

S19 Rotary Control Valve Excels in Gas Metering Custody Transfer Application

KEY RESULTS

- > Reduced pressure drops and improved rangeability significantly, allowing more accurate measurements.
- > Reduced equipment costs by more than 30% and reduced delivery time greatly.
- > Smaller and lighter overall package resulted in system structure savings.
- > Self-diagnostics resulted in minimized maintenance costs.



APPLICATION

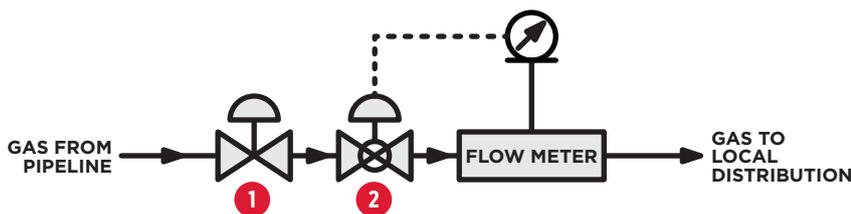
Custody transfer of natural gas describes the process of measuring the amount of product transacted to the customer, from the seller to the buyer. Ensuring accuracy and consistency is critical to profitability for the seller.

Custody transfer occurs at stations where the pipeline gas is filtered and regulated to maintain consistency for accurate flow metering. Because the flow meters are calibrated to provide accurate measurement, performance of the control valve is a critical element of the process. If the pressure is too high or too low, the flow meter will report inaccurate values for the amount of gas transferred — resulting in loss of profitability, by providing too much gas or shorting the customer the amount of gas purchased.

PROCESS CONDITIONS

Application	Custody transfer at a gas metering station in Mexico.
Media	Natural gas.
Operating Pressure	500 to 1440 psi 35 to 99 bar
Operating Temperature	50°F to 86°F 10°C to 30°C

TYPICAL GAS METERING STATION DIAGRAM



Isolation valve (1) for shutting off flow, and flow control valve (2) for modulating volume to the flow meter. Together, the two devices ensure that the flow of gas through the flow meter is as close to optimal as possible for providing accurate transfer.

CHALLENGE

Historically, globe valves have been used for custody transfer applications, so switching to a new way of operating would be challenging. However, in this situation, globe valves had an inherent disadvantage, with a pressure drop across the valve (Length/Diameter) much higher than ball valves. Since the flow meter in the custody transfer station depends on pressure and flow rate stability for accurate measurement, reducing the L/D would yield better flow stability.

In addition to high pressure drops, globe valves presented other challenges, including reduced flow range, large size & weight, very high costs, and long delivery times.

SOLUTION

After technical discussions, Bray's engineering team presented the customer with an opportunity to use modern, innovative technology that would provide superior performance and additional benefits relevant to their process. The Series 19 rotary control valve was proposed as an ideal solution. The segmented ball valve design is engineered for control applications, with a considerably lower pressure drop than comparably sized globe valves.

The S19 control valve was packaged with a Bray Series 98 scotch yoke pneumatic actuator and Series 6A explosion-proof smart positioner, to replace the traditional diaphragm actuator used with globe valves. The control valve package was optimized to provide exceptional control fidelity and repeatability, with >220:1 rangeability. The high resolution and low hysteresis of the digital electro-pneumatic S6A positioner provided the precision required for this application.

RESULTS

After Bray analyzed the application and recommended an optimal size for the control valves, the customer installed four S19 rotary control valve packages in different gas metering custody transfer stations. The performance difference was immediately evident — in addition to **cost reductions** greater than 30% and **reduced delivery time**, results experienced by the customer included:

- > **Higher Precision:** The accuracy of both Coriolis mass flow meters and ultrasonic meters is dependent on calibration, which requires consistent pressure through the meter. The Bray solution provided a lower pressure drop across the valve, as well as higher sensitivity from the equal percentage flow characteristics of the S19, resulting in more accurate flow measurement.
- > **Lighter Weight:** The Bray package weighed considerably less, due to the higher Cv afforded by the smaller S19 valve. This also reduced the size of the actuator required to deliver lower torque, resulting in a considerable weight savings over the previous globe valve solution it replaced.
- > **Positioner with Advanced Diagnostics:** The S6A HART Positioner features internal self-diagnostics and reporting for preventative maintenance, with early detection of seat and stem seal wear, internal air supply monitoring, and fault reporting (both on-screen and to the control center).
- > **Simplified Installation:** The S6A is ATEX/FM EEx d rated for Class 1 Div 1 & Div 2 environments, allowing the client to use a 2-stage pressure reducing system, using line gas for actuation.
- > Due to the success of the project, the customer has now **standardized** on the Series S19 control valve package in all custody transfer applications.

PERFORMANCE REQUIREMENTS

- Lower pressure drops.
- Higher rangeability.
- Cost reductions.
- Faster delivery time.
- Globe valve replacement.

BRAY PRODUCT DETAILS

Valve	Series 19 Rotary Control Valve; Stainless steel metal seat with stellite hard facing; Carbon Steel body; Hardened stainless steel stem; Graphite stem seals.
Size	NPS 10 DN 250
Pressure Class	ANSI 600 PN63, PN100
Rangeability	>220:1
Control Curve	Equal percentage
Shutoff Rating	Class IV per FCI 70-2
Actuator	Series 98 Scotch Yoke Pneumatic
Controls	Series 6A Smart Positioner with Advanced Diagnostics (Explosion Proof)



Based on the successful performance of the four installations, the Bray Series 19 control valve package has become the client's standard for all custody transfer applications.