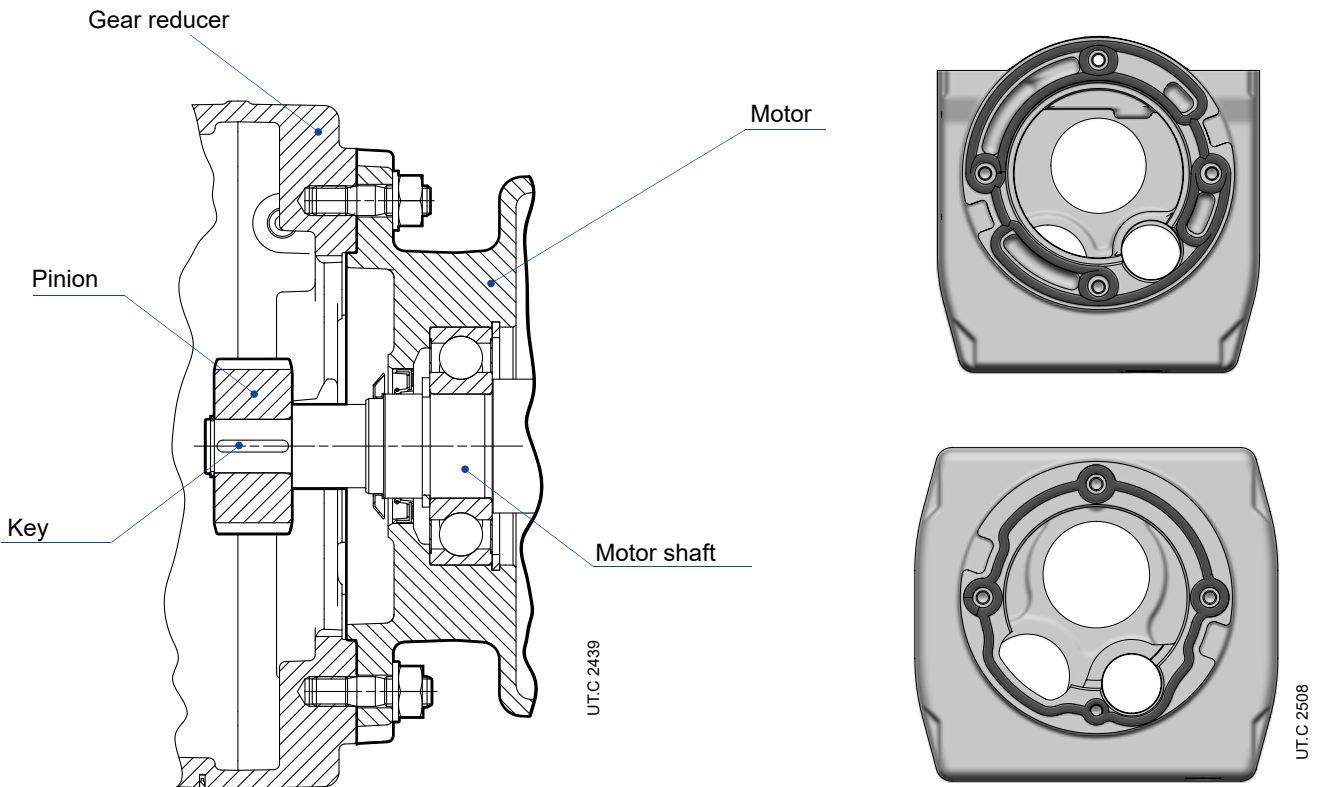


- insert the motor up to shoulder; **do not force the motor shaft during gear reducer coupling: danger of serious damages.**

## Procedures of assembling the cylindrical pinion splined to the motor shaft

The following assembly procedures involving the drive shaft must be performed in the order shown:

- 1) mount the supplied key in the groove provided;
- 2) spline the preheated pinion onto the motor shaft at approx. **140 °C** taking care not to strike the motor shaft with a mallet or other tool;
- 3) coat with adhesive product (e.g.: LOXEAL 23-18) the portion of the motor shaft below the pinion;
- 4) check that the flexible ring is in place;
- 5) mount the motor on the gearbox by applying a thin, continuous bead of LOXEAL 58-14 sealant to the flange and gearbox housing, surrounding the motor mounting studs and staying in the central position of the machined surface, as far as possible from the bearing seats (see figure below).



## 7.3

### Assembling the motor (IEC or NEMA) on adapter

Check the mating dimensions – for standards IEC 72-1 be sure that the mating surfaces are machined under accuracy rating (IEC 60072-1, UNEL 13501-69; DIN 42955) – for NEMA standards please refer to NEMA C-FACE chart;

Proceed as follows to assemble the motor on the adapter:

- thoroughly clean the coupling surfaces (motor shaft, motor flange and adapter);
- check and, if necessary, lower the key in order to obtain a backlash of  $0,1 \div 0,2$  mm between the top and the bottom of the hole groove. If the shaft key is without shoulder, lock the key;
- lubricate the coupling surfaces to prevent contact oxidation (Klüberpaste 46 MR 401 is recommended);
- push the motor up to shoulder;  
**Do not force the motor shaft into the adapter coupling. Risk of serious damage.**
- Tighten the supplied motor fastening screws to the adapter flange until reaching the tightening torque indicated in the table below:

Table 7.4.1 Tightening torques for motor adapter fastening screws

Worm Ød	Tightening torque $M_s$ IEC motors N m cl. 8.8		Worm Ød [in]	Tightening torque $M_s$ NEMA motors	
				ft lb	N m
M8		25	3/8" - 16	32.9	44.6
M10		50	1/2" - 13	80.3	109
M12		85	5/8" - 11	157	213
M16		205			

In order to prevent harmful moisture or dirt (e.g.: dust) infiltrations inside the adapter, it is advisable to insulate any discontinuities or openings in the coupling surfaces between the motor and the adapter flange by applying a continuous bead of sealant (e.g.: LOXEAL 58-14).

Prior to fitting the customer-supplied motor, verify that the static bending torque  $M_b$  generated by the weight of the motor on the adapter counterflange is below the permitted value  $M_{bmax}$ , shown in table 7.4.2:

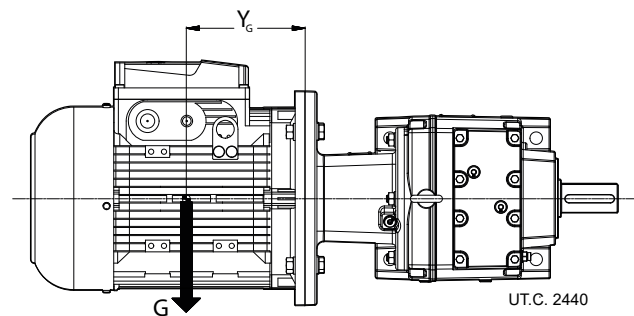
$$M_b < M_{bmax}$$

where:

$$M_b = (G \cdot Y_g) / 1000 \text{ [N m]}$$

G [N] motor weight; numerically approximately equal to motor mass, expressed in kg, multiplied by 10.

$Y_g$  [mm] distance of motor center of gravity from flange surface



Motors that are too long and too thin, even if the bending moment is below the prescribed table limits, can generate abnormal vibrations during operation.

In these cases, a suitable additional motor support must be provided (see specific motor documentation).

Loads above those permitted may be present in dynamic applications if the gearmotor is subject to translation, rotation or oscillation: contact Rossi to examine each individual case.

Table 7.4.2 Maximum bending torque  $M_{bmax}$  related to IEC and NEMA motor adapter

Size motor IEC	Maximum bending torque $M_{bmax}$ [N m]					Size motor NEMA	Maximum bending torque $M_{bmax}$ [N m]				
	iC 27, iC 37	iC 47 ... iC 67	iC 77	iC 87	iC 97		iC 27, iC 37	iC 47 ... iC 67	iC 77	iC 87	iC 97
63, 71	55					56	45				
80, 90	90	265				143/145 TC	72	246			
100, 112	200					182/184 TC	161				
132 S, M	290		870			213/215 TC	251		656		
132 L						254/256 TC	740		1003		
160			935	1155			284/286 TC				
180							324/326 TC				1430
200											1645

## Commissioning

## 8

### 8.1

#### General

Carry out an overall check, making particularly sure that the **gear reducer is filled with lubricant**.  
 Where Y- $\Delta$  starting is being used, input voltage must match the motor lower voltage ( $\Delta$  connection).  
 For asynchronous three-phase motor, if the direction of rotation is not as desired, invert two phases at the terminals.

### 8.2

#### Running-in

It is advisable to execute a running-in of approximately 200 ÷ 400 h so that it is possible to achieve maximum functionality. The temperature of both gear reducer and lubricant may well rise beyond normal values during running-in. After the running-in period it may be necessary to verify the gear reducer fixing bolt tightness.

## 9.1

### General

**At machine rest**, verify at regular intervals (more or less frequently according to environment and use):

- all external surfaces are clean and air passages to the gear reducer or gearmotor are free, in order that cooling remains fully effective;
- oil level and deterioration degree (check with cold gear reducer at rest);
- correct fastening screws tightening.

**During the operation** check:

- noise level;
- vibrations;
- seals;
- etc.

#### Attention!



After a running period, the gear reducer is subject to a light internal overpressure which may cause burning liquid discharge. Therefore, before loosening whichever plug (filler plug included) wait until gear reducer has become cold, if this is not possible, use appropriate protection against burns resulting from contact with hot oil. In all cases, always proceed with great care.

The maximum oil temperatures indicated in the lubrication table (see ch. 6.2) will not impair proper functioning of the gear reducer.

## 9.2

### Oil change

Execute the oil change with the **machine at rest and cold** gear reducer.

Pre-arrange a proper waste oil collection system, unscrew the drain plug and the filler plug in order to facilitate the draining; dispose of the waste lubricant according to the laws in force.

wash the inside part of gear reducer housing using the same oil type suitable for the running; the oil used for this wash can be applied for further washings after proper filtering by 25 µm of filtration standard;

Fill the gear reducer with oil again up to level.

During the oil change, replace the seal rings.

When dismantling the cap (whenever gear reducers are provided with), reset the sealing with adhesive on cleaned and degreased mating surfaces.

For lubrication interval see ch. 6.2.

Apart from running hours:

- replace mineral oil at least each 3 years;
- replace or regenerate synthetic oil each 5 - 8 years according to gear reducer size, running, and environmental conditions.

Never mix different makes of synthetic oil; if oil change involves switching to a type different from that used hitherto, then give the gear reducer a thorough clean-out.

For bearings lubricated with "lifetime" grease, it is not strictly necessary to replace the grease. However, during maintenance operations in which the bearings are accessible, it is always advisable to check and, if necessary, top up the grease.

### Seal ring

It is always recommended that the seal rings are replaced with new ones when they are removed or during periodic checks of gear reducer; in this case, the new ring should be generously greased and positioned so that the seal line does not work on the same point of sliding contact as the previous ring.

Oil seals must be protected against heat radiation, also during the shrink fitting of parts, if applicable.

Duration depends on several factors such as dragging speed, temperature, ambient conditions, etc.; as a rough guide it can vary from 3150 to 12000 h.

### Bearings

Since there are many different types of bearings in a gear reducer (roller, tapered roller, straight roller, etc.) and each bearing works with different loads and speeds depending on the input speed, the nature of the load of the driven machine, the transmission ratio, etc., and with different lubricants (oil bath, oil splash, grease, oil circulation, etc.), it is not possible to define any periodical maintenance and replacement of bearings in advance.

**If precautionally maintenance is required, undertake periodical checks to verify noise level and vibration with the help of appropriate diagnostic equipment** and instruments. If the measured values worsen even slightly it is necessary to stop gear reducer or gear motor and after having inspected the unit replace the bearings which are subject to breakdown.

### Metal filler plug with filter and valve



To clean the filler plug, unscrew it from the gear reducer to remove any dust and foreign matter, clean it thoroughly, and refit it.

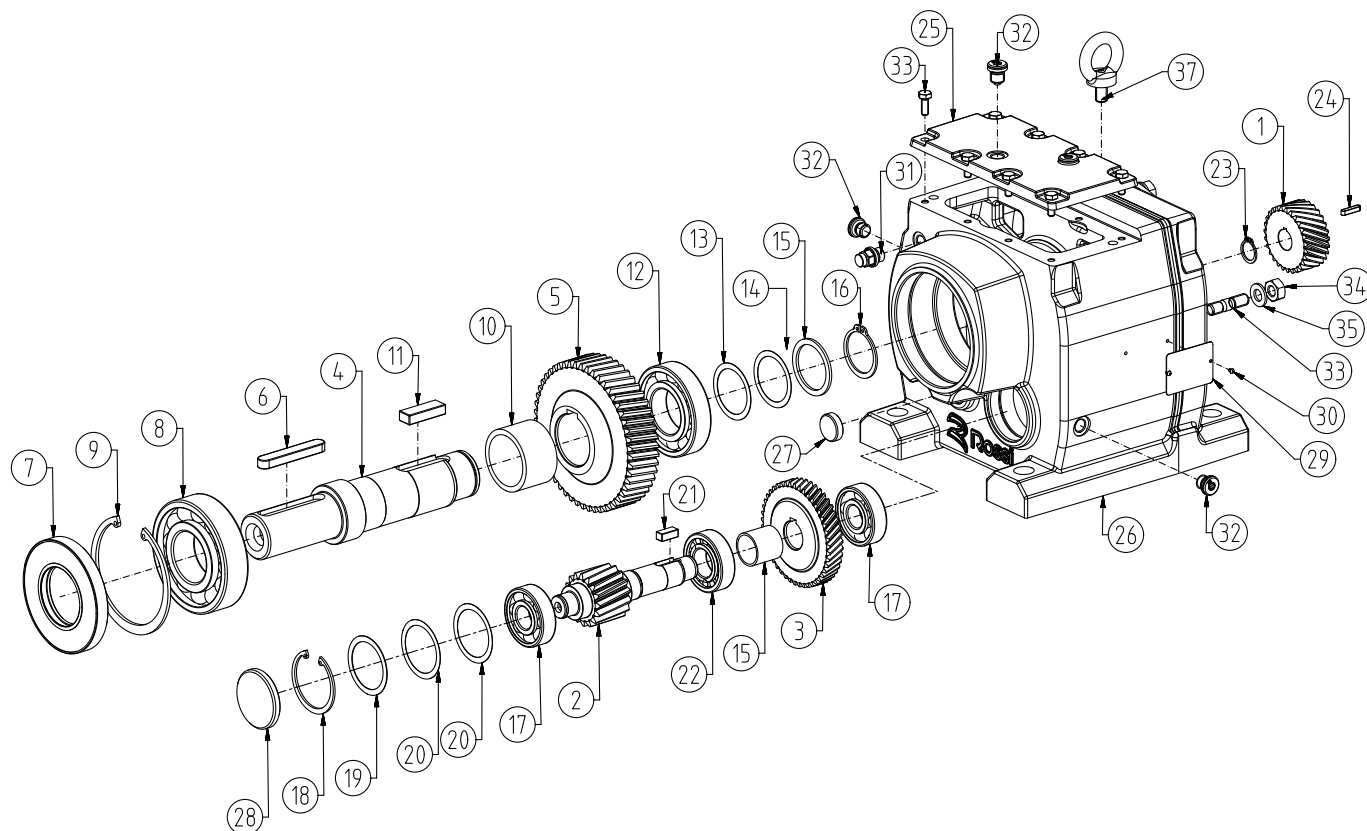
### Sound levels $L_{WA}$ and $L_{pA}$

The standard levels of sound power emission  $L_{WA}$  relevant to the gearmotors of this catalog, running at nominal load and speed, fulfill the limits settled by VDI 2159 for gear reducers and EN 60034 for motors.

## 9.7

### Spare part tables

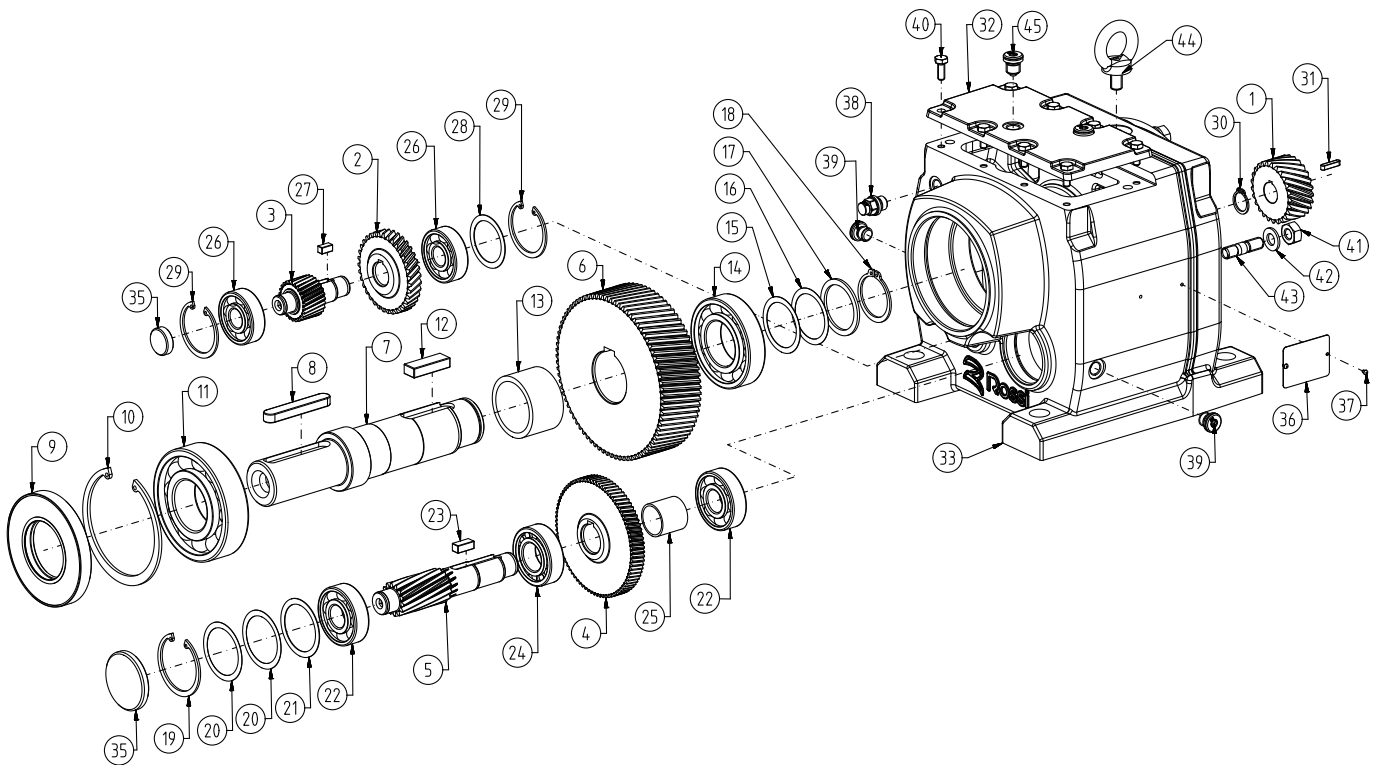
#### Gear reducer structure base R272...R972



Pos.	Description
1	Wheel
2	Pinion
3	Wheel
4	Output shaft
5	Wheel
6	Key
7	Seal ring
8	Ball bearing
9	Flexible ring
10	Spacer
11	Key
12	Ball bearing
13	Shim
14	Shim
15	Spacer
16	Flexible ring
17	Ball bearing
18	Flexible ring

Pos.	Description
19	Shim
20	Shim
21	Key
22	Roller bearing
23	Flexible ring
24	Key
25	Cover
26	Housing
27	Cap
28	Cap
29	Name plate
30	Rivet
31	Filler plug
32	Drain plug
33	Worm
34	Nut
35	Washer
36	Worm
37	Eyebolt

## Gear reducer structure base R273...R973



Pos.	Description
1	Wheel
2	Wheel
3	Pinion
4	Wheel
5	Pinion
6	Wheel
7	Output shaft
8	Key
9	Seal ring
10	Flexible ring
11	Ball bearing
12	Key
13	Spacer
14	Ball bearing
15	Shim
16	Shim
17	Spacer
18	Flexible ring
19	Flexible ring
20	Shim
21	Shim
22	Ball bearing
23	Key
24	Roller bearing
25	Spacer
26	Ball bearing

Pos.	Description
27	Key
28	Shim
29	Flexible ring
30	Flexible ring
31	Key
32	Cover
33	Housing
34	Cap
35	Cap
36	Name plate
37	Rivet
38	Filler plug
39	Drain plug
40	Worm
41	Nut
42	Washer
43	Worm
44	Eyebolt

# Gear reducer troubles: causes and corrective actions 10

Trouble	Possible causes	Corrective actions
<b>Excessive temperature of oil</b>	Inadequate lubrication: – excessive of insufficient oil quantity – unsuitable lubricant (different type, too viscous, exhausted, etc.)	Check: – oil level (gear reducer at rest) or quantity – lubricant type and/or state (see ch. 6.2, lubrication table) and replace if necessary
	Incorrect mounting position	Change the mounting position
	Too tightened taper roller bearings	Consult Rossi
	Excessive ambient temperature	Increase the cooling or correct the ambient temperature
	Obstructed passage of air	Eliminate obstructive material
	Slow or missing air recycle	Arrange auxiliary ventilation
	Radiance	Screen gear reducer and motor properly
	Inefficiency of auxiliary bearing lubrication system	Check the pump and the pipes
	Bearings failure, defect or bad lubrication	Consult Rossi
	Inefficient or out of service oil cooling system: obstructed filter, insufficient oil (exchanger) or water (coil) flow rate, pump out of service, water temperature > 20 °C	Check the pump, the pipes, the oil filter and safety devices efficiency (manostats, thermostats, etc.)
<b>Abnormal noise</b>	One or more teeth with — dents or spillings — excessive flanks roughness	Consult Rossi
	Bearings failure, defect or bad lubrication	Consult Rossi
	Taper roller bearings with excessive clearance	Consult Rossi
	Vibrations	Check the fastening and the bearings
<b>Lubricant leaking from seal ring</b>	Seal ring with worm, bakelized, damaged or false mounted seal lip	Replace seal ring (see ch. 11.4)
	Damaged raceway surface (scoring, rust, dent, etc.)	Restore the seating
	Mounting position differs from the one stated on the name plate	Correctly position the gear reducer
<b>Oil leaking from filler plug</b>	Too much oil	Check oil level/quantity
	Incorrect mounting position	Check mounting position
	Inefficient vent valve	Clean/replace filler plug with vent valve
<b>Low speed shaft not rotating even with high speed shaft/motor running</b>	Broken key	Consult Rossi
	Completely worn gear pair	Consult Rossi
<b>Lubricant leaking from joints (covers or half-casing joints)</b>	Defective oil seals	Consult Rossi
<b>Water in the oil</b>	Defective cooling coil or heat exchanger	Consult Rossi

See specific motor documentation.

## NOTE

When contacting Rossi S.p.A. please indicate:

- all data on gear reducer or gearmotor name plate;
- failure nature and duration;
- when and under what conditions the failure happened;
- during the warranty period, in order not to lose validity, do not disassemble nor tamper the gear reducer or gearmotor without approval by Rossi.











# Rossi

Solutions for  
an evolving  
industry

**Rossi S.p.A.**  
Via Emilia Ovest 915/A  
41123 Modena - Italy

Phone +39 059 33 02 88

[info@rossi.com](mailto:info@rossi.com)  
[www.rossi.com](http://www.rossi.com)

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