

Original Instructions **CE**

Doc. No. NDP 086M-10



MAINTENANCE MANUAL

YAMADA AIR-OPERATED DOUBLE DIAPHRAGM PUMP

NDP-10BP□

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 NDP-10 YE (YE-Spec.) series Diaphragm Pumps.

This edition is based on the standards for the June 2022 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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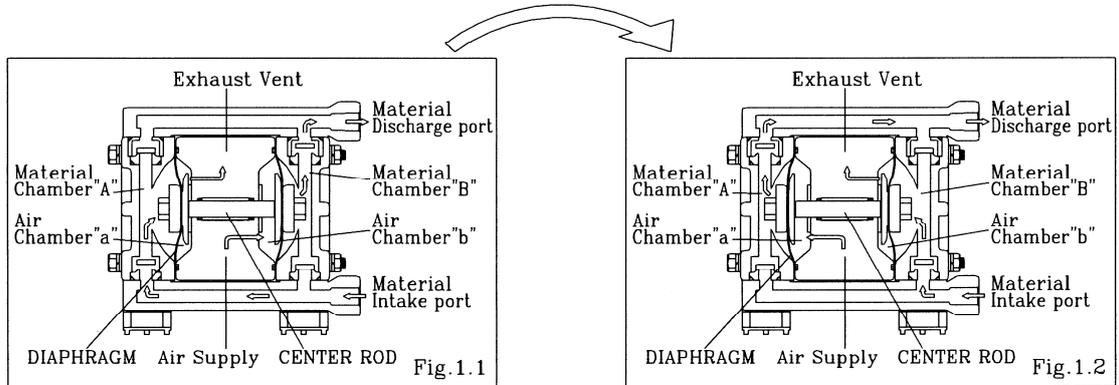
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1. Principles of operation

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.



2. Maintenance and Tools

2.1 Maintenance

It is recommended that the pump should be regularly inspected, as this kind of diaphragm pump can be used in many different circumstances such as pressures, temperatures, viscosities, or corrosiveness. It's very useful for your future reference to keep records of the pump conditions for every inspection.

The regular inspection includes the air valve, diaphragms, balls, valve seats, or O-rings.

When it comes to diaphragms, in particular, both of the diaphragms should be replaced at one time, as they tend to be worn out or have some cracks on the surfaces. Please refer to 'usage range' in each section regarding the frequency of the replacement of the other spare parts.

2.2 General tools

- Socket wrenches 13 mm
- Open-end wrenches 13 mm, 21 mm
- Pliers

2.2 Special tools (sold separately)

- Cap remover

Purpose: Removing the cap.

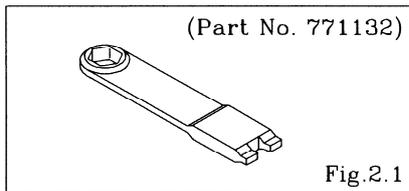


Fig.2.1

- Sleeve remover

Purpose: For removing sleeves

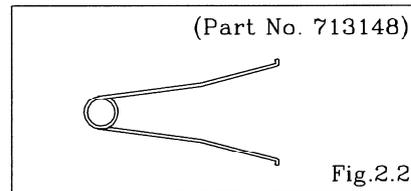


Fig.2.2

2.4 Misc.

- Assembly oil Turbine oil none addition class 1 (equivalent to ISO VG32 grade)
- Nuts M8 × 1.25
- Grease Urea grease grade (NLGI) No.2

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 and Valve seats

4.1 Removal

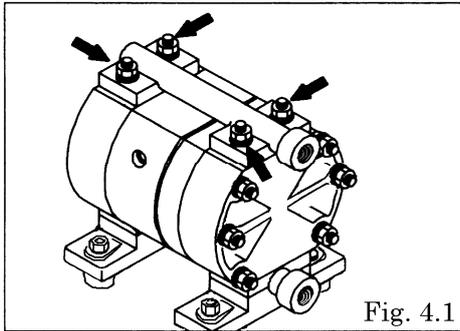


Fig. 4.1

- Remove the 4 retainer nuts from the out manifold, and remove the out manifold. [Fig.4.1]

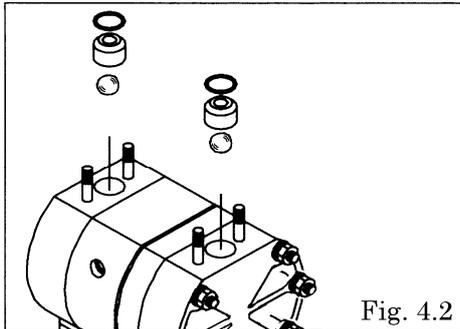


Fig. 4.2

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

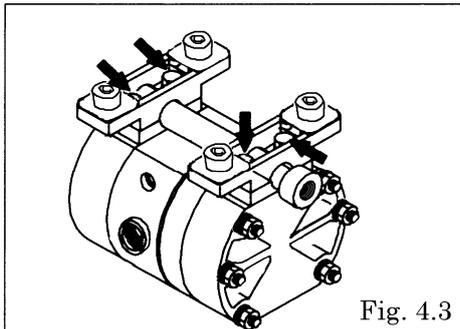


Fig. 4.3

- Turn over the main body assembly. [Fig.4.3]
- Remove the 4 retainer nuts from the in manifold, and remove the in manifold.

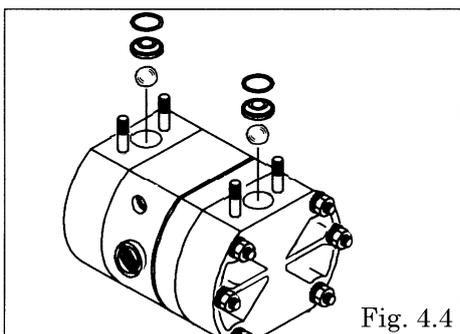


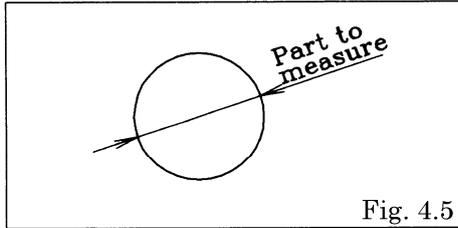
Fig. 4.4

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

<NOTE>

- The type BPC and BPN does not use O-ring.

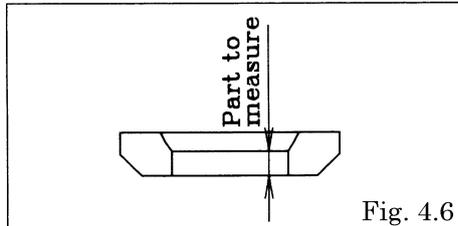
4.2 Inspection



- Ball [Fig.4.5]
Measure the outside diameter, and if it is outside the usable range, replace the ball.

Usable range of Ball

NDP-10 BP□	S Ø 14.3 - S Ø 16.3 mm
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- Valve seat [Fig.4.6]
Measure the dimension shown at left, and if it is outside the usable range, replace the seat.

Usable range of Valve seat

NDP-10 BP□	2.0 - 6.5 mm
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- O-ring (other than PTFE)
If O-rings are worn out or cracked, replace them.

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

NDP-10 BP□	8 N·m
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< NOTE >

- Make sure there is no dust on the seal surface and the seal is not damaged.
- Replace the PTFE O-ring regardless of its condition.

5. Diaphragm and Center rod

5.1 Removal

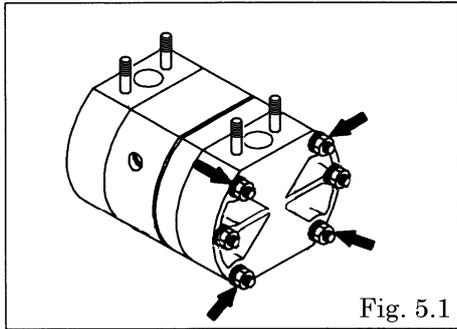


Fig. 5.1

- Remove the ball and valve seat (see Fig. 4.1).
- Remove the 4 retainer nuts from the out chamber, and remove the out chamber. [Fig.5.1]

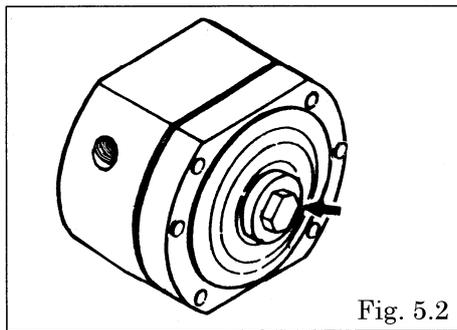


Fig. 5.2

- Remove the center disk from one side. [Fig.5.2]
- After the center disk (outside) has been removed, remove the diaphragm and the center disk (inside).
- Remove the center disk and center rod from the opposite side of the main body.

<NOTE>

- When the diaphragms are removed, the main body is separated 2 pieces. For easy work, leave bolts fastened temporarily before remove the diaphragms.

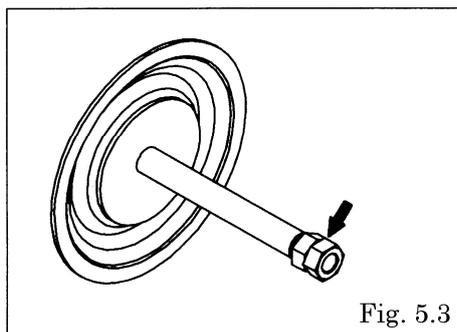


Fig. 5.3

- Remove the center disk and diaphragm from the opposite side using the double nut. [Fig.5.3]

<NOTE>

- When the diaphragms are removed, the main body is separated 2 pieces. For easy work, leave the tie rods or bolts fastened temporarily before remove the diaphragms.
- Be careful not to scratch or score the center rod.

5.2 Inspection

- Diaphragm
If the diaphragm is worn out or damaged, replace it.
Never replace just one diaphragm.

Frequency of inspecting the diaphragms
(Transferring water at room temperature)

NDP-10 BP□	CR, NBR, PTFE, EPDM	10,000,000 cycle
	TPEE, TPO	15,000,000 cycle

*The standard in our facility is 'Air supply pressure 0.5 MPa with discharge pressure.

*It's recommended to conduct an inspection, if 3 months have passed since you start using the pump, or if the number of cycles reaches the above.

- Center rod [Fig.5.4]
Measure the diameter, and if it is outside the usable range, replace the rod.

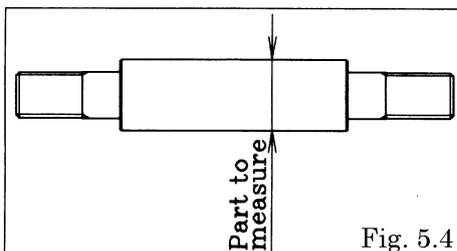


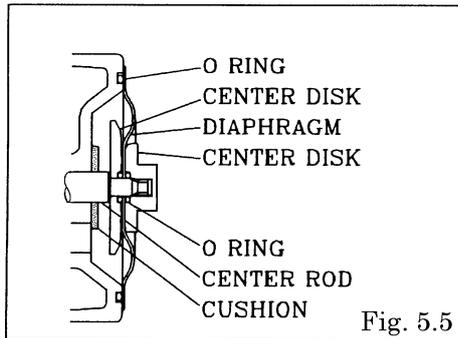
Fig. 5.4

Usable range of center rod

NDP-10 BP□	Ø 13.96 - Ø 14.0 mm
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5.3 Installation

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



- Apply grease to the center rod, and insert it into the main body.
- Keep the marking “LIQUID” to liquid end for CR, NBR diaphragms.
- Keep the convex side to the outside for PTFE diaphragm.
- Install the O-ring(cf. Fig.5.5).
- Tighten the center disk using the open-end wrenches.
- After installation of the out chambers on both sides, place the pump on a flat surface and stand the pump upright for further assembly.

Tightening torque for center rod and out chamber

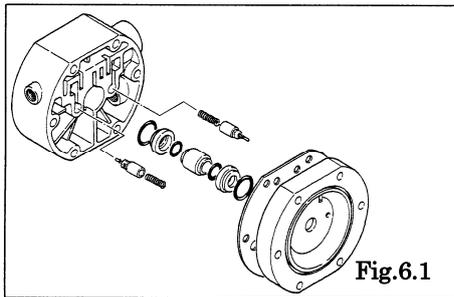
NDP-10 BP□	12 N·m
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< NOTE >

- 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.

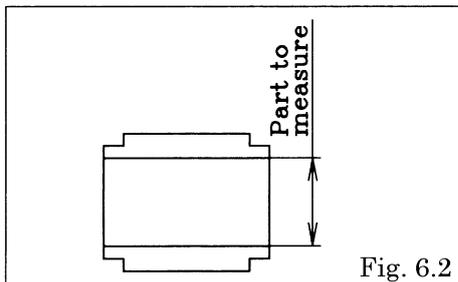
6. Pilot valve Assembly, Guide and Bushing

6.1 Removal



- Remove the diaphragm and center rod etc. (see “5.1 Removal”)
- Remove the body B. [Fig.6.1]
- Draw out the pilot valve assembly. [Fig.6.1]
- Remove the packing, bushing and guide. [Fig.6.1]

6.2 Inspection



- Guide [Fig.6.2]
Measure the inside diameter, and if it is outside the usable range, replace the guide.

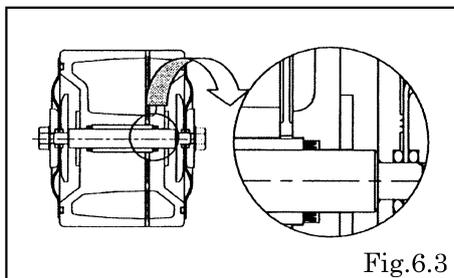
Usable range of guide

Ø 14.1 - Ø 14.2 mm

- O-rings, Packing
If the O-ring is worn out or cracked, replace it.
- Pilot valve assembly
If the pilot valve is worn out or cracked, replace it.

6.3 Installation

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



<NOTE>

- Make sure there is no dust on the seal surface and the seal is not damaged.
- Apply grease to packing.
- The open side of the V faces toward the diaphragm (air chamber).

7. C-Spool valve assembly and Sleeve assembly

7.1 Removal

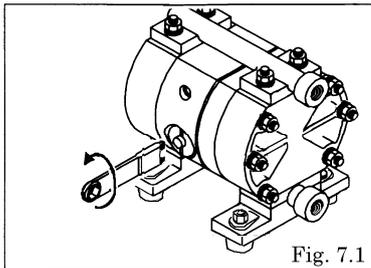


Fig. 7.1

- Remove the cap using the cap remover (special tool: Part No. 771132). [Fig.7.1]

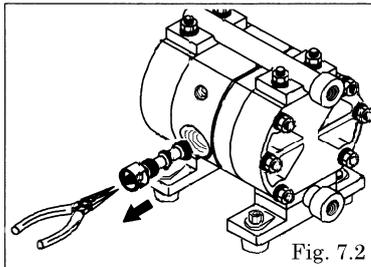


Fig. 7.2

- Draw out the C-spool valve assembly using the pliers, and remove the seal ring from the C-spool valve assembly. [Fig.7.2]

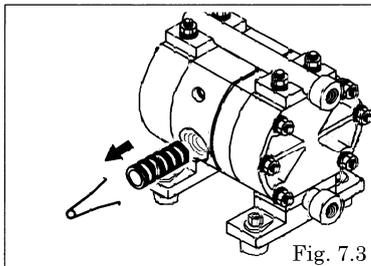


Fig. 7.3

- Remove the sleeve using the sleeve remover (special tool: Part number 713148). [Fig.7.3]

7.2 Inspection

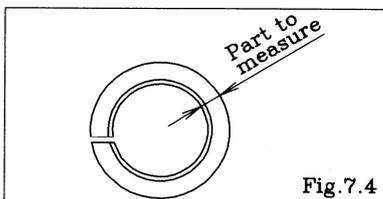


Fig. 7.4

- C-Spool valve Assembly Seal ring [Fig.7.4]
Measure the inside thick diameter, and if it is outside the usable range, replace the c spool valve assembly.
If the seal ring is worn out or cracked, replace C-spool Valve assembly.

Usable range of seal ring

NDP-10 BP□	1.82 - 1.90 mm
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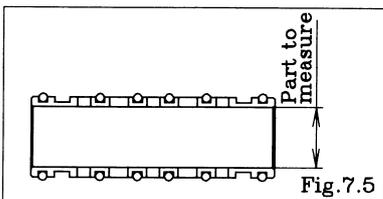


Fig. 7.5

- Sleeve Assembly [Fig.7.5]
Measure the inside diameter, and if it is outside the usable range, replace the sleeve assembly.

Usable range of Sleeve

NDP-10 BP□	Ø 15.8 - Ø 15.85 mm
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- O-rings
If the O-ring is worn out or cracked, replace it.

<NOTE>

- C-Spool Valve Assembly and Sleeve Assembly must be replaced complete set. Unable to replace individual component.

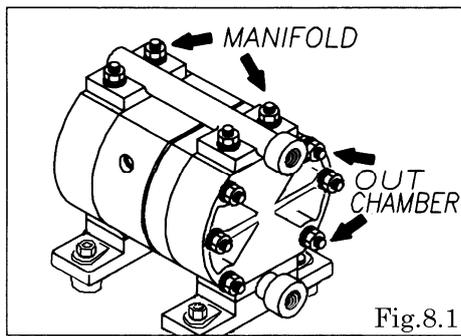
7.3 Installation

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

<NOTE>

- Make sure there is no dust on the seal surface and it is not damaged.

8. Retightening of Tie rods



- 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
NDP-10	12 N·m	8 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]

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