Serial No.	H-V059-E-3

Water BV
- for Water -
Pneumatic Actuated Type VC

User's Manual

Contents

ASAHI AV VALVES

This user's guide contains very important information for the proper installation, maintenance and safe use of an ASAHI AV Product. Please store this manual in an easily accessible location.

<Warning & Caution Signs>

 Warning	This symbol reminds the user to take caution due to the potential for serious injury or death.
 Caution	This symbol reminds the user to take caution due to the potential for damage to the valve if used in such a manner.

<Prohibited & Mandatory Action Signs>

	Prohibited: When operating the valve, this symbol indicates an action that should not be taken.
	Mandatory action: When operating the valve, this symbol indicates mandatory actions that must be adhered to.

(1) Be sure to read the following warranty clauses of our product

- Always observe the specifications of and the precautions and instructions on using our product.
- We always strive to improve product quality and reliability, but cannot guarantee perfection. Therefore, should you intend to use this product with any equipment or machinery that may pose the risk of serious or even fatal injury, or property damage, ensure an appropriate safety design or take other measures with sufficient consideration given to possible problems. We shall assume no responsibility for any inconvenience stemming from any action on your part without our written consent in the form of specifications or other documented approval.
- The related technical documents, operation manuals, and other documentation prescribe precautions on selecting, constructing, installing, operating, maintaining, and servicing our products. For details, consult with our nearest distributor or agent.
- Our product warranty extends for one and a half years after the product is shipped from our factory or one year after the product is installed, whichever comes first. Any product abnormality that occurs during the warranty period or which is reported to us will be investigated immediately to identify its cause. Should our product be deemed defective, we shall assume the responsibility to repair or replace it free of charge.
- Any repair or replacement needed after the warranty period ends shall be charged to the customer.
- The warranty does not cover the following cases:
  (1) Using our product under any condition not covered by our defined scope of warranty.
  (2) Failure to observe our defined precautions or instructions regarding the construction, installation, handling, maintenance, or servicing of our product.
  (3) Any inconvenience caused by any product other than ours.
  (4) Remodeling or otherwise modifying our product by anyone other than us.
  (5) Using any part of our product for anything other than the intended use of the product.
  (6) Any abnormality that occurs due to a natural disaster, accident, or other incident not stemming from something inside our product.

(2) General operating instructions

Warning

- Do not disassemble or modify the actuator.
  (If disassembled forcible, internal parts may jump out and this is very dangerous.)
- Using a positive-pressure gas with our plastic piping may pose a dangerous condition due to the repellent force particular to compressible fluids even when the gas is under similar pressures used for liquids. Therefore, be sure to take the necessary safety precautions such as covering the piping with protective material. For inquiries, please contact us. For conducting a leak test on newly installed piping, be sure to check for leaks under water pressure. If absolutely necessary to use a gas in testing, please consult your nearest service station beforehand.

Caution

- Do not step on or apply excessive weight on valve. (It can be damaged.)
- Water BV is only for water. (Do not use the valve in the following fluids.)
  - Acid liquid. (ex. HCl) - Base liquid. (ex. NaOH)
  - Containing the slurry. - Containing the crystal.
- Do not use AV valves in a place where they may become submerged in water.
- Do not remove a dust-proof cap provided to piping port before piping work starts.
- Keep the valve away from excessive heat or fire. (It can be damaged, or destroyed.)
- Always operate the valve within the pressure vs. temperature range.
  (The valve can be damaged or deformed by operating beyond the allowable range.)
- Allow sufficient space for maintenance and inspection.
- Keep the valve out of direct sunlight, water and dust. Use cover to shield the valve.
  (The valve will not operate properly.)
- Perform periodic maintenance. (Leakage may develop due to temperature changes or periods of prolonged storage, rest, or operation.)
- Set valve support on the valve.
- The AV valves must be used within the specifications specifically applicable to the Product.
- If the actuator is used in an environment below 5℃ temperature, its operating fluid must be free from the water and moisture contained in it because of possible problems due to the freeze.
- The operating fluid must be clean air filtered through a pertinent air filter.

(3) General instructions for transportation, unpacking and storage


Warning

- When suspending and supporting a valve, take care and do not stand under a suspended valve.

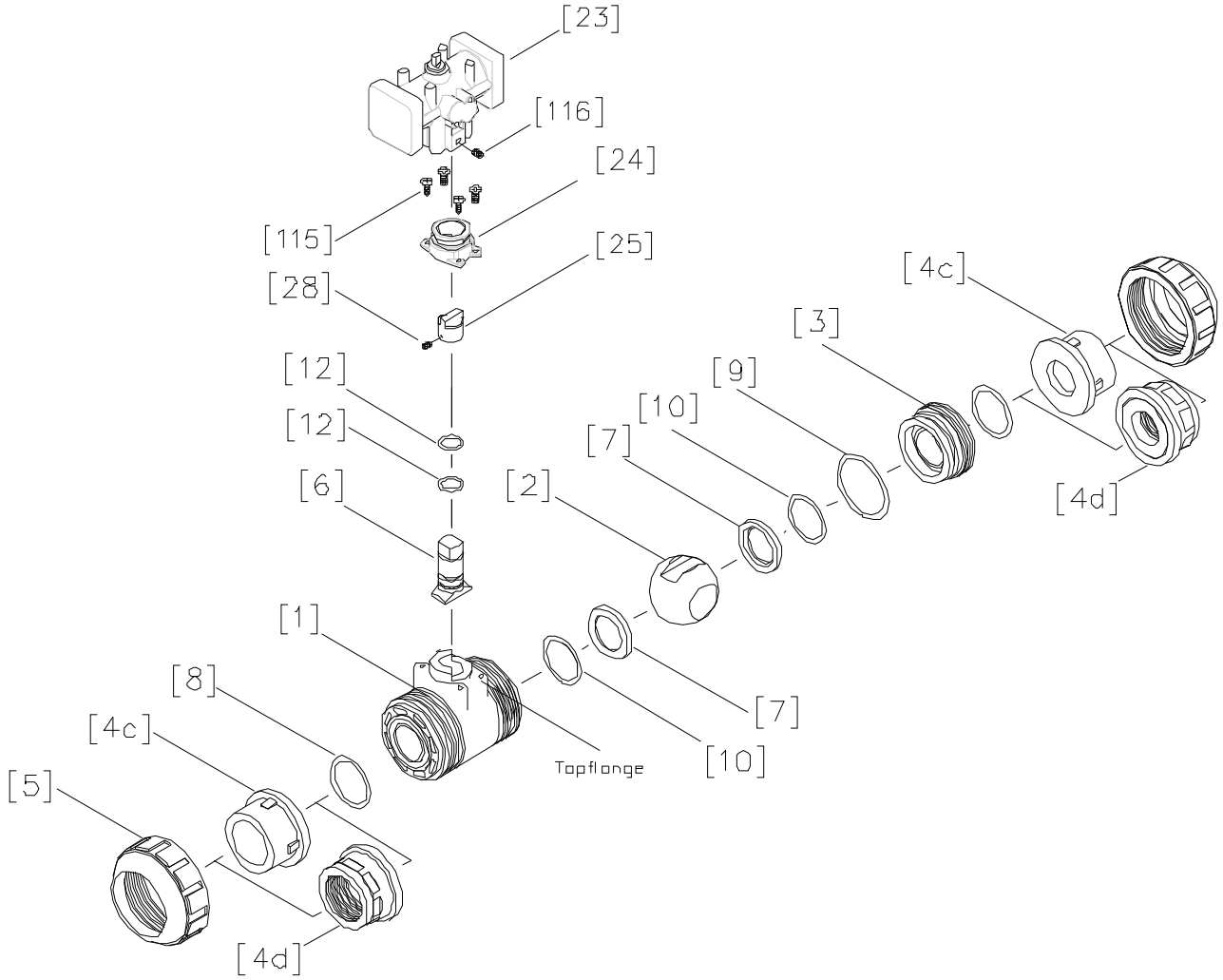

Caution

- This valve is not designed to handle impacts of any kind. Avoid throwing or dropping the valve.
- Avoid scratching the valve with any sharp object.
- Do not over-stack cardboard shipping boxes. Excessively stacked packages may collapse.
- Avoid contact with any coal tar creosote, insecticides, vermicides or paint.
  (These chemicals may cause damage to the valve.)
- When transporting a valve, do not carry it by the handle.

- Store products in their corrugated cardboard boxes. Avoid exposing products to direct sunlight, and store them indoors (at room temperature). Also avoid storing products in areas with excessive temperatures. (Corrugated cardboard packages become weaker as they become wet with water or other liquid. Take care in storage and handling.)
- After unpacking the products, check that they are defect-free and meet the specifications.

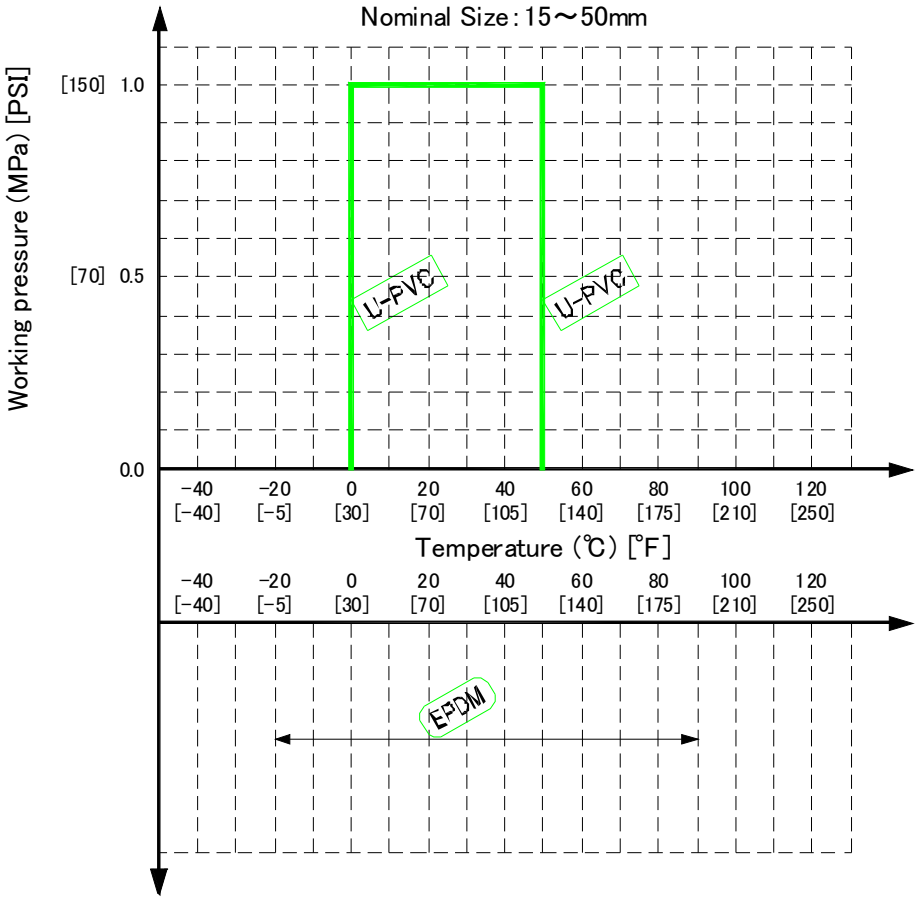
(4) Name of parts

Nominal size 15-50mm (1/2”-2”)



No.	DESCRIPTION	No.	DESCRIPTION	No.	DESCRIPTION
[1]	Body	[6]	Stem	[23]	Actuator
[2]	Ball	[7]	Seat	[24]	Stand
[3]	Carrier	[8]	O-ring (A)	[25]	Joint
[4c]	End connector (Socket end type)	[9]	O-ring (B)	[28]	Screw (B)
[4d]	End connector (Threaded end type)	[10]	O-ring (C)	[115]	Screw (D)
[5]	Union nut	[12]	O-ring (D)	[116]	Screw (E)

(5) Working pressure vs. temperature



(6) Specification of actuator

【Double Action Type】

Nominal size [mm]	15, 20	25, 32	40, 50
Actuator name	PND-03S	PND-03D	PND-04D
Standard operating pressure [MPa {kgf/cm^2}]	0.4～0.7		
Air consumption [NL /per 1 open and close](at 0.4MPa)	0.05	0.08	0.19
Air supply bore	Rc1/8		
Material	PPS		
Temperature [℃]	-10～50		

【Single Action Type】

Nominal size [mm]		15, 20	25	32～50
Actuator name	Air to open Type	PSO-03D	PSO-04D	PSO-04W
	Air to close Type	PSC-03D	PSC-04D	PSC-04W
Standard operating pressure [MPa {kgf/cm^2}]		0.4～0.7MPa		
Air consumption [NL /per 1 open and close](at 0.4MPa)		0.04	0.10	0.17
Air supply bore		Rc1/8		
Material		PPS		
Temperature [℃]		-10～50		

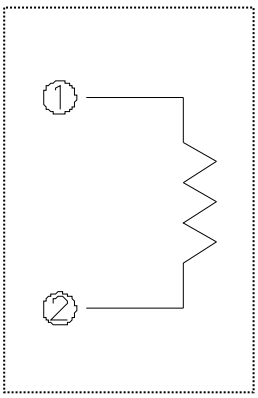
(7) Specification of solenoid valve (option)

Actuation	Nom. size	Type sign	Pipe bore	Effective cross section area	Power consumption	Additional function
All type	15-50mm (1/2"-2")	VZ3190-□SD- X213	Rc 1/8	4.5 mm^2	AC : 4.5/4.2VA (50/60Hz) DC : 1.8W	○ Silencer with needle valve attached (to be used as speed controller)

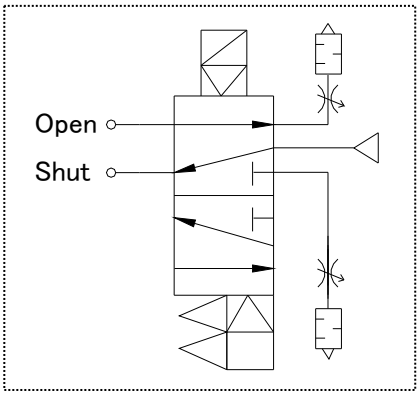
VZ3190-□SD-X213

Specification	Sign
AC100V 50/60Hz	1
AC200V 50/60Hz	2
AC110V 50/60Hz	3
AC220V 50/60Hz	4
DC 24V	5

Connection Diagram



JIS Sign



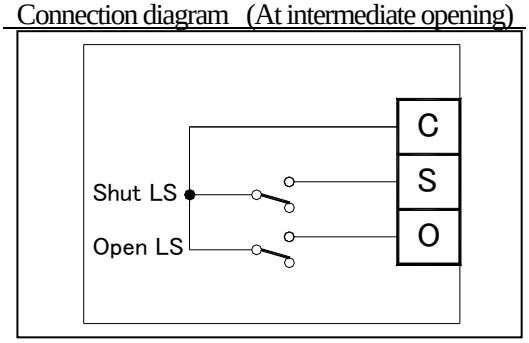
(8) Specifications of limit switch (option)

Actuation	Nominal size	Type sign	Protection grade	Limit switch type
Double Action Type	15-32mm (1/2"-1 1/4")	LB-03	IP 65	SS-5GL2D (Omron)
	40, 50mm (1 1/2", 2")	LB-04		
Single Action Type	15, 20mm (1/2", 3/4")	LB-03		
	25-50mm (1"-2")	LB-04		

Limit switch rating

Rate voltage	Resistive load	Inductive load
AC125V	5A	3A
AC250V	5A	2A
DC14V	5A	4A
DC30V	4A	3A

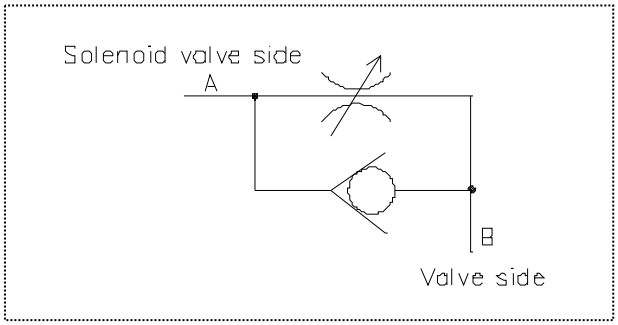
Connection diagram (At intermediate opening)



(9) Specification of speed controller (option)

Actuation	Nom. size (mm)	Type sign	Pipe bore	Cable diameter	Effective cross section area (mm^2) Free (Control) flow	Needle No. of revolution
Double Action Type Single Action Type	15-50mm (1/2-2")	AS2201F-01-06	Rc 1/8	ϕ6	3.5	10

JIS sign



(10) Installation procedure

Warning

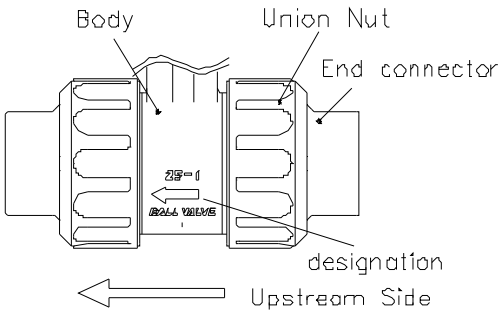
- When suspending and supporting a valve, take care and do not stand under a suspended valve.

- Be sure to conduct a safety check on all hand and power tools to be used before beginning work.
- Wear protective gloves and safety goggles while fluid remains in the valve. (You may be injured.)

Caution

- When installing a pipe support by means of a U-band or something similar, take care not to over-tighten. (Excessive force may damage the pipe.)
- Do not use the pipe wrench. (The valve can be damaged.)

- When installing pipes and valves, ensure that they are not subjected to tension, compression, bending, impact, or other excessive stress.
- When tightening the union nut, close the valve completely. (The ball disc may injure seat.)
- Tighten the union nut tightly. (If not, leakage will be occurred)
- When tightening the union nut by tool, use strap wrench or similar tool. And take care to avoid injury to the valve. Please note that over tightening the union nut may cause valve damage.
- When installing a piece of equipment at the end of the piping line, be sure to keep the secondary (Downstream) End Connector and Union Nut installed on the valve.
- When installing Water BV, note the direction of flow. (Find the arrow molded on the Carrier-side body. On the secondary (Downstream) side, the Carrier is integral with the valve body. This is the preferred method of installation when installing the equipment at the end of the line for safety purposes.)



- When connecting an ASAHI AV Valve to metal piping, take care not to let the pipe stress on the ASAHI AV Valve.
- When loosening the union nut on the union side, fix the end connector (hold it with your hand) and do work. (If the end connector turns, the carrier will turn together, resulting in the union and ball separating from the body.) If the carrier is loosened, retighten the carrier.
- When installing, disassembling, or reassembling the piping, fix the end connector, to keep it from rotating.
- Before a water test, be sure that the Union Nut is tightly fastened.
- Fasten the Union Nut while avoiding the parallelism and axial misalignment of the flange surface.

Threaded End

Caution

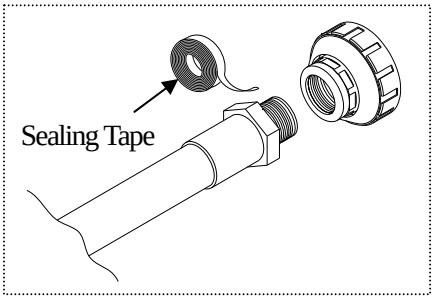
- Avoid excessive tightening. (The valve can be damaged.)
- Make sure that the threaded connections are plastic x plastic. (Metallic thread can cause damage.)
- Wrap the threaded joints on our plastic piping with sealing tape. Using a liquid sealing agent or liquid gasket may cause stress cracks (Environmental Stress Cracking). Our product warranty shall not apply in case of said use, even when said use is unavoidable.

Necessary items

- Sealing tape
- Strap wrench
- Spanner wrench

Procedure

1) Wind a sealing tape around the external thread of joint, leaving the end (about 3mm) free.
2) Loosen the union nut [5] with a strap wrench..
3) Remove the union nut [5] and the end connector [4d].
4) Tighten the external thread of the joint and the end connector [4d] hardly with hand.
5) Using a spanner wrench, screw in the end connector [4d] by turning 180° -360° carefully without damaging it.
   *Avoid excessive tightening.（The valve can be damaged.)
6) Make sure that the O-ring (A) [8] is mounted.
7) Set the end connector [4d] and union nut [5] directly on the body without allowing the O-ring (A) [8] to come off.
8) Tighten the union nuts [5] on each valve until hand tight.
9) Tighten union nuts tightly by using a strap wrench. Please note that over tightening union nuts may cause valve damage.
   (If you wish to control tightening torque, please contact us.)



Socket End

Warning
- When using an adhesive, ventilate the space sufficiently, prohibit the use of a fire in the vicinity, and do not inhale adhesive vapors directly.
- If an adhesive gets into contact with your skin, wash it off immediately. If you feel sick or find any anomaly, receive a physician's diagnosis and take appropriate measures promptly.

Caution
- Take care in doing work at low temperatures. Solvent vapors are hard to evaporate and are likely to remain. (Solvent cracks may occur, damaging the equipment.) After assembling the piping system, open both ends of the piping and use a fan (of the Low-Voltage Type) or something similar to ventilate the space, thus removing the solvent vapors.
- Use the appropriate Asahi AV cement.
- Conduct a water test at least 24 hours after joining the pipes with an adhesive.

Necessary items
- Adhesive for hard vinyl chloride pipes
- Strap wrench

Procedure

1) Loosen the union nut [5] with a strap wrench.
2) Remove the union nut [5] and end connector [4c].
3) Lead the union nut through the pipe.
4) Clean the hub part of the end connector [4c] by wiping the waste cloth.
5) Apply adhesive evenly to the hub part of the end connector [4c] and the pipe spigot.

Caution
- Do not apply more adhesive than necessary. (The valve can be damaged due to solvent cracking.)

Adhesive quantity (guideline)

Nom. Size	15mm (1/2")	20mm (3/4")	25mm (1")	32mm (1 1/4")	40mm (1 1/2")	50mm (2")
Quantity(g)	1.0	1.3	2.0	2.4	3.5	4.8

6) After applying adhesive, insert the pipe quickly to the end connector [4c] and leave it alone for at least 60 seconds.

Caution
- Do not under any circumstances try to insert a pipe into another fitting or valve by striking it, which may break the piping.

7) Wipe away overflowing adhesive.
8) Make sure that O-ring(A) [8] is mounted
9) Set the end connector [4c] and union nut [5] directly on the body without allowing the O-ring (A) [8] to come off.
10) Tighten union nuts [5] on each valve until hand tight.
11) Tighten union nuts tightly by using a strap wrench. Please note that over tightening union nuts may cause valve damage.
(If you wish to control tightening torque, please contact us.)

(11) Support setting procedure

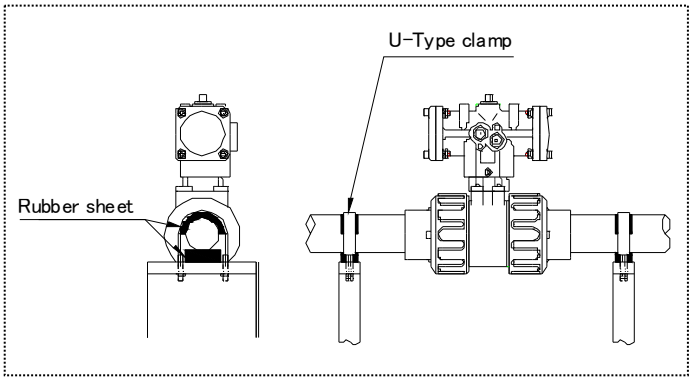
Caution - Set the valve support. (The valve may be damaged because the actuator is heavy.)

Necessary items

- Spanner wrench
- U-type clamp (with bolt)
- Rubber sheet

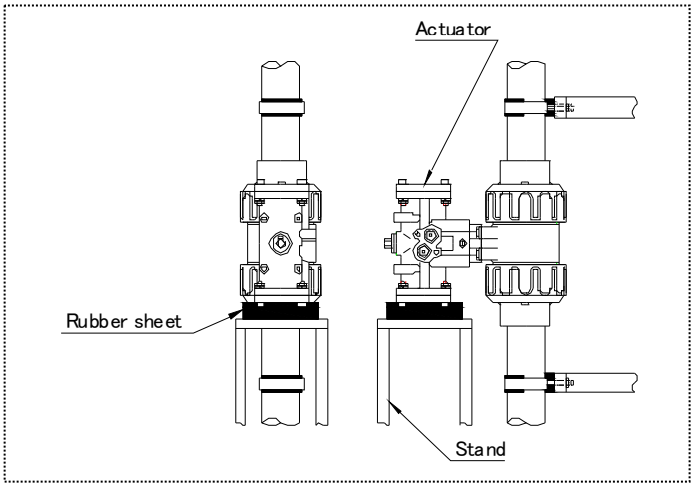
Level installation

Spread the rubber sheet on the pipe and secure pipe with U-type clamp.



Perpendicular installation

Spread the rubber sheet on the pipe and fix pipe with U-type band.



(12) Air piping procedure

<1> For a standard type and an attached speed controller type

Caution

- Do not remove a dust-proof cap provided to piping port before piping work starts.
- Avoid excessive tightening. (The threaded area of a pipe can be damaged.)
- Steel pipes must always be of the plated.
- Before installing an actuator in pipeline, flash the inside of pipeline completely.
- Do not apply a sealant excessively lest it fall off in the pipeline when an actuator is piped.
- Threaded area of a pipe must be free from the sharp edges and burr.

Necessary items

- Spanner wrench
- Steel pipe or tube for piping
- Seal tape
- Joint for steel pipe or tube

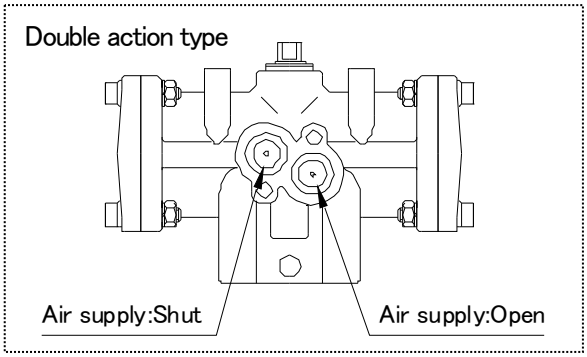
Procedure

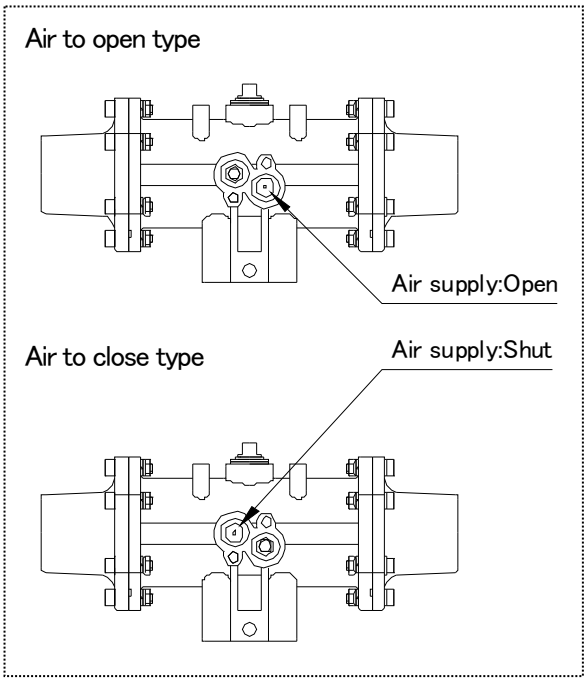
1) Wind a seal tape onto the male screw of the joint with a blank about 3mm (about 2 threads) left at the end.

2) Screw the joint in the piping female screw of the actuator by hand fully.

3) Screw the joint one turn with a spanner wrench.
*Avoid excessive tightening.
（The valve can be damaged.）

4) Mount a steel pipe or a tube.





<2> For an attached solenoid valve type.

Caution

- Do not remove a dust-proof cap provided to piping port before piping work starts.
- Avoid excessive tightening. (The threaded area of a pipe can be damaged.)
- Steel pipes must always be of the plated.
- Before installing an actuator in pipeline, flash the inside of pipeline completely.
- Do not apply a sealant excessively lest it fall off in the pipeline when an actuator is piped.
- Threaded area of a pipe must be free from the sharp edges and burr.
- Solenoid valve-A speed controller adjusts and fastens a lock nut by open ended spanners.

Necessary items

- Spanner wrench
- Steel pipe or tube for piping
- Seal tape
- Joint for steel pipe or tube

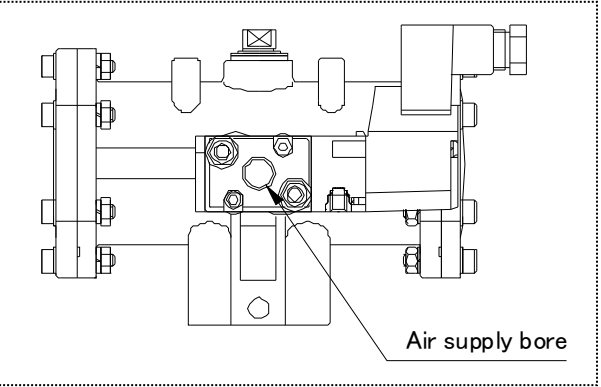
Procedure

1) Wind a seal tape onto the male screw of the joint with a blank about 3mm (about 2 threads) left at the end.

2) Screw the joint in the piping female screw of the actuator by hand fully.

3) Screw the joint one turn with a spanner wrench.
*Avoid excessive tightening.
(The valve can be damaged.)

4) Mount a steel pipe or a tube.



(13) Connection of limit switch procedure

Warning - Shut down the power on the equipment before connecting wires. There are risks of electrical shock depending on the level of operating voltage.

Caution - Be sure that the cover are put on during the operation.

- Connect the cables by using insulated sheathed crimping terminals in such a way as not to contact the cover or housing. (Contact of a crimping terminal with the cover may disable the cover from being closed or may cause a ground fault.)
- Be sure that the terminal cover and body cover are put on during the operation.
- If you use the limit switch at 1mA-100mA or 5-30V, consult near Asahi dealer.

Necessary items

- Screw driver (+)
- Screw driver (−)
- Connector (G1/2)
- Wire stripper

Procedure

1) Remove the cover screws from the casing a using a screw driver (+).
   * Don't lose a case and cover O-ring

2) Turn counter clockwise and remove the piping port protective cap.

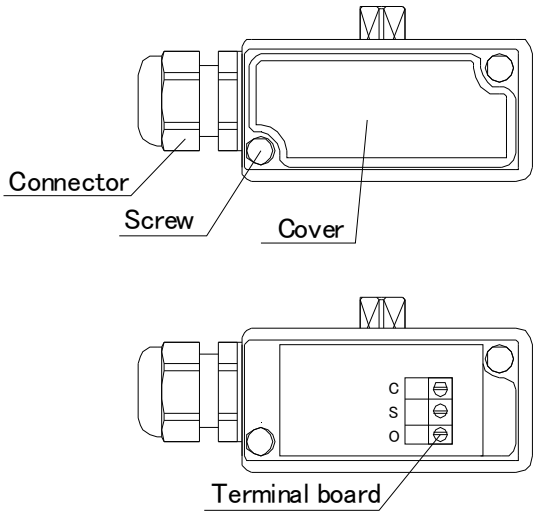
3) Draw the cable through the connector.

4) Strip the cable with wire stripper.

5) Connect the cable to terminal board with a screw driver (-) in accordance with page 7.
   * Tighten the screws firmly.
   (Short circuit or shocks may occur.)

6) Tighten the connector to hold the cable firmly.

7) The cover screws must be tightened in an alternations pattern to the case with a screw driver (+)
   * Be sure to properly set case and cover O-ring before tightening cover screws
   (Short circuit or leaks may occur.)



(14) Connection of solenoid valve procedure

Caution

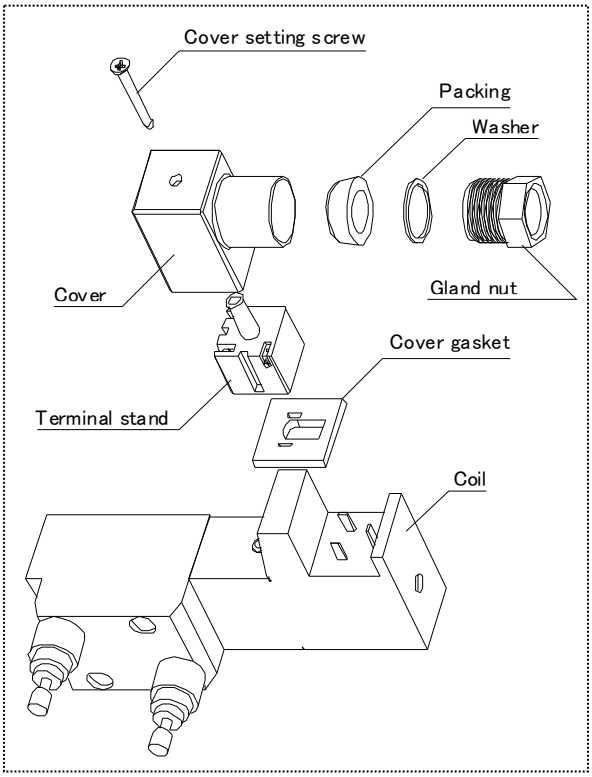
- Go after you surely interrupt a power supply when you do the installation of the terminal base line is combined.
- Solenoid valve- A speed controller adjusts and fastens a lock nut by open ended spanners.

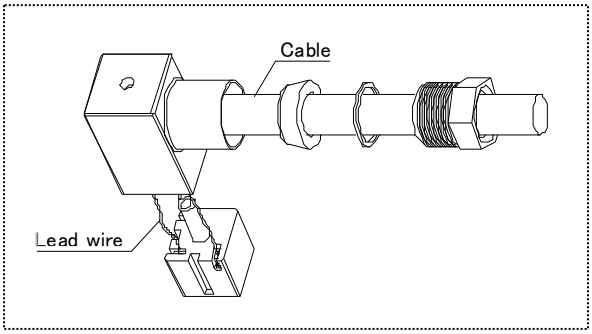
Necessary items

- Terminal crimping tool
- Connector (G1/2)
- Screw driver (+)
- Wire stripper

Procedure

1) Loosen the Cover setting screws, and remove the cover.
2) Remove the cover, washer, packing.
3) Remove the terminal stand from the cover.
4) Draw the cable through the connector, washer, Packing to the cover.
5) Strip off coating of the tip of the cable by using a wire stripper.
6) Connect a lead wire to a terminal stand by using a precision screwdriver. ※Please wire (1), (2) of the terminal. Another terminal is for grounds. In the case of DC24V, please be careful to polarity.
7) Insert the terminal stand into the coil side. And fit the cover.
8) Tighten the cover setting screws to fix it.
9) Tighten the cable by replace the connector tightly.





(15) Operating procedure

Manual operating procedure

Warning - Don't supply air during manual operation.
(When air is supplied during the manual operation, you may be injured.)

Caution - Do not turn the handle forcibly at the right and left full operating positions.
(If not, a trouble will develop.)

○ Double action type * Single action type (Air to open type, Air to lose type) can't do the manual operation.

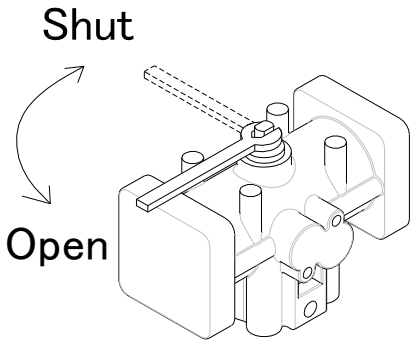
Necessary items
- Spanner wrench

Procedure

1) Attach the manual handle (Option) or spanner to the output shaft in the upper part of the actuator, and turn the handle 1-2 times between full open and full close.

   Right turn (clock wise) → Shut direction
   Left turn (counter clock wise) → Open direction

2) Attach the manual handle (Option) or spanner wrench to the output shaft in the upper part of the actuator.



Automatic (Air) operating procedure

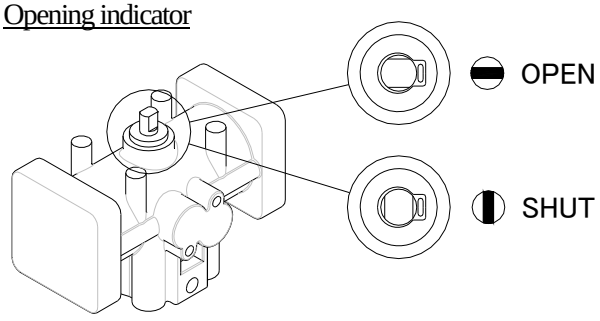
Warning - Make sure that the manual handle (option) or spanner is not attached to the output shaft in the upper part of the actuator securely. {If not, the manual handle (option) or spanner will be flown by the rotation of the output shaft and the manual handle (option) or spanner may injure you.}

Caution - Keep air supply pressure from a compressor at least 0.4MPa (4.1kgf/cm^2). (Actuator may not work normally.)

Procedure

1) Supply the air to the actuator.
2) Check to ensure that the valve indicating direction and the operating direction agree with each other.
3) Stop supplying air.

Opening indicator



Adjustment of opening / closing speed procedure

Warning - Solenoid valve-A speed controller adjusts and fastens a lock nut by open ended spanners.

○ Double action type

Necessary items
● Spanner wrench

Procedure

1) Turn right the adjustment knob of the solenoid valve fully.
   * Avoid excessive tightening.
   (The speed controller can be destroyed.)

2) Supply the air to the solenoid valve.

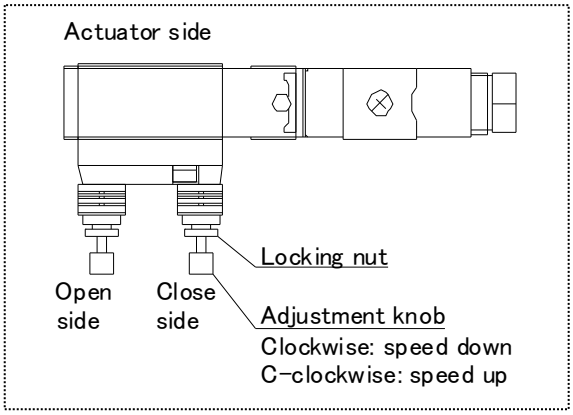
3) Apply regular rated voltage to solenoid valve, and turn left the open side adjustment knob little by little.

4) Turn off the solenoid valve, and turn left the close side adjustment knob little by little.

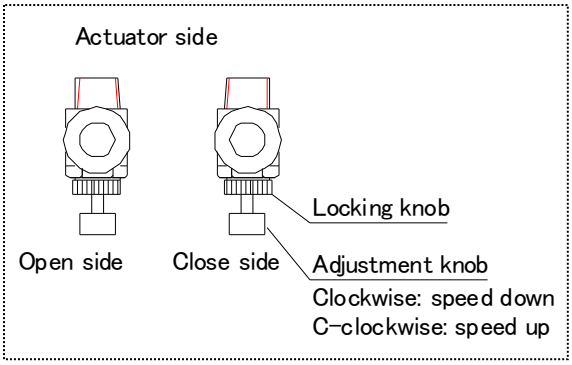
5) Repeat item 3), 4) to adjust the opening / closing speed required.

6) When the adjustment is finished, fix the adjustment knob with locking nuts.
   * Avoid excessive tightening.
   (The locking nut can be damaged.)

For Double action type with solenoid valve



For Double action type with speed controller



Adjustment of opening / closing speed procedure

Warning - Solenoid valve-A speed controller adjusts and fastens a lock nut by open ended spanners.

○Single action type

Necessary items
- Spanner wrench

The actuation type changes the speed-adjustable direction.

Single action	Opening speed	Closing speed
Air to open type	Not adjustable	Adjustable
Air to close type	Adjustable	Not adjustable

Procedure

1) Turn right the adjustment knob of the solenoid valve fully.
   * Avoid excessive tightening.
   (The speed controller can be damaged.)

2) Supply the air to the solenoid valve.

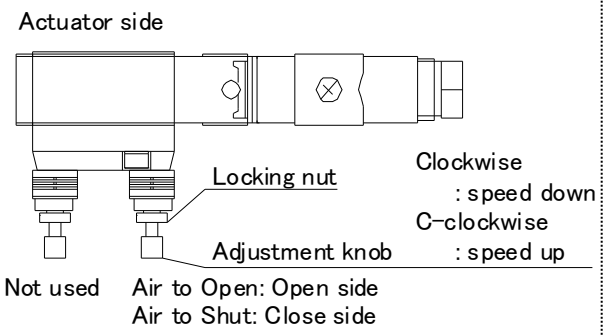
3) Apply regular rated voltage to solenoid valve, and turn left the open side adjustment knob little by little.

4) Turn off the solenoid valve, and turn left the close side adjustment knob little by little.

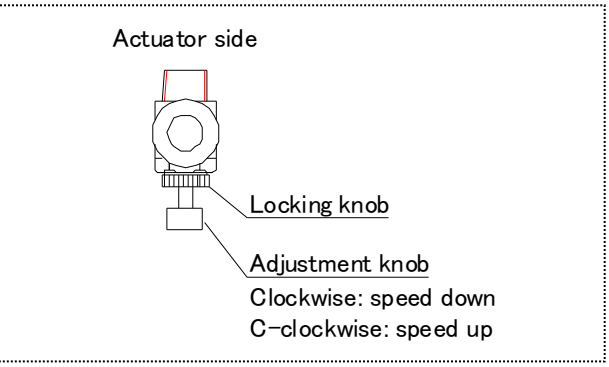
5) Repeat item 3), 4) to adjust the opening / closing speed required.

6) When the adjustment is finished, fix the adjustment knob with locking nuts.
   * Avoid excessive tightening.
   (The locking nut can be damaged.)

For Single action type with solenoid valve



For Single action type with speed controller



(16) Method of adjusting face pressure between ball and seat

Caution
- Take care not to over-tighten the Union Nut. (The valve can be damaged.)
- Do not use the pipe wrench. (The valve can be damaged.)

Necessary items

- ●Strap wrench
- ●Allen wrench
- ●Handle (For manual operating)
- ●Screwdriver
- ●Safety goggles
- ●Protective gloves

Procedure

1) Completely discharge fluid from pipes.

2) Operate the valve to full close.
   * Except for spring return type. (Air to open type)

3) Shut the main air valve, and open the bypass valve to discharge air from the actuator.

4) Loosen the screw (D) with a screwdriver, and remove the actuator [23] and stand [24] from valve body [1].

5) Remove the joint [25].

6) Loosen the union nuts [5] with a strap wrench.

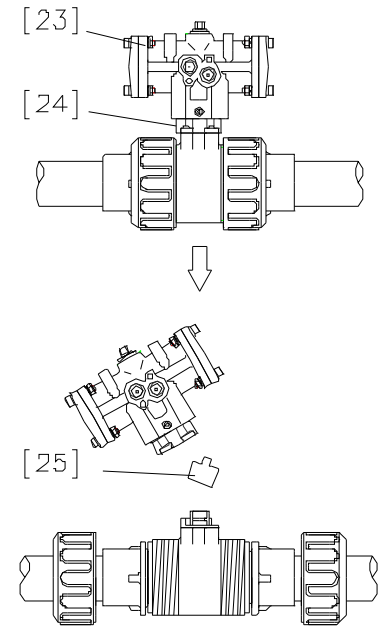
7) Remove the body part from piping system.

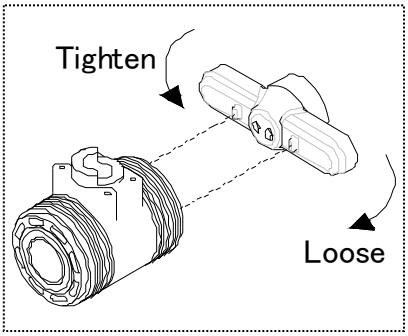
8) Engage the upper convex part of the handle with the concave part of the union.

9) Make an adjustment by turning the union clockwise or counter clockwise.

10) Make sure that the handle can be operated smoothly.

11) Assemble the valve by following the above procedure in the reverse order, starting at 7).





(17) Inspection items

- Perform periodic maintenance. (Leakage may develop due to temperature changes or over periods of prolonged storage, rest or operation.)

○Periodically inspect and maintain the AV valve in accordance with the decided schedule.

Portion to be inspected	Inspection item
Actuator	- Existence of rust, and dirt of inspection hole of valve travel indicator. - Tightening condition of respective threaded portions. (Loose or not) - Existence of abnormality in opening and closing operating sounds. - Make sure that the handle can be operated smoothly. * It is unnecessary to supply oil to this actuator.
Stand	- Tightening condition of respective threaded portions. (Loose or not)
Valve	- Existence of scratches, cracks, deformation, and discoloring. - Existence of leakage from the valve to the outside. - Existence of leakage when the valve is opened fully at right or left.

(18) Troubleshooting

Problem	Cause	Treatment
The handle is not (can't be) turned when the valve is operated manually.	The valve has already been opened fully.	Turn the handle in the reverse direction.
	The air is supplied to actuator.	Shut the main air valve, and open the solenoid valve.
	Foreign matter is in the valve.	Disassemble the valve to remove foreign matter.
	The torque of the valve is increased by the piping stress.	Remove the piping stress.
	The torque is increased by the influence (temperature, components, pressure) of fluid on the valve.	Check service condition. (Refer to page 5)
The valve does not operate by air operations	Foreign matter is in the valve.	Disassemble the valve to remove foreign matter.
	The torque of the valve is increased by the piping stress.	Remove the piping stress.
	The torque is increased by the influence (temperature, components, pressure) of fluid on the valve.	Check service condition. (Refer to page 5)

Problem	Cause	Treatment
Fluid leaks from the valve even when the valve is closed fully.	The carrier is loosened.	Adjust the face pressure between the ball and the seat. (Refer to page 19)
	The seat is worn.	Replace the valve with a new one.
	The seat and ball are scratched.	Replace the valve with a new one.
	Foreign matter is in the valve.	Discharge the foreign matter from the valve by opening and closing the valve several times.
Fluid leaks from the valve.	The union nut is loosened.	Tighten the union nut.
	The O-ring is scratched or worm.	Replace the valve with a new one.
	The O-ring is projected from the groove.	
	The sliding face or the fixed face of the O-ring is scratched or worm.	Replace the valve with a new one.
The actuator operates, but the valve does not open or close.	The stem is broken.	Replace the valve with a new one.
	The joint is broken.	Replace the joint with a new one.
	The engagement between the stem and the ball is broken.	Replace the valve with a new one

(19) Handling of residual and waste materials

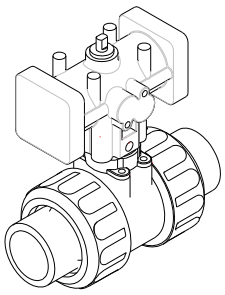

Warning

- Make sure to consult a waste treatment dealer for recommendations on the proper disposal of plastic valves. (Poisonous gas is generated when the valve is burned improperly.)

Water BV
Pneumatic Actuated Type VC

[Automatic Valve]

ASAHI *AV* VALVES



Distributor

Asahi Organic Chemicals Industry's homepage http://www.asahi-yukizai.co.jp/en/

Information in this manual is subject to change without notice. 2013.8