GE Oil & Gas

Becker* High Pressure Pneumatic Valve Positioners

HPP-SB: Single Acting Positioner

Accurate Valve Positioning for Multiple Control Applications

GE's Becker HPP-SB Pneumatic Positioners Provide Accurate Positioning of Single-Acting Actuated Control Valves

GE's Becker Products' High Pressure Pneumatic (HPP) Single-Acting Positioners represent a breakthrough in valve control technology for the natural gas industry. They work with any Becker single-acting series actuator (spring and piston type) to accurately position valves in a variety of control applications, including pressure control, flow control, power plant type pressure control, power plant type flow control, and surge control. The product's design includes features that improve process performance, resist vibration under demanding conditions while continuing calibration, assure long service life, eliminate atmospheric bleed gas, and perform in fast-acting applications.

HPP-SB Positioner Applications

- Pressure control
- Flow control
- Power plant type pressure control
- Power plant type flow control
- Surge control

Compatible Actuators

- RPSR Series
- LPSR Series
- LD Series

Figure 1 - HPP-SB Single-Acting Valve Positioner

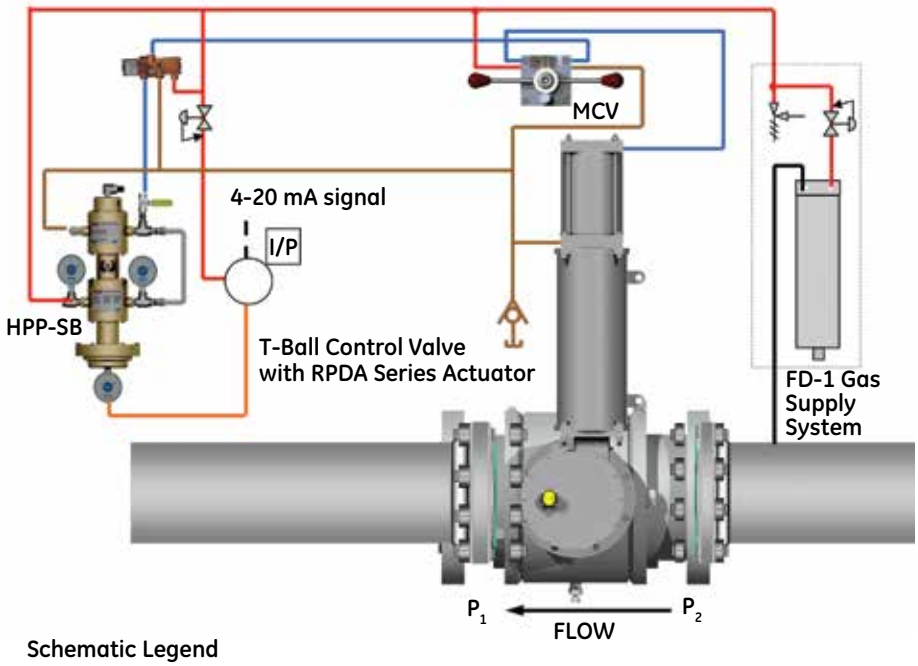

Figure 2 - HPP-SB positioner installed on GE's Becker Products' RPSR Series Actuator installed on Becker RPSR Series Actuator

The HPP-SB positioner may be utilized with any Becker single-acting series actuator (spring and piston type) for accurate positioning of control valves.

The HPP-SB positioner is designed to accept a pneumatic instrument signal from an I/P transducer or a pneumatic controller. The HPP-SB positioner is available in both reverse and direct-acting with a variety of instrument signal input ranges. The configuration shows the HPP-SB positioner mounted on a Becker RPSR Series actuator. The HPP-SB positioner features ZERO bleed at steady state combined with high speed response.

Schematic Legend

- Line Pressure
- Exhaust
- Power Supply
- Loading Pressure
- Sensing

Benefits

- Superior resolution and sensitivity and positioning capabilities for improved process performance
- High flow capacity of any valve positioner in the industry, makes well-suited for fast-acting applications including compressor surge control
- ZERO bleed when control valve is full open and full closed.
- Balanced seat design exhibits ZERO bleed when process is at steady state
- Becker positioner's unique Bleed to Pressure System* (BPS) feature allows for complete elimination of atmospheric bleed gas by maintaining vent gas within the process piping
- Stable, accurate positioning with minimal overshoot
- Vibration resistant design will perform in the most demanding applications and maintain calibration — annual adjustments required
- Anodized AL 2024 Aluminum and Stainless Steel construction provide rugged durability for long life

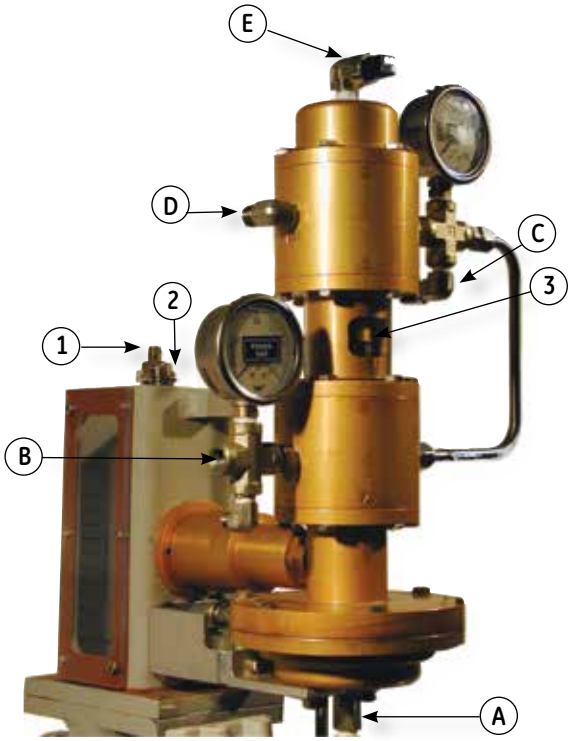

Figure 3 - HPP-SB Single-Acting Valve Positioner

HPP-SB Positioner Port Definitions	Port Size	Item
Instrument Signal (Input)	1/4" FNPT	A
Power Gas Supply (Input)	1/2" FNPT	B
Actuator Loading (Input)	1/4" FNPT	C
Exhaust (Discharge)	1/4" FNPT	D
Breather Vent	1/4" FNPT	E

Reference Figure 3.

Table 2 - HPP-SB Positioner Adjustments

HPP-SB Positioner Adjustments	Item
Bias Adjustment (Zero/Offset)	1**
Range Adjustment (Span)	2**
Sensitivity (Deadband Adjustment)	3

Reference Figure 3.
** Bias and range adjustments not shown

Improve Performance and Minimize Bleed Gas Emissions

If you already have existing Becker control valve actuators in service with older, obsolete Becker Model HPP-S positioner, the addition of an HPP-SB positioner can improve performance, reduce maintenance, and minimize bleed gas emissions. Becker HPP-SB positioners are compatible to retrofit older Becker Model HPP-S positioners originally installed on Becker RPSR Actuators. Consult your GE representative for more information.

Precision Operation

The HPP-SB positioner configuration shown below is closed on increasing instrument input signal, the control valve will fail open on loss of instrument input signal. The HPP-SB positioner is a force-balanced instrument that provides a control valve position proportional to a pneumatic instrument input signal. The energy to operate the control valve is obtained from the differential between supply gas pressure and discharge gas pressure. From a steady state position (Figure 4.1), an increase in the instrument signal causes the internal pistons to move up and load pressure to the actuator (Figure 4.2), closing the valve. As the force from the positioner range spring increases to a point equal to the diaphragm force created by the instrument input signal, the internal pistons will center. Centering of the internal pistons will close both of the balanced seats and cease loading of the control valve (Figure 4.1). At steady state, the control valve will remain in a fixed position with ZERO bleed. Decrease of the instrument input signal will result in the opposite reaction, opening the valve (Figure 4.3). Note that loss of instrument input signal causes the control valve to fail in the full open position (configuration shown).

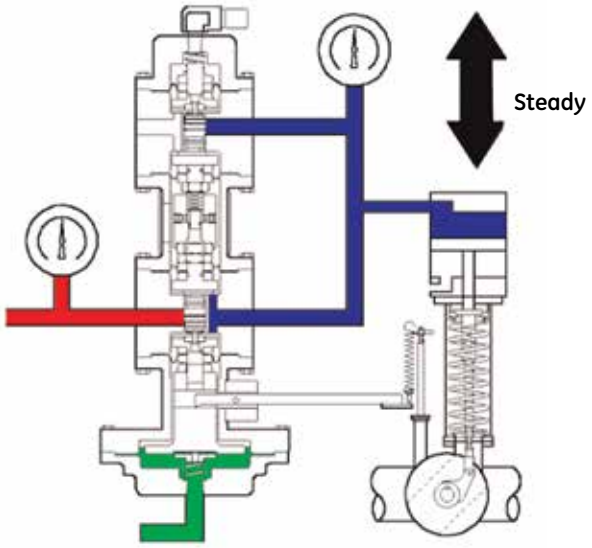

Figure 4.1 - Steady State Position (Fixed)
At steady state, the instrumentation diaphragm force is equal to the feedback spring force, centering the internal pistons and closing the internal balanced seat valves. Steady state conditions exhibit ZERO bleed.

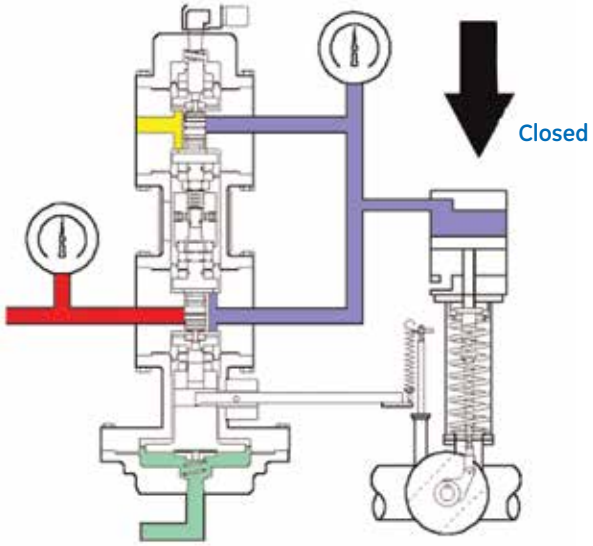

Figure 4.2 - Increase in Instrument Input Signal to CLOSE Valve
An increase in the instrument input signal causes the internal pistons to move up and load pressure to the actuator, closing the valve.

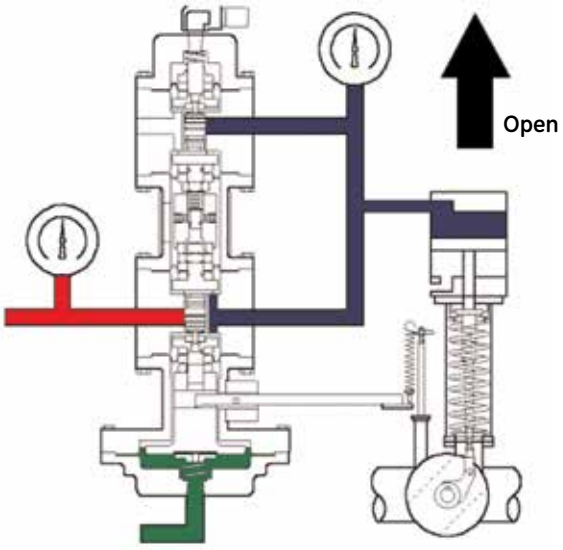

Figure 4.3 - Decrease in Instrument Input Signal to OPEN Valve
A decrease in the instrument input signal causes the internal pistons to move down and exhaust pressure from the actuator, opening the valve.

- Exhaust Pressure (Discharge)
- High Pressure Gas
- Actuator Loading Pressure (Medium Pressure)
- Actuator Loading Pressure (High Pressure)
- Actuator Loading Pressure (Low Pressure)
- Instrumental Signal
- Exhaust Pressure

Table 3 - Technical Specifications for Model HPP-SB Positioner

Technical Specifications	
Steady State Gas Consumption	ZERO (See Table 3)
Supply Gas	Dry, filtered (100 micron gas 500 psig maximum
Maximum Flow Capacity	2400 scfh (40 scmh)
Maximum Supply-Discharge Differential	150 psig (1034 kPa)
Minimum Supply-Discharge Differential	50 psig (348 kPa)
Operative Ambient Temperature Range	-20°F to +160°F (-29°C to +71°C)
Approximate Weight	12 lbs. (5.4 kg)
Minimum Deadband	0.2% instrument signal
Independent Linearity	± 1.0% positioning range
Resolution	0.1% of position range
Instrument (Input) Signal Ratings	3-15 psig, 6-30 psig (standard) (See Table 2)
Available Stroke Lengths	2", 4", 6", 8", 12" (See Table 4) reverse-acting/direct acting
Housing	Meets NEMA 3 Classification
Installation Orientation	Vertical position recommended
Materials of Construction	
External Parts	Anodized AL2024, 316SS available (for marine environments)
Springs	316 SS and anodized AL 2024
Diaphragms	Buna-n reinforced by nylon fabric
Seats and O-rings	Buna-n
Tubing and Tubing Fittings	316 SS
Gauges	2-1/2" dial liquid filled brass connection w/stainless steel case (standard issue with units of pisg dual units of psig/ kPa available

Notes
1. Direct-Acting: increasing instrument signal causes control valve to close (fail-open upon loss of instrument signal)
2. Reverse-Acting: decreasing instrument signal causes control valve to close (fail-closed upon loss of instrument signal)

Table 4 - Bleed rates (consumption) for Becker Control Instrumentation
Becker Control Instrumentation features low bleed and ZERO bleed technologies to minimize fugitive natural gas emissions and environmental impact.

	VRP-CH Pilot	VRP-B-CH Pilot	VRP-SB-CH Pilot	VRP-SB-GAP Pilot	VRP-SB-PID Pilot	HPP-4 Positioner	HPP-5 Positioner	HPP-SB Positioner	DNGP Positioner
Bleed Rates (Consumption)									
Steady State Bleed[3]	~100	<10	zero	zero	zero	~100	<10	zero	zero
Non-Bleed Full-Open/Full-Closed	Y_1	Y_2	Y	Y	Y	Y_1	Y_2	Y	Y
Bleed to Pressure System (BPS)[4]	Y	N	Y	Y	N	Y	Y	Y	Y

Notes
1. Requires Model PS-2 or NBV Non-Bleed Device to eliminate bleed
2. Requires Model DPS-2 or NBV Non-Bleed Device to eliminate bleed
3. Bleed rates are estimated utilizing Supply Gas Pressure = 100 psig
4. Bleed to Pressure System (BPS) eliminates all atmospheric bleed

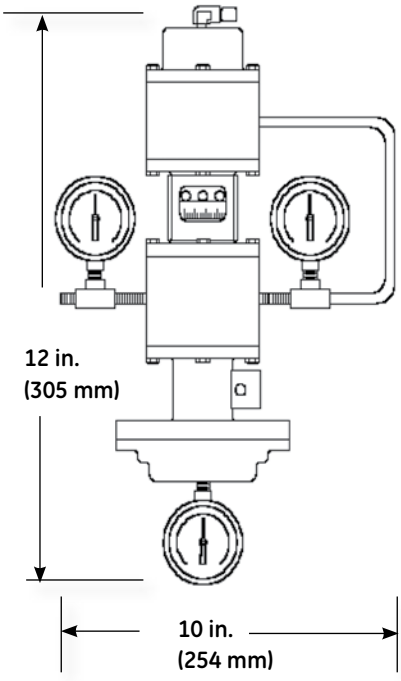

Figure 5 - Overall dimensions of HPP-SB positioner (standard range)

Table 5 - Bias and Range Spring Part Numbers for Specific Model HPP-SB Positioner Actuator Stroke Lengths

Signal Range	Spring Type	2" (51 mm)	4" (102 mm)	6" (152 mm)	8" (203 mm)	12" (305 mm)
3-15 psig (21-103 kPa)	Range Spring	25-1151	25-1151	25-1152	25-1153	25-1154
	Bias Spring			Not Required		
6-30 psig (41-207 kPa)	Range Spring	25-1218	25-1218	25-1219	25-1220	25-1221
	Bias Spring			Not Required		
3-9 psig (21-62 kPa)	Range Spring	01-6288	01-6288	01-6287	01-6287	01-6801
	Bias Spring			Green (20-2592)		
9-15 psig (62-103 kPa)	Range Spring	01-6288	01-6288	01-6287	01-6287	01-6801
	Bias Spring			Blue (25-1036)		
6-24 psig (41-166 kPa)	Range Spring	25-1599	25-1599	25-1600	25-1601	25-1602
	Bias Spring			Silver (25-1038)		
18-30 psig (124-207 kPa)	Range Spring	25-1151	25-1151	25-1152	25-1153	25-1154
	Bias Spring			Red (25-1037)		

Standard model range springe and bias spring part numbers for the Model HPP-SB positioner. Other configurations are available upon request.

Repair or Rebuild?

Becker instrumentation rebuild kits are available from stock for regular maintenance or emergency needs. To order repair kits for your Becker products call us toll-free at (800) 323-8844, or contact your local sales representative.

Model HPP-SB Pneumatic Positioner Repair Kit* (Standard Range) Part Number 35-0210

*Includes all rubber goods and finite life items for rebuild or repair for HPP-SB.

Figure 6 - Becker HPP-SB Pneumatic Positioners
Becker HPP-SB positioners are available in both reverse-acting and direct-acting.
Standard instrument signal ranges are 3-15 psig and 6-30 psig.
Alternate instrument ranges are available for split range control to enable staging of control valve runs.

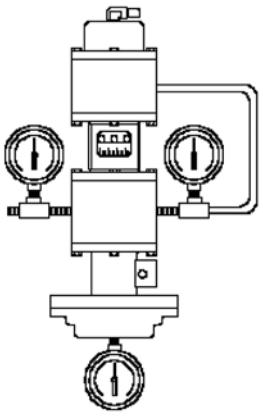

Figure 6.1 - Model HPP-SB Reverse-Acting Positioner (Standard Range)

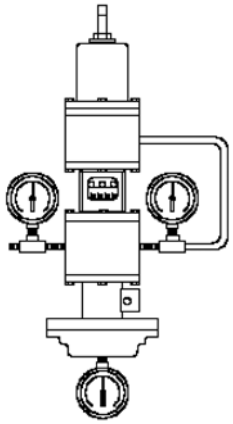

Figure 6.2 - Model HPP-SB Reverse-Acting Positioner (Split Range)

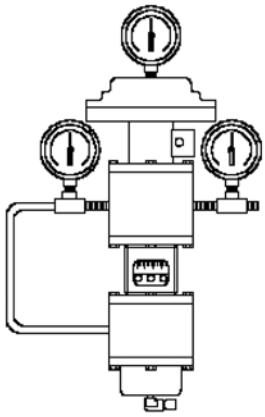

Figure 6.3 - Model HPP-SB Direct-Acting Positioner (Standard Range)

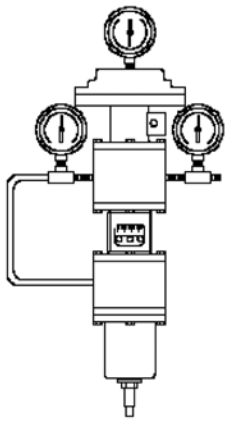

Figure 6.4 - Model HPP-SB Direct-Acting Positioner (Split Range)

Table 6 - Selection table for Becker Control Valves and Actuators

	VRP-CH Pilot	VRP-B-CH Pilot	VRP-SB-CH Pilot	VRP-SB-GAP Pilot	VRP-SB-PID Pilot	HPP-4 Positioner	HPP-5 Positioner	HPP-SB Positioner	DNGP Positioner	NOTES
Applications										
Pressure Control	•	•	•		•	•	•	•	•	1,2
Flow Control						•	•	•	•	2
Power Plant Type Pressure Control	•				•	•		•	•	3
Power Plant Type Flow Control						•		•	•	3
Surge Control						•		•		
On/Off				•						
Compatible Actuators										
RPDA Series (Small Models)	•	•		•		•	•		•	4
RPSR Series (Large Models)	•			•	•				•	5
RPSR Series			•	•	•			•	•	
LPDA Series (Small Models)	•	•		•		•			•	4
LPDA Series (Large Models)	•			•		•	•		•	5
LPSR Series			•	•	•			•	•	
LD Series			•	•	•			•	•	6
Instrumentation Options										
Bleed to Pressure System BPS	•		•	•		•	•	•	•	7
AB Series Atmospheric Bleed Control	•		•	•		•	•	•	•	
NBV Series No-Bleed Valve	•	•				•	•			8
DPS-2 Series Non Bleed Sensor	•	•				•	•			9
PS-2 Series Non Bleed Sensor	•					•				9
SP Series Setpoint Pump	•	•	•	•	•					
RSM Series Remote Setpoint Module	•	•	•	•	•					
Panel Mounting	•	•	•	•	•				•	
Stainless Steel Option	•	•	•	•	•	•	•	•		
VB Series Volume Booster	•		•		•	•		•		10
QEV Series Quick Exhaust Valve				•				•		
I/P Transducer						•	•	•		
SLV Series Signal Lock Valve						•	•	•		

1. Pressure control applications include: pressure letdown, primary regulation, monitors, standby, overpressure protection, underpressure protection, and relief valve.
2. All positioners require controller device to perform pressure control or flow control.
3. Power plant regulation includes all power plants and "fast-acting" short systems.
4. RPDA and LPDA Small Models are defined as actuator sizes 14L and smaller (< 2000 in3 / 0.033m^3)
5. RPDA and LPDA Large Models are defined as actuator sizes 12T and larger (≥ 2000 in3 / 0.033m^3).
6. LD Series Actuators are limited to Becker CVE Series Globe Valves.
7. BPS is limited to discharge pressure systems below 300 psig (2068 kPa). Consult Becker for application assistance.
8. NBV No-Bleed Valves may only be utilized when $P_{discharge} \leq 60$ psig (414 kPa) and/or $P_{supply} \leq 150$ psig (1034 kPa).
9. PS-2 and DPS-2 Non-Bleed Sensors must be utilized when $P_{discharge} > 60$ psig (414 kPa) and/or $P_{Supply} > 150$ psig (1034 kPa).
10. VB Series Volume Boosters are necessary for power plant regulation, surge control applications, or when large model RPDA are utilized.

The HPP-SB Positioner provides high performance for the Becker Surge Control Valve

GE's Becker Surge Control Valve is a key control valve for protection of centrifugal natural gas compressors. The Surge Control Valve offers:

- Accurate control
- Fast action
- Friction free design
- Repeatability
- Stability
- Vibration resistance

The HPP-SB positioner is the ideal choice for this demanding application.

The HPP-SB positioner provides all the necessary performance combined with these environmentally-friendly features:

- ZERO bleed at steady state
- ZERO bleed when control valve is at full open position
- ZERO bleed when control valve is at full closed position

Complete elimination of atmospheric bleed gas emissions with the Becker positioner's unique Bleed to Pressure System (BPS) feature.

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GEA19589 09/2014