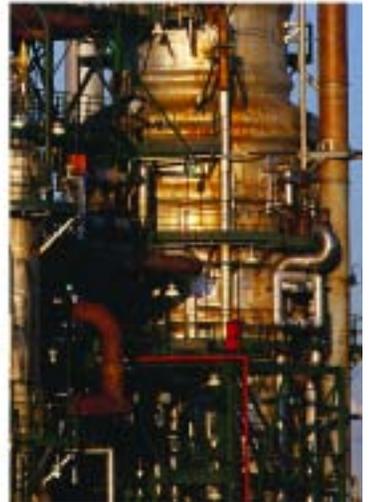
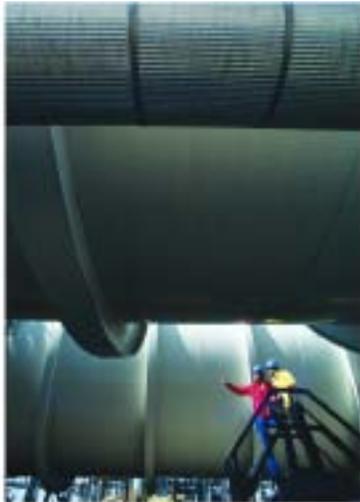
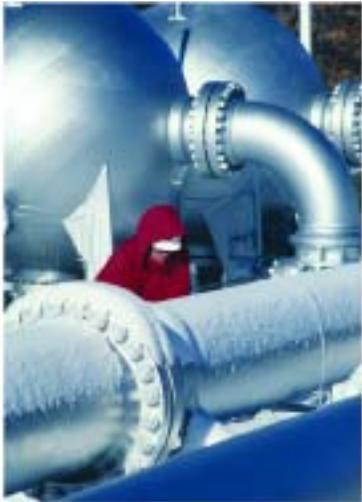


Fisher® Expander Bypass Valve Solutions



Severe Service



EMERSON
Process Management

Application Discussion

Turboexpanders typically are used in natural gas processes that have high feed pressures (greater than 400 psig), varying feed products and where a large amount (greater than 30%) of ethane recovery is desired. Consisting of alternate sets of nozzles and rotating blades through which vapor or gas flows in a steady-state expansion process, the turboexpander is utilized also to convert the energy of an expanding gas stream into mechanical work.

The use of a turboexpander, however, does not eliminate the need for the Joule Thompson expansion valve that is used in a conventional refrigeration system. In a turboexpander system the valve typically is referred to as the expander bypass valve (Figure 1). It enables a more efficient startup and shutdown of the turboexpander. The valve also allows continuing the process should the turboexpander go offline or if flow increases beyond the full speed capability of the turboexpander.

There are many factors to consider when selecting the proper valve for expander bypass service:

- Proper valve trim must be chosen to offset the damaging noise and vibration that can occur as process inlet pressures can vary between 700 and 1500 psig and outlet pressures between 200 and 700 psig.
- At the low temperatures encountered, proper body and trim material selection is important and use of an extension style bonnet should be considered. Cryogenic temperatures can exist
- To protect the turboexpander in the event of a system upset, the valve must open quickly.
- Ideally, the valve possesses the same capacity and flow characteristic as the turboexpander to provide a seamless transition between the devices.
- The turboexpander is a much more efficient device than the valve, making tight shutoff important to avoid the loss of energy.
- The possibility of hydrate formation in the line must be considered. Hydrates are solid compounds formed by the chemical combination of gas and water under pressure that can cause deposits to form on the pipe and valve trim. Most facilities utilize dehydration units to prevent hydrate formation, and the turboexpanders are usually installed at the end of the process. However, this should be explored when selecting the expander bypass valve. If hydrates are present, trims with small passages can plug and render the valve useless.

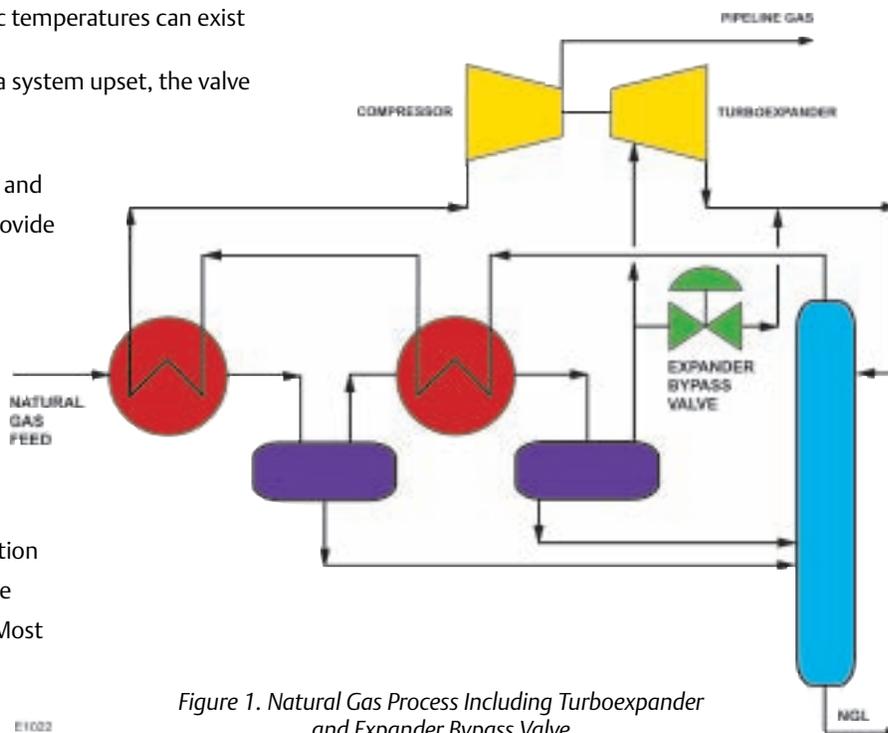
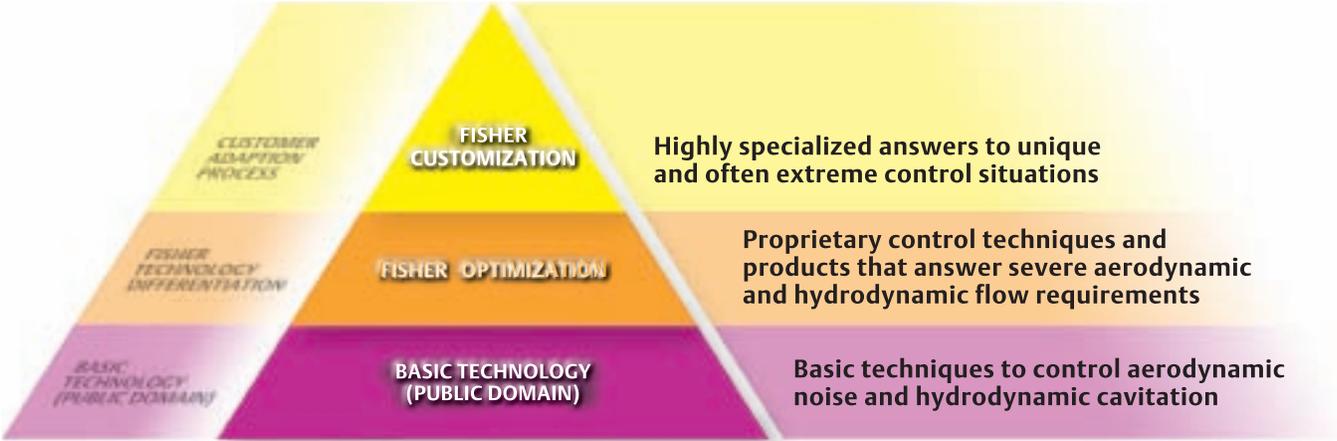


Figure 1. Natural Gas Process Including Turboexpander and Expander Bypass Valve

Emerson has developed Fisher valve solutions that address the potential for excessive noise at high pressure drops as well as the need for materials suited to cryogenic service. Additional Fisher control valve solutions offer protection against erosion, plugging and leakage. Also, to ensure proper operation after installation, a Fisher FIELDVUE® Digital Valve Controller can be used to monitor performance. The FIELDVUE DVC provides diagnostic reviews that can be conducted without interrupting the process in order to identify potential performance issues. This helps to ensure proper operation over the normal service life of the valve.

Fisher Severe Service Solutions



Expander Bypass – Control Valve Solutions

FISHER CUSTOMIZATION

Corrosion protection and adequate noise attenuation required specially designed valves for specialty chemical plants in China and Taiwan. The solution consisted of Hastelloy cladding of the entire valve body coupled with high performance actuation and specially characterized valve trim to address noise attenuation and capacity concerns. See [D351052X012 at www.Fishersevereservice.com](http://www.Fishersevereservice.com) for additional details.

FISHER OPTIMIZATION

easy-e®
Cryogenic Valve



- Provides throttling or on-off control of liquids and gases at cryogenic temperatures as low as -198°C (-325°F)
- Unique metal-to-metal seat provides repeatable tight shutoff, reducing maintenance costs
- Optional ENVIRO-SEAL packing systems provide a superior stem seal to prevent loss of valuable or hazardous process fluids
- Quick-change trim, with a clamped-in seat ring, reduces disassembly/assembly time

WhisperFlo® Trim



- Incorporates patented, three-dimensional flow path, pressure staging and special passage shapes that uniquely combine to achieve up to a 40 dBA noise reduction
- Provides greater capacity than tortuous path designs
- Can be characterized to meet specific pressure staging, travel and flow requirements

Whisper Trim®



- Utilizes multiple orifices of special shape, size and spacing to achieve noise reductions to 30 dBA
- Process flow-up technique keeps energy sources away from critical trim parts
- Trim parts furnished in hardened materials to extend service life

BASIC TECHNOLOGY



- Standard trim control valve with 316 SST body and trim at low pressure operation
- Tight shutoff construction
- Optional extension bonnet to prevent frost formation on valve stem and instruments

Emerson. Your partner in instrument and valve reliability.

The way you manage your key production assets directly affects your plant's performance and profitability. Emerson's Asset Optimization capabilities deliver world-class services and innovative technologies to increase the availability and performance of mechanical equipment, electrical systems, process equipment, instruments and valves for improved bottom-line results. Asset Optimization helps you improve process availability and attain peak performance, which means wherever you are in your plant's life cycle—startup, maximizing operations or life extension—by relying on Emerson's Asset Optimization capabilities, you'll be on the path to realizing the true potential of your plant's instruments and valves.

The Next Step

Contact your local Emerson Process Management sales office or sales representative location for more information or to make a purchase.

For severe service solutions, see us at www.FisherSevereService.com



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