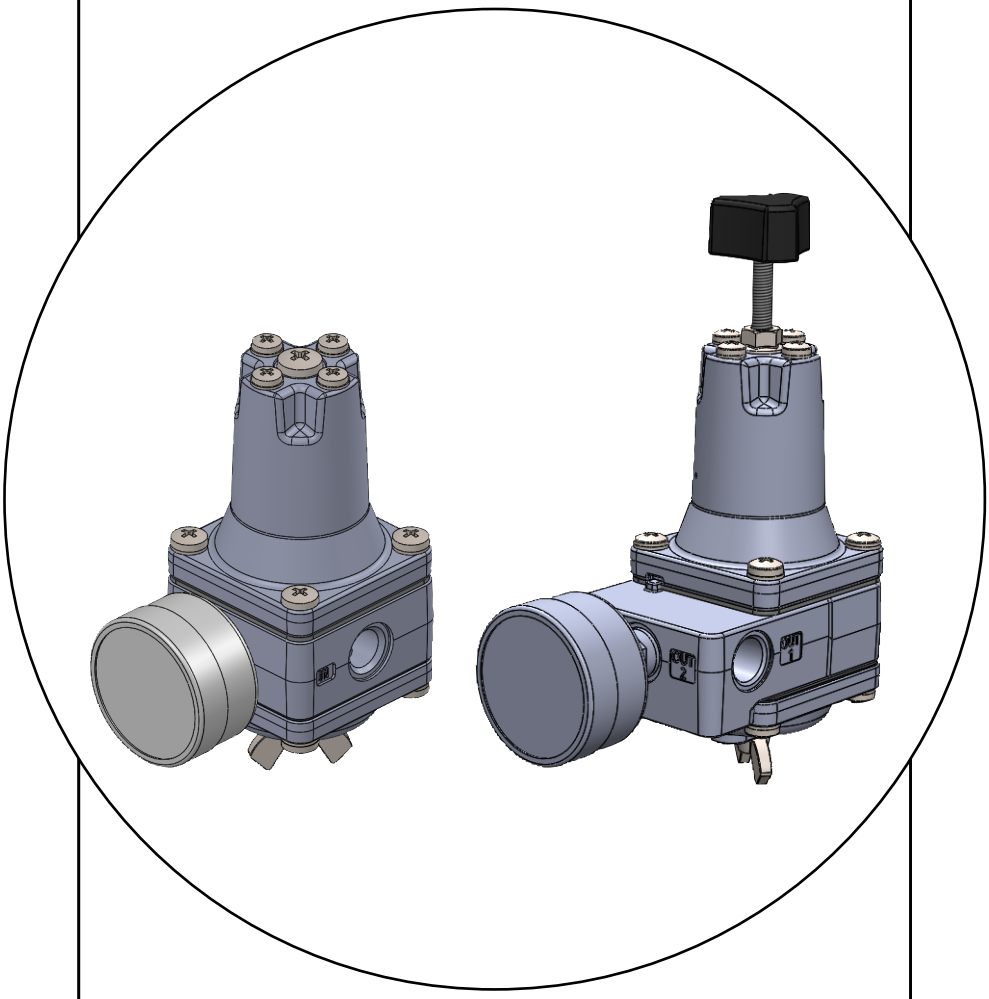
azbil

CM2-RA1B10-2001

Pressure Regulator with Air Filter

Model RA1B

User's Manual



Azbil Corporation

NOTICE

Please make sure that this manual is available to the user of the product.

Unauthorized duplication of this user's manual in part or in whole is forbidden. The information and specifications in this manual are subject to change without notice.

Considerable effort has been made to ensure that this manual is complete and accurate, but if you should find an omission or error, please contact us.

In no event is Azbil Corporation liable to anyone for any indirect, special, or consequential damages as a result of using this product.

Conventions Used in This User's Manual

▪ The safety precautions explained below aim to prevent injury to you and others, and to prevent property damage.

WARNING **Warnings are indicated when mishandling this product may result in death or serious injury.**

CAUTION **Cautions are indicated when mishandling this product may result in minor injury or property damage only.**

▪ In describing the product, this manual uses the icons and conventions listed below.

 : Indicates that caution is required in handling.

 : The indicated action is prohibited.

 : Be sure to follow the indicated instructions.

Handling Precautions : Information to be aware of when handling.

Note : Indicates information that may be useful.

 : Indicates an item or page to which the user may refer.

(1)(2)(3) : Steps in a sequence or parts of a figure, etc.

Handling Precautions

■ General

⚠ WARNING

Before starting to work, check that the pressure in the pipes has dropped to atmospheric pressure. If fluid spews out, injury may result.

■ Installation

⚠ CAUTION

Do not stand on the device or use it as a step. There is a risk of falling.
Do not touch the device unnecessarily while it is operating. Depending on the operating conditions, the surface might be extremely hot or cold.
Since this product is heavy, when handling it, wear safety shoes and watch your step.
During work, wear protective goggles to prevent injury from flying objects.
During work, wear protective gloves to prevent injury due to burrs on bolt heads or edges.

Introduction

Thank you for purchasing the model RA1B pressure regulator with air filter.

■ Unpacking and Storing the Product

● Unpacking

This device is a precision instrument. When unpacking, take special care in handling it to prevent accidents, damage, etc. After unpacking, check for the following items.

- Pressure regulator
- User's manual

● Checking the specifications

The nameplate on this device includes the model number and specifications. Check that the model number and specifications are correct.

● Inquiries

For inquiries concerning this device, contact the azbil Group.
When making an inquiry, have your model number and product number ready.

● Precautions for storage

Observe the following precautions when storing the purchased device in an unused state.

- Store the product at normal room temperature and humidity in an indoor location that is as free as possible from vibration and shock.
- Store the product in its original packaging.

To store a pressure regulator that has been used, follow the instructions below.

(1) Clean the pipe threads and the inside of the drain bowl to remove any dirt and then dry them.

(2) Seal this device in a clean plastic bag with desiccant to prevent moisture from entering the device.

(3) Place the device back in its original packaging.

(4) Store it at normal room temperature and humidity in an indoor location that is as free as possible from vibration and shock.

Structure of This User's Manual

This manual explains the structure of this device and its uses in the following order.

Chapter 1 Overview

Structure and operating principles

Chapter 2 Installation

How to install this device and points to keep in mind during installation

Chapter 3 Operation

Procedures and important points for operating and stopping this device

Chapter 4 Maintenance

Maintenance procedures and service parts

Contents

-MEMO-

Chapter 1 Overview

■ Overview

The pressure regulator with air filter supplies the secondary side with a constant air pressure regardless of changes in primary pressure or secondary-side load resistance. In addition, it has a built-in filter to remove solid foreign matter.

■ Structure

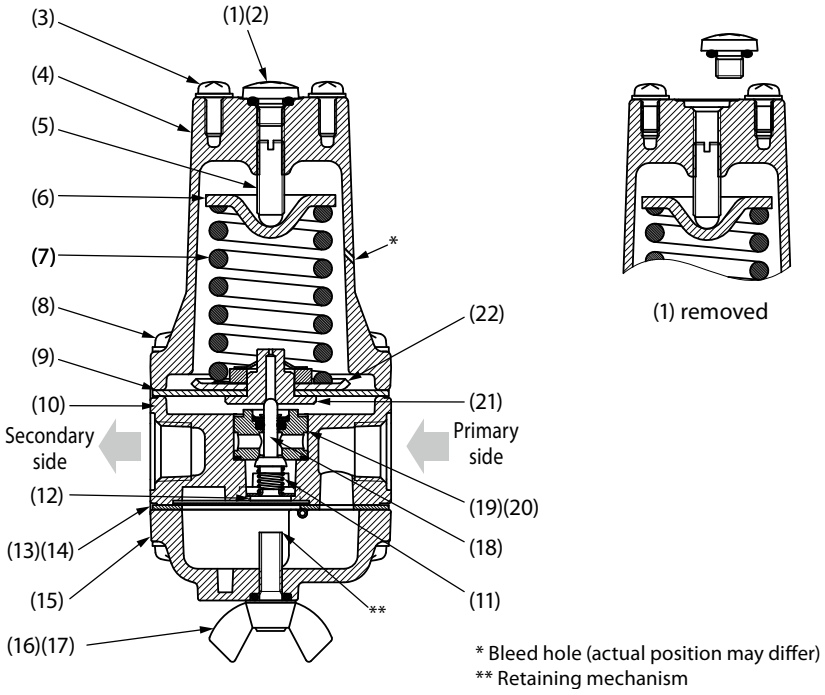


Fig. 1-1. RA1B-1

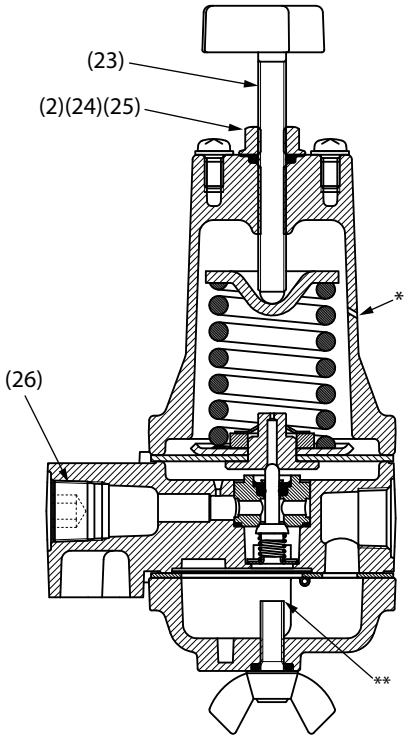


Fig. 1-2. RA1B-2, RA1B-3

Table 1-1. RA1B standard specifications — Main materials

No.	Name	Material	No.	Name	Material
1	Cover screw (M6)	Stainless steel	14	Filter	PVA resin
2	O-ring	VMQ	15	Drain bowl	Aluminum alloy
3	Screw (M4)	Stainless steel	16	Drain plug (M5)	Stainless steel
4	Bonnet	Aluminum alloy	17	O-ring	VMQ
5	Slotted screw (M6)	Stainless steel	18	Valve	Stainless steel
6	Pressure adjustment spring receiver	Plated steel plate	19	Intake port	Copper alloy
7	Pressure adjustment spring	Spring steel	20	O-ring	VMQ
8	Screw (M5)	Stainless steel	21	Exhaust pipe	Copper alloy
9	Diaphragm	CR (inserted into base fabric)	22	Pressure-receiving plate	Stainless steel
10	Main unit	Aluminum alloy	23	Pressure adjustment knob	PBT resin, stainless steel
11	Pressure adjustment spring	Spring steel	24	Flange nut (M6)	Stainless steel
12	Pressure adjustment spring receiver	Plated steel plate	25	Flat washer	Stainless steel
13	Gasket	NBR	26	Plug (only for OUT2)	Stainless steel

■ Operating Principles

As shown by the arrows, air from the primary side passes through the filter (14), where solid foreign matter is removed.

Until the secondary pressure balances the force of the pressure adjustment spring (7) and closes the valve (18), air continues to flow into the secondary side. When the secondary pressure exceeds the specified pressure, the diaphragm (9) rises to release excess air through the openings in the valve (18) and diaphragm (9) and the bleed hole in the side of the bonnet (4).

Chapter 2 Installation

■ Description of Parts

The structure of each model is shown in the figures below.

● Model RA1B-1

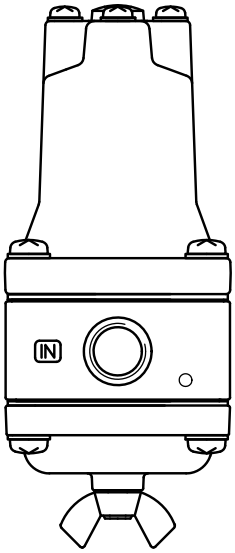


Fig. 2-1. RA1B-1: Side view

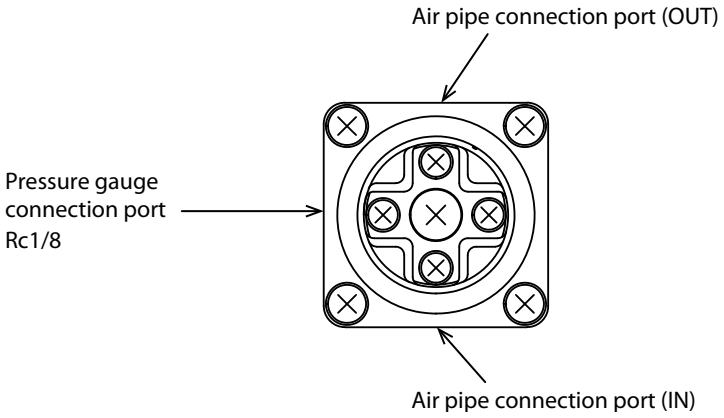


Fig. 2-2. RA1B-1F: Top view

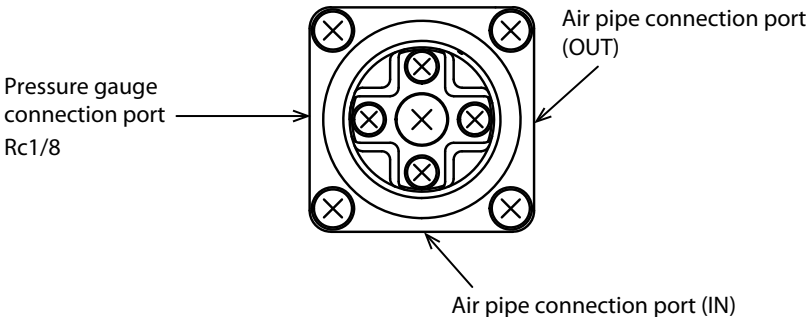


Fig. 2-3. RA1B-1P: Top view

● **Models RA1B-2 and RA1B-3**

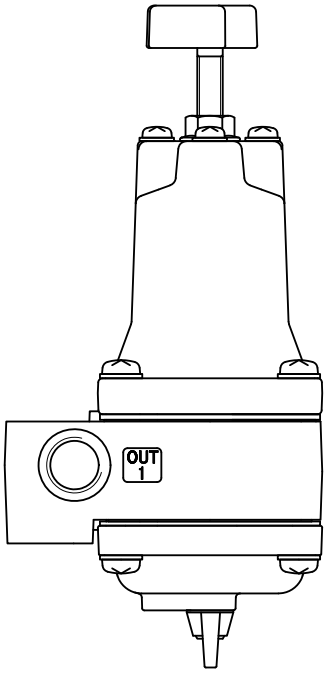


Fig. 2-4. Side view

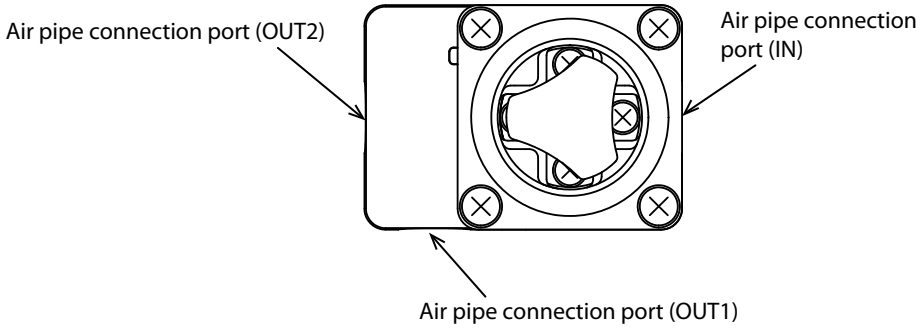


Fig. 2-5. Top view

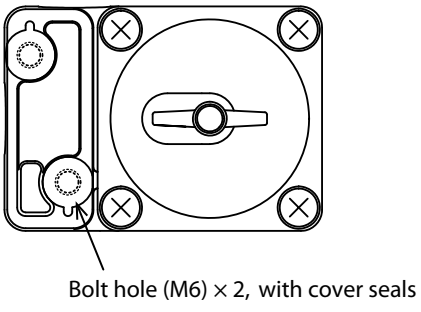


Fig. 2-6. Bottom view

■ Instrumentation Air

The quality of instrumentation air to be supplied to this device is defined as follows.

- Solid material: No particles with a diameter larger than 3 μm (although solid material will be collected by the filter of this device, there should be none in the instrumentation air)
- Oil: Less than 1 ppm by mass
- Supply air humidity: The dew point temperature must be at least 10 °C lower than that of the device
  From JIS C1805-1 (2001)

Referring to the above specifications, select a compressor and main line or terminal-installation type compressed air purifier.

● Compressed air purifier for the main line

Select a compressed air purifier for the main line, such as a main line filter or micro coalescer from SMC, CKD, or any other leading compressed air purifier manufacturer, to satisfy the above specifications.

● Compressed air purifier to be installed on the terminal

If measures cannot be taken on the main line due to installation of a control valve or for other reasons, use a compressed air purifier (oil mist removal equipment/device) that can be installed on the terminal in order to supply purified instrumentation air to this device.

● Sample devices

If there are changes or discontinued models, please contact the relevant manufacturer.

- **Products from SMC Corporation**
  Mist Separator AM150 or AM250 Series
  (Filtering level 0.3 μm, secondary oil mist concentration 1.0 mg/m^3)

- **Products from CKD Corporation**
  Oil Mist Filter M1000 or M3000 Series Mantle S Type
  (Filtering level 0.3 μm, remaining oil 1.0 mg/m^3)

! Handling Precautions

- Select a compressed air purifier with specifications suited to the usage conditions.
- After installation of the above oil removal equipment, it is necessary to properly inspect and maintain the air circuit section for long-term stable operation. Install the oil removal equipment before use and perform periodic inspection and maintenance.
- The warranty is void if the device fails because of poor-quality instrumentation air.

■ Installation Procedure

Be sure to install this device with the drain plug facing down.
If it is installed in the wrong orientation, it may be damaged or malfunction, or the device may not be able to drain.

● Mounting this device

For details on how to mount this device to a product on the secondary side, see the user's manual for the relevant product.
If the relevant user's manual provides mounting instructions, follow them instead of this document. Also, note that the tightening torques for screws and nuts provided in this section onward are rough guides. Determine the appropriate torque depending on the usage conditions.
Mount the pressure regulator on the mounting plate using two or more of the four M4 screws (Fig. 1-1 (3)) in the top of the pressure regulator. The RA1B-2 and RA1B-3 can also be mounted using the two M6 screw holes (see Fig. 2-6) in the pressure regulator body.

Note

- The M6 screw holes are covered with cover seals. Remove them before use. No M6 screws are included with this device. Please obtain them separately.
- For the dimensions of each mounting part, see the specifications in Appendix A or the following documents.

Model	Document number
RA1B-1F	(Japanese) CS000258 (English) CS000262
RA1B-1P	(Japanese) CS000259 (English) CS000263
RA1B-2, RA1B-3	(Japanese) CS000260 (English) CS000264
RA1B Model number table	(Japanese) CS000261 (English) CS000265

- If the pressure adjustment knob interferes with the screwdriver when tightening the M4 screws on the RA1B-2 or RA1B-3, turn the knob slightly to change its position, tighten the M4 screws, and then adjust the pressure.
(See ■ How to Adjust the Pressure.)

● M4 threaded parts

Mounting plate thickness	Up to 3 mm
Tightening torque	2 ± 0.2 N·m
If the usage conditions are not strict*	1–2 N·m

* For screws that are used to prevent this device from rotating and that are not relevant to supporting the weight of this device.

● M6 threaded parts

Hole depth	8 mm
Tightening torque	7 ± 0.4 N·m

! Handling Precautions

- Use the correct screwdriver on the screws. Not doing so may result in damage.
- If any of the screws or the pressure adjustment knob get detached, they may fall or get lost. Also, if the pressure adjustment knob is removed, this device may be damaged or malfunction.
- If the thickness of the mounting plate or the tightening torque is inappropriate, this device may be damaged or fall.
- When carrying a product to which this device is attached, do not hold it by this device or by the air pipes or mounting plate attached to this device. Doing so may result in damage, malfunction, or air leakage.
- Do not apply a load to this device by using it as a foothold or handhold. Doing so may result in damage, malfunction, or air leakage.
- When using a retaining device, such as a clamp, insert a rubber sheet or other protective material between it and this device so as not to damage this device. Not doing so may result in damage, malfunction, or air leakage. If this device is damaged, touching the damaged surface may cause an injury.
- If the M4 screw holes are not used, do not leave them open. Cover them with screws or a mounting plate. Otherwise, they may corrode.

● Air pipe connection

For details on how to attach a product on the secondary side, see the user's manual for the relevant product.
If the relevant user's manual gives instructions on piping, follow them instead of the instructions in this document.
Remove the resin caps (red) attached to the pipe connection ports of this device before connecting air pipes.
The air pipe connection ports are either Rc ¼ or ¼ NPT, depending on the specifications. In addition, the RA1B-1 has a Rc ⅛ pressure gauge connection port.
When attaching a fitting to the OUT2 connection port of the RA1B-2 or RA1B-3, remove the hex socket plug beforehand. Remove any foreign matter on the screw threads using a brush.

Tool required for removing the hex socket plug: a hex key (Allen wrench)

Handling Precautions

- Be sure to plug connection ports to which no pipes are attached. Otherwise, air may leak.
- Do not connect the secondary-side pipe to the pressure gauge connection port. Doing so may cause this device to malfunction.
- Do not attach fittings that do not satisfy the specifications. Doing so may result in damage or air leakage.
- Do not connect an air supply to the secondary-side air pipe connection port and the pressure gauge connection port. Doing so may result in damage, malfunction, or air leakage.
- Take steps to prevent a detached plug or part from falling.
- Do not supply instrumentation air until all the air pipe connection ports are connected and the drain plug is securely fastened. Otherwise damage, malfunction, or air leakage may result.
- If fittings are overtightened, this device may be damaged or air may leak.
- When using a retaining device, such as a clamp, insert a rubber sheet or other protective material between it and this device so as not to damage this device. Not doing so may result in damage, malfunction, or air leakage. If this device is damaged, touching the damaged surface may cause an injury.

Chapter 3 Operation

This chapter describes how to start and stop this device and how to adjust the pressure.
If the user's manual for the product on the secondary side provides instructions on how to start and stop operation and how to adjust pressure, follow them instead of the instructions in this document.

■ How to Start Operation

(1) Change the pressure to the lowest setting before supplying air to this device. (See ■ How to Adjust the Pressure.)

(2) Check the state of connections on the secondary side of this device, and make sure that there is no chance of devices being damaged or malfunctioning due to a release of unadjusted air pressure.

(3) Supply air to this device, and adjust the pressure by following the prescribed procedure. (See ■ How to Adjust the Pressure.)

(4) Check that the product on the secondary side functions normally. If so, the procedure is completed.

■ How to Stop Operation

(1) Check the operation of the device on the secondary side, and make sure that there is no chance of it being damaged or malfunctioning due to fluctuations in air pressure output before stopping this device. Close the shutoff valve, if any, on the secondary-side pipe.

(2) Change the pressure of this device to the lowest setting. (See ■ How to Adjust the Pressure.)

(3) Stop supplying air to the primary side of this device.

(4) After tightening the slotted screw or pressure adjustment knob slightly, change the pressure to the lowest setting again and then release residual pressure from the primary side.

(5) If the residual pressure cannot be released in one operation, repeat operation (4) several times.

(6) Check for any residual pressure and then confirm that there is nothing abnormal with this device or the air piping. This completes the procedure.

Note

- If the piping is laid out in such a way that residual pressure on the primary side is released when the air supply is stopped, steps (4) and (5) can be omitted.

■ How to Adjust the Pressure

If this device is attached to a product that does not always expel air and the piping capacity of the secondary side is large, it will take some time for the air pressure to reach the specified pressure. Adjust the pressure after closing the pipe at a position immediately after the pressure regulator, or check the pressure after sufficient time has passed.
Before, after, or during pressure adjustment, check for air leakage from the seals and piping connection ports. If the pressure fluctuates drastically because of a sudden operation, this device may be damaged or malfunction, or air may leak.

● Model RA1B-1

(1) Remove the cover screw (small M6×6 mm cross head screw).

(2) Turn the slotted screw (M6) while checking a pressure gauge or other appropriate instrument, and adjust the pressure of the secondary side to the prescribed level. Tightening the slotted screw increases the pressure and loosening it reduces the pressure.

(3) Tighten the cover screw.

(4) Check again that the pressure is at the specified level to complete the procedure.

● Required tool and tightening torque

- Cover screw
  Tool: cross head screwdriver
  Tightening torque: 7 ± 0.4 N·m

- Pressure adjustment screw
  Tool: screwdriver
  (maximum width 4.8 mm or less; nominal thickness 1 mm or less; shank length 20 mm or more)
  Example: HOZAN D-640-100

! Handling Precautions

- Be careful not to drop or lose the cover screw when it is removed.
- If the slotted screw is overtightened beyond the adjustable range, it may fall into the pressure regulator, making it impossible to adjust the pressure.
- If the slotted screw is loosened too much, it may fall off the pressure regulator, or it may interfere with the cover screw, resulting in damage or malfunction.
- Use a screwdriver that does not come into contact with the M6 female threads. If the screw threads are damaged, this device may malfunction or fail to adjust the pressure.

● Model RA1B-2, model RA1B-3

(1) Loosen the M6 flange nut.

(2) Turn the pressure adjustment knob to adjust the pressure of the secondary side to the prescribed level. Tightening the pressure adjustment knob increases the pressure and loosening it reduces the pressure.

(3) Tighten the M6 flange nut, taking care not to misalign the pressure adjustment knob.

(4) Check that the pressure is at the specified level to complete the procedure.

● Required tool and tightening torque

- Flange nut M6

  Tool: wrench

  Tightening torque: 7 ± 0.4 N·m

! Handling Precautions

- If a tool comes into contact with the M4 thread when opening or closing the flange nut, the M4 thread may be damaged. In addition, coming into contact with damaged thread may result in injury.
- If the pressure adjustment knob is loosened beyond the adjustable range, this device may be damaged or malfunction, or the pressure adjustment knob may fall off and be lost.

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Chapter 4 Maintenance

■ Drain

Water or oil can be drained from the drain bowl without removing it.

(1) Make sure that air pressure is not being applied to the pressure regulator, and that there is no residual pressure in it.

(2) Place sheeting or an empty container under the pressure regulator as protection against stains, etc.

(3) Loosen the drain plug approximately two revolutions.

(4) Water or oil will flow along the screw threads and drip out.

(5) When the drain bowl is drained, wipe water, oil, and foreign matter from the drain plug with a cloth.

(6) Tighten the drain plug to the specified torque.

(7) Check that no air is leaking from the drain plug and that the pressure is adjusted correctly to complete this procedure.

● Tightening torque for the drain plug

In principle, tighten the drain plug manually. However, if it might loosen due to vibration or other reasons, tighten it as follows.

● Required tool and tightening torque

Tool: monkey wrench or other appropriate tool
Tightening torque: 3.0 N·m or less

[!] Handling Precautions

- The tightening torque above is a rough guide. Determine the appropriate torque depending on the usage conditions.
- Wear protective gear when draining. If there is residual pressure in the pressure regulator, the contents may spew out when draining.
- If foreign matter is caught in the threads when the drain plug is tightened, air may leak.
- If the O-ring is damaged when draining, air may leak.
- The drain plug cannot be detached. If the drain plug is loosened forcefully without regard for the retaining mechanism, it may be damaged or air may leak.
- If a force that exceeds the specified tightening torque is applied to the drain plug, the drain plug may be damaged.
- When using a tool to open or close the drain plug, take appropriate measures not to damage the drain plug. If the drain plug is damaged, coming into contact with it may result in injury.

■ Filter Maintenance

Replace the filter regularly.
In addition, replace the gasket as well when replacing the filter. (See ■ Ordering Parts.)

(1) Make sure that air pressure is not being applied to the pressure regulator, and that there is no residual pressure in it.

(2) Drain any water or oil from inside the drain bowl. (See ■ Drain.)

(3) Remove the four M5 screws from the drain bowl.

(4) Replace the filter and gasket.

(5) Tighten the four M5 screws of the drain bowl to the specified torque.

(6) Before starting operation, check that no air is leaking from the drain plug or tightened parts and that the pressure is adjusted to the specified pressure. This completes the procedure.

● Required tool and tightening torque

M5 drain bowl screws
Tool: cross head screwdriver
Recommended tightening torque: 2 ± 0.2 N·m

! Handling Precautions

- Do not bend or scratch the filter. Do not use a filter that is damaged, etc. Doing so may result in damage, air leakage, or malfunction.
- The filter may not filter water or oil sufficiently. Any water or oil in the instrumentation air may result in damage, air leakage, or malfunction.
- Avoid washing and reusing the filter. Doing so makes the filter less functional, resulting in damage, air leakage, or malfunction.

■ Ordering Parts

Check the specifications and model number of the device and select parts from the table below.
When replacing the filter, replace the gasket as well.
Replacing any parts of this device other than the filter and gasket is not recommended.

Table 4-1. Parts to order

Part No.	Part name	Compatible model	Required qty.
80389120001	Filter (resin)	(7) Filter element: X	1
80389121001	Filter (SUS316)	(7) Filter element: F	1
80389119001	Gasket (NBR)	(5) Environmental specification: S	1
80389119002	Gasket (FKM)	(5) Environmental specification: V	1

■ Storage

- Store this device at normal room temperature and humidity (around 25°C and 65 % RH) in an indoor location not exposed to direct sunlight.
- Avoid dusty or moldy locations, locations subject to condensation, and locations near heating equipment.
- Do not drop this device or subject it to strong vibration or shock. Do not place anything on top of this device.
- When storing this device for a prolonged period, put it in a clean plastic bag with desiccant.
- It is recommended that this device be stored vertically (drain plug facing down).

[!] Handling Precautions

- An inappropriate storage method may cause corrosion, damage, malfunction, or air leakage.
- Leaving this device outdoors with no air supplied or in the wrong orientation may cause corrosion, damage, or malfunction due to rainwater entering the device.

■ Disposal

Dispose of this device appropriately as industrial waste, in accordance with local regulations.
To dispose of this device after disassembling it, take appropriate action, such as recycling each material, by referring to chapter 1, “Structure.”

● Disassembly procedure

(1) Drain any water or oil from inside the drain bowl.

(2) Detach pipes and brackets from this device.

(3) Remove the pressure adjustment knob or the cover screw and slotted screw.

(4) Remove the four M5 screws that hold the bonnet, remove the bonnet, and then remove the parts inside.

(5) Remove the four M5 screws that hold the drain bowl and then remove the parts inside.

[!] Handling Precautions

- If this device is disassembled while the spring is compressed, the parts may scatter.
- Forcefully disassembling parts molded together, press-fitted parts, or any other parts joined together by means other than screws may result in injury.
- When disassembling this device, wear protective gear and goggles and use appropriate tools.
- Table 1-1 lists the included materials for the standard specifications. For details, see the respective specifications.

■ Other

If this device fails, stop use and replace it with a new one.
If there is a problem with a part other than the filter or gasket, replace this device as a whole instead of disassembling it.
For corrosive atmospheres and instrumentation air containing ozone, a corrosion-resistant model is recommended. A corrosion-resistant model is also recommended for constant high temperature conditions. For operating temperature ranges, see the specifications in Appendix A.

[!] Handling Precautions

- Use this device only with instrumentation air. Otherwise, damage, leakage, or malfunction may result.
- Do not use this device if there is something wrong with it. Doing so may result in damage, air leakage, or malfunction.
- If the coating of this device flakes off due to corrosion, etc., the flakes can cause injury.
- The casing of this device (bonnet, body, and drain bowl) is made of a cast aluminum alloy. If there are any burrs, they can cause injury.
- If the resin knob cracks, coming into contact with the cracked surface or fragments may result in injury.
- If a screw head or nut is stripped with a tool, coming into contact with the damaged surface or fragments may result in injury.
- Since the diaphragm is a sheet of rubber-coated cloth, a minute amount of air may leak through the cloth. This does not affect the specifications or characteristics of this device, and you can continue to use the diaphragm.
- If the device is exposed to heavy rain and strong wind, rainwater may enter the inside through openings due to the structure of this device.
- Do not close the bleed hole. Doing so may result in damage or malfunction.
- When this device becomes dirty, wipe off the dirt gently using a soft cloth. Wiping this device with a solvent or detergent may cause peeling of the coating, corrosion, damage, or air leakage due to swelling of rubber parts. Also, do not wash this device with water. Water will get inside the device, resulting in damage or malfunction.

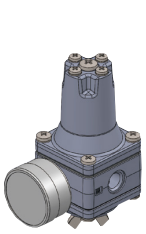
Appendix A

Pressure Regulator with Air Filter

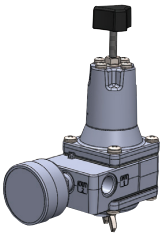
Model RA1B

OVERVIEW

The pressure regulator with air filter supplies air at a constant pressure for instruments and control valves that use air pressure. The model with a variable air pressure handle can be used for manual control of an air pressure cylinder or to set an air pressure signal.

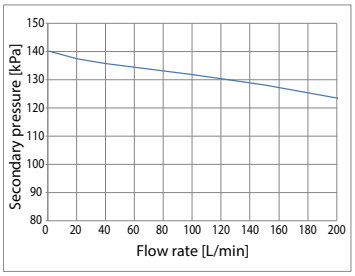
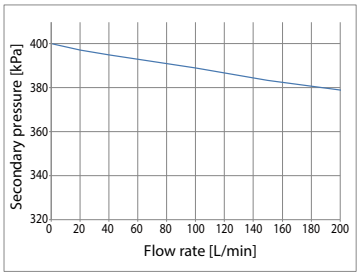
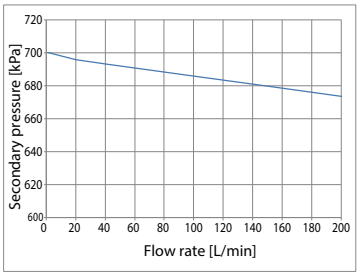


Model RA1B-1



Model RA1B-2/3
(with handwheel)

STANDARD SPECIFICATIONS

Model		RA1B-1	RA1B-2	RA1B-3
Primary pressure (kPa)		200 to 1035	Secondary pressure +50 to 1035	Secondary pressure +50 to 1035
Secondary pressure (kPa)		140 ± 4 (fixed)	20 to 400 (variable)	150 to 700 (variable)
Characteristics				
Pressure characteristics	Secondary pressure change (kPa)	Within 10 kPa for primary pressure change of 200 to 700 kPa	Within 8 kPa for primary pressure change of 450 to 850 kPa	Within 8 kPa for primary pressure change of 800 to 1035 kPa
Flow characteristics		(1) Model RA1B-1 (primary pressure 700 kPa) 	(2) Model RA1B-2 (primary pressure 700 kPa) 	(3) Model RA1B-3 (primary pressure 1000 kPa) 
Air consumption		0.5 L/min [normal] max.		
Material		Filter: 3 µm PVA sponge, or 3 µm stainless steel (option)		
		Case: die-cast aluminum		
		External screws and drain bolt: stainless steel		
Ambient temperature		Standard: –30 to +80 °C Corrosion resistant: –20 to +80 °C		
Vibration characteristics		20 m/s² (5–500 Hz) max.		
Air pressure connection port		Primary connection port and secondary connection port: Rc ¼ or ¼ NPT tapered pipe thread Connection port (for RA1B-1): Rc ⅛ tapered pipe thread		
Drain capacity		14 cm³		
Weight		0.4 kg: RA1B-1 (without pressure gauge) 0.5 kg: RA1B-2/3 (without pressure gauge)		
Maximum flow rate		200 L/min (secondary pressure drop is 25 kPa max. (for RA1B-3, 30 kPa max.))		

INSTRUCTIONS FOR PROPER USE

- This product is designed for the general industrial market.
- Be sure to install this product with the drain plug facing downward.

Specifications are subject to change without notice.

MODEL SELECTION

Basic model No.

RA1B	Pressure regulator with air filter semi-bleed type		–	(1)	(2)	(3)	(4)	(5)	–	(6)	(7)	(8)	(9)	–	(10)	(11)
1. Setting pressure range 2. Model	Secondary pressure = 140 kPa (fixed)	Pneumatic instrument (Other than Model KDP/KKP)		1	F											
		Pneumatic Transmitter Model KDP/KKP			P											
	20 ≤ secondary pressure ≤ 400 kPa (variable)	For positioners and control valves		2	X											
	400 < secondary pressure ≤ 700 kPa (variable)	For positioners and control valves		3	X											
(3) Pipe thread	Rc ¼ (in/out)					R										
	¼ NPT (in/out)					N										
(4) Paint	Standard (baked acrylic finish)						S									
	Corrosion resistant (baked urethane finish)						B									
(5) Environmental specifications (temperature range)	Standard (−30 to +80 °C)							S								
	Corrosion resistant (−20 to +80 °C) [diaphragm, gasket: fluororubber]*1							V								
(6)(7)(8)(9) Filter element	Resin (PVA sponge)									X	X	X	X			
	Stainless steel (SUS316L)									X	F	X	X			
(10) Pressure gauge range	Without pressure gauge														X	
	200 kPa (secondary pressure ≤ 150 kPa)														1	
	400 kPa (150<secondary pressure ≤ 300 kPa)														2	
	600 kPa (300 < secondary pressure ≤ 450 kPa)														3	
	1000 kPa (450 < secondary pressure ≤ 700 kPa)														4	
(11) Pressure gauge unit	Without pressure gauge															X
	kgf/cm^2 *2															A
	psi*2															B
	bar															C
	kPa															D
	MPa															E

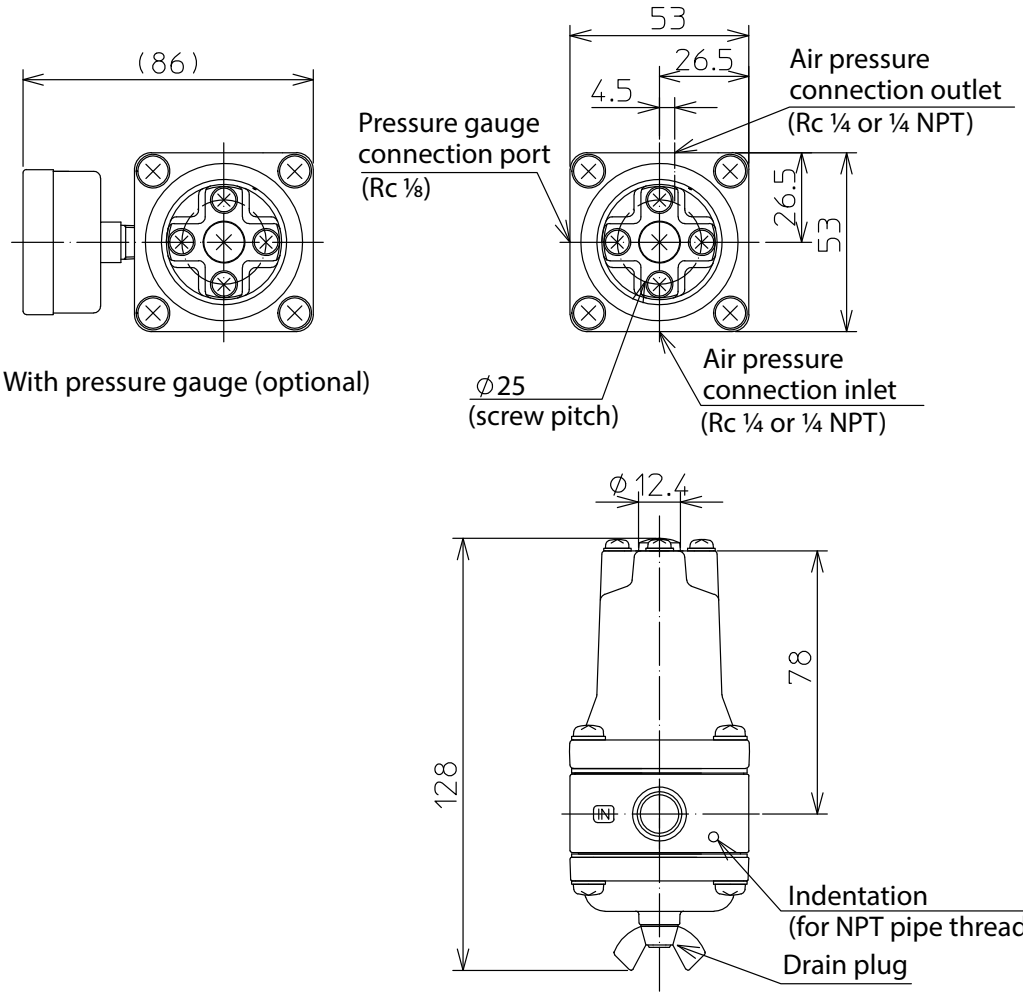
1. If the selection for (5) is "V," select "XFXX" for filter elements (6)(7)(8)(9).

2. For use overseas only. Cannot be used in Japan.

DIMENSIONS

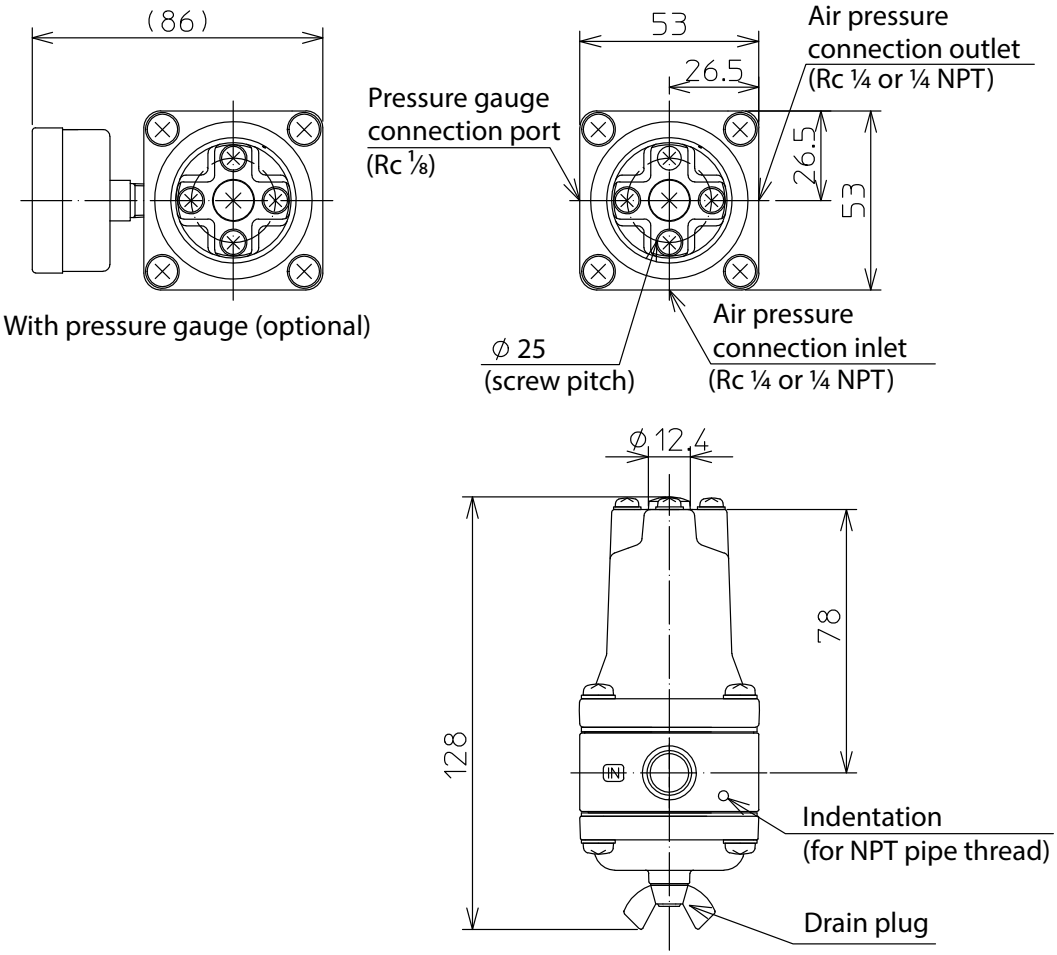
RA1B-1F

Unit: mm



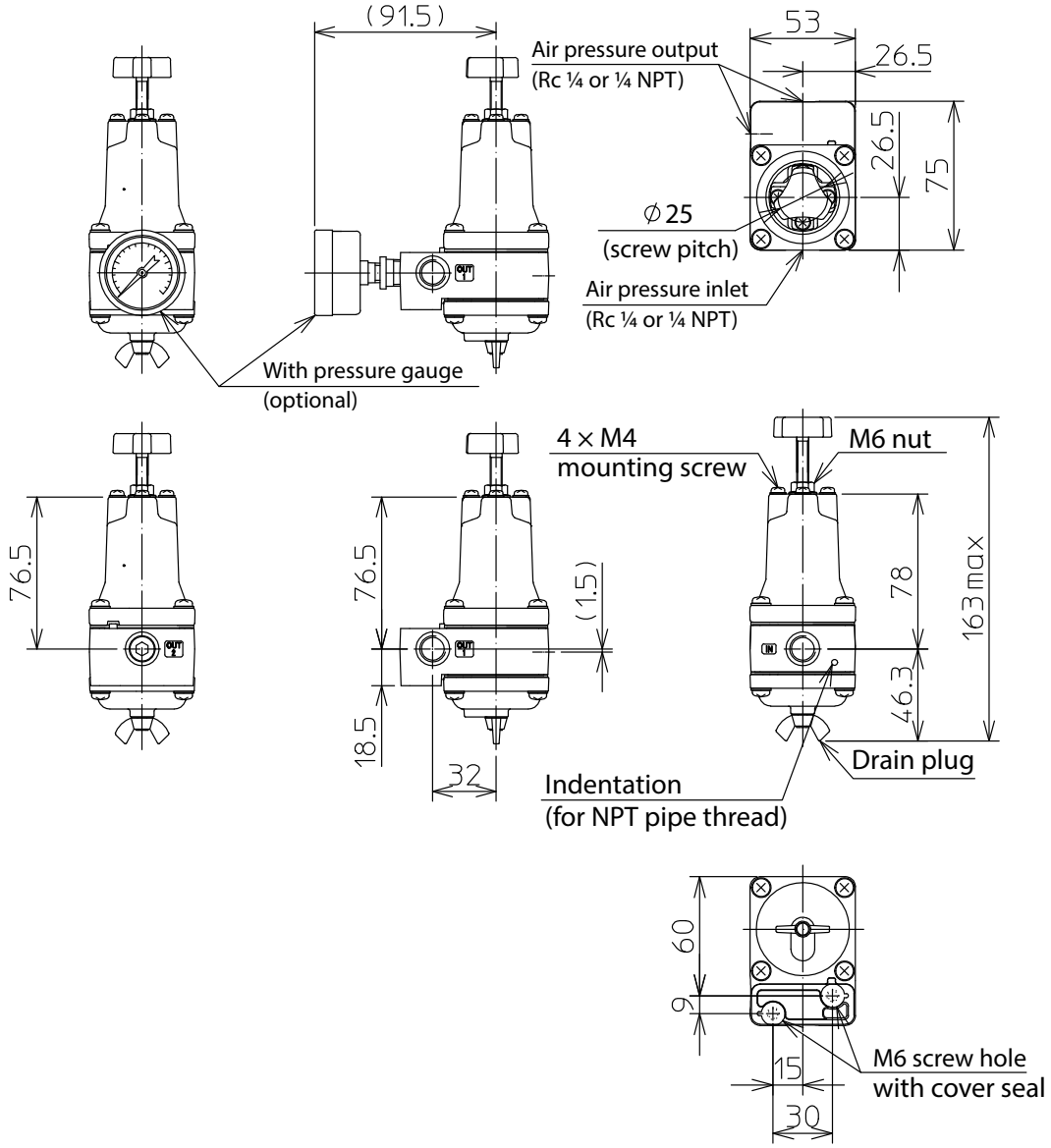
RA1B-1P

Unit: mm



RA1B-2/3

Unit: mm



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

   3.1 Restrictions on application

   Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

   *5. Nuclear power quality: compliance with JEAG 4121 required
   *6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes,"etc.
   *7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

   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.

   3.2 Precautions on application

   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
      [When used outside a radiation controlled area and where nuclear power quality is not required]
      [When the limit switch for nuclear power is used]
    * 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. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

   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.

azbil

Specifications are subject to change without notice. (11)

Azbil Corporation
Advanced Automation Company

1-12-2 Kawana, Fujisawa
Kanagawa 251-8522 Japan

URL: https://www.azbil.com

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