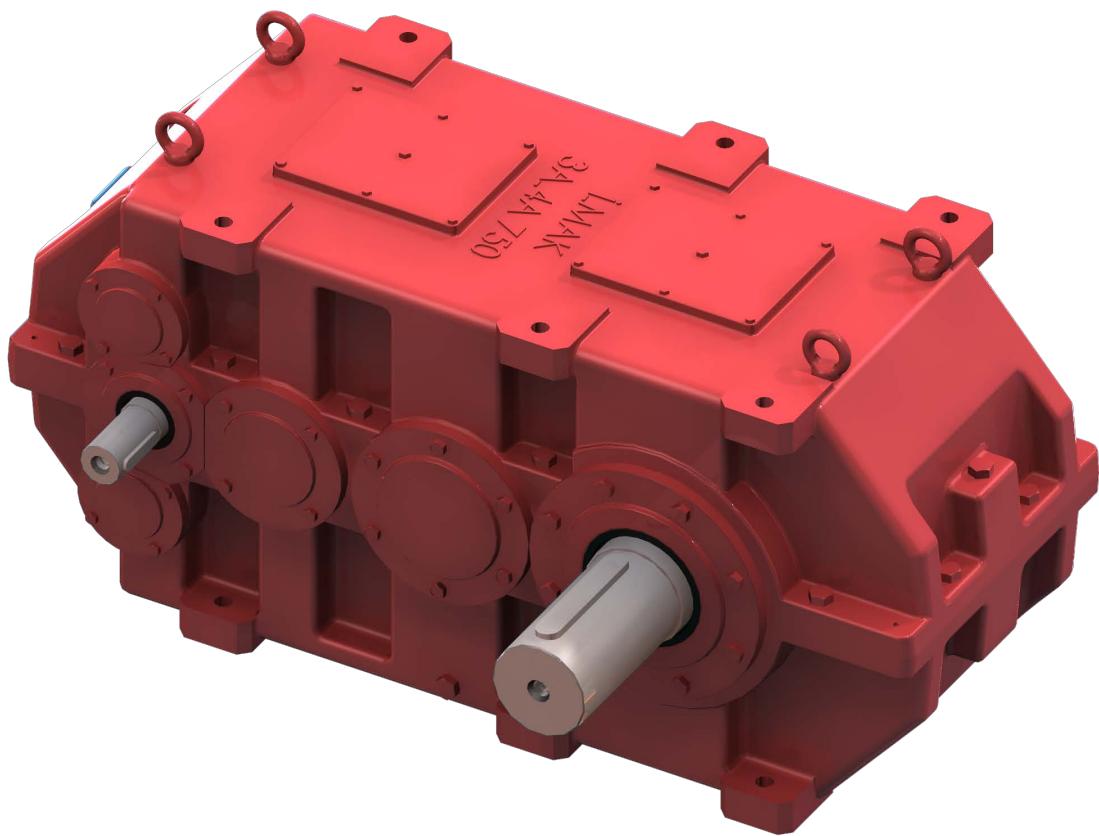


***i.Mak***<sup>®</sup>

**GEARBOX – VARIATOR  
INDUSTRY & TRADE CORPORATION**



**OPERATING GUIDE FOR  
HELICAL GEAR UNITS**



## CONTENTS

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## **IMPORTANT NOTES**

### **1. IMPORTANT NOTES**

#### **1.1 EXPLANATIONS**

**The description of the symbols in this operating guide is as follows:**



This symbol calls attention to security measures that should be taken in order to prevent danger that may come to the unit you purchased.



This symbol calls attention to the security measures that would prevent personal injuries.



This symbol expresses possible dangers that may cause death and injuries.



This symbol expresses the rules that must certainly be complied with.

#### **1.2. GENERAL**

This operating guide book covers the important rules concerning the hauling, installation and operation of gearbox and belt variators. It should always be kept close to gearbox and belt variators where operators could easily reach.

It is only possible to maintain high performance operation without breakdowns by fully complying with the instructions in this operating guide in order to avoid any incorrect operation and provide errorless usage. Therefore, it is obligatory for this operating guide to be completely read and comprehended and demonstrated by each operators and responsible people.



## **IMPORTANT NOTES**

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The alterations and additions in this operating guide may only be made by our company, otherwise our company will not be held responsible for the outcomes.

Our company must be contacted with about the problems and applications concerning the issues that are not stated in this operating guide, and written information should be asked about solutions. Our company will not be held responsible on the contrary. Please contact with the following addresses and phone numbers in such situations.

**İ-MAK REDÜKTÖR VARIYATÖR SANAYİ VE TİCARET A.Ş.**  
**Sanayi cad. No:1 Şeyhli-Pendik –İstanbul-TURKEY**  
**Tel: +90 216 378 26 36**  
**Facsimile: +902163780686**  
**e-mail: [imak@imakreduktor.com](mailto:imak@imakreduktor.com)**  
**web: [www.imakreduktor.com](http://www.imakreduktor.com)**



Be sure that you have chosen the most appropriate gearbox and belt variators for your needs in order to prevent possible risks that might occur.



The gearbox and belt variators that you have purchased have been designed to operate solely and they should never be coupled with other machines.



The gearbox and belt variators that you have purchased have been manufactured according to the provisions numbered 98/37/AT (98/37/EEC) and in this scope, our company is only responsible in condition that the rules in this operating guide are abided by.



The machines, that are to be coupled with the gearbox and belt variators that you have purchased, must fulfil the basic requirements of the provisions numbered 98/37/ AT (98/37/EEC).



## **SECURITY NOTES**

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### **2. SECURITY NOTES**

Gearbox and belt variators have been manufactured with superior technology and served for usage. For this reason it is forbidden for the user to make any changes on the product. Our company does not undergo the responsibility of such alterations and the risks and faults arising from these changes.



- √ The product is only used and operated under the conditions stated in the catalogue and operating guide.



- √ The user must ensure that every person, who are responsible for operating, maintenance, installation and protection of the product, must read and understand the operating guide and that they are cautious for these rules including every points given below:
  - To prevent possible dangers to user's life and organs, and to the third parties.
  - To maintain the safety of products.
  - To prevent inadequate performance and environment pollution that may arise from incorrect installation, usage and maintenance
  - To provide the safety conditions of work and workers during the operation of the product.



- √ The product shall be installed, operated, repaired and maintained by only authorized and educated personnel who has been trained about the requirements of the product..



- √ The entire work shall be carried out carefully and with safety.



## SECURITY NOTES

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- √ The operating guide that is given together with the gearbox-variators should be protected with labels and warnings placed on the product from materials such as paint, dust, moisture etc. and should be renewed when necessary.



- √ All work to be carried out on the product (installation, hauling, mounting, maintenance etc.) should only be conducted when the product is at stop position. All safety precautions should be taken in order to prevent the accidental operation of the product. Signs and warnings that would prevent the product to operate, should be placed on the visible parts of the mechanism, which is coupled with the product, and on the start button in order to indicate that these processes continue on the product.



- √ Related rules concerning industrial safety and pollution control should be taken into consideration during usage, installation, operation, maintenance and protection.



- √ Rotating parts such as coupling, gearwheel or chain gear, belt pulley, trigger belt and V belt should be protected with the help of required precautions in order to prevent possible contacts. (Please apply basic requirements of the provision numbered 98/37/ AT (98/37/EEC) regarding safety precautions).



- √ The gearing operation should be stopped immediately if any difference such as the operation exaltation or noise of the gearing is spotted at the gearing mechanism during the operation. The manufacturer or the authorized service should be contacted.



## **SECURITY NOTES**

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- √ During the installation of the geared mechanism at the tools and systems are obliged to include the requirements, notes and instructions stated in this instructions, which produce tools and systems, in their own instructions.



- √ The oils used are harmful to health and environment. The contact of this oil with skin and eyes should be avoided.  
Old and dirty oil, drained from the product during the oil renewal, should be put into an appropriate container and destroyed without harming the environment. The extremely dirty and greasy cleaning elements should also be kept in appropriate containers and destroyed without harming the environment.



- √ In the cases where the product is used with food processing machines or in food processing environments, the relevant hygiene legislation should be abided by and the food and the surface of the product should not be contacted. In such conditions it is preferred for the oil used in the product to be suitable for the food when necessary.



## HAULING AND STORAGE

### 3. HAULING AND STORAGE

#### 3.1. HAULING



Small gearboxes do not have a hauling handles. These products should be carried by hand with the help of at least two people.

There are hauling rings on gearbox and belt variators in large scale or lifting points on the trunk. (See Page 7). During the haulage of the product, a polyester sling, which is suitable for the weight of the product and hauling handles, a hook and a lifting lug, should be chosen and it should be lifted with an appropriate crane that would lift its weight.

During transportation the product should be fixed upon the transportation vehicle and this way its movement and overturn will be prevented.



During the hauling and lifting, the required security precautions should be taken in order to protect the operators, who carry out this process, from any injury; and it is necessary not to be present under a crane or a product during lifting.

#### 3.2 STORAGE



In cases where gearboxes and variators have to be stored for a long period of time, it is necessary to keep them in a non-humid area where water entrance is avoided, fixed temperature is maintained, and where there is no dust and vibration and also well ventilated. Protective oils that prevent the pivot ends from oxidation should be changed periodically.



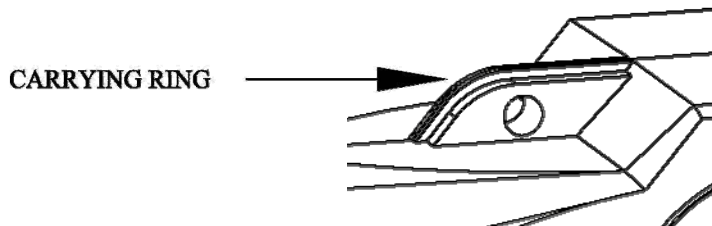
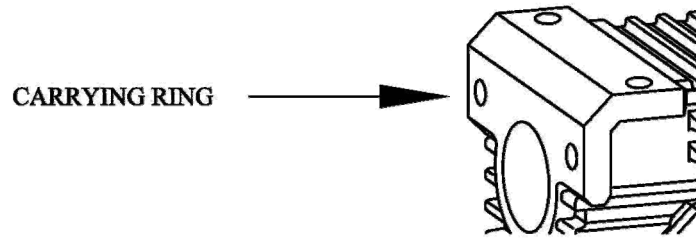
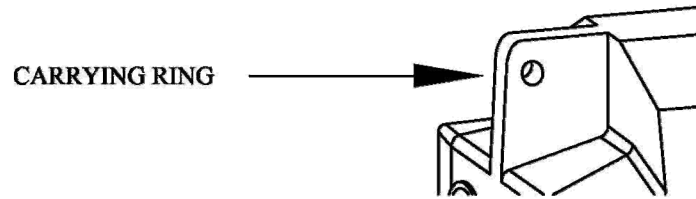
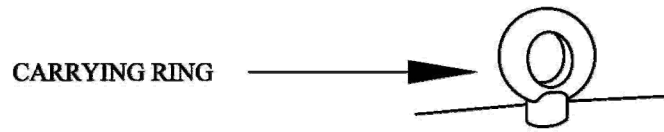
Never change the covering over the gearbox and variator. The mechanical (scratches), chemical (acid, alkaline melting) or thermal (spark, solder light, heat) damages that may possibly form on the covering may lead to rusting and outer protection deficiency.





## HAULING AND STORAGE

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### 4. MOUNTING AND DISMOUNTING

#### 4.1 MOUNTING



The gearboxes and variators should only be assembled and operated in assembling positions as indicated in this operating guide. Written permission of the producer should be taken for mounting positions excluding this.



The required measures should be taken in case that the connection points located on the system which is coupled with the product are set free and thus giving harm to the environment and operators by falling is prevented.



Regarding the mounting locations of the variators, and keeping in mind that the variator rotation adjustments are made during the operation, ergonomical and safe areas should be chosen. The basic requirements of the legislation number 98/37/ AT concerning this subject should be applied.



The variators and gearboxes should be operated together with the devices they are coupled with after they are assembled and the volume power level should be measured by a testing device that complies with IEC 651 .The volume power depends on the speed, power rate and power proportions. After the measurement, appropriate precautions that comply with related legal legislations about the effects of noise on humans should be taken.

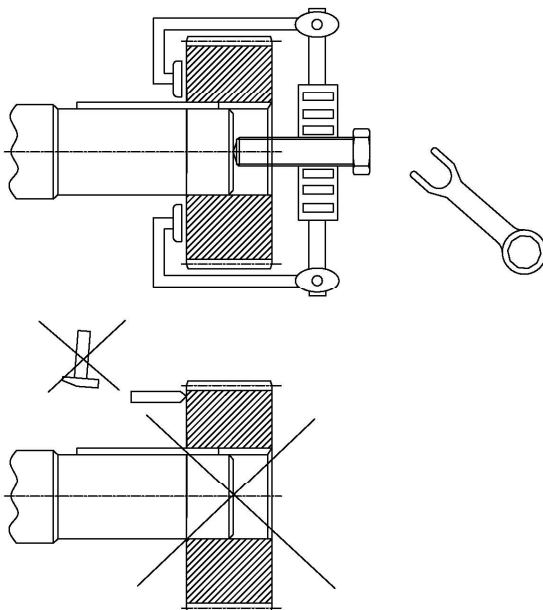


## MOUNTING AND DISMOUNTING

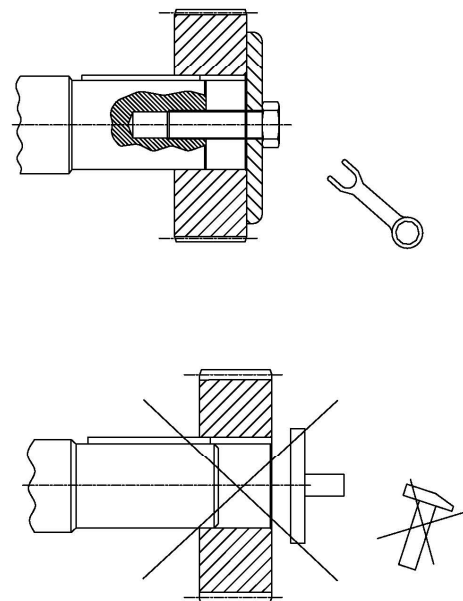


- I. Before beginning the process of the assembling and/or disassembling of your gearbox and belt variator, you should read the operating guide thoroughly.
- II. Check whether the the ventilation stopper of the gearbox or belt variator you will mount is suitable to the assembling position or not. In case there is any problem, please, contact the manufacturer company. *(Please check our catalogue for the correct position of the ventilation stopper.)*
- III. If the mechanism you will mount is to work at outdoor environments, make sure that the mounting material you use such as bolts and nuts to fix your gearbox and/or belt variator is made of stainless steel material . Protect your motor and variators against dust, water, moisture and other outdoor conditions.
- IV. Receive affirmation from the manufacturer company that the gearbox and/or belt variator that you will mount will have the correct oil pressure level for its mounting positions.
- V. Never use a hammer during the mounting and dismounting of the connection elements used in the gearbox and belt variators pivots such as coupling, belt pulley, chain gear etc., use a pivot end pulling device for this purpose

DISMOUNTING



MOUNTING

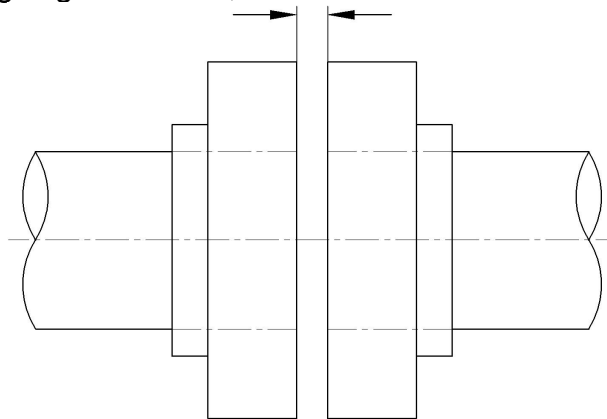




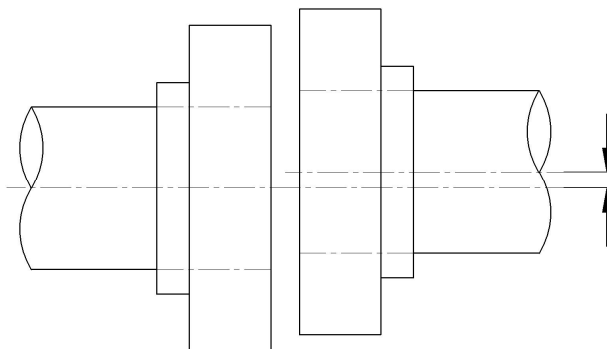
## MOUNTING AND DISMOUNTING

VI. The chassis on which you will mount your gearbox and/or belt variator should be straight, clean and rigid.

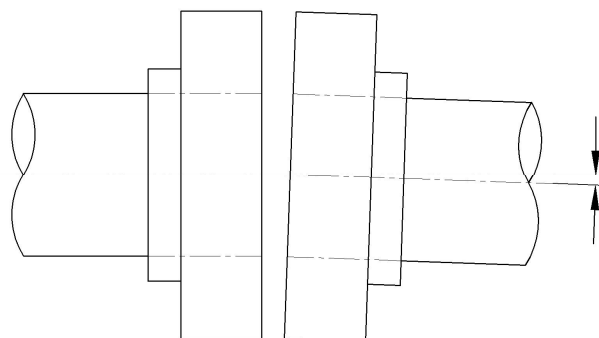
VII. If a coupling is going to be used,



please assure that there is enough space between the two couplings.



between the output shafts of the gearbox and/or belt variator and the activated machine then make sure that the shafts are on the same axis.



please assure that there is same axis between the two couplings.

When choosing couplings, elastic ones should be preferred, rigid connections are not recommended. The chain gear, belt pulley connections should be made linear and tightly.



### 5. OPERATION

- I. Fulfilling the requirement as listed in the operating guide, you can demonstrate the operation conditions of your gearbox and/or belt variator and start operation of the product.
- II. For motor-driven type products check if grounding has been applied.
- III. For motor-driven type products be sure that the electrical connections are done correctly and firmly according to the electrical diagram on the klemens box.
- IV. Gearboxes and belt variators may rotate in both ways except for the locked types. For this reason the rotation direction should be checked by putting it on/off and before connecting it to the machine it will drive.
- V. The temperature of the working environment should be between + 5 ° C / +60 ° C. If it will be operated in an environment temperature excluding these intervals, the manufacturer company must be contacted and consulted with.
- VI. Obtain an information document on cooling interval period of your products from the relevant manufacturer and take action according to the listed intervals.



## **CONTROL AND MAINTENANCE**

### **6. CONTROL AND MAINTENANCE**

Comply with the maintenance instructions for your gearboxes and belt variators longevity and expected work efficiency.

#### **GEARBOXES:**

- Check the oil levels and quantity of your motors. Chose the type and quantity of oil from the İ.MAK catalogue.
- Check if the ventilation stopper is active or not. If the air evacuation hole does not work, the accumulated air in the motor trunk causes pressure and gas leakage from the mats. Thus the oil reduces and causes environmental is pollution and hinders the efficient operation of the motor.
- Check wether the motor connection bolts have loosened or not. Take measures by firming loosened bolts. Be careful for the harmful shaking of the disposition of the axis during motor installation.
- Change the oil after 500 hours of initial operation and periodically every 6000 hours of operating the motor.
- You must contact and consult with our company for special matters and operation conditions.

#### **BELT VARIATORS:**

- It is necessary to apply oil from the greaser at the relevant parts of the belt variators periodically.
- The adjustment of the rotation interval fixing bolt of the belt variator should not be changed. In case these intervals are changed and the max/min rotation limit values are exceeded, it may cause uninvited damage on the belt.
- It is beneficial to change and operate the rotation of the belt variator regulation system for a few minutes once in a while (at weekends) for the continuous and proper operation of the machine.
- Relevant precautions should be taken to protect from the dusty environments effects as much as possible.

The rotation interval of the belt variator must be done during the operation of the variator.



## FREQUENTLY ASKED QUESTIONS








### 7. FREQUENTLY ASKED QUESTIONS



<b>PROBLEM</b>	<b>POSSIBLE CAUSES</b>	<b>SOLUTION</b>
Hardly regular, noises are heard	<ol style="list-style-type: none"><li>1. The bearings might be damaged if the noise is like a grinding sound</li><li>2. If the like a hitting noise there a change of breakage in the gearing</li></ol>	<ol style="list-style-type: none"><li>1) Check the oil (See part 6)</li><li>2) Contact authorized service</li></ol>
Irregular noises are heard	There could be foreign substance in the oil	<ol style="list-style-type: none"><li>1. Check the oil</li><li>2. Stop operating and contact authorized service</li></ol>
<u>Oil is leaking</u> from the motor flange, the oil containers, motors and oil stopper	<ol style="list-style-type: none"><li>1. The stopper container or gasket could be damaged</li><li>2. The trunk of the motor could be cracked</li></ol>	Contact authorized service
Oil is leaking from the ventilation opening	<ol style="list-style-type: none"><li>1. Excess oil might be filled</li><li>2. The ventilation opening is not in an appropriate position</li></ol>	<ol style="list-style-type: none"><li>1. Check oil levels (See part 8)</li><li>2. Check mounting position (See part 8)</li></ol>
The motor is working but the exit pivot or entrance pivot is not rotating	The wedge of the gearing could be scraped of the gears could be completely broken and connection could stop	Contact authorized service



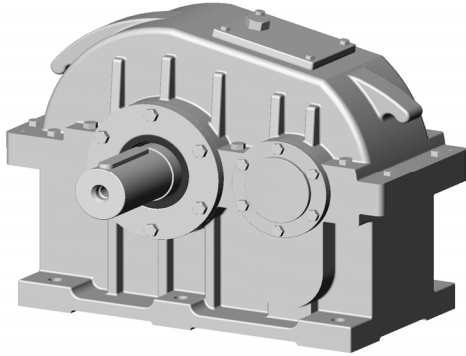
Contact us for further information and inquiries.

Lubricant	ISO Viscosity Class	DIN 51517-3	Usage Temperature C°	Firm						
										
Mineral Oil	ISO VG 320	CLP	0.....+100	Mobilgear XMP 320	Degol BG 320	Energol GR-XP320	Omala F320	Alpha SP 320	GEM 1 320 N	Spartan EP 320
	ISO VG 220	CLP	-5.....+100	Mobilgear XMP 220	Degol BG 220	Energol GR-XP220	Omala F220	Alpha SP 220	GEM 1 220 N	Spartan EP 220
	ISO VG 150	CLP	-5.....+100	Mobilgear XMP 150	Degol BG 150	Energol GR-XP150	Omala 150	Alpha SP 150	GEM 1 150 N	Spartan EP 150
	ISO VG 100	CLP	-5.....+100	-	Degol BG 100	Energol GR-XP100	Omala 100	Alpha SP 100	GEM 1 100 N	Spartan EP 100
Synthetic Oil	ISO VG 320	CLP PG	-25.....+140	Gylgoyle 320	Degol GS 320	Enersyn SG-XP320	Tivela S 320	Alphasyn PG 320	Klübersynth GH 6-320	Glycolube 320
	ISO VG 220	CLP PG	-25.....+140	-	Degol GS 220	Enersyn SG-XP220	Tivela S 220	Alphasyn PG 220	Klübersynth GH 6-220	-
	ISO VG 150	CLP PG	-30.....+140	-	Degol GS 150	Enersyn SG-XP150	Tivela S 150	Alphasyn PG 150	Klübersynth GH 6-150	-
	ISO VG 100	CLP PG	-30.....+140	-	-	-	-	-	Klübersynth GH 6-100	-

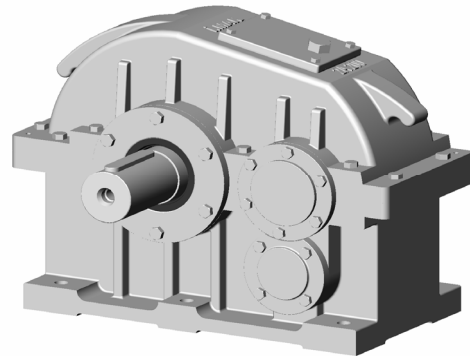




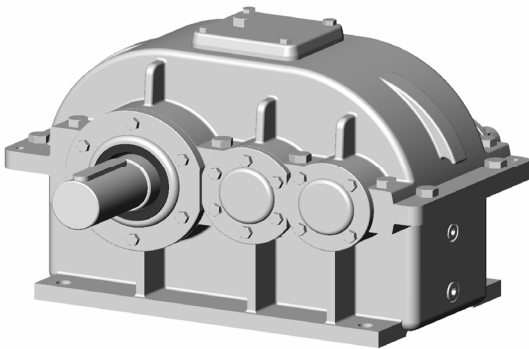




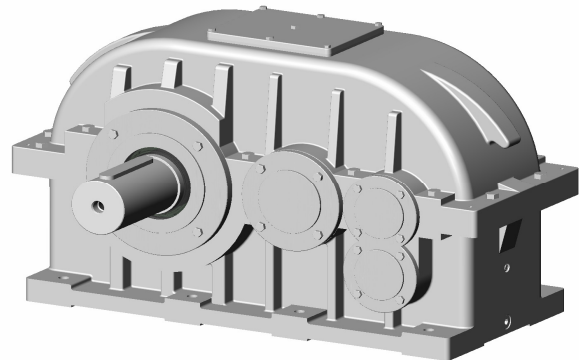
**A ...**



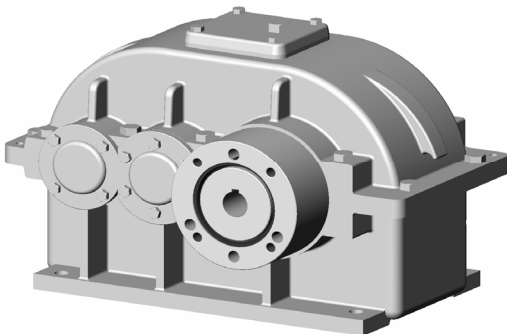
**2A ...**



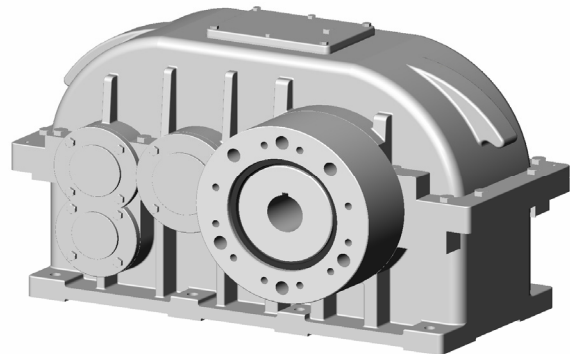
**2A ...**



**3A ...**

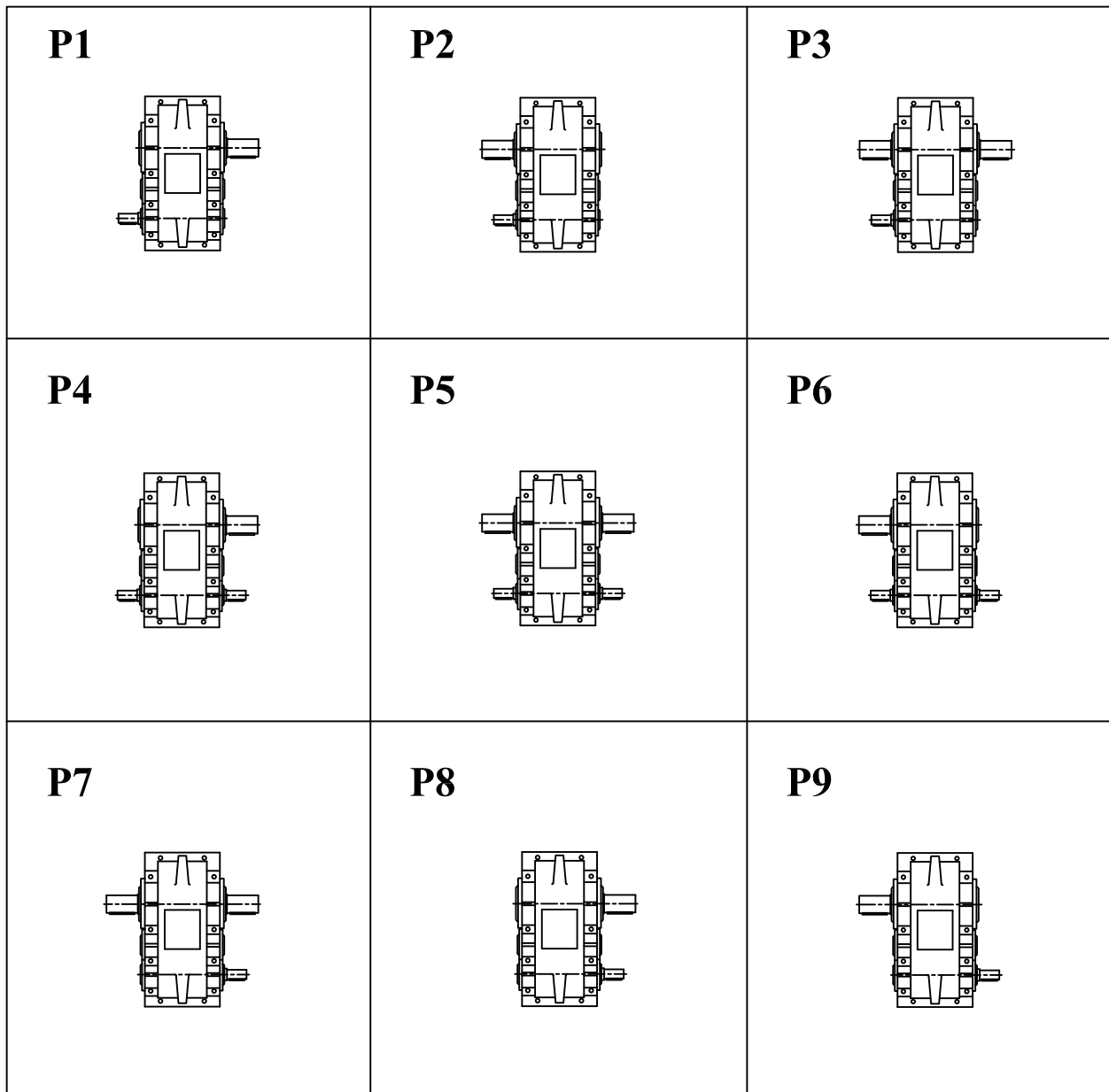


**2AE ...**



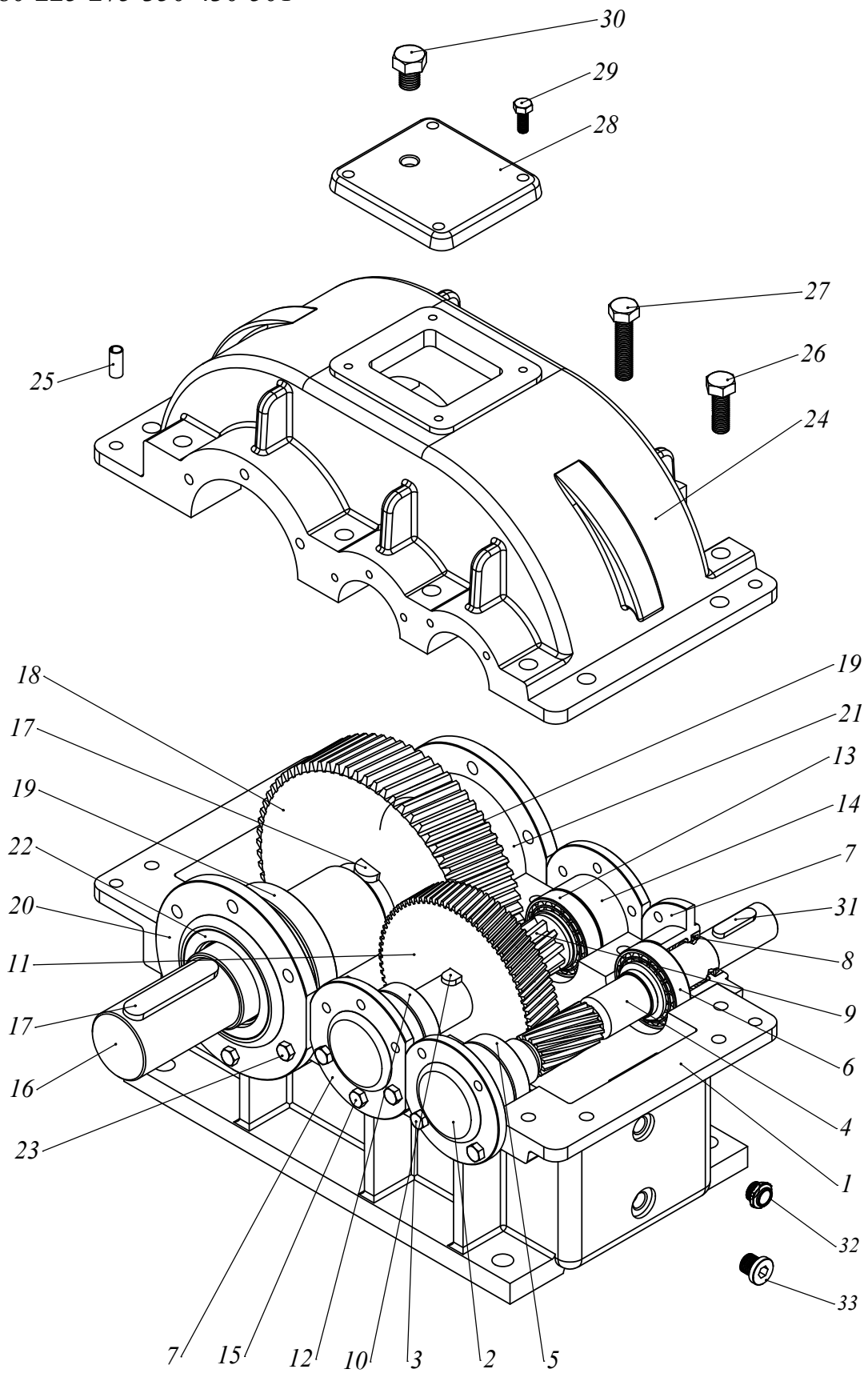
**3AE ...**

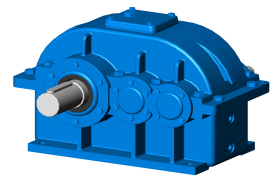
### Mounting Positions



	TYPE											
	A 200	2A 200	2A 180	2A 225	2A 275	2A 350	2A 430	2A 501	3A 430	3A 501	3A 750	4A 750
Oil Quantities lt	10	10	4	7	10	18	25	32	25	32	65	65

TYPE  
2A... 180-225-275-350-430-501





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## General Parts List

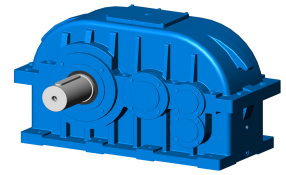
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### TYPE

2A } 180-225-275-350-430-501

1 - Gear Case (Lower Part)	17- Key
2 - Bearing Cover	18- Gear Z4
3 - Bolt	19- Bearing
4 - Gear Z1 (Input Shaft)	20- Seal Cover
5 - Bearing	21- Bearing Cover
6 - Bearing	22- Seal
7 - Seal Cover	23- Bolt
8 - Seal	24- Gear Case (Upper Part)
9 - Gear Z3	25- Pin
10- Key	26- Bolt
11- Gear Z2	27- Bolt
12- Bearing	28- Upper Cover
13- Bearing	29- Bolt
14- Bearing Cover	30- Vent Plug
15- Bolt	31- Key
16- Output Shaft	32- Oil Level Plug
	33- Drain Plug





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## General Parts List

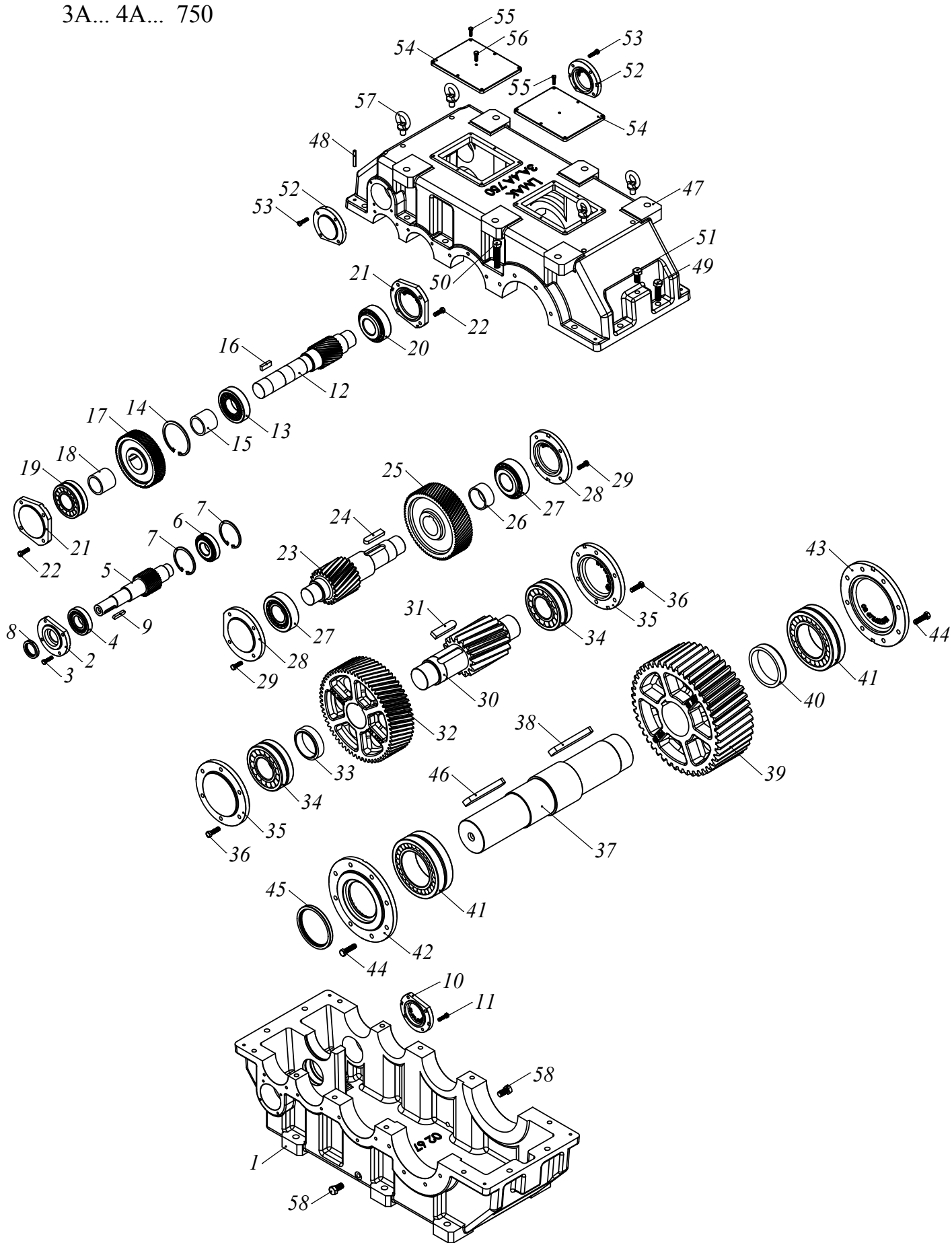
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### TYPE

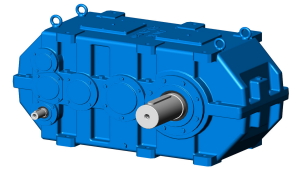
3A } 430-501

1- Gear Case (Lower Part)	21- Bearing
2- Bearing Cover	22- Output Shaft
3- Bolt	23- Key
4- Gear Z1 (Input Shaft)	24- Gear Z6
5- Bearing	25- Bearing
6- Bearing Cover	26- Seal Cover
7- Seal	27- Seal
8- Seal	28- Bearing Cover
9- Bearing Cover	29- Bolt
10- Gear Z3	30- Gear Case (Upper Part)
11- Key	31- Mech
12- Gear Z2	32- Bolt
13- Bearing	33- Upper Cover
14- Bearing	34- Bolt
15- Bolt	35- Vent Plug
16- Bearing Cover	36- Key
17- Bolt	37- Key
18- Gear Z5	38- Drain Plug
19- Key	39- Oil Level Plug
20- Gear Z4	40- Bolt

TYPE  
3A... 4A... 750







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## General Parts List

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### TYPE

3A - 4A } 750

1- Gear Case (Lower Part)	30- Gear Z7
2- Seal Cover	31- Key
3- Bolt	32- Gear Z6
4- Bearing	33- Spacer
5- Gear Z1 (Input Shaft)	34- Bearing
6- Bearing	35- Bearing Cover
7- Circlip	36- Bolt
8- Seal	37- Output Shaft
9- Key	38- Key
10- Bearing Cover	39- Gear Z8
11- Bolt	40- Spacer
12- Gear Z3	41- Bearing
13- Bearing	42- Seal Cover
14- Circlip	43- Bearing Cover
15- Pipe	44- Bolt
16- Key	45- Seal
17- Gear Z2	46- Key
18- Pipe	47- Gear Case (Upper Part)
19- Bearing	48- Pin
20- Bearing	49- Bolt
21- Bearing Cover	50- Bolt
22- Bolt	51- Bolt
23- Gear Z5	52- Bearing Cover
24- Key	53- Bolt
25- Gear Z4	54- Upper Cover
26- Spacer	55- Bolt
27- Bearing	56- Vent Plug
28- Bearing Cover	57- Flange Eye Bolt
29- Bolt	58- Drain Plug



## **WARRANTY CONDITIONS**

1. All gearboxes and variators' parts except the engine are warranted for 2(two) year.
2. Conditions in the warranty and user's guide of manufacturer are valid for the Warranty of the Engine.
3. This warranty is valid if there is no direct or indirect intervention to the product by the end user and if it is used accordingly to the user's guide.
4. This warranty does not cover the defects arising from misuse and wrong choices.
5. The time taken for maintenance, repair and replacement made under the warranty shall be added to warranty period. This time starts with the delivery of the product to the service station.
6. Warranty period is valid beginning the invoice date, commissioning date is void.
7. No interference such as mounting, demounting, or maintenance shall be made to the warranted product on the machine or facility it works.
8. Our company does not warrant the parts of other companies which are mounted on our standard product; related company is responsible for the warranty of these products.
9. Warranty conditions cover the parts produced by I-mak Gearbox&Variator Co.; do not cover the customer parts coming with the standard product and damages caused while mounting and demounting these parts.
10. This warranty does not cover the damages that may be occurred during transportation.
11. Consumers have to inform the manufacturer about their questions on maintenance and repair.
12. I-mak Gearbox&Variator Co. is not responsible for the material and moral losses in case of the failure of the product.
13. Our company will supply a free of charge repair in its factory for the product failures under the conditions and period of warranty. Cost of shipment is borne by the user.
14. Only the replaced parts of the products, on which revisions are made, are warranted; warrant period for the spare parts is 6(six) months.



## **WARRANTY**

İ.Mak Gearbox&Variator products and all parts except electrical motor and faulty choices are warranted on condition that they are used accordingly to the user's guide and not maintained, repaired or interfered by any other individuals other than İ.Mak Gearbox&Variator Service Employees, against defects in material, workmanship and manufacturing for 2(two) year.

All costs relating to workmanship and replacement of parts regarding the work performed within the extent of warranty shall be borne by our company.

The time used for repairs to be made within the warranty period shall be added to warranty period.

Power(kW):

Ratio (i):

Type:

Serial Number:

Date:

Manufacturer:

**İ-Mak Gearbox & Variator Co.**

Factory : Sanayi Caddesi No. 1 Seyhli Pendik – ISTANBUL

Tel: +90 216 378 03 26 Fax: +90 216 378 06 86

Office : Demirkapi Keresteciler Sitesi Rıza Uzun Sokak

No: 21 34030 Topçular – ISTANBUL

Tel: +90 212 567 87 32-33 Fax: +90 212 612 61 17

Authorized Signature/Seal

User Company :



**MANUFACTURER'S DECLARATION IN ACCORDANCE  
WITH THE EC MACHINERY DIRECTIVE 98/37/EC**

ANEXIIB

**BELGE NO / AY – YIL**

**DOCUMENT NO. / MONTH – YEAR : İM – 01/11/03**

**İMALATÇI**

**MANUFACTURER : İMAK REDÜKTÖR VARYATÖR SAN ve TİC. A.Ş.  
DEMİRKAPI KERESTECİLER SİT. RIZA UZUN SOK. NO:21  
TOPÇULAR – İSTANBUL – TÜRKİYE**

**ÜRÜN TANITIMI : HELİSEL ve SONSUZ DİŞLİLİ REDÜKTÖRLER VARYATÖRLER**

**PRODUCT DESIGNATION : HELICAL and WORM GEARED UNITS VARIABLE SPEED DRIVES**

TANIMLANAN ÜRÜNLERİN AŞAĞIDAKİ AVRUPA NORMLARININ TALİMATLARINA UYGUNDUR.  
THE DESIGNATED PRODUCTS CONFIRM TO THE PROVISIONS OF THE FOLLOWING EUROPEAN  
DIRECTIVES

**SAYI / NUMBER : YAYIN TARİHİ :**

EN 292 – 1

OCAK 1996

EN 292 – 2

OCAK 1996

**UYGULANAN DİREKTİFLER / THE FOLLOWING DIRECTIVES**

98/37/AT MAKİNE EMNİYET DİREKTİFİ  
98/37/EEC MACHINERY DIRECTIVE

BU TALİMATLARA UYGUNLUKLA İLGİLİ BİLGİLER UYGUNLUK DOSYASINDA BELİRTİLMİŞTİR.  
FOR FURTHER INFORMATION ABOUT COMPLIANCE WITH THESE DIRECTIVES SEE TECHNICAL  
FILES

**CE İŞARETİ UYGULAMA SIRASI / AFFIXING OF THE CE MARKING : 01**

**TANZİM EDEN / ISSUER : MUSA HALLAÇ**

**YER – TARİH / PLACE – DATE : İSTANBUL 03.12.03**

**YETKİLİ İMZA – LEGALLY BINDING SIGNATURE**

BU BEYAN, BELİRTİLEN TALİMATLARA UYGUNLUĞU, BELGELER, ÖZELLİKLER İLE İLGİLİ  
GARANTİ HAKKI İÇERMEZ. ÜRÜN İLE BİRLİKTE VERİLEN TÜM GÜVENLİK UYARILARI, MONTAJ  
VE İŞLETİM TALİMATLARINA UYULMASI GEREKİR. BU BEYAN, DİŞLİ ÜNİTESİ İÇİN GEÇERLİDİR.  
MOTORU KAPSAMAZ.

THIS DECLARATION CERTIFIES COMPLIANCE WITH THE INDICATED DIRECTIVES BUT IMPLIENCE  
NO WARRANTY OF PROPERTIES ALL SAFETY INSTRUCTIONS SHOWN ON DOCUMENTATION AND  
MOUNTING INSTRUCTIONS ETC. SHALL COSERVED. THIS DECLARATION IS VALID ONLY FOR THE  
GEAR UNIT PARTS AND DOES NOT COVER THE MOTOR.

KAYIT NO : 113199