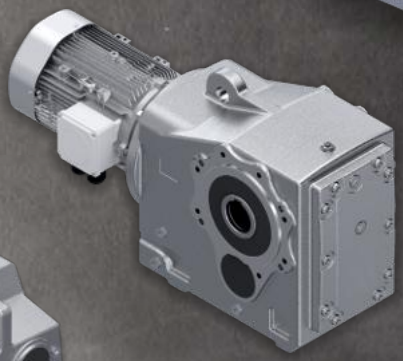
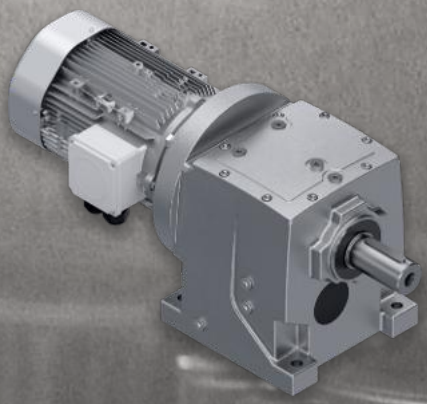
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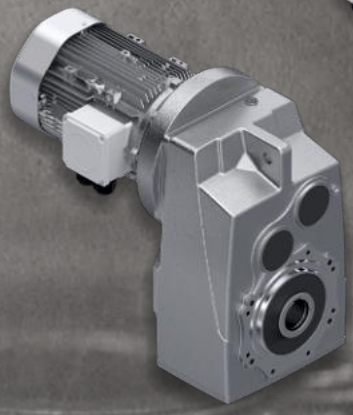
PA-PF / PD-PM / PKD / PSH SERIES

Helical Gear Units
Parallel Shaft Mounted Gear Units
Helical Bevel Gear Units
Helical Worm Gear Units
GEAR UNIT WITH MOTORS / WITHOUT MOTORS









PGR®
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



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, installion / 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.

1.3 Correct Use

PGR The products are designed to use in commercial plants and are operated convenientto the current standards and directions. Technical datas and allowed usage conditions are placed in product's power tab and usage guidance. Should be conformed to all the values.

This usage guidance is prepared by our firm according to 2006/42/EC The European Union Machinery Safety Instructions and is not be in placed 2014/34/EU "The direction about tools used in possible explosive environment and protective systems".

1.4 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 accidential protection.

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.

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 cataloque.

NOTE !

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

ATTENTION !

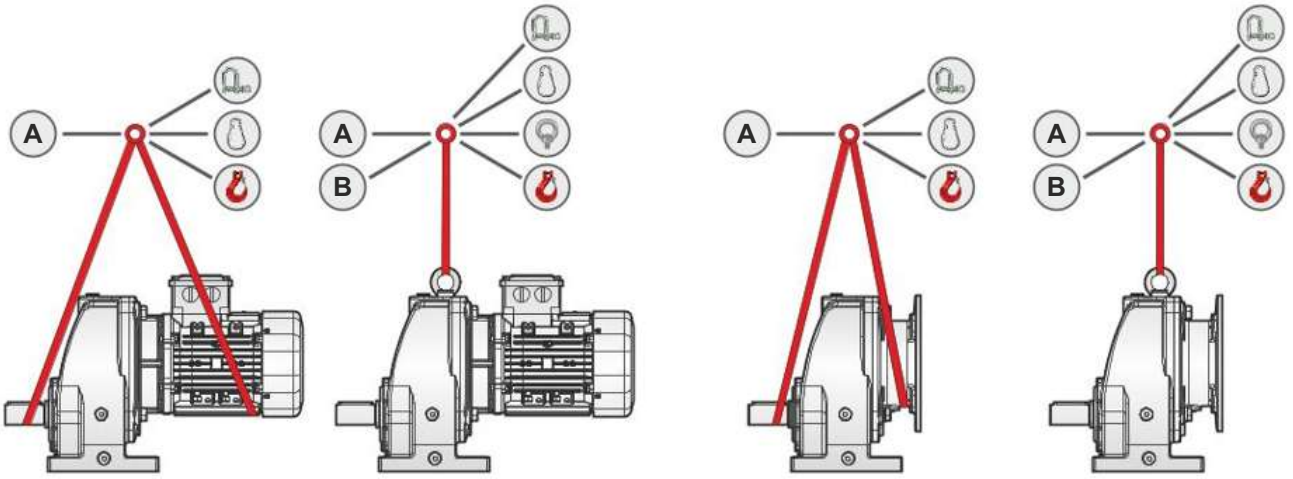
If the connection tool is coupling between electric motor and gear unit, lifting eyebolt should not be used.

1.6.4 Transport of Gearboxes;

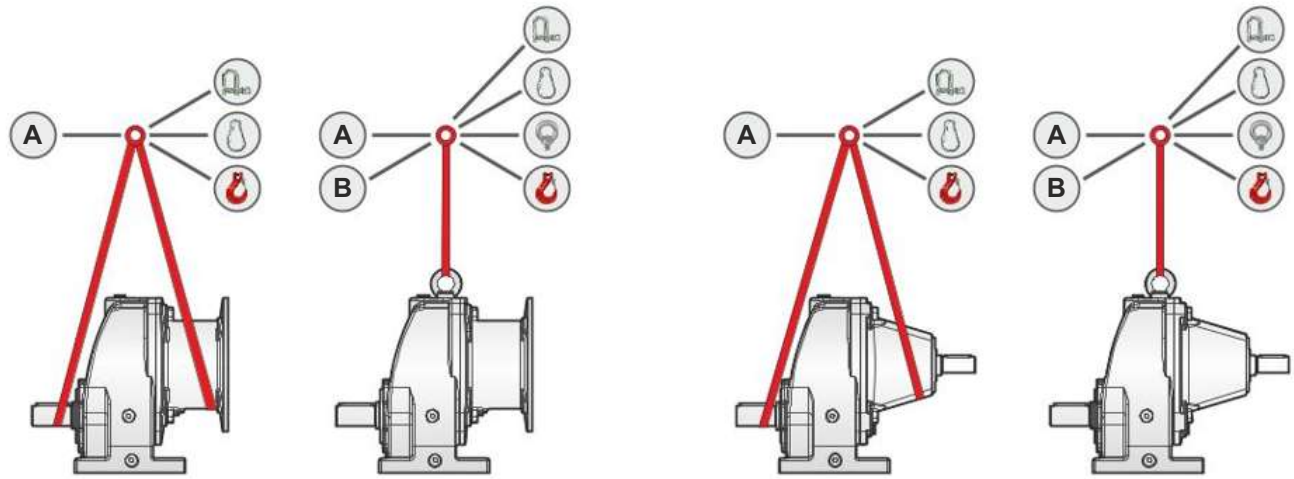
Figure 1: Transport of Gearboxes **(PA / PF)**

PA SINGLE STAGE

MOTOR / PAM



IEC / W



A Hoop equipped (swab)

B Hoop equipped (chain)

Load hook

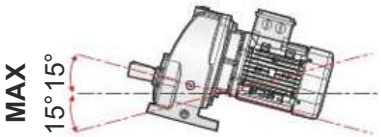
Screw hook

Locked hook

Lifting eyebolts

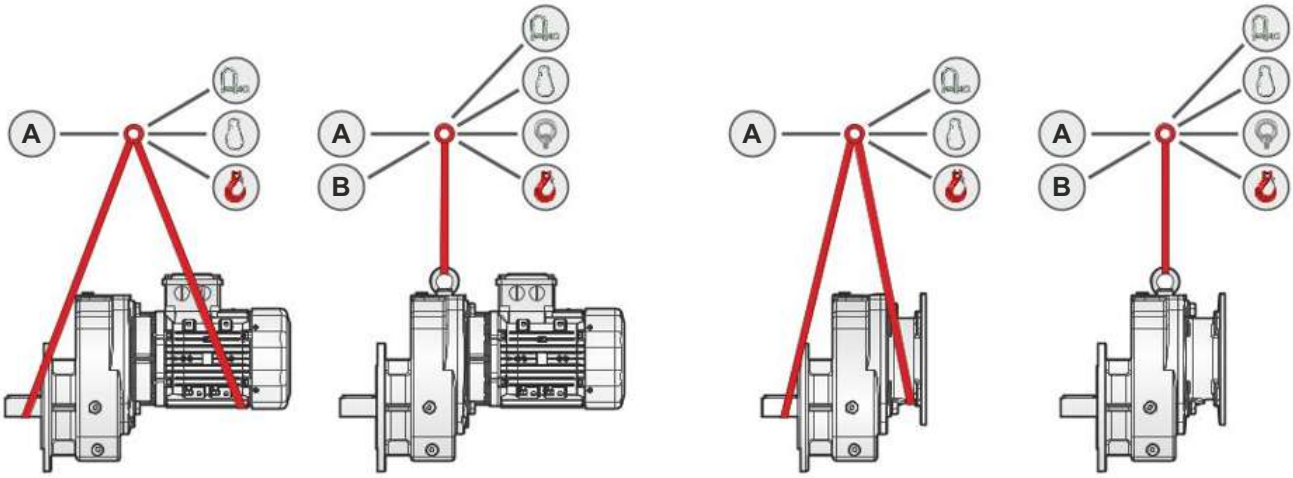
Manuel lifting (Weight ≤ 15 kg)
(ref. ILO Contract)Not valid for the continuous carrying.
Not valid for the continuous carrying.

The allowable maximum slope is 15 degree.

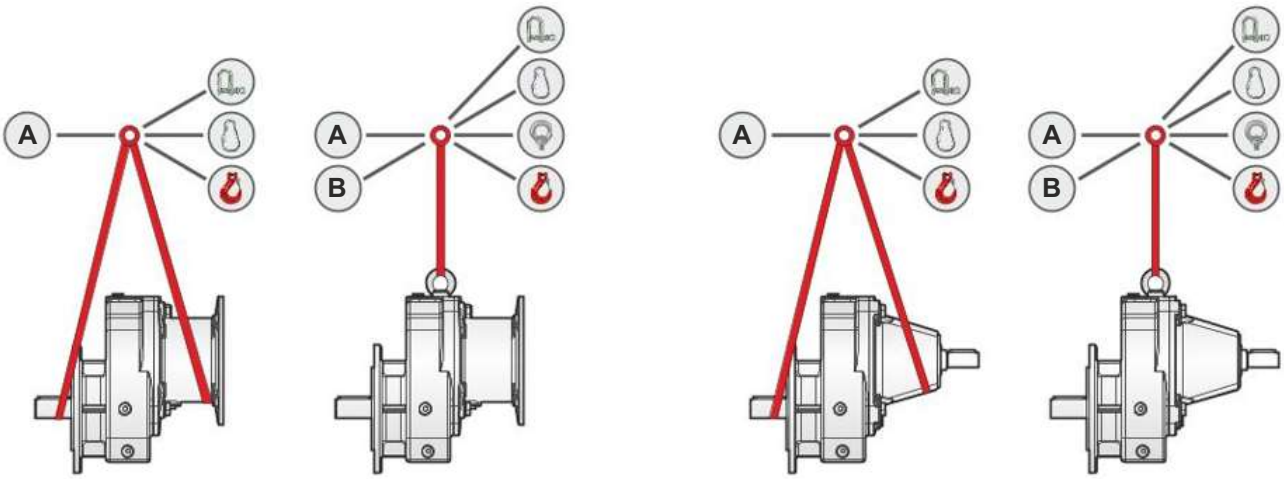


PF SINGLE STAGE

MOTOR / PAM



IEC / W



A Hoop equipped (swab)

B Hoop equipped (chain)

Load hook

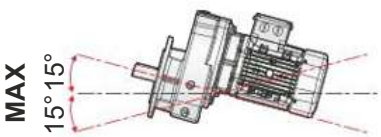
Screw hook

Locked hook

Lifting eyebolts

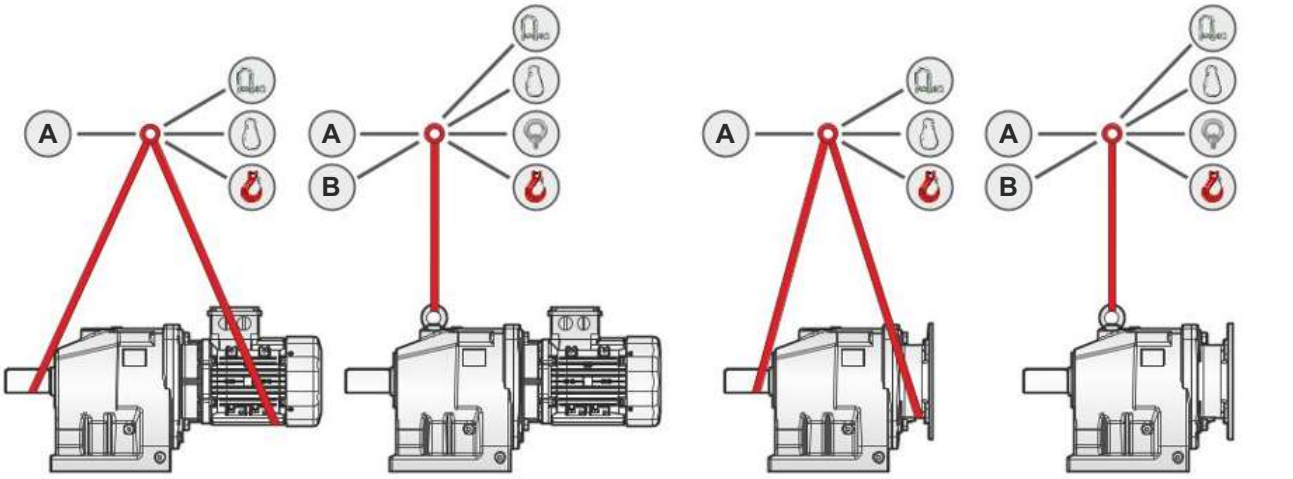
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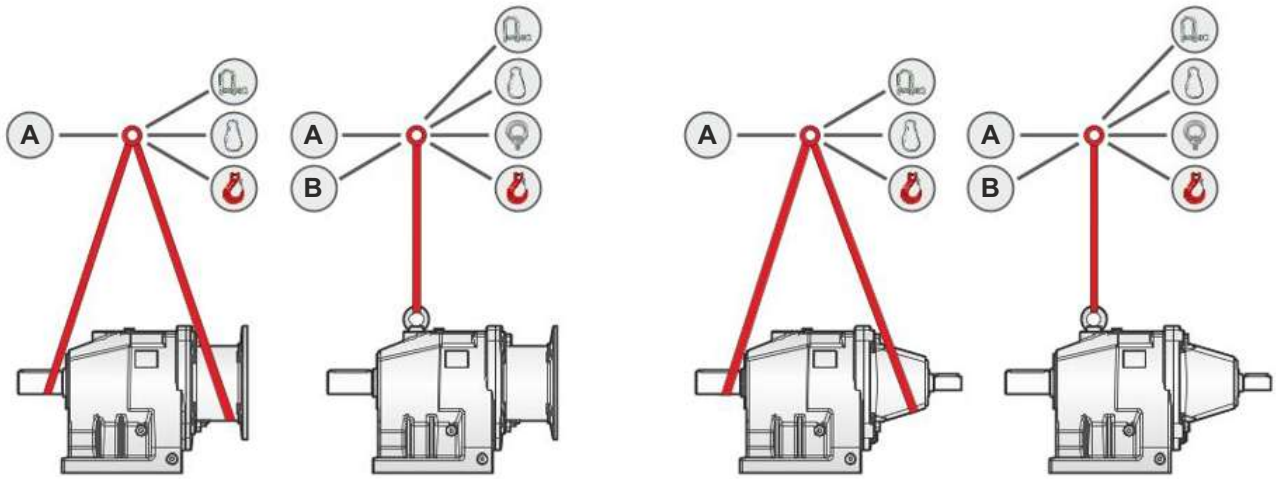


PA DOUBLE STAGE

MOTOR / PAM



IEC / W



A Hoop equipped (swab)

B Hoop equipped (chain)

Load hook

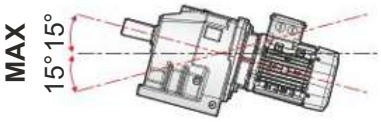
Screw hook

Locked hook

Lifting eyebolts

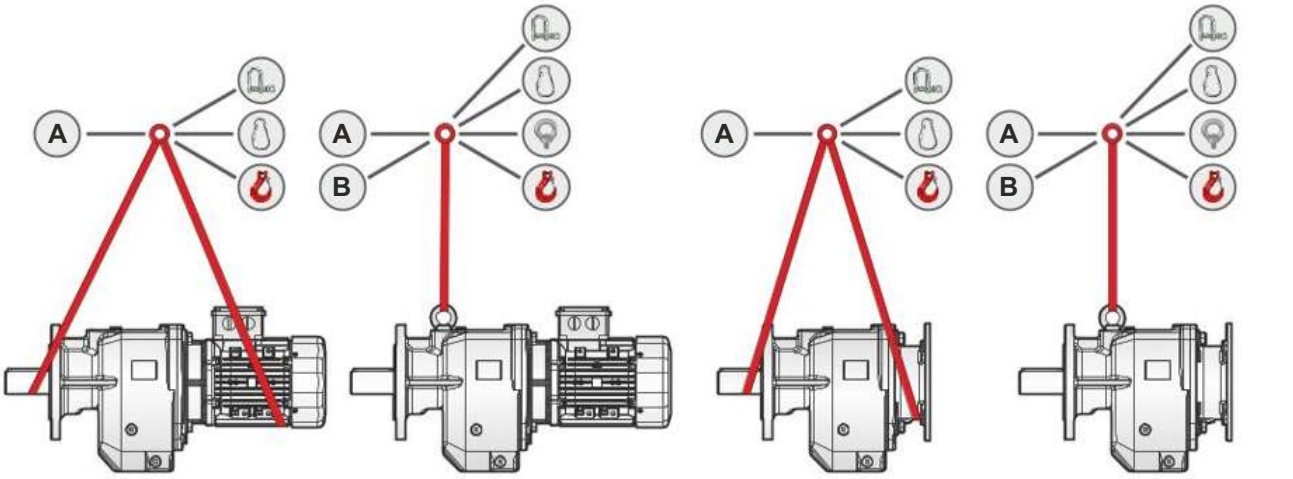
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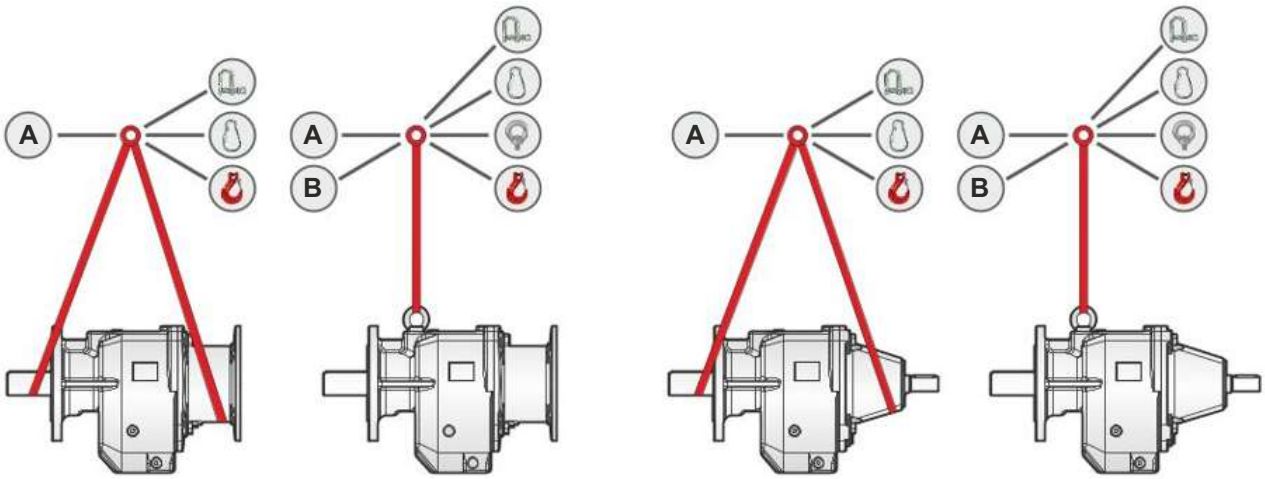


PF DOUBLE STAGE

MOTOR / PAM



IEC / W



A Hoop equipped (swab)

B Hoop equipped (chain)

Load hook

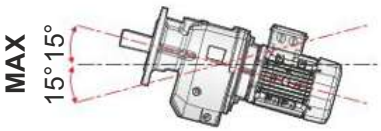
Screw hook

Locked hook

Lifting eyebolts

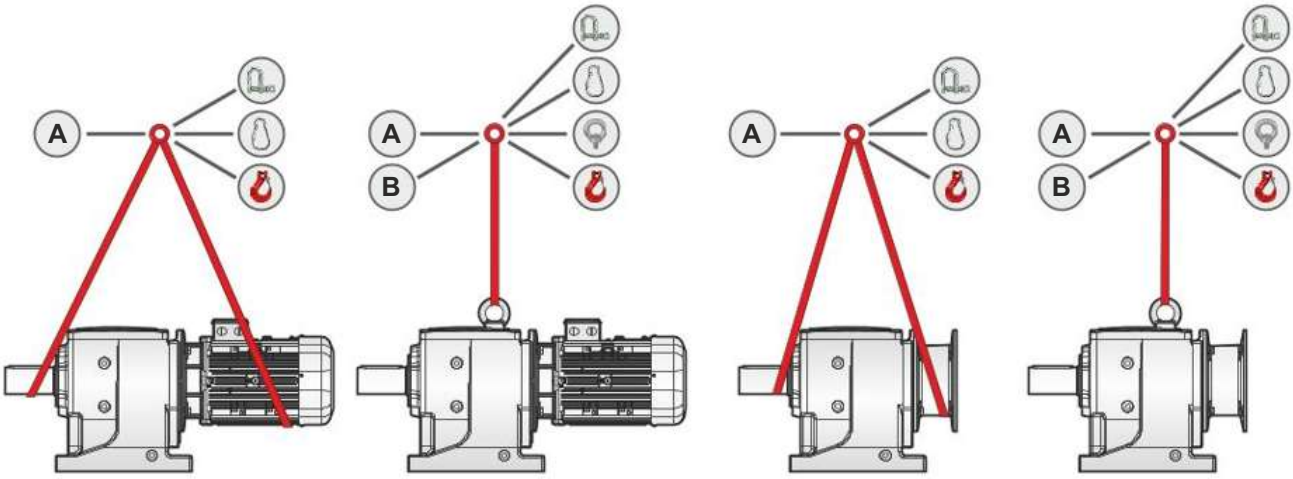
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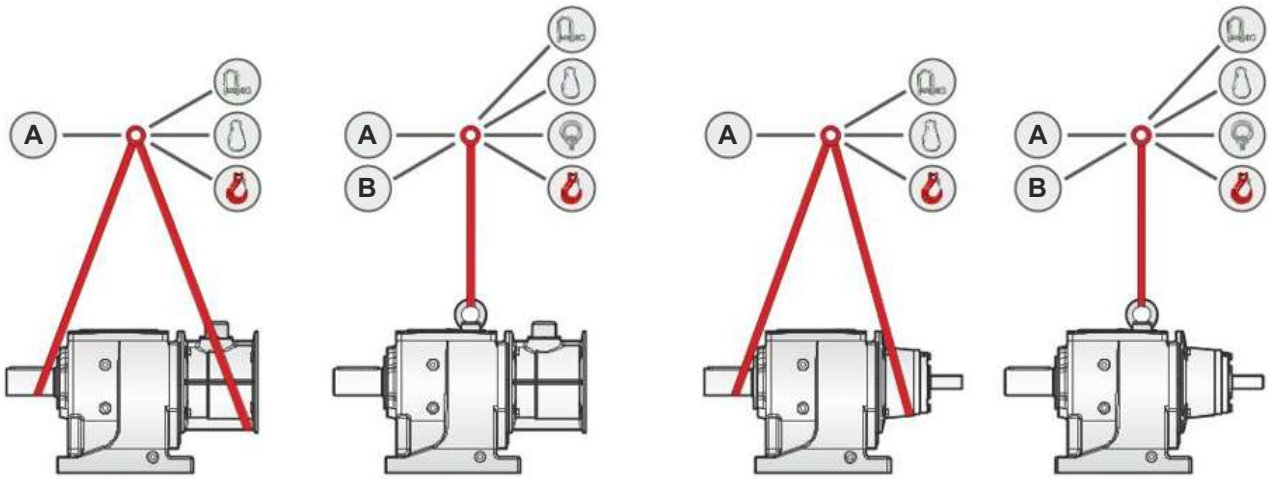


PA TRIPLE STAGE

MOTOR / PAM



IEC / W



A Hoop equipped (swab)

B Hoop equipped (chain)

Load hook

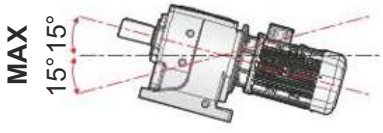
Screw hook

Locked hook

Lifting eyebolts

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

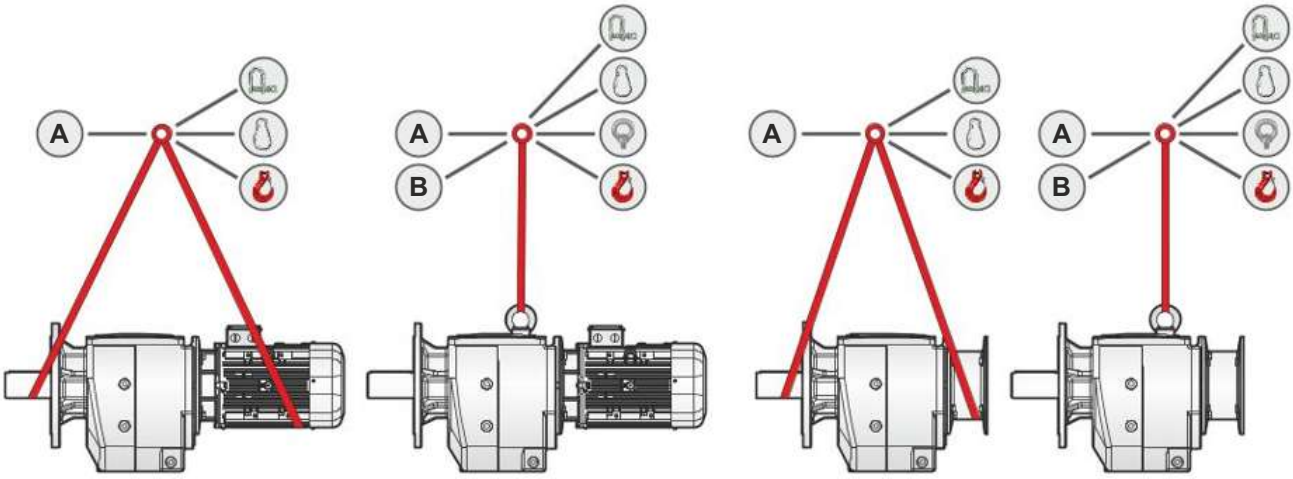
The allowable maximum slope is 15 degree.



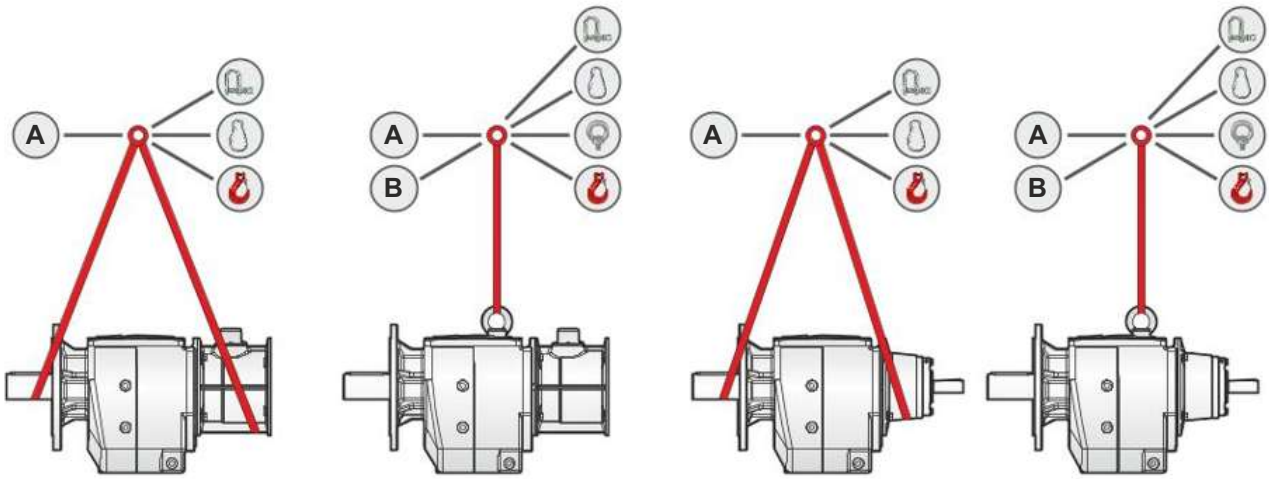
PF

TRIPLE 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)
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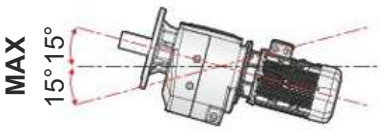
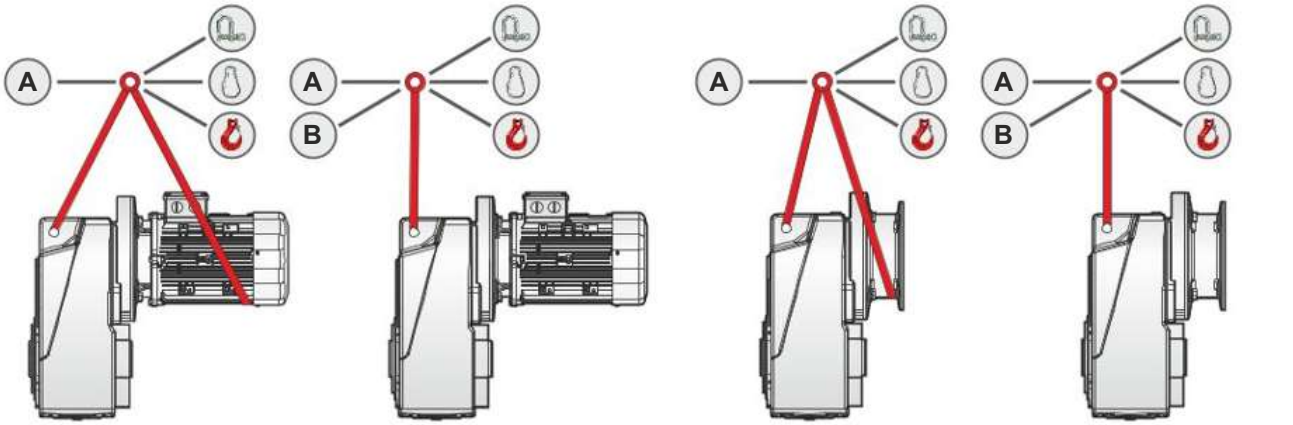


Figure 2: Transport of Gearboxes **(PD / PM)**

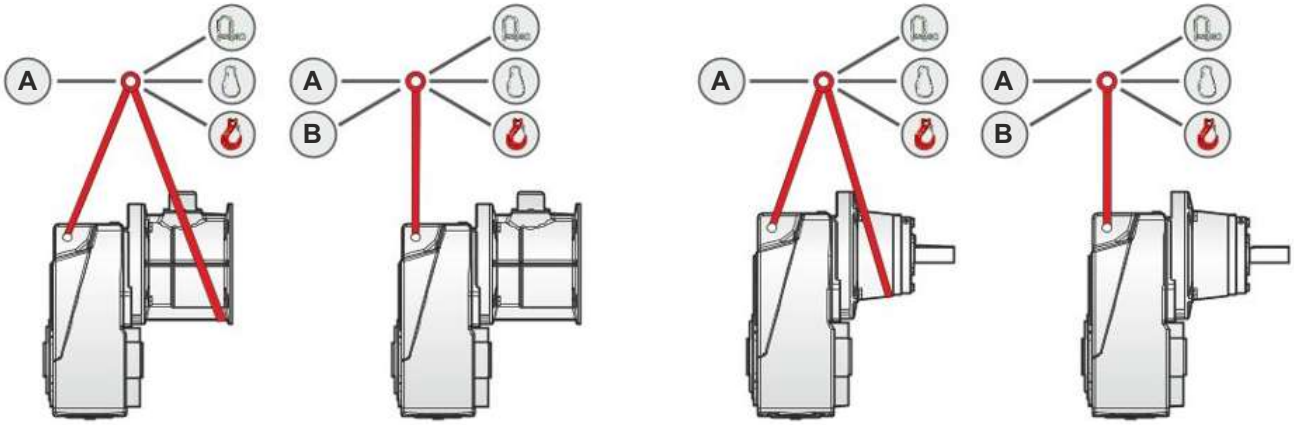
DOUBLE STAGE
TRIPLE STAGE

PD

MOTOR / PAM



IEC / W



A Hoop equipped (swab)

B Hoop equipped (chain)

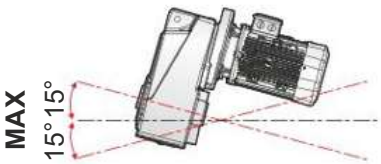
Load hook

Screw hook

Locked hook

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

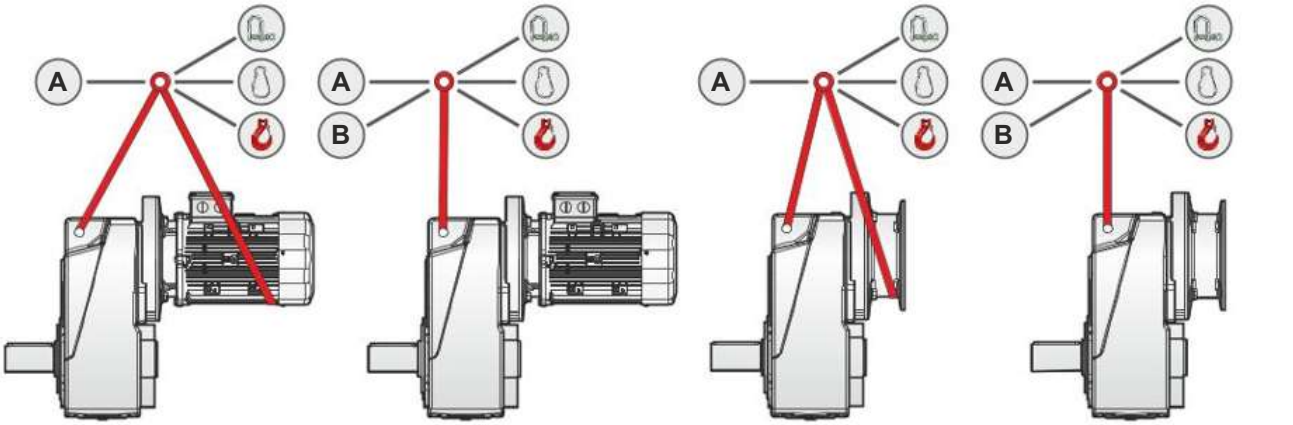
The allowable maximum slope is 15 degree.



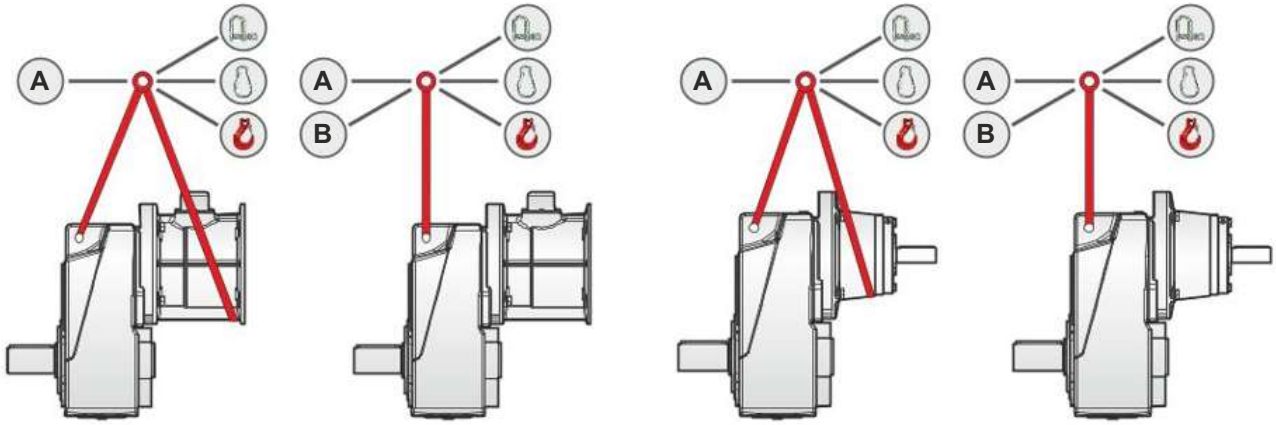
DOUBLE STAGE
TRIPLE STAGE

PM

MOTOR / PAM



IEC / W



A Hoop equipped (swab)

B Hoop equipped (chain)

Load hook

Screw hook

Locked hook

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

The allowable maximum slope is 15 degree.

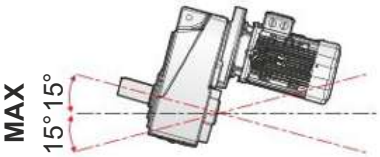
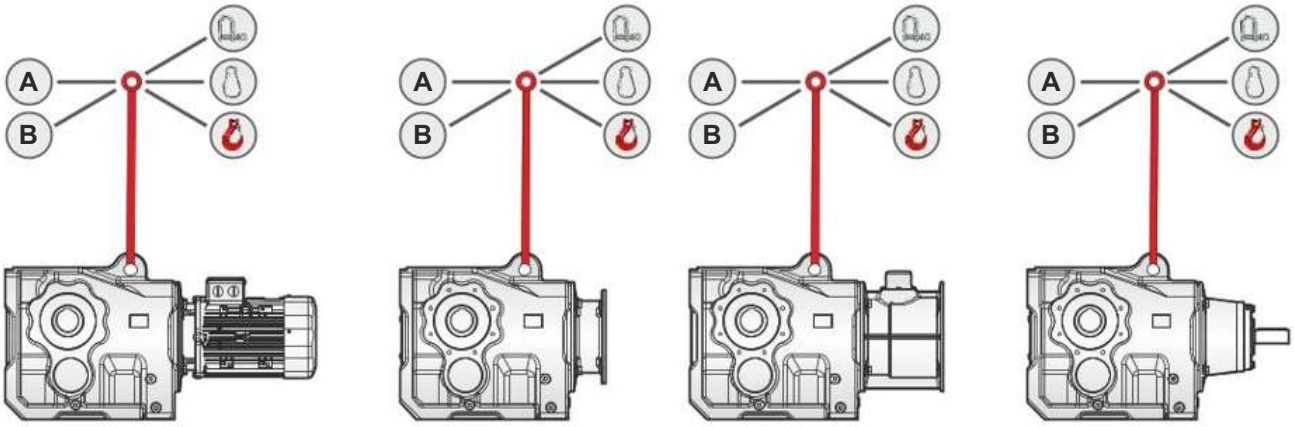


Figure 3: Transport of Gearboxes **(PKD)**

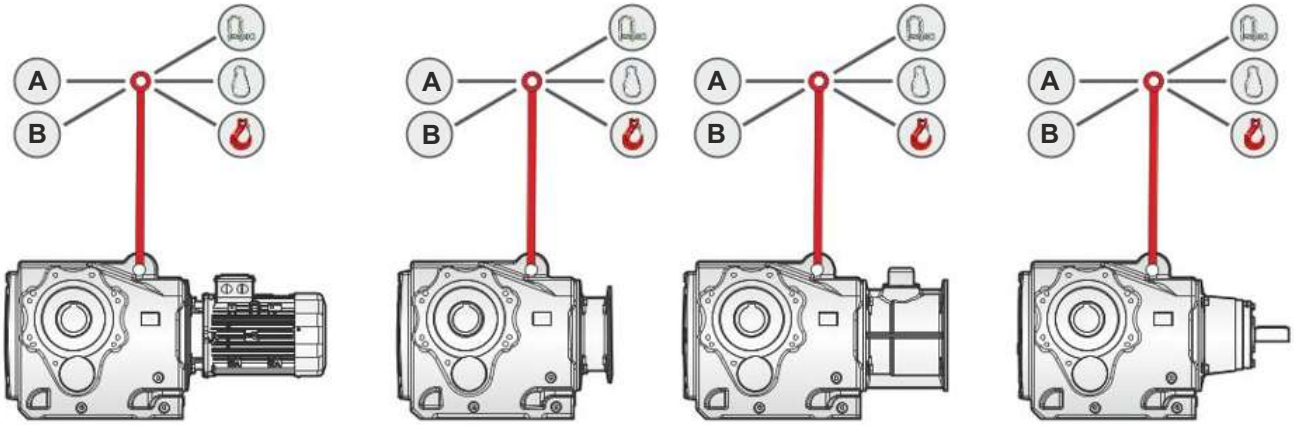
PKD - DA

MOTOR / PAM / IEC / W



PKD - DG

MOTOR / PAM / IEC / W



A Hoop equipped (swab)

B Hoop equipped (chain)

Load hook

Screw hook

Locked hook

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

The allowable maximum slope is 15 degree.

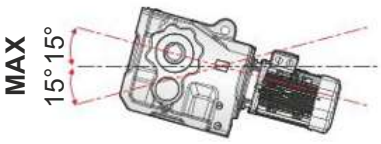
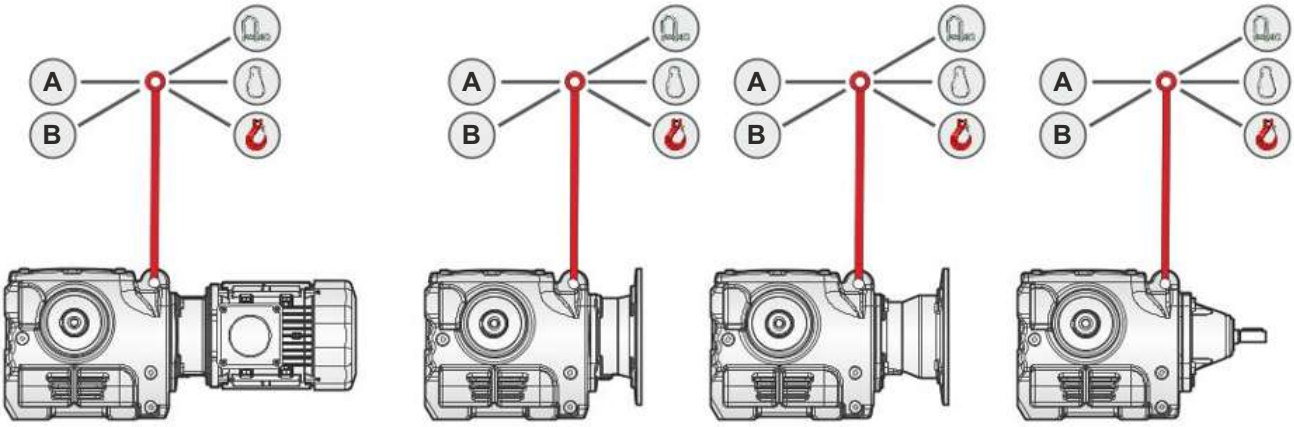


Figure 4: Transport of Gearboxes **(PSH)**

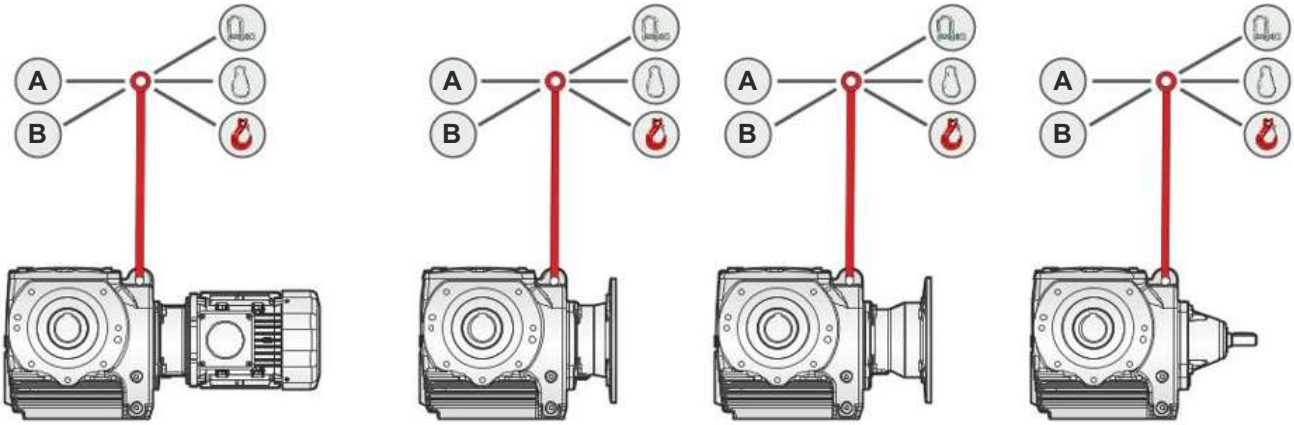
PSH - DA

MOTOR / PAM / IEC / W



PSH - DG

MOTOR / PAM / IEC / W



A Hoop equipped (swab)

B Hoop equipped (chain)

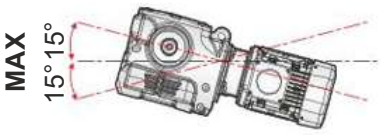
Load hook

Screw hook

Locked hook

Manuel lifting (Weight ≤ 15 kg)
(ref. ILO Contract)Not valid for the continuous carrying.
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 0°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.

1.7.1 Long Term Storage Suggestions;

NOTE !

- 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.
- In the fully oil filled gear unit, the oil level should be reduced according to the mounting position.

ATTENTION !

- The incorrect and excessive long storage could cause the gearbox getting defected.
- Please control not to exceed allowed storage period before starting up the gearbox.

NOTE !

- PGR, recommends long-term storage option for periods of more than 9 months holding and pausing times.
- 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.

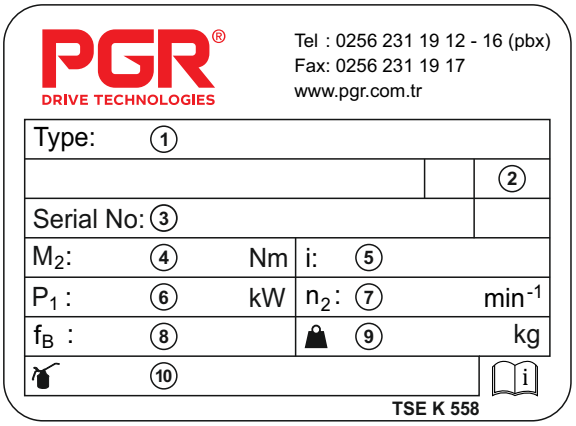
Long term storage suggestions;

- 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

Important technical informations are found on gearbox's label.

Figure 5: Gearbox Nameplate and Explanation

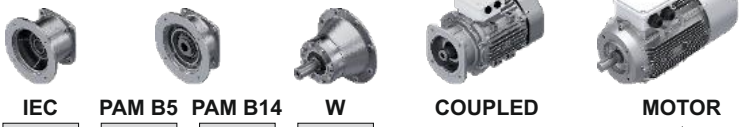


1. Type
2. Mounting position
3. Serial number
4. Output torque (Nm)
5. Reduction ratio
6. Rated power of motor [kW]
7. Output speed [rpm]
8. Service factor
9. Weight of the geared motor (kg)
10. Used oil kind and amount (Lt)

2.2 Explanations

Table 2: Product Description **(PA / PF)**

PA - PF | **103 / 52** | **244.66** – **PAM 132 - B5** – **132M / 4 BRE**



IEC
56 63 71 80 90 100 112 132 160 180 200 225 250 280 315

PAM B5
63 71 80 90 100 112 132 160 180 200 225 250 280 315

PAM B14
63 71 80 90 100 112 132

W
122 172 213 288 397

COUPLED

MOTOR

Catalog : PA/PF
Page : 157 - 220

Case Width
63 M
71 M
80 M
90 S/L
100 L
112 M
132 S/M
160 M/L
180 M/L
200 L
225 S
250 S/M/L
280 S/M/L
315 S/M/L

Number of Poles
2
4
6
2 - 4
2 - 8

Other pole combinations on request.

Motor Options
BRE
RG
SR
HL
TF
TW
WU
EF
ZF
DF
IG
KK/FK
RLS

Catalog : PA/PF
Page : 23 - 24

i_{ges}: Reduction Ratio
Catalog : PA/PF
Page : 55-156

10 Case Width
0 1 2 3 4 5 6 7 8 9 10

Catalog : PA/PF
Page : 157 - 200

3 Stage
1 2 3

PF CASE

5 Case Width
0 1 2 3 4 5

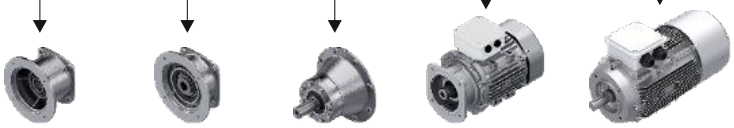
2 Stage
2 3

Catalog : PA/PF
Page : 157 - 200

Type: PGR (Helical Foot Mounted Geared Motor) **PA**
PGR (Helical Flange Mounted Geared Motor) **PF**

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

PD - PM | **93 / 52** | **410.49** | **B5** | – | **PAM 132 - B5** | – | **132M / 4 BRE**



IEC	PAM B5	PAM B14	W	COUPLED	MOTOR
63	63	63	122		
71	71	71	172		
80	80	80	213		
90	90	90	253		
100	100	100	288		
112	112	112	397		
132	132	132			
160	160	160			
180	180	180			
200	200	200			
225	225	225			
250	250	250			
280	280	280			
315					

Catalog : PD/PM
Page : 185 - 243

Case Width

63 M
71 M
80 M
90 S/L
100 L
112 M
132 S/M
160 M/L
180 M/L
200 L
225 S/M
250 S/M/L
280 S/M/L
315 S/M/L

Number of Poles

2
4
6
2 - 4
2 - 8

Other pole combinations on request.

Motor Options

BRE
RG
SR
HL
TF
TW
WU
EF
ZF
DF
IG
KK/FK
RLS

Catalog : PD/PM
Page : 24

iges: Reduction Ratio
Catalog : PD/PM
Page : 77 - 183

Available Standard Products **(B5** Flange**)**
Catalog : PD/PM
Page : 27 - 34

LT	**Ç***	**Ç/LT***	**KS***	**KS/LT***	**B5**
B14	**Ç/B14***	**Ç/B5***	**KS/B5***	**KS/B14***	

*** Sign shows that these option is acceptable for only Polat Hollow Shaft gear unit series.**

9
Case Width

A0
B0
C1
1
2
3
4
5
6
7
8
9
10
11
12

Catalog : PD/PM
Page : 185 - 243

3
Stage

2
3

PF CASE

5
Case Width

0
1
2
3
4
5

2
Stage

2

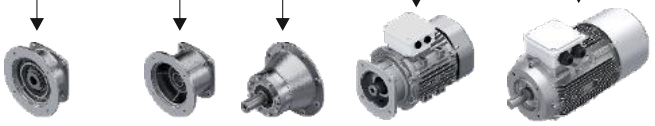
Catalog : PD/PM
Page : 245 - 267

Type: PGR (Hollow Shaft Gear Unit) **PD**
PGR (Solid Shaft Gear Unit) **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)**

PKD 6390/32 297.35 DA/KS – PAM 90 - B5 – 90S/4 BRE – R



PAM B5

63
71
80
90
100
112
132
160
180
200
225
250
280
315

Catalog : PKD
Page : 185 - 284

PAM B14

63
71
80
90
100
112
132

IEC

63
71
80
90
100
112
132
160
180
200
225
250
280
315

W

109
122
125
172
213
288
397

AKUPLE

MOTOR

Output Direction
L/R: Left/Right
Catalog : PKD
Page : 27 - 39

Case Width

63 M
71 M
80 M
90 S/L
100 L
112 M
132 S/M
160 M/L
180 M/L
200 L
225 S/M
250 S/M/L
280 S/M/L
315 S/M/L

Number of Poles

2
4
6
2 - 4
2 - 8

Other pole combinations on request.

Motor Options

BRE
RG
SR
HL
TF
TW
WU
EF
ZF
DF
IG
KK/FK
RLS

Catalog : PKD
Page : 21

İges: Reduction Ratio
Catalog : PKD
Page : 71 - 110

Available Standard Products
(DA/KS Foot mounted, Hollow shaft, Shrink disc connector)

TMA	DA	ÇMA	DA/KS	TMA/B5	DA/B5
DA/KS-B5	TMA/B14	DA/B14	ÇMA/B14	DA/KS-B14	
DG/B14	DG/KS-B14	DG/TK	DG/KS-TK	DG/TKP-B14	
DG/KS-TKP-B14	TMG/B5	DG/B5	DG/KS-B5	TMG/B14	

Catalog : PKD
Page : 27 - 39

6
Case Width

*A0
*B0
*C1
*F4
*H5
1
G1
2
3
4
5
6
7
8
G8
9
G9

3
Stage

2
3
4

Catalog : PKD
Page : 185 - 284

90°
Angle between input - output

PF CASE

3
Case Width

3
4
5
6

2
Stage

2
3

Catalog : PKD
Page : 185 - 284

Type: PGR (Helical Bevel Geared Motor) **PKD**

*** Double Reduction, Helical Bevel Gear Unit**

Table 5: Product Description **(PSH)**

PSH 2100 10.73 DG/KS – PAM 132 - B5 – 132M / 4 BRE – R







PAM B5

63
71
80
90
100
112
132
160

PAM B14

63
71
80
90
100
112
132

IEC

63
71
80
90
100
112
132
160

W

109
122
172
213

Catalog : PSH
Page : 91 - 135

COUPLED

MOTOR

Output Direction
L / R: Left / Right
Catalog : PSH
Page : 28 - 30

Case Width

63 M
71 M
80 M
90 S/L
100 L
112 M
132 S/M
160 M/L

Number of Poles

2
4
6
2 - 4
2 - 8

Other pole combinations on request.

Motor Options

BRE
RG
SR
HL
TF
TW
WU
EF
ZF
DF
IG
KK/FK
B

Catalog : PSH
Page : 24 - 25

İges: Reduction Ratio
Catalog : PSH
Page : 55 - 90

Available Standard Products
(DG/KS Double Reduction, Helical Bevel Gear Unit**)**
Catalog : PSH
Page : 28 - 30

TMA	ÇMA			
DG/B14	DG/B5	DG/KS	DG/TK	DG/Ç
DG/Ç-KK	TMG/B5	DG/KS-KK		

2
Stage

2
3

Catalog : PSH
Page : 91 - 135

100
Distance between center of the worm gear and center of output shaft. (mm)

040	050	063	080
100	125		

Catalog : PSH
Page : 91 - 135

Type: PGR (Helical Worm Gearbox) **PSH**

2.3 Abbreviations

Table 6: Abbreviations **(PA / PF)**

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

✓ **: Existing designs are marked with a tick.**

Table 7: Abbreviations **(PD / PM)**

Abbreviations	Meaning	Parallel Shaft Gear Units
D	Hollow Shaft	✓
M	Solid Shaft	✓
B5	Flange B5	✓
B14	Flange B14	✓
Ç	Puller Washer	✓
LT	Rubber Buffer	✓
KS	Shrink Disc	✓
DIN 5480	Splined Hollow Shaft, DIN 5480	✓ (2)
KK	Protection Cap	✓
IEC	IEC Adapter	✓
W	Free Input Shaft	✓
B	Backstop	✓
GR	Reinforced Bearing	✓
WB	Backstop in W Adapter	✓
GKS	Reinforced Shrink Disc	✓
GB5	Reinforced Flange B5	✓
PD A - B - C	Hollow Shaft, Foot Mounted	✓ (1)
PM A - B - C	Solid Shaft, Foot Mounted	✓ (1)
PD ... B5	Hollow Shaft, Flange B5	✓
PD ... B14	Hollow Shaft, Flange B14	✓
PM ... B5	Solid Shaft, Flange B5	✓
Ç - LT	Puller Washer, Rubber Buffer	✓
KS - LT	Shrink Disc, Rubber Buffer	✓
Ç - B5	Puller Washer, Flange B5	✓
Ç - B14	Puller Washer, Flange B14	✓
KS - B5	Shrink Disc, Flange B5	✓
KS - B14	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
DG / B5	Case Mounted, Hollow Shaft, Flange B5	✓
DG / B14	Case Mounted, Hollow Shaft, Flange B14	✓
DG / TK	Case Mounted, Hollow Shaft, Torque arm	✓
Ç	Puller Washer	✓
KK	Protection Cap	✓
IEC	IEC Adapter	✓
ÇMA	Foot Mounted, Solid Shaft on Both Sides	✓
B	Backstop	✓
WB	Backstop in W Adapter	✓
KS	Case Mounted, Solid Shaft, Flange B5	✓
TMG / B5	Case Mounted, Solid Shaft on One Side, Flange B5	✓
GR	Reinforced Bearing	✓
TMA	Foot Mounted, Solid Shaft on One Side	✓
W	Free Input Shaft	✓

✓ **: Existing designs are marked with a tick.**

3.1 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.



DANGER !

The Gear unit must not be mounted in the ambient conditions listed below:

- Explosive atmosphere, high corrosive and/or oils, acids, gases, steams, radiation,
- Places directly contacted to the food.

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/hallow 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.



DANGER !

In the one-way locked gear units, the gear unit must be operated at the direction of lock rotation, otherwise the damage could be occured.

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

The lifting eyebolts screwed to gear unit must be used in gear unit mounting.

- Mounting of gear unit/gear unit with motor to the machine and selection of mounting place are crucial.
- The convenient connection points must be determined for gear unit type. (Foot mounted or Flange mounted)
- Ventilation plug must be opened after the carrying process.
- The connection tools which attached during the mounting to the machine must be tightened convenient to the torc given at the table.
- Because of the voltage, for to avoid transferring additional forces to the gear unit, both the gear unit and driven machine shaft must be aligned.
- There should not be any welding process on the gear unit. In the welding processes, the gear unit must not be used as a bracket. Otherwise bearing and gear part could damaged.



ATTENTION !

During the mountage, the voltage should not be emerged between the foot and flanges and allowed radial and axial forces would not be taken into consideration! Check whether if there is radial or axial leakage at the connection unit which is between IEC, PAM and output shaft.

- The gear unit/gear unit with motor only could be mounted according to determined mounting position. After the delivery, in the case of changing mounting position the change of lubrication level and other precautions could be needed. Any failures to comply to the determined mounting position could damaged gear unit. Please consult to PGR.
- The gear unit/gear unit with motor have to be structured to stand against motor weight and operating voltages. The machine which will be connected has to be structured to stand against the weight of the gear unit with motor and operating voltage. The surface where the gear unit is to be fixed must be straight, vibrationless and protected against torsion.
- The machine which gear unit /gear unit with motor will be connected, there must be sured that it is closed and not to be operated without intention.
- The sphere of the movable pieces out of the gear unit must be closed with the safety cabinet kit.
- The sunlight and the impact of the weather conditions must be prevented during the mountage of the gear unit to the outside machine. However the air circulation needed to be provided to the unit.
- Depending on the type of used gearbox, all the foot and flange bolts must be used completely. Bolts must be tightened with proper tightening moments.



NOTE !

The opportunity of the easy access must be provided to the oil level plug, drain plug and ventilation plug.

The proper oil filling should be controlled according to mounting position. (Could be viewed on "lubricators/oil filling quantities" part or the values written on gear unit) The necessary amount of oil has filled to the gear unit/ gear unit with motor by our firm.The slight deviations in oil level plug are resulted because of the mounting position and within the production tolerances.

If there is any danger of the electro-chemical corrosion between gear unit and machine, plastic pieces (2-3 mm) must be mounted between the connections. The electrical discharge resistance of used plastic material must be <10 Ω.
Electro-chemical corrosion could be occured between the different metals like cast iron and stainless steel. Also plastic washer should be used in bolts!

3.3 Bolt Tightening Torque Value

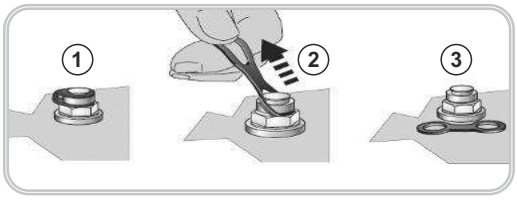
Table 10: Bolt Tightening Moments

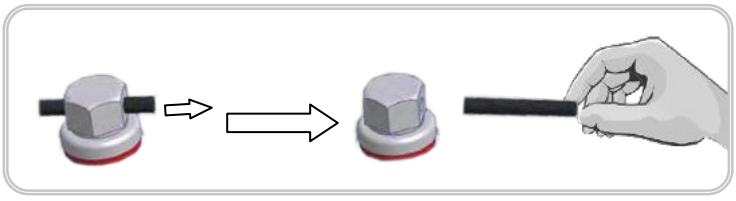
Bolt Tightening Moments [Nm]						
Dimensions	Bolt Quality			Cover Bolts	Coupling Bolts	Protective Cover Connection Bolts
	8.8	10.9	12.9			
M4	3.2	5	6	-	-	-
M5	6.4	9	11	-	2	-
M6	11	16	19	-	-	6.4
M8	27	39	46	11	10	11
M10	53	78	91	11	17	27
M12	92	135	155	27	40	53
M16	230	335	390	35	-	92
M20	460	660	770	-	-	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

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 seperately, 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 Retrospective Paintwork

If you paint over all or part of the drive, please take care to mask the breather valve and oil seals carefully. Remove the masking tape once you have completed the painting work.

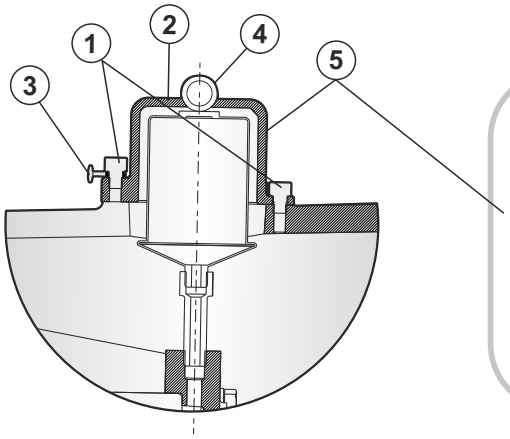
3.6 The Operating of the Automatic Lubricating Sensor

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

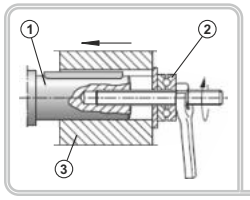
The operating time

MONTHS	YEAR
1 2 3 4 5 6 7	06 07 08 09 10
8 9 10 11 12	11 12 13 14 15

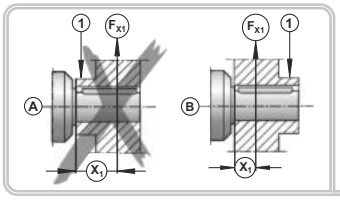
3.7 The Mountage of the Connection Tool to the Output Shaft

For the mountage of the output shaft tools look at the schema below.

Figure 8: The Mountage of the Connection Tool to the Output Shaft



1) The gear unit shaft end
2) The axial bearing
3) The connection tool



1) Connection unit
A) False
B) True

* To prevent high radial forces:the gear and sprocket must be mounted as seen in shape B.

For the mounting of the connection tools only pulling device must be used. For the position adjustment the bearing strip which is at output shaft end must be used.

NOTE !

The belt and pulleys, couplings, gears and etc. Must not be installed with hammering to the shaft end. Otherwise there could be a damage in body, bearings and shaft. In belt and pulleys, the rightness of the belt voltage must be paid attention. (suitable to the producer's data). For the not emerging of disallowed radial and axial forces, balance adjustment of the connection tool must be made.

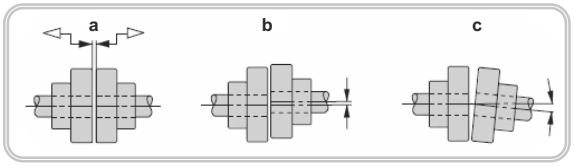
NOTE !

With smearing a little amount of grease or heating the connection tool in a short-time (80….100 °C), the mounting easiness may be provided.

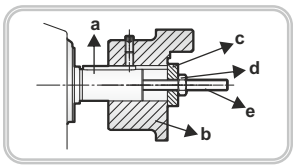
3.8 The Mountage of the Couplings

While the couplings are mounting, it's balances must be made suitable to the datas of the producers. Must be implemented with suitable clamping device. Before mounting with the smearing of corrosion oil material to the solid output shaft / hollow shaft, mounting and demounting processes may be easened.

Figure 9: The Mountage of the Coupling



a. Maximum and minimum distance
b. Axial displacement
c. Angular displacement



A basical clamping device example;

a. The solid output shaft
b. The coupling
c. The washer
d. The nut
e. The stud

ATTENTION !

The belt-pulley, chain and gear drives must be protected from the contact of the external effects.

3.9 The Mountage of the Standard B5 Motor to the IEC Gear Unit

1. The motor and solid output shaft of the motor with adaptor, flange surfaces must be cleaned and damage control should be done. During the mounting of the couplings, must be sured that every precautions that would harm motor solid output shaft are taken. The sizes and tolerances of the motor fixing elements must be suitable to EN 60079-0.
2. The metal coupling (the half piece of the coupling) should be heated to 80-100 and passed to the motor solid output shaft with the help of centering the key.
3. The Set screw on the metal coupling must be tightened. But before tightening, firstly Loctite 242 or Loxeal 54-03 safety sticky must be smeared and set screw must be taken into the safety, should be fixed to the motor solid output shaft according to tightening moment given in the table.
4. If the mounting is to be done in open air and the environment is wet, the isolation of the surfaces of the motor flange and IEC adaptor is recommended. Before and after the motor mounting, as the flange is to be isolated, Loctite 574 or Loxeal 58-14 surface isolation material should be used to flange surfaces.
5. The motor must be installed to IEC adaptor, meanwhile the installation of the coupling must not be forgotten.
6. The IEC adaptor must be mounted to the suitable tightening moment and while doing this must be sured that IEC solid output shaft is passed to the plastic house of the coupling with comfortably.

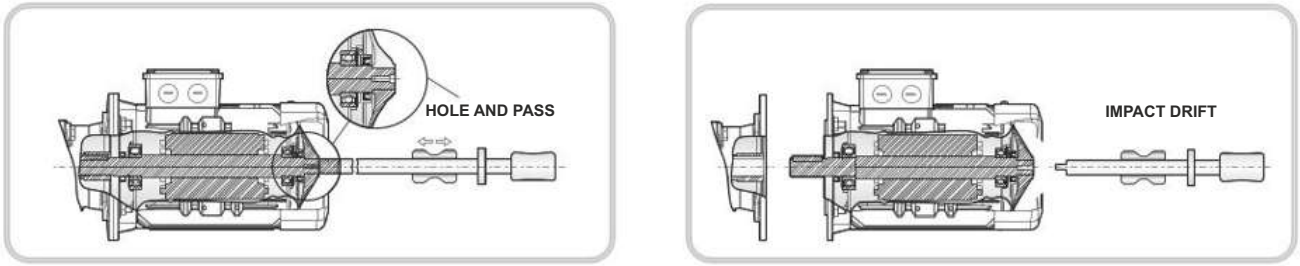
3.10 The Mountage of the Standard B5 Motor to the PAM Gear Unit

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.

3.11 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 seperation 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 10: 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 batwean the motor and gear unit must be removed.
4. By the help of impact drift inertial force, the motor must be seperated 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.

3.12 Gear Unit Operating

- The gear unit is tested firstly at our firm. (leakproofing test, noise test, torc test)
- For the confirmation of direction of rotation of gear unit, it is needed to be operated before machine mounting.● T
- The mounting of gear unit to the machine is needed to be convenient to 2006/42/EC and other safety standards.● T
- The electrical motor is needed to cover EN 60204-1 and EN 60079-0 standard.
- The mounting position of the gear unit should be as same as tag values.
- The datas in power units should be tolerated (plus, minus) %10 according to values specified in tag.
- There must not be any oil leakage in gear unit.
- There must not be extremely vibration and must not exceed acceptable voice decibel for gear units.
- In the situation of long-term non-usage, the storage conditions are needed to be implemented.
- The oil position must be controlled for the mounting position specified in catalogue.
- The oil level must be controlled.
- Before the operating, the carrying safety of the ventilation plug on the gear unit is needed to be removed.
- If the gear unit is dispatched without oil, the first oil filling must be loaded according to oil quantity stated in oil tables.●
- It is not allowed to operate in sensitive areas against explosion. For these conditions, specific motors are availale. Please consult to our firm.

4.1 Control and Periodic Maintenance

NOTE !

The maintenance and periodic maintenance works are performed by qualified person/ operator who is well-educated and is sufficient in electric and mechanic issues; the rules convenient to job health and safety and specific environmental problems are performed as protected.

DANGER !

Before the start of the maintenance work of the gear unit, gear unit should be closed at first (get into the voltage-free position), be sured service-free, needed to take measures against any accident or spinning items with the help of unexpected external load. Also all environmental safety precautions must be taken.

- Before the maintenance process, all safety equipments are needed to get ready and if necessary the outside personal should be warned.The border around the unit must be specified and must prevented equipment entrance to the area. If any failures to comply to these conditions, the situations which causes harm to health and safety could be occured.
- Worn items only must be changed with original and unused items.
- The lubricators, which recommended by our company, should be used. (see. **6.3 Lubrication Table**, page 68)
- The leakproofing items on the gear unit must be changed with original items.
- If the bearing is needed to be changed please contact to our firm.
- After the maintenance work, we recommend to change the lubrication oil.

All above informations were given for the purpose of efficient and confidential operating of gearboxes.
Our firm is not responsible for substitute product and unroutined maintenance that causes damages and woundings.
When purchasing gear unit,should be noted that it is original product and has technical informations written in catalogue.

NOTE !

The polluted oil and rusted items must not be left to the environment after the maintenance. These items must be disposed convenient to the regulations.

Table 11: Control and Periodic Maintenance Ranges - Works

Control and Periodic Maintenance Ranges	Control and Periodic Maintenance Works
Once at every 3000 work hours or once at every 6-months until the	- Visual inspection - Check for running noises - Check oil level - Additional lubrication with grease (in certain W and IEC options and GB5 applications) - The change of the automatic lubrication sensor (only at the IEC/standard motor mountage)
80 work heat.Once at every 10.000 work hours or once at least in two years (the synthetic oil is once at every 20.000 work hours or once at every four years)	- Change the oil - The change of the ventilation plug
At least every 10 years	- General overhaul.

4.2 Visual Inspection

Controlling whether there is any oil leakage exists or not should be made at gearbox.
There must be controlled that if there is oil filled or not in gear unit. Should be controlled that if there is any damage in gear unit's items and whether if the connection spots are rusted.
Also must be controlled that if any cracks could emerge in hose connection lines and in rubber wedges.
Leakproofing likes of dripping of gear unit's oil or dripping of cooling water and in damages and cracks, repair of the gear unit must be provided. Like these situations please get in contact with PGR.

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

The emerge of unusual operation voice or vibrations in gear units could mean damages. In this type of situations, the gear unit must be stopped and overall revision must be made.

4.4 Control of the Lubricant and Lubricant Level

- Regular oil level controlling must be made.
- The electrical connection of motor must be cut and must got into safety form to prevent for reactivating.
- Must be waited until the gear unit got cooled.
- If the mounting position is changed, the section of "the mounting of gear unit" must be got into attention.
- A little amount of oil must be taken out of the oil drain plug. The quality of oil must be controlled.
- The oil must be changed when the sign of extremely oil pollution is seen.

4.5 Additional Lubrication With Grease

At some gear unit types (in certain W and IEC options and GB5 applications), additional lubrication setup is available. At GB5 types before the additional lubrication, ventilation plug across the lubrication hole must be dismantled. Additional lubrication with grease must be made from here until approximately 20-25 gr grease is come out.
After that the ventilation plug is again assembled. In certain W and IEC adaptors, additional lubrication with approximately 20-25 gr grease must be made to the roller bearing outer ring which is on the lubrication hole. (the recommended grease type: Petamo GYH 133N)

4.6 Changing the Oil

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 catalagoue 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 cataloque. (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.

NOTE !

In standard helical gear units glassed oil level plug is not available. At this place the oil filling is made from the ventilation plug.

4.7 Oil Plugs Squeezing Torc Chart

Table 12: Oil Plugs Squeezing Torc Chart

Plug	Torc [Nm]
1/4”	7
3/8”	7
1/2”	12

4.8 Change of the Ventilation Plug

In excessive pollution situations, ventilation plug must be dismantled and got cleaned or with aluminum washer, the new ventilation plug must be mounted.

4.9 Change of the Oil Seal and Oil Cover

- The electric connection of motor drive unit must be cut and got into safety for mistakenly re-activation.
- At the time oil seal is changing, the sufficient amount of grease must be found between leakproofing lips and should be paid attention that the surface is not dirty and dusty.
- When the double seal is used, 3/2 of the part which remained between two seal must be filled with grease convenient to the oil type inside the gear unit.
- During the change of the oil seal the proper devices must be used for not to harm the body and shaft.
- During the change of the oil seal and oil filler cup, the original product must be used.

4.10 The Bearing Greases

- To the bearings of motorized gearboxes, greases should be used which are available at the grease table given by our company.
- Our company (PGR) recommends also replacing of grease while changing lubricant at the greased bearings.

4.11 The Changing of The Automatic Lubricating Sensor

- Automatic lubrication, the protection cap must be dismantled.
- The automatic lubricating sensor must be dismantled.
- The new automatic lubricating sensor must be installed.
- After that, the operating processes of the automatic lubricating sensor must be performed respectively.

4.12 General Overhaul

The gear unit must fully be dismantled and works written below have to be done respectively.

- 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 orginal 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.

NOTE !

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.

4.13 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.

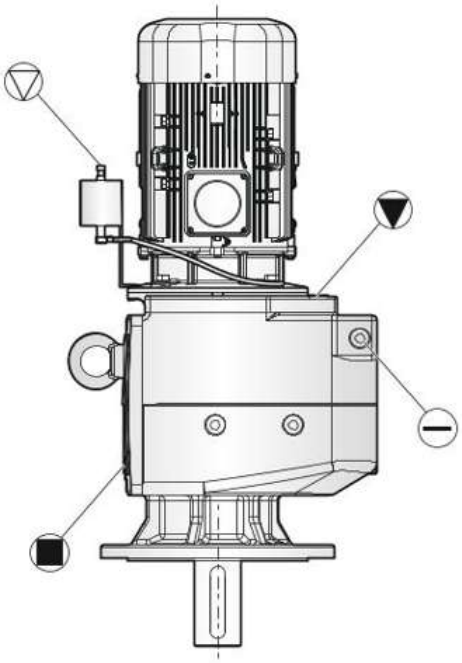
5.1 Additional Oil Volume and Oil Tank for the M4 Mountage Position

Additional lubricant volume unit uses for preventing oil laekage 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 11: The Oil Level Tank and Oil Level Control **(PA / PF)**

PA / PF

Catalog: PA/PF
Page : 48



Filling Plug Vent Plug Oil Level Plug Drain Plug

Figure 12: The Oil Level Tank and Oil Level Control **(PD / PM)**

PD / PM

Catalog: PD/PM
Page : 67

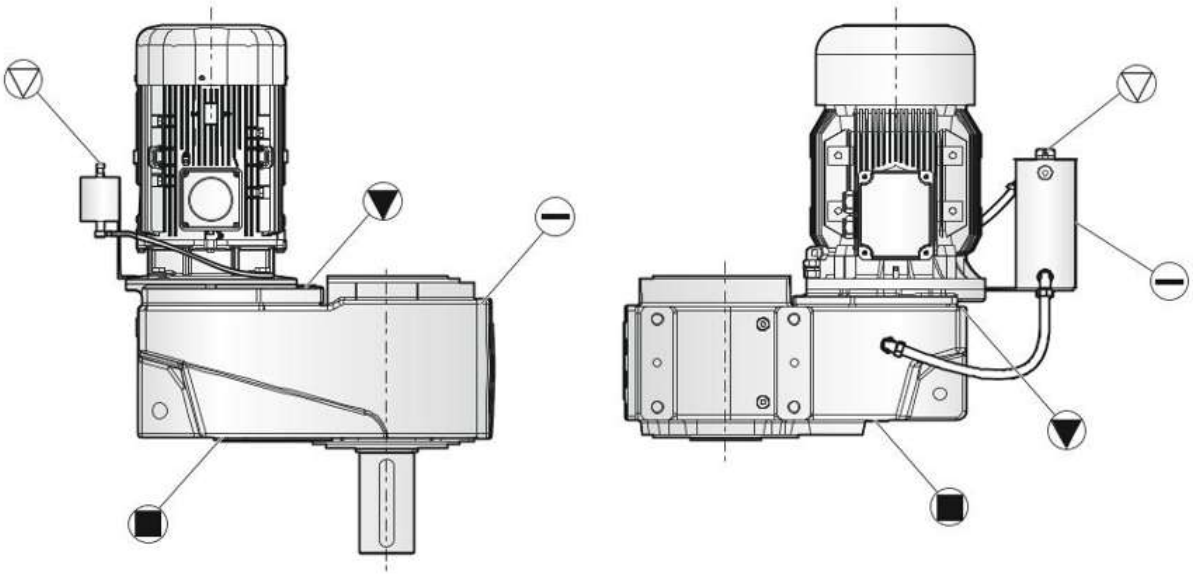
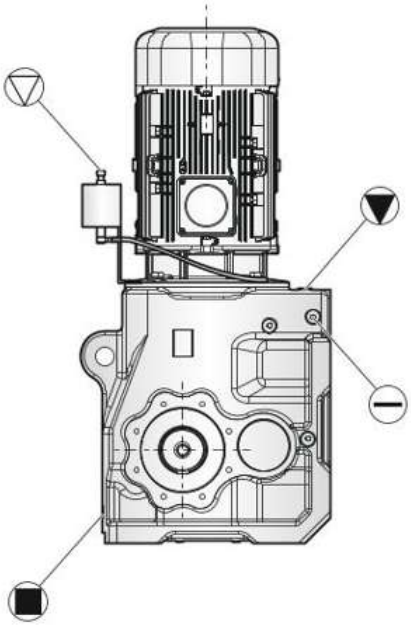


Figure 13: The Oil Level Tank and Oil Level Control **(PKD)**

PKD

Catalog: PD/PM
Page : 71



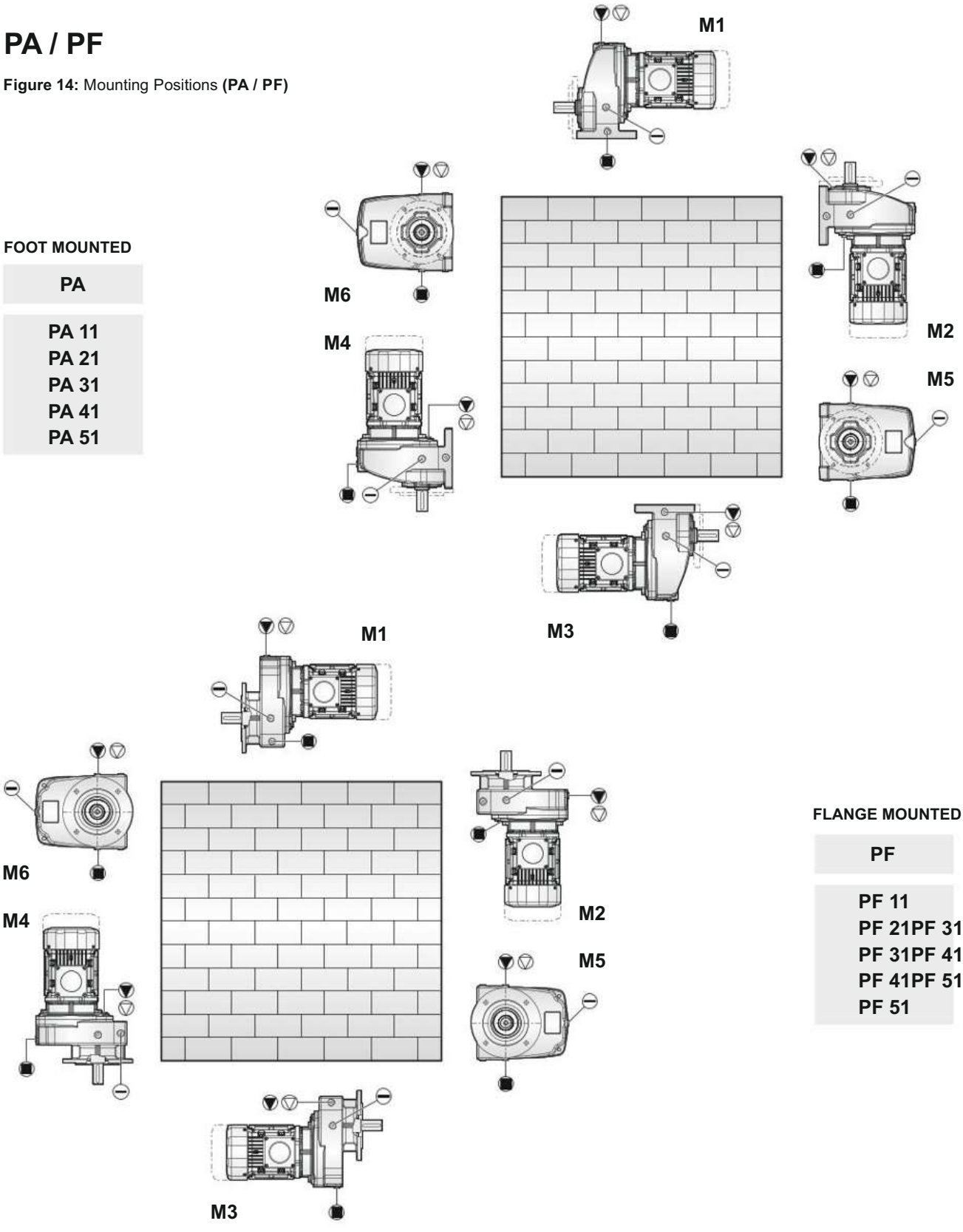
Filling Plug Vent Plug Oil Level Plug Drain Plug

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 14: Mounting Positions **(PA / PF)**



FOOT MOUNTED

PA
PA 11 PA 21 PA 31 PA 41 PA 51

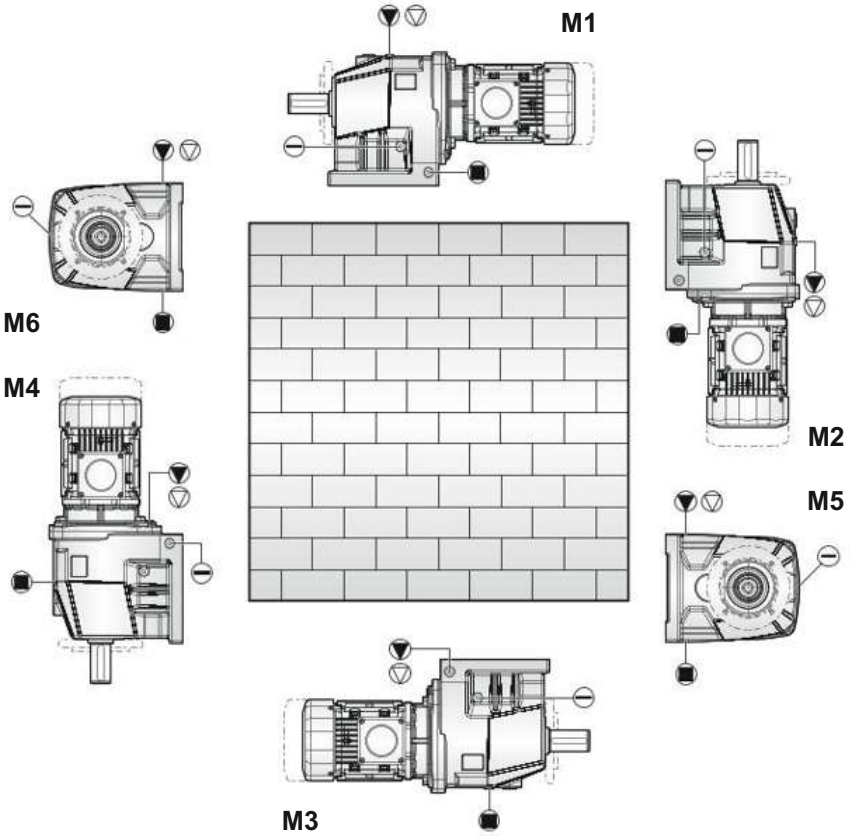
FLANGE MOUNTED

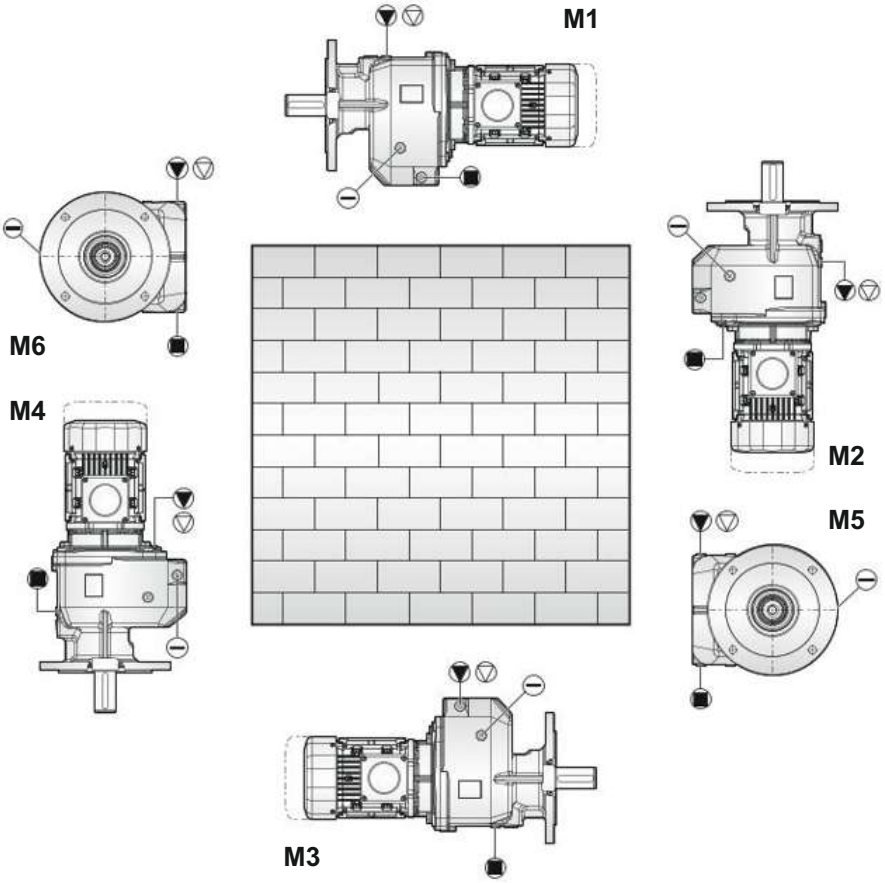
PF
PF 11 PF 21PF 31 PF 31PF 41 PF 41PF 51 PF 51

Filling Plug Vent Plug Oil Level Plug Drain Plug

FOOT MOUNTED

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





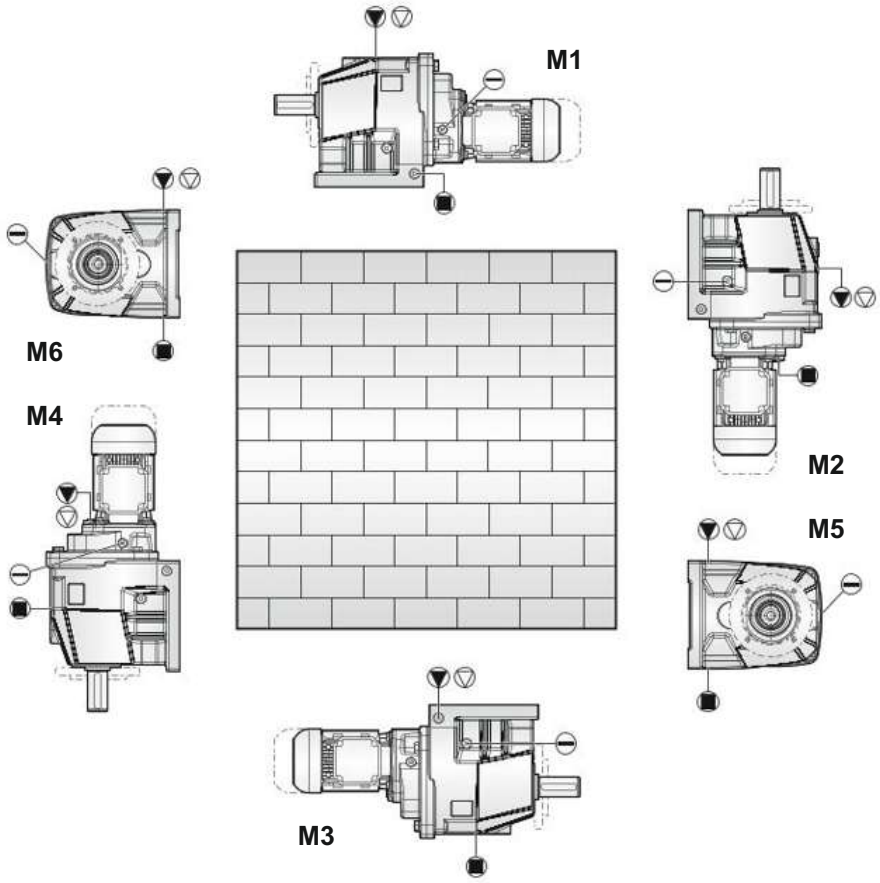
FLANGE MOUNTED

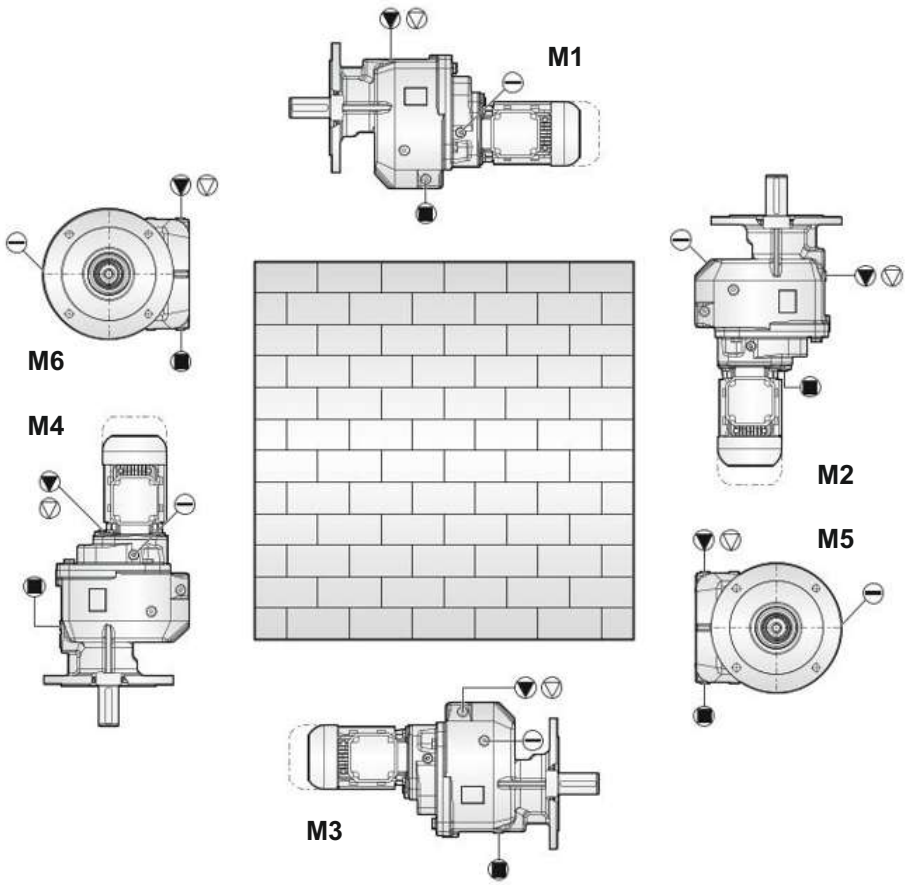
PF
PF 02 PF 12PF 22 PF 22PF 32 PF 32PF 42 PF 42PF 52 PF 52

Filling Plug Vent Plug Oil Level Plug Drain Plug

FOOT MOUNTED

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





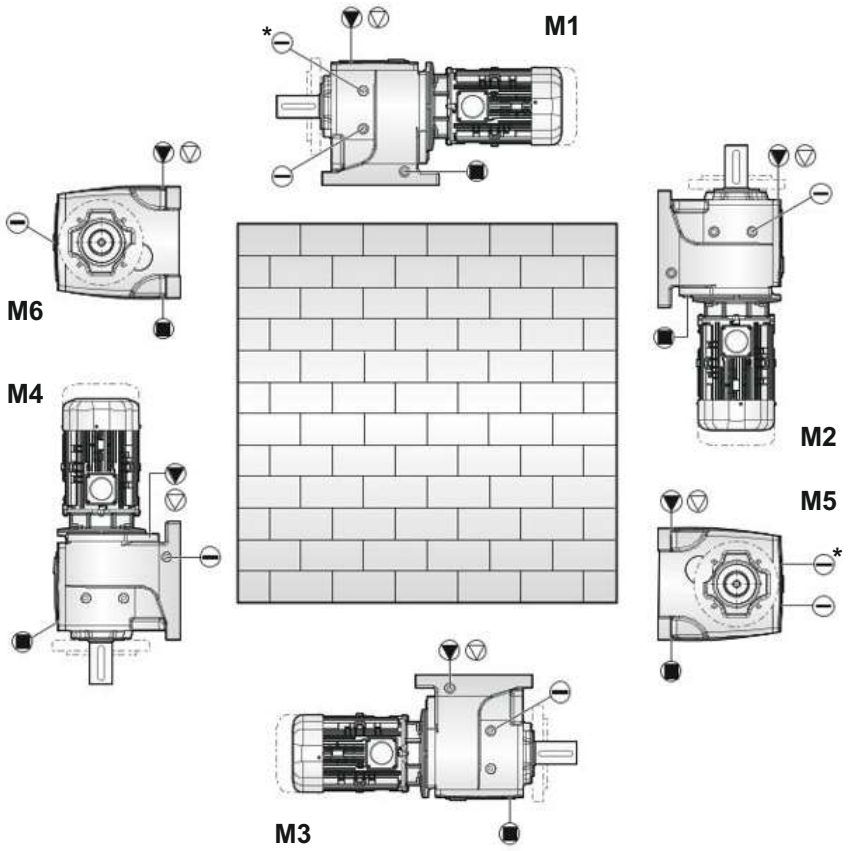
FLANGE MOUNTED

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

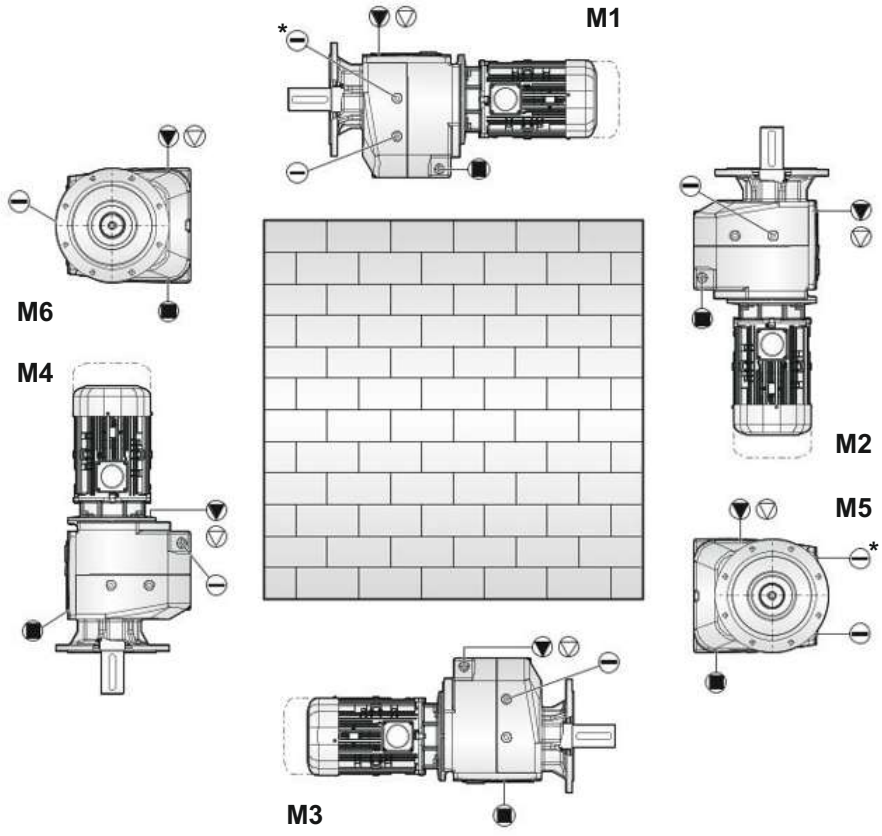
Filling Plug Vent Plug Oil Level Plug Drain Plug

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.



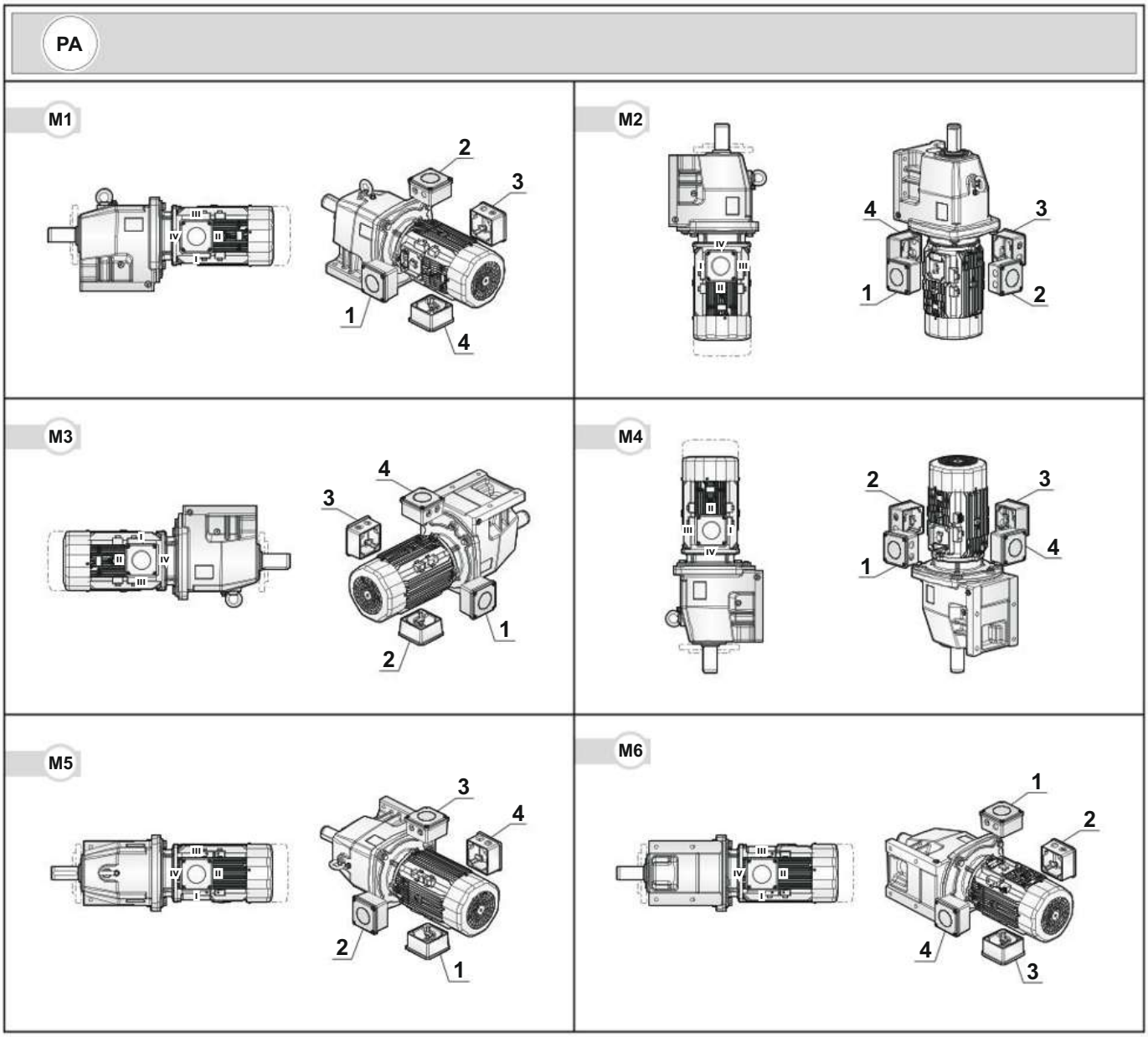
FLANGE MOUNTED

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 13: Terminal Box and Cable Entrance Sides **(PA)**



* **1 - 2 - 3 - 4 :** Shows terminal box position.
* **I - II - III - IV:** Shows cable entry position.

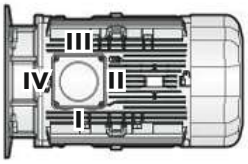
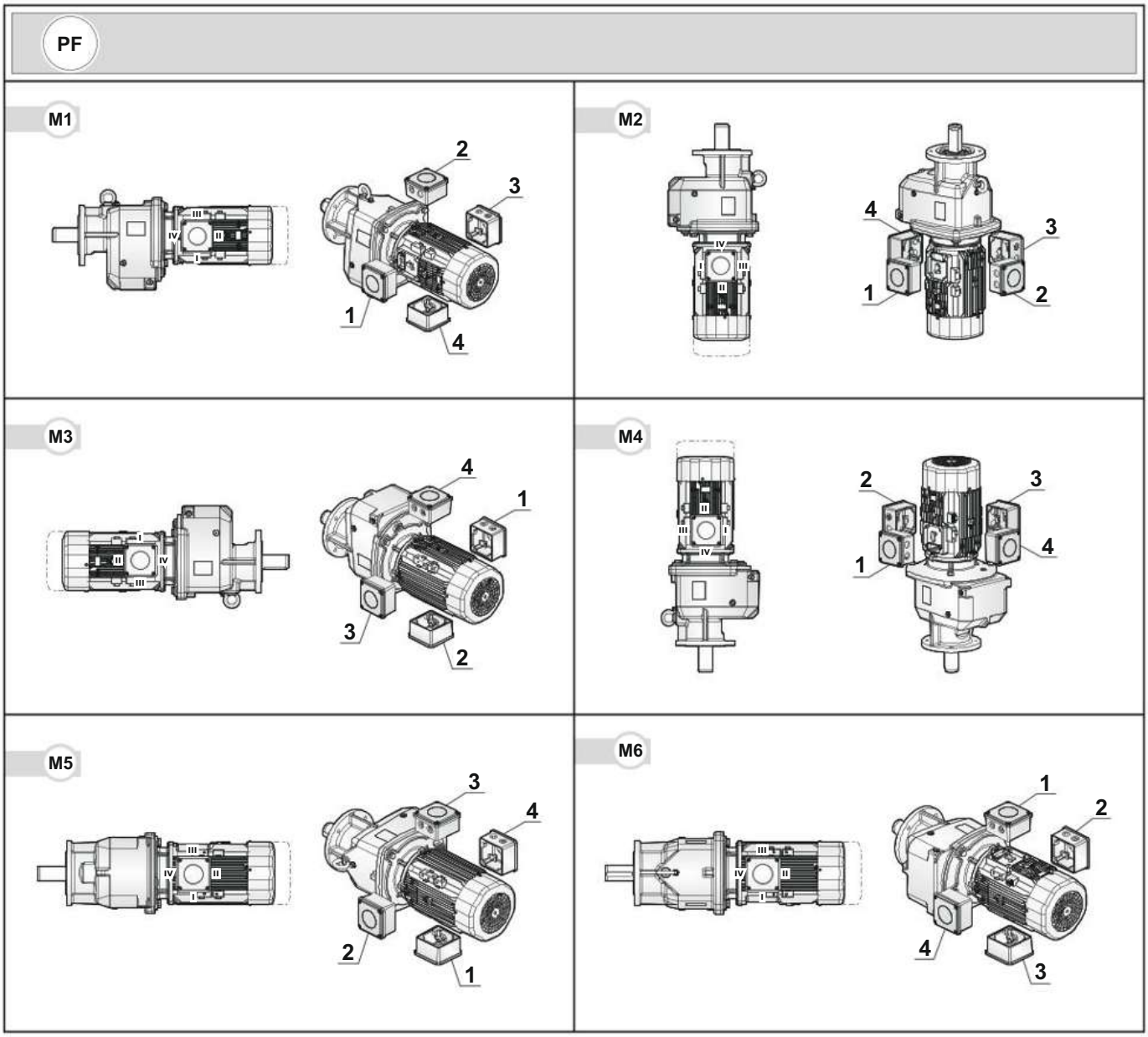
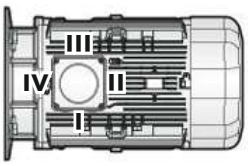


Table 14: Terminal Box and Cable Entrance Sides **(PF)**

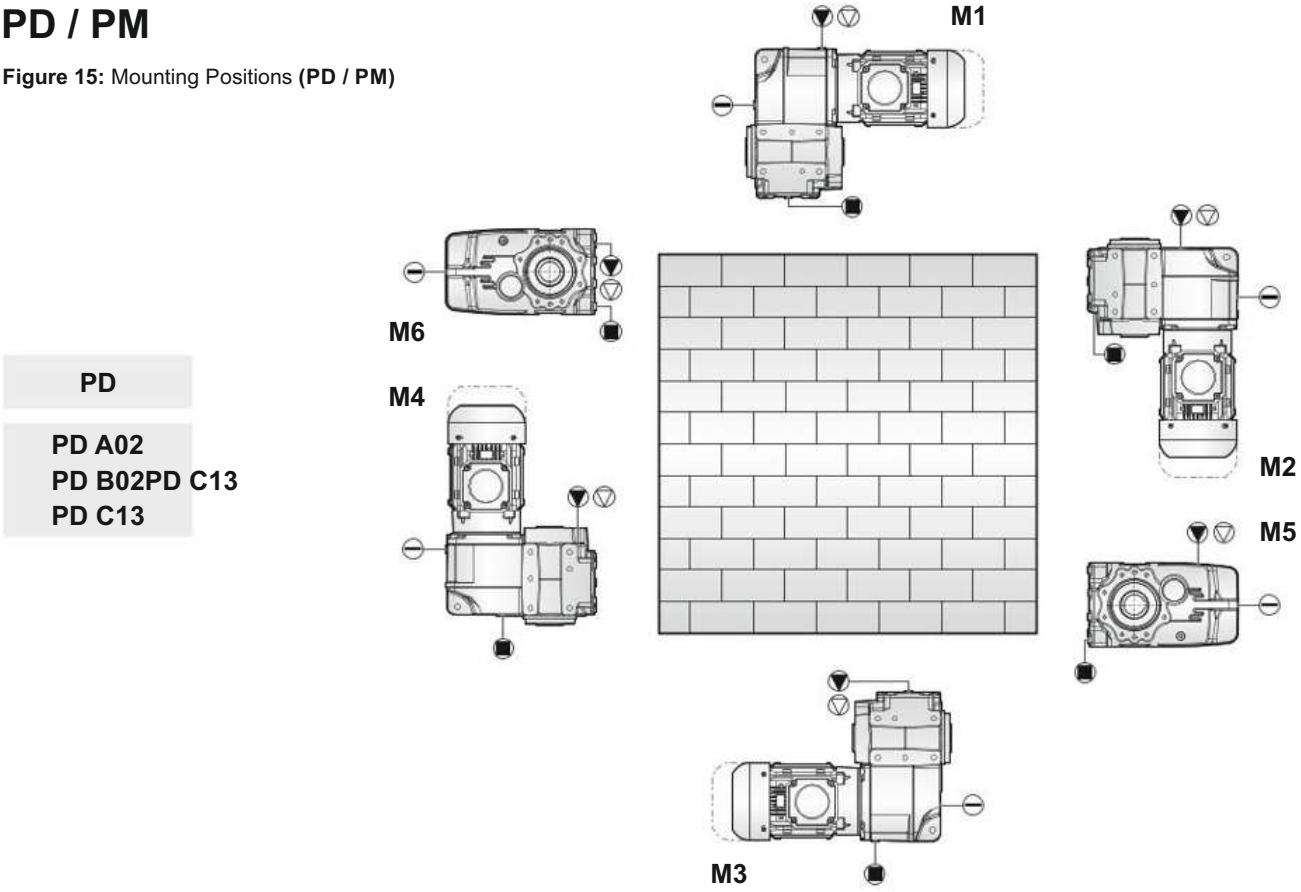


* **1 - 2 - 3 - 4 :** Shows terminal box position.
* **I - II - III - IV:** Shows cable entry position.

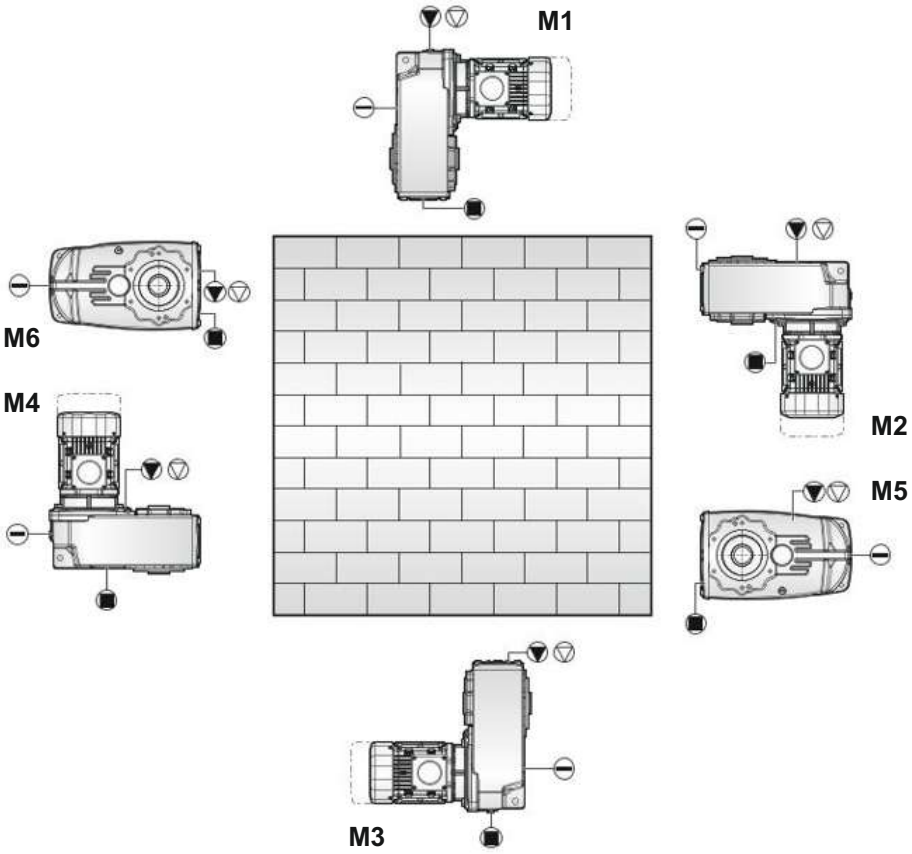


PD / PM

Figure 15: Mounting Positions **(PD / PM)**



PD
PD A02 PD B02PD C13 PD C13

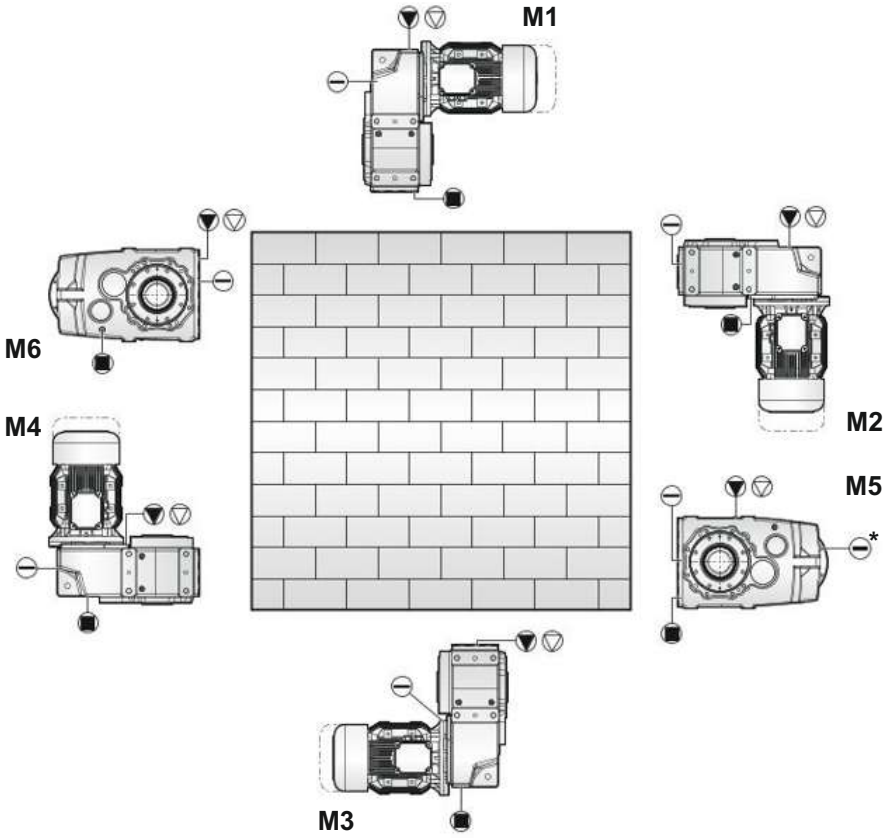


PD
PD 12 PD 22PD 32 PD 32PD 42 PD 42PD 52 PD 52PD 13 PD 13PD 23 PD 23PD 33 PD 33PD 43 PD 43PD 53 PD 53

Filling Plug Vent Plug Oil Level Plug Drain Plug

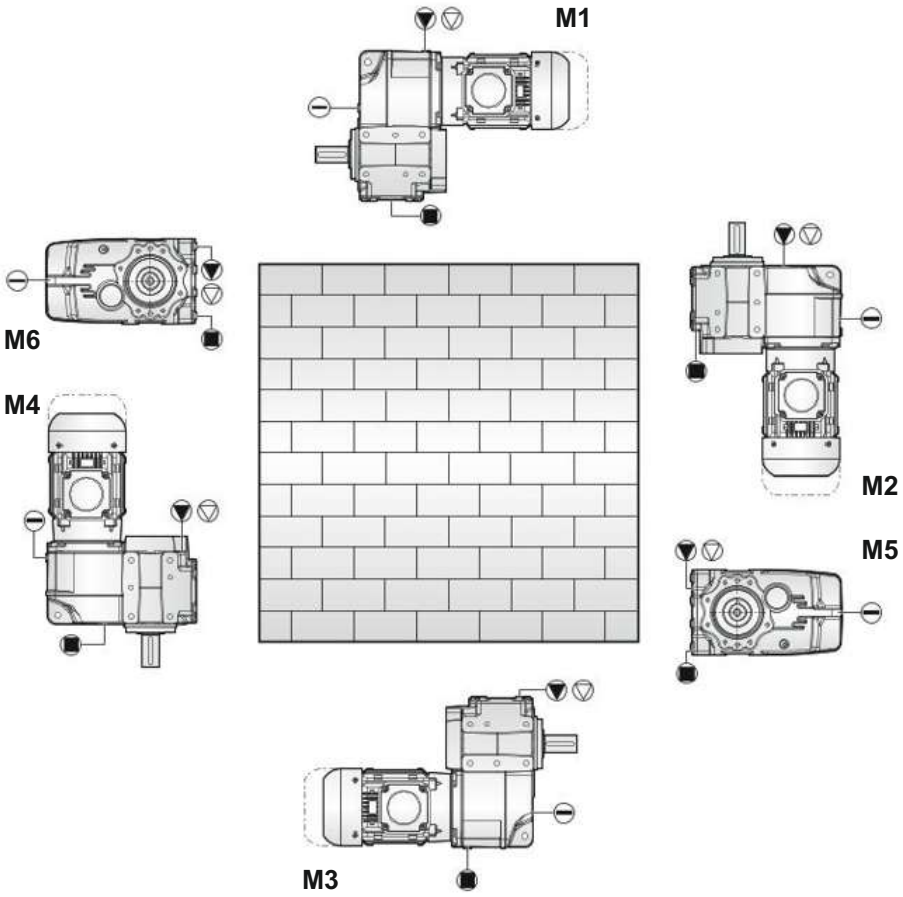
* Sign shows that position of oil level plug for gear units which are from PD 63 to PD 123.

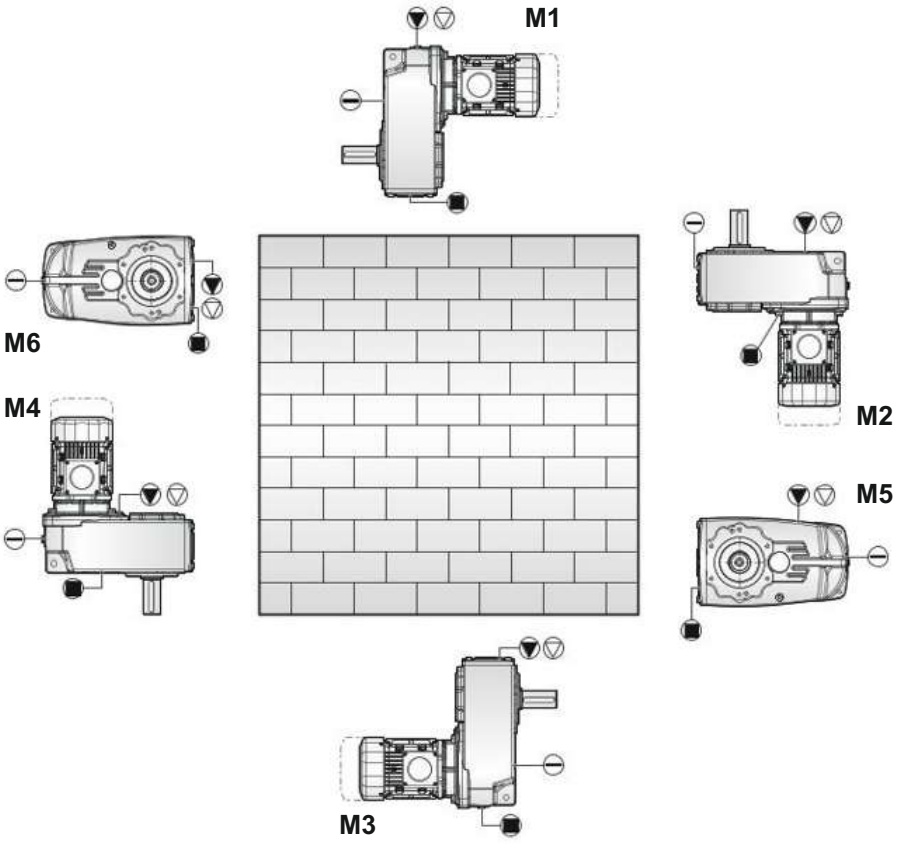
PD
PD 62
PD 72 PD 82
PD 82 PD 92
PD 92 PD 102
PD 102 PD 1
PD 112
* PD 63* PD 73
* PD 73* PD 83
* PD 83* PD 93
* PD 93* PD 103
* PD 103* PD 1
* PD 113
* PD 123



Filling Plug Vent Plug Oil Level Plug Drain Plug

PM
PM A02 PM B02PM C13 PM C13



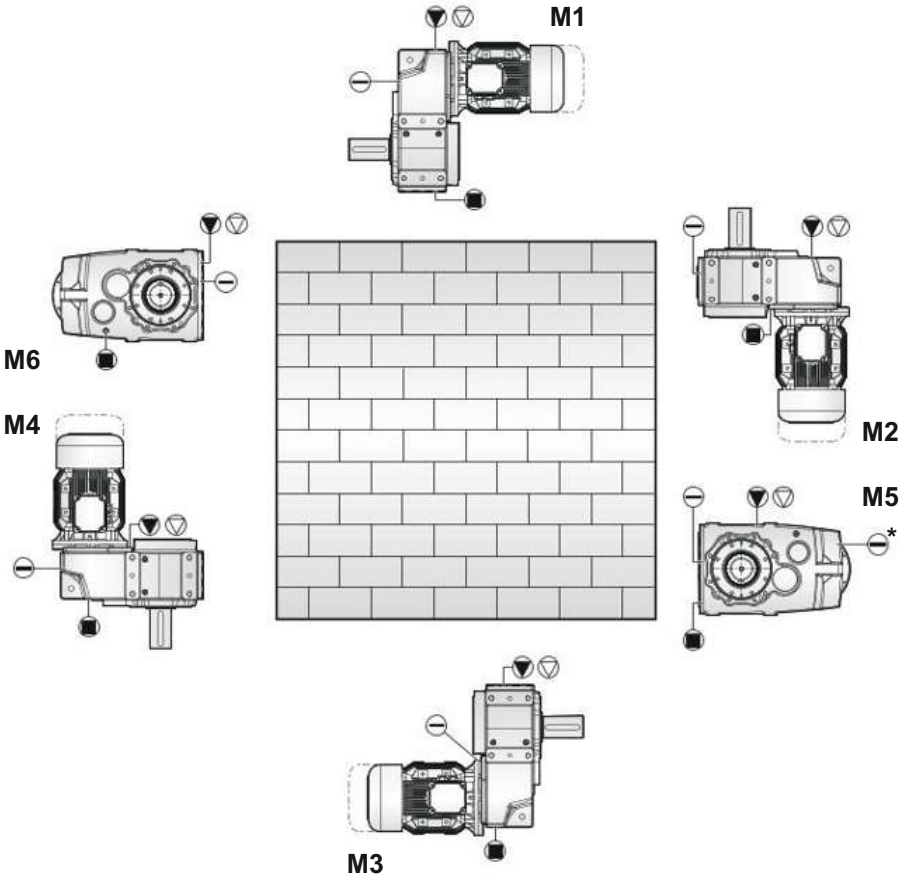


PM
PM 12 PM 22PM 32 PM 32PM 42 PM 42PM 52 PM 52PM 13 PM 13PM 23 PM 23PM 33 PM 33PM 43 PM 43PM 53 PM 53

Filling Plug Vent Plug Oil Level Plug Drain Plug

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

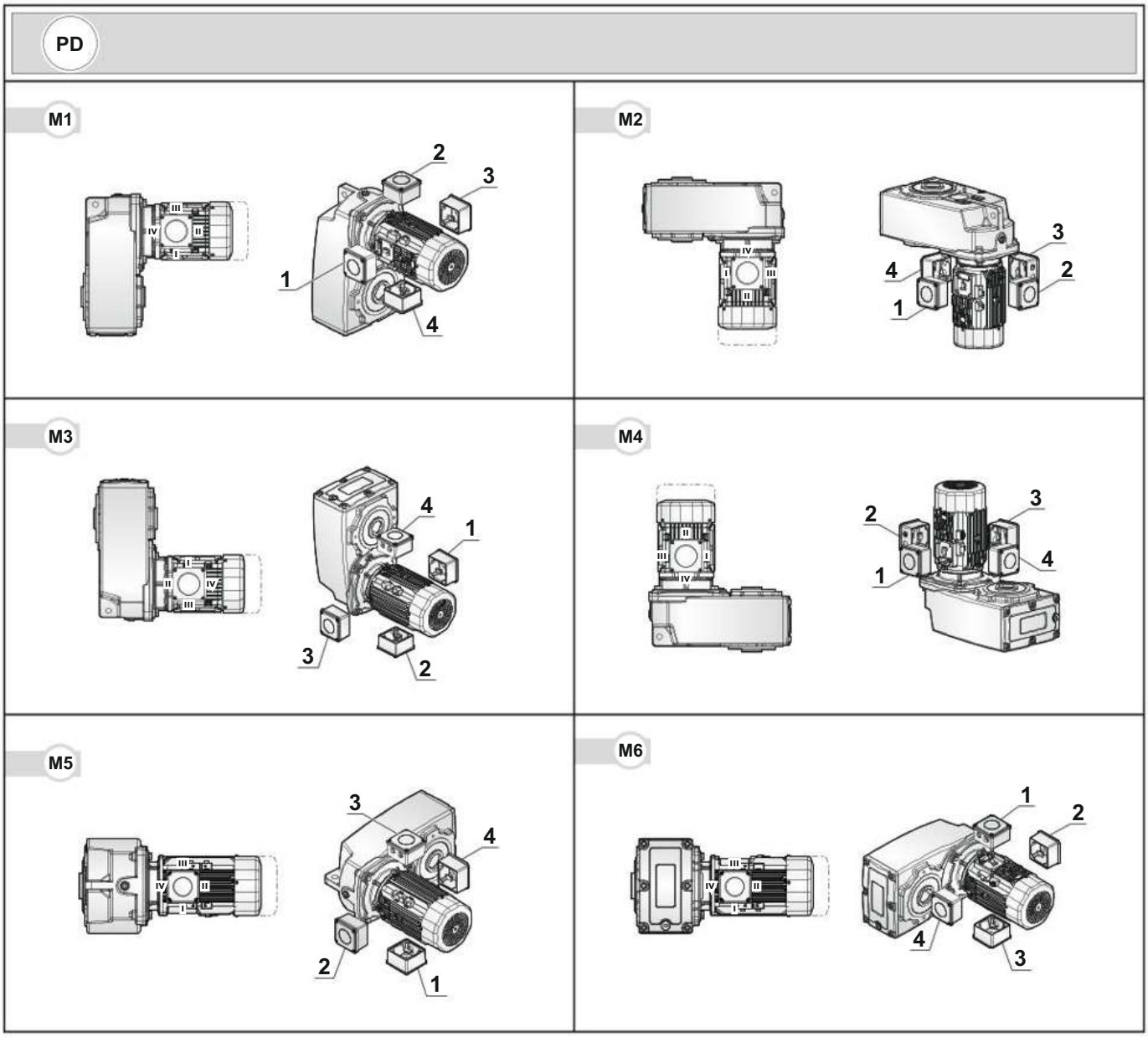
PM
PM 62
PM 72 PM 82
PM 82 PM 92
PM 92 PM 102
PM 102 PM 1
PM 112
* PM 63* PM 73
* PM 73* PM 83
* PM 83* PM 93
* PM 93* PM 103
* PM 103* PM 1
* PM 113
* PM 123



Filling Plug Vent Plug Oil Level Plug Drain Plug

PD / PM

Table 15: Terminal Box and Cable Entrance Sides **(PD)**



* **1 - 2 - 3 - 4 :** Shows terminal box position.
* **I - II - III - IV:** Shows cable entry position.

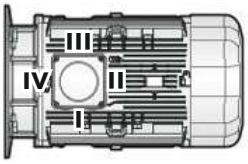
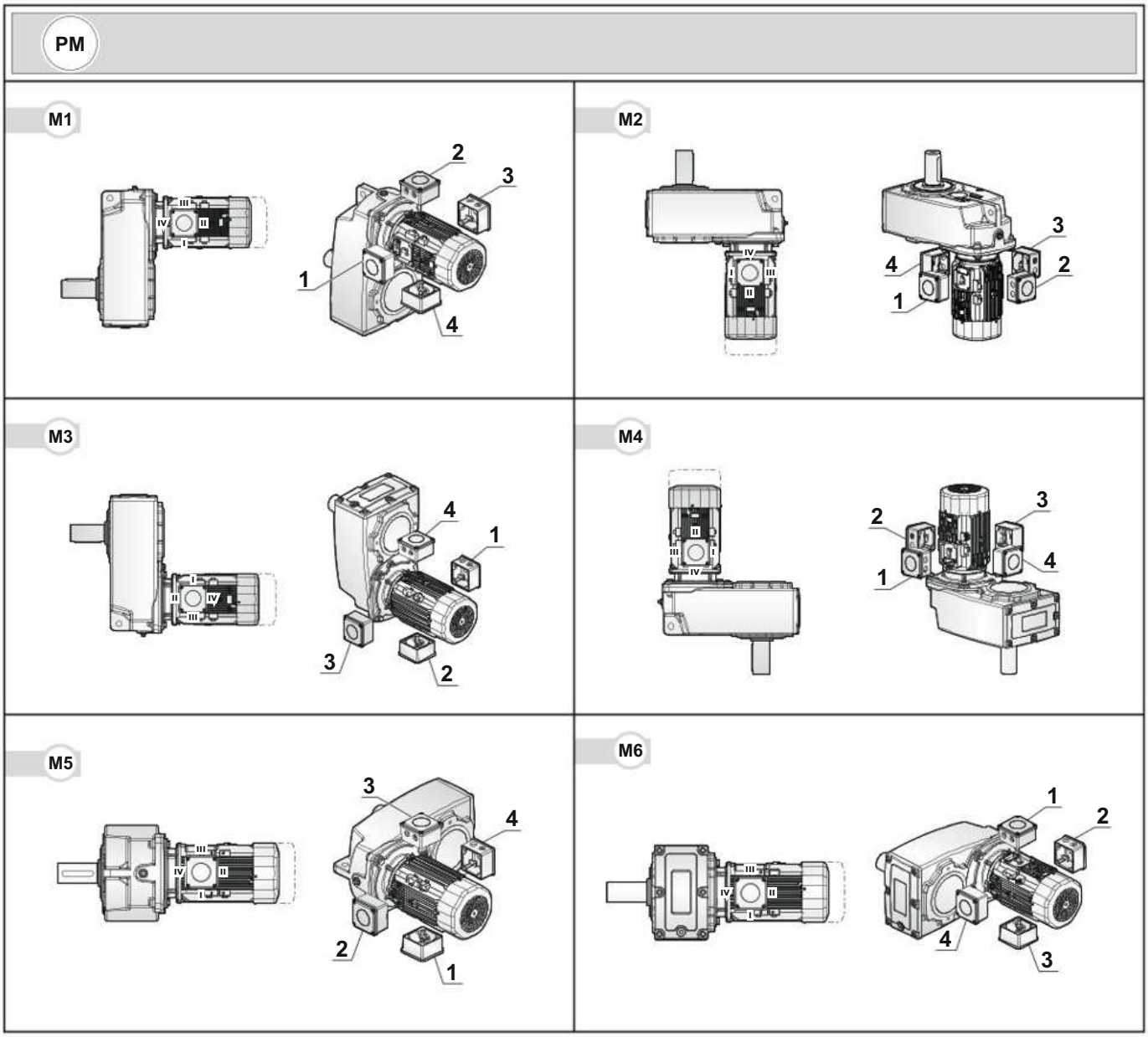
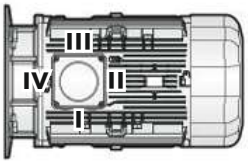


Table 16: Terminal Box and Cable Entrance Sides **(PM)**

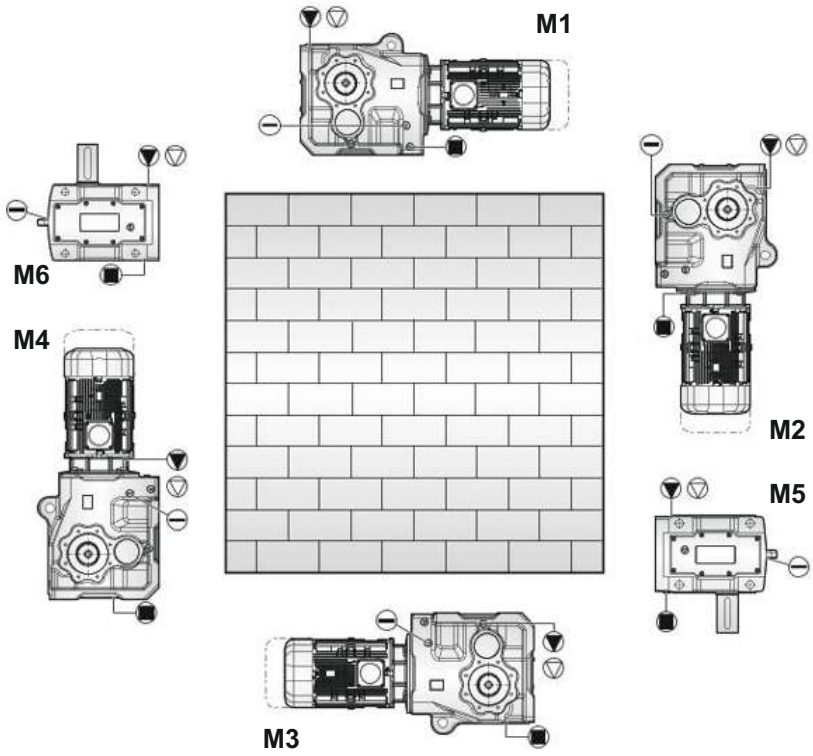


* **1 - 2 - 3 - 4 :** Shows terminal box position.
* **I - II - III - IV:** Shows cable entry position.



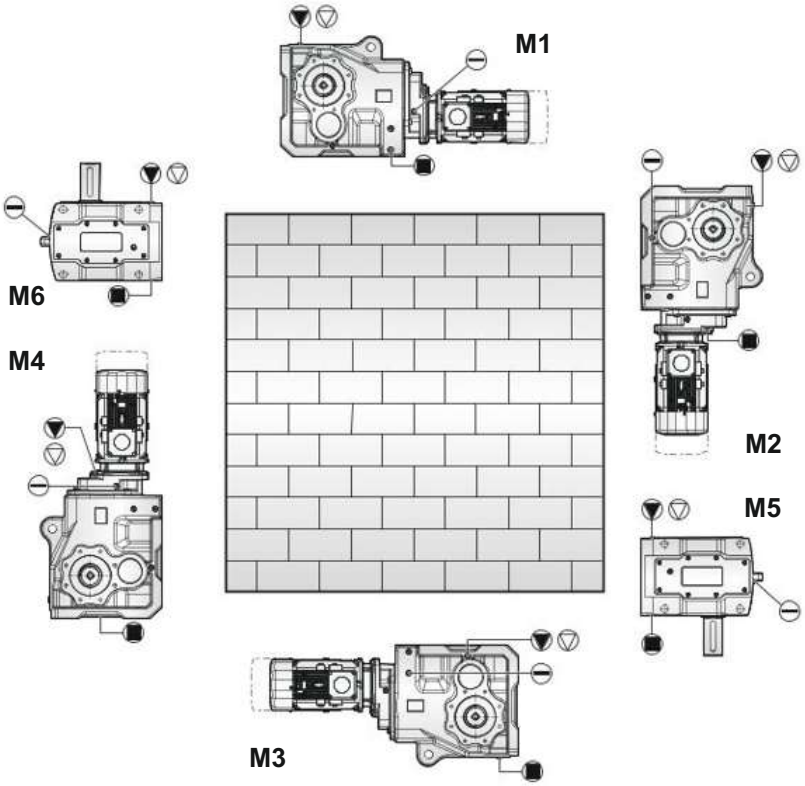
PKD

Figure 16: 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

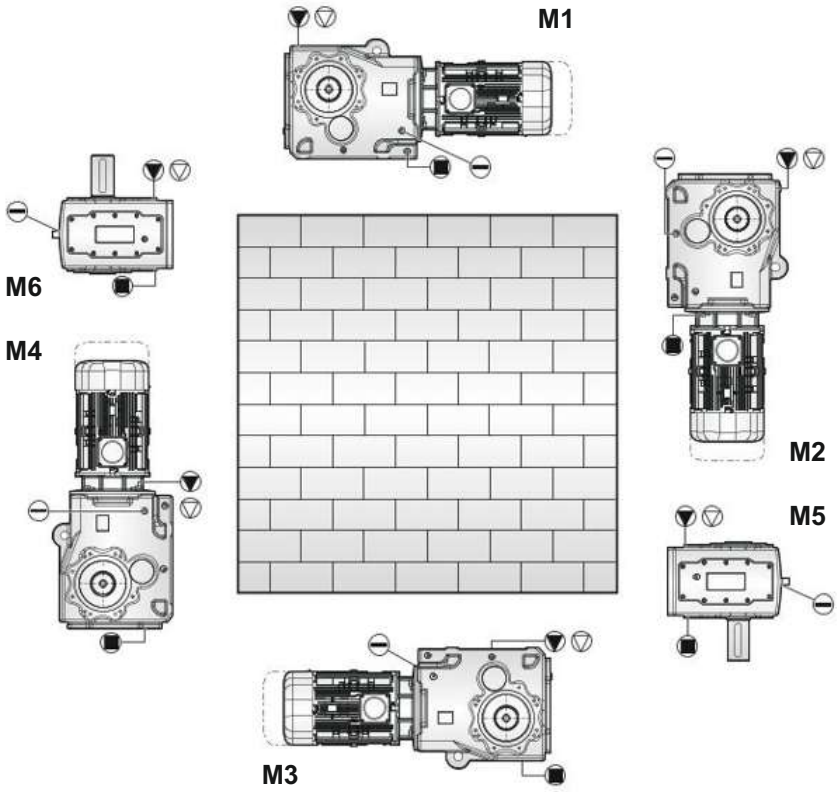
PKD
PKD 1490
PKD G 1490
PKD 2490
PKD 3490
PKD 4490
PKD 5490

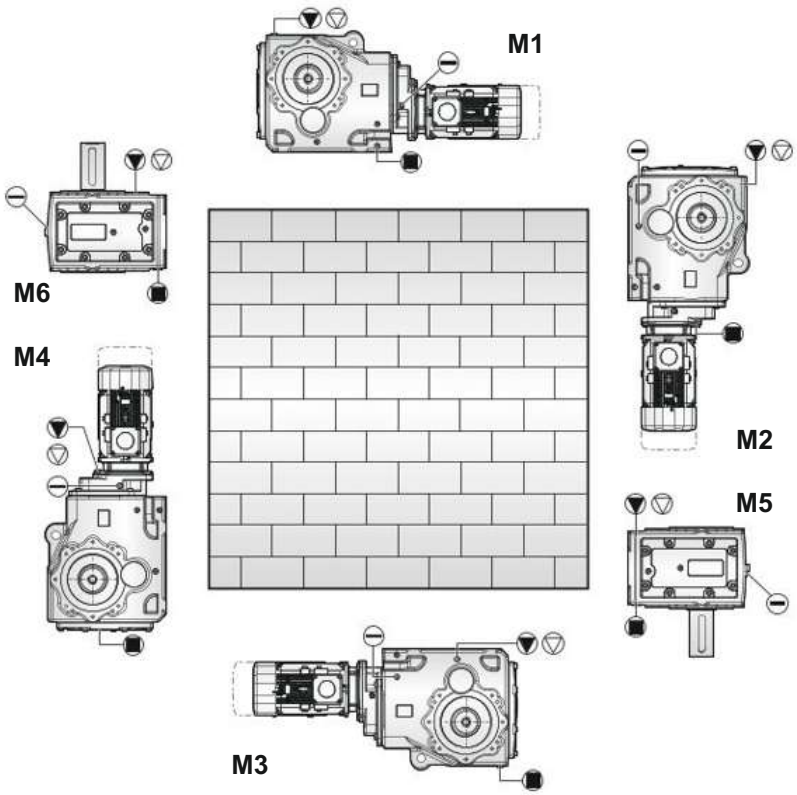
Filling Plug Vent Plug Oil Level Plug Drain Plug

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

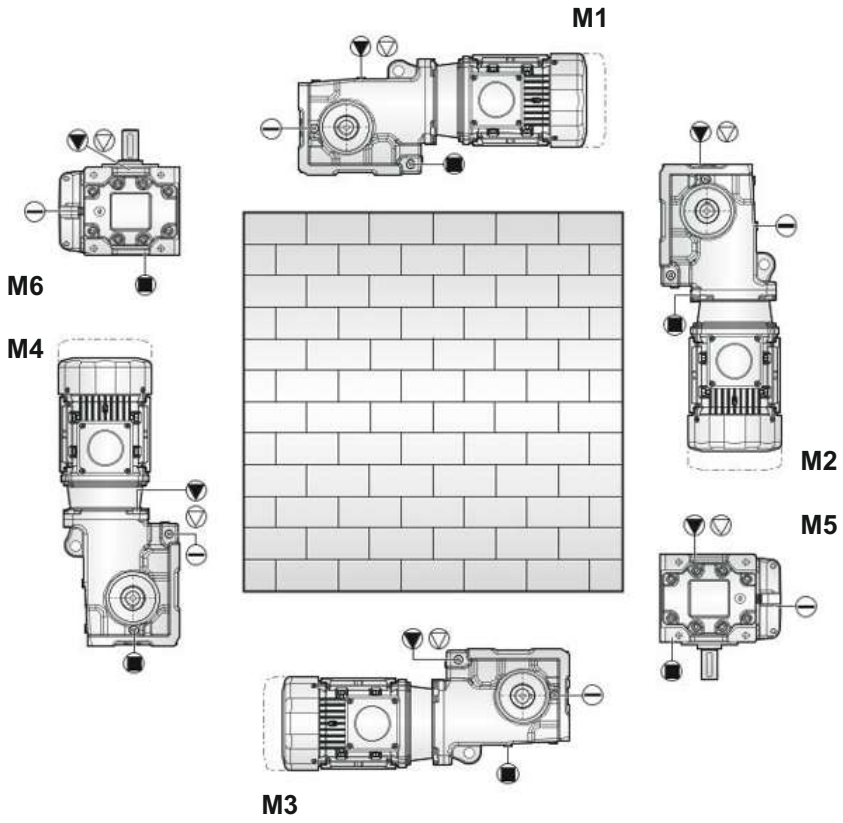
PKD
PKD 1490
PKD G 1490
PKD 2490
PKD 3490
PKD 4490
PKD 5490

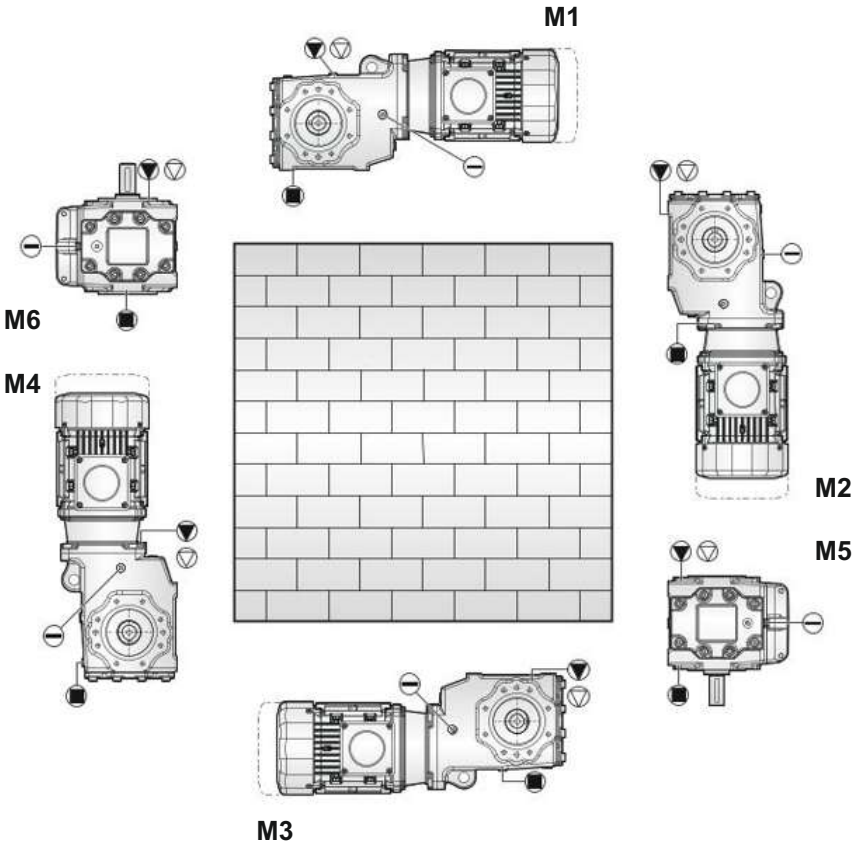
Filling Plug Vent Plug Oil Level Plug Drain Plug

PKD

FOOT MOUNTED

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





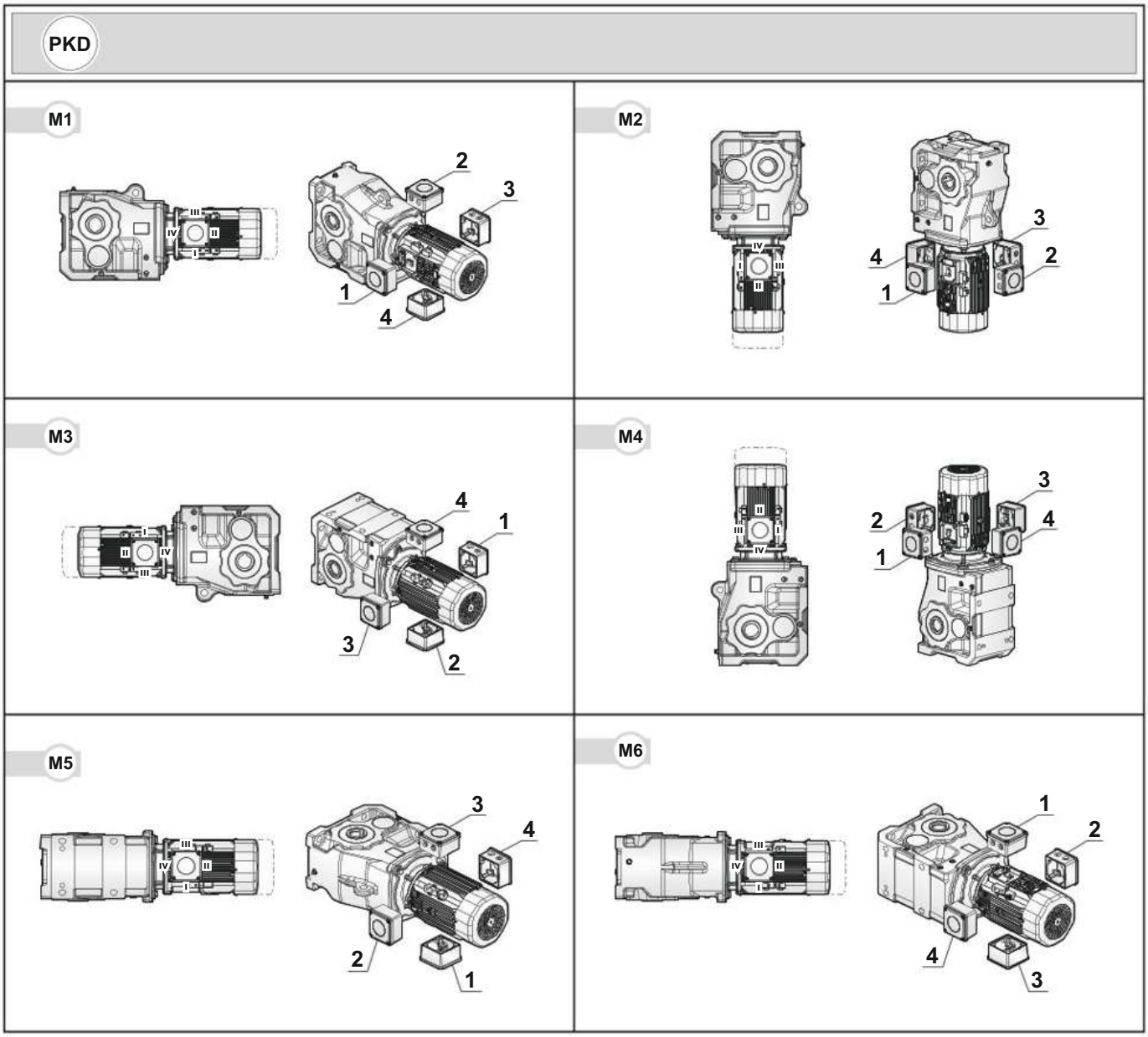
CASE MOUNTED

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

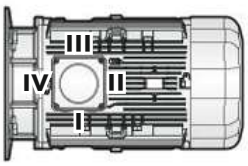
Filling Plug Vent Plug Oil Level Plug Drain Plug

PKD

Table 17: Terminal Box and Cable Entrance Sides **(PKD)**

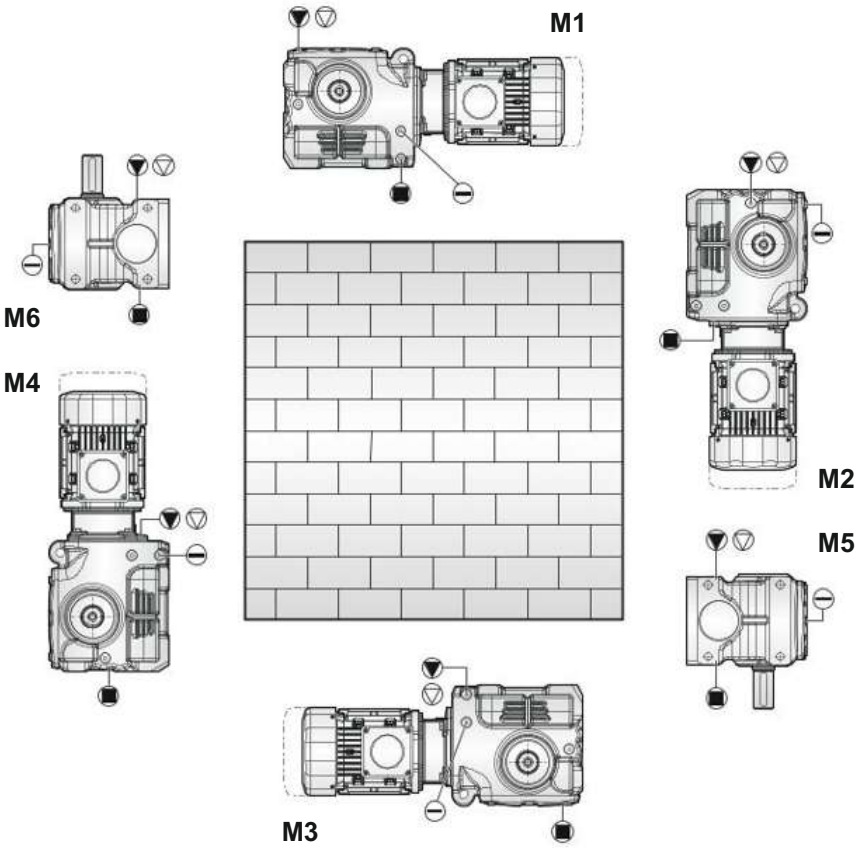


* **1 - 2 - 3 - 4 :** Shows terminal box position.
* **I - II - III - IV:** Shows cable entry position.



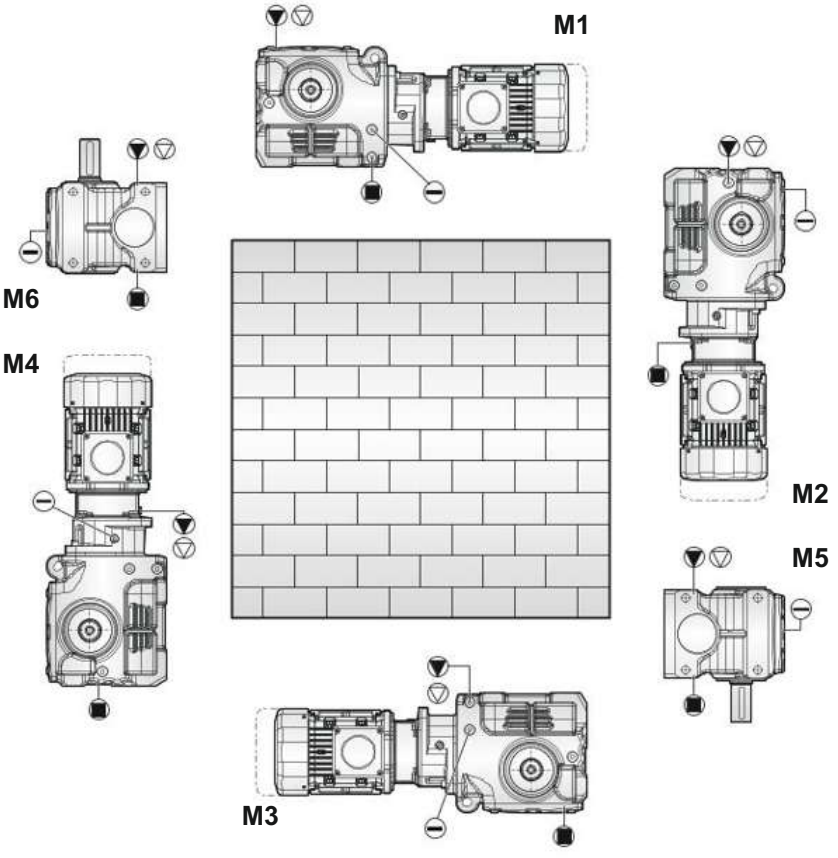
PSH

Figure 17: Mounting Positions **(PSH)**



FOOT MOUNTED

PSH
PSH 2050 PSH 2063PSH 2080 PSH 2080PSH 2100 PSH 2100PSH 2125 PSH 2125

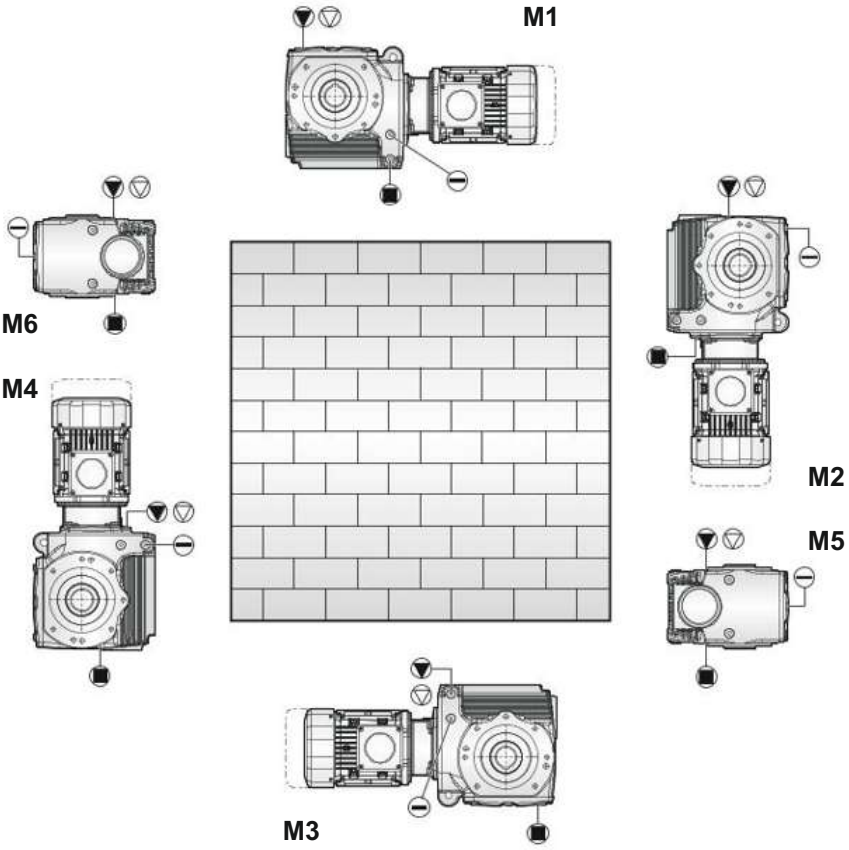


FOOT MOUNTED

PSH
PSH 3050 PSH 3063PSH 3080 PSH 3080PSH 3100 PSH 3100PSH 3125 PSH 3125

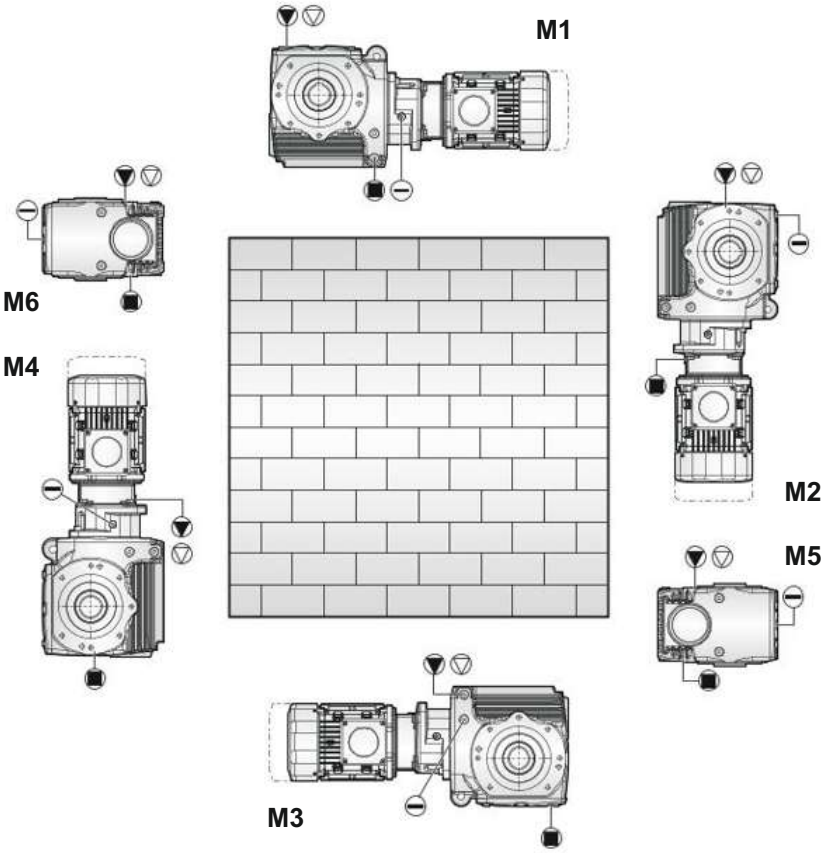
Filling Plug Vent Plug Oil Level Plug Drain Plug

PSH



CASE MOUNTED

PSH
PSH 2050 PSH 2063PSH 2080 PSH 2080PSH 2100 PSH 2100PSH 2125 PSH 2125



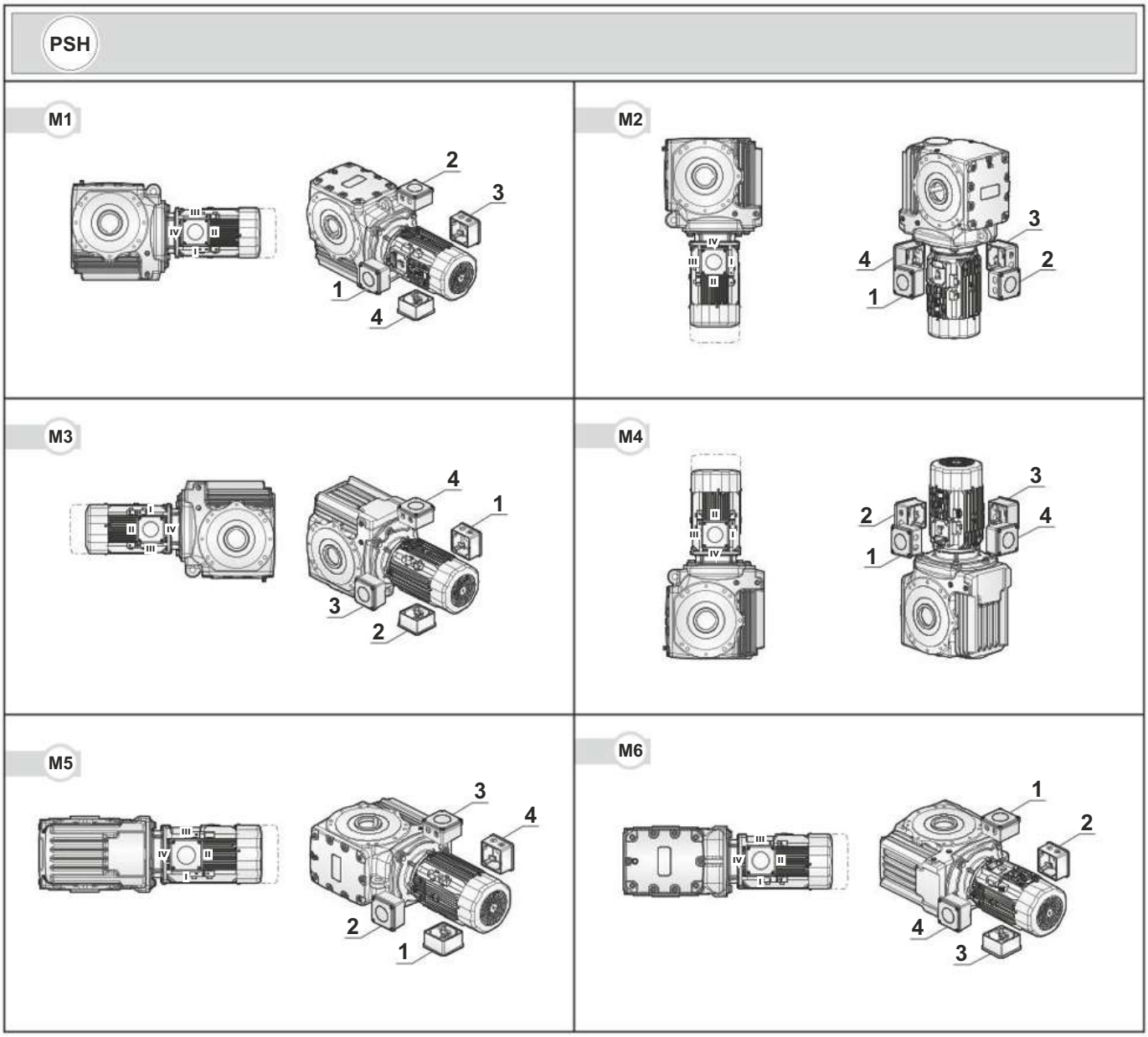
CASE MOUNTED

PSH
PSH 3050 PSH 3063PSH 3080 PSH 3080PSH 3100 PSH 3100PSH 3125 PSH 3125

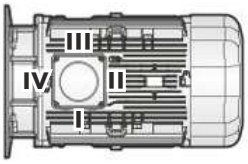
Filling Plug Vent Plug Oil Level Plug Drain Plug

PSH

Table 18: Terminal Box and Cable Entrance Sides **(PSH)**



* **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.

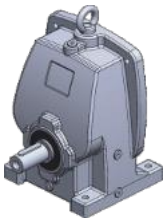
DANGER !

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.

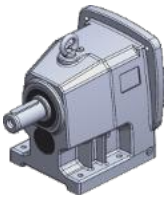
6.2 Lubricant Fill Quantities

PA (SINGLE STAGE)

Table 19: Lubricant Fill Quantities **(PA)**

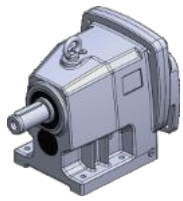
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PA 11	0.25	0.50	0.55	0.40	0.40	0.40
	PA 21	0.60	1.20	1.20	1.00	1.00	1.00
	PA 31	1.00	1.80	2.20	2.00	1.60	1.60
	PA 41	1.30	2.60	3.10	2.50	2.60	2.60
	PA 51	2.00	3.50	4.40	4.00	3.40	3.40

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

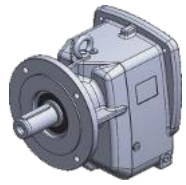
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PA 63	13.00	14.50	13.50	17.00	13.00	13.00
	PA 73	19.00	20.00	19.00	25.00	19.20	19.20
	PA 83	27.00	31.00	29.00	37.00	30.50	30.50
	PA 93	51.50	56.00	51.00	72.00	53.50	53.50
	PA 103	69.00	71.00	69.00	92.50	67.00	67.00

PF (SINGLE STAGE)

Table 20: 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

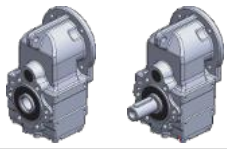
PF (TRIPLE STAGE)

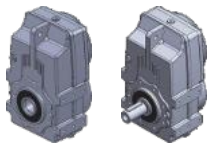
Mounting Positions / Litre (L)						
	**TYPE**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
	PF 03	0.50	1.10	0.90	1.10	0.65	0.65
	PF 13	0.85	1.40	1.10	1.35	0.80	0.80
	PF 23	1.80	2.90	2.10	2.90	1.50	1.50
	PF 33	1.90	3.40	2.90	4.00	2.20	2.20
	PF 43	3.50	6.10	4.20	6.10	3.00	3.00
	PF 53	5.20	8.80	6.50	9.20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

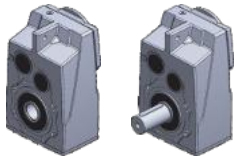
PD / PM (DOUBLE STAGE)

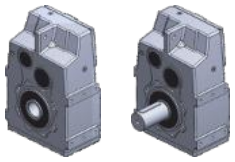
Table 21: Lubricant Fill Quantities **(PD / PM)**

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

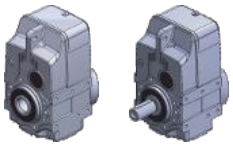
Mounting Positions / Litre (L)							
	**TYPE**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
	PD / PM B02	0.80	1.10	0.90	1.20	0.75	0.75

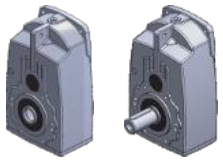
Mounting Positions / Litre (L)							
	**TYPE**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
	PD / PM 12	0.90	1.40	1.00	1.30	0.90	0.90
	PD / PM 22	1.70	2.50	2.10	2.10	1.50	1.50
	PD / PM 32	3.20	4.20	3.70	4.20	2.70	2.70
	PD / PM 42	4.80	6.60	5.40	5.50	4.20	4.20
	PD / PM 52	7.60	9.00	8.50	9.50	6.60	6.60

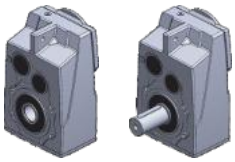
Mounting Positions / Litre (L)							
	**TYPE**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
	PD / PM 62	16.00	17.50	15.50	17.60	10.10	13.50
	PD / PM 72	24.00	25.00	21.00	27.10	16.10	20.00
	PD / PM 82	35.00	40.00	33.50	41.50	28.50	30.50

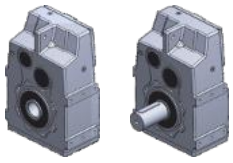
Mounting Positions / Litre (L)							
	**TYPE**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**
	PD / PM 92	68.00	77.00	55.50	75.00	50.00	56.00
	PD / PM 102	90.10	90.10	40.10	90.10	60.10	82.10
	PD / PM 112	166.00	161.00	146.00	196.00	101.00	141.00

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

FOOT MOUNTED

PKD (DOUBLE STAGE)

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

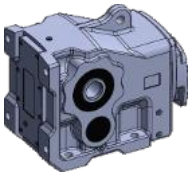
Mounting Positions / Litre (L)							
	TYPE	M1	M2	M3	M4	M5	M6
	PKD A 0290	0.40	0.70	0.50	0.60	0.40	0.50

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

CASE MOUNTED

PKD (DOUBLE STAGE)



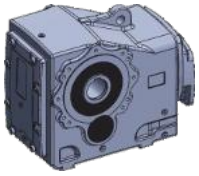
Mounting Positions / Litre (L)						
TYPE	M1	M2	M3	M4	M5	M6
PKD B 0290	0.60	1.00	1.00	1.10	0.70	0.70
PKD C 1290	1.10	1.50	1.30	1.90	0.90	0.90
PKD F 4290	1.50	2.80	2.80	3.50	2.10	2.10
PKD H 5290	2.90	4.50	4.30	6.00	3.60	3.60

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 23: Lubricant Fill Quantities **(PSH)**

FOOT MOUNTED

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

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)

CASE MOUNTED

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

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 20). 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 24: Lubrication Table

Type of gearbox	Type of Lubricant	Ambient Temp. °C	ISO viscosity class	Shell	Mobil	bp	Esso	DEA	ARAL	Castrol	TRIBOL	KLÜBER LUBRICATION
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	Enersyn 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	Enersyn 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 !

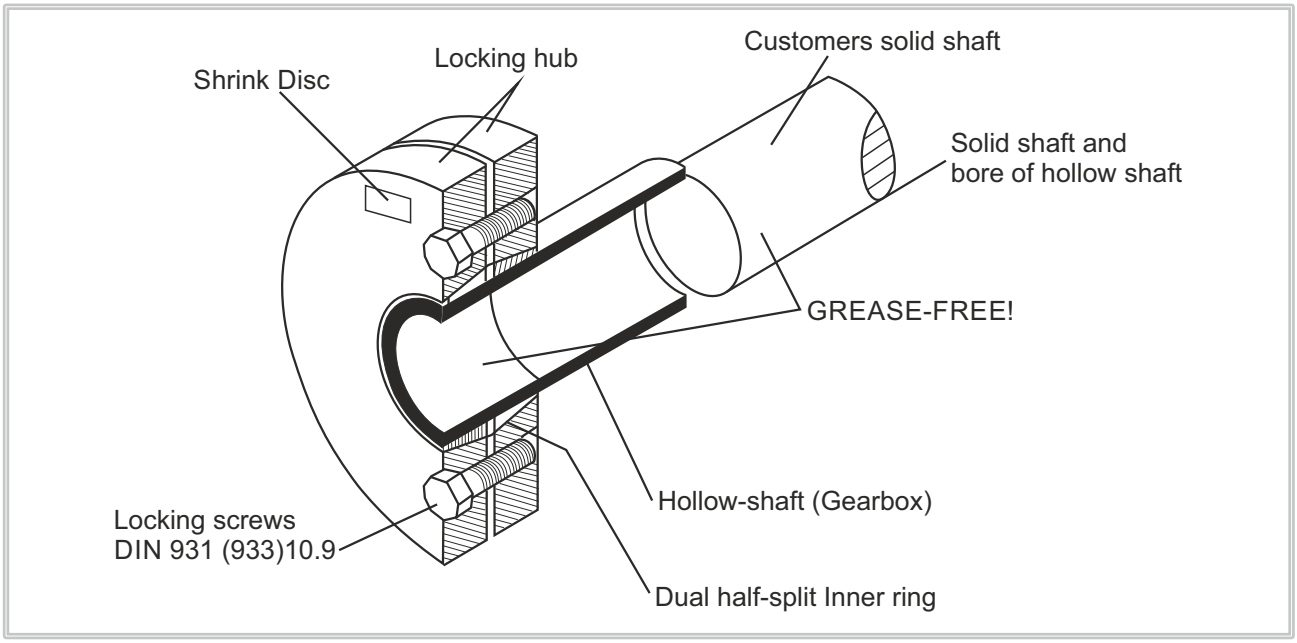
At ambient temperatures under -30° degree and above 60° degree for leakproofing element inside the shaft, special quality material must be used.

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 18: 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 easining 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 seperated 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 25: Lubrication Schedule While Cleaning of Shrink Disc

Lubricant (Mo S2)	Type
▸ Molykote 321 (Slippery lac)	▪ Spray
▸ Molykote Spray (Powder spray)	▪ Spray
▸ Molykote G Rapid	▪ Spray or paste
▸ Aemasol MO 19P	▪ Spray or paste
▸ Aemasol DIO-setral 57 N (Slippery lac)	▪ Spray

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) woundings. 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.

Figure 19: Protection Cover **(PD / PM, PKD, PSH)**



Catalog: PD/PM
Page : 64

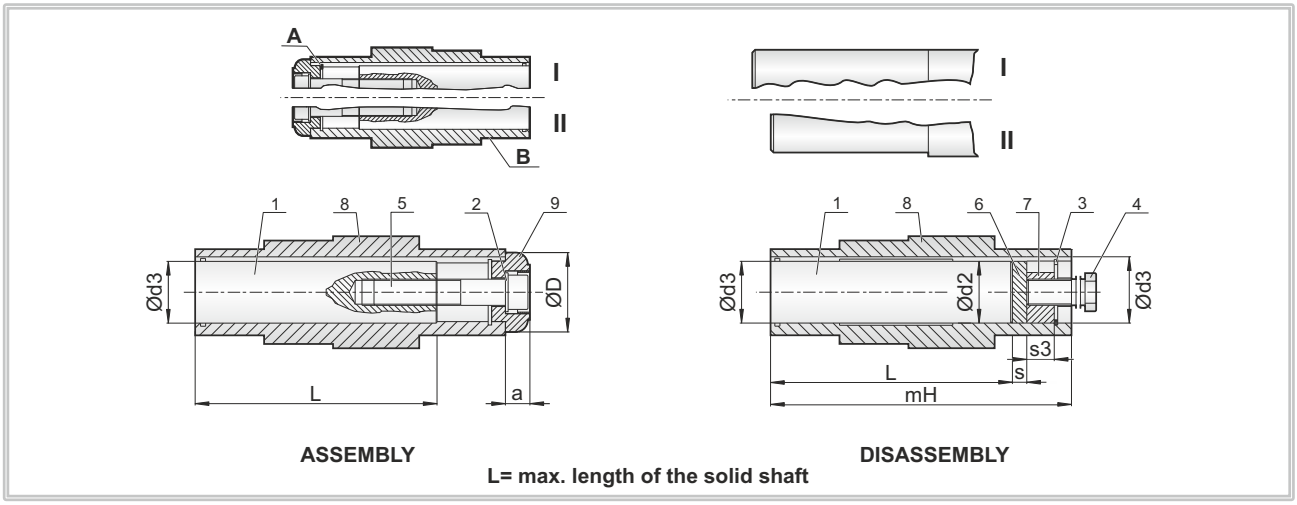
Catalog: PKD
Page : 68

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 schoulder.
- 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 20: 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 26: 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 27: 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 28: 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 29: 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 20: Fixing Kit (PD, PKD, PSH)**, page 71)

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 20: Fixing Kit (PD, PKD, PSH)**, page 71))

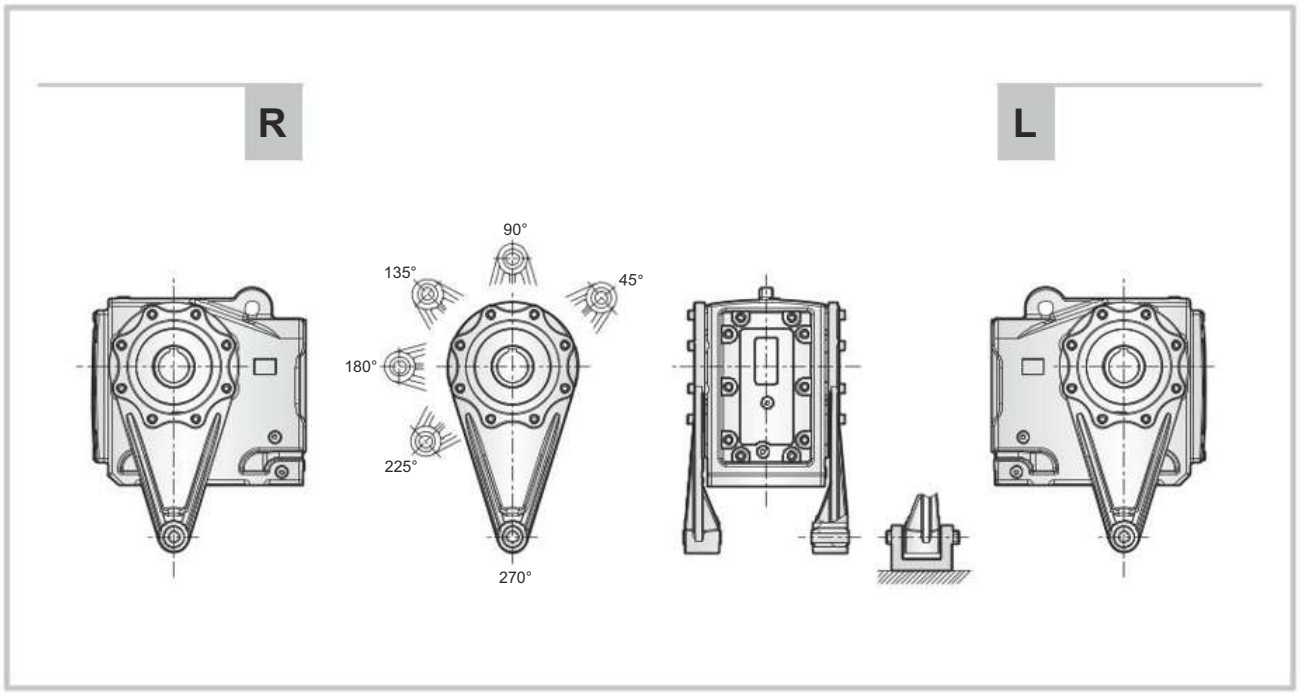
7.3.2 Disassembling of the Fixing Kit (PD, PKD, PSH);

- 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 20: Fixing Kit (PD, PKD, PSH)**, page 71)

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

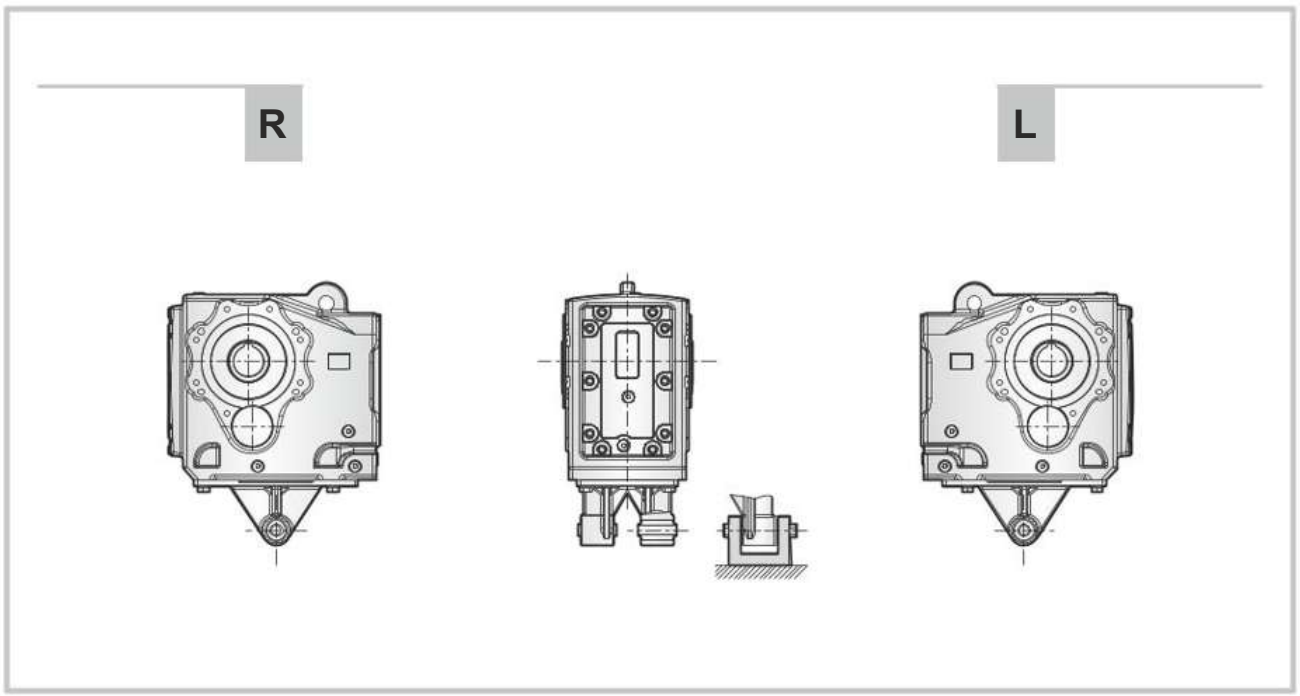
- The rubber wedge part of the torc arm must be taken into the bearing from both sides.
- Torc arms must be mounted as a voltage-free.
- For the correct mountage, the sticky (LOCTITE 510 OR EQUIVALENT) which absorbs vibration must be used.
- The screw connection of the torc arm must be tightened with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

Figure 21: Torque Arm **(PKD)**



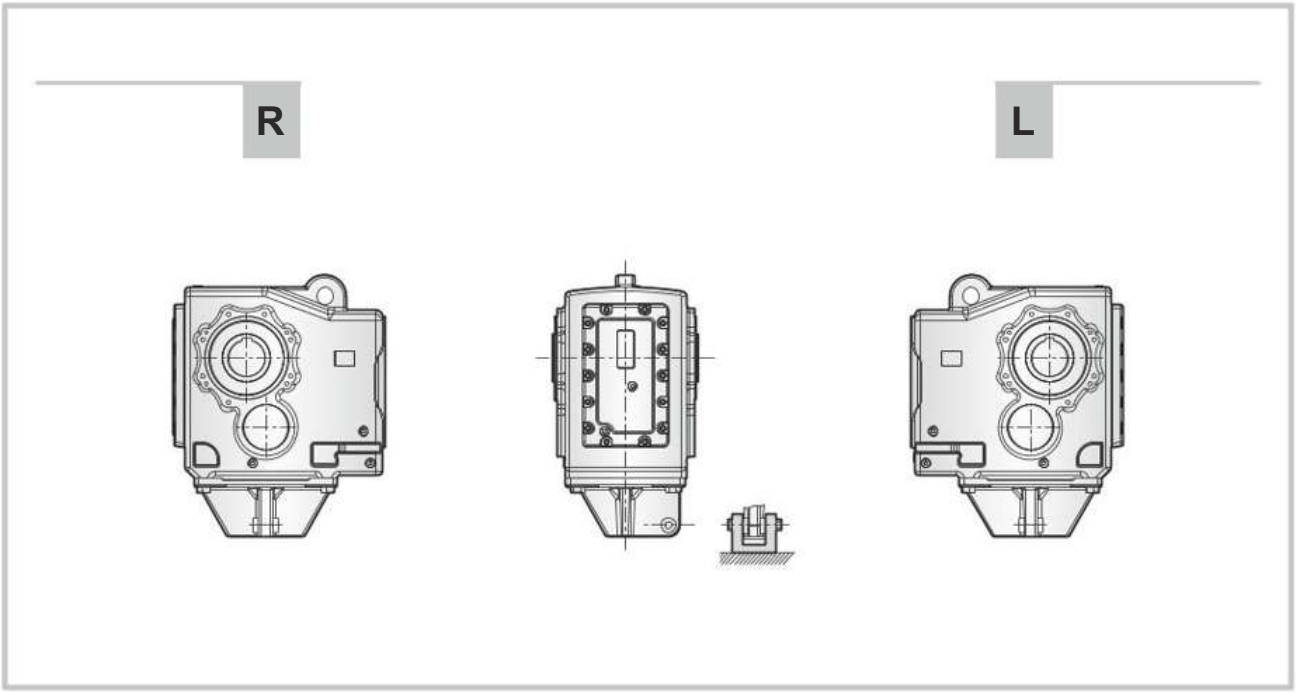
Catalog: PKD
Page : 65

Figure 22: Torque Arm Platform **(PKD)**



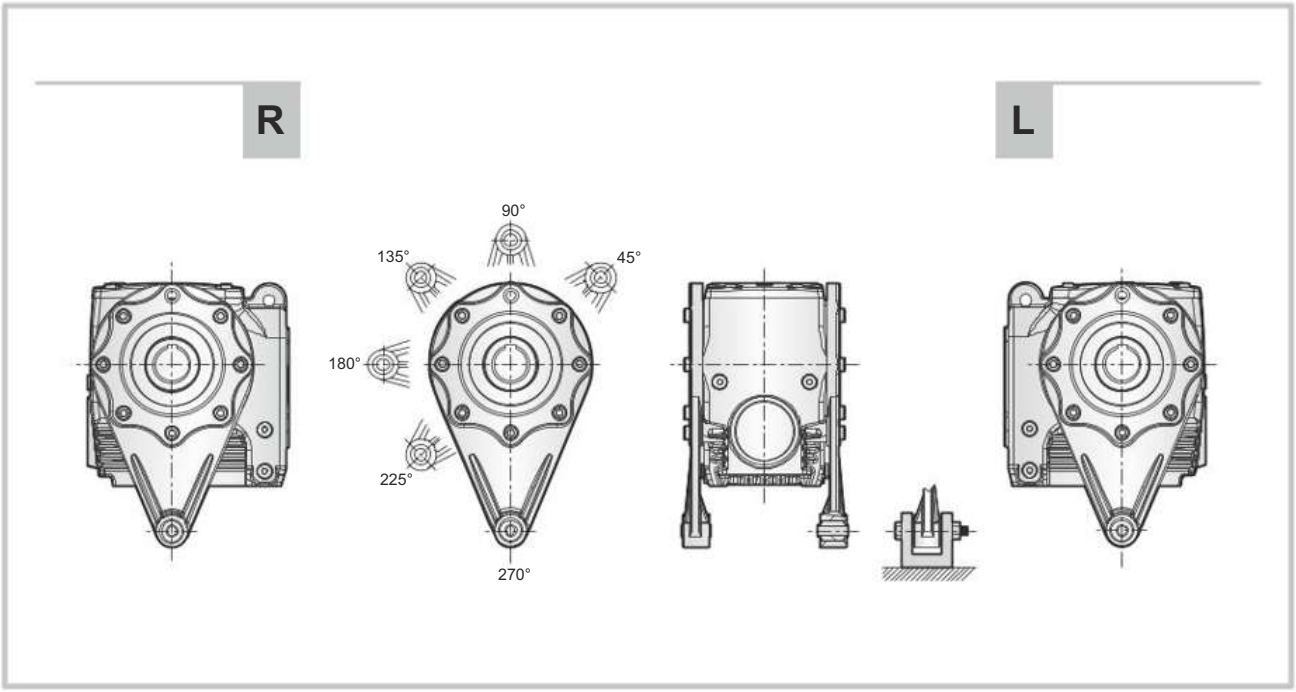
Catalog: PKD
Page : 66

Figure 23: Torque Arm Platform **(PKD)**



Catalog: PKD
Page : 66

Figure 24: Torque Arm **(PSH)**



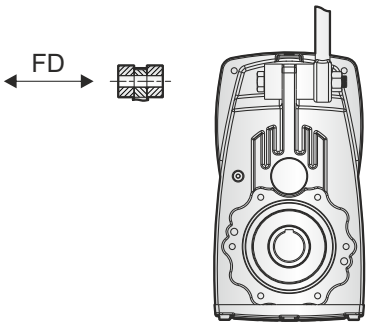
Catalog: PSH
Page : 45

NOTE !

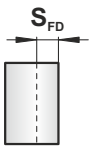
The failure of the using of the original parts on the gear unit is not in our firm's responsibility.

7.5 Rubber Buffer (PD / PM)

Figure 25: Rubber Buffer

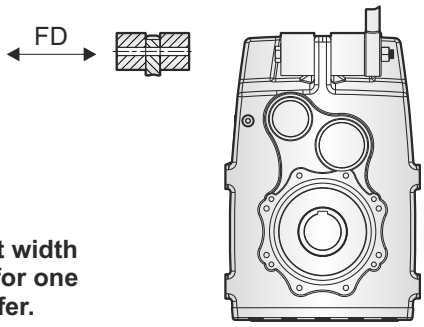


PD / PM ... LT



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

Figure 26: Reinforced Rubber Buffer



PD / PM ... GLT

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.

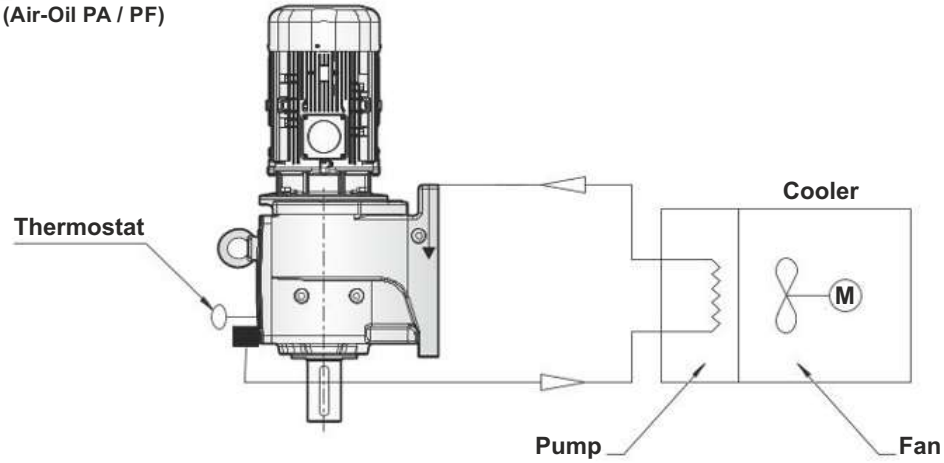
The allowed direction of rotation is marked on the gear unit.
If the backstop direction is wrong, please contact PGR.

7.7 Air - Oil Cooled (PA / PF, PD / PM, PKD)

PA / PF

Catalog: PA/PF
Page : 49

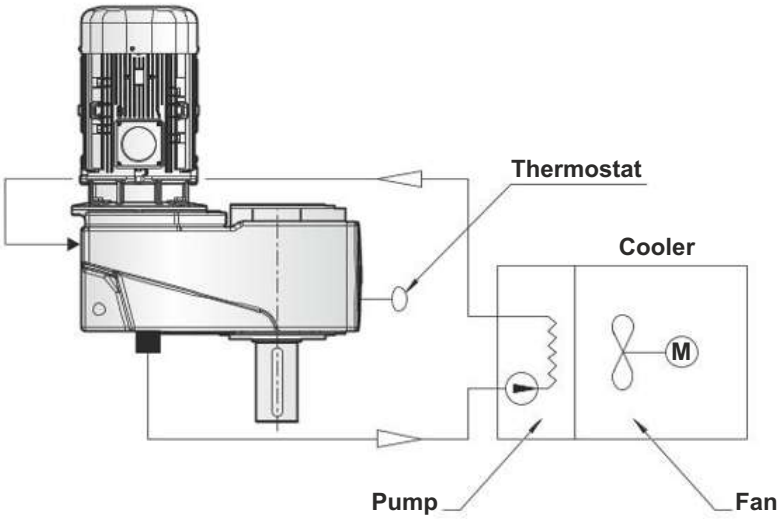
Figure 27: Cooled **(Air-Oil PA / PF)**



PD / PM

Catalog: PD/PM
Page : 68

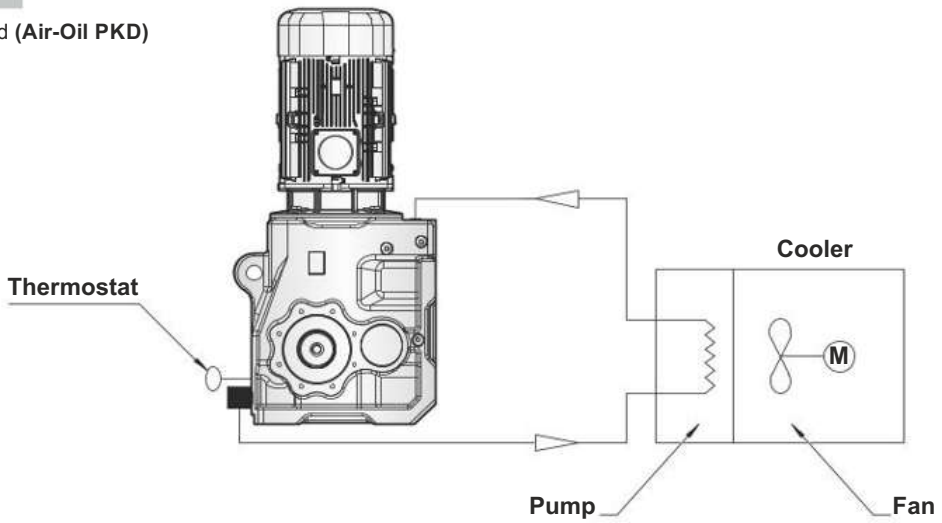
Figure 28: Cooled **(Air-Oil PD / PM)**



PKD

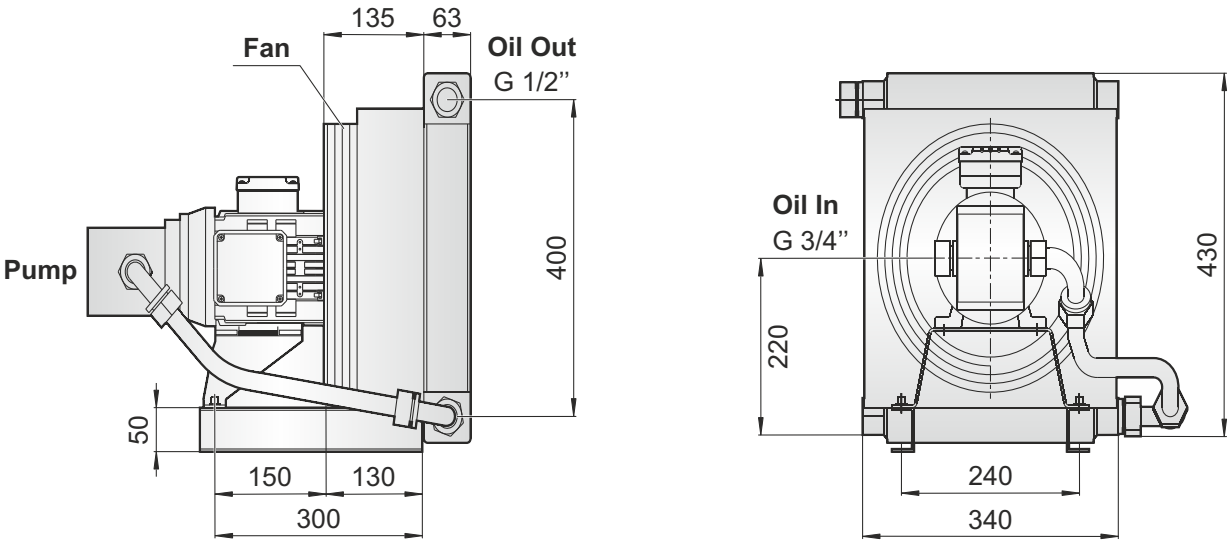
Catalog: PKD
Page : 72

Figure 29: Cooled **(Air-Oil PKD)**



Picture which is above on this page shows cycle of the cooling unit. There is a thermostat on the gear unit for checking oil temperature. Oil flows from suction line to pressure line which is provided by pump. In this way, oil temperature is cooled down by a fan which is supplying air flow to the coil. Then, oil flows to the house of gear unit.

Figure 30: Cooled **(Radiator)**



7.8 Water Cooled (PD / PM, PKD)

The cooling water must possess water-liked heat capacity (heat capacity at 20 degree is c=4.18kj/kgK) For the cooling water, the tap water is recommended which is air bubble free and is not included the materials which leaves residue. The water hardness must be between 1 dH and 15 dH, pH value must be between pH7,4 and pH9,5. Another liquid must not be mixed to the cooling water.

The cooling water pressure must be maximum 8 bar. The necessary cooling water amount must be 10l/dk and the cooling water inlet temperature must be over the 40 degree. (10 degree is recommended) For preventing the damages of the high pressure, the installation of pressure reducer or similar device to the entrance of the cooling water is recommended.

The business has the responsibility of adding of the antifreeze to the cooling water at the proper time against the danger of freezing Both the cooling water temperature and cooling water flowing amount must be controlled by business and must be got into the secure.

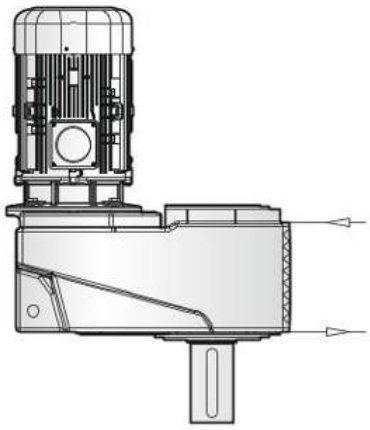
DANGER !

The gear unit must only be activated after both cooling channel is linked to the cooling turbination and put the cooling turbination into the process.

For cooling gear unit, conjugate heat exchanger is available optionally. (This design exist for helical-bevel and parallel shaft gear units.) Consider that, PGR suggests that cooling water flow and temperature of gear unit should be checked because, coil of heat exchanger is on the cover of gear unit. Heat transfer from oil or gear unit to cooling water should be monitored. This design could be used in explosive areas. Heat exchanger might be supplied heat to the gear unit in low temperature.

PD / PM

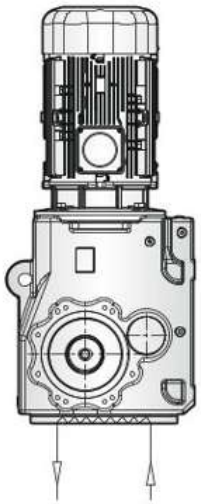
Table 30: Table Shows that Suitability of Water Cooling for Which Mounting Positions **(PD / PM)**



Gear Unit Type	Mounting Positions					
	M1	M2	M3	M4	M5	M6
PD / PM 62 - PD / PM 63	✓	✓	–	✓	✓	✓
PD / PM 72 - PD / PM 73	✓	✓	–	✓	✓	✓
PD / PM 82 - PD / PM 83	✓	✓	–	✓	✓	✓
PD / PM 92 - PD / PM 93	✓	✓	–	✓	✓	✓
PD / PM 102 - PD / PM 103	✓	✓	–	✓	✓	✓
PD / PM 112 - PD / PM 113	✓	✓	–	✓	✓	✓
PD / PM 123	✓	✓	–	✓	✓	✓

PKD

Table 31: Table Shows that Suitability of Water Cooling for Which Mounting Positions **(PKD)**



Gear Unit Type	Mounting Positions					
	M1	M2	M3	M4	M5	M6
PKD 8390	–	–	✓	✓	–	–
PKD G 8390	–	–	✓	✓	–	–
PKD 9390	–	–	✓	✓	–	–
PKD G 9390	–	–	✓	✓	–	–

8.1 The Electrical Motor and Brake Connection

The connections must be made according to electric connection schema (If there is brake, it must be made according to brake connection schema).

- Must be sured that the supply voltage and frequency are the same as tag values.
- Both the protective tag values and connection must be controlled.
- If the motor is operated at the opposite direction, two stages must be changed.
- Unused cable entries should be closed.
- Not to have excessive load and stage failures, the protector must be used (stage protection or thermic etc.)
- The motor protection must be set to the nominal current.
- The gear unit and motor must be grounded against potential differences.
- The electrical motor and/or brake connections must be made by the experienced electric technicians.



DANGER !

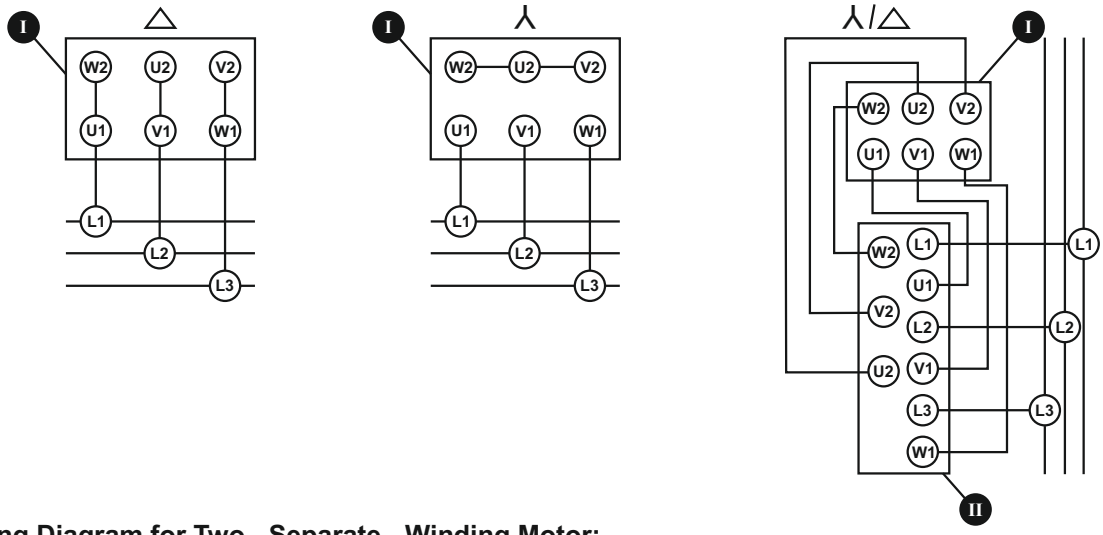
Wrong voltage or connection would harm to electrical motor or environment.

8.2 The Electrical Motor Connection Schema

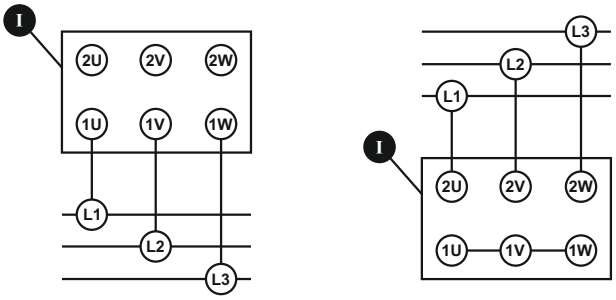
Three Phase Squirrel - Cage Motor

Figure 31: The Electrical Motor Connection Schema

I. Terminal Box
II. Circuit Breaker

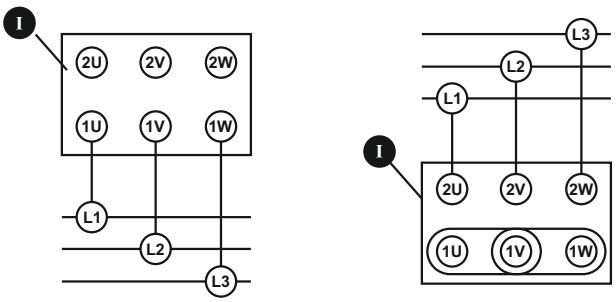


Wiring Diagram for Two - Separate - Winding Motor:



Low Speed High Speed

Dahlender Motor Connection Diagram:

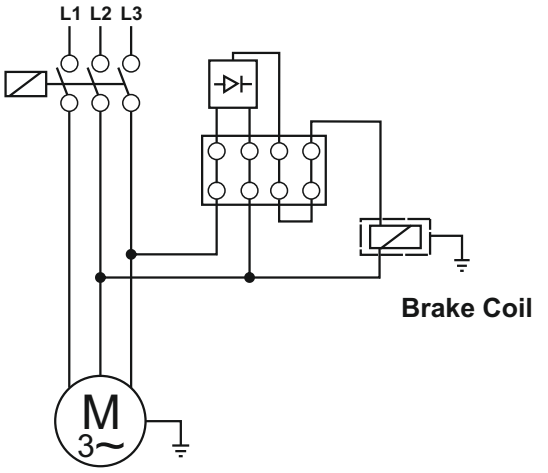


Low Speed High Speed

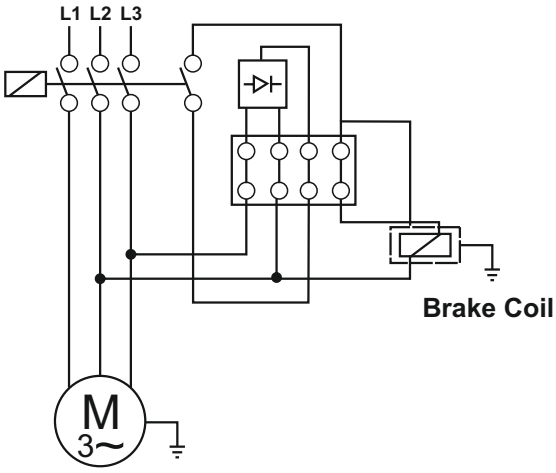
8.3 Standard Type Brake Anchorage Schema

Figure 32: Standard Type Brake Anchorage Schema

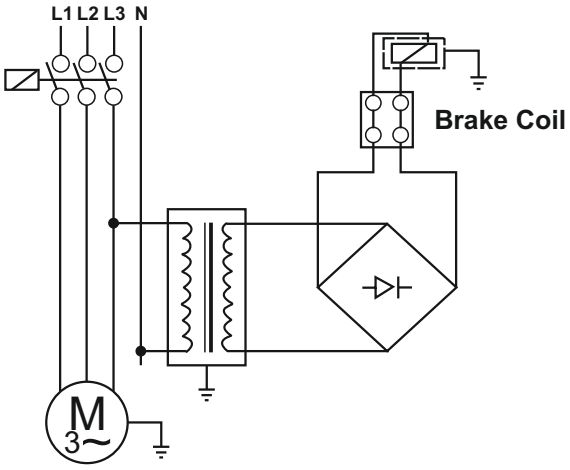
Delayed Running Brake (400V)



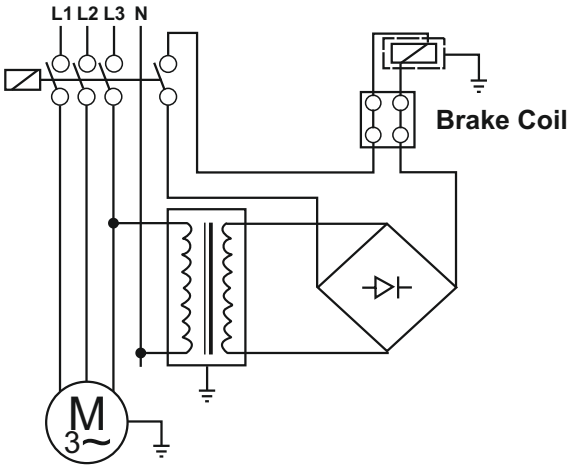
Sudden Brake (400V)



Delayed Running Brake (24V)

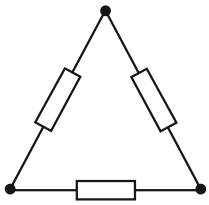


Sudden Brake (24V)

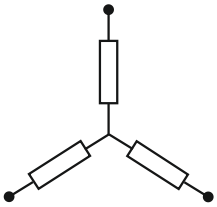


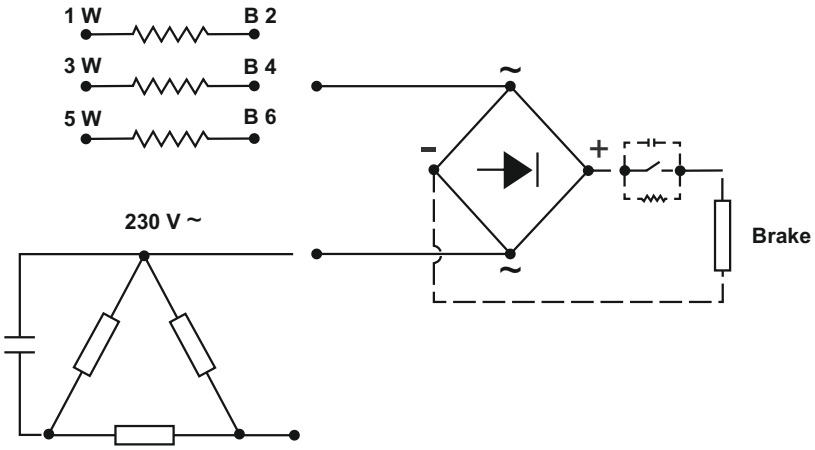
Please check brake coil by using a tester.

DELTA CONNECTION
△ 230 V



STAR CONNECTION
ʎ 400 V





9.1 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.

9.1.1 Disposal

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

Table 32: 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.

9.2 Troubleshooting

Table 33: 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 invertor 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 invertor is used.	Look to the guide of driver / frequency invertor or driver usage guide. Determine that error is not originated from driver / frequency invertor by seperating electric motor either from driver and frequency invertor and making direct connection to the motor.
3	Gearbox does not work.	A different noise is coming out of the gearbox. But earbox and motor shaft are not rotating. Driver / frequency invertor 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 invertor or magnetic brake are used.	The frequency invertor or driver usage guide should be examined. Determine that error is originated whether from driver / frequency invertor by seperating electric motor either from driver and frequency invertor 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 invertor.	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 invertor parameters very well. Besides for the low speeds, there could be big changes even at the gearbox efficiency. To enlarge motor power and invertor 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 viscocity 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 seperating 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 seperating 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 seperating 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. Seperate 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 invertor and the noise is changing every time by the change of cycle.	Frequency invertor parameters may not be compatible with your used motor. Examine frequency invertor 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 continious 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 loosened, 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 poligon 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 poligon 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 decrelations 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.

10.1 Authorized Service

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

NOTE !

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 34: 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.

11.1 Contact Information

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