



## How to Order

VBA 40A - 04 -

### Body size

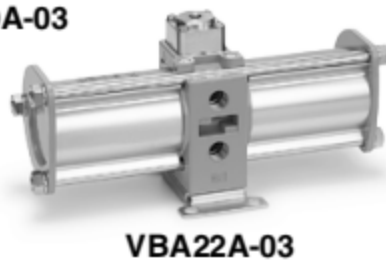
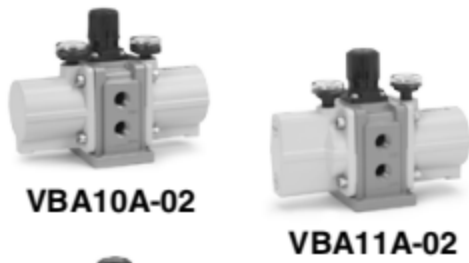
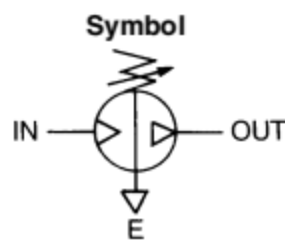
10A	1/4", Knob-operated type	Pressure increase ratio: Twice
20A	3/8", Knob-operated type	
40A	1/2", Knob-operated type	
22A	3/8", Air-operated type	
42A	1/2", Air-operated type	
43A	1/2", Max. operating pressure 1.6 MPa	
11A <sup>Note)</sup>	1/4", Knob-operated type	Pressure increase ratio: 2 to 4 times

Note) Set the pressure increase ratio to 2 or more.

### Thread type <sup>Note)</sup>

Symbol	Thread type
Nil	Rc
F	G
N	NPT
T	NPTF

Note) Thread types apply to the IN, OUT, and EXH ports of the VBA1□A and to the IN, OUT, EXH, and gauge ports of the VBA2□A and VBA4□A. The gauge ports of the VBA1□A are Rc thread type regardless of the thread type indication.



### Port size

Symbol	Port size	Applicable series
02	1/4	VBA1□A
03	3/8	VBA2□A
04	1/2	VBA4□A

### Semi-standard

Symbol	Semi-standard
Nil	Standard product
Z <sup>Note)</sup>	<ul style="list-style-type: none"> <li>● Pressure unit on the product name label: psi</li> <li>● Pressure unit on the pressure gauge: MPa and psi</li> </ul>

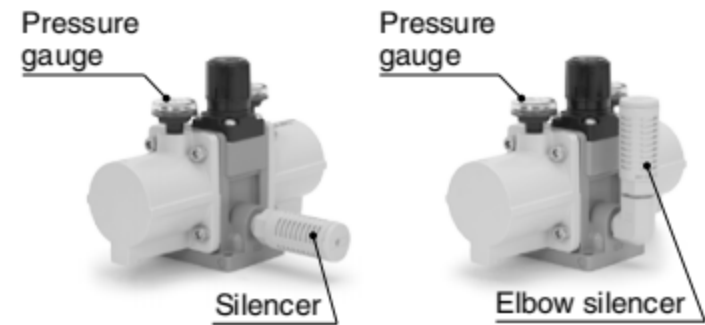
Note) Thread type: NPT, NPTF

Under the new measurement law, the pressure unit of "psi" on the pressure gauges cannot be used in Japan.

### Option

Symbol	Option
Nil	None
G	Pressure gauge
N	Silencer
S	High-noise reduction silencer <sup>Note)</sup>
GN	Pressure gauge, Silencer
GS	Pressure gauge, High-noise reduction silencer <sup>Note)</sup>
LN	Elbow silencer <sup>Note)</sup>
LS	Elbow high-noise reduction silencer <sup>Note)</sup>
GLN	Pressure gauge, Elbow silencer <sup>Note)</sup>
GLS	Pressure gauge, Elbow high-noise reduction silencer <sup>Note)</sup>

Note) Refer to "Combination of Thread Type and Options."



### Combination of Thread Type and Options

Body size	Thread type	Option										Semi-standard						
		Nil	G	N	S	GN	GS	LN	LS	GLN	GLS	Nil	-Z					
10A 11A	Nil	●	●	●	●	●	●	●	●	●	●	●	●	—				
	F	●	●	●	●	●	●	●	●	●	●	●	●	—				
	N	●	●	●	—	●	—	●	—	●	—	●	●	●				
	T	●	●	●	—	●	—	●	—	●	—	●	●	●				
20A 22A	Nil	●	●	●	●	●	●	/					●	—				
	F	●	●	●	●	●	●						●	●	●	●	●	—
	N	●	●	●	●	●	●						●	●	●	●	●	●
	T	●	●	●	●	●	●						●	●	●	●	●	●
40A 42A 43A	Nil	●	●	●	●	●	●	/					●	—				
	F	●	●	●	●	●	●						●	●	●	●	●	—
	N	●	●	●	●	●	●						●	●	●	●	●	●
	T	●	●	●	●	●	●						●	●	●	●	●	●

### Air Tank Compatibility Chart

Booster regulator	VBA10A/11A	VBA20A/22A	VBA40A/42A	VBA43A
Air tank				
VBAT05A(1)	●	—	—	—
VBAT05S(1)	●	●	—	—
VBAT10A(1)	—	●	●	—
VBAT10S(1)	—	●	●	●
VBAT20A(1)	—	●	●	—
VBAT20S(1)	—	●	●	●
VBAT38A(1)	—	●	●	—
VBAT38S(1)	—	●	●	●



## Standard Specifications

Model	VBA10A-02	VBA20A-03	VBA40A-04	VBA22A-03	VBA42A-04	VBA43A-04	VBA11A-02
Fluid	Compressed air						
Pressure increase ratio	Twice						2 to 4 times
Pressure adjustment mechanism	Knob-operated with relief mechanism <sup>Note 2)</sup>			Air-operated		Knob-operated with relief mechanism <sup>Note 2)</sup>	
Max. flow rate (L/min (ANR))	230	1000	1900	1000	1900	1600	70
Set pressure range (MPa)	0.2 to 2.0	0.2 to 1.0		0.2 to 1.0		0.2 to 1.6	0.4 to 2.0
Supply pressure range (MPa)	0.1 to 1.0	0.1 to 0.9				0.1 to 1.0	
Proof pressure (MPa)	3	1.5				2.4	3
Port size (Rc) (IN/OUT/EXH: 3 locations)	1/4	3/8	1/2	3/8	1/2		1/4
Pressure gauge port size (Rc) (IN/OUT: 2 locations)	1/8						
Tank connection port (with plug)	1/4	3/8	1/2	3/8	1/2		1/4
Ambient and fluid temperature (°C)	2 to 50 (No freezing)						
Installation	Horizontal						
Lubrication	Grease (Non-lube)						
Weight (kg)	0.84	3.9	8.6	3.9	8.6	8.6	0.89

Note 1) Be sure to secure an air supply capacity of the minimum operating pressure (0.1 MPa) or more.

Note 2) If the OUT pressure is higher than the set pressure by the knob, excess pressure is exhausted from the back of the knob.

## Options/Part No.

### Pressure Gauge, Silencer (When thread type is Rc or G.)

Description	Model	VBA10A-02	VBA20A-03	VBA40A-04	VBA22A-03	VBA42A-04	VBA43A-04	VBA11A-02
		VBA10A-F02	VBA20A-F03	VBA40A-F04	VBA22A-F03	VBA42A-F04	VBA43A-F04	VBA11A-F02
Pressure gauge	G	G27-20-01	G36-10-01		KT-VBA22A-7	G36-10-01	G27-20-01	G27-20-01
Silencer	N	AN20-02	AN30-03	AN40-04	AN30-03	AN40-04	AN40-04	AN20-02
High-noise reduction silencer	S	ANA1-02	ANA1-03	ANA1-04	ANA1-03	ANA1-04	ANA1-04	ANA1-02
Elbow for silencer	L	KT-VBA10A-18	—	—	—	—	—	KT-VBA10A-18

Note 1) In the case of options GN, two pressure gauges and one silencer are included in the same container as accessories.

Note 2) KT-VBA22A-7 is a pressure gauge with fitting. (Please order two units when using with IN and OUT.)

### Pressure Gauge, Silencer (When thread type is NPT or NPTF.)

Description	Model	VBA10A-N02*	VBA20A-N03*	VBA40A-N04*	VBA22A-N03*	VBA42A-N04*	VBA43A-N04*	VBA11A-N02*	
		VBA10A-T02*	VBA20A-T03*	VBA40A-T04*	VBA22A-T03*	VBA42A-T04*	VBA43A-T04*	VBA11A-T02*	
		*: when "-Z"		*: when "-Z"		*: when "-Z"		*: when "-Z"	
Pressure gauge *: when Nil	G	G27-20-01	G36-10-N01		KT-VBA22A-7N	G36-10-N01	G27-20-N01	G27-20-01	
Pressure gauge *: when "-Z" <sup>Note 4)</sup>		G27-P20-01-X30	G36-P10-N01-X30		KT-VBA22A-8N	G36-P10-N01-X30	G27-P20-N01-X30	G27-P20-01-X30	
Silencer	N	AN20-N02	AN30-N03	AN40-N04	AN30-N03	AN40-N04	AN40-N04	AN20-N02	
High-noise reduction silencer	S	—	ANA1-N03	ANA1-N04	ANA1-N03	ANA1-N04	ANA1-N04	—	
Elbow for silencer	L	KT-VBA10A-18N	—	—	—	—	—	KT-VBA10A-18N	

Note 1) In the case of options GN, two pressure gauges and one silencer are included in the same container as accessories.

Note 2) KT-VBA22A-7N, KT-VBA22A-8N are pressure gauges with fittings. (Please order two units when using with IN and OUT.)

Note 3) Under the new measurement law, the pressure unit of "psi" on the pressure gauges cannot be used in Japan.

Note 4) Pressure unit on the pressure gauge: MPa and psi

## Related Products/Part No.

### Mist Separator, Exhaust Cleaner

Description	Model		
	For VBA10A-02 For VBA11A-02	For VBA20A-03 For VBA22A-03	For VBA40A-04 For VBA42A-04 For VBA43A-04
Mist separator	AM250C-02	AM450C-04, 06	AM550C-06, 10
Exhaust cleaner	AMC310-03	AMC510-06	AMC610-10

Note) Refer to page 1288 for air tanks, page 329 for mist separators and the **Web Catalog** for exhaust cleaners.

Refer to the separate operation manual for the connection method.



Solid line: Operating range

Operate so that the flow rate follows the solid line even when the outlet side air has been consumed.

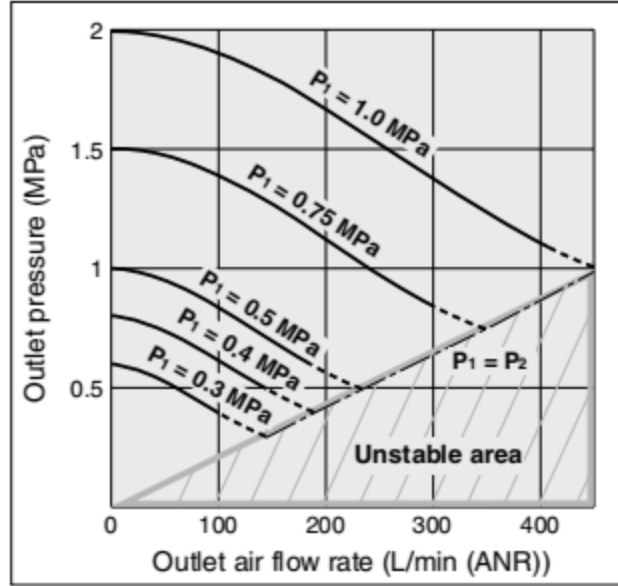
Ex.) For the VBA10A: When the inlet pressure is 0.5 MPa and the set pressure is 1.0 MPa, operate at an outlet air flow rate of 180 L/min (ANR) or less.

Dotted line: Outside of the set pressure range

P<sub>1</sub>: Inlet pressure P<sub>2</sub>: Outlet pressure

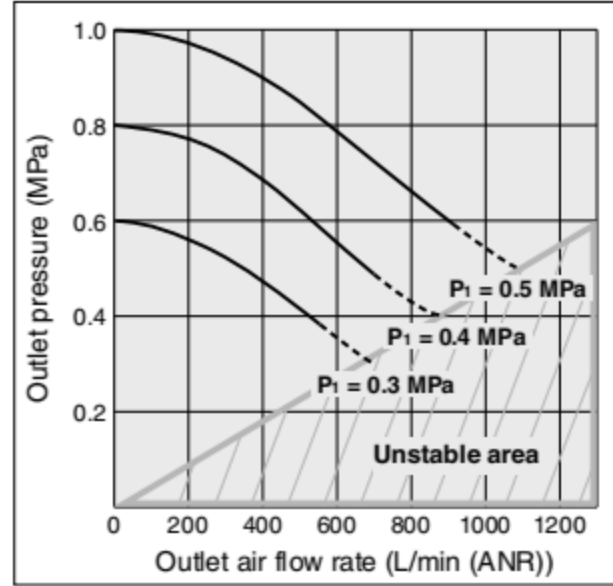
## VBA10A

### Flow Rate Characteristics



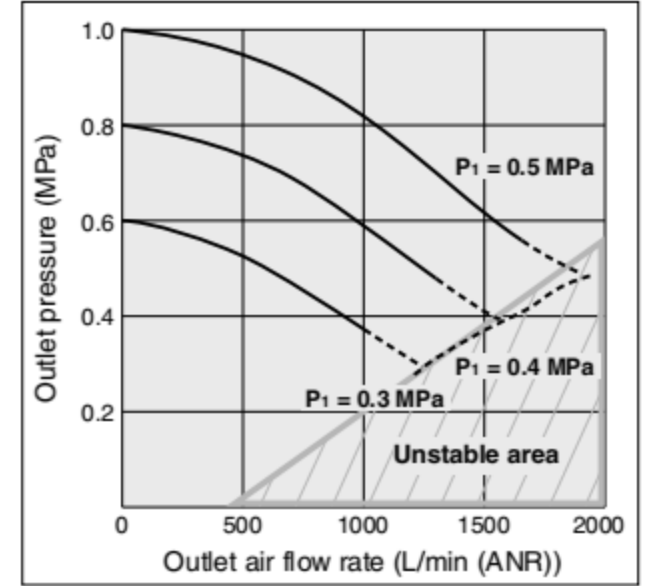
## VBA20A, 22A

### Flow Rate Characteristics



## VBA40A, 42A

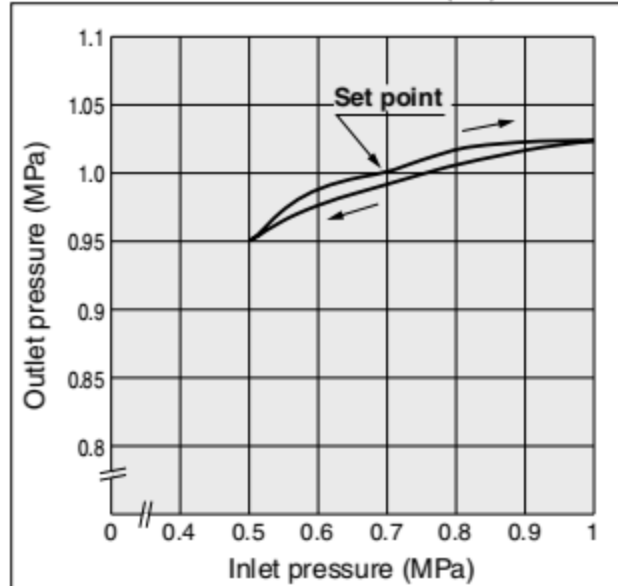
### Flow Rate Characteristics



When operated at a flow rate that falls within the unstable area (P<sub>2</sub> < P<sub>1</sub> conditions) as shown in the graphs above, the booster regulator may not operate normally and may therefore fail to increase the pressure.

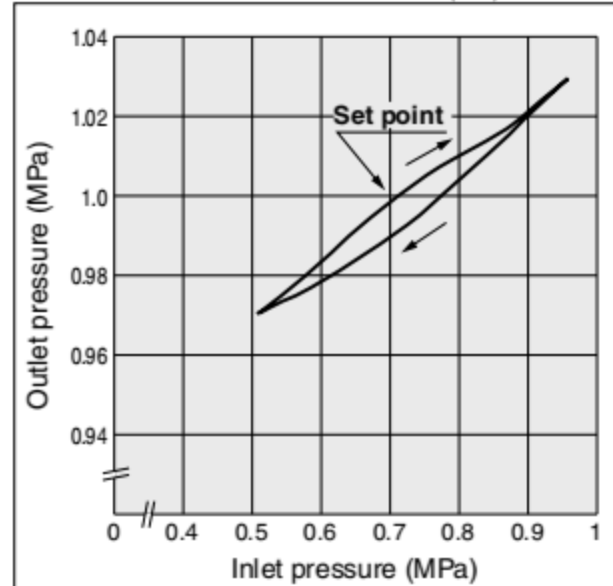
### Pressure Characteristics

Inlet pressure: 0.7 MPa  
Outlet pressure: 1.0 MPa  
Flow rate: 20 L/min (ANR)  
(Representative value)



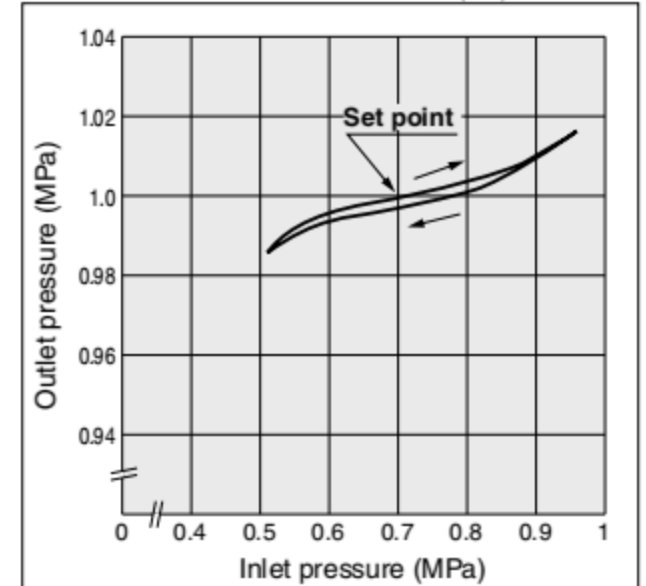
### Pressure Characteristics

Inlet pressure: 0.7 MPa  
Outlet pressure: 1.0 MPa  
Flow rate: 20 L/min (ANR)  
(Representative value)



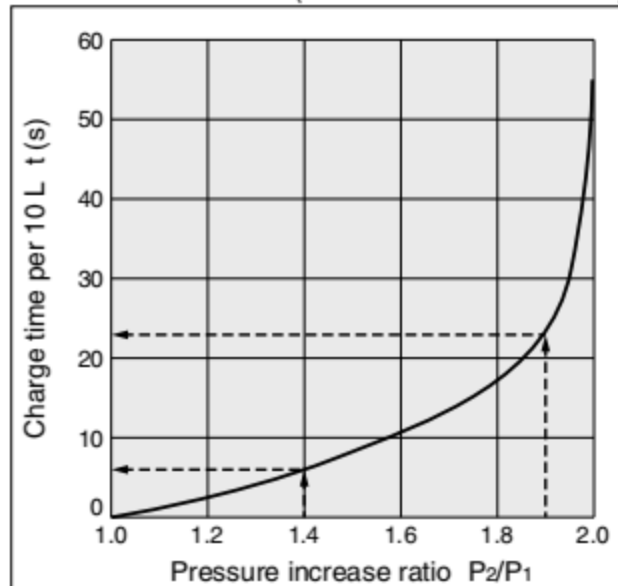
### Pressure Characteristics

Inlet pressure: 0.7 MPa  
Outlet pressure: 1.0 MPa  
Flow rate: 20 L/min (ANR)  
(Representative value)



### Charge Characteristics

(Pressure increase ratio: Twice)



#### VBA10A

- The time required to charge pressure in the tank from 0.7 MPa to 0.95 MPa at 0.5 MPa supply pressure:

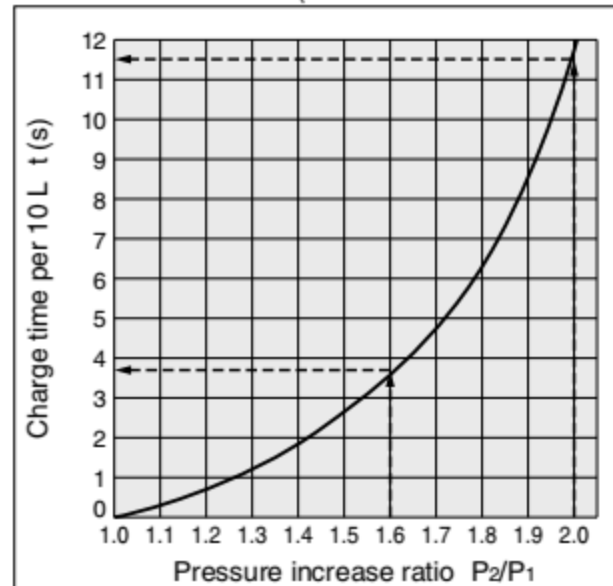
$$\frac{P_2}{P_1} = \frac{0.7}{0.5} = 1.4 \quad \frac{P_2}{P_1} = \frac{0.95}{0.5} = 1.9$$

With the pressure increase ratio from 1.4 to 1.9, the charge time of 23 - 6 = 17 sec. (t) is given by the graph. Then, the charge time (T) for a 10 L tank:

$$T = t \times \frac{V}{10} = 17 \times \frac{10}{10} = 17 \text{ (s)}$$

### Charge Characteristics

(Pressure increase ratio: Twice)



#### VBA20A, 22A

- The time required to charge pressure in the tank from 0.8 MPa to 1.0 MPa at 0.5 MPa supply pressure:

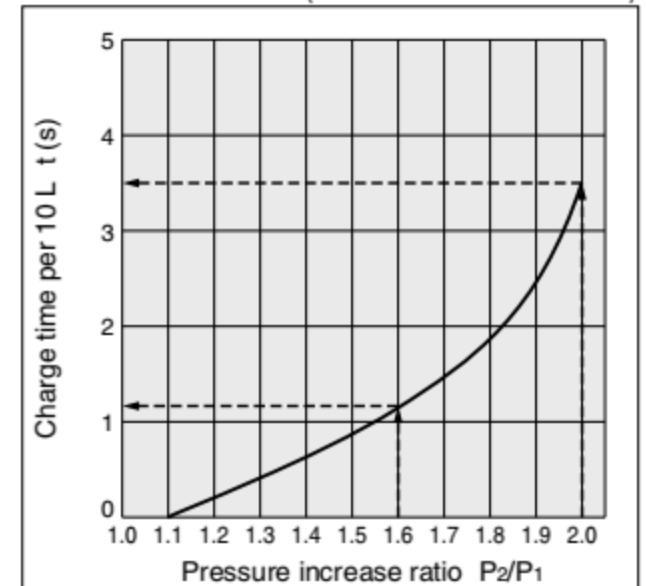
$$\frac{P_2}{P_1} = \frac{0.8}{0.5} = 1.6 \quad \frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0$$

With the pressure increase ratio from 1.6 to 2.0, the charge time of 11.5 - 3.8 = 7.7 sec. (t) is given by the graph. Then, the charge time (T) for a 100 L tank:

$$T = t \times \frac{V}{10} = 7.7 \times \frac{100}{10} = 77 \text{ (s)}$$

### Charge Characteristics

(Pressure increase ratio: Twice)



#### VBA40A, 42A

- The time required to charge pressure in the tank from 0.8 MPa to 1.0 MPa at 0.5 MPa supply pressure:

$$\frac{P_2}{P_1} = \frac{0.8}{0.5} = 1.6 \quad \frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0$$

With the pressure increase ratio from 1.6 to 2.0, the charge time of 3.5 - 1.1 = 2.4 sec. (t) is given by the graph. Then, the charge time (T) for a 100 L tank:

$$T = t \times \frac{V}{10} = 2.4 \times \frac{100}{10} = 24 \text{ (s)}$$



Solid line: Operating range

Operate so that the flow rate follows the solid line even when the outlet side air has been consumed.

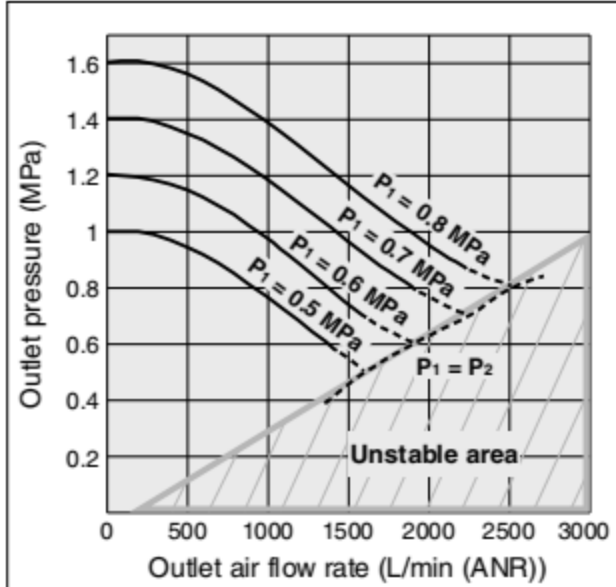
Ex.) For the VBA10A: When the inlet pressure is 0.5 MPa and the set pressure is 1.0 MPa, operate at an outlet air flow rate of 180 L/min (ANR) or less.

Dotted line: Outside of the set pressure range

P<sub>1</sub>: Inlet pressure P<sub>2</sub>: Outlet pressure

## VBA43A

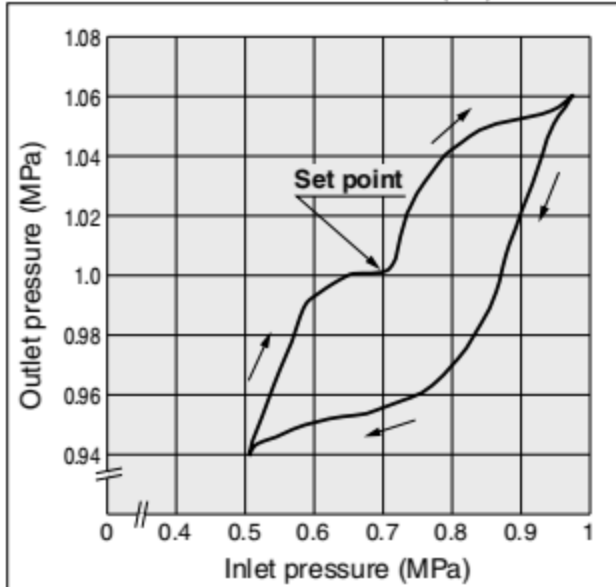
### Flow Rate Characteristics



When operated at a flow rate that falls within the unstable area (P<sub>2</sub> < P<sub>1</sub> conditions) as shown in the graphs above, the booster regulator may not operate normally and may therefore fail to increase the pressure.

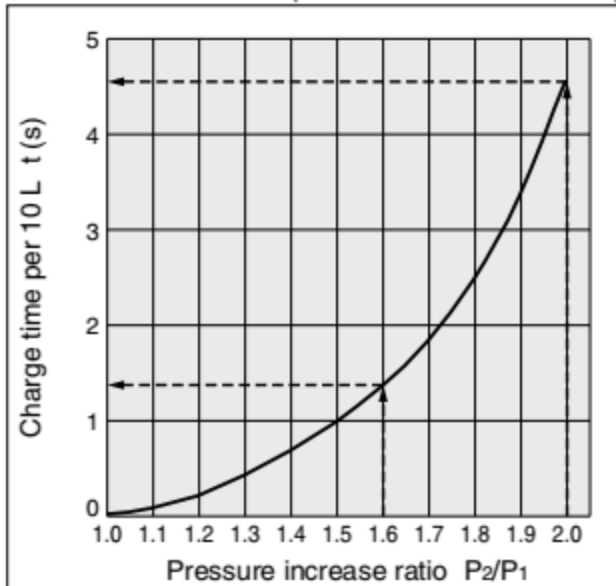
### Pressure Characteristics

Inlet pressure: 0.7 MPa (Representative value)  
Outlet pressure: 1.0 MPa  
Flow rate: 20 L/min (ANR)



### Charge Characteristics

(Pressure increase ratio: Twice)



## VBA43A

- The time required to charge pressure in the tank from 0.8 MPa to 1.0 MPa at 0.5 MPa supply pressure:

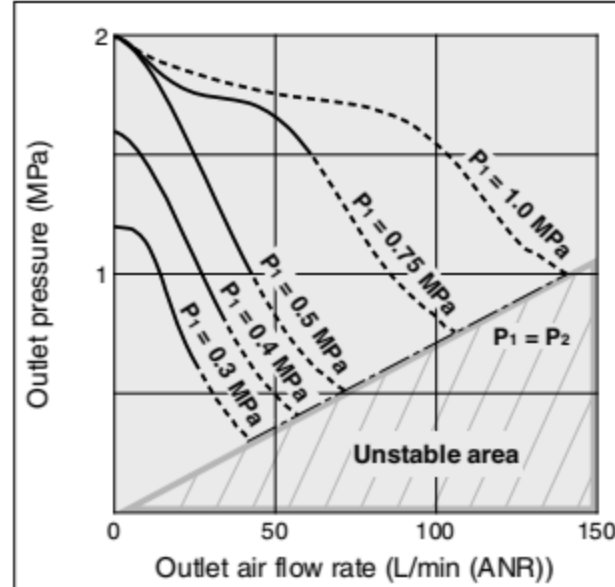
$$\frac{P_2}{P_1} = \frac{0.8}{0.5} = 1.6 \quad \frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0$$

With the pressure increase ratio from 1.6 to 2.0, the charge time of 4.5 – 1.3 = 3.2 sec. (t) is given by the graph. Then, the charge time (T) for a 100 L tank:

$$T = t \times \frac{V}{10} = 3.2 \times \frac{100}{10} = 32 \text{ (s)}$$

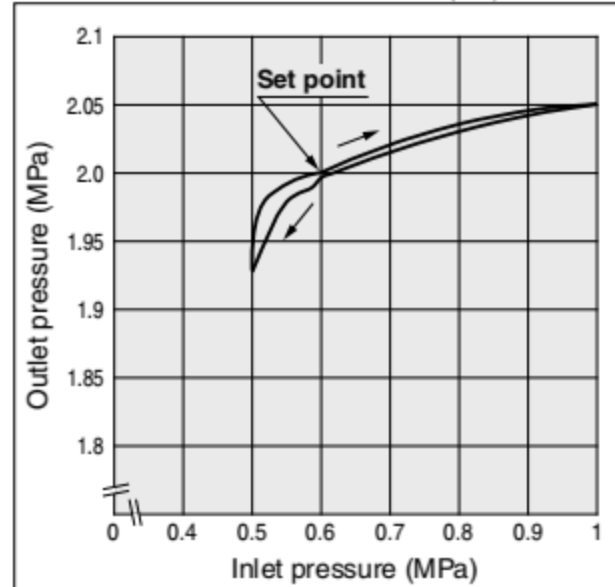
## VBA11A

### Flow Rate Characteristics



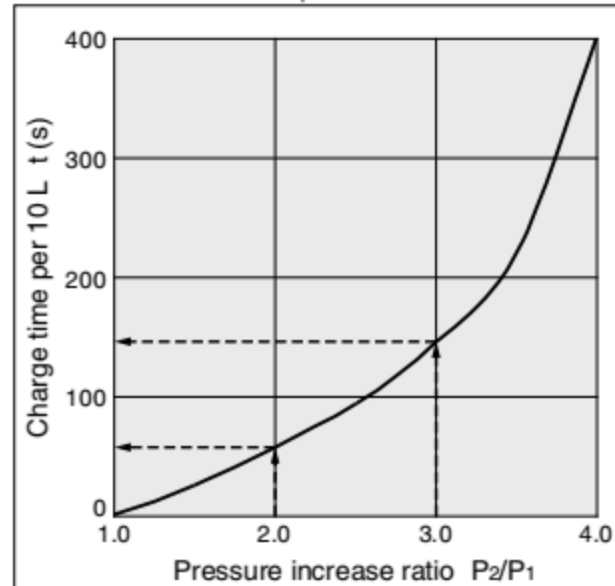
### Pressure Characteristics

Inlet pressure: 0.6 MPa (Representative value)  
Outlet pressure: 2.0 MPa  
Flow rate: 10 L/min (ANR)



### Charge Characteristics

(Pressure increase ratio: Twice)



## VBA11A

- The time required to charge pressure in the tank from 1.0 MPa to 1.5 MPa at 0.5 MPa supply pressure:

$$\frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0 \quad \frac{P_2}{P_1} = \frac{1.5}{0.5} = 3.0$$

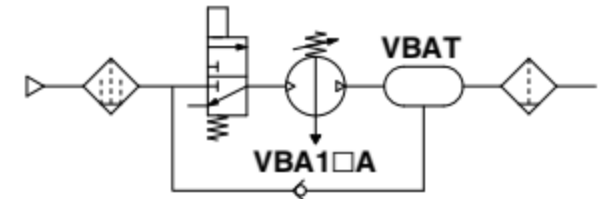
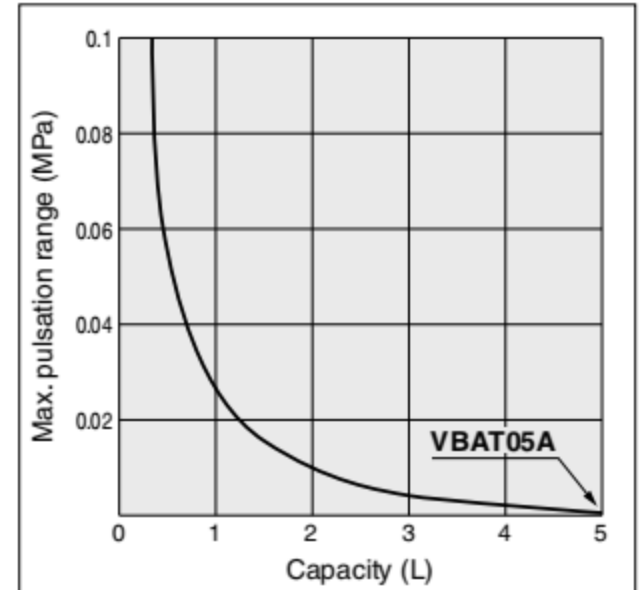
With the pressure increase ratio from 2.0 to 3.0, the charge time of 147 – 58 = 89 sec. (t) is given by the graph. Then, the charge time (T) for a 10 L tank:

$$T = t \times \frac{V}{10} = 89 \times \frac{10}{10} = 89 \text{ (s)}$$

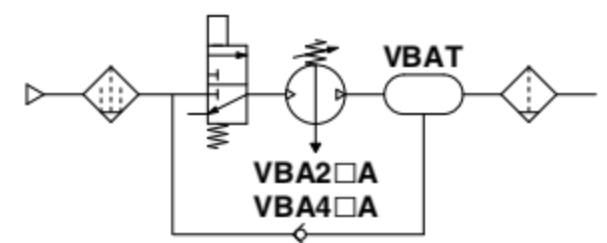
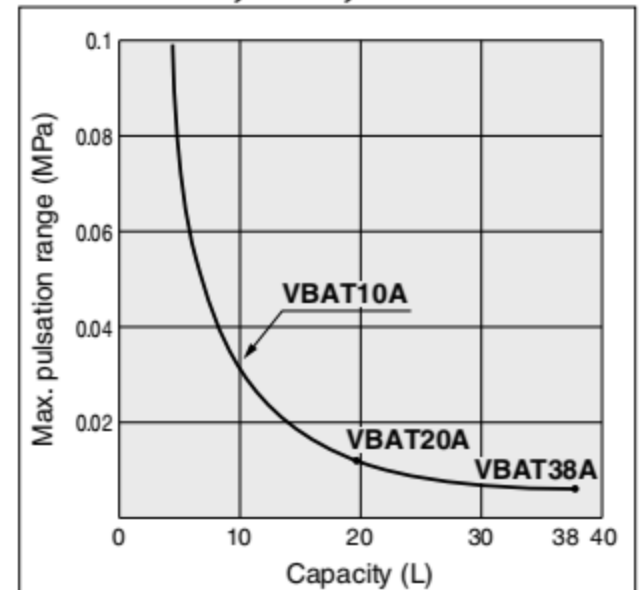
## Pulsation/Pulsation is decreased with a tank.

If the outlet capacity is undersized, pulsation may occur.

## VBAT05A



## VBAT10A, 20A, 38A



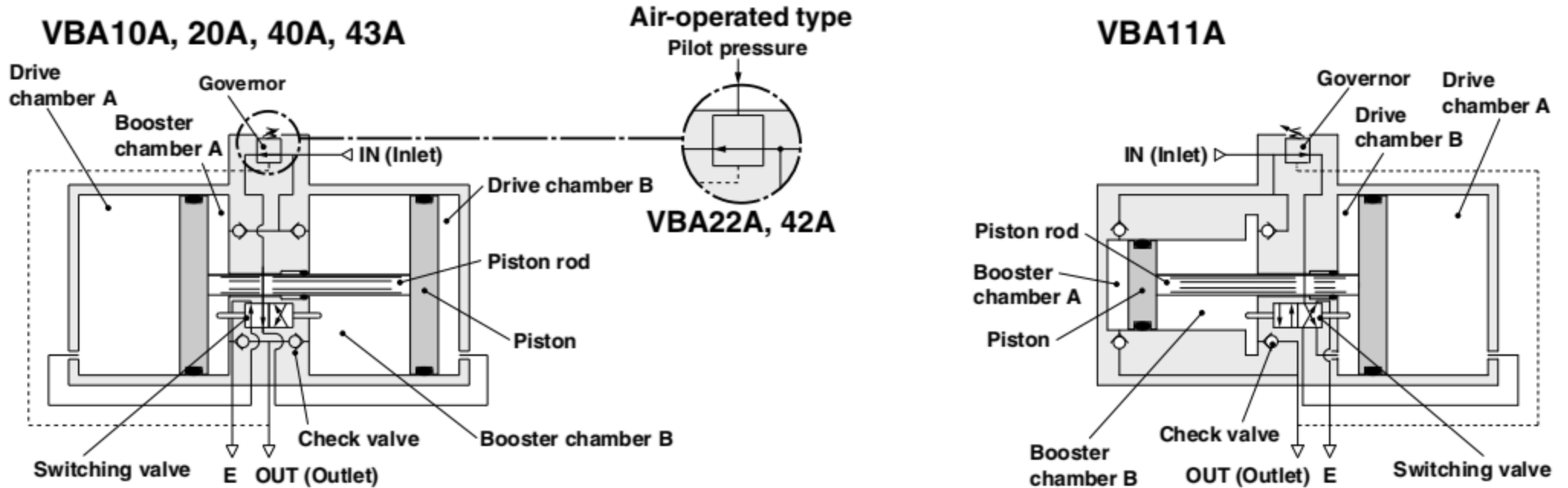
Conditions:  
Inlet pressure: 0.5 MPa  
Outlet set pressure: 1 MPa  
Flow rate: Between 0 and max. flow rate

- Performance of air tank
  - Alleviates the pulsation generated on the outlet side.
  - When air consumption exceeds air supply during intermittent operation, required air will be accumulated in the tank for use. This does not apply for continuous operation.
  - Operation at a flow rate that falls within the unstable area under temporary P<sub>1</sub> ≥ P<sub>2</sub> conditions can be prevented when the outlet side air has been consumed.



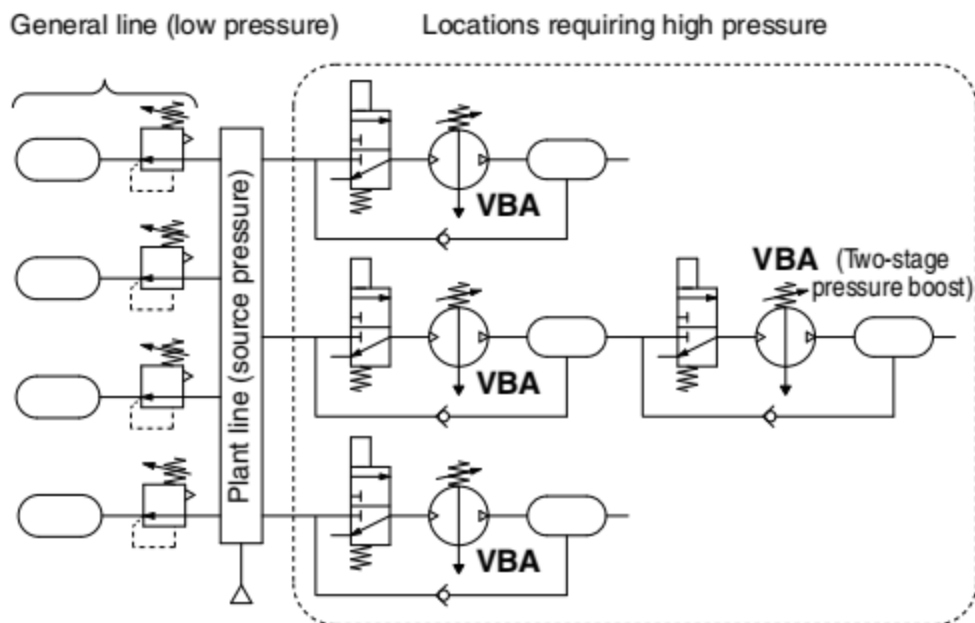
## Working Principle

The **IN** air passes through the check valve to **booster chambers A and B**. Meanwhile, air is supplied to **drive chamber B** via the governor and the switching valve. Then, the air pressure from **drive chamber B** and **booster chamber A** are applied to the piston, boosting the air in **booster chamber B**. As the piston travels, the boosted air is pushed via the check valve to the **OUT** side. When the piston reaches to the end, the piston causes the switching valve to switch, so that **drive chamber B** is in the exhaust state and **drive chamber A** is in the supply state respectively. Then, the piston reverses its movement, this time, the pressures from **booster chamber B** and **drive chamber A** boosts the air in **booster chamber A** and sends it to the **OUT** side. The process described above is repeated to continuously supply highly pressurized air from the **IN** to the **OUT** side. The governor establishes the outlet pressure by knob operation and pressure adjustment in the drive chamber by feeding back the outlet pressure.



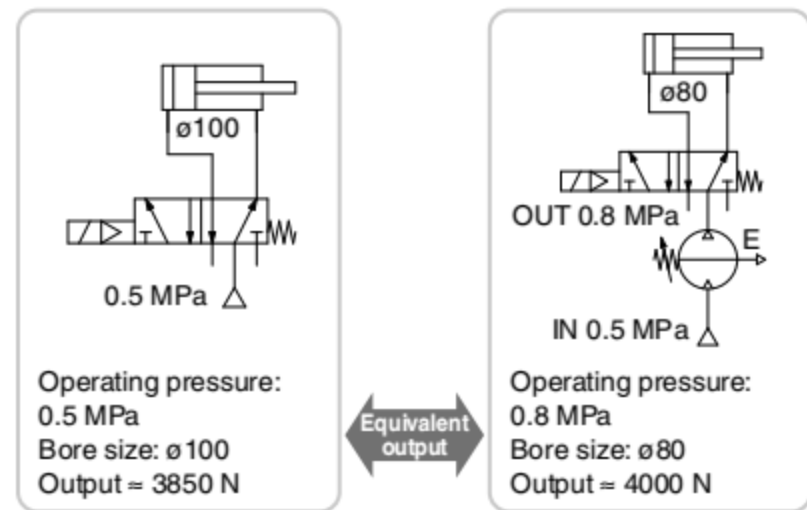
## Circuit Example

- When only some of the machines in the plant require high-pressure air, booster regulators can be installed for only the equipment that requires it. This allows the overall system to use low-pressure air while accommodating machines requiring high-pressure air.

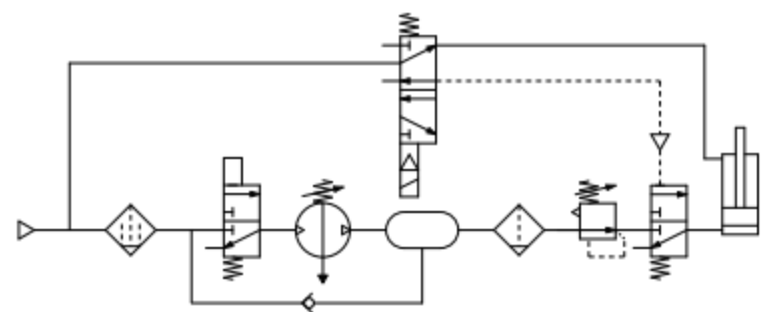


\* When using two booster regulators for 2-stage pressure boost, be sure to supply sufficient flow to each booster regulator in order to stabilize the booster regulator inlet pressure. Refer to Selection 2. on page 1281 for the inlet side supply amount.

- When the actuator output is insufficient but space limitations prohibit switching to a larger cylinder diameter, a booster regulator can be used to increase the pressure. This makes it possible to boost the output without replacing the actuator.
- When a certain level of output is required but the cylinder size must be kept small so that the driver remains compact.



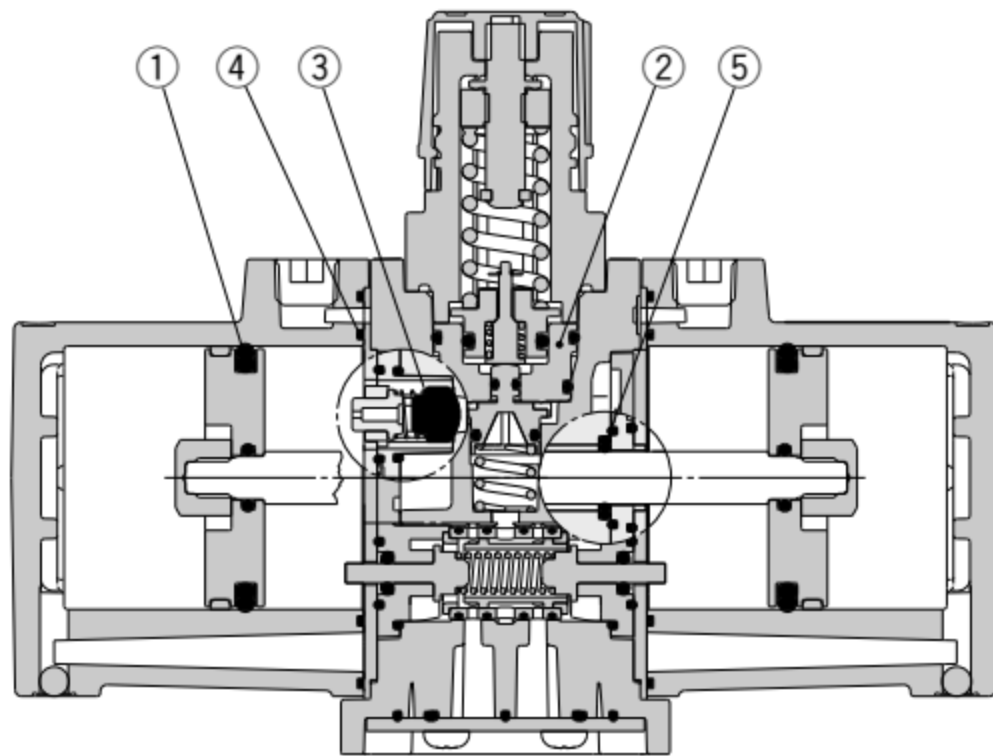
- When only one side of the cylinder is used for work, booster regulators can be installed only on the lines that require them to reduce the overall air consumption volume.



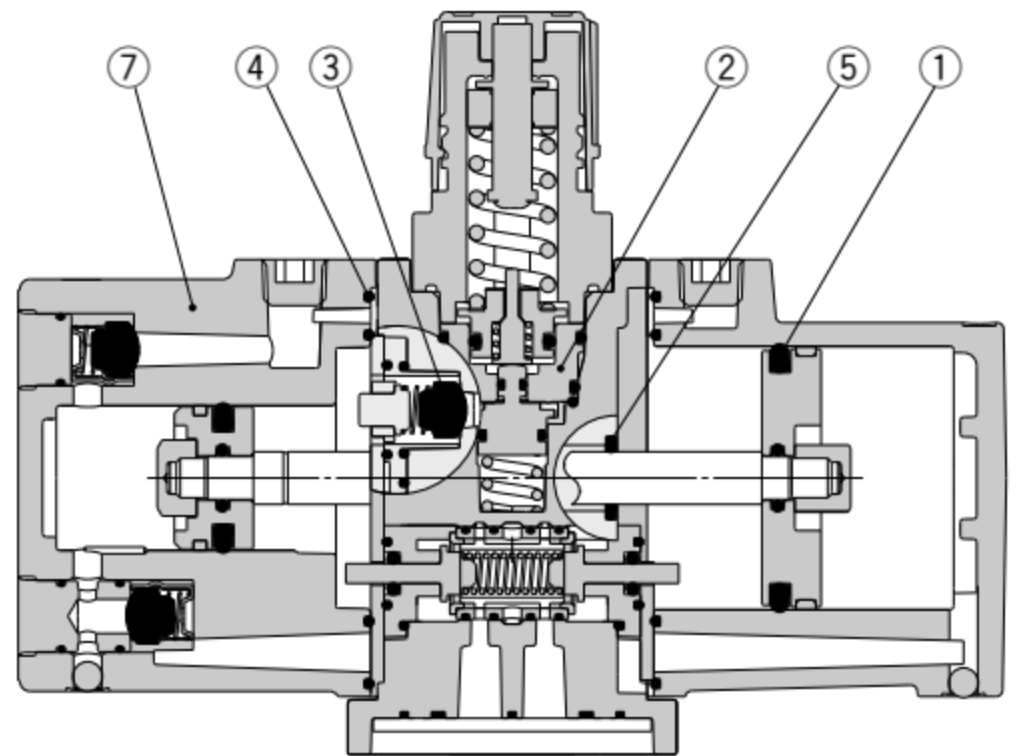


## Construction/Replacement Parts

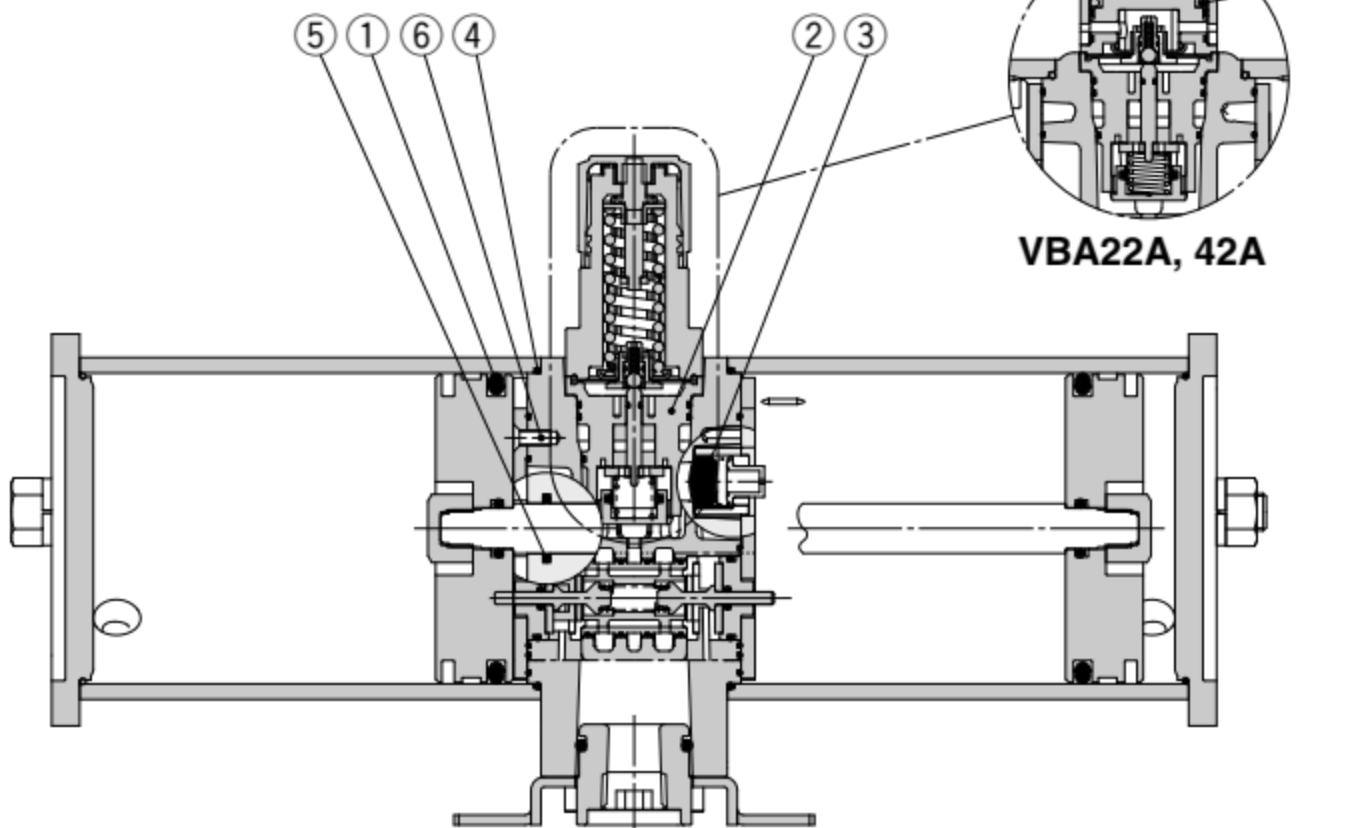
### VBA10A



### VBA11A



### VBA20A, 22A, VBA40A, 42A, 43A



### Replacement Parts/Kit No.

Place an order with the following applicable kit number.

Model	VBA10A	VBA20A	VBA40A	VBA22A	VBA42A	VBA43A	VBA11A
Kit no.	KT-VBA10A-1	KT-VBA20A-1	KT-VBA40A-1	KT-VBA22A-1	KT-VBA42A-1	KT-VBA43A-1	KT-VBA11A-20

The kit includes the parts from ① to ⑦ and a grease pack.

No.	Description	Model						
		VBA10A	VBA20A	VBA40A	VBA22A	VBA42A	VBA43A	VBA11A
		Quantity						
1	Piston seal		2		2 large 1 small		2	1 each large and small
2	Governor assembly				1			
3	Check valve			4				2
4	Gasket				2			
5	Rod seal				1			
6	Mounting screw	—	8	12	8	12		—
7	Cover C assembly							1
—	Grease pack	1		2	1	2		1

\* The grease pack has 10 g of grease.

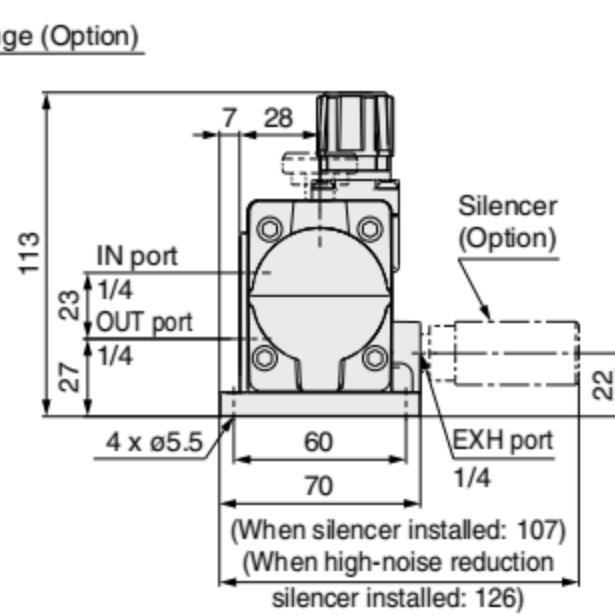
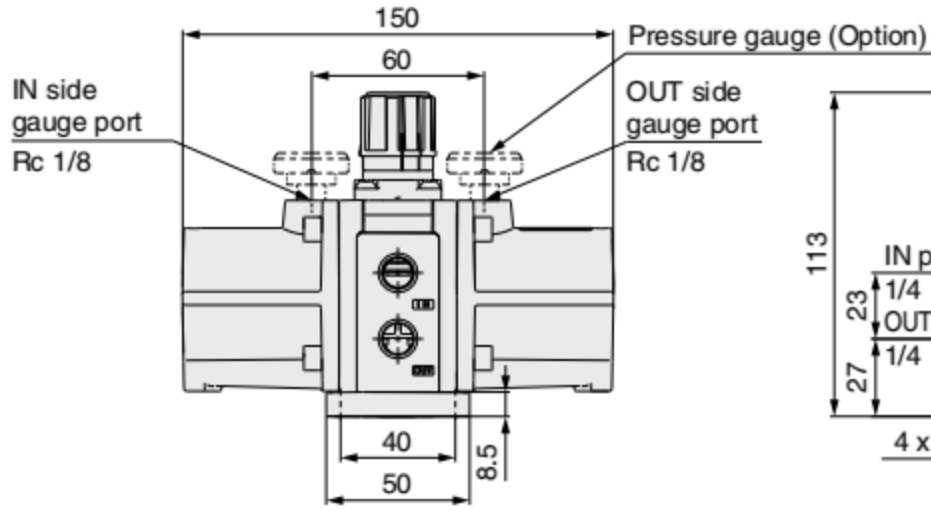
\* Make sure to refer to the procedure for maintenance.

\* For details on the replacement parts kit, refer to the procedure for maintenance.

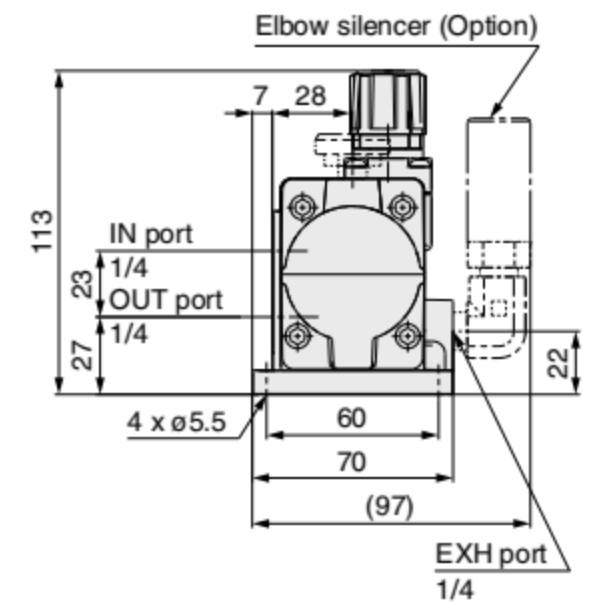


## Dimensions

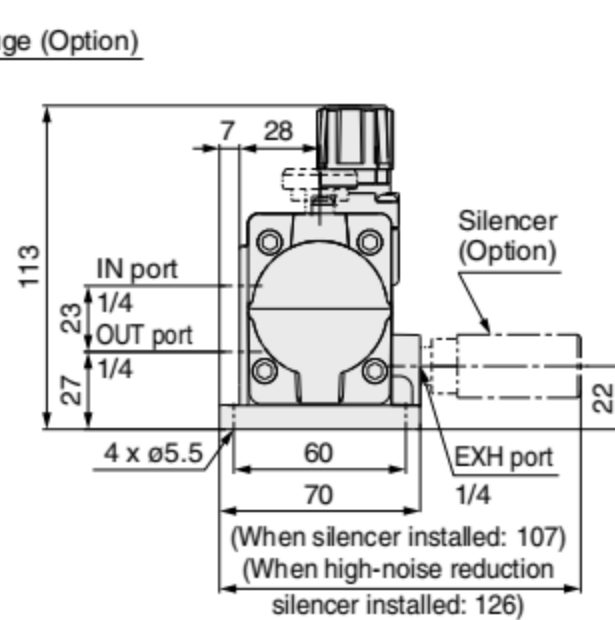
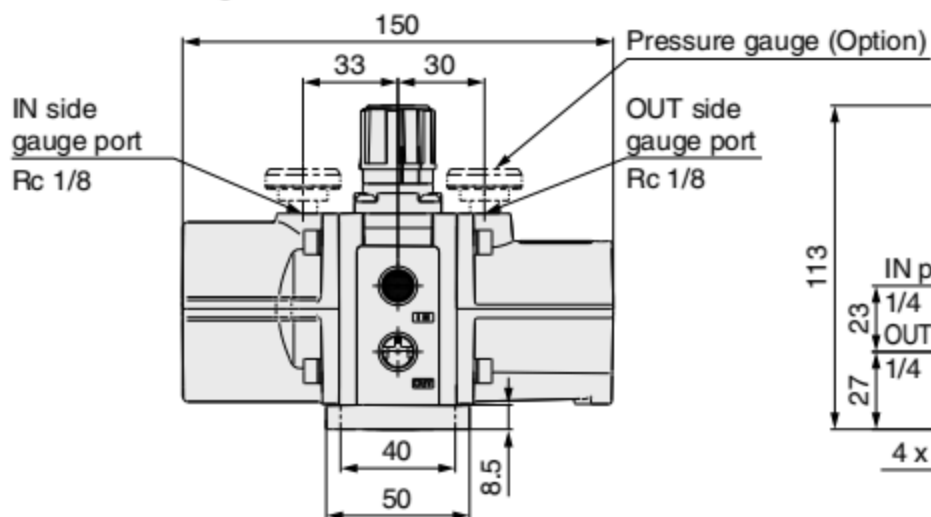
### VBA10A-02



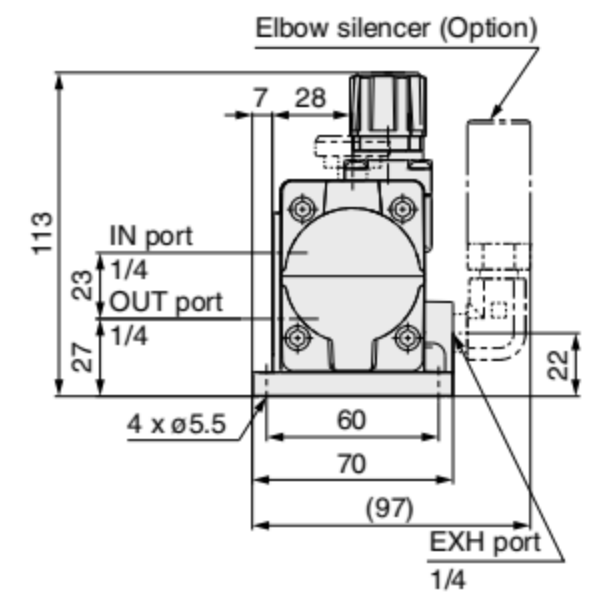
### With elbow silencer (Option)



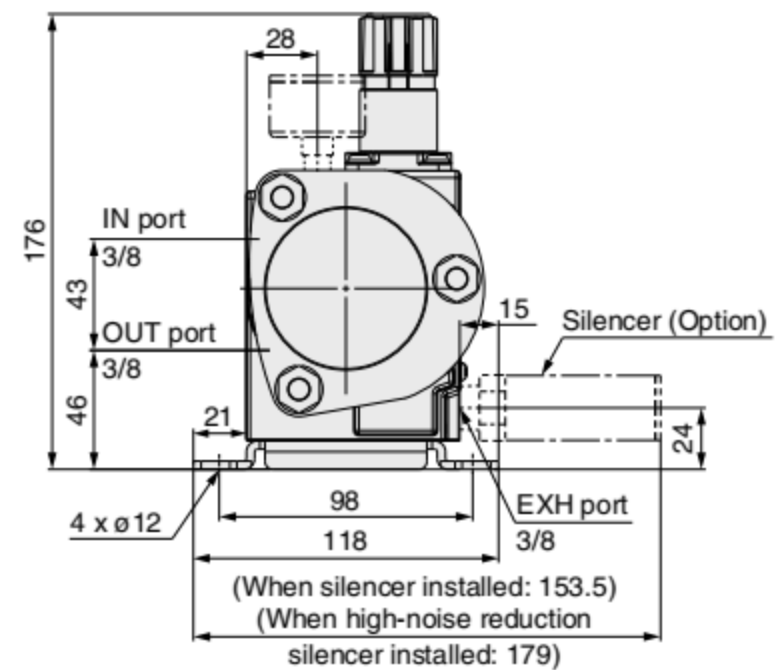
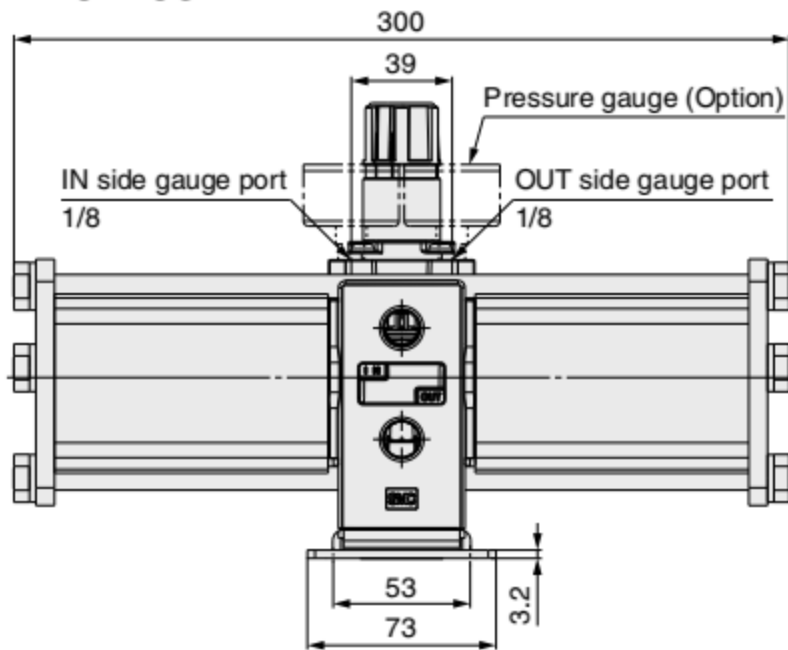
### VBA11A-02



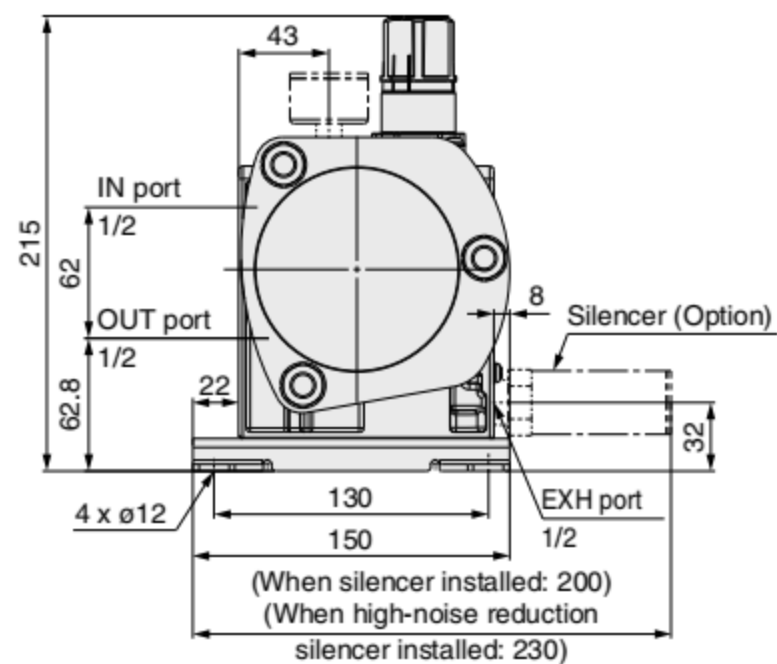
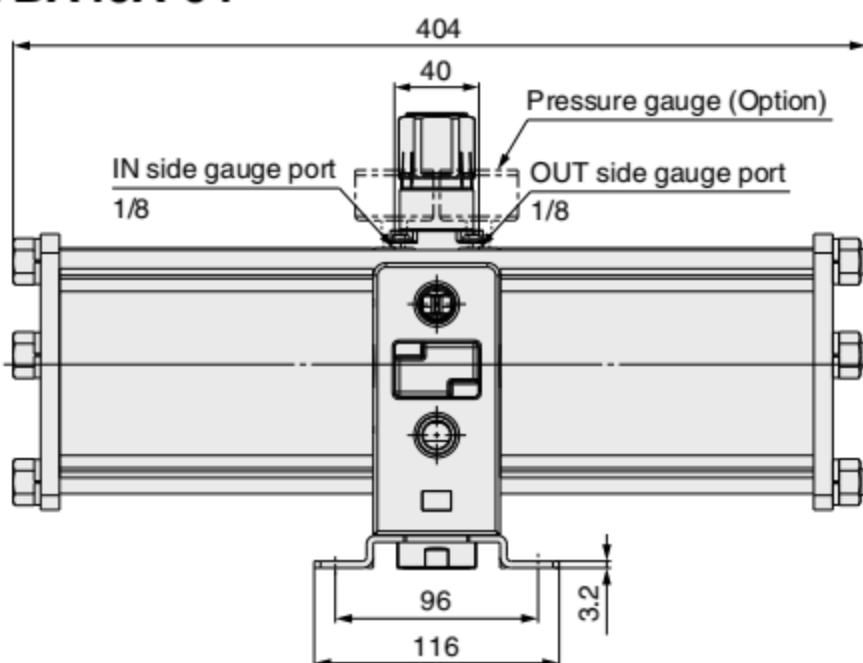
### With elbow silencer (Option)



### VBA20A-03



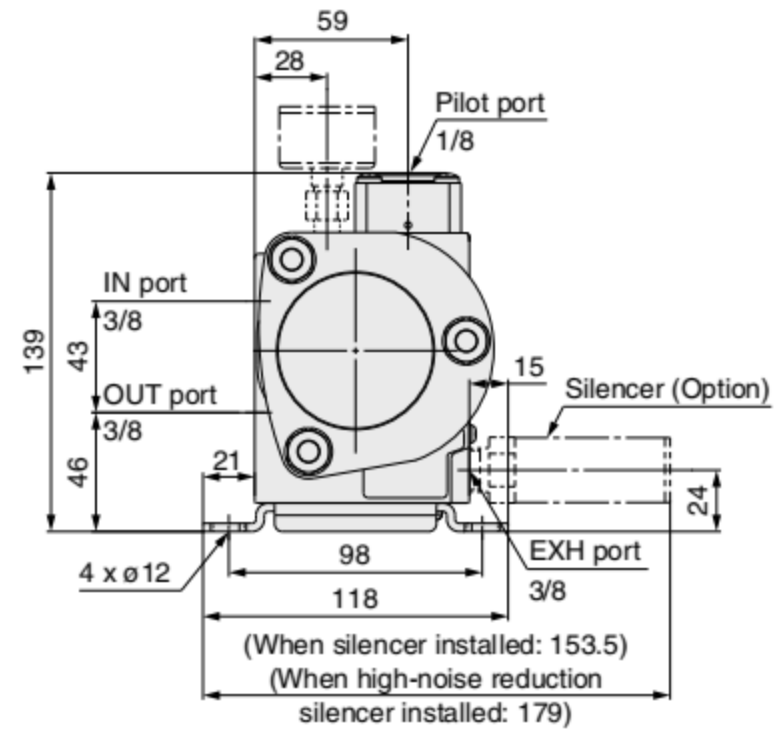
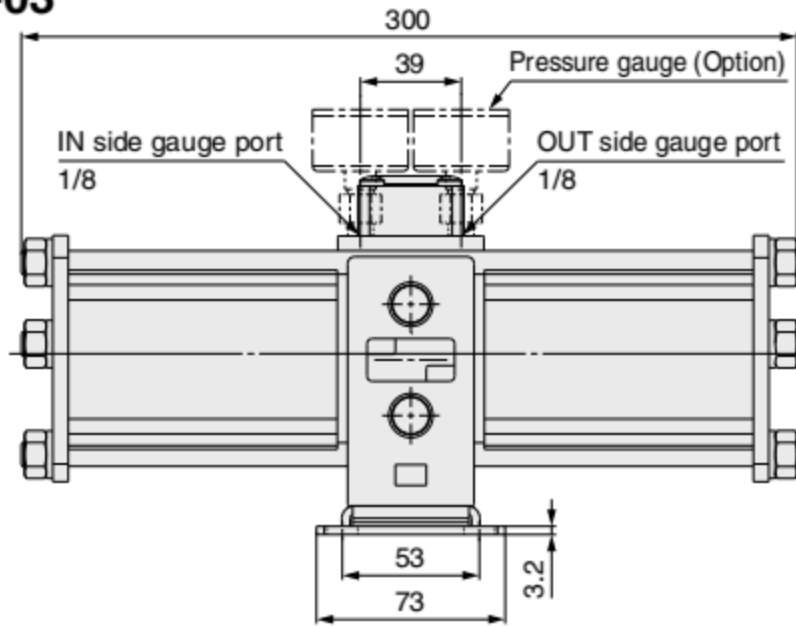
### VBA40A-04



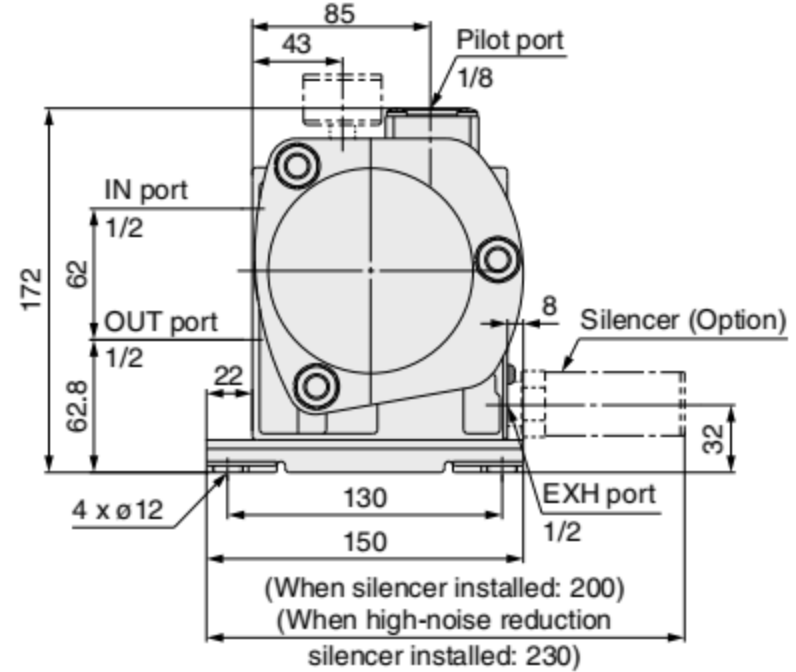
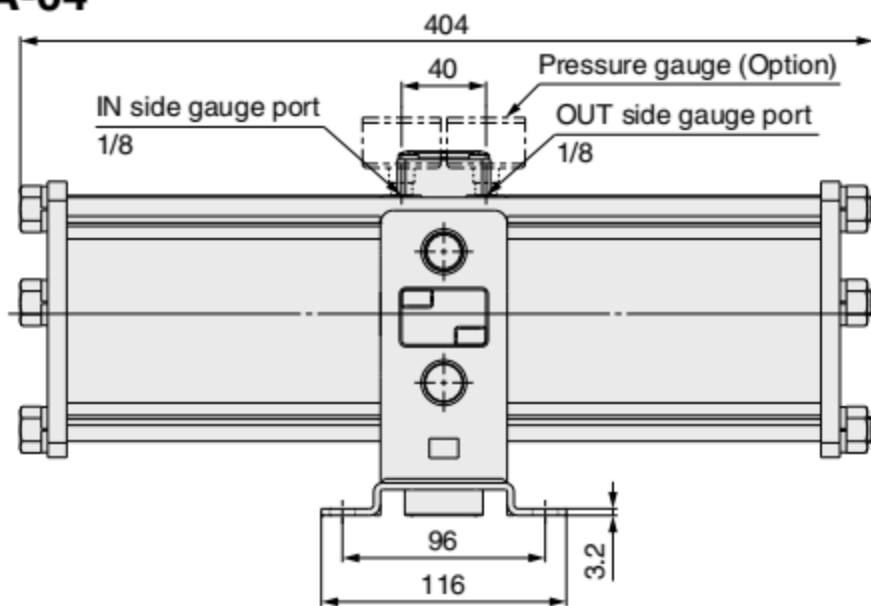


## Dimensions

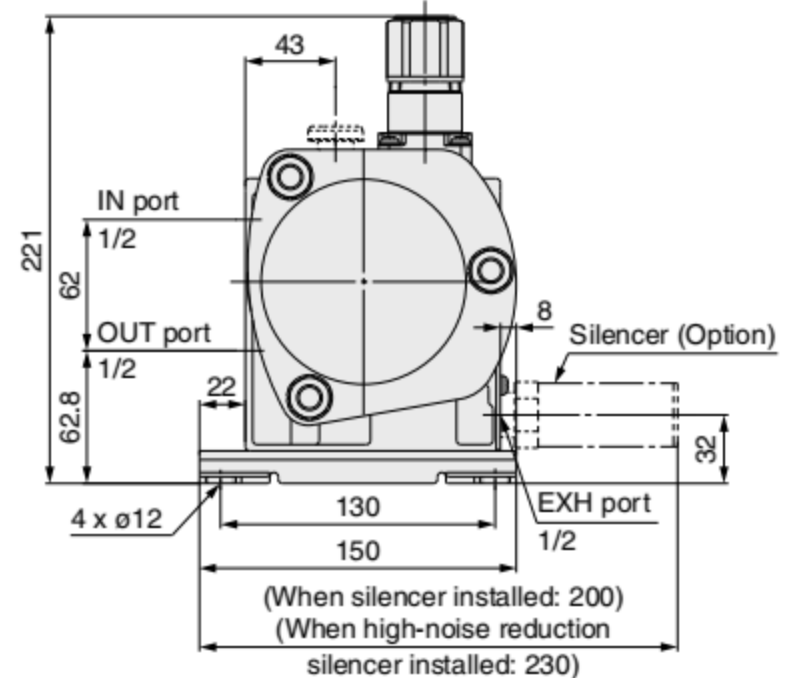
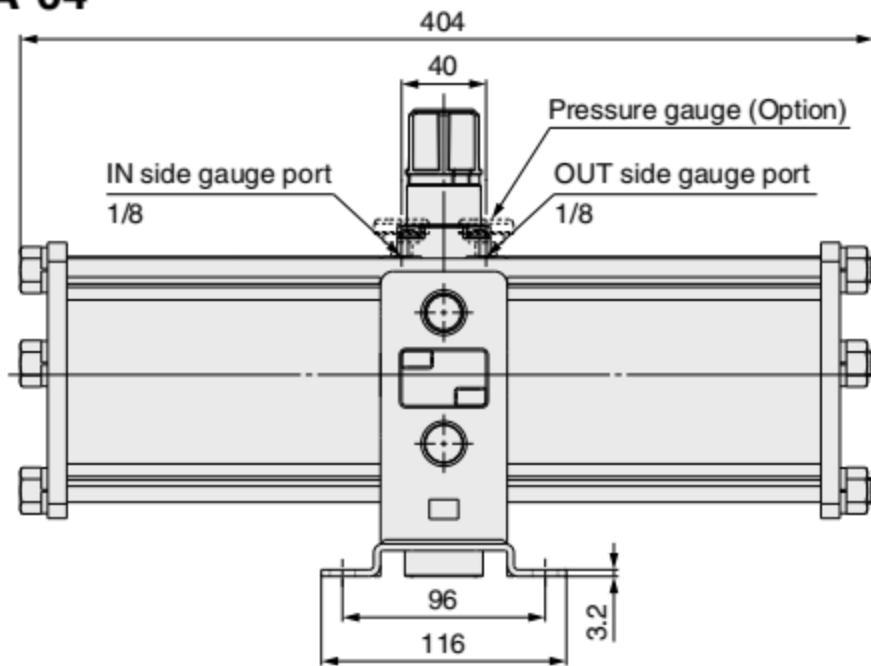
### VBA22A-03



### VBA42A-04



### VBA43A-04



## Made to Order

### 1 Copper-free/Fluorine-free

The inner or outer copper parts material has been changed to stainless steel or aluminum. The fluorine resin parts has been changed to general resin.

**20** — Standard model no.

• Made to Order  
Copper-free/Fluorine-free  
(Excludes models with a pressure gauge (Option))

\* This option cannot be selected for air tank with safety valve.

### 2 CE/UKCA explosion-proof directive (ATEX) compliant

**56** — Standard model no.

• Made to Order  
CE/UKCA explosion-proof directive (ATEX): Category 3GD

### 3 Ozone resistant

Ozone resistance is strengthened through the use of fluororubber (diaphragm) and hydrogenated NBR (valve, rod seal) for the rubber parts of the seal material.

**80** — Standard model no.

• Made to Order  
Ozone resistant

\* Weather resistant NBR (diaphragm) and hydrogenated NBR (valve) are used for the rubber parts of the standard model.