

KOGANEI

Air Valve

AIR-PILOTED VALVES

INSTRUCTION MANUAL Ver.1.0

Air-piloted Valves Features

- Since the unit requires air piping only, with no need for electrical wiring, it can be handled by a person without fear of electrical shocks or current leakage.
- Using no electricity means that expensive equipment to protect against explosions, special precautions, or measures against electric noise are not to be required.
- Unlike electrical equipment, the construction is simple. The associated limit valve is also durable and can be used for long periods.
- Because harmless compressed air is used, there is no need for major construction work on the main or pilot air line unlike that of hydraulic piping, and piping work is simple enough for anyone trained to perform.
- The power source is always compressed air, so that the system can be easily used where no power supply exists. In addition, it retains memory for about several dozen minutes, and can therefore continue operations even during power outages.

Koganei Air-piloted Valves Features

Assured operation

Sharp, switching characterized by poppet and diaphragm construction. The valve seat is also reliable. (Quick switching of main pressure helps to keep valve seat seal performance.)

Few breakdowns occur in this construction.

The construction is extremely simple. A poppet-type prevents galling or other problems, even if small foreign objects have entered inside. And no sticking occurs even if the unit is left unused for long periods of time.

It can be used without lubrication.

With virtually no sliding parts, there is no need for lubrication other than for a few specific models. This means no breakdown due to insufficient lubrication.

Tolerates frequent operations for long operating life

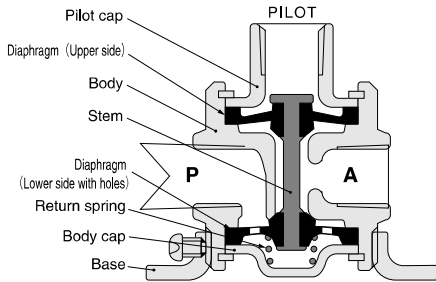
The small mass and stroke of the moving parts means a small inertial force which, along with construction with the large-capacity synthetic rubber for absorbing impacts, ensures continuous high-frequency operations and a long operating life.

Any mounting direction acceptable

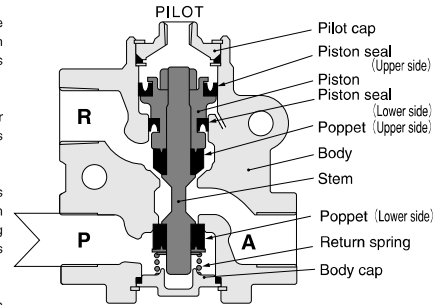
No matter what direction is used for mounting, the construction causes no trouble to the operation.

Compact and lightweight

A unique, compact design, with a body of light aluminum alloy.



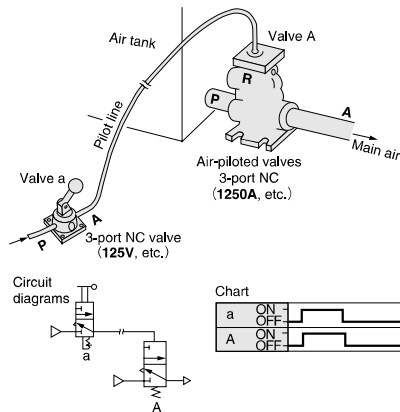
Diaphragm type basic construction (125A type)



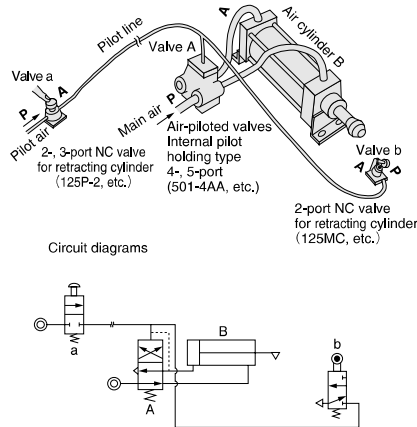
Piston poppet-type basic construction (501A type)

Application Examples of Air-piloted Valves

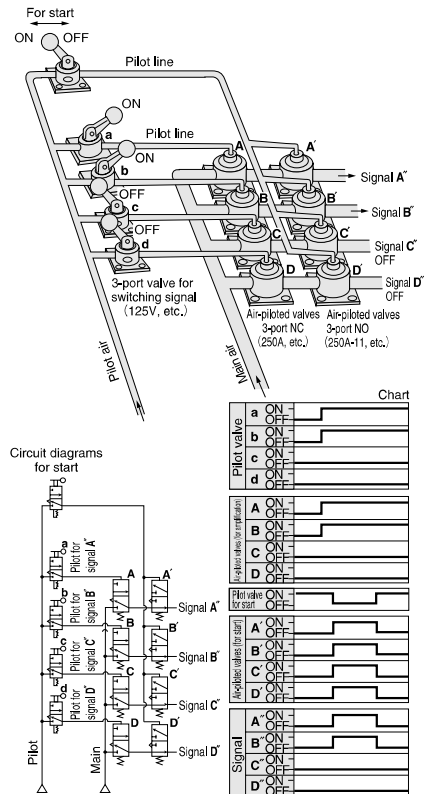
Using as a large-sized stop valve



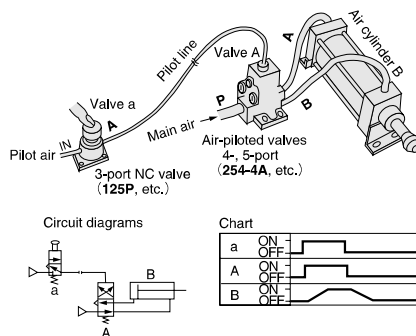
Air cylinder operation



Switching of air pressure signal



Air cylinder operation



The air cylinder rod extends only as long as pilot valve a is pressed down.

To obtain signals A' and B', turn ON hand operated valves a and b, and open the air-piloted valves A and B. Then, turning off the manual valve for start (which is normally left ON) turns off all of the air-piloted valves, (NO valves) A', B', C', and D', and A' and B' appear.

Charts for Selection of Air-piloted Valves

●2-, 3-port valve (air flow rate of each model)

Model of air-piloted valve	Air flow rate ℓ/min [ft. ³ /min.] (ANR)						
	200	300	400	1000	2000	3000	10000 20000
3P+34A (TAC valve)	120 [4.2]						
31P+341A (TAC ² valve)	370 [13.1]						
125A	370 [13.1]						
250A 2503A	1000 [35.3]						
500A	3700 [131]						
375A 501A	4700 [166]						
750A	9300 [328]						
1000A 1250A	18600 [657]						

●4-, 5-port valve (applicable cylinder bore size of each model)

Model of air-piloted valve	Cylinder bore size mm [in.]									
	φ20 [0.787]	25.32 [0.984] 1.260	40 [1.575]	50 [1.969]	63 [2.480]	80 [3.150]	100 [3.937]	125 [4.921]	140 [5.512]	180 [7.087]
4P+34A (TAC valve)	This area presents high cylinder speed is not required.									
41P+341A (TAC ² valve)	Normal operating range (Cylinder speed 300~500mm/s [11.8~19.7in./sec.]) (min. 50mm/s [2.0in./sec.])									
250-4A 2503-4A	This area presents high cylinder speed is required. (Cylinder speed: min. 500~600mm/s [19.7~23.6in./sec.])									
375-4A 501-4A										
750-4A										
1000-4A 1250-4A										

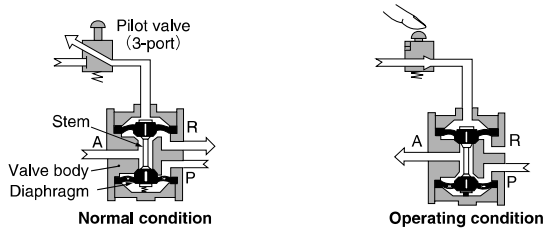
Notes : 1. While the speeds shown in this graph assume an air supply pressure of 0.5MPa [73psi.] and a load ratio of 0, the speeds will be virtually the same in the range of 0.4~0.7MPa [58~102psi.], and up to a load ratio of about 30 %.

2. In general, select a valve with a margin of about 50 % for the required cylinder speed, and then use a speed controller to reduce the speed in operation.

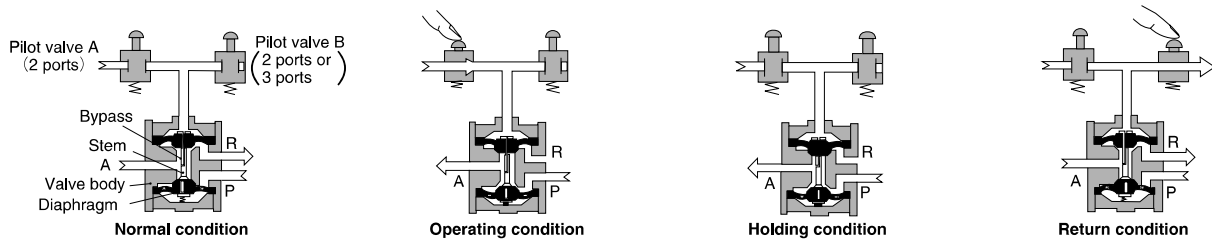
3. In considering the time required for the cylinder to make one stroke, the "cylinder delay time" and "cushioning time" need to be considered alongside the "cylinder speed."

Differences between A Type and AA Type Air-piloted Valves

A type valves (Continuous pilot pressure is needed to maintain the operating condition.)



AA type Valves (The difference from the A type valve is the existence of a bypass hole (small hole) on the stem. This helps the pilot valve to maintain its operating condition during a momentary operation. It is able to maintain the operating condition even if a certain amount of air leaks from the pilot line.)



Note : These schematic diagrams show the diaphragm type, 3-port valves. The bypass for the 4, 5-port valve is on the A side stem. See the Operating Principles for the 250-4 AA type on p.946.

Safety Precautions (Air-piloted valves)

Warning

1. All types other than the A2 (double pilot) type are designed to use air as the media. For other media, consult us.
2. Always check the Catalog, etc., when performing piping to products to ensure that the connections are correctly done. Wrong piping could result in abnormal operation of the actuator, etc.

Caution

For locations subject to water or to large amounts of dust, use a cover, etc., to protect the valve. In addition, install a muffler, etc., to the R port to prevent entering of dust. Intrusion of water or dust could result in short-term functional breakdowns, or in sudden drops in performance or reduced operating life.

Others

1. Use main air pressure higher than the minimum operating pressure listed in the Catalog.
2. Set the pilot pressure to a level suitable to the main pressure. An unnecessarily high pressure can shorten the operating life.
3. If excessively throttling the R port for operation, set the pilot pressure at the main pressure or higher (A type). For details, see the specifications of each series.
4. The AA type (internal pilot holding type) cannot be used as a 2-port valve. For a large air flow rate, provide sufficient air supply. In addition, the R port cannot be used in a choked condition. Install speed controllers between the valve and cylinder.
5. As with the normal A type, use a pilot valve size that offers enough margin when the AA type is operated as a single pilot valve. In this case, set the main and pilot valves to the same pressure.

Diaphragm Type Air-piloted Valves Rc1/8~1/2

125, 250, 2503, 500 Series

Symbols

Spring return normal type (A type)				Spring return internal pilot holding type (AA type)
2-port		3-port		3-port
NC (normally closed)	NO (normally open)	NC (normally closed)	NO (normally open)	NC (normally closed)
125A-2 250A-2 2503A-2 500A-2	125A-2-11 250A-2-11 2503A-2-11 500A-2-11	125A 250A 2503A	125A-11 250A-11 2503A-11	125AA 250AA 2503AA
500A (common for NC and NO)				

Specifications

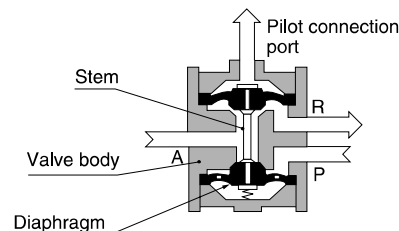
Item	Basic model	A type (normal type)				AA type (internal pilot holding type)		
		125A	250A	2503A	500A	125AA	250AA	2503AA*
Port size Rc	Main	1/8	1/4	3/8	1/2	1/8	1/4	3/8
	Pilot	1/8				1/8		
Effective area [Cv]	mm ²	5.5 [0.27]	15 [0.76]		55 [2.7]	5.5 [0.27]	15 [0.76]	
Media		Air						
Operating pressure range MPa {kgf/cm ² } [psi.]	Main	Normally closed Normally closed with booster Normally open	0~0.9 {0~9.2} [0~131] 0.07~0.9 {0.7~9.2} [10~131] 0.07~0.9 {0.7~9.2} [10~131]		Normally closed 0~0.9 [0~9.2] [0~131] Normally open 0~0.5 [0~5.1] [0~73]	0.2~0.9 {2.0~9.2} [29~131]		
	Pilot	See the table "Minimum Pilot Pressure"				0.2~0.9 {2.0~9.2} [29~131] (Use at the same pressure as main pressure)		
Proof pressure MPa {kgf/cm ² } [psi.]		1.35 {13.8} [196]			Normally closed 1.35 {13.8} [196] Normally open 0.75 {7.65} [109]	1.35 {13.8} [196]		
Operating temp. range (atmosphere and media) °C [°F]		5~60 [41~140]						
Maximum operating frequency Hz		10						
Lubrication		Not required						
Mass kg [lb.]		0.05 [0.11]	0.19 [0.42]	0.22 [0.49]	0.45 [0.99]	0.05 [0.11]	0.19 [0.42]	0.22 [0.49]

- Notes :1. The AA type offers the 3-port NC (normally closed) only.
 2. The * mark shows semi-standard products.
 3. When excessively throttling the R port in operation, set the pilot pressure at the main pressure or higher.

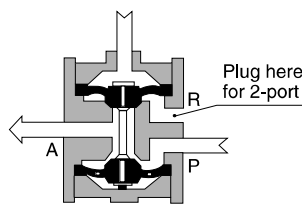
Operating Principles, Major Parts and Materials

A type normally closed

● Normal condition



● Operating condition

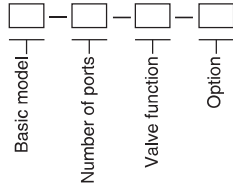


Note: The AA type (internal pilot holding type) is identical, except for the bypass hole (small hole) in the stem.

Parts	Materials
Body	Aluminum alloy (anodized)
Stem	Brass
Diaphragm	Synthetic rubber (Upper diaphragm of 500A: Urethane rubber)

Order Codes

● A type (normal type)



Basic model

Code	Main port size
125A	Rc1/8
250A	Rc1/4
2503A	Rc3/8
500A	Rc1/2

Valve function

Code	Valve function
Blank	NC (normally closed)
11	NO (normally open) (500A type common for NC and NO)

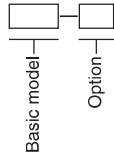
Number of ports

Code	Number of ports
Blank	3 ports
2	2 ports

Option

Code	specifications
22	With lock nuts for panel mounting (125A type only)
65	Normally closed with pilot booster (125A, 250A, 2503A type only)

● AA type (internal pilot holding type)



Basic model

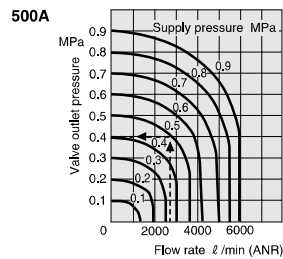
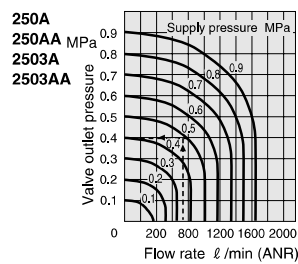
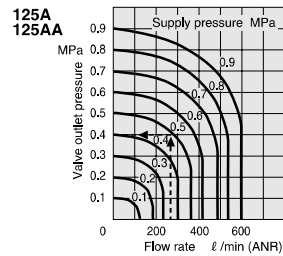
Code	Main port size Rc
125AA	1/8
250AA	1/4
2503AA*	3/8

Option

Code	Specifications
22	With lock nuts for panel mounting (125AA type only)

Notes: 1. The * mark shows semi-standard products.
2. 2-port valve and normally open type not available.

Flow Rate



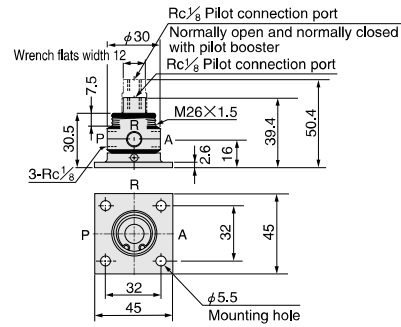
1MPa = 145psi., 1 l/min = 0.0353ft.³/min.

How to read the graph (500A)

When the supply pressure is 0.5MPa [73psi.] and the flow rate is 2750 l/min [97.1ft.³/min.] (ANR), the valve outlet pressure becomes 0.4MPa [58psi.].

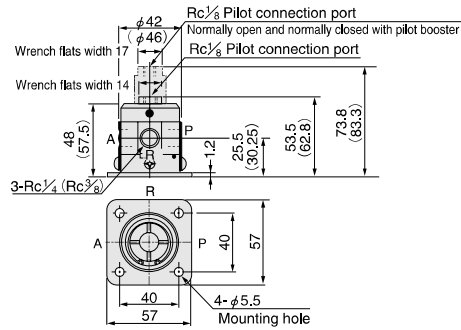
Dimensions (mm)

● 125A ● 125AA

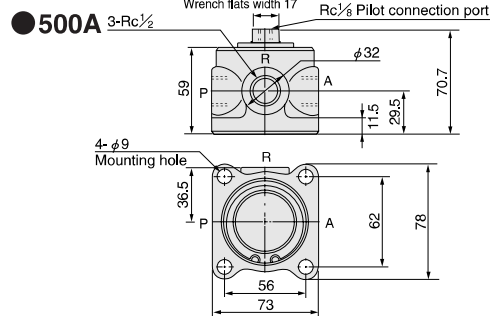


Note: For normally open type, the exhaust port (R) is on the opposite side (A type).

● 250A ● 250AA ● 2503A ● 2503AA



Notes: 1. () shows 2503A, 2503AA
2. For the normally open type, the exhaust port (R) is on the opposite side (A type).



Note: For the normally open type, the exhaust port (R) becomes the inlet port (P), and P becomes R.

Minimum Pilot Pressure

Model		MPa [psi.]							
		Main pressure							
		0	0.1	0.3	0.5	0.7	0.9		
		[0]	[15]	[44]	[73]	[105]	[131]		
125A	NC	0.16	0.18	0.26	0.39	0.54	0.67		
	With booster	—	0.13	0.2	0.26	0.35	0.44		
	NC	—	[19]	[29]	[38]	[51]	[64]		
250A	NO	—	0.18	0.26	0.39	0.54	0.67		
	With booster	—	[26]	[38]	[57]	[78]	[97]		
	NC	—	[17]	[26]	[35]	[42]	[52]		
500A	NC	0.1	0.15	0.29	0.46	0.64	0.83		
	With booster	—	[15]	[22]	[42]	[67]	[93]		
	NO	—	[17]	[26]	[51]	[80]	—		

Note: Set the AA type pilot pressure to the same as the main pressure.

Time Required for Switching by Pilot Line Length

(Both main and pilot 0.5MPa [73psi.]
Pilot line inner diameter 4mm [0.16in.]_s)

Model		Pilot line length L m [ft.]				
		2	6	10	50	100
		[6.6]	[19.7]	[32.8]	[164]	[328]
125A	ON	0.05	0.1	0.2	1.0	2.6
	OFF	0.1	0.2	0.4	1.7	4.8
250A	ON	0.05	0.1	0.2	1.1	2.9
	OFF	0.1	0.2	0.3	1.3	4.0
500A	ON	0.05	0.1	0.15	1.1	3.2
	OFF	0.1	0.1	0.2	1.2	3.0

How to read the table

For example, when using a 10m [32.8ft.] pilot line to send a signal to the 125A type, it takes 0.2 second for the switching operation to turn it on and 0.4 second to turn it off.

