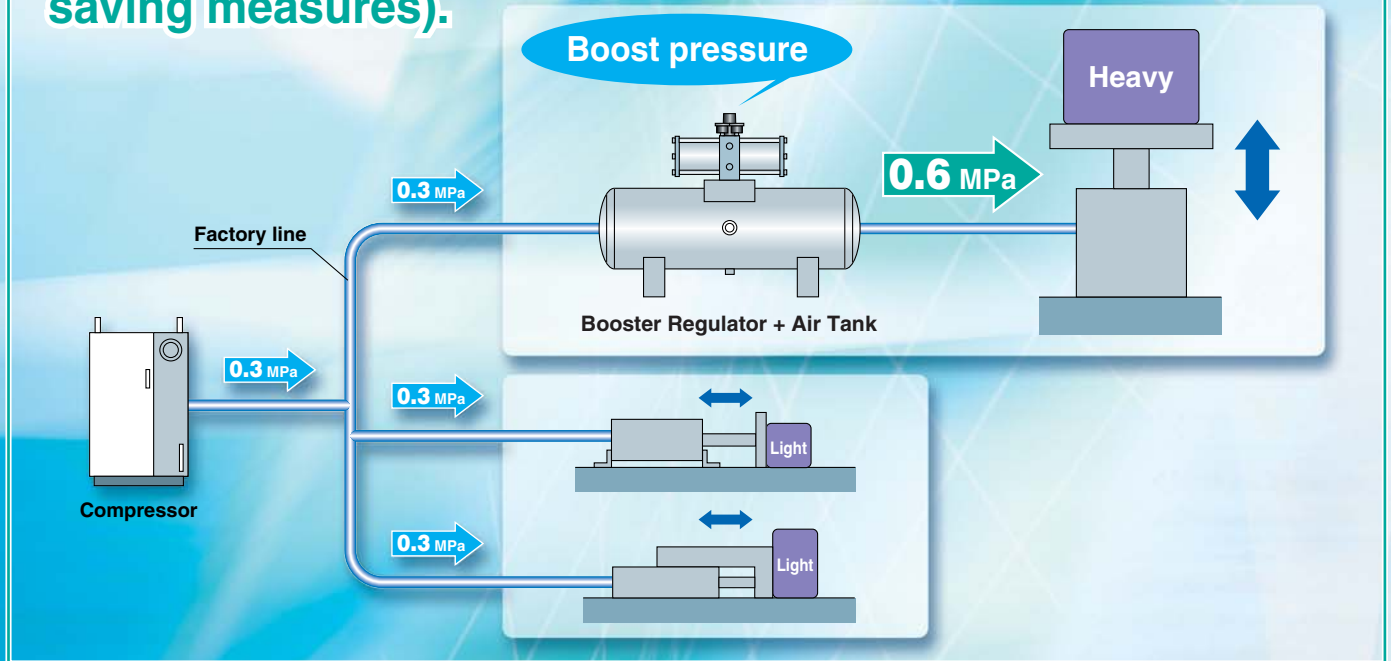


Increase factory air pressure by up to twice as much! No need for an electrical supply!

- Using air from a factory supply line increases pressure by up to twice as much. (Fourfold pressure at the maximum with the VBA1111)
- Space-saving air tank and booster regulator can be connected directly.

Booster regulator assists supplying more pressure where force is insufficient due to low factory pressure (for energy-saving measures).



New Air-operated type
Series **VBA22A/42A**



New Max. operating pressure **1.6 MPa**
Series **VBA43A**



Booster Regulator Series **VBA**



Air Tank Series **VBAT**



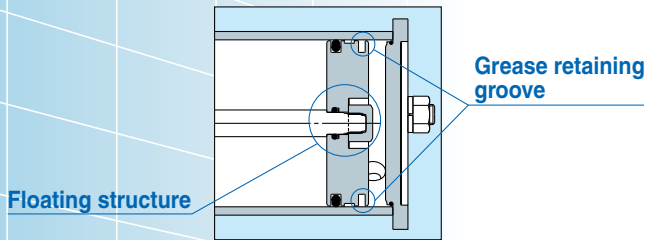
Series VBA/VBAT **RoHS compliant**



CAT.ES11-96B

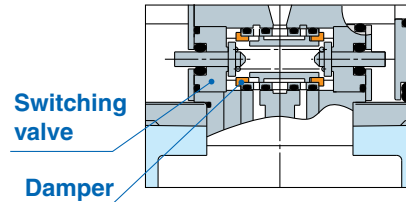
● **Improved service life: Doubled that of conventional model**

- Floating piston structure (PAT. PEND)
- Grease retaining groove



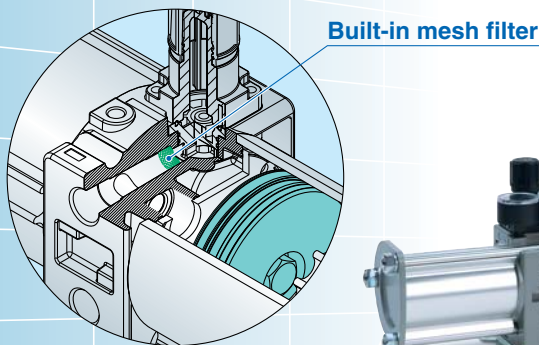
● **Reduced noise: Reduced by 13 dB (A) compared with the conventional model**

- Metal noise reduced by a damper on the impact part of the switch valve
- Exhaust noise reduced by a high-noise reduction silencer



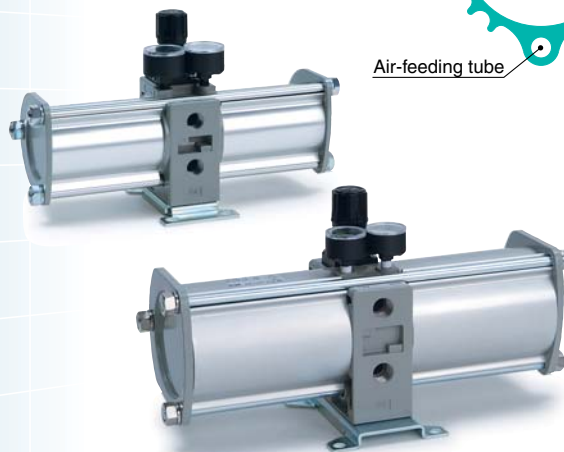
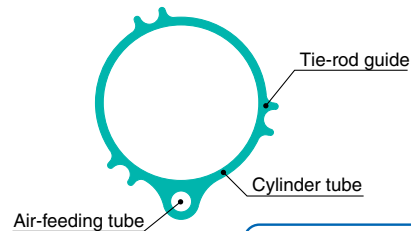
● **Improved reliability: Built-in mesh filter at IN port**

- Prevent operation failure due to foreign matter.



● **Anti-condensation: Integrated air-feeding tube with the main tube**

- Prevent condensation at air-feeding tube due to cooling of expanded exhausting air.



Series VBA¹¹¹⁰₁₁₁₁
 Pressure increase ratio: twofold to fourfold
 Set pressure range: 0.2 to 2 MPa

This is a small capacity air tank to which a booster regulator can be connected directly. It can be used alone as a tank. The pressure vessel law is different from country to country, so as an air tank suitable to a country needs to be confirmed.

Specifications

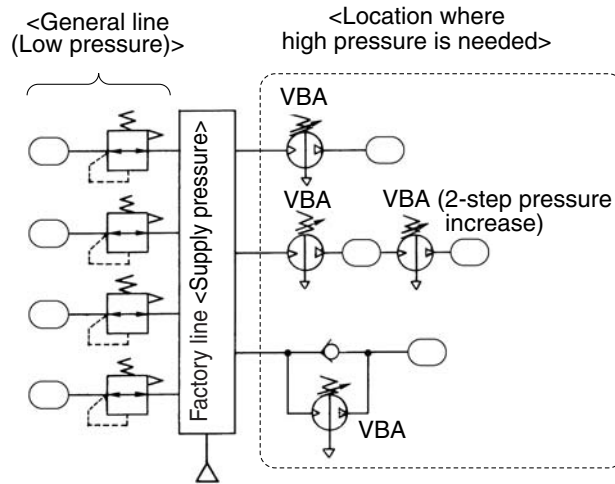
Model	VBAT10A	VBAT20A	VBAT38A
Tank capacity (ℓ)	10	20	38
Max. operating pressure (MPa)	2.0	1.0	
Material	SS400		

Model	VBAT10S	VBAT20S	VBAT38S
Tank capacity (ℓ)	10	20	38
Max. operating pressure (MPa)	2.0		
Material	Stainless steel 304		



Example of Circuit Diagram

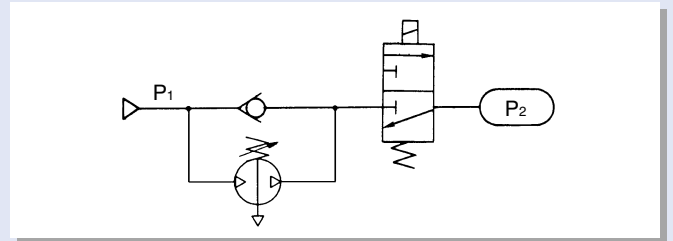
Energy and cost saving booster regulator for factory



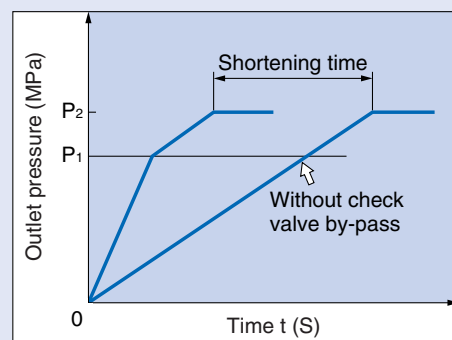
Example of Application

- When certain equipment requires a higher pressure than the factory line pressure.
- When the lower pressure limit for equipment must be ensured due to the fluctuation and reduction of the factory line pressure.
- When the actuator lacks power output for some reason but it is not feasible to replace it with a larger bore cylinder due to space constraints.
- In spite of diverse pressure conditions of the end user, equipment that achieves the specified high power output must be provided.
- When a small cylinder size is desired while ensuring sufficient power, in order to achieve a compact drive unit.

- When the tank must be filled from the atmospheric pressure in a short time.

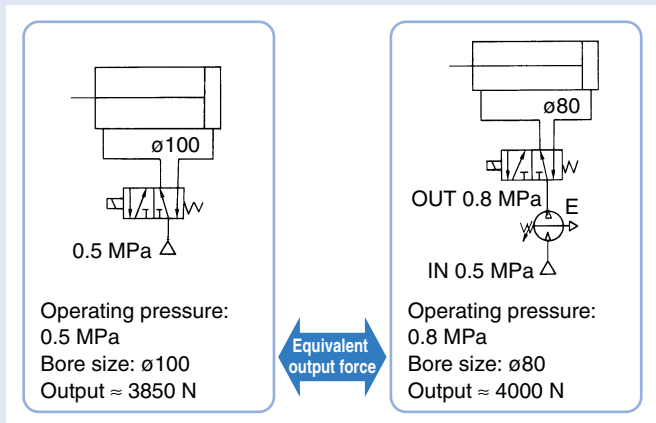
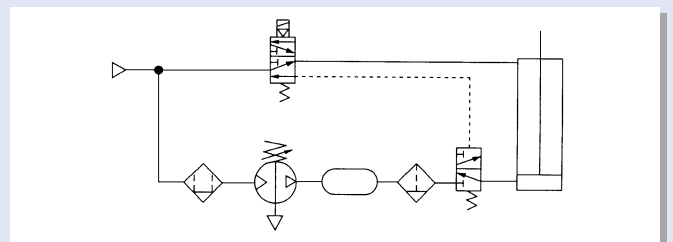


Initially, inlet pressure (P_1) passes through the check valve, fills P_2 , and results in $P_1 = P_2$.



- When the pressure in one chamber of the cylinder must be boosted.

(In the case of a three-way valve, use a reverse pressure type.)



- When the hydraulic pressure of an air-hydro unit must be raised.
- When the pressure must be raised in an explosion-proof environment.
- To boost the pressure by remote operation, using an air operated type.

Booster Regulator Series VBA

How to Order

Series VBA ¹¹¹⁰/₁₁₁₁ - VBA 111 0 - 02 GN

Made to Order

Symbol	Specifications
Nil	Standard
20	Copper-free/Fluorine-free
56	CE explosion-proof directive (ATEX): Category 3GD

(Refer to page 15.)



VBA1110-02



VBA1111-02

Body size

111	1/4
-----	-----

* Pressure: 2 MPa

Pressure increase ratio

0	Twice
1	4 times

Thread type

Symbol	Thread type
Nil	Rc
F	G
N	NPT
T	NPTF

Option

Symbol	Option
Nil	None
G	Pressure gauge
N	Silencer
GN	Pressure gauge, Silencer

Port size

Symbol	Port size
02	1/4

Series VBA ^{2□A}/_{4□A} - VBA 40A - 04 GN -

Made to Order

Symbol	Specifications
Nil	Standard
20	Copper-free/Fluorine-free
56	CE explosion-proof directive (ATEX): Category 3GD

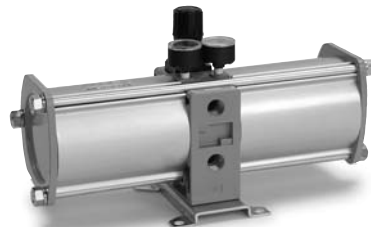
(Refer to page 15.)



VBA20A-03



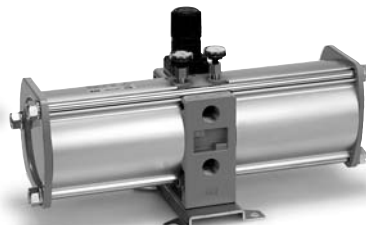
VBA22A-03



VBA40A-04



VBA42A-04



VBA43A-04

Body size

20A	3/8, Handle-operated type
40A	1/2, Handle-operated type
22A	3/8, Air-operated type
42A	1/2, Air-operated type
43A	1/2, Max. operating pressure 1.6 MPa

* Pressure increase ratio: Twice

Semi-standard

Symbol	Specifications
Nil	Standard
Z (Note)	Pressure unit on the product name label and pressure gauge: psi

Note) Thread type: NPT, NPTF

This product is for overseas use only according to the new Measurement Law. (The SI unit type is provided for use in Japan.)

Option

Symbol	Option
Nil	None
G	Pressure gauge
N	Silencer
S	High-noise reduction silencer
GN	Pressure gauge, Silencer
GS	Pressure gauge, High-noise reduction silencer

Port size

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

Thread type

Symbol	Thread type
Nil	Rc
F	G
N	NPT
T	NPTF

Standard Specifications

Model	VBA1110-02	VBA20A-03	VBA40A-04	VBA22A-03	VBA42A-04	VBA1111-02	VBA43A-04
Fluid	Compressed air						
Pressure increase ratio	Twice				Twice to 4 times		Twice
Pressure adjustment mechanism	Handle-operated with relief mechanism ^{Note 1)}			Air-operated ^{Note 2)}		Handle-operated with relief mechanism ^{Note 1)}	
Max. flow rate ^{Note 3)} (l/min (ANR))	200	1000	1900	1000	1900	60	1600
Set pressure range (MPa)	0.2 to 2.0	0.2 to 1.0		0.2 to 1.0		0.2 to 2.0	0.2 to 1.6
Supply pressure range (MPa)	0.1 to 1.0						
Proof pressure (MPa)	3	1.5		1.5		3	2.4
Port size (IN/OUT/EXH: 3 locations) (Rc)	1/4	3/8	1/2	3/8	1/2	1/4	1/2
Pressure gauge port size (IN/OUT: 2 locations) (Rc)	1/16	1/8	1/8	1/8	1/8	1/16	1/8
Ambient and fluid temperature (°C)	2 to 50 (No freezing)						
Installation	Horizontal						
Lubrication	Grease (Non-lube)						
Mass (kg)	0.85	3.9	8.6	3.9	8.6	0.98	8.6

Note 1) If the OUT pressure is higher than the set pressure by the handle, excessive pressure is exhausted from the back of the handle.

Note 2) Please consult with SMC for details on the air-operated type (VBA22A-03, VBA42A-04) and 1.6 MPa compatible type (VBA43A-04).

Note 3) Flow rate at IN= OUT= 0.5 MPa. The pressure varies depending on the operating conditions. Refer to "Flow Characteristics" on page 3 and 4.

Options/Part No.

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

Model		VBA1110-02	VBA20A-03	VBA40A-04	VBA22A-03	VBA42A-04	VBA1111-02	VBA43A-04
		VBA1110-F02	VBA20A-F03	VBA40A-F04	VBA22A-F03	VBA42A-F04	VBA1111-F02	VBA43A-F04
Description		EVBA1110-F02					EVBA1110-F02	
Pressure gauge	G	G27-20-R1	G36-10-01		KT-VBA22A-7	G36-10-01	G27-20-R1	KT-VBA43A-7
Silencer	N	AN200-02	AN300-03	AN400-04	AN300-03	AN400-04	AN200-02	AN400-04
High-noise reduction silencer	S	—	ANA1-03	ANA1-04	ANA1-03	ANA1-04	—	ANA1-04

Note 1) In the case of option GN, two pressure gauges and one silencer are included.

Note 2) KT-VBA22A-7 and KT-VBA43A-7 are pressure gauges with fittings. (Please order two units when using with IN and OUT.)

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

Model		*VBA1110-N02	VBA20A-N03*	VBA40A-N04*	VBA22A-N03*	VBA42A-N04*	*VBA1111-N02	VBA43A-N04*
		VBA1110-T02	VBA20A-T03	VBA40A-T04*	VBA22A-T03*	VBA42A-T04*	*VBA1111-T02	VBA43A-T04*
Description		*: when "N"	*: when "-Z"	*: when "-Z"	*: when "-Z"	*: when "-Z"	*: when "N"	*: when "-Z"
Pressure gauge *: when Nil	G	G27-20-R1	G36-10-N01		KT-VBA22A-7N	G36-10-N01	G27-20-R1	KT-VBA43A-7N
Pressure gauge *: when "-Z" ^{Note 4)}		—	G36-P10-N01		KT-VBA22A-8N	G36-P10-N01	—	KT-VBA43A-8N
Pressure gauge *: when "N" ^{Note 5)}		G27-20-R1-X214	—	—	—	—	G27-20-R1-X214	—
Silencer	N	AN200-N02	AN300-N03	AN400-N04	AN300-N03	AN400-N04	AN200-N02	AN400-N04
High-noise reduction silencer	S	—	ANA1-N03	ANA1-N04	ANA1-N03	ANA1-N04	—	ANA1-N04

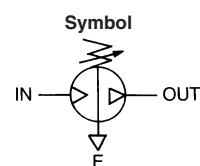
Note 1) In the case of option GN, two pressure gauges and one silencer are included as accessories.

Note 2) KT-VBA22A-7(N), KT-VBA43A-7(N), KT-VBA22A-8N and KT-VBA43A-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 of pressure gauge: psi

Note 5) Pressure unit of pressure gauge: psi and MPa



Related Products/Part No.

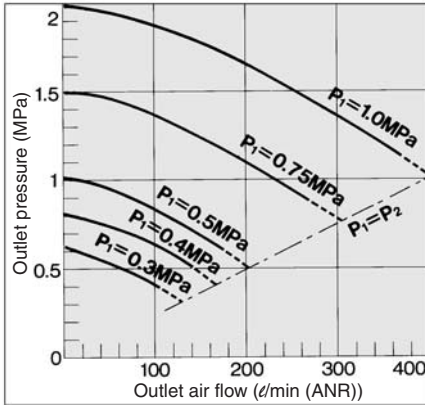
Description	Model	For VBA1110-02	For VBA20A-03	For VBA40A-04
		For VBA1111-02	For VBA22A-03	For VBA42A-04
		For VBA43A-04		
Air tank		VBAT05□ VBAT10□	VBAT10□ VBAT20□ VBAT38□	VBAT20□ VBAT38□
Mist separator		AM250C-02	AM450C-04, 06	AM550C-06, 10
Exhaust cleaner		AMC310-03	AMC510-06	AMC610-10

Note) Refer to page 9 for air tanks, Best Pneumatics No. 5 for mist separators and Best Pneumatics No. 6 for exhaust cleaners.

Series VBA

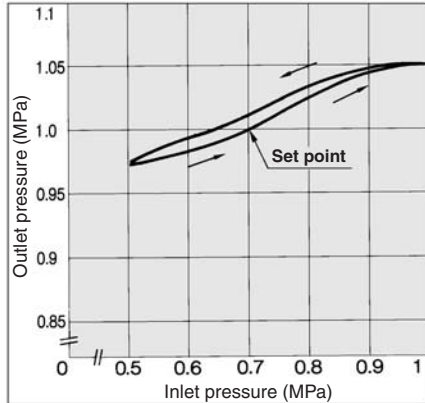
VBA1110

Flow Characteristics

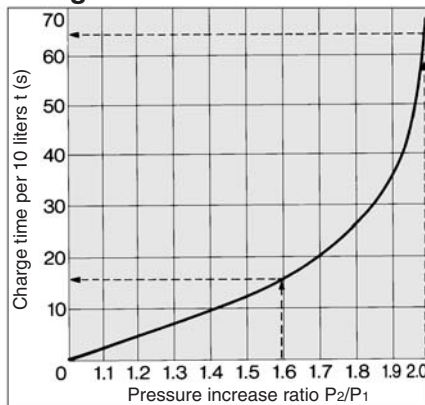


Pressure Characteristics

Inlet pressure: 0.7 MPa
Outlet pressure: 1.0 MPa
Flow rate: 20 l/min (ANR)



Charge Characteristics



VBA1110

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

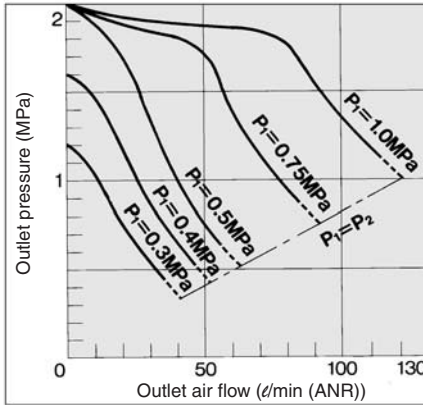
$$\frac{P_2}{P_1} = \frac{0.8}{0.5} = 1.6 \quad \frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0$$

With the pressure increase ratio from 1.6 to 2.0, the charge time of 65 – 16 = 49 sec. (t) is given by the graph. Then, the charge time (T) for a 10 l tank:

$$T = t \times \frac{V}{10} = 49 \times \frac{10}{10} = 49 \text{ (s)}$$

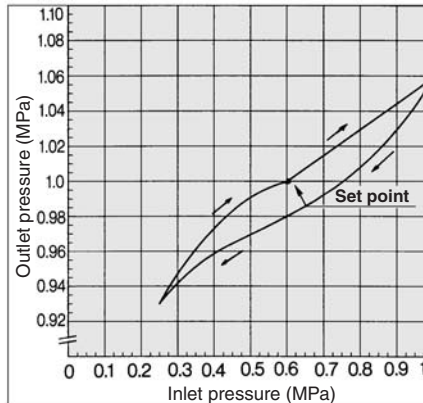
VBA1111

Flow Characteristics

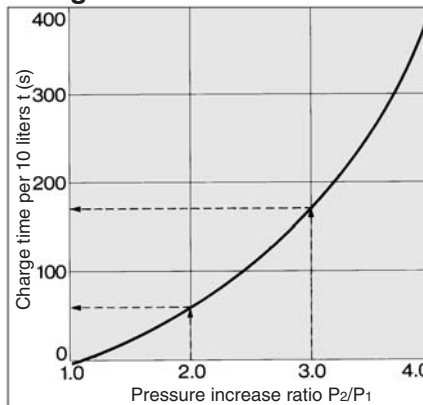


Pressure Characteristics

Inlet pressure: 0.6 MPa
Outlet pressure: 1.0 MPa
Flow rate: 10 l/min (ANR)



Charge Characteristics



VBA1111

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

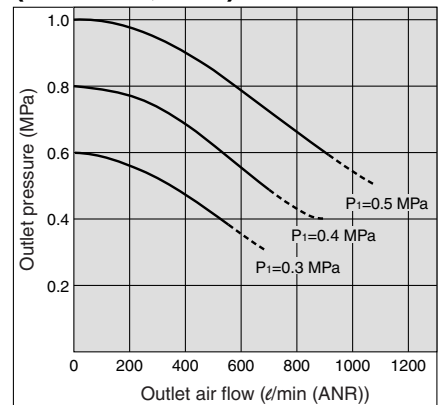
$$\frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0 \quad \frac{P_2}{P_1} = \frac{1.5}{0.5} = 3.0$$

With the pressure increase ratio from 2.0 to 3.0, the charge time of 170 – 60 = 110 sec. (t) is given by the graph. Then, the charge time (T) for a 10 l tank:

$$T = t \times \frac{V}{10} = 110 \times \frac{10}{10} = 110 \text{ (s)}$$

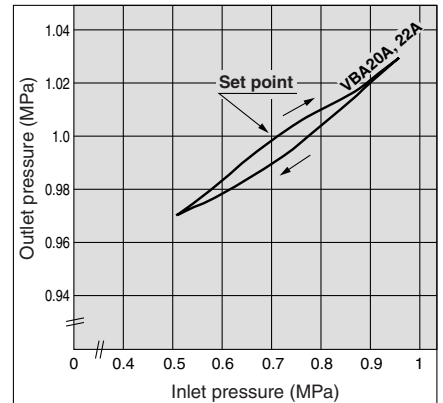
VBA20A, 22A

Flow Characteristics (VBA20A, 22A)

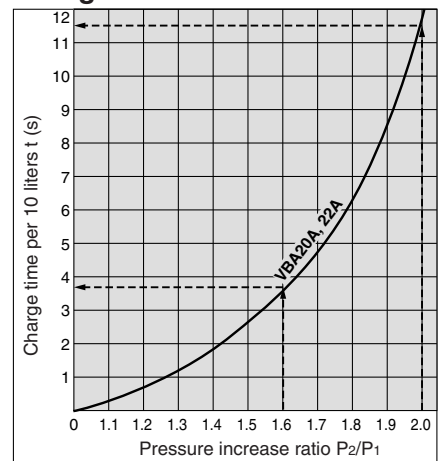


Pressure Characteristics

Inlet pressure: 0.7 MPa
Outlet pressure: 1.0 MPa
Flow rate: 20 l/min (ANR)



Charge Characteristics



VBA20A, 22A

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

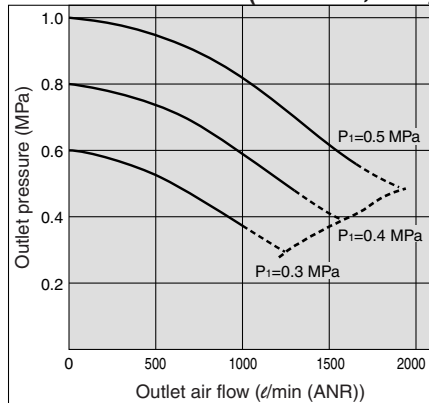
$$\frac{P_2}{P_1} = \frac{0.8}{0.5} = 1.6 \quad \frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0$$

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:

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

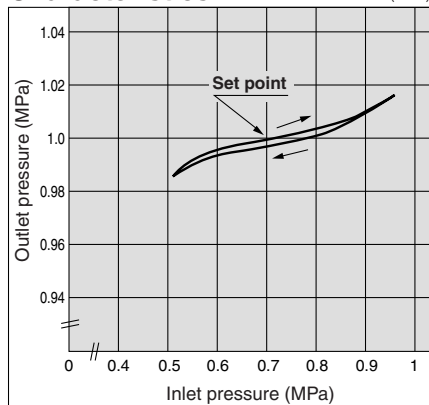
VBA40A, 42A

Flow Characteristics (VBA40A, 42A)

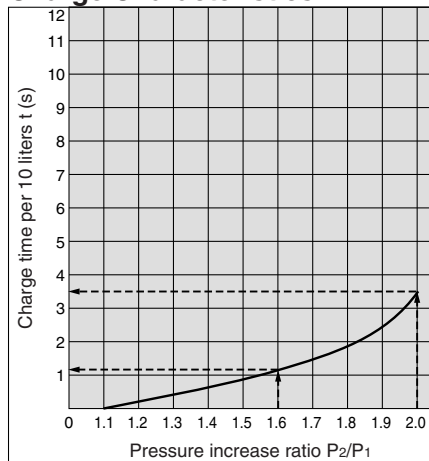


Pressure Characteristics

Inlet pressure: 0.7 MPa
Outlet pressure: 1.0 MPa
Flow rate: 20 l/min (ANR)



Charge Characteristics



VBA40A, 42A

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

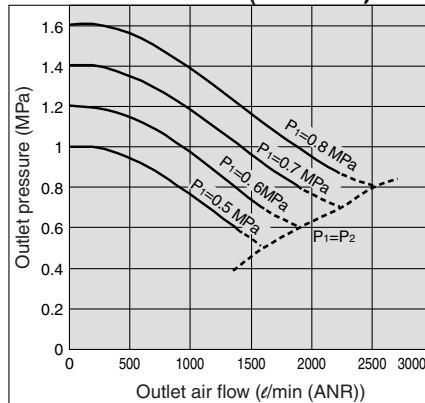
$$\frac{P_2}{P_1} = \frac{0.8}{0.5} = 1.6 \quad \frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0$$

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:

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

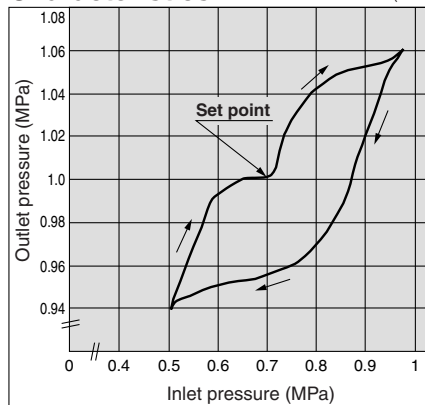
VBA43A

Flow Characteristics (VBA43A)

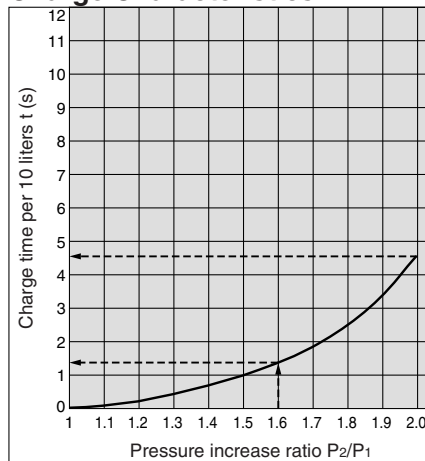


Pressure Characteristics

Inlet pressure: 0.7 MPa
Outlet pressure: 1.0 MPa
Flow rate: 20 l/min (ANR)



Charge Characteristics



VBA43A

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

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

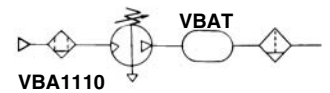
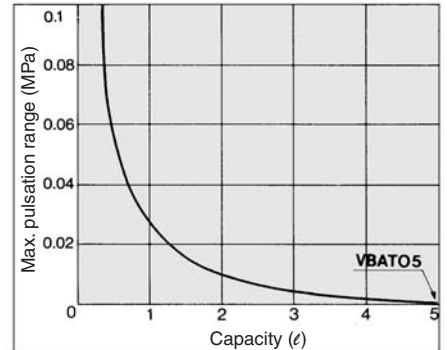
With the pressure increase ratio from 1.6 to 2.0, the charge time of $4.5 - 1.3 = 3.2$ sec. (t) is given by the graph. Then, the charge time (T) for a 100 l tank:

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

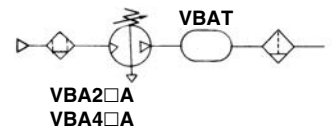
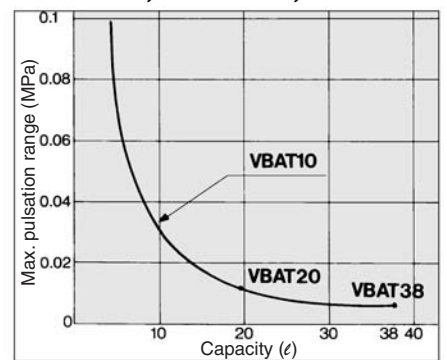
Pulsation/ Pulsation is decreased by using tank.

If the outlet capacity is undersized, pulsation may occur.

VBAT05A



VBAT10A, VBAT20A, VBAT38A



Conditions:

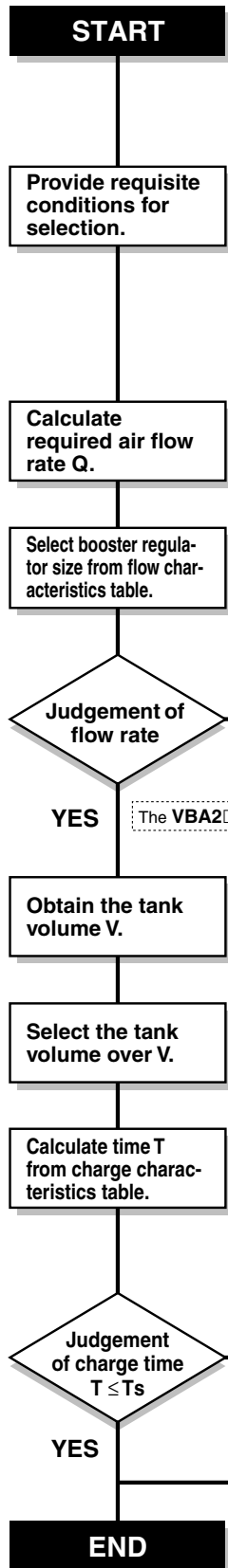
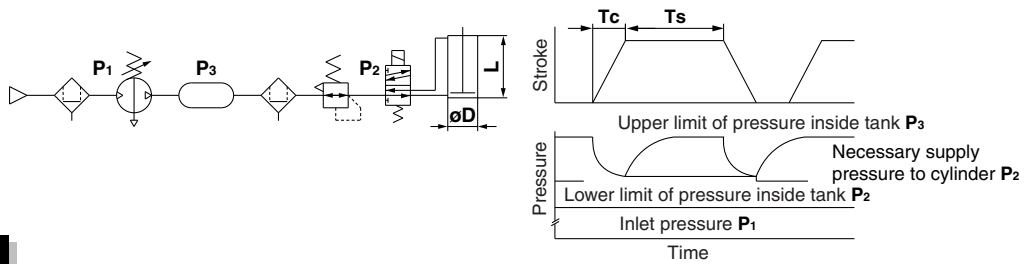
- Inlet pressure: 0.5 MPa
- Outlet set pressure: 1 MPa
- Flow rate: Between 0 and max. flow rate

Performance of air tank

- Alleviates the pulsation generated on the outlet side.
- Manages supply air to be consumed for short periods of time by storing air through raising the tank pressure.

Series VBA

Sizing (Sizing can be achieved by using SMC Pneumatic System Energy Saving Program Ver. 3.1. Please contact your SMC sales representative.)



Necessary conditions:
D [mm]: Cylinder bore size
L [mm]: Cylinder stroke
W [mm/s]: Cylinder operating speed
C [pc.]: Number of cylinders
Tc [s]: Cylinder operating time
Ts [s]: Cylinder stop time
P1 [MPa]: Inlet pressure
P2 [MPa] ^{Note 1)}: Necessary supply pressure to cylinder

Example

D	100
L	100
W	200
C	1
Tc	0.5
Ts	30
P1	0.5
P2	0.8

Other conditions:
Q [ℓ/min (ANR)]: Required air flow rate
Qb [ℓ/min (ANR)]: Outlet air flow rate of booster regulator
Tc [s]: Cylinder stroke time
K: Cylinder double-acting: 2, single-acting: 1
P3 [MPa] ^{Note 2)}: Tank charge pressure
T1 [s]: Time to charge (Time to charge to P2)
T2 [s]: Time to charge (Time to charge to P3)
T [s]: Time to charge (Time to charge from P2 to P3)
Z: Number of booster regulators

Note 1) P2 is the necessary supply pressure to a cylinder, and set the pressure below the lower limit of pressure inside the tank with a regulator. Adjust the pressure taking the maximum operating pressure of equipment in use into consideration.
 Note 2) P3 is the output pressure of the booster regulator, which is also the upper limit of charge pressure to a tank.

$$Q \text{ [ℓ/min (ANR)]} = \frac{\pi \times D^2 \times W}{4 \times 10^6} \times \frac{(P_2 + 0.101)}{0.101} \times 60 \times C$$

$$Q = \frac{\pi \times 100^2 \times 200}{4 \times 10^6} \times \frac{(0.8 + 0.101)}{0.101} \times 60 \times 1 = 841 \text{ [ℓ/min (ANR)]}$$

VBA2□A: Qb = 500 [ℓ/min (ANR)]
VBA4□A: Qb = 1050 [ℓ/min (ANR)]
 Refer to "Flow Characteristics" on page 3 and 4.

⚠ Caution

- Use the VBA1111 (pressure increase ratio 4) with pressure increase ratio of 2 to 4. Usage of pressure increase ratio below 2 (pressure increase ratio 2) is preferred for the VBA1110. A stable operation and increased life expectancy will result.
- Inlet supply pressure volume is approximately twice the volume of the outlet side. {approx. 2 times (pressure increase ratio 2), approx. 4 times (pressure increase ratio 4)}. Booster regulator requires that the inlet side volume should be the sum of the flow volume running into the outlet side and the volume exhausted from E port (for driving), because air is the power source.

NO: Need no tank The VBA4□A can supply necessary pressure.

YES: The VBA2□A cannot obtain necessary pressure.

$$V \text{ [ℓ]} = \frac{(Q - Qb/2) \times (Tc \times K/60)}{(P_3 - P_2) \times 9.9}$$

$$V = \frac{(841 - 500/2) \times (0.5 \times 2/60)}{(1.0 - 0.8) \times 9.9} = 5 \text{ [ℓ]}$$

Select the **VBAT10□**, which can be directly connected to the **VBA2□A**.

Refer to "Charge Characteristics" on page 3 and 4.

$$T \text{ [s]} = \left(\frac{V}{10}\right) \times \frac{T_2 - T_1}{Z}$$

$$T = \left(\frac{5}{10}\right) \times \frac{12 - 3.7}{1} = 4.2 \text{ [s]}$$

Avoid pulsation (Max. 0.05 MPa)

YES: Select the tank from table below.

Tank part no.	Inner volume	Applicable combination model		
VBAT05□	5 ℓ	VBA1110	—	—
VBAT10□	10 ℓ	VBA1110	VBA2□A	—
VBAT20□	20 ℓ	—	VBA2□A	VBA4□A
VBAT38□	38 ℓ	—	VBA2□A	VBA4□A

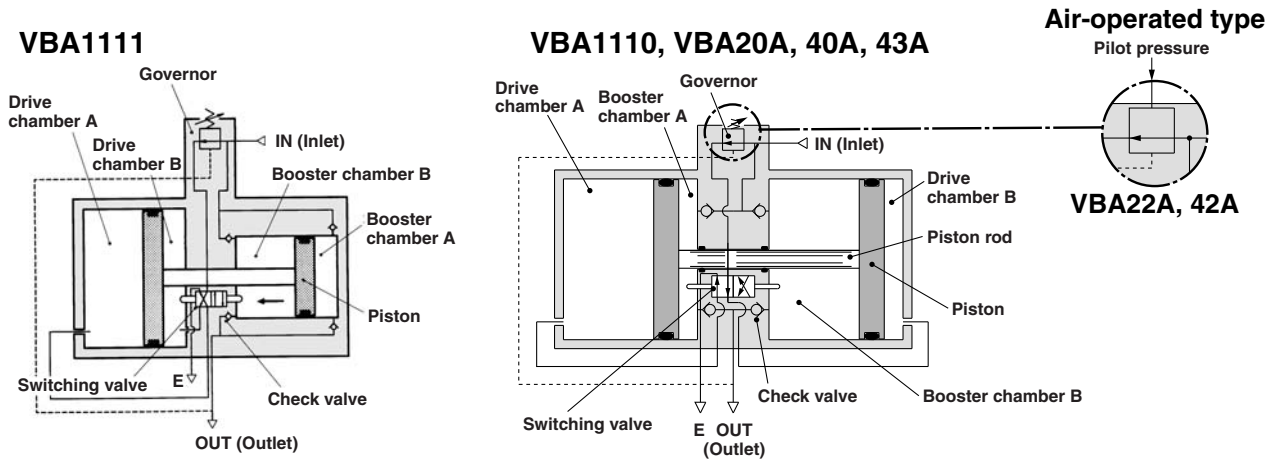
NO: Extend stop time Ts up to charge time T or more.

NO: Increase number of booster regulators (Z) to decrease T.

When running continuously for longer periods of time, confirm the life expectancy. When the life expectancy is shorter than required, select a larger sized booster regulator.

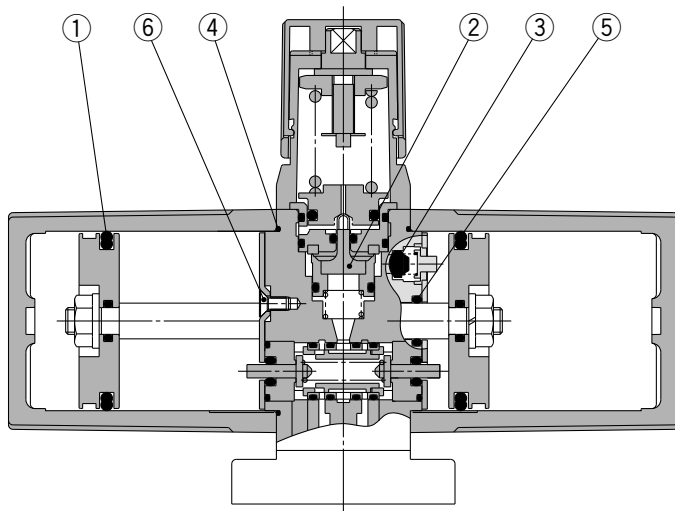
Construction/Working Principle

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 handle operation and pressure adjustment in the drive chamber by feeding back the outlet pressure.



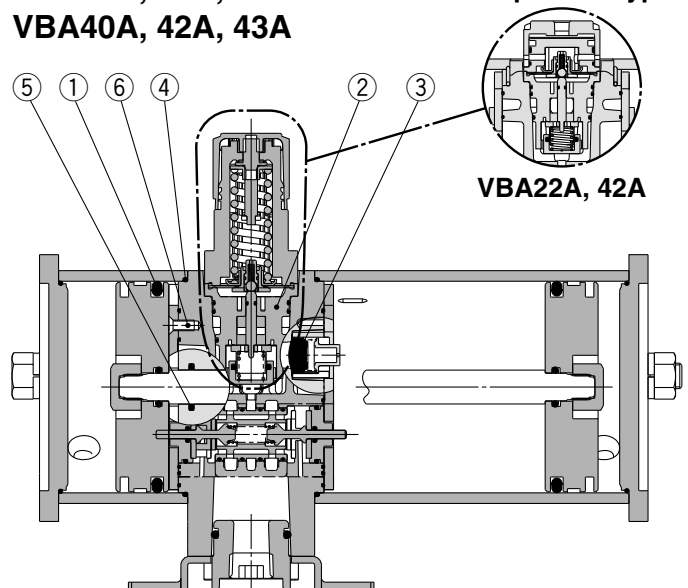
Construction/Replacement Parts

VBA111₁⁰



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

Air-operated type



Replacement Parts/Kit Part No.

Place an order with the following applicable kit part number.

Model	VBA111 ₁ ⁰ -02	VBA20A-03 VBA22A-03	VBA40A-04 VBA42A-04 VBA43A-04
Kit part no.	KT-VBA1110-2	KT-VBA20A-1	KT-VBA40A-1

The kit includes the parts from ① to ⑥ and a grease pack.

No.	Description	Model		
		VBA111 ₁ ⁰ -02	VBA20A-03 VBA22A-03	VBA40A-04 VBA42A-04 VBA43A-04
		Quantity		
1	Piston seal		2	
2	Governor assembly		1	
3	Check valve		4	
4	Gasket		2	
5	Rod seal	2	1	1
6	Mounting screw	8	8	12
—	Grease pack	1	1	2

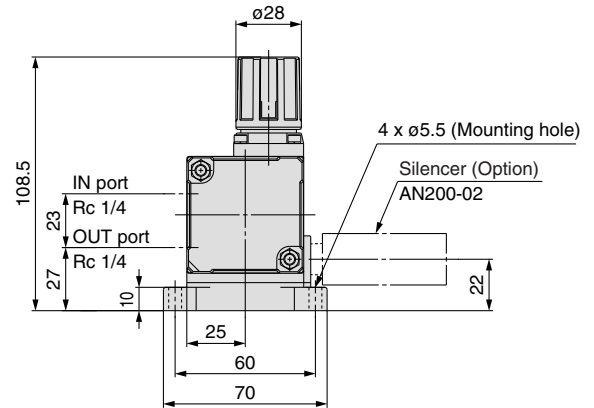
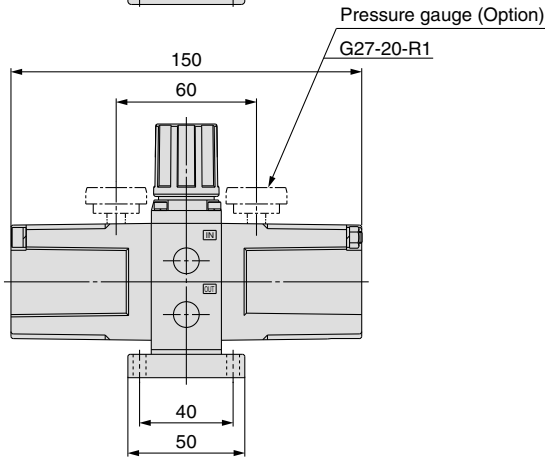
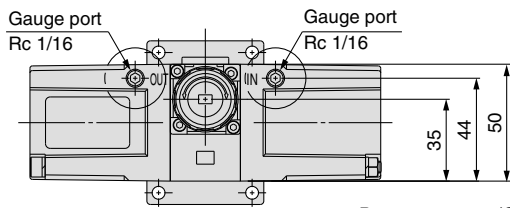
* The grease pack has 10 g of grease.

* Make sure to refer to the procedure for maintenance.

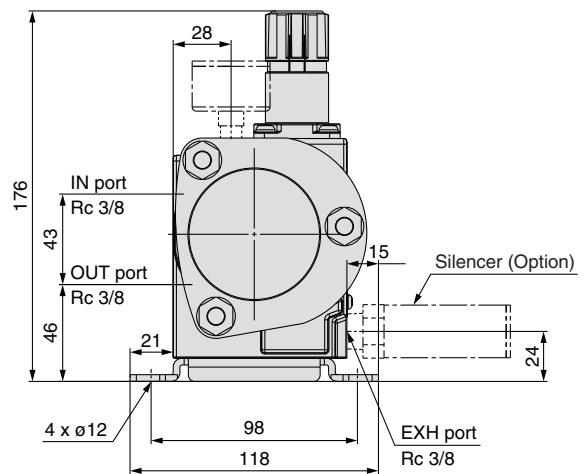
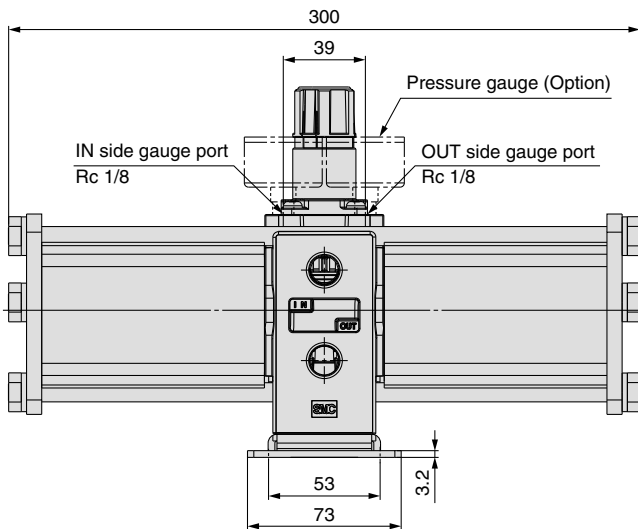
Series VBA

Dimensions

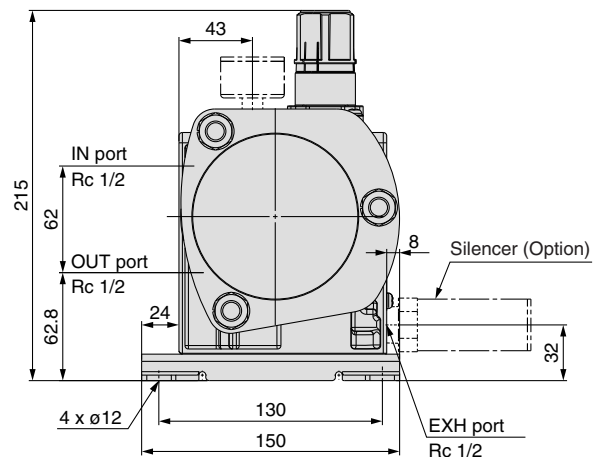
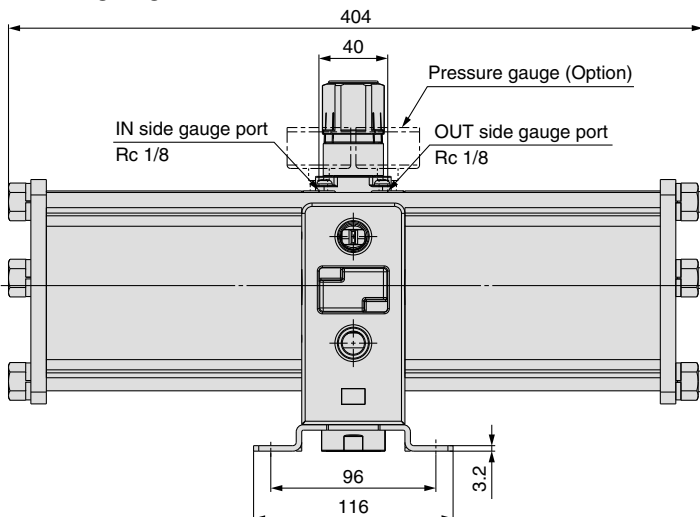
VBA1110-02, VBA1111-02



VBA20A-03

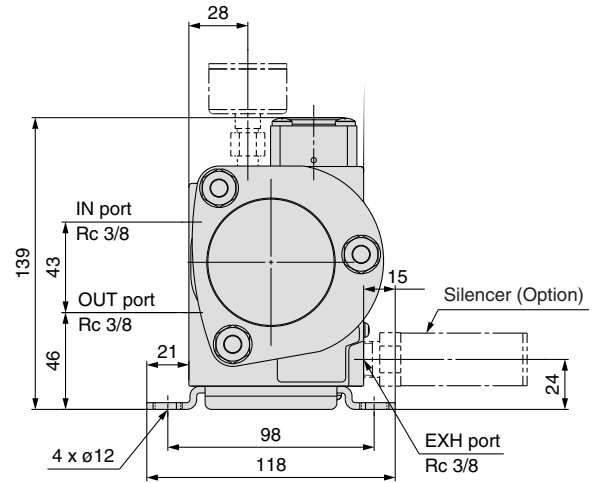
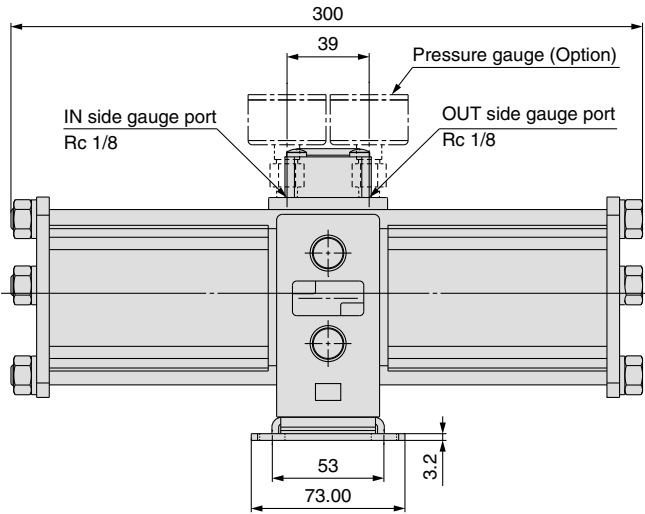


VBA40A-04

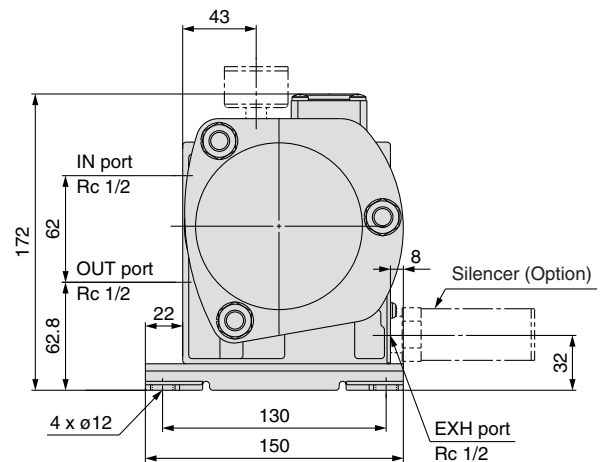
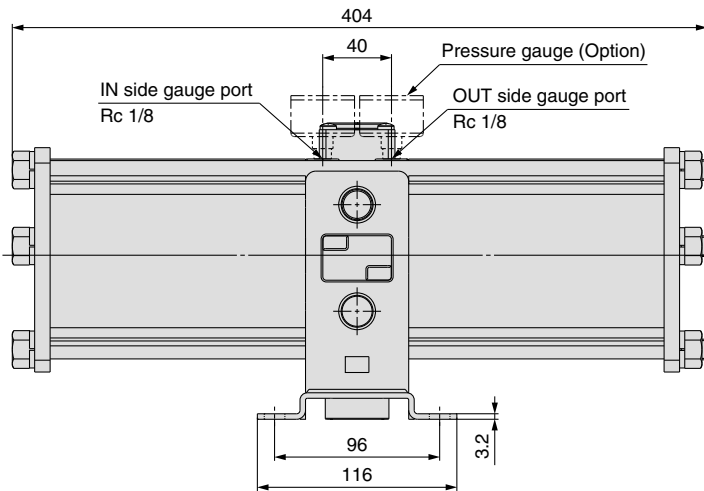


Dimensions

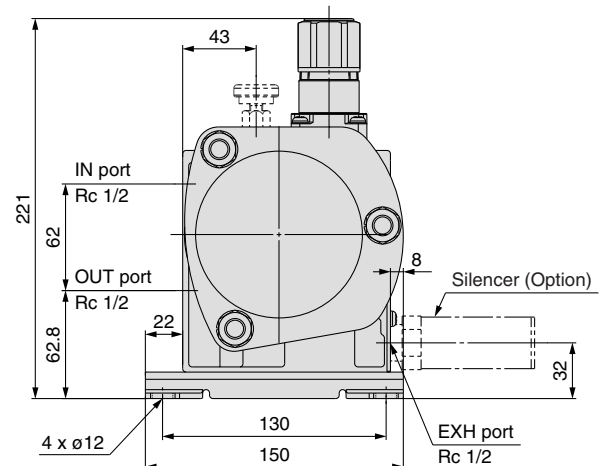
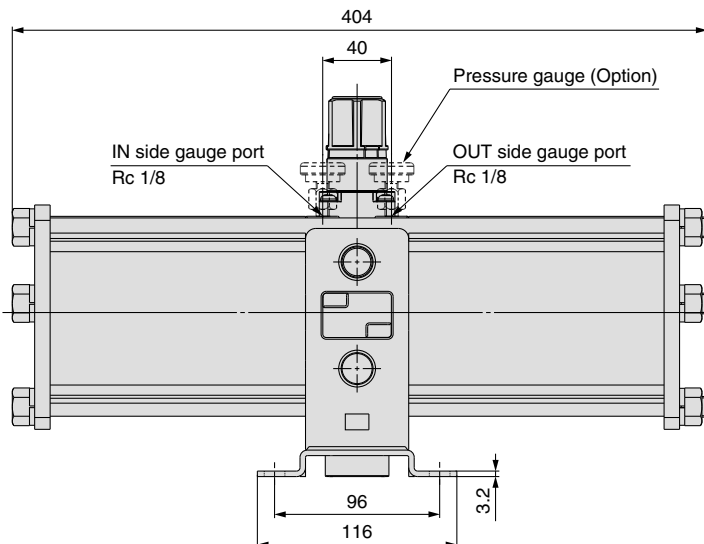
VBA22A-03



VBA42A-04



VBA43A-04



Air Tank Series VBAT



How to Order

□ - VBAT 10 A □ - S □ - □

Made to Order

Symbol	Specifications
Nil	Standard
20	Copper-free/Fluorine-free

(Refer to page 15.)

Tank inner volume

Material	Inner volume
05	5 ℓ
10	10 ℓ
20	20 ℓ
38	38 ℓ

Material

Symbol	Material
A	Carbon steel (SS400)
S	Stainless steel 304

Thread type

Symbol	Thread type
Nil	Rc
F	G
N	NPT

Note) Name label of NPT thread products: psi only (The psi unit cannot be used in Japan.)

Overseas-compatible product

Symbol	Standard
Q	CE marking

* Refer to page 10 for other overseas-compatible products.

Option

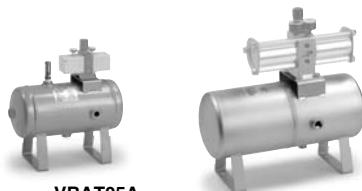
Symbol	Option
Nil	None
V	Drain valve

Option

Symbol	Option	Applicable model
Nil	None	All models
R ^{Note)}	Safety valve (Set pressure 1 MPa)	VBAT05A VBAT10A VBAT20A VBAT38A
S ^{Note)}	Safety valve (Set pressure 2 MPa)	VBAT05A VBAT10A

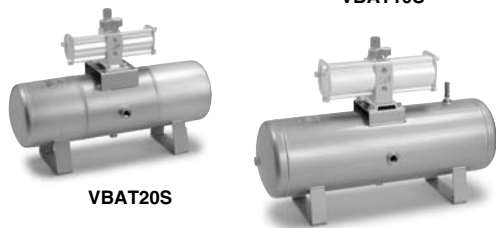
Note) The safety valve is not applicable for copper-free, fluorine-free specification (20-).

- Compact connections are possible with booster regulators.
- It can be used alone as a tank.
- Also compatible with overseas standards (Refer to page 10 for details.)



VBAT05A

VBAT10S



VBAT20S

VBAT38A

Specifications and option combinations

● Required ○ Combination possible □ Combination impossible

Option	Material	Option		Thread type		
		Safety valve	Drain valve	Rc	G	NPT
Specifications	A: Carbon steel S: Stainless steel					
Standard VBAT□	A	○	○	●	—	—
	S	—	○	●	—	—
Overseas-compatible product: CE marking ^{Note 1)}	A	●	●	○	○	—
Overseas-compatible special product: ASME ^{Note 2)}	A	●	●	○	—	○
Made to Order: Copper-free/Fluorine-free 20-VBAT□	A	—	○ ^{Note 3)}	●	—	—
	S	—	○ ^{Note 3)}	●	—	—

Note 1) Tanks for overseas are only carbon steel products.

Note 2) Tank volumes are only 5 ℓ or 10 ℓ.

Note 3) Drain valve material is made of stainless steel.

Model (Carbon Steel)

Model	VBAT05A	VBAT10A	VBAT20A	VBAT38A
Tank capacity (ℓ)	5	10	20	38
Max. operating pressure (MPa)	2.0			
IN port size (Rc)	3/8	1/2	3/4	3/4
OUT port size (Rc)	3/8	1/2	1/2	3/4
Ambient and fluid temperature (°C)	0 to 75			
Mass (kg)	6.6	10.0	14.0	21.0
Material	Carbon steel			
Paint	Outside: Silver paint, Inside: Rustproof paint			

* Accessories and options are included in the same container.

Model (Stainless Steel)

Model	VBAT05S	VBAT10S	VBAT20S	VBAT38S
Tank capacity (ℓ)	5	10	20	38
Max. operating pressure (MPa)	2.0			
IN port size (Rc)	3/8	1/2	3/4	3/4
OUT port size (Rc)	3/8	1/2	1/2	3/4
Ambient and fluid temperature (°C)	0 to 75			
Mass (kg)	3.2	4.9	12.0	19.0
Material	Stainless steel			

* Accessories and options are included in the same container.

List of Air Tank for Overseas

The pressure vessel law is different from country to country, so an air tank suitable to a country needs to be manufactured. Please select from the below table. For details on all products except for CE markings, please contact SMC.

Country/Region	Law	Exportable models	Details
EU	CE Marking Simple Pressure Vessels Directive	VBAT05A-SV-Q, VBAT05AF-SV-Q	Applicable product Self-declaration document attached (The G-thread type is 6 mm longer due to plug type differences.)
		VBAT10A-SV-Q, VBAT10AF-SV-Q	
		VBAT20A-RV-Q, VBAT20AF-RV-Q	
		VBAT38A-RV-Q, VBAT38AF-RV-Q	
South Korea	High Pressure Gas Safety Management Law Industrial Safety Health Law	VBAT05A-RV-X101, VBAT05S-V-X101	Exemption Maximum operating pressure: 0.97 MPa
		VBAT10A-RV-X101, VBAT10S-V-X101	
		VBAT20A-RV-X101, VBAT20S-V-X101	
		VBAT38A-RV-X101, VBAT38S-V-X101	
Singapore, Malaysia	Factory Act	VBAT05A-SV-X102	Applicable product Product complies with ASME specifications JBA (Japan Boiler Association) certification attached
		VBAT10A-SV-X102	
		VBAT20A-RV-X102	
		VBAT38A-RV-X102	
U.S.A.	ASME standard Industrial Safety and Health Law	VBAT05AN-SV, VBAT05A-SV	Exemption (The dimensions of VBAT10-X11 are not the same as the standard dimensions.)
		VBAT10AN-SV-X11, VBAT10A-SV-X11	
Thailand, Taiwan	No applicable specifications	Standard product	—

VBAT□A (Carbon Steel) Accessories/Part No.

Model	VBAT05A	VBAT10A	VBAT20A	VBAT38A
Accessory kit number contains a set of the following parts ① to ⑤.	VBAT5A-Y-2	VBAT10A-Y-2	VBAT20A-Y-2	
① Bushing assembly for connection (1 pc.) ^{Note)}	VBAT5A-Y-1	VBAT10A-Y-1	VBAT20A-Y-1	
② Hexagon socket head cap screw/SW (4 pcs.)	M5	M5/M10	M10	
③ Anchor bolt/Nut (4 pcs.)	No accessories		M12	
④ Drain port plug (1 pc.)	Hexagon socket head taper screwed plug R 1/4 (Stainless steel)			
⑤ Safety valve port plug (1 pc.)	Hexagon socket head taper screwed plug R 3/8 (Steel)			

Note) Equipped with an ozone-resistant O-ring.

VBAT□S (Stainless Steel) Accessories/Part No.

Model	VBAT05S	VBAT10S	VBAT20S	VBAT38S
Accessory kit number contains a set of the following parts ① to ④.	VBAT5S-Y-3	VBAT10S-Y-3	VBAT20S-Y-3	
① Bushing assembly for connection (1 pc.) ^{Note)}	VBAT5A-Y-1	VBAT10A-Y-1	VBAT20A-Y-1	
② Hexagon socket head cap screw/SW (4 pcs.)	M5	M5/M10	M10	
③ Anchor bolt/Nut (4 pcs.)	No accessories		M12	
④ Drain port plug (1 pc.)	Hexagon socket head taper screwed plug R 1/4 (Stainless steel)			

Note) Equipped with an ozone-resistant O-ring.

Options/Part No.

Model	VBAT05A	VBAT10A	VBAT20A	VBAT38A
Safety valve (Set pressure 1 MPa) ^{Note)}	VBAT-R			
Safety valve (Set pressure 2 MPa) ^{Note)}	VBAT-S		—	
Drain valve	VBAT-V1			

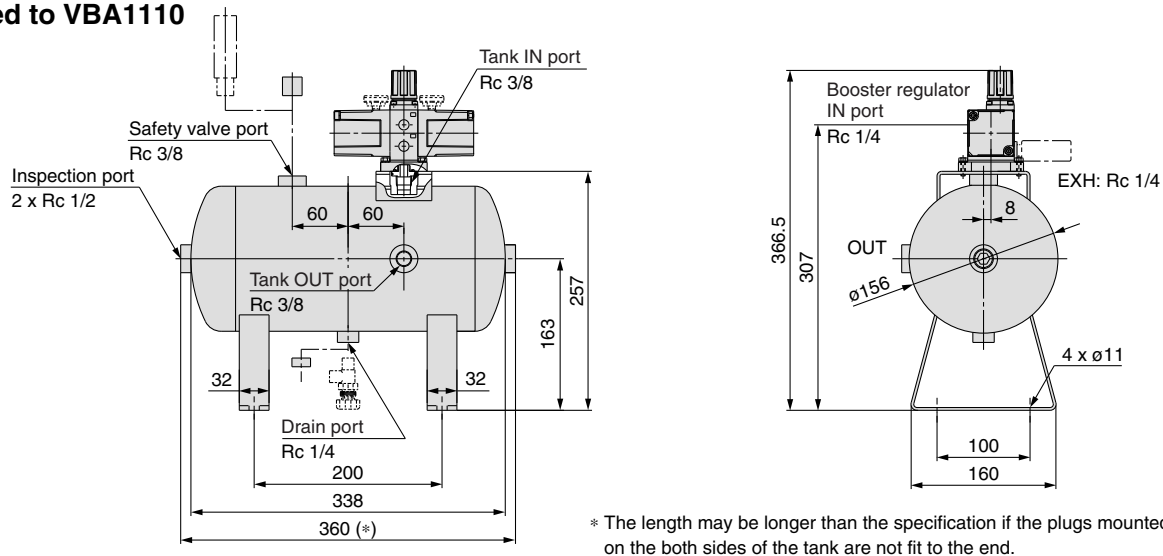
Note) The set pressure of the safety valve cannot be changed.

Series VBAT

Dimensions: VBAT05A, 10A (Material: Carbon Steel)

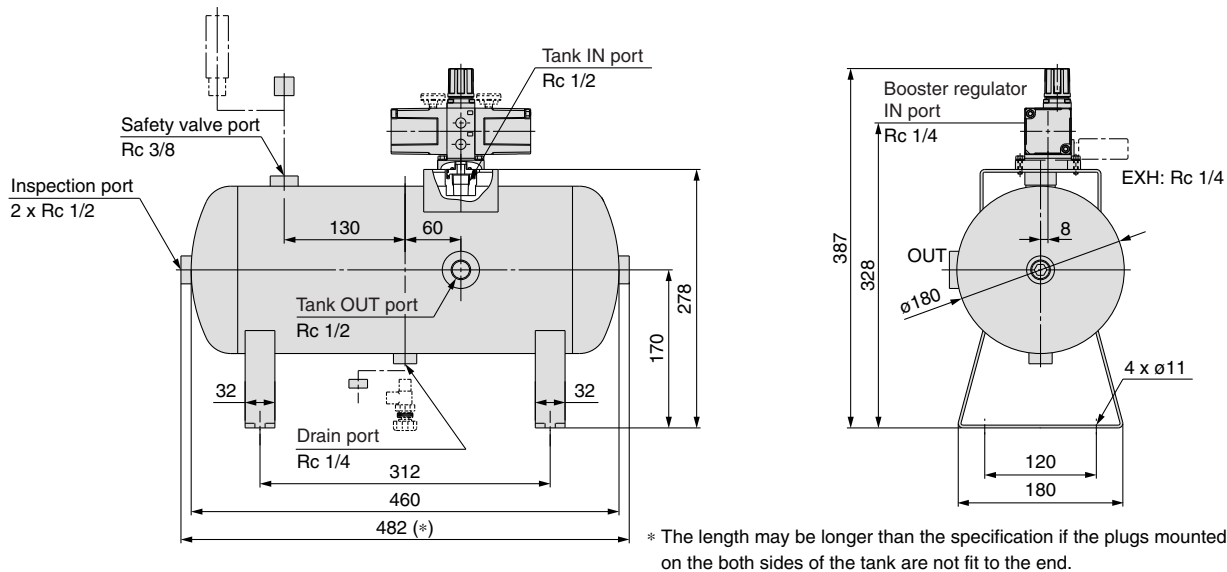
VBAT05A

Connected to VBA1110

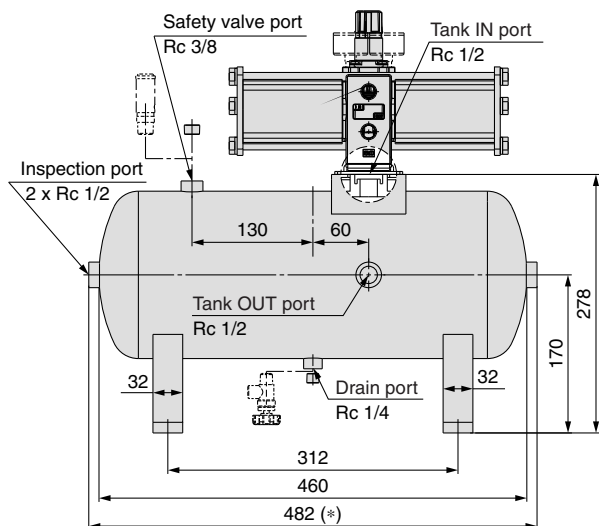


VBAT10A

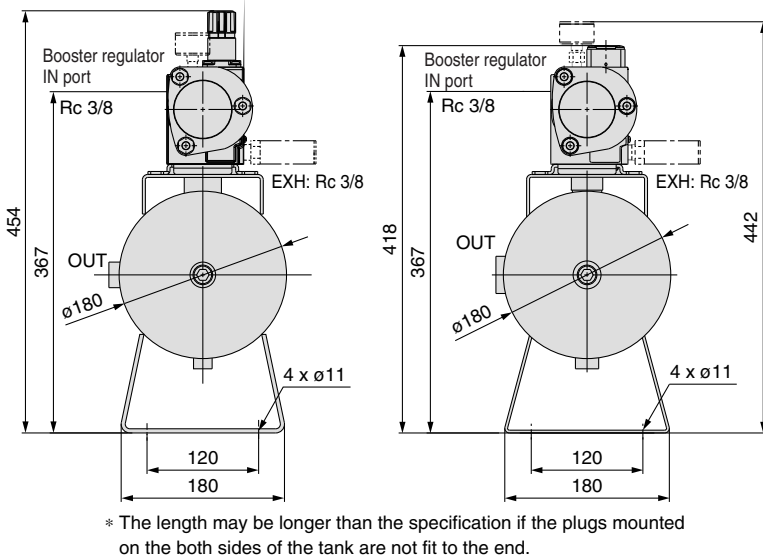
Connected to VBA1110



Connected to VBA20A



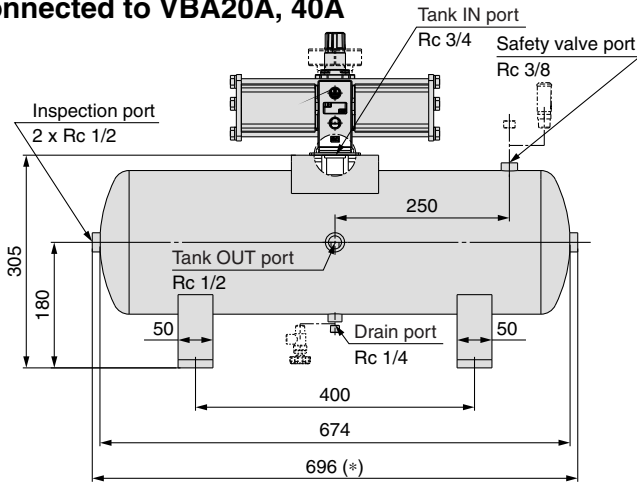
Connected to VBA22A



Dimensions: VBAT20A, 38A (Material: Carbon Steel)

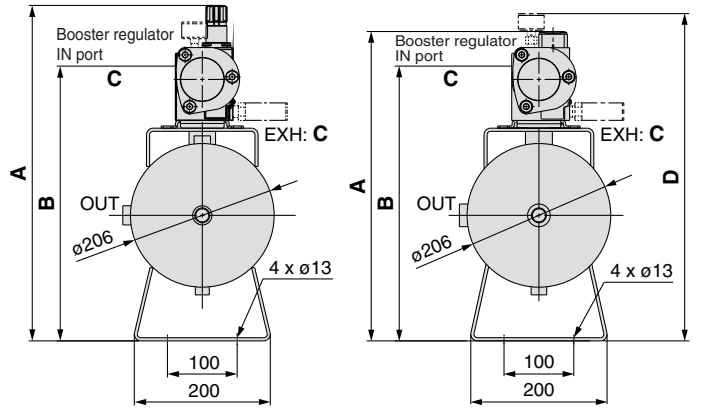
VBAT20A

Connected to VBA20A, 40A



* The length may be longer than the specification if the plugs mounted on the both sides of the tank are not fit to the end.

Connected to VBA22A, 44A

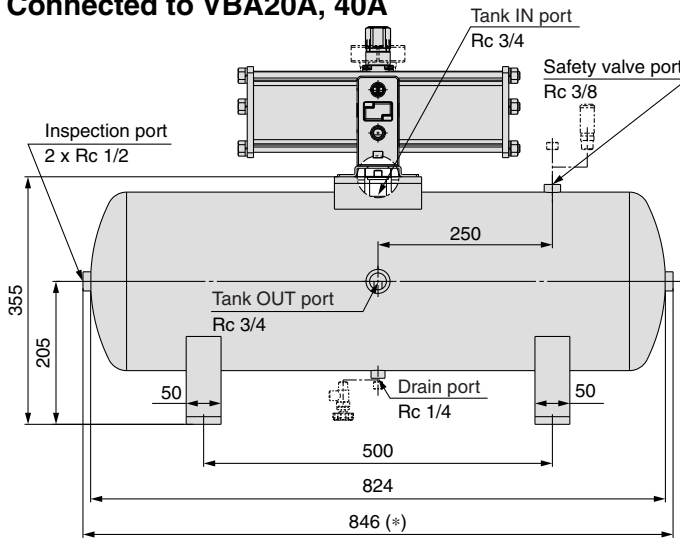


Booster regulator model	A	B	C	D (Note)
VBA20A	481	394	Rc 3/8	—
VBA40A	520	430	Rc 1/2	—
VBA22A	445	394	Rc 3/8	469
VBA42A	478	430	Rc 1/2	493

Note) Option: when G (pressure gauge) is selected

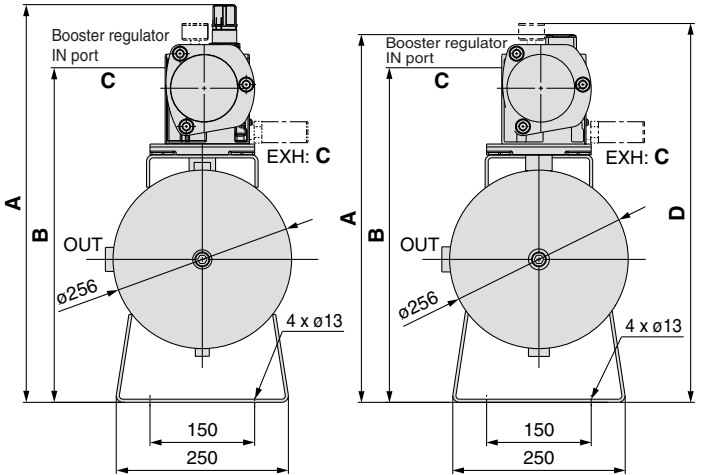
VBAT38A

Connected to VBA20A, 40A



* The length may be longer than the specification if the plugs mounted on the both sides of the tank are not fit to the end.

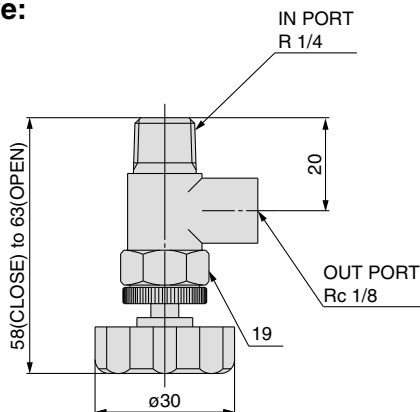
Connected to VBA22A, 42A



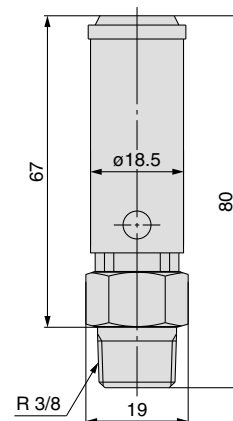
Booster regulator model	A	B	C	D (Note)
VBA20A	531	444	Rc 3/8	—
VBA40A	570	480	Rc 1/2	—
VBA22A	495	444	Rc 3/8	519
VBA42A	528	480	Rc 1/2	543

Note) Option: when G (pressure gauge) is selected

Drain valve: VBAT-V1



Safety valve: VBAT-R, VBAT-S

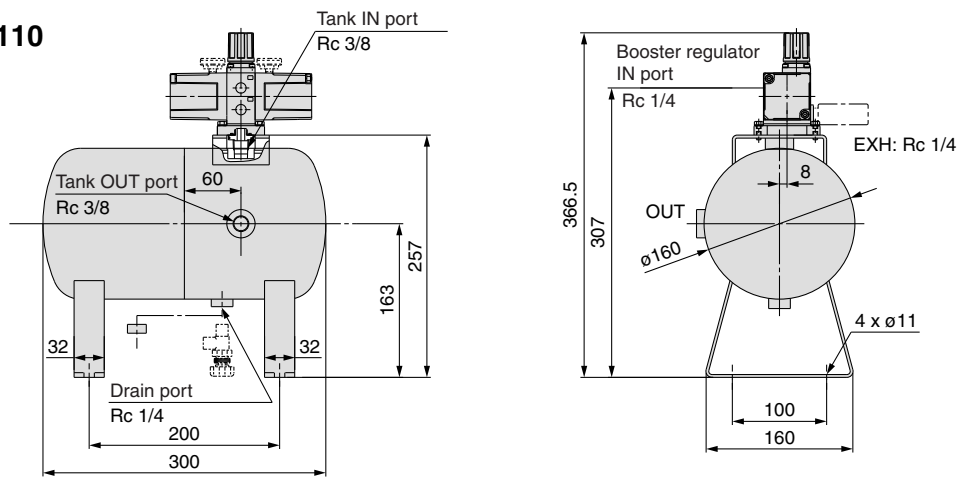


Series VBAT

Dimensions: VBAT05S, 10S (Material: Stainless Steel 304)

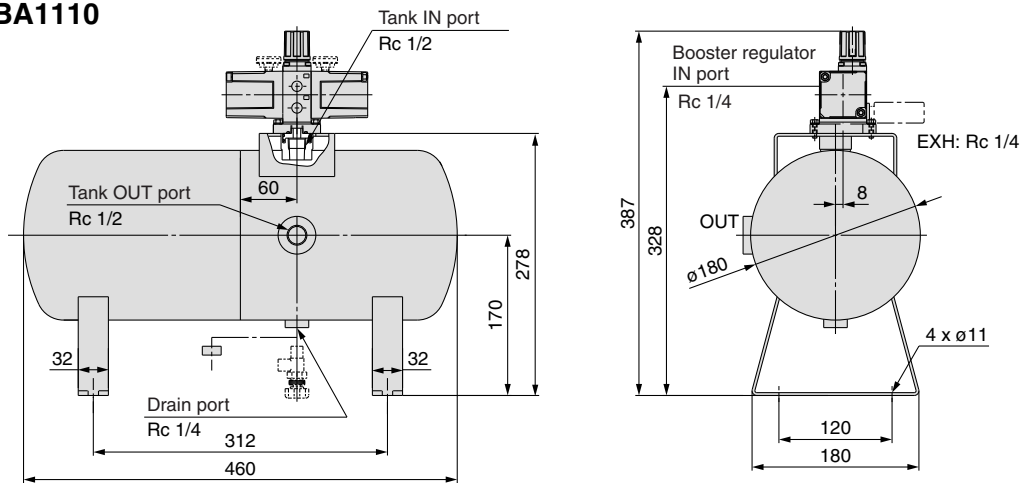
VBAT05S

Connected to VBA1110

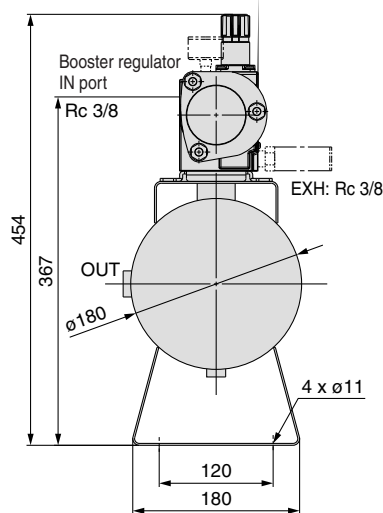
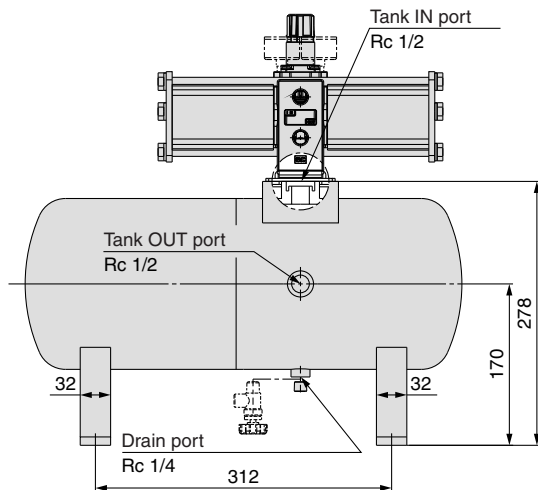


VBAT10S

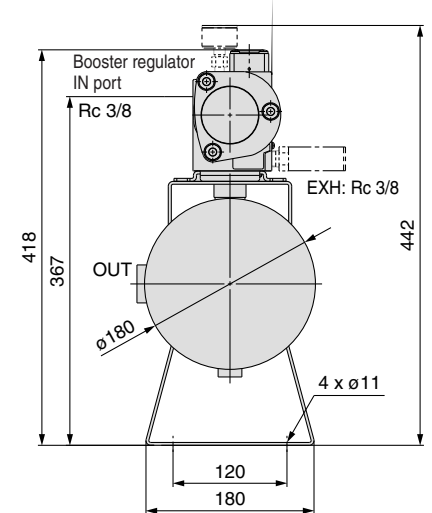
Connected to VBA1110



Connected to VBA20A



Connected to VBA22A

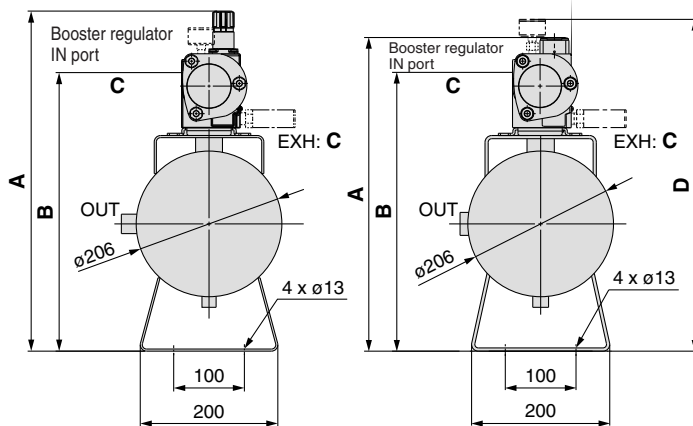
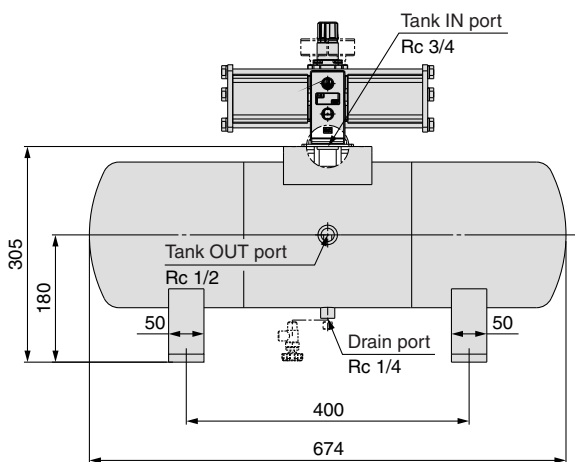


Dimensions: VBAT20S, 38S (Material: Stainless Steel 304)

VBAT20S

Connected to VBA20A, 40A

Connected to VBA22A, 42A, 43A



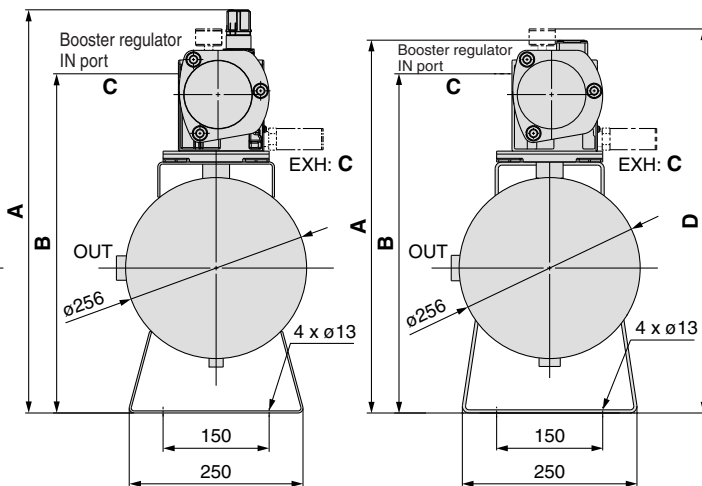
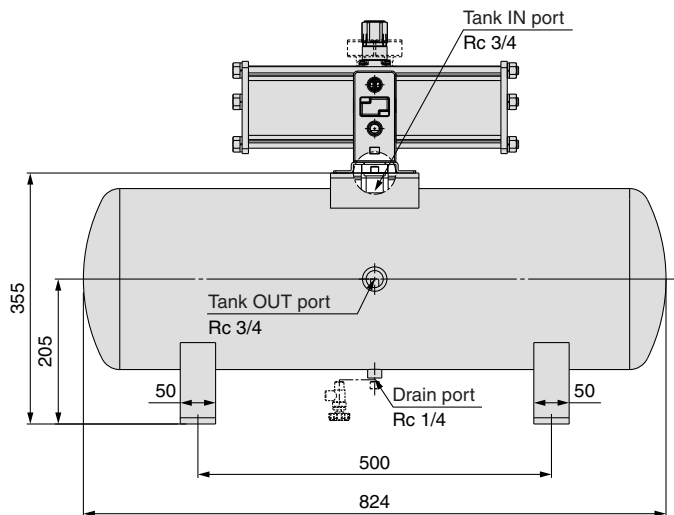
Booster regulator model	A	B	C	D (Note)
VBA20A	481	394	Rc 3/8	—
VBA40A	520	430	Rc 1/2	—
VBA22A	445	394	Rc 3/8	469
VBA42A	478	430	Rc 1/2	493
VBA43A	526	—	—	—

Note) Option: when G (pressure gauge) is selected

VBAT38S

Connected to VBA20A, 40A

Connected to VBA22A, 42A, 43A



Booster regulator model	A	B	C	D (Note)
VBA20A	531	444	Rc 3/8	—
VBA40A	570	480	Rc 1/2	—
VBA22A	495	444	Rc 3/8	519
VBA42A	528	480	Rc 1/2	543
VBA43A	576	—	—	—

Note) Option: when G (pressure gauge) is selected



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

* Inquire about booster regulator with pressure gauge.
* This option cannot be selected for air tank with safety valve.

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) is used for the rubber parts of standard products.

2 CE explosion-proof directive (ATEX) compliant

56 – **Standard model no.**


- **Made to Order**
CE explosion-proof directive (ATEX): Category 3GD





Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution,**” “**Warning**” or “**Danger.**” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC), Japan Industrial Standards (JIS)*1) and other safety regulations*2).

- * 1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1992: Manipulating industrial robots -Safety.
JIS B 8370: General rules for pneumatic equipment.
JIS B 8361: General rules for hydraulic equipment.
JIS B 9960-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
JIS B 8433-1993: Manipulating industrial robots - Safety.
etc.
- * 2) Labor Safety and Sanitation Law, etc.

 **Caution:** Operator error could result in injury or equipment damage.

 **Warning:** Operator error could result in serious injury or loss of life.

 **Danger :** In extreme conditions, there is a possibility of serious injury or loss of life.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



Safety Instructions

Caution

The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch.

Limited Warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited Warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited Warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered.*3)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

* 3) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).



Series VBA

Specific Product Precautions 1

Be sure to read this before handling.

Refer to back pages 1 and 2 for Safety Instructions and “Handling Precautions for SMC Products” (M-E03-3) for Common Precautions.

Booster Regulator/Specific Product Precautions

Design

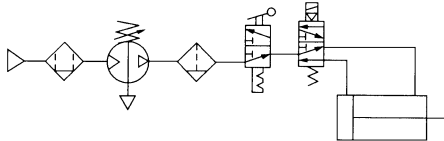
⚠ Warning

1. Warning concerning abnormal outlet pressure

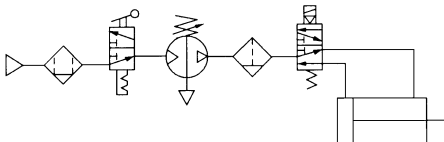
- If there is a likelihood of causing an outlet pressure drop due to unforeseen circumstances such as equipment malfunction, thus leading to a major problem, take safety measures on the system side.
- Because the outlet pressure could exceed its set range if there is a large fluctuation in the inlet pressure, leading to unexpected accidents, take safety measures against abnormal pressures.
- Operate the equipment within its maximum operating pressure and set pressure range.

2. Residual pressure measures

- Connect a 3-port valve to the OUT side of the booster regulator if the residual pressure must be released quickly from the outlet pressure side for maintenance, etc. (Refer to the below diagram.) The residual outlet pressure side cannot be released even if the 3-port valve is connected to the IN side because the check valve in the booster regulator will activate.



- After operation is finished, release the supply pressure at the inlet. This stops the booster valve from moving needlessly and prevents operating malfunctions.



⚠ Caution

1. System configuration

- The IN port of the booster regulator has metallic mesh to prevent dust from entering the booster regulator. However, it cannot remove dust continuously or separate drainage. Make sure to install a mist separator (AM series) at the inlet side of the booster regulator.
- The booster regulator has a sliding part inside, and it generates dust. Also, install a cleaning device such as an air filter or a mist separator on the outlet side as necessary.
- Connect a lubricator to the outlet side, because the accumulated oil in the booster regulator may result in a malfunction.

2. Exhaust air measures

- Provide a dedicated pipe to release the exhaust air from each booster regulator. If exhaust air is converged into a pipe, the back pressure that is created could cause improper operation.
- Depending on the necessity, install a silencer or an exhaust cleaner on the exhaust port of the booster regulator to reduce the exhausting sound.

3. Maintenance space

- Allow the sufficient space for maintenance and inspection.

Selection

⚠ Caution

1. Verify the specifications.

- Consider the operating conditions and operate this product within the specification range that is described in this catalog.

2. Selection

- Based on the conditions (pressure, flow rate, takt time, etc.) required for the outlet side of the booster regulator, select the size of the booster regulator in accordance with the selection procedures described in this catalog or model selection program.
- Use the VBA1111 (pressure increase ratio 4) with pressure increase ratio of 2 to 4. Usage of pressure increase ratio below 2 (pressure increase ratio 2) is preferred for the VBA1110. A stable operation and increased life expectancy will result.
- Inlet supply pressure volume is approximately twice the volume of the outlet side. {approx. 2 times (pressure increase ratio 2), approx. 4 times (pressure increase ratio 4)}. Booster regulator requires that the inlet side volume should be the sum of the flow volume running into the outlet side and the volume exhausted from E port (for driving), because air is the power source.
- When running continuously for longer periods of time, confirm the life expectancy. The life expectancy of a booster regulator is dependent upon the operational cycle. Thus, when used for driving cylinders, etc. in the outlet side, life expectancy will be reduced.
- Make sure the outlet pressure is set more than 0.1 MPa higher than the inlet pressure. A pressure difference less than 0.1 MPa makes the operation unstable and may result in malfunction.

Mounting

⚠ Caution

1. Transporting

- When transporting this product, hold it lengthwise with both hands. Never hold it by the black handle that protrudes from the center because the handle could become detached from the body, causing the body to fall and leading to injury.

2. Installation

- Install this product so that the silver-colored tie-rods and cover are placed horizontally. If mounted vertically, it may result in malfunction.
- Because the piston cycle vibration is transferred, use the following mounting bolts (VBA1: M5; VBA2, 4: M10) and tighten them with the specified torque (VBA1: 3 N·m; VBA2, 4: 24 N·m).
- If the transmission of vibration is not preferred, insert an isolating rubber material before installation.
- The pressure gauge should be mounted with the following torque. R 1/16 for VBA1: 3 to 4 N, R 1/8: 7 to 9 N



Series VBA

Specific Product Precautions 2

Be sure to read this before handling.

Refer to back pages 1 and 2 for Safety Instructions and “Handling Precautions for SMC Products” (M-E03-3) for Common Precautions.

Booster Regulator/Specific Product Precautions

Piping

⚠ Caution

1. Flushing

- Use an air blower to flush the piping to thoroughly remove any cutting chips, cutting oil, or debris from the piping inside, before connecting them. If they enter the inside of the booster regulator, they could cause the booster regulator to malfunction or its durability could be affected.

2. Piping size

- To bring the booster regulator’s ability into full play, make sure to match the piping size to the port size.

Air Supply

⚠ Caution

1. Quality of air source

- Connect a mist separator to the inlet side near the booster regulator. If the quality of the compressed air is not thoroughly controlled, the booster regulator could malfunction (without being able to boost) or its durability could be affected.
- If dry air (atmospheric pressure dew point: -17°C or less) is used, the life expectancy may be shortened because dry air will accelerate evaporation of grease inside.

Operating Environment

⚠ Caution

1. Installation location

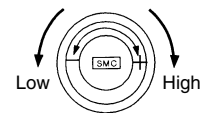
- Do not install this product in an area that is exposed to rain-water or direct sunlight.
- Do not install in locations influenced by vibrations. If it must be used in such an area due to unavoidable circumstances, please contact SMC beforehand.

Handling

⚠ Caution

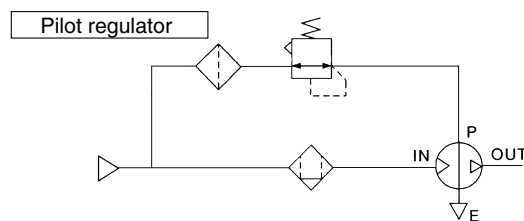
1. Setting the pressure on the handle-operated type

- If air is supplied to the product in the shipped state, the air will be released.
Set the pressure by quickly pulling up on the governor handle, and rotating it in the direction of the arrow (+).
- There is an upper and lower limit for the handle rotation. If over-rotating the handle even after reaching to the limit, the internal parts may be damaged. If the handle suddenly feels heavy while being turned, stop turning the handle.
- Once the setting is completed, push the handle down.
- To decrease the outlet pressure, after the pressure has been set, rotate the handle in the direction of the arrow (–). The residual air will be released from the area of the handle, due to the relief construction of the governor.
- To reset the pressure, first reduce the pressure so that it is lower than the desired pressure; then, set it to the desired pressure.



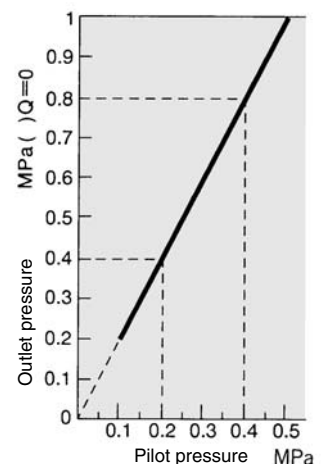
2. Setting the pressure on the air-operated type (VBA22A, 42A)

- Connect the outlet pipe of the pilot regulator for the remote control to the pilot port (P). (Refer to the figure below.)
- Refer to the following figure for the pilot pressure and outlet pressure.
- The AR20 and AW20 are recommended for the pilot regulator.



- The outlet pressure is twice the pilot pressure.
- When the inlet pressure is 0.4 MPa:

Pilot pressure
0.2 MPa to 0.4 MPa
Outlet pressure
0.4 MPa to 0.8 MPa





Series VBA

Specific Product Precautions 3

Be sure to read this before handling.

Refer to back pages 1 and 2 for Safety Instructions and “Handling Precautions for SMC Products” (M-E03-3) for Common Precautions.

Booster Regulator/Specific Product Precautions

Handling

⚠ Caution

3. Draining

- If this product is used with a large amount of drainage accumulated in the filter, mist separator, or the tank, the drainage could flow out, leading to equipment malfunction. Therefore, drain the system once a day. If it is equipped with an auto-drain, check its operation once a day.

4. Exhaust

- Exhausting time from E port may be longer for a booster regulator which is set to switch in longer hour intervals. This is not an abnormal phenomenon.

5. Maintenance

- Life expectancy varies depending on the quality of air and the operating conditions. As a symptom of the end of life expectancy, it can be found by breathing all the time beneath the handle, or hearing the exhausting sound from booster regulator in 10 to 20 second intervals despite no air consumption in the outlet side. Conduct maintenance earlier than scheduled in such cases.
- When maintenance is required, confirm the model and serial number of the booster regulator, and please contact SMC for maintenance kit.
- Maintenance should be carried out according to the specified maintenance procedure by individuals possessing enough knowledge and experiences in maintaining pneumatic equipment.
- The list of replacement parts and kit part number are shown on page 6, and the figure shows the position of the parts.

Air Tank/Specific Product Precautions

Design

⚠ Warning

1. Operating pressure

- Operate this product at or below the maximum operating pressure. If it is necessary, take appropriate safety measures to ensure that the maximum operating pressure is not exceeded.
- Even when the tank alone is used, use a pressure switch or a safety valve to make sure that the maximum operating pressure is not exceeded.

2. Connection

- Connect a filter or a mist separator to the OUT side of the tank. Because the inner surface of the tank is untreated, there is a possibility of dust flowing out to the outlet side.
- Using tank accessories, a VBA booster regulator can be connected directly in the combinations indicated below.

		Booster regulator		
		VBA111□-02	VBA2□A	VBA4□A
Air tank	VBAT05A	●	—	—
	VBAT05S	●	—	—
	VBAT10A	●	●	—
	VBAT10S	●	●	—
	VBAT20A	—	●	●
	VBAT20S	—	●	●
VBAT38A	—	●	●	
VBAT38S	—	●	●	

Air Tank/Specific Product Precautions

Selection

⚠ Caution

- Consider the operating conditions and operate this product within the specification range.
- When using the air tank with a booster valve, refer to “Sizing” on page 5 or SMC Pneumatic System Energy Saving Program.

Mounting

⚠ Caution

1. Accessories

- The accessories are secured by bands to the feet of the tank. Once removed, make sure not to lose them.

2. Installation

- Tank should be installed away from people. It is dangerous if the accumulated air inside the tank were to seep out.
- Do not mount the air tank on a moving part or a place with vibration.
- When connecting a booster regulator with the tank, refer to the operating manual first, which is provided with the air tank before assembling.
- To mount the air tank on a floor surface, use the four holes to secure the tank with bolts or anchor bolts.

Maintenance

⚠ Warning

1. Inspection

- The use of pressure vessels could lead to an unexpected accident due to external damage or internal corrosion caused by drainage. Therefore, make sure to check periodically for external damage, or the extent of internal corrosion through the port hole. An ultrasonic thickness indicator may also be used to check for any reduction in material thickness.

2. Draining

- If this product is used with a large amount of drainage, the drainage could flow out, leading to equipment malfunction or corrosion inside the tank. Therefore, drain the system once a day.

Record of changes

- B edition** * The addition of air-operated type booster regulators, VBA22A/42A series
* The addition of booster regulators with max. operating pressures of 1.6 MPa, VBA43A series
* Number of pages increased from 24 to 28

MY



Safety Instructions

Be sure to read "Handling Precautions for SMC Products" (M-E03-3) before using.

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