Power Valve
Economy Valve
Series VEX5

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

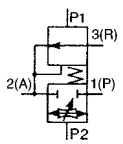
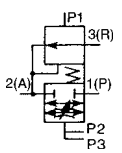
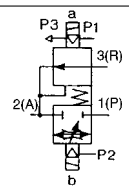
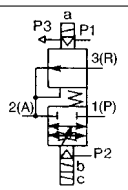
Three functions (pressure regulator, switching valve, and speed controller) are provided by a single valve.

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 style. (Comparison based on SMC data.)

Basic

Select style

	Basic	Select style
Air operated		
External pilot solenoid valve		

Standard Specifications

Model			VEX55□□ 04/06/10			VEX57□□ 10/12		VEX59□□ 14/20	
Style			Air operated, External pilot solenoid						
Fluid			Air						
Proof pressure			1.5MPa						
Pressure range			0 to1.0MPa						
Set pressure range			0.05 to 0.9MPa						
Ambient and fluid temp.			Max. 50°C(Air operated 60°C)						
Pilot pressure			P1: 0.05 to 0.9MPa P2: 0.2 to 0.9MPa (Air operated: P2, P3: 0.2 to 0.9MPa P2≦P3)						
Repeatability			0.01MPa						
Sensitivity			0.01MPa						
Response time			60ms or less						
Max. operating frequency			3 cycles/sec.						
No. of needle rotations			6 turns			8 turns			
Mounting			Free						
Lubrication			Not required(use turbine oil No.1 ISO VG32, if lubricated)						
Port size Rc(PT)		Port	04	06	10	10	12	14	20
		P	1/2	3/4	1	1	1 1/4	1 1/4	2
		A							
		R				1 1/4		2	
Effective area		mm²	130	160	180	300	330	590	670
		Cv	7.2	8.9	10	17	18	33	37
Weight (kg)	Air operated	Basic	2.0			3.2		4.7	
		Select	2.3			3.5		5.0	
	Solenoid	Basic	2.2			3.5		4.9	
		Select	2.6			3.8		5.3	

Solenoid Specifications

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

Accessories/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		

How to Order

VEX5 [5] [1] [1] – [06] [2] [E] [Z] – [B]

Economy valve

Style
0 — Basic
1 — Select

Operation style
0 — Air operated
1 — External pilot solenoid

Body size **Port size**

Body size	Port size Rc(PT)		
		P, A port	R port
5	**04**	1/2	1/2
	06	3/4	3/4
	10	1	1
7	**10**	1	1 1/4
	12	1 1/4	
9	**14**	1 1/4	2
	20	2	

Coil rated voltage

1	100V AC50/60Hz
2	200V AC50/60Hz
3*	110V AC50/60Hz
4*	220V AC50/60Hz
5	24V DC
6*	12V DC
7*	240V AC50/60Hz
9*	Other

* **Options**

Electrical entry (Only solenoid)
G — Grommet, Lead wire length 300mm
H — Grommet, Lead wire length 600mm
E — Grommet terminal
T — Conduit terminal
D — DIN connector

Indicator light and surge voltage suppressor
— — None
S — With surge voltage suppressor (Only grommet)
Z — With indicator light and surge voltage suppressor (Except for grommet)

Option
B — Bracket
G — Pressure gauge

How to Order Pilot valve

SF4 – [ ] [ ] – 20

Electrical entry
Coil rated voltage

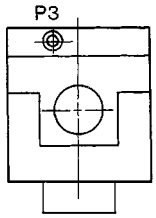
(Ex.) **SF4-1G-20**
100V AC, Grommet

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

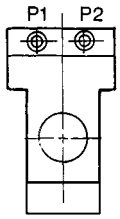
Model

Model	Basic		Select		Port size Rc(PT)	
	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

External Pilot Piping



R port size



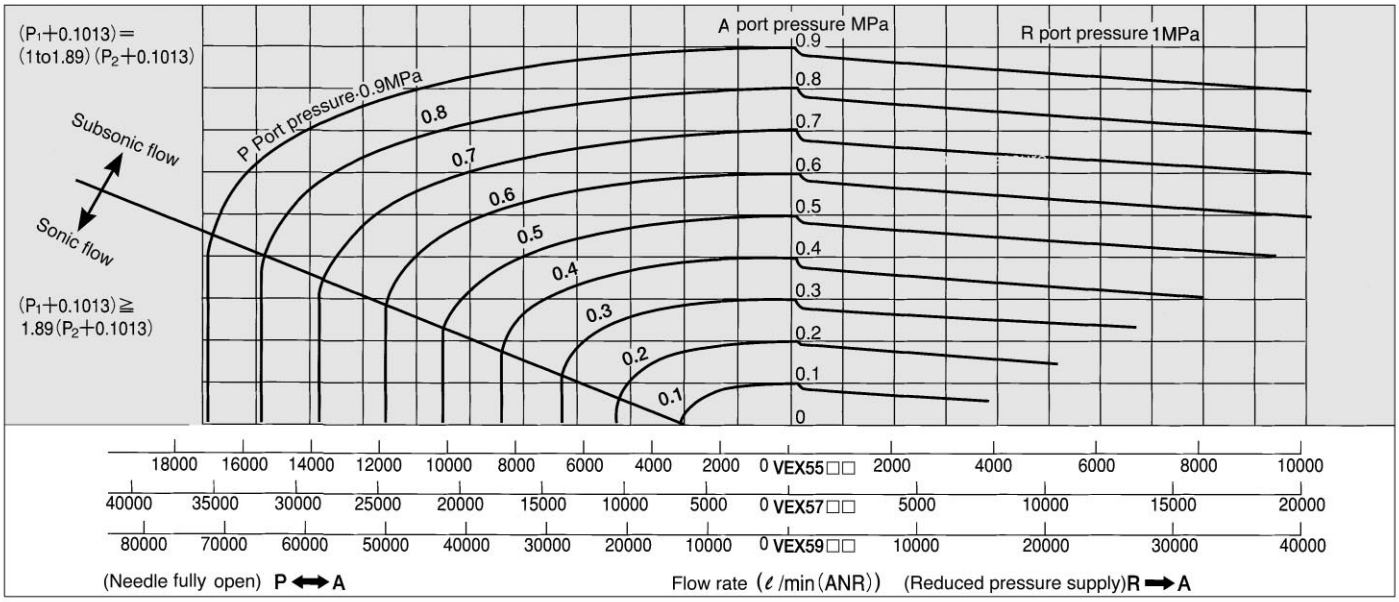
P port size

Model	P1	P2	P3
VEX5□00	External pilot	External pilot	Plug
VEX5□01	External pilot	External pilot	Pilot Exhaust
VEX5□10	External pilot	External pilot	External pilot
VEX5□11	External pilot	External pilot	Pilot Exhaust

⚠ Caution

Refer to p.0-33 to 0-36 for Safety Instructions and common precautions

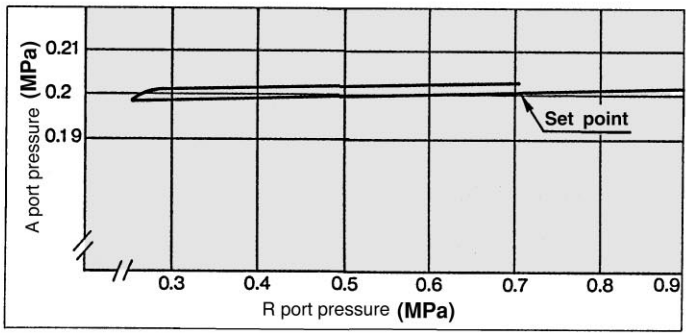
Flow Characteristics



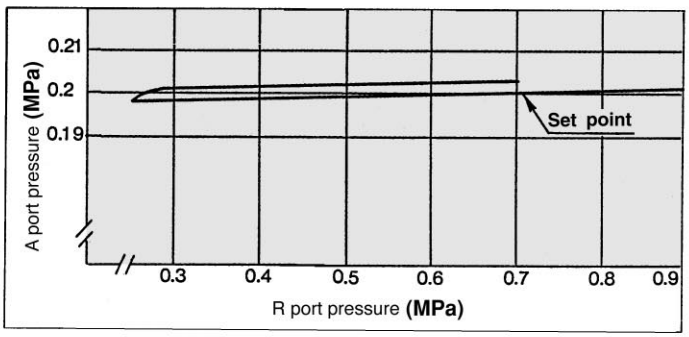
Pressure Characteristics

Shows secondary pressure (A port) change against primary pressure (R port) change. They conform to JISB8372(Air pressure regulator)

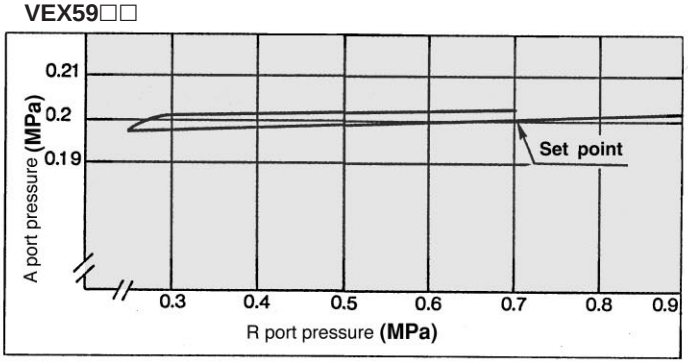
VEX55□□



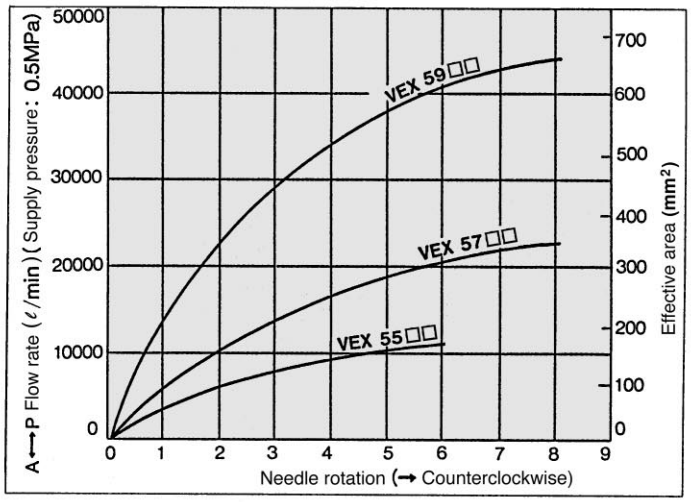
VEX57□□



VEX59□□

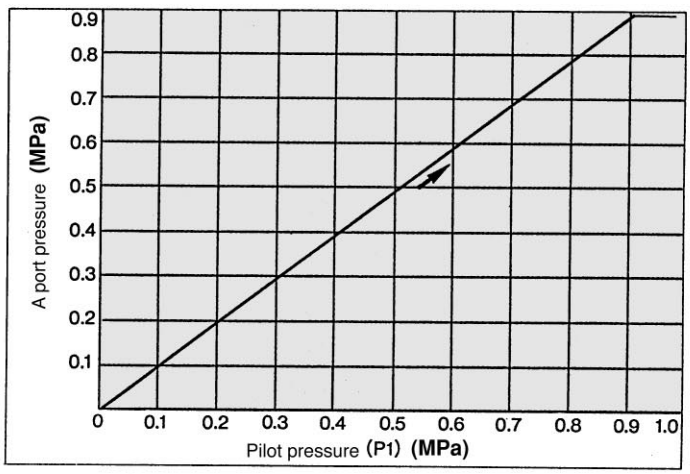


Needle Characteristics A↔P



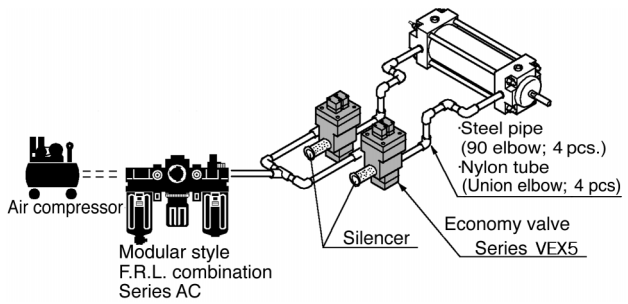
Setting Pressure Characteristics

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

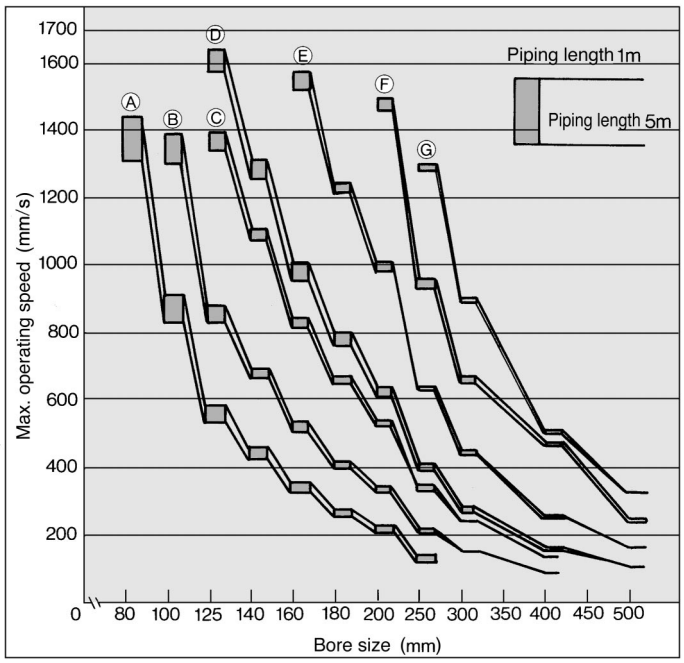


Cylinder Speed

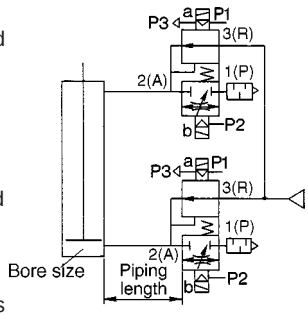
System diagram



System	Solenoid valve	Silencer	Port size	Fitting (One side) 4 pcs
Ⓐ	**VEX55□□**	AN400	SGP 1/2 B	90° Elbow
Ⓑ	**VEX55□□**	AN500	3/4 B	90° Elbow
Ⓒ	**VEX55□□**	AN600	1B	90° Elbow
Ⓓ	**VEX57□□**	AN600	1B	90° Elbow
Ⓔ	**VEX57□□**	AN700	1 1/4B	90° Elbow
Ⓕ	**VEX59□□**	AN800	1 1/2B	90° Elbow
Ⓖ	**VEX59□□**	AN900	2B	90° Elbow



- Supply air pressure
  Set pressure is 0.5MPa both on rod and head side.
- Needle fully open
- Load 50%
- 90° elbow 4 pcs.
- There is a limit to the relation between maximum operational speed and load in the cushion incorporated in the cylinder. Check it with the cylinder catalogue.
- Maximum working speed is 1.2 times when load factor is 0% and is 0.7 times when load factor is 75%.



Energy Saving Lifter

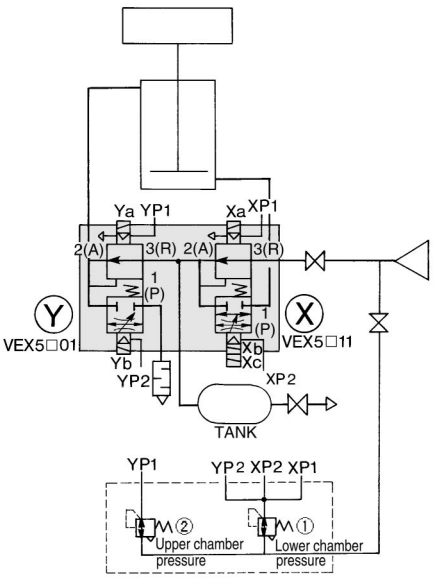
• Simple
Two economy valves and a tank move the double-acting cylinder to raise and lower heavy objects.

• 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 con sumption 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**) Ⓧ and Ⓨ 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
Upward	High speed	ON ●	●	OFF —	●	—	**a**
	Low speed	●	●	●	●	—	**b**
Downward	High speed	—	●	—	—	●	**c**
	Low speed	—	●	●	—	●	**d**
Stop		—	—	—	—	—	**e**

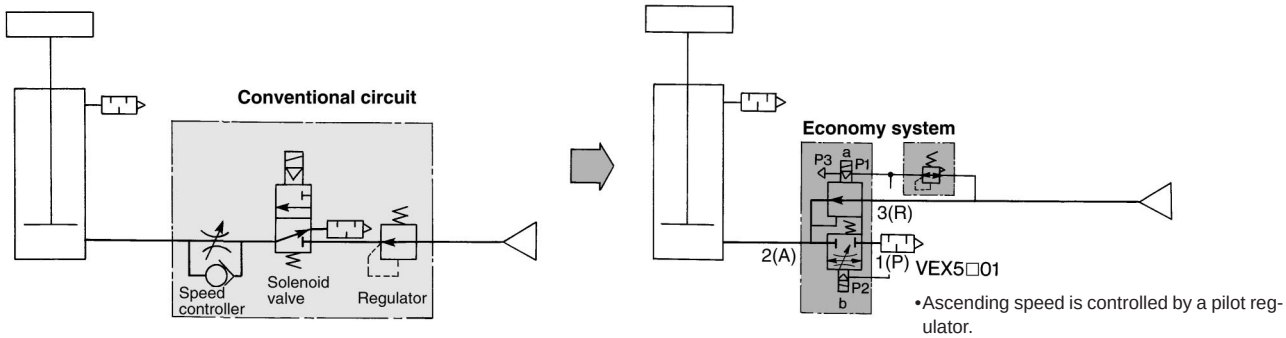
a: The air in the upper cylinder chamber is exhausted from the **P** port of **VEX**Ⓨ,and the air in the tank flows in through the **P** port of **VEX**Ⓧ.
b: Air flows into the lower cylinder chamber through a throttled opening,set by a needle,from the **A** to **P** port of **VEX**Ⓧ.
c: The air in the tank flows into the upper cylinder chamber at a preset low pressure from the **A** port of **VEX**Ⓨ,while the air in the lower cylinder chamber returns to the tank through **VEX**Ⓧ.
d: Air returns to the tank through a throttled opening from the **P** to the **A** port of **VEX**Ⓧ.
e: The air in the lower cylinder chamber is blocked at the **P** port of **VEX**Ⓧ,while the air in the upper cylinder chamber is blocked at the **A** port of **VEX**Ⓨ.

⚠ Caution

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

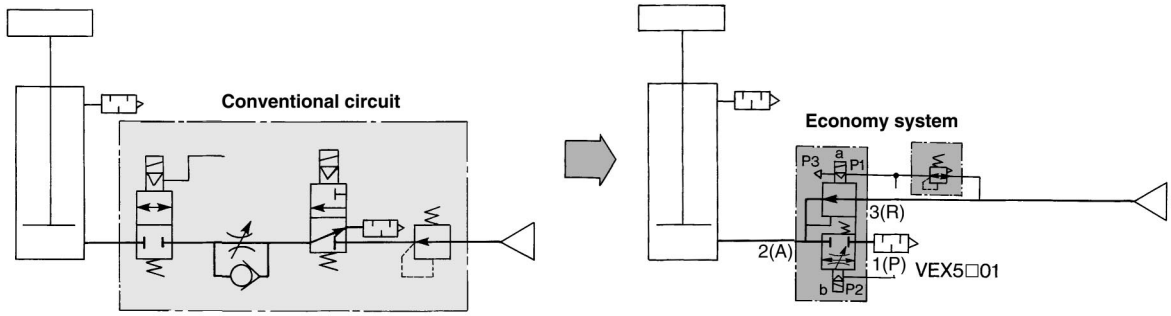
Applicable System/Example of Single Acting Circuit (The valves can be used also for double acting circuits. Consult SMC for details.)

① Speed control

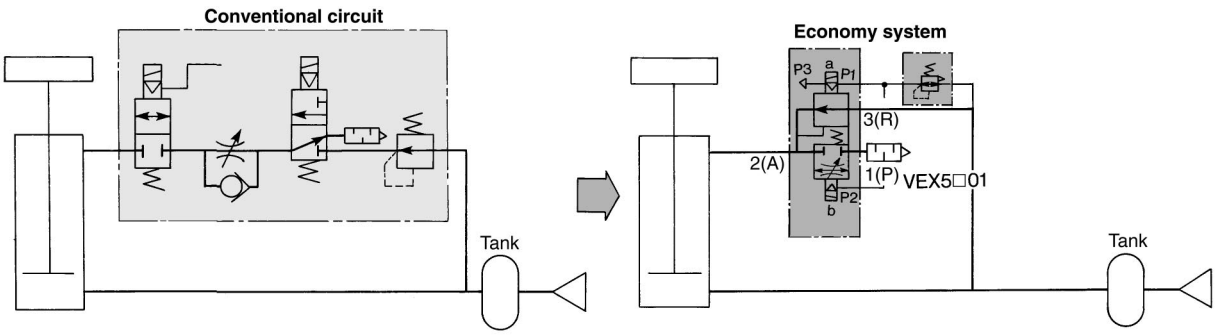


- Ascending speed is controlled by a pilot regulator.
- Descending speed is controlled by needle setting.

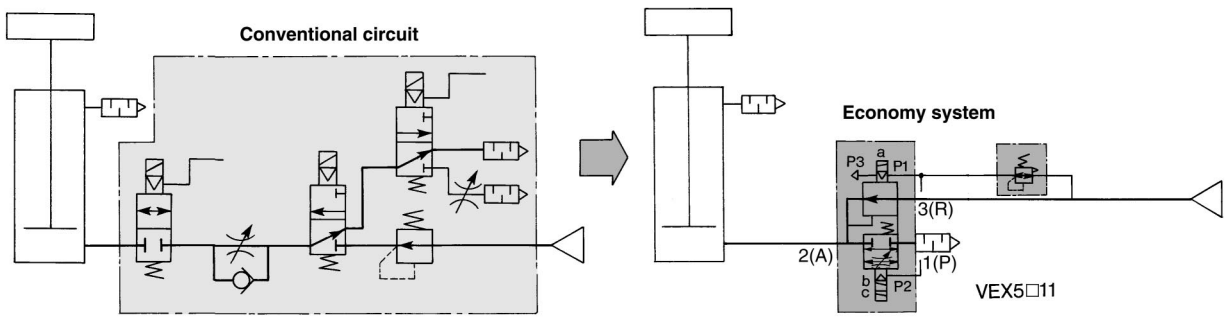
② Intermediate (emergency) stop



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

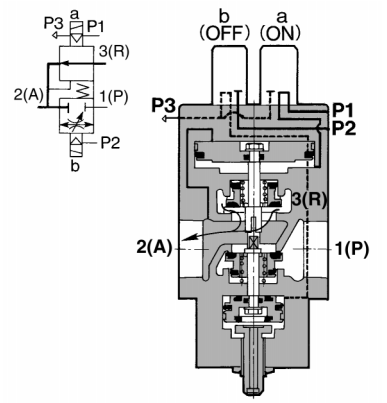


④ Two speed driving



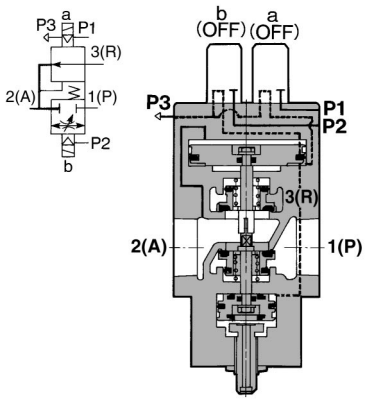
Basic Construction/Principles

(1)3(R)→2(A) Reduced pressure supply



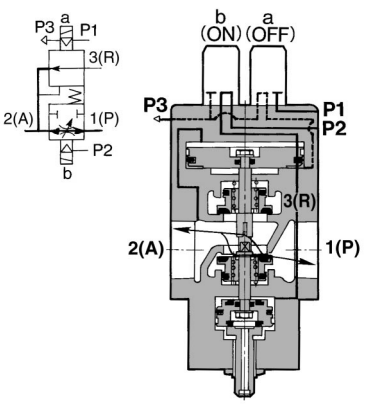
When the pilot solenoid valve “a” is energized (or when pilot pressure is applied to the P1 port of the air operated style) while the P1 port is under the pilot pressure, reduced pressure is supplied from the R port to the A port. The acting force of the pilot pressure (P1 port) reaches the space under 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 it’s 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



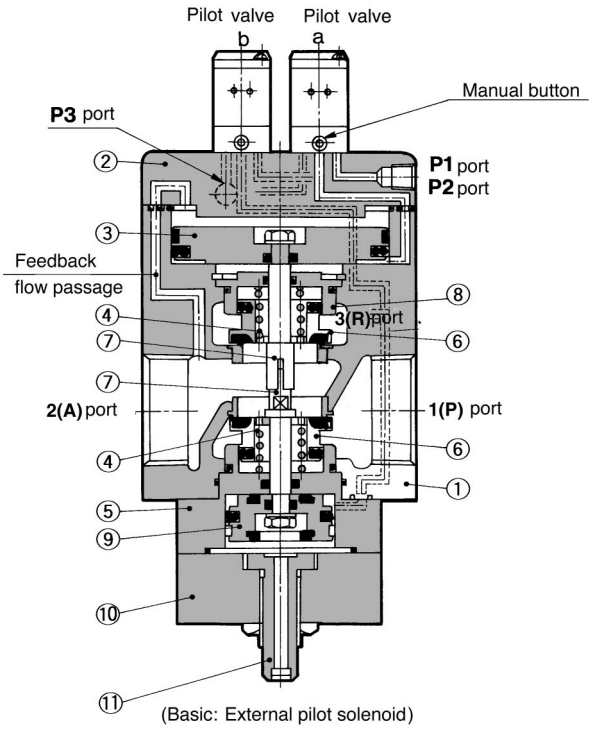
When neither the pilot solenoid valves “a” or “b” is energized(or when no pilot pressure is applied to the P1 and P2 ports of the air operated style), no acting force is applied to the pressure control piston ③ and operation piston ⑨, and the spring ④ closes both poppet valves ⑥, thus the valves assuming the closed centre 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 if released from the P1 port of the air operated style).
(R→A: Non releif 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 style), 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

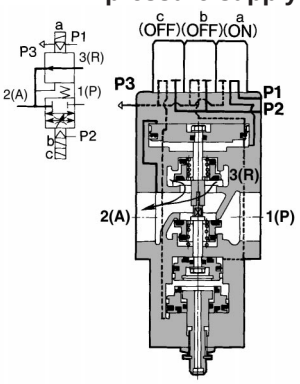


Component Parts

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

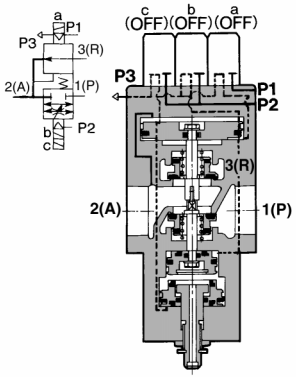
Select style Construction/Principles

(1)3(R)→2(A) Reduced pressure supply



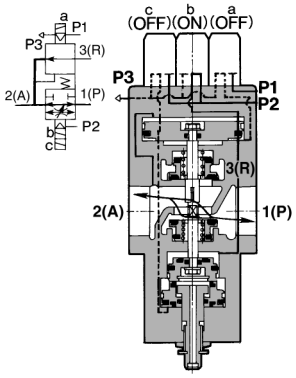
When the pilot solenoid valve “a” is energized while the P1 port is under the pilot pressure, reduced pressure is supplied from the R port to the A port.
The acting force of the pilot pressure (P1 port) reaches the space under the pressure control piston ③ pushes the piston upward and opens the poppet 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 it’s 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



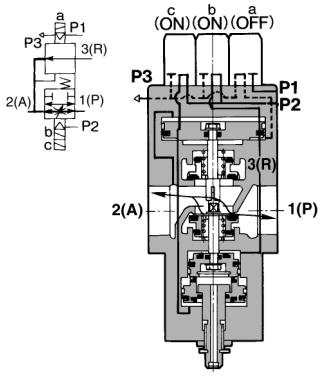
When neither the pilot solenoid valve “a” nor “b” is energized (or when no pilot pressure is applied to the P1 and P2 ports of the air operated style), no acting force is applied to the pressure control piston ③ and operation piston ⑨, and the spring ④ closes both poppet valves ⑥, thus the valve assuming 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 if released from the P1 port of the air operated style).
(R→A: Non relief regulator)

(3)2(A)→1(P)Fully open exhaust



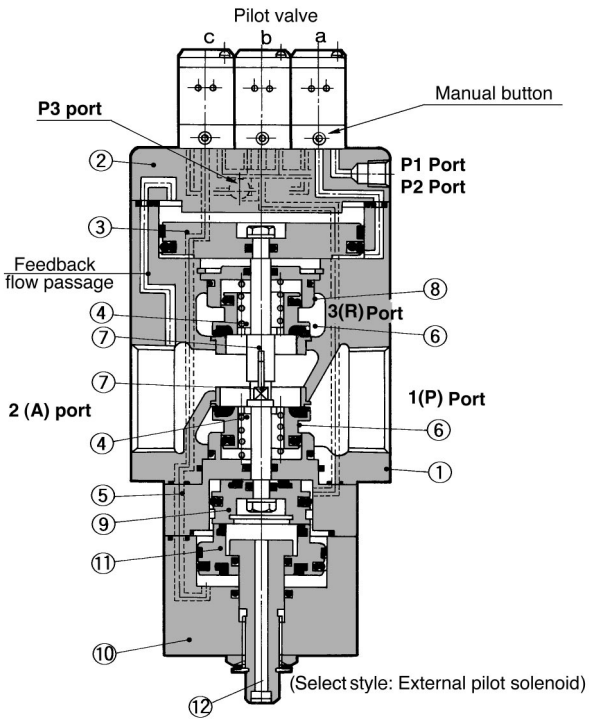
When the pilot solenoid valve “b” is energized while pilot pressure is in the P2 port (or when the pilot pressure is applied to the P2 port of the air operated style), an acting force generated above the operation piston ⑨, and pushes down the operation piston, and thus the P and A ports are connected.
At that time, the lower poppet valve ⑥ 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 style), 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 style), 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 style).
By turning on/off the pilot solenoid valve “c” (or by supplying/exhausting pilot pressure to/from the P3 port of the air operated style)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 style), either throttling or fully open exhaust can be selected (decelaration/accelaration) for the A↔P port.

Construction

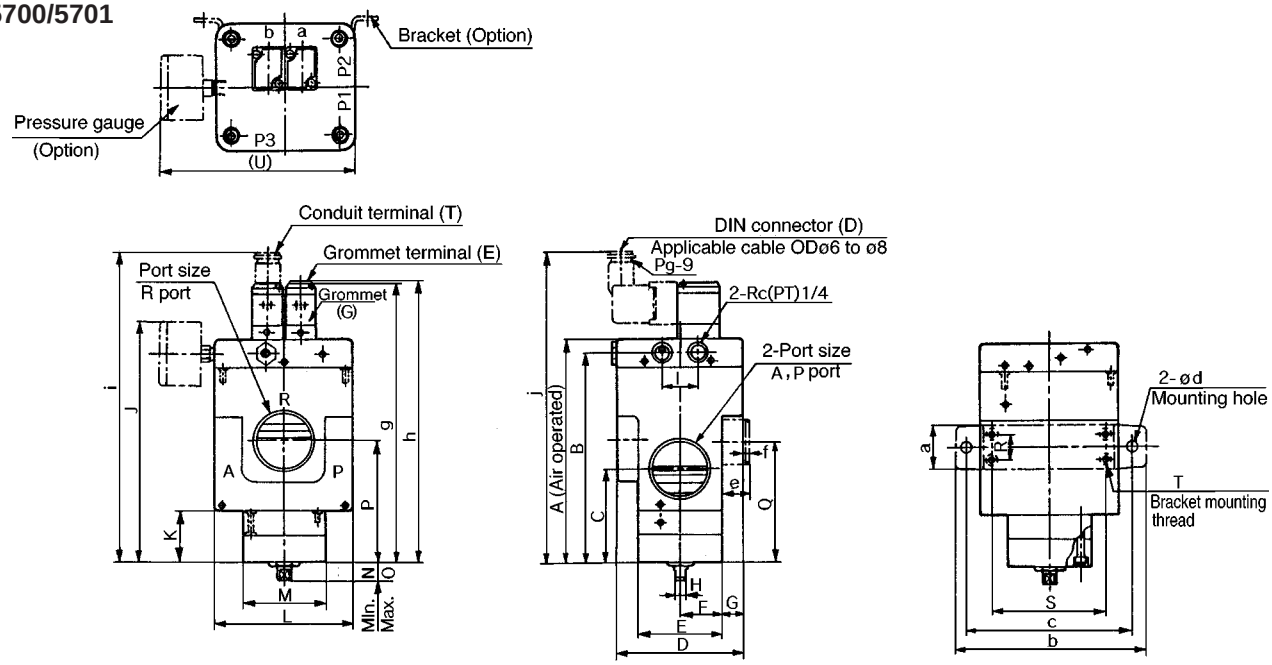


Component Parts

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

Basic Dimensions

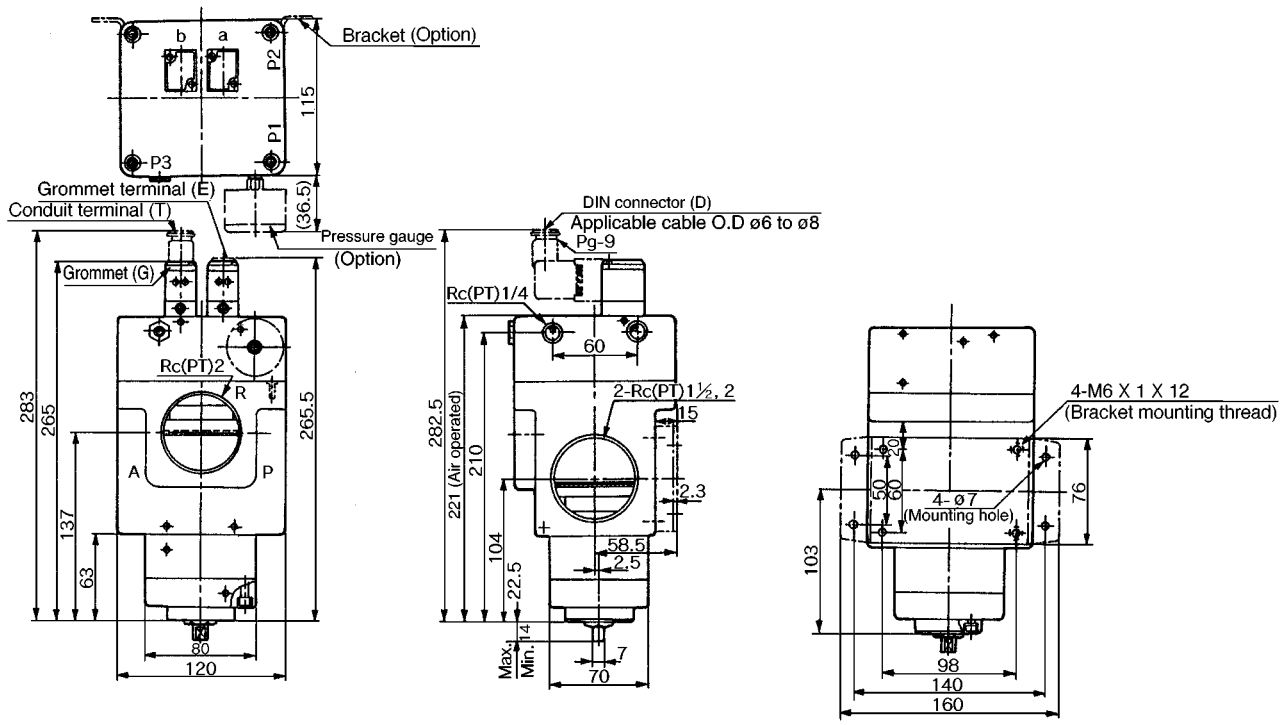
VEX5500/5501
VEX5700/5701



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(PT) 1/2, 3/4, 1	Rc(PT) 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(PT) 1,1 1/4	Rc(PT) 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 connector
	a	b	c	ød	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



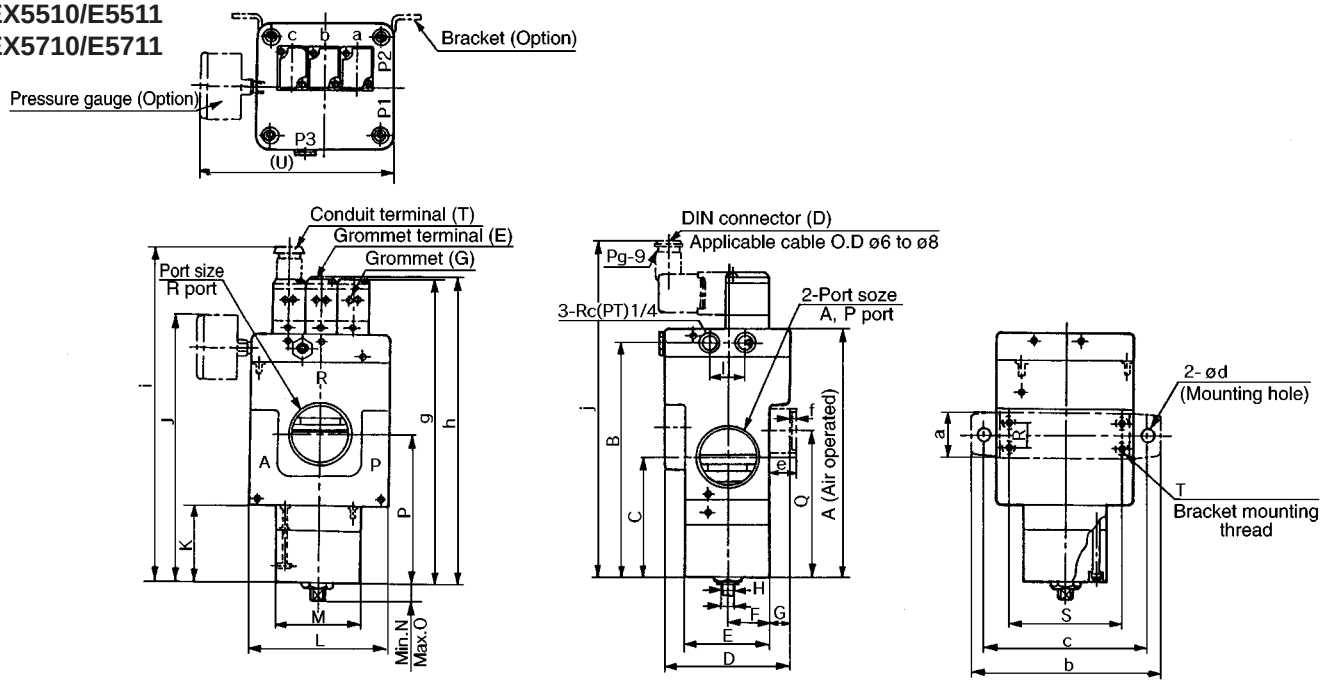
VEX

AN

AMC

Select style Dimensions

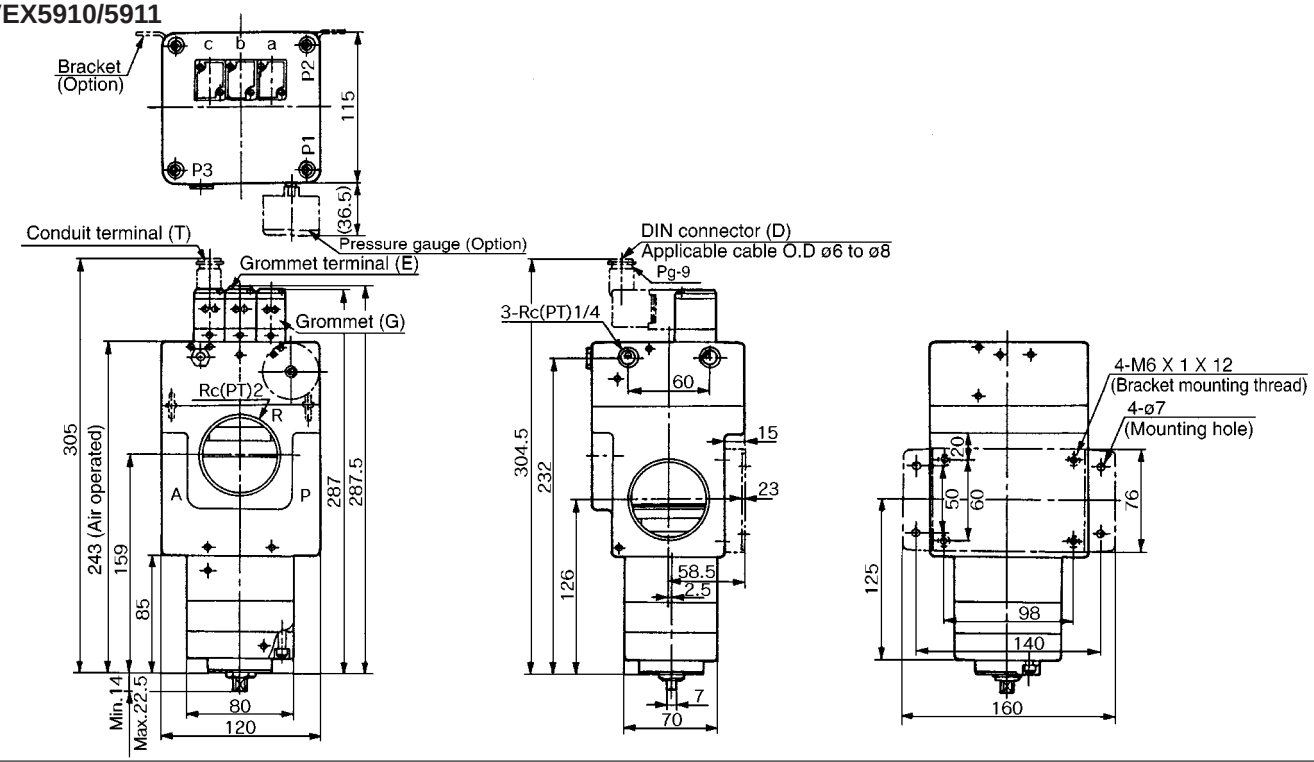
VEX5510/E5511
VEX5710/E5711



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(PT) ½, ¾, 1	Rc(PT) ½, ¾, 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(PT) 1, 1¼	Rc(PT) 1¼	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 connector
	a	b	c	ød	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



Others

Silencer (Series AN)

- Over 30dB noise reduction
- Sufficient effective area

Model	Connection R(PT)	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 p.5.2-1 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(PT)	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 35dB noise reduction.

• Refer to p.5.3-1 for details.