

MAINTENANCE MANUAL
YAMADA AIR-OPERATED DIAPHRAGM PUMPS
DP-10

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 DP-10 series Diaphragm Pumps.

This edition is based on the standards for the March 2009 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 operating 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.

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 Operating Manual. Also, remember that the pump is heavy, and extreme care must be taken when lifting it.

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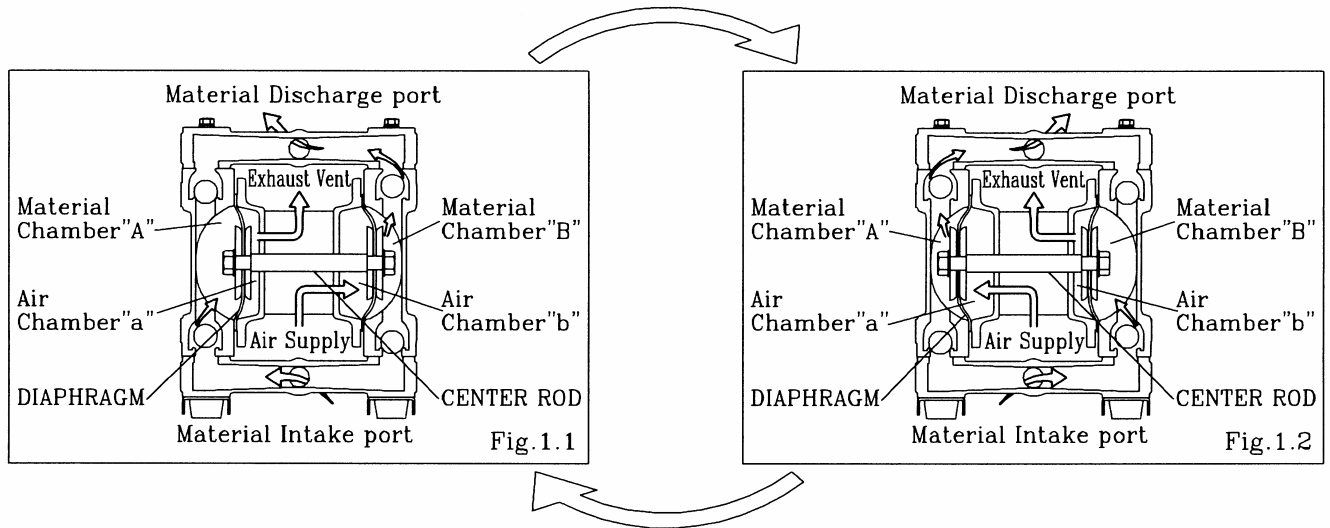
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1.Principles of operation

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.Tools, etc.

2.1 General tools

- Socket wrenches 13mm
- Hexagonal box wrenches 5mm, 6mm
- Open-end wrenches 21mm (BP□)
- Snap ring plyer

2.2 Misc.

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

3.Ordering Replacement parts

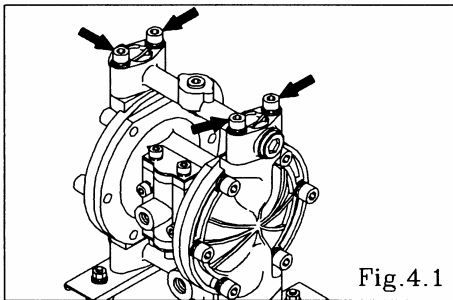
For accurate and speedy shipment of parts, be sure to order the right parts for your model to distributor. Indicate the part numbers, descriptions, and quantities

4. Balls and Valve seats

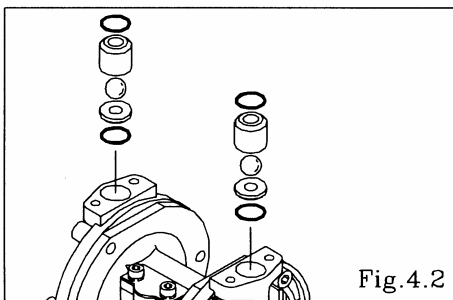
4.1 Removal

■BA□, BS□ types

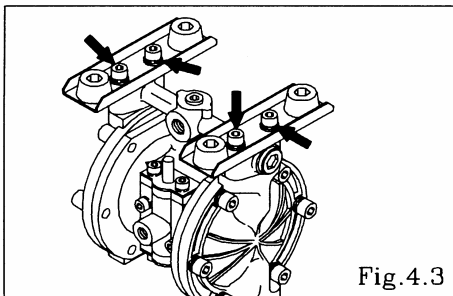
See [9. Exploded View] on after p.9.(Fig. 4.1, 4.2, 4.3 and 4.4 show the BA□.)



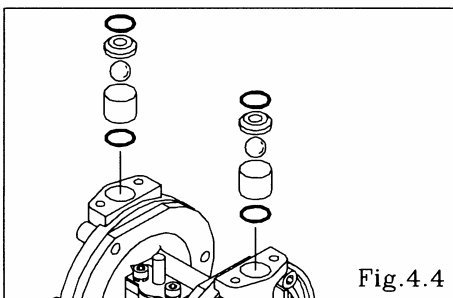
- Remove the 4 retainer bolts from the out manifold, and remove the out manifold. [Fig.4.1]



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



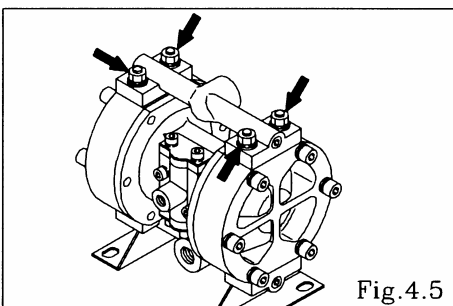
- Turn over the main body assembly. [Fig.4.3]
- Remove the 4 retainer bolts from the in manifold, and remove the in manifold. [Fig.4.3]



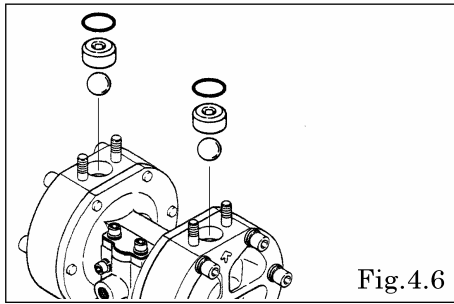
- Remove the O ring, valve seat, ball and valve stopper. [Fig.4.4]

■BP□type

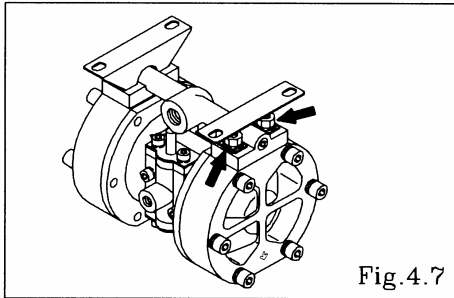
See [9. Exploded View] on after p.9.



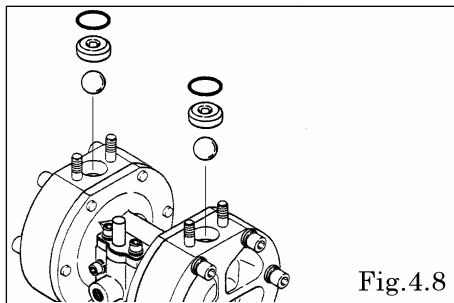
- Remove the 4 retainer nuts from the out manifold, and remove the out manifold. [Fig.4.5]



- Remove the O ring, valve stopper, ball and valve seat. [Fig.4.6]

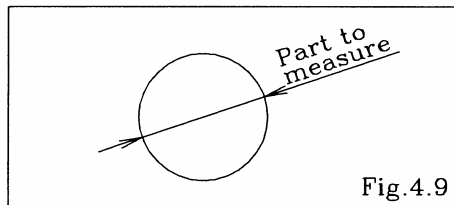


- Turn over the main body assembly. [Fig.4.7]
- Remove the 4 retainer nuts from the in manifold, and remove the in manifold. [Fig.4.7]



- Remove the O ring (excluded BPC, BPN), ball and valve seat. [Fig.4.8]

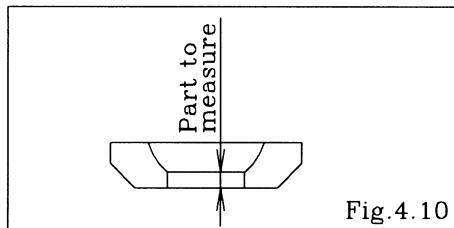
4.2 Inspection



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

Usable range of ball

Sø14.3 ~ Sø16.3 mm



- 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

BA□, BS□, BPH, BPT, BPS	2.0 ~ 5.1 mm
BPC, BPN	2.0 ~ 6.7 mm

- O ring (other than PTFE)
If O rings are worn out or cracked, replace them.

4.3 Installation

For installation, see [9. Exploded View] on after p.9, and install in the reverse order of disassembly.

Tightening torque for manifold retainer bolts

BA□, BS□	12 N·m
BP□	8 N·m

<NOTE>

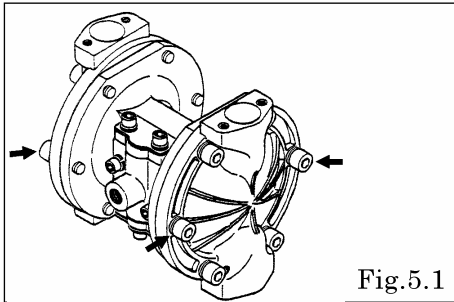
- Make sure there is no dust on the seal surface and the seal is not damaged.
- Replace the PTFE O ring regardless of its condition.

5. Diaphragm

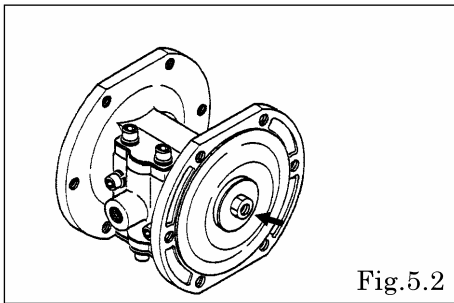
5.1 Removal

■ BA□, BS□ types

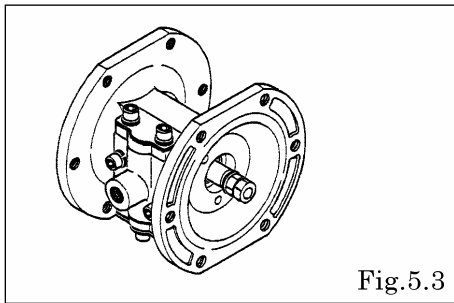
• See [9. Exploded View] on after p.9. (Fig.5.1 and 5.2 show the BA□.)



- Remove the ball and valve seat etc.(see [4.1 Removal BA□, BS□ types] on p. 2)
- Remove the 12 retainer bolts from the out chamber, and remove the out chamber. [Fig.5.1]



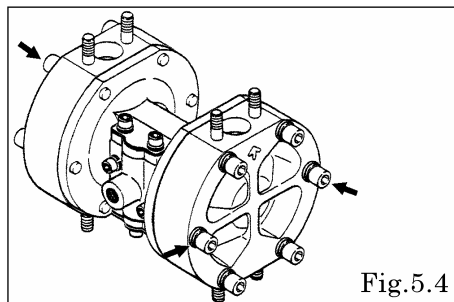
- Remove the nuts on both sides of the center rod. [Fig.5.2]
- After the nuts on one side have been removed, remove the center disk and diaphragm. [Fig.5.2]



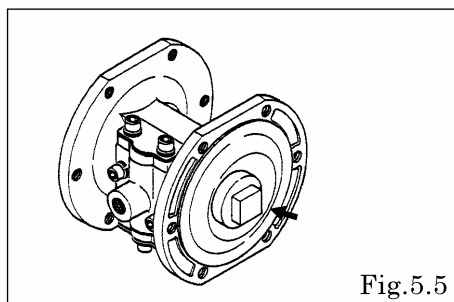
- Remove the nuts on the opposite side using the double nut. [Fig.5.3]
- Remove the coned disk spring, center disk and diaphragm.

■ BP□ type

See [9. Exploded View] on after p.9.



- Remove the ball and valve seat etc.(see [4.1 Removal BP□ type] on p. 2)
- Remove the 12 retainer bolts from the out chamber, and remove the out chamber. [Fig.5.4]



- Remove the center disk from one side. [Fig.5.5]
- After the center disk (outside) has been removed, remove the diaphragm and the center disk (inside).

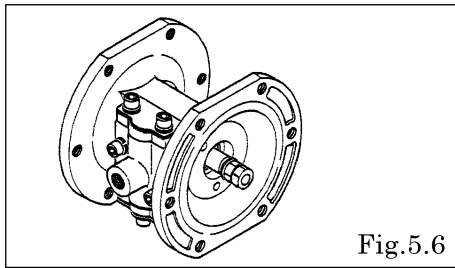


Fig.5.6

- Remove the center disk and diaphragm from the opposite side using the double nut. [Fig.5.6]
Be careful not to scratch or score the center rod.

5.2 Inspection

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

Guideline of diaphragm life

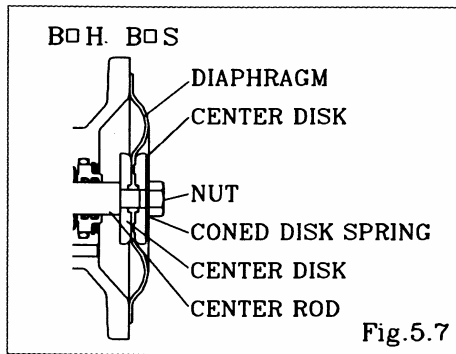
CR, NBR, PTFE	10,000,000 cycle
TPEE, TPO	15,000,000 cycle

(When used with clean water at room temperature)

5.3 Installation

■ B□H, B□S types

For installation, see [9. Exploded View] on after p.9, and install in the reverse order of disassembly.



- Apply assembly grease to the center rod, and insert it into the main body.
- Keep the convex side to the outside (cf. Fig.5.7).
- Tighten the center disk using the open-end wrenches for the DP-10BP□.
(No coned disk springs and nuts are needed.)
- Tighten the out chamber temporarily at first.
- 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

center rod	out chamber
14 N·m	12 N·m

<NOTE>

- Make sure there is no dust on the seal surface in order to prevent seal damaged.
- Tighten the bolts gradually in a diagonal sequence with even torque. [Fig.5.8].

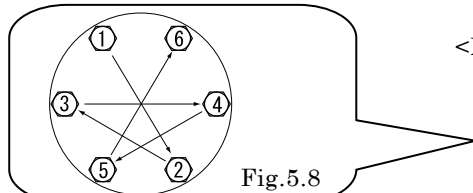
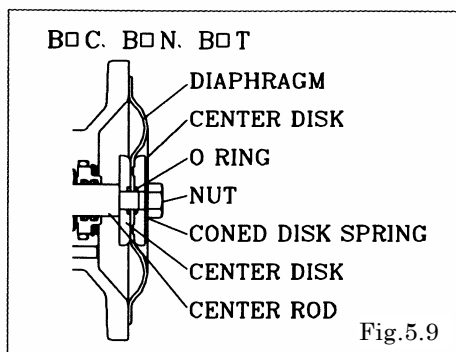


Fig.5.8

■ B□C, B□N, B□T types

For installation, see [9. Exploded View] on after p.9, and install in the reverse order of disassembly.



- Apply Assembly 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.5.8).
- Tighten the center disk using the open-end wrenches for the DP-10BP□.
(No coned disk springs and nuts are needed.)
- 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.

center rod	out chamber
14 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 gradually in a diagonal sequence with even torque. [Fig.5.10].

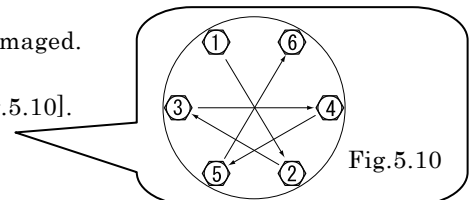


Fig.5.10

6.Center rod, Body and Guide bush

6.1 Removal

See [9. Exploded View] on after p.9.

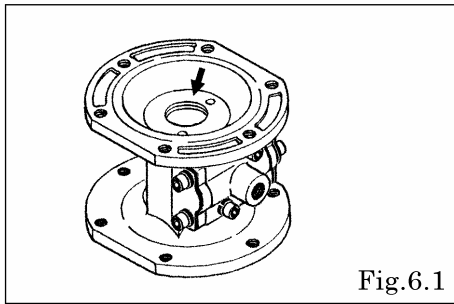


Fig.6.1

- Remove the diaphragm etc.(see [5.1 Removal] on p. 4)
- Remove the snap ring using the snap ring pleyer, and remove the guide bush, spacer and center rod assembly. [Fig.6.1]

6.2 Inspection

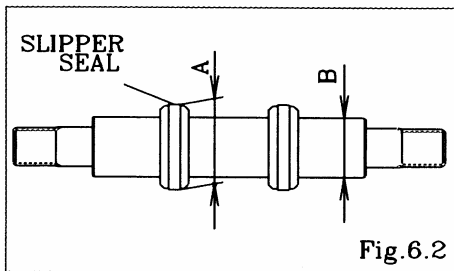


Fig.6.2

- Center rod assembly [Fig.6.2]
Measure the outside diameter (A), and if it is outside the usable range, replace the slipper seal.

Usable range of Slipper seal (A)

Ø 19.9 ~ Ø 20.0 mm

- Measure the outside diameter (B), and if it is outside the usable range, replace the center rod Slipper seal.

Usable range of Center rod (B)

Ø 13.9 ~ Ø 14.0 mm

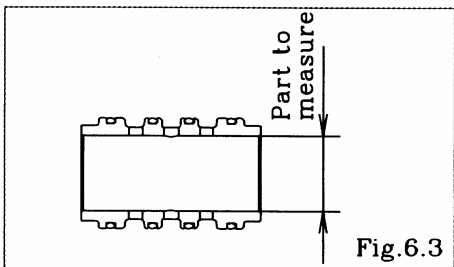


Fig.6.3

- Sleeve [Fig.6.3]
Measure the inside diameter, and if it is outside the usable range, replace the Sleeve.
Remove the Sleeve from the Spacer side.

Usable range of sleeve

Ø 20.00 ~ Ø 20.08 mm

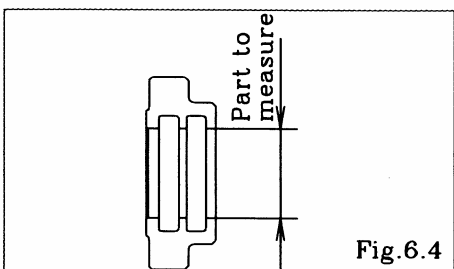


Fig.6.4

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

Usable range of Guide bush

Ø 14.02 ~ Ø 14.08 mm

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

6.3 Installation

For installation, see [9. Exploded View] on after p.9, and install in the reverse order of disassembly.

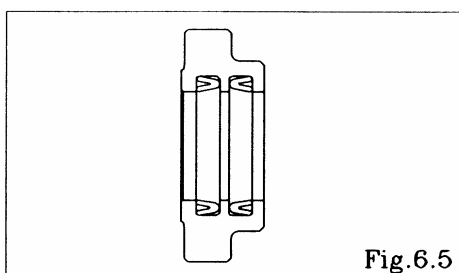


Fig.6.5

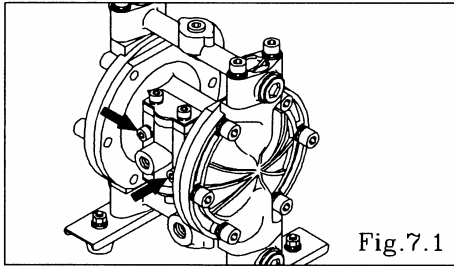
<NOTE>

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

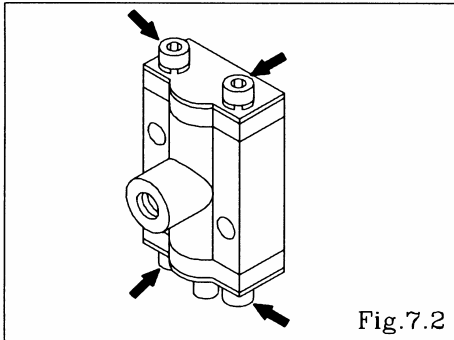
7. Spool valve case and Spool Assembly

7.1 Removal

See [9. Exploded View] on after p.9. (Fig.7.1 shows the BA□.)

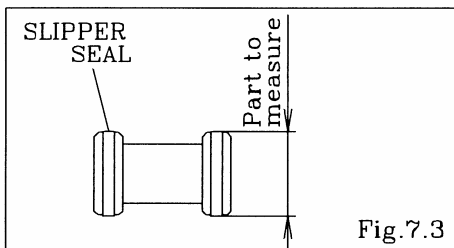


- Remove the 2 retainer bolts from the spool valve case, and remove the spool valve case. [Fig.7.1]



- Remove the 2 retainer bolts from the cap, and remove the reinforcement plate A, cap and reset button. [Fig.7.2]
- Remove the 2 retainer bolts from the cap, and remove the reinforcement plate B, and cap. [Fig.7.2]
- Remove the spool valve assembly from the spool valve case.

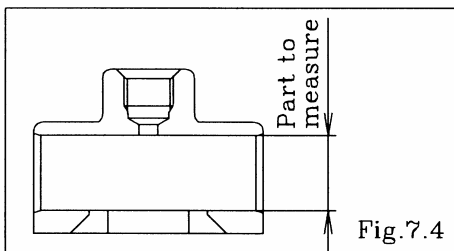
7.2 Inspection



- Spool valve assembly [Fig.7.3]
Measure the outside diameter, and if it is outside the usable range, replace the slipper seal.

Usable range of spool valve assembly

Ø 19.9 ~ Ø 20.0 mm



- Spool valve case [Fig.7.4]
Measure the inside diameter, and if it is outside the usable range, replace the Spool valve case.

Usable range of spool valve case

Ø 20.00 ~ Ø 20.08 mm

7.3 Installation

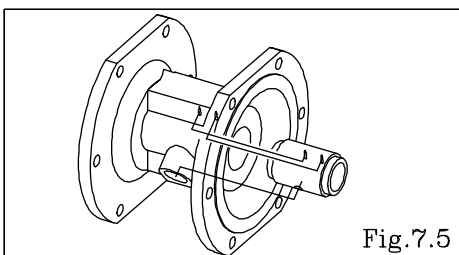
For installation, see [9. Exploded View] on after p.9, and install in the reverse order of disassembly.

Tightening torque for installation Cap

6 N·m

Tightening torque for installation Spool valve case

6 N·m

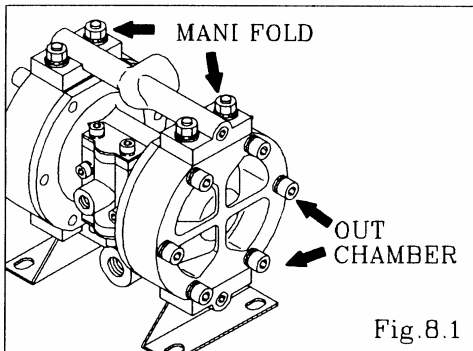


- Sleeve [Fig.7.5]
When inserting the sleeve into the body, please make sure the position of the 3 holes in the sleeve match the corresponding holes in the body.

<NOTE>

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

8. Retightening of Tie rods

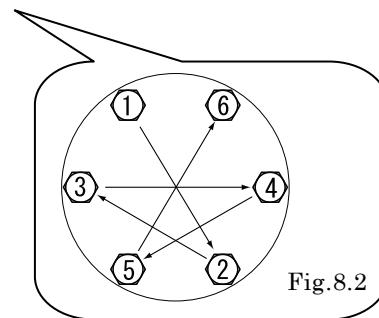


- All bolts should be retorqued:
 - (1) Right before start up.
 - (2) There are any leaks of material on daily inspecting a pump.

		Retain bolts for the out chamber	Retain bolts for the manifold
DP-10	BP□	12 N·m	8 N·m

<NOTE>

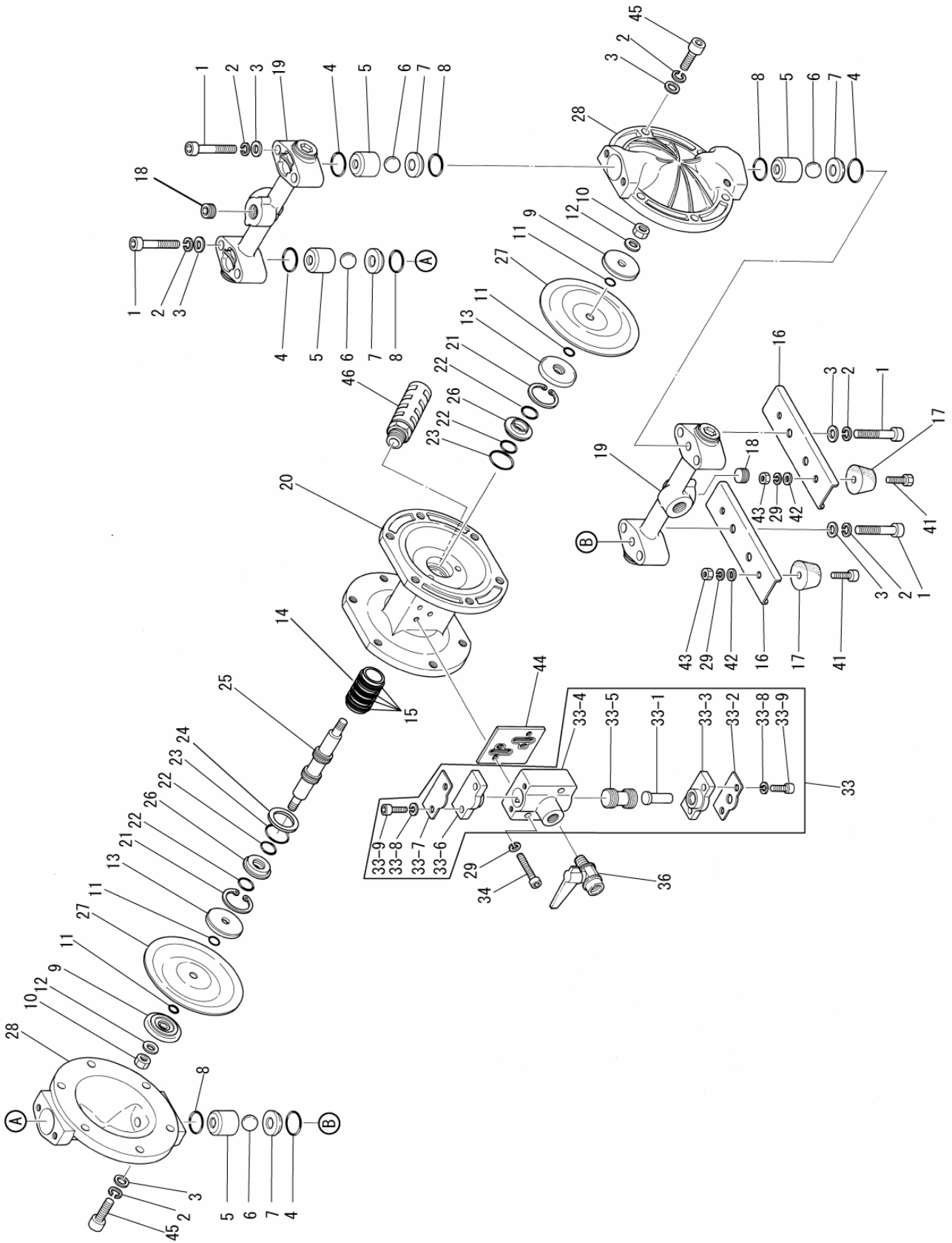
- Retighten the Out chamber and then the manifold in this order. [Fig.8.1]
- Tighten the bolts in the order shown. [Fig.8.2]



9. Exploded View and Parts List

9.1 Exploded View

■ DP-10BA□



9.1 Parts List

■ DP-10BA□

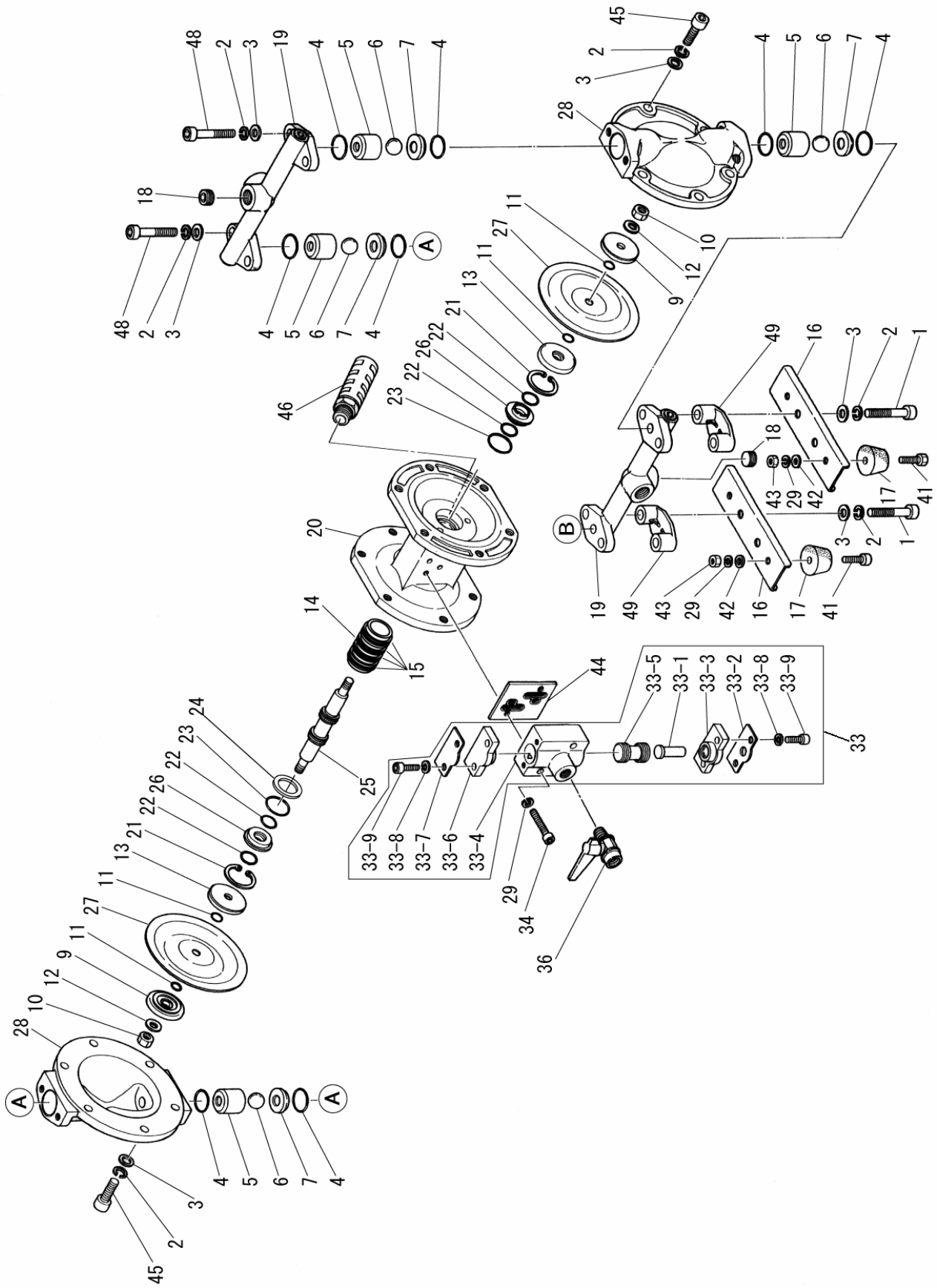
NO.	BA□	DESCRIPTION	Q'TY	NOTE
1	681295	HEXAGON SOCKET HEAD BOLT	8	M8 x 1.25 x 45
2	681300	SPRING LOCK WASHER	20	
3	631329	PLAIN WASHER	20	
4	643018	O RING	4	P21 PTFE
5	771368	VALVE STOPPER	4	
6	Tab.1	BALL	4	
7	710638	VALVE SEAT	4	
8	643017	O RING	4	P20 PTFE
9	708770	CENTER DISK	2	
10	681849	NUT	2	M8 x 1.25
11	Tab.2	O RING	4	
12	684916	CONED DISK SPRING	2	
13	709512	CENTER DISK	2	
14	714678	SLEEVE	1	
15	684900	O RING	4	
16	710586	PUMP BASE	2	
17	771123	CUSHION	4	
18	682279	HEXAGON SOCKET HEAD PLUG	2	3/8"
19	802559	MANIFOLD ASSEMBLY	2	
20	715106	BODY	1	
21	630807	RETAINING RING R TYPE	2	
22	684284	PACKING	4	MYA-14
23	640131	O RING	2	G30 NBR
24	772651	SPACER	1	
25	801785	CENTER ROD ASSEMBLY	1	*2(681294)
26	772619	GUIDE BUSH	2	
27	Tab.3	DIAPHRAGM	2	
28	710572	OUT CHAMBER	2	
29	681855	SPRING LOCK WASHER	10	
33	804504	VALVE BODY ASSEMBLY	1	
34	682918	HEXAGON SOCKET HEAD BOLT	2	M6 x 1 x 35
36	682771	BALL VALVE	1	1/4"
41	621102	BOLT	4	M6 x 1 x 22
42	631328	PLAIN WASHER	4	
43	628010	NUT	4	M6 x 1
44	771358	GASKET	1	
45	682944	HEXAGON SOCKET HEAD BOLT	12	M8 x 1.25 x 25
46	681293	SILENCER	1	
51	790910	NAME PLATE	1	

NOTE 1)NO.51(NAME PLATE) IS NOT INDICATED IN EXPLODED VIEW

2)*2 SHOWS PARTS NUMBER OF SLIPPER SEAL IN CENTER ROD ASSEMBLY.

9.2 Exploded View

■ DP-10BS□



9.2 Parts List

■ DP-10BS□

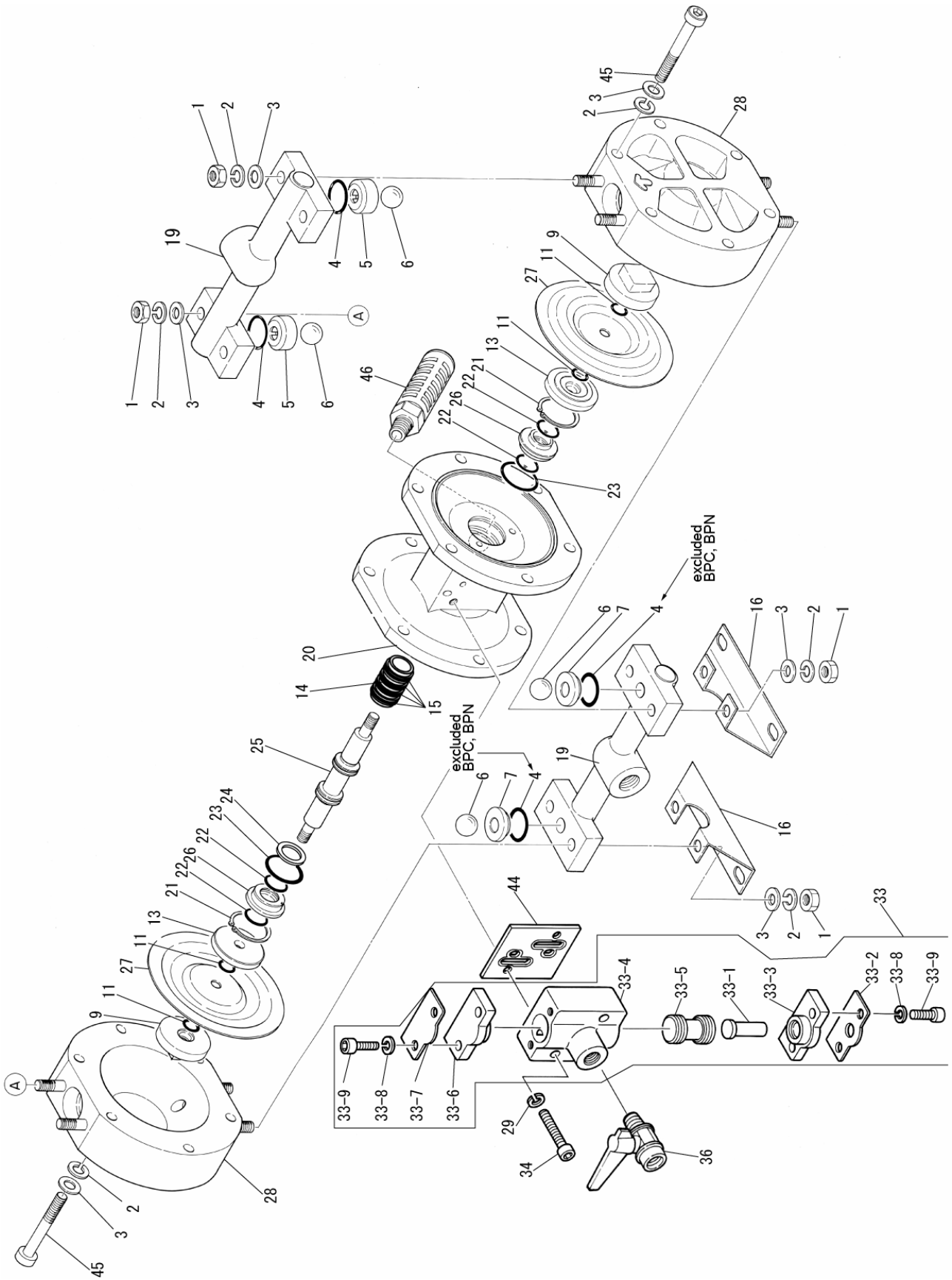
NO.	BS□	DESCRIPTION	Q'TY	NOTE
1	682971	HEXAGON SOCKET HEAD BOLT	4	M8 x 1.25 x 40
2	681300	SPRING LOCK WASHER	20	
3	631329	PLAIN WASHER	20	
4	Tab.4	O RING	8	
5	710637	VALVE STOPPER	4	
6	Tab.1	BALL	4	
7	708913	VALVE SEAT	4	
9	708506	CENTER DISK	2	
10	681849	NUT	2	M8 x 1.25
11	Tab.2	O RING	4	
12	684916	CONED DISK SPRING	2	
13	709512	CENTER DISK	2	
14	714678	SLEEVE	1	
15	684900	O RING	4	
16	710586	PUMP BASE	2	
17	771123	CUSHION	4	
18	709340	HEXAGON SOCKET HEAD PLUG	2	3/8"
19	831529	MANIFOLD ASSEMBLY	2	
20	715106	BODY	1	
21	630807	RETAINING RING R TYPE	2	
22	684284	PACKING	4	
23	640131	O RING	2	G30 NBR
25	801785	CENTER ROD ASSEMBLY	1	*2(681294)
26	772619	GUIDE BUSH	2	
27	Tab.3	DIAPHRAGM	2	
28	710660	OUT CHAMBER	2	
29	681855	SPRING LOCK WASHER	10	
33	804504	BALVE BODY ASSEMBLY	1	
34	682918	HEXAGON SOCKET HEAD BOLT	2	M6 x 1 x 35
36	682771	BALL VALVE	1	1/4"
41	621102	BOLT	4	M6 x 1 x 22
42	631328	PLAIN WASHER	4	
43	628010	NUT	4	M6 x 1
44	771358	GASKET	1	
45	682944	HEXAGON SOCKET HEAD BOLT	12	M8 x 1.25 x 25
46	681293	SILENCER	1	
48	681297	HEXAGON SOCKET HEAD BOLT	4	M8 x 1.25 x 20
49	771380	SPACER	2	
51	790910	NAME PLATE	1	

NOTE 1)NO.51(NAME PLATE) IS NOT INDICATED IN EXPLODED VIEW

2)*2 SHOWS PARTS NUMBER OF SLIPPER SEAL IN CENTER ROD ASSEMBLY.

9.3 Exploded View

■ DP-10BP□



9.3 Parts List

■ DP-10BP□

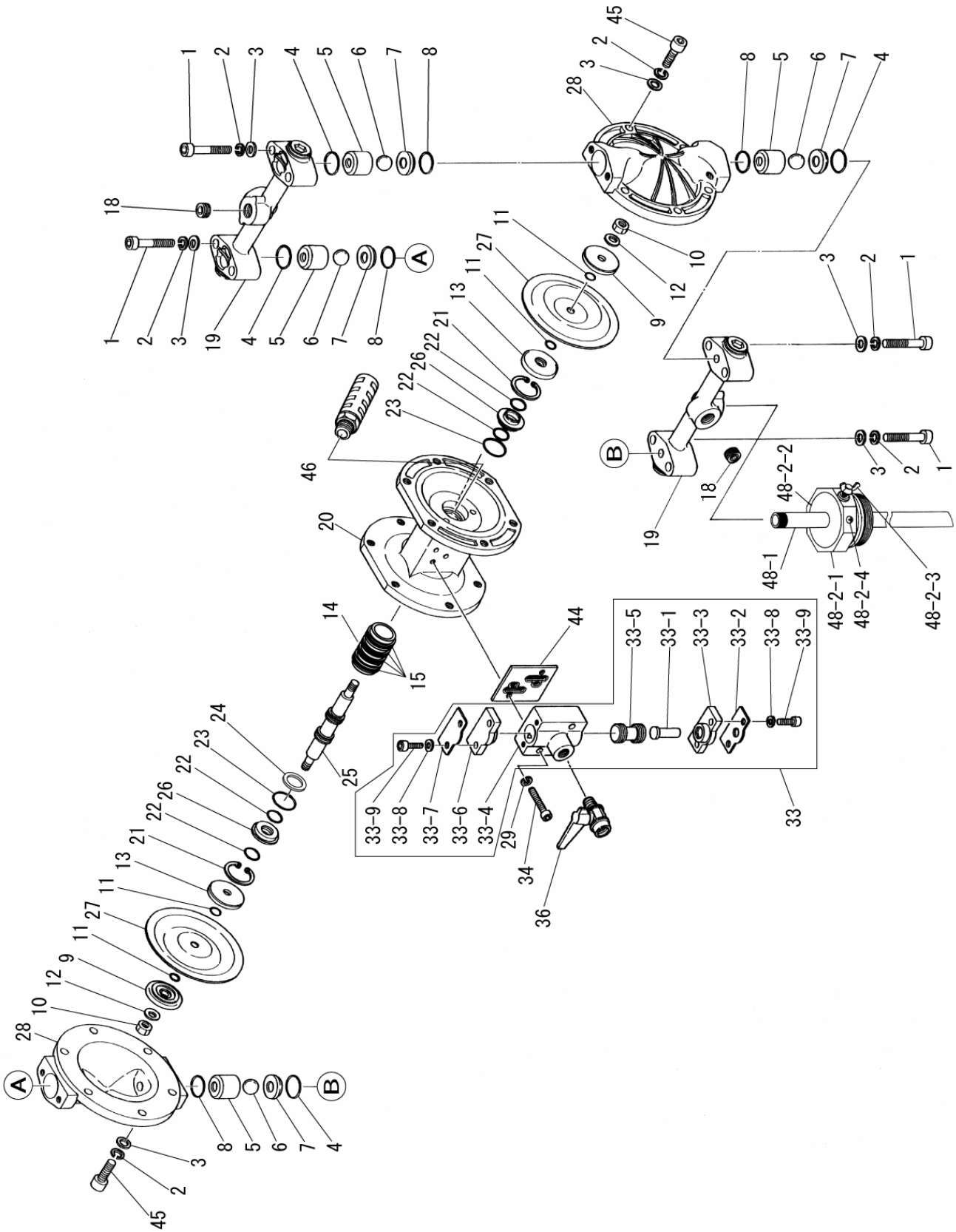
NO.	BP□	DESCRIPTION	Q'TY	NOTE
1	628012	NUT	12	M8 x 1.25
2	681300	SPRING LOCK WASHER	24	
3	631329	PLAIN WASHER	24	
4	Tab.5	O RING	-	
5	771136	VALVE STOPPER	2	
6	Tab.1	BALL	4	
7	Tab.6	VALVE SEAT	2	
9	770968	CENTER DISK	2	
11	Tab.2	O RING	4	
13	708770	CENTER DISK	2	
14	714678	SLEEVE	1	
15	684900	O RING	4	
16	708511	PUMP BASE	2	
19	831291	MANIFOLD ASSEMBLY	2	
20	715106	BODY	1	
21	630807	RETAINING RING R TYPE	2	
22	684284	PACKING	4	MYA-14
23	640131	O RING	2	G30 NBR
25	801785	CENTER ROD ASSEMBLY	1	**2(681294)
26	772619	GUIDE BUSH	2	
27	Tab.3	DIAPHRAGM	2	
28	780194	OUT CHAMBER	2	
29	681855	SPRING LOCK WASHER	2	
33	804504	VALVE BODY ASSEMBLY	1	
34	682918	HEXAGON SOCKET HEAD BOLT	2	M6 x 1 x 35
36	682771	BALL VALVE	1	1/4"
44	771358	GASKET	1	
45	682945	HEXAGON SOCKET HEAD BOLT	12	M8 x 1.25 x 50
46	681293	SILENCER	1	
51	790910	NAME PLATE	1	

NOTE 1)NO.51(NAME PLATE) IS NOT INDICATED IN EXPLODED VIEW

2)*2 SHOWS PARTS NUMBER OF SLIPPER SEAL IN CENTER ROD ASSEMBLY.

9.4 Exploded View

■ DP-10BA□-D,BS□-D



9.4 Parts List

■ DP-10BA□-D,BS□-D

NO.	BA□-D	BS□-D	DESCRIPTION	Q'TY	NOTE
1	681295	681297	HEXAGON SOCKET HEAD BOLT	8	M8 x 1.25 x 45
	681295	681297		8	M8 x 1.25 x 20
2	681300	←	SPRING LOCK WASHER	20	
3	631329	←	PLAIN WASHER	20	
4	643018	710637	O RING	4	P21 PTFE
	643018	Tab.4		8	
5	771368	710637	VALVE STOPPER	4	
6	Tab.1	←	BALL	4	
7	710638	708913	VALVE SEAT	4	
8	643017	710637	O RING	4	P20 PTFE
9	708770	708506	CENTER DISK	2	
10	681849	←	NUT	2	M8 x 1.25
11	Tab.2	←	O RING	4	
12	684916	←	CONED DISK SPRING	2	
13	709512	←	CENTER DISK	2	
14	714678	←	SLEEVE	1	
15	684900	←	O RING	4	
18	682279	709340	HEXAGON SOCKET HEAD PLUG	2	3/8"
19	802559	831529	MANIFOLD ASSEMBLY	2	
20	715106	←	BODY	1	
21	630807	←	RETAINING RING R TYPE	2	
22	684284	←	PACKING	4	
23	640131	←	O RING	2	G30 NBR
25	801785	←	CENTER ROD ASSEMBLY	1	*2(681294)
26	772619	←	GUIDE BUSH	2	
27	Tab.3	←	DIAPHRAGM	2	
28	710572	710660	OUT CHAMBER	2	
29	681855	←	SPRING LOCK WASHER	2	
33	804504	←	VALVE BODY ASSEMBLY	1	
34	682918	←	HEXAGON SOCKET HEAD BOLT	2	M6 x 1 x 35
36	682771	←	BALL VALVE	1	1/4"
44	771358	←	GASKET	1	
45	682944	←	HEXAGON SOCKET HEAD BOLT	12	M8 x 1.25 x 25
46	681293	←	SILENCER	1	
48	803671	←	SUCTION PIPE SET	1	
51	790910	←	NAME PLATE	1	

NOTE 1)NO.51(NAME PLATE) IS NOT INDICATED IN EXPLODED VIEW

2)CR, NBR, PTFE AND TPEE DIAPHRAGMS

ARE SET UP IN DP-10BA□-D, BS□-D SERIES.

3)*2 SHOWS PARTS NUMBER OF SLIPPER SEAL IN CENTER ROD ASSEMBLY.

9.5 Parts List

■ DP-10 COMMON PARTS

804504 BALVE BODY ASSEMBLY

NO.	PART NO.	DESCRIPTION	Q'TY	NOTE
33-1	706798	PUSH ROD	1	
33-2	710587	REIN FORCEMENT PLATE A	1	
33-3	771357	CAP	1	
33-4	710574	SPOOL VALVE CASE	1	
33-5	801404	SPOOL VALVE ASSEMBLY	1	
33-6	771356	CAP	1	
33-7	710636	REIN FORCEMENT PLATE B	1	
33-8	681855	SPRING LOCK WASHER	4	
33-9	682943	HEXAGON SOCKET HEAD BOLT	4	M6 X 1 X18

803671 SUCTION PIPE SET

NO.	PART NO.	DESCRIPTION	Q'TY	NOTE
48-1	713237	SUCTION PIPE	1	
48-2	803665	BUNG LOCK ADAPTER ASSEMBLY	1	

803665 BUNG LOCK ADAPTER ASSEMBLY

NO.	PART NO.	DESCRIPTION	Q'TY	NOTE
48-2-1	712928	PUMP HOLDER	1	
48-2-2	713238	COLLAR	1	
48-2-3	683648	WING BOLT	1	
48-2-4	682203	SCREW WITH SPRING WASHER	2	

Tab.1 BALL

TYPE	BA/BS/BP□	MATERIAL
B□C	770970	CR
B□N	770972	NBR
B□T	770931	PTFE
B□H	770972	NBR
B□S	771978	EPDM
B□H/T	770931	PTFE

Tab.2 O RING (P8)

TYPE	BA/BS/BP□	MATERIAL
B□C	640005	NBR
B□N	640005	NBR
B□T	643005	PTFE
B□H		
B□S		
B□H/T		

Tab.3 DIAPHRAGM

TYPE	BA/BS/BP□	MATERIAL
B□C	770971	CR
B□N	770973	NBR
B□T	770933	PTFE
B□H	771372	TPEE
B□S	771972	TPO
B□H/T	771372	TPEE

Tab.4 O RING (P21)

TYPE	BS□	MATERIAL
BSC	640018	NBR
BSN	640018	NBR
BST	643018	PTFE
BSH	640018	NBR
BSS	684112	EPDM
BSH/T	640018	NBR

Tab.5 O RING (P21)

TYPE	BP□	MATERIAL	Q'TY
BPC	640018	NBR	2
BPN	640018	NBR	2
BPT	643018	PTFE	4
BPH	640018	NBR	4
BPS	684112	EPDM	4
BPH/T	640018	NBR	4

Tab.6 VALVE SEAT

TYPE	BP□	MATERIAL
BPC	770975	CR
BPN	770976	NBR
BPT	771187	PPG
BPH	771187	PPG
BPS	771187	PPG
BPH/T	771187	PPG

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