



MAINTENANCE MANUAL
YAMADA AIR-OPERATED DIAPHRAGM PUMPS
DP-15BA_

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.

These maintenance manuals cover what you should know about maintenance of the Yamada DP-15BA_ Diaphragm Pumps.

This edition is based on the standards for the October 2016 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 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 Exploded View and Reminder to order correct item on 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.

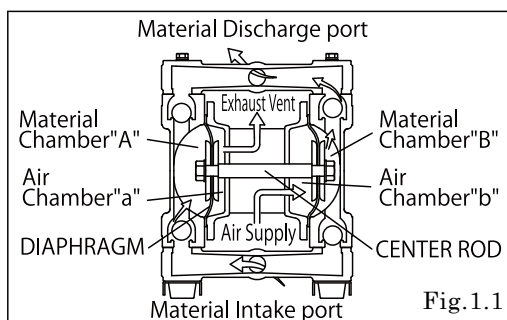


Fig. 1.1

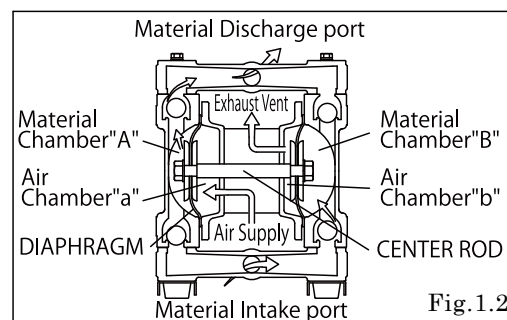
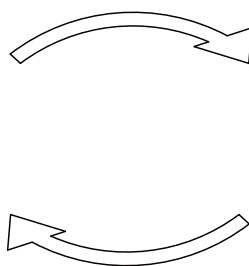


Fig. 1.2

2. Tools, etc.

2.1 General tools

- Socket wrenches 10mm , 13mm , 17mm
- Open-end wrenches 10mm , 13mm , 17mm
- Hexagonal box wrenches 5mm

2.2 Special tools (sold separately)

- Cap and disk remover
Purpose: Removing the cap

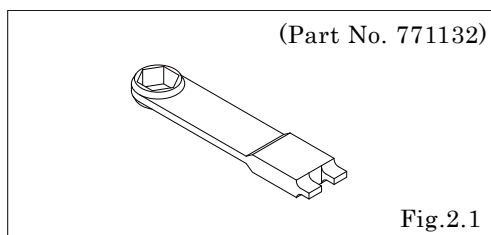


Fig.2.1

- Sleeve remover
Purpose: For removing sleeves

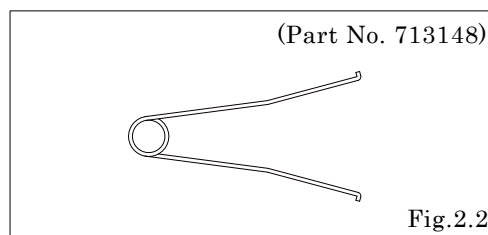


Fig.2.2

2.3 Misc.

- Assembly oil Turbine oil none addition class 1(equivalent ISO VG32 grade)
- Nuts M10×1.5
- Grease Urea grease grade (NLGI) No.2

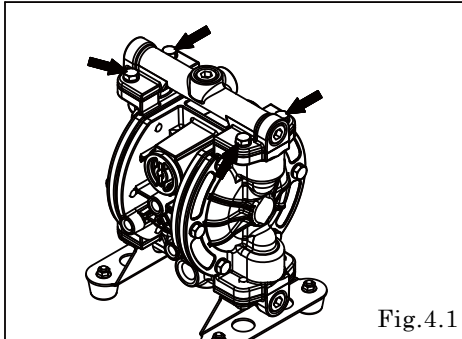
3. Ordering Replacement parts

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.

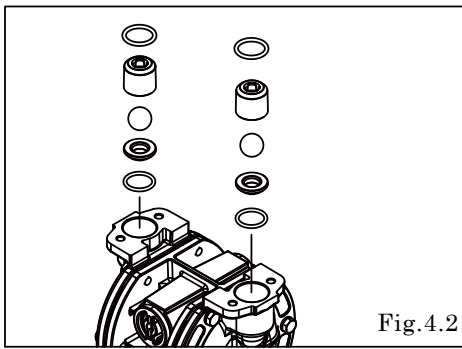
4. Balls, Valve seats

4.1 Removal

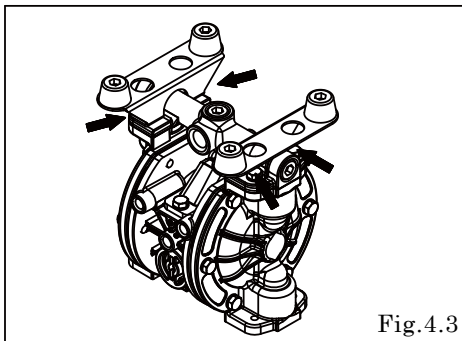
■BA_ types



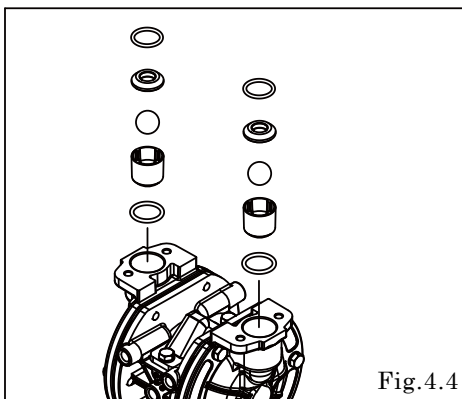
- Remove 4 mounting bolts from upper manifold and remove the manifold. [Fig.4.1]



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



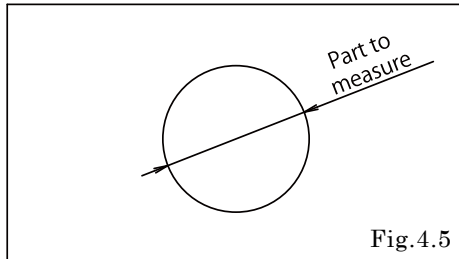
- Turn over the main body assembly. [Fig.4.3]
- Remove 4 mounting bolts from lower manifold and remove the base and the manifold. [Fig.4.3]



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

4.2 Inspection

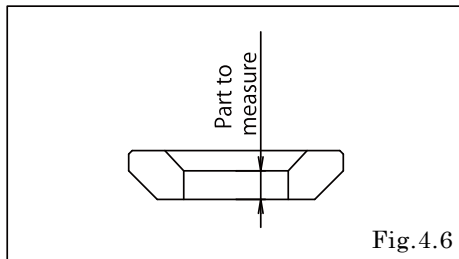
■ Ball valve type



▪ Ball [Fig.4.9]

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

DP-15	Sø0.787 ~ Sø0.898 in {Sø20.0 ~ Sø22.8 mm}
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▪ Valve seat [Fig.4.10]

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

Usable range of Valve seat	
DP-15	0.102 ~ 0.225 in {2.6 ~ 5.7 mm}

▪ O ring (other than PTFE)

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

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	
15BAN , BAS	105 in-lbf {12 N-m}
15BAT	160 in-lbf {18 N-m}

<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

■BA_ types

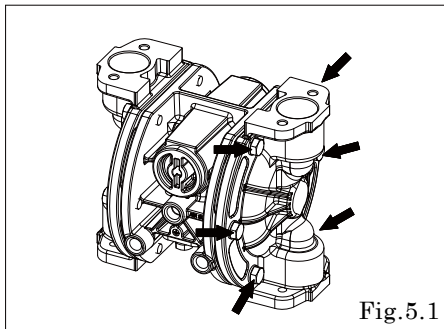


Fig.5.1

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

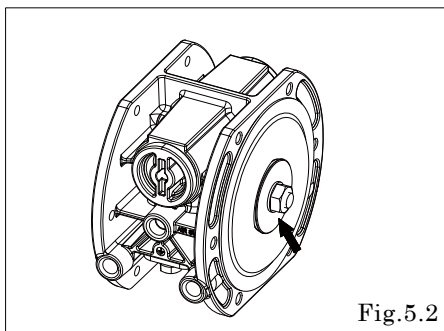


Fig.5.2

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

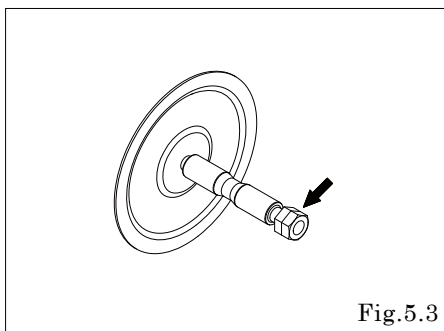


Fig.5.3

- Remove the nuts on the opposite side using the double nuts. [Fig.5.3]
- Remove the coned disk spring, center disk and diaphragm.

5.2 Inspection

- Diaphragm
If the diaphragm is worn out or damaged, replace it.
New replace just one diaphragm.

DP-15	NBR, PTFE	10,000,000 cycle
	TPO	15,000,000 cycle

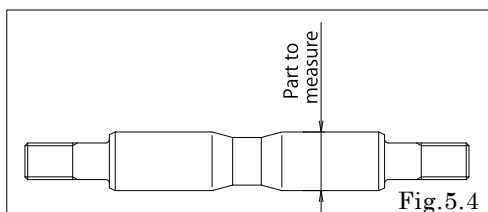


Fig.5.4

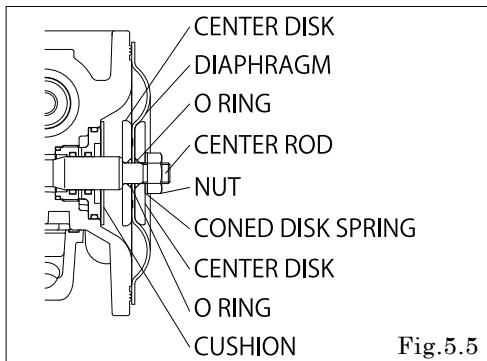
- Center rod [Fig.5.7]
Measure the diameter, and if it is outside the usable range, replace the rod.

Usable range of center rod	
DP-15	Ø0.6280 ~Ø0.6299 in {Ø15.95 ~Ø16.00 mm}

5.3 Installation

■BA_ types

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 convex side to the outside for diaphragm.
- For the model with PTFE diaphragm, put the Orings into both side of the diaphragms. (cf. Fig.5.5).
- Pull out the diaphragm to one side and assemble the out chamber with Fig. 5.5 condition. Bolts should not be fully tightened at this point.
- Pull out the diaphragms to the other side and assemble the out chamber with Fig. 5.5 condition. 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.

	Center rod	Out chamber
DP-15	160 in-lbf {18 N-m}	105 in-lbf {12 N-m}

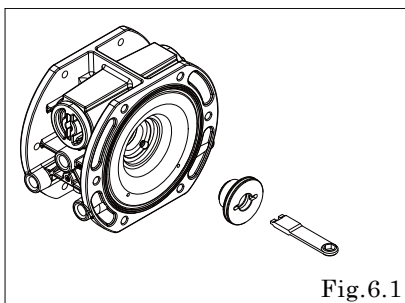
<NOTE>

- 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.

6. Guide bush

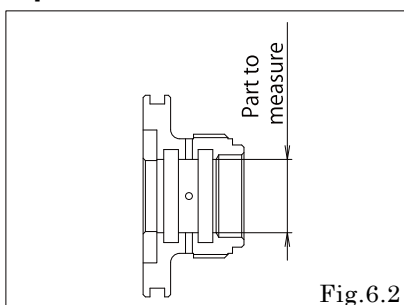
6.1 Removal

■DP-15BA_



- 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]

6.2 Inspection



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

Usable range of guide
$\varnothing 0.6299 \sim \varnothing 0.6378$ in { $\varnothing 16.0 \sim \varnothing 16.2$ 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.
- Apply grease to O ring.

7. Spool assembly and Sleeve

7.1 Removal

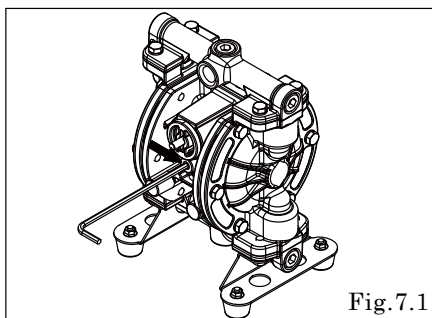


Fig. 7.1

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

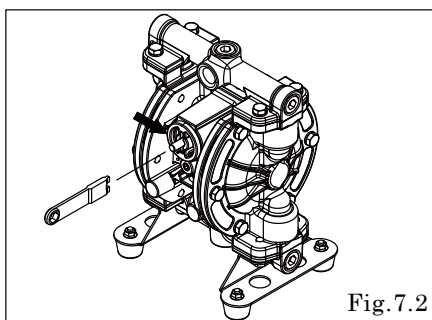


Fig. 7.2

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

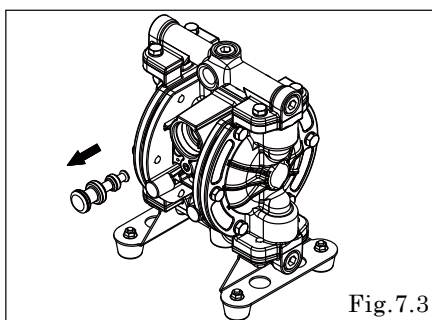


Fig. 7.3

- Remove Spool Assembly by pushing it from Cap A side (the side without reset button). [Fig. 7.3]

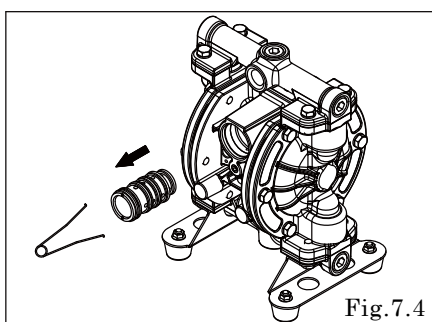


Fig. 7.4

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

7.2 Inspection

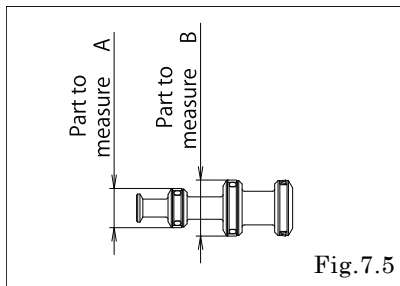


Fig. 7.5

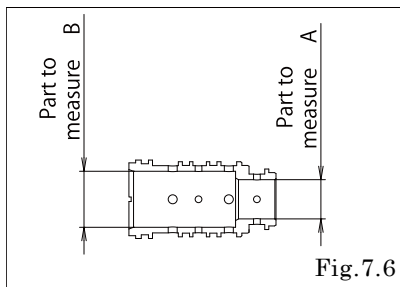


Fig. 7.6

▪ Spool Assembly

Seal ring [Fig. 7.5]

Measure the inside thick 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.

Part to measure A	0.6909 in and over { $\varnothing 17.55$ mm and over }
Part to measure B	0.9862 in and over { $\varnothing 25.05$ mm and over }

▪ Sleeve [Fig. 7.6]

Measure the inside diameter, and if it is outside the usable range, replace the sleeve assembly.

Usable range of Sleeve

Part to measure A	$\varnothing 0.6909 \sim \varnothing 0.6937$ in { $\varnothing 17.55 \sim \varnothing 17.62$ mm }
Part to measure B	$\varnothing 0.9862 \sim \varnothing 0.9890$ in { $\varnothing 25.05 \sim \varnothing 25.12$ 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.

<NOTE>

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

8. Retightening of bolts

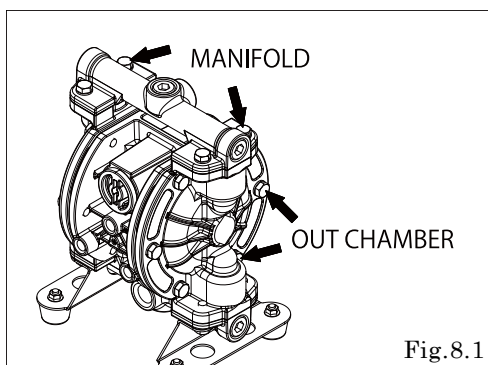


Fig. 8.1

- 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.

	Retain bolts for the out chamber	Retain bolts for the manifold
15BAN , BAS	105 in-lbf {12 N-m}	
15BAT	105 in-lbf {12 N-m}	160 in-lbf {18 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]

MEMO.

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