5 Port Pilot Operated Solenoid Valve
Metal Seal, Plug-in/Non Plug-in
Series VFS5000

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	**VFS5100**	**VFS5110**	3/8	15	0.30	3.7	15	0.30	4.1	600	45 or less	0.88
				1/2	16	0.15	3.7	19	0.15	4.5			
				3/4	17	0.15	3.9	20	0.13	4.7			
	Double	**VFS5200**	**VFS5210**	3/8	15	0.30	3.7	15	0.30	4.1	600	25 or less	1.06
				1/2	16	0.15	3.7	19	0.15	4.5			
				3/4	17	0.15	3.9	20	0.13	4.7			
3 position	Closed center	**VFS5300**	**VFS5310**	3/8	14	0.25	4.0	14	0.24	4.1	300	55 or less	1.16
				1/2	16	0.25	4.1	16	0.24	4.1			
				3/4	16	0.25	4.1	16	0.23	4.1			
	Exhaust center	**VFS5400**	**VFS5410**	3/8	14	0.32	3.8	14	0.25	3.5	300	55 or less	1.14
				1/2	16	0.17	3.8	16	0.18	4.1			
				3/4	17	0.20	4.2	17	0.13	4.1			
	Pressure center	**VFS5500**	**VFS5510**	3/8	14	0.30	3.7	14	0.31	3.8	300	55 or less	1.14
				1/2	16	0.23	3.9	16	0.22	4.1			
				3/4	18	0.25	4.6	17	0.22	4.3			
	Double check	**VFS600**	**VFS5610**	3/8	9.0	—	—	9.0	—	—	180	60 or less	1.99
				1/2	9.0	—	—	9.0	—	—			
				3/4	9.0	—	—	9.0	—	—			

Note 1) Based on JIS B 8375 (once per 30 days) for the minimum operating frequency. Note 2) Based on JIS B8375-1981. (The value at supply pressure 0.5 MPa.)
Note 3) The figures in the above list are without sub-plate. In the case of with plug-in sub-plate and, with non plug-in sub-plate add 3/8, 1/2—0.744 kg, 3/4—0.966 kg and 3/8, 1/2—0.577 kg, 3/4—0.823 kg respectively.
Note 4) "Note 1) " and "Note 2) " are with controlled clean air.

Compact yet provides a large flow capacity
3/4: C: 20 dm³/(s·bar)

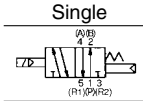
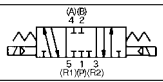
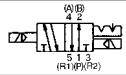
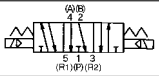
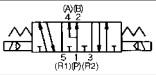
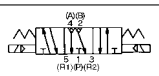
Low power consumption: 1.8 W DC

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: Grommet 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

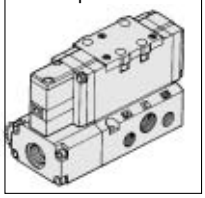
Pilot type		External pilot Note)
Manual override	Main valve	Direct manual override
	Pilot valve	Non-locking push type (Extended), Locking type (Tool required), Locking type (Lever)
Coil rated voltage		110 to 120, 220, 240 VAC (50/60 Hz)
		12, 100 VDC
Porting specifications		Bottom ported
Option		With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

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

* In the case of external pilot (Option), bottom piping is not available.

Port size

Nil	Without sub-plate
03	Rc 3/8
04	Rc 1/2
06	Rc 3/4

Thread type

Nil	Rc
N*	NPT
T*	NPTF
F*	G

* Option

Plug-in VFS5 [1] 0 [0] [ ] — 2 F [ ] [ ] — [ ] 04 [ ]

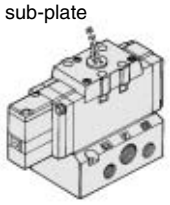
Non plug-in VFS5 [1] 1 [0] [ ] — 5 [D] [ ] [ ] — [ ] 06 [ ]

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		

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

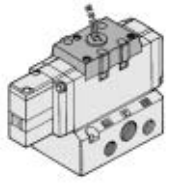
Option

Nil	None
Z	With light/surge voltage suppressor
P*	Non-rotating DIN terminal
ZP*	Light/Surge Voltage Suppressor Non-rotating DIN terminal

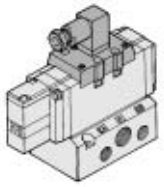
* Type "P", "ZP" is available for DIN type only.

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

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

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

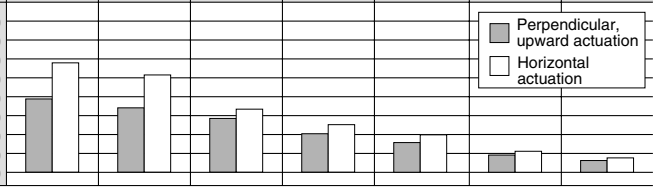
Manual override

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.

Series	Average speed (mm/s)	Bore size: Series CS1, Pressure 0.5 MPa, Load factor 50%, Stroke 300 mm						
		ø125	ø140	ø160	ø180	ø200	ø250	ø300
VFS5100-06	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%

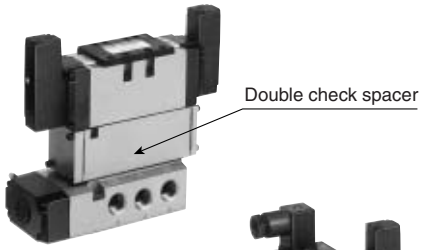
Conditions

		Series CS1
VFS5100-06	Tube bore x Length	SGP20A x 1 m
	Speed controller	AS500-06
	Silencer	AN500-06

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.



Plug-in type

Non plug-in type

Specifications

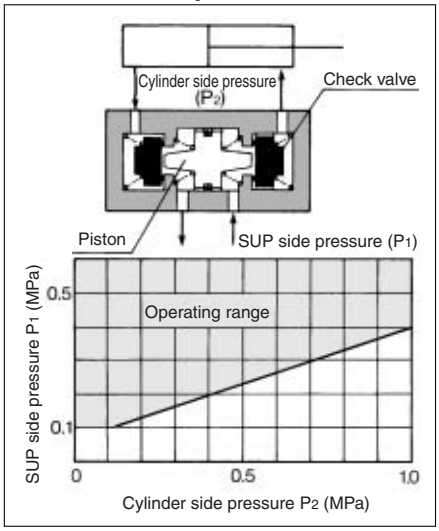
Double check spacer part no.	Plug-in type			Non plug-in type
	VVFS5000-22A-1			**VVFS5000-22A-2**
Applicable valve model	VFS5400-□F			VFS5410-□D VFS5410-□E
Leakage∗ (cm³/min)	Solenoid one side energized	P	R1	320 or less
			R2	
	Solenoid both sides de-energized	P	R1	320 or less
			R2	
		A	R1	0
		B	R2	

∗ Supply pressure: 0.5 MPa

⚠Caution

- In the case of 3 position double check valve (VFS56□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.

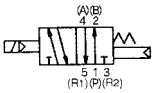
Check Valve Operation

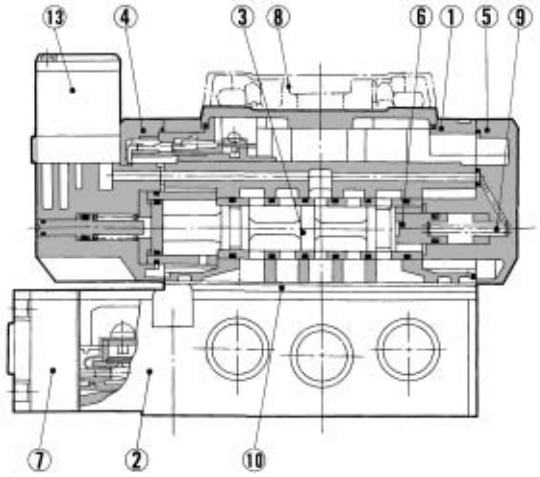


- The combination of VFS51$^{0}_{1}$0, VFS52$^{0}_{1}$0 and a double check spacer can be used as prevention of falling at the stroke end but cannot hold the intermediate position of the cylinder.

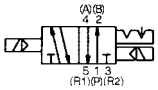
Construction

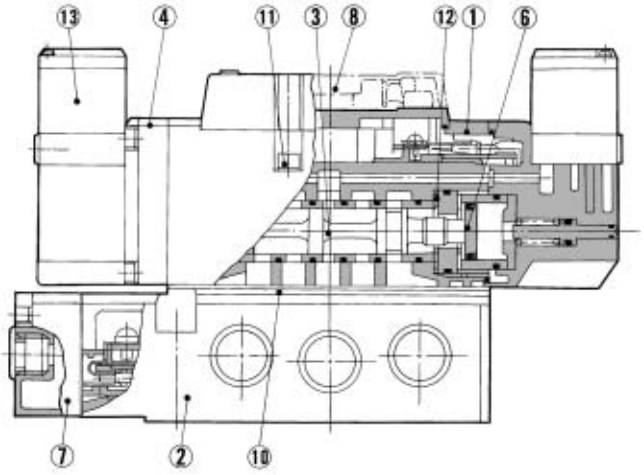
2 position single





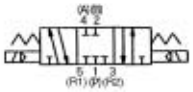
2 position double





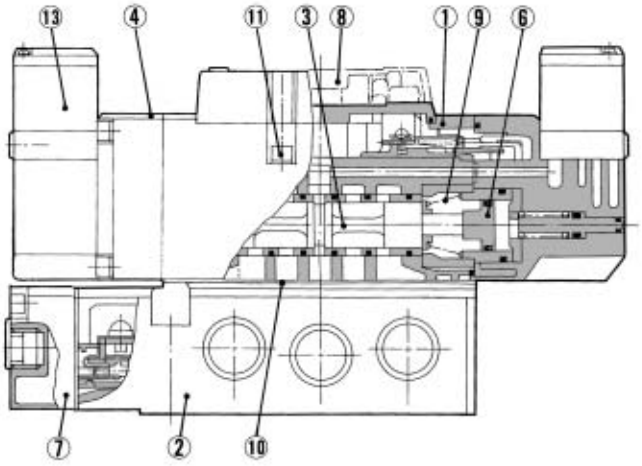
3 position closed center/exhaust center/pressure center

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	Aluminum die-casted	Black
⑤	End plate	Aluminum die-casted	Black
⑥	Piston	Resin	—
⑦	Junction cover	Resin	—
⑧	Light cover	Resin	—

Sub-plate Assembly Part No.

Plug-in	VFS5000-P-$^{03}_{04}_{06}$
Non plug-in	VFS5000-S-$^{03}_{04}_{06}$

∗ Mounting bolt and gasket are not included.

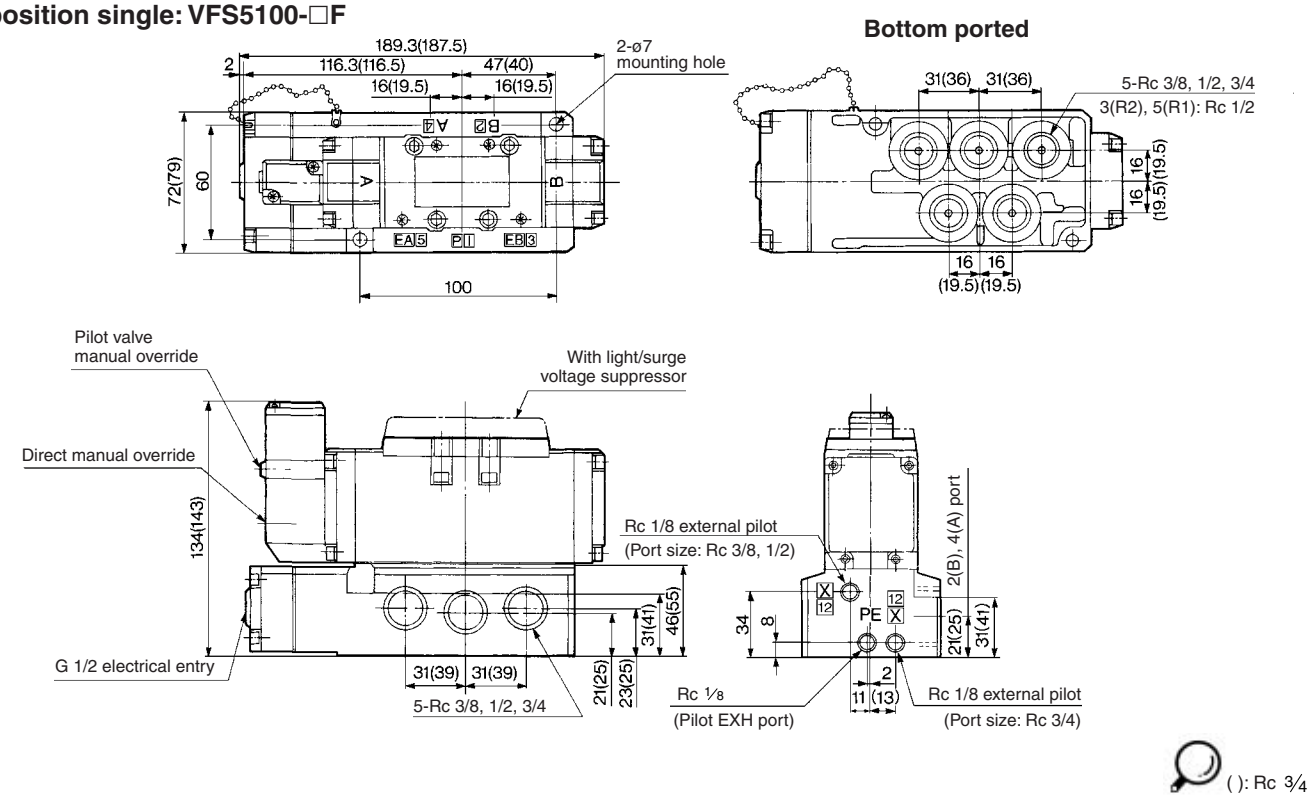
Part no. for mounting bolt and gasket
BG-VFS5000

Replacement Parts

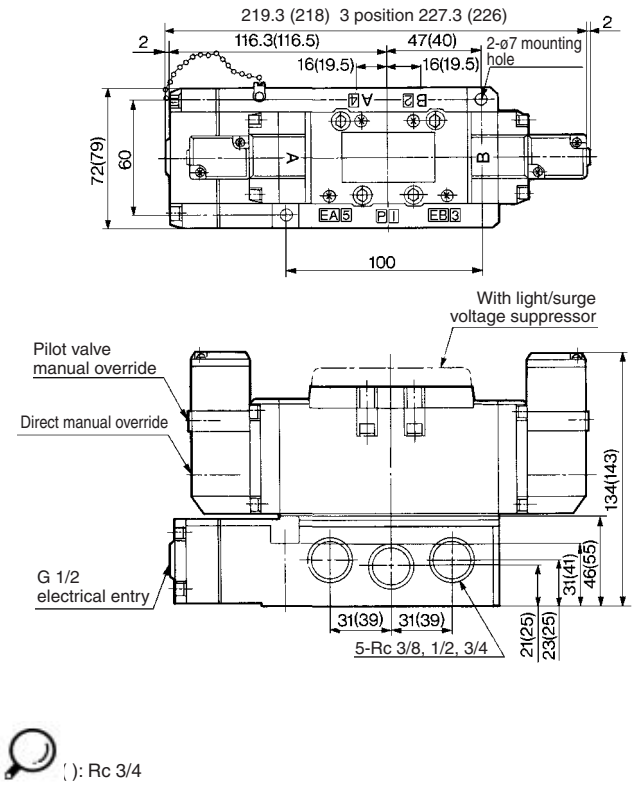
No.	Description	Material	Part no.		
			VFS51□□	**VFS52□□**	**VFS53□□/54□□/55□□**
⑨	Return spring	Stainless steel	VFS5000-9	—	AXT627-18
⑩	Gasket	NBR	AXT627-10-1	AXT627-10-1	AXT627-10-1
⑪	Hexagon socket head screw	Steel	M5 x 50	M5 x 50	M5 x 50
⑫	Detent assembly	—	—	AXT510-9	—
⑬	Pilot valve assembly	—	Refer to “How to Order Pilot Valve Assembly” on page 3-8-86.		

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

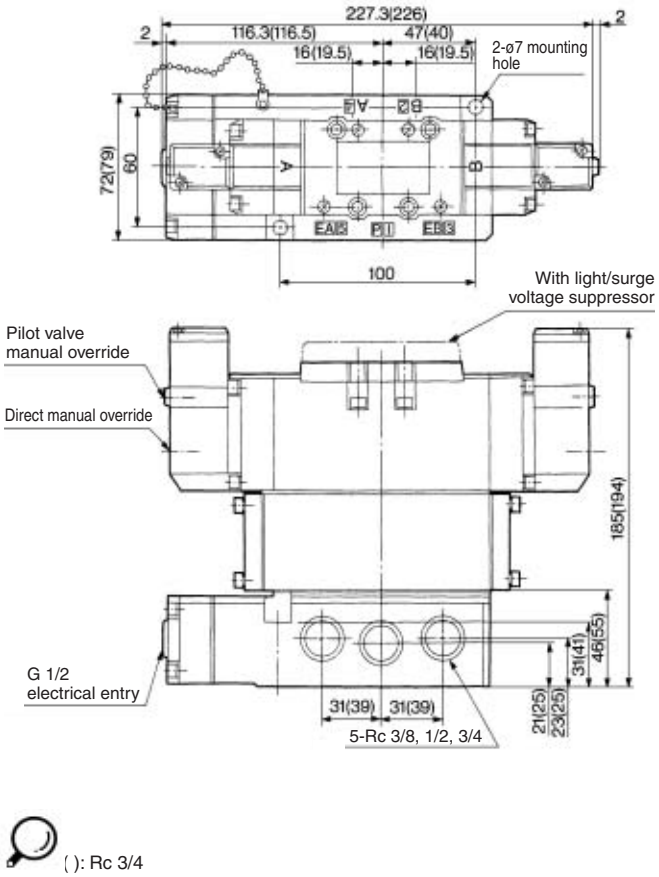
2 position single: VFS5100-□F



2 position double: VFS5200-□F
3 position closed center: VFS5300-□F
3 position exhaust center: VFS5400-□F
3 position pressure center: VFS5500-□F

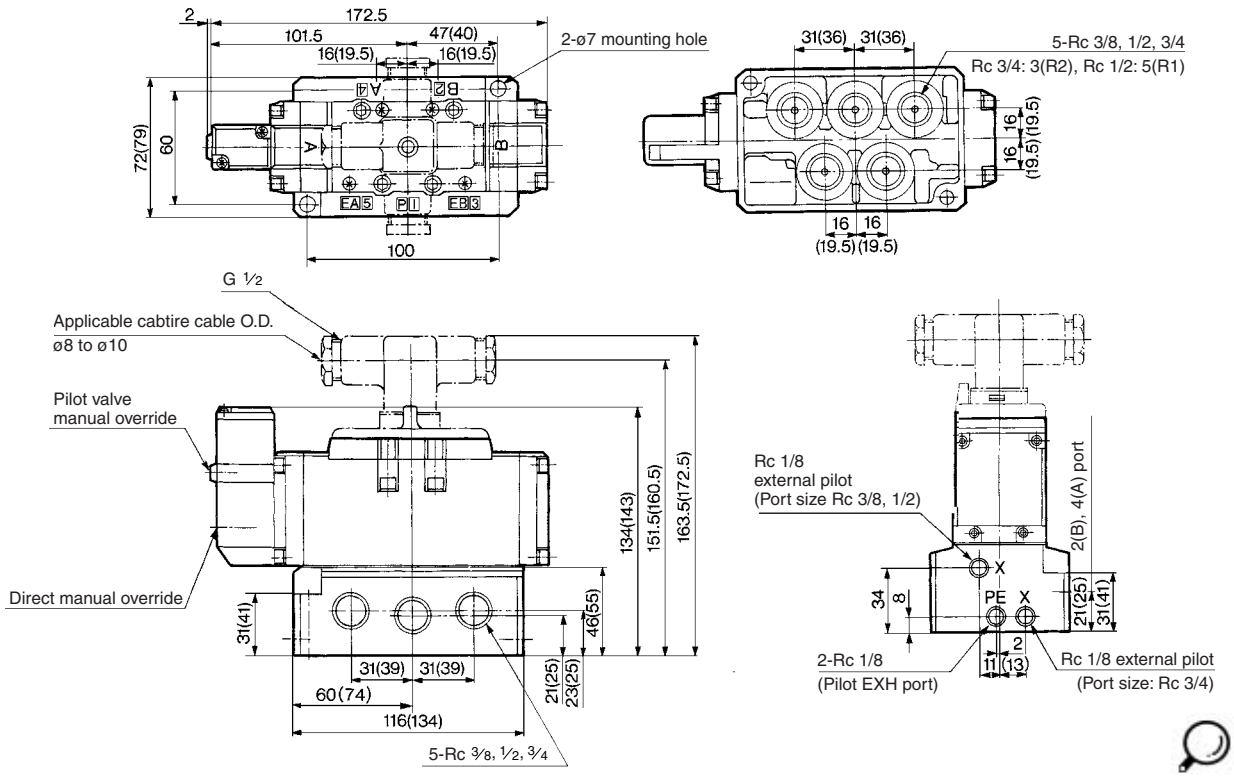


3 position double check: VFS5600-□F

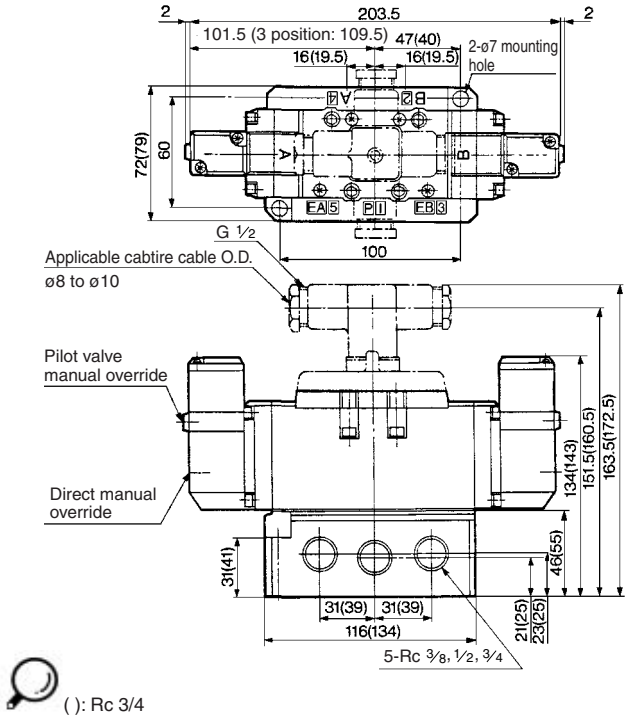


Non Plug-in 2 position single/double, 3 position closed center/exhaust center/pressure center/double check

2 position single: VFS5110-□E, VFS5110-□D



2 position double: VFS5210-□E, VFS5210-□D
3 position closed center: VFS5310-□E, VFS5310-□D
3 position exhaust center: VFS5410-□E, VFS5410-□D
3 position pressure center: VFS5510-□E, VFS5510-□D



3 position double check: VFS5610-□E, VFS5610-□D