Type 759	1/4" and 1/2" Air-to-Close Positioner Actuator RESEARCH® CONTROL Valves	Technical Brief

DESCRIPTION

The Type 759 actuator with integral, top-mounted positioner is a pneumatically operated, spring opposed diaphragm actuator designed specifically to fit the Research Control® Valve body-bonnet assembly. The unit is available in two sizes: one for the 1/4" valve and another larger version for the 1/2" through 1" valves. The unit, when equipped with the model TLDA positioner, functions as an air-to-close actuator extending the stem and closing the valve on an increasing instrument signal. The unit is designed to retract the stem, opening the valve, on a decreasing or loss of instrument signal. A force-balance system is incorporated utilizing the full force of the supply air to position the stem precisely and with a high degree of repeatability. This type actuator should be used when the application calls for high positioning accuracy or when greater force is required over the standard actuator such as in the case of high shutoff pressures or excess packing friction.

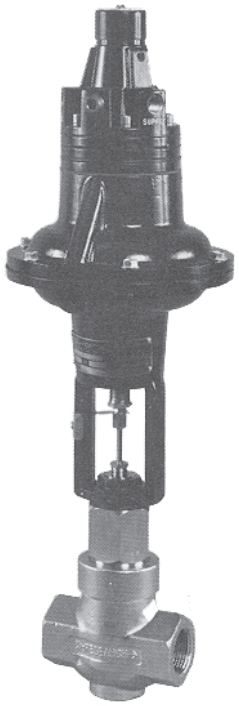
FUNCTION

The Type 759 actuator normally operates in response to a 3-15 psi change in instrument signal, or a 12 psi range. The span, or range, of instrument signal is determined by the feedback range spring mounted directly under the positioner. The feedback range spring is responsible for sensing the position of the main diaphragm as the instrument signal changes. The position is then transmitted through the spring, directly to the positioner diaphragm assembly. The valve spring, housed inside the casting just above the yoke area, provides the upward thrust necessary to open the valve on a decreasing signal. Although few applications require additional spring forces over the standard spring and loading, additional supply pressure can occasionally be required to offset high forces or excess packing friction within the valve.

OPERATION

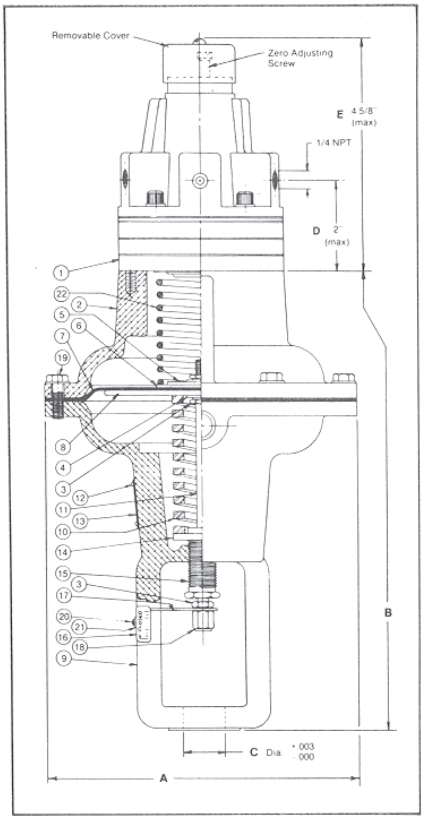
The actual operation of the unit is simple. Two air lines are required: one to provide the instrument signal and one to provide supply air. The amount of supply air required is determined by the amount of thrust necessary to overcome forces generated within the valve. The standard minimum supply pressure is 22 psig of clean, filtered, dry air.

The two air lines should be connected to the ports marked "supply" and "inst" on the positioner. The unmarked port between the supply and instrument port is provided with a blind pipe plug. Since this port is an integral part of the piping of air from the positioner to the main diaphragm, it can also be plugged with a gauge, which will indicate the actual output of the positioner to the main diaphragm. Upon an increase in instrument signal, the position of the pilot within the positioner is shifted up, causing the supply air to be directed through the positioner to the top of the main valve diaphragm cavity. As the main diaphragm travels downward, the compression on the feedback range spring decreases. The decreased force of the range spring is transmitted to the diaphragm assembly in the positioner. The downward shift in the positioner diaphragm assembly causes the pilot to re-position and assume a balanced state. The entire function creates a complete feedback loop within the unit, causing the valve to position accurately and with a high degree of repeatability.



Shown mounted on Type 807 valve

Note: The positioner, when in operation, will constantly bleed unused supply air.



Description of items

	Description	Material
1.	Positioner	Aluminum
2.	Positioner mount	Aluminum
3.	Stem nut	300 s/s
	1/4" unit = 1/4" hex, 1/2" unit = 3/8" hex	
4.	Washer	Steel (ZnPl)
5.	Spring loc. plate	Aluminum
6.	Spring loc. plate	Aluminum
7.	Diaphragm	Buna on nylon
8.	Diaph. plate	Steel (ZnPl)
9.	Spring case & yoke	Aluminum
10.	Spring	Steel
11.	Stem	316 s/s
	1/4" unit = 1/8" dia., 1/2" unit = 3/16" dia.	
12.	Drive screw (2 ea)	300 s/s
13.	Nameplate	s/s*
14.	Spring seat	Aluminum
15.	Spring adjustor	300 s/s
16.	Travel scale	s/s*
17.	Travel pointer	s/s
18.	Stem connector	s/s
19.	Rim screw (6 ea)	300 s/s*
	1/4" unit = 5/16" hx, 1/2" unit = 3/8" hx	
20.	Screw	s/s*
21.	Washer	s/s
22.	Range spring	Steel

Technical Information

Dimensions: Actuator Size

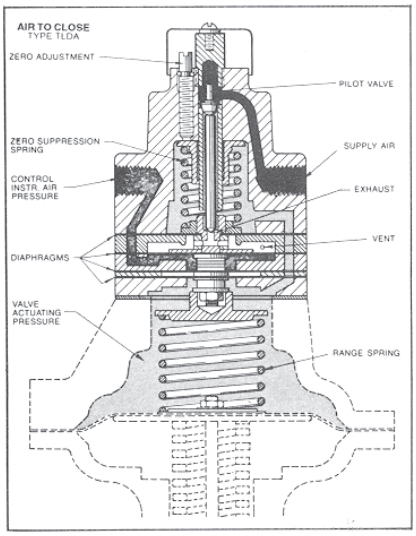
Dimensions:	1/4"	1/2"
A:	5.12"	6.43"
B:	7.93"	9.40"
C:	.625"	.875"
D:	2"	max.--
E:	4.625"	max.---
Stroke:	.437"	.562"

Weight:
1/4" unit w/posit. - aprx. 6 lbs.
1/2" unit w/post. - aprx. 7 lbs.

Maximum Operating Supply Pressure = 60 psig
Maximum overload Pressure = 100 psig
Maximum Temp. at 25 psi
Lower limit- minus 20 deg. F
Upper limit- plus 150 deg. F

Effective diaphragm area:
1/4" unit - 7.3 sq. in.
1/2" unit - 11.3 sq. in.

Positioner data:
Air consumption with 25 psig supply:
0.60 scfm in balance condition
0.22 scfm in unbalanced cond.
Response level:
The output is sensitive to changes in control-air pressure as small as 0.1% of full range.



Zero Adjustment:
The point at which the valve closes can be adjusted with the zero adjusting screw located under the protective cap on top of the positioner. The closing point can be adjusted to begin at any point between 12 psi and 16 psi and will still allow full stroke of the valve with a 12 psi change in signal (when using a 12 lb. range spring).

Force Spring Adjustment:
The valve spring under the diaphragm plate is normally preadjusted at the factory to allow the valve to attain full travel when the instrument signal is at 15 psi. Only when high packing hysteresis is encountered or when using a bellows sealed bonnet will additional forces need to be adjusted into the spring. If it becomes necessary, turning the spring adjuster (item 15) clockwise will increase the tension on the spring. If the adjuster is turned more than one complete turn, additional supply air may be required.

Supply Air Requirements:
The standard supply pressure of 22 psig is sufficient to handle most applications. The amount of supply pressure required can be calculated prior to installation by: 1. Multiplying the max. shutoff pressure by the seat orifice area. 2. Multiply the trim stem or bellows, if used, by the max. downstream pressure. Whichever is greater should be divided by the effective area of the actuator. This number is the amount of supply air in psi that is required over and above the inst. signal.
Example: Inst. signal is 3-15 lbs.
Calculated additional supply is 8 psi.
8 + 15 = 23 psi.
Note: Do not exceed 25 psi without consulting the factory.

Note: For outdoor use, do not mount upside down as water can enter the spring cavity via the stem and may freeze in colder climates.

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