FMC Technologies

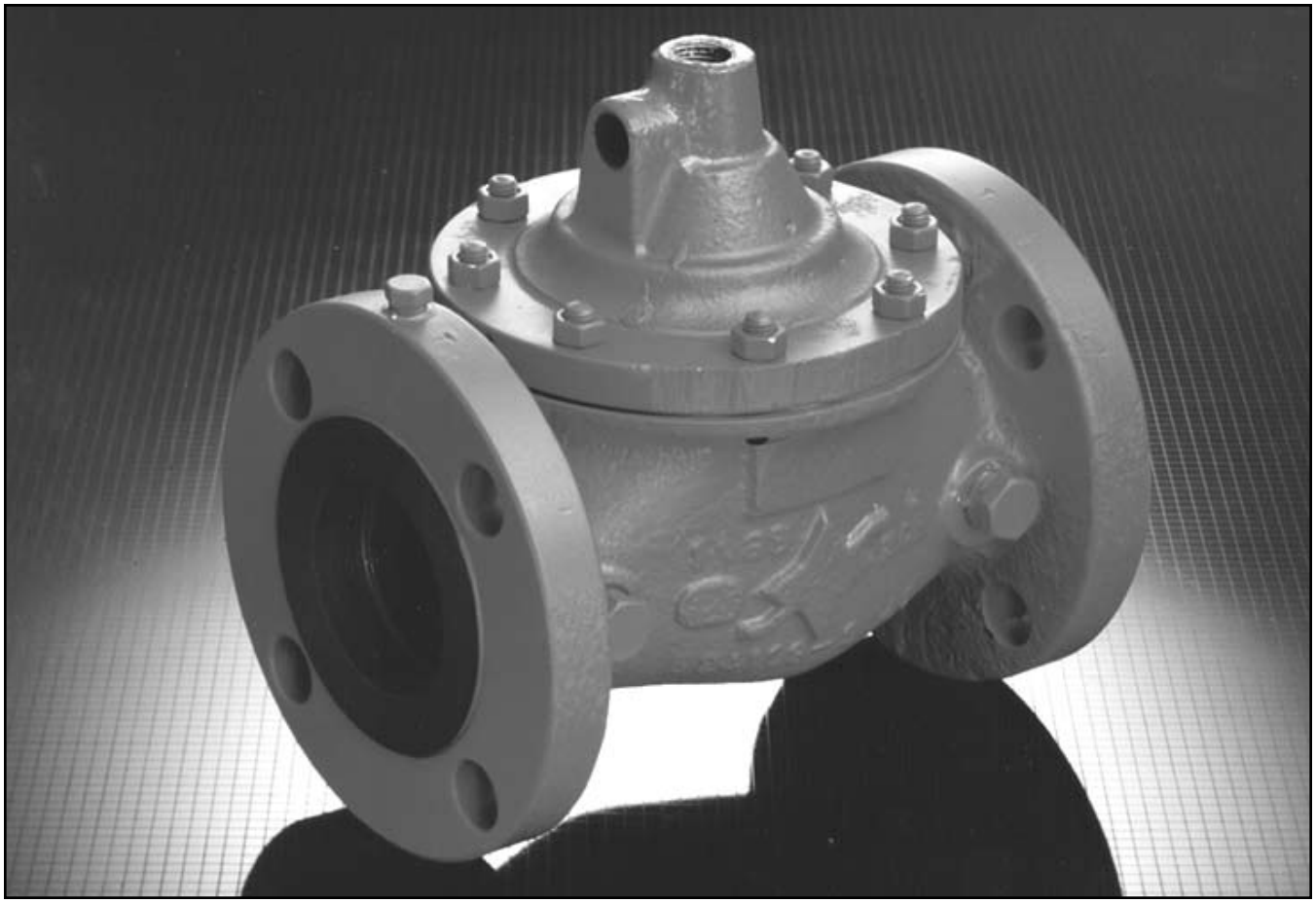
Smith Meter™ Valves

# *200 Series*
# *Hydraulic Control Valves*

Application Bulletin

Issue/Rev. 0.2 (4/07)

Bulletin AB03004



## *Table of Contents*

**Smith Meter™ 200 Series Control Valves** feature hydraulically-operated, diaphragm-actuated globe valves. Liquid control is accomplished by using line pressure or an external pressure source for actuation of the valve.

## *Features*

- **Compact Design and Mechanical Simplicity** - Lower maintenance costs.
- **In-Line Serviceability** - Reduced maintenance time.
- **Drip-Tight Closure** - Positive valve shut-off.
- **No External Packing Gland** - Reduced chance of leakage to atmosphere.

## *Basic Application Notes*

- **Suitable for horizontal or vertical applications.**
- **Maximum Viscosity**
  All valves will operate satisfactorily up to 200 SSU (45 mPa·s)[1] viscosity. For operation on higher viscosity products, consult the factory.
- **Elastomer/Valve Temperature Limits[2]**
  Buna-N Elastomers: -20°F to 200°F (-28°C to 93°C).
  Low Swell (LS) Buna-N Elastomers: -20°F to 200°F (-28°C to 93°C).
  Viton Elastomers: -20°F to 350°F (-28°C to 177°C).
- **Maximum Working Pressure**
  Diaphragm Type Bare Valves:
  Class 150 ASME Cast Steel: 285 psig @ 100°F maximum working pressure (1,965 kPa @ 38°C).
  Class 300 ASME Cast Steel: 300 psig @ 100°F maximum working pressure (2,068 kPa @ 38°C).
- **Direction of Flow**

| For 200 Series Valve Packages: | For Bare Valves: |
|---|---|
| Model 200 is fail-closed/flow-over-the-seat. | Model 202 is fail-closed/flow-over-the-seat. |
| Model 201 is fail-open/flow-under-the-seat. | Model 203 is fail-open/flow-under-the-seat. |

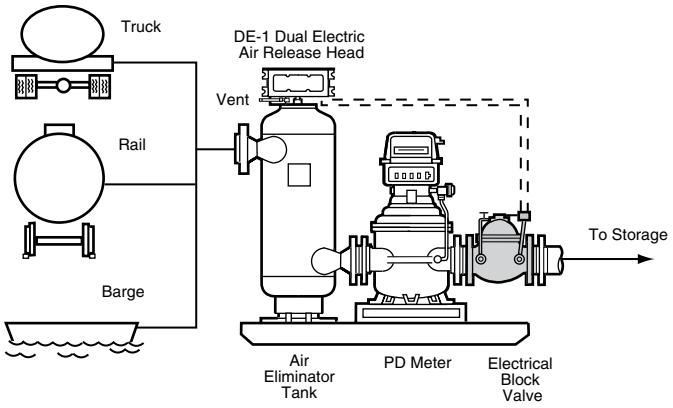
- **Flow Rate**

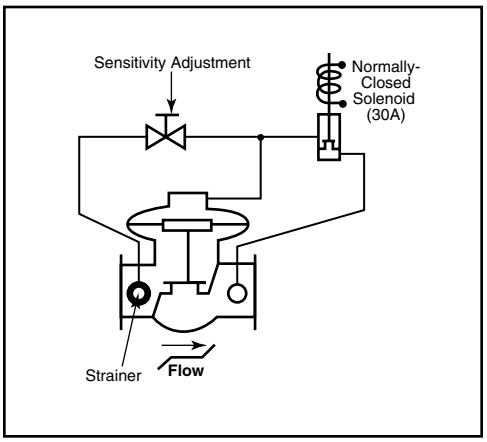
| Size | 2" | 3" | 4" | 6" |
|---|---|---|---|---|
| Nominal Flow - USGPM (L/min) | 130 (492) | 420 (1,600) | 600 (2,250) | 1,000 (3,750) |

*1 1mPa·s = 1cP.*
*2 Temperature Limits are based on the following: (a) minimum temperature rating of the housing, (b) min./max. effective temperature of one of the seals, (c) min/max. temperature limit of typical applications.*

## *Electrical Block*

Used as a fail-closed system permissive for remote opening or closing by an electrical switch, manually- or automatically-actuated. Typically used with the Smith Meter™ Model DE-1 Dual Electric Air Release Head mounted on a system air eliminator.

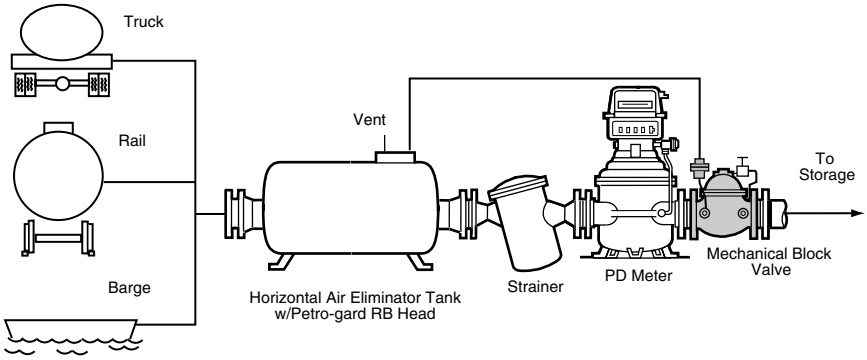


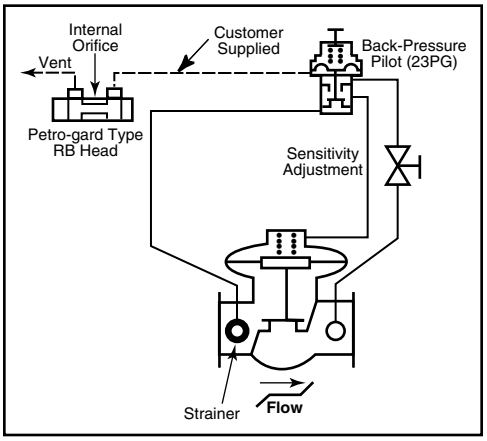




**Model 200-30A**

## *Mechanical Block*

Typically used in off-loading flow measurement systems in conjunction with an air eliminator tank having a special Petro-gard-type air release head. It can be used in a fail-closed or fail-open mode.

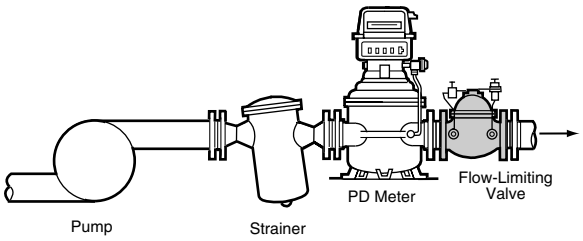


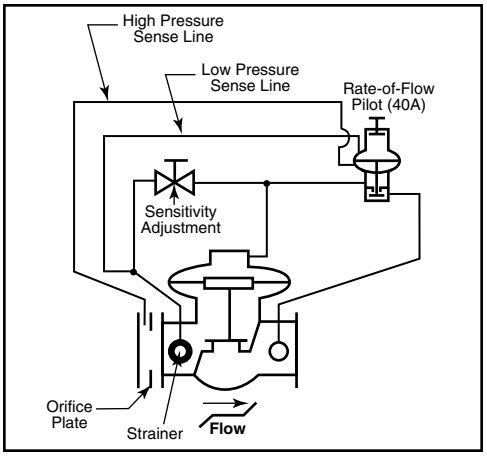




**Model 200-23PG**

## *Flow-Limiting*

Used primarily in systems with parallel meter runs to protect the meters against excessive flow rate when less than the maximum number of meter runs are operating.

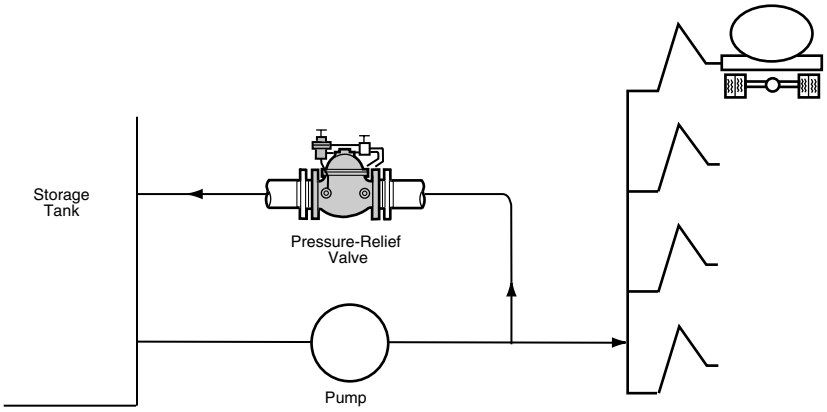


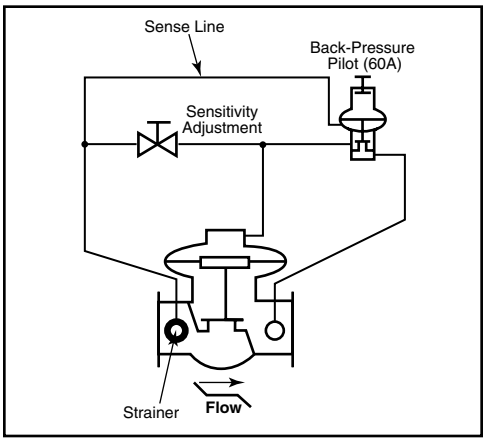




**Model 200-40A**

## *Pressure-Relief*

Normally a fail-open valve, installed in a pump bypass line to control pump discharge pressure.

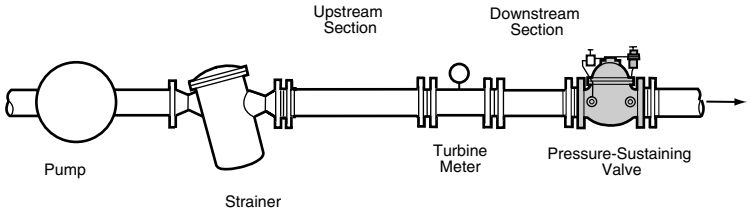


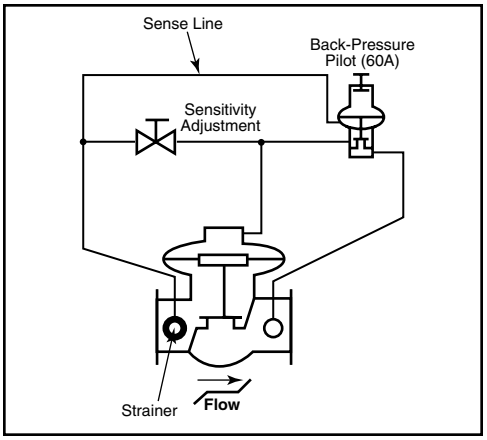




**Model 201-60A**

## *Pressure-Sustaining*

Maintains a predetermined minimum back-pressure when installed downstream of the pump. Commonly used to provide minimum back-pressure for turbine meter runs.

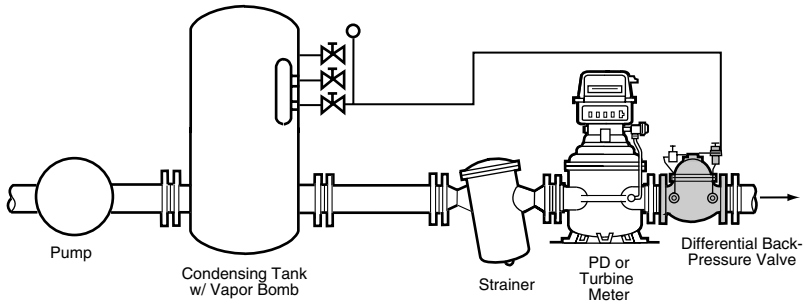


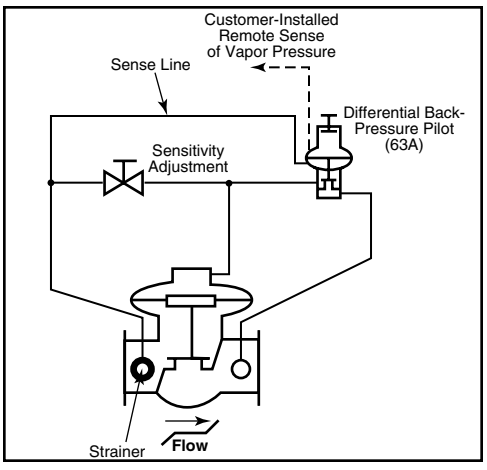




**Model 200-60A**

## *Differential Back-Pressure Sustaining*

Used in LPG metering applications to maintain system pressure above the product vapor pressure in order to prevent flashing.

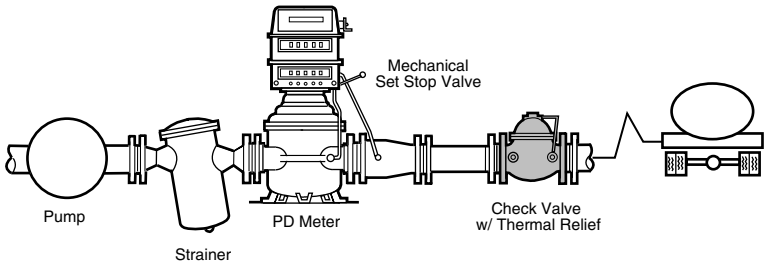


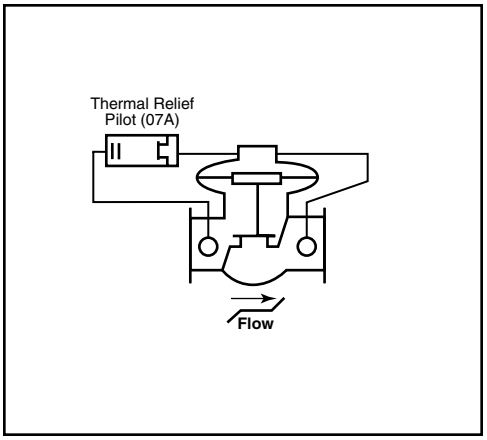




**Model 200-63A**

## *Check with Thermal Relief*

The check features prevents reverse flow should valve outlet pressure exceed inlet pressure. The thermal relief feature automatically provides relief upstream for downstream thermal expansion.

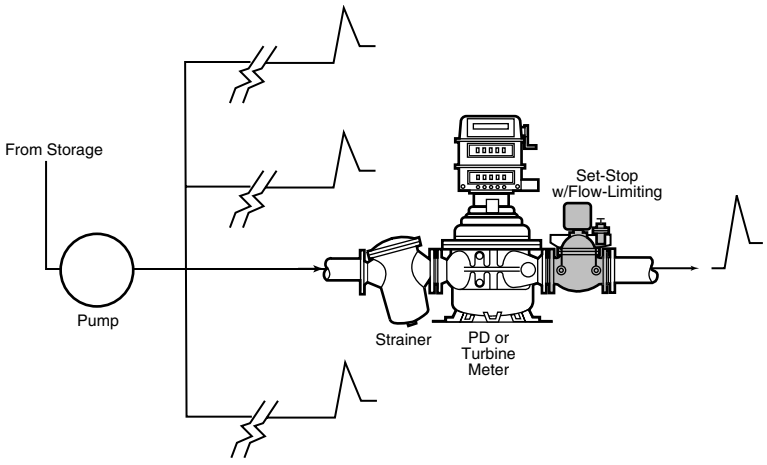


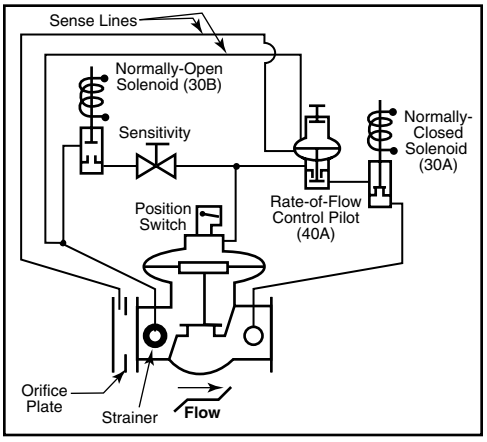




**Model 202CH-07A**

## *Two-Stage Electro-Hydraulic Set-Stop with Flow-Limiting*

A set-stop valve commonly used for **low viscosity** petroleum loading rack applications. Provides electrically-actuated, two-stage closure when operating in conjunction with positive displacement meters equipped with electro-mechanical preset counters. Meter protection against overspeed is provided by a flow-limiting pilot sensing pressure drop across a valve inlet-mounted orifice plate.

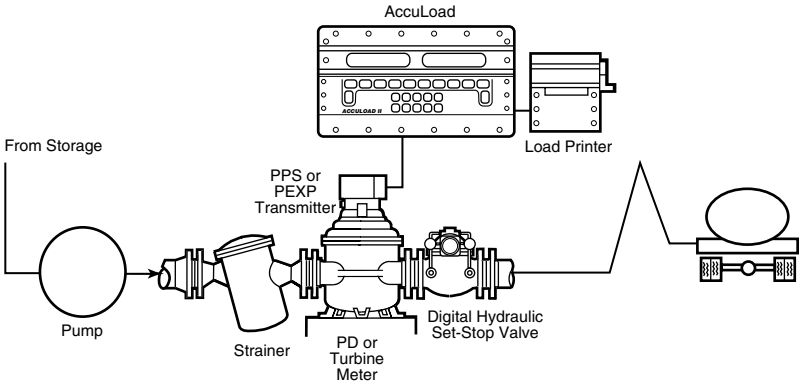


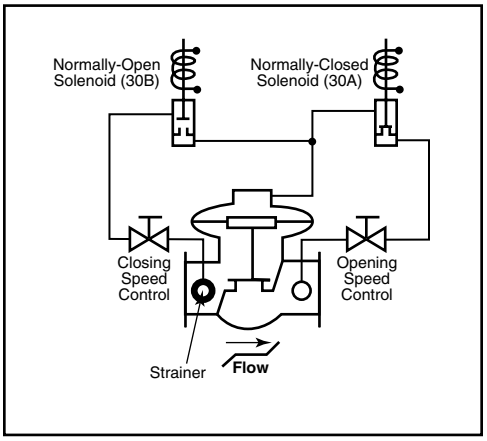




**Model 296-40A**

## *Digital Electro-Hydraulic Set-Stop*

Used in conjunction with a Smith SS1 Controller, AccuLoad, or MiniLoad to provide electrically-actuated, multi-stage closure and rate-of-flow limiting in **low viscosity** loading rack applications. Works equally well with positive displacement or turbine meters.

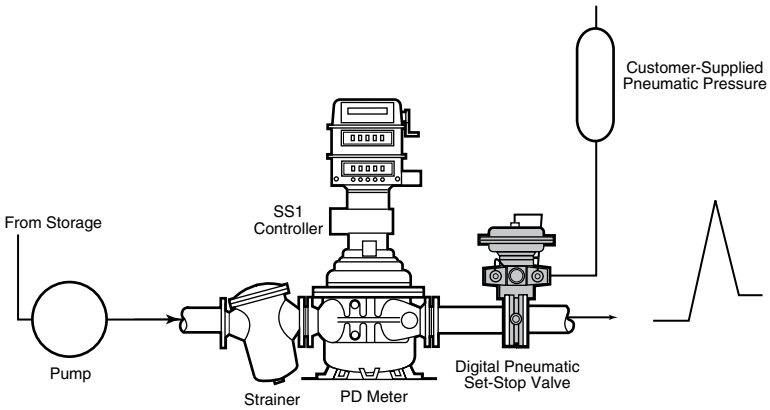


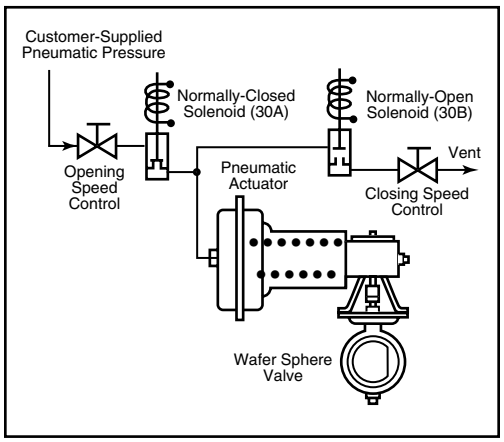




**Model 210**

## *Digital Electro-Pneumatic Set-Stop*

Used in conjunction with a Smith Meter™ SS1 Controller, AccuLoad, or MiniLoad to provide electrically-actuated, multi-stage closure and rate-of-flow control in **high viscosity** batching applications. External air pressure is utilized to actuate the opening and closing of the valve.

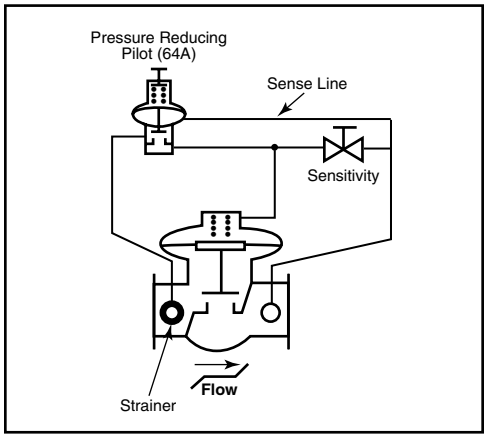



**Model 215**

## *Pressure-Limiting*

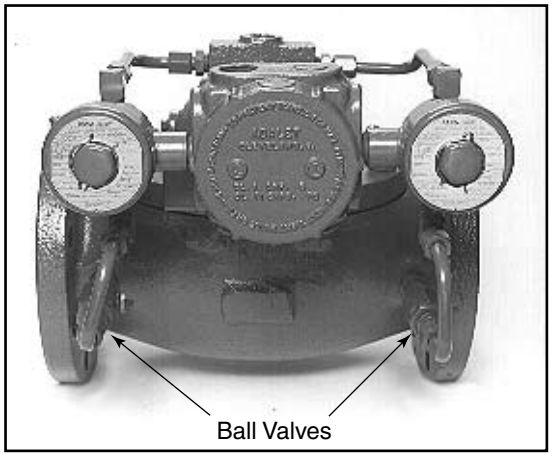
Used in nondead-end service where it is necessary to limit downstream pressure (during flow) to protect lower pressure rated equipment. This valve was not designed to be a systems main pressure relief.



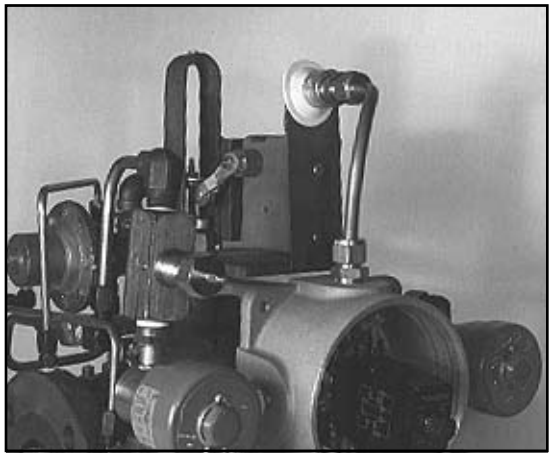

**Model 200-64A**

## *Options*

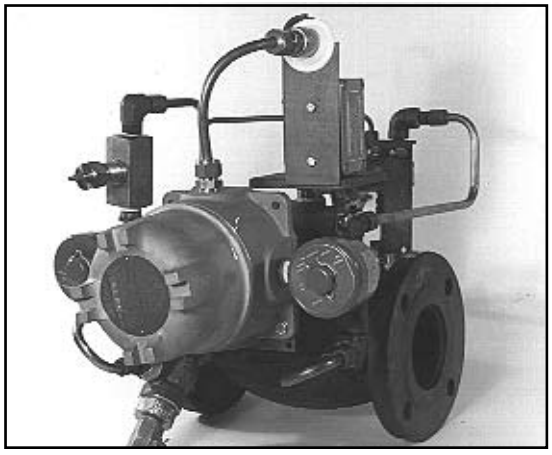
Smith 200 Series Control Valves are available with a variety of optional accessories which are used to enhance overall valve performance. Options include **opening and closing speed controls, mechanical position indicators, position switches,** and, where applicable, **low-flow start timers** and **pre-wired junction boxes.**



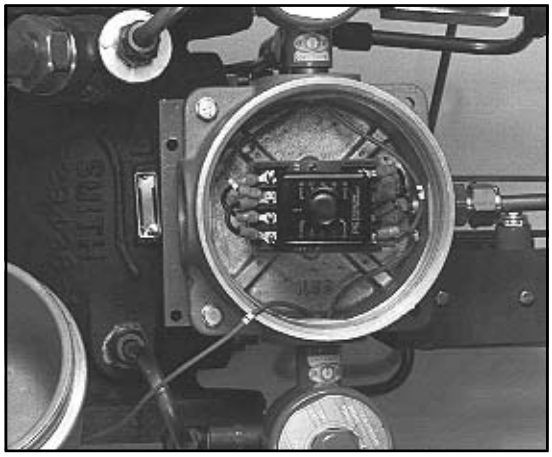

**Model 03A Opening/Closing Speed Controls**



**Model 04A Mechanical Position Indicator and Switch**



**Pre-Wired Junction Box on Model 296-40A-15AX Valve**



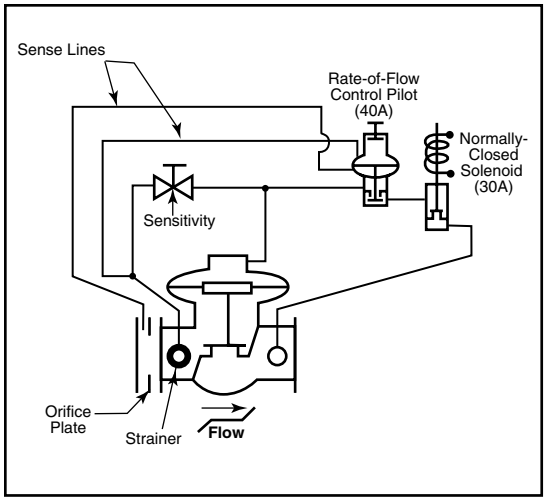
**Model 15AX Low-Flow Start Timer**

***Note:*** *These products have been designed for petroleum applications, where corrosion/erosion is normally minimum. The design of the pressure containing housings have adequate material allowance for typical petroleum applications. Consult the factory for other applications or for the actual material allowances.*

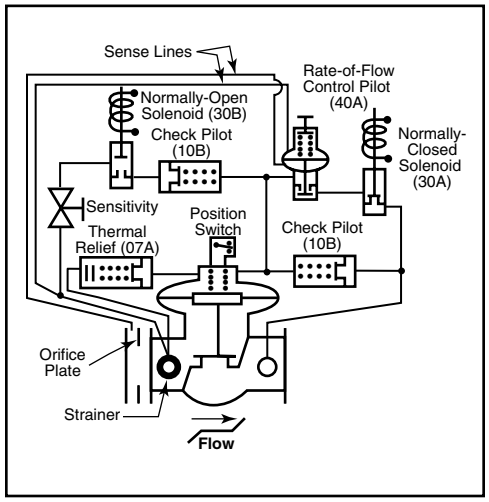
## *Valve Function Combinations*

Most Smith 200 Series Valves are capable of performing multiple control functions. A typical single valve arrangement, for example, combines flow-limiting control with electrical block. Another common arrangement is that of a set-stop valve with flow-limiting in combination with check and thermal-relief.

The available options and possible control function combinations are tabulated below.




**Model 200-40A-30A Combination Flow-Limiting and Electrical Block**



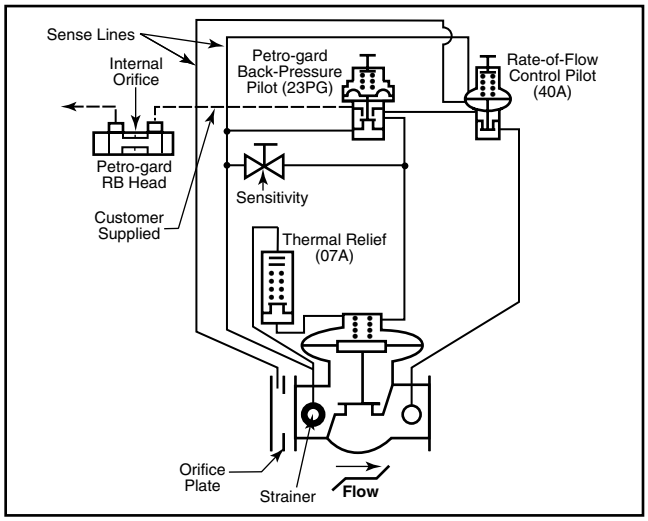

**Model 296-80B/07A-40A Set-Stop with Flow-Limiting in Combination with Check and Thermal-Relief**

## *Smith Meter™ Control Valve Function Intermix*

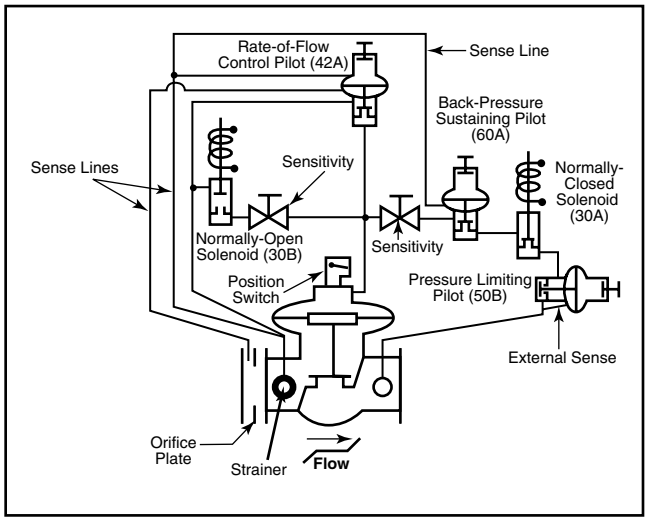
| | Function | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Basic Type** | Electrical Block | Mechanical Block | Flow-Limiting | Pressure-Limiting | Pressure-Relief | Back Pressure Sustaining | Differential Back-Pressure Sustaining | Check with Thermal-Relief | Two-Stage Set-Stop with Flow Limiting | Digital Hydraulic Set-Stop, 210 | Digital Pneumatic Set-Stop, 215 | Opening/Closing Speed Option | Low-Flow Start Option | Position Indicator | Position Switch | Junction Box |
| Electrical Block | A | C | B | B | C | B | B | D | D | D | D | B,A | D | B | B | B |
| Mechanical Block | C | A | B | B | C | B | C | D | D | D | D | A,B | D | B | B | C |
| Flow-Limiting | B | B | A | B | B | B | B | B | D | D | D | B,A | D | B | B | C |
| Pressure-Limiting | B | B | B | A | D | B | C | B | D | D | D | B,A | D | B | B | C |
| Pressure-Relief | B | C | C | C | A | D | C | B | D | D | D | B,A | D | B | B | C |
| Back-Pressure Sustaining | B | B | B | B | D | A | C | B | D | D | D | B,A | D | B | B | C |
| Differential Back-Pressure Sustaining | B | B | B | B | C | C | A | B | D | D | D | B,A | D | B | B | C |
| Check with Thermal-Reflief | D | D | B | B | B | B | B | A | D | D | D | B,B | D | B | B | C |
| Two-Stage Set-Stop with Flow Limiting | A | C | A | B | B | B | B | B | A | D | D | B,A | B | A | A | B |
| Digital Hydraulic Set-Stop, 210 | A | B | A | B | C | B | B | B | D | A | D | A,A | A | B | B | A |
| Digital Pneumatic Set-Stop, 215 | A | B | A | D | D | D | D | D | D | D | A | A,A | A | A | B | A |

A - Standard function
B - Typical
C - Atypical
D - Not possible

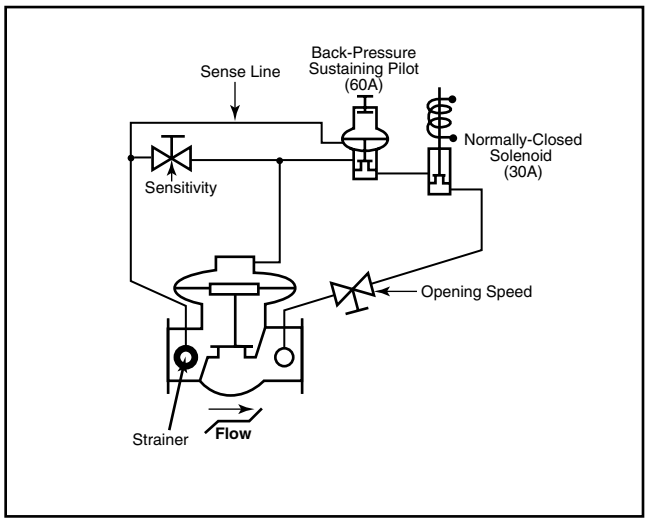
## *Other Configurations*



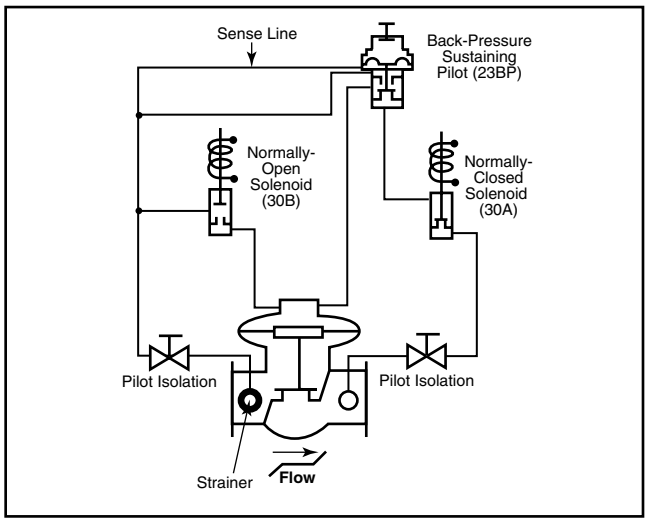

**Model 200-40A-23PG-07A**
**Combination Flow-Limiting and Back Pressure Sustaining (Petro-gard) with Thermal-Relief**



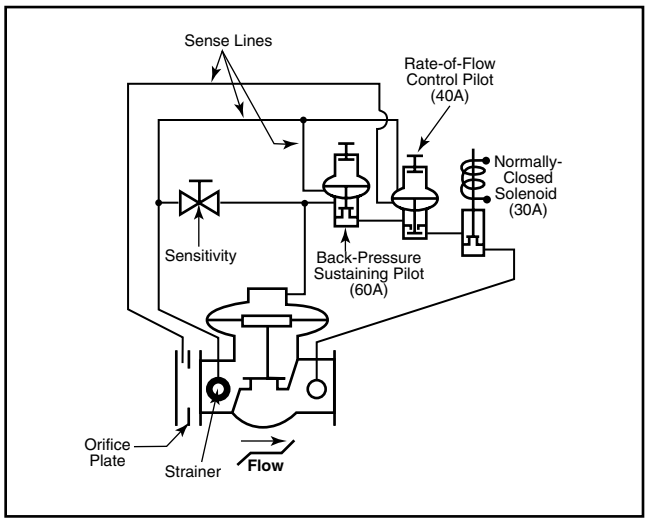

**Model 296-60A-50B-42A**
**Combination Two-Stage Set-Stop with Flow-Limiting, Back-Pressure Sustaining, and Pressure-Limiting**



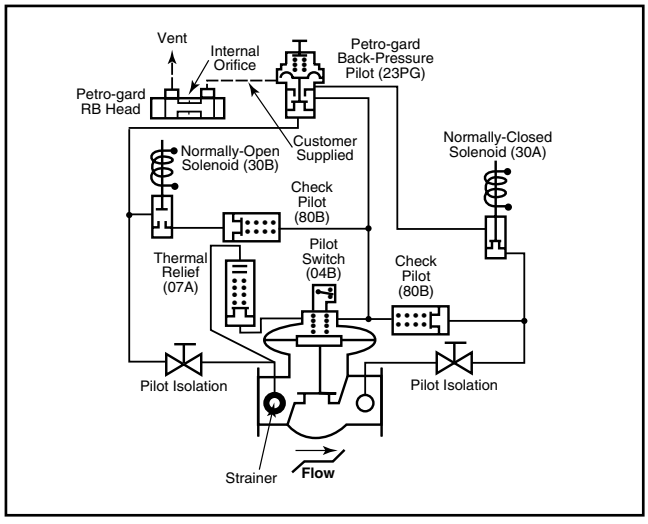

**Model 200-185A-60A-30A**
**Combination Back-Pressure Sustaining and Electrical Block with Opening Speed Control**




**Model 210-23BP**
**Digital Hydraulic Set-Stop with Back-Pressure Sustaining Control**

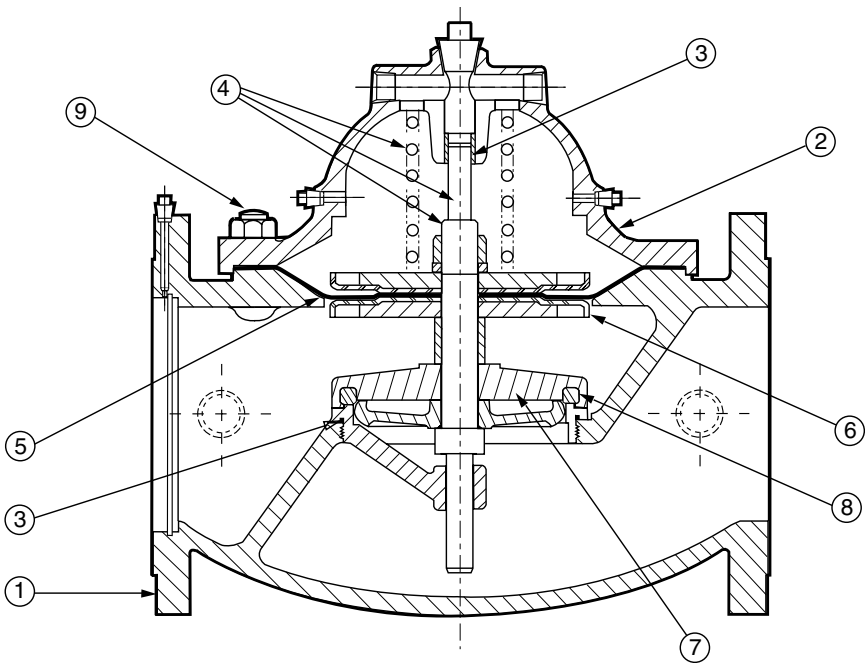



**Model 200-60A-40A-30A**
**Combination Back-Pressure Sustaining, Flow-Limiting, and Electrical Block**




**Model 210-80B/07A-23PG-04B**
**Combination Digital Hydraulic Set-Stop and Back-Pressure Sustaining (Petro-gard) with Check, Thermal-Relief, and Position Switch**

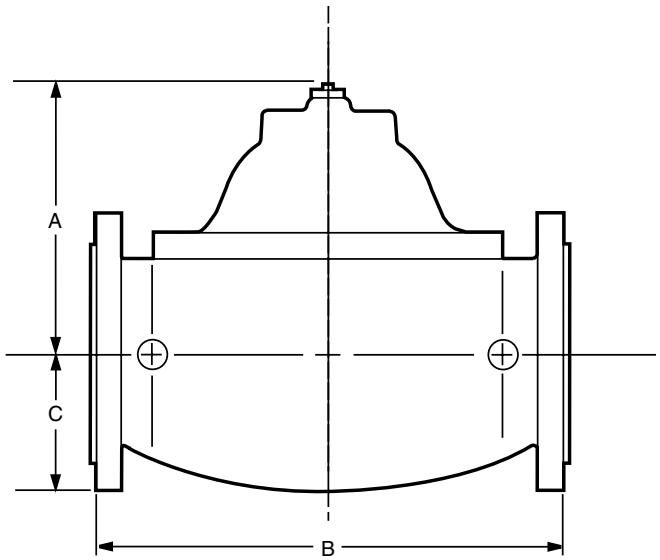
## *Standard Materials of Construction*




| | 2" | 3" through 6" |
|---|---|---|
| 1. Body | Cast Steel | Cast Steel |
| 2. Cover | Cast Steel | Cast Steel |
| 3. Seat | 316 Stainless Steel with Ni-Resist | 316 Stainless Steel with Ni-Resist |
| 4. Spring, Stem, and Stem Nut | Stainless Steel | Stainless Steel |
| 5. Diaphragm | Low Swell Buna or Viton (Buna Optional for Low Temperature) | Low Swell Buna or Viton (Buna Optional for Low Temperature) |
| 6. Diaphragm Washer | Carbon Steel | Stainless Steel |
| 7. O-Ring Retainer | Ductile Iron | Ductile Iron |
| 8. O-Rings | Low Swell Buna or Viton (Buna Optional for Low Temperature) | Low Swell Buna |
| 9. Nuts/Studs | Alloy Steel | Alloy Steel |

*Low Swell Buna-N available for diaphragm and dynamic seals.

## *Dimensions*




| | | Class 150 ASME | | | Class 300 ASME | | |
|---|---|---|---|---|---|---|---|
| **Size** | **A** | **B** | **C** | **Weight lb (kg)** | **B** | **C** | **Weight lb (kg)** |
| 2" | 5.5" (140) | 8.0" (203) | 3.0" (76) | 37 (17) | 8.5" (216) | 3.3" (84) | 41 (19) |
| 3" | 7.0" (178) | 11.0" (279) | 3.8" (97) | 74 (34) | 11.8" (300) | 4.1" (104) | 86 (39) |
| 4" | 8.0" (203) | 13.5" (343) | 4.5" (114) | 127 (58) | 14.1" (358) | 5.0" (127) | 148 (67) |
| 6" | 10.8" (274) | 17.0" (432) | 5.5" (140) | 249 (113) | 17.9" (455) | 6.3" (160) | 287 (130) |

***Note:*** *Inches to the nearest tenth (millimetres to the nearest whole mm), each independently dimensioned from respective engineering drawings.*

Revisions included in AB03004 Issue/Rev. 0.2 (4/07):

Page 8: Revised control valve function intermix chart.
Page 9: Revised model 210-80B/07A-23P6-04B diagram.



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**Thetford, England** Phone (44) 1842-82-2900
**Kongsberg, Norway** Phone (47) 32/286-700
**Buenos Aires, Argentina** Phone 54 (11) 4312-4736

***Integrated Measurement Systems:***
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**Kongsberg, Norway** Phone (47) 32/286-700
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**Erie, PA USA** Phone 814/898-5000
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