

Power Valve: Economy Valve Series VEX5

Three functions (pressure regulator, switching valve, and speed controller) are provided by a single valve.

The conventional valve combination circuit has been condensed into a single valve.

A large capacity and economical system.

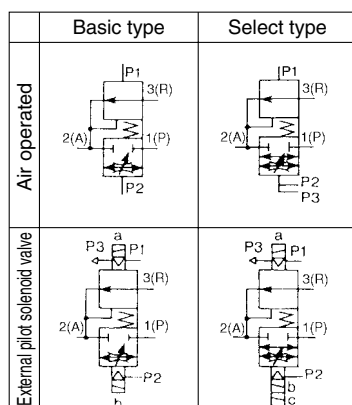
This valve provides twice the system capacity of the conventional circuit. Therefore, it is possible to downsize 1 or 2 sizes (for example, a conventional 32A circuit can be changed to a 25A or a 20A). It is economical, as its performance cost (system price/effective area) is one half of the conventional type. (Comparison based on SMC data.)



Basic type



Select type



Standard Specifications

Model		VEX55□□- ⁰⁴ ₀₆ ¹⁰			VEX57□□- ¹⁰ ₁₂		VEX59□□- ¹⁴ ₂₀		
Operation type		Air operated, External pilot solenoid							
Fluid		Air							
Proof pressure		1.5 MPa							
Pressure range		0 to 1.0 MPa							
Set pressure range		0.05 to 0.9 MPa							
Ambient and fluid temperature		Max. 50°C (Air operated 60°C)							
Pilot pressure		P1: 0.05 to 0.9 MPa P2: 0.2 to 0.9 MPa (Air operated: P2, P3: 0.2 to 0.9 MPa P2 ≤ P3)							
Repeatability		0.01 MPa							
Sensitivity		0.01 MPa							
Response time		60 ms or less							
Max. operating frequency		3 cycles/sec.							
Number of needle rotations		6 turns			8 turns				
Mounting		Free							
Lubrication		Not required (Use turbine oil Class 1 ISO VG32, if lubricated.)							
Port size	Port	04	06	10	10	12	14	20	
	P				1		1 1/4		
	A	1/2	3/4	1		1 1/4		2	
Rc	R				1 1/4		2		
	Cv	7.2	8.9	10	17	18	33	37	
Effective area	mm ²	130	160	180	300	330	590	670	
	Cv	7.2	8.9	10	17	18	33	37	
Weight (kg)	Air operated	Basic type	2.0			3.2		4.7	
		Select type	2.3			3.5		5.0	
	Solenoid	Basic type	2.2			3.5		4.9	
		Select type	2.6			3.8		5.3	

Solenoid Specifications

Model		VEX5511/5711/5911/5501/5701/5901	
Pilot valve		SF4-□□-20	
Electrical entry		Grommet (G), Grommet terminal (E), Conduit terminal (T), DIN terminal (D)	
Coil rated voltage (V)	AC (50/60 Hz)	100 V, 200 V, Other (Option)	
	DC	24 V, Other (Option)	
Allowable voltage		-15 to +10% of rated voltage	
Coil insulation		Class B (130°C) or equivalent	
Temperature rise		35°C or less (Rated voltage)	
Apparent power	AC	Inrush	5.6 VA (50Hz), 5.0 VA (60Hz)
		Holding	3.4 VA (50Hz), 2.3 VA (60Hz)
Power consumption	DC	1.8 W	
Manual override		Non-locking push type	
Pilot port silencer		AN210-02	

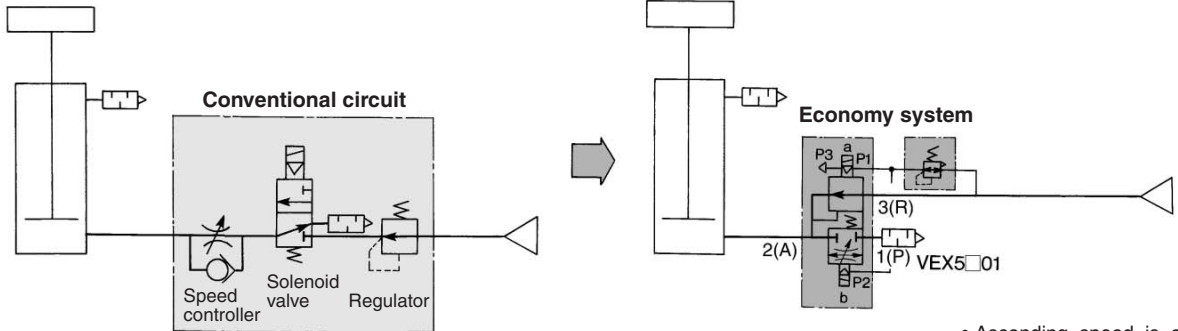
Accessory/Part No.

Description	Model	Part no.		
		VEX55□□- ⁰⁴ ₀₆ ¹⁰	VEX57□□- ¹⁰ ₁₂	VEX59□□- ¹⁴ ₂₀
Bracket (With bolt and washer)	VEX5-32A	VEX7-32A	VEX9-32A	
Pressure gauge		G46-10-01		

Applicable System/Example of Single Acting Circuit

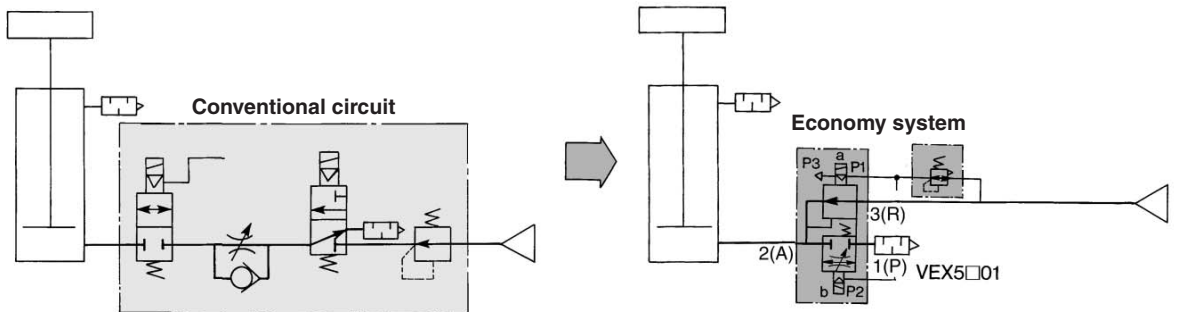
(The valves can be used also for double acting circuits, too. Please consult with SMC for details.)

1. Speed control

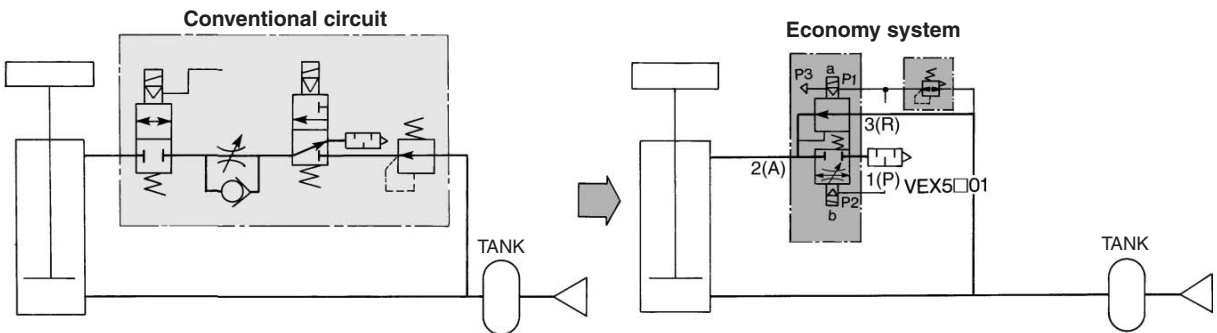


- Ascending speed is controlled by a pilot regulator.
- Descending speed is controlled by needle setting.

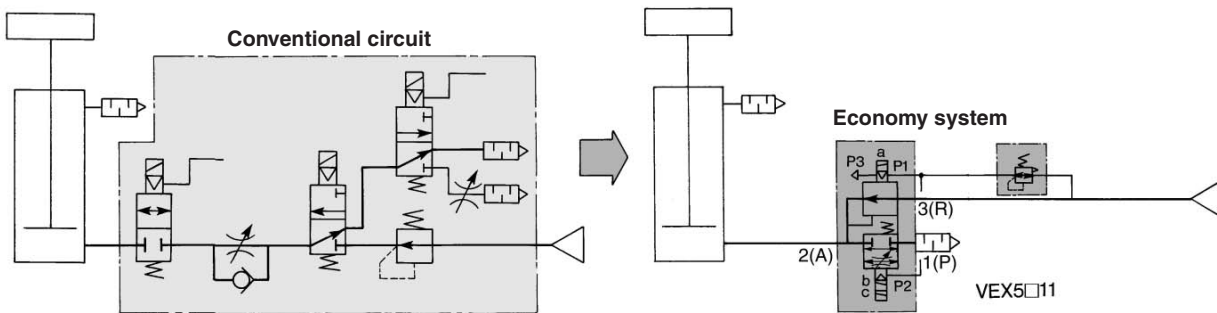
2. Intermediate (emergency) stop



3. Double pressure driving...Energy-saving lifter (Air saving counter balance)



4. Two speed driving



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Energy-saving Lifter

• Simple

Two economy valves and a tank move the double-acting cylinder to raise and lower heavy objects.

• Energy-saving

The balancing air reciprocates between the lower cylinder chamber and the tank, thus not being consumed. Low pressure air alone is exhausted from the upper chamber in every cycle, so the air consumption is reduced to 20 to 30% of the air consumption by the double acting cylinder with an ordinary change over valve.

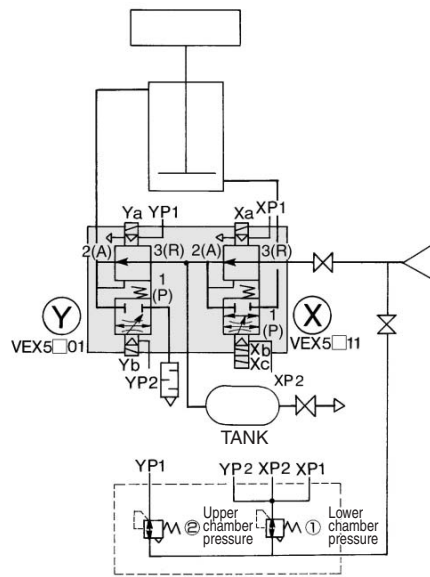
• Excellent operation control

The economy valve sets pressure and permits high speed and low speed operation as well as suspension of operation. While the piston moves up and down, the valve controls speed change in the middle of strokes, terminal deceleration, inching, and emergency stops.

• Simple operation

The pilot system is composed of a small regulator and solenoid valve (which is unnecessary for solenoid style), remote controls the economy valve. Therefore, change in the pilot system sequence allows selection of a cylinder operation mode. Change in the large capacity main piping system is not necessary.

<System configuration and operation of circuit in which external pilot solenoid is used>



The two economy valves (hereinafter called VEX) X and Y and a tank composes a main system that drives the double acting cylinder, and the small regulator (hereinafter called REG) and pilot valve (hereinafter called SOL) remote control the economy valve.

Action

Cylinder	SOL	Xa	Xb	Xc	Yb	Ya	Mode
		ON	OFF	—	—	—	
Upward	High speed	●	●	—	●	—	a
	Low speed	●	●	●	●	—	b
Downward	High speed	—	●	—	—	●	c
	Low speed	—	●	●	—	●	d
Stop	—	—	—	—	—	—	e

a: The air in the upper cylinder chamber is exhausted from the P port of VEXY, and the air in the tank flows in through the P port of VEXX.

b: Air flows into the lower cylinder chamber through a throttled opening, set by a needle, from the A to P port of VEXX.

c: The air in the tank flows into the upper cylinder chamber at a preset low pressure from the A port of VEXY, while the air in the lower cylinder chamber returns to the tank through VEXX.

d: Air returns to the tank through a throttled opening from the P to the A port of VEXX.

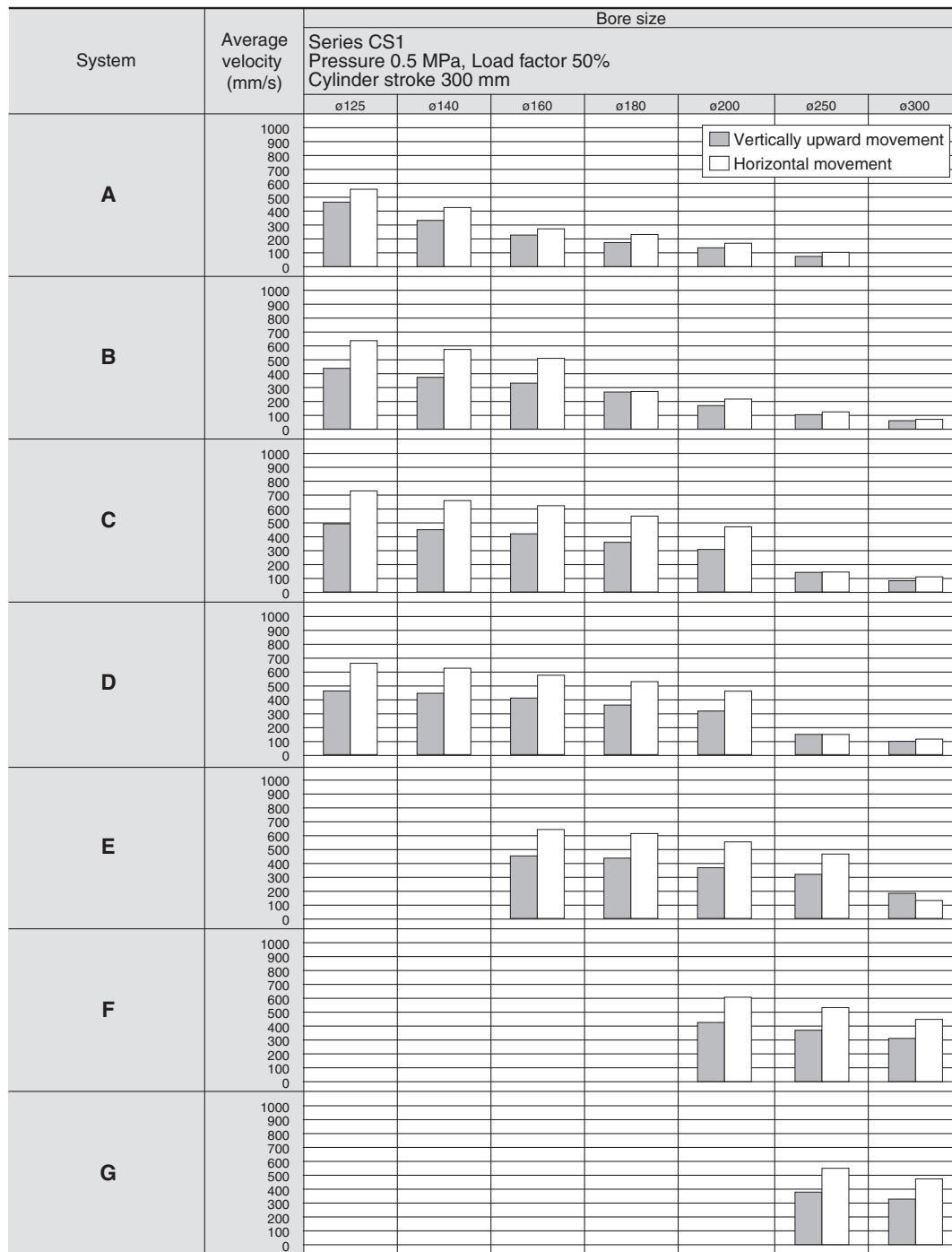
e: The air in the lower cylinder chamber is blocked at the P port of VEXX, while the air in the upper cylinder chamber is blocked at the A port of VEXY.

⚠ Caution

* A lifter circuit can be composed of air operated valves. Please contact SMC for details.

Cylinder Speed Chart

Please assume the chart is offered as the guideline. For details about various each condition, please make use of SMC Model Selection Software and then decide it.



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- * When the cylinder is extended, the speed controller is metered-out, is connected with the cylinder directly, and its needle is fully open.
- * Values on the average velocity of a cylinder are obtained from the stroke length divided by full stroke time.
- * Load proportion is ((load weight x 9.8)/theoretical force) x 100%

Conditions of Speed Chart

System	Solenoid valve	Speed controller	Silencer	Tubing diameter x Length
A	VEX55□□- ⁰⁴ / ₀₆ / ₁₀	AS420-04	AN400-04	SGP15A x 1 m
B		AS500-06	AN500-06	SGP20A x 1 m
C		AS600-10	AN600-10	SGP25A x 1 m
D	VEX57□□- ¹⁰ / ₁₂	AS600-10	AN600-10	SGP25A x 1 m
E		AS800-12	AN700-12	SGP32A x 1 m
F	VEX59□□- ¹⁴ / ₂₀	AS900-14	AN800-14	SGP40A x 1 m
G		AS900-20	AN900-20	SGP50A x 1 m

Series VEX5

How to Order

VEX5 5 1 1 06 2 E Z B

Economy valve

Type

0	Basic
1	Select

Operation type

0	Air operated
1	External pilot solenoid

Body size

5	7	9
04	10	14
06	12	20
10	1	1 1/4
1	1 1/4	2

Port size

Body size	Port size Rc	
	P, A port	R port
5	1/2, 3/4	1/2, 3/4
7	1	1 1/4
9	1 1/4	2

Option

B	Bracket
G	Pressure gauge

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor (Grommet only)
Z	With light/surge voltage suppressor (Except grommet)

Coil rated voltage

1	100 VAC 50/60 Hz
2	200 VAC 50/60 Hz
3*	110 VAC 50/60 Hz
4*	220 VAC 50/60 Hz
5	24 VDC
6*	12 VDC
7*	240 VAC 50/60 Hz
9*	Other

* Option

Thread type

Nil	Rc
F	G
N	NPT
T	NPTF

Electrical entry (only with solenoid)

G	Grommet, Lead wire length 300 mm
H	Grommet, Lead wire length 600 mm
E	Grommet terminal
T	Conduit terminal
D	DIN terminal

How to order pilot valves

SF4 - 20

Electrical entry

Coil rated voltage

(Ex.) SF4-1G-20

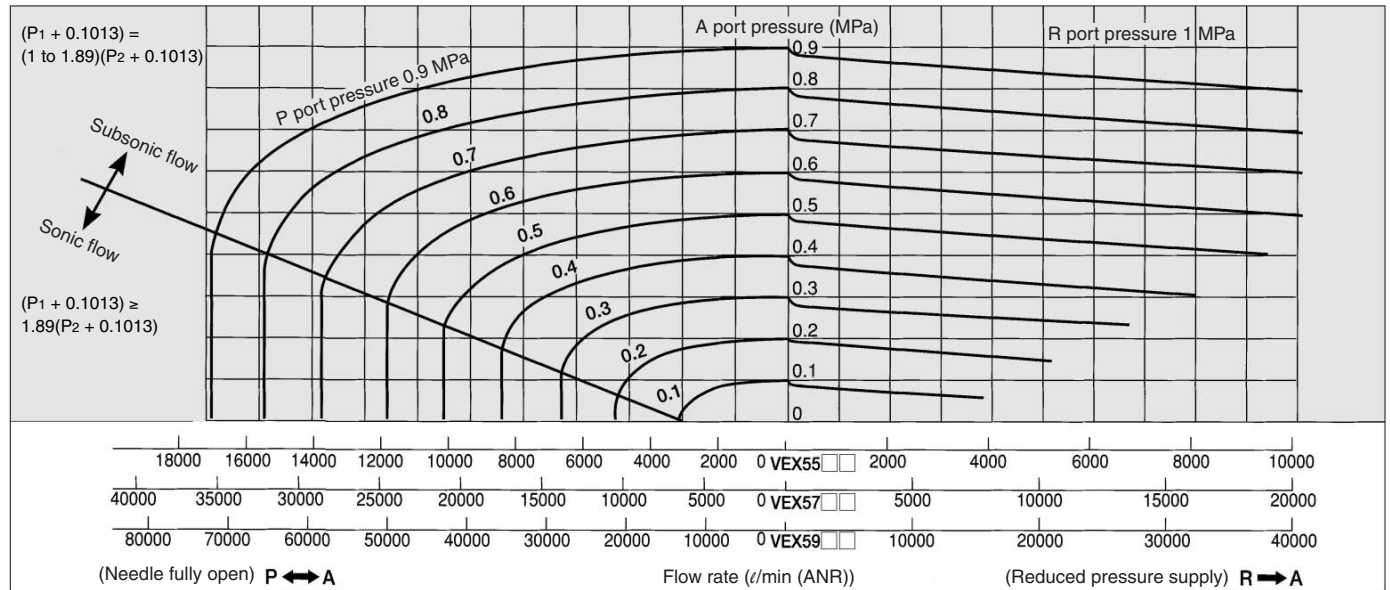
100 VAC, Grommet

(Ex.)
VEX5511-062EZ-BG
Body size 5, Select, External pilot solenoid
Port size Rc 3/4
200 VAC, Grommet terminal, with light/surge voltage suppressor
Option---Bracket, with pressure gauge

Model

Model	Basic type		Select type		Port size Rc	
	Air operated	External pilot solenoid	Air operated	External pilot solenoid	P, A port	R port
Economy valve	VEX5500	VEX5501	VEX5510	VEX5511	1/2, 3/4, 1	1/2, 3/4, 1
	VEX5700	VEX5701	VEX5710	VEX5711	1, 1 1/4	1 1/4
	VEX5900	VEX5901	VEX5910	VEX5911	1 1/2, 2	2

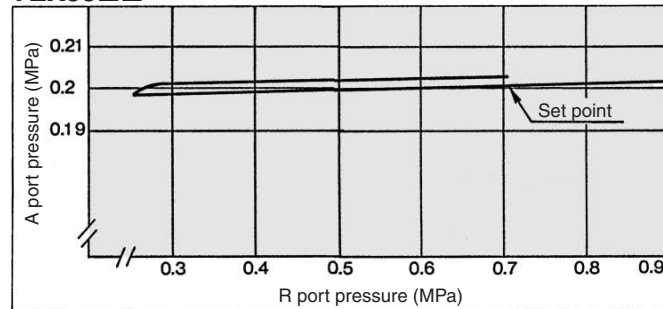
Flow Characteristics



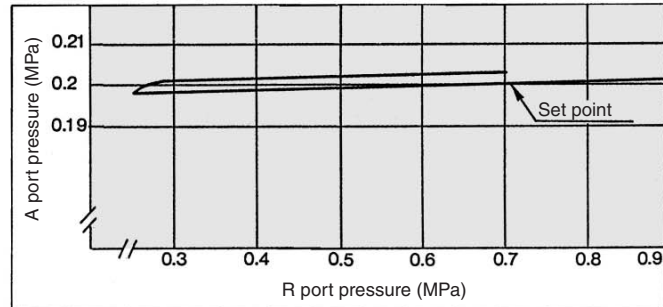
Pressure Characteristics

Shows the outlet pressure (A port) change against the inlet pressure (R port) change. They conform to JIS B 8372 (Air pressure regulator).

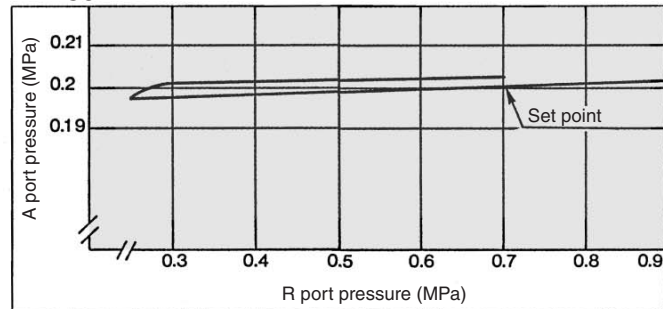
VEX55 □ □



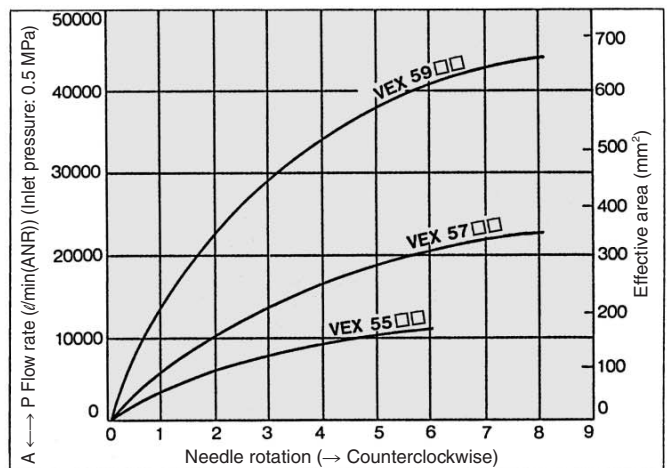
VEX57 □ □



VEX59 □ □



Needle Characteristics A ↔ P



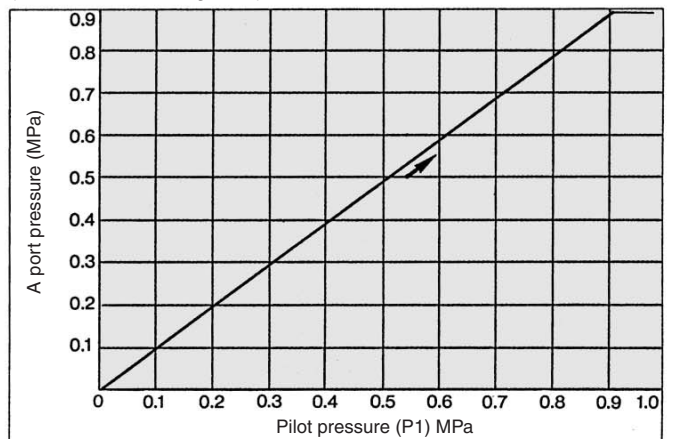
VEX

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Setting Pressure Characteristics

A port pressure is set according to pilot pressure.
(R → A: Non-relief regulator)

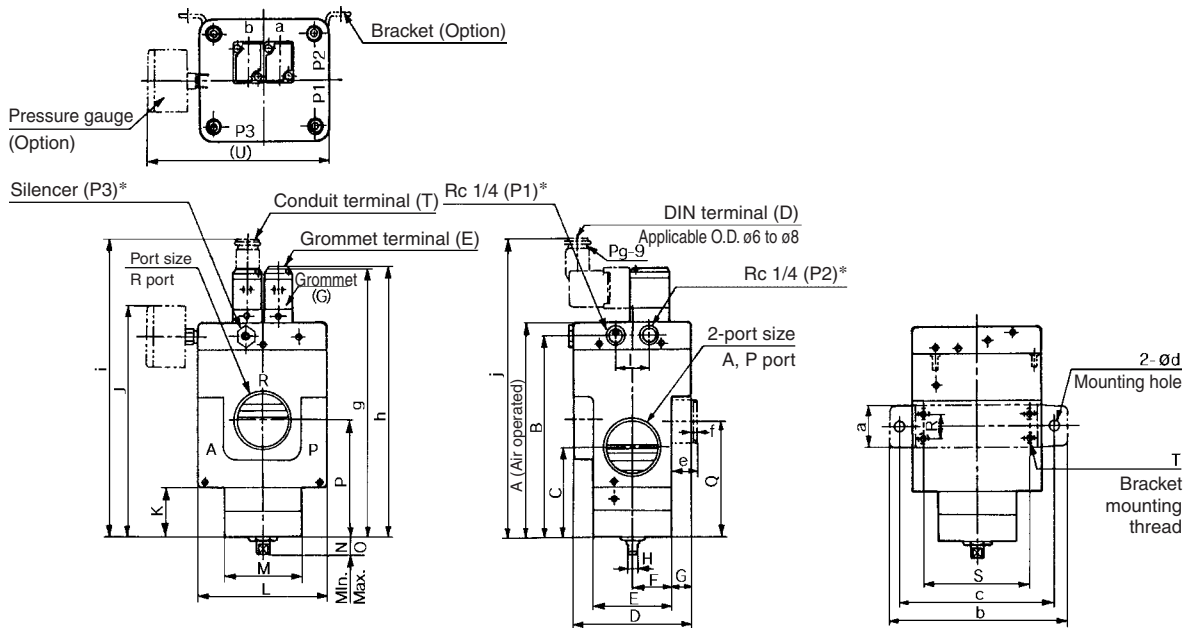


Series VEX5

Basic Type Dimensions

VEX5500/5501
VEX5700/5701

* Refer to page 5-9-38.

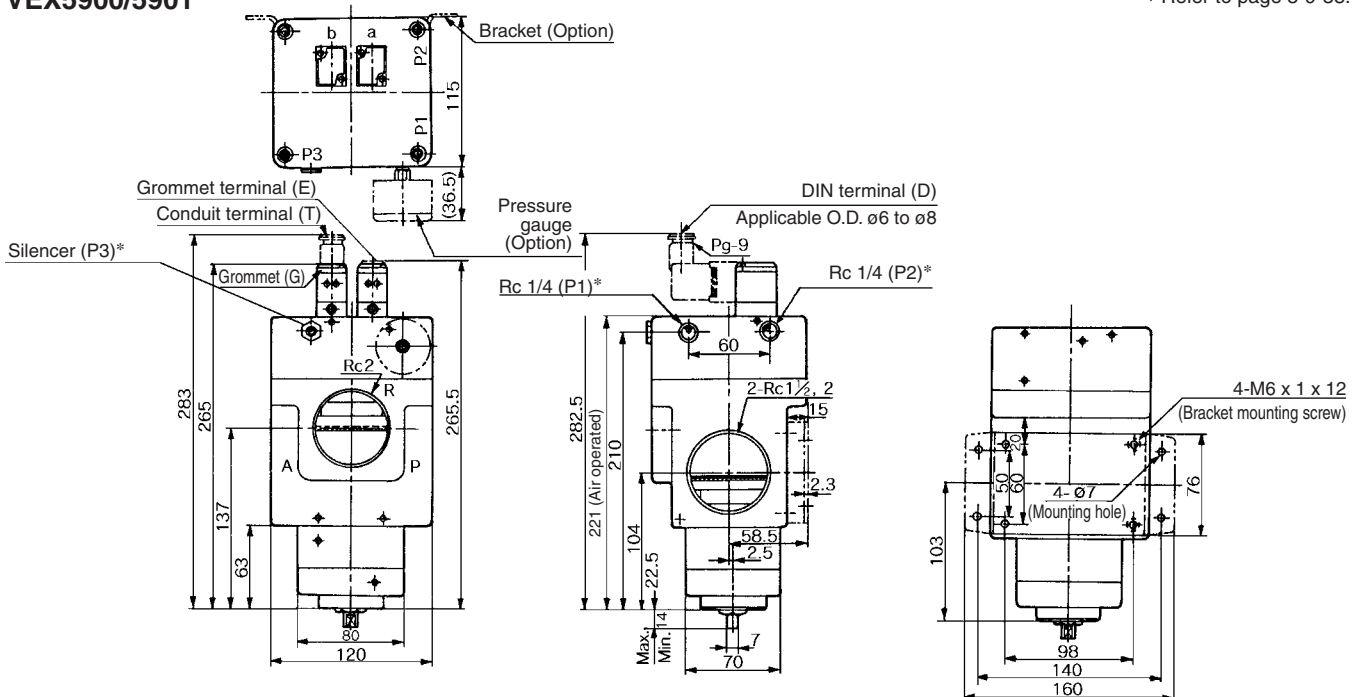


Model	Port size		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
	A, P port	R port																					
VEX5500 VEX5501	Rc 1/2, 3/4, 1	Rc 1/2, 3/4, 1	143.5	133.5	62.5	70	50	25	10	7	25	156.5	36.5	80	60	16.5	20	81.5	83.5	Center	60	2-M6 x 1 x depth 9	116.5
VEX5700 VEX5701	Rc 1, 1 1/4	Rc 1 1/4	160.5	150.5	62.5	90	60	30	15	7	25	173.5	37.5	100	60	13	17	88.5	86.5	18	82	4-M6 x 1 x depth 6	136.5

Model	Bracket mounting dimensions						Grommet	Grommet terminal	Conduit terminal	DIN terminal
	a	b	c	d	e	f	g	h	i	j
VEX5500 VEX5501	19	130	110	9	12	2.3	187	187.5	205.5	205
VEX5700 VEX5701	32	136	120	9	20	2.3	204	204.5	222.5	222

VEX5900/5901

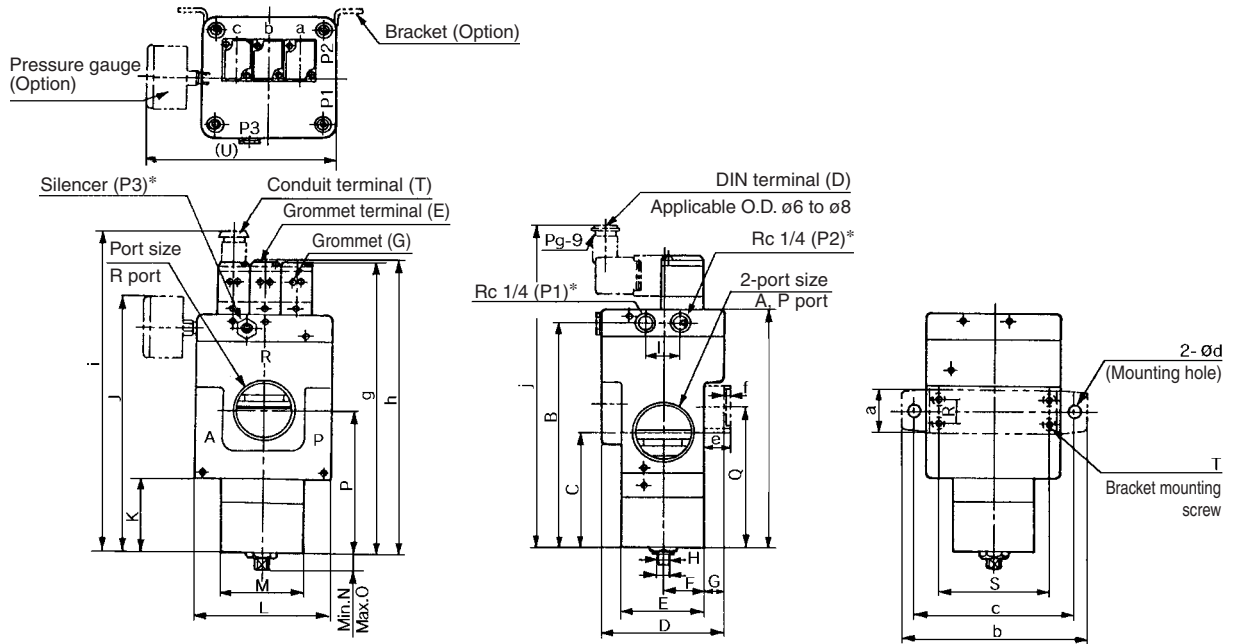
* Refer to page 5-9-38.



Select Type Dimensions

VEX5510/5511
VEX5710/5711

* Refer to page 5-9-38.

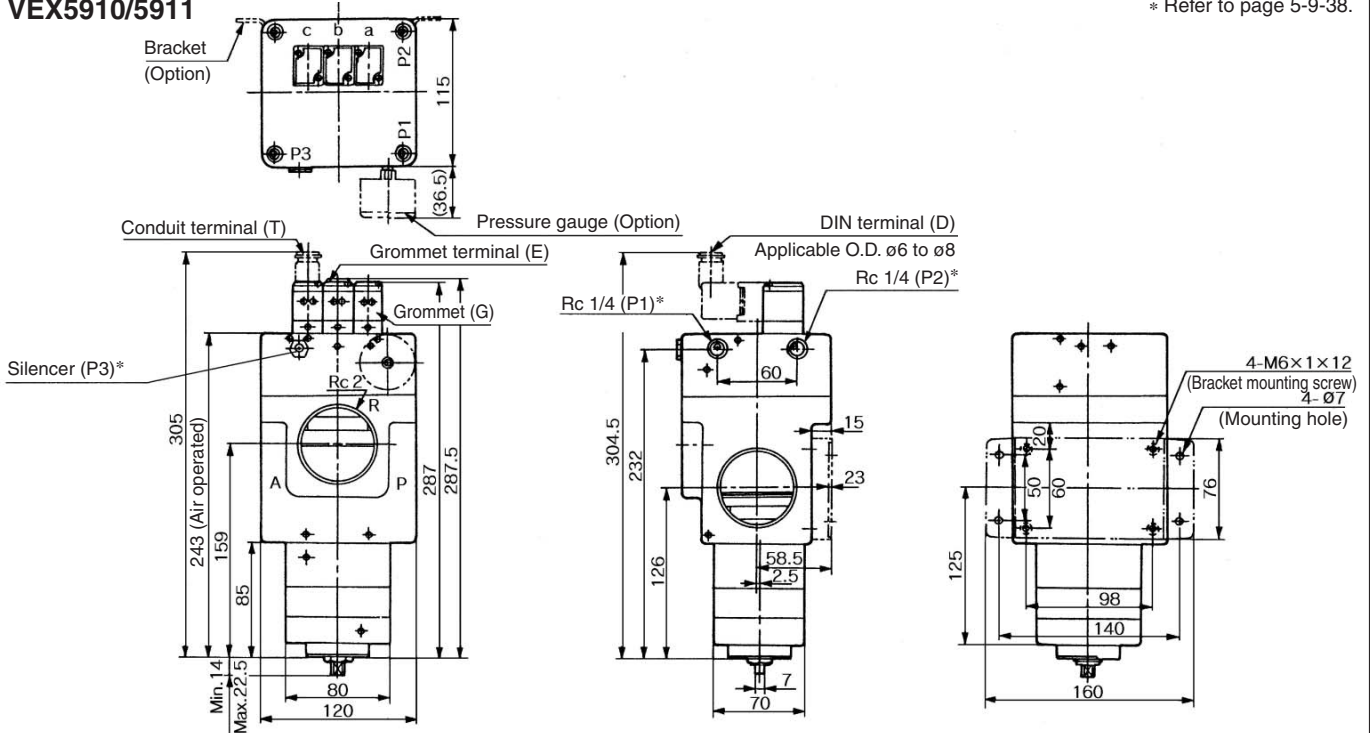


Model	Port size		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
	A, P port	R port																					
VEX5510 VEX5511	Rc 1/2, 3/4, 1	Rc 1/2, 3/4, 1	160	150	79	70	50	25	10	7	25	173	53	80	60	13	18	98	100	Center	60	2-M6 x 1 x depth 9	116.5
VEX5710 VEX5711	Rc 1, 1 1/4	Rc 1 1/4	177.5	167.5	84.5	90	60	30	15	7	25	190.5	54.5	100	60	13	17	105.5	103.5	18	82	4-M6 x 1 x depth 6	136.5

Model	Bracket mounting dimensions						Grommet	Grommet terminal	Conduit terminal	DIN terminal
	a	b	c	d	e	f	g	h	i	j
VEX5510 VEX5511	19	130	110	9	12	2.3	204	204.5	222	221.5
VEX5710 VEX5711	32	136	120	9	20	2.3	221	221.5	239.5	239

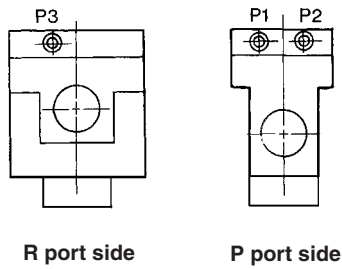
VEX5910/5911

* Refer to page 5-9-38.



Series VEX5

External Pilot Piping



⚠ Caution

Refer to pages 5-11-2 to 5-11-6 for Safety Instructions and Solenoid Valve Precautions.

Model	P1	P2	P3
VEX5□00	External pilot	External pilot	Plug
VEX5□01	External pilot	External pilot	Pilot exhaust ^{Note)}
VEX5□10	External pilot	External pilot	External pilot
VEX5□11	External pilot	External pilot	Pilot exhaust ^{Note)}

Note) For pilot exhaust port, silencer AN210-02 is mounted.

Related Products:

Silencer (Series AN)

- Over 30 dB noise reduction
- Sufficient effective area



Model	Connection R	Effective area (mm ²)
AN110	1/8	35
AN200	1/4	35
AN300	3/8	60
AN400	1/2	90
AN500	3/4	160
AN600	1	270
AN700	1 1/4	440
AN800	1 1/2	590
AN900	2	960



Refer to page 5-10-1 for details.

Exhaust Cleaner (Series AMC)

- Provides a silencing capability and an oil mist recovery function.
- Can also be used in a centralized piping system.



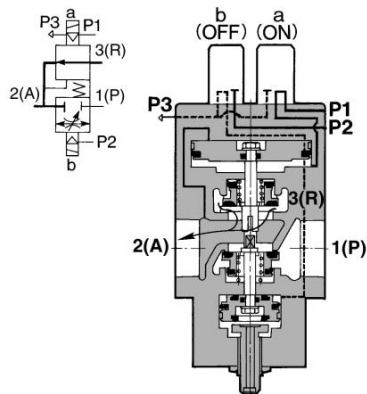
Model	Connection R	Effective area (mm ²)	Max. air flow (ℓ/min)
AMC310	3/8	16	300
AMC510	3/4	55	1,000
AMC610	1	165	3,000
AMC810	1 1/2	330	6,000
AMC910	2	550	10,000

- 99.9% of oil mist removal.
 - Over 35 dB noise reduction.
- Refer to page 5-11-1 for details.



Basic Type Construction/Working Principle/Component Parts

1. 3(R) → 2(A) Reduced pressure supply

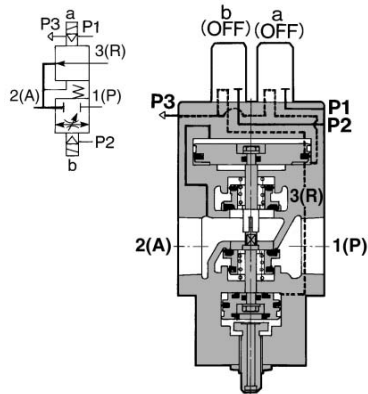


When the pilot solenoid valve "a" is energized (or when pilot pressure is applied to the P1 port of the air operated type) while the P1 port is under the pilot pressure, reduced pressure is supplied from the R port to the A port.

The acting force of the pilot pressure (P1 port) reaches the space under the pressure control piston (3) pushes the piston upward and opens the poppet valve (6). Thus air is supplied from the R port to the A port.

The air entering through the A port flows through the feedback passage to the space above the piston, and when its pressure balances with the pilot pressure under the pressure control piston, the poppet valve closes, thus setting the A port pressure corresponding to the pilot pressure (P1 port). (P1 port pressure: A port pressure = 1:1)

2. Closed center

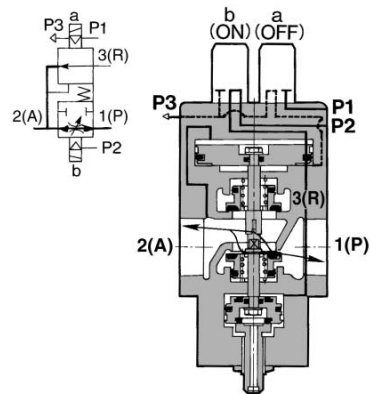


When neither the pilot solenoid valves "a" or "b" is energized (or when no pilot pressure is applied to the P1 and P2 ports of the air operated type), no acting force is applied to the pressure control piston (3) and operation piston (9), and the spring (4) closes both poppet valves (6), thus the valves assume the closed center position.

While the A port is being pressurized, air will not be released even if electrical power to the pilot solenoid valve "a" is turned off (or pilot pressure is released from the P1 port of the air operated type).

(R → A: Non relief regulator)

3. 2(A) ↔ 1(P) Throttled exhaust

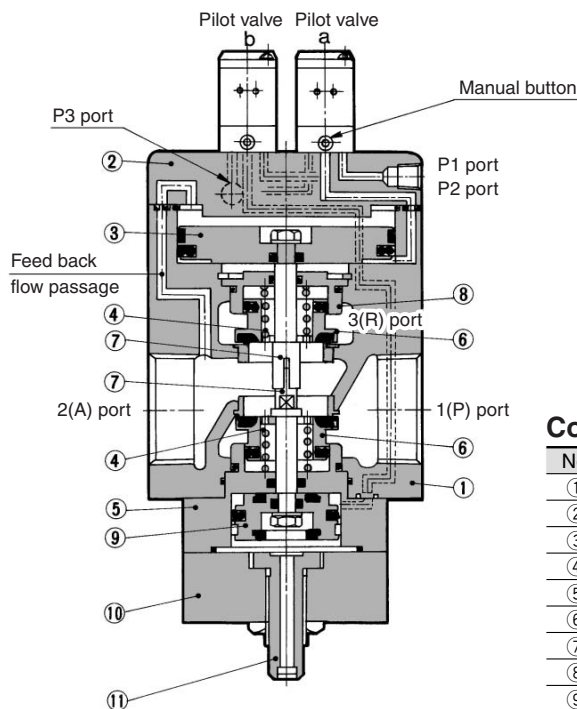


When the pilot solenoid valve "b" is energized while pilot pressure is in the P2 port (or when the pilot pressure is applied to the P2 port of the air operated type), an acting force generated above the operation piston (9) pushes the operation piston down, and thus the P and A ports are connected.

At that time, the lower poppet valve (6) opens by the degree preset by the needle (11). (Counterclockwise rotation of the needle opens the poppet valve.)

The upper and lower poppet valves operate independently. When the pilot solenoid valves "a" and "b" are energized alternately (or when pilot pressure is applied to the P1 and P2 ports of the air operated style alternately), the supplied reduced pressure (R → A) can be throttled and exhausted (A → P).

Construction



(Basic type: External pilot solenoid)

Component Parts

No.	Description	Material
①	Body	Aluminum alloy casted
②	Cover	Aluminum alloy casted
③	Regulation piston	Aluminum alloy
④	Spring	Stainless steel
⑤	Chamber	Aluminum alloy
⑥	Poppet valve	NBR
⑦	Rod	Stainless steel
⑧	Valve guide	Aluminum alloy
⑨	Operating piston	Aluminum alloy
⑩	Bottom cover	Aluminum alloy
⑪	Needle	Brass

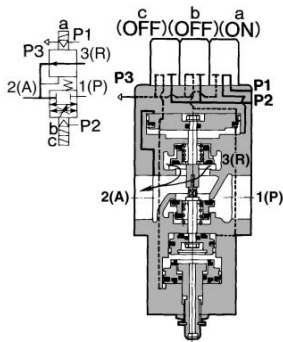
VEX

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AMC

Select Type Construction/Working Principle/Component Parts

1. 3(R) → 2(A) Reduced pressure supply



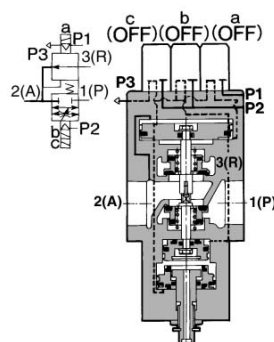
When the pilot solenoid valve "a" is energized while the P1 port is under the pilot pressure, reduced pressure is supplied from the R port to the A port.

The acting force of the pilot pressure (P1 port) reaches the space under the pressure control piston ③ pushes the piston upward and opens the poppet valve ⑥. Thus air is supplied from the R port to the A port.

The air entering through the A port flows through the feedback passage to the space above the piston and when its pressure balances with the pilot pressure under the pressure control piston, the poppet valve closes, thus setting the A port pressure corresponding to the pilot pressure (P1 port).

(P1 port pressure: A port pressure = 1:1)

2. Closed center

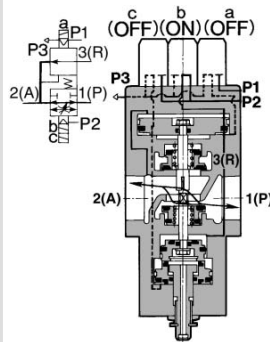


When neither the pilot solenoid valve "a" nor "b" is energized (or when no pilot pressure is applied to the P1 and P2 ports of the air operated type), no acting force is applied to the pressure control piston ③ and operation piston ⑨, and the spring ④ closes both poppet valves ⑥, thus the valve assumes the closed center position.

While the A port is being pressurized, air will not be released even if electrical power to the pilot solenoid valve "a" is turned off (or pilot pressure is released from the P1 port of the air operated type).

(R → A: Non relief regulator)

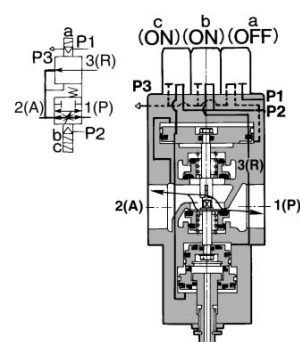
3. 2(A) ↔ 1(P) Fully open exhaust



When the pilot solenoid valve "b" is energized while pilot pressure is in the P2 port (or when the pilot pressure is applied to the P2 port of the air operated type), an acting force generated above the operation piston ⑨, and pushes down the operation piston, and thus the P and A ports are connected.

At that time, the lower poppet valve y fully opens.

4. 2(A) ↔ 1(P) Throttled exhaust



When the pilot solenoid valves "b" and "c" are energized simultaneously while pilot pressure is in the P2 port (or when the pilot pressure is applied simultaneously to the P2 and P3 ports of the air operated type), an acting force generated above the operation piston ⑨ pushes the piston down and another acting force generated under the stopper ⑪ pushes up the stopper, and thus the P and A parts are connected.

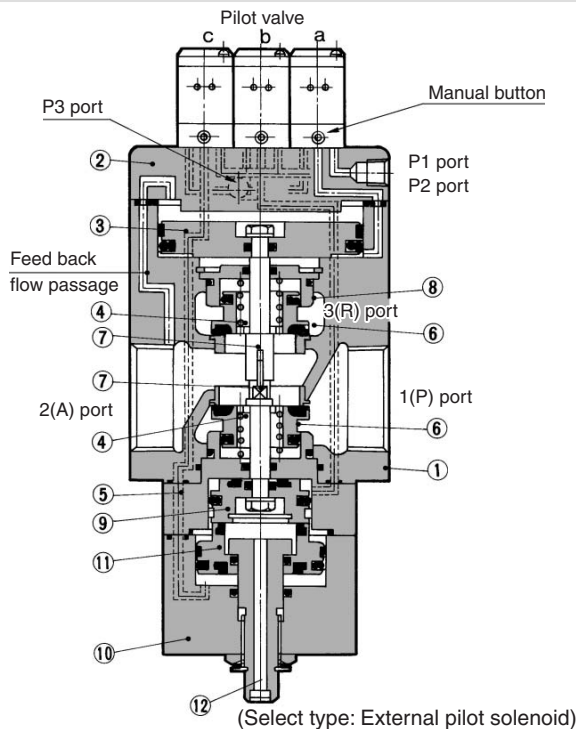
At that time, the lower poppet valve ⑥ opens by the degree preset by the needle ⑫. (Counterclockwise rotation of the needle opens the poppet valve.)

The upper and lower poppet valves operate independently. When the pilot solenoid valves "a" and "b" are energized alternately (or when pilot pressure is applied alternately to the P1 and P2 ports of the air operated type), the supplied reduced pressure (R→A) can be throttled and exhausted (A → P).

* The pilot solenoid valve "c" remains energized (or pilot pressure remains applied to the P3 port of the air operated type).

By turning on/off the pilot solenoid valve "c" (or by supplying/exhausting pilot pressure to/from the P3 port of the air operated type) while electric power is being supplied to the pilot solenoid valve "b" (or pilot pressure is being applied to the P2 port of the air operated type), either throttling or fully open exhaust can be selected (deceleration/acceleration) for the A ↔ P port.

Construction



Component Parts

No.	Description	Material
①	Body	Aluminum alloy casted
②	Cover	Aluminum alloy casted
③	Regulation piston	Aluminum alloy
④	Spring	Stainless steel
⑤	Chamber	Aluminum alloy
⑥	Poppet valve	NBR
⑦	Rod	Stainless steel
⑧	Valve guide	Aluminum alloy
⑨	Operating piston	Aluminum alloy
⑩	Bottom cover	Aluminum alloy
⑪	Stopper	Aluminum alloy
⑫	Needle	Brass