ANEST IWATA

Instruction Manual

Maintenance Tools and Fixtures

OCX-793B

ISP-250B/250C

ISP-500B/500C

This instruction manual includes important warnings, cautions, and instructions for safe and effective use of the scroll vacuum pump. Be sure to read this manual thoroughly and understand it fully before use. Keep it an appropriate place for immediate reference.

ANEST IWATA Corporation

3176 Shinyoshida-cho, Kohoku-ku, Yokohama 223-8501, Japan

Manual No.V074-00

Code No. 08801913

NOTE

Important information

This is the instruction manual of exclusive tools (OCX-793B) which are used when you maintain and inspect oil-free scroll vacuum pumps ISP-250B,-250C,-500B and 500C. Be sure to read this instruction manual as well as instruction manual for the related scroll vacuum pumps in order to correctly understand its operation, functions and maintenance. The operator shall be fully conversant with the requirements stated within this instruction manual including important warnings, cautions and operation. Wrong operation (mishandling) can cause serious bodily injury, death, fire or explosion.

◆ About safety

Warnings and cautions are especially important for safe operation. Symbols and marks have the following meanings.

Examples of warnings and cautions

⚠ **WARNING**	Indicates a potentially hazardous situation which, if not avoided, may result in serious injury or loss of life.
⚠ **CAUTION**	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

Examples of symbols

	Indicates「you must be careful」. We will briefly explain in or near the symbol. (The example on the left is [Be careful about electric shock])
	Indicates「you must not do」. We will briefly explain in or near the symbol. (The example on the left is [Never touch])
	Indicates「you must do」. We will briefly explain in or near the symbol. (The example on the left is [Be sure to ground])

＊We shall not be responsible for any injury or damage caused by disregard of warnings, cautions or instructions.

Supplementary notes

Important	Indicates notes which we ask you to observe. They are helpful to achieve full performance and function of the equipment.

Contents

1. For safe operation

As the points below are very important for safe operation, be sure to fully read and understand before inspection and maintenance, and operate correctly.

⚠ WARNING

 Pump clean gas	Never pump toxic, explosive, flammable, corrosive gases, chemicals, solvents or powders. ※When you inspect the pumps, flowing substances, explosion or fire can cause bodily injury.

 Cut off electric source	Be sure to cut off electric source before wiring or inspection. ※If not, it can cause electric shock or damage by turning section(Fan).

 Maintenance after Pump is cool	Do the maintenance after pump becomes fully cool. ※ If not, it can cause burns injury.

 Install breaker	Prevent short-circuit by breaker of proper volume. ※If not, it can cause fire or electric shock.

 Be sure to ground	Be sure to ground. ※ If not, it can cause electric shock or fire.

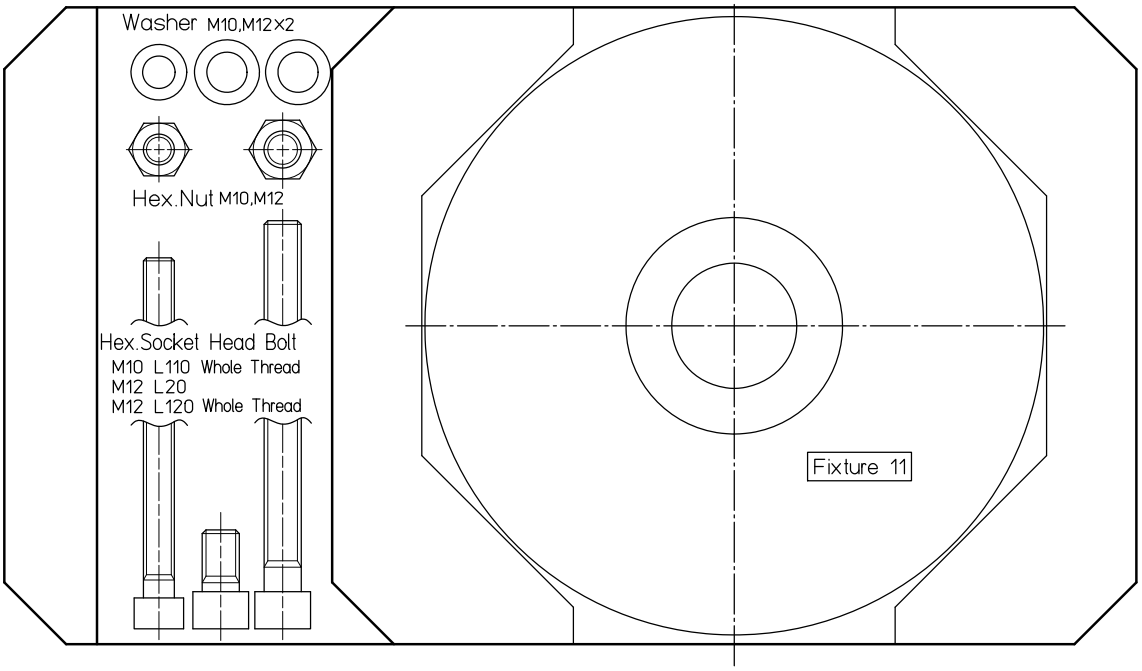
⚠ CAUTION

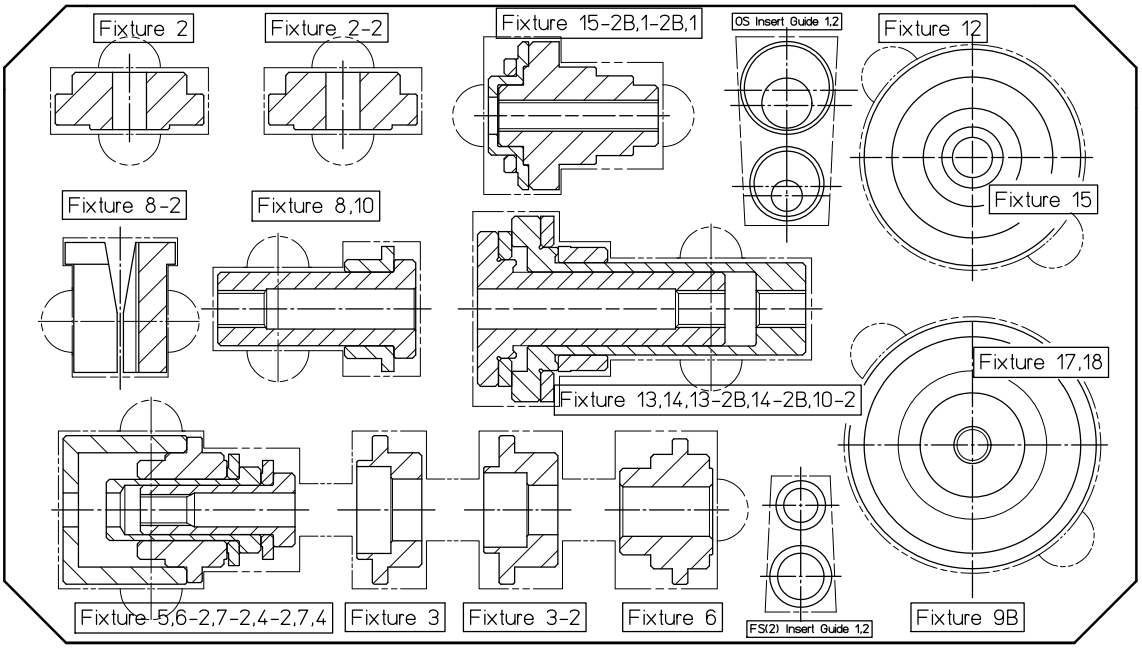
 Use ISP exclusive grease	Be sure to use **ISP exclusive grease** for Bearings. ※ Mixing with other oil can shorten grease lifetime and damage Bearings.

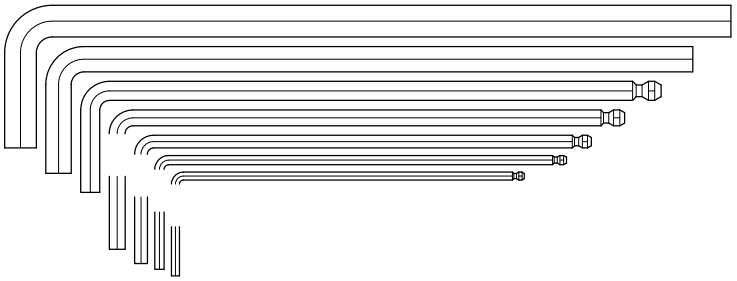
 Conduct periodic maintenance	Conduct periodic maintenance and inspections. ※ If not, it can cause damage or shorter lifetime.

 Never use solvent	Never use solvent when cleaning inside the pump and Tip Seal. ※ If done, it can shorten lifetime.

2. Names of Fixtures and Tools (OCX-793B)







Hex.Bar Spanner

Wrench Flat 10	Long Type
Wrench Flat 8	Long Type
Wrench Flat 6	Ball at Tip,Long Type
Wrench Flat 5	Ball at Tip,Long Type
Wrench Flat 4	Ball at Tip,Long Type
Wrench Flat 3	Ball at Tip,Long Type
Wrench Flat 2.5	Ball at Tip,Long Type

3. Preparation

3.1 Check the product (OCX-793B)

①Check that model name is as you ordered (Model name is attached to side of package).
②Check that there is no shortage or damage. If so, contact the distributor who sold it to you.
③Check that accessory (instruction manual) is attached.

3.2 Install Pump

Refer to an instruction manual of the pumps.

4. How to use

These are exclusive tools for doing the maintenance and inspection of Oil-Free Scroll Vacuum Pumps, ISP-250B,-250C,-500B and 500C.

⚠ WARNING	
Do the maintenance after pump becomes fully cool. ※If not, it can cause burns injury.	 Maintenance after Pump is cool
Be sure to cut off electric source before wiring or inspection. ※If not, it can cause electric shock or damage by turning section(Fan).	 Cut off electric source

⚠ CAUTION	
Conduct periodic maintenance and inspections. ※If not, it can cause damage or shorter lifetime.	 Conduct periodic maintenance

4.1 Maintenance standards

Do the maintenance according to maintenance standards which are shown in time and period, whichever comes first. Maintenance items at each point include all items up to the time before. Do the maintenance carefully without missing any points.

Parts No.	Where to inspect	Maintenance standards			Remarks
		Minor	Major	Vapor pumping	
		Every 8,000hr	Every 16,000hr	Every 400 times	
18	Needle bearing [FS(2)]	grease／△	○	△	Supply with Bearing kit
21	Needle bearing [OS]	grease／△	○	△	
31	Ball bearing [FS(1)]	△	○	△	
37	O ring [Pin crank･Needle bearing]	△	○	△	
38	Needle bearing [Pin crank]	grease／△	○	△	
53	Spider	△	○	△	
17	G-seal [FS(2)]	○	○	△	Supply with Seal kit
19	Shaft seal(2) [FS(2)]	○	○	△	
20	G-seal [OS]	○	○	△	
28 - 1	Shaft seal(1) [FS(1)]	○	○	△	
28 - 2	G-seal [FS(1)]	○	○	△	
75 *1	Seal [Pin crank･Needle bearing]	○	○	△	
107	Exhaust valve set	○	○	△	
23	O ring [FS(2)]	○	○	△	Supply with O ring set
25	O ring [Inlet flange]	○	○	△	
202 *2	O ring [Outlet flange]	○	○	△	
101	Tip seal set(1)	△	○	△	Supply with Tip seal set
103	Tip seal set(2)	△	○	△	
104	Pin crank set	△	△	△	
306 *1	Air flush set	○	○	○	

○. . . Replace
△. . . Replace if something goes wrong

＊1 ISP-500B/-500C only
＊2 ISP-250B/-250C only

Important

Causes of failure

Shorten maintenance interval if conditions of installation place or operation is inappropriate.
Especially ambient temperature has great influence on failure.
Maintenance interval is based on 5～40℃ ambient temperature and 25℃ average yearly ambient temperature.
Shorten maintenance interval if temperature is over it. If not, it can cause failure.
Maintenance interval is not a guarantee interval.

⚠ CAUTION

Be sure to use **ISP exclusive grease** for Bearings.
※Mixing with other oil can shorten grease lifetime and damage Bearings.

Use ISP exclusive grease

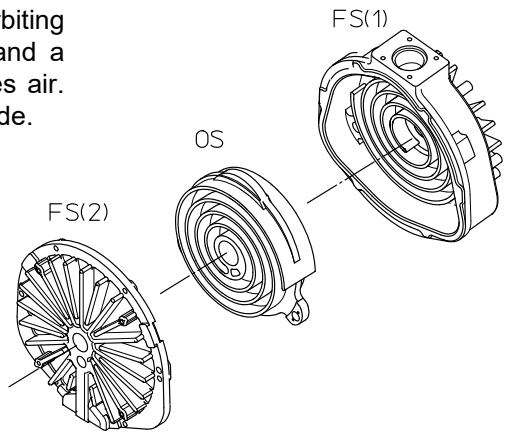
4.2 Necessary items for maintenance

Prepare the following items before maintenance.

1. Block（large） 2pcs.
   (55mm×55mm×length 250mm　wood which does not damage pump)
2. Block（small） 1pc.
   (20mm×10mm×length 250mm　wood which does not damage pump)
3. Clean cloth
4. Spanners (・17mm wrench flat　・19mm wrench flat　・24mm wrench flat)
5. Torque wrench for bolt with Hex. Socket head
   - for 4mm wrench flat which can measure 3.0N・m (30kgf・cm) torque
   - for 5mm wrench flat and 6mm wrench flat which can measure15N・m (150kgf・cm) torque
6. Rubber mat which can prevent sliding
7. Straight edge screwdriver
8. Cross head screwdriver
   - small for M3（tip shape No.1）
   - medium for M4（tip shape No.2）
9. Cutter (Sharp knife)
10. LOCTITE 242 or 542 (medium strength)
11. Tweezers（more than 150 mm）
12. Bamboo spatula, Brass brush
13. ISP exclusive grease
14. Stop ring supplier
15. Vernier caliper
16. Ampere meter (Clamp meter)
17. Air compressor etc.
18. Pirani vacuum gauge
19. Leak detector

4.3 Pump structure

This Pump is a scroll type vacuum pump. An orbiting scroll (OS) rotates between a fixed scroll FS(1) and a fixed scroll FS(2) and the set of scrolls compresses air. FS(1) is on Motor side and FS(2) is on Fan Cover side.



5. Minor Maintenance - Every 8,000 hours

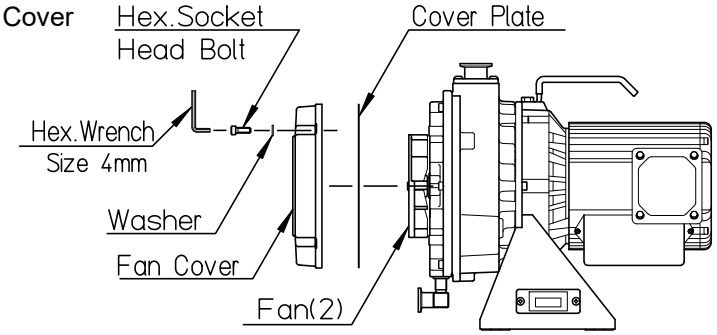
5.1 Disassembly

Important	Before disassembly, open Inlet to atmospheric pressure, repeat close-open operation for a couple of times in order to clean inside the pump, and cut off electric source.

⚠ WARNING	
Be sure to cut off electric source before wiring or inspection. ※If not, it can cause electric shock or damage by turning section(Fan).	 Cut off electric source

5.1.1 Remove Fan Cover

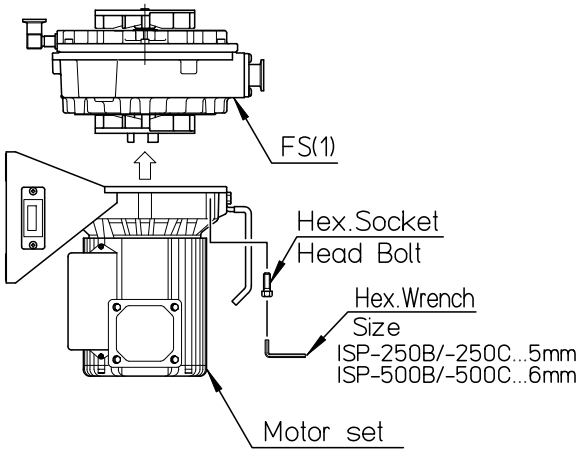
・Remove 4 Hex. Socket head bolts which tighten Fan Cover, and remove Fan Cover and Cover Plate.



Important	**Rotate Fan by hand and check smooth rotation, and remember the feeling of rotating resistance.** When reassembling, check the slightly heavier rotating resistance. If rotation is not smooth, something will go wrong inside the pump. Check each Bearing and replace it if something goes wrong.

5.1.2 Remove Body set

・Place the pump vertically with Motor downwards.
・Remove Hex. Socket head bolts which hold Motor set and FS(1), lift Body set and separate it from Motor set.

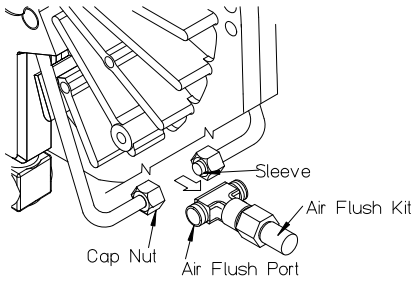


Important	**Rotate Motor Shaft by hand and check the smooth rotation.** If rotation is not smooth with some resistance, check Motor Bearings and Motor, and replace it if something goes wrong.

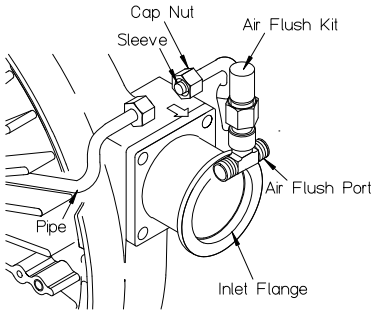
5.1.3 Remove Air Flush Port or Air Flush Kit

5.1.3.a ISP-250B／500B Version

①Loosen nuts while keeping Air Flush Port and pipes by spanner.
②After taking FS(2) away, remove Air Flush Port.



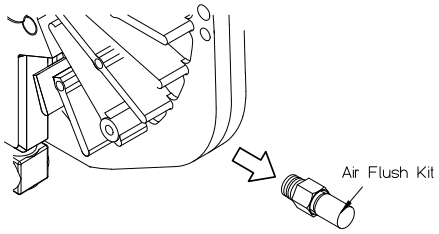
ISP-250B



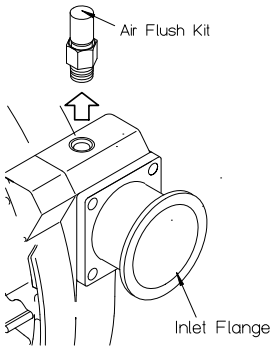
ISP-500B

5.1.3.b ISP-250C／500C Version

①Remove Air Flush Kit from pump.



ISP-250C



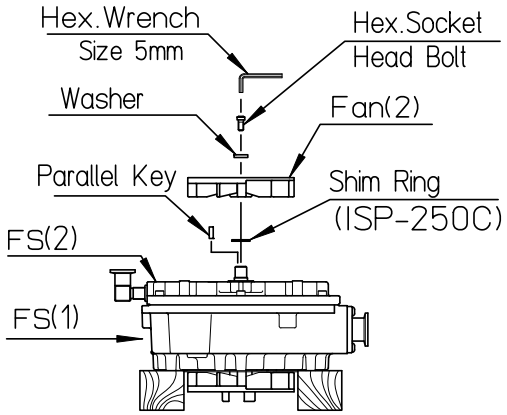
ISP-500C

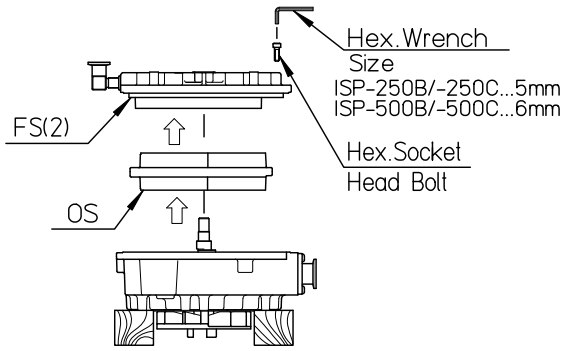
5.1.4 Disassembly of Body set

①Place Body set with FS(1) downwards on 2 blocks (wood which height is over 55mm).

②Remove Hex. Socket head bolt which fixes Fan(2) on FS(2) side, and remove Washer, Fan(2) and Parallel Key. （In the case of ISP-250C,remove Shim Ring between FS2 and Fan(2) as well.）

③Loosen Hex. Socket head bolts diagonally by turns which fix FS(2), and remove them.
・Pull FS(2) towards axis and remove it.
・Pull OS towards axis and remove it.



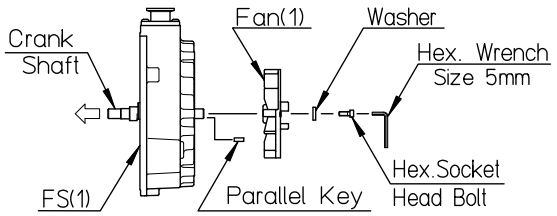


Important

・When pulling FS(2) and OS, pay attention not to damage Needle Bearing or Shaft Seal with angle of Key groove of Crank Shaft.
・When you cannot pull OS due to damaged OS Needle Bearing, first do ④ item , pull Crank Shaft and OS at the same time, and separate OS and Crank Shaft from FS(2) side .
・Do not lose the Shim Ring for ISP-250C.

④Remove Hex. Socket head bolts which holds Fan(1) on FS(1) side, and remove a Washer and Fan(1).

・Remove Parallel Key and pull Crank Shaft.



5.2 Replace O ring

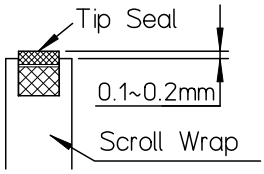
When replacing o-rings, clean up the ditch for O rings by clean cloths and put new O rings. Refer to 4.1 Maintenance standards for maintenance intervals and 9. Extended Drawing for the positions of O rings, the list of O rings is:

- O ring between FS(1) and FS(2)
- O ring for Inlet Flange
- O ring for Outlet Flange (only for ISP-250B/250C)
- O rings for Pin Crank

Important	・Pay attention not to damage O ring groove and sealed O ring surface. **・Pay attention not to leave any thread of cloth in O ring surface and O ring groove.**

5.3 Clean Tip Seal

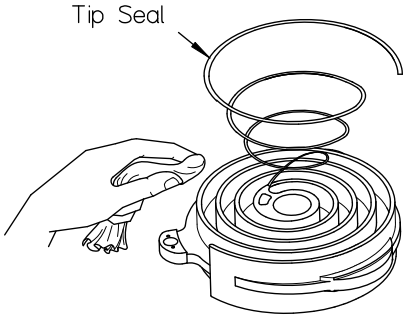
Important	**・Check that top of Tip Seal comes out from the groove of FS(1),FS(2) and OS** **・(by about 0.1mm) at any point.** **・If extrusion is less than 0.1mm at any point, replace all Tip Seals at the same time (refer to 6.9).** **Tip Seal height:** **ISP-250B/-250C: 2.23～2.29mm** **ISP-500B/-500C: 2.65～2.75mm** If it is not replaced, tip of scroll wrap contacts counter surface (bottom) and damages it, resulting in failure.



5.3.1 Remove Tip Seal

・Gradually remove old Tip Seal from the end of outer periphery edge.

Important
・If you feel resistance when removing Tip Seal, dust will attach to side and groove of Tip Seal. Wipe out dust from the groove and Tip Seal by using clean cloth and bamboo spatula. **・Remember each Tip Seal position to return it to original position.**



5.3.2 Clean Tip Seal

・Lightly wipe out both sides of Tip Seal while black sliding material facing upwards.

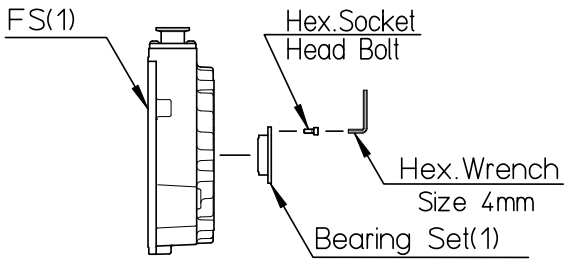
Important	**・If you feel resistance when removing Tip Seal, dust will attach to side and groove of Tip Seal. Wipe out dust from the groove and Tip Seal by using clean cloth and bamboo spatula.** **・Never use solvent.** ・It makes Tip Seal expand to clean too hard, which results in making it difficult to insert it into the groove.

⚠ CAUTION	
Never use solvent when cleaning inside the pump and Tip Seal. ※If done, it can shorten lifetime.	Never use solvent

5.4 Maintenance of FS(1)

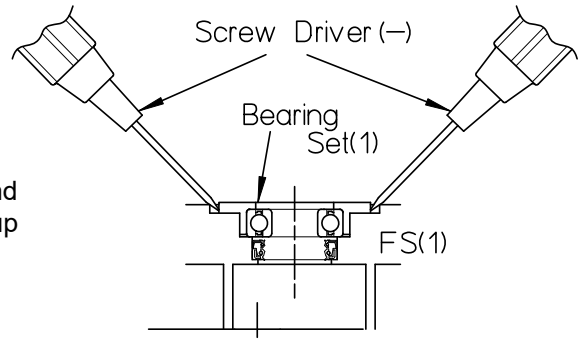
5.4.1 Remove Bearing set(1)

①Remove Hex. Socket head bolts which hold Bearing set(1).



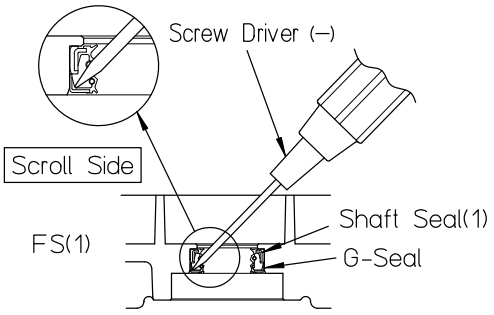
②Insert 2 straight edge screwdrivers under outer dia. of Bearing set(1), lift it up and remove it.

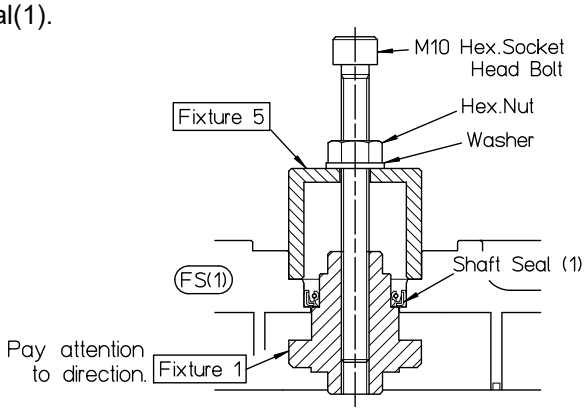
* Do not lose Washer between Bearing Set(1) and FS(1) only for ISP-250B/250C. Clean it up before it is assembled later.



5.4.2 Remove G-seal and Shaft Seal(1)

- Insert straight edge screwdriver to G-seal from the scroll side, hit the screwdriver and remove it.
- Insert **Fixture 1** to Shaft Seal(1) from scroll side, fit **Fixture 5** to FS(1) from the opposite side, and screw **M10** Hex. Socket head bolt with Washer, and Hex. nut .
- Turn Hex. nut and remove Shaft Seal(1).





Important	・**Check direction of Shaft Seal(1).** Side of Shaft Seal(1) where you can see spring faces G-seal. ・**Pay attention to direction of Fixture 1.** Check direction of **Fixture 1** in the drawing above. ・**Remove Shaft Seal(1) toward the Fin side (opposite side of scroll).**

5.4.3 Clean FS(1)

①Wipe out dust on the place where Bearing of FS(1) and Shaft Seal(1) enter.

・Wipe out dust on wall and bottom of scroll wrap, inside the Inlet Flange and Inlet Filter with clean cloth.

・Wipe out dust on side and bottom of Tip Seal groove by using clean cloth and bamboo spatula.
・Wipe out dust which remains at Pin Crank and inner wall of FS(1).
・Blow out the whole unit with air.

Important	**・If you feel some resistance to remove Tip Seal , be sure to wipe out dust.** **・Be sure to clean Tip Seal groove with soft bamboo spatula since groove is fragile.** **・Always use clean cloth.** Mixing with other grease can greatly deteriorate its performance. **・Pay attention not to leave the waste thread in the Bearings.**

②Turn Pin Crank by hand and check that it turns lightly and smoothly.
・If you feel rumble when turning by hand, replace all Pin Crank with new one.
③When replacing Pin Crank set, remove two screws with cross head screwdriver.
・Wipe out adhesives and dust around screws.
・Fit new Pin Crank set and tighten by **screws with slight amount of LOCTITE 242 or 542.**

Important	**・Use LOCTITE 242 or 542 (medium strength).** **・Apply slight amount of LOCTITE to thread section.** **・Wipe out extruded LOCTITE with clean cloth.**

5.4.4 Fit Shaft Seal(1)

①Apply slight amount of **LOCTITE 242 or 542 to outer periphery of new Shaft Seal(1).**

ＩＳＰ－２５０Ｂ／２５０Ｃ

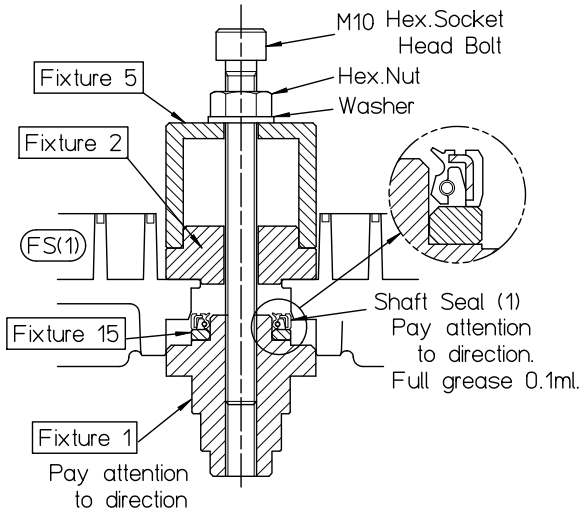
②Insert **Fixture 15** and Shaft Seal(1) to **Fixture 1** and fit it to FS(1) from the Fin side .
・Fit **Fixtures 2 and 5** in this order to FS(1) from scroll side, and screw **M10** Hex. Socket head bolt along with Hex. nut and Washer.

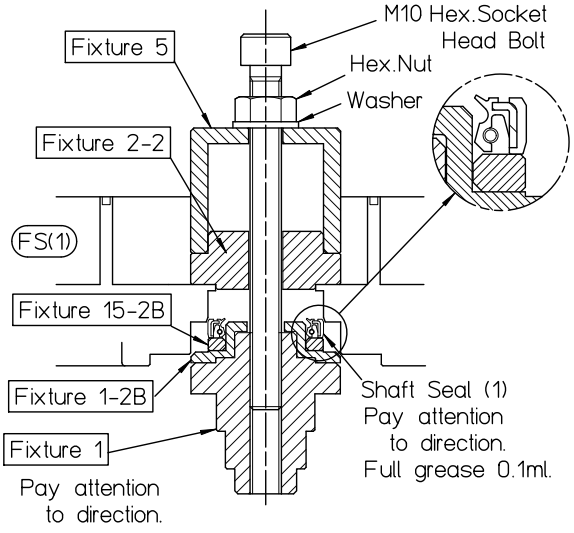
ＩＳＰ－５００Ｂ／５００Ｃ

②Insert **Fixture 15-2B** and Shaft Seal(1) to a set of **Fixtures 1** and **1-2B** and fit it to FS(1) from the Fin side.
・Fit **Fixtures 2-2** and **5** in this order to FS(1) from scroll side, and screw **M10** Hex. Socket head bolt along with Hex. nut and Washer.

③Turn Hex. nut and fit Shaft Seal(1) .

④Wipe out extruded LOCTITE with clean cloth.





Important	**・Pay attention to direction of Fixtures and Shaft Seal(1).** Side of Shaft Seal (1) where you can see spring faces Fixture. **・Wipe out extruded LOCTITE with clean cloth.**

5.4.5 Fit G-seal

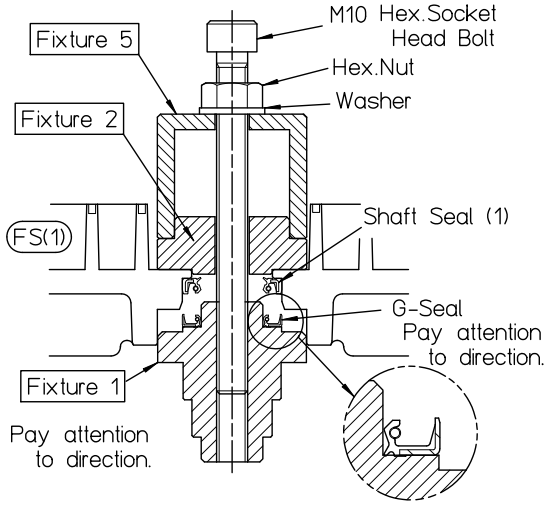
①Apply slight amount of **LOCTITE 242 or 542 to outer periphery of new G-seal.**

ＩＳＰ－２５０Ｂ／２５０Ｃ

②Insert G-seal to **Fixture 1** and fit it to FS(1) from the Fin side.

・Fit **Fixtures 2 and 5** in this order to FS(1) from scroll side, and screw **M10** Hex. socket head bolt along with Hex. nut and Washer.

③Turn Hex. nut and fit G-seal.

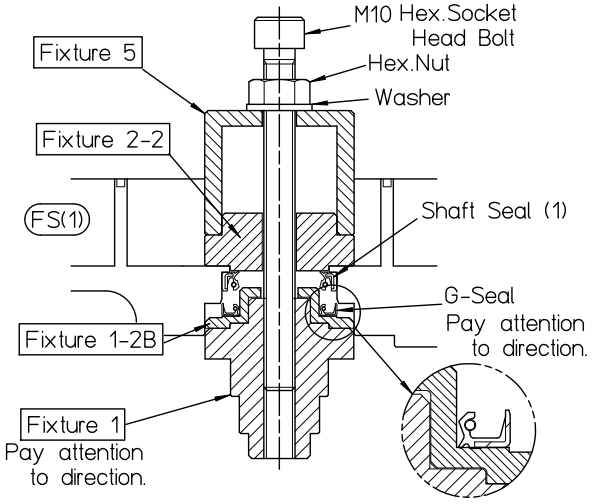


ＩＳＰ－５００Ｂ／５００Ｃ

②Insert G-seal to a set of **Fixtures 1 and 1-2B**, and fit it to FS(1) from the Fin side.

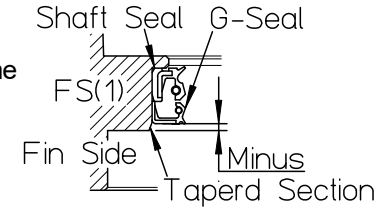
・Fit **Fixtures 2-2 and 5** in this order to FS(1) from scroll side, and screw **M10** Hex. socket head bolt along with Hex. nut and Washer.

③Turn Hex. nut and fit G-seal.



Important

- **Pay attention to directions of Fixture and G-seal.**
  Side of G-seal where you can see spring faces Shaft Seal (1).
- **Check that the top of G-seal is lower than bottom of tapered section of FS(1).**
- If not, tighten further with Fixture again in the same direction
- **Wipe out extruded LOCTITE with clean cloth.**



④Fill ISP exclusive grease [0.1ml(0.2g)] between 2 lips of Shaft Seal(1) and G-seal with syringe evenly around whole periphery.

5.4.6 Fit Bearing set(1)

- Wipe out dust and grease attached to Bearing set(1).
- Turn Inner ring by hand and check that it turns lightly and smoothly.
- If you feel some rumble, replace the Bearing according to 6.3.2.
- Put washer between Bearing Set(1) and FS(1).If not, you cannot rotate the pump.(only for ISP-250B/250C)
- **Fit 3 holes of Bearing set(1) to screw holes on FS(1) side, and tighten by Hex. socket head bolt with slight amount of LOCTITE 242 or 542.**

Tightening torque 2.94±0.3 N･m (30±3kgf･cm)

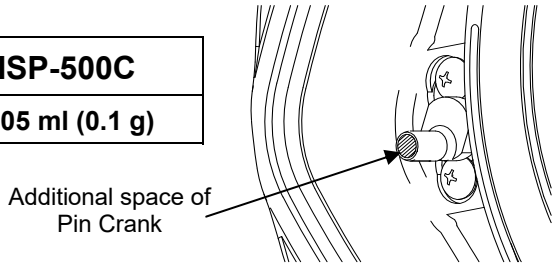
Important

- **Use LOCTITE 242 or 542 (medium strength).**
- **Apply slight amount of LOCTITE to the thread section.**
- **Wipe out extruded LOCTITE with clean cloth.**

5.4.7 Grease additional space of Pin Crank (ISP-250C/500C)

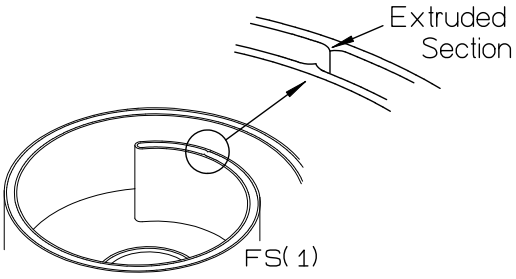
①Clean old grease in the additional space of Pin Crank.
②Put new exclusive grease in with the amount below.

Grease volume ［／1 pc.］	ISP-250C	ISP-500C
	0.05 ml (0.1 g)	**0.05 ml (0.1 g)**



5.4.8 Fit Tip Seal

- Place white soft back-up part facing downwards and black hard sliding material facing upwards.
- Fit Tip Seal from the center of FS(1).
- Internally extruded section near the center of wrap functions as a stopper to hold Tip Seal. Completely push sliding material side by hand into the groove.

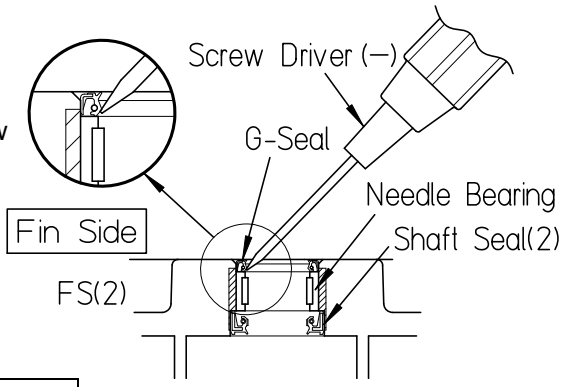


5.5 Maintenance of FS(2)

5.5.1 Remove G-seal

Remove the G-seal as follows and replace it with new one.

- Insert straight edge screwdriver to G-seal from the Fin side of FS(2) and remove it.

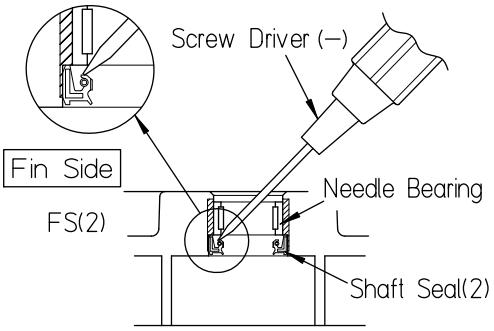


Important	**・Pay attention not to damage Flange surface of FS(2), scroll section, and Needle Bearing section .**

5.5.2 Remove Shaft Seal(2)

Remove the Shaft Seal (2) as follows and replace it with new one.

- Insert straight edge screwdriver from the Fin side of FS (2) to Shaft Seal(2), lightly tap handle of screwdriver and remove Shaft Seal(2) while moving the screwdriver around the whole periphery Shaft Seal(2).



Important	**・Pay attention not to damage Flange surface of FS(2), scroll section and Needle Bearing section.**

5.5.3 Clean FS(2)

①Wipe out dust on the place where Shaft Seal(2) of FS(2) and G-seal enter, with clean cloth.

- Wipe out dust on wall and bottom of scroll wrap with clean cloth.
- Wipe out dust attached to side and bottom of Tip Seal groove by using bamboo spatula covered with clean cloth so as not to damage the groove.
- Blow out the whole unit with air.

②Fully wipe out old grease attached to Needle Bearing in the center of FS(2) with clean cloth while turning roller until no more comes out.

Important	**・If you feel some resistance to remove Tip Seal, be sure to wipe out dust.** **・Be sure to clean Tip Seal groove with soft bamboo spatula since it is fragile.** **・Always use clean cloth.** Mixing with other grease can greatly deteriorate the performance. **・Pay attention not to leave the waste thread in Bearings.**

5.5.4 Fit Shaft Seal (2)

① Apply slight amount of **LOCTITE 242 or 542 around outer periphery of new Shaft Seal (2).**

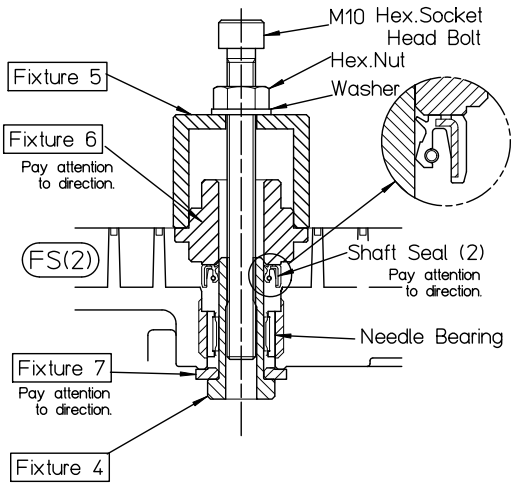
ＩＳＰ－２５０Ｂ／２５０Ｃ

②Insert **Fixture 7** to **Fixture 4** and insert them to FS(2) from the Fin side.

③Horizontally insert Shaft Seal(2) to **Fixture 4**.

- Fit **Fixtures 6 and 5** in this order to Shaft Seal(2) from the scroll side. Screw **M10** Hex. socket head bolt along with Hex. nut and Washer from the scroll side.

④Turn Hex. nut and fit Shaft Seal(2).

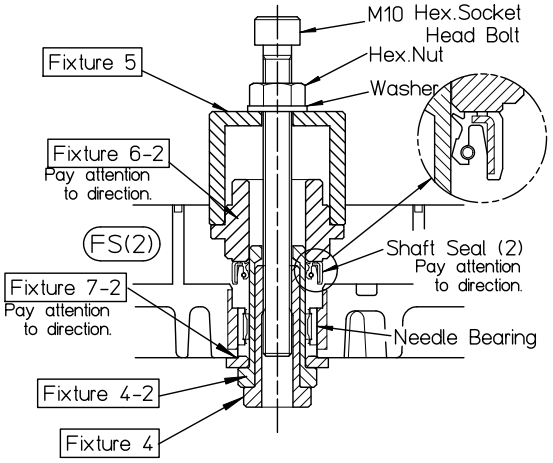


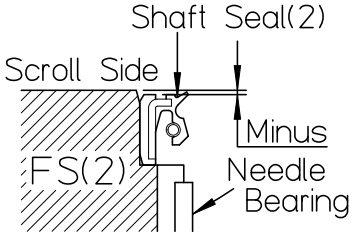
ＩＳＰ－５００Ｂ／５００Ｃ

②Insert **Fixture 7-2** to a set of **Fixtures 4 and 4-2**, and insert them to FS(2) from the Fin side.

③Horizontally insert Shaft Seal(2) to **Fixture 4-2**.

- Fit **Fixtures 6-2 and 5** in this order to Shaft Seal(2). Screw **M10** Hex. socket head bolt along with Hex. nut and Washer from the scroll side.



Important	**・Pay attention to directions of Fixture and Shaft Seal(2).** Side of Shaft Seal(2) where you can see spring faces Needle Bearing. **・Horizontally place Shaft Seal(2) on the Fixture.** **・Check that Shaft Seal(2) is lower than the surface of FS(2) scroll side.** If not, tightly further again with Fixture in the same direction. Otherwise, Shaft seal(2) can contact OS. 

5.5.5 Fit G-seal

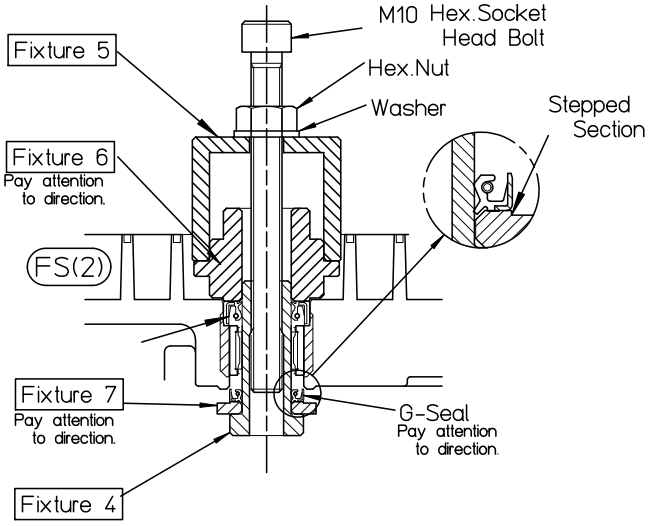
ＩＳＰ－２５０Ｂ／２５０Ｃ

①Insert **Fixture 7** and new G-seal to **Fixture 4**.

②Insert **Fixture 6** and **Fixture 5** in this order to FS(2) from scroll side.

③Insert G-seal and **Fixture 4** with **Fixture 7** to FS(2) from the Fin side, and screw **M10** Hex. socket head bolt along with Hex. nut and Washer from the opposite side.

④Turn Hex. nut and fit G-seal.

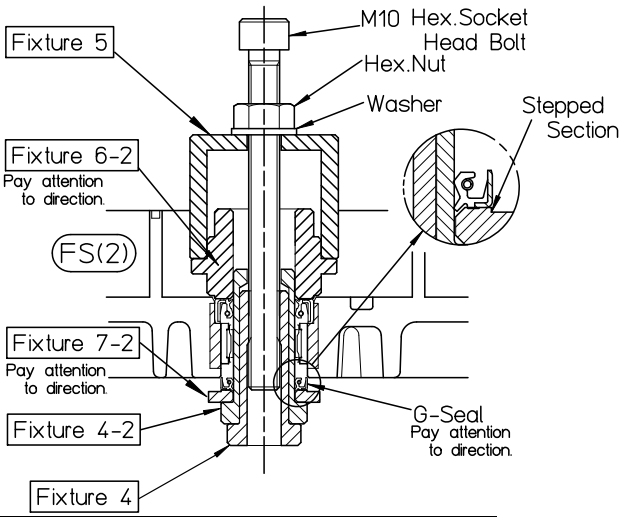


ＩＳＰ－５００Ｂ／５００Ｃ

①Insert **Fixture 7-2** and new G-seal to a set of **Fixture 4** and **Fixture 4-2**.

②Insert **Fixture 6-2** and **Fixture 5** in this order to FS(2) from scroll side.

③Insert G seal and **Fixture 4** along with **Fixture 7-2** and **fixture 4-2** to FS(2) from the Fin side, and screw **M10** Hex. socket head bolt along with Hex. nut and Washer from the opposite side.



Important	・**Pay attention to directions of Fixtures and G-seal.** Side of G-seal where you can see spring faces Bearing. ・**Check that G-seal is lower than FS(2) Fin side and that is parallel to Fin surface (not curved).** If not, tighten further again with Fixture in the same direction.

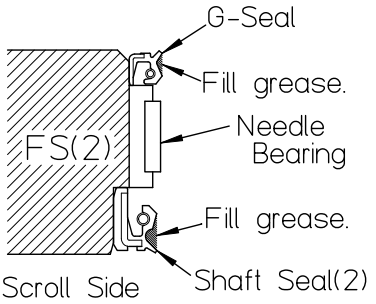
5.5.6 Grease Needle Bearing and Shaft Seal, G-seal

・Fill ISP exclusive grease to roller section of Needle Bearing.

・Apply ISP exclusive grease between roller and cage while turning roller.

Grease volume [／1 pc.]	**ISP-250B/250C**	**ISP-500B/500C**
	0.8 ml (1.6 g)	**0.85 ml (1.7 g)**

・Evenly fill **ISP exclusive grease [0.1ml (0.2g)]** between 2 lips of Shaft Seal (2), and also between 2 lips of G-seal.



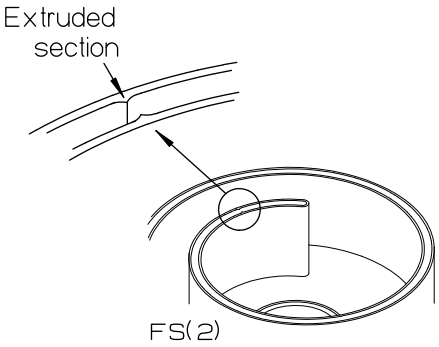
Important	・**Be sure to use ISP exclusive grease.** ・**Be sure to use clean rubber gloves when applying grease to Needle Bearing.** ・**Apply grease a bit more to both roller and cages which are somewhat worn, different from new Bearing.**

⚠ CAUTION

Be sure to use **ISP exclusive grease** for Bearings. ※Mixing with other oil can shorten grease lifetime and damage Bearings.	Use ISP exclusive grease

5.5.7 Fit Tip Seal

・Place white soft back-up part facing downwards and black hard sliding material facing upwards.
・Fit Tip Seal from the center of FS(2).
・Internally extruded section near the center of wrap functions as a stopper to hold Tip Seal. Completely push sliding material side with hand into the groove.

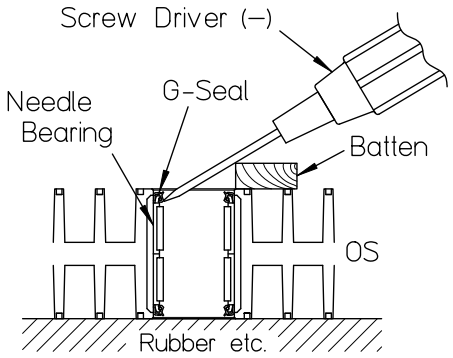


5.6 Maintenance of OS

5.6.1 Remove G-seal

Remove G-seal as follows and replace it with new one.

・Place OS on horizontal stand with rubber.
・Place batten on OS and remove G-seal with straight edge screwdriver.
・Remove G-seal on the opposite side in the same way.



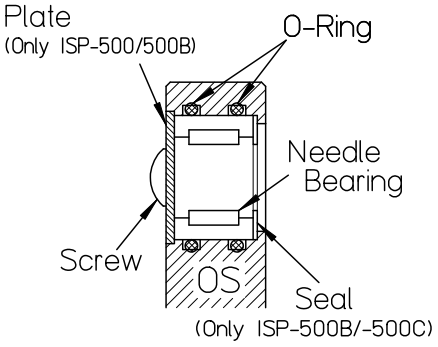
Important	**Pay attention not to damage scroll top, bottom and side surfaces of OS**

5.6.2 Clean OS

①Wipe out dust in the place where G-seals enter OS with clean cloth.
・Wipe out dust on wall and bottom of scroll wrap with clean cloth.
・Wipe out dust attached to side and bottom of Tip Seal groove by using bamboo spatula covered with clean cloth so as not to damage the groove.
・Blow out the whole unit with air.
②Fully wipe out old grease attached to Needle Bearings and Sleeve in the center of OS with clean cloth while turning roller until no more comes out.

Important	・If you feel some resistance to remove Tip Seal, be sure to wipe out dust. ・Be sure to clean Tip Seal groove by soft bamboo spatula since it is fragile . ・**Always use clean cloth.** Mixing with the other grease can greatly deteriorate the performance. ・**Pay attention not to leave the waste thread in Bearings.**

③ Remove screws of Needle Bearing (Pin Crank) around OS with cross head screwdriver.
④ Remove Plate (ISP-500B/-500C only) and push Needle Bearing and Seal (ISP-500B/-500C only) from the opposite side and remove them.
⑤Fully wipe out old grease attached to Needle Bearing with clean cloth while turning roller until no more comes out.
・If you replace Pin Crank set in 5.3.3, replace Needle Bearings also.



Important	**Pay attention not to damage cross section of screw to fix Needle Bearing.** Use small cross head screwdriver (for M3).

5.6.3 Fit G-seal

ＩＳＰ－２５０Ｂ／２５０Ｃ

①Insert **Fixture 14** and new G-seal to **Fixture 13**, and then to OS. Insert **Fixture 10** from the opposite side.

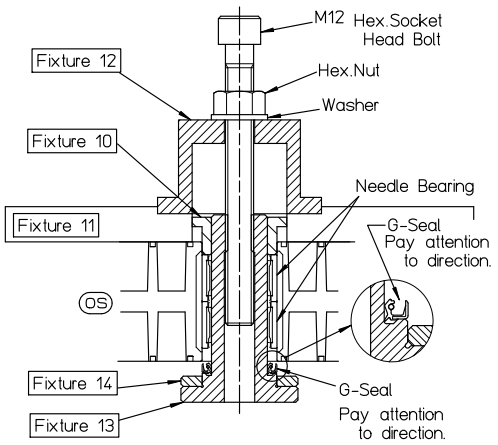
②Insert **Fixtures 11 and 12** in this order to **Fixture 10**, screw **M12** Hex. socket head bolt along with Hex. nut and Washer, and turn Hex. nut and fit G-seal.

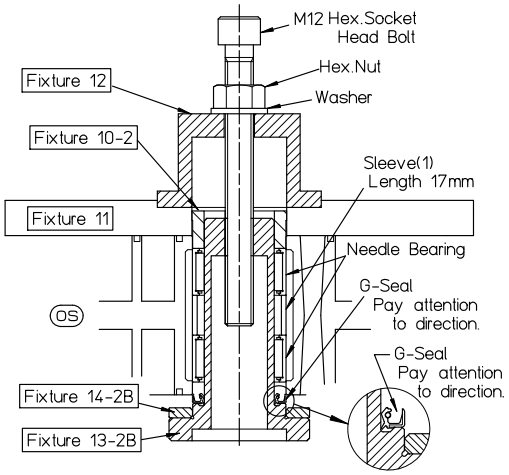
ＩＳＰ－５００Ｂ／５００Ｃ

① Insert **Fixture 14-2B** and new G-seal to **Fixture 13-2B**, and then to OS. Insert **Fixture 10-2** from the opposite side.

②Insert **Fixtures 11 and 12** in this order to **Fixture 10-2**, and screw **M12** Hex. socket head bolt along with Hex. nut and Washer, and turn Hex. nut and fit G-seal.

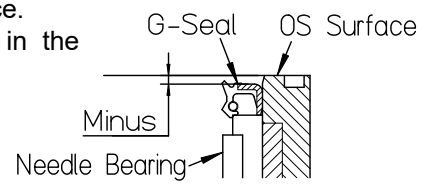
③Every fill ISP exclusive grease [0.1ml(0.2g)] between 2 lips of G-seal.
④Fit G-seal on the opposite side in the same way.





Important

- **Pay attention to directions of Fixtures and G-seals.**
  Side of G-seal where you can see spring faces Bearing.
- Check that G-seal is lower than OS surface.
  If not, tighten further again with fixture in the same direction.



5.6.4 Grease Needle Bearing of Pin Crank

- Fill **ISP exclusive grease** to roller section of Needle Bearing (Pin Crank) which was removed from OS.
- Apply **ISP exclusive grease** between roller and cage while turning roller.

Grease volume ［／1 pc.］	**ISP-250B/250C**	**ISP-500B/500C**
	0.1 ml (0.2 g)	**0.1 ml (0.2 g)**

Important

- **Be sure to use ISP exclusive grease.**
- Be sure to use clean rubber gloves when filling **grease to Needle Bearing.**
  Apply grease a bit more to both roller and cages which are somewhat worn, different from new Bearing.

⚠ CAUTION

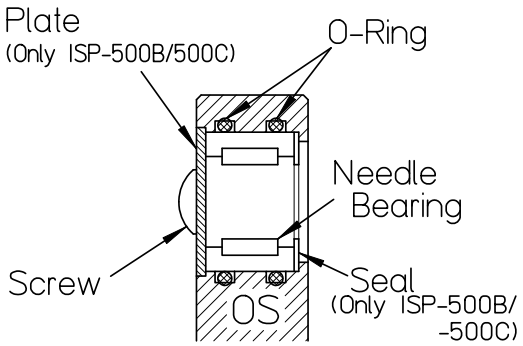
Be sure to use **ISP exclusive grease** for Bearings.
※Mixing with other oil can shorten grease lifetime and damage Bearings.

Use ISP exclusive grease

5.6.5 Fit Needle Bearing of Pin Crank

・Insert straight (not askew) Seal (ISP-500B/-500C only) and Needle Bearing (Pin Crank) in this order into holes on the outer periphery of OS

・Fit Plate (ISP-500B/-500C only), apply slight amount of **LOCTITE 242 or 542 to screws and tighten them**.



5.6.6 Grease OS Needle Bearing

①Fill **ISP exclusive grease** to roller of Needle Bearing in the center of OS.

・Apply ISP exclusive grease between roller and cage while turning roller.

Grease volume [／ I pc.]	ISP-250B/250C	ISP-500B/500C
	1.55 ml (3.1 g)	**2.25 ml (4.5 g)**

②Fill **ISP exclusive grease [0.2 ml (0.4 g)]** between G-seal and Needle Bearing with syringe to evenly around whole periphery.

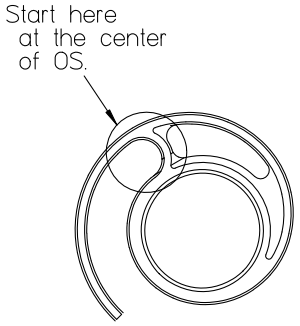
Important	・**Be sure to use ISP exclusive grease.** ・Be sure to use clean rubber gloves when filling **grease to Needle Bearing.** Apply grease a bit more to both roller and cages which are somewhat worn, different from new Bearing.

⚠ CAUTION	
Be sure to use **ISP exclusive grease** for Bearings. ※Mixing with other oil can shorten grease lifetime and damage Bearings.	Use ISP exclusive grease

5.6.7 Fit Tip Seal

・Place white soft back-up part facing downwards and black hard sliding material facing upwards.

・Fit Tip Seal in accordance with shape at the center of OS and insert gradually further towards outside.



5.7 Replace Exhaust valve

ＩＳＰ－２５０Ｂ／２５０Ｃ

① Loosen Nut and remove Exhaust Flange. Remove O ring in the Outlet hole of FS(2), and clean in the hole and Outlet Flange by using cloth and brass brush.

② Remove C snap ring in the Outlet Flange with stop ring supplier. Remove Exhaust Guide. Exhaust Spring and Exhaust Valve with tweezers.

ＩＳＰ－５００Ｂ／５００Ｃ

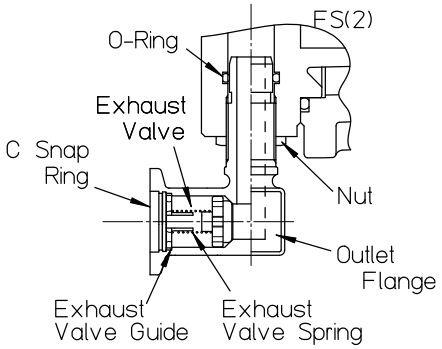
①Remove Outlet Flange with spanner (wrench flat 24) and clean Outlet hole of FS(1) with clean cloth and blow out with air.

②Remove C snap ring in Outlet flange with stop ring supplier. Remove Exhaust guide, Exhaust spring and Exhaust valve with tweezers.

③ Clean Outlet Flange and sealing surface where Outlet hole and Exhaust Valve contact by using clean cloth and brass brush so as not to damage, and blow out with air.

④ Fit new O ring to the groove of Exhaust Valve ,hole for O ring and new Exhaust Valve,Exhaust Spring and Exhaust Guide to Outlet Flange and attach with C snap ring.

⑤ Fit Outlet Flange with Nut to FS(2),and tighten Nut and fix it.

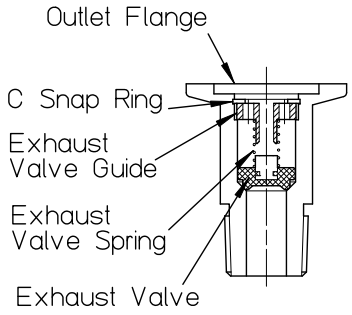


③Clean Outlet Flange sealing surface where Outlet hole and Exhaust valve contact by using bamboo spatula covered with clean cloth so as not to damage , and blow out with air.

④Fit new Exhaust valve, Exhaust spring and Exhaust guide to Outlet Flange and attach with C snap ring.

・Exhaust valve must be in the center.

⑤Apply slight amount of LOCTITE 242 or 542 to thread section of Exhaust flange and screw into FS(1).



Important	**・Exhaust valve should be at the center.** **・Use LOCTITE 242 or 542(medium strength).** **・Apply slight amount of LOCTITE to only thread section.** **・Wipe out extruded LOCTITE with clean cloth.**

5.8 Maintenance of Inlet Flange

① Remove Hex.Socket head bolts of Inlet Flange.

② Clean inside the Inlet Flagne and Inlet Filter with clean cloth ,and blow out dusts.

③ Put a new O ring in the groove of Inlet Flange.Put the Inlet Flange on the FS(1) and tighten by Hex socket head bolts with slight amount of LOCTITE 242 or 542.

5.9 Maintenance of Air Flush Port

5.9.1 ISP-250B/500B version

①Loosen nuts while keeping Air Flush Port and pipes by spanner.

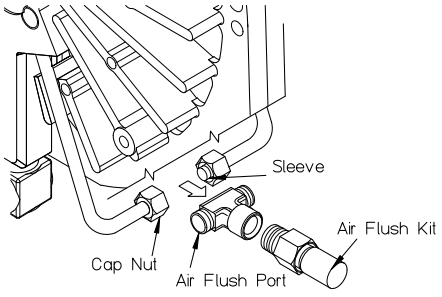
②After taking FS(2) away remove Air Flush Port.

③Blow out inside the Air Flush Port.

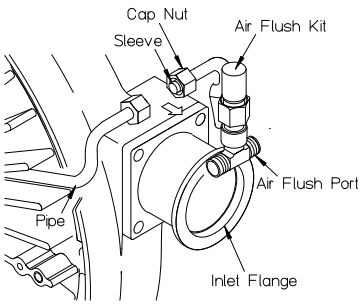
④Blow out inside pipes attached to FS(1) and FS(2).

⑤Put slight amount of LOCTITE 242 or 542 and tighten Air Flush kit.

⑥Replace sleeve to new ones.



ISP-250B



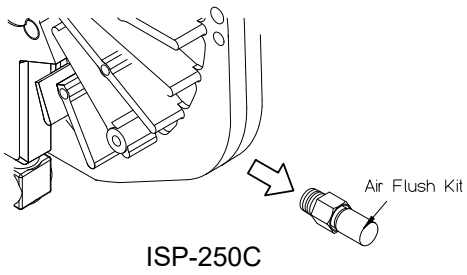
ISP-500B

Important	**・Evenly insert Pipe so that Pipe fully contact to the bottom of Air Flush Port.** **・Do not tighten Cap nut too hard.**

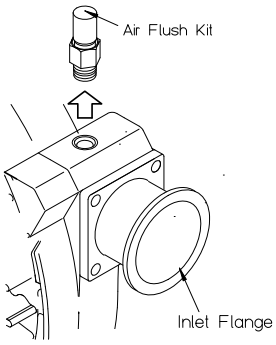
5.9.2 ISP-250C/500C version

①Remove Air Flush Kit from pump.

②Put slight amount of LOCTITE 242 or 542 and tighten Air Flush Kit to pump.



ISP-250C



ISP-500C

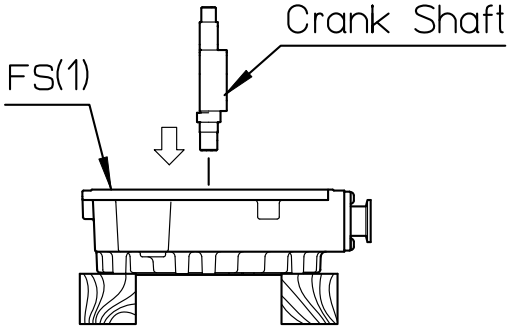
5.10 Assembly

Assemble in reverse order of disassembly.

5.10.1 Assemble Body set

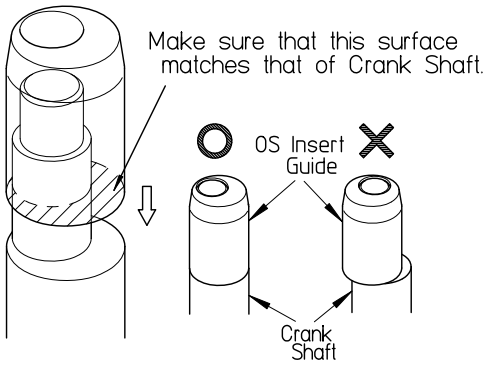
①Place 2 blocks (wood which height is over 55mm) on horizontal workbench and FS(1) on the top of them.

・Fit Crank Shaft vertically to FS(1).



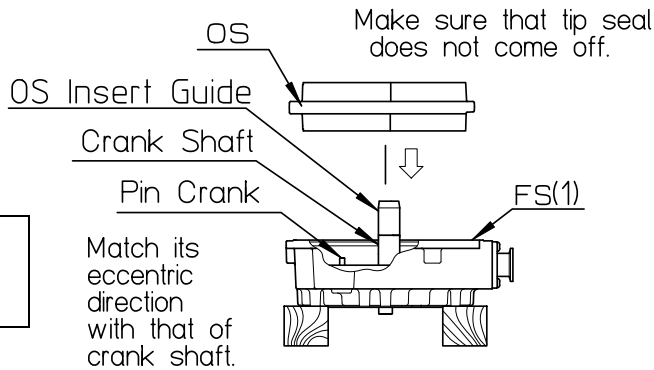
Important	**When fitting Crank Shaft to FS(1), pay attention not to damage Bearing and Shaft Seal with the angle of Key groove of Crank Shaft.**

②Turn eccentric section of both Crank Shaft and Pin Crank in the same direction. Put the **OS Insert Guide (Black one for ISP-250B/-250C, White one for ISP-500B/-500C)** on the Crank Shaft as shown in the right drawing. Fit OS to FS(1).

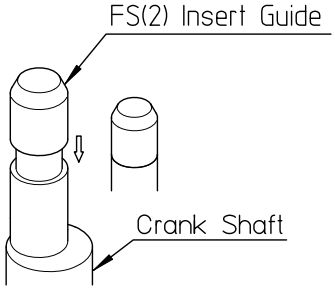


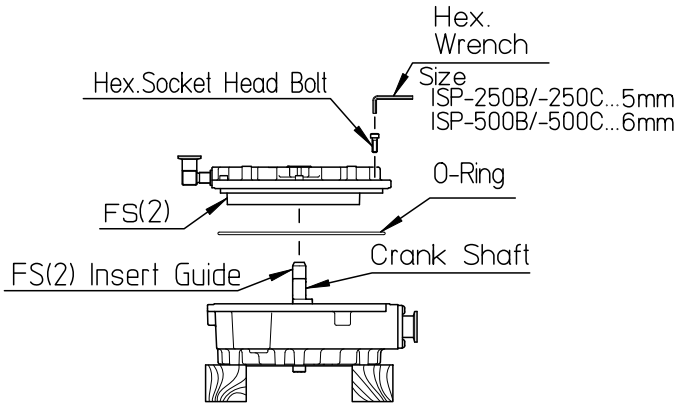
Important	**Pay attention that Tip Seal does not come off when fitting OS.**

③ Put the **FS(2) Insert Guide (Black one for ISP-250B/-250C, White one for ISP-500B/-500C)** on the Crank Shaft. Fit new O ring to FS(2), fit it to FS(1) and tighten the Hex. socket head bolts.



Tightening torque	
ISP-250B/-250C	**7.8±0.7 N·m（80±7kgf·cm)**
ISP-500B/-500C	**14.7±0.7 N·m（150±7kgf·cm)**



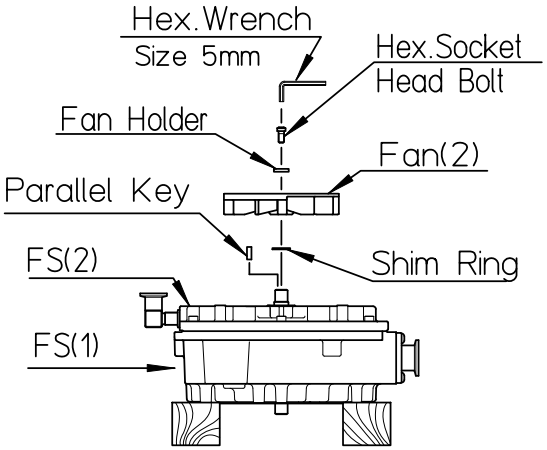


Important	・Check that there is no dust or damage on the surface of O ring for FS(1), FS(2) and O ring surface. ・Apply slight amount of ISP exclusive grease to the O ring surface. ・Check that O ring does not come off from mating side and Tip Seal does not come off from the groove. ・Diagonally tighten Hex. socket head bolts fixing FS(2) by turns in order to tighten evenly.

④Fit Parallel Key and Fan(2) to FS(2), apply slight amount of **LOCTITE 242 or 542 to Hex. socket head bolts** and fully tighten along with Washer.

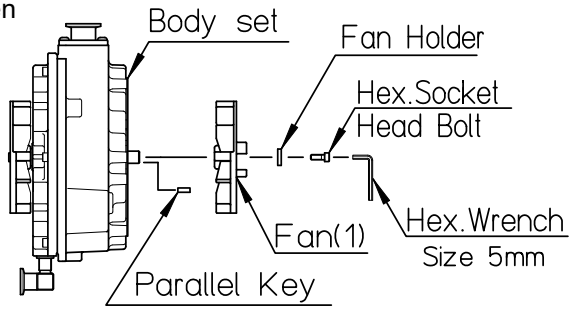
Tightening torque 14.7±0.7 N・m(150±7kgf・cm)

*Assemble Shim Ring, parallel key and FS(2) in order.



⑤Stand Body set vertically, fit Parallel Key and Fan(1). Apply slight amount of **LOCTITE 242 or 542 to Hex. socket head bolts** and fully tighten along with Washer.

Tightening torque 14.7±0.7N・m(150±7kgf・cm)



Important	・Turn Fan(2) by hand and check that it turns smoothly (a little bit heavier than rotating resistance checked in Disassembly 5.1.1.) If rotation is heavy, disassemble again and check that Tip Seal does not come off. **・Use LOCTITE 242 or 542 (medium strength).** **・Apply slight amount of LOCTITE to only thread section.** **・Wipe out extruded LOCTITE with clean cloth.**

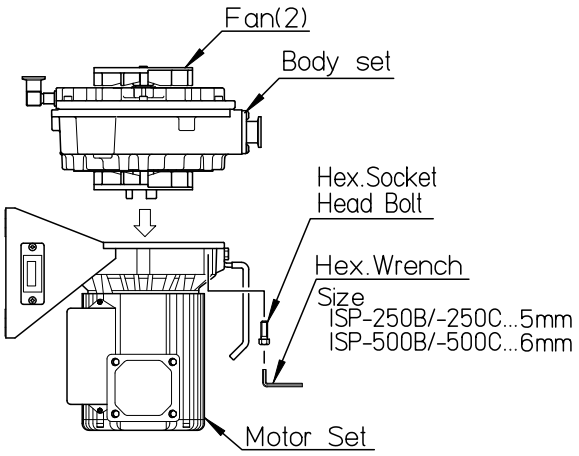
5.10.2 Fit Body set

①Stand Motor set and Body set vertically and fit new Spider to Coupling, with central dent on Motor side.

②Match nail of Fan with nail of Spider, Parallel Pin with hole position, and fit Body to Motor set.

・Check that Fan(2) turns smoothly and tighten Hex. socket head bolts.

Tightening torque 14.7±0.7 N·m(150±7kgf·cm)



Important	Fit pump to Motor set so that Inlet can face the same direction as before maintenance.

5.10.3 Fit Fan Cover

・ Apply slight amount of LOCTITE 242 or 542 to the thread section of Hex. Socket head bolts.

・Tighten Fan Cover and Cover Plate(2) together with the bolts.

5.11 Operation

・Operate pump for 2～3 hours and check that current is within rated one (refer to 6.11) and that there is no abnormal sound and vibration. Also inspect the pump performance (refer to 6.10).
When you have replaced Tip Seal, be sure to do **break-in operation** (refer to 6.9).

6. Major Maintenence - Every 16,000 hours

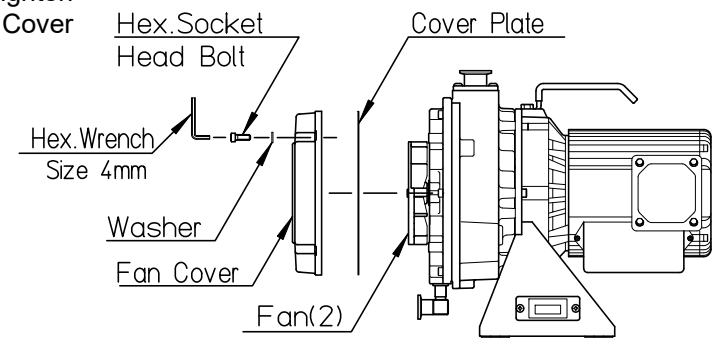
6.1 Disassembly of Pump Body

Important	Before disassembly, open Inlet to atmospheric pressure, repeat close-open operation for a couple of times in order to clean inside the pump, and cut off electric source.

⚠ WARNING	
Be sure to cut off electric source before wiring or inspection. ※If not, it can cause electric shock or damage by turning section(Fan).	 Cut off electric source

6.1.1 Remove Fan Cover

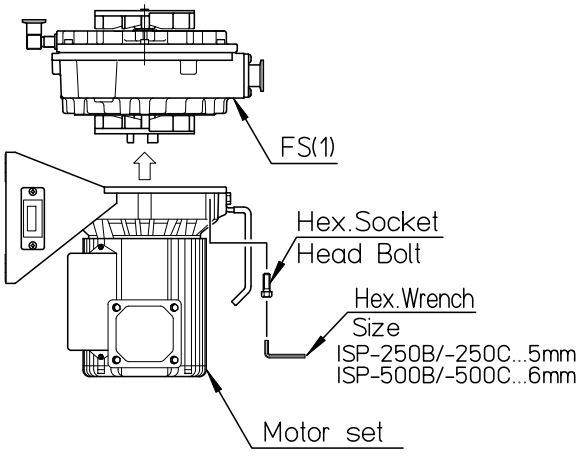
・Remove 4 Hex. Socket head bolts which tighten Fan Cover, and remove Fan Cover and Cover Plate.



Important	**Rotate Fan by hand and check smooth rotation, and remember the feeling of rotating resistance.** When reassembling, check the slightly heavier rotating resistance. If rotation is not smooth, something will go wrong inside the pump. Check each Bearing and replace it if something goes wrong.

6.1.2 Remove Body set

・Place the pump vertically with Motor downwards.
・Remove Hex. Socket head bolts which hold Motor set and FS(1), lift Body set and separate it from Motor set.

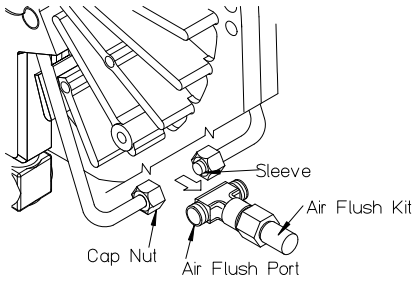


Important	**Rotate Motor Shaft by hand and check the smooth rotation.** If rotation is not smooth with some resistance, check Motor Bearings and Motor, and replace it if something goes wrong.

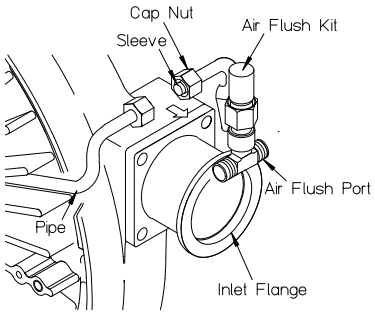
6.1.3 Remove Air Flush Port or Air Flush Kit

ISP-250B／500B Version

①Loosen nuts while keeping Air Flush Port and pipes by spanner.
②After taking FS(2) away, remove Air Flush Port.



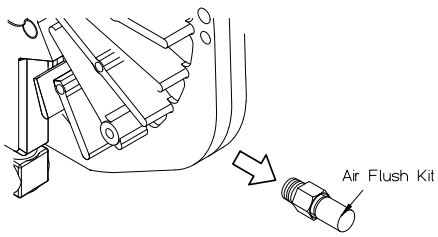
ISP-250B



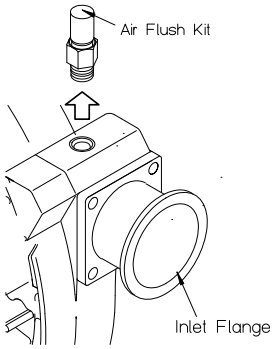
ISP-500B

ISP-250C／500C Version

①Remove Air Flush Kit from pump.



ISP-250C



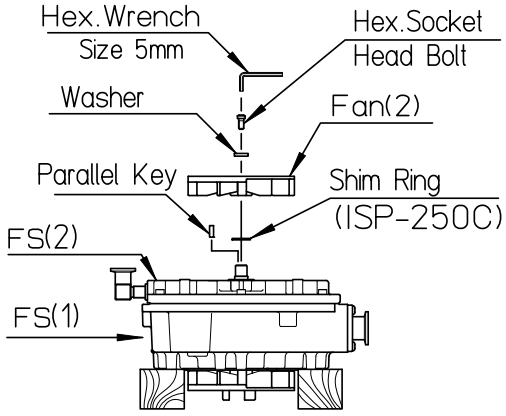
ISP-500C

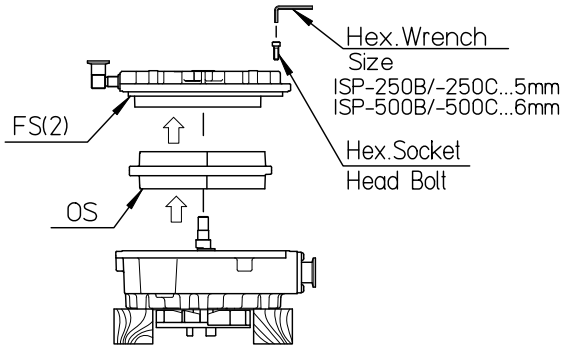
6.1.4 Disassembly of Body set

①Place Body set with FS(1) downwards on 2 blocks (wood which height is over 55mm).

②Remove Hex. Socket head bolt which fixes Fan(2) on FS(2) side, and remove Washer, Fan(2) and Parallel Key. （In the case of ISP-250C,remove Shim Ring between FS2 and Fan(2) as well.）

③Loosen Hex. Socket head bolts diagonally by turns which fix FS(2), and remove them.
・Pull FS(2) towards axis and remove it.
・Pull OS towards axis and remove it.



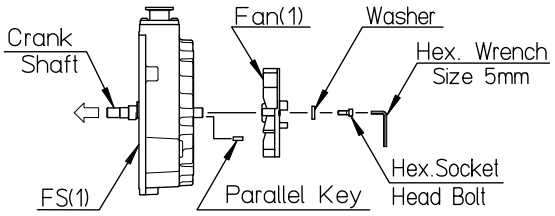


Important

・When pulling FS(2) and OS, pay attention not to damage Needle Bearing or Shaft Seal with angle of Key groove of Crank Shaft.
・When you cannot pull OS due to damaged OS Needle Bearing, first do ④ item , pull Crank Shaft and OS at the same time, and separate OS and Crank Shaft from FS(2) side .
・Do not lose the Shim Ring for ISP-250C.

④Remove Hex. Socket head bolts which holds Fan(1) on FS(1) side, and remove a Washer and Fan(1).

・Remove Parallel Key and pull Crank Shaft.



6.1.5 Remove O-ring

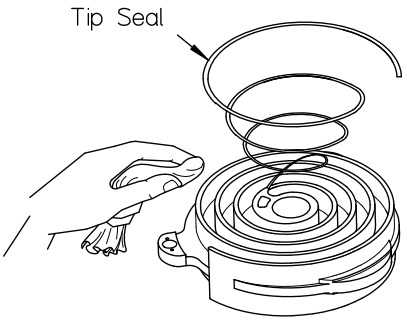
Refer to 4.1 Maintenance standards for maintenance intervals and 9. Extended Drawing for the positions of O rings, the list of O rings is:

- O ring between FS(1) and FS(2)
- O ring for Inlet Flange
- O ring for Outlet Flange (only for ISP-250B/250C)
- O rings for Pin Crank

Important	・Pay attention not to damage O ring groove and sealed O ring surface. ・**Pay attention not to leave any thread of cloth in O ring surface and O ring groove.**

6.1.6 Remove Tip Seal

・Gradually remove old Tip Seal from the end of outer periphery edge.

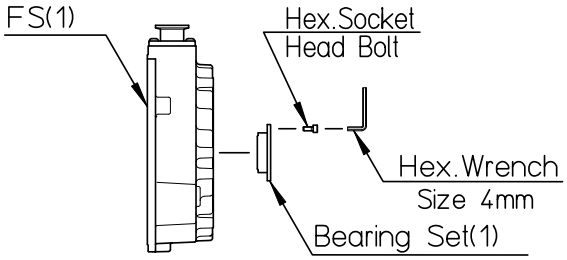


Important
・If you feel resistance when removing Tip Seal, dust will attach to side and groove of Tip Seal. Wipe out dust from the groove and Tip Seal by using clean cloth and bamboo spatula. **・Remember each Tip Seal position to return it to original position.**

6.2 Disassembly of FS(1)

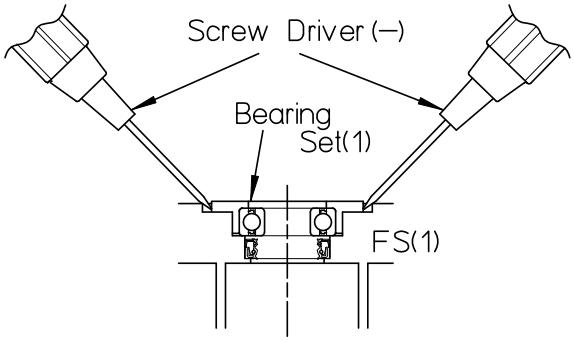
6.2.1 Remove Bearing set(1)

①Remove Hex. Socket head bolts which hold Bearing set(1).



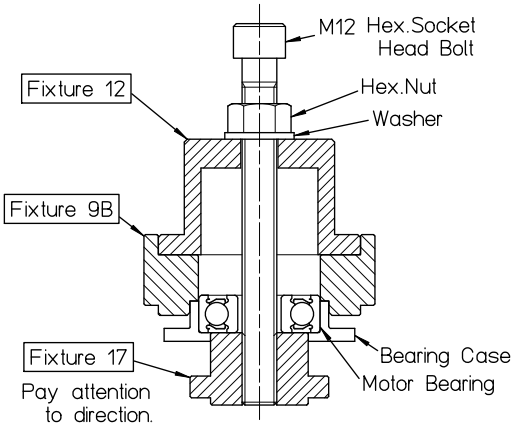
②Insert 2 straight edge screwdrivers under outer dia. of Bearing set(1), lift it up and remove it.

* Do not lose Washer between Bearing Set(1) and FS(1) only for ISP-250B/250C. Clean it up before it is assembled later.



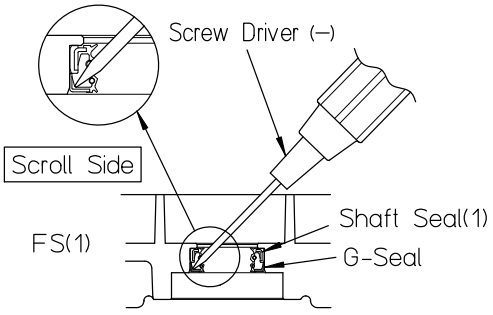
6.2.2 Remove Ball Bearing

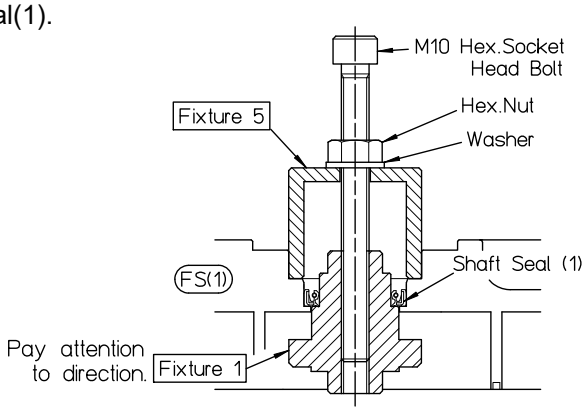
①Fit **Fixture 17** (pay attention to direction) to Bearing from Flange side of Bearing case side.
②Fit **Fixtures 9B and 12** to Bearing case from the opposite side and screw **M12** Hex. socket head bolts along with Hex. nut and Washer.
③Turn Hex. nut and remove Ball Bearing.



6.2.3 Remove G-seal and Shaft Seal(1)

- Insert straight edge screwdriver to G-seal from the scroll side, hit the screwdriver and remove it.
- Insert **Fixture 1** to Shaft Seal(1) from scroll side, fit **Fixture 5** to FS(1) from the opposite side, and screw **M10** Hex. Socket head bolt with Washer, and Hex. nut .
- Turn Hex. nut and remove Shaft Seal(1).





Important	**・Check direction of Shaft Seal(1).** Side of Shaft Seal(1) where you can see spring faces G-seal. **・Pay attention to direction of Fixture 1.** Check direction of **Fixture 1** in the drawing above. **・Remove Shaft Seal(1) toward the Fin side (opposite side of scroll).**

6.2.4 Remove Pin Crank Bearing (if necessary)

①Turn Pin Crank by hand and check that it turns lightly and smoothly.
・If you feel rumble when turning by hand, replace all Pin Crank with new one.

②When replacing Pin Crank set, remove two screws with cross head screwdriver.
・Wipe out adhesives and dust around screws.
・Fit new Pin Crank set and tighten by **screws with slight amount of LOCTITE 242 or 542.**

Important	**・Use LOCTITE 242 or 542 (medium strength).** **・Apply slight amount of LOCTITE to thread section.** **・Wipe out extruded LOCTITE with clean cloth.**

6.2.5 Clean FS(1)

Wipe out dust on the place where Bearing of FS(1) and Shaft Seal(1) enter.
・Wipe out dust on wall and bottom of scroll wrap, inside the Inlet Flange and Inlet Filter with clean cloth.

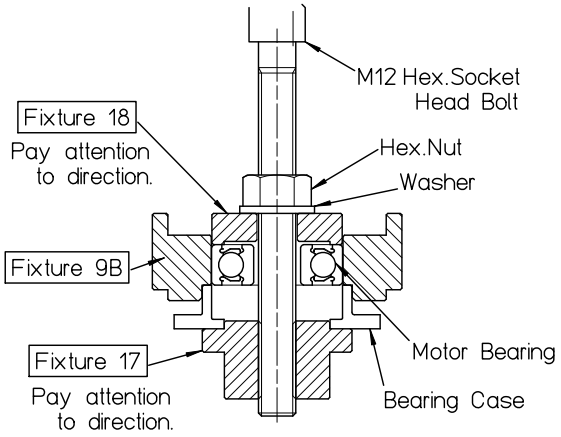
・Wipe out dust on side and bottom of Tip Seal groove by using clean cloth and bamboo spatula.
・Wipe out dust which remains at Pin Crank and inner wall of FS(1).
・Blow out the whole unit with air.

Important	**・If you feel some resistance to remove Tip Seal , be sure to wipe out dust.** **・Be sure to clean Tip Seal groove with soft bamboo spatula since groove is fragile.** **・Always use clean cloth.** Mixing with other grease can greatly deteriorate its performance. **・Pay attention not to leave the waste thread in the Bearings.**

6.3 Reassembly of FS(1)

6.3.1 Fit Ball Bearing

①Fit **Fixture 17** to Bearing case from Flange side (pay attention to direction) .
②Fit **Fixture 9B** to Bearing case from the opposite side and insert new Bearing horizontally.
③Fit **Fixture 18** (pay attention to direction) to Bearing and screw **M12** Hex. socket head bolt along with Hex. nut and Washer from **Fixture 18** side.
④Turn Hex. nut and fit Bearing.



6.3.2 Fit Shaft Seal(1)

①Apply slight amount of **LOCTITE 242 or 542 to outer periphery of new Shaft Seal(1).**

ＩＳＰ－２５０Ｂ／２５０Ｃ

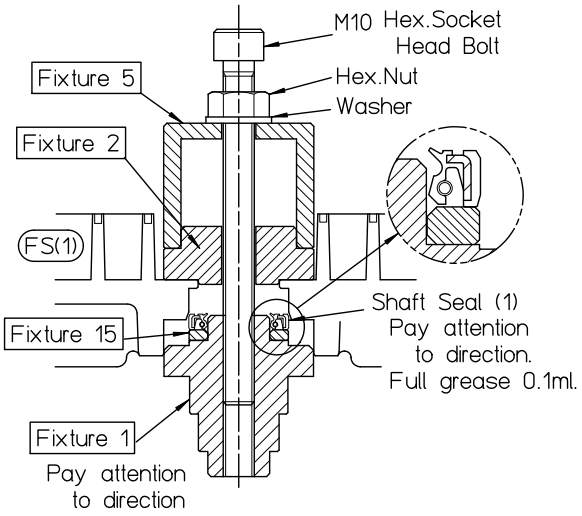
②Insert **Fixture 15** and Shaft Seal(1) to **Fixture 1** and fit it to FS(1) from the Fin side .
・Fit **Fixtures 2 and 5** in this order to FS(1) from scroll side, and screw **M10** Hex. Socket head bolt along with Hex. nut and Washer.

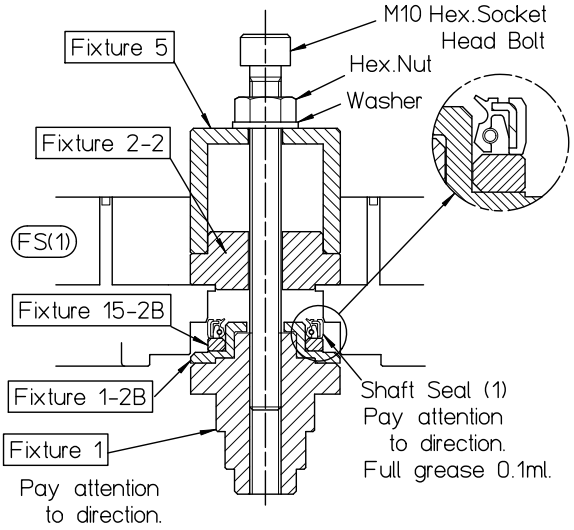
ＩＳＰ－５００Ｂ／５００Ｃ

②Insert **Fixture 15-2B** and Shaft Seal(1) to a set of **Fixtures 1** and **1-2B** and fit it to FS(1) from the Fin side.
・Fit **Fixtures 2-2** and **5** in this order to FS(1) from scroll side, and screw **M10** Hex. Socket head bolt along with Hex. nut and Washer.

③Turn Hex. nut and fit Shaft Seal(1) .

④Wipe out extruded LOCTITE with clean cloth.





Important	**・Pay attention to direction of Fixtures and Shaft Seal(1).** Side of Shaft Seal (1) where you can see spring faces Fixture. **・Wipe out extruded LOCTITE with clean cloth.**

6.3.3 Fit G-seal

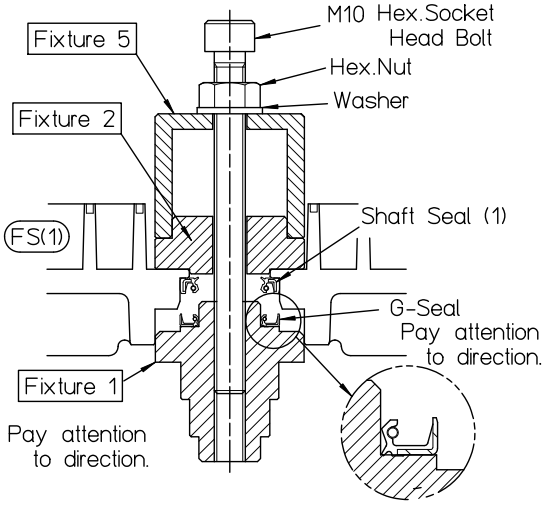
①Apply slight amount of **LOCTITE 242 or 542 to outer periphery of new G-seal.**

ＩＳＰ－２５０Ｂ／２５０Ｃ

②Insert G-seal to **Fixture 1** and fit it to FS(1) from the Fin side.

・Fit **Fixtures 2 and 5** in this order to FS(1) from scroll side, and screw **M10** Hex. socket head bolt along with Hex. nut and Washer.

③Turn Hex. nut and fit G-seal.

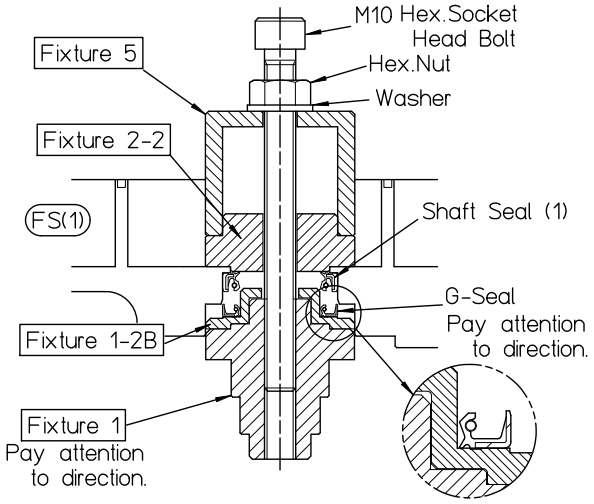


ＩＳＰ－５００Ｂ／５００Ｃ

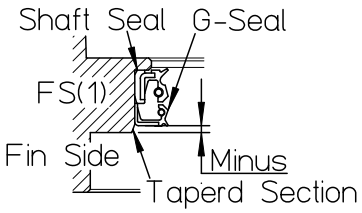
②Insert G-seal to a set of **Fixtures 1 and 1-2B**, and fit it to FS(1) from the Fin side.

・Fit **Fixtures 2-2 and 5** in this order to FS(1) from scroll side, and screw **M10** Hex. socket head bolt along with Hex. nut and Washer.

③Turn Hex. nut and fit G-seal.



Important	**・Pay attention to directions of Fixture and G-seal.** Side of G-seal where you can see spring faces Shaft Seal (1). **・Check that the top of G-seal is lower than bottom of tapered section of FS(1).** ・If not, tighten further with Fixture again in the same direction **・Wipe out extruded LOCTITE with clean cloth.**



④Fill ISP exclusive grease [0.1ml(0.2g)] between 2 lips of Shaft Seal(1) and G-seal with syringe evenly around whole periphery.

6.3.4 Fit Bearing set(1)

・Wipe out dust and grease attached to Bearing set(1).

・Turn Inner ring by hand and check that it turns lightly and smoothly.

・Put washer between Bearing Set(1) and FS(1).If not, you cannot rotate the pump.(only for ISP-250B/250C)

・Fit 3 holes of Bearing set(1) to screw holes on FS(1) side, and tighten by Hex. socket head bolt with slight amount of LOCTITE 242 or 542.

Tightening torque　2.94±0.3 N･m (30±3kgf･cm)

Important	**・Use LOCTITE 242 or 542 (medium strength).** **・Apply slight amount of LOCTITE to the thread section.** **・Wipe out extruded LOCTITE with clean cloth.**

6.3.5 Fit New Pin Crank Bearing (if necessary)

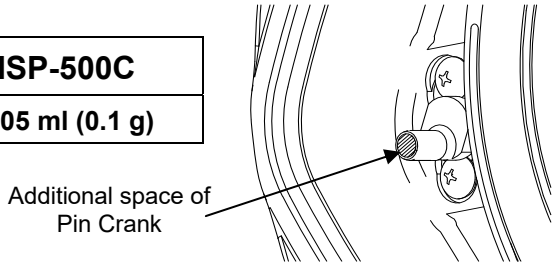
・Wipe out adhesives and dust around screws.
・Fit new Pin Crank set and tighten by **screws with slight amount of LOCTITE 242 or 542.**

Important	**・Use LOCTITE 242 or 542 (medium strength).** **・Apply slight amount of LOCTITE to thread section.** **・Wipe out extruded LOCTITE with clean cloth.**

6.3.6 Grease additional space of Pin Crank (ISP-250C/500C)

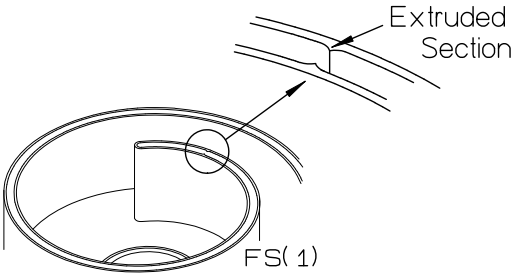
①Clean old grease in the additional space of Pin Crank.
②Put new exclusive grease in with the amount below.

Grease volume ［／1 pc.］	**ISP-250C**	**ISP-500C**
	0.05 ml (0.1 g)	**0.05 ml (0.1 g)**



6.3.7 Fit Tip Seal

・Place white soft back-up part facing downwards and black hard sliding material facing upwards.
・Fit Tip Seal from the center of FS(1).
・Internally extruded section near the center of wrap functions as a stopper to hold Tip Seal. Completely push sliding material side by hand into the groove.

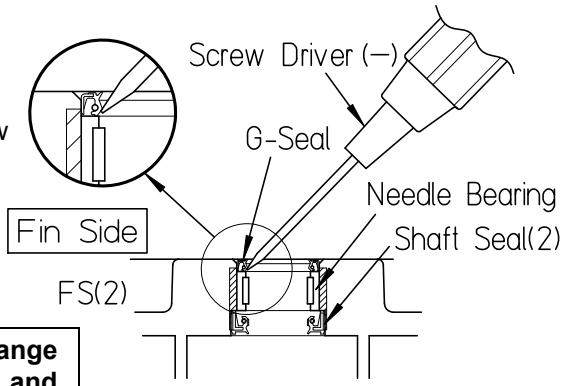


6.4 Disassembly of FS (2)

6.4.1 Remove G-seal

Remove the G-seal as follows and replace it with new one.

・Insert straight edge screwdriver to G-seal from the Fin side of FS(2) and remove it.

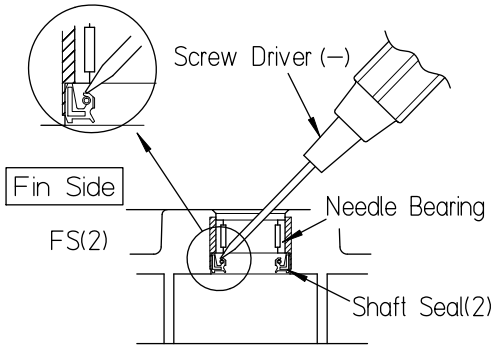


Important	・**Pay attention not to damage Flange surface of FS(2), scroll section, and Needle Bearing section .**

6.4.2 Remove Shaft Seal(2)

Remove the Shaft Seal (2) as follows and replace it with new one.

・Insert straight edge screwdriver from the Fin side of FS (2) to Shaft Seal(2), lightly tap handle of screwdriver and remove Shaft Seal(2) while moving the screwdriver around the whole periphery Shaft Seal(2).



Important	・**Pay attention not to damage Flange surface of FS(2), scroll section and Needle Bearing section.**

6.4.3 Remove FS (2) Needle Bearing

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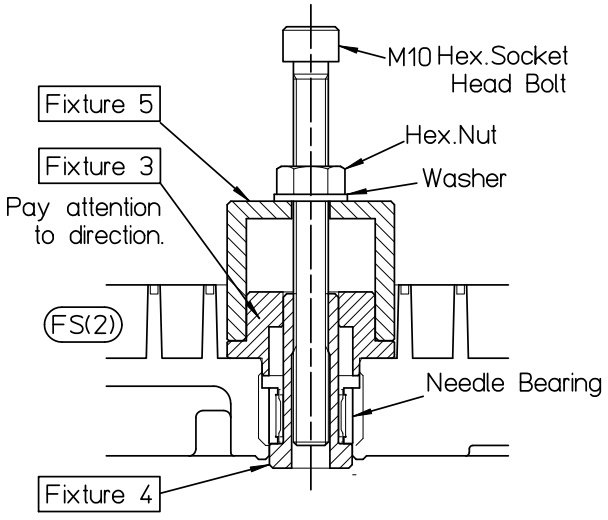
①Insert **Fixture 4** to FS(2) from. Fin side.

②Fit **Fixtures 3 and 5** to FS(2) from scroll side, and screw **M10** Hex. socket head bolts along with Hex. nut and Washer.

③Turn Hex. nut and remove Needle Bearing.

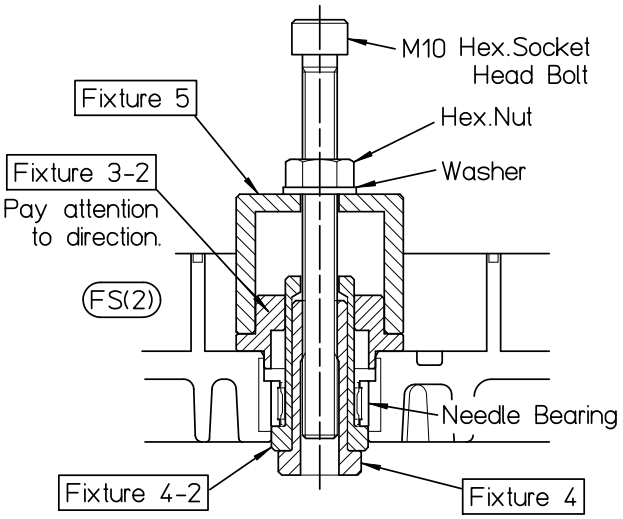


ＩＳＰ－５００Ｂ／５００Ｃ

①Insert **Fixtures 4 and 4-2** to FS(2) from Fin side .

②Fit **Fixtures 3-2 and 5** to FS(2) from scroll side, and screw **M10** Hex. socket head bolts along with Hex. nut and Washer.

③Turn Hex. nut and remove Needle Bearing.



6.4.4 Clean FS(2)

①Wipe out dust on the place where Shaft Seal(2) of FS(2) and G-seal enter, with clean cloth.
- Wipe out dust on wall and bottom of scroll wrap with clean cloth.
- Wipe out dust attached to side and bottom of Tip Seal groove by using bamboo spatula covered with clean cloth so as not to damage the groove.
- Blow out the whole unit with air.

②Fully wipe out old grease attached to Needle Bearing in the center of FS(2) with clean cloth while turning roller until no more comes out.

Important	**・If you feel some resistance to remove Tip Seal, be sure to wipe out dust.** **・Be sure to clean Tip Seal groove with soft bamboo spatula since it is fragile.** **・Always use clean cloth.** Mixing with other grease can greatly deteriorate the performance. **・Pay attention not to leave the waste thread in Bearings.**

6.5 Reassembly of FS (2)

6.5.1 Fit FS(2) Needle Bearing

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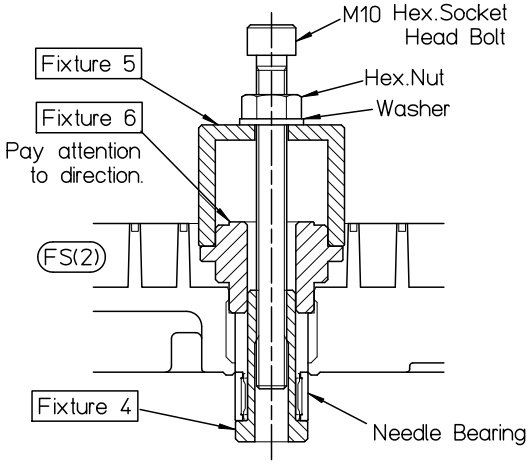
①Insert new Needle Bearing to **Fixture 4**.

②Insert **Fixture 6** to **Fixture 5** and fit them to FS(2) from scroll side .

③Insert **Fixture 4** with Needle Bearing to FS(2) from Fin side and screw **M10** Hex. socket head bolt along with Hex. nut and Washer.

④Turn Hex. nut and fit Needle Bearing.



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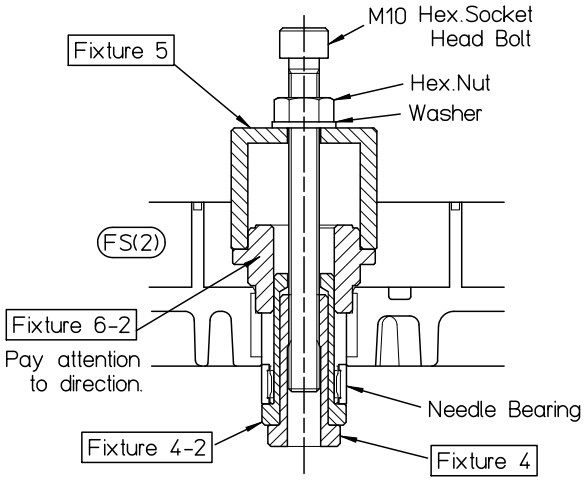
①Insert new Needle Bearing to a set of **Fixtures 4 and 4-2.**

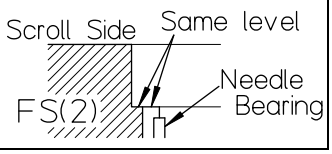
②Insert **Fixture 6-2** to **Fixture 5** and fit them to FS(2) from scroll side .

③Insert a set of **Fixture 4** with Needle Bearing and **Fixture 4-2** to FS(2) from Fin side and screw **M10** Hex. socket head bolt with Hex. nut and Washer.

④Turn Hex. nut and fit Needle Bearing.



Important	**・Pay attention to Fixture direction.** **・Check that edge surface (scroll side) of Needle bearing and stepped section on FS (2) side are on the same level.** If not, fully tighten with Fixture in the same direction. **・Wipe out dust on Fixture with clean cloth.**



6.5.2 Fit Shaft Seal (2)

① Apply slight amount of **LOCTITE 242 or 542 around outer periphery of new Shaft Seal (2).**

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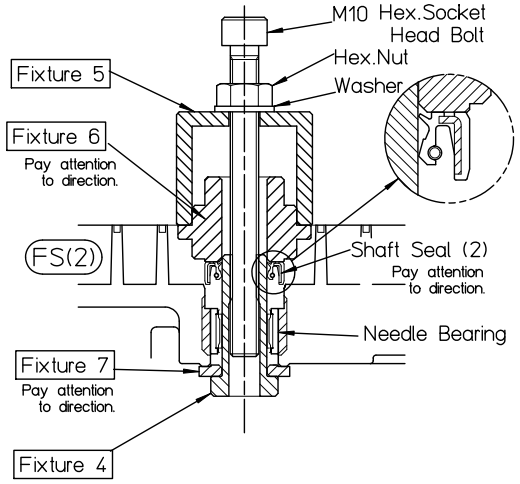
②Insert **Fixture 7** to **Fixture 4** and insert them to FS(2) from the Fin side.

③Horizontally insert Shaft Seal(2) to **Fixture 4**.

・Fit **Fixtures 6 and 5** in this order to Shaft Seal(2) from the scroll side. Screw **M10** Hex. socket head bolt along with Hex. nut and Washer from the scroll side.

④Turn Hex. nut and fit Shaft Seal(2).



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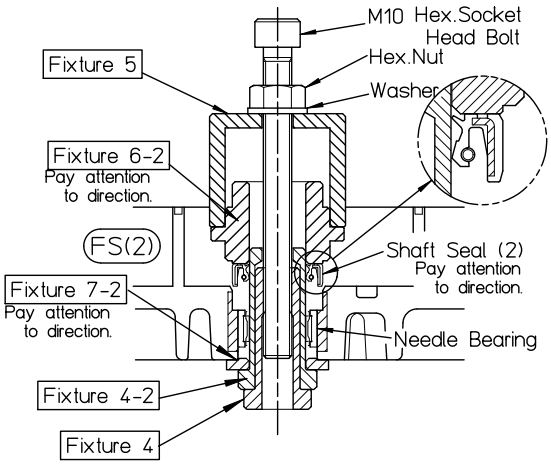
②Insert **Fixture 7-2** to a set of **Fixtures 4 and 4-2**, and insert them to FS(2) from the Fin side.

③Horizontally insert Shaft Seal(2) to **Fixture 4-2**.

・Fit **Fixtures 6-2 and 5** in this order to Shaft Seal(2). Screw **M10** Hex. socket head bolt along with Hex. nut and Washer from the scroll side.



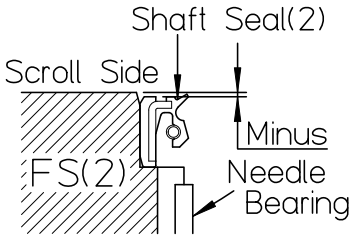
Important

・**Pay attention to directions of Fixture and Shaft Seal(2).**
Side of Shaft Seal(2) where you can see spring faces Needle Bearing.

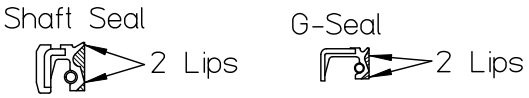
・**Horizontally place Shaft Seal(2) on the Fixture.**

・**Check that Shaft Seal(2) is lower than the surface of FS(2) scroll side.**

If not, tightly further again with Fixture in the same direction. Otherwise, Shaft seal(2) can contact OS.



Evenly fill **ISP exclusive grease [0.1ml(0.2g)]** between 2 lips of Shaft Seal and between 2 lips of G-seal around the whole periphery with syringe.



⚠ CAUTION

Be sure to use **ISP exclusive grease** for Bearings.

※Mixing with other oil can shorten grease lifetime and damage Bearings.

Use ISP exclusive grease

6.5.3 Fit G-seal

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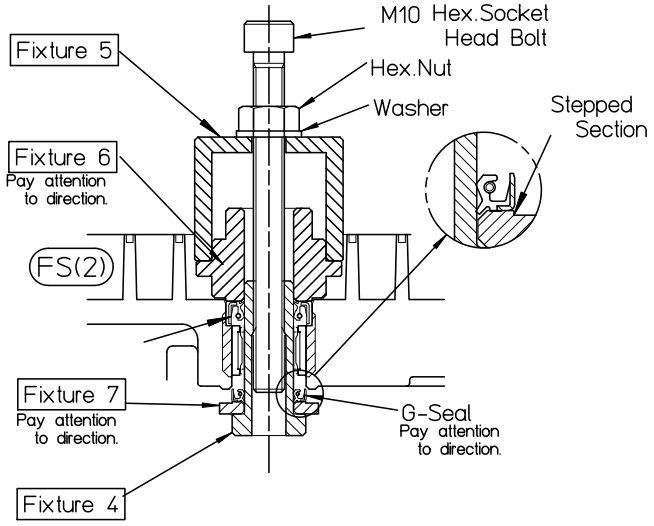
①Insert **Fixture 7** and new G-seal to **Fixture 4**.

②Insert **Fixture 6** and **Fixture 5** in this order to FS(2) from scroll side.

③Insert G-seal and **Fixture 4** with **Fixture 7** to FS(2) from the Fin side, and screw **M10** Hex. socket head bolt along with Hex. nut and Washer from the opposite side.

④Turn Hex. nut and fit G-seal.



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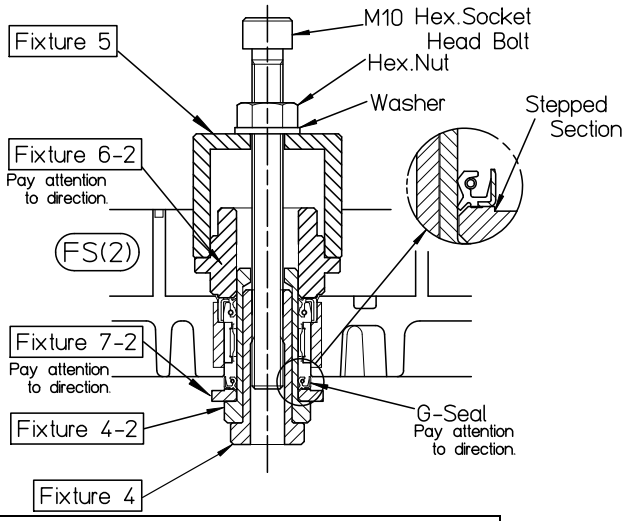
①Insert **Fixture 7-2** and new G-seal to a set of **Fixture 4** and **Fixture 4-2**.

②Insert **Fixture 6-2** and **Fixture 5** in this order to FS(2) from scroll side.

③Insert G seal and **Fixture 4** along with **Fixture 7-2** and **fixture 4-2** to FS(2) from the Fin side, and screw **M10** Hex. socket head bolt along with Hex. nut and Washer from the opposite side.



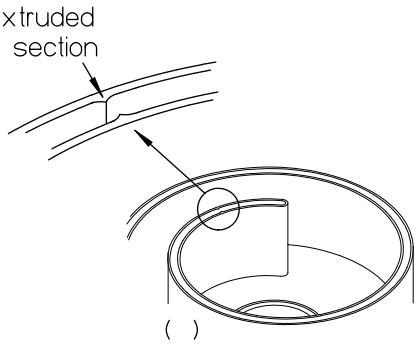
Important	・**Pay attention to directions of Fixtures and G-seal.** Side of G-seal where you can see spring faces Bearing. ・**Check that G-seal is lower than FS(2) Fin side and that is parallel to Fin surface (not curved).** If not, tighten further again with Fixture in the same direction.

6.5.4 Fit Tip Seal

・Place white soft back-up part facing downwards and black hard sliding material facing upwards.

・Fit Tip Seal from the center of FS(2).

・Internally extruded section near the center of wrap functions as a stopper to hold Tip Seal. Completely push sliding material side with hand into the groove.

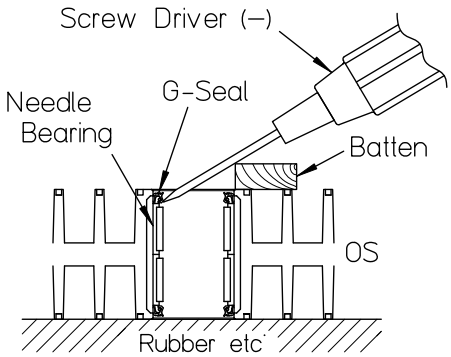


6.6 Disassembly of OS

6.6.1 Remove G-seal

Remove G-seal as follows.

・Place OS on horizontal stand with rubber.
・Place batten on OS and remove G-seal with straight edge screwdriver.
・Remove G-seal on the opposite side in the same way.



Important	Pay attention not to damage scroll top, bottom and side surfaces of OS

6.6.2 Remove Main Needle Bearing

①Remove 2 Tip Seals attached to the both sides of OS from the end of outer periphery.
②Remove G-seal in the same way as 5.6.1.

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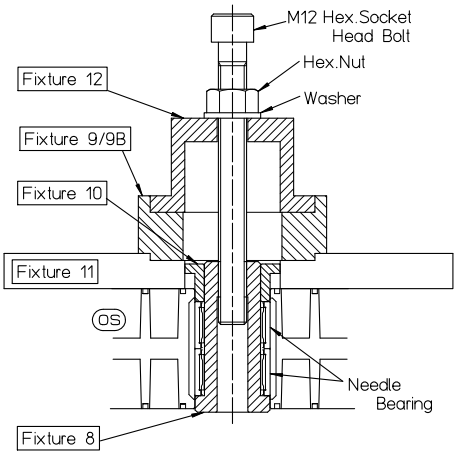
③Insert **Fixture 8** to Needle Bearing of OS.

④Fit **Fixtures 10, 11, 9 (or 9B) and 12** in this order from the opposite side and screw **M12** Hex. socket head bolts with Hex. nut and Washer.

⑤Turn Hex. nut and remove Needle Bearing(a set of 2 bearings.)



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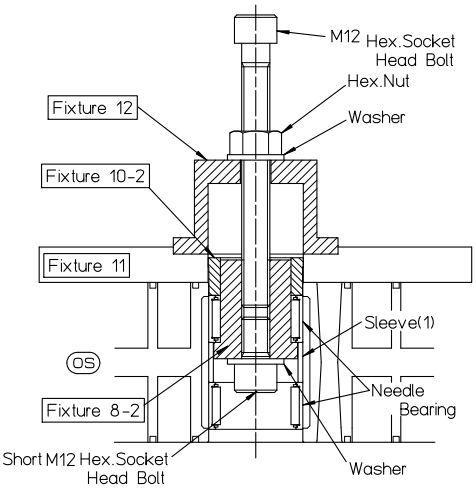
③Insert 2 pcs. of **Fixture 8-2** to Needle Bearing of OS. Fit short **M12** Hex. socket head bolts with Washer into **Fixture 8-2** from the opposite side.

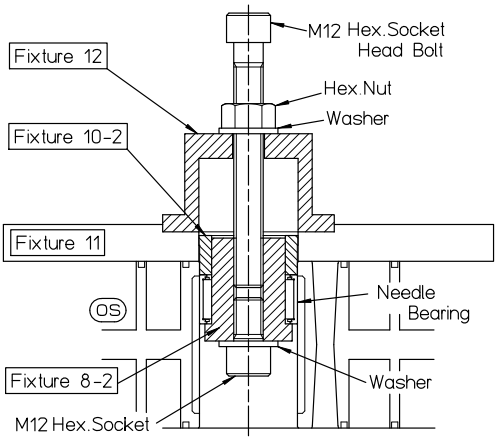
④Insert **Fixture 10-2** to **Fixture 8-2** from opposite side, fit **Fixtures 11 and 12** in this order and screw **M12** Hex. socket head bolts along with Hex. nut and Washer.

⑤Turn Hex. nut, remove Needle Bearing and Sleeve(1).

⑥Also remove Needle Bearing on the opposite side.

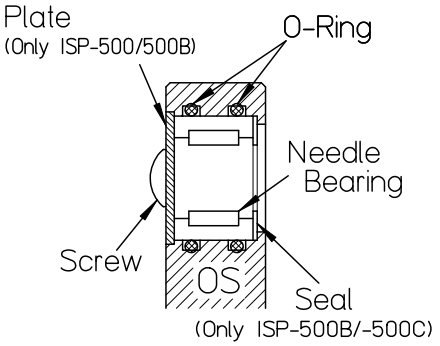


Important
・Pay attention to Fixture direction. ・Pay attention not to damage top, bottom and side of scroll of OS.



6.6.3 Remove Mini Needle Bearing

③ Remove screws of Needle Bearing (Pin Crank) around OS with cross head screwdriver.
④ Remove Plate (ISP-500B/-500C only) and push Needle Bearing and Seal (ISP-500B/-500C only) from the opposite side and remove them.
⑤ Fully wipe out old grease attached to Needle Bearing with clean cloth while turning roller until no more comes out.
・If you replace Pin Crank set in 5.3.3, replace Needle Bearings also.



Important	**Pay attention not to damage cross section of screw to fix Needle Bearing.** Use small cross head screwdriver (for M3).

6.6.4 Clean OS

①Wipe out dust in the place where G-seals enter OS with clean cloth.
・Wipe out dust on wall and bottom of scroll wrap with clean cloth.
・Wipe out dust attached to side and bottom of Tip Seal groove by using bamboo spatula covered with clean cloth so as not to damage the groove.
・Blow out the whole unit with air.
②Fully wipe out old grease attached to Needle Bearings and Sleeve in the center of OS with clean cloth while turning roller until no more comes out.

Important	・If you feel some resistance to remove Tip Seal, be sure to wipe out dust. ・Be sure to clean Tip Seal groove by soft bamboo spatula since it is fragile . ・**Always use clean cloth.** Mixing with the other grease can greatly deteriorate the performance. ・**Pay attention not to leave the waste thread in Bearings.**

6.7 Reassembly of OS

6.7.1 Fit Needle Bearing

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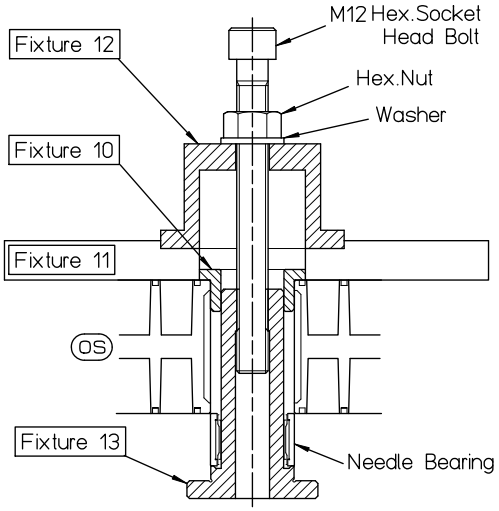
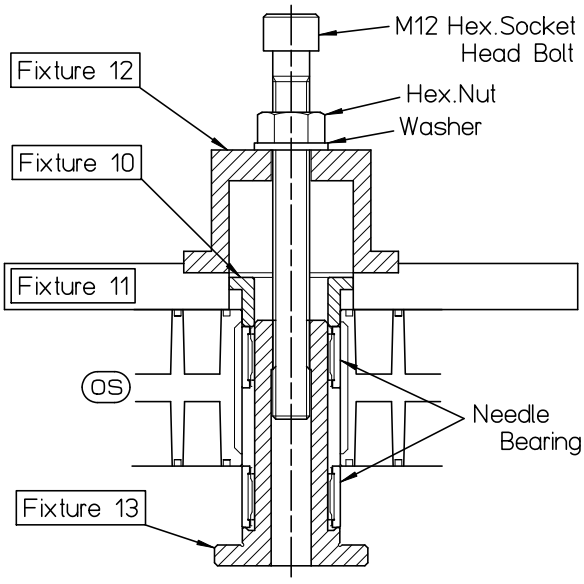
①Insert new Needle Bearing to **Fixture 13** and fit to one side of OS. Fit Fixture 10 from the opposite side.



②Insert **Fixtures 11 and 12** in this order to **Fixture 10**, and screw **M12** Hex. socket head bolts with Hex. nut and Washer.
③Turn Hex. nut and fit Needle Bearing.

④Insert **Fixture10** to Needle Bearing side already pressed, insert the other new Needle Bearing to **Fixture 13**, and fit it to OS from the opposite side .
⑤Fit **Fixtures 11 and 12**, and screw **M12** Hex. socket head bolt along with Hex. nut and Washer.
⑥Turn Hex. nut and fit Needle Bearing.



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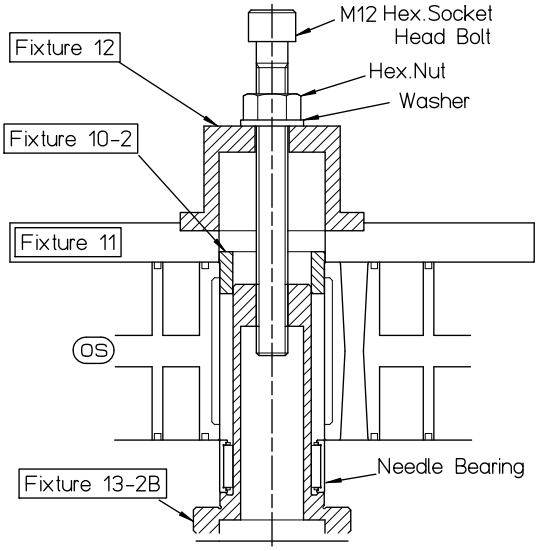
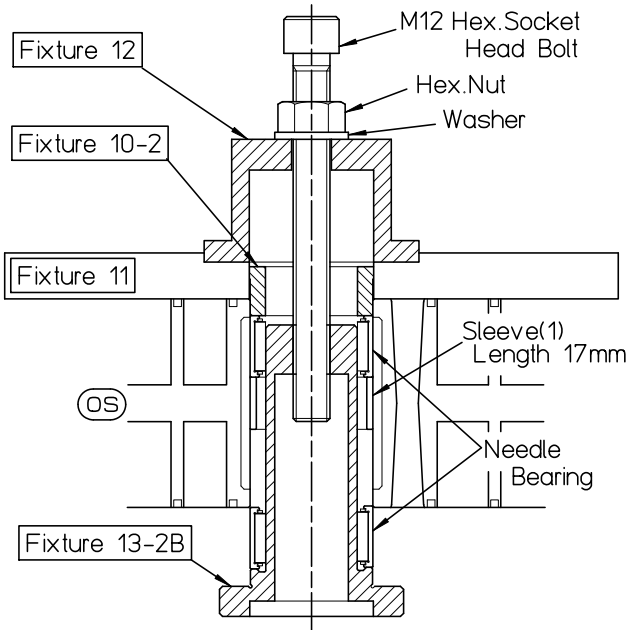
①Insert new Needle Bearing to **Fixture 13-2B** and fit to one side of OS. Fit Fixture 10-2 from the opposite side.



②Insert **Fixtures 11 and 12** in this order to **Fixture 10-2** and screw **M12** Hex. socket head bolts with Hex. nut and Washer.
③Turn Hex. nut and fit Needle Bearing. Insert Sleeve(1) from the opposite side.
④Insert **Fixture 10-2** to Needle Bearing side already pressed, insert the other new Needle Bearing to **Fixture 13-2**, and fit it to OS from the opposite side .
⑤Fit **Fixtures 11 and 12** and screw **M12** Hex. socket head bolt along with Hex. nut and Washer.
⑥Turn Hex. nut and fit Needle Bearing. Check that Sleeve (1) does not turn. If it turns, tighten further again in the same direction.



Important	**・Pay attention to direction of Fixtures.** ・Needle Bearing consists of 2 pcs. Do not combine with other set of Bearing. ・Pay attention not to damage top, bottom and side of scroll of OS. **・Wipe out dust on Fixtures with clean cloth.**

6.7.2 Fit G-seal

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①Insert **Fixture 14** and new G-seal to **Fixture 13**, and then to OS. Insert **Fixture 10** from the opposite side.

②Insert **Fixtures 11 and 12** in this order to **Fixture 10**, screw **M12** Hex. socket head bolt along with Hex. nut and Washer, and turn Hex. nut and fit G-seal.

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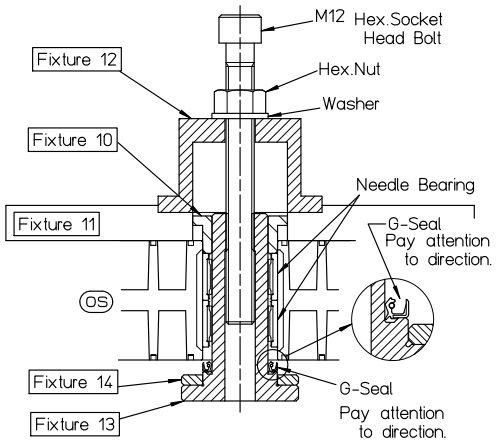
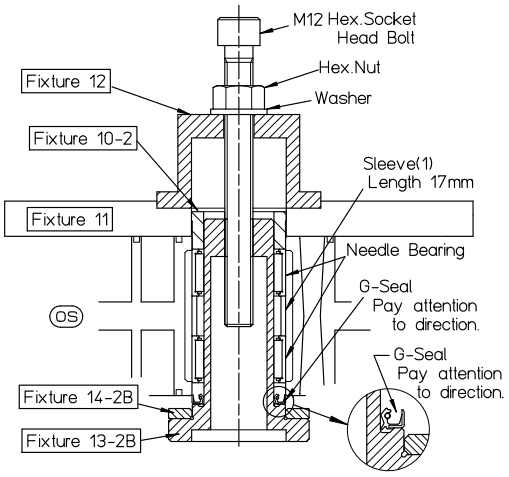
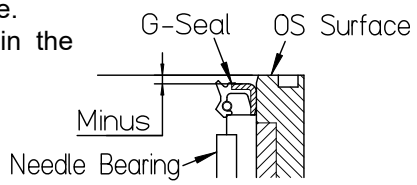
① Insert **Fixture 14-2B** and new G-seal to **Fixture 13-2B**, and then to OS. Insert **Fixture 10-2** from the opposite side.

②Insert **Fixtures 11 and 12** in this order to **Fixture 10-2**, and screw **M12** Hex. socket head bolt along with Hex. nut and Washer, and turn Hex. nut and fit G-seal.

③Every fill ISP exclusive grease [0.1ml(0.2g)] between 2 lips of G-seal.
④Fit G-seal on the opposite side in the same way.





Important	**・Pay attention to directions of Fixtures and G-seals.** Side of G-seal where you can see spring faces Bearing. ・Check that G-seal is lower than OS surface. If not, tighten further again with fixture in the same direction. 

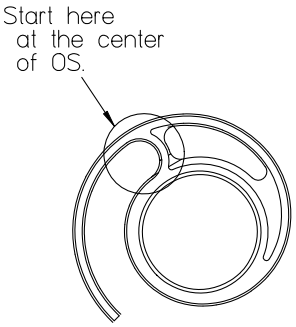
Fill **ISP exclusive grease [0.2 ml (0.4 g)]** between G-seal and Needle Bearing with syringe to evenly around whole periphery.

Important	**・Be sure to use ISP exclusive grease.** ・Be sure to use clean rubber gloves when filling **grease to Needle Bearing.** Apply grease a bit more to both roller and cages which are somewhat worn, different from new Bearing.

6.7.3 Fit Tip Seal

・Place white soft back-up part facing downwards and black hard sliding material facing upwards.

・Fit Tip Seal in accordance with shape at the center of OS and insert gradually further towards outside.



6.8 Replace Exhaust valve

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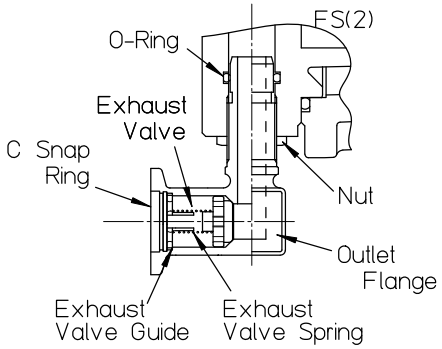
① Loosen Nut and remove Exhaust Flange. Remove O ring in the Outlet hole of FS(2), and clean in the hole and Outlet Flange by using cloth and brass brush.

② Remove C snap ring in the Outlet Flange with stop ring supplier. Remove Exhaust Guide. Exhaust Spring and Exhaust Valve with tweezers.

③ Clean Outlet Flange and sealing surface where Outlet hole and Exhaust Valve contact by using clean cloth and brass brush so as not to damage, and blow out with air.

④ Fit new O ring to the groove of Exhaust Valve ,hole for O ring and new Exhaust Valve,Exhaust Spring and Exhaust Guide to Outlet Flange and attach with C snap ring.

⑤ Fit Outlet Flange with Nut to FS(2),and tighten Nut and fix it.



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①Remove Outlet Flange with spanner (wrench flat 24) and clean Outlet hole of FS(1) with clean cloth and blow out with air.

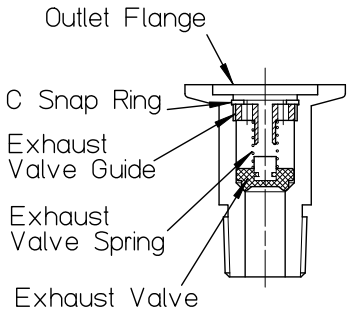
②Remove C snap ring in Outlet flange with stop ring supplier. Remove Exhaust guide, Exhaust spring and Exhaust valve with tweezers.

③Clean Outlet Flange sealing surface where Outlet hole and Exhaust valve contact by using bamboo spatula covered with clean cloth so as not to damage , and blow out with air.

④Fit new Exhaust valve, Exhaust spring and Exhaust guide to Outlet Flange and attach with C snap ring.

・Exhaust valve must be in the center.

⑤Apply slight amount of LOCTITE 242 or 542 to thread section of Exhaust flange and screw into FS(1).



Important	**・Exhaust valve should be at the center.** **・Use LOCTITE 242 or 542(medium strength).** **・Apply slight amount of LOCTITE to only thread section.** **・Wipe out extruded LOCTITE with clean cloth.**

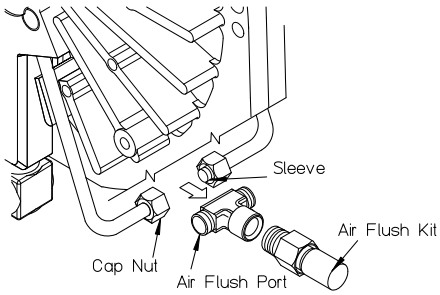
6.9 Maintenance of Inlet Flange

① Remove Hex.Socket head bolts of Inlet Flange.
② Clean inside the Inlet Flagne and Inlet Filter with clean cloth ,and blow out dusts.
③ Put a new O ring in the groove of Inlet Flange.Put the Inlet Flange on the FS(1) and tighten by Hex socket head bolts with slight amount of LOCTITE 242 or 542.

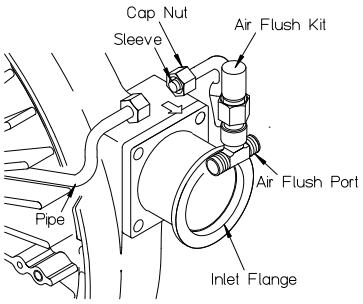
6.10 Maintenance of Air Flush Port

6.10.1 ISP-250B/500B version

①Loosen nuts while keeping Air Flush Port and pipes by spanner.
②After taking FS(2) away remove Air Flush Port.
③Blow out inside the Air Flush Port.
④Blow out inside pipes attached to FS(1) and FS(2).
⑤Put slight amount of LOCTITE 242 or 542 and tighten Air Flush kit.
⑥Replace sleeve to new ones.



ISP-250B

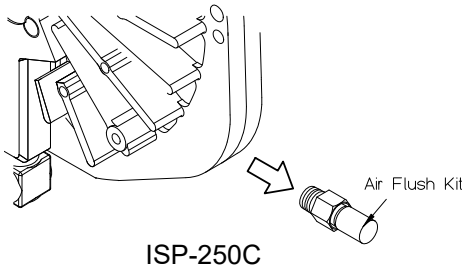


ISP-500B

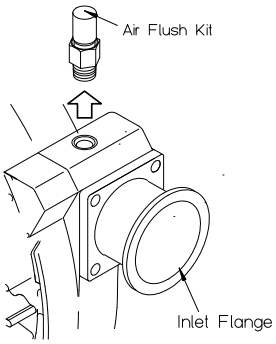
Important	**・Evenly insert Pipe so that Pipe fully contact to the bottom of Air Flush Port.** **・Do not tighten Cap nut too hard.**

6.10.2 ISP-250C/500C version

①Remove Air Flush Kit from pump.
②Put slight amount of LOCTITE 242 or 542 and tighten Air Flush Kit to pump.

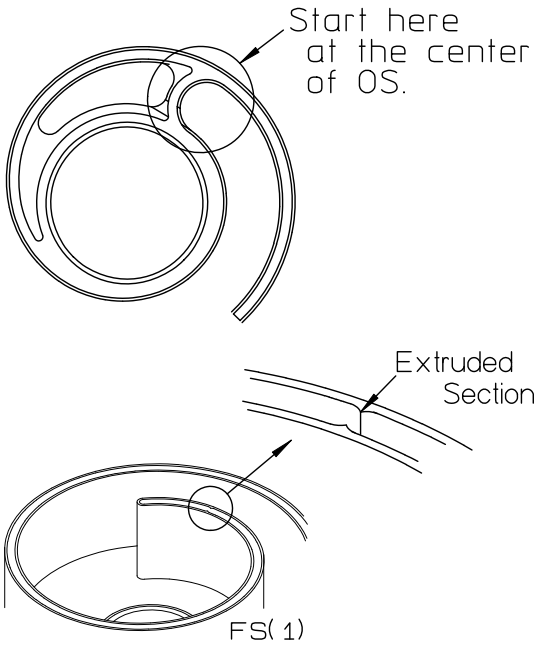


ISP-250C



ISP-500C

6.11 Replace Tip Seal



①Place white soft back-up part facing downwards and black hard sliding material side facing upwards and push it into the groove by hand so that protruded portion of black sliding material is minimal.

②First insert Tip Seal in accordance with the shape at the center on FS(2) side of OS and insert gradually further towards outside.

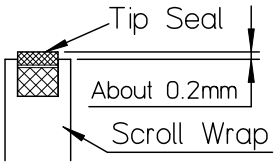
③Cut Tip Seal at 2~3mm before the end of Tip Seal groove by cutter (sharp knife).

④Insert remaining Tip Seal at the center of the groove from FS(1) side and cut at 2~3mm before the end of the groove by cutter (sharp knife).

⑤Internally extruded section at the center of wrap functions as a stopper to hold Tip Seal. Completely push sliding material by hand into the groove.

⑥In the same way, insert Tip Seal to FS(1) side of OS, and fit remaining Tip Seal to FS(2) side.

Important	**・Check that Tip Seal extrudes by about 0.2mm.** **・Fit Tip Seal to the groove properly, not too tightly or too loose.** Too loose insertion can cause Tip Seal to come off since it extrudes too much from the groove.

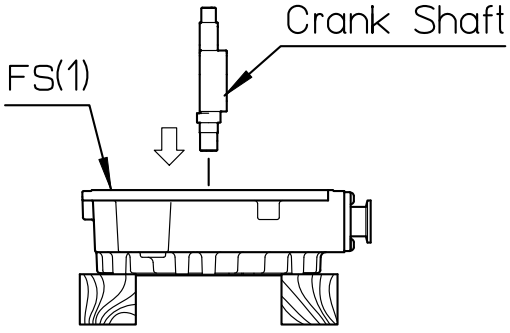


6.12 Assembly of Pump Body

6.12.1 Assemble Body set

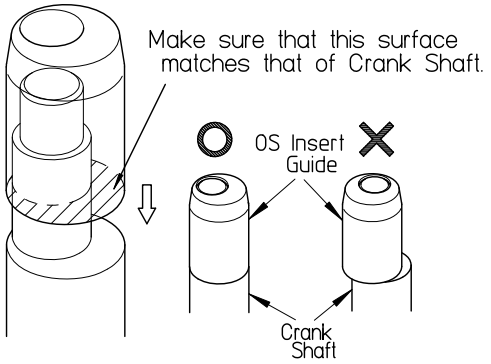
①Place 2 blocks (wood which height is over 55mm) on horizontal workbench and FS(1) on the top of them.

・Fit Crank Shaft vertically to FS(1).



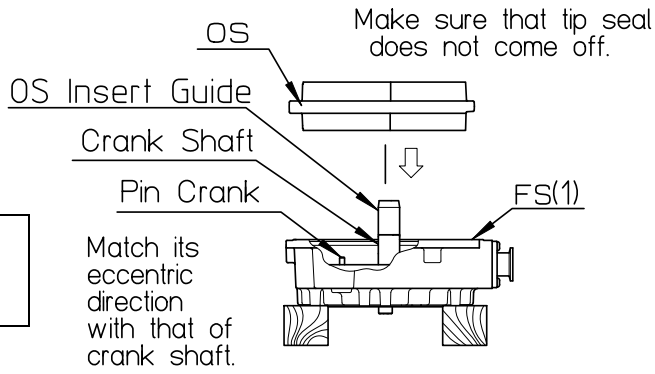
Important	**When fitting Crank Shaft to FS(1), pay attention not to damage Bearing and Shaft Seal with the angle of Key groove of Crank Shaft.**

②Turn eccentric section of both Crank Shaft and Pin Crank in the same direction. Put the **OS Insert Guide (Black one for ISP-250B/-250C, White one for ISP-500B/-500C)** on the Crank Shaft as shown in the right drawing. Fit OS to FS(1).

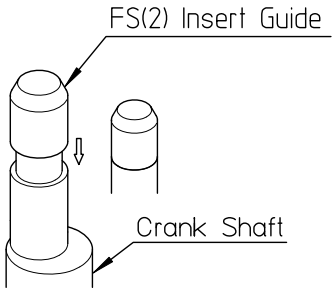


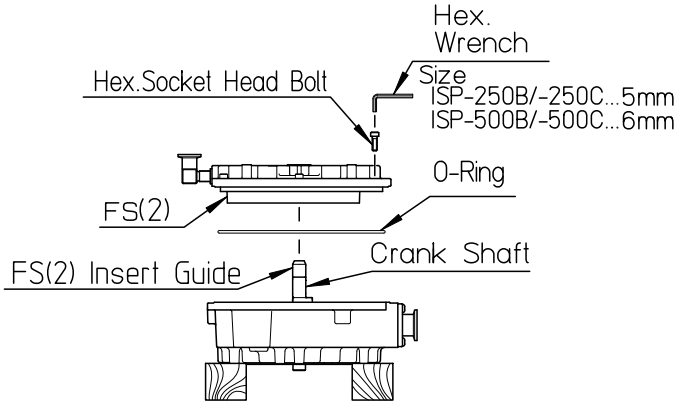
Important	**Pay attention that Tip Seal does not come off when fitting OS.**

③ Put the **FS(2) Insert Guide (Black one for ISP-250B/-250C, White one for ISP-500B/-500C)** on the Crank Shaft. Fit new O ring to FS(2), fit it to FS(1) and tighten the Hex. socket head bolts.



Tightening torque	
ISP-250B/-250C	**7.8±0.7 N·m (80±7kgf·cm)**
ISP-500B/-500C	**14.7±0.7 N·m (150±7kgf·cm)**



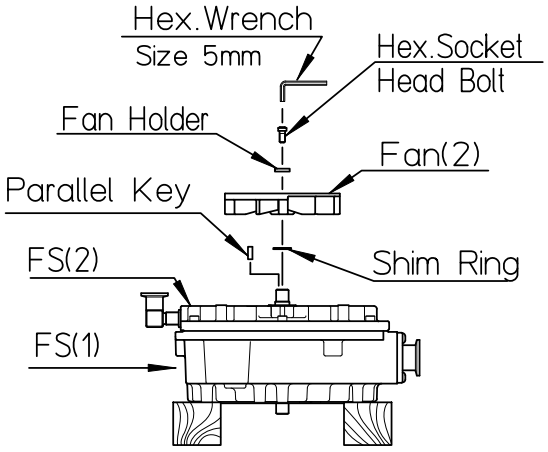


Important	・Check that there is no dust or damage on the surface of O ring for FS(1), FS(2) and O ring surface. ・Apply slight amount of ISP exclusive grease to the O ring surface. ・Check that O ring does not come off from mating side and Tip Seal does not come off from the groove. ・Diagonally tighten Hex. socket head bolts fixing FS(2) by turns in order to tighten evenly.

④Fit Parallel Key and Fan(2) to FS(2), apply slight amount of **LOCTITE 242 or 542 to Hex. socket head bolts** and fully tighten along with Washer.

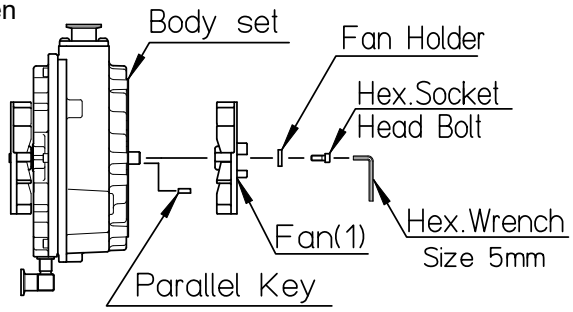
Tightening torque 14.7±0.7 N·m(150±7kgf·cm)

∗Assemble Shim Ring, parallel key and FS(2) in order.



⑤Stand Body set vertically, fit Parallel Key and Fan(1). Apply slight amount of **LOCTITE 242 or 542 to Hex. socket head bolts** and fully tighten along with Washer.

Tightening torque 14.7±0.7N·m(150±7kgf·cm)



Important	・Turn Fan(2) by hand and check that it turns smoothly (a little bit heavier than rotating resistance checked in Disassembly ５．１．１.) If rotation is heavy, disassemble again and check that Tip Seal does not come off. **・Use LOCTITE 242 or 542 (medium strength).** **・Apply slight amount of LOCTITE to only thread section.** **・Wipe out extruded LOCTITE with clean cloth.**

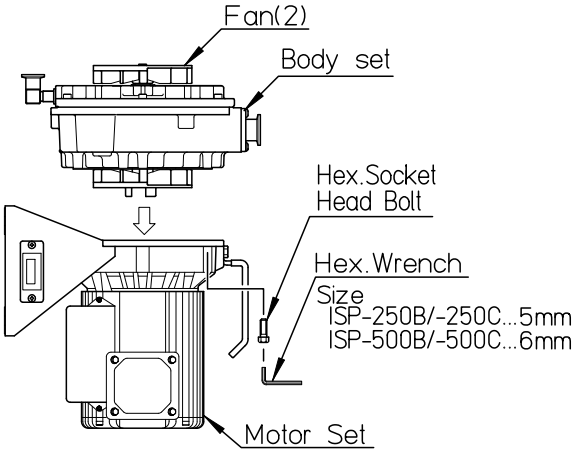
6.12.2 Fit Body set

①Stand Motor set and Body set vertically and fit new Spider to Coupling, with central dent on Motor side.

②Match nail of Fan with nail of Spider, Parallel Pin with hole position, and fit Body to Motor set.

・Check that Fan(2) turns smoothly and tighten Hex. socket head bolts.

Tightening torque 14.7±0.7 N·m(150±7kgf·cm)



Important	Fit pump to Motor set so that Inlet can face the same direction as before maintenance.

6.12.3 Fit Fan Cover

・ Apply slight amount of LOCTITE 242 or 542 to the thread section of Hex. Socket head bolts.

・Tighten Fan Cover and Cover Plate(2) together with the bolts.

6.13 Break-in operation

⚠ WARNING	
Never pump toxic, explosive, flammable, corrosive gases, chemicals, solvents or powders. ※When you inspect the pumps, flowing substances, explosion or fire can cause bodily injury.	 Pump clean gas
Prevent short-circuit by breaker of proper volume. ※If not, it can cause fire or electric shock.	 Install breaker
Be sure to ground. ※If not, it can cause electric shock or fire.	 Be sure to ground

①Do break-in of Tip Seal in the following way while removing Exhaust Valve.

②Close Inlet Valve and operate at 50Hz.

③Loosen Hex. socket head bolts which fix FS(1) and FS(2), and tighten with hand till it stops.

④If current during pump operation is within + 10% from rated figure (refer to [rated current chart] on next page), continue operation as it is. If it exceeds + 10% from rated figure, open Inlet to atmosphere and operate for a while, then close Inlet again and check current. Repeat this procedure till current is less than 10% from rated figure.

⑤If current is less than the rated figure, tighten Hex. socket head bolts and do 24 hours continuous operation.

Tightening torque
ISP-250B/-250C 7.8±0.7N·m(80±7kgf·cm)
ISP-500B/-500C 14.7±0.7N·m(150±7kgf·cm)

⑥Change electric source to 60Hz and do ②～⑤.

⑦Stop pump and turn off electric source.

⑧After break-in running, clean up inside the pump.
In the case of ISP-250B/500B, follow the procedure in 5.1.1, 5.1.3a and 5.1.4(only for ②,③).
In the case of ISP-250C/500C, follow the procedure in 5.1.1, 5.1.3b and 5.1.4(only for ②,③).
Clean up inside the pump and blow out.

⑨Wipe out dust at Exhaust Valve hole with clean cloth in the same way as 5.6, blow out with air and fit Exhaust Valve.

⑩Apply **ISP exclusive grease** to roller at OS Needle Bearings, Needle Bearings for Pin Crank and FS(2) Needle Bearings.

・Apply **ISP exclusive grease** between roller and cage while turning roller.

Grease volume [／ **bearing**]	**where to apply**	**ISP-250B/250C**	**ISP-500B/500C**
	OS Needle bearing	**0.2ml(0.4 g)**	**0.3ml(0.6 g)**
	Needle bearing at Pin crank	**0.05ml(0.1 g)**	**0.05ml(0.1 g)**
	FS(2) Needle bearing	**0.1ml(0.2 g)**	**0.1ml(0.2 g)**

⑪Evenly fill **ISP exclusive grease [0.1ml(0.2g)]** between OS G-seal and Needle Bearings; FS(2) G-seal and Needle Bearings; and between 2 lips of FS(2) Shaft Seal(2) and G-seals of OS around the whole periphery with syringe.
⑫Assemble in reverse order of disassembling.

⚠ CAUTION	
Be sure to use **ISP exclusive grease** for Bearings. ※Mixing with other oil can shorten grease lifetime and damage Bearings.	 Use ISP exclusive grease

6.14 Inspect pump performance

①Operate pump and measure currents.

model	Specification	current after break-in (when Inlet is closed)
ISP−250B/250C	1-phase 200V	1.8～2.0A
	3-phase 200V	1.3～1.5A
ISP−500B/500C	1-phase 200V	2.9～3.2A
	3-phase 200V	2.0～2.3A

②Check that there is no abnormal noise and vibration.
③Inspect the ultimate pressure and leak tightness.
Ultimate pressure: ISP-250B/-250C: ≦1.6Pa ISP-500B/-500C: ≦1.0Pa
Leak tightness: ISP-250B/-250C, 500B/-500C: ≦1.0×10^{-2} Pa･L/s

6.15 Rated current chart

ＩＳＰ－２５０Ｂ／２５０Ｃ Single-phase

Voltage V	１００		１１５	２００		２３０	
Hertz Hz	５０	６０	６０	５０	６０	５０	６０
Rated current A	４.８	４.８	４.３	２.６	２.８	２.４	２.４
Rated current+10% A	５.３	５.３	４.７	２.９	３.１	２.６	２.６

ＩＳＰ－２５０Ｂ／２５０Ｃ Three-phase

Voltage V	２００		２０８	２３０	３８０	４００	４１５	４６０
Hertz Hz	５０	６０	６０	６０	５０	５０	５０	６０
Rated current A	１.６	１.９	１.９	１.８	０.９	０.９	１.０	１.０
Rated current+10% A	１.８	２.１	２.１	２.０	１.０	１.０	１.１	１.１

ＩＳＰ－５００Ｂ／５００Ｃ Single-phase

Voltage V	１００		１１５	２００		２３０	
Hertz Hz	５０	６０	６０	５０	６０	５０	６０
Rated current A	８.５	１０.０	８.６	４.３	４.８	３.９	４.０
Rated current+10% A	９.４	１１.０	９.５	４.７	５.３	４.３	４.４

ＩＳＰ－５００Ｂ／５００Ｃ Three-phase

Voltage V	２００		２０８	２３０	３８０	４００	４１５	４６０
Hertz Hz	５０	６０	６０	６０	５０	５０	５０	６０
Rated current A	２.７	２.８	２.６	２.５	１.５７	１.５７	１.６３	１.４７
Rated current+10% A	３.０	３.１	２.９	２.８	１.７３	１.７３	１.７９	１.６２

7. Fixture combination chart

Model ISP-250B/250C

Fixture No.		1	2	3	4	5	6	7	8	9B	10	11	12	13	14	15	17	18
FS(1)	1. Remove Shaft Seal	○				○												
	2. Fit Shaft Seal	○	○			○										○		
	3. Fit G-seal	○	○			○												
FS(2)	4. Fit G-seal				○	○	○	○										
	5. Fit Shaft Seal				○	○	○	○										
OS	6. Fit G-seal										○	○	○	○	○			
FS(2)	7. Remove Needle Bearing			○	○	○												
	8. Fit Needle Bearing				○	○	○											
OS	9. Remove Needle Bearing								○	○	○	○	○					
	10. Fit Needle Bearing										○	○	○	○				
FS(1)	11. Remove Ball Bearing									○			○				○	
	12. Fit Ball Bearing									○							○	○

Model ISP-500B/500C

Fixture No.		1	1-2B	2-2	3-2	4	4-2	5	6-2	7-2	8-2	10-2	11	12	13-2B	14-2B	15-2B	9B	17	18
FS(1)	1. Remove Shaft Seal	○						○												
	2. Fit Shaft Seal	○	○	○				○									○			
	3. Fit G-seal	○	○	○				○												
FS(2)	4. Fit G-seal					○	○	○	○	○										
	5. Fit Shaft Seal					○	○	○	○	○										
OS	6. Fit G-seal											○	○	○	○	○				
FS(2)	7. Remove Needle Bearing				○	○	○	○												
	8. Fit Needle Bearing					○	○	○	○											
OS	9. Remove Needle Bearing										○	○	○	○						
	10. Fit Needle Bearing											○	○	○	○					
FS(1)	11. Remove Bearing													○				○	○	
	12. Fit Bearing																	○	○	○

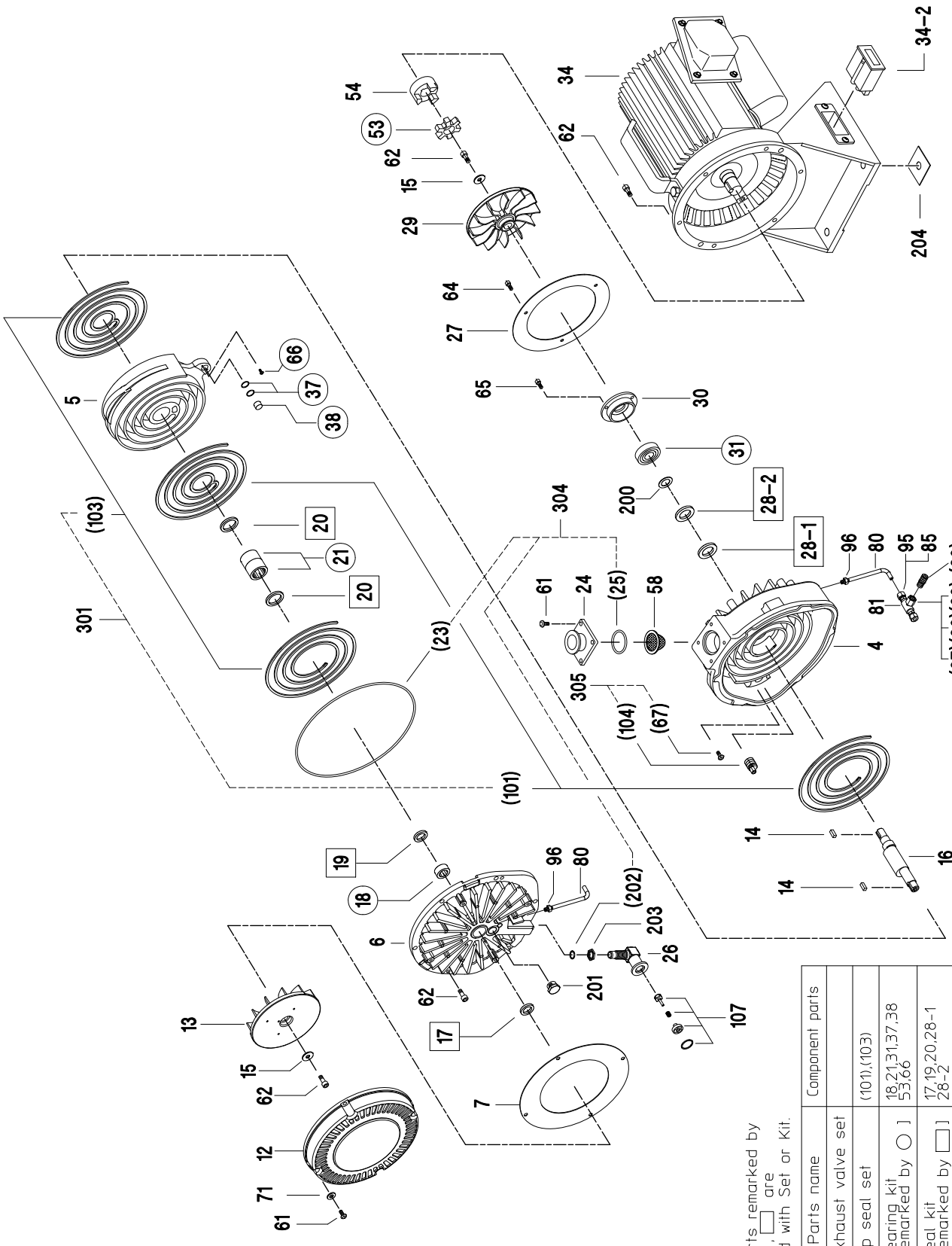
8. Parts list

No.	Parts Name	Quantity				No.	Parts Name	Quantity			
		ISP-250B	ISP-250C	ISP-500B	ISP-500C			ISP-250B	ISP-250C	ISP-500B	ISP-500C
4	F S(1)	1	1	1	1	6 1	Bolt	8		8	
5	O S	1	1	1		6 2	Bolt	1 4		2	
6	F S(2)	1	1	1	1	6 3	Bolt	—	—	1 2	
7	Cover Plate (2)	1		1		6 4	Screw	3		4	
1 2	Fan Cover	1		1		6 5	Bolt	3		3	
1 3	Fan (2)	1		1		6 9	Plug	2		2	
1 4	Parallel Key	2		1		7 1	Washer	4		4	
1 5	Washer	2		—	—	7 2	Bolt	—	—	4	
1 6	Crank Shaft	1		1		7 3	Washer	—	—	7	
2 2	Sleeve (1)	—	—	1		7 4	Nut	—	—	5	
2 4	Inlet Flange	1		1		8 0	Pipe	2	—	2	—
2 6	Exhaust Flange	1		1		8 1	Female branch tee	1	—	1	—
2 7	Cover Plate (1)	1		1		8 5	Sleeve	2	—	2	—
2 9	Fan (1)	1		1		107	Exhaust Valve set	1		1	
3 0	Bearing Case	1		1		200	Washer	1		—	—
3 3	Parallel Key	—	—	1		201	Cap	1		—	—
3 4	Motor set	1		1		203	Nut	1		—	—
34-2	Hour Meter	1		1		204	Rubber Plate	4		—	—
3 6	Pin Crank Plate	—	—	3		231	Shim Ring	—	1	—	—
5 1	Washer	—	—	2		301	Tip Seal set	1		1	
5 4	Coupling	1		1		302	Bearing kit	1		1	
5 6	Bolt (1)	—	—	3		303	Seal set	1		1	
5 7	Bolt (2)	—	—	1		304	O ring set	1	1	1	1
5 8	Inlet Filter	1		1		305	Pin Crank kit	1	1	1	1
5 9	Snap ring	—	—	1		306	Air Flush kit	1		1	

（Consumables）

No.	Parts Name	Quantity				Remarks
		ISP-250B	ISP-250C	ISP-500B	ISP-500C	
(１７)	G-seal ［ＦＳ(2)］	1		1		No.303 supplied by Seal set
(１８)	Needle Bearing ［ＦＳ(2)］	1		1		No.302 supplied by Bearing kit
(１９)	Shaft Seal (2) ［ＦＳ(2)］	1		1		No.303 supplied by Seal set
(２０)	G-seal ［ＯＳ］	2		2		No.303 supplied by Seal set
(２１)	Needle Bearing ［ＯＳ］	1 set		1 set		No.302 supplied by Bearing set
(２３)	O ring ［ＦＳ(2)］	1		1		No.304 supplied by O ring set
(２５)	O ring ［Inlet Flange］	1		1		No.304 supplied by O ring set
(28-1)	Shaft Seal (1) ［ＦＳ(1)］	1		1		No.303 supplied by Seal set
(28-2)	G-seal ［ＦＳ(1)］	1		1		No.303 supplied by Seal set
(３１)	Ball Bearing ［ＦＳ(1)］	1		1		No.302 supplied by Bearing kit
(３７)	O ring ［Pin Crank･Needle Bearing］	4		6		No.302 supplied by Bearing kit
(３８)	Needle Bearing ［Pin Crank］	2		3		No.302 supplied by Bearing kit
(５３)	Spider	1		1		No.302 supplied by Bearing kit
(６６)	Screw	4		6		No.302 supplied by Bearing kit
(６７)	Screw	4		6		No.305 supplied by Pin Crank kit
(７５)	Seal ［Pin Crank･Needle Bearing］	—	—	3		No.303 supplied by Seal set
(８２)	Housing	1		1		No.306 supplied by Air Flush set
(８３)	Filter	1		1		No.306 supplied by Air Flush set
(８６)	Ball	1		1		No.306 supplied by Air Flush set
(８７)	Snap ring	1		1		No.306 supplied by Air Flush set
(101)	Tip Seal set(1)	1		1		No.301 supplied by Tip Seal set
(103)	Tip Seal set(2)	1		1		No.301 supplied by Tip Seal set
(104)	Pin Crank set	2	2	3	3	No.305 supplied by Pin Crank kit
(214)	O ring	—	1	—	1	No.304 supplied by O ring set

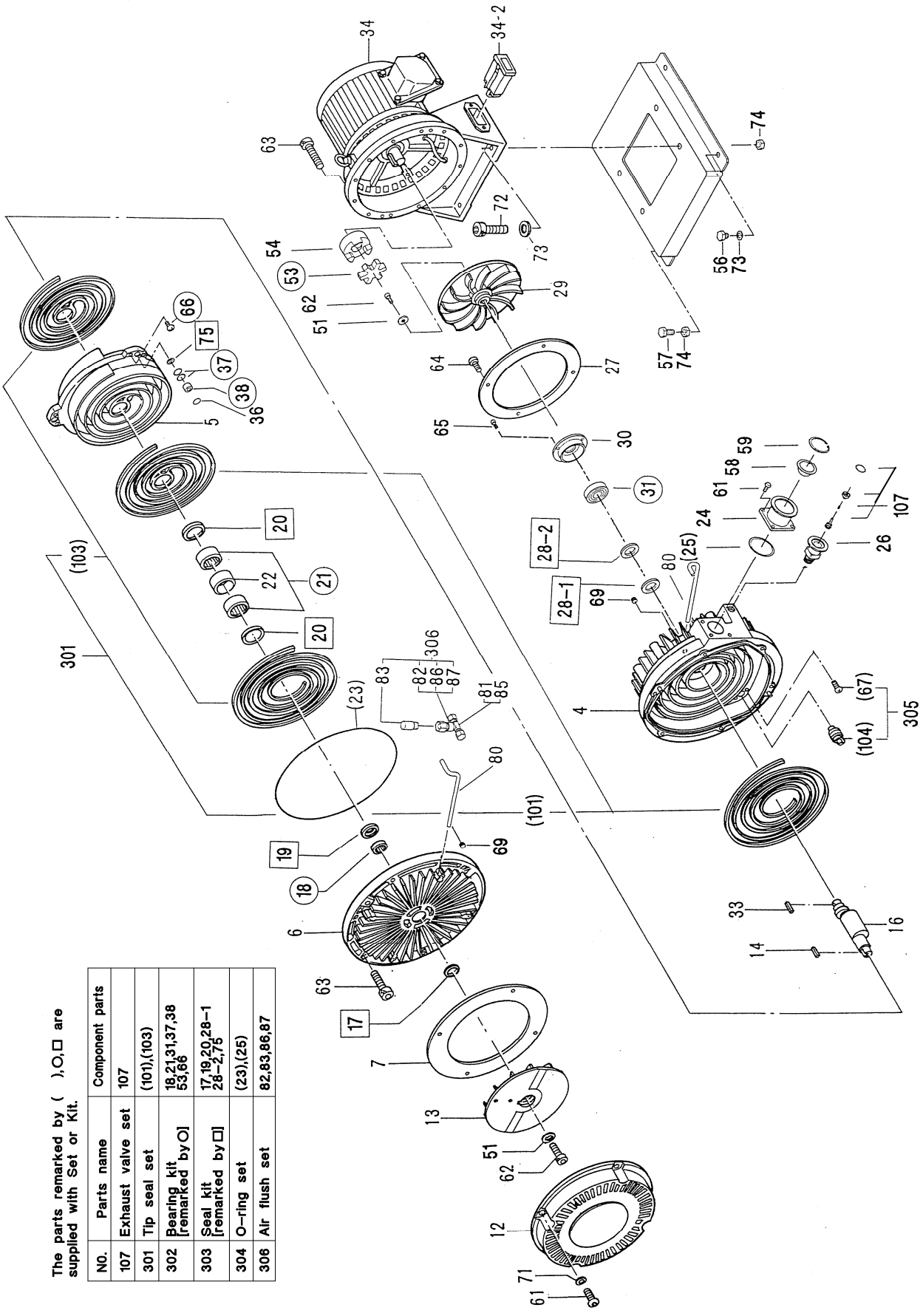
9. Exploding Drawing
ISP-250B



The parts remarked by ( ), ○, □ are supplied with Set or Kit.

NO.	Parts name	Component parts
107	Exhaust valve set	
301	Tip seal set	(101),(103)
302	Bearing kit [remarked by ○]	18,21,31,37,38 53,66
303	Seal kit [remarked by □]	17,19,20,28-1 28-2
304	O-ring set	(23),(25),(202)
306	Air flush set	(82),(83),(86),(87)

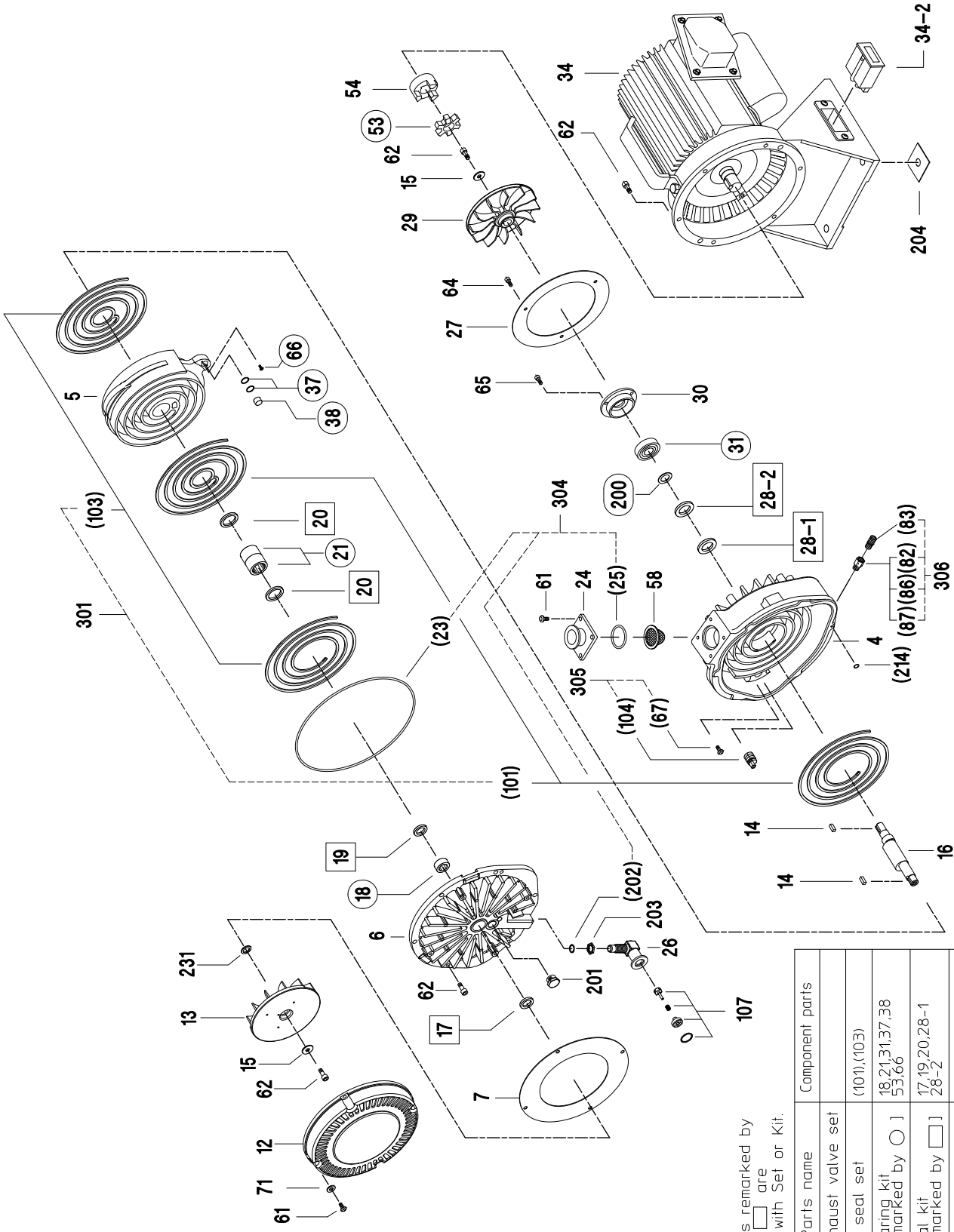
ISP-500B



The parts remarked by ( ),○,□ are supplied with Set or Kit.

NO.	Parts name	Component parts
107	Exhaust valve set	107
301	Tip seal set	(101),(103)
302	Bearing kit [remarked by○]	18,21,31,37,38 53,66
303	Seal kit [remarked by□]	17,19,20,28–1 28–2,75
304	O–ring set	(23),(25)
306	Air flush set	82,83,86,87

ISP-250C



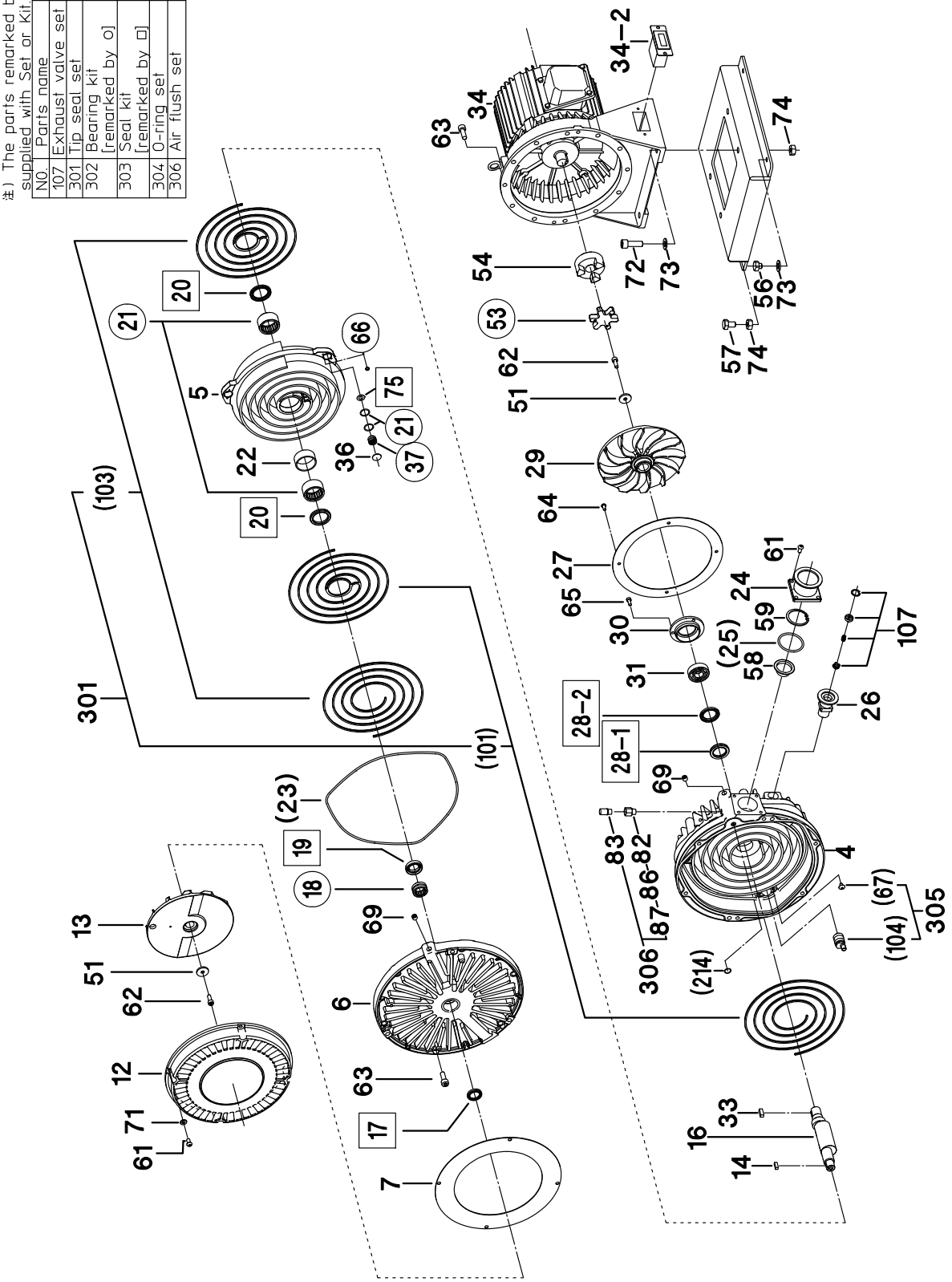
The parts remarked by ( ), ○, □ are supplied with Set or Kit.

NO.	Parts name	Component parts
107	Exhaust valve set	
301	Tip seal set	(101),(103)
302	Bearing kit [remarked by ○]	18,21,31,37,38 53,66
303	Seal kit [remarked by □]	17,19,20,28-1 28-2
304	O-ring set	(23),(25),(202),(214)
306	Air flush set	(82),(83),(86),(87)

ISP-500C

注) The parts remarked by ( ), ○, □ are supplied with Set or Kit.

NO.	Parts name	Component parts
107	Exhaust valve set	
301	Tip seal set	(101),(103)
302	Bearing kit [remarked by ○]	18,21,31,37,38 53,66
303	Seal kit [remarked by □]	17,19,20,28-1 28-2,75
304	O-ring set	(23),(25),(214)
306	Air flush set	82,83,86,87



NOTE