

MAINTENANCE AND OPERATION INSTRUCTIONS | EN

PCD SERIES

Cycloidal 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

	<p>ATTENTION ! Dangerous situation and possible outcome Mild or major/minor injuries This indicates that minor personal injury may occur if proper precautions are not taken.</p>
	<p>NOTE ! Advice and useful information for the user This indicates that property damage may occur if proper precautions are not taken.</p>
	<p>DANGER ! Harmful situation and possible outcome Damage occurs in the reducers and the environment. If proper precautions are not taken, serious damage on the gearbox may occur, death or serious personal injury will result.</p>
	<p>DANGER OF ELECTRICITY ! Electrical shock hazard and possible outcome Death and serious injuries</p>
	<p>DANGER ! Danger and possible outcome Death and serious injuries</p>
	<p>WARNING ! General usage information If proper precautions are not taken that indicates serious personal injury may occur.</p>

1.2 General Information

This user guide is prepared by our firm to provide information about safety transportation of gear unit/gear unit with motors, storage, installation/mounting, connection, operating, maintenance and repair processes. All the purchase and technical data are positioned at product catalogues. Beside engineering applications, the information which is placed in this instruction, should be well read and applied. 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 is prepared by motor-producing firm.

1.3 Correct Use

PGR The products are designed to use in commercial plants and are operated convenient to the current standards and directions. Technical data 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, mounting, connection, operating, maintenance-repair processes could be implemented by qualified employees and responsible managers.

All the processes to be implemented during the working period;

- Related usage and maintenance instructions,
- Warning and Safety Tags in gear unit/gear unit with motor,
- Instructions and Requirements related to the system,
- Local and International requirements for safety and accidental protection.

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 misuse of gear unit/gear unit with motor in plant,
- Extremely dirty and maintenance free of gear unit/gear unit with motor,
- Without oil and without grease 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 persons.

1.5 Responsibility

PGR accepts no liability if the following occurs:

- Use of reducers that do not comply with national laws on safety and accident prevention,
- Work done by unqualified personnel,
- Wrong installation,
- Tampering with the product (making changes),
- It does not accept any liability for non-observance or inaccuracy of the instructions in the manual, for damage or malfunctions resulting from non-observance of these operating instructions.
- To follow the signs indicated on the product labels of the reducers incorrectly or inappropriately,
- Wrong electrical energy for geared motor reducers,
- Incorrect connections and/or use of temperature sensors (if any),
- Oil-free use of the reducer,
- The content of this guide has been reviewed to ensure consistency with the documents such as catalog etc. We cannot guarantee full consistency, as dynamic required by the system cannot be completely blocked. However, the information in this manual is regularly reviewed and corrections are made in subsequent editions.

Since products supplied by PGR are designed to be included in "complete machines", commissioning them is prohibited until the full machine has been declared compatible.

Restarting the reducer:

When installing the reducer on machines or systems, the machine or system manufacturers must ensure that the regulations, notes and descriptions contained in this operating manual are included in their operating manual.



DANGER !

Only the configurations found in the product catalog are allowed. Do not use the product contrary to the indications given in the product. The instructions given in this manual do not replace the obligations of current laws regarding safety regulations and do not compensate for any damages.

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 adequate-size carrier should be used.
- Carrying safeties should be removed before the start of operating.
- The weights of the movable gear units/gear units with motors are placed in product catalogues.
- The dangerous area should be got into the secure to prevent damage to the persons.
- During the carrying process, to stand under the gear unit could cause danger of death.
- The damage of gear unit must be prevented. The crushes to the free input shafts could damaged into the gear unit.

1.6.2 Package Transportation;

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

1.6.3 Equipment Transportation;

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



ATTENTION !

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



NOTE !

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



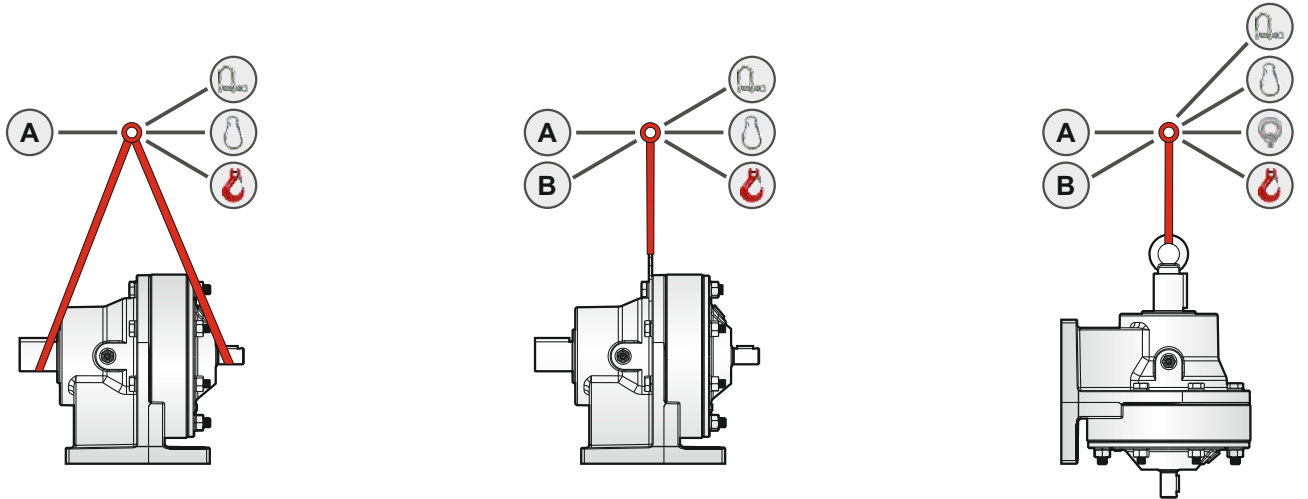
ATTENTION !

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

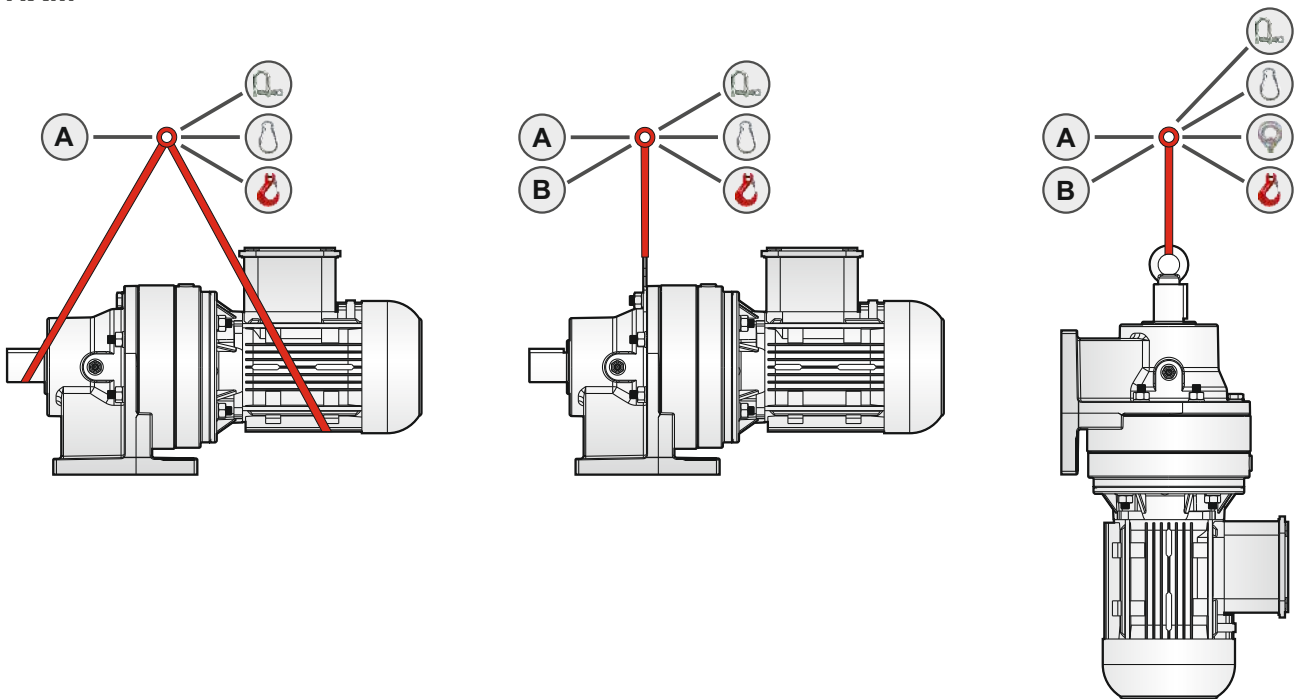
1.6.4 Transport of Gearboxes;

Figure 1: Transport of Gearboxes
PCD 607 - 615

HW



HXM



A Hoop equipped (swab)

Load hook

Locked hook

B Hoop equipped (chain)

Screw hook

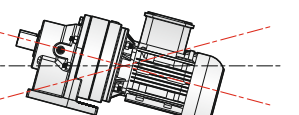
Lifting eyebolts

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

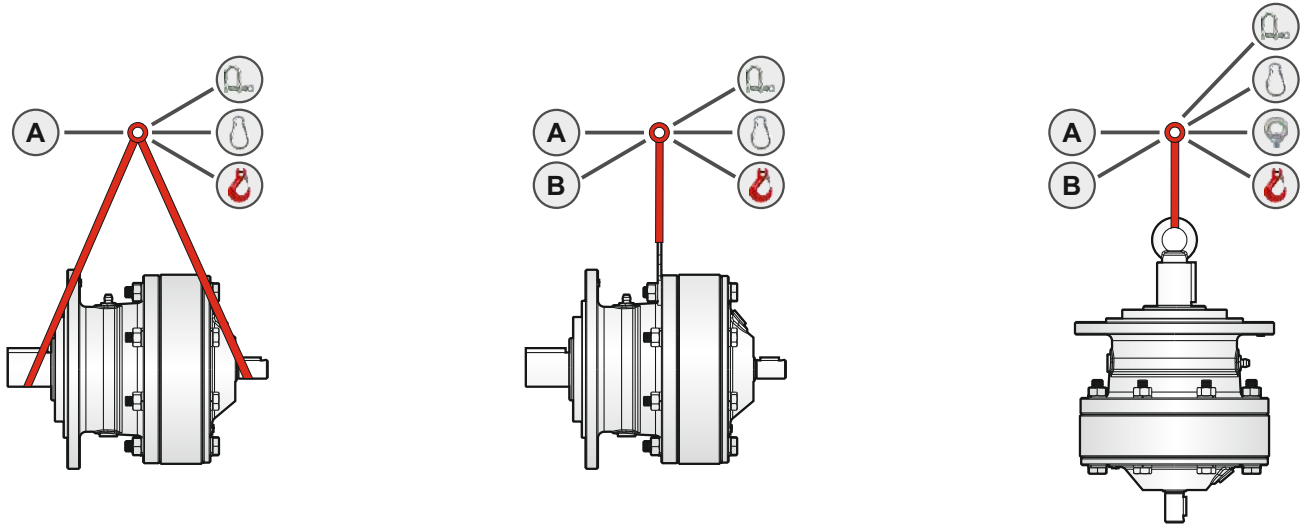


The allowable maximum slope is 15 degree.

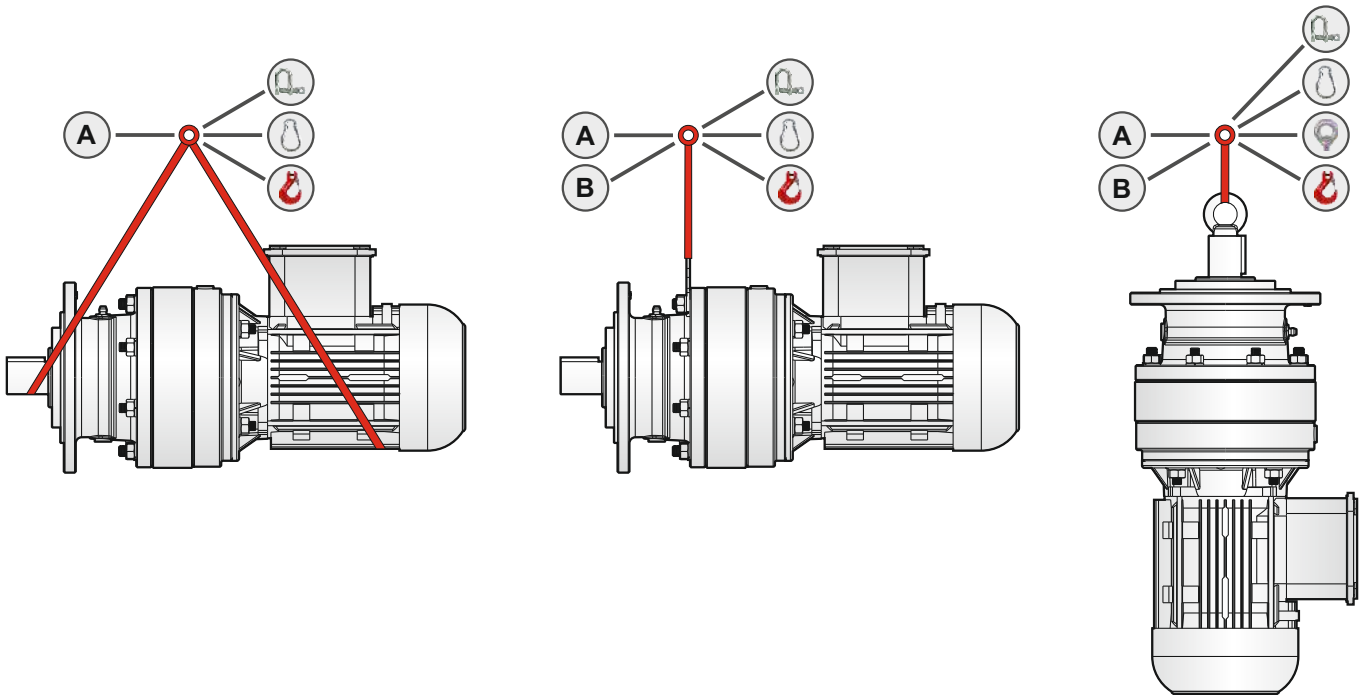
MAX
15° 15°




VW




VXM





A Hoop equipped (swab)

 Load hook

 Locked hook

B Hoop equipped (chain)

 Screw hook

 Lifting eyebolts

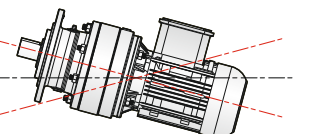
Manuel lifting (Weight ≤ 15 kg)
(ref. ILO Contract)
Not valid for the continuous carrying.



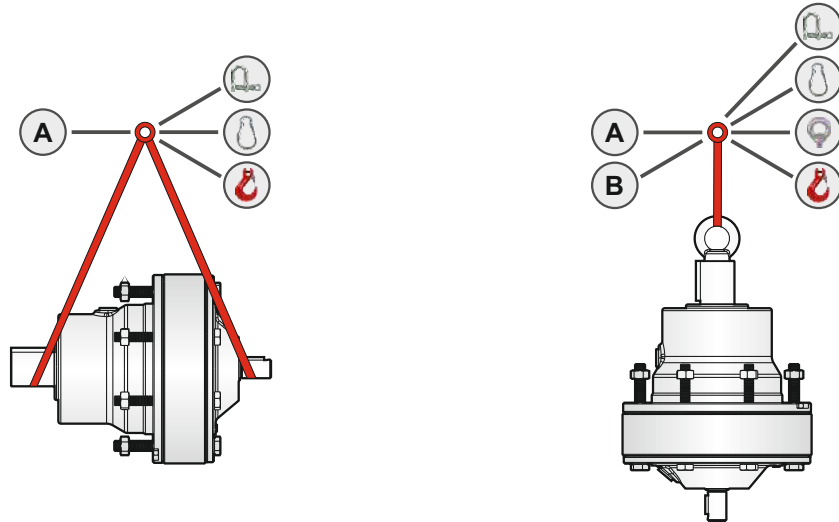
The allowable maximum slope is 15 degree.

MAX

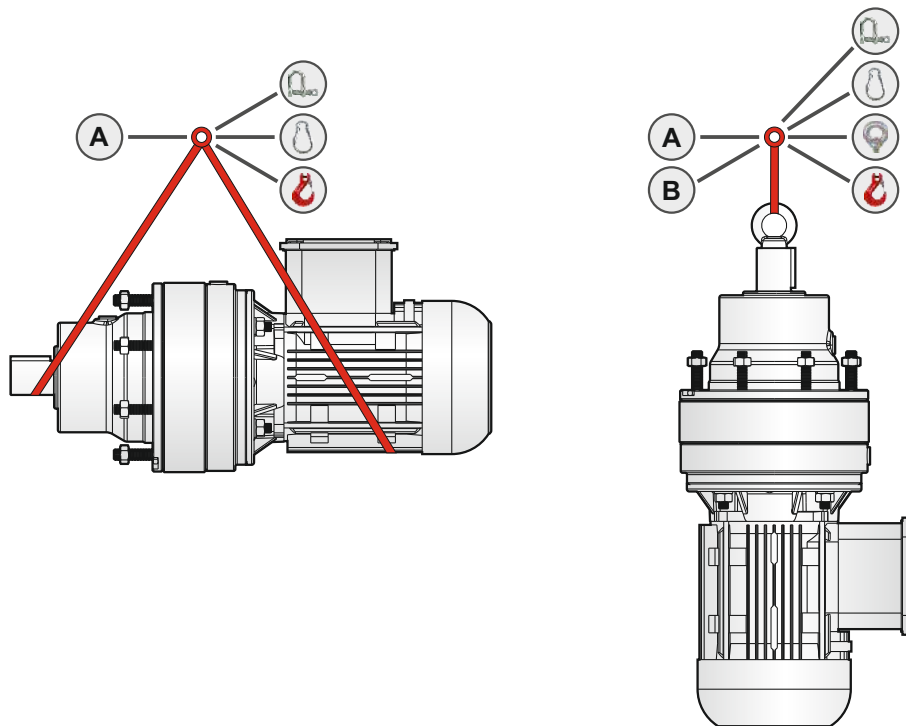
15° 15°



FW



FXM



A Hoop equipped (swab)

Load hook

Locked hook

B Hoop equipped (chain)

Screw hook

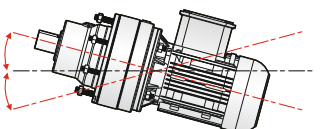
Lifting eyebolts

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



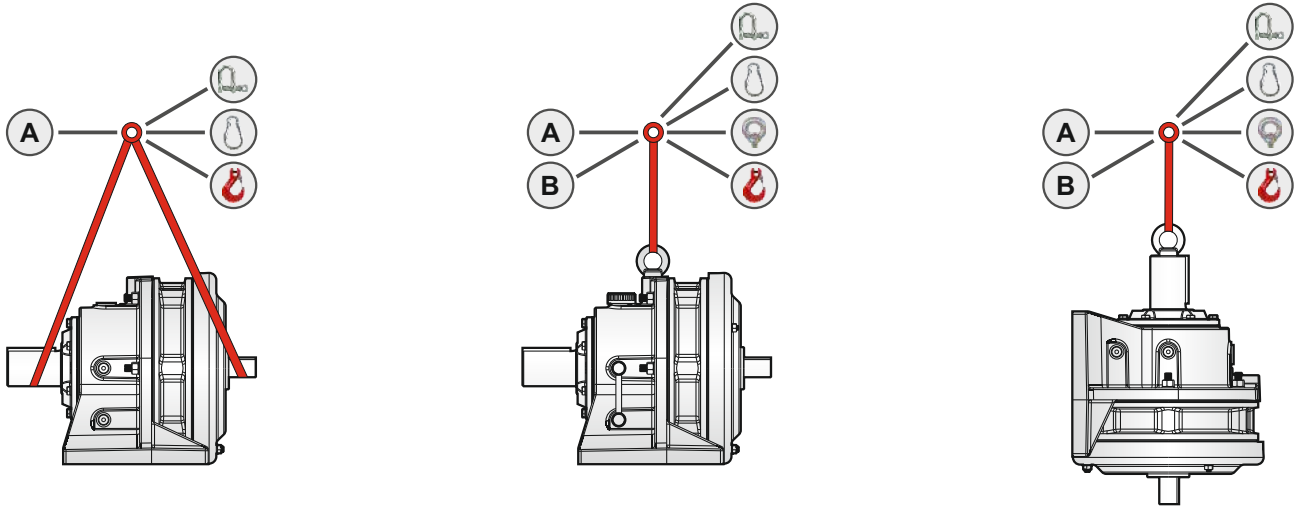
The allowable maximum slope is 15 degree.

MAX
15° 15°

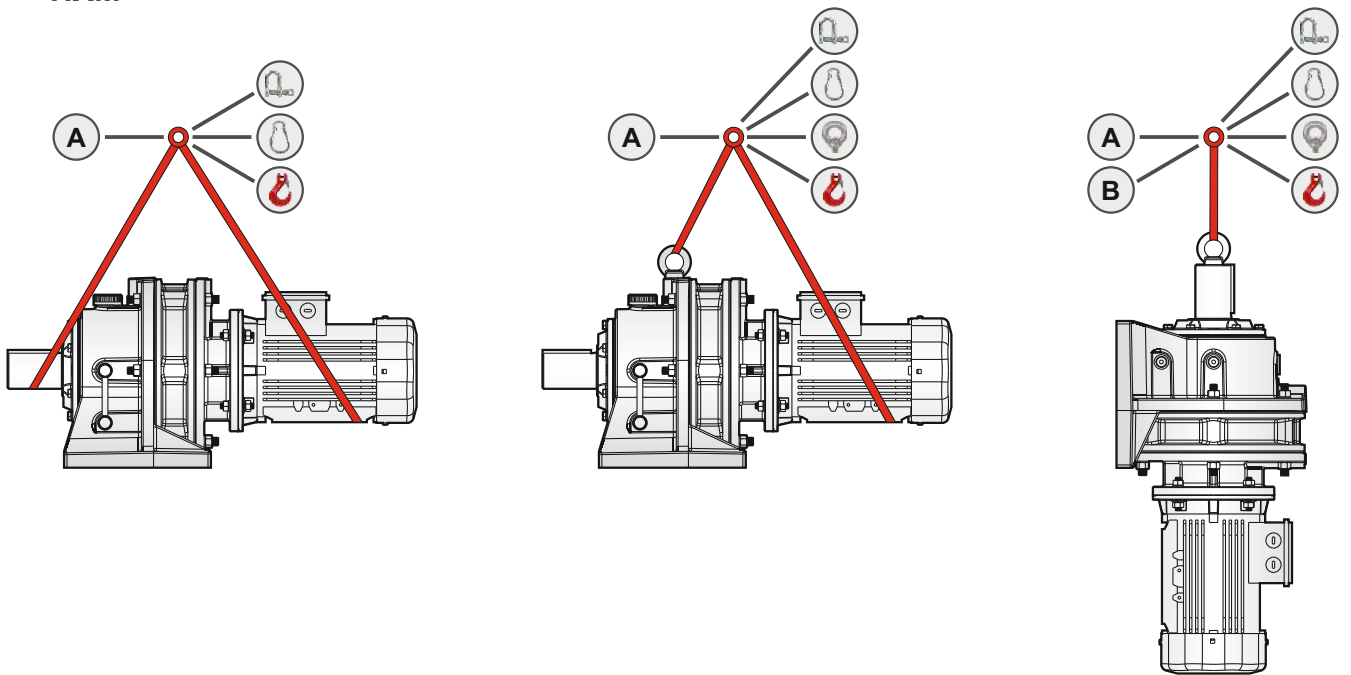


PCD 616 - 627

HW



HXM



A Hoop equipped (swab)

Load hook

Locked hook

B Hoop equipped (chain)

Screw hook

Lifting eyebolts

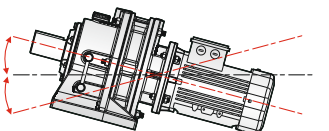
Manual lifting (Weight ≤ 15 kg)
(ref. ILO Contract)
Not valid for the continuous carrying.



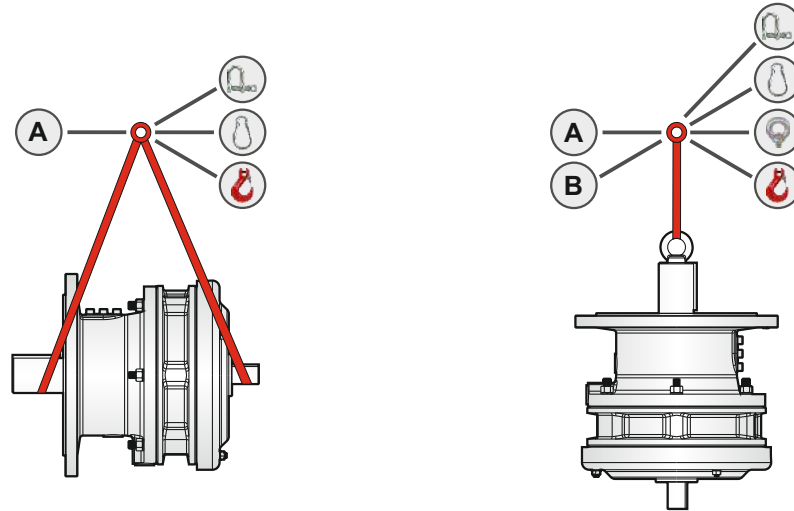
The allowable maximum slope is 15 degree.

MAX

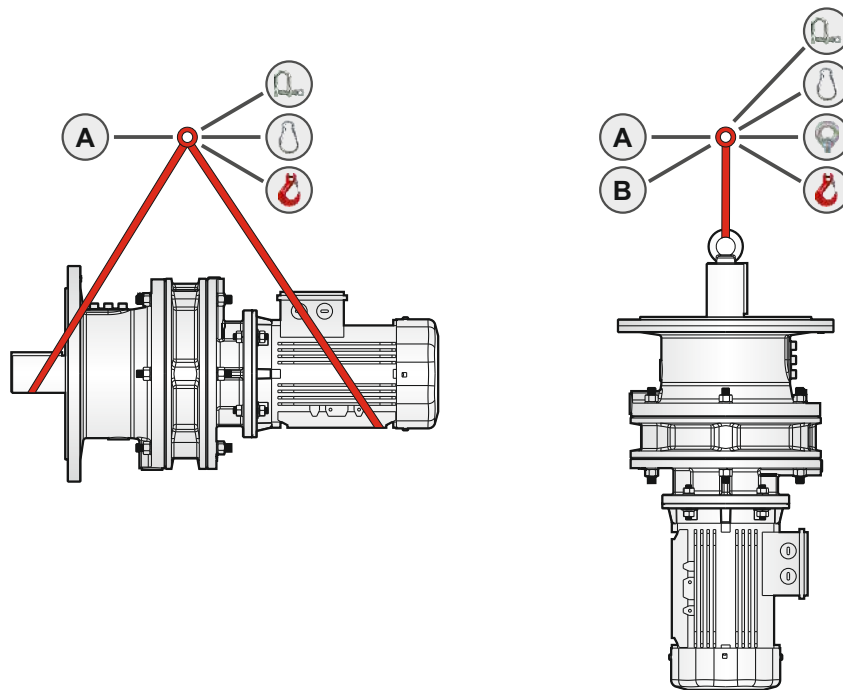
15° 15°



VW



VXM



A Hoop equipped (swab)

Load hook

Locked hook

B Hoop equipped (chain)

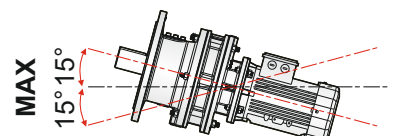
Screw hook

Lifting eyebolts

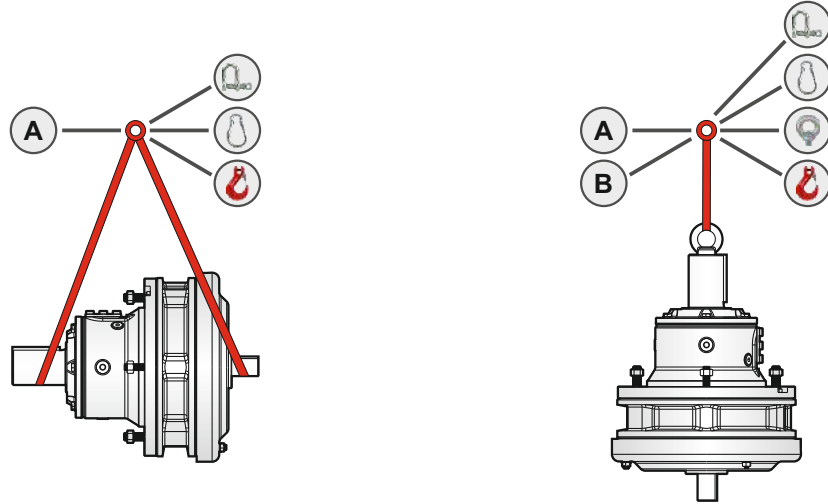
Manuel lifting (Weight ≤ 15 kg)
(ref. ILO Contract)
Not valid for the continuous carrying.



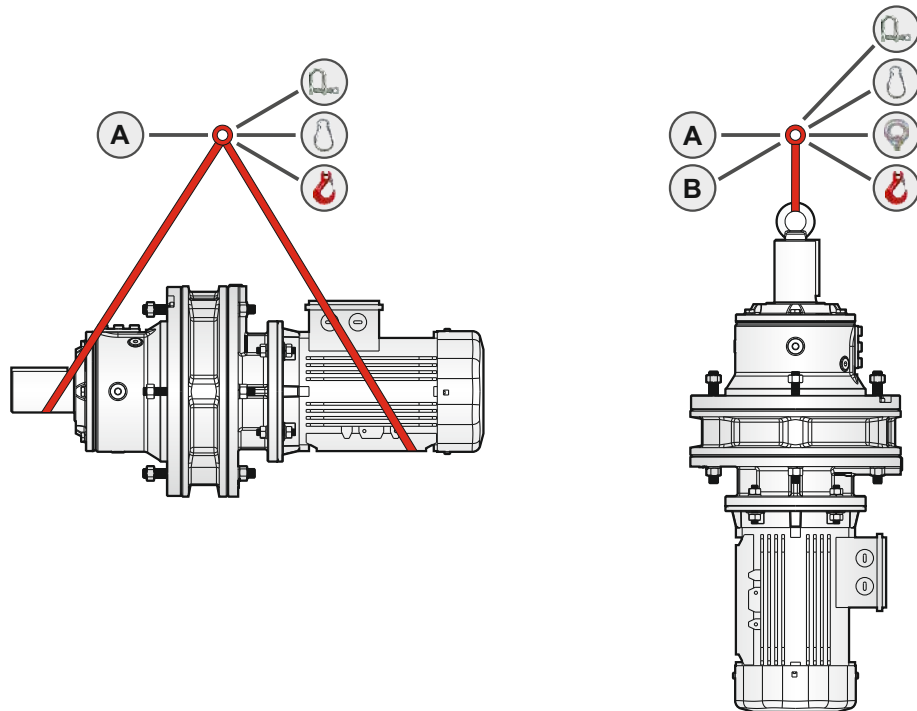
The allowable maximum slope is 15 degree.



FW



FXM



A Hoop equipped (swab)

Load hook

Locked hook

B Hoop equipped (chain)

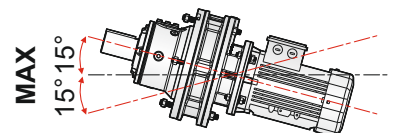
Screw hook

Lifting eyebolts

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



The allowable maximum slope is 15 degree.






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 -10°C and +50°C.
- Relative humidity must be less than %60.
- Not directly be exposed to sunlight and infrared 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;

	<p>NOTE !</p> <ul style="list-style-type: none"> - If there is an excessive temperature difference during long-term or short-term storage, the oil in the reducer must be changed before starting. - In a fully oil-filled reducer, the oil level must be reduced in accordance with the mounting position.
	<p>DANGER !</p> <ul style="list-style-type: none"> - Incorrect or excessively long storage may cause the reducer to malfunction. - Before commissioning the reducer, check that the permissible storage time is not exceeded.
	<p>NOTE !</p> <ul style="list-style-type: none"> - PGR recommends the long-term storage option for storage or downtimes greater than 9 months. - Storage up to 2 years is possible with the long-term storage option and taking into account the precautions listed below. Since the actual effects of the reducer are highly dependent on local conditions, these times should be viewed as guide values only.

Long term storage suggestions;

- Mineral oil, synthetic oil, or grease should be filled according to the assembly position, ready for operation. However, the oil level or grease level should be checked before starting.
- 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 2: Gearbox Nameplate and Explanation

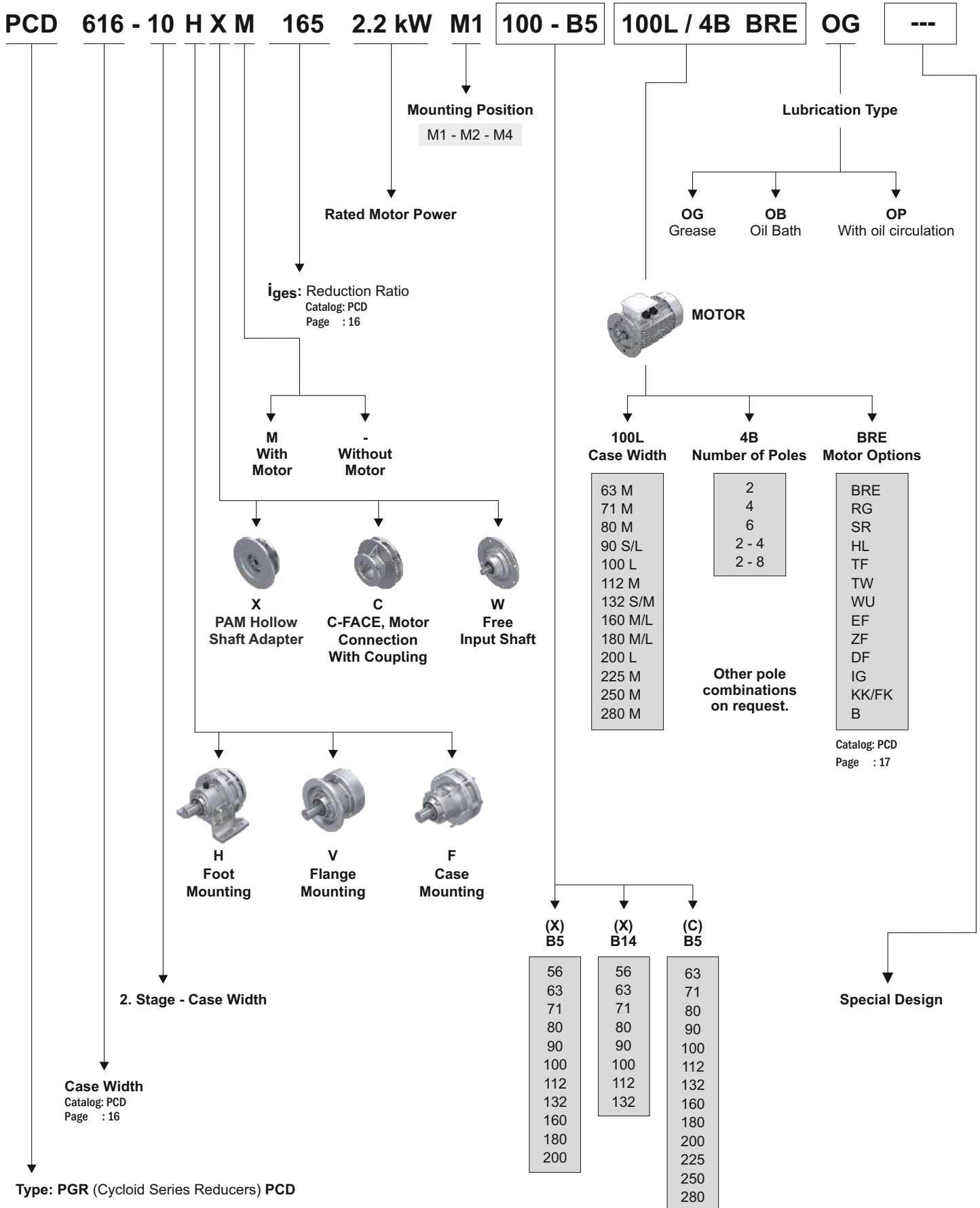
PGR [®] DRIVE TECHNOLOGIES		Tel : 0256 231 19 12 - 16 (pbx) Fax: 0256 231 19 17 www.pgr.com.tr	
Type: ①			②
Serial No: ③			
M ₂ : ④	Nm	i: ⑤	
P ₁ : ⑥	kW	n ₂ : ⑦	min ⁻¹
f _B : ⑧		⚖️ ⑨	kg
🛢️ ⑩			📖 i
TSE K 558			

- 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 Type and amount of oil-grease used (l)-(gr)



2.2 Explanations

Table 2: Product Description





2.3 Abbreviations

Table 3: Abbreviations

Abbreviations	Meaning	Cycloidal Gear Units
H	Foot Mounting	✓
V	Flange Mounting	✓
F	Case Mounted	✓
X	PAM Hollow Shaft Adapter	✓
C	C-FACE, Motor Connection With Coupling	✓
W	Free Input Shaft	✓
M	With Motor	✓

✓ : Existing designs are marked with a tick.



2.4 Connection Types

Tablo 4: Connection Types

Single Stage	Double Stage
607	607-07
608	608-07
609	609-08
610	610-08
611	611-08
612	611-09
613	613-08
614	613-09
615	613-10
616	614-08
617	614-09
618	614-10
619	616-09
620	616-10
621	616-11
622	617-09
623	617-10
624	617-11
625	618-10
626	618-13
627	619-11
	619-13
	620-11
	620-13
	621-13
	621-16
	622-13
	622-17
	623-16
	623-18
	624-16
	624-18
	625-17
	625-19
	626-19
	627-19



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.
- Cycloid gearboxes; 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 in anti-corrosion substance on treated surfaces, dirt, etc. impurities must be cleaned.

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

In corrosive environmental conditions, the output shaft and the sealing elements must be protected against corrosion.

The connection flanges must be connected to the shaft with the pilot holes opened according to DIN 332.

In cases where an incorrect direction of rotation may cause damage or hazards, the correct direction of rotation of the output shaft should be determined by performing a test run on the gearbox before installation and secured for later operation.

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 occurred.

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 mounting - Flange mounting or Case mounting)
- 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 C-FACE, 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 $<10 \Omega$.

Electro-chemical corrosion could be occurred between the different metals like cast iron and stainless steel. Also plastic washer should be used in bolts!



DANGER !

- Do not use a standard unit in an explosive atmosphere (which is likely to be filled with explosive gas or steam). Under such conditions, an explosion proof motor should be used; otherwise, electric shock, personal injury, explosion fire, or damage to the equipment may result.
- In the case of a Explosion proof motor, use a motor that has specifications that are appropriate for a dangerous location (a location where gas or volatile vapor is present); otherwise explosion, ignition, electric shock, injury, fire, or equipment damage may result.
- Since the inverter itself is not explosion proof, when a flameproof motor is driven by an inverter install an inverter in a place free from explosive gas; otherwise, electric shock, personal injury, explosion fire, or damage to the equipment may result.



ATTENTION !

- Do not use the products for purposes other than those shown on the nameplate or in the manufacturing specifications; otherwise, electric shock, personal injury, or damage to the equipment may result.
- Do not place flammable objects around the gearmotor; otherwise, fire may result.
- Do not place any object around the gearmotor or reducer that will hinder ventilation. Insouciant cient ventilation can cause excessive heat build-up that may result in burns or fire.
- Do not step on or hang from the gearmotor or reducer; otherwise injury may result.
- Do not touch the shaft end of the gearmotor or reducer, inside keyways, or the edge of the motor cooling fan with bare hands; otherwise, injury may result.
- When the unit is used in food processing applications, machines for cleanroom and so on, vulnerable to oil contamination, install an oil pan or other such device to cope with oil leakage due to breakdown or failure; otherwise, oil leakage may damage products.
- Always drain oil lubricated models before mounting, moving, and transporting. Moving with lubricating oil in the machine may cause oil to escape from the air vent, etc.

3.2.1 Installation Location

- Ambient Temperature: -10 to +50°C
- Ambient Humidity : Maximum 85%
- Altitude : Maximum 1000 m
- Atmosphere : No corrosive or volatile gases, no steam Dust-free, well-ventilated area.
- Installation Location : **Indoor type** ; Indoors (area with minimal dust, no contact with water)
Outdoor type; Indoors or outdoors (place where are got wet with common rainwater not but direct heavy wind and rain)
- Vibration : Maximum 1G.

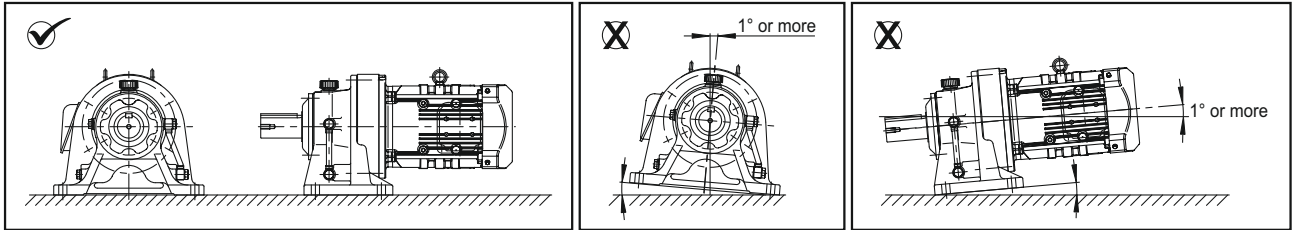
- Mounting in conditions other than the above requires adherence to optional specifications. Please consult with us.
- The Gearbox/Gear Motor manufactured according to specifications such as explosion protection can be used in the specified installation environments. However, apply precautions based on the installation environment regarding the connector of the machine being used.
- Mount in a location that enables easy operation, such as inspection and maintenance.
- Install it on a sufficiently solid base.



3.2.2 Mounting Angle

For machines built to a specified mounting angle, only use the specified mounting angle. Do not remove the motor's eye-bolt. In the rare case that it is removed, insert a bolt or other appropriate material into the screw hole to prevent water or other substances from entering the motor through the screw hole. The gearbox must be installed on the machine in accordance with the selected mounting position. Lubricants recommended by our company should be used. (see Lubrication Charts, pages 35-41)

Figure 3: Mounting Angle (Example Mount Type)



NOTE !

In non-standard mounting positions of gearboxes with body sizes 613-627, grease lubrication is performed only. Please consult with our company.

3.2.3 When Load Condition Is Critical

In case of excessive vibration or frequent start-stop situations, it is recommended to use a mounting bolt of at least grade 8.8 (JIS B 1051) to absorb the impact on the gearbox foot.

3.3 Bolt Tightening Torque Value

Table 5: Bolt Tightening Moments

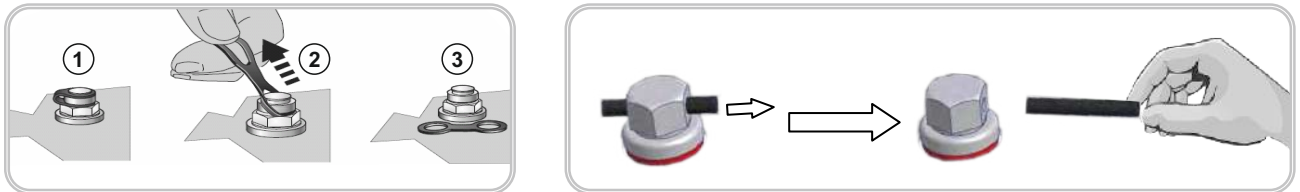
Bolt Tightening Moments [Nm]			
Dimensions	Bolt Quality		
	8.8	10.9	12.9
M4	3.2	5	6
M5	6.4	9	11
M6	11	16	19
M8	27	39	46
M10	53	78	91
M12	92	135	155
M16	230	335	390
M20	460	660	770
M24	790	1150	1300
M30	1600	2250	2650
M36	2780	3910	4710
M42	4470	6290	7540
M48	6140	8640	16610
M56	9840	13850	24130



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 separately, it has to be inserted.

Figure 4: Activation of Vent Plug



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

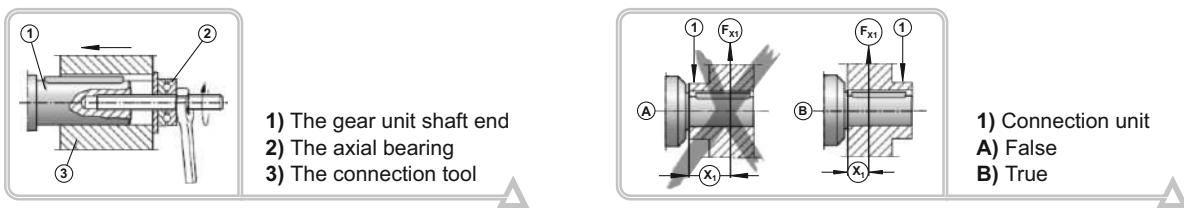
3.5 Retrospective Paintwork

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 Mountage of the Connection Tool to the Output Shaft

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

Figure 5: The Mountage of the Connection Tool to the Output Shaft




* 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.

	<p>DANGER !</p> <p>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.</p>
	<p>NOTE !</p> <p>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.</p>



3.7 Installation of the Cycloid Gearbox on the Machine

	ATTENTION !
	<ul style="list-style-type: none"> - Verify the direction of rotation before connecting the gearbox to the driven machine. The wrong turning direction may cause personal injury or damage to equipment. - When operating the gearbox alone (without connection), remove the key that is temporarily connected to the output shaft; otherwise, the key may pop and injury may occur. - Close the rotating parts; otherwise, injury may occur. - When connecting the gearbox to a load, check whether the centering, belt tension and parallelism of the pulleys are within the specified limits. When the gearbox is connected directly to another machine, please check whether the accuracy of the direct connection is within the specified limits. Check the belt tension when the belt is used to connect the gearbox to another machine. Tighten the bolts on the pulley and coupling correctly before starting; otherwise, there is a risk of injury or damage to the products due to scattering of broken parts around.

3.8 Checking Rotational Direction

Figure 6-1: Output Shaft Rotation Direction (Gear Motor)

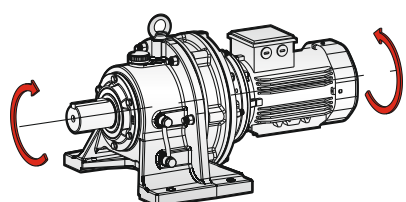
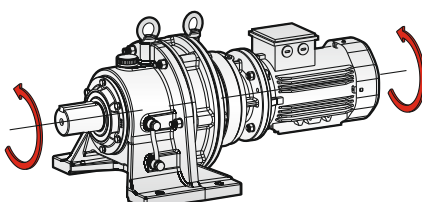
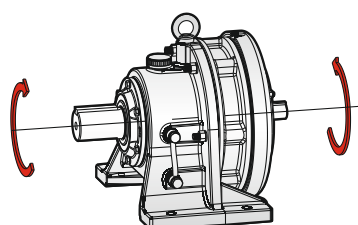
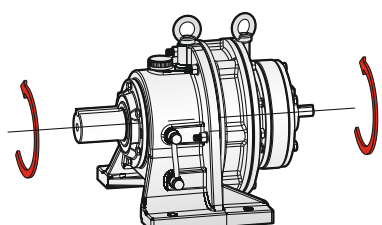
Type of Gearbox	Single Stage - Triple Stage	Double Stage Low reduction ratio series
Output shaft rotation direction		

Figure 6-2: Output Shaft Rotation Direction (Gearbox)

Type of Gearbox	Single Stage - Triple Stage	Double Stage
Output shaft rotation direction	<p>It rotates in the opposite direction of the input shaft.</p> <div style="text-align: center;">  </div>	<p>It rotates in the same direction as the input shaft.</p> <div style="text-align: center;">  </div>



3.9 Mounting Fastener

- Do not apply impact or excessive axial load to the shaft when installing the connection equipment on the output shaft.
The bearing may be damaged or the bearing ring may come off.
- Crimping tools are recommended.

3.9.1 When Using a Coupling;

The alignment accuracy (A, B, X) in figure 7-1 should be no greater than that shown in Table 6.

Figure 7-1: Alignment Accuracy

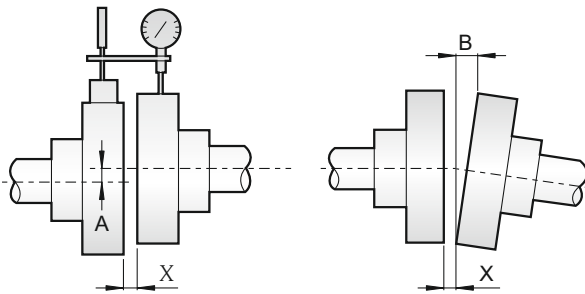


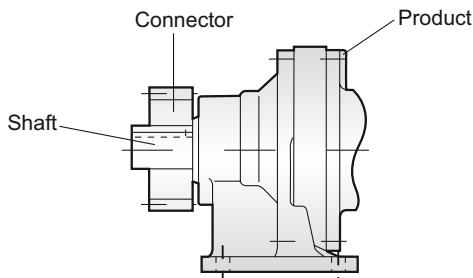
Table 6: Alignment Precision for Flexible Coupling

Allowable Tolerance A	0.1 mm or manufacturer-specified value
Allowable Tolerance B	0.1 mm or manufacturer-specified value
X	manufacturer-specified value

3.9.2 When Using a Chain, Sprocket or Gear Wheel;

- When using a chain, install the chain tension angle so that it is perpendicular to the shaft.
- Refer to the chain catalog or other references for chain tension.
- The section circle of the chain gear or gear wheel can be a maximum of 3 times larger than the output shaft diameter.
- The working load point of the chain gear or gear wheel should be between the center of the shaft and the gearbox. (see figure 7-2)

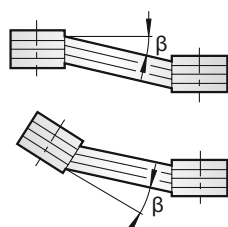
Figure 7-2: When Using a Chain, Sprocket or Gear Wheel



3.9.3 When Using a V Belt;

- Over-tightening the V belt will damage the shaft and bearing. Refer to the V belt catalog or other reference for V belt tension.
- The parallelism, eccentricity β of the two pulleys should be within 20'. (See figure 7-3)
- When using multiple V belts, use a matched set having the same circumferential length.

Figure 7-3: When Using a V Belt





3.10 Installation of a Standard B5 Flanged Motor on a Gearbox with a C-FACE Adapter

1. The motor and the shaft of the motor with the C-FACE Adapter, the flange surfaces should be cleaned and damage control should be carried out. During the installation of the couplings, it should be ensured that all precautions that may damage the motor shaft are taken. The dimensions and tolerances of the motor fastening elements must comply with EN 60079-0.
2. The metal coupling (coupling half-piece) should be heated to a temperature of 80-100°C and the key should be centered and passed to the motor shaft.
3. The setuskur bolt located on the metal coupling must be tightened. However, before tightening, Loctite 242 or Loxeal 54-03 threadlocker should be applied and the setuskur bolt should be secured. It should be fixed to the motor shaft according to the tightening moment given in the charts. If necessary, the plastics supplied with the coupling for 160, 180, 200, 225, 250, 280 C-FACE adapter types should be placed between the coupling and the shoulder.
4. If the installation is to be carried out outdoors and the environment is humid, it is recommended to isolate the motor flange and C-FACE Adapter surfaces. Loctite 574 or Loxeal 58-14 surface insulation material should be used on the flange surfaces so that the flange is isolated before and after motor installation.
5. The motor must be connected to the C-FACE Adapter, it should be remembered to install the supplied coupling at this time.
6. The C-FACE adapter must be installed according to the appropriate tightening torque. When doing this, it should be made sure that the C-FACE adapter shaft passes into the plastic housing of the coupling without any contractions.

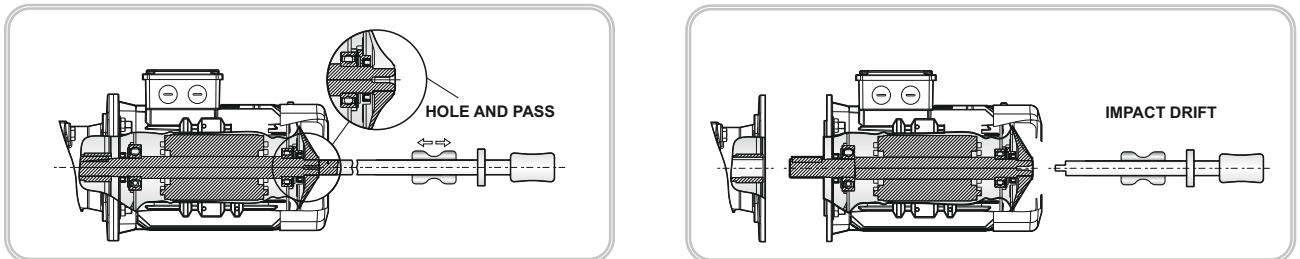
3.11 Installation of Standard B5-B14 Flanged Motor on PAM Gearbox

1. The motor shaft, PAM adapter shaft and flange surfaces should be cleaned and damage control should be performed. The dimensions and tolerances of the motor fastening elements must comply with EN 60079-0.
2. The motor B5-B14 flange must be pushed until it rests on the forehead of the PAM adapter.
3. If the installation is to be carried out outdoors and the environment is humid, it is recommended to isolate the motor flange and PAM Adapter surfaces. Loctite 574 or Loxeal 58-14 surface insulation material should be used on the flange surfaces so that the flange is isolated before and after motor installation.
4. The motor must be connected to the PAM Adapter.
5. The bolts of the PAM adapter must be installed according to the appropriate tightening torque.

3.12 The Demountage of the Electrical Motor (C-FACE, PAM)

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

Figure 8: The Demountage of the Electrical Motor (C-FACE, PAM)



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

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



3.13 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.
- The mounting of gear unit to the machine is needed to be convenient to 2006/42/EC and other safety standards.
- The electrical motor is needed to cover EN 60204-1 and EN 60079-0 standard.
- The mounting position of the gearbox must be the same as the nameplate.
- 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 should not be excessive vibration and the acceptable sound level for gearboxes should not be exceeded.
- In case of long-term non-use, proper storage conditions must be met.
- 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 gearbox is shipped without oil, the first oil filling should be done according to the amount of oil specified in the oil tables.
- The gearbox is not allowed to operate in explosion-sensitive areas. However, special motors are available for these conditions. Please consult to our firm.



4.1 Control and Periodic Maintenance

	<p>NOTE!</p> <p>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.</p>
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	<p>DANGER !</p> <p>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.</p>
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- 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 occurred.
- Worn items only must be changed with original and unused items.
- The lubricators, which recommended by our company, should be used. (see. **Lubrication Table**, page 37-41)
- 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.

	<p>NOTE !</p> <p>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.</p>
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Table 7: 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 .	<ul style="list-style-type: none"> - Visual inspection - Check for running noises - Check oil level - Additional lubrication with grease (in certain W and C-FACE options applications)
<ol style="list-style-type: none"> 1. If the daily working time is a maximum of 10 hours; one in every 3-6 months. 2. If the daily working time is a maximum of 10-24 hours; one in every 500-1000 working hours. 3. One in after every 20000 working hours or; 3-5 years. 	<ul style="list-style-type: none"> - Maintenance-free Grease replacement (3.) - Re-grease change (1.2.3.)
<ol style="list-style-type: none"> 1. If the daily working time is a maximum of 10 hours; one in 6 months. 2. If the daily working time is a maximum of 12-24 hours; one in 2500 working hours. 3. In high temperature and heavy working conditions; every 1 to 3 months. 	<ul style="list-style-type: none"> - Change the oil (1.2.3.) - Replacement of the ventilation plug (1.2.3.)
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 Checking the Level of Grease or Oil

- 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.
- The amount of grease in the gearbox should be checked, and if it is deficient, it should be filled



4.5 Grease or Oil Change

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

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

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

	NOTE ! 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.
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If the lubrication of the gearbox is done with grease, the properties of the grease in the gearbox and the properties of the grease to be added should be the same. Mixing of different greases should not be allowed. During the grease change, it should be made sure that the inside of the gearbox is completely filled with new grease

4.6 Oil Plugs Squeezing Torc Chart

Table 8: Oil Plugs Squeezing Torc Chart

Plug	Torc [Nm]
1/8"	3.5
1/4"	7
3/8"	7
1/2"	12

4.7 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.



4.8 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, 2/3 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.

4.9 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.

4.10 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 original part.
- All roller bearings must be replaced.
- 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.

4.11 The Maintenance of the Motor

Our firm recommends to change the grease in greased bearings.

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

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



4.12 Daily Periodic Maintenance



DANGER !

- Do not touch the gearbox when there is a voltage on the cables. Be sure to turn off the power while working on the gearbox; otherwise, an electric shock may occur.
- To any part rotating during the maintenance or inspection of the gearbox during operation (output shaft, etc.) do not approach or touch; loose clothing may get stuck in these rotating parts and may cause serious injury or death.
- Customers should not disassemble explosion-proof motors or exchange parts, otherwise an explosion, ignition, electric shock or damage to the equipment may occur.
- The installation of explosion-proof motors must be carried out in accordance with the electrical codes of the plant, the motor manual and the operating maintenance instructions; Also, do not open the terminal box cover during operation, otherwise an explosion, ignition, electric shock or damage to the equipment may occur.
- Do not operate the machine while the brake is disabled; otherwise, a fall, out of control or damage to the equipment may occur.



ATTENTION !

- Do not insert your fingers or foreign objects into the gearbox and its components; otherwise, electric shock, injury, fire or damage to the equipment may occur.
- The gearbox gets very hot during operation. Touching the gearbox with bare hands can cause serious burns.
- Do not touch the terminals when measuring the insulation resistance; otherwise, an electric shock may occur.
- Do not operate the gearbox without a safety cover (removed during inspection) to protect the rotating parts, otherwise loose clothing may get stuck in these rotating parts and cause serious injury or death.
- Identify and correct any abnormalities observed during the study immediately according to these usage and maintenance instructions. Do not operate until the cause of the abnormality is understood and the abnormality is corrected.
- Replace the lubricant according to these usage and maintenance instructions. Be sure to use the lubricant recommended by the factory.
- Only assemble, transport or transport lubricated models with lubricating oil removed. Moving when there is lubricating oil inside the machine, through the ventilation hole of the oil, etc. it could cause it to leak.
- Do not change the lubricant during operation or immediately after it stops working; otherwise, burns may occur.
- According to these usage and maintenance instructions, provide grease to/from the motor bed/bearings/-unload. Avoid contact with rotating parts; otherwise, injury may occur.
- Do not start damaged gearmotors or gearboxes; otherwise, injury, fire or damage to equipment may occur.
- Since it is outside the scope of warranty, our company does not accept any responsibility for damage or injuries caused by unauthorized changes made by the customer.
- Dispose of the lubricant of the products as general industrial waste.
- When measuring the insulation resistance of explosion-proof motors, make sure that there is no gas or other vaporized explosive material around the unit to prevent explosion or ignition.
- Replacing brake pads requires experience. Please consult the nearest authorized service station.
- The brake torque will vary according to the working environment and conditions, the condition of the friction surface and other factors. In particular, the brake torque may not be at the predicted level at the first start and after a long period of inactivity. In such a case, turn the brake on and off under as light a load as possible so that it contacts the friction surfaces of the brake.



4.12.1 What Needs to Be Done in Daily Periodic Maintenance

Make sure that you make daily inspections in accordance with Table 9. Neglect of inspections is a source of problems.

If any abnormalities are detected during the daily examination, “8. Troubleshooting” (Pages, 49-50). If these actions do not solve the problem, contact the nearest authorized service station immediately.

Table 9: Daily Inspection

INSPECTION ITEM		INSPECTION DETAIL
Current Value		Is the current greater than the nominal value shown on the product label? Check it out.
Noise		Are there any unusual sounds or extreme changes in sounds? Check it out.
Vibration		Is there an abnormally large vibration? Are there any extreme changes? Check it out.
Surface Temperature		Is the surface temperature unusually high? Has there been a sudden rise? Temperature increases during operation will differ depending on the model and type. However, the difference between the gearbox surface temperature and the ambient temperature should be about 60°C. For the 607-...-612 Series, this value should be about 40 Dec.
Oil Level (Oil lubricated machines)	When the gearbox is not working	Is the oil level below the red line at the top of the oil indicator when the machine is stopped? If the oil level is below the upper red mark while stationary, fill in the lubricating oil up to the mark. Do not add while the machine is running.
	When the gearbox is working	Is the oil level significantly different from the level during stable operation? The red mark at the bottom is an auxiliary sign that serves as a guide to check the oil level while the machine is running.
	Trochoid Pump Type	Are the oil signal and flow indicator working properly? The fact that they do not work properly is a sign that gearbox lubrication is inappropriate due to factors such as insufficient oil, pump damage and blocked pipes. Stop the machine immediately and examine it.
Lubrication Pollution		Is the lubricating oil contaminated? In order to control oil pollution, in addition to removing oil while the machine is stopped, it is also possible to carry out control using the oil indicator. If the oil indicator is polluted, replace it immediately.
Oil-Grease Leaks		Is there an oil or grease leak from the gearbox? Are the sliding surfaces of the oil seal worn out?
Mounting Bolts		Are the mounting bolts loose?
Chain, V Belt		Is the chain or V-belt loose?



5.1 Mounting Positions

Figure 9: Mounting Positions

	H Foot Mounting	V Flange Mounting	F Case Mounting
M1			
M2			
M4			
MX			

MX: Nonstandart montage position (607 - 612)

- * The reducers with case dimension between 607 and 612 are suitable for nonstandart mounting position.
- * At case dimensions above 613, for nonstandart mounting positions, lubrication need to done by only grease. Pleaseconsult to PGR
- The mounting positions which is given at table are also valid for X, C, W connected reducers.



5.2 Terminal Box and Cable Entrance Sides

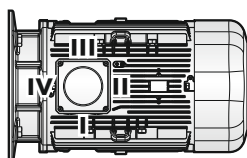
- In the case of specific requirements, when ordering, specify the position of the terminal box as shown in the diagram.
- Unless specified otherwise, the standard positions are M1.
- Unless other wise specified, the gear reducer is supplied with terminal box in position 1.
- For positions not envisaged, it is necessary to call our Technical Service.

Figure 10: Terminal Box and Cable Entrance Sides

TERMINAL BOX AND CABLE ENTRANCE SIDES			
	H Foot Mounting	V Flange Mounting	F Case Mounting
M1			
M2			
M4			

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

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





6.1 Lubrication

Gearboxes are shipped with oil or grease unless otherwise requested by the customer. The lubricated gearboxes are supplied with a ventilation plug, an oil level kit and a discharge plug, while the greased gearboxes are supplied with a greaser and a blind plug. The actual mounting positions must be specified in customer orders. Lubrication with oil the internal components of the gearboxes are lubricated in oil or by splashing. In the charts given, the amount of oil that needs to be placed according to the different mounting positions and the plug positions are determined accordingly. In some cases, there is a slight possibility of loss other than the amounts of oil and grease given in the chart.

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

6.2 Lubrication with Grease

Standart greases are suitable for degrees between -10°C and +50°C. For this reason, the difference between the gearbox surface temperature and ambient temperature should be about 60°C in case of continuous operation when operating at high temperature values or using different type of oil, please kindly consult PGR.

6.2.1 Maintenance Free Grease Lubrication

Lubricated whit grease for life for usage of all mounting positions. Please kindly do not for adding grease. It will provide an average of 20.000 operating hours or 5 years of operating life.

6.2.2 Relubrication whit Grease

After 500 hours of operation or 2 months of operation, it should be lubricated with grease again. The grease in the reducer provides 2 years of operation under normal conditions without any problem. However, due to the variability of working hours, we recommend changing the grease every 3 to 6 months. When relubricating whit grease, the properties of the oil in the gearbox should be same whit the oil which will be added. Please kindly do not allow to mix different types of greases.

When changing the grease, it must be ensured that the gear unit is completely filled whit new grease.

Table 10: Recommended Grease

Type of Gearbox	Type of Lubricant	Ambient Temp.°C	Manufacturer	Description
Cycloid Series Reducers	Grease	- 10...50	SHELL	Gadus S2 V100 2
		- 10...50	MOBIL	UNIREX N2



6.3 Lubrication whit Oil Baht

All lubrication oils that meet the requirements of DIN 51517 part 3 are suitable. Depending on the ambient or operating temperature, according to DIN 51519, the viscosity class should be selected.

Table 11: Oil Change Interval

Oil Change Interval	
The First Oil Change;	after 500 working hours or after 6 months, whichever is first
If the daily working time is a maximum of 10 hours;	one in every 6 months
If the daily working time is a maximum of 12-24 hours;	one in every 2500 working hours
In high temperature and heavy working conditions;	one in every 1 to 3 months

Oil degrades more rapidly when ambient temperature is high or changes radically, and when corrosive gases are present. In suchcases confer with the lubricating oil manufacturer.

Table 12: Working Temperatures

Lubricant as per DIN 51517 part 3	Working Temperatures °C							
	Ambience							
	-20°	0°	+20°	+40°	+60°	+80°	+100°	+120°
ISO VG 68								
ISO VG 100								
ISO VG 150								
ISO VG 220								
ISO VG 320								

Table 13: Recommended Oils

Type of Gearbox	Type of Lubricant	Ambient Temp. °C	ISO viscosity class	SHELL	MOBIL	BP	ESSO	DEA	ARAL	CASTROL	TRIBOL	KLÜBER
Cycloid Series Reducers	Mineral oil	- 5...40 Normal	ISO VG 220	Shell Omala Oel 220	Mobilgear 600 XP 220	Energol GR-XP 220	Spartan EP 220	Deagear DX SAE 85W-90 Falcon CLP 220	Degol BG 220	Alpha SP 220 Alpha MW 220 Alpha MAX 220	Tribol 1100/220	Klüberoil GEM 1-220
		-15...25	ISO VG 100	Shell omala Oel 100	Mobilgear 600 XP 150	Energol GR-XP 100	Spartan EP 100	Deagear DX SAE 80W Falcon CLP 150	Degol BG 100	Alpha SP 100 Alpha MW 100 Alpha MAX 220	Tribol 1100/100	Klüberoil GEM 1-100
		# - 50...-15	ISO VG 15	Shell Tellus Oel T 15	Mobil DTE 10 Excel 15	Bartran HV 15	Univis J 13	Alrkraft Hydraulic Oil 15	Vitamol 1010	Hyspin SP 15 Hyspin ZZ 15	Tribol 770	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



6.4 Standard Lubrication Method

Table 14-1: Single Stage Lubrication Chart

SINGLE REDUCTION																					
Type	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627
Horizontal Type	Grease lubrication without maintenance						Lubrication with oil bath														
Vertical Type	Grease lubrication without maintenance						Lubrication with oil bath			Forced (Circulating) lubrication											TP

Table 14-2: Double-Stage Lubrication Chart

DOUBLE REDUCTION							
Type	607-07 608-07 609-08	610-08 611-08 611-09	613-08 613-09 613-10	614-08 614-09 614-10	616-09 616-10	617-08 617-10	618-10
Horizontal Type	Grease lubrication without maintenance			Grease lubrication			
Vertical Type	Grease lubrication without maintenance			Grease lubrication			

Table 15: Lubrication Chart with Double-Stage Oil Bath

DOUBLE REDUCTION													
Type	616-11	617-11	618-13	619-11 619-13	620-11 620-13	621-13 621-16	622-13 622-17	623-16 623-18	624-16 624-18	625-17 625-19	626-19	627-19	
Horizontal Type	Lubrication with oil bath												
Reduction Ratio	~473	~841	~1015	~2065	~2537							Forced (Circulating) lubrication/ (TP)	
Vertical Type	Forced (Circulating) lubrication												
Reduction Ratio	559 ~	1003 ~	1247 ~	2537 ~	3045 ~								
	Grease lubrication												

* TP: with external pump

* The products which may be given as oil bath or circulating lubrication may be given as grease lubrication upon request.



6.5 Amount of Lubrication

The below oil amounts are approximate. The oil level of the reducer must be followed from the oil level indicator. In addition, geraboxes which is sent without oil should be filled with amount of oil which is indicated on label.

Table 16-1: Amount of Grease ((Single Reduction) ~ (gr))

SINGLE REDUCTION						
Type	607	608	609	610	611	612
Reduction portion	25	25	90	140	330	330
Output shaft bearing portion	35	35	100	100	120	120

Table 17-1: Quantity of Oil in Litres ((Single Reduction) ~ (l))

SINGLE REDUCTION									
Type	H Foot Mounting			V Flange Mounting			F Case Mounting		
	M1	M2	M4	M1	M2	M4	M1	M2	M4
607	G	G	G	G	G	G	G	G	G
608	G	G	G	G	G	G	G	G	G
609	G	G	G	G	G	G	G	G	G
610	G	G	G	G	G	G	G	G	G
611	G	G	G	G	G	G	G	G	G
612	G	G	G	G	G	G	G	G	G
613	0.7	G	G	0.7	G	1.1	0.25	G	0.5
614	0.7	G	G	0.7	G	1.1	0.25	G	0.5
615	0.7	G	G	0.7	G	1.1	0.25	G	0.5
616	1.4	G	G	1.4	G	1.0	0.9	G	0.7
617	1.9	G	G	1.9	G	1.9	1.5	G	1.5
618	2.5	G	G	2.5	G	2.0	1.3	G	1.0
619	4.0	G	G	4.0	G	2.7	2.0	G	1.5
620	5.5	G	G	5.5	G	5.7	3.0	G	3.0
621	8.5	G	G	8.5	G	7.5	4.0	G	3.7
622	10.0	G	G	10.0	G	10.0	5.0	G	5.0
623	15.0	G	G	15.0	G	12.0	7.5	G	6.0
624	16.0	G	G	16.0	G	15.0	8.0	G	7.5
625	21.0	G	G	21.0	G	42.0	11.0	G	22.0
626	29.0	G	G	29.0	G	51.0	14.0	G	26.0
627	56.0	G	G	56.0	G	60.0	30.0	G	33.0



Table 16-2: Amount of Grease ((Double Reduction) ~ (gr))

DOUBLE REDUCTION																			
Type	607-07	608-07	609-08	610-08	611-08	611-09	613-08	613-09	613-10	614-08	614-09	614-10	616-09	616-10	616-11	617-09	617-10	617-11	
1.Stage, Reducer part	25				90	25	90	140	25	90	140	90	140	330	90	140	330		
2.Stage, Reducer part	25		90	140	330			450				750			1000				
2.Stage, Output shaft bearing part	35	35	100	100	120			300						500					

DOUBLE REDUCTION																		
Type	618-10	618-13	619-11	619-13	620-11	620-13	621-13	621-16	622-13	622-17	623-16	623-18	624-16	624-18	625-17	625-19	626-19	
1.Stage, Reducer part	140	450	330	450	330	450		750	450	1000	750	1100	750	1100	1000	1500	1500	
2.Stage, Reducer part	1100		1500		1500			2000		2500		4000		4500		6000		8000
2.Stage, Output shaft bearing part	600		700		700			800		900		1000		1100		1200		1300

Table 17-2: Quantity of Oil in Litres ((Double Reduction) ~ (l))

DOUBLE REDUCTION									
Type	H Foot Mounting			V Flange Mounting			F Case Mounting		
	M1	M2	M4	M1	M2	M4	M1	M2	M4
607 - 07	G	G	G	G	G	G	G	G	G
608 - 07	G	G	G	G	G	G	G	G	G
609 - 08	G	G	G	G	G	G	G	G	G
610 - 08	G	G	G	G	G	G	G	G	G
611 - 08	G	G	G	G	G	G	G	G	G
611 - 09	G	G	G	G	G	G	G	G	G
613 - 08	G	G	G	G	G	G	G	G	G
613 - 09	G	G	G	G	G	G	G	G	G
613 - 10	G	G	G	G	G	G	G	G	G
614 - 08	G	G	G	G	G	G	G	G	G
614 - 09	G	G	G	G	G	G	G	G	G
614 - 10	G	G	G	G	G	G	G	G	G
616 - 09	G	G	G	G	G	G	G	G	G
616 - 10	G	G	G	G	G	G	G	G	G
616 - 11	1.5	G	G	1.5	G	1.0	1.0	G	0.8
617 - 09	G	G	G	G	G	G	G	G	G
617 - 10	G	G	G	G	G	G	G	G	G
617 - 11	2.4	G	G	2.4	G	1.9	2.0	G	1.7
618 - 10	G	G	G	G	G	G	G	G	G
618 - 13	3.5	G	G	3.5	G	2.0	2.3	G	1.5
619 - 11	5.8	G	G	5.8	G	2.7	3.8	G	2.0
619 - 13	6.0	G	G	6.0	G	2.7	4.0	G	2.0
620 - 11	5.8	G	G	5.8	G	11.0	3.8	G	7.0
620 - 13	6.0	G	G	6.0	G	11.0	4.0	G	7.0
621 - 13	10.0	G	G	10.0	G	14.0	5.5	G	8.0
621 - 16	10.0	G	G	10.0	G	14.0	5.5	G	8.0
622 - 13	11.0	G	G	11.0	G	18.0	6.0	G	9.0
622 - 17	11.0	G	G	11.0	G	18.0	6.0	G	9.0
623 - 16	17.0	G	G	17.0	G	23.0	9.5	G	12.5
623 - 18	17.0	G	G	17.0	G	23.0	9.5	G	12.5
624 - 16	18.0	G	G	18.0	G	29.0	10.0	G	16.5
624 - 18	18.0	G	G	18.0	G	29.0	10.0	G	16.5
625 - 17	23.0	G	G	23.0	G	42.0	13.0	G	24.0
625 - 19	23.0	G	G	23.0	G	42.0	13.0	G	24.0
626 - 19	32.0	G	G	32.0	G	51.0	17.0	G	30.0
627 - 19	70.0	G	G	70.0	G	60.0	44.0	G	40.0

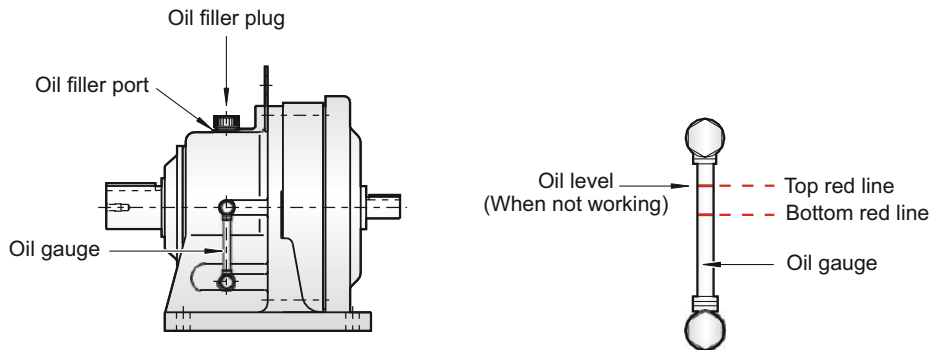


6.6 Oil Fill Procedure

6.6.1 Oil Fill Procedure for Horizontal Type

1. Remove the filler plug.
2. Pour oil into the oil filler port, keeping an eye on the oil gauge to check the oil level.
3. Confirm that the oil level is up to the top red line on the oil gauge.
4. Replace the filler plug.

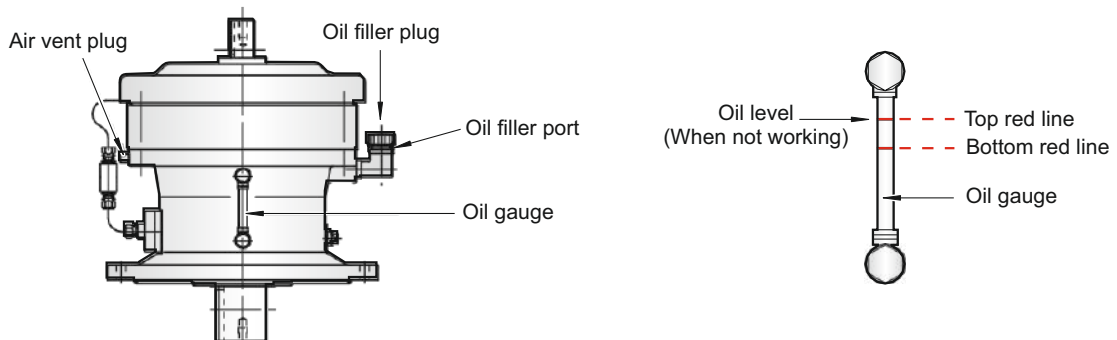
Figure 11: Horizontal Types



6.6.2 Oil Fill Procedure for Vertical Type

1. Remove the filling plug, remove the ventilation plug to empty the air.
2. Pour oil into the oil filler port, keeping an eye on the oil gauge to check the oil level.
3. Confirm that the oil level is up to the top red line on the oil gauge.
4. Wrap the ventilation plug with sealing tape and install it.
5. Replace the filler plug.

Figure 12: Vertical Types



NOTE !



- Only fill oil when the machine is stopped.
- It will take some time for high-viscosity oil to reach a uniform level. Be careful not to fill with too much oil. (If oil is filled above the top red line, churning heat may raise the temperature.)
- Use the lower red line of the oil gauge as a guideline for the oil level while the machine is running. (The oil level may drop below the bottom red line immediately after the machine starts. It will return when oil viscosity drops as the machine runs. Therefore, this is not a problem.)
- For daily oil level management see Table 9 on (Page 36).

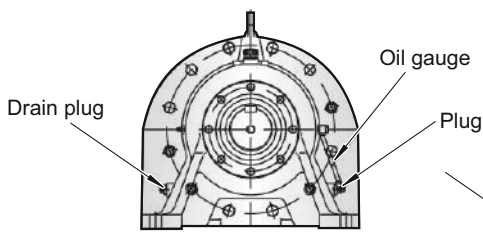


6.7 Draining Procedures

To drain the oil, remove the oil drain plug and the the plug at the bottom of the oil gauge.

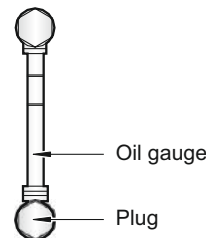
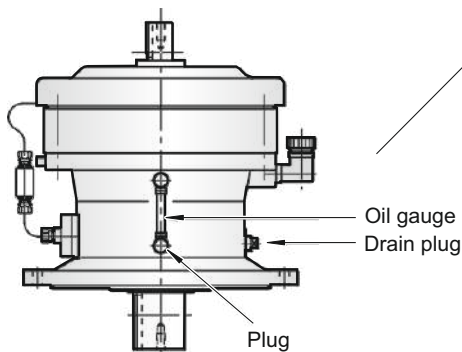
6.7.1 Oil Discharge for Horizontal Type

Figure 13: Oil Discharge for Horizontal Type



6.7.2 Oil Discharge for Vertical Type

Figure 14: Oil Discharge for Vertical Type



6.8 Long Term Inactivity

Table 18: Long Term Inactivity

Period of Inactivity	Approximately 1 month	Drain the old oil and make a new oil supply before putting the system on standby for about 1 month. After the new oil supply, run the system for a short time to ensure the homogeneous distribution of the oil to the gearbox.
	1 month or more	Before putting the system on standby for 1 month or longer, clean the gearbox, make an anti-rust oil supply, and then run it in an unloaded state for a few minutes

When resuming operation after a long period of inactivity, change to new oil because the existing oil may degrade.



6.9 Grease Supply for Grease Lubricated Gearboxes

Table 19: Grease Replenishment Intervals

Type	Grease Replenishment and Change Intervals
Maintenance - free grease - lubricated models (607...612)	Although these models use long-life grease, and can run for a long time without replenishment, maintenance with disassembly after approximately 20,000 hours or 3 to 5 years will further increase lifetime.
Other models other than maintenance-free grease - lubricated models (613...627)	Replenish as shown in Table 20. Maintenance with disassembly after approximately 20,000 hours or 3 to 5 years will further increase lifetime.

Table 20: Grease Replenishment Intervals (Except Long-Life Grease Lubricated Models)

Operation Time	Replenishment Interval	Remarks
Less than 10 hours per day	Once every 3 - 6 months	Shorten the replenishment interval when the operating conditions are severe or the frame size is large.
10 - 24 hours per day	Once every 500 - 1,000 hours	

6.10 Grease Filling and Unloading Procedure

Grease filling procedure for grease-lubricated models (Other models other than maintenance-free grease-lubricated models):

1. Remove the grease drain plug from the housing.
2. Make a grease supplement using a grease gun from greasing using the amounts of grease shown in Chart 16-1/16-2. If the greaser has a metal cover, remove the cover before adding oil. After filling, replace the metal cover.
3. Replace the grease discharge plug.

Figure 15: Location of Grease Fill and Discharge Port (Horizontal, Gearmotor, 2-Stage)

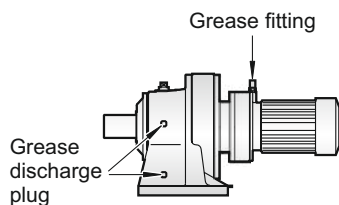


Figure 16: Location of Grease Fill and Discharge Port (Vertical, Gearmotor, 2-Stage)

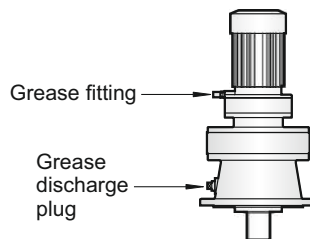
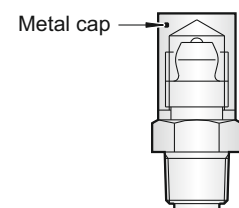


Figure 17: Grease Fitting with Metal Cap



NOTE !



- Grease while the machine is running to improve grease distribution.
- In addition to being used for discharging grease, the grease discharge plug also functions as a pressure vent when replenishing grease. Make certain to remove when replenishing.
- Replenish grease slowly.
- Replenishing more than the quantity shown in Table 16-1/16-2 may cause agitation heat, which raises the temperature, and may cause grease to leak into the motor unit.
- Grease may ooze out of the grease fitting after starting the machine. In such a case replace the grease fitting with one that has a metal cap.
- Be careful when handling the metal cap for the grease fitting as dropping it from a high place is dangerous.
- Contact the nearest authorized service station concerning changing all of the grease in a grease lubricated model.



7.1 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.

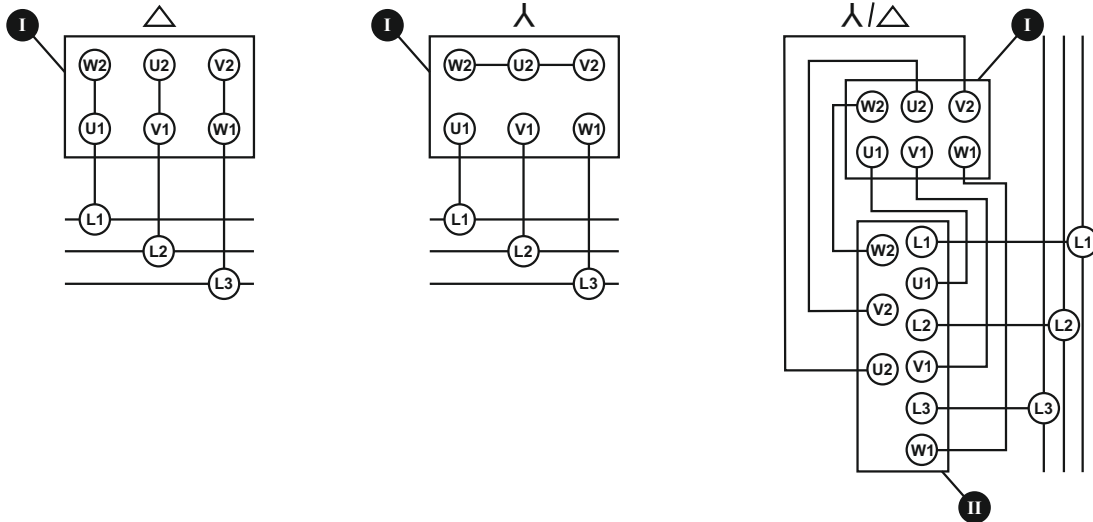


7.2 The Electrical Motor Connection Schema

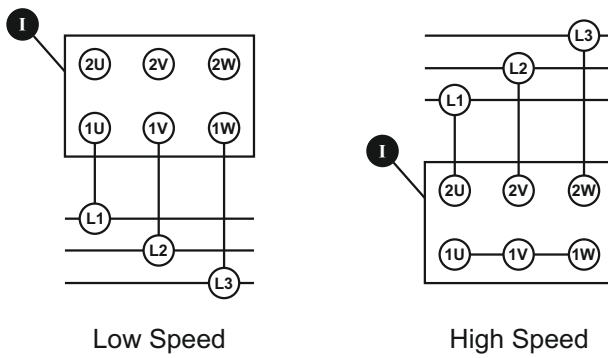
Three Phase Squirrel - Cage Motor

Figure 18: The Electrical Motor Connection Schema

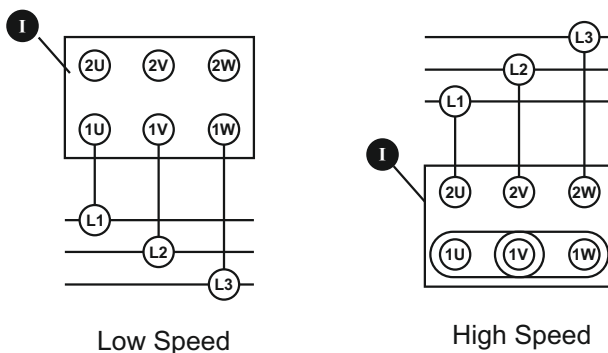
- I. Terminal Box
- II. Circuit Breaker



Wiring Diagram for Two - Separate - Winding Motor:



Dahlender Motor Connection Diagram:

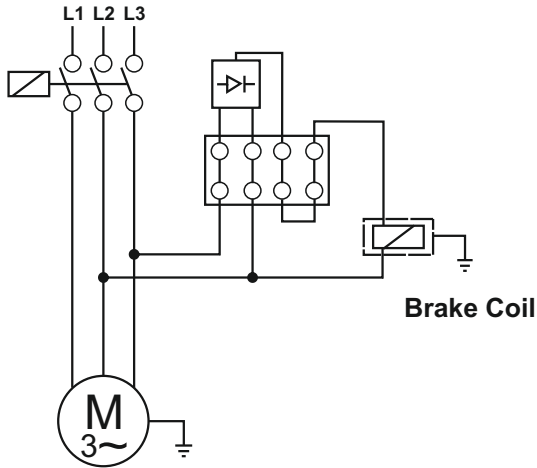




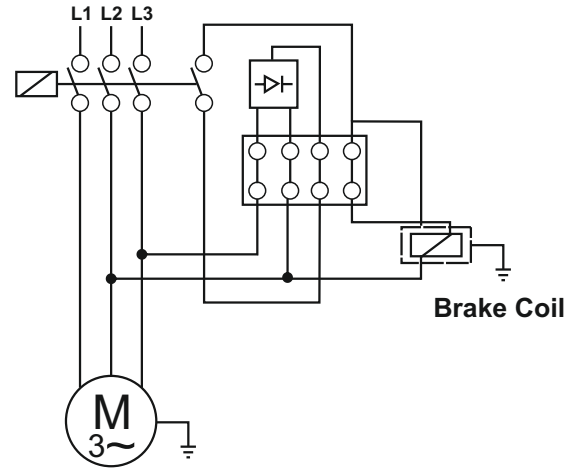
7.3 Standard Type Brake Anchorage Schema

Delayed Running Brake (400V)

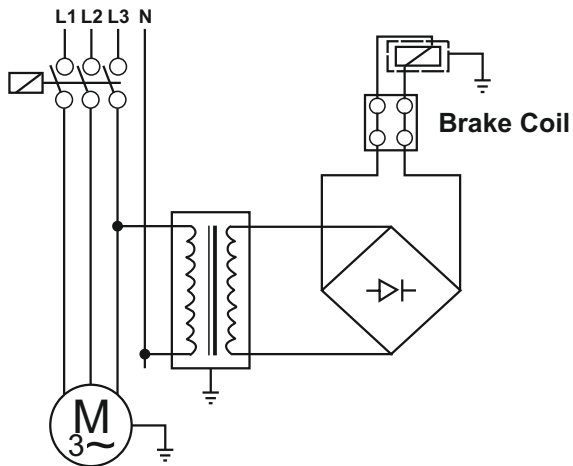
Figure 19: Standard Type Brake Anchorage Schema



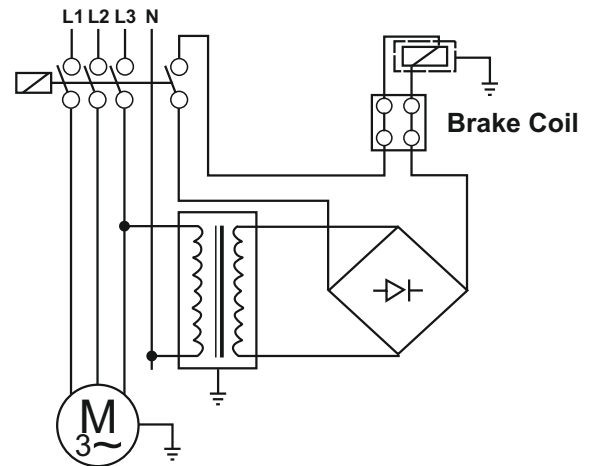
Sudden Brake (400V)



Delayed Running Brake (24V)

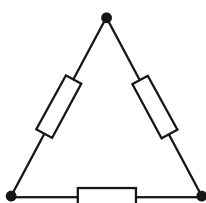


Sudden Brake (24V)

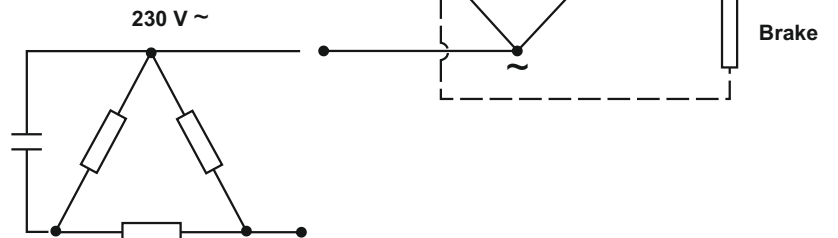
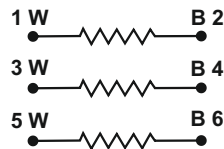
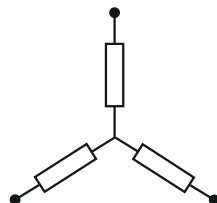


Please check brake coil by using a tester.

DELTA CONNECTION
Δ 230 V



STAR CONNECTION
Λ 400 V





8.1 Product Disposal

Dismantle the machine, separating the parts following the instructions given in this manual. You must group the parts according to the materials they are made of: iron, aluminium, copper, plastic and rubber.

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

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

8.1.1 Disposal

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

Table 21: Disposal Table

GEAR UNIT COMPONENTS	MATERIAL
Cycloid gears, shafts, bearings, adjustment springs, rings, bushings,	Steel
Gear unit housing,	Grey cast iron
Light alloy gear unit housing, light alloy gear unit housing components,...	Aluminium
Shaft seals, lock heads, rubber elements,	Elastomers with steel
Coupling components	Plastic with steel
Flat seals	Asbestos - free sealing material
Gear oil	Additive mineral oil
	Polyglycol-based Synthetic gearbox oil (label: CLP PG)

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

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



8.2 Troubleshooting

Table 22: Troubleshooting

PROBLEM		CAUSE	SOLUTION
The motor does not work when it is not under load.		Power failure.	Contact the electrical company.
		Defective electrical circuit.	Check the circuit.
		The burned-out fuse.	Change the fuse.
		Activation of the protection device.	Fix the problem and save it.
		Load locking.	Check the load and the protection device.
		Bad ignition switch contact.	Set up the contact unit.
		Disconnecting the motor stator coil.	Contact the authorized service.
		Damaged bearing.	Contact the authorized service.
		Operation of 3 phases as a single phase.	Check the power supply with a voltmeter. Controlling the motor, transformer coil, condenser, fuse, etc. disassemble the parts, repair them or replace them with a new one.
		The friction surface of the brake is worn.	Please request brake cleaning from the authorized service.
		Incorrect brake clearance setting.	Adjust the brake clearance again.
The motor rotates when it is not on load, but the output shaft does not rotate.		Damage to the gear unit due to overload.	Contact the authorized service.
The output shaft rotates when it is not loaded.	The ignition switch is overheating.	Insufficient key capacity.	Replace it with the specified ignition key.
		Overload.	Reduce the load to the specified value.
	Fuse blows.	Insufficient fuse capacity.	Replace with the specified fuse.
		Overload.	Reduce the load to the specified value.
	The speed does not increase and the motor overheats.	Voltage drop.	Contact the electrical company.
		Overload.	Reduce the load to the specified value.
		A short circuit in the motor stator coil.	Contact the authorized service.
	The motor stops.	The key is not installed.	Insert the key.
		Damaged bearing.	Contact the authorized service.
		Poor adjustment of the protection device.	Set up the protection device.
	The motor is running in the opposite direction.	Connection error.	Change the connection.
	Blown fuse.	A short circuit in the output cable.	Contact the authorized service.
		Poor contact between motor and switch.	Make the connection well.
	Extreme temperature rise.	Overload.	Reduce the load to the specified value.
		Voltage drop or rise.	Contact the electrical company.
The ambient temperature is high.		Improve the ventilation method.	
Damaged bearing.		Contact the authorized service.	
Abnormal wear of gearbox parts due to overload.		Contact the authorized service.	



PROBLEM		CAUSE	SOLUTION
Oil leakage	Oil droplets or seal stains on the seal areas of the input or output shaft.	The grease applied towards the oil seal leaks out of the seal first.	Wipe around the oil seal and observe.
	Oil or grease leakage in the sealed areas of the inlet or outlet shaft.	Damaged oil seal or damaged shaft or insert.	Contact the authorized service.
	Cycloid disk body, output body, etc. oil or grease leakage on the contact surfaces of the parts.	Loose connection bolts.	Tighten the connection bolts correctly.
	Oil or grease leakage into the motor.	Damaged oil seal.	Contact the authorized service.
Excessive oil supply.		Drain off excess oil.	
Abnormal sound / Excessive vibration.		Dust and foreign substances in the bearings or damaged bearings.	Contact the authorized service.
		Damaged gearbox parts.	Contact the authorized service.
		Bending of the body due to the inability of the installation platform to be straight.	Flatten the installation platform or adjust the installation using parts such as washers, etc.
		Resonance caused by insufficient rigidity of the installation base.	Strengthen the installation platform.
		The shaft is not on the same axis as the driven machine shaft.	Bring the shafts to the same axis.
		Vibration in the driven machine.	Run it separately to find out where the vibration is caused from.
Abnormal motor sounds.		Entry of foreign substance.	Contact the authorized service.
		Damaged bearing.	Contact the authorized service.
		Incorrect brake clearance setting.	Adjust the brake clearance again.
		Wear of the brake pad or disc.	Request a brake pad or disc from the authorized service.
		Burning of brake unit electromagnetic coil.	Contact the authorized service.
		The damaged diode.	Contact the authorized service.
		Failure of the leaf spring on the brake unit to remain closed or malfunction.	Contact the authorized service.
The brake is working ineffectively	It's not being activated.	The brake adjustment bolt is not set well.	Adjust the brake adjustment bolt again.
		Misalignment.	Ask the authorized service to make a re-adjustment.
	Braking is slipping / Braking takes a long time.	Failure to use the rapid braking circuit.	Switch to the fast braking circuit.
		Foreign substances on the brake pads or discs, oil stuck to the surface.	Contact the authorized service center for cleaning.
		Wear of the brake pad or disc.	Adjust the brake clearance. Contact the authorized service for the replacement of the brake pad and disc.
		The brake clearance is not equal on the entire surface.	Adjust the brake clearance.
		Overload.	Reduce the load to the specified value.
		The brake adjustment bolt is not set well.	Adjust the brake adjustment bolt again.

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



9.1 Authorized Service

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


	NOTE !
<p>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.</p>	

Table 23: Authorized Service

No	CRITERIA	MANUFACTURER (PGR)	AUTHORIZED SERVICE	CUSTOMER (USER)
1	Disassembly of geared unit	✓	✓	X
1.1	Case changing	✓	✓	X
1.2	Cycloid disc replacement	✓	✓	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-grease replacement	✓	✓	✓
5	Motor montage to C-FACE adapter type	✓	✓	✓
6	Motor montage to PAM type	✓	✓	✓
7	To the gearboxes with W connection; gear wheel, pulley, coupling, etc. installation of equipment	✓	✓	✓
8	Disassembly of motor from C-FACE / PAM type	✓	✓	✓

- ✓ : SUITABLE
- X : NOT SUITABLE

- 2-3 : Send to the contaminated waste disposal (licensed firm).
- 4 : Send to the licensed firm for the purpose of disposal.

**10.1 Contact Information****FACTORY**

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ASSEMBLY FACTORY AND LOGISTICS CENTER

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