



rotork[®]

Keeping the World Flowing
for Future Generations

Application Focus:
Gas Compressor Stations

Gas Compressor Station Processes

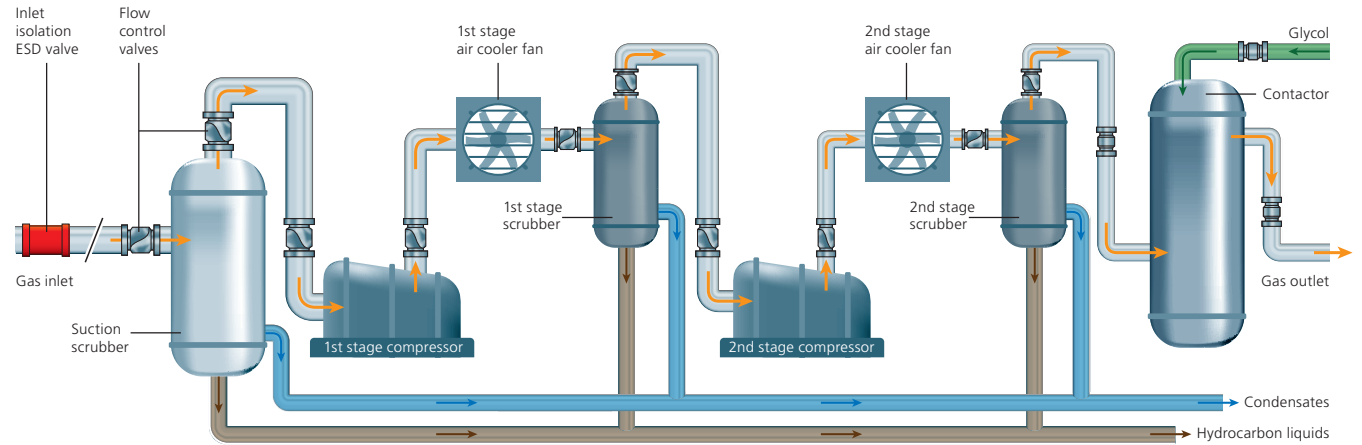
Compressor stations are required to increase and regulate the pressure of natural gas distribution networks. They can be found in all sectors of the supply chain from upstream, through midstream and finally downstream.

Gas enters the compressor station via an inlet valve which can also be used to safely isolate the station in case of an emergency (Emergency Shutdown – ESD). The gas passes through scrubbers (filters) to remove any solids or liquids that could cause operational issues.

The 'cleaned' gas is then processed in compression stages. Depending on the station configuration and output pressures required, there can be multiple stages of compression, either working in parallel or series to produce the correct pressures and flow rates.

During the compression stages heat is generated so the gas must be passed through a series of intercoolers in order to reduce the temperature. Reducing the temperature causes condensate to form so further scrubbers are used to remove the excess liquid from the gas.

The gas needs to be dried before onward distribution and this is carried out by using a highly absorbent liquid called Glycol. The gas is mixed with Glycol inside a dehydration



Above: Diagram representing a natural gas compressor station with two compression stages. There may be parallel compression processes operating within a single station. The number of compressors varies based upon the diameter of the pipe, the volume of gas to be moved and the required flow rate.

column and the moisture is absorbed into the Glycol whilst the gas separates out as dry gas.

The rich Glycol is then fed to a re-boiler where the excess moisture is removed so that the Glycol may be reused. The extracted liquids are stored in a drip gathering tank and finally transported off-site. The clean, dry and compressed gas now continues its journey downstream.

In this document we identify the main challenges where modern, reliable flow control equipment provides solutions for gas compressor stations.

➤ **Rotork produce flow control solutions for reliable gas compression operations**

➤ **ESD service actuators guarantee safe operational environments for personnel**

➤ **Vibration resistant, explosionproof and suitable for use in harsh environments**

➤ **Products designed with safety, integrity and industry leading lifespans**

➤ **Valve automation packaged solutions for all areas of valve operation**

➤ **Rotork reliability reduces maintenance, improves efficiency and increases productivity**

Design Challenges for Gas Compressor Stations

Challenge:

Remote operation, low power usage

Design of compressor stations in remote locations requires equipment with low power usage, suited to remote and harsh environments and operated and monitored remotely.

Solution

Compressor stations are often located in remote locations away from infrastructure. Modern, low powered equipment can be operated from solar panels and batteries. This reduces the requirement for extensive power cable runs, polluting diesel generators or expensive compressed air installations.

Rotork engineers have worked to improve the efficiency of our actuators while maintaining their high levels of accuracy and performance outputs. This not only provides practical operation in remote locations, it also means any installation can benefit from the low power solution.

Rotork IQ electric and SI electro-hydraulic actuators

have been designed for low power remote operation.

SI actuators can be used for section valves where solar and battery storage is available in remote locations.

IQ-D actuators feature unique motors designed for solar power operation.

Rotork CP and GP pneumatic actuators are designed to provide efficient operation where pre-existing pneumatic air supply is available.

Challenge:

Process monitoring and diagnostics

Modern facilities require detailed process information so that operators can monitor site performance and reduce unplanned downtime through predictive maintenance.

Solution

Traditional pneumatic actuators are being replaced with intelligent electric actuators, which can provide valve performance and diagnostic data.

Product and operational data, performance information and process criticality are analysed by asset management systems to provide insights into necessary maintenance activities to prevent equipment degradation and failure, reduce unplanned downtime and to increase operational stability.

Rotork IQ, CVA and CMA electric and SI electro-hydraulic actuators

have built-in data loggers and deliver reliable flow control with advanced analytics.

They continually monitor valve performance and communicate with network control systems to assist plant management programmes.

Rotork Master Station supervisory network controller and Intelligent Asset Management (IAM) cloud-based system

work together to collect, analyse and report on data logger information gathered from Rotork products throughout the compressor station.

Challenge:

Net-zero carbon emissions

Global industry must rise to meet the challenges of climate change. Governments have set industrial net-zero carbon emissions targets to be met by 2050 (EU) and 2060 (China).

Solution

Many pneumatic actuators use the motive power of the gas in the pipeline for operation. By design, this causes pollution when the motive gas is vented to the atmosphere after use.

The two options to meet the net-zero emissions target is to use an efficient compressed air supply in place of the gas or a fully electric solution.

Rotork electric actuators provide highly accurate and repeatable flow control operation over extended periods of time with zero on-site emissions for the lifetime of the device once installed.

Rotork pneumatic actuators provide emissions free operation when connected to an efficient compressed air supply system. Our pneumatic actuators are being specified as replacements for existing inefficient actuators during plant refurbishment and retrofit operations.

Design Challenges for Gas Compressor Stations

Challenge: Emergency Shutdown (ESD) systems

Compressor station yard piping includes emergency shutdown valves. These are used to isolate the station in the event of an emergency.

Solution

A specialised actuator design is necessary to achieve the immediate, but controlled fail-safe operation demanded by ESD applications. Rotork has shown this can be successfully delivered using our GO, HPG and GP pneumatic valve actuators.

Rotork GO and HPG pneumatic actuators use the motive power of the pipeline gas to pressurise oil tanks that convert it into hydraulic pressure that operates the actuator. When combined with our **Electronic Line Break (ELB)** product they perform remote pressure sensing and shutdown of the pipeline if a break and pressure loss is detected downstream.

Rotork GP pneumatic actuators are used in ESD applications where external control systems monitor pipeline pressure and process parameters to trigger valve shutdown. GP actuators are available in spring-return configuration to provide operation in either direction.

Challenge: Non-failsafe valve control

Although non-failsafe valves have fewer safety requirements, their operation must still be reliable and efficient.

Solution

Low pressure pneumatic actuators are used extensively and provide low cost valve operation. They are powered either by the pipeline gas or by a compressed air system run throughout the station.

Low power electric actuators are also used in applications such as odorising, methane gas injection and compressor drainage systems.

Rotork GP and CP pneumatic actuators provide efficient operation using our industry recognised scotch-yoke design with spring-return configurations options.

Rotork IQ electric actuators provide efficient operation and detailed process data from built-in data loggers. The IQ is available to suit many applications including multi-turn, part-turn, linear and modulating output, low power use, high torque and high speed configurations.

Rotork ExMax and RedMax electric actuators deliver compact part-turn valve operation with optional spring-return safety configurations.

Challenge: Reliable and safe operation

Gas compressor stations process a volatile hydrocarbon in gaseous state. Flow control equipment must be tested and certified for use and have a record of proven reliability.

Solution

Reliability is key to ensuring continuous operation. Advanced diagnostics like the data logger on the IQ can be used for predicting early failures by analysing torque variation in valve operation over time.

Our entire product range has one thing in common - reliability. The founding principle of Rotork was to deliver simplified and reliable automated valve control.

Rotork IQ electric actuators are renowned for being an innovative and dependable solution with the highest levels of performance and reliability. They comply with stringent quality standards authorities around the world.

Rotork SI electro-hydraulic actuators deliver high levels of safety and reliability. They are certified for SIL 2/3 applications and are specified for use in ESD systems and operation of Remote Operated Shutoff Valves (ROSoV). They are highly reliable and capable of closing valves within 0.5 seconds should the process require it.

GO Range of Gas-over-Oil Pneumatic Pipeline Actuators and Electronic Line Break (ELB) System



Gas pipeline valve operation and monitoring

Power and Reliability

- Powerful and reliable actuation of large, high pressure inlet and outlet pipelines
- ELB continuously monitors pipeline pressure differentials for early detection of pipeline breaks and initiates automatic valve actuator movement
- Pressurised oil provides actuator control and isolates the cylinder from pipeline gas
- Extremely wide range of high-pressure control logic options
- Certified to IP 66M/67M, ATEX 2014/34/EU and in accordance with PED 2014/68/EU
- PED or ASME approved gas/oil and power gas storage tanks

HPG Range of High Pressure Gas Pneumatic Pipeline Actuators



High pressure gas pipeline valve operation

Power and Reliability

- Separate cylinder for hydraulic override ensures complete separation of high-pressure pipeline gas from the hydraulic fluid
- Powerful and reliable actuation of large, high pressure inlet and outlet pipelines
- Extremely wide range of high-pressure control logic options
- Certified to IP 66M/67M, ATEX 2014/34/EU and in accordance with PED 2014/68/EU
- PED or ASME approved gas/oil and power gas storage tanks

IQ Range of Multi and Part-Turn Electric Actuators

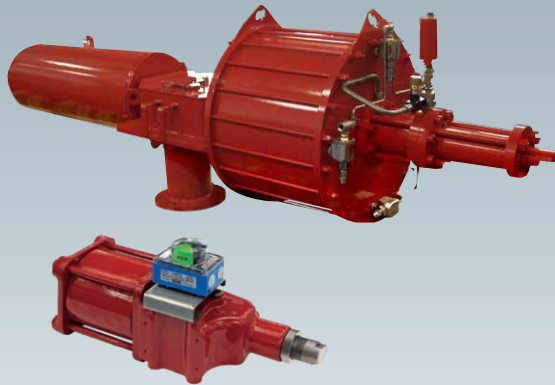


Heavy-duty pipeline valve control and intelligent diagnostics

Reliability and Diagnostics

- Accurate, reliable and safe actuation of multiple valve types throughout compressor stations
- Proven in remote locations throughout the world, requiring minimal maintenance
- Remote control and built-in data logging provide monitoring of valve performance and detailed process information for advanced analytics
- Robust and reliable isolation duty
- Compact size, low weight, high power output
- SIL capability to IEC 61508
- Low power variants for DC solar power supply

CP and GP Part-Turn Pneumatic Actuators



Reliable actuation across all compressor station pipeline applications

Safety, Reliability and ESD Capabilities

- Installed for safe isolation of compressor station main inlet and outlet pipelines
- Added security available with spring-return functionality providing automatic closure on air pressure loss or ESD event
- Mid-sized CP actuators used for moderate torques and for main line isolation (designed for ESD operation)
- GP actuators are used for high torque operation of larger valves

SI Range Intelligent Self-Contained Electro-Hydraulic Actuators



Emergency Shutdown (ESD) for inlet and outlet pipeline valve operation and diagnostics

Safety and ESD Shutdown Capabilities

- Fast shutdown response protects your personnel and site infrastructure
- Provide fail-safe actuation for ESD applications
- Data logger monitoring of valve performance provides detailed diagnostics information
- SIL 2/3 compliant for use in SIS to IEC 61508
- Partial Stroke Testing (PST) capability
- Designed to meet today's control and safety needs
- Double-sealing design reduces effects of humidity, improves reliability and reduces unplanned downtime

CVA/CMA Part-Turn and Linear Electric Control Valve Actuators



High precision operation of pressure control valves

Accuracy and Repeatable Performance

- Precise actuation of control valves involved in the pressure control processes
- Reliable linear, quarter-turn and rotary valve operation
- Compact and powerful, with a 0.1% resolution capability
- Maintains tight process specifications
- Internal failsafe super-capacitor options

ExMax and RedMax Part-Turn Electric Valve Actuators



Compact, robust actuation on auxilliary valves

Accuracy and Repeatable Performance

- Reliable linear, quarter-turn and rotary valve operation
- 24-240 VAC/VDC auto-adjustable power supply suitable for solar power operation
- Explosionproof to international standards with UL and CSA certified variants available
- Suitable for outdoor use with standard IP66/67 dust and watertight enclosure
- Suitable for outdoor use with standard IP66/67 dust and watertight enclosure
- Spring-return failsafe option

Control and Communication



Valve control and monitoring

Reliable Network Control with Reduced Cabling Complexity

- Reliable control and communication between the PLC and actuators
- From simple, effective hard-wired digital control, to variable 4-20 mA and high-end digital networks with options including Profibus®, Modbus®, Foundation Fieldbus® and Rotork's proprietary Pakscan™ network
- Network options reduce the need for multiple cable runs
- Minimised cabling costs
- Capable of controlling up to 240 actuators on a single loop

Service and Aftermarket Solutions



All plant operations

Lifetime Management

A complete solution to the risks associated with the life cycle of your equipment

Intelligent Asset Management

Advanced analytics to improve reliability and availability of key assets

Spares

Comprehensive OEM spares available worldwide

Life Cycle Management

Controlled strategies for managing the risks of ageing equipment

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A full listing of our worldwide sales and service network is available on our website

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