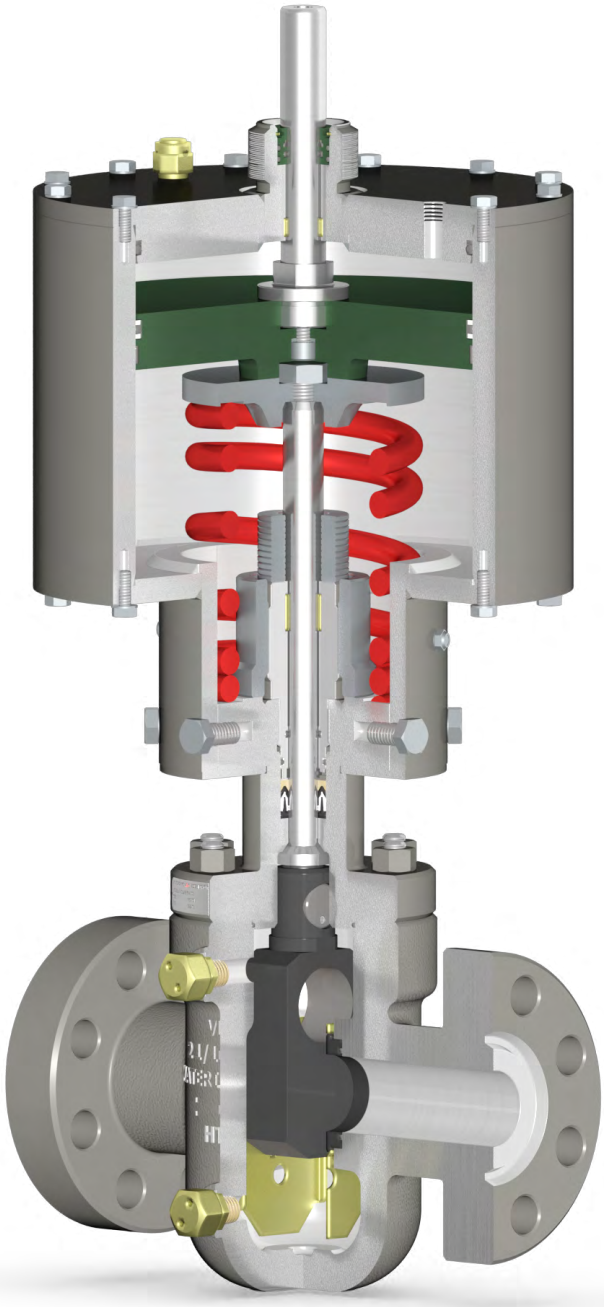
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PNEUMATIC PISTON ACTUATOR (PPA)
GATE VALVE SERVICE AND OPERATION MANUAL

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SALES@VWUSA.US WWW.VALVEWORKSUSA.COM

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INTRODUCTION

In appreciation to our customer for purchasing our product, we have prepared this Operation Manual to assist you in the Operation, Maintenance, Assembly and Installation of the Valveworks USA API 6A Piston Pneumatic Gate Valve. We encourage following the recommendations in this booklet to attain the best possible service from our product, which is designed and proven to offer the service one can expect of a quality product.
To contact a representative for more specific information pertaining to a special problem:

VALVEWORKS USA
WHEN PRESSURE DEMANDS QUALITY®
1650 SWAN LAKE ROAD
BOSSIER CITY, LA USA 71111

PHONE	318-425-0266
FAX	318-425-0934
TOLL FREE	888-425-0266
EMAIL	SALES@VWUSA.US
WEBSITE	WWW.VALVEWORKSUSA.COM

QUALITY

Valveworks USA management and employees are committed to continually improve the effectiveness of our quality management system to produce a quality assured product which meets or exceeds our customer's expectations and requirements.

SAFETY

Caution must be taken as to the surrounding area and its potential dangers of projectiles.
Pressure kills! Even a loose, stand alone valve may contain trapped pressure which will turn any component into a projectile missile when disassembled, causing injury or death. Never stand over a component or in its path of release during assembly. Always operate the valves from the open to close position slowly releasing trapped pressure. Always remove fittings first, taking extreme caution to their potential danger as a projectile. If the valve is frozen and can not be operated, take extreme caution to the disassembly of the components.
Weighted blankets or protective screens and shields should be utilized. Caution should be taken when handling components during disassembly and assembly, as most components are heavy, greasy, hard to handle and have edges which can cause injury. Always be cautious of how the valve is positioned and standing. Be sure the valve is secured in position so there is no possible chance of tipping over. Never apply test pressure above the manufacturers rated working pressure. The shell test pressure above the working pressure has already been tested by the manufacturer and is not required after the initial assembly test of the valve. The manufacturer has already verified the quality of the valve shell body components and will void the warranty from the manufacturer if the valve is pressure tested above the rated working pressure indicated for the valve. Always wear steel toes shoes, hard hat, eye and ear protection while performing repairs.

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APPLICATIONS

Valveworks USA Piston Pneumatic gate valves can be applied to the following sizes and working pressures.

APPLICATION	OPTIONS AVAILABLE
GATE VALVE SIZE	1-13/16 through 5-1/8
MAXIMUM ALLOWABLE WORKING PRESSURE (MAWP)	0 to 15M
ACTUATOR MAXIMUM OPERATING PRESSURE	250 PSI
TEMPERATURE RANGE	-60°C TO 121°C (-75°F TO 250°F)

The Piston Pneumatic Gate Valves covered in this manual are suitable for performance requirement levels 1 and 2, PR1 and PR2 respectively.

TEMPERATURE RATING

TEMPERATURE CLASSIFICATION	OPERATING RANGE			
	°C		(°F)	
K	-60	82	-75	180
L	-46	82	-50	180
N	-46	60	-50	140
P	-29	82	-20	180
S	-18	60	0	140
T	-18	82	0	180
U	-18	121	0	250
V	2	121	35	250

TRIM CHART

MATERIAL CLASS	MINIMUM MATERIAL REQUIREMENTS	
	BODY, BONNET, END AND OUTLET CONNECTIONS	PRESSURE-CONTROLLING PARTS, STEMS, AND MANDREL HANGERS
AA - General Service	Carbon or low-alloy steel	Carbon or low-alloy steel
BB - General Service	Carbon or low-alloy steel	Stainless steel
CC - General Service	Stainless steel	Stainless steel
DD - Sour Service [a]	Carbon or low-alloy steel [b]	Carbon or low-alloy steel [b]
EE - Sour Service [a]	Carbon or low-alloy steel [b]	Stainless steel [b]
FF - Sour Service [a]	Stainless steel [b]	Stainless steel [b]
HH - Sour Service [a]	CRAs [b]	CRAs [b]

[a] As defined by NACE MR0175.
[b] In compliance with NACE MR0175.

As shown by API-6A. For specific details consult Valveworks USA.

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ORDERING INFORMATION

The following information should be provided with any request for quote or order placement of Valveworks USA Piston Pneumatic Gate Valves:

ACTUATOR

- **Model, Series and Size of Actuator**
- **API 6A Requirements (PR – PSL)**
- **ISO Certification Requirements**
- **Control Fluid Power**
- **Well Fluid Power**
- **Temperature**
- **Location (Onshore/Offshore)**
- **Material (API 6A)**
- **Actuator Control Pressure Availability**
- **Special Test Requirements**
- **Special Material Requirements**

VALVE

- **Model of Valve**
- **Size of Valve**
- **Pressure Rating (maximum)**
- **API 6A Requirements (PR-PSL)**
- **API 14D Requirements (Class of Service)**
- **Temperature Rating (API 6A)**
- **Material (API 6A)**
- **Any Special Test Requirements**
- **Any Special Material Requirements**
- **Any Special Coating or Protection Requirements**
- **Other Specifications and/or Certifications**

ACTUATOR ACCESSORIES (MECHANICAL)

Safety Lock Open Device:

This device is used to mechanically stroke the actuator. It is used on small or low-pressure valves while valve body is pressurized. It is typically used during installation and testing phases of well completions.

Fusible Lock Open Cap:

Mechanically holds open the actuator and valve during work over or when the safety systems are inoperative. This device locks the actuator in the down position, allowing it to rise only in the event of a fire.

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ASSEMBLY INSTRUCTIONS

The following steps have to be followed before assembly of any component of the PPA series equipped valves.

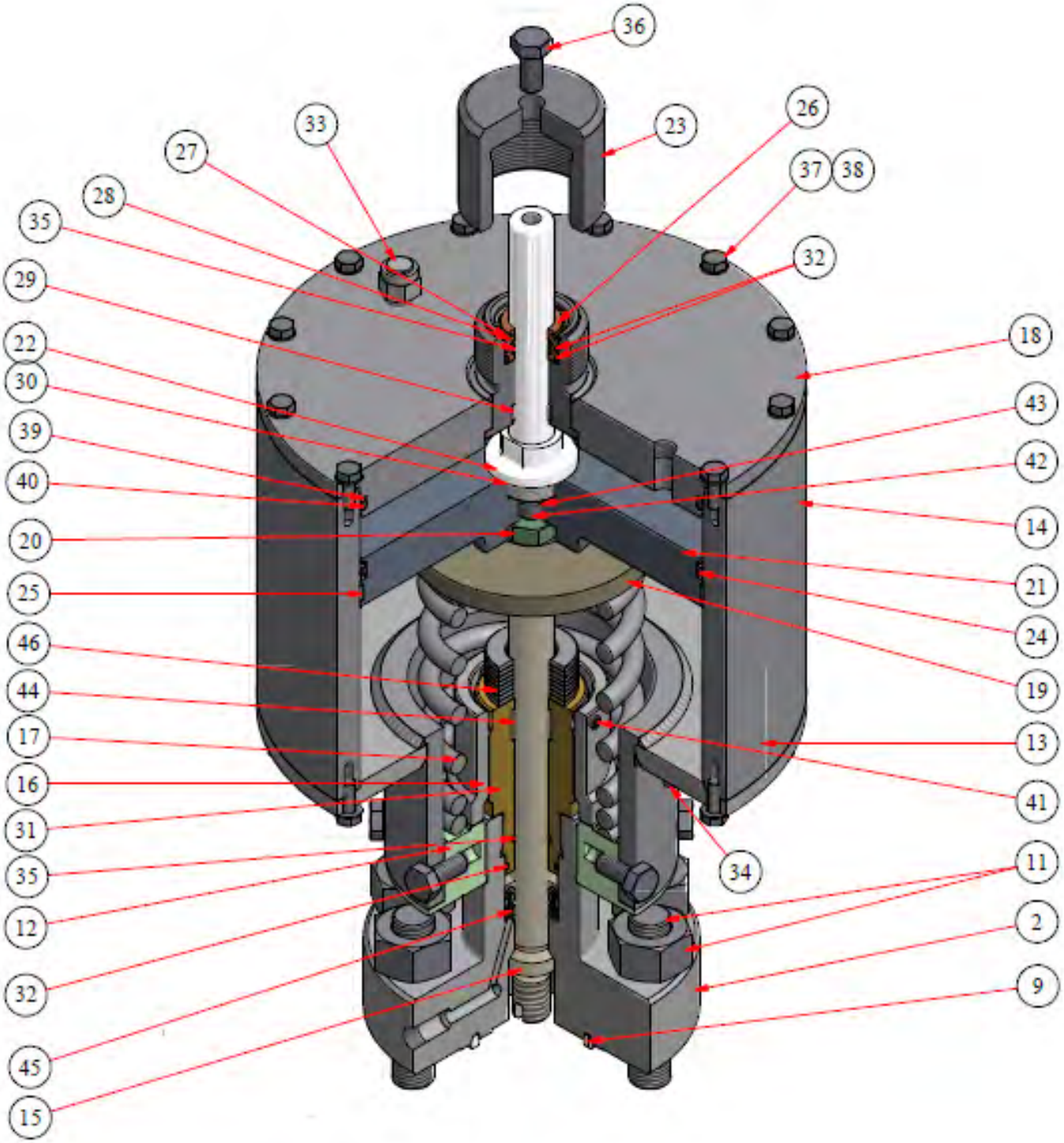
- Assembly work area must be clean and free of dirt, metallic shavings and wood particles.
- Surface preparation of work area should be metallic or covered with a layer of corrugated cardboard.
- All lubricants and utensils used in assembly must be clean.
- All tools used in assembly must be clean and in good working order.
- Clean all components (metallic) prior to assembly.
- Keep all elastomers and plastic base materials in bags or boxes until needed for assembly.
- Inspect all components for burrs, dings, marks, scrapes, nicks, and etc. prior to assembly.

PISTON PNEUMATIC ACTUATOR

- Place the O-ring (30) in the o-ring groove at the base of the Top Shaft (22).
- Lock the top shaft into the piston while ensuring that the o-ring stays in the groove. Tighten with the open-end wrench.
- Place the Lock Washer (43) on the Cap Screw (42). Insert the screw through the bottom of piston and screw it into the top shaft. Tighten the cap screw with the hex key wrench while bracing the top shaft with the open-end wrench.
- This sub-assembly should rest on the Piston Housing (14).
- Install the Rod Wiper (28) into the groove inside the Seal Retainer (26) with the inside edge of the rod wiper pointing in the direction of the smaller diameter portion (top) of the seal retainer.
- Install the O-Ring (35) in the ring groove located inside of the seal retainer.
- Install the two O-Rings (32) in the ring grooves located on the outside of the seal retainer.
- Insert the Seal Retainer Assembly into the Upper Weldment (18). Press the seal retainer into the upper weldment so that the ring-groove is fully exposed.
- Install the Retainer Ring (27) in the ring-groove of the weldment to hold the seal retainer in place.
- Install the Wear Bearing (29) in the wear bearing pocket located just inside the bottom of the upper weldment.
- Place the O-ring (40) and Back-up ring (39) on the exterior groove of the weldment
- Screw the top plate assembly to the top of the piston housing with the top shaft protruding through the seal retainer.
- This sub-assembly should rest on the piston until used for Main Assembly.
- Place the Lower Weldment (13) on the Lower ring (12). Install and tighten the 8 Hex. Bolts that fasten the lower weldment to the lower ring.
- Screw the piston housing Assembly on the lower weldment assembly with bolt holes aligned. Place the Spring (17) on the lower ring; screw the Spring Plate (19) onto the stem to preload the spring by about 2 inches.
- Use Shims (46) to set the drift on the valve.
- Install 4 Breathers (34) in threaded breather holes.
- After the actuator has been pressure tested, install Burst Disc Fitting (33) in the pressure nipple located on the top of the upper weldment.

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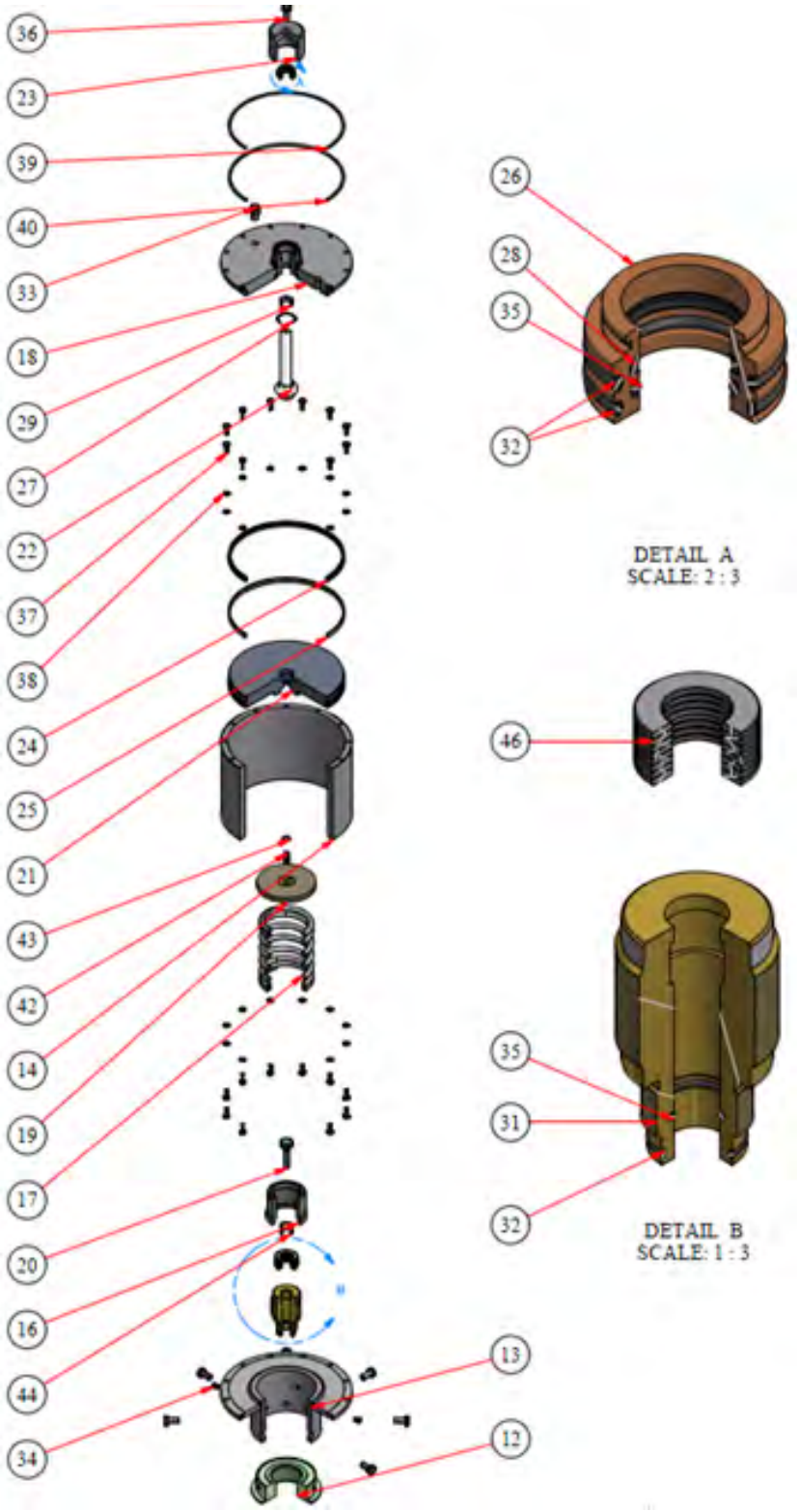
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Piston Pneumatic Gate Valve

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Piston Pneumatic Gate Valve

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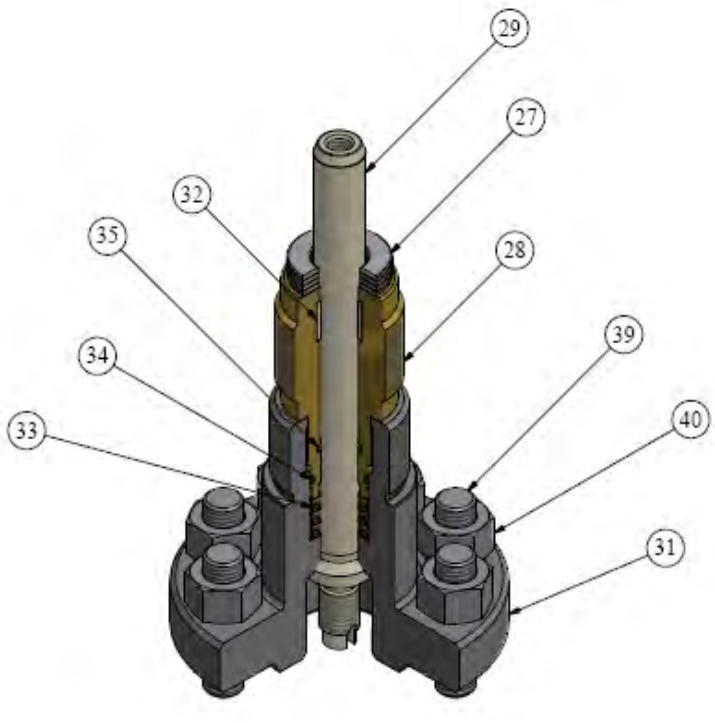
Piston Pneumatic Actuator - BILL OF MATERIALS		
ITEM	DESCRIPTION	QTY
1	TOP SHAFT	1
2	SEAL RETAINER	2
3	SHIM - COARSE	2
4	RETAINER PLATE	1
6	TOP CAP	1
7	PISTON	1
8	SEAL FACE PLATE	2
9	HYDRAULIC HOUSING	1
11	LOWER CAP	1
13	LOCK OPEN CAP	1
14	OPERATING STEM	1
15	PISTON SEAL	2
16	WEAR BEARING	1
17	WEAR BEARING	3
18	RETAINER RING	1
19	RETAINER RING	2
20	ROD WIPER	1
21	POLYPAK SEAL	2
22	O-RING - #356	2
23	O-RING - #440	1
24	BACKUP RING	2
25	BOLT, HEX HD	1
26	SET SCREW	12
27	BONNET	1
28	CAP SCREW	8
29	CAP SCREW	1
30	PACKING GLAND	1

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BONNET ASSEMBLY

- Install the Body Grease Fitting in the side of the bonnet flange. (Model FC bonnets only)
- Place Bonnet (31) on flat surface and insert Stem Packing (33) (Optiseal) with the pointed side facing away from bonnet flange.
- Insert Wear Bearing (32) into Packing Retainer (28) using channel-lock pliers to compress the wear bearing.
- Install Inner O-Ring (35) in ring groove located inside the packing retainer.
- Install Outer O-Ring (34) in the packing retainers outside ring groove that has no holes in it.
- Screw Packing Retainer Assembly into the bonnet and tighten with a large pipe wrench using the upper (non-threaded) portion of the packing retainer.



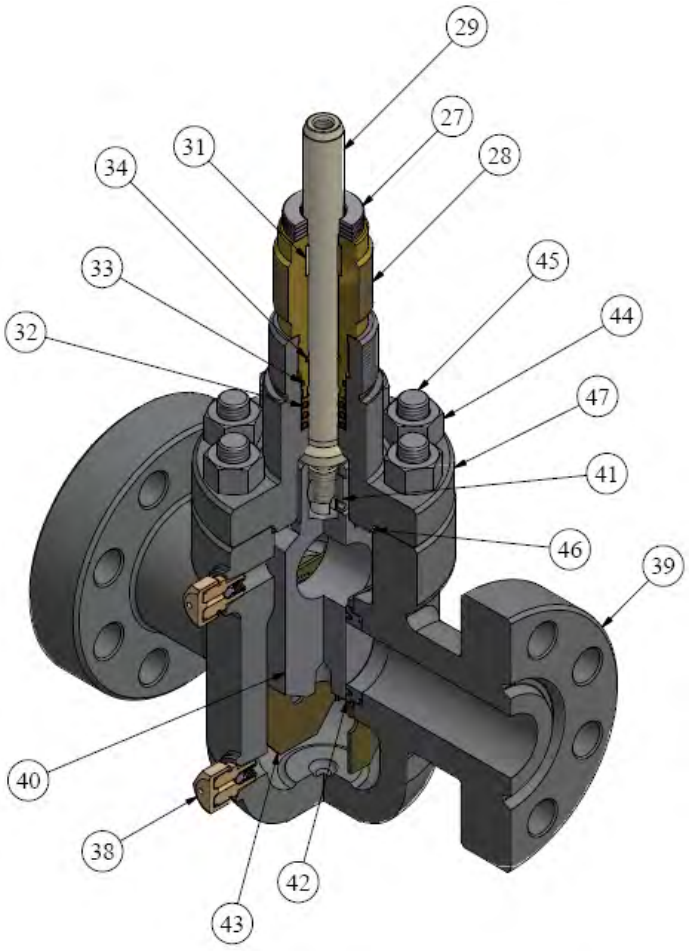
BONNET ASSEMBLY - BILL OF MATERIALS		
ITEM	DESCRIPTION	QTY
27	SHIMS	4
28	PACKING RETAINER	1
29	STEM, BONNET	1
31	BONNET	1
32	WEAR BEARING	1
33	OPTISEAL	1
34	O- RING	1
35	O- RING	1
39	STUD	8
40	HEX NUT	8

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BONNET TO VALVE ASSEMBLY

- Insert the Operating Stem into the bottom of the bonnet and lower the bonnet onto the Valve Body Assembly. Install bonnet nuts and tighten using star pattern.
- Screw the Lower Ring onto the bonnet and tighten.
- Screw the Anti-Rotate Slip onto the packing retainer and tighten.
- Screw Set Screw into the threaded hole at the top of the anti-rotate slip. The set screw should be tightened firmly against the upper (non-threaded) portion of the packing retainer.
- Move the gate into the open position and verify with the drift rod. Hold the Spring Plate in position on top of the operating stem and slide a stack of shims into the space between the top of the packing retainer and the bottom of the spring plate to determine the correct number of shims to use for setting the drift. Remove spring plate and slide shims onto operating stem so that they rest on the packing retainer. Replace the spring plate to ensure that no space exist between the shims and the bottom of the spring plate.
- Place the spring on the lower ring. Place the spring plate on the top of the spring and insert the spring plate bolt through the spring plate. Screw the spring plate bolt into the top of the operating stem as far as possible by hand. Using a wrench, compress the spring by screwing the spring plate bolt into the operating stem until it is tight.
- The bonnet assembly is now ready to accept a Valveworks piston pneumatic actuator.



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BONNET TO VALVE ASSEMBLY - BILL OF MATERIALS		
ITEM	DESCRIPTION	QTY
27	SHIM	4
28	PACKING RETAINER	1
29	STEM, BONNET	1
31	WEAR BEARING	1
32	OPTISEAL	1
33	O-RING	1
34	O- RING	1
38	BODY GREASE FITTING	2
39	BODY, FLANGED	1
40	GATE	1
41	LIFT NUT	1
42	SEAT	2
43	GATE GUIDE	2
44	HEX NUT	8
45	STUD	8
46	BONNET SEAL RING	1
47	BONNET	1

PERIODIC MAINTENANCE

Valveworks USA recommends the following maintenance schedule.

Interval	Maintenance Operation
Once a Month	Cycle open and close one time.
As Required	Clean debris from vent and breather holes. Replace as needed.
Every 5 years	Replace Safety Valve
Every 5 years	Replace piston seals and wear rings.
When seals are replaced	Inspect top shaft and interior of piston housing.

These are just recommended intervals of maintenance. Depending on the level of usage, your valve(s) may require more or less maintenance than this manual suggests. For more information, contact Valveworks USA.

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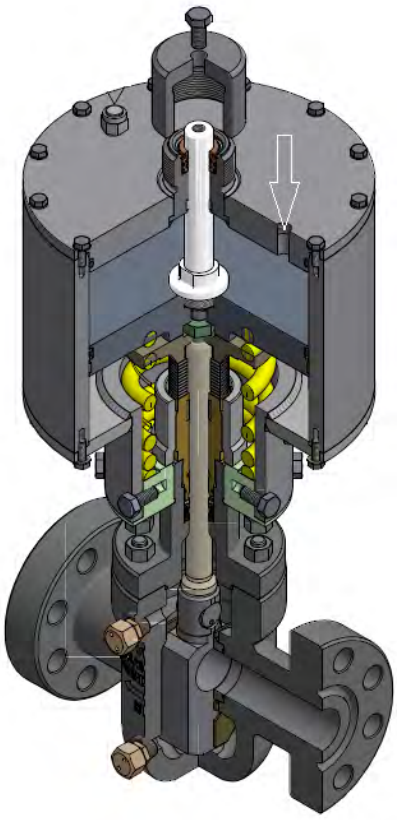
OPERATION

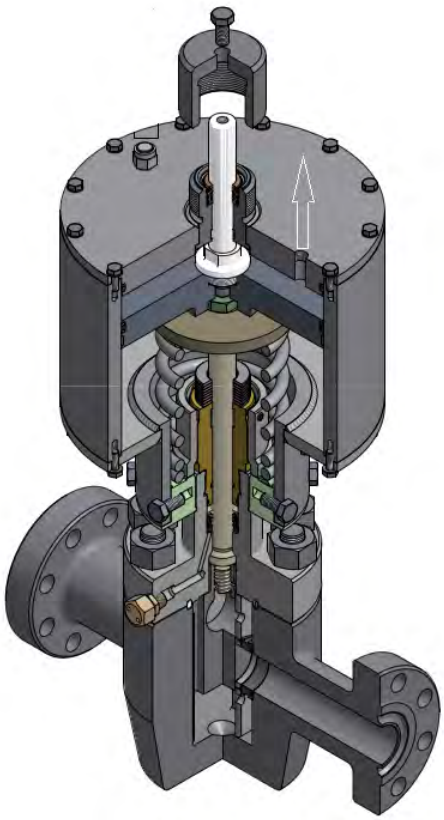
The Safety Valve with a Valveworks USA actuator is normally supplied in the fail-closed operating configuration. Pneumatic actuator supply drives the valve's reverse ported gate down and holds it in open position under normal operating conditions. In the event of an abnormal condition, the actuator supply pressure is released or bled off by quick exhaust mechanisms, allowing the valve to close by body pressure acting on the bonnet stem diameter and spring force. Restoration of pneumatic actuator supply pressure automatically reopens the valve.

When required, the valve can be configured with a fail open gate design for a blow-down system.

OPENING AND CLOSING THE VALVE

The actuator input pressure drives the reverse ported gate downwards into open position as shown in the figure. The arrow shows the pressure input location.
As the actuator pressure exits from the upper weldment, valve body pressure and actuator spring force close the valve as shown in the figure. The arrow shows the pressure exit location.





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TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
LEAKAGE WHEN CLOSED	Seats	Disconnect from service and replace the seats.
LEAKAGE WHEN OPEN THRU BODY/BONNET CONNECTION	Bonnet Seal Ring	Disconnect from service and replace the bonnet seal ring.
LEAKAGE WHEN PARTIALLY OPEN THRU TOP OF BONNET	Packing	Disconnect from service and replace the packing.
LEAKAGE AT FLANGE	Flange Seal Ring	Disconnect from service and replace the flange seal ring.
CONTROL PRESSURE WILL NOT BUILD IN ACTUATOR	Damaged control line	Inspect control line for damage and/or leaking fittings.
	Insufficient pressure in control line	Install gauge at pressure source to verify desired pressure available.
	Leaking around bolted flange	Tighten flange bolts.
	Leaking through top plug of actuator	Replace top shaft seal.
ACTUATOR WILL NOT STROKE ON A VALVE WHETHER OR NOT VALVE IS PRESSURIZED	Insufficient pressure in control line	Check pressure from source. Consult control pressure information from the information chart per size valve application (appendix).
	Bonnet to bonnet stem binding	Consult appropriate maintenance and operating instructions for bonnet.
	Valve and/or seals improperly	Check threads on bonnet stem and piston for burrs, nicks, dings and debris. Check size and thread pattern for proper engagement.
	Installed	Remove actuator and bonnet. Repair and/or replace faulty valve components.
ACTUATOR WILL NOT STROKE TO “FULL CLOSED” OR FAIL SAFE” POSITION.	Excessive friction due to loss of lubrication in bonnet/ valve.	Lubricate valve in accordance with maintenance instructions.
	Gate and seats are improperly installed causing excessive friction.	Remove actuator per instructions in this manual. Manually push and/or pull bonnet stem to determine severity of binding. If severe, clean and inspect gate and seats for wear/abrasion. Replace if signs of galling are observed.
	Valve has frozen liquid in valve body	Steam the valve from outside such that the frozen liquid inside melts.
	Restriction of movement of top shaft	Remove manual override or top cap such that the top cap is visible.
VALVE BORE WILL NOT DRIFT AFTER ASSEMBLY OF BONNET TO VALVE	Wrong number of shims installed.	Remove actuator per instructions. Check number of spacers.
	Improper gate to stem engagement.	Remove actuator and bonnet as per instructions in this manual. Adjust engagement per valve in manufacturer’s instructions and/or drawings.
ACTUATOR LOWER RING TRIES TO UNSCREW	Anti-Rotate Slip is not torqued.	Remove Piston Assembly, Spring, Spring plate and re-torque with pipe wrench per torque specifications.

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Limited Product Warranty

The following limited warranty ("Limited Warranty") is exclusive and shall supersede all other warranties, whether express, implied or statutory, including, but not by way of limitation, any warranty of merchantability of fitness for any particular purpose. All other warranties or liabilities, expressed or implied, oral or statutory, including any warranty of merchantability or fitness for a particular purpose are hereby terminated and waived upon Purchaser purchasing any Products (as that term is defined herein) manufactured by **VALVEWORKS USA**.

VALVEWORKS USA hereby warrants to each original purchaser ("Purchaser") of material(s) or product(s) (hereinafter collectively referred to as "Products" or "Product(s)") manufactured by **VALVEWORKS USA** that such products are free from material and workmanship defects when operated under Normal Use (as defined herein) and Normal Service (as defined herein) for a period of one (1) year from the date of shipment ("Warranty Period"). This warranty is valid only for the original purchaser of the material(s) or product(s), and is non-transferrable. "Normal Use" shall mean the intended use of the product for which it was designed by **VALVEWORKS USA**. "Normal Service" shall mean the necessary servicing as suggested or required by **VALVEWORKS USA**, industry standards, or applicable laws and regulations.

THIS WARRANTY WILL BE NULL AND VOID FOR THE FOLLOWING PRODUCTS:

- Other than testing during testing processes by **VALVEWORKS USA** in accordance with industry rules and regulations, any Product(s) that has been tested to, or subjected to, any pressure greater than the stated product working pressure* at any time, other than by **VALVEWORKS USA** during testing processes per industry rules and regulations. **PRODUCTS SHOULD NEVER BE TESTED / SUBJECTED TO PRESSURE GREATER THAN THE STATED PRODUCT WORKING PRESSURE*. THIS IMMEDIATELY VOIDS THIS LIMITED WARRANTY, AND IS AN EXTREMELY DANGEROUS SAFETY RISK.**
- Any product repaired, altered, or modified by any contractor, laborer, person or entity that has not been authorized in writing by **VALVEWORKS USA**.
- Any product, in **VALVEWORKS USA's** reasonable judgment, that has been subject to negligence, accident, improper storage, or improper handling by any person(s).
- Any product which has not been operated or maintained in accordance with normal practices and in conformity with the manufacturer's recommendations, industry standards, and operation and maintenance specifications of **VALVEWORKS USA**.

***Stated Product Working Pressure** is defined as "the maximum internal pressure that the equipment is designed to contain and / or control"

Under any circumstances where this Limited Warranty is voided on any Product(s) manufactured and supplied by VALVEWORKS USA, VALVEWORKS USA is immediately excluded from any and all liabilities associated with such Product(s).

For gate valves used in extreme service conditions such as "frac" applications, **VALVEWORKS USA** recommends full lubrication of the gate valve body cavity and bonnet assemblies between each frac stage (or zone). Failure to comply with this recommendation COULD result in warranty claims being denied. Custom orders, or orders where modifications are made to **VALVEWORKS USA** products by **VALVEWORKS USA** per the purchaser's request to the purchaser's design criteria, and do not conform to **VALVEWORKS USA** design criteria, are subject to review at the time of contract review to determine whether warranty coverage applies to that particular order. Unless specified otherwise in writing at the time of order placement, warranty coverage will NOT apply to the aforementioned type(s) of order(s).

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VALVEWORKS USA obligations under this Limited Warranty consist of, and shall be expressly limited to, reasonable efforts to repair, replace or, at **VALVEWORKS USA'S** sole option, refund the purchase price. The cost of labor for installing a Product that has been repaired or replaced shall be borne by Purchaser. Replacement parts provided under the terms of this Limited Warranty are covered by this Limited Warranty for the remainder of the Warranty Period, and no obligations fulfilled under the terms and conditions of this Limited Warranty shall ever extend the Warranty Period. Limited Warranty services provided hereunder shall not give rise to any kind of liability that may be caused by the delays in **VALVEWORKS USA** performing its obligations under this Limited Warranty.

The remedy for claims against **VALVEWORKS USA** for any breach of this Limited Warranty shall be limited to the replacement of any product that was proven defective in material or workmanship. Such remedy shall only be available upon written notice to **VALVEWORKS USA** of such defect within thirty (30) days of delivery of the Product(s), and the return of such Product(s) to **VALVEWORKS USA** at the address provided herein for written notice. Costs of labor, freight, drayage, or other similar charges shall be at the expense of the customer.

Please contact **VALVEWORKS USA** at 1-318-425-0266 prior to returning any Product(s) covered by this Limited Warranty. Upon determination that a Limited Warranty claim is valid, **VALVEWORKS USA** shall issue a return authorization number. **HOWEVER, THE DELIVERY OF AN ALLEGEDLY DEFECTIVE PRODUCT NOT BEARING A VALID RETURN AUTHORIZATION NUMBER WILL BE REFUSED, AND THE SHIPMENT WILL BE RETURNED TO THE SENDER AT THE SENDER'S EXPENSE.** Except as specifically provided herein, any Purchaser hereby waives the right to seek claims, damages or other legal or equitable remedies against or from **VALVEWORKS USA**, its principals, subcontractors, agents, vendors, suppliers and/or design professionals under any and all causes of action whether statutory, at common law or at equity, including but not limited to any claims based on implied warranties of fitness, redhibition, reduction of the purchase price, negligence and/or strict liability. The agreements and remedies contained in this Limited Warranty are the sole remedies available to any Purchaser as to the issues raised herein, shall be enforceable to the fullest extent permissible by applicable state and federal law, and shall apply to any claim thereafter made against VALVEWORKS USA or any other person related to any **VALVEWORKS USA** Products. Purchaser's sole remedy is as prescribed in the terms and conditions of this Limited Warranty document. In no event shall **VALVEWORKS USA**, its agent(s), or employees be liable for any injuries or damages to any person or property whatsoever, or for any special, indirect, secondary, or consequential damage of any nature however arising. By Purchaser purchasing any Products from **VALVEWORKS USA**, Purchaser agrees (without any further action required by **VALVEWORKS USA** or Purchaser) to all remedies, waivers and limitations of warranty set forth herein.

Written Notice: Any written notice shall be sent to 1650 Swan Lake Road, Bossier City, Louisiana 71111.

The obligations of **VALVEWORKS USA** under this Limited Warranty are limited by the terms and conditions provided herein.

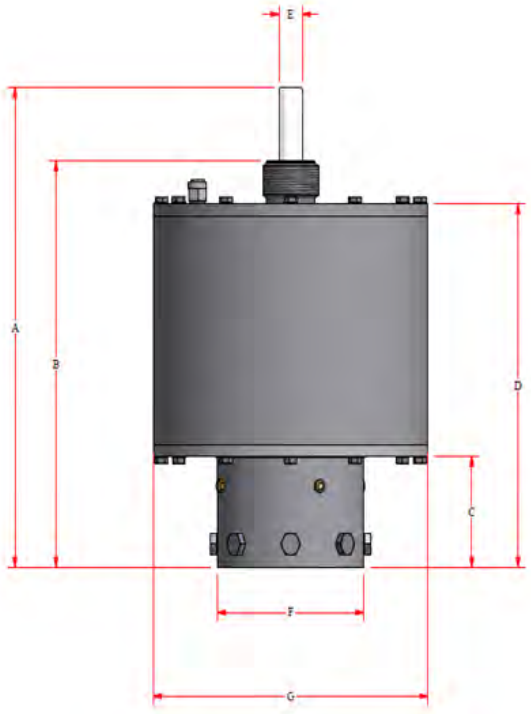
This warranty is limited in extent to the warranty, if any, which the user receives from the manufacturer(s) of any component part(s) or buyout items for resell. All other warranties or liabilities, expressed or implied, oral or statutory, including any warranty of merchantability or fitness for a particular purpose are expressly denied. In no event shall VALVEWORKS USA, its agent(s), or employees be liable for injury or damage to any person or property whatsoever or for any special, indirect, secondary, or consequential damage of any nature however arising.

ORDERS POLICY

All orders for Product(s) are subject to acceptance by **VALVEWORKS USA**, and such acceptance shall not be unreasonably withheld. Prices are subject to change without notice and any errors in published or quoted prices are subject to correction. No Product(s) may be returned for credit without written authorization from **VALVEWORKS USA**. Credit will not be issued for Product(s) after the Warranty Period. **VALVEWORKS USA** reserves the right to deduct reconditioning and handling charges when issuing credit for returned material(s) or product(s). Products of special design, not considered "standard" to the **VALVEWORKS USA** product line, will not be permitted to be returned.

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VALVEWORKS USA
WHEN PRESSURE DEMANDS QUALITY®



SERIES	A	B	C	D	E	F	G
13”	20.727	17.550	4.750	15.680	1.250	7.875	14.750

ALL DIMENSIONS ARE IN INCHES

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WHEN PRESSURE DEMANDS QUALITY®

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