

**Air Lock Valve
Model : VF02
User's Manual**



Azbil Corporation

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Air Lock Valve Model VF02

1. Overview

In cases of failure in the supply air pressure source, an Air Lock Valve Model VF02 can be used to automatically maintain the signal air pressure to a control valve and the positioner output air pressure to the actuator at the state prior to the change in pressure. When the signal air pressure decreases below the setting air pressure, the Air Lock Valve locks the air lines between the instrument and the control valve and between the positioner and the actuator and stops the control valve at a control position until the unit recovers.

2. Operation Principle

When the supply air pressure source is in normal condition, the signal air pressure works to move the diaphragm ⑮ downward and exerts the force which will overcome the force of a spring ⑥, lift the pilot valve ⑧ upward, and fully open the port.

When the supply air pressure starts decreasing due to a failure in the supply air pressure source, the signal air pressure which is higher than the line pressure first starts decreasing.

When the signal air pressure decreases, the force to move the diaphragm ⑮ upward is weakened and the pilot valve ⑧ is pushed down by the force of the spring ⑥. When the signal air pressure becomes equal to the setting air pressure, the Air Lock Valve shuts down the port to maintain the line pressure to the actuator at the pressure prior to the failure.

3. Piping

This valve has three connection holes for piping. Each connection hole is marked with SIG, IN, and OUT. SIG is the signal air pressure hole. A maximum pressure of 690 kPa { 7.0 kgf/cm² } can be introduced. When the signal air pressure is higher than the setting air pressure, the line pressure that is introduced from the line pressure hole (IN) goes to the line pressure connection hole (OUT) thorough the port. Since the air lock is designed to keep the line pressure (OUT) in a state right before the signal air pressure drops by shutting down the port when the signal air pressure drops to the setting air pressure, attention must be paid to these marks for the piping in use.

All connection holes are Rc1/4 threads.

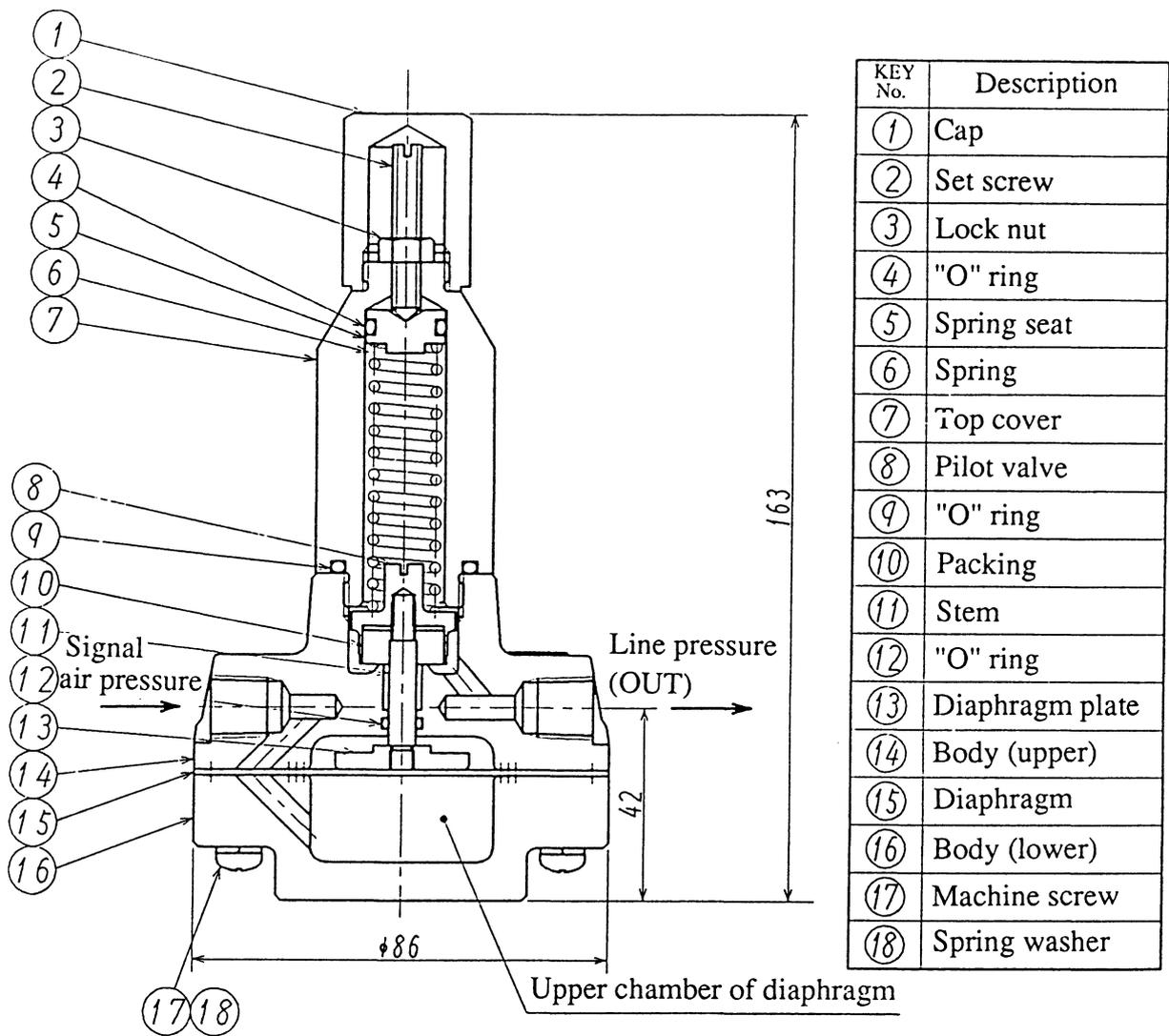


Figure 1 Sectional View of Air Lock Valve

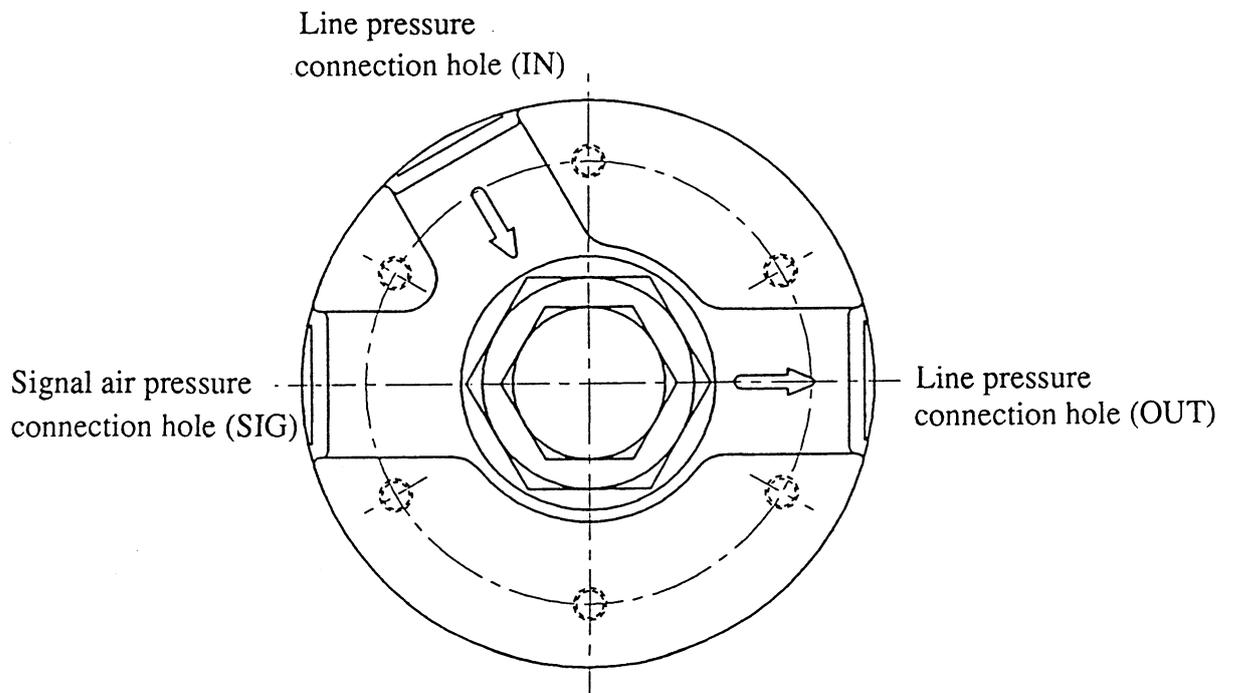


Figure 2 Piping Connection

4. Standard Specifications

Rating of the body: 690 kPa {7.0 kgf/cm²}

Main materials:

Body : Brass

Diaphragm : Chloroprene rubber with fabric insert

Trim : SUS304 (with neoprene sheet)

Line pressure: 20 to 200 kPa {0.2 to 2.0 kgf/cm²}

Signal air pressure: 690 kPa {7.0 kgf/cm²} (Max.)

Setting air pressure adjustable range:

120 to 290 kPa {1.2 to 3.0 kgf/cm²}

Connection: Rc1/4 thread

Ambient temperature range: -30 to +80°C

5. Assembly, Adjustment and Disassembly

5-1. Assembly

Assembly		Remarks
a)	Install the "O" ring ⑫ to the body (upper) ⑭, then insert the stem ⑪, which has been assembled with the diaphragm plate ⑬ into the hole of the "O" ring and screw-in the pilot valve ⑧, in which the packing ⑩ is set, to the stem ⑪. At this stage, screw-in the pilot valve ⑧ in the extent that maximum stroke for pilot valve becomes 2.0 to 2.5 mm.	Apply silicone grease to the "O" ring ⑫. In the assembly procedure of pilot valve ⑧, be careful not to damage the "O" ring ⑫ or the packing ⑩.
b)	Next, mount the diaphragm ⑮ and the body (lower) ⑯ to the body (upper) ⑭ with the machine screws ⑰.	In the assembly procedure of the body (lower) ⑯, caution must be taken in the position of the signal air pressure connecting hole. Also tighten the machine screws evenly.
c)	After completing assembly of the main body, place the spring (6) and the spring seat ⑤ with the "O" ring ④ in the pilot valve ⑧. Then put the top cover ⑦ and screw it into the body (upper) ⑭. At this stage, seal it with the "O" ring ⑨.	
d)	Screw-in screw ② so that it lightly touches spring seat ⑤. Then mount cap ①.	

5-2. Adjustment

	Adjustment	Remarks
a)	<p>In cases where the line pressure is 20 to 100 kPa (0.2 to 1.0 kgf/cm²) as a standard and the setting air pressure is 140 kPa (1.4 kgf/cm²).</p> <p>(In cases where the line pressure is 40 to 200 kPa (0.4 to 2.0 kgf/cm²) and the setting air pressure is 250 kPa (2.6 kgf/cm²), see note column for numerical values.)</p> <p>First, seal the line pressure connection hole (OUT) and introduce the maximum signal air pressure from the signal air pressure connection hole (SIG) then fully open the pilot valve ⑧. Lead the line pressure through the line pressure connection hole (IN) and hold it to the maximum operating line pressure of 100 kPa (1.0 kgf/cm²)(*1).</p> <p>At this stage, verify that there is no air leakage from each part.</p> <p>Perform leakage test for two to three minutes by means of soapy water.</p>	<p>The piping of the line pressure connecting hole (OUT) should be released upon adjustment.</p> <p>*1 In cases where line pressure is 40 to 200 kPa (0.4 to 2.0 kgf/cm²), 200 kPa (2.0 kgf/cm²).</p> <p>If there is leakage found around the vent hole, the "O" ring ⑩ should be replaced with a new one.</p>
b)	<p>Actuate the pilot valve ⑧ by gradually lowering the signal air pressure and keep the signal air pressure at the setting air pressure of 140 kPa (1.4 kgf/cm²)(*2).</p> <p>Keep the line pressure at the same level and release the line pressure connection hole (OUT) into the atmosphere. Then, adjust the spring ⑥.</p> <p>Remove cap ① and turn screw ② clockwise until the signal air stops flowing out on the line pressure connection hole (OUT) to tighten the spring ⑥.</p> <p>Lock the screw ② with a lock nut ③ and mount the cap ①.</p> <p>Set a signal air pressure above 170 kPa (1.7 kgf/cm²)(*3) and reduce it slowly, and conform that the flow of line pressure on the line pressure connection hole (OUT) stops at 140 kPa (1.4 kgf/cm²)(*2) of signal air pressure.</p> <p>At this state, for a signal air pressure above 140 kPa (1.4 kgf/cm²)(*2) to decrease the initial load of the spring ⑥, turn the screw ② counterclockwise or if below 140 kPa (1.4 kgf/cm²)(*2), further clockwise to increase the initial load of the spring ⑥.</p>	<p>*2 In cases where the line pressure is 40 to 200 kPa (0.4 to 2.0 kgf/cm²), keep the setting air pressure at 250 kPa (2.6 kgf/cm²).</p> <p>*3 In cases where the line pressure is 40 to 200 kPa (0.4 to 2.0 kgf/cm²), keep the setting air pressure at 270 kPa (2.8 kgf/cm²) or more.</p> <p>Verify leakage from the line pressure connection hole (OUT) using soapy water, etc. If there is trace leakage, lower the signal air pressure to 10 kPa (0.1 kgf/cm²). If leakage continues nonetheless, replace the packing ⑨ and the pilot valve ⑧.</p>
c)	<p>Until perfect operating conditions are obtained, repeat adjustment procedures as specified above.</p>	<p>When setting a set screw ②, be sure to fix it with a lock nut ③.</p>

5-3. Disassembly

To disassemble, follow the assembly procedure in reverse.

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products. You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

1.1 Warranty period

Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

1.2 Warranty scope

In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place.

Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

- (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
- (2) Failure caused for other reasons than Azbil Corporation's product;
- (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
- (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
- (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
- (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

- (1) Regulations and standards or laws that your Equipment is to comply with.
- (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
- (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use
Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down.
You are required to provide your Equipment with safety design such as fool-proof design, *1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance, *3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

*1. A design that is safe even if the user makes an error.

*2. A design that is safe even if the device fails.

*3. Avoidance of device failure by using highly reliable components, etc.

*4. The use of redundancy.

3. Precautions and restrictions on application

Azbil Corporation's products other than those explicitly specified as applicable (e.g. azbil Limit Switch For Nuclear Energy) shall not be used in a nuclear energy controlled area (radiation controlled area).

Any Azbil Corporation's products shall not be used for/with medical equipment.

The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product.

However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

In addition,

you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below.

Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

- (1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
- (2) For use of specific purposes, such as:
 - * Nuclear energy/radiation related facilities
[For use outside nuclear energy controlled areas] [For use of Azbil Corporation's Limit Switch For Nuclear Energy]
 - * Machinery or equipment for space/sea bottom
 - * Transportation equipment
[Railway, aircraft, vessels, vehicle equipment, etc.]
 - * Antidisaster/crime-prevention equipment

- * Burning appliances
 - * Electrothermal equipment
 - * Amusement facilities
 - * Facilities/applications associated directly with billing
- (3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
 - (4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
 - (5) Machinery or equipment that may affect human lives, human bodies or properties
 - (6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety
4. Precautions against long-term use

Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.
 5. Recommendation for renewal

Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations. In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.
 6. Other precautions

Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.
 7. Changes to specifications

Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.
 8. Discontinuance of the supply of products/parts

Please note that the production of any Azbil Corporation's product may be discontinued without notice. For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.
 9. Scope of services

Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

 - (1) Installation, adjustment, guidance, and attendance at a test run
 - (2) Maintenance, inspection, adjustment, and repair
 - (3) Technical guidance and technical education
 - (4) Special test or special inspection of a product under the conditions specified by you

Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

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