

# MAINTENANCE AND OPERATION INSTRUCTIONS | EN

## PA-PF / PD-PM / PKD / PSH SERIES

Helical Gear Units

Parallel Shaft Mounted Gear Units

Helical Bevel Gear Units

Helical Worm Gear Units

*GEAR UNIT WITH MOTORS / WITHOUT MOTORS*



**ATEX**



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**PGR<sup>®</sup>**  
DRIVE TECHNOLOGIES



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## 1.1 Important Warnings

Take into consideration the listed safety warnings and information signs below!

Table 1: Safety Alerts and Information Signs



### **EXPLOSION !**

**Indicates an immediate danger**, which may result in death or serious injury.  
Contains important information regarding explosion protection.



### **ATTENTION !**

**Dangerous position and possible result**  
Slight and unimportant woundings



### **NOTE !**

**Advices and necessary informations for the user**



### **DANGER !**

**Harmful position and possible result**  
Damage in gear unit and environment



### **DANGER OF ELECTRICITY !**

**Danger of electrical shock and possible result**  
Death and heavy woundings




### **DANGER !**


**Danger possible result**  
Death and heavy woundings

## 1.2 General Information

This user guide is prepared by our firm to provide information about safety transportation of gear unit/gear unit with motors, storage, installation/mounting, connection, operating, maintenance and repair processes. All the purchase and technical datas are positioned at product catalogues. Beside engineering applications, the informations which placed in this instruction, should be well read and applicated. The documents must be protected and to get ready for controlling by authorized person. The information about electrical motor could be found by guidance which prepared by motor-producing firm.


	<p><b>EXPLOSION !</b></p> <p>All the informations those boxes include would only state proper goods to the instruction of ATEX 2014/34/EU.</p> <p>Processes which related to these regulations should only be made by personnel (qualified) who has expertise regarding security in the fields that has the probability of being exploded.</p>
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## 1.3 Correct Use


	<p><b>EXPLOSION !</b></p> <p>Only components which comply with the applicable regulations of Directive 2014/34/EU may be fitted and operated.</p> <p>Observe the Declaration of Conformity and all safety information for the components.</p>
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These gear units generate a rotational movement and are intended for use in commercial systems. They satisfy the explosion protection requirements of Directive 2014/34/EU for the product category indicated on the type plate. No mixture from categories IID and IIG may be present during operation. The ATEX approval is void in case of a hybrid mixture.

Commissioning (start of proper operation) is prohibited until it has been established that the machine complies with the local laws and directives. The EMC Directive 2014/30/EU and the Machinery Directive 2006/42/EC in their currently valid scope of application must be complied with in particular.

	<p><b>DANGER !</b></p> <p><b>Danger to persons:</b></p> <p>Appropriate safety measures must be taken in the case of applications in which failure of a gear unit or geared motor may cause a hazard to persons.</p> <p>Safeguard a wide area around the hazard zone.</p>
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## 1.4 Safety Information

	<p><b>EXPLOSION !</b></p> <p><b>Explosion hazard:</b> Failure to comply may cause severe, or even fatal injuries.</p> <p>All work, e.g. transportation, storage, installation, electrical connection, commissioning, servicing and maintenance must be performed in a non-explosive atmosphere.</p>
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**Safety Information**

In gear units /gear units with motors and motors, there could be pieces subjected to voltage, movable pieces and hot areas. During all the works to be done; transportation, storage, placing, mountage, connection, operating, maintenance-repair processes could be implemented by qualified employees and responsible managers.

**All the processes to be implemented during the working period;**

- Related usage and maintenance instructions,
- Warning and Safety Tags in gear unit/gear unit with motor,
- Instructions and Requirements related to the system,
- Local and International requirements for safety and accidental protection,
- Disassembly of gearbox should only be made by authorized personnels.

**Our Firm is not responsible where the listed items are implemented below:**

- Violation of work health and safety rules in gear unit /gear unit with motors,
- Improper usage (The usage which stated out of bounds in guidance and all the usages except tag/catalogue values especially usage in high moment and different cycle) and mismounting and misusage of gear unit/ gear unit with motor in plant,
- Extremely dirty and maintenance free of gear unit/gear unit with motor,
- Unlubricated usage,
- Usage of product other than out of tag/catalogue values,
- Wrong motor selection,
- Take out of the necessary protective plugs,
- Disuse of original pieces in gear unit/gear unit with motor,
- The using, mounting, maintaining and taking place of the uneducated, unauthorized and unqualified 3. persons,
- Additional dangers that could be generated during power cut can be prevented by materials such as brake/ key.

**1.5 Responsibility**

PGR, declines any responsibility in case of:

- Use of the reducer not compliant with national laws on safety and accident prevention,
- Work done by unqualified personnel,
- Incorrect installation,
- Tampering with the product,
- Incorrect or failure to follow the instructions in the manual,
- Incorrect or failure to follow the indications marked on the identification labels fixed on the units,
- For motor gearboxes, wrong delivery of electrical power,
- Incorrect connections and/or use of temperature sensors (when present),
- Use of gearbox under unlubricated conditions,
- The contents of this manual were reviewed to ensure consistency with the catalogues and etc. documents. We cannot guarantee full consistency since the changes cannot be completely prevented. However, the informations in this manual are reviewed regularly and necessary revisions are made in next editions.

The products supplied by PGR are intended to be incorporated into "complete machines", so it is prohibited to put them into service until the entire machine has not been declared compliant.

**ATTENTION !**

The configurations provided in the catalogue of the unit are the only ones allowed. Do not use the product in contrast with the indications provided in it. The instructions provided in this manual do not replace but compensate the obligations of current laws concerning safety regulations.

## 1.6 Transportation

### 1.6.1 Transportation and Freightage;

- Take into consideration of the article stated on package during the product delivery.
- During the delivery, product should be controlled about possible damages in carrying period.
- The firm should be informed about possible damages.
- The damaged products should not be put into use.
- Lifting flanged eyebolts must be tightened. These flanged eyebolts sized to carry the weight of only gear unit/gear unit with motor. The additional weight should not be added. The flanged eyebolts must be suitable to the DIN 580 norm.
- If there are 2 lifting flanged eyebolts in gear unit with motor, both of them could be used in carrying process upon the size of gear unit and motor. In necessary situations, the suitable and adequated-size carrier should be used.
- Carrying safeties should be removed before the start of operating.
- The weights of the movable gear units/gear units with motors are placed in product catalogues.
- The dangerous area should be got into the secure to prevent damage to the persons.
- During the carrying process, to stand under the gear unit could cause danger of death.
- The damage of gear unit must be prevented. The crushes to the free input shafts could damaged into the gear unit.

### 1.6.2 Package Transportation;

- There could be no loads on packages or the shelved surfaces should be prepared.
- The necessary carrying equipments should be prepared.
- The carrying and lifting equipments should be larged - enough to the sufficient capacity.
- The calculations should be made to the connection points and center of gravity.
- If necessary, this information should be written on the package.
- The carrying equipments (steel rope, belt, chain etc.) must be robust and suitable to the applied weight.
- During the carrying process, the load centering could be done without oscillation.

### 1.6.3 Equipment Transportation;

- The connection carrying point should be appointed.
- The carrying equipments (hook, chain, belt) must be prepared. To the alternative, pallet must be used for the load -lifting.
- If the Crane will be used, it could be lifted perpendicular from inside to the outside of the package.
- If the forklift or palletized carrying equipment will be used, the product which removed from package should be placed on the pallet.
- The fork of the equipment should be carried out the way that gripped the pallet.
- The weight must be lifted both with slowly and constant speed and must take measure to the sudden oscillation.



#### ATTENTION !

During the carrying process, the fixings like the lifting lug, hook, belt, rope, locked hook must be sufficient to the load and have conformity certificate. The weights of the movable gear unit/gear unit with motor have given in product catalogue.



#### NOTE !

In all carrying processes, there should be avoided from both sudden movements and sudden liftings.



#### ATTENTION !

If the connection tool is coupling between electric motor and gear unit, lifting eyebolt should not be used.



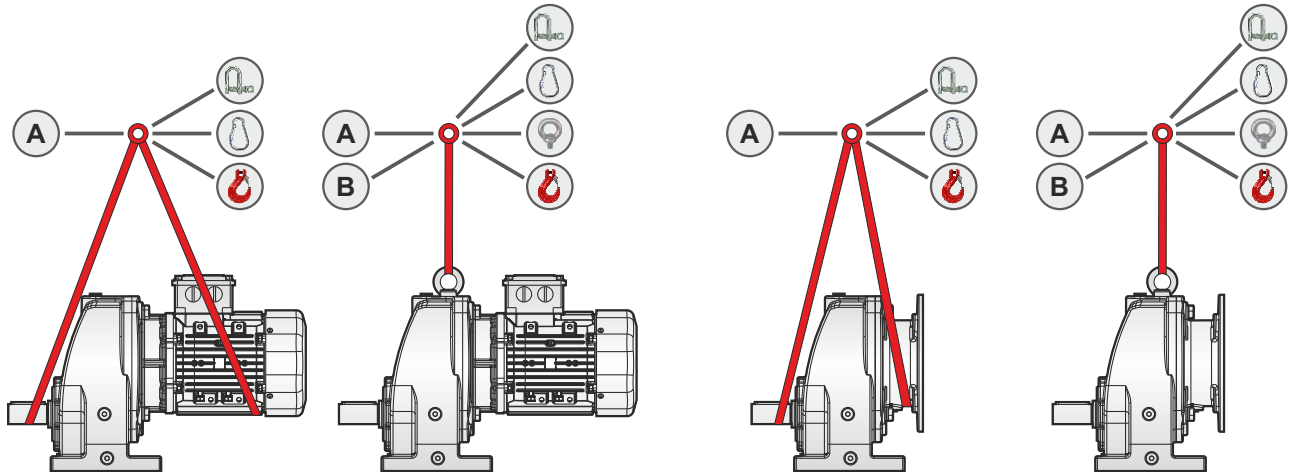
#### 1.6.4 Transport of Gearboxes;

Figure 1: Transport of Gearboxes (PA / PF)

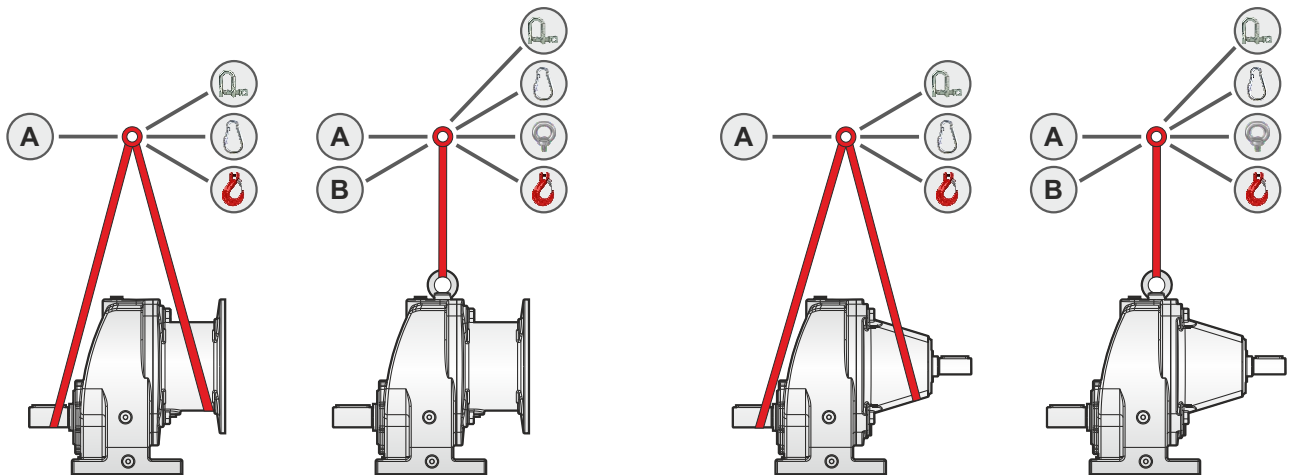
**PA**

**SINGLE STAGE**

**MOTOR / PAM**



**IEC / W**



**A** Hoop equipped (swab)

Load hook

Locked hook

**B** Hoop equipped (chain)

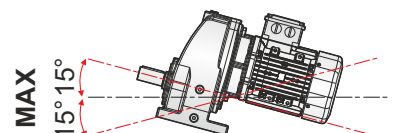
Screw hook

Lifting eyebolts

Manuel lifting (Weight ≤ 15 kg)  
(ref. ILO Contract)  
Not valid for the continuous carrying.



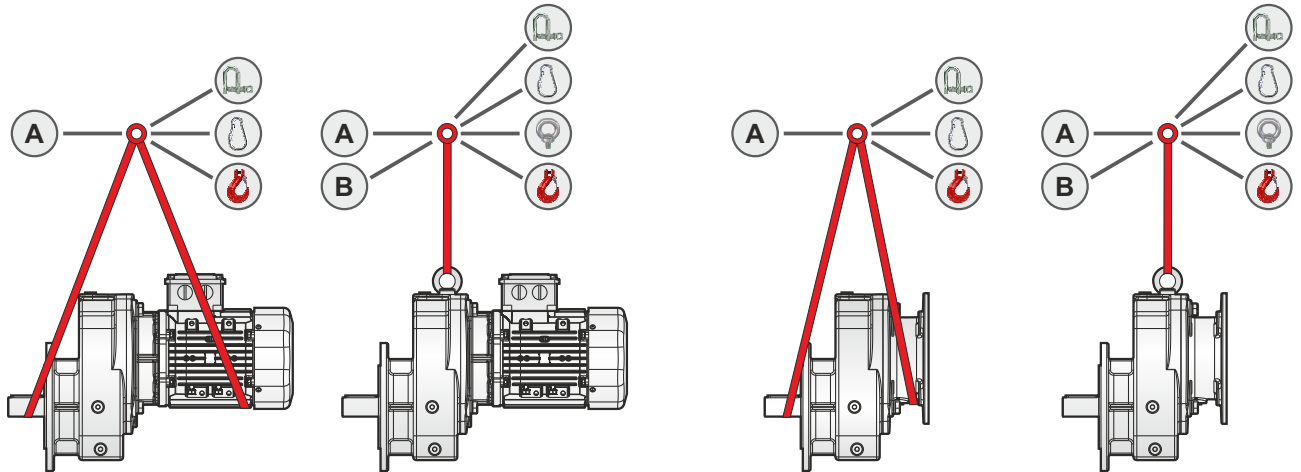
The allowable maximum slope is 15 degree.



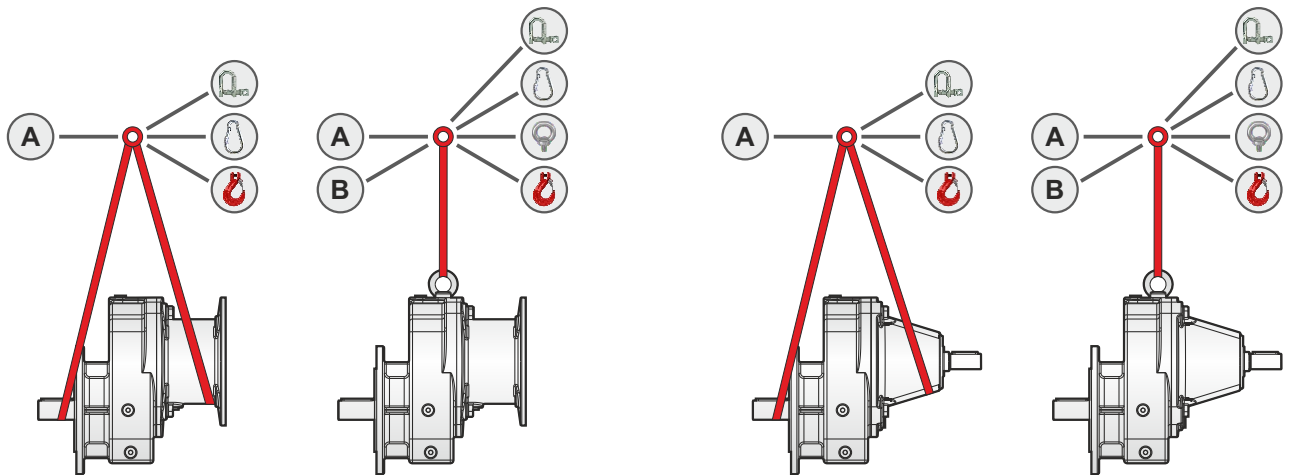
PF

SINGLE STAGE

MOTOR / PAM




IEC / W





**A** Hoop equipped (swab)

**B** Hoop equipped (chain)

 Load hook

 Screw hook

 Locked hook

 Lifting eyebolts

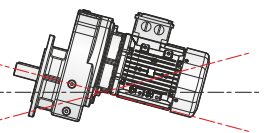
Manuel lifting (Weight ≤ 15 kg)  
(ref. ILO Contract)  
Not valid for the continuous carrying.



The allowable maximum slope is 15 degree.

MAX

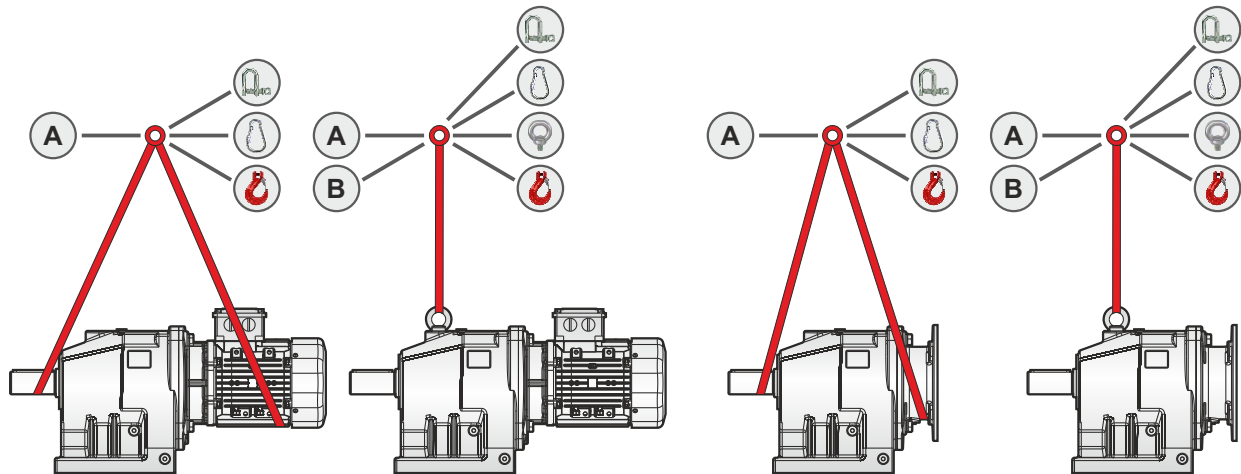
15° 15°



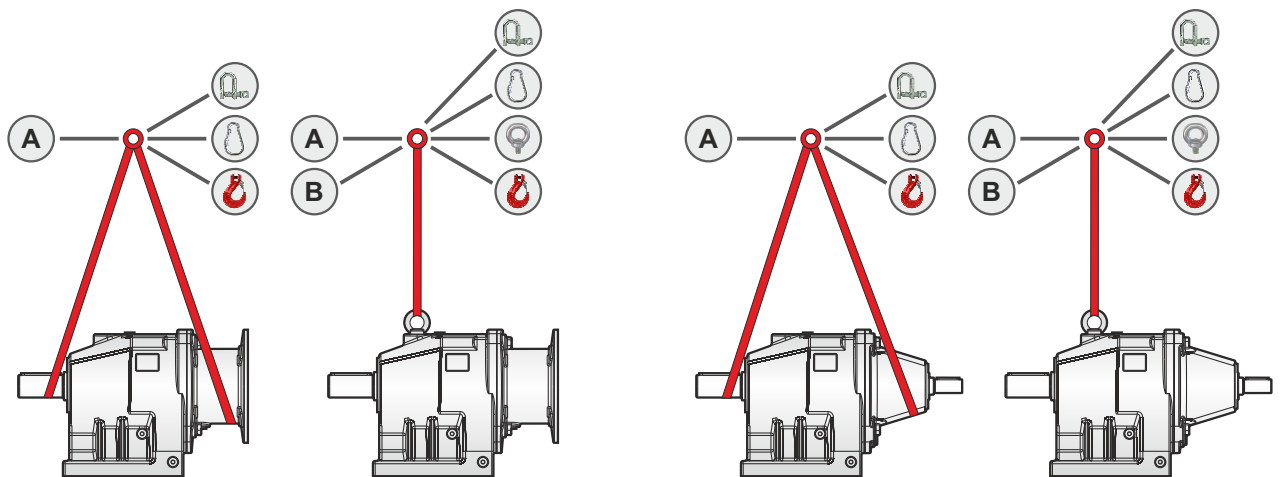
### PA

### DOUBLE STAGE


#### MOTOR / PAM




#### IEC / W




**A** Hoop equipped (swab)

 Load hook

 Locked hook

**B** Hoop equipped (chain)

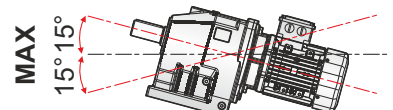
 Screw hook

 Lifting eyebolts

Manuel lifting (Weight ≤ 15 kg)  
(ref. ILO Contract)  
Not valid for the continuous carrying.



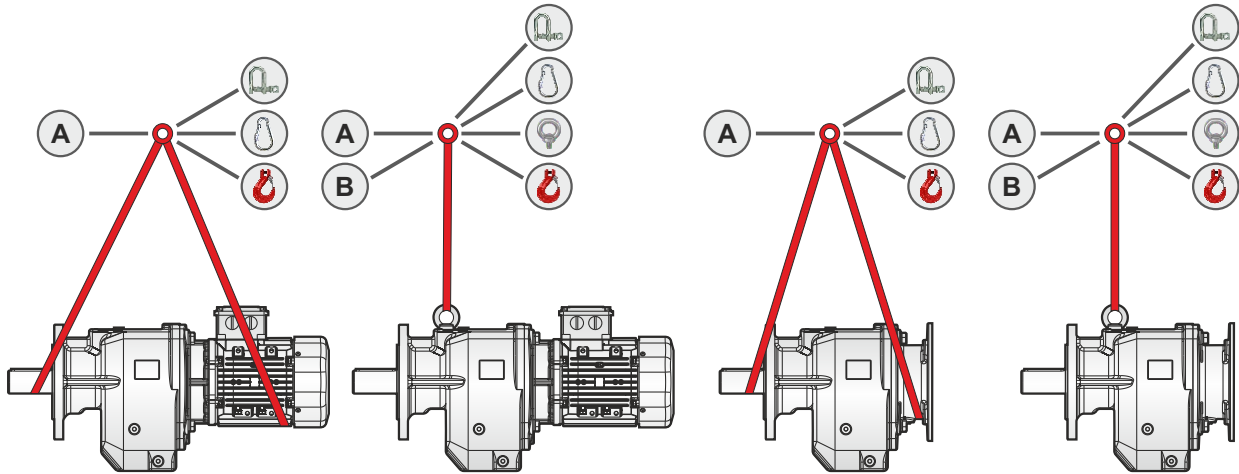
The allowable maximum slope is 15 degree.



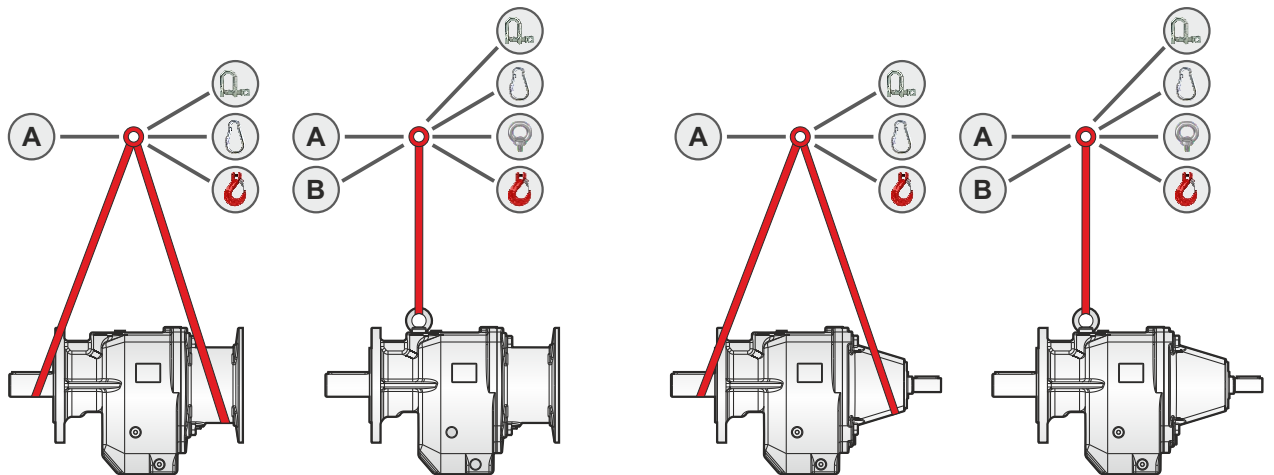
PF

DOUBLE STAGE


MOTOR / PAM



IEC / W



**A** Hoop equipped (swab)

 Load hook

 Locked hook

**B** Hoop equipped (chain)

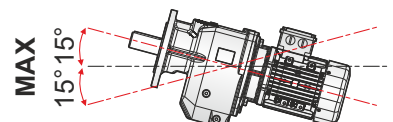
 Screw hook

 Lifting eyebolts

Manual lifting (Weight ≤ 15 kg)  
(ref. ILO Contract)  
Not valid for the continuous carrying.



The allowable maximum slope is 15 degree.

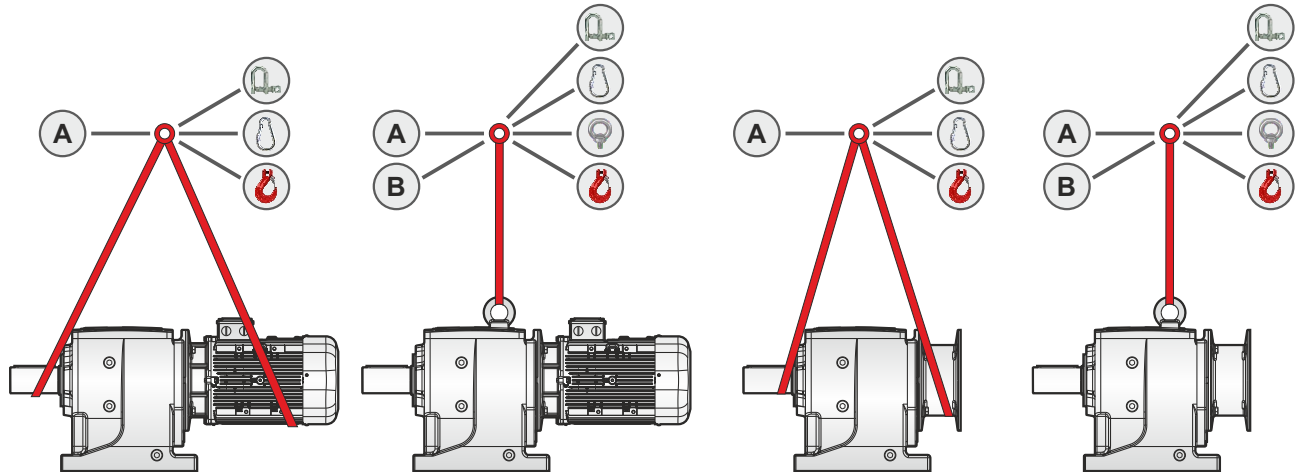




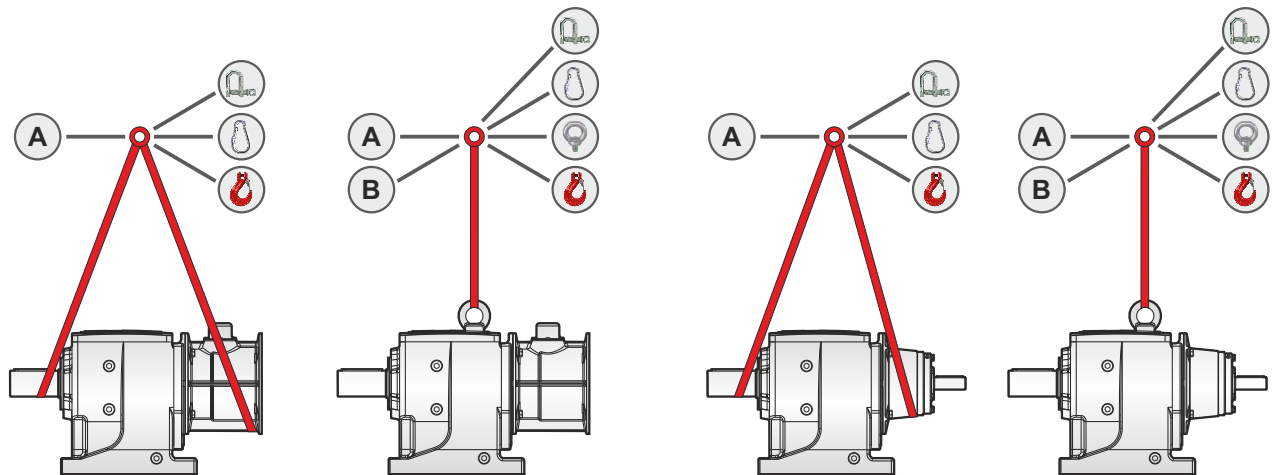
### PA

### TRIPLE STAGE


#### MOTOR / PAM




#### IEC / W




**A** Hoop equipped (swab)

 Load hook

 Locked hook

**B** Hoop equipped (chain)

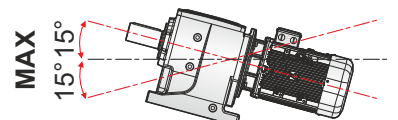
 Screw hook

 Lifting eyebolts

Manuel lifting (Weight ≤ 15 kg)  
(ref. ILO Contract)  
Not valid for the continuous carrying.



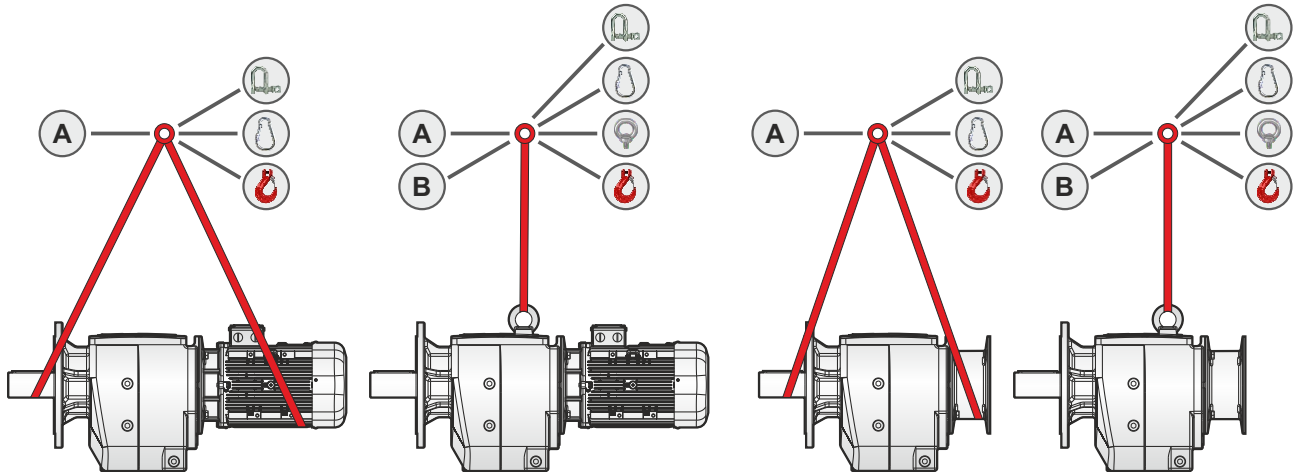
The allowable maximum slope is 15 degree.



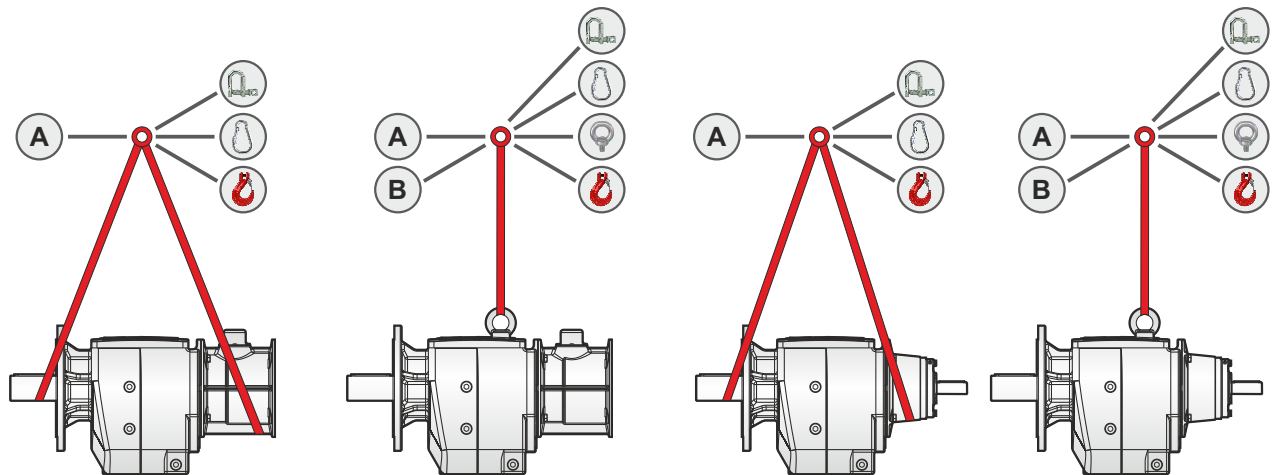
PF

TRIPLE STAGE

MOTOR / PAM



IEC / W



**A** Hoop equipped (swab)

Load hook

Locked hook

**B** Hoop equipped (chain)

Screw hook

Lifting eyebolts

Manuel lifting (Weight ≤ 15 kg)  
(ref. ILO Contract)  
Not valid for the continuous carrying.



The allowable maximum slope is 15 degree.

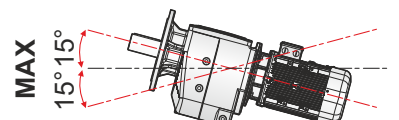
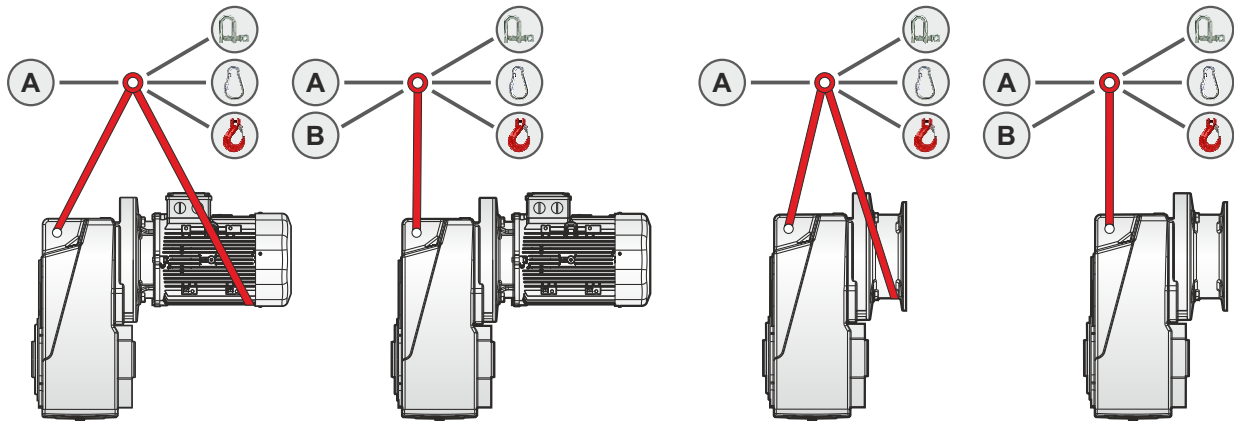


Figure 2: Transport of Gearboxes (PD / PM)

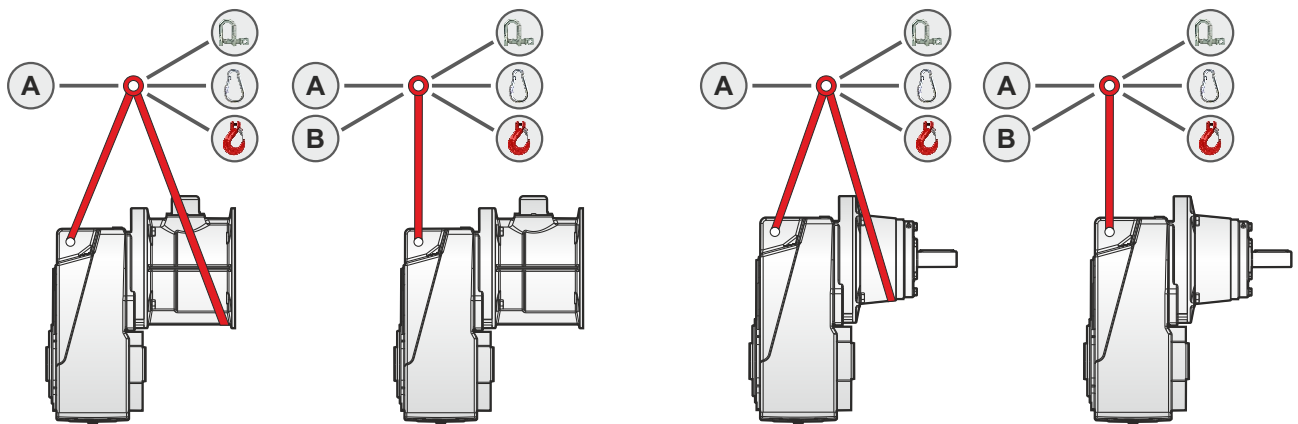
PD

DOUBLE STAGE  
TRIPLE STAGE


MOTOR / PAM




IEC / W



**A** Hoop equipped (swab)

 Load hook

 Screw hook

 Locked hook

**B** Hoop equipped (chain)

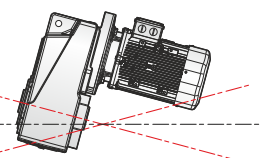
Manuel lifting (Weight ≤ 15 kg)  
(ref. ILO Contract)  
Not valid for the continuous carrying.



The allowable maximum slope is 15 degree.

MAX

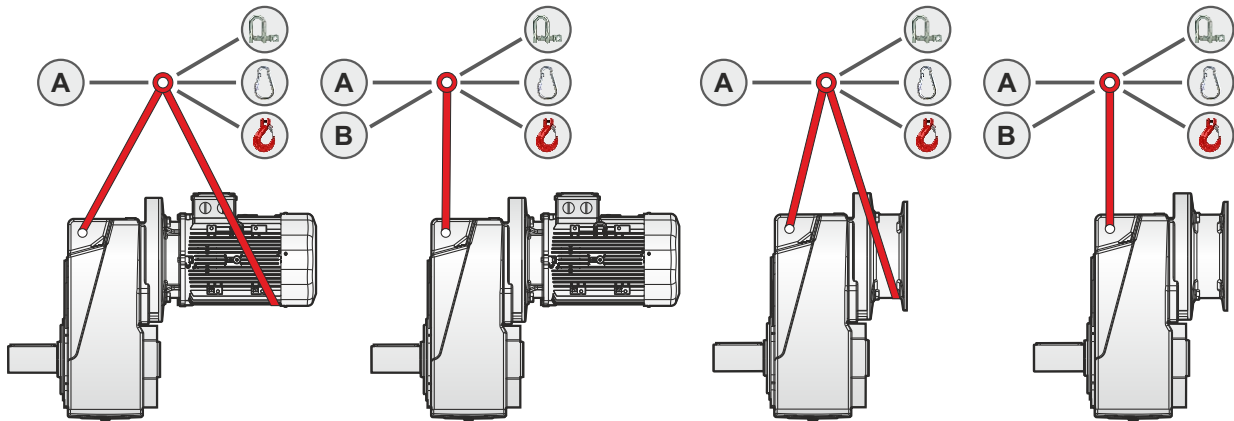
15° 15°



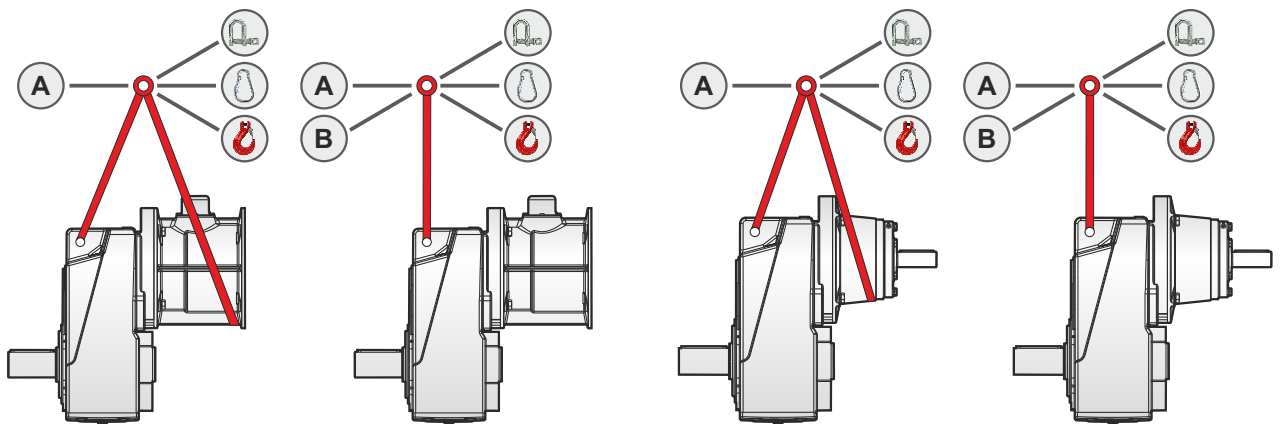
PM

DOUBLE STAGE  
TRIPLE STAGE


MOTOR / PAM





IEC / W



**A** Hoop equipped (swab)

 Load hook

 Screw hook

 Locked hook

**B** Hoop equipped (chain)

Manuel lifting (Weight ≤ 15 kg)  
(ref. ILO Contract)  
Not valid for the continuous carrying.



The allowable maximum  
slope is 15 degree.

MAX

15° 15°

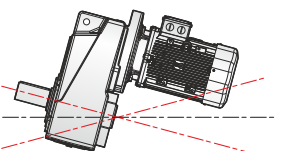
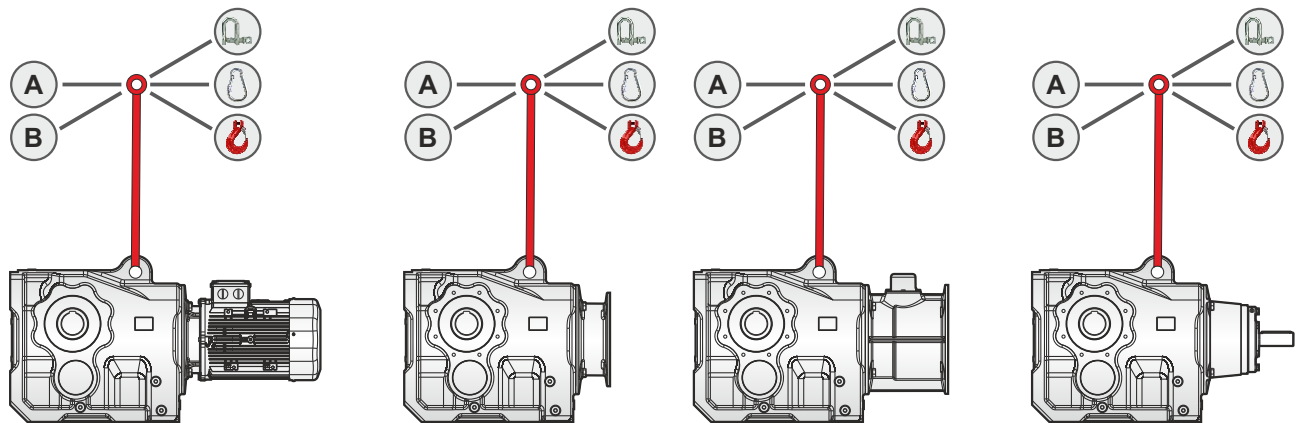


Figure 3: Transport of Gearboxes (PKD)

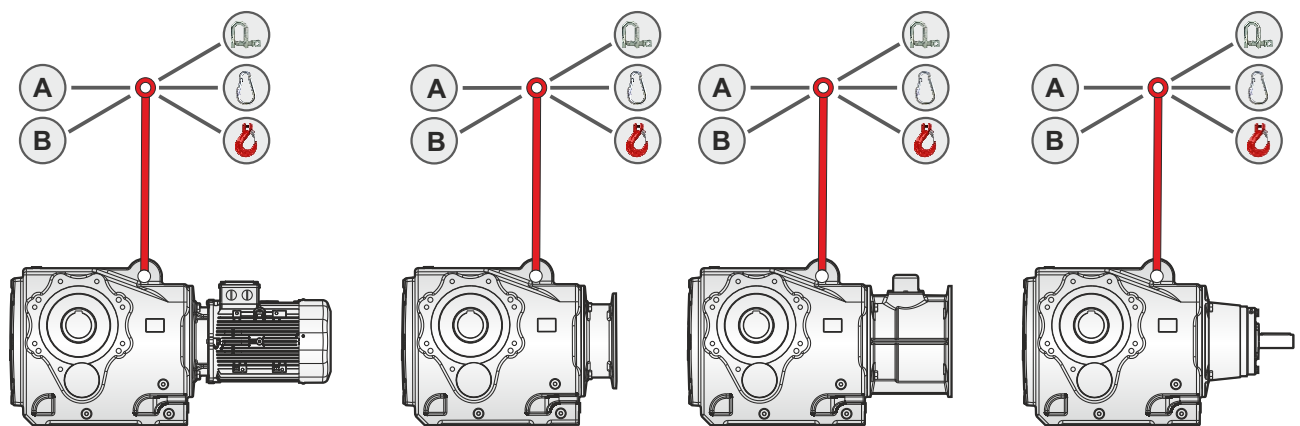
## PKD - DA

MOTOR / PAM / IEC / W





## PKD - DG

MOTOR / PAM / IEC / W



**A** Hoop equipped (swab)

 Load hook

 Screw hook

 Locked hook

**B** Hoop equipped (chain)

Manuel lifting (Weight ≤ 15 kg)  
(ref. ILO Contract)  
Not valid for the continuous carrying.



The allowable maximum slope is 15 degree.

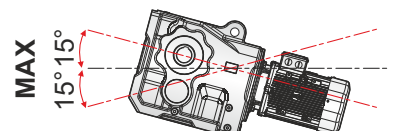
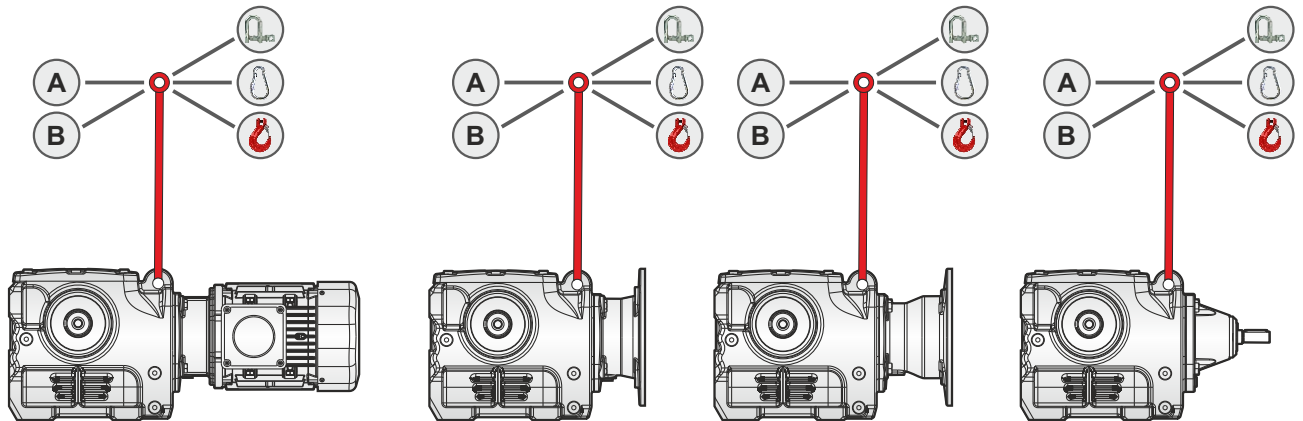




Figure 4: Transport of Gearboxes (PSH)

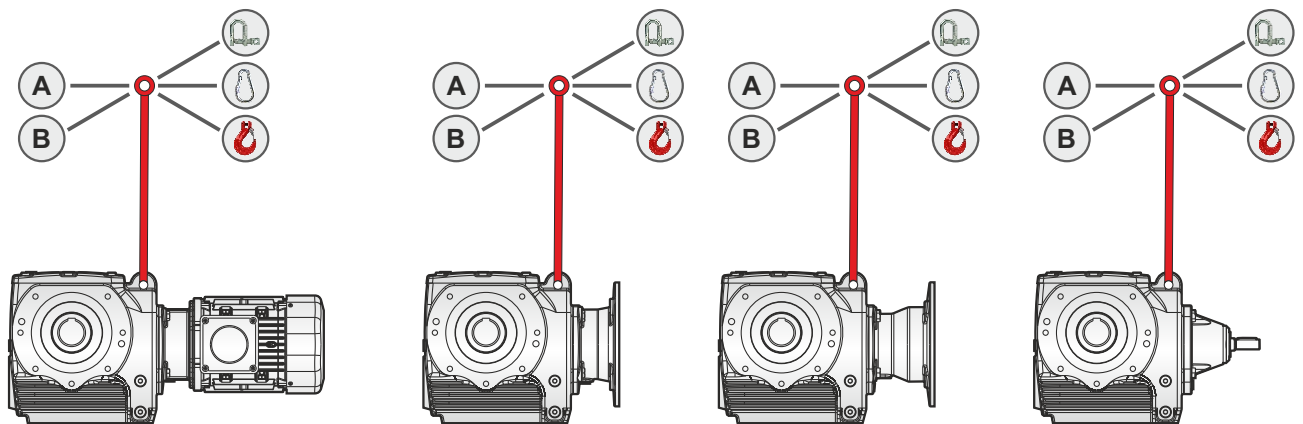
## PSH - DA

MOTOR / PAM / IEC / W





## PSH - DG

MOTOR / PAM / IEC / W



**A** Hoop equipped (swab)

 Load hook

 Screw hook

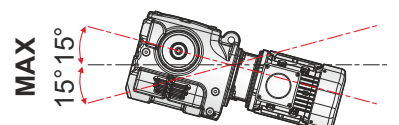
 Locked hook

**B** Hoop equipped (chain)

Manuel lifting (Weight ≤ 15 kg)  
(ref. ILO Contract)  
Not valid for the continuous carrying.



The allowable maximum slope is 15 degree.



## 1.7 Storage

The certain suggestions have given about the storage conditions of the gear unit/gear unit with motor below;

- In clear and moist-airs, the storage should not be made.
- The gear unit/gear units with motor should not directly be contacted to the ground.
- The place must be moveless where the both gear unit/gear units with motors are contacted. Otherwise there could be damage during the movement.
- The gear unit should be got into the secure to the falling.
- The processed surfaces of the gear units and both solid and hollow shafts must be lubricated with protective oil.
- Gear unit/Gear units with motors must be in the place where there will be no big temperature differences between -5°C and +40°C.
- Relative humidity must be less than %60.
- Not directly be exposed to sunlight and infraded light.
- Must be kept away from the abrasive materials which causes corrosion (dirty weather, ozon, gases, solvents, acids, salts, radioactivity, etc.) in environment.
- The protective oil SHELL ENSIS or similar product should be used on the corrodible pieces.
- If the gear unit is without oil, it must be filled with lubrication oil.

**EXPLOSION !**

Gearboxes during storage;  
Provide protection of unpainted and processed areas by lubricant. In case of areas getting rusted, ATEX certificate will be no longer valid.

**EXPLOSION !**

These processes should be made far away from explosive atmosphere.  
If there is an unproper oil inside of gearbox to operate, this oil must be discharged and be cleaned.

**SECURITY MEASURES !****Precautions to be taken when returning the gear unit to service after storage:**




The output shafts and external surfaces must be thoroughly cleaned of all rustproofing product, contaminants and other impurities (use a standard commercial solvent).

Do this outside the explosion hazard area. The solvent must not touch the seal rings as this may damage them, causing them to leak.

If the oil or protective material used during storage is not compatible with the synthetic oil used during the machine's operation, the interior of the unit must be thoroughly cleaned before filling with the operating oil.

The service life of the bearing grease is reduced if the unit is stored for more than 1 year. The bearing grease must be synthetic.

**1.7.1 Long Term Storage Suggestions;**


	<b>NOTE !</b> <ul style="list-style-type: none"><li>- In the long-term storage or during the short-term storage, if the excessive temperature differences occur, the oil in the gear unit must be changed before the operating.</li><li>- In the fully oil filled gear unit, the oil level should be reduced according to the mounting position.</li></ul>
	<b>ATTENTION !</b> <ul style="list-style-type: none"><li>- The incorrect and excessive long storage could cause the gearbox getting defected.</li><li>- Please control not to exceed allowed storage period before starting up the gearbox.</li></ul>
	<b>NOTE !</b> <ul style="list-style-type: none"><li>- PGR, recommends long-term storage option for periods of more than 9 months holding and pausing times.</li><li>- By paying attention both to the long-term storage option and precautions which listed below, the holding of goods up to 2 years could be possible. Because of real efficiency of gearboxes depending on local conditions widely, these periods could be seen solely guide values.</li></ul>

**Long term storage suggestions;**

- Mineral oil or synthetic oil according to mounting position is filled of getting available for operating. Despite this, the oil level should be controlled before operating.
- The VCI Corrosion protected tool are mixed into the gear unit's oil.
- The carrying safety of the ventilation plug must not be removed during the storage.
- The gear unit must be closed to the shape of unleaked.





### 2.1 Gear Unit Label



**EXPLOSION !**

**Explosion hazard:** Failure to comply may cause severe, or even fatal injuries. It must be checked and ensured that the gear unit type, all technical data and the ATEX labelling conform to the planning of the plant or the machine.

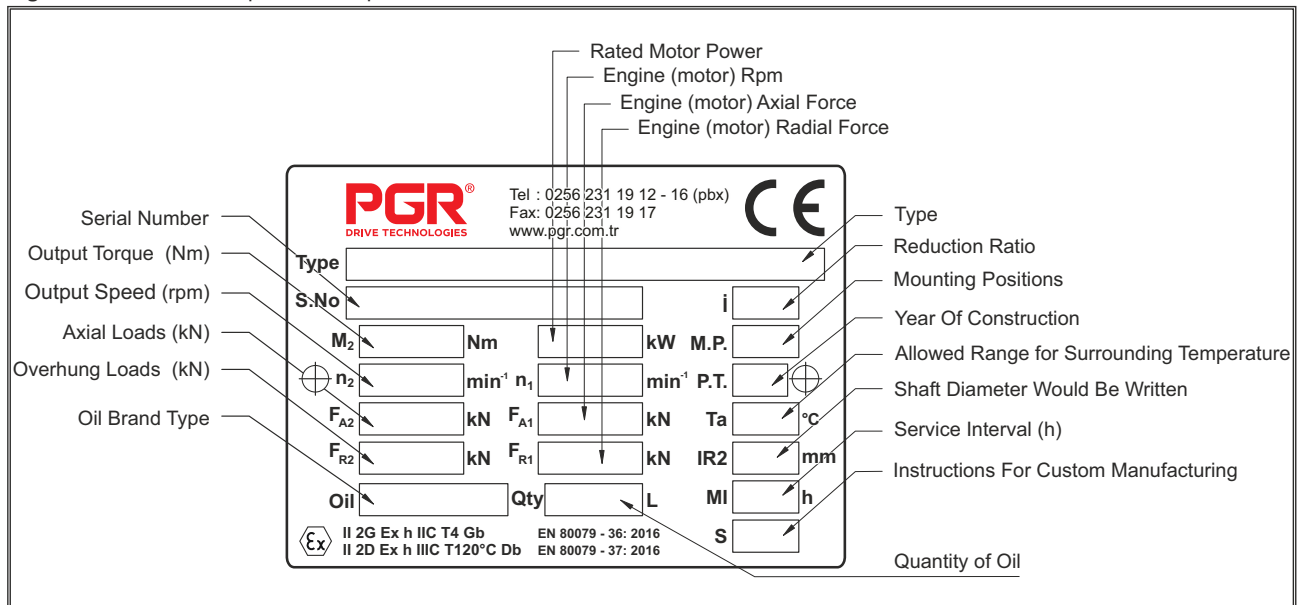
The type plate must be firmly attached to the gear unit and must not be subjected to permanent soiling. Please contact the PGR service department if the type plate is illegible or damaged.

**EXPLOSION !**

Gearboxes that are suitable to 2014/34/EU instruction; have "ATEX" label which is at the standard of EN ISO 80079-36:2016, EN ISO 80079-37:2016 and also proper to stated contents. **An example is given below:**

**Figure 5:** Gearbox Nameplate and Explanation




The diagram shows a PGR gearbox nameplate with the following fields and labels:

- Serial Number:** S.No
- Output Torque (Nm):**  $M_2$
- Output Speed (rpm):**  $n_2$
- Axial Loads (kN):**  $F_{A2}$
- Overhung Loads (kN):**  $F_{R2}$
- Oil Brand Type:** Oil
- Rated Motor Power:** kW
- Engine (motor) Rpm:**  $n_1$
- Engine (motor) Axial Force:**  $F_{A1}$
- Engine (motor) Radial Force:**  $F_{R1}$
- Type:** Type
- Reduction Ratio:** i
- Mounting Positions:** Mounting Positions
- Year Of Construction:** Year Of Construction
- Allowed Range for Surrounding Temperature:** Allowed Range for Surrounding Temperature
- Shaft Diameter Would Be Written:**  $\varnothing$
- Service Interval (h):** Service Interval (h)
- Instructions For Custom Manufacturing:** Instructions For Custom Manufacturing
- Quantity of Oil:** Qty

Additional information on the nameplate includes:

- CE Marking:** CE
- Technical Standards:** II 2G Ex h IIC T4 Gb, II 2D Ex h IIC T120°C Db
- EN Standards:** EN 80079 - 36: 2016, EN 80079 - 37: 2016
- Contact Information:** Tel : 0256 231 19 12 - 16 (pbx), Fax: 0256 231 19 17, www.pgr.com.tr





**Marking according to ATEX (EN ISO 80079-36:2016, EN ISO 80079-37:2016):**

1. Group (Always II, quarries are not included)
2. Category (for gas **2G-3G**, for powder **2D-3D**)
3. If firing protective type (**c**) is put
4. Implementing explosive group (**IIC, IIB**)
5. Temperature Class (for gas **T1-T3** or **T4**) or maximum surface heat (for example for powder **125°C**) or specific maximum surface heat, look at private documents. (**TX**)
6. Temperature measurement during access to a plant. (**X**)

### 2.2 Compatibility Declaration

All gear units or gearmotors (when supplied with electric motor) are designed in compliance with the provisions of applicable Essential Health and Safety Requirements, the "Machinery Directive" 2006/42/EC and, if requested, can be supplied with a Manufacturer's Declaration-Annex IIB as provided by said Directive.

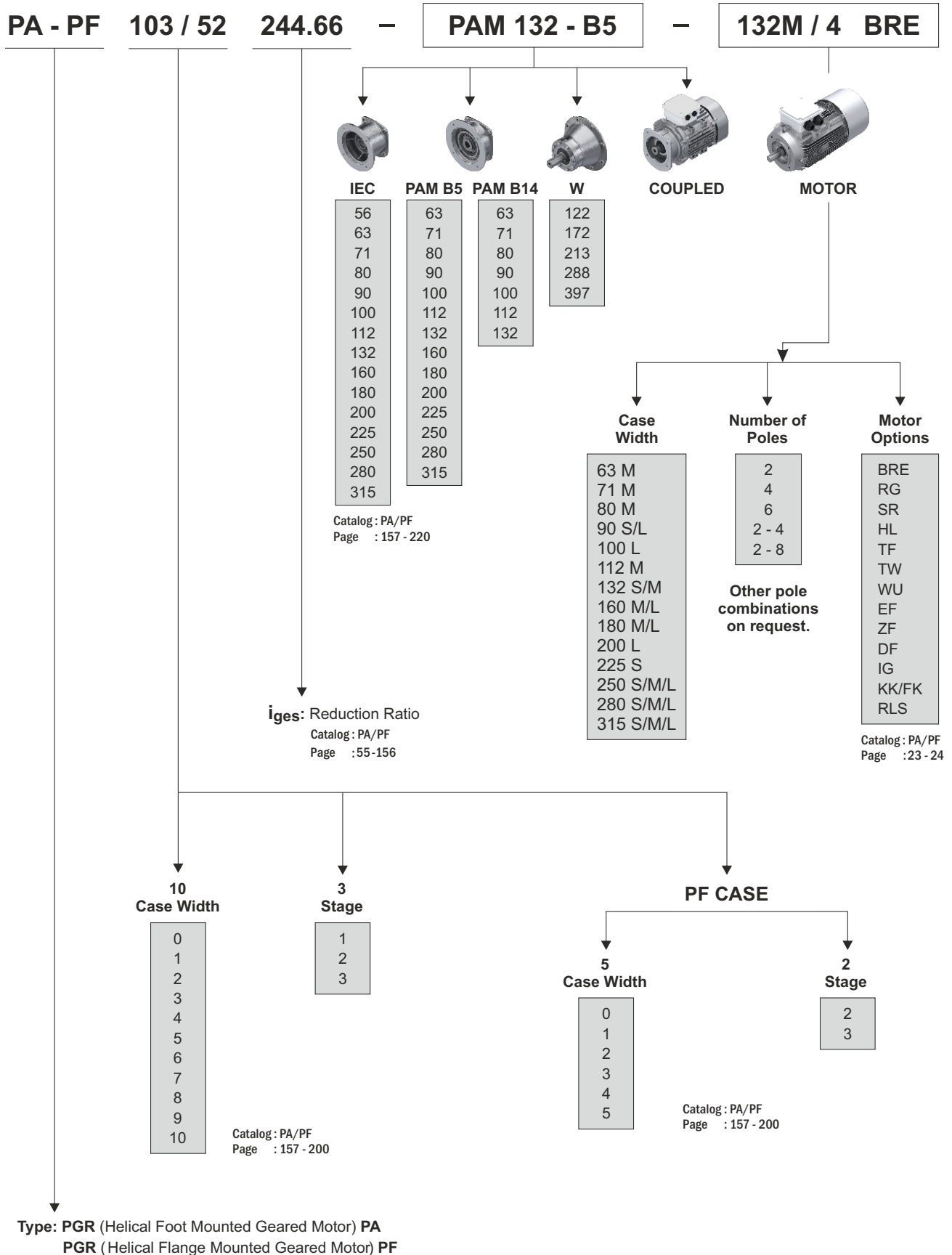
**EXPLOSION !**

The nameplate specifications regarding the maximum surface temperature, refer to readings taken in normal ambient and installation conditions. Even minimal variations to said conditions (e.g. smaller mounting cabinet) may have a significant effect on the unit's heat output.

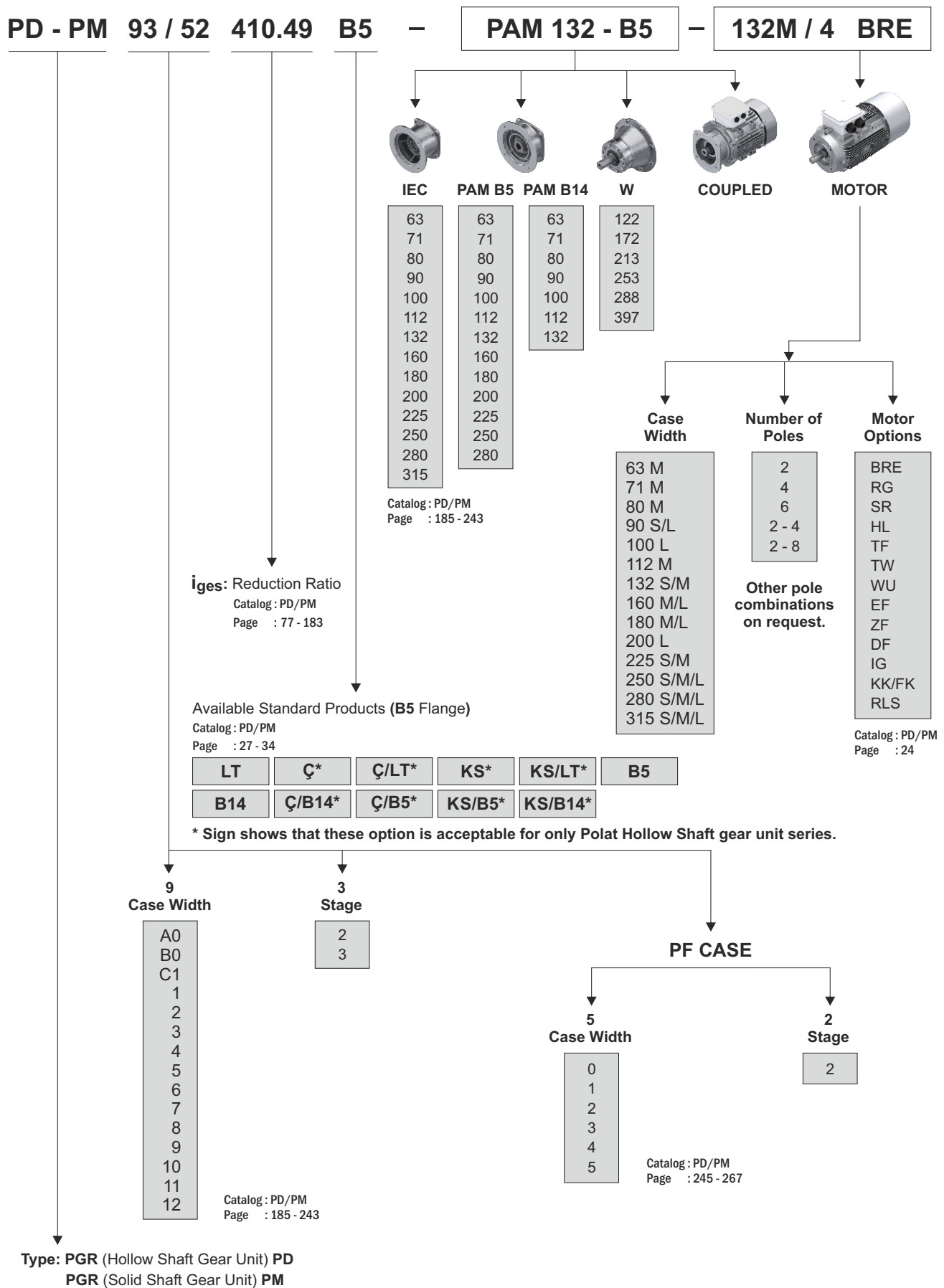


### 2.3 Explanations

Table 2: Product Description (PA / PF)





**Table 3: Product Description (PD / PM)**

**Note:** Gear units which are PD/PM A02, PD/PM B02 and PD/PM C13 are 2, 2 and 3 stage reduction respectively, but A0, B0 and C1 codes in this gear unit type don't determine case width.



Table 4: Product Description (PKD)

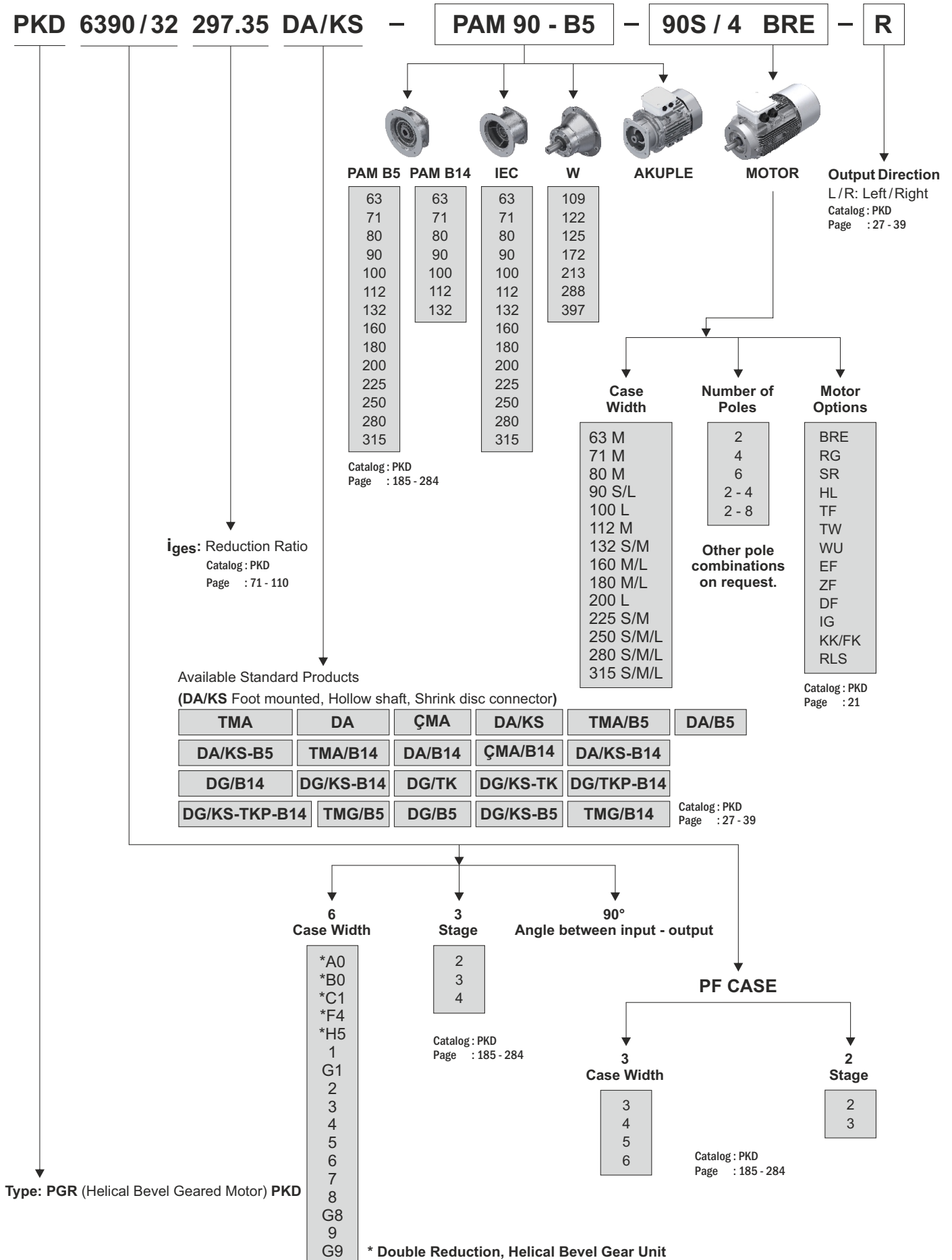
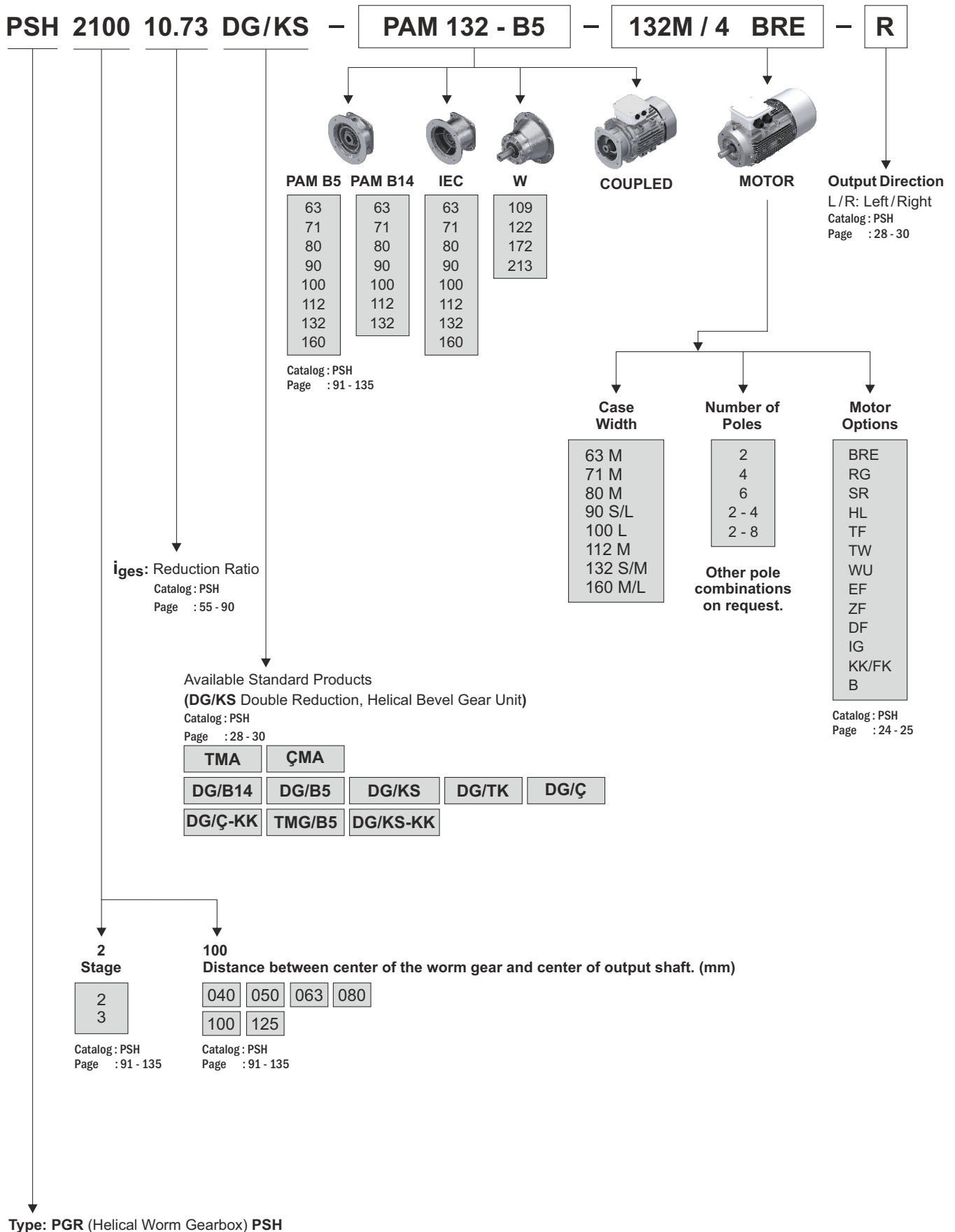




Table 5: Product Description (PSH)





## 2.4 Abbreviations

Table 6: Abbreviations (PA / PF)

Abbreviations	Meaning	Helical Gear Units
<b>A</b>	Foot Mounted	✓
<b>F</b>	Flange Mounted	✓
<b>IEC</b>	IEC Adapter	✓
<b>W</b>	Free Input Shaft	✓
<b>B</b>	Backstop	✓
<b>GR</b>	Reinforced Bearing	✓
<b>WB</b>	Backstop in W adapter	✓

✓ : Existing designs are marked with a tick.



Table 7: Abbreviations (PD / PM)

Abbreviations	Meaning	Parallel Shaft Gear Units
<b>D</b>	Hollow Shaft	✓
<b>M</b>	Solid Shaft	✓
<b>B5</b>	Flange B5	✓
<b>B14</b>	Flange B14	✓
<b>Ç</b>	Puller Washer	✓
<b>LT</b>	Rubber Buffer	✓
<b>KS</b>	Shrink Disc	✓
<b>DIN 5480</b>	Splined Hollow Shaft, DIN 5480	✓ (2)
<b>KK</b>	Protection Cap	✓
<b>IEC</b>	IEC Adapter	✓
<b>W</b>	Free Input Shaft	✓
<b>B</b>	Backstop	✓
<b>GR</b>	Reinforced Bearing	✓
<b>WB</b>	Backstop in W Adapter	✓
<b>GKS</b>	Reinforced Shrink Disc	✓
<b>GB5</b>	Reinforced Flange B5	✓
<b>PD A - B - C</b>	Hollow Shaft, Foot Mounted	✓ (1)
<b>PM A - B - C</b>	Solid Shaft, Foot Mounted	✓ (1)
<b>PD ... B5</b>	Hollow Shaft, Flange B5	✓
<b>PD ... B14</b>	Hollow Shaft, Flange B14	✓
<b>PM ... B5</b>	Solid Shaft, Flange B5	✓
<b>Ç - LT</b>	Puller Washer, Rubber Buffer	✓
<b>KS - LT</b>	Shrink Disc, Rubber Buffer	✓
<b>Ç - B5</b>	Puller Washer, Flange B5	✓
<b>Ç - B14</b>	Puller Washer, Flange B14	✓
<b>KS - B5</b>	Shrink Disc, Flange B5	✓
<b>KS - B14</b>	Shrink Disc, Flange B14	✓

✓ : Existing designs are marked with a tick.

(1) : PD/PM A02 - B02 - C13 gear unit series include foot mounted option.

(2) : DIN 5480 option is not available for PD A02 - B02 - C13 and PD 102 inclusive and higher gear unit types.





Table 8: Abbreviations (PKD)

Abbreviations	Meaning	Helical Bevel Gear Units
DG / B5	Case Mounted, Hollow Shaft, Flange B5	✓ (2)
DA	Foot Mounted, Hollow Shaft	✓
DA / B5	Foot Mounted, Hollow Shaft, Flange B5	✓ (1)
DA / B14	Foot Mounted, Hollow Shaft, Flange B14	✓
DG / B14	Case Mounted, Hollow Shaft, Flange B14	✓ (2)
DG / TK	Case Mounted, Hollow Shaft, Torque Arm	✓ (1) (2)
DG / TKP - B14	Case Mounted, Hollow Shaft, Torque Arm Platform, Flange B14	✓ (2)
Ç	Puller Washer	✓
DIN 5480	Splined Hollow Shaft, DIN 5480	✓
KK	Protection Cap	✓
IEC	IEC Adapter	✓
ÇMA	Foot Mounted, Solid Shaft on Both Sides	✓
B	Backstop	✓
WB	Backstop in W Adapter	✓
KS	Shrink Disc	✓
GKS	Reinforced Shrink Disc	✓
TMG / B5	Case Mounted, Solid Shaft on One Side, Flange B5	✓ (2)
GR	Reinforced Bearing	✓
GB5	Reinforced Flange B5	✓
TMA / B5	Foot Mounted, Solid Shaft on One Side, Flange B5	✓
TMA	Foot Mounted, Solid Shaft on One Side	✓
TMG / B14	Case Mounted, Solid Shaft on One Side, Flange B14	✓ (2)
W	Free Input Shaft	✓

✓ : Existing designs are marked with a tick.

(1) : This design exists for PKD 7390 and lesser cases.

(2) : This number shows, there are threaded holes at the bottom of gear unit but these are not usable for installation.



**Table 9: Abbreviations (PSH)**

Abbreviations	Meaning	Helical Worm Gear Units
<b>DG / B5</b>	Case Mounted, Hollow Shaft, Flange B5	✓
<b>DG / B14</b>	Case Mounted, Hollow Shaft, Flange B14	✓
<b>DG / TK</b>	Case Mounted, Hollow Shaft, Torque arm	✓
<b>Ç</b>	Puller Washer	✓
<b>KK</b>	Protection Cap	✓
<b>IEC</b>	IEC Adapter	✓
<b>ÇMA</b>	Foot Mounted, Solid Shaft on Both Sides	✓
<b>B</b>	Backstop	✓
<b>WB</b>	Backstop in W Adapter	✓
<b>KS</b>	Case Mounted, Solid Shaft, Flange B5	✓
<b>TMG / B5</b>	Case Mounted, Solid Shaft on One Side, Flange B5	✓
<b>GR</b>	Reinforced Bearing	✓
<b>TMA</b>	Foot Mounted, Solid Shaft on One Side	✓
<b>W</b>	Free Input Shaft	✓

✓ : Existing designs are marked with a tick.



### 3.1 Prerequisites of Assembly



#### EXPLOSION !

**Explosion hazard:** Failure to comply may cause severe, or even fatal injuries. Care must be taken that drive elements attached to the gear unit, such as clutches, pulleys etc. and drive motors are also ATEX-compliant.

In applications where an incorrect rotational direction may result in damage or potential risk, the correct rotational direction of the output shaft is to be established by test running the drive when uncoupled and guaranteeing such for subsequent operation.

Gears with integrated return stops are marked with arrows on the drive/driven sides. The arrows point in the rotation direction of the gear unit. When connecting the motor and during motor control, it must be ensured that the gear unit can only operate in the direction of rotation.



#### NOTE !

For gear units with an integrated back stop, switching the drive motor to the blocked direction of rotation, i.e. incorrect direction of rotation, may result in damage to the gear unit. Take care that the direction of rotation of the gear unit is correct when connecting the motor and the motor control unit.

Please note that for geared motors (gear units with attached electric motors) the electric motor has its own type plate and separate ATEX designation. The motor labelling must also comply with data for the planning of the plant or the machine.

**The lowest explosion protection level on the gear unit and the motor labelling applies for the geared motor unit.**

If the electric motor is driven with a frequency inverter, the motor requires ATEX approval for inverter operation. If the motor is operated with an inverter, significant differences between the nominal speeds on the type plates of the motor and the gearbox are normal and permissible. For operation of the motor with the mains supply, differences of the nominal speeds on the motor and the gear unit of up to  $\pm 60$  rpm are permissible.



#### EXPLOSION !

**Explosion hazard:** Failure to comply may cause severe or even fatal injuries.

- The gear unit may only be operated in the stated version.
- The permissible version is stated on the type plate (IM...). If an X is present in the field IM, the special documentation, whose number is in field S, must be observed. (Section 4.1 "Control and Periodic Maintenance" page 41) or the special documentation, shows the configuration of the individual types of gear units.
- It must be checked and ensured that the configuration as stated on the type plate complies with the installation orientation and that the installation orientation does not change during operation.

**Please heed the Operating Instructions for the motor, in particular with regard to the chosen version.**

### Prerequisites of Assembly

Take into the consideration which listed below;

- The informations placed on gear unit with motor in accordance with current network voltage.
- There could be no damage in the gear unit.  
At standard gear units;
- The ambient temperature should be fitted temperature values given in the "Lubricant" part.




#### EXPLOSION !


The bearings, gear wheels, shafts and housing may be damaged by incorrect fitting.


- Observe the assembly instructions.
- The push-on gear unit must be fitted onto the shaft using a suitable puller, which will not exert damaging axial forces on the gear unit. In particular, do not hit the gear unit with a hammer.



	<p><b>EXPLOSION !</b></p> <p><b>Before access to a plant, those belows should be controlled and be secured:</b></p> <ul style="list-style-type: none"> <li>• During assembly of gearbox, whatever any explosion danger such as due to lubricant, acid, gas and steam radiation, could not be happened and there should not be powder accumulation at gearbox more than 5 mm.</li> <li>• During operating process, gearbox should be put in a well-vented room and not to be exposed in an effect of substantially heat radiation from outside.</li> <li>• During operating process, the temperature of cooling air should not exceed 40°C.</li> <li>• Controlling of lubricant and both discharging plugs and valves must be easily accessible.</li> <li>• Several other devices belong to gearbox, separately from their own functions should have an ATEX Certificate. (Protective electrical working substance against explosion)</li> <li>• The setting of gearboxes which have hollow shafts (even if there may be a friction preventer connection or may not) should be made properly according to an instructions at this hand guide.</li> <li>• After set up process is completed, cleaning of gearbox would be required.</li> <li>• Please be sure that all parts expanding and shifting with help of machine operator or all operating devices which prevent unwanted contacts between gearbox gaskets, would be operativeness.</li> </ul>
---	--

Assembly and subsequent dismantling is aided by applying an anti-corrosive lubricant to the shaft before fitting. Excess grease or anti-corrosion agent may escape after assembly and may drip off. Clean these points on the driven shaft after a running-in time of approx. 24 hours. This escape of grease is not due to a leak in the gear unit.

	<p><b>DANGER !</b></p> <p><b>There is a danger of injury due to shrink discs and freely rotating shaft journals:</b></p> <ul style="list-style-type: none"> <li>• Use a cover (Option KK) as a guard.</li> <li>• If this does not achieve sufficient protection against contact according to the required protection type, the machinery and plant constructor must ensure this by means of special attached components.</li> </ul>
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	<p><b>DANGER !</b></p> <p><b>The Gear unit must not be mounted in the ambient conditions listed below:</b></p> <ul style="list-style-type: none"> <li>- Explosive atmosphere, high corrosive and/or oils, acids, gases, steams, radiation,</li> <li>- Places directly contacted to the food.</li> </ul>
---	---

Gearboxes are either dispatched without motor or motors by ATEX are assembled to a gearbox after getting supplied from electrical motor manufacturer. Electric connection belongs to end user.


At special applications the configuration of gear unit/gear unit with motor are realized convenient to the ambient conditions. Output shafts, processed surfaces, corrosion preventive material on the solid shaft/hollow shaft, jerks etc. must be cleaned.

Extensive usage-solvent must be used. The solvent should not be contacted to the bearing houses and sealing components.

In the abrasive ambient conditions, both output shaft, sealing components must be protected to the wearing Connection flanges must be attached to the hollow shaft/solid shaft according to DIN 332.

The situations where the wrong direction of rotation could caused to damages and dangers, before the mounting, the test work should implemented to the gear unit so the right direction of rotation could be determined and must got into the secure for the next operating.

In the one-way locked gear units, nibs are placed at the entry and exit side of the gear unit. The ends of the nibs shows the direction of rotation of the gear unit. During the motor connection and motor-operating with the help of magnetic field, the gear unit must be operated just at the direction of rotation.

	<p><b>DANGER !</b></p> <p>In the one-way locked gear units, the gear unit must be operated at the direction of lock rotation, otherwise the damage could be occurred.</p>
---	---

Around the mounting position, there must be sured that there are not any materials fused to metal, lubricating tool or elastomers which causes corrosion or will not be emerged.



### 3.2 Gear Unit Mounting

	<p><b>EXPLOSION !</b></p> <p><b>Explosion hazard:</b> Failure to comply may cause severe, or even fatal injuries.</p> <ul style="list-style-type: none"> <li>• No explosive atmosphere must be present when installing the gear unit.</li> <li>• The cooling air supplied to the gear unit/geared motor must be within the permissible temperature range stated on the type plate.</li> <li>• In case of direct sunlight falling onto the gear unit, the cooling air supplied to the gear unit/geared motor must be at least 10°C below the highest permissible temperature of the ambient temperature range Tu, which is stated on the type plate.</li> </ul>
	<p><b>DANGER !</b></p> <p><b>Danger of Burns:</b> The surfaces of gear units or geared motors may become hot during or shortly after operation. Hot surfaces which can be touched directly must be protected with a contact guard.</p>
	<p><b>DANGER !</b></p> <p>Damage to the gear unit due to overheating.</p>

The gear unit may be damaged by overheating.

#### During installation:

- Ensure a free flow of air to all sides of the gear unit.
- Ensure adequate space around the gear unit.
- With geared motors, the cooling air of the motor fan must be able to flow unobstructed onto the gear unit.
- Do not enclose or encase the gear unit/geared motor.
- Do not subject the gear unit to highly energetic radiation.
- Do not direct warm exhaust air from other units onto the gear unit/geared motor.
- The base or flange to which the gear unit is attached must not input any heat into the gear unit during operation.
- Do not allow dust to accumulate in the area of the gear unit
- To prevent overloading of machine equipment which gearbox is connected, supply of extreme current breaker, temperature delimiter, extreme speed monitors etc. equipments by end user is required.
- During operation of urgent stopping system, accumulated energy should be swiftly and securely be distributed or would be isolated the way that no danger is created. Distribution of accumulated energy is related with system connected to the gearbox. Necessary precautions must be taken at those systems.

The base or flange to which the gear unit is fitted should be vibration-free, torsionally rigid and flat (flatness error <0.2 mm).

All contamination to the bolting surfaces of gear unit and base and/or flange must be thoroughly removed. The gear housing must always be earthed. With geared motors, earthing via the motor connection must be ensured.

The gear unit must be precisely aligned with the drive shaft of the machine in order to prevent additional forces from being imposed on the gear unit due to distortion.

Welding of the gear unit is prohibited. The gear unit must not be used as the earth connection for welding work, as this may cause damage to the bearings and gear wheels.

The gear unit must be installed in the correct orientation (please see chapter 3.1 "Prerequisites of Assembly" page 30-31) and (please see chapter 4.1 "Control and Periodic Maintenance" page 41).

All gear unit feet and/or all flange bolts on each side must be used. Bolts must have a minimum quality of 10.9. The bolts must be tightened to the correct torques (please see chapter 3.3 "Bolt Tightening Torque Value" page 33).

Tension-free bolting must be ensured, particularly for gear units with a foot and flange. Oil checking and oil drain screws must be accessible.



### 3.3 Bolt Tightening Torque Value

**Table 10:** Bolt Tightening Moments

Bolt Tightening Moments [Nm]						
Dimensions	Bolt Quality			Cover Bolts	Coupling Bolts	Protective Cover Connection Bolts
	8.8	10.9	12.9			
M4	3.2	5	6	-	-	-
M5	6.4	9	11	-	2	-
M6	11	16	19	-	-	6.4
M8	27	39	46	11	10	11
M10	53	78	91	11	17	27
M12	92	135	155	27	40	53
M16	230	335	390	35	-	92
M20	460	660	770	-	-	230
M24	790	1150	1300	80	-	460
M30	1600	2250	2650	170	-	-
M36	2780	3910	4710	-	-	1600
M42	4470	6290	7540	-	-	-
M48	6140	8640	16610	-	-	-
M56	9840	13850	24130	-	-	-
G½	-	-	-	75	-	-
G¾	-	-	-	110	-	-
G1	-	-	-	190	-	-
G1¼	-	-	-	240	-	-
G1½	-	-	-	300	-	-



### 3.4 Gear Unit Ventilation

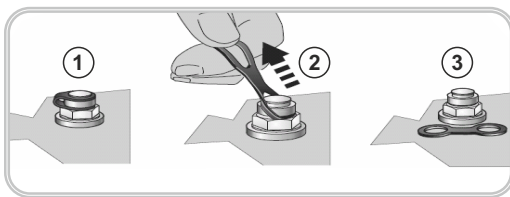
Ensure that no aggressive or corrosive substances are present in the area surrounding the installation site or are subsequently expected during operation, which attack metal, lubricants or elastomers. In case of doubt, please contact PGR and take the recommended action.

The pressure vent must be activated prior to commissioning. To activate, remove the transport securing devices. Double gear units consist of two single units and are equipped with 2 oil chambers and 2 pressure vents. Position of the vent plug (please see chapter 5.2 "Mounting Position" page 52-69).

In moist places or in open air usage, the gear unit which is resistant to corrosion is recommended. The damages in paint (in ventilation plug) must soon be corrected.

The carrying safety of the ventilation plug on the gear unit is to be remove. If ventilation plug was sent separately, it has to be inserted.

**Figure 6:** Activation of Vent Plug



1. The carrying secured ventilation plug,
2. Remove the carrying safety,
3. The ventilation safety is active.

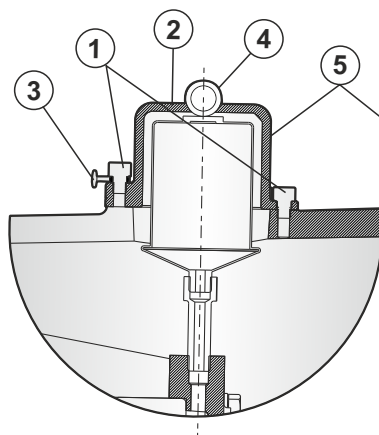
### 3.5 The Operating of the Automatic Lubricating Sensor

At the types of gear unit which used in for installing a standard motor, IEC/NEMA adaptors must be used. At some IEC/NEMA adaptors there is an automatic lubricating sensor for the lubrication of roller bearing. Before the operating of the gear unit, this sensor must be operated. For the operating of the automatic lubricating sensor, there is a red warning label on the protection cap.

1. The inbus bolts (M8 16) must be loosened and removed.
2. The protection cap must be dismantled.
3. The activation bolt must be screwed to the automatic lubricating sensor until the hook on it, is getting broken off.
4. The protection cap must again be seated to it's place and must be fixed with inbus bolt.
5. The activation time must be marked on to the label with indicating month/year.

Our firm is using KLUBER PETAMO GHY 133 as a lubricating material.

**Figure 7:** The Automatic Lubricating Sensor



#### **ATTENTION !!!**

Before the operating of the gear unit, turn the activation bolt which placed next to it, until the hook on it, is getting broken off. The lubrication time is 12 months

#### **The operating time**

##### **MONTHS**

1 2 3 4 5 6 7  
8 9 10 11 12

##### **YEAR**

06 07 08 09 10  
11 12 13 14 15





### 3.6 Temperature Sticker



#### EXPLOSION !

**Explosion hazard:** due to lack of labelling.

Failure to comply may cause severe, or even fatal injuries.

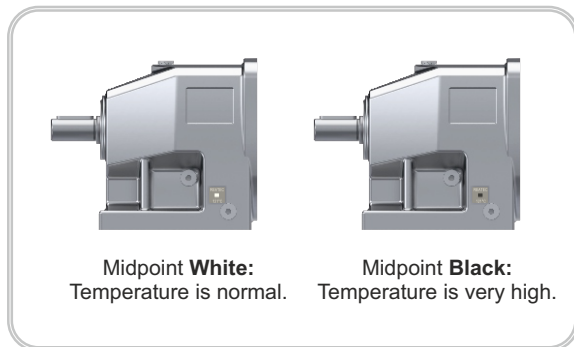
With temperature class **T4** gear units or gear units with a maximum surface temperature of less than **135 °C**, the supplied self-adhesive temperature sticker (printed with value **121 °C**) must be affixed to the gear unit housing.

The temperature class or the maximum surface temperature can be seen from the ATEX labelling in the last line of the type plate.

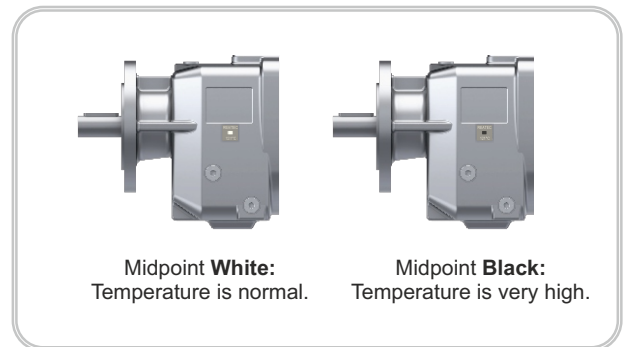
Examples: II 2G c IIC T4 X or II 3D 125 °C X

The temperature sticker must be affixed next to the oil level screw and (please see chapter 4.7 "Temperature Measurement" page 45-46) towards the motor. For gear units with an oil level vessel, the temperature sticker must be affixed in the same position as for gear units without an oil level vessel. For gear units which are lubricated for life, without oil maintenance, the temperature sticker should be affixed next to the type plate.

**Figure 8:** Temperature Sticker (PA)



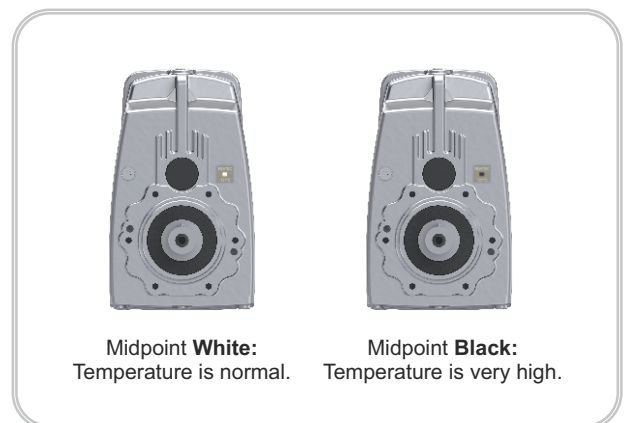
**Figure 9:** Temperature Sticker (PF)



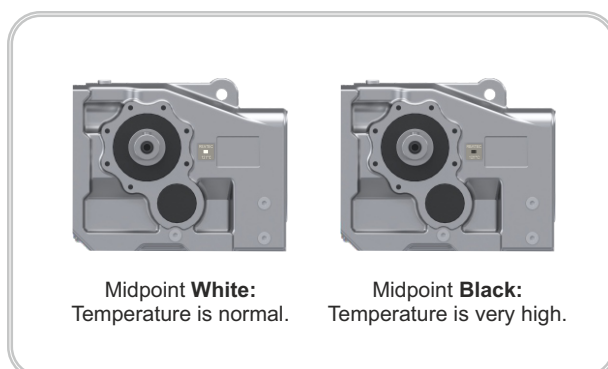
**Figure 10:** Temperature Sticker (PD)



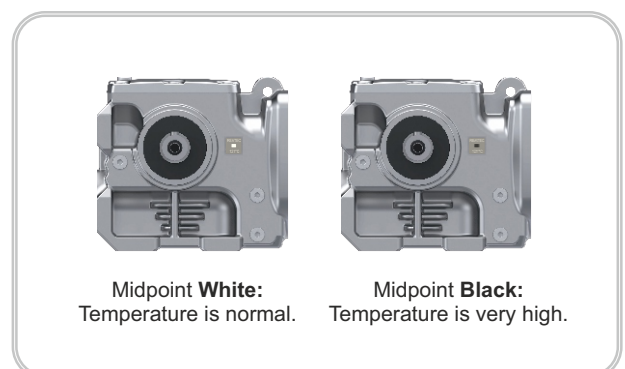
**Figure 11:** Temperature Sticker (PM)



**Figure 12:** Temperature Sticker (PKD)



**Figure 13:** Temperature Sticker (PSH)





### 3.6.1 Visual Inspection of the Temperature Sticker

	<b>EXPLOSION !</b>
	<b>Explosion hazard:</b> Failure to comply is likely to cause severe or even fatal injuries.
	<ul style="list-style-type: none"> <li>• Check whether the temperature sticker has turned black.</li> <li>• If the temperature sticker has turned black, the gear unit has become too hot.</li> </ul>

The cause of overheating must be established. Please contact the PGR service department immediately. The drive unit must not resume operation before the cause of overheating has been remedied and renewed overheating can be ruled out. Before putting into operation again, a new temperature-sensitive adhesive label must be attached to the gear unit. Remove dust (only necessary for category 2D)

	<b>EXPLOSION !</b>
	<b>Explosion hazard:</b> Failure to comply is likely to cause severe or even fatal injuries.
	<ul style="list-style-type: none"> <li>• Dust deposits on the gear unit housing must be removed if they are more than 5 mm thick.</li> </ul>

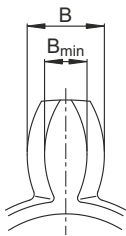
### 3.7 Checking the Coupling

(Only necessary for category 2G and IEC / NEMA standard motor attachments)

The motor must be removed. Plastic or elastomer coupling components must be examined for traces of wear. If the limiting values listed below for the particular coupling versions and sizes are exceeded, the plastic or elastomer coupling components must be replaced.

	<b>NOTE !</b>
	Only use replacement parts with the same colour.

With claw couplings (ROTEX®) the tooth thickness of the elastomer gear rim must be measured as shown in the illustration.  $B_{min}$  is the minimum permitted tooth thickness.



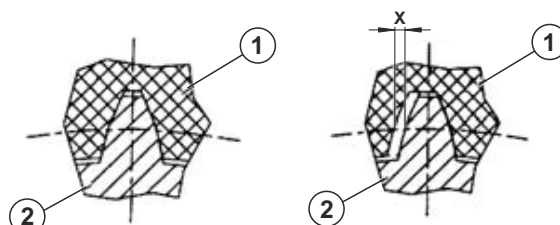
**Figure 14:** Measurement of Gear Rim Wear on the ROTEX® Claw Coupling

**Table 11:** Limiting Wear Values for Coupling Gear Rims

Limiting Wear Values for Coupling Gear Rims							
Type	R14	R24	R38	R42	R48	R65	R90
B [mm]	9.7	8.6	13.3	15.7	17.7	22.2	32.3
$B_{min}$ [mm]	7.7	5.6	10.3	11.7	13.7	17.2	24.3

For gear couplings, the limiting wear value is  $X = 0.8$  mm, as shown in the following illustration.

1. Sleeve
2. Hub



**Figure 15:** Measurement of Gear Sleeve Wear for Gear BoWex® Couplings

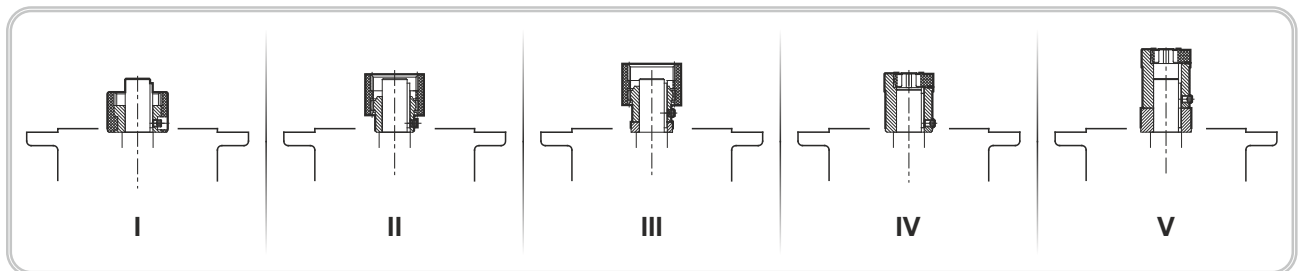


### 3.8 The Mountage of the Standard B5 Motor to the IEC Gear Unit

Assembly procedure to attach a standard motor to the IEC adapter;

1. Clean motor shaft and flange surfaces of motor and adapter and check for damage. The mounting dimensions and tolerances of the motor must conform to DIN EN 60079-0 / NEMA MG1 Part 4.
2. Push the coupling sleeve onto the motor shaft so that the motor parallel key engages into the groove in the sleeve on tightening.
3. Tighten the coupling sleeve on the motor shaft in accordance with the motor manufacturer's instructions until it touches the collar. With motor sizes 90, 160, 180 and 225, any spacer bushes must be positioned between the coupling sleeve and the collar. With standard helical gear units, dimension B between the coupling sleeve and the collar must be observed (see Figure 16). Certain NEMA adapters require the adjustment of the coupling in accordance with the specifications indicated on the adhesive plate.
4. If the coupling half contains a threaded pin, the coupling must be secured axially on the shaft. The threaded pin must be coated prior to use with a securing lubricant e.g. Loctite 242, Loxeal 54-03 and tightened to the correct torque (please see chapter 3.3 "Bolt Tightening Torque Value" page 33).
5. The flange surfaces of motor and adapter must be completely coated with surface sealant e.g. Loctite 574 or Loxeal 58-14 prior to mounting the motor, so that the flange seals after mounting. (only necessary for category 2D gear units-see ATEX labelling on the last line of the gear unit type plate) Sealing of the flange surfaces is also recommended for installation outdoors or in damp environments.
6. Mount the motor to the adapter. Do not forget to fit the gear rim or the sleeve (see Figure 16).
7. Tighten the adapter bolts to the correct torque (please see chapter 3.3 "Bolt Tightening Torque Value" page 33).

Figure 16: Coupling Types for IEC Adapter



- I Curved tooth coupling (BoWex®) single part
- II Curved tooth coupling (BoWex®) two-part
- III Curved tooth coupling (BoWex®) two-part with spacer bush
- IV Claw coupling (ROTEX®) two-part
- V Claw coupling (ROTEX®) two-part, observe dimension B



#### EXPLOSION !

**Explosion hazard:** Failure to comply is likely to cause severe or even fatal injuries.

- Only standard motors with an adequate ATEX Zone category according to the type plate may be used.
- In addition, for ATEX category 2D gear units (see the ATEX labelling on the last line of the gear unit type plate), the motor must have at least protection class IP6x.

The maximum permitted motor weights indicated in the table below must not be exceeded:

Table 12 : Max. Motor Weight

Maximum Permitted Motor Weights														
IEC Motor Size	63	71	80	90	100	112	132	160	180	200	225	250	280	315
Max. Motor Weight (Kg)	25	30	40	50	60	80	100	200	250	350	500	700	1000	1500



for vertical motor mounting only, (installation position M2, M4) a %50 higher maximum weight is permissible under the following conditions:

- Use screws with strength class 10.9 to fasten the motor.
- The base or flange to which the gear unit is fitted should be vibration-free, torsionally rigid and flat.
- When transporting the geared motor, the motor must be lifted with suitable lashings.



**DANGER !**

For IEC motors, which have a %50 higher maximum weight, the ring bolt may tear out of the gear unit and severe injuries may result from the falling geared motor. The motor must be lifted with suitable lashings for transport.



**DANGER !**

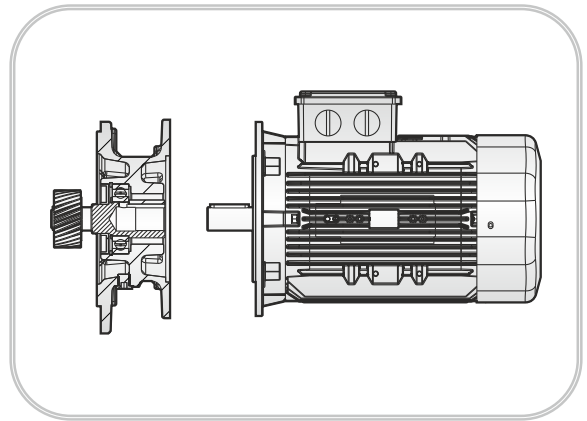
Severe injuries may be caused by rapidly rotating parts when installing and servicing couplings. Secure the drive unit against accidental switch-on.

Gear units with IEC/NEMA adapters must be operated with self-ventilated motors which comply with IC411 (TEFC) or IC416 (TEBC) externally ventilated motors compliant with EN 60034-6, which generate a continuous airflow towards the gear unit. Please contact PGR if the use of IC410 (TENV) motors without fans is intended.

### 3.9 The Mountage of the Standard B5 Motor to the PAM Gear Unit

1. The motor and the solid output shaft of the motor with PAM adapted, flange surfaces must be cleaned and damage control must be made. The sizes and tolerances of the motor fixing elements must be suitable to EN 60079-0.
2. Must be pushed till to stand to the block of motor solid output shaft.
3. If the mountage is to be done in open air and the environment is wet, it is recommended that the surfaces of the motor flange and PAM adaptor have to be isolated. Before and after the motor mounting, in the shape of flange is isolated, loctite 574 or loxeal 58-14 surface isolation material should be used to flange surfaces.
4. The motor, must be installed to PAM adaptor.
5. The bolt of the PAM adaptor has to be mounted with suitable tightening moment.

**Figure 17:** The Mountage of the Standard B5 Motor to the PAM Gear Unit



**EXPLOSION !**

- If all controls that were stated above are positive and all instructions were performed completely/properly, electric motor could be set up with ATEX protection that is suitable to the gearbox and in the same way 2014/34/EU regulation adaptable a gearbox motor could be generated.

Although during the connection of motor and gearbox, in the use of a process which is not stated in this handbook and/or not follow a single or more instructions, the operator should calculate analysis and must define by himself that the risk could emerge from motor-gearbox connection. In the situation of gearbox would be feeding motor, this risk analysis will always be required.

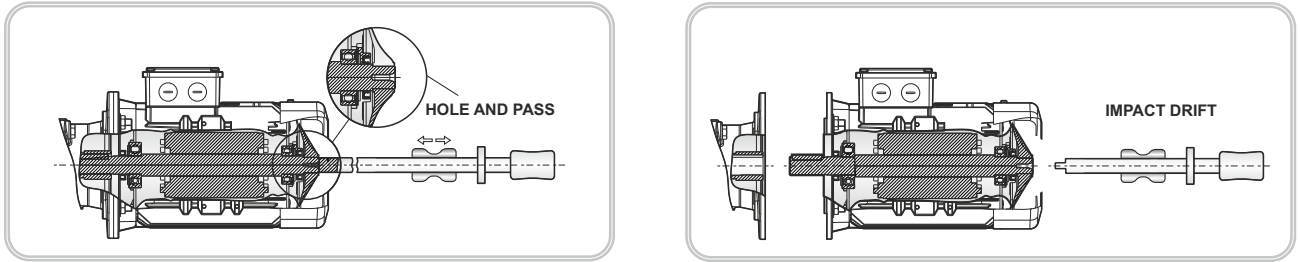
Only just in this manner, complete system would be subject to both certificate of manufacturer and 2014/34/EU regulation adaptable gearbox.



### 3.10 The Demountage of the Electrical Motor (IEC, PAM)

During the operating, it is crucial that the surface of the connection tool between the motor and gear unit is not rusted, for the removal of the motor not to exercise excessive load is necessary. During the separation of motor from the gear unit without forcing, the method at the below must be implemented. Must be avoided the implementations that causes strain and harm to the gear unit.

Figure 18: The Demountage of the Electrical Motor (IEC, PAM)



1. By fan with drilling the motor solid output shaft, the thread cutting must be opened.
2. The impact drift has to be installed to the threaded place.
3. The connection screws between the motor and gear unit must be removed.
4. By the help of impact drift inertial force, the motor must be separated from the gear unit.

The using of slots both in the bodies of PAM and IEC, with the help of screwdriver or lever in a way that the motor is not getting harmed, may be removed by pushing back.

### 3.11 Gear Unit Operating



#### EXPLOSION !

**Explosion hazard:** Failure to comply may cause severe, or even fatal injuries.

- When operating the gear unit, the instructions in this operating manual must be complied with.
- The prescribed inspection and servicing intervals must be complied with.
- It must be ensured that the power ratings stated on the type plate are not exceeded. If, e.g. for variable speed drive units, there are several operating points, the maximum permissible drive power P1 or the maximum permissible torque on the driven shaft M2 or the maximum permissible speed must not be exceeded at any operating point. Overload of the gear unit must be ruled out.
- If the gear unit is equipped with a cooling coil, it may only be put into operation if the cooling coil has been connected to the cooling circuit and the cooling circuit is in operation. The temperature of the cooling fluid and the cooling fluid flow rate must be monitored and ensured by the operator.
- Gear units with an integrated back stop on the drive shaft may only be operated at more than the minimum speed of the gear unit drive shaft,  $n_{1min} = 900$  rpm.
- The painting of the gear unit is designed for Category 2G Group IIB (Zone 1 Group IIB). For use in Category 2G Group IIC (Zone 1 Group IIC) the gear unit must not be used or installed in areas in which processes which cause electrostatic charging are to be expected. This also includes occasional manual rubbing of the gear unit housing; cleaning may only be carried out with a cloth which is moistened with water.
- During operation, if any of the irregularities described in Section (chapter 4.9 page 47) are detected, or the temperature sticker has turned black, the gear unit must be shut down and PGR must be consulted.



### 3.12 Installation of an Oil Expansion Tank

The expansion tank must be installed vertically with the hose connection facing downwards and the vent plug upwards. If the tank is not fitted, observe the following steps for fitting:

- After installing the gear unit (motor), remove the vent screw on the gear unit.
- For modules 0.7 I, 2.7 I and 5.4 I the reduction / extension is screwed in with the existing sealing ring.
- Now fit the expansion tank (see below for suggested position).



#### **NOTE !**



If the necessary screw insertion depth of 1.5d can no longer be achieved, use a 5 mm longer screw. If a longer screw cannot be fitted, use a stud and a nut with appropriate dimensions. If the fastening screw is screwed into a through hole, seal the thread with a medium strength screw securing material such as LOXEAL 54-03 or Loctite 242.

- The tank should be fitted as high as possible. - Note the length of the hoses!
- After this, fit the vent hose with the enclosed hollow screws and seals.
- Finally, screw the enclosed M12x1.5 vent screw and sealing ring into the tank.

For ATEX gear units, screw the enclosed M12x1.5 vent screw into the tank.



### 4.1 Control and Periodic Maintenance

	<p><b>EXPLOSION !</b></p> <p><b>Explosion hazard:</b> Failure to comply may cause severe or even fatal injuries. Before commissioning, the oil level must be checked with the supplied dipstick.</p>
	<p><b>DANGER !</b></p> <p><b>Danger of burns due to hot oil:</b></p> <ul style="list-style-type: none"> <li>• Allow the gear unit to cool down before carrying out maintenance or repair work.</li> <li>• Wear protective gloves.</li> </ul>

The installation position must comply with the version on the type plate. Section 5.2 "Mounting Positions" page 52-69 describes the versions and the corresponding oil level screws. With double gear units, the oil level must be checked on both units.

The pressure vent must be at the position marked in Section 3.4 "Gear Unit Ventilation" page 34.

The oil level does not need to be checked on gear units without oil level screw.

Gear unit types that are not supplied full of oil must be filled before the oil level is checked. (please see chapter 6.2 "Lubricant Fill Quantities" page 71-88).

Check the oil level with an oil temperature of between 20 °C to 40 °C.

#### Checking the Oil Level:

1. The oil level may only be checked when the gear unit is at a standstill and has cooled down. The gear unit must be secured to prevent accidental switch-on.
2. **Gear units with oil level screw:**
  - The oil level screw corresponding to the version must be screwed out (please see chapter 4.1 "Control and Periodic Maintenance" page 41).
  - Please control oil (lubricant) level at the gearbox.
  - Maximum oil (lubricant) level would be top of the hole of oil level.
  - The minimum oil level is approx. 4 mm below the lower edge of the oil level hole. The dipstick then just dips into the oil.
  - If the oil level is not correct, it must be adjusted by draining off oil or topping up with the type of oil stated on the type plate.
  - If the integrated seal of the oil level screw is damaged, a new oil level screw must be used or the thread cleaned and coated with securing adhesive, e. g. Loctite 242, Loxeal 54-03 prior to insertion.
  - Fit the oil level screw together with the sealing ring and tighten to the correct torque (please see chapter 3.3 "Bolt Tightening Torque Value" page 33).
  - If the pressure vent has been unscrewed, reinsert it together with the sealing ring and tighten to the correct torque (please see chapter 3.3 "Bolt Tightening Torque Value" page 33).
  - Mount all removed attachments again.
3. **Gear units with an oil level tank:**
  - The oil level in the oil level tank must be checked with the aid of the dipstick plug (thread G1¼). The oil level must be between the upper and lower marking when the dipstick is fully screwed in; (see Figure 20-21-22) These gearboxes may only be operated in the version stated in Section 5.1 "Additional Oil Volume and Oil Tank for the M4 Mountage Position" page 50-51.
4. **Gear units with oil inspection glass:**
  - The oil level can be seen directly in the window.
  - The correct oil level is: the middle of the oil inspection glass.
  - If the oil level is not correct, it must be adjusted by draining off oil or topping up with the type of oil stated on the type plate.
5. **Final check:**
  - All previously removed screws must be screwed back in correctly.






#### 4.1.1 Service and Maintenance Time Periods

**Table 13:** Service and Maintenance Time Periods

Service and Maintenance Intervals	Service and Maintenance Work	Information see Section
Weekly or every 100 operating hours.	<ul style="list-style-type: none"> <li>• Visual inspection for leaks.</li> </ul>	4.4
	<ul style="list-style-type: none"> <li>• Check the gear unit for unusual running noises and/or vibrations.</li> </ul>	4.3
	<ul style="list-style-type: none"> <li>• Only for gear units with cooling cover: Visual inspection of the temperature sticker.</li> </ul>	3.6 3.6.1
Every 2500 operating hours, at least every six months.	<ul style="list-style-type: none"> <li>• Check the oil level.</li> </ul>	4.1
	<ul style="list-style-type: none"> <li>• Visual inspection of the rubber buffer.</li> <li>• Visual inspection of hose.</li> <li>• Visual inspection of shaft sealing ring</li> </ul>	4.2
	<ul style="list-style-type: none"> <li>• Visual inspection of the temperature sticker.</li> </ul>	3.6
	<ul style="list-style-type: none"> <li>• Remove dust. (Only for category 2D).</li> </ul>	4.10
	<ul style="list-style-type: none"> <li>• Check the coupling (Only for category 2G and standard IEC / NEMA motor attachment).</li> </ul>	3.7
	<ul style="list-style-type: none"> <li>• Re-grease / remove excess grease (only applicable for free drive shaft / Option W and for agitator bearings / Option VLII / VLIII)</li> </ul>	4.1
	<ul style="list-style-type: none"> <li>• Clean or replace the pressure vent screw.</li> </ul>	3.4
Every 5000 operating hours, at least every year (only for standard IEC / NEMA motor attachment)	<ul style="list-style-type: none"> <li>• Replace the automatic lubricant dispenser / remove excess grease , empty or replace the grease collection container at each second replacement of the lubricant dispenser.</li> </ul>	3.5
For operating temperatures up to 80 °C every 10000 operating hours at least every 2 years.	<ul style="list-style-type: none"> <li>• Change the oil. (The interval is doubled if filled with synthetic products).</li> </ul>	4.5
	<ul style="list-style-type: none"> <li>• Replace the shaft sealing rings</li> </ul>	3.5
Every 20000 operating hours at least every 4 years.	<ul style="list-style-type: none"> <li>• Re-lubrication of the bearings in the gear unit.</li> </ul>	6.1
Interval as stated in field MI of the type plate (only for Category 2G and 2D) or at least every 10 years.	<ul style="list-style-type: none"> <li>• General overhaul.</li> </ul>	4.10




### 4.2 Visual Inspection

	<b>EXPLOSION !</b>
	<p><b>Explosion hazard:</b> Failure to comply may cause severe, or even fatal injuries. All work, e.g. transportation, storage, installation, electrical connection, commissioning, servicing and maintenance must be performed in a non-explosive atmosphere.</p> <p><b>The drive unit must be inspected and may only be installed if:</b></p> <ul style="list-style-type: none"> <li>• No damage, e.g. due to storage or transport is apparent. In particular the radial seals, the sealing caps and the covers must be inspected for damage.</li> <li>• No leakage or no oil loss is visible.</li> <li>• No corrosion or other indications of incorrect or damp storage is apparent.</li> <li>• The packaging material has been completely removed.</li> </ul>


The PAM and W input shaft bearings of the gear unit are the double capped bearings which form interruption. (ZZ or 2RS) These are with the inner ring, form long sealing space. By this way the bearing operates almost frictionlessly. Losses could be minimized and in these bearings the temperature rises could not be seen. Because of the storage and carrying, before the operation of gear unit and during at first operation, low amount of grease could flow out from bearing, this type of oil leak could not create any technical failure, the safety of gear unit and bearing operation could not be effected.


### 4.3 Check for Running Noises

	<b>EXPLOSION !</b>
	<p><b>Explosion hazard:</b> Failure to comply is likely to cause severe or even fatal injuries. If the gear unit produces unusual running noises and/or vibrations, this could indicate damage to the gear unit. In this case the gear should be shut down and a general overhaul carried out.</p>

#### Visual inspection of the temperature sticker;

Only necessary for temperature class **T4** or max. surface temperature **< 135 °C**.

	<b>NOTE !</b>
	<p><b>Shaft sealing rings;</b> Shaft sealing rings are rubbing seals and have sealing lips made from an elastomer material. These sealing lips are lubricated with a special grease at the factory. This reduces the wear due to their function and ensures a long service life.</p>

	<b>EXPLOSION !</b>
	<p><b>Explosion hazard:</b> Failure to comply may cause severe, or even fatal injuries. If any irregularities are seen during controlling which were explained above, should be consulted to PGR and gearbox has to be stopped immediately.</p>



#### 4.4 Control of the Lubricant and Lubricant Level



##### EXPLOSION !

**Explosion hazard:** Failure to comply is likely to cause severe or even fatal injuries. The gear unit must be checked for leaks. Attention should be paid to escaping gear oil and traces of oil on the exterior or underneath the gear unit. In particular, the radial seals, cover caps, screw plugs, hoses and housing joints should be checked.

If leaks are suspected, the gear unit should be cleaned, the oil level checked and checked again for leaks after approx. 24 hours. If a leak is confirmed (dripped oil), the gear unit must be repaired immediately. Please contact the PGR service department.

If the gear unit is equipped with a cooling coil in the housing cover, the connections and the cooling coil must be checked for leaks. If there are any leaks, these must be repaired immediately. Please contact the PGR service department.

#### 4.5 Changing the Oil



##### EXPLOSION !

**Explosion hazard:** Failure to comply may cause severe, or even fatal injuries. When changing oil or filling for the first time, the type of lubricant stated on the type plate must be used.

To prevent the emergence of the danger of burning, must be waited until the gear unit got cooled. The oil level, draining and position of ventilation plugs are dependent on mounting position. For the mounting position, related pages from catalogue could be seen. When the oil-changing process, the gear unit should be at operating temperature. The electric connection of motor driving unit must be cut and got into safety for re-activation.



##### NOTE !

Because of the coldness of oil will affected the flowing and venting, the gear unit must not be cooled fully.

#### Changing the oil;

- Oil level plug, oil draining plug and ventilation plug must be removed.
- Both the oil is completely drained and the cleaning of gear unit must be made with proper solvent.
- The leakproofing elements on gear unit must be changed with original items.
- The oil draining plug must be put back to it's own place again.
- If the oil draining and level plug's gear part are damaged, instead of these, the new plug must be used.
- Before putting on the plugs, the sticky must be applied to the gear part like Loctite 242. If the aluminum washer is damaged, the new one must be used.
- The aluminum washer must be put lower and oil draining bolt must be bolted with proper moment.
- The oil according to mounting position must be filled from the vent hole with the proper draining device to the amount which is shown in catalogue. (could be filled from hole which is on the oil level). If the oil type is changed. Must be consulted to our firm.
- After the filling process, all plugs should be closed.
- 30 minutes after the oil filling, oil level must be controlled.

**At high temperatures or at hard working conditions (high humidity, corrosive environment or high temperature fluctuations), the oil changing ranges must be reduced by half.**




### 4.6 Oil Plugs Squeezing Torc Chart

**Table 14:** Oil Plugs Squeezing Torc Chart

Plug	Torc [Nm]
1/4"	7
3/8"	7
1/2"	12

### 4.7 Temperature Measurement

The details of the ATEX temperature class or the maximum surface temperature are based on normal installation conditions (please see chapter 3.6 "Temperature Sticker" page 35). Even small changes to the installation conditions can have a significant effect on the temperature of the gear unit.




**EXPLOSION !**

**Explosion hazard:** Failure to comply may cause severe, or even fatal injuries. On commissioning, a surface temperature measurement of the gear unit must be made under maximum load. (This does not apply to gear units which are labelled as temperature class **T4** or a maximum surface temperature of **130°C** in the last line of the type plate.)

For the temperature measurement, a normal temperature measuring device is required, with a measurement range from 0°C to 130°C and a precision of at least  $\pm 4^\circ\text{C}$  and which enables the measurement of the surface temperature and the temperature of the air. Temperature measurement procedure:

1. Allow the gear unit to run at maximum speed under maximum load for approx. 4 hours.
2. Following warm-up, the temperature of the gear unit housing surface " $T_{gm}$ " must be measured close to the temperature indication label .
3. Measure the temperature of the air " $T_{um}$ " in the immediate vicinity of the gear unit.



**EXPLOSION !**

**Explosion hazard:** Failure to comply may cause severe, or even fatal injuries. The gear unit must be shut down and PGR must be consulted if any of the following criteria do not apply.

- The measured air temperature " $T_{um}$ " is within the permissible range stated on the type plate;
- The measured temperature of the surface of the gear unit housing " $T_{gm}$ " is below 121°C and the temperature indication label has not turned black (see Figure 19).
- The measured temperature of the surface of the gear unit housing plus the difference between the highest permissible air temperature " $T_u$ " stated on the type plate and the measured air temperature must be at least 15°C lower than the maximum permissible surface temperature, i.e.:



<b>ATEX labelling:</b> II 2G Ex h IIC T4 Gb	: $T_{gm} + T_u - T_{um} < 135\text{ °C} - 15\text{ °C}$
<b>ATEX labelling:</b> II 2D Ex h IIC T120°C Db	: $T_{gm} + T_u - T_{um} < T_{max} - 15\text{ °C}$
<p><b>T<sub>gm</sub></b> : Measured temperature of the surface of the gear unit housing in °C</p> <p><b>T<sub>um</sub></b> : Measured air temperature in °C</p> <p><b>T<sub>max</sub></b> : Maximum surface temperature according to gear unit type plate (ATEX labelling) in °C</p> <p><b>T<sub>u</sub></b> : Upper value of the permissible ambient temperature range according to the type plate in °C</p>	

Figure 19: Temperature Sticker



#### 4.8 Operation with Frigorific

	<b>EXPLOSION !</b>
	<p><b>Explosion hazard:</b> Failure to comply may cause severe, or even fatal injuries. The temperature of the cooling water and the cooling water flow rate must be supervised and ensured by the operator.</p> <p>The ATEX approval is void if these instructions are not observed!</p>
	<b>ATTENTION !</b>
	<p><b>The gear unit may be damaged by overheating:</b></p> <p>The drive may only be commissioned after the cooling spiral has been connected to the cooling circuit, and the cooling circuit has been put into operation.</p>

Operation with lubricant cooling The coolant must have a similar thermal capacity as water (specific thermal capacity at 20 °C  $c=4.18\text{ kJ/kgK}$ ). Industrial water without any air bubbles or sediments is recommended as a coolant. The hardness of the water must be between 1 dH and 15 dH; the pH value must be between pH 7.4 and pH 9.5. No aggressive liquids may be added to the coolant!

The **coolant pressure** must **not exceed 8 bar**. The required **quantity of coolant** is **10 litres/minute**, and the **coolant inlet temperature** must **not exceed 40 °C**; we recommend **10 °C**.

We also recommend fitting a pressure reducer or similar at the coolant inlet to avoid damage due to excessive pressure.

If there is a danger of frost the operator should add a suitable anti-freeze solution to the cooling water.



### 4.9 Checking the Gear Unit

During a test run under full load, the gear unit should be checked for:

- Unusual noises, such as grinding, knocking or rubbing noises,
- Unusual vibrations, oscillations or other movements,
- Production of steam or smoke.

After the test run, the gear unit should be checked for:

- Leaks,
- Slippage of the shrink disks. For this, the cover must be removed and a check carried out whether the marking described in (Section 7.1 "Shrink Disc" page 80). Shows a relative movement of the hollow shaft of the gear unit and the machine shaft. After this, the cover must be fitted as described in (Section 7.2 "The Mounting Of The Protection Caps" Page 82).



#### 4.9.1 Checklist

Table 15: Checklist

CHECKLIST	
Subject of Check	Information see Section
Is any transportation damage or damage apparent?	4.2
Does the labelling on the type plate conform to the specifications?	2.1
Does the configuration on the type plate conform to the actual installation?	3.1
Is the pressure vent screwed in?	3.4
Do all drive and driven elements have ATEX approval?	7.2
Are the external gear shaft forces within permitted limits (chain tension)?	3.1
Are contact guards fitted to rotating components?	4.6
Does the motor also have a relevant ATEX approval?	4.1
Is the temperature sticker affixed?	3.6
Has the correct oil level for the configuration been checked?	4.1 4.4
Is the automatic lubricant dispenser activated?	3.5
Has the temperature measurement been carried out?	3.6 3.6 .1
Has the centre of the temperature sticker turned black?	4.7
Is the cooling cover connected to the cooling circuit?	4.8
Has the gear unit been checked with a test run?	4.8
Has the shrink disk connection been checked for slippage?	7.1



#### 4.10 General Overhaul

	<p><b>EXPLOSION !</b></p> <p><b>Explosion hazard:</b> Failure to comply is likely to cause severe or even fatal injuries.</p> <ul style="list-style-type: none"> <li>• No explosive atmosphere must be present during servicing and repair work. Servicing and maintenance work must only be performed by qualified specialist personnel.</li> <li>• When cleaning the gear unit, do not use procedures or materials which may cause electrostatic charging of the gear unit or adjacent non-conducting components.</li> </ul>
	<p><b>ATTENTION !</b></p> <p><b>Severe personal injury:</b></p> <ul style="list-style-type: none"> <li>• Severe injury and material damage may be caused by incorrect servicing and maintenance work.</li> <li>• Servicing and maintenance work must only be performed by qualified specialist personnel. Wear the necessary protective clothing for servicing and maintenance work (e.g. industrial footwear, protective gloves, goggles, etc.)</li> </ul>

With Category 2G and 2D gear units, a general overhaul is necessary after a specified longer period of operation. The specification of the operating period in terms of operating hours, after which a general overhaul must be carried out, can be seen from the type plate data in field MI.

Alternatively, the maintenance class  $C_M$  can be used to determine the operating period after which a general overhaul must be carried out. The data in field MI of the type plate is then e. g.: MI  $C_M = 5$ .

The time for the general overhaul with the stated maintenance class  $C_M$  is calculated as follows:

$$N_A = C_M \cdot f_L \cdot k_A$$

$N_A$  : Number of years since commissioning. With calculated values of  $N_A$  which exceed 10 years, a general overhaul is due 10 years after commissioning.


$C_M$  : Maintenance class according to field MI of the type plate.

$f_L$  : Running time factor.

$f_L = 10$	Running time maximum 2 hours per day
$f_L = 6$	Running time 2 to 4 hours per day
$f_L = 3$	Running time 4 to 8 hours per day
$f_L = 1.5$	Running time 8 to 16 hours per day
$f_L = 1$	Running time 16 to 24 hours per day

$k_A$  : Utilisation factor

If the utilisation factor is not known ,  $k_A = 1$

	<p><b>ATTENTION !</b></p> <p>The general revision should be made by the qualified personnel with considering the international laws and regulations in the plants which has the required equipments. We recommend that the general revision has to be made at the PGR service.</p>
---	--

Longer maintenance intervals often result if the actual power required by the application is known. The utilisation factor may be calculated as follows:

$$k_A = \left( \frac{P_1}{P_{tat}} \right)^3$$





$P_1$  : max. permissible drive power or motor power in kW according to the type plate.

$P_{tat}$  : actual drive power or motor power in kW which is required by the application at the nominal speed. This is determined e. g. by measurements.

For variable loads with differing actual drive powers with nominal speeds  $P_{tat1}$ ,  $P_{tat2}$ ,  $P_{tat3}$ , ... with known percentage times  $q_1$ ,  $q_2$ ,  $q_3$ , ... the following equivalent average drive power applies:

$$P_{tat} = \sqrt[3]{P_{tat1}^3 \cdot \frac{q_1}{100} + P_{tat2}^3 \cdot \frac{q_2}{100} + P_{tat3}^3 \cdot \frac{q_3}{100} + \dots}$$



### **PATLAMA !**

**Explosion hazard:** Failure to comply may cause severe or even fatal injuries.

- The general overhaul must be carried out by qualified personnel in a specialist workshop with appropriate equipment in observance of national regulations and laws. We urgently recommend that the general overhaul is carried out by PGR Service.

If a general overhaul is due, the gear unit must be completely dismantled. The following work must be carried out:

- All parts of the gear unit must be cleaned.
- The damage control must be done to all parts of the gear unit.
- The damaged parts must be changed with original part.
- All roller bearings must be changed.
- If there are, locks must be changed.
- All oil seals and nilos caps must be changed.

All plastic and elastomer parts of the motor coupling must be changed.

### **4.11 The Maintenance of the Motor**

Our firm recommends to change the grease in greased bearings.

Before the start of motor maintenance, the operator should closed the unit, must be sured that it is out of service and must taken all the measures against any accident or unexpected load.

- To prevent overheating, if there is, the dust coat on it must be cleaned.
- The bearings must be dismantled, cleaned and greased.
- By 1/3 of bearing, the grease must be used.
- The proper grease must be selected from the oil tables.
- Motor oil seals must be changed.



### 5.1 Additional Oil Volume and Oil Tank for the M4 Mountage Position

Additional lubricant volume unit uses for preventing oil leakage from venting plug when gear unit is mounted with M4 mounting position. It is important because at vertical mounting position oil could be foamed.

**Figure 20: The Oil Level Tank and Oil Level Control (PA / PF)**

**PA / PF**

Catalog: PA/PF  
Page :48

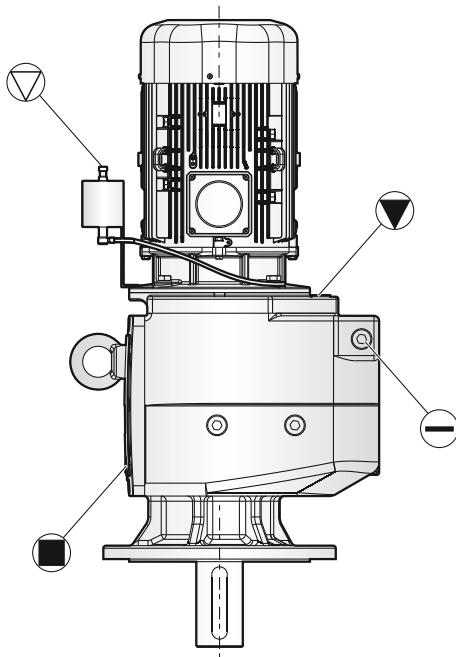




Figure 21: The Oil Level Tank and Oil Level Control (PD / PM)

### PD / PM

Catalog: PD/PM  
Page : 67

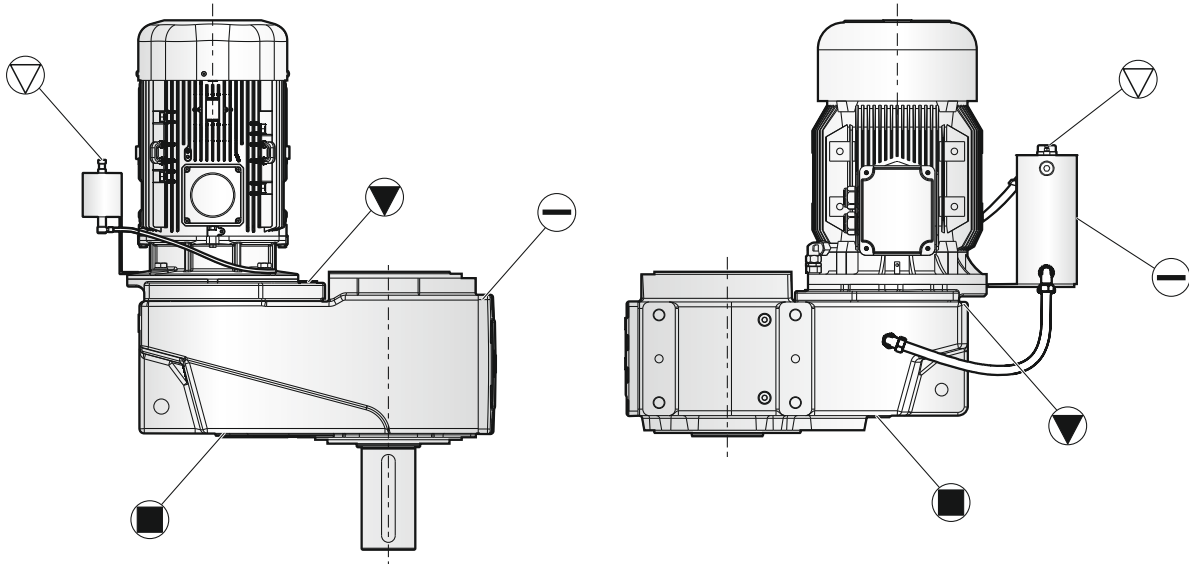
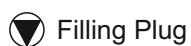
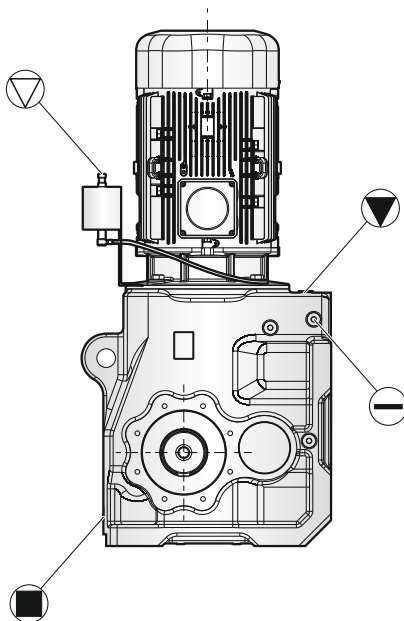


Figure 22: The Oil Level Tank and Oil Level Control (PKD)

### PKD

Catalog: PD/PM  
Page : 71



Filling Plug



Vent Plug



Oil Level Plug



Drain Plug



## 5.2 Mounting Positions

Install the gearbox at the projected mountage position. For the other mountage positions except this one, please consult to our Technical Service.

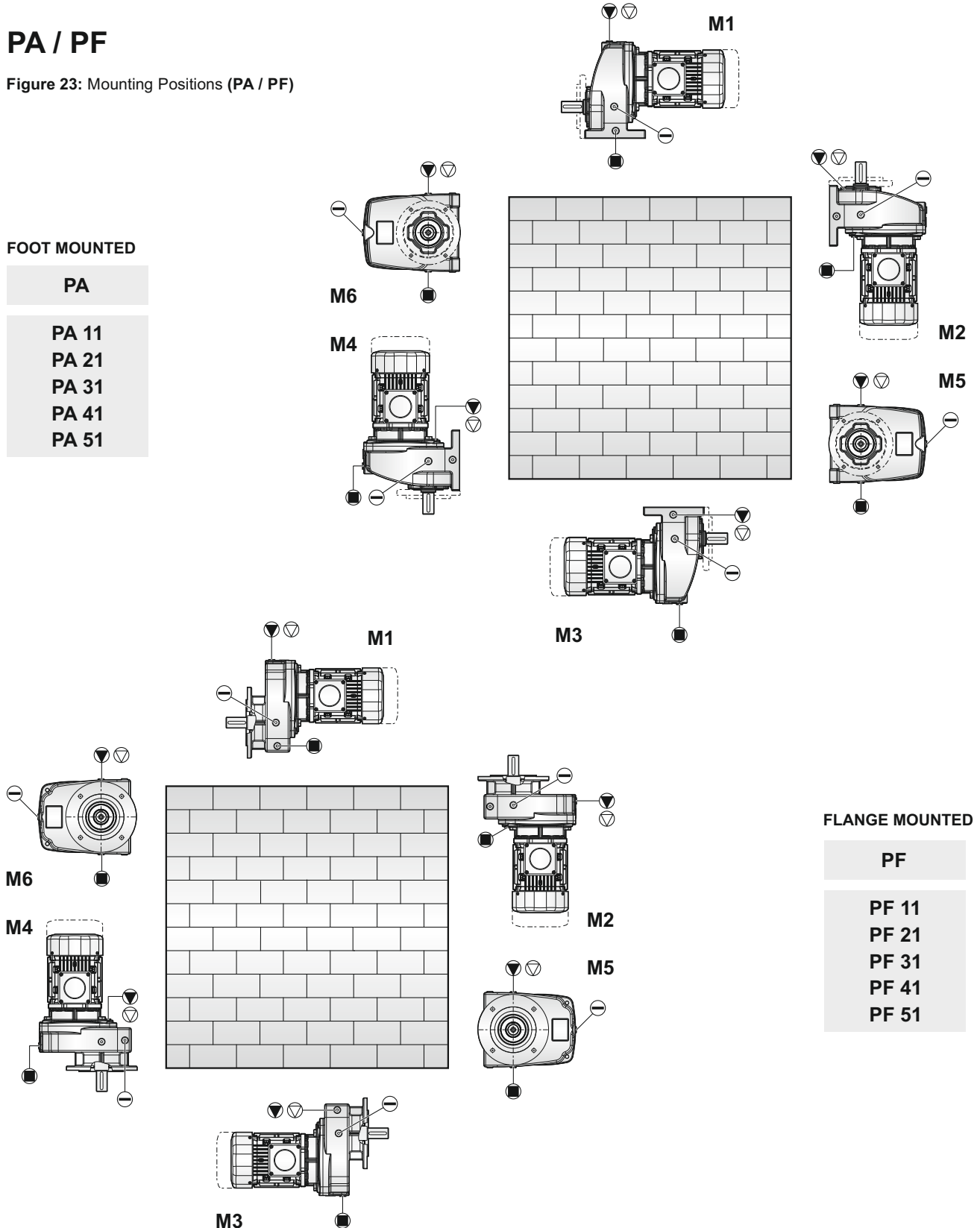
### PA / PF

Figure 23: Mounting Positions (PA / PF)

#### FOOT MOUNTED

##### PA

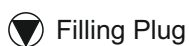
PA 11  
PA 21  
PA 31  
PA 41  
PA 51



#### FLANGE MOUNTED

##### PF

PF 11  
PF 21  
PF 31  
PF 41  
PF 51



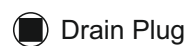
Filling Plug



Vent Plug



Oil Level Plug



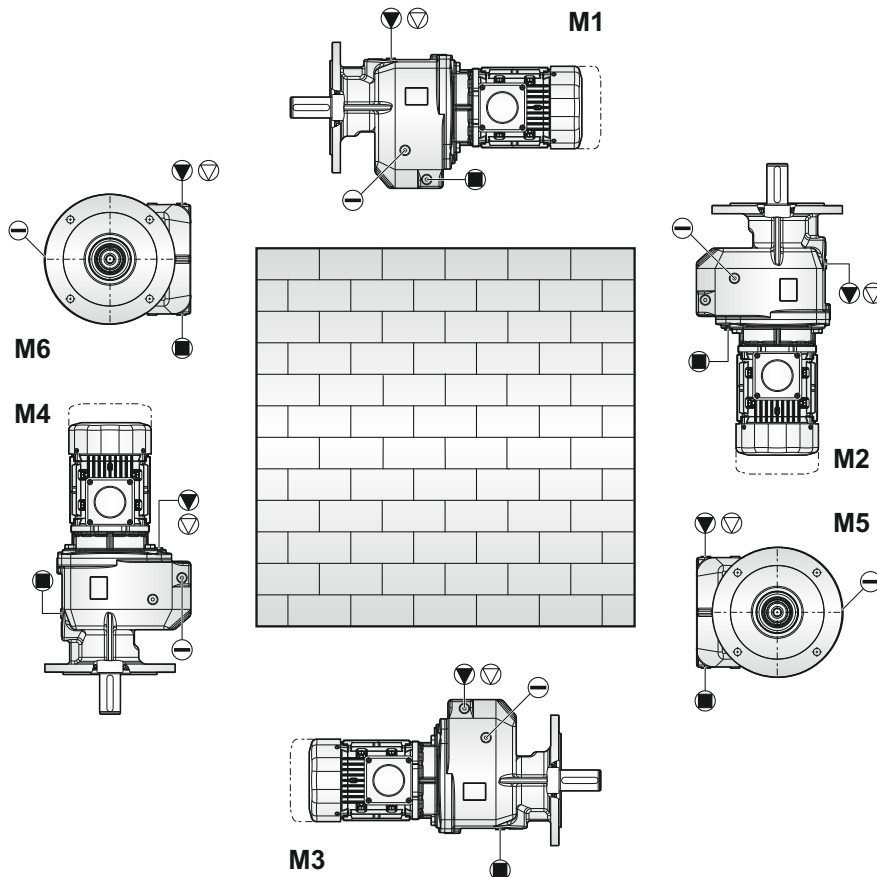
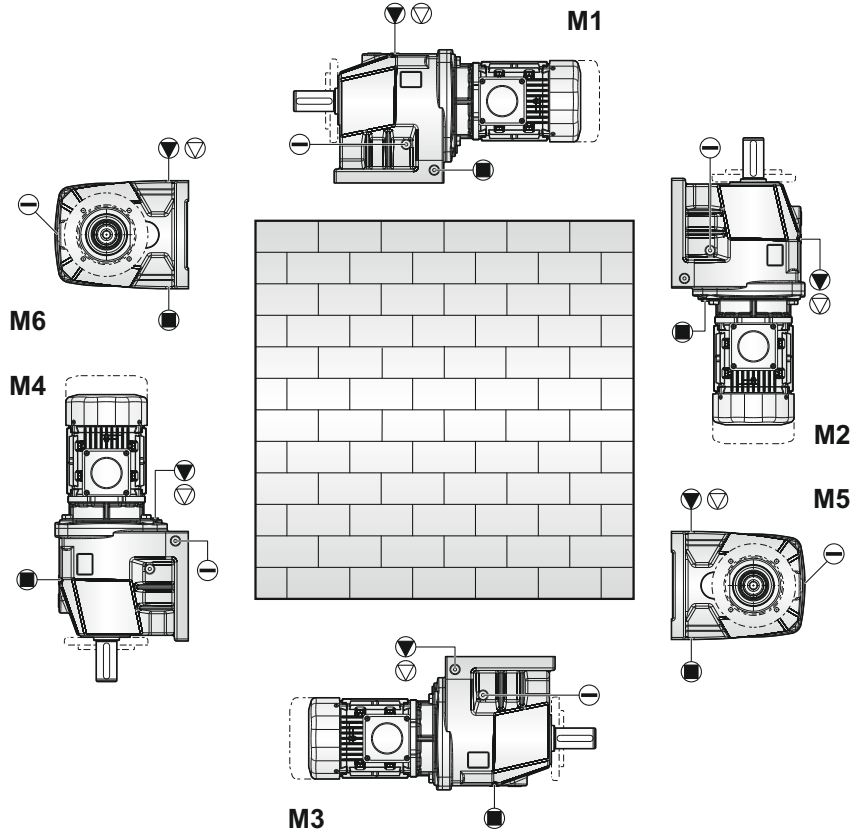
Drain Plug



### FOOT MOUNTED

#### PA

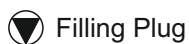
PA 02  
PA 12  
PA 22  
PA 32  
PA 42  
PA 52



### FLANGE MOUNTED

#### PF

PF 02  
PF 12  
PF 22  
PF 32  
PF 42  
PF 52



Filling Plug



Vent Plug



Oil Level Plug



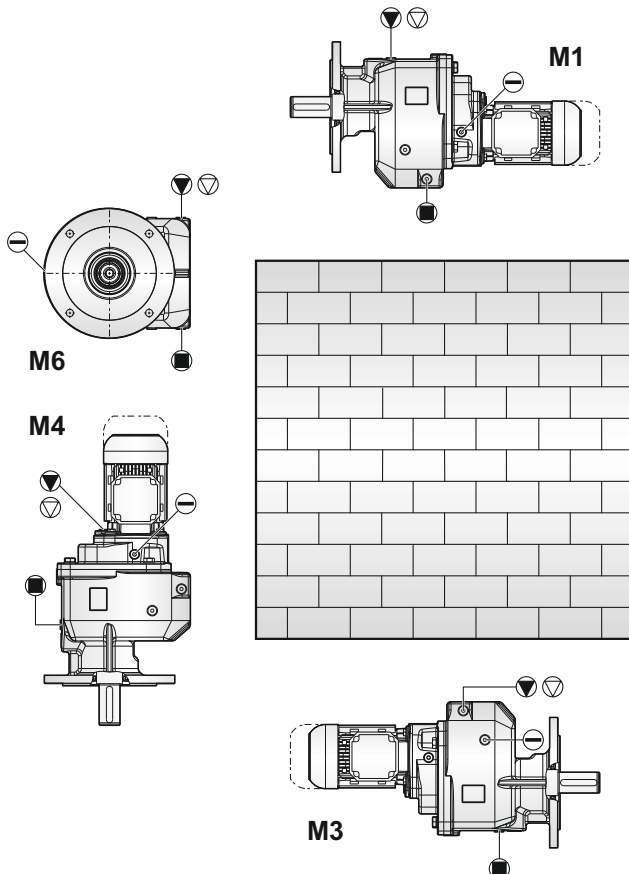
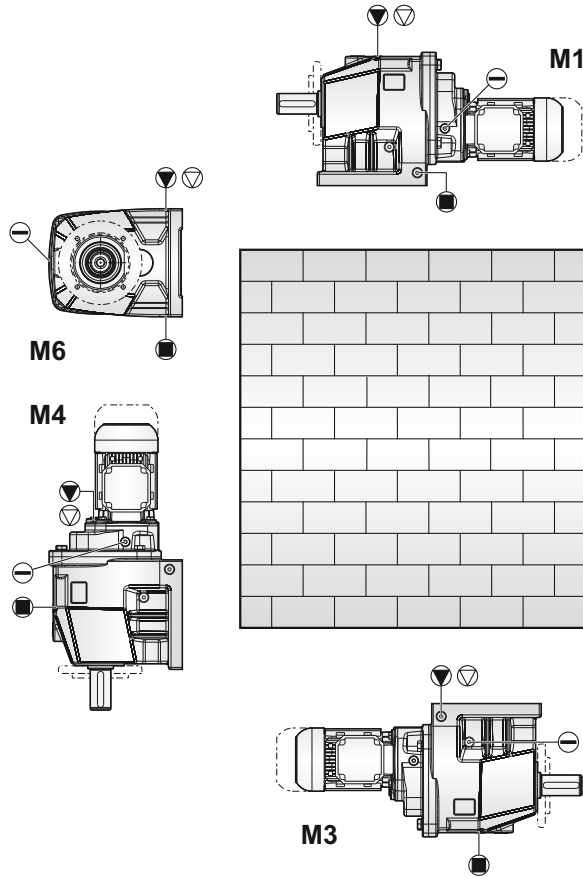
Drain Plug



FOOT MOUNTED

PA

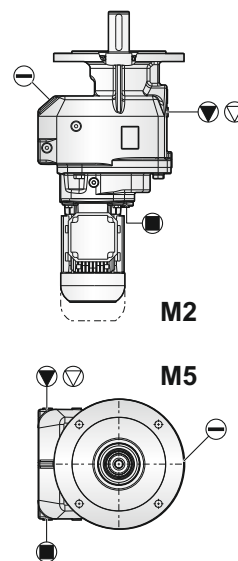
PA 03  
PA 13  
PA 23  
PA 33  
PA 43  
PA 53



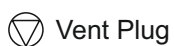
FLANGE MOUNTED

PF

PF 03  
PF 13  
PF 23  
PF 33  
PF 43  
PF 53



Filling Plug



Vent Plug



Oil Level Plug



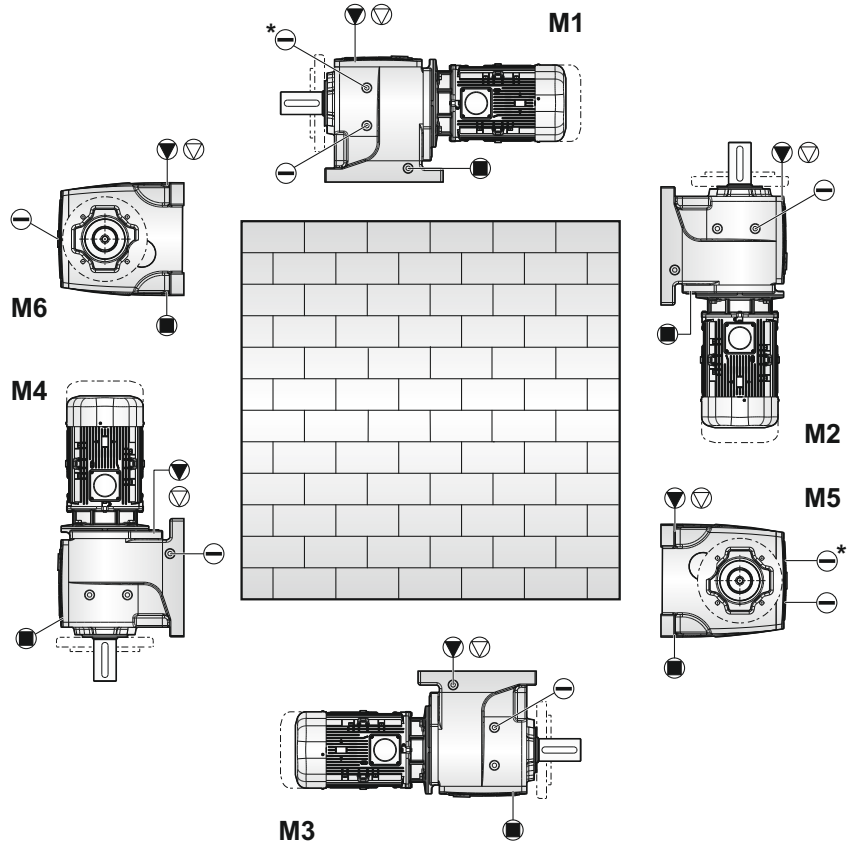
Drain Plug



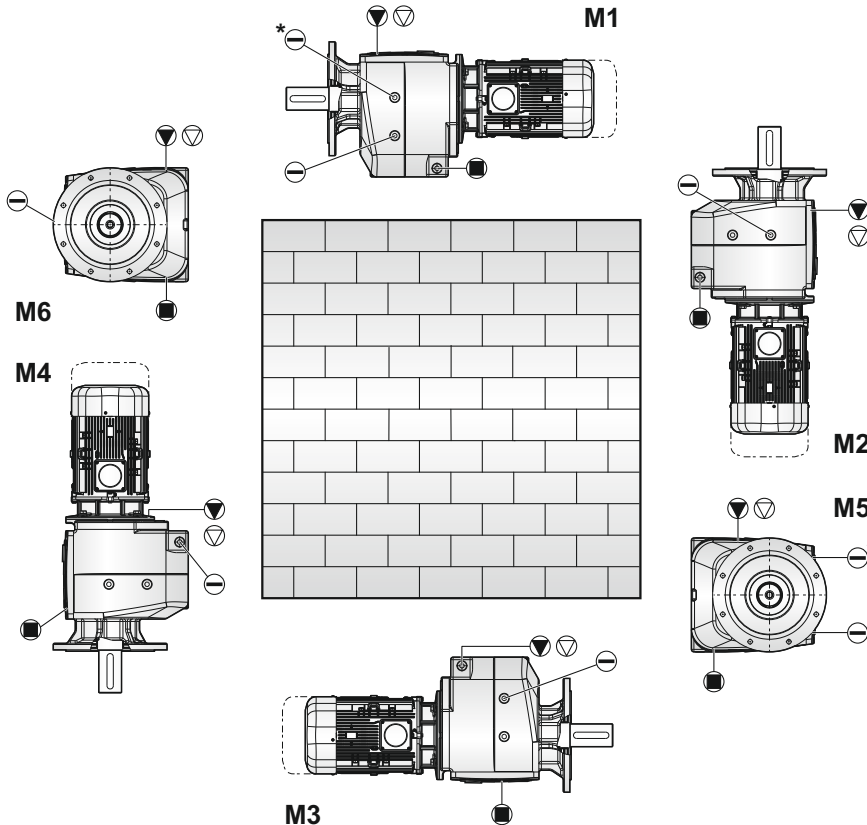
### FOOT MOUNTED

#### PA

- PA 62
- \* PA 63
- PA 72
- \* PA 73
- PA 82
- \* PA 83
- PA 92
- \* PA 93
- PA 102
- \* PA 103



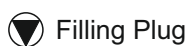
\* Sign shows that position of oil level plug for gear units which are from PA/PF 63 to PA/PF 103.



### FLANGE MOUNTED

#### PF

- PF 62
- \* PF 63
- PF 72
- \* PF 73
- PF 82
- \* PF 83
- PF 92
- \* PF 93
- PF 102
- \* PF 103



Filling Plug



Vent Plug



Oil Level Plug



Drain Plug





### 5.3 Terminal Box and Cable Entrance Sides (PA / PF)

**Table 16:** Terminal Box and Cable Entrance Sides (PA)

PA	
<p><b>M1</b></p>	<p><b>M2</b></p>
<p><b>M3</b></p>	<p><b>M4</b></p>
<p><b>M5</b></p>	<p><b>M6</b></p>

\* 1 - 2 - 3 - 4 : Shows terminal box position.

\* I - II - III - IV: Shows cable entry position.

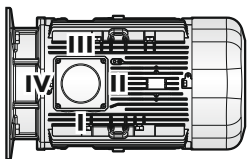
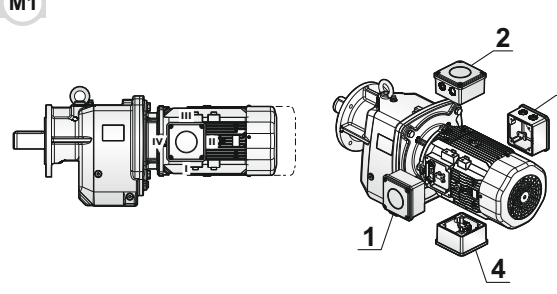
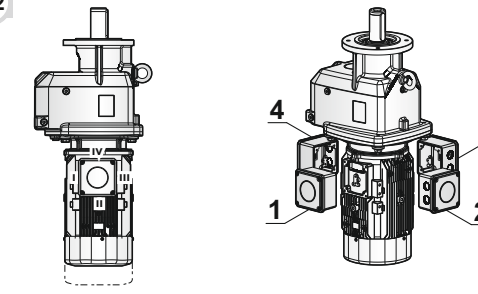
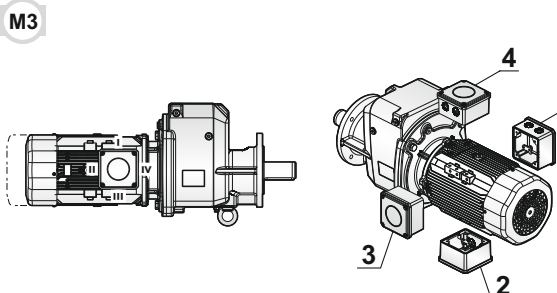
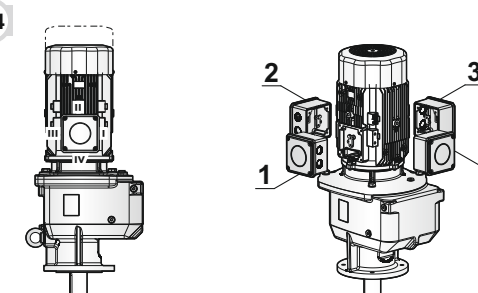
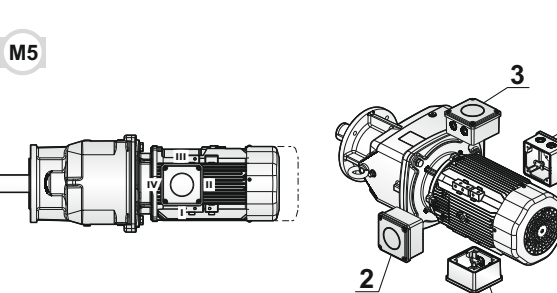
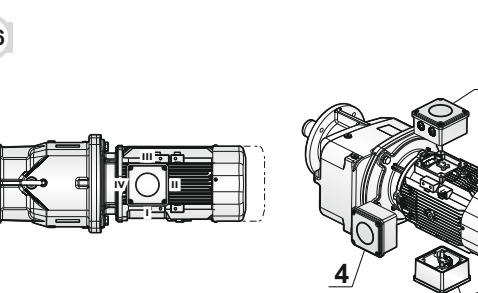


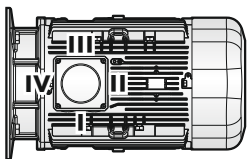


Table 17: Terminal Box and Cable Entrance Sides (PF)

PF	
<p><b>M1</b></p> 	<p><b>M2</b></p> 
<p><b>M3</b></p> 	<p><b>M4</b></p> 
<p><b>M5</b></p> 	<p><b>M6</b></p> 

\* 1 - 2 - 3 - 4 : Shows terminal box position.

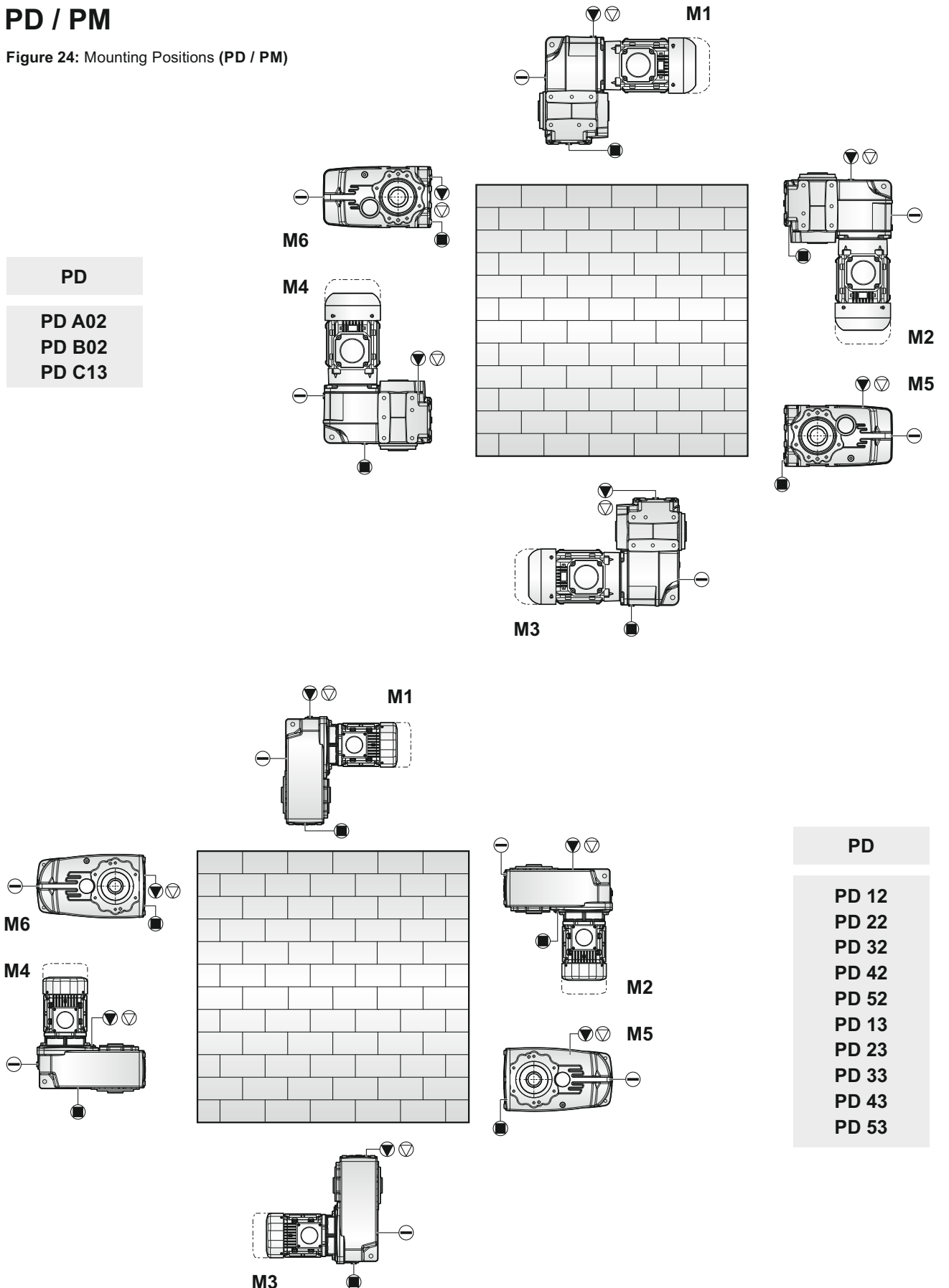
\* I - II - III - IV: Shows cable entry position.





## PD / PM

Figure 24: Mounting Positions (PD / PM)

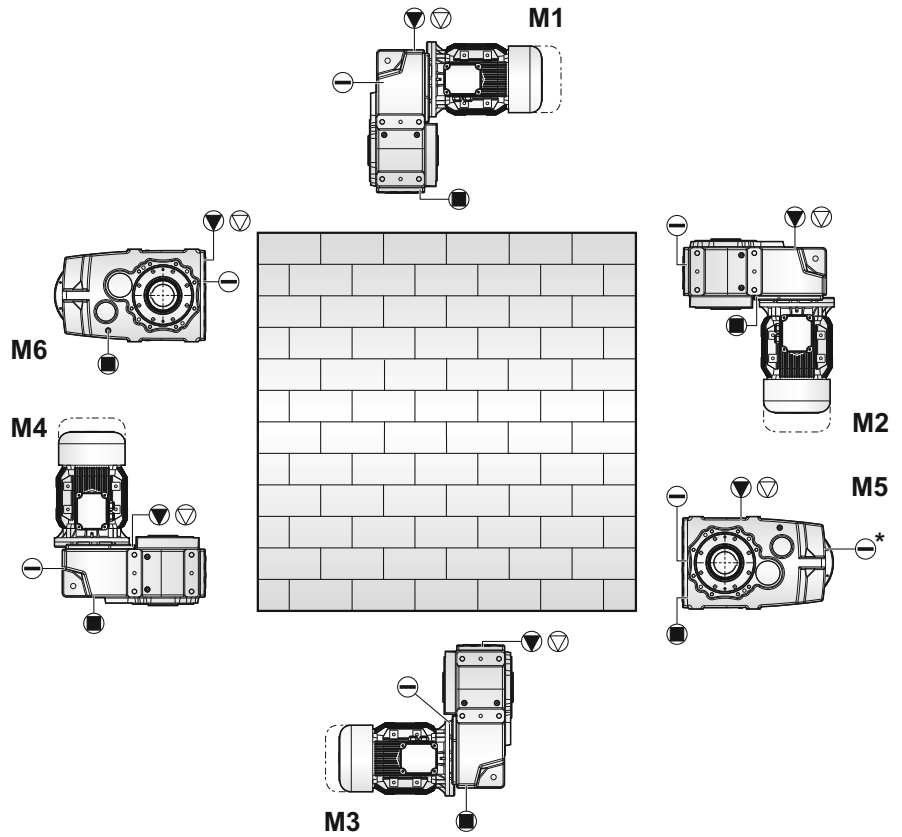




\* Sign shows that position of oil level plug for gear units which are from PD 63 to PD 123.

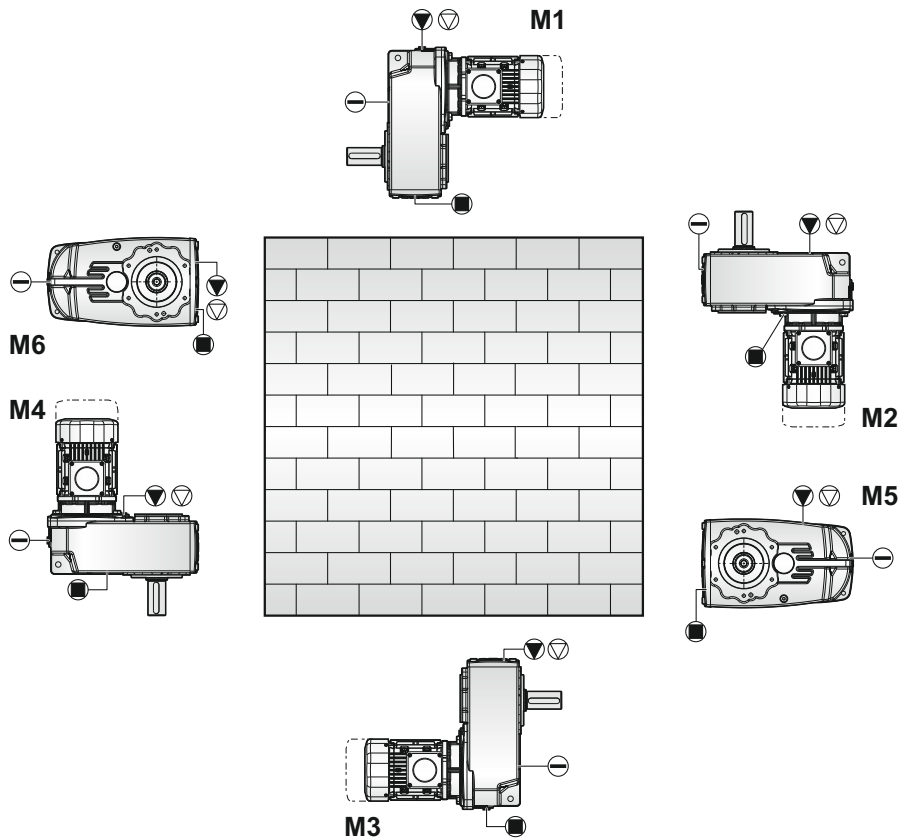
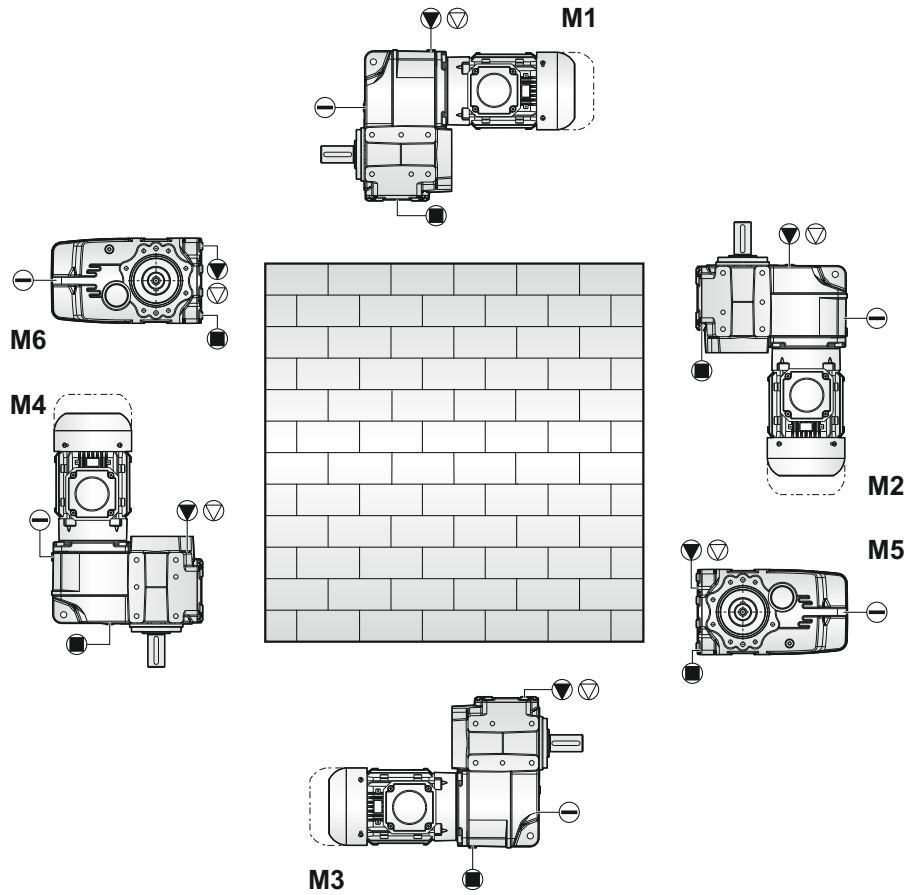
### PD

PD 62  
PD 72  
PD 82  
PD 92  
PD 102  
PD 112  
\* PD 63  
\* PD 73  
\* PD 83  
\* PD 93  
\* PD 103  
\* PD 113  
\* PD 123

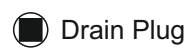




PM
PM A02
PM B02
PM C13



PM
PM 12
PM 22
PM 32
PM 42
PM 52
PM 13
PM 23
PM 33
PM 43
PM 53

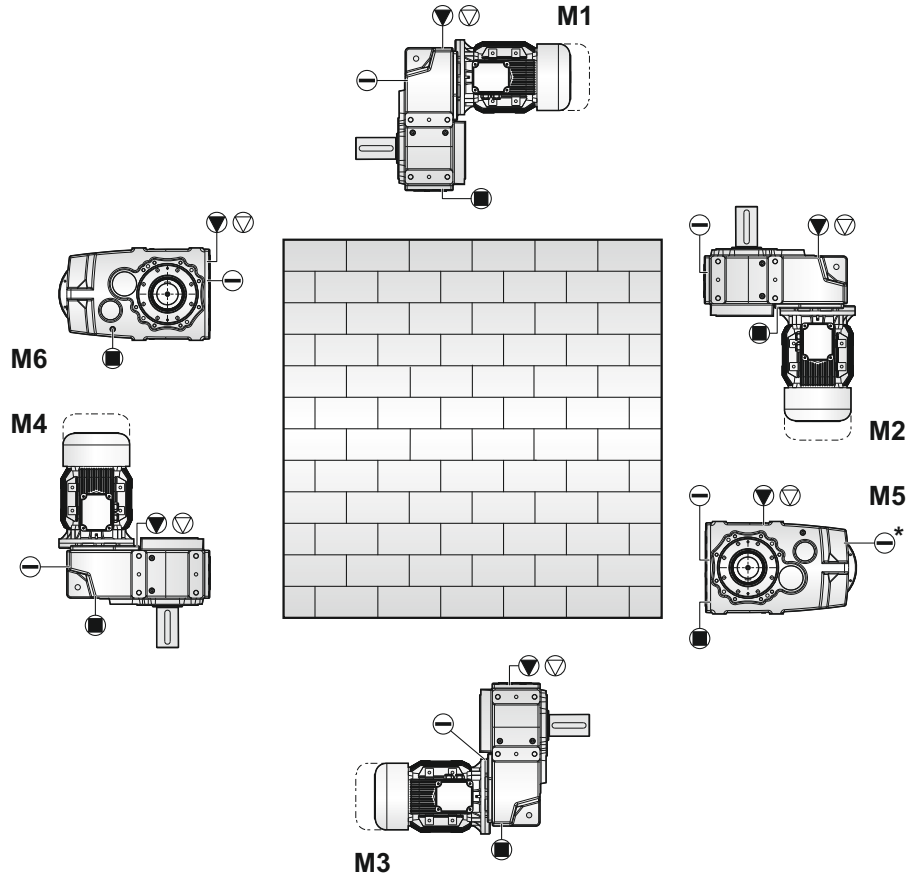




\* Sign shows that position of oil level plug for gear units which are from PM 63 to PM 123.

### PM

PM 62  
PM 72  
PM 82  
PM 92  
PM 102  
PM 112  
\* PM 63  
\* PM 73  
\* PM 83  
\* PM 93  
\* PM 103  
\* PM 113  
\* PM 123





PD / PM

Table 18: Terminal Box and Cable Entrance Sides (PD)

PD	
<p><b>M1</b></p>	<p><b>M2</b></p>
<p><b>M3</b></p>	<p><b>M4</b></p>
<p><b>M5</b></p>	<p><b>M6</b></p>

\* 1 - 2 - 3 - 4 : Shows terminal box position.

\* I - II - III - IV: Shows cable entry position.

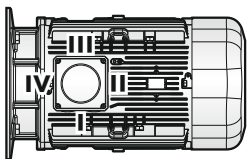
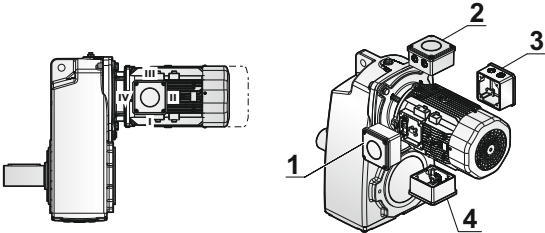
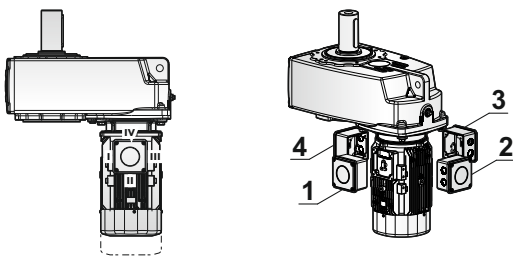
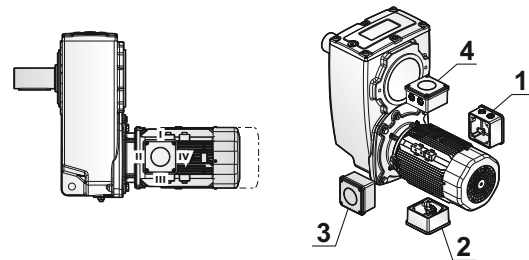
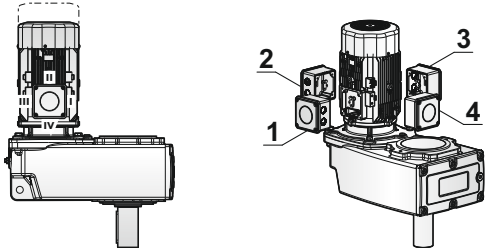
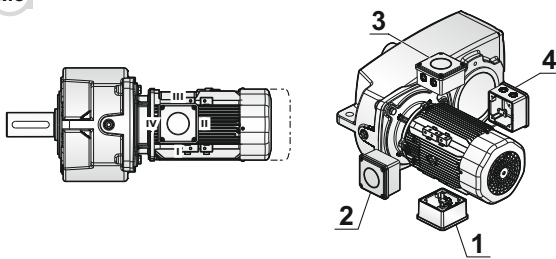
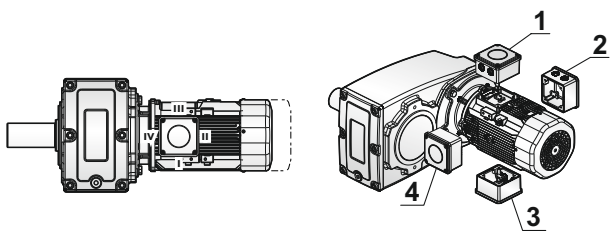




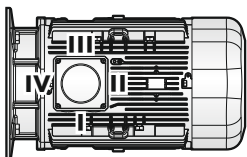


Table 19: Terminal Box and Cable Entrance Sides (PM)

PM	
<p><b>M1</b></p> 	<p><b>M2</b></p> 
<p><b>M3</b></p> 	<p><b>M4</b></p> 
<p><b>M5</b></p> 	<p><b>M6</b></p> 

\* 1 - 2 - 3 - 4 : Shows terminal box position.

\* I - II - III - IV: Shows cable entry position.





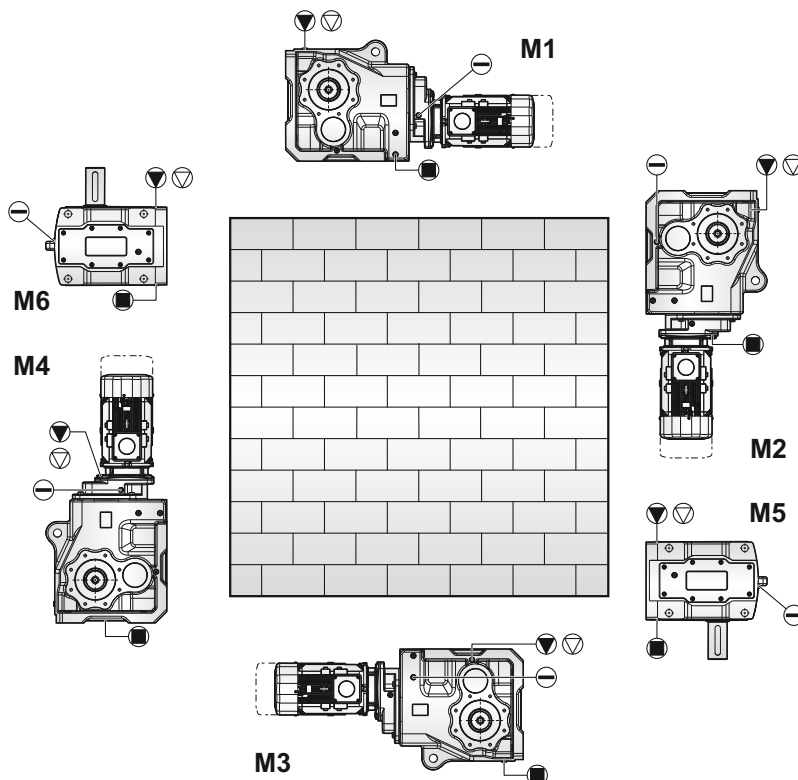
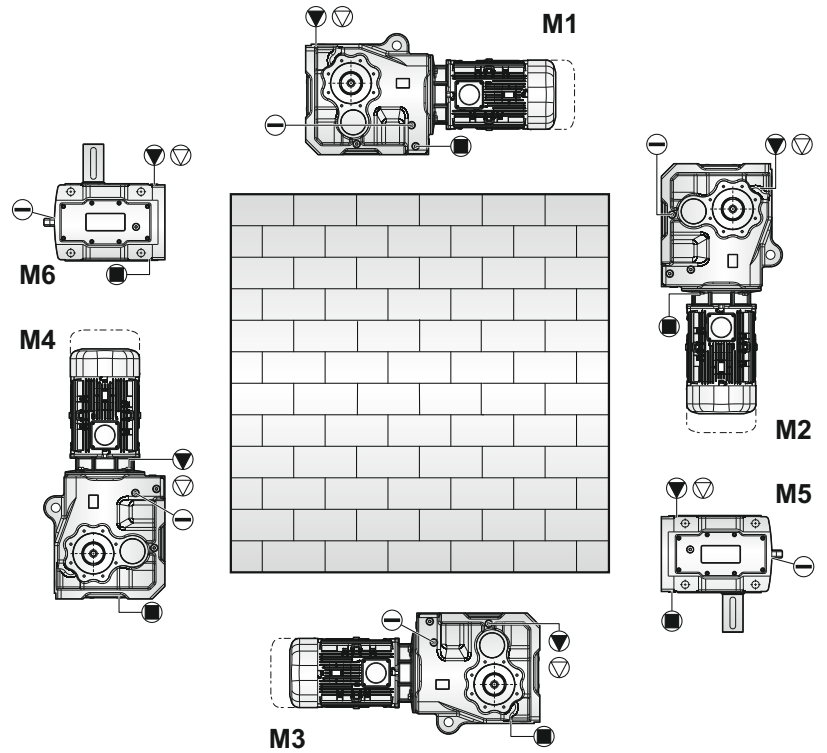
## PKD

Figure 25: Mounting Positions (PKD)

### FOOT MOUNTED

#### PKD

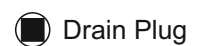
PKD 1390  
PKD G 1390  
PKD 2390  
PKD 3390  
PKD 4390  
PKD 5390  
PKD 6390  
PKD 7390  
PKD 8390  
PKD G 8390  
PKD 9390  
PKD G 9390



### FOOT MOUNTED

#### PKD

PKD 1490  
PKD G 1490  
PKD 2490  
PKD 3490  
PKD 4490  
PKD 5490



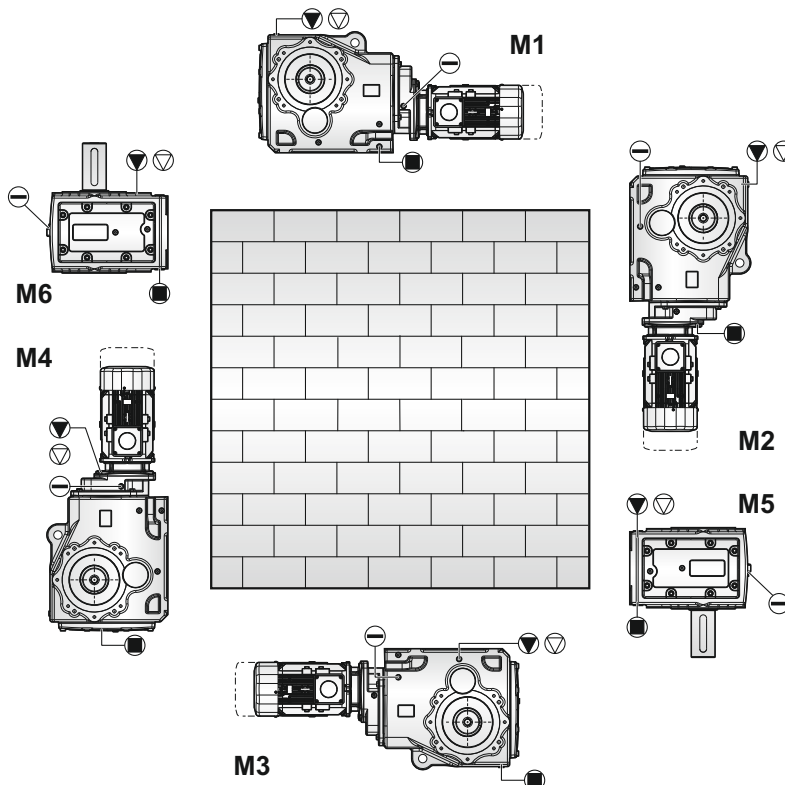
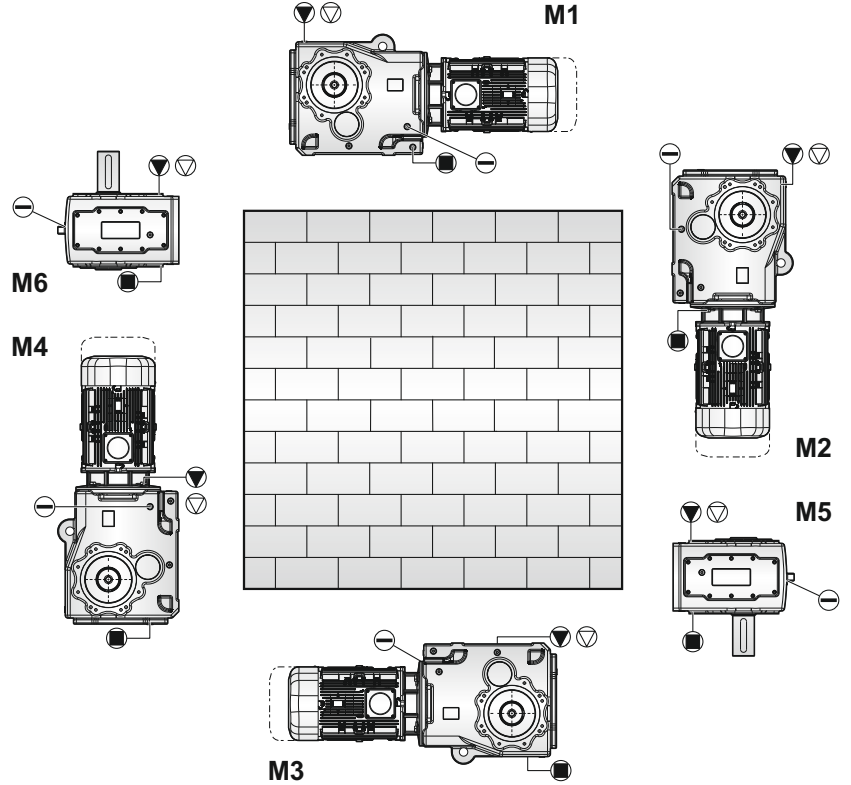


### PKD

#### CASE MOUNTED

##### PKD

PKD 1390  
PKD G 1390  
PKD 2390  
PKD 3390  
PKD 4390  
PKD 5390  
PKD 6390  
PKD 7390  
PKD 8390  
PKD G 8390  
PKD 9390  
PKD G 9390



#### CASE MOUNTED

##### PKD

PKD 1490  
PKD G 1490  
PKD 2490  
PKD 3490  
PKD 4490  
PKD 5490



Filling Plug



Vent Plug



Oil Level Plug



Drain Plug

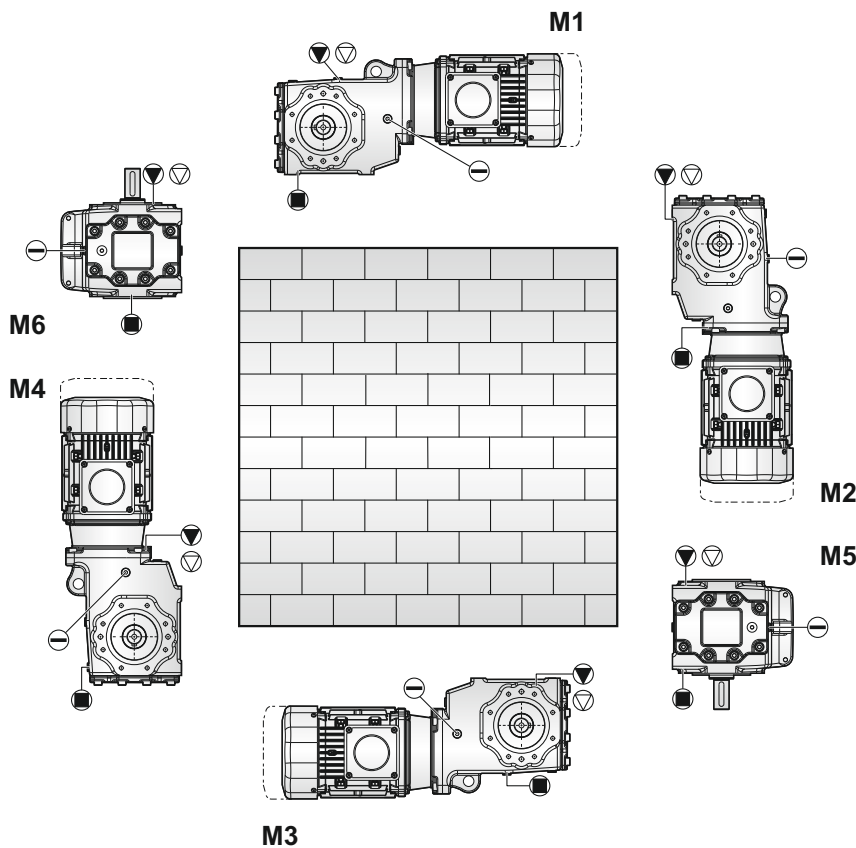
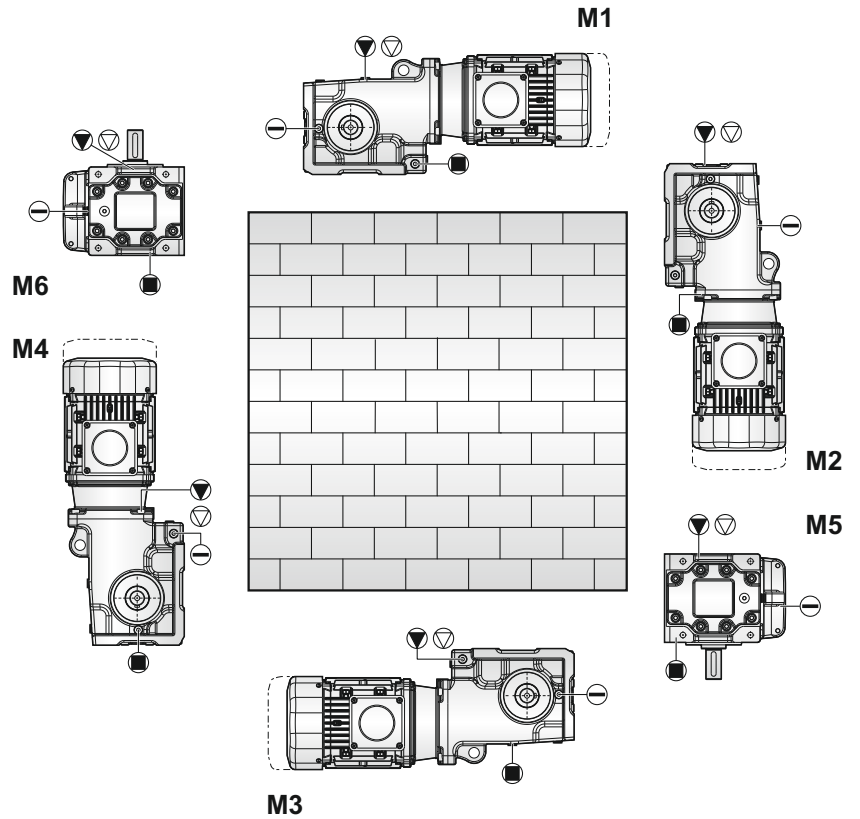


## PKD

### FOOT MOUNTED

#### PKD

PKD A 0290  
PKD B 0290  
PKD C 1290  
PKD F 4290  
PKD H 5290



### CASE MOUNTED

#### PKD

PKD A 0290  
PKD B 0290  
PKD C 1290  
PKD F 4290  
PKD H 5290



Filling Plug



Vent Plug



Oil Level Plug

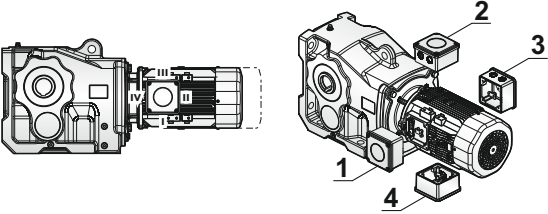
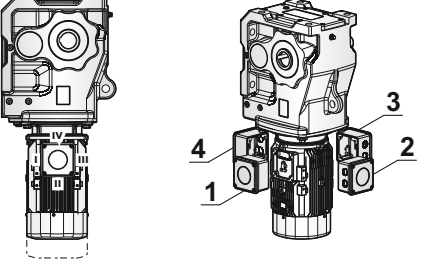
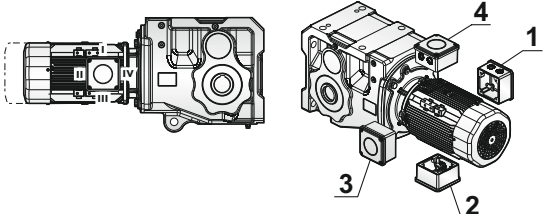
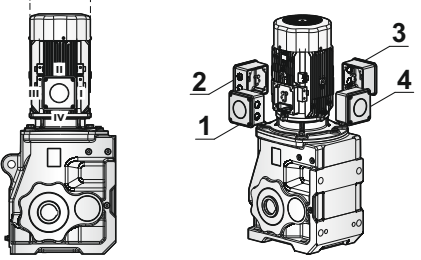
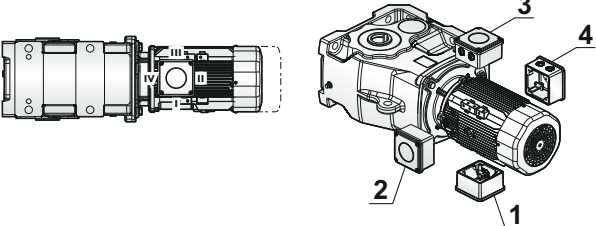
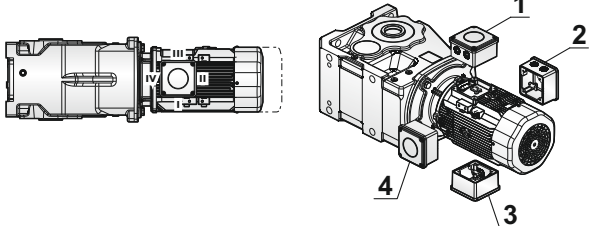


Drain Plug



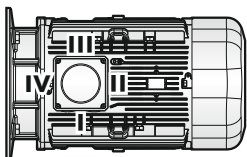
### PKD

Table 20: Terminal Box and Cable Entrance Sides (PKD)

PKD	
<p><b>M1</b></p> 	<p><b>M2</b></p> 
<p><b>M3</b></p> 	<p><b>M4</b></p> 
<p><b>M5</b></p> 	<p><b>M6</b></p> 

\* 1 - 2 - 3 - 4 : Shows terminal box position.

\* I - II - III - IV: Shows cable entry position.





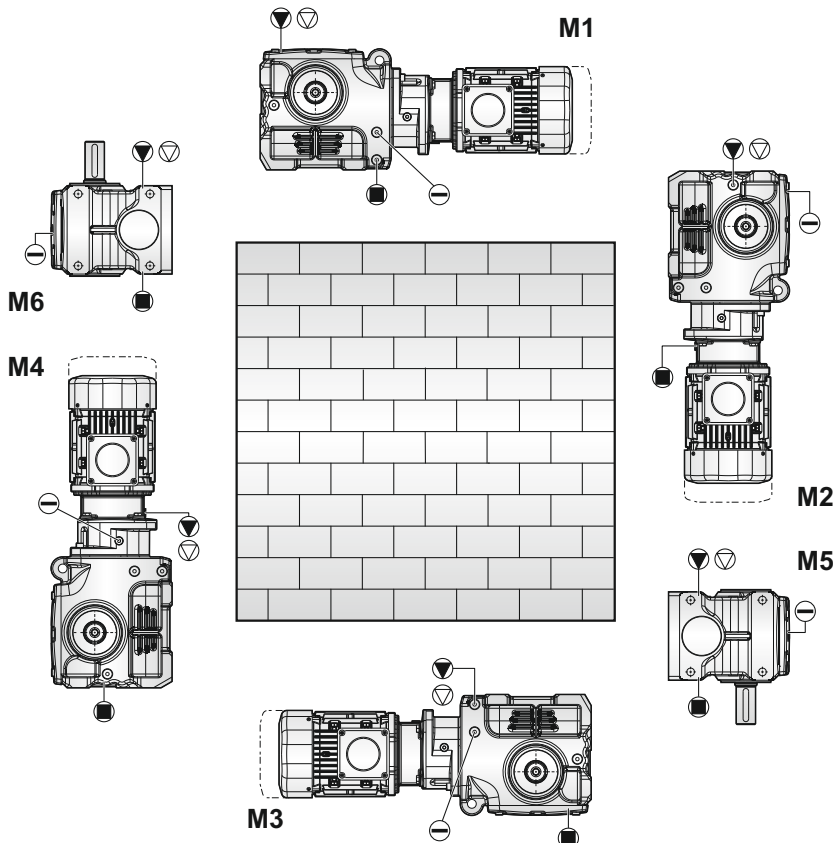
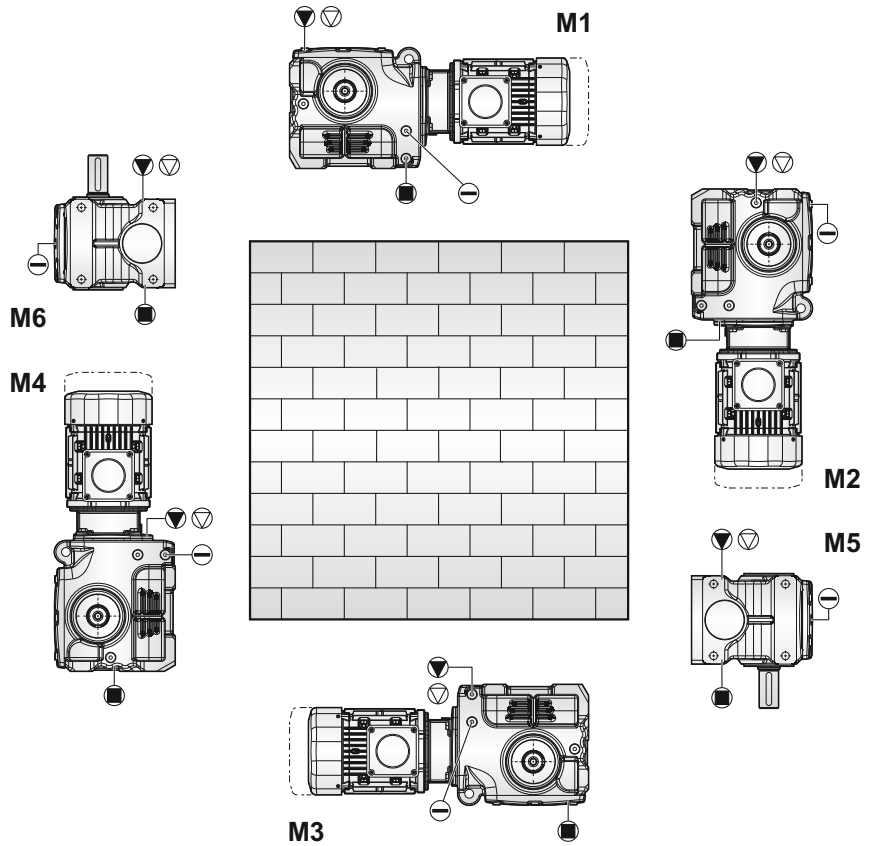
## PSH

Figure 26: Mounting Positions (PSH)

### FOOT MOUNTED

#### PSH

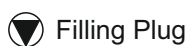
PSH 2050  
PSH 2063  
PSH 2080  
PSH 2100  
PSH 2125



### FOOT MOUNTED

#### PSH

PSH 3050  
PSH 3063  
PSH 3080  
PSH 3100  
PSH 3125



Filling Plug



Vent Plug



Oil Level Plug



Drain Plug

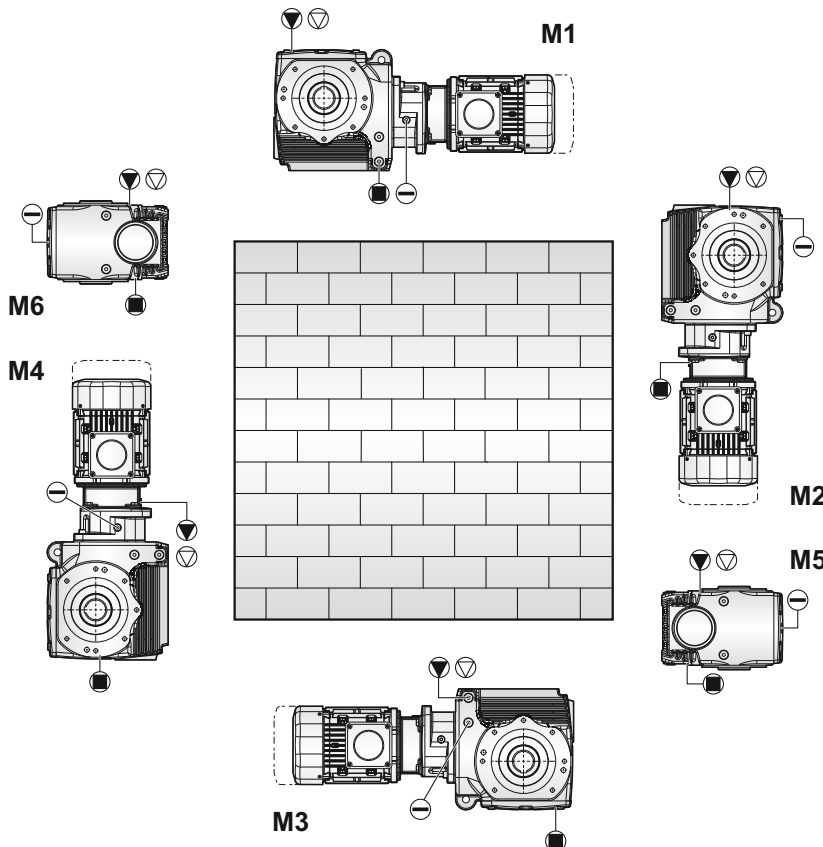
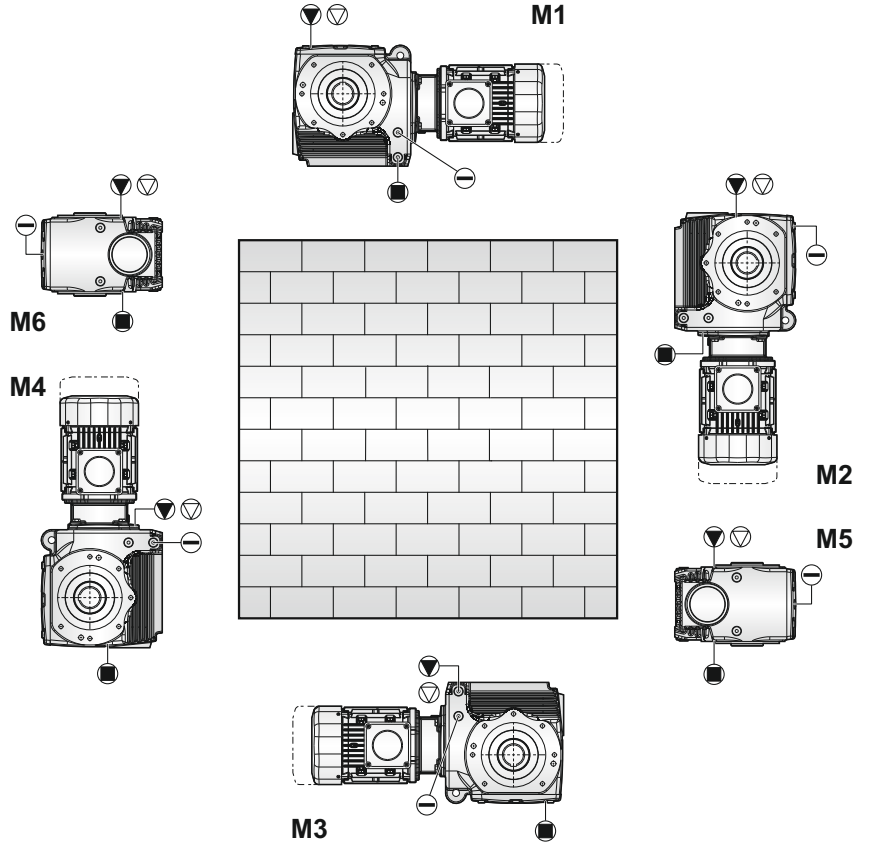


## PSH

### CASE MOUNTED

#### PSH

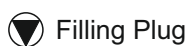
PSH 2050  
PSH 2063  
PSH 2080  
PSH 2100  
PSH 2125



### CASE MOUNTED

#### PSH

PSH 3050  
PSH 3063  
PSH 3080  
PSH 3100  
PSH 3125



Filling Plug



Vent Plug



Oil Level Plug



Drain Plug





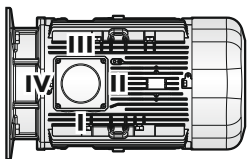
**PSH**

**Table 21: Terminal Box and Cable Entrance Sides (PSH)**

PSH	
<p><b>M1</b></p>	<p><b>M2</b></p>
<p><b>M3</b></p>	<p><b>M4</b></p>
<p><b>M5</b></p>	<p><b>M6</b></p>

\* 1 - 2 - 3 - 4 : Shows terminal box position.

\* I - II - III - IV: Shows cable entry position.





### 6.1 Lubrication

The gearboxes are sent with oil unless the customer wants contrary. The oil added gearboxes are supplied with ventilation, level and draining plugs. The certain mounting positions must be determined in customer orders.

The inner pieces of gearboxes are lubricated within the oil or by spillage. At the given tables oil amounts which must be put according to different mountage positions and in respect to that plug positions are determined. In particular situations a probability of small quantity of oil-loss could exist apart from the oil amounts given from table.



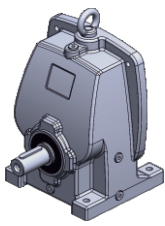
#### DANGER !

In the situations of not using the stated amount of oil out of the table the probability of emerging a damage at the gearbox could be high.

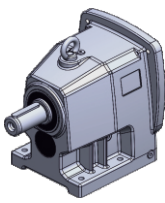
### 6.2 Lubricant Fill Quantities

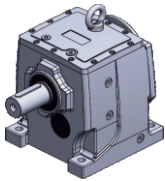
#### PA (SINGLE STAGE)

**Table 22:** Lubricant Fill Quantities (PA)

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PA 11	0.25	0.50	0.55	0.40	0.40	0.40
	PA 21	0.60	1.20	1.20	1.00	1.00	1.00
	PA 31	1.00	1.80	2.20	2.00	1.60	1.60
	PA 41	1.30	2.60	3.10	2.50	2.60	2.60
	PA 51	2.00	3.50	4.40	4.00	3.40	3.40

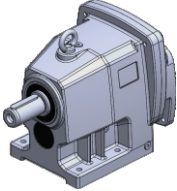
#### PA (DOUBLE STAGE)

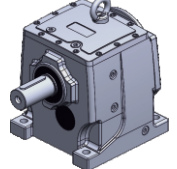
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PA 02	0.15	0.60	0.75	0.60	0.45	0.45
	PA 12	0.25	0.75	0.85	0.75	0.50	0.50
	PA 22	0.50	1.80	2.00	1.80	1.35	1.35
	PA 32	0.90	3.00	2.90	2.90	2.00	2.00
	PA 42	1.20	4.50	4.20	4.30	3.20	3.20
	PA 52	2.50	7.20	6.80	6.80	5.10	5.10

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PA 62	6.50	15.00	13.00	18.00	13.00	13.00
	PA 72	9.00	23.00	18.00	26.50	18.00	18.00
	PA 82	14.00	35.00	27.00	40.00	28.00	28.00
	PA 92	25.00	73.00	47.00	74.00	50.00	50.00
	PA 102	36.00	79.00	66.00	102.00	71.00	71.00



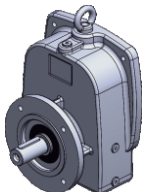
**PA (TRIPLE STAGE)**

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PA 03	0.50	1.10	0.85	1.05	0.60	0.60
	PA 13	0.70	1.30	1.10	1.20	0.70	0.70
	PA 23	1.40	2.40	1.90	2.40	1.40	1.40
	PA 33	1.60	2.90	2.90	3.70	2.00	2.00
	PA 43	3.00	5.60	4.40	5.70	3.20	3.20
	PA 53	4.50	8.70	6.80	9.20	5.00	5.00

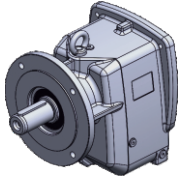
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PA 63	13.00	14.50	13.50	17.00	13.00	13.00
	PA 73	19.00	20.00	19.00	25.00	19.20	19.20
	PA 83	27.00	31.00	29.00	37.00	30.50	30.50
	PA 93	51.50	56.00	51.00	72.00	53.50	53.50
	PA 103	69.00	71.00	69.00	92.50	67.00	67.00

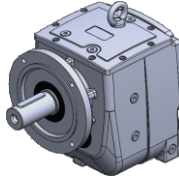
**PF (SINGLE STAGE)**

**Table 23:** Lubricant Fill Quantities (PF)

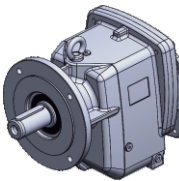
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PF 11	0.25	0.50	0.45	0.30	0.35	0.35
	PF 21	0.50	1.30	1.20	0.80	1.00	0.10
	PF 31	0.80	1.60	1.65	1.30	1.20	1.20
	PF 41	1.00	2.60	2.80	1.90	2.40	2.40
	PF 51	1.80	3.50	3.90	3.30	3.40	3.40

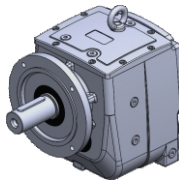
**PF (DOUBLE STAGE)**

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PF 02	0.25	0.65	0.70	0.70	0.50	0.50
	PF 12	0.35	0.85	0.90	0.90	0.60	0.60
	PF 22	0.70	2.00	2.00	2.15	1.55	1.55
	PF 32	1.30	3.50	3.00	3.10	2.15	2.15
	PF 42	1.80	5.00	4.00	4.50	3.20	3.20
	PF 52	3.00	7.70	6.20	7.40	5.10	5.10

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PF 62	7.00	15.00	14.00	18.70	13.50	13.50
	PF 72	10.00	23.00	20.50	31.00	21.00	21.00
	PF 82	15.00	37.00	30.00	45.50	30.00	30.00
	PF 92	26.00	73.00	48.00	76.00	50.00	50.00
	PF 102	40.00	81.00	66.00	104.00	72.00	72.00

**PF (TRIPLE STAGE)**

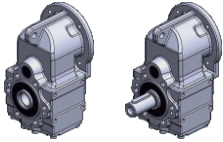
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PF 03	0.50	1.10	0.90	1.10	0.65	0.65
	PF 13	0.85	1.40	1.10	1.35	0.80	0.80
	PF 23	1.80	2.90	2.10	2.90	1.50	1.50
	PF 33	1.90	3.40	2.90	4.00	2.20	2.20
	PF 43	3.50	6.10	4.20	6.10	3.00	3.00
	PF 53	5.20	8.80	6.50	9.20	5.00	5.00

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PF 63	13.50	14.70	14.00	18.00	14.00	14.00
	PF 73	21.50	22.50	22.00	29.00	22.00	22.00
	PF 83	31.00	34.00	32.00	40.00	34.00	34.00
	PF 93	53.00	70.00	53.00	74.00	54.50	54.50
	PF 103	69.00	78.00	78.00	99.00	67.00	67.00

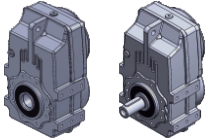


**PD / PM (DOUBLE STAGE)**

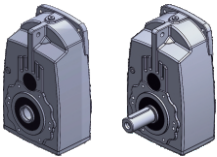
**Table 24:** Lubricant Fill Quantities (PD / PM)

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PD / PM A02	0.50	0.70	0.50	0.60	0.35	0.35

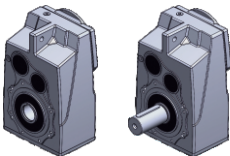
  

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PD / PM B02	0.80	1.10	0.90	0.90	0.75	0.75

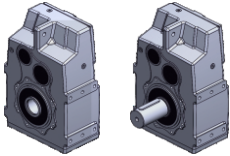
  

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PD / PM 12	0.90	1.40	1.00	1.30	0.90	0.90
	PD / PM 22	1.70	2.50	2.10	2.10	1.50	1.50
	PD / PM 32	3.20	4.20	3.70	4.20	2.70	2.70
	PD / PM 42	4.80	6.60	5.40	5.50	4.20	4.20
	PD / PM 52	7.60	9.00	8.50	9.50	6.60	6.60

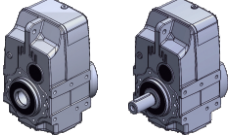
  

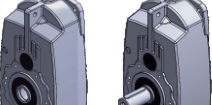
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PD / PM 62	16.00	17.50	15.50	17.60	10.10	13.50
	PD / PM 72	24.00	25.00	21.00	27.10	16.10	20.00
	PD / PM 82	35.00	40.00	33.50	41.50	28.50	30.50

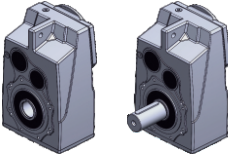
  

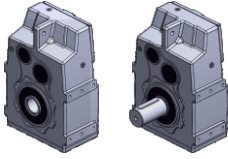
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PD / PM 92	68.00	77.00	55.50	75.00	50.00	56.00
	PD / PM 102	90.10	90.10	40.10	90.10	60.10	82.10
	PD / PM 112	166.00	161.00	146.00	196.00	101.00	141.00

**PD / PM (TRIPLE STAGE)**

Mounting Positions / Litre (L)								
	TYPE	M1	M2	M3	M4	M5	M6	
	PD / PM C13	1.40	2.40	1.50	2.20	1.80	1.80	

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PD / PM 13	1.50	1.70	1.50	1.80	1.10	1.10
	PD / PM 23	1.80	2.70	2.00	3.10	1.60	1.60
	PD / PM 33	4.20	4.20	3.40	5.50	3.00	3.00
	PD / PM 43	6.00	7.80	5.00	8.70	4.70	4.70
	PD / PM 53	11.50	12.00	6.80	13.50	7.00	7.00

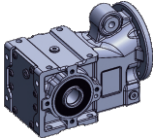
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PD / PM 63	16.00	17.50	10.50	18.10	14.50	12.50
	PD / PM 73	22.10	20.10	16.10	26.00	22.00	18.50
	PD / PM 83	33.80	37.50	25.10	38.50	34.00	29.00

Mounting Positions / Litre (L)								
	TYPE	M1	M2	M3	M4	M5	M6	
	PD / PM 93	70.00	73.00	45.10	74.10	62.50	54.00	
	PD / PM 103	84.50	97.50	74.00	101.00	74.00	66.00	
	PD / PM 113	161.00	156.00	141.00	211.00	156.00	136.00	
	PD / PM 123	161.00	156.00	141.00	211.00	156.00	136.00	

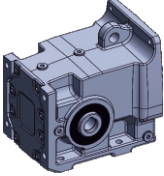


**PKD (DOUBLE STAGE)**

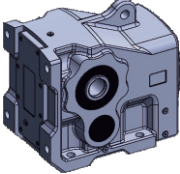
**Table 25:** Lubricant Fill Quantities (PKD)

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PKD A 0290	0.40	0.70	0.50	0.60	0.40	0.50

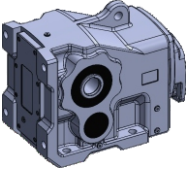
**FOOT MOUNTED**

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PKD B 0290	0.50	1.00	1.00	1.10	0.60	0.80
	PKD C 1290	1.00	1.50	1.50	1.90	0.90	1.40
	PKD F 4290	1.90	3.00	3.00	3.90	2.20	2.20
	PKD H 5290	2.40	4.40	4.50	5.80	3.30	3.30

**PKD (TRIPLE STAGE)**

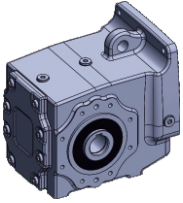
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PKD 1390	0.70	1.80	1.90	2.00	1.80	1.80
	PKD G 1390	0.80	1.90	1.80	2.00	1.80	1.80
	PKD 2390	1.20	2.90	3.30	3.60	2.80	2.90
	PKD 3390	1.90	5.30	6.00	6.40	5.20	5.20
	PKD 4390	2.90	8.80	9.20	9.20	7.70	7.60
	PKD 5390	6.00	16.0	17.80	19.50	14.50	14.50
	PKD 6390	10.10	28.00	31.30	34.70	26.40	24.50
	PKD 7390	10.10	28.00	29.80	32.00	26.40	24.50
	PKD 8390	17.20	52.00	60.00	66.00	50.00	47.00
	PKD G 8390	29.30	73.50	83.00	96.50	69.00	62.50
	PKD 9390	42.00	128.00	144.00	160.00	116.00	106.00
	PKD G 9390	74.60	188.00	207.00	252.00	185.50	155.00

**PKD (QUADRUPLE STAGE)**

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PKD 1490	1.60	2.30	2.40	2.70	2.00	2.20
	PKD G 1490	1.60	2.30	2.40	2.70	2.10	2.20
	PKD 2490	2.70	3.30	3.90	4.40	3.10	3.40
	PKD 3490	3.40	6.00	7.00	7.80	5.30	5.70
	PKD 4490	5.00	10.00	10.80	12.50	8.90	9.40
	PKD 5490	12.50	17.10	19.20	23.60	16.10	16.90

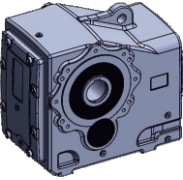


**PKD (DOUBLE STAGE)**

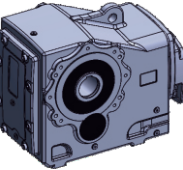
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PKD B 0290	0.60	1.00	1.00	1.10	0.70	0.70
	PKD C 1290	1.10	1.50	1.30	1.90	0.90	0.90
	PKD F 4290	1.50	2.80	2.80	3.50	2.10	2.10
	PKD H 5290	2.90	4.50	4.30	6.00	3.60	3.60

CASE MOUNTED

**PKD (TRIPLE STAGE)**

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PKD 1390	0.70	1.90	1.90	2.00	1.80	2.00
	PKD G 1390	0.80	1.90	1.90	2.00	1.80	2.00
	PKD 2390	1.40	3.30	3.50	4.20	3.30	3.70
	PKD 3390	2.90	5.10	6.50	7.20	5.80	5.80
	PKD 4390	3.60	8.30	9.80	10.90	9.40	9.40
	PKD 5390	6.00	13.90	18.50	21.00	15.90	17.00
	PKD 6390	11.30	25.80	30.60	34.60	29.80	31.40
	PKD 7390	11.10	25.70	30.40	34.00	29.00	30.90
	PKD 8390	20.80	53.60	65.70	71.20	56.00	62.70
	PKD G 8390	31.00	67.30	75.80	90.80	71.70	77.90
	PKD 9390	40.50	117.40	139.50	156.80	121.60	131.50
	PKD G 9390	74.10	188.00	194.00	249.40	170.00	190.00

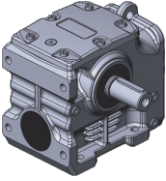
**PKD (QUADRUPLE STAGE)**

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PKD 1490	1.80	2.30	2.30	2.70	2.20	2.20
	PKD G 1490	1.80	2.30	2.30	2.70	2.20	2.20
	PKD 2490	3.00	3.40	3.90	4.90	3.30	3.70
	PKD 3490	4.90	5.50	7.10	8.40	5.70	6.40
	PKD 4490	8.30	9.60	10.80	13.50	10.90	10.90
	PKD 5490	14.10	15.30	19.50	24.40	16.70	17.30



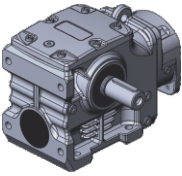
**PSH (DOUBLE STAGE)**

**Table 26:** Lubricant Fill Quantities (**PSH**)

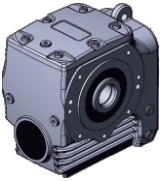
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PSH 2040	0.50	0.65	0.65	0.65	0.55	0.55
	PSH 2050	0.60	1.25	0.80	1.20	0.75	0.75
	PSH 2063	0.45	1.80	1.35	1.65	1.05	1.05
	PSH 2080	0.90	2.75	1.90	3.00	1.85	1.85
	PSH 2100	1.60	6.00	3.80	5.95	3.50	3.50
	PSH 2125	3.10	12.10	6.90	11.30	6.40	6.40

**FOOT MOUNTED**

**PSH (TRIPLE STAGE)**

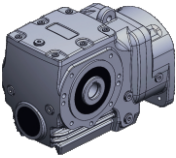
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PSH 3050	0.95	1.60	1.20	1.50	1.00	1.00
	PSH 3063	0.90	2.40	1.75	2.10	1.30	1.30
	PSH 3080	1.80	3.35	2.30	3.70	2.10	2.10
	PSH 3100	2.20	8.10	4.40	7.35	4.00	4.00
	PSH 3125	5.10	15.10	7.90	14.50	7.30	7.30

**PSH (DOUBLE STAGE)**

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PSH 2040	0.55	0.85	0.80	0.65	0.55	0.55
	PSH 2050	0.40	1.35	0.85	1.20	0.95	0.95
	PSH 2063	0.45	1.60	1.25	1.60	1.35	1.35
	PSH 2080	0.70	3.00	2.25	3.30	2.30	2.30
	PSH 2100	1.35	5.70	4.40	5.00	4.00	4.00
	PSH 2125	3.00	11.20	11.10	10.40	6.80	6.80

**CASE MOUNTED**

**PSH (TRIPLE STAGE)**

Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PSH 3050	0.85	1.75	1.10	1.70	1.20	1.20
	PSH 3063	0.90	2.10	1.50	1.95	1.60	1.60
	PSH 3080	1.15	3.90	2.50	3.80	2.55	2.55
	PSH 3100	2.15	6.90	5.00	7.10	4.45	4.45
	PSH 3125	4.00	12.90	7.70	12.10	7.70	7.70



### 6.3 Lubrication Table

At below table, registered brands or names of goods have been showed according to gearbox lubricant type which stated on product label (see. **2.1 Gear Unit Label**, page 21). This situation means that just a product should be used convenient to the lubricant type that shown on the label. In particular situations, stated product's name is shown on gearbox product label.

Table 27: Lubrication Table

Type of gearbox	Type of Lubricant	Ambient Temp. °C	ISO viscosity class	Shell	Mobil	bp	Esso	DEA	ARAL	Castrol	TRIBOL	KLÜBER LUBRI-CATION
Helical Gear-boxes	Mineral oil	- 5...40 Normal  -15...25 # - 50...-15	ISO VG 220  ISO VG 100  ISO VG 15	Shell Omala Oel 220  Shell omala Oel 100  Shell Tellus Oel T 15	Mobilgear 600 XP 220  Mobilgear 600 XP 150  Mobil DTE 10 Excel 15	Energol GR-XP 220  Energol GR-XP 100  Bartran HV 15	Spartan EP 220  Spartan EP 100  Univis J 13	Deagear DX SAE 85W-90 Falcon CLP 220  Deagear DX SAE 80W Falcon CLP 150 Alrkraft Hydraulic Oil 15	Degol BG 220  Degol BG 100  Vitamol 1010	Alpha SP 220 Alpha MW 220 Alpha MAX 220 Alpha SP 100 Alpha MW 100 Alpha MAX 220 Hyspin AWS 15 Hyspin SP 15 Hyspin ZZ 15	Tribol 1100/220  Tribol 1100/100  Tribol 770	Klüberoil GEM 1-220  Klüberoil GEM 1-100  Isoflex MT 30 rot
	Synthetic oil	- 25...80	ISO VG 220	Shell Tivela Oel WB	Mobil Glygoyle 30	Energyn SG-XP 220	ESSO Glycolube 220	Polydea PGLP 220	Degol GS 220	Alphasyn PG 220	Tribol 800/220	Klübersynth GH 6 - 220
	Bio-degradable oil	- 25...80	ISO VG 220					Plantogear 220 S	Bio-Degol S 220	Carelube GES 220	Tribol Bio Top1418/220	Klüber - Bio GM 2 - 220
	Food - grade oil	- 25...80	ISO VG 220	Cassida 220	Mobil SHC Cibus 220		GEAR OIL FM 220	Renolin 220	Degol FG 220	OPTIMOL optileb GE 220	Tribol Food Proof 1810/220	Klüberoil 4UH1 - 220
	Synthetic fluid grease	- 35...60			Shell Tivela compound A	Energyn GSF	Fliessfett S 420	Glissando 6833 EP 00	Aralub SKA 00	Alpha Gel 00	Tribol 800/1000	Klübersynth GE 46 -1200
Anti Friction Bearings	Mineral oil grease	- 30...60 Normal  # 50...110		Alvania Fett R 3 oder  Alvania Fett RL 3	Mobil SHC Polyrex 005  Mobilux 3 Mobilux 2	Energrease LS 3  Energrease LS 2	Beacon 3  Beacon 2	Glissando 30 Glissando 20  Glissando FT 3	Aralub HL 3 Aralub HL 2  Aralub BAB EP 2	Spheerol AP 3 Spheerol AP 2 LZV - EP  Spheerol EPL 2	Tribol 3030/100-2  Tribol 4020/220-2 Tribol 3785	Centoplex 3 Centoplex 2
	Synthetic grease	# - 50...110		Aero Shell Grease 16 oder 7	Mobiltemp SHC 32		Beacon 325	Discor 8 - EP 2	Aralub SKL 2	Product 783/46	Tribol 3499	Isoflex Topas NB52



#### DANGER !

The synthetic and mineral oils must not be mixed with eachother.



#### NOTE !

At ambient temperatures under -30° degree and above 60° degree for leakproofing element inside the shaft, special quality material must be used.



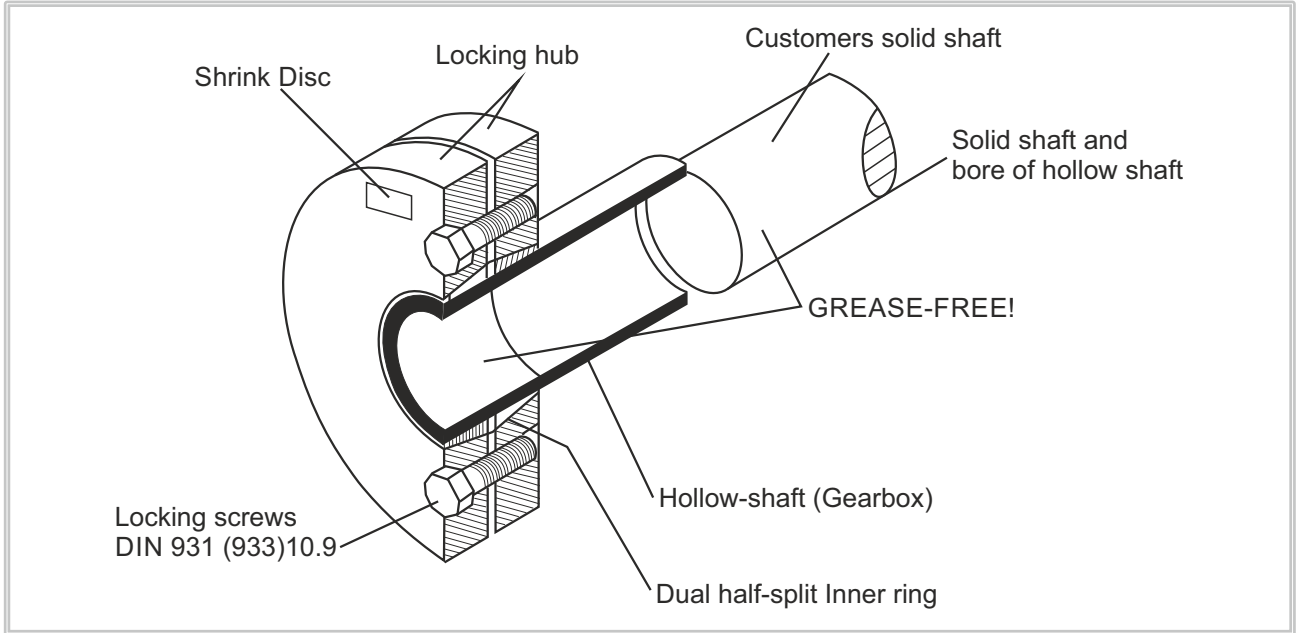
#### NOTE !

This table shows the oil types of different companies. Oils of different companies should not be mixed. Please contact PGR if you want to change the oil type and viscosity class. Otherwise we provide no guarantee for the function of the gearbox.



## 7.1 Shrink Disc (PD / PM, PKD, PSH)

Figure 27: Shrink Disc (PD / PM, PKD, PSH)



### NOTE !

Shrink disc would be sent ready to assembly by manufacturer.  
Please do not segment the shrink disc into pieces before assembly process.  
There could be wounding risk during both assembly and disassembly.  
Please obey instructions given below.



### NOTE !

Do not tighten screws on the shrink disc without installing the shaft.  
If it is tightened, hollow shaft could be damaged.

### 7.1.1 Mounting Position of the Shrink Disc (PD / PM, PKD, PSH);

- If there is, the shrink disc must be removed from the package.
- The clamping bolts are loosened but must not be removed. Must be squeezed with the help of hand until to get the space out of between the flanges and inner loop.
- The external clamping flange connected to the gear unit's shaft, shrink disc must be pushed on to the output shaft. Soft grease must applied to the hole at inner ring. (for easing the pushing process).
- The soft grease must be applied to the spacer side of customer applications solid shaft. The oil must not be touched the compressed side of the shrink disc. For not creating that kind of risk, the grease should not be applied directly on the spacer.
- The grease both on the gear unit's shaft and customer's application shaft must be fully cleaned and be ungreased.
- The Customer's applications solid shaft must be mounted completely to the hollow shaft to the shrink disc's shrinking area.
- To positioned the shrink disc, the clamping bolts must slightly tightened.
- The clamping bolts must be tightened at clockwise a few times respectively (approximately ¼ bolt tour per tour). Never be tightened diagonally.
- After tightened the clamping bolts, there should be an equal space between the clamping bolts. If this space is not ensured, the gear unit must be dismantled and the sensibility of the external tightened flange of the shrink disc must be controlled.

**7.1.2 Demounting Position of the Shrink Disc (PD / PM, PKD, PSH);**

- The clamping bolts must be loosened respectively a few times. (approximately ¼ bolt tour per tour) But clamping bolts must not be fully removed.
- The shrink disc should not be separated from the gear unit's shaft.
- The gear unit must be removed from customer's applications solid shaft.

**DANGER !**

If the shrink disc are mounted and dismantled incorrectly, the wounding danger could exist.

**7.1.3 Cleaning of the Shrink Disc (PD / PM, PKD, PSH);**

- Dismantled shrink disc before remounting, is not needed to subject the cracking process.
- Only the polluted surfaces of the shrink disc must be cleaned.
- The conical surfaces must be lubricated with one of the the solid material lubricants listed below.

**Table 28:** Lubrication Schedule While Cleaning of Shrink Disc

Lubricant (Mo S2)	Type
<ul style="list-style-type: none"> <li>▶ Molykote 321 (Slippery lac)</li> <li>▶ Molykote Spray (Powder spray)</li> <li>▶ Molykote G Rapid</li> <li>▶ Aemasol MO 19P</li> <li>▶ Aemasol DIO-setral 57 N (Slippery lac)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Spray</li> <li>▪ Spray</li> <li>▪ Spray or paste</li> <li>▪ Spray or paste</li> <li>▪ Spray</li> </ul>

For the lubricating of clamping screws Molykote BR 2 or similar material must be used.



## 7.2 The Mounting of the Protection Caps (PD / PM, PKD, PSH)

The contact protection is required to prevent shrink disc and free rolling output solid shaft (the side which the customer is not using) windings. A protection cap (KK or KS-KK) may be put as a contact protection.

- The protection cap must be attached with fixing bolts to the mounting place.
- Must be tightened with the proper torc.



### EXPLOSION !

**Explosion hazard due to damaged and rubbing covers:** Failure to comply may cause severe, or even fatal injuries.

- Damaged covers must not be used, as they may cause rubbing.
- Covers must be inspected for transportation damage e.g. dents and warping before they are fitted.

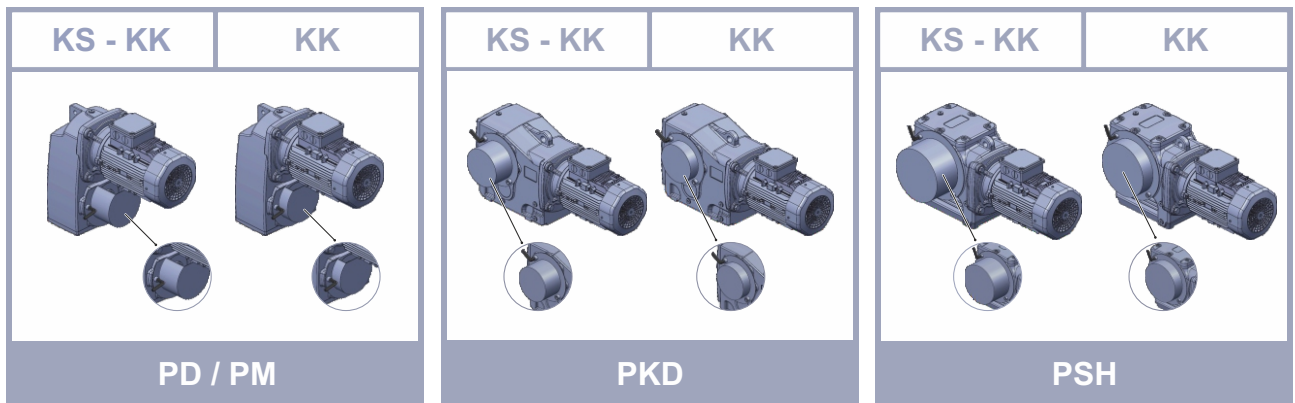
All fixing screws must be used and coated prior to use with a securing lubricant e.g. Loctite 242, Loxeal 54-03 and tightened to the correct torque (please see chapter 3.3 "Bolt Tightening Torque Value" page 33). For covers with Option IP66, press in the new/new condition closing cap by tapping it lightly with a hammer.



### NOTE !

Some cover headings could be closed with the help of liquid leaktightness material. In such cases if cover headings were fully closed by liquid leaktightness material likes of Loctite 574 or Loxeal 58 -14, it is not required to have cleaned them regularly.

**Figure 28: Protection Cover (PD / PM, PKD, PSH)**



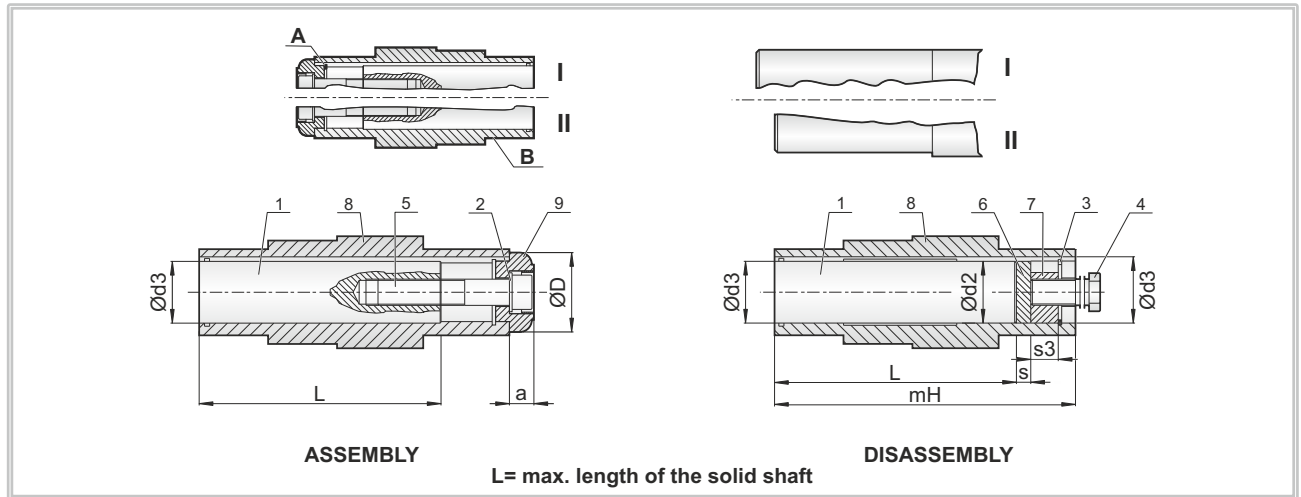
Catalog: PD/PM  
Page : 64

Catalog: PKD  
Page : 68

Catalog: PSH  
Page : 47

**7.3 Fixing Kit (PD, PKD, PSH)**

- The fixing kit is optionally available on shaft mounted gear units.
- Center bore of the customer solid shaft must be machined appropriately DIN 322/2.
- Customer shaft can be mounted either with a shaft shoulder or without shaft shoulder.
- When the assembly in Fig. I is used, the customer shaft is fasten by the circlip in the gear unit shaft. **(A)**
- When the assembly in Fig. II is used, It is used, the customer shaft is fasten directly by its shaft shoulder to the gearbox shaft. **(B)**

**Figure 29: Fixing Kit (PD, PKD, PSH)**

1. Customer's shaft
2. Washer DIN 127
3. \*Circlip DIN 472
4. \*Fixing screw
5. Socket head screw DIN 912
6. \*Washer
7. \*Nut
8. Hollow shaft
9. Fixing disc

\* **ATTENTION:** Star signs are shown this item are not provided by PGR.

**Table 29: Fixing Kit Dimensions (PD)**

TYPE	1	2	3	4	5	6		7		8		9	
	L					d2	s	d3	s3		d x mH	a	D
PD A02 / Ç	79	A10	I 25 x 1.5	M10	M10 X 45	24.9	3	24.9	12	M10	25 X 100	20	38
PD B02 / Ç	100	A10	I 30 x 1.5	M12	M10 X 45	29.9	3	29.9	12	M12	30 X 122	20	40
PD C13 / Ç	149	A12	I 35 x 1.75	M16	M12 X 55	34.9	3	34.9	16	M16	35 X 176	24.5	45
PD 12 / Ç	100	A10	I 30 x 1.2	M12	M10 X 45	29.9	3	29.9	12	M12	30 X 122	20	40
PD 22 / Ç	110	A12	I 35 x 1.5	M16	M12 X 55	34.9	3	34.9	16	M16	35 X 139	24.5	45
PD 32 / Ç	140	A16	I 40 x 1.75	M16	M16 X 70	39.9	4	39.9	16	M16	40 X 174	24.7	55
PD 42 / Ç	160	A16	I 50 x 2.0	M20	M16 X 70	49.9	4	49.9	20	M20	50 X 195	25.7	65
PD 52 / Ç	185	A20	I 60 x 2.0	M24	M20 X 90	59.9	5	59.9	24	M24	60 X 230	30	75
PD 62 / Ç	245	A20	I 70 x 2.5	M24	M20 X 90	69.9	5	69.9	24	M24	70 X 290	31.3	95
PD 72 / Ç	250	A20	I 80 x 2.5	M30	M20 X 100	79.9	8	79.9	30	M30	80 X 310	31	102
PD 82 / Ç	310	A24	I 100 x 3.0	M30	M24 X 110	99.9	8	99.9	30	M30	100 X 366	36.5	120
PD 92 / Ç	370	A24	I 120 x 4.0	M36	M24 X 110	119.9	10	119.9	32	M36	120 X 430	36.5	150



Table 30: Fixing Kit Dimensions (PKD - DA)

TYPE	1	2	3	4	5	6		7			8	9	
	L					d2	s	d3	s3		d x mH	a	D
PKD A 0290 DA / Ç	100	A10	I 25 x 1.5	M12	M10 X 45	24.9	3	24.9	12	M12	25 x 116	15	38
PKD B 0290 DA / Ç	115	A6	I 20 x 1.5	M10	M6 X 30	19.9	3	19.9	10	M10	20 x 134	15	38
PKD C 1290 DA / Ç	140	A10	I 30 x 1.5	M12	M10 X 45	29.9	3	29.9	12	M12	30 x 164	20	40
PKD F 4290 DA / Ç	140	A12	I 35 x 1.5	M12	M12 X 55	34.9	3	34.9	16	M16	35 x 170	24.5	45
PKD H 5290 DA / Ç	160	A16	I 40 x 2.0	M16	M16 X 70	39.9	4	39.9	16	M16	40 x 192	25	55
PKD 1390 DA / Ç	120	A10	I 30 x 1.5	M12	M10 X 45	29.9	3	29.9	12	M12	30 x 148	20	40
PKD G 1390 DA / Ç	120	A10	I 30 x 1.5	M12	M10 X 45	29.9	3	29.9	12	M12	30 x 148	20	40
PKD 2390 DA / Ç	150	A12	I 35 x 1.5	M16	M12 X 55	34.9	3	34.9	16	M16	35 x 180	24.5	45
PKD 3390 DA / Ç	170	A16	I 40 x 2.0	M16	M16 X 70	39.9	4	39.9	16	M16	40 x 210	25	55
PKD 4390 DA / Ç	200	A16	I 50 x 2.5	M20	M16 X 70	49.9	4	49.9	20	M20	50 x 240	26	65
PKD 5390 DA / Ç	255	A20	I 60 x 3.0	M24	M20 X 90	59.9	5	59.9	24	M24	60 x 300	31	75
PKD 6390 DA / Ç	305	A20	I 70 x 3.0	M24	M20 X 90	69.9	5	69.9	24	M24	70 x 350	32	78
PKD 7390 DA / Ç	305	A24	I 90 x 4.0	M30	M24 X 110	89.9	8	89.9	22	M30	90 x 350	36	102
PKD 8390 DA / Ç	365	A24	I 100 x 4.0	M30	M24 X 110	99.9	8	99.9	30	M30	100 x 420	36.5	120
PKD G 8390 DA / Ç	440	A24	I 110 x 5.0	M30	M24 X 110	109.9	10	109.9	30	M30	110 x 500	36	135
PKD 9390 DA / Ç	550	A24	I 120 x 5.0	M36	M24 X 110	119.9	10	119.9	32	M36	120 x 610	34.5	150
PKD G 9390 DA / Ç	605	A24	I 160 x 4.0	M36	M24 X 110	159.9	10	159.9	34	M36	160 x 674	34	200

Table 31: Fixing Kit Dimensions (PKD - DG)

TYPE	1	2	3	4	5	6		7			8	9	
	L					d2	s	d3	s3		d x mH	a	D
PKD A 0290 DG / Ç	100	A10	I 25 x 1.5	M12	M10 X 45	24.9	3	24.9	12	M12	25 x 116	20	38
PKD B 0290 DG / Ç	120	A10	I 25 x 1.5	M12	M10 X 45	24.9	3	24.9	12	M12	25 x 138	20	38
PKD C 1290 DG / Ç	140	A10	I 30 x 1.5	M12	M10 X 45	29.9	3	29.9	12	M12	30 x 164	20	40
PKD F 4290 DG / Ç	140	A12	I 35 x 1.5	M12	M12 X 55	34.9	3	34.9	16	M16	35 x 170	24.5	45
PKD H 5290 DG / Ç	160	A16	I 40 x 2.0	M16	M16 X 70	39.9	4	39.9	16	M16	40 x 192	25	55
PKD 1390 DG / Ç	120	A12	I 35 x 1.5	M16	M12 X 55	34.9	3	34.9	16	M16	35 x 148	24.5	45
PKD G 1390 DG / Ç	120	A16	I 40 x 2.0	M16	M16 X 70	39.9	4	39.9	16	M16	40 x 148	25	55
PKD 2390 DG / Ç	150	A16	I 40 x 2.0	M16	M16 X 70	39.9	4	39.9	16	M16	40 x 180	25	55
PKD 3390 DG / Ç	170	A16	I 50 x 2.5	M20	M16 X 70	49.9	4	49.9	20	M20	50 x 210	26	65
PKD 4390 DG / Ç	195	A20	I 60 x 3.0	M24	M20 X 90	59.9	5	59.9	24	M24	60 x 240	30	75
PKD 5390 DG / Ç	255	A20	I 70 x 3.0	M24	M20 X 90	69.9	5	69.9	24	M24	70 x 300	31.5	95
PKD 6390 DG / Ç	295	A20	I 80 x 4.0	M30	M20 X 100	79.9	8	79.9	30	M30	80 x 350	32	88
PKD 7390 DG / Ç	305	A24	I 90 x 4.0	M30	M24 X 110	89.9	8	89.9	22	M30	90 x 350	36	102
PKD 8390 DG / Ç	360	A24	I 110 x 5.0	M30	M24 X 110	109.9	10	109.9	30	M30	110 x 420	36.5	135
PKD G 8390 DG / Ç	440	A24	I 120 x 5.0	M36	M24 X 110	119.9	10	119.9	32	M36	120 x 500	36.5	150
PKD 9390 DG / Ç	550	A24	I 150 x 5.0	M36	M24 X 110	149.9	10	149.9	32	M36	150 x 610	34.5	200
PKD G 9390 DG / Ç	605	A24	I 160 x 4.0	M36	M24 X 110	159.9	10	159.9	34	M36	160 x 674	34	200





Table 32: Fixing Kit Dimensions (PSH - DG)

TYPE	1	2	3	4	5	6		7			8	9	
	L					d2	s	d3	s3		d x mH	a	D
PSH 2040 DG / Ç	100	A6	I 20 x 1.5	M10	M6 X 30	19.9	3	19.9	10	M10	20 X 120	15	30
PSH 2050 DG / Ç	110	A10	I 25 x 1.2	M12	M10 X 45	24.9	3	24.9	12	M12	25 X 132	20	38
	110	A10	I 30 x 1.2	M12	M10 X 45	29.9	3	29.9	12	M12	30 X 132	20	40
PSH 2063 DG / Ç	125	A10	I 35 x 1.5	M12	M10 X 45	29.9	3	12	12	M12	30 X 148	20	40
	120	A12	I 40 x 1.75	M16	M12 X 55	34.9	3	16	16	M16	35 X 148	24.5	45
PSH 2080 DG / Ç	135	A16	I 40 x 1.75	M16	M16 X 70	39.9	4	39.9	16	M16	40 X 168	25	55
	135	A16	I 45 x 2.0	M16	M16 X 70	44.9	4	44.9	16	M16	45 X 168	26	60
PSH 2100 DG / Ç	165	A16	I 50 x 2.0	M20	M16 X 70	49.9	4	49.9	20	M20	50 X 202	26	65
	155	A20	I 60 x 2.0	M24	M20 X 70	59.9	5	59.9	24	M24	60 X 202	30	75
PSH 2125 DG / Ç	205	A20	I 60 x 2.0	M24	M20 X 90	59.9	5	59.9	24	M24	60 X 250	30	75
	205	A20	I 70 x 2.5	M24	M20 X 90	69.9	5	69.9	24	M24	70 X 250	30	95

### 7.3.1 Assembling of the Fixing Kit (PD, PKD, PSH);

- The customer shaft must be mounted inside the gear units shaft. (1-8)
- The fixing disc must be mounted inside the gear units shaft. (8-9)
- The bolt and washer (DIN 127) must be fixed with the fixing disc. (2-5)  
(see. **Figure 29: Fixing Kit (PD, PKD, PSH)**, page 83)



#### NOTE !

Consider that the customer's shaft should not exceed the lenght "L max". Otherwise, fixing cannot be done.(1-5-6-7 (see. **Figure 29: Fixing Kit (PD, PKD, PSH)**, page 83))

### 7.3.2 Disassembling of the Fixing Kit (PD, PKD, PSH);

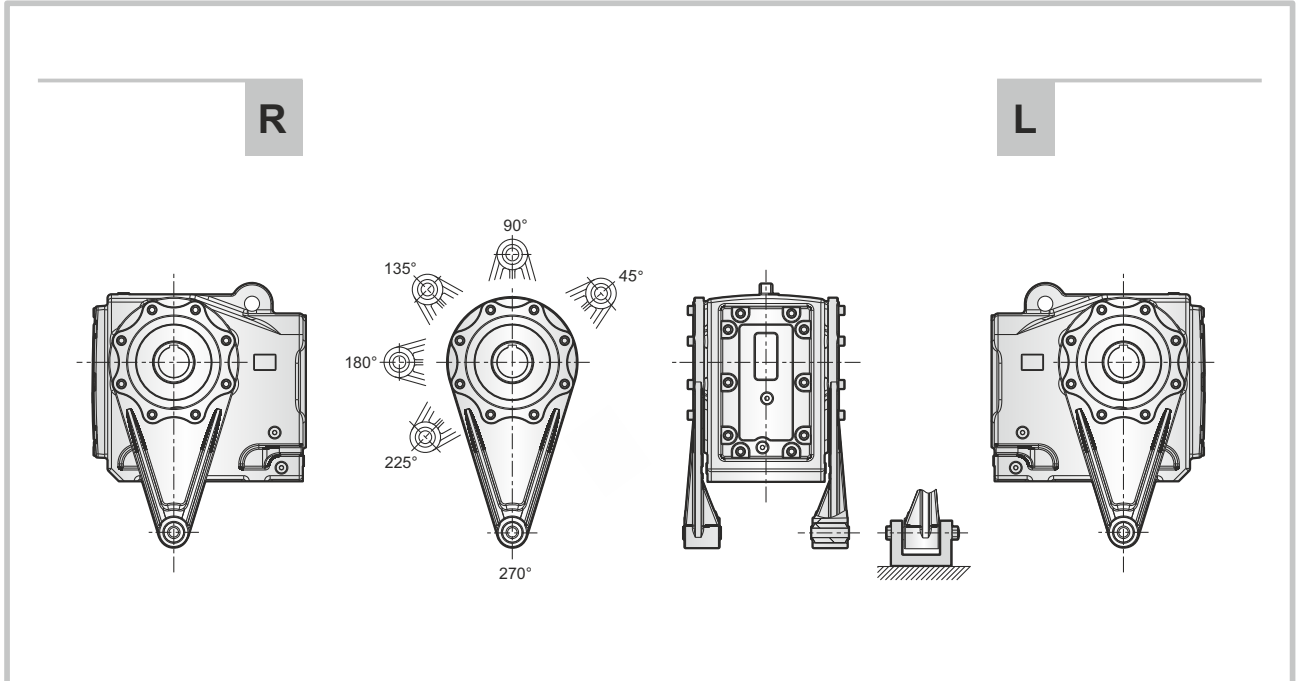
- Loosen the socket head screw. (2-5)
- Remove fixing disc. (9)
- Install washer. (6)
- Install nut. (7)
- Install circlip. (3-8)
- Remove solid shaft from hollow shaft with using fixing screw. (4)  
(see. **Figure 29: Fixing Kit (PD, PKD, PSH)**, page 83)



#### 7.4 Torque Arm and Torque Arm Platform (PKD, PSH)

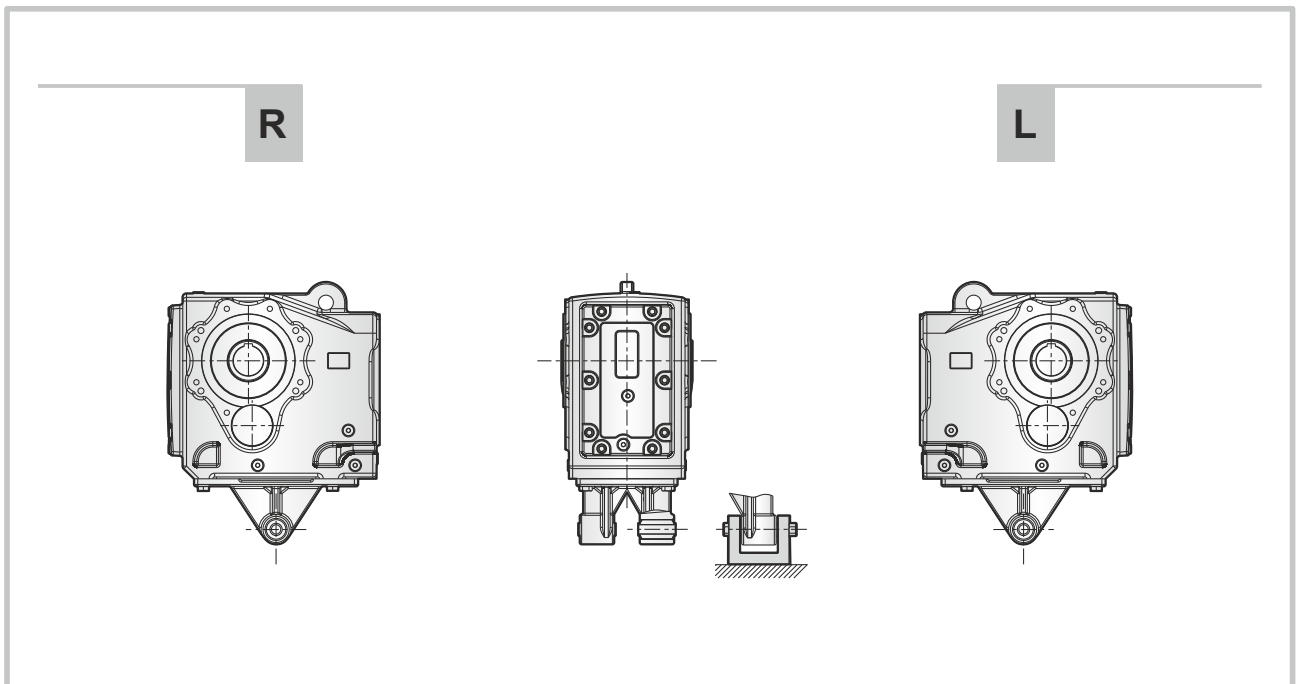
- The rubber wedge part of the torc arm must be taken into the bearing from both sides.
- Torc arms must be mounted as a voltage-free.
- For the correct mountage, the sticky (LOCTITE 510 OR EQUIVALENT) which absorbs vibration must be used.
- The screw connection of the torc arm must be tightened with proper torc and must got into the safe against loosening (LOCTITE 510 or equivalent).

Figure 30: Torque Arm (PKD)



Catalog: PKD  
Page : 65

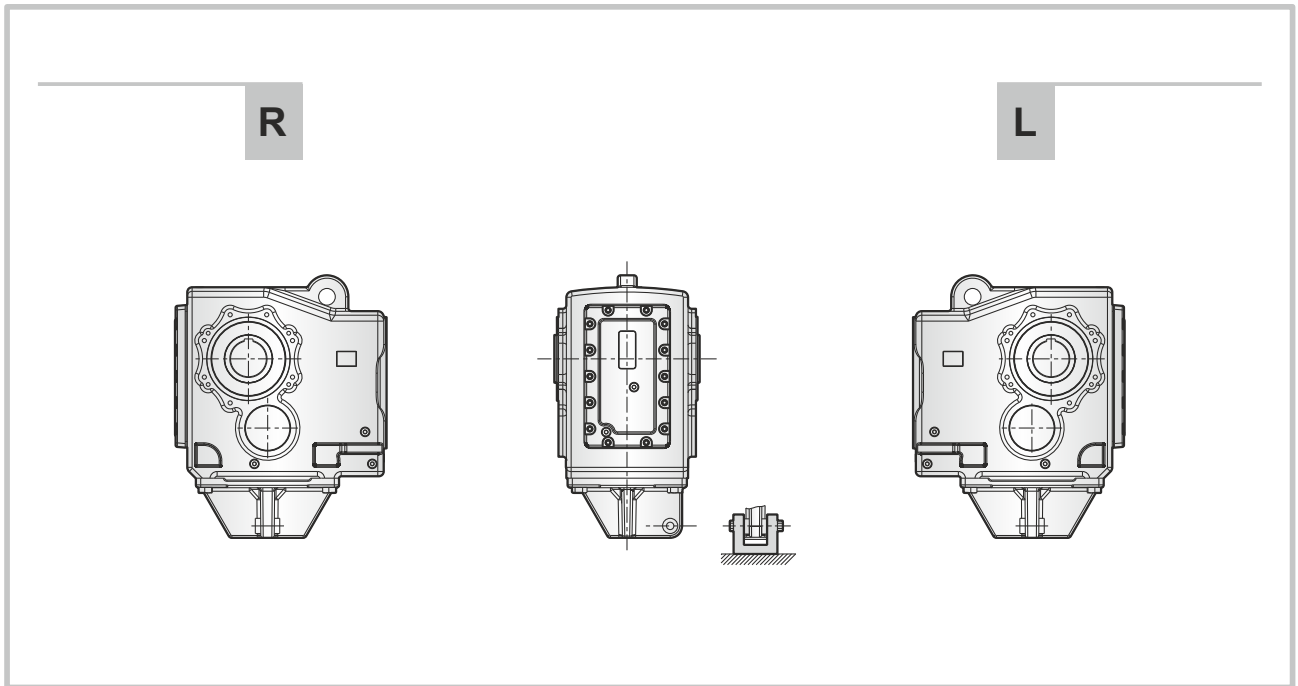
Figure 31: Torque Arm Platform (PKD)



Catalog: PKD  
Page : 66

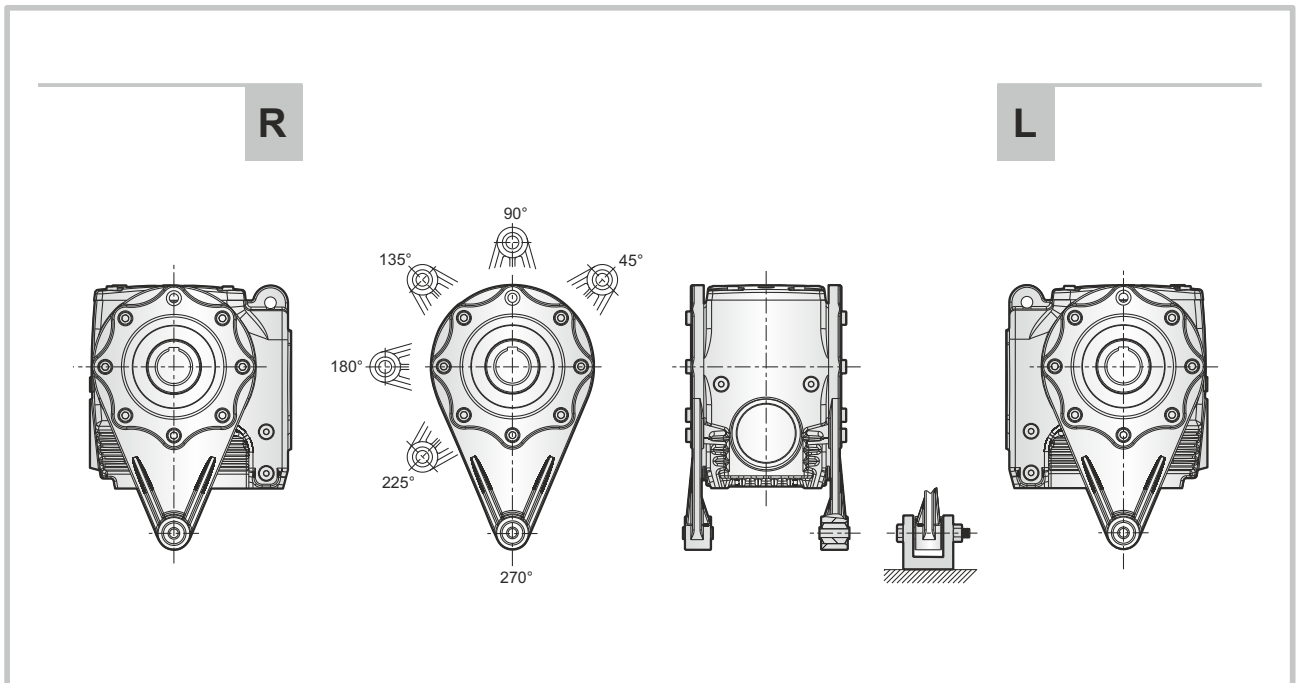


Figure 32: Torque Arm Platform (PKD)



Catalog: PKD  
Page : 66

Figure 33: Torque Arm (PSH)



Catalog: PSH  
Page : 45



**NOTE !**

The failure of the using of the original parts on the gear unit is not in our firm's responsibility.



## 7.5 Rubber Buffer (PD / PM)

Figure 34: Rubber Buffer

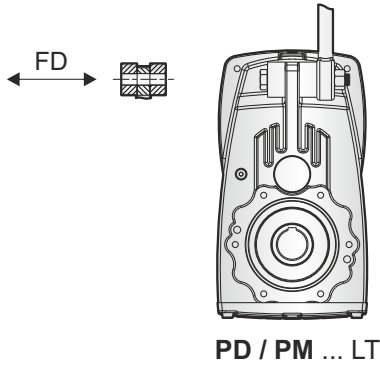
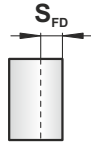
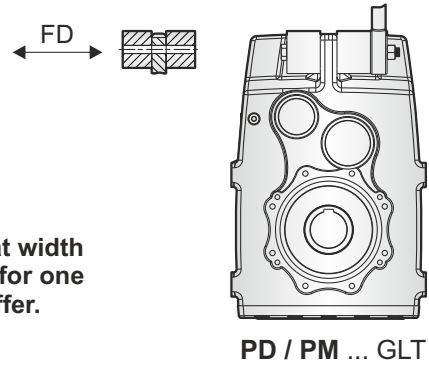


Figure 35: Reinforced Rubber Buffer



$S_{FD}$ : Shows that width of stretch for one rubber buffer.

### 7.5.1 The Rubber Wedge Assembly Row (PD / PM);

- In unloaded conditions the screw connection must be tightened until the space between contact surfaces are eliminated.
- To exercise prevoltage to the rubber wedge, the fixing nut should be turned half tour (not permitted larger prevoltage).
- LOCTITE 242 or equivalent or second nut-screw connection must got into safety for loosening.

### 7.5.2 The Rubber Wedge Disassembly Row (PD / PM);

- To remove voltage on the rubber wedge, the fixing nut must be loosened by half tour.
- The screw connection must be seperated from the rubber wedge.

## 7.6 Backstop

Backstop prevents output shaft from rotation in the wrong direction. Depending on the type and size of the gearbox, the backstop can be installed to the case, input flange or motor. It is important to specify the required output rotation direction.



### NOTE !

- The action of the motor in locking direction could cause fracturing of the lock.
- The motor absolutely must not rotated to the direction of locking. To provide specified direction of rotation, it must be careful that the motor is supplied by direct current.
- As a control, the output shaft/hollow shaft of the gearbox should be turned half a turn against the backstop direction.

The allowed direction of rotation is marked on the gear unit.  
If the backstop direction is wrong, please contact PGR.



## 8.1 Product Disposal

Dismantle the machine, separating the parts following the instructions given in this manual.

You must group the parts according to the materials they are made of: iron, aluminium, copper, plastic and rubber.

The parts must be disposed of by the relative centres in full compliance with the laws and force on the matter of dismantling and demolishing industrial waste.

**Waste Oil:** At the disposal of waste oil, please obey both to the environmental protection laws as well as rules and regulations those are in force into countries which the machine has been using of.

### 8.1.1 Disposal

The valid regulations must be taken into the consideration for the waste materials.

**Table 33:** Disposal Table

GEAR UNIT COMPONENTS	MATERIAL
Toothed wheels, shafts, rolling bearings, parallel keys, locking rings,...	Steel
Gear unit housing, housing components,...	Grey cast iron
Light alloy gear unit housing, light alloy gear unit housing components,...	Aluminium
Worm gears, bushes,...	Bronz
Radial seals, sealing caps, rubber components,...	Elastomers with steel
Coupling components	Plastic with steel
Flat seals	Asbestos - free sealing material
Gear oil	Additive mineral oil
Synthetic gear oil (rating plate code: CLP PG)	Polyglycol - based lubricants
Cooling spiral, embedding material of the cooling spiral, screw fittings	Copper, epoxy, yellow brass



#### NOTE !

Please do not diffuse any biologically indivisible materials, oil and noninclusive components (PVC, rubber, resins and etc.) to the environment.



#### ATTENTION !

Do not reuse damaged parts during inspection, only should be changed by expert personnels.



## 8.2 Troubleshooting

Table 34: Troubleshooting

NO	PROBLEM	OBSERVED	SOLUTION
①	Gearbox does not work.	The noise is not coming from gearbox. Output shaft of the gearbox is not rotating. Driver / frequency inverter is not be used.	Check the connection of electric motor, voltage and frequency. The values could be same with the values which are on the motor label. Look at to the motor usage guide. If the solution is not found look to the article 50.
②	Gearbox does not work.	The noise is not coming from gearbox. Output shaft of the gearbox is not rotating. Driver / frequency inverter is used.	Look to the guide of driver / frequency inverter or driver usage guide. Determine that error is not originated from driver / frequency inverter by seperating electric motor either from driver and frequency inverter and making direct connection to the motor.
③	Gearbox does not work.	A different noise is coming out of the gearbox. But gearbox and motor shaft are not rotating. Driver / frequency inverter or magnetic brake are not used.	The first thing that has to be made is to check whether motor connection, voltage and frequency are identical with motor label values. If there is not any problem, to pull out gearbox from the machine and try to operate in neutral. If gearbox works, the power of motor may not be enough to operate system. If the motor which connected to the gearbox is monophase, take off capacitors should be controlled. Even the motor does not work despite all tests and examinations, look at to the article 50.
④	Gearbox does not work.	A different noise is coming out of the gearbox. But gearbox and motor shaft are not rotating. Driver / frequency inverter or magnetic brake are used.	The frequency inverter or driver usage guide should be examined. Determine that error is originated whether from driver / frequency inverter by seperating electric motor either from driver and frequency inverter and making direct connection to the motor. If the gearbox does not work, look at to the article 50.
⑤	Gearbox does not work.	A different noise is coming out of the gearbox. But gearbox and motor shaft are not rotating. Magnetic brake is used.	It is necessary to check whether electric motor connection, voltage and frequency are identical with motor label values. Look at to the motor usage guide. Be sure that brake is working. If the brake is assembled by us to check whether it is made correctly according to the schema at the usage and maintenance instructions. If the error is not found to check whether the brake is operating by making direct connection to the brake appropriate to the brake voltage. When the electric is given, the noise of the opening of brake will come. If the brake is not working even by giving electric, the diode of brake could be in failure. To feed the motor directly according to the informations on the label when the brake is seperated from disc. If the problem is continuing, the power of the motor may not be enough. Look to the article 50.
⑥	Gearbox does not work at low speeds / frequencies.	Use driver / frequency inverter.	The motor feeding frequency is declining at low speeds. For the operating of motor at very low frequencies, it is essential to adjust motor parameters and frequency inverter parameters very well. Besides for the low speeds, there could be big changes even at the gearbox efficiency. To enlarge motor power and inverter or for to reach your requested cycle range, change the gearbox ratio.



NO	PROBLEM	OBSERVED	SOLUTION
7	Gearbox does not work after long awaitings or at mornings.	Environmental temperatures are dropping below -5°C.	The gearbox oil is not suitable to the environmental temperatures where it works. It is necessary to use low viscosity oils or to protect gearbox group from cold. To find proper oil look to usage guide or examine lubricating pages from the product catalogs. To work at higher environmental temperatures could be a solution. If the problem is continuing, the motor power should be increased.
8	Gearbox is very heating up.	You use worm screw type gearbox and environmental temperature is under +40°C.	When the gearbox is working under the full load, gauge gearbox surface temperature with heat meter. If it is under +90°C it is normal and no harm to gearbox. All worm screw and ATEX compatible helical gearboxes could be used up to the +120°C surface temperatures. If the temperature is above the +120°C and gearbox is ATEX compatible immediately stop gearbox and inform to PGR. Look to the article 50. If it is the product without ATEX, to check the oil amount according to the mountage position. Be sure that the mounting position written on the label and mounting position which gearbox is working should be identical. If not look to the article 50. To the gearboxes without worm screw types at heatings above +80°C, look to the articles 9 and 50.
9	Gearbox is very heating up.	You use helical gearboxes and environmental temperature is under +40°C.	When the gearbox is working under the full load, gauge gearbox surface temperature with heat meter. If it is under +90°C it is normal and no harm to the gearbox. All gearboxes with ATEX are designed to work at maximum +120°C. If the temperature is above +120°C and gearbox is ATEX compatible immediately stop gearbox and inform to PGR. The gearboxes without ATEX are designed to work at maximum +90°C temperature values. If the gearbox temperature is above the +90°C, control the oil amount according to mounting position. Be sure that the mounting position written on the label and mounting position which gearbox is working should be identical. If there is inconsistency look to the article 50.
10	Gearbox is very heating up.	Environmental temperature is above +40°C.	The standard gearboxes are designed to work at maximum +40°C. Temperatures above +40°C, special applications and additions should be done. In these situations please consult to PGR.
11	Gearbox is working noisy.	Noise is regular and perpetual.	Control the mobile machine elements. Operate gearbox without load by separating from the system. If you hear the same noise, bearings which belong to gearbox or motor could be in failure. Look to the article 50.
12	Gearbox is working noisy.	Noise is irregular.	Control the mobile machine elements. Operate gearbox without load by separating from the system. If the same noise is continuing, foreign objects could be in the oil. Change the oil and control the foreign objects in the oil. If the metal piece is found into the controlled oil, the gearbox could be damaged. Look to the article 50.



NO	PROBLEM	OBSERVED	SOLUTION
13	Gearbox is working noisy.	Noise is regular with clicking.	Control the mobile machine elements. Operate gearbox without load by separating from the system. If the same noise is continuing, gearbox parts could be damaged. Look to the article 50.
14	Gearbox is working noisy.	Noise is regular and fluctuating.	Control the flexure of connection elements which connect to output shaft. Separate element which is connected to output shaft and operate gearbox without load. If the same noise is continuing, look to the article 50.
15	Gearbox is working noisy.	Gearbox has motor with brake and noise is coming from the brake side.	The noises could be coming from the brake like in the shape of low level randomly tickings and it is normal. If the noise level is disturbing, brake could be damaged or there may be a problem at the gap adjustment between lining and disc. Look to the article 50.
16	Gearbox is working noisy.	You use frequency inverter and the noise is changing every time by the change of cycle.	Frequency inverter parameters may not be compatible with your used motor. Examine frequency inverter usage guide and if the same problem is continuing look to the article 50.
17	Oil leakage is existing.	Oil leakage from the seal.	If the environmental temperature is above +40°C and there is continuous working over 16 hours, according to the mounting position pull out a plug which is on the top and use ventilation plug instead of it. If your situation is not suited to this, seal could be damaged. Look to the article 50.
18	Oil leakage is existing.	Oil is leaking from the plug.	If you use the ventilation plug, be sure that the plug is at the right position. According to the mounting position of the gearbox, plug which is on the top could be ventilation plug. The plug may loosen, clean the surface and plug itself and squeeze it again. If the same problem is continuing, look to the article 50.
19	Oil leakage is existing.	Oil is coming out of the the housing.	To observe where the oil is exactly coming from. It is leaking from the oil plug, oil cover or seal and could flow onto the housing. If the situation is like this, look to the article 18 and 19. If you sure that oil is coming out of the housing there could be cracks and fractures at the housing. Look to the article 50.
20	Oil leakage is existing.	Oil is coming out of the the cover.	A gasket that is used between cover and housing is not performing its leaktightness duty. Dismantle the cover clean the bottom side and assemble cover to its place by smearing liquid gasket. If the problem continues look to the article 50.
21	Gearbox is making regular vibrations when it is worked at the assemble point.	You use torc arm.	The reason of the vibration of gearbox is originated from the shaft flexure which gearbox is connected. When the torc arm is used, it has no harm to gearbox and it is usual situation.






NO	PROBLEM	OBSERVED	SOLUTION
(22)	Gearbox is making random vibrations when it is worked at the assemble point.	You use torc arm.	The reason of the vibration of gearbox is because of shaft flexure which the gearbox is connected and passing gap between shaft and bushing. Control your shaft hole passing tolerance. When the torc arm is used, it has no harm to gearbox and it is usual situation.
(23)	Motor is warming a lot.	Motor is working above its normal ampere. Environment is clear.	There could be overloading or motor power is insufficient. Motor could be in failure. Look to the article 50.
(24)	Motor is warming a lot.	Environment is dusty.	Be sure of whether motor fan bowl and motor cooler cores are clean for the air passing. If you use extra fan be sure that it is working. If there is invertor usage at the motor and works at low frequencies, the motor fan may not be sufficient. Use extra fan in these situations. If the problem continues look to the article 50.
(25)	Motor shaft is rotating but gearbox shaft is not.	Friction noise is coming from inside of gearbox or only there is motor noise.	There could be a damage at the gearbox parts. Look to the article 50.
(26)	Motor shaft is rotating but gearbox shaft is not.	You use chain geared or pinion geared at the output shaft of gearbox.	The damage could be originated of polygon impact formed by chain geared or from the radial load. Gearbox connection points may not be rigid enough. Be sure that you are able to use proper chain geared and pinion geared for used gearbox. Recalculate maximum allowable radial load according to this position. Look to the article 50.
(27)	Output shaft is cut.	You use either chain geared or pinion geared.	The damage could be originated of polygon impact formed by chain geared or from the radial load. Gearbox connection points may not be rigid enough. Be sure that you are able to use proper chain geared and pinion geared for used gearbox. Recalculate maximum allowable radial load according to this position. Look to the article 50.
(28)	Gearbox is stopping too late.	You use motor with brake	Control the electric connection schema of brake. Be sure that there is not assembled delayed diode onto the brake. If there is delayed diode, it could be changed. ( Hoisting gearboxes are excluded PCS)
(50)	Service is required.	Informing of PGR Company.	Please contact with PGR company. Communication informations are given at the usage guides,catalogs. Mechanical parts can only be changed either by PGR or within the knowledge. Any change that is to be made without the knowledge of PGR would cancel both guarantee of product and all certificate decelerations and remove the responsibilities of PGR over the product.

*If there are problems or malfunctions different to the onesdescribed here contact a PGR Industries Assistance Centre.*



### 9.1 Authorized Service

They are skill and qualified people, which are determined by company. They have education about electrical and mechanical subject.

	<b>NOTE !</b>  At below; the list took in place decided by our firm, authorized service and customer (user) which is about control and maintenance criterias/applications. Must be obliged to the informations which were given in the list. To the contrary that Usage and Maintenance directions become invalid.
---	--

**Table 35:** Authorized Service

No	CRITERIA	MANUFACTURER (PGR)	AUTHORIZED SERVICE	CUSTOMER (USER)
1	Disassembly of geared unit	✓	✓	X
1.1	Case changing	✓	✓	X
1.2	Gear changing	✓	✓	X
1.3	Solid / shaft changing	✓	✓	X
1.4	Changing of all consumable material except sealing materials	✓	✓	X
2	Oil cup changing	✓	✓	✓
3	Seal changing	✓	✓	✓
4	Oil changing	✓	✓	✓
5	Motor montage to IEC adapter type	✓	✓	✓
6	Motor montage to PAM type	✓	✓	✓
7	Assembly of geared unit with W cylinder type	✓	✓	✓
8	Disassembly of motor from IEC / PAM type	✓	✓	✓

✓ : SUITABLE

X : NOT SUITABLE

2-3 : Send to the contaminated waste disposal (licensed firm).

4 : Send to the licensed firm for the purpose of disposal.

**10.1 Declaration of Conformity (PA / PF)****DECLARATION OF CONFORMITY****COMPANY**

**NAME** : POLAT GRUP REDÜKTÖR SAN. VE TİC. A.Ş.  
**ADDRESS**: Ata OSB Mah. Astim 1.Cad. No: 4, PK 105 Efeler / Aydın / TURKEY  
**PHONE** : +90 256 231 19 12 - 16 (pbx)  
**FAX** : +90 256 231 19 17

**PRODUCT**

**NAME** : HELICAL GEAR UNITS  
**TYPE** : PA / PF  
**BRAND** : PGR  
**MODEL** : PA / PF 11 ... 51  
02 ... 102  
03 ... 103  
12 / 02 ... 52 / 12  
63 / 22 ... 103 / 52  
63 / 23 ... 103 / 53

**APPLIED REGULATIONS:**

Machinery Directive	2006/42/EC
ATEX	2014/34/EU
Low Voltage Directive	2014/35/EU

**APPLIED HARMONIZED STANDARDS:**

TS EN ISO 12100:2010  
TS EN ISO 13857  
TS EN 60204  
TS EN ISO 80079-36:2016  
TS EN ISO 80079-37:2016

Our products comply with the regulations and standards described above. When our products are fitted with an electric motor, we fulfill the requirements to the extent that the Low Voltage Regulation is included in the application area 2014/35/EU.



Applied Person  
Necdet DEMİR  
General Manager

Date: 11 July 2016



PD / PM



**DECLARATION OF CONFORMITY**

**COMPANY**

**NAME** : POLAT GRUP REDÜKTÖR SAN. VE TİC. A.Ş.  
**ADDRESS**: Ata OSB Mah. Astim 1.Cad. No: 4, PK 105 Efeler / Aydın / TURKEY  
**PHONE** : +90 256 231 19 12 - 16 (pbx)  
**FAX** : +90 256 231 19 17

**PRODUCT**

**NAME** : PARALLEL SHAFT MOUNTED GEAR UNITS  
**TYPE** : PD / PM  
**BRAND** : PGR  
**MODEL** : PD / PM A 02 ... 112  
C 13 ... 123  
12 / 02 ... 52 / 12  
63 / 22 ... 113 / 52

**APPLIED REGULATIONS:**

Machinery Directive	2006/42/EC
ATEX	2014/34/EU
Low Voltage Directive	2014/35/EU

**APPLIED HARMONIZED STANDARDS:**

TS EN ISO 12100:2010  
TS EN ISO 13857  
TS EN 60204  
TS EN ISO 80079-36:2016  
TS EN ISO 80079-37:2016

Our products comply with the regulations and standards described above. When our products are fitted with an electric motor, we fulfill the requirements to the extent that the Low Voltage Regulation is included in the application area 2014/35/EU.



Applied Person  
Necdet DEMİR  
General Manager

Date: 11 July 2016

**PKD****DECLARATION OF CONFORMITY****COMPANY**

**NAME** : POLAT GRUP REDÜKTÖR SAN. VE TİC. A.Ş.  
**ADDRESS**: Ata OSB Mah. Astim 1.Cad. No: 4, PK 105 Efeler / Aydın / TURKEY  
**PHONE** : +90 256 231 19 12 - 16 (pbx)  
**FAX** : +90 256 231 19 17

**PRODUCT**

**NAME** : HELICAL BEVEL GEAR UNITS  
**TYPE** : PKD  
**BRAND** : PGR  
**MODEL** : PKD A 0290 ... H 5290  
1390 ... G 9390  
1490 ... 5490  
6390 / 32 ... G 9390 / 62  
G 9390 / 63

**APPLIED REGULATIONS:**

Machinery Directive	2006/42/EC
ATEX	2014/34/EU
Low Voltage Directive	2014/35/EU

**APPLIED HARMONIZED STANDARDS:**

TS EN ISO 12100:2010  
TS EN ISO 13857  
TS EN 60204  
TS EN ISO 80079-36:2016  
TS EN ISO 80079-37:2016

Our products comply with the regulations and standards described above. When our products are fitted with an electric motor, we fulfill the requirements to the extent that the Low Voltage Regulation is included in the application area 2014/35/EU.



Applied Person  
Necdet DEMİR  
General Manager

Date: 11 July 2016



PSH



## DECLARATION OF CONFORMITY

### COMPANY

**NAME** : POLAT GRUP REDÜKTÖR SAN. VE TİC. A.Ş.  
**ADDRESS**: Ata OSB Mah. Astim 1.Cad. No: 4, PK 105 Efeler / Aydın / TURKEY  
**PHONE** : +90 256 231 19 12 - 16 (pbx)  
**FAX** : +90 256 231 19 17

### PRODUCT

**NAME** : HELICAL WORM GEAR UNITS  
**TYPE** : PSH  
**BRAND** : PGR  
**MODEL** : PSH 2040 ... 2125  
3050 ... 3125

### APPLIED REGULATIONS:

Machinery Directive	2006/42/EC
ATEX	2014/34/EU
Low Voltage Directive	2014/35/EU

### APPLIED HARMONIZED STANDARDS:

TS EN ISO 12100:2010  
TS EN ISO 13857  
TS EN 60204  
TS EN ISO 80079-36:2016  
TS EN ISO 80079-37:2016

Our products comply with the regulations and standards described above. When our products are fitted with an electric motor, we fulfill the requirements to the extent that the Low Voltage Regulation is included in the application area 2014/35/EU.



Applied Person  
Necdet DEMİR  
General Manager

Date: 11 July 2016



**10.2 ATEX Document**

[1] **CERTIFICATE OF RECEIPT OF TECHNICAL FILE**  
*ACCORDING TO ATEX 2014/34/EU DIRECTIVE*

- [2] According to Article 13.1 b (ii), Directive 2014/34/EU, we confirm the receipt of documentation to retain it.
- [3] Receipt Number: SCA18TDEX006
- [4] Technical File Number: PGRATEX18 / Rev.00
- [5] Date: 22.03.2018
- [6] Equipment or Protective System: GEARBOX - GEAR UNIT  
Models: P,PA,PF,PD,PM,PKD,PSH,P+A,PMRV,PMRV Plus,A,F,D,M,K,PL,PLB,PH,PB,PHYK,PRC/PRCF,PEX,PCS
- [7] Manufacturer: POLAT GROUP REDUKTOR SAN. VE TIC. A.S.
- [8] Address : ATA MAH. ASTIM. OSB 1. CADDE , NO:4 EFELER-AYDIN/TURKEY
- [9] SCA, notified body that no. 2336, in accordance with the Council Directive 2014/34/EU of 26 February 2014, herewith acknowledges receipt, from the Manufacturer, of the technical documents (Technical File).
- [10] This acknowledgement is an evidence about fulfillment of manufacturer duties concerning communicate the dossier of technical documentation to notified body in accordance with clause Article 13.1 b (ii) of Directive 2014/34/EU ATEX. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system.
- [11] SCA holds the Technical File for at least ten years from the date of the last manufactured apparatus. In case of lack of a written acknowledgement from the manufacturer about the intention of maintaining the Technical File deposit, SCA will hold the TECHNICAL FILE in its archives for 10 years, starting from the date this receipt is confirmed.
- [12] This receipt can be reproduced only entirely and with no change.
- [13] Reference standards:  
*EN ISO 80079-36:2016 , EN ISO 80079-37:2016*
- [14] Marking of the equipment or protective system according to manufacturer's declaration :



**II 2G Ex h IIC T4 Gb**  
**II 2D Ex h IIC T120°C Db**



Digitally  
signed by  
İSMAIL  
OĞLAKCIOĞLU

CONFIRMATION

**İsmail OĞLAKCIOĞLU**  
SCA Technical Manager

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SCA Belgelendirme ve Özel Eğitim Hizmetleri Ltd. Şti.  
Mansuroğlu Mah. 284/1 Sok. No:1 İhsaniye Plaza D.17 Bayraklı İZMİR / TURKEY  
Phone: 0090- 232 - 489 02 12 Fax: 0090 - 489 02 17  
www.scaatex.com e-mail: info@scaatex.com

**11.1 Contact Information****FACTORY**

ATA OSB MAH. ASTİM 1. CAD. NO: 4, PK 105 Efeler / Aydın / TURKEY

Tel : +90 256 231 19 12 - 16 (pbx)  
Fax : +90 256 231 19 17  
Web : [www.pgr.com.tr](http://www.pgr.com.tr)  
e-mail : [info@pgr.com.tr](mailto:info@pgr.com.tr) - [satissonrasi@pgr.com.tr](mailto:satissonrasi@pgr.com.tr)

**ASSEMBLY FACTORY AND LOGISTICS CENTER**

AYDIN ORGANİZE SANAYİ BÖLGESİ UMURLU MAH. NO:66 Efeler / Aydın / TURKEY

Tel : +90 256 231 19 12 - 16 (pbx)  
Fax : +90 256 231 19 17  
Web : [www.pgr.com.tr](http://www.pgr.com.tr)  
e-mail : [info@pgr.com.tr](mailto:info@pgr.com.tr) - [satissonrasi@pgr.com.tr](mailto:satissonrasi@pgr.com.tr)

**AREAS****ANKARA AREA**

AHI EVRAN CAD. 1203.SK NO:18 D:58-60 İSGEM Ostim / Ankara / TURKEY

Tel : +90 312 354 44 08  
+90 312 385 86 68  
Fax : +90 312 385 79 27  
Web : [www.pgr.com.tr](http://www.pgr.com.tr)  
e-mail : [ankara@pgr.com.tr](mailto:ankara@pgr.com.tr)

**ISTANBUL AREA**

ŞERİFALİ MAH. ALPTEKİN CAD. SÖYLEŞİ SOK. NO:31 Ümraniye / İstanbul / TURKEY

Web : [www.pgr.com.tr](http://www.pgr.com.tr)  
e-mail : [istanbul@pgr.com.tr](mailto:istanbul@pgr.com.tr)

**GERMANY AREA**

IN DER SCHLINGE 6, D-59227 Ahlen / GERMANY

Tel : +49 (0) 238 2855 7010  
: +49 (0) 238 2855 7011  
: +49 (0) 238 2855 7012  
: +49 (0) 238 2855 7016  
Web : [www.pgr.com.tr](http://www.pgr.com.tr)  
e-mail : [info@pgrgermany.de](mailto:info@pgrgermany.de)







- Ata OSB Mah. Astim 1. Cad. No: 4, Pk 105 Efeler / Aydın / TÜRKİY
- T: +90 256 231 19 12 - 16 (pbx)
- F: +90 256 231 19 17
- [info@pgr.com.tr](mailto:info@pgr.com.tr) - [satissonrasi@pgr.com.tr](mailto:satissonrasi@pgr.com.tr)
- [www.pgr.com.tr](http://www.pgr.com.tr)