

MAINTENANCE MANUAL SUPPLEMENT

YAMADA AIR-OPERATED DIAPHRAGM PUMPS

NDP-P20BTT

NDP-P25BTT

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 supplement provides additional essential information about maintenance of the YAMADA NDP-P20BTT and NDP-P25BTT diaphragm pumps. Refer to this supplement instead of section 2, 4, and 5 in the Maintenance Manual “NDP233M” when performing maintenance on this product.

This edition is based on the standards for the September 2011 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 or property damage.



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 1.1 "Main body specification" in the operation manual. Also, remember that the pump is heavy, and extreme care must be taken when lifting it.

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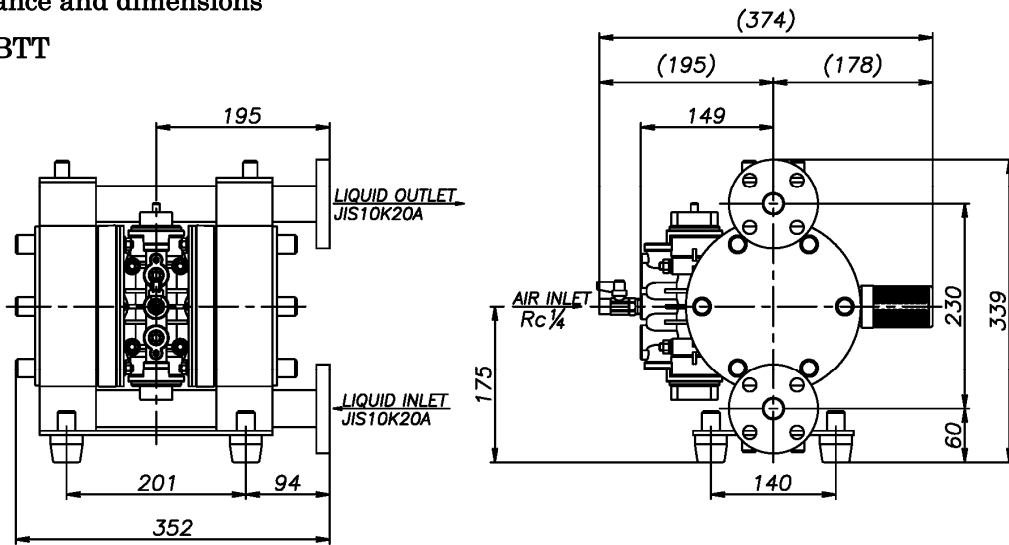
1. Main body specification

1.1 Main specifications

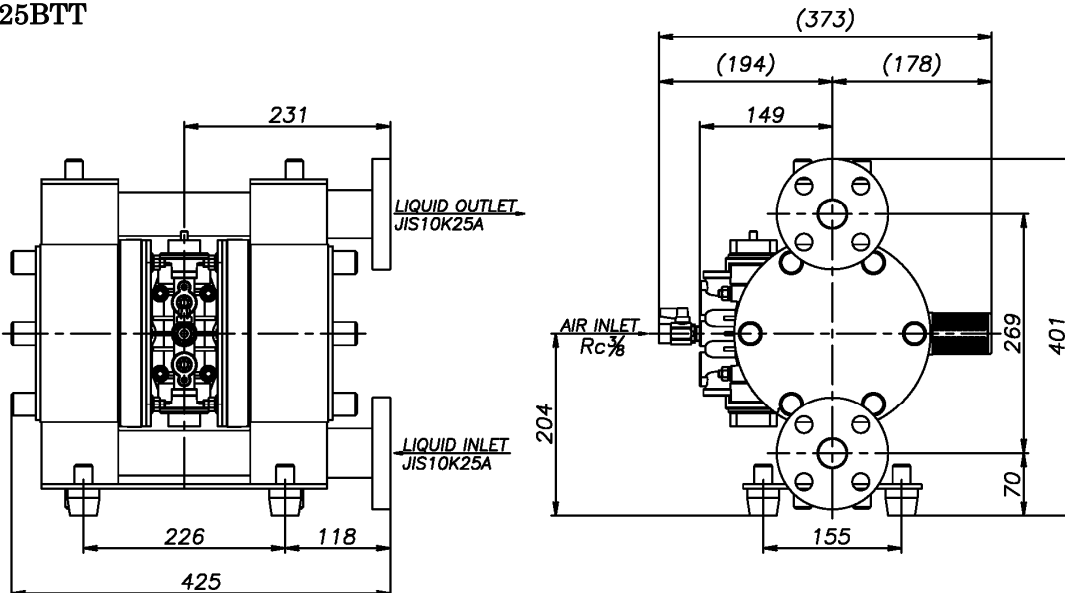
Type		NDP-P20BTT	NDP-P25BTT
Nominal Diameter		3/4" (20mm)	1" (25mm)
Fluid Connection	Suction Port	JIS flange	JIS flange
	Discharge port	10K20A	10K25A
Air Connection	Supply Port	Rc1/4	Rc3/8
	Exhaust Port	Rc3/4	
Operating Air Pressure		0.2~0.5MPa	
Maximum Discharge Pressure		0.5MPa	
Discharge Volume/cycles		290mL	500mL
Maximum Discharge Volume		72L/min	125L/min
Maximum Air Consumption		1100L/min(ANR)	1300L/min(ANR)
Slurry Limitation		2mm or less	3mm or less
Limitation of Viscosity		2Pa·s or below	2.5Pa·s or below
Operating Ambient Temperature Range	Temp.	0~70°C	
	Fluid Temp.	0~60°C	
A-weighted emission sound pressure level		85dB(A)	
Weight		20kg	33kg

1.2 Appearance and dimensions

■NDP-P20BTT

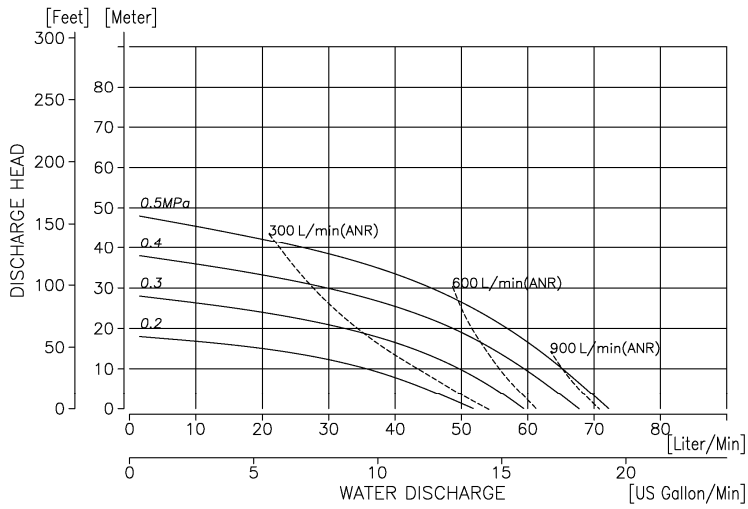


■NDP-P25BTT

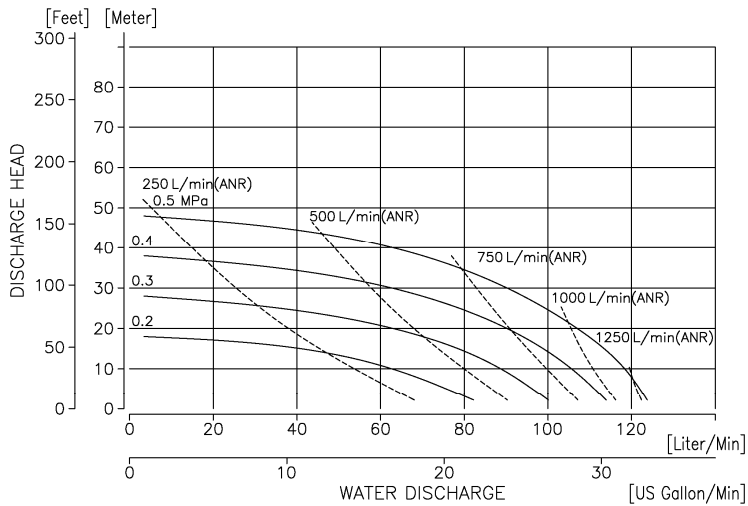


1.3 Performance curve

■NDP-P20BTT



■NDP-P25BTT



2. Tools, etc.

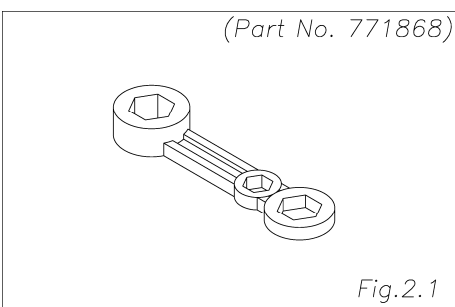
2.1 General tools

- Socket wrenches 10mm, 13mm, 17mm
- Open end wrenches 10mm, 12mm, 13mm, 14mm
- Adjustable angle wrenches
- Phillips head screw driver

2.2 Special tools (sold separately)

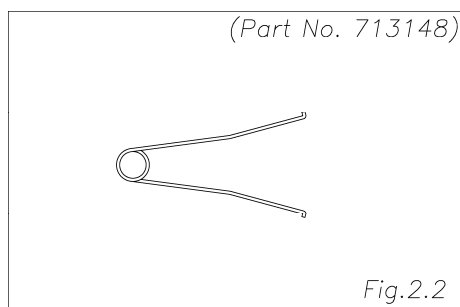
- PP wrenches (2)

Purpose: For removing center disks



- Sleeve remover (1)

Purpose: For removing sleeve



2.3 Misc.

- Assembly oil Turbine oil none addition class 1 (equivalent to ISO VG32 grade)
- Nuts (2) M10×1.5 (NDP-P20BTT) M14×1.5 (NDP-P25BTT)
- Grease Urea grease grade (NLGI) No. 2

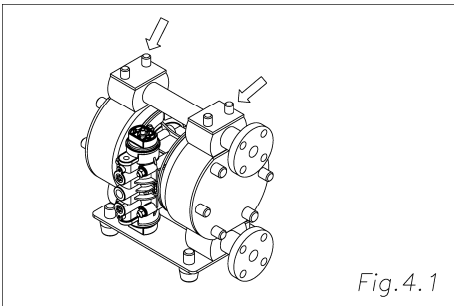
3. Ordering replacement parts

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. Ball, valve seats

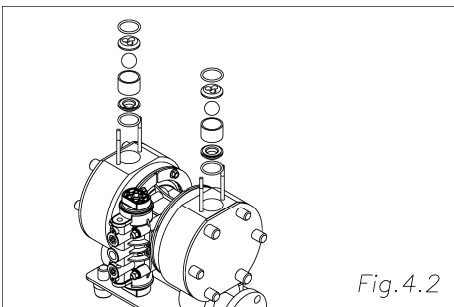
4.1 Removal



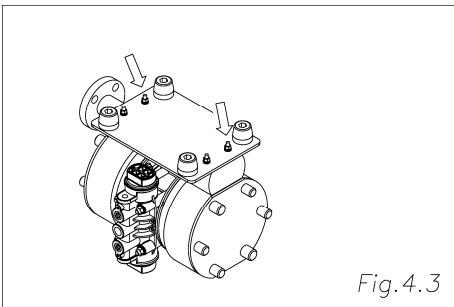
- Remove the 8 caps (4 on the top and 4 on the bottom) from both sides of the vertical tie rods.
- Unscrew the 4 retainer nuts from the upper side of the vertical tie rods. Then, remove the reinforcement plates and out-manifolds. [Fig.4.1]

<NOTE>

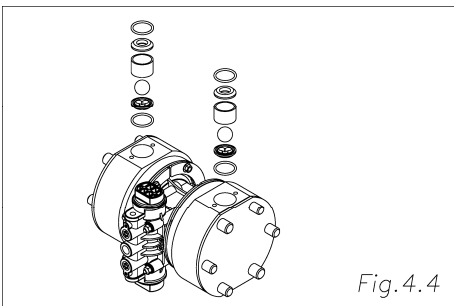
When the retainer nuts both sides of the tie rod remove, the in-manifold removes.



- Remove the O rings, valve stoppers, valve guides, balls, and valve seats. [Fig.4.2]

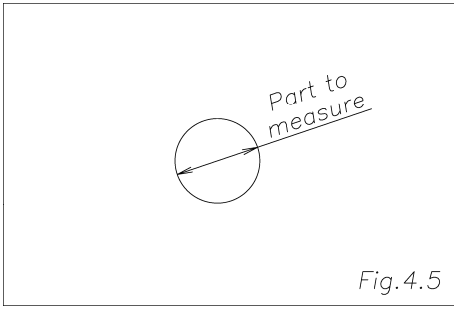


- Turn over the body assembly [Fig.4.3]
- Pull out the four vertical tie rods and remove the base and in-manifold. [Fig.4.3]



- Remove the O rings, valve seats, balls, valve guides, and valve stoppers. [Fig.4.4]

4.2 Inspection

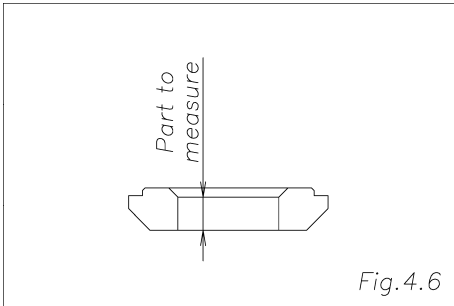


- Ball [Fig.4.5]

Measure the diameter and if it is not within the permissible range, replace the ball.

Permissible range of ball diameter

NDP-P20BTT	S ϕ 24.3~S ϕ 27.8mm
NDP-P25BTT	S ϕ 31.5~S ϕ 36.1mm



- Valve seat [Fig.4.6]

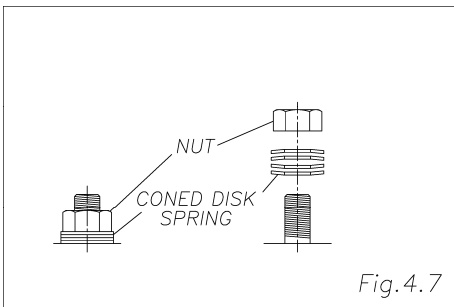
Measure the dimension shown at left and if it is not within the permissible range, replace the valve seat.

Permissible range of valve seat dimension

NDP-P20BTT	2.0~7.0mm
NDP-P25BTT	3.2~7.5mm

4.3 Installation

For installation, see [Exploded view] on page 7 and install in the reverse order of disassembly.

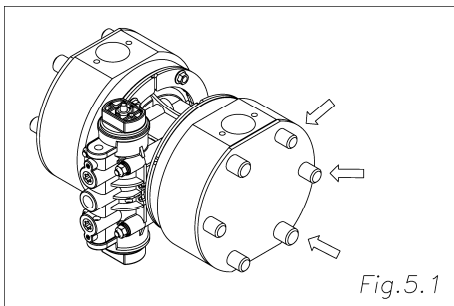


Tightening torque for vertical tie rod

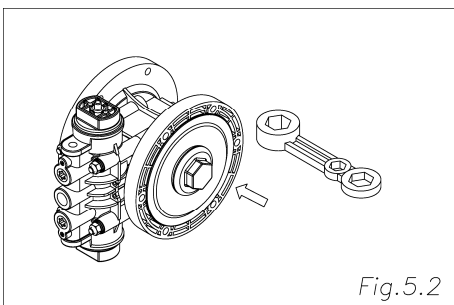
NDP-P20BTT	5N·m
NDP-P25BTT	7N·m

5. Diaphragm, center rod

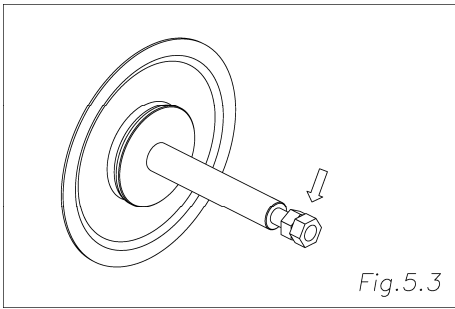
5.1 Removal



- Remove the balls, valve seats, valve guides, valve stoppers, etc. (see [4.1 removal] on page 3).
- Remove the caps, horizontal tie rods, retainer nuts, reinforcement plates, and out chambers. [Fig. 5.1]



- Remove the center disks from one side using the PP wrenches. (special tool: Part No. 771868) [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.



- Fix a double nut to one end of the center rod and take the diaphragm and center disk off the opposite end. [Fig.5.3]

5.2 Inspection

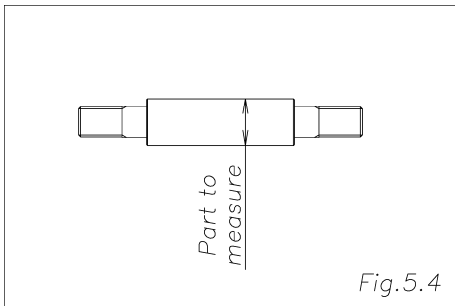
- Diaphragm

If the diaphragm is worn out or damaged, replace it with a new one.

Guideline of diaphragm life

PTFE	3 million cycles
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(When used with clean water at room temperature)



- Center rod [Fig.5.4]

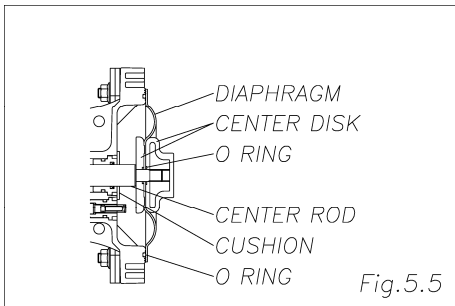
Measure the diameter and if it is outside the usable range, replace the center rod.

Usable range of center rod

$\phi 17.9 \sim \phi 18.0\text{mm}$

5.3 Installation

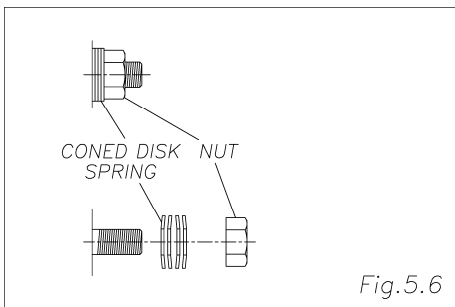
For installation, see [Exploded view] on page 7 and install in the reverse order of disassembly.



- Attach O ring into the grooves on both sides of the body. [Fig.5.5]
- Apply grease to the center rod and insert it into the main body.
- Put the O ring to both sides of the diaphragm.
- Keep the convex side to the outside.
- Tighten the center disk using the PP wrenches. (special tool: #771868)
- 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 horizontal tie rod

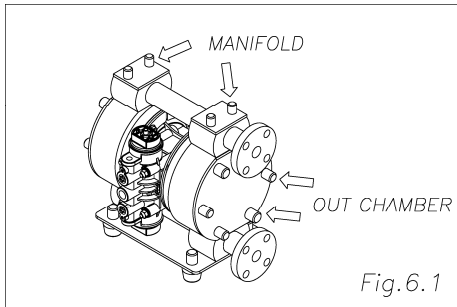
NDP-P20BTT	7N·m
NDP-P25BTT	10N·m



<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 tie rods that balance should be equal from both side on diagonal line with even torque.

6. Retightening



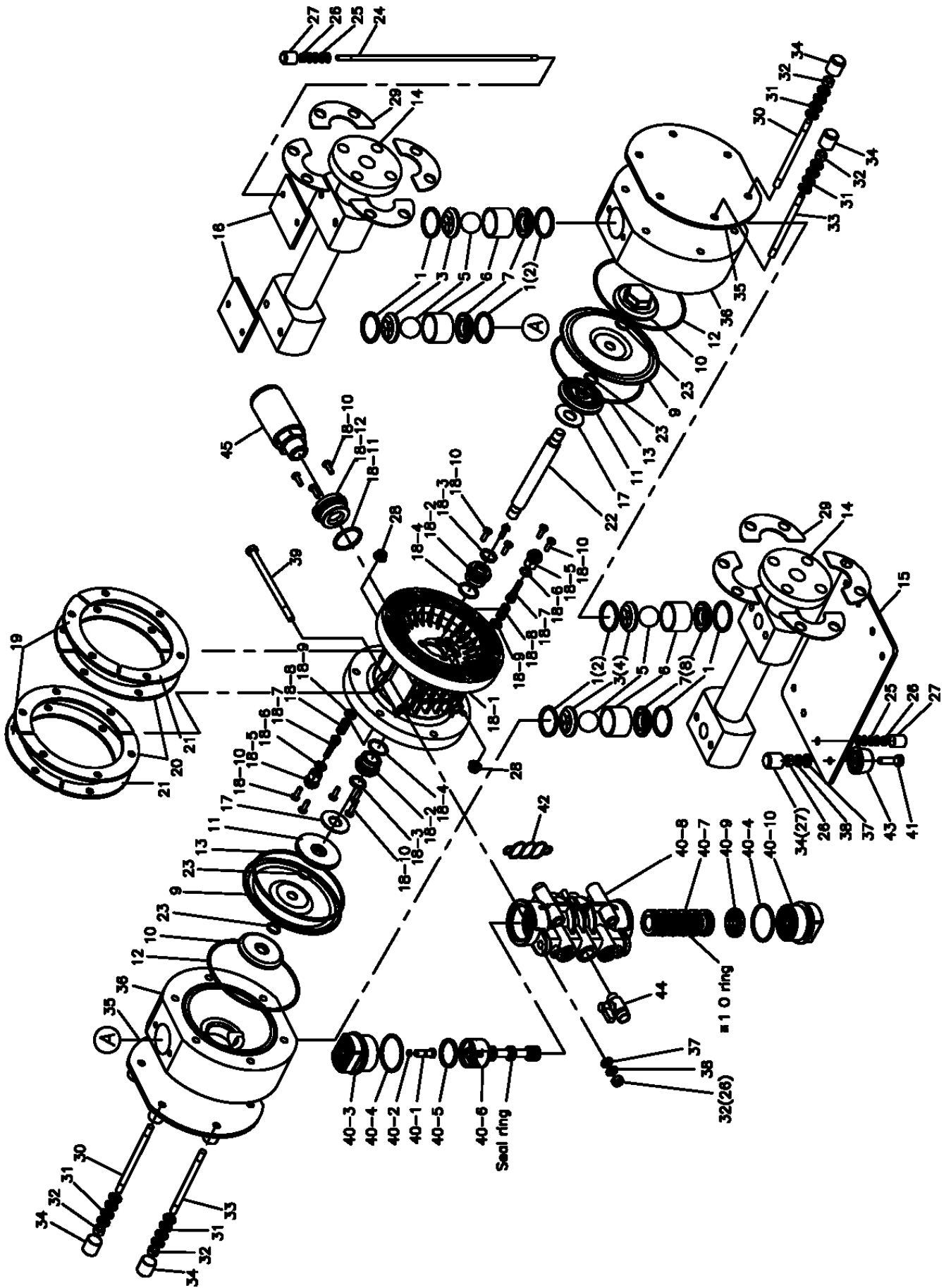
- The torque should be applied on the occasion of
 - ① Right before the pump to use.
 - ② There are any leaks of material on daily inspecting a pump.

	Retain tie rods for the out chamber	Retain tie rods for the manifold
NDP-P20BTT	7N·m	5N·m
NDP-P25BTT	10N·m	7N·m

<NOTE>

- Tighten the tie rods 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.6.1]

7. Exploded view and parts list



Number in parenthesis indicates the quantity for NDP-P25BTT

■ PARTS LIST

NDP-P20BTT(NO.854323)

NO.	PART NO.	DESCRIPTION	Q'TY
1	643033	O RING P34(PTFE)	8
3	772769	VALVE STOPPER	4
5	770736	BALL	4
6	770994	VALVE GUIDE	4
7	772768	VALVE SEAT	4
9	770805	DIAPHRAGM	2
10	780180	CENTER DISK	2
11	707765	CENTER DISK	2
12	643151	O RING G130(PTFE)	2
13	640151	O RING G130(NBR)	2
14	773039	MANIFOLD	2
15	716181	BASE	1
16	716180	REINFORCEMENT PLATE	2
17	771054	CUSHION	2
18	804603	BODY ASSEMBLY	1
18-1	772928	BODY	1
18-2	772931	THROAT BEARING	2
18-3	685414	PACKING MYA-18(NBR)	2
18-4	685276	O RING JASO-2023(NBR)	2
18-5	772932	VALVE SEAT	2
18-6	640009	O RING P11(NBR)	2
18-7	802360	PILOT VALVE ASSEMBLY	2
18-8	708666	SPRING	2
18-9	772948	SPRING SEAT	2
18-10	686030	TAPPING SCREW	13
18-11	640132	O RING G35(NBR)	1
18-12	772933	BUSHING	1
19	716177	REINFORCEMENT PLATE A	2
20	716179	REINFORCEMENT PLATE C	4
21	716178	REINFORCEMENT PLATE B	2
22	716182	CENTER ROD	1
23	643007	O RING P10(PTFE)	4
24	715869	TIE ROD	4
25	682300	CONED DISK SPRING M6(SUS304)	32
26	683634	NUT M6X1(SUS304)	8
27	771114	CAP	8
28	686032	NUT WITH FLANGE M8X1.25(SUS304)	8
29	711190	REINFORCEMENT PLATE	8
30	716175	TIE ROD	8
31	681880	CONED DISK SPRING M8(SUS304)	48
32	683635	NUT M8X1.25(SUS304)	20
33	716176	TIE ROD	4
34	771783	CAP	16
35	711178	REINFORCEMENT PLATE	2
36	773135	OUT CHAMBER	2
37	631329	PLAIN WASHER M8(SUS304)	8
38	681300	SPRING LOCK WASHER M8(SUS304)	8
39	686031	BOLT M8X1.25X130(SUS304)	4
40	804607	VALVE BODY ASSEMBLY	1
40-1	772991	RESET BUTTON	1
40-2	640002	O RING P5(NBR)	1
40-3	772946	CAP A	1
40-4	640043	O RING P45(NBR)	2
40-5	771241	PACKING	1
40-6	802400	C SPOOL VALVE ASSEMBLY	1
40-7	804609	SLEEVE ASSEMBLY	1
40-8	832902	VALVE BODY ASSEMBLY	1
40-9	771914	CUSHION	1
40-10	772947	CAP B	1
41	621151	BOLT M8X1.25X30(SUS304)	4
42	772848	GASKET	1
43	771402	CUSHION	4
44	686018	BALL VALVE	1
45	804697	SILENCER ASSEMBLY	1

■ PARTS LIST

NDP-P25BTT(NO.854618)

NO.	PART NO.	DESCRIPTION	Q'TY
1	643044	O RING P46(PTFE)	4
2	643041	O RING P42(PTFE)	4
3	773132	VALVE STOPPER	2
4	773133	VALVE STOPPER	2
5	770691	BALL	4
6	773134	VALVE GUIDE	4
7	773130	VALVE SEAT	2
8	773131	VALVE SEAT	2
9	771110	DIAPHRAGM	2
10	780181	CENTER DISK	2
11	709459	CENTER DISK	2
12	643154	O RING G145(PTFE)	2
13	640154	O RING G145(NBR)	2
14	773128	MANIFOLD	2
15	716462	BASE	1
16	716464	REINFORCEMENT PLATE	2
17	771054	CUSHION	2
18	804604	BODY ASSEMBLY	1
18-1	772929	BODY	1
18-2	772931	THROAT BEARING	2
18-3	685414	PACKING MYA-18(NBR)	2
18-4	685276	O RING JASO-2023(NBR)	2
18-5	772932	VALVE SEAT	2
18-6	640009	O RING P11(NBR)	2
18-7	802360	PILOT VALVE ASSEMBLY	2
18-8	708666	SPRING	2
18-9	772948	SPRING SEAT	2
18-10	686030	TAPPING SCREW	13
18-11	640132	O RING G35(NBR)	1
18-12	772933	BUSHING	1
19	716458	REINFORCEMENT PLATE A	2
20	716460	REINFORCEMENT PLATE C	4
21	716459	REINFORCEMENT PLATE B	2
22	716463	CENTER ROD	1
23	643013	O RING P14(PTFE)	4
24	716455	TIE ROD	4
25	681880	CONED DISK SPRING M8(SUS304)	32
26	683635	NUT M8X1.25(SUS304)	16
27	771783	CAP	12
28	686033	NUT WITH FLANGE M10X1.5(SUS304)	8
29	708964	REINFORCEMENT PLATE	8
30	716456	TIE ROD	8
31	681303	CONED DISK SPRING M10(SUS304)	48
32	683636	NUT M10X1.5(SUS304)	12
33	716457	TIE ROD	4
34	771644	CAP	12
35	716461	REINFORCEMENT PLATE	2
36	773129	OUT CHAMBER	2
37	631329	PLAIN WASHER M8(SUS304)	8
38	681300	SPRING LOCK WASHER M8(SUS304)	8
39	686031	BOLT M8X1.25X130(SUS304)	4
40	804607	VALVE BODY ASSEMBLY	1
40-1	772991	RESET BUTTON	1
40-2	640002	O RING P5(NBR)	1
40-3	772946	CAP A	1
40-4	640043	O RING P45(NBR)	2
40-5	771241	PACKING	1
40-6	802400	C SPOOL VALVE ASSEMBLY	1
40-7	804609	SLEEVE ASSEMBLY	1
40-8	832902	VALVE BODY ASSEMBLY	1
40-9	771914	CUSHION	1
40-10	772947	CAP B	1
41	621151	BOLT M8X1.25X30(SUS304)	4
42	772848	GASKET	1
43	771402	CUSHION	4
44	682772	BALL VALVE	1
45	804697	SILENCER ASSEMBLY	1

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