SVF FLOW CONTROLS

IOM-CNG Manifold

INSTALLATION, OPERATION & MAINTENANCE MANUAL FOR SVF CNG MANIFOLD

Manifold Part #: M1P46DBA105

Maintenance Tools Required – See PAGE 4

Repair Kits Part #: Valves – RKM1P405DB
Details on PAGE 6
Actuators - RKM1V-A2-20
Details on PAGE 6

IMPORTANT SAFETY WARNINGS

A. Before carrying out any repair or maintenance on the actuator, make sure that the pressure supply lines and electrical connections have been safely isolated, removed or disconnected by authorized personnel. The actuator must not be pressurized at any time during installation as injury may result.

B. Never put any part of your body in the opening or port of the controlled valve or device.

C. Special attention and precautions should be observed of the stored energy contained in the spring return pneumatic actuators. Do not disassemble individual spring cartridges. Disassembly may result in personal injury.

D. Before installing onto a valve make sure that the rotation of the valve and the actuator are the same and that the position indicator orientation is also correct.

E. Never forget that for the correct operation, a pneumatic actuator must be sized adequately and with sufficient safety margin of torque output for the correct operating conditions of the valve.

*Authorized and skilled personnel should only perform maintenance of these actuators.

!!!CAUTION! Safety Precautions!!!

Before removing valve from pipeline NOTE that:

Media flowing through a valve may be corrosive, toxic, flammable, or of a contaminant or harmful nature. Where there is evidence of harmful fluids having flowed through the valve, the utmost care must be taken. It is suggested that the following minimal safety precautions be taken when handling valves.

1. Always wear eye shields.
2. Always wear gloves and overalls.
3. Wear protective footwear.
4. Wear protective headgear.
5. Ensure that running water is readily accessible.
6. Have a suitable fire extinguisher ready if media is flammable.
7. Be sure that you are aware of the fluid that has been passing through the valve before opening or dismantling any valve. Require MSDS information.

By checking line gauges ensure that no pressure is present at the valve. Ensure that any media is released by operating valve slowly to half open position. Ideally, the valve should be decontaminated when the ball is in the half open position.

These valves, when installed, have body connectors which form an integral part of the pipeline and the valve cannot be removed from the pipeline without being dismantled.

Valves and accessories must not be used as a sole support of piping or human weight. Safety accessories such as safety relief (overpressure) valves are the responsibility of the system designer.

It is the user/system designer's responsibility to use insulation in high temperature applications. Refer to OSHA documents for more details.

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GENERAL

This instruction manual contains important information regarding the installation, operation, maintenance and storage for rack and pinion pneumatic actuators. Please read these instructions carefully and save them for future reference. It is important that only properly trained personnel disassemble or assemble the actuator.
SVF Ball valves have been designed and engineered to provide long lasting and trouble free service when used in accordance with the instructions and specifications herein. The following instructions refer only to Ball Valves that are part of the Manifold Assembly.

DESCRIPTION OF *aero2* ACTUATORS

The Aluminum pneumatic actuator is a 90° Double acting or Spring return rack and pinion system, which has been designed for the actuation of all type of 1/4 turn valves or 1/4 turn applications. The special finish of the interior surface of the body (Ra 0.4 – 0.6 µm) together with the use of antifriction pads manufactured in material of a very low coefficient of friction, mounted in the pistons, prevent metal on metal contact. SVF Flow Controls, Inc. actuators enjoy a long and maintenance free life.

Operating Media

- Clean, dry and lubricated compressed air
- Light hydraulic oil
- Any other Inert and non corrosive gas (consult SVF)

The maximum particle size must not exceed 0.001 µin (30 µm)

Supply Pressure

- Minimum: 15 psig (1 bar)
- Maximum: 120 psig (8 bar)

Operating Temperature

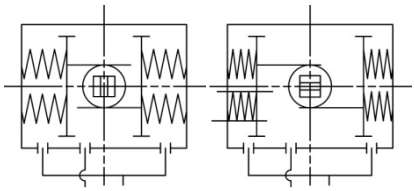
- High temperature (Viton O-ring): +5°F~+302°F (-15°C~+150°C)

High and low temperature will vary the output torque of the actuator.

LUBRICATION

The actuator is supplied ready-lubricated no further lubrication is required.

- Operating the actuator beyond its stated maximum operating limits of temperature, pressure or recommend operating media, can cause personal safety risks, including death or injury, and/or damage to internal components and to actuator housing.



STANDARD ROTATION:

Air to port A forces the pistons outwards, causing the springs to compress, the pinion turns counterclockwise while air is being exhausted from port B. Loss of air pressure on port A, the stored energy in the springs forces the pistons inwards. The pinion turns clockwise while air is being exhausted from port A.

ACTUATOR ASSEMBLY TO VALVE:

Pneumatic actuators are fitted with a double square "star" pattern drive shaft and a mounting bolt pattern conforming to ISO Standards. This allows the actuator to be fitted to valves in increments of 90°, allowing mounting alignment either inline or across the line of the pipe work, enabling the most efficient use of space without the position affecting the actuators basic operation.

1. Fit the square of the valve stem coupler directly into the square of the actuator.
2. Connect Actuator mounting bracket to the valve ISO mounting pad.

Following should be noted prior to assembly to valves:

- Determine the desired operation of the assembly, Normally closed valve (NC), or Normally open (NO).
- Check that valve and actuator are in the same position (open or closed).
- Check the correct positioning (alignment) of all the elements of the group, valve, coupler, bracket and actuator.
- Use the cross pattern method to ensure an even clamping load between bracket & actuator and bracket & valve.
- Ensure all position indicators are correctly adjusted and show the correct position.

IMPORTANT: When using a spring return actuator for a fail safe operation ensure that, when air or electricity failure occurs, the direction of rotation is correct for your application.

Refer to "*aero*² IOM"

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INSTALLATION

The valve may be installed for flow or vacuum in either direction. Carefully exclude pipe sealants from the valve cavity. When installing, use standard gaskets suitable for the specific service. Tighten bolts or studs evenly.

OPERATION

SVF valves provide tight shut off when used under normal conditions and in accordance with SVF's published pressure/temperature chart. If these valves are used in a partially open (throttled) position seat life may be reduced. SVF valves have ¼ turn operation closing in a clockwise direction. It is possible to see when the valve is open or closed by the position of the stem flats. When the stem flats are in line with the pipeline, the valve is open. Any media which might solidify, crystallize or polymerize should not be allowed to stand in the ball valve cavities unless regular maintenance is provided.

TORQUE REQUIREMENTS

Torque ratings are subject to variations depending on the length of time between cycles and the media in the system. Breakaway torque is that force which must be exerted to cause the ball to begin to open. Operating torque requirements will vary depending on the length of time between cycles, media in the system, line pressure and type of valve seat.

MAINTENANCE

With self-wiping ball/seats, SVF valves have a long, trouble free life, and maintenance is seldom required. But, when necessary, valves may be refurbished, using a small number of components, none of which require machining. SVF valves are designed for easy service and assembly in the field. The following checks will help to extend valve life, or reduce plant problems. SVF ball valves utilize live-loaded stem seals featuring
Belleville washers (disk springs) that maintain constant pressure on the Stem Seal area even under a wide range of pressure and temperature fluctuations. If stem leakage is evident proceed as follows:

STEM LEAKAGE

Examine the disk springs (Belleville washers) for damage. If in good condition tighten the gland nut until disk springs are firmly compressed, then back nut off 1/16th of a turn. If damaged, dismantle the stem down to the gland, fit new disk springs with their outer edges touching, replace and retighten using gland nut. Further maintenance necessitates dismantling of the valve.

LEAKAGE AT BODY JOINT

Check for tightness at the body connector bolts. If loose, tighten body bolts. Excessive force will damage the bolts (See Table A).
If there is still leakage it will be necessary to dismantle the valve and replace the body seals.

IN-LINE LEAKAGE

Check that the valve is fully closed. If leakage occurs while the valve is in the closed position, a seat or ball sealant surface may be damaged and it will be necessary to disassemble the valve.
NOTE: If Stem leakage and leakage at body joint are not cured by the simple means described above, it will be necessary to dismantle the valve. If there is no stem leakage the stem assembly should not be touched.

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REBUILDING

Safely disconnect all electric power and supply lines connected to the actuator and or accessories. Disassemble all the accessories off the actuator (solenoid, limit switch box, etc.)
Before rebuilding, check that all the correct components are available and that they are fit for reassembly. When rebuilding, cleanliness is essential to allow long valve life and provide cost effective maintenance.

CAUTION:

NO BODY SEALS OR STEM SEALS ARE REUSABLE.
Care must be taken to avoid scratching the seats and seals during installation.

NOTE: Caution must be taken with valves that have been in hazardous media. They must be decontaminated before disassembly by relieving the line pressure and flushing the line with the valve in the partially open position. Protective clothing, face shields, gloves, etc., MUST BE USED for this operation.

Tools needed:

- 8mm, 10mm, 11mm, 7/16, 9/16 combination wrench
- Flat screwdriver
- 1/4" Allen Hex Bit
- 3/16" Allen Wrench
- 9/16" Socket
- Torque Wrench

DISASSEMBLY OF VALVE

1. Carefully remove the entire manifold from the system. **Do not attempt to disassemble the manifold while it is installed.**
2. Begin by removing the Actuators (#5), Brackets (#4), and Couplers (#6) by removing the M5 Mounting bolts (#20) from the P4 Body (#2) using an 8mm wrench.
3. If necessary, remove the bracket (#4) from the actuator (#5) by removing the 1/4"-20 Bracket bolts (#18) using an 11 mm wrench.
4. Remove Aluminum End Connectors (#3) using a ¼" Allen Hex Bit to remove the Body Bolts (#15).
5. Remove the P4 Body (#2) from the Manifold Body (#1), Body Seals (#16), and Seats (#8).
6. Make sure the Ball (#7) is in the close position, thus the ball can be taken out easily from the P4 Valve Body (#2).

REMOVING STEM ASSEMBLY

1. Remove the Tab Lock (#17) followed by the Stem Nut (#12) using a 9/16" socket wrench.
2. Remove the Belleville Washers (#14), Gland (#13), Thrust Washer (#10) and Stem Seals (#11).
3. Push the Stem (#9) down into the body cavity to remove, and take off Thrust Washer (#10).
4. Verify that Stem Seals and upper Thrust Washer have been removed from body cavity.

INSPECTION

1. The Ball and the surfaces against which the Seats make contact should be free of pit marks and scratches. Light marring from the action of the Ball against the Seats is normal and will not affect the operation of the valve.
2. The Stem and Body surfaces, which the Thrust Washers and Stem Seal make contact with, should be free of pit marks and scratches.

REFER TO "*aero*² – IOM" FOR DISASSEMBLY OF THE ACTUATOR, INSPECTION AND MAINTENANCE, ASSEMBLY OF THE ACTUATOR, ENDSTOP ADJUSTMENTS & PRESSURE TESTING

REASSEMBLY

1. Apply an adequate amount of lubricant, compatible with the media being handled, around the Ball (#7) and Seats (#8).
2. For stem reassembly, disassembly procedure should be followed in reverse order.
3. When the stem assembly is complete, tighten Stem Nut (#12) according to the values in Table A using a 9/16" socket wrench.
4. With the Stem (#9) in the closed position, insert the Ball (#7) into P4 Body (#2).
5. Make sure Body Seal (#16) rests squarely on center seal surface of the P4 Body (#2)
6. Insert Seats (#8) in P4 Body (#2). Make sure seats rest firmly on back surface of each recess.
7. Merge the P4 Bodies (#2) with the Manifold Body (#1).
8. Merge the Aluminum End Connectors (#3) with the P4 Bodies (#2)
9. Insert and tighten Body Bolts (#15) diagonally, in accordance to the bolt tightening sequence shown on the right. Use a 1/4" Allen Hex Bit with torque wrench to torque appropriately.
10. In the final assembly step, ensure that Body Bolts (#15) are tightened to torque values according to Table A.
11. If Bracket (#4) was removed from the actuator (#5), insert the Couplers (#6) onto the Actuator to properly align the bracket before tightening 1/4"-20 Bracket bolts (#18) with the Lock Washers (#19) using an 11 mm wrench.
12. Once the bracket fasteners are tightened, remove the couplers and place onto the Stem (#9) of the P4 valve bodies.
13. Place and tighten the Actuator (#5) and Bracket (#4) assemblies onto the P4 Bodies (#2) using the M5 Mounting bolts (#20) with the Lock Washers (#19). Use an 8 mm wrench to tighten.

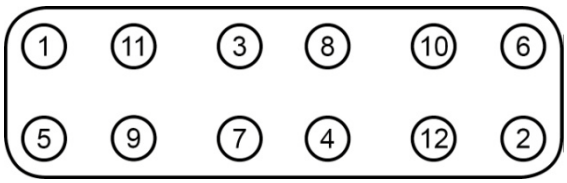
TORQUE SPECIFICATIONS

Certain precautions need to be followed when tightening bolts down to their corresponding torques to help prevent bolt galling. There are two passes each bolt has to undergo during the process, first pass and the final pass. Once every bolt has met the first pass requirement, the final pass can be initiated. When tightening down bolts it is necessary to follow the corresponding bolt pattern shown below.

Table A: Torque Requirements (in-lbs)

Series P4 Valve Size	Body Bolts		Stem Nuts
	First Pass	Final Pass	
1/2"	96	160	35

Bolt Tightening Sequence – Manifold End
See Page 7, Item #3



REPAIR KITS

Repair Kits are available from SVF Flow Controls, Inc. Table B below shows what the kit consists of. When repairing a valve use only SVF Flow Controls, Inc. authorized spare parts including; bolts and nuts, etc. In addition to maintenance kits, spare parts are available from SVF Flow Controls, Inc. They are: balls, stems and glands. Components from a different valve series should not be used with the repair of any other valve. If any of the manifold components are altered in any way, no liability can be accepted by SVF Flow Controls, Inc.

Table B: aero2 Actuator Repair Kit

	ITEM/PART	QTY
Actuator Repair Kit	Pinion Snap Ring	1
	Thrust Washer	1
	Thrust Bearing	1
	Piston Guide	2
	O-Ring (Pinion Top)	1
	Bearing (Pinion Top)	1
	Inside Washer	1
	Bearing (Pinion Bottom)	1
	O-Ring (Pinion Bottom)	1
	Bearing (Piston)	2
	O-Ring (Piston)	2
	Plug	2
	O-Ring (Adjust Screw)	2
	O-Ring (End Cap)	2

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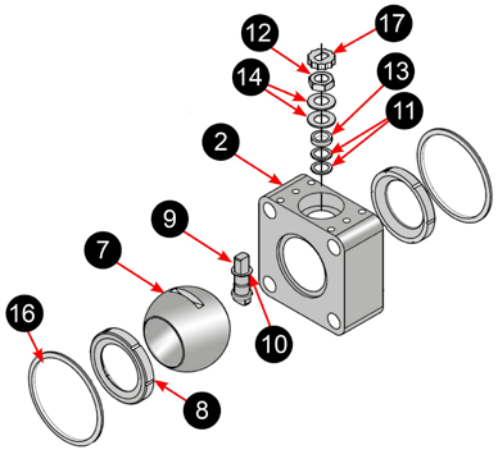
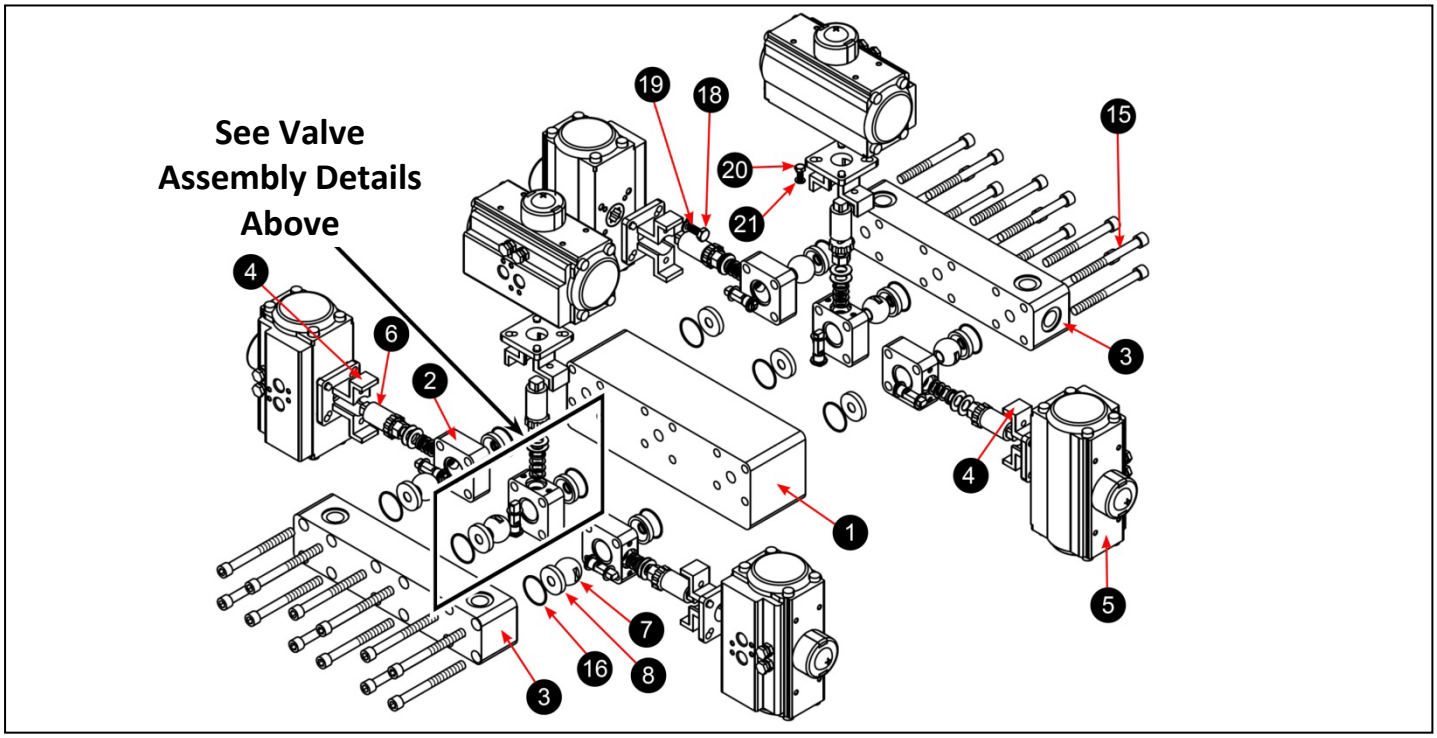
ITEM #	PART NAME	MATERIALS	QTY
1	Manifold Body	Stainless Steel	1
2	P4 Body	ASTM A479 SS316L	6
3	Manifold Ends	Anodized Aluminum	2
4	Bracket	304 Stainless Steel	6
5	Actuator	Anodized Aluminum	6
6	Coupler	Stainless Steel	6
7	Ball	ASTM A351 CF8M	6
8	Seat	Delrin	12
9	Stem	SS 17-4 ph (ASTM A564 630)	6
10	Thrust Washer	Delrin	6
11	Stem Seals	SupraLon	12
12	Stem Nut	Stainless Steel	6
13	Gland	Stainless Steel	6
14	Belleville Washers	17-4 pH Stainless Steel	12
15	Body Bolts	18-8 Stainless Steel, Passivated	24
16	Body Seal	Buna "N"	12
17	Tab Lock	304 Stainless Steel	6
18	Bracket Bolts	1/4"-20 x 5/8 Stainless Steel	24
19	Lock Washer	1/4"- Stainless Steel	24
20	Mounting Bolts	M5 x 10 Stainless Steel	12
21	Lock Washer	M5 Stainless Steel	12

Valve Assembly Details





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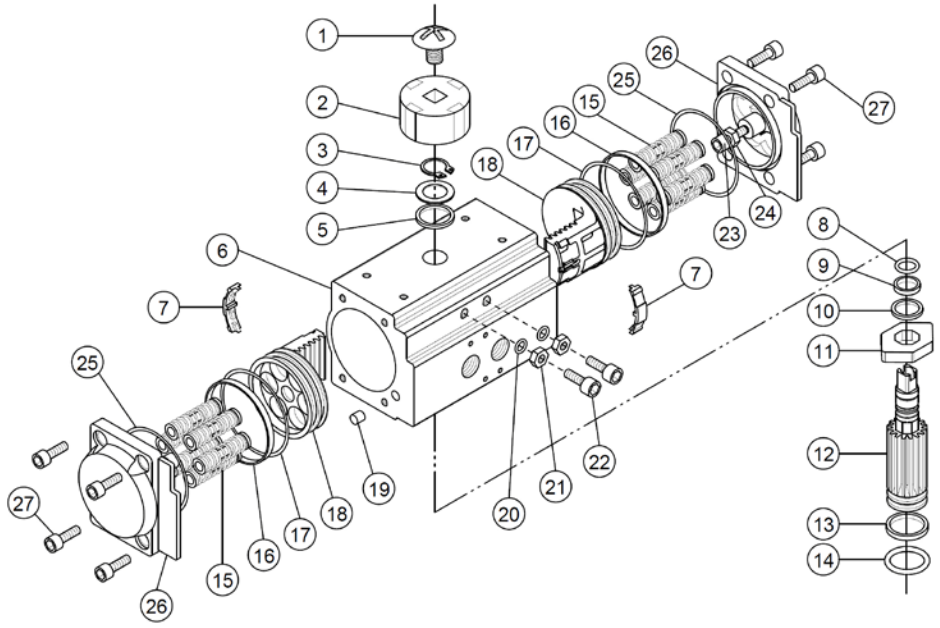

aero2 ACTUATOR - MATERIALS OF CONSTRUCTION		
ITEM	**DESCRIPTION**	**MATERIALS SPECIFICATIONS**
1	Indicator Cap Screw	Plastic/Stainless Steel
2	Position Indicator	Plastic (ABS)
3	Pinion Snap Ring	Stainless Steel 300 Series
4	Thrust Washer	Stainless Steel 300 Series
5	Thrust Bearing	Polyoxymethylene (Delrin®)
6	Body	Extruded Aluminum Alloy
7	Piston Guide	Polyoxymethylene (Delrin®)
8	O-Ring (Pinion Top)	Buna "N" (standard), Viton®
9	Bearing (Pinion Top)	Polyoxymethylene (Delrin®)
10	Inside Washer	Polyoxymethylene (Delrin®)
11	Stroke Adjustment Stop	Alloy Steel
12	Pinion (Drive Shaft)	Nickel Plated Alloy Steel
13	Bearing (Pinion Bottom)	Polyoxymethylene (Delrin®)
14	O-Ring (Pinion Bottom)	Buna "N" (standard), Viton®
15	Spring (Cartridge)	Spring Steel (Corrosion Resistant)
16	Bearing (Piston)	Polyoxymethylene (Delrin®)
17	O-Ring (Piston)	Buna "N" (standard), Viton®
18	Piston	Aluminum
19	Plug	NBR
20	O-Ring (Adjust Screw)	Buna "N" (standard), Viton®
21	Stop Nut (Adjust Screw)	Stainless Steel 300 Series
22	Adjust Screw	Stainless Steel 300 Series
23	Stop Screw	Stainless Steel 300 Series
24	Nut (Stop Screw)	Stainless Steel 300 Series
25	O-Ring (End Cap)	Buna "N" (standard), Viton®
26	End Cap	Aluminum
27	End Cap Screw	Stainless Steel 300 Series