NIPPON VALVE CONTROLS, INC.

Instruction manual

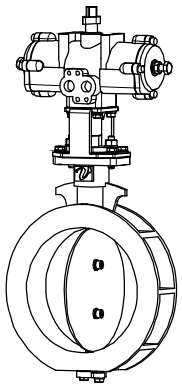
Pneumatic Actuated Butterfly Damper WT

SP-1526

Please read this manual before installation and use.

GENERAL

It composed of wafer type butterfly damper and pneumatic actuator.
The piston incorporating wear ring prevents wear of sliding surface and offers superior durability.



Actuator

Double-acting type
TAD

Single-acting type (Airless: SHUT)
TAO

Single-acting type (Airless: OPEN)
TAC

Damper

WT type With heat-resistant damper material this series can be used at fluid temperatures ranging from -40 °C to +550 (600) °C.

PRODUCT CODE

WT type	(Without seat)			W	T	9		2	T	G	0	-			-			-				
	(With SUS316 seat)			W	T	9		2	T	G	S	-			-			-				
		(1)		(2)		(3)	(4)	(5)	(6)	(7)	(8)		(9)			(10)			(11)			

(1) Actuator
- TAD
- TAO
- TAC

(2) Damper
- WT

(3) Voltage
- 9 : Air

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

(5) Connection
- 2 : JIS 5K

(6) Body material
- T : SCS13A

(7) Packing material
- G : Expansion graphite

(8) Seat material
- 0 : (Zero) None
- S : SUS316

(9) Size [mm]
- ex. 80 A → 080

(10) Option
- XT : For high / low temperatures
- FR : Filter Regulator Unit
- LB : Limit Switch Box
- LC : Built-in limit switch
- 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 (TAO)
- C : OPEN by 20 mA ↔ SHUT by 4 mA (Airless: SHUT)
- D : OPEN by 4 mA ↔ SHUT by 20 mA (Airless: SHUT)

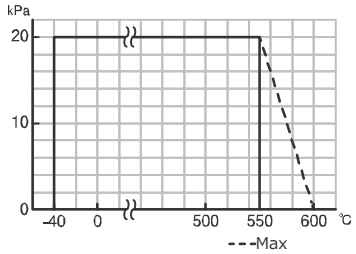
(11) Positioner control pattern (TAC)
- E : SHUT by 4 mA ↔ OPEN by 20 mA (Airless: OPEN)
- T : SHUT by 20 mA ↔ OPEN by 4 mA (Airless: OPEN)

DAMPER SPECIFICATIONS

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

Damper type		WT (Without seat)		WT (With SUS316 seat)
Design		2-way, Wafer		2-way, Wafer
Connection		JIS Flanges 5K		JIS Flanges 5K
Fluid				
Max pressure		20 kPa		20 kPa
Size [mm]		040 to 250	300 to 400	040 to 400
Material	Body	SCS13A		SCS13A
	Disc	SUS420J2	SUS420J1	SUS410S / SUS420J2
	Seat	None		SUS316
Stem seal	Packing	Expansion graphite		Expansion graphite

PRESSURE & TEMPERATURE RATING



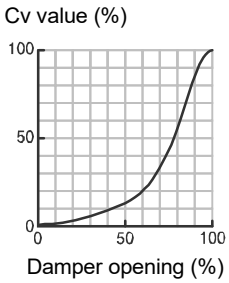
Temperature range : -40 to 600 °C

Note) If the fluid temperature is more than +250 °C or less than -20 °C, the option (XT) is required.

SEAT LEAKAGE VOLUME

	Damper size [mm]	Remarks
WT-2TG0 (Without seat)	040 to 050	Less than 2 % of rated Cv.
	065 to 400	Less than 1 % of rated Cv.
WT-2TGS (With SUS316 seat)	040	Less than 1 % of rated Cv.
	050	Less than 0.5 % of rated Cv.
	065	Less than 0.2 % of rated Cv.
	080 to 400	Less than 0.1 % of rated Cv.

INHERENT FLOW CHARACTERISTIC



Range ability 50:1

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	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		○	○
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)	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	0 mA: SHUT	SHUT by 4 mA. ↔ OPEN by 20 mA. (Airless: HOLD)	A	○		
			SHUT by 20 mA. ↔ OPEN by 4 mA. (Airless: HOLD)	B	○		
		0 mA: OPEN	SHUT by 20 mA. ↔ OPEN by 4 mA. (Airless: HOLD)	W	○		
	ER EU	0 mA: SHUT	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			○
		0 mA: OPEN	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		○	

SOLENOID VALVE

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)

TAD	SHUT by solenoid off.	↔	OPEN by power to solenoid.
TAO (Airless: SHUT)	OPEN by power to solenoid.	↔	SHUT by solenoid off. (Spring-return)
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.

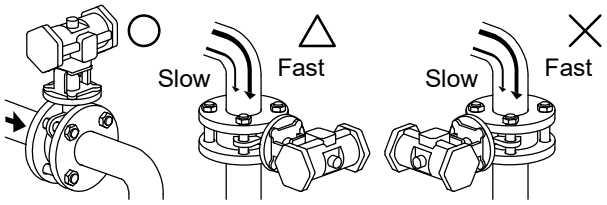
③CHECKING

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

INSTALLATION

①PRECAUTIONS

- Flush the pipeline carefully before installing the damper. Foreign particles, such as sand or pieces of welding electrode, will damage the disk and seats.
- For dampers with specified flow direction (WT), check the arrows on the product before piping.
- Damper is shipped closed. (TAC: closed with a manual unit. Without a manual unit is open.)
- The butterfly damper 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 damper stem should be mounted perpendicular to the flow for biased fluid.
- Disc interference may also occur when damper is installed in pipeline with smaller than normal inside diameter such as thick wall pipe, or lining pipe. Suitable corrective measurement must be taken (taper boring the pipe or pipe liner, etc.)

②PIPING FLANGES

- Gasket should be selected appropriately to suit the fluid, pressure and temperature. Use spring washer to prevent from decreasing surface pressure gasket when the temperature change happens frequently.
- Wafer type butterfly damper is put between two seats of flanged-end and tightened with long bolts.
- Before bolts are tightened, damper should be centered within the bolts to prevent possible disc interference or damage by contact with the pipe or flange.
- Tighten all bolts using crossover method to load the joint evenly.

③ENVIRONMENT

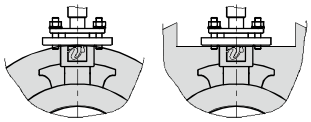
- Do not install in place where corrosive gas is present or where vibration is heavy (0.5 G or more).
- When radiant heat causes the surface temperature of the control unit to exceed 50 °C, provide an appropriate shielding plate.
- If there is a possibility that the fluid and drive part freeze, please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

④POSITIONING

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

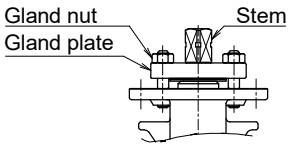
⑤INSULATION WORK

- For maintenance of gland packing, insulation should be below the ground part.
- The upper part of the ground plate part is a heat dissipation part, do not insulate it.



TIGHTEN THE GLAND NUTS

- Check that there is no leakage from the gland packing.
- If it leakage, tighten gland nuts by alternately. Do not over-tighten the gland nuts.

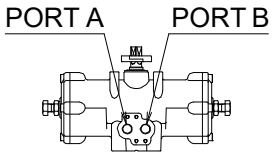


Damper size [mm]	Recommended torques [N·m]
040 050 065	1
080 100 125	2
150 200 250 300	5
350 400	8

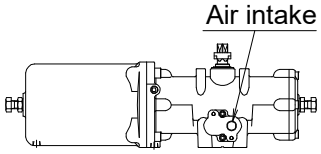
AIR PIPING

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

Double-acting type
Rc 1/4



Single-acting type
Rc 1/4



TAD, TAO, TAC (050 to 160)

• 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.
• The air supply port may be damaged if over-tightened. 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.

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

MANUAL OPERATION

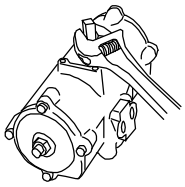
- Double-acting; stop the air supply and do not leave the air inside of cylinder.
- Single-acting; cannot be operated manually.

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

- Before automatic operation, be sure to remove wrench.

OPERATION (TAD)

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



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 damper stem.
- Confirm the bolt tightening torque.

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.	There is a foreign object in the damper.	Remove a foreign object.
	Damper is distorted.	Replace the damper.
Leakage from damper gland	Gland packing is worn or distorted.	Tighten the gland nut.
		Replace the gland packing.

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

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