Doc. No.	NDP137U-21

OPERATION MANUAL

YAMADA AIR-OPERATED DIAPHRAGM PUMPS

NDP-20 series
NDP-25 series
NDP-32 series
NDP-40 series
NDP-50 series
NDP-80 series

·Introduction

Thank you for purchasing a Yamada Diaphragm Pump. This product is a positive-displacement pump that transfers fluids by movement of diaphragms driven by compressed air through a unique switching mechanism. The casing that comes in contact with the fluid is made of aluminum, stainless steel, forged iron, polypropylene, polyvinylidene fluoride depending on the model you have selected according to the type of fluid to be pumped.
The diaphragms are made of a thermoplastic elastomer material suitable for the Application.

·For safe operation

This document contains information vital for safe and efficient operation of this product. Before using the pump, be sure to read this document carefully, particularly the "warnings and cautions," and be fully familiar with the operating procedures. Be sure to keep this document handy for future reference.

·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.

·Operating caution

Before using this product

⚠ WARNING


- When using compressed gas (hereinafter called "compressed air") to drive this pump, be sure it is one of the following:
  * Compressed air supplied from an air compressor
  * Nitrogen (N_2) gas

  Use of compressed air other than the above may cause air pollution, damage to the pump, or even an explosion.


- Pressure Ratings are dependent on pump material and liquid temperature variations. Please see “Temperature Pressure Curve” in the [10.1 Main Specification] and check for the allowable working pressure at the specific temperature of the liquid being pumped. Air pressure and discharge pressure must not exceed the allowable working pressure. If air pressure and discharge pressure exceed the allowable working pressure, it may cause liquid leaks, damaged pump casings or diaphragms and could cause a fatal accident.


- When moving this product, make sure that the internal pressure is released. If the pump is moved while under pressure, any shock imparted by drop page, etc. may damage the pump or even cause an explosion.


- Hazardous fluids (with strong acid or alkali, flammable or toxic) or gas bubbles generated by such fluids may cause serious injury or even death if accidentally inhaled or consumed or if they come into contact with the eyes or adhere to skin. Therefore, the following precautions are strongly advised.
  *Be fully familiar with the properties of the fluid to be pumped and work in strict accordance with the operating instructions provided by the suppliers of such fluids (such as wearing goggles, gloves, mask or work clothes).
  *When storing a hazardous fluid, strictly comply with the regulatory procedures (such as using proper containers, storage conditions, etc.).
  *Always install the piping and exhaust port of this pump away from human and animal traffic.


- When a diaphragm is damaged, fluid will gush out together with air through the exhaust port. Also when pump has positive suction head, liquid will be forced out from exhaust port due to positive inlet pressure. Make sure to provide protective measures in consideration of possible leakage of fluid (see NOTE: Arranging outside exhaust on P.16). For example using a hose and pit etc., be sure you are using a model with appropriate corrosion resistance for the fluid to be pumped.

⚠ WARNING

・When installing this product, be sure to connect a ground wire from the specified position of this product .
When this product is installed and operated without the ground wire properly connected, friction between parts, as well as abrasion caused by the flow of some fluids inside the casing, may generate static electricity. Also, depending on the type of fluid being pumped and the installation environment (such as gases in the air and type of surrounding fixtures), static electricity could become a cause of fire or electric shock.

・Improper grounding, poor ventilation, or unshielded fire or spark can create a danger of fire or explosion. Therefore, the following precautions are strongly advised.
*All peripheral equipment and piping connected to this product should be properly grounded.
*To pump flammable liquids, use a model with an aluminum or stainless-steel casing.
*Whenever you notice any spark while operating this product, immediately stop it operation, and do NOT start using it again unless you are sure of the cause and corrective actions have been taken.
*Depending upon the type of fluid being pumped, bubbles of flammable gas may be generated. Make sure that ventilation is satisfactory.
*This product itself, its piping and exhaust ports should be kept away from unshielded fire, spark and other causes of ignition. If a diaphragm is damaged, fluid will gush out together with air from the exhaust port.
*Do NOT leave gasoline or solvent etc. that contains waste at the work site.
*Machinery and other equipment near the place of installation of this product should be properly insulated to prevent conduction with each other.
*Do NOT operate heating devices that create flames or have heating filaments anywhere near the pump or its piping.
*If there are flammable gases in the air while the pump is operating, do NOT switch electric appliance on and off.
*Do NOT operate a gasoline engine at the work site.
*Restrict smoking at the work site.
*When filling cans, drums, etc. with combustible or flammable liquids, both containers should be bonded and ground to dissipate possible accumulations of static electricity, this will minimize sparks caused by static electricity (refer NFPA 77).
*Removal of outer garments in work areas where there may by flammable or explosive liquids, which ignite with low electrical energy, can be fatal and/or cause property damage (refer NFPA 56A, 77).
Follow all electrical and safety codes, including the Occupational Safety and Health Act (OSHA), most recent National Electrical Code (NEC), National Fire Protection Association, Inc. (NFPA) Code 30 (Flammable and Combustible Code), NFPA 77 (Static Electricity), NFPA 78 (Lightning Protection Code), NFPA 80 (Standard Method of Fire Test of Building Construction), NFPA 704 (Identification of the Fire Hazards of Materials), other NFPA codes, local codes and ordinance, as needed in a particular application.

・After you shut down the pump and disconnect the piping, some fluid may remain inside the pump. Also, if the pump is left unused for a prolonged period, some fluid may remain inside the pump and connected piping. Therefore, be sure to purge the system of fluid and clean the pump after prolonged disuse.
If the product is left unused for a prolonged period with fluid remaining in the connected piping as well as the pump itself, the fluid may expand, depending on the ambient temperature (because of freezing or heat), which may cause damage to the pump and/or piping, and possible leakage of fluid.

・Always use genuine Yamada parts when replacing component parts of this product.
Do NOT attempt to modify the components parts or replace them with other than genuine Yamada parts.

⚠WARNING

·When pumping a hazardous fluid (hot, flammable, strong acid, etc.) with this product, provide protective measures (install a pit, a protection box, sensors, etc.) in consideration of possible leakage of fluid, and post warning signs at necessary places. Make the warning symbols on P.54, and attach them to the casing and piping, etc. Leakage of fluid may cause fire, air pollution or a serious accident. When pumping a hot fluid, the casing and piping will become hot, which may burn the skin when touched.

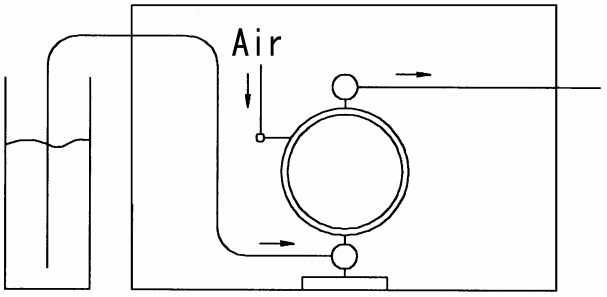


Fig.0.1

·Before using this product, be sure you are familiar with the precautions regarding the fluid to be pumped, and verify the corrosion resistance of the parts that will come into contact with the fluid. NEVER use the product with any fluid against which it does not have sufficient corrosion resistance or with a fluid that poses a risk of explosion. If you are unsure of the corrosion resistance, contact your dealer or our regional office.
Please make sure that pump material is compatible with liquid being pumped, or damage may result to the pump or product being pumped.

·When working in the vicinity of pumping of fluid with this product, be sure to wear protective gear (goggles, mask, etc.).

·It is the responsibility of the user to operate the pump in conformance with O.S.H.A. rules for dispensing liquid.

·If you have any questions on the operation of this product (method of connection or installation), contact your dealer or our regional office.

⚠CAUTION

·When operating this product, it may generate loud operating noise, depending upon the condition of use (fluid pumped, supply air pressure and discharge pressure).
If regulatory rules apply, provide appropriate acoustic measures where necessary. (For the noise value of this product, see 10.1 Main specifications after P.25.)

·To drive this product, use supply air with minimum moisture content.

·If a diaphragm of this product is damaged, supply air may mix with the fluid or the fluid may flow into the main body (air-switching portion). If air supply is inadequate or contaminated, do NOT operate the pump.

·While operating this product, do NOT cover the intake port by hand.

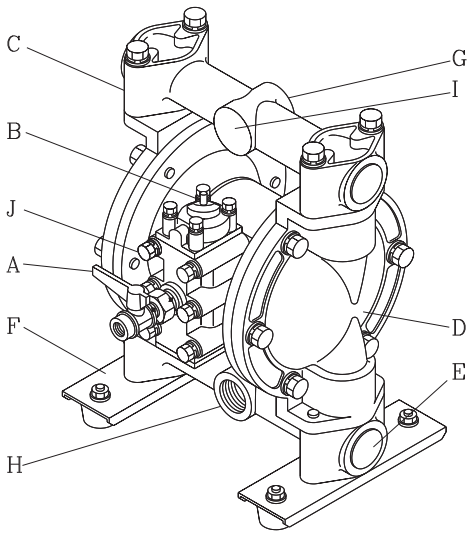
·If the pump remains unused for a long period of time, or you have misgivings about running the pump, please consult with the dealer where you purchased it or our Sales office.

Table of contents

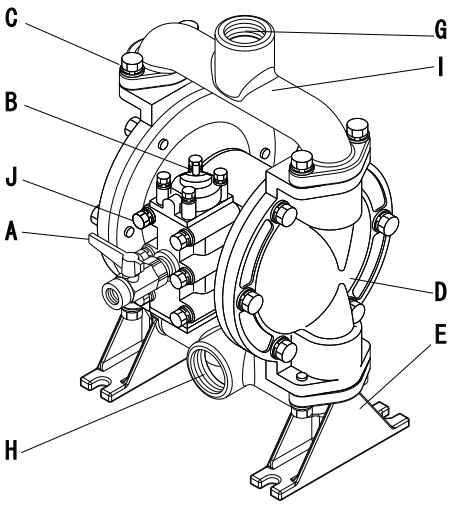
1.Names of parts and materials

1.1 NDP-20, 25, 32 series

A:Air Valve
B:Reset Button
C:Out Manifold
D:Out Chamber
E:In Manifold
F:Pump Base
G:Discharge Port
H:Intake Port
I:Lift Point
J:Ground Connection Point



NDP-20BA_, NDP-20BS_
NDP-25BA_, NDP-25BS_
NDP-25BF_



NDP-32BAN

·Aluminum type

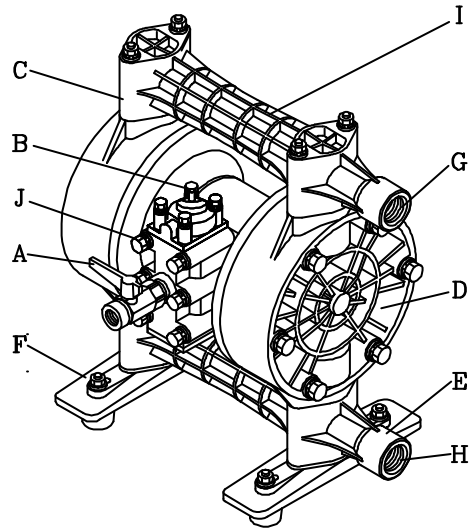
Type	BAC	BAN	BAE	BAV	BAT	BAH	BAS
Switching Portion	ADC12						
Fluid contact Portion	ADC12						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	SMS1025						
Center Disk	SS316				A5056	SS316	

·Stainless-steel type ([ ]: Forged iron type)

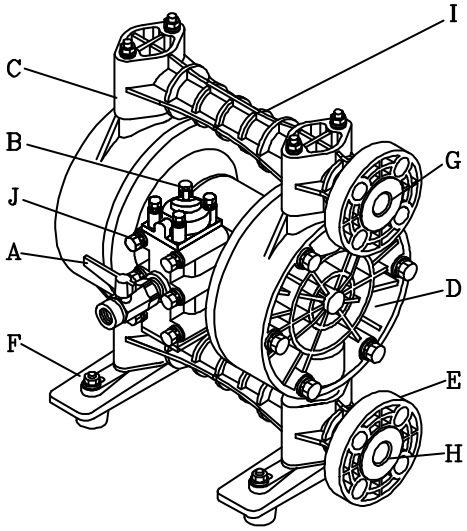
Type	BSC [BFC]	BSN [BFN]	BSE [BFE]	BSV [BFV]	BST [BFT]	BSH [BFH]	BSS [BFS]
Switching Portion	ADC12						
Fluid contact Portion	SCS14[S45C]						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	SS316[SMS1025]						
Center Disk	SS316						

*Forged iron casing is set up in NDP-25 series.

A:Air Valve
B:Reset Button
C:Out Manifold
D:Out Chamber
E:In Manifold
F:Pump Base
G:Discharge Port
H:Intake Port
I:Lift Point
J:Ground Connection Point



NDP-20BP_ (THREAD TYPE)
NDP-25BP_ (THREAD TYPE)
NDP-25BV_ (THREAD TYPE)



NDP-20BP_ (FLANGE TYPE)
NDP-25BP_ (FLANGE TYPE)
NDP-25BV_ (FLANGE TYPE)

·Polypropylene type ([ ]: Polyvinylidene fluoride type)

Type	BPC	BPN	BPE [BVE]	BPV [BVV]	BPT [BVT]	BPH [BVH]	BPS [BVS]
Switching Portion	ADC12						
Fluid contact Portion	PPG[PVDF]						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR [PTFE]	EPDM
Valve Seat	PPG[PVDF]						
Center Disk	PPG(SCS13)[PVDF(SCS13)] *1						

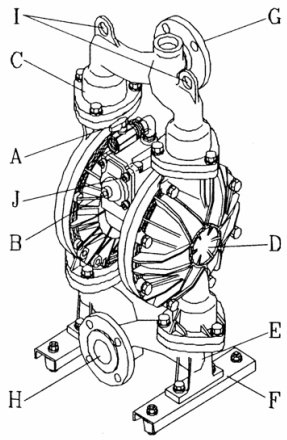
*1 SUS13 is an insert material.

■List of accessories

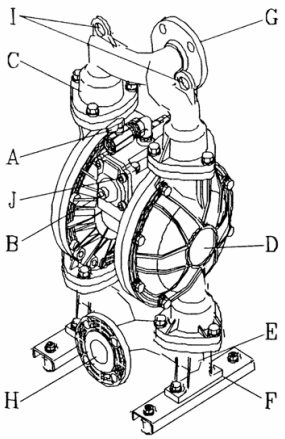
·Operation Manual····· 1
·Maintenance Manual ····· 1
·Air Valve ····· 1
·Silencer····· 1
·Accessory Tool ····· 2 (only BP _ and BV_)
·Cushion····· 4
·Bolt, Nut····· 4

1.2 NDP-40 series

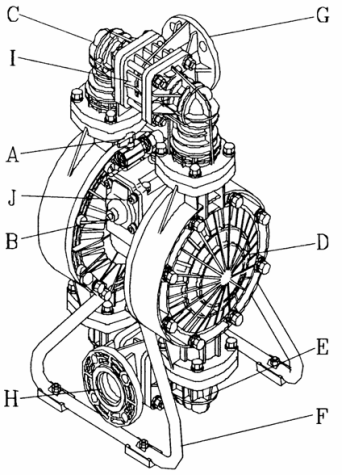
A:Air Valve
B:Reset Button
C:Out Manifold
D:Out Chamber
E:In Manifold
F:Pump Base(Stand)
G:Discharge Port
H:Intake Port
I:Lift Point
J:Ground Connection Point



NDP-40BA_



NDP-40BS_
NDP-40BF_



NDP-40BP_
NDP-40BV_

·Aluminum type

Type	BAC	BAN	BAE	BAV	BAT	BAH	BAS
Switching Portion	ADC12						
Fluid contact Portion	ADC12,AC4C-T6						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	A5056	TPEE	TPO
Center Disk	A5056						

·Stainless-steel type ([ ]: Forged iron type)

Type	BSC [BFC]	BSN [BFN]	BSE [BFE]	BSV [BFV]	BST [BFT]	BSH [BFH]	BSS [BFS]
Switching Portion	ADC12						
Fluid contact Portion	SCS14						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	SS316	TPEE	TPO
Center Disk	SS316 [SS400]						

·Polypropylene type ([ ]: Polyvinylidene fluoride type)

Type	BPC	BPN	BPE	BPV	BPT [BVT]	BPH	BPS [BVS]
Switching Portion	ADC12						
Fluid contact Portion	PPG						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM [PTFE]
Valve Seat	PP						
Center Disk	PPG(SCS13) *1						

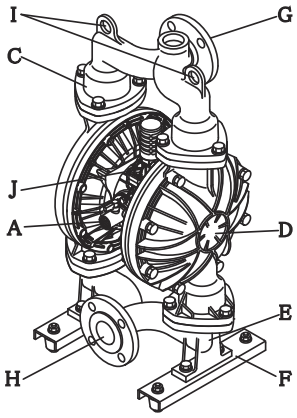
*1 SUS13 is an insert material.

■List of accessories

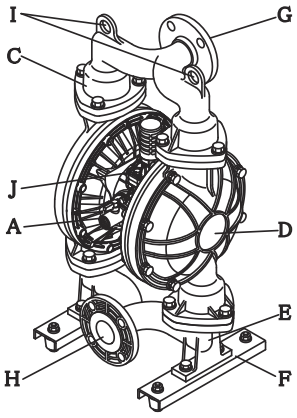
·Operation Manual····· 1
·Maintenance Manual ····· 1
·Cushion ····· 4 (excluding BP_ and BV_ type)
·Bolt, Nut····· 4 (for securing the pump with the cushions, excluding BP_ and BV_ type)

DP-40-HD series

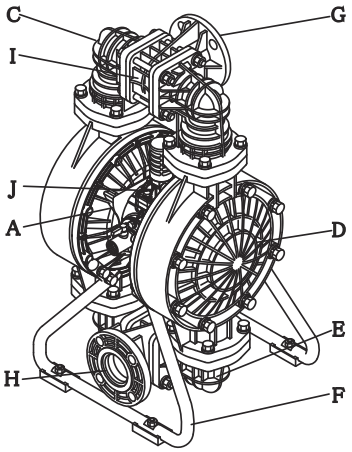
A:Air Valve
C:Out Manifold
D:Out Chamber
E:In Manifold
F:Pump Base(Stand)
G:Discharge Port
H:Intake Port
I:Lift Point
J:Ground Connection Point



DP-40BA_-HD



DP-40BS_-HD
DP-40BF_-HD



DP-40BP_-HD

·Aluminum type

Type	BAC-HD	BAN-HD	BAE-HD	BAV-HD	BAT-HD	BAH-HD	BAS-HD
Switching Portion	ADC12						
Fluid contact Portion	ADC12,AC4C-T6						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	A5056	TPEE	TPO
Center Disk	A5056						

·Stainless-steel type ([ ]: Forged iron type)

Type	BSC-HD [BFC-HD]	BSN-HD [BFN-HD]	BSE-HD [BFE-HD]	BSV-HD [BFV-HD]	BST-HD [BFT-HD]	BSH-HD [BFH-HD]	BSS-HD [BFS-HD]
Switching Portion	ADC12						
Fluid contact Portion	SCS14						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	SS316	TPEE	TPO
Center Disk	SS316 [SS400]						

·Polypropylene type ([ ]: Polyvinylidene fluoride type)

Type	BPC-HD	BPN-HD	BPE-HD	BPV-HD	BPT-HD	BPH-HD	BPS-HD
Switching Portion	ADC12						
Fluid contact Portion	PPG						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	PP						
Center Disk	PPG(SCS13) *1						

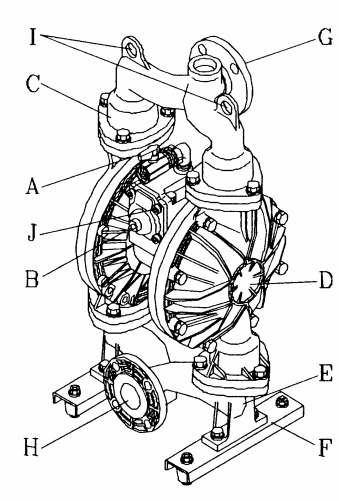
*1 SUS13 is an insert material.

■List of accessories

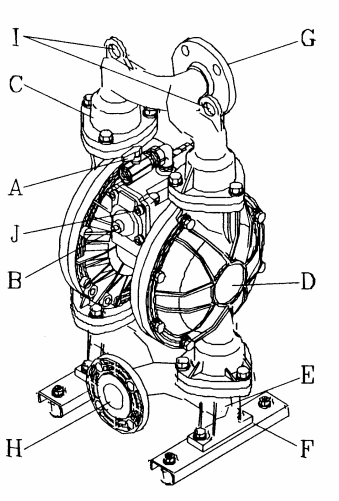
·Operation Manual····· 1
·Maintenance Manual ····· 1
·Cushion····· 4 (excluding BP_ type)
·Bolt, Nut····· 4 (for securing the pump with the cushions, excluding BP_ type)
·Air Valve····· 1
·Silencer····· 2
·Bushing····· 1

1.3 NDP-50 series

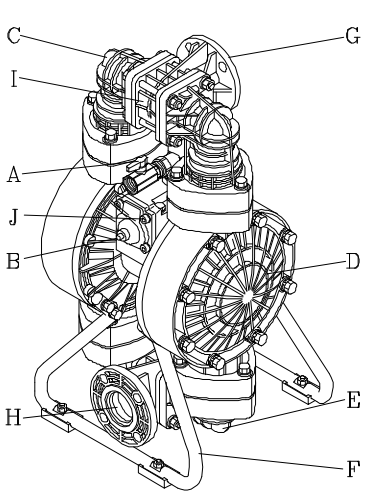
A:Air Valve
B:Reset Button
C:Out Manifold
D:Out Chamber
E:In Manifold
F:Pump Base(Stand)
G:Discharge Port
H:Intake Port
I:Lift Point
J:Ground Connection Point



NDP-50BA _



NDP-50BS_
NDP-50BF_



NDP-50BP_
NDP-50BV_

·Aluminum type

Type	BAC	BAN	BAE	BAV	BAT	BAH	BAS
Switching Portion	ADC12						
Fluid contact Portion	ADC12,AC4C-T6						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	A5056	TPEE	TPO
Center Disk	A5056						

·Stainless-steel type ([ ]: Forged iron type)

Type	BSC [BFC]	BSN [BFN]	BSE [BFE]	BSV [BFV]	BST [BFT]	BSH [BFH]	BSS [BFS]
Switching Portion	ADC12						
Fluid contact Portion	SCS14[FC250]						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	SS316	TPEE	TPO
Center Disk	SS316 [SS400]						

·Polypropylene type ([ ]: Polyvinylidene fluoride type)

Type	BPC	BPN	BPE [BVE]	BPV [BVV]	BPT [BVT]	BPH [BVH]	BPS [BVS]
Switching Portion	ADC12						
Fluid contact Portion	PPG[PVDF]						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR [PTFE]	EPDM [PTFE]
Valve Seat	PP[PTFE]						
Center Disk	PPG(SCS13)[PVDF(SCS13)] *1						

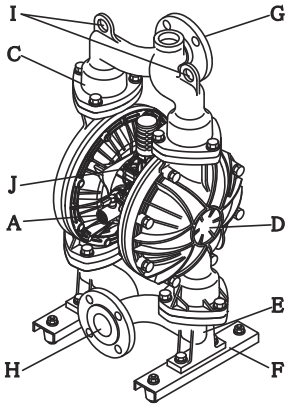
*1 SUS13 is an insert material.

■List of accessories

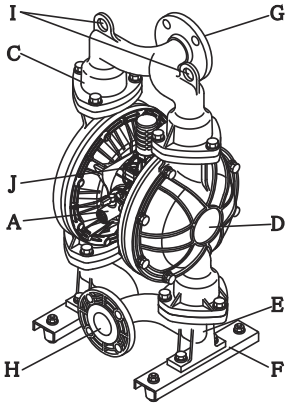
·Operation Manual····· 1
·Maintenance Manual ····· 1
·Cushion ····· 4 (excluding BP_ and BV_ type)
·Bolt, Nut····· 4 (for securing the pump with the cushions, excluding BP_ and BV_ type)

DP-50-HD series

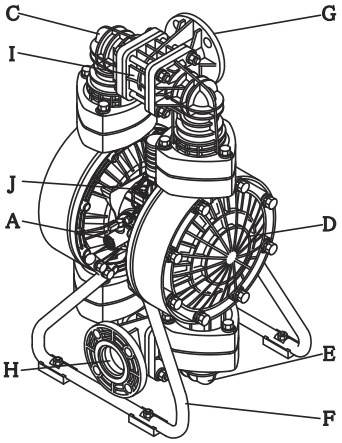
A:Air Valve
C:Out Manifold
D:Out Chamber
E:In Manifold
F:Pump Base(Stand)
G:Discharge Port
H:Intake Port
I:Lift Point
J:Ground Connection Point



DP-50BA _-HD



DP-50BS_-HD
DP-50BF_-HD



DP-50BP_-HD
DP-50BV_-HD

·Aluminum type

Type	BAC-HD	BAN-HD	BAE-HD	BAV-HD	BAT-HD	BAH-HD	BAS-HD
Switching Portion	ADC12						
Fluid contact Portion	ADC12,AC4C-T6						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	A5056	TPEE	TPO
Center Disk	A5056						

·Stainless-steel type ([ ]: Forged iron type)

Type	BSC-HD [BFC-HD]	BSN-HD [BFN-HD]	BSE-HD [BFE-HD]	BSV-HD [BFV-HD]	BST-HD [BFT-HD]	BSH-HD [BFH-HD]	BSS-HD [BFS-HD]
Switching Portion	ADC12						
Fluid contact Portion	SCS14[FC250]						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	SS316	TPEE	TPO
Center Disk	SS316 [SS400]						

·Polypropylene type ([ ]: Polyvinylidene fluoride type)

Type	BPC-HD	BPN-HD	BPE-HD [BE-HD]	BPV-HD [BVV-HD]	BPT-HD [BVT-HD]	BPH-HD [BVH-HD]	BPS-HD [BVS-HD]
Switching Portion	ADC12						
Fluid contact Portion	PPG[PVDF]						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR [PTFE]	EPDM [PTFE]
Valve Seat	PP[PTFE]						
Center Disk	PPG(SCS13)[PVDF(SCS13)] *1						

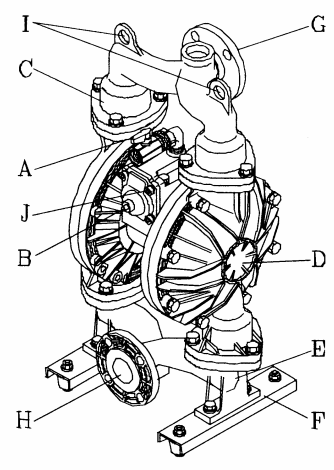
*1 SUS13 is an insert material.

■List of accessories

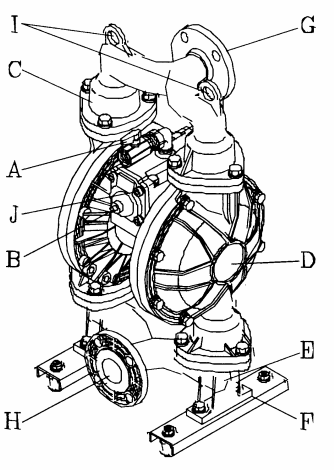
·Operation Manual····· 1
·Maintenance Manual ····· 1
·Air Valve····· 1
·Silencer····· 2
·Cushion····· 4 (excluding BP_ and BV_ type)
·Bolt, Nut····· 4 (for securing the pump with the cushions, excluding BP_ and BV_ type)

1.4 NDP-80 series

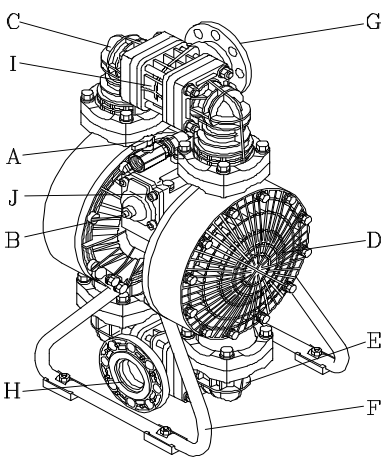
A:Air Valve
B:Reset Button
C:Out Manifold
D:Out Chamber
E:In Manifold
F:Pump Base(Stand)
G:Discharge Port
H:Intake Port
I:Lift Point
J:Ground Connection Point



NDP-80BA_



NDP-80BS_
NDP-80BF_



NDP-80BP_

·Aluminum type

Type	BAC	BAN	BAE	BAV	BAT	BAH	BAS
Switching Portion	ADC12						
Fluid contact Portion	ADC12,AC4C-T6						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	A5056	TPEE	TPO
Center Disk	A5056						

·Stainless-steel type ([ ]: Forged iron type)

Type	BSC [BFC]	BSN [BFN]	BSE [BFE]	BSV [BFV]	BST [BFT]	BSH [BFH]	BSS [BFS]
Switching Portion	ADC12						
Fluid contact Portion	SCS14						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	SS316	TPEE	TPO
Center Disk	SS316 [SS400]						

·Polypropylene type

Type	BPC	BPN	BPE	BPV	BPT	BPH	BPS
Switching Portion	ADC12						
Fluid contact Portion	PPG						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	PP						
Center Disk	PPG(SCS13) *1						

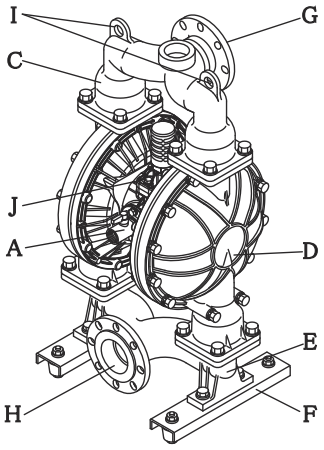
*1 SUS13 is an insert material.

■List of accessories

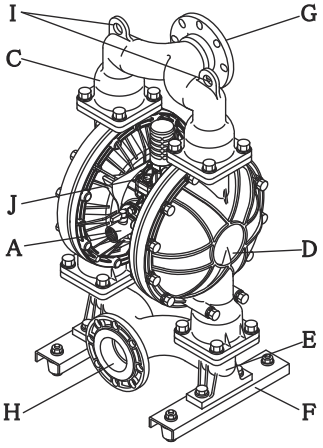
·Operation Manual····· 1
·Maintenance Manual ····· 1
·Cushion ····· 1 (excluding BP_ type)
·Bolt, Nut····· 4 (for securing the pump with the cushions, excluding BP_ type)
·Protector ····· 8 (only BP_ type)

DP-80-HD series

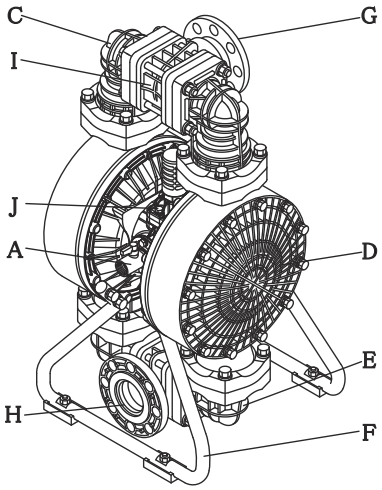
A:Air Valve
C:Out Manifold
D:Out Chamber
E:In Manifold
F:Pump Base(Stand)
G:Discharge Port
H:Intake Port
I:Lift Point
J:Ground Connection Point



DP-80BA_-HD



DP-80BS_-HD
DP-80BF_-HD



NDP-80BP_-HD

·Aluminum type

Type	BAC-HD	BAN-HD	BAE-HD	BAV-HD	BAT-HD	BAH-HD	BAS-HD
Switching Portion	ADC12						
Fluid contact Portion	ADC12,AC4C-T6						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	A5056	TPEE	TPO
Center Disk	A5056						

·Stainless-steel type ([ ]: Forged iron type)

Type	BSC-HD [BFC-HD]	BSN-HD [BFN-HD]	BSE-HD [BFE-HD]	BSV-HD [BFV-HD]	BST-HD [BFT-HD]	BSH-HD [BFH-HD]	BSS-HD [BFS-HD]
Switching Portion	ADC12						
Fluid contact Portion	SCS14						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	CR	NBR	EPDM	FKM	SS316	TPEE	TPO
Center Disk	SS316 [SS400]						

·Polypropylene type

Type	BPC-HD	BPN-HD	BPE-HD	BPV-HD	BPT-HD	BPH-HD	BPS-HD
Switching Portion	ADC12						
Fluid contact Portion	PPG						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Valve Seat	PP						
Center Disk	PPG(SCS13) *1						

*1 SUS13 is an insert material.

■List of accessories

·Operation Manual····· 1
·Maintenance Manual ····· 1
·Air Valve····· 1
·Silencer····· 2
·Cushion····· 4 (excluding BP_ type)
·Bolt, Nut····· 4 (for securing the pump with the cushions, excluding BP_ type)
·Protector ····· 8 (only BP_ type)

2. Assembly

2.1 Installation of accessories

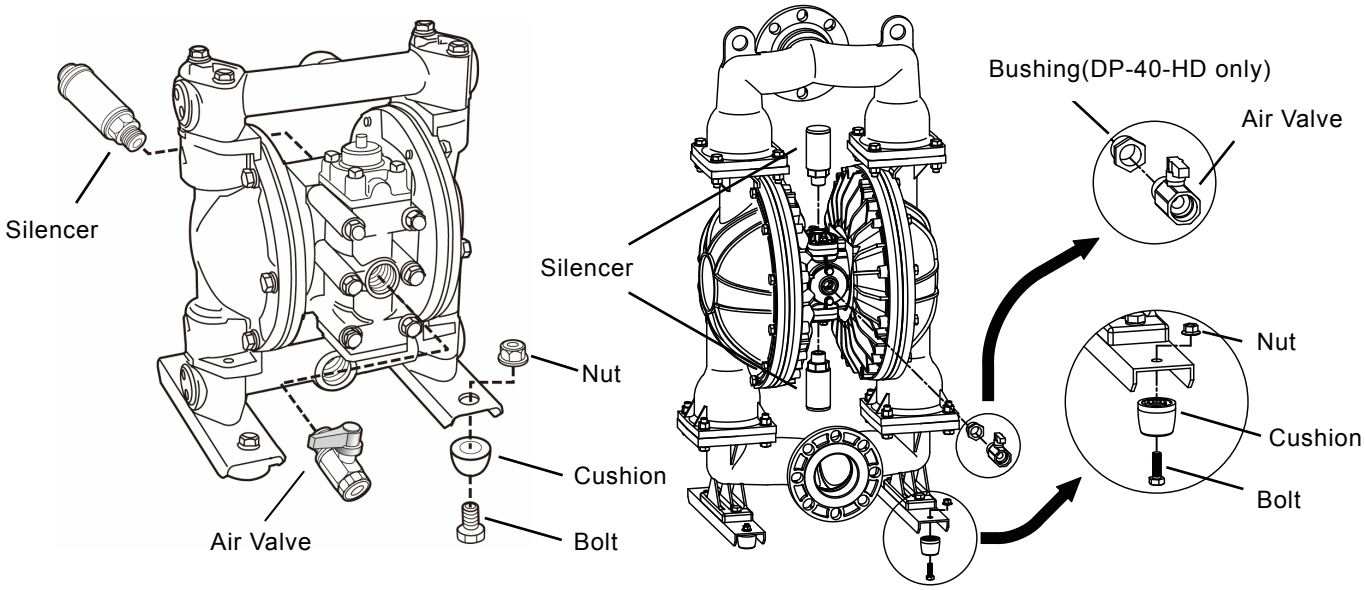
1) First, open the product package and make sure that all the accessories are in order (see 1. Names of parts and materials ■List of accessories after P.6).
2) Attach the air valve and the silencer (see the appearance drawings on 1. Names of parts and materials after P.6).
(With some models, these are already installed.)

⚠CAUTION

- ·All of the connection parts are capped or taped for shipment. Remove the caps and tapes.
- ·When installing accessories, make sure that no foreign matter falls into the product, as it could cause malfunction of the switching portion.
- ·Cover an air valve, a silencer with sealing tape to prevent leakage.
- ·See 10.1 Main specifications after P.25. Remember that the pump is heavy, so extreme care must be taken when lifting it.

According to the point of a figure, please tighten each accessories with tools.
Seal tape can coil itself around an air valve, a silencer, a cushion screws part, and please prevent leak.

DP-40-HD~DP-80-HD Type



NDP-32BAN does not have these nuts, cushions and bolts.

3. Installation

3.1 Method of transport

·When lifting the pump using a chain hoist or crane before transporting it, be sure to lift it by the specified lift point (see 1. Names of parts and materials after P.6).

⚠WARNING

·Be careful that nobody will pass under the pump when you lift it. It would be very dangerous if the pump should fall.

⚠CAUTION

·See 10.1 Main specifications after P.25. Remember that the pump is heavy, so extreme care must be taken when lifting it.

·When moving the pump with a forklift or truck, make sure that the pump will not fall. If it does, it may be damaged and/or cause bodily injury.

·NEVER try to move the pump by pulling the hose connected to the pump. The hose or the pump may be damaged.

3.2 Installing the pump

1) Decide where the pump should be installed and secure a suitable space (see Fig. 3.1 A to D).

NOTE:

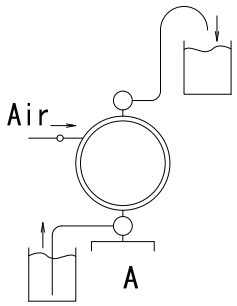
·It should be installed horizontally.

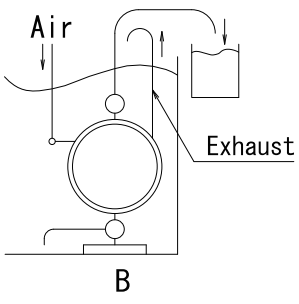
·Try to keep the suction lift as short as possible.
To Protect diaphragm from abnormal breakage, inlet pressure must be kept below the following values:
*PTFE diaphragm : 2.8 PSI (height 6.6 ft) During operation
: 7 PSI (height 16.4 ft) Not in operation
*Other diaphragms : 14 PSI (height 32.8 ft)
(When using clean water under ambient temperature)

·Remember to provide sufficient space around the pump for maintenance.

· The direction of the fluid intake port and the discharge port can be switched opposite from each other. (For switching, see the maintenance manual.)

· In the event diaphragm failure the exhaust from pump may contain some sludge.
When operating the pump where it would have an impact on the environment, the exhaust should be directed to a place where there will be no environmental impact.





2) Remove the pump from the package and install it in the designated location.

3) When fixing the pump in place, use the cushions on the pump base, and secure the pump by tightening the tied-down bolts a little at a time.

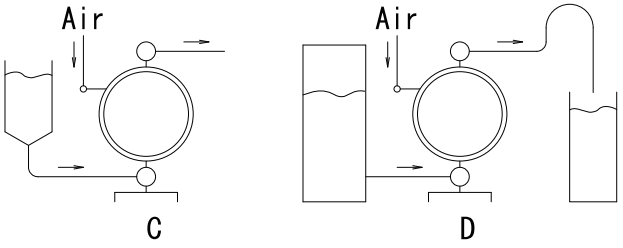


Fig. 3.1

⚠CAUTION

·Even if you do not use the cushions to secure the pump in place, mount it in such a way that vibration generated by pump operation will be absorbed.

·If the pump will be submerged during operation, follow the steps below:
*Verify the corrosion resistance of each component of the pump, and do NOT expose the pump to any fluid for which it does not have proper corrosion resistance.
*Exhaust should directed outside, not into the fluid in which the pump is submerged. For information on how to arrange the exhaust, see Note: Arranging outside exhaust and Fig. 3.2 below.
*Make sure that you can reach all of the valves without submerging your hand.

·When operating the pump, operation noise may be generated, depending upon conditions of use (kind of fluid being pumped, supply air pressure and discharge pressure).
If any regulatory rules apply, provide appropriate acoustic measures. (For the noise level of this product, see 10.1 Main specifications on P.25.)

·When pumping a hazardous fluid (hot, flammable, strong acid, etc.), provide protective measures (installation of a pit or sensors, etc.) in consideration of possible leakage of fluid, and post warning signs at necessary places. For details, see the applicable operating caution on P.2 and P.4.

⚠WARNING

·If using the pump with a flammable fluid or in a flammable environment, read the applicable operating caution on P.3.

NOTE: Arranging outside exhaust

·Remove the silencer.
·Connect a hose with a ground wire to the pump's exhaust port, and attach the silencer to the tip of the hose. Use a hose of the same diameter as the exhaust port. (If the hose is longer than 5 meters, consult your dealer or our regional office.)
·Have a pit, a protection box, etc. at the end of the hose.

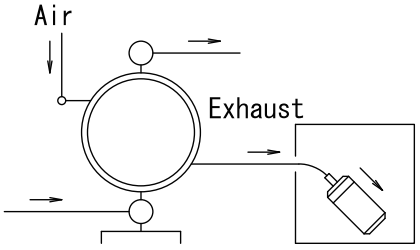


Fig. 3.2

⚠WARNING

·Be sure to have a pit, a protection box, etc. at the end of the hose in preparation for the flow of fluid in case of damage to a diaphragm. For details, see the applicable operating caution on P.2.

·Pump exhaust should be directed to a safe place, away from people, animals and food.

NOTE: Solenoid Operation

When air line operation is to be controlled by a solenoid valve, a three way type is recommended.
A three way solenoid valve allows any trapped air to bleed off, in turn improving pump performance.

3.3 Connecting the ground wire

a) When installing the pump, be sure to connect the ground wire at the specified position.
For the specified position for connecting the ground wire, see 1. Names of parts and materials after P.7.
b) Also connect ground wires to peripheral equipment and piping.
c) Use 2.0mm^2 minimum ground wire.

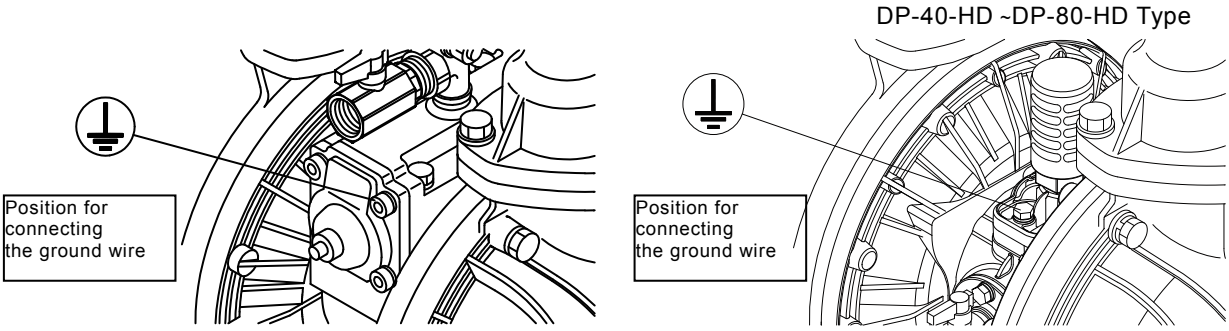


Fig. 3.3

⚠WARNING

·Be sure to connect ground wires to the connected piping and any other connected equipment.
For details, see the applicable operating caution on P.3.
When the pump is operated without a ground wire or otherwise not properly grounded, friction between parts and abrasion caused by some fluids flowing inside the casing may generate static electricity. Also, depending on the type of fluid being pumped and the installation environment (such as gases in the air or the surrounding fixtures), it may be a cause of fire or electric shock.

4. Connection

4.1 Connecting fluid piping

1) Connect a flow valve and a drain valve to the fluid discharge port of the pump.
2) Connect a valve for maintenance to the fluid suction intake port of the pump.
3) Connect a hose to the valve on the suction-port side and the valve of the discharge-port side of the pump.
4) Connect a hose on the suction-side intake and the discharge-port side to the respective vessels.

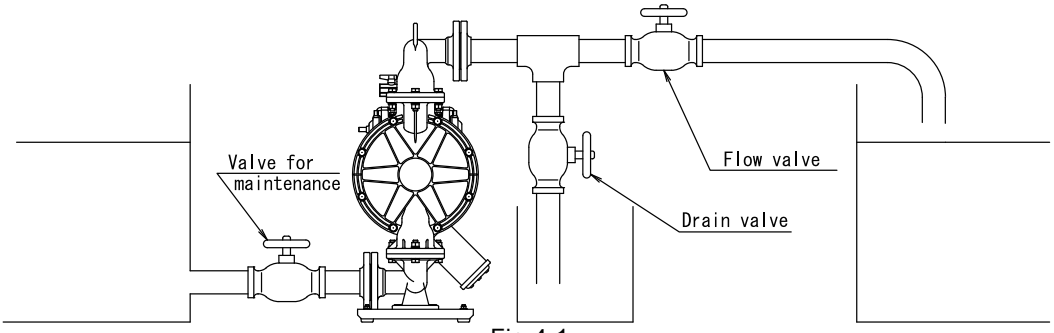


Fig.4.1

⚠CAUTION

- ·Use a flexible hose to absorb pump vibration, and ground the hose.
- ·Make sure that there will be no external force on any connection part of the pump. Be especially careful not to have the pump support part of the weight of the hose and the piping.
- ·Use a sturdy hose that will not collapse under the strong suction of the pump. Also, make sure the hose is of more than sufficient pressure rating.
- ·Use a hose of a diameter the same as or larger than the pump's ports. If you use a hose of smaller diameter, the pump's performance will be adversely affected, and it may even malfunction.
- ·When pumping a fluid that contains slurry, verify that the particle size is below the slurry limitation (after P.25, 10.1 Main specifications). If it exceeds the limitation of slurries indicated in the main specifications, attach a strainer to the pump to stop larger particles. Otherwise, such particles may cause a malfunction.
- ·If, depending upon the place of pump installation, the volume of the pumped fluid changes drastically, install a relief valve on the discharge side, and bring the pressure down below the maximum permissible value. If, owing to a change in the volume of fluid, the pressure inside the pump exceeds the maximum permissible pressure, it may cause damage.

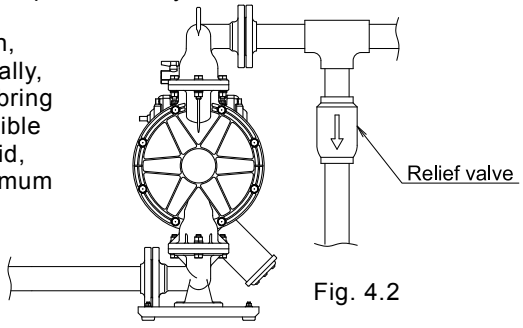


Fig. 4.2

- ·Keep a vessel below the relief valve to catch any drain off.
- ·When testing piping for leakage, do NOT apply pressure to the pump's inlet and outlet sides with compressed air from outside. It may cause abnormal breakage to the diaphragm or the switching portion. When testing the piping, either install a valve between the pump's suction inlet and the discharge outlet and piping, or disconnect the pump from the piping and install plugs so that there will be no pressure from outside.
- ·In our product inspection, clean water is used. To prevent mixture of dirty water into the fluid to be pumped, clean the inside of the pump before finishing installation work.
- ·When installing a standby pump or two pumps in parallel form, be sure to provide a valve on each of the IN and OUT sides and perform pump switching by using the liquid material valve. If the valve of the stop-side pump is open, the diaphragm will be inverted by the discharge pressure of the operating-side pump, resulting in damage in an early stage.

4.2 Connecting air piping

⚠WARNING

·Before starting work, make sure that the air compressor is shut off.

1) Connect an air valve, air filter, regulator and if necessary lubricator (hereinafter called the "peripheral equipment") to hose which connected to compressor. Refer (NOTE) for detail information.
2) Install these peripheral items supported by brackets, etc., near the pump.
3) Connect the hose from the peripheral equipment to the air valve of the pump's supply port.

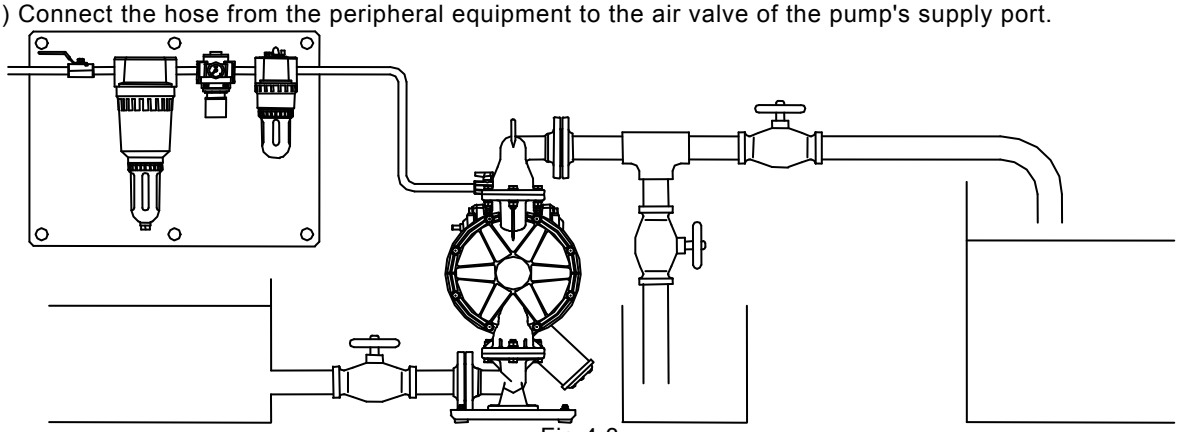


Fig.4.3

⚠CAUTION

·Use a flexible hose to absorb pump vibration, and ground the hose.

·Make sure that there will be no external force on any connection part of the pump. Be especially careful not to have the pump support part of the weight of the hose and the piping.

·The piping and the peripheral equipment may become clogged with sludge. Clean the inside of the piping for 10 to 20 seconds before connecting it to the pump.

·Be sure to sufficiently ground the piping and peripheral equipment.

NOTE:

·Air piping size should be equal to the inlet port of the pump to supply enough air to run the pump. The air compressor should be able to provide adequate air flow to the pump. Attach the compressor as close as possible to the pump, considering operability and stability of air pressure.

·If you use a solenoid valve as the air valve, be sure it is a three-way valve. When the valve is closed, the internal compressed air of the pump will be released, and this will switch the spool to its normal position.

·Use of a coupler for the connection part of each hose will make operation and maintenance easier.

·If you use the pump intermittently the pump will not require lubrication. However lubrication is recommended if running the pump continuously for long periods or using very dry air or at high temperatures. This will guarantee the life of the pumps seals.

- High temperature operation: When transferring liquid whose temperature exceeds 158°F (70°C)
- Continuous operation: When the pump operates continuously for longer than 1 hour and is stopped for less than 15 minutes.
- Lubrication: Use only turbine oil Class 1 grade oil (equivalent to ISO VG 32), under the following conditions; Oil concentration at 50mg/m³, Absolute pressure at 0.1MPa. Maximum temperature of 68°F (20°C) and Humidity at 65%.

5. Operation

5.1 Method of operation

⚠CAUTION

- ·Before starting the pump, make sure that all piping is properly connected.
- ·Also, before starting the pump, make sure that all the bolts are securely tightened. (Refer to the maintenance manual for the bolts that a regulation torque are explained.)
- ·Make sure that the air valve, regulator and the drain valve on the discharge side are closed. Also, make sure that the valve on the suction side is opened.

1) Start the air compressor.
2) Open the air valve in front of each piece of peripheral equipment, and adjust the supply air pressure with a regulator to within the permissible range (see 10.1 Main specifications after P.25).
3) Open the flow valve on the discharge side.
4) Press the reset button (DP-40-HD~DP-80-HD is excluded), and then slowly open the air valve of the pump.
5) First, verify that fluid is flowing inside the piping and is being pumped to the discharge side, and then fully open the air valve.
6) Again adjust the supply air pressure with a regulator to within the permissible range (see 10.1 Main specifications after P.25).

⚠CAUTION

- ·Do NOT open the air valve suddenly.
- ·In case of use lubricator, must be used turbine oil none addition class 1 turbine oil (equivalent ISO VG32 grade) for lubricants. Do not apply lubricants more than required and also do not use any other lubricants, which designated on this instruction manual. This may cause of pump problem and there is danger of serious bodily damage.

5.2 Flow adjustment

·Adjust the flow valve on the discharge side. For the relationship among the flow, supply air pressure and discharge pressure, see 10.3 Performance curve after P.44.

⚠CAUTION

- ·As you start closing the flow valve, the supply air pressure may rise. Make sure that the pressure is kept within the normal operating range (see 10.1 Main specifications after P.25).
- ·Depending upon the viscosity and specific gravity of the fluid, the suction stroke and other conditions, the permissible suction flow speed of fluid into the pump will vary; however, if the pump speed (flow speed of fluid) increases greatly, cavitation will occur, and this not only will reduce pump performance, but it may cause a malfunction. Adjust the supply air pressure as well as the flow in order to prevent cavitation.
- ·If fluid is not discharged after you start the pump, or if you hear an abnormal noise or notice any irregularity, shut down the pump immediately (see 8. Troubleshooting after P.23).

5.3 Shutdown

·Close the air valve of the pump and shut off the supply air.

⚠CAUTION

·There is no problem in shutting down the pump with the flow valve closed while air is being supplied; however, if this condition continues for many hours while there is nobody watching the pump, it may continue running when there is a leak from the pump or piping, and fluid may continue flowing out of the position of leakage. Upon finishing your work, release the internal pressure from the pump and close the air valve (see 5.4 Releasing the pressure).

·When the pump is shut down while pumping slurry, particulate matter contained in the slurry will be deposited and get stuck inside the out chamber. If the pump is started again as is, the diaphragm may be damaged or the center disk may be overloaded, and this may cause damage such as bending of the center rod. After finishing your work, purge the remaining fluid from the pump (see 6. Method of cleaning on P.22).

5.4 Releasing the pressure

1) Make sure that the air valve of the pump is closed.
2) Shut down the air compressor or close the valve on the air-supply side of the peripheral equipment.
3) Close the flow valve on the discharge side, start slowly opening the drain valve, and discharge the fluid under pressure.
4) Open the air valve of the pump, start running the pump, and discharge the remaining air.
5) After making sure that the pump has been shut down and the pressure has been released, fully open the regulator, and close the air valve and drain valve of the pump.

⚠CAUTION

·Keep a vessel below the relief valve to catch any drain off.

·Fluid under pressure will gush out as soon as you open the valve, so be careful.

·If the pump will be unused for a prolonged period, purge and clean the pump (see the Operating caution on P.3).

6. Method of cleaning

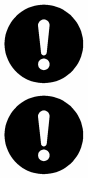
⚠WARNING

·Before starting operation, make sure that compressed air is not supplied to the pump.

·Before starting operation, make sure that the pump is not pressurized.

1) Remove the hose from the suction side of the pump.
2) Close the flow valve on the discharge side, open the drain valve, and then operate a pump by starting air pressure for a while to discharge any fluid remaining inside the pump as much as possible.
3) Remove the hose from the discharge side, and attach different hoses to the suction side and the discharge side for cleaning.
4) Be ready with a vessel with cleaning solution, select cleaning solution appropriate for the type of fluid pumped, and then connect the suction-side and the discharge-side hoses of the pump.
5) Operate a pump by starting air pressure slowly, and let the cleaning solution circulate for sufficient cleaning.
6) Finally, flush with clean water.
7) Remove the hose from the suction side of the pump, run the pump for a while and purge the pump of remaining fluid as much as possible.

⚠CAUTION



·Be careful when removing piping. Fluid will gush out.

·After cleaning with clean water, turn the pump upside-down to drain out the water.

7. Daily check

·Before starting pump operation, be sure to conduct the following check every day. If any irregularity is found, do NOT start running the pump until the cause of the irregularity has been found and corrective measures have been taken.

a) Verify the drain flow through the air filter.
b) In case using a lubricator, verify the quantity of lubricating oil.
c) Make sure that there is no leakage of fluid from any connection part or the pump.
d) Make sure that there are no cracks in the pump casing or piping.
e) Check the tightness of every bolt of the pump.
(Refer to ”maintenance manual” about the retighten of ” Tie rod”)
f) Make sure that the connection parts of the piping and peripheral equipment are not loose.
g) Make sure that the time has not elapsed for replacing any parts of the pump that are to be replaced at regular intervals. For details, see the maintenance manual.

8. Troubleshooting

8.1 Pump does not run

Cause	Action to be taken
The exhaust port (silencer) of pump is clogged with sludge.	Check and clean the exhaust port and silencer.
Air is not supplied.	Start the compressor, and open the air valve and air regulator.
The supply air pressure is low.	Check the compressor and the configuration of air piping.
Air leaks from connection parts.	Check the connection parts and tightness of bolts.
Air piping or peripheral equipment is clogged with sludge.	Check and clean the air piping.
The flow valve on the discharge side is not open.	Open the flow valve on the discharge side.
The spool stopped in neutral position. (DP-40-HD~DP-80-HD is excluded)	Press the RESET button.
The fluid piping is clogged with sludge.	Check and clean the fluid piping.
The pump is clogged with sludge.	Disassemble the casing, check and clean.

8.2 Pump runs, but fluid does not come out

Cause	Action to be taken
The suction lift or discharge head is long.	Confirm the piping configuration and shorten the length.
The discharge-side fluid piping (including the strainer) is clogged with sludge.	Check and clean the fluid piping.
The valve on the suction side is not open.	Open the valve on the suction side.
The pump is clogged with sludge.	Disassemble the casing, check and clean.
The ball and valve seat are worn out or damaged.	Disassemble the manifold, check and replace parts.

8.3 Flow (discharge volume) decreased

Cause	Action to be taken
The supply air pressure is low.	Check the compressor and configuration of air piping.
Air piping or peripheral equipment is clogged with sludge.	Check and clean the air piping.
The discharge-side flow valve opens differently.	Adjust the discharge-side flow valve.
Air is taken in together with fluid.	Replenish fluid and check the configuration of the suction-side piping.
Cavitation occurs.	Adjust the supply air pressure and discharge pressure, and shorten the suction lift.
Chattering occurs.	Adjust the supply air pressure and discharge pressure. Reduce inlet flow valve to adjusting liquid pressure and volume.
Icing on air-switching portion.	Eliminate ice from air-switching valve and check and clean the air filter. Use external exhaust hose to control exhaust air speed. (Refer Fig.3.2)
The fluid piping (including the strainer) is clogged with sludge.	Check and clean the fluid piping and strainer.
The exhaust port (silencer) of the pump is clogged with sludge.	Check and clean the exhaust port and silencer.
The pump is clogged with sludge.	Disassemble the casing, check and clean.

8.4 Liquid leakage from exhaust port (silencer)

Cause	Action to be taken
The diaphragm is damaged.	Disassemble and check the pump and replace the diaphragm.
The fastening nuts for the center disk are loose.	Disassemble and check the pump. Tighten the nuts.

8.5 High air consumption during operation (DP-40-HD~DP-80-HD is excluded.)

Cause	Action to be taken
The seal ring and sleeve are worn out.	Disassemble the air-switch portion, check and clean. Replace parts as necessary.

8.6 Irregular noise

Cause	Action to be taken
The supply air pressure too high.	Adjust the supply air pressure.
The spool oscillates (DP-40-HD~DP-80-HD is excluded), and occur ball chattering.	Adjust the supply air pressure and discharge pressure. Reduce inlet flow valve to adjusting liquid pressure and volume.
The pump is clogged with sludge with particles of larger than the permissible diameter.	Disassemble the casing, check and clean.

8.7 Irregular vibration

Cause	Action to be taken
The supply air pressure is too high.	Adjust the supply air pressure.
The spool oscillates (DP-40-HD~DP-80-HD is excluded), and occur ball chattering.	Adjust the supply air pressure and exhaust pressure.
Connection parts and pump mounting are loose.	Check each connection part and tighten the bolts.

·If disassembly is required, refer to the maintenance manual and follow with the instructions.
·If any of the above mentioned causes does not apply to your problem, contact your dealer or our regional office.

9. Returning the product for servicing

9.1 How to use the FAX Sheet

·Copy the FAX Sheet on P.52 "11.Trouble-Reporting FAX Sheet", fill out the necessary details regarding your problem and conditions of operation, and fax it to your dealer or our regional office.

9.2 Before returning the product

1) Purge the pump of fluid and clean (see 6. Method of cleaning on P.22).
2) Return the product in the same package as when it was first shipped from the factory.

⚠WARNING

·It will be the end-user responsibility to thoroughly wash a clean the pumps to prevent accidents caused by liquid leaks.

⚠CAUTION

·Be sure to prevent liquid leak from pump for safe transport.

10. MAIN BODY SPECIFICATION
10.1 MAIN SPECIFICATIONS

■NDP-20 series

Type		NDP-20					
		BA_	BAT	BS_	BST	BP_	BPT
Nominal Diameter		0.79 inch [20 mm]					
Fluid Connection	Suction Port	NPT 3/4				NPT 3/4 or Equivalent to ANSI flange 150 3/4	
	Discharge Port						
Air Connection	Supply Port	NPT 1/4					
	Exhaust Port	NPT 3/4					
Operating Air Pressure		30~100 PSI [0.2~0.7 MPa]				30~100 PSI *1 [0.2~0.7 MPa]	
Maximum Discharge Pressure		100 PSI [0.7 MPa]				100 PSI *1 [0.7 MPa]	
Discharge Volume/cycle*2		350 mL	240 mL	350 mL	240 mL	350 mL	240 mL
Maximum Discharge Volume		29.1Gallon/min [110 L/min]	26.4Gallon/min [100 L/min]	29.1Gallon/min [110 L/min]	26.4Gallon/min [100 L/min]	29.1Gallon/min [110 L/min]	26.4Gallon/min [100 L/min]
Maximum Air Consumption		42.4 SCFM [1200 L/min (ANR)]	49.4 SCFM [1400 L/min (ANR)]	42.4 SCFM [1200 L/min (ANR)]	49.4 SCFM [1400 L/min (ANR)]	42.4 SCFM [1200 L/min (ANR)]	49.4 SCFM [1400 L/min (ANR)]
Slurry Limitation		2 mm or less					
Limitation of Viscosity		Suction Lift 3Pa·s or below Force In 8Pa·s or below					
Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]					
	Fluid Temp.	*3				32~140 °F [0~60 °C]	
A-weighted emission sound pressure level*4		82 dB				84 dB	
A-weighted sound power level*5		96 dB				94 dB	
Weight		19.8 lbs [9.0 kg]		30.9 lbs [14.0 kg]		17.6 lbs [8.0 kg]	

■NDP-25 (metal type)series

Type		NDP-25					
		BA_	BAT	BS_	BST	BF_	BFT
Nominal Diameter		1 inch [25 mm]					
Fluid Connection	Suction Port	NPT 1					
	Discharge Port						
Air Connection	Supply Port	NPT 3/8					
	Exhaust Port	NPT 3/4					
Operating Air Pressure		30~100 PSI [0.2~0.7 MPa]					
Maximum Discharge Pressure		100 PSI [0.7 MPa]					
Discharge Volume/cycle*2		600 mL	500 mL	600 mL	500 mL	600 mL	500 mL
Maximum Discharge Volume		42.3 Gallon/min [160 L/min]					
Maximum Air Consumption		56.5 SCFM [1600 L/min (ANR)]	63.6 SCFM [1800 L/min (ANR)]	56.5 SCFM [1600 L/min (ANR)]	63.6 SCFM [1800 L/min (ANR)]	56.5 SCFM [1600 L/min (ANR)]	63.6 SCFM [1800 L/min (ANR)]
Slurry Limitation		3 mm or less					
Limitation of Viscosity		Suction Lift 3Pa·s or below Force In 8Pa·s or below					
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]					
	Fluid Temp.	*3					
A-weighted emission sound pressure level*4		81 dB					
A-weighted sound power level*5		92 dB					
Weight		28.7 lbs [13 kg]		44.1 lbs [20 kg]		44.1 lbs [20 kg]	

*1.Maximum air pressure for non-metallic pumps decreases with temperature (See 30 page Temperature Pressure Curve).

*2.Discharge Volume/cycle is highly dependent on application. Contact your local distributor or Yamada for more information.

*3.Diaphragm NBR/CR : 32~158 °F [0~70 °C]
TPEE/EPDM : 32~176 °F [0~80 °C]
FKM/TPO/PTFE : 32~212 °F [0~100 °C]

*4. The measuring method is based on ISO 1996.

*5. The measuring method is based on ISO 3744.

■NDP-25 (plastic type) series

Type		NDP-25			
		BP_	BPT	BV_	BVT
Nominal Diameter		1 inch [25 mm]			
Fluid Connection	Suction Port	NPT 1 or Equivalent to ANSI flange 150 1			
	Discharge Port				
Air Connection	Supply Port	NPT 3/8			
	Exhaust Port	NPT 3/4			
Operating Air Pressure *1		30~100 PSI [0.2~0.7 MPa]			
Maximum *1 Discharge Pressure		100 PSI [0.7 MPa]			
Discharge Volume/cycle *2		600 mL	500 mL	600 mL	500 mL
Maximum Discharge Volume		42.3 Gallon/min [160 L/min]			
Maximum Air Consumption		56.5 SCFM [1600 L/min(ANR)]	63.6 SCFM [1800 L/min(ANR)]	56.5 SCFM [1600 L/min(ANR)]	63.6 SCFM [1800 L/min(ANR)]
Slurry Limitation		3mm or less			
Limitation of Viscosity		Suction Lift 3Pa·s or below Force In 8Pa·s or below			
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]			
	Fluid Temp.	32~140 °F [0~60 °C]			
A-weighted emission sound pressure level *4		86 dB			
A-weighted sound power level *5		96 dB			
Weight		24.3 lbs [11.0 kg]		29.8 lbs [13.5 kg]	

■NDP-32 series

Type		NDP-32
		BAN
Fluid Connection	Suction Port	NPT 1·1/2 (F)
	Discharge Port	NPT 1·1/4 (F)
Air Connection	Supply Port	NPT 3/8
	Exhaust Port	NPT 3/4
Operating Air Pressure		30~100 PSI [0.2~0.7 MPa]
Maximum Discharge Pressure		100 PSI [0.7 MPa]
Discharge Volume/cycle *2		670 mL
Maximum Discharge Volume		50.2 Gallon/min [190 L/min]
Maximum Air Consumption		70.6 SCFM [2000 L/min (ANR)]
Slurry Limitation		3 mm or less
Limitation of Viscosity		Suction Lift 3Pa·s or below Force In 8Pa·s or below
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]
	Fluid Temp.	
A-weighted emission sound pressure level *4		81 dB
A-weighted sound power level *5		95 dB
Weight		26.5 lbs [12.0 kg]

*1.Maximum air pressure for non-metallic pumps decreases with temperature (See 30 page Temperature Pressure Curve).

*2.Discharge Volume/cycle is highly dependent on application. Contact your local distributor or Yamada for more information.

*3.Diaphragm NBR/CR : 32~158 °F [0~70 °C]
TPEE/EPDM : 32~176 ° F [0~80 °C]
FKM/TPO/PTFE : 32~212 °F [0~100 °C]

*4. The measuring method is based on ISO 1996.

*5. The measuring method is based on ISO 3744.

■NDP-40 series

Type		NDP-40									
		BA_	BAT	BS_	BST	BF_	BFT	BP_	BPT	BV_	BVT
Nominal Diameter		1.5 inch [40 mm]									
Fluid Connection	Suction Port / Discharge Port	Equivalent to ANSI flange 150 1·1/2		NPT 1·1/2 or Equivalent to ANSI flange 150 1·1/2						Equivalent to ANSI flange 150 1·1/2	
Air Connection	Supply Port	NPT 1/2									
	Exhaust Port	NPT 1									
Operating Air Pressure		30~100 PSI [0.2~0.7 MPa]						30~100 PSI [*1] [0.2~0.7 MPa]			
Maximum Discharge Pressure		100 PSI [0.7 MPa]						100 PSI [*1] [0.7 MPa]			
Discharge Volume/cycle [*2]		2800 mL	1400 mL	2800 mL	1400 mL	2800 mL	1400 mL	2800 mL	1400 mL	2800 mL	1400 mL
Maximum Discharge Volume		105.7 Gallon/min [400L/min]	89.8 Gallon/min [350 L/min]	105.7 Gallon/min [400 L/min]	92.5 Gallon/min [350 L/min]	105.7 Gallon/min [400 L/min]	92.5 Gallon/min [350L/min]	97.7 Gallon/min [370 L/min]	87.2 Gallon/min [330 L/min]	97.7 Gallon/min [370 L/min]	87.2 Gallon/min [330 L/min]
Maximum Air Consumption		141 SCFM [4000 L/min(ANR)]						105.9 SCFM [3000 L/min(ANR)]			
Slurry Limitation		7 mm or less									
Limitation of Viscosity		Suction Lift 3Pa·s or below Force In 8Pa·s or below									
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]									
	Fluid Temp.	*3						32~140 °F [0~60 °C]			
A-weighted emission sound pressure level [*4]		93 dB						95 dB			
A-weighted sound power level [*5]		102 dB						104 dB			
Weight		63.9 lbs [29 kg]		88.2 lbs [40 kg]		103.6 lbs [47kg]		59.5 lbs [27 kg]		70.5 lbs [32 kg]	

■DP-40-HD series

Type		DP-40-HD							
		BA_	BAT	BS_	BST	BF_	BFT	BP_	BPT
Nominal Diameter		1.5 inch [40 mm]							
Fluid Connection	Suction Port / Discharge Port	Equivalent to ANSI flange 150 1·1/2		NPT 1·1/2 or Equivalent to ANSI flange 150 1·1/2				Equivalent to ANSI flange 150 1·1/2	
Air Connection	Supply Port	NPT 1/2							
	Exhaust Port	NPT 1							
Operating Air Pressure		14 ~120 PSI [0.1~0.85 MPa]	22 ~100 PSI [0.15~0.7 MPa]	14 ~120 PSI [0.1~0.85 MPa]	22 ~100 PSI [0.15 ~0.7 MPa]	14 ~120 PSI [0.1~0.85 MPa]	22~100 PSI [0.15～0.7 MPa]	14 ~100 PSI [*1] [0.1~0.7 MPa]	22~100 PSI [*1] [0.15～0.7 MPa]
Allowable Air pressure		130 PSI [0.9 MPa]	——	130 PSI [0.9 MPa]	——	130 PSI [0.9 MPa]	——	——	
Maximum Discharge Pressure		120 PSI [0.85 MPa]	100 PSI [0.7 MPa]	120 PSI [0.85 MPa]	100 PSI [0.7 MPa]	120 PSI [0.85 MPa]	100 PSI [0.7 MPa]	100 PSI [*1] [0.7 MPa]	
Discharge Volume/cycle [*2]		2300 mL	900 mL	2300 mL	900 mL	2300 mL	900 mL	2300 mL	900 mL
Maximum Discharge Volume		97.7 Gallon/min [370L/min]	71.3 Gallon/min [270 L/min]	97.7 Gallon/min [370 L/min]	71.3 Gallon/min [270 L/min]	97.7 Gallon/min [370L/min]	71.3 Gallon/min [270L/min]	84.5 Gallon/min [320 L/min]	66.0 Gallon/min [250 L/min]
Maximum Air Consumption		159 SCFM [4500 L/min(ANR)]	141 SCFM [4000 L/min(ANR)]	159 SCFM [4500 L/min(ANR)]	141 SCFM [4000 L/min(ANR)]	159 SCFM [4500 L/min(ANR)]	141 SCFM [4000 L/min(ANR)]	124 SCFM [3500 L/min(ANR)]	141 SCFM [4000 L/min(ANR)]
Slurry Limitation		7 mm or less							
Limitation of Viscosity		Suction Lift 3Pa·s or below Force In 8Pa·s or below							
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]							
	Fluid Temp.	*3						32~140 °F [0~60 °C]	
A-weighted emission sound pressure level [*4]		91 dB						92 dB	
A-weighted sound power level [*5]		104 dB						103 dB	
Weight		57.3 lbs [26 kg]		81.6 lbs [37 kg]		97.2 lbs [44 kg]		52.9 lbs [24 kg]	

*1.Maximum air pressure for non-metallic pumps decreases with temperature (See 30 page Temperature Pressure Curve).
*2.Discharge Volume/cycle is highly dependent on application. Contact your local distributor or Yamada for more information.
*3.Diaphragm NBR/CR : 32~158 °F [0~70°C]
TPEE/EPDM : 32~176 °F [0~80°C]
FKM/TPO/PTFE : 32~212 °F [0~100°C]
*4. The measuring method is based on ISO 1996.
*5. The measuring method is based on ISO 3744.

■NDP-50 series

Type		NDP-50									
		BA_	BAT	BS_	BST	BF_	BFT	BP_	BPT	BV_	BVT
Nominal Diameter		2 inch [50 mm]									
Fluid Connection	Suction Port	Equivalent to ANSI flange 150 2		NPT 2 or Equivalent to ANSI flange 150 2						Equivalent to ANSI flange 150 2	
	Discharge Port										
Air Connection	Supply Port	NPT 3/4									
	Exhaust Port	NPT 1									
Operating Air Pressure		30~100 PSI [0.2~0.7 MPa]						30~100 PSI [*1] [0.2~0.7 MPa]			
Maximum Discharge Pressure		100 PSI [0.7 MPa]						100PSI [*1] [0.7 MPa]			
Discharge Volume/cycle [*2]		4300 mL	2100 mL	4300 mL	2100 mL	4300 mL	2100 mL	4300 mL	2100 mL	4300 mL	2100 mL
Maximum Discharge Volume		158.5 Gallon/min [630L/min]	153.2 Gallon/min [600L/min]	166.4 Gallon/min [630L/min]	158.5 Gallon/min [600L/min]	166.4 Gallon/min [630L/min]	158.5 Gallon/min [600L/min]	158.5 Gallon/min [600L/min]	145.3 Gallon/min [550L/min]	158.5 Gallon/min [600L/min]	145.3 Gallon/min [550L/min]
Maximum Air Consumption		212 SCFM [6000 L/min(ANR)]									
Slurry Limitation		8 mm or less									
Limitation of Viscosity		Suction Lift 3Pa·s or below Force In 8Pa·s or below									
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]									
	Fluid Temp.	*3						32~140 °F [0~60 °C]			
A-weighted emission sound pressure level[*4]		95 dB						93 dB			
A-weighted sound power level[*5]		104 dB						102 dB			
Weight		81.6 lbs [37 kg]		132 lbs [60 kg]		143 lbs [65 kg]		77.2 lbs [35 kg]		90.5 lbs [41 kg]	

■DP-50-HD series

Type		DP-50-HD									
		BA_	BAT	BS_	BST	BF_	BFT	BP_	BPT	BV_	BVT
Nominal Diameter		2 inch [50 mm]									
Fluid Connection	Suction Port	Equivalent to ANSI flange 150 2		NPT 2 or Equivalent to ANSI flange 150 2						Equivalent to ANSI flange 150 2	
	Discharge Port										
Air Connection	Supply Port	NPT 3/4									
	Exhaust Port	NPT 1									
Operating Air Pressure		14~120 PSI [0.1 ~0.85 MPa]	22 ~100 PSI [0.15~0.7 MPa]	14~120 PSI [0.1 ~0.85 MPa]	22 ~100 PSI [0.15~0.7 MPa]	14~120 PSI [0.1 ~0.85 PSI]	22 ~100 PSI [0.15~0.7 MPa]	14 ~100 PSI [*1] [0.1~0.7 MPa]	22 ~100 PSI [*1] [0.15~0.7 MPa]	14 ~100 PSI [*1] [0.1~0.7 MPa]	22 ~100 PSI [*1] [0.15~0.7 MPa]
Allowable Air pressure		130 PSI [0.9MPa]	———	130 PSI [0.9 MPa]	———	130 PSI [0.9 MPa]	———	———			
Maximum Discharge Pressure		120 PSI [0.85MPa]	100 PSI [0.7 MPa]	120 PSI [0.85 MPa]	100 PSI [0.7 MPa]	120 PSI [0.85 MPa]	100 PSI [0.7 MPa]	100 PSI [*1] [0.7 MPa]			
Discharge Volume/cycle [*2]		3500 mL	1300 mL	3500 mL	1300 mL	3500 mL	1300 mL	3500 mL	1300 mL	3500 mL	1300 mL
Maximum Discharge Volume		121.6 Gallon/min [460L/min]	89.8 Gallon/min [340L/min]	121.6 Gallon/min [460L/min]	89.8 Gallon/min [340L/min]	121.6 Gallon/min [460L/min]	89.8 Gallon/min [340L/min]	158.5 Gallon/min [600L/min]	145.3 Gallon/min [550L/min]	158.5 Gallon/min [600L/min]	145.3 Gallon/min [550L/min]
Maximum Air Consumption		159 SCFM [4500 L/min(ANR)]	141 SCFM [4000 L/min(ANR)]	159 SCFM [4500 L/min(ANR)]	141 SCFM [4000 L/min(ANR)]	159 SCFM [4500 L/min(ANR)]	141 SCFM [4000 L/min(ANR)]	141 SCFM [4000 L/min(ANR)]	159 SCFM [4500 L/min(ANR)]	141 SCFM [4000 L/min(ANR)]	159 SCFM [4500 L/min(ANR)]
Slurry Limitation		8 mm or less									
Limitation of Viscosity		Suction Lift 3Pa·s or below Force In 8Pa·s or below									
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]									
	Fluid Temp.	*3						32~140 °F [0~60 °C]			
A-weighted emission sound pressure level[*4]		93 dB						92 dB			
A-weighted sound power level[*5]		104 dB						103 dB			
Weight		75.1 lbs [34 kg]		126 lbs [57 kg]		137 lbs [62 kg]		70.5 lbs [32 kg]		83.9 lbs [38 kg]	

*1.Maximum air pressure for non-metallic pumps decreases with temperature (See 30 page Temperature Pressure Curve).

*2.Discharge Volume/cycle is highly dependent on application. Contact your local distributor or Yamada for more information.

*3.Diaphragm NBR/CR : 32~158 °F [0~70°C] TPEE/EPDM : 32~176 °F [0~80°C]
FKM/TPO/PTFE : 32~212 °F [0~100°C]

*4. The measuring method is based on ISO 1996.

*5. The measuring method is based on ISO 3744.

■NDP-80 series

Type		NDP-80							
		BA_	BAT	BS_	BST	BF_	BFT	BP_	BPT
Nominal Diameter		3 inch [80 mm]							
Fluid Connection	Suction Port	Equivalent to ANSI flange 150 3		NPT 3 or Equivalent to ANSI flange 150 3				Equivalent to ANSI flange 150 3	
	Discharge Port								
Air Connection	Supply Port	NPT 3/4							
	Exhaust Port	NPT 1							
Operating Air Pressure		30~100 PSI [0.2~0.7 MPa]						30~100 PSI [*1] [0.2~0.7 MPa]	
Maximum Discharge Pressure		100 PSI [0.7 MPa]						100 PSI [*1] [0.7 MPa]	
Discharge Volume/cycle[*2]		8500 mL	3800 mL	8500 mL	3800 mL	8500 mL	3800 mL	8500 mL	3800 mL
Maximum Discharge Volume		211.3 Gallon/min [840 L/min]	158.5 Gallon/min [640 L/min]	221.9 Gallon/min [840 L/min]	169.1 Gallon/min [640 L/min]	221.9 Gallon/min [840 L/min]	169.1 Gallon/min [640 L/min]	211.3 Gallon/min [800 L/min]	153.2 Gallon/min [580 L/min]
Maximum Air Consumption		212 SCFM [6000 L/min(ANR)]							
Slurry Limitation		10 mm or less							
Limitation of Viscosity		Suction Lift 3Pa·s or below Force In 8Pa·s or below							
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]							
	Fluid Temp.	*3						32~140 °F [0~60 °C]	
A-weighted emission sound pressure level[*4]		90 dB						93 dB	
A-weighted sound power level[*5]		99 dB						103 dB	
Weight		143 lbs [65 kg]		225 lbs [102 kg]		247 lbs [112 kg]		141 lbs [64 kg]	

*1.Maximum air pressure for non-metallic pumps decreases with temperature (See 30 page Temperature Pressure Curve).

*2.Discharge Volume/cycle is highly dependent on application. Contact your local distributor or Yamada for more information.

*3.Diaphragm NBR/CR : 32~158 °F [0~70 °C]
TPEE/EPDM : 32~176 °F [0~80 °C]
FKM/TPO/PTFE : 32~212 °F [0~100 °C]

*4. The measuring method is based on ISO 1996.

*5. The measuring method is based on ISO 3744.

■DP-80-HD series

Type		DP-80-HD							
		BA_	BAT	BS_	BST	BF_	BFT	BP_	BPT
Nominal Diameter		3 inch [80 mm]							
Fluid Connection	Suction Port	Equivalent to ANSI flange 150 3		NPT 3 or Equivalent to ANSI flange 150 3				Equivalent to ANSI flange 150 3	
	Discharge Port								
Air Connection	Supply Port	NPT 3/4							
	Exhaust Port	NPT 1							
Operating Air Pressure		14 ~120 PSI [0.1 ~0.85 MPa]	22 ~100 PSI [0.15~0.7 MPa]	14 ~120 PSI [0.1~0.85 MPa]	22 ~100 PSI [0.15 ~0.7 MPa]	14 ~120 PSI [0.1~0.85 MPa]	22~100 PSI [0.15～0.7 MPa]	14 ~100 PSI *1 [0.1~0.7 MPa]	22~100 PSI *1 [0.15～0.7 MPa]
Allowable Air pressure		130 PSI [0.9 MPa]	——	130 PSI [0.9 MPa]	——	130 PSI [0.9 MPa]	——	——	
Maximum Discharge Pressure		120 PSI [0.85MPa]	100 PSI [0.7 MPa]	120 PSI [0.85MPa]	100 PSI [0.7 MPa]	120 PSI [0.85MPa]	100 PSI [0.7 MPa]	100 PSI *1 [0.7 MPa]	
Discharge Volume/cycle*2		6400 mL	3100 mL	6400 mL	3100 mL	6400 mL	3100 mL	6400 mL	3100 mL
Maximum Discharge Volume		155.9 Gallon/min [590 L/min]	95.1 Gallon/min [360 L/min]	155.9 Gallon/min [590 L/min]	95.1 Gallon/min [360 L/min]	155.9 Gallon/min [590 L/min]	95.1 Gallon/min [360 L/min]	161.1 Gallon/min [610 L/min]	95.1 Gallon/min [360 L/min]
Maximum Air Consumption		177 SCFM [5000 L/min(ANR)]							
Slurry Limitation		10 mm or less							
Limitation of Viscosity		Suction Lift 3Pa·s or below Force In 8Pa·s or below							
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]							
	Fluid Temp.	*3						32~140 °F [0~60 °C]	
A-weighted emission sound pressure level*4		90 dB						84 dB	
A-weighted sound power level*5		97 dB						95 dB	
Weight		137 lbs [62 kg]		218 lbs [99 kg]		240 lbs [109 kg]		134 lbs [61 kg]	

*1.Maximum air pressure for non-metallic pumps decreases with temperature (See 30 page Temperature Pressure Curve).

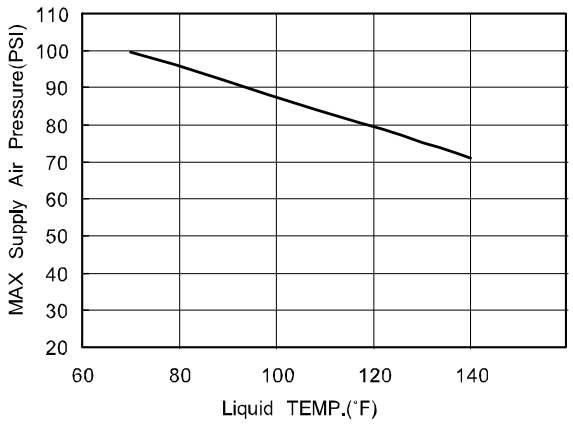
*2.Discharge Volume/cycle is highly dependent on application. Contact your local distributor or Yamada for more information.

*3.Diaphragm NBR/CR : 32~158 °F [0~70 °C]
TPEE/EPDM : 32~176 °F [0~80 °C]
FKM/TPO/PTFE : 32~212 °F [0~100 °C]

*4. The measuring method is based on ISO 1996.

*5. The measuring method is based on ISO 3744.

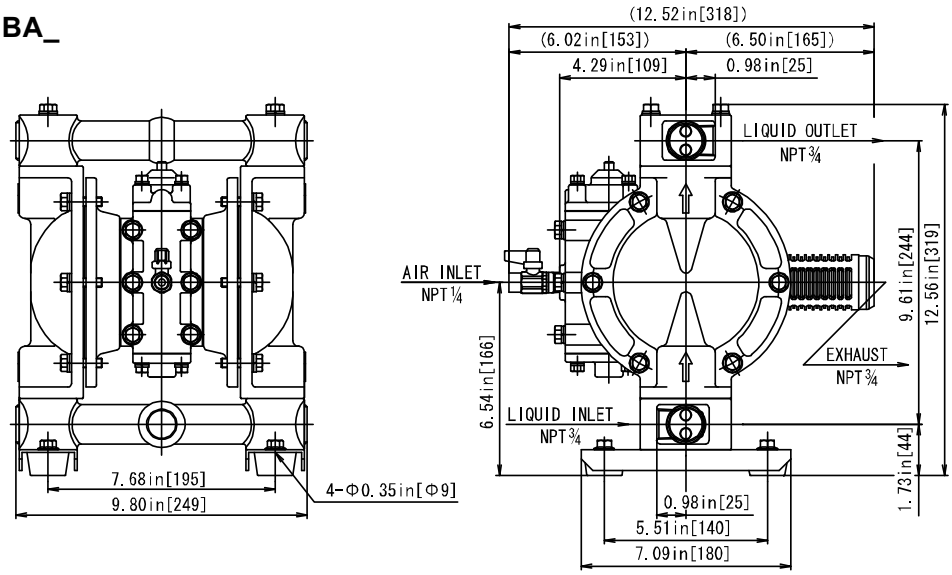
Liquid TEMP.-MAX. Supply Air Pressure Curve



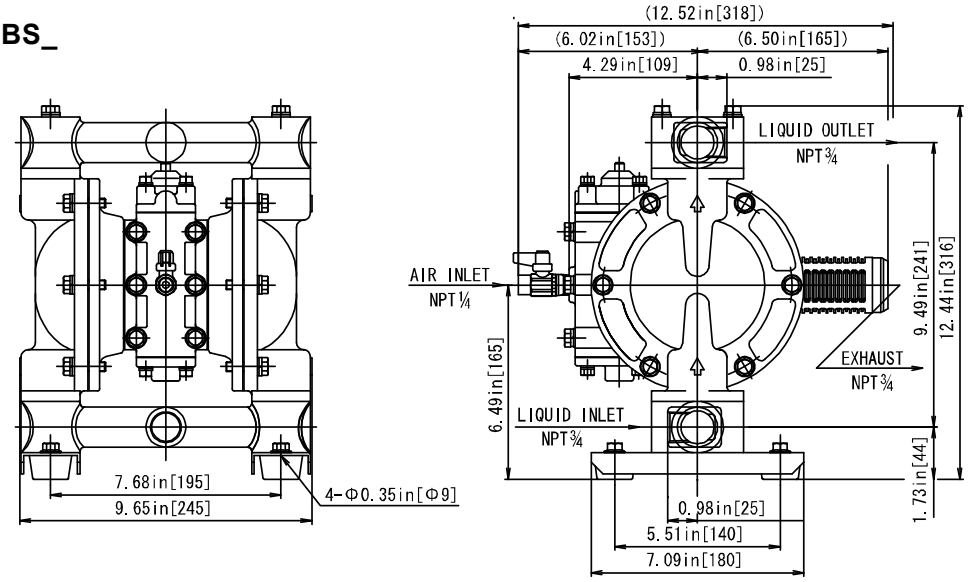
10.2 Appearance and dimensions

10.2.1 NDP-20 series

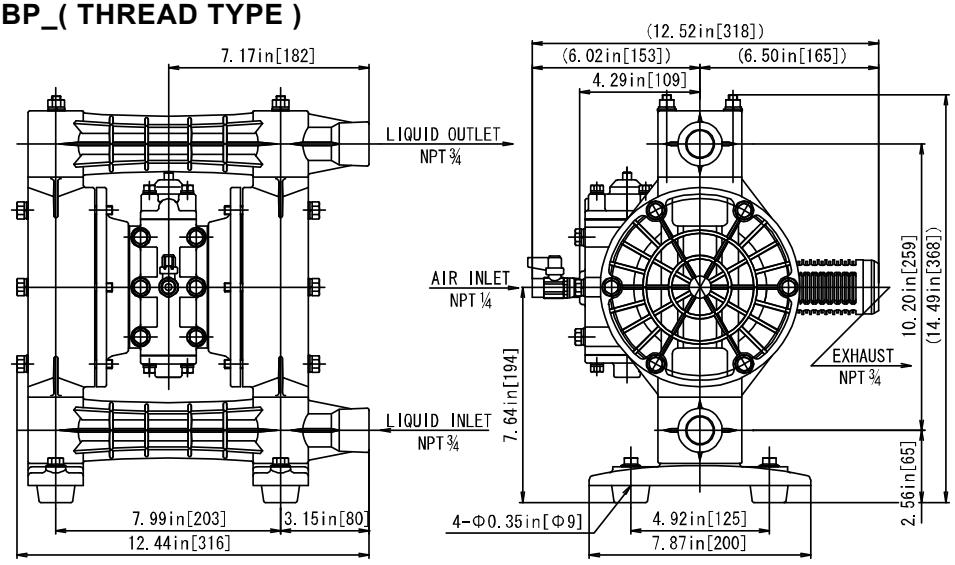
■NDP-20BA_



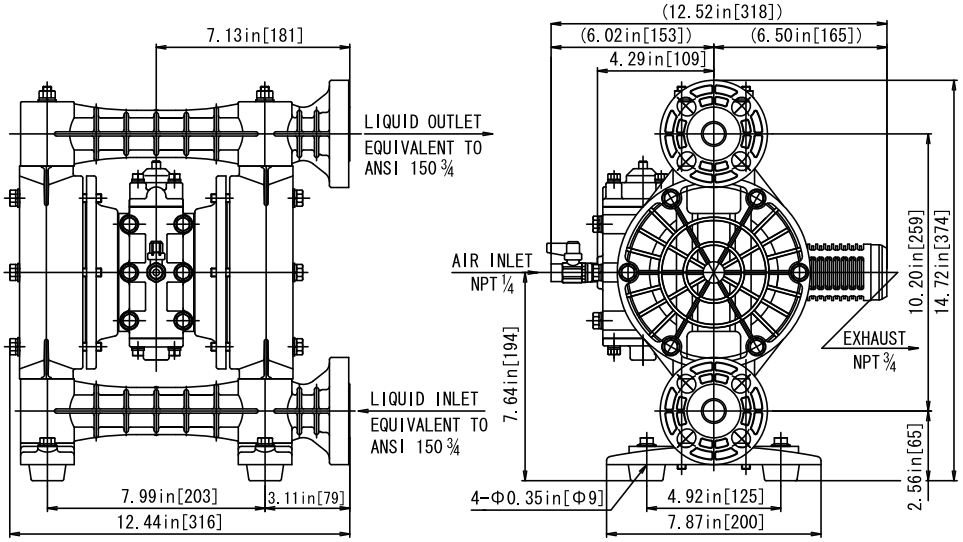
■NDP-20BS_



■NDP-20BP_(THREAD TYPE)

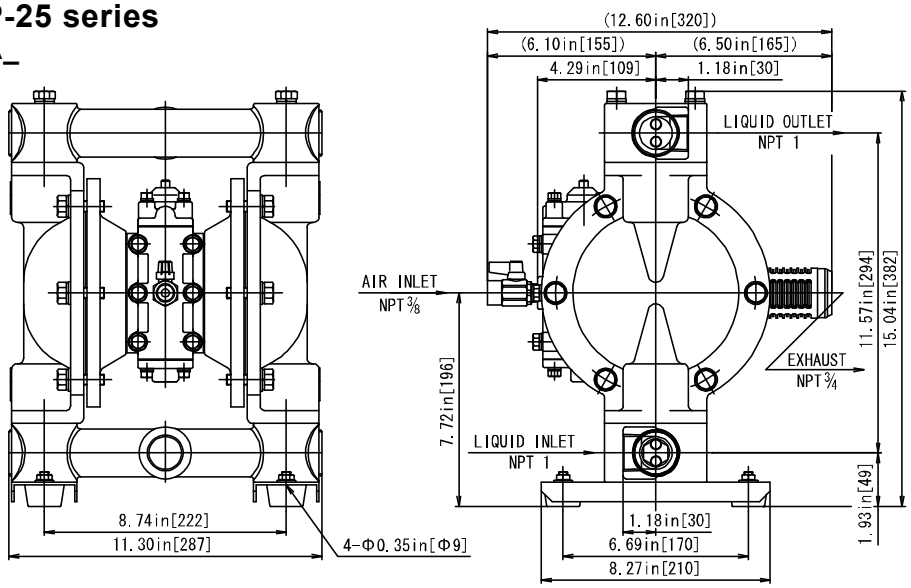


■NDP-20BP_(FLANGE TYPE)

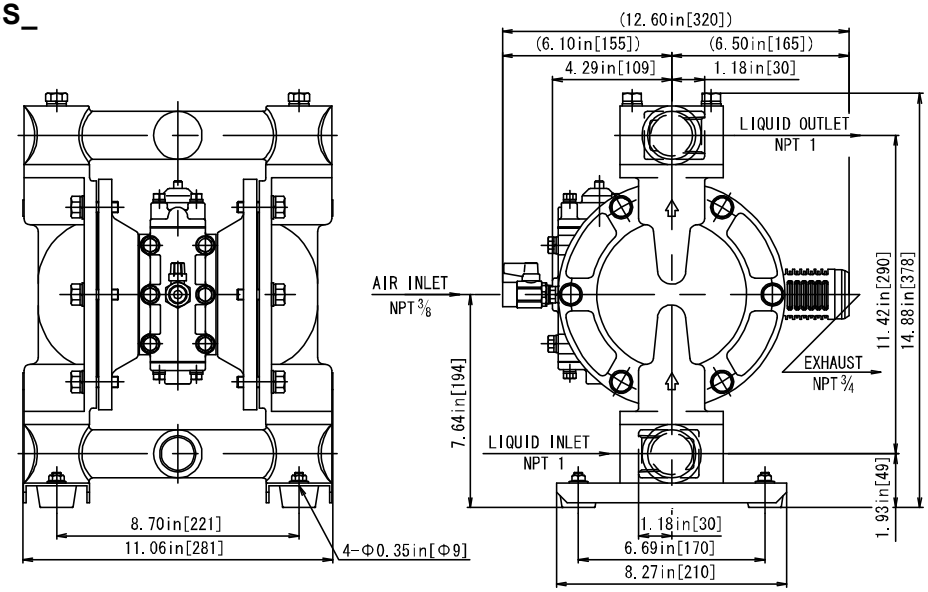


10.2.2 NDP-25 series

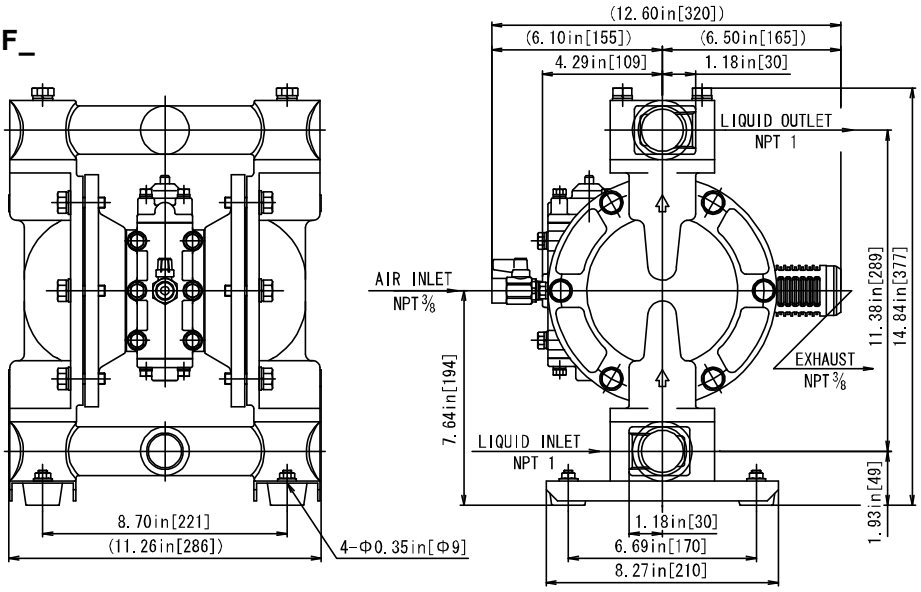
■NDP-25BA_



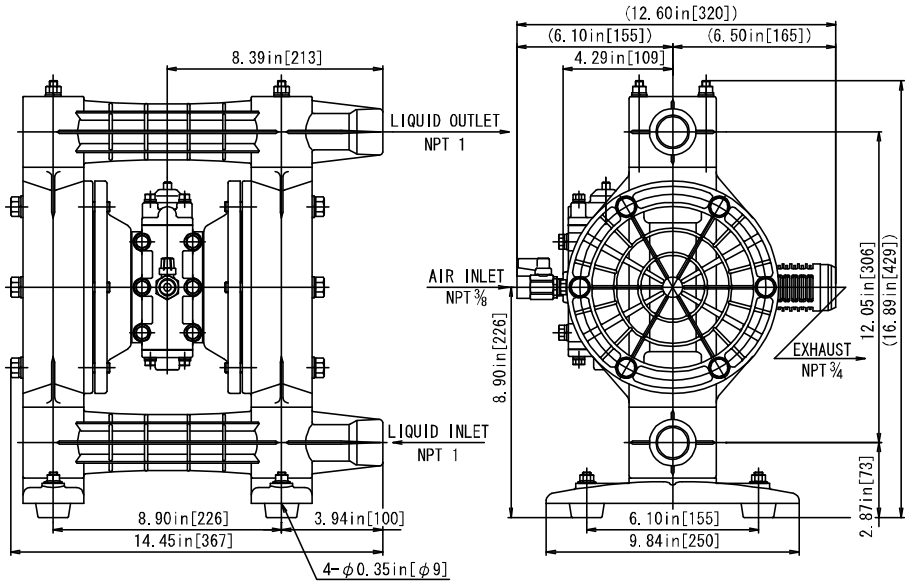
■NDP-25BS_



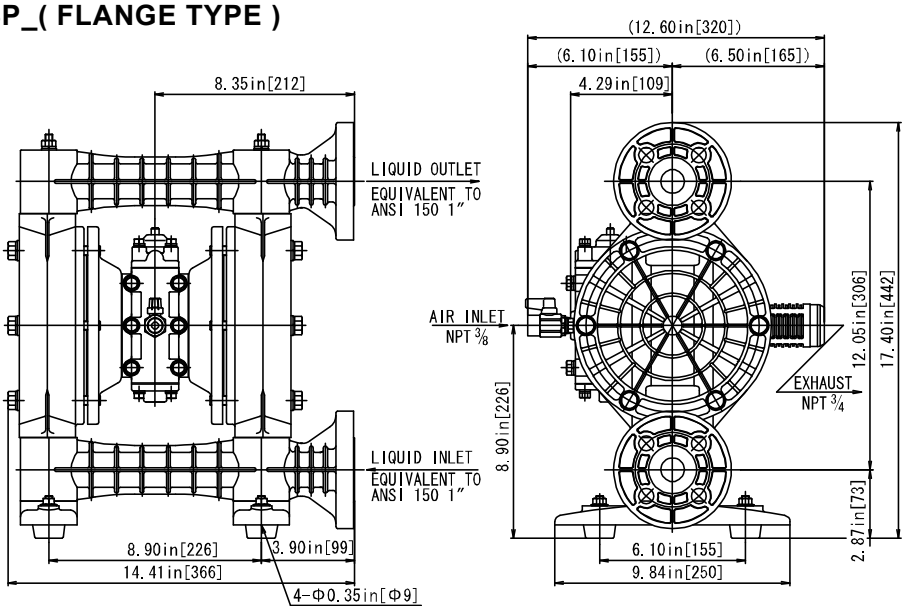
■NDP-25BF_



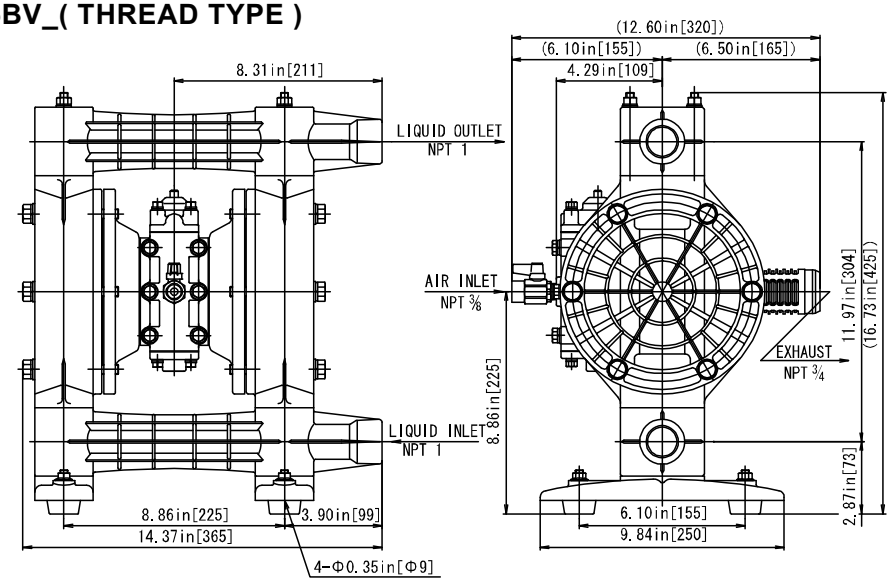
■NDP-25BP_(THREAD TYPE)



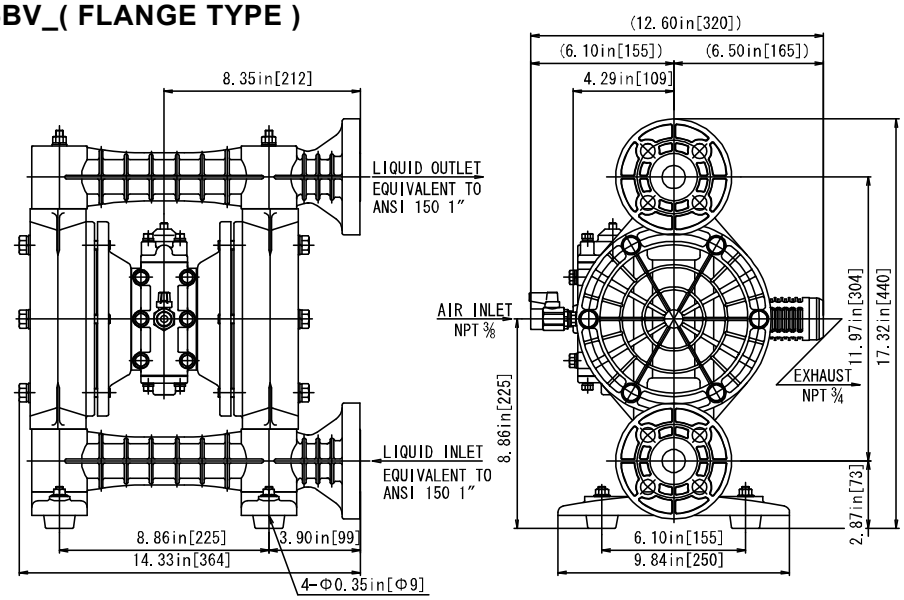
■NDP-25BP_(FLANGE TYPE)



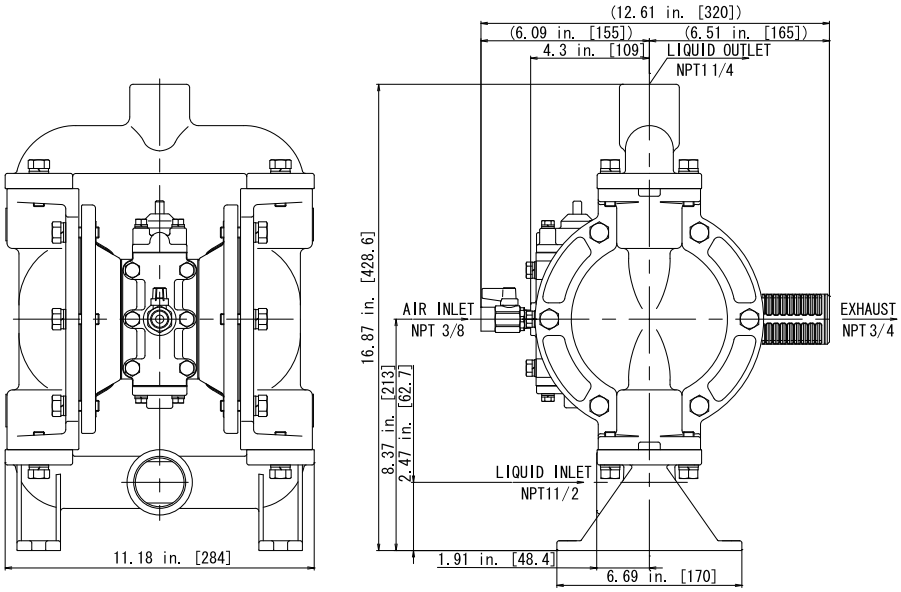
■NDP-25BV_(THREAD TYPE)



■NDP-25BV_(FLANGE TYPE)

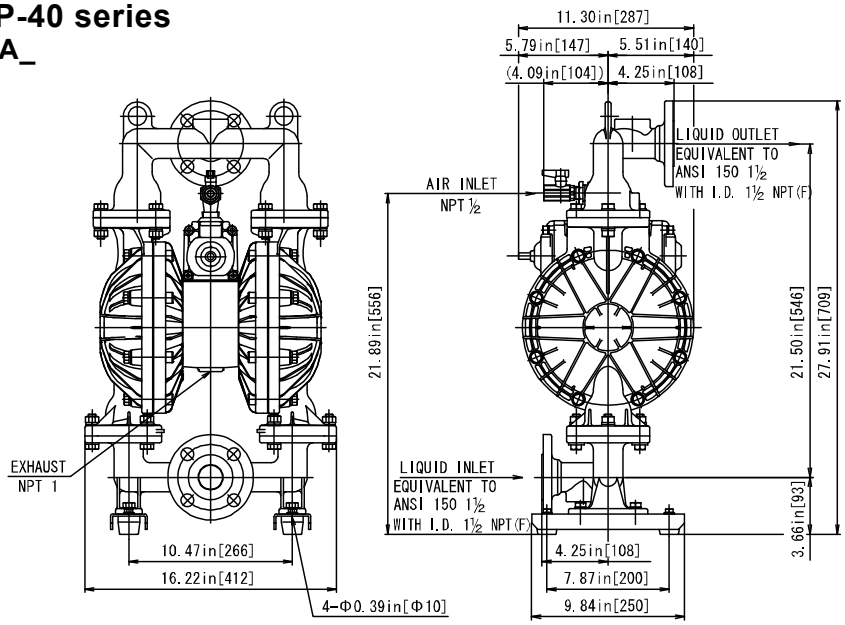


■NDP-32BAN

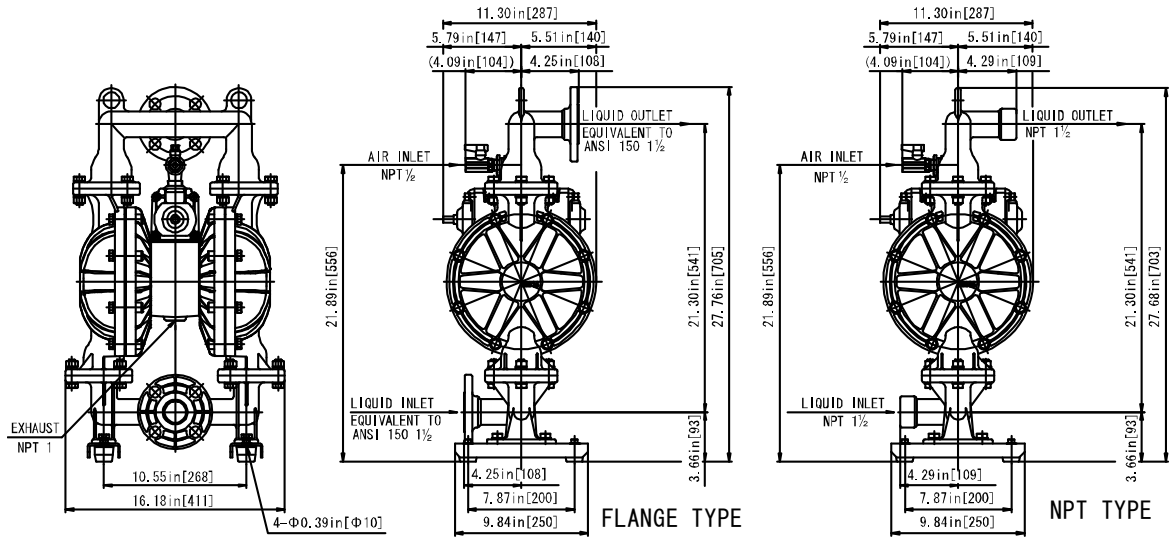


10.2.3 NDP-40 series

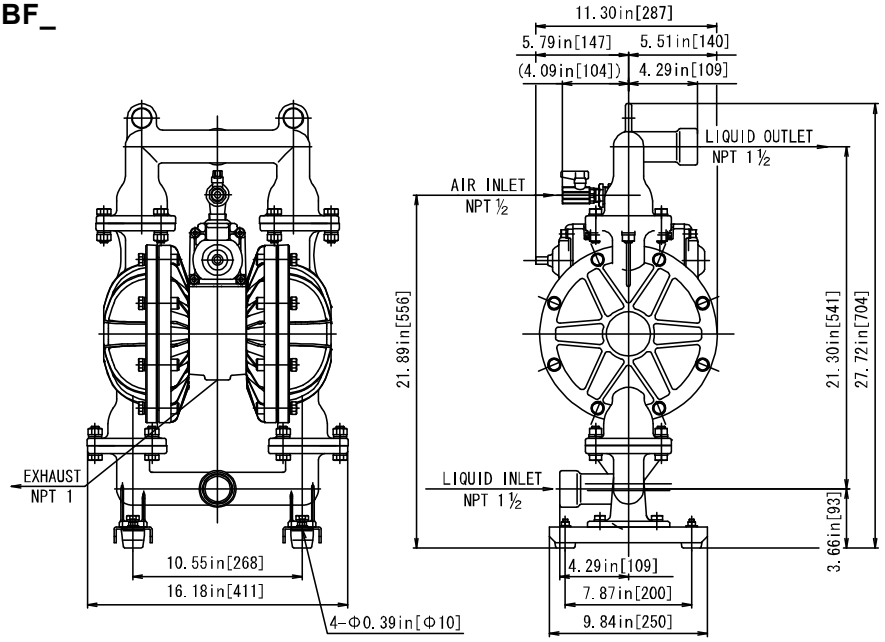
■NDP-40BA_



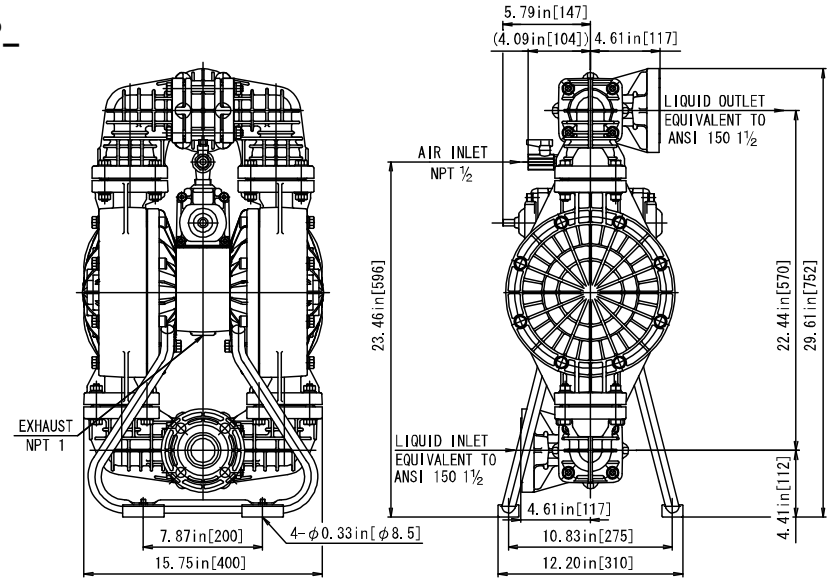
■NDP-40BS_



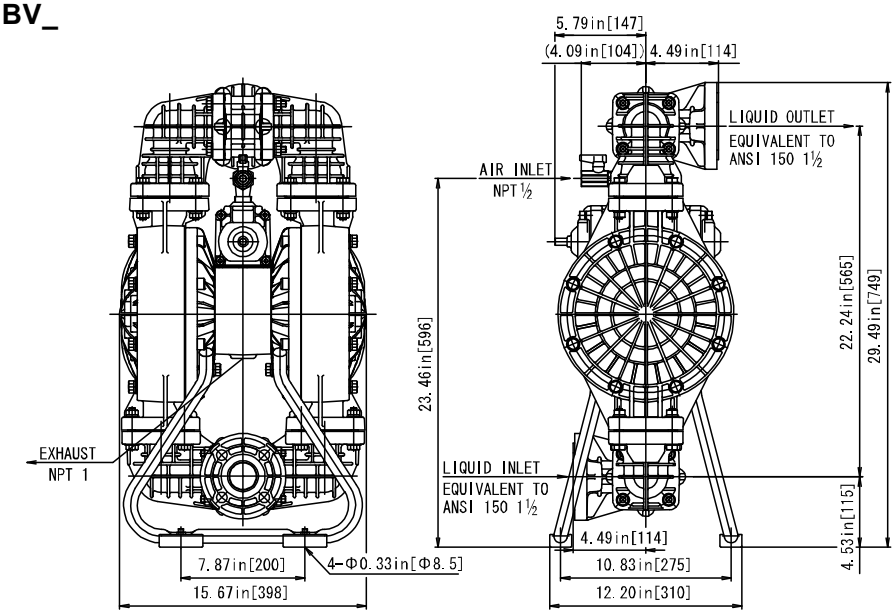
■NDP-40BF_



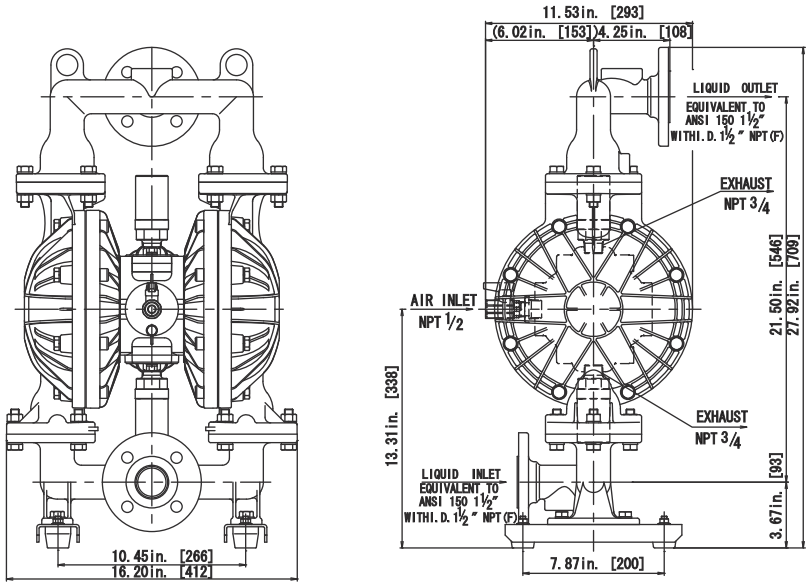
■NDP-40BP_



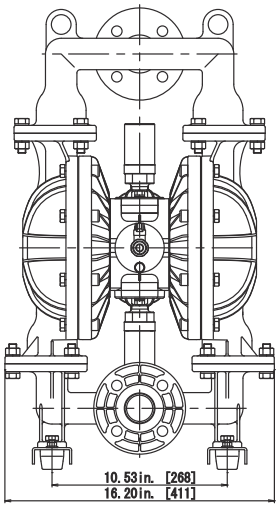
■NDP-40BV_

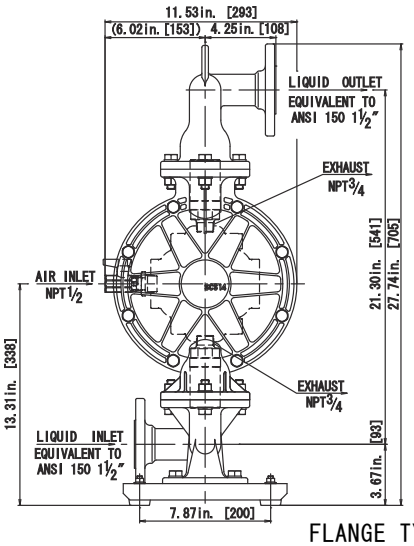


■DP-40BA_-HD

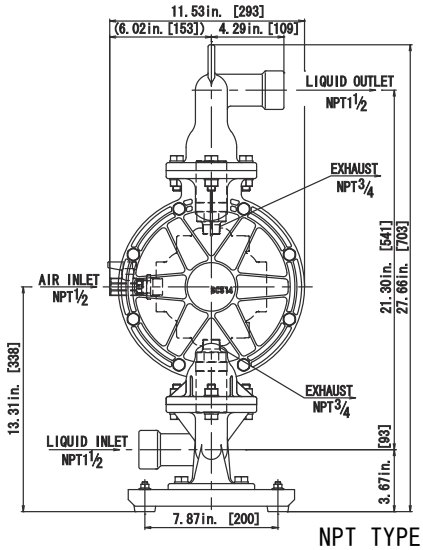


■DP-40BS_-HD



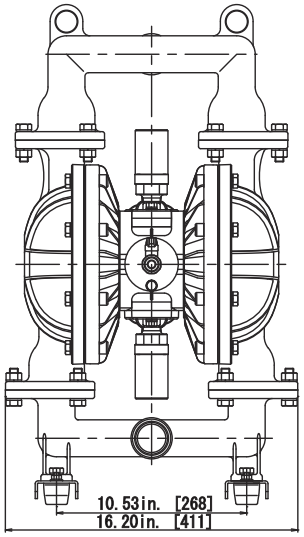


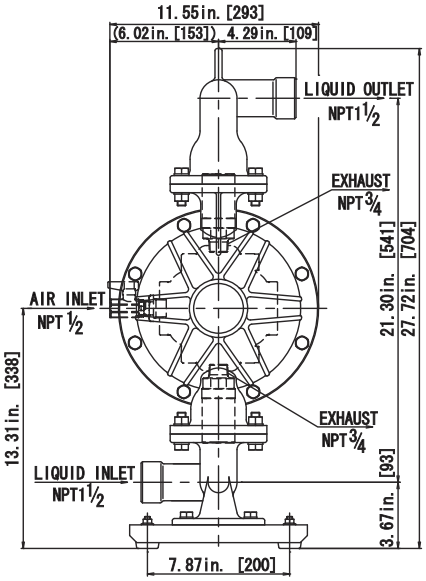
FLANGE TYPE



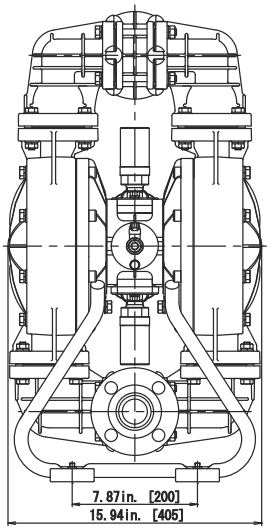
NPT TYPE

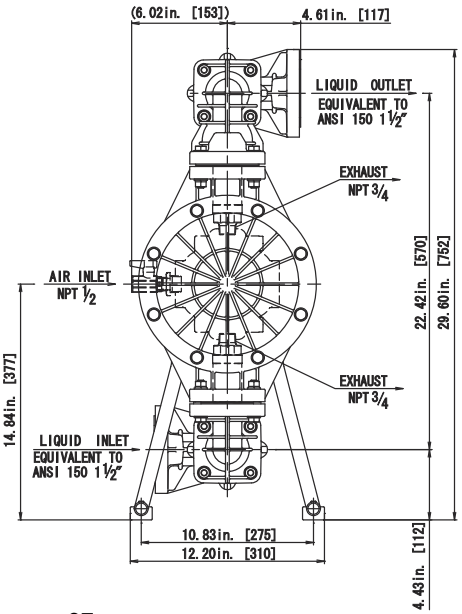
■DP-40BF_-HD





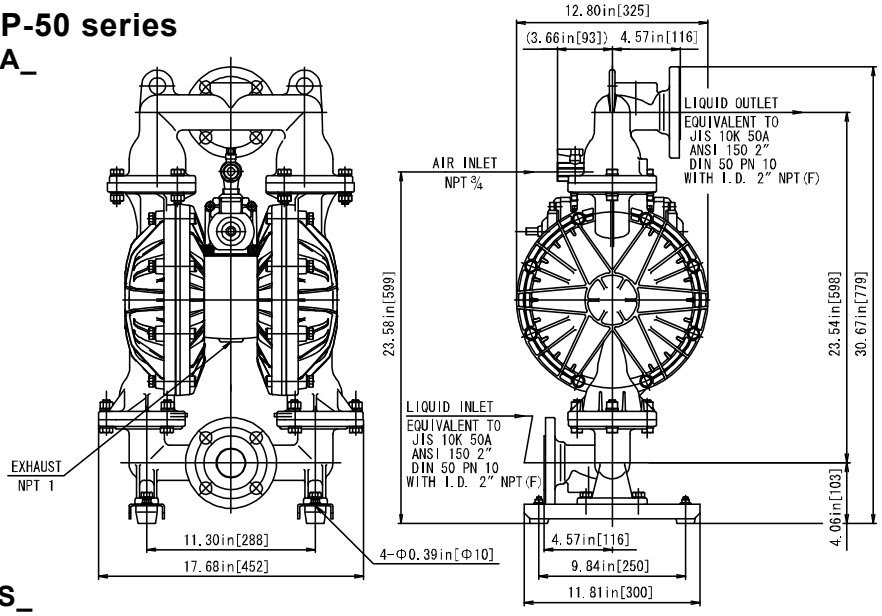
■DP-40BP_-HD



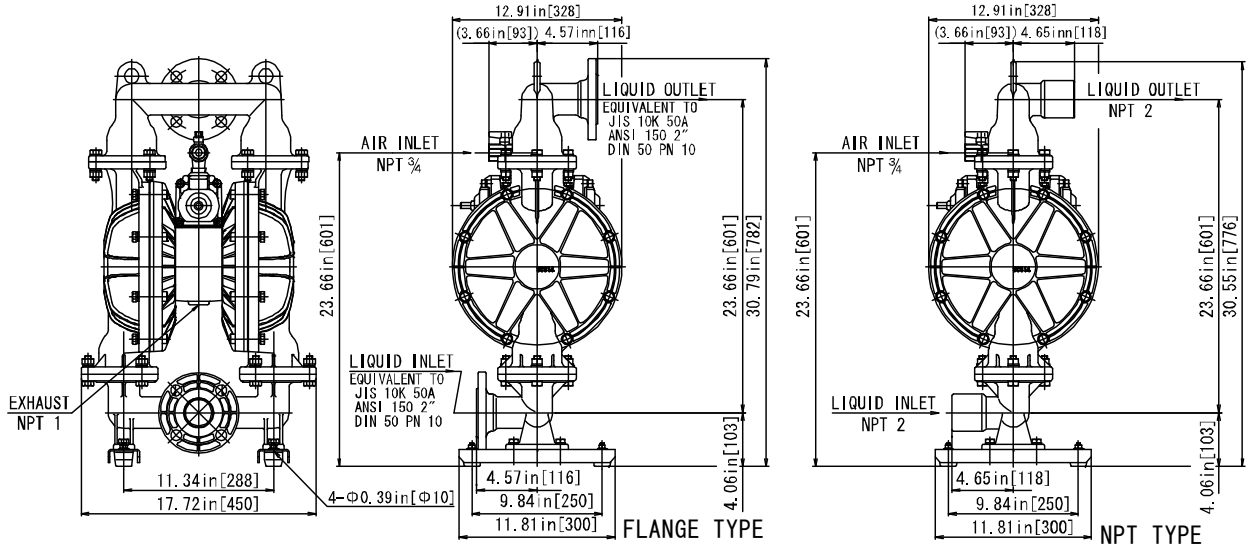


10.2.4 NDP-50 series

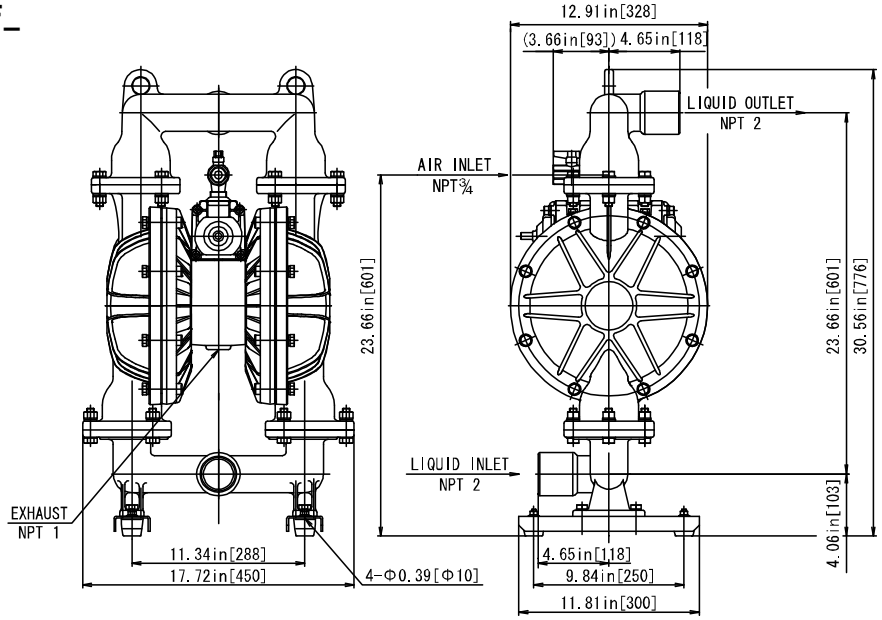
■NDP-50BA_



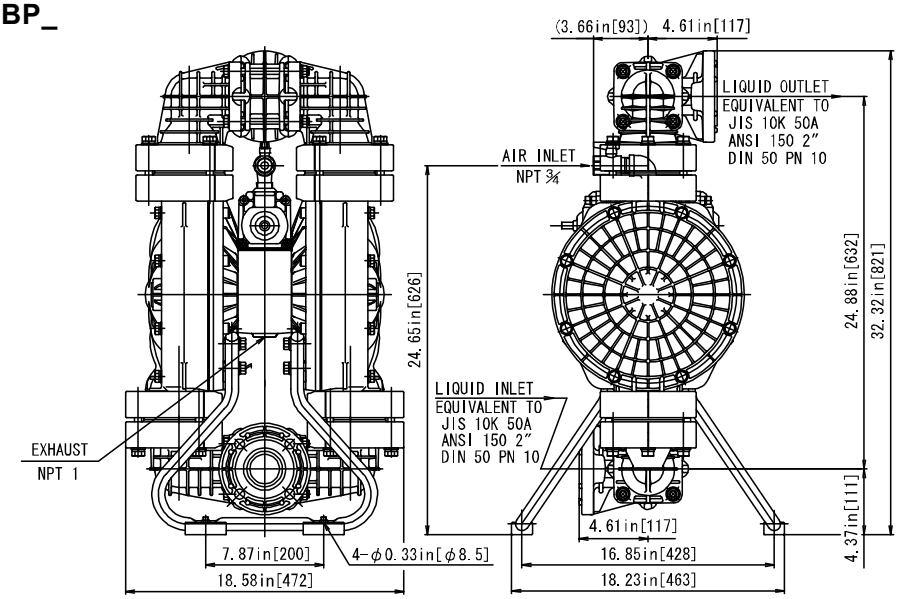
■NDP-50BS_



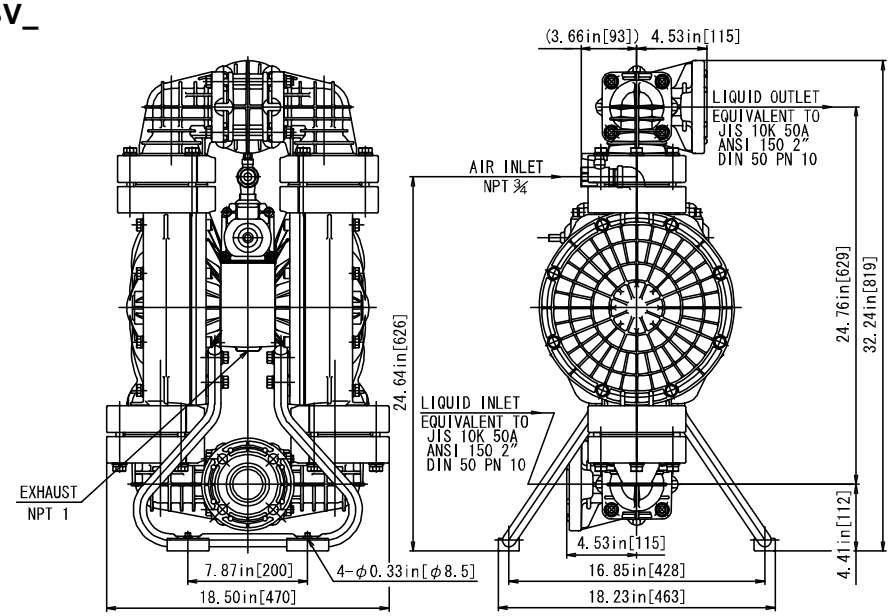
■NDP-50BF_



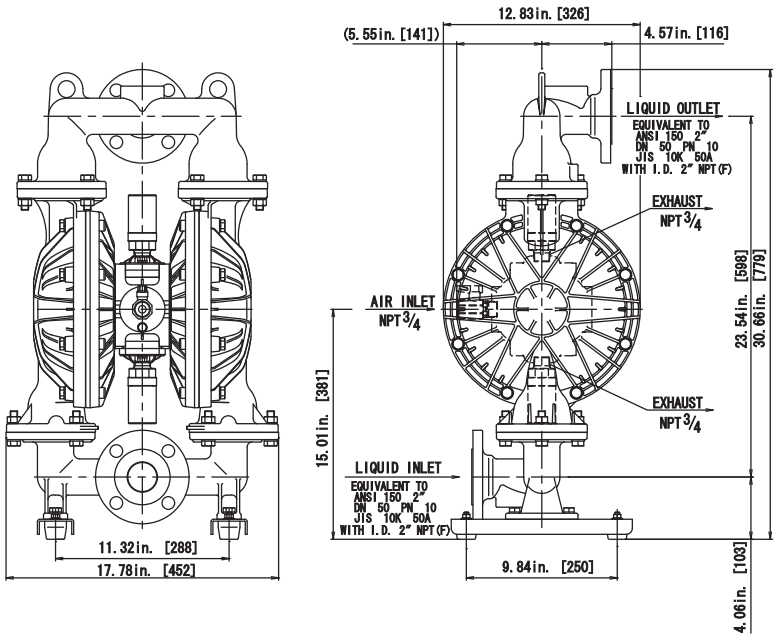
■NDP-50BP_



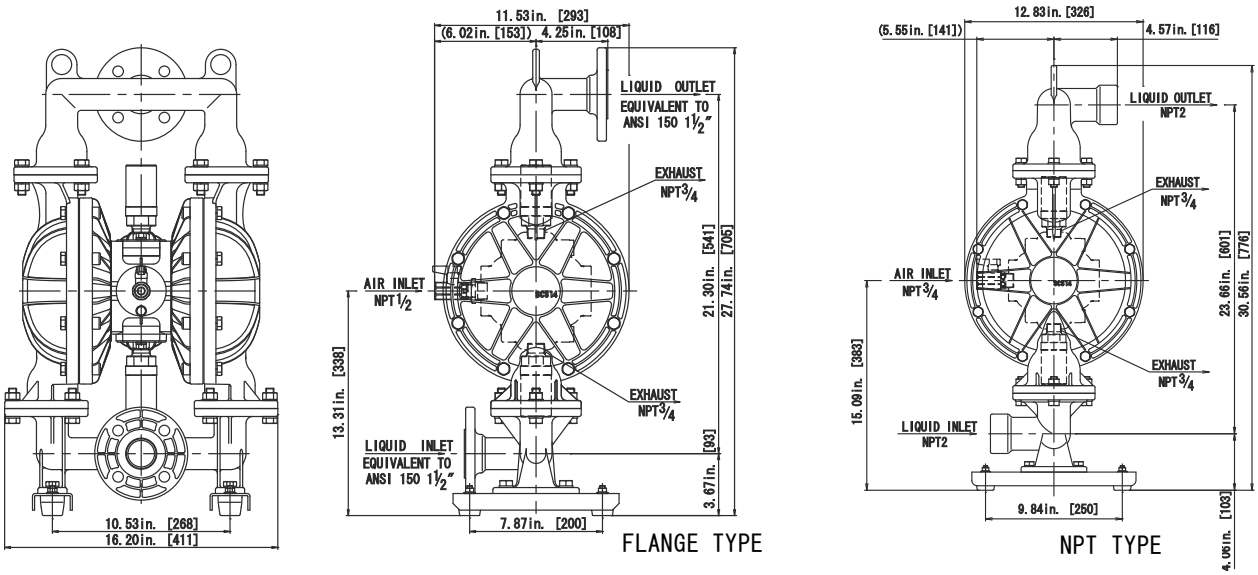
■NDP-50BV_



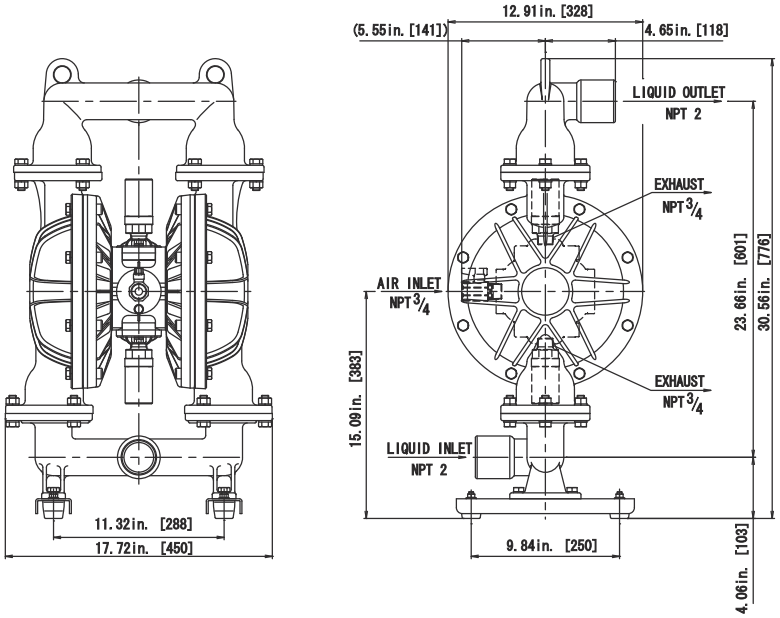
■DP-50BA_-HD



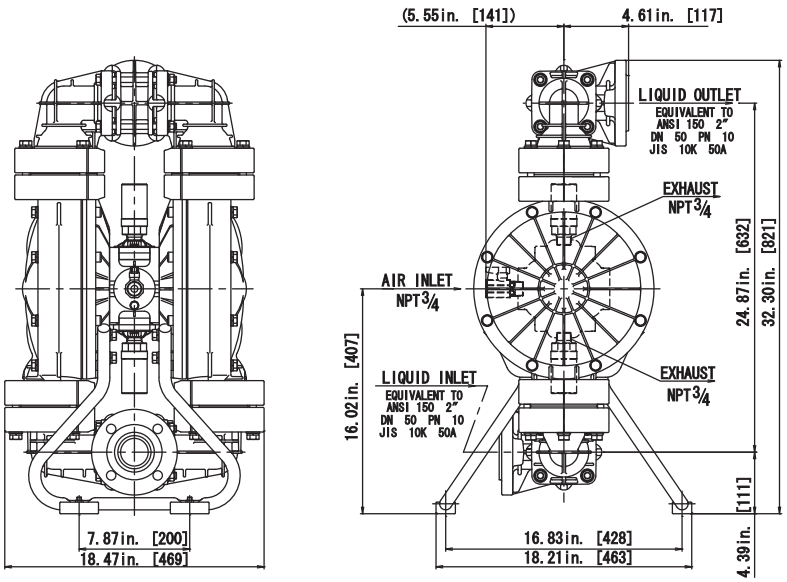
■DP-50BS_-HD



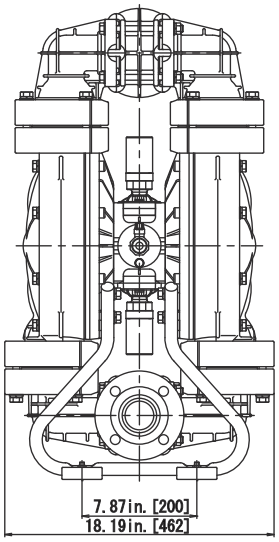
■DP-50BF_-HD

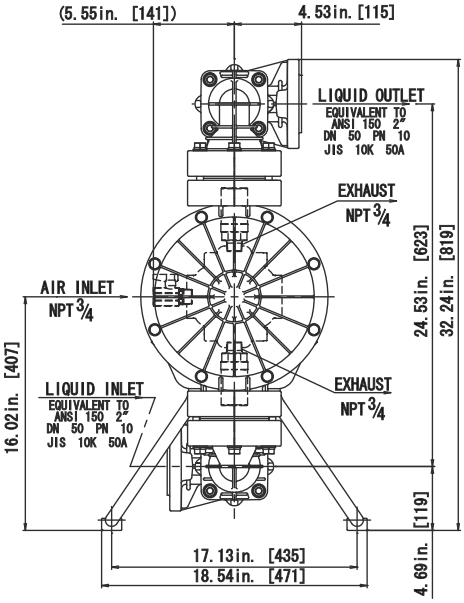


■DP-50BP_-HD



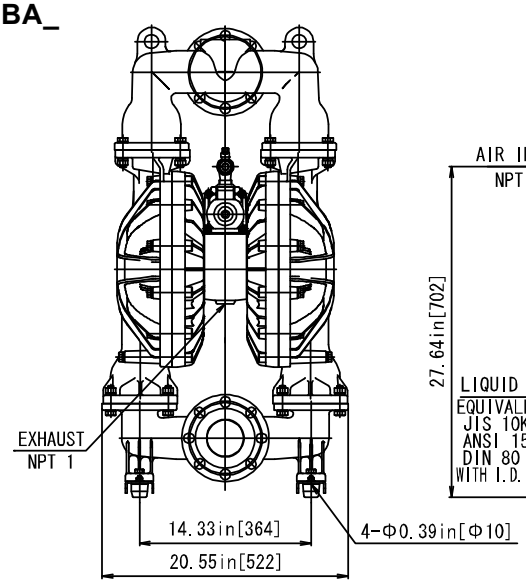
■DP-50BV_-HD

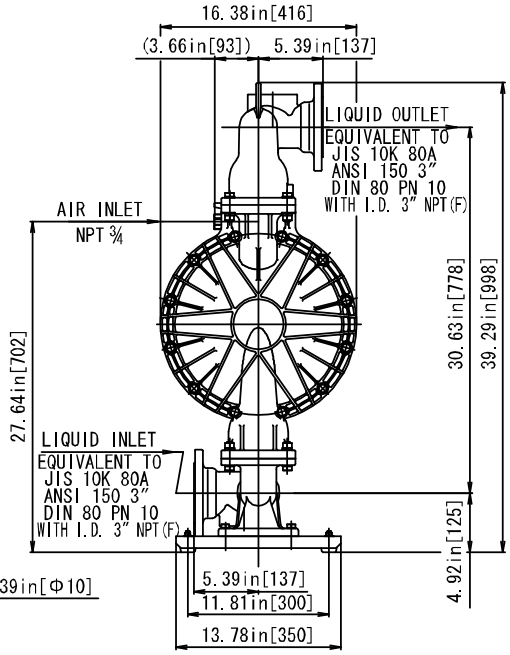




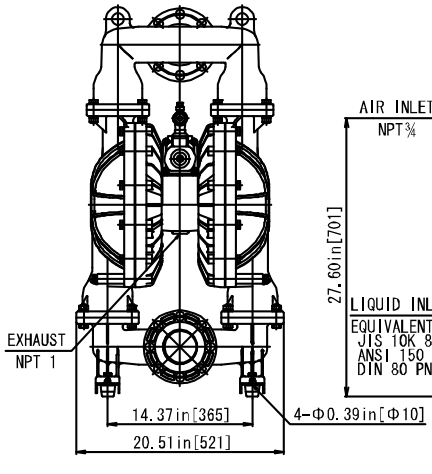
10.2.5 NDP-80 series

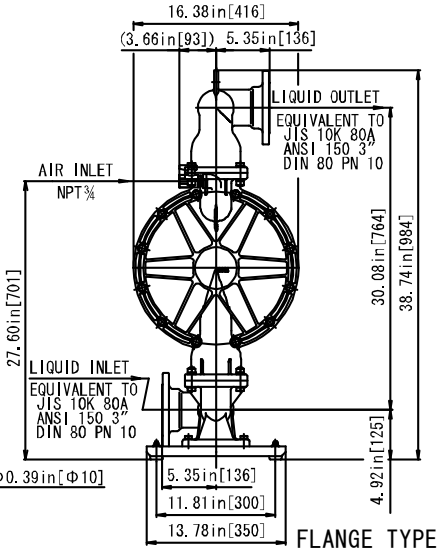
■NDP-80BA_

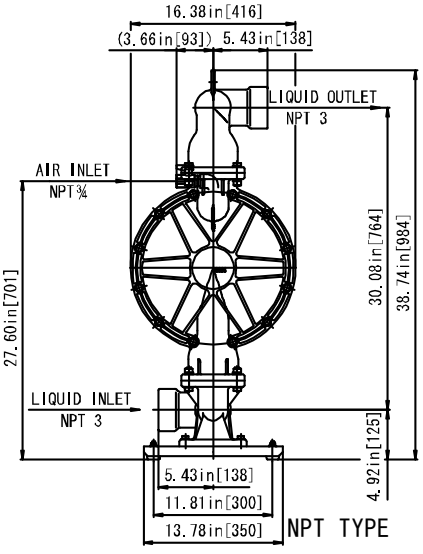




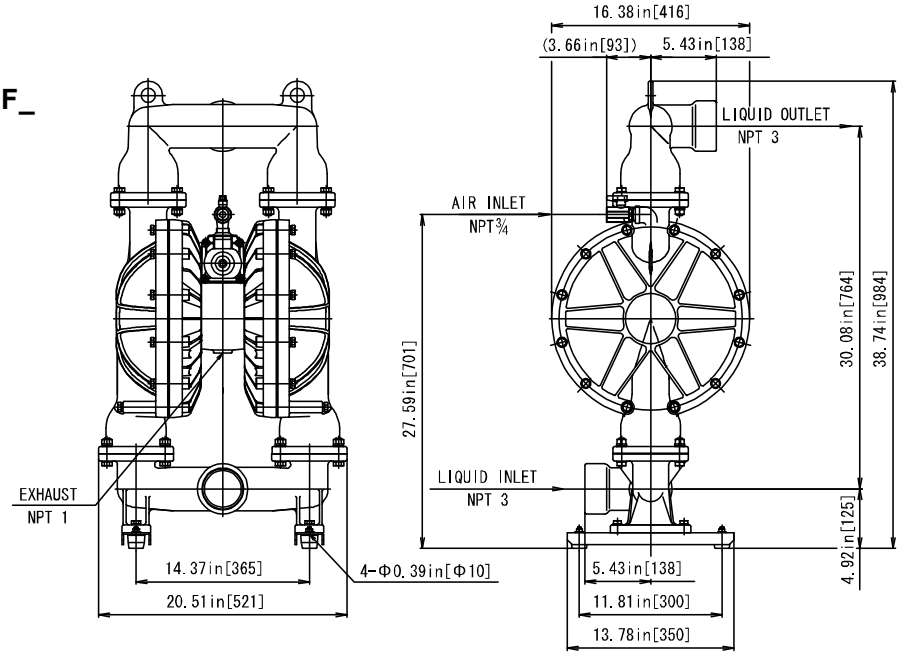
■NDP-80BS_



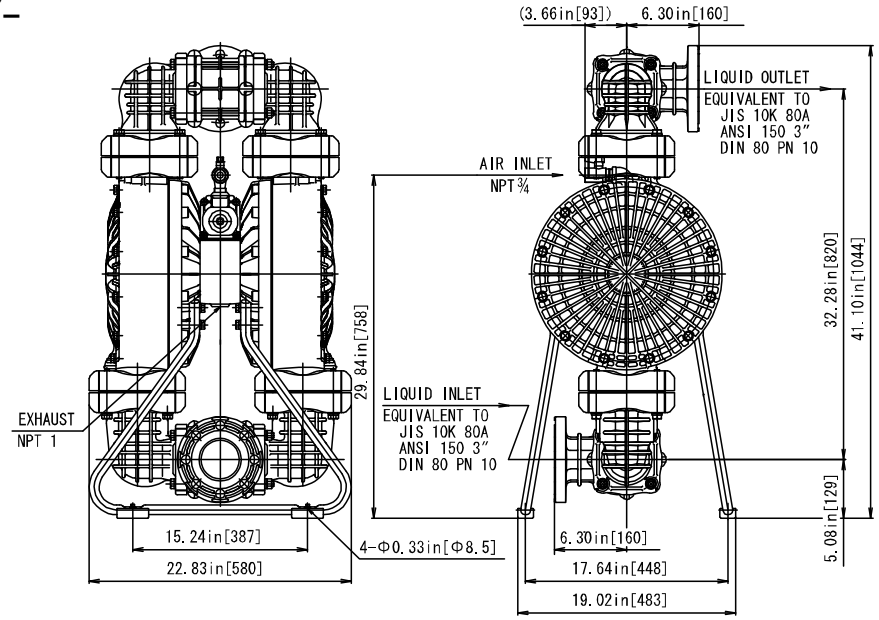




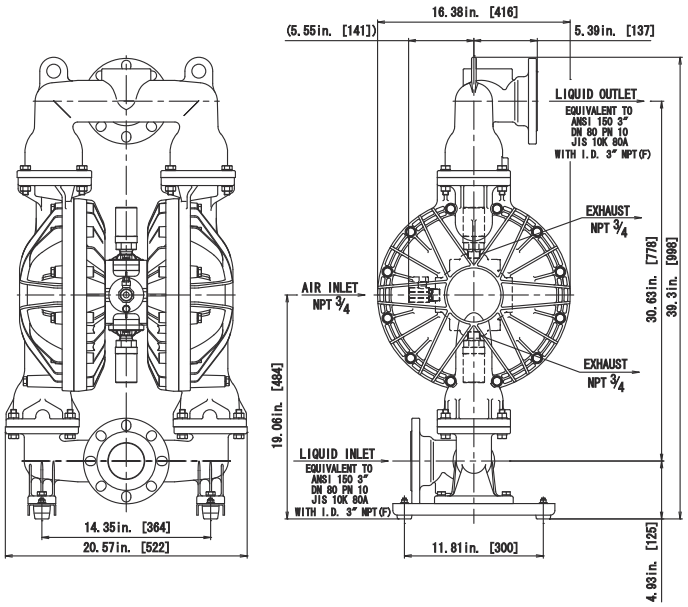
■NDP-80BF_



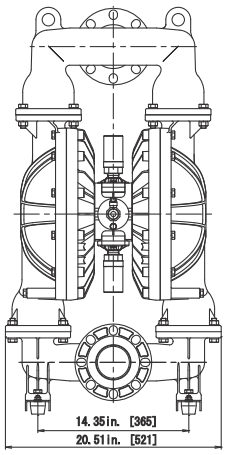
■NDP-80BP_

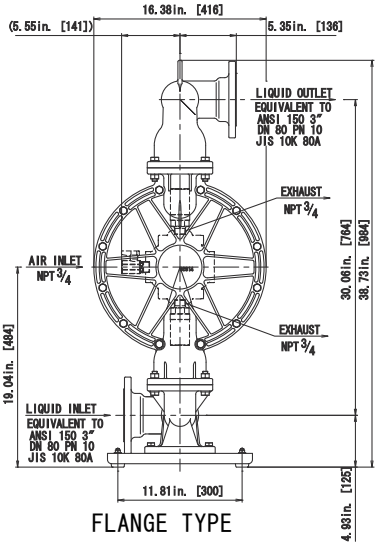


■DP-80BA_-HD

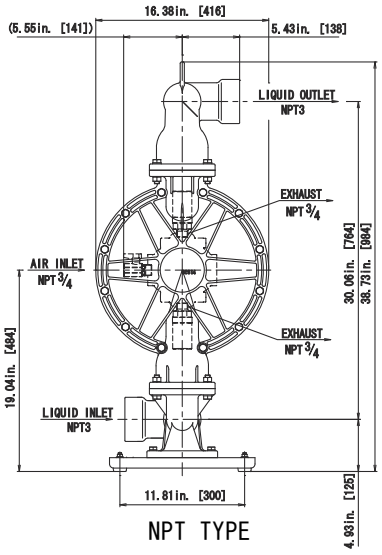


■DP-80BS_-HD



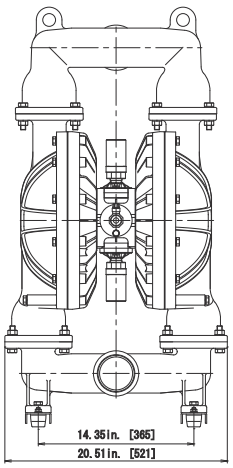


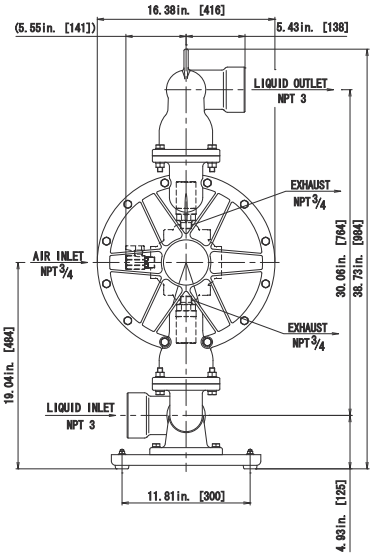
FLANGE TYPE



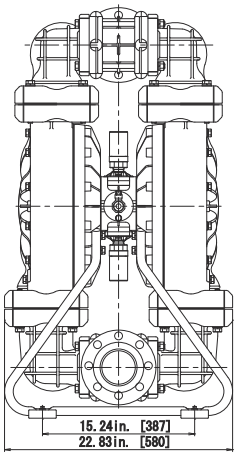
NPT TYPE

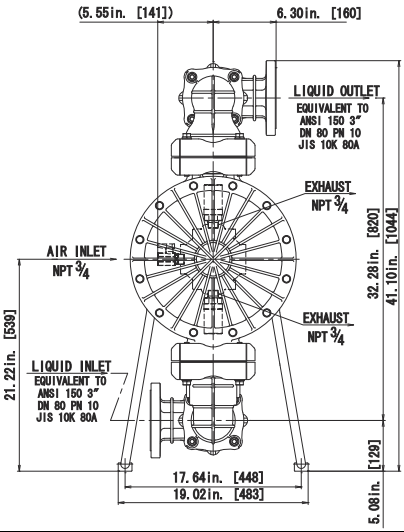
■DP-80BF_-HD





■DP-80BP_-HD





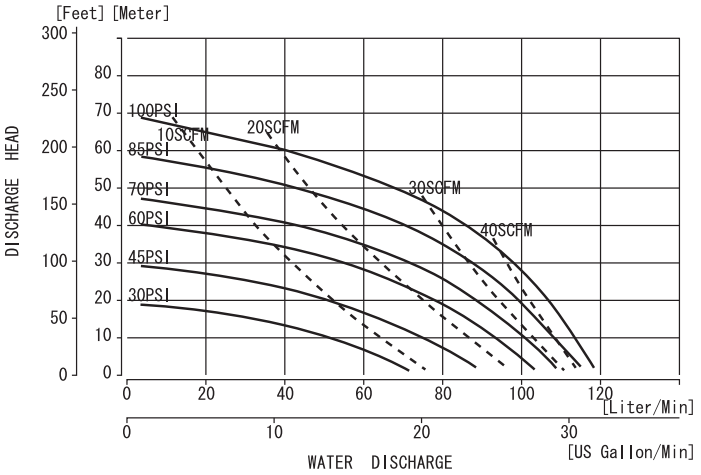
⚠ CAUTION

・Due to improvement or modification of products, dimensions may change without notice.
Please contact your distributor our regional office for detailed information.

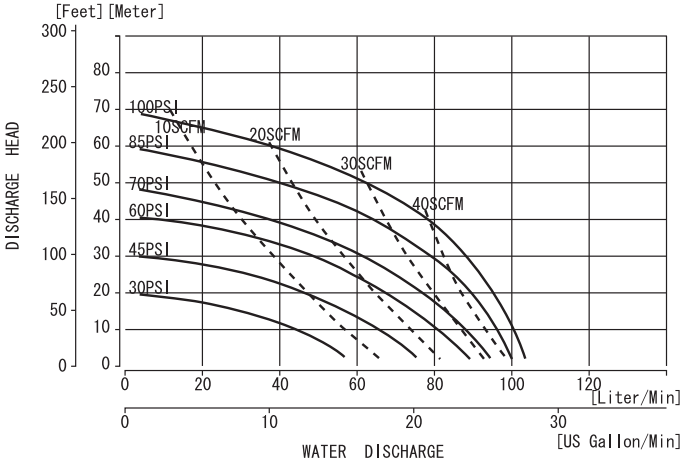
10.3 Performance curve

10.3.1 NDP-20 series

■NDP-20BA_/BS_/BP_

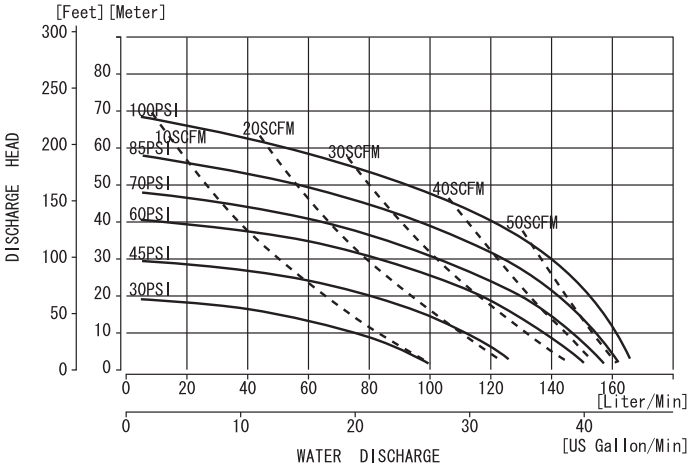


■NDP-20BAT/BST/BPT

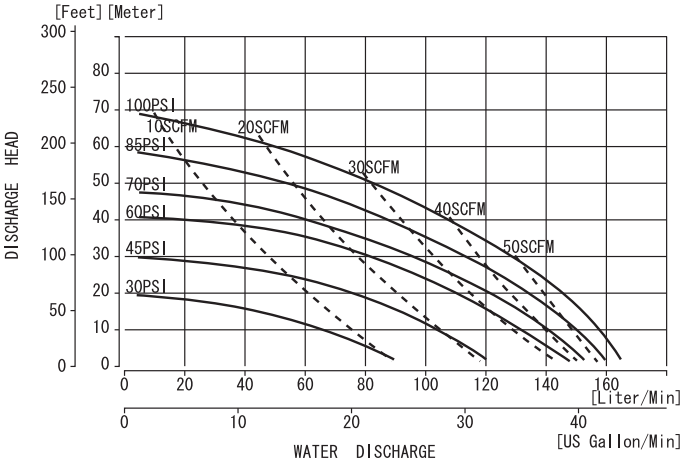


10.3.2 NDP-25 series

■NDP-25BA_/BS_/BF_/BP_/BV_

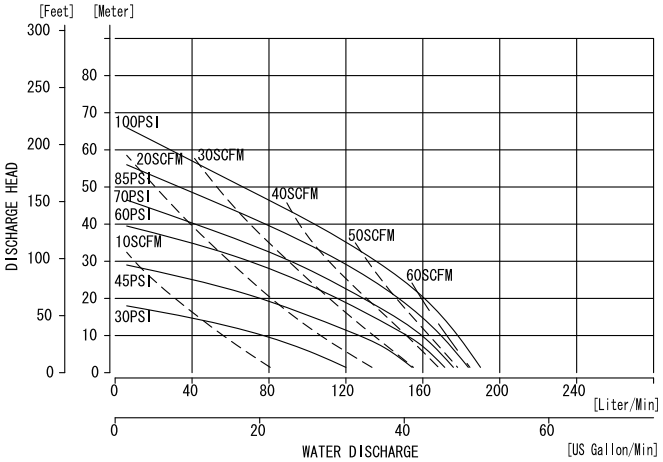


■NDP-25BAT/BST/BFT/BPT/BVT



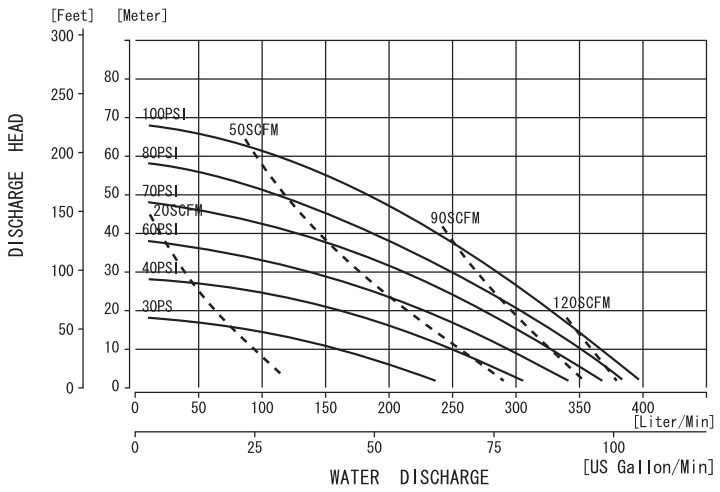
10.3.3 NDP-32 series

■NDP-32BAN

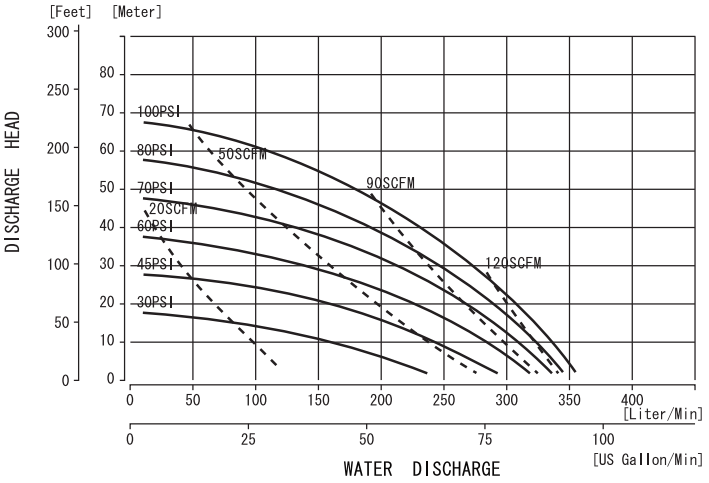


10.3.4 NDP-40 series

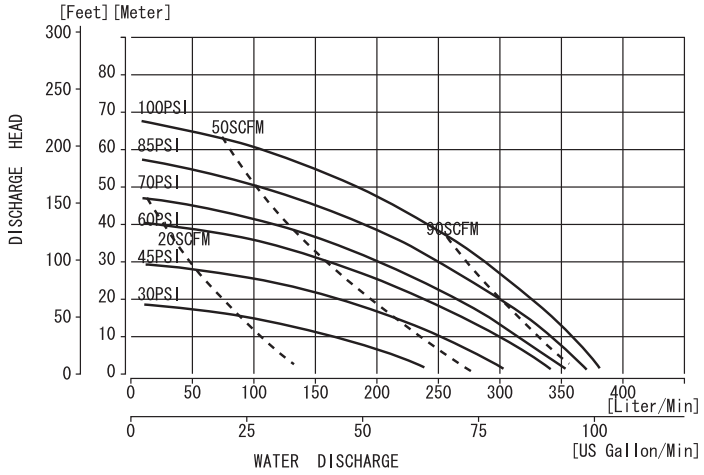
■NDP-40BA_/BS_/BF_



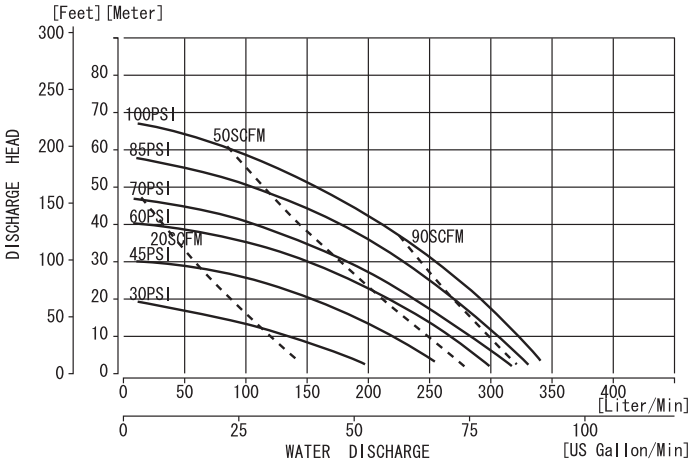
■NDP-40BAT/BST/BFT



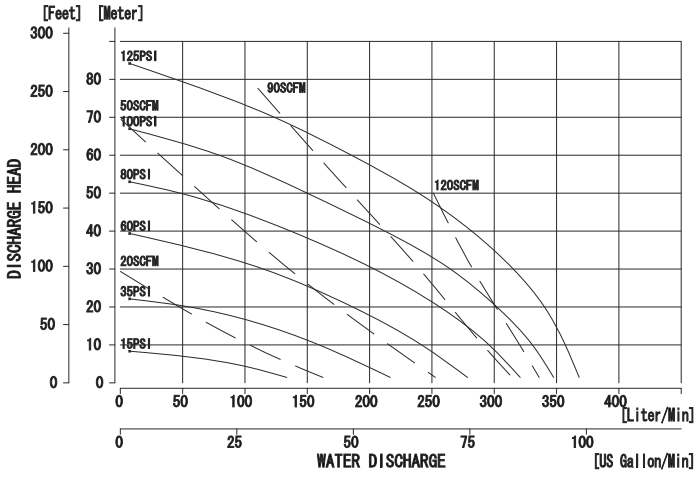
■NDP-40BP_/BV_



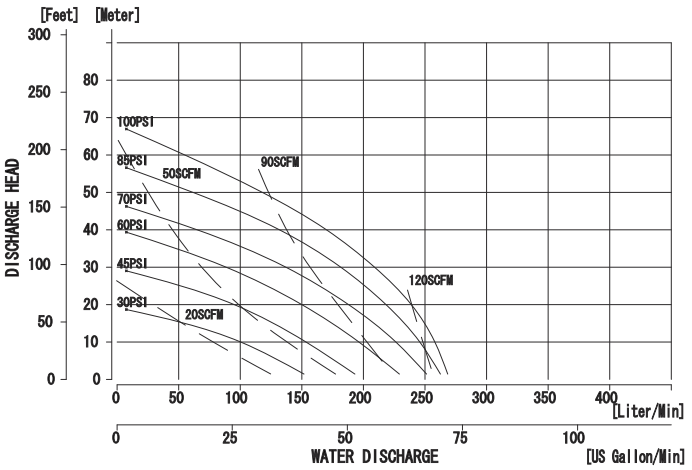
■NDP-40BPT/BVT



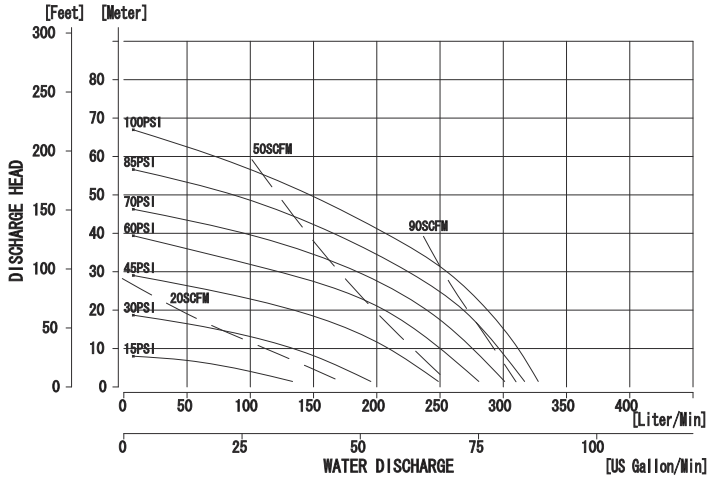
■DP-40BA_/BS_/BF_-HD



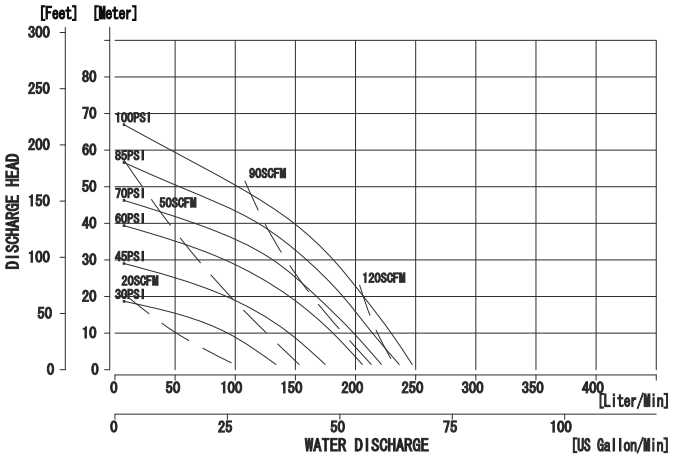
■DP-40BAT/BST/BFT-HD



■DP-40BP_-HD

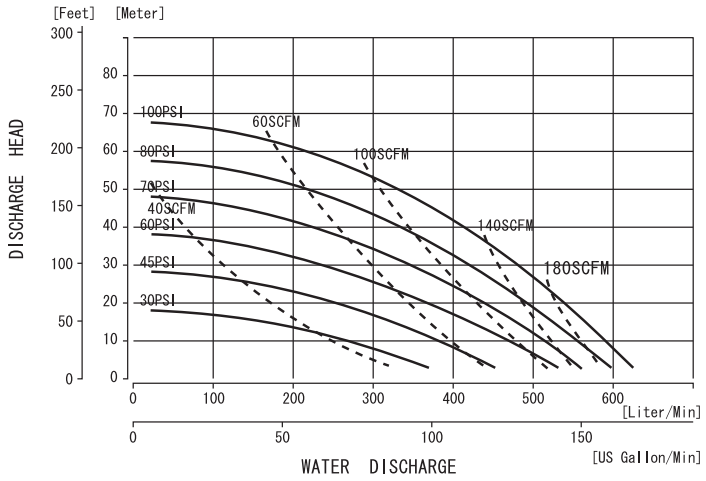


■DP-40BPT-HD

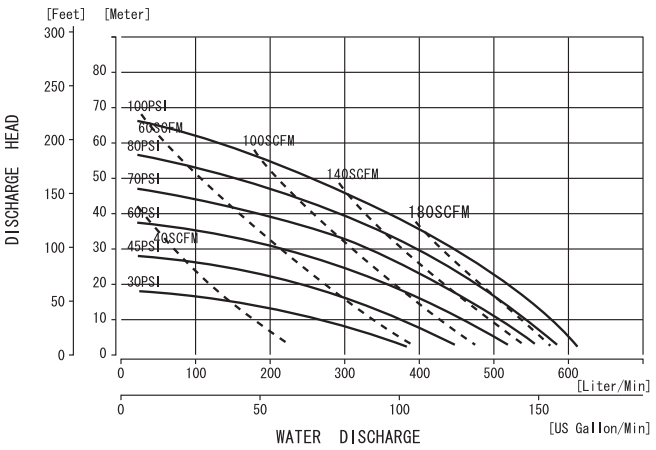


10.3.5 NDP-50 series

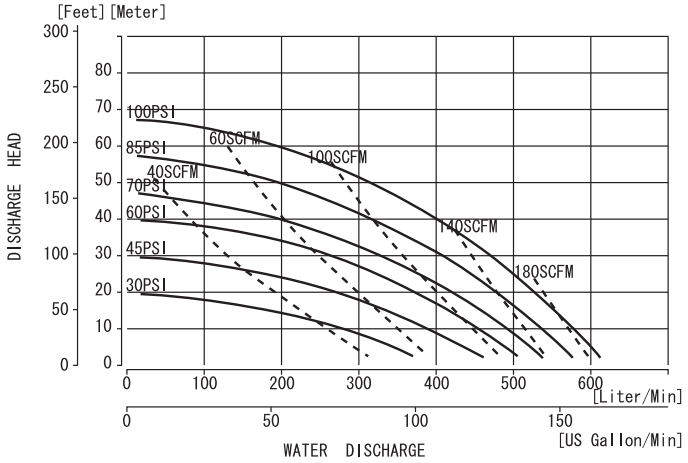
■NDP-50BA_/BS_/BF_



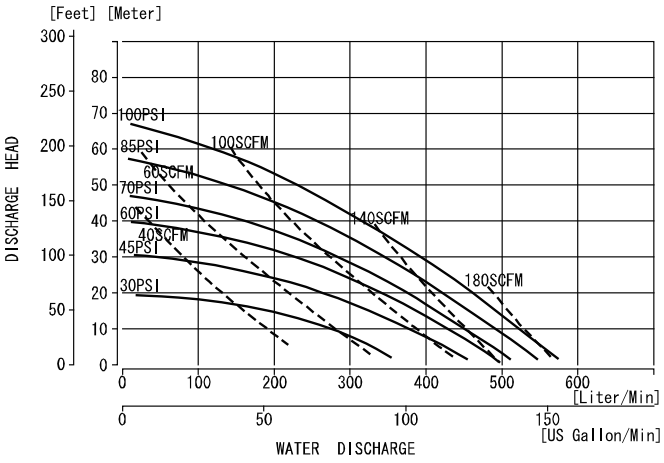
■NDP-50BAT/BST/BFT



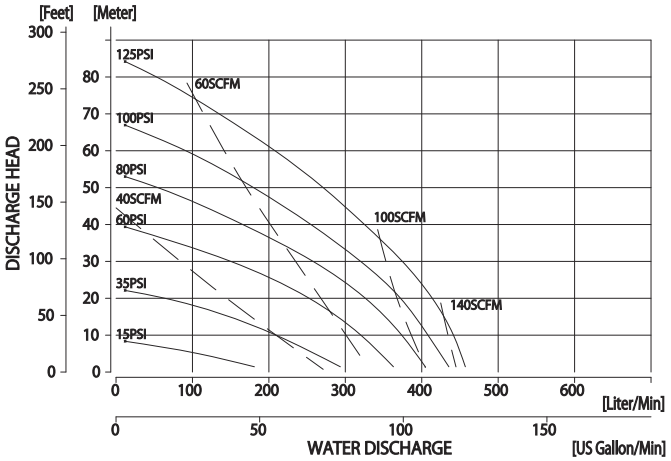
■NDP-50BP_/BV_



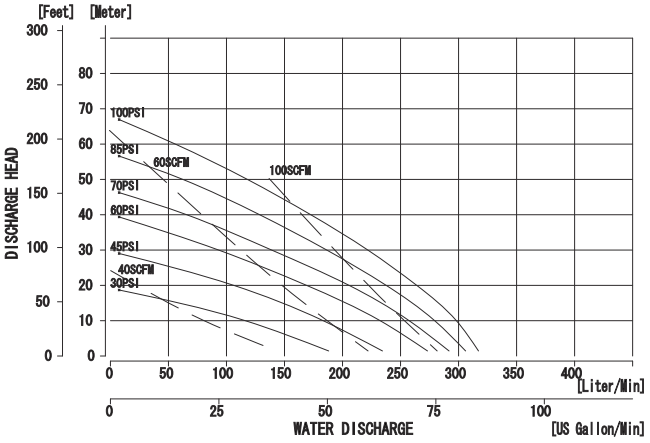
■NDP-50BPT/BVT



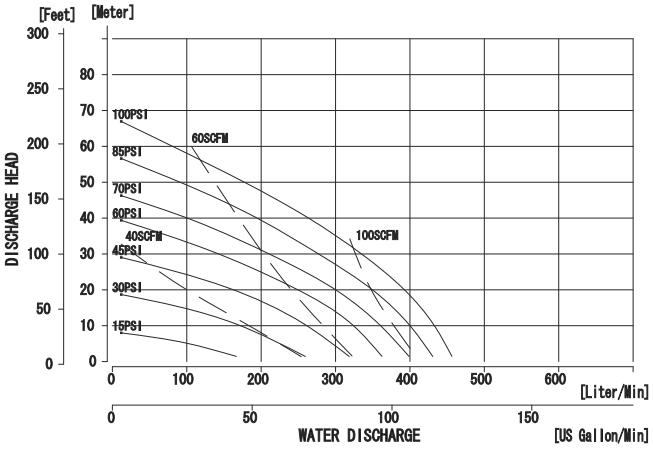
■DP-50BA_/BS_/BF_-HD



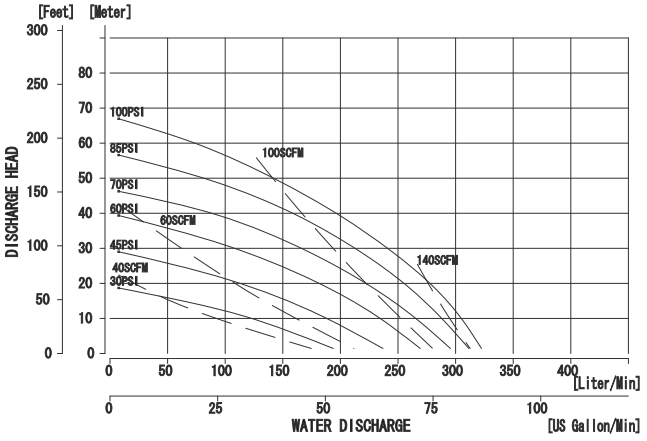
■NDP-50BAT/BST/BFT-HD



■DP-50BP_/BV_-HD

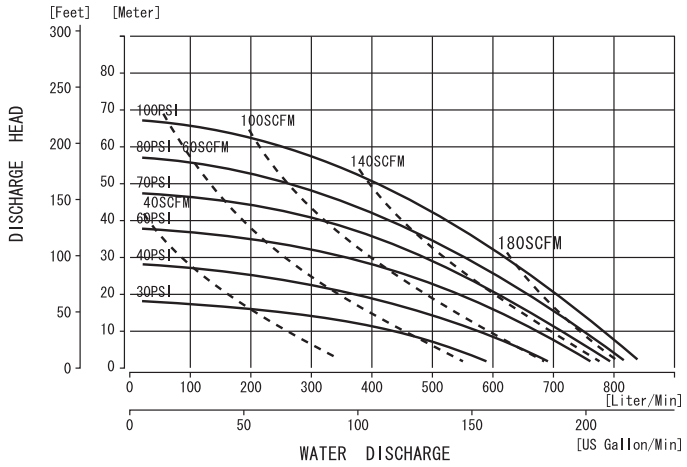


■DP-50BPT/BVT-HD

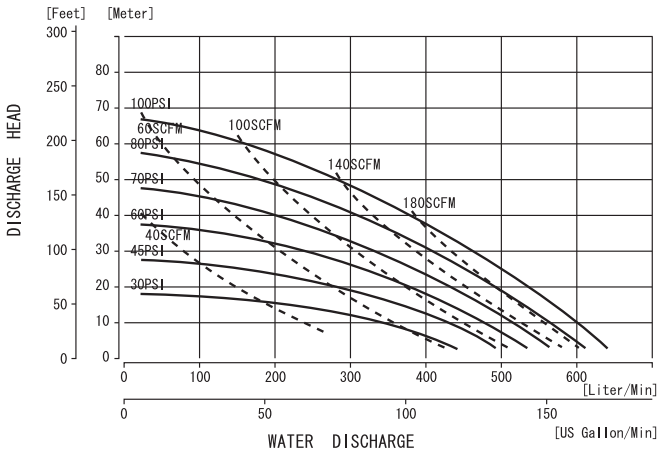


10.3.6 NDP-80 series

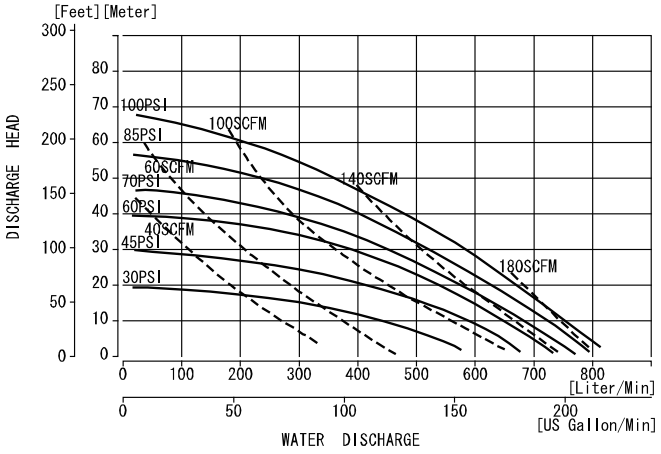
■NDP-80BA_/BS_/BF_



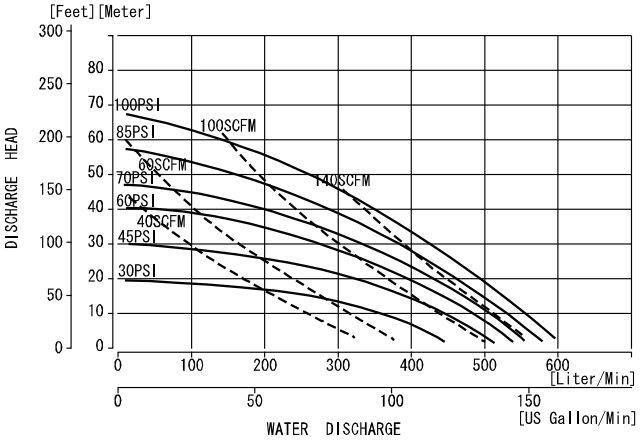
■NDP-80BAT/BST/BFT



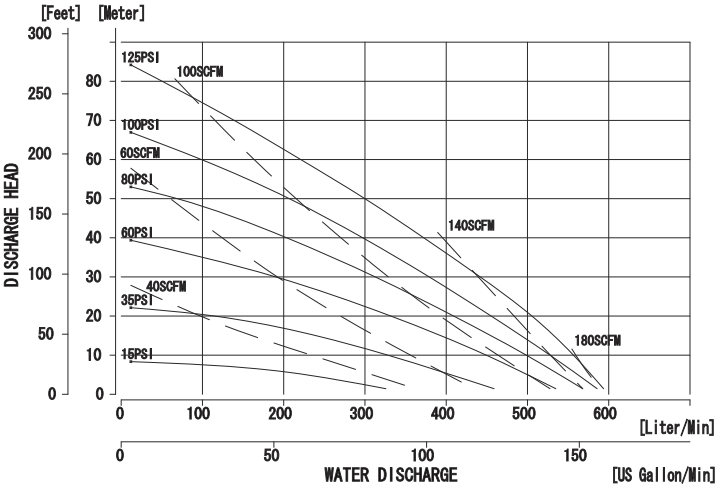
■NDP-80BP_



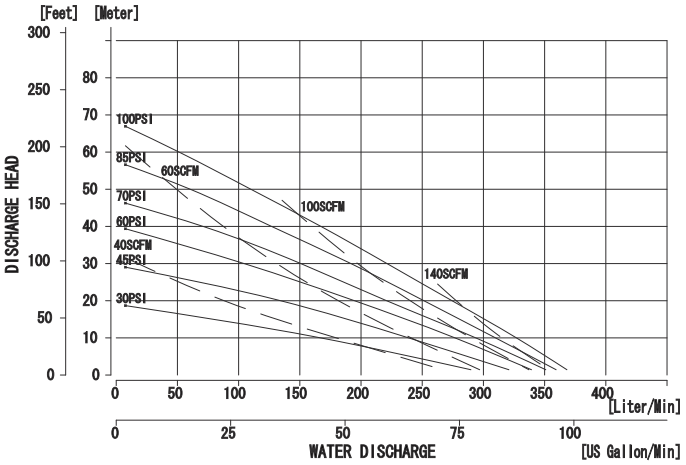
■NDP-80BPT



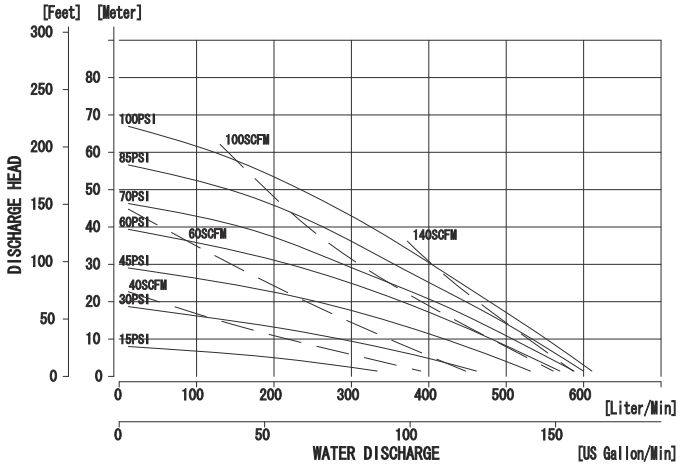
■DP-80BA_/BS_/BF_-HD



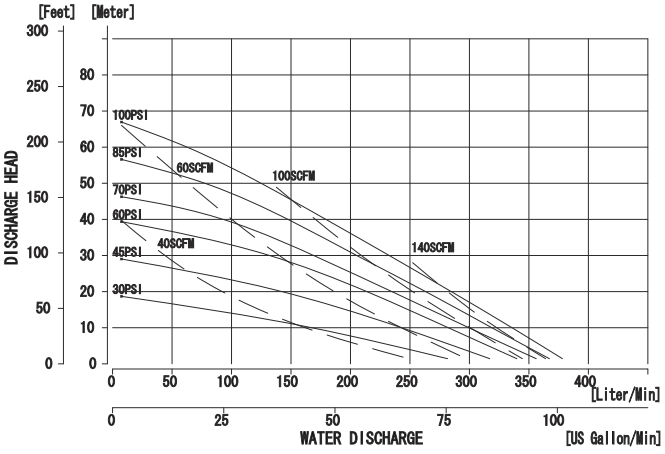
■DP-80BAT/BST/BFT-HD



■DP-80BP_-HD



■DP-80BPT-HD



Note: Method of measurement of performance curve

Measuring instruments and procedure

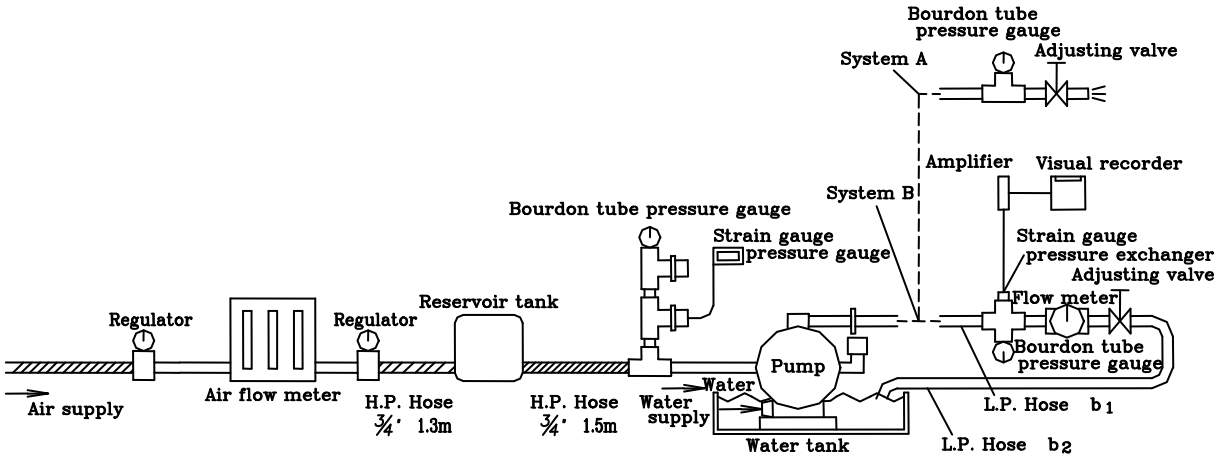


Fig.10.1

▪ Conditions

a) Supplied air pressure: Maintaining preset pressure

b) Liquid pumped: Fresh water

c) Temperature: Ambient

d) Condition of suction: Flat suction 0 feet head

e) Measuring system: System A ▪▪▪▪▪▪ Converting weight of discharged fluid to volume.

System B ▪▪▪▪▪▪ By liquid meter

11. Trouble-Reporting FAX Sheet

・Your information will be most helpful in our efforts to improve our service as well as checking into causes of troubles and irregularities. Therefore, please. fill out the following FAX sheet and fax it to your distributor or our regional office. Thank you.

<table>
<tr><th colspan="2">Trouble-Reporting FAX Sheet</th></tr>
<tr><td>Name of your company

_____</td><td>Contact person

_____</td></tr>
<tr><td rowspan="2">Address _____

City _____ State _____ Zip _____</td><td>Department

_____</td></tr>
<tr><td>Telephone ( ) _____ – _____

Fax ( ) _____ – _____</td></tr>
<tr><td>MODEL/No. (Product name/Product No.)</td><td>Date of product</td></tr>
<tr><td>Period of use
From to
_____ / ____ _____ / ____</td><td>SERIAL No.
(Lot No.)</td></tr>
<tr><td>Operating conditions
☐Indoor ☐Outdoor
Frequency of operation
☐Continuous
☐Intermittent
_____ Hours / day / week / month</td><td>Date of purchase

_____
Name of dealer

_____</td></tr>
<tr><td>Operating air pressure _____ PSI or MPa
Discharge pressure _____ PSI or MPa
Discharge volume _____ G/min. or L/min.
Stroke Suction side _____ ft or m
Discharge side _____ ft or m
(choose one)
Oil lubrication ☐YES ☐NO</td><td>Type of fluid pumped

_____
Specific gravity _____
Viscosity _____ Pa·s
Fluid temperature _____ °F or °C
Slurry ☐YES Density _____ wt%
Particulate diameter _____ inch or mm
☐NO</td></tr>
<tr><td colspan="2">Condition of pump (nature of problem)</td></tr>
<tr><td colspan="2">Draw a summary drawing of application
(size, length of piping, and component parts)</td></tr>
</table>

12. Limited warranty

YAMADA'S ONE-YEAR LIMITED WARRANTY.

Yamada air operated diaphragm pump series are warranted by YAMADA to the original user against defects in workmanship or materials under normal use for one year from date of purchase.
Any part which is determined by Yamada to be defective in material or workmanship and returned to an authorized service location, as Yamada designates, shipping costs pre-paid, will be, as the exclusive remedy, repaired or replaced at Yamada's option. For limited warranty claim procedures, see PROMPT DISPOSITION below.

WARRANTY DISCLAIMER AND LIMITATION OF REMEDIES.

Yamada neither makes nor authorizes anyone else to make any warranties other than those herein.
THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE. YAMADA SHALL NOT BE RESPONSIBLE FOR INCIDENTAL CONSEQUENTIAL, OR SPECIAL DAMAGES OR LOST PROFITS.
IN NO EVENT SHALL YAMADA'S LIABILITY EXCEED THE PURCHASE PRICE PAID.

PRODUCT SUITABILITY.

Many states and localities have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. Yamada cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, please review the product application, national and local codes and regulations to be sure that the product, installation, and use will comply with them.

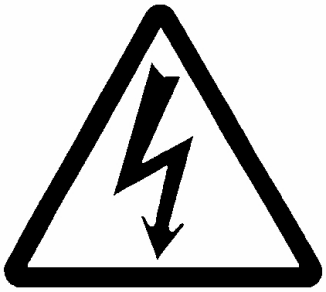
PROMPT DISPOSITION.

For any product believed to be defective, first write or call dealer from whom the product was purchased. The dealer will give additional directions. If the dealer cannot correct the defect, write to Yamada, citing dealer's name, address, date and number of dealer's invoice, and describe the nature of the defect.
Title and risk of loss pass to buyer on delivery to common carrier. If a product was damaged in transit to you, file claim with the carrier.

13. Warning symbols

BEWARE: HIGH TEMPERATURE

ELECTRIC SHOCK

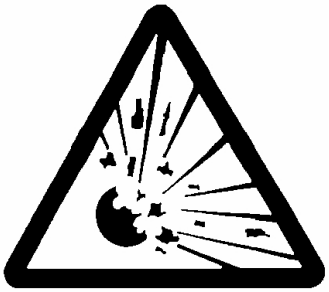


POISON

FLAMMABLE

CORROSION

EXPLOSION



General warnings, cautions and danger notifications

FIRE STRICTLY PROHIBITED

YAMADA AMERICA, INC

955 E. ALGONQUIN RD., ARLINGTON HEIGHTS, IL 60005, USA
PHONE: 1-847-631-9200 or 1-800-990-7867 (Toll Free) FAX : 1-847-631-9273
www.yamadapump.com

Manufactured by:

YAMADA CORPORATION

International Department
1-1-3 CHOME, MINAMI MAGOME, OHTA-KU, TOKYO, 143-8504, JAPAN
PHONE : +81-(0)3-3777-0241 FAX : +81-(0)3-3777-0584

201011 NDP137U