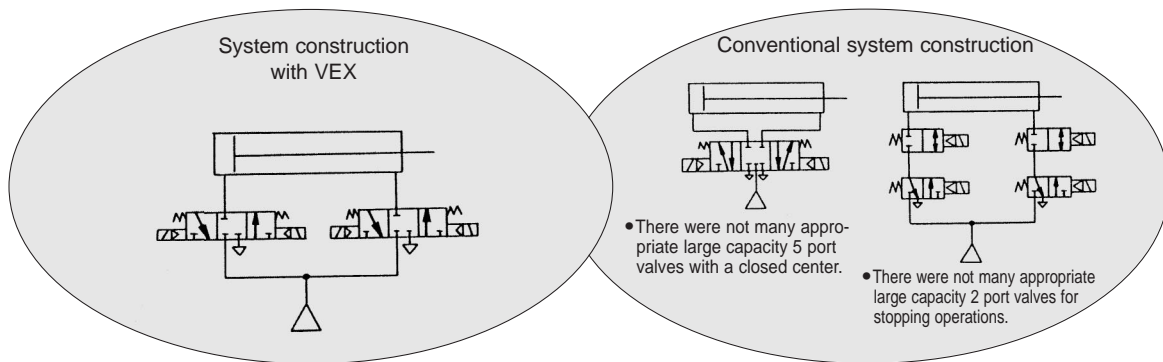


Power Valve

3 Position Valve

Series VEX3

A variety of circuits in simple construction
 ■ Intermediate and emergency stops with a large size cylinder



Cylinder Speed

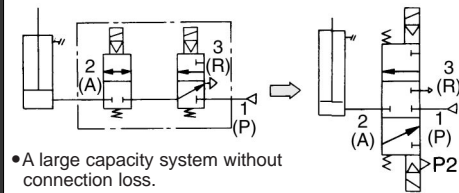
This table should be used as a guide only, because the cylinder speed is subject to the equipment in the piping. For details, refer to the cylinder working capacity and maximum working speed data on p.5.1-15.

Condition: Pressure 0.5MPa, Load 50%, Piping length 5m

	Effective area mm ² (Cv)	Port size Rc(PT)	Cylinder speed (mm/s)	Bore size (mm)											
				ø40	ø50	ø63	ø80	ø100	ø125	ø140	ø160	ø180	ø200	ø250	ø300
Body ported	VEX312□ -01, 02	25(1.4) 02 (1/4)	250												
			500												
			750												
	VEX332□ -02, 03, 04	60(3.3) 03 (3/8)	250												
			500												
			750												
	VEX350□ -04, 06, 10	160(8.9) 06 (3/4)	250												
			500												
			750												
VEX370□ -10, 12	300(17) 10(1)	500													
		750													
		1000													
VEX390□ -14, 20	590(33) 14(1 1/2)	500													
		750													
		1000													
Base mounted	VEX322□ -01, 02	25(1.4) 02 (1/4)	250												
			500												
			750												
	VEX342□ -02, 03, 04	70(3.9) 04(1/2)	250												
			500												
			750												

Intermediate and emergency cylinder stops

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



- A large capacity system without connection loss.

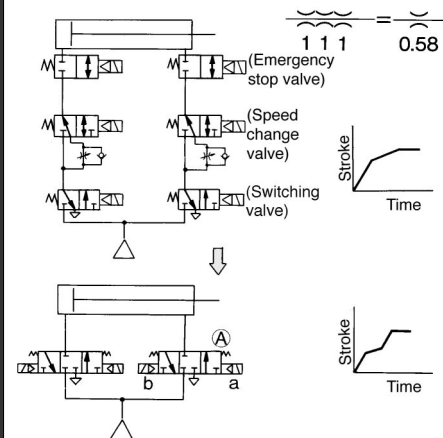
$$\frac{11}{0.71}$$

(Valves and piping can be made smaller.)

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

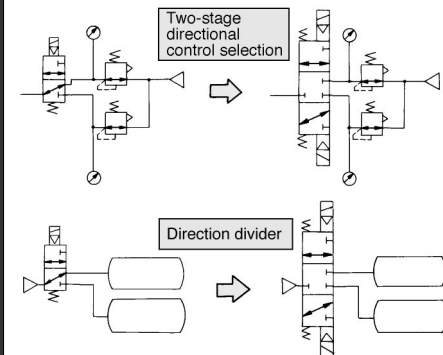
The simple system configuration permits sharp response. The large capacity system configuration without connection loss allows the use of smaller valves and piping.

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



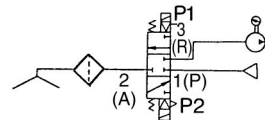
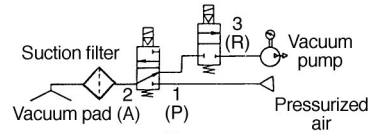
Universal porting for use as a selector/divider valve

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.



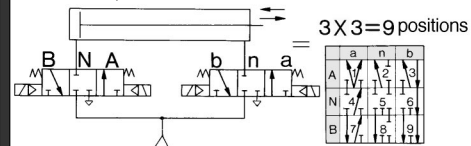
- Sequential switching operation prevents the inflow of pressurized air into the vacuum pump system.

⚠ Caution

- To maintain the vacuum of port A via the closed center, be aware that the vacuum could be decreased due to a 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 } — Reciprocation
 - 7 } —
 - 1 — Pressure center
 - 5 — Closed center
 - 9 — Exhaust center
 - 2 } — Pressure & closed center
 - 4 } —
 - 6 } — Exhaust & closed center
 - 8 } —
- } Slow stopping or deceleration

⚠ Caution

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

VEX
AN
AMC

VEX3

How to Order



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

Electrical entry (Only solenoids)

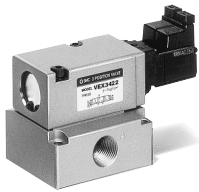
Body size	Symbol	Electrical entry	
12	G	Grommet, 300mm lead wire	
	H	Grommet, 600mm lead wire	
	L	L plug connector, with lead wire	
	LN	L plug connector, without lead wire	
	LO	L plug connector, without connector	
	32	M	M plug connector, with lead wire
32	MN	M plug connector, without lead wire	
	MO	M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

Body ported

VEX3 12 0 01 5 D B

Base mounted

VEX3 22 0 01 5 D B



Operation

- 0 — Air operated
- 1 — External pilot solenoid
- 2 — Internal pilot solenoid

Body size	Port size		
	Port	P, A port	R port
22	—	Without subplate	
	01	1/8	
42	02	1/4	
	—	Without subplate	
	03	3/8	
	04	1/2	

Thread

- — Rc(PT)
 - T — NPTF
 - F — G(PF)
 - N — NPT
- Voltage (Only solenoids)**
- 1 — 100V AC (50/60Hz)
 - 2 — 200V AC (50/60Hz)
 - 3* — 110V AC (50/60Hz)
 - 4* — 220V AC (50/60Hz)
 - 5 — 24V DC
 - 6* — 12V DC
 - 7* — 240V AC (50/60Hz)
 - 9* — Other

* Option

Option

- B — Bracket (Except VEX332□)
- F — Foot (Only VEX312□, VEX332□)
- N — Silencer for pilot exhaust (P₂) port (Only solenoids)

Indicator light and surge voltage suppressor

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

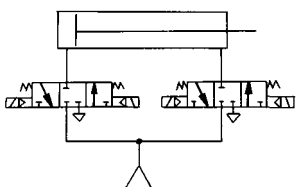
Electrical entry

Symbol	Electrical entry
G	Grommet, 300mm lead wire
H	Grommet, 600mm lead wire
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 connector
DO	DIN terminal, without connector

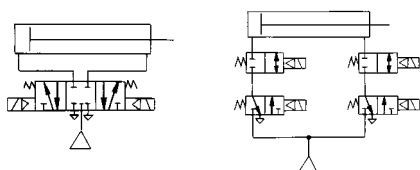
⚠ Caution

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

Variety of circuits in simple construction
3 position valve suitable for intermediate
and emergency stop of large size cylinder.
System construction with VEX

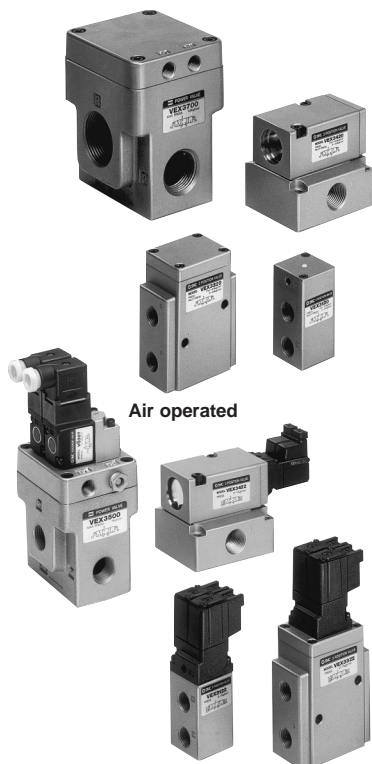


Conventional system construction



• There were not many appropriate large capacity 5 port valves of a closed center.

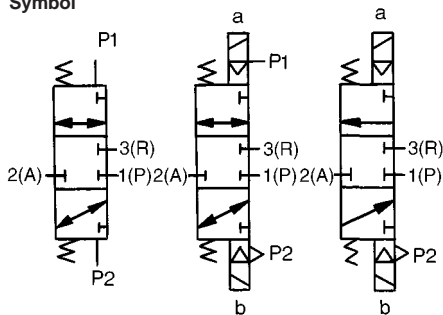
• There were not many appropriate 2 port valves for stopping operation.



Air operated

Internal pilot solenoid/External pilot solenoid

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	Air operated, External pilot solenoid, Internal pilot solenoid												
Fluid	Air												
Proof pressure	1.5MPa												
Set pressure range	Air operated	Low vacuum to 1.0MPa											
	External pilot solenoid	External pilot pressure 0.2 to 1.0MPa											
	Internal pilot solenoid	Low vacuum to 1.0MPa											
Ambient and fluid temperature	External pilot solenoid	External pilot pressure 0.2 to 0.7MPa		External pilot pressure 0.2 to 0.9MPa									
	Internal pilot solenoid	0.2 to 0.7MPa		0.2 to 0.9MPa									
Response time	40ms or less (Pilot pressure 0.5MPa)	60ms or less (Pilot pressure 0.5MPa)											
Max. operating frequency	3 cycles/s												
Mounting	Free												
Lubrication	Not required (Use turbine oil No.1, ISO VG32, if lubricated)												
Port size Rc(PT)	Port	01	02	02	03	04	04	06	10	10	12	14	20
	P									1	1 1/4	1 1/2	2
	A	1/8	1/4	1/4	3/8	1/2	1/2	3/4	1	1 1/4	1 1/4	1 1/2	2
Effective area	R									1 1/4	1 1/4	2	2
	mm ²	16	25	36	60	70	130	160	180	300	330	590	670
	Cv	0.9	1.4	2.0	3.3	3.9	7.2	8.9	10	17	18	33	37

Solenoid Specifications

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

Option

Parts name		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

VEX

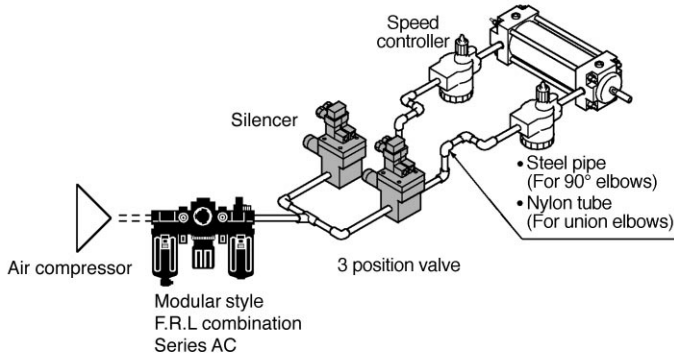
AN

AMC

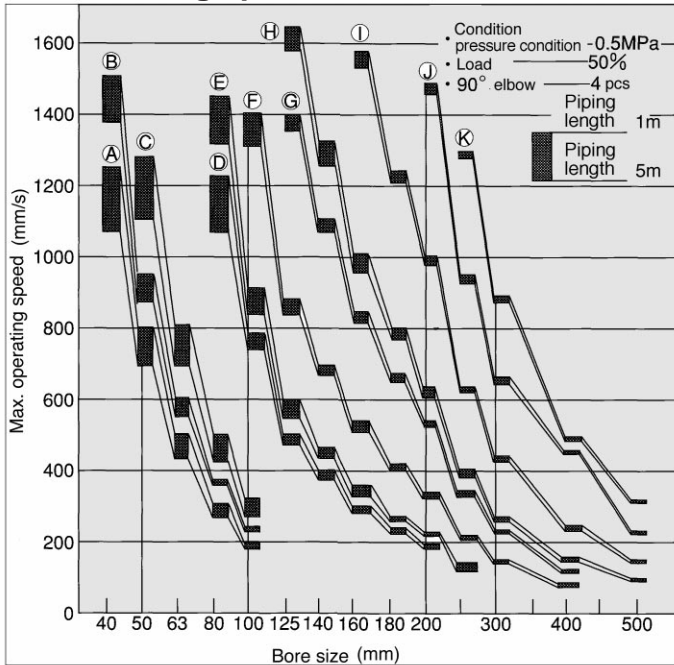
VEX3

Cylinder Speed

System



Max. Working speed



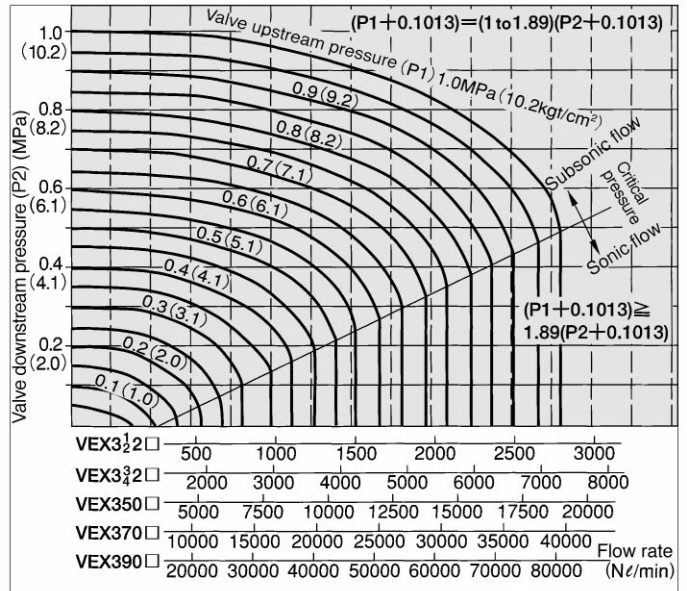
System	Solenoid valve	Speed controller	Silencer	Port size	Fitting (One side) 4 pcs
(A)	VEX3 $\frac{1}{2}$ 2□	AS4000	AN200	T1075* (ø10)	DL10-02
(B)				T1209* (ø12)	DL12-02
(C)	VEX3 $\frac{3}{4}$ 2□	AS420	AN300	T1209* (ø12)	DL12-03
(D)				SGP1 $\frac{1}{2}$ B	90° elbow
(E)	VEX350□	AS420	AN400	SGP1 $\frac{1}{2}$ B	90° elbow
(F)		AS500	AN500	SGP $\frac{3}{4}$ B	90° elbow
(G)		AS600	AN600	SGP1B	90° elbow
(H)	VEX370□	AS600	AN600	SGP1B	90° elbow
(I)		AS700	AN700	SGP1 $\frac{1}{4}$ B	90° elbow
(J)	VEX390□	AS800	AN800	SGP1 $\frac{1}{2}$ B	90° elbow
(K)		AS900	AN900	SGP2B	90° elbow

* Nylon tube No.

Caution

- The cushion incorporated in the cylinder has a limit to the relationship between maximum working speed and load. Please check it with the cylinder catalog.
- When the load factor is 0% (no load), the maximum working speed will be 1.2 times, and when the load factor is 75%, it will be 0.7 times.

Flow Characteristics



When air is used, the flow characteristics are subject to P₁ (Mpa), P₂ (Mpa) ΔP (Mpa), and the distinction between sonic and subsonic flow.

① Equation in the domain of subsonic flow.

Calculation by effective area

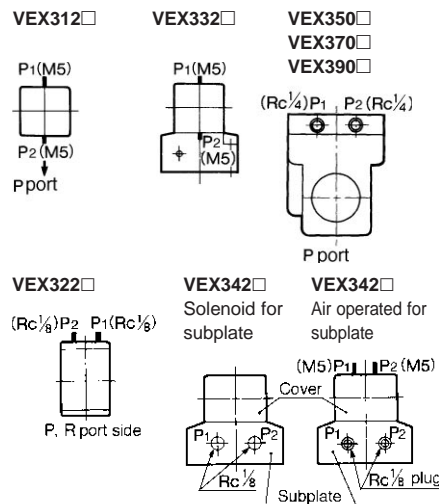
$$Q = 226S \sqrt{\frac{\Delta P(P_2 + 0.1013)}{G}} \cdot \sqrt{\frac{273}{273 + \theta}} \dots \text{dl/min(ANR)}$$

② Equation in the domain of sonic flow.

$$Q = 113S(P_1 + 0.1013) \frac{1}{\sqrt{G}} \cdot \sqrt{\frac{273}{273 + \theta}} \dots \text{dl/min(ANR)}$$

- Q: Flow rate (dl/min)
- ΔP: Pressure differential (P₁ - P₂)
- P₁: Upstream pressure (MPa)
- P₂: Downstream pressure (MPa)
- G: Specific gravity (Air = 1)
- θ: Temperature (°C)
- S: Effective area (mm²)

External Pilot Piping

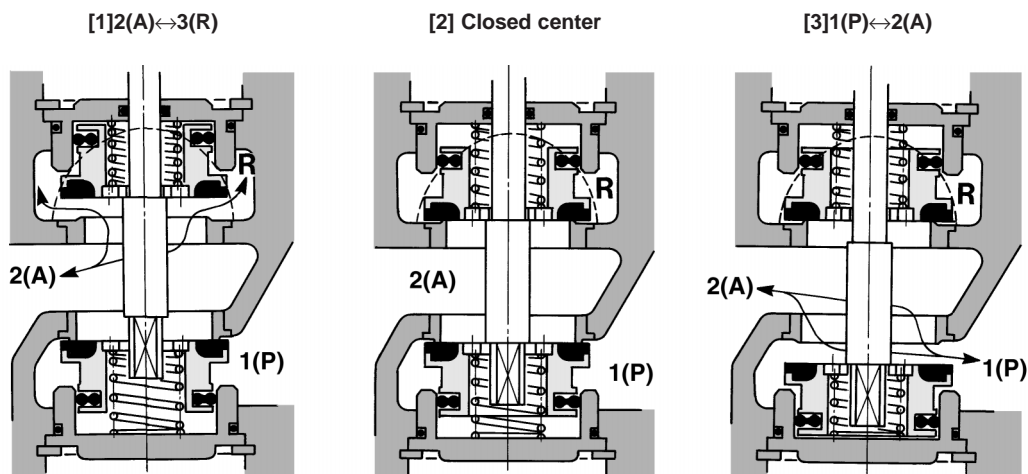


Port	VEX3□□0	VEX3□□1	VEX3□□2
P1	External pilot	External pilot	Plug
P2	External pilot	Pilot exhaust	Pilot exhaust

Caution

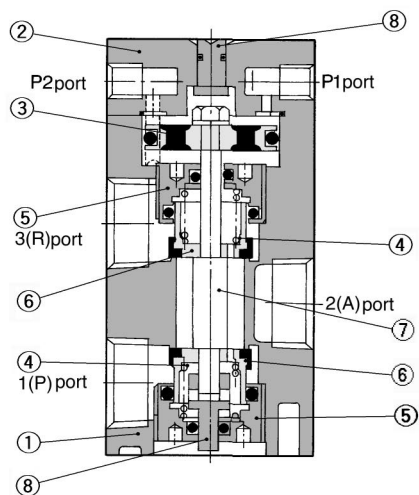
When the VEX3420 air operated power valve is delivered from our factory, the M5 threaded pilot ports P₁ and P₂ in the cover are open and the Rc $\frac{1}{8}$ pilot port in the subplate is plugged. Before connecting pipes to P₁ and P₂ ports in the subplate, remove the 1/8 plug from the subplate and put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

Construction/Operation Principles

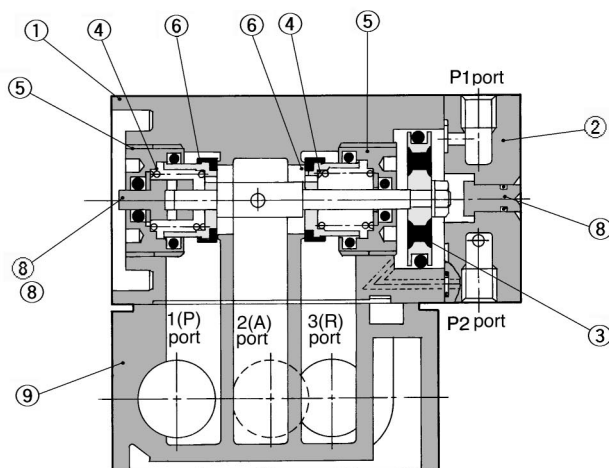


- This is a 3 port switch valve in which the shaft (7)- extending from the driving piston (3) opens/closes a pair of poppet valves (6). The poppet valve has a pressure balancing mechanism in which A port pressure is constantly applied from the back and the center spring (4) is acting as a backup.
- When neither the pilot solenoid valve "a" nor "b" are energized (or when air is exhausted both from the P1 and P2 ports of the air-operated style), no force will act on the working piston, and the spring closes the poppet valve, thus the valve assuming the closed center position. ([2])
- When the pilot solenoid valve "a" is energized (or when pressurized air enters through the P1 port of the air operated style), pilot air that enters the space above the working piston pushes down the piston and opens the lower poppet valve, thus connecting the P port and A port. ([3]) The upper poppet valve continues to close the R port by means of pressure balance and the spring.
- When the pilot solenoid valve "b" is energized (or when pressurized air enters through the P2 port of the air-operated style), the pilot air that enters the space under the working piston pushes the piston upward and opens the upper poppet valve, thus connecting the A port and R port. ([1]) The lower poppet valve continues to close the P port by means of pressure balance and the spring.

VEX3120(Air operated)



VEX3220(Air operated)



VEX

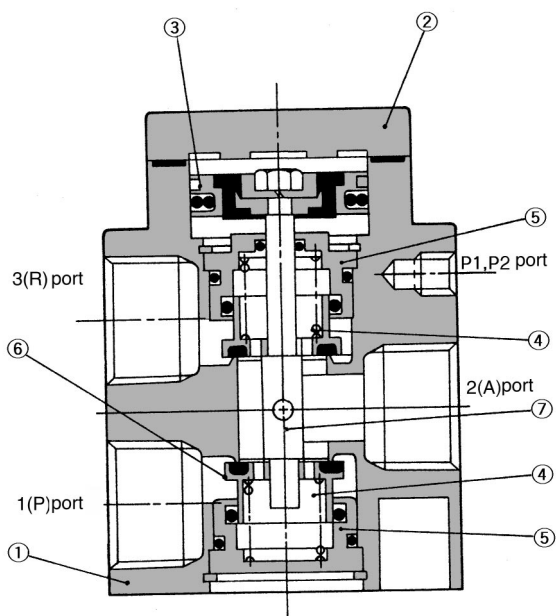
AN

AMC

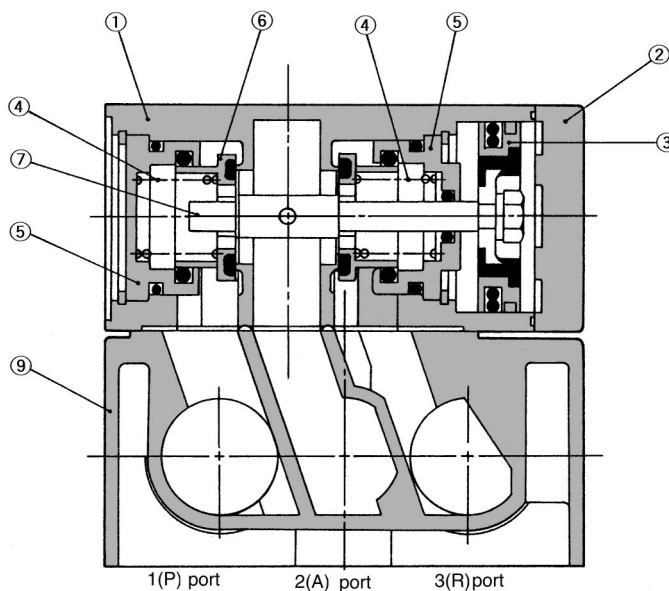
VEX3

Construction (Component Parts)

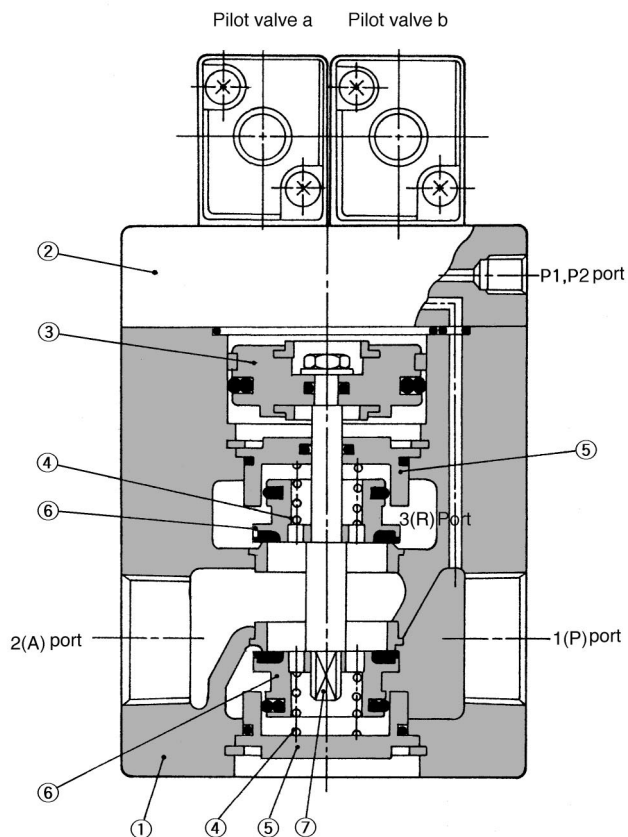
VEX3320 (Air operated)



VEX3420 (Air operated)



VEX350□, 370□, 390□ (Solenoid)



Component Parts

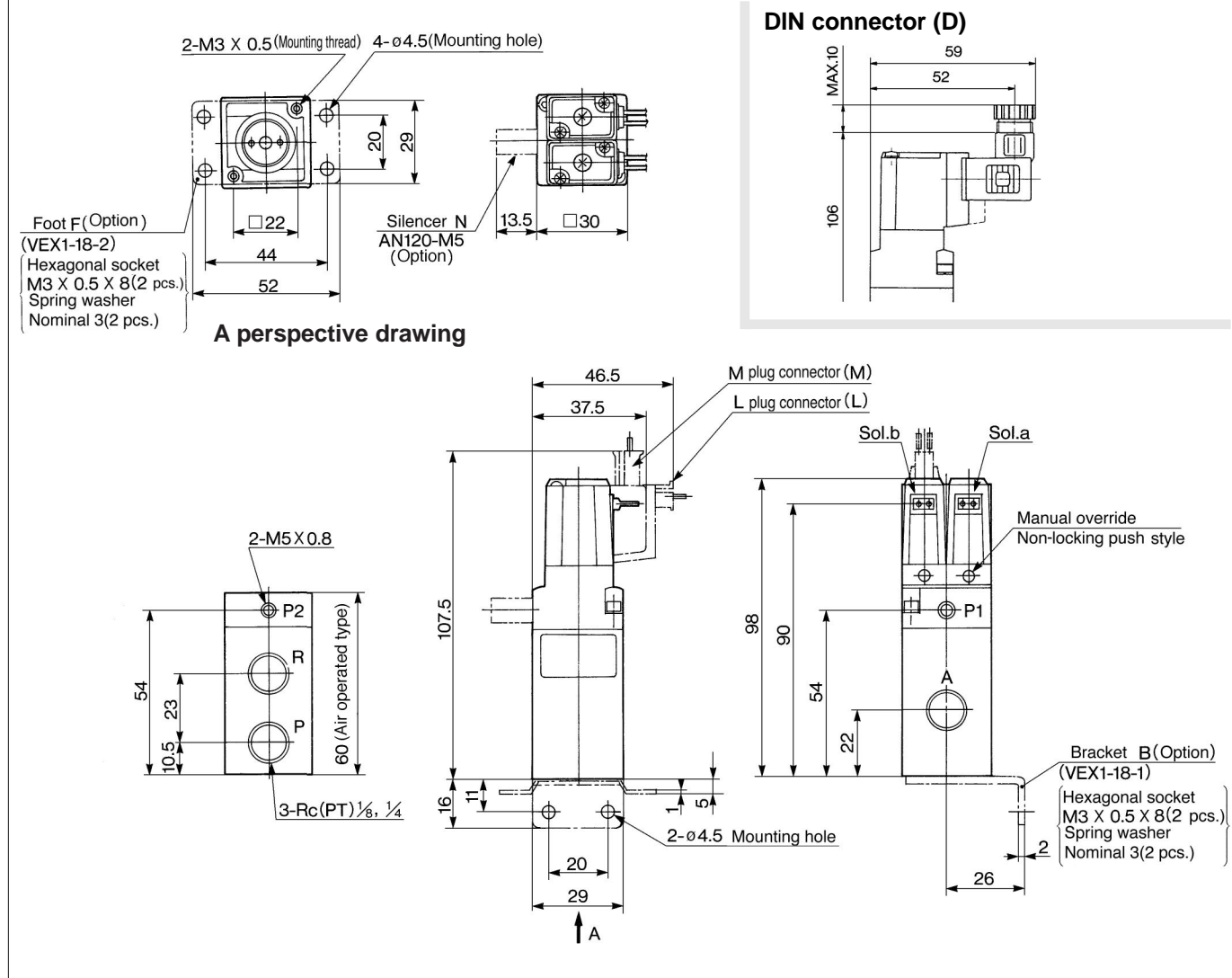
No.	Description	Material
①	Body	Aluminium alloy
②	Cover	Aluminium alloy
③	Working piston	Aluminium alloy
④	Center spring	Stainless steel
⑤	Valve guide	Aluminium alloy
⑥	Poppet valve	Aluminium alloy, NBR
⑦	Shaft	Stainless steel
⑧	Manual override	P.O.M
⑨	Sub-plate	Aluminium alloy

Body Ported/VEX312□

Air operated: VEX3120

External pilot solenoid: VEX3121

Internal pilot solenoid: VEX3122



VEX

AN

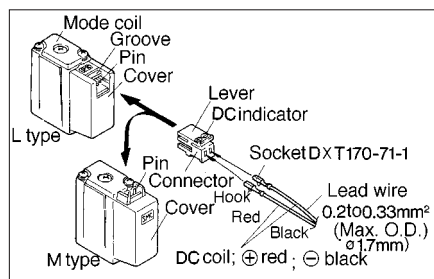
AMC

⚠ Caution

How to Use of Plug Connector Applicable Model: VEX312¹/₂, 322¹/₂, 332¹/₂, 342¹/₂

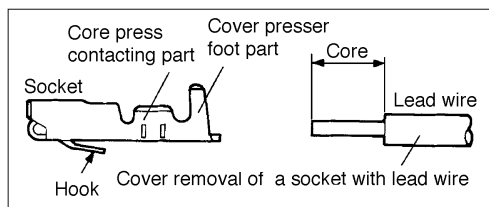
Connection/Disconnection of a plug

- 1 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 Press the lever against the connector and pull the connector away straightly from the solenoid.



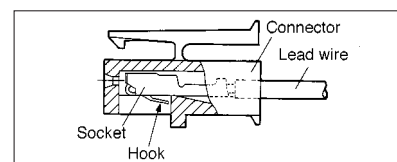
Crimping lead wire and socket

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 by 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)



Connection/Disconnection of socket with lead wire

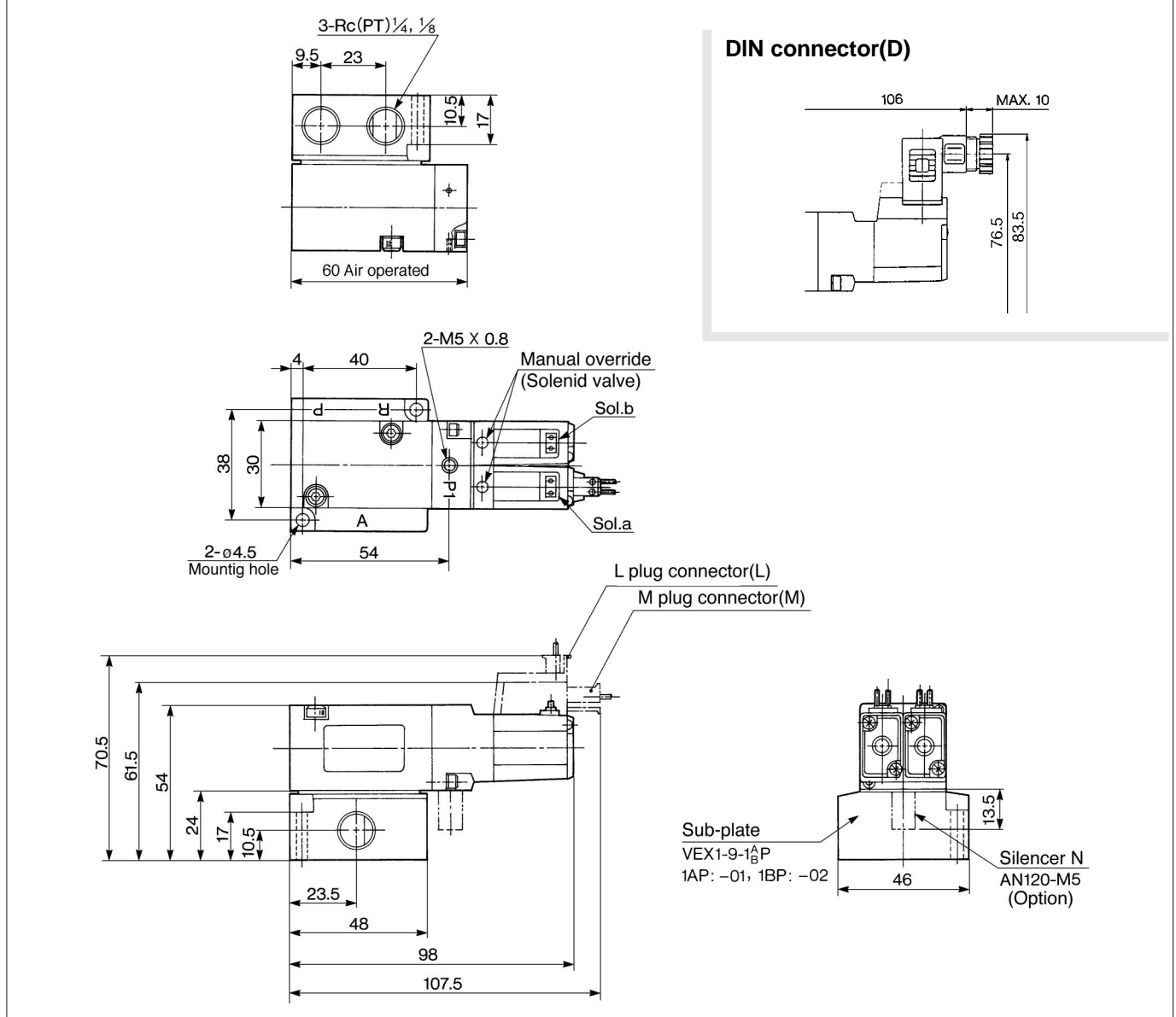
- 1 **Connection**
Insert a socket into the square hole (indicated at +, -) of connector, push fully the lead wire and lock by hanging the hook of socket to the seat of connector. (Pushing in can open the hook and lock it automatically.) Then confirm the locking by lightly pulling on the lead wire.
- 2 **Disconnection**
For pulling out the socket from the connector, pull out the lead wire while pushing the hook of socket with a stick with a fine point (1mm). If the socket is to be re-used as it is, return the hook to the outside.



VEX3

Base mounted/VEX322□

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



⚠ Caution

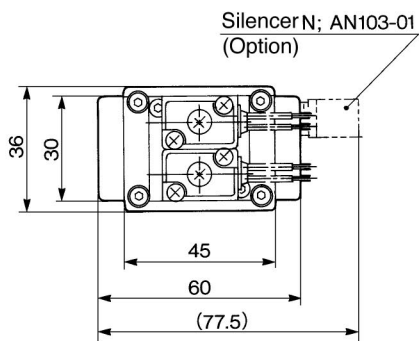
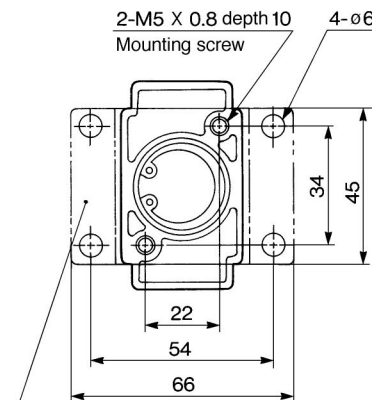
How to Use DIN Connector



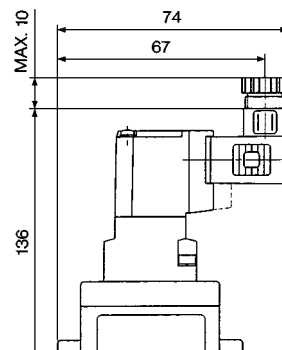
Refer to p.1.5-6

Body ported: VEX332□

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

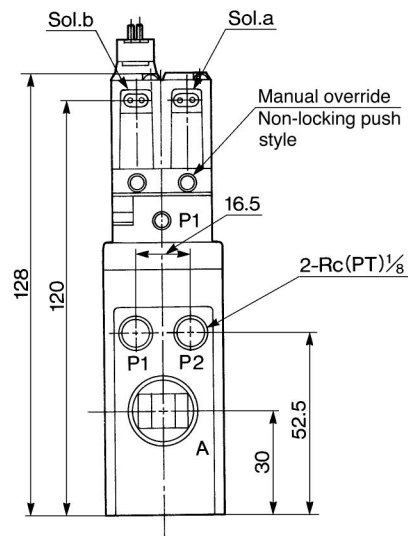
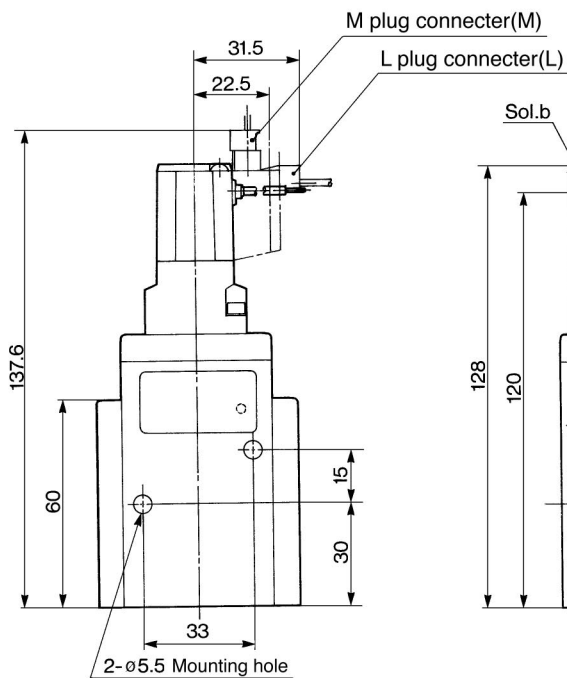
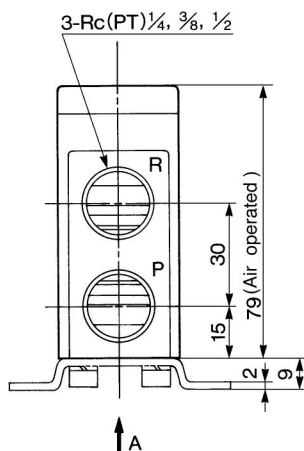


DIN connector(D)



Foot; VEX3-32-2 (Option)
Hexagonal socket head cap screw
With (with spring washer)
M5 X 0.8 L=10 (2 pcs.)

A perspective drawing



VEX

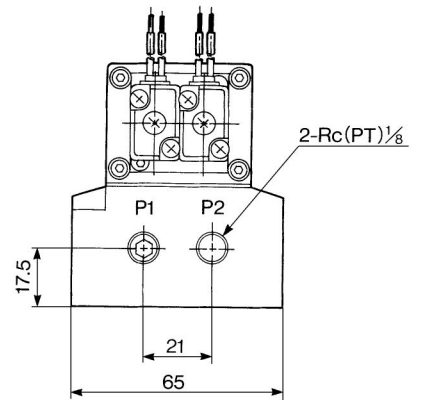
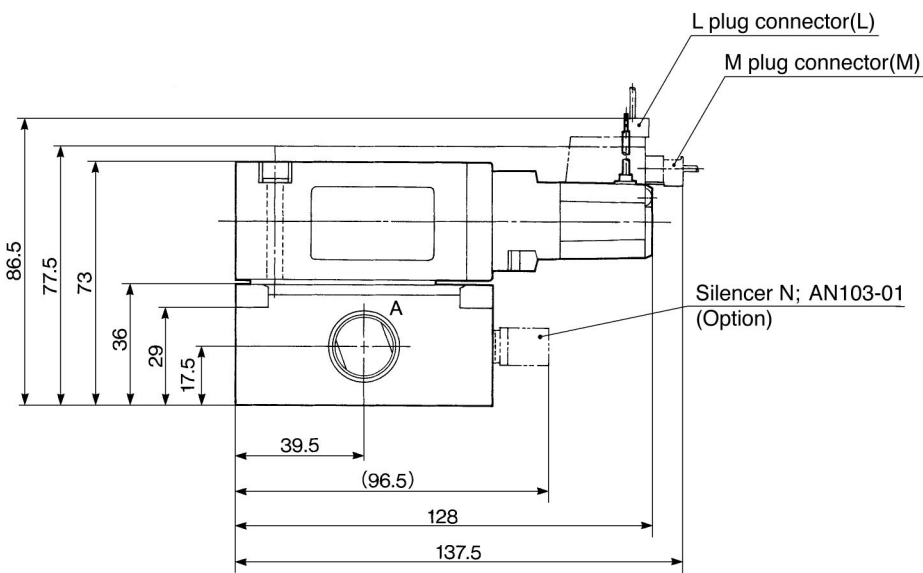
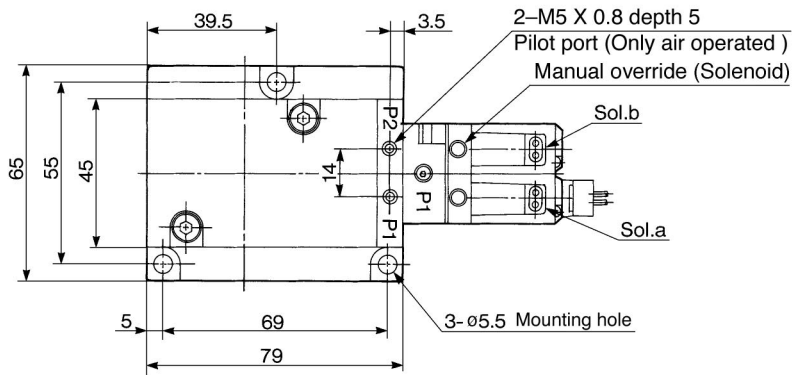
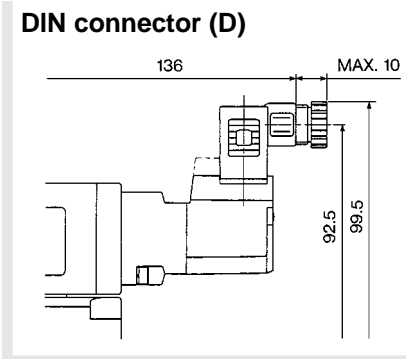
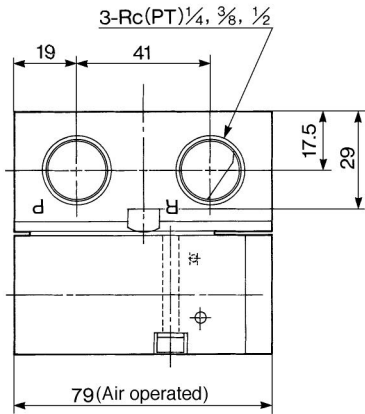
AN

AMC

VEX3

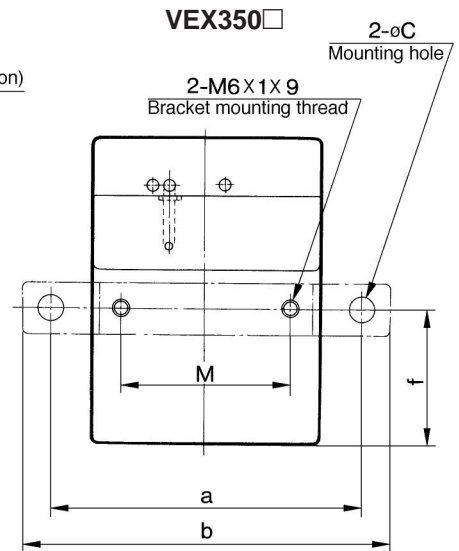
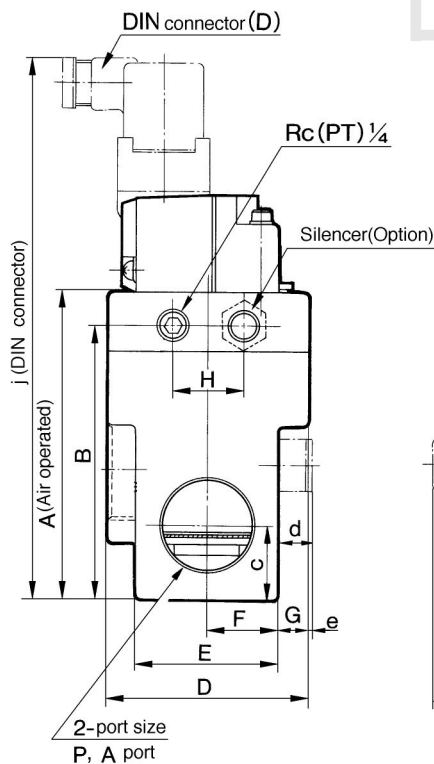
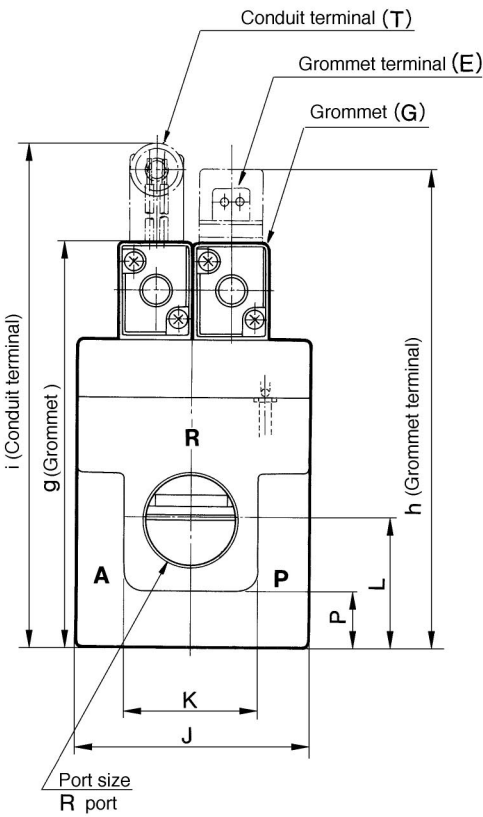
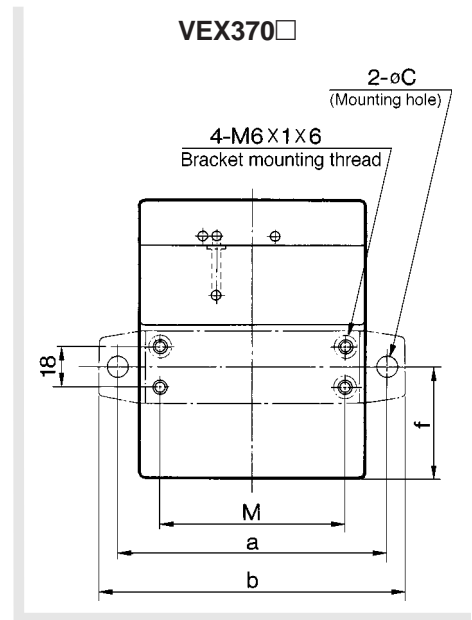
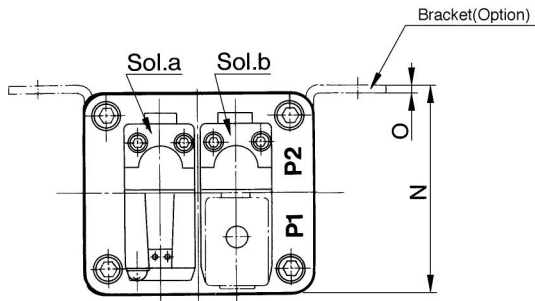
Base mounted: VEX342□

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



Body ported/VEX350□/370□

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



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(PT)1/2, 3/4, 1		107	96	26	70	50	25	10	25	80	46	45	60	72	2.3
VEX370□	Rc(PT)1, 1 1/4	Rc(PT)1 1/4	123	112	30	90	60	30	15	25	100	60	51	82	95	2.3

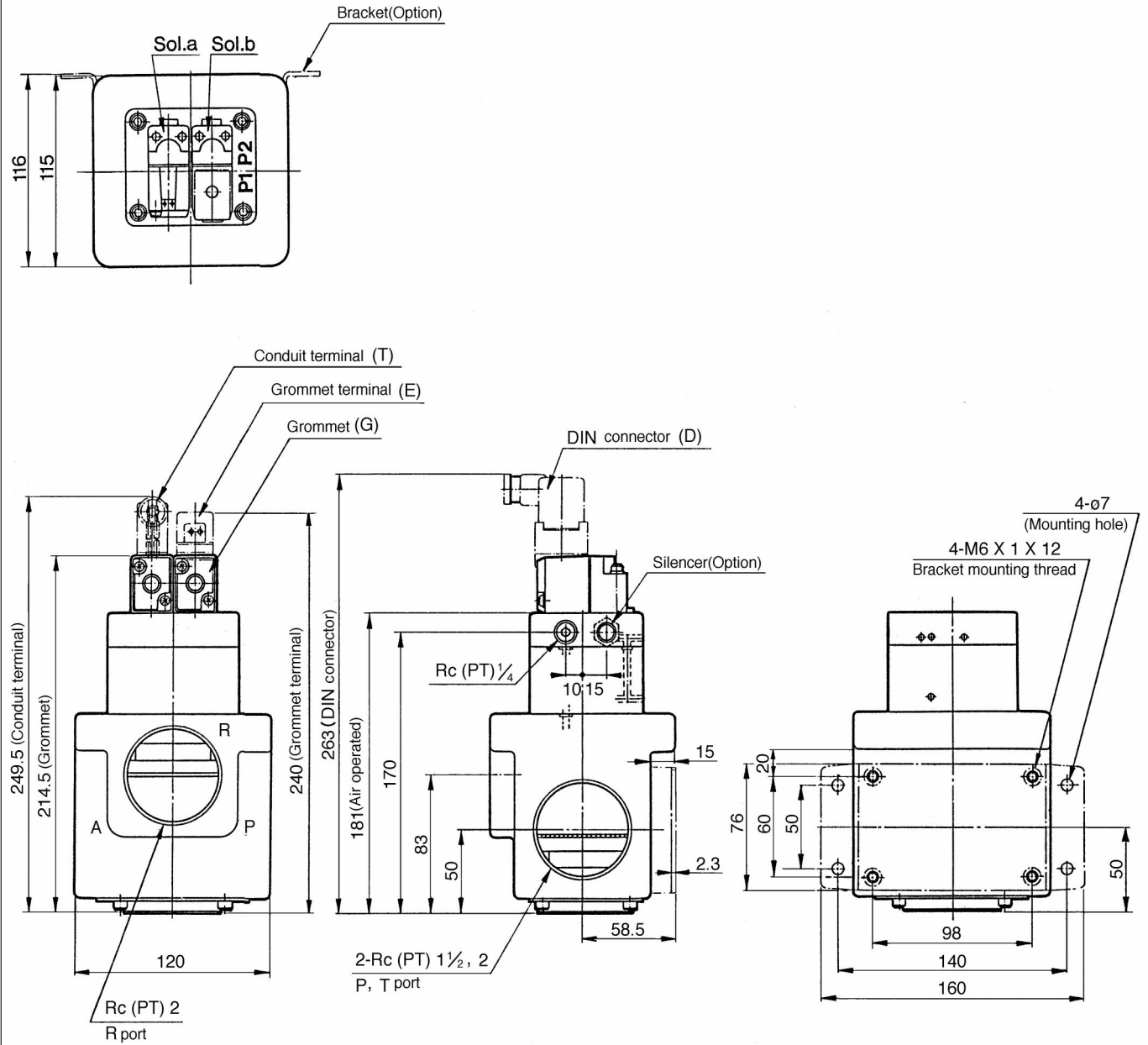
Model	Bracket						Grommet	Grommet terminal	Conduit terminal	DIN connector
	a	b	øc	d	e	f				
VEX350□	110	130	9	12	2	47	140.5	166	175.5	189
VEX370□	120	136	9	20	5	49	156.5	182	191.5	205

VEX
AN
AMC

VEX3

Body ported/VEX390□

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



Series VEX3 Manifold

Manifold: Series VVEX



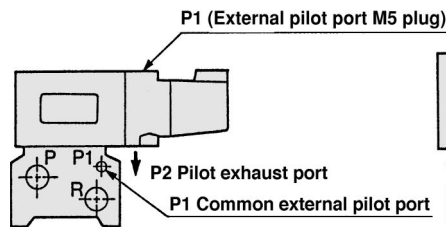
Specifications

Model	VVEX2		VVEX4		
Applicable valve	VEX3220, VEX3222		VEX3420, VEX3422		
Valve stations (1)	2 to 8		2 to 6		
Port specifications	Common SUP, EXH				
Pilot	Internal pilot, Common external pilot				
Common external pilot port size	M5 X 0.8 Length of thread 5				
Port size	P	1/4	3/8	3/8	1/2
	R		1/4	3/8	3/8
	A				
Blank plate	VEX1-17 (With gasket, mounting bolt)		VEX4-5 (With gasket, mounting blot)		

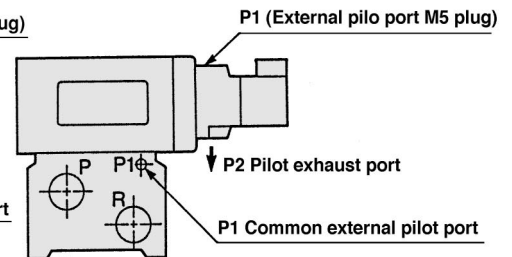
Note 1) When series VVEX2 is used with more than 5 stations, Series VVEX4 is used with more than 4 stations, apply pressure to the P port on both sides and exhaust from the R port on both sides.

External Pilot Piping

VVEX2-2



VVEX4-2

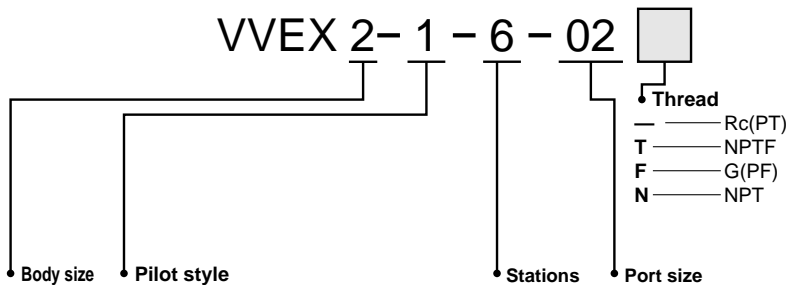


⚠ Caution

When ordering the valve for manifold, be sure to indicate "for manifold" in case of VEX3422 (internal pilot solenoid)

How to Order Manifold Base

VVEX 2-1-6-02



Body size	Pilot style		Applicable Valve	Valve stations	Port size			
					Port	P	R	A
2	1	Internal pilot	VEX3222	2 2 stations	02	1/4		
		Common external pilot	(Air operated: VEX3220 (1))	6 6 stations				
	2	Common external pilot		8 8 stations				
4	1	Internal pilot	VEX3422	2 2 stations	A	3/8	1/4	
		Common external pilot	(Air operated: VEX3420 (1))	6 6 stations	B	3/8		
	2	Common external pilot		6 6 stations	C	1/2	3/8	

Note) Air operated

VEX 3220 and VEX3420 (air operated) are used. Distinction between the pilots (internal or external pilot) of the manifold base does not matter. Either may be used.

Example of ordering a manifold base:

The valve and blank plate for manifold arrangement should be specified in order from the left side of the manifold base (With the A port on your side).
(Example) **VVEX2-2-7-02N**

- * VEX3222-1LN—6 pcs. } Solenoid
- * VEX1-17—1 pc. }
- VVEX4-2-6-A**
- * VEX3420—5 pcs. } Air operated
- * VEX4-5—1 pc. }

VEX

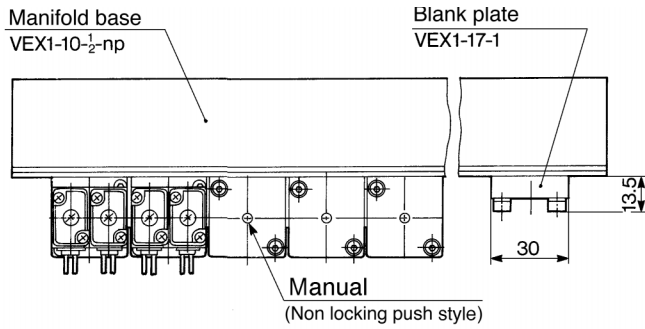
AN

AMC

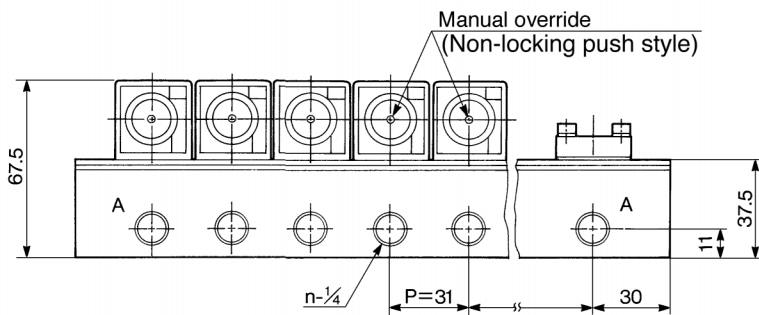
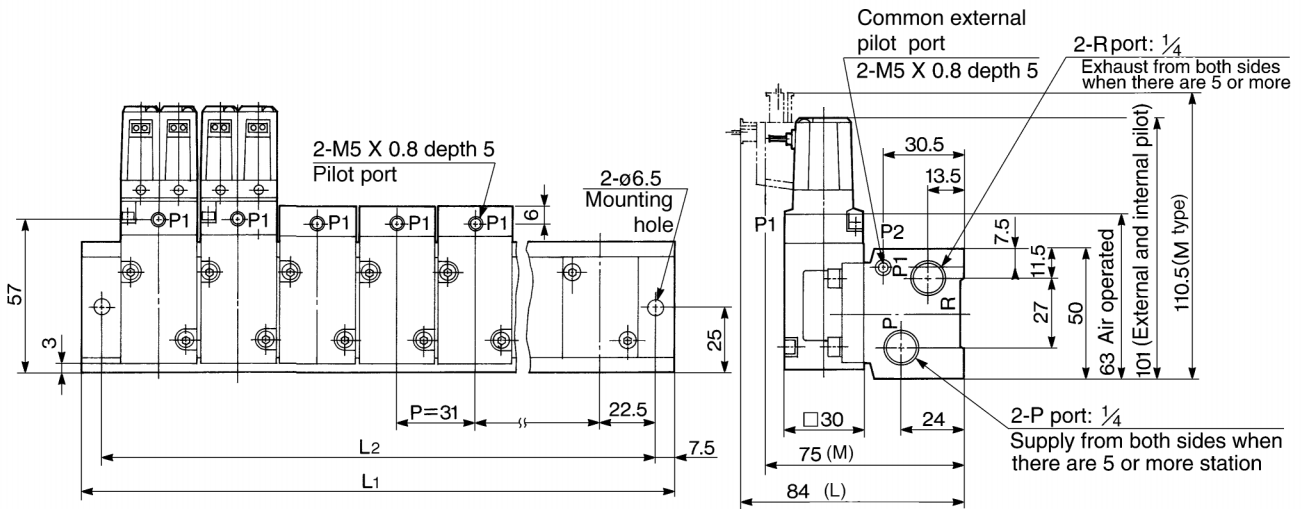
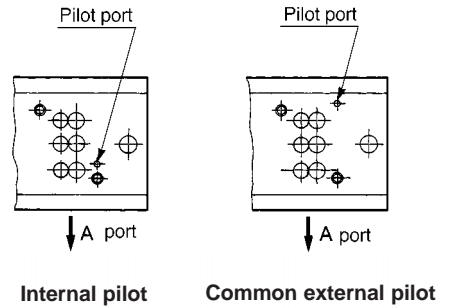
VEX3

Manifold/VVEX2

VVEX2- $\frac{1}{2}$ Applicable valve: VEX3220/3222



Valve mounting side



L: Dimensions

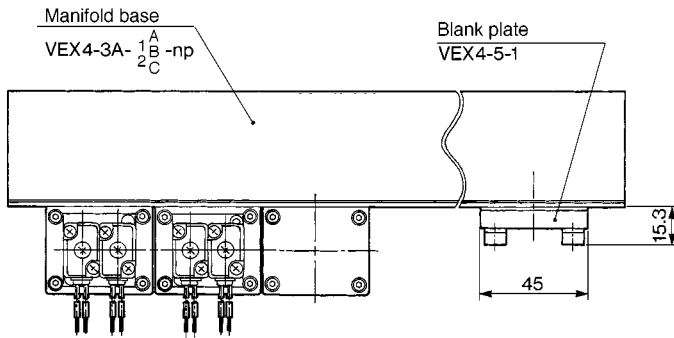
Equation $L_1=31n+29$, $L_2=31n+14$ n: Station

L	n	2	3	4	5	6	7	8
L1		91	122	153	184	215	246	277
L2		76	107	138	169	200	231	262

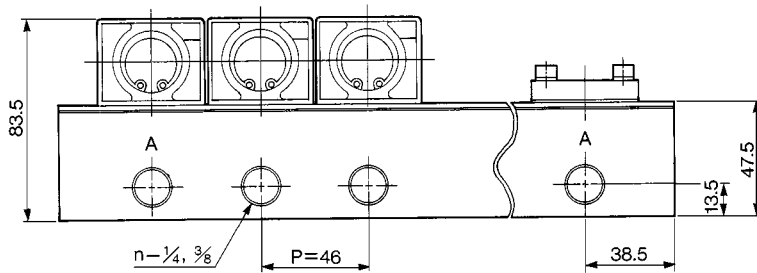
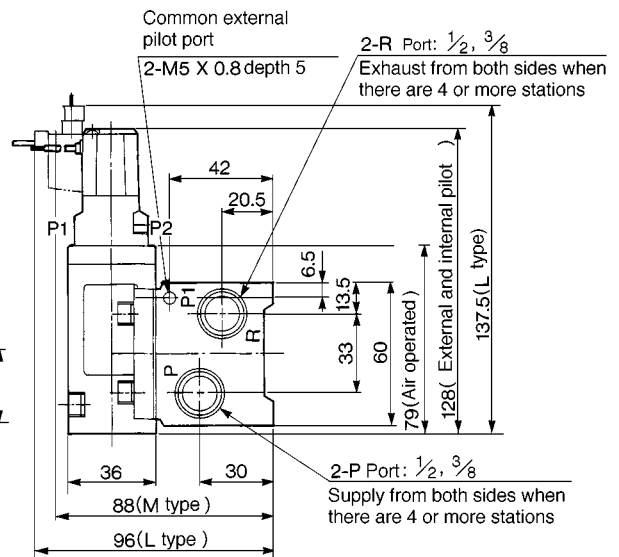
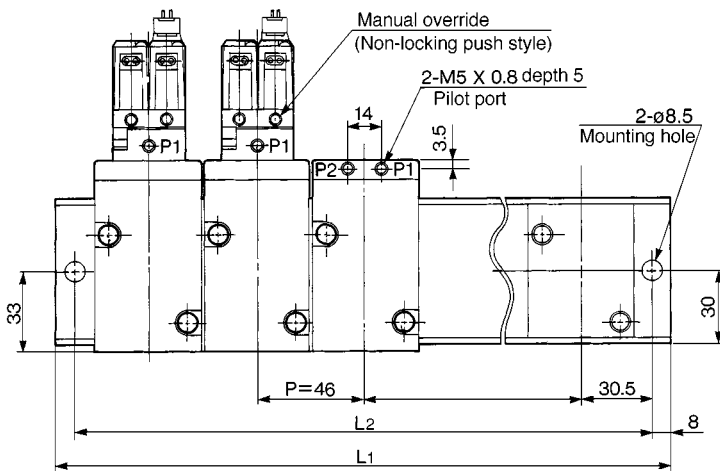
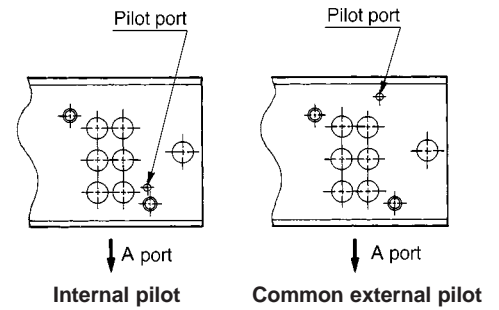
Manifold/VVEX4-1 □

VVEX4-1 Applicable valve: VEX3420/E3422

VVEX4-2 Applicable valve: VEX3420/E3422



Valve mounting side



L: Dimensions

$L_1=46n+31$, $L_2=46n+15$ n: Station

L \ n	2	3	4	5	6
L1	123	169	215	261	307
L2	107	153	199	245	291

VEX

AN

AMC