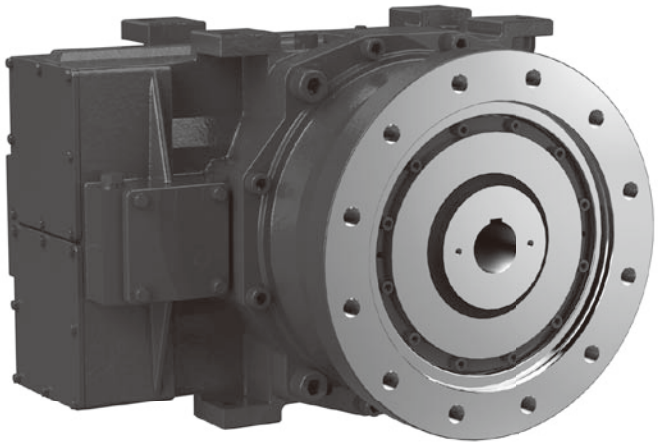
Sumitomo Drive Technologies

PARAMAX®

SEB Series
for Extruder



《CAUTION》

- These products should be handled, installed, and maintained by trained technicians. Carefully read the maintenance manual before use.
- Oil is removed from these products before shipment. Supply oil according to the maintenance manual before operation.
- A copy of this maintenance manual should be sent to the actual user.
- This maintenance manual should be kept by the user for future reference.

Sumitomo Heavy Industries Gearbox Co., Ltd. Maintenance Manual No.GM0302E-5

(Safety and other precautions)

- Carefully read this maintenance manual and all accompanying documents before use (installation, operation, maintenance, inspection, etc.). Thoroughly understand the machine, information about safety, and all precautions for correct operation.
  Maintain this manual for future reference.
- Pay particular attention to the "DANGER" and "CAUTION" warnings regarding safety and proper use.

DANGER : Improper handling may result in physical damage, serious personal injury and/or death.

CAUTION : Improper handling may result in physical damage and/or personal injury.

Matters described in **CAUTION** may lead to serious danger depending on the situation. Be sure to observe important matters described herein.

DANGER

- Transport, installation, plumbing, operation, maintenance, and inspections should be handled by properly trained technicians ; otherwise, injury or damage to the machine may result.
- When the unit is to be used in a system for transport of human beings, a secondary safety device should be installed to minimize chances of accidents resulting in injury, death, or damage to the system.
- When the unit is to be used for an elevator, install a safety device on the elevator side to prevent it from falling, otherwise, serious injury, death, or damage to the elevator may result.
- Do not disassemble PARAMAX DRIVE FOR EXTRUDERS during operation. Even if it is at rest, do not disassemble any parts other than the dip stick, oil inlet/outlet, and inspection cover when the input/output shafts of the PARAMAX DRIVE FOR EXTRUDERS is connected to a motor or other mating machines; otherwise falling or operation out of control due to disengagement of gears, as well as death, injury, or damage to the machine may result.

CAUTION

- The unit should be operated only within its design and performance specifications ; othrewise, injury or damage to a system may occur.
- Keep hands and all foreign objects from the internal moving parts of the unit ; otherwise, injury or damage to a system may occur.
- Damaged units should be taken off - line and not put back in operation until properly repaired.
- Any modifications or alterations of any kind, to the unit, will void the warranty and all subsequent claims.
- Do not remove the rating plate.

- Oil has been removed from PARAMAX DRIVE FOR EXTRUDERS before shipment from our factory, so supply oil before use.

CONTENTS

1. Inspection upon delivery

⚠ CAUTION

- Unpack the unit after verifying that it is positioned right side up ; otherwise, injury may result.
- Verify that the unit received is in fact the one ordered. When a different product is installed, injury or damage to the system may result.

Upon delively of the PARAMAX DRIVE FOR EXTRUDERS, check the following :

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

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 — 1) How to check the rating plate

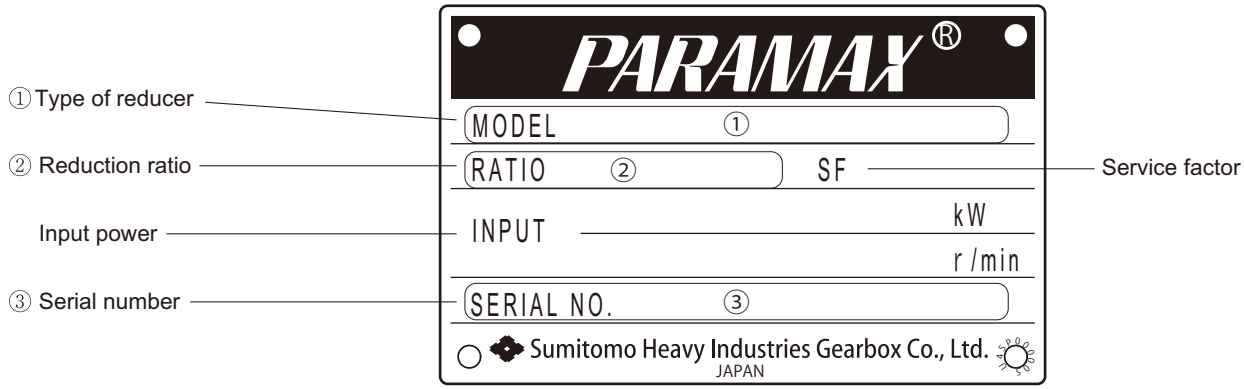
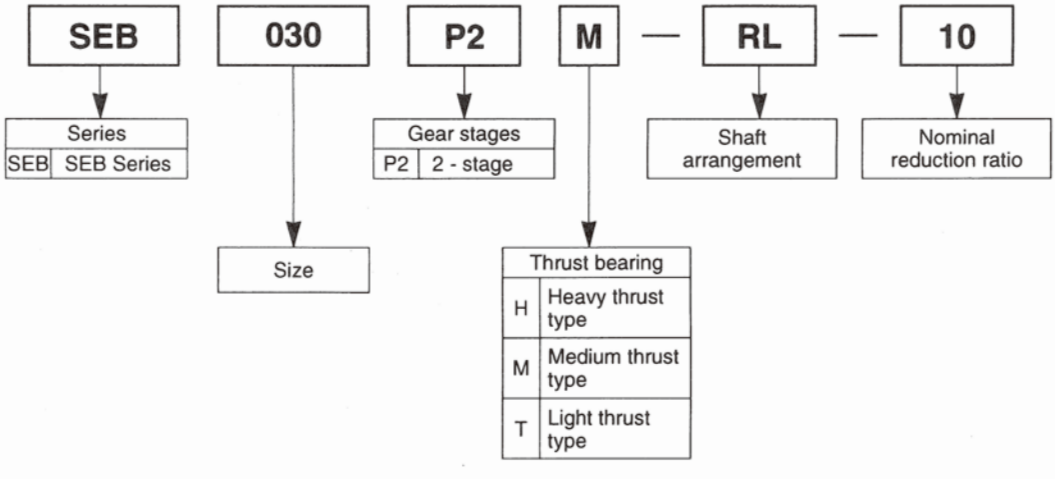


Fig. 1 Rating plate of reducer

· Have the ①MODEL ②RATIO ④SERIAL No. information ready when making inquiries.

1 — 2) Types of reducers

Symbols denote the following. Check that the type of reducer conforms to your order.



2. Storage

When storing PARAMAX DRIVE FOR EXTRUDERS for any extended periods of time before use, consider the following important points.

2 — 1) Temporary storage

(1) Store PARAMAX DRIVE FOR EXTRUDERS in a clean, dry, covered storage area.

· Do not store PARAMAX DRIVE FOR EXTRUDERS outdoors or in a wet location.

2 — 2) Long-term storage

(1) The oil seal will deteriorate when exposed to high temperatures and UV rays. Inspect and replace the oil seal after long-term storage if there are any signs of damage or cracking.

(2) After starting PARAMAX DRIVE FOR EXTRUDERS, check that it is free from abnormal sound, vibration, or heat build-up. (If any kind of anomaly is observed) contact the nearest agent, dealer, or service office immediately.

(3) Every 2 — 3 months after shipment, operate PARAMAX DRIVE FOR EXTRUDERS with the recommended lubricant for 5 — 10 minutes. If this is not possible, or when PARAMAX DRIVE FOR EXTRUDERS is to be stored for more than 6 months, fill the unit with the proper amount of vapor phase inhibitor (JIS NP20 or its equivalent) according to the inhibitor manufacturers recommendations.

3. Transport

⚠ CAUTION

- Exercise ample care not to drop PARAMAX DRIVE FOR EXTRUDERS during transport. When a hanging bolt or hole is provided, be sure to use it. After mounting PARAMAX DRIVE FOR EXTRUDERS on a system, however, do not hoist the entire system using the hanging bolt or hole. Before hoisting, check the weight with the rating plate, crate, outline drawing, catalog, etc. Never hoist a PARAMAX DRIVE FOR EXTRUDERS that exceeds the rating of the crane or other mechanism being used to lift it ; otherwise, injury or damage to the unit and/or lifting device may occur.

4. Installation

⚠ DANGER

- Never stand directly under a unit suspended by a crane or other lifting mechanism ; otherwise personal injury or death may result.

⚠ CAUTION

- Do not place any objects that will hinder ventilation around PARAMAX DRIVE FOR EXTRUDERS; otherwise, cooling effect is reduced, and may lead to a possible fire hazard due to excessive heat build-up.
- Do not step on or hang from PARAMAX DRIVE FOR EXTRUDERS; otherwise, injury may result.
- Do not touch the key way at the shaft end or on the inside of PARAMAX DRIVE FOR EXTRUDERS; otherwise, injury may result.
- When PARAMAX DRIVE FOR EXTRUDERS is used in food processing applications vulnerable to oil contamination, install an oil pan or other such device to cope with oil leakage due to failure or limited service life. Otherwise, oil leakage may damage products.

4 — 1) Location of installation

Ambient temperature : -10 to +40°C
Ambient humidity : 85% max.
Ambient atmosphere : There shall be no corrosive gas, explosive gas, or steam.
The installation space shall be well ventilated, and free from dust.
Location of installation : Indoors

· Special specifications are necessary when installation conditions are other than those mentioned here. In such cases contact the nearest agent, dealer or service office.
· When a product is made according to special specifications for outdoor use or use in explosive environments, the product can be safely operated under those specified conditions without problem.

4 — 2) Installation angle

Install the machine on a flat frame. (Be sure to contact us when the machine is to be installed on a slope.)
When the machine is made for a specific installation angle, do not install the machine at any angle other than the specified angle.

· Install PARAMAX DRIVE FOR EXTRUDERS on a sufficiently rigid base.
· Use installation bolts corresponding to JIS strength class 10.9 or its equivalent.

5. Coupling with other machines

⚠ CAUTION

- Install appropriate guard devices around rotating parts ; otherwise, injury may result.
- When coupling PARAMAX DRIVE FOR EXTRUDERS with a load, confirm that the alignment error is within the specified limits shown in the maintenance manual, drawings, catalog, etc. ; otherwise, damage to the system may result, due to misalignment.
- Correctly tighten respective bolts to the specified torque shown in the drawing, catalog, etc. ; otherwise ; scattering fragments may damage the system.
- When a belt is used for coupling the unit with another machine, check that the belt tension and the parallelism of the pulley are within the specified limits. When the unit is directly coupled with another machine, check that the direct coupling accuracy is within the specified limits ; otherwise, the system may be damaged, due to misalignment.
- Remove the key temporarily attached to the output shaft of PARAMAX DRIVE FOR EXTRUDERS when the shaft is free-rotating (i. e. not loaded) ; otherwise, injury may result.
- Confirm the direction of rotation before coupling PARAMAX DRIVE FOR EXTRUDERS with its driven machine. Difference in the direction of rotation may cause injury or damage to the system.

5 — 1) Installation coupler

· When attaching a coupler, be careful not to apply impact force or excessive thrust to the shaft ; otherwise, the bearing may be damaged.
· 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 shown in Table 1.

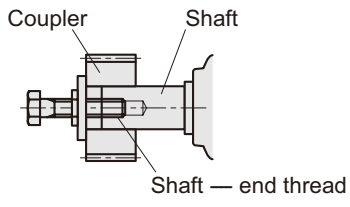


Fig. 2

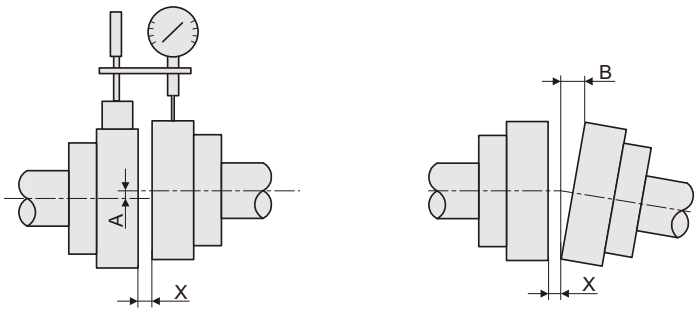


Fig. 3

Table 1 Aligning tolerance 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 PARAMAX DRIVE FOR EXTRUDERS.

· The pitch circle of the sprocket and gear shall be more than three times the shaft diameter.

· Locate the sprocket and gear as close to PARAMAX DRIVE FOR EXTRUDERS as possible so that the point of application of the load will be closer to the PARAMAX DRIVE FOR EXTRUDERS'S vertical centerline.

(3) Use of V belt

· Excessive V belt tension will damage the output shaft and bearing. The amount must be specified by V belt manufacturer.

· Eccentricity of parallelism between two pulleys shall be less than 20'. (Fig. 4)

· Use a matched set with identical circumferential length when more than one V belt is used.

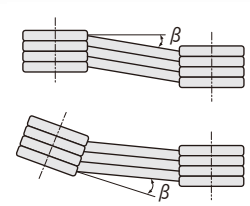


Fig. 4

6. Lubrication

6 — 1) Shipping condition

· PARAMAX DRIVE FOR EXTRUDERS units are shipped without oil. Supply oil before operation.

6 — 2) Method of lubrication

The oil bath lubrication method is used for PARAMAX DRIVE FOR EXTRUDERS. An oil pump may be used for forced lubrication depending on operating conditions.

6 — 3) Forced lubrication

⚠ CAUTION

● For a system in which a lubricant motor pump is provided separately, switch on the pump motor prior to switching on the reducer motor. This will enable praper lubrication of the bearings prior to start – up. Failure to do so may damage the unit.

Use a flow switch and/or sight to verify that lubricant is circulating, and for emergency motor stop if necessary.

6 — 4) Selection of lubricant

Refer to Table 2 to select appropriate viscosity.
Table 3 shows recommended lubricants.
The brand name may be changed. If so, make sure that the new brand-name product is interchangeable with the old brand-name product.

Table 2 Lubricant viscosity

	Ambient temperature		
	-10C° – +16C°	0C° – 30C°	10C° – 50C°
ISO* AGMA	VG100 3EP	VG150 4EP	VG220 5EP

*ISO : Kinetic viscosity (cSt) at 40˚C

Table 3 Recommended lubricants

	Brand	BP	CASTROL			CHEVRON TEXACO		EXXON MOBIL		SHELL	TOTAL
Gear Oil	ISO VG100 AGMA 3EP	ENERGOL GR-XP-100	ALPHA SP100	OPTIGEAR BM100	TRIBOL 1100/100	GEAR COMPOUNDS EP100	MEROPA WM100	–	MOBIL-GEAR 600XP 100	Shell Omala S2 G 100	CARTER EP100
	ISO VG150 AGMA 4EP	ENERGOL GR-XP-150	ALPHA SP150	OPTIGEAR BM150	TRIBOL 1100/150	GEAR COMPOUNDS EP150	MEROPA WM150	SPARTAN EP150	MOBIL-GEAR 600XP 150	Shell Omala S2 G 150	CARTER EP150
	ISO VG220 AGMA 5EP	ENERGOL GR-XP-220	ALPHA SP220	OPTIGEAR BM220	TRIBOL 1100/220	GEAR COMPOUNDS EP220	MEROPA WM220	SPARTAN EP220	MOBIL-GEAR 600XP 220	Shell Omala S2 G 220	CARTER EP220

6 — 5) Oil quantity

An estimated quantity of oil for standard specifications is shown in Table 4. The oil quantity shown in Tabel 4 and the catalog is not exact. Use a dipstick or visible oil gauge to check the oil level.

Table 4 Approx. quantity of oil (Unit : ℓ)

Size	004	005	010	020	030	040	050	060	070
Heavy thrust	–	3	6	8	10	18	27	–	–
Medium thrust	2	3	6	8	10	18	27	60	75
Light thrust	–	–	–	–	12	25	35	–	–

6 — 6) Oil supply

Supply oil through the filling port atop the main unit. Check the oil level with a dipstick or visual oil gauge. (Fig. 5) Exercise care when supplying oil to ensure that loose nuts, bolts, washers, dust, water, and other foreign substances will not enter the unit. In case the oil level is lower than the specified range, lubrication cannot be done sufficiently. In case the oil level is higher, deterioration of oil is accelerated due to oil temperature rise.

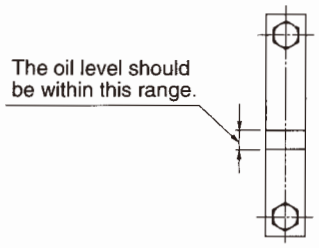


Fig. 5

6 — 7) Waste oil

Remove the drain plug under the main unit to drain waste oil while it is still warm. (i. e. Soon after operation of the unit has ceased. But not immediately after.)

7. Operation

DANGER

- Never approach or touch any rotating parts (shaft, etc.) during operation, loose clothing caught in these rotating parts may result in severe injury and/or death.

CAUTION

- The reducer will get very hot during operation. Do not touch or come in contact in any way with the reducer ; otherwise, you may suffer burns.
- If the reducer is operating in an abnormal way, stop the unit immediatery ; otherwise, injury may result.
- Do not operate the reducer in a manner that exceeds its rating criteria ; otherwise, injury or damage to the system may result.
- Do not remove any covers or open the reducer during operation ; otherwise, splashing lubricant may cause burns.
- Do not loosen the oil filler plug during operation ; otherwise, splashing lubricant may cause burns.
- When reversing the direction of rotation, first bring the unit to a complete stop, then commence reverse rotation ; otherwise, the system may be damaged.

After installation, check the following points prior to operation.
(1) Is the reducer correctly coupled with the mating machine ?
(2) Are foundation bolts firmly tightened ?
(3) Does the direction of rotation conform to the one specified and designed for ?
After confirming the above, allow for a no-load break-in period. Then gradually apply the design load.
At this time, confirm the following :

Table 5

Items to be checked during break-in period/possible causes.	
Abnormal sound and vibration	(1) The housing is deformed because the installation surface is irregular. (2) Resonance is occurring due to the lack of rigidity of the installation base. (3) The shaft center is not properly aligned with the mating machine. (4) The vibration of the mating machine is transmitted to the reducer.
The surface temperature of the reducer is abnormally high.	(1) The motor current has exceeded the rated current shown in the rating plate. (2) The voltage rise and drop of the motor is too large. (3) The ambient temperature at which the reducer is operating in is too high. (4) The oil is not at its specified level (too low or too high).

When an anomaly is found, stop operation, and contact the nearest agent, dealer, or service office.

8. Daily inspection and maintenance

⚠ DANGER

- Never approach or touch any rotating parts (shaft, etc.) when maintaining or inspecting the reducer during operation.
  Loose clothing cought in these rotating parts may result in severe injury and/or death.
- Be sure to stop both the driving and driven machines before checking any tooth surfaces, otherwise, you may be caught in the gear engaging section, resulting in severe injury and/or death.
- Do not operate any units without all (safety) covers in place. Failure to do so may cause injury and/or death.

⚠ CAUTION

- The surface of the reducer will get hot, do not touch the reducer ; otherwise, a burn may result.
- Do not change the oil during operation or soon after operation has ceased ; otherwise, the hot oil may cause burns.
- Do not remove any covers or open the reducer during operation ; otherwise, splashing hot lubricant may cause burn.
- Change lubricant according to the maintenance manual, and use only those recommended lubricants ; otherwise, the system may be damaged.

- Disassembly the machine 3 — 5 years after initial operation, depending on the operating condition. Replace the following parts to extend the service life.

Renewal parts

- ◆ Bearing, oil seal, nilosring, collar, key, shim, packing, retaining ring, and visible gauge.
- ◆ When forced lubrication is adopted
  All piping parts including pump (directly coupled with shaft).
  The adapter shaft is included for a pump directly coupled with the shaft.
  Special equipment (flow switch, cooler, etc.) as necessary.
- ◆ Shafts and gears when damage is found.
- ◆ Other parts (incl. special applications) as necessary.

The PARAMAX DRIVE FOR EXTRUDERS should be returned to our plant for disassembly, in principle. Advise us of the machine No. of the speed reducer to disassembly, serial No., type, number of speed reducers, and period.

8 — 1) Daily inspection

To ensure proper and contined optimum operation, use the table below to perform daily inspections of the unit.

Table 6

Inspection item	Details of inspection
Noise	Is there abnormal sound or sudden change in the noise characteristics during operation ?
Vibration	Is there sudden change in the vibration of the reducer excessive vibration ?
Surface temperature	Is the temperature of the surface of the reducer abnormally high (more than 90˚C) ? Or is it rising rapidly ? (The temperature rise during operation differs according to the type of reducers. A surface temperature of approx. 80˚C will not cause any adverse effects as long as it doesn't rise significantly above this level.)
Oil level	Is the oil level decreasing ? (Check the oil level with a dipstick or visible oil gauge when the reducer is not operating)
Oil leakage	Is oil leaking from the oil seal, etc. ?
Foundation bolt	Have any bolts come loose ?
Chain and belt	Have any transumission belts or chains come loose ?

When any abnomality is found during daily inspection, take appropriate corrective measures based on "9. Troubleshooting (P. 9)"

If normal operation is still not possible, contact the nearest agent, distributor, or service office.

8 — 2) Change of lubricant

(1) Change oil 500 hours or 6 months whichever comes first after initial start-up. The second oil change should be after 2,500 hours or 6 months, whichever comes first.

(2) In case of the oil temperature is below 70˚C, a 50000 hour or 1 year (whichever comes first) change interval is recommended.

(3) In case of the oil temperature is above 70˚C, a 2500 hour or 1 year (whichever comes first) change interval is recommended.

(4) Deterioration of the oil will be accelerated when the ambient temperature changes rapidly or the ambient atmosphere contains corrosive gases. In these situations consult with the lubricant manufacturer.

8 — 3) Lubricant cooler (Special specification)

· Periodically inspect and clean the cooling pipe and water cooling unit. The periodical inspection cycle depends on the degree of oil contamination and the quality of cooling water. However, be sure to conduct inspection and cleaning every 3 — 6 months.

· Unless water quality control is sufficient, water leakage may occur although inspection and cleaning are conducted periodically.

· The quality of cooling water should conform to JRA9001 (The Japan refrigeration and air conditioning industry association).

Standard values are shown in the table below for reference.

(1) maintenance of cooling pipe

· Remove the lubricant from the reducer and remove the cooling pipe mounting bolt, and the cooling pipe can be removed from the reducer. Remove the cover plate tightening bolt, and separate the cover plate from the main unit for inspection.

· When the reducer will not be used for an extended period of time, remove the cooling water. Cooling water remaining in the pipe will cause corrosion. The same applies to cases where the reducer operation is stopped in places where cooling water will be frozen in winter.

(2) Maintenance of water cooling unit

· Remove the hood on the U — turn side to check the water cooling unit for contamination. Remove the oil from the drain plug of the cooling unit to check the condition of the oil side. Check the anticorrision zinc bar at that time, and replace it with a new one when it is reduced by half or less. It should be changed in 3 — 6 months depending on the water quality.

· When the reducer is to be operated in places where cooling water is frozen in winter, remove cooling water every day.

pH	(25˚C)	6.5 — 8.0	Sulfate ion	(PPM)	200 or less
Electric conductivity	(25˚C μs / cm)	800 or less	Total ion	(PPM)	1.0 or less
M alkalinity	(PPM)	100 or less	Ammonium ion	(PPM)	1.0 or less
Total hardness	(PPM)	200 or less	Sulfur ion	(PPM)	Not detected
Chlorine ion	(PPM)	200 or less	Silica	(PPM)	50 or less

(PPM = mg / liter)

(The Japan refrigeration and air conditioning industry association)

9. Troubleshooting

⚠ CAUTION

- Identify and provide appropriate corective action in a timely fashion for any abnormal operation characteristics according as the maintenance manual. Do not operate the unit until corrective action has been taken.

When any abnomality occurs in the reducer, refer to the following table and take appropriate measures as soon as possible.

Table 7

Details of trouble		Cause	Correction
The input shaft rotates, but the output shaft will not.		Damage due to overloaded gears or shafts	Repair at a specialized workshop
The output shaft turns when there is no load.	But it seizes up when a load is applied.	The key is out of position	Place the key in position
		Scorched bearing	Repair at a specialized workshop
		Poor adjustment of protective device	Adjust the protective device
	Reverse rotation is possible.	Incorrect wiring for the motor	Change the connection
Excessive temperature rise		Overload	Reduce the load to the specified value
		The ambient temperature it too high	Improve the ventilation method
		Damage due to overload applied to gears, bearings, etc.	Repair at a specialized workshop
Oil leakage	Oil leaks from the input / output shaft sections.	Damaged oil seal	Change the oil seal
		Scratches or abrasion of the lip contact section	Repair at a specialized workshop
	Oil leaks from the joint surface of the housing.	Loose tightening bolt	Tighten the tightening bolts to their proper torque
Abnormal sound. Excessively high vibration.		Damaged gears, shafts, or bearings	Repair at a specialized workshop
		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 the mating machine	Align the shaft center
		Transmission of the mating machine's vibration to the reducer	Independently operate the reducer to check the source of abnormal sound

10. Disassembly / reassembly and disposal

10 — 1) Disassembly and reassembly

⚠ CAUTION

- Repair, disassembly, and reassembly should be handled by properly trained technicians ; otherwise, the system may be damaged.

10 — 2) Disposal

⚠ CAUTION

- Dispose the reducer and lubricant as general industrial waste.

11. Construction drawing

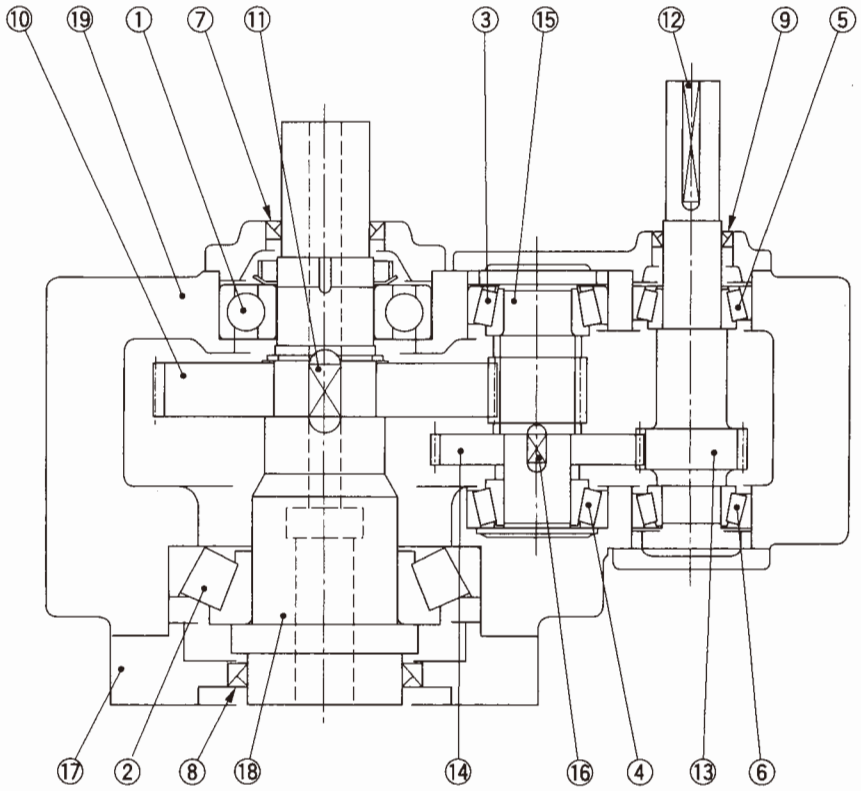


Fig. 6 SEB004

Ref. No.	Part name
1 — 6	Refer to the list of bearings (Table 9).
7 — 9	Refer to the list of oil seals (Table 8).
10	Helical gear
11	Key
12	Key
13	Helical pinion shaft
14	Helical gear
15	Helical pinion shaft
16	Key
17	Flange cover
18	Hollow shaft
19	Housing

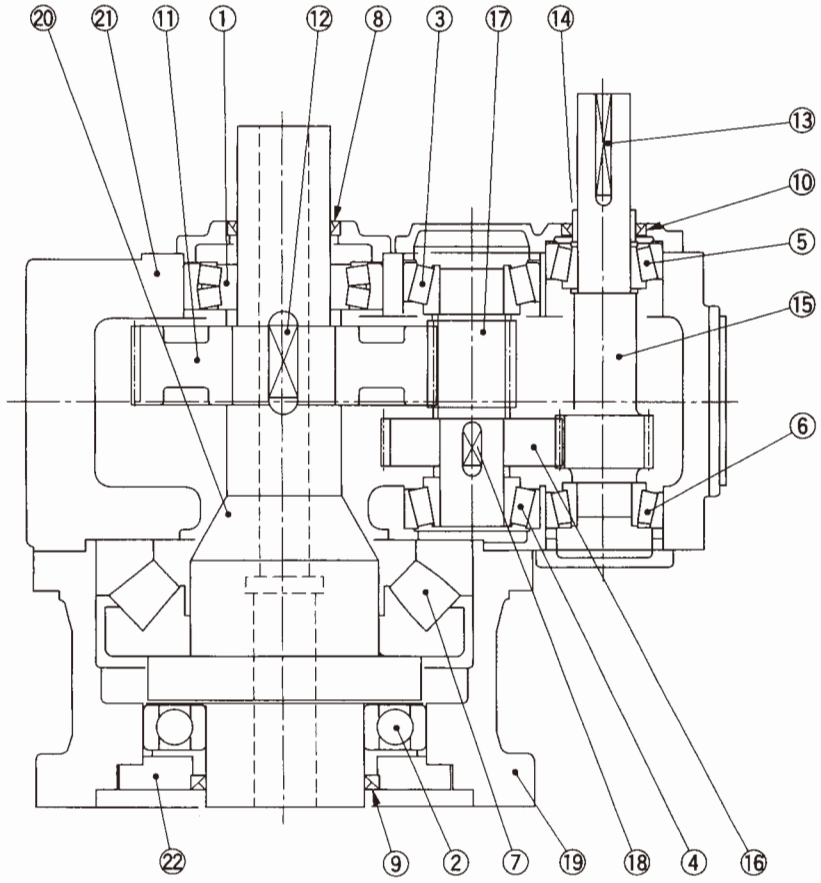


Fig. 7 SEB005 — 050 (Heavy and medium thrust types)

Ref. No.	Part name
1 — 7	Refer to the list of bearings (Table 9).
8 — 10	Refer to the list of oil seals (Table 8).
11	Helical gear
12	Key
13	Key
14	Collar
15	Helical pinion shaft
16	Helical gear
17	Helical pinion shaft
18	Key
19	Bearing case
20	Hollow shaft
21	Housing
22	Cover

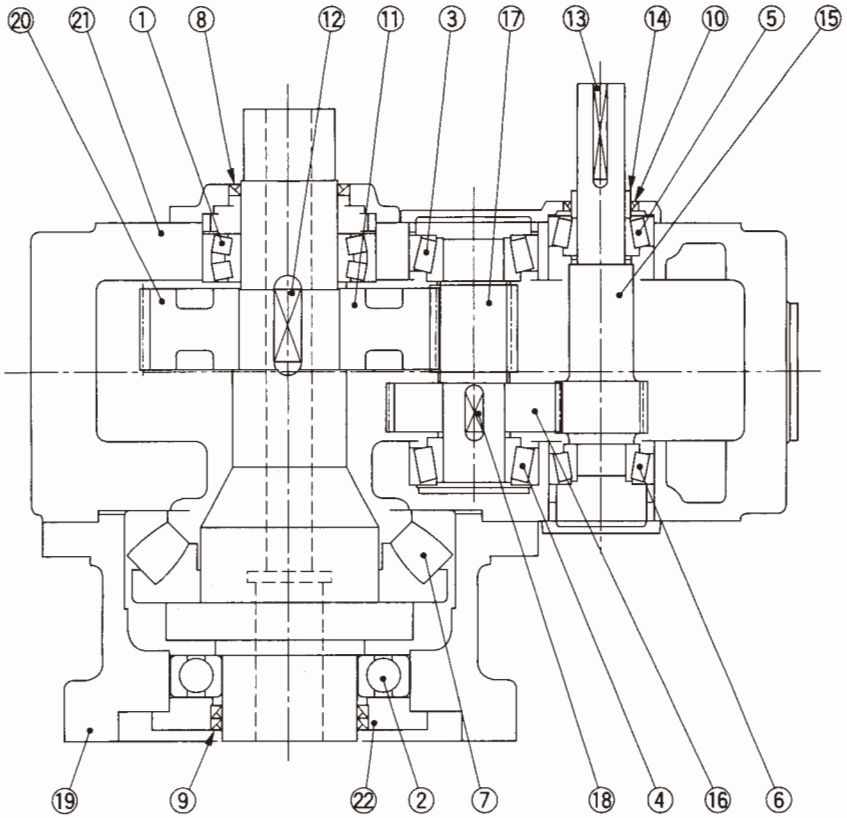


Fig. 8 SEB060, 070

Ref. No.	Part name
1 — 7	Refer to the list of bearings (Table 9).
8 — 10	Refer to the list of oil seals (Table 8).
11	Helical gear
12	Key
13	Key
14	Collar
15	Helical pinion shaft
16	Helical gear
17	Helical pinion shaft
18	Key
19	Bearing case
20	Hollow shaft
21	Housing
22	Cover

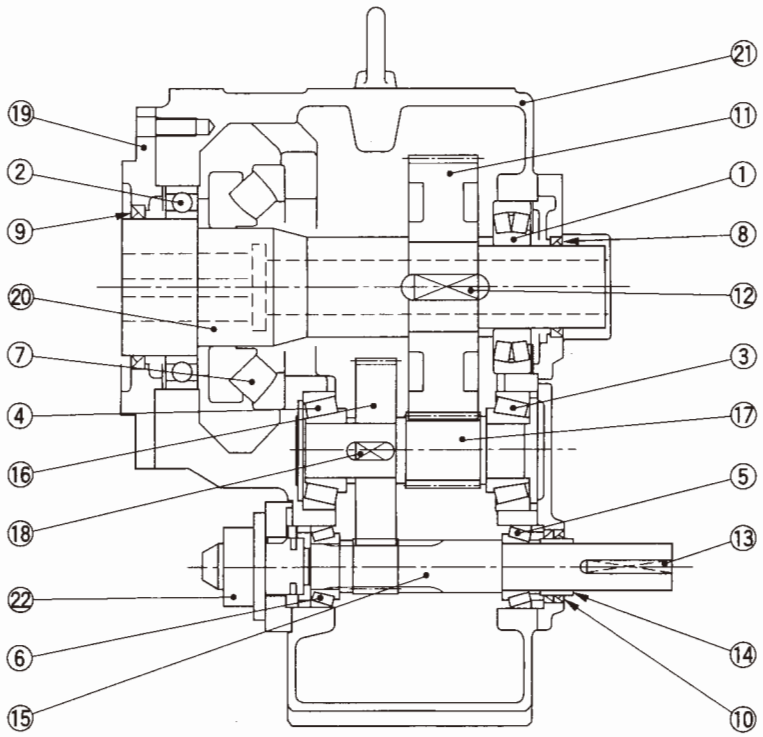


Fig. 9 SEB030 — 050 (Light thrust types)

Ref. No.	Part name
1 — 7	Refer to the list of bearings (Table 9).
8 — 10	Refer to the list of oil seals (Table 8).
11	Helical gear
12	Key
13	Key
14	Collar
15	Helical pinion shaft
16	Helical gear
17	Helical pinion shaft
18	Key
19	Flange cover
20	Hollow shaft
21	Housing
22	Oil pump

12. Locations of oil filler and drain plug

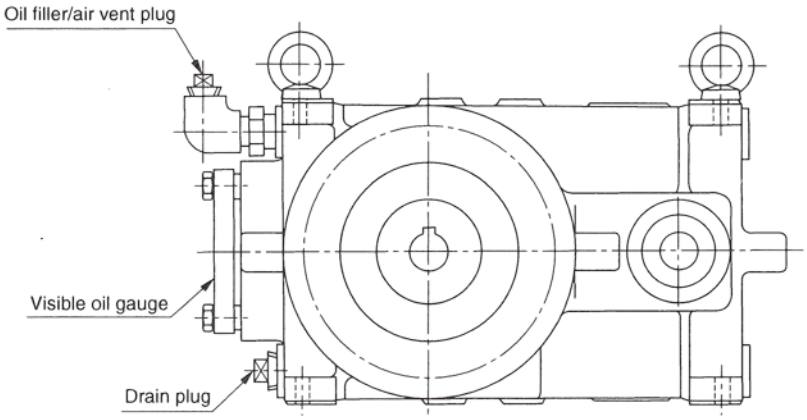


Fig. 10 SEB004

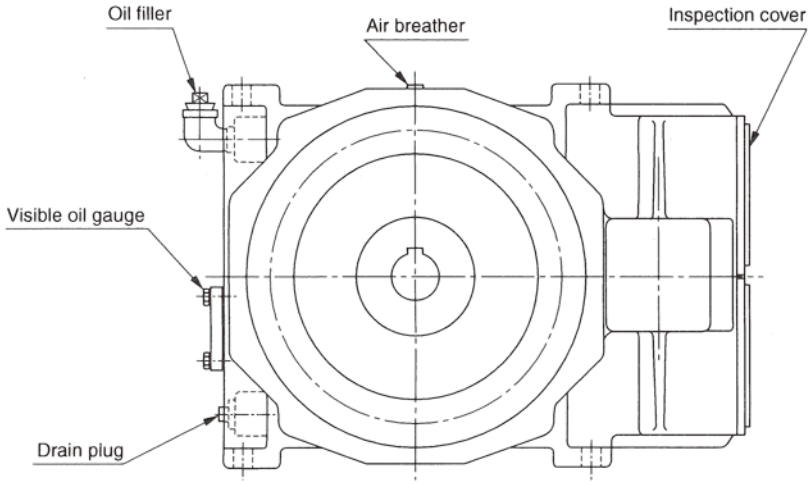


Fig. 11 SEB005 — 050 (Heavy and medium thrust types)

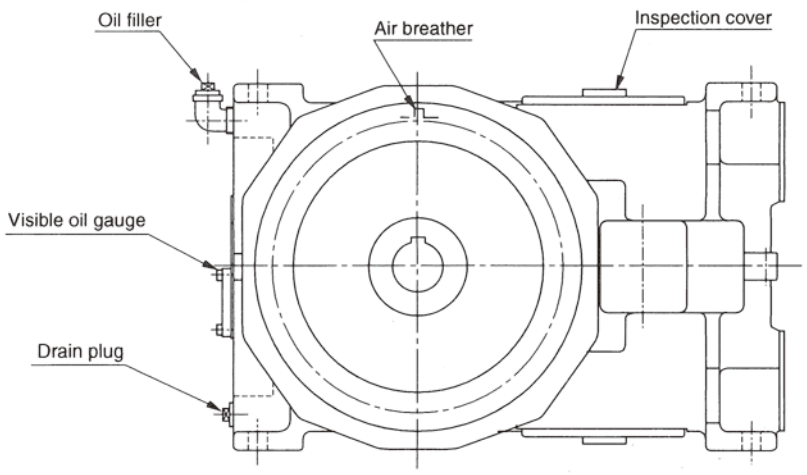


Fig. 12 SEB060 and 070

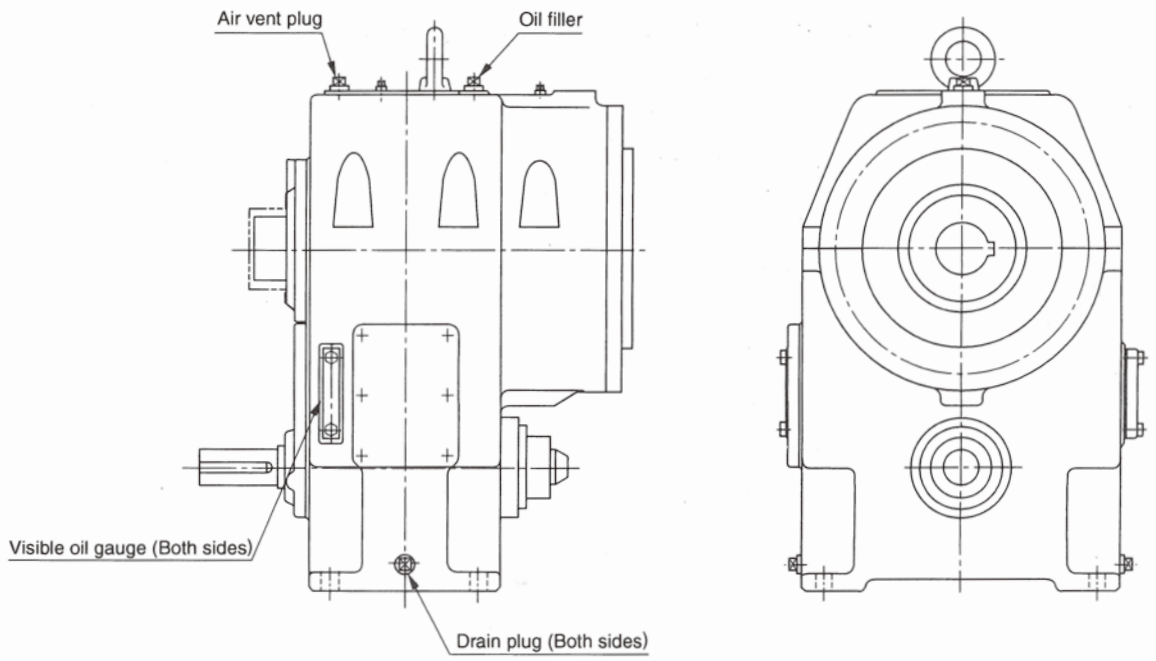


Fig. 13 SEB030 — 050 (Light thrust type)

13. Warranty

The scope of our warranty for our products is limited to the range of our manufacture.
Warranty (period and contents)

Warranty Period	The warranty period for the Products shall be 18 months after the commencement of delivery or 18 months after the shipment of the Products from the seller's works or 12 months from the Products coming into operation, whether comes first.
Warranty Condition	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. 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.
Exception for Warranty	Notwithstanding the above warranty, the warranty as set forth herein shall not be applied to the problems, troubles or damages on the Products which are caused by: 1. installations, connections, combinations or integration of the Products in or to the other equipment or machines, which are rendered by any person or entity other than the Seller, 2. the 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 or designated by the Seller, 3. the improper use or operation of the Products by the Buyer or its customers which are not informed to the Seller, including, without limitation, 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 the Seller, 4. troubles, problems or damages on any equipment or machines in or to which the Products are installed, connected or combined or installed, or any specifications particular to the Buyer or its customers, or 5. any changes, modifications, improvements or alterations on the Products or those functions which are rendered on the Products by any person or entity other than the Seller, 6. any parts in the Products which are supplied or designated by the Buyer or its customers, 7. earthquake, fire, flood, sea-breeze, gas, thunder, acts of God or any other reasons beyond the control of the Seller, 8. waste, exhaustion, normal tear or ware, or deterioration on the parts of the Products, such as bearing, oil-seal. 9. any other troubles, problems or damages on the Products which are not attributable to the Seller.

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No.GM0302E-5.1
EH11 Printed 2020.08