



V Series Pneumatic Actuators Instructions



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1. Introduction

The following instructions should be thoroughly reviewed and understood prior to installing, operating or performing maintenance on this equipment.

Throughout the text, safety and/or caution notes will appear and must be strictly adhered to, otherwise, serious injury or equipment malfunction could result.

Valution has a highly skilled After Sales Department available for start-up, maintenance repair of our valves and component parts. Arrangements for this service can be and made through your local Valution Representative or After Sales Department When performing maintenance use only Valution replacement parts.

Parts are obtainable through your local Valution Representative or Spare Parts Department.

When ordering parts always include Model and Serial Number of the unit being repaired.

2. General

These installation and maintenance instructions apply to pneumatic actuators of linear motion and rotary motion.

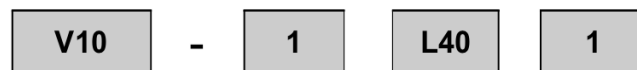
The actuators are operated by pneumatic supply, the actions can be air to open and air to close.

There are single acting actuators, spring-diaphragm actuators for linear and spring- cylinder actuators for rotary motions. These single acting actuators can perform the air fail safe - open and close.

There are double acting actuators, springless-cylinder actuators for both linear and rotary motions available.

Other type of actuators would be required to consult Valution Sales Contacts.

3. Model Description



Actuator Type	Action	Stroke(Travel)	Option
V10. Linear motion, Spring-Diaphragm, Single acting	1. ATO (Air to Open, Spring close)	*. Linear(mm) L020, L040, L050, L070, L080, L100, L150, L200, L250, L300, L400 L00 : Other	1. N/A 2. Top H/W 3. Top-Side H/W 4. Side-Declutch H/W 5. Lim. Stopper 6. Other
V20. Linear motion, Spring-Cylinder, Single acting			
V30. Linear motion, Springless-Cylinder, Double acting			
V40. Rotary motion, Spring-Diaphragm, Single acting			
V50. Rotary motion, Spring-Cylinder, Single acting Rack & Pinion	2. ATC (Air to Close, Spring open)	*. Rotary(degree) R90 : 90° R00 : Other	
V60. Rotary motion, Springless-Cylinder, Double acting, Rack & Pinion			
V70. Rotary motion, Spring-Cylinder, Single acting Scotch yoke			
V80. Rotary motion, Springless-Cylinder, Double acting, Scotch yoke			
V90. Electric Motor	3. Double Acting (Springless)		
V01. Other Type			
	4. Other		

4. Unpacking

Care must be exercised when unpacking the actuator to prevent damage to the accessories and component parts. Should any problems arise, contact the local Valution Representative or After Sales Department.

5. V10, Linear, Spring-Diaphragm Type

5.1 Description

The V10 Series, Spring-Diaphragm Actuator of the Valution is one of the main candidates for pneumatic actuators.

The Rolling diaphragm was used to minimize the change in the effective cross section area due to displacement, and stable long stroke was implemented.

Multi springs of cold coiling were adopted, not single springs by hot coiling, to improve elastomeric precision. The multi springs can achieve the air fail safe position.

Long-term motion also has stable precision and durability, and modulating functions with traditional E/P, smart, and HART positioners depending on the purpose of use. On-Off functions with SOV, Lim. S/W and Relays can be performed.

5.2 General Specifications

Descriptions		Specifications
Applicable Temperature Range		Ambient -20°C ~ 80°C
Air Supply Connection		NPT 1/4" Female, Optional : NPT 3/8", 1/2" and others
Hysteresis		without Positioner : ± 3.5% with E/P Positioner : ± 1.0% with Smart Positioner : ± 0.5%
Linearity		without Positioner : ± 3.5% with E/P Positioner : ± 1.0% with Smart Positioner : ± 0.5%
Sensitivity		without Positioner : ± 2.0% with E/P Positioner : ± 0.2% with Smart Positioner : ± 0.2%
Major Parts Materials	Diaphragm	EPDM Rubber (Ethylene Propylene Diene Monomer Rubber) with Reinforced Nylon
	Diaphragm Case	Carbon Steel Plate, JIS G3101, SS400
	Actuator Stem	304 St. Steel, A276 TY304
	Spring	Alloy Spring Steel, JIS G3560, SWOSC-B
	Yoke	Carbon Cast Steel, A216 Gr. WCB
Maximum Allowable Pressure		4.2 Kg/cm ²
Actuator Action		DA : Direct Action, Air to Close(ATC), Air to Extend Stem RA : Reverse Action, Air to Open(ATO), Air to Retract Stem

5.3 Size

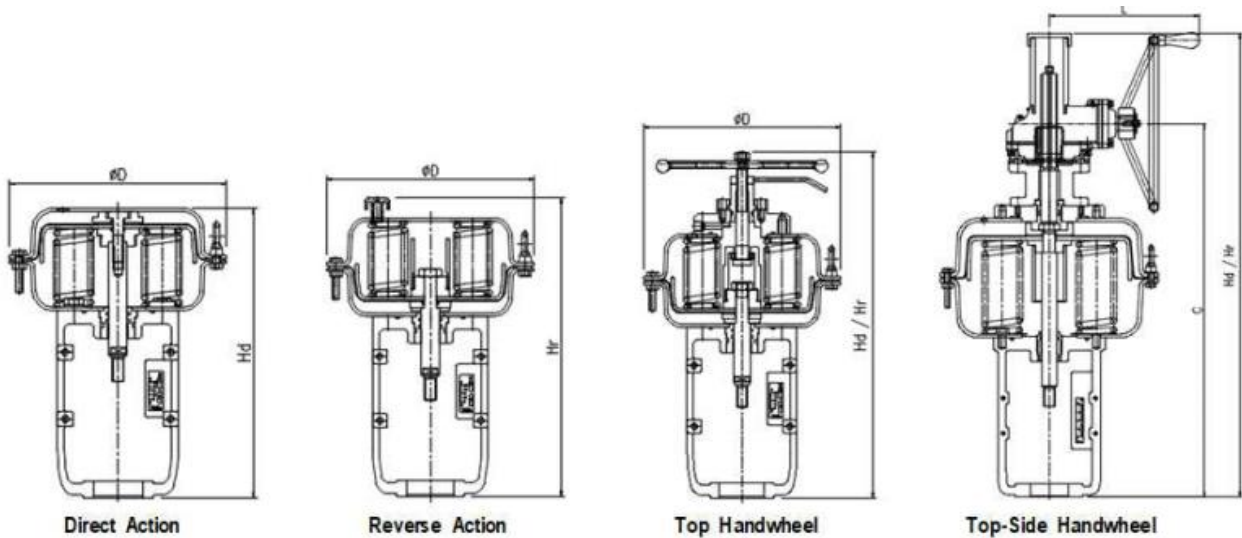
Model	V10 Spring-Diaphragm Actuators					
V10 Size	V10 - #2	V10 - #3	V10 - #4	V10 - #5	V10 - #6	V10 -#6H
Outside Diameter(mm)	254	294	375	485	565	565
Effective Area(cm ²)	272	393	642	1,134	1,524	1,524
Actuator Volume(cm ³)	898	1,796	3,494	10,196	18,157	18,157

5.4 Technical Specifications

Model	V10 Spring-Diaphragm Actuators					
V10 Size	V10 - #2	V10 - #3	V10 - #4	V10 - #5	V10 - #6	V10 -#6H
Outside Diameter(mm)	254	294	375	485	565	565
Effective Area(cm2)	272	393	642	1,134	1,524	1,524
Actuator Volume(cm3)	898	1,796	3,494	10,196	18,157	18,157
Spring Rnage(kg/cm2g)	0.6-2.6					
	1.4-3.2	1.4-3.2	1.4-3.2	1.4-3.2	1.4-3.2	1.4-3.2
Rated Travel(mm)	20	40	50	70	80	100
Handle Option	Top H/W			Top-Side H/W		
Maximum Allowable Pressure(kg/cm2g)	4					
Actuator Action	DA : Direct Action, Air to Close(ATC), Air to Extend Stem					
	RA : Reversee Action, Air to Open(ATO), Air to Retract Stem					

5.5. Dimensions

The actuators are designed to accept 1/4" NPT air supply piping. Use 1/4" OD tubing (4 x 6 mm) or equivalent for all air lines. If the supply air line exceeds 25 feet in length (7meters) or if the valve is equipped with volume boosters, 3/8" tubing (6 x 8 mm) is preferred. All connections must be free of leaks.



(unit : mm)

Actuator Size	ØD	Without Handwheel		With Handwheel				
		DA	RA	Handwheel Type	DA	RA	C	L
		Hd	Hr		Hd	Hr		
#2	254	347	372	Top	454	488	-	-
#3	294	407	432	Top	514	548	-	-
#4	375	454	488	Top	619	648	-	-
#5	486	655	679	Top side	1,075	1,075	870	335
#6	565	702	728	Top side	1,148	1,148	917	335
#6H	565	728	778	Top side	1,148	1,148	917	335

Caution : Do not exceed supply pressure indicated on name plate.

5.6. OPERATION

Note! Only apply the loading pressure to the diaphragm chamber that does not contain the springs. It is important for a troublefree operation of the actuator that the vent port is not blocked.

5.7. AIR PIPING

The Model V10 actuator is designed to accept 1/4" NPT air supply connections.

If the actuator has been supplied with accessories, they are piped at the factory.

Dry compressed air or natural gas can be used in actuators in open-close operation, no oil spraying is needed. Clean, dry and oil-free instrument air must be used for diaphragm actuators with a positioner. The maximum supply pressure is 4.0 kg/cm²g.

5.8. ACTUATOR REMOVAL

Maintenance on the valve body normally requires removal of the valve actuator.

The steps in removal of the actuator are different depending on whether the actuator is air to close or air to open.

Note: Actuator action may be checked by referring to the valve name plate on yoke side. It indicates air to close or air to open positions.

CAUTION:

When handling the actuator or the control valve assembly, take its weight into account!

<AIR TO CLOSE>

- A. Shut off air supply to actuator.
- B. Disconnect air piping from diaphragm case.
- C. Check the travel indicator (7) against the travel scale (9) to insure that the plug is up (off the seat).

Note: No air pressure is required to the actuator since the spring pressure tends to open the valve.

- D. Loosen stem lock nuts (1).
- E. Re-tighten lock nuts (1) against each other so they will lock at a point that is not against the stem connector (2).
- F. Loosen and remove drive nut.

CAUTION:

Depending on stem length, it may be required to slightly raise the actuator off the body to enable the plug stem to disengage from the actuator stem. The actuator must be raised straight off the body to prevent stress on the plug stem.

G. Turn the stem lock nut, (1), counterclockwise and loosen the plug stem until it dis-engages from the actuator stem (10).

Note: Do not allow the valve plug to drop or turn against the seat ring, as this could damage the seat and plug.

H. Remove actuator from the valve body.

CAUTION:

Care should be taken in handling the to prevent damages on the parts.

<AIR TO OPEN>

Since removal of the valve plug stem from the actuator stem connector requires that the valve plug be off the seat.

- A. Shut off air supply to the actuator.
- B. Disconnect air supply piping to the actuator.
- C. Connect manual loading panel tubing to the lower diaphragm case tubing connector.
- D. Apply required air pressure through the manual loading panel to open the valve as is indicated by the travel indicator (7) and travel indicator scale (9).

CAUTION:

Do not use the over pressure indicated on the diaphragm case.

- E. Loosen stem lock nuts (1).
- F. Re-tighten stem lock nuts (1) against each other so they will lock at a point that is not against the actuator stem connector (2).
- G. Loosen and remove drive nut.
- H. Turn the upper stem lock nut (1) counterclockwise and unscrew the valve plug stem until disengaged from the actuator stem (10).

Note: Do not allow the plug to drop or turn against the seat ring.
This could damage the seat and plug.

- I. Remove actuator from the valve body and shut off air supply pressure.

CAUTION:

Care should be taken in handling the to prevent damages on the parts.

5.9. ACTUATOR INSTALLATION

These installation and plug stem adjustment procedures are available for mounting of diaphragm actuators on most of the reciprocating and metal seat valve series.

In case of the valves with spring loaded internal auxiliary tight shutoff plug (Pilot Trim), or valves with PTFE Soft seat ring, contact Valution.

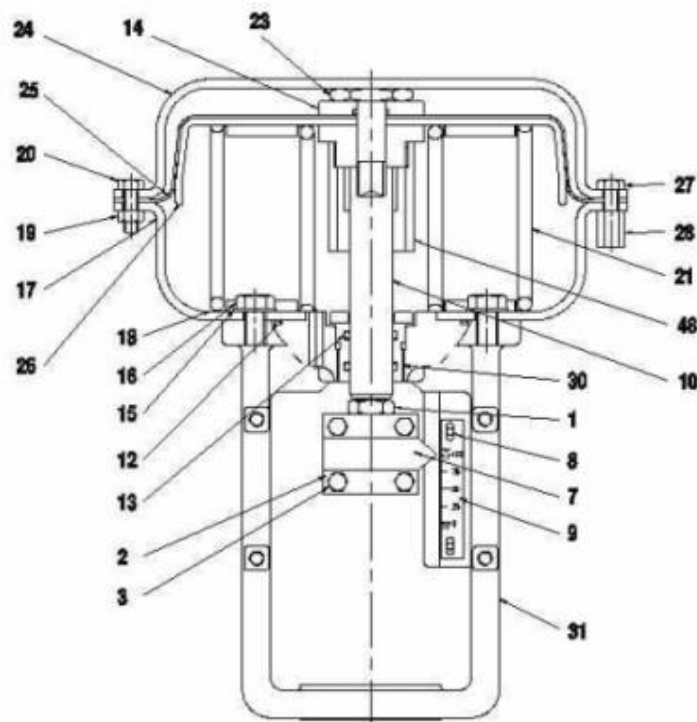
<AIR TO CLOSE>

- A. Install actuator on the valve body with drive nut.
- B. Position stem connectors (2) and replace the two socket head cap screws (3). Turn as far as possible the plug stem into lower part of the stem connector (2).
- C. Pneumatically or with the handwheel, stroke the actuator to the rated spring range or stroke.
- D. Using the stem lock nuts (1) unscrew the plug stem until the plug touches the seat.

CAUTION:

DO NOT TURN the plug against the seat as damage can occur.

- E. Release the pressure in the actuator or back off the handwheel to raise the stem.
- F. Unscrew the stem 1/2 turn and lock the stem in place by tightening the stem nuts (1) against the stem connector (2).
- G. Line up the stroke scale (9) with the pointer (7) and check actuator for operation.



<AIR TO CLOSE>

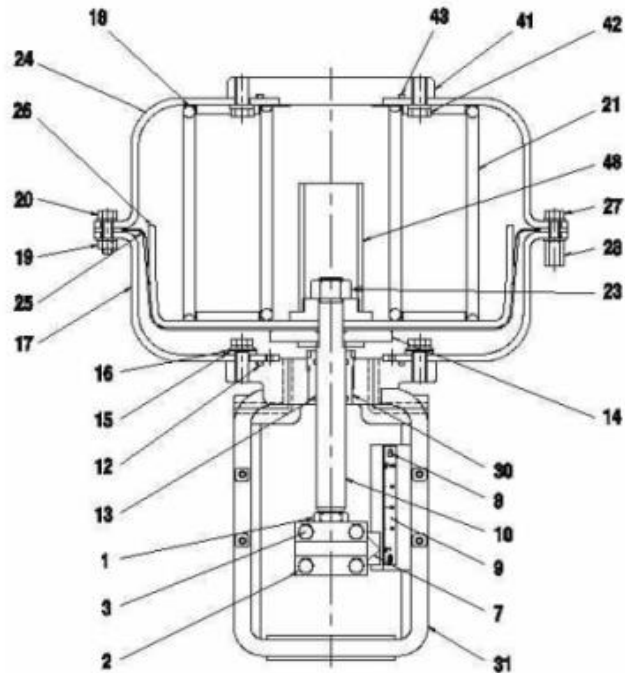
<AIR TO OPEN>

- A. Connect manual loading panel tubing to the lower diaphragm case.
- B. Apply required air pressure through the manual loading panel to completely retract the actuator stem (10).
- C. Install actuator on the valve body with drive nut.
- D. Turn as far as possible the plug stem into lower part of the stem connector (2).
- E. Release air pressure, then ensure that the actuator stem is fully extended.
- F. Using the stem lock nuts (1), unscrew the plug stem until the plug touches the seat.

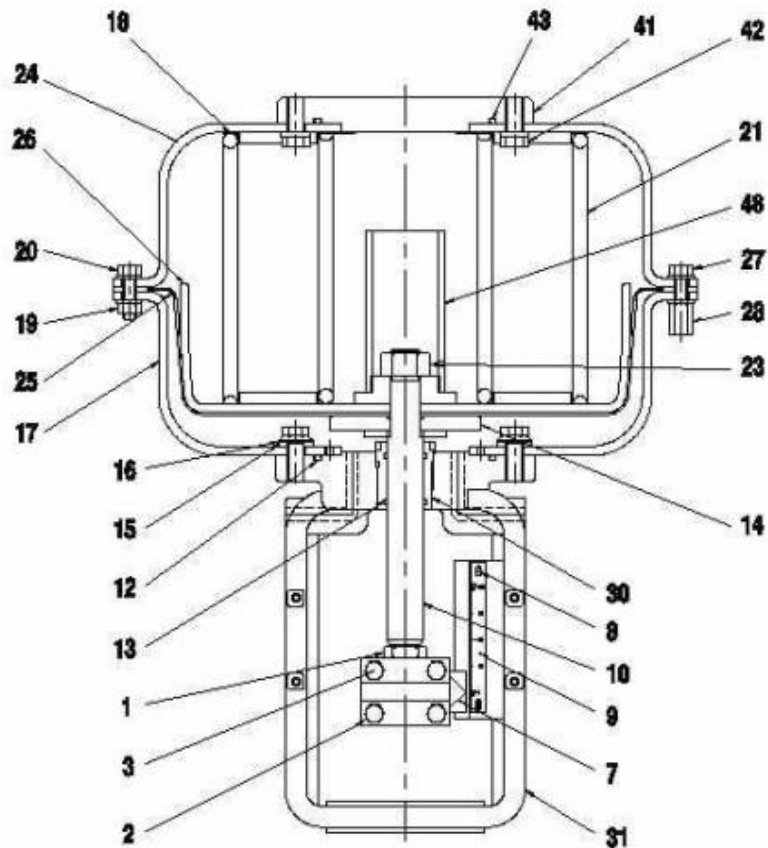
CAUTION:

DO NOT TURN the plug against the seat as damage can occur.

- G. Pneumatically or with the handwheel, stroke the actuator to raise the plug off the seat. Unscrew the plug stem one full turn and lock the stem in place with the lock nut(s) (1) against the stem connector (2).
- H. Line up the stroke scale (9) with the pointer (7) and check actuator for operation.

**<AIR TO OPEN>**

5.10. ACTUATOR PARTS LIST



<PARTS LIST>

No	Description	No	Description
1	Lock Nut (Hex Nut)	20	Cap Screw, Hex Head
2	Stem Connector	21	Springs
3	Cap Screw, Hex Head	22	Washer
7	Pointer	23	Nut. Jam
8	Screw, Pan Head	24	Upper Diaphragm Case
9	Scale - Travel	25	Diaphragm
10	Actuator Stem	26	Diaphragm Plate
12	O-Ring	27	Cap Screw, Hex Head
13	O-Ring	28	Compression Nut
14	Spacer	30	Stem Bushing
15	Washer	31	Yoke
16	Cap Screw, Hex Head	41	Cover Plate
17	Lower Diaphragm Case	42	Cap Screw, Hex Head
18	Spring Spacer	43	O-Ring
19	Hex Nut	48	Stopper