Amflow®

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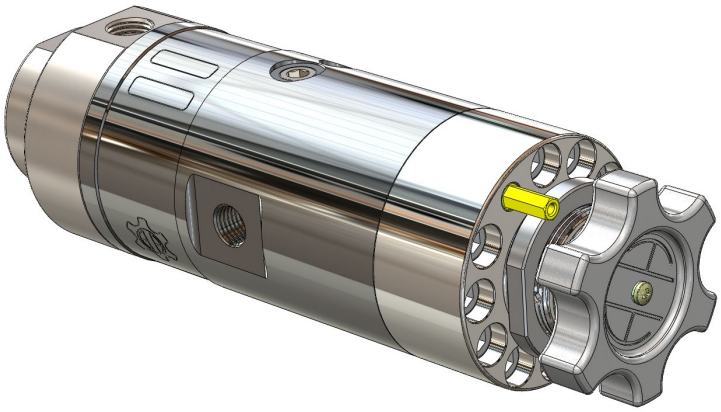
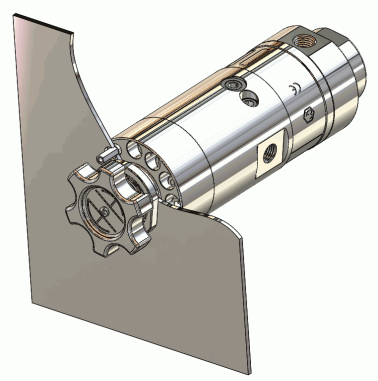
INSTALLATION, OPERATION & MAINTENANCE MANUAL

AMFLOW® AM7E
FLOW CONTROL VALVE
Dual Jet Feature





Part Number: 00000880-0501

Standards and Patents:

Material traceability certificates, post processes, and As-Built documents shall be maintained on file with ***Amflow®*** for a period of not less than TEN years.

ATEX DIRECTIVE 2014/34/EU
CE 0891 Ex II 2G Ex h T6
PED 2014/68 EU SEP CATEGORY II MODULES A, D1 & E1
US PATENTS 5,427,139 * 5,494,070 * 6,189,564, B1 * EU PATENT 1110132

Amflow® reserves the right to amend or change specifications without prior notice

TABLE OF CONTENTS

Explanation of Graphic Symbols

DANGER AND/OR WARNING
The exclamation point within an equilateral triangle surrounded by red is intended to alert the user to the presence of important operating and maintenance instructions that may cause personal injury or harm to the system.

CAUTION AND/OR IMPORTANT

The exclamation point within an equilateral triangle that is solid yellow with an exclamation point is intended to alert the user

SECTION 1: SAFETY INFORMATION

SAFETY INFORMATION

Usage

- Use only within range of pressure and temperature conditions indicated on product data sheet.
- Do not use with chemicals which are incompatible with 316SS or with seal materials.
- Equipment is certified hazardous for Group 2 Category II.
- Equipment should not be used in systems requiring a higher level of certification.

Faults and Damage

The safety features and integrity may be compromised by any of the following:

- External damage to body
- Exposure to pressure loads in excess of maximum rated pressure
- Maintenance performed by improperly trained personnel

Protection from Pressure Releases

- To avoid injury due to release of high pressure, use only adaptors and fittings rated to withstand appropriate pressure.
- Confirm that all adaptors and fittings are securely connected.
- To avoid a violent release of pressure, slowly bleed off pressure before attaching or removing from pressure line.

Avoid Mechanical Damage

- Caution must be observed to not damage any threaded components during maintenance procedure. Such damage could compromise the pressure safety factor of the AM7E Flow Control Valve.
- When replacing seals, care must be used to avoid damage to sealing surfaces. Damage could lead to a sudden release of pressure during operation.

SECTION 2: TECHNICAL INFORMATION

2.00 INTRODUCTION

This Manual contains installation, operation, and maintenance instructions for the ***Amflow®*** AM7E Flow Control Valve.

2.01 PRODUCT DESCRIPTION

The ***Amflow®*** AM7E Flow Control Valve is an adjustable device for flow regulation from 0.05 to 140 LPH. It is easily adaptable for automation.

The ***Amflow®*** AM7E Flow Control Valve is designed to be mounted in a stainless-steel panel with a minimum thickness of 2 mm. The mounting hole should be from 34 mm to 38 mm in diameter.

2.02 PURGE PORT

Incorporated into the ***Amflow®*** AM7E Flow Control Valve is a purge port that allows the user to direct a high flow stream of chemical across the fixed orifice to flush any chemical residue that might accumulate over time. This feature reduces the necessity of opening the valve and cleaning the jet manually. The purge port is located 180-degrees from the inlet port. The inlet and outlet ports are at a 90-degree orientation to each other. The body section that contains the outlet port can be rotated 180-degrees to change the relative port orientations to facilitate installation requirements.

2.03 DESIGN FEATURES

- Pressure independent on the downstream side
- Pressure Vessel Materials of Construction: Standard is 316/316L Stainless Steel & Titanium (6AL-6V-2Sn)
- External Materials of Construction: Standard is 316/316L Stainless Steel & Titanium (6AL-6V-2Sn)
- Wetted Materials of Construction: 316/316L & Titanium (6AL-4V & 6AL-6V-2Sn)
- Operating Pressure: 20 bar (300 psi) to 690 bar (10,000 psi)
- **Inlet pressure must be stable (+/- 3%) for proper valve operation.**
- Pressure drop across the AM7E valve is 7 bar (100 PSI)
- Operating Temperature: -15˚C (5˚F) to 232˚C (450˚F)
- Standard Inlet & Outlet Ports: 1/4” FBSPP or FNPT
- Purge Port: 1/4” FBSPP or FNPT
- Turndown Ratio: Up To 144:1
- Weight: 3.9 Kg (8.6 lbs.)
- Ceramic & Titanium pins & seats for wear resistance
- Standard Seals are FFKM (Perfluorolastomer) & PTFE seals for high chemical resistance.
- Low maintenance
- Very low torque is required for flow rate adjustment. Easy hand operation of flow adjustment knob.

2.04 FILTRATION RECOMMENDATION

Filtration upstream of the AM7E Flow Control Valve is recommended using ***Amflow®*** Simplex filter products.

(**Valves that are damaged or clogged due to lack of proper filtration are not covered under the warranty**)

2.05 PANEL MOUNT: Panel Cut-out Dimensions

Panel mounting requires two holes:

- one 35 mm hole to mount main body of valve
- one 8 mm hole to have access to the Low/High Flow switch.

The switch radial location is a function of the installation requirements. If the "INLET" port of valve is positioned for the tubing connection to enter from above, then the size and orientation for hole cutouts should be made as indicated in the diagram below. If the tubing connection is from below then the 8 mm hole would be located on the right side of the 35 mm hole.

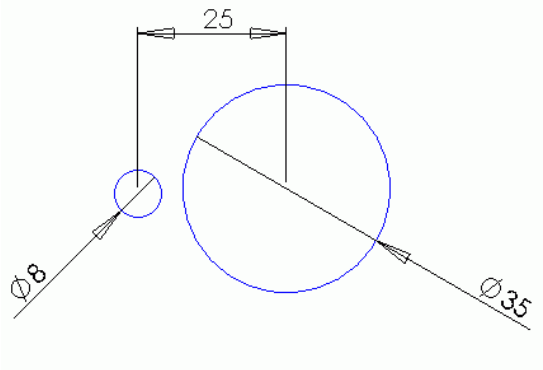
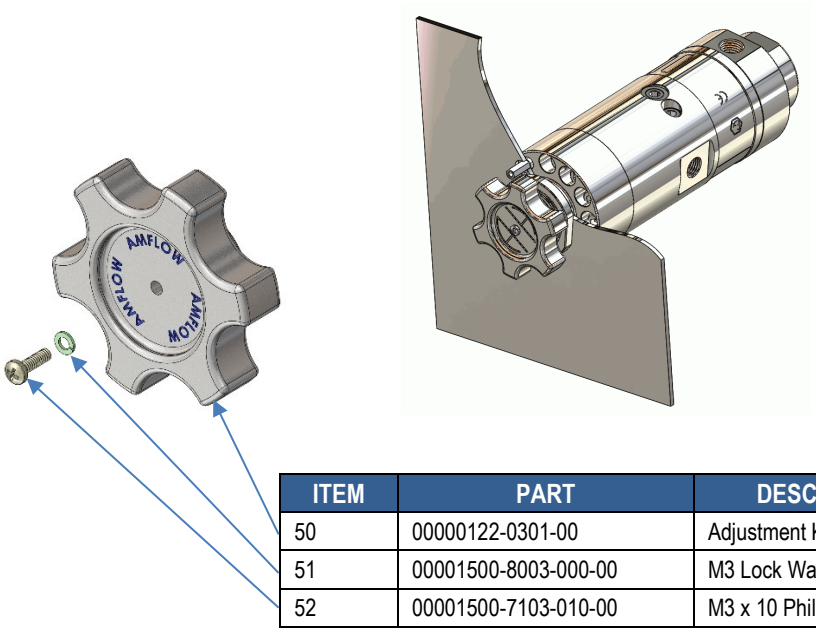


DIAGRAM 1: AM7E Mounting Panel Opening

CUT-AWAY VIEW: Panel Mount



ITEM	PART	DESCRIPTION	QTY
50	00000122-0301-00	Adjustment Knob	1
51	00001500-8003-000-00	M3 Lock Washer	1
52	00001500-7103-010-00	M3 x 10 Phillips Pan Head	1

2.06 VALVE INSTALLATION

Step 1

- Place AM7E valve into prepared hole on mounting panel.

Step 2

- Install M33 Panel Lock (Item 49) and ADJUSTMENT KNOB (Item 50).
- Adjustment Knob is attached using 1 ea. M3 Lock washer (Item 51) & 1 ea. M3 x 10 Phillips Panhead Screw (Item 52). This hardware is supplied with each valve.

2.07 INSTALLATION PRECAUTIONS

Good system design is critical to the optimum operation of the ***Amflow®*** Valves. At a minimum, the design should include:

- Isolation valves located near inlet and outlet ports of the ***Amflow®*** Valve. (The outlet isolation valve is normally a three-way valve that can be incorporated into the calibration loop.)

⚠ **IMPORTANT:** The importance of proper media filtering cannot be overstated. It is **strongly** recommended that filters be placed on both the suction side and the pressure side of pump. It is not unusual to have individual filters inline for each valve. The recommended micron size of the high-pressure filter is somewhat dependent on the specific configuration of any given ***Amflow®*** Valve. However, a 50-micron filter size is generally adequate for most applications.

- The system design should take into consideration that materials which come into contact with the injected media should not contribute to foreign matter entering into the system.
- A check valve located on the outlet side of each Valve is strongly recommended. There are a number of reasons for this:
  - Safety considerations.
  - To prevent backflow through the Valve.

This backflow can occur if there is a pump failure or some other system failure that would cause a loss of positive pressure across the valve. The valve is designed to accommodate some backflow conditions; ⚠ however, piston seal damage can occur if backflow is excessive. The seal is designed to fail under certain conditions in order to prevent damage that is more serious to the valve.

2.08 START-UP PROCEDURE

PREFERRED METHOD

Amflow® FLOW CONTROL VALVE INITIAL OUT OF BOX START-UP PROCEDURE.

1. After installing the ***Amflow***® valve, open the valve by turning the adjustment knob counterclockwise to a soft stop. This will open the valve to its maximum flow.

2. Close the inlet isolation ball valve.

3. Make sure the outlet isolation valve is open to allow flow through the valve.

4. Start the pump and adjust the pump or pressure relief valve to a low inlet pressure.
   I.E. 14 bar (200 PSI).

5. Open the inlet isolation ball valve to allow the valve to slowly fill with chemical.
   NOTE: The goal is to have the low-pressure chemical push the air out of the valve so that the valve is filled with fluid only, and no air remains when you increase the pump to operating pressures.

6. After a couple of minutes of running the valve at a low pressure, it should be cleared of air. At this time, the pump pressure can be increased to operating pressures.

7. The valve can now be adjusted for the desired flow rate.

2.09 VALVE OPERATION

The ***Amflow***® AM7E Valve achieves its high turndown ratio by means of a two-stage jet configuration. By turning the jet switch fully open (counterclockwise) the high flow range is selected. By turning the jet switch fully closed (clockwise) the low flow range is selected.

The switch off point for the low flow to high flow jet is 4.50 LPH.

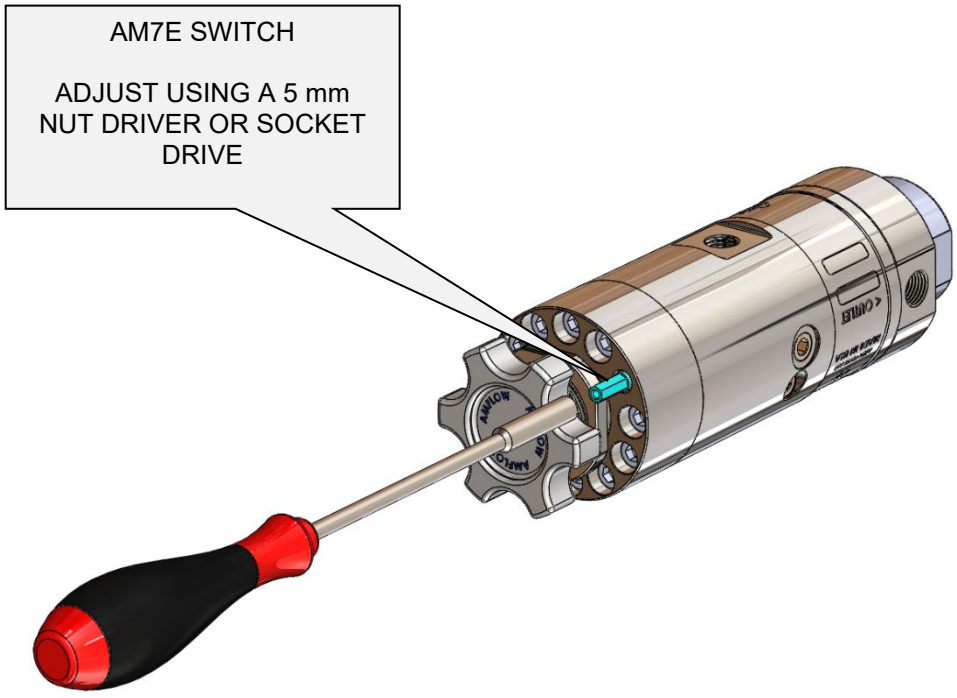
For flow rates 4.50 LPH down to 0.09 the External jet should be fully closed. Turned all the way in clockwise

For flow rates 4.5 LPH and higher the External jet should be fully open. Turned all the way out counterclockwise.

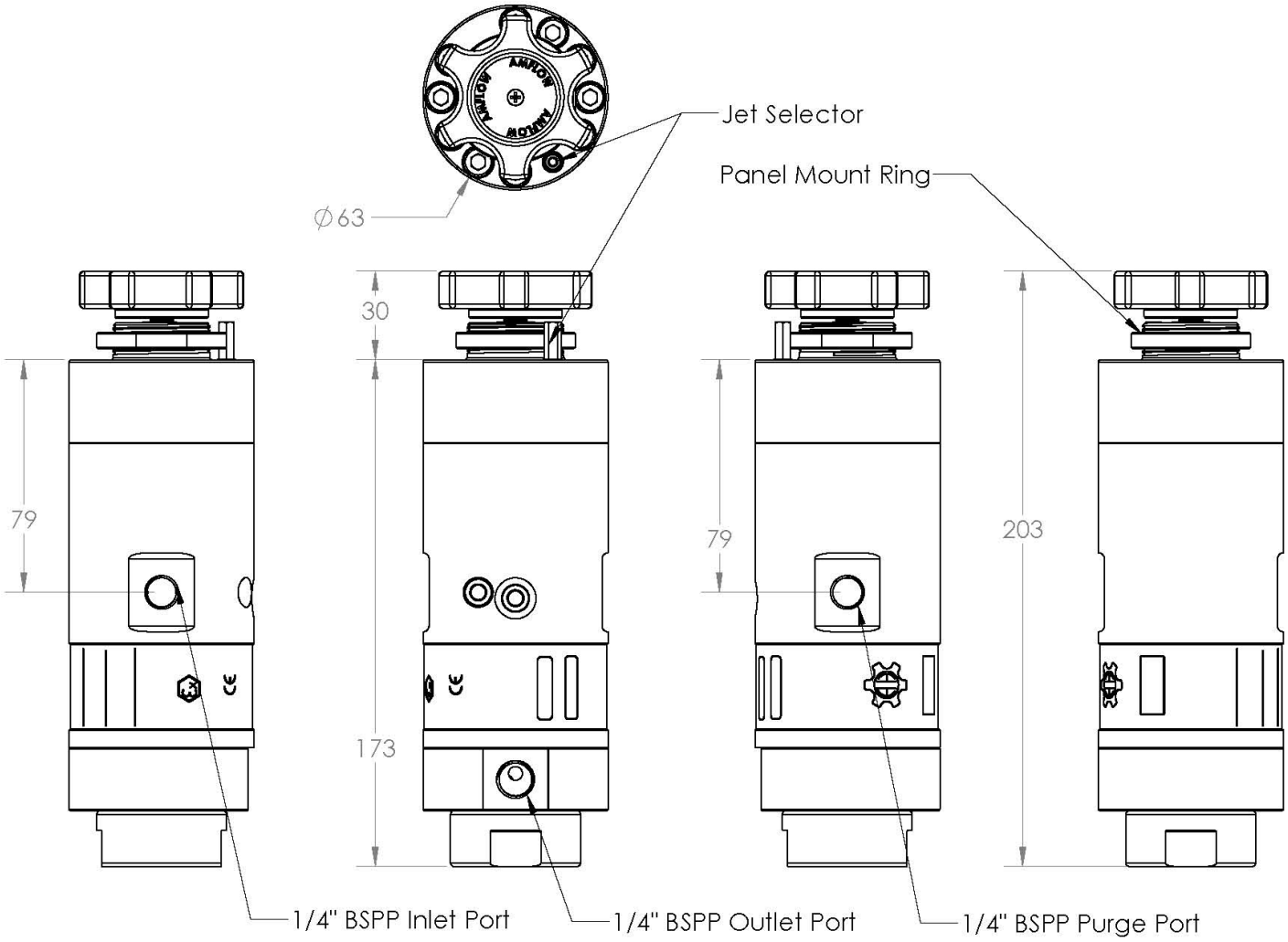
2.10 EXTERNAL JET CONTROL

There are two external jet positions available on the AM7E valve:

- Position one is fully closed. For flow rates 4.50 LPH down to 0.09 the External jet should be fully closed. Turned all the way in clockwise.
- The switch off point for the low flow to high flow jet is 4.50 LPH.
- Position two is fully open. For flow rates 4.5 LPH and higher the External jet should be fully open. Turned all the way out counterclockwise.

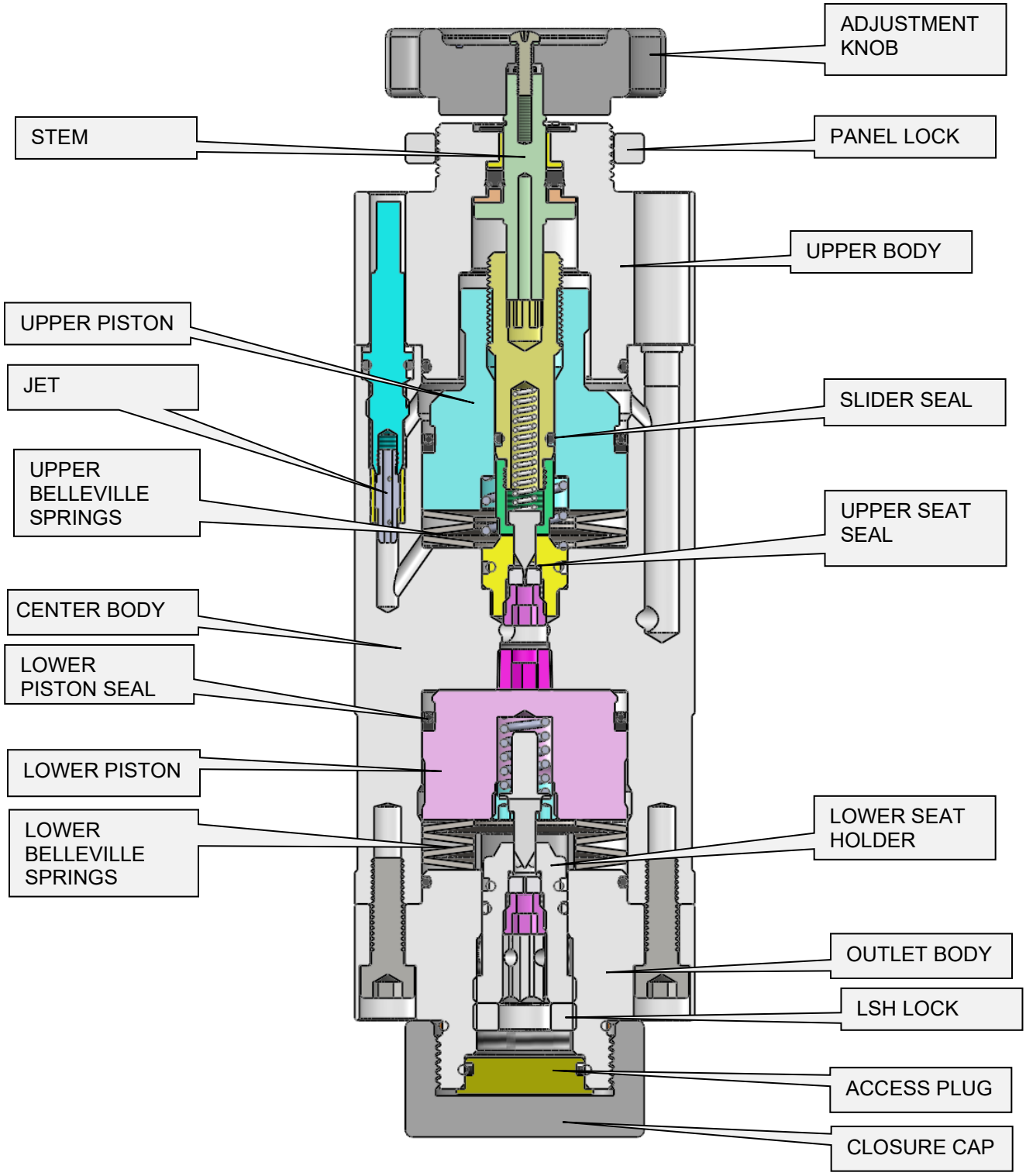


2.11 GA DRAWING

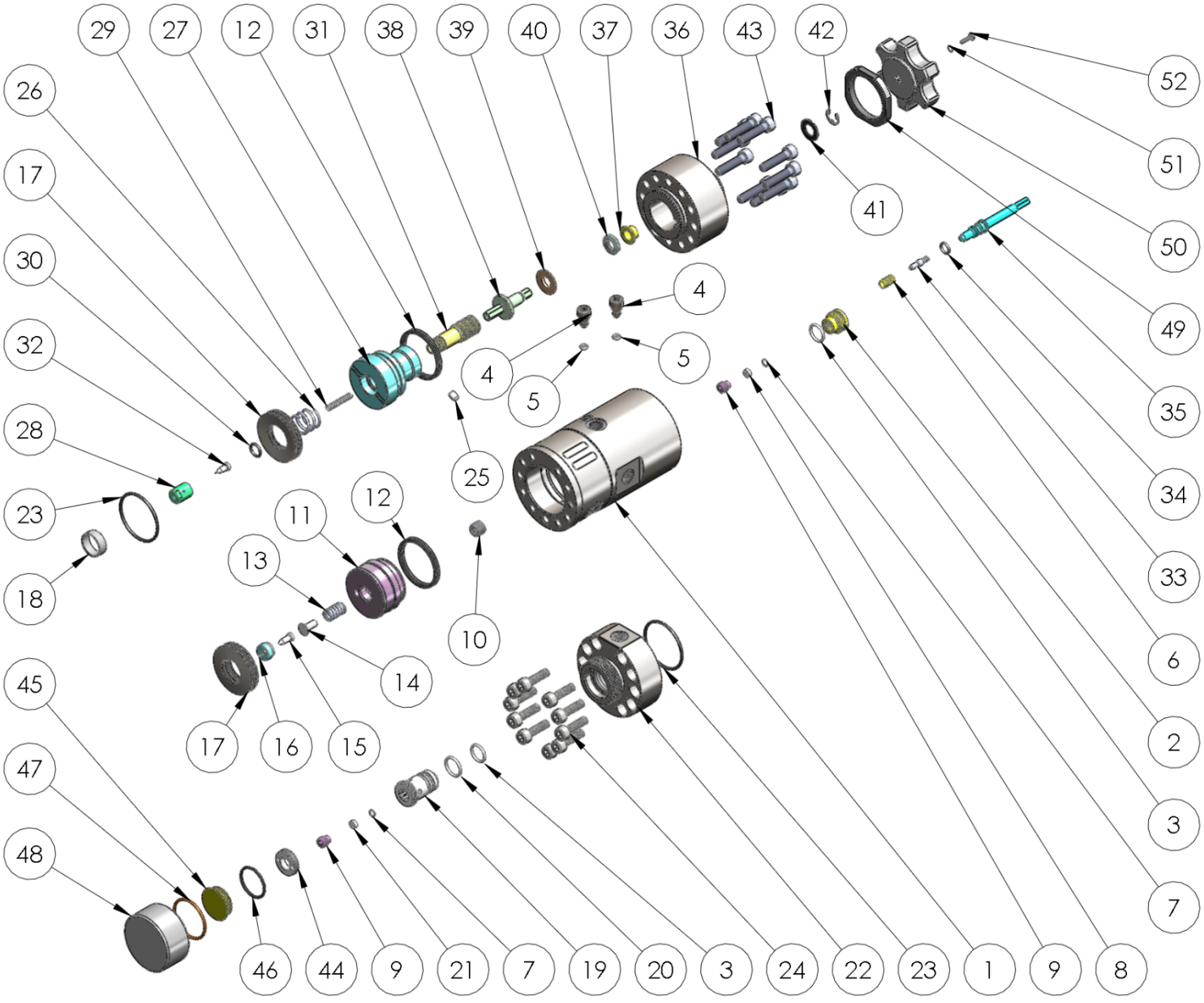


Your Inlet & Outlet ports may differ from those shown here. Please reference the As-Built Datasheet supplied with your valve, for your exact ports.

2.12 CROSS SECTIONAL VIEW: Full Valve Assembly



2.13 EXPLODED VIEW



2.14 BILL OF MATERIALS

ITEM #	PART #	DESCRIPTION	QTY
1	00000887-0301	Center Body	1
2	00000083-0301-002	Seat Holder Upper	1
3	00001555-2013-003	O-Ring, 2-013, PTFE	2
4	00000118-0301-000	Port Access Plug	2
5	00001555-2006-003	O-Ring, 2-006, PTFE	2
6	00000886-0301-000	Jet Seal	1
7	00000092-0301-002	Seal, Seat	2
8	00000093-0301	Seat, Upper	1
9	00000094-0301-000	Seat Retainer	2
10	00000030-0301-000	Plug, NPT - 1/8	1
11	00000140-0301-000	Lower Piston	1
12	00000146-0301-002	Cup Seal, Piston	2
13	00001997-0301-000	Spring, Lower Piston	1
14	00001923-0301-000	Spacer, Lower Piston	1
15	00000054-0301-001	Lower Pin	1
16	00000549-0301-000	Pin Enclosure	1
17	00001600-1500-045-00-0755	Spring, Belleville	7
18	00002091-0301-000	Spacer, Lower Piston	1
19	00000142-0301-000	Lower Seat Holder	1
20	00001555-2014-003	O-Ring, 2-014, PTFE	1
21	00000093-0301	Seat, Lower	1
22	00000125-0301	Outlet Body	1
23	00001555-2028-103	O-Ring, 2-028, FFKM	2
24	00001500-7006-020-00	M6 x 20 SHCS	10
25	00000135-0301-000	Anti-rotate Pin	1
26	00000149-0301-000	Coil Spring. Piston	1
27	00000132-0301-000	Upper Piston	1
28	00000137-0301-002	Retainer, Pin	1
29	00000138-0301-000	Spring, Pin Upper	1
30	00001555-2011-103	O-Ring, 2-011, FFKM	1
31	00000136-0301-000	Upper Slider	1
32	00000054-0301	Upper Pin	1
33	00000885-0301-000	Jet Housing	1
34	00001555-2010-103	O-Ring, 2-010, FFKM	1
35	00001065-0301-002	Switch	1
36	00001074-0301-000	Upper Body	1
37	00001076-0301-000	Stem Bushing	1
38	00001075-0301-002	Stem	1
39	00000005-0301-000	Rub Washer, Stem	1
40	00000009-0301-000	Cup Seal, Stem	1
41	00000272-0301-000	Washer, Clip	1

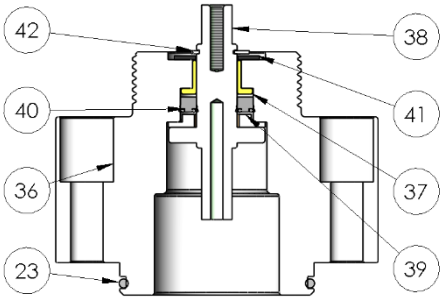
Line items 1, 8, 21, 22 & 32 can vary in part number configurations.

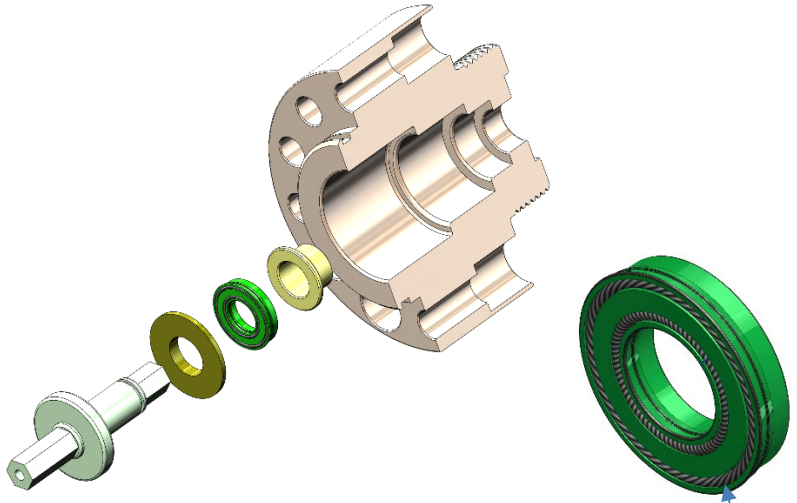
Please reference the As-Built datasheet that was supplied with your valve for the exact part numbers used in your valve.

ITEM #	PART #	DESCRIPTION	QTY
42	00000273-0301-000	Stem clip	1
43	00001500-7006-025-00	M6 x 25mm SHCS	10
44	00000153-0301-000	LSH Lock	1
45	00000144-0301-000	Plug Access	1
46	00001555-2018-103	O-Ring, 2-018, FFKM	1
47	00001555-2024-000	O-Ring, 2-024, VB75	1
48	00000145-0301-000	Cap Closure	1
49	00000015-0301-000	Panel Lock	1
50	00000122-0301-000	Knob	1
51	00001500-8003-000-00	M3 Lock Washer	1
52	00001500-7103-010-00	M3 x 10 Pan head	1

SECTION 3: MAINTENANCE & SERVICE

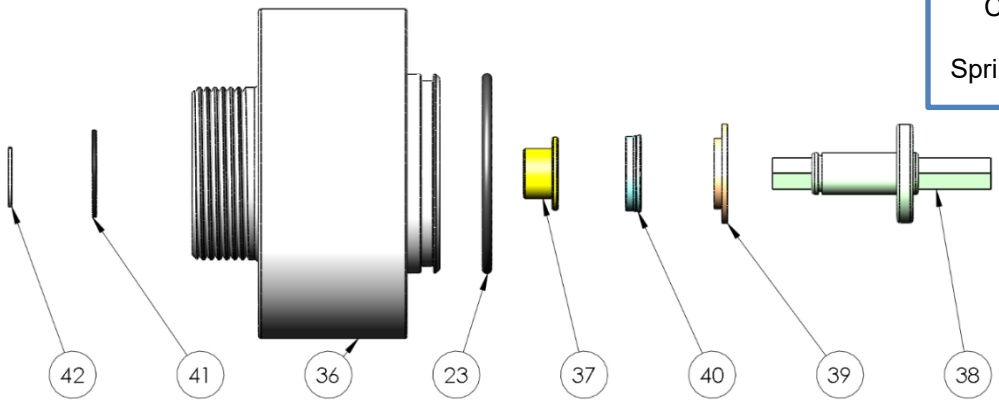
3.00 UPPER BODY – SUB-ASSEMBLY – Cross Sectional & Cut Away View:





Cup Seal orientation when installing. Springs are face up & out.

3.01 UPPER BODY – SUB-ASSEMBLY – Exploded View:

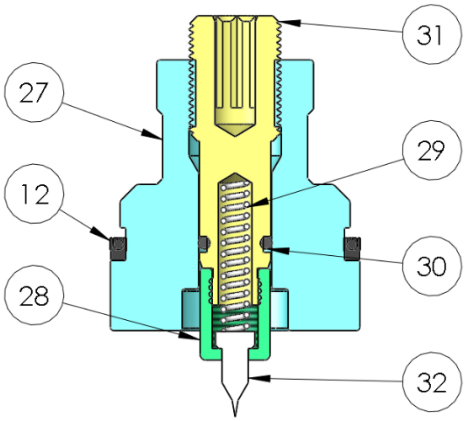


3.02 UPPER BODY – SUB-ASSEMBLY – BOM:

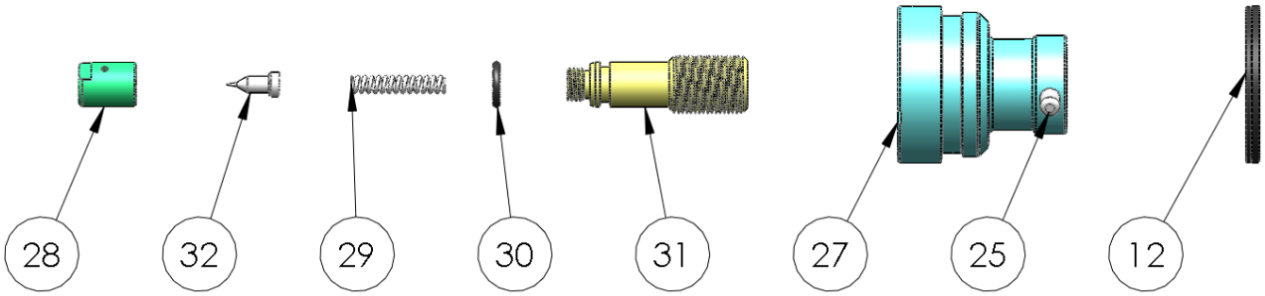
ITEM	PART	DESCRIPTION	QTY
42	00000273-0301-000	Stem Clip	1
41	00000272-0301-000	Washer, Clip	1
36	00001074-0301-000	Upper Body	1
23	00001555-2028-103	O-Ring, 2-028, FFKM	1
37	00001076-0301-000	Stem Bushing	1
40	00000009-0301-000	Cup Seal, Stem	1
39	00000005-0301-000	Rub Washer, Stem	1
38	00001075-0301-002	Stem	1

3.03 UPPER PISTON – SUB-ASSEMBLY – Cross Sectional View

Cup Seal orientation.
When installing.
Spring is face up & out.



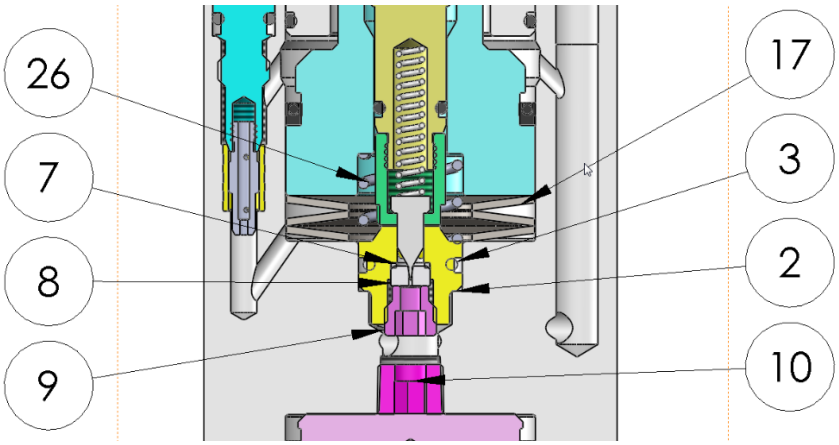
3.04 UPPER PISTON – SUB-ASSEMBLY – Exploded View



3.05 UPPER PISTON – SUB-ASSEMBLY – BOM:

ITEM	PART	DESCRIPTION	QTY
28	00000137-0301-002	Retainer, Pin	1
32	00000054-0301	Upper Pin	1
29	00000138-0301-000	Spring, Pin Upper	1
30	00001555-2011-103	O-Ring, 2-011, FFKM	1
31	00000136-0301-000	Upper Slider	1
27	00000132-0301-000	Upper Piston	1
25	00000135-0301-000	Anti-Rotate Pin	1
12	00000146-0301-002	Cup Seal, Piston	1

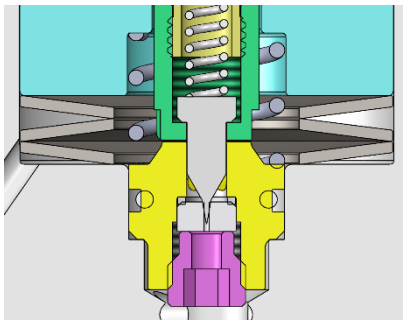
3.06 CENTER BODY – Cross Sectional View



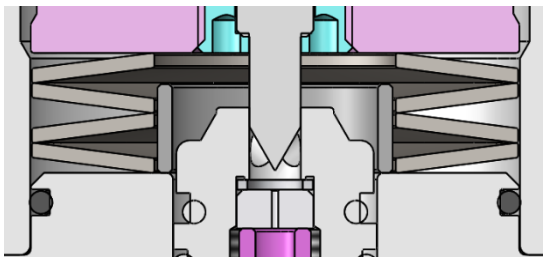
3.07 CENTER BODY – BOM:

ITEM	PART	DESCRIPTION	QTY
26	00000149-0301-000	Coil Spring, Piston	1
7	00000092-0301-002	Seal Seat	1
8	00000093-0301	Seat	1
9	00000094-0301-001	Seat Retainer	1
17	00001600-1500-045-00-0755	Spring, Belleville	3
3	00001555-2013-003	O-Ring, 2013, PTFE	1
2	00000083-0301-002	Seat Holder Upper	1
10	00000030-0301-000	Plug, NPT – 1/8”	1

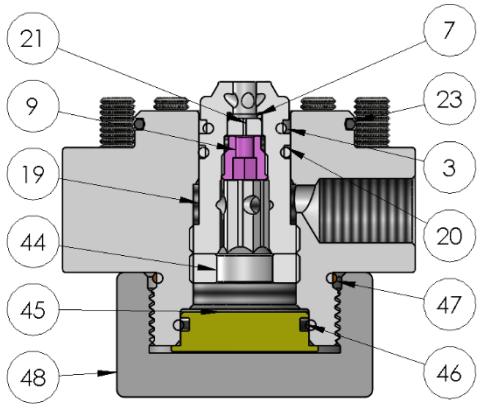
3.08 UPPER Belleville Springs Configuration



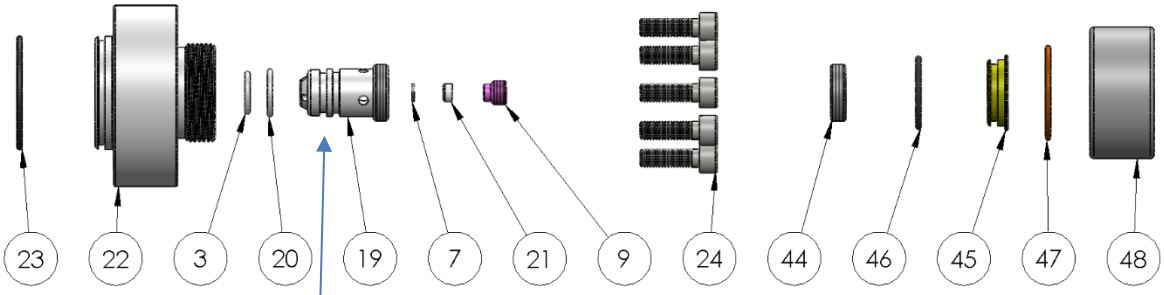
3.09 LOWER Belleville Springs Configuration



3.10 OUTLET BODY – SUB-ASSEMBLY – Cross Sectional View



3.11 OUTLET BODY – SUB-ASSEMBLY – Exploded View



WARNING

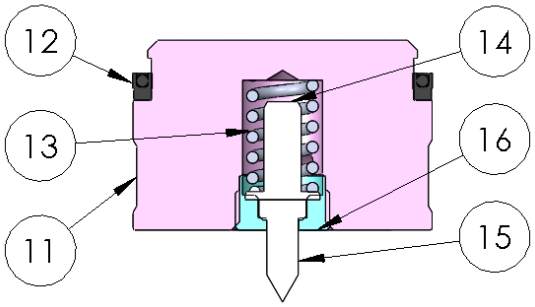
REMOVAL OF LOWER SEAT HOLDER FROM VALVE WILL CAUSE LOSS OF CALIBRATION AND THE VALVE WILL NOT FUNCTION PROPERLY UNLESS RE-CALIBRATED BY FACTORY TRAINED PERSONNEL.

Lower seat removal by non-factory trained personnel will void any implied or stated warranty.

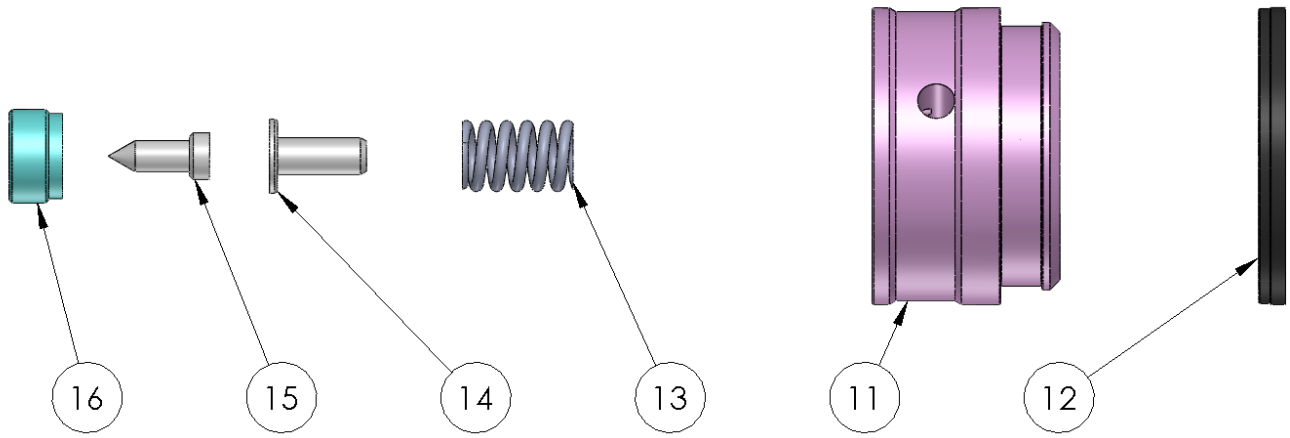
3.12 OUTLET BODY – SUB-ASSEMBLY – BOM:

ITEM	PART	DESCRIPTION	QTY
23	00001555-2028-103	O-Ring, 2-028, FFKM	1
22	00000125-0301	Outlet Body	1
3	00001555-2013-003	O-Ring, 2-013, PTFE	1
20	00001555-2014-003	O-Ring, 2-014, PTFE	1
19	00000142-0301-000	Lower Seat Holder	1
7	00000092-0301-002	Seal, Seat	1
21	00000093-0301	Seat	1
9	00000094-0301-001	Seat Retainer	1
24	00001500-7006-020-00	M6 x 20 SHCS	10
44	00000153-0301-000	LSH Lock	1
46	00001555-2018-103	O-Ring, 2-018, FFKM	1
45	00000144-0301-000	Plug Access	1
47	00001555-2024-000	O-Ring, 2-024, Viton	1
48	00000145-0301-000	Cap Closure	1

3.13 LOWER PISTON – SUB-ASSEMBLY – Cross Sectional View



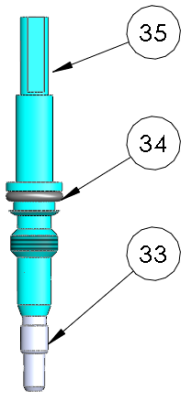
3.14 LOWER PISTON – SUB-ASSEMBLY – Exploded View



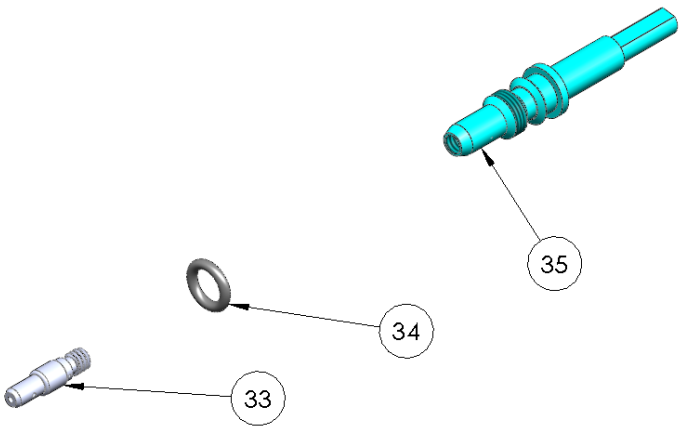
3.15 LOWER PISTON- SUB ASSEMBLY – BOM:

ITEM	PART	DESCRIPTION	QTY
16	00000549-0301-000	Pin Enclosure	1
15	00000054-0301-001	Lower Pin	1
14	00001923-0301-000	Spacer, Lower Piston	1
13	00001997-0301-000	Spring, Lower Piston	1
11	00000140-0301-000	Lower Piston	1
12	00000146-0301-002	Cup Seal, Piston	1

3.16 JET – SUB ASSEMBLY



3.17 JET – SUB-ASSEMBLY – Exploded View



3.18 JET – SUB-ASSEMBLY – BOM:

ITEM	PART	DESCRIPTION	QTY
33	00000885-0301-000	Jet Housing	1
34	00001555-2010-103	Switch O-Ring	1
35	00001065-0301-002	Switch	1

SECTION 4: TROUBLESHOOTING

There are a variety of reasons that can cause ***Amflow®*** Valves to not perform as expected. Listed below are troubleshooting solutions:

a. Springs installed incorrectly
b. Defective Upper Piston Seal
c. Defective Lower Piston Seal
d. Defective Slider Seal
e. Plugged Orifice
f. Clogged Filter
g. Isolation Valve in wrong position
h. Check Valve failure
i. Viscosity of Media too high
j. Defective Upper Seat Seal
k. Differential Pressure across valve set improperly
l. Trapped air
m. Upper Pin broken
n. Lower Pin broken

PROBLEM	PROBABLE CAUSE
No flow though valve	e, f, g, h, m
Flow rate will not stabilize	a, b, c, d, j, k, l, n
Adjustment Knob feels “rough” when turned	j
Maximum flow rate not achievable	a, e, f, i
Slow drift downwards in flow rate	b, d, l, n

NO FLOW -OR- REDUCED FLOW FROM VALVE	CORRECTIVE ACTION
DEBRIS IN JET OR JET SWITCH	➢ Remove SWITCHABLE JET ASSEMBLY. • Check for visual debris. ➢ Clear any visual debris. • Use compressed air to clear any debris in JET ASSEMBLY. ➢ It may be necessary to remove Jet (Item 33) from Jet SWITCH (Item 35) to clear debris. ➢ If problem persists, • Replace JET SWITCH (Item 35)
BROKEN SLIDER PIN	Replace Upper Pin (Item 32)
BROKEN LOWER PISTON PIN	Replace Lower Pin (Item 15)
DEBRIS BLOCKING UPPER SEAT	To clear **UPPER SEAT** debris or physically remove debris, ➢ use **PURGE PORT** to clear.
DEBRIS BLOCKING LOWER SEAT	Physically remove debris.
***NOTE:** A complete dis-assembly of VALVE and flushing out of all passageways may be required to clear debris.	

TROUBLESHOOTING

FLOW RATE FLUCTUATION	CORRECTIVE ACTION
CHIPPED LOWER SEAT	Replace LOWER SEAT and LOWER SEAT SEAL: LOWER SEAT (Item 21) SEAT SEAL (Item 7)
CHIPPED LOWER PISTON PIN	Replace Lower Pin (Item 15)
TRAPPED AIR IN SYSTEM	Clear trapped air by; ➢ use PURGE PORT to clear and/or ➢ run VALVE fully open for a few minutes to clear remaining air in VALVE.
DEFECTIVE UPPER SLIDER O-RING	Visually inspect UPPER SLIDER O-RING for damage. ➢ If damaged; replace UPPER SLIDER O-RING (Item 30)
ADJUSTMENT HANDLE TURNS ROUGHLY	**CORRECTIVE ACTION**
DEFECTIVE UPPER PISTON CUP SEAL	Visually inspect UPPER PISTON CUP SEAL for damage. ➢ If damaged; replace UPPER PISTON CUP SEAL (Item 12)
DEFECTIVE UPPER SLIDER O-RING	Visually inspect UPPER SLIDER O-RING for damage. If damaged; replace UPPER SLIDER (Item 30)

STANDARDS, PATENTS & WARRANTY

ATEX DIRECTIVE 2014/34/EU
CE 0891 Ex II 2G Ex h T6
PED 2014/68 EU SEP CATEGORY II MODULES A, D1 & E1
US PATENTS 5,427,139 * 5,494,070 * 6,189,564, B1 * EU PATENT 1110132

3-YEAR LIMITED WARRANTY

Each ***Amflow***® product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is three (3) years and begins on the date of original purchase. This warranty extends only to the original buyer and does not apply to any product which, in A & H Enterprises' opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation or handling.

At A & H Enterprises' option, the A & H Enterprises' warranty obligation is limited to the replacement or repair of a defective product that is returned to A & H Enterprises within the warranty period. Merchandise returned to A & H Enterprises within the warranty period, which in A & H Enterprises' opinion is defective by accident, improper operation or improper handling shall be subject to a charge for repair. Merchandise, free from defects, returned to A & H Enterprises shall be subjected to a 20% restocking fee within thirty (30) days of the purchase date. Written authorization is required for all merchandise returned to A & H Enterprises.

To obtain warranty service, contact A & H Enterprises to obtain return authorization information. Then send the product to A & H Enterprises with a description of the difficulty, transportation and insurance prepaid. A & H Enterprises assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation and insurance prepaid. If A & H Enterprises determines that failure was caused by neglect, misuse, contamination, alteration, accident, or abnormal condition of operation or handling, A & H Enterprises will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer, transportation and insurance prepaid, and the Buyer will be billed for the repairs and the return transportation and insurance charges.

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. A & H ENTERPRISES SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, ARISING FROM ANY CAUSE OR THEORY.

Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of the Warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

STANDARDS

A&H Enterprises designs its products to meet the applicable **ATEX** and **PED** standards for valve design and pressure vessels.

Products are also **CE** marked and **ATEX** approved for Hazardous area installations.

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