

ISO 9001
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Manufacturer

TLV CO., LTD.

Kakogawa, Japan

is approved by LRQA Ltd. to ISO 9001:2001



Instruction Manual

Bypass Blowdown Steam Trap

Featured Models: BT3N/MBT3N/PBT3N

172-65162M-07

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Introduction

Thank you for purchasing the TLV bypass blowdown steam trap.

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 bypass blowdown steam trap features a combination of: the most reliable of steam traps, the free float; a compact ball valve, with superior long-lasting sealing properties; and an actuator unit (electric, pneumatic).

The following models are contained in this manual:

BT3N: Steam trap with an integrated compact bypass blowdown ball valve with a manual operation handle

MBT3N: Steam trap with an integrated compact bypass blowdown ball valve with an electric actuator

PBT3N: Steam trap with an integrated compact bypass blowdown ball 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

NEVER apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.



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

DO NOT use this product in excess of the maximum operating pressure differential. Such use could make discharge impossible (blocked).



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 product, leading to fluid discharge, which may 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**

Do not stand on or apply body weight to the handle. The handle may break, resulting in injury 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.

**Caution**

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

Checking the Piping

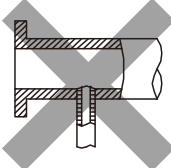
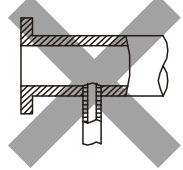
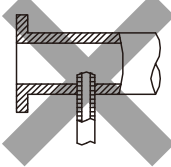
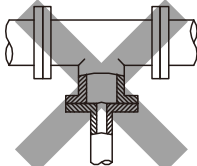
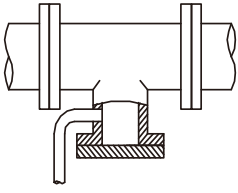
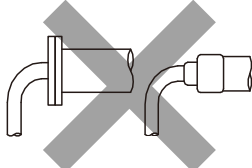
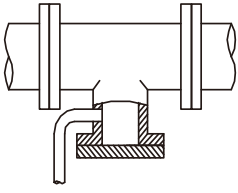
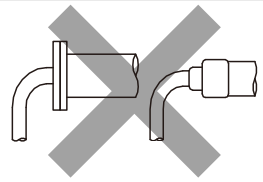


Caution

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.

Check to make sure that the pipes to be connected to the product have been installed properly.

1. Is the pipe diameter suitable?
2. Has sufficient space been secured for maintenance?
(Refer to step 3. in the "Installation" section.)
3. Is the piping where the product is to be installed horizontal?
4. Have maintenance valves been installed at the inlet and outlet? If the outlet is subject to back pressure, has a check valve (TLV-CK) been installed?
5. Is the inlet pipe as short as possible, with as few bends as possible, and installed so the liquid will flow naturally down into the product?
6. Has the piping work been done correctly, as shown in the figures below?

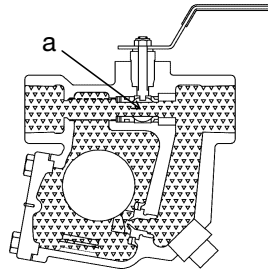
Requirement	Correct	Incorrect
Install catchpot with the proper diameter.		 Diameter is too small.
Make sure the flow of condensate is not obstructed.		 Diameter is too small and inlet protrudes into pipe interior.
To prevent rust and scale from flowing into the product, the inlet pipe should be connected 25 to 50 mm above the base of the T-pipe.		 Rust and scale flow into the trap with the condensate.
When installing on the blind end, make sure the flow of condensate is not obstructed.		 Condensate collects in the pipe.

Operation

Principles of air and condensate discharge:

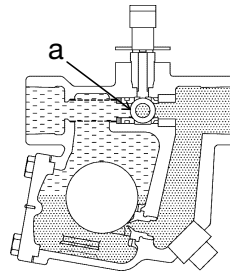
1. At start-up, the bypass blowdown valve can be opened to allow a large quantity of condensate to be rapidly discharged, minimizing the time required for the unit to warm up. The bimetal holds the float away from the orifice so that initial air in the product chamber is also discharged.

Bypass Valve (a): Opened

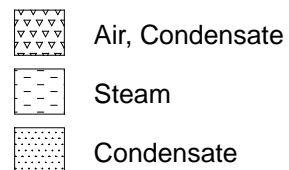
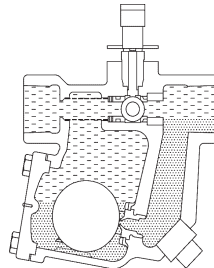


2. After the blowdown operation ends, the bimetal strip retracts and the valve closes, the float automatically adjusts the valve opening in response to the fluctuation in load, and the condensate is continuously discharged-no condensate will accumulate ahead of the steam trap.

Bypass Valve (a): Closed



3. When the amount of condensate flowing into the chamber decreases, the float gradually closes the orifice. Steam leakage is prevented through the use of a three-point seating design and the water sealing of the valve. Normally the bimetal remains retracted and has no effect on the operation of the float, but if air should accumulate in the product and the temperature drops, it extends, forcing the float up and the air is automatically vented.



Specifications



Caution

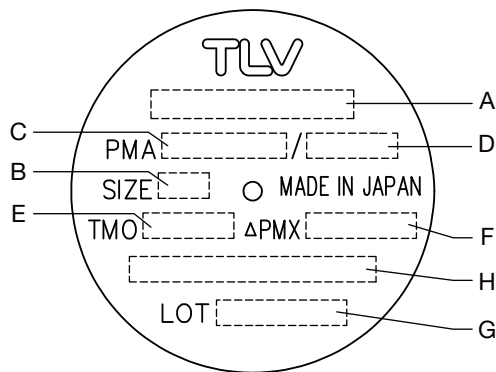
Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product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

DO NOT use this product in excess of the maximum operating pressure differential. Such use could make discharge impossible (blocked).

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.

Steam Trap Body

Refer to the product nameplate for detailed specifications.



A	Model	E	Maximum Operating Temperature (TMO)
B	Nominal Diameter	F	Maximum Differential Pressure (PMX)
C	Maximum Allowable Pressure (PMA) ⁰¹	G	Production Lot No.
D	Maximum Allowable Temperature (TMA) ⁰¹	H	Valve No. ⁰²

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

⁰²Valve No. is displayed for products with options. This item is omitted from the nameplate when there are no options.

MBT3N: Motor Unit

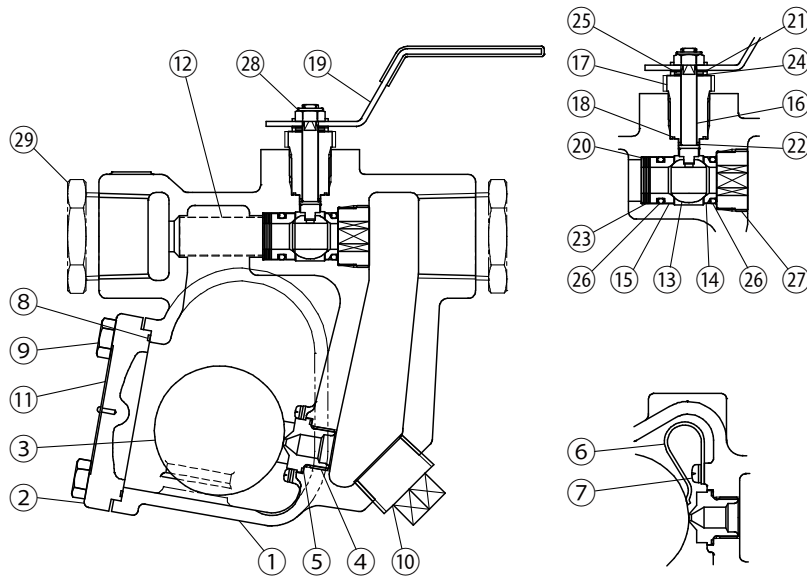
Motor Type	Reversible motor (condenser run type single-phase induction motor)
Power Consumption	52 VA (100 to 110 V), 62 VA (200 to 220 V)
Control System	ON-OFF (fully open/fully closed)
Overload Protection	Built-in thermal protector 120 ±5 °C
Direction of Rotation	90° reciprocating
Open/Close Time (90° rotation)	3.5 seconds/50 Hz 3.0 seconds/60 Hz
Water Resistance	Rainproof
Manual Override	Possible when the power is OFF
Ambient Temp. Range and Operation Cycles (within 1 cm of the trap cover)	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>0.5 MPaG Steam</p> <p>1.0 MPaG Steam</p> <p>Operation Cycles (sec.)</p> <p>Ambient Temp. (°C)</p> </div> <div style="text-align: center;"> <p>Operation Cycle</p> <p>A Open B Closed</p> <p>A: Closed-to-open</p> <p>B: Open-to-closed</p> <p>“Operation cycle” is the interval between the motor stop at the end of one open or close operation and the motor start at the beginning of the next.</p> </div> </div> <p>Example: When the ambient temperature is 40 °C, and the medium in use is steam at 0.5 MPaG, allow for a cycle operation interval of at least 36 seconds. When the cycle operation interval is less than 36 seconds, a thermal protector will prevent the motor unit from operating until it cools down sufficiently.</p>

PBT3N: Actuator Unit

Actuator Type	Vane rotary actuator										
Air Supply Pressure	0.3 to 1.0 MPaG										
Air Supply Port Size	Rc(PT) ¹ / ₈										
Control System	ON-OFF (fully open/fully closed) reciprocating										
Open/Close Time (90° rotation)	0.09 to 0.8 seconds										
Actuator Capacity	42 cm ³										
Ambient Temp. Range	60 °C or lower										
Water Resistance	Rainproof										
Manual Override	Possible in absence of motive pressure										
Air Consumption (Graph represents consumption for one reciprocating cycle)	<p style="text-align: center;">(kg/cm²G)</p> <table border="1"> <caption>Approximate data points from the Air Consumption graph</caption> <thead> <tr> <th>Air Supply Pressure (MPaG)</th> <th>Air Consumption (Nℓ)</th> </tr> </thead> <tbody> <tr> <td>0.4</td> <td>0.3</td> </tr> <tr> <td>0.6</td> <td>0.5</td> </tr> <tr> <td>0.8</td> <td>0.7</td> </tr> <tr> <td>1.0</td> <td>0.9</td> </tr> </tbody> </table> <p style="text-align: center;">Air Supply Pressure (MPaG)</p>	Air Supply Pressure (MPaG)	Air Consumption (Nℓ)	0.4	0.3	0.6	0.5	0.8	0.7	1.0	0.9
Air Supply Pressure (MPaG)	Air Consumption (Nℓ)										
0.4	0.3										
0.6	0.5										
0.8	0.7										
1.0	0.9										

Configuration

BT3N



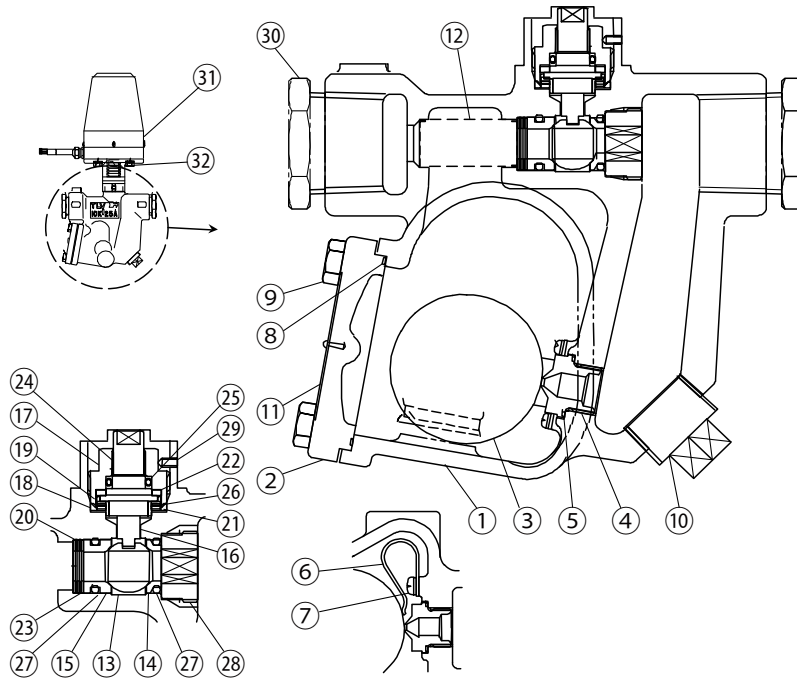
Note

Removing the handle or locknut causes degradation of the gland section seal. Do not remove the handle or locknut except when performing a disassembly inspection.

No.	Part Name	No.	Part Name
1	Body	16	Spindle
2	Cover	17	Gland
3	Float	18	Gland Gasket
4	Orifice	19	Handle
5	Orifice Gasket	20	Disc Spring
6	Air Vent Strip (Bimetal)	21	Disc Spring
7	Screw & Spring Washer	22	Gland Packing
8	Cover Gasket	23	Washer
9	Cover Bolt	24	Thrust Washer
10	Orifice Plug	25	Washer
11	Nameplate	26	O-ring (Inlet/Outlet Valve Seat)
12	Screen	27	Valve Holder
13	Ball	28	Locknut
14	Outlet Valve Seat	29	Bushing ⁰¹
15	Inlet Valve Seat		

⁰¹Included only with 15, 20 mm sizes.

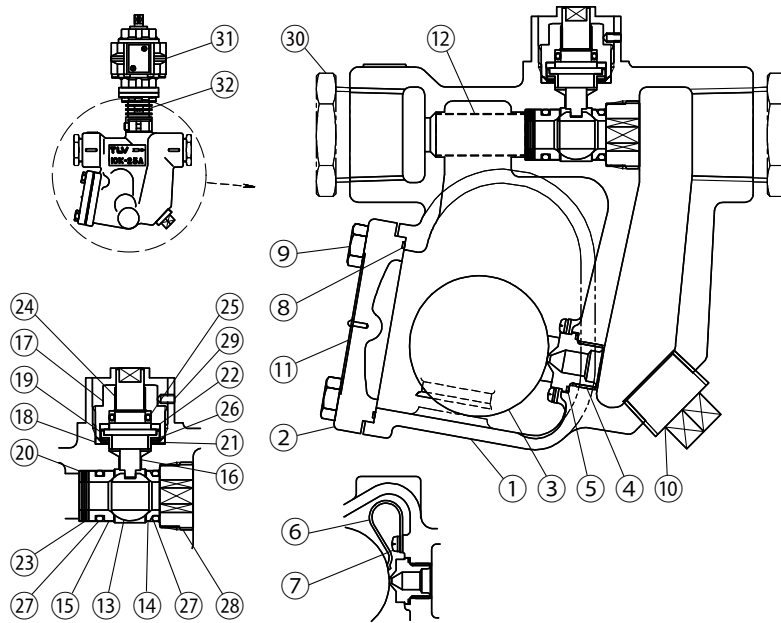
MBT3N



No.	Part Name	No.	Part Name
1	Body	17	Gland Holder
2	Cover	18	Gland Holder Gasket
3	Float	19	Gland Seat
4	Orifice	20	Disc Spring
5	Orifice Gasket	21	Disc Spring
6	Air Vent Strip (Bimetal)	22	Gland Packing
7	Screw & Spring Washer	23	Washer
8	Cover Gasket	24	Guide Bushing
9	Cover Bolt	25	Seal
10	Orifice Plug	26	Washer
11	Nameplate	27	O-ring (Inlet/Outlet Valve Seat)
12	Screen	28	Valve Holder
13	Ball	29	Hex Socket Set Screw
14	Outlet Valve Seat	30	Bushing ⁰¹
15	Inlet Valve Seat	31	Motor Unit
16	Spindle	32	Shaft Coupling

⁰¹Included only with 15, 20 mm sizes.

PBT3N



No.	Part Name	No.	Part Name
1	Body	17	Gland Holder
2	Cover	18	Gland Holder Gasket
3	Float	19	Gland Seat
4	Orifice	20	Disc Spring
5	Orifice Gasket	21	Disc Spring
6	Air Vent Strip (Bimetal)	22	Gland Packing
7	Screw & Spring Washer	23	Washer
8	Cover Gasket	24	Guide Bushing
9	Cover Bolt	25	Seal
10	Orifice Plug	26	Washer
11	Nameplate	27	O-ring (Inlet/Outlet Valve Seat)
12	Screen	28	Valve Holder
13	Ball	29	Hex Socket Set Screw
14	Outlet Valve Seat	30	Bushing ⁰¹
15	Inlet Valve Seat	31	Actuator Unit
16	Spindle	32	Shaft Coupling

⁰¹Included only with 15, 20 mm sizes.

Installation and Operation



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 product outlets. 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.

Do not stand on or apply body weight to the handle. The handle may break, resulting in injury or other accidents.

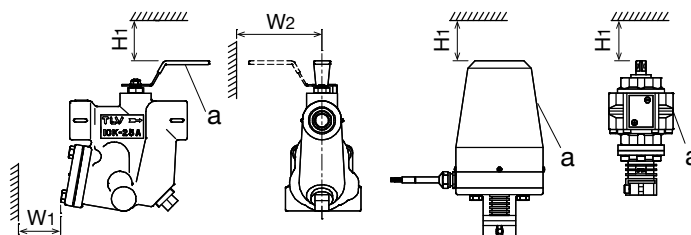
Make sure the power supply switch is OFF before carrying out work on the wiring or inspections involving disassembly. If such work is carried out with the power on, there is a danger that equipment may malfunction or electric shock may occur, leading to injury or other accidents.

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, NEVER stand close to, or leave tools anywhere near moving parts such as the 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.

1. Before installation, be sure to remove all protective seals.
2. Before installing the product, open the inlet valve and thoroughly blow out the piping to remove any piping scraps, dirt and oil. Blowdown is possible after the product has been installed, however it is recommended that you remove all dirt, oil, etc. from the inlet piping before installation. Close the inlet valve after blowdown.
3. Confirm that sufficient maintenance space has been provided around the product.

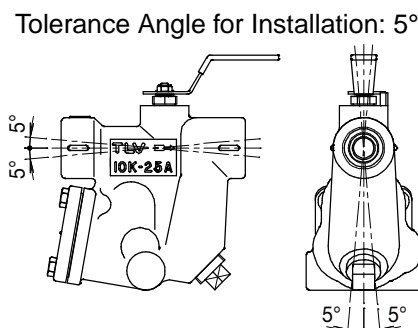


Model	a	H ₁ mm	W ₁ mm	W ₂ mm
BT3N	Handle	100	100	150
MBT3N	Motor Unit	25	—	—
PBT3N	Actuator Unit	25	—	—

4. Where the product is installed in a location that may be affected by radiant heat from nearby heat-generation, install a device to block the radiant heat, such as a protective plate.
5. 15, 20 mm sizes come with an additional bushing (refer to the “Configuration” section). Be sure to screw the bushing or 25mm diameter piping to the body only up to a point where

at least 15 mm remain protruding from the connecting screw. Over-tightening may cause breakage.

6. Install the product so that the arrow on the product is pointing in the direction of condensate flow.
7. The product should be inclined no more than 5° horizontally and front-to-back.
8. Install the condensate outlet valve and the outlet piping.



Make sure the product is installed with the raised TLV lettering on the body horizontal.

BT3N: Operation

1. Turn the handle to a position perpendicular to the piping. (The integrated ball valve will close, causing the product to function as a trap.) Open the inlet and outlet valves slowly and check to make sure that the product functions properly as a steam trap. If there is a problem, determine the cause by using the “Troubleshooting” section in this manual.
2. To use the bypass function, turn the handle to a position parallel to the piping. (The integrated ball valve will open.)
3. Return the handle to a position perpendicular to the piping to stop using the bypass function.
(The integrated ball valve will close, causing the product to function as a trap.)
4. The integrated ball valve should be closed when the product is used as a trap.

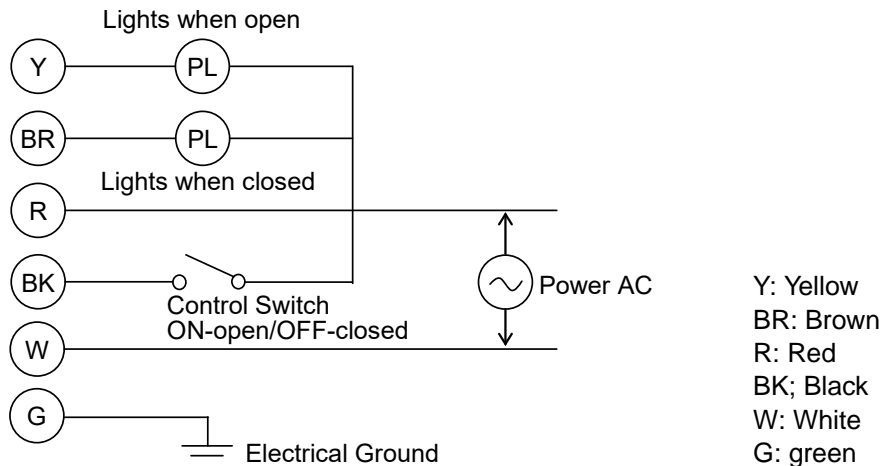


Note

Operate the bypass valve (ball valve) in only the fully open or fully closed positions. Operation in an intermediate position will damage the valve seat and may lead to leaking of the valve.

MBT3N: Wiring/Operation

1. Connect the ON/OFF control switch as follows: When the control switch is ON, the valve will open; when it is OFF, the valve will close.
2. If connected to the yellow wire, a pilot lamp will light when the valve is open; if to the brown, a pilot lamp will light when the valve is closed.
3. When checking the operation of the motor unit before installation, keep fingers well clear of the bypass blowdown valve section.



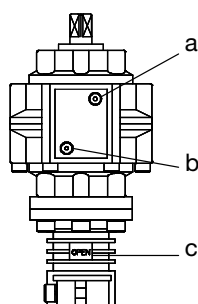
4. Carry out an operational check of the motor under no-load conditions (no pressure) before actual operation to ensure that the wiring is done properly.
You can check whether the valve is opened or closed by checking the orientation of the flat surfaces on the shaft coupling at the base of the motor unit. (See "Manual Operation" section) When the flat surfaces of the shaft coupling are lined up with the piping, the valve is open; when they are perpendicular, the valve is closed.
5. Make sure the control switch is OFF at start-up.
(The integrated ball valve is closed, causing the product to function as a trap.)
Open the inlet and outlet valves slowly and check to make sure that the product functions properly as a steam trap. If there is a problem, determine the cause by using the "Troubleshooting" section of this manual.
6. Turn the control switch ON to use the bypass function.
(The integrated ball valve will be open.)
7. Turn the control switch OFF to stop using the bypass function.
(The integrated ball valve will be closed.)
8. The integrated ball valve should be closed when the product is used as a trap.

PBT3N: Air Supply Piping/Operation

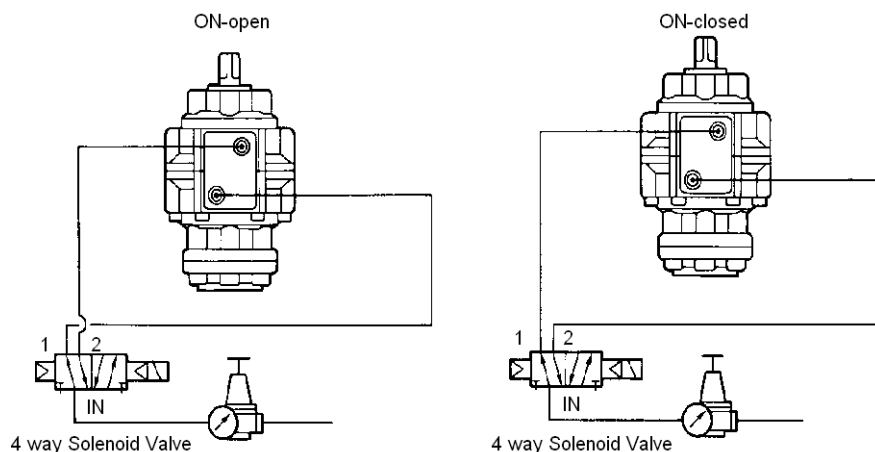
1. Use only clean air, which has been run through an air trap, filter, oiler, etc.
2. Make sure there is no foreign matter, particularly dirt or sealing tape, in the pneumatic actuator.
3. The table below shows the relationship between the air supply and valve opening/closing.

Port: A	Port: B	Valve
Supply	Exhaust	Open
Exhaust	Supply	Closed

4. When checking operation of the pneumatic actuator before installation, keep fingers well clear of the bypass blowdown valve section.



a: Air Supply to Port A (air-to-open)
 Air supply pressure: 0.3 to 1.0 MPaG
 b: Air Supply to Port B (air-to-close)
 Air supply pressure: 0.3 to 1.0 MPaG
 c: Open/Closed Indicator



5. Carry out an operational check of the actuator under no-load conditions (no pressure) before actual operation to ensure that the air is supplied properly. The “Open/Closed” Indicator located in the lower part of the actuator indicates whether the valve is opened/ closed.
6. Make sure that the integrated ball valve is closed at start-up, causing the product to function as a trap. The state of the integrated ball valve can be confirmed using the “open/closed” indicator. Open the inlet and outlet valves slowly and check to make sure that the product functions properly. If there is a problem, determine the cause by using the “Troubleshooting” section in this manual.
7. To use the bypass function, supply air through port A and exhaust the air in the actuator through port B. The integrated ball valve will open.
8. To stop using the bypass function, supply air through port B and exhaust the air in the actuator through port A. Integrated ball valve will close.
9. The integrated ball valve should be closed when the product is used as a trap.

Manual Operation



Caution

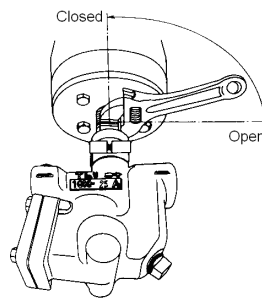
When using this product, **NEVER stand close to, or leave tools anywhere near moving parts such as the shaft.** Contact with moving parts or objects becoming caught in moving parts could lead to injury, damage or other accidents.

MBT3N

1. Perform manual operation only after making sure that the power is OFF. Manual operation cannot be performed when the power is ON.

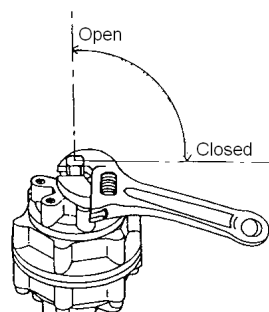
For safety, make sure the power is OFF even during a power outage.

2. Grasp the flat surfaces of the shaft coupling at the base of the motor unit with a wrench, and turn in the direction of the arrows. When the flat surfaces of the shaft coupling are lined up with the piping, the valve is open; when they are perpendicular, the valve is closed (distance across flats: 19 mm).



PBT3N

1. Perform manual operation only after shutting off the air supply first and making sure there is no pressure remaining inside the actuator unit. Manual operation can not be performed if there is pressure remaining inside the actuator unit.
2. Grasp the manual operation key on the top of the actuator unit with a wrench, and turn in the direction of the arrows (distance across flats: 10 mm).



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

BT3N/MBT3N/PBT3N: Operational Check of the Steam Trap

The following inspections should be carried out only after making sure that the bypass valve is closed: A visual inspection of the following items should be done on a daily basis to determine whether the trap is operating properly or has failed. Periodically (at least biannually) the operation should also be checked by using diagnostic equipment, such as a stethoscope or thermometer.

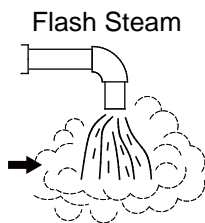
(Inspection, installation, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.)

To determine whether the bypass valve is closed, make sure that the flat surfaces of the spindle (BT3N) or the shaft coupling (MBT3N and PBT3N) are perpendicular to the piping.

If the valve is not fully closed when the flat surfaces are in this position, there is a problem. Refer to the “Troubleshooting” section to determine the cause, then correct the problem.

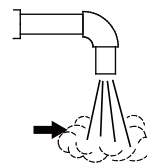
If the trap or bypass blowdown valve should fail, it may cause damage to piping and equipment, resulting in faulty or low quality products or losses due to steam leakage.

Normal:	Condensate, together with flash steam, is discharged continuously, accompanied by the powerful rushing sound of flow. When the amount of condensate being discharged is very slight, the sound of flow is almost inaudible.
Blocked (Discharge Impossible):	No condensate is discharged. The product is quiet and makes no noise, and the surface temperature of the product is low.
Blowing:	Live steam continually flows from the outlet and there is a continuous metallic sound.
Steam Leakage:	Live steam is discharged through the product outlet together with condensate, accompanied by a high-pitched sound.



White jet containing water droplets

Live Steam Leakage



Clear, slightly bluish jet

MBT3N: Operational Check of the Motor Unit and Bypass Valve Section

1. An operational check shall be performed at least once every 6 months.
2. Turn the motor unit power ON and check the operation of the motor unit (angle of rotation, time required to open/close the valve, sound).
3. After turning the motor unit power OFF, manually operate the valve, check for foreign matter in the valve and confirm torques.

Refer to the following table for tightening torques. A torque of more than 2 times the shown torque is considered abnormal, and an inspection should be performed.

Tightening Torque N-m		
No load	0.5 MPaG load	1.0 MPaG load
0.4	0.5	0.6

PBT3N: Operational Check of the Actuator Unit and Bypass Valve Section

1. An operational check shall be performed at least once every 6 months.
2. Making sure there is air supplied to the actuator, check the operation (angle of rotation, time required to open/close the valve, sound).
3. After shutting off the air supply, manually operate the valve, check for foreign matter in the valve and confirm torques.

Refer to the following table for tightening torques. A torque of more than 2 times the shown torque is considered abnormal, and an inspection should be performed.

Tightening Torque N-m		
No load	0.5 MPaG load	1.0 MPaG load
0.4	0.5	0.6

BT3N: Additional Tightening of the Valve Unit Gland Section

It is possible to further tighten the gland section in the BT3N valve unit.

Holding the handle tightly, by hand, so that it cannot rotate, use a wrench to tighten the locknut at the top of the handle (distance across flats: 10 mm).

Cautions when applying additional tightening:

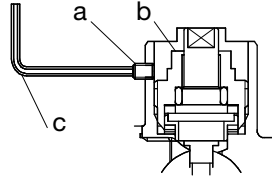
- Do not tighten the locknut completely the first time. Do not tighten it any more than is necessary to stop leakage.
- If leakage continues even after applying additional tightening to the locknut, replace parts (part No. 16, spindle; part No. 18, gland gasket; part No. 22, gland packing; part No. 28, locknut).

MBT3N/PBT3N: Additional Tightening of the Valve Unit Gland Section

It is possible to further tighten the gland section in the MBT3N/PBT3N valve units.

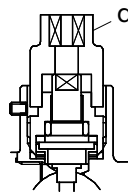
1. Detach the actuator unit (refer to the “Disassembly/Reassembly” section for details).
2. Follow the steps given below to apply additional tightening

1) Loosen the holder screw.



a: Holder Screw
b: Gland Holder
c: Hex Key
Diameter: 2 mm

2) Tighten the gland holder further in with a socket wrench.



d: Socket Wrench
Diameter: 17 mm

3) Retighten the holder screw.

Cautions when applying additional tightening:

- Do not tighten the gland holder completely the first time. Do not tighten it any more than necessary to stop leakage.
- If leakage continues even after applying additional tightening to the gland holder, replace parts.

Disassembly/Reassembly



Warning

NEVER apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.



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.

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.

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.

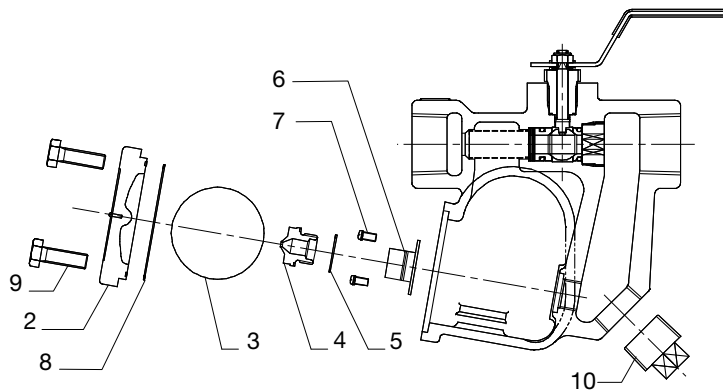
Make sure the power supply switch is OFF before carrying out work on the wiring or inspections involving disassembly. If such work is carried out with the power on, there is a danger that equipment may malfunction or electric shock may occur, leading to injury or other accidents.

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.)

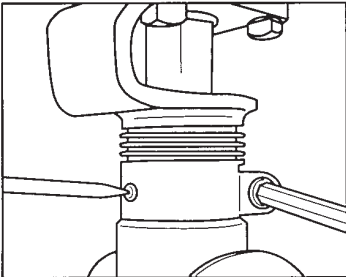
BT3N/MBT3N/PBT3N: Disassembly/Reassembly of the Steam Trap

Part Name & No.	During Disassembly	During Reassembly	During Inspection
Orifice Plug 10	Remove with a wrench	Wrap 3 to 3.5 turns of sealing tape around threads and tighten to the proper torque	—
Cover Bolt 9	Remove with a wrench	Coat threads with anti-seize and tighten to the proper torque	—
Cover 2	Remove the cover	Replace the cover	—
Cover Gasket 8	Remove the cover gasket	Replace with a new cover gasket only if misshapen or damaged	—
Float 3	Remove the float	Reinsert the float gently	Check for deformation or scratches
Screw & Spring Washer 7	Remove the screw & the spring washer	Coat threads with anti-seize and tighten to the proper torque	—
Air Vent Strip 6	Remove the air vent strip	Be careful not to deform the strip	Check the tip for splitting, corrosion, etc.
Orifice 4	Remove with a socket wrench	Coat threads with anti-seize and tighten to the proper torque	Check the sealing surfaces for scratches, wear, etc.
Orifice Gasket 5	Remove the orifice gasket	Replace with a new orifice gasket only if misshapen or damaged	—



MBT3N/PBT3N: Detaching/Reattaching the Motor Unit or Actuator Unit

Part Name	During Disassembly	During Reassembly	During Inspection
Screw & Spring Washer	Remove the screw & the spring washer	Coat threads with anti-seize and tighten to the proper torque	—
Hex Socket Set Screw	Remove with a Hex Key Bolt	Coat threads with anti-seize and tighten to the proper torque	—
Spring Washer	Remove the spring washer	Reinsert the spring washer	—
Motor or Actuator Unit	Detach the motor or the actuator unit	Reattach the motor or the actuator unit	—
Shaft Coupling	Detach the shaft coupling	Reattach the shaft coupling	Check for deformation or wear



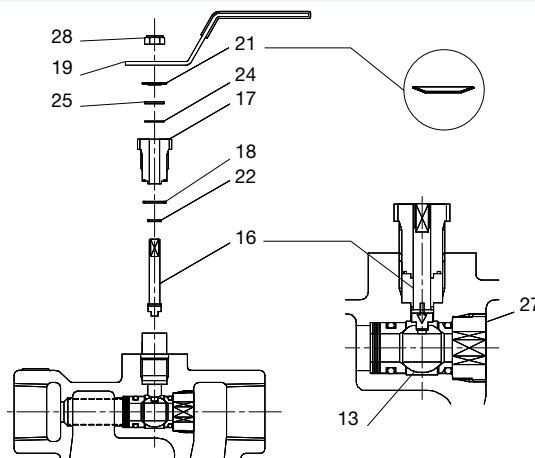
BT3N: Disassembly/Reassembly of the Bypass Valve Gland Section

Part Name & No.	During Disassembly	During Reassembly	During Inspection
Locknut 28	Remove with a wrench	A new locknut must be used Tighten to the proper torque	—
Handle 19	Pull the handle up off of the spindle	Reattach the handle, being careful of its orientation (see the drawing below)	Check the handle hole in the spindle for deformation
Disc Spring 21	Remove the disc spring	Reinsert the disc spring, referring to the drawing below for proper operation	Check for damage or deformation
Thrust Washer 24	Remove the thrust washer	Reinsert the thrust washer	Check for wear
Gland 17	Remove with a wrench	Coat threads with anti-seize, then tighten to the proper torque	Check the spindle sleeve area for signs of seizure, deformation, scratches, etc.
Spindle 16	Remove the spindle	Replace with a new spindle, coat sliding area with gland and threads with anti-seize	—
Gland Gasket 18	Remove the gland gasket	Replace with a new gland gasket only if warped or damaged	—
Gland Packing 22	Remove the gland packing	Replace with a new gland packing	—



Note

1. Reassemble the gland section after reassembling the valve section.
2. Finger-tightening the valve holder first makes it easier to reinsert the spindle into the ball. After reinserting the spindle, tighten the valve holder and the gland.
3. **Removing the handle and the locknut from the BT3N destroys the gland section seal. Do not detach the handle and the locknut unless performing a disassembly inspection.**



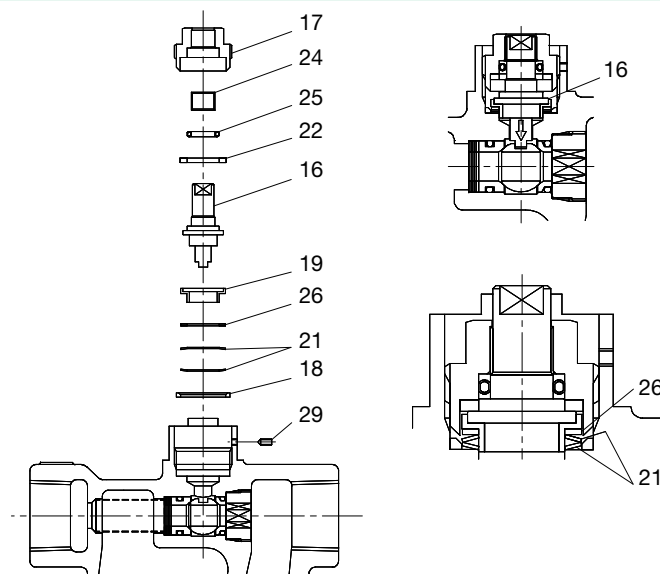
MBT3N/PBT3N: Disassembly/Reassembly of the Bypass Valve Gland Section

Part Name & No.	During Disassembly	During Reassembly	During Inspection
Hex Socket Set Screw 29	Remove with a hex key	Coat threads with anti-seize, then tighten to the proper torque	—
Gland Holder 17	Remove with a socket wrench	Tighten to the proper torque	—
Guide Bushing 24	Remove the guide bushing	Reinsert the guide bushing	Check for wear
Seal 25	Remove the seal	Replace with a new seal	—
Gland Packing 22	Remove the gland packing	Replace with a new gland packing	—
Spindle 16	Remove the spindle	Reinsert the spindle	Check flat surfaces for deformation, wear, scratches, corrosion, etc.
Gland Seat 19	Remove the gland seat	Replace with a new gland seat	—
Washer 26 (1 pcs)	Remove the washer	Reinsert the washer	Check for damage deformation, etc.
Disc Spring 21 (2 pcs)	Remove the disc springs	Reinsert with the proper orientation (see the fig. below)	Check for damage, deformation, etc.
Gland Holder Gasket, 18	Remove the gland holder gasket	Replace with a new gland holder gasket only if misshapen or damaged, being careful of the orientation	—



Note

1. Reassemble the gland section after reassembling the valve section.
2. Finger-tightening the valve holder first makes it easier to reinsert the spindle into the ball. After reinserting the spindle, tighten the valve holder.



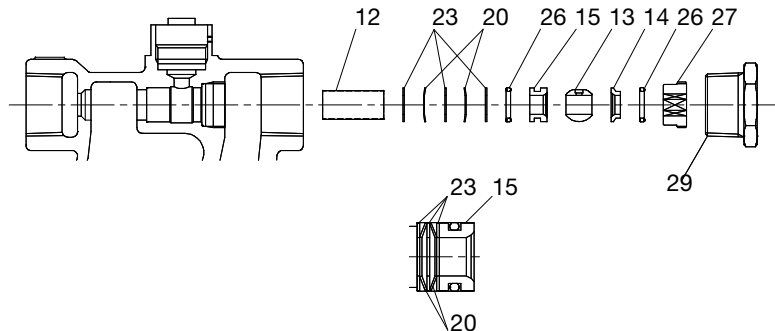
BT3N/MBT3N/PBT3N: Disassembly/Reassembly of Bypass Valve Section

Part Name & No.	During Disassembly	During Reassembly	During Inspection
Bushing 29 (for 15,20 mm only)	Remove with a wrench	Wrap 3 to 3.5 turns of sealing tape around threads and tighten to the proper torque	—
Valve Holder 27	Remove with a hex key	Coat threads with anti-seize, then tighten to the proper torque	—
O-ring 26 (Outlet Valve Seat)	Remove the o-ring	Replace with a new o-ring, insert into the outlet valve seat	—
Outlet Valve Seat 14	Remove the outlet valve seat	Replace with a new outlet valve seat	—
Ball 13	Remove the ball	Reinsert the ball	Check sealing surfaces for scratches, wear, etc.
Inlet Valve Seat 15	Remove the inlet valve seat	Replace with a new inlet valve seat	—
Washer 23 (3 pcs)	Remove the washer	Reinsert the washer	Check for damage, deformation, etc.
Disc Spring 20 (2 pcs)	Remove the disc spring	Reinsert with the proper orientation (refer to the fig. below)	Check for damage, deformation, etc.
Screen 12	Remove the screen	Reinsert the screen	Check for clogging, corrosion, damage, etc.



Note

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



Part number is BT3N

Table of Tightening Torques

Part Name	Torque N·m	Distance Across Flats mm
BT3N/MBT3N/PBT3N: Steam Trap		
Orifice Plug	70	17
Cover Bolt	40	13
Screw & Spring Washer	1.5	+
Orifice	40	17
BT3N/MBT3N/PBT3N: Bypass Valve Section		
Locknut ^{01,02}	2.5	10
Gland ⁰¹	35	17
Bushing ⁰³	100	38
Valve Holder	40	10
MBT3N/PBT3N: Motor Unit or Actuator Unit		
Screw & Spring Washer	0.8	+
Hex Key Bolt	10	5
Hex Socket Set Screw	1.0	2
Gland Holder	1.0	17

⁰¹BT3N only

⁰²Guideline for new nut

⁰³For 15,20 mm only



Note

- Coat all threaded portions with anti-seize.
- If drawings or other special documentation were supplied for the product, any torque given there takes precedence over values shown here.

Troubleshooting



Warning

NEVER apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.



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.

When the product fails to operate properly, use the following table to locate the cause and remedy.

BT3N/MBT3N/PBT3N: Troubleshooting for the Steam Trap and Bypass Valve

Problem	Cause	Remedy
No condensate is discharged (blocked) or discharge is poor	The float is damaged or filled with condensate	Replace with a new float
	The orifice, screen and the piping are clogged with rust and scale	Clean parts
	The product operating pressure exceeds the maximum specified pressure, or whether there is insufficient pressure differential between the product inlet and outlet	Compare specifications and actual operating conditions
	Check to see if steam-locking has occurred	Perform a bypass blowdown
Steam is discharged or leaks from the outlet (blowing) (steam leakage)	Check for a clogged orifice or rust and scale under the float	Clean parts
	Scratches on the orifice	Replace with a new orifice
	The float is not misshapen or coated with scale	Clean or replace with a new float
	Check for the improper installation	Correct the installation
	Product vibration	Lengthen the inlet piping and fasten it securely
	Check to see if the bypass valve is open	Close the bypass valve
Steam leaks from the bypass valve gland	Check the valve sealing surfaces for dirt or scratches, and the o-ring (outlet valve seat) for scratches or damage	Clean or replace parts
	Check for dirt, scratches or wear on the gland packing	Clean or replace parts
The bypass valve does not move or remains half-open	The valve seat or the ball have build-up (the ball should turn easily: normal operation torque is less than 1.0 N·m)	Clean parts
	Check the shaft coupling for wear or deformation	Replace with a new shaft coupling
	Check the motor unit or actuator unit (see following pages)	Replace with a new motor unit or an actuator unit

Problem	Cause	Remedy
Steam is leaking from a place other than the outlet	The gasket deterioration or damage	Replace with new gasket(s)
	Check to make sure that the proper tightening torques are used	Tighten to the proper torque
Float frequently becomes damaged	Water hammer has occurred	Study and correct the piping

MBT3N: Troubleshooting for the Motor Unit

When the motor unit fails to operate as it did when first installed, use the following table to locate and remedy the cause. Detach the motor unit from the trap body when checking the motor unit itself.

(For detaching the actuator unit from the trap body, refer to the “Disassembly/Reassembly” section.)

Problem	Cause	Remedy
Does not operate even though the control switch is ON	Turn OFF the power, and check to see if manual operation is possible	The motor unit is broken; contact TLV
	Check for improper wiring or control	Correct the problem
	Check to make sure that the main power is ON, and that the voltage is correct, also check current and fuses	Correct problem
	Check whether the thermo-protector is in operation or not	After allowing the motor unit to cool down, check its operation again to ascertain whether the thermo-protector is the cause
Reciprocating action is repeated over and over	Check to see if there is a problem with the control system	Correct the problem
Rotation only takes place in one direction	Check to see if there is a problem with the control system	Correct the problem
Does not rotate the full 90°, stops at a partial rotation	Check to see if there is a problem with the control system	Correct the problem



Note

If after attempting all of the above remedies the product still does not operate properly, contact TLV after confirming operating pressure, operating temperature, operating frequency and serial number.

All motor units must be repaired by TLV. DO NOT disassemble the motor unit yourself.

PBT3N: Troubleshooting for the Actuator Unit

When the actuator unit fails to operate as it did when first installed, use the following table to locate and remedy the cause. Detach the actuator unit from the trap body when checking the actuator unit itself. (For detaching the actuator unit from the trap body, refer to the “Disassembly/Reassembly” section.)

Problem	Cause	Remedy
Does not operate even though the control switch is ON	Shut off the air supply, make sure there is no pressure left in the actuator unit, then check to see if manual operation is possible	The actuator unit is broken; contact TLV
	Check for a problem with the solenoid valve	Replace with a new solenoid valve
	Check to make sure that the power is reaching the solenoid valve and that the voltage is correct, also check current and fuses	Correct the problem
	Check for proper air supply	Correct irregularities
	Check to see if the filter and the air supply ports are clogged	Clean parts
Reciprocating action is repeated over and over	Check to see if there is a problem with the magnetic control system	Correct the problem
Rotation only takes place in one direction	Check to see if there is a problem with the magnetic control system	Correct the problem
	Check to see if the filter and the air supply ports are clogged	Clean parts
Does not rotate the full 90°, stops at a partial rotation	Check to see if there is a problem with the air supply	Correct the problem
	Check to see if the filter and the air supply ports are clogged	Clean parts



Note

If after attempting all of the above remedies the product still does not operate properly, contact TLV after confirming operating pressure, operating temperature, operating frequency and serial number.

All motor units must be repaired by TLV. DO NOT disassemble the motor unit yourself.

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This warranty does not cover defects or failures caused by:

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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.

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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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