5 Port Pilot Operated Solenoid Valve
Metal Seal, Body Ported
Series VFS3000

Model

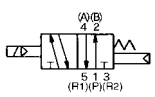
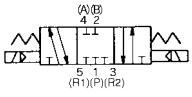
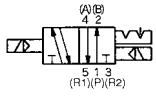
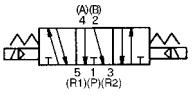
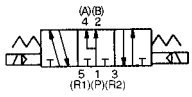
Type of actuation		Model: Plug-in	Model: Non plug-in	Port size Rc	Flow characteristics: 1 → 4/2 (P → A/B) C [dm³/(s·bar)]	b	Cv	Flow characteristics: 4/2 → 5/3 (A/B → R1/R2) C [dm³/(s·bar)]	b	Cv	Max.(1) operating cycle (cpm)	Response time(2) (ms)	Weight(3) (kg)
2 position	Single	**VFS3120**	**VFS3130**	1/4	5.0	0.20	1.1	6.8	0.30	1.7	1200	20 or less	0.33
				3/8	6.1	0.14	1.4	7.3	0.23	1.8			
	Double	**VFS3220**	**VFS3230**	1/4	5.0	0.20	1.1	6.8	0.3	1.7	1500	15 or less	0.43
				3/8	6.1	0.14	1.4	7.3	0.23	1.8			
3 position	Closed center	**VFS3320**	**VFS3330**	1/4	5.0	0.20	1.1	6.3	0.27	1.6	600	40 or less	0.45
				3/8	5.7	0.20	1.4	6.8	0.21	1.7			
	Exhaust center	**VFS3420**	**VFS3430**	1/4	4.9	0.24	1.1	6.5	0.28	1.6	600	40 or less	0.45
				3/8	5.8	0.15	1.4	7.0	0.22	1.7			
	Pressure center	**VFS3520**	**VFS3530**	1/4	4.9	0.23	1.1	6.6	0.28	1.6	600	40 or less	0.45
				3/8	6.5	0.15	1.6	7.0	0.23	1.7			

Note 1) Based on JIS B 8375 (once per 30 days) for the minimum operating frequency.
Note 2) Based on JIS B 8375-1981. (The value at supply pressure 0.5 MPa.)
Note 3) In the case of grommet type.
Note 4) Factors of "Note1)" and "Note 2)" are achieved in controlled clean air.

Compact yet provides a large flow capacity 3/8: C: 6.8 dm³/(s·bar)

Low power consumption: 1.8 W DC

JIS Symbol

2 position	3 position
Single	Closed center
	
Double	Exhaust center
	
	Pressure center
	

Standard Specifications

Valve specifications	Fluid		Air/Inert gas
	Maximum operating pressure		1.0 MPa
	Minimun operating pressure		0.1 MPa
	Proof pressure		1.5 MPa
	Ambient and fluid temperature		–10 to 60°C (1)
	Lubrication		Non-lube (2)
	Pilot valve manual override		Non-locking push type (Flush)
	Shock/Vibration resistance		150/50 m/s² (3)
	Enclosure		Dustproof (Degrees of protection 0) (4)
Electricity specifications	Coil rated voltage		100, 200 VAC, 50/60 Hz; 24 VDC
	Allowable voltage fluctuation		–15 to +10% of rated voltage
	Coil insulation type		Class B or equivalent (130°C) (5)
	Apparent power (Power consumption) AC	Inrush	5.6 VA/50 Hz, 5.0 VA/60 Hz
		Holding	3.4 VA (2.1 W)/50 Hz, 2.3 VA (1.5 W)/60 Hz
	Power consumption		1.8 W (2.04 W: With light/surge voltage suppressor)
	Electrical entry		Grommet, Grommet terminal, Conduit terminal, DIN terminal

Note 1) Use dry air at low temperatures.
Note 2) Use turbine oil Class 1 (ISO VG32), if lubricated.
Note 3) Impact resistance: No malfunction occurred when it is tested with a drop tester in the axial direction and at the right angles to the main valve and armature in both energized and de-energized states every once for each condition. (Values at the initial period)
Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Test was performed at both energized and de-energized states in the axial direction and at the right angles to the main valve and armature. (Values at the initial period)
Note 4) Based on JIS C 0920. Note 5) Based on JIS C 4003.

Option Specifications

Pilot type	External pilot (1)
Pilot valve manual override	Non-locking push type (Extended), Locking type (Tool reguired)
Coil rated voltage	110 to 120, 220, 240 VAC (50/60 Hz)
	12, 100 VDC
Option	With light/surge voltage suppressor (2)
Foot bracket (With screw)	Part no.: VFS3000-52A, VFS3120 (single) only

Note 1) Operating pressure: 0 to 1.0 MPa
Pilot pressure: 0.1 to 1.0 MPa
Note 2) Grommet type is available only w/ surge voltage suppressor (which is directly connected with lead wire), not w/ indicator light.

Manifold

Body type	Applicable manifold base	Pilot EXH
VFS3□20	Stacking manifold	Individual EXH (Valve side)
VFS3□30		Common EXH (Manifold base side)

How to Order

VFS3 1 20 — 1 G — 02 —

Symbol

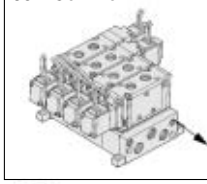
1	2 position single
2	2 position double
3	3 position closed center
4	3 position exhaust center
5	3 position pressure center

∗ Reverse pressure: Can be used by external pilot specifications.

Body (Pilot exhaust)

20: Individual EXH

30∗: Common EXH



∗ Manifold only

Pilot type

Nil	Internal pilot
R∗	External pilot

∗ Option. It will be an individual external pilot.

Port size

02	Rc 1/4
03	Rc 3/8

Thread type

Nil	Rc
N∗	NPT
T∗	NPTF
F∗	G

∗ Option

Option

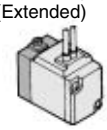
F: With foot bracket

∗ Mountable only for VFS3120.

Manual override

Nil: Non-locking push type (Flush)

A∗: Non-locking push type (Extended)



B∗: Locking type (Tool required)

∗ Option

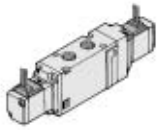
Light/Surge voltage suppressor

Nil	None
Z	With light/surge voltage suppressor
S∗	With surge voltage suppressor

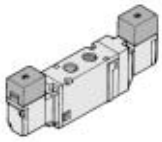
∗ Indicator light is not available for grommet type. W/ surge voltage suppressor is available for grommet type only.

Electrical entry

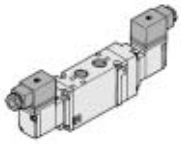
G: Grommet



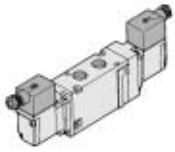
E: Grommet terminal



T: Conduit terminal



D-Y: DIN terminal



Coil rated voltage

1	100 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)
3∗	110 to 120 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

External pilot port: Body side. For 30 type, common external pilot (on manifold side).

How to Order Pilot Valve Assembly

SF4 — 1 DZ — 21

Coil rated voltage

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3∗	110 to 120 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

Electrical entry, Light/Surge voltage suppressor

G	Grommet
GS	Grommet with surge voltage suppressor
D	DIN terminal
DZ	DIN terminal with light/surge voltage suppressor
DO	DIN terminal ∗∗
DOZ	DIN terminal with light/surge voltage suppressor ∗∗
Y∗	DIN terminal
YZ∗	DIN terminal with light/surge voltage suppressor
YO∗	DIN terminal ∗∗
YOZ∗	DIN terminal with light/surge voltage suppressor ∗∗
T	Conduit terminal
TZ	Conduit terminal with light/surge voltage suppressor
E	Grommet terminal
EZ	Grommet terminal with light/surge voltage suppressor

∗ Y: Conforming to DIN43650B standard
∗∗ DIN connector is not attached.

Applicable model

14	A side pilot operator for VFS3$^{1}_{2}{}^{3}_{4}{}_{5}$20	Individual pilot exhaust
15	B side pilot operator for VFS3220	
16	B side pilot operator for VFS3$^{3}_{4}{}_{5}$20	
17	A side pilot operator for VFS3$^{1}_{2}{}^{3}_{4}{}_{5}$30	Common pilot exhaust
18	B side pilot operator for VFS3230	
19	B side pilot operator for VFS3$^{3}_{4}{}_{5}$30	

Manual override

Nil	Non-locking push type (Flush)
A∗	Non-locking push type (Extended)
B∗	Locking type (Tool required)
C∗	Locking type (Lever)

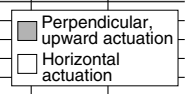
∗ Option

Cylinder Speed Chart

Use as a guide for selection.
Please confirm the actual conditions with SMC Sizing Program.

Body Ported

Series	Average speed (mm/s)	Bore size													
		Series CJ2 Pressure 0.5 MPa Load factor 50% Stroke 60 mm			Series CM2 Pressure 0.5 MPa Load factor 50% Stroke 300 mm				Series MB Pressure 0.5 MPa Load factor 50% Stroke 500 mm					Series CS1 Pressure 0.5 MPa Load factor 50% Cylinder stroke 1000 mm		
		ø6	ø10	ø16	ø20	ø25	ø32	ø40	ø40	ø50	ø63	ø80	ø100	ø125	ø140	ø160
VFS3120-03	900 800 700 600 500 400 300 200 100 0															



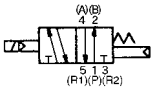
∗ It is when the cylinder is extending that is meter-out controlled by speed controller which is directly connected with cylinder, and its needle valve with being fully open.
∗ The average velocity of the cylinder is what the stroke is divided by the total stroke time.
∗ Load factor: ((Load weight x 9.8)/Theoretical force) x 100%

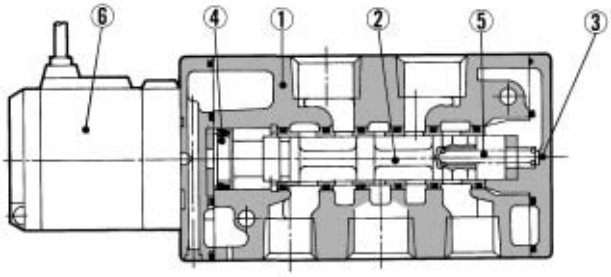
Conditions

Body ported		Series CJ2	Series CM2	Series MB	Series CS1
VFS3120-03	Tube bore x Length	T0604 x 1 m	T1075 x 1 m	T1209 x 1 m	
	Speed controller	AS3001F-06	AS4001F-10	AS4001F-12	
	Silencer	AN200-02			AN202-02

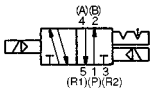
Construction

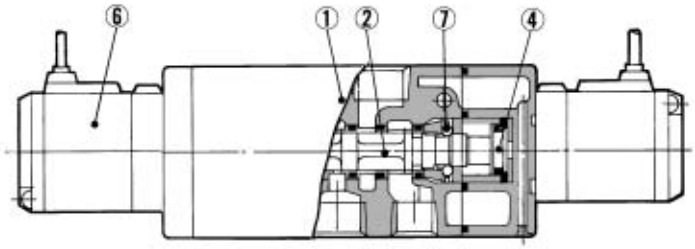
2 position





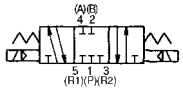
2 position double



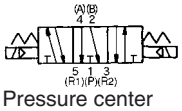


3 position closed center/exhaust center/pressure center

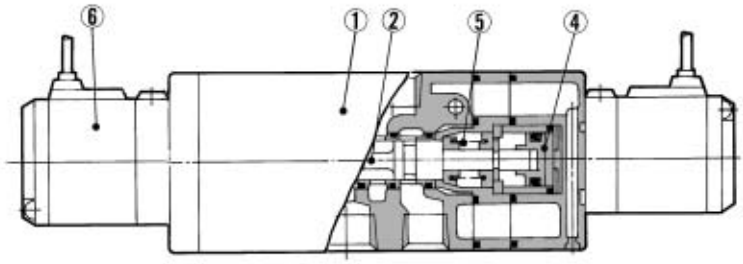
Closed center



Exhaust center



Pressure center



Component Parts

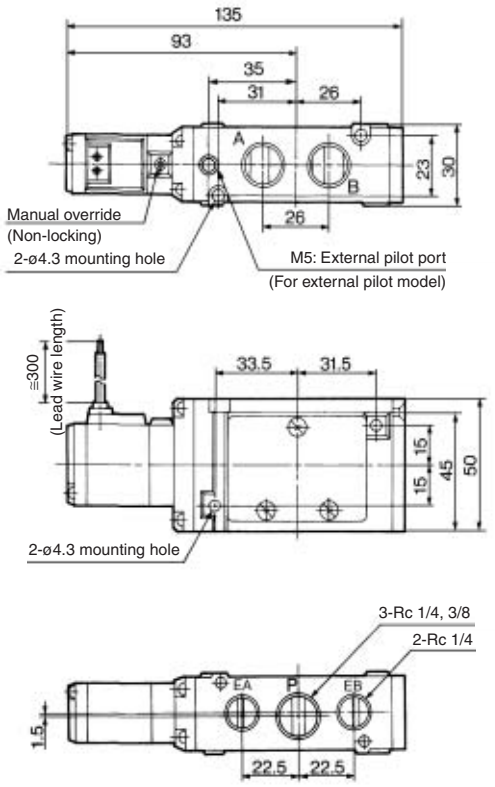
No.	Description	Material	Note
①	Body	Aluminum die-casted	Platinum silver
②	Spool/Sleeve	Stainless steel	—
③	End plate	Resin	Black
④	Piston	Resin	—

Replacement Parts

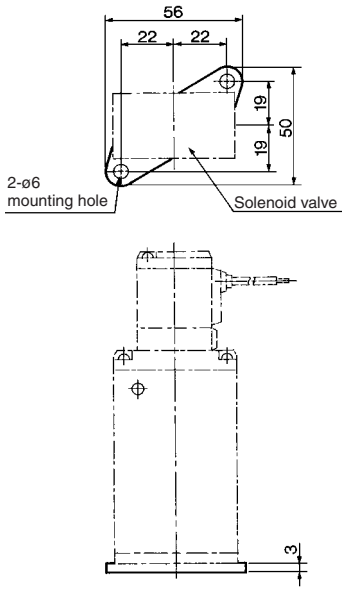
No.	Description	Material	Part no.		
			VFS3120	**VFS3220**	**VFS3320/3420/3520**
⑤	Return spring	Stainless steel	VFS3000-17-1	—	VFS3000-17-2
⑥	Pilot valve assembly	—	Refer to “How to Order Pilot Valve Assembly” on page 3-8-26.		
⑦	Detent assembly	—	—	VFS3000-9A	—

2 Position Single Grommet, Grommet terminal, Conduit terminal, DIN terminal

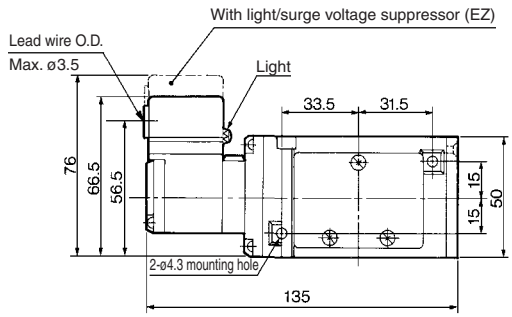
Grommet: VFS3120-□G



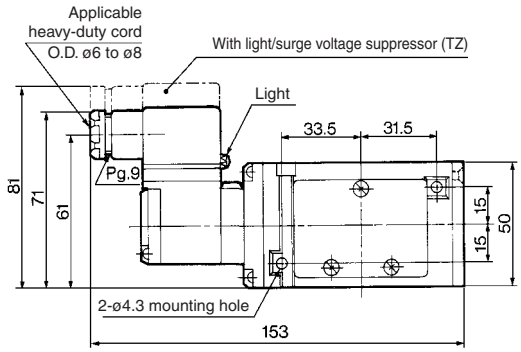
Foot bracket (F)
Part no.: VFS3000-52A



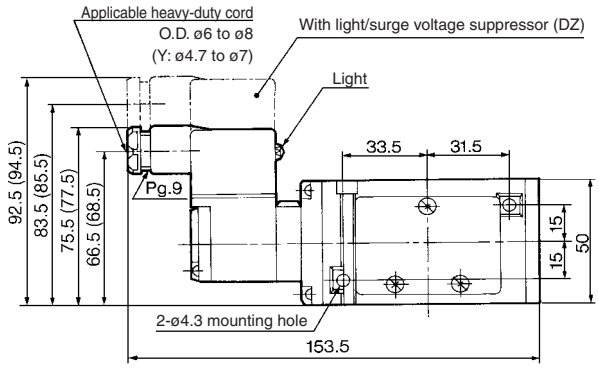
Grommet terminal: VFS3120-□E/EZ



Conduit terminal: VFS3120-□T/TZ



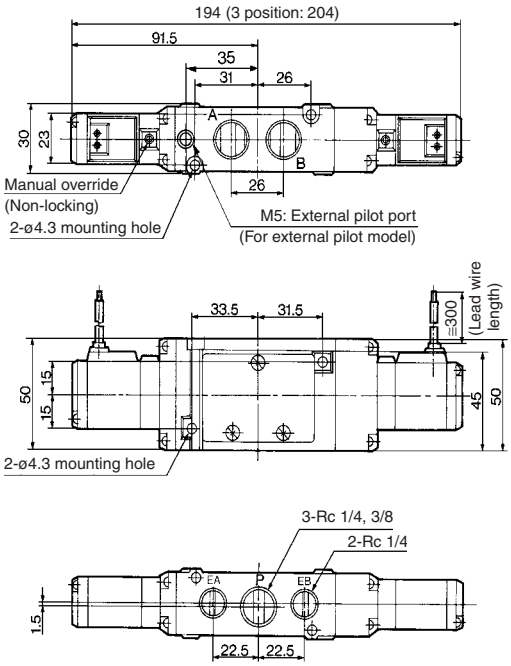
DIN terminal: VFS3120-□D/DZ/Y/YZ



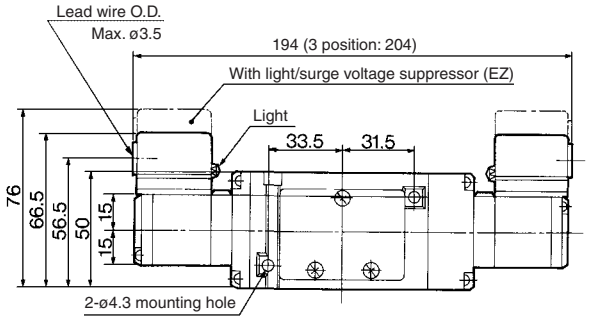
( ): Y, YZ

2 Position Double, 3 Position Grommet, Grommet terminal, Conduit terminal, DIN terminal

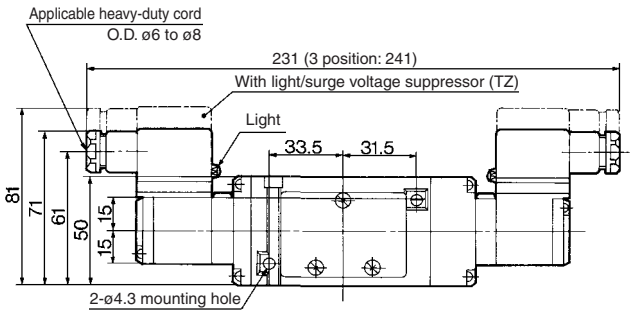
Grommet: VFS3220-□G, VFS3320-□G, VFS3420-□G, VFS3520-□G



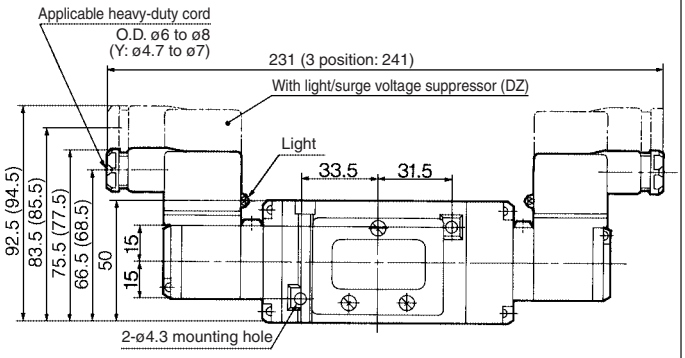
Grommet terminal: VFS3220-□E/EZ VFS3320-□E/EZ VFS3420-□E/EZ VFS3520-□E/EZ



Conduit terminal: VFS3220-□T/TZ VFS3320-□T/TZ VFS3420-□T/TZ VFS3520-□T/TZ



DIN terminal: VFS3220-□D/DZ/Y/YZ VFS3320-□D/DZ/Y/YZ VFS3420-□D/DZ/Y/YZ VFS3520-□D/DZ/Y/YZ



( ): Y, YZ

5 Port Pilot Operated Solenoid Valve
Metal Seal, Plug-in/Non Plug-in
Series VFS3000

Model

Type of actuation		Model: Plug-in	Model: Non plug-in	Port size Rc	Flow characteristics: 1 → 4/2 (P → A/B) C [dm³/(s·bar)]	b	Cv	Flow characteristics: 4/2 → 5/3 (A/B → R1/R2) C [dm³/(s·bar)]	b	Cv	Max.(1) operating cycle (cpm)	Response time(2) (ms)	Weight(3) (kg)
2 position	Single	**VFS3100**	**VFS3110**	1/4	6.0	0.15	1.4	5.8	0.12	1.3	1200	20 or less	0.31
				3/8	7.3	0.23	1.8	6.8	0.12	1.6			
	Double	**VFS3200**	**VFS3210**	1/4	6.0	0.15	1.4	5.8	0.12	1.3	1500	15 or less	0.41
				3/8	7.3	0.23	1.8	6.8	0.12	1.6			
3 position	Closed center	**VFS3300**	**VFS3310**	1/4	5.8	0.21	1.4	5.4	0.14	1.2	600	40 or less	0.43
				3/8	6.8	0.22	1.7	6.3	0.12	1.5			
	Exhaust center	**VFS3400**	**VFS3410**	1/4	6.1	0.23	1.4	5.0	0.14	1.2	600	40 or less	0.43
				3/8	7.4	0.20	1.8	5.6	0.18	1.3			
	Pressure center	**VFS3500**	**VFS3510**	1/4	6.0	0.22	1.5	5.8	0.16	1.3	600	40 or less	0.43
				3/8	7.2	0.19	1.8	7.1	0.18	1.8			
	Double check	**VFS3600**	**VFS3610**	1/4	4.0	—	—	3.5	—	—	600	50 or less	0.91
				3/8	4.0	—	—	3.7	—	—			

Note 1) Based on JIS B 8375 (once per 30 days) for the minimum operating frequency. Note 2) Based on JIS B 8375-1981 (the value at supply press. 0.5 MPa).
Note 3) The figures in the above list are for without sub-plate. In the case of with plug-in sub-plate and with non plug-in sub-plate, add 0.30 kg and 0.27 kg respectively.
Note 4) "Note 1)" and "Note 2)" are with controlled clean air.

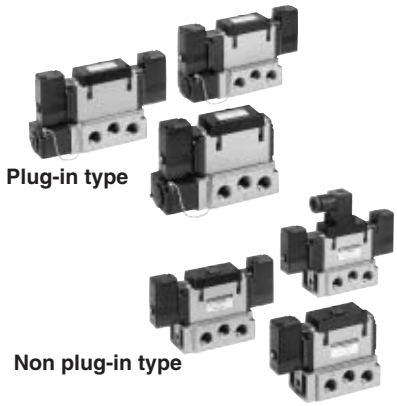
Compact yet provides a large flow capacity
3/8: C: 5.8 dm³/(s·bar)

Low power consumption: 1.8 W DC

Easy maintenance

2 types of sub-plates:

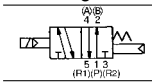
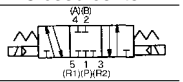
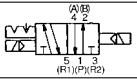
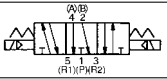
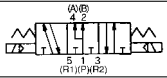
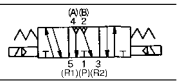
Plug-in and non plug-in



Plug-in type

Non plug-in type

JIS Symbol

2 position	3 position
Single	Closed center
	
Double	Exhaust center
	
	Pressure center
	
	Double check
	

Standard Specifications

Valve specifications	Fluid		Air/Inert gas
	Maximum operating pressure		1.0 MPa
	Minimum operating pressure		0.1 MPa
	Proof pressure		1.5 MPa
	Ambient and fluid temperature		–10 to 60°C (1)
	Lubrication		Non-lube (2)
	Pilot valve manual override		Non-locking push type (Flush)
	Shock/Vibration resistance		150/50 m/s² (3)
	Enclosure		Type E: Dustproof (Level 0), Type F: Dripproof (Level 2), Type D: Splashproof (Level 4) (4)
Electricity specifications	Coil rated voltage		100, 200 VAC, 50/60 Hz; 24 VDC
	Allowable voltage fluctuation		–15 to +10% of rated voltage
	Coil insulation type		Class B or equivalent (130°C) (5)
	Apparent power (Power consumption) AC	Inrush	5.6 VA/50 Hz, 5.0 VA/60 Hz
		Holding	3.4 VA (2.1 W)/50 Hz, 2.3 VA (1.5 W)/60 Hz
	Power consumption DC		1.8 W (2.04 W: With light/surge voltage suppressor)
	Electrical entry	Plug-in type	Conduit terminal
		Non plug-in type	DIN terminal, Grommet terminal

Note 1) Use dry air at low temperatures.
Note 2) Use turbine oil Class 1 (ISO VG32), if lubricated.
Note 3) Impact resistance: No malfunction occurred when it is tested with a drop tester in the axial direction and at the right angles to the main valve and armature in both energized and de-energized states every once for each condition. (Values at the initial period)
Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Test was performed at both energized and de-energized states in the axial direction and at the right angles to the main valve and armature. (Values at the initial period)
Note 4) Based on JIS C 0920. Note 5) Based on JIS C 4003.

Option

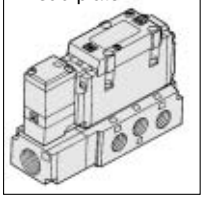
Pilot type		External pilot Note)
Manual override	Main valve	Direct manual override type
	Pilot valve	Non-locking push type (Extended), Locking type (Tool required), Locking type (Lever)
Coil rated voltage		110 to 120, 220, 240 VAC (50/60 Hz)
		12, 100 VDC
Porting specifications		Bottom ported
Option		With light/surge voltage suppressor

Note) Operating pressure: 0 to 1.0 MPa
Pilot pressure: 0.1 to 1.0 MPa

How to Order

Body type

O: Plug-in type sub-plate



Electrical entry

F: Plug-in type conduit terminal

Porting specifications

Nil	Side ported
B*	Bottom ported

* Option

Port size

Nil	Without sub-plate
02	Rc 1/4
03	Rc 3/8

* For bottom ported, Rc 1/4 is only available.

Thread type

Nil	Rc
N*	NPT
T*	NPTF
F*	G

* Option

Plug-in VFS3 **1 0 0 — 1 F — 02**

Non plug-in VFS3 **2 1 1 — 2 D — 02**

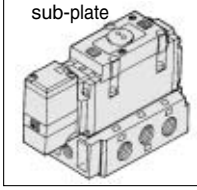
Symbol

1	2 position single	**5**	3 position pressure center
2	2 position double	**6**	3 position double check
3	3 position closed center		
4	3 position exhaust center		

* Reverse pressure: Can be used by external pilot specifications.

Body type

1: Non plug-in type sub-plate



Body Option

0	Standard
1*	Direct manual override

* Option

Pilot type

Nil	Internal pilot
R*	External pilot

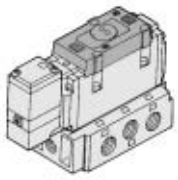
* Option

Option

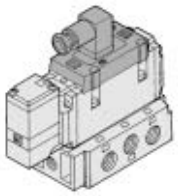
Nil	None
Z	With light/surge voltage suppressor

Electrical entry

E: Grommet terminal



D: DIN terminal



Coil rated voltage

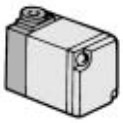
1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3*	110 to 120 VAC, 50/60 Hz
4*	220 VAC, 50/60 Hz
5	24 VDC
6*	12 VDC
7*	240 VAC, 50/60 Hz
9*	Other

* Option

Pilot valve Manual override

Nil: Non-locking push type (Flush)

A*: Non-locking push type (Extended)



B*: Locking type (Tool required)

C*: Locking type (Lever)

* Option

How to Order Pilot Valve Assembly

SF4 — 1 F □ — 30

Coil rated voltage

Symbol	Rated voltage
1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3*	110 to 120 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

Manual override

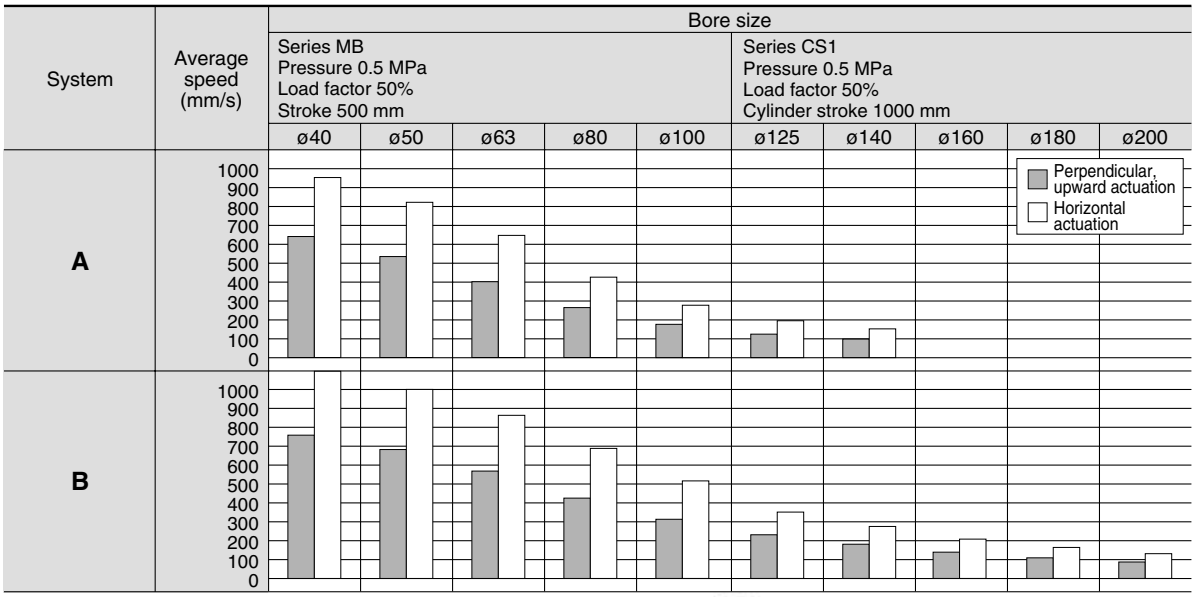
Symbol	Manual override
Nil	Non-locking push type (Flush)
A*	Non-locking push type (Extended)
B*	Locking type (Tool required)
C*	Locking type (Lever)

* Option

* Refer to page 3-8-5 for voltage conversion.

Cylinder Speed Chart

Use as a guide for selection.
Please confirm the actual conditions with SMC Sizing Program.



∗ It is when the cylinder is extending that is meter-out controlled by speed controller which is directly connected with cylinder, and its needle valve with being fully open.
∗ The average velocity of the cylinder is what the stroke is divided by the total stroke time.
∗ Load factor: ((Load weight x 9.8)/Theoretical force) x 100%

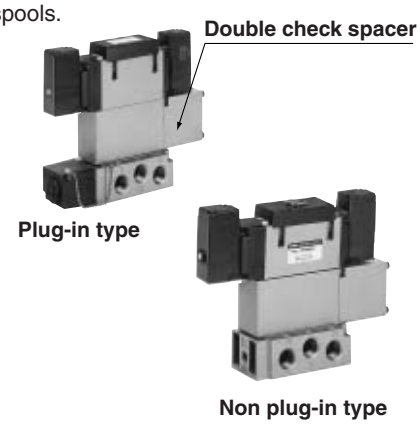
System Components

System	Solenoid valve	Speed controller	Silencer	SGP (Steel pipe) Port size x Length
A	Series VFS3000 Rc 1/4	AS4000-02 (S = 24 mm²)	AN200-02 (S = 35 mm²)	6A x 1 m
B	Series VFS3000 Rc 3/8	AS420-03 (S = 73 mm²)	AN300-03 (S = 60 mm²)	10A x 1 m

Double Check Spacer/Specifications

Can hold an intermediate cylinder position for an extended time

If the double check spacer with a built-in double check valve is combined, it will enable the cylinder to stop in the intermediate stroke and maintain its position for a long time without being affected by the leakage between the spools.



Specifications

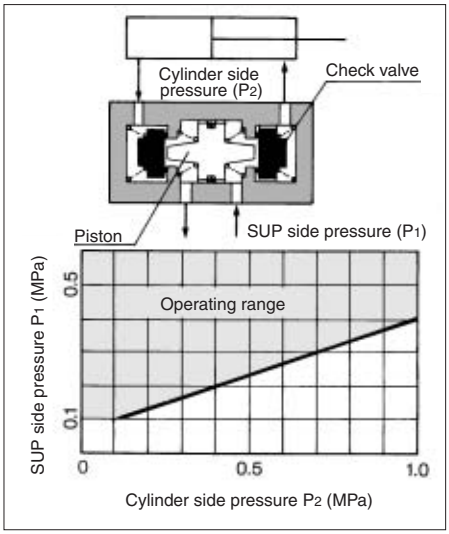
Double check spacer part no.	Plug-in type			Non plug-in type
	VVFS3000-22A-1			**VVFS3000-22A-2**
Applicable valve model	VFS3400-□F			VFS3410-□D VFS3410-□E
Leakage∗ (cm³/min)	Solenoid one side energized	P	EA	230 or less
			EB	
	Solenoid both sides de-energized	P	EA	230 or less
			EB	
		A	EA	0
		B	EB	

∗ Supply pressure: 0.5 MPa

⚠ Caution

- In the case of 3 position double check valve (VFS36□0), check the leakage from piping and fittings in between valve and cylinder by means of synthetic detergent solutions, and ensure that there is no such leakage found there. Also check the leakage from cylinder seal and piston seal. If there is any leakage, sometimes the cylinder, when valve is de-energized, can move without stopping at intermediate position.
- Be aware that if the exhaust side is restricted excessively, the intermediate stopping accuracy will decrease and will lead to improper intermediate stops.

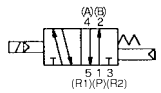
Check Valve Operation

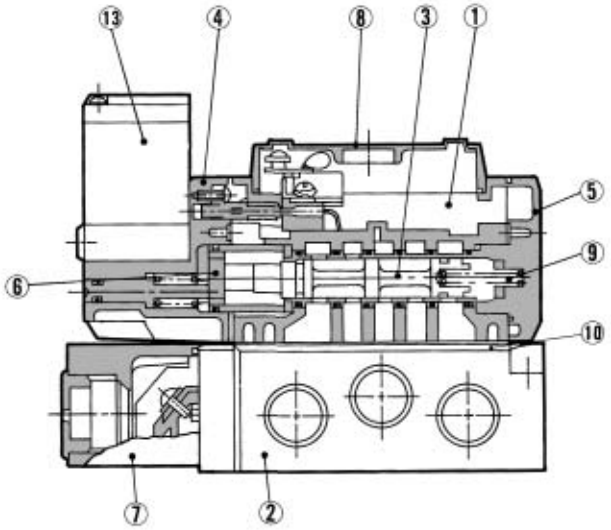


- The combination of VFS31$^{0}_{1}$0, VFS32$^{0}_{1}$0 and double check spacer can be used as prevention for falling at the stroke end but cannot hold the intermediate position of the cylinder.

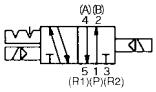
Construction

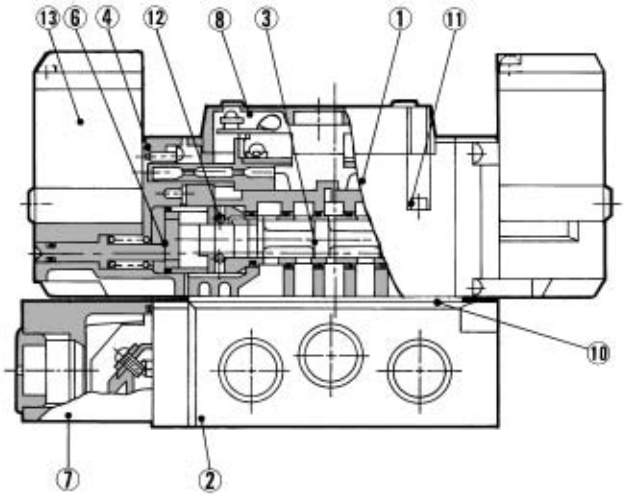
2 position single





2 position double



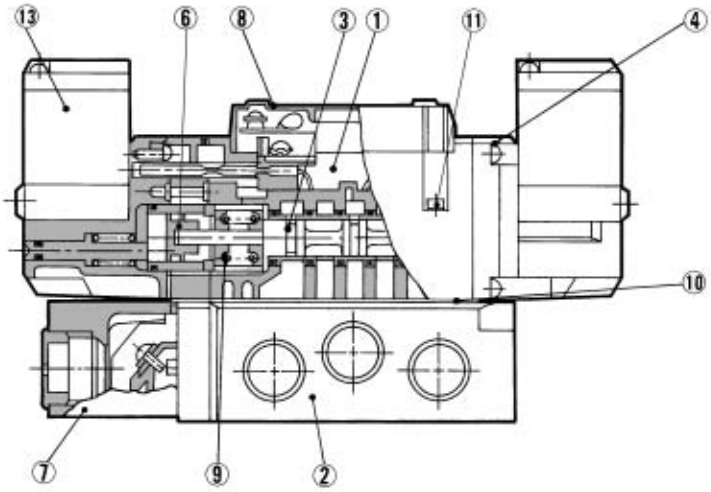


3 position closed center/exhaust center/pressure center

Closed center

Exhaust center

Pressure center



Component Parts

No.	Description	Material	Note
①	Body	Aluminum die-casted	Platinum silver
②	Sub-plate	Aluminum die-casted	Platinum silver
③	Spool/Sleeve	Stainless steel	—
④	Adapter plate	Resin	Black
⑤	End plate	Resin	Black
⑥	Piston	Resin	—
⑦	Junction cover	Resin	—
⑧	Light cover	Resin	—

Sub-plate Part No.

Plug-in	VFS3000-P-$^{02}_{03}$
Non plug-in	VFS3000-S-$^{02}_{03}$

∗ Mounting bolt and gasket are not included.

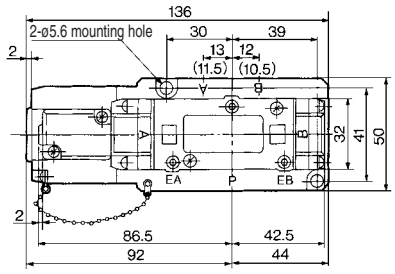
Part no. for mounting bolt and gasket
BG-VFS3000

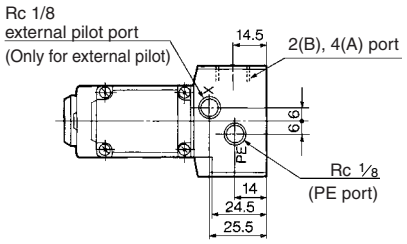
Replacement Parts

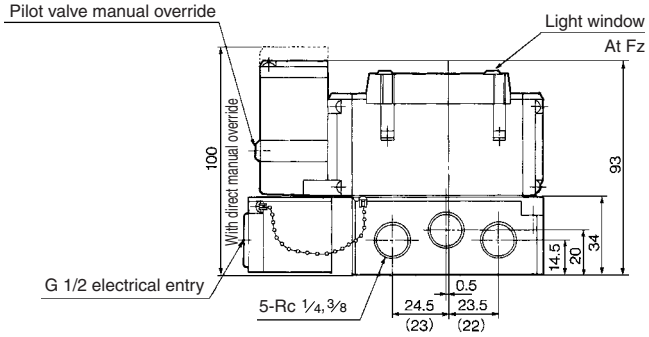
No.	Description	Material	Part no.		
			VFS31□□	**VFS32□□**	**VFS33□□/34□□/35□□**
⑨	Return spring	Stainless steel	VFS3000-17-1	—	VFS3000-17-2
⑩	Gasket	NBR	VFS3000-20	VFS3000-20	VFS3000-20
⑪	Hexagon socket head screw	Steel	M3 x 32	M3 x 32	M3 x 32
⑫	Detent assembly	—	—	VFS3000-9A	—
⑬	Pilot valve assembly	—	Refer to “How to Order Pilot Valve Assembly” on page 3-8-54.		

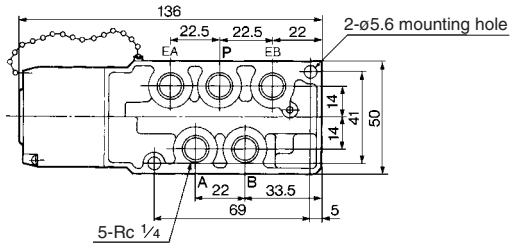
Plug-in 2 position single, 3 position closed center/exhaust center/pressure center/double check

2 position single: VFS3100-□F





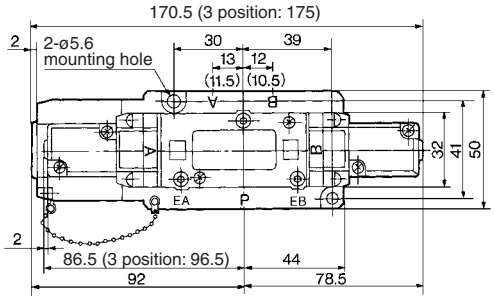


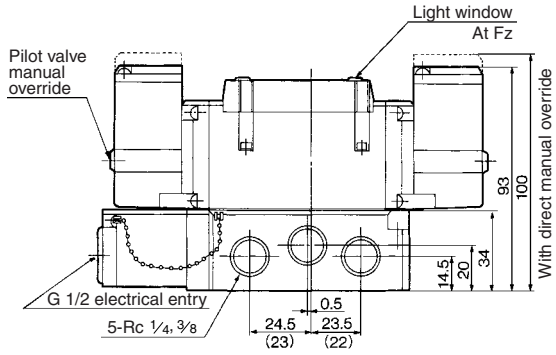


Bottom ported

( ): Rc 1/4

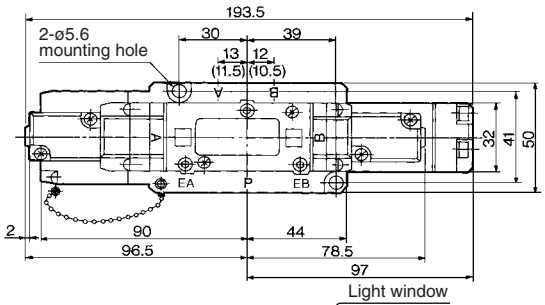
2 position double: VFS3200-□F
3 position closed center: VFS3300-□F
3 position exhaust center: VFS3400-□F
3 position pressure center: VFS3500-□F

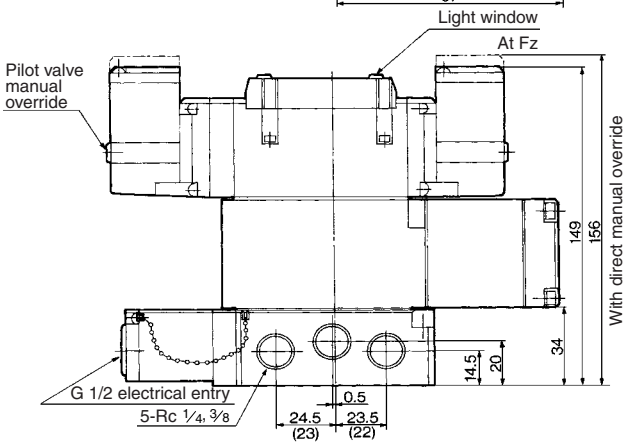




( ): Rc 1/4

3 position double check: VFS3600-□F

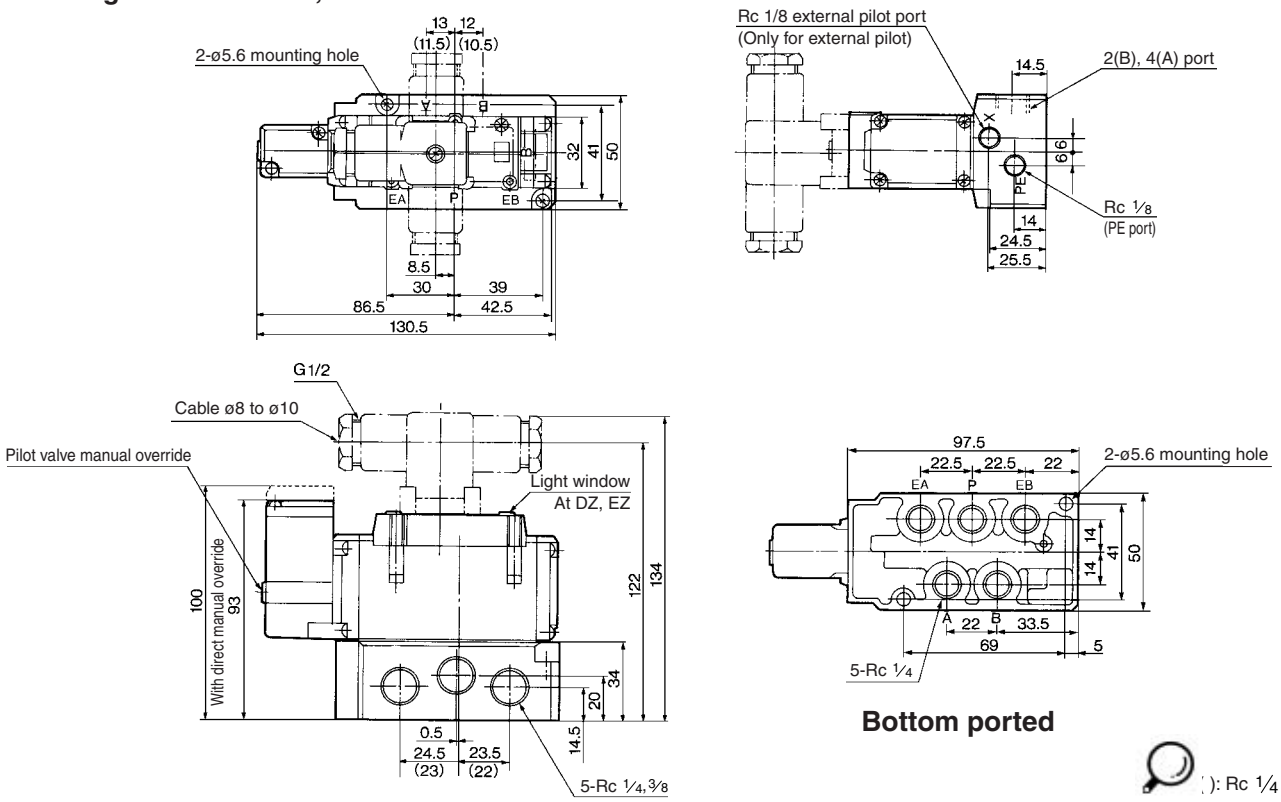




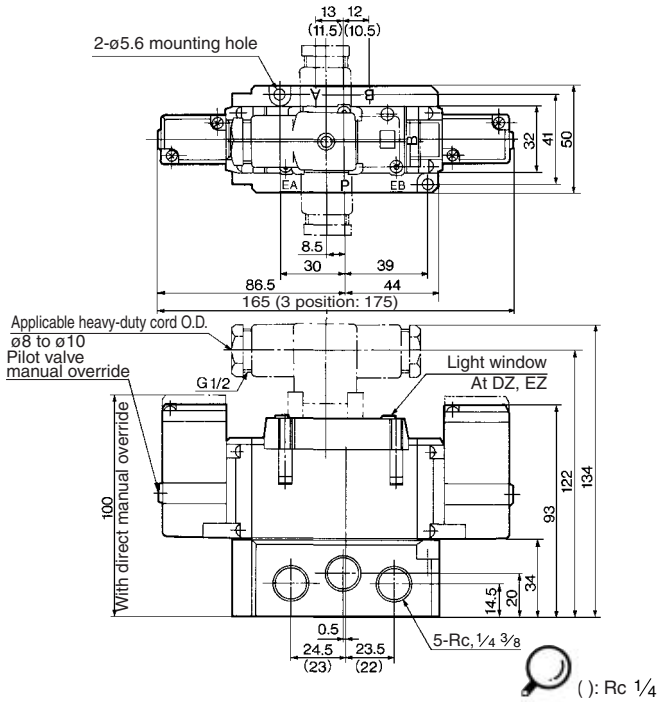
( ): Rc 1/4

Non Plug-in 2 Position single/double, 3 position closed center/exhaust center/pressure center/double check

2 position single: VFS3110-□E, VFS3110-□D



2 position double: VFS3210-□E, VFS3210-□D
3 position closed center: VFS3310-□E, VFS3310-□D
3 position exhaust center: VFS3410-□E, VFS3410-□D
3 position pressure center: VFS3510-□E, VFS3510-□D



3 position double check: VFS3610-□E, VFS3610-□D