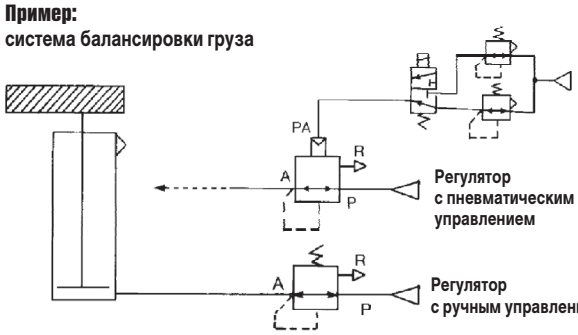
VEX

M5 ~ G2

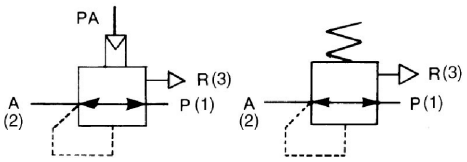
Предназначен для понижения давления сжатого воздуха и поддержания его на заданном уровне с высокой точностью

- При малых габаритных размерах обладает высокой пропускной способностью (до 37000 норм.л/мин.)
- Высокая скорость деаэрации
- Может иметь как пневматическое, так и ручное управление
- Высокая точность регулировки давления
- Широкий диапазон размеров присоединительных резьб
- Может использоваться на различные рабочие среды
- Возможен монтаж на плите
- Применяется в схемах балансировки, контроля прижима и натяжения, регулировки давления в ресиверах

Пример:
система балансировки груза



Давление регулируется в соответствии с изменением нагрузки.
Обеспечивается балансировка как в статических,
так и в динамических условиях.



Пневматическая
регулировка давления
(по запросу)

Ручная
регулировка давления

Технические характеристики

Типоразмер	VEX1A33		VEX1B33 (монтаж на плите)		VEX113		VEX123 (монтаж на плите)		VEX133			VEX153			VEX173		VEX193	
Регулировка давления	Ручная																	
Рабочая среда	Сжатый воздух (углекислый газ,азот, фреон11, 113, 114, аргон, гелий, высокотемпературный воздух - по запросу)				Сжатый воздух													
Присоединительная резьба	M5	G1/8	M5	G1/8	G1/8	G1/4	G1/8	G1/4	G1/4	G3/8	G1/2	G1/2	G3/4	G1	G1	G1 1/4	G1 1/4	G2
Присоединительная резьба порта деаэрации															G1 1/4		G2	
Нормальный объемный расход (норм.л/мин)	280	560	280	560	900	1400	900	1400	2000	3300	3900	7200	8900	10000	17000	18000	33000	37000
Испытательное давление (МПа)	1.5																	
Макс. рабочее давление (МПа)	1.0																	
Мин. рабочее давление (МПа)	Давление на выходе + 0.1																	
Диапазон регулирования (МПа)	0.01 ~ 0.7				0.05 ~ 0.7													
Воспроизводимость	±0.5%																	
Чуствительность	±0.2%																	
Линейность (для пневмоуправляемого регулятора)	–				±1%													
Давление управления (для пневмоуправляемого регулятора) (МПа)	–				0.05 ~ 0.7													
Присоединительная резьба для порта пневмоуправления	–				G1/8													
Резьба для присоединения манометра	G1/8																	
Расход воздуха на собственные нужды (Норм.л/мин)	6 (при давлении 0.9 МПа)																	
Монтажное положение	Произвольное																	
Диапазон рабочих температур (°C)	0 ~ 60																	
Вес (кг)	0.15		0.18		0.2		0.3		0.5			1.4			2		4	

Прецизионный регулятор давления
VEX

Номер для заказа

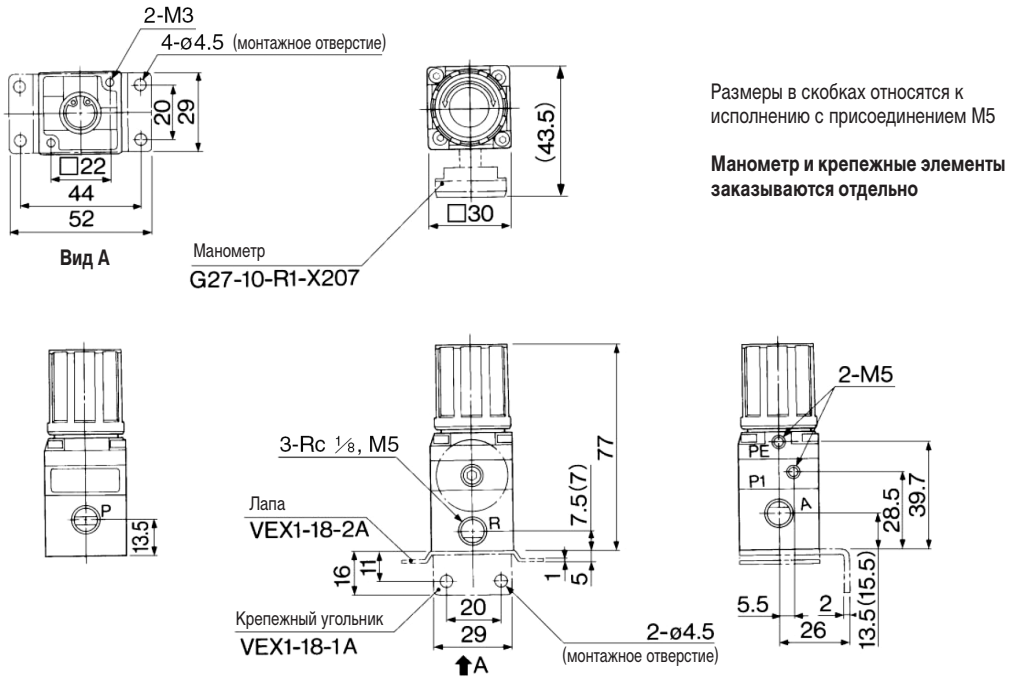
Присоединительная резьба	Ручная регулировка давления	Присоединительная резьба порта деаэрации	Пневмоглушитель для порта деаэрации (заказывается отдельно)
M5	**VEX1A33-M5**	M5	**AN120-M5**
G1/8	**VEX1A33-01**	G1/8	**AN103-01**
G1/8	**VEX1133-01F**	G1/8	
G1/4	**VEX1133-02F**	G1/4	**AN200-02**
G1/4	**VEX1333-02F**	G1/4	
G3/8	**VEX1333-03F**	G3/8	**AN300-03**
G1/2	**VEX1333-04F**	G1/2	**AN400-04**
G1/2	**VEX1533-04F**	G1/2	
G3/4	**VEX1533-06F**	G3/4	**AN500-06**
G1	**VEX1533-10F**	G1	**AN600-10**
G1	**VEX1733-10F**	G1 1/4	**AN700-12**
G1 1/4	**VEX1733-12F**		
G1 1/2	**VEX1933-14F**	G2	**AN900-20**
G2	**VEX1933-20F**		

Принадлежности (заказываются отдельно)

Типоразмер	VEX1A33	VEX113	VEX133	VEX153	VEX173	VEX193
Крепежный угольник	**VEX1-18-1A**		**VEX3-32A**	**VEX5-32A**	**VEX7-32A**	**VEX9-32A**
Лапа	**VEX1-18-2A**		–			
Манометр	**G27-10-R1-X207**	**G27-10-01**	**K8-10-40**	**K8-10-50**		
Пневмоглушитель для порта вспомогательного выпуска	**AN120-M5**					

Размеры

VEX1A33-M5, 01

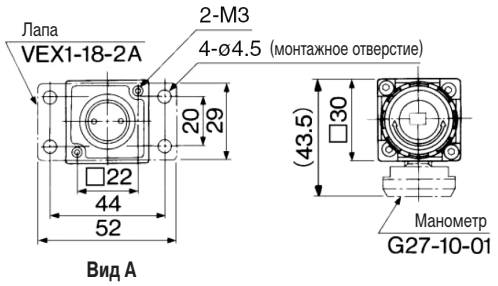


Размеры в скобках относятся к исполнению с присоединением M5

Манометр и крепежные элементы заказываются отдельно

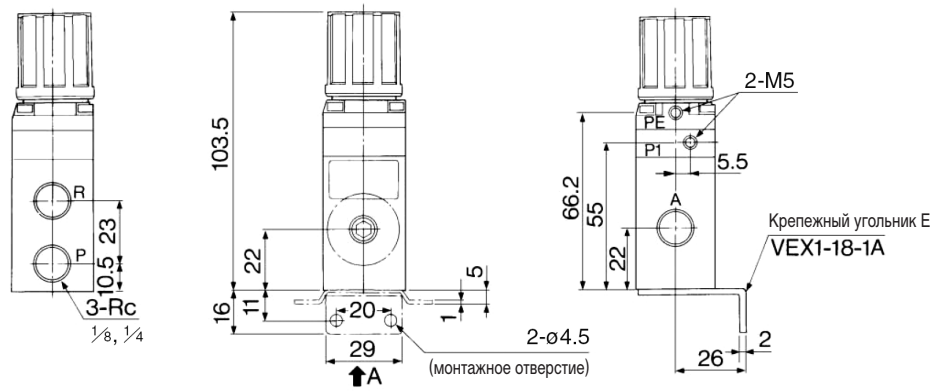
Размеры

VEX113$^{0}_{3}$-01, 02

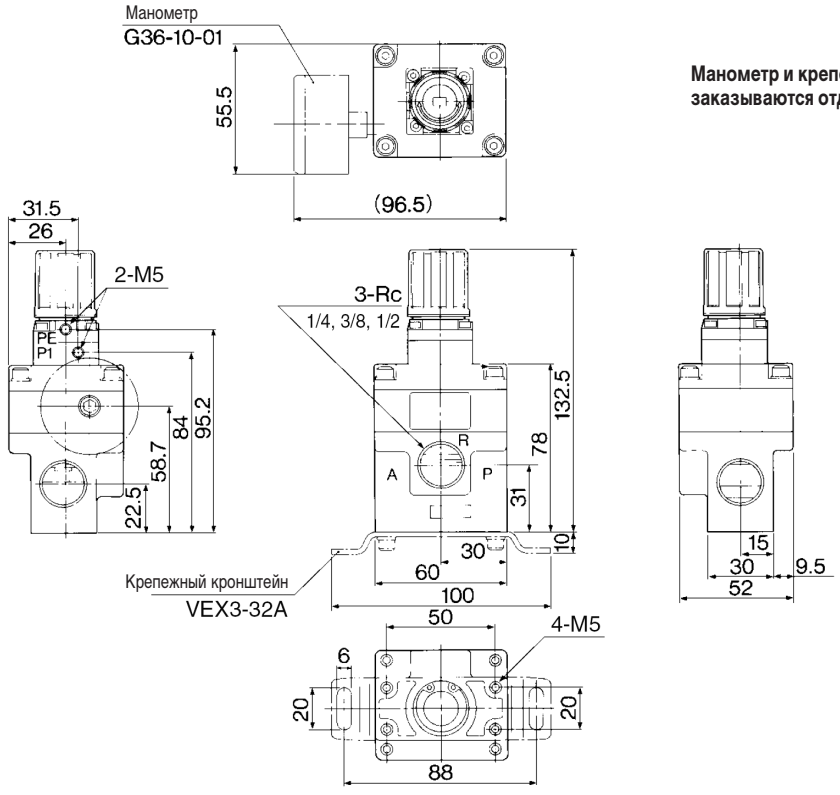


Вид A

Манометр и крепежные элементы заказываются отдельно



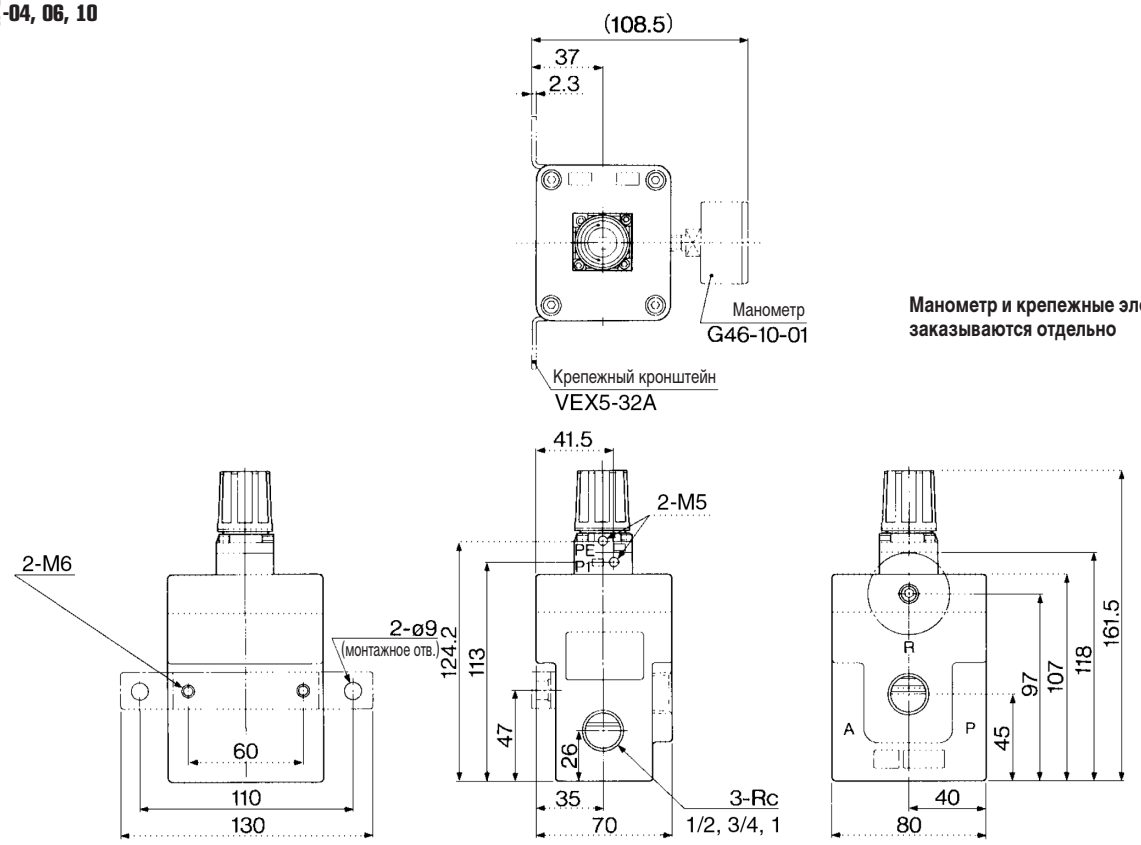
VEX133$^{0}_{3}$-02, 03, 04



Манометр и крепежные элементы заказываются отдельно

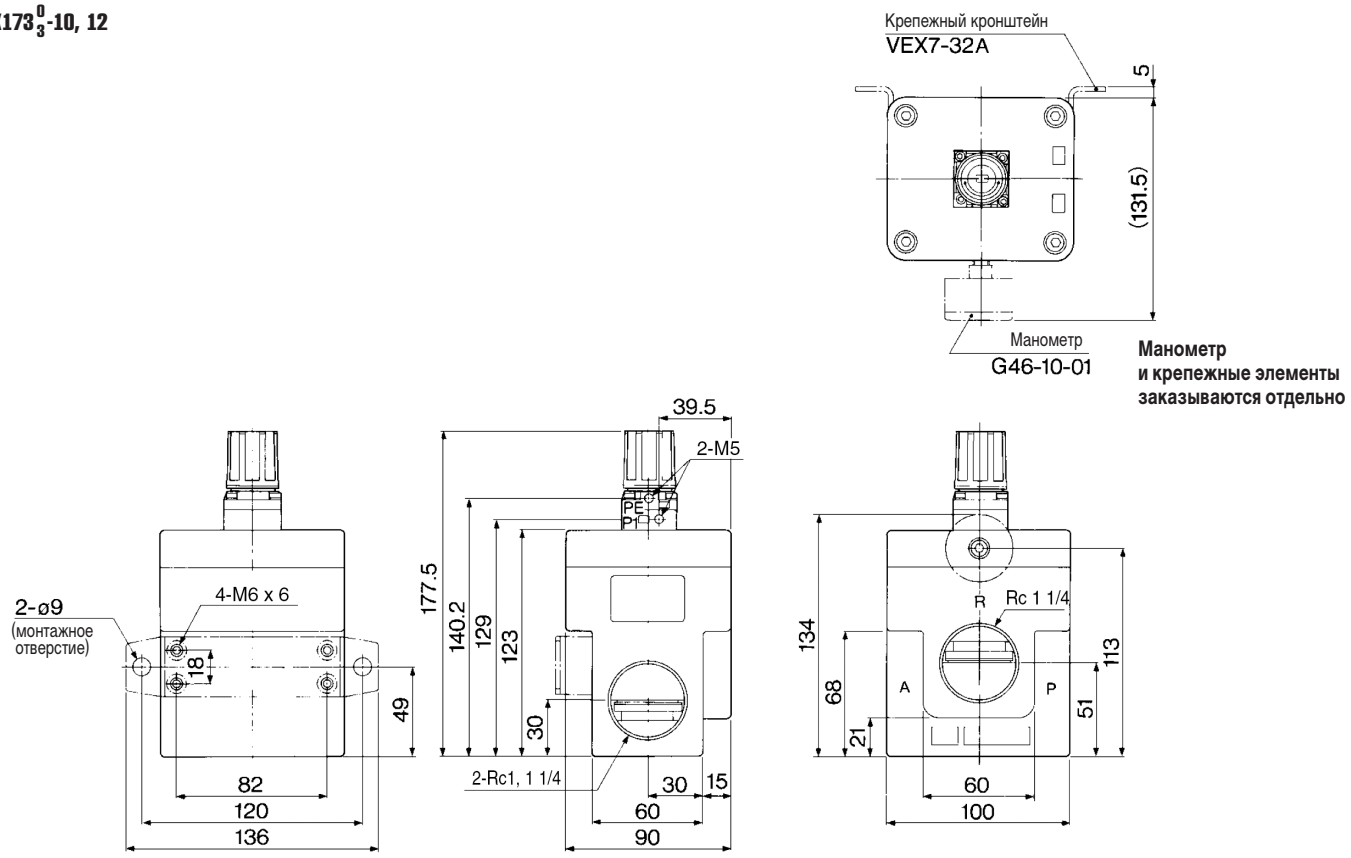
Размеры

VEX153$^{0}_{3}$-04, 06, 10



Манометр и крепежные элементы заказываются отдельно

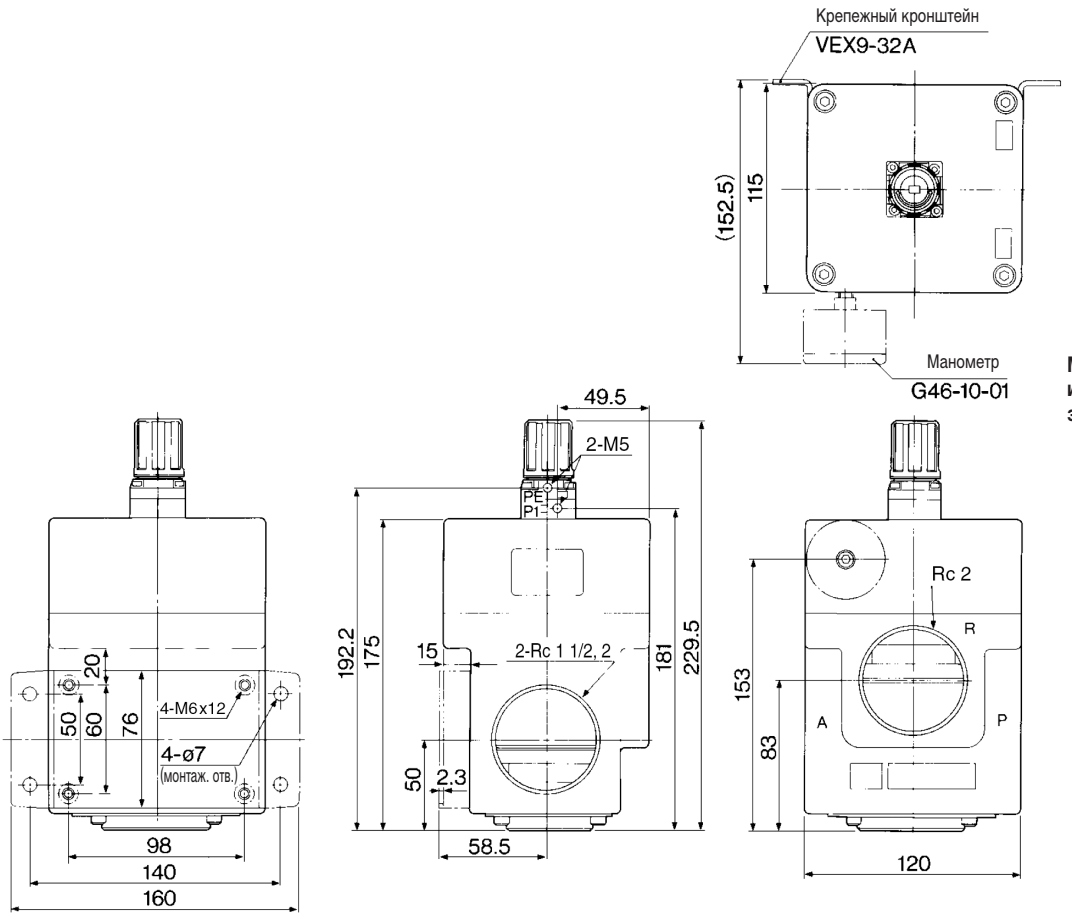
VEX173$^{0}_{3}$-10, 12



Манометр и крепежные элементы заказываются отдельно

Размеры

VEX193$^{D}_{3}$-14, 20



Манометр и крепежные элементы заказываются отдельно

Power Valve: Regulator Valve

Series VEX1

Large capacity relief regulator

Rapid tank internal pressure setting, air blow, constant pressure supply and driving, balance and driving, 2 steps directional control setting and multiple steps pressure control

Air operated

External pilot solenoid

Specifications

Model			VEX110□-01/02	VEX120□-01/02	VEX130□-02/03/04	VEX150□-04/06/10	VEX170□-10/12	VEX190□-14/20
Operation type			Air operated, External pilot solenoid					
Fluid			Air					
Max. operating pressure			1.0 MPa					
Set pressure range	Air operated		0.05 to 0.9 MPa					
	Solenoid		0.05 to 0.7 MPa			0.05 to 0.9 MPa		
Ambient and fluid temp.			0 to 50°C (Air operated: 0 to 60°C) No condensation					
Hysteresis			0.03 MPa					
Repeatability			0.01 MPa					
Sensitivity			0.01 MPa					
Mounting			Free					
Lubrication			Not required (Use turbine oil Class 1 ISO VG32, if lubricated.)					
Port size		Port	01	02	01	02	02	03	04	04	06	10	10	12	14	20
		1(P)	1/8	1/4	1/8	1/4	1/4	3/8	1/2	1/2	3/4	1	1	1 1/4	1 1/2	2
		2(A)											1 1/4		2	
		3(R)														
Weight (kg)	Air operated		0.1		0.2		0.4			1.3			1.9		3.9	
	Solenoid		0.2		0.3		0.5			1.4			2.0		4.0	

Note) Non-lubricated specifications are not available for this product.

Pilot Solenoid Valve Specifications

Model			VEX1101 / 1201 / 1301	VEX1501 / 1701 / 1901
Pilot valve			VK334-□□□	VO307K-□□□1
Electrical entry			Grommet, DIN terminal	Grommet, DIN terminal
Coil rated voltage (V)	AC (50/60Hz)		100 V, 110 V, 200 V, 220 V, 240 V	
	DC		12 V, 24 V	
Allowable voltage			±10% of rated voltage	−15 to +10% of rated voltage
Apparent power	AC	Inrush	9.5 VA/50 Hz, 8 VA/60 Hz	12.7 VA (50 Hz), 10.7 VA (60 Hz)
		Holding	7 VA/50 Hz, 5 VA/60 Hz	7.6 VA (50 Hz), 5.4 VA (60 Hz)
	DC		4 W (Without indicator light), 4.3 W (With indicator light)	4 W (Without indicator light), 4.2 W (With indicator light)
Manual override			Non-locking push type	

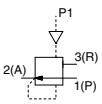
Option

Description		Part no.					
		VEX110□-01/02	VEX120□-01/02	VEX130□-02/03/04	VEX150□-04/06/10	VEX170□-10/12	VEX190□-14/20
Bracket (With bolt and washer)	B	VEX1-18-1A	–	VEX3-32A	VEX5-32A	VEX7-32A	VEX9-32A
	F	VEX1-18-2A	–	–	–	–	–
Pressure gauge Note)	G	G27-10-01		G36-10-01	G46-10-01		

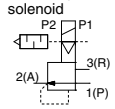
Note) When requiring a gauge different than that mentioned above, specify the model number.
Option is packed with it.
(Refer to Best Pneumatics No. 6.)
Example: VEX1300-03
G36-4-01

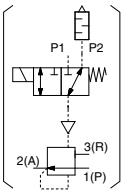
Symbol

Air operated



External pilot solenoid





How to Order

VEX 1 3 0 1 – 03 □ □ D □ – B

Regulator valve

Operation type

0	Air operated
1	External pilot solenoid

Thread type

Nil	Rc
F	G (3)
N	NPT
T	NPTF

Note 3) Not conforming to ISO1179-1.

Rated 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)

* For other rated voltages, please consult with SMC.

Option

Nil	None
B	Bracket
F	Foot (VEX110□ only)
G	Gauge

● When specifying more than one option, combine symbols alphabeticaly.

Light/Surge voltage suppressor (Only with solenoid)

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

Sub-plate and gasket part no.

Sub-plate	**VEX1 – 9 – 1 □ □ P** **Port size**: Symbol **A** 1/8; **B** 1/4 **Thread type**: Symbol **Nil** Rc; **F** G; **N** NPT; **T** NPTF
Base gasket	**VEX1 – 11 – 2**

Body size **Port size** **Electrical entry (Only with solenoid)**

Body size		Port size			Electrical entry (Only with solenoid)	Light/Surge voltage suppressor (Only with solenoid)		
		Port	1(P), 2(A)	3(R)		**Nil**	**S**	**Z**
Body ported	1	**01**	1/8	1/8	**G**: Grommet (300 mm)	●	●	×
		02	1/4	1/4	**H**: Grommet (600 mm)	●	●	×
	3	**02**	1/4	1/4	**D**: DIN terminal	●	●	●
		03	3/8	3/8	**DO**: DIN terminal (Without connector)	●	●	×
		04	1/2	1/2				
	5	**04**	1/2	1/2	**G**: Grommet (300 mm)	●	●	×
		06	3/4	3/4				
		10	1	1				
	7	**10**	1	1 1/4	**H**: Grommet (600 mm)	●	●	×
		12	1 1/4					
	9	**14**	1 1/2	2	**D**: DIN terminal	●	×	●
		20	2					
Base mounted	2	**Nil**	Without sub-plate		**G**: Grommet (300 mm)	●	●	×
		01	1/8	1/8	**H**: Grommet (600 mm)	●	●	×
		02	1/4	1/4	**D**: DIN terminal	●	●	●
					DO: DIN terminal (Without connector)	●	●	×

⚠Caution

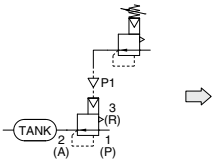
Refer to front matter 53 for Safety Instructions and pages 3 to 8 for 3/4/5 Port Solenoid Valve Precautions.

VEX

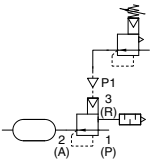
Application Example

1. Relief regulator (Rapid tank internal pressure setting)

(Relieving type regulator e.g. AR2000)



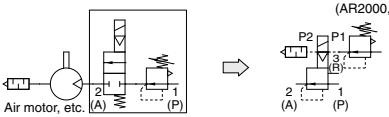
Relieving type diaphragm regulator



- Large exhaust capacity.
- Silencer is easy to connect.

2. Air blow (As 2 port directional control regulator valve)

(AR2000, etc.)



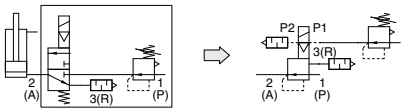
External pilot 2 port solenoid valve (For on/off operation)

Diaphragm regulator (For pressure setting)

- Solenoid on/off operation controls the air flow.
- Setting can be changed by remote control. (Remote control)

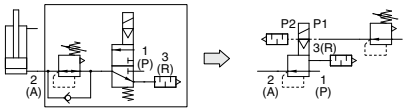
3. Constant pressure supply and driving (As 3 port directional control regulator valve)

Note) The pressure is about 0.01 MPa when OFF because of leakage.



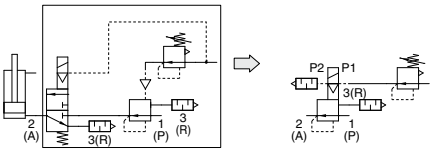
(Solenoid valve) (Regulator)

- Actuator's appropriate pressure control saves energy (Air).



- Actuator driving system becomes simple.

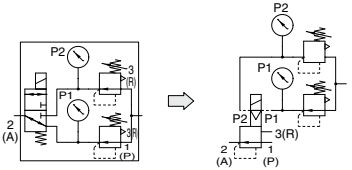
4. Balance and driving



(External pilot solenoid valve) (Relieving type regulator)

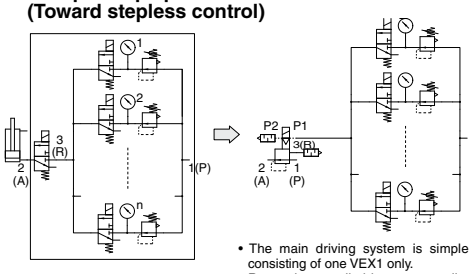
- The large capacity relief valve rapidly responds and sets the balance pressure.
- Solenoid on/off operation drives the cylinder.
- Common exhaust.

5. 2 steps directional control setting

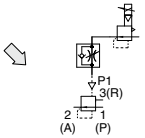


- 3 VALVES IN ONE – A simple main system is ensured.
- Remotely controlled by compact pilot system.

6. Multiple steps pressure control (Toward stepless control)



- The main driving system is simple consisting of one VEX1 only.
- Remotely controlled by compact pilot system.



- Steplessly and remotely controlled by electric signals.
- Flexibile pressure control for welders.

⚠Caution

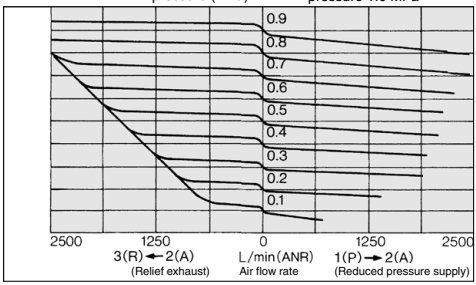
- When the VEX outlet side capacity is small, install a speed controller AS2000, in the pilot pipe to lower the pilot pressure for vibration prevention. (Meter-in)

⚠ Caution ((5) 2 steps directional control setting, (6) multiple steps pressure control setting)

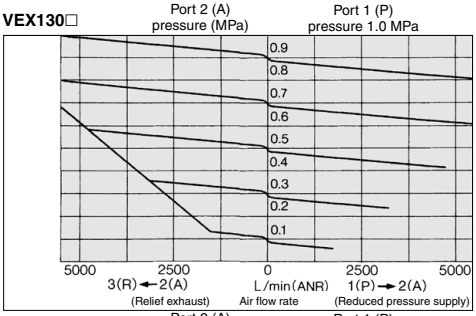
- Relieving type regulator such as AR2000, etc. should be used as pilot regulator in the application.(When the non-relieving type is used, pressure cannot be changed from high to low.)
- A sensitive regulator such as the ARP30, etc. should be used as a pilot regulator on the low pressure side, particularly with 5. 2 steps directional control setting and 6. multipje steps pressure control. (Using a non-sensitive regulator may cause unstable pressure.)

Flow Characteristics

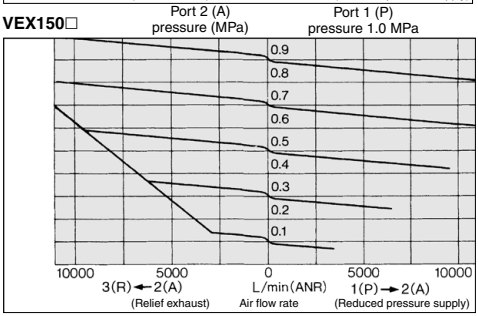
VEX110□ / 120□



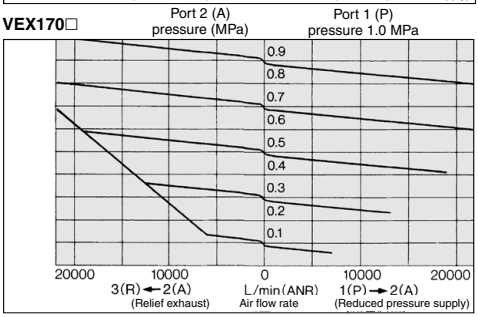
VEX130□



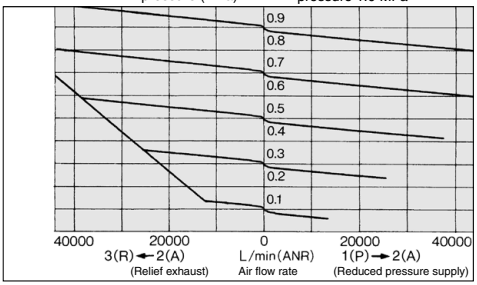
VEX150□



VEX170□

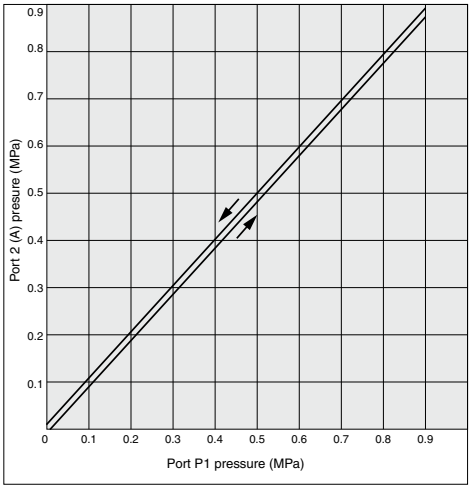


VEX190□



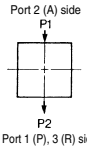
Setting Pressure Characteristics

Port P1 pressure is set according to port 2 (A) pressure.

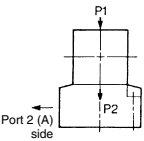


External Pilot Piping

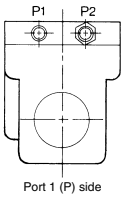
VEX110□



VEX120□



VEX130□ VEX150□ VEX170□ VEX190□



Port	VEX1□00	VEX1□01
P1	External pilot	External pilot
P2	— (1)	Pilot exhaust

Note 1) Port P2 is not compatible with VEX1□00.

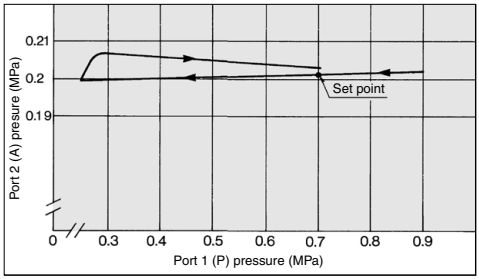
Note 2) A silencer is mounted to port P2 for VEX1 3/5/7/9 01 as a standard. For the 2 steps directional control and multiple steps pressure control setting, use the product after removing a silencer.

VEX

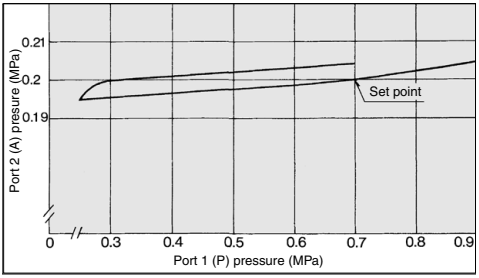
Pressure Characteristics

Shows the outlet pressure (Port 2 (A)) change against the inlet pressure (Port 1(p)) change. They conform to JIS B 8372 (Air pressure regulator).

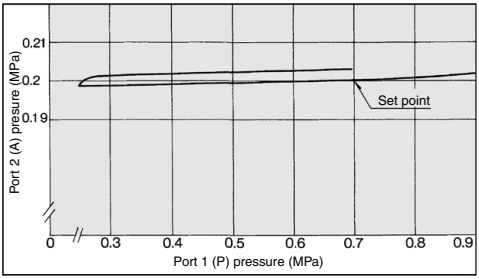
VEX110□ / 120□



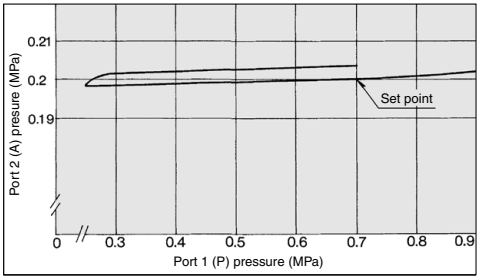
VEX130□



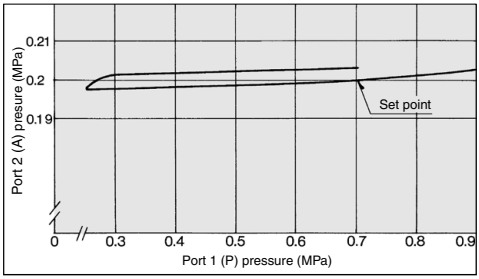
VEX150□



VEX170□

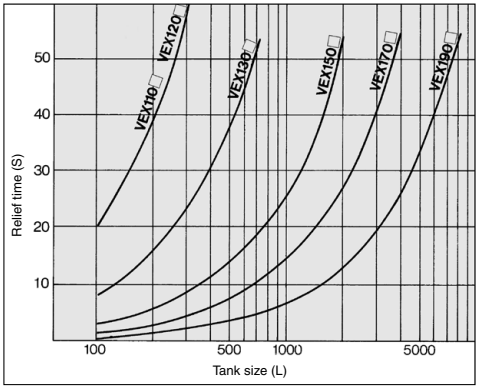


VEX190□

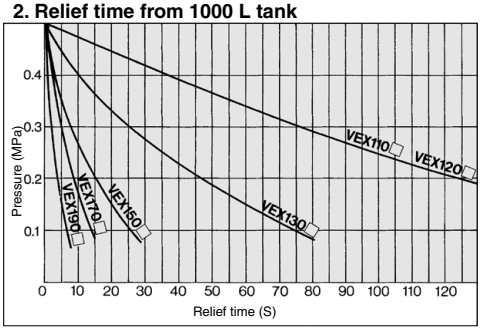


Relief Time

1. Relief time from 0.5 MPa to 0.1 MPa



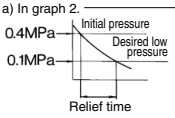
2. Relief time from 1000 L tank



3. Relief time from an arbitrary pressure

[Example] VEX 1500 lowers 2000 L tank from 0.4 MPa to 0.1 MPa:

a) In graph 2.



From above, the relief time is
26 – 3 = 23 s

b) The relief time for the 2000 L tank is found by conversion as shown below.

$$t = \frac{\text{Tank capacity}}{1000} \times \left[\text{Relief time that is read}\right]$$

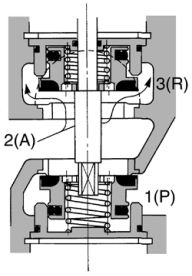
$$= \frac{2000}{1000} \times 23$$

$$= 46$$

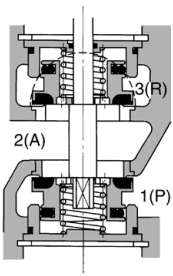
The result is 46 s.

Construction/Working Principle/Component Parts

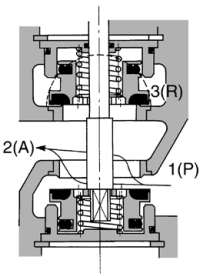
(1) When Port 2 (A) pressure is high
Relief exhausting



(2) Setting pressure condition

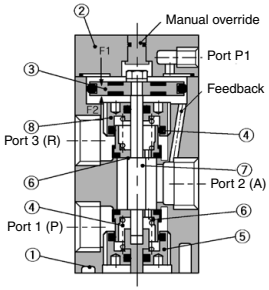


(3) When Port 2 (A) pressure is low
Pressure reducing supply

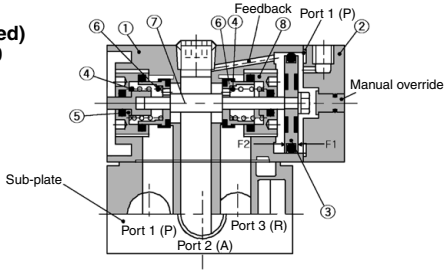


- The balance between the acting force F1 of the pilot pressure (port P1) over the upper surface of the pressure regulating piston ③ and the acting force F2 of the pressure at port 2 (A) leading to a space under the piston through the feed back flow root closes a couple of poppet valves ⑥ and sets port 2 (A) pressure that corresponds to port P1 pressure. The poppet valves are backed up by spring ④- in the pressure balance structure by means of port 2 (A) pressure. (DRW (2))
- When port 2 (A) pressure exceeds port P1 pressure, F2 becomes larger than F1, and the pressure regulating piston moves upward, opening the upper poppet valves. Thus air is released from port 2 (A) to port 3 (R) (DRW (1)). When port 2 (A) pressure lowers enough to restore the balance with port P1 pressurs, the regulator valve returns again to the DRW (2) condition.
- When port 2 (A) pressure is lower than port P1 pressure, F1 becomes larger than F2, and the pressure regulating piston moves downwards, opening the lower poppet valves. Thus air is supplied from port P1 to port 2 (A) (DRW (3)). When port 2 (A) pressure rises enough to restore the balance with port P1 pressure, the regulator valve returns again to the DRW (2) condition.

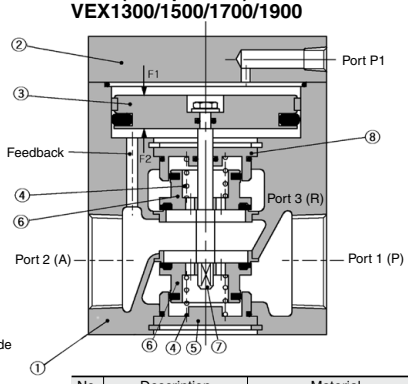
(Air operated)
VEX1100



(Air operated)
VEX1200



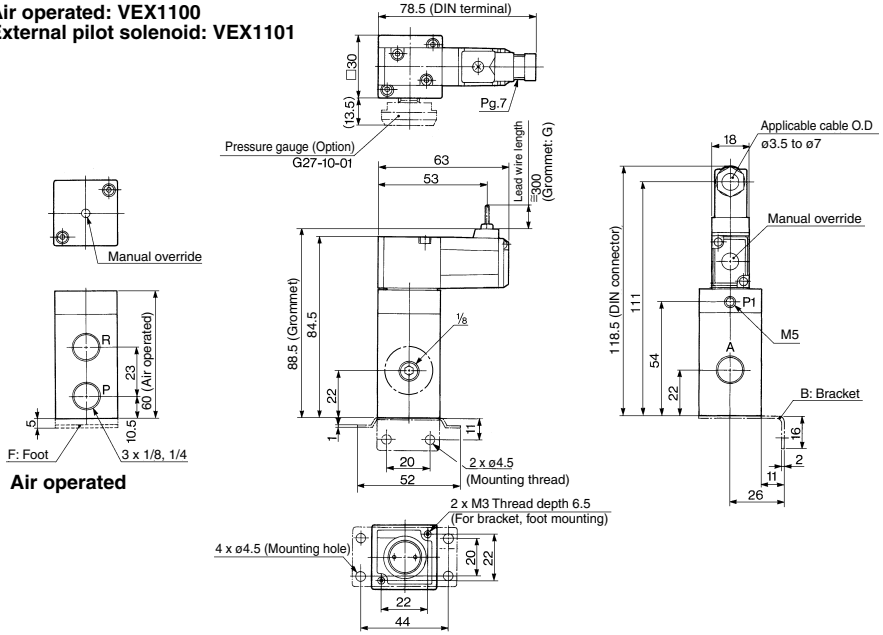
(Air operated)
VEX1300/1500/1700/1900



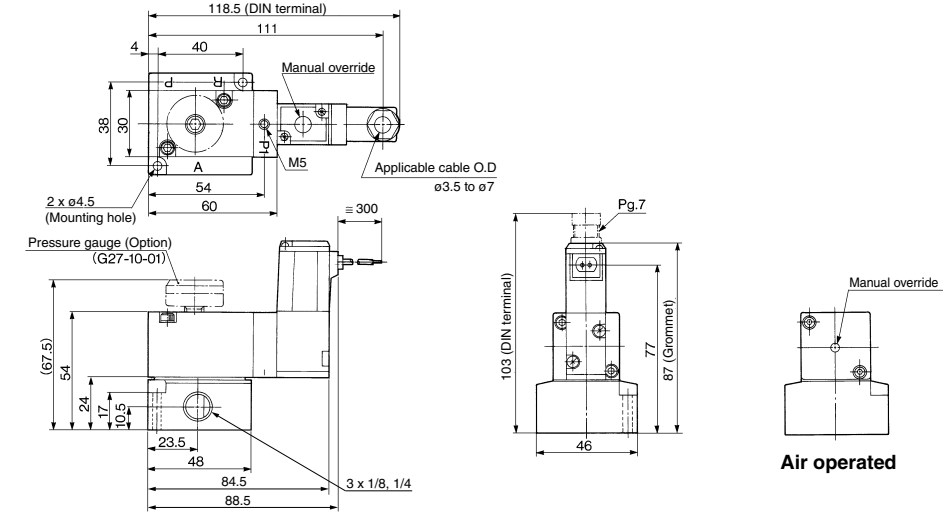
No.	Description	Material
1	**Body**	Aluminum alloy casted
2	**Cover**	Aluminum alloy casted
3	**Regulation piston**	Aluminum alloy
4	**Spring**	Stainless steel
5	**Valve guide**	Aluminum alloy
6	**Poppet valve**	Aluminum alloy, Rubber
7	**Shaft**	Stainless steel
8	**Valve guide**	Aluminum alloy

Dimensions

Air operated: VEX1100
External pilot solenoid: VEX1101



Air operated: VEX1200
External pilot solenoid: VEX1201



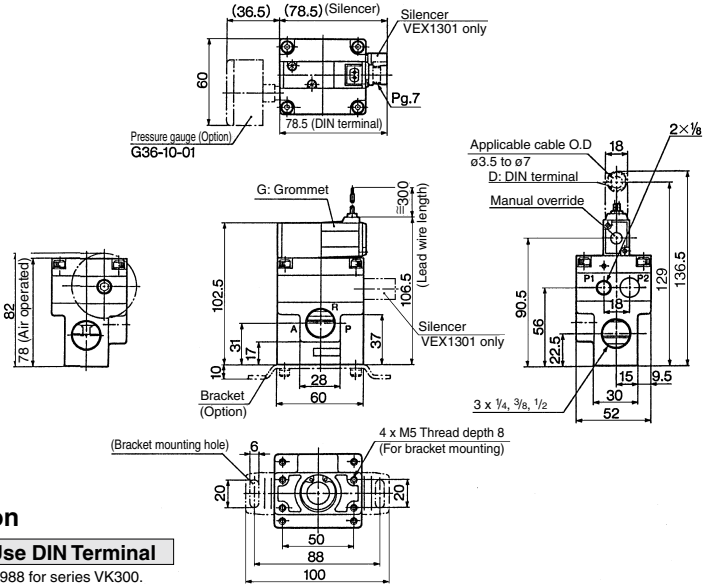
⚠Caution

How to Use DIN Terminal

Refer to page 1988 for series VK300.

Dimensions

Air operated: VEX1300
External pilot solenoid: VEX1301

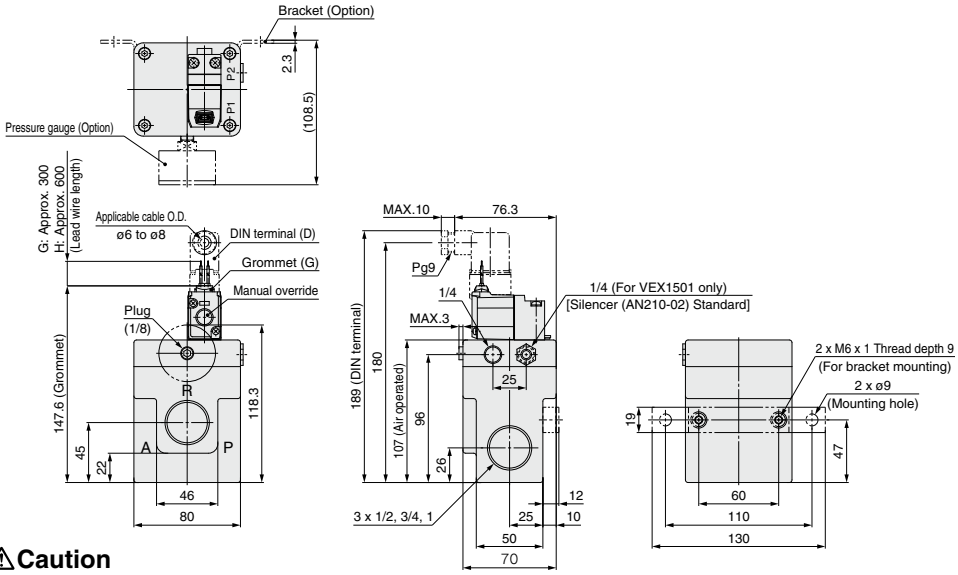


⚠Caution

How to Use DIN Terminal

Refer to page 1988 for series VK300.

Air operated: VEX1500
External pilot solenoid: VEX1501



⚠Caution

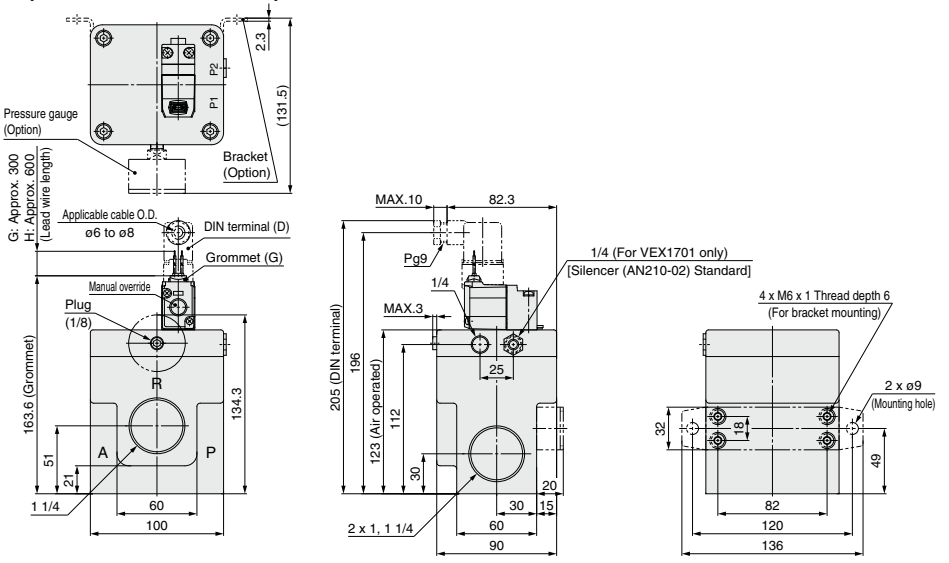
How to Use DIN Terminal

Refer to page 2005 for series VT307.

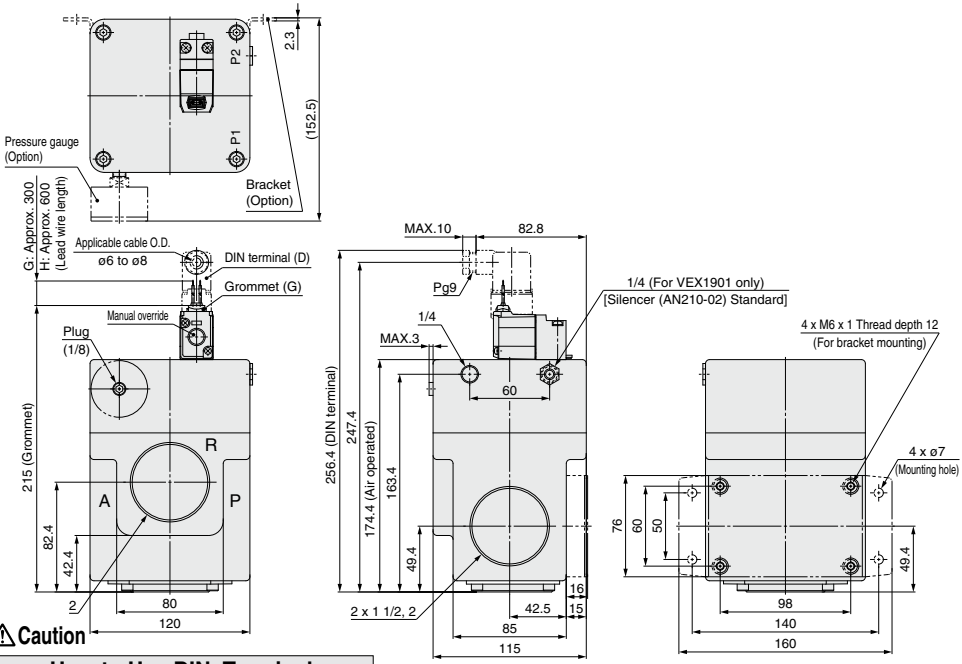
VEX

Dimensions

Air operated: VEX1700 External pilot solenoid: VEX1701



Air operated: VEX1900 External pilot solenoid: VEX1901

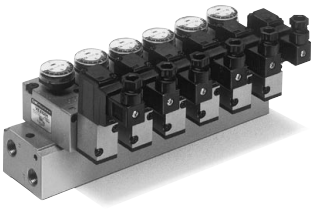


⚠Caution

How to Use DIN Terminal

Refer to page 2005 for series VT307.

Manifold Specifications



Specifications

Valve stations	2 to 8 (1)
Port specifications	Common SUP, EXH
Port size (Port 1 (P), 2 (A), 3 (R))	Rc, NPTF, G, NPT 1/4
Applicable valve	VEX1200/1201 (2)
Applicable blanking plate	VEX1-17 (With gasket and bolts)

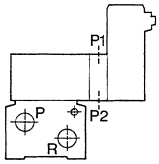
Note 1) If there are more than 5 stations, apply pressure from port 1(P) on both sides and exhaust from port 3 (R) on both sides.

Note 2) VEX1200 (air operated) and VEX1201 (external pilot solenoid) are both individual external pilot type. The port P1 on the valve is used as a pilot port, but not the P1 hole on the manifold base.

External Pilot Piping

Type / Valve port	Air operated	External pilot solenoid valve
Applicable valve	VEX1200	VEX1201
P1	External pilot	External pilot
P2	— Note)	Pilot exhaust

Note) Port P2 is not available for VEX 1200



How to Order

VVEX2 – 1 – 6 – 02 □

Series VEX1 Manifold

Valve stations

2	2 stations
⋮	⋮
8	8 stations

P, A, R port size

02	1/4

Thread type

Nil	Rc
F	G (3)
N	NPT
T	NPTF

Note 3) Not conforming to ISO1179-1.

How to Order Manifold

Specify the part numbers for the regulator valve and blanking plates starting from the left of manifold base (After making the port 2 (A) face the front).

(Ex.) VVEX2-1-5-02N·····1 5 station manifold base, Port thread NPT

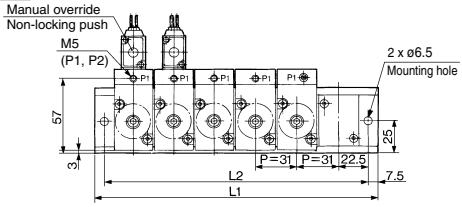
∗ VEX1201-5DZ-G·····4 Regulator valve, External pilot solenoid valve, 24 VDC, DIN terminal, with light/surge voltage suppressor, Option···· with pressure gauge Note)

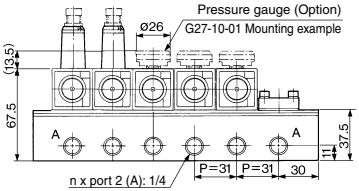
∗ VEX1-17····· 1 Blanking plate

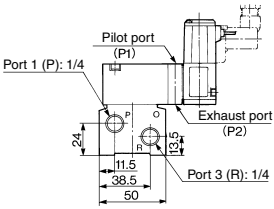
Note) In the case of manifold, pressure gauge: G27-10-01 only (O.D. ø26)

Dimensions

VVEX2-1-1-Station-02







n: Station

L \ n	2	3	4	5	6	7	8	Formula
L1	91	122	153	184	215	246	277	L1 = 31 x n + 29
L2	76	107	138	169	200	231	262	L2 = 31 x n + 14

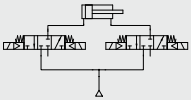
VEX

Power Valve: 3 Position Valve
Series VEX3

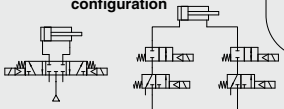
Realize a variety of circuits using simple components.

■ Intermediate and emergency stops of large-sized cylinders

System configuration when using VEX



Conventional system configuration

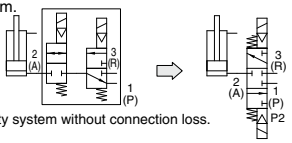


●There were not many suitable large capacity 5 support valves available with a 3 position closed center.

●There were not many suitable 2-port valves for stopping.

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.

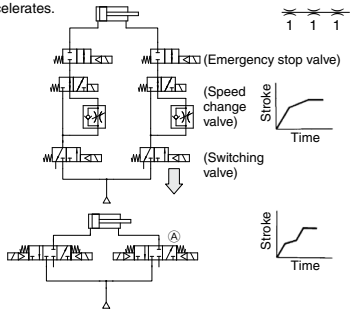
1 1 = 0.71 (Valves and piping can be made smaller.)

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.

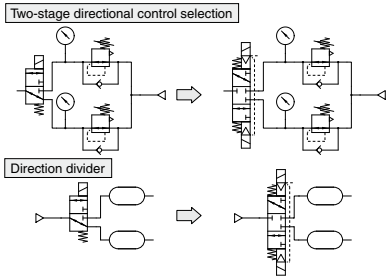
• For example, when solenoid (b) of valve (A) is turned off while the cylinder is extending, the exhaust port closes and cylinder movement decelerates.

1 1 1 = 0.58



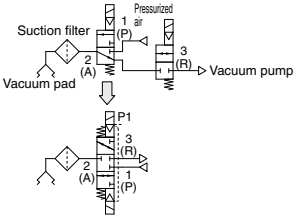
Universal porting could be used as a selector/ divider valve

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.



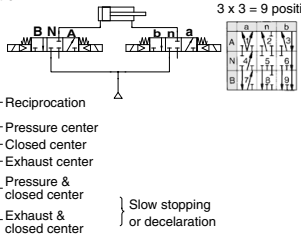
●There is no blow-by when switched from vacuum suction to vacuum release or vice versa.

⚠Caution

●When maintaining the vacuum of port 2 (A), the vacuum may decrease due to leakage from the vacuum pad or piping. Conduct vacuum suction at the vacuum adsorption position. 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.



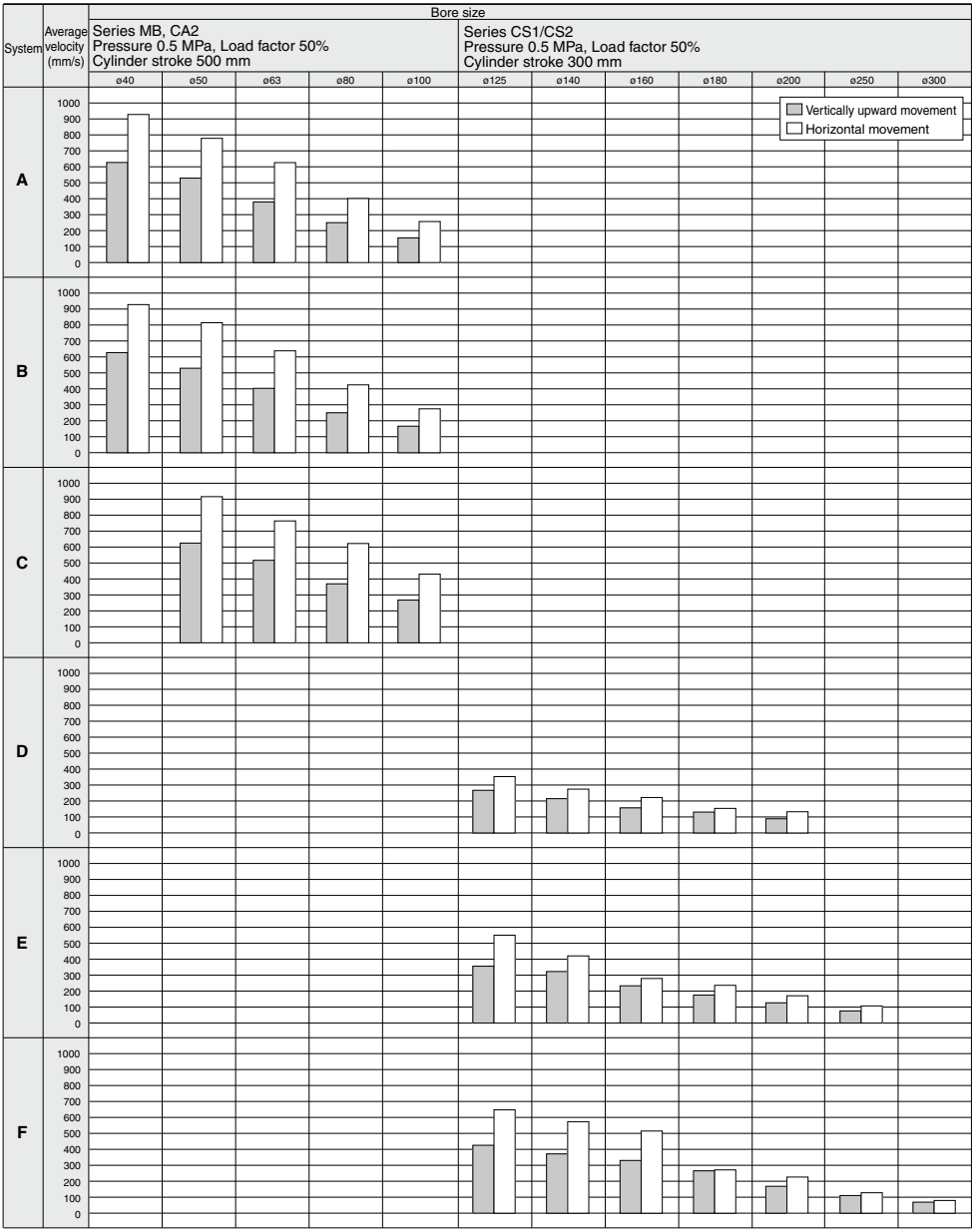
⚠Caution

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

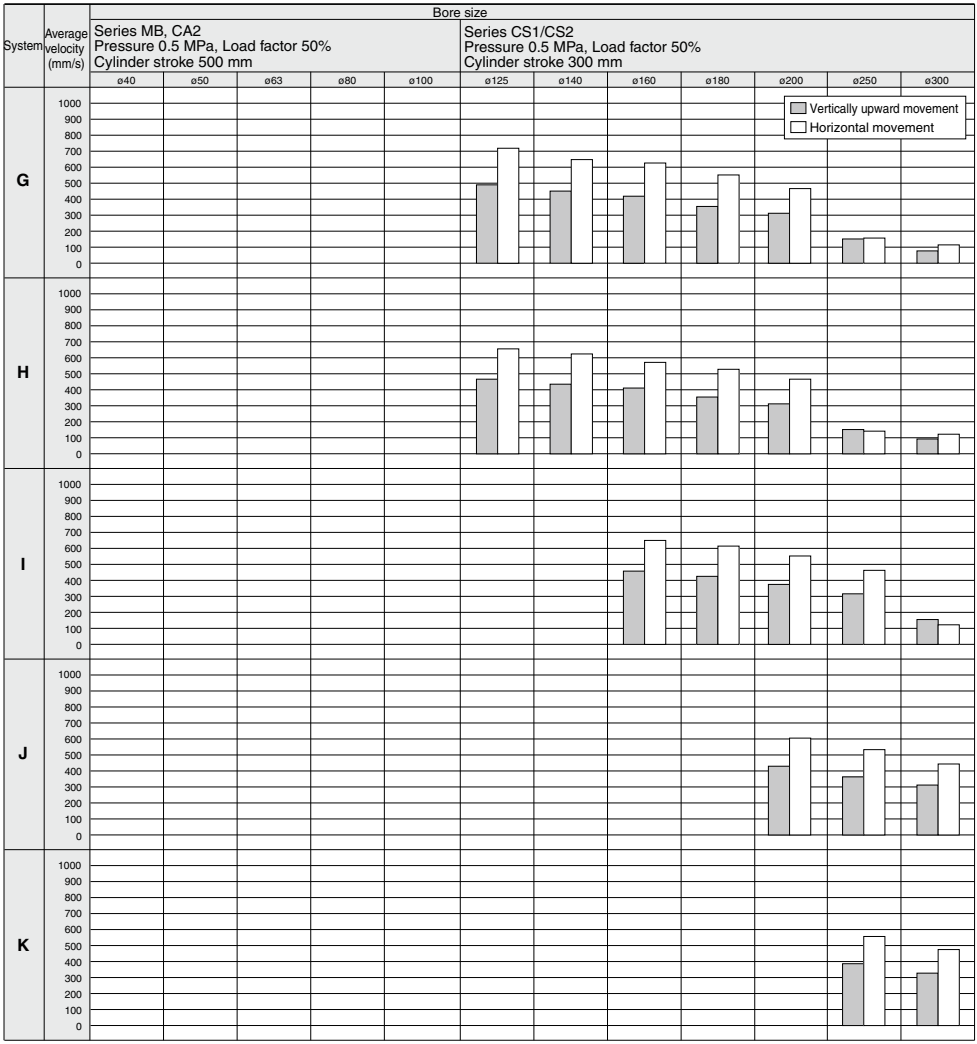
VEX

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 2^{1} 2□-02	AS4000-02	AN20-02	ø10 x 1 m
B				ø12 x 1 m
C	VEX3 3_{4} 2□-03 04	AS420-03	AN30-03	ø12 x 1 m
D		AS420-04	AN40-04	SGP15A x 1 m
E	VEX350□-04 06 10	AS420-04	AN40-04	SGP15A x 1 m
F		AS500-06	AN500-06	SGP20A x 1 m
G		AS600-10	AN600-10	SGP25A x 1 m
H	VEX370□-10 12	AS600-10	AN600-10	SGP25A x 1 m
I		AS800-12	AN700-12	SGP32A x 1 m
J	VEX390□-14 20	AS900-14	AN800-14	SGP40A x 1 m
K		AS900-20	AN900-20	SGP50A x 1 m

VEX

How to Order

Body size • Port size

Body size	Port size		
	Port	1 (P), 2 (A)	3 (R)
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 1/2	2
	20	2	

Electrical entry (Only with solenoid)

Body size	Symbol	Electrical entry (Only with solenoid)	Electrical entry (Only with solenoid)		
			Nil	S	Z
12 • 32	G	Grommet, Lead wire length 300 mm	●	●	×
	H	Grommet, Lead wire length 600 mm	●	●	×
	L	L plug connector, Lead wire length 300 mm	●	●	●
	LN	L plug connector, Without lead wire	●	●	●
	LO	L plug connector, Without connector	●	●	●
	M	M plug connector, Lead wire length 300 mm	●	●	●
	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	●	●	×
	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
(Only bracket or foot may be mounted.)

Nil	None
B	Bracket (1)
F	Foot (VEX312□ and VEX332□ only)
N	Silencer for pilot exhaust (P2) port (Only with solenoid)

Note1) Except VEX322□, VEX332□ and VEX342□

Body size • Port size

Body size	Port size		
	Port	1 (P), 2 (A)	3 (R)
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	

Note 2) Not conforming to ISO1179-1.

Thread type

Nil	Rc
F	G(2)
N	NPT
T	NPTF

Rated 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)

For other rated voltages, please consult with SMC.

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor (Grommet only for a body size of 50 or more)
Z	With light/surge voltage suppressor (Except grommet)

Electrical entry (3) (Only with solenoid)

Symbol	Electrical entry (Only with solenoid)	Electrical entry (Only with solenoid)		
		Nil	S	Z
G	Grommet, Lead wire length 300 mm	●	●	×
H	Grommet, Lead wire length 600 mm	●	●	×
L	L plug connector, Lead wire length 300 mm	●	●	●
LN	L plug connector, Without lead wire	●	●	●
LO	L plug connector, Without connector	●	●	●
M	M plug connector, Lead wire length 300 mm	●	●	●
MN	M plug connector, Without lead wire	●	●	●
MO	M plug connector, Without connector	●	●	●
D	DIN terminal	●	●	●
DO	DIN terminal, Without connector	●	●	×

Note 3) Refer to page 2440 for individual part numbers of plug and DIN connectors. (Common with Series VZ)

Sub-plate and base gasket part no.

Valve size	2	4
Sub-plate	VEX1 – 9 – 1 [ ] [ ] P Port size: A: 1/8; B: 1/4 Thread type: Nil: Rc; F: G; N: NPT; T: NPTF	VEX4 – 2A – [ ] [ ] P Port size: A: 1/8; B: 3/8; C: 1/2 Thread type: Nil: Rc; F: G; N: NPT; T: NPTF
Base gasket	VEX1 – 11 – 2	VEX4 – 4

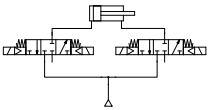
⚠Caution

Refer to front matter 53 for Safety Instructions and pages 3 to 8 for 3/4/5 Port Solenoid Valve Precautions.

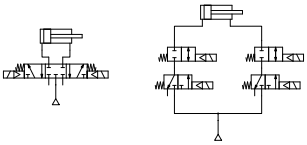
Variety of circuits in simple construction

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

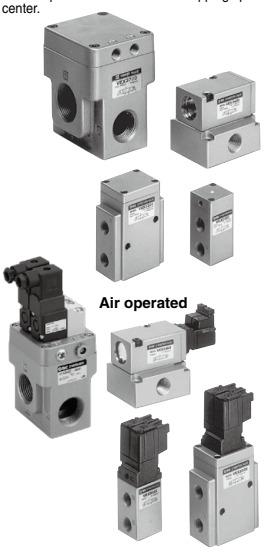
System construction with VEX



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

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				
Pressure range	**Air operated**	Main pressure Low vacuum to 1.0 MPa External pilot pressure 0.2 to 1.0 MPa				
	External pilot solenoid	Main pressure 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	Main pressure 0.2 to 0.7 MPa		Main pressure 0.2 to 0.9 MPa		
Ambient and fluid temperature		0 to 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.)				

Note) Non-lubricated specifications are not available for this product.

Pilot Solenoid Valve Specifications

Model			VEX3121, VEX3221, VEX3321, VEX3421 VEX3122, VEX3222, VEX3322, VEX3422	VEX3501, VEX3701, VEX3901 VEX3502, VEX3702, VEX3902
Pilot valve			Exclusive pilot valve	VO307K-□□□1
Electrical entry			Grommet, L plug connector, M plug connector, DIN terminal	Grommet, Grommet terminal, Conduit terminal, DIN terminal
Coil rated voltage (V)	**AC(50/60Hz)**		100V, 110V, 200V, 220V, 240V	
	DC		6V, 12V, 24V, 48V	
Temperature rise			–15 to +10% of 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 (Without indicator light), 2.1 W (With indicator light)	4 W (Without indicator light), 4.2 W (With indicator light)
Manual override			Non-locking push type	Non-locking push type

Note) When replacing the pilot valves specified for valve sizes 1 to 4, please request SMC to replace them at the factory.

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 port P2 silencer Note)	**N**	AN120-M5				AN210-02		

Note) Only with solenoid.

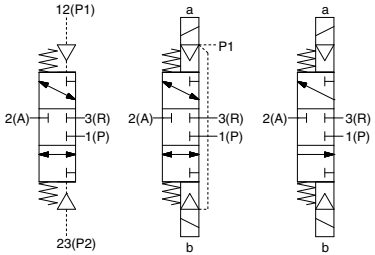
Weight

(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

Internal pilot solenoid/External pilot solenoid

Symbol



Air operated External pilot solenoid Internal pilot solenoid

VEX

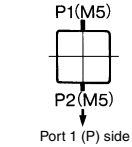
Flow Characteristics

Model		Port size	Flow characteristics											
			1 (P) → 2 (A)			2 (A) → 1 (P)			3 (R) → 2 (A)			2 (A) → 3 (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**	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	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	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	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	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	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**	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	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	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	3/8	12	0.26	3.2	12	0.29	3.2	12	0.28	3.1	13	0.28	3.3
	VEX342□-04	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**	3/4	160	8.9
	VEX350□-10	1	180	10
	VEX370□-10	1	300	17
	VEX370□-12	1 1/4	330	18
	VEX390□-14	1 1/2	590	33
	VEX390□-20	2	670	37

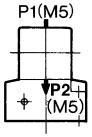
External Pilot Piping

VEX312□

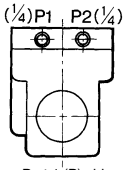


Port 1 (P) side

VEX322□



VEX350□
VEX370□
VEX390□



Port 1 (P) side

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

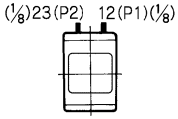
⚠Caution

●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 1/8 pilot port in the sub-plate is plugged. When port P2 on the body Note) is used as a pilot exhaust port, remove the 1/8 plug and put the M5 plug into the pilot valve port P2 to cover it.

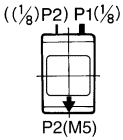
Note) Body for VEX332$^{1}_{2}$, sub-plate for VEX342$^{1}_{2}$

VEX3320
Air operated



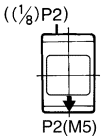
Port 1 (P), 3 (R) side

VEX3321
External pilot solenoid



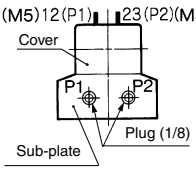
Port 1 (P), 3 (R) side

VEX3322
Internal pilot solenoid

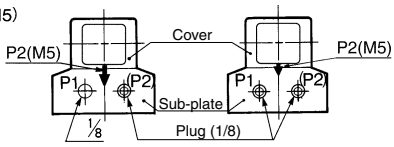


Port 1 (P), 3 (R) side

VEX3420
Air operated for sub-plate



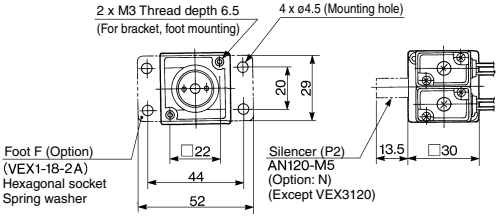
VEX3421
External pilot solenoid for subplate



VEX3422
Internal pilot solenoid for subplate

Body Ported: VEX312□

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



A perspective drawing

DIN terminal (D)

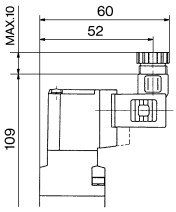
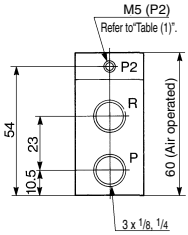
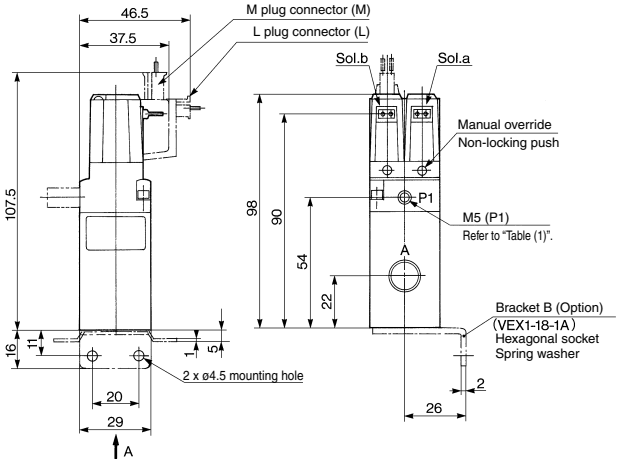


Table (1)
With/Without Plug for M5 Port

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



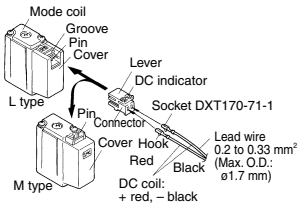


⚠Caution

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

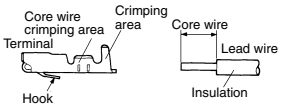
Attaching/Detaching of a plug

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.



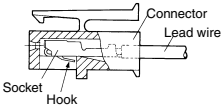
Crimping lead wire and socket

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. (Please contact SMC for the dedicated crimping tools.)



Attaching/Detaching of a socket with lead wire

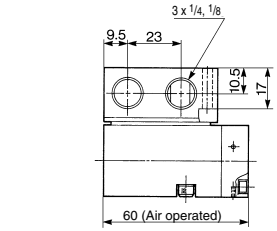
1. **Attaching**
   Insert a socket into the square hole (indicated at +, –) of connector, push fully the lead wire and lock by hanging the hook of a socket to the seat of connector. (Pushing in can open the hook and lock it automatically.) Then confirm the locking by lightly pulling on the lead wire.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



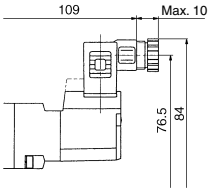
VEX

Base Mounted: VEX322□

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



DIN terminal (D)



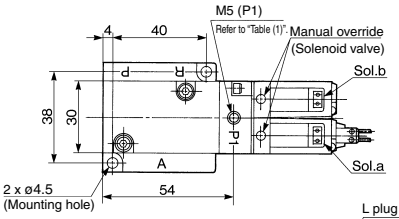
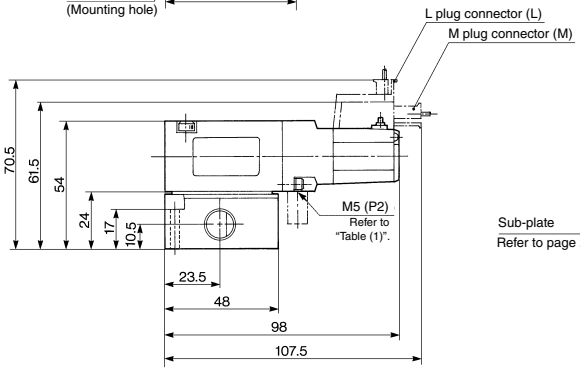
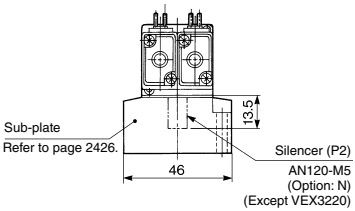


Table (1)
With/Without Plug for M5 Port

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





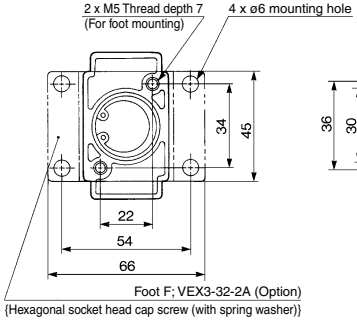
⚠Caution

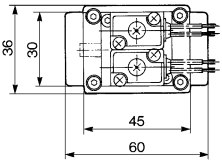
How to Use DIN Terminal

Refer to page 2440.

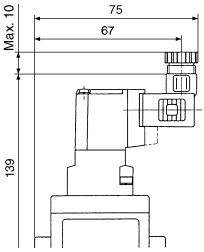
Body Ported: VEX332□

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





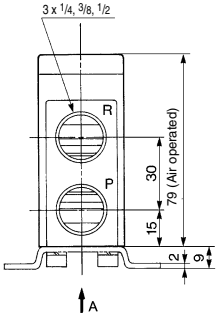
DIN terminal (D)

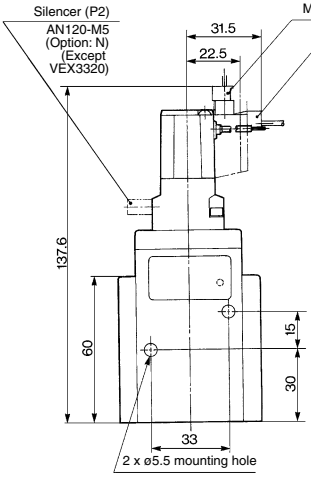


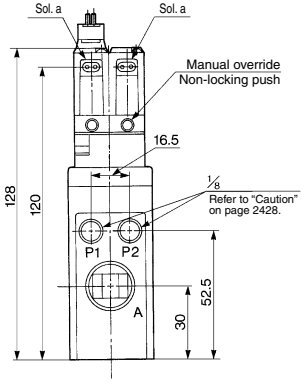
A perspective drawing

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

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

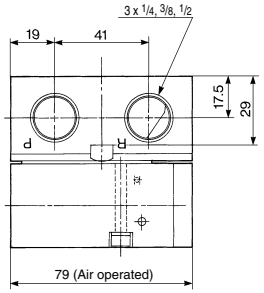




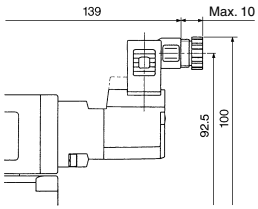


Base Mounted: VEX342□

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



DIN terminal (D)



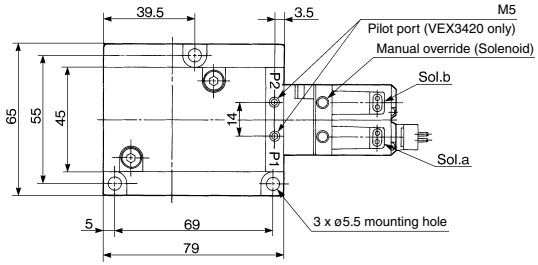
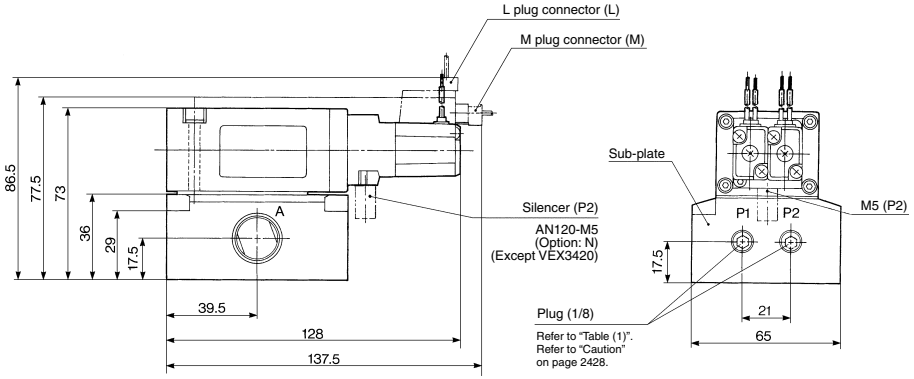


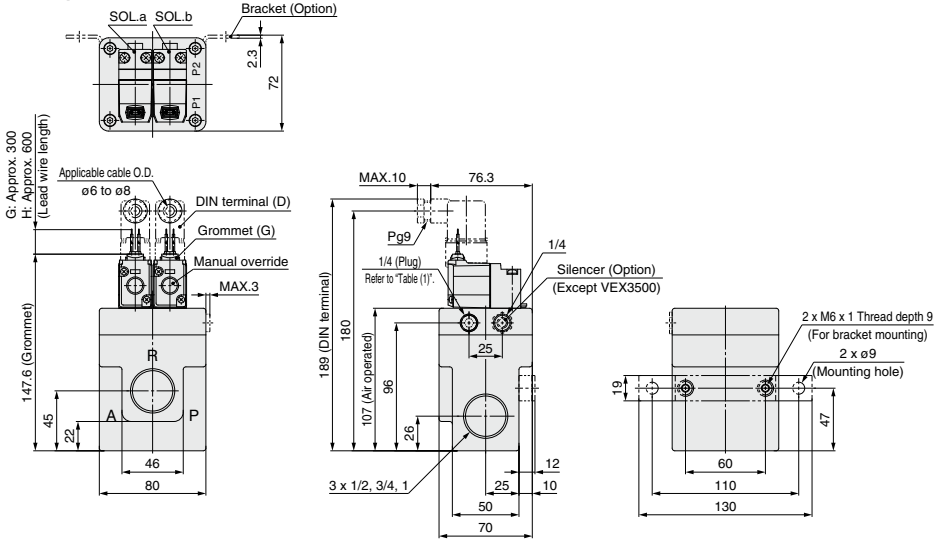
Table (1)
With/Without Plug for Sub-plate

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



Body Ported: VEX350□/370□

Air operated: VEX3500
External pilot solenoid: VEX3501
Internal pilot solenoid: VEX3502



Air operated: VEX3700
External pilot solenoid: VEX3701
Internal pilot solenoid: VEX3702

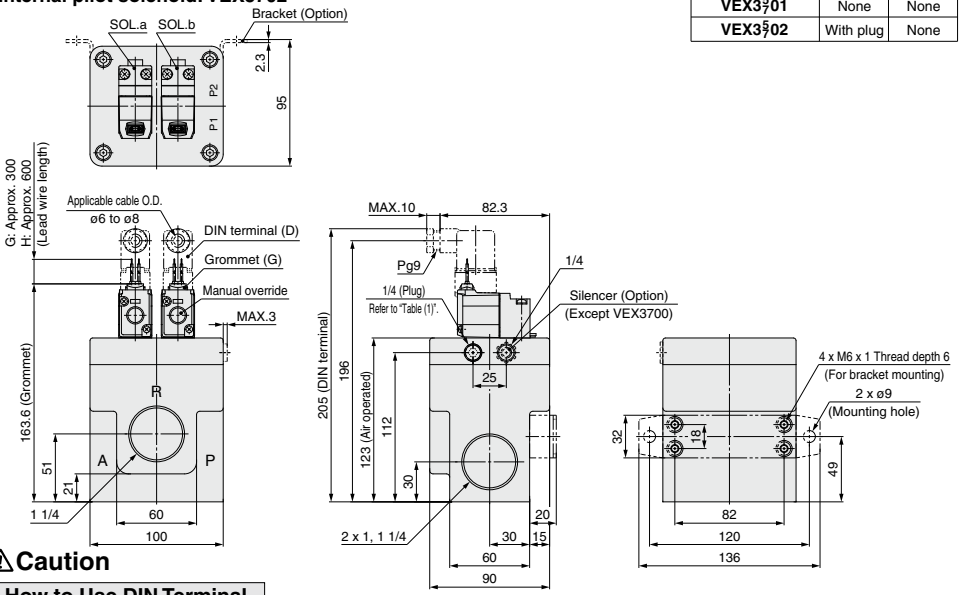


Table (1) With/Without Plug for 1/4 Port

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

⚠Caution

How to Use DIN Terminal

Refer to page 2005 for series VT307.

Base Mounted: VEX390□

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

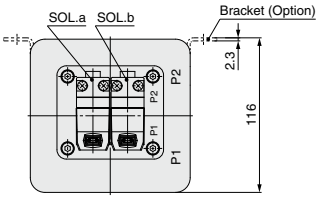
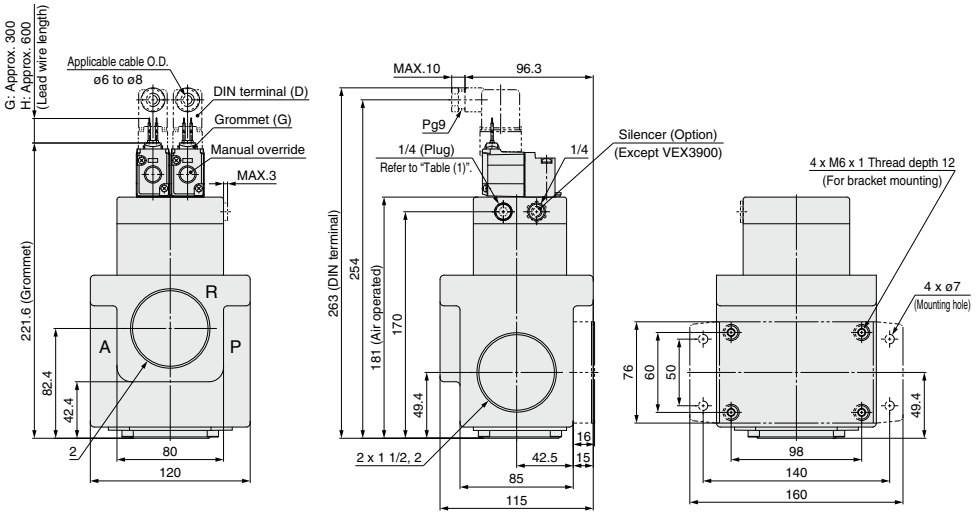


Table (1)
With/Without Plug for 1/4 Port

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



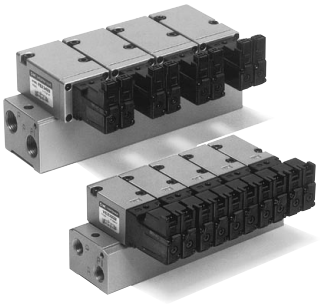
⚠Caution

How to Use DIN Terminal

Refer to page 2005 for series VT307.

Series VEX3
Manifold Specifications

Manifold: Series VVEX



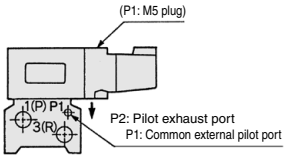
Specifications

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

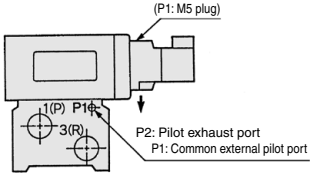
Note) When series VVEX2 is used with more than 5 stations, or Series VVEX4 is used with more than 4 stations, apply pressure to the port 1 (P) on both sides and exhaust from the port 3 (R) on both sides.

Common External Pilot Piping

VVEX2-2



VVEX4-2



How to Order Manifold Base

VVEX 2− 1 − 6 − 02 □

Thread type

Nil	Rc
N	NPT
F	G
T	FNPT

Body size **Pilot type** **Valve stations** **Port size**

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

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

Example for 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 port 2 (A) 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. }

VEX3 manifold (Size 2, 4) Pilot type

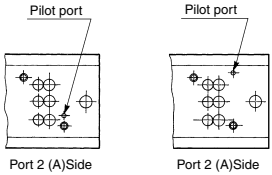
Manifold pilot type	Manifold part no.	Applicable valve part no.	Operating pressure range	Pilot pressure range
Air operated type	VVEX□-□-□-□	VEX3220/VEX3420	Low vacuum to 1.0 MPa	0.2 to 1.0 MPa
Internal pilot type	VVEX□-1-□-□	VEX3222/VEX3422	0.2 to 0.7 MPa	—
Common external pilot type	VVEX□-2-□-□	VEX3222/VEX3421/VEX3422	Low vacuum to 1.0 MPa	0.2 to 0.7 MPa
Individual external pilot type	VVEX□-□-□-□	VEX3221		

Note) If external pilot types are used, the common external pilot type is recommended.

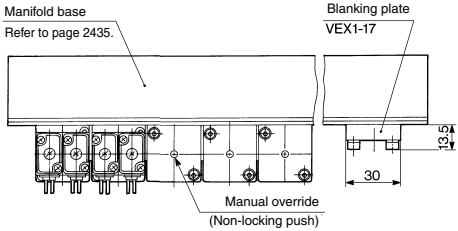
Manifold: VVEX2-□

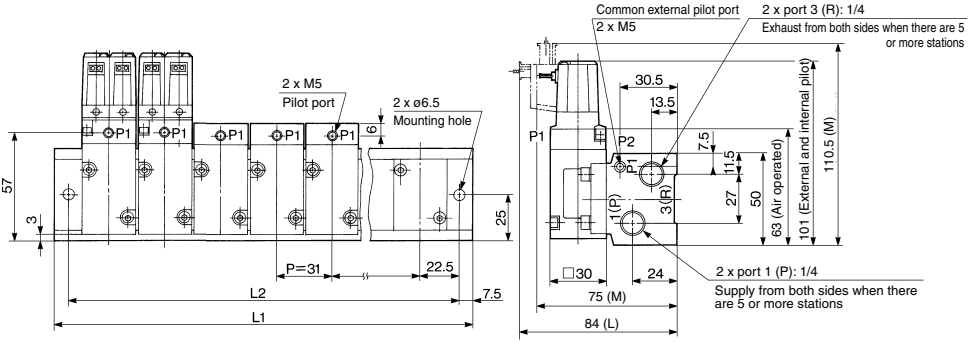
VVEX2-$\frac{1}{2}$ Applicable valve: VEX3220/3222

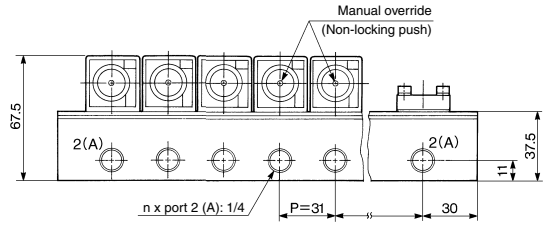
Valve mounting side



Internal pilot type **Common external pilot**







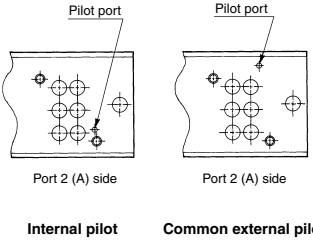
L Dimension Formula $L_1 = 31n + 29$, $L_2 = 31n + 14$ n: Station

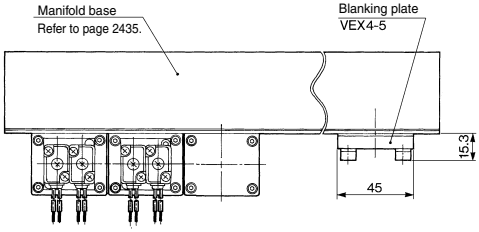
L \ n	2	3	4	5	6	7	8
L1	91	122	153	184	215	246	277
L2	76	107	138	169	200	231	262

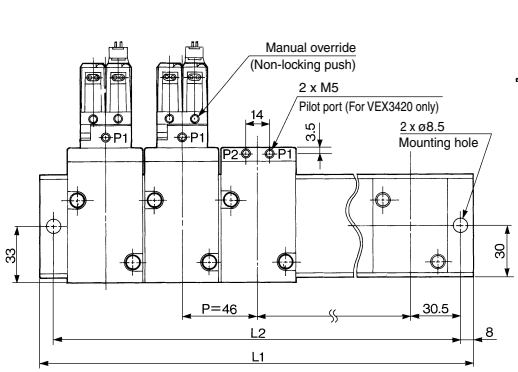
Manifold: VVEX4-□

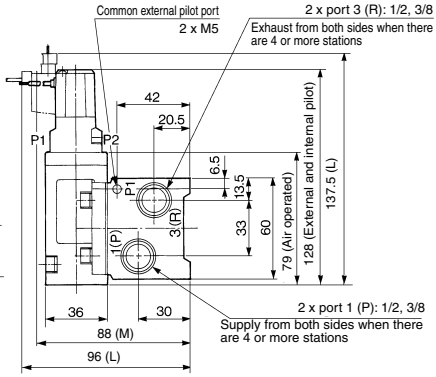
VVEX4-1 Applicable valve: VEX3420/3422
VVEX4-2 Applicable valve: VEX3420/3422

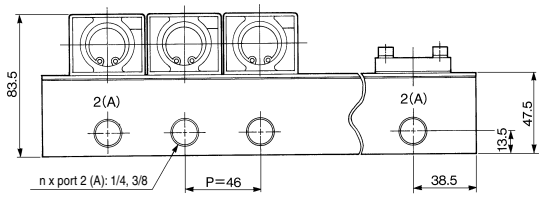
Valve mounting side









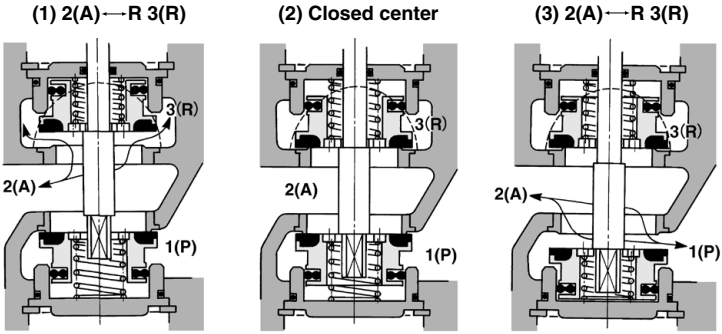


L Dimension $L_1 = 46n + 31$, $L_2 = 46n + 15$ n: Station

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

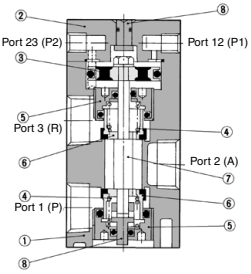
VEX

Construction/Working Principle/Component Parts

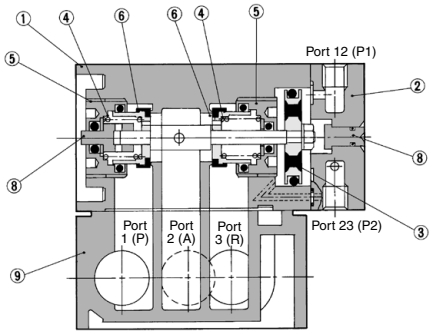


- This is a 3 port switch valve in which the shaft ⑦ - extending from the driving piston ③ opens/closes a pair of poppet valves ⑥. The poppet valve has a pressure balancing mechanism in which port 2 (A) pressure is constantly applied from the back and the center spring ④ is acting as a backup.
- When neither the pilot solenoid valve "a" nor "b" are energized (or when air is exhausted both from the port 12 (P1) and 23 (P2) of the air operated type), no force will act on the working piston, and the spring closes the poppet valve, thus the valve assumes the closed center position (DRW (2)).
- When the pilot solenoid valve "a" is energized (or when pressurized air enters through the port 12 (P1) of the air operated type), pilot air that enters the space above the working piston pushes down the piston and opens the lower poppet valve, thus connecting the port 1 (P) and port 2 (A) (DRW (3)). The upper poppet valve continues to close the port 3 (R) by means of pressure balance and the spring.
- When the pilot solenoid valve "b" is energized (or when pressurized air enters through the port 23 (P2) of the air operated type), the pilot air that enters the space under the working piston pushes the piston upward and opens the upper poppet valve, thus connecting the port 2 (A) and port 3 (R) (DRW (1)). The lower poppet valve continues to close the port 1 (P) by means of pressure balance and the spring.

VEX3120 (Air operated)



VEX3220 (Air operated)

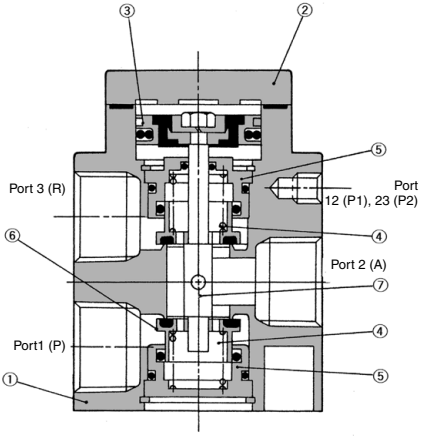


Component Parts

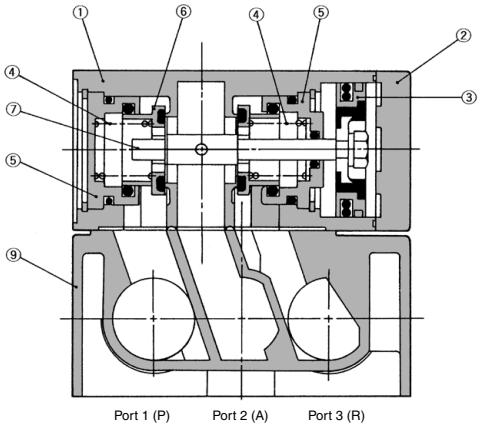
No.	Description	Material
1	**Body**	Aluminum alloy
2	**Cover**	Aluminum alloy
3	**Working piston**	Aluminum alloy
4	**Center spring**	Stainless steel
5	**Valve guide**	Aluminum alloy
6	**Poppet valve**	Aluminum alloy, Rubber
7	**Shaft**	Stainless steel
8	**Manual override**	POM
9	**Sub-plate**	Aluminum alloy

Construction/Working Principle/Component Parts

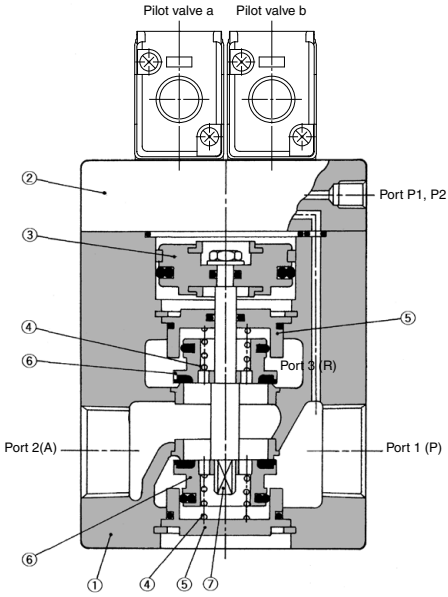
VEX3320 (Air operated)



VEX3420 (Air operated)



VEX350□/370□/390□ (Solenoid)



VEX

Series VEX3
Specific Product Precautions

Be sure to read before handling.
Refer to front matter 53 for Safety Instructions.

Connectors for Series VEX3 Body Sizes 12, 22, 32 and 42 (For connectors for body sizes 50, 70, and 90, refer to series VT307.)

Plug Connector Lead Wire Length

⚠ Caution

The standard length of a plug connector with lead wire is 300 mm, but the following lengths are also available.

How to Order Connector Assembly

DXT170 − 80 − □ A − □

Lead wire colors

Symbol	Lead wire with socket	Note
Nil	Socket only (2 pcs.)	Without lead wire
1	Blue (2 pcs.)	For 100 VAC
2	Red (2 pcs.)	For 200 VAC
3	Gray (2 pcs.)	For other VAC
4	Red: +, Black: −	For DC

Lead wire length

Symbol	Lead wire length (L mm)
Nil	300
6	600
10	1000
15	1500
20	2000
25	2500
30	3000

How to Order

Specify the connector assembly part number together with the part number for the plug connector's solenoid valve without connector.
Note) The solenoid valve and the connector assembly are shipped separately.

Connector Assembly with Cover

⚠ Caution

Connector assembly with protective cover enhances dust protection.
- Effective to prevent short circuit accidents due to penetration of foreign matter into the connector part.
- Cover material adopts the chloroprene rubber which is excellent in weather ability and electric insulation properties. However, use caution not to splash cutting oil, etc. onto it.
- Simple and unencumbered appearance by adopting a round-shaped cord.

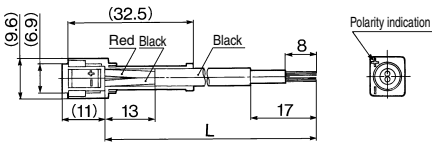
How to Order

DXT170 − 123 − A − □

Lead wire length

Symbol	Lead wire length (L mm)
Nil	300
6	600
10	1000
15	1500
20	2000
25	2500
30	3000

Connector assembly with cover: Dimensions



How to Use DIN Connector

⚠ Caution

Wiring
1) Loosen the set screws and pull out connector from the terminal block of solenoid valve.
2) Pull out screws and insert a screwdriver to the slit area near the bottom of terminal block to separate the terminal block and housing.
3) Loosen the terminal screws (slotted screws) on the terminal block, insert the core of the lead wire into the terminal in accordance with the wiring method, and secure with the terminal screws.
4) Tighten the ground nut to secure the cord.

Change of electrical entry

After separating the terminal block and housing, the cord entry direction can be changed by attaching the housing in the desired direction (4 directions in 90° increments).

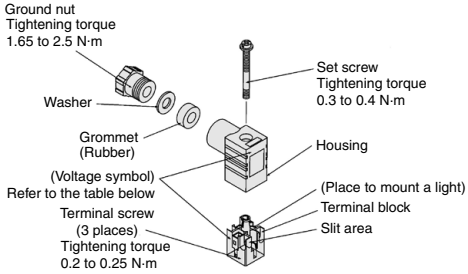
* When equipped with light, avoid damaging the light with lead wire.

Caution

Plug a connector in or out vertically, never at an angle.

Applicable cables

Cord O.D.: ø3.5 to ø7
(Reference) 0.5 mm² 2-core and 3-core wires equivalent to JIS C 3306.



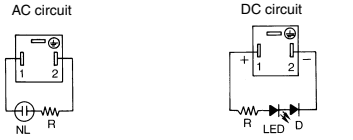
DIN connector part no.

Without light	DXT170-176-1

With Light

Rated voltage	Voltage symbol	Part no.
100 VAC	100 V	DXT170-176-2-01
200 VAC	200 V	DXT170-176-2-02
110 VAC	110 V	DXT170-176-2-03
220 VAC	220 V	DXT170-176-2-04
240 VAC	240 V	DXT170-176-2-07
6 VDC	6 VD	DXT170-176-3-51
12 VDC	12 VD	DXT170-176-3-06
24 VDC	24 VD	DXT170-176-3-05
48 VDC	48 VD	DXT170-176-3-53

Connector with light circuit



NL: Neon light
R: Resistor

D: Protective diode
LED: LED diode
R: Resistor

Power Valve: Economy Valve
Series VEX5

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

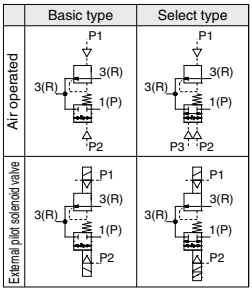
The conventional valve combination circuit has been condensed into a single valve.

A large capacity and economical system.

This valve provides twice the system capacity of the conventional circuit. Therefore, it is possible to downsize 1 or 2 sizes (for example, a conventional 32A circuit can be changed to a 25A or a 20A). It is economical, as its performance cost (system price/effective area) is one half of the conventional type. (Comparison based on SMC data.)

Basic type

Select type



Note) With this valve, the port 3(R) is a supply port and port 1(P) is an exhaust port.

Standard Specifications

Model			VEX55□□-$^{04}_{06}$$^{}_{10}$			VEX57□□-$^{10}_{12}$		VEX59□□-$^{14}_{20}$	
Operation type			Air operated, External pilot solenoid						
Fluid			Air						
Pressure range			0 to 1.0 MPa						
Set pressure range			0.05 to 0.9 MPa						
Ambient and fluid temperature			Max. 50°C (Air operated 60°C)						
Pilot pressure			P1: 0.05 to 0.9 MPa P2: 0.2 to 0.9 MPa (Air operated: P2, P3: 0.2 to 0.9 MPa P2 ≤ P3)						
Repeatability			0.01 MPa						
Sensitivity			0.01 MPa						
Response time			60 ms or less						
Max. operating frequency			3 cycles/sec.						
Number of needle rotations			6 turns			8 turns			
Mounting			Free						
Lubrication			Not required (Use turbine oil Class 1 ISO VG32, if lubricated.)						
Port size		Port	04	06	10	10	12	14	20
		1 (P)	½	¾	1	1	1¼	1¼	2
		2 (A)				1¼		2	
		3 (R)							
Effective area		mm²	130	160	180	300	330	590	670
		Cv	7.2	8.9	10	17	18	33	37
Weight (kg)	Air operated	Basic type	2.0			3.2		4.7	
		Select type	2.3			3.5		5.0	
	Solenoid	Basic type	2.2			3.5		4.9	
		Select type	2.6			3.8		5.3	

Note) Non-lubricated specifications are not available for this product.

Pilot Solenoid Valve Specifications

Model			VEX5511/5711/5911/5501/5701/5901
Pilot valve			SF4-□□□-20
Electrical entry			Grommet (G), Grommet terminal (E), Conduit terminal (T), DIN terminal (D)
Coil rated voltage (V)	AC (50/60Hz)		100 V, 200 V, Other (Option)
	DC		24 V, Other (Option)
Allowable voltage			–15 to +10% of rated voltage
Apparent power	AC	Inrush	5.6 VA (50Hz), 5.0 VA (60Hz)
		Holding	3.4 VA (50Hz), 2.3 VA (60Hz)
Power consumption	DC		1.8 W (Without indicator light), 2 W (With indicator light)
Manual override			Non-locking push type

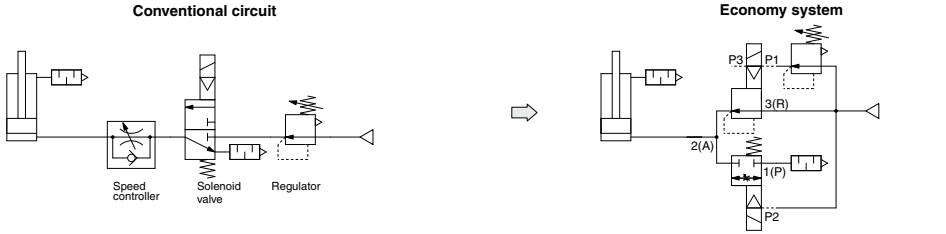
Accessory/Part No.

Description \ Model	Part no. VEX55□□-$^{04}_{06}$$^{}_{10}$	VEX57□□-$^{10}_{12}$	VEX59□□-$^{14}_{20}$
Bracket (With bolt and washer)	VEX5-32A	VEX7-32A	VEX9-32A
Pressure gauge	G46-10-01		

VEX

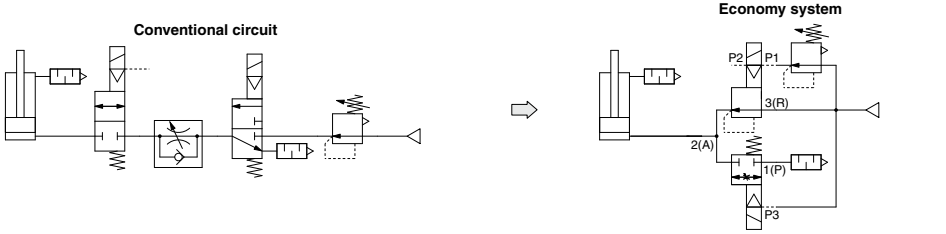
Applicable System/Example of Single Acting Circuit (The valves can be used also for double acting circuits, too. Please consult with SMC for details.)

1. Speed control

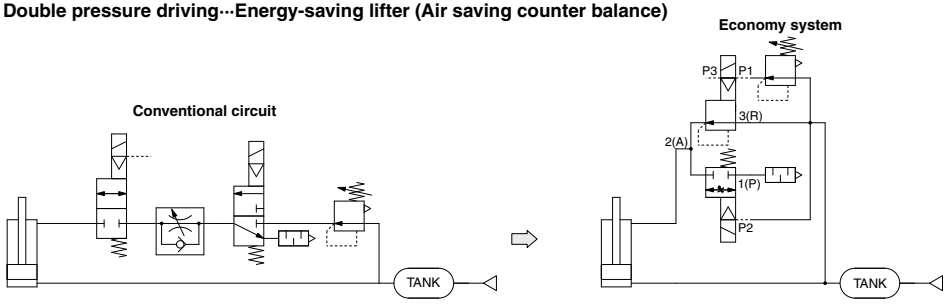


- Ascending speed is controlled by a pilot regulator.
- Descending speed is controlled by needle setting.

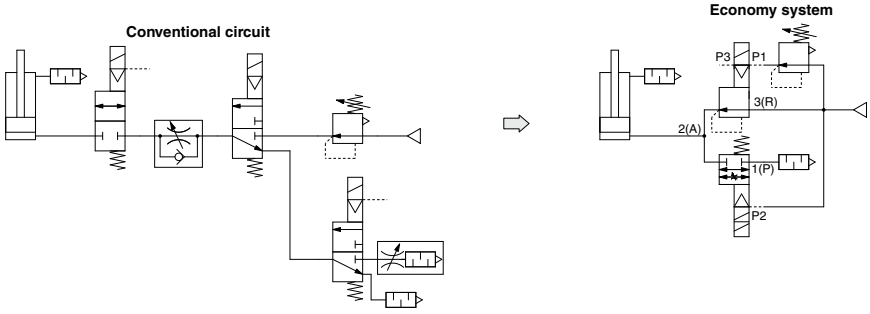
2. Intermediate (emergency) stop



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



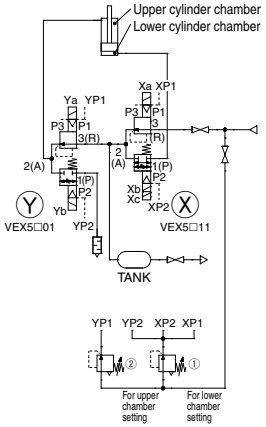
4. Two speed driving



Energy-saving Lifter

- **Simple**
  Two economy valves and a tank move the double-acting cylinder to raise and lower heavy objects.
- **Energy-saving**
  The balancing air reciprocates between the lower cylinder chamber and the tank, thus not being consumed. Low pressure air alone is exhausted from the upper chamber in every cycle, so the air consumption is reduced to 20 to 30% of the air consumption by the double acting cylinder with an ordinary change over valve.
- **Excellent operation control**
  The economy valve sets pressure and permits high speed and low speed operation as well as suspension of operation. While the piston moves up and down, the valve controls speed change in the middle of strokes, terminal deceleration, inching, and emergency stops.
- **Simple operation**
  The pilot system is composed of a small regulator and solenoid valve (which is unnecessary for solenoid style), remote controls the economy valve. Therefore, change in the pilot system sequence allows selection of a cylinder operation mode. Change in the large capacity main piping system is not necessary.

<System configuration and operation of circuit in which external pilot solenoid is used>



The two economy valves (hereinafter called VEX) Ⓧ and Ⓨ and a tank composes a main system that drives the double acting cylinder, and the small regulator (hereinafter called REG) and pilot valve (hereinafter called SOL) remote control the economy valve.

Action

Cylinder \ SOL		Xa	Xb	Xc	Yb	Ya	Mode
Upward	High speed	ON ●	●	OFF –	●	–	a
	Low speed	●	●	●	●	–	b
Downward	High speed	–	●	–	–	●	c
	Low speed	–	●	●	–	●	d
Stop		–	–	–	–	–	e

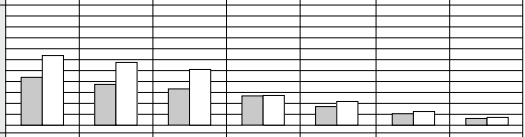
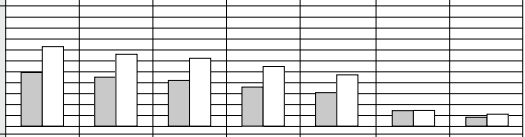
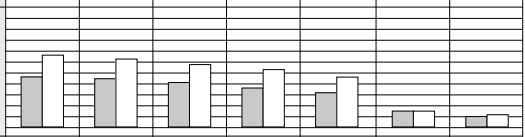
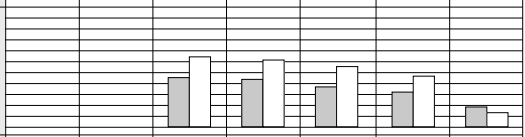
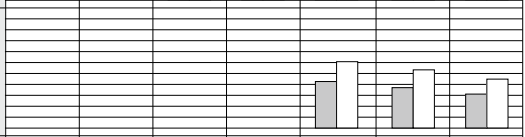
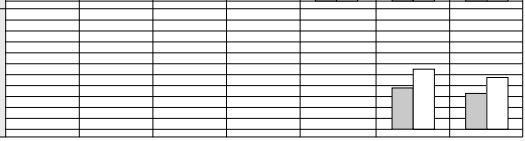
a: The air in the upper cylinder chamber is exhausted from the port 1 (P) of VEX Ⓨ, and the air in the tank flows in through the port 1 (P) of VEX Ⓧ.
b: Air flows into the lower cylinder chamber through a throttled opening, set by a needle, from the port 2 (A) to 1 (p) of VEX Ⓧ.
c: The air in the tank flows into the upper cylinder chamber at a preset low pressure from the port 2 (A) of VEX Ⓨ, while the air in the lower cylinder chamber returns to the tank through VEX Ⓧ.
d: Air returns to the tank through a throttled opening from the port 1 (P) to 2 (A) of VEX Ⓧ.
e: The air in the lower cylinder chamber is blocked at the port 1 (P) of VEX Ⓧ, while the air in the upper cylinder chamber is blocked at the port 2 (A) of VEX Ⓨ.

⚠Caution

A lifter circuit can be composed of air operated valves. Please contact SMC for details.

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.

System	Average velocity (mm/s)	Bore size: Series CS1/CS2, Pressure 0.5 MPa, Load factor 50%, Cylinder stroke 300 mm
		ø125 / ø140 / ø160 / ø180 / ø200 / ø250 / ø300
A	1000 900 800 700 600 500 400 300 200 100 0	
B	1000 900 800 700 600 500 400 300 200 100 0	
C	1000 900 800 700 600 500 400 300 200 100 0	
D	1000 900 800 700 600 500 400 300 200 100 0	
E	1000 900 800 700 600 500 400 300 200 100 0	
F	1000 900 800 700 600 500 400 300 200 100 0	
G	1000 900 800 700 600 500 400 300 200 100 0	

∗ 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	**VEX55□□-04 06 10**	AS420-04	AN40-04	SGP15A x 1 m
B		AS500-06	AN500-06	SGP20A x 1 m
C		AS600-10	AN600-10	SGP25A x 1 m
D	**VEX57□□-10 12**	AS600-10	AN600-10	SGP25A x 1 m
E		AS800-12	AN700-12	SGP32A x 1 m
F	**VEX59□□-14 20**	AS900-14	AN800-14	SGP40A x 1 m
G		AS900-20	AN900-20	SGP50A x 1 m

How to Order

VEX5 5 1 1 – 06 [ ] 2 E Z – B

Economy valve

Type

0	Basic
1	Select

Operation type

0	Air operated
1	External pilot solenoid

Body size **Port size**

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

Thread type

Nil	Rc
F	G(1)
N	NPT
T	NPTF

Note 1) Not conforming to ISO1179-1.

Rated 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

Electrical entry (Only with solenoid)

G	Grommet, Lead wire length 300 mm
H	Grommet, Lead wire length 600 mm
E	Grommet terminal
T	Conduit terminal
D	DIN terminal

Light/Surge voltage suppressor (Only with solenoid)

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

Option

Nil	None
B	Bracket
G	Pressure gauge

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

• How to order pilot valves

SF4 – [ ] [ ] [ ] – 20

Light/Surge voltage suppressor
Electrical entry
Rated voltage

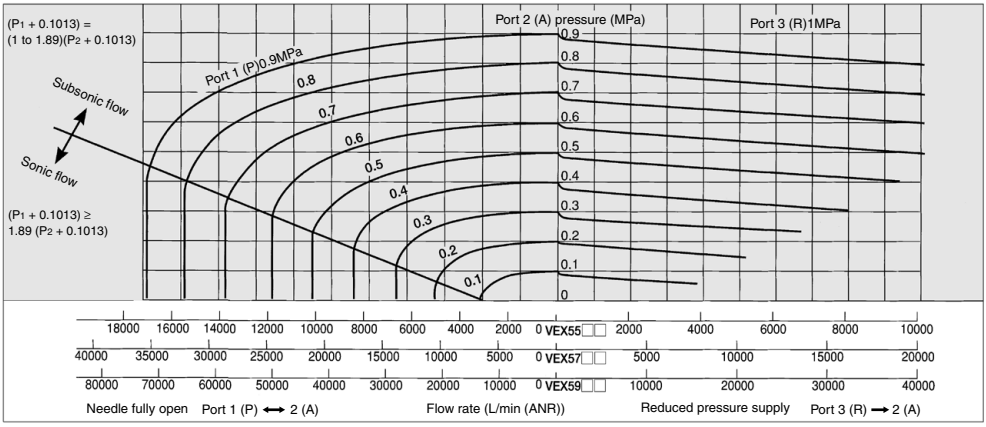
(Ex.) **SF4-1G-20**
100 VAC, Grommet

Model

Model	Basic type		Select type		Port size	
	Air operated	External pilot solenoid	Air operated	External pilot solenoid	Port 1 (P), 2 (A)	Port 3 (R)
Economy valve	VEX5500	VEX5501	VEX5510	VEX5511	1/2, 3/4, 1	1/2, 3/4, 1
	VEX5700	VEX5701	VEX5710	VEX5711	1, 1 1/4	1 1/4
	VEX5900	VEX5901	VEX5910	VEX5911	1 1/2, 2	2

VEX

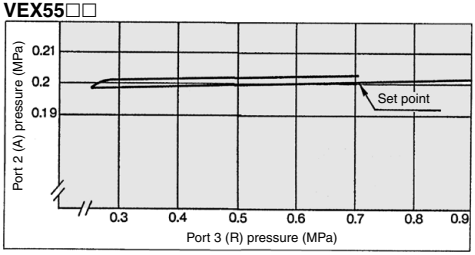
Flow Characteristics



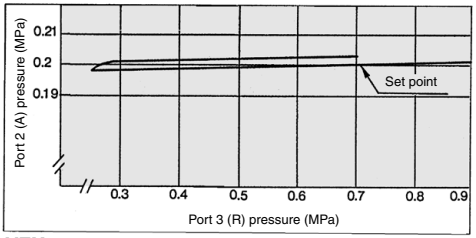
Pressure Characteristics

Shows the outlet pressure (port 3 (R)) change against the inlet pressure (port 2 (A)) change. They conform to JIS B 8372 (Air pressure regulator).

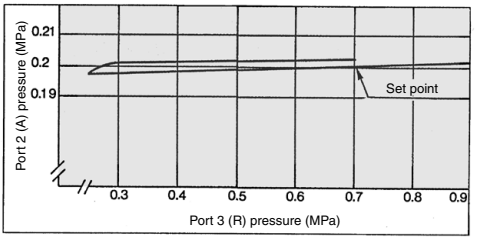
VEX55□□



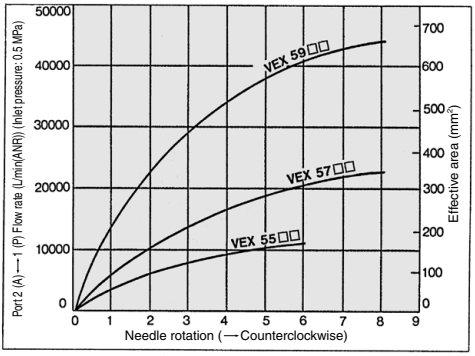
VEX57□□



VEX59□□

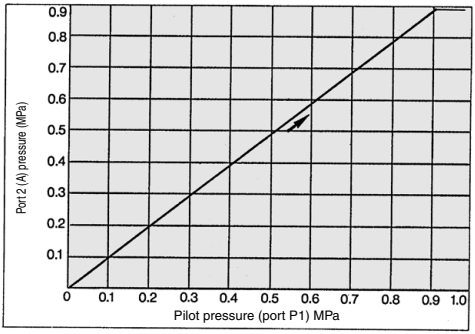


Needle Characteristics Port 2 (A)⟵1 (P)



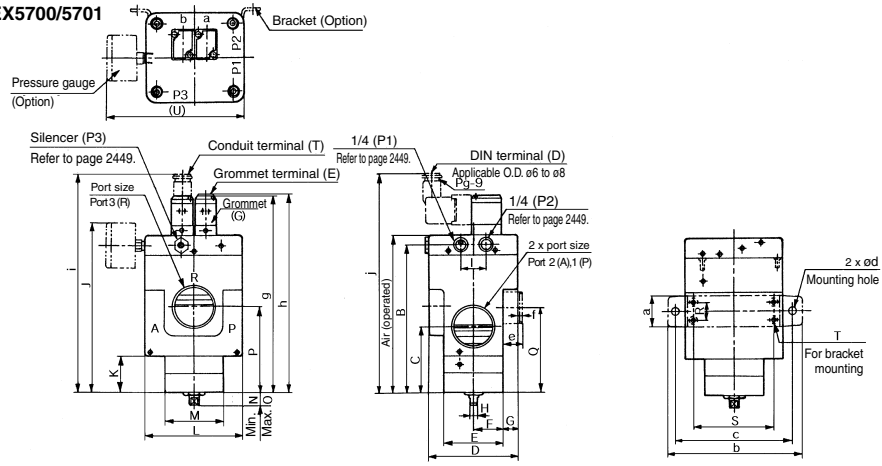
Setting Pressure Characteristics

Port 2 (A) pressure is set according to pilot pressure.
(port 3 (R) ⟶2 (A): Non-relief regulator)



Basic Type/Dimensions

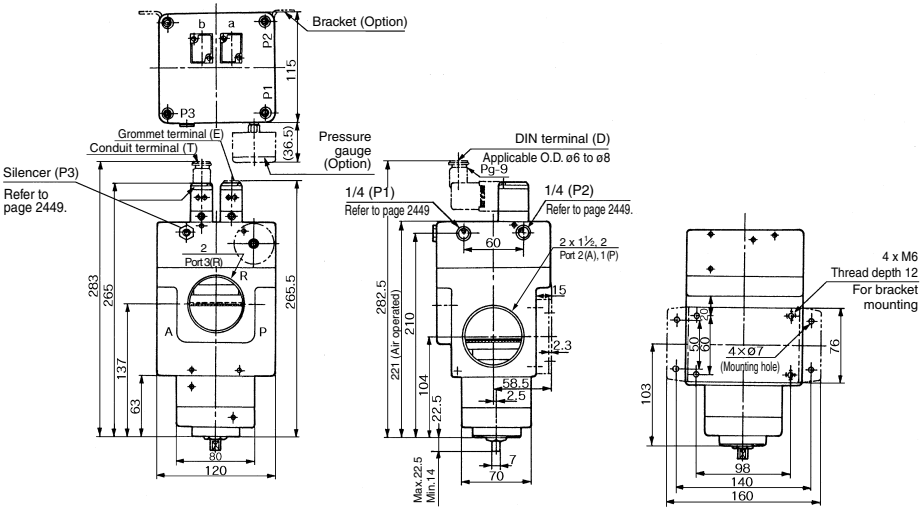
VEX5500/5501
VEX5700/5701



Model	Port size		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
	Port 2 (A), 1 (P)	Port 3 (R)																					
VEX5500 **VEX5501**	½, ¾, 1	½, ¾, 1	143.5	133.5	62.5	70	50	25	10	7	25	156.5	36.5	80	60	16.5	20	81.5	83.5	Center	60	2 x M6 Thread depth 9	116.5
VEX5700 **VEX5701**	1, 1¼	1¼	160.5	150.5	62.5	90	60	30	15	7	25	173.5	37.5	100	60	13	17	88.5	86.5	18	82	2 x M6 Thread depth 6	136.5

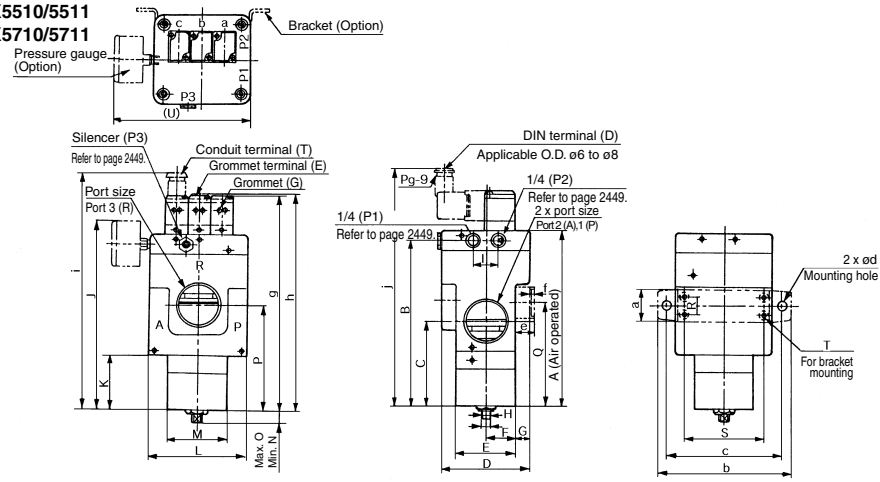
Model	Bracket mounting dimensions						Grommet	Grommet terminal	Conduit terminal	DIN terminal
	a	b	c	d	e	f	g	h	i	j
VEX5500 **VEX5501**	19	130	110	9	12	2.3	187	187.5	205.5	205
VEX5700 **VEX5701**	32	136	120	9	20	2.3	204	204.5	222.5	222

VEX5900/5901



Select Type/Dimensions

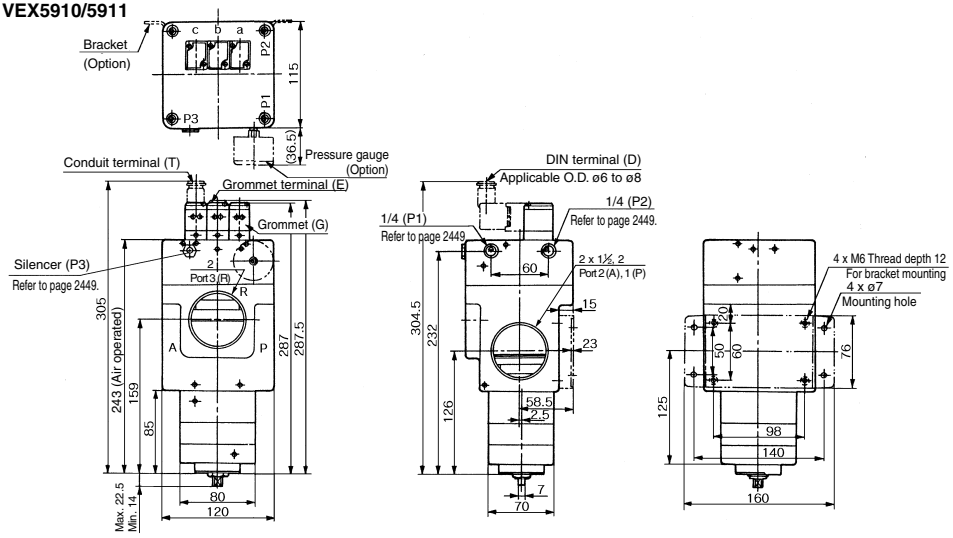
VEX5510/5511
VEX5710/5711



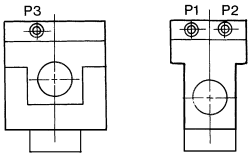
Model	Port size		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
	Port 2 (A), 1 (P)	Port 3 (R)																					
VEX5510 **VEX5511**	1/2, 3/4, 1	1/2, 3/4, 1	160	150	79	70	50	25	10	7	25	173	53	80	60	13	18	98	100	Center	60	2 x M6 Thread depth 9	116.5
VEX5710 **VEX5711**	1, 1 1/4	1 1/4	177.5	167.5	84.5	90	60	30	15	7	25	190.5	54.5	100	60	13	17	105.5	103.5	18	82	4 x M6 Thread depth 6	136.5

Model	Bracket mounting dimensions						Grommet	Grommet terminal	Conduit terminal	DIN terminal
	a	b	c	d	e	f	g	h	i	j
VEX5510 **VEX5511**	19	130	110	9	12	2.3	204	204.5	222	221.5
VEX5710 **VEX5711**	32	136	120	9	20	2.3	221	221.5	239.5	239

VEX5910/5911



External Pilot Piping



Port 3 (R) side **Port 1 (P) side**

Model	P1	P2	P3
VEX5□00	External pilot	External pilot	Plug
VEX5□01	External pilot	External pilot	Pilot exhaust Note)
VEX5□10	External pilot	External pilot	External pilot
VEX5□11	External pilot	External pilot	Pilot exhaust Note)

Note) For pilot exhaust port, silencer AN210-02 is mounted.

⚠Caution

Refer to front matter 53 for Safety Instructions and pages 3 to 8 for 3/4/5 Port Solenoid Valve Precautions.

How to Use DIN Terminal

1. Disassembly

1) After loosening the screw ①, then if the housing ② is pulled in the direction of the screw ①, the connector will be removed from the body of equipment (solenoid, etc.).
2) Pull the screw ① out of the housing ②.
3) On the bottom part of the terminal block ③, there's a cut-off part ⑨. If a small flat head screwdriver is inserted between the opening in the bottom, terminal block ③ will be removed from the housing ②. (Refer to the figure-1.)
4) Remove the cable gland ④, plain washer ⑤ and rubber seal ⑥.

2. Wiring

1) Pass the cable ⑦ through the cable gland ④, plain washer ⑤ and rubber seal ⑥ in this order, and then insert them into the housing ②.
2) Loosen the screw ⑪ attached to the terminal block ③. Then, pass the lead wire ⑩ through the terminal block ③ and tighten the screw ⑪ again.
   Note 1) Tighten within the tightening torque of 0.5 N·m ±15%.
   Note 2) Cable ⑦ outside diameter: ø6 to ø8 mm

3. Assembly

1) Pass the cable ⑦ through the cable gland ④, plain washer ⑤ and rubber seal ⑥ in this order and connect to the terminal block ③. Then, mount the terminal block ③ on the housing ②. (Push it down until you hear the click sound.)
2) Put the rubber seal ⑥ and plain washer ⑤ in this order into the cable entry of the housing ②, and then tighten the cable gland ④ securely.
3) Insert the gasket ⑧ between the bottom part of terminal block ③ and the plug attached to the equipment. Then, screw in ① from the top of the housing ② to tighten it.
   Note) Tighten within the tightening torque of 0.5 N·m ±20%.

Changing the entry direction

The orientation of a connector can be changed 180°, depending on the combination of a housing ② and a terminal block ③.

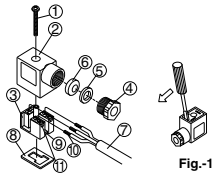


Fig.-1

Related Products:

Silencer (Series AN)

- Over 30 dB noise reduction
- Sufficient effective area

- Refer to Best Pneumatics No. 6 for details.

Exhaust Cleaner (Series AMC)

- Provides a silencing capability and an oil mist recovery function.
- Can also be used in a centralized piping system.

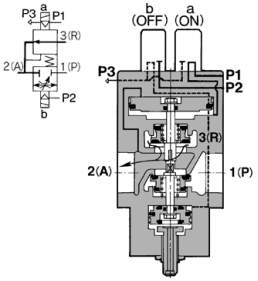
- Refer to Best Pneumatics No. 6 for details.

VEX

Basic Type/Construction/Working Principle/Component Parts

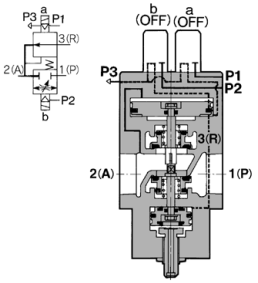
Note) With this valve, the port 3 (R) is a supply port and port 1 (P) is an exhaust port.

1. 3 (R)→2 (A) Reduced pressure supply



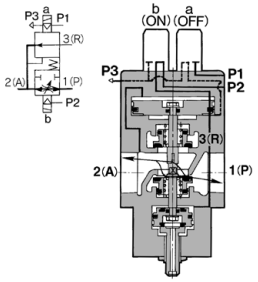
When the pilot solenoid valve "a" is energized (or when pilot pressure is applied to the port P1 of the air operated type) while the port P1 is under the pilot pressure, reduced pressure is supplied from the port 3 (R) to the port 2 (A). The acting force of the pilot pressure (port P1) reaches the space under the pressure control piston ③ pushes the piston upward and opens the poppet valve ⑥. Thus air is supplied from the port 3 (R) to the port 2 (A).
The air entering through the port 2 (A) flows through the feedback passage to the space above the piston, and when its pressure balances with the pilot pressure under the pressure control piston, the poppet valve closes, thus setting the port 2 (A) pressure corresponding to the pilot pressure (port P1).
(port P1 pressure: port 2 (A) pressure = 1:1)
When the reduced pressure is supplied from 3 (R) to 2 (A), air will not be exhausted from 2 (A) to 1 (P) even when the pilot pressure (port P1) is larger than the port 2 (A) pressure.

2. Closed center



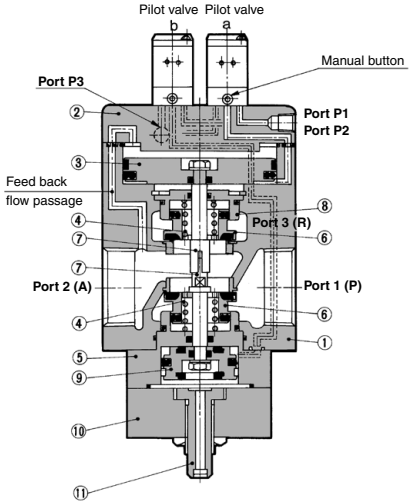
When neither the pilot solenoid valves "a" or "b" is energized (or when no pilot pressure is applied to the ports P1 and P2 of the air operated type), no acting force is applied to the pressure control piston ③ and operation piston ⑨, and the spring ④ closes both poppet valves ⑥, thus the valves assume the closed center position.
While the port 2 (A) is being pressurized, air will not be released even if electrical power to the pilot solenoid valve "a" is turned off (or pilot pressure is released from the port P1 of the air operated type).

3. 2 (A)←→1 (P) Throttled exhaust



When the pilot solenoid valve "b" is energized while pilot pressure is in the port P2 (or when the pilot pressure is applied to the port P2 of the air operated type), an acting force generated above the operation piston ⑨ pushes the operation piston down, and thus the port 1 (P) and port 2 (A) are connected.
At that time, the lower poppet valve ⑥ opens by the degree preset by the needle ⑪.
(Counterclockwise rotation of the needle opens the poppet valve.)
The upper and lower poppet valves operate independently. When the pilot solenoid valves "a" and "b" are energized alternately (or when pilot pressure is applied to the ports P1 and P2 of the air operated style alternately), the supplied reduced pressure (3 (R)→2 (A)) can be throttled and exhausted (2 (A)→1 (P)).

Construction



(Basic type: External pilot solenoid)

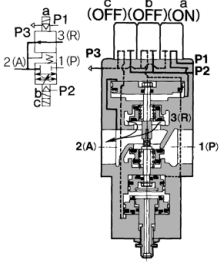
Component Parts

No.	Description	Material
1	**Body**	Aluminum alloy casted
2	**Cover**	Aluminum alloy casted
3	**Pressure control piston**	Aluminum alloy
4	**Spring**	Stainless steel
5	**Chamber**	Aluminum alloy
6	**Poppet valve**	NBR
7	**Rod**	Stainless steel
8	**Valve guide**	Aluminum alloy
9	**Operation piston**	Aluminum alloy
10	**Bottom cover**	Aluminum alloy
11	**Needle**	Brass

Select Type/Construction/Working Principle/Component Parts

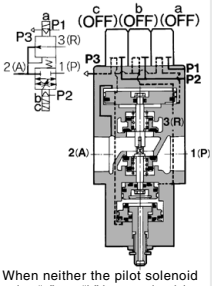
Note) With this valve, the port 3 (R) is a supply port and port 1 (P) is an exhaust port.

1. 3 (R) ➡ 2 (A) Reduced pressure supply



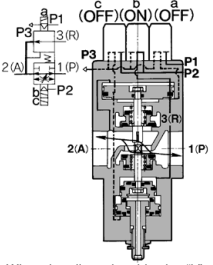
When the pilot solenoid valve "a" is energized (or when pilot pressure is applied to the port P1 of the air operated type) while the port P1 is under the pilot pressure, reduced pressure is supplied from the port 3 (R) to the port 2 (A).
The acting force of the pilot pressure (port P1) reaches the space under the pressure control piston ③ pushes the piston upward and opens the poppet valve ⑥. Thus air is supplied from the port 3 (R) to the port 2 (A).
The air entering through the port 2(A) flows through the feedback passage to the space above the piston and when its pressure balances with the pilot pressure under the pressure control piston, the poppet valve closes, thus setting the port 2 (A) pressure corresponding to the pilot pressure (port P1).
(port P1 pressure: port 2(A) pressure = 1:1)
When the reduced pressure is supplied from 3 (R) to 2 (A), air will not be exhausted from 2 (A) to 1 (P) even when the pilot pressure (port P1) is larger than the port 2 (A) pressure.

2. Closed center



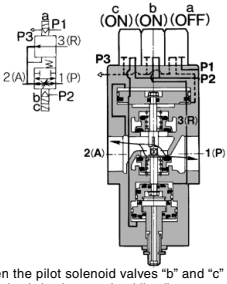
When neither the pilot solenoid valve "a" nor "b" is energized (or when no pilot pressure is applied to the ports P1 and P2 of the air operated type), no acting force is applied to the pressure control piston ③ and operation piston ⑨, and the spring ④ closes both poppet valves ⑥, thus the valve assumes the closed center position.
While the port 2(A) is being pressurized, air will not be released even if electrical power to the pilot solenoid valve "a" is turned off (or pilot pressure is released from the port P1 of the air operated type).

3. 2 (A)⟷1 (P) Fully open exhaust



When the pilot solenoid valve "b" is energized while pilot pressure is in the port P2 (or when the pilot pressure is applied to the port P2 of the air operated type), an acting force generated above the operation piston ⑨, and pushes down the operation piston, and thus the ports 1(P) and 2 (A) are connected.
At that time, the lower poppet valve ⑥ fully opens.

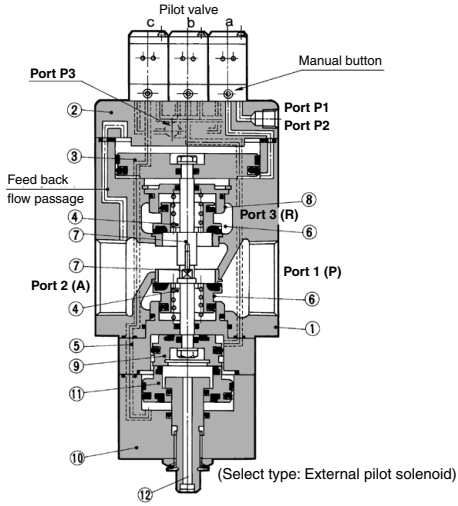
4. 2 (A)⟷1 (P) Throttled exhaust



When the pilot solenoid valves "b" and "c" are energized simultaneously while pilot pressure is in the port P2 (or when the pilot pressure is applied simultaneously to the ports P2 and P3 of the air operated type), an acting force generated above the operation piston ⑨ pushes the piston down and another acting force generated under the stopper ⑪ pushes up the stopper, and thus the ports 1 (P) and 2 (A) are connected.
At that time, the lower poppet valve ⑥ opens by the degree preset by the needle ⑫. (Counterclockwise rotation of the needle opens the poppet valve.)
The upper and lower poppet valves operate independently. When the pilot solenoid valves "a" and "b" are energized alternately (or when pilot pressure is applied alternately to the ports P1 and P2 of the air operated type), the supplied reduced pressure (3 (R) ➡ 2 (A)) can be throttled and exhausted (2 (A) ➡ 1 (P)).
* The pilot solenoid valve "c" remains energized (or pilot pressure remains applied to the port P3 of the air operated type).

By turning on/off the pilot solenoid valve "c" (or by supplying/exhausting pilot pressure to/from the port P3 of the air operated type) while electric power is being supplied to the pilot solenoid valve "b" (or pilot pressure is being applied to the port P2 of the air operated type), either throttling or fully open exhaust can be selected (decelaration/ accelaration) for the port 2 (A)⟷1 (P).

Construction



Component Parts

No.	Description	Material
1	**Body**	Aluminum alloy casted
2	**Cover**	Aluminum alloy casted
3	**Pressure control piston**	Aluminum alloy
4	**Spring**	Stainless steel
5	**Chamber**	Aluminum alloy
6	**Poppet valve**	NBR
7	**Rod**	Stainless steel
8	**Valve guide**	Aluminum alloy
9	**Operation piston**	Aluminum alloy
10	**Bottom cover**	Aluminum alloy
11	**Stopper**	Aluminum alloy
12	**Needle**	Brass

VEX

Power Valve
Precision Regulator
Series VEX1□3$^{0}_{3}$

High precision, large capacity relief regulator

A 3 port large exhaust capacity pressure reducing valve which utilizes a nozzle flapper mechanism available as air operated or manual styles.

Precise pressure setting

Having a relief Cv value that is similar to the supply Cv value, this regulator responds quickly in order to set a precise outlet pressure even when the outlet volume and the pressure fluctuations are large.

High precision

This regulator is well-suited for balancer applications because it minimizes pressure fluctuations with its large-volume supply/exhaust capability, in addition it features high precision F.S. (full span) sensitivity within 0.2% and F.S. repeatability of ±0.5%.

Manifold capable

VVEXB 1/8—Up to 10 stations
VVEX2 1/4—Up to 8 stations

Rich line-up

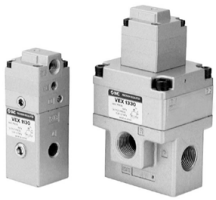
Port sizes available from M5 to 2 inches, most flow rates and pipes can be accommodated.

Minimum size VEX1$^{A}_{B}$33

- **Non-grease only for VEX1$^{A}_{B}$33**
- **Seal materials (NBR, FKM) only for VEX1$^{A}_{B}$33**

Minimum size

Manual handle type

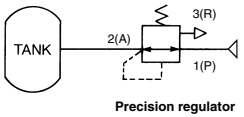


Air operated type

Application Example

Relief Type Regulator

Precise internal tank pressure setting

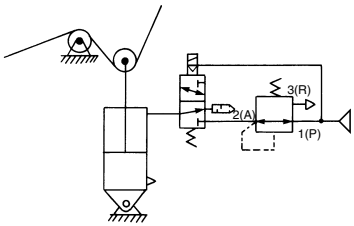


Precision regulator

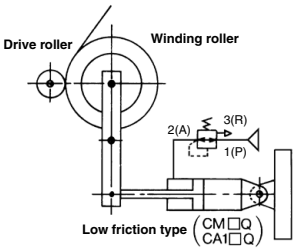
● Large effective areas of both supply and exhaust sides make it possible to precisely set large-flow internal tank pressure.

Accurate Pressure Setting

Sensitivity within 0.2% F.S. (Full span)
Tension control



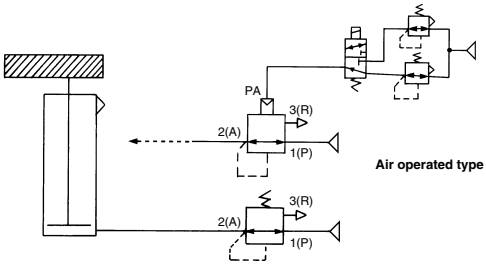
Contact Pressure Control



● Pressure is kept steady, responding rapidly to the position change of the piston in the cylinder.

Balance and Drive

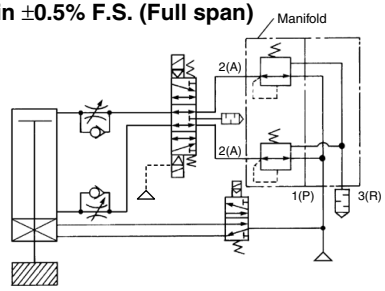
Accurate balance pressure setting



● Pressure changes during cylinder actuation are suppressed, balancing the cylinder in both static and dynamic conditions.

Load Balance (With superior repeatability)

Within ±0.5% F.S. (Full span)



● Accurate balance pressure setting and superior repeatability prevent actuating play in the cylinder, and make the stop precision steady.

● Manifold can be mounted to VEX1B33, VEX123$^{0}_{3}$.

Specifications

Model		VEX1A33-M5/01	VEX1B33-M5/01	VEX113 0-01/3-02	VEX123 0-01/3-02	VEX133 0-02/3-03/04	VEX153 0-04/3-06/10	VEX173 0-10/3-12	VEX193 0-14/3-20
Operation		Manual (Push locking slotted type)		Manual handle (Push locking slotted type) and Air operated type					
Pilot		Internal pilot (External pilot can be switched. ∗ Refer to "How to Switch to External Pilot" on page 745.)							
Fluid		Refer to Applicable Fluids.		Air					
Supply pressure		(Set pressure + 0.1 MPa) to Max. 1 MPa ⚠**Caution** ∗ Refer to "Precautions".							
Setting pressure range		0.01 to 0.7 MPa		0.05 to 0.7 MPa					
Ambient temperature (1)		0 to 60°C							
Fluid temperature (1)		0 to 60°C (VEX1$^{A}_{B}$33) 0 to 99°C (VEX1$^{A}_{B}$33B)		0 to 60°C					
Repeatability		Within ±0.5% F.S. (Full span)							
Sensitivity		Within 0.2% F.S. (Full span)							
Air consumption (2)		9.5 L/min (ANR) (at supply pressure 1.0 MPa)							
Mounting		Free							
Port size	**Port**	M5	01	M5	01	01	02	01	02
	1(P)	M5	1/8	M5	1/8	1/8	1/4	1/8	1/4
	2(A)								
	3(R)								
Weight (kg)		0.15		0.18(4)		0.2		0.3(4)	

Port	02	03	04	04	06	10	10	12	14	20
1(P)	1/4	3/8	1/2	1/2	3/4	1	1	1 1/4	1 1/2	2
2(A)										
3(R)							1 1/4		2	

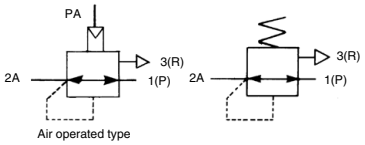
Model		VEX113 0-01/3-02	VEX123 0-01/3-02	VEX133 0-02/3-03/04	VEX153 0-04/3-06/10	VEX173 0-10/3-12	VEX193 0-14/3-20
Weight (kg)		0.2	0.3(4)	0.5	1.4	2	4

Note 1) No condensation.
Note 2) Large amount of air is exhausted all the time.
Note 3) Applicable only to air operated type.
Note 4) With sub-plate.
Note 5) Non-lubricated specifications are not available for valve sizes 1 to 9.

Applicable Fluids

Model	VEX1$^{A}_{B}$33 (Seal material: NBR seals)	VEX1$^{A}_{B}$33B (Seal material: FKM seals)
Fluid	Air (Normal, Dry)	High temp. air (Max. 99°C)

Symbol



How to Order

VEX1 A 3 3 B – M5 □ – G

- **Regulator valve**
- **Type**: Precision regulator
- **Operation**: Manual handle
- **Seal material**

Nil	NBR seals
B	FKM seals

Note) Refer to Applicable Fluids on page 744.

- **Threads (1/8 only)**

Nil	Rc
F	G Note 1)
N	NPT
T	NPTF

- **Option**

B	Bracket
F	Foot
G	Pressure gauge
N	Silencer for bleed port

- **Body size** / **Port size**

Body size		Port size: Port	Port size: 1(P), 2(A), 3(R)
Body ported	A	M5	M5
		01	1/8
Base mounted	B	Nil	Without sub-plate
		M5	M5
		01	1/8

VEX1 5 3 3 – 10 □ – G

- **Regulator valve**
- **Type**: Precision regulator
- **Operation**

0	Air operated type
3	Manual handle type

- **Thread type**

Nil	Rc
F	G Note 1)
N	NPT
T	NPTF

- **Option**

B	Bracket
F	Foot
G	Pressure gauge
N	Silencer for bleed port

- **Body size** / **Port size**

Body size		Port size: Port	Port size: 1(P), 2(A)	Port size: 3(R)
Body ported	1	01	1/8	
		02	1/4	
	3	02	1/4	
		03	3/8	
		04	1/2	
	5	04	1/2	
		06	3/4	
		10	1	
	7	10	1	1 1/4
		12	1 1/4	
	9	14	1 1/2	2
		20	2	
Base mounted	2	Nil	Without sub-plate	
		01	1/8	
		02	1/4	

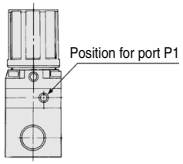
⚠Caution

Using the External Pilot

1. If a pressure difference over 0.1 MPa between the supply and the set pressure cannot be maintained, change to an external pilot to obtain the necessary pressure difference.
2. If a mist separator cannot be installed on the supply side, change to an external pilot, and make sure to install a mist separator on the pilot side.

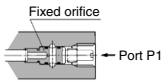
How to Switch to External Pilot

1. Using a flat head screwdriver, remove the fixed orifice from port P1.
2. Install the fixed orifice facing in the opposite direction (external pilot). Install it carefully to prevent damage to the O-ring.
3. Tighten the fixed orifice again and connect the pilot piping to port P1 using an M5 fitting.

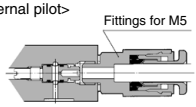


Dimensions of port P1

<Internal pilot>



<External pilot>



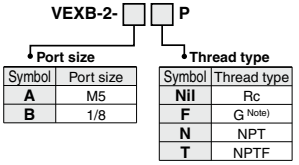
- For VEX1□33 (NBR seals)
  Fixed orifice assembly (with O-ring) part no.: VEX1-A30-3
- For VEX1$^{A}_{B}$33B (FKM seals)
  Fixed orifice assembly (with O-ring) part no.: VEX1-A30-3B
  Note) O-rings cannot be shipped as a single unit.

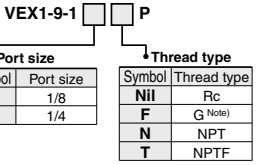
Option (2)

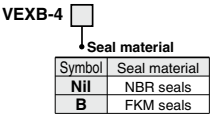
Description		Part no. VEX1A33	VEX1B33	VEX113$^{0}_{3}$	VEX123$^{0}_{3}$	VEX133$^{0}_{3}$	VEX153$^{0}_{3}$	VEX173$^{0}_{3}$	VEX193$^{0}_{3}$
Bracket (With bolt and washer)	B	VEX1-18-1A	—	VEX1-18-1A	—	VEX3-32A	VEX5-32A	VEX7-32A	VEX9-32A
Foot (With bolt and washer)	F	VEX1-18-2A	—	VEX1-18-2A	—	—	—	—	—
Pressure gauge (3)	G	G27-10-R1-X207		G27-10-01		G36-10-01		G46-10-01	
Silencer for bleed port (PE)	N	AN120-M5							

Note 1) Not conforming to ISO1179-1.
Note 2) The optional parts are shipped in the same package.
Note 3) If a pressure gauge other than that which is indicated in the option table is to be used, also enter the part number of the pressure gauge.
Refer to the pressure gauge guide in Best Pneumatics No. 6 for details.
Example: VEX1333-03
G36-4-01

Sub-plate/Base Gasket Part No.

<table>
<tr><th>Valve body size</th><th>B</th><th>2</th></tr>
<tr><td>Sub-plate</td><td>


<table>
<tr><th>Symbol</th><th>Port size</th></tr>
<tr><td>A</td><td>M5</td></tr>
<tr><td>B</td><td>1/8</td></tr>
</table>
<table>
<tr><th>Symbol</th><th>Thread type</th></tr>
<tr><td>Nil</td><td>Rc</td></tr>
<tr><td>F</td><td>G Note)</td></tr>
<tr><td>N</td><td>NPT</td></tr>
<tr><td>T</td><td>NPTF</td></tr>
</table>
</td><td>


<table>
<tr><th>Symbol</th><th>Port size</th></tr>
<tr><td>A</td><td>1/8</td></tr>
<tr><td>B</td><td>1/4</td></tr>
</table>
<table>
<tr><th>Symbol</th><th>Thread type</th></tr>
<tr><td>Nil</td><td>Rc</td></tr>
<tr><td>F</td><td>G Note)</td></tr>
<tr><td>N</td><td>NPT</td></tr>
<tr><td>T</td><td>NPTF</td></tr>
</table>
</td></tr>
<tr><td>Base gasket</td><td>


<table>
<tr><th>Symbol</th><th>Seal material</th></tr>
<tr><td>Nil</td><td>NBR seals</td></tr>
<tr><td>B</td><td>FKM seals</td></tr>
</table>
</td><td>VEX1-11-2</td></tr>
</table>

Note) Not conforming to ISO1179-1.

Series VEX1□3$^{0}_{3}$
Manifold Specifications

Specifications

Applicable valve	VEX1B33		VEX123$^{0}_{3}$	
Valve stations	2 to 10 stations Note)		2 to 8 stations Note)	
Air passage	Common supply/exhaust			
Pilot	Internal pilot	Common external pilot	Internal pilot	Common external pilot
Pilot port size	——	M5 x 0.8	——	M5 x 0.8
Port size Port 1(P), 2(A), 3(R)	1/8		1/4	
Blanking plate	**VEXB-5** □ (With gasket and mounting bolt) **Seal material**: Nil: NBR seals; B: FKM seals		**VEX1-17** (With gasket and mounting bolt)	

Note) Pressurize to Port 1(P) and exhaust from Port 3(R) on the both sides for six stations or more of "VEX1B33" and/or five stations or more of "VEX1233".

How to Order

VVEXB – 1 – 5 – 01 □

- Body size
- Pilot type: 1 Internal pilot; 2 Common external pilot
- Valve stations: 2 2 stations … 10 10 stations
- Port size: 01 1/8
- Thread type: Nil Rc; F G Note); N NPT; T NPTF

VVEX2 – 1 – 5 – 02 □

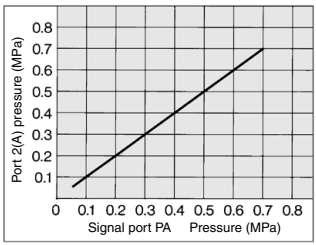
- Body size
- Pilot type: 1 Internal pilot; 2 Common external pilot
- Valve stations: 2 2 stations … 8 8 stations
- Port size: 02 1/4
- Thread type: Nil Rc; F G Note); N NPT; T NPTF

List symbols in the order of precision regulators and blanking plates for manifolds from the left-hand side (Port 2(A) faces this side) of the manifold base.

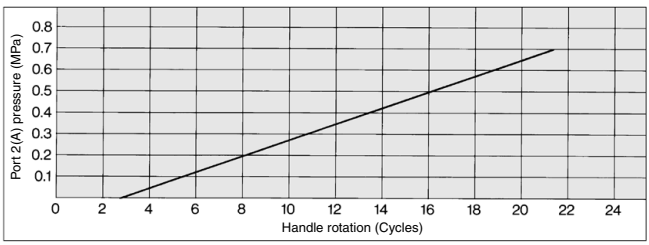
Ex.) VVEX2-2-5-02
- ∗ VEX1233-G —— 4 pieces
- ∗ VEX1-17 ——— 1 piece

Note) Not conforming to ISO1179-1.

Set Pressure Characteristics (Air Operated Type)



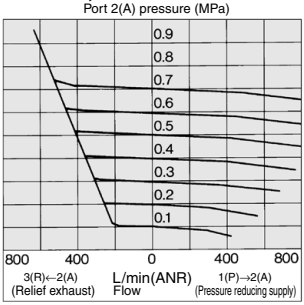
Set Pressure Characteristics (Manual Handle Type)



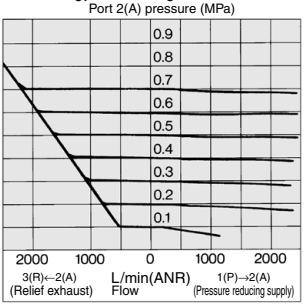
Flow Characteristics

Port 1(P) pressure: 1 MPa

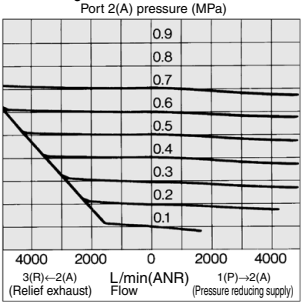
VEX1A33, VEX1B33-01



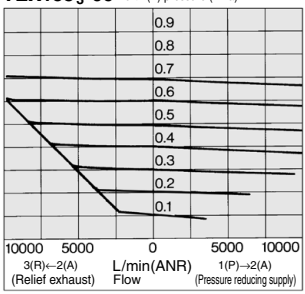
VEX113$^{0}_{3}$, VEX123$^{0}_{3}$-02



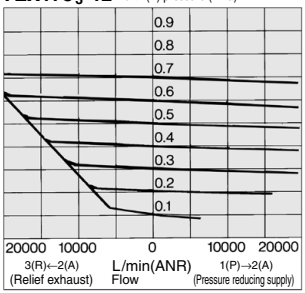
VEX133$^{0}_{3}$-03



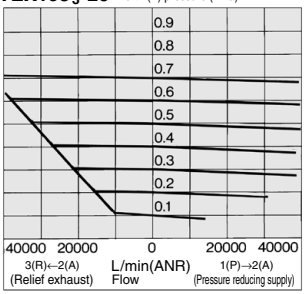
VEX153$^{0}_{3}$-06



VEX173$^{0}_{3}$-12



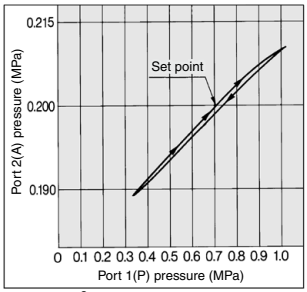
VEX193$^{0}_{3}$-20



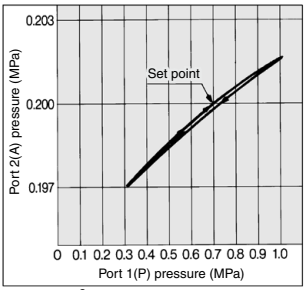
Pressure Characteristics

Port 1(P) pressure: 0.7 MPa, Port 2(A) pressure: 0.2 MPa, Flow: 0 L/min (ANR)

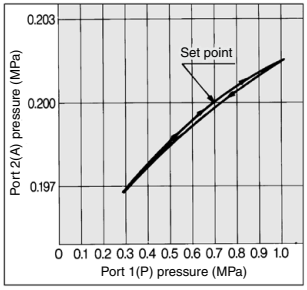
VEX1A33, VEX1B33



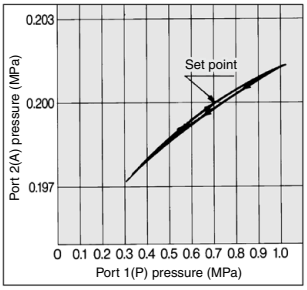
VEX113$^{0}_{3}$, VEX123$^{0}_{3}$



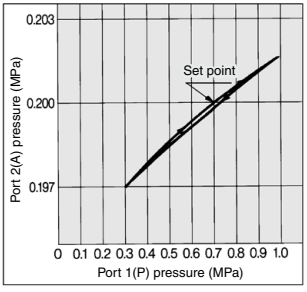
VEX133$^{0}_{3}$



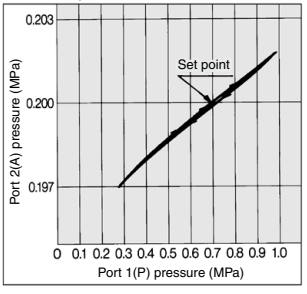
VEX153$^{0}_{3}$



VEX173$^{0}_{3}$

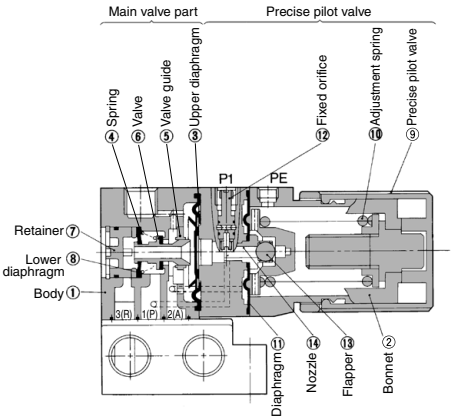


VEX193$^{0}_{3}$



Construction/Working Principle

VEX1A33, VEX1B33



When set-handle ⑨ is turned clockwise, the force generated by set spring ⑩ causes flapper ⑬ to close nozzle ⑭, allowing the nozzle back pressure to be applied to the right surface of top diaphragm ③. Then, valve ⑥ moves to the left, allowing the supply air to flow from port 1(P) to port 2(A). The air pressure that has flowed in is applied to the left surface of top diaphragm ③ and counteracts the force generated by the nozzle back pressure; at the same time, it is applied to the left surface of diaphragm ⑪, and balances with the set pressure that counteracts the compression force of set spring ⑩.
When the outlet pressure increases higher than the set pressure, it pushes diaphragm ⑪ towards the right, and the pressure at the right side of top diaphragm ③ decreases, causing top diaphragm ③ to move to the right. Then, valve ⑥ moves away from the left surface of top diaphragm ③, the outlet pressure flows from port 2(A) via the valve hollow and is discharged through port 3(R) (atmosphere). If set handle ⑨ is turned conterclockwise, the movement will be the opposite, the outlet pressure will decrease, and will balance with a newly set pressure.

Component Parts

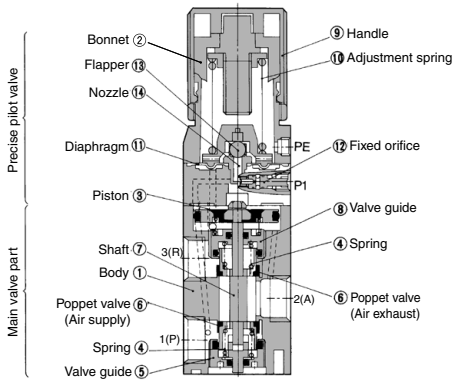
No.	Description	Material
1	**Body**	Zinc alloy die-casted
2	**Bonnet**	Aluminum alloy die-casted
3	**Upper diaphragm**	NBR/FKM
4	**Spring**	Stainless steel
5	**Valve guide**	Stainless steel
6	**Valve**	NBR/FKM
7	**Retainer**	Resin
8	**Lower diaphragm**	NBR/FKM

Replacement Parts

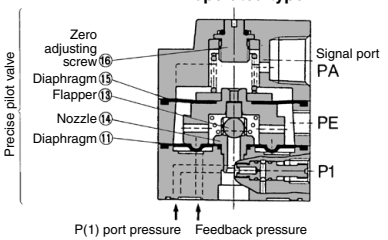
No.	Description	Part no.
9	**Handle**	VBA1-10

VEX113$^{0}_{3}$, VEX123$^{0}_{3}$, VEX133$^{0}_{3}$, VEX153$^{0}_{3}$ VEX173$^{0}_{3}$, VEX193$^{0}_{3}$

Manual handle type



Air operated type



When set-handle ⑨ is turned clockwise, the force generated by set spring ⑩ causes flapper ⑬ to close nozzle ⑭, allowing the nozzle back pressure to be applied to the top of piston ③. Then, via shaft ⑦, poppet valve (supply air) ⑥ opens, allowing the supply air to flow from port 1(P) to port 2(A). The air pressure that has flowed in is applied to the bottom surface of piston ③ and counteracts the force generated by the nozzle back pressure; at the same time, it is applied to the bottom surface of diaphragm ⑪, and balances with the set pressure that conterects the compression force of set spring ⑩.
When the outlet pressure increases higher than the set pressure, it pushes the diaphragm ⑪ upward, the pressure at the top surface of piston ③ decreases, causes piston ③ to move upward, opens poppet valve (exhaust) ⑥ via shaft ⑦, and is discharged through port 3(R) to the atmosphere.
If set-handle ⑨ is turned counterclockwise (if the set pressure of the pressure-reducing valve connetcted to the signal port is decreased), the movement will be the opposite; the outlet pressure will decrease and balance with a newly set pressure.
Note) Those indicated in parentheses are for the air operated type.

Component Parts

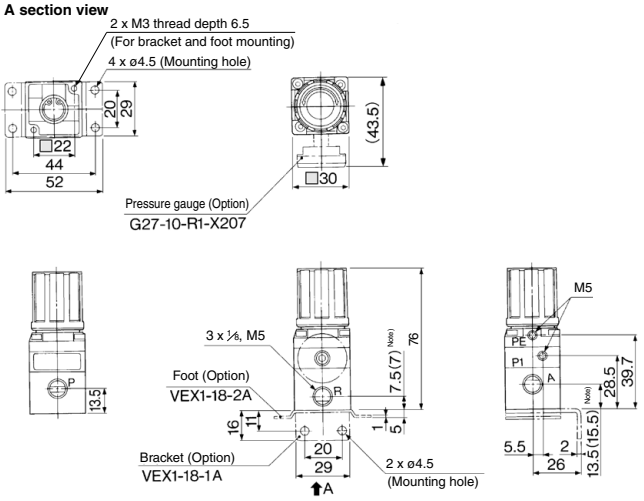
No.	Description	Material
1	**Body**	Aluminum alloy die-casted
2	**Bonnet**	Aluminum alloy die-casted
3	**Regulating piston**	Aluminum alloy
4	**Spring**	Stainless steel
5	**Valve guide**	Aluminum alloy
6	**Poppet valve**	NBR
7	**Shaft**	Stainless steel
8	**Valve guide**	Aluminum alloy

Replacement Parts

No.	Description	Part no.
9	**Handle**	VBA1-10

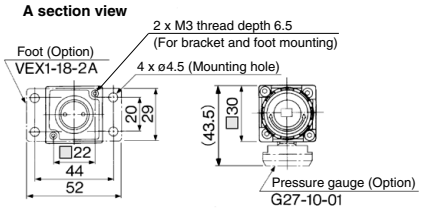
Body Ported

VEX1A33-M5, 01

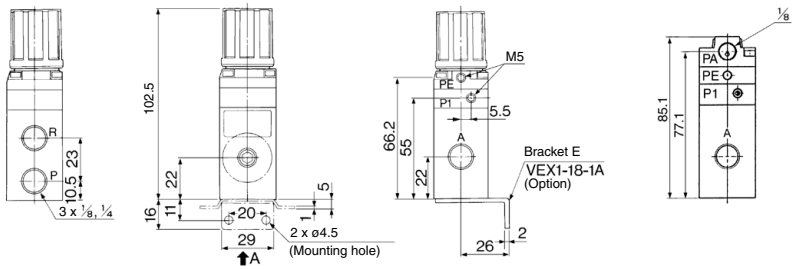


Note) ( ) are the dimensions of "M5".

VEX113$^{0}_{3}$-01, 02

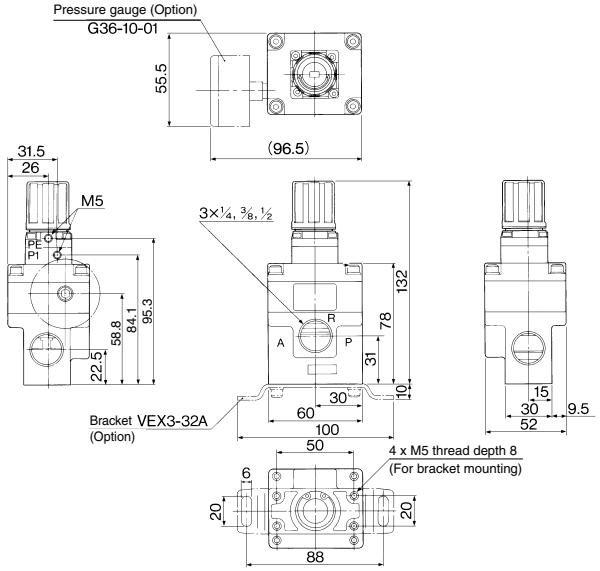


Air operated type

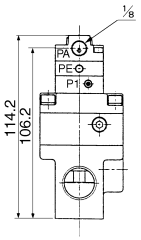


Body Ported

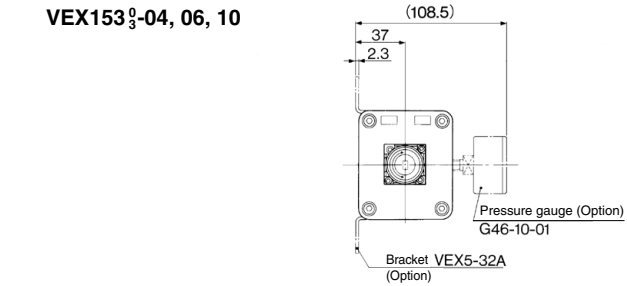
VEX133$^{0}_{3}$-02, 03, 04



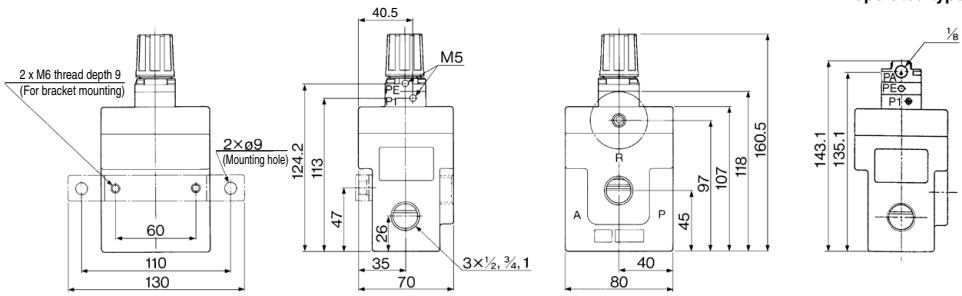
Air operated type



VEX153$^{0}_{3}$-04, 06, 10

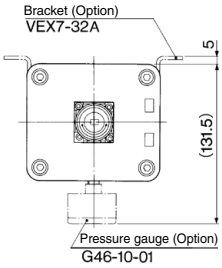


Air operated type

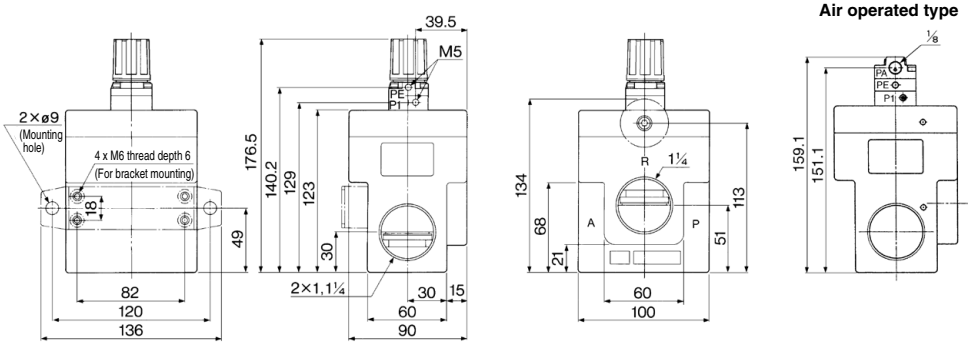


Body Ported

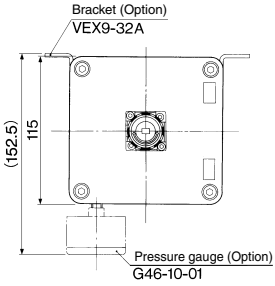
VEX173⁰₃-10, 12



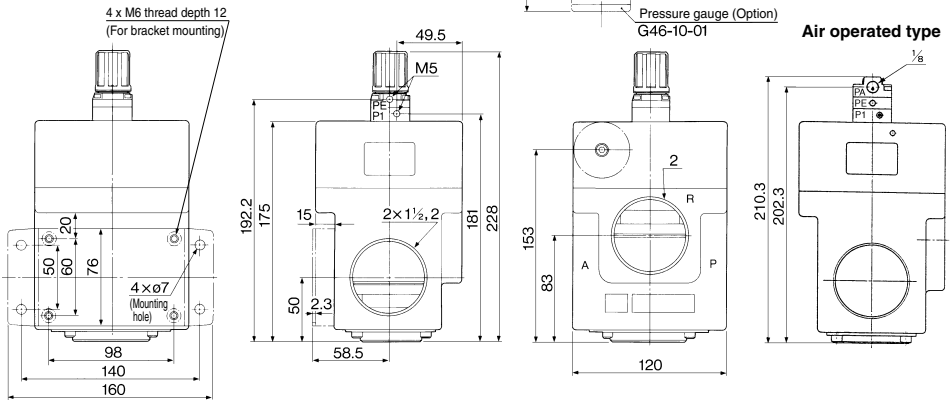
Air operated type



VEX193⁰₃-14, 20

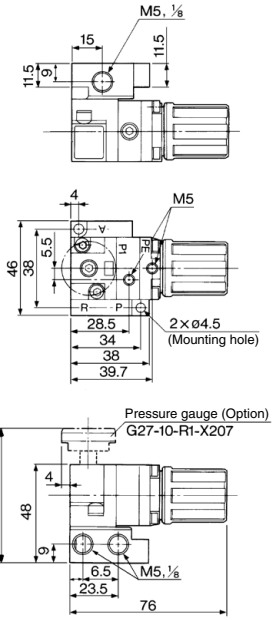


Air operated type

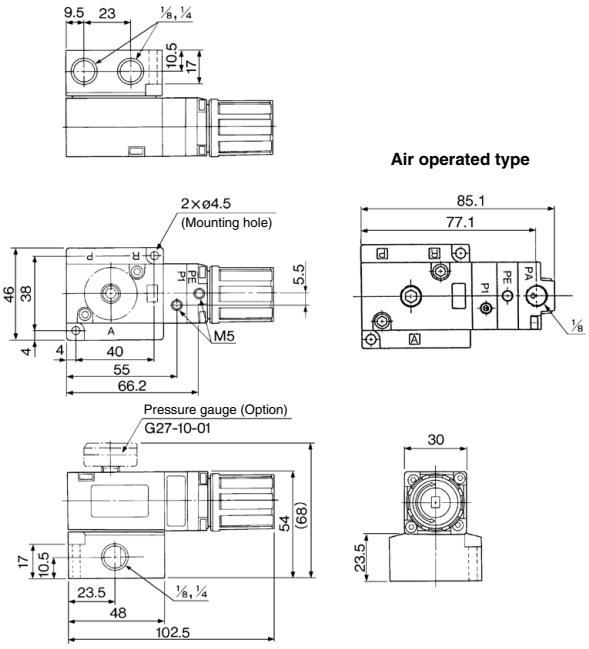


Base Mounted

VEX1B33-M5, 01



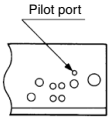
VEX123$^{0}_{3}$-01, 02

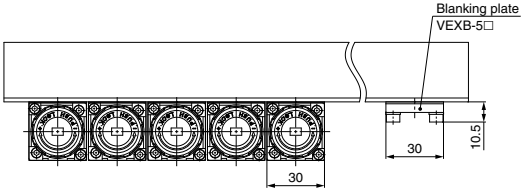


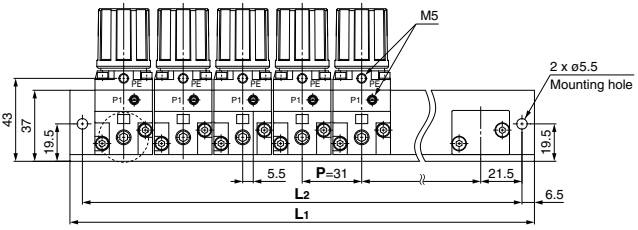
Manifold: VVEXB-□-□-01

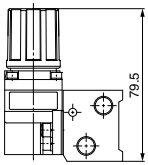
Applicable valve: VEX1B33

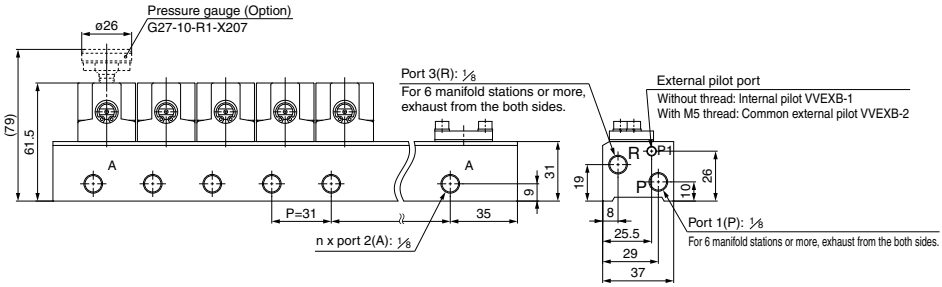
Valve mounting side











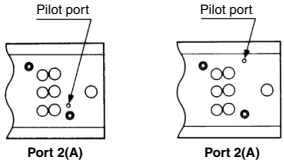
L Dimension $L_1 = 31n + 25$, $L_2 = 31n + 12$ n: Station

Symbol \ n	2	3	4	5	6	7	8	9	10
L_1	87	118	149	180	211	242	273	304	335
L_2	74	105	136	167	198	229	260	291	322

Manifold: VVEX2-□-□-02

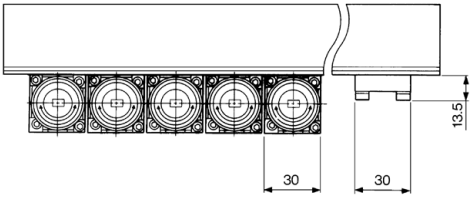
Applicable valve: VEX123$^{0}_{3}$

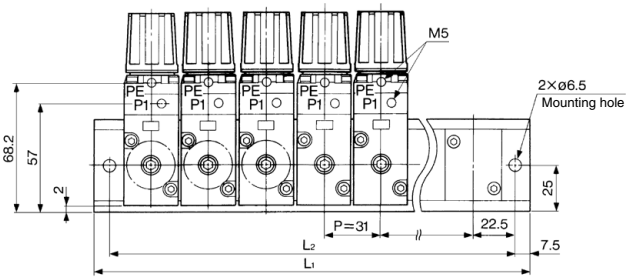
Valve mounting side

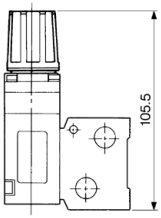


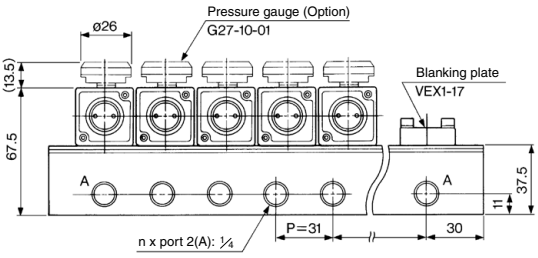
Internal pilot
VVEX2-1

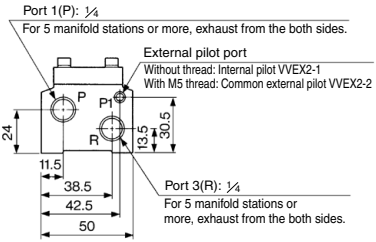
Common external pilot
VVEX2-2











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

Symbol \ n	2	3	4	5	6	7	8
L_1	91	122	153	184	215	246	277
L_2	76	107	138	169	200	231	262

⚠Precautions

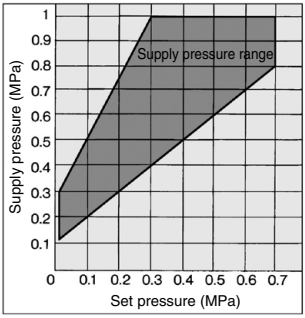
Be sure to read before handling. Refer to front matter 43 for Safety Instructions and pages 365 to 369 for Precautions on every series.

Operating Fluid

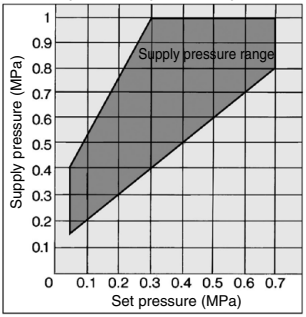
⚠Caution

1. If drainage or debris is present in the supply pressure line, the fixed orifice becomes clogged, resulting in a malfunction. Therefore, in addition to the air filter (SMC's AF series), make sure to use a mist separator (SMC's AM, AFM series). Concerning the quality of the operating air, refer to SMC's the air preparation equipment selection guide (pages 2 and 3).
2. Make sure to perform a maintenance periodically on air filter and mist separator (by discharging the drain and cleaning a filter element or replacing with new one).
3. Never use a lubricator on the supply side with the internal pilot remaining in place, doing so will cause the fixed orifice to become clogged, invariably leading to a malfunction.
4. When lubrication to terminal device is required: Connect a lubricator on the supply [port 1(P)] side using the external pilot type. Use mist separator passage on the pilot air [port P1] side.
5. Use a supply pressure in the recommended range (the range indicated in the diagram below).

VEX1A33, VEX1B33



VEX113$^{3}_{0}$, VEX123$^{3}_{0}$, VEX133$^{3}_{0}$
VEX153$^{3}_{0}$, VEX173$^{3}_{0}$, VEX193$^{3}_{0}$



Piping

⚠Warning

1. Use the flow characteristics on page 748 as reference to select a regulator size so that the required flow rates on the reduced pressure supply and relief exhaust sides have sufficient allowances.
   If the reduced pressure supply and relief exhaust that may cause extreme changes in flow rate are repeated (main valve is fully opened and closed repeatedly), the nozzle flapper is deformed. This may cause the pressure set value to deviate or the diaphragm to break early. So, do not use under such conditions.

⚠Caution

1. **Tightening the fittings and their torque**
   When screwing fittings into the valve, make sure to tighten them to the proper torque values given below.

Tightening Torque when Piping

Connection thread	Applicable torque (N·m)
M5 x 0.8	Approx. 1/6 rotation after manual tightening
1/8	7 to 9
1/4	12 to 14
3/8	22 to 24
1/2	28 to 30
3/4	28 to 30
1	36 to 38
1 1/4	40 to 42
1 1/2	48 to 50
2	48 to 50

2. Ordinarily, air is discharged from the bleed port (PE). The consumption of air through this discharge is normal, owing to the construction of the precision pressure regulator.

Regulator for Signals (Air operated type only)

⚠Caution

- Applicable model
  Regulator Series IR2000
  Series VEX1$^{A}_{B}$33
- In the case of multiple pressure control, consider using series ITV or the E-P HYREG® series VY, which can simplify your system.

Zero Adjustment Screw

⚠Caution

- The zero adjustment screw has been adjusted at the time of shipment to set the signal pressure and the output pressure as close to 1:1 as possible. Thus, it is not necessary to adjust it for operational purposes.

Vibration

⚠Caution

Vibration is likely to occur under the following conditions.

1. **Supply pressure is relatively high (approx. 0.5 MPa or higher), set pressure is low (approx. 0.1 MPa or lower) and the outlet side is open to the atmosphere.**
2. **Capacity of the precision regulator outlet side is extremely small.**

The following measures can be taken.

a. Set the supply pressure extremely low (+0.1 MPa or more of the set pressure).
b. Make the capacity of the precision regulator outlet side larger.
c. Install an exhaust throttle valve with a silencer (ASN2-M5) on the bleed port (PE). Vibration can be avoided by adjusting the exhaust throttle. However, if the bleed is throttled too much, sensitivity may be reduced, resulting in poor performance. Be sure not to apply excessive throttle.

Related Products:

Silencer (Series AN)

- Noise reduction capability of over 30 dB.
- Provides a sufficient effective area.

For details, refer to Best Pneumatics No. 6.

Exhaust cleaner (Series AMC)

- Provides noise reduction and oil mist recovery functions.
- Can also be used in an intensive piping system.
- Oil mist removal of 99.9%
- Noise reduction of over 35 dB.

For details, refer to Best Pneumatics No. 6.