

Bio and Synthetic Fuels

Energy Transition Challenges

Innovative Valve Solutions

Baker Hughes is looking to the future

The world is rapidly changing. In the dynamic environment of Energy Transition, it's more important than ever to innovate and provide solutions that help our customers face new challenges with confidence in their process applications.



Optimize Service



Improve Reliability



Increase Efficiency



Reduce Emissions

The production of Bio and Synthetic Fuels will help decarbonize the transportation industry from the cars we drive, the planes we fly in and the buses and trucks that transport us. The use of these new fuels requires a range of refining processes that include safety and control valves.

Baker Hughes valves have more than 140 years of experience in supplying valves in process technology licenses for use in refineries around the world on many applications and therefore you will have the best and safest control of flow and pressure.

Optimize Service

Our digital suite of Valve Lifecycle Management tools coupled with our global network of Masoneilan™ Authorized Repair Centers and Consolidated™ Green Tag™ Centers help you easily identify and service the valves that need it the most, making turnarounds and planned maintenance easier.

Improve Reliability

Our engineers work closely with our customers and regulatory agencies to ensure that our valves are designed for compliance and each specific installation, maintaining safe and reliable performance over the installed lifecycle with reduced maintenance.

Increase Efficiency

Our legacy of innovating control valve and pressure relief valve technology provides the right solutions to ensure installed valves are configured and sized to reduce operational costs, maximize process efficiency and keep critical processes running smoothly.

Reduce Emissions

Fugitive emissions not only cost money but can be harmful to the environment. With an ever-growing number of companies committed to achieving carbon neutral status in the next decade, best-in-class leak tightness and superior valve technology are required in every process design.



Refinery application solutions

With 140 years of valve experience, Masoneilan control valves and Consolidated pressure relief valves have been providing world class refining solutions with over a century of innovation.

The refining industry is undergoing many changes, from types of feedstocks and processing methods to the duration they operate. This puts a lot of strain on the valves installed in a refinery. Processing organic material still requires the safest control of flow and pressure.

Baker Hughes has developed advanced valve sizing and calculation methods to aid our application engineers in selecting the optimal valve for each application. With a wide portfolio of solutions ranging from rotary valves to severe service valves, our engineers can optimize the best fit valve for your application, characterizing each selection with the proper amount of pressure resistance, while still maximizing the flow capacity.

Green fuels are carbon-neutral or even carbon-free alternatives to fossil fuels. There are a number of different fuels that fall into this green group, such as those made from vegetable oil, animal fats, hydrogen, captured CO₂ and biomass.

- **ETHANOL** – a blending agent with gasoline to increase octane and cut down CO₂
- **BIODIESEL** – a cleaner-burning blending fuel for petroleum-based diesel fuel
- **SYNTHETIC FUELS** – considered to be carbon neutral fuel that replaces traditional fossil petroleum/gasoline
- **RENEWABLE DIESEL** – can be substituted with fossil diesel in existing vehicles because it is chemically identical to fossil diesel
- **SAF** – used to power aircraft that has similar properties to conventional jet fuel but with a smaller CO₂ footprint

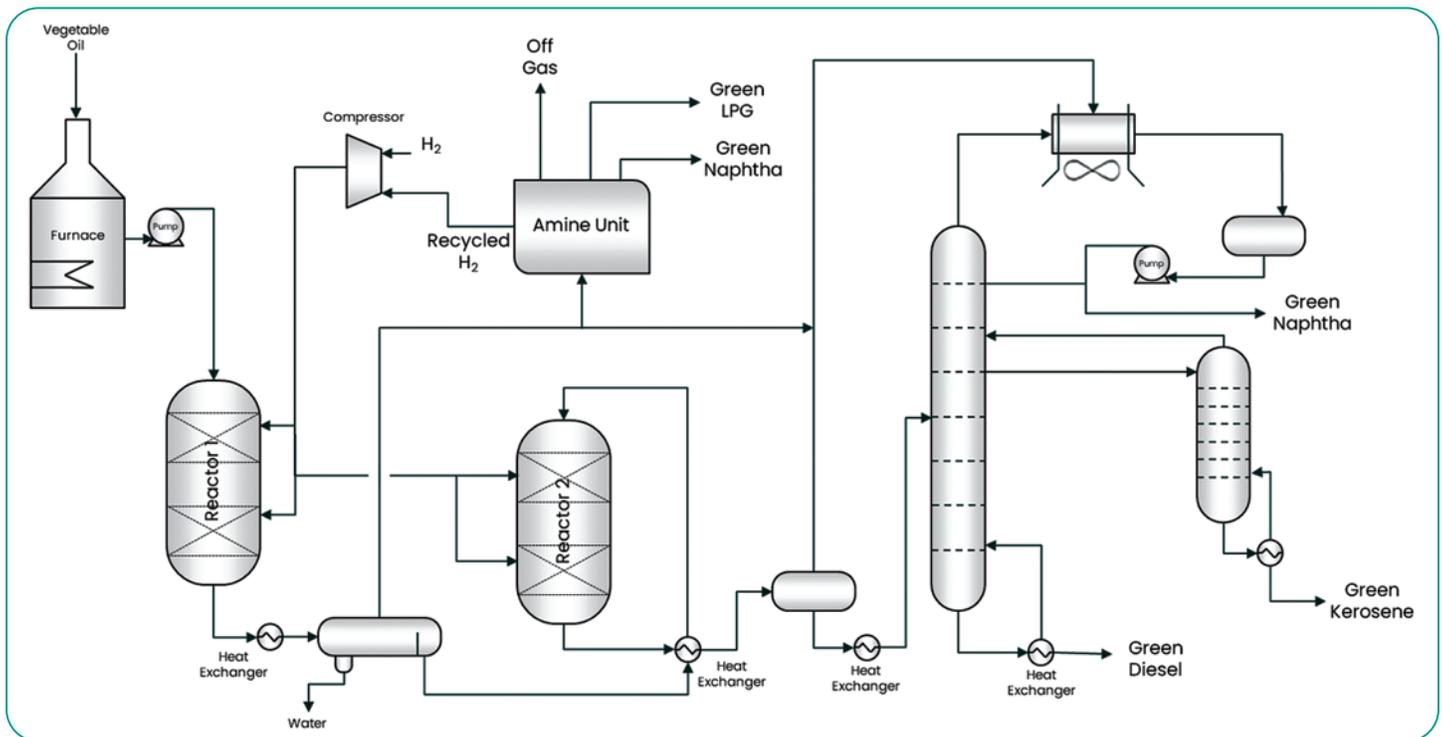


Bio-refinery ecosystem

Co-processing enables a simple and efficient integration of renewable feed insertion that can take place in the fluid catalytic cracker (FCC), the hydrocracker, and the hydrotreater and provides flexibility to the refinery operator.

Other processing options for refiners would be to generate 100% renewable fuels; this would require a stand-alone process commonly referred to as renewable diesel, that requires hydroprocessing of oil and fats.

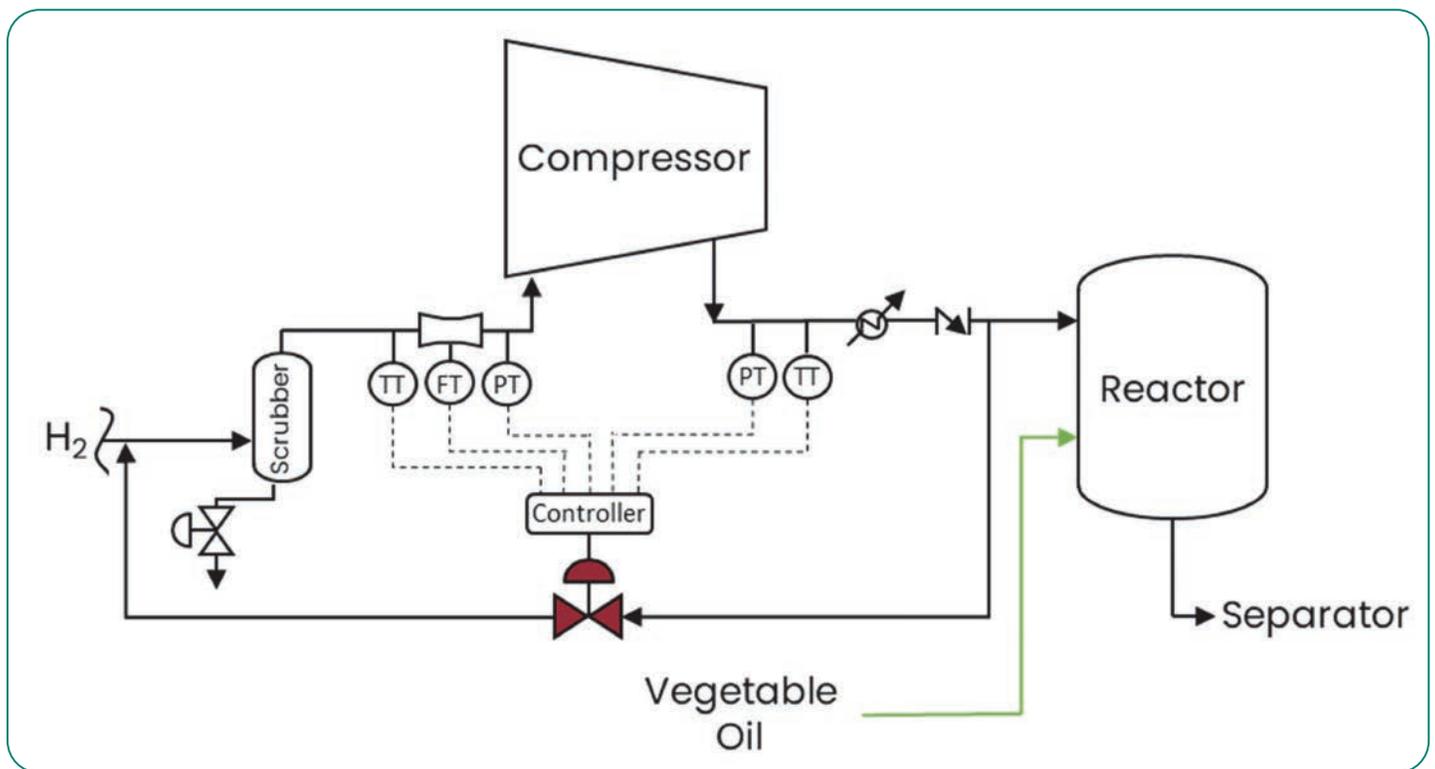
Biofuel refining requires hydrotreaters. These can be built as a grass roots unit or converted from existing units that were originally designed for removal of sulfur and nitrogen from fossil feeds by hydrogen treatment.



Bio-refinery Applications

Compressor Anti-surge

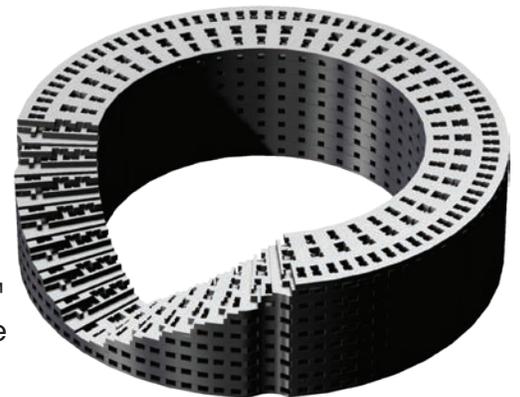
The compressor anti-surge valve is the most critical valve in the anti-surge recycle loop and is the key to achieving stable, reliable and efficient compressor operation. In today's compressor operation the anti-surge recycle valve is designed to avoid surge events by responding to the surge compressor controls with small, fast movements that is designed to prevent compressor surge events by responding faster to the commands from the compressor controls.



Products

- Masoneilan™ 41005 Series, Lo-dB
- Masoneilan™ 49000 or 72005 Series V-Log™

The 3-dimensional tortuous path design of Masoneilan's V-LOG™ trim controls pressure reduction through the management of the process fluid energy. This is accomplished by directing the gas through discrete flow channels that are designed with multiple stages consisting of 90-degree turns along with the intermediate contractions and expansions in the flow area. The enhanced flow geometry of the V-LOG trim creates a series of kinetic energy losses, followed by partial energy recoveries at each stage. This gradual letdown process is highly effective for noise attenuation due to the staged reduction of the fluid's pressure.



Bio-refinery Applications

Minimum Flow Recirculation

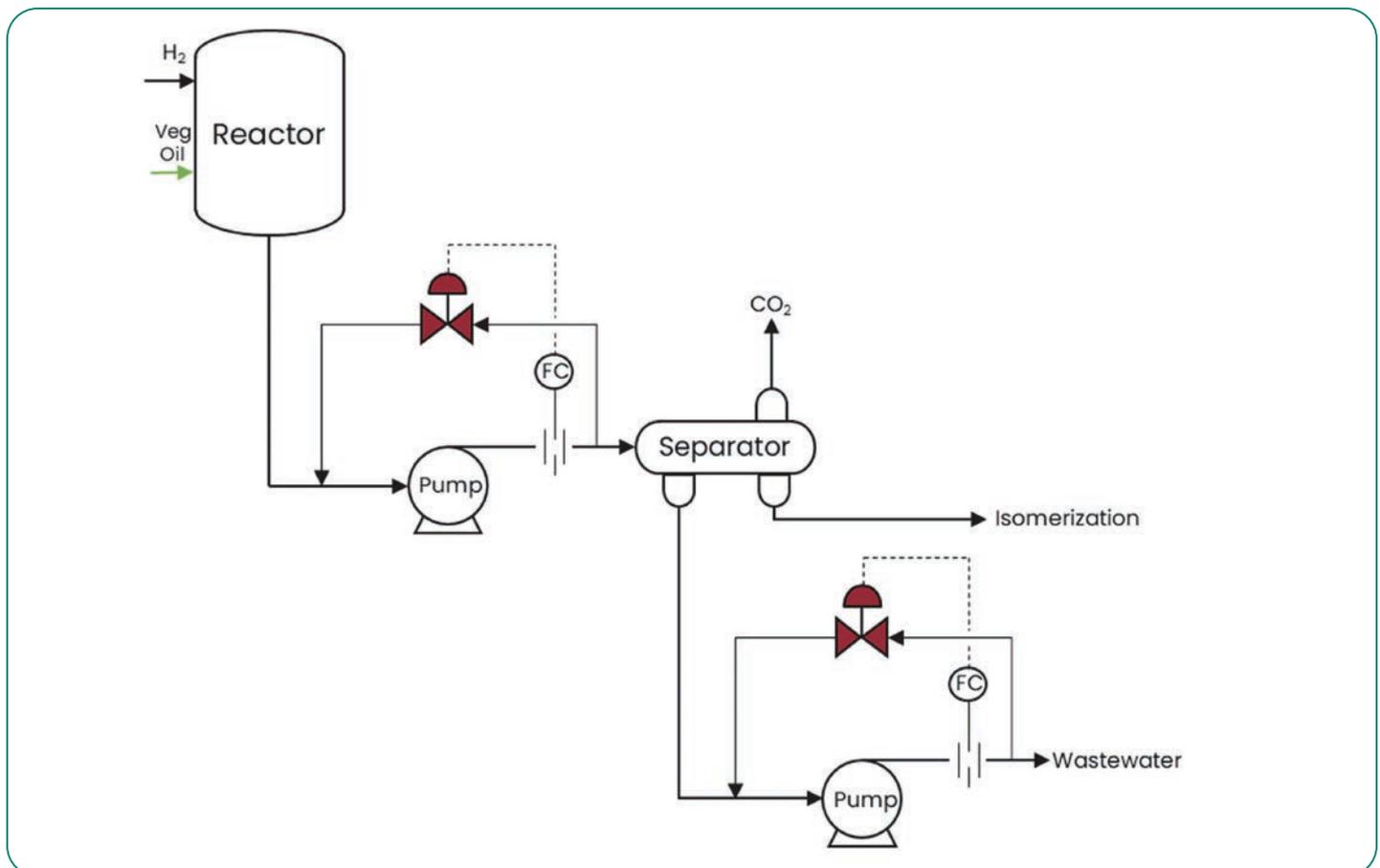
Cavitation is another phenomena that commonly occurs as liquid is pressurized during pump recirculation. It is created when vapor bubbles form and collapse as the liquids pressure falls near the vapor pressure as the flow passes through the control valve.

Selection of the right valve, such as the Masoneilan LincolnLog, is crucial to ensure longevity in these applications during low flow, high pressure drop start-up conditions.

Products

- Anti-Cavitation trim – Single stage for low pressure drops
- Anti-Cavitation trim – Multi-stage for low/medium pressure drops
- VRT™ / Vari-Log / LincolnLog™ for high pressure drop

The axial flow design of LincolnLog valve offers reliable performance throughout the entire range of plug travel. By throttling at all stages in unison, the design reduces short-circuiting of any pressure-reduction stage, decreasing wear along the leading and controlling edge of the plug. It also 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.



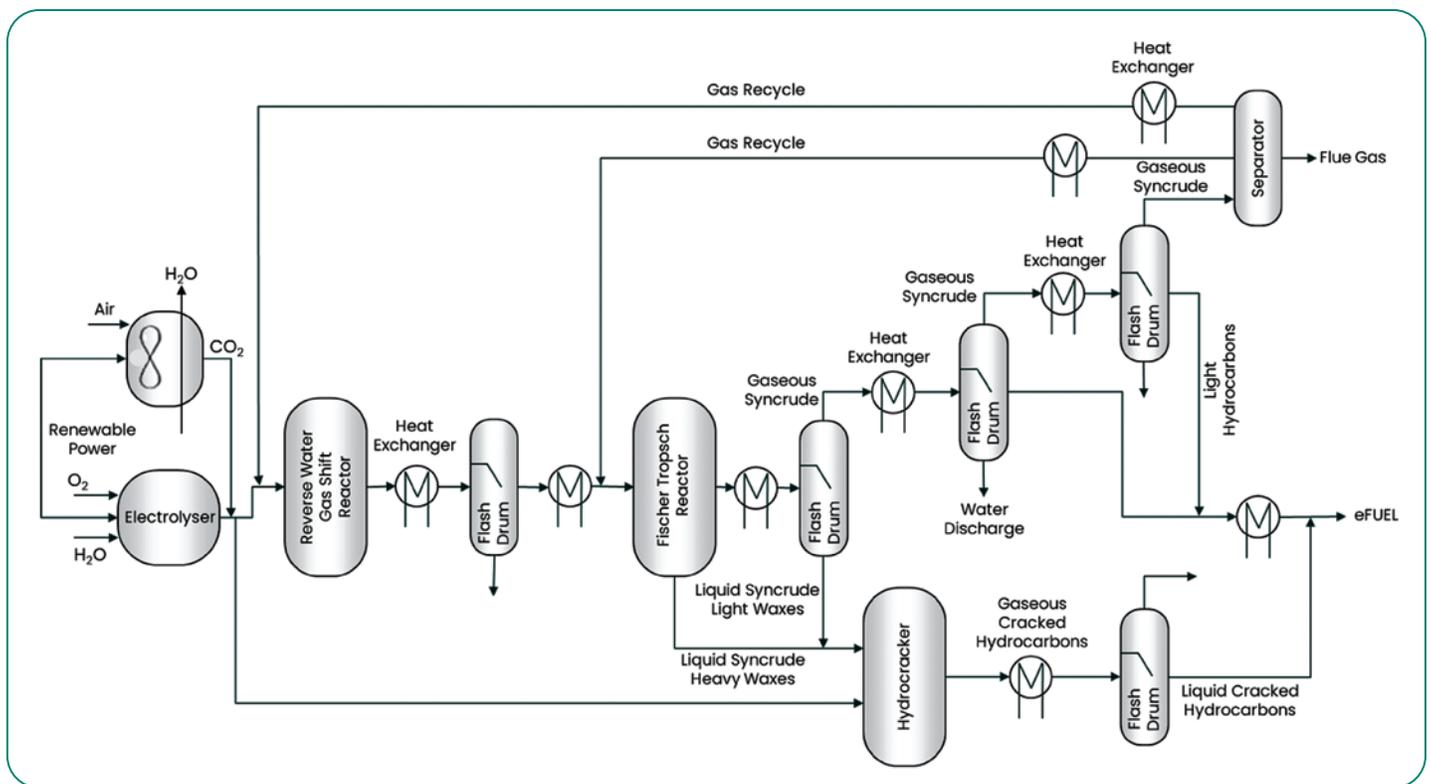
eFUEL ecosystem

Offering a similar performance to petrol and diesel, e-fuels are produced using renewable energy. They're manufactured with CO₂ and hydrogen, meaning the environmental impact is low.

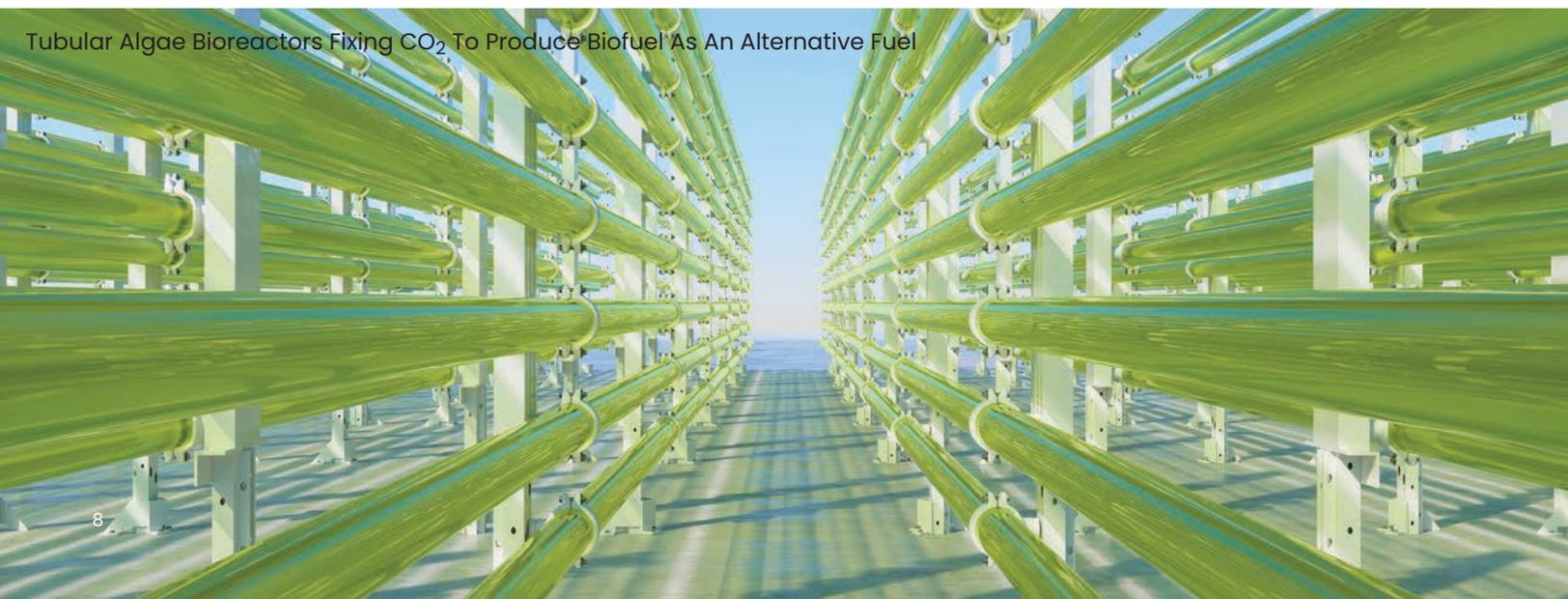
To make the fuel, renewable electricity is used to split water into CO₂ and hydrogen. This is then combined with carbon dioxide captured from factories and air emissions. The result is a powerful hydrocarbon with a negligible environmental footprint.

The manufacturing process produces virtually no greenhouse gas emissions, making e-fuels an option for auto makers to improve environmental credentials and hit sustainability targets.

Typical Fischer-Tropsch Synthesis Process



Tubular Algae Bioreactors Fixing CO₂ To Produce Biofuel As An Alternative Fuel



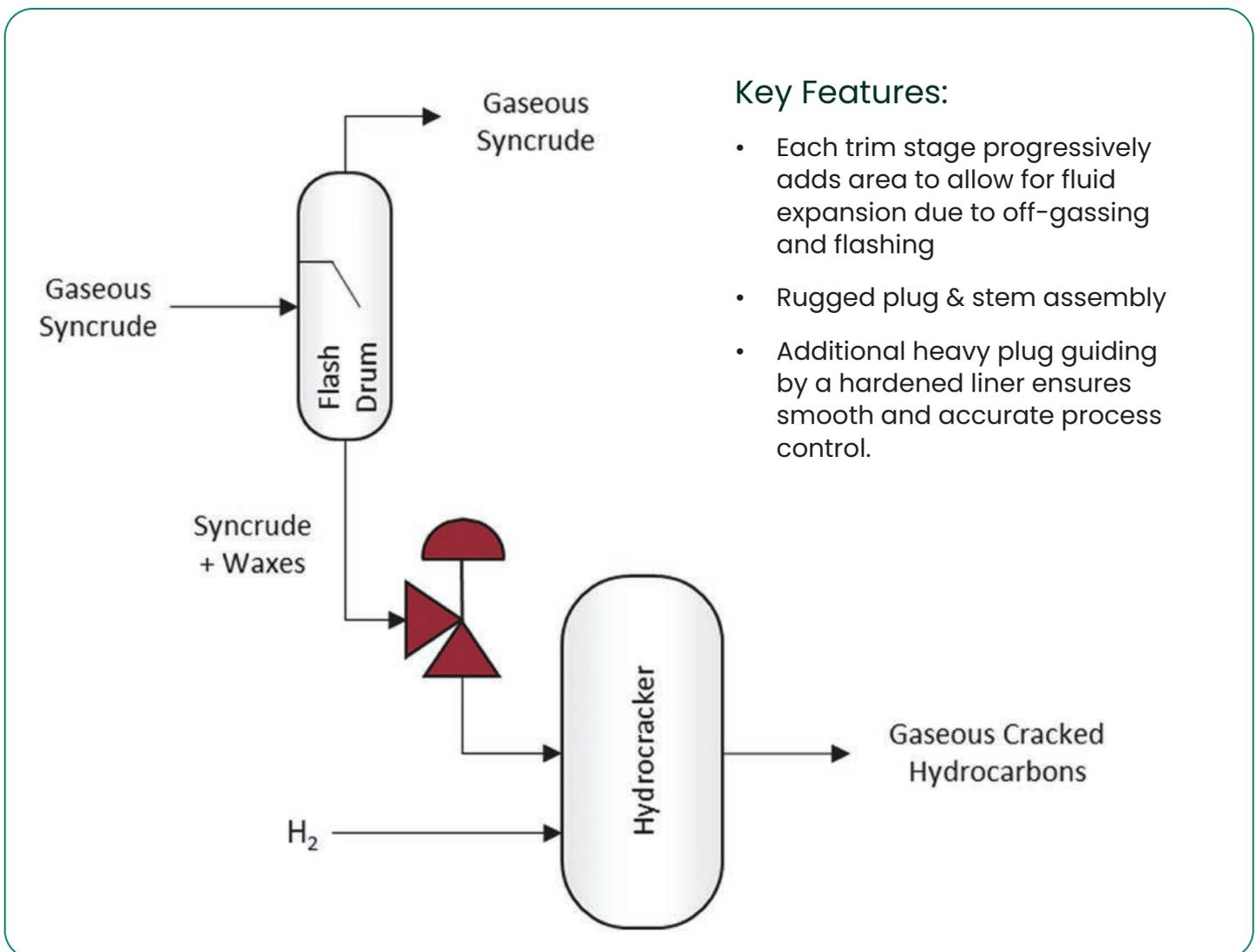
eFUEL refinery Applications

Out-gassing / Off-gassing

Some of the most challenging applications in refining of fossil fuel, biofuel and eFUEL is the release of gas that is dissolved within a liquid, this is commonly referred to as out-gassing. Being able to recognize such applications is crucial to the refining process.

Out-gassing in control valve applications requires a special knowledge and experience to be able to apply it to the sizing calculations. The existence of both a compressible (gas or vapor) element and non-compressible (liquid) element in the media prior to the valve trim cannot be accurately modeled using the standard industry standards or other proprietary liquid control valve sizing equations. To successfully calculate a reasonable CV that is neither undersized nor oversized and allowing the fluid to still be controlled requires skills above normal control valve sizing.

LincolnLog: Expanding Area Trim with Heavy Guiding

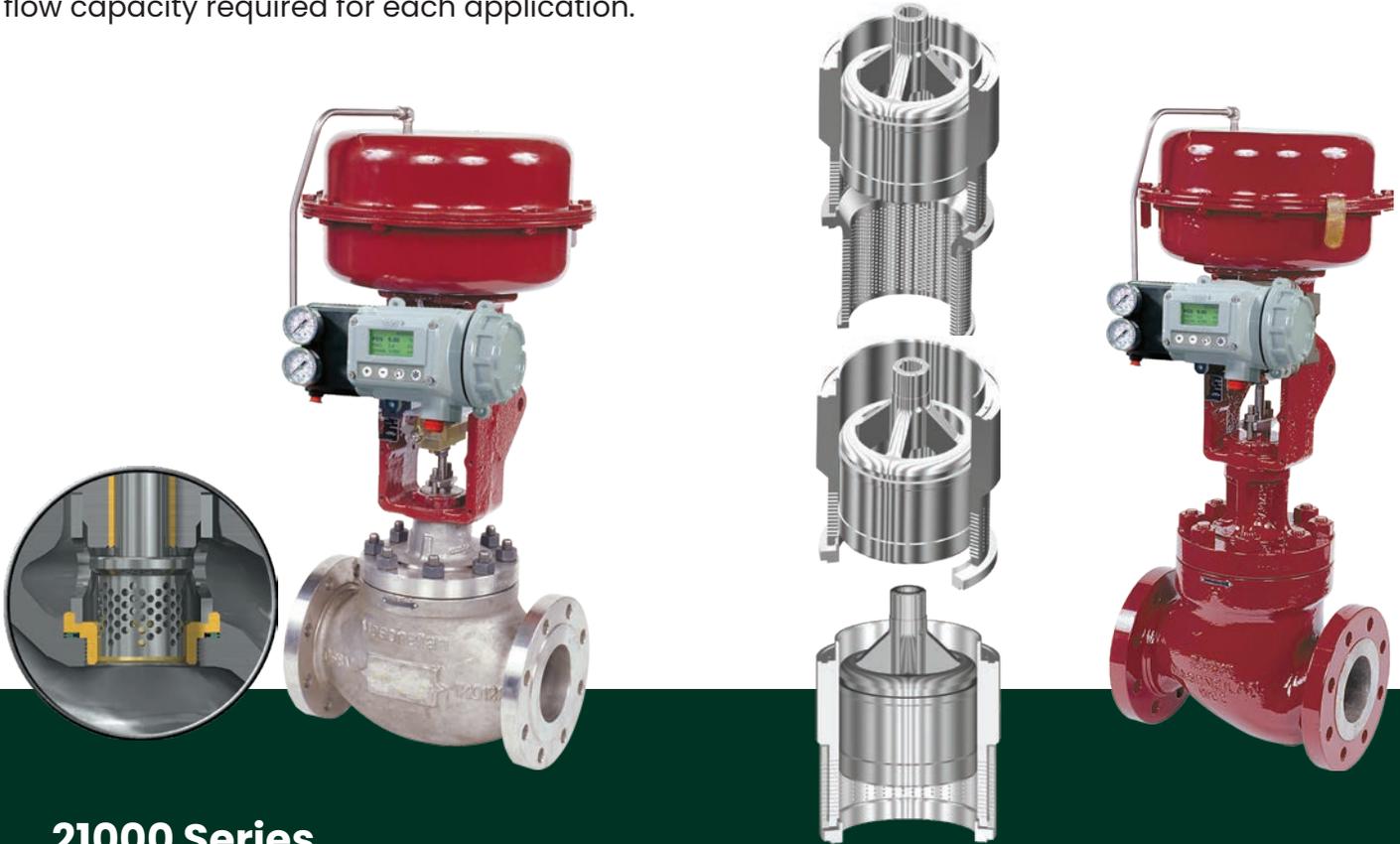


Key Features:

- Each trim stage progressively adds area to allow for fluid expansion due to off-gassing and flashing
- Rugged plug & stem assembly
- Additional heavy plug guiding by a hardened liner ensures smooth and accurate process control.

Masoneilan™ Globe Valves for Biofuels Refining Systems

Masoneilan offers a full range of control solutions, designed for the size, pressure reduction, and flow capacity required for each application.



21000 Series

The Masoneilan 21000 Series heavy top-guided globe valve can be installed for a wide range of general service applications. The 21000 Series product line features a single-ported unbalanced design configuration, which permits numerous trim, actuation, and instrumentation solutions.

41005 Series

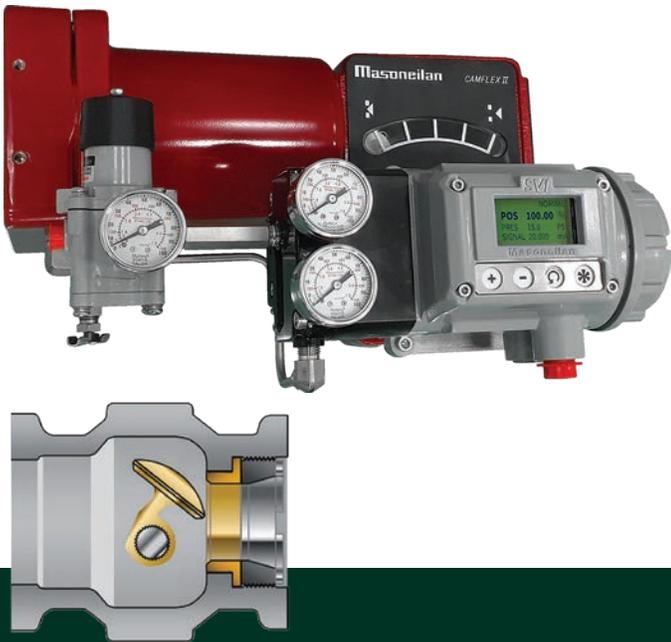
The Masoneilan 41005 Series heavy duty severe service valve features balanced trim with multistage pressure reduction, ideal for a higher range of demanding operating conditions. The 41005 valve includes low noise/anti-cavitation trim for high pressure reduction, large temperature variation materials for cryogenic service, and a lower balancing seal ring with large capacity flow to support compressor anti-surge applications up to 30" in size.

21000 Series & 41005 Series Features:

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

Masoneilan™ Rotary Valves for Biofuels Refining Systems

Masoneilan rotary control valves offer a high capacity, tight shutoff solution for many key applications.



Camflex 35002 Series

The Camflex Rotary Globe Control Valve combines the best features of a traditional globe valve in a rotary platform. The eccentric contoured plug provides true globe valve seating and control performance with the enhanced benefits provided by the inherent force amplification resulting in a smaller, more responsive actuator package. The standard extended bonnet allows application over a wide temperature range.

- Entirely Eliminates Body-to-Bonnet Leakage
- Industry Leading, Best-in-Class ISO 15848-1 Certified Low Emissions (<1 ppm)

33000 Series Triple Offset Valve

The 33000 Series triple offset valve provides zero leakage performance for extreme pressure and temperature applications, providing a safe environment. Enhanced features of the 33000 Series make it an excellent solution for refining applications:

- Self-centering disc without pins or keyways
- Low torque with square actuator connection
- Control accuracy with the SVI™3 smart digital positioner

Consolidated Safety Relief Valves for Biofuels Refining Systems

Consolidated combines safety, stability and emissions reduction for many biofuels production and processing applications.



1900 Series Dual Media (DM)

The 1900 Series Dual Media (DM) is the first and only spring-loaded SRV in the industry that is “dual certified” for both liquid and/or gas media



2900 Series Gen II

The 2900 Series Gen II is a pilot-operated SRV offering a unique full-nozzle design for protecting the valve body during severe service conditions.



3900 Series

The 3900 Series is a modular pilot-operated SRV featuring a conventional semi-nozzle design for easy access and maintenance of the main valve seat sealing area.

Triple Media (TM) Certification

The TM Series, available for both the 2900 Series and 3900 Series, meets agency certification requirements for multiple media for multiple media capacity stamping per ASME B & PVC Code Case 2787, validating valve performance on any service without changes to set pressure or part modifications. The TM Series provides exceptional set pressure performance, stable opening and closing, and exceptional blowdown performance ensuring the system is efficiently protected from an overpressure event with air, gas, liquid, steam, or a two-phase mixture as the relieving media.

“True Zero Leakage Pilot”

Both valve series use the “True Zero Leakage” modulating pilot that provides a modernized overpressure protection solution for reducing carbon footprint, emissions, and product loss.

There is no need to shutdown with the Field Test Connection accessory that comes standard with every Consolidated pilot.



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 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!

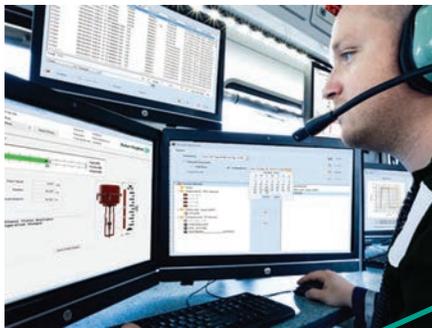
Designed with corrosion resistant materials, and universally certified to global hazardous area standards. Ready to serve with explosion proof rating for the presence of hydrogen.

Valve Lifecycle Management Solutions

Driving Outcomes

The industries we serve are evolving to pursue new frontiers with an increased focus on corporate social responsibility. Reducing emissions and ensuring safety are non-negotiables in the modern economy, while pressure to unlock new growth and improve margins continues to increase. As these industries seek to modernize and future-proof their operations accordingly, now more than ever, these operators are looking for more than a valve supplier. They are looking for a partner going into the future who can deliver comprehensive Valve Lifecycle Solutions enabling them to deliver on their commitments and to address their toughest operational challenges.

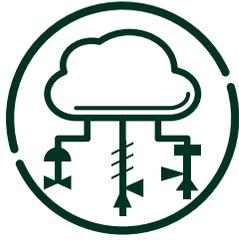
Valve Lifecycle Management



VLM Services

- Asset Management
- Calibration & Tuning
- Monitoring & Diagnostics
- Turnaround Management
- Product Upgrades

Product & Application	Maintenance & Repair	Discrete Monitoring	Continuous Monitoring
Factory Tests	Service Intervals	Digital Positioner Calibration	Distributed Sensors
Quality Data	Repair History	Digital Positioner Diagnostics	Supply Pressure
ERP Production Data	Critical Dimension Measurements	DTM Calibration & Tuning	Temperature
Product Sizing & Configuration	Visual Inspection	EVT Pro PRV Functional Test	Friction
Product Design	As Received vs. Shipped	ValScope PRO Control Valve Test	RMS Error
			Overshoot



ValvKeep

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

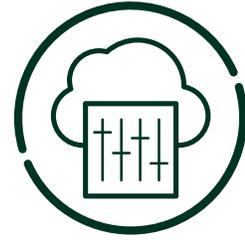
- Valve Repair Quality System
- Brand Agnostic
- Service & Repair History
- Turnaround Planning
- Documents & Reports
- On-Demand Photos & Data



ValvAware

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

- Read Only Secure Operations
- Brand Agnostic
- Reports Turn Data into Action
- 16 KPI & Performance Trending
- Compatible with OPC & DCS



ValVue3

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

- One Click Calibration Auto-Tunes Positioner to any Control Valve
- Run Remote Diagnostics
- Integrate with AMS, PRM, & FDM



ValScope

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

- Complete Control Valve Signature within Minutes
- Graphical Interface to Visualize
- Portable for in-line or in-house uses
- Rugged Durable Construction



EVT PRO

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

- Ensure PRV Set Pressure is Calibrated
- Portable for in-situ use
- Perform Test Without Shut-Down
- Rugged Durable Construction



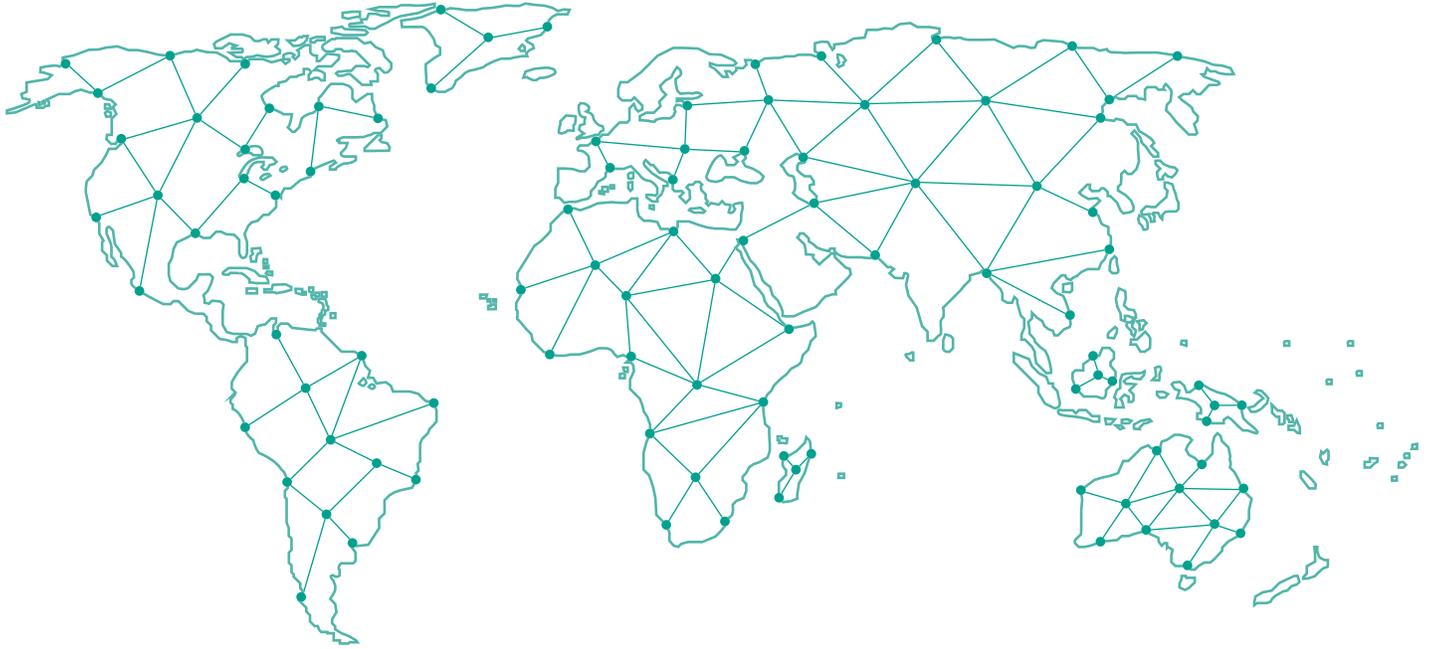
ValvStream

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

- Guided Valve Selection
- Sizing & Calculation Sheets
- Drawing
- Bill of Materials
- Specify Special Certs & Tests

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