

OPERATION MANUAL VBA-M3A

BOOSTER REGULATOR

VBA10A/20A/40A

Contents

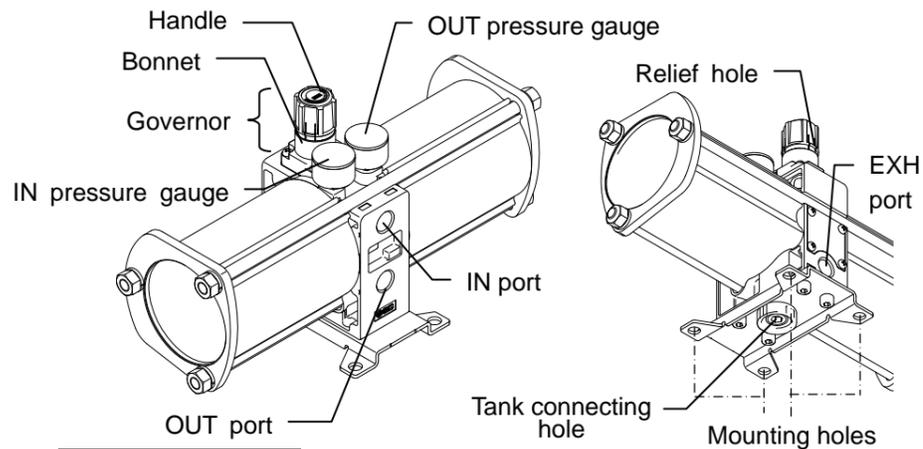
Descriptions and specifications of the components

Operation Precautions

Before requesting service

Thank you for choosing this SMC product. This operation manual provides essential information to ensure its optimum performance and lifespan. Please read it before using the product. Keep this manual accessible and refer to it if problems occur. Please refer to the latest catalogue, drawings and maintenance procedures for product configuration and specifications.

Descriptions and specifications of the components



Specifications

Model	VBA10A	VBA11A	VBA20A VBA40A	VBA22A VBA42A	VBA43A
Pressure increase ratio	MAX.2	2 to 4	MAX.2		
Operating fluid	Compressed air				
Set pressure range	0.2 to 2.0MPa	0.2 to 1.0MPa		0.2 to 1.6MPa	
Supplied pressure range	0.1 to 1.0MPa				
Proof pressure	3MPa	1.5MPa		2.4MPa	
Ambient temperature and operating fluid temperature	2 to 50°C (No freezing)				
Lubrication	Lubrication is not allowed				
Mounting posture	Horizontal				
Governor* (Pressure adjusting mechanism)	Handle-operated type		Air-operated type	Handle-operated type	
	Relief function				

***The default pressure of the handle is 0. When the air is supplied, the pressure is relieved.**

Handling Precautions

To ensure safe and optimum operation, confirm the product's specifications before use. Operating the product out of the scope of its specifications may cause failure or accident.

Operating location

CAUTION

- Do not install the product where it can be exposed to rain or direct sunlight.
- Do not install the product where it can be affected by vibration.

Installation

CAUTION

Since the booster regulator vibrates due to the reciprocation of the internal piston, mount 4 bolts onto the mounting holes and tighten them completely.

Model	Bolt size	Tightening torque
VBA1 A	M5	3Nm
VBA2 A, 4 A	M10	24Nm

CAUTION

Carrying

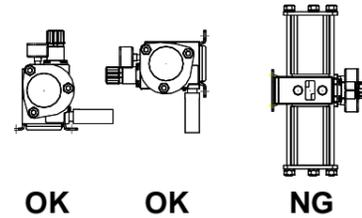
- Hold both ends when carrying by hand. **Do not hold the handle.** If the handle comes off, the body will fall and it may cause injury.

Installation

- Mount the booster regulator so that the tie-rod/cover is placed horizontally.

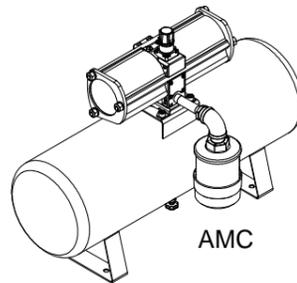
A malfunction will occur if it is vertical.

- If vibration of the booster regulator may cause problems, take countermeasures in your application to prevent vibration.
- Ensure there is enough space for maintenance.
- When connecting the booster regulator with the VBAT tank, be sure to read the operation manual and use the accessories provided with the tank.



Piping

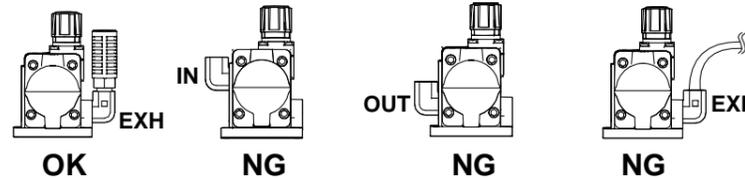
- Connect IN port with the air source, and OUT port with an actuator. Mount a silencer (Option) or exhaust cleaner to the exhaust port to reduce the exhaust noise.



Booster regulator model	Exhaust cleaner model No.	Installation distance
VBA1 A	AMC310-03	200mm
VBA2 A	AMC510-06	270mm
VBA4 A	AMC610-10	300mm

- * Separate piping should be prepared to connect the booster regulator with the exhaust cleaner.
- * If the tank is not used, mount the booster regulator away from the floor in accordance with the installation distance stated above.

- The elbow for silencer (option) can be used only for mounting a silencer to the exhaust port. Do not use it for the IN port and the OUT port. Prepare piping separately to exhaust remotely by connecting pipes to the exhaust port.



- Piping on each port should be tightened to the tightening torque specified below.

Port size	1/8	1/4	3/8	1/2
Tightening torque	7 to 9Nm	12 to 14Nm	22 to 24Nm	28 to 30Nm

- When mounting the silencer and the elbow for silencer, hold the end of the body (the side without thread) and screw it in. When the screw becomes slightly tight, tighten it further for approximately 1/4 turn with a spanner whose size is appropriate for the width across flat of the hexagon head.

CAUTION

Flushing · Care should be taken especially for the precision parts.

- Before piping, flush pipes to remove cutting chips, cutting oil, and dust which may cause malfunction or lower the durability of the booster regulator.

Piping size

- Ensure that the piping size corresponds to the port size to achieve the full function of the booster regulator. **If the piping is too thin, the function will be reduced due to the pressure loss.**

Exhaust air

- When piping to the exhaust, connect piping to the exhaust port individually. If centralized piping is used, it may not be able to boost pressure due to back pressure.

- If inlet pressure and outlet pressure are set close together, air may leak from the exhaust port. This is not an abnormal phenomenon.

This occurs when the booster regulator is on standby for switching.

Particle generation

- Since there are sliding parts in the booster regulator, particles are generated. Mount air purification equipment such as an air filter or a mist separator on the outlet side as necessary.
- Lubrication (grease/turbine oil) from inside the booster regulator is contained in the exhaust air.

Air supply

CAUTION

Quality of Air Source · Take care especially for precision parts.

- Connect a mist separator at the inlet of the booster regulator. If the quality of compressed air is not fully controlled, it may cause a malfunction or deterioration of durability.

- Although a metal net is installed at the IN port of the booster regulator for initial prevention of foreign matter intrusion, it cannot continuously filter particles or separate drainage. Make sure to install a mist separator (model AM Series) at the inlet side of the booster regulator.

- If dry air (atmospheric pressure dew point -17°C or less) is used, the lifespan may be shortened because volatilization of the internal grease can be accelerated.

- Connect the lubricator only at the outlet. Accumulation of oil in the booster regulator may cause malfunction.

- If the product is used in a condition in which large amounts of drainage remain in the filter, mist separator, and tank, drainage may flow out and cause malfunction. Exhaust drainage once a day to prevent such failure. For the auto-drain type, also check the operation once a day.

Pneumatic circuit

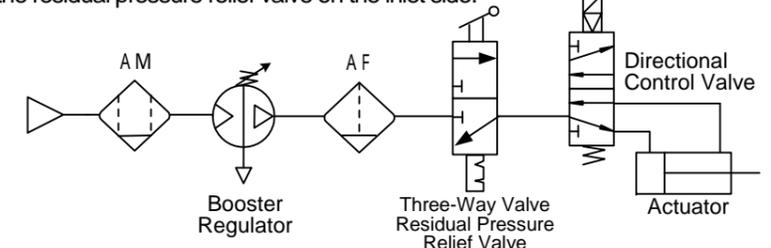
WARNING

Warning about error of the outlet pressure.

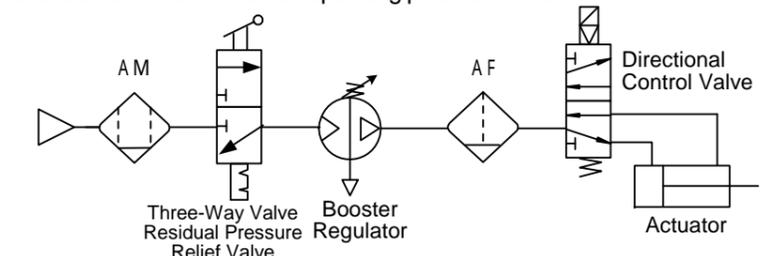
- If there is a likelihood of an outlet pressure drop due to unforeseen circumstances such as equipment malfunction, thus leading to a major problem, **take safety measures on the system side.**
- Even when the booster valve cannot correctly boost the pressure due to the valve reaching the end of its life or malfunctioning, supply air continues coming out from OUT port and the exhaust port.
- If there is a large fluctuation in the inlet pressure, the outlet pressure could exceed its set range depending on the governor adjustment, which may lead to unexpected accidents. Therefore, take safety measures against abnormal pressures.

Dealing With Residual Pressure

- When residual pressure is released for machine maintenance, connect a 3-port valve to the outlet of the booster regulator (see the drawing below). Since the check valve mounted in the booster regulator works, the residual pressure cannot be released with the residual pressure relief valve on the inlet side.



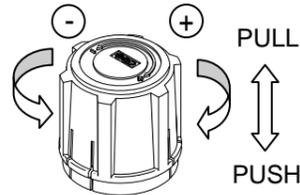
- Release the supply pressure with the residual pressure relief valve after operation is stopped. Stop unnecessary motion of the booster regulator to prevent switching failure that occurs below the minimum operating pressure or less.



Pressure operation

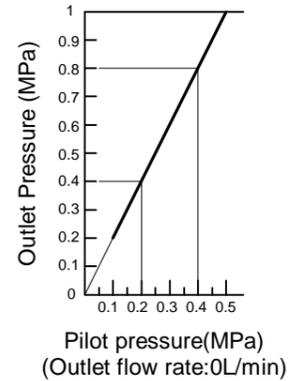
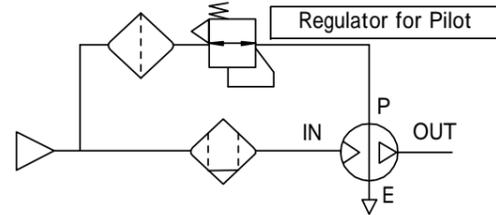
Handle operation type

- The outlet pressure increase when handle is rotated in the [+] direction. The outlet pressure decrease when handle is rotated in the [-] direction.
- The handle is locked when it is pushed down(PUSH), and released when it is pulled up (PULL).
- When decreasing the outlet pressure, air leaks from the handle due to the relief mechanism.



Air operated type

- Connect a regulator to the pilot port as shown below.
- AR20 and AW20 is recommended for the pilot regulator.



• As shown in the drawing on the right, the outlet pressure is twice as much as the pilot pressure.

⚠ WARNING

- **Operate the booster regulator within its maximum operating pressure and set pressure range.**
- Do not rotate the handle to a pressure exceeding the max. set pressure.

Model	VBA1 A	VBA2 A, 4 A	VBA43A
Maximum set pressure	2.0MPa	1.0MPa	1.6MPa

- Do not supply 0.5MPa or more of pilot pressure for VBA22A and VBA42A. When the inlet pressure becomes 0.5MPa or more, the outlet pressure will increase and finally exceed the operating pressure range.
- The lower limit of the set pressure should be the inlet pressure plus 0.1MPa or more. When the booster regulator is operated with the minimum operating pressure (0.1MPa) or less, the directional control valve may stop at the intermediate position.

⚠ CAUTION

- **The pressure of the handle is set to 0 before shipment. When the air is supplied, the pressure is relieved.**
- It is not possible to reduce the pressure to the inlet pressure or less. A regulator function is not installed.
- There are upper and lower limits to the handle operation. If the handle is rotated too much, it will break.

Selection

- Since the booster regulator is a compressor that uses air as power, air is consumed. The air consumption is approx. 1.2 times (ratio of intensified pressure 2) and approx. 2.7 times (ratio of intensified pressure 4) as much as air consumed on the outlet side. Therefore, inlet air supply should be approx. 2.2 times (ratio of intensified pressure 2) and approx. 3.7 times (ratio of intensified pressure 4) as much as air consumed on the outlet side.
- For long term continuous operation, the booster regulator's lifespan must be verified. The life expectancy of a booster regulator depends on the operational cycle. Thus the more frequently the actuator operates in the outlet side, or the higher the pressure, the shorter the life expectancy will be.

Before requesting service

Troubleshooting			
Trouble	Possible cause	Time of occurrence	Countermeasures
Leakage from the handle (Relief doesn't stop.)	Inlet pressure is higher than the set pressure.	Beginning Middle	Set the pressure to the inlet pressure or more with the handle. If the inlet pressure fluctuation is large, stabilize it with a regulator.
	Sealing failure of the governor due to foreign matter.	Beginning Middle	Disassemble the governor and remove the foreign matter (Refer to the maintenance procedure).
Pressure doesn't increase.	IN and OUT piping connected the wrong way round.	Beginning	Reconnect the piping properly.
	Insufficient supply of Inlet pressure and flow rate. Outlet flow rate (amount used) is too much.	Beginning Middle	Decrease the operating pressure and flow rate. Change the size of the booster valve (from VBA2 to VBA4). Increase the number of the booster valve (for parallel and series).
	The silencer is clogged.	later	Replace the silencer.
	The handle is turning idly (handle breakage).	Beginning	Remove the handle and rotate the square nut with a spanner wrench.
Doesn't operate.	The booster valve stopped because the pressure was lower than the minimum operating pressure. (Intermediate stop of the directional control valve)	Beginning Middle	Relieve the supply pressure after the operation is stopped. If the inlet pressure fluctuation is large, stabilize it with a regulator.
	Operation is stopped due to intrusion of foreign matter. (Intermediate stop of the directional control valve due to increase in internal resistance.)	Beginning Middle later	Supply air and increase the exhaust pressure while holding the exhaust port with your finger. Then release your finger quickly. Relieve the air from IN and OUT ports. After that, supply the air again and increase the pressure rapidly.
Operation doesn't stop.	Air is leaking from the equipment or piping on the downstream side of the outlet.	Beginning	Check where the air is leaking from and fix it.
	Sealing is worn out or broken due to intrusion of foreign matter or lubrication running out.	Middle later	Change the seals (Refer to the maintenance procedure).

• **The life of the booster regulator depends on the air quality and operating conditions. The following are signs that it is reaching the end of the life.**

- Even when the outlet flow rate is 0, the booster regulator doesn't stop. (When the interval of the exhaust noise is less than 30 seconds, the seals are being worn out or damaged.)
- Sliding noise. (abnormal noise) (This indicates that the Lubrication is running out.)
- The silencer mounted on the exhaust turns black due to dirt. (Seals are getting worn out, so particles get stuck in the silencer.)

•Maintenance

- Only personnel who are fully trained and experienced in pneumatically operated machinery and equipment should perform the maintenance in accordance with the maintenance manual.
- Refer to the maintenance manual for the replacement parts.

SMC Corporation URL <http://www.smcworld.com>

Akihabara UDX 15F,
4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN
Phone: +81 3 5207 8249 Fax: +81 3 5298 5362

Specifications are subject to change without prior notice and any obligation the part of the manufacturer.

© 2010 SMC Corporation All Rights Reserved