

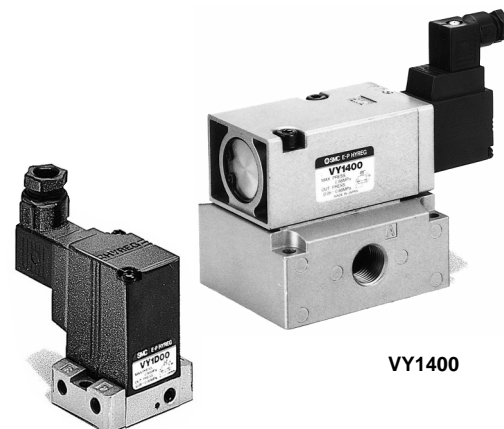
E-P HYREG®

Series VY1

A hybrid regulator is created from a regulator and a solenoid valve!

Stepless Control through Electric Signals

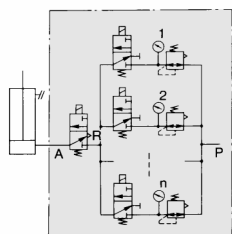
A maximum effective area of 670mm² (2B) can be covered by the combination of an ultra-compact electro-pneumatic pilot valve (22.4 X 30 X 39) and a 3 port, high-capacity exhaust main regulator (VEX1□00 series).



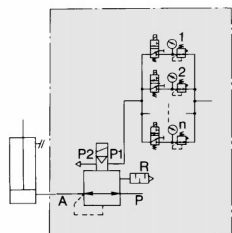
VY1D00

VY1400

Simple Circuit Configuration

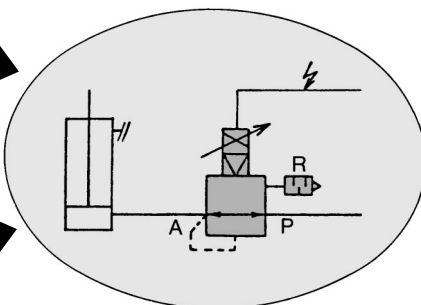


Simplified main circuit



Simplified pilot circuit

Piping labor reduced
A flexible system has been adopted.



E-P HYREG®

Ease of handling

Having the amplifier built into the electro-pneumatic pilot valve, only an external (24V DC) power supply and (1 to 5V DC) signal voltage need to be connected.

Manifold Capable

Using the VVEXB/2/4 series, a maximum 10 station manifold is possible.

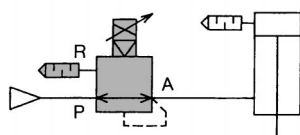
Application examples

Capable of performing multistage pressure control and stepless pressure control by varying the electrical signals.

Cylinder thrust control

Tension control
Balancer

Example
Auto balancer

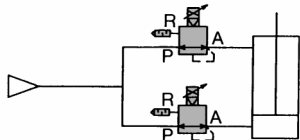


Drive and thrust control

Cylinder behavior and pressurization control for peening and stamping

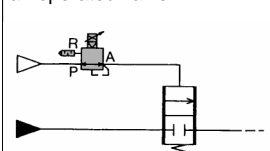
Example

Welding pressure control of spot welding gun cylinder (arranged for the 4 port type)
Loading cylinder control



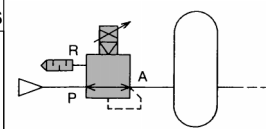
Flow control of various fluids

For remote control of another air operated valve



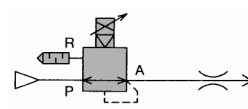
Pressure control of the tank

Automatic adjustments



Air flow control of the nozzle*

Air blowing
Air cooling



*Contact SMC.

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VEX

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AMR

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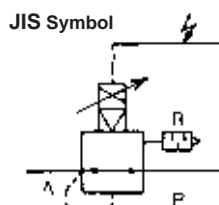
VE

VY

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Series VY1



How to Order

E-P HYREG

Pilot

0	Internal pilot
1	External pilot

VY1 **1** **0** **0** **01**

Power source/Command signal

Symbol	Power source voltage DC	Command signal DC
—	24V	1 to 5V
1		0 to 10V
2		4 to 20mA
3		0 to 20mA
5	12V	1 to 5V
6		0 to 10V
7		4 to 20mA
8		0 to 20mA

Thread

—	Rc(PT)
T	NPTF
F	G(PF)
N	NPT

Body size **Port size** **Option**

Mounting	Symbol	Symbol	P/A port	R port	B (Bracket)	F (Foot)	G (Pressure gauge)	N (Silencer)
Base mounted style	D	00	Without sub-plate	—	—	—	—	—
		M5	M5	—	—	—	●	—
	B	00	Without sub-plate	—	—	—	●	—
		M5	M5	—	—	—	●	—
	2	00	Without sub-plate	—	—	—	●	●
		01	1/8	—	—	—	●	●
		02	1/4	—	—	—	●	●
	4	00	Without sub-plate	—	—	—	—	●
		02	1/4	—	—	—	—	●
		03	3/8	—	—	—	—	●
	Body ported style	A	M5	M5	●	●	—	—
			01	1/8	●	●	●	●
1		02	1/4	●	●	●	●	
		02	1/4	●	—	●	●	
3		03	3/8	●	—	●	●	
		04	1/2	●	—	●	●	
5		04	1/2	●	—	●	●	
		06	3/4	●	—	●	●	
7		10	1	●	—	●	●	
		12	1 1/4	●	—	●	●	
9		14	1 1/2	●	—	●	●	
		20	2	●	—	●	●	

Standard Specifications

Model		VY1D00-M5	VY1A0 ⁰ ₁ -M5	VY1B0 ⁰ ₁ -M5	VY110 ⁰ ₁₋₀₁	VY110 ⁰ ₁₋₀₂	VY120 ⁰ ₁₋₀₂	VY130 ⁰ ₁₋₀₂	VY130 ⁰ ₁₋₀₃	VY130 ⁰ ₁₋₀₄	VY140 ⁰ ₁₋₀₃	VY140 ⁰ ₁₋₀₄	VY150 ⁰ ₁₋₀₄	VY150 ⁰ ₁₋₀₆	VY170 ⁰ ₁₋₁₀	VY170 ⁰ ₁₋₁₂	VY190 ⁰ ₁₋₁₄	VY190 ⁰ ₁₋₂₀					
Port size	Port	M5	M5	M5	01	02	01	02	02	03	04	02	03	04	04	06	10	10	12	14	20		
	P	M5	M5	M5	1/8	1/8	1/4	1/8	1/4	1/4	3/8	1/2	1/4	3/8	1/2	1/2	3/4	1	1	1 1/4	1 1/2	2	
	A																		1 1/4		2		
	R																		1 1/4		2		
Effective area	mm ²	0.13	5	5	10	7.4	16	25	16	25	36	60	70	36	60	70	130	160	180	300	330	590	670
	Cv factor	0.007	0.28	0.28	0.56	0.41	0.9	1.4	0.9	1.4	2.0	3.3	3.9	2.0	3.3	3.9	7.2	8.9	10	17	18	33	37
Weight (kg) ⁽¹⁾		0.11	0.16	0.19		0.25		0.35		0.55			0.75			1.5			2		4		
Hysteresis ^{(2)*}		1%F.S.	2.5%F.S.										3%F.S.			5%F.S.							
Sensitivity*		0.5%F.S.	1%F.S.										1.5%F.S.			2%F.S.							
Repeatability*		± 0.5%F.S.	±1%F.S.										±1%F.S.			±2%F.S.							
Response Time*		10ms	30ms																				
Fluid		Air, Inert gas																					
Ambient and fluid temperature		0 to 50°C (No condensation)																					
Max. operating pressure		0.88MPa																					
Set pressure range		0.05MPa to Supply pressure																					
External pilot pressure		Setting pressure to 0.88MPa (VY1□01)																					
Command signal		1 to 5V DC, 0 to 10V DC, 4 to 20mA DC, 0 to 20mA DC																					
Power supply		12V DC ±10%, 24V DC ±10%, 1.8W or more																					
Electrical entry		DIN connector																					
Applicable cable		Cable O.D. ø4 to 6.5																					
Bleed air flow		When not operating: Zero, When operating: Max. 10ℓ/min {ANR} (supply pressure 0.88MPa)																					
Mounting orientation		Universal																					
Lubrication		Not required ⁽³⁾																					



Note 1) The weight of the base mounted style (D/B/2/4 size) with a subplate is indicated.

Note 2) The property values with a * mark indicate max. values.

Note 3) To lubricate to the secondary side of "VY", use "VY" as an external pilot. Avoid lubrication to the pilot air.

Options

Description		Part No.										
		VY1D00-M5	VY1A0 ⁰ ₁ -M5	VY1B0 ⁰ ₁ - ^{M5} ₀₁	VY110 ⁰ ₁ - ⁰¹ ₀₂	VY120 ⁰ ₁ - ⁰¹ ₀₂	VY130 ⁰ ₁ - ⁰² ₀₃ ⁰² ₀₄	VY140 ⁰ ₁ - ⁰² ₀₃ ⁰² ₀₄	VY150 ⁰ ₁ - ⁰⁴ ₁₀	VY170 ⁰ ₁ - ¹⁰ ₁₂	VY190 ⁰ ₁ - ¹⁴ ₂₀	
Braket (with bolt, washer)	B	—	VEXA-18-2	—	VEX1-18-1	—	VEX3-32	—	VEX5-32	VEX7-32	VEX9-32	
	F	—	VEXA-18-3	—	VEX1-18-2	—	—	—	—	—	—	
Pressure gauge	G	—	—	G27-10-R1-X207	G27-10-01		G36-10-01	—	G46-10-01			
Pilot EXH. port silencer	N	AN120-M5	—	—	AN120-M5		AN101-01	AN120-M5	AN210-02			

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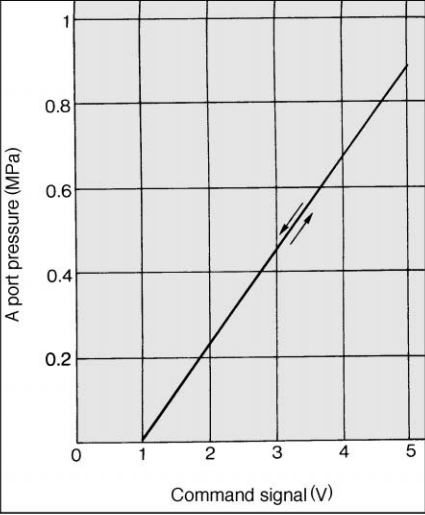
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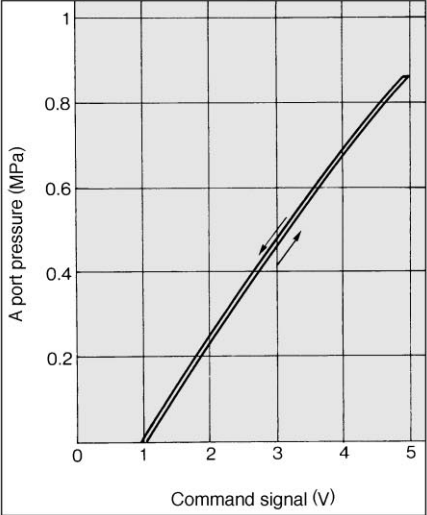
Characteristics

Signal-Secondary Pressure Characteristics (Characteristics of pressure setting)

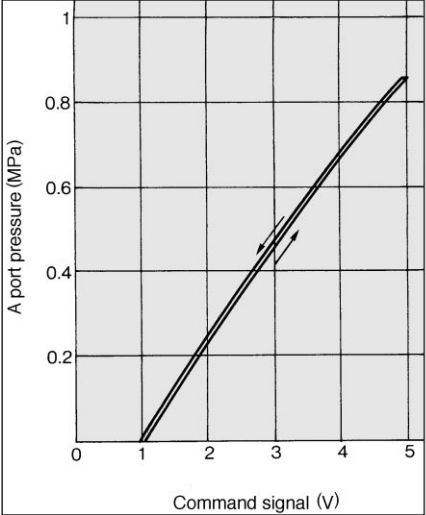
VY1D00



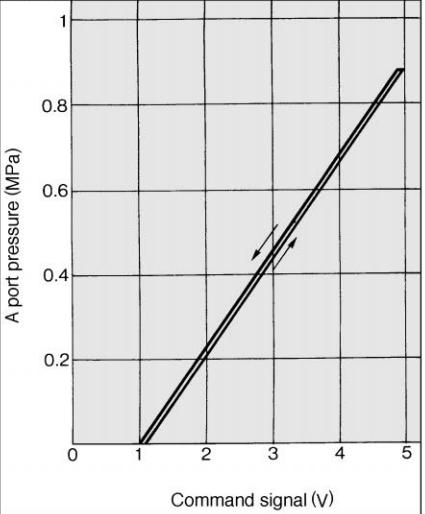
VY1A0⁰/1B0⁰



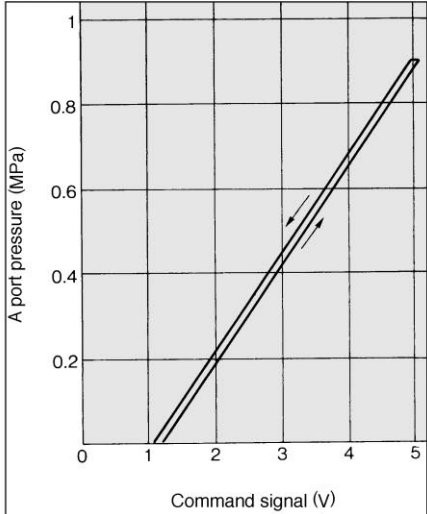
VY110⁰/120⁰



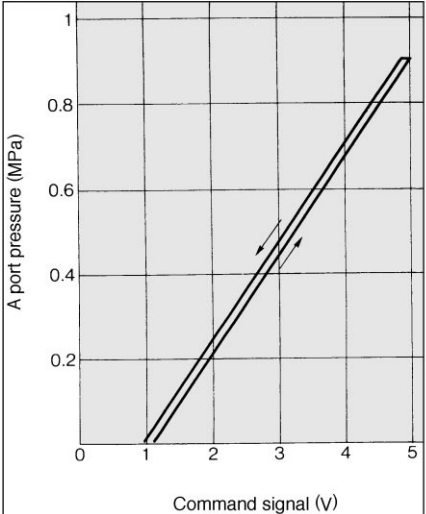
VY130⁰



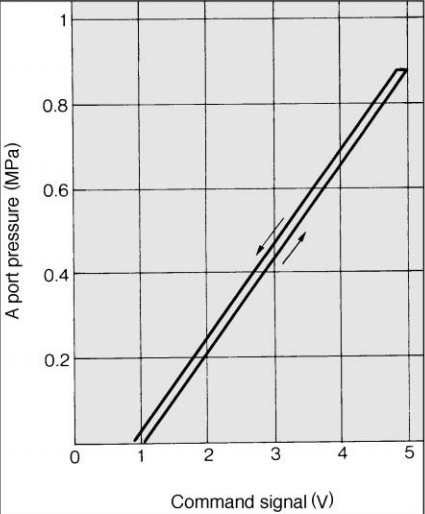
VY140⁰



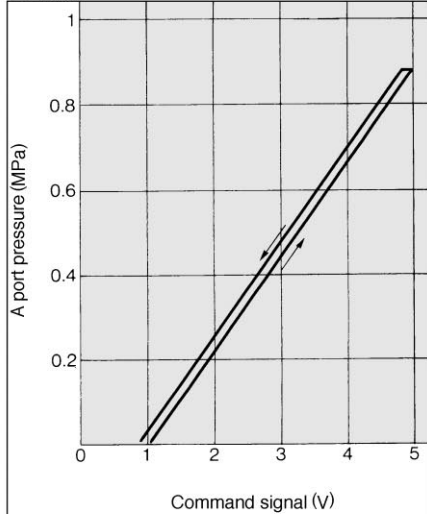
VY150⁰



VY170⁰

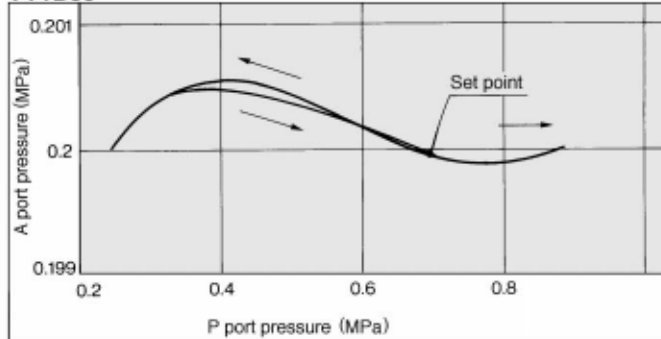


VY190⁰

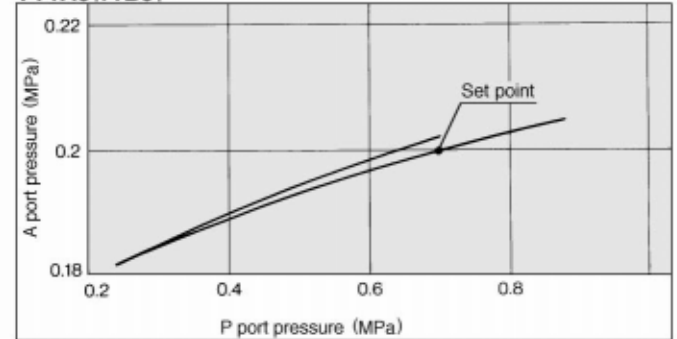


Pressure Characteristics

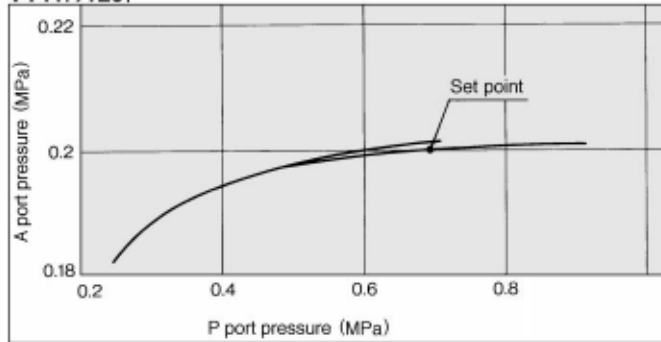
VY1D00



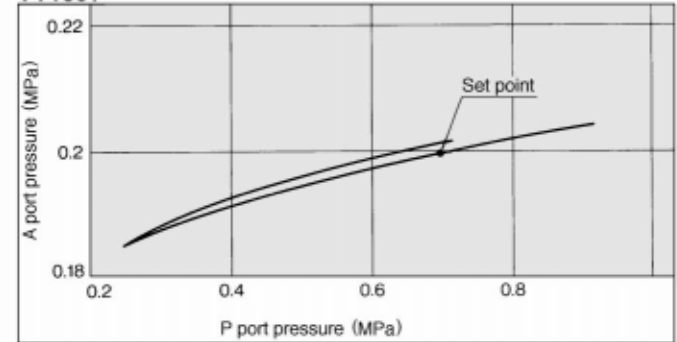
VY1A0⁰/1B0⁰



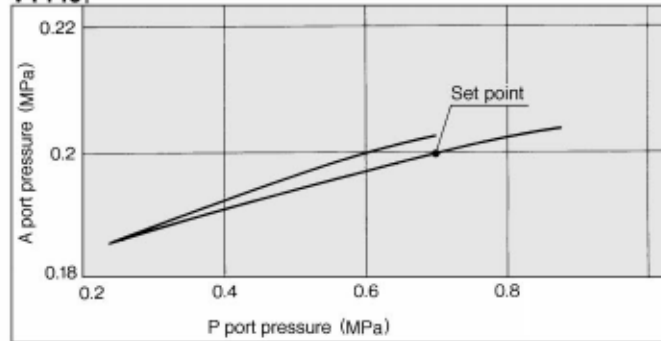
VY11⁰/120⁰



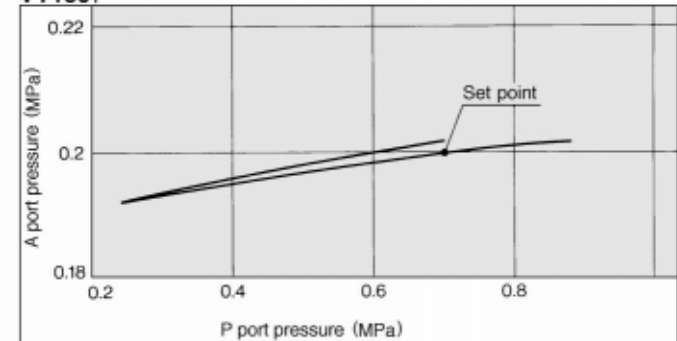
VY130⁰



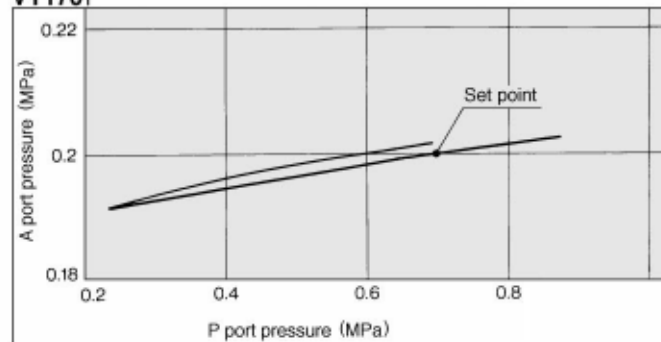
VY140⁰



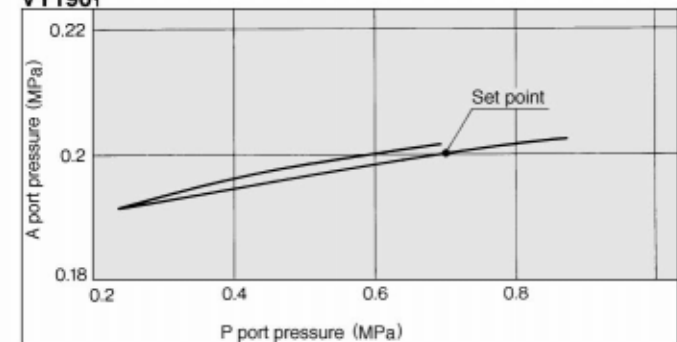
VY150⁰



VY170⁰



VY190⁰



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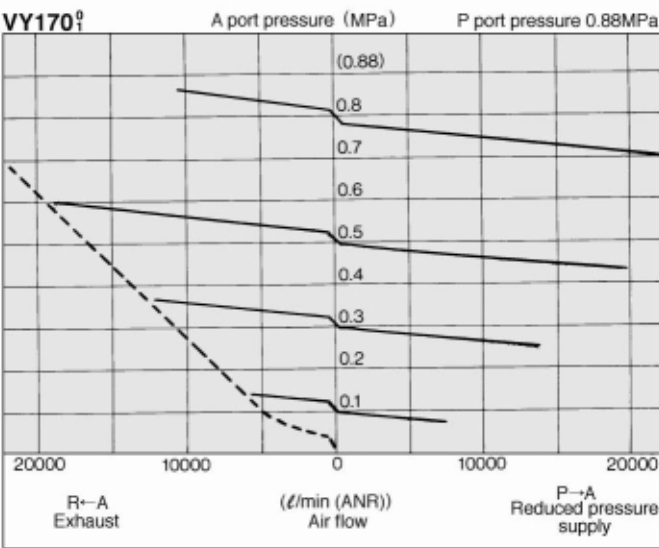
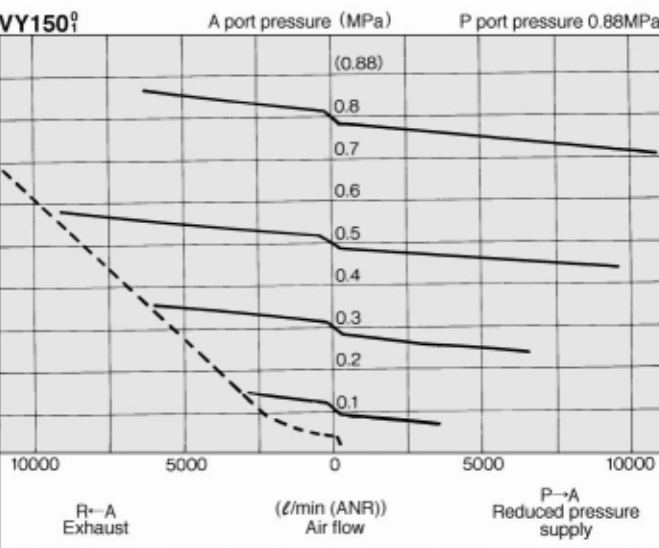
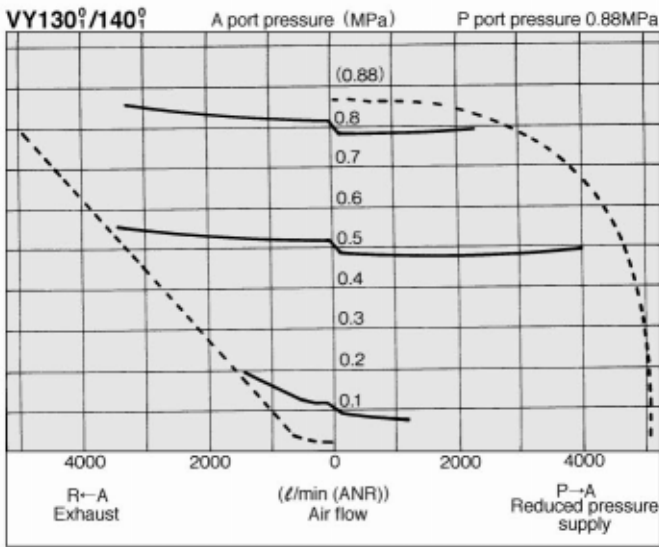
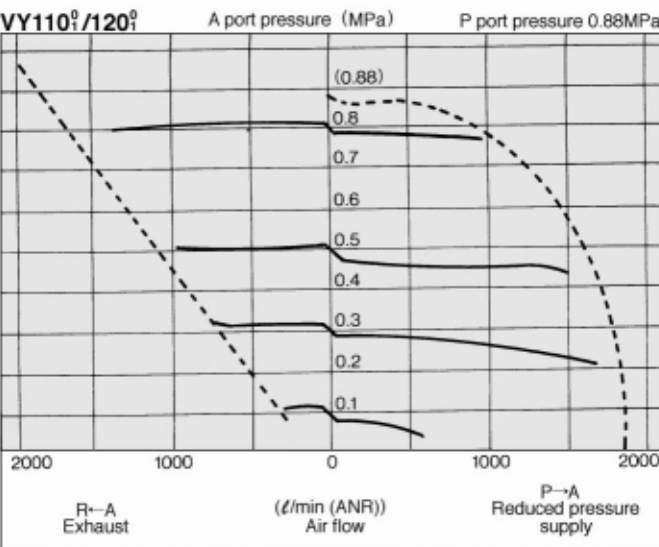
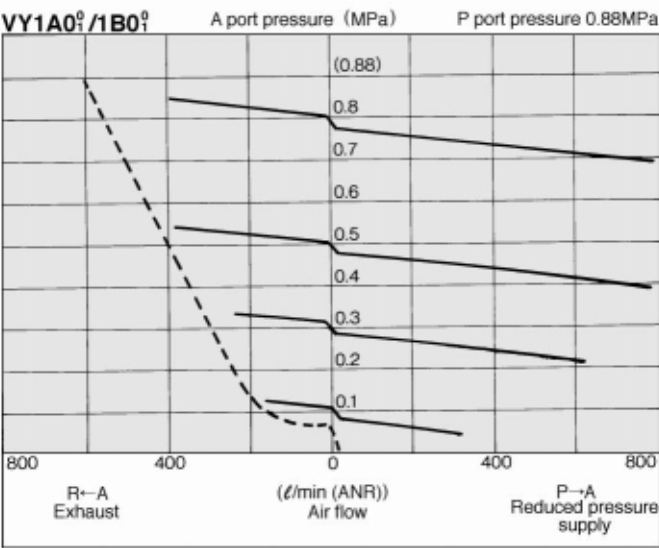
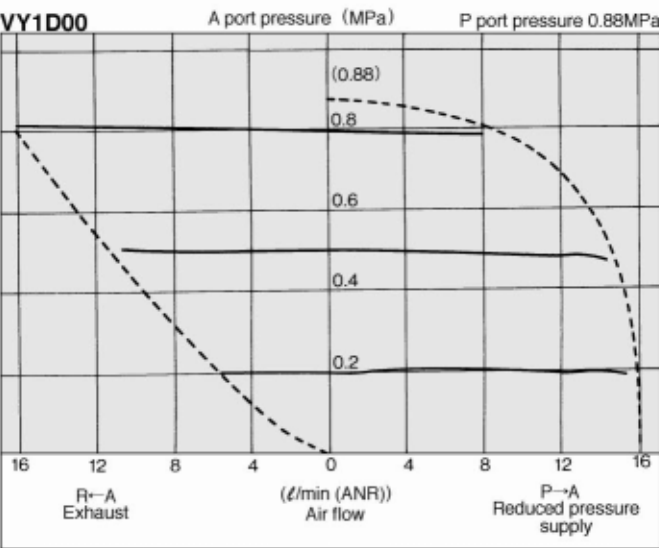
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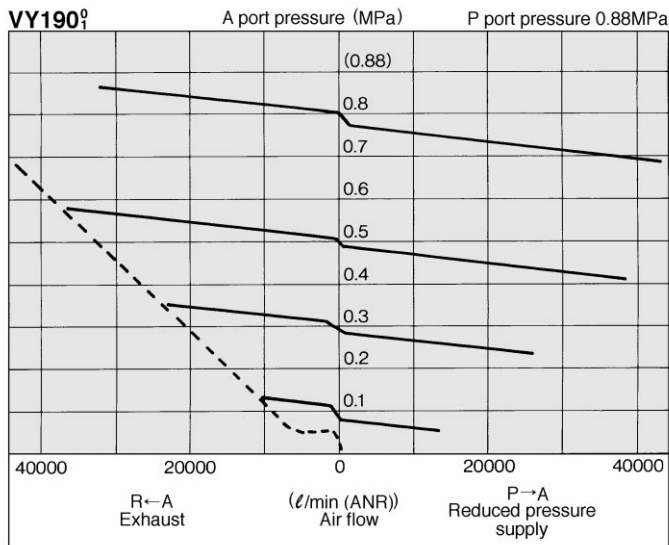
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Series VY1

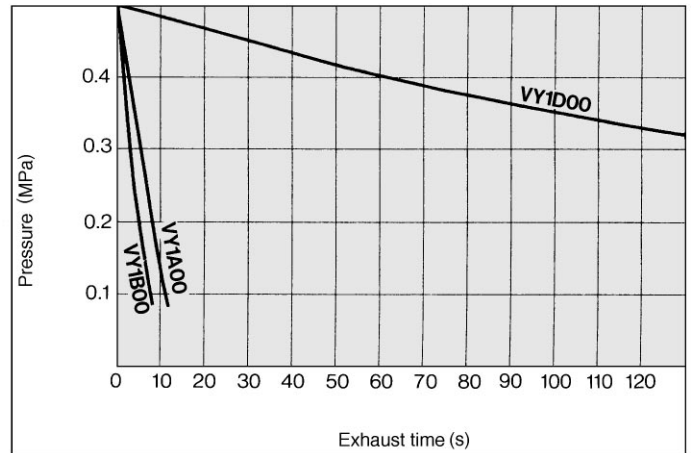
Characteristics

Flow Characteristics

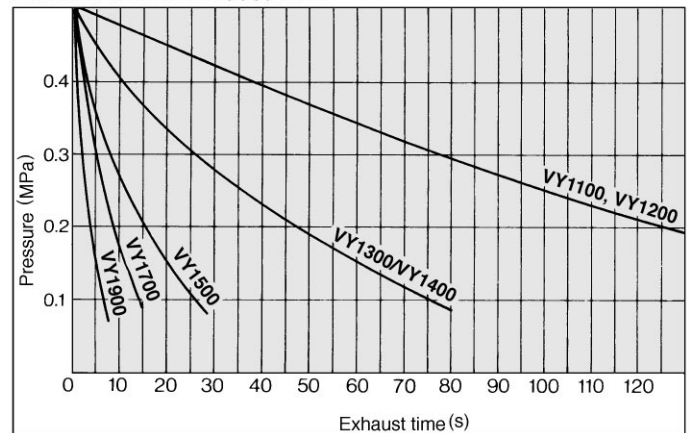




② Exhaust time from 10ℓ tank

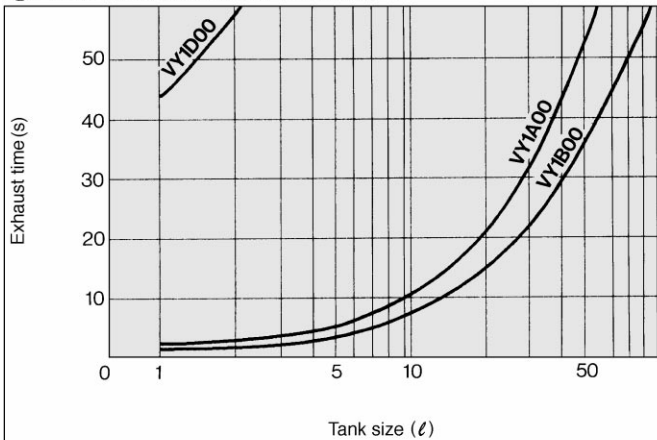


Exhaust time from 1000ℓ tank

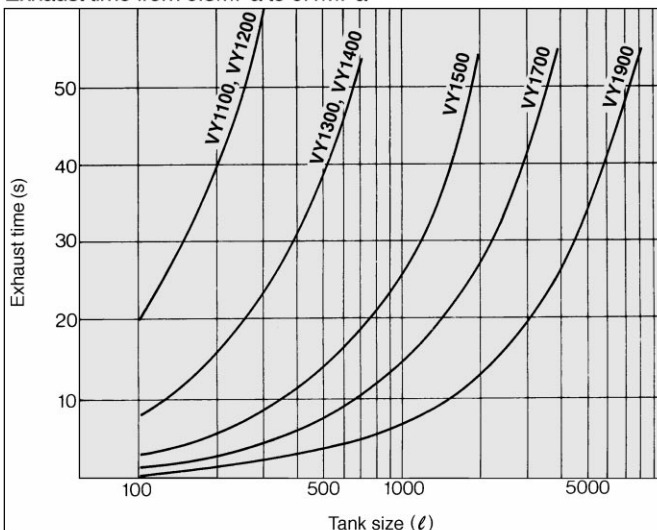


Exhaust time

① Exhaust time from 0.5MPa to 0.1MPa



Exhaust time from 0.5MPa to 0.1MPa



③ Exhaust time from optional pressure point

[Ex.] Using VY1500, lower the 500ℓ tank pressure from 0.4 to 0.1.

a) If describing the above graph in accordance with graphs, the exhaust time is read; 27-3 = 24S.

b) Then, to convert the time into one from a 500ℓ tank.

$$t = \frac{\text{Tank capacity}}{1000} \times \left[\text{Read ex-haust time} \right]$$

$$= \frac{500}{1000} \times 24$$

$$\cong 12$$

Then, the result is 12S.

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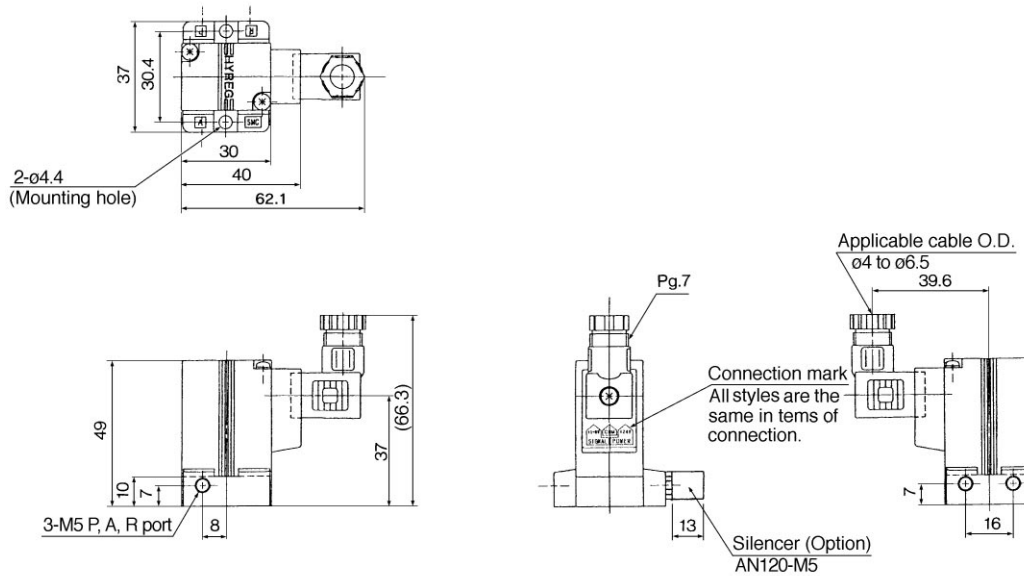
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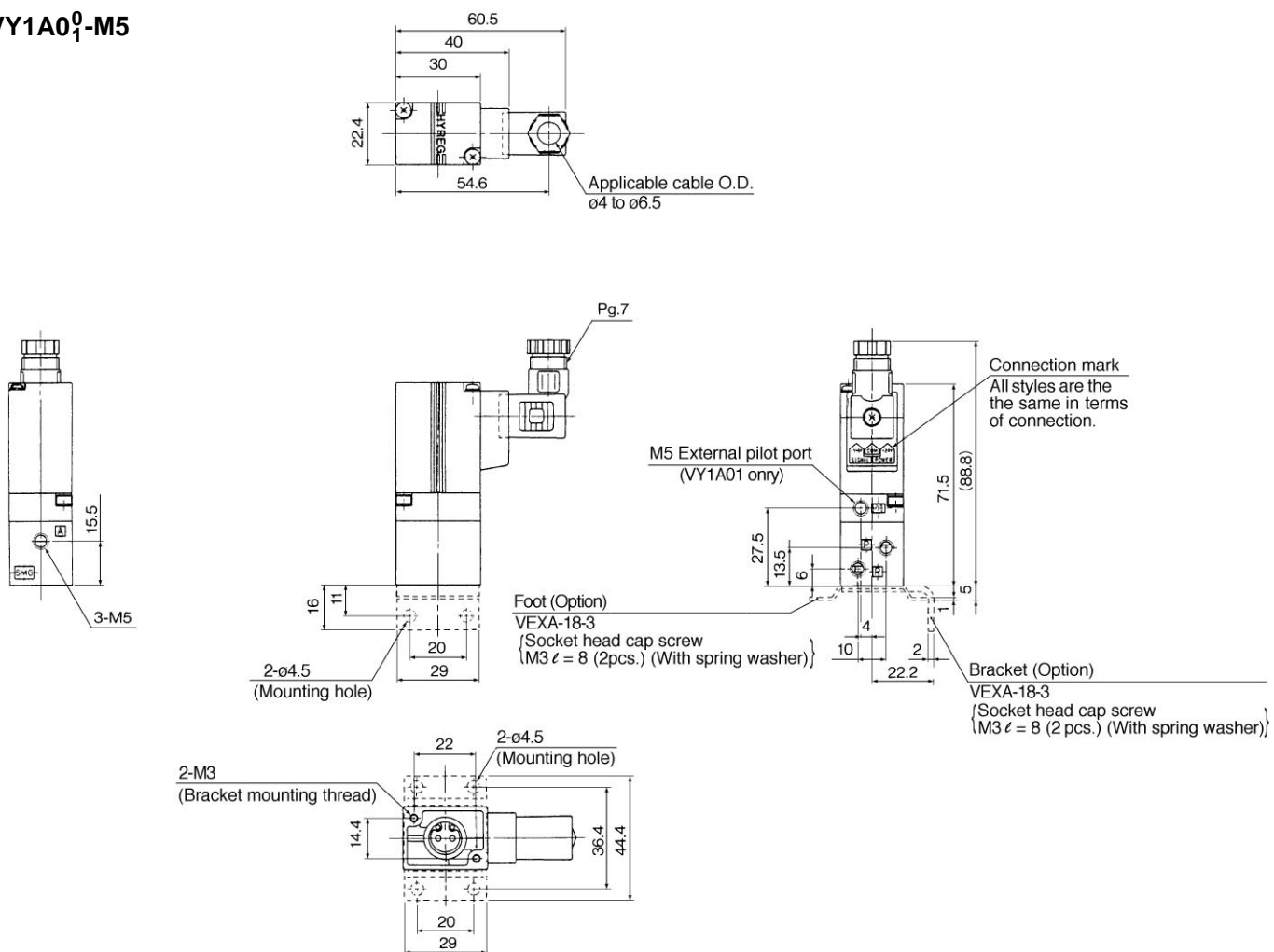
Series VY1

Dimensions

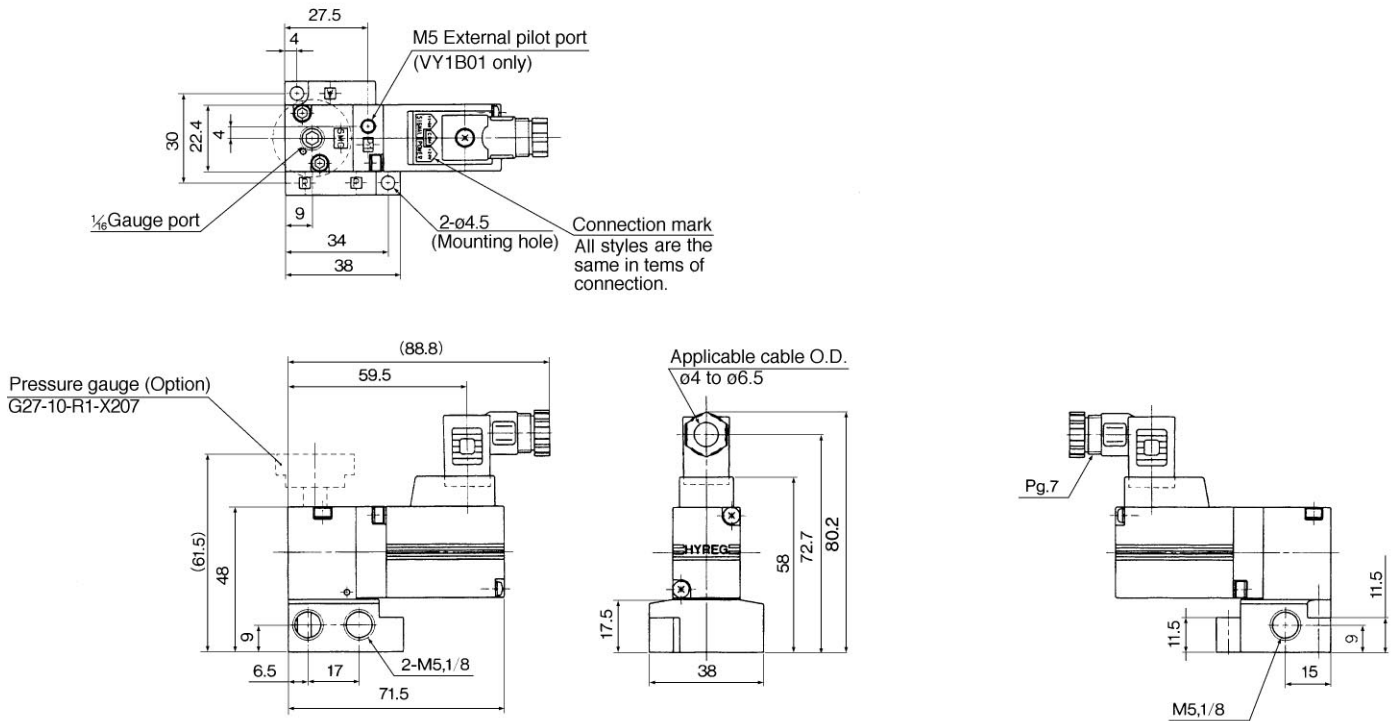
VY1D00-M5



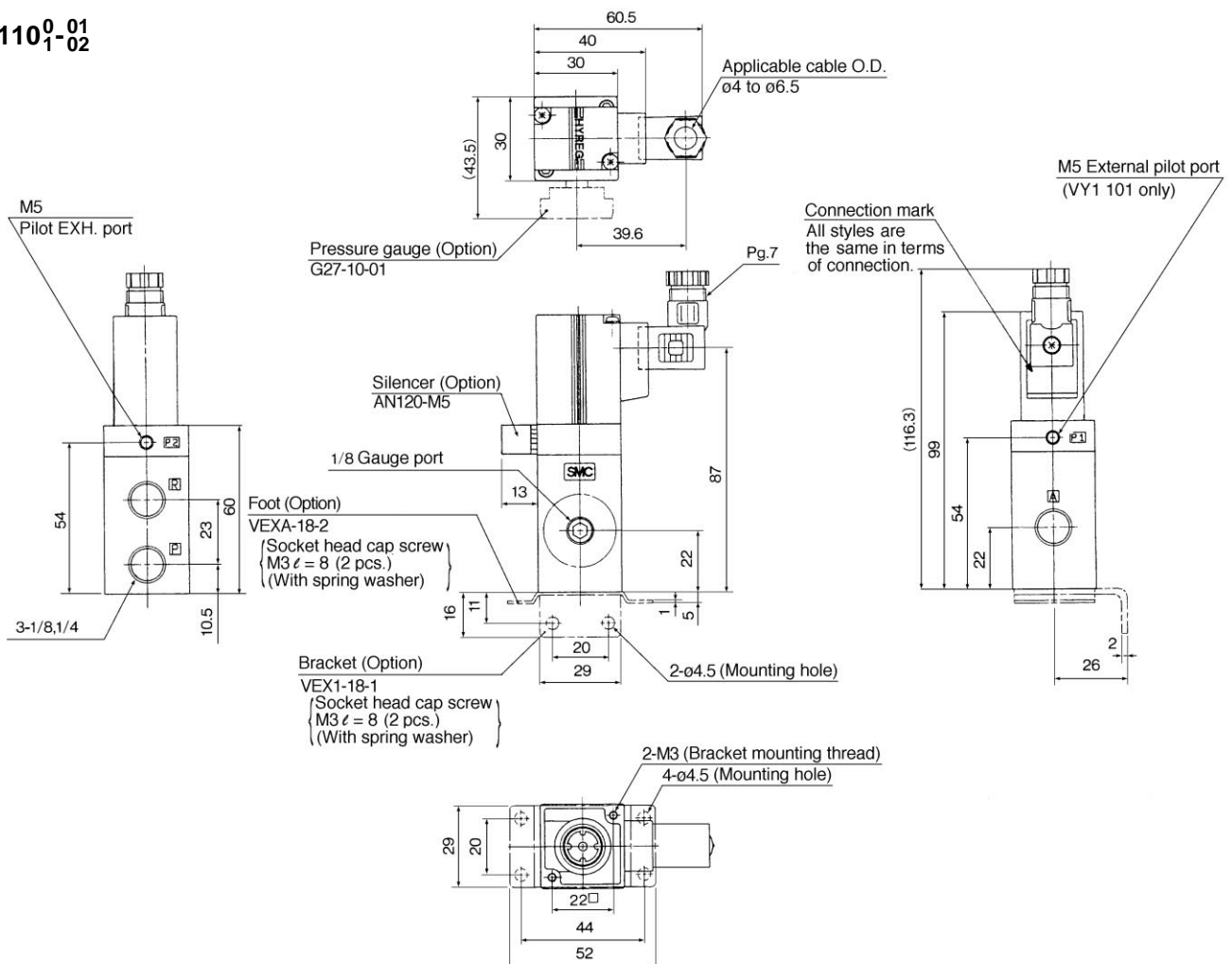
VY1A01-M5



VY1B0⁰₁-M5



VY110⁰₁-02



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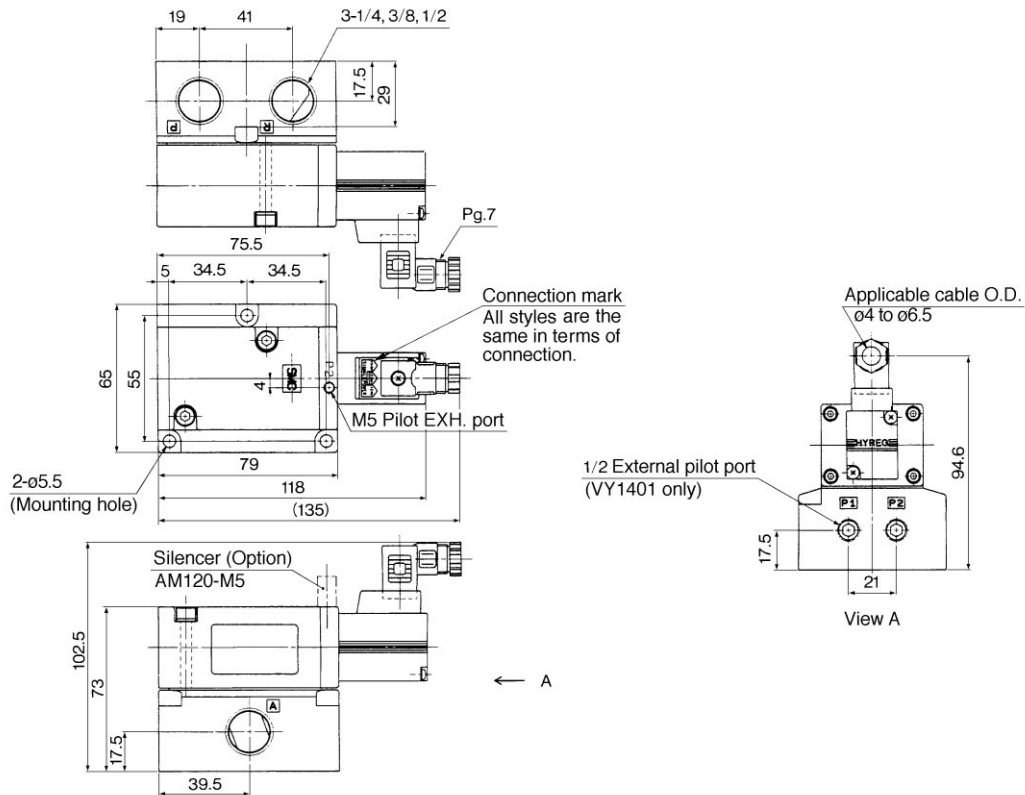
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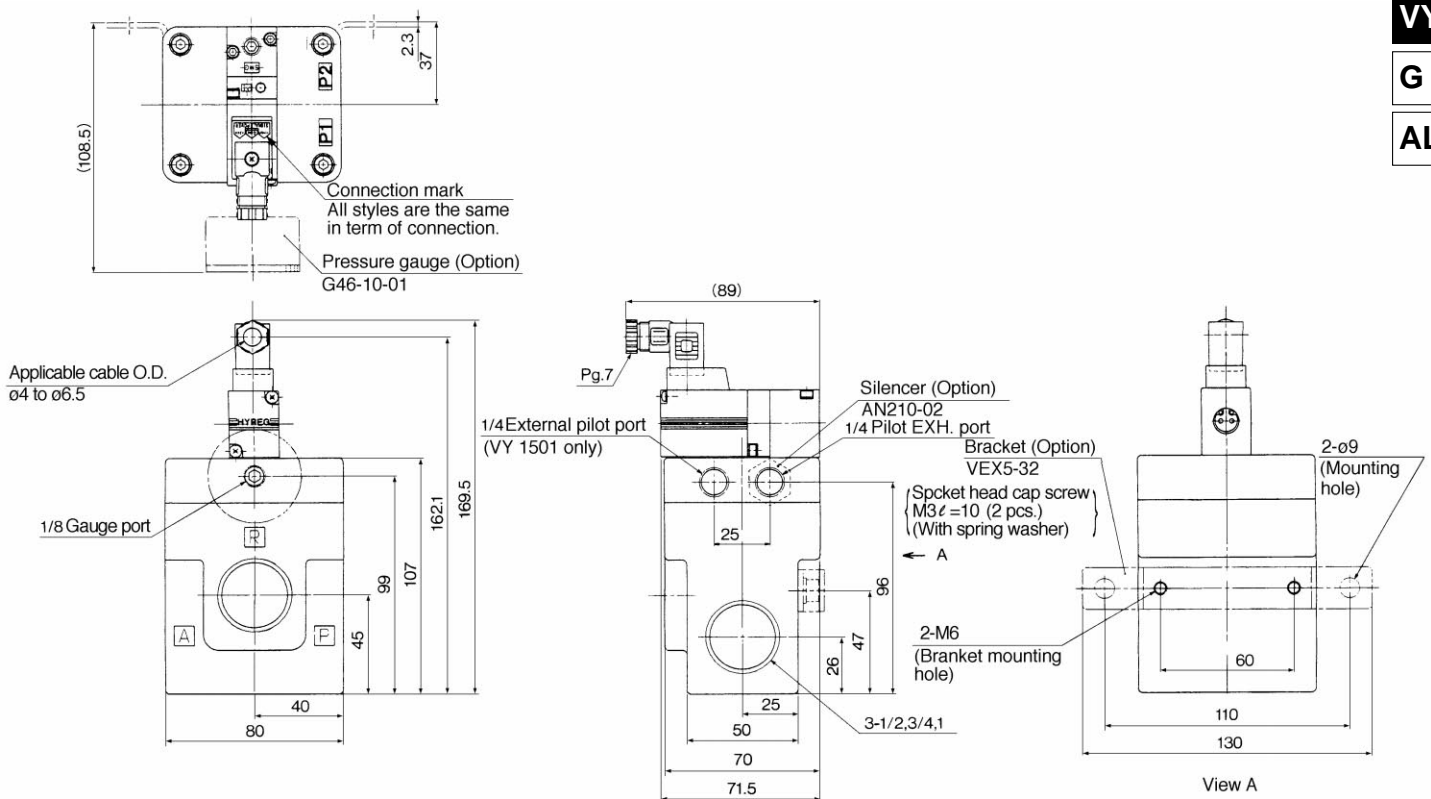
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VY140⁰²₁₋₀₃
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VY150⁰⁴₁₋₀₆
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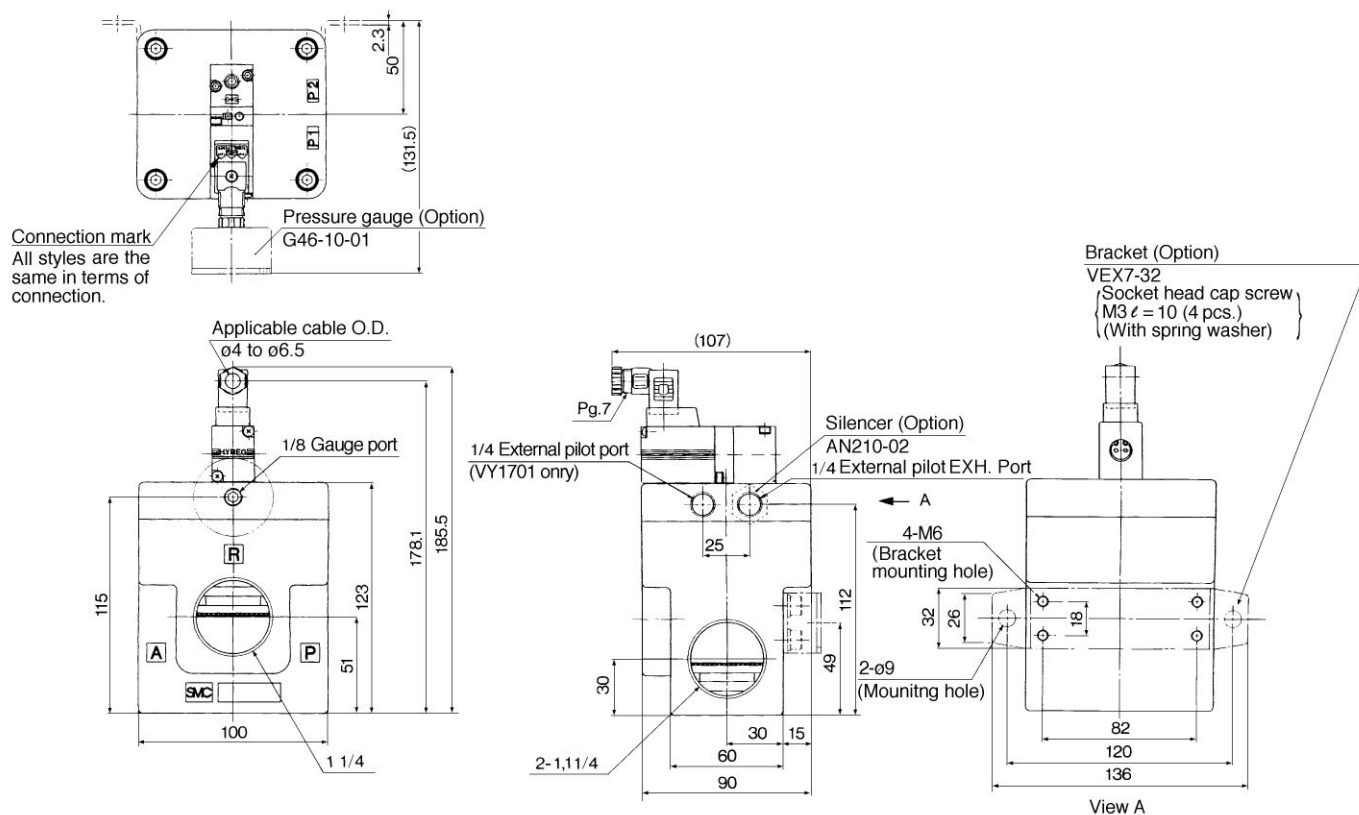
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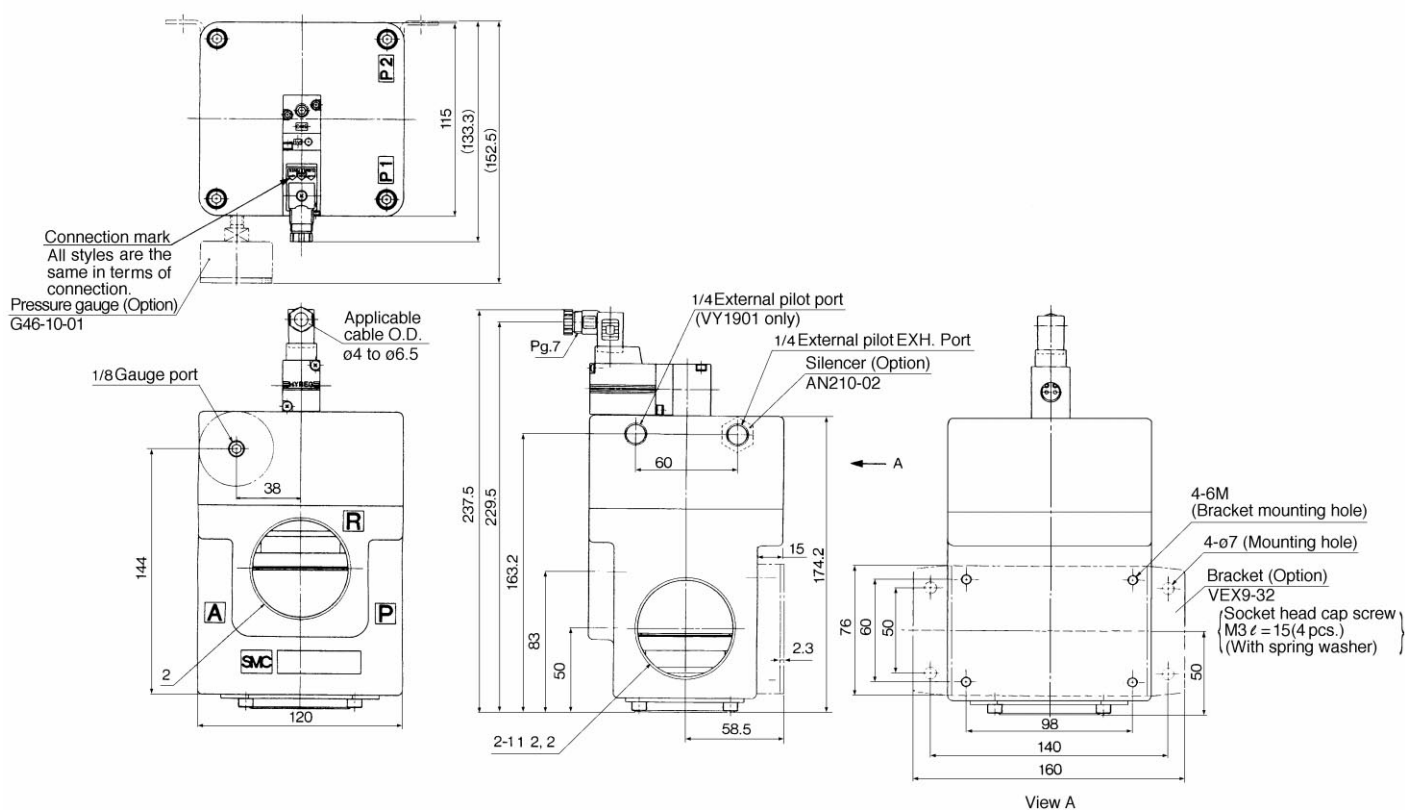
Series VY1

Dimensions

VY170⁰⁻¹⁰₁₋₁₂



VY190⁰⁻¹⁴₁₋₂₀



⚠ Precautions

- Be sure to read before handling.
- Refer to p.0-26 and 0-27 for Safety Instruction and common precautions on the products mentioned in this catalog.

Piping

⚠ Caution

① Tightening the fittings and their torque

When screwing fittings into the valves, 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	1.5 to 2 \cong $\frac{1}{6}$ rotation
Rc(PT) $\frac{1}{8}$	7 to 9
Rc(PT) $\frac{1}{4}$	12 to 14
Rc(PT) $\frac{3}{8}$	22 to 24
Rc(PT) $\frac{1}{2}$	28 to 30
Rc(PT) $\frac{3}{4}$	28 to 30
Rc(PT)1	36 to 38
Rc(PT)1 $\frac{1}{4}$	40 to 42
Rc(PT)1 $\frac{1}{2}$	48 to 50
Rc(PT)2	48 to 50

Operating air quality

⚠ Caution

Poor quality air could increase the spool's sliding resistance. Use compressor oil with a minimal generation of oxidants and install a mist separator (SMC's AM series). Refer to "Compressed Air Cleaning Systems" in Best Pneumatics 4.

Pressure gauge

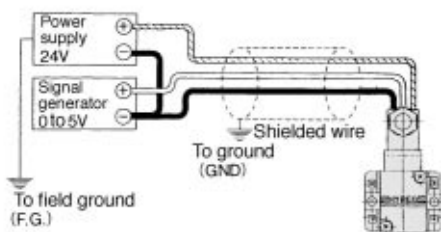
⚠ Caution

If equipped with a pressure gauge, be aware of the possibility of the gauge being affected due to sudden pressure fluctuations.

Wires to be used

⚠ Caution

Use 3 core shielded wires measuring 0.5 (mm²) for the power supply and signal lines according to the respective number of conductors. When connecting the shielded braided wire, connect it to the ground of the signal generator. As a rule, the electro-pneumatic hybrid regulator should be installed in a location that is free of noise or is shielded. If it must be installed in an environment with poor noise conditions, eliminate the power supply noise by using a line filter, Z-wrap, or a spark killer on the 100V power supply or signal source line. The length of the power supply and signal lines must be kept as short as possible.



How to use DIN connector

⚠ Caution

● Wiring procedures

- Loosen the retaining screw and pull the connector from the solenoid valve terminal block.
- Remove the retaining screw, insert a flat head screw driver into the groove below the terminal block and pry it up to separate the terminal block from the housing.
- Loosen the terminal screws (slot head screws) on the terminal block. Then, in accordance with the wiring procedure, insert the cores of the lead wires into the terminals and tighten the terminal screws to secure the wires in place.
- Tighten the ground nut to secure the cord.

● Outlet changing procedure

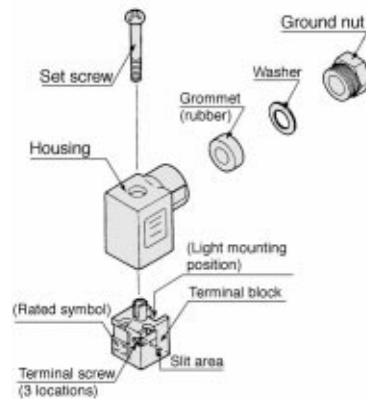
After the terminal block has been separated from its housing, reassemble the housing in the desired direction (in four 90° increments) to change the cord outlet.

● Precaution

Make sure to push or pull the connector straight, without tilting it diagonally.

● Applicable wire

Cord external diameter: $\phi 4$ to $\phi 6.5$
c.f. 0.5mm² 3-core wire (JISC3306 equivalent)



- Connector part no.: VK300-82-1

Related Products

Silencer (Series AN)

- Noise reducing effect: 30dB or more.
- Large effective area



Model	Connection R(PT)	Effective area (mm ²)
AN120	M5 X 0.8	5
AN110	$\frac{1}{8}$	35
AN200	$\frac{1}{4}$	35
AN300	$\frac{3}{8}$	60
AN400	$\frac{1}{2}$	90
AN500	$\frac{3}{4}$	160
AN600	1	270
AN700	1 $\frac{1}{4}$	440
AN800	1 $\frac{1}{2}$	590
AN900	2	960

- Refer to p.5.2-1 in Best Pneumatics 1 for details.

Exhaust cleaner (Series AMC)

- Provides noise reduction and oil mist collecting functions.
- Can also be used in a common piping system.



Model	Connection R(PT)	Effective area (mm ²)	Max. flow capacity (L/min(ANR))
AMC310	$\frac{3}{8}$	16	300
AMC510	$\frac{3}{4}$	55	1,000
AMC610	1	165	3,000
AMC810	1 $\frac{1}{2}$	330	6,000
AMC910	2	550	10,000

- Oil mist removal: 99.9%
- Noise reduction effect: 35dB or more
- Refer to p.5.3-1 in Best Pneumatics 1 for details.

AC

AV

AU

AF

AR

IR

VEX

AW

AMR

AWM

AWD

ITV

VBA

VE

VY

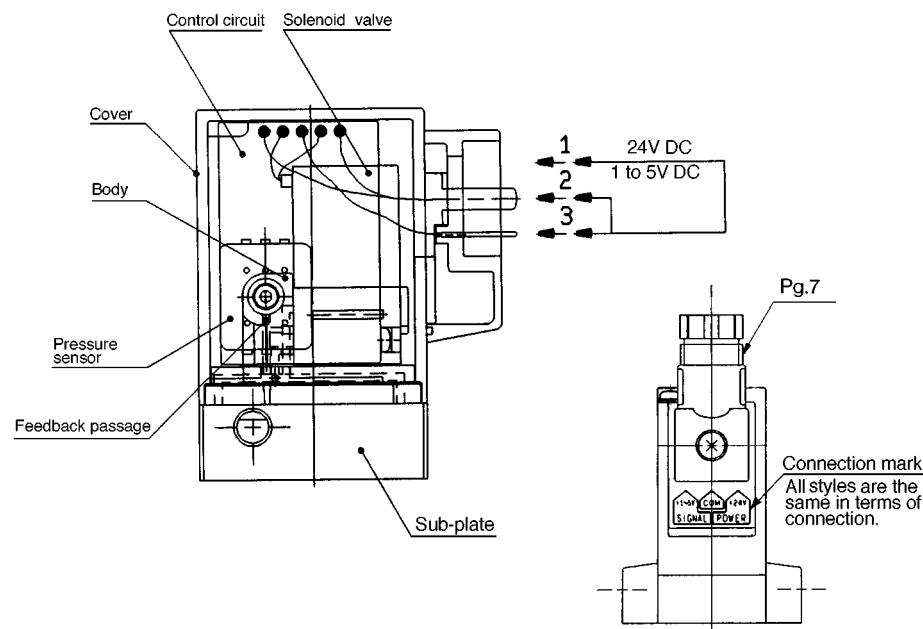
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AL

Series VY1

Construction/Operation Principles

VY1D00-M5

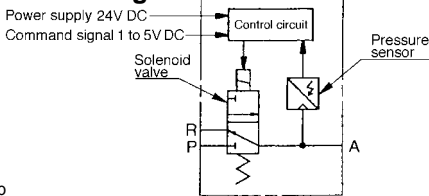


The VY1D00, which is the smallest direct drive, consists of a solenoid, pressure sensor, control circuit, body cover, and a sub plate. The style with a sub plate can be used alone, and the style without a sub plate can also be used as a pilot valve.

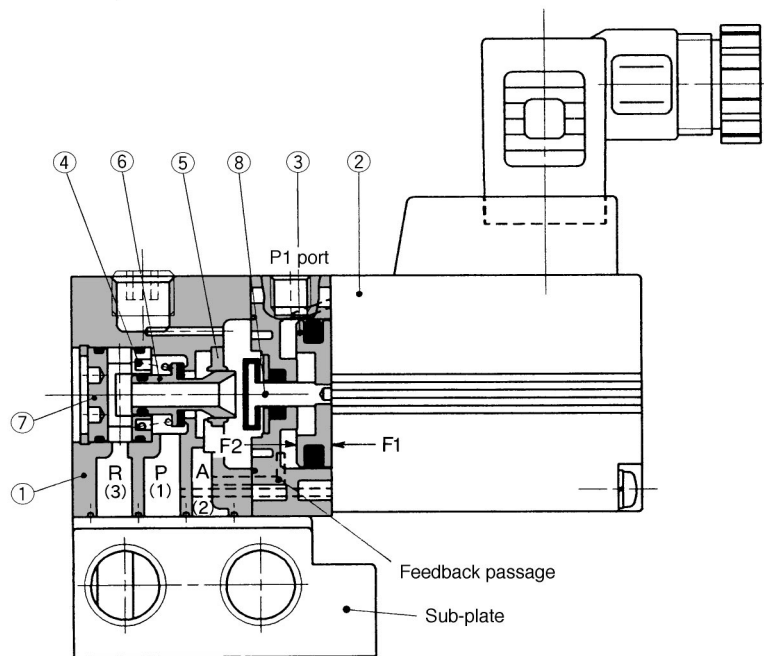
Operation Principles

- When the command signal is below 1V DC, the solenoid valve is inactive, and the port A pressure is zero.
 - When a command signal between 1 and 5V DC is provided, the solenoid is activated. The port A pressure is fed back to the control circuit by the pressure sensor.
 - The control circuit compares the feedback signal with the size of the command signal that was provided, and:
 - 1) If the feedback signal is smaller, current is supplied to the solenoid valve to raise the port A pressure (from P to A).
 - 2) If the feedback signal is greater, current is not supplied to the solenoid valve to reduce the port A pressure (from A to R).
- *The above processes 1) and 2) are repeated at high speeds to establish the port A pressure.

Circuit diagram



VY1A0⁰₁, VY1B0⁰₁ (Pilot valve: VY1D00-00)



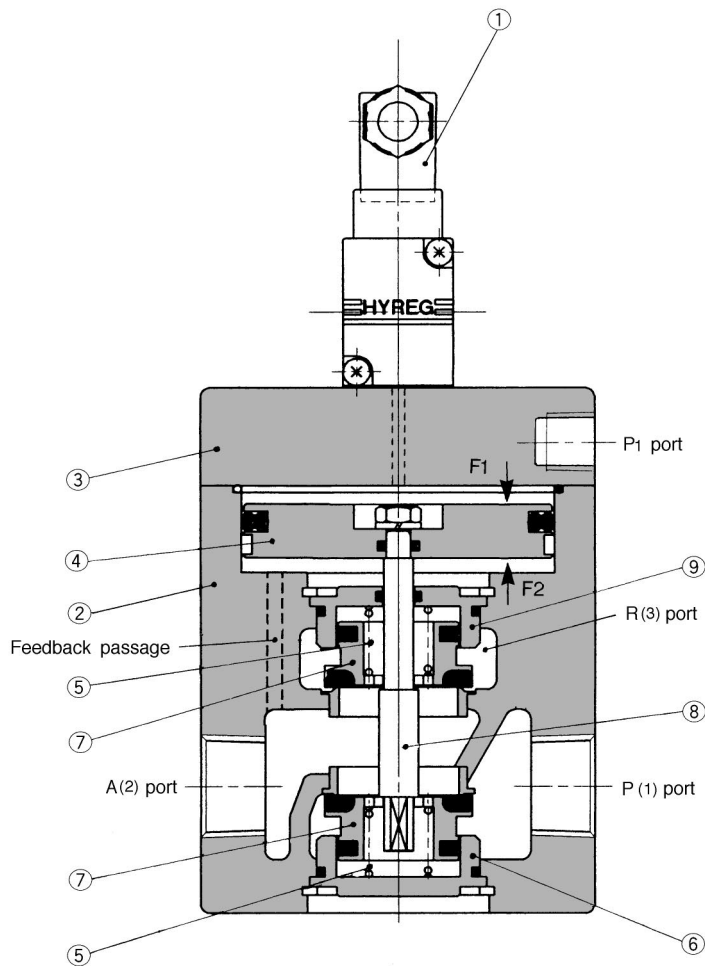
Operation Principles

- The supply (P to A) valve of valve ⑥ and the exhaust (A to R) valve close due to the balance between actuating forces F1 and F2. Actuating force F1 is applied to the right surface of pressure regulation piston ③ by the pilot pressure (pilot valve assembly ②: VY1D00-00), and actuating force F2 is applied to the left surface of the pressure regulation piston by the port A pressure that passes through the feedback passage. Thus, the port A pressure that corresponds to the pilot pressure is established.
- When the port A pressure becomes higher than the pilot pressure, F2 becomes greater than F1. This causes only the pressure regulation piston to move to the right, and the exhaust valve seat to open, allowing the air to be discharged from port A to port R. When the port A pressure drops to reach a balance, the regulator returns to the set state.
- Conversely, if the port A pressure is lower than the pilot pressure, F2 becomes lower than F1. This causes the pressure regulating piston to move the valve to the left, and the supply valve seat to open, allowing the air to be supplied from port P to port A. When the port A pressure balances, the regulator returns to the set state.

Component Parts

No.	Description	Material
①	Body	Zinc alloy die cast
②	Pilot valve ass'y	—
③	Adjusting piston	Aluminum alloy
④	Spring	Stainless steel
⑤	Valve guide	Stainless steel
⑥	Valve	NBR
⑦	Retainer	Aluminum alloy
⑧	Rod	NBR

VY110₁⁰, VY120₁⁰, VY130₁⁰, VY140₁⁰ (Pilot valve: VY1D00-00)
 VY150₁⁰, VY170₁⁰, VY190₁⁰ (Pilot valve: VY1B00-00)



Operation Principles

●The pair of poppet valves ⑦ close due to the balance between actuating forces F1 and F2. Actuating force F1 is applied to the top surface of pressure regulation piston ④ by the pilot pressure (pilot valve assembly ①: VY1_B00-00), and actuating force F2 is applied to the bottom surface of the piston by the port A pressure that passes through the feedback passage. Thus, the port A pressure that corresponds to the pilot pressure is established. The poppet valve, which maintains a pressure balance with the port A pressure, is backed up by spring ⑤ (refer to the diagram on the left).

●When the port A pressure becomes higher than the pilot pressure, F2 becomes higher than F1. This causes the pressure regulation piston to move upward, and the top poppet valve to open, allowing the air to be discharged from port A to port R. When the port A pressure drops to reach a balance, the regulator returns to the state shown in the diagram to the left.

●Conversely, if the port A pressure is lower than the pilot pressure, F2 becomes less than F1. This causes the pressure regulation piston to move downward, and the lower poppet valve to open, allowing the air to be supplied from port P to port A. When the port A pressure rises to reach a balance, the regulator returns to the state shown in the diagram to the left.

Component Parts

No.	Description	Material
①	Pilot valve ass'y	—
②	Body	Zinc alloy die cast
③	Cover	Zinc alloy die cast
④	Adjusting piston	Aluminum alloy
⑤	Spring	Stainless steel
⑥	Valve guide	NBR
⑦	Poppet valve	Stainless steel
⑧	Shaft	Aluminum alloy
⑨	Valve guide	NBR

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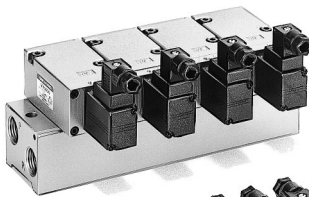
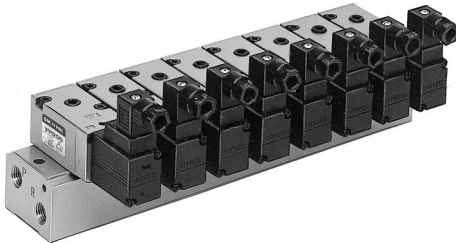
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E-P HYREG Manifold

Using the VVEXB/2/4 series, a maximum 10 station manifold is possible.



Specifications

Applicable valve	VY1B0 ₁	VY120 ₁	VY140 ₁
Valve stations ⁽¹⁾	2 to 10 stations	2 to 8 stations	2 to 6 stations
Passage	Common supply/exhaust		
Pilot style	Internal pilot, Common external pilot		
Pilot port size	M5		
Port size P, A, R port	1/8	1/4	1/4, 3/8, 1/2
Blank plate ass'y ⁽²⁾	VEXB-6	VEX1-17	VEX4-5

Note1) VY1B0₁: 6 stations or more, VY120₁: 5 stations or more, VY140₁: 4 stations or more

Supply pressure to the P ports on both sides of the manifold and exhaust pressure from the R port on the both sides.

Note2) Gasket and mounting bolts are equipped.

How to Order

VVEX B 1 5 01

Piping thread

—	Rc(PT)
T	NPTF
F	G(PF)
N	NPT

Enter the valves and the blank plates to be placed on a manifold in order, starting at the left side of the manifold base (with port A facing you).

Ex.) VVEX2-2-5-02

·VY1200-00-G-4 pcs.

·VEX1-17 —1 pc.

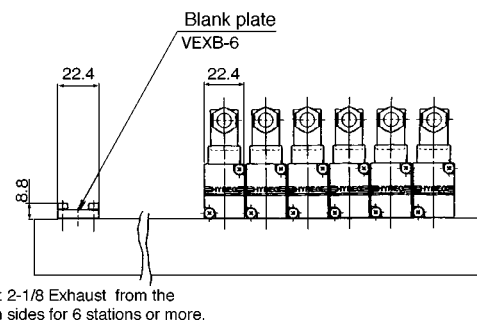
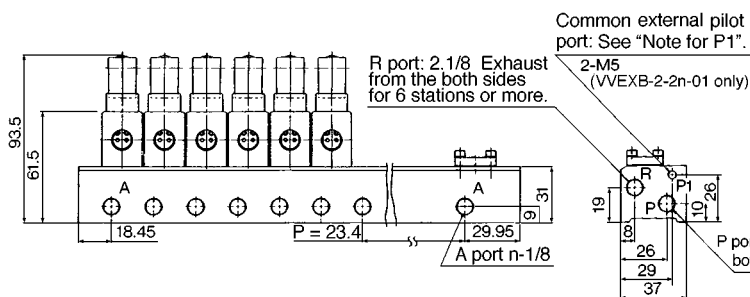
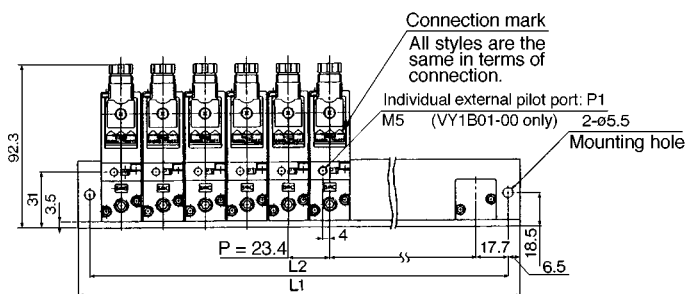
Body size Pilot style Valve stations Piping port size

B	For VY1B0 ₁		Pilot style	Valve stations	Piping port size	P.R	A
1	For VY1B0 ₁	1	Internal pilot	22* 2 stations	01	1/8	
		2	Common external pilot	210* 10 stations			
2	For VY120 ₁	1	Internal pilot	2 2 stations	02	1/4	
		2	Common external pilot	8 8 stations			
4	For VY140 ₁	1	Internal pilot	2 2 stations	A	3/8	1/4
		2	Common external pilot	6 6 stations			

*In the case of VVEXB, the "2" in the first digit of the valve station number is a dummy part number.

Dimensions

VVEXB



Note for P1

Confirm internal pilot or common external pilot by checking whether P1 has a M5 screw or not.
Internal pilotP1 has no M5 screw.
Common external pilotP1 has an M5 screw.

Stations	2	3	4	5	6	7	8	9	10
L1	71.8	95.2	118.6	142	165.4	188.8	212.2	235.6	259
L2	58.8	82.2	105.6	129	152.4	175.8	199.2	222.6	246

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AMR
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VY
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AL