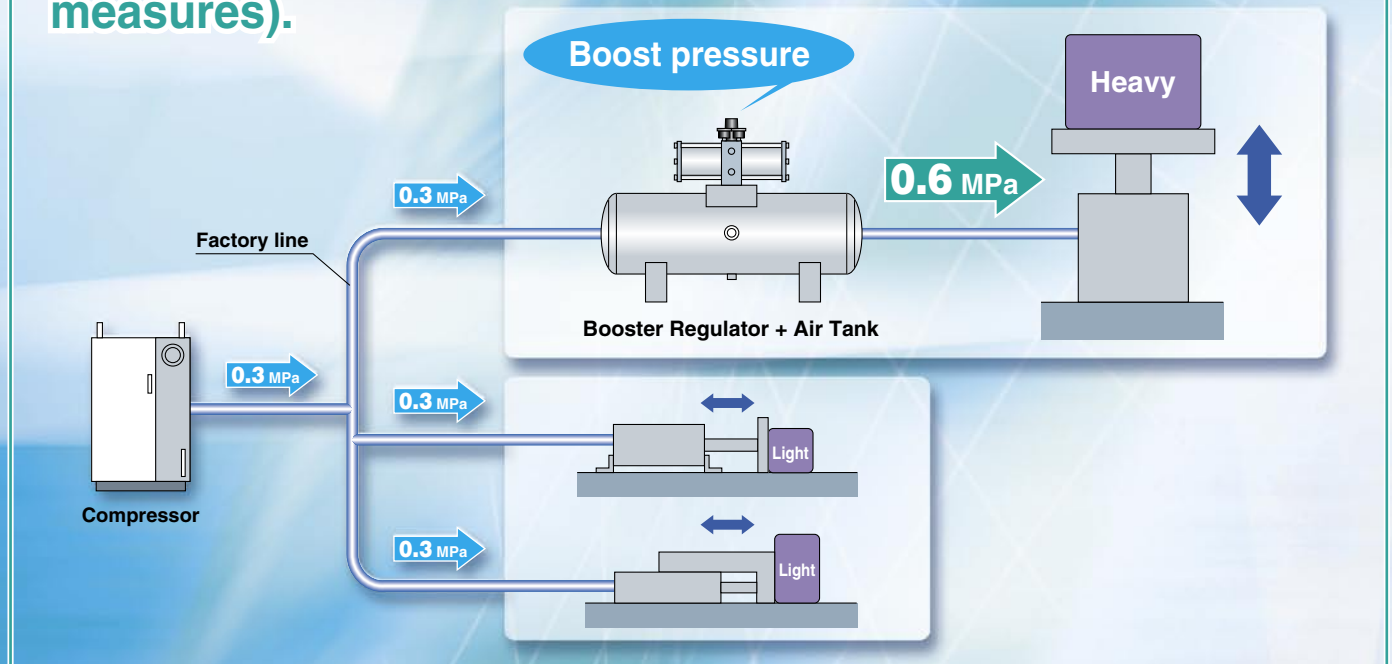


Increase factory air pressure by up to twice! No need for an electrical supply!

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

Booster regulator provides 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**



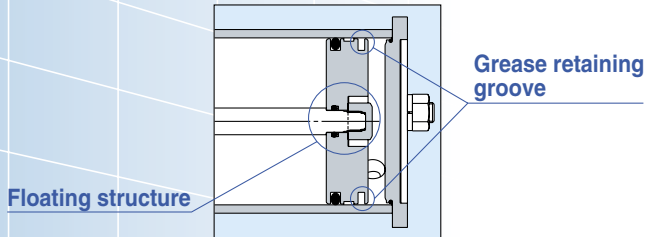
CAT.ES11-96B'-UK

Booster Regulator *Series VBA*

P.1

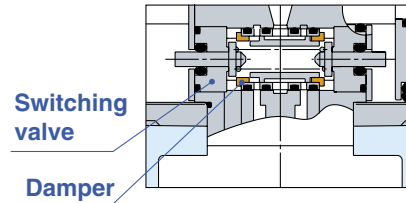
Improved service life: Doubled than the conventional model

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



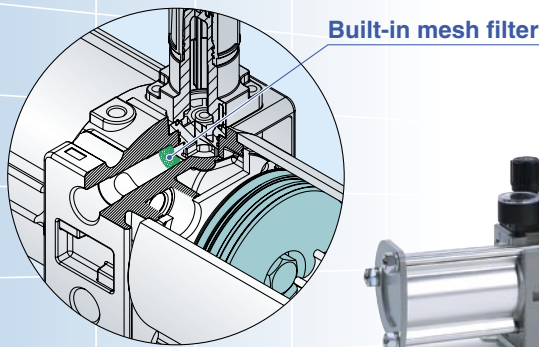
Reduced noise: 13 dB (A) less compared with the conventional model

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



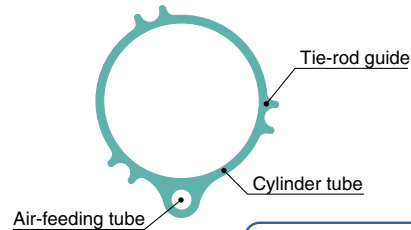
Improved reliability: Built-in mesh filter at IN port

- Prevents operation failure due to foreign matter.



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

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



Series VBA ¹¹¹⁰/₁₁₁₁

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



Air Tank *Series VBAT*

P.9

A small capacity air tank to which a booster regulator can be connected directly, or that can be used alone as a tank. Due to pressure vessel law is different from country to country so confirm the use of following air tanks in other countries outside the European market.

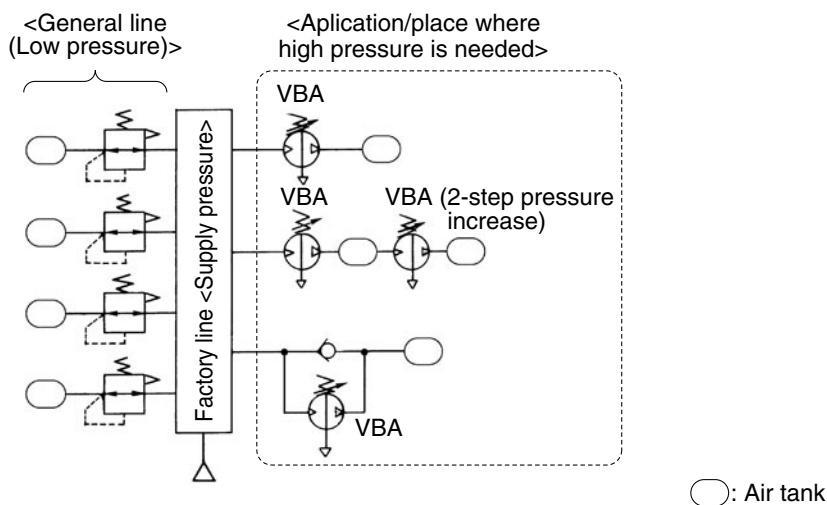
Specifications

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



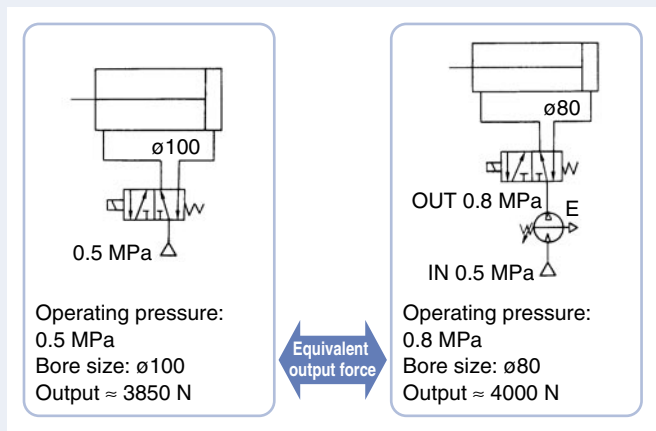
Example of Circuit Diagram

Energy and cost saving booster regulator



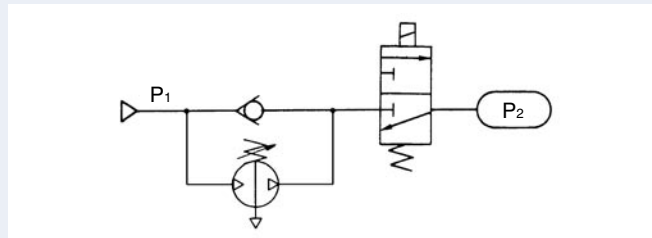
Examples of Application

- When certain equipment requires a higher pressure than the factory line pressure.
- When the lower pressure limit for equipment must be ensured due to fluctuation and/or 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 enough power, in order to achieve a compact drive unit.

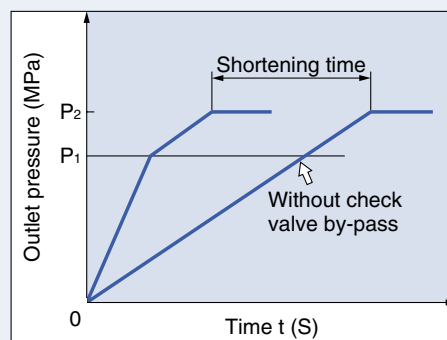


- When the hydraulic pressure of an air-hydro unit must be raised.
- When the pressure must be raised in an explosion-proof environment.
- To boost the pressure by remote operation, using an air operated type.

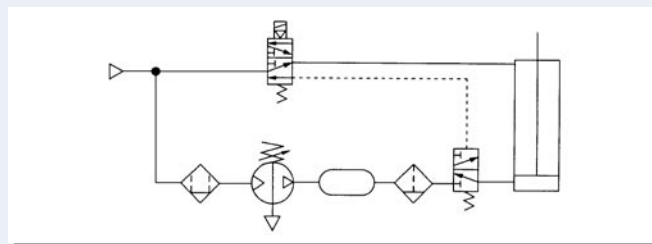
- When the tank must be filled with atmospheric pressure in a short time.



Initially, inlet pressure (P₁) passes through the check valve, fills P₂, and results in P₁ = P₂.



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



Booster Regulator Series VBA

How to Order

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

Made to Order

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

Note) Refer to page 13.



VBA1110-02



VBA1111-02

Body size

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

Note) Pressure: 2 MPa

Pressure increase ratio

0	Twice
1	4 times

Thread type

Symbol	Thread type
—	Rc
F	G
N	NPT
T	NPTF

Option

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

Port size

Symbol	Port size
02	1/4

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

Made to Order

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

Note) Refer to page 13.



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

Note) Pressure increase ratio: Twice

Semi-standard

Symbol	Specifications
—	Standard
Z Note)	Display units for product name plate and pressure gauge: psi

Note) For thread types 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
—	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
—	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
Max. supply pressure (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)						
Weight (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 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 pages 3 and 4.

Options/Part No.

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

Model		VBA1110-02	VBA20A-03	VBA40A-04	VBA22A-03	VBA42A-04	VBA1111-02	VBA43A-04
Description		VBA1110-F02	VBA20A-F03	VBA40A-F04	VBA22A-F03	VBA42A-F04	VBA1111-F02	VBA43A-F04
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 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 N or T.)

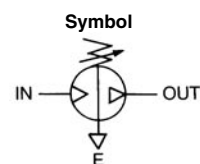
Model		*VBA1110-N02	VBA20A-N03*	VBA40A-N04*	VBA22A-N03*	VBA42A-N04*	*VBA1111-N02	VBA43A-N04*
Description		*VBA1110-T02	VBA20A-T03*	VBA40A-T04*	VBA22A-T03*	VBA42A-T04*	*VBA1111-T02	VBA43A-T04*
		(* indicates "N")	(* indicates "-Z")	(* indicates "-Z")	(* indicates "-Z")	(* indicates "-Z")	(* indicates "N")	(* indicates "-Z")
Pressure gauge (* No symbol)	G	G27-20-R1	G36-10-N01		KT-VBA22A-7N	G36-10-01	G27-20-R1	KT-VBA43A-7N
Pressure gauge (* indicates "-Z") ^{Note 3)}		—	G36-P10-N01		KT-VBA22A-8N	G36-10-N01	—	KT-VBA43A-8N
Pressure gauge (* indicates "N") ^{Note 4)}		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 case of option GN, two pressure gauges and one silencer are included as accessories.

Note 2) KT-VBA22A-7N, KT-VBA43A-7N, KT-VBA22A-8N and KT-VBA43A-8N are pressure gauges with fittings (Please order two units when using with IN and OUT).

Note 3) Display unit for pressure gauge: psi

Note 4) Display unit for pressure gauge: psi and MPa



Related Products/Part No.

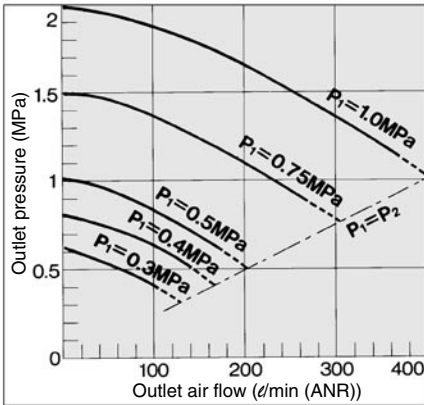
Model	For VBA1110-02 For VBA1111-02	For VBA20A-03 For VBA22A-03	For VBA40A-04 For VBA42A-04 For VBA43A-04
Air tank	VBAT05A VBAT10A	VBAT10A VBAT20A VBAT38A	VBAT20A VBAT38A
Mist separator	AM250C-02	AM450C-04, 06	AM550C-06, 10
Exhaust cleaner	AMC350-03	AMC350-04	AMC350-05

Note) Refer to SMC "Best Pneumatics" Vol.14 catalogue for Air Tank and Mist Separator, and Vol.5 catalogue for Exhaust Cleaner.

Series VBA

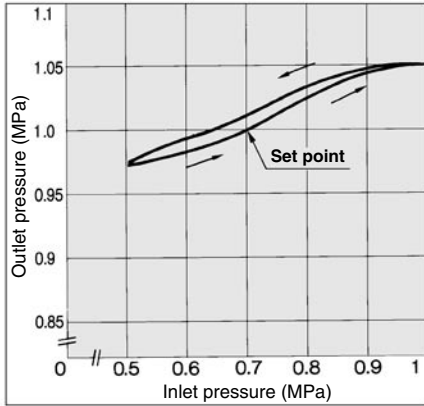
VBA1110

Flow Characteristics

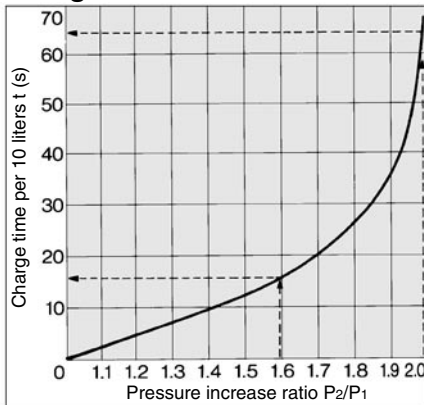


Pressure Characteristics

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



Charge Characteristics



VBA1110

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

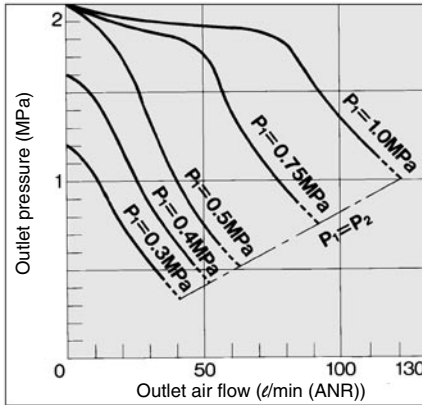
$$\frac{P_2}{P_1} = \frac{0.8}{0.5} = 1.6 \quad \frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0$$

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 is:

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

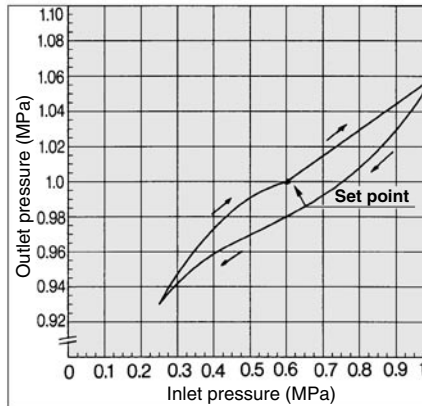
VBA1111

Flow Characteristics

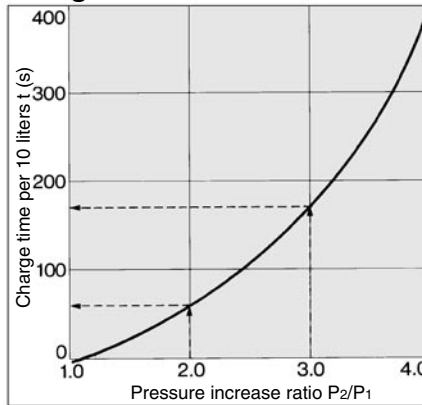


Pressure Characteristics

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



Charge Characteristics



VBA1111

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

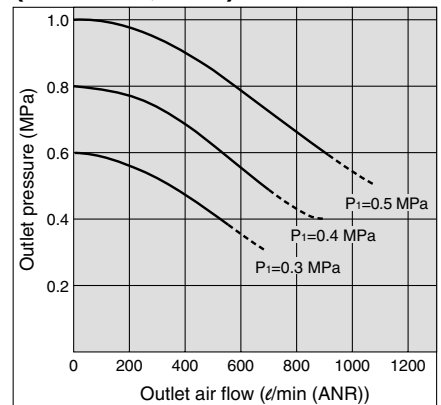
$$\frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0 \quad \frac{P_2}{P_1} = \frac{1.5}{0.5} = 3.0$$

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 is:

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

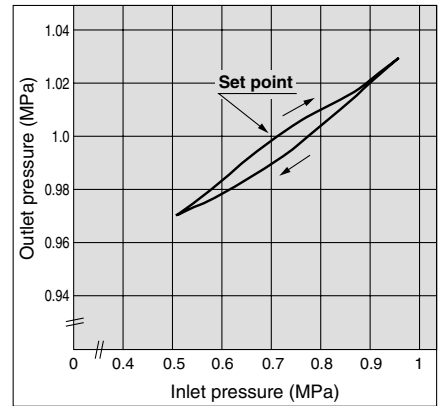
VBA20A, 22A

Flow Characteristics (VBA20A, 22A)

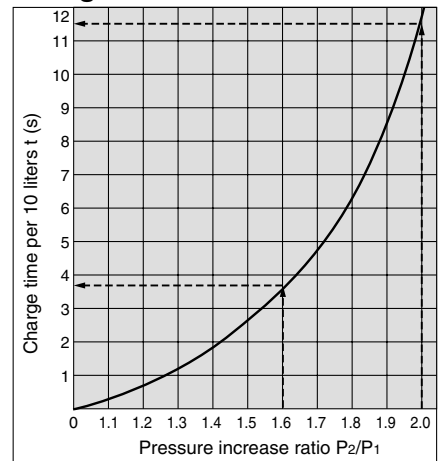


Pressure Characteristics

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



Charge Characteristics



VBA20A, 22A

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

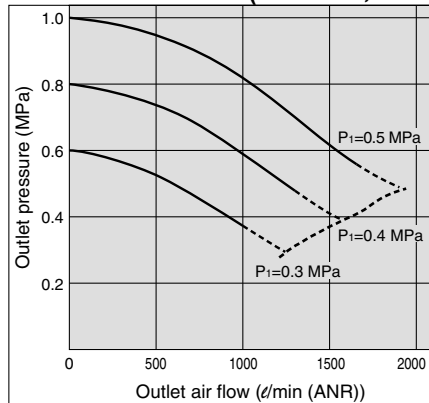
$$\frac{P_2}{P_1} = \frac{0.8}{0.5} = 1.6 \quad \frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0$$

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 is:

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

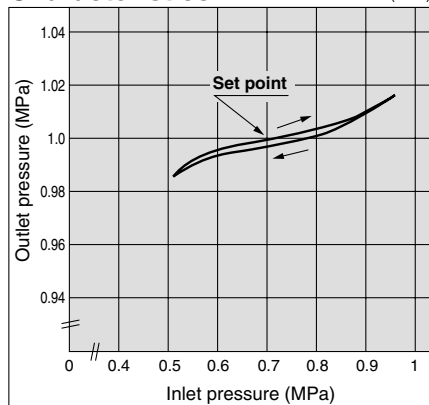
VBA40A, 42A

Flow Characteristics (VBA40A, 42A)

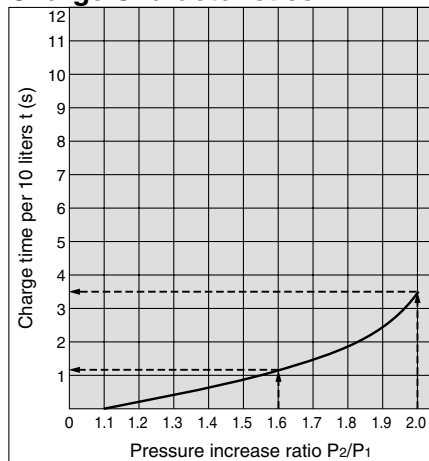


Pressure Characteristics

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



Charge Characteristics



VBA40A, 42A

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

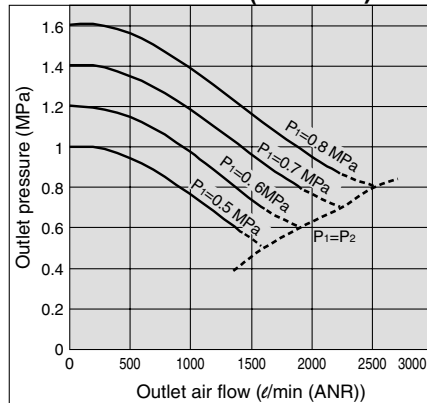
$$\frac{P_2}{P_1} = \frac{0.8}{0.5} = 1.6 \quad \frac{P_2}{P_1} = \frac{1.0}{0.5} = 2.0$$

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 is:

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

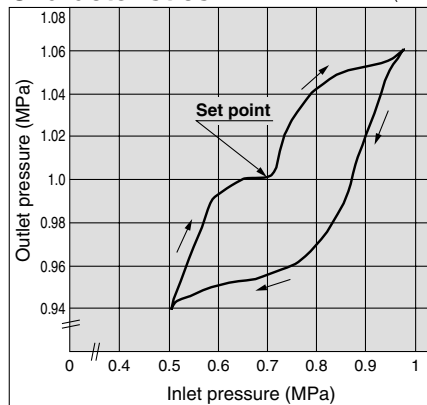
VBA43A

Flow Characteristics (VBA43A)

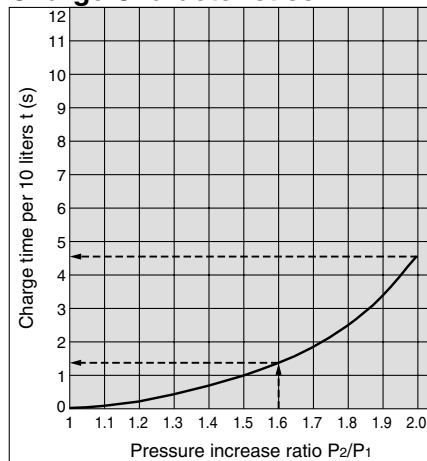


Pressure Characteristics

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



Charge Characteristics



VBA43A

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

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

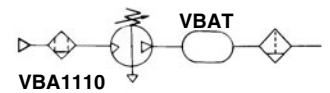
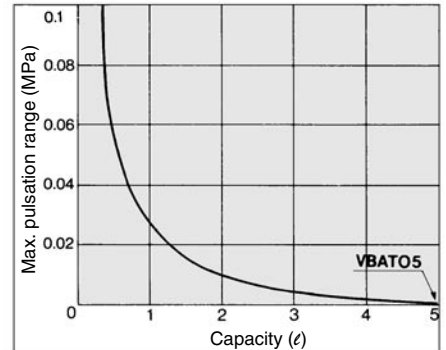
With the pressure increase ratio from 1.6 to 2.0, the charge time of $4.5 - 1.3 = 3.2$ sec. (t) is given by the graph. Then, the charge time (T) for a 100 l tank is:

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

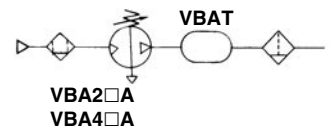
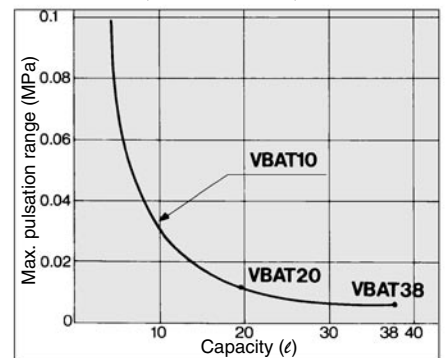
Pulsation/ Pulsation is decreased by using tank.

If the outlet capacity is undersized, pulsation may occur.

VBAT05A



VBAT10A, VBAT20A, VBAT38A



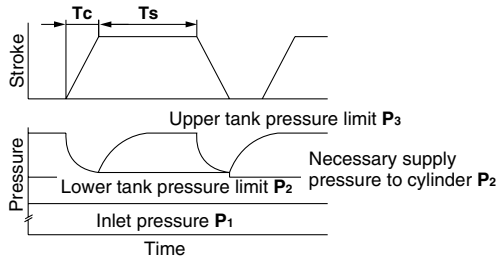
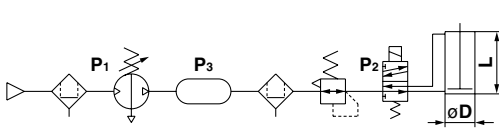
Conditions:

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

Performance of air tank:

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

Sizing (Sizing can be achieved by using SMC Energy Saving Program. Contact your SMC sales representative.)



START

Provide requisite conditions for selection.

Necessary conditions:
D [mm]: 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
 100
 100
 200
 1
 0.5
 30
 0.5
 0.8

Other conditions:
Q [ℓ/min (ANR)]: Necessary air flow amount
Qb [ℓ/min (ANR)]: Air flow at outlet of booster regulator
Tc [s]: Cylinder stroke time
K: Cylinder double-acting: 2, single-acting: 1
P3 [MPa] ^{Note 2)}: Pressure to charge in a tank
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) Set the pressure to the lower tank pressure limit (or less) with a regulator.
 Adjust the pressure considering the maximum operating pressure of equipment in use.
 Note 2) P3 is the output pressure of the booster regulator, which is also the upper pressure limit charged in a tank.

Calculate required flow Q.

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

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

Select booster regulator size from flow characteristics table.

VBA2□A: Qb = 500 [ℓ/min (ANR)]
VBA4□A: Qb = 1050 [ℓ/min (ANR)]

Refer to "Flow Characteristics" on pages 3 and 4.

Flow rate?

NO: No tank needed. The **VBA4□A** can supply necessary pressure.

YES: The **VBA2□A** cannot obtain necessary pressure.

Obtain the tank volume V.

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

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

Select the tank with the capacity over V.

Select the **VBAT10A**, which can be directly connected to the **VBA2□A**.

Tank part no.	Inner volume	Applicable combination model		
VBAT05A	5 ℓ	VBA1110	—	—
VBAT10A	10 ℓ	VBA1110	VBA2□A	—
VBAT20A	20 ℓ	—	VBA2□A	VBA4□A
VBAT38A	38 ℓ	—	VBA2□A	VBA4□A

Calculate time T from charge characteristics table.

Refer to "Change Characteristics" on pages 3 and 4.

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

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

Charge time T ≤ Ts?

NO: Extend stop time Ts up to charge time T or more?
NO: Increase number of booster regulators (Z) to decrease T.

YES

END

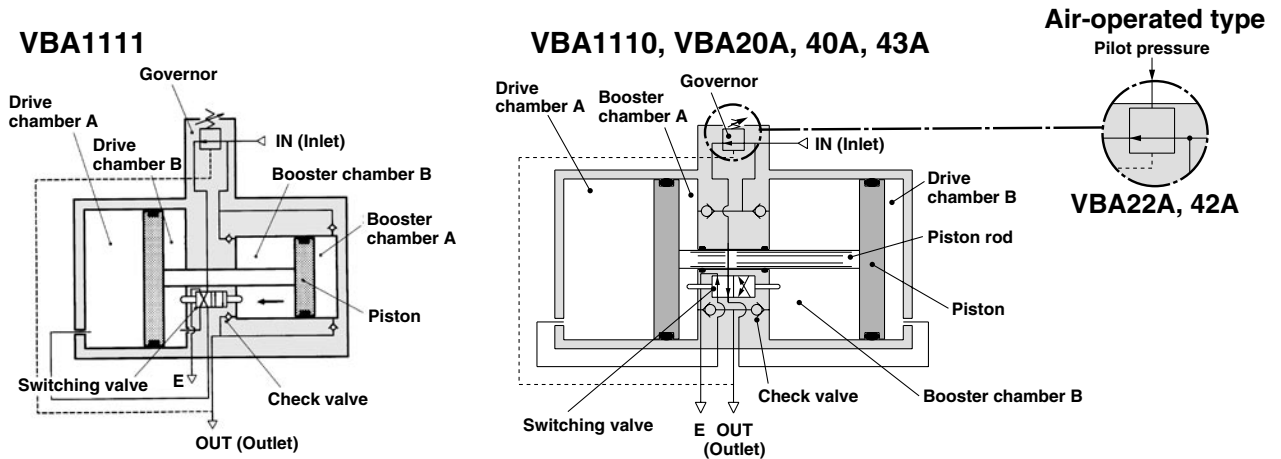
When running continuously for long periods of time, confirm the life expectancy. When the life expectancy is shorter than required, select a larger sized booster regulator.

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 at the outlet side. {approx. 2 times (pressure increase ratio 2), approx. 4 times (pressure increase ratio 4)}. Boost 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).

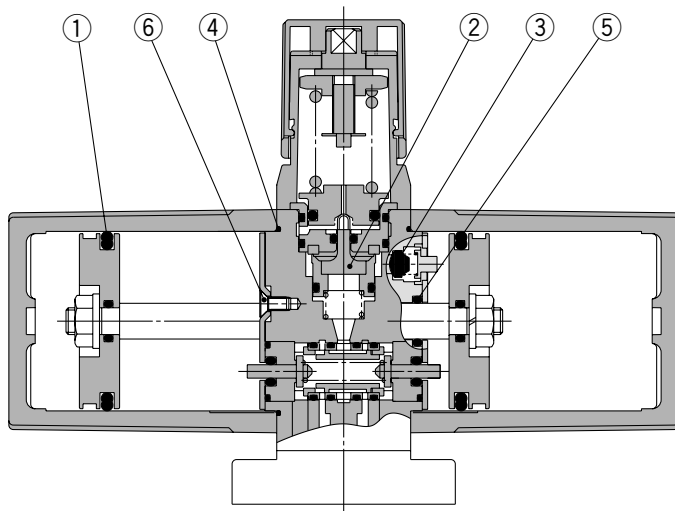
Construction/Principle

The IN air passes through the check valve to pressure boosting chambers A and B. Meanwhile, air is supplied to actuating chamber B via the governor and the switching valve. Then, the air from chamber B and boosting chamber A are applied to the piston, boosting the air in 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 chamber B is in the exhaust state and chamber A is in the supply. Then, the piston reverses its movement, this time, the pressures from chamber B and chamber A boosts the air in boosting 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.

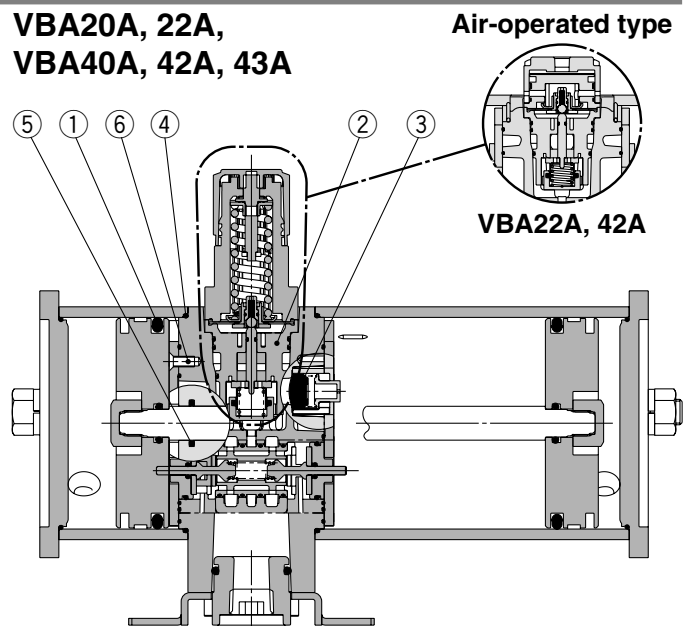


Construction/Replacement Parts

VBA111₁⁰



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



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

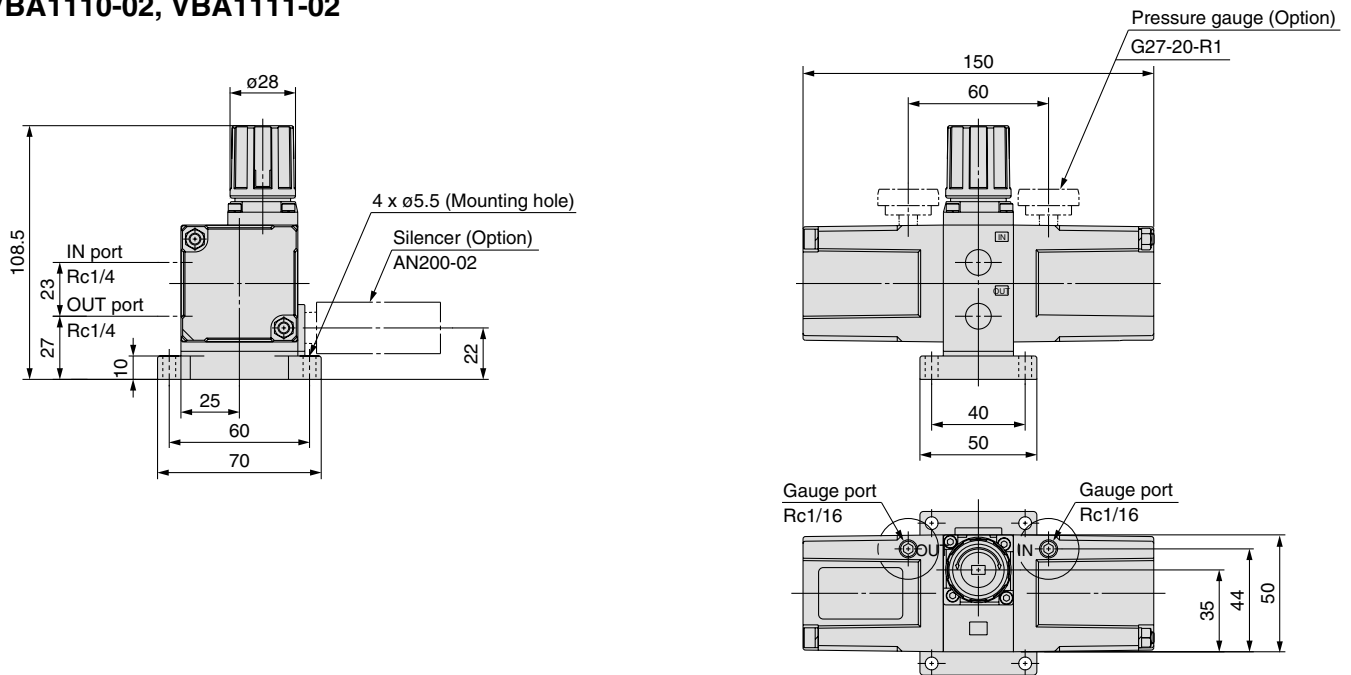
Note 1) The grease pack has 10 g of grease.

Note 2) Make sure to refer to the procedure for maintenance.

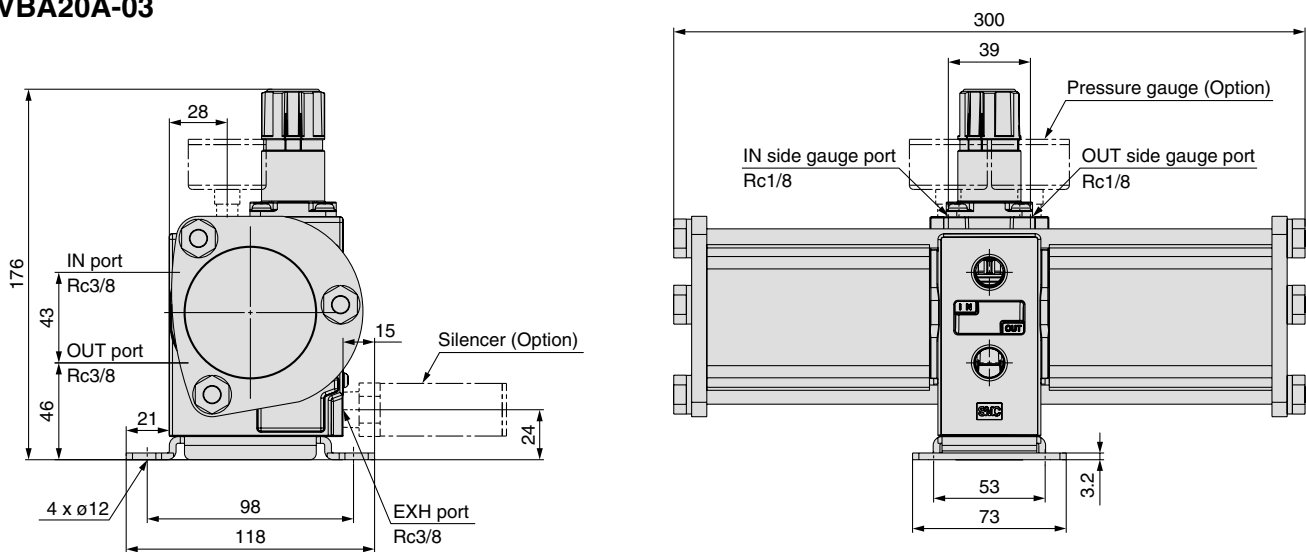
Series VBA

Dimensions

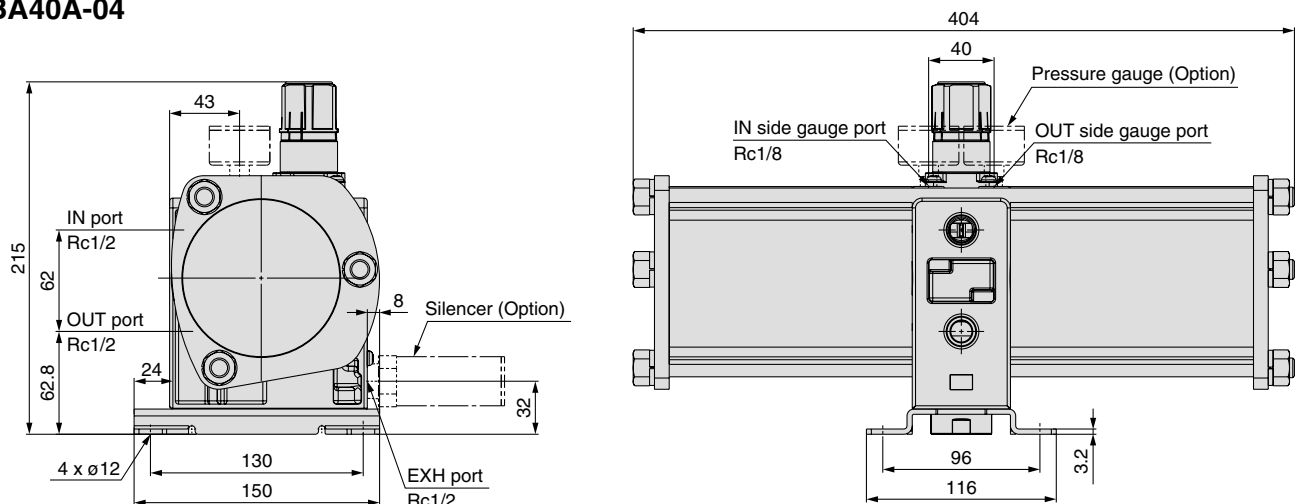
VBA1110-02, VBA1111-02



VBA20A-03

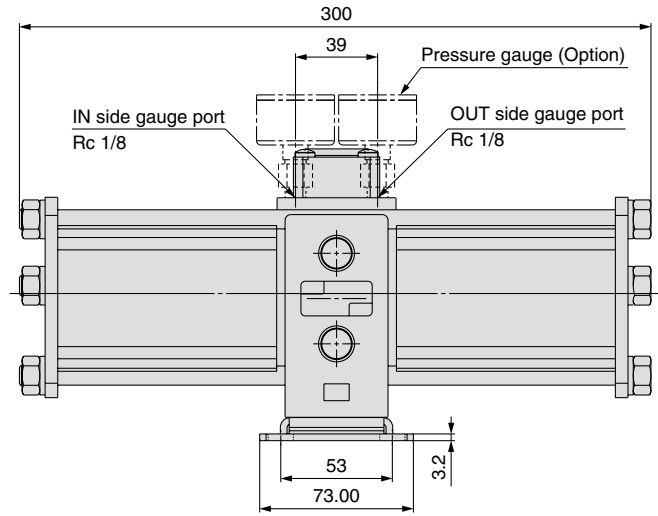
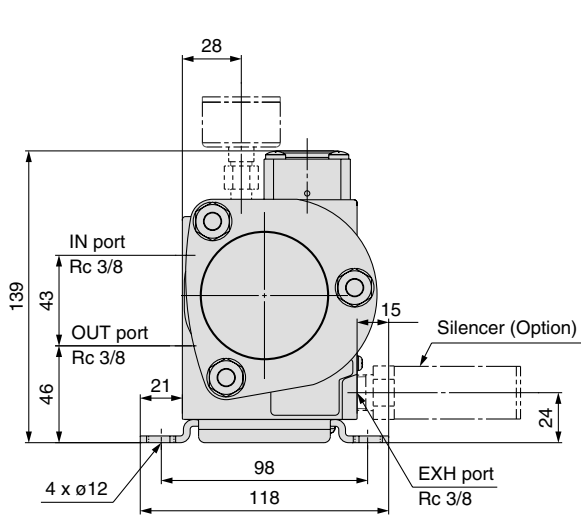


VBA40A-04

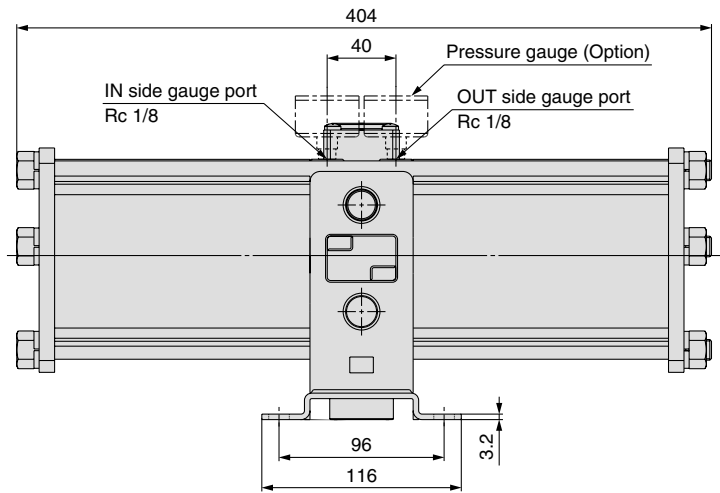
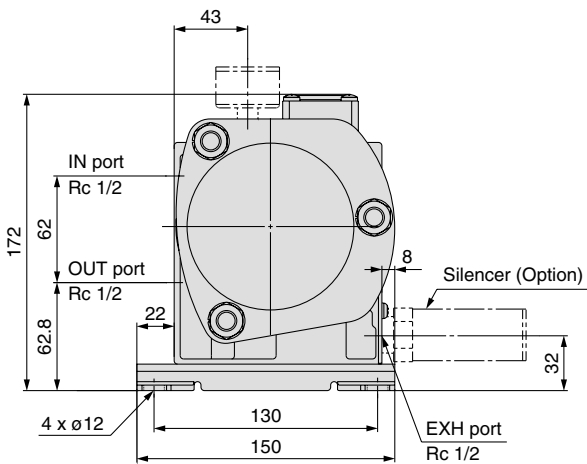


Dimensions

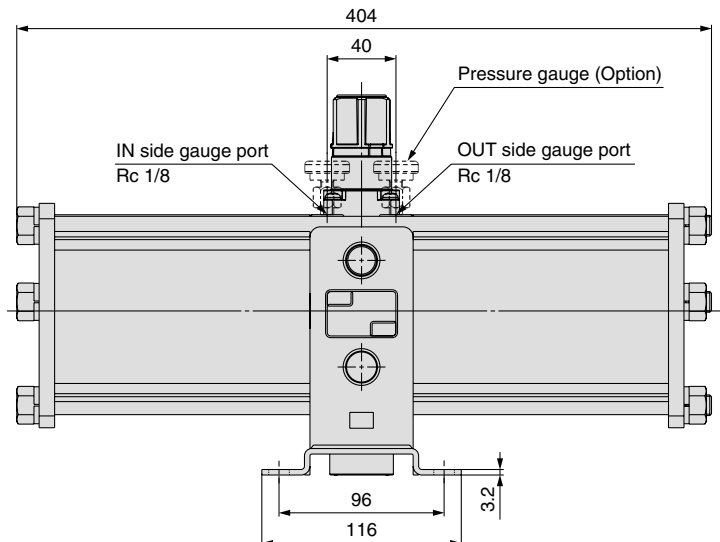
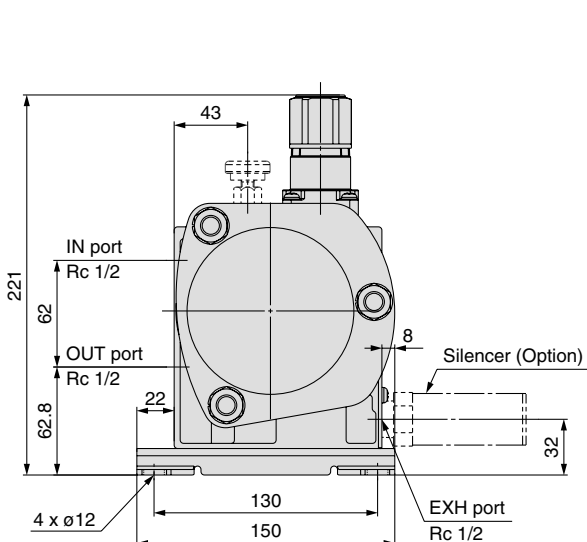
VBA22A-03



VBA42A-04



VBA43A-04



Air Tank

Series VBAT

How to Order



VBAT05A



VBAT38A

VBAT 10 A - S

Tank inner volume

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

Material

Symbol	Material
A	Carbon steel

Thread type

Symbol	Thread type
—	Rc
F	G

Overseas-compatible product

Symbol	Standard
-Q	CE marking

Option

Symbol	Option
V	Drain valve

Option

Symbol	Option	Applicable model
R	Safety valve (Set pressure 1 MPa)	VBAT20A VBAT38A
S	Safety valve (Set pressure 2 MPa)	VBAT05A VBAT10A

- Compact connections are possible with booster regulators.
- It can be used alone as a tank. The pressure vessel law is different from country to country, so confirm a suitable air tank to your place.

Specifications and option combinations

● Required ○ Combination possible

Specifications	Option	Material	Option		Thread type	
		A: Carbon steel S: Stainless steel	Safety valve	Drain valve	Rc	G
Overseas-compatible product: CE marking ^{Note)}	A	●	●	○	○	

Note) Tanks for overseas are carbon steel products.

Model (Carbon Steel)

Model	VBAT05A	VBAT10A	VBAT20A	VBAT38A
Tank capacity (ℓ)	5	10	20	38
Max. operating pressure (MPa)	2.0		1.0	
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			
Weight (kg)	6.6	10.0	14.0	21.0
Material	Carbon steel			
Paint	Outside: Silver paint, Inside: Rustproof paint			

Note) Accessories and options are enclosed in a package.

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.

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
		VBAT10A-SV-Q, VBAT10AF-SV-Q	
		VBAT20A-RV-Q, VBAT20AF-RV-Q	
		VBAT38A-RV-Q, VBAT38AF-RV-Q	

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

Model	VBAT05A	VBAT10A	VBAT20A	VBAT38A
Accessory kit number contains a set with 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 plug R1/4 (Stainless steel)			
⑤ Safety valve port plug (1 pc.)	Hexagon socket head taper plug R3/8 (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			

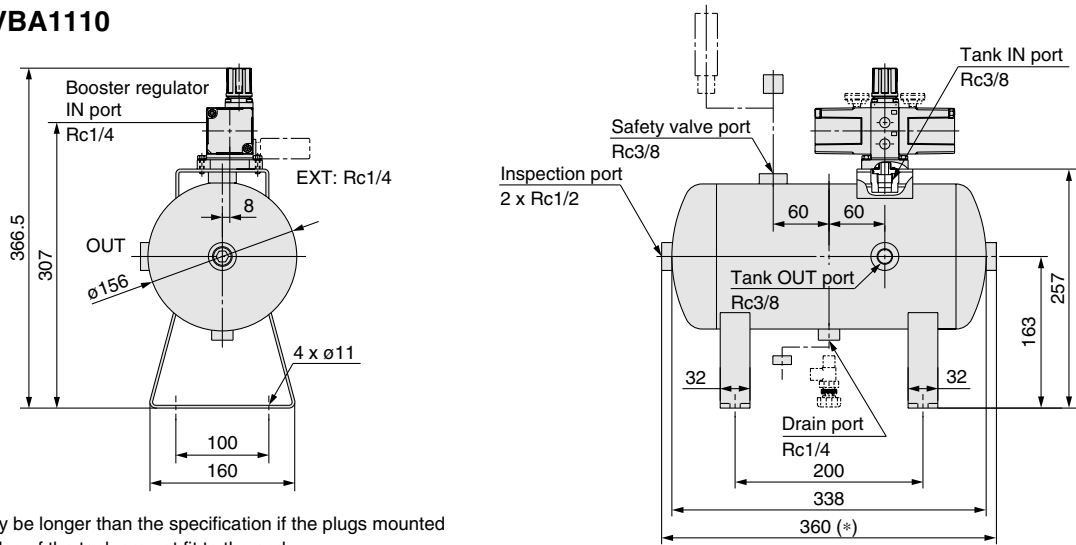
Note) The set pressure of the safety valve cannot be changed.

Series VBAT

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

VBAT05A

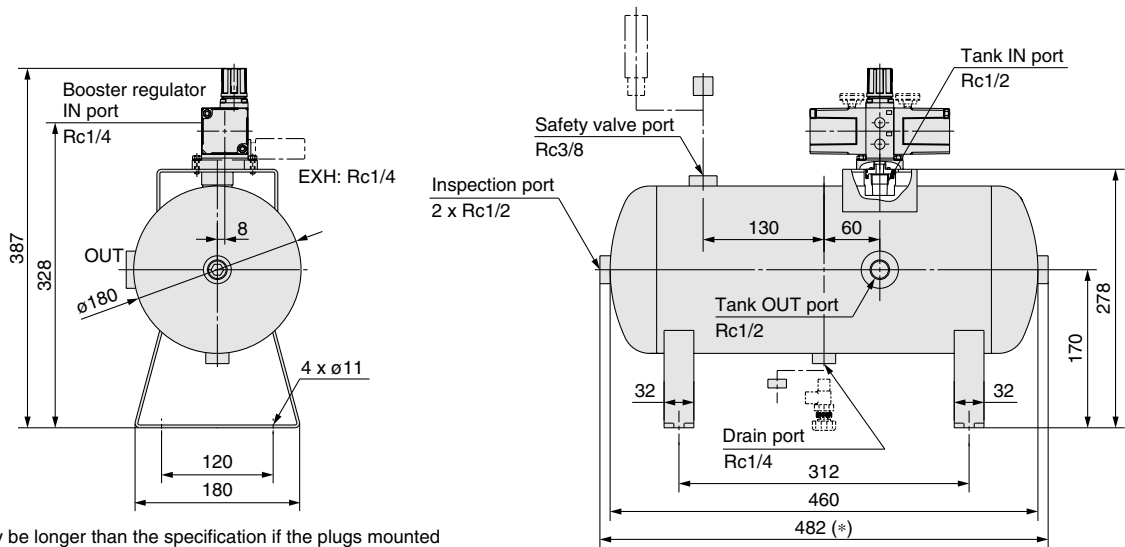
Connected to VBA1110



Note) 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.

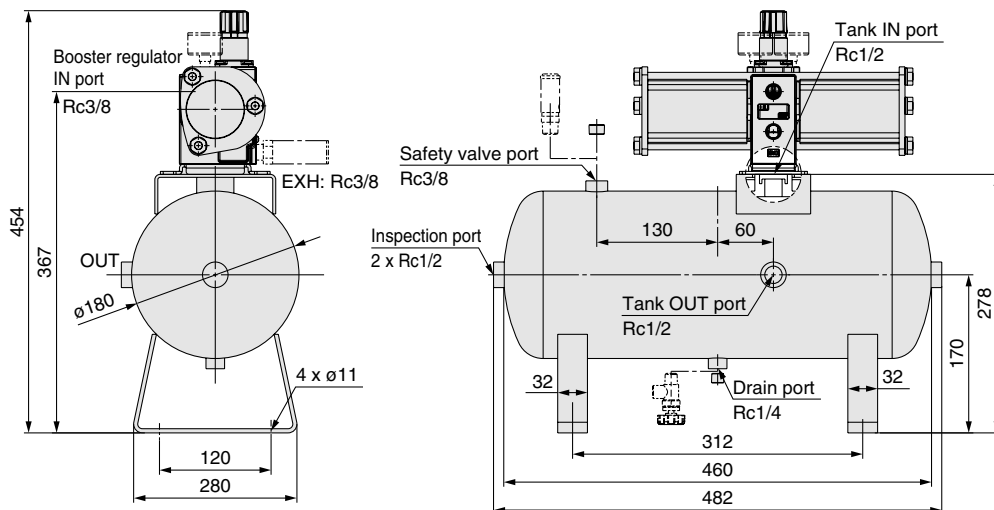
VBAT10A

Connected to VBA1110



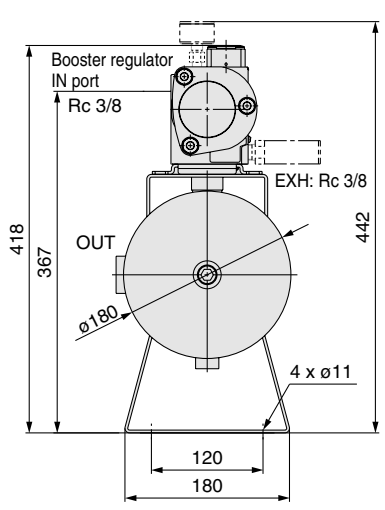
Note) The length may be longer than the specification if the plugs mounted on the both sides of the tank are not fit to the end.

Connected to VBA20A



Note) 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

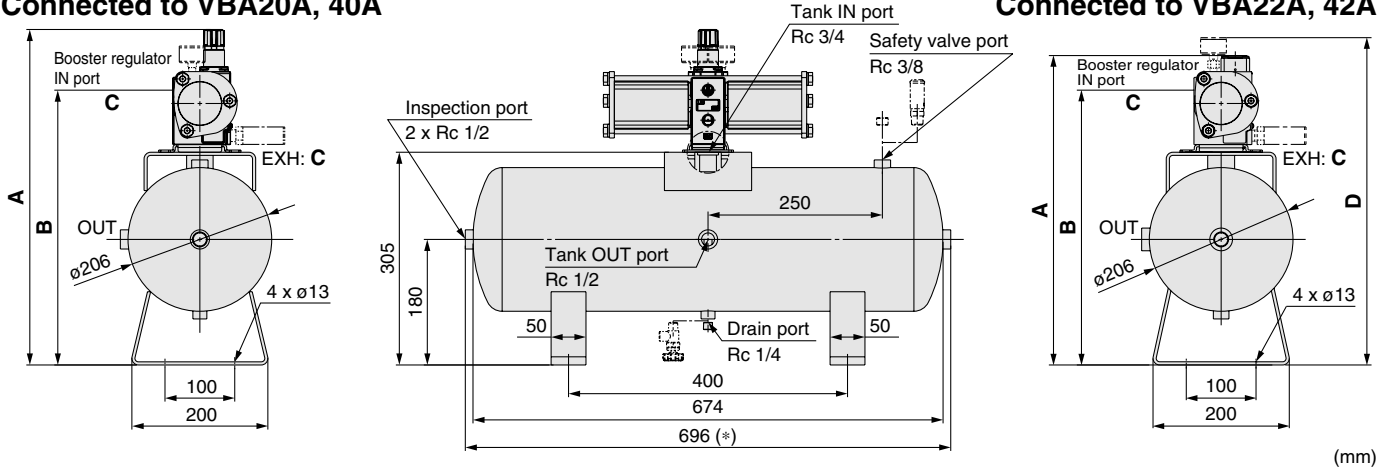


Dimensions: VBAT20A, 38A (Material: Carbon Steel)

VBAT20A

Connected to VBA20A, 40A

Connected to VBA22A, 42A



Note) 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.

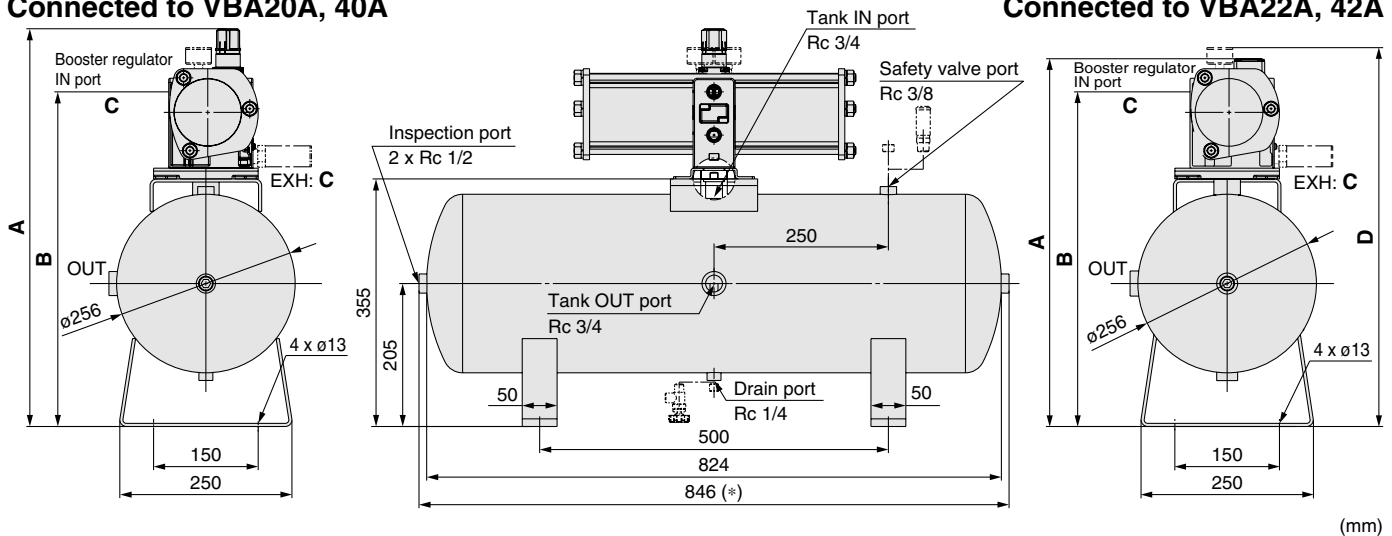
Booster regulator model	A	B	C	D (Note)
VBA20A	481	394	Rc 3/8	—
VBA40A	520	430	Rc 1/2	—
VBA22A	445	394	Rc 3/8	469
VBA42A	478	430	Rc 1/2	493

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

VBAT38A

Connected to VBA20A, 40A

Connected to VBA22A, 42A

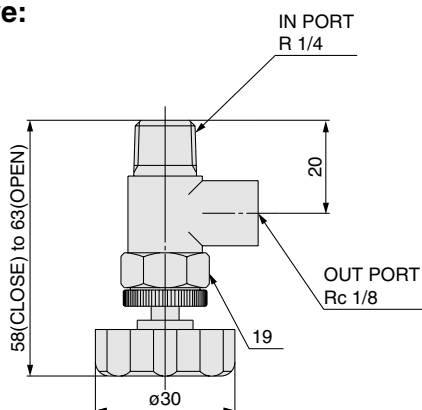


Note) The length may be longer than the specification if the plugs mounted on the both sides of the tank are not fit to the end.

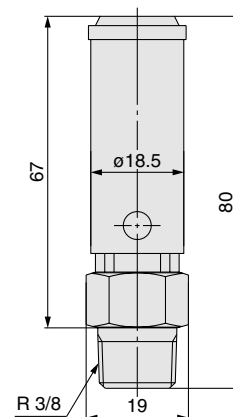
Booster regulator model	A	B	C	D (Note)
VBA20A	531	444	Rc 3/8	—
VBA40A	570	480	Rc 1/2	—
VBA22A	495	444	Rc 3/8	519
VBA42A	528	480	Rc 1/2	543

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

Drain valve: VBAT-V1



Safety valve: VBAT-R, VBAT-S





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

Note 1) Inquire about booster regulator with pressure gauge.

2 CE explosion-proof directive (ATEX) compliant

56 – **Standard model no.**

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

3 Ozone resistant

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

80 – **Standard model no.**

- Made to Order
Ozone resistant

Note) Weather resistant NBR (diaphragm) and hydrogenated NBR (valve) is used for the rubber parts of standard products.





Safety Instructions


These safety instructions are intended to prevent a hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution,**” “**Warning**” or “**Danger.**” The ensure safety be sure to observe ISO/IEC and JIS B Standards^{Note 1)} and other safety practices^{Note 2)}.

Note 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.

Note 2) Labour 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 equipment is the responsibility of the person who designs the system or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility for specific system 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 are responsibility of the person who has determined its compatibility of the system. This person should also continuously review the suitability of all items specified referring to the latest catalog information with a view to giving due consideration to any possibility of equipment failure when configuring the trained.

2. Only trained personnel should operate pneumatic/hydraulic operated machinery and equipment.

Compressed air can be dangerous if handled incorrectly. Assembly, handling or repair of the system using pneumatic/hydraulic equipment should be performed by trained and experienced operators (understanding JIS B 8370 and 8361, and other safety rules are included).

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

1. 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 equipment is removed, confirm the safety process as mentioned above turn the source off, and read and understand carefully the specific precautions for all relevant equipment.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if products is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, 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 any other applications unsuitable for the specifications described in the catalogue.
3. An application which has the possibility of having negative effects on people, property, or animals requiring special safety analysis.
4. If the equipment is used in an interlock circuit, prepare a double interlock style circuit with a mechanical protection function for the prevention of breakdown. Also examine the devices periodically to check if they function normally or not.



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.**^{Note)}

The product also has 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 SMC responsibility, a replacement product or necessary parts will be provided.**

This limited warranty applies only to SMC 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 catalogue for the particular products.**

Note) 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, follow strictly 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 the back of pages 1 and 2 for Safety Instructions. For Common Precautions, refer to “Precautions for Handling Pneumatic Devices” (M-03-E3A).

Booster Regulator Specific Product Precautions

Design

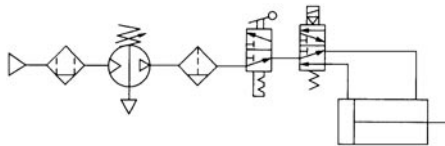
Warning

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.
- Due to outlet pressure could exceed its set range if there is a large fluctuation in the inlet pressure, leading to unexpected accidents, take safety measures to avoid 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 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.



Caution

1. System configuration

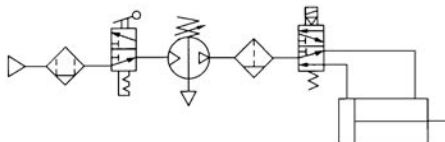
- The IN port of the booster regulator has metallic mesh to prevent dust from entering the booster regulator. However, it cannot remove dust continuously or separate drainage. Make sure to install a mist separator (AM series) at the inlet side of the booster regulator.
- The booster regulator has a sliding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

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 created back pressure 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 enough space for maintenance and inspection.



Selection

Caution

1. Verify the specifications.

- Consider the operating conditions and operate this product within the specification range described in this catalogue.

2. Selection

- Consider the outlet side conditions of the booster regulator, to select its size 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. Increasing the life expectancy and allowing a stable operation.
- Inlet supply pressure volume is approximately twice the outlet side volume {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).
- When running continuously for longer periods of time, confirm the life expectancy. The life expectancy of a booster regulator depends on 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.

Installation

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-coloured tie-rods and cover are placed horizontally. If mounted vertically, it may malfunction.
- Because the piston cycle vibration is transferred, use the following retaining 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 the back of pages 1 and 2 for Safety Instructions. For Common Precautions, refer to “Precautions for Handling Pneumatic Devices” (M-03-E3A).

Booster Regulator Specific Product Precautions

Piping

⚠ Caution

1. Flushing

- Use an air blower to flush the piping thoroughly removing 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 work, 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, life expectancy may be shortened because dry air will accelerate evaporation of grease inside.

Operating Environment

⚠ Caution

1. Installation location

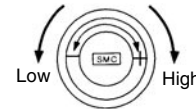
- Do not install this product in an area exposed to rainwater or direct sunlight.
- Do not install in locations influenced by vibrations. Contact SMC if it must be placed in such an area due to unavoidable circumstances.

Handling and maintenance

⚠ Caution

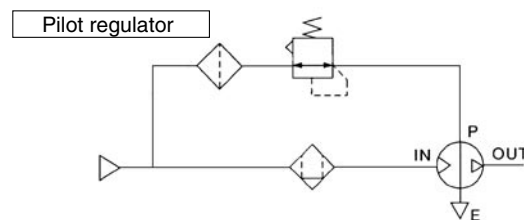
1. Setting the pressure on the handle-operated type

- If air is supplied to the product in the shipped state, it will be released.
Set the pressure by quickly pulling up the governor handle, and rotating it in the direction of the arrow (+).
- There is an upper and lower limit for the handle rotation. If the handle is over-rotated once the limit is reached, the internal parts may be damaged. So stop turning the handle if it suddenly feels heavy.
- 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.
- To reset the pressure, first reduce the pressure so that it is lower than the desired pressure; then, set it to the desired pressure.



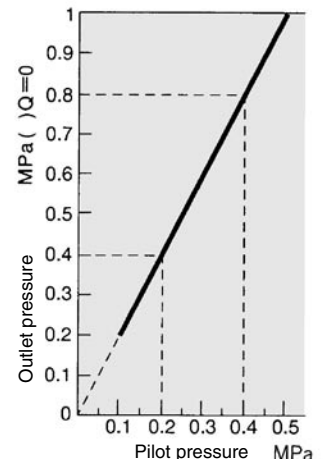
2. Setting the pressure on the air-operated type (VBA22A, 42A)

- 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 VBAT Specific Product Precautions

Be sure to read this before handling. Refer to the back of pages 1 and 2 for Safety Instructions. For Common Precautions, refer to “Precautions for Handling Pneumatic Devices” (M-03-E3A).

Air Tank Specific Product Precautions

Handling and maintenance

⚠ 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 also 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. Symptoms of the end of life expectancy 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 experts in maintaining pneumatic equipment.
- The list and position of spare parts and kit part number are shown on page 6.

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 wall of the tank is untreated, there is a possibility of dust flowing out to the secondary 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	●	—	—
	VBAT10A	●	●	—
	VBAT20A	—	●	●
	VBAT38A	—	●	●

Selection

⚠ Caution

- Consider the operating conditions and operate this product within the specification range.
- Follow the size selection procedure indicated on page 5 to select the size of the air tank if it will be used with a booster regulator connected to it.

Installation

⚠ 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.
- To booster regulator to the tank, refer to the operating manual that 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 and Inspection

⚠ 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.


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