NIPPON VALVE CONTROLS, INC.

Instruction manual

Pneumatic Actuated Butterfly Valve Z

SP-1526

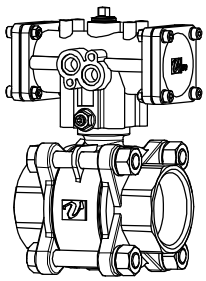
Please read this manual before installation and use.

GENERAL

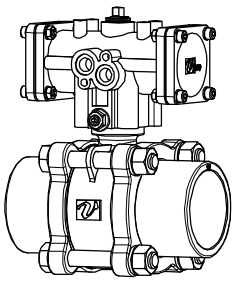
It is small, light weight and economical butterfly valve.

Actuator
- Double-acting type
  - PND TAD
- Single-acting type (Airless: SHUT)
  - PSO TAO
- Single-acting type (Airless: OPEN)
  - PSC TAC

Valve
- Z type This type designed for 3 piece structure and it is easy to maintenance.



Threaded End Rc



Socket End

PRODUCT CODE

Z type	Threaded End Rc			Z	-	9		5	T	U		-			-			-			
	Socket End	(PVC)		Z	-	9		7	T	P		-			-			-			
		(C-PVC)		Z	-	9		7	T	H		-			-			-			
			(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)		(9)			(10)			(11)		

(1) Actuator
- PND TAD
- PSO TAO
- PSC TAC

(2) Valve
- Z-

(3) Voltage
- 9 : Air

(4) Sizing code
- 0 : Standard
- 1 : Light
- 2 : Heavy

(5) Connection
- 5 : Threaded End Rc
- 7 : Socket End

(6) Body material
- T : SCS13A

(7) Cap material
- U : SCS14A

(7) Socket material
- P : PVC
- H : C-PVC

(8) Seat material
- E : EPDM
- B : NBR
- V : FKM

(9) Size [mm]
- ex. 25 A → 025

(10) Option
- FR : Filter Regulator Unit
- LB : Limit Switch Box
- LC : Built-in limit switch
- EX : Smart Positioner
- EN : Positioner
- EP : Positioner
- ER, ER, ET, EU : Smart Positioner

(11) Positioner control pattern (TAD)
- A : SHUT by 4 mA ↔ OPEN by 20 mA
- B : SHUT by 20 mA ↔ OPEN by 4 mA

(11) Positioner control pattern (PSO, TAO)
- C : OPEN by 20 mA ↔ SHUT by 4 mA (Airless: SHUT)
- D : OPEN by 4 mA ↔ SHUT by 20 mA (Airless: SHUT)

(11) Positioner control pattern (PSC, TAC)
- E : SHUT by 4 mA ↔ OPEN by 20 mA (Airless: OPEN)
- T : SHUT by 20 mA ↔ OPEN by 4 mA (Airless: OPEN)

VALVES SPECIFICATIONS

Water Oil Air, Gas Steam Chemicals Sea water Slurry Negative pressure

Valve type		Z	
Design		3 piece structure	
Connection		Threaded End Rc	Socket End
Fluid			
Max pressure		1 MPa	
Size [mm]		015 to 050	
Material	Body	SCS13A	
	Disc	PPS	
	Cap	SCS14A	-
	Socket	-	PVC C-PVC
	Seat	EPDM NBR FKM	
Stem seal	O-ring	Depend on seat material	

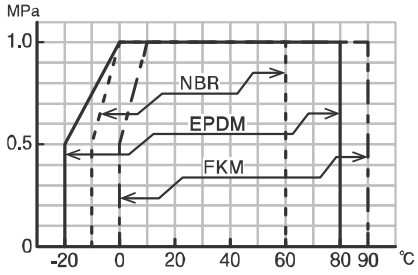
SEAT MATERIAL GUIDE

Seat material	Fluid temp.	Use
EPDM	-20 to +80 °C	
NBR	-10 to +60 °C	
FKM	-0 to +90 °C	

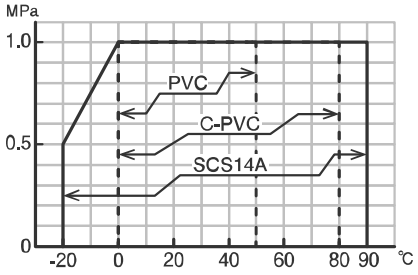
Note) • EPDM seat cannot be used for oil.
• Unsuitable for steam or hot water over 80 °C.
• Can flow the seawater with PVC socket and EPDM sheet.

PRESSURE & TEMPERATURE RATING

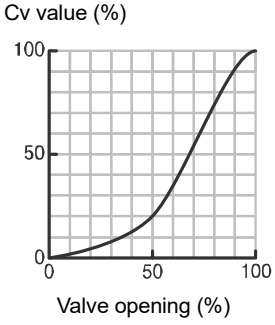
Valve seat



Cap / Socket



INHERENT FLOW CHARACTERISTIC



Range ability 30:1

PNEUMATIC ACTUATOR SPECIFICATIONS

PND type

Classification	Double-acting type			
Actuator type	PND-03S	PND-03D	PND-04D	PND-05D
Weight [kg]	0.2	0.3	0.5	0.8
Air consumption [ℓ] (round-trip)	0.05	0.08	0.19	0.35
Operation time [s]	Less than 1.			
Operation	SHUT by air to port A. ↔ OPEN by air to port B.			
Air pressure	0.4 to 0.7 MPa			
Piping connection	Rc 1/8			
Method of operation	Scotch yoke			
Housing material	PPS resin			
Ambient temperature	-10 to 50 °C (Please be careful when you use in 5 °C or less, so that there no freeze.)			
Manual operation	Operates the upper shaft of the actuator directly.			

PSO PSC type

Classification	Single-acting type (Spring-return)				
Actuator type	PSO - 03S PSC - 03S	PSO - 03D PSC - 03D	PSO - 04D PSC - 04D	PSO - 05D PSC - 05D	PSO - 05W PSC - 05W
Weight [kg]	0.2	0.4	0.6	1.2	1.8
Air consumption [ℓ] (round-trip)	0.03	0.04	0.1	0.2	0.53
Air exit	One side	Both sides			
Operation time [s]	Less than 1.				
Operation	PSO : OPEN by air to intake port. ↔ SHUT by spring-return. (Airless: SHUT) PSC : SHUT by air to intake port. ↔ OPEN by spring-return. (Airless: OPEN)				
Air pressure	0.4 to 0.7 MPa				
Piping connection	Rc 1/8				
Method of operation	Scotch yoke				
Housing material	PPS resin				
Ambient temperature	-10 to 50 °C (Please be careful when you use in 5 °C or less, so that there no freeze.)				
Manual operation	No manual operation.				

PNEUMATIC ACTUATOR SPECIFICATIONS

TAD type

Classification	Double-acting type						
Actuator type	TAD-040	TAD-050	TAD-063	TAD-080	TAD-100	TAD-125	TAD-160
Weight [kg]	0.9	1.3	2.1	3.4	6.1	9.8	18.2
Air consumption [ℓ] (round-trip)	0.11	0.18	0.34	0.66	1.36	2.72	5.56
Operation	SHUT by air to port A. ↔ OPEN by air to port B.						
Air pressure	0.4 to 0.7 MPa						
Piping connection	Rc 1/8	Rc 1/4					
Method of operation	Rack-and-pinion	Scotch yoke					
Housing material	Aluminum alloy						
Ambient temperature	-10 to 50 °C (Please be careful when you use in 5 °C or less, so that there no freeze.)						
Manual operation	Operates the upper shaft of the actuator directly.						

TAO TAC type

Classification	Single-acting type (Spring-return)						
Actuator type	TAO-040 TAC-040	TAO-050 TAC-050	TAO-063 TAC-063	TAO-080 TAC-080	TAO-100 TAC-100	TAO-125 TAC-125	TAO-160 TAC-160
Weight [kg]	2.3	3	4.9	8.5	16.4	27.6	51.2
Air consumption [ℓ] (round-trip)	0.23	0.34	0.67	1.26	2.62	4.44	8.77
Operation	TAO : OPEN by air to intake port. ↔ SHUT by spring-return. (Airless: SHUT) TAC : SHUT by air to intake port. ↔ OPEN by spring-return. (Airless: OPEN)						
Air pressure	0.4 to 0.7 MPa						
Piping connection	Rc 1/4						
Method of operation	Rack-and-pinion	Scotch yoke					
Housing material	Aluminum alloy						
Ambient temperature	-10 to 50 °C (Please be careful when you use in 5 °C or less, so that there no freeze.)						
Manual operation	No manual operation.	Option: MT (Manual handle unit)					

PNEUMATIC ACTUATOR SPECIFICATIONS

OPTIONAL PARTS

Classification				Code	PND	PSO	PSC	TAD	TAO	TAC
Speed Controller with bypass valve (Housing material: PPS)				BS				○		
FR Unit (Regulator with Filter) TA2-FR (KONAN)				FR	○	○	○	○	○	○
Limit Switch Box (Standard load signal)				LB	○	○	○	○	○	○
Built-in limit switch				LC				○	○	○
Explosion Proof Limit Switch, VCX7001 (azbil) Ex d e II C T6				LR				○	○	○
Speed Controller (with One-touch Fitting) One set				SE	○	○	○	○	○	○
Speed Controller (with One-touch Fitting) Two sets				SS	○			○		
Speed Controller (with One-touch Fitting) Dual Speed Controller				SF		○	○		○	○
Manual handle unit (Except 040)				MT					○	○
Sealing the spring unit. (Oil-free)				92					○	○
Smart positioner (Except 03S)				EX		○	○			
Explosion Proof Electro-Pneumatic Positioner EXd II BT5 (TIIS)				EN				○	○	○
Explosion Proof Electro-Pneumatic Positioner Ex dmb II B T5 (TIIS)				EP				○	○	○
Smart positioner				ES				○		
				ER					○	○
Smart positioner (with 4 to 20 mA DC, output)				ET				○		
				EU					○	○
Positioner operation (Input signal: 4 to 20 mA DC)	EX EN EP		SHUT by 4 mA. ↔ OPEN by 20 mA.	A				○		
			SHUT by 20 mA. ↔ OPEN by 4 mA.	B				○		
			OPEN by 20 mA. ↔ SHUT by 4 mA. (Airless: SHUT)	C		○			○	
			OPEN by 4 mA. ↔ SHUT by 20 mA. (Airless: SHUT)	D		○			○	
			SHUT by 4 mA. ↔ OPEN by 20 mA. (Airless: OPEN)	E			○			○
			SHUT by 20 mA. ↔ OPEN by 4 mA. (Airless: OPEN)	T			○			○
	ES ET	*1	SHUT by 4 mA. ↔ OPEN by 20 mA. (Airless: HOLD)	A				○		
			SHUT by 20 mA. ↔ OPEN by 4 mA. (Airless: HOLD)	B				○		
		*2	SHUT by 20 mA. ↔ OPEN by 4 mA. (Airless: HOLD)	W				○		
	ER EU	*1	OPEN by 20 mA. ↔ SHUT by 4 mA. (Airless: SHUT)	C					○	
			OPEN by 4 mA. ↔ SHUT by 20 mA. (Airless: SHUT)	D					○	
			SHUT by 4 mA. ↔ OPEN by 20 mA. (Airless: OPEN)	Y						○
		*2	SHUT by 4 mA. ↔ OPEN by 20 mA. (Airless: OPEN)	E						○
			SHUT by 20 mA. ↔ OPEN by 4 mA. (Airless: OPEN)	T						○
			OPEN by 4 mA. ↔ SHUT by 20 mA. (Airless: SHUT)	X					○	
5-Port Solenoid Valve (with speed controller, silencer)			Voltage: 100V AC	1S	○	○	○			
			Voltage: 200V AC	2S	○	○	○			
			Voltage: 110V AC	3S	○	○	○			
			Voltage: 220V AC	4S	○	○	○			
			Voltage: 24V DC	5S	○	○	○			

Positioner operation (ES, ER, ET, EU) *1 0 mA: SHUT
*2 0 mA: OPEN

SOLENOID VALVE (PND-05D) (TAD, TAO, TAC)

Classification			Code (☐: Voltage)	
5-port Solenoid Valve Return (with bypass valve)	Lead wire	4N3S102K-L☐	N43SL☐	☐: Voltage 1 : 100V AC 3 : 200V AC 5 : 24V DC
	DIN Connector	4N3S102K-D☐	N43SD☐	
	DIN Connector (with lamp)	4N3S102K-N☐	N43SN☐	
	Watertight cover	4N3S102K-W☐	N43SW☐	
5-port Explosion proof solenoid valve Return (with bypass valve)	Conduit	4N4S102K-E01-H☐B0-R	4N4S01-☐B0, NO	
	Flame proof packing (Cable size Φ9.5 to 10.4 mm)	4N4S102K-E10-H☐B0-R	4N4S10-☐B0, NO	

Operate by solenoid valve (Normally Open)

PND, TAD	SHUT by solenoid off.	↔	OPEN by power to solenoid.
PSO, TAO (Airless: SHUT)	OPEN by power to solenoid.	↔	SHUT by solenoid off. (Spring-return)
PSC, TAC (Airless: OPEN)	SHUT by power to solenoid.	↔	OPEN by solenoid off. (Spring-return)

HANDLING & STORAGE

①HANDLING

Do not drop or throw the product as it may break.

②STORAGE

- Store away from dust, moisture and direct sunlight. If possible, store in the original package.
- Do not remove a dust proof cap until the piping.

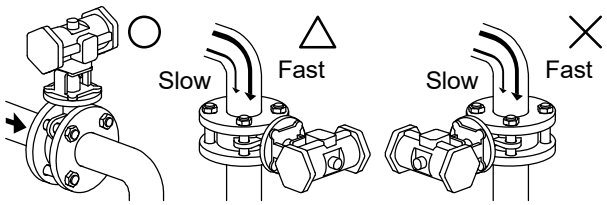
③CHECKING

- Check the product code before installation.
- Make sure that the bolts are not loose.

INSTALLATION

①PRECAUTIONS

- Flush the pipeline carefully before installing the valve. Foreign particles, such as sand or pieces of welding electrode, will damage the disk and seats.
- When piping the valve disk should be closed before mounting.
- Avoid oil or grease when using EPDM seat.
- The butterfly valve should be piped upstream of the elbow. When piping downstream from the elbow, considered a straight line that is at least five times the length of the pipe.



- The valve stem should be mounted perpendicular to the flow for biased fluid.

②PIPING

- Using a pipe with too long a thread will damage the valve.
- If sealing tape or sealant gets inside the valve, the valve seat leaks or malfunctions.
- When connecting a pipe or fitting to a valve, use a tool on the octagonal or hexagonal part of the insertion side and screw it.
- Refer to the recommended tightening torque table and do not apply excessive torque.

Valve size [mm]	Torque [N·m]
015	25 to 35
020	40 to 50
025	50 to 60
032	60 to 80
040	75 to 85
050	90 to 110

③Socket End

Should use adhesive suitable for valve materials.

④ENVIRONMENT

- Do not install in place where corrosive gas is present or where vibration is heavy (0.5 G or more).
- When radiant heat causes the surface temperature of the control unit to exceed 50 °C, provide an appropriate shielding plate.
- If there is a possibility that the fluid and drive part freeze, please take measures to prevent freezing.
- For single-acting type, prevent water and dust from coming into air exit.

⑤POSITIONING

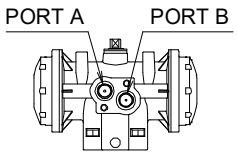
Should be positioned through 90° upward from horizontal. Provide space around the product to allow manual operation, inspection and replacement work.

AIR PIPING

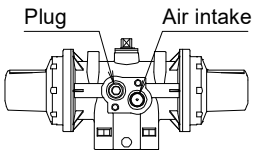
- Pneumatic actuator has an air supply ports to operate piston.

Double-acting type
PND : Rc 1/8
Coupling OD
less than 14.5 Φ

TAD-040 : Rc 1/8
TAD-050 to 160 : Rc 1/4



Single-acting type
PSO, PSC : Rc 1/8
TAO, TAC : Rc 1/4



- Piping of double-acting type is connected by seal tape on PORT A / B. Piping of single-acting type is put seal tape only on the air intake port.
- PND, PSO, PSC: PPS resin air supply port may be damaged if over tighten, please lightly tighten by hand.
- Never put anything on the actuator or make it into a foothold.

OPERATION

①AIR SOURCE

- Use the filtered dry air (less than 40 μ).
- Extra attention is needed where it's cold climate (below 5 °C).
- When air pressure is high, reduce it to standard pressure (0.4 to 0.7 MPa). Air pressure should not exceed 0.7 MPa during operation test.
- Capacity of compressor and air tank are to be calculated by capacity of piping and air consumption. A margin of 30 % is required.

②TEST OPERATION

Check the operation of pneumatic actuator before fluid enters the piping.

Double-acting type	Stop the air from the air source. Release the residual pressure in the air cylinder. Open the air equalizer. Move the manual shaft of actuator with a wrench.
Single-acting type	Send the standard pressure air. Confirm the opening / closing operation by slowly moving the actuator.

③TESTING

After piping, check following points.

- Piping is correct.
- Air or fluid leakage from connection. Flow direction of air is correct.
- Air pressure is in the range.
- Nothing interferes with operation when limit switch or solenoid damper is attached.

④ATTENTION

The opening and closing operation of the pneumatic actuator is fast, which may affect the product life. Please adjust the operation time of pneumatic actuator using a speed controller.

Valve size [mm]	Adjustment of operation time.
Less than 040	More than 1 second
050 or more	More than 2 seconds

MANUAL OPERATION

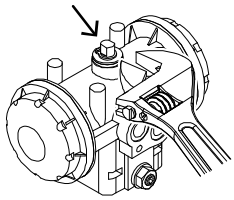
- Double-acting; stop the air supply and do not leave the air inside of cylinder.
- Single-acting; cannot be operated manually.

Optional code with the handle: TAO-MT, TAC-MT

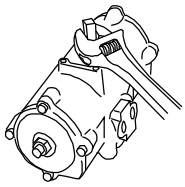
- Before automatic operation, be sure to remove wrench.

OPERATION (PND, TAD)

After turning air pressure to 0, turn manual shaft slowly with a smooth-jawed wrench to check the direction of OPEN/SHUT position.



PND



TAD

MAINTENANCE

- Do the routine maintenance at least once in half a year.
- Do not set or take spring unit parts apart after installing the pneumatic single-acting actuator.

Can be used with no oil supply.

- Confirm the air leakage.
- Confirm the air supply pressure.
- Confirm the dirt or grit inside of cylinder.

Lubrication Procedure (TAD, TAO, TAC)
In case of lubricating, use turbine oil or the equivalent through a lubricator. (ISO VG 32.46).
Once lubricate, do the regularly.

Inspection items

- Confirm operation of opening and closing.
- Confirm whether screws are loose or not.
- Confirm the fluid temperature or pressure.
- Confirm the leak from valve stem.

TROUBLESHOOTING

Problem	Cause	Solution
Fail to operate.	Air doesn't come out.	Supply air.
	Air pressure is too low.	Adjust to standard pressure level.
Stop in the mid position.	Biting of valve seat.	Remove a foreign object.
Leakage from valve seat	Seat is worn or damaged.	Replace the valve.
Leakage from valve stem	Packing is worn or distorted.	

For more information contact
NIPPON VALVE CONTROLS, INC. for consultation.

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