

ISO 9001
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Manufacturer

TLV CO., LTD.

Kakogawa, Japan

is approved by LRQA Ltd. to ISO 9001:2001



Instruction Manual

Motorized Ball Butterfly Valve

Featured Models: MB12A/MB12AF/MB12B/MB12BF

172-65316M-11

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Introduction

Thank you for purchasing the TLV motorized ball butterfly 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 motorized ball butterfly 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 an electric 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

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 switch 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.

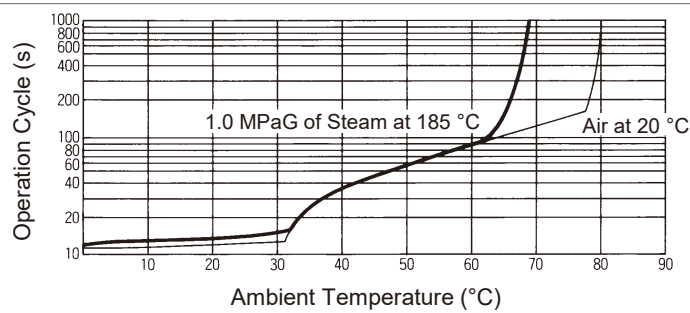
Model	MB12A	MB12AF	MB12B	MB12BF
Connection	Screwed	Flanged	Screwed	Flanged
Max. Operating Press.(PMO)	1.0 MPaG			
Max. Operating Temp. (TMO)	90 °C		185 °C	
Max. Allowable Press. (PMA ⁰¹)	1.0 MPaG			
Max. Allowable Temp. TPMA ⁰¹)	185 °C			
Applicable Fluid	Cold water, hot water and air		Very hot water and steam	
Cv Values (Cv US)	Size	MB12A/MB12B	MB12AF/MB12BF	
	15 mm	9.6	8.0	
	20 mm	18	16	
	25 mm	29	26	
	32 mm	50	47	
	40 mm	82	78	
	50 mm	135	135	
Motor Type	Single-phase capacitor-run induction motor			
Power Supply Voltage	100 V AC ±10%, 200 V AC ±10%			
Electrical Consumption	Sizes 15 to 25 mm: 100 V: 50 V A, 200 V: 50 V A Sizes 32 to 50 mm: 100 V: 69 V A, 200 V: 80 V A			
Control System	Toggle switch for fully-open fully-closed			
Overload Protection	Built-in thermal protector Sizes 15 to 25 mm: 115 °C ±5 °C Sizes 32 to 50 mm: 130 °C ±5 °C			
Insulating Class	Class E			
Direction of Rotation	Opening: Counter-clockwise (left) when viewed from above Closing: Clockwise (right) when viewed from above			
Open/Close Time (for 90° rotation)	Sizes 15 to 25 mm: 50 Hz: 4.5 seconds 60 Hz: 4.0 seconds Sizes 32 to 50 mm: 50 Hz: 5.5 seconds; 60 Hz: 4.5 seconds			
Protection Class	IP54 equivalent (splash-proof model)			
Manual Override	Possible when power supply is OFF			

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

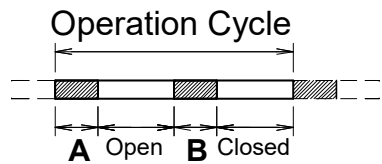
Avoid using the ball valve in the half-open position, as it may result in damage to the valve seat. Be sure to use only in the fully open and fully closed positions. Also, do not use with slurries.

To prevent overheating of the motor unit, determine the minimum operation cycle interval based on the ambient temperature from the graph below.

Ambient Temperature⁰¹ Range
and Operation Cycles



Operation cycle: The time for one cycle of opening and closing the valve



A: Time to cycle from closed to open, B: Time to cycle from open to closed

Example : When the ambient temperature is 40 °C and the medium in use is steam, allow for an operation cycle interval of at least 36 seconds. When the operation cycle interval is less than this, the thermal protector may operate, causing operation to cease until the motor temperature has fallen.

⁰¹Within one cm of cover

Specifications for No-voltage Contact Microswitch

Standard Model

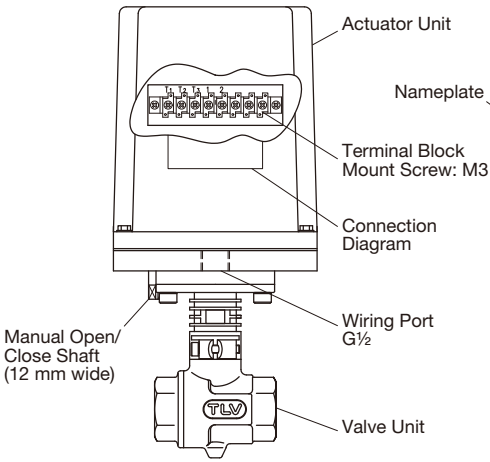
Manufacturer	OMRON CORPORATION
Model	V-105-1A5-T
Contact Capacity (Resistance Load)	15 to 250 V AC, 160 mA to 10 A 15 to 30 V DC, 160 mA to 6 A 15 to 125 V DC, 160 to 600 mA

Small-load Model

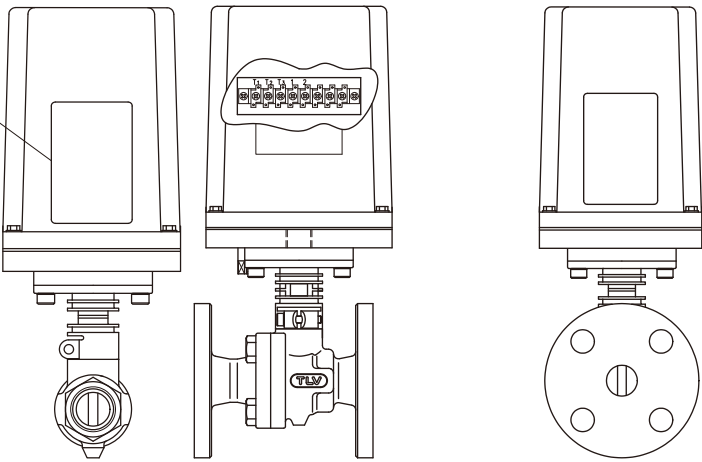
Manufacturer	Yamatake Corporation
Model	V-3214EK-011
Contact Capacity (Resistance Load)	5 to 125 V AC, 5 to 100 mA 5 to 30 V DC, 5 to 100 mA

Configuration

Screwed

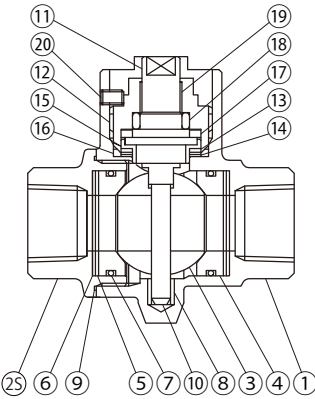


Flanged

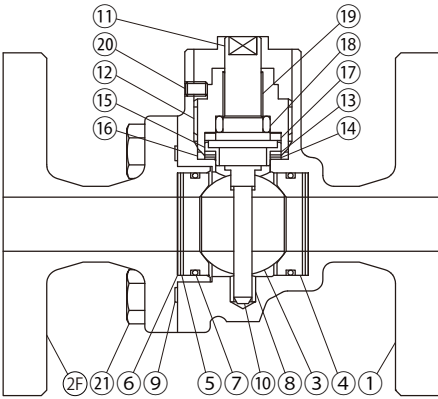


Valve Unit

Screwed



Flanged



No.	Part Name	No.	Part Name
1	Body	11	Spindle
2S	Union	12	Holder
2F	Flange	13	Washer
3	Ball	14	Belleville Washer
4 ⁰¹	Valve Seat	15	Gland Seat
5 ⁰¹	Washer	16	Holder Gasket
6 ⁰¹	Belleville Washer	17	Stem Packing
7 ⁰¹	Valve Seat O-ring	18	Seal
8	Bushing	19	Guide Bushing
9	Body Gasket	20	Holder Screw
10	Valve Shaft	21	Flange Bolt

⁰¹Inlet and outlet sides – 2 pieces

Installation



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 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.

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 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.

Make sure the power supply switch 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.

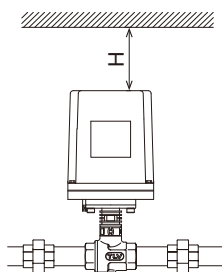
Make sure that wiring work requiring a special license is carried out only by qualified personnel. If carried out by unqualified personnel, overheating or short circuits leading to injury, fires, damage or other accidents may occur.

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.

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

Installing the Product

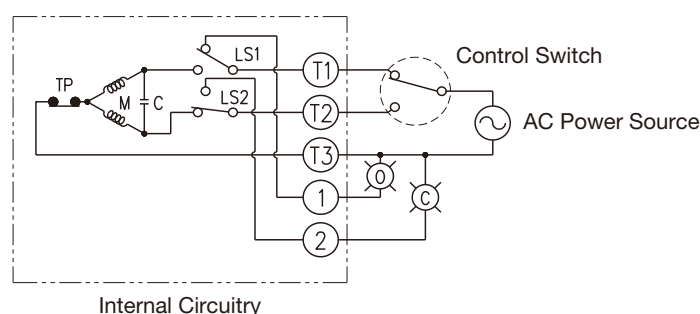
1. Before installation, make sure to remove all protective seals.
2. Before installing the product, thoroughly blow out the piping to remove any piping scraps, dirt and oil.
3. When installing the product, confirm that sufficient maintenance space has been secured around the product. Allow a space (H) of at least 200 mm above the top of the product.
4. Where the product is installed in a location that may be affected by radiant heat from nearby heat-generation, install a device such as a protective plate to block the radiant heat.
5. There are no restrictions concerning which side is to be installed as the inlet and which side is to be installed as the outlet.
6. Do not remove the cover except when necessary to carry out wiring, and do not operate the product with the cover removed.
7. Use a connector, etc. for the wiring port (G $\frac{1}{2}$) to maintain the seal inside the cover.
8. For screwed models, the installation of unions at the inlet and outlet is recommended to facilitate replacement of the valve unit.



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

Wiring Procedures (Standard)

1. Connect the ON/OFF control switch as shown in the diagram below.
 - When electricity flows through T1 and T3: As viewed from above, left rotation for the valve fully open when stopped.
 - When electricity flows through T2 and T3: As viewed from above, right rotation for the valve fully closed when stopped.
2. Terminals 1, 2 and 3 can be wired for the ON/OFF pilot lamp.
 - When the valve is fully open, the "O" pilot lamp is lit.
 - When the valve is fully closed, the "C" pilot lamp is lit.
3. When checking the operation of the actuator unit before installing in the piping, keep fingers well clear of the valve section.
4. Connect the electrical ground to the terminal block mounting screw on the actuator unit.



1. Connect the ON/OFF control switch as shown in the diagrams below.
 - When electricity flows through T1 and T3: As viewed from above, left rotation for the valve fully open when stopped.
 - When electricity flows through T2 and T3: As viewed from above, right rotation for the valve fully closed when stopped.
2. Auxiliary contact operation is shown below. The example below uses the pilot lamps.

Open: Lit when valve is fully open

Not Open: Lit when valve is not fully open

Closed: Lit when valve is fully closed

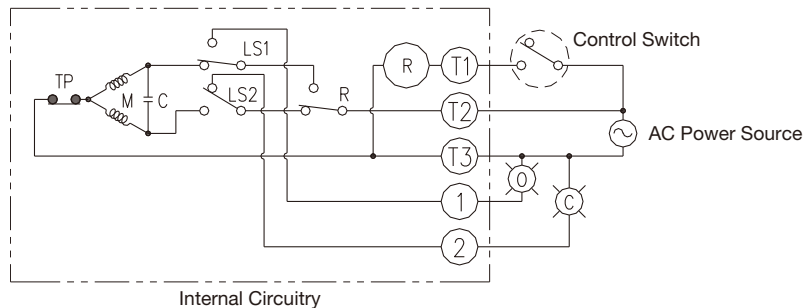
Not Closed: Lit when valve is not fully closed
3. When checking the operation of the actuator unit before installing in the piping, keep fingers well clear of the valve section.
4. Connect the electrical ground to the terminal block mounting screw on the actuator unit.



The auxiliary contact closed signal is sent when the valve reaches 5° before the fully closed position. The auxiliary contact opened signal is sent when the valve reaches 5° before the fully opened position.

Wiring Procedures (Optional Relay Model (Energize to Open Type))

1. Connect the ON/OFF control switch as shown in the diagrams below.
 - When the control switch is ON: As viewed from above, left rotation for the valve fully open when stopped.
 - When the control switch is OFF: As viewed from above, right rotation for the valve fully closed when stopped.
2. Terminals 1, 2 and 3 can be wired for the ON/OFF pilot lamp.
 - When the valve is fully open, the "O" pilot lamp is lit.
 - When the valve is fully closed, the "C" pilot lamp is lit.
3. When checking the operation of the actuator unit before installing in the piping, keep fingers well clear of the valve section.
4. Connect the electrical ground to the terminal block mounting screw on the actuator unit.



Note

Excessively long controller wiring may lead to malfunction due to induction voltage. If this occurs, install a relay near the motorized valve; use the relay contact for the controller or install a resistor between terminals T1 and T3.

Contact TLV for details.

Wiring Procedures (Optional Relay (Energize to Open Type) + Auxiliary Contact Model)

1. Connect the ON/OFF control switch as shown in the following diagrams.
 - When electricity flows through T1 and T3: As viewed from above, left rotation for the valve fully open when stopped.
 - When electricity flows through T2 and T3: As viewed from above, right rotation for the valve fully closed when stopped.
2. Auxiliary contact operation is shown below.

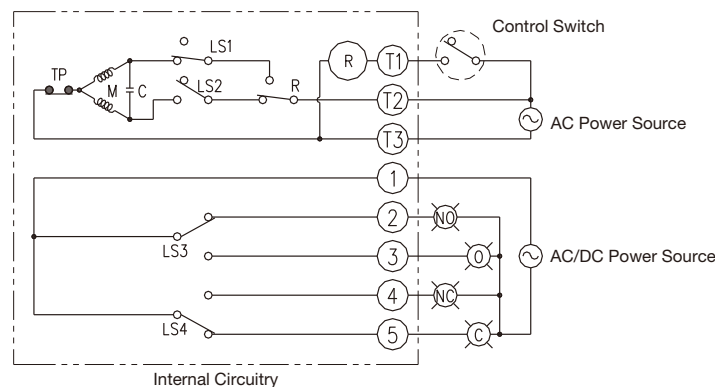
The example below uses the pilot lamps.

Open: Lit when valve is fully open

Not Open: Lit when valve is not fully open

Closed: Lit when valve is fully closed

Not Closed: Lit when valve is not fully closed
3. When checking the operation of the actuator unit before installing in the piping, keep fingers well clear of the valve section.
4. Connect the electrical ground to the terminal block mounting screw on the actuator unit.

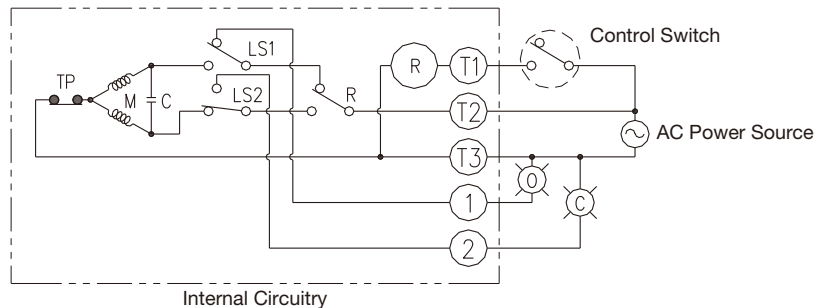


Note

- Excessively long controller wiring may lead to malfunction due to induction voltage. If this occurs, install a relay near the motorized valve; use the relay contact for the controller or install a resistor between terminals T1 and T3. Contact TLV for details.
- The auxiliary contact closed signal is sent when the valve reaches 5° before the fully closed position. The auxiliary contact opened signal is sent when the valve reaches 5° before the fully opened position.

Wiring Procedures (Optional Relay Model (Energize to Close Type))

1. Connect the ON/OFF control switch as shown in the diagrams below.
 - When the control switch is ON: As viewed from above, left rotation for the valve fully closed when stopped.
 - When the control switch is OFF: As viewed from above, right rotation for the valve fully open when stopped.
2. Terminals 1, 2 and 3 can be wired for the ON/OFF pilot lamp.
 - When the valve is fully open, the "O" pilot lamp is lit.
 - When the valve is fully closed, the "C" pilot lamp is lit.
3. When checking the operation of the actuator unit before installing in the piping, keep fingers well clear of the valve section.
4. Connect the electrical ground to the terminal block mounting screw on the actuator unit.



Note

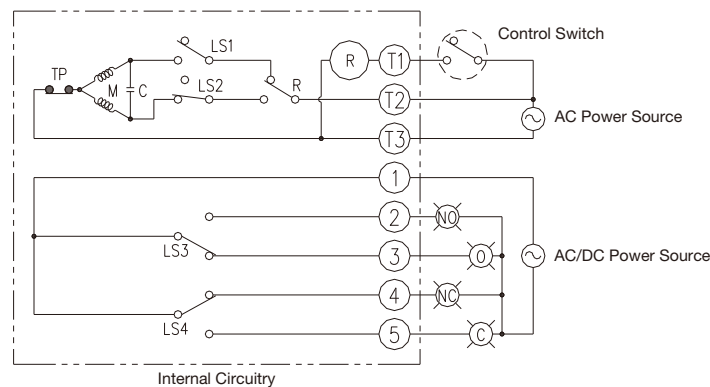
Excessively long controller wiring may lead to malfunction due to induction voltage. If this occurs, install a relay near the motorized valve; use the relay contact for the controller or install a resistor between terminals T1 and T3.

Contact TLV for details.

Wiring Procedures (Optional Relay (Energize to Close Type) + Auxiliary Contact Model)

1. Connect the ON/OFF control switch as shown in the following diagrams.
 - When electricity flows through T1 and T3: As viewed from above, left rotation for the valve fully closed when stopped.
 - When electricity flows through T2 and T3: As viewed from above, right rotation for the valve fully open when stopped.
2. Auxiliary contact operation is shown below. The example below uses the pilot lamps.

Open: Lit when valve is fully open
 Not Open: Lit when valve is not fully open
 Closed: Lit when valve is fully closed
 Not Closed: Lit when valve is not fully closed
3. When checking the operation of the actuator unit before installing in the piping, keep fingers well clear of the valve section.
4. Connect the electrical ground to the terminal block mounting screw on the actuator unit.



Note

- Excessively long controller wiring may lead to malfunction due to induction voltage. If this occurs, install a relay near the motorized valve; use the relay contact for the controller or install a resistor between terminals T1 and T3. Contact TLV for details.
- The auxiliary contact closed signal is sent when the valve reaches 5° before the fully closed position. The auxiliary contact opened signal is sent when the valve reaches 5° before the fully opened position.

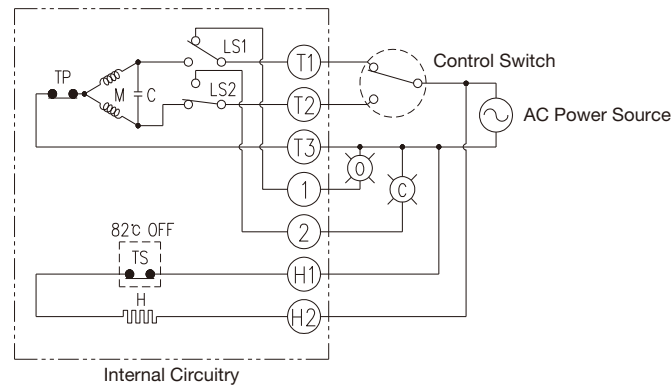
Wiring Procedures (Standard + Optional Space Heater Model)

Connect the space heater as shown in the diagrams below.

Temperature is controlled using a thermo-switch.

The diagram shows standard wiring with the space heater option. The options listed below also have the H1 and H2 terminals and are wired in the same manner:

- Standard + Auxiliary Contact + Space Heater
- Relay + Space Heater
- Relay + Auxiliary Contact + Space Heater



Manual Operation

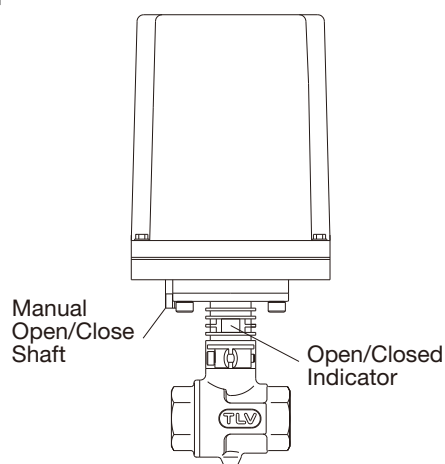


Caution

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.

1. Perform manual operation only after first making sure that the power is OFF.
Manual operation is not possible when the power is ON.
For safety, make sure the power is OFF even during a power outage.
2. Using a wrench, turn the manual open/close shaft (side-to-side width: 12 mm) located on the bottom (valve side) of the actuator.
Turn the shaft one revolution to rotate the valve section 90°.
The shaft may be turned in either direction.
There are no stoppers at the valve fully-open and fully-closed positions.
Pay close attention to the open/closed indicator as the shaft is being turned.



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.

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 of the Actuator Unit and Valve Unit

1. An operational check shall be performed at least once every 3 months.
2. Begin the supply of electricity to the actuator unit, and check the operation (angle of rotation, time elapse for open/close, sound).
3. After shutting off the supply of electricity to the actuator unit, manually operate the valve and check for foreign matter in the valve and check that the torque for opening and closing force (rotational torque) is as it should be.

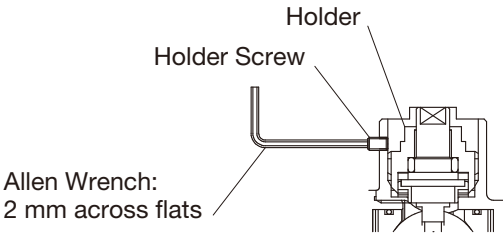
To do this, refer to the table of rotational torques found below. If a torque exceeds twice the value of that found in the table, it is an abnormal torque and an inspection should be performed.

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

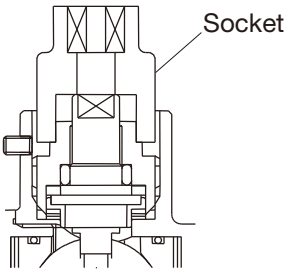
Additional Tightening of the Valve Unit Gland Section

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. Screw the holder further in with a socket wrench.



Valve Connection Size (mm)	Socket Distance Across Flats (mm)
15 to 25	17
32 to 50	27

- 3. 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).

Disassembly/Reassembly



Caution

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

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.

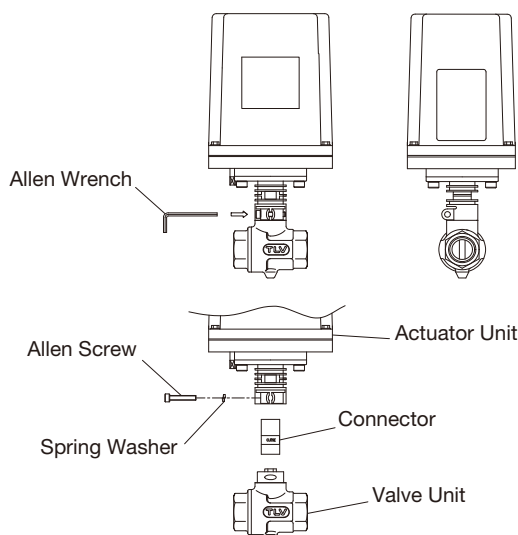
Make sure the power supply switch is OFF before carrying out work on the wiring or inspections involving disassembly. If such work is carried out with the power on, there is a danger that equipment may malfunction or electric shock may occur, leading to injury or other accidents.

Use the following procedures to remove components. Use the same procedures in reverse to reassemble.

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

Detaching/Reattaching the Actuator Unit and Valve Unit

Part Name	During Disassembly	During Reassembly	Part Inspection
Allen Screw	Remove with an allen wrench	Coat threads with anti-seize and tighten to the proper torque	—
Spring Washer	Remove the spring washer	Reinsert spring washer	—
Actuator Unit	Slowly pull actuator unit up and off	Remount the actuator unit	—
Connector	Detach the connector	Reattach the connector	Check for deformation or wear

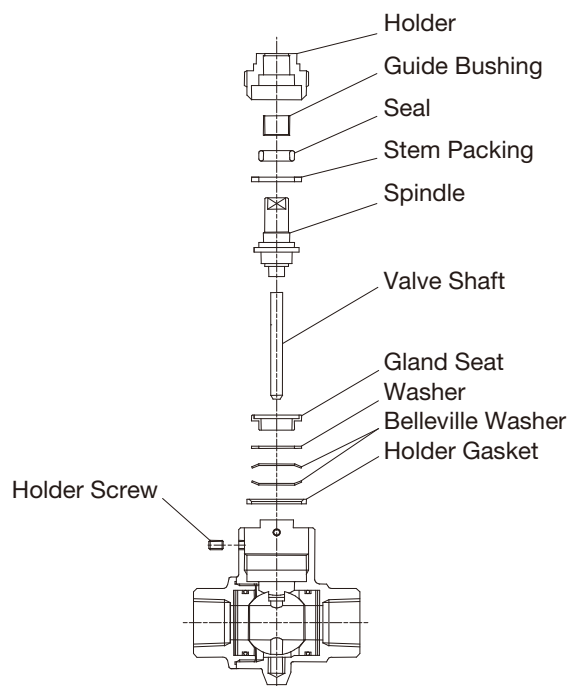


Allen Screw

Valve Size mm	Torque N-m	Distance Across Flats mm
15 to 25	10	5
32 to 50	12	6

Disassembly/Reassembly of the Valve Unit Gland Section

Part Name	During Disassembly	During Reassembly	Part Inspection
Holder Screw	Remove with an allen wrench	If the valve body material is stainless steel, coat threads with anti-seize; tighten to the proper torque	—
Holder	Remove with a socket wrench	If the valve body material is stainless steel, coat threads with anti-seize; tighten to the proper torque	—
Guide Bushing	Remove the bushing	Reinsert the bushing	Check for wear
Seal	Remove the seal	Replace with a new seal	—
Stem Packing	Remove the stem packing	Replace with new stem packing	—
Spindle	Remove the spindle	Reinsert the spindle – 2 flat surfaces should fit into the slot in the ball	Check the 2 flat surfaces for deformation, wear, scratches, corrosion, etc.
Valve Shaft	Remove the valve shaft	Reinsert the valve shaft	Check for wear, deformation, etc.
Gland Seat	Remove the gland seat	Replace with a new gland seat with the proper orientation	—
Washer	Remove the washer	Reinsert the washer	Check for damage, deformation, etc.
Belleville Washer	Remove the Belleville washer	Reinsert the Belleville washer with the proper orientation	Check for damage, deformation, etc.
Holder Gasket	Remove the gasket and clean sealing surfaces	Replace with a new gasket if damaged; be careful of the orientation when inserting	—



Part Name	Valve Size mm	Torque N·m	Distance Across Flats mm
Holder Screw	15 to 50	1.2	2
Holder	15 to 25	50	17
	32 to 50	80	27



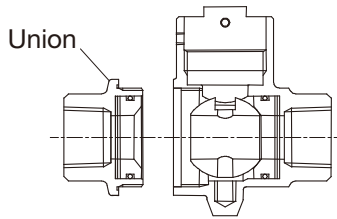
Note

1. Reassemble the gland section only after first reassembling the valve section.
2. To facilitate reinsertion of the spindle and valve shaft into the ball, for the screwed model first finger-tighten the inlet union, for the flanged model first finger-tighten the flange. This centers ball, thus making it easier to reassemble. When reassembly is completed, tighten the valve holder.

Disassembly/Reassembly of the Valve Section

Screwed Connection:

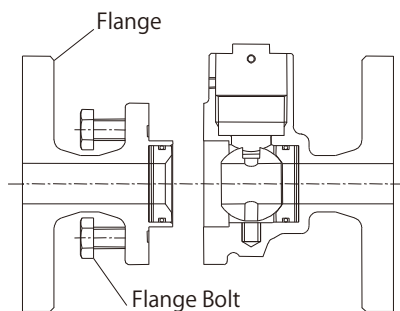
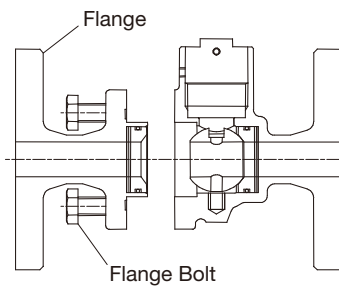
Part Name	During Disassembly	During Reassembly	Part Inspection
Union	Remove with a socket or an adjustable wrench	If the valve body material is stainless steel, coat threads with anti-seize; tighten to the proper torque	—



Part Name	Valve Size mm	Torque N·m	Distance Across Flats mm
Union	15	100	27
	20	150	32
	25	200	41
	32	300	50
	40	500	60
	50	700	70

Flanged Connection:

Part Name	During Disassembly	During Reassembly	Part Inspection
Flange Bolt	Remove with a wrench	If the valve body material is stainless steel, coat threads with anti-seize; tighten to the proper torque	—
Flange	Remove the flange	Reattach the flange	—

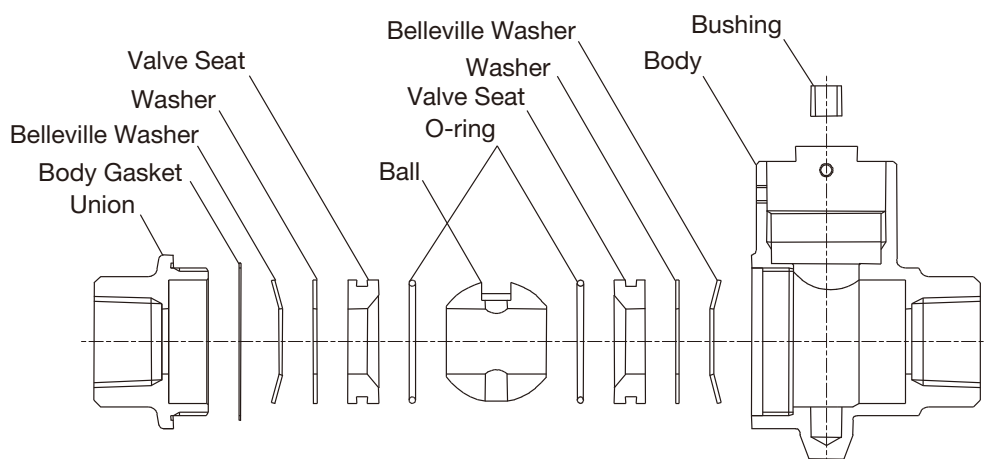


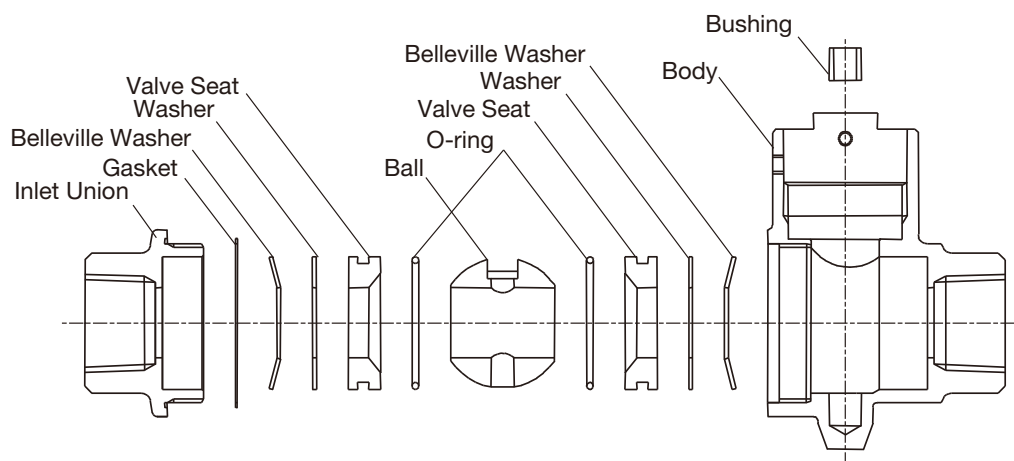
Part Name	Valve Size mm	Torque N-m	Distance Across Flats mm
Union	15	20	13
	20	35	16/17 ⁰¹
	25	50	19
	32	60	19
	40, 50	80	24

⁰¹Size depends on bolt standard

Common Items for Screwed and Flanged Connection Models:

Part Name	During Disassembly	During Reassembly	Part Inspection
Body Gasket	Remove the gasket and clean sealing surfaces	Replace with a new gasket if damaged	—
Valve Seat (Union/Flange Side)	Remove the valve seat	Replace with a new valve seat	—
Valve Seat O-ring	Remove the O-ring	Replace with a new O-ring; insert into the valve seat	—
Washer	Remove the washer	Reinsert the washer	Check for damage, deformation, etc.
Belleville Washer	Remove the Belleville washer	See the drawing below for the proper orientation of the Belleville washer	Check for damage, deformation, etc.
Ball	Remove the ball	Reinsert the ball – see the drawing below for the proper orientation	Check the sealing area for scratches, wear, etc.
Valve Seat (Body Side)	Remove the valve seat	Replace with a new valve seat	—
Valve Seat O-ring	Remove the O-ring	Replace with a new O-ring; insert into the inlet valve seat	—
Washer	Remove the washer	Reinsert the washer	Check for damage, deformation, etc.
Belleville Washer	Remove the Belleville washer	See the drawing below for the proper orientation of the Belleville washer	Check for damage, deformation, etc.
Bushing	Remove the bushing	Replace with a new bushing	—





Note

Clean, then check the inside of the body for scratches, erosion, etc.

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.

Valve Section

Problem	Cause	Remedy
Fluid leaks from the outlet	Sealing area of the valve has build-up or is scratched, or the valve seat O-ring is scratched or damaged	Clean or replace with new parts
Fluid leaks from the gland section	Remove with a socket wrench	Apply additional tightening, clean or replace with new parts
The valve does not move or remains half-open	Valve seat or ball has build-up, valve seat is deformed, or ball has an unacceptable rotational torque (see the rotational torque table in the "Maintenance" section)	Clean or replace with new parts
	Connector is worn or deformed	Replace with a new connector
	Actuator unit malfunction (see 'Troubleshooting the Actuator Unit', next page)	Replace with a new actuator
Fluid leaks from the union/flange connections	Gasket deterioration or wear	Replace with a new gasket
	The inlet union or flange bolt is loose	Tighten to the proper torque
The valve seat frequently becomes damaged	Occurrence of water hammer	Replace with a new gland seat with the proper orientation
	Valve is being used in the half-open position	Reinsert the washer

When the actuator unit fails to operate as it did when first installed, use the following table to locate the cause. Detach the valve body before troubleshooting, and check the actuator unit itself (see next page).

Actuator Unit

Part Name	During Disassembly	During Reassembly
Does not operate even though control switch is operating	Actuator is broken (manual operation is possible, see the "Manual Operation" section)	Contact TLV
	Improper wiring or control	Correct the problem
	Power is not reaching the unit or the voltage is incorrect (also check current and fuses)	Correct the problem
	Thermal protector is not functioning	After allowing the thermal protector to cool down, begin its operation again and re-check to ascertain whether operation of the thermal protector is the cause
	Check the voltage between terminals T1 and T3 and between T2 and T3 <ul style="list-style-type: none"> • When the valve should be open, power should be supplied to T1 and T3 • When the valve should be closed, power should be supplied to T2 and T3 	Correct the problem
Does not rotate the full 90°, stops at a partial rotation	There is a problem with the control system	Correct the problem

If the above remedies do not restore the equipment to normal operation, make a note of the operating pressure, operating temperature, frequency of operation, and serial number of the product, and then contact your sales representative.

In the event of product failure, any necessary repairs shall be carried out by TLV, so do not disassemble the actuator unit.

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.

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REPORTED TO THE SELLER IN WRITING WITHIN THE WARRANTY PERIOD, INCLUDING A DETAILED WRITTEN DESCRIPTION OF THE CLAIMED DEFECT AND HOW AND WHEN THE CLAIMED DEFECTIVE PRODUCT WAS USED; AND (b) THE CLAIMED DEFECTIVE PRODUCT AND A COPY OF THE PURCHASE INVOICE IS RETURNED TO THE SELLER, FREIGHT AND TRANSPORTATION COSTS PREPAID, UNDER A RETURN MATERIAL AUTHORIZATION AND TRACKING NUMBER ISSUED BY THE SELLER. ALL LABOR COSTS, SHIPPING COSTS, AND TRANSPORTATION COSTS ASSOCIATED WITH THE RETURN OR REPLACEMENT OF THE CLAIMED DEFECTIVE PRODUCT ARE SOLELY THE RESPONSIBILITY OF BUYER OR THE FIRST END USER. THE SELLER RESERVES THE RIGHT TO INSPECT ON THE FIRST END USER'S SITE ANY PRODUCTS CLAIMED TO BE DEFECTIVE BEFORE ISSUING A RETURN MATERIAL AUTHORIZATION. SHOULD SUCH INSPECTION REVEAL, IN THE SELLER'S REASONABLE DISCRETION, THAT THE CLAIMED DEFECT IS NOT COVERED BY THIS WARRANTY, THE PARTY ASSERTING THIS WARRANTY SHALL PAY THE SELLER FOR THE TIME AND EXPENSES RELATED TO SUCH ON-SITE INSPECTION.

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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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