Original Instructions CE

Doc. No.	NDP 495M-03

yamada

MAINTENANCE MANUAL

GLOBAL SERIES

Air-Operated Double Diaphragm Pumps

G15 series

⚠ WARNING

- For your own safety, be sure to read these procedures carefully before performing maintenance on this product. After reading this document, be sure to keep it handy for future reference.

This maintenance manual covers what you should know about maintenance of the Yamada G15 series Diaphragm Pumps.
This edition is based on the standards for the September 2020 production run. Remember, the specifications are always subject to change; therefore, some of the information in this edition may not apply to new specifications.

·Warnings and Cautions

For safe use of this product, be sure to note the following: In this document, warnings and cautions are indicated by symbols. These symbols are for those who will operate this product and for those who will be nearby, for safe operation and for prevention of personal injury and property damage. The following warning and caution symbols have the meanings described below. Be sure to remember their meanings.

⚠ WARNING: If you ignore the warning described and operate the product in an improper manner, there is danger of serious bodily injury or death.

⚠ CAUTION : If you ignore the caution described and operate the product in an improper manner, there is danger of personal injury or property damage.

Furthermore, to indicate the type of danger and damage, the following symbols are also used along with those mentioned above:

This symbol indicates a DON'T, and will be accompanied by an explanation on something you must not do.

This symbol indicates a DO, and will be accompanied by instructions on something you must do in a certain situation.

⚠ WARNING

- Before starting maintenance work, cut off the feed air and clean the pump. If air pressure or residue remain in the pump, there is danger of explosion, or possible poisoning resulting in serious injury or death if chemicals adhere to the skin or are accidentally swallowed.
(For details on cleaning the pump, refer to Chapter 6 of the Operation Manual.)
- When replacing parts, be sure to use the recommended genuine parts or Equivalents. Use of other parts may cause a malfunction of the product.
(Refer to Parts list the separate sheets.)

⚠ CAUTION

- When it is instructed that special tools must be used, be sure to use the specified tools. Otherwise, the pump may be damaged.
- Refer to “10.1 Specifications” in the Operation Manual. Also, remember that the pump is heavy, and extreme care must be taken when lifting it.

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1. Principles of operation

There are two diaphragms fixed to the center rod, one at each end. When compressed air is supplied to air chamber b (right side, see Fig.1.1), the center rod moves to the right, the material in material chamber B is pushed out, and at the same time material is sucked into material chamber A.

When the center rod is moved full-stroke to the right, the air switch valve is switched, compressed air is sent to air chamber a (left side, see Fig.1.2), and the center rod moves to the left. The material in material chamber A is pushed out, and at the same time material is sucked into material chamber B.

Through repetition of this operation, material is repeatedly taken in and discharged out.

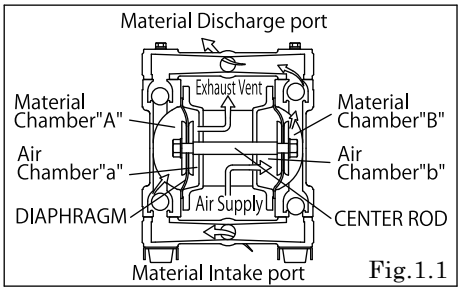

Fig.1.1

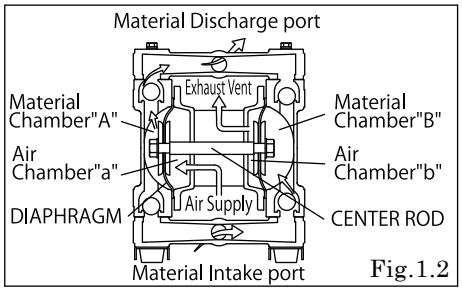

Fig.1.2

2. Maintenance and Tools

2.1 Maintenance

Pump maintenance is recommended after each of the following periods.

Estimated inspection timing (Based on water at room temperature)

Type of diaphragm	Operation hours (h) A□、S□	Type of diaphragm	Operation hours (h) P□、V□
NBR	500	NBR	350
PTFE	500	PTFE	350
TPEE	750	TPEE	500
TPO	750	TPO	500

* In critical operations where preventive measures need to be taken, it is recommended to inspect diaphragms after every three months of operation.

2.2 General tools

- Socket wrenches 10 mm（A□, S□, P□, V□）, 12 mm（P□, V□）, 13 mm（A□, S□）, 17 mm（A□, S□）
- Open-end wrenches 10 mm（A□, S□）, 12 mm（P□, V□）, 13 mm（A□, S□）, 17 mm（A□, S□）, 22 mm（P□, V□）
- Hexagonal box wrenches 5mm
- Phillips head screw driver（P□, V□）
- Pliers（P□, V□）

2.3 Special tools (sold separately)

- Cap and disk remover（A□, S□）
  Purpose: Removing the cap

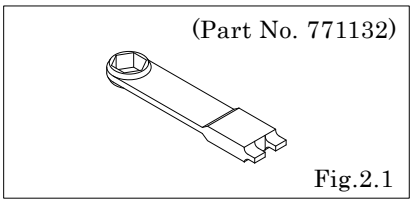

Fig.2.1

- Sleeve remover
  Purpose: For removing sleeves

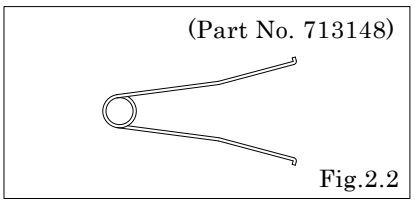

Fig.2.2

2.4 Misc.

- Assembly oil Turbine oil none addition class 1(equivalent to ISO VG32 grade)
- Grease Urea grease grade (NLGI) No.2
- Thread locking agent Equivalent to LOCTITE® 222（S□）
- Thread locking agent Equivalent to LOCTITE® 243（P□, V□）

3. Ordering Replacement parts

For accurate and speedy shipment of parts, be sure to order the right parts for your model to distributor Indicate the part numbers, descriptions, and quantities.

4. Balls, Valve seats

4.1 Removal

■A□, S□ Type

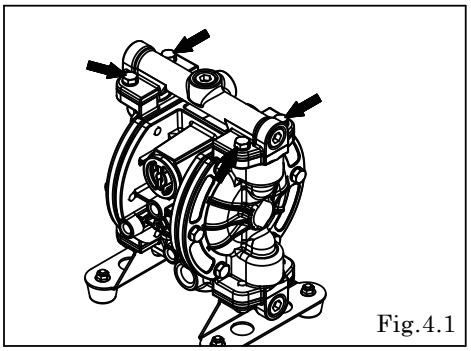

Fig.4.1

- Remove 4 mounting bolts from upper manifold and remove the manifold. [Fig.4.1]

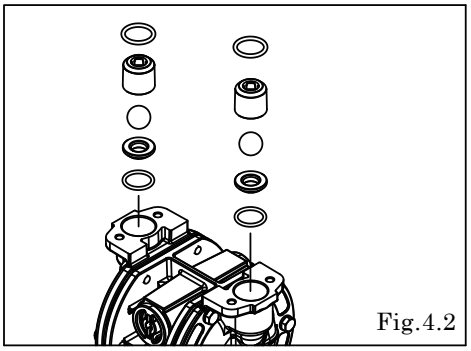

Fig.4.2

- Remove the O ring, valve stopper, ball, valve seat. [Fig.4.2]

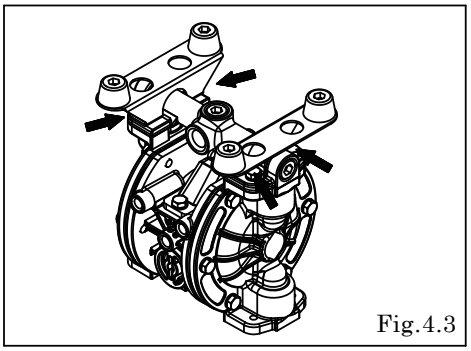

Fig.4.3

- Turn over the main body assembly. [Fig.4.3]
- Remove 4 mounting bolts from lower manifold and remove the base and the manifold. [Fig.4.3]

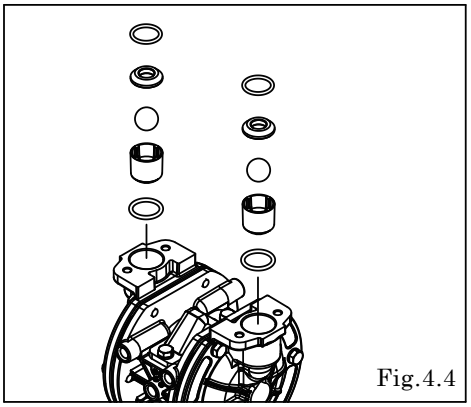

Fig.4.4

- Remove the O ring, valve seat, ball, valve stopper. [Fig.4.4]

■P□, V□ Type

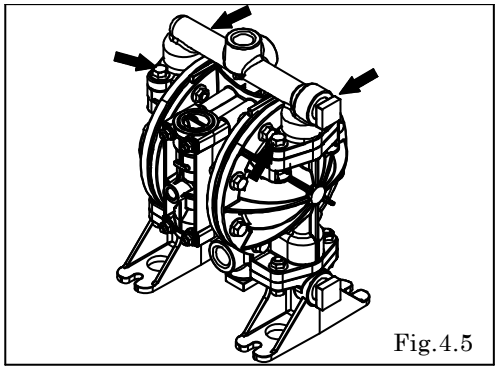

Fig.4.5

▪ Remove 4 mounting bolts from upper manifold A and remove the manifold A. [Fig.4.5]

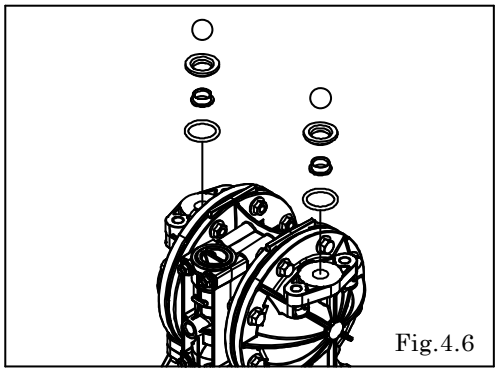

Fig.4.6

▪ Remove the Ball, valve seat A, valve seat B, O ring. [Fig.4.6]

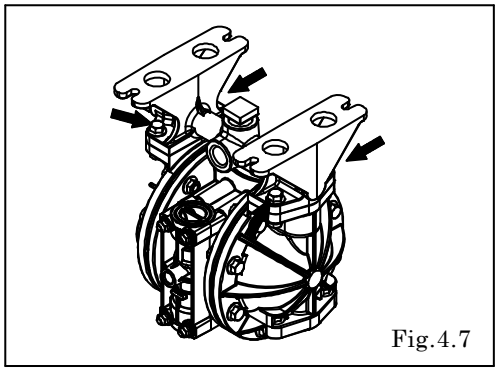

Fig.4.7

▪ Turn over the main body assembly. [Fig.4.7]
▪ Remove 4 mounting bolts from lower manifold B and remove the manifold B. [Fig.4.7]

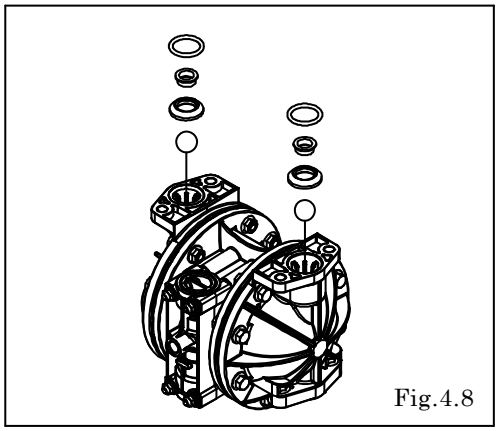

Fig.4.8

▪ Remove the O ring, valve seat B, valve seat A, ball. [Fig.4.8]

4.2 Inspection

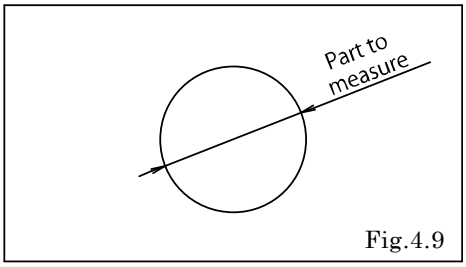

Fig.4.9

▪ Ball [Fig.4.9]
Measure the outside diameter, and if it is outside the usable range, replace the ball.

Usable range of Ball

Sø 17.00 - Sø 19.3 mm

▪ O ring
If O ring is worn out or cracked, replace it.
Replace the PTFE O ring regardless of its condition.

■A□, S□ Type

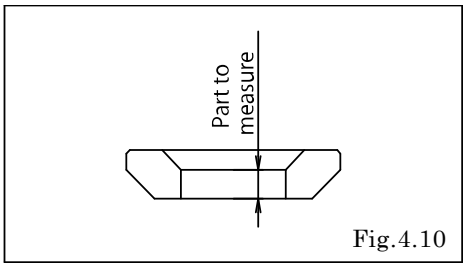

Fig.4.10

▪ Valve seat [Fig.4.10]
Measure the dimension shown at left, and if it is outside the usable range, replace the valve seat.

Usable range of Valve seat

2.6 - 5.7 mm

■P□, V□ Type

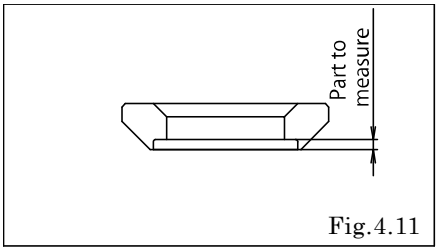

Fig.4.11

▪ Valve seat A [Fig.4.11]
Measure the dimension shown at left, and if it is outside the usable range, replace the valve seat A.

Usable range of Valve seat A

1.4 - 1.8 mm

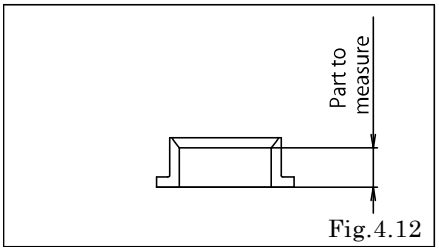

Fig.4.12

▪ Valve seat B [Fig.4.12]
Measure the dimension shown at left, and if it is outside the usable range, replace the valve seat B.

Usable range of Valve seat B

4.5 - 6.5 mm

4.3 Installation

For installation, see [Exploded View] on the separate sheet and install in the reverse order of disassembly.

Tightening torque for manifold retainer bolts or nuts

AN, AH, AS SN, SH, SS	12 N･m
AT, ST	18 N･m
P□, V□	10 N･m

< NOTE >
▪ Make sure there is no dust on the seal surface and the seal is not damaged.

5. Diaphragm and Center rod

5.1 Removal

■A□, S□ Type

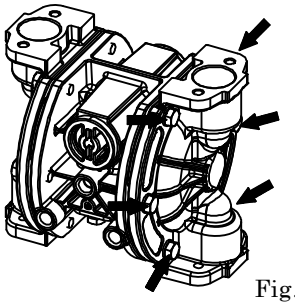

Fig.5.1

- Remove the O ring, valve, stopper, ball valve seat (see “4.1 Removal”).
- Remove the 12 retainer bolts from the out chamber, and remove the out chamber. [Fig.5.1]

A□ Type

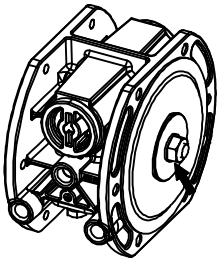

Fig.5.2

- After the nuts on one side have been removed, remove the center disk and diaphragm. [Fig.5.2]
- Remove the diaphragm, center disk and center rod from the opposite side of the main body.

S□ Type

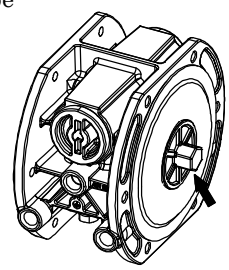

Fig.5.3

- After the center disk on one side have been removed, remove the center disk and diaphragm. [Fig.5.3]
- Remove the diaphragm, center disk and center rod from the opposite side of the main body.

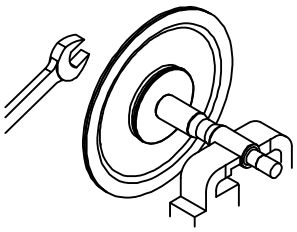

Fig.5.4

- Put the cloth between the vise and the center rod to prevent the part get scratched. [Fig.5.4]
- Fix the Center Rod, and then;
  A□ type: remove the nut
  S□ type: remove the center disk
- Remove the coned disk spring (only A□ Type), center disk and diaphragm from center rod.

■P□, V□ Type

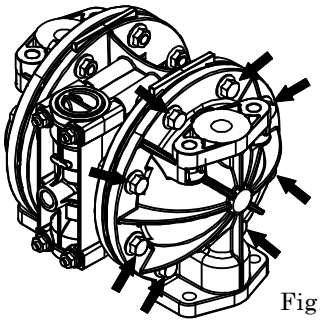

Fig.5.5

- Remove the ball, valve seat A, valve seat B, O ring. (see “4.1 Removal”).
- Remove the 16 retainer bolts from the out chamber, and remove the out chamber. [Fig.5.5]

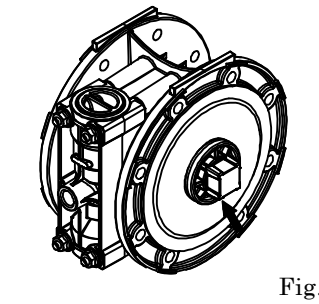

Fig.5.6

- After the center disk on one side have been removed using the spanner 22 mm etc., remove the center disk, diaphragm and backup diaphragm (only PT, VT Type). [Fig.5.6]
- Remove the diaphragm, backup diaphragm (only PT VT Type), center disk and center rod from the opposite side of the main body.

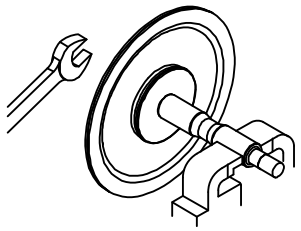

Fig.5.7

- Put the cloth between the vise and the center rod to prevent the part get scratched.
- Fix the center rod, and remove the center disk. [Fig.5.7]
- Remove the diaphragm, backup diaphragm (only PT, VT Type) and center disk.

5.2 Inspection

▪ Diaphragm
- ・If the diaphragm is worn out or damaged, replace it. Never replace just one diaphragm.
- ・Please replace it together with the back-up diaphragm. (only PT, VT Type)

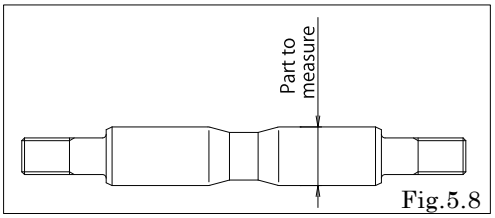

Fig.5.8

▪ Center rod [Fig.5.8]
Measure the diameter, and if it is outside the usable range, replace the center rod.

Usable range of center rod

ø 15.95 - ø 16.00 mm

5.3 Installation

For installation, see [Exploded View] on the separate sheet and install in the reverse order of disassembly.

■A□, S□ Type

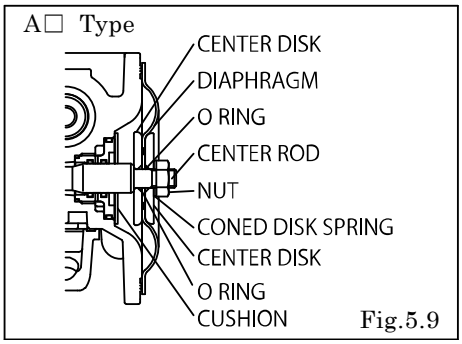

Fig.5.9

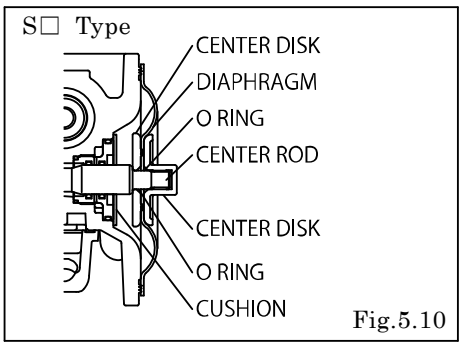

Fig.5.10

▪ Apply grease to the center rod, and insert it into the main body.
▪ Keep the convex side to the outside for diaphragm.
▪ For the model with PTFE diaphragm, put the O rings into both side of the diaphragms. (cf. Fig.5.9, Fig.5.10).
▪ A□ type: Tighten the nuts.
▪ S□ type: Apply screw glue on the thread of center rod, then tighten the center disks.
▪ Assemble the out chamber. Bolts should not be fully tightened at this point.
▪ Place the pump on flat surface, stand the pump upright and tighten all the bolts fully.

Tightening torque for center rod and out chamber

Center rod	Out chamber
18 N・m	12 N・m

< NOTE >
▪ Make sure there is no dust on the seal surface in order to prevent seal damaged.
▪ Replace the PTFE O ring by new one.
▪ Tighten the bolts that balance should be equal from both side on diagonal line with even torque.

■P□, V□ Type

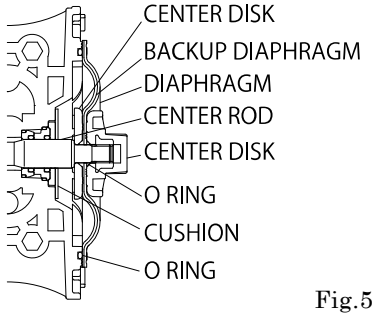

Fig.5.11

- Apply grease to the center rod, and insert it into the main body.
- PTFE Diaphragm model : Put the backup diaphragm before PTFE diaphragm, and O ring after PTFE diaphragm. (cf. Fig.5.11)
- Keep the convex side to the outside for diaphragm and backup diaphragm.
- Apply screw glue on the thread of center rod, then tighten the center disk.
- Assemble the out chamber. Bolts should not be fully tightened at this point.
- Place the pump on flat surface, stand the pump upright and tighten all the bolts fully.

Tightening torque for center rod and out chamber

Center rod	Out chamber
20 N･m	10 N･m

＜NOTE＞
- Make sure there is no dust on the seal surface in order to prevent seal damaged.
- Replace the PTFE O ring by new one.
- Tighten the bolts that balance should be equal from both side on diagonal line with even torque.

6. Guide Bush

6.1 Removal

■A□, S□ Type

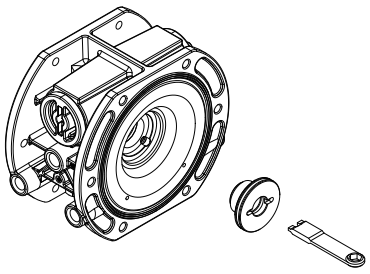
Fig.6.1

- Remove the diaphragm and center rod etc. (see “5.1 Removal”).
- Remove the guide bushing with Cap and disk remover (Special tool: 771132) [Fig.6.1]

■P□, V□ Type

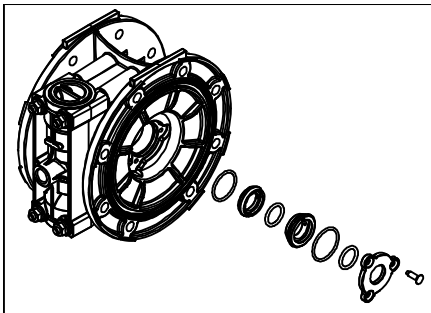
Fig.6.2

- Remove the diaphragm and center rod etc. (see “5.1 Removal”).
- Remove the tapping screw fixing the guide bush stopper and remove the guide bush A, guide bush B and O ring. [Fig.6.2]

6.2 Inspection

▪ O ring
If the O ring is worn out or cracked, replace it.

■A□, S□ Type

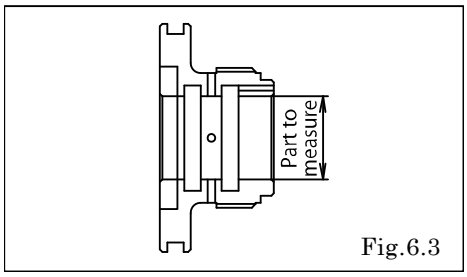

Fig.6.3

▪ Guide bush [Fig.6.3]
Measure the inside diameter, and if it is outside the usable range, replace the guide bush.

Usable range of guide bush

ø 16.0 - ø 16.2 mm

■P□, V□ Type

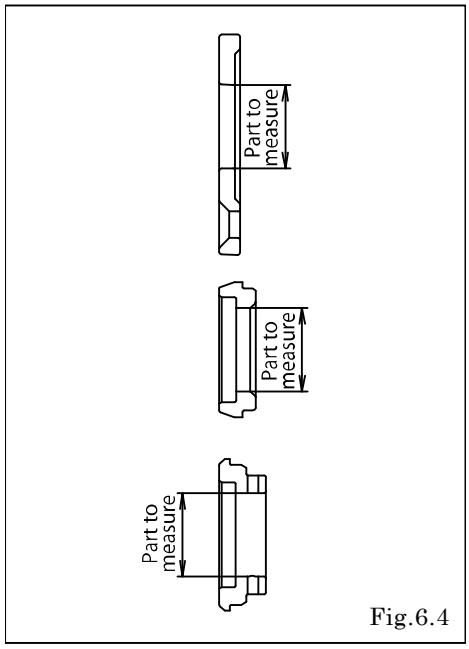

Fig.6.4

▪ Guide bush stopper, guide bush A, guide bush B [Fig.6.4]
Measure the inside diameter, and if it is outside the usable range, replace the guide bush stopper, guide bush A, guide bush B.

Usable range of guide bush stopper, guide bush A, guide bush B

ø 16.0 - ø 16.5 mm

6.3 Installation

For installation, see [Exploded View] on the separate sheet and install in the reverse order of disassembly.

Tightening torque for tapping screw

P□, V□	1.0 N･m

<NOTE>
▪ Make sure there is no dust on the seal surface and the seal is not damaged.
▪ Apply grease to O ring.

7. Spool assembly and Sleeve

7.1 Removal

■A□, S□ Type

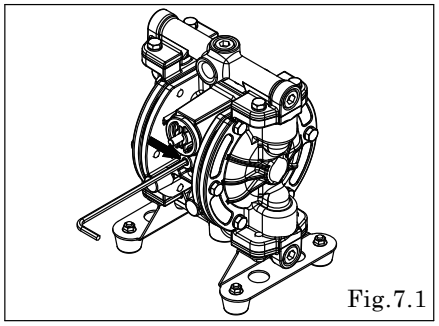

Fig.7.1

▪ Loosen the plug with hexagonal box wrench and remove remaining air from inside the pump. [Fig.7.1]

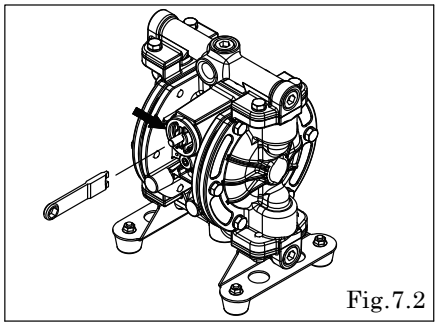

Fig.7.2

▪ Remove the cap A and cap B using the cap and disk remover. (special tool: Part No. 771132). [Fig.7.2]

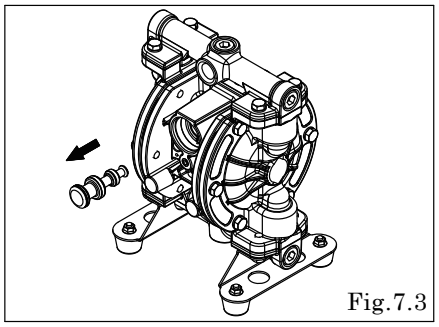

Fig.7.3

▪ Remove spool assembly by pushing it from Cap A side (the side without reset button). [Fig.7.3]

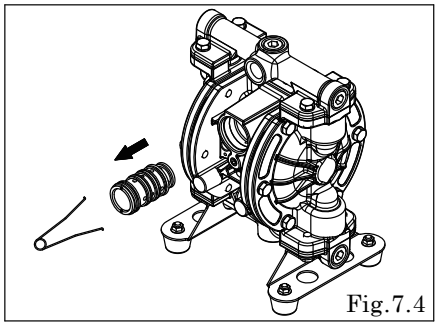

Fig.7.4

▪ Remove the sleeve using the sleeve remover (special tool: Part number 713148). [Fig.7.4]

■P□, V□ Type

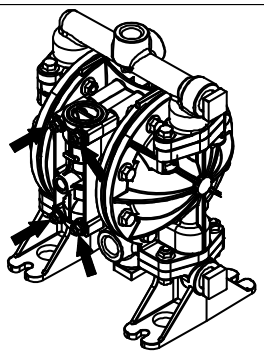

Fig.7.5

▪ Remove 4 nuts fixing the valve body assembly and draw out the valve body assembly from the main body. [Fig.7.5]

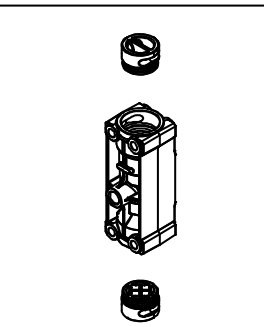

Fig.7.6

▪ Remove the cap using the Pliers. [Fig.7.6]

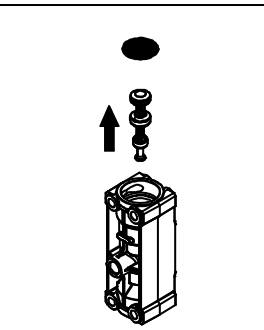

Fig.7.7

▪ Remove the cushion, and then push out the spool assembly from opposite side. [Fig.7.7]

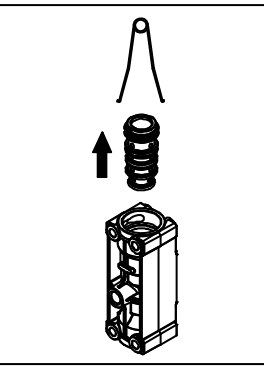

Fig.7.8

▪ Remove the sleeve using the sleeve remover (special tool: Part number 713148). [Fig.7.8]

7.2 Inspection

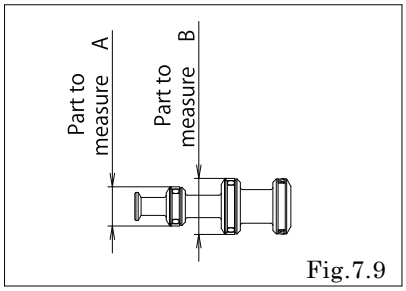

Fig.7.9

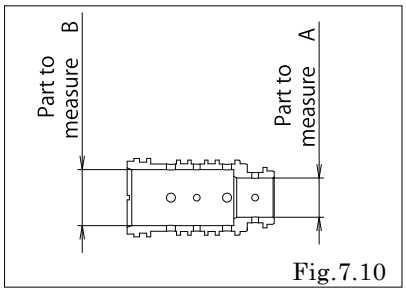

Fig.7.10

▪ Spool assembly
Seal ring [Fig.7.9]
Close the diagonal slit and measure the outside diameter, and if it is outside the usable range, replace the spool assembly.
If the Seal ring is worn out or cracked, replace spool assembly.

Usable range of Seal ring

A□, S□	Part to measure A	ø 17.55 mm and over
	Part to measure B	ø 25.05 mm and over
P□, V□	Part to measure A	ø 12.58 mm and over
	Part to measure B	ø 17.88 mm and over

▪ Sleeve [Fig.7.10]
Measure the inside diameter, and if it is outside the usable range, replace the sleeve assembly.

Usable range of Sleeve

A□, S□	Part to measure A	ø 17.55 - ø 17.62 mm
	Part to measure B	ø 25.05 - ø 25.12 mm
P□, V□	Part to measure A	ø 12.66 - ø 12.74 mm
	Part to measure B	ø 17.92 - ø 18.00 mm

▪ O ring, Packing
If the O ring is worn out or cracked, replace it.

<NOTE>
▪ Spool assembly and Sleeve must be replaced complete set. Unable to replace individual component.

7.3 Installation

For installation, see [Exploded View] on the separate sheet and install in the reverse order of disassembly.

Tightening torque for valve body assembly attaching nuts

P□, V□	1.0 N･m

<NOTE>
▪ Make sure there is no dust on the seal surface and it is not damaged.

8. Retightening of Tie rods

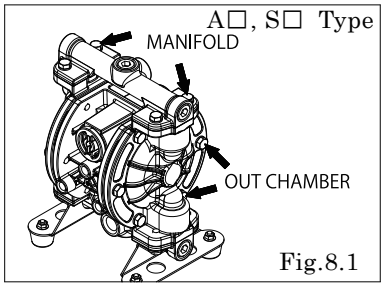

Fig.8.1

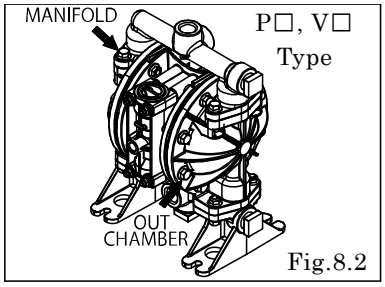

Fig.8.2

▪ The torque should be applied on the occasion of
(1) Right before the pump to use.
(2) There are any leaks of material on daily inspecting a pump.

	Retainer bolts from the out chamber	Retainer bolts from the manifold
AN, AH, AS SN, SH, SS	12 N･m	
AT, ST	12 N･m	18 N･m
P□, V□	10 N･m	

<NOTE>
▪ Tighten the bolts that balance should be equal from both side on diagonal line with even torque.
▪ Retighten the Out chamber and then the manifold in this order. [Fig.8.1, Fig.8.2]

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202009.2484 NDP495M