RCV
Research Control® | ReCo® Valves

Actuator

Type 766

DESCRIPTION

The Type 766 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 in. (6 mm) valve and another larger version for the 1/2…1 in. (12…25 mm) valves. The unit, when equipped with the model BLRA positioner, functions as an air-to-open actuator retracting the stem and opening the valve on an increasing instrument signal. The unit is designed to extend the stem, closing the valve, on a decreasing or loss of instrument signal. A force-balance system is incorporated using 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 766 actuator normally operates in response to a 3…15 psi (0.2…1 bar) change in instrument signal or a 12 psi (0.8 bar) 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, visible in the yoke area, provides the downward thrust necessary to counteract forces created within the valve. Consideration should be given to the amount of preload required for proper operation since the main valve spring only provides downward force. See *"Force Spring Adjustment" on page 2*.

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 spring force necessary to overcome forces generated within the valve. The standard minimum supply pressure is 22 psig (1.5 bar) of clean, filtered, dry air.

The two air lines should be connected to the ports marked *Supply* and *Inst* on the positioner. The "load" and "aux load" are not used in normal installations and are provided with "vented" stainless plugs. These plugs should not be removed. The port marked "valve" is provided with a blind pipe plug and should be left in place. 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 air diaphragm.

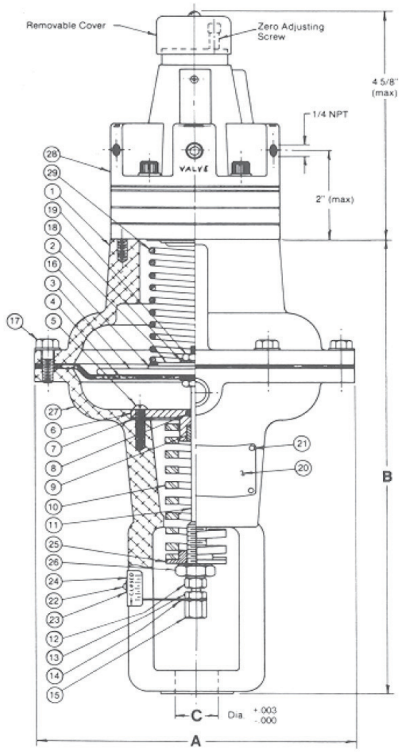
Upon an increase in instrument signal, the position of the pilot within the positioner is shifted down, causing the supply air to be re-directed through internal passages to the main valve diaphragm cavity. As the main diaphragm travels upward, the feedback range spring is compressed. The increased force, created by the range spring, is transmitted to the diaphragm assembly in the positioner. The upward 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.

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

Badger Meter

RCV-DS-00269-EN-04 (November 2020)

Product Data Sheet



DESCRIPTION OF ITEMS

Item	Description	Material
1	Positioner mount	Aluminum
2	Spring loc. plate	Aluminum
3	Diaphragm plate	Steel-Zn/Pl
4	Diaphragm	Buna on nylon
5	Screw (4 ea.)	Steel-Zn/Pl
6	Spring plate	Aluminum
7	Gasket	Vellumoid
8	O-ring	Silicone
9	Bushing	Nylon
10	Spring (force)	Steel
11	Stem	316 stainless steel
12	Connector	300 stainless steel, 3/8 in. (9.5 mm) hex
13	Stem nut	300 stainless steel
	1/4 in. (6.4 mm) unit = 1/4 in. (6.4 mm) hex, 1/2 in. (12.7 mm) unit = 3/8 in. (9.5 mm) hex	
14	Travel pointer	Stainless steel
15	Connector nut	300 stainless steel
16	Spring locating plate	Aluminum
17	Rim screw (6 ea.)	300 stainless steel*
	1/4 in. (6.4 mm) unit = 5/16 in. (7.9 mm) hex, 1/2 in. (12.7 mm) unit = 3/8 in. (9.5 mm) hex	
18	Washer (2 ea)	Steel-Zn/Pl
19	Stem nut	300 stainless steel, 3/8 in. (9.5 mm) hex
20	Nameplate	Stainless steel
21	Drive screw (2 ea.)*	Stainless steel
22	Screw	Stainless steel
23	Washer	Stainless steel
24	Travel scale*	Stainless steel
25	Spring seat	Aluminum
26	Spring adjusting nut	300 stainless steel, 5/8 in. (15.9 mm) hex
27	Spring case & yoke	Aluminum
28	Positioner (not included)	—
29	Range spring	Steel

*May not be made of stainless steel prior to 12-86

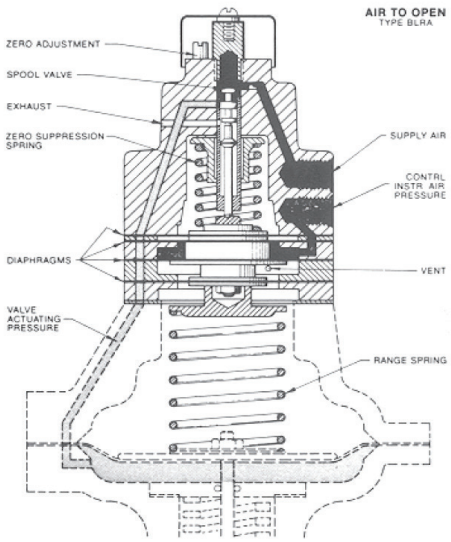
DIMENSIONS

Dimensions	Actuator Size	
	1/4 in. (6.4 mm)	1/2 in. (12.7 mm)
A	5.12 in. (103.0 mm)	6.43 in. (163.3 mm)
B	7.93 in. (201.4 mm)	9.40 in. (238.8 mm)
C	0.625 in. (15.9 mm)	0.875 in. (22.2 mm)
Stroke	0.437 in. (11.1 mm)	0.562 in. (14.3 mm)

SPECIFICATIONS

Weight w/ Positioner	1/4 in. (6.4 mm)	Approx. 6 lbs (2.7 kg)
	1/2 in. (12.7 mm)	Approx. 7 lbs (3.2 kg)
Pressure Rating	Max. operating	60 psig (4.1 bar)
	Max. overload	100 psig (6.9 bar)
Temp. Range*	–20…150° F (–28.9…65.6° C)	
Effective Diaphragm Area	1/4 in. (6.4 mm)	7.3 in.^{2} (4709.7 mm^2)
	1/2 in. (12.7 mm)	11.25 in.^{2} (7258.1 mm^2)
Positioner Data	Air consumption*	0.60 scfm balanced
		0.22 scfm unbalanced
	Response level	The output sensitive to changes in control-air pressure as small as 0.1% of full range.

* At 25 psig (1.7 bar)



ZERO ADJUSTMENT

The point at which the valve begins to open can be adjusted with the zero adjusting screw located under the protective cap on top of the positioner. The opening point can be adjusted to begin at any point between 2…6 psi (0.1…0.4 bar) and will still allow full stroke of the valve with a 12 psi (0.8 bar) change in signal when using a 12 pound range spring.

FORCE SPRING ADJUSTMENT

The spring tension necessary to operate the valve can be roughly calculated prior to installation.

1. Multiply the trim orifice area by the max. upstream pressure the valve will have to close against.
2. Multiply the trim stem (or bellows area) by the max. downstream pressure.
3. Whichever is greater can be divided by the effective area of the topworks. This figure is the amount of air preload required to overcome the forces generated by pressures in the valve body. The normal factory setting is 3.5 psig (0.2 bar). If the figure calculated is greater than this, additional loading will have to be adjusted into the spring. If the factory is notified prior to shipment, we will make the necessary adjustments.

If the adjustment must be made in the field, use the following procedure:

Reverse the supply and instrument lines into the positioner (pipe the inst. line into the supply port and the supply line into the inst. port). This procedure bypasses the positioner. Using a regulator in the line piped to the supply port, the amount of preload in the valve spring can be determined by raising and lowering the pressure to this port. If it does not meet the amount determined by the calculations above, you may tighten the spring adjusting nut (item 26). Repeat the procedure until the amount of air pressure required to lift the valve off seat corresponds to the amount indicated in the calculations.

NOTE: The supply pressure may need to be raised to counteract the increased spring loading. Use only the amount of supply necessary to achieve full stroke.

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

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