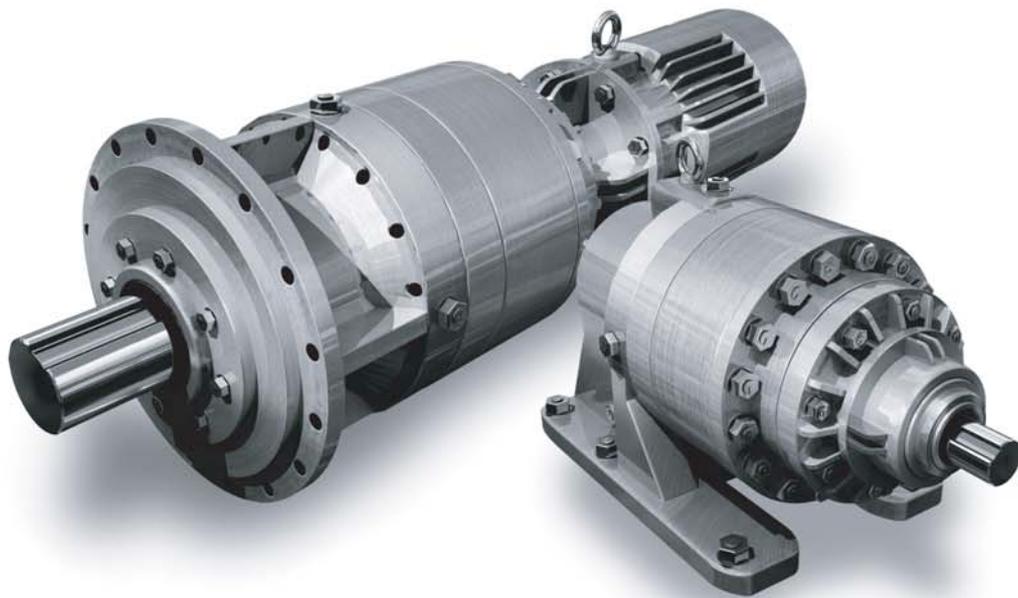


COMPOWER Planetary Gear Drive

DP1000 Series

Maintenance Manual



Precautions:

- COMPOWER Planetary Gear Drive shall be handled, installed, and maintained by well-trained technicians. Please carefully read the maintenance manual before use.
- Oil has been removed from COMPOWER Planetary Gear Drive before shipment. Please supply oil according to the maintenance manual before operation.
- A copy of this maintenance manual shall be sent to the actual user of COMPOWER Planetary Gear Drive.
- This maintenance manual shall be kept properly by the actual user.

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[Introduction and Safety]

- Read these instructions and all accompanying documents carefully prior to use (installation, operation, maintenance/inspection, etc.). Actual use of the equipment shall be done only after the user fully understands all information on the equipment and safety instructions. This maintenance manual must always be kept close to the operators of this equipment.
- This maintenance manual contains two specific safety markings, “DANGER” and “CAUTION”.



: This symbol indicates safety instructions where non-compliance may involve a high risk to personal safety or loss of life.



: This symbol indicates safety instructions where non-compliance may suffer slight injuries or cause property damages.

In some cases, any non-compliance in “CAUTION” may cause serious results. Please strictly follow these instructions.

DANGER

- Transport, installation, plumbing, operation, maintenance/inspection shall be handled by well-trained technicians; otherwise, injury or damage to the equipment may occur.
- When the unit is to be used in a system for transport of human beings, a secondary safety device shall be installed to the system; otherwise, physical injury or damage to the equipment by the runaway system may occur.
- When the unit is used for an elevator, install a safety device on the elevator side to prevent it from falling; otherwise, physical injury or damage to the elevator may occur.
- Do not disassemble the reducer during operation. When shaft of the reducer is connected to motor or other machine, don't disassemble it even at rest except dipstick, fill & drain ports, and inspection cover; otherwise, physical injury or damage to the equipment by the fall, runaway, etc. of the machine may occur.

CAUTION

- The reducer shall be operated only within its design and performance specifications; otherwise, injury or damage to the equipment may occur.
- Keep hands and all foreign objects from internal moving parts of the reducer; otherwise, injury or damage to the equipment may occur.
- Damaged reducer shall not be used for operation; otherwise, injury or damage to the equipment may occur.
- Any modifications or alterations of any kind to the unit shall void the warranty.
- Do not remove the nameplate.

1 Inspection upon delivery.

⚠ CAUTION

- Unpack the unit after verifying that it is positioned right side up; otherwise, injury may occur.
- Verify that the unit received is exactly the ordered item. When a different product is installed, injury or damage to the equipment may occur.
- Do not remove the nameplate.

Upon delivery of reducer or drive unit, check the following. If there is any doubt that the unit delivered does not conform to the one ordered, contact the nearest agent, distributor, or service office.

- (1) The descriptions on the nameplate conform to your order.
- (2) There were no parts damaged during transport.
- (3) All bolts and nuts are firmly tightened.

1—1) How to check the nameplate.

Following is the typical example. Confirm according to the size of reducer.

- Please inform ①type of reducer or drive unit, ②reduction ratio, and ③serial number when making inquiries.

①Type of reducer or drive unit.
(Refer to page 4 & 5)

②Reduction ratio.

Input power.

③Serial number.

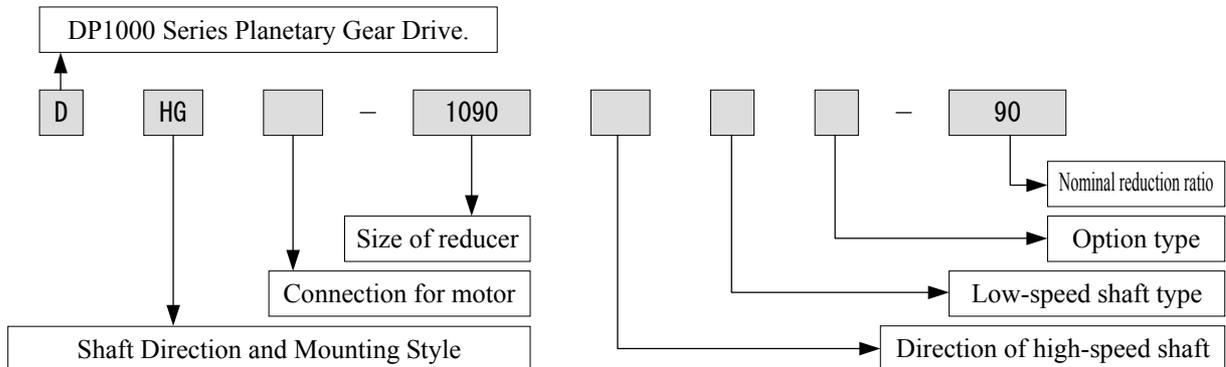


Fig. 1 Nameplate.

1-2) Nomenclature.

Meanings of nomenclature are shown below. Please check if the product type conforms to your order. Some special types are not mentioned below.

(1) Type of reducer.



Shaft Direction and Mounting Style.

HG	Horizontal	HF	Horizontal Flange	VF	Vertical Flange	HY	Shaft mounting

Connection for motor.

Blank	Solid Shaft	J	with Motor Adaptor	JM	Motor Adaptor + Motor

Direction of high-speed shaft.

Blank	Inline	G	Upright	R	Shaft direction (right)

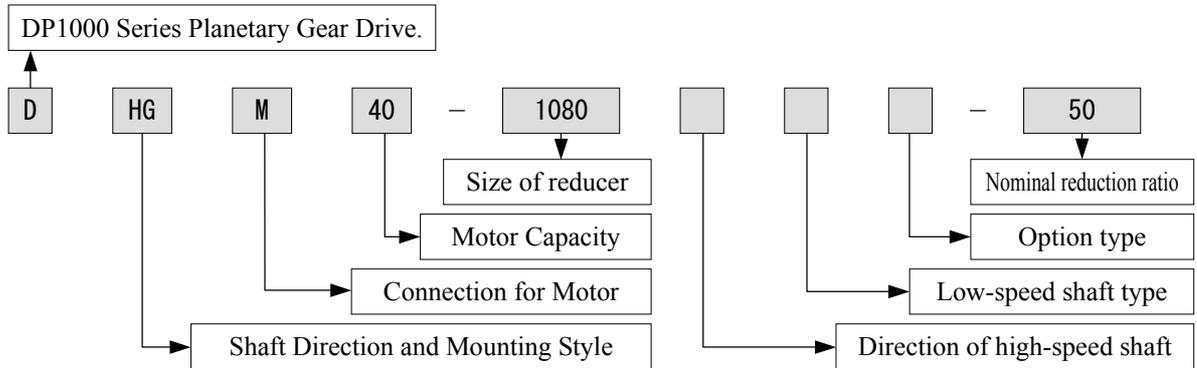
Low-speed shaft type.

Blank	Solid Shaft (Key type)	P	Spline	T	Hollow Shaft (Shrink Disk type)

Option type.

Blank	Standard Specification	F	Cooling Fan	R	with Radial Table

(2) Type of drive unit.



Shaft Direction and Mounting Style.

HG	Horizontal	HF	Horizontal Flange	VF	Vertical Flange	HY	Shaft mounting

Connection for motor.

M	Direct Motor mounting type

Motor Capacity. (4 Pole)

Code	kW(HP)	Code	kW(HP)	Code	kW(HP)
02	0.2 (1/4)	5	3.7 (5)	30	22 (30)
05	0.4 (1/2)	8	5.5 (7.5)	40	30 (40)
1	0.75 (1)	10	7.5 (10)	50	37 (50)
2	1.5 (2)	15	11 (15)	60	45 (60)
3	2.2 (3)	20	15 (20)	75	55 (75)
4	3.0 (4)	25	18.5 (25)		

Direction of high-speed shaft.

Blank	Inline

Low-speed shaft type.

Blank	Solid Shaft (Key type)	P	Spline	T	Hollow Shaft (Shrink Disk type)

Option type.

Blank	Standard Specification
-	

2 Storage

Store reducer or drive unit for extended periods of time in accordance with these instructions.

2-1) Storage Location

Store reducer and drive unit indoors in a clean and dry area.

- Do not store outdoors or in an area with high humidity, lots of dust, extreme temperature fluctuation, and corrosive gas.

2-2) Storage Period

- (1) Storage period shall be within the rust-proofing period below.
- (2) When the storage period exceeds the rust-proofing period, special rust-proofing is necessary. Contact us for details.
- (3) Export models need export rust prevention. Contact us for details.
- (4) Standard rust-proofing specification:
 - ① Outside rust-proofing
Rust-proofing treatment has been applied before shipment. Check the effect of rust-proofing in every six months and do the new treatment whenever it is necessary.
 - ② Inside rust-proofing
The rust-proofing period is for six months.
Store inside the factory or warehouse to be free from humidity, dust, extreme temperature fluctuation, and corrosive gas.

2-3) Use after Storage

- (1) Oil seals will deteriorate when being exposed to high temperature and UV ray. Inspect the oil seals before operation and replace deteriorated one with new one.
- (2) After starting operation, please verify that there is no abnormal sound, vibration, or heat rise. If supplied as a brake motor, check that the brake operates properly. If any problem is observed, contact our nearest agent, distributor, or sales office.

3 Transport

DANGER

- Do not stand directly under the unit suspended by a crane; otherwise, physical injury by the fall of equipment may occur.

CAUTION

- Do not drop or upset the unit in transit. Use the provided handling bolt or hole for these reducers and drive units that have handling bolt or hole. After mounting the unit to machine, however, don't hoist the entire machine using the handling bolt or hole. Personal injury or damage to the equipment by the fall or upset of machine may occur.
- Before hoisting, check the weight of the unit by the nameplate, crate, outline drawing, product specification, catalog, etc. Never hoist the unit that exceeds the capacity of crane. Personal injury or damage to the equipment by the fall or upset of unit may occur.

4 Installation

⚠ CAUTION

- Do not use the reducer or drive unit for purposes other than those shown on the nameplate or product specification; electric shock, personal injury, or damage to the equipment may occur.
- Do not place flammable objects around the drive unit; fire may occur.
- Do not place any object around the reducer or drive unit that will hinder ventilation. Insufficient ventilation may cause excessive heat build-up that may result in burn and fire.
- Do not step on or hang from the reducer or drive unit; injury or damage to the equipment may occur.
- Do not touch the shaft end and inside keyways of the reducer or drive unit with bare hands; injury may occur.
- Install oil pans or other device to protect product when the unit is used in food processing applications vulnerable to oil contamination. The product may be damaged by oil leakage

4-1) Installation Location

Ambient temperature: -10°C to + 40°C

Ambient humidity: 85% max.

Ambient atmosphere: No corrosive gas, explosive gas, or steam.

To be well ventilated and dust-free.

Installation location: Indoors. (Clean and dry location.)

- Special units are necessary for the installation other than above conditions. Contact us for details.
- Units made for outdoor, explosion-proof, or other specifications can be used under the specified conditions without any problem.
- Install units where inspection, maintenance, and other operations can be easily carried out.
- Install units on a sufficiently rigid base.

4-2) Installation Angle

Install the reducer or drive unit on a level base. (Consult us for inclined installation.) When the unit is manufactured for inclined installation, do not install at any angle other than the one specified.

4-3) Installation Method

- Install the reducer or drive unit on a sufficiently rigid base with steel bolts corresponding to JIS strength class 10.9. (JIS B1051)
- Knock pin will be used together if the vibration or shock strongly occurs.
- In case of the reducer with motor, always do centering again on installation. Though centering has been made before shipment, decentering may be caused by transport or rigidity of the base.
- Remove rust-proofing treatments on high-speed shaft, low-speed shaft, key, and installation area with wash oil before installation. Do not use unusual solvents or sandpaper for this purpose.

5 Coupling with other machines

⚠ CAUTION

- Confirm the direction of rotation before coupling with driven machine. Difference in the direction of rotation may cause injury or damage to the system.
- Remove the key temporarily attached to the slow-speed shaft of the reducer or drive unit when the shaft is free-rotating; otherwise, injury may occur.
- Install appropriate guard devices around rotating parts; otherwise, injury may occur.
- When coupling the reducer or drive unit to a load, check the centering, belt tension, and parallelism of the pulley. When the unit is directly coupled with another machine, check the direct coupling accuracy. When a belt is used for coupling the unit with another machine, check the belt tension. Correctly tighten respective bolts of the pulley and coupling before starting operation; otherwise, injury or damage to the equipment may occur.

5-1) Installation of coupling

- When attaching a coupling, do not apply impact force or excessive thrust to the shaft; otherwise, damage to the bearing or loose of seal sleeve may occur.
- Shrink fit or shaft-end thread is recommended for mounting. (Fig. 2)

(1) Use of coupling

The dimensions (A, B and X) illustrated in Fig. 3 shall be within the tolerance in Table 1.

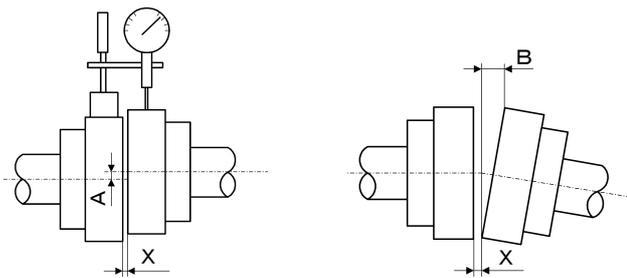


Fig. 3

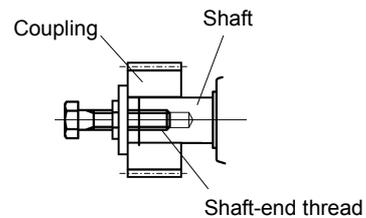


Fig. 2

Table 1 Centering accuracy for coupling

Tolerance for A dimension	0.05mm
Tolerance for B dimension	0.05mm
X dimension	Specified by coupling manufacturer

(2) Use of chain, sprocket and gear

- The chain tension angle shall be perpendicular to the shaft of reducer.
- The pitch circle of the sprocket and gear shall be more than three times of the shaft diameter.
- Install sprocket and gears so that their point of load application will be closer to the drive unit or reducer side with respect to the length of the shaft. (Fig. 4)

(3) Use of V belt

- Excessive V belt tension will damage the shaft and bearing. Please refer to the catalog of V belt manufacturer.
- Parallelism and eccentricity(β) between two pulleys shall be less than $20'$. (Refer to Fig. 5)
- Use a matched set with identical circumferential length when more than one V belt is used.

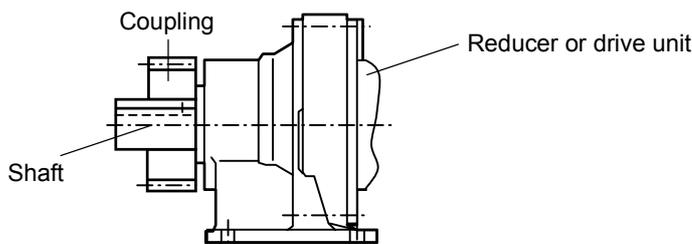


Fig. 4

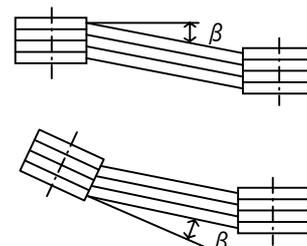


Fig. 5

5-2) Hollow shaft type

■ Remarks for mounting and removal of shrink disk.

New shrink disk can be mounted as it is since proper grease has been treated before shipment. When mounting used shrink disk, disassemble and clean it first. Smear sliding cone, locking bolt, and contact area of locking bolt with molybdenum disulfide like MolycoteBR2 and MolyLG grease. Prior test of tightening locking bolt is recommended.

⚠ CAUTION

Clean oil content on the hole of boss and its contacting shaft sufficiently. Do not use solvent; corrosion by the solvent may occur. Locking bolt shall be tightened when the shaft is fully inserted in the boss.

It is recommended to smear the surface of boss and hole of sliding cone with grease before mounting shrink disk.

Mounting procedure

- ① If shrink disk can be easily lifted, mount it as assembly. If it is very heavy and crane cannot be used, disassemble first and assemble it on the hub.
- ② Make sure that outer ring and inner ring are parallel when tightening bolts. (A short handle wrench is suitable.)
- ③ After confirming that the shrink disk is set correctly, tighten the bolts with a wrench of appropriate length. Uniformly and orderly, tighten bolts clockwise (not diagonally) while keeping outer ring and inner ring parallel. It is recommended to tighten respective bolts by 30 degree each time.
- ④ All locking bolts shall be tightened with a torque wrench in accordance with the torque strength shown in the table 2.
- ⑤ Finally, confirm again that outer ring and inner ring are parallel.

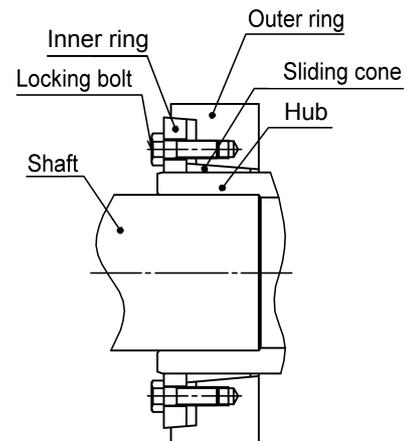


Fig. 6

Removal procedure

Steps of removal procedure shall be done in a reverse order of mounting procedure. Keep reducer or shrink disk from falling off shaft during the process. Carefully loosen locking bolts for keeping outer ring from inclining on the sliding cone.

⚠ CAUTION

Do not remove locking bolts unless you confirm that outer ring and inner ring are parallel; otherwise, injury by a sudden release of outer ring or inner ring from sliding cone.

Table 2 Standard torque of locking bolt for shrink disk.

Bolt (10.9(10T))	M4	M5	M6	M8	M10	M12	M16	M20	M24	M27
Torque Tightening N · m	2	4	12	30	59	100	250	490	840	1250

6 Operation

⚠ DANGER

- Do not approach or touch rotating parts (Low-speed shaft, etc.) during operation; serious injury by being caught in a machine may occur.

⚠ CAUTION

- Do not put fingers or foreign objects into the opening of reducer and drive unit; possible electric shock, personal injury, or damage to the equipment may occur.
- The reducer and drive unit will be extremely hot during operation. Touching the unit may result in burns.
- Do not remove inspection cover during operation; otherwise, hot, splashing lubricant may cause burns.
- When the reverse rotation is required, always stop operation first and start reverse rotation; otherwise, damage to the equipment may occur.
- Do not loosen the oil filler plug during operation; otherwise, hot, splashing lubricant may cause burns.
- If a problem occurs during operation, stop operation immediately; otherwise, electric shock, personal injury, or fire may occur.
- Do not operate in excess of the specified load; injury or damage to the equipment may occur.

- Reducer and drive unit have been shipped without oil. Proper amount of recommended oil shall be filled before operation.
- Models of specifications for long rusting-proof, export rusting-proof, and inclusive lubrication have been shipped with plug to seal air vent hole. After installation, replace it with the attached air vent.
- For a Model, which needs special piping, pipes are packaged separately for avoiding possible damage during shipment. After installation, do not forget pipework.

After the unit is installed and filled with oil, check the following before operation.

- (1) If the unit is properly coupled with another machine.
- (2) If foundation bolts are tightened firmly.
- (3) If the direction of rotation is as required.
- (4) If the oil level at rest is in the specified position.

When all of above items are positive, conduct a trial run with light load. Move on to actual operation after confirming that there is no abnormal vibration, sound, and temperature rise.

Check the items shown in table 3.

Table 3 Items to check on initial operation

Is there any abnormal sound or vibration?	(1) Is the housing deformed because the installation surface is not flat? (2) Is insufficient rigidity of the installation base generating excessive noise? (3) Is the shaft center aligned with another machine? (4) Is the vibration of another machine transmitted to reducer and drive unit?
Is the surface temperature of reducer and drive unit abnormally high?	(1) Is the ambient temperature too high? (2) Is the oil level at specified level?

If any abnormality is found, stop operation and contact our nearest agent, distributor, or sales office.

7 Daily Inspection and Maintenance

⚠ DANGER

- Do not approach or touch any rotating parts (output shaft, etc.) during maintenance or inspection of the unit; serious injury by being caught in a machine may occur.

⚠ CAUTION

- Do not put fingers or foreign objects into the opening of reducer and drive unit; possible electric shock, personal injury, fire, or damage to the equipment may occur.
- The reducer and drive unit will be extremely hot during operation. Touching the unit may result in burns.
- When any abnormality is observed, check it according to the maintenance manual. Do not operate until the cause of abnormality is identified and corrected.
- Change lubricant according to the maintenance manual. Be sure to use the recommended lubricant by the maintenance manual; damage to the equipment may occur.
- Do not change lubricant during operation or immediately after stopping operation; otherwise, burns may occur.
- Do not operate damaged reducer or drive unit; otherwise, injury, fire, or damage to the equipment may occur.
- We do not assume any responsibility for damage or injury resulting from an unauthorized modification of product by the customer.
- Dispose reducer, drive unit, or lubricant as general industrial waste.

7-1) Daily Inspection

Perform daily inspection according to table 4. Neglect of daily inspection may cause some troubles.

Table 4 Daily Inspection

Inspection Item		Details of Inspection
Noise		Is there abnormal sound or sudden change in sound?
Vibration		Is there excessive vibration or sudden change of vibration?
Surface temperature		Is the surface temperature abnormally high (more than 90°C)? Does the surface temperature rise suddenly? (The temperature rise during operation differs according to models. When the temperature of the gear surface is 80°C, there is no problem if fluctuation is minimum.)
Oil level		Is the oil level decreasing? (Check the line by dipstick or oil gauge when operation is stopped.)
Lubrication	Forced oil lubrication	Is the function of oil signal or flow gauge normal? When the function is abnormal, stop the unit and inspect it as poor lubrication caused by oil shortage, broken pump, and blockage in a pipe may be occurred in reducer.
Oil or grease leakage		Does oil or grease leak from the gear section?
Foundation bolt		Are foundation bolts loose?
Chain and V-belt		Are chain and V-belt loose?

When any problem is found during the daily inspection, take corrective measures listed in section 9, Troubleshooting (page 17). If the problem cannot be corrected, contact our nearest agent, distributor, or sales office.

7-2) Lubrication Method

Standard Lubrication Method

- Oil bath lubrication is applied to all models.
- Some of the upper bearings for vertical and upright type are lubricated with grease.
- Refer for details to specifications sheet and outline drawings.

⚠ CAUTION

● For equipment with motor oil pump, run the pump prior to operation of reducer or drive unit. Start motor of reducer or drive unit after lubricating oil has circulated through the bearing; otherwise, damage to the equipment may occur.

- Provide flow switch or flow sight to check the circulation of the lubricating oil. Stop the motor of reducer or drive unit when abnormality occurs.

7-3) Lubrication Maintenance

(1) Oil change interval

Table 5 Oil change interval

		Interval	Using conditions
Oil feeding	At purchasing		—
Oil change	1 st time	Whichever comes first, after 500 hours or six months of operation.	—
	2 nd time	Whichever comes first, after 2,500 hours or six months of operation.	—
	3 rd time or later	Whichever comes first, every 5,000 hours or every year.	When oil temperature is lower than 70°C.
		Whichever comes first, every 2,500 hours or every half a year.	When oil temperature is 70°C or higher.

- Please consult lubrication supplier when ambient temperature changes dramatically or atmosphere contains corrosive gas.

(2) Grease interval

Table 6 Grease interval

Interval	Input speed
Every 1,500 hours	750 r/min or slower
Every 1,000 hours	Over 750 to 1,800 r/min

- The grease-lubricated models are packed with grease before shipment. Check the number of grease fittings and their position carefully.
- Refer for the confirmation of grease lubrication and position of grease fitting to specifications sheet and outline drawing.

(3) Recommended lubricants

- Only following lubricants in table 7 shall be applied for lubrication.

Table 7 Recommended lubricants

Ambient temperature	ISO AGMA	BP	CASTROL			CHEVRON TEXACO		EXXON MOBIL		SHELL	TOTAL	
			ENERGOL	ALPHA	OPTIGEAR	TRIBOL	GEAR COMPOUNDS	MEROPA	Mobil			ESSO
Gear oil	-10°C~+25°C	VG150 4EP	ENERGOL GR-XP-150	ALPHA SP150	OPTIGEAR BM150	TRIBOL 1100/150	GEAR COMPOUNDS EP150	MEROPA WM150	MOBIL- GEAR 629	SPARTAN EP150	OMALA 150	CARTER EP150
	10°C~40°C	VG220 5EP	ENERGOL GR-XP-220	ALPHA SP220	OPTIGEAR BM220	TRIBOL 1100/220	GEAR COMPOUNDS EP220	MEROPA WM220	MOBIL- GEAR 630	SPARTAN EP220	OMALA 220	CARTER EP220
	30°C~50°C	VG320 6EP	ENERGOL GR-XP-320	ALPHA SP320	OPTIGEAR BM320	TRIBOL 1100/320	GEAR COMPOUNDS EP320	MEROPA WM320	MOBIL- GEAR 632	SPARTAN EP320	OMALA 320	CARTER EP320
Bearing grease		ENER-GREASE LS EP2	SPHEEROL AP3	Olista Long- time 3EP	TRIBOL 3020/1000-2	DURALITH GREASE 68	MULTI- FAK EP2	MOBILUX EP2	BEACON EP2	ALVANIA EP2	MULTIS EP2	

(4) Oil quantity

An estimated quantity of oil for standard specifications is shown in section 11, Oil quantity on page 20.

(As to oil quantity for special specifications, refer to specifications sheet and outline drawing.)

The oil quantity shown in the catalog, etc., is not exact quantity. Use a dipstick or visible oil gauge to check the oil level when filling.

(5) Oil supply and draining

Supply oil through the oil inlet on top of the main unit. Check the oil level with a dipstick or visible oil gauge.

(Fig. 7)

Screw the dipstick to its deepest position to check the oil level; otherwise, the measured oil level may be wrong.

(Fig. 8)

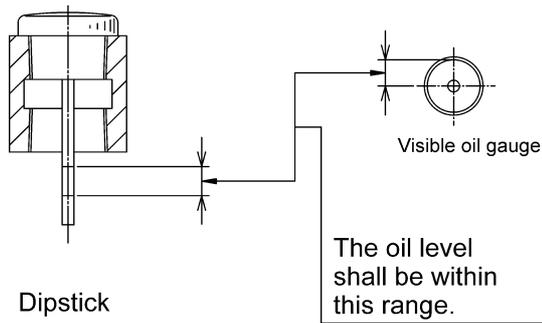


Fig. 7

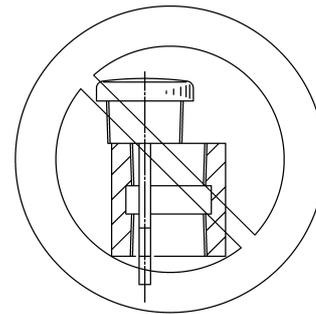


Fig. 8

Make sure during the oil-filling process that any foreign materials, dust, and water will not enter the unit. If the oil level is less than the range, the unit will not be lubricated well, and if higher, deterioration of the oil is accelerated due to oil temperature rise.

Please remove drain plug located under the unit for oil draining when lubricating oil is still warm.

Removing the air vent makes draining and supplying oil easier.

(6) Grease supply and draining

- ① Confirm the position of grease fitting and relief fitting (or relief plug) by specifications sheet and outline drawing.
- ② In case of relief plug, remove the plug and supply new grease by grease gun from grease fitting. Fill new grease until when it drains from relief fitting.
- ③ In case of relief plug, put the relief plug back after supplying grease.

7-4) Parts Maintenance

To extend operational life, replace the following parts every 3 to 5 years.

Replacement parts

- ◎ Bearing, oil seal, seal sleeve, and oil gauge.
- ◎ Check and replace shafts and gears if there is any damage.
- ◎ On a case-by-case basis for other parts including special applications.

COMPOWER Planetary Gear Drive shall be basically returned to the factory to exchange the parts. Please inform the serial number, model name, quantity, operation period, and so on.

8 Disassembly / reassembly

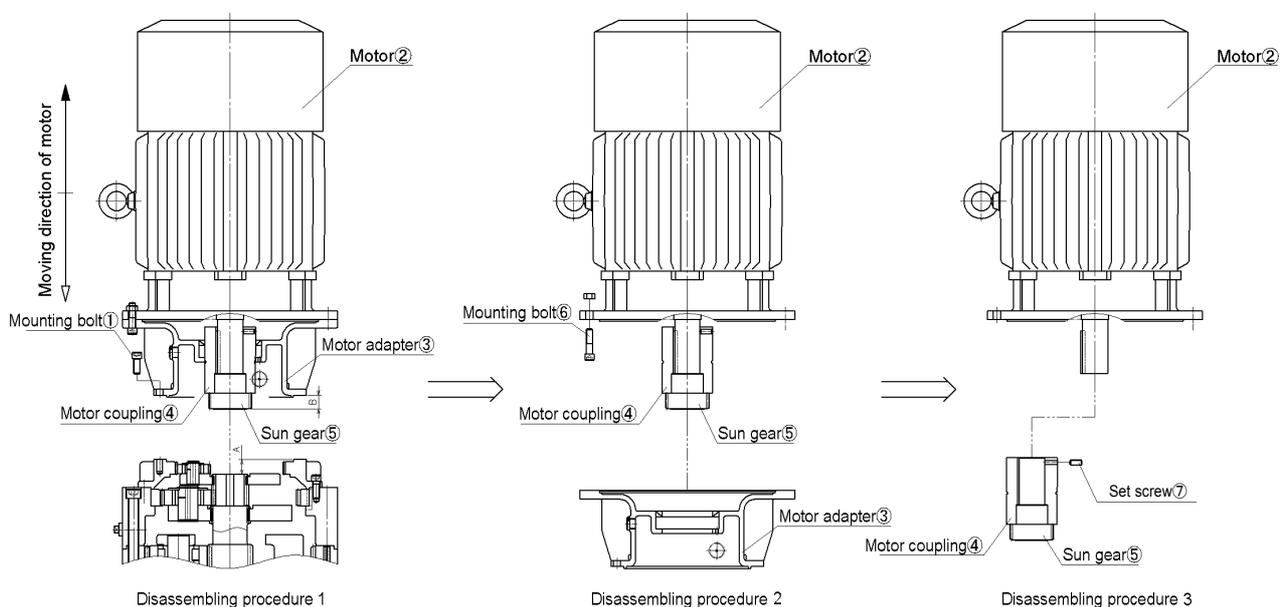
⚠ CAUTION

● Repair, disassembly, and reassembly shall be handled by proper technicians; otherwise, personal injury or damage to the equipment may occur.

- Make sure not to be injured by keyway or other sharp edges of parts.
- Disassemble the unit at a clean and dry location.
- Keep accessory parts like screws in the box to prevent loss.
- Carefully handle all parts to prevent damage. Keep them from water and dust.

Disassembly / reassembly of gear and motor

Construction 1



Disassembling procedure 1

- (1) Verify that the drive unit is the right model for Construction 1 according to table 9 “Selection Table” on page 16.
- (2) Set the drive unit stably on rigid base with the motor upper side.
- (3) Remove mounting bolt ①.
- (4) Move motor ②, motor adapter ③, motor coupling ④, and sun gear ⑤ integrally towards →, and disassemble.

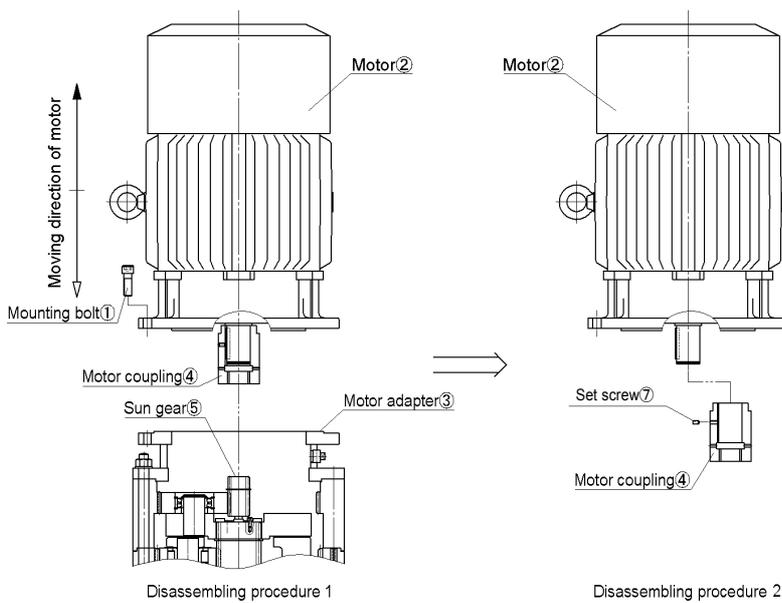
Disassembling procedure 2

- (1) Remove mounting bolt ⑥.
- (2) Remove motor ②, motor coupling ④, and sun gear ⑤ integrally from motor adapter ③.

Disassembling procedure 3

- (3) Remove set screw ⑦ and demount motor coupling ④ and sun gear ⑤ integrally from motor shaft.

Construction 2



Disassembling procedure 1

- (1) Verify that the drive unit is the right model for Construction 2 according to table 9, Selection Table on page 16.
- (2) Set the drive unit stably on rigid base with the motor upper side.
- (3) Remove mounting bolt①.
- (4) Move motor② and motor coupling④ integrally towards \longrightarrow , and disassemble.

Disassembling procedure 2

- (1) Remove set screw⑦ and demount motor coupling④ from motor shaft.

Reassembling procedure

Steps of reassembling procedure shall be done in a reverse order of disassembling procedure carefully with followings.

- (1) Keep gear part from dirt and dust, and reassemble each part to be fully cleaned with wash oil.
- (2) Assemble oil seals with attention to the direction of lip after applying grease to lip part.
- (3) For Construction 1, adjust the position of sun gear within 0.5~1.5mm for A - B.
- (4) Remove old liquid packing attached to the contact area and apply new one. Assemble completely by sliding slowly towards \longrightarrow .
- (5) All bolts shall be tightened by a torque wrench in accordance with the standard torque shown in the table 8, Standard torque of bolts.

Table 8 Standard torque of bolts.

Unit: N.m

Strength	Bolt size									
	M6	M8	M10	M12	M14	M16	M18	M20	M24	M30
4.6	3.3~	8.1~	16.5~	28.5~	45.5~	70.5~	95.4~	137~	236~	480~
	4.1	9.9	20.2	34.8	55.6	86.2	117	167	289	586
10.9	12.8~	31.0~	61.3~	107~	170~	265~	365~	518~	896~	1370~
	14.2	34.8	69.0	120	191	298	411	583	1010	1540

Table 9 Selection Table: Drive Unit

		Size of Reducer																					
		1010	1020	1030	1040	1050	1060	1070	1080	1090	1100	1110	1120	1130	1140	1150	1160	1170	1180	1190	1200	1210	1220
Reduction Ratio	5																						
	9																						
	16																						
	18																						
	20																						
	22.4																						
	25																						
	28																						
	31.5																						
	35.5																						
	40																						
	45																						
	50																						
	56																						
	63																						
	71																						
	80																						
	90																						
	100																						
	112																						
	125																						
	140																						
	160																						
	180																						
	200																						
	224																						
	250																						
	280																						
	315																						
	355																						
400																							
450																							
500																							
560																							
630																							
710																							
800																							
900																							
1000																							
1120																							
1250																							
1400																							

Construction 1 **Construction 2**

-  Applicable range for Construction 1
-  Applicable range for Construction 2
- Blank Not covered by DP-Series

9 Troubleshooting

 CAUTION

● Identify and provide appropriate corrective actions for any abnormality according to the maintenance manual. Do not operate the unit until corrective action has been taken.

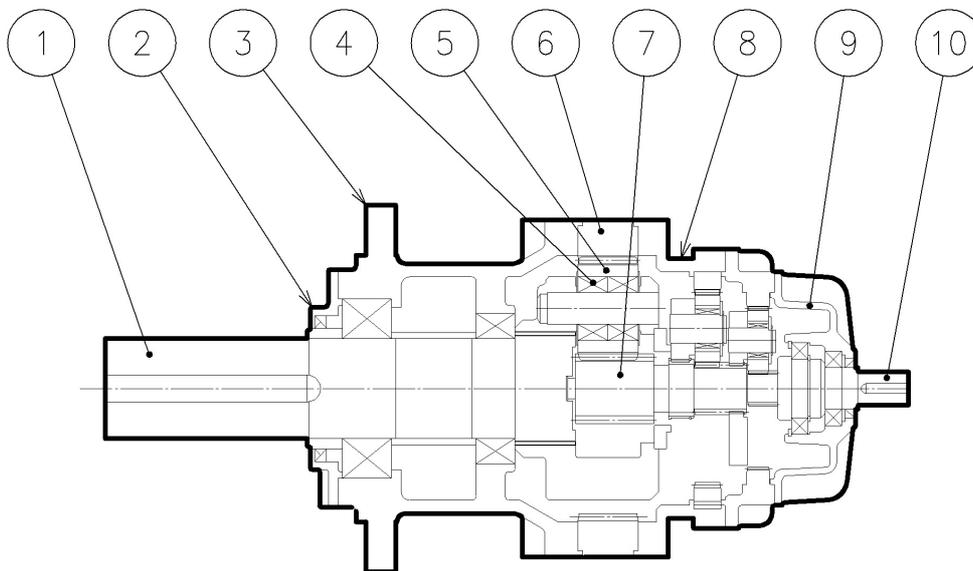
When any abnormality happens on reducer or drive unit, take appropriate measures immediately referring to the following table. If they are not repairable, contact our nearest agency, distributor, or sales office.

Table 9 Troubleshooting

Details of trouble		Cause	Correction
Excessive temperature rise.		Overload.	Lower the load to the specified value.
		The ambient temperature is high.	Improve the ventilation method.
		Damaged bearings.	Repair at a specialized factory.
		Damage due to overload to gears.	Repair at a specialized factory.
Oil Leakage.	Oil leakage from the high-speed/low-speed shaft sections.	Damaged oil seal.	Change the oil seal.
	Oil leakage from the joint surface of internal gear/housing/cover.	Loose locking bolt.	Tighten the bolt properly.
	Oil leakage inside of motor.	Damaged oil seal.	Change the oil seal.
Abnormal sound. Excessively high vibration.		Damaged gears, shafts, or bearings.	Repair at a specialized factory.
		Deformation of the housing due to uneven installation surface.	Flatten the installation surface or use liners for adjustment.
		Resonance due to insufficient rigidity of installation base.	Reinforce the installation base to improve the rigidity.
		Incorrect alignment with another machine.	Align the shaft center.
		Transmission of another machine's vibration to the unit.	Independently operate reducer and drive unit to check the source of noise.
Motor runs without load but low-speed shaft doesn't run.		Damage due to overload to gears or shafts.	Repair at a specialized factory.

10 Construction Drawing

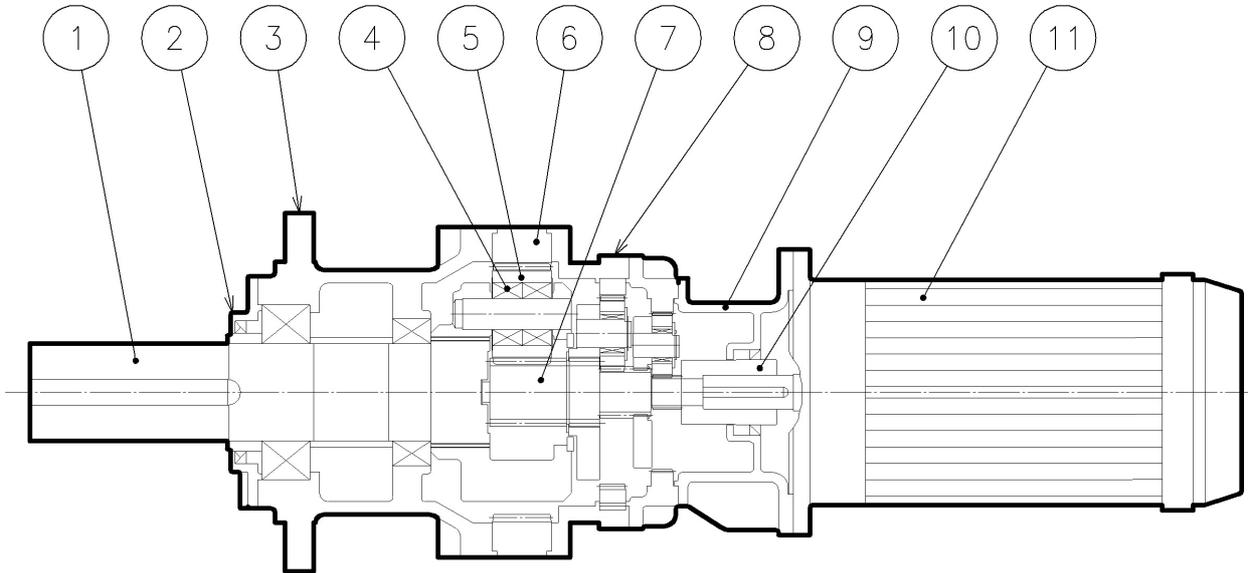
10-1) Reducer



DHF (flange type)

No.	Part Name	No.	Part Name
1	Low-Speed Shaft	6	Internal Gear
2	Seal Cover	7	Sun Gear
3	Casing	8	Inter Mediate Cover
4	Bearing	9	High-Speed side Cover
5	Planetary Gear	10	High-Speed Shaft

10-2) Drive Unit



DHFM (flange type)

No.	Part Name	No.	Part Name
1	Low-Speed Shaft	7	Sun Gear
2	Seal Cover	8	Inter Mediate Cover
3	Casing	9	Motor Adapter
4	Bearing	10	Coupling
5	Planetary Gear	11	Motor
6	Internal Gear		

11 Oil quantity

※The oil quantity shown below is not exact quantity. Use a dipstick or visible oil gauge to check the oil level when filling.

(As to oil quantity for special specifications, refer to specifications sheet and outline drawing.)

Table 10 Oil quantity for Reducer

Unit: Liter

Size	Reducer							
	DHG type				DHF type			
	Nominal Reduction Ratio				Nominal Reduction Ratio			
	5・9	16~45	50~224	250~1400	5・9	16~45	50~224	250~1400
1010	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.4
1020	0.4	0.4	0.5	0.5	0.4	0.4	0.5	0.5
1030	0.5	0.6	0.6	0.7	0.5	0.6	0.6	0.7
1040	0.7	0.8	0.8	0.9	0.7	0.8	0.8	0.9
1050	0.9	1.1	1.3	1.4	0.9	1.1	1.3	1.4
1060	2.0	2.2	2.5	2.7	2.0	2.2	2.5	2.7
1070	3.5	3.8	4.5	4.9	3.5	3.8	4.5	4.9
1080	-	4.8	5.7	6.8	-	4.8	5.7	6.8
1090	-	5.9	7.0	8.0	-	5.9	7.0	8.0
1100	-	11	12	13	-	8.3	9.0	10.5
1110	-	14	13	14	-	10	9.5	11
1120	-	20	16	17	-	15	11	12.5
1130	-	21	22	23	-	15	16	15.5
1140	-	33	34	34.5	-	22	15	16
1150	-	-	-	-	-	-	18	17
1160	-	-	-	-	-	-	22	20.5
1170	-	-	-	-	-	-	25	24
1180	-	-	-	-	-	-	28	26
1190	-	-	-	-	-	-	40	36
1200	-	-	-	-	-	-	52	47
1210	-	-	-	-	-	-	63	57
1220	-	-	-	-	-	-	77	70

Table 11 Oil quantity for Drive Unit

Unit: Liter

Size	Drive Unit												
	DHGM type				DHFM type				DVFM type				
	Nominal Reduction Ratio				Nominal Reduction Ratio				Nominal Reduction Ratio				
	5・9	16~45	50~224	250~1400	5・9	16~45	50~224	250~1400	5・9	16~45	50~224	250~1400	
1010	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.6	0.7	0.9	1.1
1020	0.4	0.4	0.5	0.5	0.4	0.4	0.5	0.5	0.6	0.7	1.0	1.2	1.2
1030	0.5	0.6	0.6	0.7	0.5	0.6	0.6	0.7	0.7	1.0	1.2	1.4	1.4
1040	0.7	0.8	0.8	0.9	0.7	0.8	0.8	0.9	1.1	1.4	1.7	1.9	1.9
1050	0.9	1.1	1.3	1.4	0.9	1.1	1.3	1.4	2.2	2.6	2.9	3.1	3.1
1060	2.0	2.2	2.5	2.7	2.0	2.2	2.5	2.7	4.1	4.8	5.2	5.4	5.4
1070	3.5	3.8	4.5	4.9	3.5	3.8	4.5	4.9	5.2	6.7	7.2	7.5	7.5
1080	-	4.8	5.7	6.8	-	4.8	5.7	6.8	-	8.3	9.0	9.5	9.5
1090	-	5.9	7.0	8.0	-	5.9	7.0	8.0	-	9.0	9.9	10.5	10.5
1100	-	11	12	12	-	8.3	9.0	9.3	-	15	16	17	17
1110	-	14	13.5	14	-	10	9.5	9.7	-	18	20	20	20
1120	-	20	-	16.5	-	15	-	11.5	-	28	-	31	31
1130	-	21	-	22.5	-	15	-	16.2	-	28	-	33	33
1140	-	-	-	35	-	-	-	17	-	-	-	34	34
1150	-	-	-	-	-	-	-	-	-	-	-	-	-
1160	-	-	-	-	-	-	-	-	-	-	-	-	-
1170	-	-	-	-	-	-	-	-	-	-	-	-	-
1180	-	-	-	-	-	-	-	-	-	-	-	-	-
1190	-	-	-	-	-	-	-	-	-	-	-	-	-
1200	-	-	-	-	-	-	-	-	-	-	-	-	-
1210	-	-	-	-	-	-	-	-	-	-	-	-	-
1220	-	-	-	-	-	-	-	-	-	-	-	-	-

12 Warranty.

Our product warranty is limited to our products.

Warranty period	The warranty period for the Products shall be 18 months after the commencement of delivery or 18 months after the shipment of Products from the seller's works or 12 months from the Products coming into operation, whichever comes first.
Warranty Condition	<p>In Case that any problems, troubles or damages on the Products arise due to the defects in the Products during the above "Warranty Period", although the Products are appropriately and properly installed in, connected or combined to the equipment or machines, or maintained in accordance with the maintenance manual and are properly operated under the conditions as described in the catalogue or otherwise as agreed upon in writing between the Seller and the Buyer or its customers, the Seller will Provide, at its sole discretion, appropriate repair or replacement on the Products free of charge, except as stipulated in the "Exception for Warranty" as described below.</p> <p>However, in the event that the Products is installed in, connected or combined to or integrated into the equipment or machines, the Seller shall not reimburse the costs for removal or re-installation of the Products or other incidental costs related thereto and any lost opportunity, loss of profit or any other incidental or consequential losses or damages incurred by the Buyer or its customers.</p>
Exception for Warranty	<p>The warranty shall not be applied to the following items.</p> <ol style="list-style-type: none"> 1. Troubles caused by the installation or the connection of the Product in or to the other equipment or machines. 2. Troubles caused by insufficient maintenance or improper operation by the Buyer or its customers, such that the Product is not appropriately maintained in accordance with the maintenance manual provided by us. 3. Troubles caused by improper use or operation of the Products by the Buyer or its customers which are not informed to us, the Buyer's or its customers' operation of the Products not in conformity with the specifications, or use of the lubrication oil in the products which is not recommended by us. 4. Troubles caused by the failure of the connected equipment or the irregular specifications arranged by the Buyer or its customers. 5. Troubles caused by the rebuilding or structural alteration made by the Buyer or its customers. 6. Troubles caused by the failure of the parts, which are supplied or specified by the Buyer or its customers. 7. Troubles caused by the force majeure such as earth quake, fire, flood, salt damage, gas damage, lightning damage, etc. 8. Warranty for those consumable parts like bearings and oil seals, which are consumed, worn out, or deteriorated ordinarily even under the proper usage by the Buyer or its customers. 9. Troubles caused by other items than above, for which we are not responsible.

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