

ISO 9001
ISO 14001



Manufacturer

TLV CO., LTD.

Kakogawa, Japan

is approved by LRQA Ltd. to ISO 9001/14001



Instruction Manual

**Ball Butterfly Pneumatic Valve: PB12A/PB12AF/PB12B/PB12BF
(Normally-closed Type)**

**Optional: PB12AP/PB12AFP/PB12BP/PB12BFP
(Normally-open Type)**

172-65724M-05

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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, with a pneumatic actuator.

If detailed instructions for special order specifications or options not contained in this manual are required, please contact TLV for full details.

This instruction manual is intended for use with the model(s) 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.

Cautionary items and definitions



Danger

Indicates an urgent situation which poses a threat of death or serious injury



Warning

Indicates that there is a potential threat of death or serious injury



Caution

Indicates that there is a possibility of injury or equipment/product damage

Safety Considerations for the Product



Warning

DO NOT use for toxic, flammable or otherwise hazardous fluids. 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 that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.



Caution

Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more). Failure to do so may result in back strain or other injury if the object should fall.



Caution

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.



Caution

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.



Caution

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.



Caution

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.



Caution

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



Caution

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.



Caution

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.



Caution

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.



Caution

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.

Specifications



Warning

DO NOT use for toxic, flammable or otherwise hazardous fluids. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents.



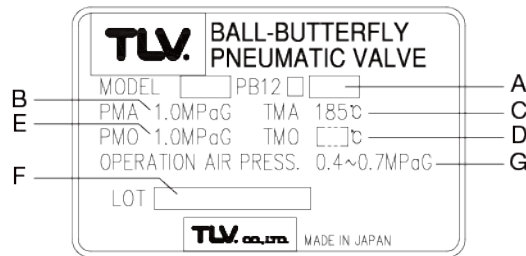
Caution

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 that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.

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

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.

Refer to the product nameplate for detailed specifications.



A	Model
B	Maximum Allowable Pressure (PMA) ⁰¹
C	Maximum Allowable Temperature (TMA) ⁰¹
D	Maximum Operating Temperature (TMO)
E	Maximum Operating Pressure (PMO)
F	Production Lot No.
G	Motive Air Pressure

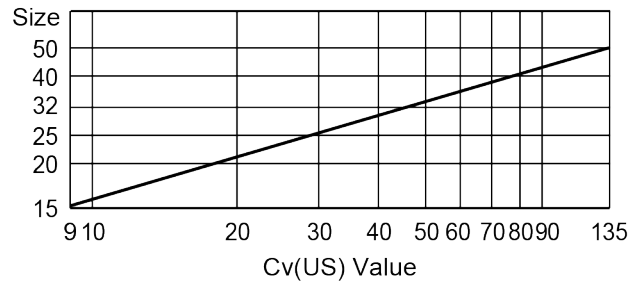
⁰¹Maximum allowable pressure (PMA) and maximum allowable temperature (TMA) are PRESSURE SHELL DESIGN CONDITIONS, **NOT** OPERATING CONDITIONS.

Product Model Displayed on the Nameplate

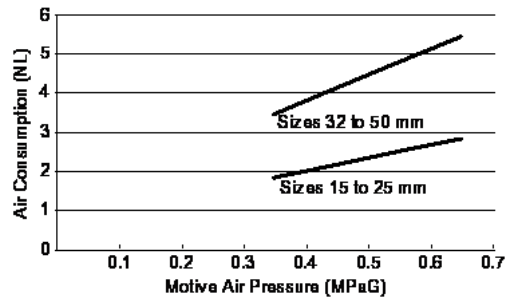
PB12 [1] [2] [3]

1	A		Applicable fluids	Water and air up to 90 °C
	B			Water and steam up to 185 °C
2	Not listed F		Connection	Screwed
				Flanged
3		Not listed	Actuator	Spring return type: Normally closed (Valve is closed when steam is not being supplied)
		P		Spring return type: Normally open (Valve is open when steam is not being supplied)

Cv Values



Air Consumption (during one cycle (reciprocating))



Note

Restrict motive air pressure to within 0.4 to 0.7 MPaG.

Cylinder Output Characteristics

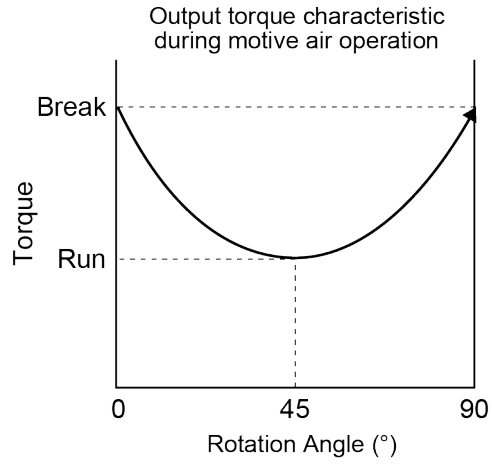
Effective torque (N-m) for motive air pressure

Size (mm)	Motive Air Pressure (MPaG)							
	0.4		0.5		0.6		0.7	
	Break	Run	Break	Run	Break	Run	Break	Run
15 to 25	20.6	11.8	25.5	14.7	30.7	17.6	35.3	20.6
32 to 50	40.2	22.5	50	27.4	59.8	33.3	70.6	39.2

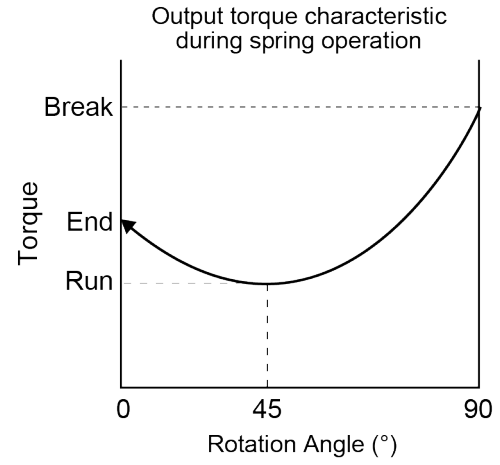
Effective torque (N-m) for spring operation

Size (mm)	Spring/Torque		
	Break	Run	Break
15 to 25	26.3	12.4	17.1
32 to 50	56.6	25.2	32.6

Output torque characteristic during motive air operation



Output torque characteristic during spring operation

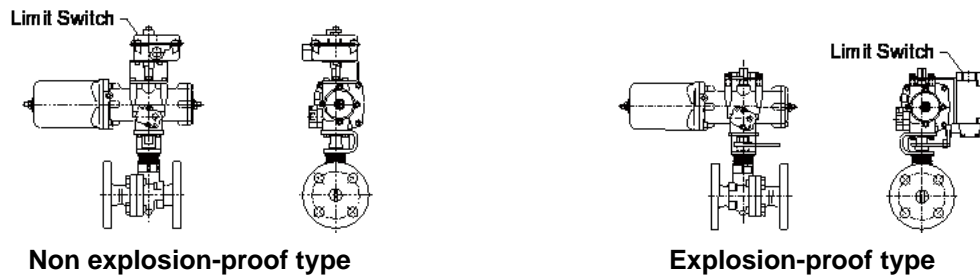


Cylinder Capacity

Size (mm)	Cylinder Capacity (L)
15 to 25	0.34
32 to 50	0.67

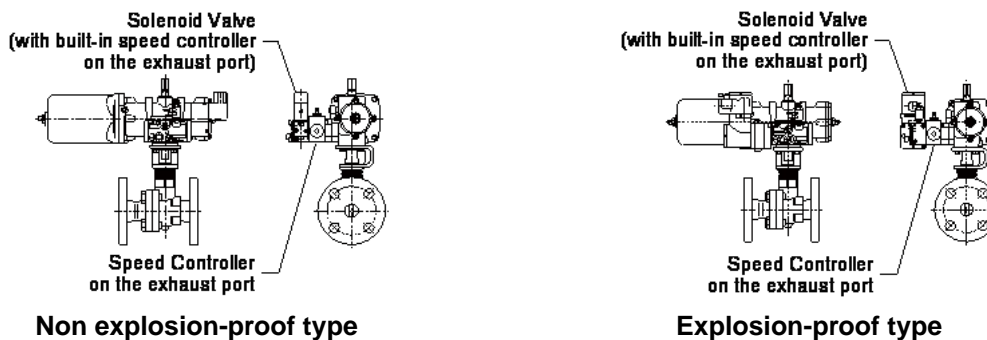
Additional Accessories

With a limit switch



The opening-closing position of the valve is converted to an electrical signal, enabling the valve position to be verified. No instruction manual is included. Contact TLV for details.

With a solenoid valve and speed controller



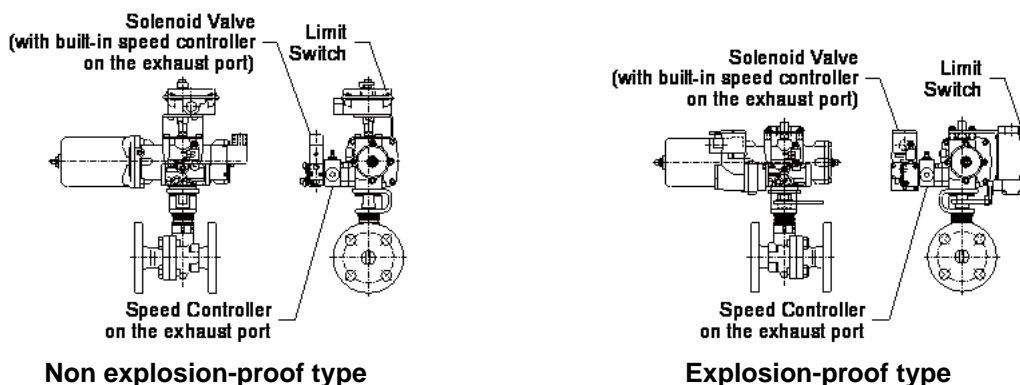
When specified, a solenoid valve (with built-in speed controller on the exhaust port) and speed controller (on the air supply port) are installed. The valve opens and closes by switching the air supply to the actuator on/off with a solenoid valve. The speed of the valve opening/closing can be set using the speed controller.



Note

Set the valve opening/closing time to a maximum of approximately 15 seconds. No instruction manuals are included. Contact TLV for details.

With a solenoid valve, speed controller and limit switch



When specified, a solenoid valve (with built-in speed controller on the exhaust port) and speed controller (on the air supply port) and limit switch are installed. No instruction manuals are supplied for the aforementioned instrument. Contact TLV for details.

Optional Accessory for the Actuator

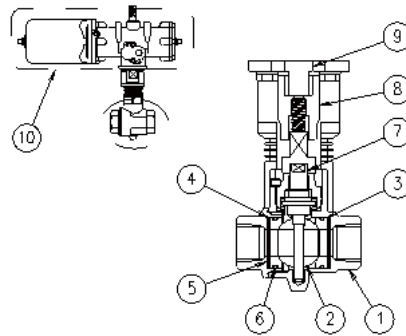
A regulator with built-in filter for motive air control is available as an option for the TLV actuator. The regulator maintains a desired pressure and enabled manual removal of moisture, condensate and other foreign matter from the air supply. Select optional equipment as needed for the desired application.

For non explosion-proof solenoid valve: TA2-FR

For explosion-proof solenoid valve: TA2-FR-E



Configuration



No.	Part Name	No.	Part Name
1	Body	6	O-ring
2	Ball	7	Valve Shaft
3	Valve Seat	8	Connector 1
4	Washer	9	Connector 2
5	Belleville Washer	10	Actuator Unit

Proper Operation



Caution

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.

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

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 to 90 °C, use model PB12A, PB12AF, PB12P or PB12AFP and for 90 to 185 °C, PB12B, PB12BF, PB12BP or PB12BFP.
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. When performing the manual operation, be sure to shut off the power source and release all residual charges and operating air.
5. Do not use with slurries.
6. Use within specification ranges.
7. When the ambient temperature is near 0 °C, dehumidify the compressed air with an air dryer. If not dehumidified, a large amount of moisture may freeze inside the actuator while the equipment is stopped, resulting in malfunction.
8. Where there is the possibility of freezing, apply insulation or freeze-prevention measures. If the product freezes, cease operation.

Installation



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 that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.

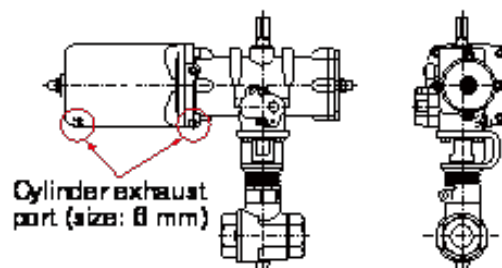
Take measures to prevent people from coming into direct contact with outlets of the unit. Failure to do so may result in burns or other injury from the discharge of fluids.

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.

Installing the Product

1. Before installation, make 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 are no inlet and outlet installation restrictions.
4. When installing the product, secure a maintenance space of at least 50 mm above actuator to facilitate detaching the actuator from the valve section.
5. To facilitate maintenance of screw type products, installation of a union at the outlet is recommended.
6. When the product is installed outdoor, make sure that rain or foreign matter will not enter the exhaust port (6 mm) of the cylinder. Install an elbow depending on the mounting orientation.

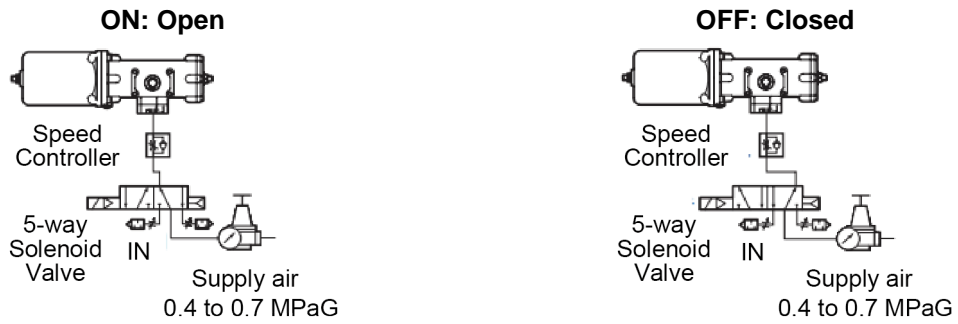


Note

No instruction manuals are supplied for the solenoid valve or the limit switch. Contact TLV for details.

Air Supply Piping to the Actuator

1. Determine the required amount of air supply to avoid insufficient supply.
2. Use clean air that has been passed through an air trap, filter, etc.
3. Make sure there is no foreign matter such as dirt or sealing tape in the actuator.



Manual Operation



Caution

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

When manually operating the actuator unit, make sure to shut off the power source and release all residual electrical charges and motive air.

Grip the two flat surfaces of connector 1 with a spanner, press connector 1 down approximately 10 mm and pull up connector 2 approximately 10 mm with a flat-head screwdriver to separate the actuator and valve. The valve opens/closes by turning connector 1 on the spanner side. Lower the connector down approximately 10 mm with a flat head screwdriver.

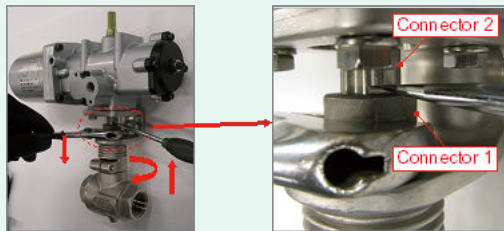
Distance across flats for spanner

Sizes 15 to 25: 19 mm, Sizes 32 to 50: 30 mm



Note

If it is difficult to push down connector 1, grip it with the spanner and move it left and right (using some force if necessary) before pushing down. After manual operation, return the valve to its original position and check that connector 2 is inside connector 1.



Maintenance



Caution

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 and burns or other injury due to malfunction or the discharge of fluids.

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.

Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) 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.

Operational Check

Daily Inspection

- Remove condensate accumulated in the regulator.
- Check the actuator visually and audibly from a safe place, making sure that there are no abnormal noise during the operation or no abnormalities in appearance.



Note

If abnormal noise is confirmed during daily inspection, contact TLV.

The following operational check shall be performed at least once every three months.

- Check the flow of air supply to the PB12 (angle of rotation, sound, time required to open/close the valve).
- Manually operate the valve and check if any foreign matter is clogged or whether the correct torque has been applied, referring to the torque table below. If the torque exceeds twice the value below, consider it as abnormal and perform inspection following the steps outlined in "Troubleshooting".



Note

When performing the actions above, make sure to shut off the power source and release all residual electrical charges and motive air.

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



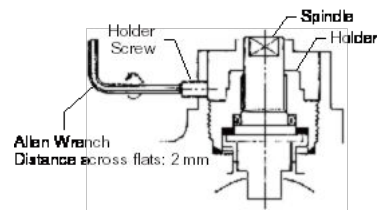
Note

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.

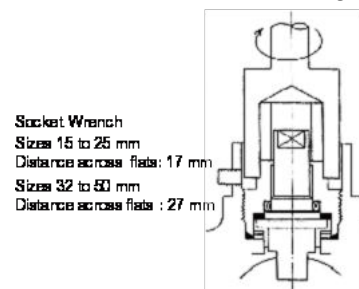
Additional Tightening of the Valve Unit Gland Section

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 with a socket wrench, and retighten the holder screw.



Cautions when tightening:

- Do not tighten the holder completely the first time, tighten gradually. 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).

Detaching the Actuator Unit

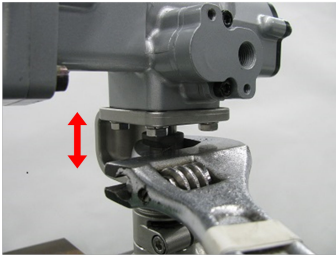


Note

Make sure to shut off the power source and release all residual electrical charges and motive air. Before performing any work, depressurize the piping before and after the product. Make sure to operate the valve in the following conditions:

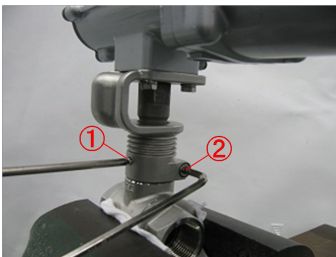
Normally closed type (standard): Closed, Normally open type (optional): Open

Before detaching the unit, make sure that the connector moves up and down smoothly. If it is difficult to push down the connector, grip the connector with a spanner and turn it left and right (using some force if necessary) before pushing down.



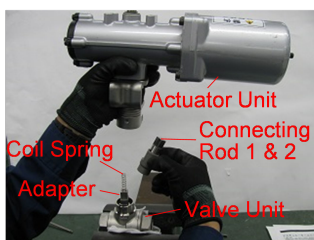
Spanner	
Size (mm)	Distance across flats (mm)
15 to 25	19
32 to 50	27

Remove the hex socket set screw from mounting bracket 1. Remove the Allen head bolt (see fig. on left) from the mounting bracket 2.



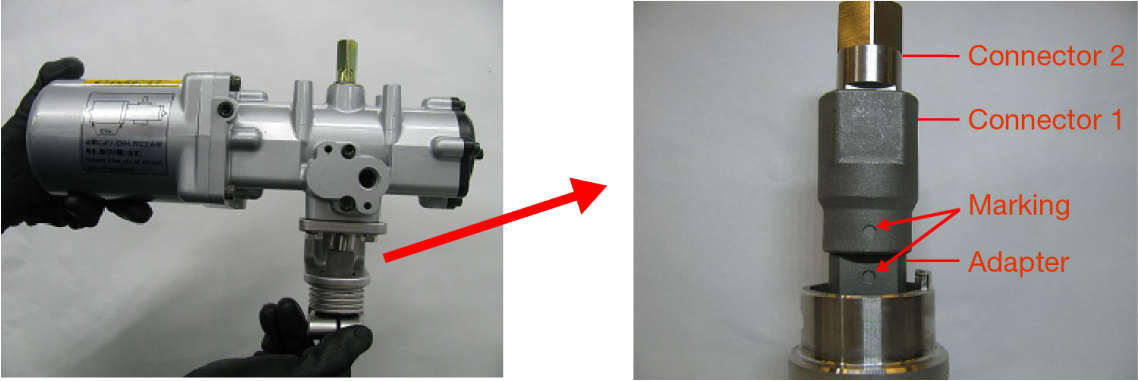
Allen Head Bolt	
Size (mm)	Distance across flats (mm)
15 to 25	5
32 to 50	6


Lift the actuator unit, being careful not to release the coil spring in the connector. When replacing the valve unit, remove the adapter and coil spring, store them with connector 1 and 2. When replacing the actuator unit, set the coil spring on the adapter.



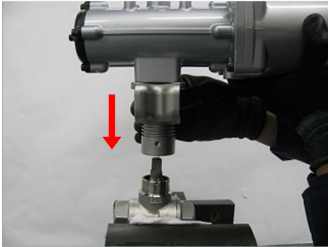
Reattaching the Actuator Unit

Attach the adapter to the spindle of the valve unit. Place the coil spring on the adapter. Set connector 1 and 2 on the output shaft of the actuator unit.

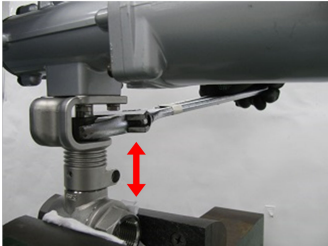


 **Note**
Make sure the "O" marks on both connector 1 and the adapter are aligned, as shown in the circle in the left photo.

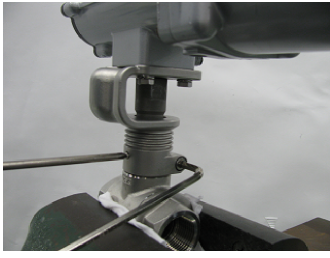
Lower the actuator unit vertically while the connector is in the output shaft of the actuator unit. Make sure to hold the connector so it does not fall off. Be sure that the coil spring stays on the connector.



If the actuator does not lower to the proper position, push the connector down with a spanner and turn it left and right.



Once the actuator unit is properly attached, tighten the hex socket set screw and Allen head bolt to the proper torques as shown below.



	Size (mm)	Torque (N·m)
Hex socket set screw	15 to 50	0.9
Allen head bolt	15 to 25	5.5
	32 to 50	13.0

After tightening the screw and bolt, make sure that the connector moves up and down smoothly using a spanner.

Changing Direction of the Actuator Unit



Caution

Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) 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.

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.

Follow the instructions below to change the direction of the actuator unit. The direction cannot be changed for the explosion-proof type actuator with the limit switch.



Note

When changing direction of the actuator unit, make sure to shut off the power source and release all residual electrical charges and motive air. Before performing any work, depressurize the piping before and after the product. Make sure that the valve is closed for normally-closed (standard) type or open for normally-open type (optional). When changing the direction of the actuator before piping work, make sure to secure the valve body in a suitable work environment such as on a work table.

Loosen the four bolts that secure the actuator and the mounting bracket. Since the center of gravity of the actuator is off-balance, make sure to support the actuator by hand so that the actuator does not fall when loosened.



Size		Distance across flats (mm)
15 to 25 mm	M6	10
32 to 50 mm	M8	13

After the bolts are removed, make sure to lift the actuator up by being careful that connector 1 and 2 will not be lifted up together with the actuator.



Note

Do not change the direction of connector 1 and 2. The connecting parts of the connector and actuator are square, so the direction can be changed in four directions: 0°, 90°, 180° and 270°.

After changing the direction of the actuator, carefully insert the actuator to connector 2 again by making sure there is no gap between the mounting bracket and the actuator. Reattach the bolts and tighten them with the torques shown below.



Size		Torque (N·m)
15 to 25 mm	M6	6
32 to 50 mm	M8	15

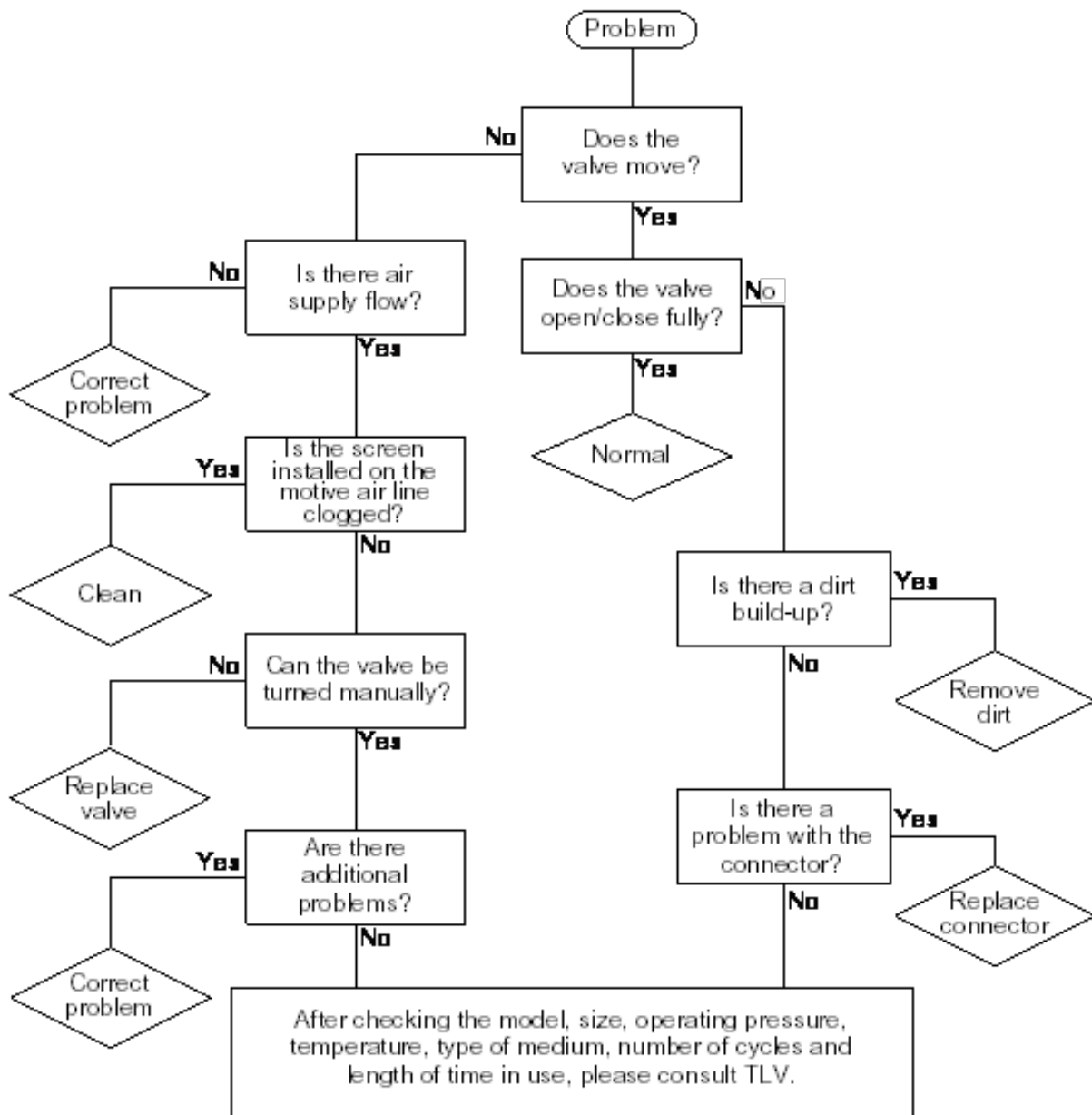
Troubleshooting



Caution

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 and remedy.



TLV EXPRESS LIMITED WARRANTY

Subject to the limitations set forth below, TLV CO., LTD., a Japanese corporation (“**TLV**”), warrants that products which are sold by it, TLV International Inc. (“**TII**”) or one of its group companies excluding TLV Corporation (a corporation of the United States of America), (hereinafter the “**Products**”) are designed and manufactured by TLV, conform to the specifications published by TLV for the corresponding part numbers (the “**Specifications**”) and are free from defective workmanship and materials. The party from whom the Products were purchased shall be known hereinafter as the “**Seller**”. With regard to products or components manufactured by unrelated third parties (the “**Components**”), TLV provides no warranty other than the warranty from the third party manufacturer(s), if any.

Exceptions to Warranty

This warranty does not cover defects or failures caused by:

1. improper shipping, installation, use, handling, etc., by persons other than TLV, TII or TLV group company personnel, or service representatives authorized by TLV; or
2. dirt, scale or rust, etc.; or
3. improper disassembly and reassembly, or inadequate inspection and maintenance by persons other than TLV or TLV group company personnel, or service representatives authorized by TLV; or
4. disasters or forces of nature or Acts of God; or
5. abuse, abnormal use, accidents or any other cause beyond the control of TLV, TII or TLV group companies; or
6. improper storage, maintenance or repair; or
7. operation of the Products not in accordance with instructions issued with the Products or with accepted industry practices; or
8. use for a purpose or in a manner for which the Products were not intended; or
9. use of the Products in a manner inconsistent with the Specifications; or
10. use of the Products with Hazardous Fluids (fluids other than steam, air, water, nitrogen, carbon dioxide and inert gases (helium, neon, argon, krypton, xenon and radon)); or
11. failure to follow the instructions contained in the TLV Instruction Manual for the Product.

Duration of Warranty

This warranty is effective for a period of one (1) year after delivery of Products to the first end user. Notwithstanding the foregoing, asserting a claim under this warranty must be brought within three (3) years after the date of delivery to the initial buyer if not sold initially to the first end user.

ANY IMPLIED WARRANTIES NOT NEGATED HEREBY WHICH MAY ARISE BY OPERATION OF LAW, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY EXPRESS WARRANTIES NOT NEGATED HEREBY, ARE GIVEN SOLELY TO THE INITIAL BUYER AND ARE LIMITED IN DURATION TO ONE (1) YEAR FROM THE DATE OF SHIPMENT BY THE SELLER.

Exclusive Remedy

THE EXCLUSIVE REMEDY UNDER THIS WARRANTY, UNDER ANY EXPRESS WARRANTY OR UNDER ANY IMPLIED WARRANTIES NOT NEGATED HEREBY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), IS **REPLACEMENT**; PROVIDED: (a) THE CLAIMED DEFECT IS

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Any provision of this warranty which is invalid, prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such invalidity, prohibition or unenforceability without invalidating the remaining provisions hereof, and any such invalidity, prohibition or unenforceability in any such jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

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