

To customers,

<p style="text-align: center;">Regarding the operation of the Samson electro-pneumatic positioner</p>
--

Thank you for purchasing this electro-pneumatic positioner manufactured by Samson. When shipped from the factory, the operating direction of the product is set to direct action (when the input signal increases, the operating pressure increases).

If the operating direction of the control valve used with the positioner is direct action, set the positioner to reverse action (when the input signal increases, the operating pressure decreases).

Make sure to follow the instruction manual when changing the operating direction of the positioner, mounting the positioner on the control valve, or adjusting the positioner.

ISO 9001
ISO14001



Manufacturer

TLV CO., LTD.

Kakogawa, Japan

Is approved by LRQA Ltd. to ISO 9001:2015



Instruction Manual

Electro-pneumatic Positioner
for Control Valve CV10

172-65098M-08

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Introduction

Thank you for purchasing the electro-pneumatic positioner for the TLV control valve CV10.

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.

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 needed not only for installation, but also 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



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 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

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.

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.

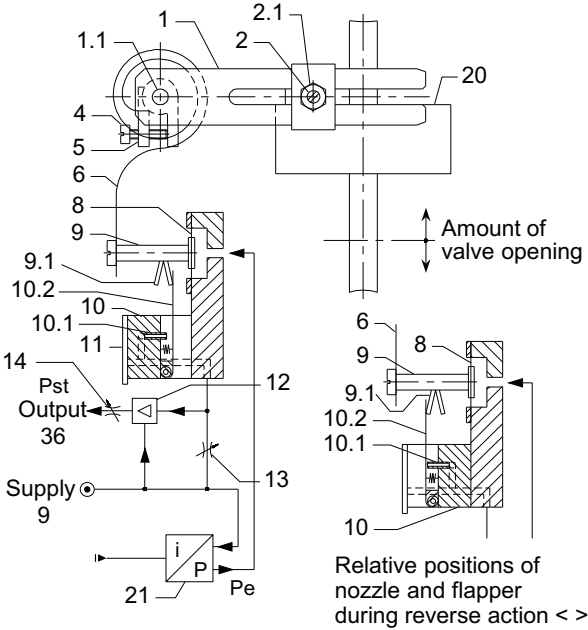
Use only under conditions in which no freeze-up will occur. Freezing may damage the product, leading to fluid discharge, which may cause burns or other injury.

Electro-pneumatic Positioner (partial list of standard specifications)

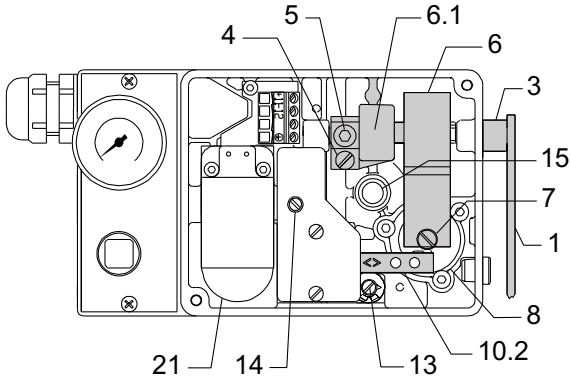
Input current/resistance	4 to 20 mA DC/approximately 200 Ω
Air supply pressure	0.14 to 0.6 MPaG
Air connection port	Rc(PT) $1/4$, optional: NPT $1/4$
Pressure gauge	Positioner supply side: 0 to 0.6 MPaG
Electrical line port	G(PF) $1/2$
Connection method	Conduit method, pressure-resistant packing method
Protection class	IP54 (dust-resistance, rain-resistant)
Ambient temperature	-20 to 50 $^{\circ}\text{C}$ (no freezing)
Materials of construction	Body: Die-cast aluminum Exposed parts: Stainless steel (SUS316 equivalent)
Air consumption	At air supply pressure 0.14 MPaG: 0.15 Nm^3/h At air supply pressure 0.6 MPaG: 0.5 Nm^3/h
Maximum air processing capacity	At air supply pressure 0.14 MPaG: 2.5 Nm^3/h At air supply pressure 0.6 MPaG: 7 Nm^3/h
Motive medium	Oil-free air, filtered to 5 μm

Configuration

Diagram: Principle of Operation



Interior



Principle of Operation

(See the "Diagram of Principle of Operation" in the "Configuration" section.)

The I/P transducer (21) converts the DC electrical input signal current W (4 to 20 or 0 to 20 mA) from a controller, etc. into a proportional output air pressure signal P_e (0.02 to 0.1 MPa). The air pressure P_e produces a force in the measurement diaphragm (8) opposing the reaction force from the measurement spring (6). The motion of the measurement diaphragm (8) is transmitted via the feeler pin (9.1) to the flapper (10.2) and thereby adjusts the opening of the nozzle (10.1). When either the pneumatic operation signal P_e or the valve opening changes, the pressure changes inside the amplifier (12: pilot valve), which is connected downstream of the nozzle (10.1). This change causes the adjusted operating pressure to be altered and the valve stem of the control valve to be moved to a position corresponding to its desired set point. The volume adjustment (14) and gain adjustment- X_p (13) are used to adjust the opening and closing speed of the positioner; to optimize the control loop. The type of measurement spring (6) used is determined by the rated control valve opening and the rated span for the desired set point; the spring may be exchanged if necessary.

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.

Operational Check

A visual inspection of the following items should be done on a daily basis to determine whether the product is operating properly or has failed. Periodically (at least biannually) the operation should also be checked.

Inspection Item	Inspection Method	Remedy
Operating conditions	Visual Inspection: Is the valve opening (travel) undergoing frequent change?	Change the controller's set point Adjust the air supply (Q) and the proportional band (gain adjustment- Xp) inside the positioner
	Visual Inspection: Does the valve opening match the value displayed on the controller?	Adjust the positioner's zero point and the span

Parts Inspection

When parts have been removed, or during periodic inspections, use the following table to inspect the parts and replace any that are found to be defective.

Positioner: Check to make sure there is no water or oil pooling when the positioner cover is opened

Filter in the filter regulator installed on the positioner: Check for clogging

Span Adjustment Pin: Check for wear

Packing for the Positioner Cover: Check for deterioration

As this is a precision instrument, avoid disassembling the parts whenever possible. When disassembly is necessary, please consult TLV.

Mounting on the Control Valve

Before mounting the positioner, determine on which side (left or right) of the control valve the positioner is to be attached, and confirm the proper operation of both the actuator and the positioner itself. Then proceed with positioner mounting.

Refer to the CV10 control valve instruction manual for installation procedures.

Positioning the Positioner and the Actuator

Refer to the "Standard" diagram (below) for the relationships between the actuator direction of operation, positioner direction of operation and the positioner mounting location. The positioner's direction of operation may be changed after installation. It is necessary to change the positioner mounting location whenever changes have been made to the positioner control loop or when the fail-safe mode of the actuator has been changed from "fail closed" to "fail open" or vice versa, etc.

Standard	
Direct Action (Air-to-close/Fail Open)	Direct Action (Air-to-open/Fail Closed)
When there is a loss of operating air or input signal, the control valve opens (the actuator stem retracts).	When there is a loss of operating air or input signal, the control valve closes (the actuator stem extends).

Option (Possible by repositioning the positioner installation and the internal parts)	
Reverse Action (Air-to-close/Fail Open)	Reverse Action (Air-to-open/Fail Closed)
When there is a loss of operating air only, the control valve opens (the actuator stem retracts). When there is a loss of input signal only, the control valve closes (the actuator stem extends).	When there is a loss of operating air only, the control valve closes (the actuator stem extends). When there is a loss of input signal only, the control valve opens (the actuator stem retracts).

Determining and Changing the Direction of Operation

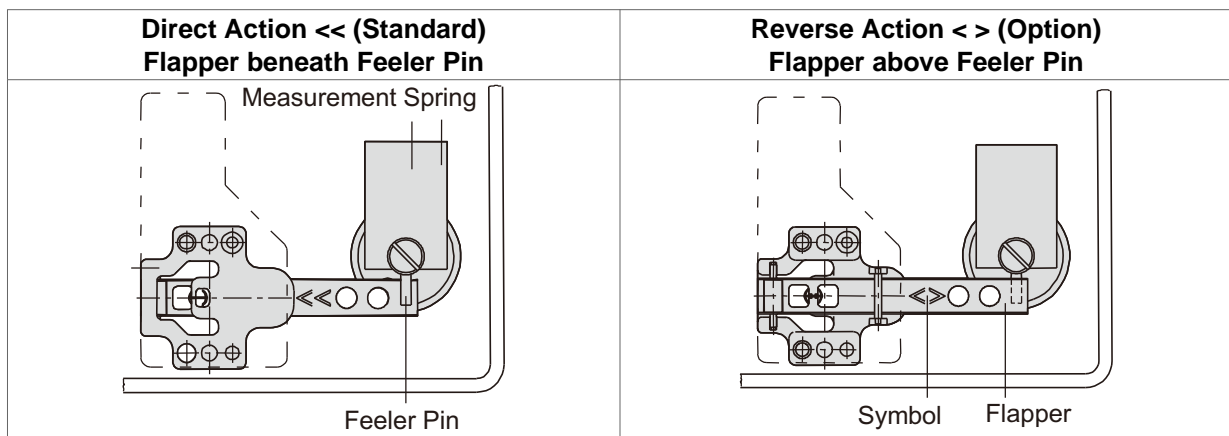
When the input signal W (desired set point) increases, the operating pressure p_{st} increases (direct action \ll ; standard).

When the input signal W (desired set point) increases, the operating pressure p_{st} decreases (reverse action \gg ; option).

In precisely the same manner, when the input signal decreases, the operating pressure for direct action \ll decreases, and the operating pressure for reverse action \gg increases. The set direction of operation is indicated by the symbol that is visible on the nozzle block. If the direction of operation indicated by the symbol does not match the direction of operation that is required by the function of the control loop, or if for some reason the direction of operation must be changed, use the following procedure (see the figures below):

Remove both of the screws on the cover plate (11) and hold down the nozzle block (10) while removing the cover plate (11). Turn the nozzle block (10) 180°, then place the cover plate (11) on top of the nozzle block (10) and retighten the screws. Make sure that the relative position of the nozzle block (10) [on which the flapper (10.2) is attached] to the feeler pin (9.1) is as shown in the figure below. After changing the direction of operation as described above, fasten the positioner onto the top of the yoke on the opposite side of the control valve.

Make sure that the lever for valve travel (1) and the feedback plate (20) are aligned correctly with each other (see the "Mounting on the Control Valve" section).



Electrical Wiring



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.

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.

For the electrical wiring, use equipment such as cable clamps and twist-on G(PF)^{1/2} wire connectors. Connect the "+" end of the input signal to the "+" terminal, and the "-" end to the "-" terminal on the terminal connector inside the positioner. Connect the ground to the ground terminal connection inside the positioner body as well as the terminal connection outside the positioner body.

Air Connections



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.

The air connections are Rc(PT)^{1/4}. Install all piping correctly, using joints for metal piping or plastic piping. Before connecting, thoroughly blow out all air lines to remove any cuttings, foreign matter, water, oil, etc. Install a filter/regulator, etc. on the positioner and ensure that the air that is to be supplied is free of any moisture and dust. Make sure that the supply air is of a suitable and stable pressure.

Zero Point Adjustment

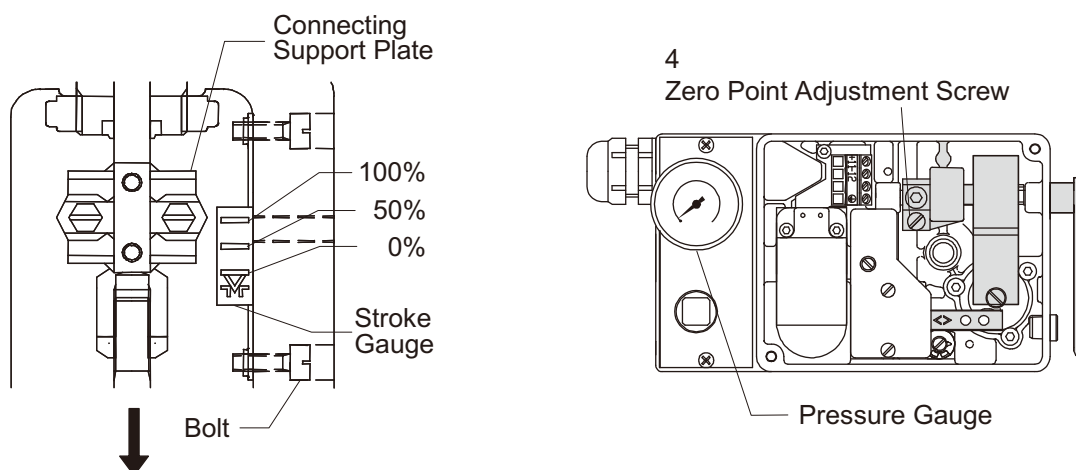
Make sure to adjust the positioner for the following cases:

- When the positioner has been removed/attached or replaced
- When the ambient temperature differs by ± 15 °C or more from 25 °C, even if that temperature is within the specification range

Zero point adjustment is recommended after installing the positioner at the site as vibration during transportation etc. may have caused the zero point to shift.

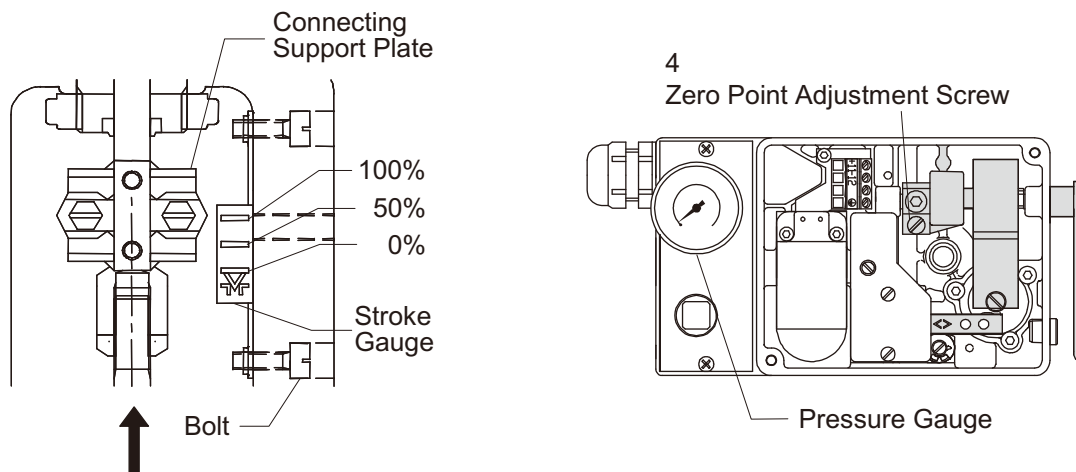
Adjustment of Direct Action (Air-to-Close, Fail Open)

1. Regulate each size of positioner supply air pressure by using a regulator, etc.
2. If using a current generator to adjust the zero point, set the output to 19.8 mA. If using a controller to adjust the zero point, set the output to 98.7%. (**This adjustment is to ensure that the control valve fully closes at 20 mA or 100%.**) Turn the zero point adjustment screw (4) slowly until the pressure gauge on the positioner reads 0 MPaG (0 kg/cm²). (Control valve is fully open.) When the pressure has dropped to 0 MPaG (0 kg/cm²), turn the zero point adjustment screw (4) slowly until the pressure gauge on the positioner shows the positioner supply air pressure. (The valve is lowered and fully closed.)
3. If using a current generator to adjust the zero point, set the output to 20 mA. If using a controller to adjust the zero point, set the output to 100%. Check to make sure the pressure gauge on the positioner indicates the supply air pressure. (The valve is lowered and fully closed.) If the pressure does not rise far enough, readjust, starting from step 2.
4. When the valve is in the fully closed position, as in step 3, check to make sure that the connecting support plate is at 0% (fully closed) on the stroke gauge. If the valve opening reading does not indicate 0%, loosen the 2 bolts holding the stroke gauge in place and adjust the stroke gauge.
5. When the zero point adjustment is complete, carry out a span adjustment. There is no need, however, to adjust the span if the span adjustment pin was neither removed nor moved while the positioner was detached.



Adjustment of Reverse Action (Air-to-Open, Fail Closed)

1. Regulate each size of positioner supply air pressure by using a regulator, etc.
2. Check to make sure that the connecting support plate is at 0% (fully closed) on the stroke gauge. If the valve opening reading does not indicate 100%, loosen the 2 bolts holding the stroke gauge in place and adjust the stroke gauge.
3. If using a current generator to adjust the zero point, set the output to 4.2 mA. If using a controller to adjust the zero point, set the output to 1.3%. (**This adjustment is to ensure that the control valve fully closes at 4 mA or 0%.**) Turn the zero point adjustment screw (4) slowly until the pressure gauge on the positioner reads 0 MPaG (0 kg/cm²). When the pressure has dropped to 0 MPaG (0 kg/cm²), turn the zero point adjustment screw (4) slowly and stop just at the point where the pressure gauge on the positioner starts to move.
4. If using a current generator to adjust the zero point, set the output to 4 mA. If using a controller to adjust the zero point, set the output to 0%. Do a visual check to make sure that the pressure gauge on the positioner reads 0 MPaG (0 kg/cm²). If the pressure does not fall far enough, readjust, starting from step 2.
5. When the zero point adjustment is complete, carry out a span adjustment. There is no need, however, to adjust the span if the span adjustment pin was neither removed nor moved while the positioner was detached.



Span Adjustment

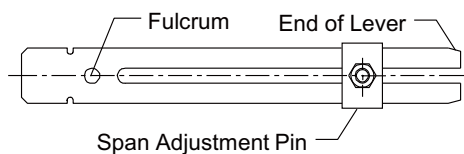
After the zero point adjustment is complete, if a control valve opening that properly corresponds to the input signal (0% – 50% – 100%) from a controller, etc., cannot be achieved, carry out a span adjustment.

If the positioner has been detached but the span pin was neither removed nor moved while the positioner was detached, there is no need to adjust the span.

Additionally, as the designated positions of the stroke gauge on the valve and the connecting plate support opening are confirmed by means of a visual check, there may be slight operator-induced variation in valve opening (travel).

Adjustment of Direct Action (Air-to-close, Fail Open)

1. If using a current generator to adjust the zero point, set the output to 20 mA. If using a controller to adjust the zero point, set the output to 100%. At this point, do a visual check to make sure that the indication on the stroke gauge on the valve is 0%. (The valve is lowered and fully closed.)
2. If using a current generator to adjust the zero point, set the output to 12 mA. If using a controller to adjust the zero point, set the output to 50%. At this point, do a visual check to make sure that the indication on the stroke gauge on the valve is 50%.
3. If using a current generator to adjust the zero point, set the output to 4 mA. If using a controller to adjust the zero point, set the output to 0%. At this point, do a visual check to make sure that the indication on the stroke gauge on the valve is 100%.
4. If the visual check in steps 2 and 3 reveals that the valve opening is smaller than the desired valve opening, slide the span adjustment pin (2) on the lever for valve travel (1) approximately 2 mm closer to the end of the lever and secure. If the valve opening is larger than the desired valve opening, slide the span adjustment pin (2) on the lever for valve travel (1) approximately 2 mm closer to the fulcrum and secure.
5. Proceed by adjusting the zero point, then, until the valve opening is correct at the 0%, 50% and 100% points, repeat the sequence, alternately adjusting the zero point and the span.

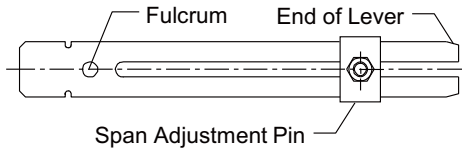


To increase travel (span): Move toward the end of the lever
To decrease travel (span): Move toward the fulcrum

Adjustment of Reverse Action (Air-to-open, Fail Closed)

1. If using a current generator to adjust the zero point, set the output to 0 mA. If using a controller to adjust the zero point, set the output to 0%. Do a visual check to make sure that the indication on the stroke gauge on the valve is 0%.
2. If using a current generator to adjust the zero point, set the output to 12 mA. If using a controller to adjust the zero point, set the output to 50%. Do a visual check to make sure that the indication on the stroke gauge on the valve is 50%.
3. If using a current generator to adjust the zero point, set the output to 20 mA. If using a controller to adjust the zero point, set the output to 100%. Do a visual check to make sure that the indication on the stroke gauge on the valve is 100%.

- If the visual check in steps 2 and 3 reveals that the valve opening is smaller than the desired valve opening, slide the span adjustment pin (2) on the lever for valve travel (1) approximately 2 mm closer to the end of the lever and secure.
If the valve opening is larger than the desired valve opening, slide the span adjustment pin (2) on the lever for valve travel (1) approximately 2 mm closer to the fulcrum and secure.
- Proceed by adjusting the zero point, then, until the valve opening is correct at the 0%, 50% and 100% points, repeat the sequence, alternately adjusting the zero point and the span.



To increase travel (span): Move toward the end of the lever
To decrease travel (span): Move toward the fulcrum

Adjusting the Proportional Band (Gain Adjustment-Xp and Volume Adjustment-Q)

With the desired set point for the input signal set to the 50% point of the range (using a current generator, set the output to 12 mA; using a controller, set the output to 50%). For actuators 700 cm² in size, set the volume adjustment Q (14) for the air supply to fully open (turn to the left). For those of 240 to 350 cm², set it to the middle position.

If the control valve opening oscillates rapidly (hunting), adjust the positioner air supply using the volume adjustment Q to halt the oscillation. If the control valve opening continues to oscillate rapidly after adjusting using the volume adjustment Q, adjust the gain adjustment Xp (13). For the gain adjustment Xp setting, pay close attention to the relationship with the supply air pressure in the middle of the graph (attached to the back of all positioner covers). The normal Xp setting is 3%. When the supply air pressure is between 0.14 MPaG and 0.4 MPaG (1.44 barg and 4 barg), open the gain adjustment Xp approximately one turn (turn to the right from fully closed). If the gain adjustment Xp is opened too far, the lower half of the zero point will be lost, due to the inability to sufficiently exhaust air.

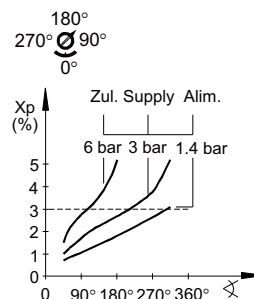
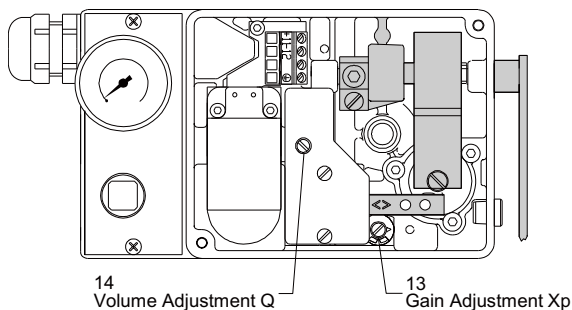
For reverse action, the control valve will not be able to close fully, thus valve leakage will occur.

For direct action, the control valve will not be able to open fully, thus there will be insufficient valve opening.



Note

As modifying the gain adjustment Xp displaces the zero point, if the gain adjustment Xp has been modified, proceed with zero point adjustment, as outlined in the "Zero Point Adjustment" section.



To set the gain adjustment-Xp: Refer to the chart attached to the back of all positioner covers.

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.

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.

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

Problem	Cause	Diagnosis/Inspection	Remedy
Valve leakage	The supply air pressure to the positioner is too high	Check the supply air pressure to the positioner (confirm product specifications)	Reset the positioner's supply air pressure; adjust the positioner's zero point
	The positioner's zero point is off	Check the pressure on the positioner's pressure gauge when the input signal is at zero	If the pressure on the pressure gauge attached to the positioner is raised, adjust the positioner's zero point
	The inlet pressure for the control valve is too high	Check the inlet pressure for the control valve	Reduce the inlet pressure (Cv value and spring range must be changed)
	The valve and valve seat are off-center	Move the valve stem up and down and check to see if it catches	Reassemble the bonnet section correctly
	The valve and valve seat are worn	Check the valve and valve seat	Replace with a new valve and valve seat (use valve and valve seat of a different material than the ones being replaced)

Problem	Cause	Diagnosis/Inspection	Remedy
Control valve opening does not move beyond a certain point	The bellowphragm in the actuator is broken	Check to see if air is leaking from the exhaust tap or bellowphragm area	Replace with a new bellowphragm (check to make sure that the ambient temperature is not too high)
	Internal parts of the positioner are broken (the diaphragm is cracked, etc.)	Check to see if any abnormal noise is coming from the positioner	Replace with a new positioner (check to see if the valve opening (travel) is changing frequently, and the ambient temperature is too high)
	Supply air pressure to the positioner is insufficient	Check the supply air pressure for the positioner (refer to the product specifications)	Adjust the supply air pressure for the positioner (refer to the product specifications)
	Controller set incorrectly	Check to see if an input signal of 4 to 20 mA is coming from the controller	Verify the controller setting and correct if necessary
No movement at all	Air is not being supplied to the positioner	Make sure that the compressor is operating properly; make sure that the regulator connected to the positioner inlet is set	Initiate the supply of supply air pressure to the positioner (confirm product specifications)
	The input signal wiring is incorrectly connected	Check the "+" and "-" connection terminals in the positioner; check the controller's connections	Correct the wiring connections
	The input signal is not being input	Check that 4 to 20 mA is being output by the connection terminals inside the positioner	Adjust the controller or replace with a new controller
	There is a short in the I/P transducer coil	Check the internal resistance (approx. 200 Ω)	Replace with a new positioner (check to make sure that the ambient humidity of the installation is not too high)
	There is water or oil inside the positioner	Check to see if there is water or oil entrained in the supply air; check to see if the humidity at the location where the control valve piping location is too high	Replace with a new positioner or have the positioner repaired (improve the quality of the supply air)

Problem	Cause	Diagnosis/Inspection	Remedy
Control valve opens closes too slowly	There is water or oil inside the positioner	Check to see if there is water or oil entrained in the supply air; check to see if the humidity at the control valve piping location is too high	Replace with a new positioner or have the positioner repaired (improve the quality of the supply air)
	The nozzle and/or adjuster(s) inside the positioner are clogged	Check the control valve operation by directly manipulating the measurement spring inside the positioner	Have the positioner repaired (improve the quality of the supply air)
	The filter/regulator is clogged	Check the filter	Clean or replace with a new filter
Control valve opening is unstable	The setting of the controller is faulty	Check the set value based on the controller's PID parameters	Change the set value
	The positioner has been insufficiently adjusted	Check the positioner	Adjust the positioner's proportional band (air supply (Q) and gain adjustment (Xp))

TLV EXPRESS LIMITED WARRANTY

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

Exceptions to Warranty

This warranty does not cover defects or failures caused by:

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

Duration of Warranty

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

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

Exclusive Remedy

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