


Fisher® Olefins Production Solutions





Olefins economics are driven by petrochemicals prices, feedstock costs, product yields, and consumer demand. Traditional feedstocks have included heavier feedstocks including gas oil, naphtha, liquified petroleum gas (LPG), propane, and butane.

Today's availability of non-traditional feedstocks including ethane, propane, and butane from natural gas liquids (NGLs) has led to cost-advantaged olefins production with higher ethylene yields. Because of this, unprecedented capital spend is occurring to debottleneck existing plants and to build new facilities.

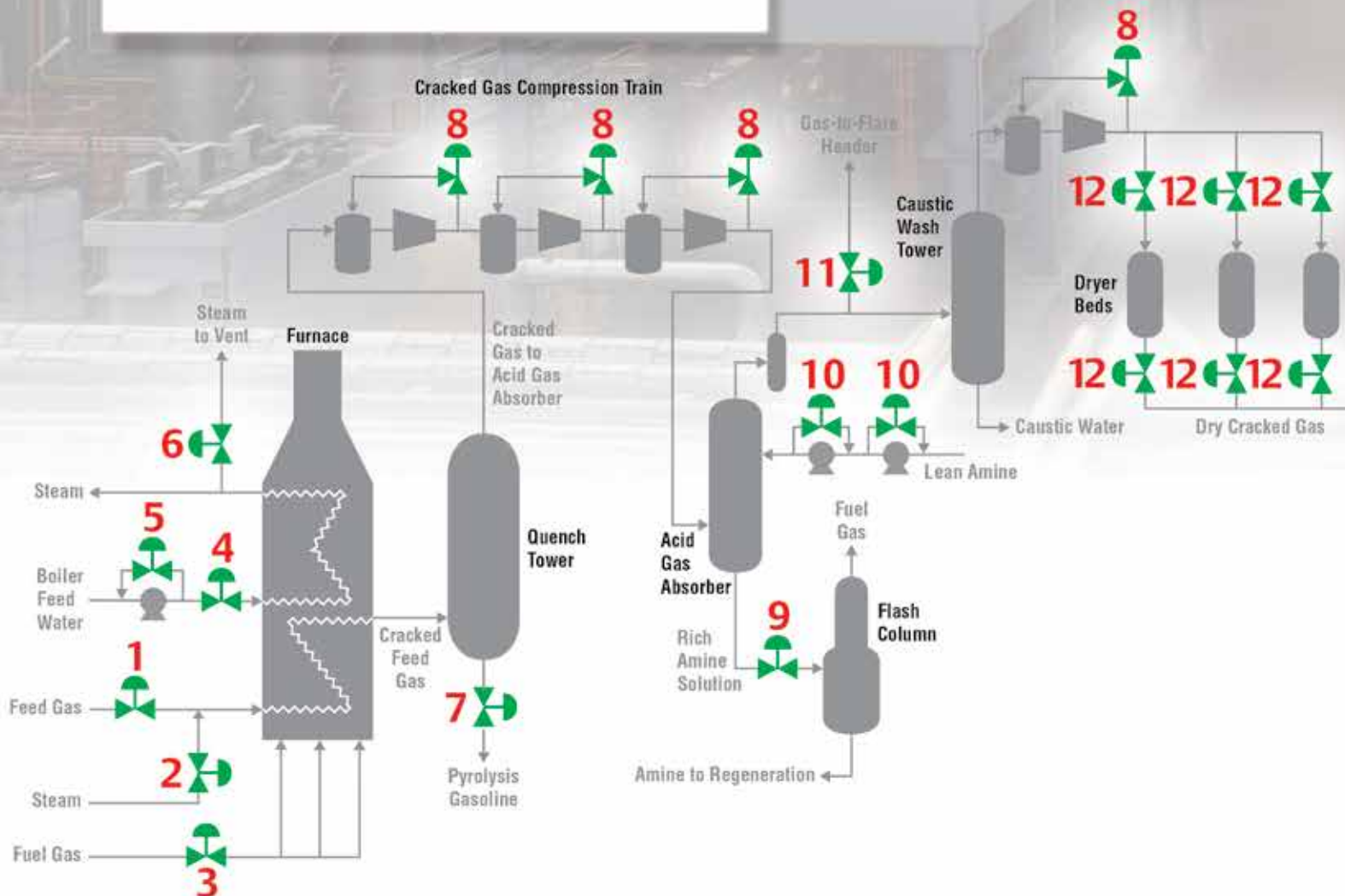
Regardless of the feedstock or process conditions, Fisher® control valves and technologies offer the reliability you need to help you achieve your required product yields.

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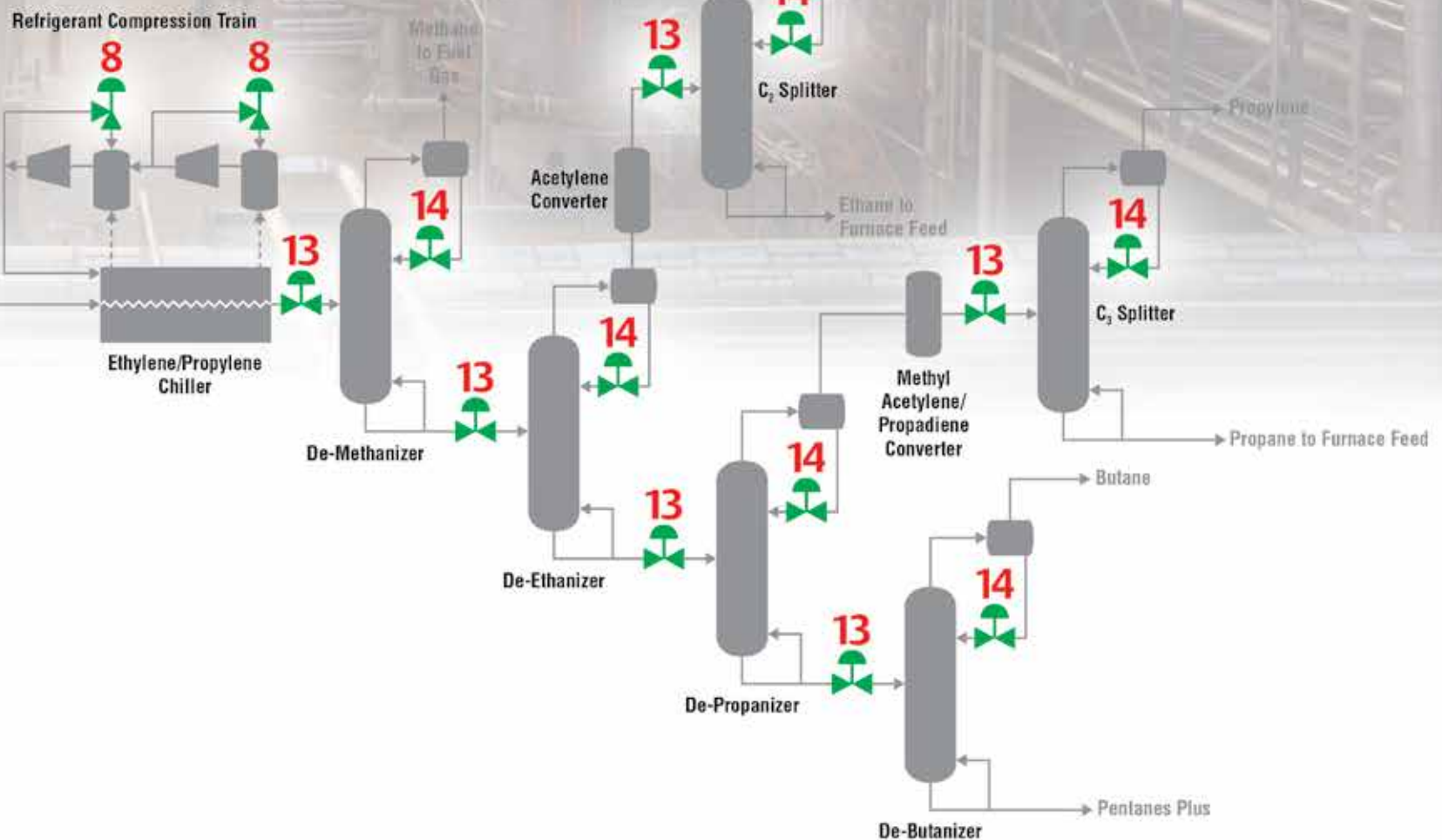
LEGEND

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Typical Olefins Production Process

Olefin production plants use a variety of feedstocks. The type of feedstock used will impact the type of recovery technology used. A front-end de-methanizer configuration is highlighted below because of its ability to allow for a variety of feedstocks. Alternative product recovery configurations include front-end de-ethanizer for plants utilizing light feedstocks and front-end de-propanizer for plants using heavier feedstocks. Most olefin production plants produce between 500 kilotons per annum (ktpa) and 1,500 ktpa per train. Highlighted below are the Fisher control valve solutions offered for critical applications within your facility.



Feed gas into the pyrolysis furnace can be a number of feedstocks, including ethane, propane, butane, gas oil, or naphtha. Regardless of feedstock, the feed rate must be balanced with dilution steam to lower hydrocarbon partial pressure and increase olefin yield. An improper ratio reduces efficiency of the furnace and will impact ethylene conversion. Valves in the furnace section play a critical role in maximizing ethylene production and throughput.

Hydrocarbon Feed Control Valve

In this particular application, a number of valves in parallel are commonly used to control the flow of the feedstock into the furnace. Reliability is the foremost requirement of inlet feed valves. Unexpected maintenance or surprise failures can stop production. In addition, these valves must be able to provide precise, stable control through a wide range of flow rates from startup and commissioning through full rated output of the plant. These valves must operate with minimal variability to help ensure stable and predictable performance of all process units downstream. Depending on the operating pressure of the pipeline, these valves can also experience a significant pressure drop. If not addressed properly, damaging noise and vibration may occur.

Dilution Steam Ratio Control Valve

An improper feed-to-steam ratio reduces efficiency of the cracker and can result in the need for additional decoking cycles, therefore reducing furnace uptime. The quantity of steam used varies with feedstock, cracking severity, and design of cracking coils. With the feed-to-steam ratio directly impacting olefin yields, it is important to maintain precise control of that ratio. In addition, steam assists to reduce coking deposits by reacting with coke to form carbon dioxide (CO₂), carbon monoxide (CO), and hydrogen (H₂).

INCREASED STABILITY

Actuator's rugged, thick-wall construction and shallow casing design increases stability and minimizes response time.

INCREASED UPTIME

The Fisher FIELDVUE™ digital valve controller with Performance Diagnostics can be used to monitor control valve assembly performance. Detection of a change in valve assembly performance can allow for scheduled maintenance prior to shutdown.



WEAR RESISTANCE

Hardened material provides exceptional wear resistance and long service life

NOISE REDUCTION

Trim technology uses multiple orifices of special shapes, sizes, and spacing to minimize aerodynamic noise

HIGH FLOW CAPACITY

Trim cage technology provides customizable valve flow characteristics with proven control for a wide range of operating conditions

Fisher ET Control Valve with FIELDVUE DVC6200 Digital Valve Controller

Burner Fuel Control Valve

Accurate and precise temperature is needed to maintain optimum furnace performance and prevents undesirable side reactions. Temperature profiles applied along the cracking coil are designed to avoid long residence times at low temperatures. Low temperatures favor reactions involved in the formation of secondary products, thereby reducing olefin yields. The burner fuel control valves regulate the temperature of the furnace by controlling the fuel supplied to the burners. Due to the location by the furnace, burner fuel control valves may be exposed to high ambient temperatures. Emissions from fuel gas can be an environmental concern and must be accounted for in packing design.

HIGH TEMPERATURE ENVIRONMENTS

Alternative valve, actuator, and accessory offerings can accommodate exposure to high temperatures

ACCURATE CONTROL

Precise throttling capability of FIELDVUE digital valve controllers combined with low-friction packing technology helps to ensure responsive and stable control



LOW EMISSIONS

Live-loaded packing technology provides emissions control below 100 parts per million volume (ppmv) in throttling applications

APPLICATION VERSATILITY

Customizable and interchangeable trim options are available for accurate throttling control throughout various process conditions

Fisher ET Control Valve with FIELDVUE DVC6200 Digital Valve Controller

Boiler Feedwater Regulator and Startup Valve

From steam dilution to heat exchange, steam is an essential part of olefin production. The feedwater regulator control valve provides flow to the boiler during normal plant operation when the boiler is under pressure. During this time, the pressure drops are small and cavitation is not a concern. Stable, reliable throttling is most important for efficient boiler operation.

The feedwater startup and regulator applications are often combined into one valve. Combined startup and regulation can eliminate cross-over points and ease operation. During startup, the feedwater regulator control valve experiences low flow rates with high differential pressure, which can cause severe cavitation damage.

Boiler Feedwater Pump Recirculation Valve

The boiler feedwater pump gets its feed from the deaerator at low pressure, and discharges at high pressure above the main steam pressure. During boiler startup or low load conditions, flow may not meet the minimum requirements of the boiler feedpump.

The boiler feedwater pump recirculation valve protects the feedpump by ensuring that adequate flow is passing through the pump at all times. A modulating boiler feedwater pump recirculation valve provides an efficient method to prevent cavitation from occurring in the pump. The high pressure drops experienced by the recirculation valve can cause severe cavitation that must be accounted for to ensure long valve trim life. Cavitation abatement trim allows for protection over a range of conditions from boiler startup to full load.

Emerson engineers conduct noise and vibration tests on cavitating applications in many different ways. Transparent pipe allows visualization of the cavitation field.



No cavitation.



Slight cavitation.



Full cavitation.



QUICK RESPONSE

Spring-opposed pneumatic diaphragm actuator utilizes a shallow casing on the pressure side for reduced volume and minimized response time

ACCURATE CONTROL

Molded actuator diaphragms allow for maximum thrust, providing excellent linearity between loading pressures and resulting travel

REDUCED DOWNTIME

Predictive diagnostic capability of the FIELDVUE digital valve controller provides health evaluation without shutting down the process or pulling the valve assembly from the line



Click on or scan the QR code to discover the broad range of Fisher anti-cavitation technologies for dirty service applications.

REDUCED MAINTENANCE

Cage-style trim allows removal and inspection of parts without taking the valve body out of the pipeline

EXTENDED SERVICE LIFE

Fisher Cavitrol™ trim design effectively stages pressure drops above liquid vapor pressures to prevent cavitation

WIDE RANGEABILITY

High turndown trim provides control through extreme flow rates

Fisher HPS Control Valve with FIELDVUE DVC6200 Digital Valve Controller

Steam Vent Valve

Boiler startup requires a gradual temperature and pressure increase in the steam distribution system in order to minimize stress on equipment. A steam vent is useful to vent low temperature and pressure steam containing a large amount of moisture. This allows for a gradual warm up of the steam system. In the event of a pressure surge, the vent system prevents overpressure of critical assets.

Vent valve applications have potential for noise and vibration due to the high flow and pressure drops experienced. Noise attenuating trim can reduce noise and vibration to acceptable levels. A vent diffuser can also be used for additional noise abatement and allow the valve to operate at a lower pressure drop ratio. Valve shutoff is important as any leakage results in wasted energy. Another consideration to make is valve trim material. Trim must be able to withstand high steam temperatures while maintaining a high level of shutoff.



Test programs are conducted on Fisher control valves, valve trim, silencers, diffusers, and spargers as well as tees, elbows, reducers, and expansions to determine their contribution to overall noise.

NOISE REDUCTION

Noise abatement trim reduces the harmful effects of noise and vibration

HIGH TEMPERATURE OPTIONS

Trim materials engineered for high temperature service



Scan this code or visit www.FisherSevereService.com to learn about the science of noise attenuation in control valves and our history of solving noise issues in facilities just like yours.



MINIMIZE STEAM LOSS

Advanced sealing technologies provides tight shutoff preventing valuable steam leakage

Fisher HPD Control Valve with FIELDVUE DVC6200 Digital Valve Controller

Quench Tower Level Control Valve

Cracked gas leaving the furnace must be cooled immediately to prevent formation of undesirable products in secondary reactions. Depending upon the feedstock, water or oil is utilized as quenching medium, with oil commonly used for heavier feedstocks. Consistent quench tower operation delivers desirable feedstock conversion.

Heavier hydrocarbons removed from the cracked gas leave the bottom of the tower and are separated downstream. Entrained carbon particles, more commonly found in heavier feedstocks, may be present in this stream and can cause control valve trim erosion. Control valves designed for erosive services should be considered to ensure long life and consistent operation. Hardened trim can provide resistance to erosive particles and extend trim service life in these applications.

REDUCED VARIABILITY

The Fisher 2052 actuator with clamped lever design and single pivot linkage reduces lost motion between the actuator and valve. Cumulative deadband for a Fisher rotary control valve assembly results in 0.5% or less variability.

EASE OF MAINTENANCE

Seal protector ring can be removed for easy access to trim

EROSION MITIGATION

Wide array of erosion resistant trim materials provide tight shutoff, preventing valuable leakage

EXTENDED SERVICE LIFE

Eccentric plug path minimizes seat ring contact when opening, reducing wear and friction

OPERATIONAL FLEXIBILITY

Self-centering seat ring and plug design allows forward or reverse flow with tight shutoff in either direction



Fisher V500 Rotary Control Valve with FIELDVUE DVC6200 Digital Valve Controller

Compressor Antisurge Valve

The availability and efficiency of a plant's compressors both have a direct impact on the profitability of the facility. Cracked gas compressor downtime will result in lost production. Unexpected operational issues with any of the plant's refrigerant loops will lead to reduced yields. Compressors also represent some of the most valuable pieces of equipment within an olefin production facility. Not only will damage to these assets cause lost production, it can also lead to very costly repairs.

Antisurge valves provide recycle flow to each stage of the multi-stage compression trains that are common to olefin production. During startup and commissioning, the valve provides throttling control to recycle a portion of the discharge flow as the compressor is brought up to capacity. During the normal operation of the plant, the antisurge valve will remain closed or slightly open to allow for a small portion of the discharge to be recycled. When closed, it is important that the valve provides tight shutoff to prevent unwanted recycle flow.

The primary purpose of antisurge valves is to protect the most critical and expensive pieces of equipment in the plant, the compressors. During a surge event, the valve must respond quickly and accurately in order to recycle the discharge flow back to the suction side of the compressor. Failure of the valve to react quickly can result in severe damage to the impellers of the compressor.

ASSET PROTECTION

Fast stroking capability of Fisher optimized antisurge valves protect compressors from surge events by quickly recycling flow back to the suction drum

EXTENDED SERVICE LIFE

Potential seat damage due to fast stroking is reduced using cushioned actuators on long stroke installations

MITIGATE RISK

Multiple fail safe piping hookups available to ensure fail made upon trip

PRECISE CONTROL

Fully customizable noise attenuating trim assists in providing precise control throughout the range of conditions, from startup to surge capacity

TIGHT SHUTOFF

ANSI Class V or VI shutoff options available to prevent unwanted recycle flow past the valve



Click on or scan this QR code to read about how Fisher optimized antisurge valves have improved compressor performance at facilities just like yours.



STABLE RESPONSE

The FIELDVUE digital valve controller provides antisurge-specific control and tuning algorithms, resulting in high and stable response.

EASE-OF-USE

Easy-to-use tuning interface reduces setup through the use of the FIELDVUE digital valve controller as part of the Optimized Digital Valve

COMPREHENSIVE NOISE MANAGEMENT

Noise modeling and prediction per IEC 60534-8-3 addresses both trim and valve body outlet noise when sizing

Fisher FBT Control Valve with FIELDVUE DVC6200 Digital Valve Controller

Rich Amine Letdown Valve

Before further processing, carbon dioxide (CO₂) and hydrogen sulfide (H₂S) are removed from the cracked gas. The presence of H₂S can cause serious corrosion issues, and CO₂ can freeze in heat exchange and fractionation equipment. Acid gas removal is accomplished by scrubbing with sodium hydroxide on a once-through basis or in combination with a regenerative solvent (amine).

As cracked gas enters the bottom of the acid gas scrubber and flows upward, lean amine solution flowing countercurrent strips the gas of impurities. The rich amine letdown valve serves two purposes. First, it regulates the level of rich amine solution that accumulates in the bottom of the contactor vessel. Second, it facilitates a pressure drop into the downstream flash tank, which liberates a portion of the acid gases entrained in the solution. If not addressed properly through detailed valve sizing and selection, this outgassing of the entrained gases can cause significant vibration and damage to the valve.

PREDICTIVE MAINTENANCE

The self-diagnosing capability of the FIELDVUE DVC6200 digital valve controller provides valve performance and health evaluation without shutting down the process or pulling the valve assembly from the line

SERVICE COMPATIBILITY

Corrosion resistance is available through a full range of alloy materials

VALVE SIZING EXPERTISE

Proprietary outgassing modeling ensures that the valve type selected is sized appropriately, accounting for both liquid and vapor phases



EXTENDED SERVICE LIFE

Various trim options can be utilized depending upon the severity of the pressure drop

Fisher ET Control Valve with FIELDVUE DVC6200 Digital Valve Controller

Amine Pump Recirculation Valve

Maintaining the proper flow of lean amine to the acid gas absorber is necessary to ensure sufficient removal of carbon dioxide (CO₂) and hydrogen sulfide (H₂S) from the cracked gas stream. The lean amine pump ensures the stable flow of amine to the absorber.

The amine pump recirculation valve is most commonly used to facilitate startup and commissioning as the acid gas absorber is brought to capacity. This valve controls the pump discharge flow that is routed back to the suction side of the pump. When needed, the recycle flow increases the suction pressure to keep it above the vapor pressure of the amine. As a result, the amine pump recirculation valve must be responsive in order to protect the pump from cavitation damage.

Due to the high pressure differential from discharge back to suction, the valve trim must be capable of mitigating the potentially damaging effects of cavitation as it recycles flow. Any unplanned maintenance on these valves due to cavitation damage can bring the amine pumps down and reduce plant throughput.



PRECISE CONTROL
Actuator and accessories provide proper control to aid removal of carbon dioxide and hydrogen sulfide through cracked gas stream

QUICK RESPONSE
Actuator package ensures rapid response throughout setpoint changes.

WIDE RANGEABILITY
Valve assembly meets capacity demands from minimum through maximum flow requirements.



To learn more about how Fisher anti-cavitation technologies can help prevent damage to your valves, view an animation video at www.FisherSevereService.com or scan the QR code.



CAVITATION RESISTANCE

Additional trim options are available to control and mitigate cavitation damage

HIGH RELIABILITY

Hardened trim materials provide excellent wear resistance and extend service life

Fisher ET Control Valve with FIELDVUE DVC6200 Digital Valve Controller

Gas-to-Flare Valve

Olefin production facilities have a flare system to safeguard against overpressure of critical assets within the plant and to dispose of any waste gas. Failure of the flare system to successfully relieve pressure from the process can lead to unexpected downtime or damage to costly pressure-retaining equipment.

Gas-to-flare valves are installed at numerous locations throughout the gas treatment and recovery section. They are used to control the flow of cracked gas or separated hydrocarbons to the flare stack for disposal. They are primarily used during plant startup, shutdown, or short-duration upset conditions. During these periods, flare valves will experience significant pressure differentials and high flow rates. If not addressed properly, these conditions can lead to excessive noise levels and even damaging vibration.

During the normal operation of the plant, gas-to-flare valves will remain closed. Because of this, it is important that these valves maintain tight, long-term shutoff in order to prevent loss of valuable product to the flare stack.

QUICK RESPONSE

Actuator and accessory technologies enable rapid response to meet demanding stroke requirements and provide dependable performance

RELIABLE OPERATION

In-service FIELDVUE Performance Diagnostics enable predictive maintenance for critical valves to achieve greater reliability



NOISE REDUCTION

Durable noise attenuating trim options provide high flow capacity and noise attenuation throughout various process conditions

CORROSION RESISTANCE

A wide range of alloy materials are available to mitigate the corrosive effects of contaminants present in the flare gas

TIGHT SHUTOFF

Trim designs can achieve Class V shutoff requirements to prevent loss of valuable product to flare

Fisher FBT Control Valve with FIELDVUE DVC6200 Digital Valve Controller

Dryer Switching Valve

Cracked gas leaving the compression train is saturated with water that must be removed before fractionation. Without drying, formation of hydrates and ice could cause damage to downstream equipment. Continuous water removal requires multiple adsorption beds. Switching valves are critical for continuous operation between active and regenerating adsorption beds.

The valves responsible for switching dryer beds are exposed to high cycles between repairs requiring high reliability. Poorly performing switching valves can create bed disturbance and damage adsorption beads. Response to setpoint and overshoot are contributors to dryer inefficiency. Switching valve design should incorporate high-cycle and setpoint requirements to ensure dryer efficiency.

RELIABLE PERFORMANCE

Three equally spaced bearing surfaces are cast into each piston. The rack and pinion construction results in even distribution of bearing loads, optimum gear engagement, and reduced piston tilt. Equal springforce applied to each piston enhances actuator life.

HIGH CYCLE CAPABILITY

Fisher valve and actuator combinations are tested to over one million cycles to meet high cycle requirements



Incorporating Fisher control valve assemblies from Emerson into your high-cycle applications can have significant benefits. Click on or scan the QR code to learn more.



ACCURATE PERFORMANCE

Discrete valve controller provides repeatable performance to eliminate bed disturbance

REGULATORY COMPLIANCE

Certified Fisher low emission (Low-F) ENVIRO-SEAL™ packing system controls emissions for environmental compliance

LOW FRICTION

PTFE-lined PEEK bearings are low friction, low wear bearings and allow the control valve to operate under high pressure drops to ensure high cycle life while maintaining low torque

LONG SERVICE LIFE

Soft seal and bearing technology reduces friction and increases service life while providing high performance

REDUCED LEAKAGE

Pressure-assisted sealing action helps provide tight shutoff regardless of the pressure drop encountered

Fisher A81 Control Valve with TopWorx™ DXP Discrete Controller

Distillation Feed Control Valve

The efficiency of a distillation column depends on the amount of contact between the vapor rising and the liquid falling through the column. If the amount of vapor and liquid traveling through the column becomes too great, the column can “flood”. When flooding occurs, the efficiency of the distillation column is dramatically reduced, with corresponding drops in product purity.

An accurate feed control valve is critical to the success of efficient column operation. A problem feed control valve can cause feed flow oscillations, making the distillation column difficult to control. As a result, the heat added by the reboiler oscillates as well, overheating and underheating the column. The effect of the swing, depending on design, can take anywhere from minutes to hours to reach the ends of the column. A control valve with high rangeability should be considered to maintain control.

Distillation Reflux Control Valve

Increasing column reflux will improve the purity of the overhead product. This requires more heat for the reboiler to vaporize the lighter components in the reflux. A precise throttling control valve will assist to balance reflux needs and reduce variability. A poorly operating reflux control valve will result in the same flow instabilities as a problem feed valve. Product purities will oscillate and column efficiency will suffer. A control valve providing minimal variability will assist in stable and predictable column performance.

ACCURATE CONTROL

Molded actuator diaphragms allow for maximum thrust resulting in excellent linearity between loading pressures and resulting travel

STABLE CONTROL

Precise throttling capability of FIELDVUE digital valve controllers combined with low-friction packing technology helps to ensure responsive and stable control



ENVIRO-SEAL systems are available for a wide range of pressure and temperature conditions in non-environmental and environmental applications. Click on or scan the QR code to learn why they are a good choice for your facility.



LOW EMISSIONS

Live-loaded packing technology provides emissions control below 100 parts per million volume (ppmv) in throttling applications.

WIDE RANGEABILITY

Customizable trim options are available for accurate throttling control throughout various process conditions.

Fisher ET Control Valve with FIELDVUE DVC6200 Digital Valve Controller

You're Never Alone

The way you manage key production assets like control valves directly affects your plant's efficiency, reliability, and profitability. Emerson Process Management's Fisher Services provides trusted expertise for control valve maintenance and repair.

Whether you're starting or commissioning a process, scheduling diagnostics and repair, or planning a turnaround with upgrades to optimize and extend your plant's lifecycle, our network of owned and authorized service centers around the world provide effective maintenance through a network of experienced, highly skilled technicians when and where you need them.

To help you maintain your plant's efficiency and reliability, Fisher Services uses only certified OEM parts and assemblies sourced through local inventories, regional parts distribution centers, and Quick Ship facilities to deliver unmatched response to customer needs.



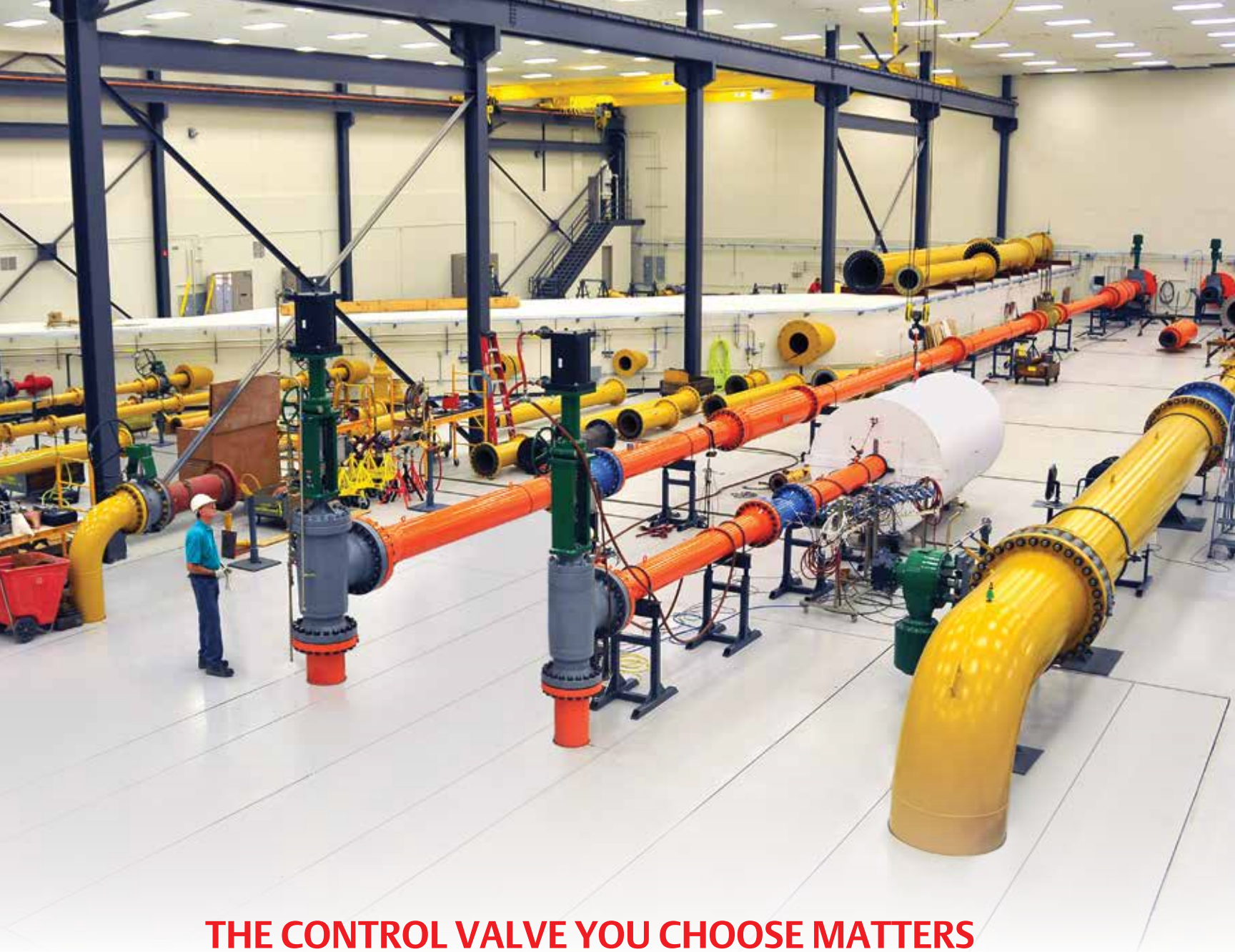
Contact your local sales office to get in touch with the Service Center nearest you. Visit www.Fisher.com or scan the QR code to learn more.



Our extensive network of Service Center locations spans every continent. We're there for you day or night, when and where you need us, 24/7/365. Visit www.Fisher.com/LifecycleServices or scan the QR code to learn more.

DO YOU NEED TO...





THE CONTROL VALVE YOU CHOOSE MATTERS WHEN YOU HAVE TO ACHIEVE EFFICIENT, PRODUCTIVE, AND RELIABLE PLANT OPERATION.

When you buy Fisher control valves, you get the application expertise that comes from more than a century of petrochemical experience. Plus you benefit from millions of dollars of research invested in reliability-centric testing of Fisher control valve technologies.

Fisher product specifications are, in many cases, more stringent than the industry accepted standards set by regulatory agencies. Our attention to and evaluation of product quality is necessary to bring you Fisher technologies of the highest reliability and performance.

Fisher technology development capabilities extend worldwide with engineers and labs in North America, Europe, and Asia.

Using Fisher technology can help you achieve efficient, productive, and reliable plant operation. Want to see for yourself? Visit the Emerson Innovation Center for Fisher Technology in Marshalltown, Iowa, USA. To schedule a visit, please contact your local Emerson sales office.



PRECISE ACTUATION



Antisurge valves must be responsive in order to protect critical and costly compressors from damage during transients. Fisher precision actuation technology enables a full stroke up to 50.8 cm (20 inches) in less than one second and better than 1% positioning accuracy.

LOW-EMISSIONS PERFORMANCE



Fisher ENVIRO-SEAL low emissions packing is designed and tested for Fisher control valves to keep fugitive emissions below 100 parts per million volume (ppmv) in your throttling application for tens of thousands of cycles.

HIGH-CYCLE TESTING



Many of Emerson's standard Fisher products are used in extremely high-cycle applications, and must be tested to more than one million cycles. Those same standard products are used in your olefins plant to enhance reliability.

WITHSTANDING VIBRATION



Fisher control valves are designed and tested for robustness in vibration applications. They are subjected to additional testing for millions of cycles at their resonant (worst case) frequency to enhance performance in your facility.

REDUCING PROCESS VARIABILITY



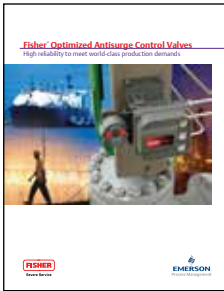
Fisher control valve assemblies are subjected to on-line, dynamic performance testing to evaluate their ability to reduce your process variability. These tests replicate how control valves are used in your plant.

QUIETING NOISE



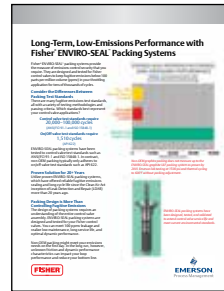
Supported with a 4,738 m² (51,000 ft²) facility and a unique 2,415 m² (26,000 ft²) sound chamber, Emerson can quantify noise from valves, piping, and vents. This capability provides insight to ensure highly accurate noise prediction and helps you comply with regulatory (IEC) requirements.

If you found this brochure valuable, may we also recommend the following literature:



“Fisher Optimized Antisurge Control Valves Brochure”

Document Number: D352208
www.Fisher.com/Documentation



“ENVIRO-SEAL Valve Packing Systems Flyer”

Document Number: D352207
www.Fisher.com/Documentation



“For Nonstop Operation of High-Cycle Operations Brochure”

Document Number: D351338
www.Fisher.com/Documentation



“The Silent Treatment Brochure”

Document Number: D351989
www.Fisher.com/Documentation



“FIELDVUE DVC6200 Series Digital Valve Controllers”



Document Number: D351908
www.Fisher.com/Documentation





“Fisher Cavitation-Control Technologies Brochure”

Document Number: D351912
www.Fisher.com/Documentation



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 <http://www.Linkedin.com/groups/Fisher-3941826>

To find the Fisher sales contact in your area, scan the QR code.



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