

MAINTENANCE MANUAL

YAMADA AIR-OPERATED DOUBLE DIAPHRAGM PUMP

DP-10F/N

DP-20F/N

DP-25F/N

WARNING



- For safety's sake, be sure to read this maintenance manual thoroughly before starting maintenance for this product. After reading the manual, keep it in an easy-to-access place so that the user may refer to it whenever necessary.

This maintenance manual describes the items required for maintenance of the Yamada DP-F/N series Diaphragm Pumps.

This document is based on the products that are manufactured in September 2020. Note that its contents are subject to change as a result of specification changes to be made in future.

- Warnings and Cautions

To use this product safely, be sure to observe the contents of the following description. In this manual, warnings and cautions are indicated by using symbols. These symbols are intended to prevent death or serious injury that may be caused to the operator or those who are around the product and damage that may be caused to the articles that are around the product, as well as to use the product safely and correctly. Each symbol is indicated and has a meaning as shown below. Read the description with a good understanding of its contents.



WARNING: This indicates the existence of potential hazard which, if not avoided, will result in death or serious injury.



CAUTION: This indicates the existence of potential hazard which, if not avoided, may result in bodily injury or in physical damage.

To indicate the contents of danger and damage, the following symbols are used together with the above indications.



This symbol indicates an act that is prohibited (prohibition). The concrete contents of prohibition are indicated by the side of the indication.



This symbol indicates the contents that must be observed. The concrete contents of observance are indicated by the side of the indication.

WARNING



- Before starting the maintenance work, shut off the supply air and clean the pump. If air pressure or residual liquid remains in the pump, damage or explosion may be caused to the product or serious injury or death may be caused if it sticks on the eyes or skin or inhaled or swallowed. (For cleaning the pump, refer to Chapter 6 of the Operation Manual.)



- When replacing parts, be sure to use the genuine parts or equivalents. Using parts other than these parts may result in a fault. (Refer to Parts list the separate sheets.)

CAUTION



- When it is indicated that dedicated tools should be used, be sure to use these dedicated tools, otherwise the pump may be damaged.



- Check the weight of the pump by referring to "10.1 Main specifications" in the operation manual and take extreme care when lifting it.

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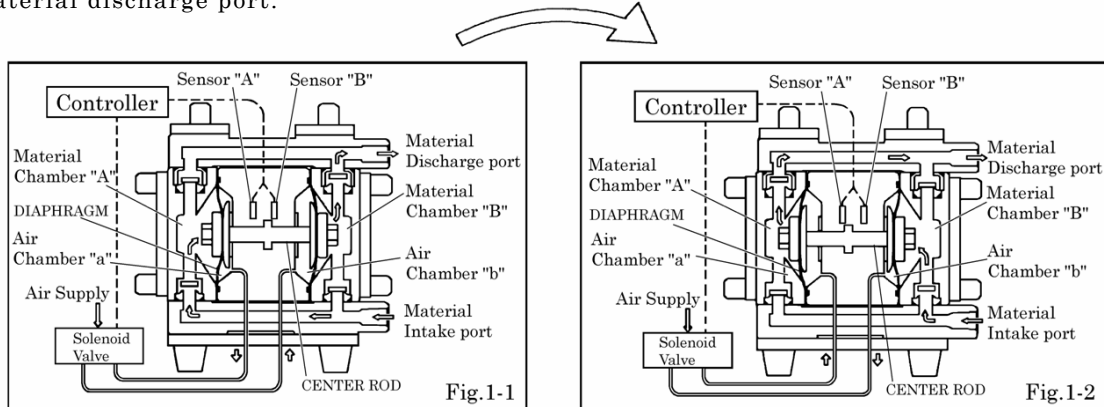
- Warnings and Cautions
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1. Principles of operation

There are two diaphragms fixed to the center rod, one at each end. As shown in Fig.1-1, when the compressed air is supplied to the right air chamber "b," the center rod moves to the right, material in the material chamber B is pushed out, and at the same time the material is sucked into the material chamber A.

When the center rod is moved full-stroke to the right, the sensor B detects it, the electromagnetic valve is switched via the controller (sequence controller) to send the compressed air into the left air chamber "a" (see Fig.1-2), and the center rod moves to the left. As the result, the material in the material chamber A is pushed out, and at the same time, material is sucked into the material chamber B. Through repetition of this operation, material is repeatedly discharged out from the material discharge port.



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)

Operation hours (h)		
DP-10F/N	DP-20F/N	DP-25F/N
300	250	550

* 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 wrench	10 mm, 13 mm
Wrench	10 mm, 13 mm, 24 mm

2.3 Dedicated tools

- Socket for a guide (sold separately)

Purpose: Removing the guide. (DP-10F/N)
Part No. 804014

Purpose: Removing the guide. (DP-20F/N, 25F/N)
Part No. 803989

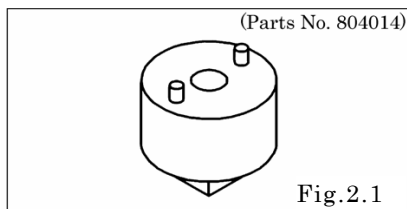


Fig.2.1

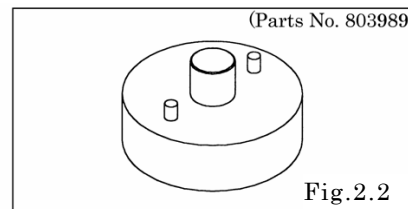


Fig.2.2

2.4 Misc.

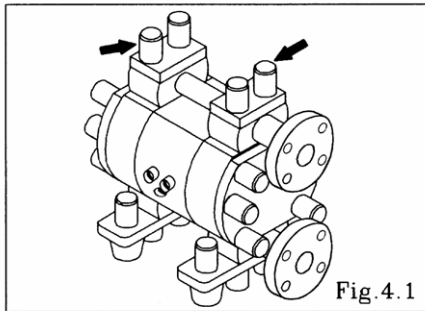
- Lubricant Fomblin® Y25 or equivalent

3. Ordering replacement parts

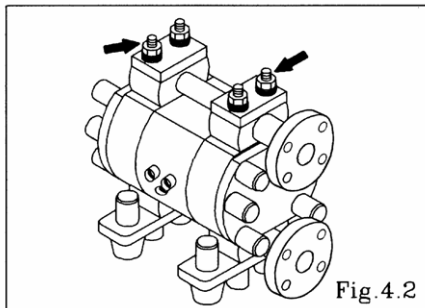
For accurate and speedy shipment of parts, be sure to order the right parts for your model to distributor. Indicate the part numbers, descriptions, and quantities.

4. Balls and Valve seats

4.1 Removal



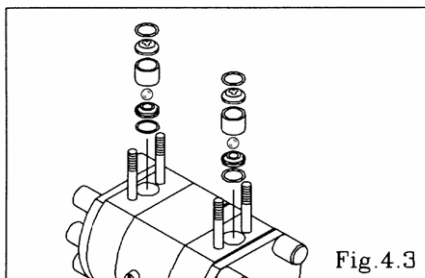
- Remove the 8 caps from the both sides of the upright tie rod. [Fig.4.1]



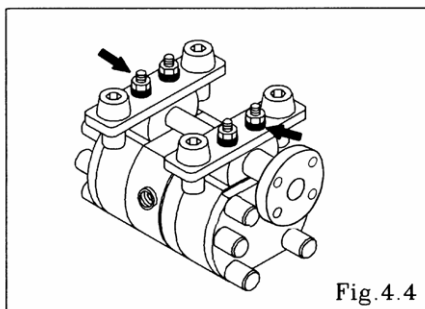
- Remove the 4 retainer nuts from the upper side of the upright tie rods, and remove the out manifold. [Fig.4.2]

<NOTE>

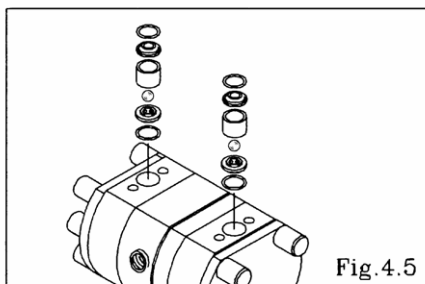
When the retainer nuts both sides of the upright tie rods remove, the in manifold removes.



- Remove the O ring, valve stopper, valve guide, ball and valve seat. [Fig.4.3]

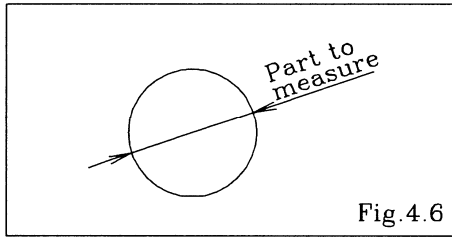


- Turn over the main body assembly. [Fig.4.4]
- Pull out the upright tie rods, and remove the base and in manifold. [Fig.4.4]



- Remove the O ring, valve seat, ball, valve guide and valve stopper. [Fig.4.5]

4.2 Inspection

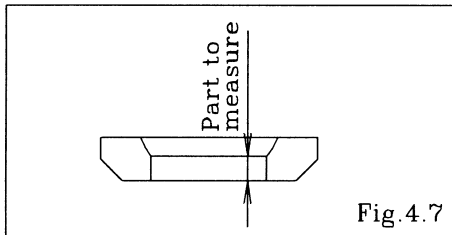


- Ball [Fig.4-6]

Measure the outside diameter, and if it is outside the usable range, replace the ball.

Usable range of Ball

DP-10F/N	SØ14.3 - SØ16.3 mm
DP-20F/N	SØ24.3 - SØ27.8 mm
DP-25F/N	SØ31.5 - SØ36.0 mm



- Valve seat [Fig.4-7]

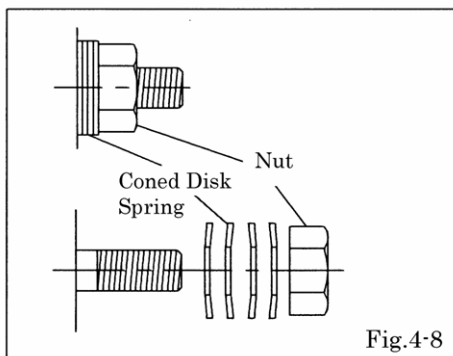
Measure the dimension shown at left, and if it is outside the usable range, replace the valve seat.

Usable range of Valve seat

DP-10F/N	2.4 - 6.0 mm
DP-20F/N	2.8 - 7.0 mm
DP-25F/N	3.2 - 7.5 mm

4.3 Installation

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



Tightening torque for vertical tie rods

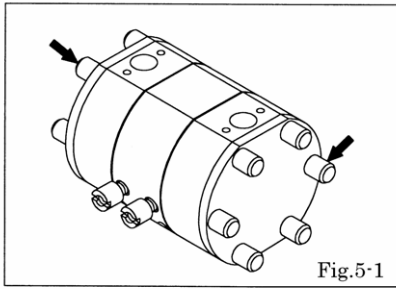
DP-10F/N, DP-20F/N	5 N·m
DP-25F/N	7 N·m

<NOTES>

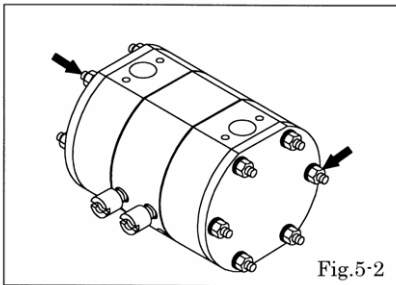
- Make sure there is no dust on the seal surface and the seal is not damaged.
- Replace the PTFE O ring regardless of its condition.
- Make sure that direction the coned disk springs. [Fig.4-8]
- Retighten the tie rods before starting the pump. (See “7. Retightening of tie rods”)

5. Diaphragm, Center rod and Bushing

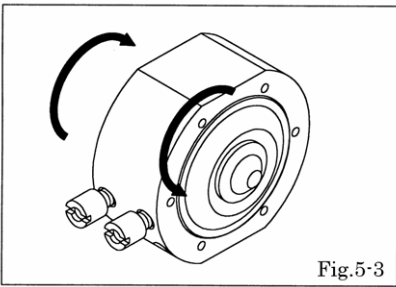
5.1 Removal



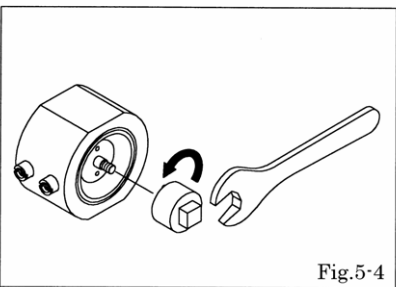
- Remove the ball, valve seat, valve guide and valve stopper etc. (see “4.1 Removal”)
- Remove the 12 caps from the both sides of horizontal tie rods. [Fig.5-1]



- Remove the 12 retainer nuts from the both sides of horizontal tie rods, and remove the reinforcement plate and out chamber. [Fig.5-2]



- Hold the edges of both diaphragms with both hands, and turn them until one diaphragm is removed. [Fig.5-3]

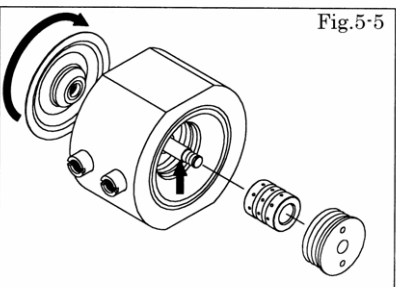


■ DP-10F/N

- Remove the guide of one side by using the socket for a guide (dedicated tool: Part No. 804014) and the spanner. [Fig.5-4]

<NOTE>

When you remove the guide, the sleeve is removed from the main body also.



- Fix the center rod by hand, and turn it until the diaphragm is removed. (When the diaphragm is removed, the center rod is removed from the body.) [Fig.5-5]

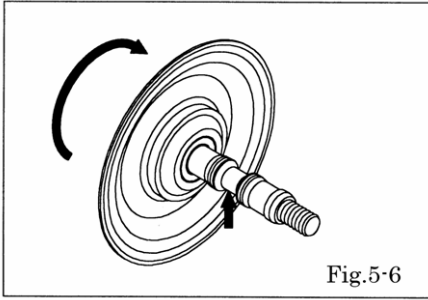


Fig.5-6

■ DP-20F/N, 25F/N

- Fix the central part of the center rod by hand or with the vice, and turn it until the diaphragm is removed. [Fig.5-6]

<NOTE>

Make sure the slipper seal of the center rod not be damaged. [Fig.5-7]

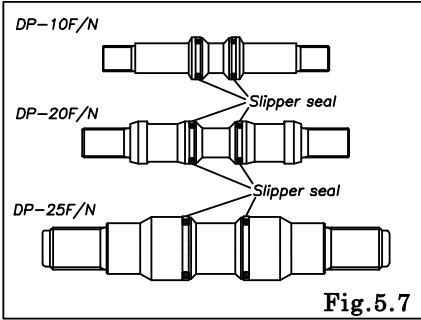


Fig.5.7

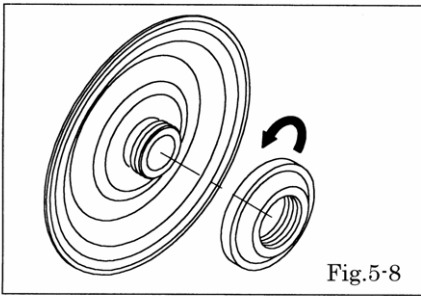


Fig.5-8

- Fix the diaphragm, and turn the bushing to remove it. [Fig.5-8]

5.2 Inspection

▪ Diaphragm

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

▪ Center rod (Slipper seal) [Fig.5-9]

Measure the diameter, and if it is outside the usable range, replace the slipper seal.

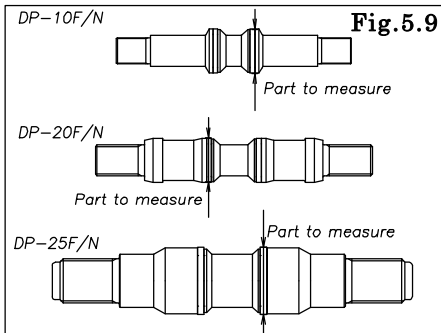


Fig.5.9

Usable range of slipper seal

DP-10F/N, DP-20F/N	Ø19.90 - Ø20.10 mm
DP-25F/N	Ø29.90 - Ø30.10 mm

▪ Bushing

If the screw is damaged, replace it with a new one.

▪ O Ring

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

5.3 Installation

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

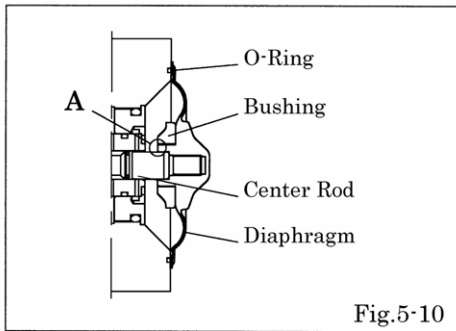


Fig.5-10

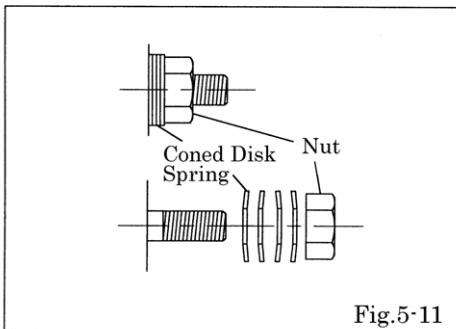


Fig.5-11

- Attach the bushing onto the diaphragm. [Fig.5-10]
- Attach the diaphragm by turning it until its level difference with the center rod of the section A becomes even. [Fig.5-10]
- Make sure there is no dust on the seal surface and the seal is not damaged.
- Tighten the bolts on a diagonal line with even torque.
- Attach the coned disk spring with making sure of its direction. [Fig.5-11]
- Make sure to attach the bushing onto the center disk securely.
- Retighten the tie rod immediately before starting the pump. (See “7. Retightening of Tie rods”)

6. Guide, Sleeve

6.1 Removal

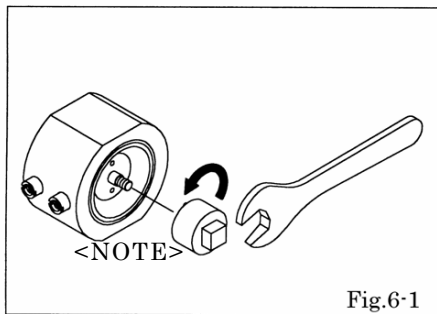


Fig.6-1

- DP-10F/N
- See “5.1 Removal”

- DP-20F/N, 25F/N

- Remove the guides of both sides using the socket for a guide (dedicated tool: Part No. 803989) and the spanner. [Fig.6-1]
- When the guide is removed, the sleeve is removed from the main body also.

6.2 Inspection

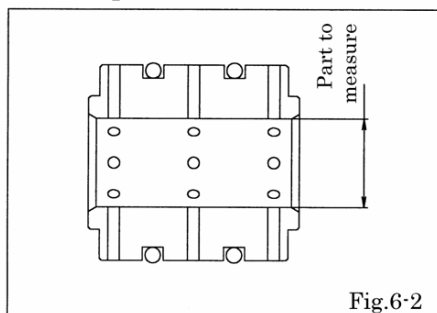


Fig.6-2

- Guide
If the screw is damaged, replace it with a new one.
- Sleeve
Measure the inside diameter, and if it is out of the usable range, replace it with a new one. [Fig.6-2]

Usable range of Sleeve

DP-10F/N, DP-20F/N	Ø20.00 - Ø20.10 mm
DP-25F/N	Ø30.00 - Ø30.15 mm

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

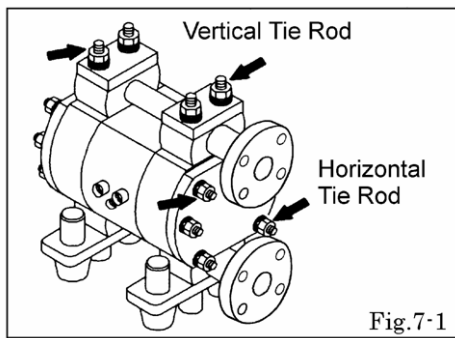
6.3 Installation

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.
- Use the dedicated tools.
- Apply a small amount of lubricant on the O ring.

7. 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.

Retightening of tie rods and torque

	Horizontal tie rods	Vertical tie rods
DP-10F/N	6 N·m	4 N·m
DP-20F/N	6 N·m	4 N·m
DP-25F/N	8 N·m	6 N·m

<NOTES>

- Fasten the nut (tie rods) on a diagonal line alternately with even force.
- Retighten the horizontal tie rods and then the vertical tie rods. [Fig.7-1]

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