



Masoneilan™

LincolnLog™

High Pressure, Anti-Cavitation  
Control Valves

Masoneilan

a Baker Hughes business

# LincolnLog Reliability

## Long Term Reliability

The Masoneilan 78400/18400 Series LincolnLog valve from Baker Hughes offers longterm reliability in high-pressure, liquid-letdown, anti-cavitation control valve applications. Engineering knowledge and expertise has made us a leader in control valve applications with products such as Flexible Better Fit severe-service solutions. The LincolnLog valve is a control valve solution of choice throughout the wide spectrum of severe-service liquidflow applications.

## Proven Performance

The LincolnLog valve design has more than 20 years of proven field performance as the industry's premier high-pressure, liquid-letdown solution. LincolnLog is a reliable and robust anti-cavitation control valve package with enhanced multi-stage and axial flow-trim technology incorporated into a rugged valve design. Over the years, LincolnLog has successfully met the challenges of thousands of severe-service applications around the globe.

## Valve Solutions and Services for the World's Tough Applications

### Industries and Applications

#### Upstream Oil & Gas

- Pump Recirculation
- Produced Water Injection
- High Pressure Separator

#### Refining

- Rich Amine Service
- Cold High Pressure Separator Letdown

#### Power Generation

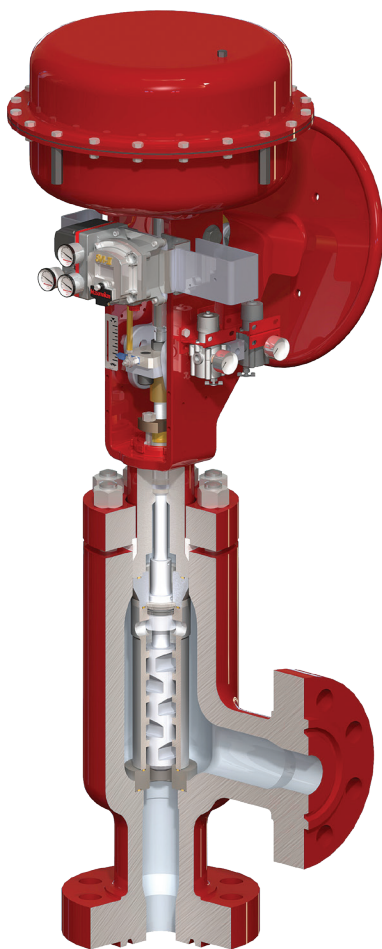
- Pump Recirculation
- Boiler Feedwater Start-Up
- High Pressure Spraywater Control



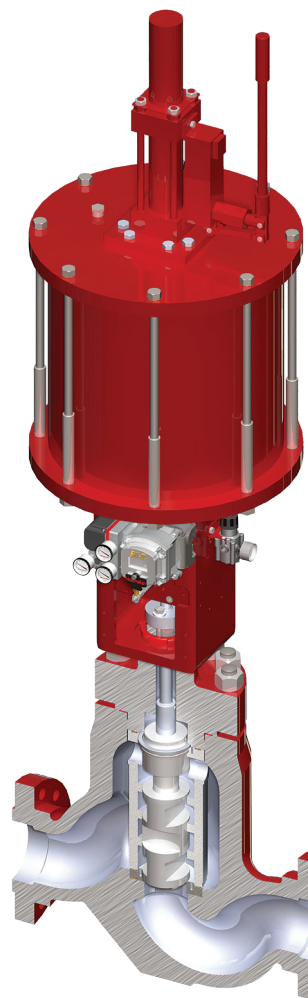
# Innovative Solutions

## Meeting Exacting Industry Specifications

The LincolnLog valve is available in a variety of body configurations, sizes, materials, ratings and trim types. The wide variety of trim designs in the LincolnLog valve includes options that offer up to a 150:1 turndown ratio, enabling response to a wide range of process conditions. With a number of combinations of forged or cast valve bodies, standard or exotic alloys, API or ANSI-rated construction, and globe or angle configurations, the LincolnLog valve meets or exceeds exacting industry specifications such as corrosive service (NACE) and Pressure Equipment Directive (PED) compliance.



78400 Series  
Angle Style LincolnLog



18400 Series  
Globe Style LincolnLog



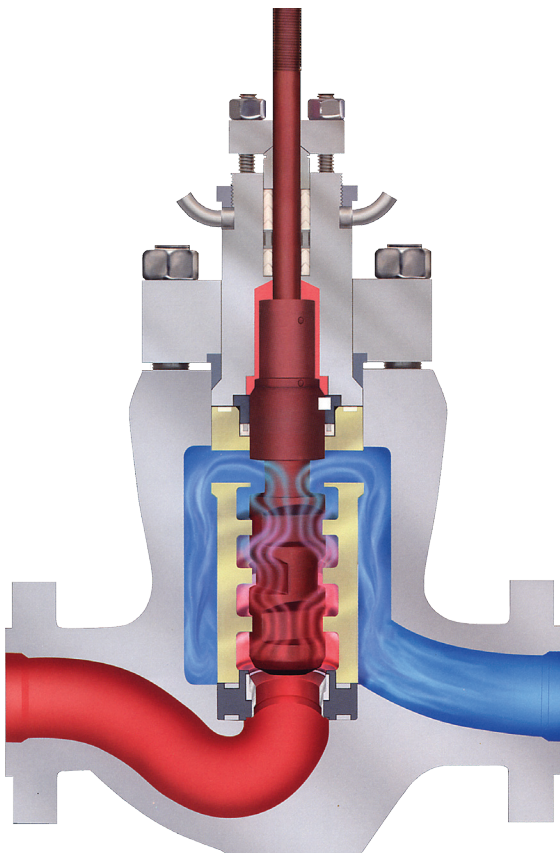
# Reliability In Performance

## Reliable, Long Term Performance

The leading cause of poor control valve performance and premature failure in high-pressure, liquid-letdown service is cavitation. Some liquid applications cavitate so severely that the valve can experience diminished performance or even mechanical failure within hours of commissioning. The multistage design of the LincolnLog valve reduces cavitation by directing the fluid through a series of three-dimensional, high-impedance pressure-reduction areas, or stages.

This highly tortuous flow path helps prevent cavitation by managing the pressure reduction and fluid velocity through every stage, promoting repeatable performance during the valve's life.

The LincolnLog valve offers reliable, long-term performance in the most extreme applications such as inaccessible high-pressure, liquid-letdown, wellhead-injection valves. The LincolnLog anti-cavitation control valve can be custom engineered with as many as 10 stages of pressure reduction for applications with extreme pressure drops in excess of 8000 psi (550 Bar). These valves control the pressure drop in multiple stages for confident operation in remote locations such as offshore platforms. Furthermore, a flexible range of staging ratios is available to customize the pressure drop for a wide variety of fluids and conditions.



Axial Flow Technology

## Multi-Stage, Axial Flow Technology

High trim velocity can intensify cavitation damage inside the control valve. This damage is common in many single-stage valve designs, which take the full pressure drop across a single region within the trim. This single region is typically the leading edge of the plug and seat – an area that experiences the highest velocity. Consequently, it receives the most severe and excessive damage.

Similarly, many radial trim designs, such as drilled-hole cages and stacked disks, often experience the same fate under extreme pressure drops. Unlike the axial flow design of the LincolnLog valve, many radial designs throttle the pressure drop at the innermost radial stage adjacent to the plug-seating surface. When this radial trim is only partially open, the outermost stages are oversized, essentially becoming inactive and voiding any intended staging. In this case, the full pressure drop is taken across the final stage, resulting in high energy release right at the controlling and seating surface of the plug.

In contrast, the axial flow design of the Baker Hughes LincolnLog valve offers reliable performance throughout the entire range of plug travel. By throttling at all stages in unison, the LincolnLog valve reduces short-circuiting of any pressure-reduction stage, decreasing wear along the leading and controlling edge of the plug. The axial flow technology of the LincolnLog valve helps eliminate damage to any controlling surface (plug, cage or seat) by not exposing any one stage to excessive velocity or the full pressure drop.



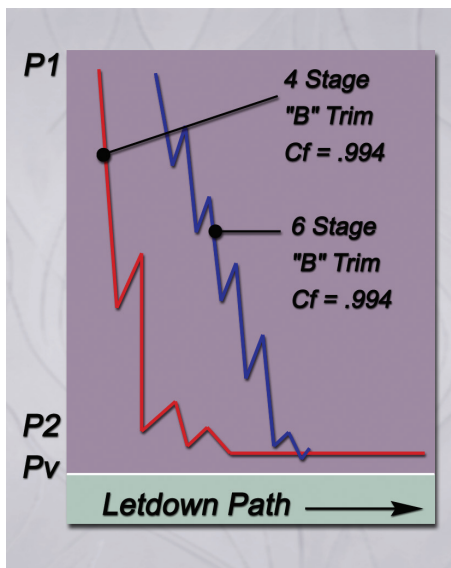
# Reliability In Service Life

## Reliable Installed Life

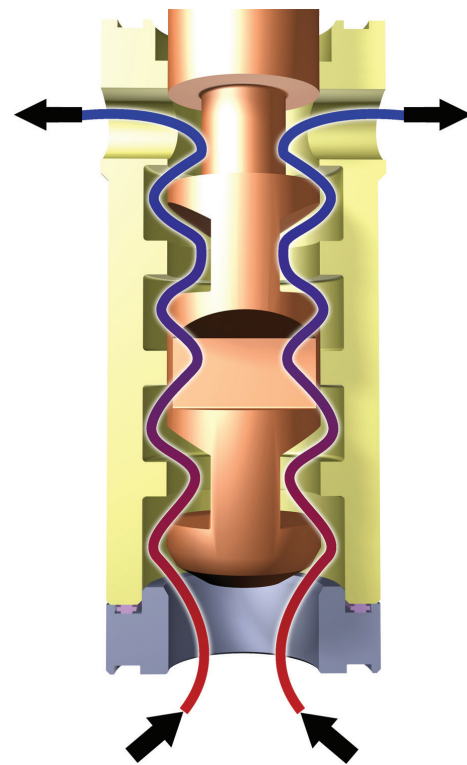
The LincolnLog valve is repeatedly applied in some of the most severe liquid service applications because of its robust design. Some of the most challenging control valve applications require the LincolnLog valve's ability to reduce cavitation while withstanding direct impingement from metal, sand or other abrasive particles traveling within the process fluid.

For applications such as wellhead chokes and reclaimed oil processing, the LincolnLog valve reduces particle impact damage by minimizing the trim velocity through its high impedance tortuous flow path. Additionally, hardened materials such as 440C stainless steel and solid tungsten carbide are successfully incorporated into the trim design to further withstand erosive attack. For these applications, the LincolnLog valve offers a reliable and long-lasting solution by combining hardened materials with a low velocity, multi-stage, anticavitation design.

Vibration is also a cause of premature valve- trim part failure – specifically, the valve plug and stem. Vibration can be process induced or can be caused by the throttling effects of very high pressure, liquid-flow streams. The LincolnLog valve features oversized stem and guiding areas to overcome premature failure due to vibration. The oversized stem is mated to the plug with a unique male-female coupling configuration that positively aligns the plug and stem. This reduces fatigue failure due to vibration caused by trim misalignment. Secure guiding extends across the full length of the valve plug, as continuous plug guides are present in each of the staged reduction areas.



Multi-Stage Trim Comparison for 4 & 6 Stage Trim



Axial Flow Technology:  
3-D Multi-Stage Pressure Reduction

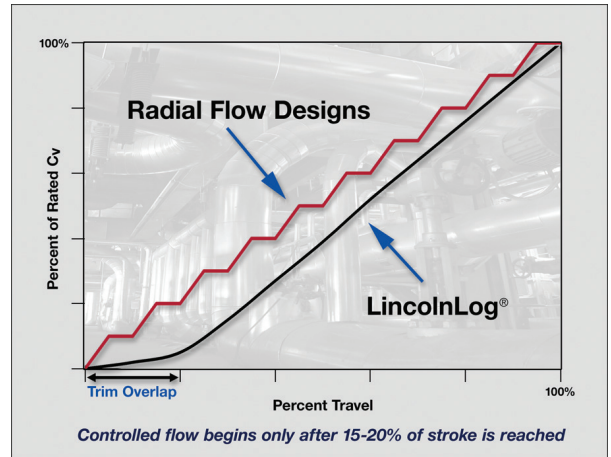
# Reliability In Control

## Reliable Valve Control

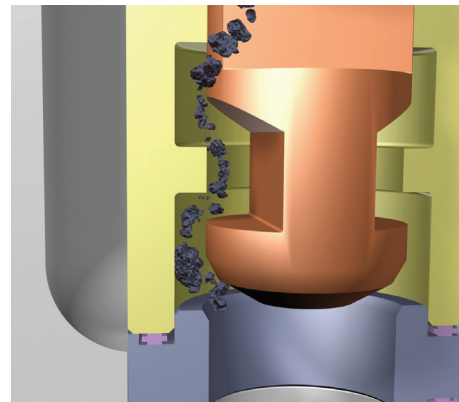
The axial flow technology of the LincolnLog valve offers a smooth control characteristic across the entire range of operation. Each pressure reduction stage is throttling simultaneously across the plug, thus avoiding a stair-stepped control response, which is commonly found in valves with radial flow designs. The smooth and continuous throttling control of the LincolnLog valve is achieved by the notches, or stages, in the plug design. The unique notched design coupled with the staged liner and cage enables the LincolnLog valve to control process conditions over an extremely large range of operation—in some applications up to 150:1 turndown ratio.

As an added feature, the enlarged flow passages of the axial flow design help protect the trim from clogging with pipeline debris. This inherent “debris tolerant” feature offers the benefit of uninterrupted service and repeatable control, which helps set the LincolnLog valve apart from the competition. Applications such as Pump Recirculation rely on this technology to promote continuous flow passing through the pump, helping to prevent burn-out or overheating of this critical piece of equipment. The LincolnLog valve can be applied in this service as flow will continue to recirculate with no risk of interruption resulting from blocked flow passages.

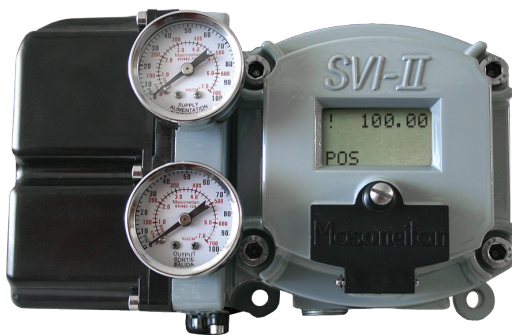
Masoneilan smart instrumentation including the SVI™ II AP (HART® digital positioner) and the Masoneilan SVI FF (FOUNDATION Fieldbus™ Positioner) allow for greater sensitivity and increased control accuracy. Masoneilan digital positioners also increase the repeatability and reliability of the control valve assembly, allowing for the precise control enabled by 1/10,000th of an inch plug travel resolution. Both positioners are available in single- or double-acting configurations.



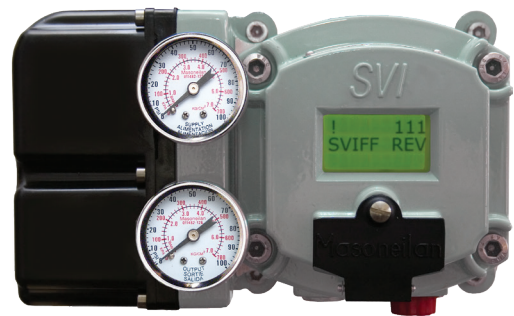
Axial Flow Technology: Smooth Control Through Continuously Active Stages



Trash Tolerant Design: Large Flow Passages Prevent Clogging



SVI II AP Digital Positioner



SVI FF Foundation Fieldbus Positioner/Controller



# Reliability In Service Life

## Reliable Installed Life

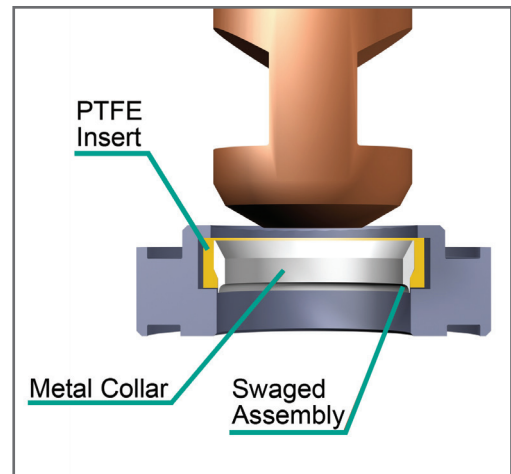
Many valve applications result in poor shutoff or excessive seat leakage after short-term use because the seating area also serves as the primary control element. Designs that throttle the flow near the seating surfaces often experience high fluid velocity in this region and direct the pressure drop across the leading edge of the plug and seat. Once early signs of erosion or wire drawing develop on the seating surface, quick deterioration of valve shutoff performance follows as a result of the high pressure drop condition.

The Masoneilan LincolnLog valve is configured to maintain long-term shutoff by separating the two functions of shutoff and control into separate areas within the trim. As the plug lifts off the seat, fluid begins to fill the first plug chamber until the valve is approximately 15 percent open. With continued travel, the downstream stages begin to open and the fluid is throttled using the remaining trim stages. Thus, the seating surfaces are never used for throttling at low flow, which commonly produces erosion damage in radial flow designs. This seat protection feature is critical for process startup valves since they are typically used to throttle high upstream pressure down to near vacuum conditions for downstream deaerators or condensers at low plant loads.

## Tight Shutoff Designs

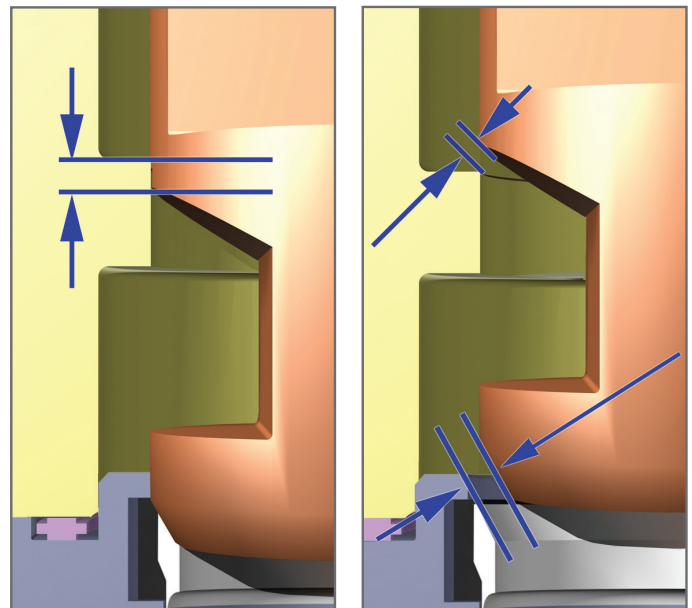
Shutoff performance consistent with ANSI/FCI Classes IV, V, and VI, as well as MSS-SP-61, is available with the LincolnLog valve. For temperatures up to 600°F (316°C), we offer a TFE-inserted, soft-seat design for tight shutoff. This soft seat is protected by a sliding metal collar that shields the TFE from direct exposure to the flow stream and erosive particles when the valve is open.

Maintaining long-term shutoff is critical in high-pressure liquid service, as high-pressure differential leakage may lead to wire drawing, cavitation, or flashing damage to the valve, downstream piping, or other equipment.



Protected Soft Seat: Class VI Shutoff Design

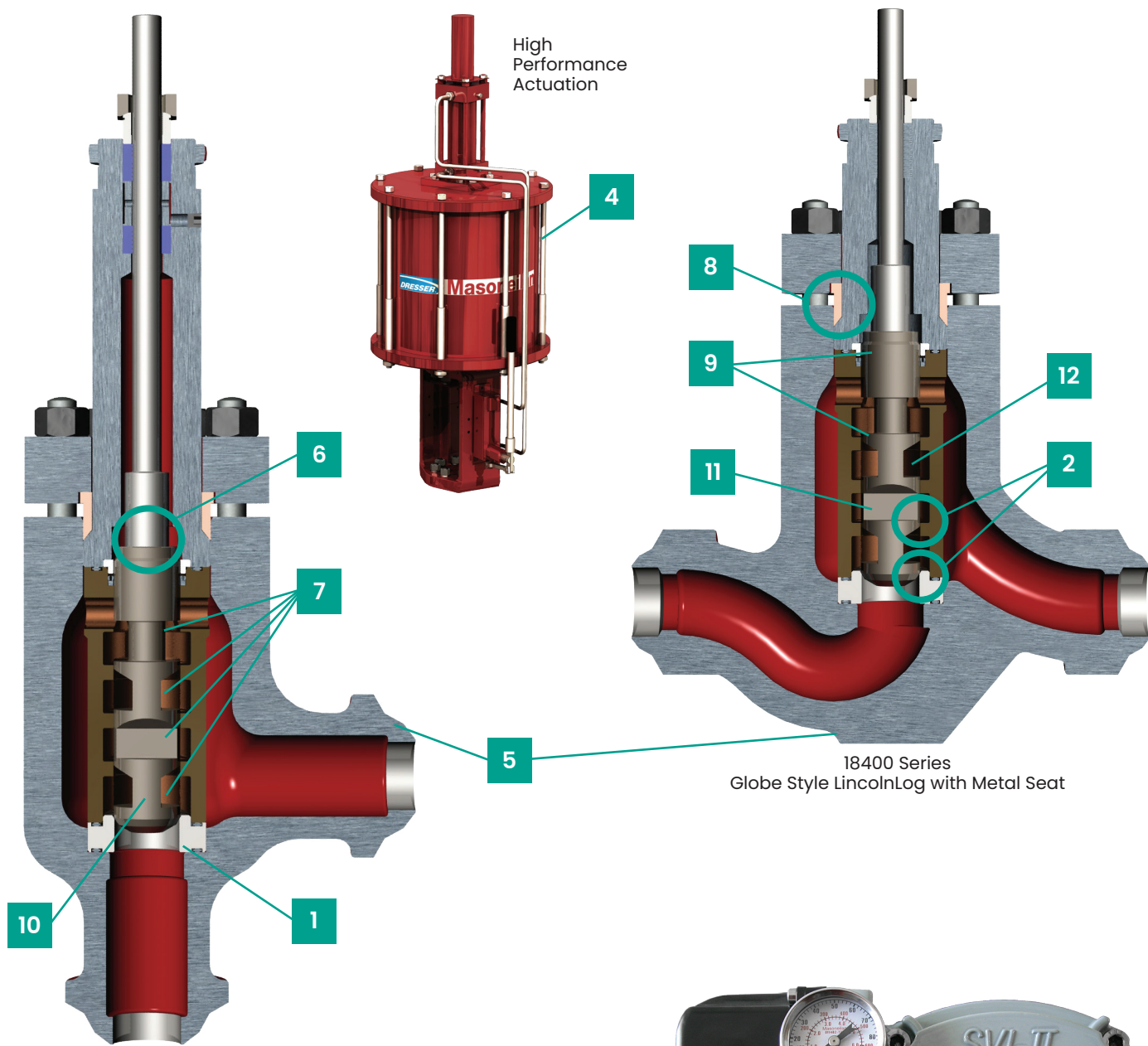
## Seat Protection Feature



Trim Surface Overlap with Valve in Closed Position

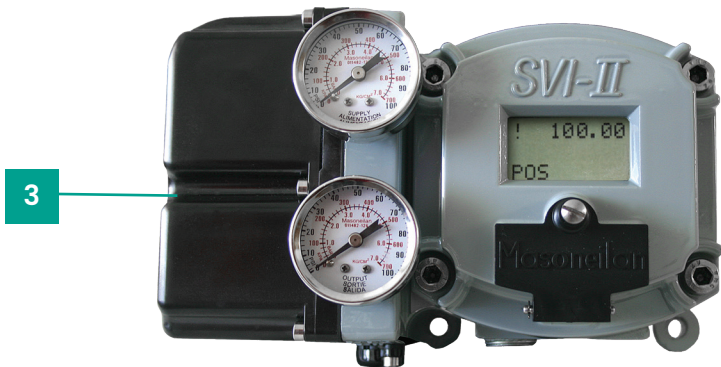
Larger Flow Area at Seat Region with Valve in Open Position

# Features & Benefits



7840 Series  
Angle Style LincolnLog with Soft Seat

18400 Series  
Globe Style LincolnLog with Metal Seat



SVI II AP Digital Positioner



| Feature |   | Advantage  | End User Benefit           |                     |
|---------|---|--|----------------------------|---------------------|
| 1       | Protected Soft Seat                         | Long-term, Reliable Class VI Shutoff                               | Prevents Loss of Product   | Revenue Enhancement |
| 2       | Trim Overlap                                | Protects Seating Area from High Velocity Flow, Maintaining Shutoff | Prevents Loss of Product   |                     |
| 3       | SVI II AP Positioner or Masoneilan SVI FF   | Optimized Control Performance                                      | Precise Process Control    |                     |
| 4       | High Performance Actuation                  | Trim Stability and Control Reliability                             | Repeatable Process Control |                     |
| 5       | Forged or Cast Angle & Globe Configurations | Flexible Installation  | Flexible Installation      | Cost Reduction      |
| 6       | Robust Plug/Stem Connection                 | Trim Durability  | Longer Installed Trim Life |                     |
| 7       | Multi-Stage Trim                            | Cavitation Elimination   | Longer Installed Trim Life |                     |
| 8       | Compact Metal Seal Design                   | Reduces Bolting Torque Requirements                                | Ease of Maintenance        | Risk Mitigation     |
| 9       | Continuous Plug Guiding                     | Eliminates Vibration Induced Damage                                | Minimizes Downtime         |                     |
| 10      | High Resistance Tortuous Flow Path          | Provides Flow Energy Management                                    | Minimizes Valve Damage     |                     |
| 11      | Axial Flow Technology                       | Trim Stability and Seat Protection                                 | Reduces Trim Wear          |                     |
| 12      | Large Flow Passages                         | Flow Entrained Particulate Tolerance                               | Minimizes Downtime         |                     |

# Specifications

| Flow Direction       |   |
|----------------------|---|
| Standard:            | Flow-to-open  |
| Optional:            | Flow-to-close   |
| Body                 |   |
| Type:                | Cast or forged globe style (18400 Series)<br>Cast or forged angle style (78400 Series)                      |
| Sizes:               | 1" to 12" (DN 25 to DN 300)   |
| Ratings:             | ANSI Class 600 to 4500<br>(ISO PN 100 to 400)<br>API 5000 & 10000   |
| End Connections:     | RF, RTJ, socket weld, butt weld, threaded, print flanges (forgings)   |
| Bonnet               |   |
| Type:                | Bolted<br>Standard<br>Extension   |
| Body and Bonnet      |   |
| Materials:           | Carbon Steel<br>316 Stainless Steel<br>Chrome-Moly<br>others on request                                     |
| Trim                 |   |
| Plug Type:           | Multi-step axial flow (3, 4, 6, 8 and 10 stages)  |
| Seat Type:           | Quick change integral with plug liner (1" & 1.5" sizes)<br>Metal seat<br>Protected soft seat                |
| Guide:               | Continuous top guided (liner acts as primary guide)   |
| Cv Ratio:            | Up to 150:1   |
| Flow Characteristic: | Modified linear   |
| Materials:           | Standard, NACE, cryogenic   |
| Actuator             |   |
| Type:                | Spring-Diaphragm<br>Spring-Return Cylinder<br>Double-Acting Cylinder<br>Electrohydraulic (such as REXA)     |
| Handwheel:           | Optional  |
| Positioner           |   |
| Type:                | SVI II AP - HART (single or double-acting)<br>SVI FF - Foundation Fieldbus (single or double-acting) others |

Optional designs are also available, such as larger sizes, higher pressure ratings, special materials, or additional trim stages as required. Consult factory for design details and specifications.

# Providing industry-leading knowledge and technology

## Integrated Smart-engineered Technology

Make the most of the LincolnLog control valve's operational benefits with Baker Hughes leading microprocessor-based field instrumentation technology. Award-winning HART communicating SVI and SVI FF digital positioners help improve your asset's effectiveness, resulting in higher returns on investment. By using patented tuning algorithms that optimize valve control performance, our digital positioners deliver improved process yields and lower maintenance cost.

Flexibility is built into each of Baker Hughes digital instrumentation offerings. SVI II and SVI FF mount on any control valve actuator and interface effectively with HART and Foundation Fieldbus distributed control schemes, respectively (since SVI is only Hart and SVI FF is only FF).

You can further increase flexibility and functionality with Baker Hughes smart instrument companion software such as *ValVue™*, a tool that monitors realtime device status. In addition, *ValvKeep™* valve database management and AMS Snap-on™ asset management software provide a comprehensive view into valve asset maintenance history and performance trends. These software support tools, in conjunction with the advanced diagnostic capabilities of smart devices, help significantly reduce operating costs.

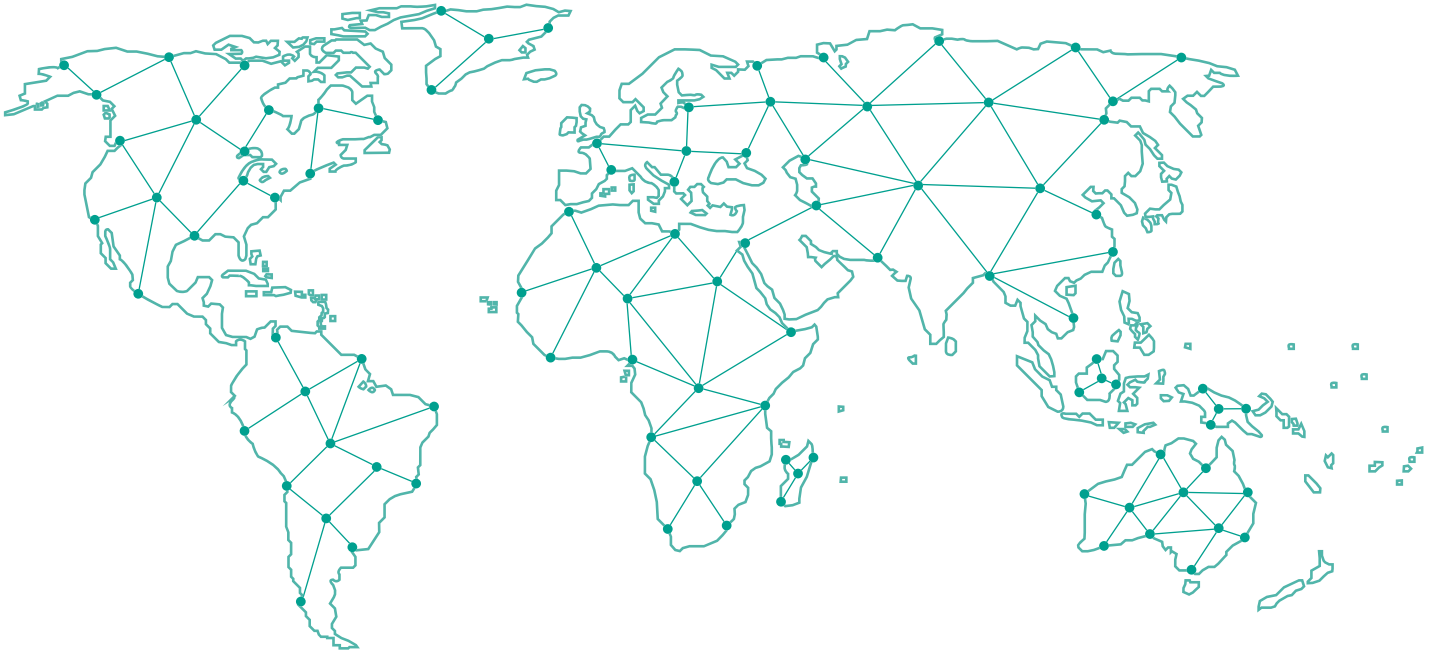
## Flexible Solutions for a Wide Range of Applications

Baker Hughes provides a wide range of control valves and services, supported by a global, integrated network of manufacturing, sales and service offices. Our broad portfolio of products includes general service and severe service control valves, actuators, pressure regulators and valve-mounted smart instrumentation and accessories. Baker Hughes has the expertise, experience and technology to deliver the best-fit solution for virtually every process control application. Masoneilan designs from Baker Hughes include industry-leading products such as the *Camflex™* rotary control valve, LincolnLog liquid letdown control valve, butterfly valves and customized solutions including T-Ball parallel plate technology and patented *V-LOG™* labyrinth trim technology.



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