VRG CONTROLS
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Tel: +1 844-Flow-VRG
Email: sales@vrgcontrols.com
Web: vrgcontrols.com

Model #:VGP-100

CE 0496

CE Ex II 2 G Ex h IIA T5 Gb

Temp: -20 to +160 °F -29 to +71 °C
MAOP for Sensing: 70 psig 483 kPa
MAOP for All Others: 150 psig 1034 kPa

PATENT NO.:
US 9,400,060 B2
US 10,234,047 B2

Applicable Models:

This instruction Manual applies to the following VRG-Valve Gas Positioner. To confirm suitability for additional models and/or components, please contact VRG Controls or view us online at www.vrgcontrols.com.

VGP-100-DA-SN

VGP-100-DA-SN-SPL

STAY IN TOUCH!
Scan the QR Code at right for company information and product updates.

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SCOPE OF THIS MANUAL

This Instruction Manual provides instruction for installation, maintenance, adjustment and troubleshooting of VRG Controls VGP - Valve Gas Positioner. This product is typically utilized in conjunction with control valves, pneumatic actuators and a variety of other axillary devices and accessories. For information on products other than those manufactured by VRG Controls, please consult the appropriate manufacturer.

Warning:
Only those qualified through training or experience should install, operate, or maintain VRG Controls positioners. If there are any questions concerning these instructions, contact your VRG Controls sales representative, sales office, or manufacturer before proceeding.

DESCRIPTION:

The VGP Valve Gas Positioner represents a breakthrough in Valve Control technology. The VGP provides a modular, plug & play control system for use in conjuction with pneumatically actuated control valves. The VGP features a simplified 5-in-1 configuration that provides compatibility with double acting and single acting (spring return) control valves utilizing a single platform. The VGP may be easily reconfigured in the field to provide compatibility with almost any pneumatic control valve on the market. The highly accurate performance and ZERO emissions capabilities of the VGP provide the desired features to meet natural gas industry needs. The VGP was designed by the inventor of the original “Valve Gas Positioner” and features patent US 9,400,060B2 technological advances that provide reliability, convenience, and performance above and beyond previous technologies. VGP- Valve Gas Positioners represent the future of control valve control technology and are backed up by the industries’ most experienced team.

TECHNICAL ASSISTANCE

For technical assistance with VRG products, please contact your local VRG Controls sales representative or VRG Control direct. In order to facilitate technical assistance, we strongly recommend that you obtain the MODEL NUMBER and SERIAL NUMBER of the product for which you require assistance prior to contacting us. The MODEL NUMBER and SERIAL NUMBER may be found on the PRODUCT ID LABEL located on the front of the VGP product on the center face of lower portion of the power assembly.

APPLICABLE MODELS:

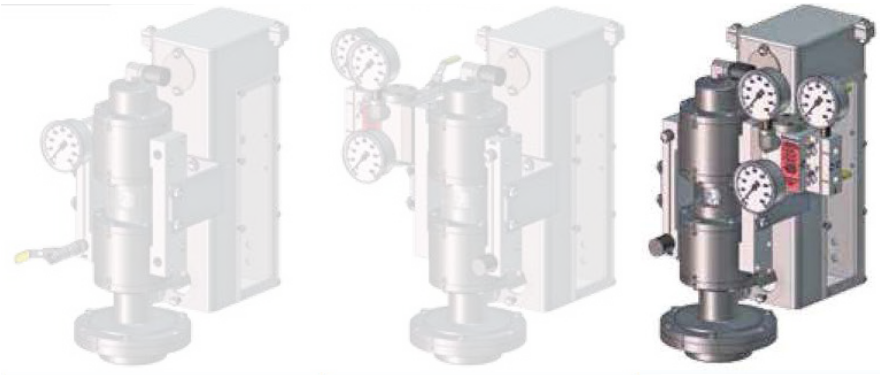
This instruction Manual applies to the following VRG - Valve Gas Positioners. To confirm suitability for additional models and/or components, please contact VRG Controls or view us online at www.vrgcontrols.com.

- VGP-100-DA-SN
- VGP-100-DA-SN-SPL

NOTES ON TABLE 1.0:

- Zero Steady State emissions achieved when VGP properly adjusted to exhibit factory advised deadband setting.
- Consumption is approximate and based upon 100 psig Supply Gas. Atmosphere emissions may be completely eliminated with Discharge to Pressure System incorporated.
- Double acting VGP’s require addition of No-Vent Device to achieve ZERO emissions at full open and full closed.

TABLE 1.0
TECHNICAL
SPECIFICATIONS



VGP MODEL	VGP-100-SA-BV	VGP-100-DA-BV	VGP-100-DA-SN
Type	Proportional Positioning Device		
Outputs	Single Acting	Double Acting	
Internal Valve Logic	NC Balanced Value		No Seat + Nozzel^1
Command Signal Range	3-15 psig 6-30 psig, Split Range		
Positioning Logic	Available (Close on Increasing) OR (Open on Increasing) Command Signal		
Temperature Range	-20*F to +160*F(-29*C to +71*C)		
Linearity and Hysterisis	< 1%		
CONSUMPTION			
Steady State Control	ZERO^2	<10 SCFH^3	See formula D.
Full Open/Closed	ZERO		ZERO^4
ZERO Emissions	0 Atmospheric Emissions May Be Achieved When “Vent to Pressure System” Feature Utilized		
EPA Specifications	Exceeds EPA Ruling, EPA-HQ-OAR-2010-0505, requiring <6 SCFH bleed rate by Oct. 2013		
PNEUMATIC			
Command Signal	Max Pressure 100 psig		
Supply Gas Quality	Dry, Filtered @ 10u Natural Gas or Air		
Max Supply Gas Pressure	400 psig (2758 kPa)		
Min Supply Gas Pressure	20 psig		
Max Discharge DeltaP	150 psig (1034 kPa)		
Min Discharge DeltaP	20 psig (138 kPa)		
Connections	All Ports 1/4 FNPT		
CONSTRUCTION			
External Parts	VRG Military grade Alloy w/[Stealth System] Corroston Protection (304SS Optional)		
Internal Parts	316 SS		
Diaphragms	Nylon Reinforced Buna-N (Viton-Optional)		
O-Rings	Buna-N (Viton-Optional)		
Control Springs	Painted Alloy Steel		
Gauges	2.5 In. Liquid-Filled SS Case & Body		
Weight	20 lbs. (9.0 kg)		
Approximate Dimensions	22In x 12 In x 7 In (559 mm x 305 mm x 178 mm)		

TABLE 2.0 MODEL NUMBER EXPLANATION

We recommend that you record the MODEL NUMBER and SERIAL NUMBER of all VRG Products installed at each application location in the table below for future reference.

Example: Model VGP-100-DA-SN			
Base Model	**Action**	**Output Type**	**Integral Valve Logic**
VGP-100-DA-SN	Double Acting	3-15 PSI 6-30 PSI	SN Sit and Nozzle
VGP-100-DA-SN-SPL	Double Acting	Split Control See Table 5.0	N Sit and Nozzle

TABLE 3.0 INSTALLED PRODUCT IDENTIFICATION LOG

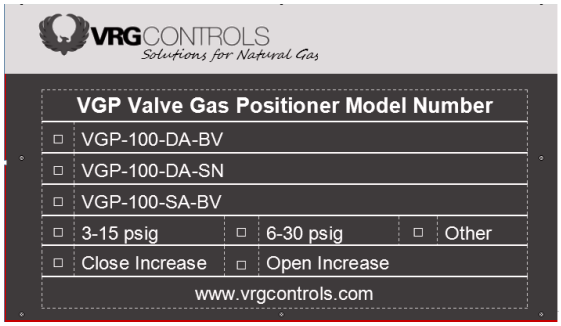
We recommend that you record the MODEL NUMBER and SERIAL NUMBER of all VRG Products installed at each application location in the table below for future reference.

Item	Tag	Model Number	Serial Number
1			
2			
3			
4			
5			
6			
7			
8			
Example	Run 1 Monitor Regulator	VGP-100-DA-BV	0912123V

PRODUCT ID LABEL

S/N 0317005DP
RCV1001

VPG MODEL NUMBER IDENTIFICATION LABEL



FLOW CALCULATIONS

TABLE 4.0 CRITICAL FLOW EQUATION

$$Qc=312.9 \times (P_1+14.7) \times Cv \times \sqrt{\frac{1}{G \times (T + 460)}}$$

Where:

Variable	Description	Unit
Qc	Critical Flow Across Inlet Orifice	scfh
P_1	Supply Pressure	psig
Cv	Flow Factor	--
G	Specific Gravity of Gas	--
T	Gas Temperature	*F

TABLE 5.0 FLOW COEFFICIENT TABLE (CV)

Adjustable Orifice Flow Coefficients

	Adjustable Orifice Setting							
Installed Orifice	0	1	2	3	4	5	6	7
Standard	0.006	0.009	0.018	0.044	0.069	0.096	0.111	0.126
Medium (M)	0.042	0.045	0.062	0.089	0.134	0.172	0.211	0.249
Large (L)	0.042	0.063	0.172	0.328	0.461	0.578	0.634	0.675

Notes:

1. Equation above may be utilized to determine supply regulator consumption requirements and steady state bleed reates for control valves operated with a VGP Valve Gas Positioner.
2. VGP Adjustable Orifices are typically utilized in double acting applications only and represents the limiting flow rates and resultant stroking times.
3. When application do not utilize Adjustable Orifice, then the VGP internal Balanced Valve becomes the limiting factor to determine flow rates and resultant stroking times. VGP Internal Balanced Valve Cv=1.45.

TABLE 6.0 ESTIMATED TRAVEL TIME

$$t=0.148 \times \frac{H \times D^2}{Cv} \times \sqrt{\frac{G}{T+460}}$$

Where:

Variable	Description	Unit
t	Stroke Time	Sec.
H	Actuator Cylinder Stroke Length	in.
D	Actuator Cylinder Diameter	in.
Cv	Limiting Flow Coefficient	--
G	Gas Specific Gravity	Typ. 0.6 Natural Gas
T	Gas Temperature	*F

TABLE 7.0 VGP VALVE GAS POSITIONERS BIAS AND SPRING RANGE CONFIGURATIONS

SIGNAL RANGE ▼	SPRING ▼	ACTUATOR STROKE LENGTH			
		2-4 in	4-6 in	6-8 in	10-12 in
3-15 psig	RANGE	ES-0015	ES-0025	ES-0035	ES-0045
	BIAS	N/A			
6-30 psig	RANGE	ES-0018	ES-0028	ES-0038	ES-0048
	BIAS	CS-0100 (BLACK) .50 psi/turn			
3-9 psig	RANGE	ES-0010	ES-0020	ES-0030	ES-0040
	BIAS	CS-0100 (BLACK) .50 psi/turn			
9-15 psig	RANGE	ES-0010	ES-0020	ES-0030	ES-0040
	BIAS	CS-0110 (BROWN) 1.86 psi/turn			
6-24 psig	RANGE	ES-0016	ES-0026	ES-0036	ES-0046
	BIAS	CS-0100 (BLACK) .50 psi/turn			
18-30 psig	RANGE	ES-0015	ES-0025	ES-0035	ES-0045
	BIAS	CS-0110 (BROWN) 1.86 psi/turn			

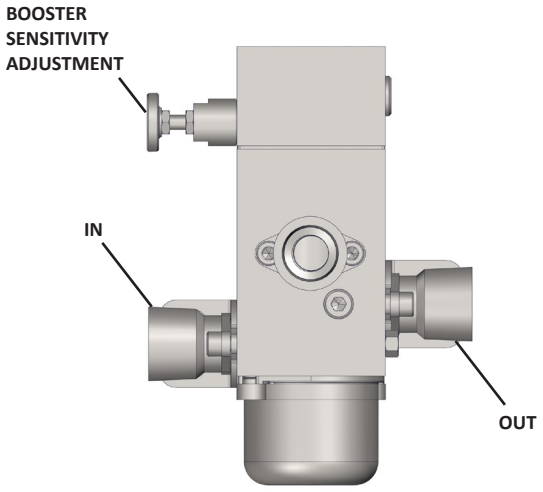
TABLE 8.0 APPICATION BASED FINE TUNING SETTING GUIDELINES - VGP DOUBLE ACTING

Application	Recommended VGP Model	Ball Valve	All Globe Valve	Moderate Volume DA < 950in^3) Actuator	Large Volume DA Actuator	See Note. 5.0 Volume Booster	Discharge of Pressure System	OPEN Orifice[10]	CLOSE Orifice[6]	70 TARGET Balance Pressure VGP Model
Pipeline Interconnect[4]	VGP-DA-SN (Actuator Volume < 950in^3)	■	■	■		N	Y	S4	S4	0.7 (PSupply - PDischarge)) + PDischarge
	VGP-DA-SN (Actuator Volume < 950in^3)	■	■	■		Y	N	S3	S3	0.7 X Psupply
	VGP-DA-SN (Actuator Volume < 950in^3)	■			■	Y	N	S2	S2	0.6 X Psupply
	VGP-DA-SN (Actuator Volume < 500in^3)		■	■		N	Y	S4	S4	0.7 (PSupply - PDischarge)) + PDischarge

NOTE: Volume Booster is adjusted with booster by-pass valve open 1/4 turn.

VOLUME BOOSTER

NOTES
1. Sensitivity adjustment screw allows to bypass the pilot output around the booster directly to the actuator.
2. Clockwise rotation of the screw reduces and eliminates bypass, the highest booster sensitivity.
3. For all applications we recommend to start the booster 45 degree away from full close position.
4. If the booster response is still to sensitive the adjusting screw can be turn additional amount CCW to reduce sensitivity.
5. As a general rule large downstream systems (over 1 mile) and or large size actuators (over 950 in3) can be used with booster at maximum sensitivity (the screw is turned CW all the way).
6. The jam nut must be tighten after adjustment is completed.



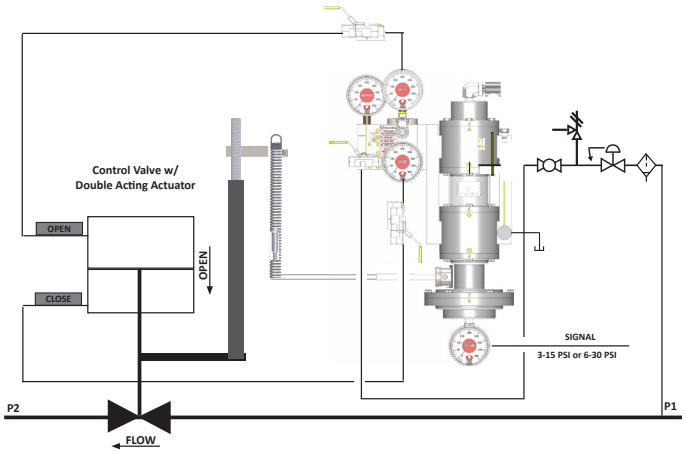
PRINCIPLES OF OPERATION FOR VGP-DA-SN DOUBLE ACTING POSITIONER

Close on Increasing Signal

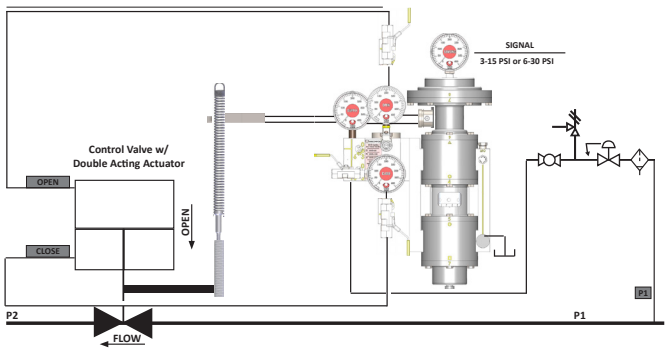
The positioner is a force-balanced instrument that provides a control valve position proportional to the pneumatic input signal. The control valve will open on loss of input signal. The energy to operate the control valve is optained from the differential between the supply and discharge pressures. In stead state, the forces imposed on the balance beam by the input signal diaphragm and the range spring are equal; therefore, the top and bottom nozzles in the positioner are at equal distance from seats. The cylinder top and bottom pressures are both equal to power gas pressure, and the control valve is stationary. An increase in the input signal pressure results in the closing of the lower seat due to an imbalance in the beam forces. This increases the pressure in the cylinder bottom and decreases the pressure in the cylinder top. The control valve begins to close. The actuator rod stretches the range spring, increasing its tension. This force, which opposes the force on the balanced beam caused by the increasing input signal, continues to increase until the balance beam forces are in equilibrium. At this point the valve is in the correct position for the applied input signal. The positioner has a sensitivity adjustment which permits a balance between greater accuracy and an amount of bleed gas.

Open on Increasing Signal - Actuator Fails Closed

The positioner is a force-balanced instrument that provides a control valve position proportional to the pneumatic input signal. The control valve will close on loss of input signal. The energy to operate the control valve is obtained from the differential between the supply and discharge pressures. In steady state, the forces imposed on the balance beam by the input signal diaphragm and the range spring are equal; therefore, the cylinder top and bottom pressures are both equal to power gas, and the control valve is stationary. An increase in the input signal pressure results in the valve due to an imbalance in the beam forces. This decreases the pressure in the cylinder while the pressures in the cylinder top remains at power gas pressure. The control valve begins to open. The actuator rod stretches the range spring, increasing its tension. This force, which opposes the force on the balanced beam caused by the increasing input signal, continues to increase until the balance beam forces are in equilibrium. At this point the valve is in the correct position for the applid input signal. The positioner has a sensitivity adjustment which permits a balance between greater accuracy and minimal bleed gas.

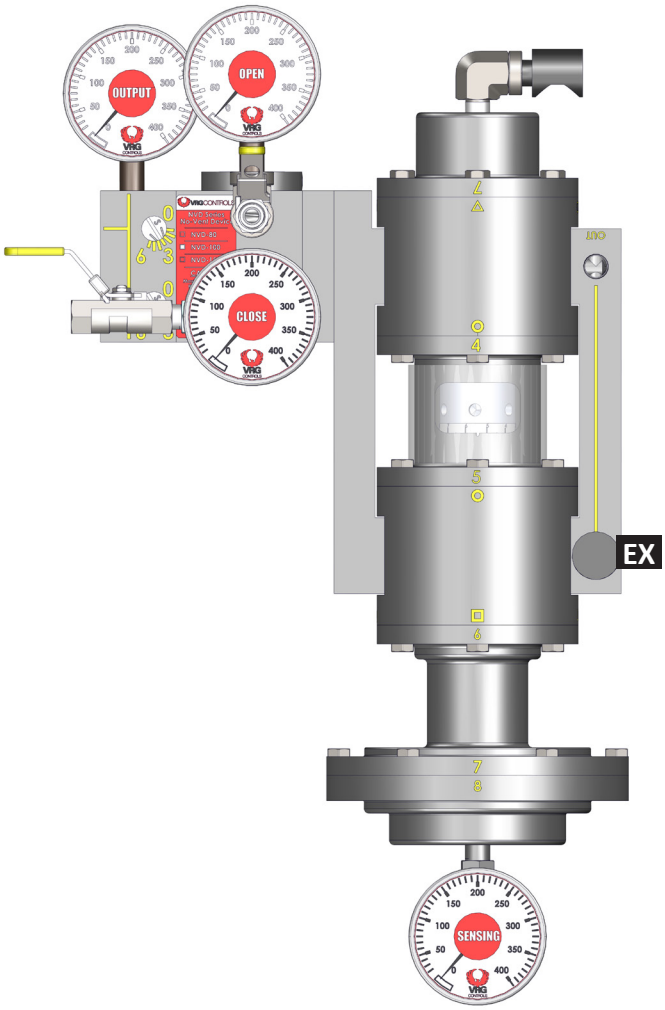


Close on Increasing Signal

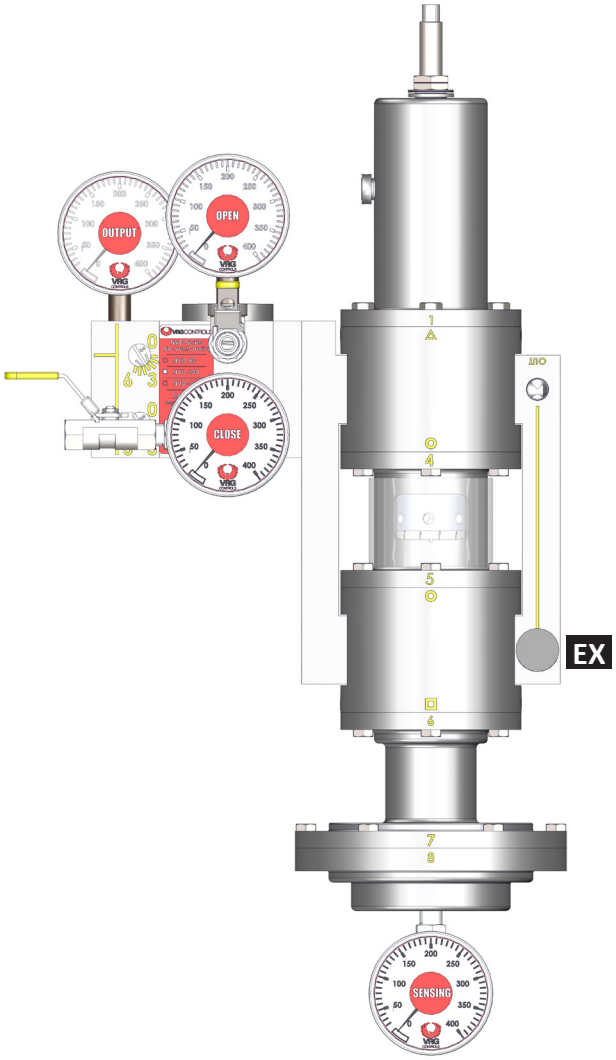


Open on Increasing Signal

VGP-100-DA-SN (CI) Assembly Guide
Part Number: PA-0170



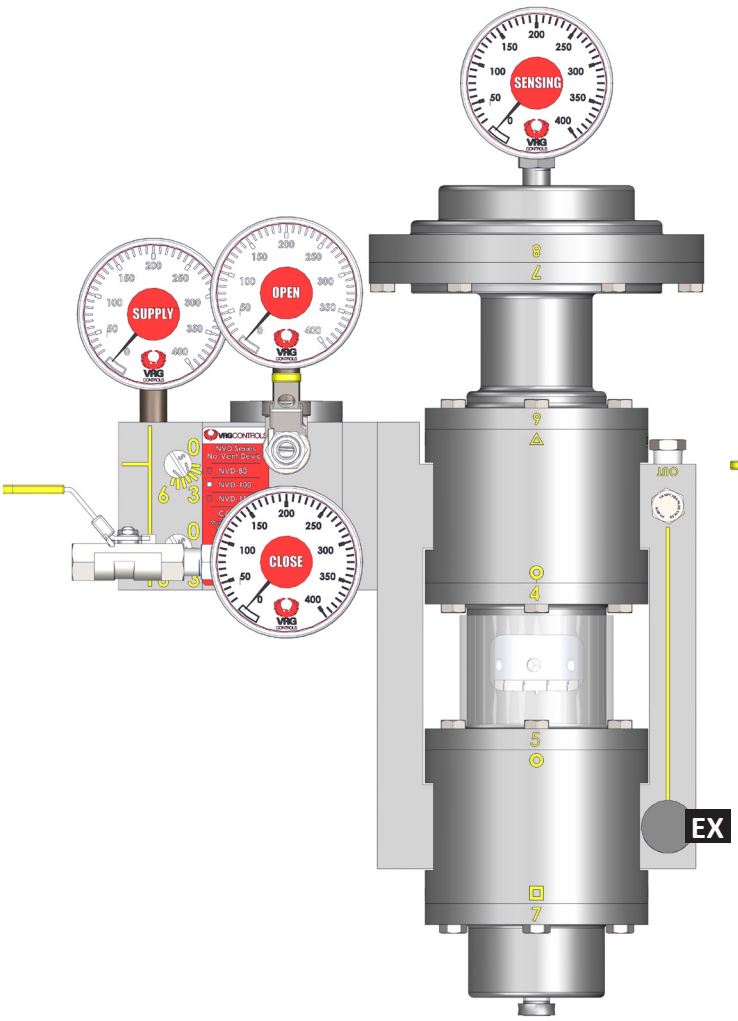
VGP-100-DA-DA SN (CI) Assembly Guide
Part Number: PA-0171

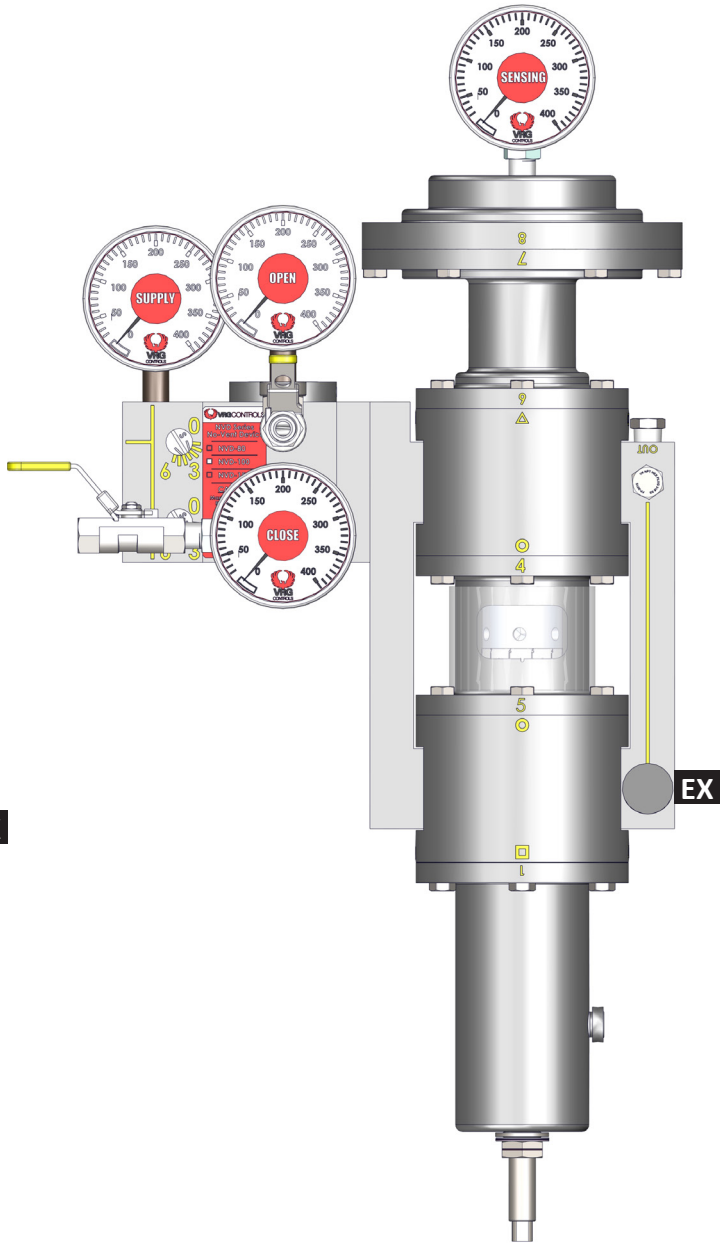


Note: Action open/close on increasing depends on direction of the feedback mechanism. The table refers to “down to open” mechanisms. If mechanisms is “down to close” the action will reverse.

VGP-100-DA-BV (OI)
Part Number: PA-0175

VGP-100-DA-SPL (OI) Assembly Guide
Part Number: PA-0176





Note: Action open/close on increasing depends on direction of the feedback mechanism. The table refers to “down to open” mechanisms. If mechanisms is “down to close” the action will reverse.

CHANGING THE ACTION OF THE VGP-DA-SN

In some situations the VGP-DA-SN positioner may need to be configured from an open on increasing signal positioner, to a close on increasing signal positioner, or vice versa.

To Change from Open on Increasing to Close on Increasing

Order parts per table 9.0.

TABLE 9.0 Bill of Materials for Conversion Kit to CI from OI

Part No.	Stroke	Description	Qt.
PD-5065	ALL	VGP TR-CI Beam Curved Extension (I)	1
FB-0035	4, 6, 8	8” Stoke Range Spring TR Extension (L)	1
FB-0037	12	12” Stroke Range Spring TR Extension (L)	1
FN-0255	ALL	7/16-20 Hex Jam Nut SS (J)	2

CHANGE FROM CLOSE TO OPEN ON INCREASING

Step 1: Disconnect all supply lines, instrument lines and output line from the positioner.

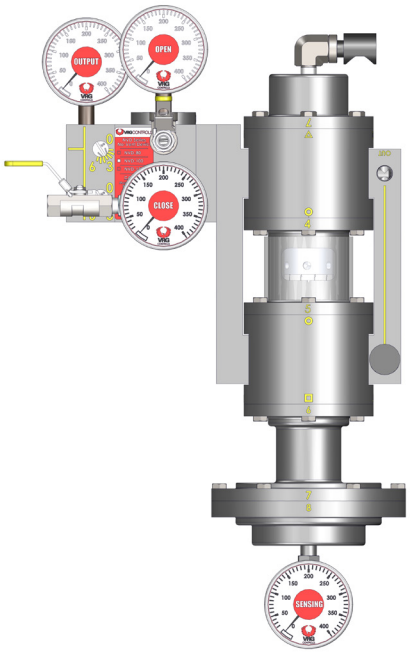


Figure 1. *Close on Increasing VGP-SA-BV Front View*

Step 2: Remove the (2) 1/4-20 x 1-1/4” SHCS 316 SS (A) from the TOP BOX COVER (B). Remove the TOP BOX COVER (B) from the TOP BOX (C).

Step 3: Remove the 1/4-20 x 1-3/4” SHCS 316 SS BOLT (D) that fasten the TOP BOX (C) to the VGP BOTTOM BOX (E).

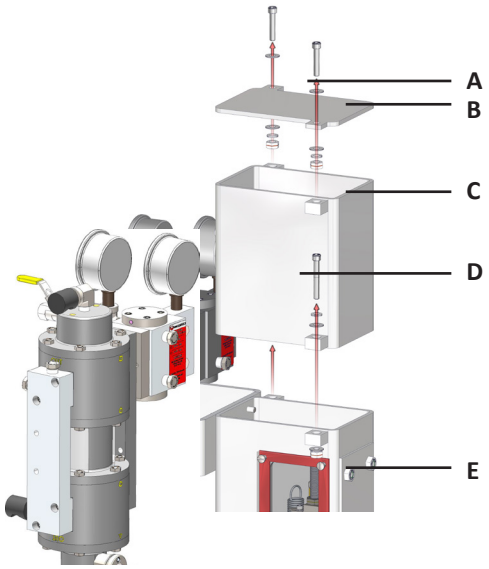


Figure 2. *Top Box Removal*

Step 4: Unlock and remove the RANGE EXTENSION SPRING (F) from the RANGE SPRING RETAINER (G).

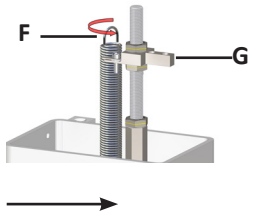


Figure 3. *Unlocking Range Spring*

Step 5: Remove the VGP RANGE SPRING SCREW 1-5/8" LONG (H) and RANGE EXTENSION SPRING (F) from the VGP-TR-CI BEAM CURVED EXTENSION (I).

Step 6: Remove the (2) 7/16-20 JAM NUTS RH 316 SS (J) and SPRING RETAINER (G) from the BIAS ADJUSTMENTING STUD (K).

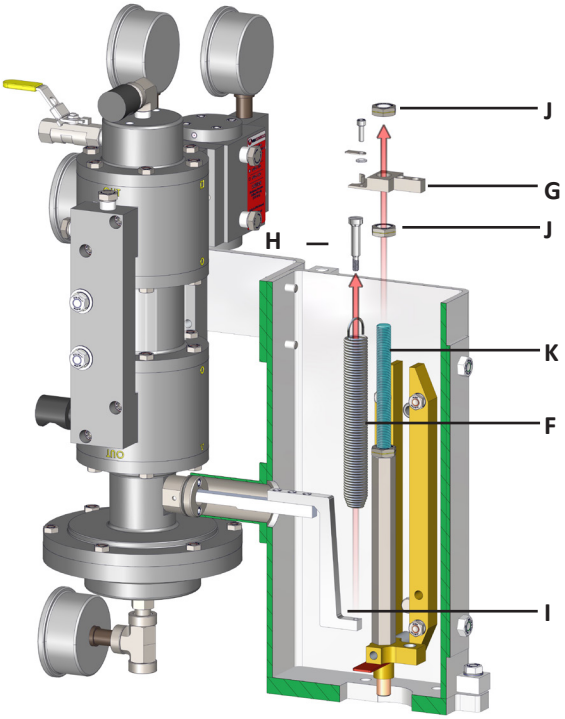


Figure 4. *Range spring and Retainer Removal*

Step 7: Unscrew and remove the VGP ADJUSTING STUD (K) from the VGP STROKE RANGE SPRING TR EXTENSION (L).

Step 8: Unscrew and remove the VGP STROKE RANGE SPRING TR EXTENSION (L) from the Actuator Rod, along with the VGP TR INDICATOR WASHER (N) and VGP TR SPACER (O).

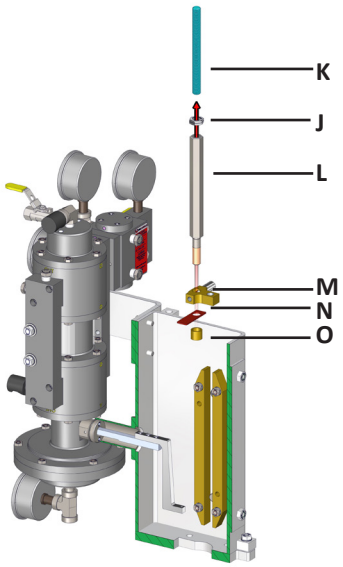


Figure 5. *Removing the Extension from the Rod*

Step 9: Unscrew and remove (4), 5/16-18x 1 HHCS 316 SS (P) from the VGP SUPPORT BRACKET (Q).

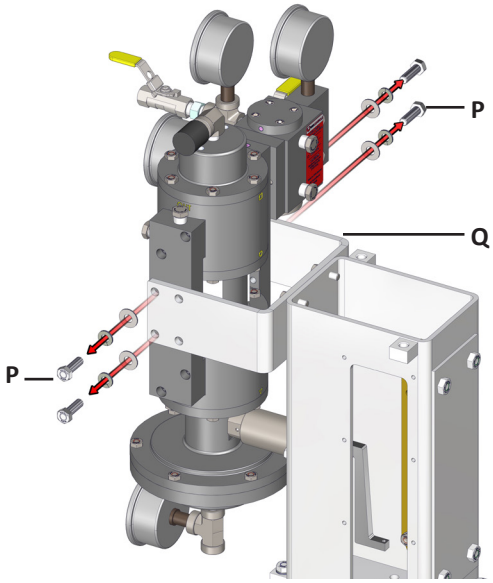


Figure 6. *Preparing to Remove the Positioner*

Step 10: Pull the VGP-DA-SN from the VGP TR BOTTOM BOX (E).

Step 11: Unscrew and remove (2) 1/4”-20 x 1/2” SCHS SS (S). Separate the VGP BEAM COVER (R) from the VGP TR BOTTOM BOX (E).

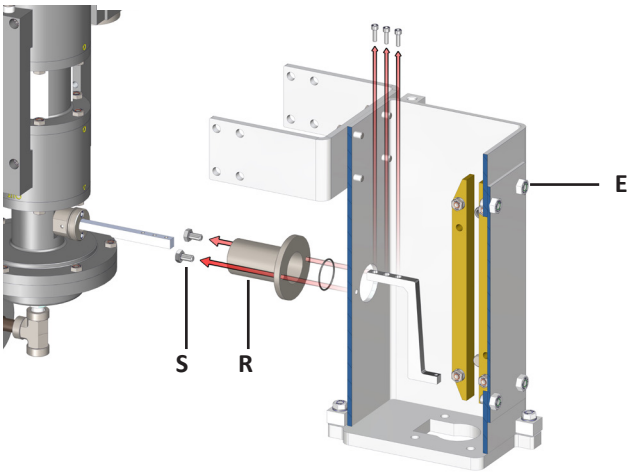


Figure 7. *Remove Positioner and VGP Beam Cover*

Step 12: Assemble parts VGP TR SPACER (Q), VGP-TR-INDICATOR WASHER (N), VGP-TR-OI OFFSET BAR (M), SPRING HOLDER EXTENSION (U) on Cylinder Tailrod or Actuator Rod. Tighten the Parts with 7/16-20 x 1-3/4” HHCS 18-8 SS (T). Insert VGP ADJUSTING STUD (K) into SPRING HOLDER EXTENSION STUD (K). Tighten 7/16-20 JAM NUT RH 316 SS (J).

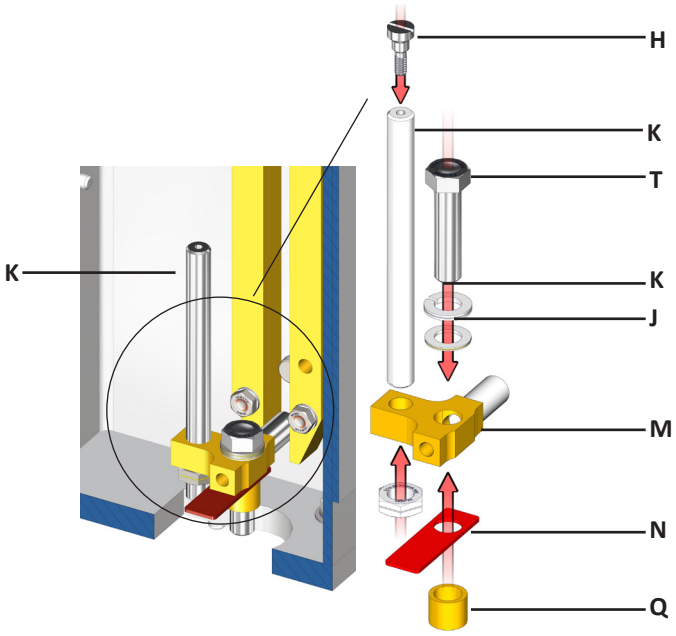


Figure 8. *Re-insert the VGP Bias Adjusting Stud Upside Down*

Step 13: Insert the **VGP-RANGE SPRING SCREW (H)** into the **RANGE EXTENSION SPRING (F),** and thread it into the **BIAS ADJUSTING STUD (K).**

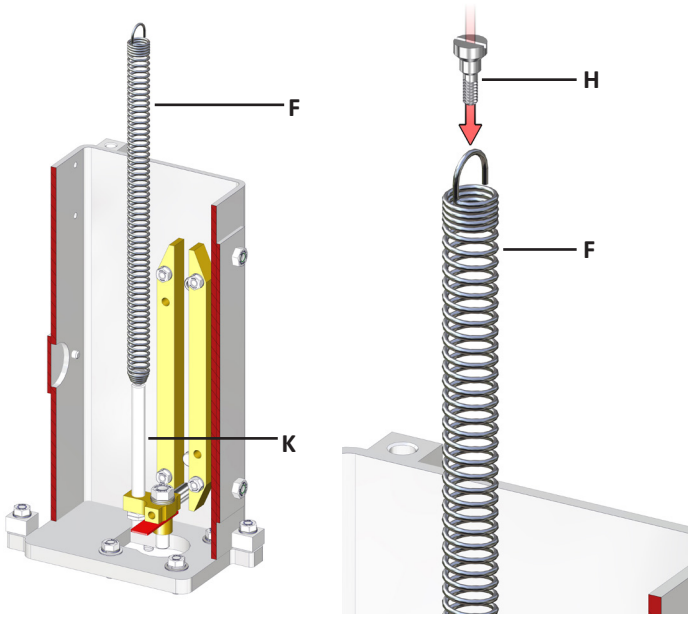


Figure 9. *Re-connecting the Range Extension Spring.*

Step 14: Install VGP TOP BOX (C) onto the VGP BOTTOM BOX (E). Fasten the assembly together using (2) 1/4-20 x 1-3/4” SHCS 316 SS (D).

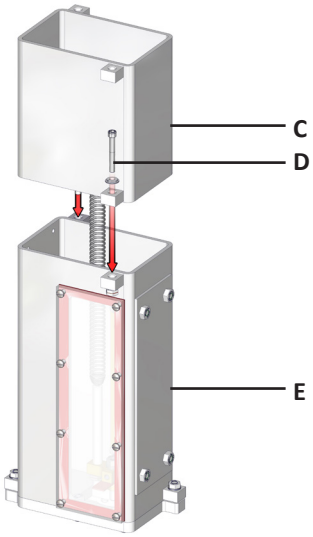


Figure 10. *Re-attaching the Top Box.*

Step 15:Insert the 1/4-20 Hex Nut 316 SS (V) into the VGP BOX SIDE COVER (W) on the VGP BOTTOM BOX (E).

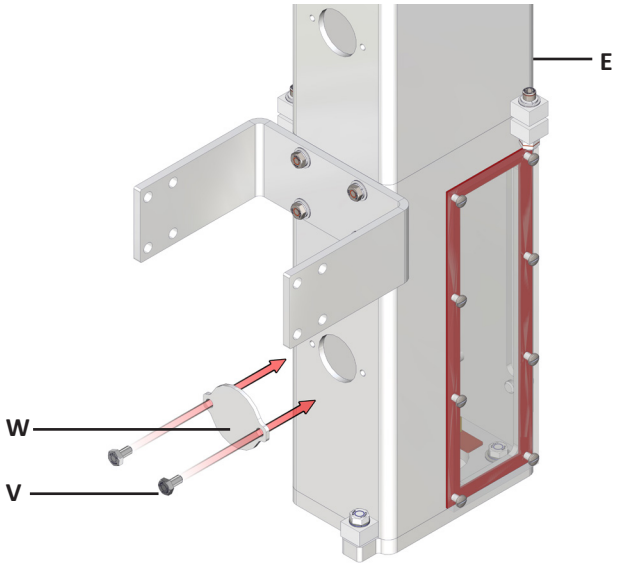


Figure 11. *Moving the VGP Box Side Cover to the VGP Bottom Box*

Step 16:Install VGP BEAM COVER (R) using 1/4-20 x 1/2" SHCS (S).

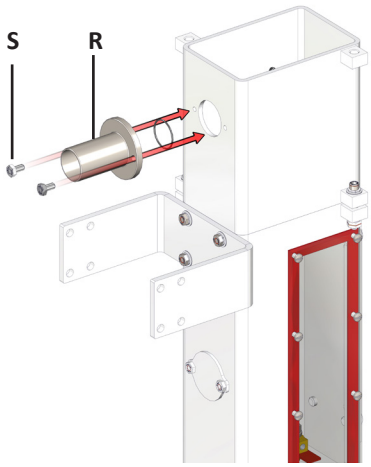


Figure 12. *Removing the Access Cover from the Top Box*

Step 17:Convert VGP-SA-BV-CI to VGP-SA-BV-OI. Use diagram and drawing on page 12. Fasten the SPRING RETAINER (G) to the PIVOTED BEAM (AA) using (2) 8-32 x 1/2" SHCS (X). Install VGP RANGE SPRING LOCK (Y) and 1/4" ID LOCK WASHER (Z) using 8-32 x 1/2" SHCS (X)

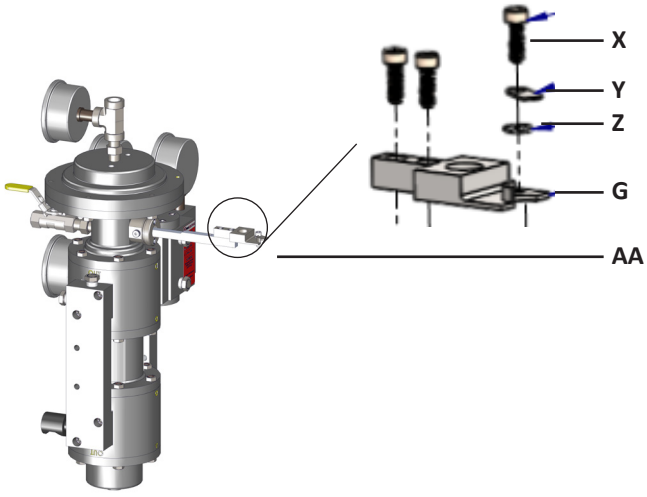


Figure 13. *Fastening the Spring Retainer*

Step 18:Insert the POSITIONER into the VGP BEAM COVER (R) onto the TOP BOX (C). Fasten the assembly using (4) 5/16-18x 1HHCS 316 SS (P).

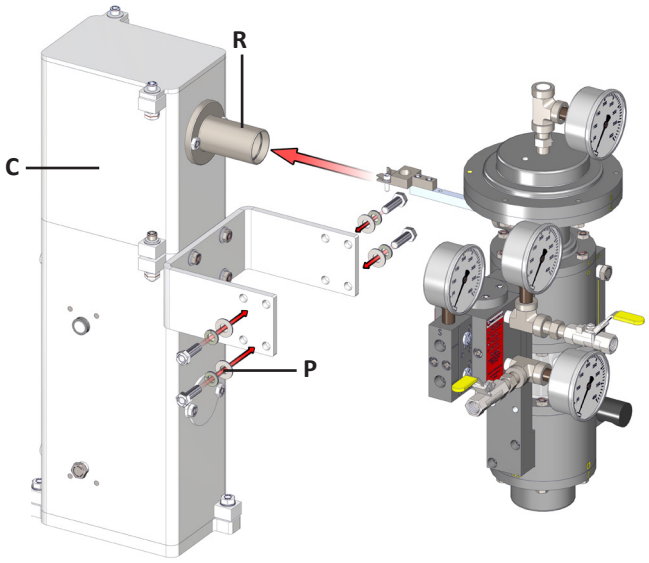


Figure 14. *Attaching the VGP*

Step 19: Pull the RANGE SPRING (F) up over the RANGE SPRING RETAINER (G) and wind approximately 3 coils before locking.

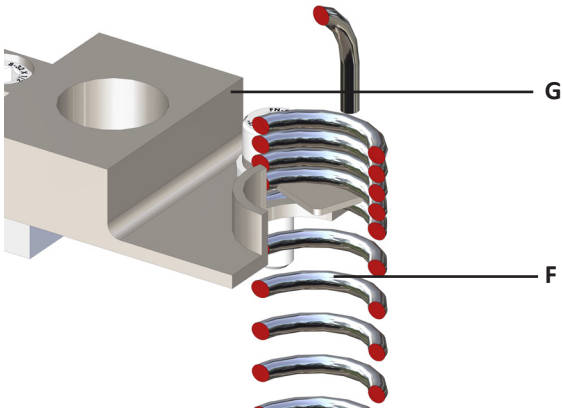


Figure 15. *Connecting the Range Spring and Locking it onto the Spring Retainer*

Step 20: Adjust positioner per procedures on PG. 20-23. Put BOX TOP COVER (B) on TOP BOX (C) using (2) 1/4-20 x 1-1/4" SCHS 316 SS (A).

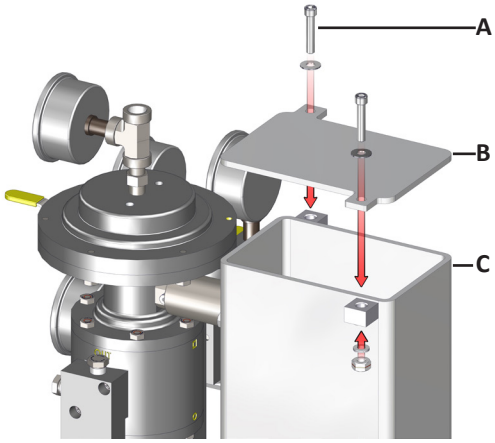


Figure 16. *Finalizing the Topworks Assembly*

Step 21: Install fittings, gages and tubing using the piping schematic drawings on Pg. 28-35.

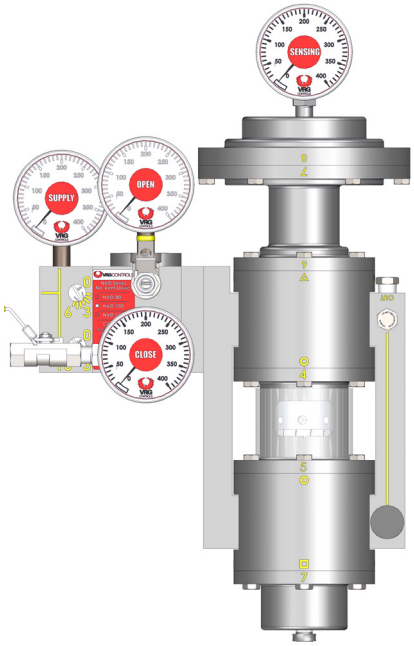


Figure 17. *Positioner Fittings and Tubing in the Final Position*

CLOSE ON INCREASING ADJUSTMENT PROCEDURE

The VGP-DA-SN positioner comes factory adjusted for your particular application. The use of the following adjustment procedure will only be necessary when a RUBBER GOODS replacement kit is installed or any other time the positioner is disassembled.

The VGP-DA-SN positioner has 3 adjustment sections:

1. The ADJUSTMENT DRUM adjusts the sensitivity.
2. The ADJUSTMENT SCREW adjusts the bias
3. The RANGE SPRING adjusts the span.

Adjustment Drum Settings

The ADJUSTMENT DRUM setting fine tunes the sensitivity of the VGP internal valves.

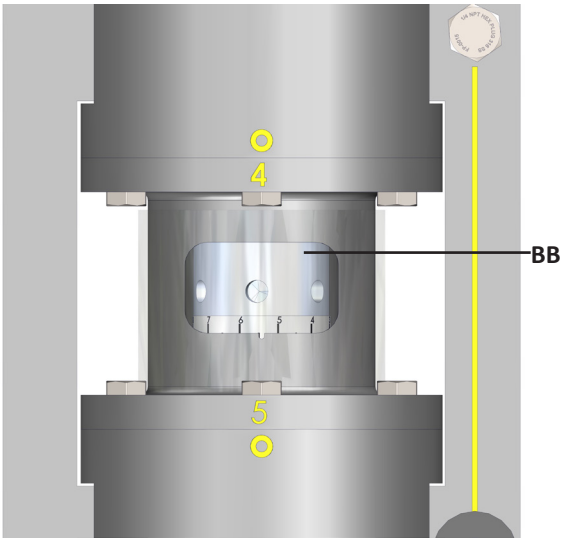


Figure 18. *VGP-SA-BV Adjustment Drum*

Step 1: Turn the dead band ADJUSTMENT DRUM (BB) in the direction of decreasing numbers until it can no longer turn, then turn the drum one turn in the opposite direction (use the numbers on the drum as a guide).

Step 2: If not already attached, wind 3 to 4 coils of the RANGE SPRING RETAINER (G).

Step 3: If not already adjusted, set the RANGE SPRING RETAINER (G) so that it is in the middle of the stud.

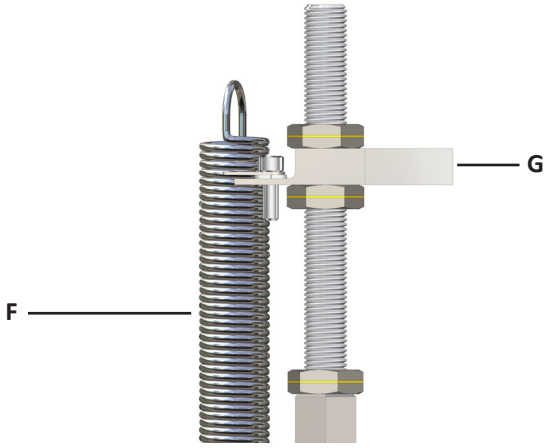


Figure 19. *Range Spring and Spring Retainer Adjustment*

Step 4: Set the instrument signal pressure at the midpoint of its range. For example, set it at 9 psig if the range is 3-15 psig, or 18 psig if the range is 6-30 psig. Stroke the actuator to an intermediate position.

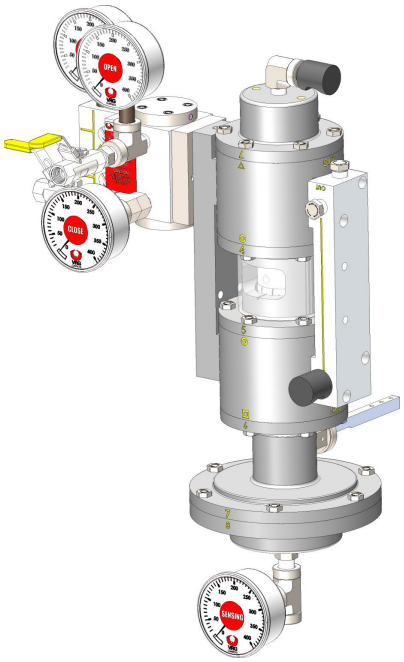


Figure 20. *Set Instrument Signal to Midpoint*

Step 5A: If the actuator is equipped with a VMO-150 Manual Control Valve, place the left VMO handle in the manual position.

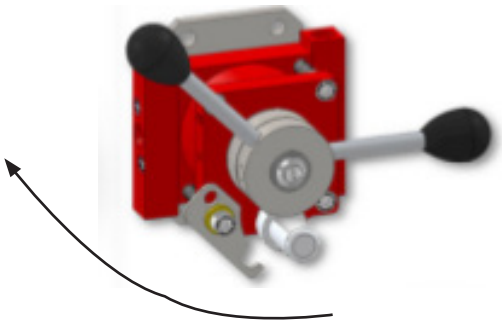


Figure 21. *Left handle moved to manual position.*

Step 5B: If the actuator is not equipped with VMO-150, use the 1/4" ball block valve installed between the positioner output and the actuator. Once the actuator has reached its desired position (based on the mid-signal applied to the instrument port in step d), place the block valve in the closed position.

a) Observe the output pressure. Set output pressure per table 8.0 using the i.O. Turning the drum in the direction of increasing numbers will reduce the output pressure.

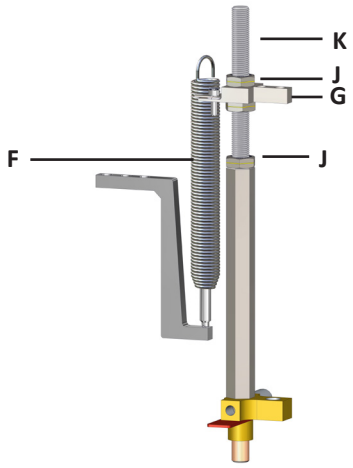
Note: Raising the output pressure will reduce sensitivity and bleed gas at steady state.

b) At this point the unit is properly adjusted if an increase or decrease in the input signal of 0.25 psig causes the output gauge to swing in either direction.

Note: *When increasing or decreasing the instrument signal, the output pressure should swing up and down respectively. When changing direction of the false instrument signal, the output pressure should immediately reverse direction. Any "bump" or initial reaction of the gauge in the wrong direction indicates friction within the components of the positioner. In the case where friction is a problem the positioner must be disassembled and rebuilt to eliminate it.*

2. BIAS ADJUSTMENT

The bias, or offset, determines the input signal at which the positioner begins to stroke the valve. Give the positioner an input signal equal to the low value of the input range (usually 3 or 6 psig). The 7/16-20 JAM NUTS RH 3/6 SS (J) must be loosened before adjustment.



For Standard (Non-Split range) Systems:

Step 1: To increase the bias setting, increase tension on the RANGE SPRING (F). This is accomplished by either raising the RANGE SPRING RETAINER (G) or screwing the BIAS ADJUSTMENTING STUD (K) into the indicator bar or tail rod. When properly adjusted, tighten the 7/16-20 JAM NUTS RH 3/6 SS (J).

Step 2: In order to decrease the bias setting, decrease tension on the RANGE SPRING (F) by either lowering the RANGE SPRING RETAINER (G) or screwing the BIAS ADJUSTMENTING STUD (K) out of the indicator bar or tail rod. When properly adjusted, tighten the 7/16-20 JAM NUTS RH 3/6 SS (J). For Split Range Systems refer to Table 6.0 on PG. 7

Step 3: The bias adjustment for Split Range Positioner
- a. Lock the G in the middle of its available positioner.
- b. Use bias adjustment screw instead of the G to adjust bias tension.

3. RANGE ADJUSTMENT

Note: *There will be some interaction between range and bias adjustments. It may therefore be necessary to readjust the bias and re-check the range after completing the following steps. The range, or the amount of travel between the lower and upper limits of the input signal, is set with the range spring. This range will typically be 12 psi for a 3-15 psi system or 24 psi for a 6-30 psi system. The limits of the range can be defined as the initial point at which the instrument signal to the VGP-DA-SN creates creates full differential pressure across cylinder top and bottom gauges. (equal to the power gas pressure) or zero (depending on the positioner and actuator action) output pressure.*

Step 1: After setting the bias for the start of the valve travel, continue increasing the instrument signal until full stroke of the valve is achieved.

Step 2: The upper end of the range will be found when the valve travel indicator reaches the end of stroke and the cylinder top and bottom pressures are equal. Continue changing the signal an additional 1/2 psi until one gauge reads the power gas and the second gauge reads zero pressure. The bleed gas will stop at this time.

Step 3: If the range is less than desired (i.e. the actuator reaches its full travel in less than the specified input range), strengthen the range spring by winding it counterclockwise onto the spring retainer. If the range is greater than desired, weaken the range spring by winding it clockwise. Repeat adjustments until the desired range provides full or zero output.

Step 4: If the desired range is not achieved after making the above adjustments, re-adjust the bias (per the previous instructions) to allow proper range adjustment.

Step 5: It may be necessary to change the range spring screw for some non-standard ranges.

TABLE 10.0 RANGE SPRING SCREW

PD-5098	VGP RANGE SCREW 7/8 LNG
PD-5100	VGP RANGE SCREW 1-5/8 LNG
PD-5101	VGP RANGE SCREW 2-1/4 LNG

TABLE 11.0 Piping Diagram Guide

Diagram No.	VGP	Part Number	Actuator	Actuator Mode	Accessory	Discharge
1	VGP-100-DA-SN (OI)	PA-0175	Piston	Double Acting	NVD	ATM
1A	VGP-100-DA-SN (OI)	PA-0175	Piston	Double Acting	NVD, VMO	ATM
1B	VGP-100-DA-SN (OI)	PA-0175	Piston	Double Acting	NVD, BOOSTER	ATM
1C	VGP-100-DA-SN (OI)	PA-0175	Piston	Double Acting	NVD, VMO, BOOSTER	ATM
2	VGP-100-DA-SN (CI)	PA-0170	Piston	Double Acting	NVD	ATM
2A	VGP-100-DA-SN (CI)	PA-0170	Piston	Double Acting	NVD, VMO	ATM
2B	VGP-100-DA-SN (CI)	PA-0170	Piston	Double Acting	NVD, VB	ATM
2C	VGP-100-DA-SN (CI)	PA-0170	Piston	Double Acting	NVD, VMP. VB	ATM

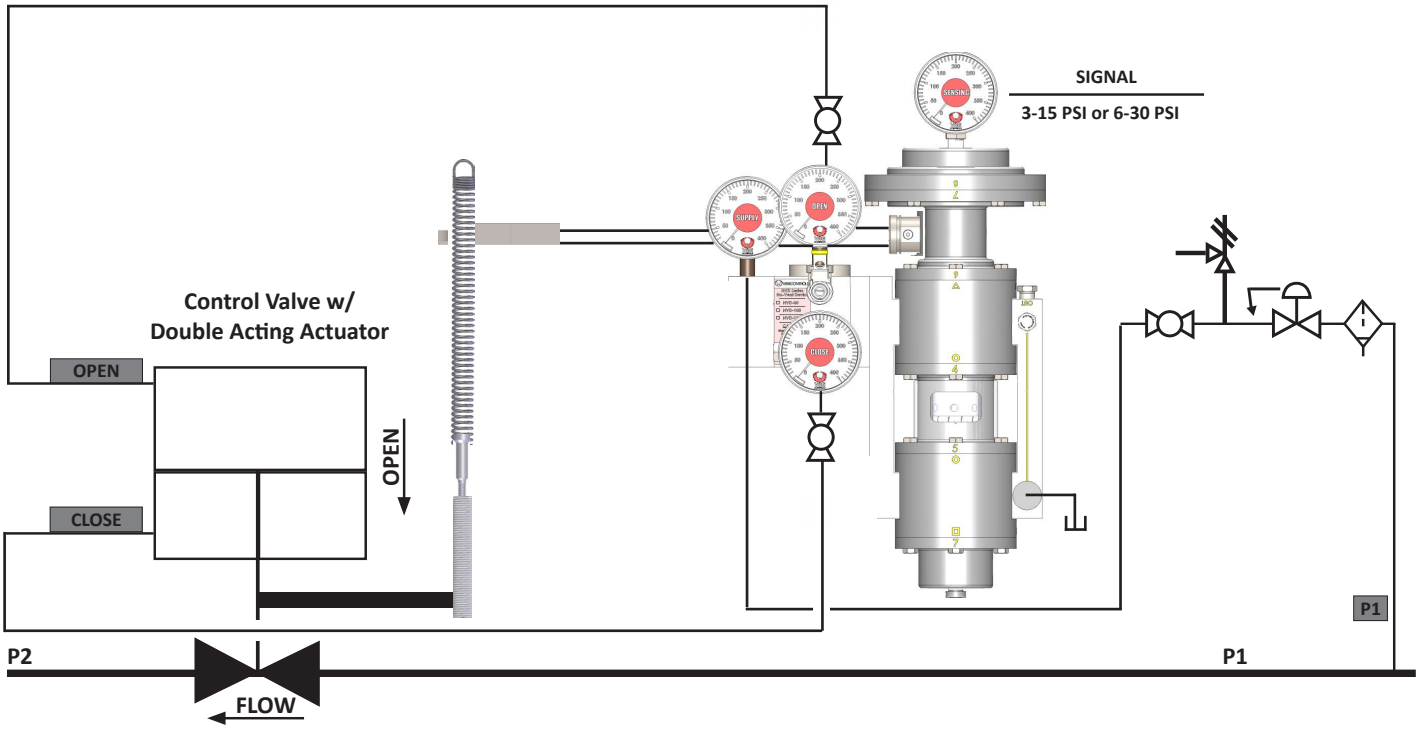
Note: *Addition of split range will not change the diagrams configuration.*

Action open/close on increasing depends on direction of the feedback mechanism. The table refers to "down to open" mechanisms. If mechanism is "down to close" the action will reverse.

All shown diagrams have feedback mechanism "down to open".

Diagram 1	Part Number	Actuator	Actuator Mode	Accessory	Discharge
VGP-100-DA-SN (OI)	PA-0175	Piston	Double Acting	NVD	ATM

OPEN ON INCREASING SIGNAL



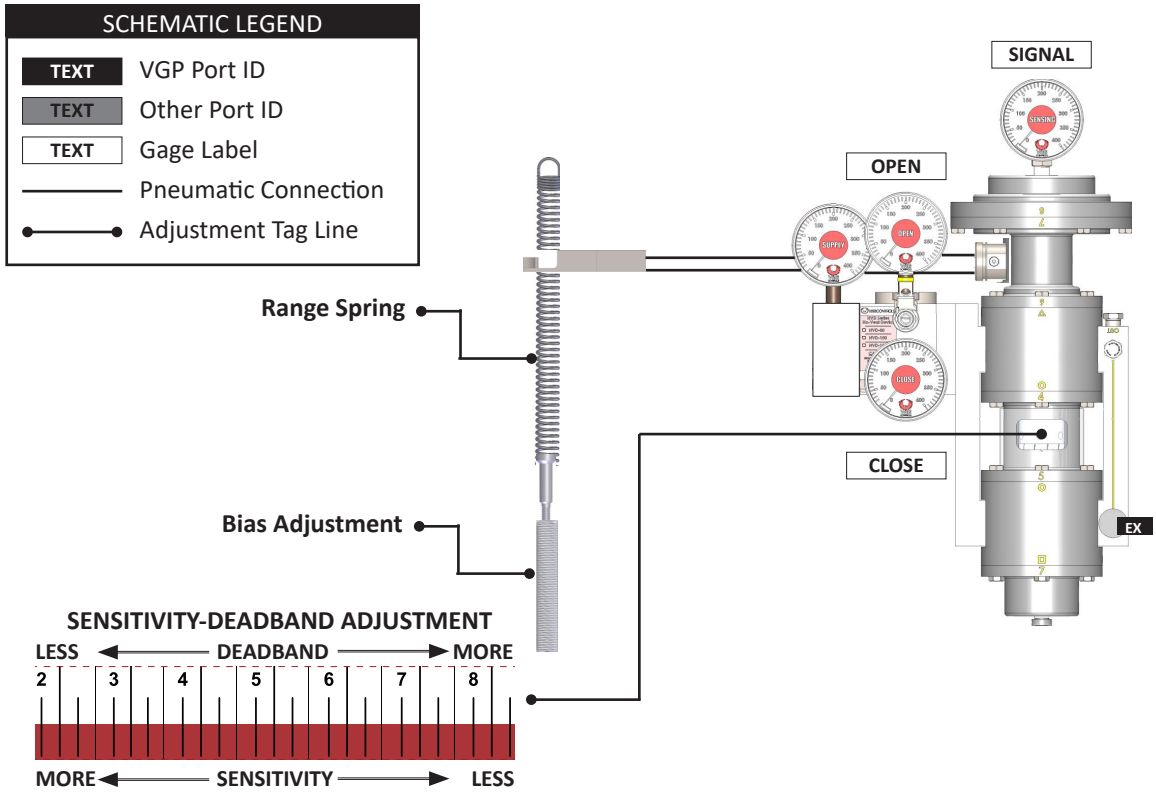
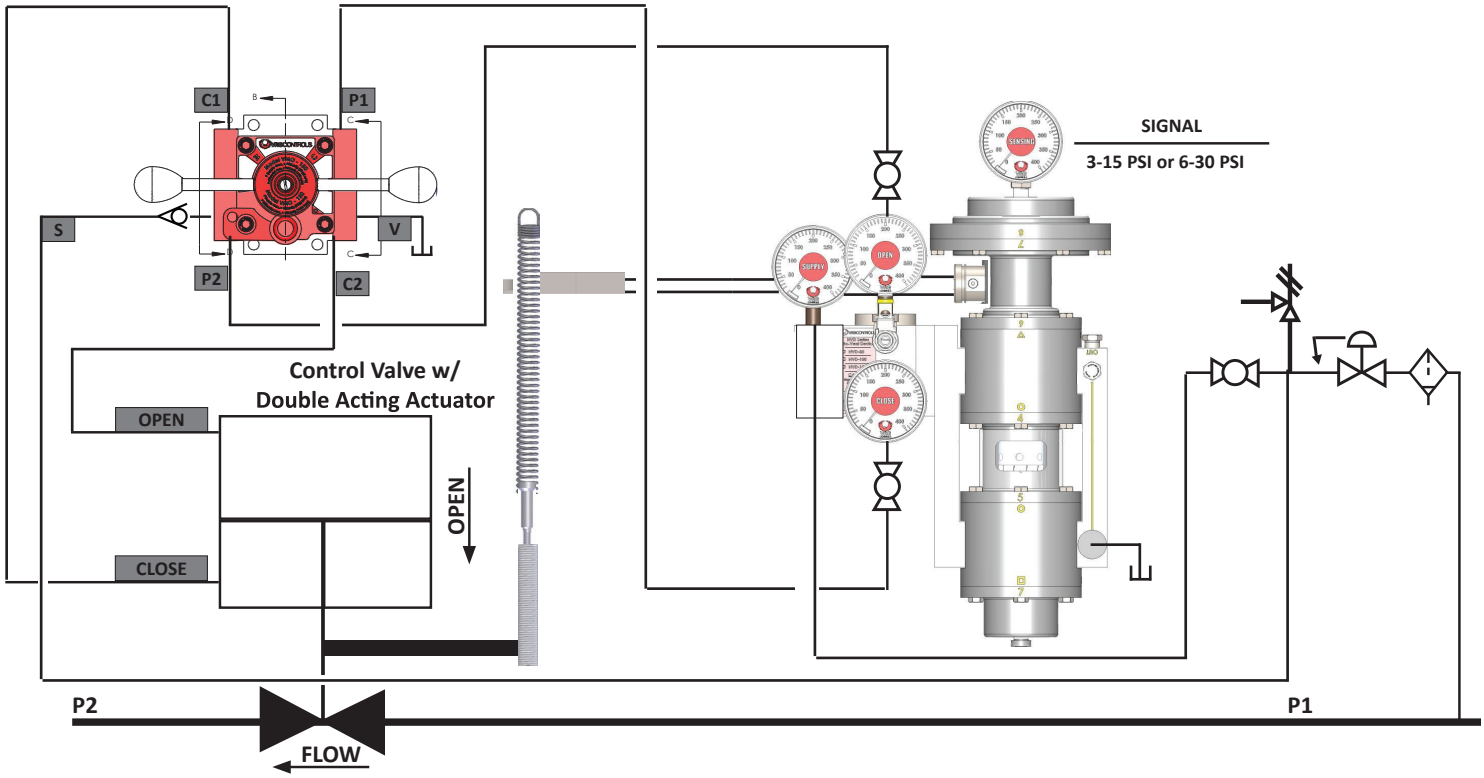


Diagram 1A	Part Number	Actuator	Actuator Mode	Accessory	Discharge
VGP-100-DA-SN (OI)	PA-0175	Piston	Double Acting	NVD, VMO	ATM

OPEN ON INCREASING SIGNAL



SCHEMATIC LEGEND

TEXT	VGP Port ID
TEXT	Other Port ID
TEXT	Gage Label
	Pneumatic Connection
	Adjustment Tag Line

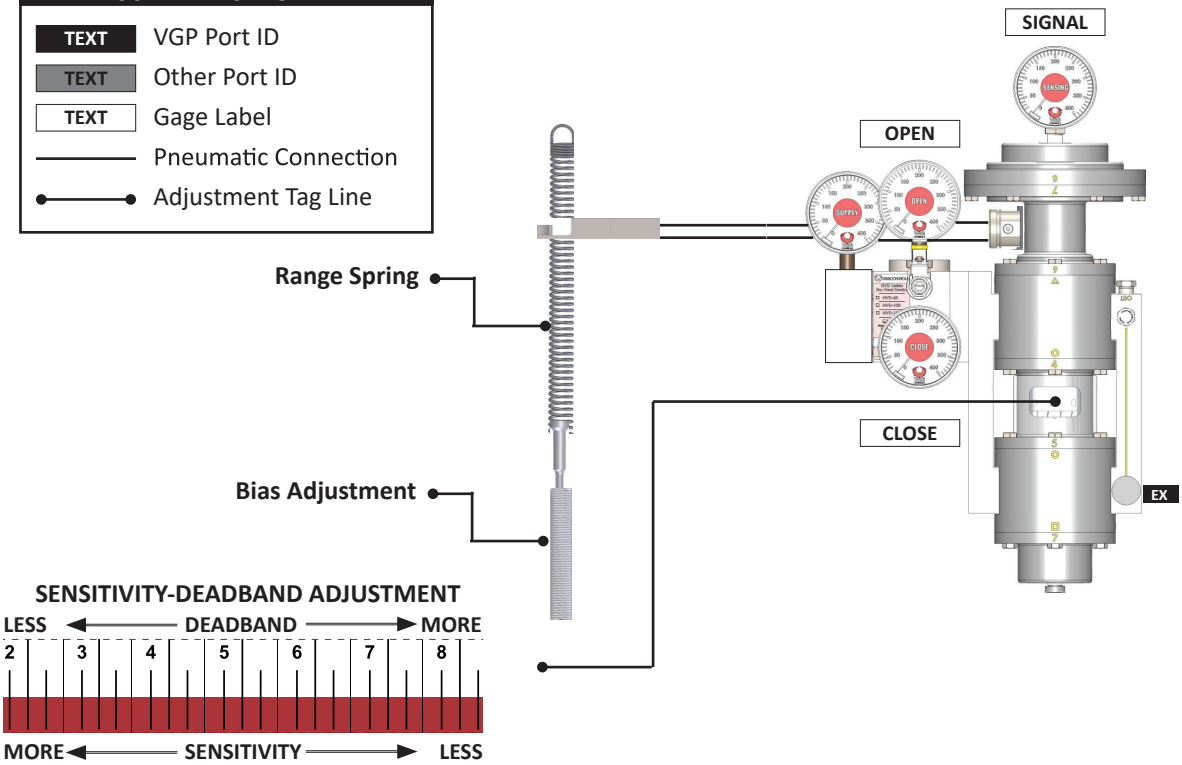
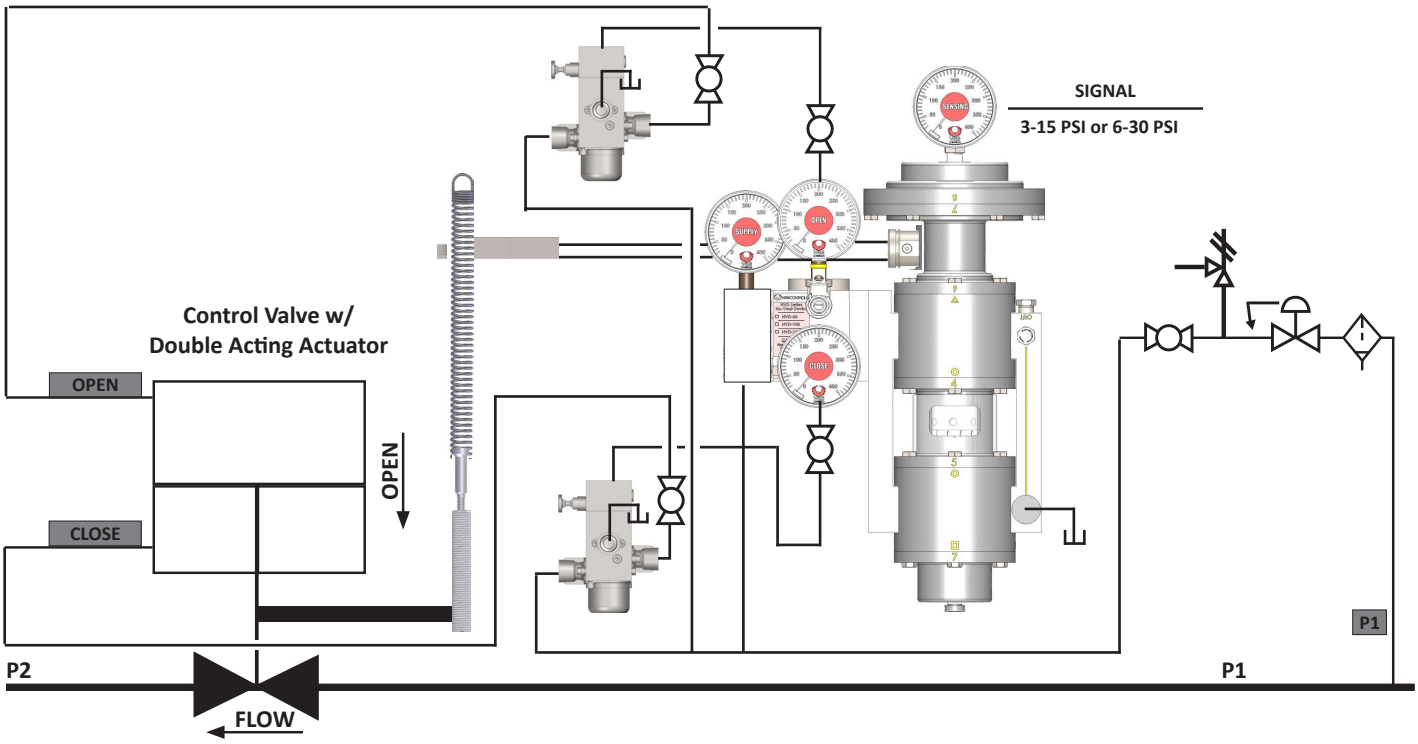


Diagram 1B	Part Number	Actuator	Actuator Mode	Accessory	Discharge
VGP-100-DA-SN (OI)	PA-0175	Piston	Double Acting	NVD	ATM

OPEN ON INCREASING SIGNAL



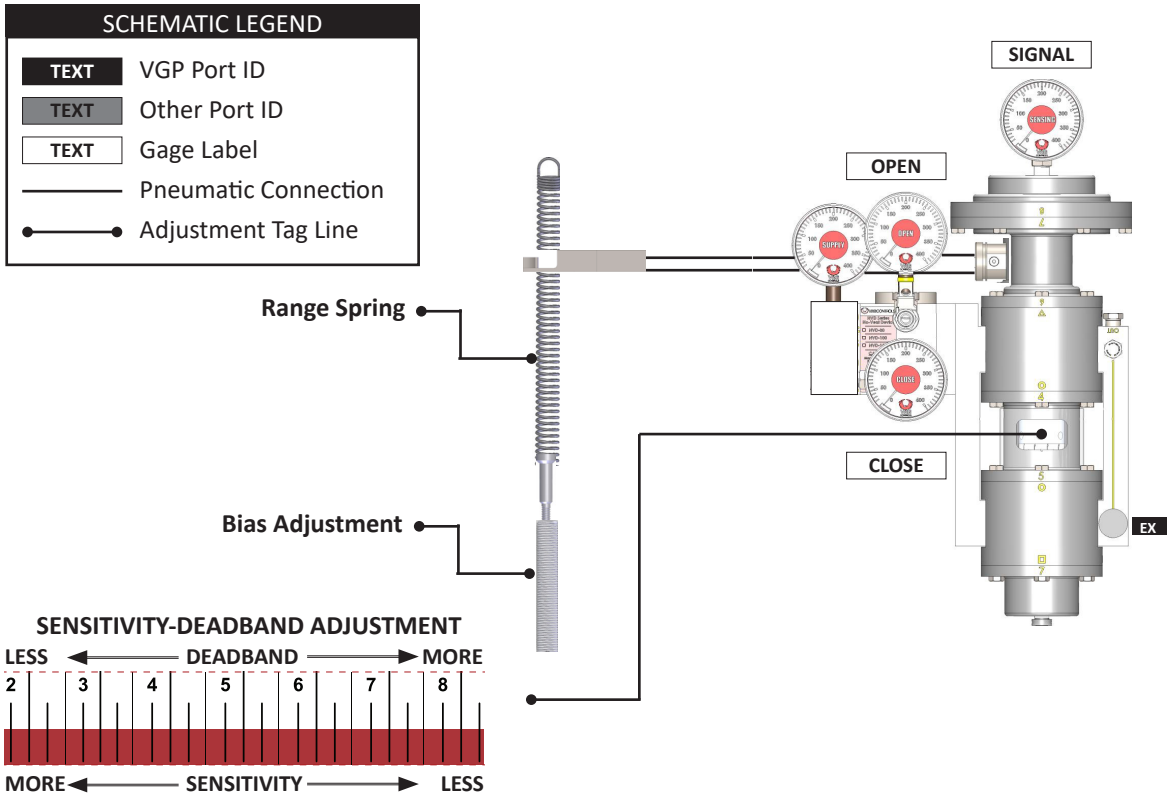
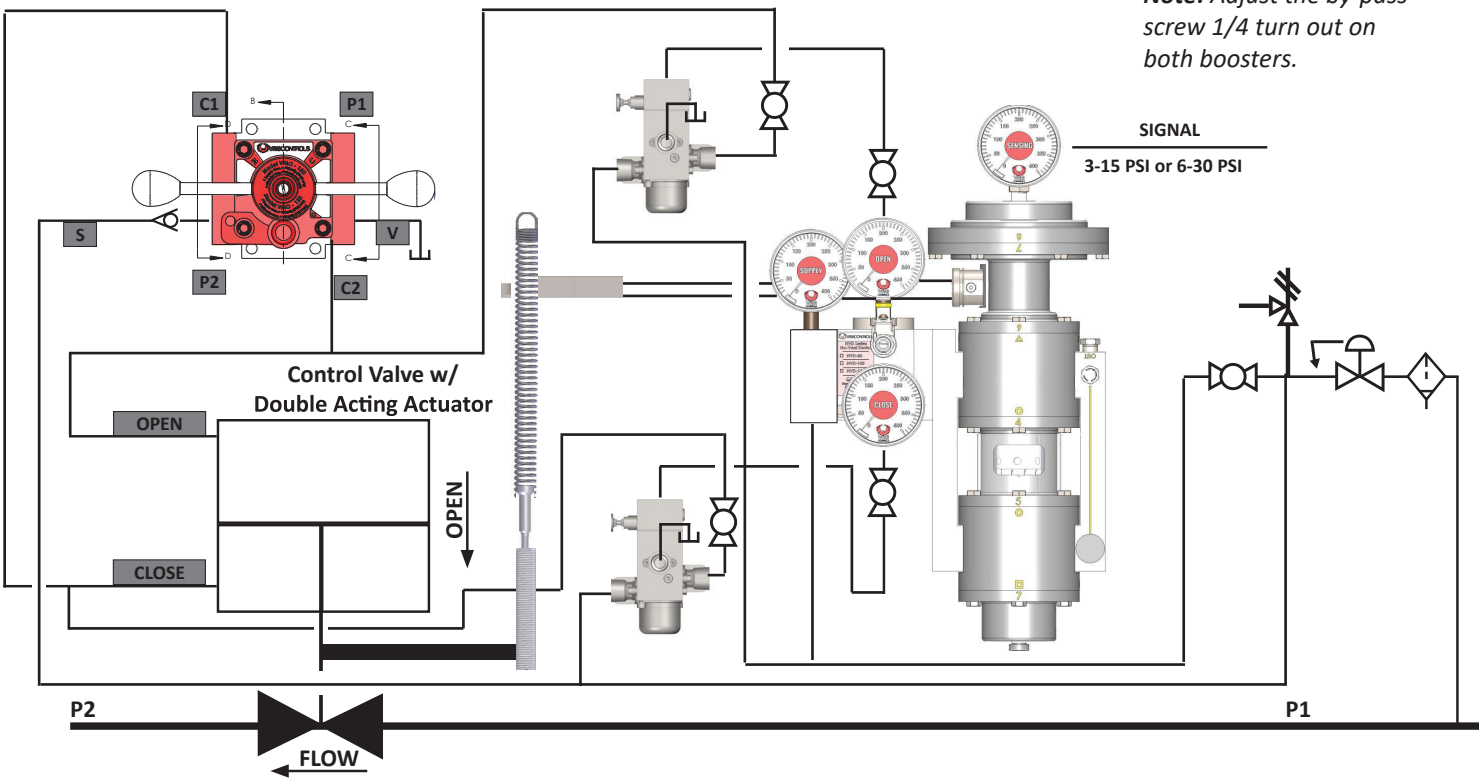


Diagram 1C	Part Number	Actuator	Actuator Mode	Accessory	Discharge
VGP-100-DA-SN (OI)	PA-0175	Piston	Double Acting	NVD, VMO	ATM

OPEN ON INCREASING SIGNAL

Note: *Adjust the by-pass screw 1/4 turn out on both boosters.*



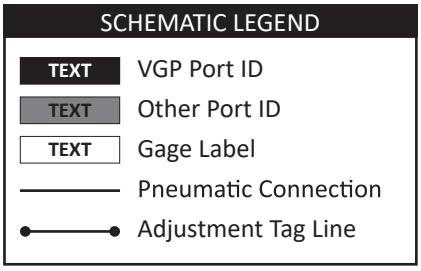
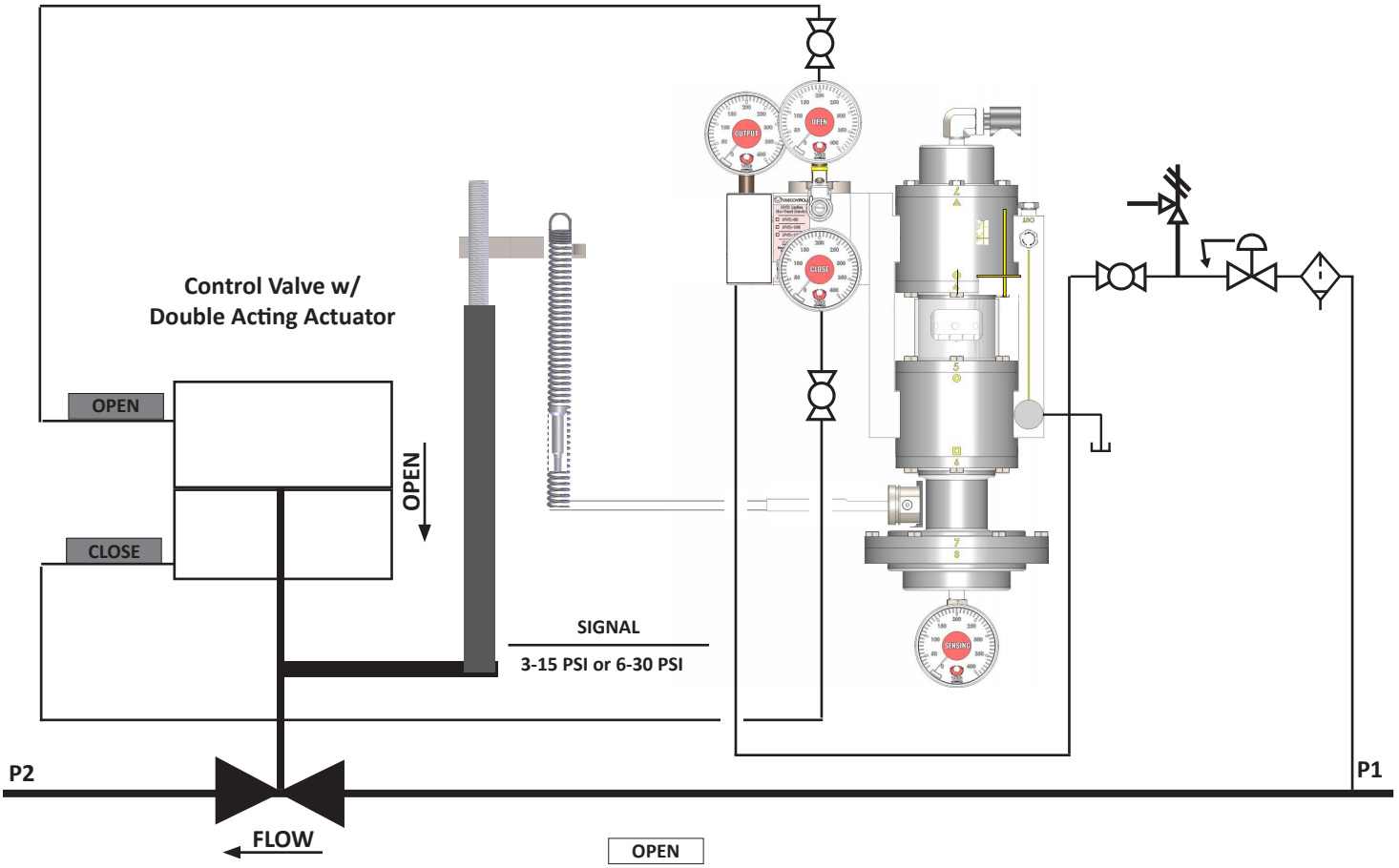
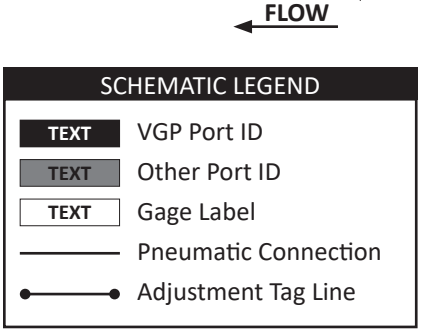


Diagram 2	Part Number	Actuator	Actuator Mode	Accessory	Discharge
VGP-100-DA-SN (CI)	PA-0170	Piston	Double Acting	NVD	ATM

CLOSED ON INCREASING SIGNAL





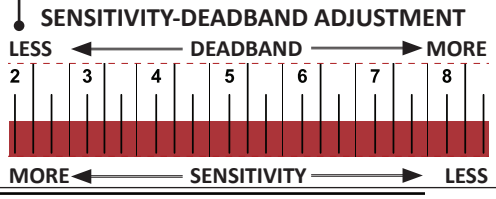
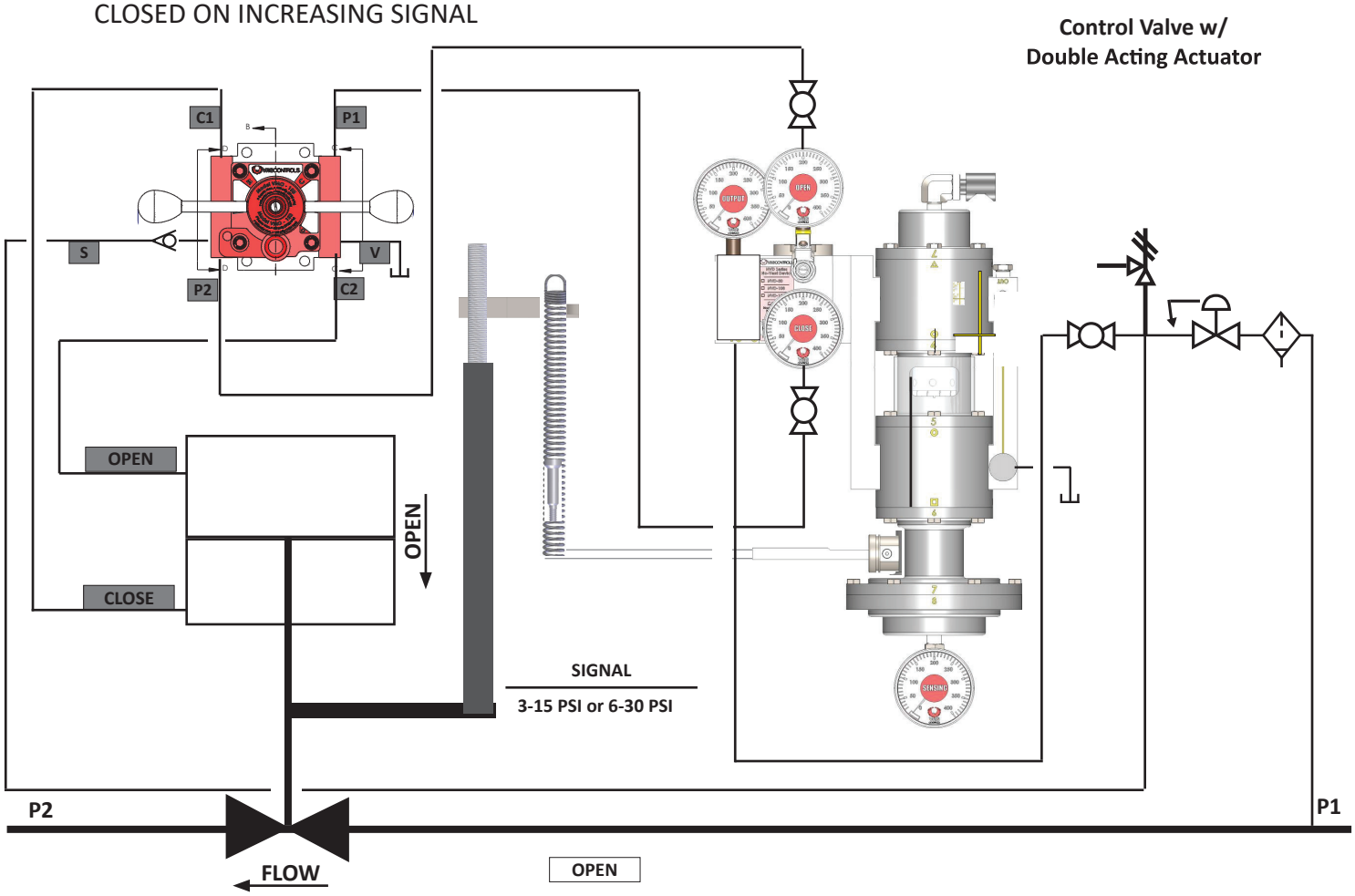


Diagram 2A	Part Number	Actuator	Actuator Mode	Accessory	Discharge
VGP-100-DA-SN (CI)	PA-0170	Piston	Double Acting	NVD, VMO	ATM

CLOSED ON INCREASING SIGNAL



SCHEMATIC LEGEND

TEXT	VGP Port ID
TEXT	Other Port ID
TEXT	Gage Label
	Pneumatic Connection
	Adjustment Tag Line

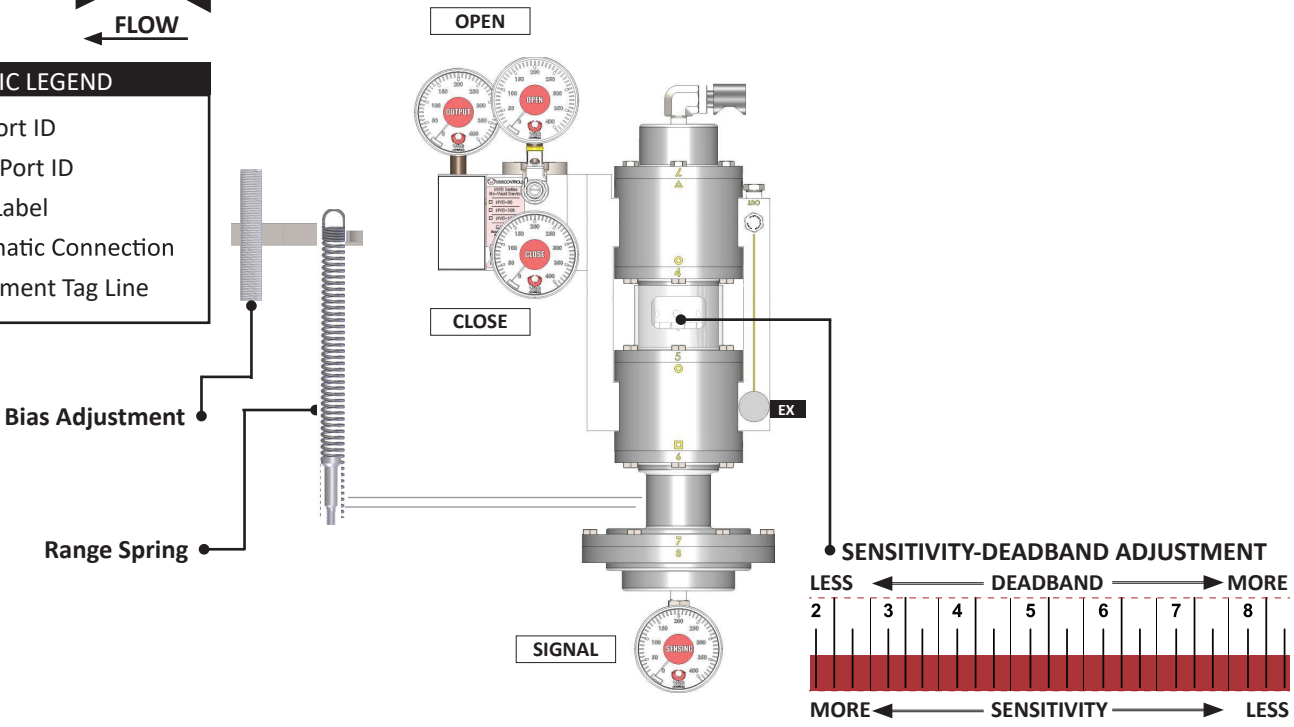
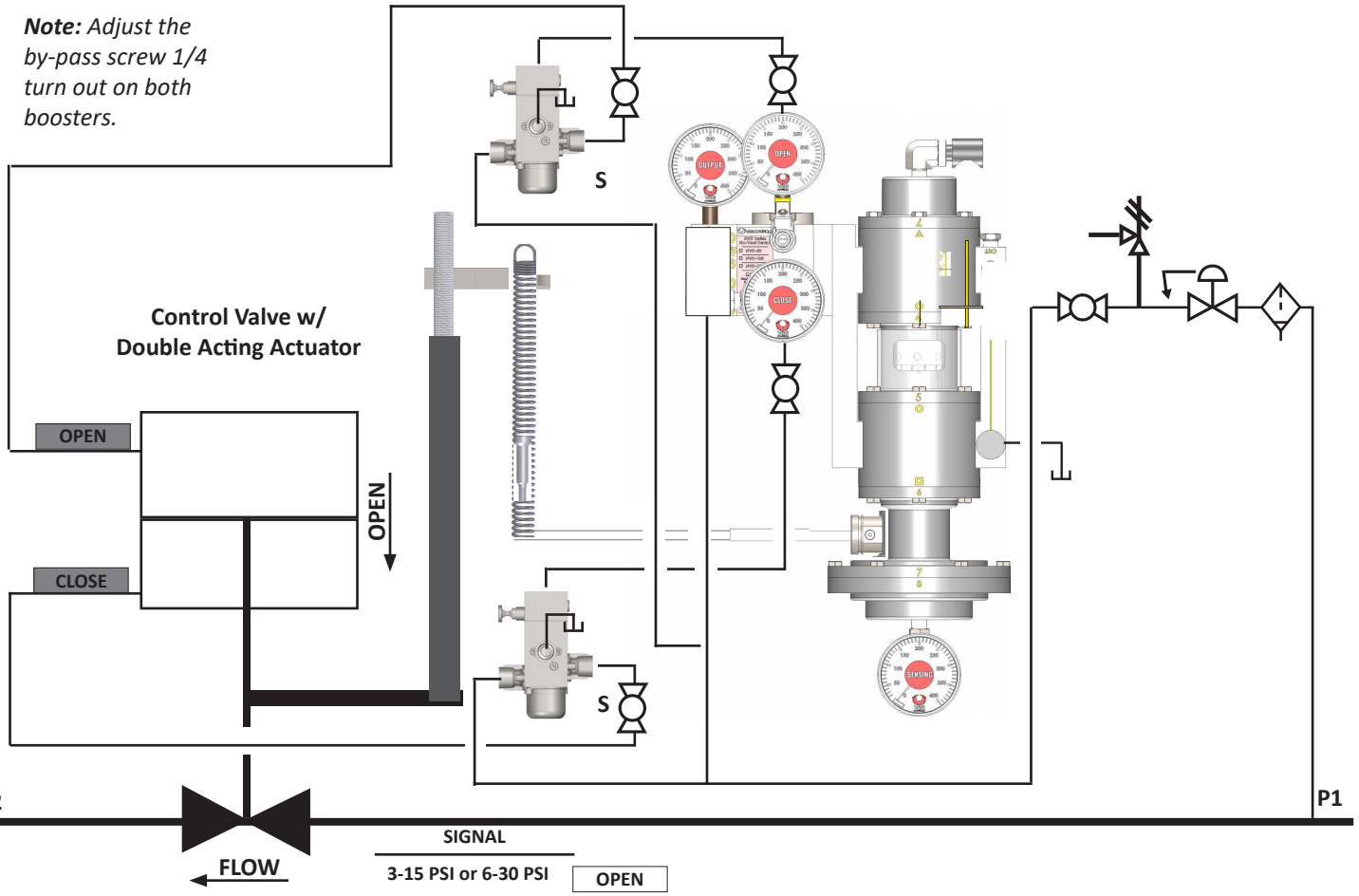


Diagram 2B	Part Number	Actuator	Actuator Mode	Accessory	Discharge
VGP-100-DA-SN (CI)	PA-0170	Piston	Double Acting	NVD, VB	ATM

CLOSED ON INCREASING SIGNAL

Note: *Adjust the by-pass screw 1/4 turn out on both boosters.*



SCHEMATIC LEGEND

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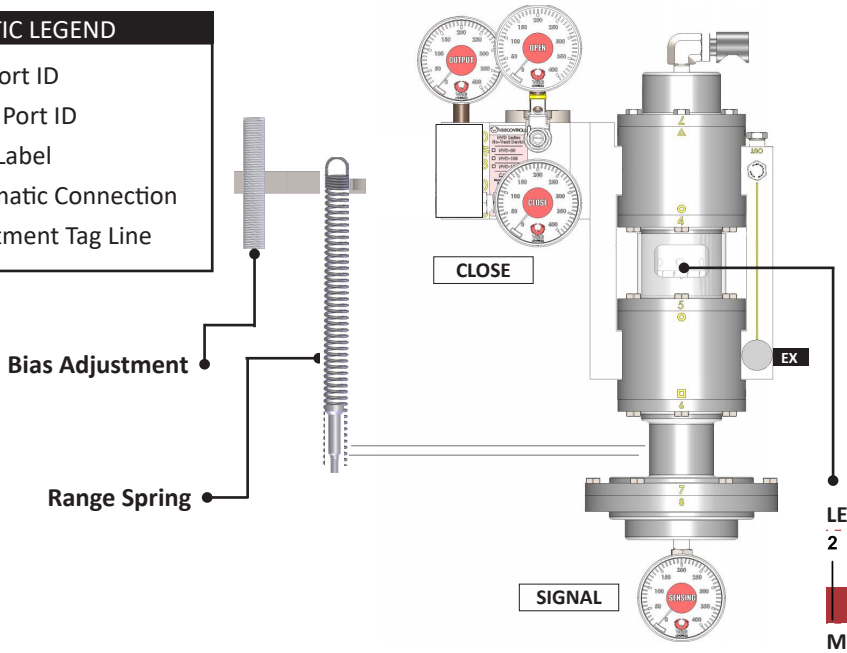
TEXT	Other Port ID
TEXT	Gage Label
	Pneumatic Connection
	Adjustment Tag Line



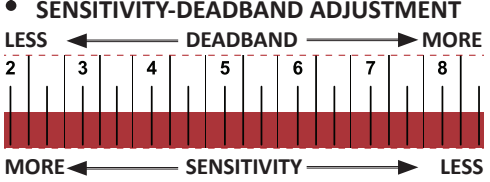
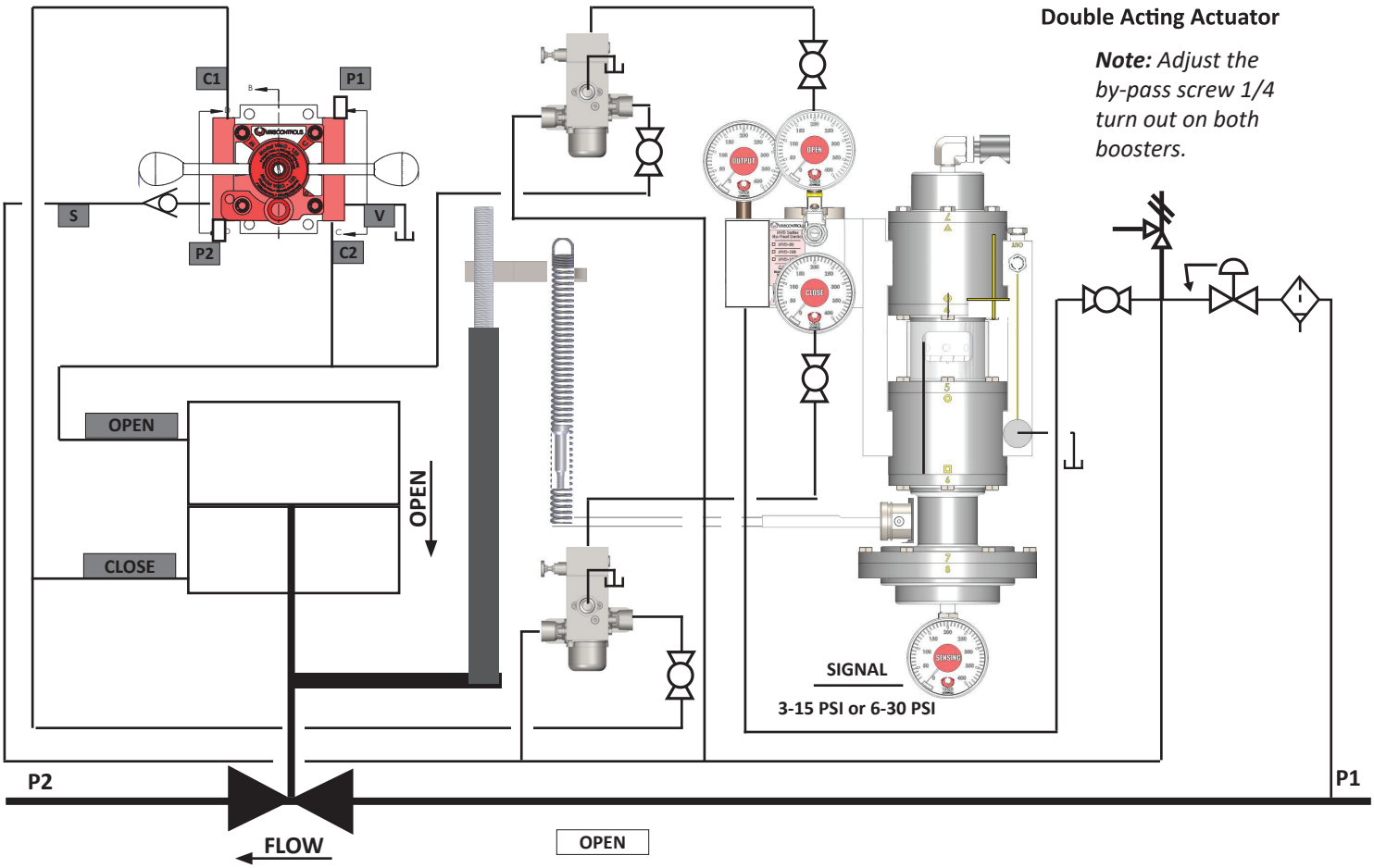


Diagram 2C	Part Number	Actuator	Actuator Mode	Accessory	Discharge
VGP-100-DA-SN (CI)	PA-0170	Piston	Double Acting	NVD, VB	ATM

CLOSED ON INCREASING SIGNAL

Control Valve w/ Double Acting Actuator

Note: *Adjust the by-pass screw 1/4 turn out on both boosters.*



SCHEMATIC LEGEND

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TEXT	Other Port ID
TEXT	Gage Label
	Pneumatic Connection
	Adjustment Tag Line

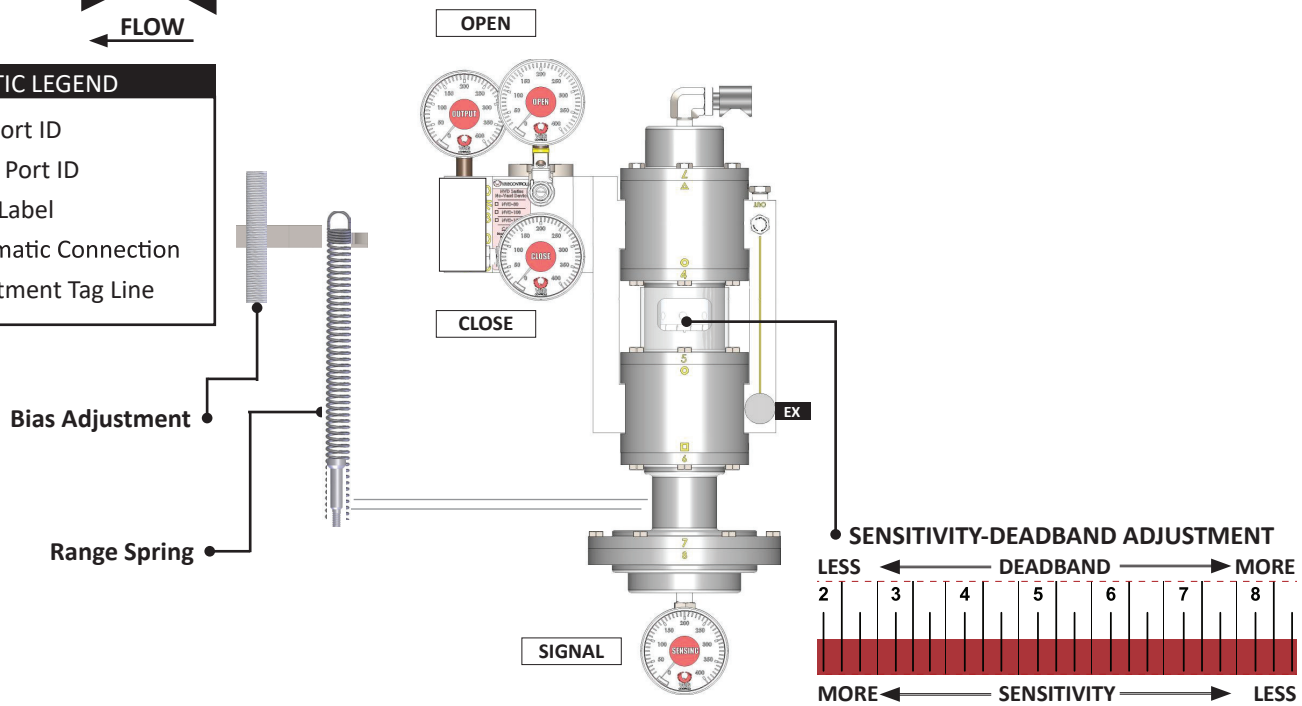

TABLE 12.0 VGP - SN (Seat and Nozzle) Repair Kit Bill of Materials BOM Packing

Repair Kit	Part No.	Notes:
VGP-SN Repair Kit	RK-0620	

This Repair Kit Fits Following VRG Models:

VGP-100-DA-SN **VGP-100-DA-SN-SPL**

Item	Part Number	Description	Type	QTY	CHECK
1	EL-0090	VGP-100 Diaphragm	Diaphragms	1	☐
2	EL-0010	Diapgragm Hole-700 psi, Buna	Diaphragms	4	☐
3	EL-0200	O-Ring, -010, Buna, 3/8 x 1/4 x 1/16	O-Rings	6	☐
4	EL-0220	O-Ring, -012, Buna	O-Rings	9	☐
5	EL-0220	O-Ring, -014, Buna	O-Rings	4	☐
6	N/A	Mobilith SHC 220 Standard	VRG Lubricant	1	☐

TABLE 12.0 Factory Quality Checklist VGP Valve Gas Positioner

Date:			
VRG Invoice Number:			
Technician Name:		**Technician Signiture:**	
QC Name:		**QC Signiture:**	
Model Number:			
Serial Number:			
Customer:			
Customer Tag:			
Supply Pressure			
Discharge Pressure			
Orifice Setting _____	□ Open		
Orifice Setting _____	□ Close		

Procedure	Verified	Notes
Apply Maximum Sensing Pressure 30 min.	□ VERIFY	
Adjust VGP to Setpoint	□ VERIFY	
Friction Test	□ VERIFY	
Gage Check	□ VERIFY	
Valve Leak Check	□ VERIFY	
Assembly Leak Check	□ VERIFY	
Sensitivity/Deadband Adjustment (Initial)	□ VERIFY	
Sensitivity/Deadband Adjustment (Adjusted)	□ VERIFY	
Sensitivity Check	□ VERIFY	
Label Check	□ VERIFY	
Notes:		

VGP "SN" Series Valve Gas Positioner Annual Maintenance Checklist

1. _____ VRG Controls recommends functional inspection of VGP "SN" Series Valve Pilot Controllers on an annual basis.

2. _____ Isolate and remove pressure from all VGP "SN" components. Clean and inspect Adjustable Orifice Assemblies. Repressurize as appropriate.

3. _____ Soap Test All Diaphragm Mating Surfaces And Adjustable Orifice Assembly to Check for Leaks.

4. _____ Check Integrity of VGP "SN" Pilot Seat Assemblies by increasing/decreasing the signal such that full differential pressure is achieved on CLOSE/OPEN gages.

5. _____ Replace Elastomers Utilizing VRG Controls VGP "SN" Series Repair Kit if leaks are found. See the Assembly Manual for the VGP "SN"Series Valve Pilot Controller.

6. _____ Check sensitivity of VGP "SN". Confirm proper cylinder balance pressures (OPEN / CLOSE Gages). See Table 8.0.

7. _____ Observe Operation Of All Gages And Replace If Defective.

8. _____ Perform Internal Friction Test (increase/decrease the signal at midrange) observe accurate movement of the output gauge in correct direction.

> ***Note:*** *When increasing or decreasing the instrument signal, the output pressure should swing up and down respectively. When changing direction of the false instrument signal, the output pressure should immediately reverse direction. Any "bump" or initial reaction of the gauge in the wrong direction indicates friction within the components of the positioner. In the case where friction is a problem the positioner must be disassembled and rebuilt to eliminate it.*

9. _____ Inspect And Verify Proper Operation Of All VGP "SN" Accessories.

> ***Note:*** *It is not necessary to replace any elastomers in VRG Controls instrumentation or instrumentation accessories on a regular basis. Industry best practices promote rebuild using a VRG Controls spare parts kit on a 5-year frequency. VRG Controls suggested maintenance frequency should never supersede any mandated regulatory requirements or company mandated maintenance.*

10. _____ PLEASE PROVIDE VGP SERIAL NUMBER TO FACILITATE ASSISTANCE.

ADDRESS: VRG Controls, LLC.
1199-B Flex Court
Lake Zurich, IL 60047, USA
TOLL FREE: (800) 844-FLOW-VRG
FAX: (208) 246-0304
E-MAIL: sales@vrgcontrols.com
WEBSITE: vrgcontrols.com