

SOLENOID VALVES

PA SERIES

Specifications

Basic Models and Valve Functions

Item	Basic model	For direct piping, F type Manifold	PA24□F5	PA24□F6	PA24□F7, PA24□F8, PA24□F9
		For sub-base piping For A type and B type Manifolds	PA24□A5	PA24□A6	PA24□A7, PA24□A8, PA24□A9
Number of positions		2 positions			3 positions
Number of ports		5			
Valve function		Single solenoid	Double solenoid ^{Note}	Closed center, Exhaust center, Pressure center	

Remark: For the specifications and order codes, see p.675~677.

Note: 2-position double solenoid valve can be switched to a single solenoid valve. For details, see p.665.

Specifications

Item	Basic model	For direct piping For F type Manifold	PA24□F5	PA24□F6	PA24□F7 PA24□F8 PA24□F9	PA24□F5G	PA24□F6G	PA24□F7G PA24□F8G PA24□F9G	PA24□F5V	PA24□F6V	PA24□F7V
		For sub-base piping For A type and B type Manifolds	PA24□A5	PA24□A6	PA24□A7 PA24□A8 PA24□A9	PA24□A5G	PA24□A6G	PA24□A7G PA24□A8G PA24□A9G	PA24□A5V	PA24□A6V	PA24□A7V
Media		Air									
Operation type		Internal pilot type			External pilot type (for positive pressure)			External pilot type (for vacuum)			
Effective area (Cv) ^{Note1}		mm ²		25{1.4}, 36{2.0}							
Port size ^{Note2}		Rc1/4, 3/8									
Lubrication		Not required									
Operating pressure range	Main valve	0.2~1.0MPa {2~10.2kgf/cm ² } [29~145psi.]			0~1.0MPa {0~10.2kgf/cm ² } [0~145psi.]			0.2MPa~-100kPa {2kgf/cm ² ~-750.1mmHg} [29psi.~-29.53in.Hg]			
	External pilot	—			0.2~1.0MPa {2~10.2kgf/cm ² } ^{Note3} [29~145psi.]			0.2~0.5MPa {2~5.1kgf/cm ² } ^{Note7} [29~73psi.]			
Proof pressure ^{Note4}		MPa {kgf/cm ² } [psi.]		1.5 {15.3} [218]							
Response time ^{Note5} ON/OFF		ms	45/25	25/30	25/35	45/25	25/30	25/35	45/25	25/30	25/35
Maximum operating frequency		Hz	5								
Minimum time to energize for self holding ^{Note6}		ms	—	50	—	—	50	—	—	50	—
Operating temperature range (Atmosphere or media) °C [°F]		5~50 [41~122]									
Shock resistance	m/s ² [G]	1373 {140.0}			1373 {140.0}			1373 {140.0}			
		Pilot valve axial direction 294.2 {30.0}			Pilot valve axial direction 294.2 {30.0}			Pilot valve axial direction 294.2 {30.0}			
Mounting direction		Any									
Environmental protection		IP65 or equivalent (optional)									

Notes: 1. For details, see the effective area on p.672.

2. For details, see the port size on p.672.

3. When the main valve is 0.2~1.0MPa [29~145psi.], set the external pilot pressure to the same pressure as the main valve or larger, and at 1.0MPa [145psi.] or smaller.

4. The proof pressure is the pressure at which no damage, rupture, or external leaking can occur when maintained for 1 minute; it is not supposed to be used continuously.

5. The value when air pressure is at 0.5MPa [73psi.]. The 3-position shows the value when the valve is switched from the neutral position.

A maximum of 5ms should be added to the response time for AC specifications, depending on the timing of the switching phase.

6. For a double solenoid

7. The recommended value. Can be used up to a maximum of 1.0MPa [145psi.].

Solenoid Specifications

Item	Rated voltage	DC24V ^{Note}	AC100V ^{Note}	AC200V ^{Note}		
		Operating voltage range	V	21.6~26.4 (24±10%)	90~110 (100±10%)	180~220 (200±10%)
Rated frequency	Hz	—	50	60	50	60
Current (when rated voltage is applied)	mA (r.m.s)	42	11	6.5		
Power consumption		1.0W	1.1VA	1.3VA		
Allowable leakage current	mA	2.0	1.0	1.0		
Insulation resistance	MΩ	Over 100 (value at DC500V megger)				
Wiring type and lead wire length	mm [in.]	Grommet type, cabtyre cable (300 [11.8], 1000 [39], 3000 [118]), and DIN connectors				
Color of lead wire		Red (COM), Black (14SA side), White (12SB side)				
Color of LED indicator		Red (14SA side), Green (12SB side)				
Surge suppression (Standard equipment)		Bridge diode				

Notes: 1. Since AC-coils already have built-in bridge diodes, the starting current value is virtually identical to the energizing current value.

2. For long continuous energizing in AC-coils, consult us.

3. For both AC- and DC-coils, provide heat radiation measures to ensure that the ambient temperature (when used in a control box, the temperature inside the box) always remains within the specified temperature range.

Effective Area [Cv]

Basic model	Valve port size	
	-02(Rc1/4)	-03(Rc3/8)
PA24HF5, PA24HF6 PA24HA5, PA24HA6	28[1.6]	36[2.0]
PA24HF7 PA24HA7	28[1.6]	32[1.8]
PA24HF8 PA24HA8	28[1.6]	1(P)→4(A),2(B) 32[1.8] 4(A),2(B)→5(R1),3(R2) 36[2.0]
PA24HF9 PA24HA9	28[1.6]	1(P)→4(A),2(B) 36[2.0] 4(A),2(B)→5(R1),3(R2) 32[1.8]
PA24F5, PA24F6, PA24F7 PA24F8, PA24F9 PA24A5, PA24A6, PA24A7 PA24A8, PA24A9	22[1.2]	25[1.4]

Safe Block Specifications

Basic model	Effective area [Cv] mm ²	Response time (ON/OFF) ms
PA24□-H	22[1.2]	40/40

Port Size

● Solenoid valves

Basic model	1(P)	4(A), 2(B)	3(R2), 5(R1)	PR
PA24□F□-02	Rc1/4	Rc1/4	Rc1/4	M5×0.8
PA24□F□-03	Rc3/8	Rc3/8	Rc1/4	M5×0.8

Remark: Set the tightening torque for the screws of the solenoid valve PR portion at 29.4N·cm {3kgf·cm} [2.6in·lbf] or less (only when -N is selected).

● Sub-base piping specifications

Basic model	1(P)	4(A), 2(B)	3(R2), 5(R1)	PR	X(P2)
PA24□A□-02-25	Rc1/4	Rc1/4	Rc1/4	M5×0.8	M5×0.8
PA24□A□-03-25	Rc3/8	Rc3/8	Rc3/8	M5×0.8	M5×0.8
PA24□A□-04-25	Rc1/2	Rc1/2	Rc1/2	M5×0.8	M5×0.8

Remark: The PR and X(P2) ports are available for the external pilot specifications (for positive pressure and vacuum) only. The pilot exhaust of internal pilot type is collected to 5(R1).

● Manifold

Manifold model	1(P)	4(A), 2(B)		3(R2), 5(R1)	PR	X(P2)
		-02	-03			
PAM□F	Rc3/8	(Rc1/4)	(Rc3/8)	Rc3/8	—	—
PAM□F-04	Rc1/2	(Rc1/4)	(Rc3/8)	Rc1/2	—	—
PAM□A	Rc1/2	Rc1/4	Rc3/8	Rc1/2	Rc1/8	—
PAM□B	Rc1/2	Rc1/4	Rc3/8	Rc1/2	Rc1/8	—
PAM□FG	Rc3/8	(Rc1/4)	(Rc3/8)	Rc3/8	Rc1/8	Rc1/8
PAM□FG-04	Rc1/2	(Rc1/4)	(Rc3/8)	Rc1/2	Rc1/8	Rc1/8
PAM□AG	Rc1/2	Rc1/4	Rc3/8	Rc1/2	Rc1/8	Rc1/8
PAM□BG	Rc1/2	Rc1/4	Rc3/8	Rc1/2	Rc1/8	Rc1/8

Remark: The positions of the 4(A) and 2(B) piping ports () are on the solenoid valve side. The pilot exhaust of PAM□F and PAM□F-04 is collected to 5(R1).

Mass

● Direct piping specification, F type manifold specifications

Basic model	Mass calculation of each unit (n=number of units)	Solenoid valve single unit (Port size) ^{Note 1}						Block-off plate PA-BP
		-02(Rc1/4)			-03(Rc3/8)			
		PA24□F5	PA24□F6	PA24□F7 PA24□F8 PA24□F9	PA24□F5	PA24□F6	PA24□F7 PA24□F8 PA24□F9	
PAM□F	(80Xn)+90 [(2.82Xn)+3.17]	203 [7.16]	215 [7.58]	241 [8.50]	197 [6.95]	209 [7.37]	235 [8.29]	54 [1.90]
PAM□F-04	(80Xn)+270 [(2.82Xn)+9.52]							

Calculation example: PBM4F

stn.1~3 PA24F5-03-G1 D4
stn.4 PA-BP

$$(80 \times 4) + 90 + (197 \times 3) + 54 = 1055\text{g} [37.21\text{oz.}]$$

- Notes: 1. For the wiring specification of DIN connector (-39), add 12g [0.42oz.] to the above, and for the cabtyre cable (-G3), add 3g [0.11oz.].
2. The wiring specifications assume a lead wire length of 300mm [11.8in.].
3. Plug R3/8: 14g [0.49in.], R1/2: 21g [0.74oz.]

● Sub-base piping specification, A type and B type manifold specifications

Basic model	Mass calculation of each unit (n=number of units)	Solenoid valve single unit ^{Note 1}										Safe block -H	Block-off plate PA-BP
		Additional mass (n=number of units)											
		Port size specification											
		Ported manifold					Piping block						
PA24□A5	PA24□A6	PA24□A7 PA24□A8 PA24□A9	-02 (Rc1/4)	-03 (Rc3/8)	-04 (Rc1/2)	-B2 (Rc1/4)	-B3 (Rc3/8)						
PA24□A□	—	—	200 [7.05]	190 [6.70]	260 [9.17]	—	—			—	—		
PAM□A	(200Xn)+380 [(7.05Xn)+13.40]	212 [7.48]	224 [7.90]	250 [8.82]	20Xn [0.71Xn]	10Xn [0.35Xn]	—	55Xn [1.94Xn]	46Xn [1.62Xn]	82 [2.89]	54 [1.90]		
PAM□B	(200Xn)+390 [(7.05Xn)+13.76]				20Xn [0.71Xn]	10Xn [0.35Xn]	—	55Xn [1.94Xn]	46Xn [1.62Xn]				

Calculation example: PAM4A-B3

stn.1~3 PA24A5-G1 D4
stn.4 PA-BP

$$(200 \times 4) + 380 + (212 \times 3) + (46 \times 3) + 54 = 2008\text{g} [70.83\text{oz.}]$$

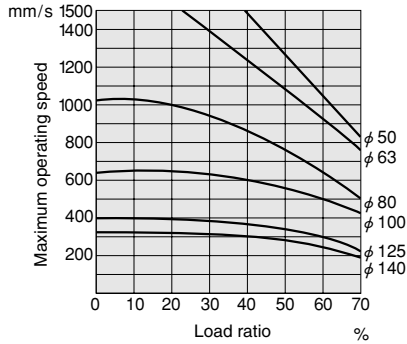
- Notes: 1. For the wiring specification of DIN connector (-39), add 12g [0.42oz.] to the above, and for the cabtyre cable (-G3), add 3g [0.11oz.].
2. The wiring specifications assume a lead wire length of 300mm [11.8in.].
3. Plug R1/2: 21g [0.74oz.]

Cylinder Operating Speed

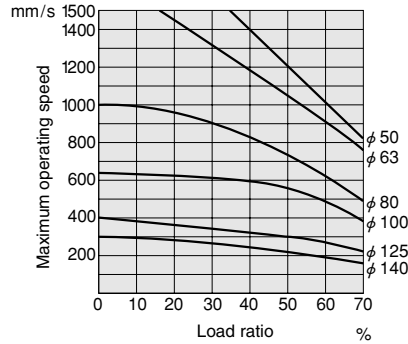
PA24HF5-03
PA24HA5-03-25

PA24F5-03
PA24A5-03-25

Maximum operating speed

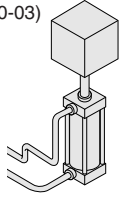


Maximum operating speed



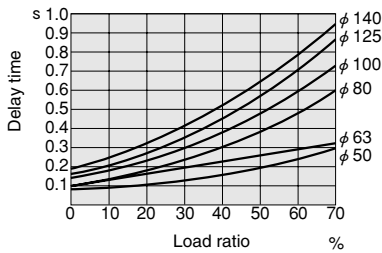
Measurement conditions

- Air pressure: 0.5MPa {5.1kgf/cm²} [73psi.]
- Piping inner diameter and length:
φ7.5×1000mm [39in.]
- Fitting: Quick fitting (Model: NTS10-03)
- Load ratio = $\frac{\text{Load}}{\text{Cylinder theoretical thrust}}$ (%)
- Cylinder stroke: 300mm [11.8in.]

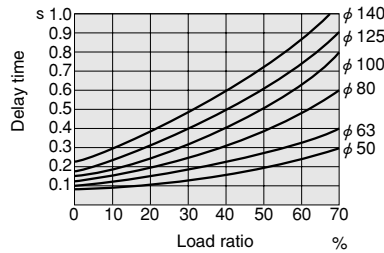


1mm/s = 0.0394in./sec.

Delay time

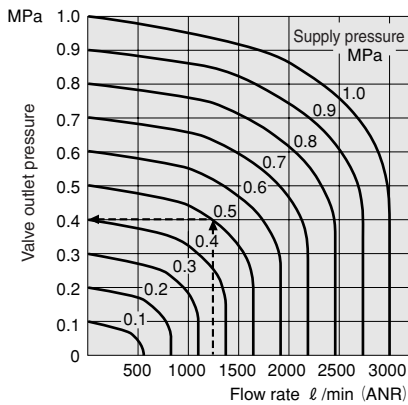


Delay time

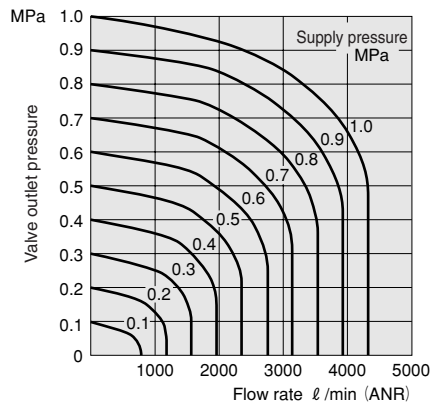


Flow Rate

PA24□



PA24H□

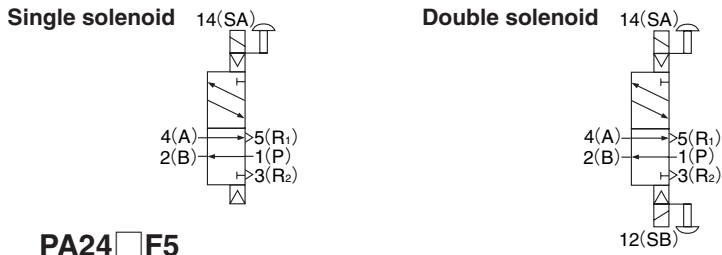


How to read the graph

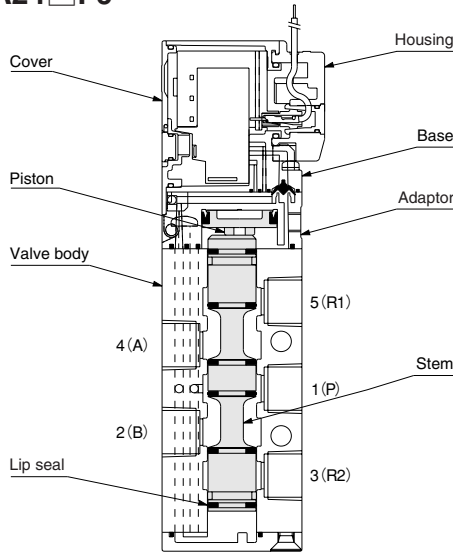
When the supply pressure is 0.5MPa [73psi.] and the flow rate is 1220 l/min [43.1ft³/min.] (ANR), the valve outlet pressure becomes 0.4MPa [58psi.]

1MPa = 145psi.
1 l/min = 0.0353ft³/min.

5-port, 2-position



PA24 □ F5
PA24 □ F6



※Schematic diagram shows double solenoid (de-energizing condition after energizing solenoid 12(SB)).

Major parts and materials

	Parts	Materials
Valve	Body	Aluminum alloy (Anodized)
	Stem	Aluminum alloy
	Cover	Plastic
	Base	
	Housing	
	Adaptor	
	Lip seal	Synthetic rubber
Piston	Plastic	
Manifold	Body	Aluminum alloy (Anodized)
	Block-off plate	Mild steel (Nickel-plated)
	Seal	Synthetic rubber

SOLENOID VALVES PA, PB SERIES

5-port, 3-position

[Both solenoid 14(SA) and 12(SB) are de-energized.]

