

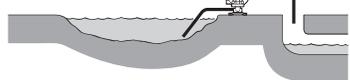
Pneumatic Operated Diaphragm Pump

TD

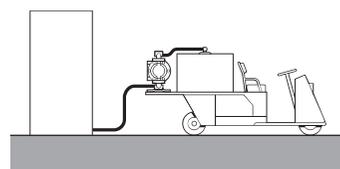
**Application Examples**

Pneumatic operated type diaphragm pumps have been used widely in various industrial fields, and their quality has been highly appreciated.

- Civil engineering and construction** Transfer of cement, paints, slurry, sewage, asphalt, etc.
- Chemical and petroleum industries** Transfer of various chemicals, latexes, adhesives, solvents, heavy oil, naphtha, etc. Cleaning in tanks.
- Electric and electronic industries** Transfer of plastic materials, ceramic materials, etc. Cleaning of parts by circulating solvents, pure water, etc.
- Textile, capemaking, and leather industries** Transfer of adhesives, glue, preservatives, pulp drain, sludge, etc. Treatment of waste liquids.
- General machines** Transfer of lubricant, hydraulic fluid, cutting oil, electric discharge oil, parting agent circulating spray, discharged oil, etc.
- Others** Transfer of printing ink, glost, clay liquid, etc. Discharge of gasoline, engine oil, etc.

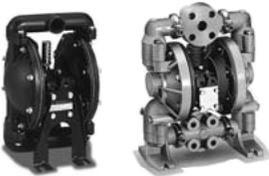


● Water, seawater, and waste liquid are discharged.



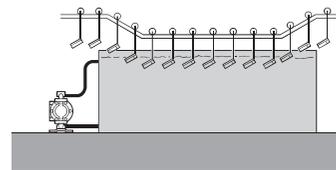
● Various chemicals and various petroleum products are transferred.

**Model Configuration**

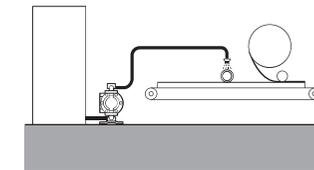
TD-08	TD-15	TD-20
 (Metal body type) Pump size : Rc1/4 Max. discharge flow rate : 13ℓ/min	 (Metal body type)    (Plastic type) Pump size : Rc1/2    NPT1/2 Max. discharge flow rate : 35ℓ/min    49ℓ/min	 (Metal body type) Pump size : Rc3/4 Max. discharge flow rate : 54ℓ/min
TD-25	TD-40	
 (Metal body type)    (Plastic type) Pump size : G1    1" flange Max. discharge flow rate : 128ℓ/min    166ℓ/min	 (Metal body type) Pump size : Rc1/2 Max. discharge flow rate : 341ℓ/min	

Pneumatic Operated Diaphragm Pump

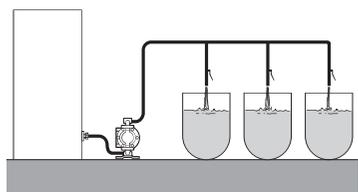
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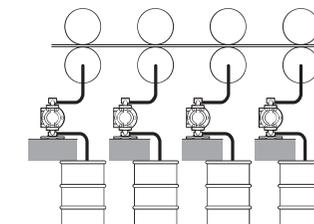
● During coating, the liquid is constantly being agitated so that the solid particles in the liquid do not settle.



● When a thin sheet is laminated, an adhesive is supplied to the roller.



● In a chemical plant, chemicals are supplied to the tanks.



● Inks are supplied to the rolls.

For WARNINGS and CAUTIONS in this section, the following definitions and signal words are used. The precautions marked with these signal words are to be followed to use the product safely. Important requirements are stated to prevent possible personal injury and property damage. Observe these instructions without fail.

**⚠ WARNING :** Improper handling of the product will cause a hazardous situation which can result in death or serious personal injury and property damage.

**⚠ CAUTION :** Improper handling of the product will cause a hazardous situation which may result in moderate or minor personal injury and property damage.

- These products have been designed and manufactured as general industrial machine parts.

### ⚠ WARNING

- Strictly observe the warnings, cautions and prohibited acts stated in this catalog. Failure to do so may damage the product or machines around it or cause personal injury.
- If the diaphragms are damaged, the fluid may spout from the exhaust port through the pneumatic valve, or pneumatic pressure may be applied to the fluid, resulting in seriously hazardous situations depending on the properties of the fluid.
- When using a fluid which may cause personal injury or property damage, be sure to take appropriate protective measures (e.g. treatment of exhaust), and strictly observe the following instructions.
- When the pump is used in an atmosphere which can cause spontaneous ignition or used to transfer or circulate a highly flammable fluid at a high speed or to clean with such a fluid, human bodies may receive a shock due to electrostatic spark, ignition or heat generation, or personal injury and property damage may be caused by fire or explosion. Be sure to ground the pump using the supplied ground wire and ventilate the working area in accordance with the specified conditions of working environment. (TD-08, 15 and 20 and TD2-25 types come with a ground wire, and TD-25 and 40 types come with a ground terminal.)
- When using the pump, set the supply pressure to the max. working pressure (0.7 MPa) or less. If it is operated at a pressure exceeding the max. working pressure, it may be damaged, thereby causing personal injury or property damage. Purchase a pneumatic regulator or pneumatic filter regulator, and fit it to the pump.
- Never use a fluid inapplicable to the materials of the pump wetted parts or an explosive solution. If such a fluid is used, a chemical change accompanied with very hazardous explosion may be caused, resulting in personal injury including death and damage to building and equipment.
- Fluids which corrosion or damage occur to the materials of the wetted parts in the body or the diaphragms must not be used. See the compatibility table in the catalog, and use an appropriate model. If an inappropriate model is used, fluid leakage or breakage may be caused. For the compatibility with fluids, contact our sales offices.
- Before using the pump every day, check for fluid leakage from the pump. If any abnormality is found, do not use it, and ask us to inspect and repair it.
- Service the wear parts, such as the diaphragms, earlier. Do not use any unused wear part which has been stored for more than 1 year after it was purchased. Aging deterioration may have occurred.
- If any abnormality is found in the operation of the pump, do not operate it, and contact our sales office.
- When handling any toxic or smelly fluid, sufficiently ventilate the working area.
- Do not discharge the handled harmful substances, such as chemicals, directly to the installation surface. Dispose of the harmful substances in accordance with applicable laws and regulations.
- If the pump operating time and frequency is increased, replace the wear parts, such as the diaphragms, earlier.

## Installation

### 1. Notes on installation

The installation condition affects the product lifetime. Observe the following instructions.

#### ⚠ WARNING

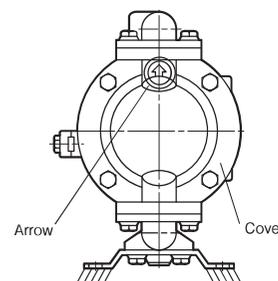
- When the pump is used in an atmosphere which can cause spontaneous ignition or used to transfer or circulate a highly flammable fluid or to clean with such a fluid, ground the pump using the supplied ground wire or ground terminal, and ventilate the working area depending on the working environment. Failure to do so may result in fire or explosion accompanied with personal injury or property damage.

- Prevent transmission of load or vibration to the pump body through the piping. Material leakage or entry of pneumatic pressure may be caused, and personal injury or property damage may occur depending on the type of material.

#### ⚠ CAUTION

- To connect the pump on the suction and discharge sides, use hoses or flexible tubes which can absorb the pump vibrations.
- Never step on or hang on the diaphragm pump. Doing so may cause injury and damage the pump.
- The suction head should be as low as possible. The maximum head is approx. 6 m (in the case of clear water).
- Carefully select the installation place, and install the pump by an appropriate method to absorb vibrations.

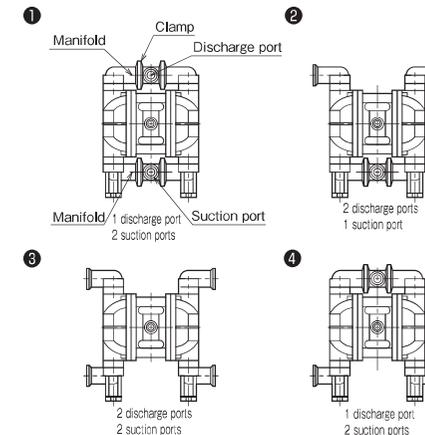
- (1) Installation place: Install the pump horizontally. Avoid using it on a slope.
- (2) Installation direction: Install the pump with the arrow ↑ on the cover upward.
- (3) Installation method: Surely tighten the mounting accessories so that the pump and pipes will not be damaged by vibrations.



- The directions of the fluid suction and discharge ports can be changed to the opposite directions.

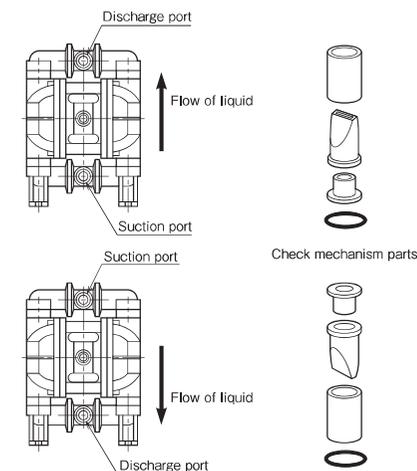
### ● Plastic type

- The manifolds can be mounted by one of the following four methods. The suction and discharge ports can be turned 360° to any direction by loosening the clamps. To change their directions, completely loosen the clamps. If they are turned forcibly, the O-rings may be damaged, and sealing failure may be caused.



### ● Duckbill type (Only TD-15PC-D)

- Two types of check mechanism are available, i.e. the ball check type (standard) and the duckbill type (semi-standard) which enables the pump to transfer liquids containing fibrous solid.
  - In the case of the duckbill type (semi-standard), the liquid flowing direction can be changed by reassembling the check mechanism parts. (See the figure below.)
- When reassembling, take care not to damage the parts. If any part is damaged, sealing failure may be caused.



## Maintenance (parts)

**⚠ CAUTION**

- The pump shall be maintained by persons with sufficient knowledge and experience.
- Never maintain or inspect the pump during operation. Doing so can cause personal injury.
- Before maintaining or inspecting the pump, stop the supply of pneumatic pressure, and completely discharge pressure from the pump and piping. If there is residual pressure in the pump, personal injury or property damage may be caused.
- Tighten the bolts to the specified torque. If any bolt is tightened to a torque higher or lower than the specified torque, accidents may be caused by nonconformity or rupture.
- Use our genuine replacement parts. If other manufacturers' parts are used, the pump performance may be degraded, or the pump may malfunction.
- If the pump is kept used without maintenance, it may be damaged, machines around it may be broken, or personal injury may be caused.
- We are not responsible for damage, accidents or failures in any case.

### 1. Routine inspection

(Inspect the pump every two or three days.)

**⚠ CAUTION**

- If all oil in the pneumatic lubricator at the pneumatic pressure supply port has been used and the pump is not lubricated, operation failure may be caused.
- If oil (machine oil or spindle oil) other than JIS K2213 Class 1 oil (non-additive turbine oil ISO VG32) or its equivalent is used, the seals in the pump may be swelled, thereby affecting the performance and causing operation failure.

## 2. Checking during test run

**⚠ CAUTION**

- Do not run the pump under no load for a long time. Doing so can cause unnecessary wear or trouble.
- Make sure that the pump has been installed correctly and vibrations are absorbed, and check for leakage.
- For test run, gradually increase the supply air pressure from the min. working pressure. After making sure that the pump operates normally, increase the pressure to the set pressure.

## 3. Checking in operating state

**⚠ CAUTION**

- When the discharge flow rate is controlled by adjusting the supply of pneumatic pressure, the allowable specified flow velocity at which the material is sucked into the pump varies depending on the material viscosity, specific gravity and suction head. If the specified flow velocity ratio is exceeded, the pump runs faster, the material causes cavitation, and the discharge flow rate decreases, thereby affecting the life of the diaphragms.
- Even if the pump is kept stopped with the discharge port valve closed while the pump is under pneumatic pressure, it does not cause a hazardous situation. However, if the piping or diaphragm leaks while it is kept in this state for a long time at night or in an unattended state, the pump will start, and the material will be kept discharged from the leaking point. When keeping the pump stopped for a long time, stop the supply of pneumatic pressure, and open the discharge port valve to discharge the residual pressure from the pump and the piping on the discharge side.
- If the pump is kept stopped for a long time with a liquid containing slurry, the slurry will settle and deposit in the pump, and, when it is used next time, the diaphragms may be damaged or a bending torque may be generated on the disk to bend and break the spool. When the pump has been stopped for a long time, clean the inside to completely remove the slurry, and restart the pump. When the pump is not used for a long time, flush the pump with a solvent applicable to the material. Failure to do so may cause material deposition, thereby disabling the pump or significantly degrading its performance.

## 2. Notes for piping

(connection of suction and discharge ports)

**⚠ CAUTION**

- When selecting the piping material, take into consideration the appropriate size, resistance to liquid and pressure resistance, Failure to do so may cause liquid leakage and breakage.
- Before piping, flush the pipes. Take care that cuttings, sealing tape fragments, dirt and rust never enter the piping. They can cause operation failure.
- Pipe the pump appropriately so that lateral load will not be applied to the pump body. Application of lateral load can damage the threaded portions of the suction and discharge ports and cause troubles, such as sealing failure.
- On the pump suction and discharge sides, use hoses or flexible tubes which can absorb the pump vibrations.
- Use pipes which are not deformed by the negative pressure caused by pump suction.
- Do not use pipes thinner than the discharge and suction ports. If the pipe inner diameter is small, sufficient performance cannot be obtained.
- Fit a filter or a strainer on the suction side to protect the pump.

## 3. Notes for piping

(connection of pneumatic pressure)

**⚠ CAUTION**

- Before connecting the pneumatic pressure piping, check that the supply of pneumatic pressure is stopped. If the supply of pneumatic pressure is not stopped, the pump may start suddenly, thereby causing personal injury or property damage.
- Use the pump at a supply air pressure less than the max. working pressure. Failure to do so may cause personal injury or property damage.  
<Working pneumatic pressure range: 0.2 to 0.7 MPa>
- After the completion of operation or at night, disconnect the supply of pneumatic pressure, and discharge the pressure from the piping and pump. If the piping is cracked or the diaphragms are damaged while pneumatic pressure is being supplied, the pump may continue to operate leaking the fluid. The user is responsible for these second accidents.

- Never add any general antifreeze to the oil to be poured to the pneumatic lubricator fitted to the pneumatic pressure supply port. This may be harmful to the health. Provide the pneumatic pressure supply port with a set of three items, pneumatic filter, regulator and lubricator, to supply clean air and lubricant. Install these three parts as close to the diaphragm pump as possible. The distance between them affects the durability and capacity of the pump.
- For the pneumatic piping, do not use pipes thinner than the pneumatic pressure supply port.
- When connecting new pipes, flush the pipes before piping the pump to completely remove cuttings and dirt. Failure to do so can cause operation failure of the pneumatic valve.
- Use the pump at a supply air pressure equal to or lower than the maximum working pressure, 0.7 MPa.

## Operation

## 1. Checking before operation

**⚠ CAUTION**

- Check that the pump body has been installed correctly and the mounting bolts are not loose. If the pump is operated with mounting bolts loosened, personal injury or damage to machines around the pump may be caused.
- When the pump is used for an ignitable fluid, ground the pump using the supplied ground wire. If it is operated without grounding, a fire or an explosion may occur, resulting in personal injury or property damage.
- Check that the pump is firmly secured in position.
- Set the pipe on each of the suction and discharge sides. Check that the pipes of the pump are not loose.
- Check that the pneumatic pressure regulator has been set to the min. working pressure.  
<Min. working pressure: 0.2 MPa>
- Check that the pneumatic lubricator is filled with lubricant <JIS K2213 Class 1 (non-additive turbine oil ISO VG32)>.

- To lubricate the pneumatic valve parts of the pump, replenish the lubricator at the pneumatic pressure supply port with oil according to the number of times of operation of the pump.
- For the pneumatic lubricator, use JIS K2213 Class 1 oil (non-additive turbine oil ISO VG32) or its equivalent.

Table of names of non-additive turbine oils (ISO VG32) of various manufacturers

Company name	Turbine oil name
Idemitsu	Turbine oil P-32
Nippon Oil	Turbine oil 32
Cosmo Oil	Turbine 32
Showa Shell Sekiyu	Turbine oil 32
TonenGeneral Sekiyu	R turbine oil 32
Japan Energy	Turbine oil 32

2. Periodic inspection

⚠ CAUTION

- Periodically discharge the drain and foreign particles which have collected in the air filter in the pneumatic pressure port. If the drain enters the pump, the oil supplied by the lubricator will be washed away, and the pump performance may be adversely affected. This can cause operation failure.
- If the diaphragms are damaged because the pump is not inspected periodically or is inspected late, the liquid will enter the pneumatic circuit in the pump, thereby causing operation failure. In addition, the liquid will be discharged from the exhaust silencer, resulting in bodily injury. Air may be included in the liquid, and unexpected accidents may be caused.
- The diaphragms, check balls and valve seats are wear parts. It is recommended to replace them when the number of times of use of the pump exceeds the specified number of cycles.

\*\*\* Estimated time for replacement of each wear part \*\*\*

1) Inspection and time of replacement of diaphragms

The estimated life of the diaphragms is approx. 10 million cycles of operation. (Note: This number of cycles is not a guaranteed value. Inspect and replace the diaphragms using this number as a guide. However, if the liquid contains particles, such as metallic particles, cuttings and hardwearing particles, which can damage the diaphragms, their life will be reduced.)

<How to calculate time for replacement> (\*Use the calculated time as a guide.)

Example) When the discharge flow rate is 20 l/min and the operating time is 8 hours/day:

Discharge flow rate per cycle: approx. 0.17 l/cycle (TD-15)\*\*)

$$\frac{\text{Discharge flow rate (l/min)}}{\text{discharge flow rate per cycle (l)}} = \frac{20}{0.17} = \text{approx. } 118 \text{ (cycles/min)}$$

$$\begin{aligned} \text{Time for replacement} &= \frac{10,000,000 \text{ (cycles)}}{\text{number of operations per min}} \times \frac{1}{60} \times \frac{1}{8} \\ &= \frac{10,000,000}{118} \times \frac{1}{60} \times \frac{1}{8} \\ &= \text{after approx. } 177 \text{ days} \end{aligned}$$

Series	Discharge flow rate per cycle
TD-08	Approx. 0.04 l
TD-15	Approx. 0.17 l
TD-20	Approx. 0.32 l
TD-25	Approx. 0.57 l
TD-40	Approx. 2.4 l
TD2-25	Approx. 0.6 l

\*Reference values for metal body type pumps

2) Time for replacement of check balls

If the external diameter of the check balls (initial value—TD-08: 12.7 mm, TD-15: 15.9 mm, TD-20: 20.6 mm, TD-25: 25.4 mm, TD-40: 38.1 mm, TD2-25: 34.9 mm) is reduced by 5% or more of the initial value or deformed, the contact between the check balls and the valve seats (sealing ability) is insufficient, and checking failure may occur. In such a case, replace the check balls.

3) Time for replacement of valve seats and cartridge

If they are deformed due to wear, replace them. It is recommended to replace them when replacing the check balls.

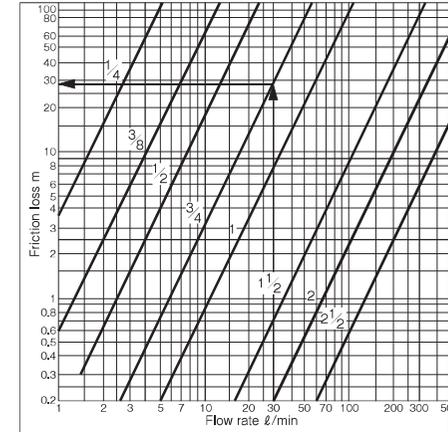
4) Request

Replace the check balls and valve seats when replacing the diaphragms.

Notes on selection

- The pump discharge flow rate significantly varies depending on the quality of the liquid to be flow (viscosity, specific gravity and content of slurry) and transferring conditions (suction head, discharge head, transferring distance, piping diameter, etc.). When selecting the pump, sufficiently consider the piping resistance to the liquid quality, suction head and discharge head.
- When determining the pump size, select a pump having a capacity of approx. 1.5 times the required discharge flow rate.
- If the piping distance is long and the friction loss is large, use one or two size larger pipes.
- Design the system so that the suction head is 6 m or less in the case of clear water. If the head exceeds 6 m, the discharge flow rate will significantly decrease, and the pump may not discharge the liquid.
- If the liquid to be flow has a high viscosity, see "Notes on transferring viscous fluid" for the selection of a pump.

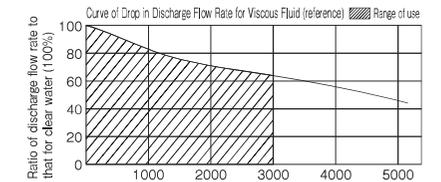
Friction Loss Diagram (for 100 m of straight pipe) [Pipe: steel, Liquid: clear water]



(Clear water: temperature 20°C, viscosity 1 mPa·s, specific gravity 1.0)

Notes on transferring viscous fluid

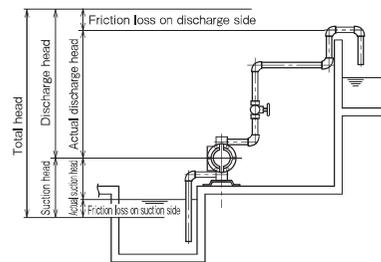
When a viscous fluid is flow, the pump discharge flow rate is lower than that for feeding clear water as shown below.



Viscosity (mPa·S) (The max. working viscosity of fluid applicable to TD Series is 3000 mPa·s.) (Clear water: temperature 20°C, viscosity 1 mPa·s, specific gravity 1.0)

Selection of bore

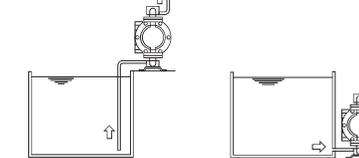
The pump discharge flow rate is determined by total of head which determined by piping diameter. If the discharge flow rate is not calculated correctly, troubles, such as insufficient flow rate, may be caused. The total head is determined by the friction loss determined by the actual suction head, actual discharge head and piping conditions as shown below. The friction loss varies depending on the piping diameter, length, the fluid average flow velocity, on the number of bends, the shape and number of valves.



(Notes)

- The above curve shows the change in discharge flow rate with viscosity with respect only to the pump. When selecting a pump, sufficiently examine the piping resistance.
- When the pump is installed in a suction manner, a viscous fluid may not be sucked due to increase in piping resistance. In the case of a viscous fluid, it is recommended to install the pump in a pushing manner.

Suction manner Pushing matter



The pump can be used at a suction head of up to 6 m in the case of clear water.

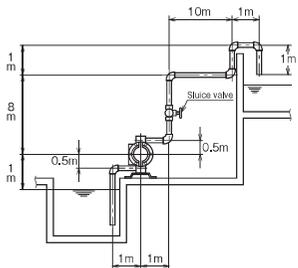
Conditions: (clear water temperature 20°C, viscosity 1 mPa·s, specific gravity 1.0)

The pump can be connected to a tank with a pipe.

- If the piping friction loss is large, reduce the piping length, or increase the piping diameter.
- The viscosity changes with temperature. Select a pump based on the viscosity at the working temperature.

Example of selection of pump for transferring clear water

Total head calculation formula



Determine the total head for pumping clear water at 30 ℓ/min by the circuit with a piping diameter of Rc3/4 as shown above.

- ① Actual discharge head=8+1=9 m
- ② Actual suction head=1 m
- ③ Friction loss on discharge side
  - a) Piping length=1+(8-0.5)+10+1+1+1=21.5 m
  - b) Elbow length corresponding to straight pipe=0.69×5 pcs.=3.45 m (from Table 1)
  - c) Sluice valve length corresponding to straight pipe=0.14 m (from Table 1)

Then, the piping length on the discharge side=21.5+3.45+0.14=25.09 m

d) Friction loss  
When the bore is Rc3/4 and the flow rate is 30 ℓ/min, the friction loss per 100 m is 29 m from the friction loss diagram,  
Friction loss on discharge side=25.09 ×  $\frac{29}{100}$  =7.28 m

- ④ Friction loss on suction side
    - a) Piping length=(1+1-0.5)+1=2.5 m
    - b) Elbow length corresponding to straight pipe=0.69×1 pc.=0.69 m (from Table 1)
- Then, the piping length on the suction side=2.5+0.69=3.19 m  
When the bore is Rc3/4 and the flow rate is 30 ℓ/min, the friction loss per 100 m is 29 m from the friction loss diagram,

Friction loss on suction side=3.19 ×  $\frac{29}{100}$  =0.93 m

- ⑤ Total head
  - a) Discharge head=actual discharge head+friction loss on discharge side=9+7.28=16.28 m
  - b) Suction head=actual suction head+friction loss on suction side=1+0.93=1.93 m
  - c) Total head=discharge head+suction head=16.28+1.93=18.21 m

(Note) Design the circuit so that the suction head is 6 m or less (in the case of clear water).

Length of Joints and Valves Corresponding to Straight Pipe (Liquid: clear water) Unit: m

Pipe dia.	1/4	3/8	1/2	3/4	1	1 1/2	2	2 1/2
90° elbow	0.11	0.17	0.39	0.69	1.07	2.66	4.06	6.58
45° elbow	0.03	0.05	0.12	0.21	0.33	0.82	1.25	2.03
Check valve and foot valve	0.10	0.16	0.36	0.63	0.98	2.46	3.75	6.08
90° bend	0.03	0.04	0.09	0.16	0.25	0.61	0.94	1.52
45° bend	0.02	0.03	0.06	0.11	0.17	0.43	0.66	1.06
Sluice valve	0.02	0.03	0.08	0.14	0.21	0.53	0.81	1.32

(Clear water: temperature 20°C, viscosity 1 mPa·s, specific gravity 1.0)

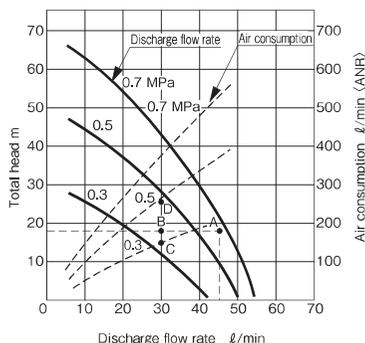
Example of determination of pump bore

Calculate the pump bore required when the total head is 18.21 m and the required discharge flow rate is 30 ℓ/min.

- ① Multiply the required discharge flow rate by an allowance rate of 1.5 taking into consideration of allowance for the pump to obtain the discharge flow rate.

$$\text{Discharge flow rate} = \text{required discharge flow rate} \times 1.5 = 30 \times 1.5 = 45 \ell/\text{min}$$

- ② A pump having a discharge flow rate of 45 ℓ/min is TD-20 (54 ℓ/min). Determine the intersection A of the total head of 18.21 m with a discharge flow rate of 45 ℓ/min from the performance curve of TD-20. The intersection A is on the left side of the performance curve of working pneumatic pressure of 0.7 MPa. This indicates that the pump meets the discharge flow rate with allowance.



In the case of clear water (clear water: temperature 20°C, viscosity 1 mPa·s, specific gravity 1.0)

Calculation of working pneumatic pressure

Then, determine the working pneumatic pressure required to discharge at 30 ℓ/min by the diaphragm pump TD-20.

- ① Determine the intersection B of the discharge flow rate of 30 ℓ/min with a total head of 18.21 m.
- ② The required pneumatic pressure is approx. 0.4 MPa according to the performance curve.

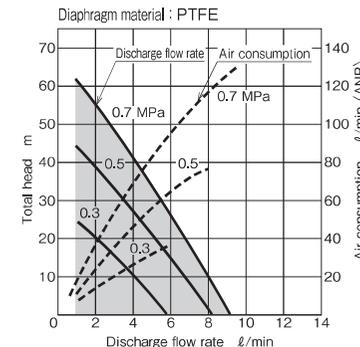
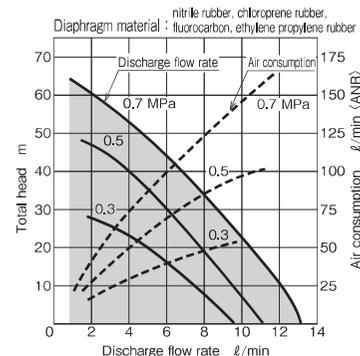
Calculation of air consumption

- ① Then, determine the required quantity of air. From the point B, draw a vertical line which intersects with the air consumption curves for 0.3 MPa and 0.5 MPa. The intersections are named point C and point D.
- ② The intersection C with the curve for 0.3 MPa corresponds to the required amount of air of 150 ℓ/min, and the intersection D for 0.5 MPa corresponds to 260 ℓ/min. Therefore, the required amount of air at 0.4 MPa is 205 ℓ/min.
- ③ The number of cycles of diaphragm pump varies depending on the liquid temperature, viscosity and specific gravity. Select a compressor taking allowance of about 30% into account. The estimated capacity of compressor is 100 ℓ/min for 0.75 kW. In this case, 205×1.3=266.5 ℓ/min. Therefore, a compressor of 2.2 kW or more must be selected.

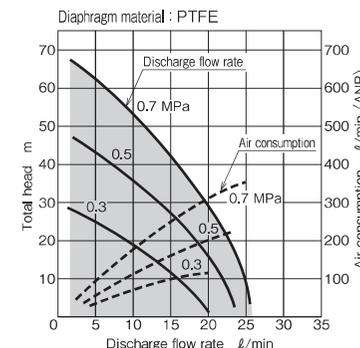
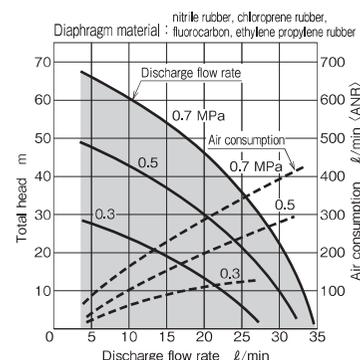
Performance Curves Note: These performance curves show the discharge flow rates with respect to clear water. (Conditions: temperature 20°C, viscosity 1 mPa·s, specific gravity 1.0) When a viscous liquid is used, the pump flow characteristics will be degraded. When selecting, see the Selection Materials.

Range of use

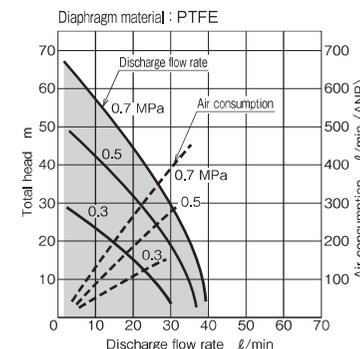
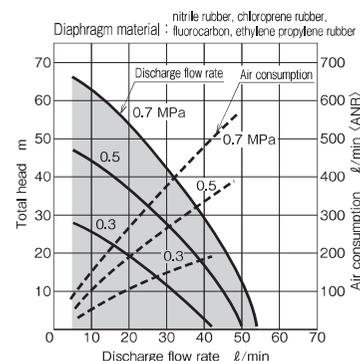
TD-08(metal body type)



TD-15(metal body type)

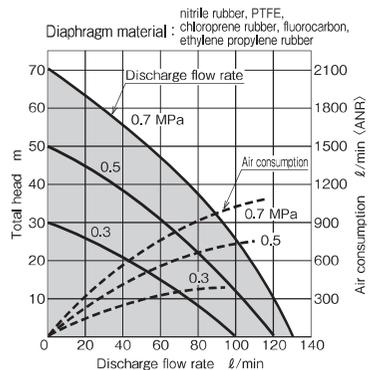


TD-20(metal body type)

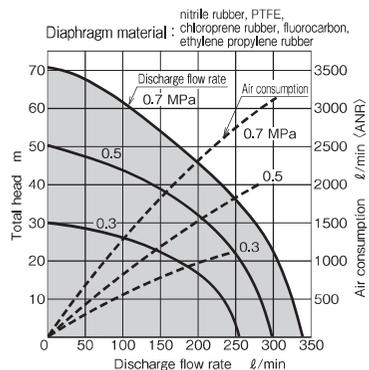


**Performance Curves** Note: These performance curves show the discharge flow rates with respect to clear water. (Conditions: temperature 20°C, viscosity 1 mPa·s, specific gravity 1.0) When a viscous liquid is used, the pump flow characteristics will be degraded. When selecting, see the Selection Materials.

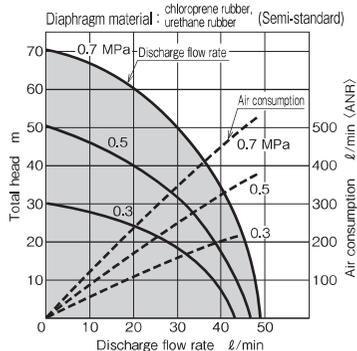
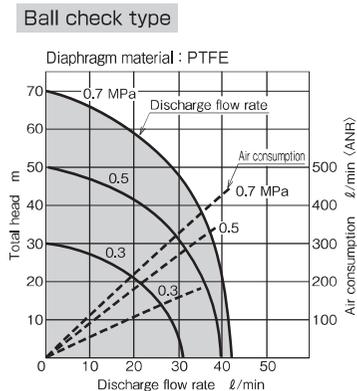
TD-25(metal body type)



TD-40(metal body type)

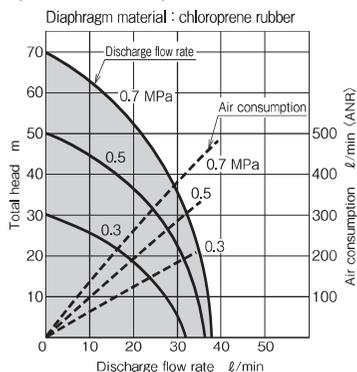


TD-15(plastic type)



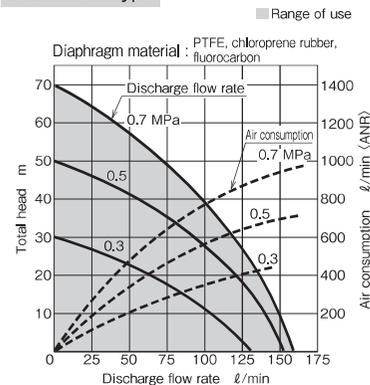
Duckbill type

(Semi-standard)



TD-25Series(plastic type)

Ball check type



How to read performance curve

The performance curve shows the relationship between pump discharge flow rate and head and between discharge flow rate and air consumption. It is possible to determine the required diaphragm pump size and air consumption from the performance curve. (For the calculation of air consumption, see the previous section.)

Determination of model (bore)

Example) Which model should be selected when the total head is 10 m and the required discharge flow rate is 30 ℓ/min? (Nitrile rubber diaphragms are used.)

- Answer) ① Multiply the required discharge flow rate by 1.5 taking allowance for the pump into account.  
 Discharge flow rate = required discharge flow rate × 1.5 = 30 × 1.5 = 45 ℓ/min
- ② From the performance curve of TD-20, determine the intersection of the total head of 10 m with a discharge flow rate of 45 ℓ/min.
- ③ The intersection is on the left side of the performance curve for the working pneumatic pressure of 0.7 MPa. This indicates that the model meets the discharge flow rate with allowance.
- ④ As the result of the above examination, select TD-20.

Parameters to be checked when placing an order

1. Fluid to be handled	Fluid name · Concentration · Specific gravity · PH · Liquid viscosity(at working temperature) · Inclusion of slurry, etc.
2. Fluid temperature	°C
3. Required flow rate	ℓ/min
4. Heads and conditions	Suction side Suction head (m) Piping diameter (A) and total length (m) Discharge side Discharge head (m) Piping diameter (A) and total length (m)
5. Air source	Pressure (MPa) · air capacity (ℓ/min) (ANR) [or compressor output (kW)]

Note) If the fluid viscosity varies depending on the temperature, the piping resistance on the suction and discharge sides changes, and, as a result, the discharge flow rate may change.

Table of Compatibility between Pump Materials and Fluids(Reference)/Metal body type

Fluid compatibility table (reference)	Metal body														
	Aluminum alloy				Stainless steel (equivalent to SUS316)					Cast iron (only 40 type)					
Body material	*N : nitrile rubber/*T : PTFE/*C : chloroprene rubber/*F : fluorocarbon/*E : ethylene propylene rubber/*U : urethane rubber														
Diaphragm material	*N : nitrile rubber/*T : PTFE/*C : chloroprene rubber/*F : fluorocarbon/*E : ethylene propylene rubber/*U : urethane rubber														
Wetted part material symbol	AN	AT	AC	AF	AE	SN	ST	SC	SF	SE	FN	FT	FC	FF	FE
Fluid name															
Sulfurous acid															
Asphalt				○											
Ammonia			○												
Ethyl alcohol (ethanol)	○														
Ethylene oxide															
Ethylene glycol															
Ethylene chloride (dichloroethane)															
Vinyl chloride							○								
Methyl chloride (chloromethane)															
Hydrochloric acid															
Seawater						○									
Hydrogen peroxide solution															
Caustic soda 30%						○									
Gasoline		○													
Gasoline (with high acid content)															
Xylene (xylol)															
Chromium plating solution 25%							○								
Sewage water						○									
Ketone												○			
Acetic acid 5 to 20%							○								
Acetic acid 50%															
Acetic acid 80%															
Ethyl acetate							○								
Vinyl acetate										○					
Butyl acetate															
Sodium hypochlorite 20%															
Heavy oil				○											
Nitric acid 5 to 10%															
Sodium nitrate															
Hydrated lime								○							
Turbine oil	○														
Toluene		○													
Brake oil		○													
Benzene (benzol)		○													
Boric acid															
Sulfuric acid 85%							○								
Aluminum sulfate															
Copper sulfate 10%															

(Notes) ● Some pumps may be unusable depending on the temperature, density, viscosity, concentration and manufacturer of the fluid.  
 ● For an abrasive fluid, select an abrasion-resistant type.  
 ● For hydraulic fluids not listed above, contact us.

Table of Compatibility between Pump Materials and Fluids(Reference)/Plastic type

Fluid compatibility table (reference)	Plastic body										
	Polypropylene					Polyvinylidene-fluoride					
Body material	*T : PTFE/*C : chloroprene rubber/*F : fluorocarbon/*U : urethane rubber										
Diaphragm material	*T : PTFE/*C : chloroprene rubber/*F : fluorocarbon/*U : urethane rubber										
Wetted part material symbol	PT	PC	PU (only 15)	PF (only 25)	PC-D	KT	KC	KU (only 15)	KF (only 25)		
Fluid name											
Sulfurous acid						○					
Asphalt											
Ammonia											
Ethyl alcohol (ethanol)	○	○			○						
Ethylene oxide	○					○					
Ethylene glycol	○	○	○	○	○	○	○	○	○	○	
Ethylene chloride (dichloroethane)						○				○	
Vinyl chloride											
Methyl chloride (chloromethane)						○		○		○	
Hydrochloric acid	○	○		○		○	○	○	○	○	
Seawater	○	○	○	○	○	○	○	○	○	○	
Hydrogen peroxide solution	○	○	○	○	○	○	○	○	○	○	
Caustic soda 30%											
Gasoline						○		○	○		
Gasoline (with high acid content)	○					○					
Xylene (xylol)	○			○		○	○		○		
Chromium plating solution 25%											
Sewage water											
Ketone											
Acetic acid 5 to 20%	○	○		○		○	○		○		
Acetic acid 50%	○							○			
Acetic acid 80%								○			
Ethyl acetate	○										
Vinyl acetate											
Butyl acetate	○										
Sodium hypochlorite 20%	○	○	○	○		○	○	○	○	○	
Heavy oil											
Nitric acid 5 to 10%	○	○				○	○				
Sodium nitrate						○	○				
Hydrated lime											
Turbine oil											
Toluene	○					○				○	
Brake oil											
Benzene (benzol)	○		○							○	
Boric acid			○	○		○	○	○	○	○	
Sulfuric acid 85%			○	○				○	○	○	
Aluminum sulfate						○	○			○	
Copper sulfate 10%						○	○	○	○	○	

(Notes) ● Some pumps may be unusable depending on the temperature, density, viscosity and concentration of the fluid.  
 ● For hydraulic fluids not listed above, contact us.

Applicable to a wide range of fluids including organic solvents, slurry liquids, viscous liquids and chemical solutions, such as acid and alkaline solutions

- Excellent explosion-proof and fire-proof performance ensures safe operation.
- The pumps do not burn out even under overload.
- The discharge flow rate can be easily adjusted.
- The self-suction pumps do not require priming water.
- Changeable piping direction



Specifications

Series	Body material	Max. discharge flow rate	Pump size		Air supply port size	Range of diameter of solid particles in fluid	Weight
			Suction port	Discharge port			
TD-08	Aluminum alloy	13ℓ /min	Rc1/4	Rc1/4	Rc1/4	φ1 mm or less	1.8kg
	Stainless steel						3.8kg
TD-15	Aluminum alloy	35ℓ /min	Rc1/2	Rc1/2	Rc1/4	φ2 mm or less	4.1kg
	Stainless steel						7.1kg
TD-20	Aluminum alloy	54ℓ /min	Rc3/4	Rc3/4	Rc1/4	φ2 mm or less	5.5kg
	Stainless steel						11.5kg
TD-25	Aluminum alloy	128ℓ /min	G1	G1	Rc1/4	φ3 mm or less	8.4kg
	Stainless steel						15.3kg
TD-40	Aluminum alloy	341ℓ /min	G1 1/2	G1 1/2	Rc1/2	φ6 mm or less	19.9kg
	Stainless steel						33.1kg
	Cast iron						34.5kg

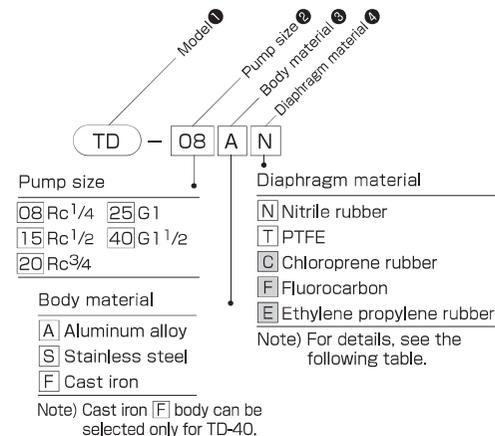
Notes ● The table shows the max. discharge flow rates obtained with clear water at an working pneumatic pressure of 0.7 MPa and a head of 0.  
● In the case of rubber diaphragms

Common specifications

- Working pneumatic pressure: 0.2 to 0.7 MPa
- Max. working viscosity: 3000 mPa·s
- Max. suction head: 6 m (in the case of clear water)
- Working temperature range (fluid/ambient temperature): 0 to +60°C (No freezing)
- Lubrication: Necessary [JIS K2213 Class 1 (non-additive turbine oil ISO VG32) or its equivalent] (When using diaphragms made of chloroprene rubber or ethylene propylene rubber, contact us.)

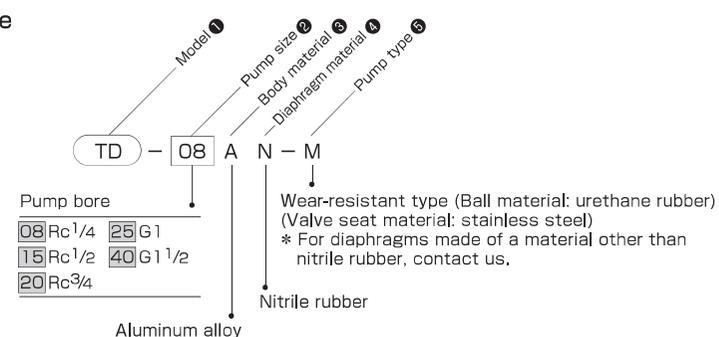
● How to order

Standard type



■ Semi-standard

Wear-resistant type



List of Diaphragm Materials

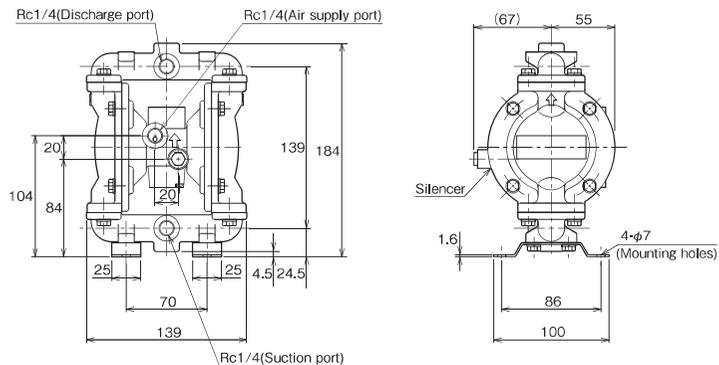
Model	Pump size	Pump body material	Diaphragm material				
			Nitrile rubber	PTFE	Chloroprene rubber	Fluorocarbon	Ethylene propylene rubber Santoprene (25 to 40)
TD-08	Rc1/8	Aluminum alloy	◎	◎	○	○	○
		Stainless steel	○	◎	○	○	○
TD-15	Rc1/2	Aluminum alloy	◎	◎	○	○	○
		Stainless steel	○	◎	○	○	○
TD-20	Rc3/4	Aluminum alloy	◎	◎	○	○	○
		Stainless steel	○	◎	○	○	○
TD-25	G1	Aluminum alloy	◎	◎	○	○	○
		Stainless steel	○	◎	○	○	○
TD-40	G1 1/2	Aluminum alloy	◎	○	○	○	○
		Stainless steel	○	◎	○	○	○
		Cast iron	◎	○	○	○	○
Ball material	TD-08 to 20		Nitrile rubber	PTFE	Chloroprene rubber	Fluorocarbon	Ethylene propylene rubber
	TD-25 to 40		Nitrile rubber	PTFE	Chloroprene rubber	Fluorocarbon(25) Teflon(40)	Santoprene

Note) ◎: Standard ○: Semi-standard

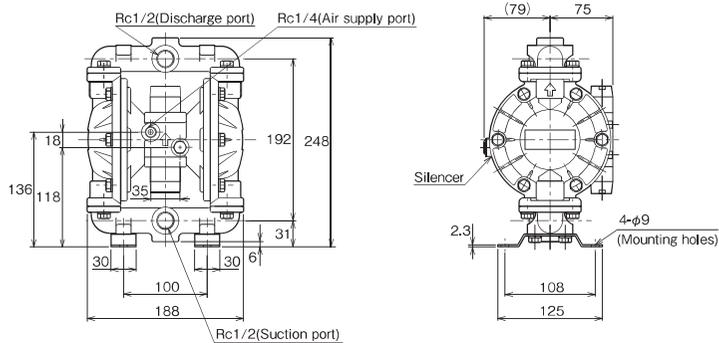
TD/TTDA

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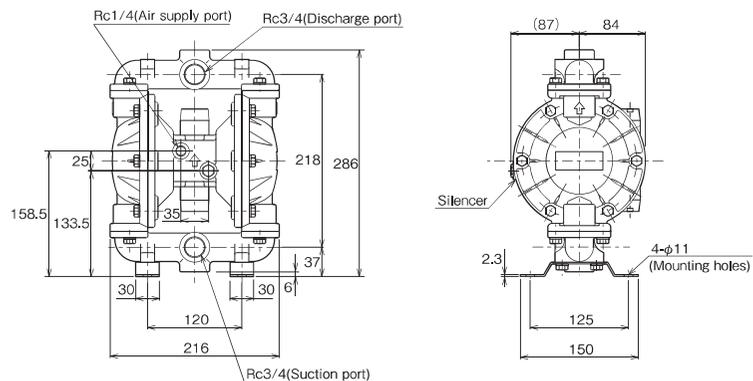
TD-08(metal body type)



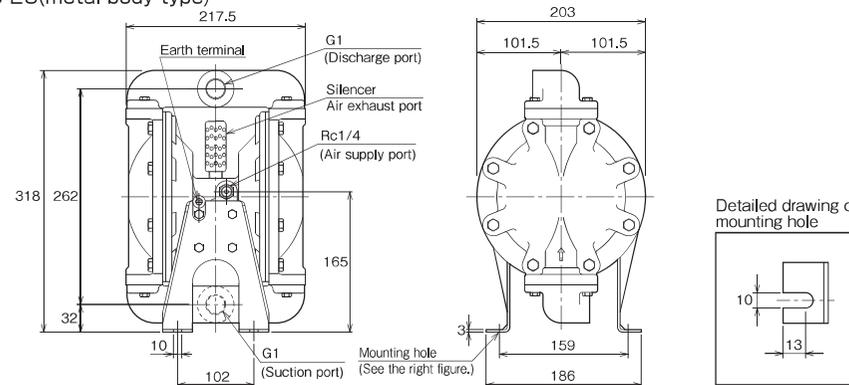
TD-15(metal body type)



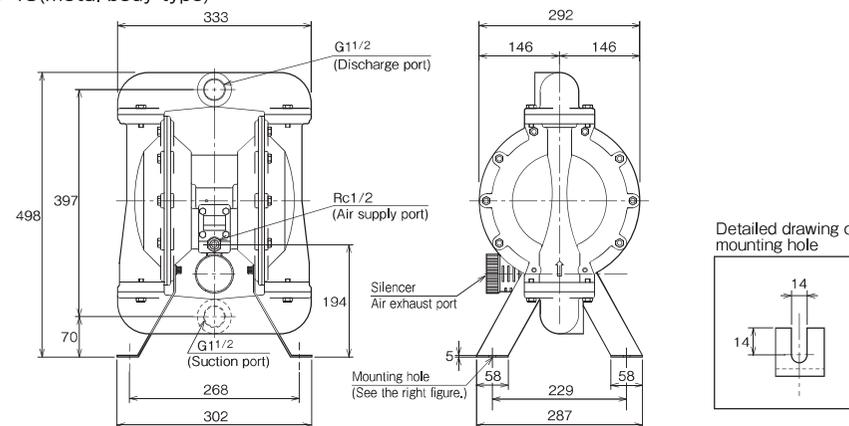
TD-20(metal body type)



TD-25(metal body type)

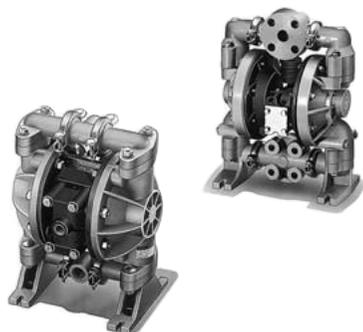


TD-40(metal body type)



## Plastic diaphragm pumps suitable for flow viscous fluids and chemicals, such as acid and alkaline liquids

- The pumps are more resistant to corrosion caused by acid and alkaline chemicals than metallic pumps.
- The directions of the discharge and suction ports can be freely changed.
- Excellent explosion-proof and fire-proof performance ensures safe operation.
- The pumps do not burn out even under overload.
- The discharge flow rate can be easily adjusted.
- The self-suction pumps do not require priming water.
- The pumps can feed fluids containing fibrous solid. (To feed such fluids, use the duckbill type (semi-standard).)



### Specifications

⊙: Standard

Check method	Model number	Material			Max. discharge flow rate ℓ /min	Range of diameter of solid particles in fluid	Pump size (suction port and discharge port)	Air port size		Weight kg	
		Body(wetted parts)	Diaphragm block	Check block				Supply port	Exhaust port		
Ball check type	⊙TD-15PT		PTFE	PTFE	42	φ1.6mm or less	NPT1/2	NPT1/4	With built-in silencer	3.4	
	TD-15PC	Polypropylene	Chloroprene rubber	Chloroprene rubber	49						
	TD-15PU		Urethane rubber	Urethane rubber	49						
	⊙TD-15KT		PTFE	PTFE	42						
	TD-15KC	Polyvinylidene fluoride	Chloroprene rubber	Chloroprene rubber	49						
	TD-15KU		Urethane rubber	Urethane rubber	49						
Duckbill type	TD-15PC-D	Polypropylene	Chloroprene rubber	Chloroprene rubber	49	—				3.4	
Ball check type	⊙TD-25PT		PTFE	PTFE	166	φ3.0mm or less	1" flange ANSI 150#	NPT1/4	NPT3/8 (With silencer)	9.2	
	TD-25PC	Polypropylene	Chloroprene rubber	Chloroprene rubber							
	TD-25PF		Fluorocarbon	Fluorocarbon							
	⊙TD-25KT		PTFE	PTFE							
	TD-25KC	Polyvinylidene fluoride	Chloroprene rubber	Chloroprene rubber							
	TD-25KF		Fluorocarbon	Fluorocarbon							

• The ⊙-marked products are standard type.

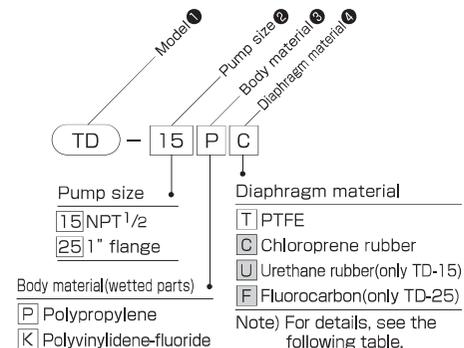
Note) The table shows the max. discharge flow rates obtained with clear water at an working pneumatic pressure of 0.7 MPa and a head of 0.

### Common specifications

- Working pneumatic pressure: 0.2 to 0.7 MPa
- Max. working viscosity: 3000 mPa·s
- Suction head: 6 m (in the case of clear water)
- Working temperature range: 0 to +60°C (No freezing)

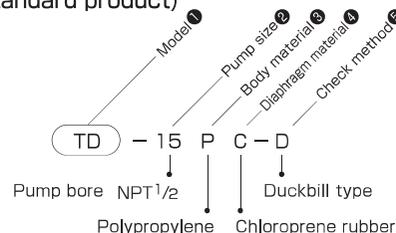
## How to order

Standard type



Semi-standard

Duckbill type (semi-standard product)

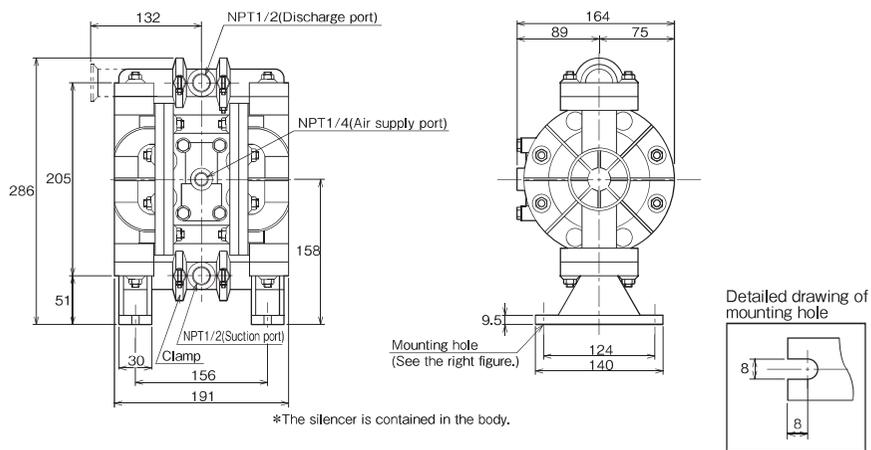


### List of Diaphragm Materials

Model	Pump size	Pump body material	Diaphragm material			
			PTFE	Chloroprene rubber	Urethane rubber	Fluorocarbon
TD-15	NPT1/2	Polypropylene	⊙	○	○	—
		Polyvinylidene-fluoride	⊙	○	○	—
TD-25	1" flange (ANSI Standard)	Polypropylene	⊙	○	—	○
		Polyvinylidene-fluoride	⊙	○	—	○
Ball material			PTFE	Chloroprene rubber	Urethane rubber	Fluorocarbon

Note) ⊙: Standard ○: Semi-standard

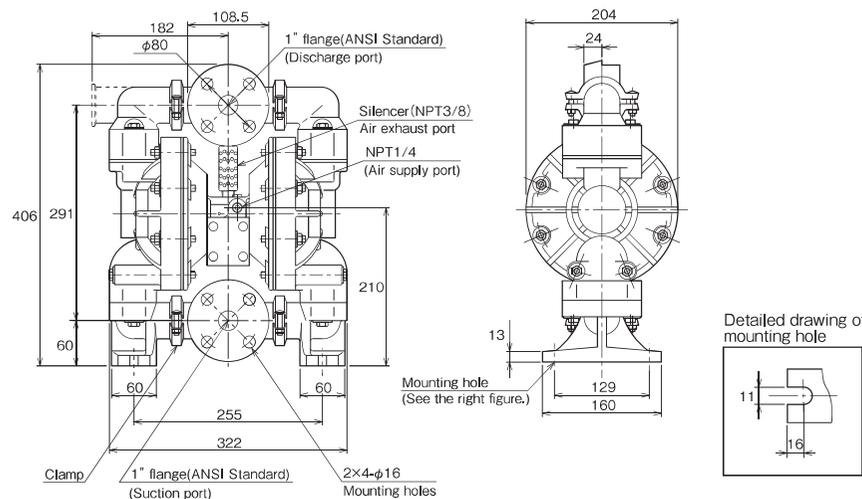
TD-15(plastic type)



\*The silencer is contained in the body.

● The directions of the discharge and suction ports can be changed by loosening the clamps.

TD-25(plastic type)



● The directions of the discharge and suction ports can be changed by loosening the clamps.