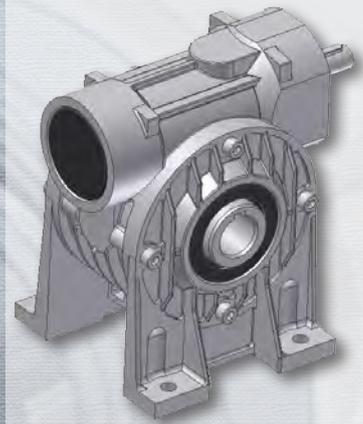




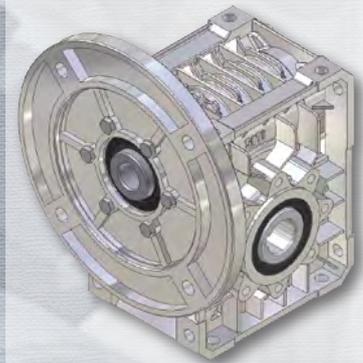
# SITI

SPA

SOCIETÀ ITALIANA TRASMISSIONI INDUSTRIALI



I-MI



U-MU



MD

**EN** WORMGEARBOXES INSTRUCTION AND SPARE PARTS MANUAL

0' .201)

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TIPO  
TYPE

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RATIO

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**A**

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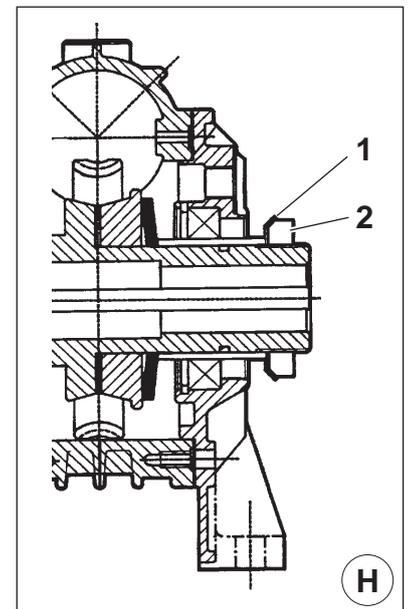
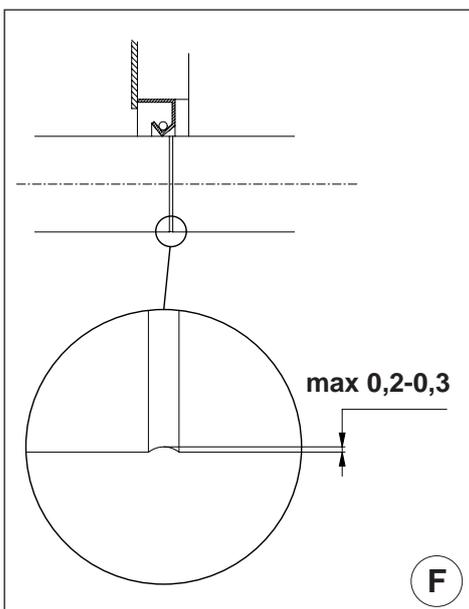
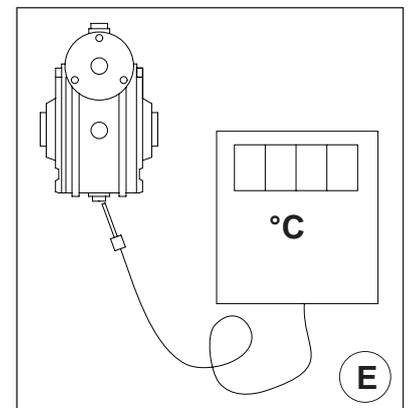
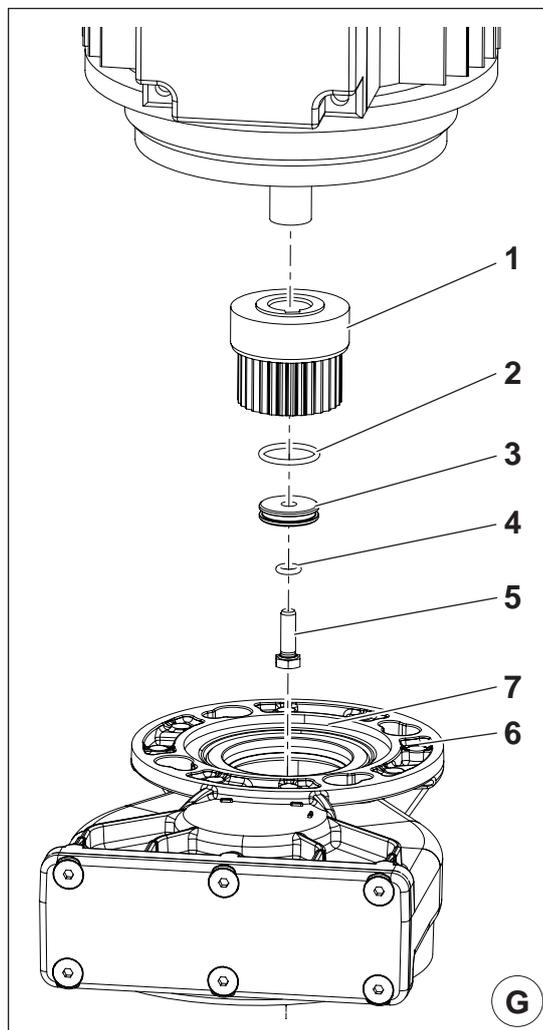
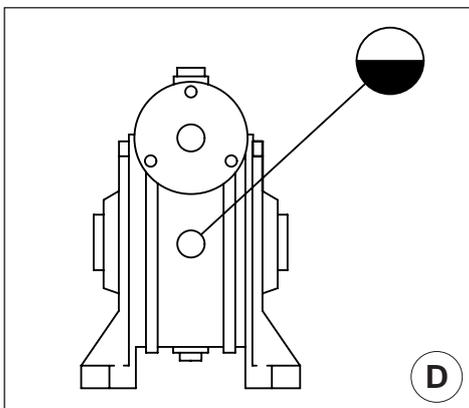
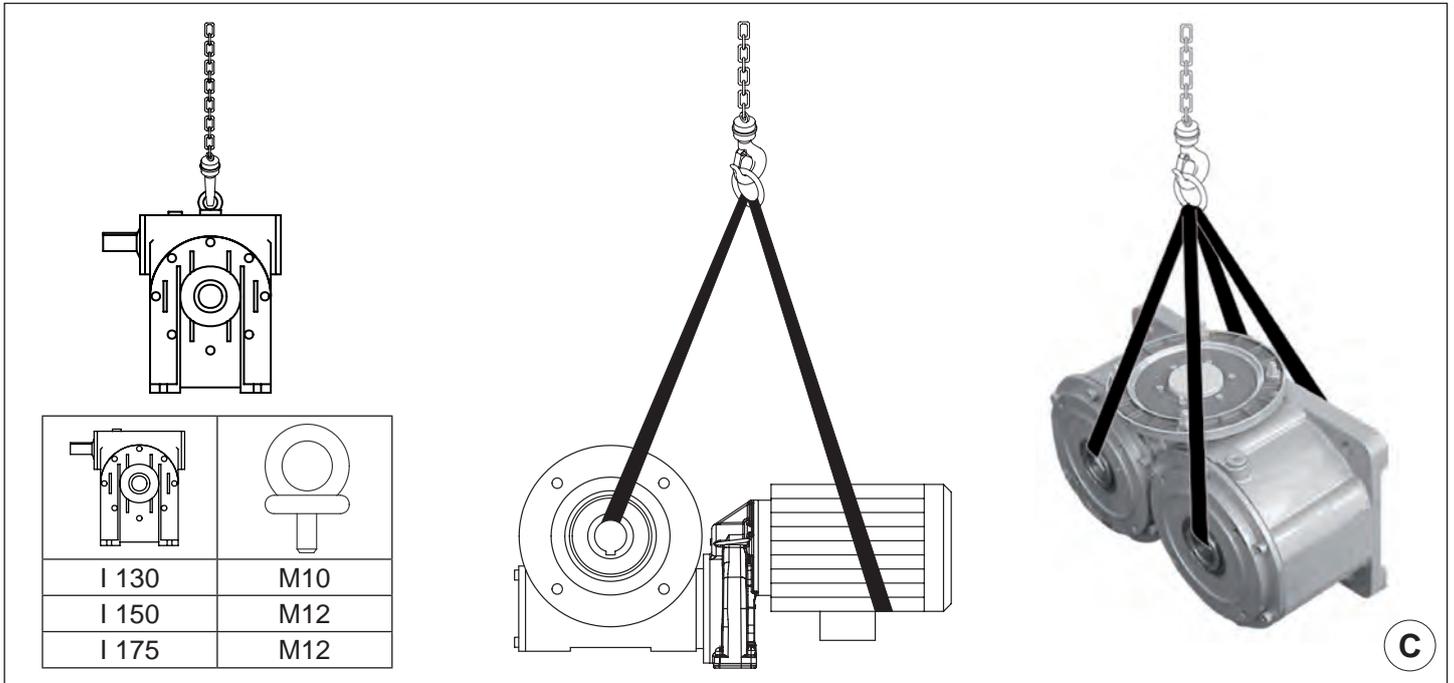
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**Ex** II 2 GD cK T 135° C  
T<sub>a</sub> -20° +60°

**B**



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# 1. Introduction

## 1.1. Foreward

SITI S.p.A. thanks you for the trust granted and reminds you that your product is the result of a work of improvement our engineers are continuously pursuing, due to a constant research in the section.

Reading and understanding the present publication is an indefeasible condition for a correct set up and following installation.

The Assistance network is anyway at your disposal in order to help you to settle all possible doubts that might arise.

Reproduction, recording or alteration, even partly, of this publication is forbidden without a written authorization by the SITI S.p.A.

## 1.2. Manufacturer's identification data



## 1.3. Communications with the technical assistance

For whatever communication with the Technical Assistance Center, please always mention the gearbox technical data appearing on the name plate, located on the unit. These data will allow a whole identification of the unit ([⇒ Identification name plate, 6](#)).

## 1.4. List of contents of the manual

The present manual provides the installation, use and maintenance instructions of the product and refers to its use in the conditions as it will be clearly described in the following sections ([⇒ Expected use, 6](#)).

The present manual has been written in Italian as original language and thereafter translated into other languages. Therefore, the italian language constitutes the "ORIGINAL INSTRUCTIONS MANUAL", while the versions drawn up in other languages are to be considered "TRANSLATIONS OF THE ORIGINAL INSTRUCTIONS". Should you be convinced that the translation is wrong or missing a few parts, you are kindly requested to get in touch with the SITI S.p.A., who will provide to supply all the convenient clarifications and possibly to amend the translation where necessary.

The description texts are sometimes equipped with a reference (A, B, C, etc..) to some images, which are shown in the reverse part of the front and rear cover.

## 1.5. Purpose and validity of the manual

The present manual offers the instructions for set up, use and maintenance related to worm gearboxes of the series I-MI, U-MU and MD and complies with all the law dispositions, to the directives and to the rules which are in force at the time of the sale. The copy of the manual delivered along with the gearbox cannot be considered inadequate simply because it has been subsequently updated due to new experiences. Should any possible changes, adjustments etc.. be carried out to the marketed units in a following moment, they neither will force the manufacturer to come in action retrospectively on products previously supplied nor to consider the same products and the related manual as missing or unsuitable.

Possible further inclusions to the manual that the manufacturer will feel convenient to send to customers will have to be saved along with the manual, which they will represent integral part of.

The warranty related to the good running and performance and full compliance of the unit with the expected service is strictly dependent on the correct application of of instructions held in the present manual.

## 1.6. Addressees of the manual

The present manual is addressed to:

- the manager of the plant;
- the personnel in charge of set ups;
- the personnel in charge of the maintenance.

The manual has to be guarded by a responsible person and kept, in the best status of preservation, in a place suitable to be always available for the consultation by the persons it is addressed to.

In case of loss or deterioration, the replacing documentation is to be requested to the manufacturer, indicating the reference data given on the identification plate ([⇒ Identification name plate, 6](#)).

## 1.7. Choice and qualification of the personnel

For the operations of handling, set up and maintenance, the user will have to commit the task to operators who have at their disposal the following features:

- Degree of education and training are adequate in view of the operation to be carried out.
- Knowledge of what is illustrated in the present manual in relation to the operation to be carried out.
- Knowledge of the accident prevention rules which are in force at the moment of use.
- Physical conditions suitable to the operation to be carried out.
- Equipment and use of certified individual protection devices.

## 1.8. Symbology used

Instructions are tied to symbols aimed at making the reading easier, by clarifying the kind of information supplied.



Generalized danger for the safety of human beings.



Important remarks in view of a correct usage without causing damages to the equipments.



Instructions related to units expected for set up in environments having a potentially explosive atmosphere, complying with the directive 94/9/CE (ATEX).

## 1.9. Glossary

**P.P.E.**

Acronym of Personal Protective Equipment.

## 1.10. Warranty

- Our warranty has a validity of one year, starting from the date of invoice of the product. It is limited exclusively to the free of charge repair or to the free replacement of the parts we recognize defective; checks intended to ascertain whether warranty can apply will be always carried out in the plant of the Seller or by one of the authorized branches. The claim can neither give rise to the cancellation of orders and not even to a high reduction of deliveries nor to the suspension of payments by the Buyer; not even the payment of a compensation in money of any kind effected by the Seller can be acceptable.

Our warranty will expire if the pieces sent back as defective ones will prove to have been in any way altered or repaired without our previous written authorization; moreover, it will expire in case the Buyer fails in anyone of his contractual obligations, especially in reference to the payment conditions.

- Our warranty does not cover any damage or failure due to external factors, a missing maintenance, overloads, unsuitable lubrication, wrong choice of the type of unit, assembling error, caused by external components and by components subject to wear and deterioration as well as damages arising as a consequence of the transport carried out on account of the customer or through a transporter designed by the customer, considering that the shipment is always carried out on account and at risk afforded by the Buyer.
- Expenses (like for instance disassembling, labor, re-assembling, transport, board and lodging), which are undertaken due to the outer service of personnel of the Seller, even after acknowledgment of the warranty, are always on charge of the Buyer. On charge of the Seller, there are to be considered the components acknowledged under warranty and the time necessary for the replacement of the same.
- Any sort of compensation is not included and not even direct or indirect damages can be claimed (even towards thirds).

- The requests for repair under warranty and/or out of warranty are to be communicated by written through the suitable module to SITI S.p.A. in view of the acceptance of the repair.  
Material to be repaired either under warranty or anyway subject to troubles, will be withdrawn by our Company only if it is sent back at free port following up a written request, and it will be sent back with transport freights covered by the customer.

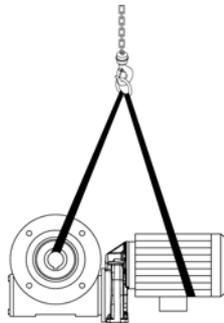
## 2. Accident prevention advices

### 2.1. General warnings

- It is prohibited to bring any kind of modification to the gearbox, without a previous authorization granted by the manufacturer.
- It is prohibited to use the gearbox in a potentially explosive atmosphere, unless the unit has been purposely pre-arranged for the use in such kind of atmosphere.
- The surface of a gearbox while operating might reach high ranges of temperature, such to cause skin burns. It is strictly recommended to check the temperature value of the outer surfaces of the gearbox, prior to enforcing any kind of service on the unit ([⇒ Measure of the running temperature, 12](#)).
- Whenever one is operating near the gearbox, it is recommended to wear a protection equipment, suitable for the operation to be carried out. All clothes worn while operating near a unit are to be close-fitting to the body. It is strongly recommendable to refrain from wearing ties, necklaces or belts, which might get caught by or squeeze in the rotating parts of the unit. It is necessary to always wear individual own protection devices, as called for by the manual in view of carrying out some kinds of service on the units.

### 2.2. Residual risks

In the stage of design and calculation of the gearboxes, an accurate analysis has been carried out about the risks, which the operators in charge of maintenance might be subject to, while they effect the manoeuvres and other kinds of maintenance and, due to this, all possible precautions have been taken, in order to make the gearbox safer and more reliable. There are anyway a few conditions of risk depending on the installation type and on the operating conditions, which may be removed just by using simple precautions, as indicated on the manual in the related paragraphs.

 <p><b>Risk:</b> crushing</p> <p><b>Eventuality / risk location</b> Fall / crash of the gearbox during transport/set up stages.</p> <p><b>Protections / precautions</b> Wear all P.P.E. called for. Comply with the instructions given in the manual (<a href="#">⇒ Handling and transport, 7</a>).</p>	
 <p><b>Risk:</b> burns</p> <p><b>Eventuality / risk location</b> By touching the gearbox during the use and maintenance.</p> <p><b>Protections / precautions</b> Wear all the P.P.E. called for. Comply with the instructions given in the manual (<a href="#">⇒ Measure of the running temperature, 12</a>) and (<a href="#">⇒ Oil replacement, 16</a>).</p>	



**Risk:** irritation of skin / eyes

**Eventuality / risk location**

Replacing / re-filling oil during the maintenance.

**Protections / precautions**

Wear all the P.P.E. called for.

Comply with the instructions given in the manual ([⇒ Oil replacement, 16](#)).



### 2.3. Advices for the use in a potentially explosive atmosphere

	<p><b>Danger!</b>  <b>Mixtures of explosive gases or high powder concentrations may cause serious damages especially when they get in touch with hot rotating parts of the gearbox.</b></p> <p>Set up, connection, start up, maintenance or repair works on gearboxes are to be accomplished only by specialized and qualified technicians, who have to comply with the following prescriptions:</p> <ul style="list-style-type: none"> <li>• Follow all manufacturer's instructions.</li> <li>• Take care and comply with all notice marks and information signs applied on the units.</li> <li>• Strictly follow the specific rules related to the installation on which the unit is operating.</li> <li>• Strictly follow all rules which are in force in the country of manufacture (protection against explosions, safety, risk prevention).</li> </ul>
--	--

### 2.4. Installation of parts on account of the customer



**Caution!**

Prior to being set in motion, the gearbox must be provided with a few parts, essential in view of a full safety in the use and operations.

After set up, the user is requested to equip the gearbox with adapted repairs, suitable to protect rotating parts connecting input shafts and output shafts. On the protections, the following pictographs are to be applied:



Do not remove the protections.



Obligation to keep protections effective.



**Caution!**

The SITI S.p.A. declines any responsibility in case of damages occurring to things or persons, caused by the use of the gearbox without taking all the due protections as mentioned here above.

### 3. General information

#### 3.1. Expected use

The unit has been designed and manufactured in order to directly transmit the rotational motion, operating a revolution speed reduction between input and output shafts.

Performance and limitation of use are clearly specified in the technical/commercial catalogue, which is available upon request or may be downloaded from the site [www.sitiriduttori.it](http://www.sitiriduttori.it)

	 <p>Only in case ATEX mounting is purposely requested, the gearbox can be used for operating in environments meeting the following requirements:          Group: II          Category 2 G          Zone D          Max. surface temperature: cK T 135 °C</p>
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#### 3.2. Prohibited uses

The gearbox cannot be used for purposes different from the expected ones.

The standard gearbox cannot be used in environments characterized by a potentially explosive atmosphere. For such a use, it is necessary to require the special version fulfilling the directive 94/9/CE (ATEX).

#### 3.3. Declaration of incorporation

In compliance with the Machinery Directory 2006/42/CE, the gearbox, being intended to be built in and/or fitted on other machines or machine components, is considered a "component", therefore it cannot be put in service as long as the machine, on which it will be built in, has not been declared in conformance with the Machinery Directory 2006/42/CE.



**Remark:**

The subject product complies with the above mentioned features and with the ones given on the catalogue which is in force at the production date. SITI S.p.A. reserves the right to change them, in order to adapt them to the technology or material variations occurred.

#### 3.4. Gearbox identification data

##### 3.4.1. Identification name plate

All units are equipped with an identification name plate **A**, showing the following pieces of information:

- type of gearbox;
- identification number;
- transmission ratio;
- part number.

	<p>In case of units fulfilling the directive 94/9/CE (ATEX), the name plate <b>B</b> is applied, on which even the following additional pieces of information are given:</p> <ul style="list-style-type: none"> <li>• Compliance with ATEX classification.</li> <li>• File: number of deposit of the technical file.</li> </ul>
---	---

##### 3.4.2. Readability and preservation of the name plate

The name plate must be always preserved in a way to be readable in relation to all data shown on it, providing periodically to its cleaning.

Should a name plate deteriorate and/or result to be not readable any longer, even in one only of the data appearing on it, it is recommended to require a new name plate to the manufacturer, mentioning the data which are still readable, and then provide to replace the name plate.

## 3.5. Technical specifications

### Dimensions and performance

Features, dimensions and performance of gearboxes are given in the related technical/commercial catalogue available on request or they can be downloaded from the website [www.sitiriduttori.it](http://www.sitiriduttori.it).

### Noise

The level of noise emitted by a gearbox during a running period at full load in the worst operating conditions is always remarkably below the value of 70 dB (A).

## 3.6. Stocking

If, prior to set up, a period of stocking is expected, it is necessary to adhere to the following rules:

- Avoid to stock outdoor, in areas exposed to the bad weather and with excessive humidity.
- Always avoid the direct contact with the floor; for instance, use pallets or materials of another nature which anyway are such to insulate the product.
- For times of stocking longer than 60 days, it is recommended to coat with anti-oxidation products shafts, flanges and anyway all not painted surfaces.
- For times of stocking longer than 6 months, it is necessary to coat with grease all non machined parts, in order to prevent oxidation. Completely fill in the gearboxes with oil, keeping attention that the fill-in/breather plug is placed in the upper zone; of course, at the time of setting the unit up, it will be necessary to recover the proper oil amounts ([⇒ Oil amount, 15](#)).

## 4. Handling and transport

### 4.1. Handling and transport



#### Caution!

Read carefully and comply with the following instructions prior to handling the gearbox.

#### P.P.E. Helmet, safety shoes and protection gloves

- Usually the gearbox is delivered in the condition of assembled and packed unit. Should the product be delivered packed in cardboard containers, handle the packed product with suitable means of weight-lifting in compliance with the law rules.
- Do not stop or move below suspended loads during lifting and transport operations.

The packages which include more gearboxes are to be lifted and handled with appropriate and suitable means, adequate to the dimensions and weights involved, like transpallets, lift trucks, overhead travelling cranes using ropes, cables, belts or suspension chains.

Single gearboxes or geared motors packed or deprived of the package must be lifted with the following operational modes:

- if their weight is equal to or lower than 15 kg they can be moved by hand;
- if their weight is higher than 15 kg, they must be moved with suitable lifting and transport means, as indicated above. Especially, the unpacked units are to be hooked and secured with a sling, as it has been described as an example in the sketches **C**, arranging ropes or chains as it is requested by the product conformation.

On the gearboxes I-MI130/150/175 there is a tapped hole conceived for fitting a golfare (not supplied), by means of which it is possible a safe hook (see table of dimensions). In the case of geared motors, a second belt has to be arranged, in order to distribute and correctly balance the weight.

**Caution!**

- Make sure that the grip of the load is steady and safe, even in case of oscillations.
- The golfare is suitable for lifting a single gearbox or a geared motor and not for lifting the whole complex of components which it will be fitted on.

## 5. Set up

### 5.1. Check and predisposition

Prior to proceeding with the gearbox mounting, the following checks are to be carried out:

- After unpacking the gearbox, it is recommended to carry out a visual check, intended to realize whether there is full compliance with the order, whether the product integrity is assured and whether there is absence of defects on all gearbox parts. Should it be found out that there is no compliance with the order and/or presence of failures or damages, this will have to be promptly communicated to the SITI S.p.A.
- Make sure that the product is suitable to the requested use.
- Check the appropriateness of the structures on which the unit will be mounted, in relation to the actions and reactions due to the load application.
- Check the conformance of the mounting position indicated in the order acknowledgment with the wished one ([⇒ Mounting positions, 8](#)). A possible change of the mounting position can be accomplished only after having consulted the SITI S.p.A. and after having received their authorization, otherwise warranty and the possible conformity with the directive 94/9/CE (ATEX) will expire.
- Make sure that the spaces available for set up and mounting can comply with the need of providing an easy assembling, maintenance, access to the plugs ([⇒ Mounting positions, 8](#)), air circulation, etc.
- Check whether the unit has been supplied complete with lubricant.  
Units without plugs are filled in by SITI S.p.A. and are provided with lifetime lubrication.  
Units with plugs might be delivered with or without lubrication oil, depending on the type and size.  
Therefore, it is strictly necessary to check whether there is actually lubricant inside the unit, by watching through the suitable inspection plug (fig. D), firstly providing to directing the gearbox in conformance with the actual expected mounting position ([⇒ Mounting positions, 8](#)). In the opposite case, please proceed with oil filling in ([⇒ First filling in of the gearbox, 8](#)).

### 5.2. Mounting positions

K e L sketches show the typical mounting positions of a gearbox with the corresponding identification abbreviations (e.g.: B3, B52, V5, etc.). On a side of the gearbox, the positions of fill-in, inspection and unloading plugs are even shown with circular symbols, if they are present in the gearbox.



Fill-in plug



Level plug



Unloading plug

### 5.3. First filling in of the gearbox

#### P.P.E. Protection gloves and mask glasses

- Check that the unloading plug, located in the lowest position, and the level plug have been correctly fastened.
- For filling oil in, use the fill-in/breather plug, located in the upper gearbox portion. Oil amount to be filled in is given in the table ([⇒ Oil amount, 15](#)), but we point out that said amounts have a merely indicative value; the user will have in any case to fill oil in, until the oil level visible at sight on the level plug has been reached, once the unit has been already mounted in the correct mounting position ([⇒ Mounting positions, 8](#)).

## 5.4. Set up



### Caution!

All actions of set up, assembling and setting on account and on behalf of the buyer must be accomplished by qualified personnel. A wrong set up might lead to dangerous situations for the safety of the personnel and could give rise to serious or even irreparable damages to the product itself and to the connected machine.

Gearboxes are supplied already assembled in their main parts. Therefore, set up consists in placing and then fixing the unit in the place where it will operate, connecting input and output shafts to their matching parts, and carrying out the electric connections of the electric motor, whenever needed.

While setting a gearbox up, it is requested to adhere to a few strictly severe prescriptions:

- Make sure that the environment, where the unit will operate, does not highlight any unexpected conditions, like:
  - potentially explosive atmosphere;
  - immersion in water or corrosive solution;
  - vapours, radiations.
 For applications in peculiar environmental conditions, please consult the SITI S.p.A.
- It is necessary to avoid, or at least to reduce as much as possible narrowings and throttlings in the air passages and especially the presence of heat sources located nearby gearboxes and such to be able to remarkably affect the temperature of the refrigerating air. Furthermore, it is necessary to prevent from an insufficient air circulation, which might compromise the regular heat removal from hot gearbox parts.
- Prior to setting the gearbox up, make sure that fill-in, unloading and level inspection plugs have been placed in the correct location in relation to the requested mounting position of the unit ([⇒ Mounting positions, 8](#)) and that the recommended oil has been used for filling the unit ([⇒ Lubrication, 13](#)).
- It is essential to fit the gearbox in a way such to avoid that it is subject to vibrations while operating. In fact, vibrations, in addition to causing noise, give rise to other kinds of problems, like the possible progressive unscrewing of the connection screws as well as an increase of loads acting on the inner parts submitted to fatigue stresses.
- Fixing surfaces are to be clean and are to have a sufficient microfinish in order to arrange that a good friction coefficient is available. In the screws and in the connection plains it is strictly necessary to use self-locking stickers.
- It is recommended to avoid as much as possible the fact of assembling cantilever mounted pinions and to reduce to the highest possible extent the stress of chains and belts. Should outer loads be there, it is suggested to use pins and positive stops.
- Prior to going ahead with the assembling, it is necessary to take particular care to clean accurately and lubricate the mating surfaces, in order to avoid possible oxidations and seizures.
- All parts which are press-fitted on the gearbox hollow shaft (made in tolerance range H7) are to be carried out with their fitting diameter made in a tolerance range h6. Wherever the kind of application requires a slight interference fit, it is possible to provide a fitting with a tolerance range female-male of the matching parts in (H7 - j6).
- Never use the hammer for assembling and disassembling fitted parts, but use the tapped holes provided on the shaft heads for suitable removal implements.
- It is of prior importance, in view of a good performance of the unit in operating conditions, to take care with the greatest attention of a good alignment of the gearbox with respect to the motor and to the machine to be driven. Whenever it is possible, it is recommended to fit elastic or self-aligning couplings. It is even suggested to proceed with a particular accuracy whenever an outrigger bearing is fitted, because possible errors in the alignment of this component would unavoidably involve the rise-up of overloads which would consequently destroy a bearing or break the shaft.
- When three-phase asynchronous electric motors are used and their start-up occurs in no load conditions or anyway under very restricted loads, it is necessary to accomplish very smooth starting times, very limited starting currents, even very restricted stresses and, whenever necessary, use the star/delta starting system.
- Whenever the application involves overloads of long duration, frequent shocks and danger of lock off, it is imperative to fit a motor saving system, electronic torque limiters, hydraulic couplings, safety couplings or control units.
- In case of use with a service factor involving several startings under load, it is recommended to make use of a motor protection by means of thermal sensors, in order to prevent the rise-up of dangerous overloading conditions for the motor, which might lead motor windings to overheat and thus to melt and fail.
- During the possible painting of the machine on which the unit is fitted, it is strictly recommended to protect the outer edge of shaft seals, aiming at preventing paint to make rubber dry, thus compromising the sealing effect.



It is advisable to use plastic inserts whenever there is a risk of electro-chemical corrosion between gearbox and actuator unit (due to the connection of different metals).  
Moreover, please provide all bolts with plastic washers! The plastic material used is to have an electric loss resistance  $< 10^9$  W.  
Provide the outer structure with earth connection, furthermore use bolts with earth connection of the motor for the geared motors.  
Assure a convenient and sufficient cooling air flow and make sure that there is no return of heated air, coming from other devices. The cooling air has not to exceed a temperature of 40 °C.

## 5.5. Assembling of the primary reduction unit on the gearbox

When it is expected that the assembling of the primary reduction unit will have to be carried out by the customer, proceed as follows (fig. G):

- fit the pinion **1** on the motor shaft;
- place the O ring **2** on the pinion;
- place the O ring **4** and the ring **3** over the screw **5** and screw up this one on the pinion;
- fill in the primary reduction unit with the amount and the type of oil indicated ([⇒ Lubrication, 13](#));
- fit the motor on the primary reduction housing **6**, paying attention not to damage the gasket **7**.



**Remark:**

During assembling, keep the position shown on the figure G.

## 6. Instructions for the use of the gearbox

### 6.1. Preliminary checks

Prior to the start up, a few very important checks are to be carried out:

- Make sure that the set up has been accomplished in a correct way, complying with all the prescriptions given on the chapter devoted to set up.
- Find out the temperature of the environment where the unit is mounted and pre-arrange a thermometer suitable to register the surface temperature ([⇒ Measure of the running temperature, 12](#)).

	<b>Prior to starting a gearbox mounted in an environment with potentially explosive atmosphere, according to the ATEX 100a directive, the following checks are to be carried out.</b>	✓
	Inspect the packing, in order to check the status of goods at the moment of delivery.	
	The following pieces of information given on the gearbox name plate correspond to the kind of explosive atmosphere approved: group, category, anti-deflagration zone, class of maximum allowed surface temperature.	
	Do you feel sure that we are not in presence of a potentially explosive atmosphere, consisting of oils, gases, acids, vapours, radiations active during the gearbox set up?	
	Does the ambient temperature meet the values given on paragraph ( <a href="#">⇒ Check of running temperature, 11</a> )?	
	Make sure that gearboxes are sufficiently ventilated and that there are no outer sources of heat inlet (e.g. through connectors). The cooling air must not exceed a temperature of 40 °C.	
	Does mounting position correspond to the expected one? ( <a href="#">⇒ Mounting positions, 8</a> ).	
	<b>Caution!</b> <b>Any change of the mounting position can be carried out only if authorized by the manufacturer. ATEX compliance will expire in case of a missing consultation with the manufacturer.</b>	
	Is oil level correct? (with the unit located exactly in the requested mounting position) ( <a href="#">⇒ Check of oil level, 15</a> )	
	Are unloading and inspection plugs (whenever expected), as well as breather valves all easily accessible?	
	Have input and output parts been mounted according to the ATEX rules?	
	In case of motors driven by a frequency converter: make sure that the motor is regularly certified in view of its usage in combination with a frequency converter.	
	The calibration and scaling of the technical parameters of the frequency converter are to be such to prevent the overloading of the gearbox.	

### 6.2. Running in

All gearboxes are to be submitted to a running in time of about 300-400 hours.

It is recommended to increase progressively during the running in time the transmitted power up to a limit of the 50-70 % of the maximum allowed power (in the first running hours).

During this time, values of temperature higher than the standard ones might occur.

Made exception for the units already supplied as lubricated by SITI S.p.A. with a lifetime lubricant, on which no oil replacement is requested, on all the units supplied by the SITI S.p.A. without oil it is recommended an oil change after running in, in order to assure higher reliability and a longer gearbox time of life ([⇒ Oil replacement, 16](#)).

### 6.3. Checks during running

#### 6.3.1. Check of running temperature

##### P.P.E. Heat insulated gloves

During the gearbox running time, it is necessary to keep the inner temperature controlled.

Temperature reached inside a unit depends on several factors:

- the kind of kinematism used for the transmission;
- type and amount of lubricant;
- main features and structure of the gearbox;

- input and output speed;
- mounting position;
- applied power;
- ambient temperature.

Temperature check may be effected by measuring its value on the gearbox outer surface. The max. surface temperature is achieved after about three running hours of continuous running and has not to overcome, in any operating condition, the differential value of 50 °C, compared with the ambient temperature, this being achieved with the max. allowable load applied. If this occurs in the period of time subsequent to running in and in standard operating conditions, the unit has to be stopped immediately and it is necessary to consult the SITI S.p.A.

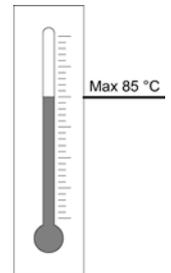
 **Remark:**

Please keep in mind that this value, like many other values of the max. admissible temperature mentioned in this manual, refers to environmental conditions characterized by an ambient temperature of 20 °C, poor conditions of ventilation (air speed ≤ 0.5 m/s) and applies when running in time has been completed.

Moreover, it refers to a correct selection and usage of the units, i.e. to a use with an effective service factor higher or equal to the minimum service factor requested by the heaviness of the application.

Even slight variations in comparison with these conditions, both environmental and operating ones, might remarkably adversely affect the temperature of the gearbox. During the stage of running in (first 300-400 operating hours), the values of temperature increase  $\Delta T$  might be even 25% higher.

Standard shaft seals are made in nitrile rubber compounds NBR and are suitable to operate in the range of standard operating temperatures included between about -15 °C and +85 °C. Should temperature inside the unit reach and keep for meaningful time intervals some values out of this range, it is necessary to require a special version of the gearbox, which is to be equipped with shaft seals made in fluorinated compounds FKM (trademark: Viton) for temperatures higher than +85 °C or in sylicon rubber compound called VMQ, for temperatures lower than -15 °C.



	<b>During the running of a unit mounted in a potentially explosive atmosphere, according to the directive ATEX 100a, the following check operations are to be carried out.</b>	✓
Measure the surface temperature after about 3 hours of continuous service. The temperature differential in comparison with the ambient temperature has not to overcome a value of 50 °C.		
Should said temperature differential $\Delta T$ be higher, stop the gearbox immediately and consult the maufacturer.		

**6.3.2. Measure of the running temperature**

**P.P.E. Heat insulated gloves**



**Do not touch the gearbox prior to providing to the detection of the actual temperature with a thermometer.**

For measuring the outer temperature of the housing, it is necessary to equip oneself with a thermometer provided with a temperature detection sensor (fig. E). Any evaluation effected by touching the gearbox with a hand might be dangerous and additionally not reliable at all. In optimal conditions of use, the temperature of the housing rises up of at least 15-20 °C compared with the environment and the values of temperature usually reached by the housing during the running conditions are mostly too high to be born by the human skin. The fact of believing that a gearbox warms up too much because it is not possible to keep the hand on its housing is a statement missing any rational foundation. In fact, as soon as the temperature is even slightly above the value of 50 °C, the most of people are unable to keep their hand over the gearbox housing, although this is still a completely acceptable running temperature of an unit.

It is important to make sure that the running temperature at which a gearbox stabilizes in rated operating conditions, when there are the same modes of use, is more or less a constant value, considering that this a signal that the unit is operating without the possible rise up of adverse effects.

The gearbox surface temperature must be detected in the area of transition from gearbox to motor, where the location of the electric motor clamp hinders a correct ventilation.

### 6.3.3. Check of the torque limiter (optional device)

#### P.P.E. Heat insulated gloves

If the gearbox is equipped with the torque limiter, check during running that said device is correctly adjusted:

- in conditions of standard load, the sliding of the coupling has not to occur in any way;
- on the contrary, in conditions of overloading, the sliding of the coupling has to occur imperatively.

Shouldn't these conditions be complied with, stop the unit and adjust correctly the torque limiter ([⇒ Adjustment of the torque limiter \(optional device\), 18](#)).

## 7. Lubrication

### 7.1. Lubrication

All units of the series U-MU, MD and the units of the series I-MI up to the size 90 included are supplied already filled in with lubrication oil and are without oil plugs, considering that it has been used a synthetic oil for lifetime lubrication, which does not require any replacement or any refilling during all the operating life of the gearbox.

On request, all gearboxes of the series U-MU and I-MI up to size 90 included may be supplied in a special version complete with fill-in, unloading and level plugs.

On the contrary, the gearboxes I-MI 110/130/150/175 are supplied without oil and are equipped with fill-in, unloading and level plugs. The primary reduction units supplied complete with motor or with solid input shaft are filled in with lubricant by SITI S.p.A. In all other cases, the filling in of oil of primary reduction units is committed to the customer.

For the lifetime lubrication, the Company SITI S.p.A. is currently using the synthetic oil type Shell Tivela S 320.

For all those cases when the filling in of oil is committed to the customer, this one can use either synthetic oils for lifetime lubrication or mineral oils for non lifetime lubrication, but anyway one of the lubrication oils recommended ([⇒ Type of oil, 13](#)). In the choice of the oil to use, the customer has even to take care of the ambient temperature.

In the following tables, we show the oils, both synthetic and mineral ones, that we suggest and we recommend to strictly comply with these indications, even when there is the occasional need of adding oil for recovering the correct level.

In the third table, it is recommended a special lubricant suitable for use in conditions of particularly low temperature.

This consideration is about special applications for which a peculiar oil type is required, suitable to operate under severe application conditions, beyond the usual ones.



**Remark:**

It is recommended never to mix mineral oils with synthetic oils.

### 7.2. Type of oil

Synthetic oils (lifetime lubrication)		TYPICAL OIL PROPERTIES SHELL TIVELA S 320	
<b>MAKE</b>	<b>TYPE</b>	Volumic mass (kg/dmc)	1.069
SHELL	TIVELA OIL S 320	Kinematic viscosity at 40 °C	321 cSt
IP	TELIUM OIL VSF 320	Pour point	- 39 °C
KLÜBER	SYNTHESO D 320 EP	Viscosity index	230
BP	ENERGOL SGXP 320	Flash point (c.o.c)	286 °C
TEXACO	SYNLUBE CLP 320	FZG test overcomes the stage	> 12

Admissible ambient temperature: -30 ÷ +50 °C

**Remark:**

It cannot be mixed with mineral oils and it is not compatible with cellulose nitrate based paints and with seals made in natural rubber.

## Mineral oils (non lifetime lubrication)

MAKE	TYPE
SHELL	OMALA OIL 220
IP	MELLANA OIL 220
MOBIL	MOBILGEAR 630
ESSO	SPARTAN EP220

Admissible ambient temperature: -5 ÷ +35 °C

TYPICAL OIL PROPERTIES  
SHELL OMALA 220

Initial boiling point	> 280 °C
Solubility in water	Negligible
Volumic mass (kg/dmc)	899 kg/m <sup>3</sup> at 15 °C
Flash point	199 °C (PMCC)
Higher flash limit in air	10%(v/v) (typical)
Lower flash limit in air	1%(v/v) (typical)
Self-ignition temperature	>320 °C (typical)
Kinematic viscosity	220 mm <sup>2</sup> /s at 40 °C
Vapour density (air=1)	>1 at 20 °C
Pour point	-18 °C

**Remark:**

It cannot be mixed with synthetic oils.

## Synthetic oil for very low temperatures

MAKE	TYPE	Admissible ambient temperature
SHELL	OMALA S4 GX150	-25 °C ÷ +50 °C
SHELL	OMALA S4 GX68	-40 °C ÷ +10 °C

TYPICAL OIL PROPERTIES  
SHELL OMALA S4 GX

	68	150
Volumic mass (kg/dmc)	861	877
Kinematic viscosity at 40 °C	69.3 cSt	157.7 cSt
Pour point	-54 °C	-45 °C
Viscosity index	158	163
Flash point (c.o.c)	228 °C	238 °C
FZG test overcomes the stage	> 12	> 14

**Remark:**

It cannot be mixed with mineral oils and it is not compatible with cellulose nitrate based paints and with seals made in natural rubber.

## 7.3. Oil amount

I-MI	Pre-lubricated with synthetic oil ISO VG 320								To be filled in on account of the customer			
Size	I 25	I 30	I 40	I 50	I 60	I 70	I 80	I 90	I 110	I 130	I 150	I 175
Oil amount (l)	0.030	0.035	0.15	0.19	0.39	0.55	0.85	1.70	1.80	2.20	5.70	6.80

U-MU	Pre-lubricated with synthetic oil ISO VG 320						
Size	U 30	U 40	U 50	U 63	U 75	U 90	U 110
Oil amount (l)	0.035	0.13	0.19	0.33	0.50	0.90	1.40

MD	Pre-lubricated with synthetic oil ISO VG 320				
Size	MD 126	MD 160	MD 200	MD 220	MD 250
Oil amount (l)	0.9	1.9	3.8	4.0	7.5

Primary reduction units	Synthetic oil ISO VG 320				
Size	P 63	P 71	P 80	P 90	P 110
Oil amount (l)	0.75	0.10	0.15	0.15	0.45

## 8. Maintenance

### 8.1. Maintenance

The program of maintenance includes the service actions of ordinary type, providing inspections, checks and audits effected directly by the operator and/or by qualified personnel committed to the usual maintenance and service actions of periodical type, including replacement of parts or recording, developed by personnel, who has been purposely trained on behalf of the manufacturer through specific courses or special issues.

### 8.2. Ordinary maintenance

#### 8.2.1. Cleaning

Carry out periodically the cleaning of the outer surface of the gearbox and of the air channels for the ventilation, in order to assure a satisfactory thermal exchange coefficient towards outside.

#### 8.2.2. Check of oil level

For the units supplied by SITI S.p.A. without oil plugs and filled in with synthetic oil, the fact of checking oil level is neither requested nor possible, due to the missing level plug.

Should the user, however, detect oil leakages or should he make sure that some running malfunction events take place, which induce him to assume that the oil level might have been meaningfully reduced, we recommend to apply to the Technical Assistance Dept. SITI S.p.A., in order to ask for an advice about the way to behave.

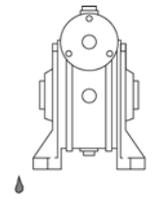


**Caution!**

The damages a gearbox might be subject to, should it operate with a poor oil amount, are extremely serious and quick, and many times are fully irreparable!

A poor amount of lubricant, in addition to the fact of not allowing the proper lubrication of all inner parts, might adversely affect the thermal exchange conditions and, due to the highly reduced refrigerating and heat removal power, gives rise to the inner running temperature increase, especially on the mating surfaces of teeth flanks.

It is suggested to often make sure, through quick visual checks, that no oil leakages are occurring through shaft seals, gaskets, connecting flanges, attaching hardware of covers, end caps etc....



A more careful check of oil level has to be carried out at sufficiently frequent time intervals. This check is to be effected through the level plug when the unit is standing still and is sufficiently cool (fig. D).

Should it be ascertained, through the same level plug, that an inner dirt sedimentation has occurred, it is strictly necessary to make sure that no foreign material, such as powder, sand, water or anything else has penetrated into the gearbox housing and anyway replace oil ([⇒ Oil replacement, 16](#)).

Should oil level have sunk down and shallowed below the recommended values, it is necessary to fill oil in, up to restoring the correct level.

### 8.3. Periodical maintenance operations

#### 8.3.1. Oil replacement

For the oil replacement after the running in time, comply with the instructions given on the paragraph ([⇒ Running in, 11](#)) and ([⇒ Lubrication, 13](#)).

The interval of periodical oil replacement depends on the conditions of use, briefly summarized in the following prospect.

Oil temperature (°C)	Service	Time interval between oil changes (hours)
< 60	Continuous	5000
	Intermittent	8000
> 60	Continuous	2500
	Intermittent	5000

 Remark:

Data given in the prospect refer to a lubrication with use of mineral oils.

Synthetic oils, if used in the range of standard temperatures from -15 °C up to +85 °C, can be used even for a lifetime lubrication.

This occurs in the case of all units already supplied by the SITI S.p.A. with a synthetic base lubrication.

In the case of large and expensive gearboxes, on which all possible maintenance actions are very costly, it is recommended for safety reasons to carry out an oil change, even if synthetic, whenever any maintenance repair service has been effected, provided that a period of operating time of 8000 thru 10000 service hours has occurred.

 Remark:

Unloading of oil is to be carried out in hot conditions, with the gearbox at a temperature of about 40-45 °C, but not beyond this range, in order to prevent from possible burnings.

 Caution!

Please be very careful in order to avoid to spill oil on the ground and pay attention to behave in full conformance with the environmental rules in force in the country of usage.

**P.P.E. Protection gloves and mask glasses**

- Unscrew the fill-in/breather plug.
- Unscrew the unloading plug located down and let oil completely flow out (this is particularly important in case of changing lubricant from a mineral to a synthetic oil or the opposite).
- Check whether the level plug is clean and transparent. In case it is not, unscrew and clean it.
- Screw again the unloading plug.
- Fill in the units from the upper hole. The oil amount to be filled in is indicated in the table ([⇒ Oil amount, 15](#)), but we point out that the mentioned amounts do have a simply indicative value; the user has to fill oil in, until the oil level visible at sight through the transparent level plug has been achieved (having already mounted the unit in the expected mounting position).
- Screw again the fill-in breather plug located above.

**8.3.2. Possible replacement of shaft seals**

The running time and thus the endurance time of a shaft seal is affected in a conclusive way by the operating temperature in the mating area, by the possible chemical reactions which might occur between rubber compound and lubrication fluid and by the status of preservation of the shaft seal.

Replacement of the shaft seal is necessary if:

- a good serviceability of the sealing function is missing, and due to this an oil leakage towards outside of the unit is occurring;
- it is being effected a revision of the machine or of the installation.

Whenever a shaft seal is not developing its sealing function any longer, it is necessary to provide as soon as possible to its replacement, in order to prevent a leakage extending along the time, as well as a damage possibly extended to other components.

At the time of fitting a new shaft seal, it is needed:

- to take a particular care while handling the shaft seal and make sure of the intactness of the product (possibly avoid too long times of storage, which might give rise to a premature aging, especially if there is an excessive level of humidity);
- always check that the shaft seal seat is in a perfect status, in other words it is free of longitudinal or oriented scores, fingerprints, engravings, cuttings, marks or surface failures;
- take care to prevent that the shaft seal lip of the new seal operates exactly over the same trace left clearly by the previous one;
- whenever it is made sure that a deterioration of the shaft seal mating area has occurred, involving a depth greater than 0.2-0.3 mm, we strongly advise not to fit the new shaft seal and to get in touch with a workshop of our Assistance, which will provide to check whether there is any chance of recovering the shaft, and in any case will issue a diagnosis about the possible reasons of the damage occurred (fig. F);
- fit the shaft seal in a way to be perpendicular to the axis and with the lip completely free and not overturned or pinched;
- position the shaft seal in a way that the sealing lip is oriented towards the fluid which is to be sealed, or on the side where a higher pressure is exerted;
- on shaft seals without a dust lip, spread grease in the outer area of the lip;
- fill in with grease the interspace between sealing and dust lip;
- coat with grease the shaft seal seat on the shaft;
- never use sealants, otherwise shaft seal lip or shaft surface would get smirched and thus would quickly deteriorate;
- exert the fitting force as close as possible to the shaft seal outer diameter;
- neither lock axially the seal nor submit it to a strong force;
- always use suitable toolings, in order to prevent possible damages to the shaft seal lip, due to the presence of threads, outlet chamfers, sharp edges, keyways;
- always protect the lip and its seat on the shaft, whenever one provides to repaint the unit or the machine on which it is fitted.

All above mentioned precautions do have the objective to avoid that a shaft seal might operate in dry conditions, especially during the first shaft turns, because otherwise too high temperatures might be achieved in the contact areas, which would immediately cause a deterioration of the materials shaft seal is made of: shaft seal getting harder, scorings, change of colorfulness.

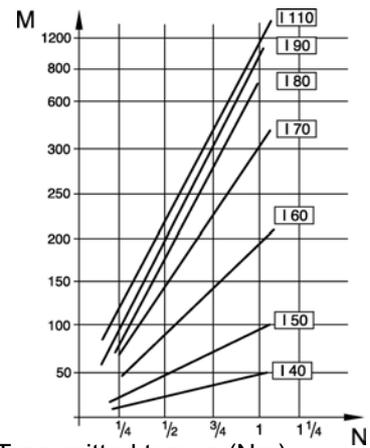
## 8.4. Adjustment of the torque limiter (optional device)

### P.P.E. Protection gloves

In order to adjust the torque limiter, it is needed (fig. H):

- to stop the unit;
- fold the tooth **1** of the anti-unscrewing washer;
- turn the nut **2** in a clockwise direction, in order to increase the transmissible torque, or turn it in counterclockwise direction, in order to decrease said torque;
- refold the tooth of the washer inside one of the little grooves.

In the reported graph, the values of the max. transmissible torque as a function of the number of turns of the nut are given for each gearbox size. However, it is to be pointed out that the values given in the graph are merely indicative and a correct and refined adjustment has to be carried out by means of different tries ([=> Check of the torque limiter \(optional device\), 13](#)).



M= Transmitted torque (Nm)

N= Number of turns of the threaded nut

## 8.5. Table of tightening torques of attaching hardware

For all gearboxes and possible accessories, please strictly adhere to the following values of the tightening torques.

Screw threads Class 8.8	Tightening torque for steel and cast iron (Nm)	Tightening torque for aluminium (Nm)
M4	2.9	2.3
M5	6	4.8
M6	10	8
M8	25	20
M10	49	39
M12	86	69
M14	135	108
M16	210	168
M18	290	232
M20	410	328

## 8.6. Troubles, causes, corrective actions

The conditions of malfunctioning, which might be reasonably expected, related to the single operating conditions of the unit, are reported; in the columns of the following table, the kind of trouble, the operating function and the component which might be the reason of the failure are accurately described.

TROUBLE	POSSIBLE CAUSES	CORRECTIVE ACTIONS
Motor does not start.	Faulty electric motor connection.	Check the connection.
	Faulty motor.	Replace the motor.
	Wrong motor sizing.	Replace the motor.
Motor and gearbox reach a too high temperature.	Mechanical overloading.	Check the mechanical parts driven by the motor-gearbox.
	Sizing of the motor-gearbox group wrong.	Replace the motor-gearbox group.
Motor current absorption and/or motor temperature are too high.	Faulty motor.	Replace the motor.
	Wrong motor sizing.	Replace the motor.
Gearbox reaches a too high temperature.	Faulty gearbox.	Repair or replace the gearbox.
	Wrong sizing of the gearbox.	Replace the gearbox.
	Mounting position not complying with the one for which the gearbox has been arranged.	Make sure that the gearbox is in compliance with the order.
	Insufficient amount of lubricant.	Re-fill new lubricant in, until the oil level corresponding to the level plug has been reached.
Oil leakages through the shafts.	Worn or faulty shaft seals.	Replace shaft seals.
	Worn shaft seal seat on shafts.	Replace shaft seals and fit the new ones in a slightly shifted position or otherwise replace shafts.
Oil leakages through the mating surfaces between flanges/covers and housing.	Flanges not sufficiently tightened.	Tighten flanges.
	Faulty gaskets between mating plains.	Replace gaskets, making sure that the sealing surfaces are perfectly machined.
The gearbox emits a noise similar to a beat.	Faulty gear teeth.	Apply to the Technical Assistance Service.
The gearbox emits a noise similar to a whisle.	Insufficient amount of lubricant.	Re-fill new lubricant in, until the oil level corresponding to the level plug has been reached.
	Faulty or worn gears.	Apply to the Technical Assistance Service.
	Faulty or incorrectly fitted bearings.	Apply to the Technical Assistance Service.

## 9. Scrapping and material disposal

### 9.1. Scrapping and material disposal

As soon as the gearbox has achieved its maximum limit of usage, it will have to be dismantled and scrapped.

Remove all oil from the gearbox, keeping in mind that exhausted oil has a strong adverse effect on the environment.

After scrapping, the operation of getting rid of the materials and of the lubricant will have to be accomplished in full compliance with all rules and law dispositions which are in force at the moment in the country of usage.

All operations related to getting rid of materials will have to be effected by qualified and authorized Companies; it is a task of the Company that is in charge of getting rid of materials to make sure that said Companies are complying with the requested National and International Directives.



**PARTI DI RICAMBIO****IT**

Per consultare il catalogo ricambi rivolgersi all'Assistenza Tecnica della SITI S.p.A. e richiedere la documentazione cartacea o il CD-ROM interattivo (quando disponibile).

**SPARE PARTS****EN**

To check the spare parts catalogue, contact the SITI S.p.A. Technical Service Department and require a hard copy of the documentation or the interactive CD-ROM (when available).

**ERSATZTEILE****DE**

Für den Ersatzteilkatalog wenden Sie sich bitte an die technische Abteilung von SITI S.p.A.; auf dieser Weise erhalten Sie die Papierunterlagen oder die interaktive CD-ROM (falls verfügbar).

**PIÈCES DE RECHANGE****FR**

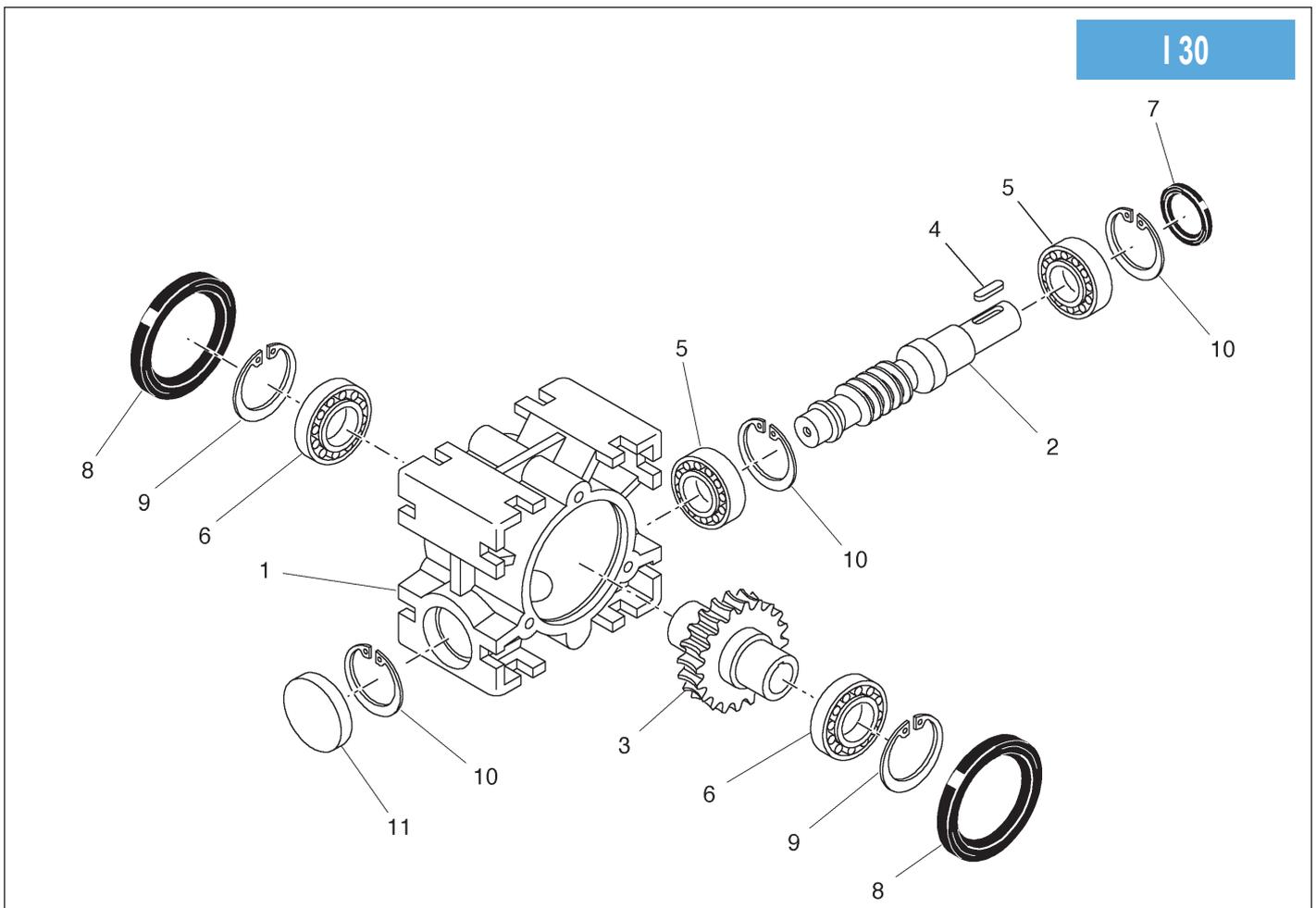
Pour consulter le catalogue pièces de rechange, veuillez vous adresser à l'Assistance Technique de SITI S.p.A. et demander la documentation sur papier ou le CD-ROM interactif (si disponible).

**PIEZAS DE REPUESTO****ES**

Para consultar el catálogo de piezas de repuesto, póngase en contacto con la Asistencia técnica de SITI S.p.A. y solicite la documentación en papel o el CD-ROM interactivo (si está disponible).

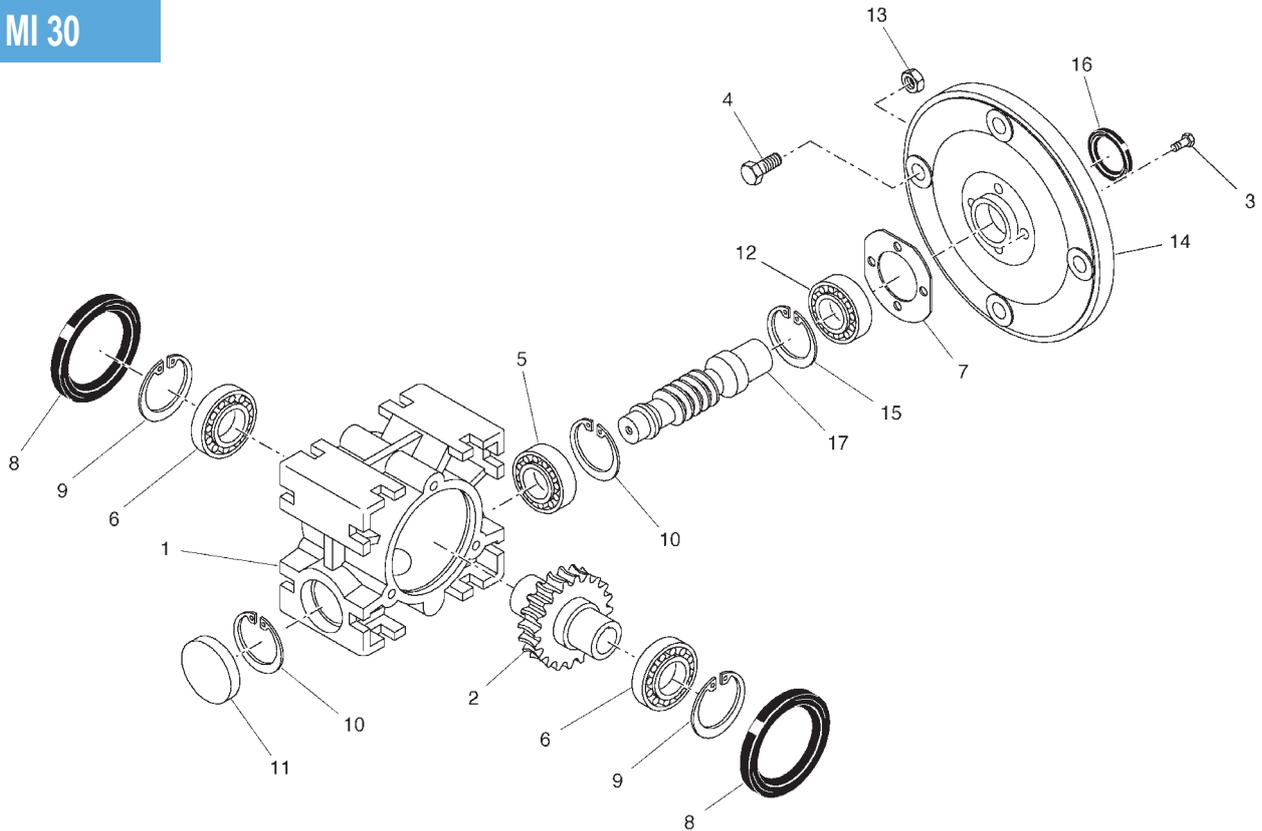
**PEÇAS DE REPOSIÇÃO****PT**

Para consultar o catálogo das peças de reposição entre em contato com a Assistência Técnica da SITI S.p.A. e peça o catálogo em papel ou o CD-ROM interativo (quando disponível).

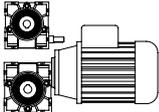


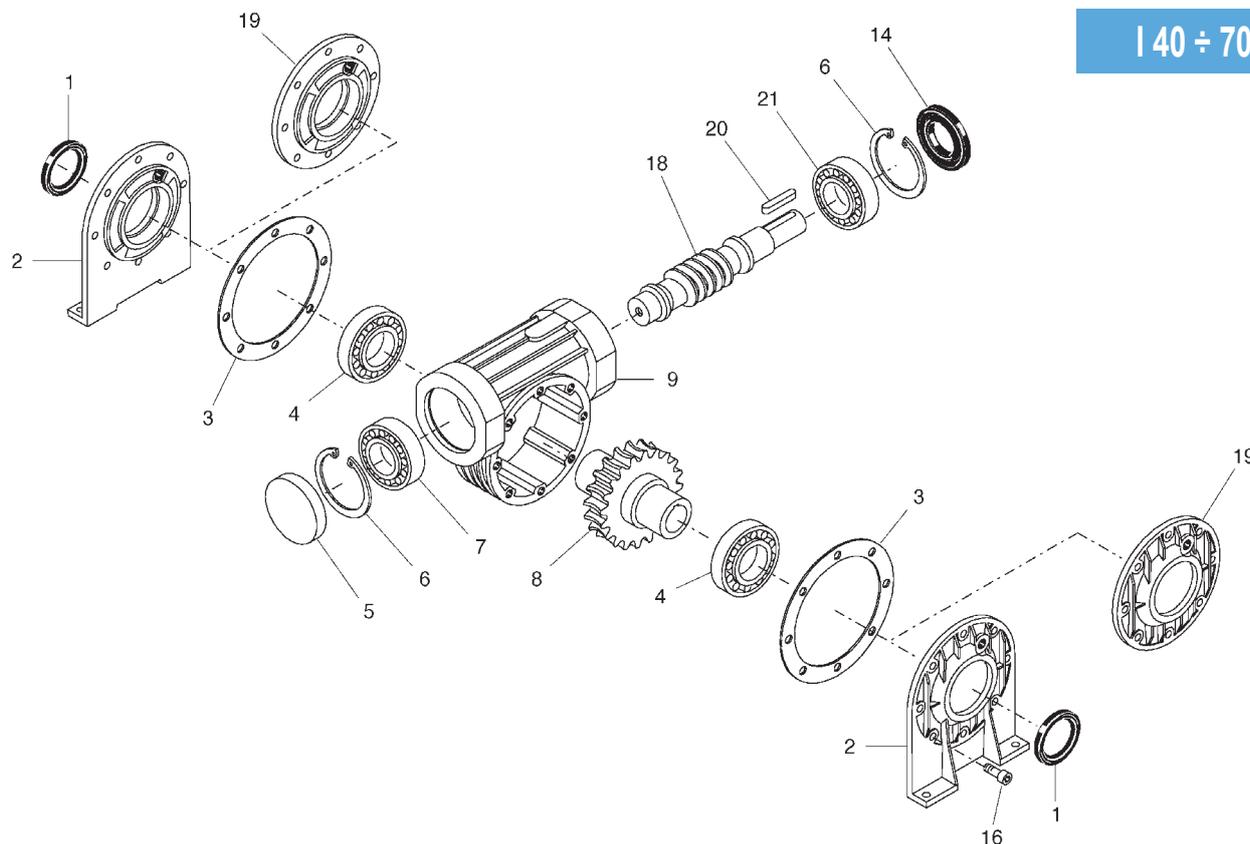
Pos.	Descrizione	Description	Beschreibung	Description	Descripción	Descrição
1	CORPO	HOUSING	GEHAUSE	CARCASSE	CUERPO	CARCAÇA
2	VITE SENZA FINE	WORM SHAFT	SCHNECKENWELLE	VIS SANS FIN	TORNILLO SINFIN	ROSCA SEM FIM
3	CORONA	WORM WHEEL	SCHNECKENRAD	COURONNE HÉLICOÏDALE	CORONA	COROA
4	LINGUETTA	KEY	KEIL	LANGUETTE	LENGÜETA	CHAVETA
5	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
6	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
7	ANELLO DI TENUTA	SHAFT SEAL	WELLENDICHTUNG	JOINT D'ÉTANCHÉITÉ	AN. DE RETENCIÓN	RETENTOR
8	ANELLO DI TENUTA	SHAFT SEAL	WELLENDICHTUNG	JOINT D'ÉTANCHÉITÉ	AN. DE RETENCIÓN	RETENTOR
9	ANELLO SEEGER	SNAP RING	SEEGERRING	ANNEAU D'ARRÊT	ANILLO SEEGER	ANEL ELÁSTICO
10	ANELLO SEEGER	SNAP RING	SEEGERRING	ANNEAU D'ARRÊT	ANILLO SEEGER	ANEL ELÁSTICO
11	CAPPELOTTO	END CAP	ENDKAPPE	CHAPEAU DE FERMETURE	CAPERUZA	TAMPÃO

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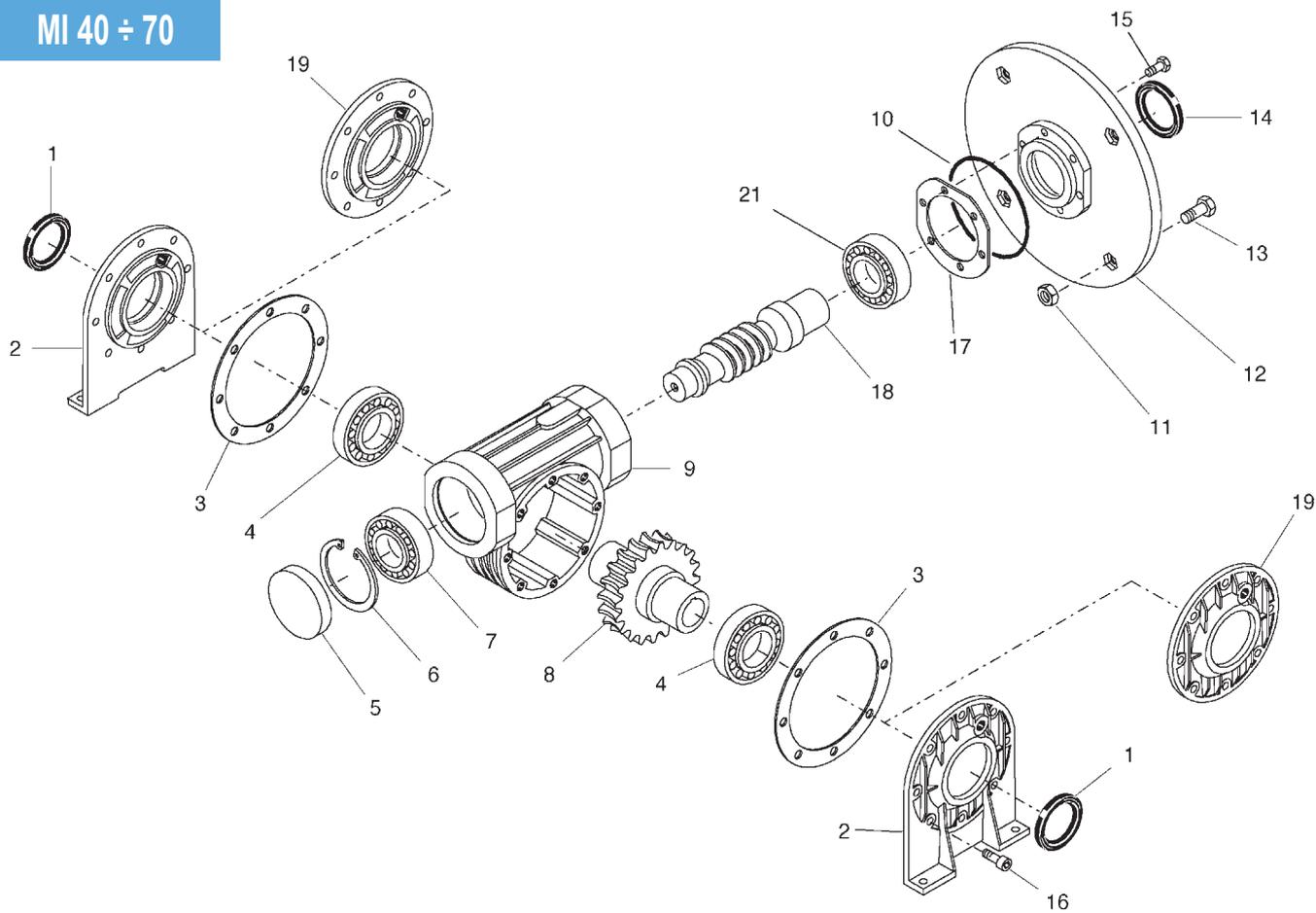
Pos.	Descrizione	Description	Beschreibung	Description	Descripción	Descrição
1	CORPO	HOUSING	GEHAEUSE	CARCASSE	CUERPO	CARCAÇA
2	CORONA	WORM WHEEL	SCHNECKENRAD	COURONNE HELIC.	CORONA	COROA
3	VITE T.C.E.I	COUNTERSUNK HEAD SCREW	INNENSECHSKANTSCHRAUBE	VIS C.H.C.	TORNILLO T.C.E.I	PARAFUSO
4	VITE T.E.	HEX. HEAD SCREW	SECHSKANTSCHRAUBE	VIS T.H.	TORNILLO T.E.	PARAFUSO
5	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
6	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
7	GUARNIZIONE ENTRATA	INPUT GASKET	ANTRIEBSGARNITUR	GARNITURE ENTRÉE	JUNTA DE ENTRADA	JUNTA
8	ANELLO DI TENUTA	SHAFT SEAL	WELLENDICHTUNG	JOINT D'ÉTANCHÉITÉ	AN. DE RETENCIÓN	RETENTOR
9	ANELLO SEEGER	SNAP RING	SEEGERRING	ANNEAU D'ARRÊT	ANILLO SEEGER	ANEL ELÁSTICO
10	ANELLO SEEGER	SNAP RING	SEEGERRING	ANNEAU D'ARRÊT	ANILLO SEEGER	ANEL ELÁSTICO
11	CAPPELOTTO	END CAP	ENDKAPPE	CHAPEAU DE FERMETURE	CAPERUZA	TAMPÃO
12	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
13	DADO ESAGONALE	HEXAGONAL NUT	SECHSKANTMUTTER	ÉCROU HÉXAGONAL	TUERCA HEXAGONAL	PORCA
14	FLANGIA ATTACCO MOTORE	MOTOR CONNECTION FLANGE	MOTORFLANSCH	BRIDE ACCOUPLEMENT MOTEUR	F.A.M	FLANGE
15	ANELLO SEEGER	SNAP RING	SEEGERRING	ANNEAU D'ARRÊT	ANILLO SEEGER	ANEL ELÁSTICO
16	ANELLO DI TENUTA	SHAFT SEAL	WELLENDICHTUNG	JOINT D'ÉTANCHÉITÉ	AN. DE RETENCIÓN	RETENTOR
17	VITE SENZA FINE	WORM SHAFT	SCHNECKENWELLE	VIS SANS FIN	TORNILLO SIN FÍN	ROSCA SEM FIM

	Cuscinetti / Bearings / Kugellager Roulements / Coljinetes / Rolamentos			Anelli di tenuta / Shaft seals / Wellendichtungen Joints d'étanchéité / Anillos de retención / Retentores	
	5	12	6	16	8
<b>I 30</b>	6000 10/26/8	6000 10/26/8	16006 30/55/9	-	30/55/7
<b>MI 30</b>	PAM 10/80	-	16006	17/25/4	30/55/7
<b>MI 30</b>	PAM 11/90	-	16006	17/25/4	30/55/7
<b>MI 30</b>	PAM 9/120	-	16006	15/24/7	30/55/7
<b>MI 30</b>	PAM 9/80	-	16006	15/24/7	30/55/7
<b>MI 30</b>	PAM 9/90	-	16006	15/24/7	30/55/7
<b>MI 30</b>	PAM 11/140	-	16006	17/28/5	30/55/7
<b>I - MI 30 F</b> <b>I - MI 30 FBC</b>					30/47/7

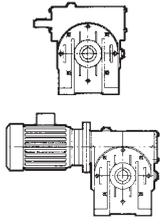


Pos.	Descrizione	Description	Beschreibung	Description	Descripción	Descrição
1	ANELLO DI TENUTA	SHAFT SEAL	WELLENDICHTUNG	JOINT D'ÉTANCHÉITÉ	AN. DE RETENCIÓN	RETENTOR
2	PIEDE	FOOT	FUSS	PIED	PIE	PÉ
3	GUARNIZIONE USCITA	OUTPUT GASKET	ABTRIEBSGARNITUR	GARNITURE SORTIE	JUNT. ÁRB. LENTO	JUNTA DE SAÍDA
4	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
5	CAPPELOTTO	END CAP	ENDKAPPE	CHAPEAU DE FERMETURE	CAPERUZA	TAMPÃO
6	ANELLO SEEGER	SNAP RING	SEEGERRING	ANNEAU D'ARRÊT	ANILLO SEEGER	ANEL ELÁSTICO
7	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
8	CORONA	WORM WHEEL	SCHNECKENRAD	COURONNE HÉLICOÏDALE	CORONA	COROA
9	CORPO	HOUSING	GEHAEUSE	CARCASSE	CUERPO	CORPO
14	AN. DI TENUTA	SHAFT SEAL	WELLENDICHTUNGEN	JOINT D'ÉTANCHÉITÉ	AN. DE RETENCIÓN	RETENTOR
16	VITE T.C.E.I	COUNTERSUNK HEAD SCREW	INNENSECHSKANTSCHRAUBE	VIS C.H.C.	TORNILLO T.C.E.I	PARAFUSO
18	VITE SENZA FINE	WORM SHAFT	SCHNECKENWELLE	VIS SANS FIN	TORNILLO SIN FÍN	ROSCA SEM FIM
19	FLANGIA PIATTA	FLAT FLANGE	FLACHFLANSCH	BRIDE PLATE	BRIDA PLANA	FLANGE FP
20	LINGUETTA	KEY	KEIL	LANGUETTE	LENGÜETA	CHAVETA
21	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO

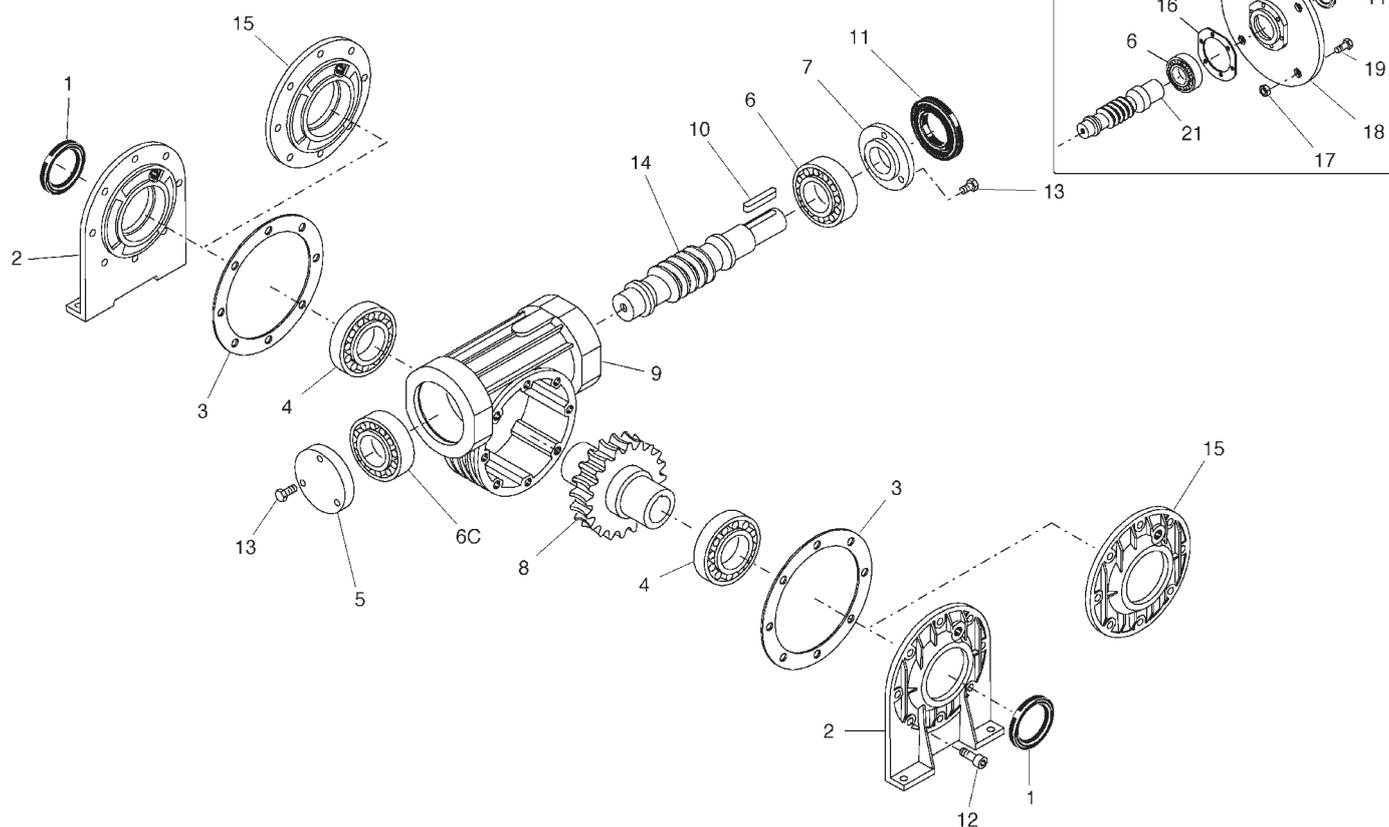
MI 40 ÷ 70



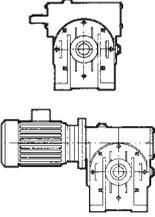
Pos.	Descrizione	Description	Beschreibung	Description	Descripción	Descrição
1	ANELLO DI TENUTA	SHAFT SEAL	WELLENDICHTUNG	JOINT D'ÉTANCHÉITÉ	AN. DE RETENCIÓN	RETENTOR
2	PIEDE	FOOT	FUSS	PIED	PIE	PÉ
3	GUARNIZIONE USCITA	OUTPUT GASKET	ABTRIEBSGARNITUR	GARNITURE SORTIE	JUNT.ÁRB.LENTO	JUNTA DE SAÍDA
4	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
5	CAPPELOTTO	ENDCAP	ENDKAPPE	CHAPEAU DE FERMETURE	CAPERUZA	TAMPÃO
6	ANELLO SEEGER	SNAP RING	SEEGERRING	ANNEAU D'ARRÊT	ANILLO SEEGER	ANEL ELÁSTICO
7	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
8	CORONA	WORM WHEEL	SCHNECKENRAD	COURONNE HÉLICOÏDALE	CORONA	COROA
9	CORPO	HOUSING	GEHAEUSE	CARCASSE	CUERPO	CORPO
10	O "RING"	O "RING"	O "RING"	JOINT TORIQUE	OR	ANEL DE VEDAÇÃO "OR"
11	DADO ESAGONALE	HEXAGONAL NUT	SECHSKANTMUTTER	ÉCROU HÉXAGONAL	TUERCA HEXAGONAL	PORCA
12	FLANGIA	FLANGE	FLANSCH	BRIDE	BRIDA	FLANGE
13	VITE T.E.	HEXAGONAL HEAD SCREW	SECHSKANTSCHRAUBE	VIS T.H.	TORNILLO T.E.	PARAFUSO
14	ANELLO DI TENUTA	SHAFT SEAL	WELLENDICHTUNG	JOINT D'ÉTANCHÉITÉ	AN. DE RETENCIÓN	RETENTOR
15	VITE T.E.	HEXAGONAL HEAD SCREW	SECHSKANTSCHRAUBE	VIS T.H.	TORNILLO T.E.	PARAFUSO
16	VITE T.C.E.I	COUNTERSUNK HEAD SCREW	INNENSECHSKANTSCHRAUBE	VIS C.H.C.	TORNILLO T.C.E.I	PARAFUSO
17	GUARNIZIONE ENTRATA	INPUT GASKET	ANTRIEBSGARNITUR	GARNITURE ENTRÉE	JUNTA	JUNTA DE ENTRADA
18	VITE SENZA FINE	WORM SHAFT	SCHNECKENWELLE	VIS SANS FIN	TORNILLO SIN FÍN	ROSCA SEM FIM
19	FLANGIA PIATTA	FLAT FLANGE	FLACHFLANSCH	BRIDE PLATE	BRIDA PLANA	FLANGE FP
21	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO

		Cuscinetto anteriore vite Front worm bearing Vorderes Schneckenlager Roulement avant vis Cojinete anterior tornillo Rolamento da frente da rosca sem fim	Cuscinetto posteriore vite Rear worm bearing Hinteres Schneckenlager Roulement arrière vis sans fin Cojinete posterior tornillo Rolamento posterior da rosca sem fim	Cuscinetto corona Output bearing Lager Roulement couronne Cojinete corona Rolamento da coroa		Anello di tenuta corona Shaft seal (output) Wellendichtung (Abtriebseite) Joint d'étanchéité couronne Anillo de retención corona Retentor de saída	Anello di tenuta vite Worm shaft seal Schneckenwellendichtung Joint d'étanchéité vis Anillo de retención tornillo Retentor de entrada
				4			
				standard	a richiesta on request only auf Anfrage sur demande bajo pedido se requerido		
<b>I 40</b>		6004	6004	16006	32006	30/47/7	20/42/7
<b>MI 40</b>	PAM 9/120	6004	6004	16006	32006	30/47/7 (FP)	20/35/7
<b>MI 40</b>	PAM 11/140	6004	6004	16006	32006	30/47/7 (FP)	20/35/7
<b>MI 40</b>	PAM 14/160	51105	6004	16006	32006	30/47/7 (FP)	25/35/7
<b>MI 40</b>	PAM 9/80	6004	6004	16006	32006	30/47/7 (FP)	20/35/7
<b>MI 40</b>	PAM 11/90	6004	6004	16006	32006	30/47/7 (FP)	20/35/7
<b>MI 40</b>	PAM 14/105	51105	6004	16006	32006	30/47/7 (FP)	25/35/7
<b>I 50</b>		30204	30204	16007	32007	35/47/7	20/47/7
<b>MI 50</b>	PAM 11/140	6005	6204	16007	32007	35/47/7	25/40/7
<b>MI 50</b>	PAM 14/160	6005	6204	16007	32007	35/47/7	25/40/7
<b>MI 50</b>	PAM 19/200	51106	30204	16007	32007	35/47/7	30/40/7
<b>MI 50</b>	PAM 11/90	6005	6240	16007	32007	35/47/7	25/40/7
<b>MI 50</b>	PAM 14/105	6005	6204	16007	32007	35/47/7	25/40/7
<b>MI 50</b>	PAM 19/120	51106	30204	16007	32007	35/47/7	30/40/7
<b>I 60</b>		6006	6006	6008	32008	40/56/8	30/55/7
<b>MI 60</b>	PAM 14/160	6006	6006	6008	32008	40/56/8	30/47/7
<b>MI 60</b>	PAM 19/200	6006	6006	6008	32008	40/56/8	30/47/7
<b>MI 60</b>	PAM 24/200	51107	6006	6008	32008	40/56/8	35/47/7
<b>MI 60</b>	PAM 14/105	6006	6006	6008	32008	40/56/8	30/47/7
<b>MI 60</b>	PAM 19/120	6006	6006	6008	32008	40/56/8	30/47/7
<b>MI 60</b>	PAM 24/140	51107	6006	6008	32008	40/56/8	35/47/7
<b>I 70</b>		30305	30305	6009	32009	45/60/7	25/62/10
<b>MI 70</b>	PAM 14/160	6007	6305	6009	32009	45/60/7	35/55/10
<b>MI 70</b>	PAM 19/200	6007	6305	6009	32009	45/60/7	35/55/10
<b>MI 70</b>	PAM 24/200	6007	6305	6009	32009	45/60/7	35/55/10
<b>MI 70</b>	PAM 28/250	51108	30305	6009	32009	45/60/7	40/55/7
<b>MI 70</b>	PAM 14/105	6007	6305	6009	32009	45/60/7	35/55/10
<b>MI 70</b>	PAM 19/120	6007	6305	6009	32009	45/60/7	35/55/10
<b>MI 70</b>	PAM 24/140	6007	6305	6009	32009	45/60/7	35/55/10
<b>MI 70</b>	PAM 28/160	51108	30305	6009	32009	45/60/7	40/55/8

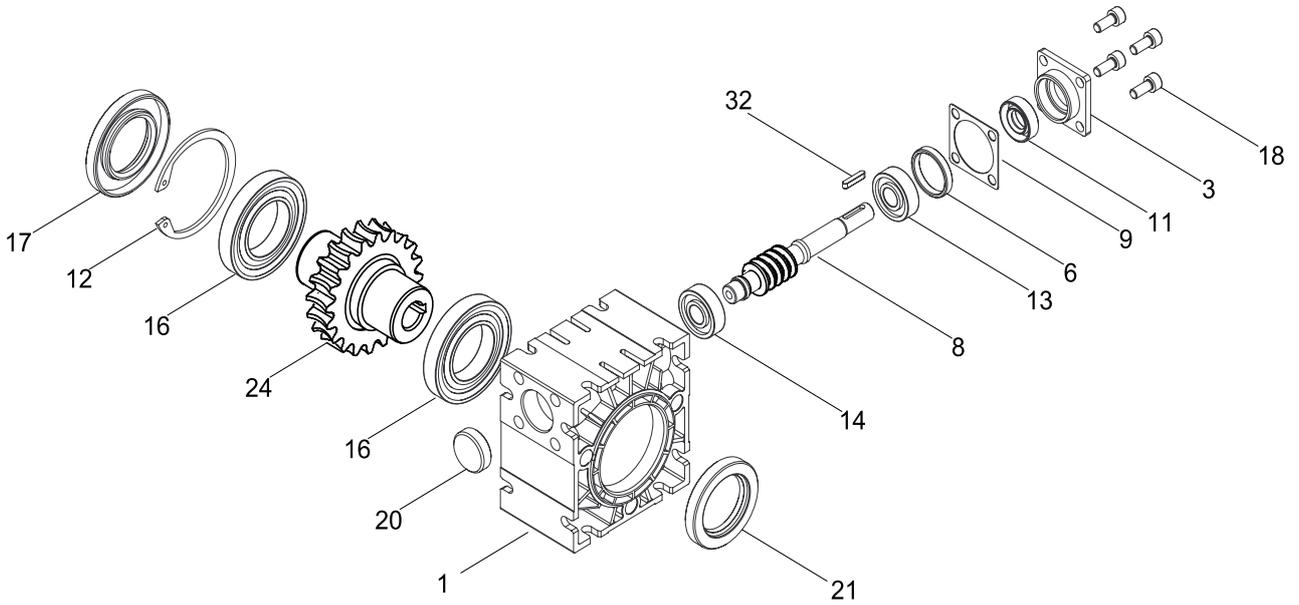
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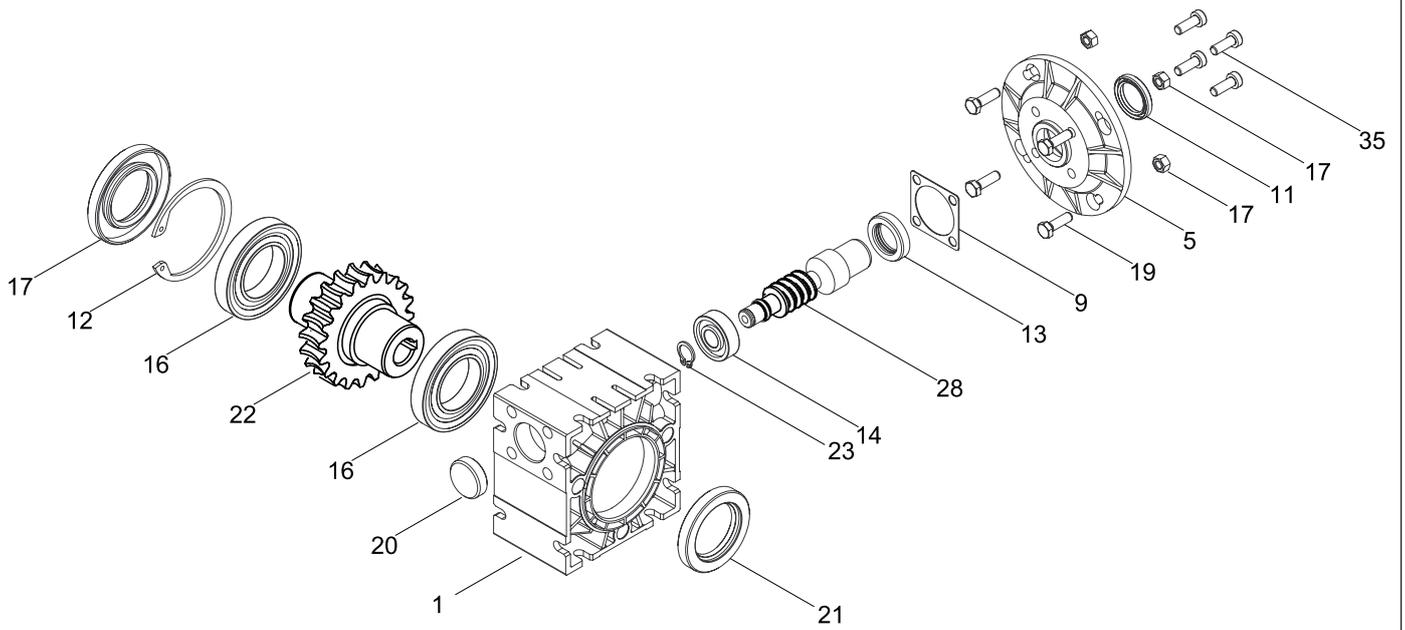
Pos.	Descrizione	Description	Beschreibung	Description	Descripción	Descrição
1	ANELLO DI TENUTA	SHAFT SEAL	WELLENDICHTUNG	JOINT D'ÉTANCHÉITÉ	AN. DE RETENCIÓN	RETENTOR
2	PIEDE	FOOT	FUSS	PIED	PIE	PÉ
3	GUARNIZIONE USCITA	OUTPUT GASKET	ABTRIEBSGARNITUR	GARNITURE SORTIE	JUNT.ÁRB.LENTO	JUNTA DE SAÍDA
4	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
5	CAPPELOTTO	ENDCAP	ENDHKAPPE	CHAPEAU DE FERMETURE	CUBIERTA CERRADA	TAMPA FECHADA
6	CUSCINETTO	BEARING	LAGER	ROULEMENT	COJINETE	ROLAMENTO
7	COPERCHIO APERTO	OPEN COVER	OFFENER DECKEL	COUVERCLE OUVERT	CUBIERTA ABIERTA	TAMPA ABERTA
8	CORONA	WORM WHEEL	SCHNECKENRAD	COURONNE HÉLICOÏDALE	CORONA	COROA
9	CORPO	HOUSING	GEHAUSE	CARCASSE	CUERPO	CARÇAÇA
10	LINGUETTA	KEY	KEIL	LANGUETTE	LENGÜETA	CHAVETA
11	ANELLO DI TENUTA	SHAFT SEAL	WELLENDICHTUNG	JOINT D'ÉTANCHÉITÉ	AN. DE RETENCIÓN	RETENTOR
12	VITE T.E.	HEXAGONAL HEAD SCREW	SECHSKANTSCHRAUBE	VIS TÊTE HÉXAGONALE	TORNILLO T.E.	PARAFUSO
13	VITE T.E.	HEXAGONAL HEAD SCREW	SECHSKANTSCHRAUBE	VIS TÊTE HÉXAGONALE	TORNILLO T.E.	PARAFUSO
14	VITE SENZA FINE	WORM SHAFT	SCHNECKENWELLE	VIS SANS FIN	TORNILLO SIN FÍN	ROSCA SEM FIM
15	FLANGIA PIATTA	FLAT FLANGE	FLACHFLANSCH	BRIDE PLATE	BRIDA PLANA	FLANGE FP
16	GUARNIZIONE ENTRATA	INPUT GASKET	ANTRIEBSGARNITUR	GARNITURE ENTRÉE	JUNTA	JUNTA DE ENTRADA
17	DADO ESAGONALE	HEXAGONAL NUT	SECHSKANTMUTTER	ÉCROU HÉXAGONAL	TUERCA HEXAGONAL	PORCA
18	FLANGIA	FLANGE	FLANSCH	BRIDE	BRIDA	FLANGE
19	VITE T.E.	HEXAGONAL HEAD SCREW	SECHSKANTSCHRAUBE	VIS TÊTE HÉXAGONALE	TORNILLO T.E.	PARAFUSO
20	VITE T.E.	HEXAGONAL HEAD SCREW	SECHSKANTSCHRAUBE	VIS TÊTE HÉXAGONALE	TORNILLO T.E.	PARAFUSO
21	V.S.F PAM	WORM SHAFT PAM	SCHNECKENWELLE PAM	VIS SANS FIN PAM	T.S.F PAM	ROSCA SEM FIM PAM

	Cuscinetto / Bearing / Lager Roulement / Cojinete / Rolamento				Anello di tenuta / Shaft seal Wellendichtung / Joint d'étanchéité Anillo de retención / Retentor	
	6	6C	4		11	1
			standard	a richiesta / on request only auf Anfrage / sur demande bajo pedido / se requerido		
I 80	<b>30305</b> 25/62/18.25	<b>30305</b> 25/62/18.25	<b>6010</b> 50/80/16	<b>32010</b> 50/80/20	25/40/7	50/65/8
MI 80	<b>32007X</b> 35/62/18	<b>30305</b> 25/62/18.25	<b>6010</b> 50/80/16	<b>32010</b> 50/80/20	35/50/7	50/65/8
MI 80 PAM 100	<b>61908</b> 40/62/12	<b>6305</b> 25/62/17	<b>6010</b> 50/80/16	<b>32010</b> 50/80/20	35/50/7 35/50/7	50/65/8 50/65/8
I 90	<b>30306</b> 30/72/20.75	<b>30306</b> 30/72/20.75	<b>6011</b> 55/90/18	<b>32011</b> 55/90/23	30/60/10	55/72/10
MI 90	<b>30207</b> 35/72/18.25	<b>30306</b> 30/72/20.75	<b>6011</b> 55/90/18	<b>32011</b> 55/90/23	35/60/10	55/72/10
MI 90 PAM 112	<b>51208</b> 40/68/19	<b>30306</b> 30/72/20.75	<b>6011</b> 55/90/18	<b>32011</b> 55/90/23	40/60/7	55/72/10
I 110	<b>30307</b> 35/80/22.75	<b>30307</b> 35/80/22.75	<b>6012</b> 60/95/18	<b>32012</b> 60/95/23	35/72/10	60/80/10
MI 110	<b>30208</b> 40/80/19.75	<b>30307</b> 35/80/22.75	<b>6012</b> 60/95/18	<b>32012</b> 60/95/23	40/60/10	60/80/10
I-MI 130	<b>32209</b> 45/85/24.75	<b>32209</b> 45/85/24.75	<b>6014</b> 70/110/20	<b>32014</b> 70/110/25	45/72/10	70/90/10
MI 130 PAM 132	<b>32011X</b> 55/90/23	<b>32209</b> 45/85/24.75	<b>6014</b> 70/110/20	<b>32014</b> 70/110/25	55/80/10	70/90/10
I-MI 150	<b>30211</b> 55/110/22.75	<b>30211</b> 55/110/22.75	<b>6216</b> 80/140/26	<b>30216</b> 80/140/28.25	55/80/10	80/100/10
I-MI 175	<b>30212</b> 60/110/23.75	<b>30212</b> 60/110/23.75	<b>6217</b> 85/150/28	<b>30217</b> 85/150/30.5	60/80/10	85/110/12

# U 30

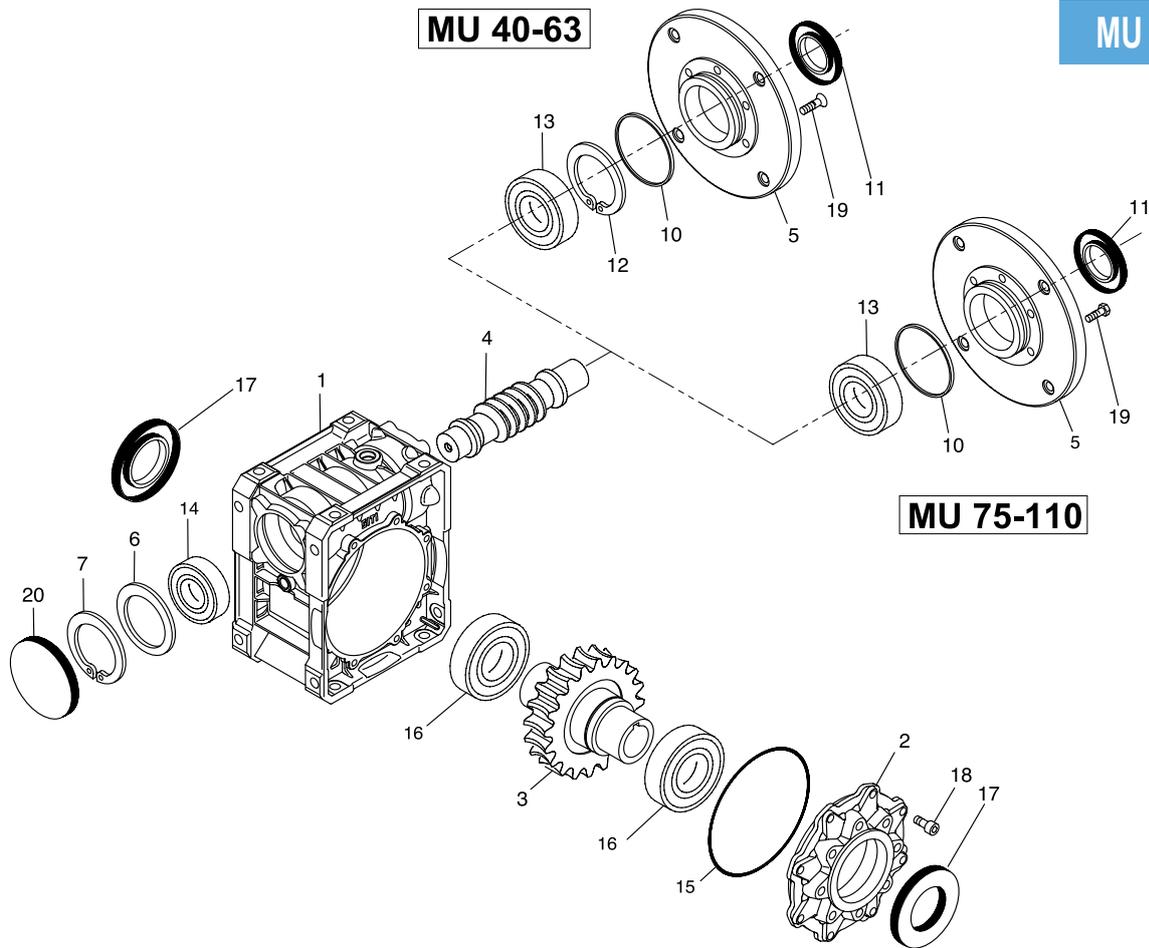


# MU 30

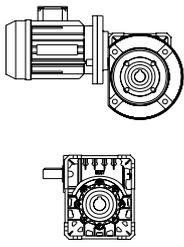


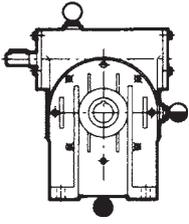
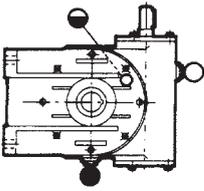
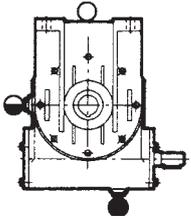
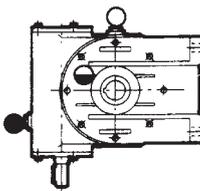
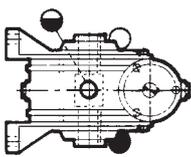
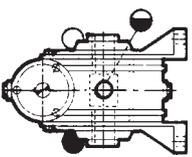
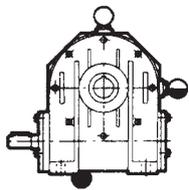
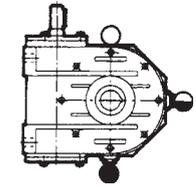
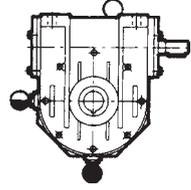
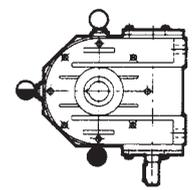
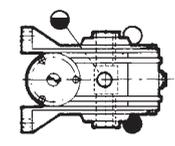
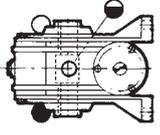
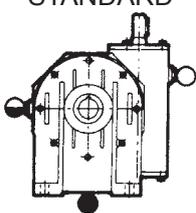
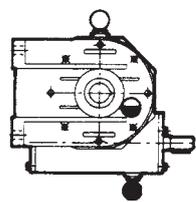
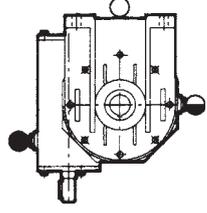
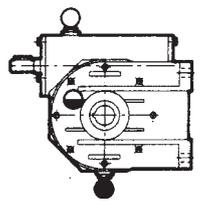
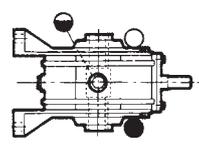
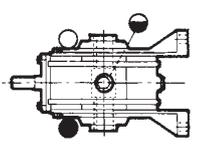
MU 40-63

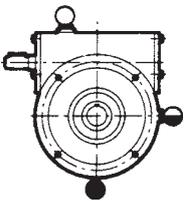
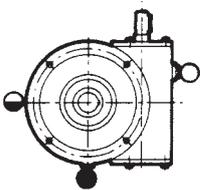
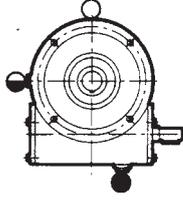
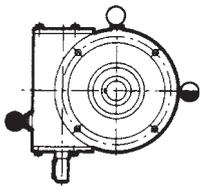
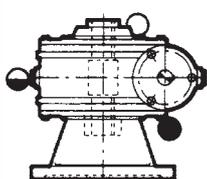
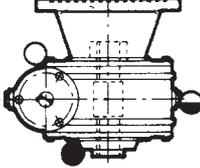
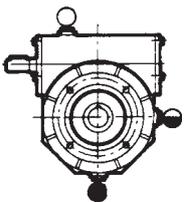
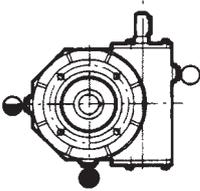
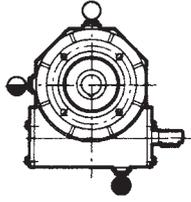
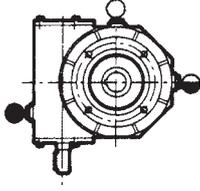
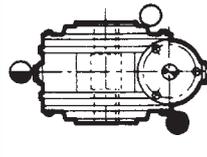
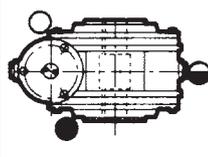
MU 40 - 110

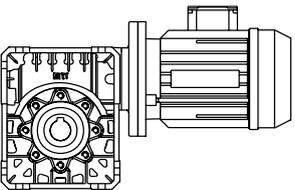
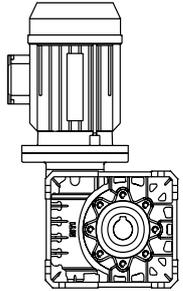
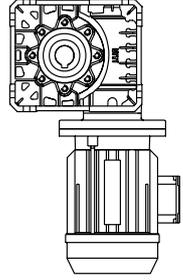
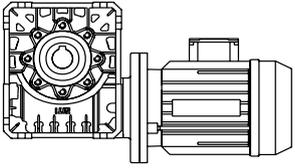
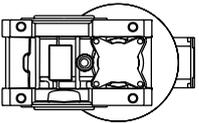
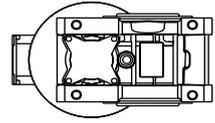


Pos.	Descrizione	Description	Beschreibung	Description	Descripción	Descrição
1	CARCASSA	HOUSING	GEHAEUSE	CARCASSE	CARCASA	CAIXA
2	COPERCHIO LATERALE	SIDE COVER	SEITLICHER DECKEL	COUVERCLE LATÉRALE	CUBIERTA LATERAL	TAMPA LATERAL
3	CORONA	WORMWHEEL	SCHNECKENRAD	COURONNE HÉLICOÏDALE	CORONA	COROA
4	VITE SENZA FINE	WORM SHAFT	SCHNECKENWELLE	VIS SANS FIN	TORNILLO SIN FÍN	ROSCA SEM FIM
5	FLANGIA ATTACCO MOTORE	MOTOR CONNECTION FLANGE	MOTORFLANSCH	BRIDE ACCOUPLEMENT MOTEUR	BRIDA CONEXIÓN MOTOR	FLANGE ACOPLAGEM MOTOR
6	DISTANZIALE	SPACER	DISTANZRING	DISTANTIAL	DISTANCIADOR	ESPAÇADOR
7	ANELLO SEEGER	SNAP RING	SEEGERRING	ANNEAU D'ARRÊT	ANILLO SEEGER	ANEL ELÁSTICO
13	CUSCINETTO ANTERIORE ENTRATA	INPUT FRONT BEARING	ANTRIEBSVORDERLAGER	ROULEMENT ANTÉRIEUR ENTRÉE	COJINETE ANTERIOR ENTRADA	MANCAL DIANTEIRO ENTRADA
14	CUSCINETTO POSTERIORE ENTRATA	INPUT REAR BEARING	ANTRIEBSHINTERLAGER	ROULEMENT DERRIÈRE ENTRÉE	COJINETE POSTERIOR ENTRADA	MANCAL TRASEIRO ENTRADA
15	"O" RING	"O" RING	"O" RING	JOINT TORIQUE	"OR"	ANEL DE VEDAÇÃO "OR"
16	CUSCINETTI ALBERO LENTO	OUTPUT BEARINGS	ABTRIEBSLAGER	ROULEMENTS ARBRE SORTIE	COJINETES EJE LENTO	MANCAIS EIXO LENTO
17	ANELLO TENUTA ALBERO LENTO	OUTPUT SHAFT SEAL	ABTRIEBSWELLENDICHTUNG	JOINT D'ÉTANCHÉITÉ SORTIE	ANILLO DE RETENCIÓN EJE LENTO	ANEL DE VEDAÇÃO EIXO LENTO
18	VITE	SCREW	SCHRAUBE	VIS	TORNILLO	ROSCA
19	VITE	SCREW	SCHRAUBEH	VIS	TORNILLO	ROSCA
20	CAPPELOTTO	END COVER	ENDKAPPE	CHAPEAU DE FERMETURE	CAPERUZA	TAMPÃO

		Cuscinetto Bearing Lager Roulement Cojinete Rolamento				Anello di tenuta Shaft seal Wellendichtung Joint d'étanchéité Anillo de retención Retentor			O-Ring		Cappellotto / Anello di tenuta End cover / Shaft seal Endkappe / Wellendichtung Chapeau / Joint d'étanchéité Caperuza / Anillo de retención Cápsula / Retentor
		13	14	16		11	17	21	10	15	20
				standard	a richiesta on request only auf anfrage sur demande bajo pedido se requerido						
<b>U 30</b>		\	6000	16006	\	10-22-7	30-55-7 BASL	30-47-7 BASL	\	\	22-7
<b>U 30 BISP.</b>		\	6000	16006	\	10-22-7	30-55-7 BASL	30-47-7 BASL	\	\	10-22-7
<b>MU 30</b>	PAM 11/90	\	6000	16006	\	15-24-7 BASL	30-55-7 BASL	30-47-7 BASL	\	\	22-7
<b>MU 30</b>	PAM 11/140	\	6000	16006	\	17-25-4	30-55-7 BASL	30-47-7 BASL	\	\	22-7
<b>MU 30</b>	PAM 14/105	\	6000	16006	\	17-25-4	30-55-7 BASL	30-47-7 BASL	\	\	22-7
<b>U 40</b>		16005	6203 2RS	6006	32006X	25-47-7 BASL	30-40-7 BASL	30-40-7 BASL	\	ORM 0700-15	40-7
<b>U 40 BISP.</b>		16005	6203	6006	32006X	25-47-7 BASL	30-40-7 BASL	30-40-7 BASL	\	ORM 0700-15	17-40-7 BASL
<b>MU 40</b>	PAM 11/90	16005	6203 2RS	6006	32006X	25-47-7 BASL	30-40-7 BASL	30-40-7 BASL	ORM 0430-20	ORM 0700-15	40-7
<b>MU 40</b>	PAM 11/140	16005	6203 2RS	6006	32006X	25-47-7 BASL	30-40-7 BASL	30-40-7 BASL	ORM 0430-20	ORM 0700-15	40-7
<b>MU 40</b>	PAM 14/105	16005	6203 2RS	6006	32006X	25-47-7 BASL	30-40-7 BASL	30-40-7 BASL	ORM 0430-20	ORM 0700-15	40-7
<b>MU 40</b>	PAM 14/160	16005	6203 2RS	6006	32006X	25-47-7 BASL	30-40-7 BASL	40-55-8 BASL	ORM 0430-20	ORM 0700-15	40-7
<b>U 50</b>		6006	6204 2RS	6008	32008X	30-55-7 BASL	40-55-8 BASL	40-55-8 BASL	\	OR 2325	47-7
<b>U 50 BISP.</b>		6006	6204 2RS	6008	32008X	30-55-7 BASL	40-55-8 BASL	40-55-8 BASL	\	OR 2325	20-47-7 BASL
<b>MU 50</b>	PAM 11/140	6006	6204 2RS	6008	32008X	30-55-7 BASL	40-55-8 BASL	40-55-8 BASL	OR 2200	OR 2325	47-7
<b>MU 50</b>	PAM 14/105	6006	6204 2RS	6008	32008X	30-55-7 BASL	40-55-8 BASL	40-55-8 BASL	OR 2200	OR 2325	47-7
<b>MU 50</b>	PAM 14/160	6006	6204 2RS	6008	32008X	30-55-7 BASL	40-55-8 BASL	40-55-8 BASL	OR 2200	OR 2325	47-7
<b>MU 50</b>	PAM 19/120	6006	6204 2RS	6008	32008X	30-55-7 BASL	40-55-8 BASL	40-55-8 BASL	OR 2200	OR 2325	47-7
<b>MU 50</b>	PAM 19/200	6006	6204 2RS	6008	32008X	30-55-7 BASL	40-55-8 BASL	40-55-8 BASL	OR 2200	OR 2325	47-7
<b>U 63</b>		6007	6205 2RS	6008	32008X	35-62-7 BASL	40-56-8 BASL	40-56-8 BASL	\	OR 2425	52-7
<b>U 63 BISP.</b>		6007	6205 2RS	6008	32008X	35-62-7 BASL	40-56-8 BASL	40-56-8 BASL	\	OR 2425	25-52-7 BASL
<b>MU 63</b>	PAM 14/105	6007	6205 2RS	6008	32008X	35-55-8 BASL	40-56-8 BASL	40-56-8 BASL	OR 59X1,5	OR 2425	52-7
<b>MU 63</b>	PAM 14/160	6007	6205 2RS	6008	32008X	35-55-8 BASL	40-56-8 BASL	40-56-8 BASL	OR 59X1,5	OR 2425	52-7
<b>MU 63</b>	PAM 19/120	6007	6205 2RS	6008	32008X	35-55-8 BASL	40-56-8 BASL	40-56-8 BASL	OR 59X1,5	OR 2425	52-7
<b>MU 63</b>	PAM 19/200	6007	6205 2RS	6008	32008X	35-55-8 BASL	40-56-8 BASL	40-56-8 BASL	OR 59X1,5	OR 2425	52-7
<b>MU 63</b>	PAM 24/140	6007	6205 2RS	6008	32008X	35-55-8 BASL	40-56-8 BASL	40-56-8 BASL	OR 59X1,5	OR 2425	52-7
<b>MU 63</b>	PAM 24/200	6007	6205 2RS	6008	32008X	35-55-8 BASL	40-56-8 BASL	40-56-8 BASL	OR 59X1,5	OR 2425	52-7
<b>U 75</b>		32008X	30206	6010	32010X	40-68-10 BASL	50-70-10 BASL	50-70-10 BASL	\	OR 2500	62-10
<b>U 75 BISP.</b>		32008X	30206	6010	32010X	40-68-10 BASL	50-70-10 BASL	50-70-10 BASL	\	OR 2500	30-62-8 BASL
<b>MU 75</b>	PAM 19/120	32008X	30206	6010	32010X	40-56-8 BASL	50-70-10 BASL	50-70-10 BASL	OR 2250	OR 2500	62-10
<b>MU 75</b>	PAM 19/200	32008X	30206	6010	32010X	40-56-8 BASL	50-70-10 BASL	50-70-10 BASL	OR 2250	OR 2500	62-10
<b>MU 75</b>	PAM 24/140	32008X	30206	6010	32010X	40-56-8 BASL	50-70-10 BASL	50-70-10 BASL	OR 2250	OR 2500	62-10
<b>MU 75</b>	PAM 24/200	32008X	30206	6010	32010X	40-56-8 BASL	50-70-10 BASL	50-70-10 BASL	OR 2250	OR 2500	62-10
<b>MU 75</b>	PAM 28/160	32008X	30206	6010	32010X	40-56-8 BASL	50-70-10 BASL	50-70-10 BASL	OR 2250	OR 2500	62-10
<b>MU 75</b>	PAM 28/250	32008X	30206	6010	32010X	40-56-8 BASL	50-70-10 BASL	50-70-10 BASL	OR 2250	OR 2500	62-10
<b>U 90</b>		32008X	32206	6011	32011X	40-68-10 BASL	55-72-10 BASL	55-72-10 BASL	\	OR 2637	62-10
<b>U 90 BISP.</b>		32008X	32206	6011	32011X	40-68-10 BASL	55-72-10 BASL	55-72-10 BASL	\	OR 2637	30-62-10 BASL
<b>MU 90</b>	PAM 19/120	32008X	32206	6011	32011X	40-56-8 BASL	55-72-10 BASL	55-72-10 BASL	OR 2250	OR 2637	62-10
<b>MU 90</b>	PAM 19/200	32008X	32206	6011	32011X	40-56-8 BASL	55-72-10 BASL	55-72-10 BASL	OR 2250	OR 2637	62-10
<b>MU 90</b>	PAM 24/140	32008X	32206	6011	32011X	40-56-8 BASL	55-72-10 BASL	55-72-10 BASL	OR 2250	OR 2637	62-10
<b>MU 90</b>	PAM 24/200	32008X	32206	6011	32011X	40-56-8 BASL	55-72-10 BASL	55-72-10 BASL	OR 2250	OR 2637	62-10
<b>MU 90</b>	PAM 28/160	32008X	32206	6011	32011X	40-56-8 BASL	55-72-10 BASL	55-72-10 BASL	OR 2250	OR 2637	62-10
<b>MU 90</b>	PAM 28/250	32008X	32206	6011	32011X	40-56-8 BASL	55-72-10 BASL	55-72-10 BASL	OR 2250	OR 2637	62-10
<b>U 110</b>		30208	30307	6012	32012X	40-80-10 BASL	60-80-10 BASL	60-80-10 BASL	\	OR 3750	80-10
<b>U 110 BISP.</b>		30208	30307	6012	32012X	40-80-10 BASL	60-80-10 BASL	60-80-10 BASL	\	OR 3750	35-80-10 BASL
<b>MU 110</b>	PAM 24/140	30208	30307	6012	32012X	40-60-10 BASL	60-80-10 BASL	60-80-10 BASL	OR 2300	OR 3750	80-10
<b>MU 110</b>	PAM 24/200	30208	30307	6012	32012X	40-60-10 BASL	60-80-10 BASL	60-80-10 BASL	OR 2300	OR 3750	80-10
<b>MU 110</b>	PAM 28/160	30208	30307	6012	32012X	40-60-10 BASL	60-80-10 BASL	60-80-10 BASL	OR 2300	OR 3750	80-10
<b>MU 110</b>	PAM 28/250	30208	30307	6012	32012X	40-60-10 BASL	60-80-10 BASL	60-80-10 BASL	OR 2300	OR 3750	80-10
<b>MU 110</b>	PAM 38/300	32010X	30307	6012	32012X	50-70-10 BASL	60-80-10 BASL	60-80-10 BASL	OR 2300	OR 3750	80-10

I						
	B3	V5	B8	V6	B6	B7
A	STANDARD 					
B	STANDARD 					
V	STANDARD 					

MI						
	B5	B51	B53	B52	V1	V3
F FBR FBM FBML	STANDARD 					
FP	STANDARD 					

U-MU		
B5	B51	B53
STANDARD 		
B3	V5	V6
	B6 	B7 

(K)

(L)



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