ABP

Air booster

Components for air preparation and pressure adjustment

Overview

Air booster ABP is a component that enables boosting by pneumatics only up to twice primary pressure (1.0MPa max.) in combination with using air tank but not using electricity. Energy and cost saving will be achieved in total manufacturing lines, since pressure can be increased at the required point in plant. Air tank and optional pressure gauge directly combined to air booster are also available.

Features

Boosting up to double ratio
Boosting ratio is adjusted within range of twice primary pressure (1.0MPa max.) by pressure adjustment knob, since boosted with compression by piston.

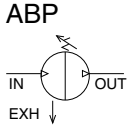
Flexible installation
This can be installed vertically due to flexible installation attitude. Pipe can be connected from 3 directions.

Tool not required pressure adjustment
Enabling pressure adjustment by single hand and lock by one push. Futhermore knob can be easily manually adjusted even for high pressure setting.

Compact
Longitudinal direction shortened compact shape.

CONTENTS

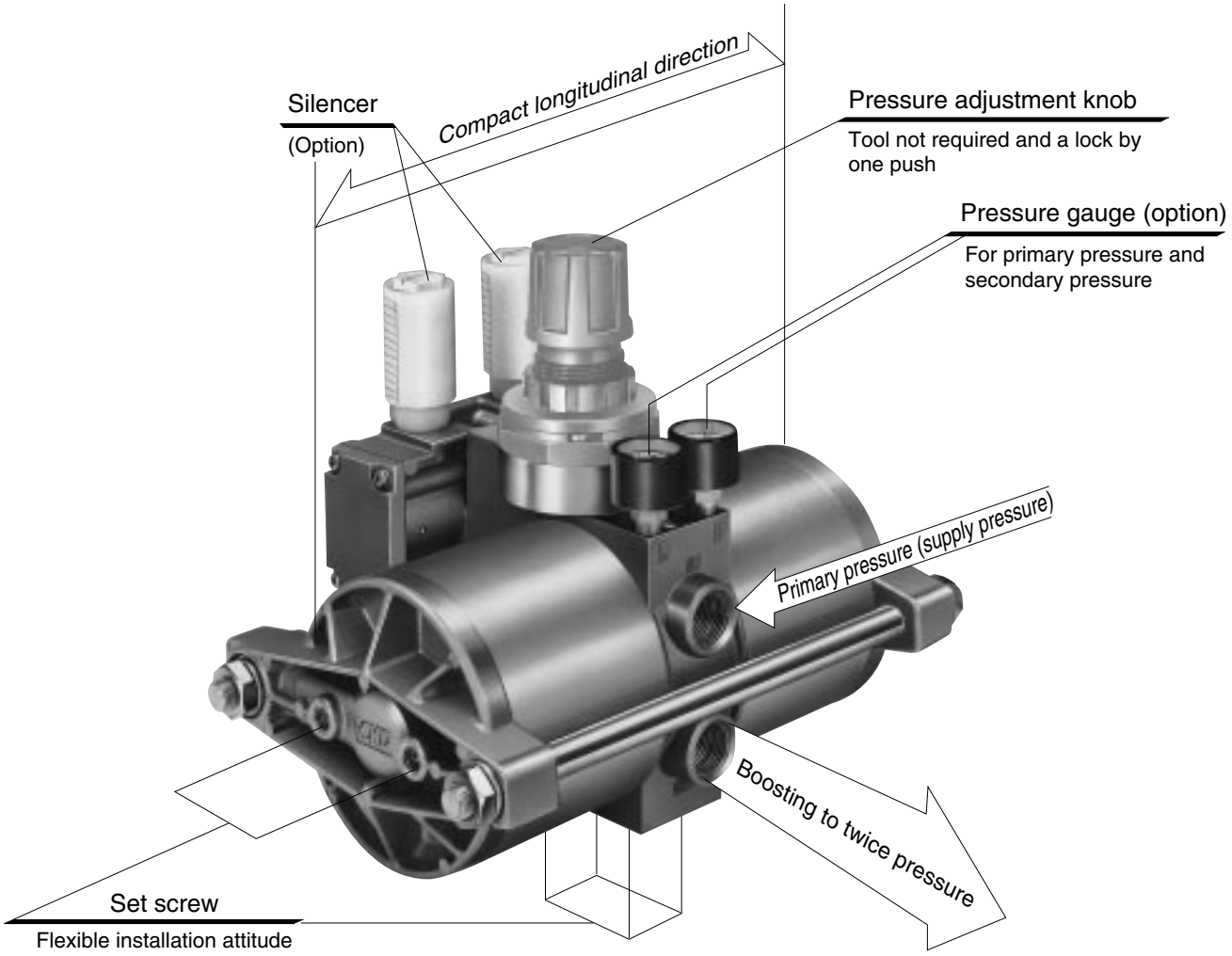
●: Standard, ◎: Option

Model	Model no. JIS symbol	OUT port position			Option			Page
		Same side of IN port	Bottom (Air tank directly connected)	Rear side of IN port	Pressure gauge	Silencer	Foot bracket	
		Blank	D	L	G	S	B	
Air booster	ABP 	●	●	●	◎	◎	◎	816

Double high compressed air is obtained.

Electroless air booster ABP

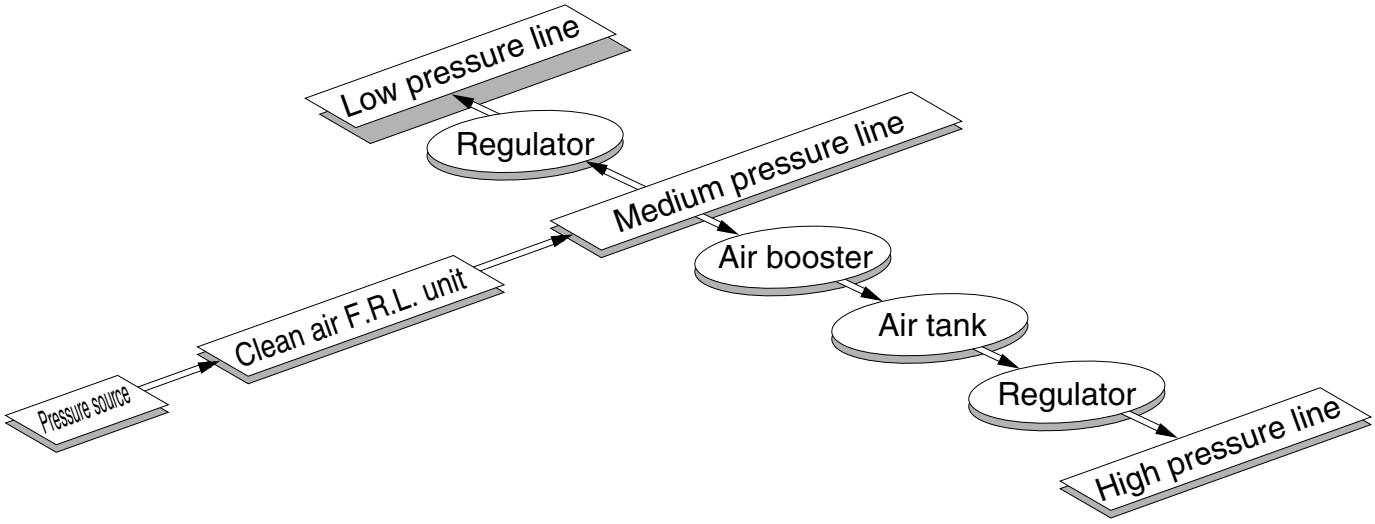
Produce high compressed air (1.0MPa max.) up to twice primary pressure (equivalent).



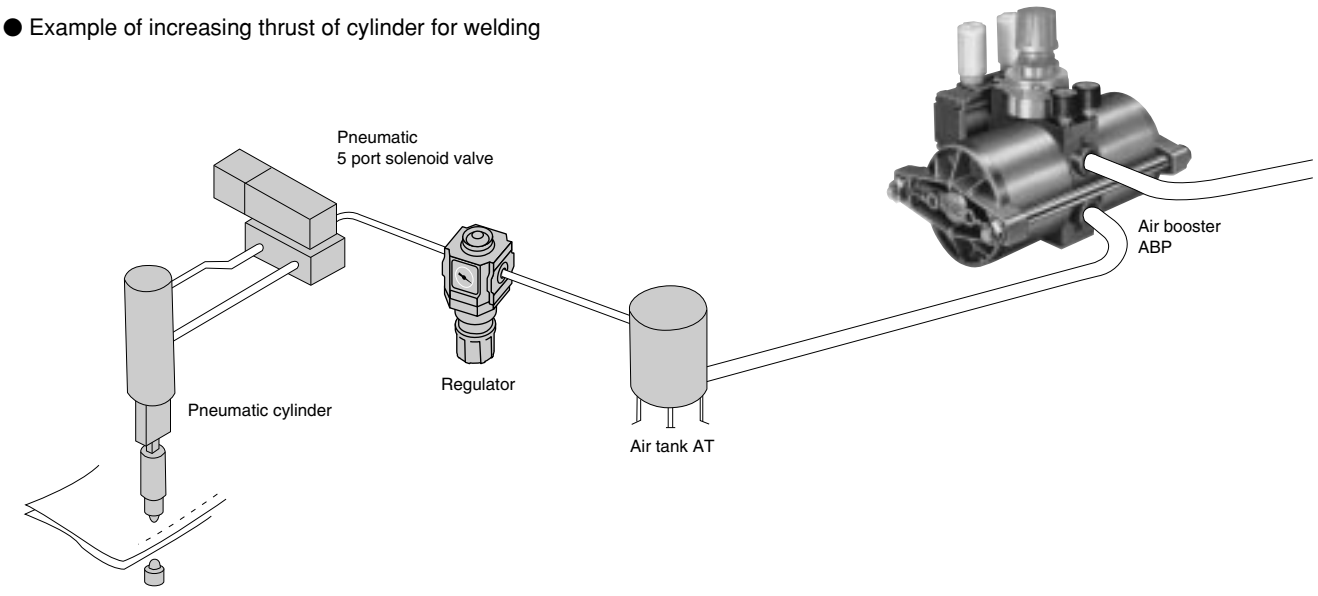
Compact design and flexible installation

⚠ Always read precautions on page 814 before starting use.

□Plant wide total cost reduction is achieved.



● Example of increasing thrust of cylinder for welding



● Other applications

1. Downsized air cylinder
2. Improving unsatisfied actuator (air cylinder, air motor etc.) output
3. High pressure and quick filling to air tank
4. Boosting in explosive environment
5. For pressure change (such as pressure decrease of line) of plant line

Safety precautions

Always read this section before starting use.
Refer to Intro 67 for general precautions.

Air booster ABP Series

Design & Selection

⚠ WARNING

■ Do not use the air booster for continuous operation such as in a compressor.

The air booster is designed for partial boosting in a factory, etc. Life is shortened if used for high frequency continuous operation, such as in a compressor. (The air booster's nominal life is approximately 5 million times when used under normal conditions)
Refer to page 817 for the estimate life calculation.

⚠ CAUTION

■ Do not use this product if vibration exceeds 50 m/s^2 or impact exceeds 300 m/s^2.

■ Pressure is raised by air pressure, so half of the air is discharged during boosting.

If the secondary side flow rate must be 1, the primary side requires a flow rate of 1 + 1 = 2.

■ The inside is cylindrical, so noise of 60 to 80 dB (primary side 0.49 MPa and secondary side 0.95 MPa for measurement of 1 m) is generated during boosting.

* This is noise when a silencer is used.

Installation & Adjustment

⚠ WARNING

■ Do not supply pressure exceeding 0.99 MPa onto the primary side.

■ Check that set pressure does not exceed 0.99 MPa.

⚠ CAUTION

■ Install a filter on the primary side to remove rust, foreign matter, and drainage. The air booster compresses compressed air so drainage is discharged easily from the secondary side. Installation of a filter is recommended to remove any moisture from piping.

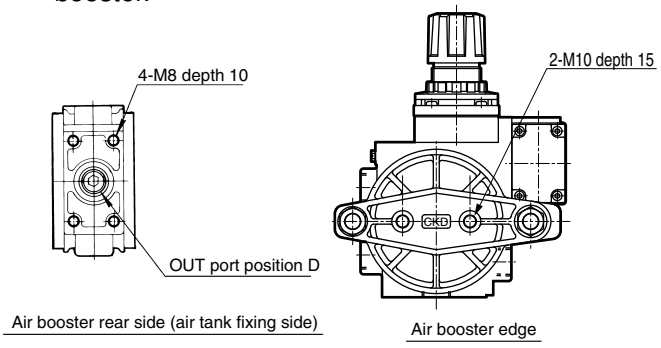
■ Install primary side piping at 1/2B and over to attain sufficient flow.

■ Install a silencer (SLW-15A, SL-15) or exhaust cleaner (FA430-15A) on the exhaust port of the air booster. When using exhaust cleaner, common porting of the exhaust port is recommended.

■ Use piping with a stop valve to the air tank's drain port.
Regularly discharge from the tank.

■ There are no set regulations regarding the air booster's installation angle, it should optimally be horizontally installed on a flat surface.

■ Install the air booster using 4-M8 depth 10 screw holes on the bottom or 2-M10 depth 15 screw holes on both sides.
Use these screw holes only for installing the air booster.



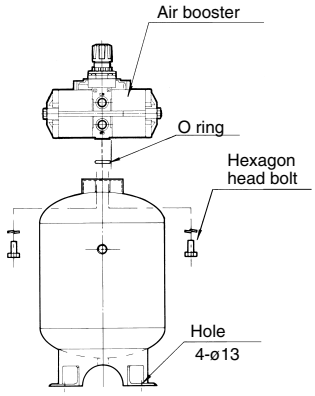
■ The bolt used to install the air booster must not exceed the screw hole depth.

Forcibly tightening a long bolt could damage the screw hole and cause air leakage.

■ A foot bracket installed on both ends is available as an option.
(Model no. ABP-12-B)

■ Fix the air tank with the 4- ø13 anchor bolt hole on the bottom.

■ When directly connecting the air booster to the air tank (AT-24), use OUT port position D, and mount the O ring enclosed with the air tank on the air booster. Then, fix to the top of the air tank with a hexagon head bolt.



■ Installation of an air tank and regulator after the air booster is recommended for attaining stable secondary pressure.

During Use & Maintenance

⚠ WARNING

■ Stop primary pressure and release secondary pressure before maintenance, inspecting, or repairing the air booster.

⚠ CAUTION

■ When setting pressure, lift the pressure adjustment knob to release the lock, and then the pressure adjustment knob.

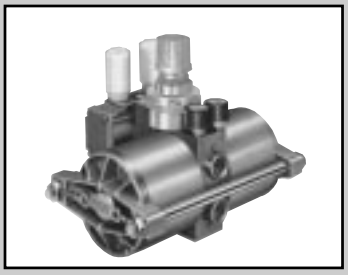
Secondary pressure increases when the pressure adjustment knob is turned clockwise. Pressure adjustment knob must be locked after using.

■ If primary pressure exceeds set pressure due to fluctuation in pressure, etc., air is released from the pressure adjustment knob.

Set a regulator on the primary side, and adjust the pressure at least 0.1MPa lower from the set pressure.

■ The silencer and pressure gauge are consumables and must be regularly replaced.

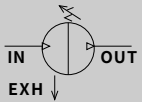
*Refer to the separate Maintenance Manual (ST-130606) for the maintenance procedures.



Air booster

ABP Series

JIS symbol



RoHS

Functional explanation

- Primary pressure flowed from IN passes through check valve on IN side, and flows in booster chamber A and B. Primary pressure also passes through pressure adjustment section and switching valve, and flows in drive room A. Piston moves to left hand due to pressure of drive room A. Air in booster chamber A is compressed, and passes through check valve on OUT side, and goes to OUT side.
- If piston reaches stroke end, changeover switch is pushed, and compressed air is supplied to pilot room of switching valve, and switching valve is switched. Then the air in drive room A is exhausted, and the air is delivered to drive room B.
- Therefore, piston moves to right hand and air in booster chamber B is compressed, and passes through check valve on OUT side, and goes to OUT side.
- Boosting on OUT side is compressed, if operations above are repeated. Feedback pressure is transmitted to pressure adjustment section due to OUT side pressure passes through shuttle valve, and boosting is continued until pressure adjustment spring and pressure is balanced.

Specifications

Descriptions	ABP
Working fluid	Compressed air
Max. working pressure MPa	0.99
Min. working pressure MPa	0.2
Set pressure range MPa	From primary pressure+0.1MPa to twice primary pressure (0.99MPa max.)
Withstanding pressure MPa	1.5
Flow m^3/min. (ANR)	Refer to the right graph rate flow characteristics
Boosting ratio	Max. double pressure (or equivalent)
Ambient temperature range ˚C	0 to 50 (no freezing)
Lubrication	Not required (use the turbine oil Class 1ISO VG32 if lubricated)
Port size	Rc1/2
Weight kg	4.6
Product sevice life	5 million (nominal)

How to order

ABP - 12 D - G

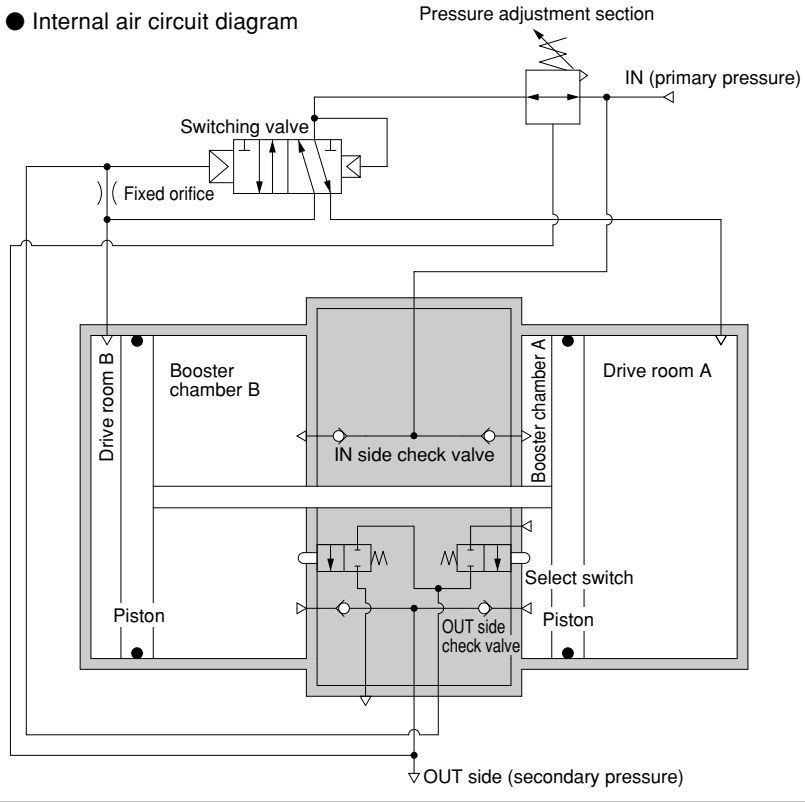
Air booster

Ⓐ OUT port position	
Blank	Same side of IN port
D	Bottom (air tank directly connected)
L	Rear side of IN port

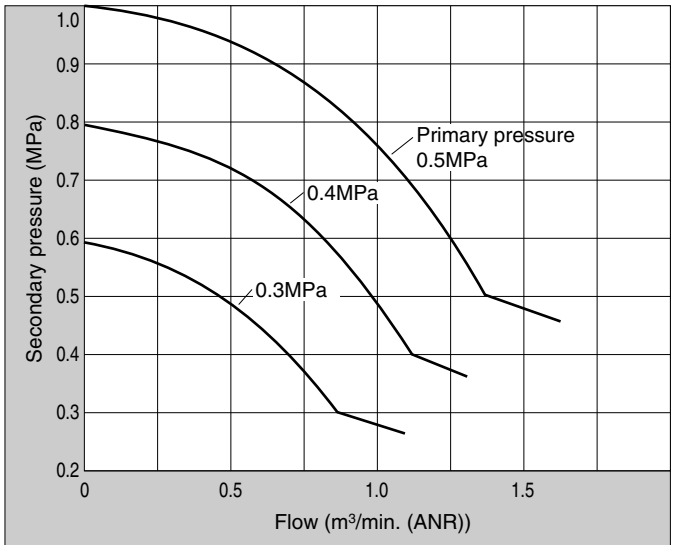
Ⓑ Option	
G	Pressure gauge
S	Silencer
B	Foot bracket

Note) Option G (pressure gauge) is installed onto air booster at shipment. B (foot bracket) and S (silencer) are attached.

● Internal air circuit diagram

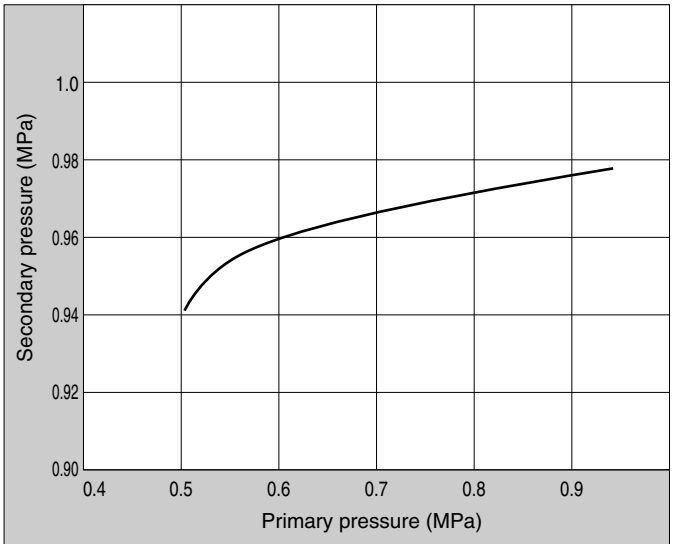


Flow characteristics (With air tank AT-24 installed, double pressure increase)



Flow rate characteristics show max. flow rate of air booster.
If primary pressure is constant and secondary side flow rate is increased, max. secondary pressure decreases.

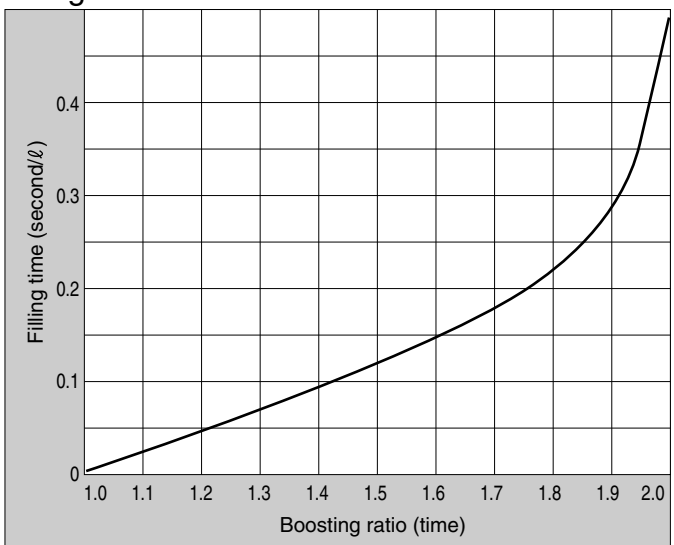
Pressure characteristics (Setting: Primary pressure 0.69MPa, secondary pressure 0.97MPa, flow rate 0.02m³/min.ANR)



Pressure characteristics show variation of set secondary pressure according to primary pressure variation.
If primary pressure is decreases, secondary pressure decreases slightly.

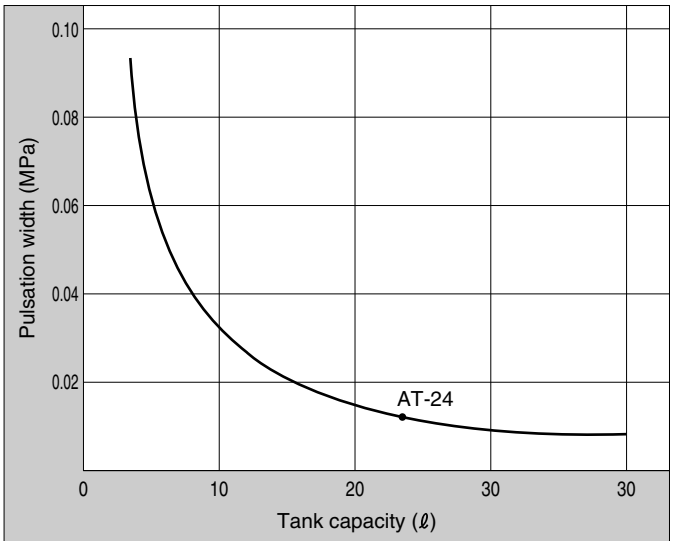
Note) Air booster needs approx. twice secondary side flow rate (max.) for primary side due to structure.
Confirm that the instantaneous flow rate is within the curve.

Filling characteristics



Filling characteristics show relations between boosting ratio and filling time, if tank etc. filled with compressed air.

Pulsation



Pulsation shows width of pulsation if air tank is installed onto secondary side of air booster.

To find filling time, when filling tank with air, where secondary side air pressure P_0, air pressure in tank before filling P_1, air pressure after filling P_2, boosting ratio before filling k_1 and boosting ratio after filling k_2, therefore $k_1 = \frac{P1}{P0}$ and $k_2 = \frac{P2}{P0}$ are led. Find k_1 and k_2 at first, then read filling time t_1 and t_2 according to graph where boosting ratio k_1, k_2, finally filling time for tank capacity A (ℓ) is obtained with $t = (t_2\text{-}t_1)$ A.

Formula of air booster operational cycle

$$N = \frac{Q \times 10^3}{7.55P + 0.76}$$

N : Operational cycle
Q : Required flow (m³/min.(ANR))
P : Primary pressure (MPa)

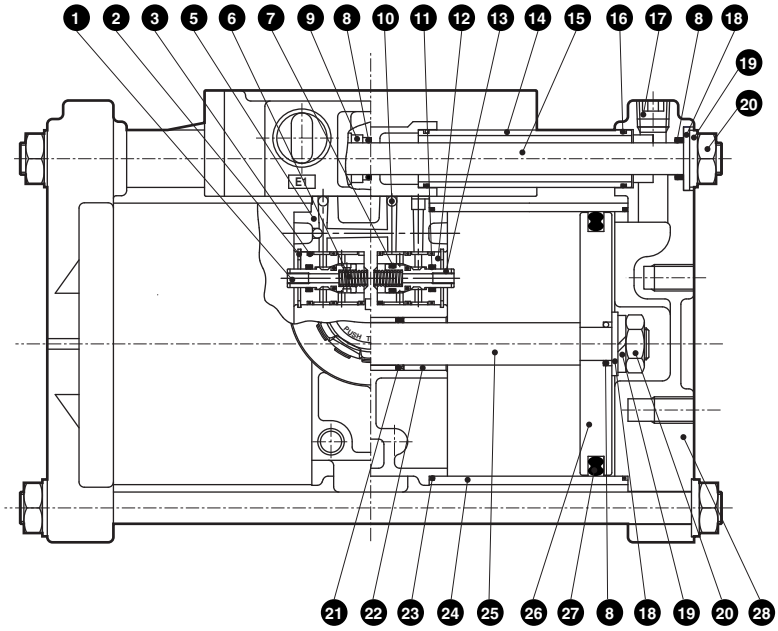
Formulation of air booster service life
Since nomin.al service life of operational cycle is 5 million

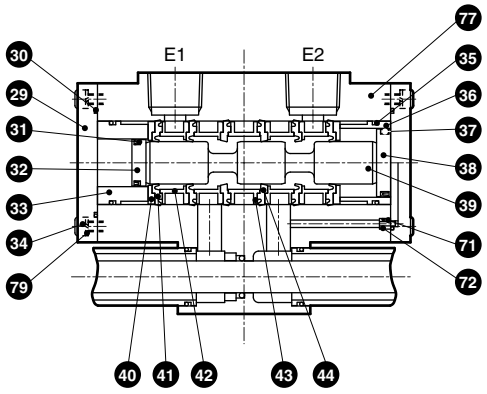
$$T = \frac{5{,}000{,}000}{N \times 60}$$

T : Service life (hour)

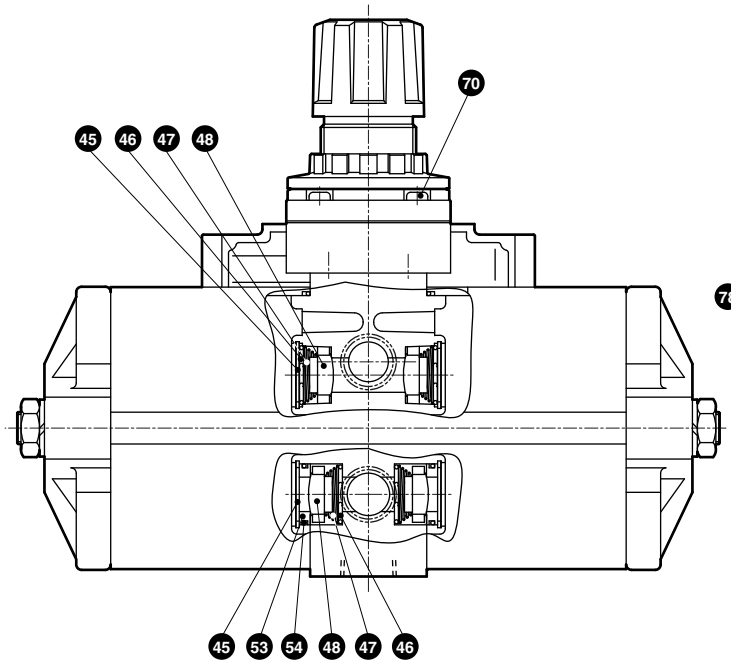
Each characteristics are just reference, but not assured conditions.

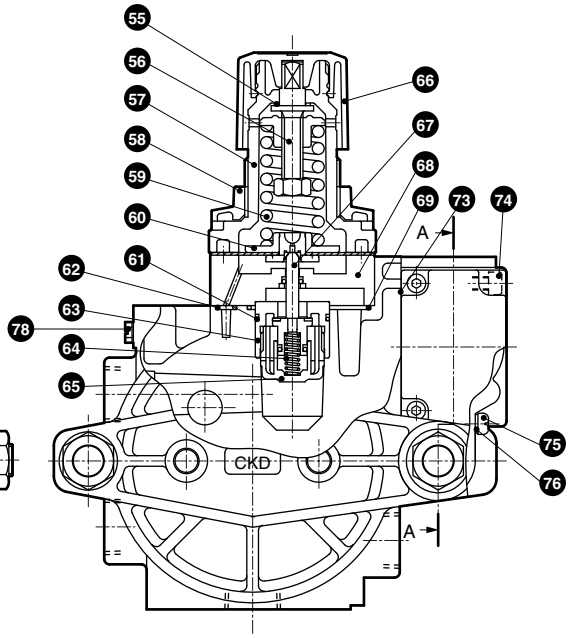
Internal structure





A-A cross section





Part list

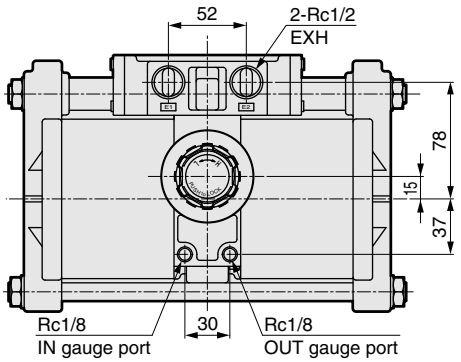
No.	Parts name	Material	Quantity	No.	Parts name	Material	Quantity
1	Valve stem (A)	Stainless steel	1	41	Soft packing seal	Urethane rubber	4
2	C type snap ring for hole	Stainless steel	2	42	Spacer	Aluminum alloy	4
3	O ring	Nitrile rubber	5	43	Spacer	Polyacetal resin	1
5	Body block assembly	Aluminum alloy	1	44	Soft packing seal	Urethane rubber	2
6	Spring	Stainless steel	2	45	C type snap ring for hole	Stainless steel	4
7	O ring	Nitrile rubber	1	46	Spring sheet	Stainless steel	4
8	O ring	Nitrile rubber	5	47	Spring	Stainless steel	4
9	Spacer	Stainless steel	1	48	Check valve	Nitrile rubber	4
10	Steel ball	Steel	3	53	Valve seat	Aluminum alloy	2
11	Packing seal	Nitrile rubber	2	54	O ring	Nitrile rubber	1
12	Detection valve body	Copper alloy	2	55	Slip ring	Polyacetal resin	4
13	Valve stem (B)	Stainless steel	1	56	Adjusting assembly		1
14	Pipe	Stainless steel	2	57	Guard	PBT resin	1
15	Tie rod	Steel	2	58	Mounting nut	Polyacetal resin	1
16	O ring	Nitrile rubber	4	59	Adjusting spring	Steel	1
17	Plug with hexagon head hole	Stainless steel	2	60	Diaphragm assembly		1
18	Plain washer	Steel	4	61	O ring	Nitrile rubber	1
19	Spring washer	Steel	6	62	O ring	Nitrile rubber	1
20	Hexagon nut	Steel	6	63	Valve seat	Copper alloy	1
21	MY packing seal	Nitrile rubber	2	64	Bottom spring	Stainless steel	1
22	Rod bushing	Oil impregnated bearing alloy	3	65	Stud	Polyacetal resin	1
23	O ring	Nitrile rubber	4	66	Knob	Polyacetal resin	1
24	Cylinder tube	Aluminum alloy	2	67	Valve assembly		1
25	Piston rod	Steel	1	68	Regulator assembly		1
26	Piston	Aluminum alloy	2	69	O ring	Nitrile rubber	1
27	Piston packing seal	Nitrile rubber	2	70	Cross-recessed tapping screw	Steel	4
28	Head cover	Aluminum alloy	2	71	Fixed orifice	Copper alloy	1
29	Cap	Aluminum alloy	2	72	O ring	Nitrile rubber	1
30	Gasket	Nitrile rubber	2	73	Master valve gasket	Nitrile rubber	1
31	Lip packing seal	Nitrile rubber	1	74	Hexagon socket head cap bolt	Steel	2
32	Piston	Polyacetal resin	1	75	Cross headed pan	Steel	1
33	Cylinder	Aluminum alloy	1	76	Gasket	Nitrile rubber	1
34	Hexagon socket head cap bolt	Steel	8	77	Valve	Aluminum alloy	1
35	O ring	Nitrile rubber	2	78	Plug	Copper alloy	1
36	Cylinder	Aluminum alloy	1	79	Spring washer	Steel	8
37	Lip packing seal	Nitrile rubber	1				
38	Piston	Polyacetal resin	1				
39	Spool	Aluminum alloy	1				
40	Stopper	Polyacetal resin	2				

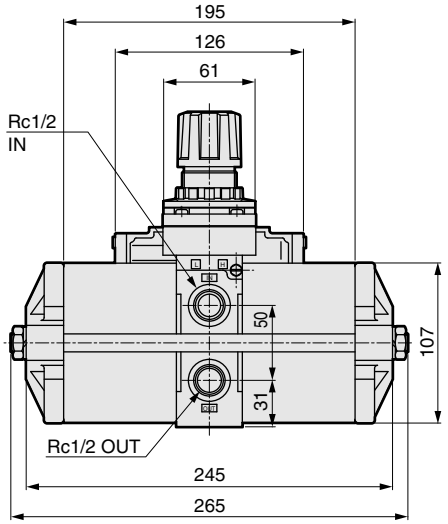
Discrete consumable parts and options

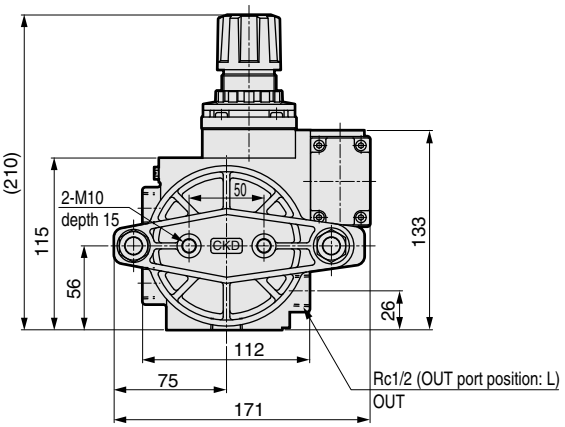
Parts name	Model no.	Part number	Remarks
Select switch packing set	ABP-K1	❶ ×1, ❸ ×5, ❻ ×2, ⓫ ×2, ⓬ ×2, ⓭ ×1	
Cylinder section packing seal set	ABP-K2	❽ ×5, ⓰ ×4, ㉑ ×2, ㉓ ×4, ㉗ ×2	
Switching valve piston assembly	ABP-K3	㉛ ×1, ㉜ ×1, ㉗ ×1, ㉘ ×1	
Switching valve sealant assembly	ABP-K4	㊵ ×2, ㊶ ×4, ㊷ ×4, ㊸ ×1, ㊹ ×2	
Check valve shuttle valve assembly	ABP-K5	㊽ ×4, ㊿ ×1, ㊶ ×2, ㊸ ×2, ㊹ ×2	Using parts prior to minor changes
Diaphragm assembly	ABP-K6	㊿ ×1	
Pressure adjustment section valve assembly	ABP-K7	㊶ ×1, ㊷ ×1, ㊼ ×1, ㊾ ×1	
Check valve assembly	ABP-K8	㊽ ×4, ㊸ ×2, ㊹ ×2	
Bracket	ABP-B		For 1 unit
Pressure gauge	ABP-GAUGE		Pressure gauge 1 pc.
Silencer	SLW-15A		Silencer 1 pc.

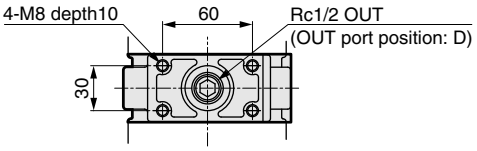
Dimensions

● ABP-12



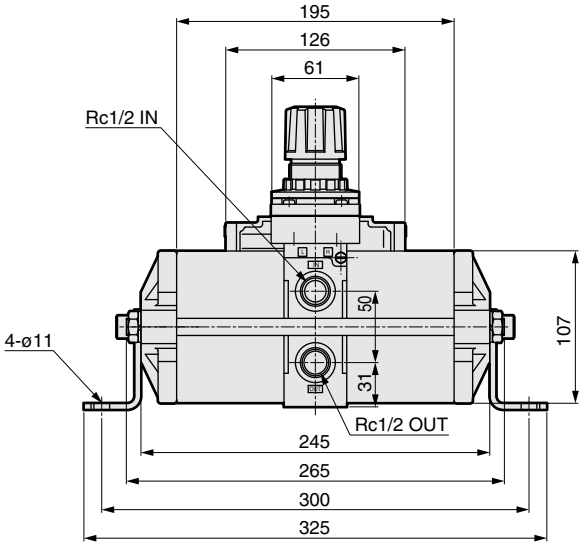


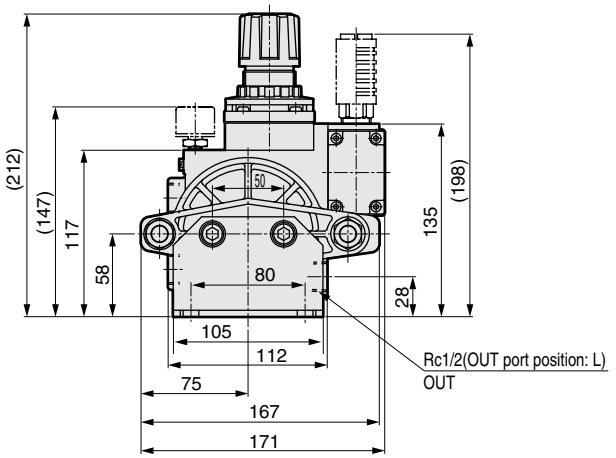




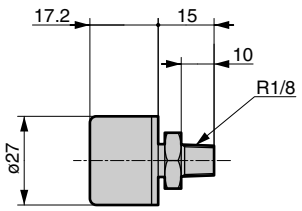
Optional dimensions

● ABracket (ABP-B) installation

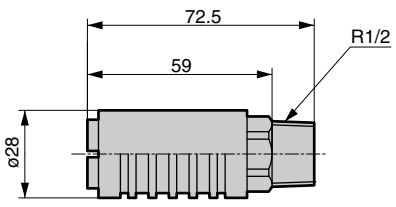




● APressure gauge (ABP-GAUGE)



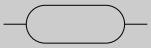
● ASilencer (SLW-15A)



Air tank (related products)

AT Series

JIS symbol



RoHS

Features

Air tank directly connected to air booster ABP-12 with compact body.

Specifications

Descriptions	AT
Working fluid	Compressed air
Max. working pressure MPa	0.99
Hydraulic test pressure MPa	1.5
Ambient temperature range ˚C	0 to 50 (no freezing)
Capacity m³	0.024
Port size	Rc1/2
Material	Steel
Weight kg	17.5

Note: O ring, hexagon head bolt and spring washer are attached to install air booster.

How to order

AT - 24

Air tank — Capacity

● Part model no.

AT-K1 (O ring, hexagon head bolt, spring washer)

Dimensions