



**BREVINI<sup>®</sup>**

*Motion Systems*

# Installation and Maintenance Manual

**Gearmotors T Series**

IMM-0020EN  
December 2022

## **DISCLAIMER**

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## CONTENTS

<b>1</b>	<b>VERSION TRACKING .....</b>	<b>5</b>
1.1	MANUAL APPLICABILITY AND SUPPORTED MODELS .....	5
<b>2</b>	<b>HOW TO USE THIS MANUAL .....</b>	<b>6</b>
<b>3</b>	<b>UNIT DESIGNATION .....</b>	<b>7</b>
3.1	DETAILED UNIT DESIGNATION .....	7
3.2	NAMEPLATE UNIT DESIGNATION .....	8
<b>4</b>	<b>PART LIST OF STANDARD TYPE GEAR UNITS .....</b>	<b>9</b>
4.1	TT...00 TYPES .....	9
4.2	TT...00.K TYPES .....	10
4.3	TT...0S TYPES .....	11
4.4	TT...0S.K TYPES .....	12
<b>5</b>	<b>SAFETY .....</b>	<b>13</b>
5.1	INTENDED USE .....	13
5.2	IMPROPER USE .....	13
5.3	SAFETY INSTRUCTIONS .....	14
5.3.1	GENERAL SAFETY INSTRUCTIONS.....	14
5.4	TIGHTENING TORQUES .....	15
5.5	CASE OF FIRE .....	16
5.5.1	SUITABLE EXTINGUISHING AGENTS, PROTECTIVE EQUIPMENT.....	16
5.5.2	UNSUITABLE EXTINGUISHING AGENTS.....	16
<b>6</b>	<b>THINKS TO CHECK BEFORE THE GEAR UNIT OR GEARED MOTOR IS INSTALLED .....</b>	<b>17</b>
6.1	TRANSPORTATION .....	17
6.2	STORAGE .....	18
<b>7</b>	<b>INSTALLING THE GEAR UNIT .....</b>	<b>19</b>
7.1	BEFORE YOU START .....	19
7.2	CHECK THE SHAFT DIMENSIONS TO FIT .....	19
7.3	CHECK THE AMBIENT TEMPERATURE .....	19
7.4	CHECK THE VOLTAGE SUPPLY .....	20
7.5	CHECK THE MOUNTING POSITION .....	22
7.6	USE THE BREATHER PLUG .....	22
7.7	CHECK THE OIL LEVEL .....	22
7.8	CHECK SHAFT ENDS AND MOUNTING FACES .....	22
7.9	COVER ABRASIVE AMBIENT .....	23
7.10	CHECK ACCESSIBILITY TO FILLING, BREATHER AND DRAIN PLUGS .....	23
<b>8</b>	<b>MECHANICAL INSTALLATION .....</b>	<b>24</b>
8.1	INSTALLING CUSTOMER SHAFT WITH SHOULDER .....	25
8.2	INSTALLING CUSTOMER SHAFT WITHOUT SHOULDER .....	26
8.3	DISASSEMBLING CUSTOMER SHAFT WITH SHOULDER .....	27
8.4	DISASSEMBLING CUSTOMER SHAFT WITHOUT SHOULDER .....	28
8.5	SHAFT TIGHTENING TORQUES .....	29
8.6	ADVISED SHAFT DIMENSIONS AND ACCESSORIES .....	30
8.7	ASSEMBLING CUSTOMER SHAFT WITH SHRINK DISK .....	31
8.8	DISASSEMBLING CUSTOMER SHAFT WITH SHRINK DISK .....	33
8.9	ASSEMBLING GEAR UNIT WITH TORQUE ARM .....	33
8.10	FITTING OUTPUTSHAFT ELEMENTS .....	36
8.11	CORRECT POSITION OF OUTPUT SHAFT ELEMENTS .....	36
8.12	FITTING COUPLINGS .....	37

# CONTENTS

- 9 MAINTENANCE & INSPECTION ..... 38**
- 10 LUBRICATION ..... 39**
  - 10.1 OIL TYPES ..... 39
  - 10.2 CHANGING THE OIL ..... 40
  - 10.3 MOUNTING POSITIONS ..... 41
  - 10.4 OIL PLUGS AND OIL QUANTITIES ..... 42
- 11 TROUBLESHOOTING GUIDE ..... 43**
- 12 DISPOSAL ..... 46**
  - 12.1 DISPOSAL OF OIL ..... 46
  - 12.2 DISPOSAL OF SEALING ..... 46
  - 12.3 DISPOSAL OF METAL ..... 46

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# 1 VERSION TRACKING

File name	Revision	Date	Changes description
IMM-0020EN_Rev.00 Gearmotors T Series	00	17/10/2022	- Changed layout
IMM-0020EN_Rev.01 Gearmotors T Series	01	07/12/2022	- Updated "Use the breather plug" page 22





## 1.1 MANUAL APPLICABILITY AND SUPPORTED MODELS

Models
Gearmotors T Series

## 2 HOW TO USE THIS MANUAL

Take attention to the following safety and warning signs for proper understanding and quick reference.

Table 1:




	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a situation which, if not avoided, may result in damage to components.
	Indicates information which may make product service easier to perform.

### NOTE:

#### Important Information.

### Hazard pictograms

Table 2:

	General danger
	Electric current
	Moving parts

### NOTE:

#### EC Machinery Directive:

Within terms of the EC machinery directive 2006/42/EC, the gearboxes are considered as not autonomous machine, but as a component to install in machines.

Operation is prohibited within the area of validity of the EC directive, until it has been determined that the machine, in which this product is installed, corresponds to the regulations within this directive.

The operating instructions contain important information to ensure;

- Trouble-free operation
- Fulfilment of any rights to claim under guarantee

The operating instruction must be kept close to the gearbox and must be available in case it is needed.

This operating instruction is written for T series gear units and is applicable only for T series. If any different type of gearbox is used please ask Dana Motion Systems Italia S.r.l. for the operating instructions of that type.

This instruction can be used only for standard type geared units of Dana Motion Systems Italia S.r.l.. For special application and modified gear units ask Dana Motion Systems Italia S.r.l. for validity.

This manual does not cover 94/9/EC compatible gearboxes. For 94/9/EC contact Dana Motion Systems Italia S.r.l..

### 3 UNIT DESIGNATION

#### 3.1 DETAILED UNIT DESIGNATION

**NOTE:**

Detailed TT Series gear units designation for ordering  
(This Designation is different from the short nameplate designation)

**TT 57 . 00 . K - M1**

Mounting Position

**M1** : Gear unit is upright and input shaft is over output shaft

**M2** : Input shaft is vertical to earth and input shaft points to sky

**M3** : Gear unit is upright and input shaft is under output shaft

**M4** : Input shaft is vertical to earth and input shaft points to earth

**M5** : Input and output shaft is paralel to earth, input shaft is under

**M6** : Input and output shaft is paralel to earth, input shaft is over

Backstop option

**K** : Backstop is available

**-** : Backtop is unavaliable

Output Type

**00** : Standart hollow shaft diameter

**0X** : Special hollow shaft diameter

**0S** : Hollow shaft with shrink disc

Gear unit size

Sizes from 17 to 97

Serie of gear unit

**TT** : Two stage helical gear unit


# UNIT DESIGNATION

## 3.2 NAMEPLATE UNIT DESIGNATION

### NOTE:

**Nameplate unit designation is a short abbreviation from the detailed designation.**

A sample name plate for TT Series

		<b>BREVINI™</b> <i>Motion Systems</i>	
Type: TT37.00.K		MADE IN TURKEY	
Serial N.: 104837			
Power: 3.0 kW	Ratio: 19.53		
Speed: 46 rpm.	M. Pos.: M5		
Oil: VG320 Mineral	Oil Qty : 4 lt.		

### Abbreviations:

Serial N.: Serial Number

M.Pos.: Mounting Position

### Type Designation;

### Serial Number Designation;

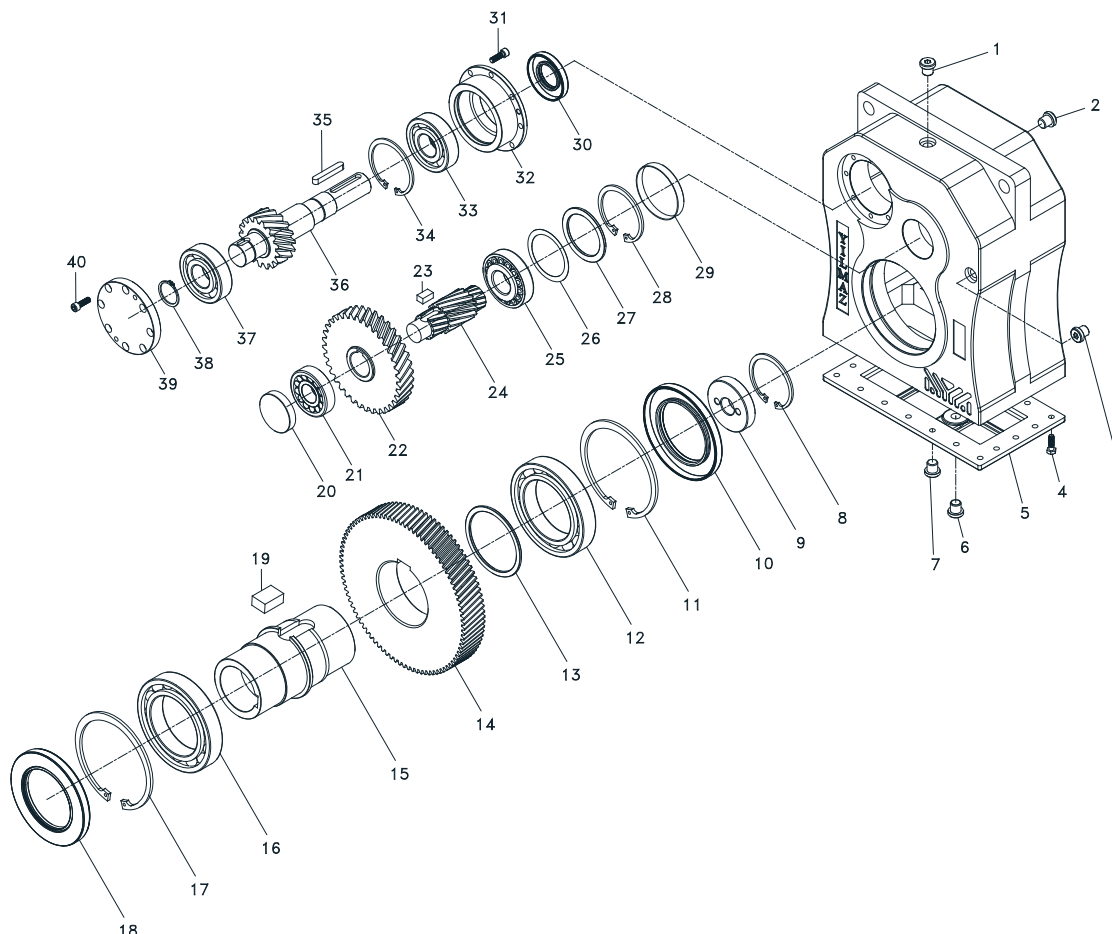
10 / 4837

Year of manufacturing / Order Number



## 4 PART LIST OF STANDARD TYPE GEAR UNITS

### 4.1 TT...00 TYPES



#### **NOTE:**

Standard TT...00 type basic part diagram. Parts may differ for special applications.

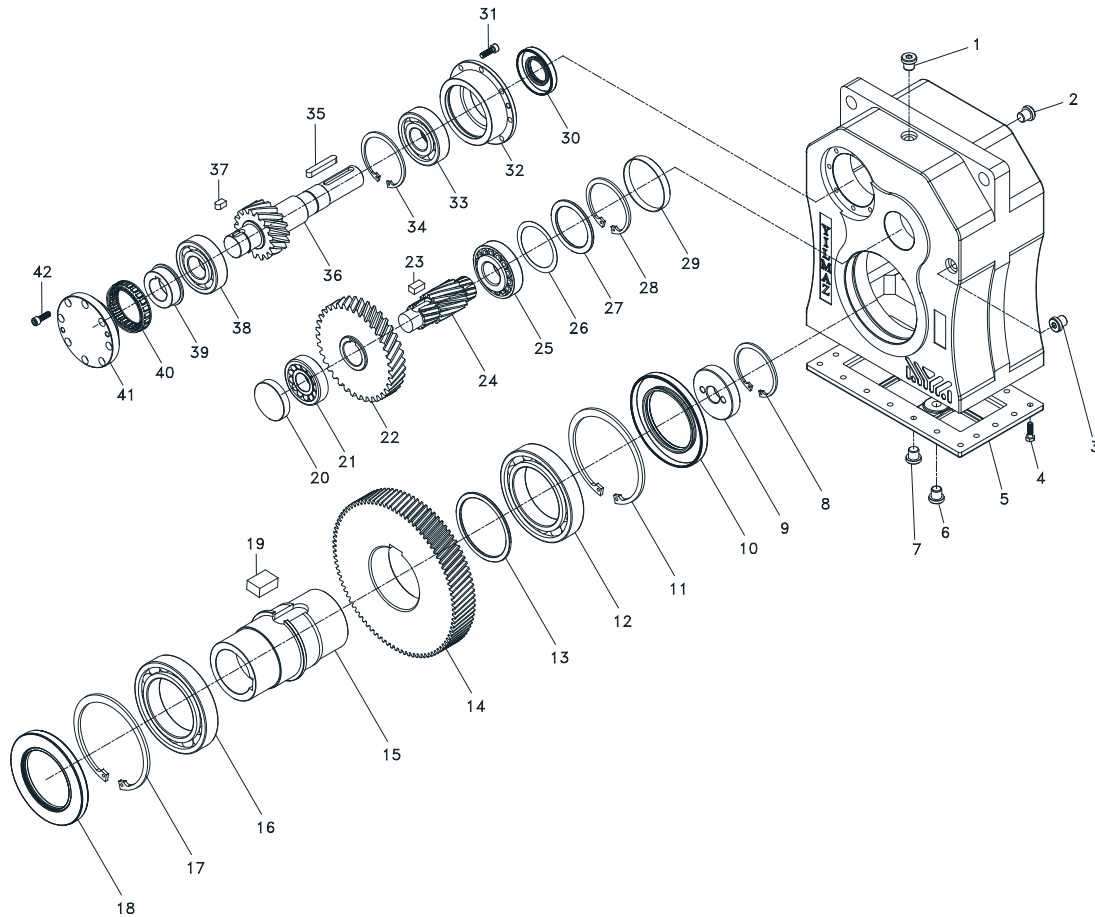
Standard Part List	
1	Plug
2	Plug
3	Plug
4	Bolt
5	Cover Plate
6	Plug
7	Plug
8	Circlip
9	Mounting Washer
10	Oil Seal
11	Circlip
12	Bearing
13	Washer
14	Gear

Standard Part List	
15	Output Hollow Shaft
16	Bearing
17	Circlip
18	Oil Seal
19	Key
20	Closing Cap
21	Bearing
22	Gear
23	Key
24	Pinion
25	Bearing
26	Shim
27	Washer
28	Circlip

Standard Part List	
29	Closing Cap
30	Oil Seal
31	Bolt
32	Input Shaft Cover
33	Bearing
34	Circlip
35	Key
36	Input Pinion Shaft
37	Bearing
38	Circlip
39	Back Cover
40	Bolt

# PART LIST OF STANDARD TYPE GEAR UNITS

## 4.2 TT...00.K TYPES



### **NOTE:**

Standard TT...00.K type basic part diagram. Parts may differ for special applications.

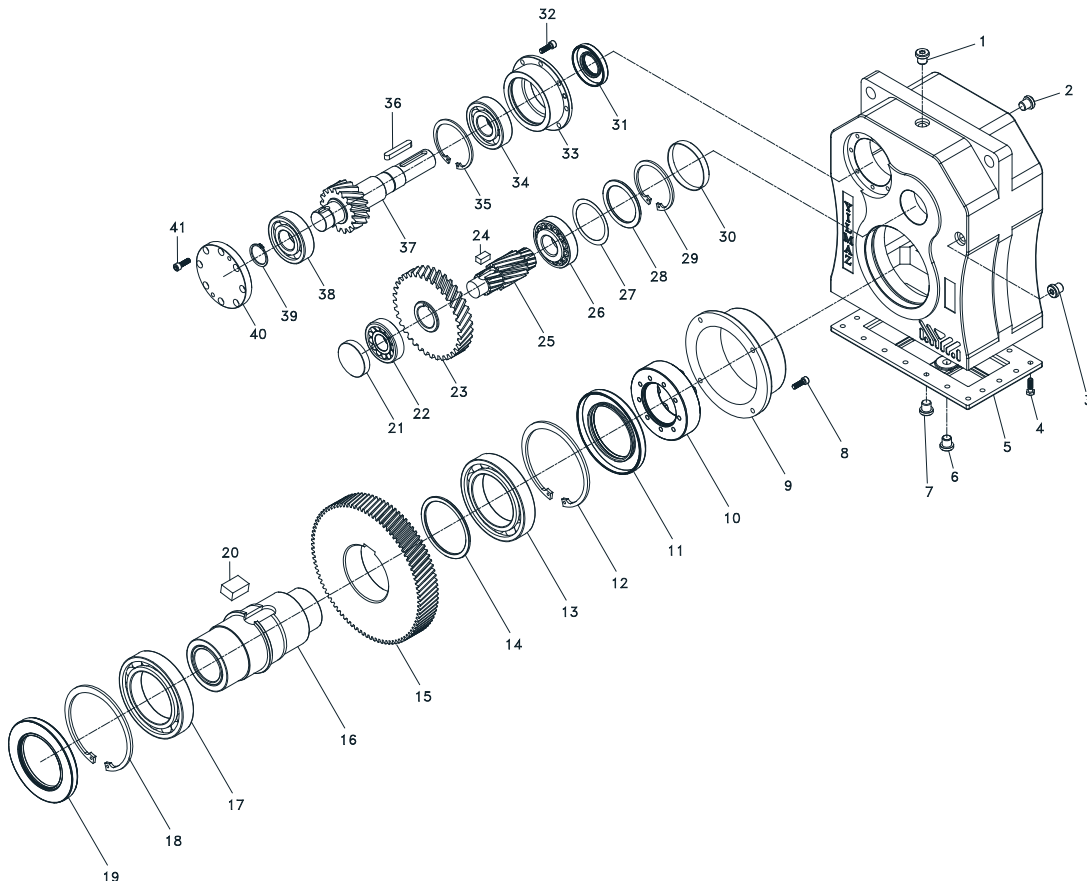
Standard Part List	
1	Plug
2	Plug
3	Plug
4	Bolt
5	Cover Plate
6	Plug
7	Plug
8	Circlip
9	Mounting Washer
10	Oil Seal
11	Circlip
12	Bearing
13	Washer
14	Gear

Standard Part List	
15	Output Hollow Shaft
16	Bearing
17	Circlip
18	Oil Seal
19	Key
20	Closing Cap
21	Bearing
22	Gear
23	Key
24	Pinion
25	Bearing
26	Shim
27	Washer
28	Circlip

Standard Part List	
29	Closing Cap
30	Oil Seal
31	Bolt
32	Input Shaft Cover
33	Bearing
34	Circlip
35	Key
36	Input Pinion Shaft
37	Key
38	Bearing
39	Backstop Inner Bush
40	Backstop
41	Backstop Cover
42	Bolt

# PART LIST OF STANDARD TYPE GEAR UNITS

## 4.3 TT...0S TYPES



### **NOTE:**

Standard TT...0S type basic part diagram. Parts may differ for special applications.

Standard Part List	
1	Plug
2	Plug
3	Plug
4	Bolt
5	Cover Plate
6	Plug
7	Plug
8	Bolt
9	Shrink Disc Protec. Cover
10	Shrink Disc
11	Oil Seal
12	Circlip
13	Bearing
14	Washer
15	Gear

Standard Part List	
16	Output Hollow Shaft
17	Bearing
18	Circlip
19	Oil Seal
20	Key
21	Closing Cap
22	Bearing
23	Gear
24	Key
25	Pinion
26	Bearing
27	Shim
28	Washer
29	Circlip
30	Closing Cap

Standard Part List	
31	Oil Seal
32	Bolt
33	Input Shaft Cover
34	Bearing
35	Circlip
36	Key
37	Input Pinion Shaft
38	Bearing
39	Circlip
40	Back Cover
41	Bolt



---

## 5 SAFETY

### 5.1 INTENDED USE

The gear reducer is designed for use in industrial machines. Please refer to our catalogue or our web page for the maximum permitted torques and speeds. The most important maximum permitted values are indicated on the nameplate of the product. But the whole data can be found on our product catalogues. Using the product out of the product catalogue / nameplate's permitted ranges will cancel the warranty/manufacture declaration and Dana Motion Systems Italia S.r.l. will not take any responsibility.

The gear units are intended for industrial machines and may only be used in accordance with the information provided in this manual the product catalogue and the nameplate of the gearbox. They comply with the applicable standards and regulations and meet the requirements of the directive 2006/42/EC. The gearbox must be started up, maintained and operated according this manual. The gearbox must be incorporated with 2006/42/EC confirming parts/machines.

#### NOTE:

**A motor connected to the gear unit is only allowed to be operated in the frequency entries so that the data provided on nameplate/catalogue of the gear unit is not exceeded and is accordance with the nameplate/catalogue. The speed range will be provided on the name plate if Dana Motion Systems Italia S.r.l. is informed that the gear unit will be used with frequency inverter. If not informed the nameplate will have a single fixed speed and only this speed is allowed.**

**The electric motor and frequency inverter must be in accordance with 2006/42/EC.**

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#### NOTE:

**If the gear units input is used with variable speed gear unit, this must be informed to Dana Motion Systems Italia S.r.l. before ordering and on the nameplate the allowed maximum and minimum speeds (speed range) will be provided. If not mentioned by ordering the gear units speed will be a fixed single input speed and only this speed is allowed.**

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#### NOTE:

**If the gear unit will be driven by belt / coupling / chain drive etc. the gear unit is only allowed to be used according the nameplate/catalogue entries. Different speed, higher motor power, higher radial/axial loads etc. than nameplate/catalogue is not allowed.**

---

#### NOTE:

**The ambient temperature must be between +5 - +40 °C and no abrasive media must attack the paint and seals. If different working conditions this must be informed to Dana Motion Systems Italia S.r.l. before ordering.**

**The gearbox maintenance (oil change / check ) must be done according this manual.**

---

### 5.2 IMPROPER USE

#### NOTE:

**Every usage which exceeds the limits stated above, the nameplate and catalogue of the product (especially higher torques and speeds) is not compliant with the regulations, and thus prohibited.**

---

The operation of the gear reducer is prohibited if:

- It was not mounted/installed according to regulations and this manual
- The gear reducer is very soiled
- It is operated without lubricant
- It is operated out of the permitted values provided on catalogues and/or nameplate.

# SAFETY

## 5.3 SAFETY INSTRUCTIONS

### 5.3.1 GENERAL SAFETY INSTRUCTIONS

#### 5.3.1.1 Working on the gear reducer

#### **WARNING**

Inappropriately executed work can lead to injury or damage.  
Make sure that the gear reducer is only installed, maintained and dismantled by trained technicians.

#### **WARNING**

Foreign bodies spinning through the air can cause grave injury.  
Before putting the gear reducer into operation, check that there are no foreign bodies or tools near the gear reducer

#### 5.3.1.2 Operation

#### **WARNING**

Touching hot surfaces can lead to burns.  
Do not touch the gear reducer if their operation temperatures are too high, or use suitable safety equipment like gloves.

#### **WARNING**

Rotating machinery can lead to injuries. There is danger of being trapped or pulled in!  
Keep a sufficient distance and make safeguarding to rotating machinery. See relevant norms EN349+A1, EN13857.

#### 5.3.1.3 Maintenance

#### **WARNING**

An unintentional start of the machine during maintenance work can lead to serious accidents.  
Make sure no one can start the machine while you are working on it.

#### **WARNING**

Even a brief running of the machine during maintenance work can lead to accidents if the safety devices are not operating.  
Make sure that all safety devices are mounted and active.

### 5.3.1.4 Lubricant

#### WARNING

Extended, intensive contact with oils can lead to skin irritations.  
Avoid extended contact with oil, and clean oil off skin thoroughly.

#### WARNING

Hot oil can cause scalding.  
When changing oil, protect yourself against contacting hot oil.

### 5.3.1.5 Ambient Conditions

#### DANGER

If the gear unit will be used in outdoor applications the gear unit must be prevented from rain snow and dust. Entering substances inside the gear unit from seals can damage the gear unit. Observe the safety instructions for outdoor use EN12100:2010.

#### WARNING

Standard gearboxes are allowed to work in ambient temperatures between +5 to +40°C unless differently specified on the nameplate. Using the gear unit out of this range can cause damage to the gear unit or environment. Over +40 °C ambient conditions the gear unit surface temp could be so high causing burns when touched.

## 5.4 TIGHTENING TORQUES

All screwed connections for which a tightening torque is specified, must on principle be tightened with a calibrated torque wrench and checked. Use the following torques for the threaded bores over the gear unit housing. For connecting elements refer to the mechanical installation part.

Table 3:

Bolt Size	Class	Tightenning Torque [Nm]
M8	8.8	23
M10	8.8	43
M12	8.8	77
M16	8.8	190
M20	8.8	370
M24	8.8	640

# SAFETY

## 5.5 CASE OF FIRE

The gear reducer itself is not combustible. However, it usually contains a synthetic or mineral gear oil. Please observe the following if the gear reducer is situated in a burning environment

### 5.5.1 SUITABLE EXTINGUISHING AGENTS, PROTECTIVE EQUIPMENT

Always keep suitable extinguishing, protective equipment like carbon dioxide, powder, foam, fog easily accessible around the gear unit.

#### WARNING

-High temperature produce irritating steam.  
Use a protective breathing apparatuses.

### 5.5.2 UNSUITABLE EXTINGUISHING AGENTS

#### WARNING

Do not spray with water!



## 6 THINKS TO CHECK BEFORE THE GEAR UNIT OR GEARED MOTOR IS INSTALLED

### NOTE:

**If geared motors are used, please also refer to the manual of the motor manufacturer.**

Before you install the gearbox you have to be sure that the gearbox is arrived with the all necessary equipment and without damage. Points to take into consideration before you start to install the unit;

- You have received the correct operation manual of the your product.
- The gearbox and all its parts are transported without damage.
- The gearbox is stored correctly according the instructions in this manual
- You have the latest product catalogue or you have access to our web page

### 6.1 TRANSPORTATION

When the goods arrive, first check for any damage. If some damage observed, immediately contact the transport company and inform about the damage. Contact Dana Motion Systems Italia S.r.l. for the damage and do not start to install the unit until it is agreed that the damage has no affect of operation.

#### DANGER

Falling or hard placement can damage the gear unit.

Only use hoisting and securing equipment which is permitted for the size / weight of your gear unit. Ensure that the load is slowly and carefully handled and placed.

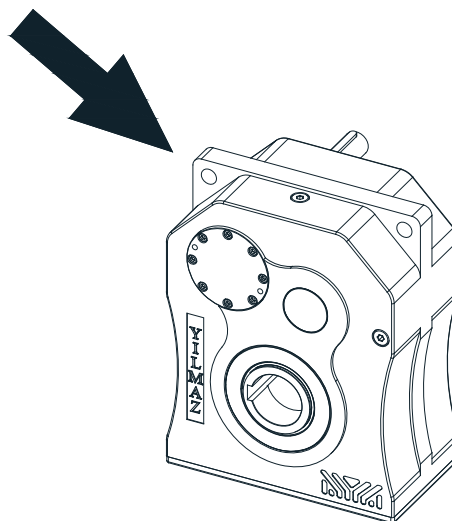
#### DANGER



Use the supplied eyebolts or lifting holes for lifting up the gear unit. The eyebolts are capable to carry the weight of gearboxes only. Do not hang additional loads. Use suitable hoisting equipment which is capable to hold the gear units weight. Refer to the catalogue for various types weights. See drawing bellow for hoisting point.

#### DANGER

Do not stay beneath / under the lifting/hoisting equipment which may cause serious injuries by falling down objects, accidental movements, unexpected accidents.



# THINKS TO CHECK BEFORE THE GEAR UNIT OR GEARED MO-

## 6.2 STORAGE

If the geared unit or geared motor will be stored up to 3 years refer to the following instructions;

### **With Packing;**

Use corrosion protection oil for the output shaft and connection surfaces like flange surface or foot assembling surface. Seal the unit in a plastic wrap and pack it in container. A moisture indicator should be placed around the container to observe the moisture. Relative atmospheric humidity should not exceed 50%. The container should be kept under roof which protects from snow and rain. Under this condition the gear unit can be stored up to 3 year with regular check. The ambient temperature should be between -5 to 60 °C.

### **Without Packing;**

Use protection oil for the output shaft and connection surfaces like flange surface or foot assembling surface. If no packing is used and the gearbox is stored without packing, the ambient temperature should be between 5 to 60 °C. The gearbox must be kept under enclosed roof with constant temperature and constant humidity not exceeding 50%. The storage should be free of dust and dirt and ventilated with filter. If the gearbox is stored without packing it is recommended not to store more than 2 years and regular check during this time is recommended.

If stored in open protect against insect damage.

## 7 INSTALLING THE GEAR UNIT

### 7.1 BEFORE YOU START

- Observe the gear unit for damages of storage or transportation. If any damage please contact Dana Motion Systems Italia S.r.l..
- Be sure that you have all the equipment necessary for installing like; Spanners, torque wrench, shims and distance rings, fixing devices for input and output elements, lubricant, bolt adhesive etc.

#### NOTE:

This manual is not for 94/9/EC (ATEX) conforming gear units. For 94/9/EC conforming gear units refer to the ATEX range manual. ATEX conforming gear units have name plates indicating the zone and the temperature class and are different from standard type geared units. Therefore Standard units can not be installed on Potentially explosive atmospheres.

### 7.2 CHECK THE SHAFT DIMENSIONS TO FIT

Table 4:

Type	Input Shaft Diameter	Tolerance	Hollow Shaft Diameter	Tolerance	Hollow Shaft Diameter with Shrink Disc	Tolerance	Customer Shaft Diameter for Shrink Disc	Tolerance
TT17.00	19	+0.02 0	30	+0.03 +0.01	30	+0.02 0	30	0 -0.01
TT27.00	19	+0.02 0	35	+0.03 +0.01	35	+0.03 0	35	0 -0.02
TT28.00	24	+0.02 0	40	+0.03 +0.01	40	+0.03 0	40	0 -0.02
TT37.00	24	+0.02 0	45	+0.03 +0.01	45	+0.03 0	45	0 -0.02
TT47.00	28	+0.02 0	50	+0.03 +0.01	50	+0.03 0	50	0 -0.02
TT57.00	38	+0.02 0	60	+0.04 +0.01	60	+0.03 0	60	0 -0.02
TT67.00	42	+0.02 0	70	+0.04 +0.01	70	+0.03 0	70	0 -0.02
TT77.00	48	+0.02 0	80	+0.04 +0.01	80	+0.03 0	80	0 -0.02
TT87.00	55	+0.03 +0.01	100	+0.05 +0.01	100	+0.04 0	100	0 -0.02
TT97.00	55	+0.03 +0.01	125	+0.05 +0.01	125	+0.04 0	125	0 -0.03

### 7.3 CHECK THE AMBIENT TEMPERATURE

The ambient temperature must be between +5 °C to +40 °C for standard type gear units. If different contact Dana Motion Systems Italia S.r.l. for special solutions.

# INSTALLING THE GEAR UNIT

## 7.4 CHECK THE VOLTAGE SUPPLY

The standard geared motors are supplied with 230/400 V 50/60 Hz up to 3 kW including 3 kW and 400/690 V 50/60 Hz over 3 kW and is indicated on the motors name plate unless it is differently ordered.

In case of only gear unit is supplied from Dana Motion Systems Italia S.r.l. please observe the name plate of the electric motor and the instructions of the supplier. Check the basic electric connection diagrams below. Use experienced electric technician.

### DANGER

Using wrong connection or voltage can damage the electric motor or environment.

The following wiring diagram is for standard 230/400 V 50 Hz AC electric motors. For different voltages please contact Dana Motion Systems Italia S.r.l.. For gear units supplied without motor, refer to the motor manufacturers user manual.

### DANGER



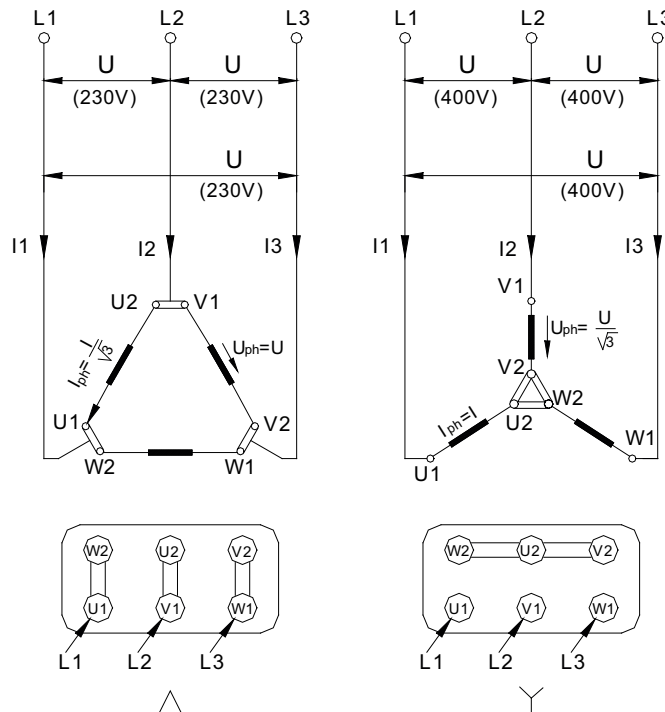
The electric connection must be done by experienced electric technician.

The gearbox, the motor and the brake must be grounded to prevent potential differences of earth and gearbox/motor.

Table 5:

Pole Number	Nominal Powers at 400V, 50Hz	
	230V ( D ) / 400 V ( Y )	400V ( D )
2 or 4	≤ 3 kW	≥ 4 kW
6	≤ 2,2 kW	≥ 3 kW
8	≤ 1,5 kW	≥ 2,2 kW
Starting Principle	Direct	Direct or Y/D

### Basic motor connection wiring diagram



# INSTALLING THE GEAR UNIT

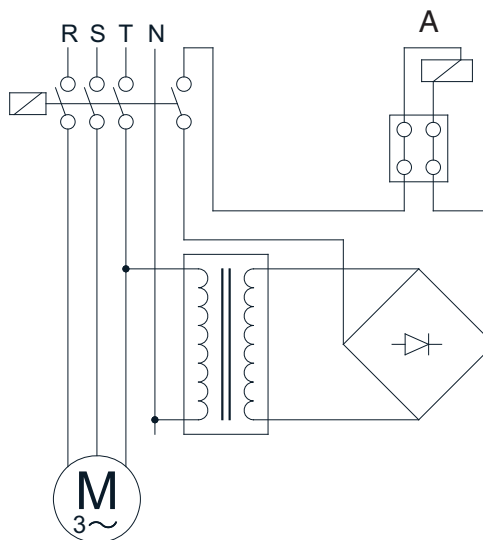
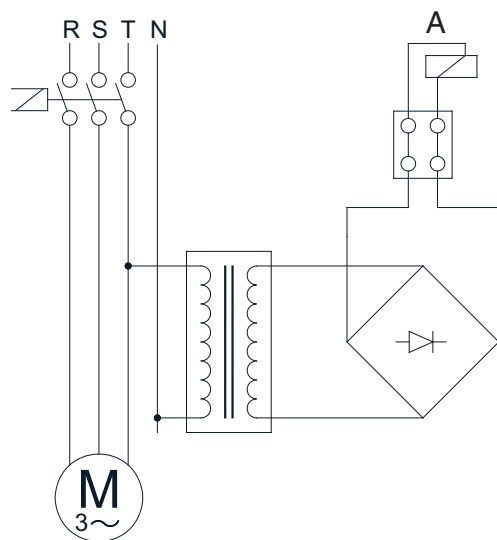
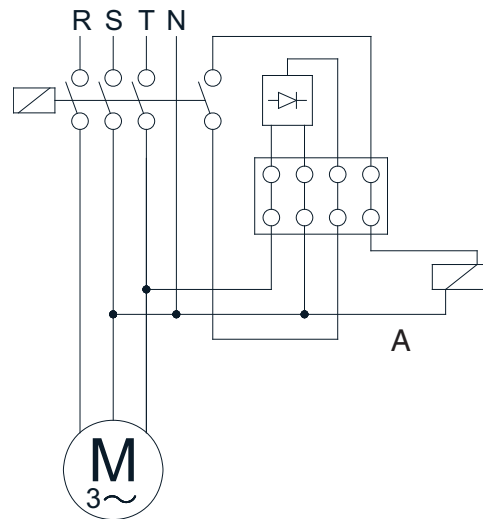
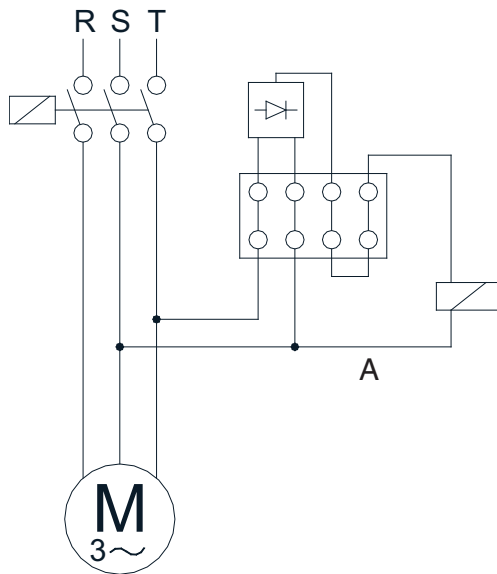
## Standard type brakes basic wiring diagram

**⚠ DANGER**



The electric connection must be done by experienced electric technician.

The gearbox and the motor must be grounded to prevent potential differences of earth and gearbox/motor.



# INSTALLING THE GEAR UNIT

## 7.5 CHECK THE MOUNTING POSITION

The mounting position must be in accordance with the mounting position mentioned on the name plate. If different please contact Dana Motion Systems Italia S.r.l. for possibilities of using in a different mounting position. Refer to the mounting positions and oil quantities on this manual and adjust the oil level accordingly with the recommended oil types given on this manual.

### DANGER

Do not mix synthetic oils with mineral oils which can cause serious damage on the gear unit.

## 7.6 USE THE BREATHER PLUG

Breather plug is delivered with the gearbox together by Dana Motion Systems Italia S.r.l.. Breather plug must be on the top of the gearbox according to mounting position.

### NOTE:

As shown in the label below, the transport protection rubber must be removed before operating the gear unit.

### WARNING



#### TRANSPORT PROTECTION RUBBER

Remove the transport protection rubber before operating the gear unit.

Please read operation instructions before operating.

### NOTE:

Some plug positions are not machined according mounting position. If no mounting position is mentioned by ordering, the standard M1 position plugs are machined.

## 7.7 CHECK THE OIL LEVEL

On the mounting position tables the oil level plug is shown. Please refer to those tables and be sure that the oil level is correct according the mounting position by screwing half way out the level plug and see if oil comes out from that plug. If oil comes out tighten the plug again. If no oil comes out take out the filling plug and add oil until oil comes out from the level plug and tighten both plugs after finish. Be sure you are using the correct oil mentioned on the oil tables on this manual.

### DANGER

Do not mix synthetic oils with mineral which can cause serious damage on the gear unit.

## 7.8 CHECK SHAFT ENDS AND MOUNTING FACES

Before you start to installing be sure that all the connection elements are free of oil and dust. The output shaft may be protected by anti-corrosion oil. Please remove this using available solvents on your market. By using this do not touch sealing lips or painting of the housing.

## 7.9 COVER ABRASIVE AMBIENT

If the gear unit will be placed on a abrasive ambient be sure that the output seals are covered so that no abrasive material, chemicals or water touches the seals. Any pressure coming from outside over the seals can cause that the out staying substances to enter the gearbox and cause serious damage to the gear unit. If pressure or abrasive material can not be prevented from coming over the sealing, contact Dana Motion Systems Italia S.r.l. for solutions.

### **DANGER**

Abrasive material, chemicals, water, positive or negative pressure exceeding 0,2 bar can affect or damage the sealing lip or output shaft. Inside entering substances from the seals can cause serious damage to the gear unit.

## 7.10 CHECK ACCESSIBILITY TO FILLING, BREATHER AND DRAIN PLUGS

The filling, breather and drain plugs must be freely accessible for further checking and service.

## 8 MECHANICAL INSTALLATION

The gear unit can only be installed using the supplied connection points like foot and flange assembling points.

### **DANGER**

To install the gear unit without the supplied connection points can cause serious injuries by loosening or braking the gear unit. Even the gear unit is installed totally correctly according this manual, be sure that no one will be harmed by accidentally brake downs or loosening.

- The mounting plate must be rigid enough not allowing torsions, flat enough to prevent strains by tightening the bolts and stable enough not allowing vibrations.
- By using chain drives this becomes much more important because of the polygon effect on chain drives.
- According to your connection elements the maximal permitted radial and axial load of the gear unit must be in accordance with your application.
- Check the product catalogue for permitted radial loads and calculation.

### **WARNING**

If the output or input shaft is overloaded by radial or axial loads it can cause serious damage to the gear unit.

Secure the gear unit using 8.8 or higher quality bolts.

### **DANGER**



Cover all the turning parts from human entering or touching. Turning parts can cause severe or fatal injuries.

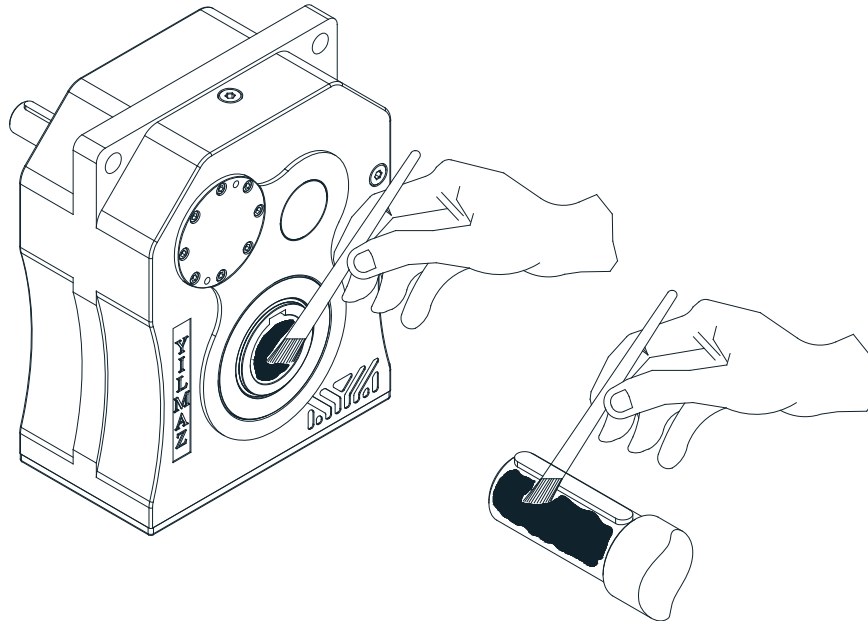
### **CAUTION**

For different kind of basic installations refer to the following illustrations.

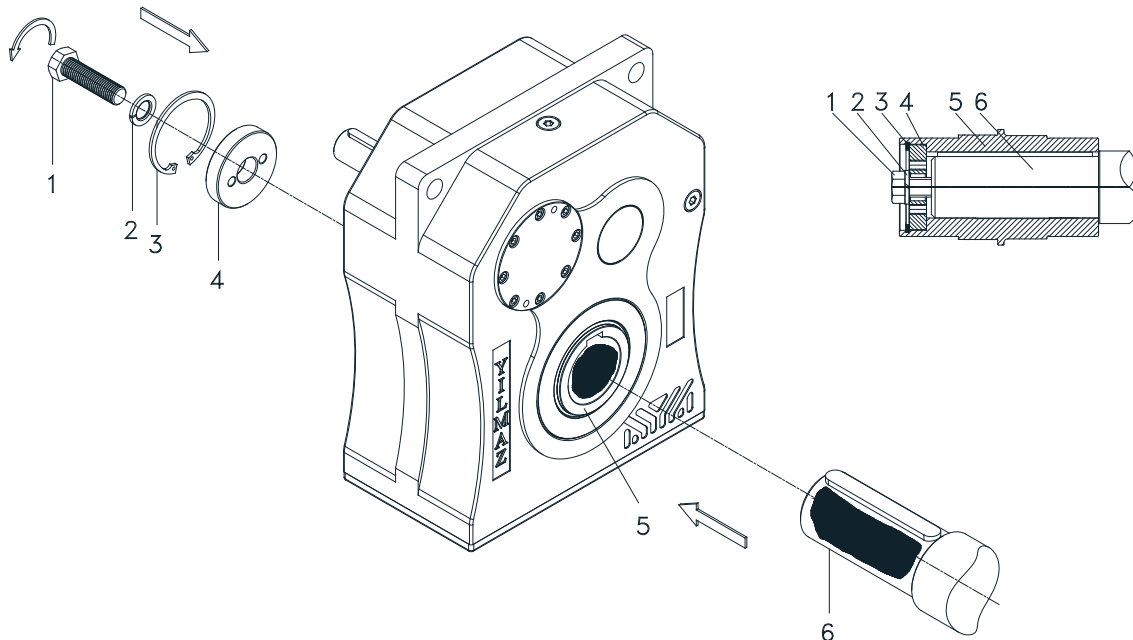


## 8.1 INSTALLING CUSTOMER SHAFT WITH SHOULDER

Use anti-seize assembling paste available on your market. Use a brush to apply the paste.



Fasten the bolt as shown below.

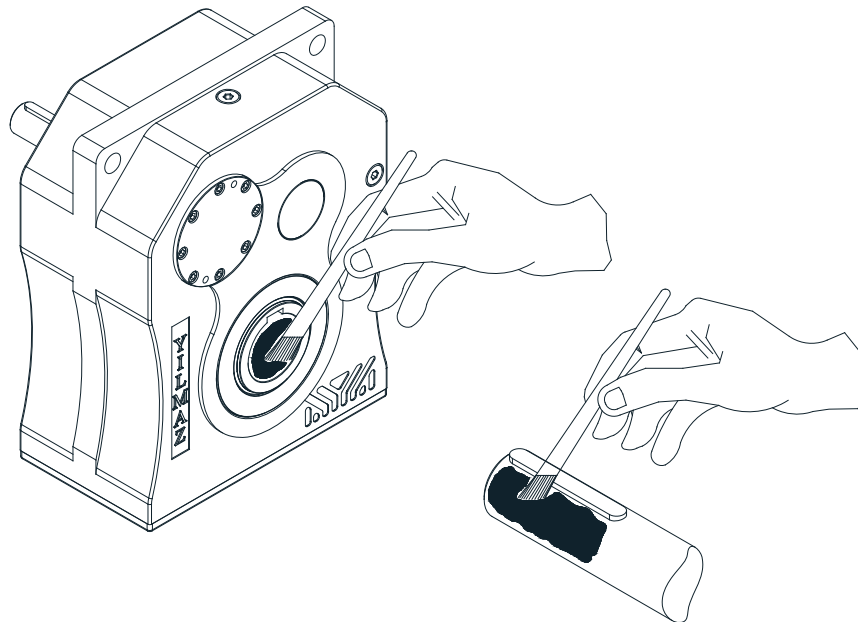


- 1 - Retaining Bolt
- 2 - Lock Washer
- 3 - Washer
- 4 - Circlip
- 5 - Hollow Shaft
- 6 - Customer Shaft

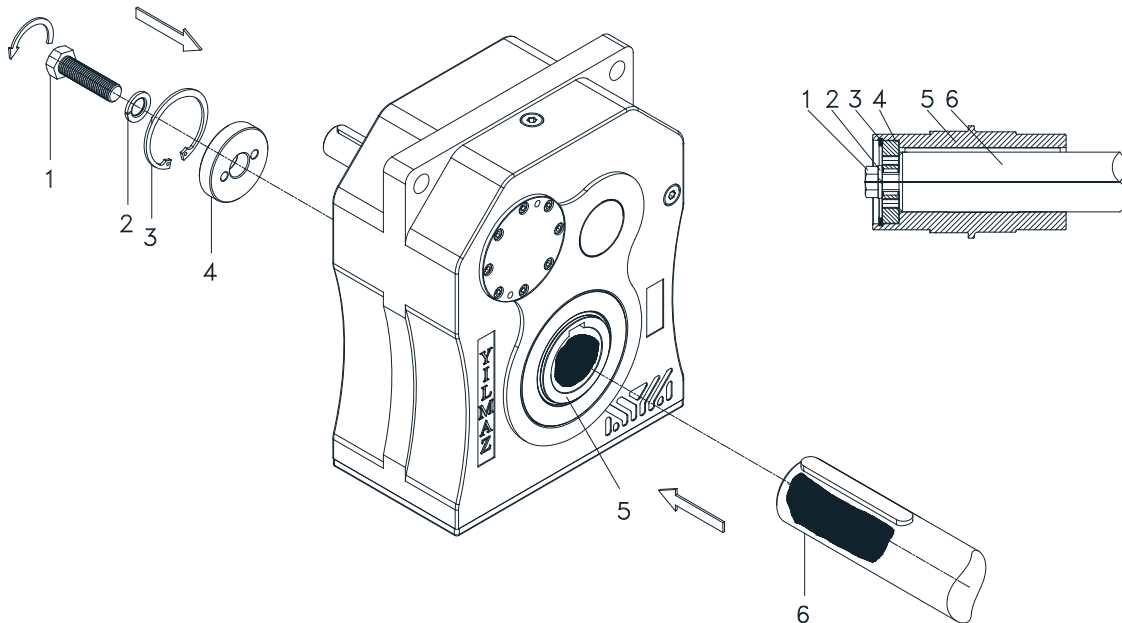
# MECHANICAL INSTALLATION

## 8.2 INSTALLING CUSTOMER SHAFT WITHOUT SHOULDER

Use anti-seize mounting paste available on your market. Use a brush to apply the paste.



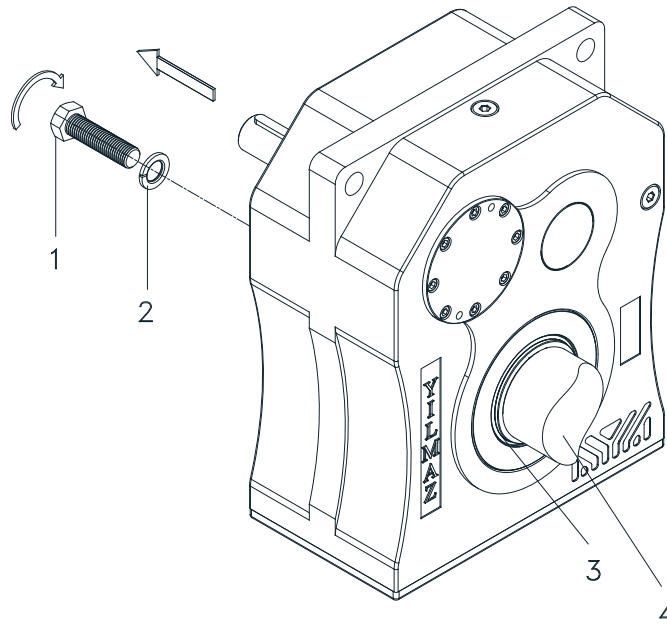
Fasten the bolt as shown below.



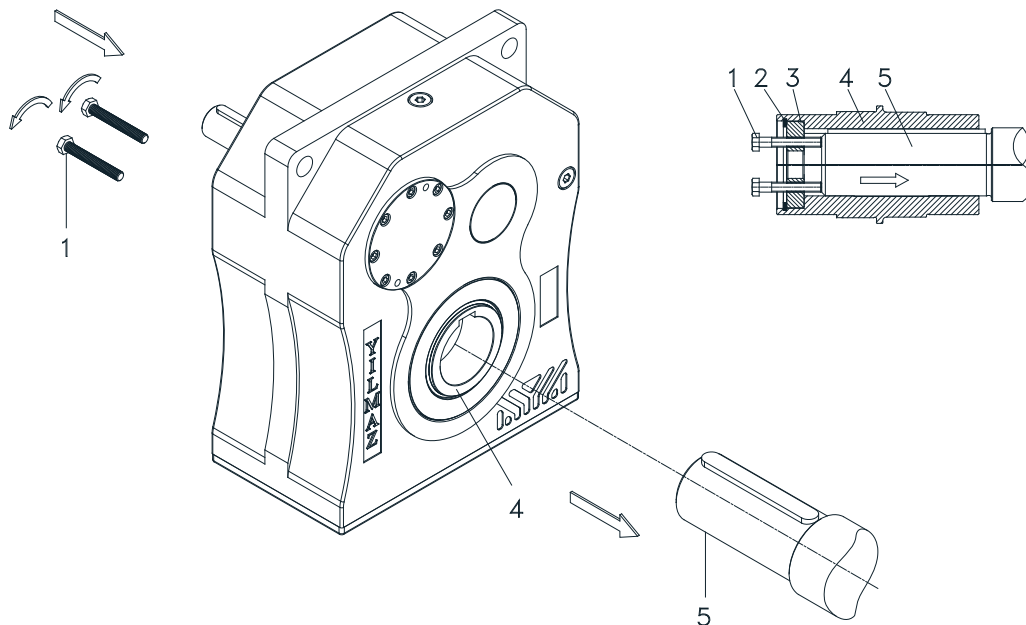
- 1 - Retaining Bolt
- 2 - Lock Washer
- 3 - Washer
- 4 - Circlip
- 5 - Hollow Shaft
- 6 - Customer Shaft

## 8.3 DISASSEMBLING CUSTOMER SHAFT WITH SHOULDER

Disassemble the bolt and take out the parts as shown



Use the disassemble set from YILMAZ and fasten the bold as shown bellow to take out the output shaft. For disassemble sets look the following pages.

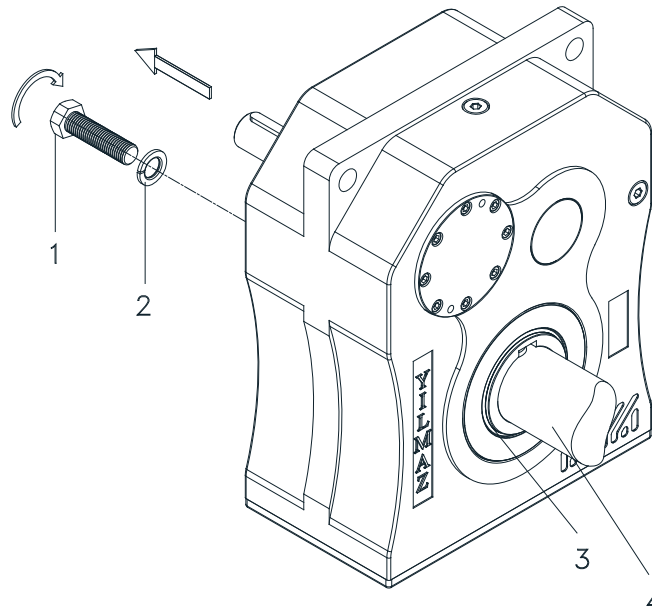


- 1 - Retaining Bolt
- 2 - Circlip
- 3 - Lock Washer
- 4 - Washer
- 5 - Hollow Shaft
- 6 - Customer Shaft

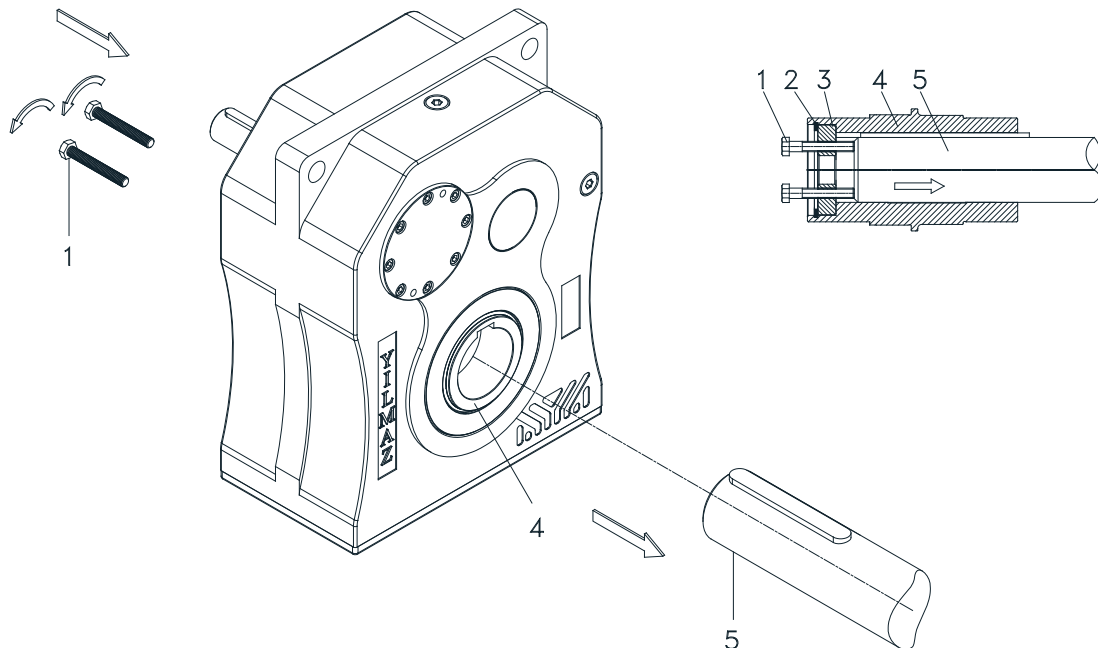
# MECHANICAL INSTALLATION

## 8.4 DISASSEMBLING CUSTOMER SHAFT WITHOUT SHOULDER

Disassembly the bolt and take out the parts as shown



Use the disassembly set from YILMAZ and fasten the bolt as shown bellow to take out the output shaft. For disassembly sets look the following pages.



- 1 - Retaining Bolt
- 2 - Circlip
- 3 - Lock Washer
- 4 - Washer
- 5 - Hollow Shaft
- 6 - Customer Shaft

## 8.5 SHAFT TIGHTENING TORQUES

Use the following table for shaft tightening torques.

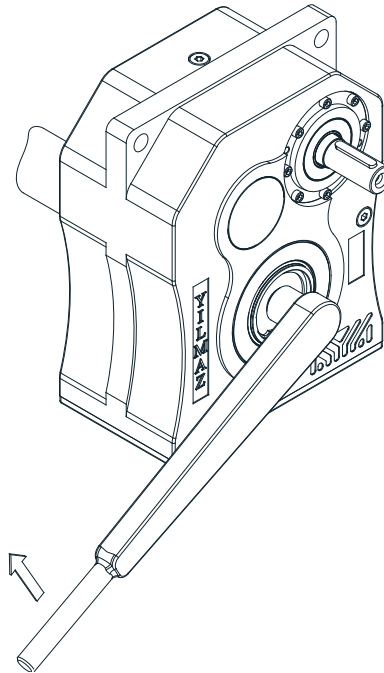


Table 6:

Type	Bolt	Tightening torque [Nm]
TT17...	M10	36
TT27...	M12	62
TT28...	M16	153
TT37...	M16	153
TT47...	M16	153
TT57...	M20	297
TT67...	M20	297
TT77...	M20	297
TT87...	M24	513
TT97...	M24	513

# MECHANICAL INSTALLATION

## 8.6 ADVISED SHAFT DIMENSIONS AND ACCESSORIES

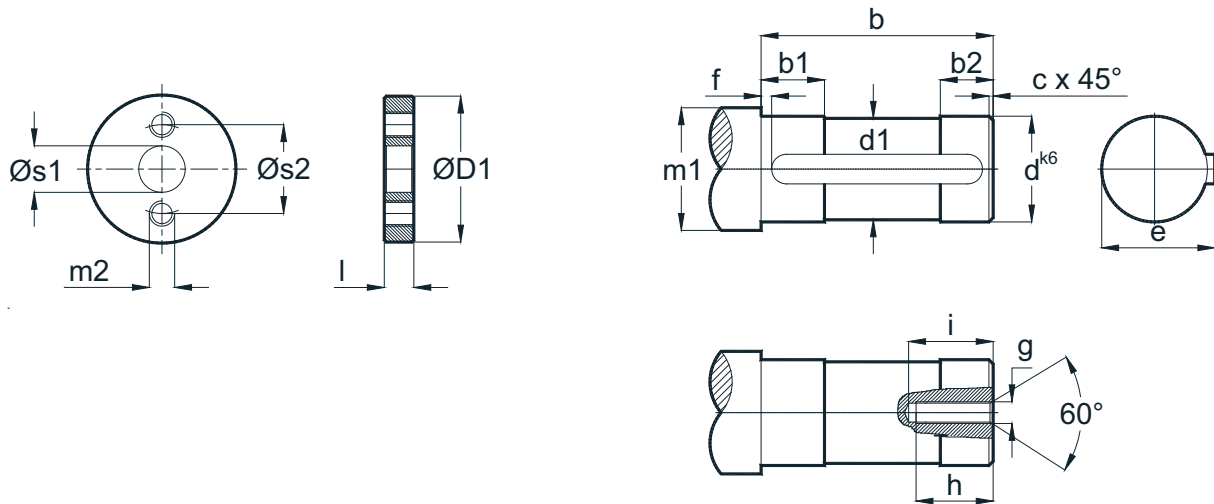
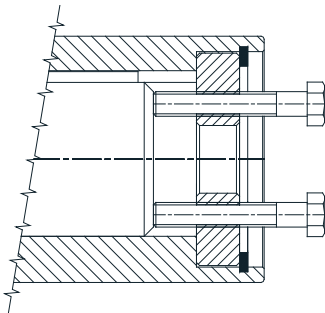


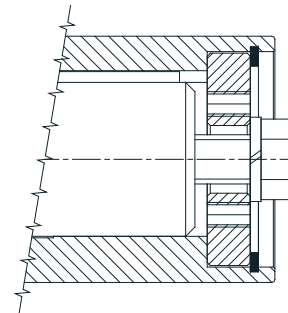
Table 7:

Type	D1	s1	s2	m2	l	d	d1	b	b1	b2	c	m1	f	h	i	g	e	t
TT17	30	11	22	M6	10	30	29,5	95	30	25	1	36	5	25	30	M10	33	8
TT27	35	17	26	M6	12	35	34,5	110	35	30	1	43		30	37	M12	38	10
TT28	40	17	28	M8	12	40	39,5	110	40	35	2	50		38	45	M16	43	12
TT37	45	22	34	M8	12	45	44,5	120	40	35	2	55		38	45	M16	48,5	14
TT47	50	22	36	M8	14	50	49,5	136	45	40	3	60		38	45	M16	53,5	14
TT57	60	22	42	M12	16	60	59,5	171	50	45	3	75		44	53	M20	64	18
TT67	70	22	48	M16	18	70	69,5	189	55	50	4	85		44	53	M20	74,5	20
TT77	80	26	54	M20	20	80	79,5	222	60	55	4	100		44	53	M20	85	22
TT87	100	26	70	M20	20	100	99,5	263	65	60	5	120		52	63	M24	106	28
TT97	125	33	90	M24	20	125	124,5	288	70	65	5	150		52	63	M24	132	32

### Dismounting



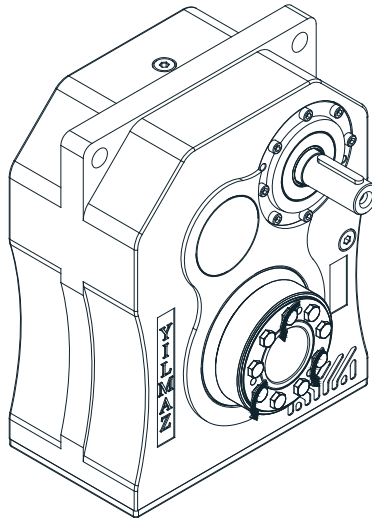
### Mounting



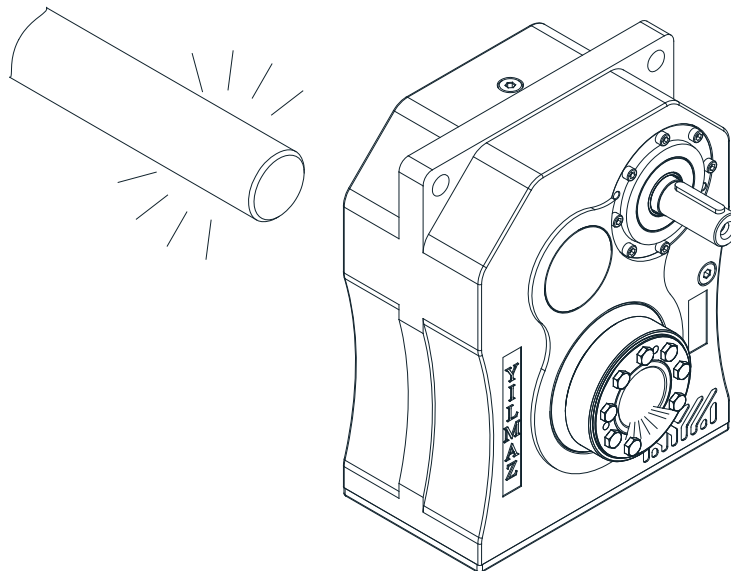
6 Contour Bolt  
(DIN ISO 4014 . DIN ISO 4017)  
(DIN ISO 8765)

### 8.7 ASSEMBLING CUSTOMER SHAFT WITH SHRINK DISK

Loosen the bolts of the shrink disk

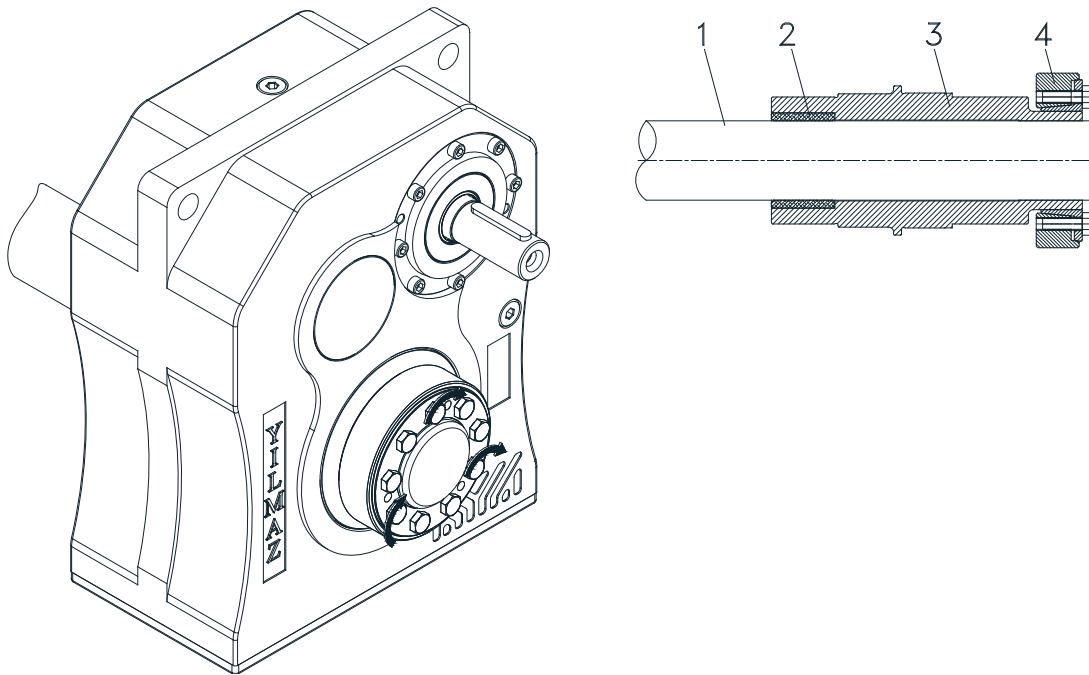


Use a solvent available in your market to clean all the dirt and oil from the shaft and shrink disk hollow. The surfaces must be free from oil or any dirt. The solvent must be removed from the surfaces as well.



# MECHANICAL INSTALLATION

Insert the shaft and tighten the bolts as shown. Be sure that there is a clearance between the shrink disk shoulder and the hollow shaft shoulder of the gearbox.



- 1 - Customer Shaft
- 2 - Bronze Ring
- 3 - Hollow Shaft
- 4 - Shrink Disk

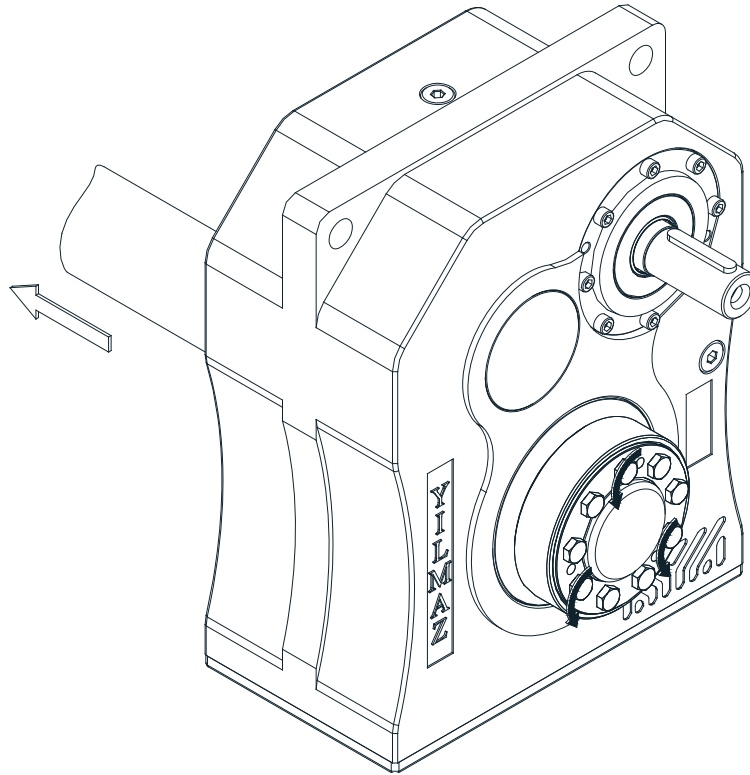
Table 8:

Type	Bolt	Tightening Torque [Nm]
TT17..	M8	30
TT27..	M8	30
TT28..	M8	30
TT37..	M8	30
TT47..	M10	59
TT57..	M10	59
TT67..	M12	100
TT77..	M14	160
TT87..	M14	160



## 8.8 DISASSEMBLING CUSTOMER SHAFT WITH SHRINK DISK

Loosen the bolts of the shrink disk and take out the shaft.



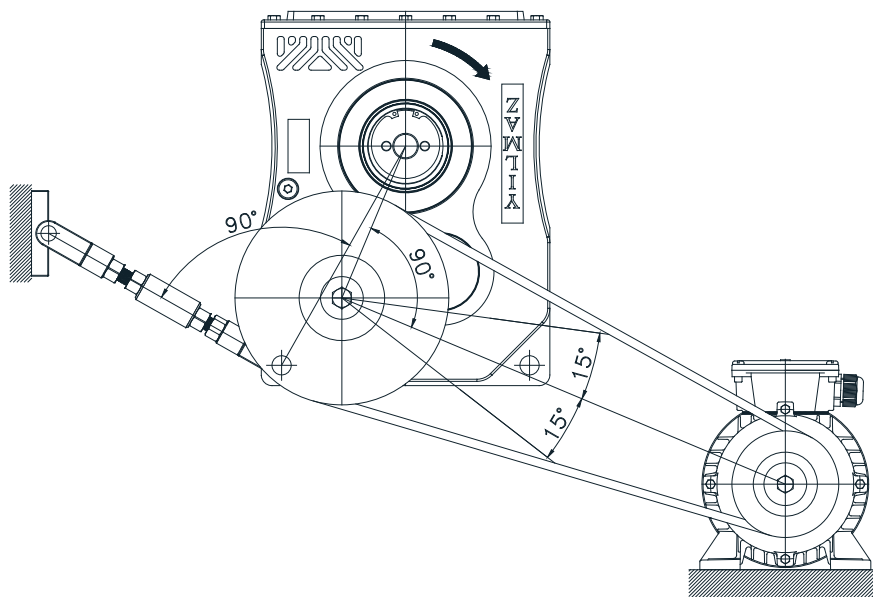
## 8.9 ASSEMBLING GEAR UNIT WITH TORQUE ARM

Use the torque arm connection according the following drawing.

The advised mounting positions are shown below. According to the nature of load and direction

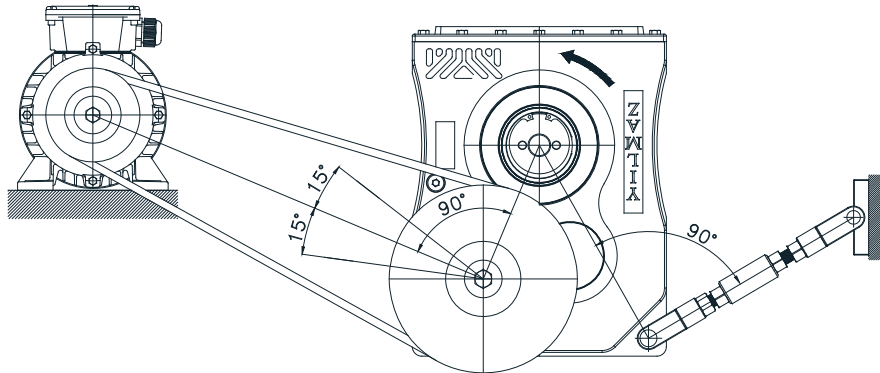
For uniform and moderate loads( $f_s \leq 1,6$ );

If direction of output shaft rotation is cw;



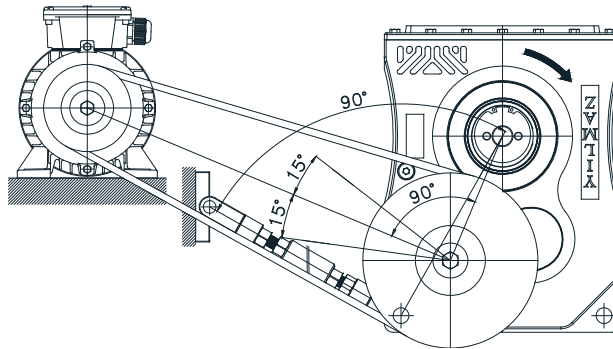
# MECHANICAL INSTALLATION

If direction of output shaft rotation is ccw;

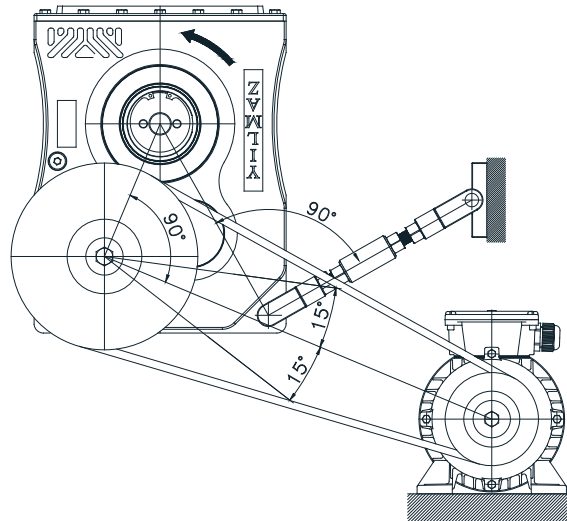


For heavy loads( $f_s > 1,6$ );

If direction of output shaft rotation is cw;



If direction of output shaft rotation is ccw;



## Fixing holes dimensions

For the fixing holes refer to the following dimensions

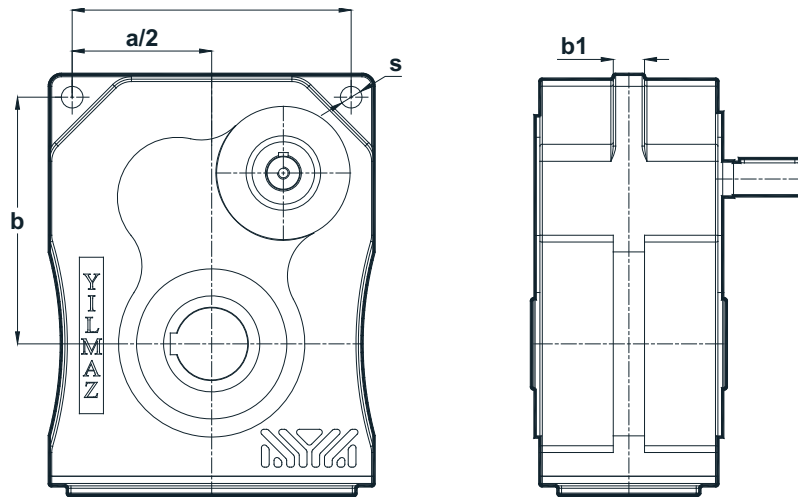


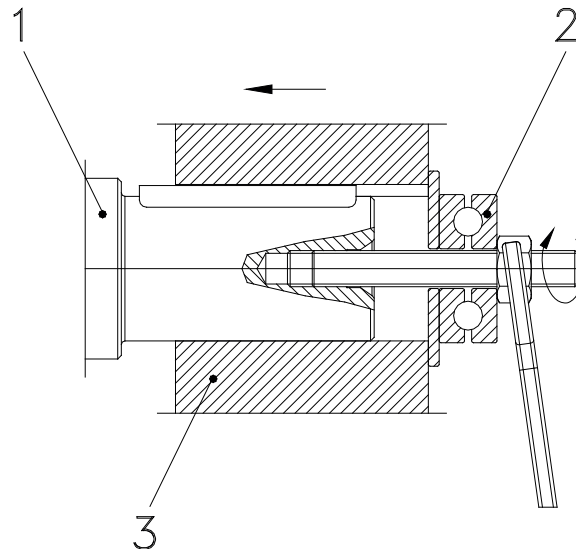
Table 9:

Type	a	b	b1	s
TT17	132	118	16	10
TT27	160	138	20	12
TT28	174	152	20	14
TT37	200	170	24	16
TT47	232	205	26	18
TT57	288	254	30	22
TT67	332	292	34	24
TT77	378	344	38	26
TT87	442	395	42	28
TT97	496	462	46	32

## MECHANICAL INSTALLATION

### 8.10 FITTING OUTPUTSHAFT ELEMENTS

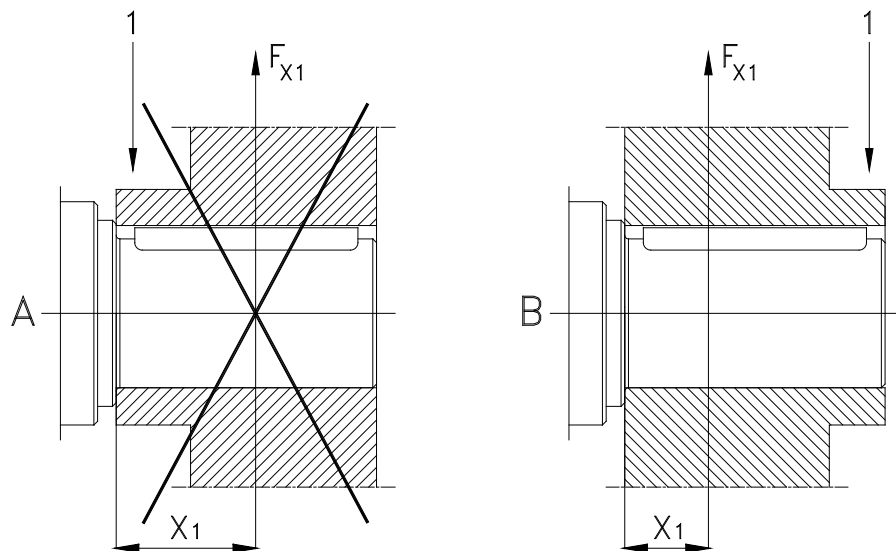
Use the following illustration to assemble output shaft units



- 1 - Gear shaft end
- 2 - Thrust bearing
- 3 - Coupling hub

### 8.11 CORRECT POSITION OF OUTPUT SHAFT ELEMENTS

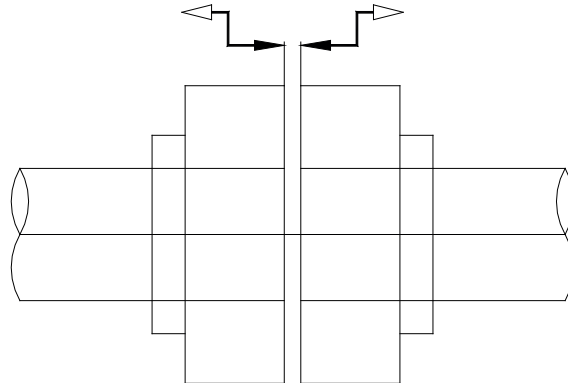
The Output Shaft unit (transmission elements) must be placed as close as possible to the gear unit so that the radial load is as close as possible to the gear unit.



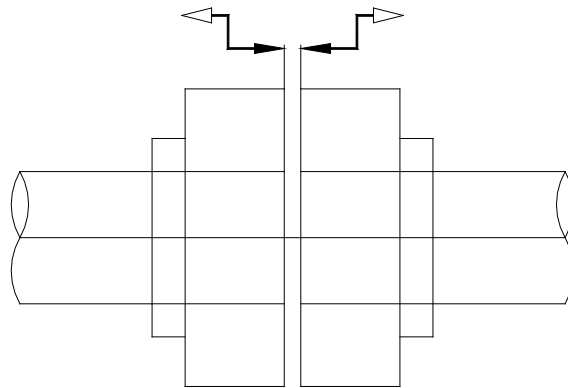
- 1 - Hub

## 8.12 FITTING COUPLINGS

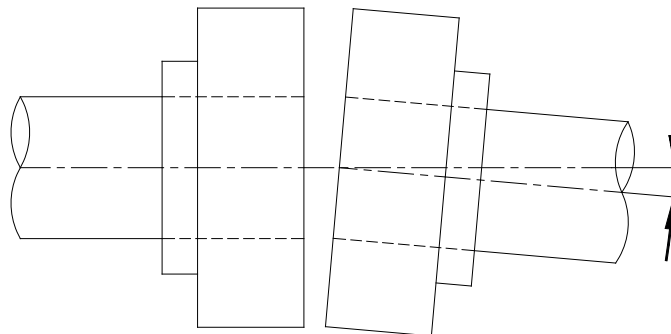
By fitting couplings be sure that there is some clearance between the two elements



By fitting couplings be sure that there is no eccentric between the two shafts.



By fitting couplings be sure that the two shafts are not angular miss-aligned.

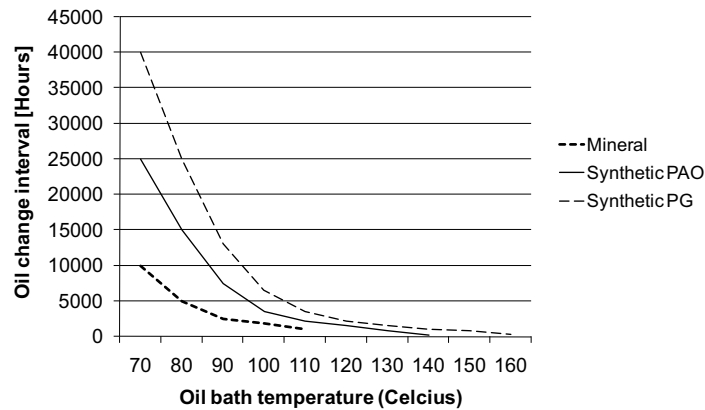


## 9 MAINTENANCE & INSPECTION

Under normal ambient and working conditions the gear unit should be checked according the following intervals. (For definition of normal working conditions refer to the product catalogue: "Selecting Gearbox" section);

Table 10:

Item to check /replace	Every 3.000 working hours or every 6 months	Every 4.000 working hours	Every 10.000 working hours or every 3 years	Every 25.000 working hours
Check for oil leakage	x			
Check for oil level	x			
Check oil leakage from seal	x			
Check Rubber buffer	x (Change if necessary)			
Check Bearings Noise		x (Change if necessary)		
Change Mineral Oil			x (See Below for details)	
Change Synthetic-PAO Oil				x (See Below for details)
Change Sealing				x
Change Bearing Grease				x
Change Bearings				x
Check for noise Changes				x



### **NOTE:**




For normal ambient conditions 70 °C oil bath temperature should be taken as reference

\* For TT series mineral oil is used unless it is differently ordered. For oil type and quantities refer to the following table.

## 10 LUBRICATION

### 10.1 OIL TYPES

Table 11:

Lubricant	DIN 51517-3	Ambient Temperature [°C]	ISO VG	Aral	Beyond Petroleum	Castrol	Klüber Lubrication	Mobil	Shell	Total
		Dip Lubrication								
Mineral Oil	CLP	0 ... +50	680	Degol BG 680	Energol GR-XP 680	Alpha SP 680	Klüberoil GEM 1-680 N	Mobilgear XMP 680	Omala 680	Carter EP 680
		-5 ... +45	460	Degol BG 460	Energol GR-XP 460	Alpha SP 460	Klüberoil GEM 1-460 N	Mobilgear XMP 460	Omala F460	Carter EP 460
		-10 ... +40	320	Degol BG 320	Energol GR-XP 320	Alpha SP 320	Klüberoil GEM 1-320 N	Mobilgear XMP 320	Omala F320	Carter EP 320
		-15 ... +30	220	Degol BG 220	Energol GR-XP 220	Alpha SP 220	Klüberoil GEM 1-220 N	Mobilgear XMP 220	Omala F220	Carter EP 220
		-20 ... +20	150	Degol BG 150	Energol GR-XP 150	Alpha SP 150	Klüberoil GEM 1-150 N	Mobilgear XMP 150	Omala 150	Carter EP 150
		-25... +10	100	Degol BG 100	Energol GR-XP 100	Alpha SP 100	Klüberoil GEM 1-100 N	-	Omala 100	Carter EP 100
Food Grade Oil	CLP NSF H1	-15 ... +25	320	-	-	Optileb GT 320	Klüberoil 4 UH1-320 N	Mobil SHC Cibus 320	Cassida Fluid GL-320	Nevastane SL 320
Biodegradable Oil	CLP E	-25 ... +40	320	-	-	Tribol Bio-Top 1418-320	Klüber-synth GEM 2-320	-	-	Carter Bio 320
Mineral Grease [-20 .... +120 Working Temperature °C]				Aralub HL3	Energrea-se LS 3	Spheerol AP3	Centoplex 2 EP	Mobilux EP 3	Alvania RL3	Multis Complex EP 2
Synthetic Grease [-30 .... +100 Working Temperature °C]				-	Energrea-se SY 2202	-	Petamo GHY 133 N	Mobiltemp SHC 100	Cassida RLS 2	Multis Complex SHD 220

# LUBRICATION

## 10.2 CHANGING THE OIL

Refer to the nameplate to find out the correct oil filled inside the gearbox.

Do not mix synthetic oils with mineral oils which will cause serious damage to the gear unit. The oil change must be done by using the filling, draining and level plugs according the mounting position illustrated in section (ERRORE: Destinazione riferimento incrociato 1\_34389 non trovato).



### WARNING

Extended, intensive contact with oils can lead to skin irritations.

Avoid extended contact with oil, and clean oil off skin thorough.



### WARNING

Hot oil can cause scalding.

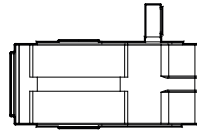
When changing oil, protect yourself against contacting hot oil.



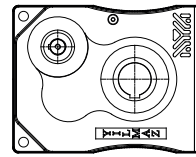
## 10.3 MOUNTING POSITIONS



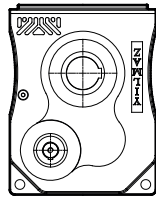
M1



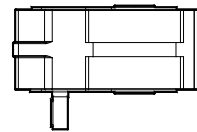
M2



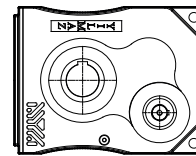
M6



M3



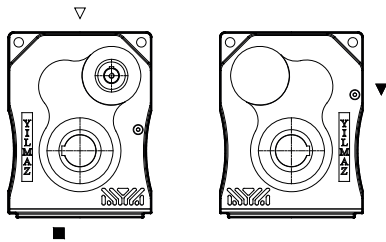
M4



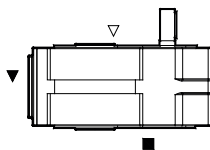
M5

### Oil Plugs

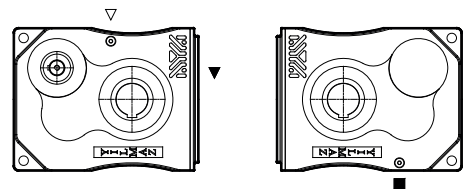
M1



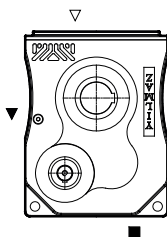
M2



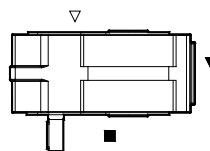
M6



M3



M4



M5

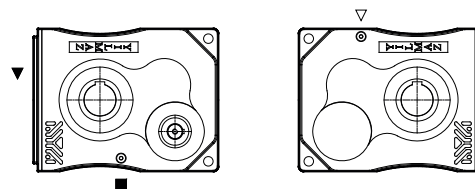


Table 12:

Symbols:					
■	Drain Plug	▽	Oil Filling and Vent plug	▼	Oil level

## 10.4 OIL PLUGS AND OIL QUANTITIES

### TT Series Oil Level Plugs:

Table 13:

Type	[M1.eps] M1	[M2.eps] M2	[M3.eps] M3	[M4.eps] M4	[M5.eps] M5	[M6.eps] M6
TT17	1,0	0,95	0,70	0,95	0,80	0,80
TT27	1,8	1,4	1,2	1,6	1,5	1,5
TT28	2,1	2,0	1,3	1,8	1,75	1,75
TT37	2,6	2,6	1,9	2,5	2,4	2,4
TT47	4,0	4,0	3,0	4,2	3,6	3,6
TT57	8,5	8,0	6,7	7,6	6,9	6,9
TT67	13,0	13,2	10,0	12,5	12,5	12,5
TT77	19,0	20,3	14,7	18,5	17,0	17,0
TT87	27,2	28,6	23,0	27,9	27,5	27,5
TT97	40,0	47,0	35,0	47,0	41,0	41,0

## 11 TROUBLESHOOTING GUIDE

### **WARNING**

All the operations bellow must be done by authorized and skilled mechanician/electrician.

Inform Dana Motion Systems Italia S.r.l. before making any change to the gearbox. Only oil change is allowed to change without information. Do not make any think if you are not sure what you are doing and contact Dana Motion Systems Italia S.r.l.. Any change or operation done without the information of Dana Motion Systems Italia S.r.l. is in your own risk and responsibility and Dana Motion Systems Italia S.r.l. does not take any responsibility.

Table 14:

ID	Problem	Observation	Remedy
001	Gearbox Does Not Start Up	You hear no noise and shaft is not turning. You are not using any driver or frequency invert-er.	Please Check the voltage supply and frequency of your electric connection. They must be in accordance with the nameplate of the motor. Observe motor manufacturers start up manual. Still does not work go to ID 100
002	Gearbox Does Not Start Up	You hear no noise and shaft is not turning. You are using frequency inverter or driver.	Please observe the frequency incerter/driver manual. Chech the motor by supplying direct voltage to see if the problem is on your driver/frequency inverter. Still does not work go to ID 001.
003	Gearbox Does Not Start Up	You hear some noise but both motor shaft and gearbox shaft is not turning. You are not using any driver /frequency inverter or braked motor.	Please Check the voltage supply and frequency of your electric connection. They must be in accordance with the nameplate of the motor. Observe motor manufacturers start up manual. Still same problem, the load may be too high for the choosen motor. Loosen the gearbox from the load/torque. If it works than the starting torque is insufficient and higher motor power is needed. For monophaze motors, check the starting up condansator and running condansator as well. If notting helps go to ID 100
004	Gearbox Does Not Start Up	You hear some noise but both motor shaft and gearbox shaft is not turning. You are using driver or frequency inverter.	Please observe the frequency inverters or drivers manual. To see if the problem is on your driver or frequency inverter take out the driver/frequency inverter and make direct voltage supply to the motor according the motors nameplate. Still does not work go to ID 100
005	Gearbox Does Not Start Up	You hear some noise but both motor shaft and gearbox shaft is not turning. You are using braked motor	Please Check the voltage supply and frequency of your electric connection. They must be in accordance with the nameplate of the motor. Observe motor manufacturers start up manual. Be sure that the brake is working. Observe the brake manufacturers manuel. If brake is supplied from Dana Motion Systems Italia S.r.l. observe this manuel for correct brake wiring diagram. If still not work supply the brake with voltage according its nameplate directly. For example 198V DC. You will hear a clicking noise explaining that the brake is opening. If you hear no noise the brake or rectifier is defect. If you hear the clicking noise the brake is working. You should this clicking noise by your normal electric connection as well. By supplying direct supply to the brake you hear the clicking noise and at same time you supply the motor with direct voltage according to its name plate and still same problem, the load may be too high for the choosen motor. Goto ID 003.
006	Gearbox Does Not Work in Low Speeds/frequencies.	You are using frequency inverter.	For very low speeds the frequency inverters frequency is lowering down. For very low frequencies the inverter parameter and motor parameter must be optimized. Also for low speeds the efficiency of the gearbox may vary too much. Specially for worm-gearboxes. The recomend frequency range is 20-70 Hz for worm-gearboxes and 10-70 Hz for Helical Gear Boxes. Use Higher motor power and Frequency inverter or change ratio of gearbox to work inside the reccomended range.
007	Gearbox Does Not Start Mornings or After Long Time Stop.	Ambient Temperature is below +5 Celsius	The oil is not in accordance with your working conditions. Change to lower viscosity oils. Observe this manuel for using the correct oil. Working in higher ambient temperatures is an other solution if possible. If still same problem you need higher motor power.

# TROUBLESHOOTING GUIDE

ID	Problem	Observation	Remedy
008	Gearbox is Heating Up too Much	You are using Worm Gear Box and ambient temp is lower than +40 Celsius	Measure the surface temp. using a temperature measuring device under full load. If the temp is under +80 Celsius this will make no harm to the gearbox and is normal. All ATEX conforming gearboxes and standart worm gearboxes are designed to work under max. +120 Celsius. If higher than +120 Celsius and using ATEX conforming gear box immediatly stop the system and contact Dana Motion Systems Italia S.r.l.. Go to ID 100. If not ATEX conforming check the oil type and oil quantity/level according your mounting position and check the nameplate mounting position. If nameplate mounting position does not fit the actual position goto ID 100.
009	Gearbox is Heating Up too Much	You are using Helical Gear Box. Ambient temp is lower than +40 Celsius	Measure the surface temp. using a temperature measuring device under full load. If the temp is under +80 Celsius this will make no harm to the gearbox and is normal. All ATEX conforming gearboxes are designed to work under max. +120 Celsius. If higher than +120 Celsius and using ATEX conforming gear box immediatly stop the system and contact Dana Motion Systems Italia S.r.l.. If not ATEX gearbox the gearbox is designed to work under max. +80 Celsius. If higher than +80 Celsius check the oil type and oil quantity/level according your mounting position and check the nameplate mounting position. If nameplate mounting position does not fit the actual position goto ID 100
010	Gearbox is Heating Up too Much	Ambient Temp is over +40 Celsius	Standart Gearboxes are designed to work under +40 Celsius. ambient temperature. If ambient temp is higher than +40 Celsius special solutions/gearboxes are required. Please contact Dana Motion Systems Italia S.r.l..
011	Gearbox is noisy	Noise is regular continious	Check Your moving parts for noise. Disassemble the gearbox and run without load. If you still hear the noise motor bearings or gearbox bearings are defect. Change bearings. Goto ID 100
012	Gearbox is noisy	Noise is random	Check Your moving parts for noise. Disassemble the gearbox and run without load. If you hear still the noise the oil may has some particles inside. Change the oil and look for small particles. If metal particles are found the gearbox may have some damage. Goto ID 100
013	Gearbox is noisy	Regular knocking noise	Check Your moving parts for noise. Disassemble the gearbox and run without load. If you still hear the noise one of the gears inside is defect. Goto ID 100
014	Gearbox is noisy	Regular up and down noise	Check the output-shaft connection alements for runout. Take out the output shaft element and run without load. If you still hear the noise one of the gears has runout problem. Goto ID 100
015	Gearbox is noisy	Gearbox is with braked motor and noise is comming from the brake side randomly.	Low randomly clicking noise may come from the brake disk which is normal. If noise level is disturbing the brake may be defect or brake clearance is not adjusted. Goto ID 100
016	Gearbox is noisy	You are using frequency inverter and the noise level is changing according your speed.	The frequency inverter parameters are not optimized for the frequency range or motor you are using. Observe the frequency inverters manual. If still same problem change the ratio of gearbox. Goto ID 100
017	Oil is Leaking	Oil Leakage from Seal	If ambient Temp is over +40 Celsius or none stop work over 16 hours please change the top plug with a breather plug. Observe this manual for using breather plug. If this is not your case the seal could be damaged. Goto ID 100
018	Oil is Leaking	Oil Leakage from Plug	If you are using breather plug be sure it is in the correct place. This is the most top plug position according your mounting position. The plug may be not tight enough. There are some particles under the plug rubber surface. Clean and tifgten the plug. If still same problem goto ID 100

# TROUBLESHOOTING GUIDE

ID	Problem	Observation	Remedy
019	Oil is Leaking	Oil Leakage from Housing	Observe exactly where the oil is coming out. It could be seal or plug point where it comes out and leaks over the housing. If this is your case goto ID 018/019. If you are sure oil comes out from housing than housing has some micro split / crack. Goto ID 100
020	Oil is Leaking	Oil Leakage from Cover	The sealing liquid under cover is split/defect. Disassemble the cover and put new sealing liquid. Assemble the cover and tighten the bolts. If still same problem goto ID 100
021	Gearbox is moving regularly on its mounting point	You are using Torque Arm	The movement of gear box is because of the runout of the shaft which you assemble the gearbox. This has no bad effect or harm to the gearbox and is normal unless you are using torque arm.
022	Gearbox is moving randomly on its mounting point	You are using Torque Arm	The movement of gear box is because of the runout and clearance of the shaft which you assemble the gearbox. Check the clearance of the assembling shaft and the clearances on your machine. This has no bad effect or harm to the gearbox unless you are using torque arm.
023	Motor is heating up	Motor is running over its nominal current	The motor power is not enough or some overload to the motor is possible. The motor may be defect. Goto ID 100
023	Motor is heating up	Ambient is dusty	Check the motor Fan Hub and ribs. They must be free of dust. If you are using forced external fan, check if it is working. If you are using frequency inverter in low speeds and you do not have forced external fan, you may need forced external fan. Goto ID 100
024	Motor is running but Gearbox shaft does not turn	Scratchin noise comes out	Some part (key, gear) may be defect inside gearbox. Goto ID 10
025	Gearbox Housing is Defect	You are using chain drive or pinion gear	The radial load or polygon effect of the chain may have caused the damage. Check also if the assembly bolts are loosened or the plate you assemble the gearbox is right enough. Check if you are using the correct diameter of chain drive and you are not exceeding max. allowed radial load. Check the position of your output element and re-calculate your radial load and check if this fits to the maximum allowed radial load. Goto ID 100
026	Output Shaft is Defect	You are using chain drive or pinion gear	The radial load or polygon effect of the chain may have caused the damage. Check also if the assembly bolts are loosened or the plate you assemble the gearbox is right enough. Check if you are using the correct diameter of chain drive and you are not exceeding max. allowed radial load. Check the position of your output element and re-calculate your radial load and check if this fits to the maximum allowed radial load. Goto ID 100
027	Gearbox is stopping too late	You are using braked motor	Please check the wiring diagram of the brake. There are two different kinds of brake wiring diagram. The standard gearbox delivered from our factory is set to delayed braking. For sudden braking check the wiring diagram.
028	Gearbox is starting too late	You are using braked motor	For fast opening of big brakes (over 100Nm), you may need shock transformers which is supplied by Dana Motion Systems Italia S.r.l.. Goto ID 100
100	Service Required	No self solution found	Please contact Dana Motion Systems Italia S.r.l. Service point. See on the back side of this manual. Changing mechanical parts of gearbox can only be done by Dana Motion Systems Italia S.r.l. or with information of Dana Motion Systems Italia S.r.l.. Any change without informing Dana Motion Systems Italia S.r.l. will cancel the warranty, manufacturer declaration and Dana Motion Systems Italia S.r.l. will take no responsibility.

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## **12 DISPOSAL**

If your product is no longer of use and you wish to dispose of it, refer to the instructions here. If you have any questions regarding ecological disposal methods, please consult our service points given on the backside of this manuel.

### **12.1 DISPOSAL OF OIL**

Lubricants (oil and greases) are hazardous substances, which can contaminate soil and water.

Collect drained lubricant into suitable receptacles and dispose of it according to the valid national guidlines.

### **12.2 DISPOSAL OF SEALING**

Remove the sealing rings from the gear reducer, and clean them of oil and grease resudies.

Dispose of the sealings as composite material (metal/plastic)

### **12.3 DISPOSAL OF METAL**

Divide up the remainder of the gear reducer into iron, aluminium, non-ferrous havvy metal if possible

Dispose of it according to the valid national guidelines.



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