

A low-angle, upward-looking photograph of a complex industrial steam desuperheating system. The system consists of numerous large, silver-colored metal pipes, walkways with railings, and platforms. The pipes are arranged in a vertical and horizontal pattern, creating a sense of height and scale. The background is a bright blue sky with scattered white clouds. The overall aesthetic is clean and industrial.

**Masoneilan**

a Baker Hughes business

# Steam Desuperheating Systems

Integrated Valve and Smart Solutions





# Baker Hughes is looking to the future

The process of reducing superheat content in steam by its nature is counter-efficient for any plant, but necessary to protect critical equipment as today's plants are driven for use across a much more demanding cyclical environment. The **Masoneilan™** desuperheater is designed with the advantage of years of experience and patented technology to provide the most effective method to stabilize operations and address our customers key concerns.



**Optimize Service**



**Improve Reliability**



**Increase Efficiency**



**Reduce Emissions**



# Years of innovation and direct customer interaction have produced an outcome that effectively uses technology to address our customers biggest concerns.

## Optimize Service

Multiple upgraded features, including upstream back-pressure device and thermal liners, are all integrated to optimize the installation for maximum performance.

## Improve Reliability

There are no parts, including spray nozzles, installed within the steam flow path which eliminates damage within the system caused by thermal cycling and fatigue.

## Increase Efficiency

The differentiated *Flow Profiler* is designed to create a turbulent mixing zone away from the pipe wall, concentrating the water injection for maximum desuperheating efficiency.

## Reduce Emissions

Welded connections combined with zero-leak spray nozzles, complete with Inconel springs designed outside the thermal cycling zone, eliminate potential paths for any escaping process fluids.



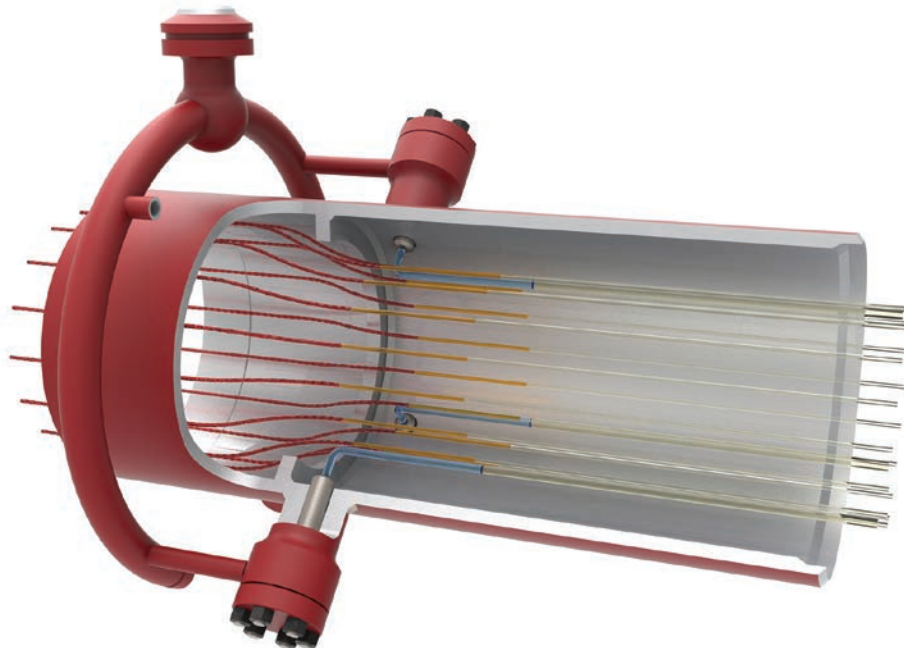
# Steam Desuperheating

The desuperheater serves as a means of controlling steam temperature (i.e. reducing superheat content) via water injection through state-of-the-art spray nozzle technology. The Masoneilan DSH model is designed for the most severe desuperheating applications, typically involving a high degree of thermal cycling across an extreme temperature differential. In applications such as boiler interstage attemperators and final attemperators, the desuperheater equipment must inject massive amounts of cooling water into high temperature steam in excess of 1000° F (537° C) to protect the downstream steam turbine and boiler tubes from adverse temperature spikes.

In addition, desuperheaters can be utilized in steam conditioning applications, such as process steam temperature control. Here, water is sprayed to reduce temperature of incoming steam to match the process steam temperature requirements. The DSH model desuperheater can be customized to provide a wide range of water injection capability to match customers process needs.

To do this properly and effectively, desuperheaters must be designed to inject the water in as fine of an atomized mist as possible to create the most surface area across the tiny water droplets for maximum heat transfer and efficient evaporation. Additionally, components within the steam flow stream must be protected from thermal shock induced from colder water injection. This can be mitigated by reducing the temperature differential between the steam and water, and by removing the spray water system from within the center of the steam flow path itself. Masoneilan has innovated many solutions over years of experience, including a differentiated *Flow Profiler* that converges the steam flow towards the center of the pipe, while creating a turbulent flow region to maximize the mixing and cooling efficiency of the water injected, away from the interior pipe wall to avoid thermal fatigue, or cracking of the steam pipe. In extreme cases, the DSH design can be integrated with a thermal liner to prevent any excess, unevaporated water from creating thermal shock against the pipe wall.

The Masoneilan DSH is designed to meet ASME B31.1, and can be manufactured under ASME Boiler & Pressure Vessel Code Section 1 welding S-Stamp to comply with installations within the Boiler or HRSG boundary limits.

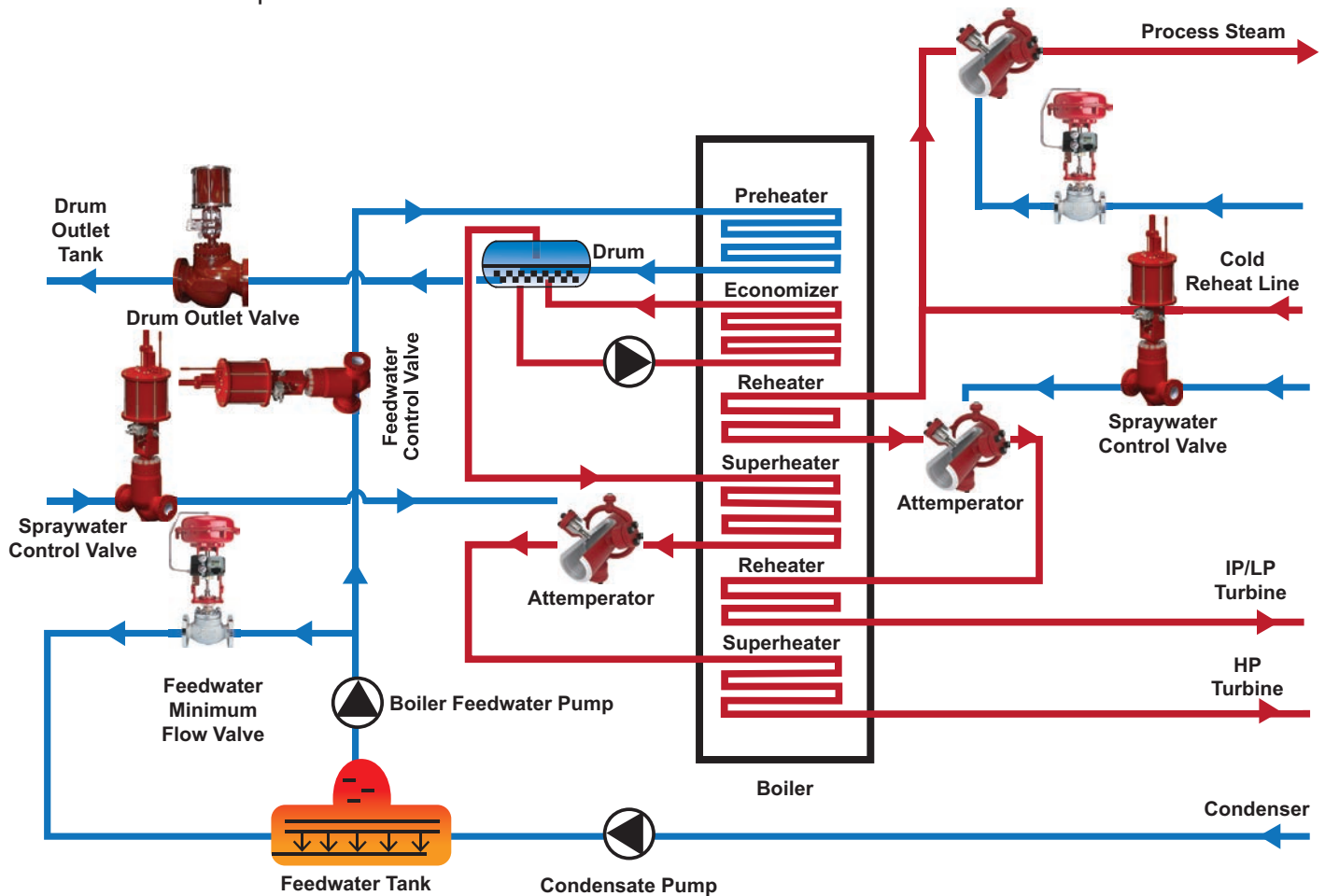


**Masoneilan DSH Desuperheater, with *Flow Profiler***



# Power Plant Attemperator Applications

Both coal-fired and gas-fired power plants use interstage attemperator to control superheated steam within a total heat content (enthalpy) range. These attemperators are located between the steam superheaters, and also between the reheaters. Newer combined cycle power plants also use an additional set of attemperators called terminal, or final attemperators to supplement the interstage attemperators and assist in plant start-up cycles. Masoneilan control valves offer the full range of desuperheaters and spray water valves to optimize temperature control and ensure safe and efficient operation.



DSH Model  
Superheat Attemperator



41005 Series  
Cage Guided  
Globe Valve



21000 Series  
Plug Guided  
Globe Valve



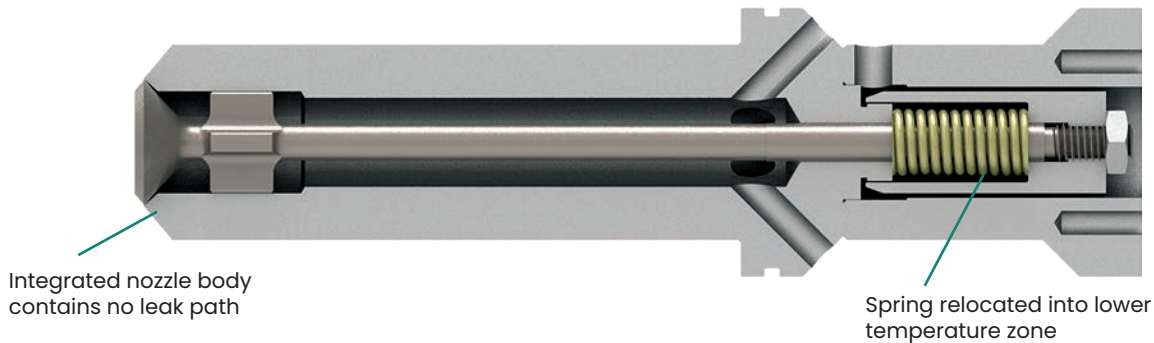
18400/78400 Series LincolnLog  
Multistage, Anti-cavitation  
Globe Valve

# Masoneilan DSH Desuperheater

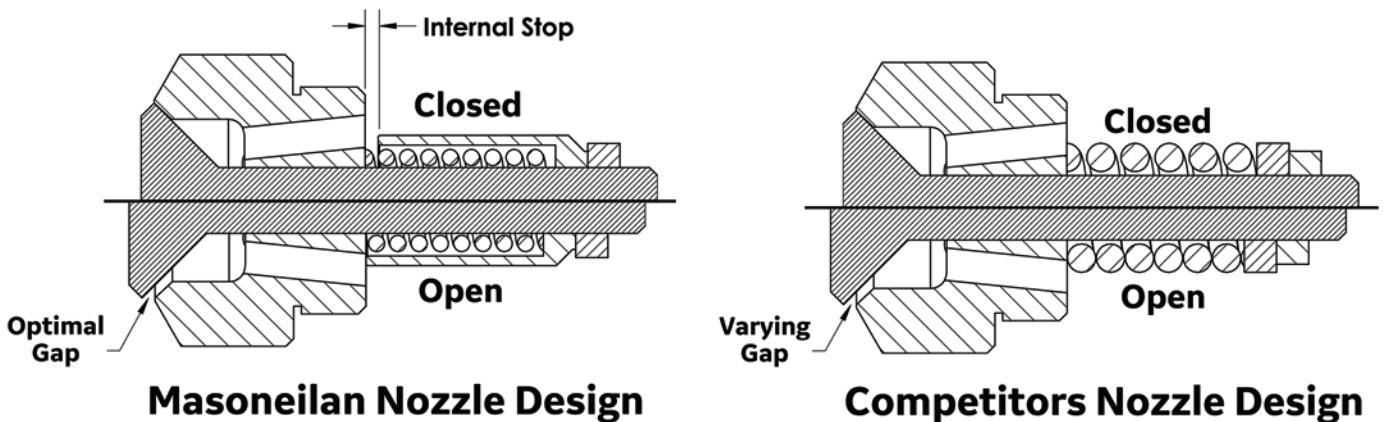
Masoneilan offers a full range of desuperheating options, ranging in pipe sizes from 4" through 48", customized to meet the application conditions for each installation, including steam flow/pipe size, water quantity and thermal differential.

## Advanced Spray Nozzle Design

Masoneilan uses a traditional and well proven spring loaded nozzle design that throttles the spray orifice to maintain a conical spray distribution with a fine atomized spray mist as the volume of water varies. However, the state-of-the-art nozzle design also leverages many features unique to Masoneilan, including eliminating any potential spray nozzle leak path to avoid either water leakage into the pipe, or steam back-flow into the water lines. Additionally, the Masoneilan nozzles extend the Inconel springs away from the high thermal cycling zone into the steady state water region to reduce the thermal fatigue and extend product life. Mechanical stops within the nozzle are provided to differentiate against traditional nozzles that "chatter" in response to fluctuating water pressure.

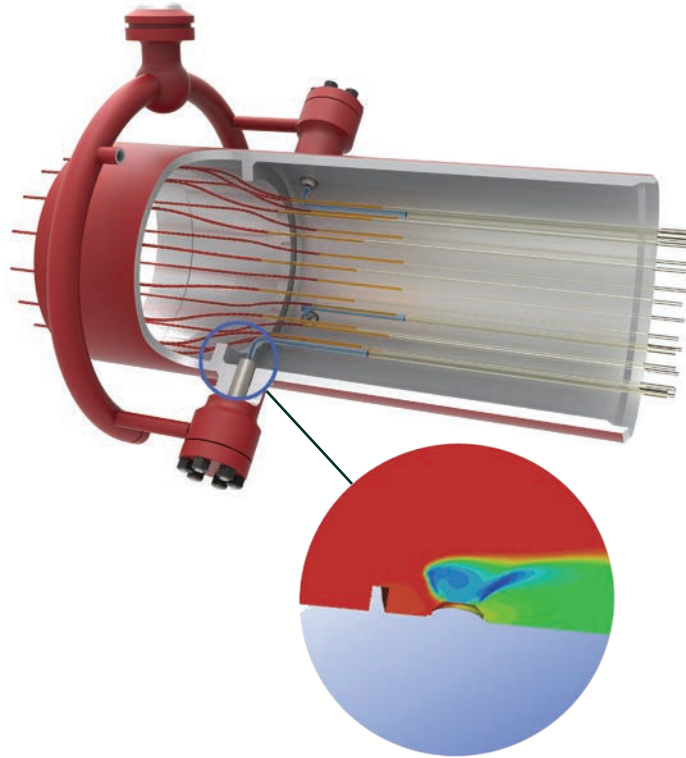


### Integrated Flow Tip



## Flow Profiler

The *Flow Profiler* is unique to the Masoneilan DSH product, and is installed upstream of the spray nozzles to create a turbulent mixing zone of steam away from the pipe wall. The feature allows for the injected water to penetrate further towards the center of the pipe, and eliminate a high velocity steam flow contour along the pipe wall. This increases the heat transfer efficiency within the steam, as opposed to applying the benefits of the cooling water against the pipe, which can lead to potential failure such as thermal cracking. This design acts similar to a thermal liner, but at a greatly reduced cost for standard applications.



## Thermal Liner

Liner style desuperheaters use an alloy steel welded pipe, internal to the steam pipeline, as a means of protecting the downstream pipe against excessive water impingement and thermal shock. The liner design is suspended within the pipe, allowing for a small clearance between the outside surface of the liner and the inside surface of the main pipe. The liner design allows the main pipeline to avoid stresses associated with sharp temperature gradients and extend the life of the system and reducing maintenance costs or risk of failure.



**Desuperheater Thermal Liner**

# Masoneilan Spray Water Injection Valves

Masoneilan offers a full range of spray water injection valves, include anti-cavitation designs, providing a well-controlled rate of water injection across all ranges of pressure differential.



## 21000 Series

The Masoneilan 21000 Series heavy top-guided globe valve is a good fit for the spray control application. It offers equal percentage and liner characteristics that allow precise control, low rated and fit-for-application  $C_v$ s to provide low spray water flow rates, and are available in Class V shut-off to ensure leak tightness.

### Specific applications:

- HP, IP, and LP spray control
- Process Steam Desuperheater spray control

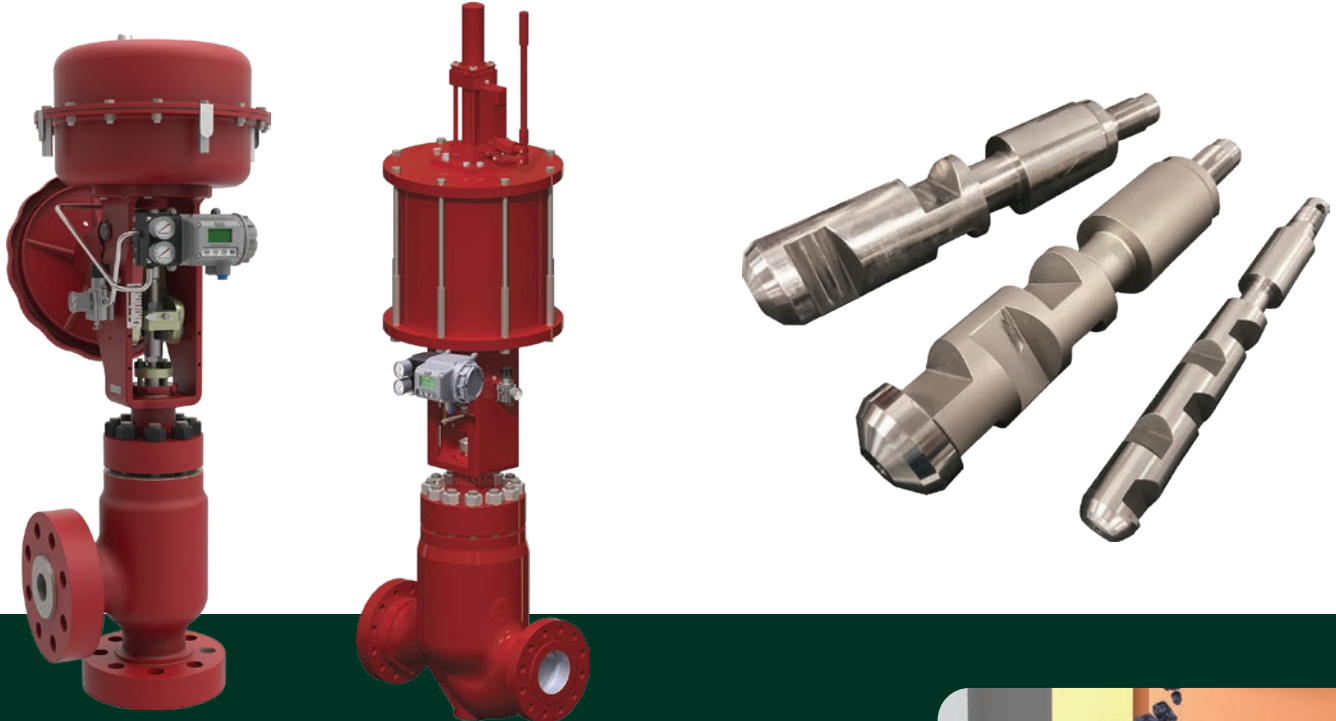
### 21000 Series & 41005 Series Features:

- ISO 15848-1 Certified, Environmental Low-Emission Packing (<15 ppm)
- Anti-Cavitation, Multistage Trim
- Lower Balancing Seal for Small Movement and Fast Response, for Tightest Temperature Control
- Tight Shutoff Design
- Light Duty and Reduced Capacity Options
- Advanced Diagnostics and Digital Positioning Control



# Masoneilan 18400/78400 Series LincolnLog for Severe Service Applications

High-Pressure, Anti-cavitation control valves.



## 18400/78400 Series LincolnLog™

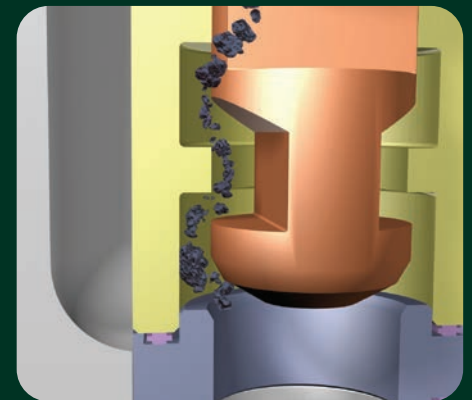
The Masoneilan LincolnLog offers long term reliability in high-pressure drop, anti-cavitation applications. This unique axial flow valve uses a series of notched flow passages as it stages the full pressure reduction into smaller, less damaging increments. The LincolnLog has the unique ability to handle high pressure drop with precise control through large flow passages to allow process media to pass through debris, such as magnetite particles, found in spray water.

### Specific applications:

- High pressure spray water control valve
- Boiler feedwater recirculation control valve
- Boiler feedwater control valve

### 18400/78400 Series LincolnLog Features:

- ISO 15848-1 Certified, Environmental Low-Emissions Packing (<7 ppm)
- High Pressure, Anti-Cavitation Multistage Trim
- High Resistance, High Rangeability Design
- Large Flow Passages to Avoid Clogging
- Tight Shutoff Design
- Advanced Diagnostics and Digital Positioning Control
- Angle and Globe Configurations Available in both BWE and Flanged Connections



Trash Tolerant Design:  
Large Flow Passages Prevent Clogging

# Masoneilan SVI Digital Control Valve Positioner

Control and monitor your critical valve assets with the proven reliability of the **SVI™** platform and new valve diagnostics.



## SVI3 Digital Valve Positioner

The SVI is a user-friendly digital valve positioner for pneumatic control valves. Utilizing advanced control and diagnostic algorithms, along with field proven, non-contact position sensing technology, the SVI delivers accurate, responsive, and reliable positioning performance.



## Continuous Health Monitoring

Improve plant efficiency and process uptime with continuously calculated diagnostics which monitor the health of the valve and process.

Plan turnarounds and prioritize repair events via data driven decisions utilizing one year of on-device diagnostic storage.



## Simple, Modular Platform

Automated, self-calibration routines and a universal mounting system provide effortless setup and commissioning across any linear or rotary control valve.



## Performance & Reliability

Built upon 20+ years of field proven technologies with billions of operating hours, the SVI is trusted on the most critical applications.



## Ready to Serve, Anywhere!

Designed with corrosion resistant materials, and universally certified to global hazardous area standards. Ready to serve with explosion proof rating for the presence of hydrogen.

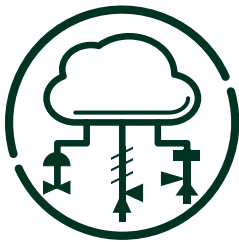


# Valve Lifecycle Management Solutions

## Driving Outcomes

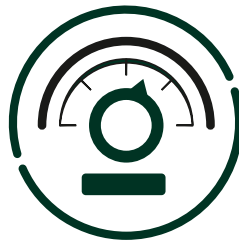
Across the many processes underway in a mining operation, with its harsh and remote environments, performance reliability and safety are non-negotiable. Efficiently planned maintenance and turnaround events reduce unnecessary time spent on examining devices that may not require immediate maintenance. Baker Hughes' Valve Lifecycle Management solutions, when installed independently or as a solutions suite, provide real-time remote diagnostic valve health monitoring, troubleshooting and valve maintenance management. Identification of the valves that require attention allows for more efficient planning for maintenance and inventory, or necessary upgrades to keep processes running reliably and productively. Baker Hughes is looking to the future to deliver solutions that enable companies to deliver on their commitments and address their toughest operational challenges.

## Valve Lifecycle Management



### ValvKeep

Valve Asset Management software application to track and manage all valve assets throughout the entire lifecycle.



### ValvAware

Online valve health monitoring service enabling condition-based monitoring in real process conditions without production interruption.



### ValVue3

Device Type Manager (DTM) application performs the configuration, calibration, and performance testing of your Masoneilan digital devices.



### ValScope

In-line or offline control valve diagnostics and troubleshooting device to evaluate & optimize control valve performance and loop efficiency.



### EVT PRO

In-situ pressure relief valve portable testing device to confirm valve set pressure in process and under normal operating conditions.

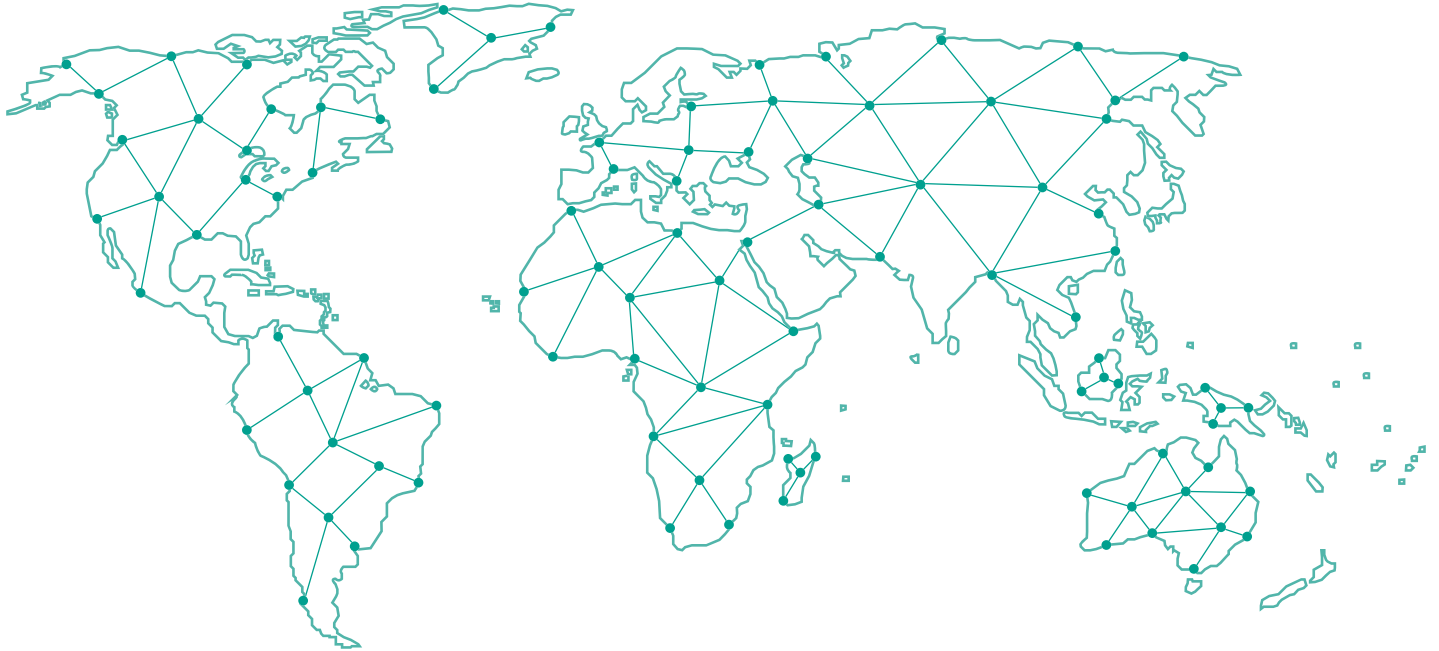


### ValvStream

Valve sizing & selection tool for Pressure Relief Valves and Control Valves to guide the proper selection of the right valve for the right application.

# Find the nearest local Channel Partner in your area:

[valves.bakerhughes.com/contact-us](https://valves.bakerhughes.com/contact-us)



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**Baker Hughes** 