

OPERATION MANUAL

YAMADA PULSATION DAMPENER SERIES

AD-10 Series

AD-25 Series

AD-40 Series

AD-50 Series

AD-TT Series

Simplified Declaration of Conformity

YAMADA CORPORATION declares under our sole responsibility that the products described below are in conformity with the following standards and/or directives.

EU Declaration of Conformity:



Product : AIR OPERATED DIAPHRAGM PUMP series and PULSATION DAMPENER series

Model : NDP, DP, G, and AD series; excluding NPT thread type

Directive 2006/42/EC

Directive 2014/30/EU (NDP-E and DP-E series)

EN ISO 12100:2010

EN 809:1998 + A1:2009

Manufacturer

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Original declaration is available at the following Internet address:

<https://www.yamada-europe.com/downloads>

- **Preface**

Thank you very much for purchasing Yamada Pulsation Dampener. This machine performs an important function as accessory equipment of Yamada Double Diaphragm Pump. The machine reduces pulsation that is caused by pump operation and obtains stable discharge. Accordingly, it is available in various lines in an extensive range including filter protection, liquid pump for measuring unit, and measuring pump for feed based on a flow meter. In the liquid-contact parts, the casing uses aluminum, stainless, cast iron, polypropylene, or fluorocarbon resin, and the diaphragm uses rubber-based or plastic-based materials.

- **For Safe Operation**

This document describes the items that are important for the user to operate this product safely, correctly, and efficiently. Before operating this product, read this manual thoroughly, in particular, "Warnings and Cautions" at the beginning of this manual, with a good understanding of its contents. Keep this manual carefully in an easy-to-access place so that the user may refer to it whenever necessary.

- Warnings and Cautions

To use this product safely, be sure to observe the contents of the following description. In this manual, warnings and cautions are indicated by using symbols. These symbols are intended to prevent death or serious injury that may be caused to the operator or those who are around the product and damage that may be caused to the articles that are around the product, as well as to use the product safely and correctly. Each symbol is indicated and has a meaning as shown below. Read the description with a good understanding of its contents.



WARNING: This indicates the existence of potential hazard which, if not avoided, will result in death or serious injury.



CAUTION : This indicates the existence of potential hazard which, if not avoided, may result in bodily injury or in physical damage.

To indicate the contents of danger and damage, the following symbols are used together with the above indications.









This symbol indicates an act that is prohibited (prohibition). The concrete contents of prohibition are indicated by the side of the indication.



This symbol indicates the contents that must be observed. The concrete contents of observance are indicated by the side of the indication.

- Precautions on Use

In handling this product:

 WARNING	
	- Use the following as compressed fluid (hereafter referred to as compressed air) to drive this product. * Compressed air to be supplied by air compressor * Nitrogen (N ₂) gas Using compressed air other than the above will result in atmospheric pollution, damage or explosion to the product.
	- 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, reduce internal pressure completely beforehand. If the product is transported and shock is caused to it by turnover, damage or explosion will be caused to the product.
	- Using hazardous liquid (strong acid, strong alkali, flammable, toxic, etc.) or an ambient atmosphere of this liquid will result in serious injury or death if it sticks on the eyes or skin or is inhaled. Pay attention to the following items. * Do the work according to the operating procedure specified the liquid maker (putting on protective goggles, mask, and working clothes) with a good understanding of the nature of the liquid to be pumped. * Observe the method (vessel, storage place, etc.) provided by law when storing hazardous liquid. * Provide exhaust ports for liquid pipes and this product in places that are far from persons, animals, and passages.
	- 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: Method of External Exhaust on P.12). 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 grounding wire from the specified position of each product. (Except the AD-TT Series)
When this product is operated without the grounding wire properly connected, static electricity may be caused by friction of the slide portion or a liquid flow in the casing though it depends on the type of liquid to be pumped. A fire or electric shock may also be caused though it depends on the type of liquid to be pumped or an installation environment (ambient environment, surrounding installations, etc.).



- Improper grounding, poor ventilation, or unshielded fire or spark may cause a very dangerous status, resulting in a fire or explosion. Be sure to observe the following contents.
 - * Ground all the component units and pipes of this pump.
 - * For pumping flammable liquid, use a dampener of metal type such as aluminum and stainless.
 - * If any spark is detected while the product is in operation, stop it immediately and make a check. Don't operate the product until the cause is clarified.
 - * An flammable atmospheric environment may be caused though it depends on the type of liquid to be pumped. Perform ventilation completely.
 - * Keep this product, liquid pipes, and exhaust ports away from all causes of ignition such as unshielded fire and spark. If a diaphragm is damaged, liquid will blow off from exhaust ports together with air.
 - * Don't leave a waste cloth soaked with gasoline or solvent.
 - * Take an insulating means for the machinery provided near the installation place of this product to prevent mutual conduction.
 - * Don't bring any fire or electric apparatus such as glow lamp into the workshop.
 - * Don't turn on or off the switch of the electric apparatus in a flammable ambient environment or during liquid pumping.
 - * Don't operate any gasoline engine in the workshop.
 - * Don't smoke in the workshop.



- The AD-TT Series product is intended to pump hazardous liquid such as strong acid and organic solvent. If any abnormality is detected on this product, ask your dealer or our business office to repair it without disassemble or repair it on your side.
If the product is disassembled or repaired on your side with the result that another trouble occurs on the product, it may invite great danger though it depends on the type of fluid.



- Even when the pump operation is suspended and pipes are disconnected, liquid may be left in the product for a structural reason. If the product is not operated for a long time, liquid may also be left in the product and connected pipes. Discharge all the liquid before storing the product. If the product is not operated for a long time with the liquid remaining in the product and connected pipes, the liquid will be caused to expand by the ambient environment (by freezing or heating), thereby causing damage or liquid leakage to the product.



- Be sure to use Yamada genuine parts as component parts of this product. Don't work any component part additionally or replace it with a part other than the genuine parts in any case.



- In this product, the tightening torque of each bolt may be reduced by secular change. Before operating the pump, perform tightening according to the maintenance manual.

! WARNING



- When pumping a hazardous fluid (hot, flammable, strong acid, etc.) with this product, provide protective measures (install a pit, protection box, sensors, etc.) in consideration of possible liquid leakage, and post warning signs in necessary places.

Make the warning symbols in “11.Warning symbols” and attach them to the casing, piping, etc.)
Liquid leakage may cause fire, air pollution, or a serious accident. When pumping a hot liquid, the casing and piping will become hot and may burn the skin when touched.

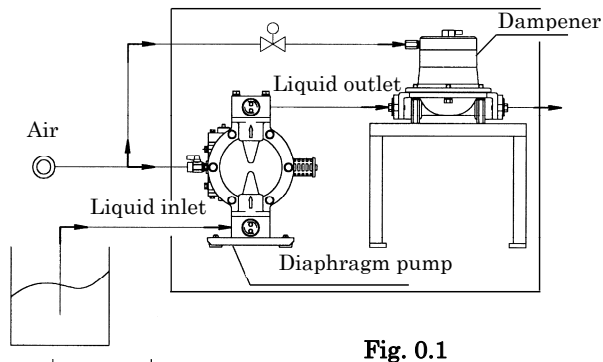


Fig. 0.1



- Before using the product, be sure that you are familiar with the precautions on the liquid to be pumped, and verify the chemical resistance of the parts that will come into contact with the liquid. Never use the product with any liquid against which it does not have sufficient chemical resistance or with a liquid that poses a risk of explosion. If you are unsure of the chemical resistance, contact your dealer or our business office.
If the product is operated when the chemical resistance of the liquid-contact parts is not improper, damage or liquid leakage may be caused to the product.



- When doing operations in the vicinity of the product that pumps liquid, put on protective gear (goggles, mask, etc.).



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



- If you have any question about the operation of this product (connection, installation, etc.) contact your dealer or our business office.

! CAUTION



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



- If a diaphragm of this product is damaged, supply air may be mixed in the liquid or the liquid may flow into the main body (air-switching part). If the product is affected by supply air or foreign materials included in it, or if the chemical resistance of any component part material is not improper, don't operate the product.



- Unless the discharge-side valve is throttled to a certain degree or piping resistance is provided, the pulsation pressure cannot be reduced.



- If the product is installed at the use point at the end of piping, any effect cannot be obtained.



- If two years or more have passed since this product was shipped from our factory, don't operate it but contact your dealer or our business office.

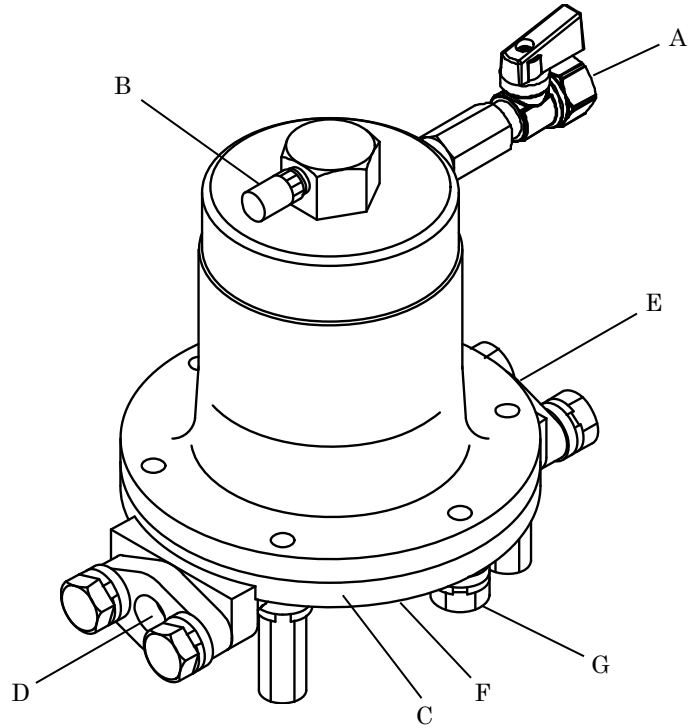
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1. Names and Materials of Parts

1.1 AD-10 Series

- A: Air Valve
- B: Exhaust port
- C: Out-chamber
- D: Discharge port
- E: Intake port
- F: Lift point
- G: Grounding wire connecting point



AD-10A□
AD-10S□

- Aluminum type

Type	AC	AN	AT	AH
Switching part	AC4C			
Liquid contact part	ADC12 [AC2A, PA]			
Diaphragm	CR	NBR	PTFE	TPEE
O ring	PTFE			
Valve sheet	A5056			
Center disk	A5056			

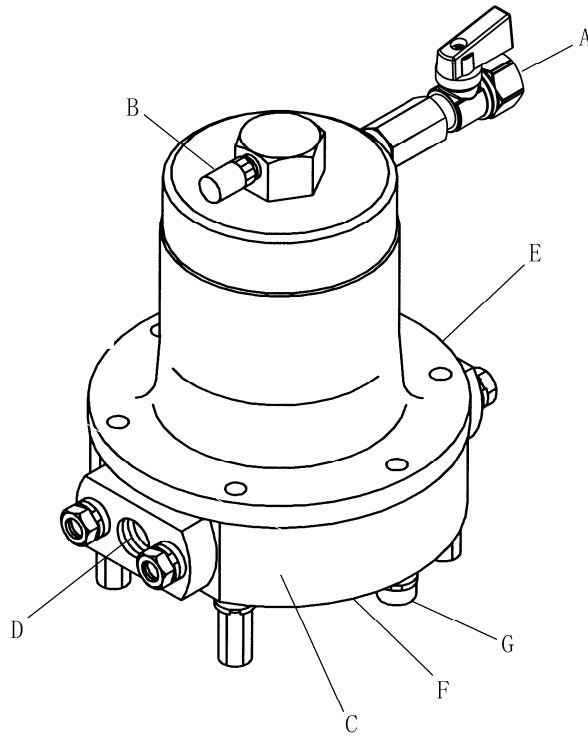
- Stainless type

Type	SC	SN	ST	SH
Switching part	AC4C			
Liquid contact part	SCS14			
Diaphragm	CR	NBR	PTFE	TPEE
O ring	PTFE			
Valve sheet	SUS316			
Center disk	SUS316			

■ Accessories list

- Simple Operation Manual 1
- Air Valve..... 1 (excluding NPT specification)

- A: Air Valve
- B: Exhaust port
- C: Out-chamber
- D: Discharge port
- E: Intake port
- F: Lift point
- G: Grounding wire connecting point



AD-10P□

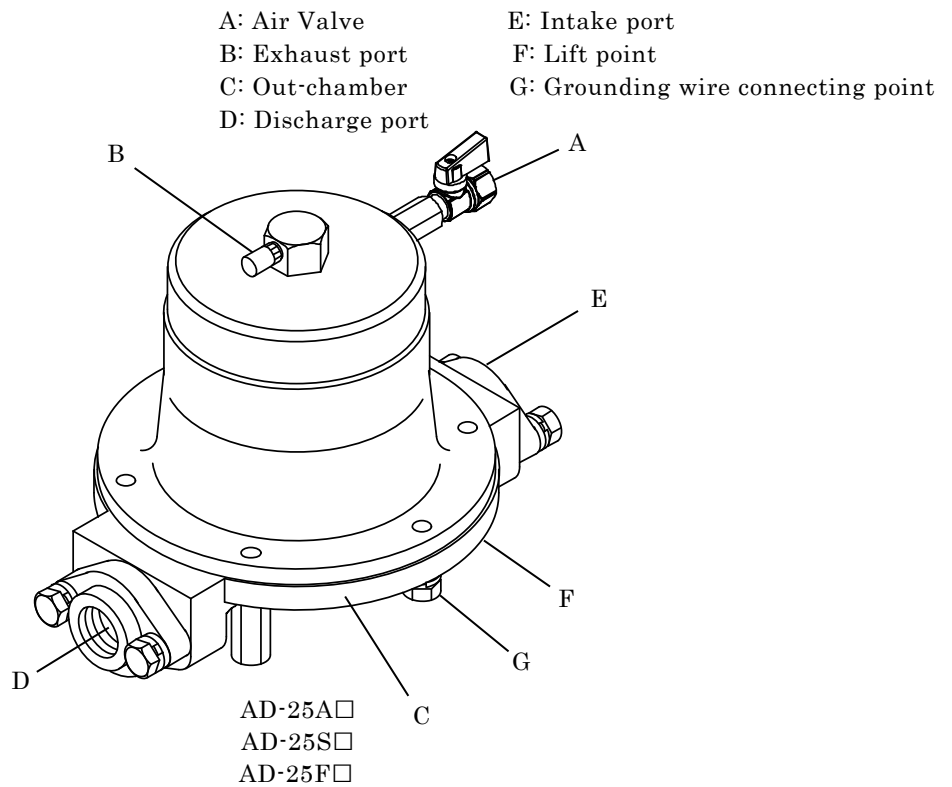
-Polypropylene type

Type	PC	PT	PS
Switching part		AC4C	
Liquid contact part		PPG	
Diaphragm	CR	PTFE	TPO
O ring		PTFE	
Valve sheet		PPG	
Center disk		PPG (SUS304)	

■ **Accessories list**

- Simple Operation Manual 1
- Air Valve..... 1 (excluding NPT specification)

1.2 AD-25 Series



- Aluminum type

Type	AC	AN	AE	AT	AH
Switching part	AC4C				
Liquid contact part	ADC12 [AC2A]				
Diaphragm	CR	NBR	EPDM	PTFE	TPEE
O ring	NBR	NBR	EPDM	PTFE	NBR
Valve sheet	SMS1025				
Center disk	SUS316			A5056	SUS316

- Stainless type

Type	SC	SN	SE	ST	SH
Switching part	AC4C				
Liquid contact part	SCS14				
Diaphragm	CR	NBR	EPDM	PTFE	TPEE
O ring	NBR	NBR	EPDM	PTFE	NBR
Valve sheet	SUS316				
Center disk	SUS316				

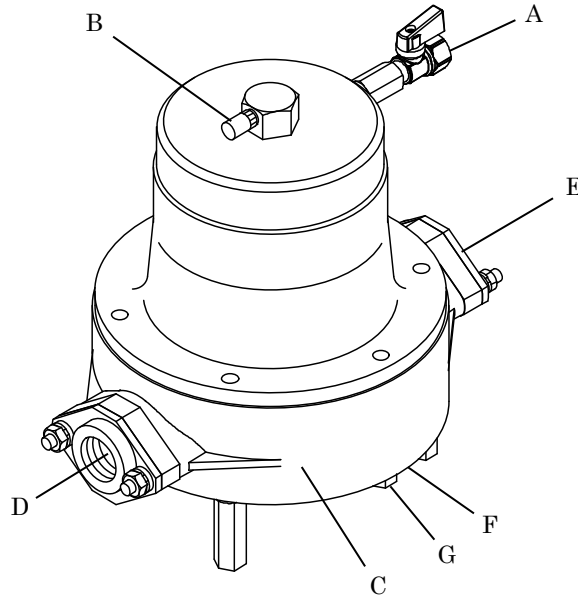
- Cast iron type

Type	FC	FN	FE	FT	FH
Switching part	AC4C				
Liquid contact part	S45C [SCS14]				
Diaphragm	CR	NBR	EPDM	PTFE	TPEE
O ring	NBR	NBR	EPDM	PTFE	NBR
Valve sheet	SMS1025				
Center disk	SUS316				

■ Accessories list

- Simple Operation Manual 1
- Air Valve..... 1 (excluding NPT specification)

A: Air Valve
 B: Exhaust port
 C: Out-chamber
 D: Discharge port
 E: Intake port
 F: Lift point
 G: Grounding wire connecting point



AD-25P□
 AD-25VT

- Polypropylene type

Type	PC	PT	PH
Switching part	AC4C		
Liquid contact part	PPG		
Diaphragm	CR	PTFE	TPEE
O ring	NBR	PTFE	NBR
Valve sheet	PPG		
Center disk	PPG (SCS13)		

- Polyvinylidene fluoride type

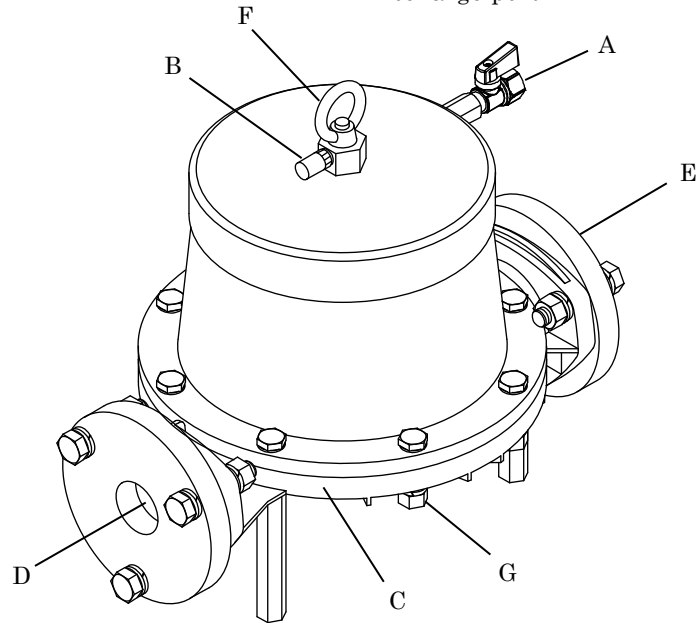
Type	VT
Switching part	AC4C
Liquid contact part	PVDF [PTFE]
Diaphragm	PTFE
O ring	PTFE
Valve sheet	PVDF
Center disk	PVDF (SCS13)

■ Accessories list

- Simple Operation Manual 1
- Air Valve..... 1 (excluding NPT specification)

1.3 AD-40 Series

- A: Air Valve
- B: Exhaust port
- C: Out-chamber
- D: Discharge port
- E: Intake port
- F: Lift point
- G: Grounding wire connecting point



AD-40A□
 AD-40S□
 AD-40F□

- Aluminum type

Type	AC	AN	AE	AV	AT	AH	AS
Switching part	AC4C						
Liquid contact part	ADC12						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
O ring	NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Center disk	A5056						

- Stainless type

Type	SC	SN	SE	SV	ST	SH	SS
Switching part	AC4C						
Liquid contact part	SCS14						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
O ring	NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Center disk	SUS316						

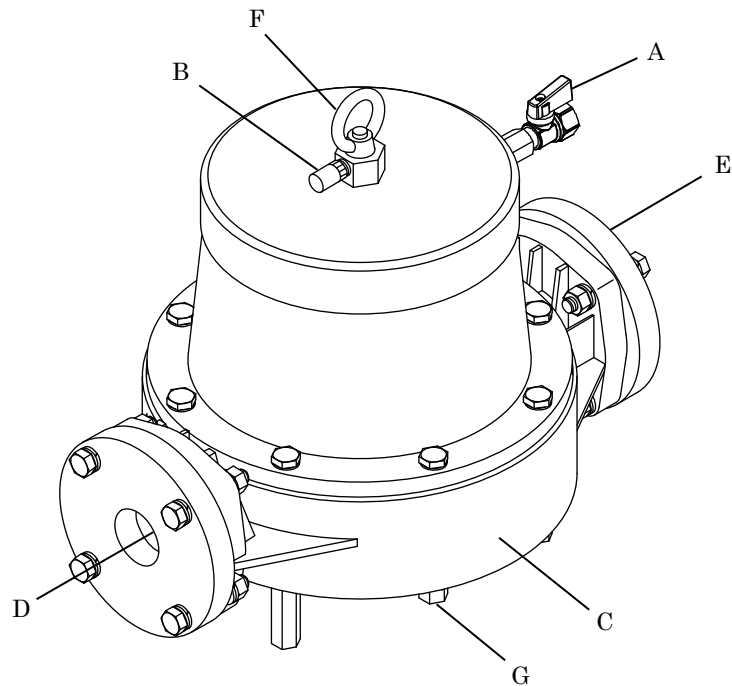
- Cast iron type

Type	FC	FN	FE	FV	FT	FH	FS
Switching part	AC4C						
Liquid contact part	FC250						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
O ring	NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Center disk	SS400						

■ Accessories list

- Simple Operation Manual 1
- Air Valve..... 1 (excluding NPT specification)

- A: Air Valve
- B: Exhaust port
- C: Out-chamber
- D: Discharge port
- E: Intake port
- F: Lift point
- G: Grounding wire connecting point



AD-40P□

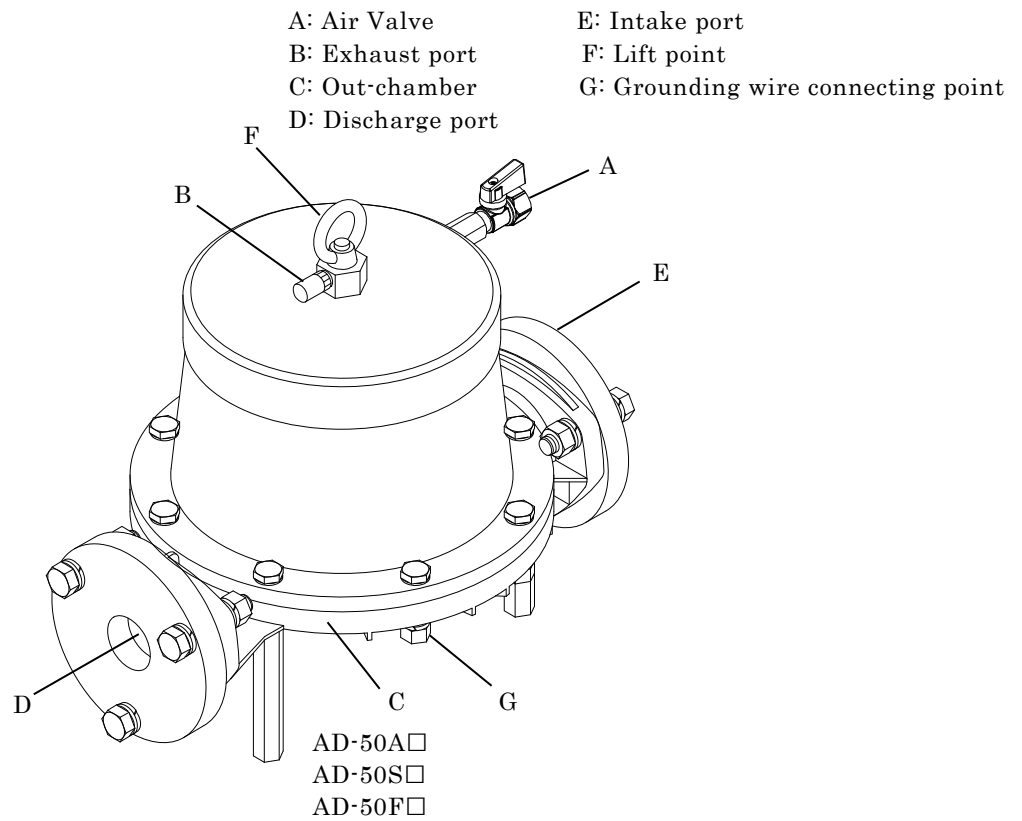
- Polypropylene type

Type	PC	PN	PE	PV	PT	PH	PS
Switching part	AC4C						
Liquid contact part	PPG						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
O ring	NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Center disk	PPG (SCS13)						

■ Accessories list

- Simple Operation Manual 1
- Air Valve..... 1 (excluding NPT specification)

1.4 AD-50 Series



- Aluminum type

Type	AC	AN	AE	AV	AT	AH	AS
Switching part	AC4C						
Liquid contact part	ADC12						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
O ring	NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Center disk	A5056						

- Stainless type

Type	SC	SN	SE	SV	ST	SH	SS
Switching part	AC4C						
Liquid contact part	SCS14						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
O ring	NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Center disk	SUS316						

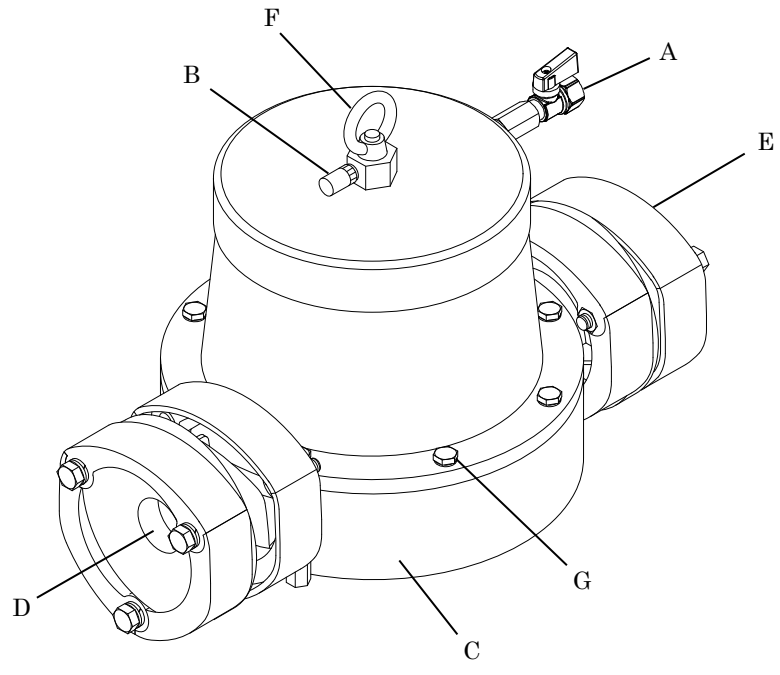
- Cast iron type

Type	FC	FN	FE	FV	FT	FH	FS
Switching part	AC4C						
Liquid contact part	FC250						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
O ring	NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Center disk	SS400						

■ Accessories list

- Simple Operation Manual 1
- Air Valve..... 1 (excluding NPT specification)

- A: Air Valve
- B: Exhaust port
- C: Out-chamber
- D: Discharge port
- E: Intake port
- F: Lift point
- G: Grounding wire connecting point



AD-50P□

- Polypropylene type

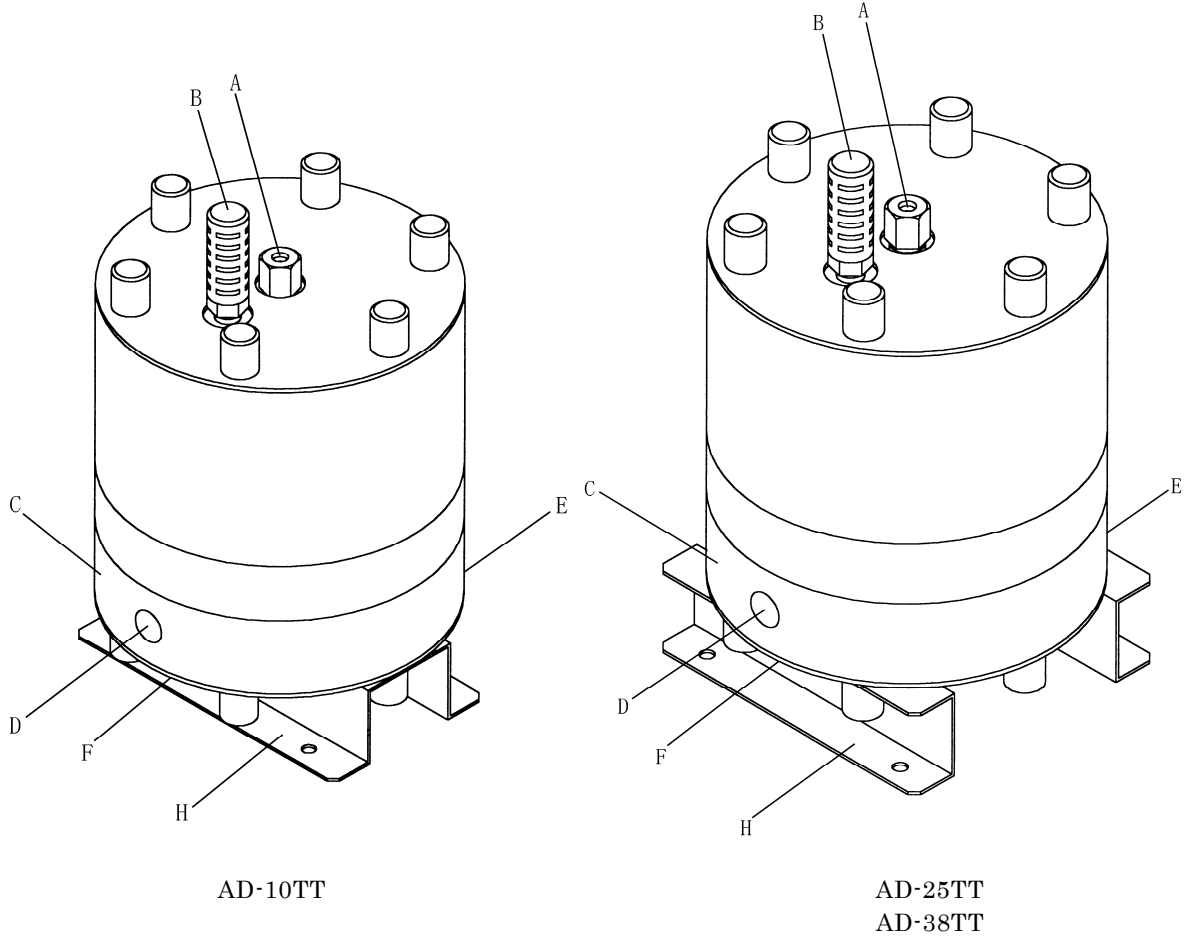
Type	PC	PN	PE	PV	PT	PH	PS
Switching part	AC4C						
Liquid contact part	PPG						
Diaphragm	CR	NBR	EPDM	FKM	PTFE	TPEE	TPO
O ring	NBR	NBR	EPDM	FKM	PTFE	NBR	EPDM
Center disk	PPG (SCS13)						

■ Accessories list

- Simple Operation Manual 1
- Air Valve..... 1 (excluding NPT specification)

1.5 AD-TT Series

A: Air supply port
 B: Exhaust port
 C: Out-chamber
 D: Discharge port
 E: Intake port
 F: Lift point
 H: Pump base



- Fluorine resin type

Type	10TT	25TT	38TT
Switching part	PP		HDPE
Liquid contact part	PTFE		
Diaphragm	PTFE		
O ring	PTFE		

■ Accessories list

- Simple Operation Manual 1
- Silencer 1

2. Assembly

2.1 Installing Accessories

- 1) After unpacking, check if all the accessories are complete, by referring to the accessories list in “1. Names and Materials of Parts”.

CAUTION



- All the connection parts are capped or taped. Remove all of the caps and tapes.



- When installing accessories, take care not to admit foreign materials in the product. Otherwise, they may cause a failure to the air switching part.



- Cover each screw with a sealing tape to prevent leakage.



- Check the weight of the pump by referring to “10.1 Main Specifications” take extreme care when lifting the pump.

3. Installation

3.1 Method of Transport

When lifting the dampener by using a chain block or crane before transporting it, lift it by supporting the specified positions (lifting points) referring to the external view in “1. Names and Materials”.

⚠ WARNING



- Make sure that when the dampener is lifted, nobody passes under it. Otherwise, injury may be caused by a fall of the dampener.

⚠ CAUTION



- Check the weight of the dampener by referring to “10.1 Main Specifications” take extreme care when lifting the dampener.



- When moving the dampener by using a forklift or truck, take care not to overturn the dampener. Otherwise, it may cause injury to the surrounding persons or a failure to the dampener.



- Don't move the dampener by pulling the hose connected to it in any case, otherwise the dampener or hose may be damaged.

3.2 Installing the Product

- 1) Select a proper place to install the dampener by referring to Fig. 3.1 and secure a space.

<NOTE>

- Secure a sufficient space for maintenance and repair work around the dampener.
- The exhaust from the dampener contains foreign materials. When operating the dampener in an environment that may be affected by them, direct the exhaust to a place that has no effect on the environment.

- 2) Move the dampener and set it in its installation place.

- 3) To fix the dampener, install it by using the mounting holes at 4 positions in the lower part.

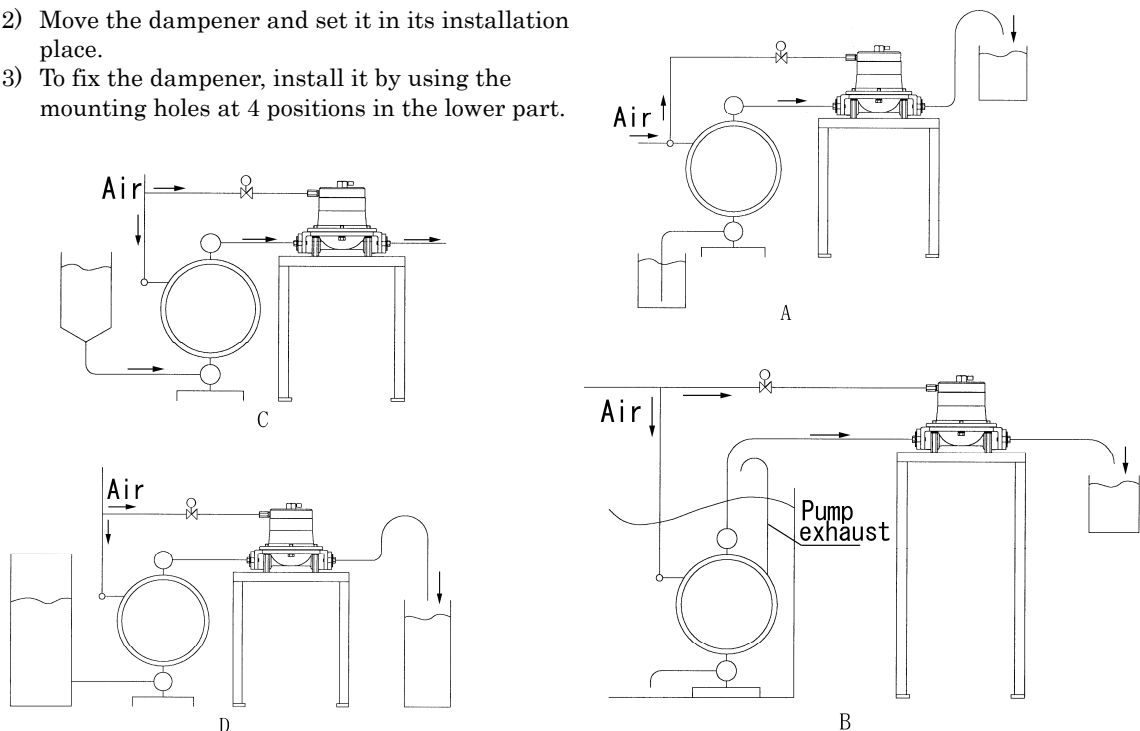


Fig. 3.1

⚠ CAUTION



- When pumping a hazardous fluid (hot, flammable, strong acid, etc.) with this product, provide protective measures (install a pit, protection box, sensors, etc.) in consideration of possible liquid leakage, and post warning signs in necessary places. For details, see “Precautions on Use” on and after P. 1/3.

⚠ WARNING



- When operating the dampener with flammable liquid or in a flammable ambient environment, see “Precautions on Use” on and after P. 1/3.

<NOTE> Method of External Exhaust

- Remove the silencer.
- Connect a hose with a grounding wire to the exhaust port of the dampener and install the silencer at the end of the hose. Use a hose with the same diameter as the exhaust port. (If the hose is longer than 5 m, consult with your dealer or our business office.)
- Install a pit, protection box, etc. at the end of the hose.

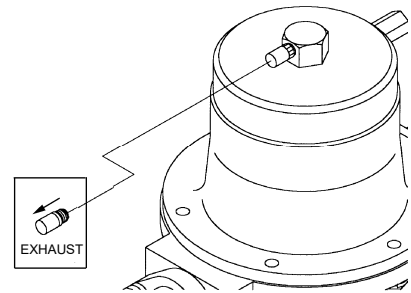


Fig. 3.2

⚠ WARNING



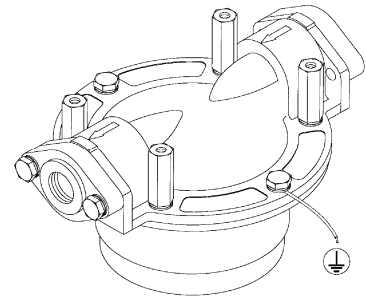
- Be sure to install a pit, protection, box, etc. at the end of the hose against a liquid outflow in case of damage caused to a diaphragm. For details, see “Precautions on Use” on and after P. 1/3.



- Direct the exhaust of the dampener to a safe place free from persons, animals, and food.

3.3 Connecting the Grounding Wire

- When installing the dampener, be sure to connect the grounding wire at the specified position. For the specified position, refer to the external view in “1. Names and materials of Parts”. (Except the AD-TT Series)
- For the auxiliaries and piping of the dampener, connect grounding wires in the same way.
- Use a grounding wire with a sectional area of 2.0 mm² or more.



Tighten the bolt together with the grounding wire.

Grounding wire connecting position

Fig. 3.3

⚠ WARNING



- Be sure to connect grounding wires to component units. For details, refer to “Precautions on Use” on after P.1/3. When the dampener is operated without the grounding wire properly connected, static electricity may be caused by friction of the slide part or a liquid flow in the casing though it depends on the type of liquid to be pumped, so that the dampener may be charged. A fire or electric shock may also be caused though it depends on the type of liquid to be pumped or an installation environment (ambient environment, surrounding installations, etc.).

4. Connections

4.1 Connecting the Liquid Pipe

- 1) Connect a hose to the intake port and the discharge port.

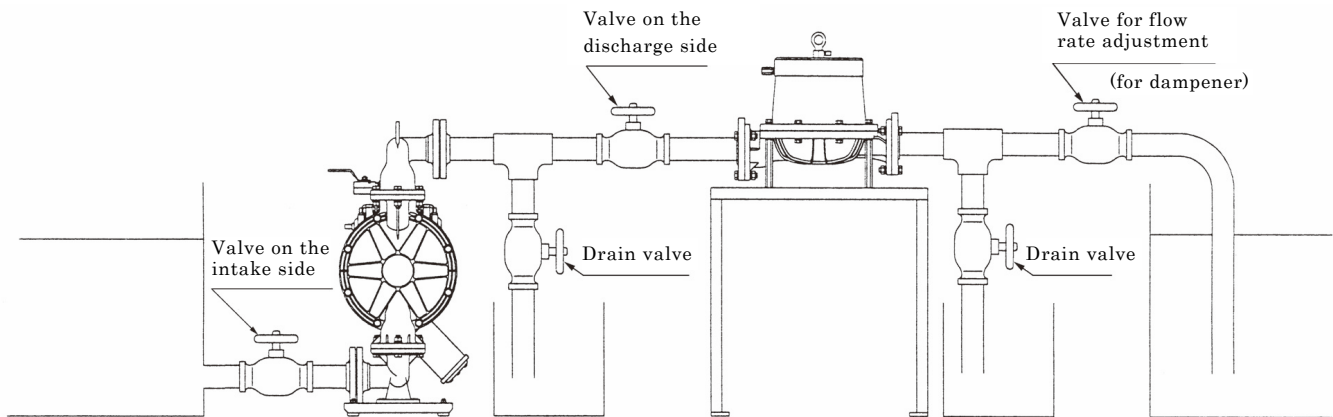


Fig. 4.1

⚠ CAUTION

- ! - Use a flexible hose with a grounding wire so as to absorb dampener vibration.
- ! - Make sure that any external force is not applied to each connection part of the dampener. In particular, take care about the empty weights of hose and pipes.
- ! - Use a hose that is not caused to collapse by suction of the pump. Take care about the allowable pressure of the hose.
- ! - Use a hose with a diameter equal or superior to that of the dampener. If the diameter of the hose is smaller, the dampener performance cannot be obtained and a failure will occur in the dampener.
- ! - When pumping a liquid that contains slurry, verify that the particle size is less than the maximum passing particle size of the pump (see “10.1 Main Specifications”). If it exceeds the limitation of slurry indicated in the Main Specifications, attach a strainer to the pump so as not to admit it in the pump. Otherwise, a failure will occur.
- ! - When making a leakage test on piping, don't apply pressure from the outside to the intake and discharge sides of the dampener by compressed air. It may cause reversal or damage of a diaphragm or a failure to the switching part. For making a leakage test on piping, install valves between the intake port and discharge port of the dampener, and the piping, or disconnect the pump from the piping and install a plug so that external pressure may not be applied to the dampener.
- ! - For our product inspection, compressed air is used. Clean the inside of the pump to avoid mixing dirty water into the liquid to be pumped before completing all the installation work.

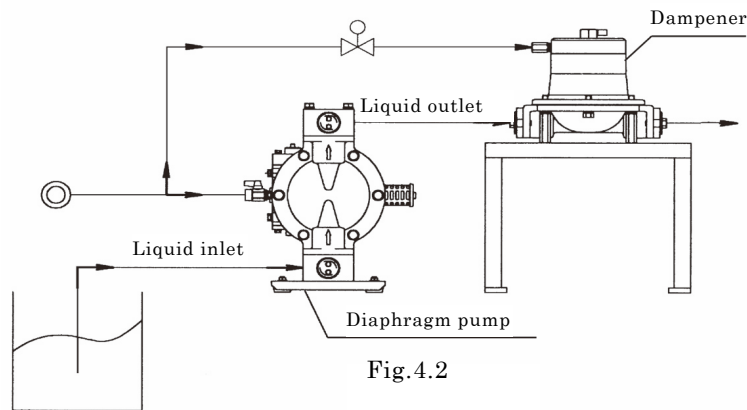
4.2 Connecting the Air Pipe.

⚠ WARNING



- Before starting the connection work, make sure that the air compressor is stopped.

- 1) Connect a hose to the supply port of the dampener after branching it with an air regulator from the air pipe connected to the pump. For details, refer to <NOTE>. (Fig. 4.2)



⚠ CAUTION



- Use a flexible hose with a grounding wire so as to absorb pump and dampener vibration.



- Make sure that any external force is not applied to each connection part of the dampener. In particular, take care about the empty weights of hose and pipes.



- The piping and auxiliaries may be clogged up with foreign materials. Clean the inside of the piping by causing air to flow for 10 to 20 seconds before connecting it to the dampener.



- Be sure to connect a grounding wire to each of the piping and auxiliaries.

<NOTE>

- The diameter of the air pipe should be the same as that of the air supply port of the dampener or larger than that so that sufficient air can be supplied according to the air consumption requirements of the dampener. Select auxiliaries with an air flow rate that can satisfy the air consumption of the dampener and install them close to the pump in consideration of operability and stability of air pressure.
- Using a coupler at the connection part of the hose will facilitate the connection work.

5. Operations

5.1 Operating Procedure

⚠ CAUTION



- Before starting the pump, make sure that each pipe is correctly connected.



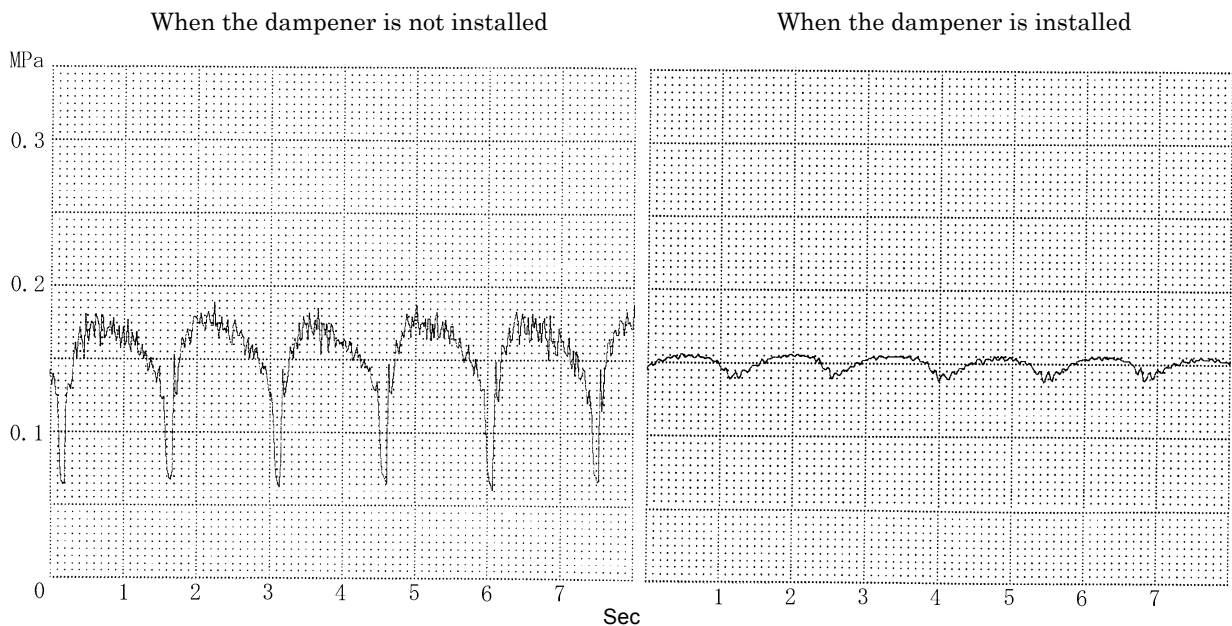
- Before starting the dampener, make sure that the bolt of each tightened part is not loose. (For the tightened parts for which the fixed torque is specified, refer to the maintenance manual.)



- Make sure that the air valve and regulator are closed.

- 1) Start the air compressor and operate the pump.
- 2) Set the supply air pressure to the reference level of “pump discharge pressure x 1.1” by using the regulator connected to the dampener and make a fine adjustment in the range of ± 0.05 MPa while checking the pulsation as required.

- Comparison of pulsation based on a Visigraph (reference materials)



⚠ CAUTION



- Unless the valve on the discharge side is somewhat throttled or piping resistance exists, the pulsation pressure with is not reduced.



- When the dampener is installed at the use point at the end of the piping, it provides no effect.

5.2 Stopping Procedure

- Close the air valves of the pump and the dampener to shut off the supply air.

CAUTION



- There is no problem in closing the valve for flow rate adjustment to stop the dampener while air is supplied. However, this status is continued for a long time or without any watchman, the dampener will start its operation upon occurrence of damage in a diaphragm or leakage from the dampener or piping, so that liquid will continue to flow out from the leaking portion. When finishing the work, stop the pump, release the internal pressure of the dampener, and close the air valve.



- If the dampener is stopped while slurry is pumped, the solid materials contained in the slurry are precipitated and stuck in the dampener. If the dampener is started again in this status, a diaphragm will be damaged or an eccentric load is applied to the center disk, thereby causing a failure such as bending of the center rod. When completing the work, discharge the liquid remaining in the pump by referring to “6. Cleaning Method”.

6. Cleaning Method

- 1) Operate the pump slowly at the starting pressure to circulate the cleaning liquid to perform cleaning completely.
- 2) Select a cleaning liquid according to the type of liquid to be pumped, and finally flush with clean water.

CAUTION



- Take care when removing the piping because liquid flows out.



- After flushing with clean water, lift the dampener with a crane to turn it upside down so as to drain water.

7. Routine Inspection

- Before starting dampener operation, perform the following inspection every day. If any abnormality is found, don't operate the dampener until the cause of the abnormality is clarified and a corrective measure is taken.
- a) Check each connection part for liquid leakage.
- b) Check the casing and piping for fissure.
- c) Check the tightness of every bolt of the dampener and retighten if necessary. For details, see the maintenance manual.
- d) Check the connection parts of the piping and auxiliaries for looseness.
- e) Make sure that each consumable parts of the dampener has not been inspected or replaced. For details, see the maintenance manual.

8. Maintenance and Inspection

8.1 Causes of Failures and Corrective Measures

Symptom	Inspection method	Corrective measure
- Pulsation occurs.	- The silencer on the exhaust side is clogged.	- Disassembly and replacement
	- The valve sheet on the exhaust side is worn away or damaged.	- Disassembly and cleaning
- Liquid leaks from the exhaust port when pulsation occurs.	- The diaphragm is damaged.	- Disassembly and replacement
	- The nut of the center disk is loose.	- Disassembly and tightening
- Air is mixed in the discharged liquid.	- The vessel on the pump suction side is empty.	- Check and replenishment

(For disassembly and inspection, refer to the exploded views of parts and the maintenance manual for diaphragm pump.)

- When the dampener must be disassembled to take the above corrective measures, perform the work according to the procedure described in each item referring to the separate maintenance manual.
- When the failure does not corresponding to any of these causes, consult with your dealer or our business office.

8.2 Routine Inspection Items

- Liquid leakage check Check each sealing part for liquid leakage.
Tighten bolts and nuts periodically.

9. Returning the Product for Servicing

9.1 Before Returning the Product

- 1) Discharge the liquid in the pump and perform cleaning according to “6. Cleaning Method”.
- 2) Return the product in the same package as when it was first shipped from the factory.

WARNING



- Any accident to be caused by incomplete cleaning of the dampener will be attributable to the sender's responsibility.

CAUTION



- Be sure to prevent liquid from flowing out from the inside of the dampener for safe transportation.

10 Specifications of the Main Body

10.1 Main Specifications

■AD-10 Series

Type		AD-10		
		A□	S□	P□
Nominal diameter		3/8" (10 mm)		
Liquid connection		Rc 3/8 NPT 3/8		
Air connection	Supply port	Rc 1/4 NPT 1/4		
	Exhaust port	Rc 1/8 NPT 1/8		
Operating air pressure * 2		0 - 0.7 MPa		0 - 0.7 MPa * 1
Maximum discharge pressure		0.7 MPa		0.7 MPa * 1
Maximum air consumption		20 L/min(ANR)		
Slurry limitation (Maximum passing particle size)		1 mm or less		
Operating Temperature Range	Temp. Ambient	0 - 70 °C		
	Temp. Liquid	* 3		0 - 60 °C
Weight		2.1 kg	3.0 kg	2.1 kg

*1. Maximum air pressure for non-metallic pumps decreases with temperature
(See P.20. Temperature Pressure Curve).

*2. The above values depend on the operating conditions. If you have any unclear point about them, ask your dealer or our business office for further information.

*3. Diaphragm material NBR/CR : 0 - 70 °C
 TPEE : 0 - 80 °C
 PTFE : 0 - 100 °C

■AD-25 Series

Type		AD-25				
		A□	S□	F□	P□	VT
Nominal diameter		1" (25 mm)				
Liquid connection		Rc 1 NPT 1				
Air connection	Supply port	Rc 1/4 NPT 1/4				
	Exhaust port	Rc 1/8 NPT 1/8				
Operating air pressure * 2		0 - 0.7 MPa			0 - 0.7 MPa * 1	
Maximum discharge pressure		0.7 MPa			0.7 MPa * 1	
Maximum air consumption		20 L/min(ANR)				
Slurry limitation (Maximum passing particle size)		3 mm or less				
Operating Temperature Range	Temp. Ambient	0 - 70 °C				
	Temp. Liquid	* 3			0 - 60 °C	
Weight		5.8 kg	8.2 kg	8.2 kg	5.5 kg	6.3kg

*1. Maximum air pressure for non-metallic pumps decreases with temperature
(See P.20. Temperature Pressure Curve).

*2. The above values depend on the operating conditions. If you have any unclear point about them, ask your dealer or our business office for further information.

*3. Diaphragm material NBR/CR : 0 - 70 °C
 TPEE/EPDM : 0 - 80 °C
 PTFE : 0 - 100 °C

■AD-40 Series

Type		AD-40			
		A□	S□	F□	P□
Nominal diameter		1. 1/2" (40 mm)			
Liquid connection		Rc 1. 1/2 NPT 1. 1/2			
Air connection	Supply port	Rc 1/4 NPT 1/4			
	Exhaust port	Rc 1/8 NPT 1/8			
Operating air pressure * 2		0 - 0.7 MPa		0 - 0.7 MPa * 1	
Maximum discharge pressure		0.7 MPa		0.7 MPa * 1	
Maximum air consumption		20 L/min(ANR)			
Slurry limitation (Maximum passing particle size)		7 mm or less			
Operating Temperature Range	Temp. Ambient	0 - 70 °C			
	Temp. Liquid	* 3		0 - 60 °C	
Weight		10.4 kg	15.9 kg	15.2 kg	11.2 kg

*1. Maximum air pressure for non-metallic pumps decreases with temperature
(See P.20. Temperature Pressure Curve).

*2. The above values depend on the operating conditions. If you have any unclear point about them, ask your dealer or our business office for further information.

*3. Diaphragm material NBR/CR : 0 - 70 °C
 TPEE/EPDM : 0 - 80 °C
 FKM/TPO/PTFE : 0 - 100 °C

■AD-50 Series

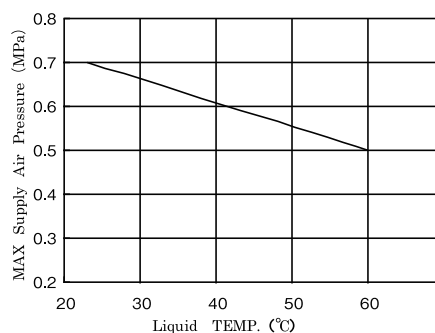
Type		AD-50			
		A□	S□	F□	P□
Nominal diameter		2" (50 mm)			
Liquid connection		Rc 2 NPT 2			
Air connection	Supply port	Rc 1/4 NPT 1/4			
	Exhaust port	Rc 1/8 NPT 1/8			
Operating air pressure * 2		0.2 - 0.7 MPa		0 - 0.7 MPa * 1	
Maximum discharge pressure		0.7 MPa		0.7 MPa * 1	
Maximum air consumption		20 L/min(ANR)			
Slurry limitation (Maximum passing particle size)		8 mm or less			
Operating Temperature Range	Temp. Ambient	0 - 70 °C			
	Temp. Liquid	* 3		0 - 60 °C	
Weight		16.6 kg	25 kg	24.0 kg	16.2 kg

*1. Maximum air pressure for non-metallic pumps decreases with temperature
(See P.20. Temperature Pressure Curve).

*2. The above values depend on the operating conditions. If you have any unclear point about them, ask your dealer or our business office for further information.

*3. Diaphragm material NBR/CR : 0 - 70 °C
 TPEE/EPDM : 0 - 80 °C
 FKM/TPO/PTFE : 0 - 100 °C

Liquid TEMP.-MAX. Supply Air Pressure Curve



■AD-TT Series

Type		AD-10TT	AD-25TT	AD-38TT
Nominal diameter		3/8" (10 mm)	3/4" (20 mm)	1" (25 mm)
Liquid connection		Rc 3/8 NPT 3/8	Rc 3/4 NPT 3/4	Rc 1 NPT 1
Air connection	Supply port	Rc 1/4 NPT 1/4		
	Exhaust port	Rc 1/8 NPT 1/8		
Operating air pressure * 1		0.2 - 0.5 MPa * 2	0.2 - 0.7 MPa * 2	
Maximum discharge pressure		0.5 MPa	0.7 MPa	
Maximum air consumption		20 L/min(ANR)		
Slurry limitation (Maximum passing particle size)		1 mm or less	3 mm or less	
Operating Temperature Range	Temp. Ambient	0 - 70 °C		
	Temp. Liquid	0 - 80 °C		
Weight		4.4 kg	11.7 kg	30.0 kg

*1. The quality of the compressed air should satisfy the Quality Classes 2 - 3 - 2 of "JIS B8392-1:2000 General Compressed Air."
(Maximum diameter of a particle: 1 μm, Maximum pressure dew-point: - 20 °C , Maximum oil content: 0.1 mg/m³)

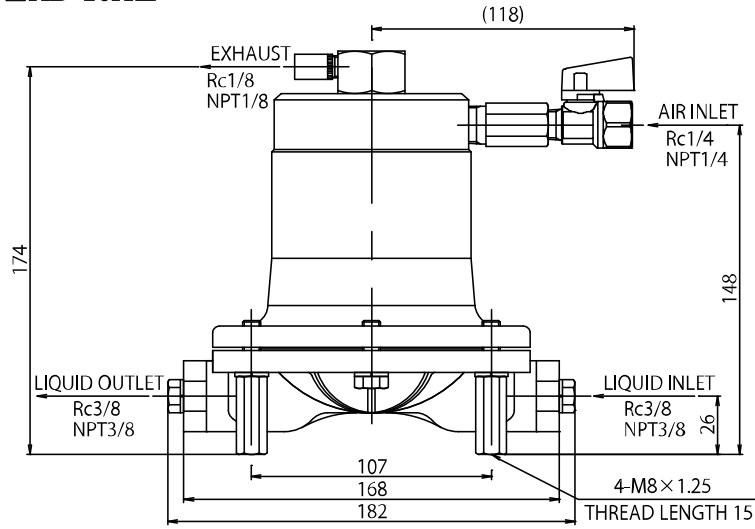
*2 . The above values depend on the operating conditions. If you have any unclear point about them, ask your dealer or our business office for further information.

10.2 Appearance and Dimensions

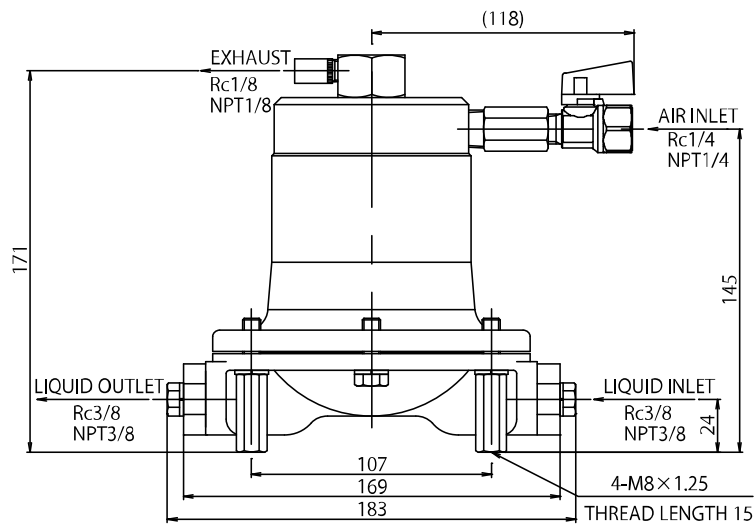
※The NPT specification does not have an air valve.

10.2.1 AD-10 Series

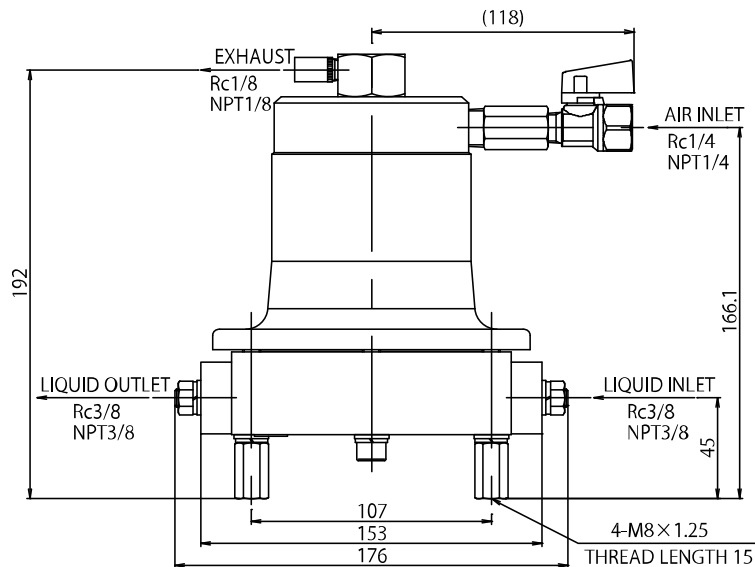
■AD-10A□



■AD-10S□

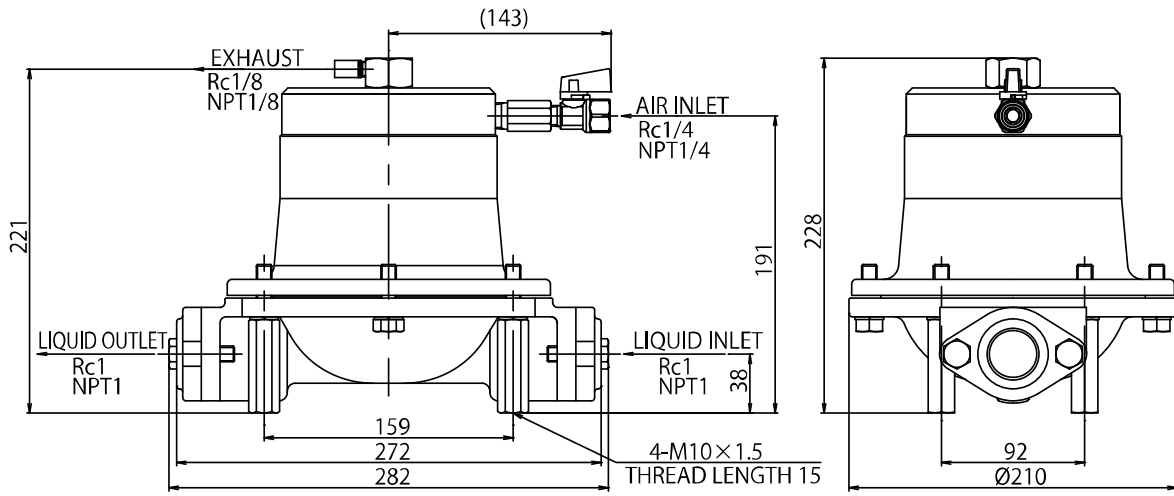


■AD-10P□

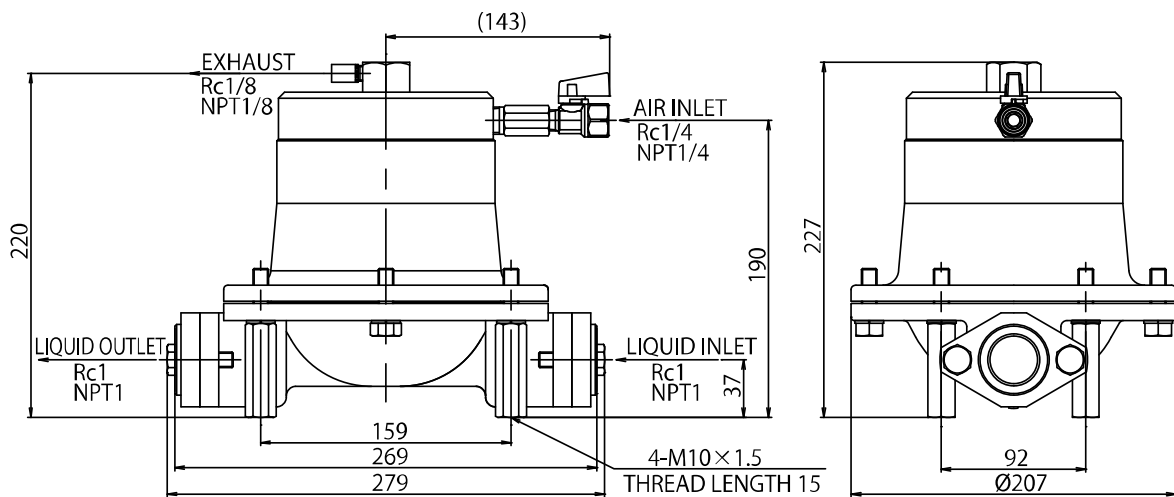


10.2.2 AD-25 Series

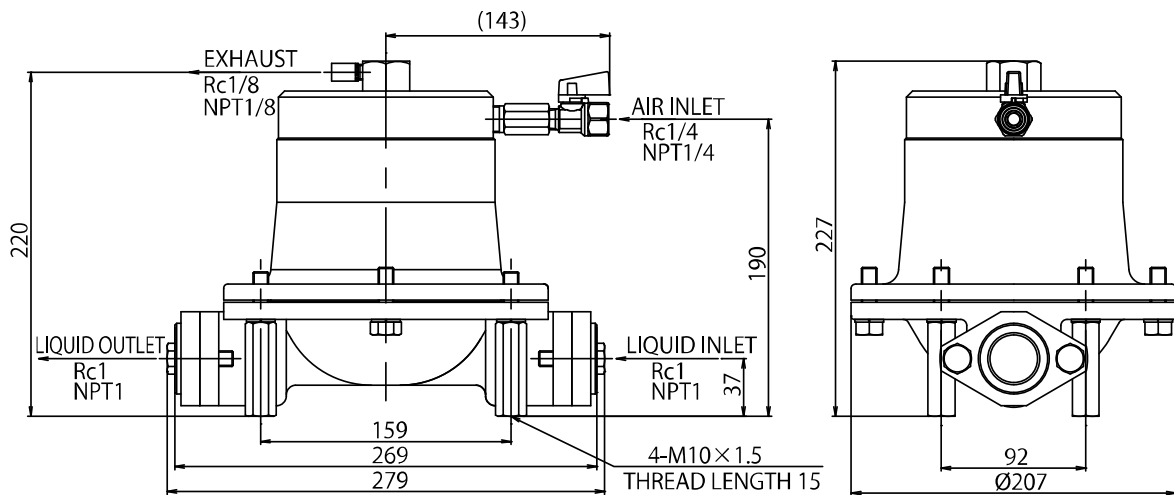
■AD-25A□



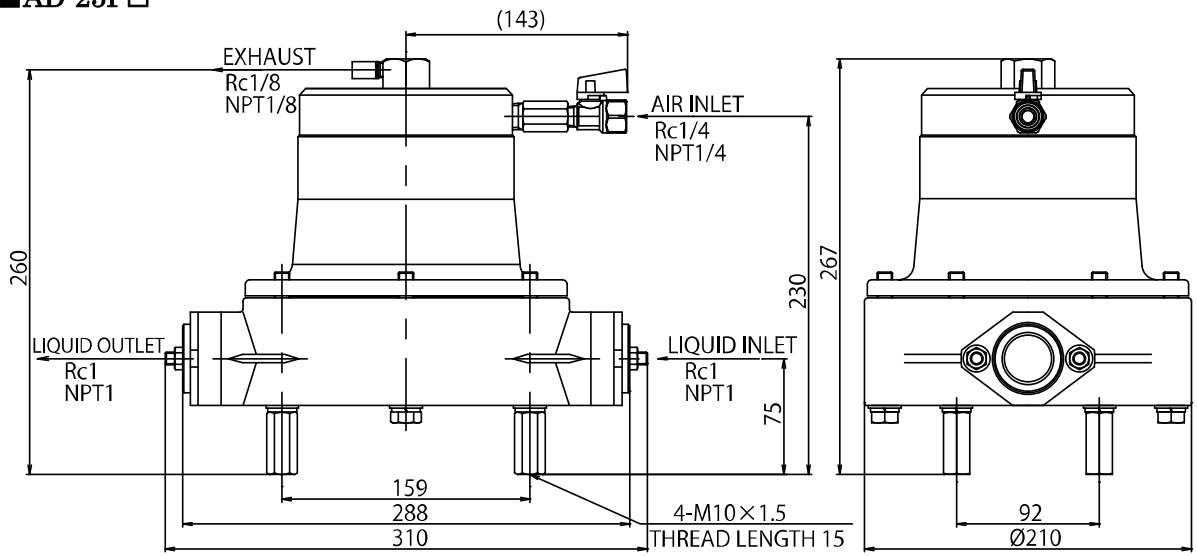
■AD-25S□



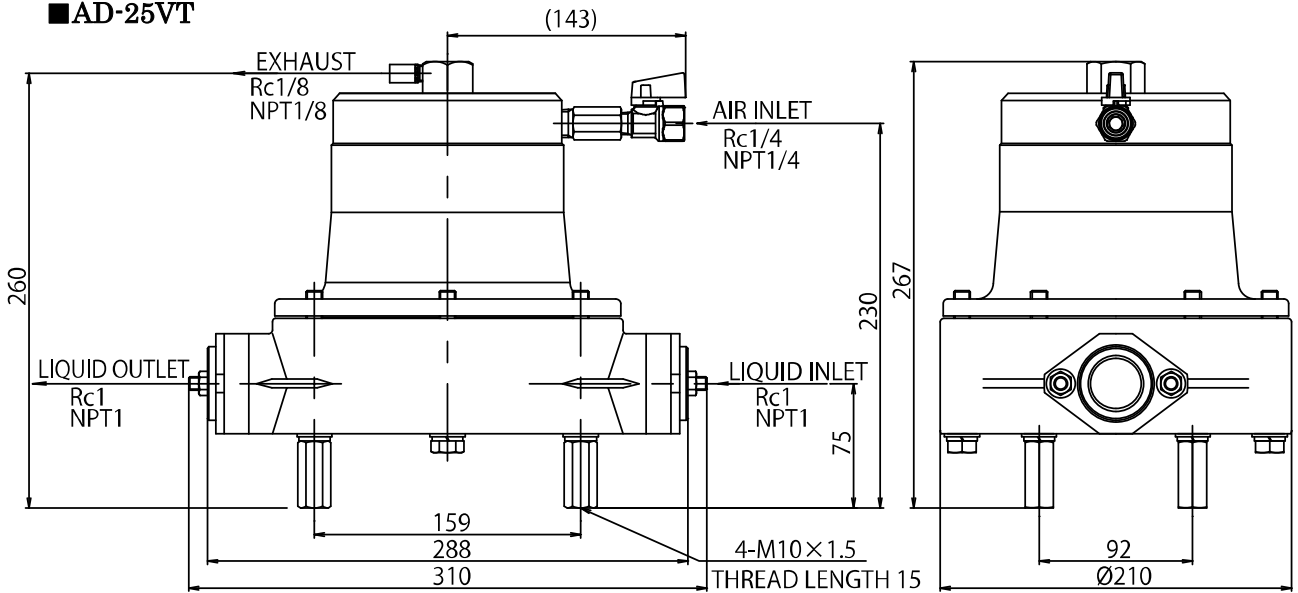
■AD-25F□



■AD-25P□

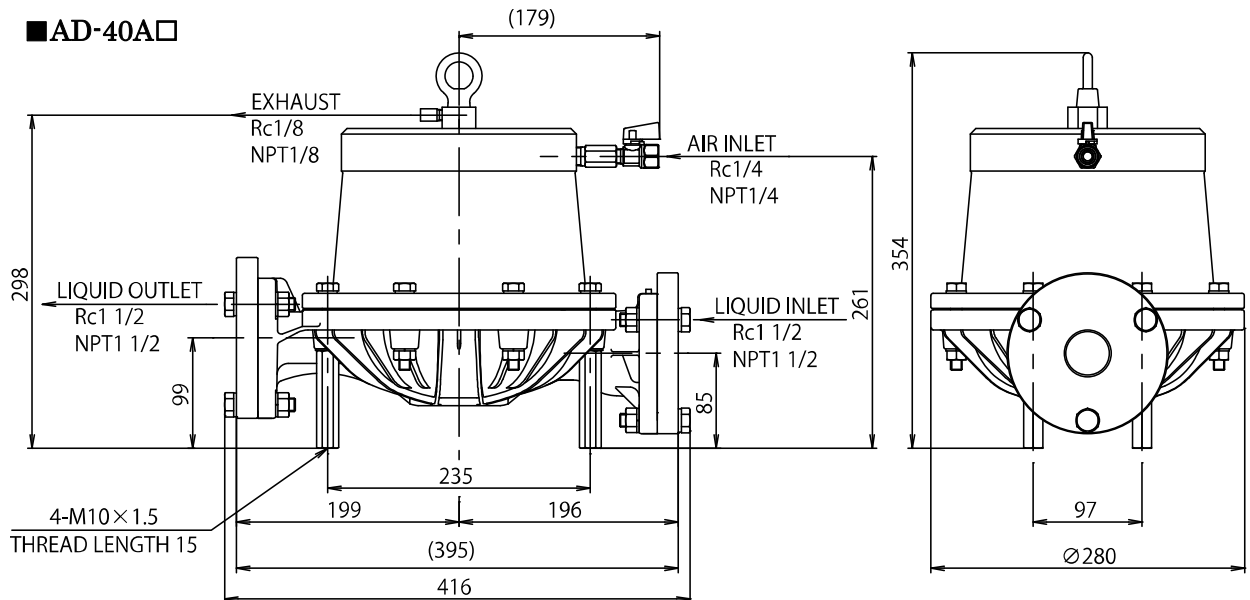


■AD-25VT

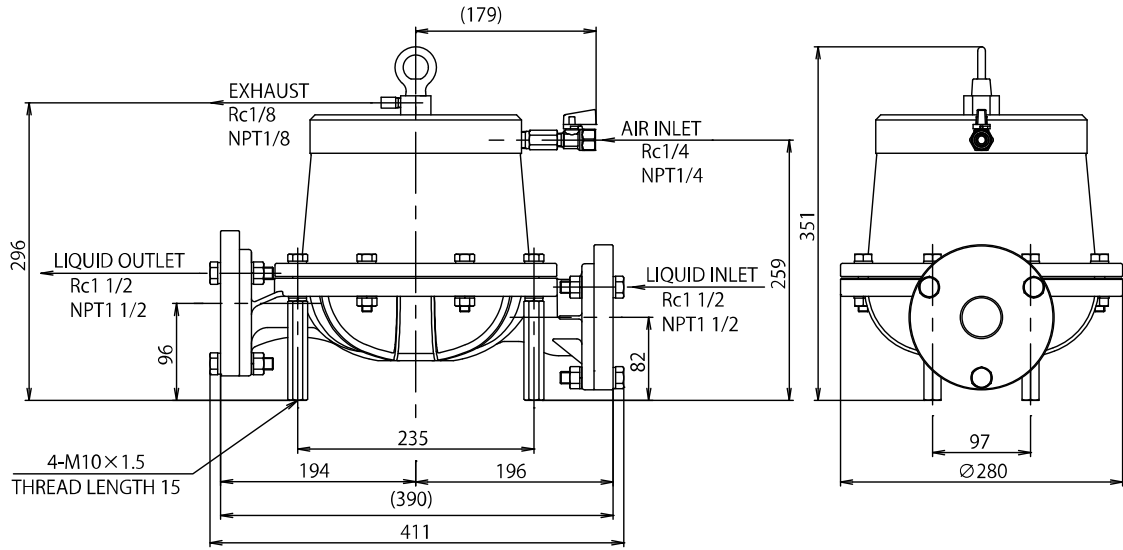


10.2.3 AD-40 Series

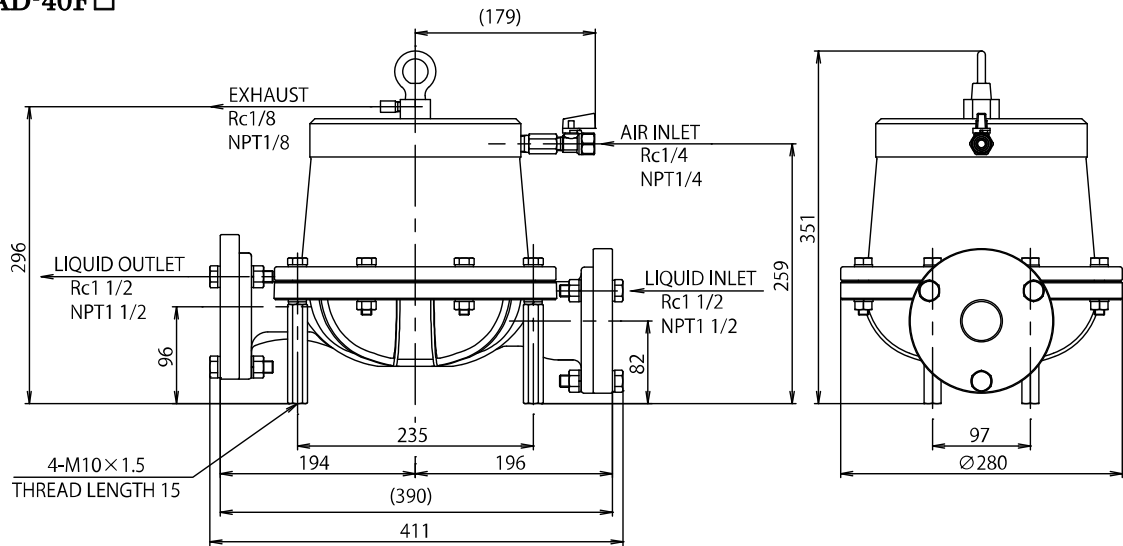
■AD-40A□



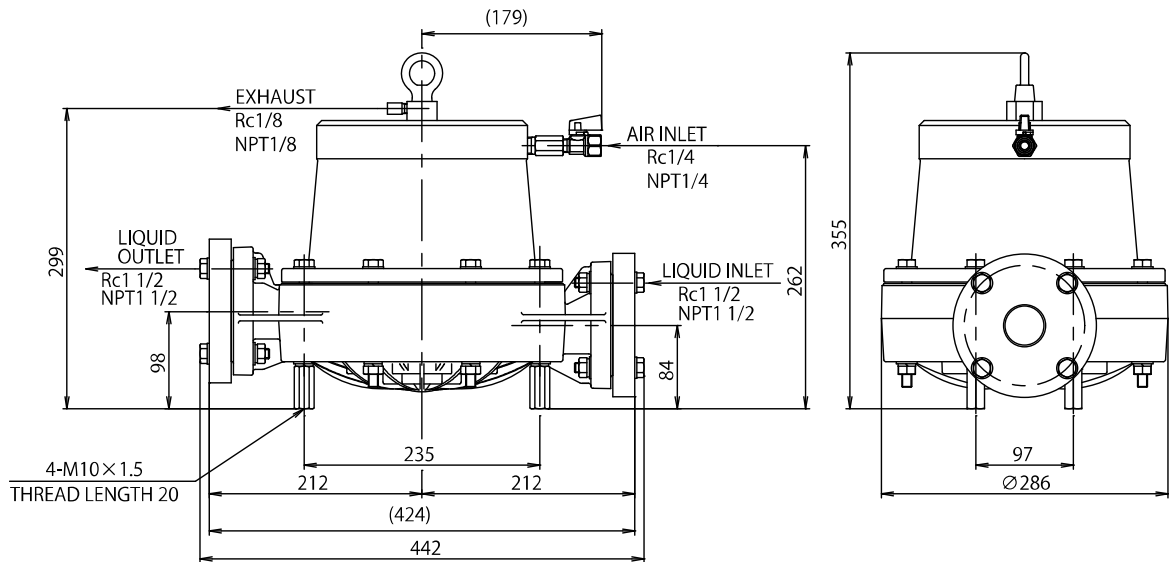
■AD-40S□



■AD-40F□

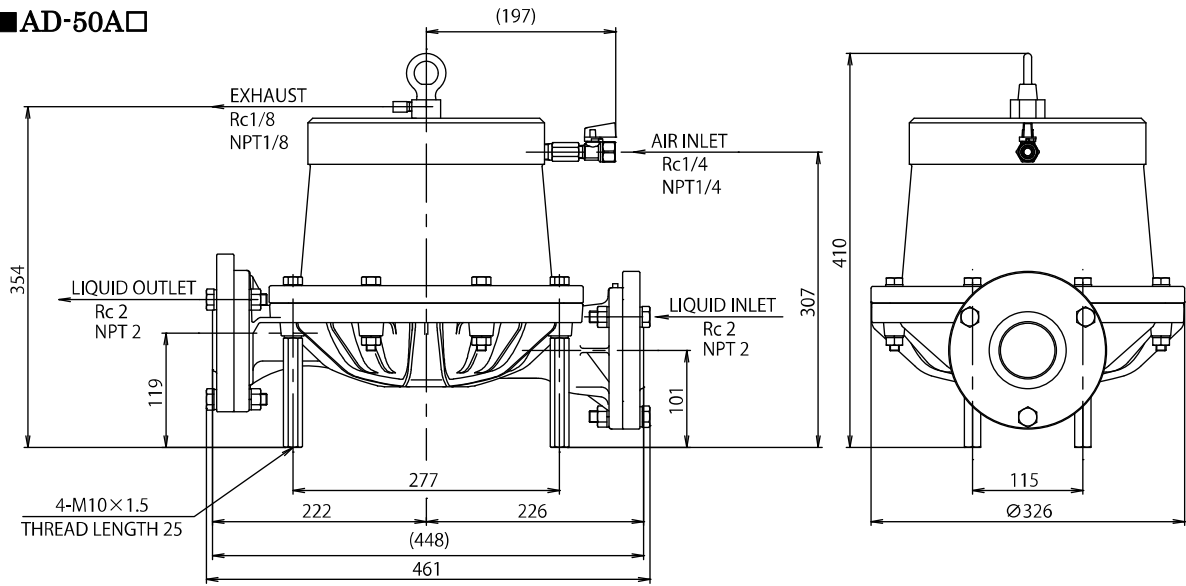


■AD-40P□

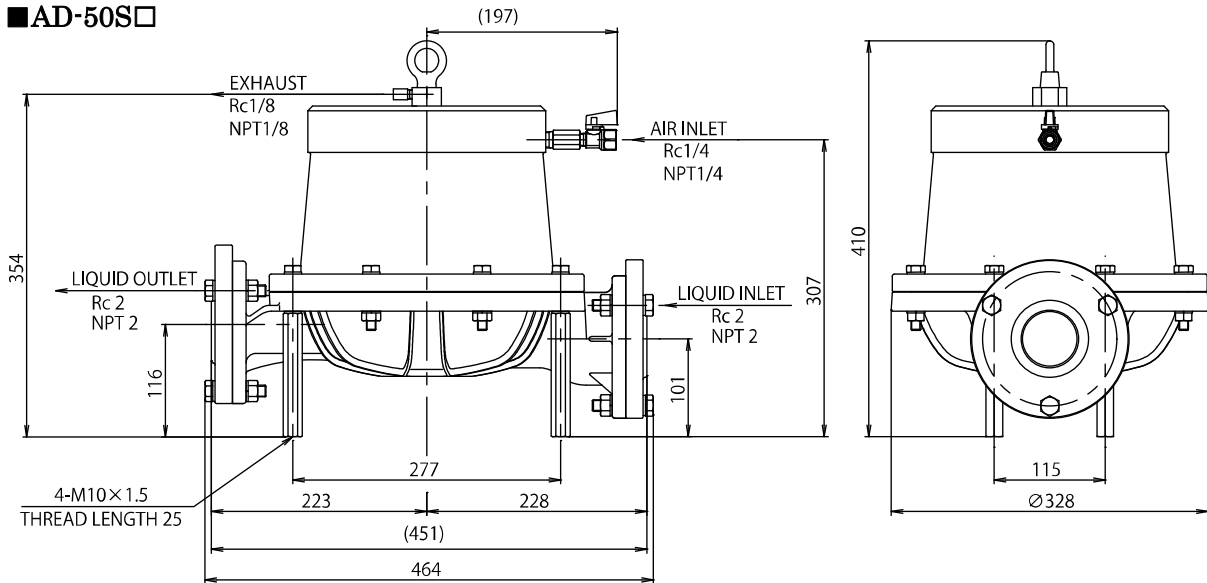


10.2.4 AD-50 Series

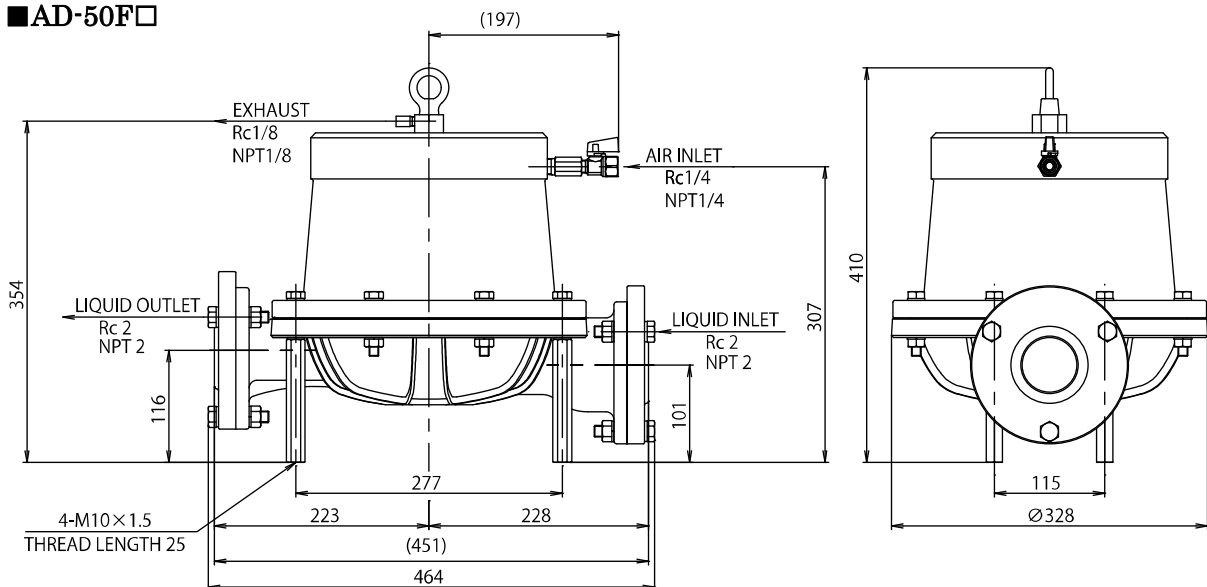
■AD-50A□



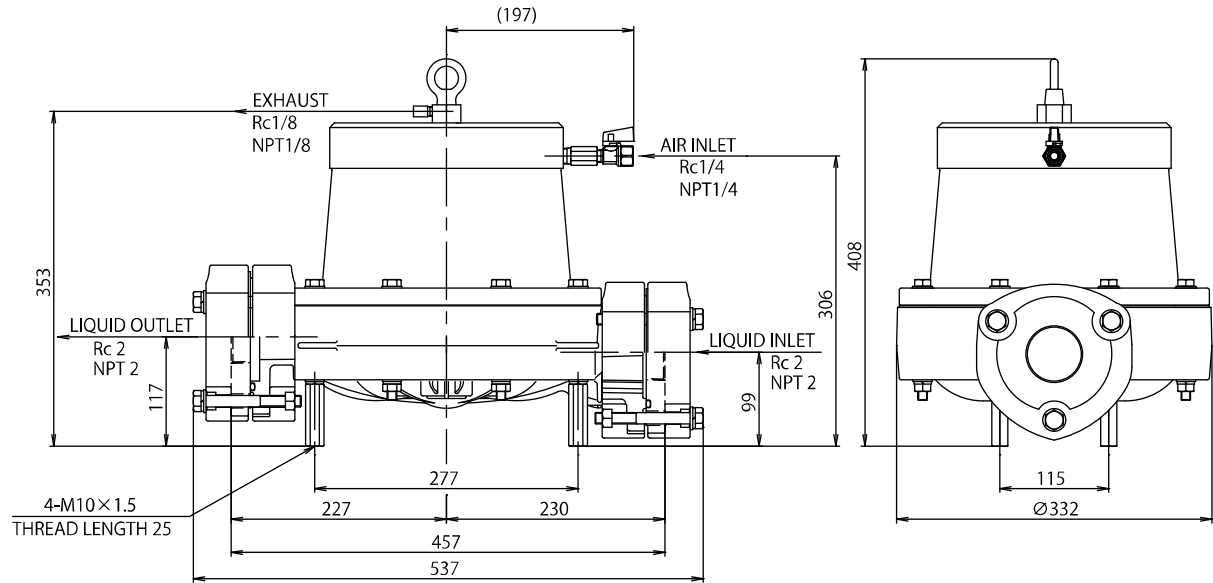
■AD-50S□



■AD-50F□

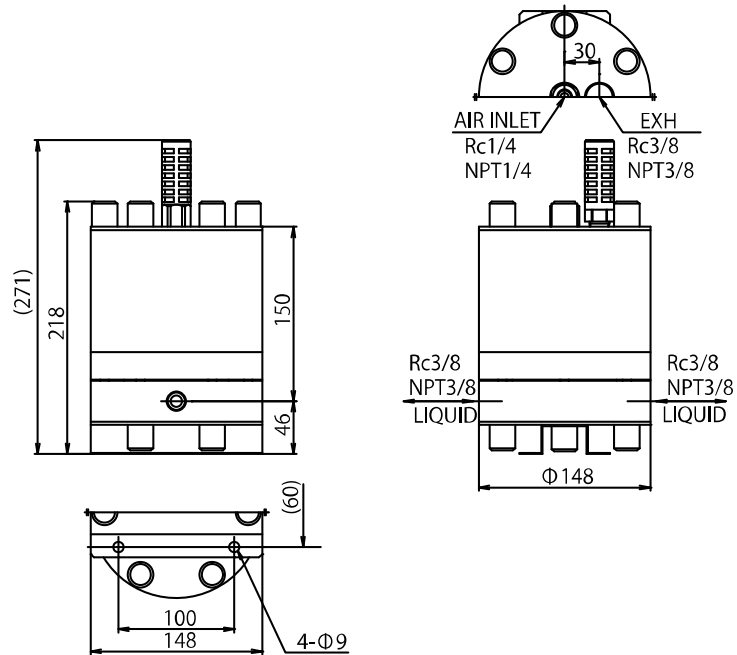


■AD-50P□

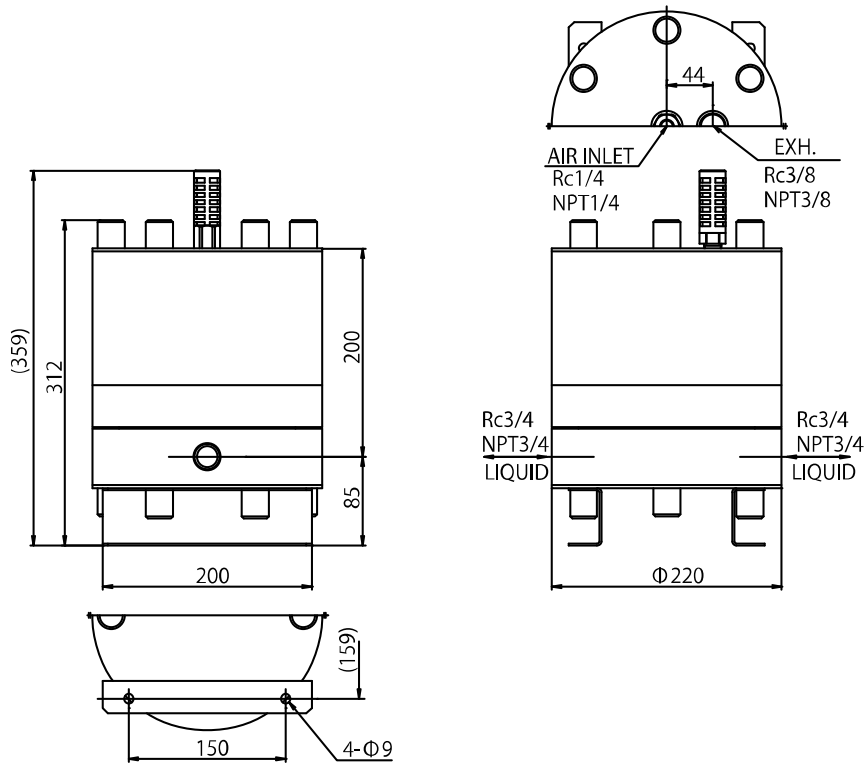


10.2.5 AD-TT Series

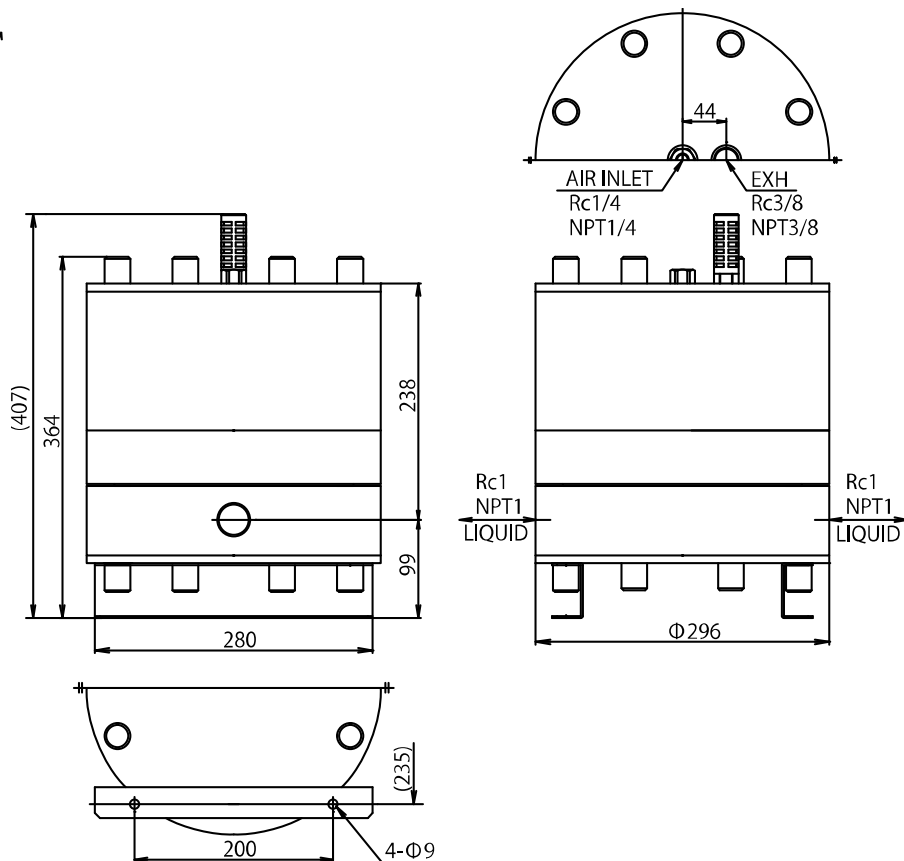
■AD-10TT



■AD-25TT



■AD-38TT

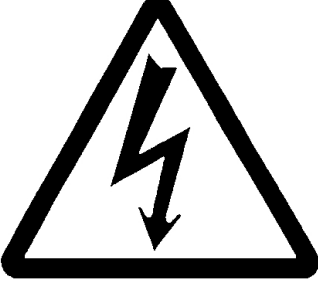





! CAUTION



- The dimensions of parts are subject to change without previous notice for the sake of product improvement. For details, ask your dealer or our business office for product drawings.

11. Warning symbols

<p>BEWARE: HIGH TEMPERATURE</p> 	<p>ELECTRIC SHOCK</p> 	<p>POISON</p> 
<p>FLAMMABLE</p> 	<p>CORROSION</p> 	<p>EXPLOSION</p> 
<p>General warnings, cautions and danger notifications</p> 	<p>FIRE STRICTLY PROHIBITED</p> 	

12. Limited warranty

If an abnormality occurs during normal operation in accordance with the operating instructions and other operating cautions within the warranty period (12 months after date of purchase) that can be attributed to a manufacturing defect, the defective parts of this product will be serviced or the product will be replaced free of charge. However, this warranty will not cover compensation for incidental damage or any malfunction listed below.

1. Warranty period

This warranty will be valid for a period of 12 months after the date of purchase.

2. Warranty

If, during the warranty period, any of the material of the genuine parts of this product or the workmanship of this product is found defective, and is so verified by our company, the servicing cost will be fully born by our company.

3. Exclusion

Even during the warranty period, this warranty does not cover the following.

- (1) Malfunction arising from use of parts other than manufacturer-specified genuine parts
- (2) Malfunction arising from misuse or operating errors, or lack of storage or maintenance care
- (3) Malfunction arising from use with a fluid that may cause corrosion, inflation or dissolution of the component parts of the product
- (4) Irregularity arising from repair made by other than by our firm, our regional office, dealer or authorized service personnel
- (5) Malfunction arising from modification of the product by other than authorized service personnel
- (6) Wear and tear of parts that must be regularly replaced in the course of normal operation, such as diaphragms, center disk, valve seats, balls/flat valve, air switch sleeve valves, pilot valve, O-rings and gasket.
- (7) Malfunction and/or damage due to use with incorrect voltage.
- (8) Malfunction and/or damage due to transportation, moving or drop page of the product after purchase
- (9) Malfunction and/or damage due to fire, earthquake, flood or other force majeure
- (10) Malfunction arising from use of compressed air that contains impurities or excessive moisture or use of gases or fluids other than the specified compressed air
- (11) Malfunction arising from use of excessively abrasive material or of inadequate grease.

Furthermore, this warranty does not cover the rubber parts, or other parts used in this product and its accessories, which are subject to wear in normal operation.

- hoses
- packings
- cords

4. Parts

Parts for this product will be kept available for 5 years after discontinuation of production. Once 5 years have elapsed after close of production, availability of parts for this product cannot be guaranteed.

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