



Manufacturer

TLV. CO., LTD.

Kakogawa, Japan

is approved by LRQA LTD. to ISO 9001/14001



Instruction Manual

Ball Butterfly Pneumatic Valve **(R-) PB10N Series**

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Introduction

Thank you for purchasing the **TLV** Ball Butterfly Pneumatic Valve.

This product has been thoroughly inspected before being shipped from the factory. When the product is delivered, before doing anything else, check the specifications and external appearance to make sure nothing is out of the ordinary. Also be sure to read this manual carefully before use and follow the instructions to be sure of using the product properly.

The **TLV** Ball Butterfly Pneumatic Valve incorporates a ball butterfly valve, which offers a combination of the superior sealing properties of the ball valve and the smooth rotary movement of the butterfly valve.

For products with special order specifications or options, if detailed instructions for the special order specifications or options are not be contained in this manual, please contact **TLV** for full details.

This instruction manual is intended for use with the model series listed on the front cover. It is necessary not only for installation but for subsequent maintenance, disassembly / reassembly and troubleshooting. Please keep it in a safe place for future reference.

Safety Considerations

- Read this section carefully before use and be sure to follow the instructions.
- Installation, inspection, maintenance, repairs, disassembly, adjustment, and valve opening/closing should be carried out only by trained maintenance personnel.
- The precautions listed in this manual are designed to ensure safety and prevent equipment damage and personal injury. For situations that may occur as a result of erroneous handling, three different types of cautionary items are used to indicate the degree of urgency and the scale of potential damage and danger: DANGER, WARNING and CAUTION.
- The three types of cautionary items above are very important for safety: be sure to observe all of them as they relate to installation, use, maintenance, and repair. Furthermore, TLV accepts no responsibility for any accidents or damage occurring as a result of failure to observe these precautions.

Symbols

	Indicates a DANGER, WARNING or CAUTION item.
	Indicates an urgent situation which poses a threat of death or serious injury
	Indicates that there is a potential threat of death or serious injury
	Indicates that there is a possibility of injury or equipment / product damage

	DO NOT use for toxic, flammable or otherwise hazardous fluids. Use only for fluids listed in the specification table. This product is for intended use only. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents.
	Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.
	Use hoisting equipment for heavy objects (weighing approximately 20 kg or more). Failure to do so may result in back strain or other injury if the object should fall.
	Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.

Safety cautions continued on next page.

 CAUTION	<p>When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.</p>
	<p>Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way. Failure to observe these precautions may result in damage to the product and burns or other injury due to malfunction or the discharge of fluids.</p>
	<p>Do not use excessive force when connecting threaded pipes to the product. Over-tightening may cause breakage leading to fluid discharge, which may cause burns or other injury.</p>
	<p>Use only under conditions in which no water hammer will occur. The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.</p>
	<p>Make sure the power supply is OFF before carrying out work on the wiring or inspections involving disassembly. If such work is carried out with the power on, there is a danger that equipment may malfunction or electric shock may occur, leading to injury or other accidents.</p>
	<p>Make sure that wiring work requiring a special license is carried out only by qualified personnel. If carried out by unqualified personnel, overheating or short circuits leading to injury, fires, damage or other accidents may occur.</p>
	<p>When using this product, be sure NEVER to stand close to, or leave tools anywhere near, moving parts such as a shaft. Contact with moving parts or objects becoming caught in moving parts could lead to injury, damage or other accidents.</p>

Specifications



WARNING

DO NOT use for toxic, flammable or otherwise hazardous fluids. Use only for fluids listed in the specification table. This product is for intended use only. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents.



CAUTION

Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions which may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.



CAUTION

Use only under conditions in which no freeze-up will occur. Freezing may damage the product, leading to fluid discharge, which may cause burns or other injury.

Model	Spring Return Type (Air to Close)	PB10AN	PB10AFN	PB10BN	PB10BFN
	Spring Return Type (Air to Open) ^{*1}	PB10APN	PB10AFPN	PB10BPN	PB10BFPN
	Reciprocating Type	R-PB10AN	R-PB10AFN	R-PB10BN	R-PB10BFN
Size (mm)	15, 20, 25, 32, 40, 50				
Connection	Screwed	Flanged	Screwed	Flanged	
Max. Operating Press. (PMO)	1.0 MPaG				
Max. Operating Temp. (TMO)	90 °C		185 °C		
Max. Allowable Press. (PMA) ^{*2}	1.0 MPaG				
Max. Allowable Temp. (TMA) ^{*2}	185 °C				
Applicable Fluid	Hot and cold water, Air		Steam, Hot water		
Motive air pressure (MPaG)	Spring Return Type: 0.4 - 0.7 MPaG				
	Reciprocating Type: 0.2 - 0.7 MPaG				
Control System	ON-OFF				
Manual Override	Possible				
Ambient Temperature Range (°C)	* ³ -20 to 70 °C (0 to 60°C) ^{*4}				

*1 Optional models

*2 Maximum allowable pressure (PMA) and maximum allowable temperature (TMA) are PRESSURE SHELL DESIGN CONDITIONS, NOT OPERATING CONDITIONS

*3 When there is a possibility that the water inside the actuator may freeze, apply freeze-prevention measures.

*4 Ambient temperature range if a solenoid valve, speed controller and/or limit switch are included (refer to next page).

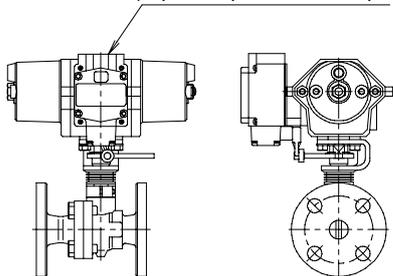
Cv Values

		15	20	25	32	40	50
Cv (US)	Screwed Models	9.6	18	29	50	82	135
	Flanged Models	8.0	16	26	47	78	135

Notes for Solenoid Valve, Speed Controller and/or Limit Switch

● With Limit Switch

Limit Switch (explosion proof or non-explosion proof)

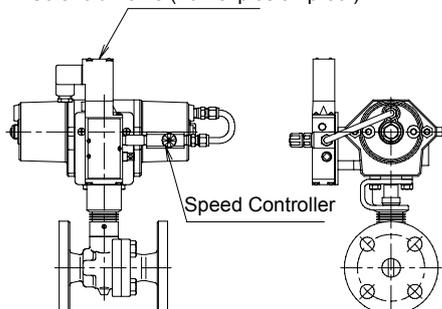


Opening-closing position of the valve is converted to an electrical signal so the position of the valve can be checked.

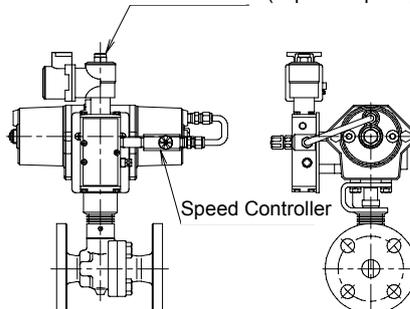
Refer to separate instruction manual for detailed specifications of the limit switch.

● With Solenoid Valve and Speed Controller

Solenoid Valve (non-explosion proof)



Solenoid Valve (explosion proof)

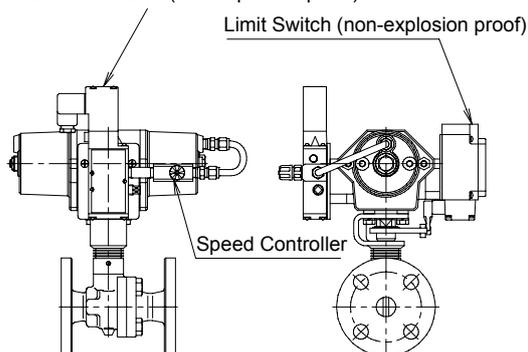


The solenoid valve and speed controller are included as a set. The valve opens and closes by switching the air supply to the actuator on/off with a solenoid valve. The speed of the valve opening can be set using the speed controller.

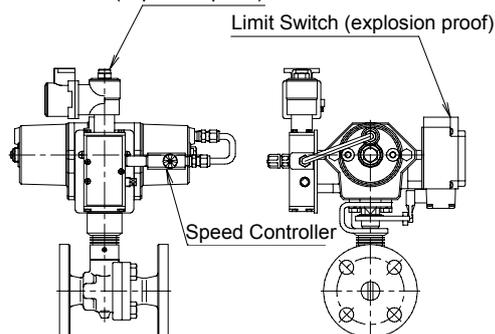
Refer to separate instruction manual for detailed specifications of the solenoid valve and speed controller.

● With Solenoid Valve, Speed Controller, and Limit Switch

Solenoid Valve (non-explosion proof)



Solenoid Valve (explosion proof)



The solenoid valve, speed controller and limit switch are all included.

Refer to separate instruction manual for detailed specifications of each item.

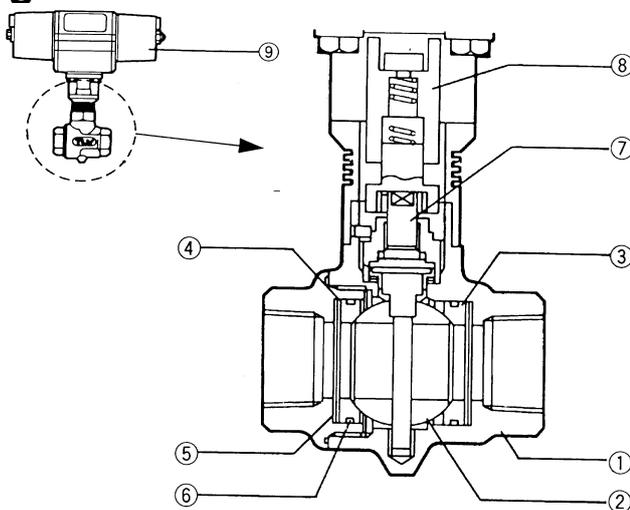
Proper Operation



When using this product, be sure NEVER to stand close to, or leave tools anywhere near, moving parts such as a shaft. Contact with moving parts or objects becoming caught in moving parts could lead to injury, damage or other accidents.

1. Make sure there is no foreign matter, such as dirt or sealing tape, in the actuator air supply piping.
2. When the temperature of the medium being used is $-30\text{ }^{\circ}\text{C}$ to $90\text{ }^{\circ}\text{C}$, use model (R)-PB10A(F)N. When the temperature of the medium being used is $90 - 185\text{ }^{\circ}\text{C}$, use model (R)-PB10B(F)N.
3. The air supply shall be clean air, such as that which has been run through an air trap filter.
4. When checking operation before installation, keep fingers well clear of the valve section.
5. Do not use with slurries.
6. Use within specification ranges.
7. Where there is the possibility of freezing, apply insulation or freeze-prevention measures. If the product freezes, cease operation.

Configuration



No	Name
1	Body
2	Ball
3	Valve Seat
4	Washer
5	Belleville Washer
6	O-ring
7	Valve Shaft
8	Connector
9	Actuator Unit

Installation



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Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions which may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.



Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.

Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.

Installation Method

1. Before installation, be sure to remove all protective seals.
2. Before installing the product, blow out the inlet piping to remove any piping scraps, dirt and oil. Close the inlet valve after blowdown.
3. There is no inlet and outlet installation restrictions.
4. When installing, secure a maintenance space of at least 25 mm above actuator, to facilitate detaching the actuator from the valve section.
5. To facilitate maintenance of screwed products, the installation of a union at the outlet is recommended.

If there is a problem, determine the cause by using the “Troubleshooting” section of this manual.

Optional Equipment for the Actuator

For controlling motive air, optional equipment for the TLV actuator are available.
Select optional equipment as needed for the desired application.

For maintaining desired pressure as well as removing moisture, condensate and other foreign matter from the air supply	Three-piece clean air device (with pressure gauge)		Regulator, Filter and Lubricator C3000-8
	Regulator with Built-in Filter		W3000-8
For maintaining desired pressure	Regulator		R3000-8
For removing moisture, condensate and other foreign matter from the air supply	Filter		F3000-8
For regularly feeding lubricant during long periods of frequent valve opening and closing	Lubricator		L3000-8
For reducing volume of the exhaust sound	Silencer		SLW-8A

Air Supply Piping to the Actuator

Solenoid Valve



Make sure the power supply is OFF before carrying out work on the wiring or inspections involving disassembly.

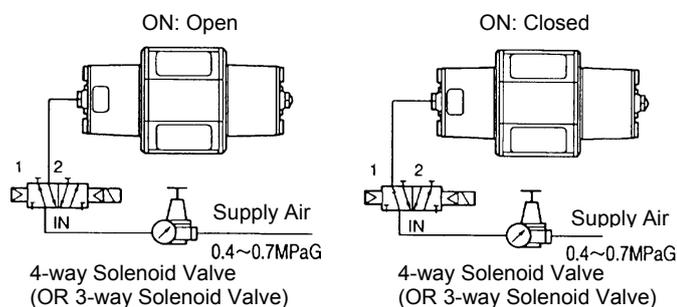
If such work is carried out with the power on, there is a danger that equipment may malfunction or electric shock may occur, leading to injury or other accidents.



Make sure that wiring work requiring a special license is carried out only by qualified personnel. If carried out by unqualified personnel, overheating or short circuits leading to injury, fires, damage or other accidents may occur.

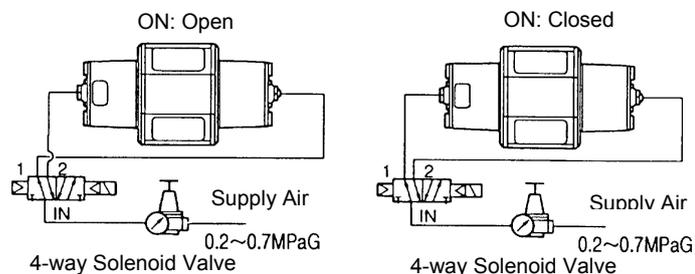
1. Determine the required amount of air supply to make sure there will be no shortage

Piping example for spring return type



2. Use clean air that has been passed through an air trap, filter, etc.

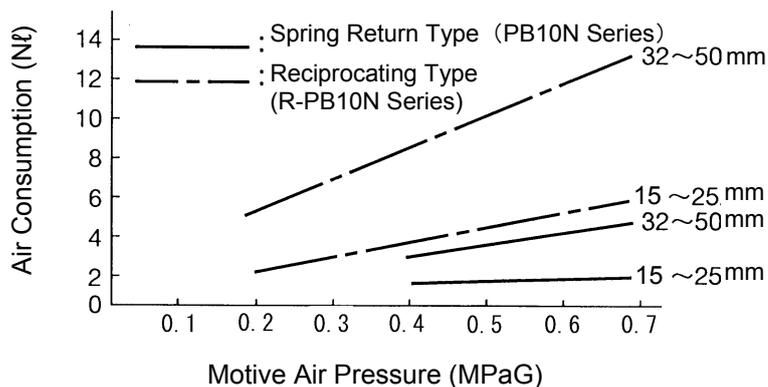
Piping example for reciprocating type



3. Make sure there is no foreign matter such as dirt or sealing tape in the actuator

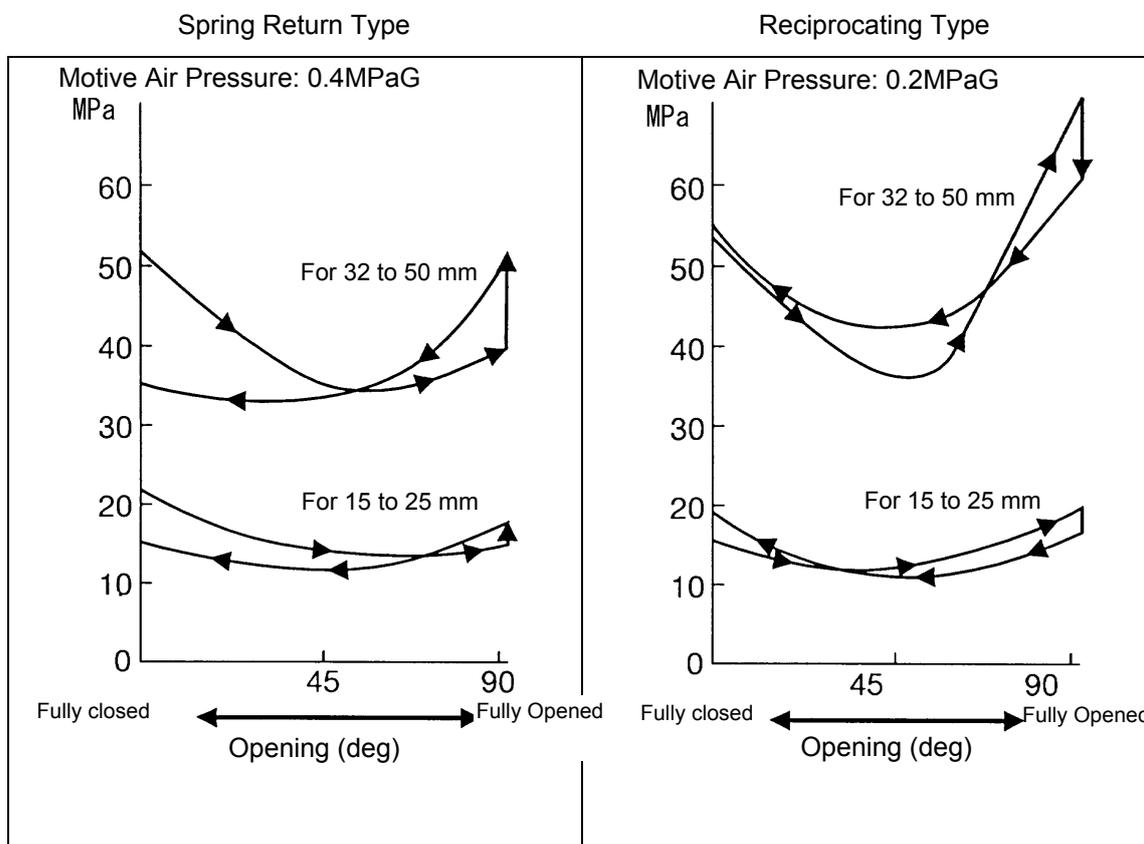
Air Consumption

Air Consumption (consumption during one cycle (reciprocating))



Cylinder Output Characteristics

Cylinder Output Characteristics Comparison



Spring Return Type:

Pressure of the motive air supply can be 0.4 to 0.7 MPaG. The above graph shows a motive air supply pressure of 0.4 MPaG.

Reciprocating Type

Pressure of the motive air supply can be 0.2 to 0.7 MPaG. The above graph shows a motive air supply pressure of 0.2 MPaG.

Cylinder Capacity

Unit: ℓ

Type Size	Spring Return Type	Reciprocating Type	
		Close→Open	Open→Close
15 - 25 mm	0.192	0.192	0.536
32 - 50 mm	0.594	0.594	1.119

Maintenance



Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.



Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way. Failure to observe these precautions may result in damage to the product or burns or other injury due to malfunction or the discharge of fluids.

Operational Check

An operational check shall be performed at least once every 3 months.

- Check the flow of air supply to the (R)-PB10N Series (angle of rotation, sound, open/close time elapse).
- After shutting off the air supply, manually operate the valve and check for foreign matter in the valve and confirm torques. If the torque required to operate the valve is over twice the values listed below, refer to the troubleshooting section.

NOTE: Do not disassemble further than detaching the valve unit from the actuator unit. TLV CO., LTD. will not be liable for the malfunctions caused by disassembly and reassembly implemented by user.

Size (mm)	Rotational Torque (N·m)	
	No Load	1.0 MPaG Load
15	0.8	1.1
20	1.1	2.0
25	2.9	4.9
32	3.6	6.6
40	10.0	15.1
50	12.0	19.0

1 N·m \approx 10 kg·cm

Manual Operation (Opening or Closing Valve)

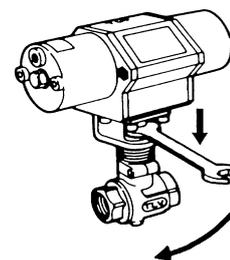


Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.

NOTE: Make sure that no motive air is being supplied to the actuator unit before carrying out the following steps.

Using a spanner, hold the two flat surfaces of the connector and press down 10 mm to separate the valve and the actuator. Open/close the valve by turning the spanner while holding the connector down.

Size (mm)	Across From Flat (mm)
15 - 25	19
32 - 50	30

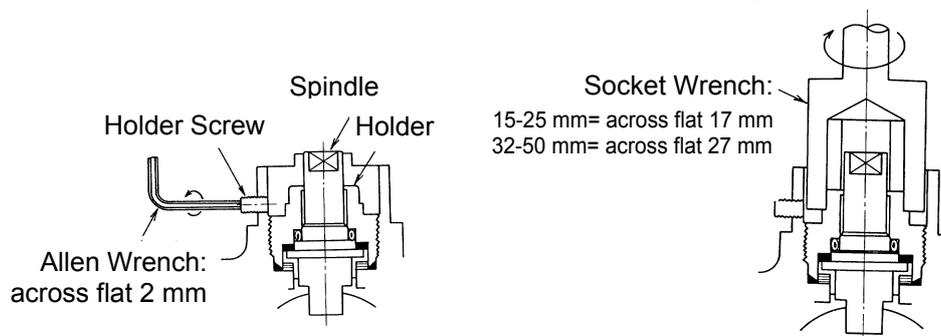


- If there is trouble pushing the connector down, hold the connector with the spanner and wiggle it left and right (using some force if necessary) before pushing down.
- Return the valve to the original position after manual operation. Make sure that the connector is lined up properly, and the actuator unit and valve are reconnected before re-supplying motive air to the actuator unit.

Additional Tightening of the Valve Unit Gland Section

It is possible to further tighten the gland section in the valve unit. Where there is leakage from the gasket or seal, tighten the gland section further using the following instructions:

- 1) Loosen the holder screw
- 2) Tighten the holder further in with a socket wrench, and retighten the holder screw



Cautions when applying additional tightening:

- Do not tighten the holder completely the first time. Do not tighten the holder any more than is necessary to stop leakage.
- If leakage continues even after the holder has been tightened, replace worn parts (gland section or valve unit).

Disassembly/Reassembly of the Actuator Unit



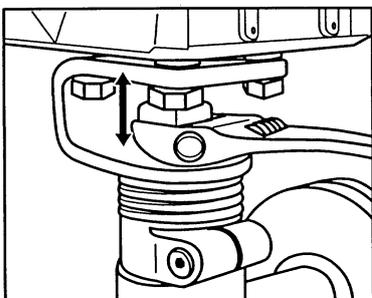
Use hoisting equipment for heavy objects (weighing approximately 20 kg or more). Failure to do so may result in back strain or other injury if the object should fall.



When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

NOTE: Standard air to open (closed by default) type should be detached/reattached when the valve is at the default closed position. Optional air to close (open by default) type should be detached/reattached when the valve is at the default open position.

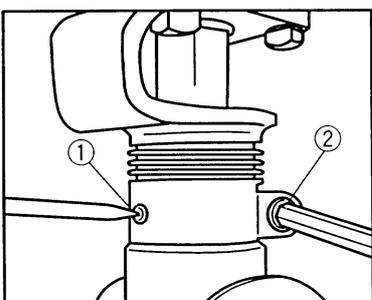
Detaching the Actuator Unit



Before detaching the unit, make sure that the connector can move up and down easily. If there is trouble pushing the connector down, hold the connector with a spanner and wiggle it left and right (using some force if necessary) before pushing down.

Spanner:

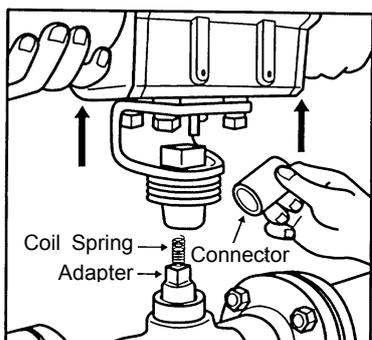
Size (mm)	Across From Flat (mm)
15 – 25	19
32 – 50	27



Remove the screw from mounting bracket (1).
Remove the allen head bolt (see fig. on left) from mounting bracket (2).

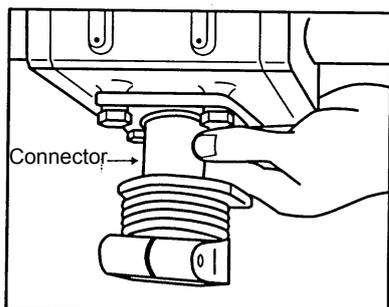
Allen Head Bolt:

Size (mm)	Across From Flat (mm)
15 – 25	5
32 – 50	6



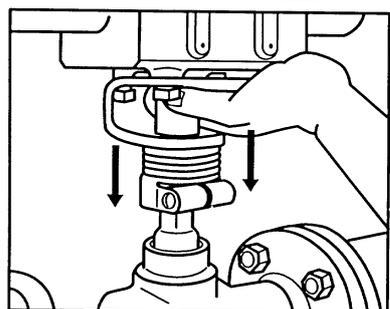
Lift the actuator unit carefully. Make sure to keep the adapter, coil spring and connector in a safe place. Before reassembly, set the adapter and coil spring on top of the valve unit (see fig. on left).

Reattaching the Actuator Unit

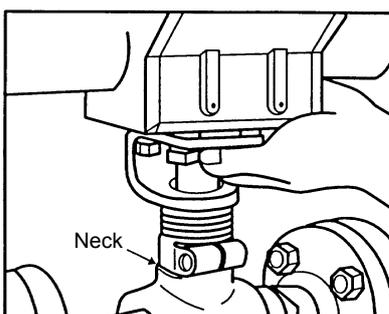


Before reassembly, make sure the adapter and coil spring are on top of the valve unit (see fig. on previous page).

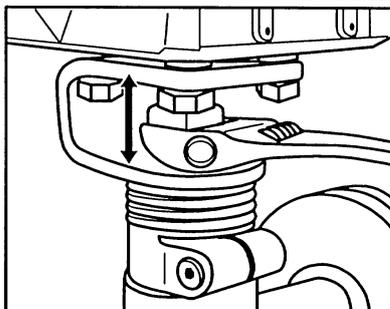
Set the connector on the output shaft of the actuator unit.



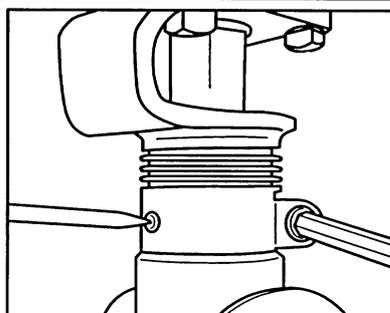
While lowering the actuator unit onto the valve unit, be sure to hold the connector unit on the output shaft of the actuator unit so that it does not fall off. Be sure that the coil spring is still on the adapter and does not shoot out as you lower the connector onto the adapter and coil spring.



Make sure that the bottom of the mounting bracket for the actuator unit is flush with the neck of the valve unit. If the mounting bracket is not seated properly, the allen head bolt will not fit into the bracket.



If the actuator cannot be lowered to the proper position, wiggle it slightly. If the actuator still cannot be lowered, the valve position may be slightly off, so hold the connector unit down with a spanner and wiggle it left and right a little.



Once the actuator unit is properly mounted, tighten the mounting bracket screw and allen head bolt to the proper torques shown below.

	Size (mm)	Torque (N·m)
Screw	15 – 50	0.9
Allen Head Bolt	15 – 25	5.5
	32 – 50	13.0

(1N·m ≈ 10kg·cm)

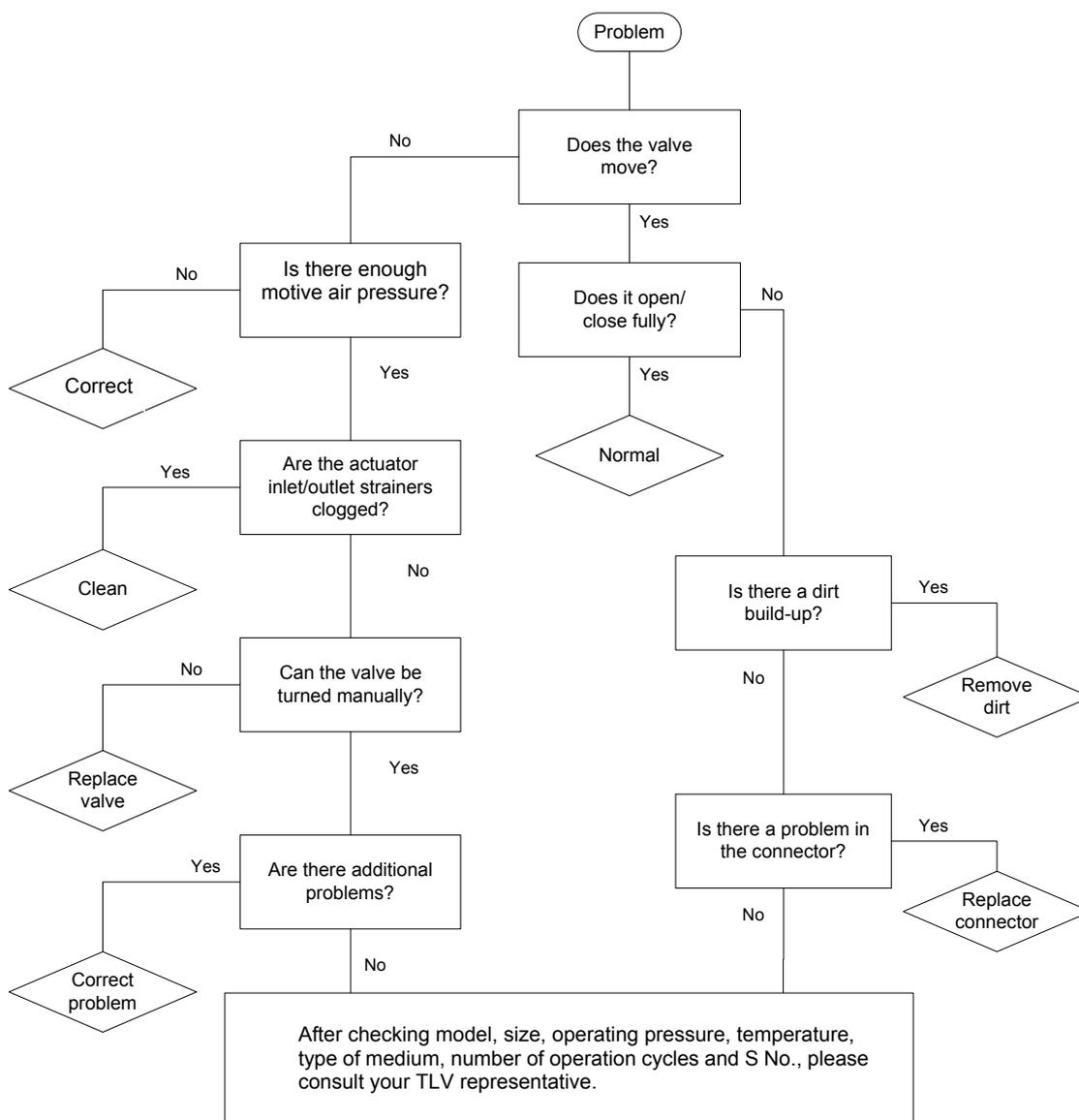
After tightening, make sure that the connector can be easily moved up and down when held by a spanner.

Troubleshooting



When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

If the product fails to operate properly, use the following flow chart to locate the cause.



Product Warranty

1. Warranty Period
One year following product delivery.
2. Warranty Coverage
TLV CO., LTD. warrants this product to the original purchaser to be free from defective materials and workmanship. Under this warranty, the product will be repaired or replaced at our option, without charge for parts or labor.
3. This product warranty will not apply to cosmetic defects, nor to any product whose exterior has been damaged or defaced; nor does it apply in the following cases:
 - 1) Malfunctions due to improper installation, use, handling, etc., by other than TLV CO., LTD. authorized service representatives.
 - 2) Malfunctions due to dirt, scale, rust, etc.
 - 3) Malfunctions due to improper disassembly and reassembly, or inadequate inspection and maintenance by other than TLV CO., LTD. authorized service representatives.
 - 4) Malfunctions due to disasters or forces of nature.
 - 5) Accidents or malfunctions due to any other cause beyond the control of TLV CO., LTD.
4. Under no circumstances will TLV CO., LTD. be liable for consequential economic loss damage or consequential damage to property.

* * * * *

For Service or Technical Assistance:

Contact your **TLV** representative or your regional **TLV** office.

Manufacturer

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