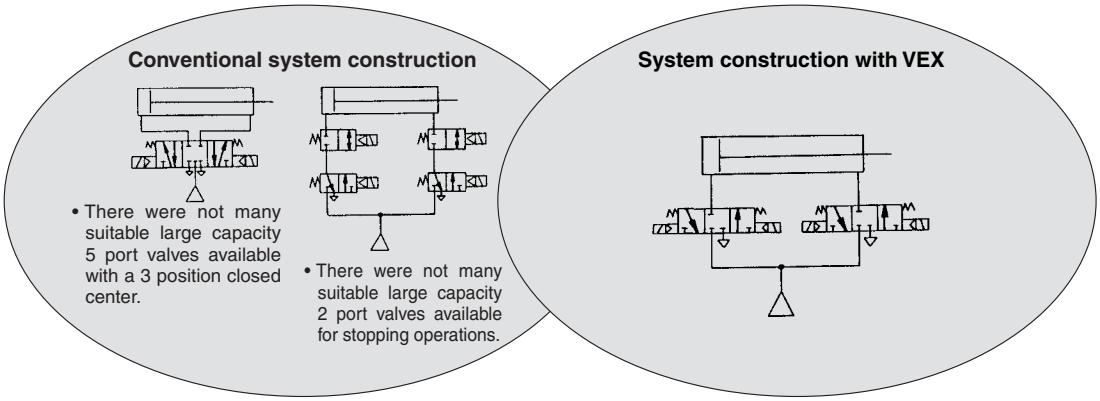
Power Valve: 3 Position Valve

Series VEX3

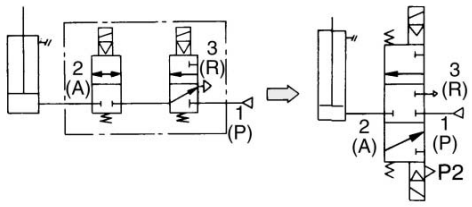
A variety of circuits in simple construction

■ Intermediate and emergency stops with a large size cylinder



Intermediate and emergency cylinder stops

The 3 position closed center valve produces a simple and large capacity system.



• A large capacity system without connection loss.

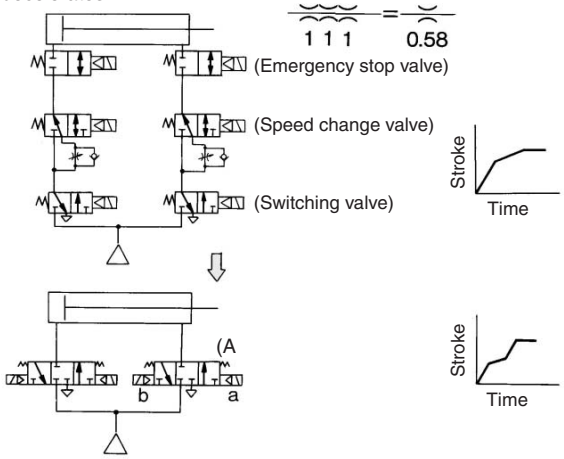
11 = 0.71

(Valves and piping can be made smaller.)

Terminal deceleration and an intermediate speed change circuit can be produced easily.

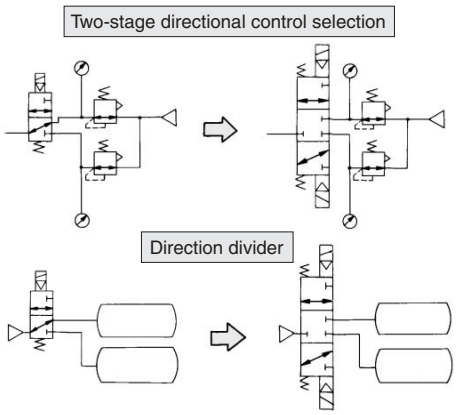
The simple system configuration permits sharp response. The large capacity system configuration without connection loss allows the use of smaller valves and piping.

• For example, when solenoid (b of valve (A is turned off while the cylinder is extending, the exhaust port closes and cylinder movement decelerates.



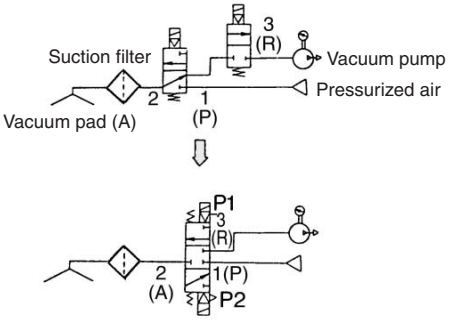
Universal porting could be used as a selector/ divider valve

The pressure balancing poppet valve that permits any flow direction allows sequential switching operation, preventing blow by and air entrainment.



Vacuum suction and release

The 3 port, 3 position double solenoid that permits vacuum suction, release, and suspension (closed) is ideal for a system where many valves are used.



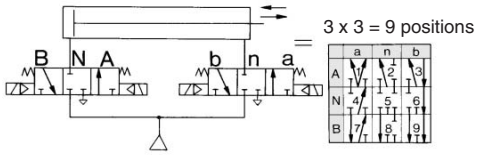
• Sequential switching operation prevents the inflow of pressurized air into the vacuum pump system.

⚠ Caution

• To maintain the vacuum of port A via the closed center, be aware that the vacuum could be decreased due to leakage from the vacuum pad and the piping. Furthermore, it cannot be used as an emergency cutoff valve.

For operation control of double acting cylinders

Two power valves driven by a double acting cylinder allows operation control in 9 positions (3 positions x 3 positions = 9 positions) including slow stopping, acceleration, and deceleration.



3, 7 — **Reciprocation**
1 — **Pressure center**
5 — **Closed center**
9 — **Exhaust center**
2, 4 — **Pressure & closed center**
6, 8 — **Exhaust & closed center**
Slow stopping or decelaration

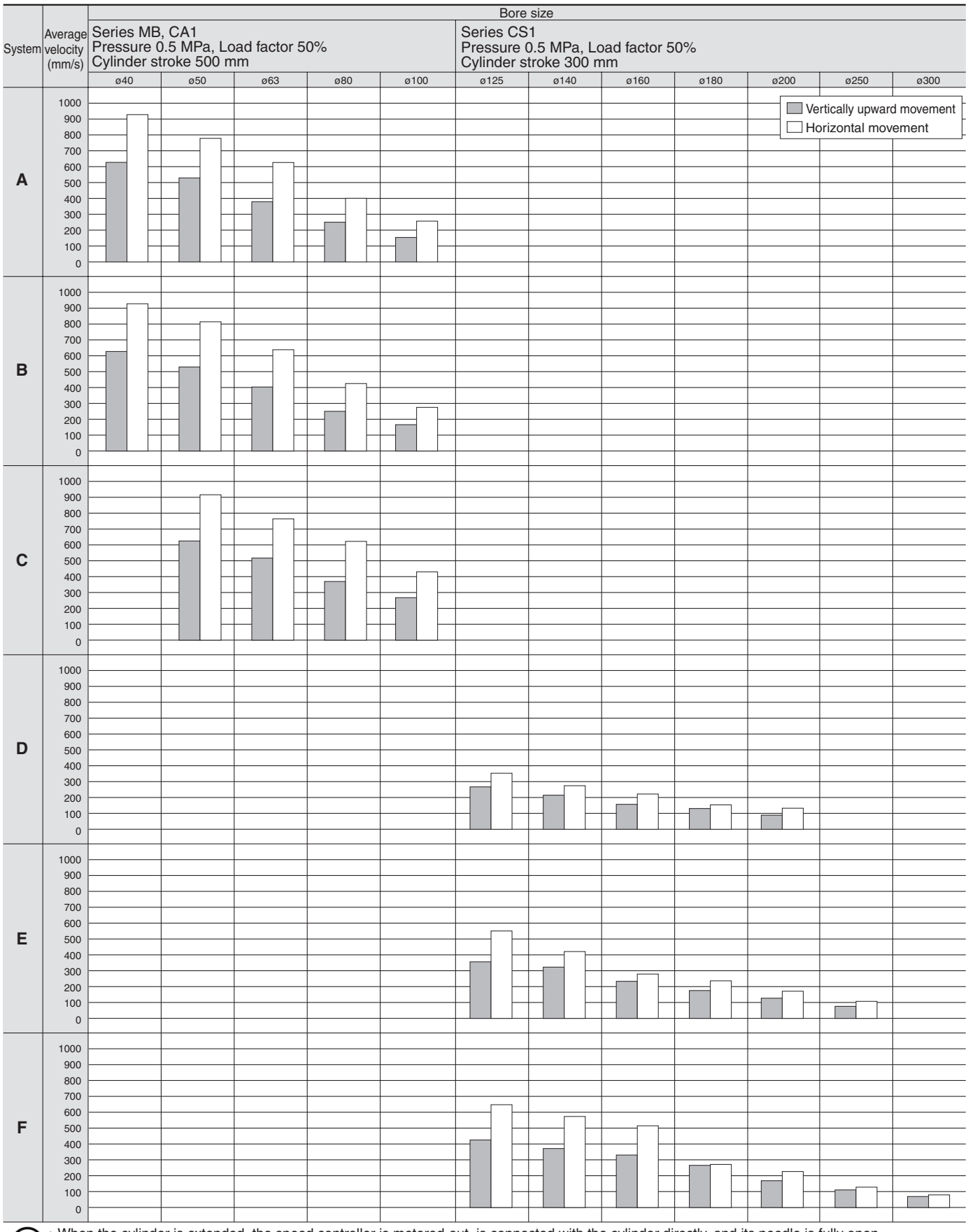
⚠ Caution

• This valve is not a non-leak specification, and thus cannot be used for long term intermediate stops or emergency stops.

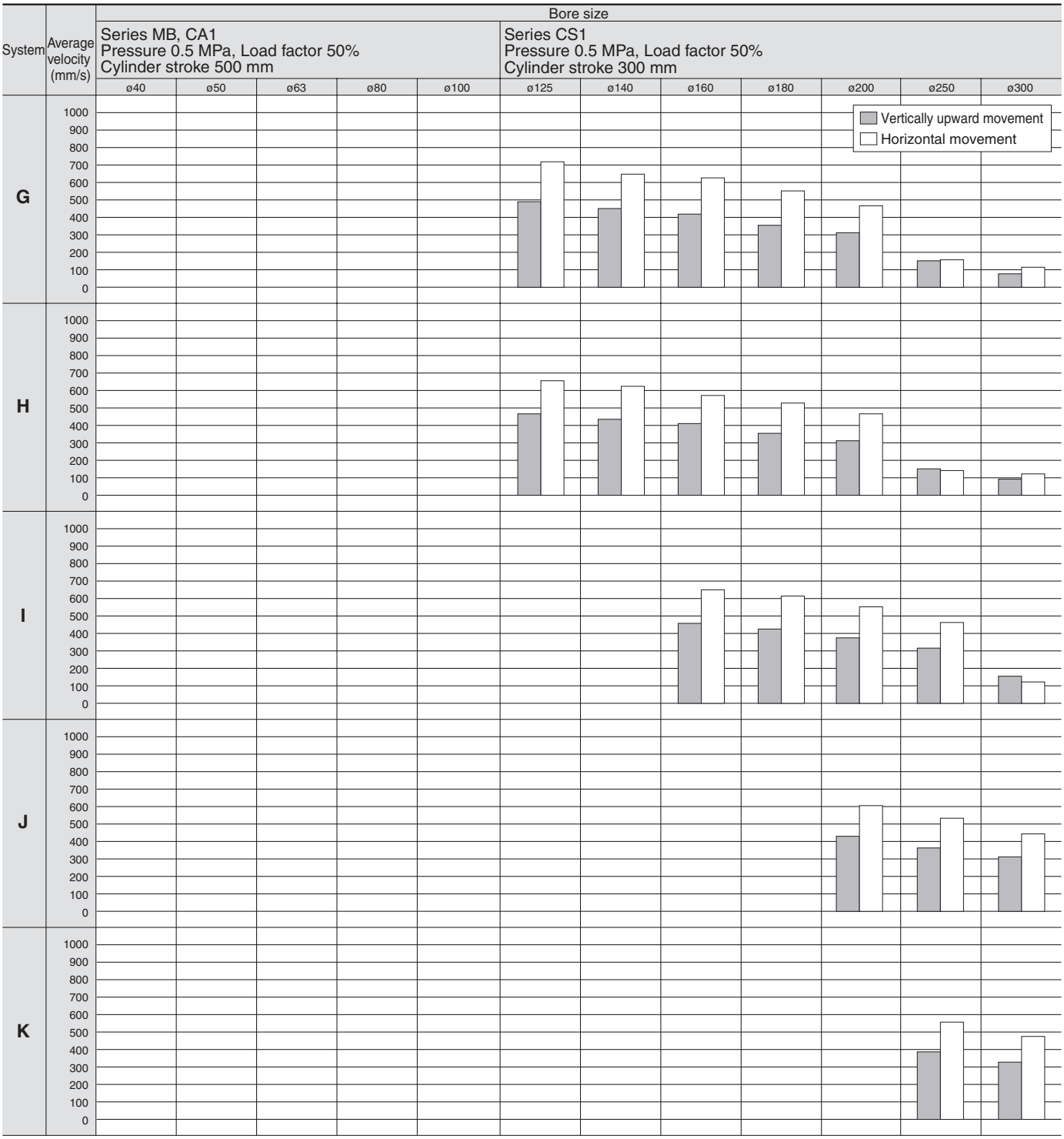
VEX
AN
AMC

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.



* 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%



∗ 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	VEX3 $\frac{1}{2}$ 2□-02	AS4000-02	AN200-02	ø10 x 1 m
B				ø12 x 1 m
C	VEX3 $\frac{3}{4}$ 2□-$\frac{03}{04}$	AS420-03	AN300-03	ø12 x 1 m
D		AS420-04	AN400-04	SGP15A x 1 m
E	VEX350□-$\frac{04}{06}$ $\frac{}{10}$	AS420-04	AN400-04	SGP15A x 1 m
F		AS500-06	AN500-06	SGP20A x 1 m
G		AS600-10	AN600-10	SGP25A x 1 m
H	VEX370□-$\frac{10}{12}$	AS600-10	AN600-10	SGP25A x 1 m
I		AS800-12	AN700-12	SGP32A x 1 m
J	VEX390□-$\frac{14}{20}$	AS900-14	AN800-14	SGP40A x 1 m
K		AS900-20	AN900-20	SGP50A x 1 m

How to Order

Body size • Port size

Body size	Port size		
	Port	P, A port	R port
12	01	1/8	
	02	1/4	
32	02	1/4	
	03	3/8	
	04	1/2	
50	04	1/2	
	06	3/4	
	10	1	
70	10	1	1 1/4
	12	1 1/4	
90	14	1 1/4	2
	20	2	

Electrical entry (Only with solenoid)

Body size	Symbol	Electrical entry
12 32	G	Grommet, Lead wire length 300 mm
	H	Grommet, Lead wire length 600 mm
	L	L plug connector, with lead wire
	LN	L plug connector, without lead wire
	LO	L plug connector, without connector
	M	M plug connector, with lead wire
	MN	M plug connector, without lead wire
	MO	M plug connector, without connector
	D	DIN terminal
	DO	DIN terminal, without connector
50 70 90	G	Grommet, Lead wire length 300 mm
	H	Grommet, Lead wire length 600 mm
	E	Grommet terminal
	T	Conduit terminal
	D	DIN terminal

Body ported	**VEX3**	**12**	**0**	—	**01**		**5**	**D**		— **B**
Base mounted	**VEX3**	**22**	**0**	—	**01**		**5**	**D**		— **B**

Operation type

0	Air operated
1	External pilot solenoid
2	Internal pilot solenoid

Option

B	Bracket (Except VEX332□)
F	Foot (VEX312□ and VEX332□ only)
N	Silencer for pilot exhaust (P2) port (Only with solenoid)

Body size • Port size

Body size	Port size		
	Port	P, A port	R port
22	Nil	Without sub-plate	
	01	1/8	
	02	1/4	
42	Nil	Without sub-plate	
	02	1/4	
	03	3/8	
	04	1/2	

Thread type

Nil	Rc
T	G
F	NPT
N	NPTF

Voltage (Only with solenoid)

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

Light/Surge voltage suppressor

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

Electrical entry

Symbol	Electrical entry
G	Grommet, Lead wire length 300 mm
H	Grommet, Lead wire length 600 mm
L	L plug connector, with lead wire
LN	L plug connector, without lead wire
LO	L plug connector, without connector
M	M plug connector, with lead wire
MN	M plug connector, without lead wire
MO	M plug connector, without connector
D	DIN terminal
DO	DIN terminal, without connector

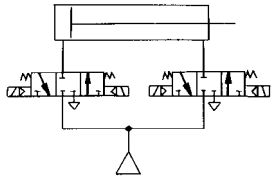
⚠ Caution

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

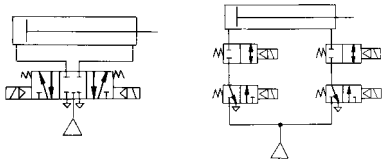
Variety of circuits in simple construction

3 position valve suitable for intermediate and emergency stop of large size cylinder.

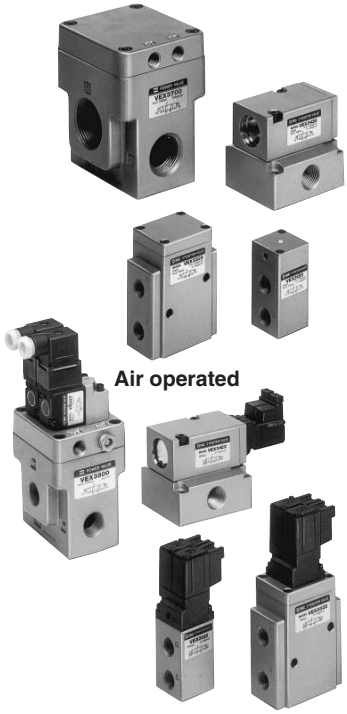
System construction with VEX



Conventional system construction



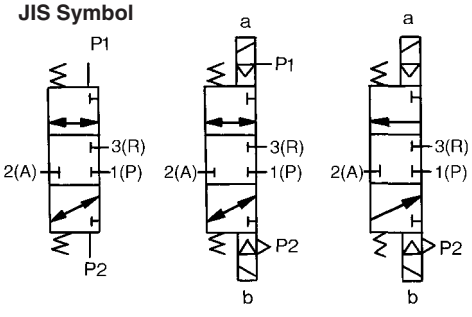
- There were not many suitable large capacity 5 port valves available with a 3 position closed center.
- There were not many suitable large capacity 2 port valves available for stopping operations.



Air operated

Internal pilot solenoid/External pilot solenoid

JIS Symbol



Air operated | External pilot solenoid | Internal pilot solenoid

Specifications

Model	Body ported	VEX312□-01/02	VEX332□-02/03/04	VEX350□-04/06/10	VEX370□-10/12	VEX390□-14/20
	Base mounted	VEX322□-01/02	VEX342□-02/03/04	—	—	—
Operation type		Air operated, External pilot solenoid, Internal pilot solenoid				
Fluid		Air				
Proof pressure		1.5 MPa				
Pressure range	Air operated	Low vacuum to 1.0 MPa				
		External pilot pressure 0.2 to 1.0 MPa				
	External pilot solenoid	Low vacuum to 1.0 MPa				
		External pilot pressure 0.2 to 0.7 MPa		External pilot pressure 0.2 to 0.9 MPa		
	Internal pilot solenoid	0.2 to 0.7 MPa		0.2 to 0.9 MPa		
Ambient and fluid temperature		Max. 50°C (Air operated 60°C)				
Response time (Pilot pressure 0.5 MPa)		40 ms or less	60 ms or less			
Max. operating frequency		3 cycles/sec.				
Mounting		Free				
Lubrication		Not required (Use turbine oil Class 1 ISO VG32, if lubricated.)				

Solenoid Specifications

Model			VEX3121, VEX3221, VEX3321, VEX3421 VEX3122, VEX3222, VEX3322, VEX3422	VEX3501, VEX3701, VEX3901 VEX3502, VEX3702, VEX3902
Pilot valve			Exclusive pilot valve	VO307-□□□
Electrical entry			Grommet, L plug connector, M plug connector, DIN terminal	Grommet, Grommet terminal, Conduit terminal, DIN terminal
Coil rated voltage (V)	AC (50/60 Hz)		100 V, 110 V, 200 V, 220 V, 240 V	
	DC		6 V, 12 V, 24 V, 48 V	
Allowable voltage			–15 to +10% of rated voltage	
Coil insulation			Class E (120°C) or equivalent	Class B (130°C) or equivalent
Temperature rise			45°C or less (Rated voltage)	50°C or less (Rated voltage)
Apparent power	AC	Inrush	4.5 VA/50 Hz, 4.2 VA/60 Hz	12.7 VA (50 Hz), 10.7 VA (60 Hz)
		Holding	3.5 VA/50 Hz, 3 VA/60 Hz	7.6 VA (50 Hz), 5.4 VA (60 Hz)
Power consumption		DC	1.8 W	4.8 W
Manual override			Non-locking push type	Non-locking push type

Option

Description		Part no.						
		VEX312□-01/02	VEX322□-01/02	VEX332□-02/03/04	VEX342□-02/03/04	VEX350□-04/06/10	VEX370□-10/12	VEX390□-14/20
Bracket (With bolt and washer)	B	VEX1-18-1A	—	—	—	VEX5-32A	VEX7-32A	VEX9-32A
Foot (With bolt and washer)	F	VEX1-18-2A	—	VEX3-32-2A	—	—	—	—
Pilot exhaust (P2) port silencer	N	AN120-M5		AN103-01		AN210-02		

Weight

(kg)

Model	VEX312□-01/02	VEX322□-01/02	VEX332□-02/03/04	VEX342□-02/03/04	VEX350□-04/06/10	VEX370□-10/12	VEX390□-14/20
Air operated	0.1	0.2	0.3	0.6	1.4	2.1	3.3
Solenoid	0.2	0.3	0.4	0.7	1.6	2.3	3.5

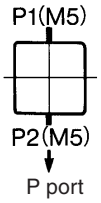
Flow Characteristics

Model		Port size	Flow characteristics											
			1→2 (P→A)			2→1 (A→P)			3→2 (R→A)			2→3 (A→R)		
			C [dm³/(s·bar)]	b	Cv	C [dm³/(s·bar)]	b	Cv	C [dm³/(s·bar)]	b	Cv	C [dm³/(s·bar)]	b	Cv
Body ported	**VEX312□-01**	Rc 1/8	2.4	0.19	0.59	2.4	0.31	0.59	2.3	0.36	0.59	2.5	0.22	0.61
	VEX312□-02	Rc 1/4	3.5	0.35	0.89	3.3	0.49	0.89	3.1	0.46	0.89	3.5	0.33	0.93
	VEX332□-02	Rc 1/4	4.1	0.36	1.1	4.3	0.42	1.1	4.1	0.41	1.1	4.6	0.25	1.2
	VEX332□-03	Rc 3/8	8.7	0.29	2.2	7.9	0.52	2.2	7.8	0.51	2.4	8.7	0.33	2.4
	VEX332□-04	Rc 1/2	9.8	0.37	2.7	9.6	0.52	2.7	9.1	0.53	3.0	11	0.37	3.0
	VEX350□-04	Rc 1/2	24	0.32	6.4	24	0.30	6.4	25	0.31	6.4	22	0.27	5.7
Base mounted (With sub-plate)	**VEX322□-01**	Rc 1/8	3.3	0.34	0.86	3.5	0.39	0.86	3.3	0.37	0.86	3.5	0.36	0.87
	VEX322□-02	Rc 1/4	4.1	0.28	0.99	4.1	0.39	0.99	3.8	0.38	0.97	4.4	0.23	1.1
	VEX342□-02	Rc 1/4	8.1	0.34	2.0	7.9	0.39	2.0	8.2	0.33	2.1	8.1	0.37	2.2
	VEX342□-03	Rc 3/8	12	0.26	3.2	12	0.29	3.2	12	0.28	3.1	13	0.28	3.3
	VEX342□-04	Rc 1/2	13	0.20	3.3	13	0.24	3.3	12	0.29	3.2	14	0.20	3.3

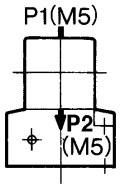
Model		Port size	Effective area (mm²)	Cv
Body ported	**VEX350□-06**	Rc 3/4	160	8.9
	VEX350□-10	Rc 1	180	10
	VEX370□-10	Rc 1	300	17
	VEX370□-12	Rc 1 1/4	330	18
	VEX390□-14	Rc 1 1/2	590	33
	VEX390□-20	Rc 2	670	37

External Pilot Piping

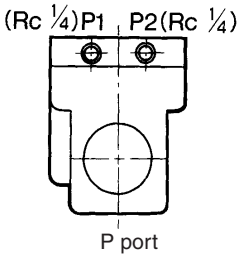
VEX312□



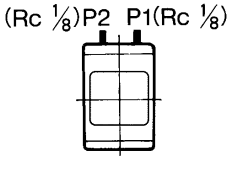
VEX322□



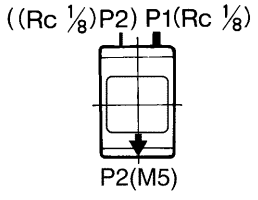
VEX350□
VEX370□
VEX390□



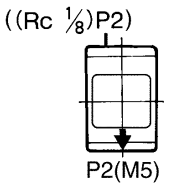
VEX3320
Air operated



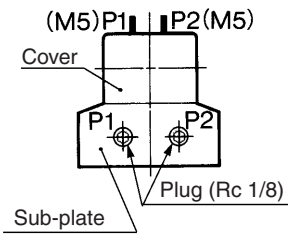
VEX3321
External pilot solenoid



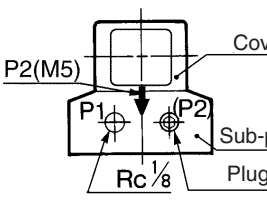
VEX3322
Internal pilot solenoid



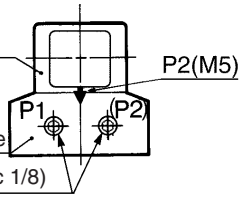
VEX3420
Air operated for sub-plate



VEX3421
External pilot solenoid for subplate



VEX3422
Internal pilot solenoid for subplate



Port	VEX3□□0	VEX3□□1	VEX3□□2
P1	External pilot	External pilot	Plug
P2	External pilot	Pilot exhaust	Pilot exhaust

⚠ Caution

- VEX3420 (Air operated)

  When the VEX3420 air operated power valve is delivered from our factory, the M5 threaded pilot ports P1 and P2 in the cover are open and the Rc 1/8 pilot port in the sub-plate is plugged. Before connecting pipes to P1 and P2 ports in the sub-plate, remove the 1/8 plug from the sub-plate and put M5 plugs into P1 and P2 ports in the cover.
  M5 plug — M-5P

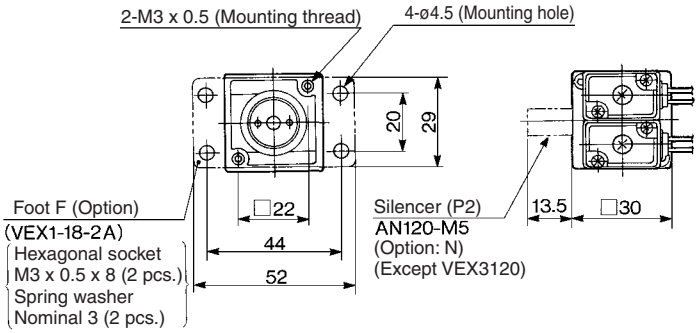
- VEX3$^{3}_{4}$2$^{1}_{2}$ (Solenoid)

  When the VEX3240 air operated power valve is delivered from our factory, the M5 threaded pilot port P2 in the cover is open and the Rc 1/8 pilot port in the sub-plate is plugged.
  Before connecting pipes to P2 port in the sub-plate, remove the 1/8 plug from the sub-plate and put M5 plugs into P2 port in the cover.

Note) The VEX332$^{1}_{2}$, Rc 1/8 body port; and the VEX342$^{1}_{2}$, Rc 1/8 sub-plate port are plugged at the factory.

Body Ported: VEX312□

Air operated: VEX3120 External pilot solenoid: VEX3121 Internal pilot solenoid: VEX3122



A perspective drawing

DIN terminal (D)

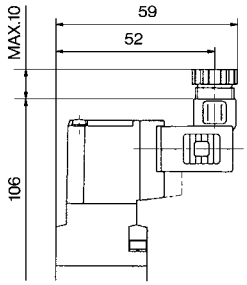
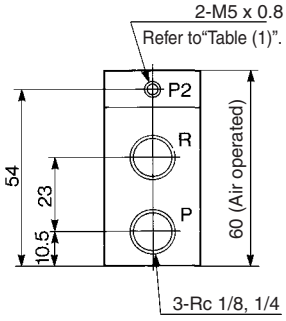
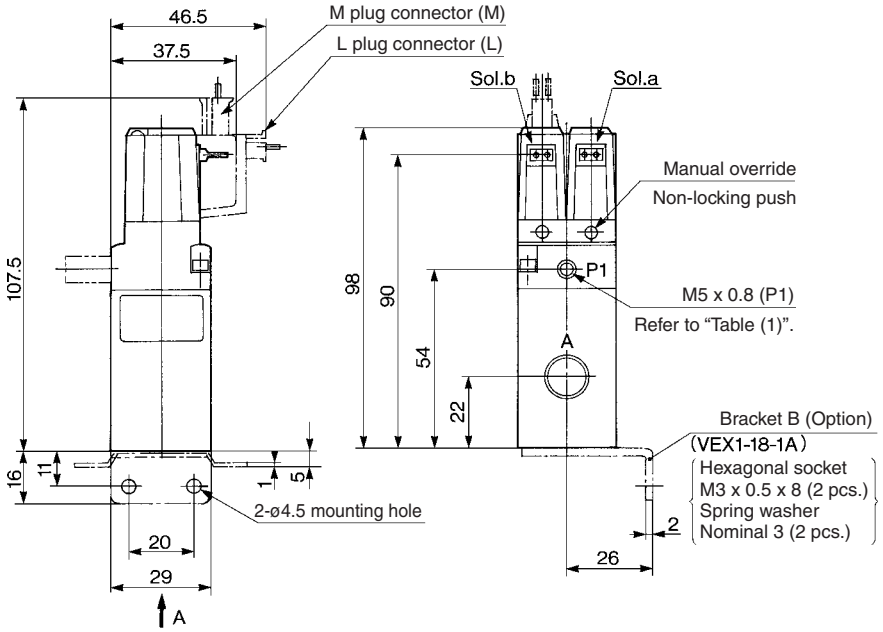


Table (1)
With/Without Plug for M5 Port

Model	P1	P2
VEX3120	None	None
VEX3121	None	None
VEX3122	With plug	None





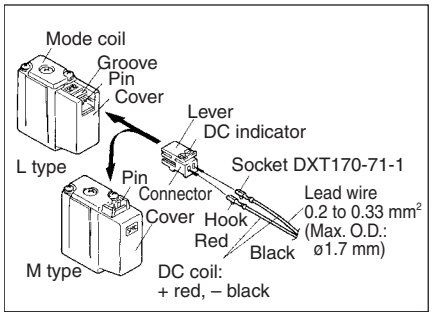
⚠ Caution

How to Use Plug Connector Applicable Model: VEX312$^{1}_{2}$/322$^{1}_{2}$/332$^{1}_{2}$/342$^{1}_{2}$

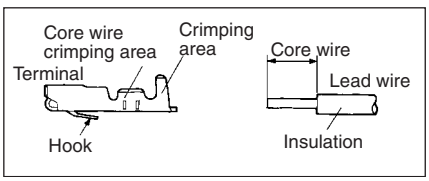
Attaching/Detaching of a plug

1. To install the connector
Push the connector straight on the pins of the solenoid, making sure the lip of the lever is securely positioned in the groove on the solenoid cover.

2. To deinstall the connector
Press the lever against the connector and pull the connector away straight from the solenoid.



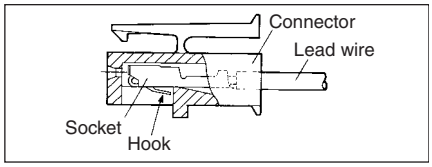
Crimping lead wire and socket
Peel 3.2 to 3.7 mm of the tip of the lead wire, enter the core wires neatly into a socket and press contact it with a press tool. Be careful so that the cover of lead wire does not enter into the core press contacting part. (Press contacting tool: No. DXT 170-75-1)



Attaching/Detaching of a socket with lead wire

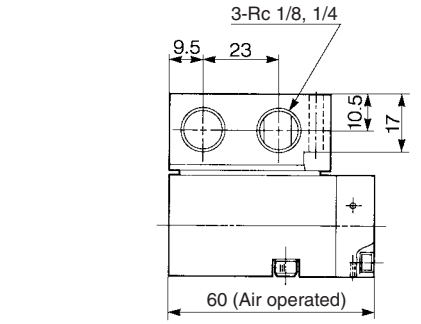
1. Attaching
Insert a socket into the square hole (indicated at +, –) of connector, push fully the lead wire and lock by hanging the hook of a socket to the seat of connector. (Pushing in can open the hook and lock it automatically.) Then confirm the locking by lightly pulling on the lead wire.

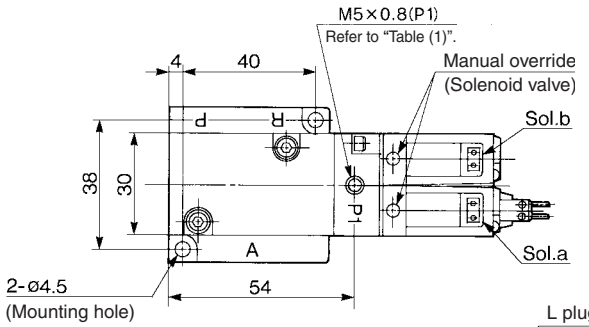
2. Detaching
For pulling out a socket from connector, pull out the lead wire while pushing the hook of a socket with a stick with a fine point (1 mm). If a socket is to be re-used as it is, return the hook to the outside.

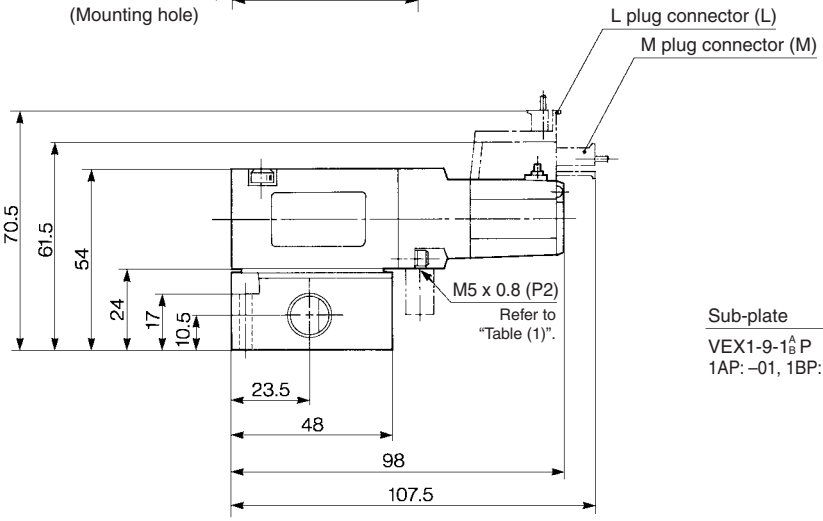


Base Mounted: VEX322□

Air operated: VEX3220 External pilot solenoid: VEX3221 Internal pilot solenoid: VEX3222







DIN terminal (D)

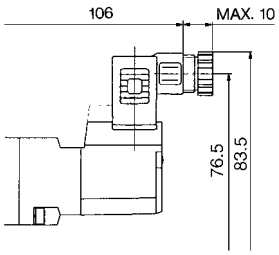
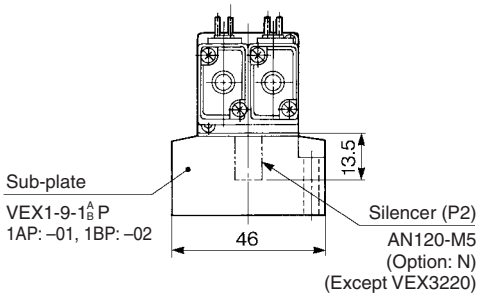


Table (1)
With/Without Plug for M5 Port

Model	P1	P2
VEX3220	None	None
VEX3221	None	None
VEX3222	With plug	None



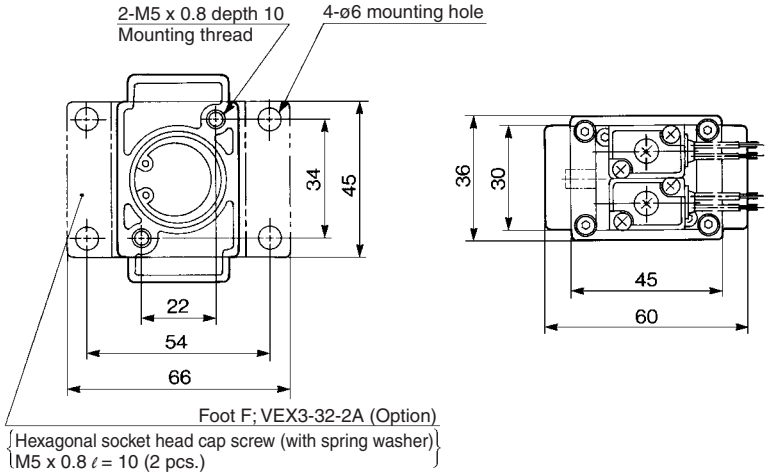
⚠ Caution

How to Use DIN Terminal

Refer to Best Pneumatics Vol. 3.

Body Ported: VEX332□

Air operated: VEX3320 External pilot solenoid: VEX3321 Internal pilot solenoid: VEX3322



A perspective drawing

DIN terminal (D)

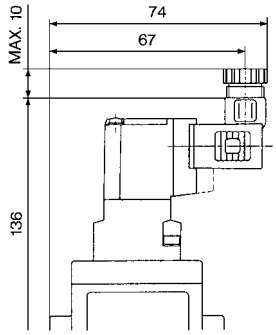
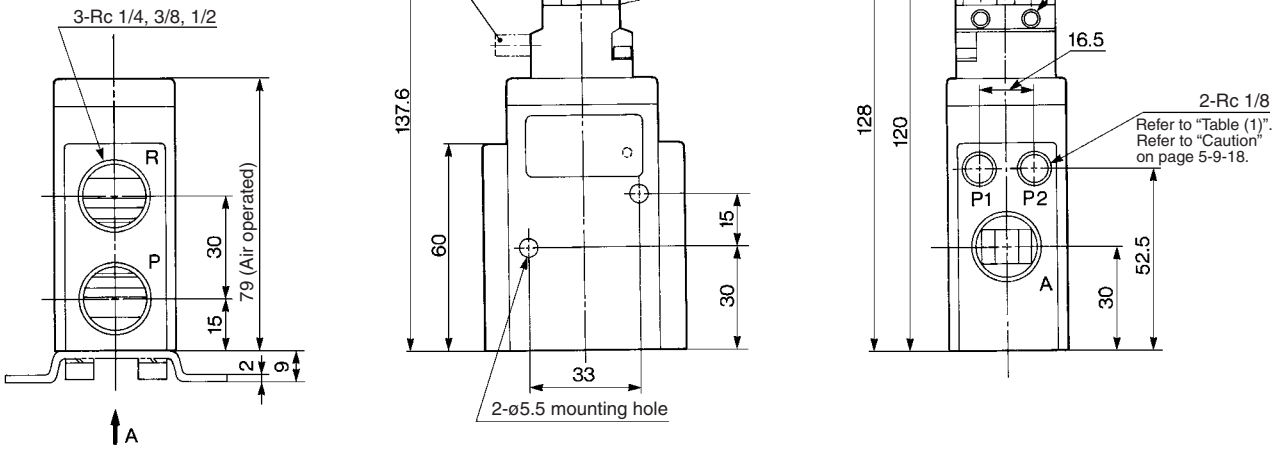


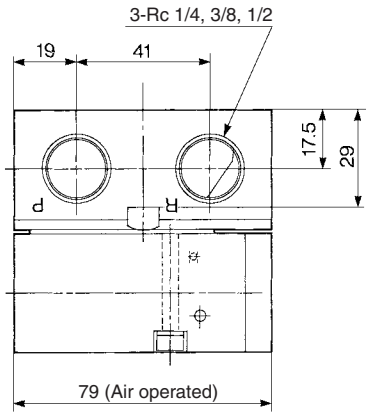
Table (1)
With/Without Plug for Rc 1/8 Port

Model	P1	P2
VEX3320	None	None
VEX3321	None	With plug
VEX3322	With plug	With plug

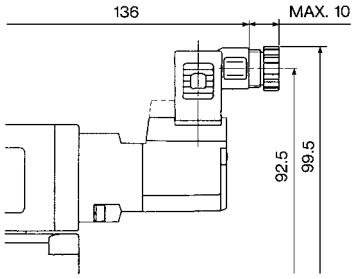


Base Mounted: VEX342□

Air operated: VEX3420 External pilot solenoid: VEX3421 Internal pilot solenoid: VEX3422



DIN terminal (D)



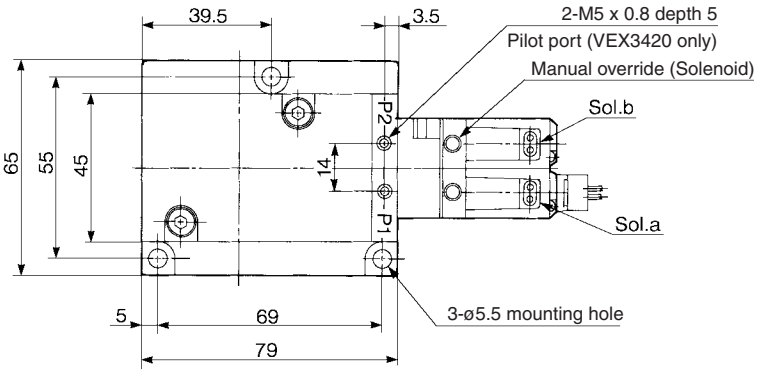
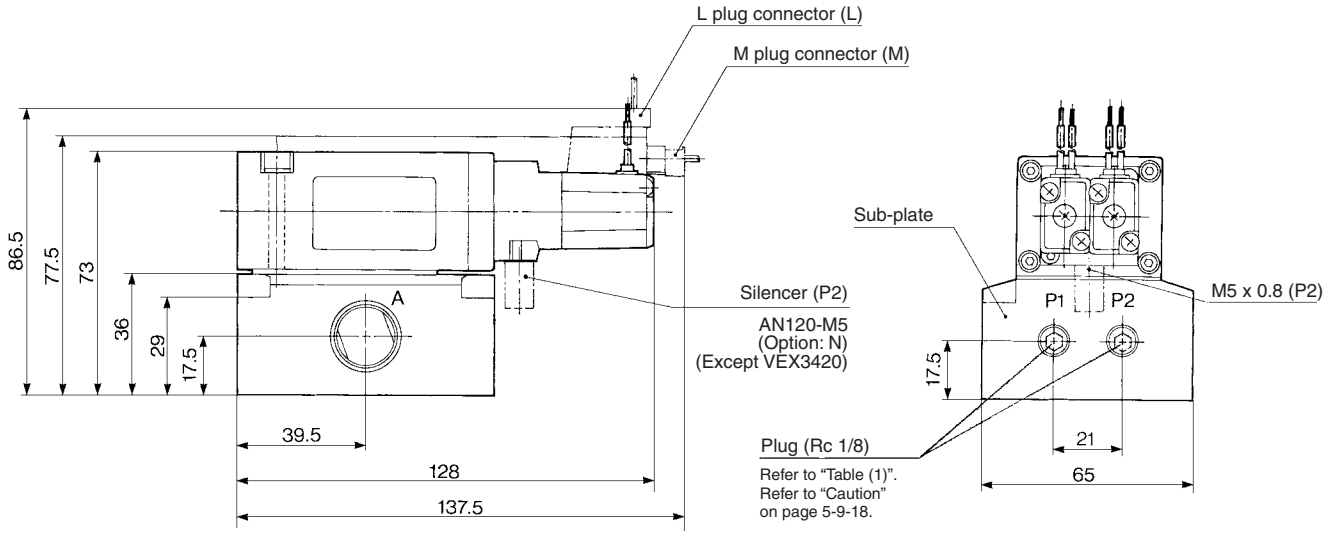


Table (1)
With/Without Plug for Sub-plate

Model	P1	P2
VEX3420	With plug	With plug
VEX3421	None	With plug
VEX3422	With plug	With plug



Body Ported: VEX350□/370□

Air operated: VEX3500/3700 External pilot solenoid: VEX3501/3701 Internal pilot solenoid: VEX3502/3702

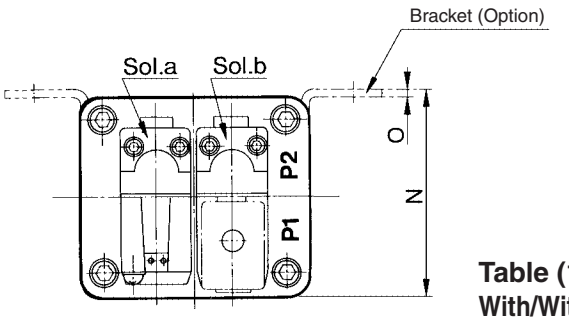
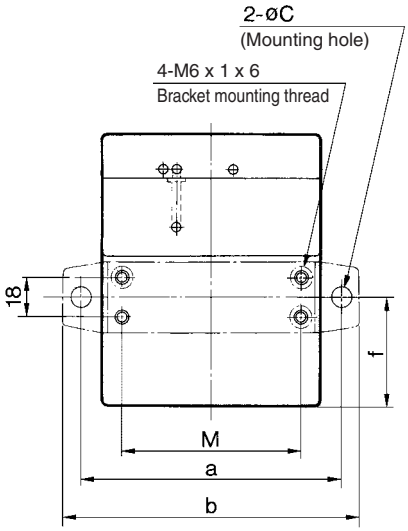
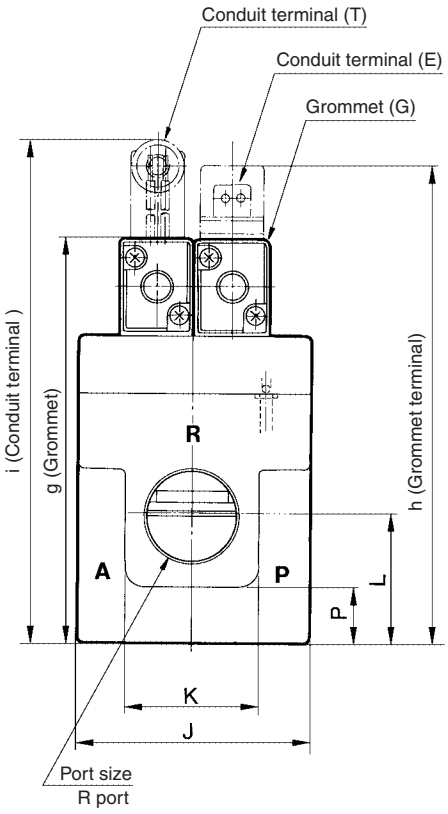


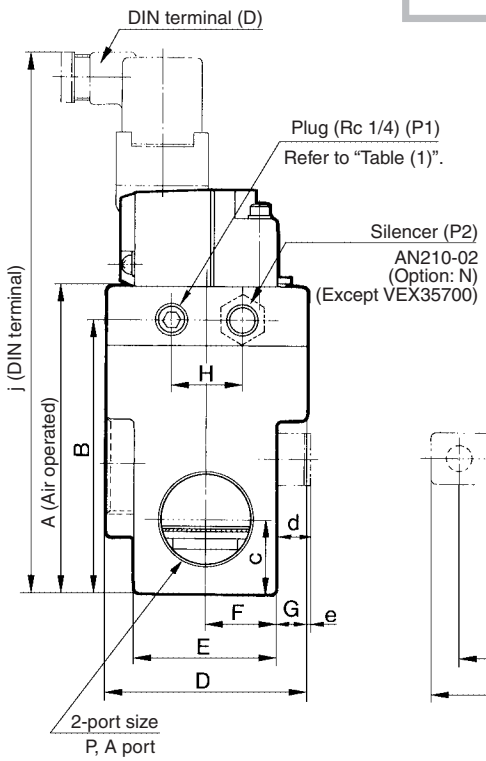
Table (1)
With/Without Plug for Rc 1/4 Port

Model	P1	P2
VEX3$^{5}_{7}$00	None	None
VEX3$^{5}_{7}$01	None	None
VEX3$^{5}_{7}$02	With plug	None

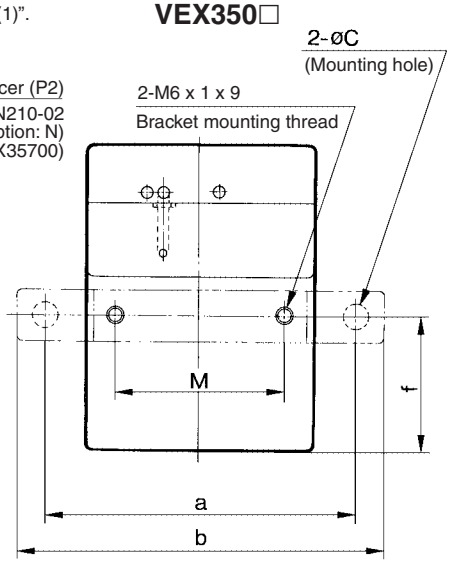
VEX370□







VEX350□



Dimensions

Model	Port size		A	B	C	D	E	F	G	H	J	K	L	M	N	O
	P, A port	R port														
VEX350□	Rc ½ , ¾ , 1		107	96	26	70	50	25	10	25	80	46	45	60	72	2.3
VEX370□	Rc 1, 1¼	Rc 1¼	123	112	30	90	60	30	15	25	100	60	51	82	95	2.3

Model	Bracket						Grommet	Grommet terminal	Conduit terminal	DIN terminal
	a	**b**	**øc**	**d**	**e**	**f**	**g**	**h**	**i**	**j**
VEX350□	110	130	9	12	2	47	140.5	166	175.5	189
VEX370□	120	136	9	20	5	49	156.5	182	191.5	205

Body Ported: VEX390□

Air operated: VEX3900 External pilot solenoid: VEX3901 Internal pilot solenoid: VEX3902

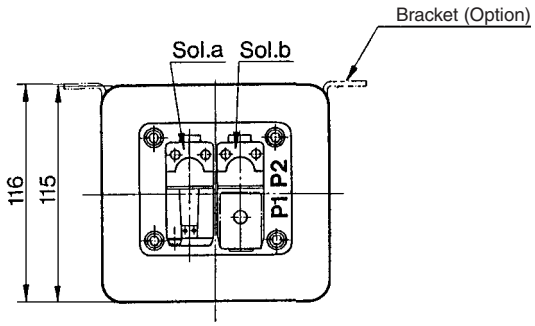


Table (1)
With/Without Plug for Rc 1/4 Port

Model	P1	P2
VEX3900	None	None
VEX3901	None	None
VEX3902	With plug	None