
BETTIS™

# WellGuard™ PWG Pneumatic Piston Actuator

Actuation for API 6A and 6D through conduit gate valves.

For shut down (reverse acting) or blow down (direct acting) applications.

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## The Company

Bettis has been providing quality valve actuation and control for more than 40 years, establishing itself as a pioneer and innovator in this industry, with products specifically engineered to your application. Today, as part of Emerson Process Management, we are the world's leading independent manufacturer of pneumatic and hydraulic valve actuators. Bettis products are used in almost every facet of the energy industry – oil and gas production, pipeline and processing. Our facility near Houston, Texas has more than 145,000 square feet of manufacturing capacity. We also operate modern manufacturing facilities in Edmonton, Canada and Mansfield, Ohio. We have been awarded the ISO 9001 designation indicating full compliance with worldwide standards for quality and documentation.

## General Description

The WellGuard™ PWG Piston range of pneumatic Control Fluid Powered linear actuators from Bettis Canada Ltd. is designed to be used in conjunction with Bettis valve bonnets to provide open and close control for major brands of API 6A through conduit reverse acting gate valves fitted to oil and gas wellhead Christmas trees and production flow lines. These actuators can also be used with API 6D and ANSI B16.34 valves where the bonnets are built to the Bettis design.

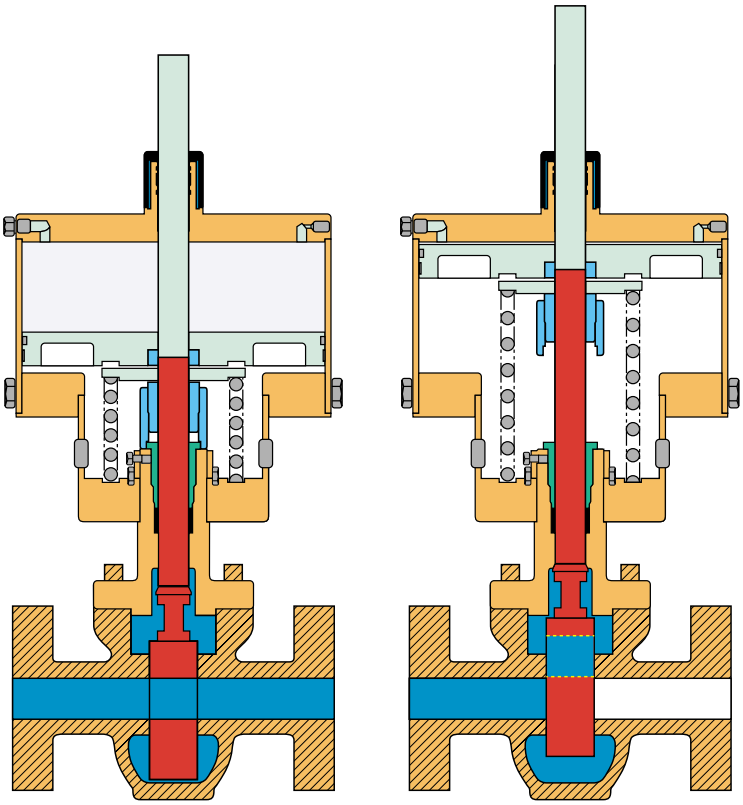
Suitable for onshore and offshore locations and ideal for use in $H_2S$ and $CO_2$ applications, the Bettis PWG range of piston actuators provides a simple and reliable valve automation solution. These actuators will be available in 10″ and 14″ diameters, suitable for valve sizes 1-13/16″ thru 4-1/16″ (18″ model currently under development).

## Operating Principle

Valve actuation is achieved by applying a low pressure (maximum 250 psig) pneumatic control pressure to a piston in a closed housing thereby exerting a force which compresses a spring and extends a valve stem. This action is designed to open a reverse acting gate valve (or close a directing acting gate valve).

The valve is returned to its fail position upon venting the piston pressure. The actuator ensures that a fail position is achieved through the use of valve body pressure acting on the valve stem diameter assisted by coiled springs. The springs provide rapid and reliable valve shutdown when there is little or no valve body or flow-line pressure available.

The Bettis PWG actuator can be supplied to API 6A SDV, SSV and BDV to meet the quality assurance and test requirements of API 6A and Q1. The standard actuator can be supplied to meet the NACE MR0175-2000 requirements (optional).

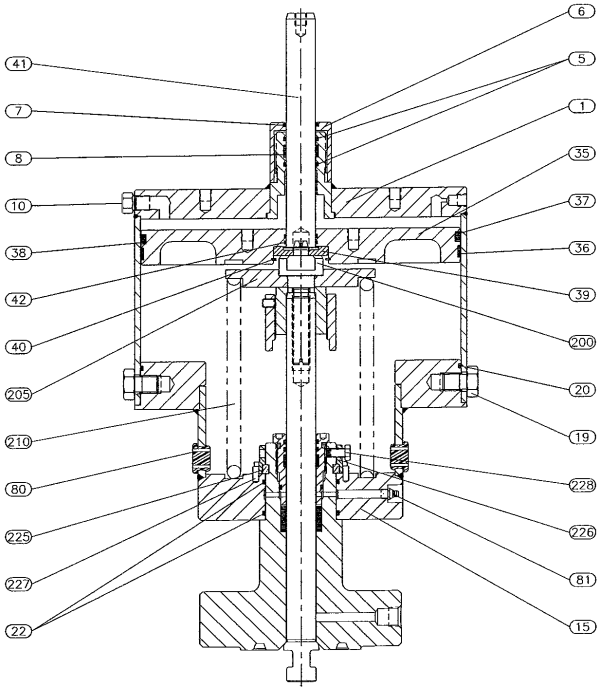


*Automatic Open* *Automatic Closed*

## Features and Benefits

The simple and reliable design of the PWG provides a range of features when actuated pneumatically:

- **Sour Service** – Compatible with both sweet and sour (NACE MR0175-2000) control fluids.
- **Visual Indication** – The shaft of the actuator extends through the top of the housing, with dual stem seals to provide local visual indication of valve position.
- **Maintenance** – The simple and reliable design allows quick and simple maintenance without the need of any specialized tools.
- **Reliability** – Springs provide reliable and quick shutdown assistance when flowline pressure is low or not available.
- **Compliance** – Certified for API 6A PR-1 and PR-2 applications. Valve/actuator packages can be supplied for PSL-1 to 3 applications.
- **Protection** – Integral, tamper resistant relief valve protects actuator from over-pressurization.
- **Operation** – Suitable for operation over a wide temperature range:
  **Actuator** -50°F (-46°C) to +150°F (+65°C)
  **Bonnet** -50°F (-46°C) to +250°F (+121°C)
- **Construction** – The actuator has no large mounting threads that could gall, corrode or be damaged.




*Notes:* *(Y) Recommended spare parts*
*(N) Not shown*
*Housing Capscrews (19) shown 15° from true orientation*
*Spiral Coil Pin (227) shown 90° from true orientation*
*Shown in closed position*
*Bonnet parts shown but not listed*

| ITEM | DESCRIPTION | MATERIAL | QTY | NOTE |
|---|---|---|---|---|
| 1 | CYLINDER | A350-LF2/A516-70/A333-6/XYLAN | 1 | |
| 5 | O-RING, HUB | NITRILE | 2 | (Y) |
| 6 | THREAD PROTECTOR | DELRIN | 1 | |
| 7 | WIPER, THD PROTECTOR | URETHANE | 1 | (Y) |
| 8 | GUIDE | DELRIN | 1 | (Y) |
| 10 | OVERPRESSURE PROT DEV | SS/BRASS | 1 | |
| 11 | WARNING LABEL, RELIEF | VINYL | 1 | (N, Y) |
| 15 | LOWER HOUSING | A516-70/A333-6/XYLAN | 1 | |
| 19 | BOLT MODIFICATION | SS 304 | 12 | |
| 20 | O-RING, FLANGE | NITRILE | 1 | (Y) |
| 22 | O-RING, MOUNTING PLATE | NITRILE | 2 | (Y) |
| 35 | PISTON | A516-70/XYLAN | 1 | |
| 36 | GUIDE, PISTON | HALLITE 506 | 1 | |
| 37 | O-RING, PISTON | NITRILE | 1 | (Y) |
| 38 | BACK UP RING, PISTON | NITRILE | 1 | (Y) |
| 39 | THRUST COLLAR | 17-4PH | 1 | |
| 40 | SPIRAL RETAINING RING | SS 302 | 1 | |
| 41 | INDICATOR ROD | 17-4PH | 1 | |
| 42 | O-RING, INDICATOR ROD | NITRILE | 2 | (Y) |
| 80 | GROMMET, VENT | EPDM | 2 | (Y) |
| 81 | VENT/LUBE FITTING | SS 304/../316 | 1 | |
| 85 | NAMEPLATE | SS 304 | 1 | (N) |
| 86 | NAMEPLATE DRIVE SCREW | SS 301/../304 | 2 | (N) |
| 200 | SPRING BOLT | SS 410 | 1 | |
| 205 | SPRING PLATE | A516-70/XYLAN | 1 | |
| 210 | SPRING | 5160/XYLAN | 1 | |
| 225 | SPLIT RING, RETAINER | 17-4PH | 1 | |
| 226 | RETAINER, SPLIT RING | 17-4PH | 1 | |
| 227 | COIL SPRING PIN, RETAINER | SS 302 | 2 | |
| 228 | BOLT, RETAINER | HXHC SS 304 | 1 | |
| 235 | WARNING LABEL, SPRING | VINYL | 1 | (N, Y) |

## Thrust Characteristics

| ACTUATOR MODEL | MAXIMUM STROKE (INCHES) | DIAMETER (INCHES) | EFFECTIVE PISTON AREA (INCHES SQ.) | INITIAL NET THRUST OUTPUT (LB) | INITIAL NET THRUST OUTPUT @ MAWP (LB) |
|---|---|---|---|---|---|
| P1 x 10 x 3 x 3PWG | 3.8 | 10 | 80 | 80P-600 (1) | 19,400 |
| P1 x 10 x 5 x 4PWG | 5.0 | 10 | 80 | 80P-600 (1) | 19,400 |
| P1 x 14 x 3 x 3PWG | 3.8 | 14 | 140 | 140P-600 (1) | 34,400 |
| P1 x 14 x 5 x 4PWG | 5.0 | 14 | 140 | 140P-600 (1) | 34,400 |
| P1 x 18 x 3 x 3PWG | * | * | * | * | * |
| P1 x 18 x 5 x 4PWG | * | * | * | * | * |

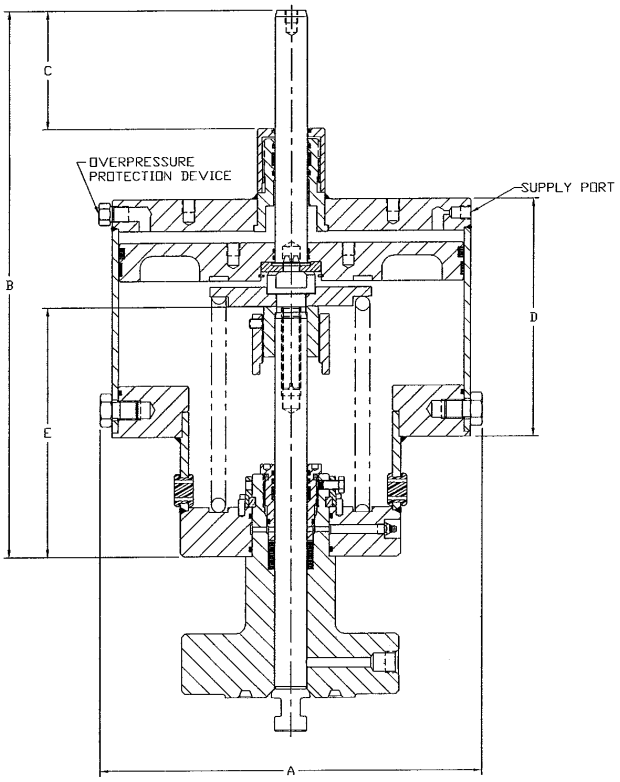
**18'' model currently under development*

*(1) P= Actuator control pressure – 250 psi*

## Weights

| ACTUATOR MODEL | WEIGHT (LBS) | WEIGHT (KG) |
|---|---|---|
| P1 x 10 x X x XPWG | 165 | 75 |
| P1 x 14 x X x XPWG | 230 | 105 |
| P1 x 18 x X x XPWG | * | * |

**18'' model currently under development*




## Dimensions

| ACTUATOR MODEL | MAXIMUM STROKE | DIMENSION | | | | | WEIGHT (LB) |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | |
| P1 x 10 x 3 x 3PWG | 3.88 | 11.7 | 21.4 | 4.6 | 9.3 | 9.8 | 165 |
| P1 x 10 x 5 x 4PWG | 5.00 | 11.7 | 22.4 | 5.6 | 10.4 | 9.8 | 165 |
| P1 x 14 x 3 x 3PWG | 3.88 | 15.0 | 21.4 | 4.6 | 9.3 | 9.8 | 230 |
| P1 x 14 x 5 x 4PWG | 5.00 | 15.0 | 22.4 | 5.6 | 10.4 | 9.8 | 230 |
| P1 x 18 x 3 x 3PWG | * | * | * | * | * | * | * |
| P1 x 18 x 5 x 4PWG | * | * | * | * | * | * | * |

**18'' model currently under development*

## Specifications

| | STANDARD SERVICE | OPTIONAL FEATURES |
|---|---|---|
| **Operating Temp. Range** | -20° TO +150°F (-29° TO +65°C) | -50° TO +150°F (-46° TO +65°C) |
| **API 6A Monogramable** | Control Fluid Powered, PR 1 or PR 2 | NACE, SSV |

## Valve Bonnet Specifications

| VALVE BONNET ASSEMBLY | | | | |
|---|---|---|---|---|
| **Operating Temp. Range** | -50° TO +250°F | -46° TO +121°C | | |
| **Bonnet Size and Pressure Rating** | **Bonnet Weight (lb.)** | **Bonnet Weight (kg.)** | **Temp. Class** | **API Trim Class** |
| 1-13/16, 10,000 | 70 | 32 | L thru V | AA, BB, CC, DD, EE, FF |
| 1-13/16, 15,000 | TBA | TBA | L thru V | AA, BB, CC, DD, EE, FF |
| 2-1/16, 2,000 – 5,000 | 50 | 23 | L thru V | AA, BB, CC, DD, EE, FF |
| 2-1/16, 10,000 | 70 | 32 | L thru V | AA, BB, CC, DD, EE, FF |
| 2-1/16, 15,000 | TBA | TBA | L thru V | AA, BB, CC, DD, EE, FF |
| 2-9/16, 2,000 – 5,000 | 50 | 23 | L thru V | AA, BB, CC, DD, EE, FF |
| 2-9/16, 10,000 | 65 | 30 | L thru V | AA, BB, CC, DD, EE, FF |
| 2-9/16, 15,000 | TBA | TBA | L thru V | AA, BB, CC, DD, EE, FF |
| 3-1/8, 2,000 – 5,000 | 55 | 25 | L thru V | AA, BB, CC, DD, EE, FF |
| 3-1/16, 10,000 | 100 | 45 | L thru V | AA, BB, CC, DD, EE, FF |
| 3-1/16, 15,000 | TBA | TBA | L thru V | AA, BB, CC, DD, EE, FF |
| 4-1/16, 2,000 – 5,000 | 65 | 30 | L thru V | AA, BB, CC, DD, EE, FF |
| 4-1/16, 10,000 | 115 | 52 | L thru V | AA, BB, CC, DD, EE, FF |
| 4-1/16, 15,000 | TBA | TBA | L thru V | AA, BB, CC, DD, EE, FF |
| **Bonnet in Conformance with API 6A** | | **PSL 1, 2, or 3** | **SSV** | **PR 1 or 2** |

## Service Conditions Reference Guide

| MATERIAL CLASS | CLASSIFICATION, APPLICATION |
|---|---|
| AA | General Service, non-corrosive |
| BB | General Service, slightly corrosive |
| CC | General Service, moderate to high corrosive |
| DD | Sour Service, non-corrosive |
| EE | Sour Service, slightly corrosive |
| FF | Sour Service, moderate to high corrosive |
| HH | Very corrosive |

| TEMP. CLASS | MINIMUM AMBIENT TEMP. | MAXIMUM PROCESS TEMP. |
|---|---|---|
| K | -75°F (-60°C) | +180°F (+82°C) |
| L | -50°F (-46°C) | +180°F (+82°C) |
| P | -20°F (-29°C) | +180°F (+82°C) |
| R | +70°F (+21°C) | +70°F (+21°C) |
| S | 0°F (-18°C) | +150°F (+66°C) |
| T | 0°F (-18°C) | +180°F (+82°C) |
| U | 0°F (-18°C) | +250°F (+121°C) |
| V | +35°F (+2°C) | +250°F (+121°C) |
| X | 0°F (-18°C) | +350°F (+177°C) |

## API Certification Number 6A-0397

Bettis Canada is authorized to use the official API monogram on Actuators and Bonnets for Surface Safety Valves manufactured and assembled under API Specification 6A for Valve and Wellhead equipment.

ISO 9001

Quality Certification Bureau Inc.

Cert. Num. 93-13
**Bettis Canada Ltd.**
Edmonton, Alberta

**API 6A Specification**

**www.emerson.com/bettis**

This product is only intended for use in large-scale fixed installations excluded from the scope of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2).

ORIGINAL LICENSE NO. 6A-0397

**American Petroleum Institute**

**Certificate of Authority to Use Official Monogram**

The AMERICAN PETROLEUM INSTITUTE hereby grants to

BETTIS CANADA LTD

Edmonton, Alberta, Canada

the right to use the Official Monogram on manufactured products under the conditions specified in the official publications of the American Petroleum Institute entitled API Spec Q1 and Specification 6A and in accordance with the provisions of the License Agreement.

In all cases where the Official Monogram is applied, the Monogram should be used in conjunction with this certificate number 6A-0397

The American Petroleum Institute reserves the right to revoke this authorization to use the Official Monogram, for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

Effective Date: JUNE 1, 2001
Expiration Date: JUNE 1, 2004

AMERICAN PETROLEUM INSTITUTE,

A. William Smith

Secretary

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