

CVS 1000L Electro-Pneumatic Linear Positioner

INTRODUCTION

Thank you for choosing the YT-1000L. Each product is fully inspected after production to offer you the highest quality. In order to fully utilize the product, we strongly recommend users to read this manual carefully.

- The manual can be changed or revised without any prior notice. Any changes in the product's specification, structure and/or any components may not result in an immediate revised version of the manual.
- The manual should not be duplicated or reproduced for any purpose without the approval of CVS Controls Ltd.



MANUFACTURER WARRANTY

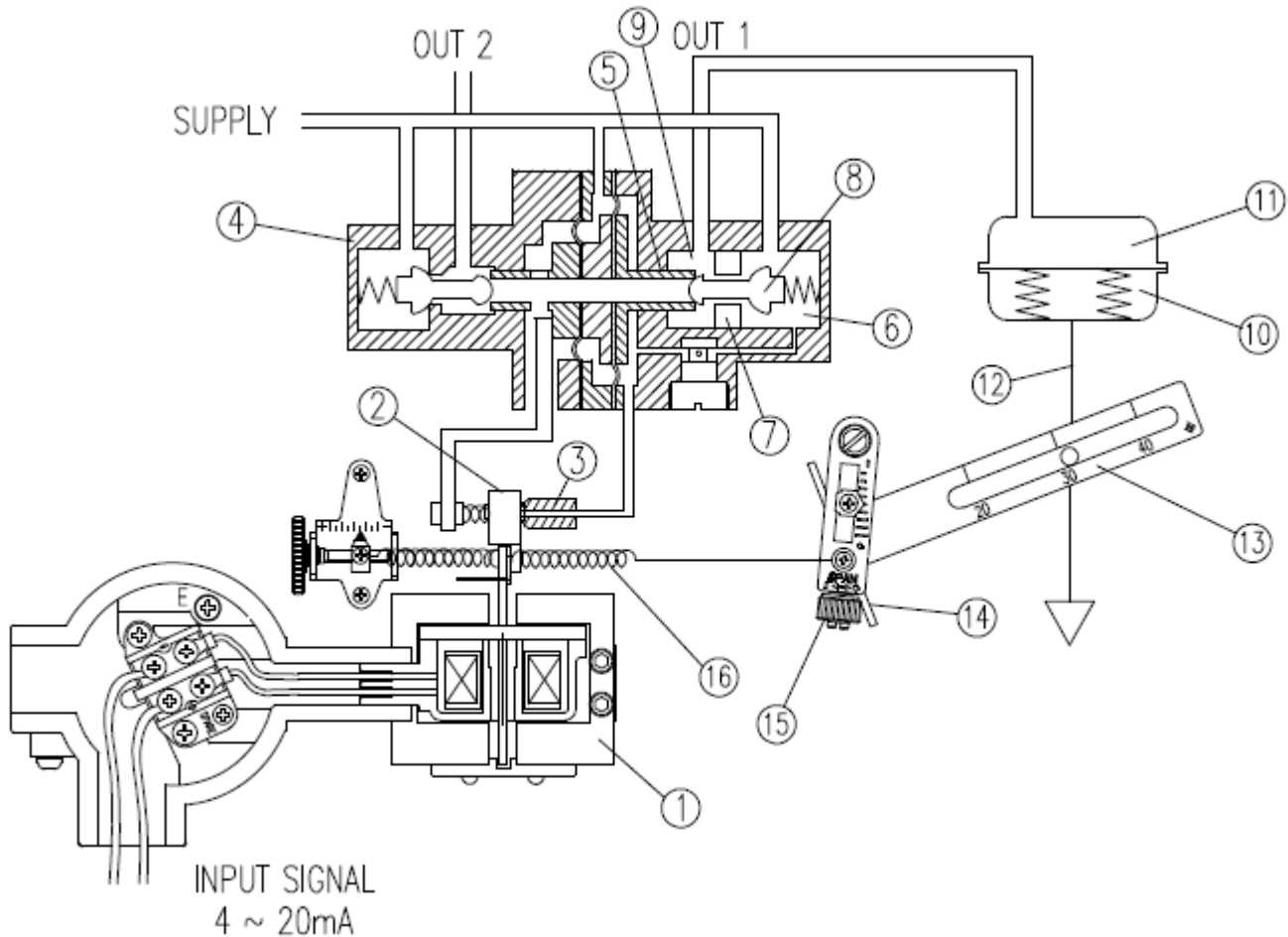
- For safety, it is imperative to follow instructions in the manual. The manufacturer is not liable for any damages caused by the users negligence.
- The manufacturer is not liable for any damages or accidents as a result of alterations or modifications made to the product or parts. If alterations or modifications are required, please contact CVS Controls Ltd.
- The manufacturer warrants the product from the original date of purchase for one (1) year, except as otherwise stated.
- The manufacturer warranty will be considered void should the product be subjected to abuse, faulty installation, lack of reasonable care, repair or service in any way, that is not contemplated in the documentation of the product, or if the model or serial number has been altered, tampered with, defaced, or removed; damages that occur in shipment, due to the act of God, failure due to power surge, and cosmetic damage. Improper or incorrectly performed maintenance also voids the Limited Warranty.

PRODUCT DESCRIPTION

Main Features and Functions

- It is designed for high durability and performance in high vibration environments.
- Proven Durability.
- Short and accurate response time.
- Simple part change can set a 1/2 Split Range.
- Economical due to less air-consumption.
- Direct/Reverse action can be easily set.
- Simple zero and span adjustment process.
- Easy feedback connection.

Operation Logic



<Figure 1>

As the input signal is increased, the **flapper (2)** get pushed by the force of the **torque-motor (1)**. As the gap between the **flapper (2)** and the **nozzle (3)** increases, air pressure bleeds from the **pilot valve (4)** and the **spool (5)**. As a result, the **spool (5)** rises and simultaneously opens the **seat (7)**. This allows air pressure to discharge through port OUT1 to the **actuator (10)**. As the actuators inner pressure increases, the actuator **stem (12)** will move, pushing on the **feedback lever (13)**. This movement is transferred to the **cam (14)** and pulls on the **feedback spring (16)**. At the point of balanced force exerted by the input signal and the feedback spring, the gap between the **flapper (2)** and the **nozzle (3)** will decrease, stopping the movement to the actuator.

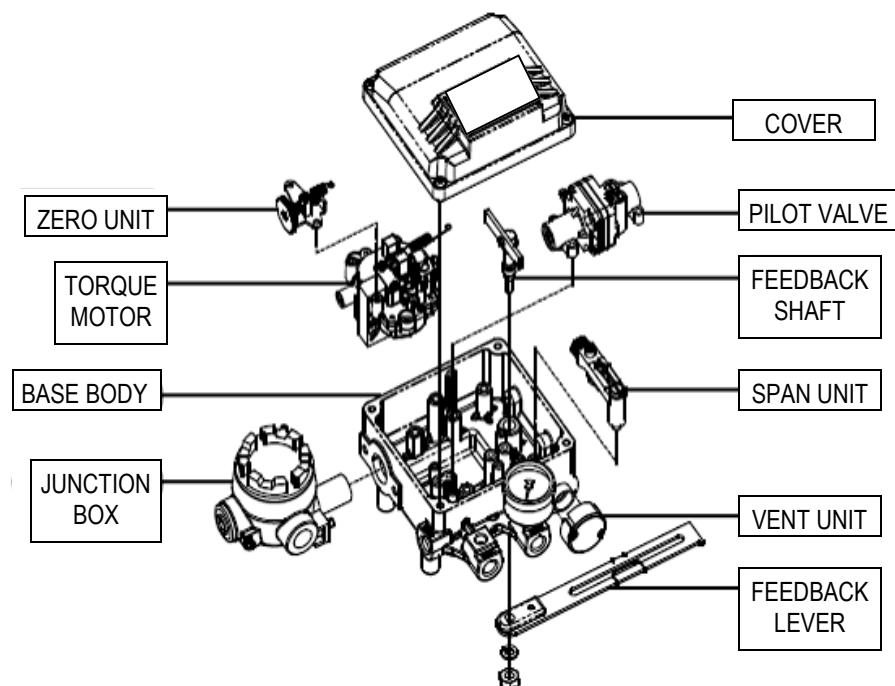
Specification

CATEGORY	YT - 1000L	
	Single	Double
Input Signal	4 ~ 20mA DC *1	
Impedance	250±15Ω	
Supply Pressure	1.4 ~ 7.0kgf/cm ² (20 ~ 100psi)	
Stroke	10 ~ 150mm *2	
Air Connection	1/4" NPT	
Gauge Connection	1/8" NPT	
Conduit Entry	1/2" NPT	
Explosion Proof	CSA: Class 1, Zone 1, Group IIB, T5	
Protection	IP66	
Ambient Operating Temperature	-40 ~ 60°C	
Linearity	±1.0% F.S	
Hysteresis	1.0% F.S	
Sensitivity	±0.2% F.S	±0.5% F.S
Repeatability	±0.5% F.S	
Air Consumption	3LPM (Sup=1.4kgf/cm ² , 20psi)	
Flow Capacity	80LPM (Sup=1.4kgf/cm ² , 20psi)	
Material	Aluminum Diecasting	
Weight	2.7 kg (6.1 lbs)	

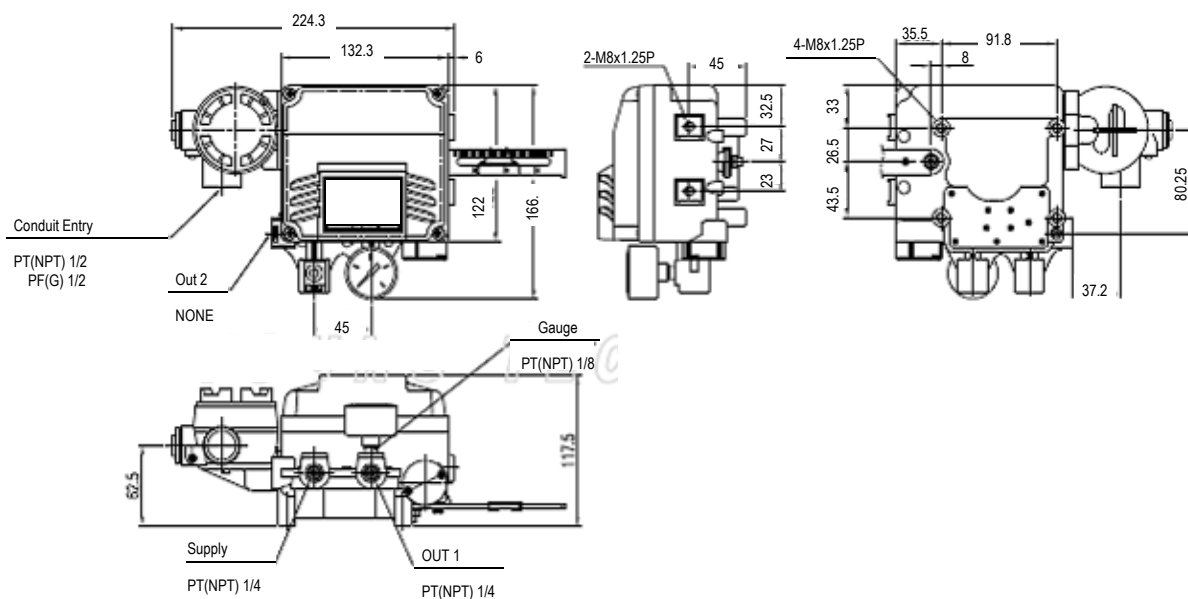
* 1: For 1/2 Split Control, it can be applied by adjusting zero and span.

* 2: For inquiries regarding strokes under 10mm or above 150mm, please contact CVS Controls Ltd.

Parts and Assembly



Dimensions



< Explosion-proof type YT-1000L >

INSTALLATION

Safety Warning

When installing the positioner, please ensure you read and follow the safety instructions.

- All input and supply pressure to valve, actuator, and other related devices must be turned off.
- Use the bypass valve or other equipment to avoid an entire system “shut down”.
- Make sure there is no remaining pressure in the actuator.

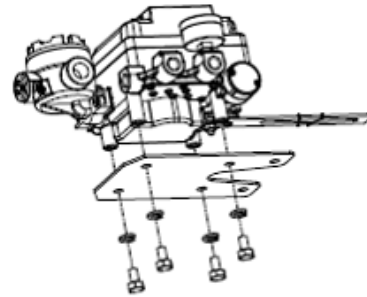
YT-1000L Installation

YT-1000L should be installed on a linear motion valve such as a globe or gate valve using a spring return type diaphragm or piston actuator. Before installation, be sure to check for the following installation components.

1. YT-1000L main body
2. Feedback lever and lever spring
3. Flange nut (bottom side of YT-1000L)
4. 4 pcs. of hexagon head bolts (M8 X 1.25P)
5. 4 pcs. of M8 plate washer

Installation Steps:

1. A proper bracket must be made in order to attach the positioner on the actuator yoke. Please consider the following when making a bracket.
 - i) Feedback level should be leveled at 50% of the valve stroke. (Refer to step 7.)
 - ii) Feedback lever connection bar of actuator clamp should be installed at the position that the valve stroke and number, indicated on the feedback, should be fitted. (Refer to step 8.)
2. Attach YT-1000L to the bracket, which was produced in the earlier step, by using bolts. (Figure 2) Please refer to the backside of the product for size of bolts. The standard size of bolt is M8 X 1.25P.

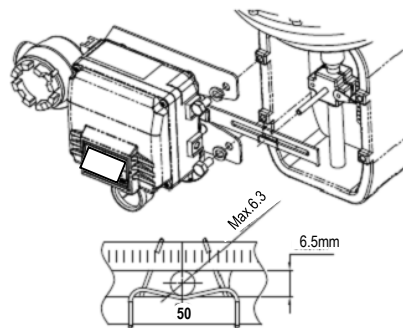


<Figure 2>

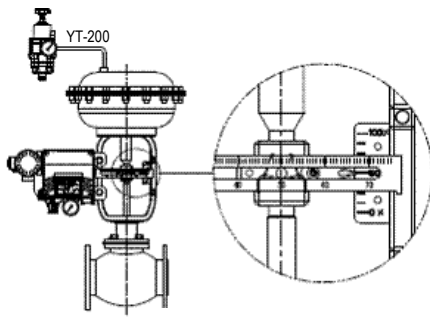
3. Attach YT-1000L (with bracket) to the actuator yoke. DO NOT TIGHTEN COMPLETELY.

4. Connect YT-1000L feedback lever to the actuator clamp. The gap on the YT-1000L feedback lever is 6.5mm. The connection bar thickness should be less than 6.3mm. (Figure 3)

5. Connect the air filter regulator to the actuator temporarily. Set supply pressure of the regulator in order to position the actuator clamp at 50% of the valve stroke. (Figure 4 next page)

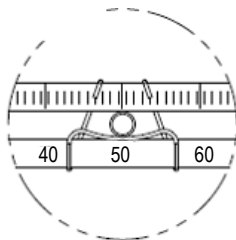


<Figure 3>



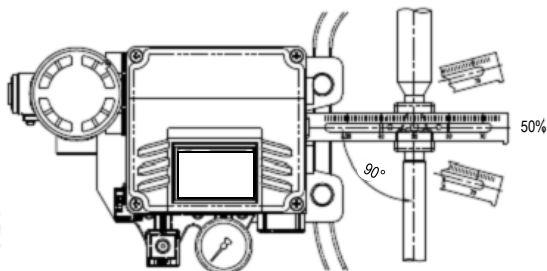
<Figure 4>

6. Insert connection bar into the YT-1000L feedback lever. The connection bar should be inserted at the 50% point on the feedback lever, which would help to reduce hysteresis.
(Figure 5)



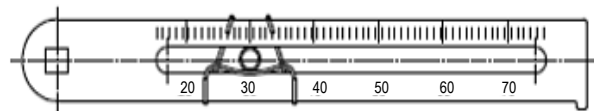
<Figure 5>

7. If the connection bar does not point at the 50% point, then adjust the bracket or feedback link bar position. Failure to position at 50% would lower the linearity of the positioner.
(Figure 6)

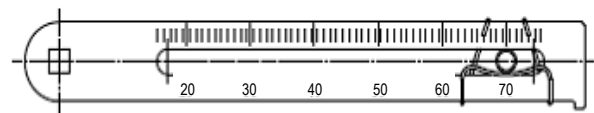


<Figure 6>

8. Check valve stroke. The stroke numbers are indicated on the feedback lever. Position the connection bar at the number on the feedback lever according to the valve stroke. To adjust, move the bracket or connection bar.
(Figure 7)

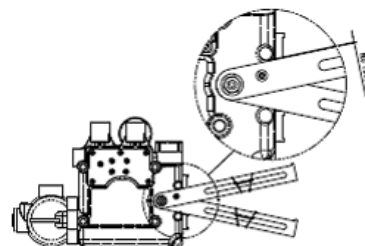


Stroke 30mm



Stroke 70mm

NOTE: After installing the YT-1000L, operate the valve from 0% to 100% stroke by using the air filter regulator on the actuator. Both at 0% and 100%, the feedback lever should not touch the lever stopper, which is located on the backside of the YT-1000L.
(Figure 8)



<Figure 8>

If the feedback lever touches the lever stopper, YT-1000L should be installed further away from the center of the yoke.

9. After the proper installation, tighten all the bolts on the bracket, the feedback lever, and the connection bar.

PIPING CONNECTION

NOTE:

- To avoid moisture, oil, or dust from entering the product, please carefully select the supply pressure compressor.

Supply Pressure Condition

- Dry air with at least 10°C lower than ambient temperature.
- Keep away from dusty air. Filter can only sort 5 micron or larger.
- Avoid oil.
- Comply with ANSI/ISA-57.3 1975(R1981).
- Not to be used beyond the range of 1.4 - 7 kgf/cm² (20 - 100 Psi).
- Set air filter regulator's supplied pressure 10% higher than actuator's spring range pressure.

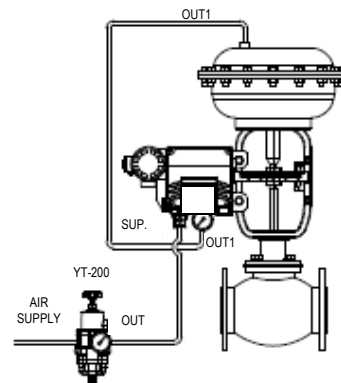
Pipe Condition

- Make sure the inside of the pipe is empty.
- Do not use pipeline that is squeezed or has holes.
- To maintain flow rate, use the pipeline that has more than a 6mm inner diameter.
- Do not use an extremely long pipeline system. It may affect flow rate due to the friction inside the pipeline.

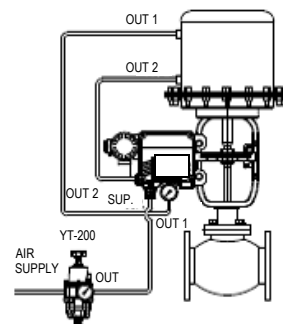
Piping Connection with Actuator

YT-1000 series single acting type is set out to use OUT1 port. OUT1 port should be connected with the supply pressure port from the actuator when using single acting type spring return actuator. For double acting, the piping connection can be changed due to the operation direction. Please refer to the following diagrams when piping.

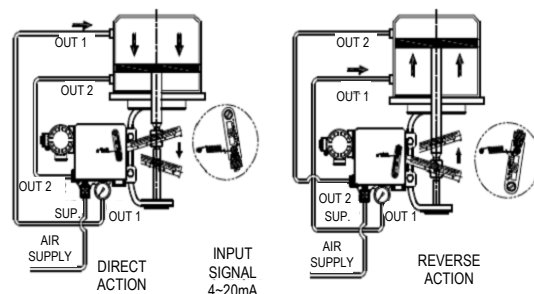
(Figures 9 - 11)



<Figure 9: Single Acting Type Actuator>



<Figure 10: Double Acting Type Actuator>



<Figure 11: Connection difference between action>

POWER CONNECTION

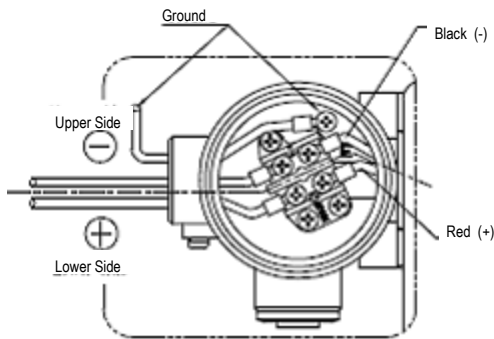
Connection - Connection Port

1. Connection port size is 1/2" NPT.

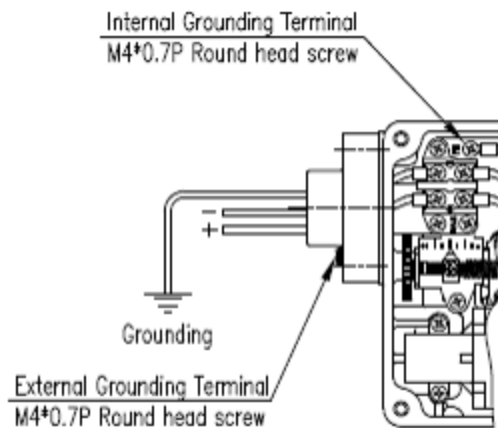
NOTE: REFER TO THE CANADIAN ELECTRICAL CODE FOR HAZARDOUS WIRING METHODS.

Connection Power

1. Open the terminal box cover.
2. Locate the poles and connect them properly. Make sure to fasten the connection.
3. Close the terminal box cover. (Figure15)



<Figure 15>

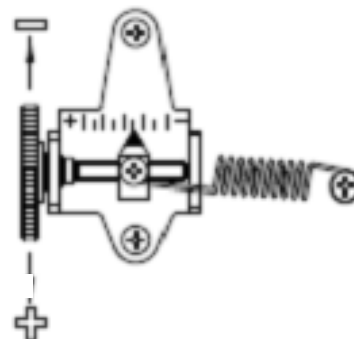


<Figure 16>

ADJUSTMENT

Adjustment - Zero Point

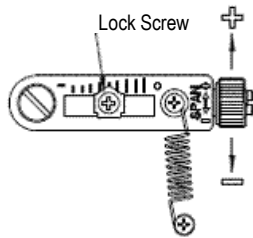
1. Set supply signal at 4mA or 20mA and rotate adjuster clockwise or counter-clockwise to adjust the actuator's initial point. When setting the initial point, the specification of valve and system must be taken into account. Please refer to Figure 17 for increase/decrease of the zero point.
2. When a single acting actuator with spring is used, please check if the pressure level, which is indicated on the positioner, is the same as the supplied pressure level.



<Figure 17>

Adjustment - Span

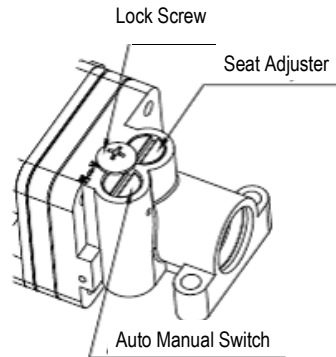
1. After setting zero, supply 20mA or 4mA of signal. Check the actuator's stroke. If the stroke is too low, adjust the span towards the (+) direction. If the stroke point is too high, adjust the span towards the (-) direction. (Figure 18)
2. Changing span points affects the zero point setting, so the zero setting must be set again. After setting zero point, confirm the span point. This step must be repeated until both points are properly set.
3. After setting is completed, tighten lock screw.



<Figure 18>

Adjustment - A/M Switch (Auto/Manual)

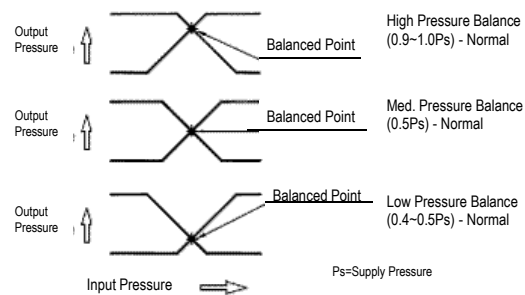
1. A/M switch adjusts the valve operation to automatic or manual.
2. When produced, YT-1000L is set at "A(Automatic)". If user prefers the positioner setting as "M(Manual)", the setting can be changed by turning the switch counter-clockwise. (Figure 19)
3. If it is set as "M(Manual)", the air pressure will be supplied to the actuator directly. Always set back to "A(Automatic)" after setting change.
4. If OUT2 in single acting actuator or double acting actuator is used, the A/M switch will not operate.



<Figure 19>

Adjustment - Seat Adjuster

1. Seat adjustment is set according to the customers request before the positioner is delivered. Please do not adjust the seat adjuster.
2. Seat adjuster is always used for double acting actuators and adjusted when the pressure balance point must be changed. Please do not touch the seat adjuster, because it can affect the positioner's performance.



<Figure 20>

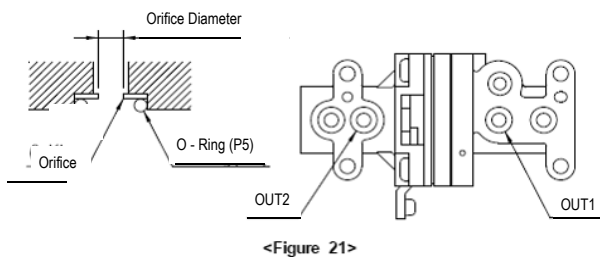
Adjustment - Orifice

1. If the size of the actuator is too small relative to the flow rate, the positioner can have hunting. In order to avoid hunting, orifice can be used. There are three types of orifice.

Actuator Size	Orifice Size	Suffix Symbol
90 cm ³ less	Ø 1	1
90 - 180 cm ³	Ø 2	2
180 cm ³ more	none	3

2. Remove the o-ring from OUT1 and OUT2 port and insert appropriate orifice. After inserting orifice, replace the o-ring. Make sure there are not any substances entering into the port. (Figure 21)

3. If hunting persists after inserting the orifice, please contact CVS Controls Ltd. or its appropriate agent.



TROUBLESHOOTING

► Positioner does not respond to the input signal.

1. Check supply pressure level. The lever must be at least 1.4 kgf/cm². For spring return type actuator, the supply pressure level has to be larger than the spring's specification.
2. Check if the input signal is properly supplied to the positioner. The signal should be 4~20mA DC.
3. Check if zero pint or span point is properly set.
4. Check if the positioners nozzle has been blocked. Also, check if the pressure is supplied to the positioner and the pressure is being exhausted through the nozzle. If the nozzle has been blocked by any substances, please send the product for repair.
5. Check if the feedback lever has been installed properly.

► The pressure of OUT1 reaches exhausting pressure level and does not decrease.

1. Check A/M Switch. If the switch has been damaged, replace the switch or pilot relay valve.
2. Check for a gap or damages between the nozzle and the flapper. If damaged, please contact CVS Controls Ltd.

► The pressure is exhausted only by the A/M switch.

1. Check if the positioners nozzle has been blocked. Also, check if the pressure is supplied to the positioner and the pressure is being exhausted through the nozzle. If the nozzle has been blocked by any substances, please contact CVS Controls Ltd.

► Linearity is too low

1. Check if the positioner is properly positioned. Especially if the feedback lever is parallel to the ground at 50% point.
2. Check if zero and span point have been properly adjusted. If either one of the values is being adjusted, another one must be adjusted as well.
3. Check if the supply air pressure level is stable from the regulator. If the level is unstable, the regulator must be replaced.

► Hysteresis is too low

1. In case of a double acting actuator, check if seat adjustment has been properly performed. Please contact CVS for any further inquiries regarding the seat adjustment.
2. Backlash can occur when the feedback lever and lever spring loosen. To avoid backlashing, please adjust the lever spring.
3. Check if the connection bar to the feedback lever is tightly fastened.

Ordering Information

CVS-1000L 1 2 3 4 5 6 7

1 Acting type	S : Single D : Double
	N : Non-explosion
	²⁾ M : Flameproof enclosure & encapsulation(IIB) : ATEX, IECEx, TS, KCs, NEPSI
	T : Flameproof enclosure & encapsulation(IIB) : INMETRO
2 Explosion Proof ¹⁾	A : Flameproof enclosure & encapsulation(IIB) : CSA F : Flameproof enclosure & encapsulation : FM C : Flameproof enclosure & encapsulation(IIC) : KCs P : Intrinsic safety(IIC) : NEPSI X : Flameproof enclosure & encapsulation(IIB) : TIIS E : Flameproof enclosure & encapsulation(IIB) : TRCU ³⁾ Z : Flameproof enclosure & encapsulation(IIB) : CCC ⁴⁾ B : Flameproof enclosure & encapsulation(IIC) : CCC G : Intrinsic safety(IIC) : CCC
3 Lever Type	1 : 10 ~ 40 mm 2 : 30 ~ 70 mm 3 : 60 ~ 100 mm 4 : 100 ~ 150 mm
4 Orifice Type	1 : Ø1 2 : Ø2 3 : None
5 Conduit – Air Connection Type	1 : G 1/2 – Rc 1/4 (N/A for FM & CSA) 2 : G 1/2 – 1/4 NPT (N/A for FM & CSA) 3 : G 1/2 – G 1/4 (N/A for FM & CSA) 4 : M20x1.5P – 1/4 NPT 5 : 1/2 NPT – 1/4 NPT
6 Operating Temp. (Non-explosion proof) ⁵⁾	S : -20 ~ 70°C (-4 ~ 158°F) H : -20 ~ 120°C (-4 ~ 248°F) L : -40 ~ 70°C (-40 ~ 158°F)
7 Option	0 : None 2 : + SPTM (Smart Position Transmitter) → Non-explosion 3 : + SPTM with LCD → Non-explosion

¹⁾ Explosion proof : M(except "KCs"), T, F, P, X, Z, B, G are only available for "S" in 6 Operating Temp..

Explosion proof : M("KCs" only) is only available for "S", "H" in 6 Operating Temp..

Explosion proof : A, i are only available for "S", "L" in 6 Operating Temp..

Explosion proof : E is only available for "L" in 6 Operating Temp..

²⁾ Please put the name of certificate in a purchase order.

³⁾ Explosion proof : Z, B are only available for "4", "5" in 5 Conduit – Air Connection Type.

⁵⁾ This option is just the normal operating temperature of the product and is not related to explosion proof temperature.



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