



MIDSTREAM LIQUID PIPELINE

The liquid pipeline industry has some of the most diverse actuation needs due to the wide range of hydrocarbon products, flow rates, pipeline sizes and pipeline distances. These pipelines transport hydrocarbons such as crude oil, refined products, and NGL's to or from refineries and chemical plants where they undergo distillation and other production processes. Pipe diameters of crude oil trunk, gathering and refined product lines vary in size. Flexibility in pipeline operation requires frequent changes in products, flow rates and delivery sites.

Liquid pipeline applications require extraordinarily dynamic performance to maximize the pipeline's throughput and ensure reliable operation. To avoid pressure fluctuations and unplanned shutdowns, pipelines need high position resolution and responsive line pressure control. With REXA Linear and Rotary Electraulic™ Actuators, these concerns disappear. Our actuators improve control performance and reliability on many different pipeline applications throughout the world.

ELECTRAULIC™ ACTUATION

The REXA Advantage

End users in the liquid pipeline industry standardize on REXA Electraulic™ Actuators because they provide maximum uptime, increased throughput, reliability and safety required for critical applications. REXA linear and rotary actuators can be adapted to any valve type or size and are built to withstand the wide ambient temperatures and harsh environmental conditions of remote outdoor locations. Our unique Electraulic™ Actuation technology combines the simplicity of electric operation with the **power and stability** of hydraulics. This delivers efficient and reliable actuation with **minimal maintenance** and a **low cost of ownership**.

Features and Benefits

- Accurate & repeatable control
- Powerful performance of hydraulics
- User adjustable speed control
- Zero overshoot
- Minimal deadtime (50-70 mS)
- No routine oil maintenance
- Lower power consumption
- 100% modulating duty cycle
- Adjustable deadband (0.05% to 5%)
- Low oil volume
- Manual handwheel or handpump
- Remote position indication

Custom Options

- SIL-3 capability
- Partial stroke testing (PST)
- Fail-safe via spring or accumulator
- Mounting bracket adapted to any valve
- <1 second emergency trip
- Redundant construction
- Hot-swappable power modules
- Solar powered operation
- Extended interconnect cable length (up to 700ft/213m)

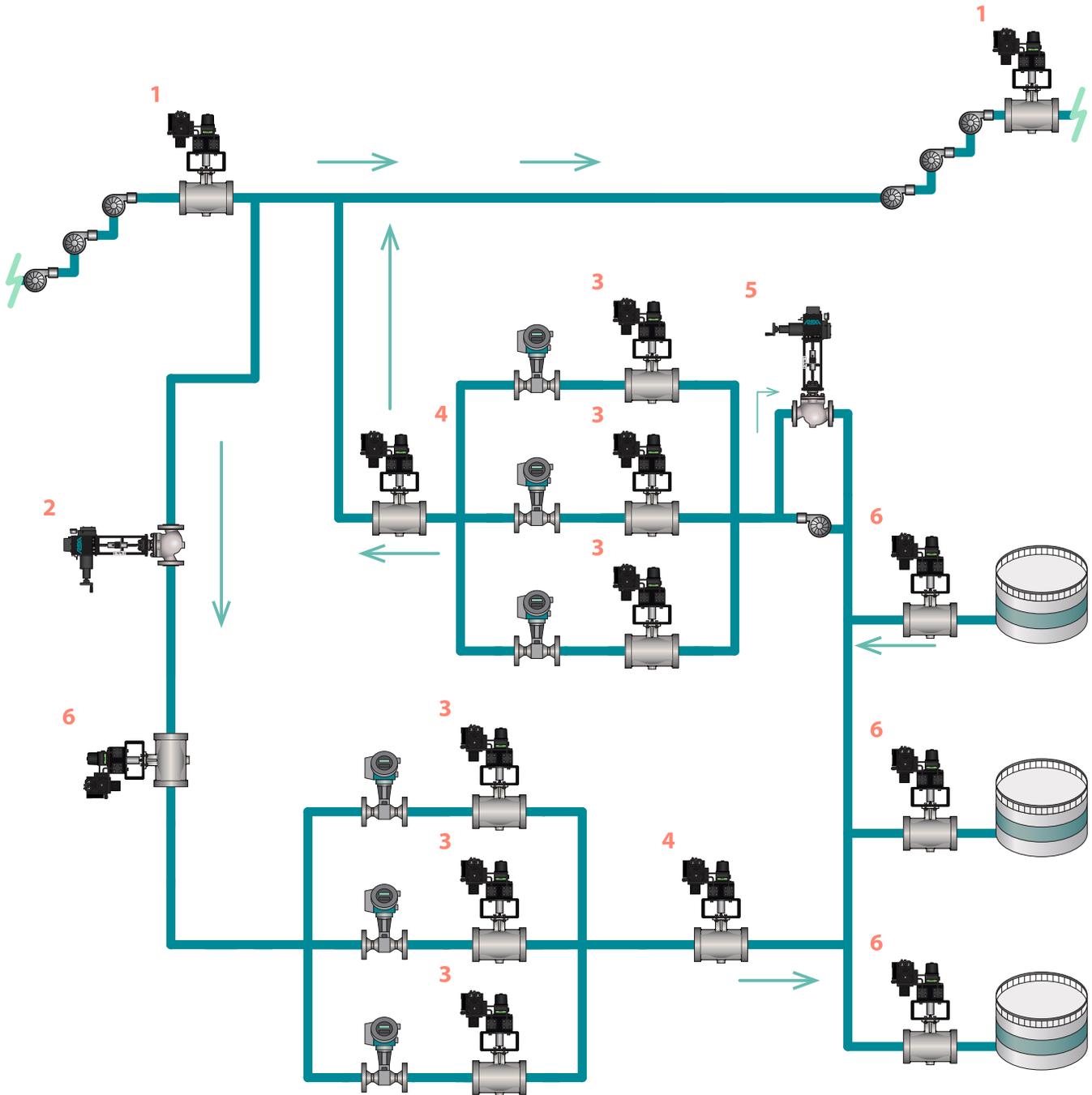
Mechanical Subassembly



Electrical Subassembly



Liquid Pipeline Applications



1
Pump Station Pressure Control

2
Terminal Inlet Pressure Control

3
Meter Balance Control

4
Meter Back Pressure Control

5
Pump Recycle Control

6
Emergency Shutdown Valve (ESD)

Pump Station Pressure Control

With REXA actuators, operators **achieve increased throughput** as stable pressure control allows the ability to run the pipeline closer to capacity. Liquid pipelines require effective pump station pressure control for safe and reliable operation. Pressure control serves two purposes in the operation of the pipeline – controlling discharge pressure of the pump station and the incoming pressure to the pump station. The pressure control function ensures the pipeline is operating at optimal design pressures. The incoming pressure must be kept above the NPSH (Net Positive Suction Head) required by the pumps in order to prevent cavitation and the ensuing damage. Pressure control interacts from one pump station to another, meaning pressure fluctuations at one station will affect all other pump stations on the pipeline. Our actuators provide fast response to pressure disturbances including starts, stops and throttling flow rate changes. They also provide **fast response** to setpoint adjustments at one station in order to achieve the desired flow rate and pressure at another.



Terminal Inlet Pressure Control

The terminal inlet pressure control system reduces pressure from the main pipeline and controls the flow of product into the terminal. This pressure is changed to alter the flow rate into the terminal or to another pipeline. The control system must provide fast response to flow and pressure disturbances. High differential pressures and flow capacities are common. REXA actuators deliver **immediate signal response**, tight control and **high reliability, while maximizing uptime.**



Meter Balance Control

REXA actuators provide the accuracy and quick response time necessary to control the meter balance valve and **prevent meter over-ranging**. Metering balance valves control the flow rate through each individual meter run. Flow range requirements may be high into and out of the terminal. Many applications use multiple meter runs to keep flow rates within the optimal accuracy range of the individual flowmeters. Small differential pressures require moderately fast speed of response to prevent meter over-ranging during transients.



Meter Back Pressure Control

Maintaining back pressure on flowmeters **ensures correct flow measurements** as the product flows through the meter. Any amount of pressure fluctuation affects the accuracy of the meter. The control system must provide fast response to main line pressure changes, as well as delivery line flow and pressure changes. Much like metering balance control, ball valve designs are generally preferred for meter back pressure control. Butterfly valves may also be used. Differential pressures are small. The meter back pressure control valves throttle during normal operation. Actuator speed of response should be moderately fast. REXA actuators provide **immediate signal response** with minimal deadtime - allowing end users to accurately control the flow of hydrocarbon through their pipeline.

Pump Recycle Control

Choosing REXA to actuate your pump recycle valve helps protect against premature pump wear, **increasing operational efficiency and maximizing throughput**. Pump recycle control (also known as pump recirculation flow control) keeps pumps operating at a point on their curve to prevent pump cavitation at low flows and overpressure at high flows. The loop directly controls pressure and flow rate. Avoiding cavitation protects operation and ensures maximum pump life. Globe valves are often selected given their higher cavitation coefficient. Actuator speed of response should be moderately fast. The hydraulic stability and accurate positioning of REXA Actuators provides **maximum control throughout the entire flow range of the pump and valve**.

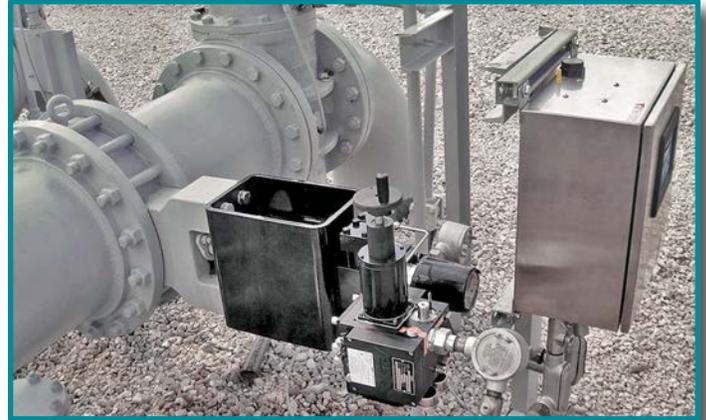


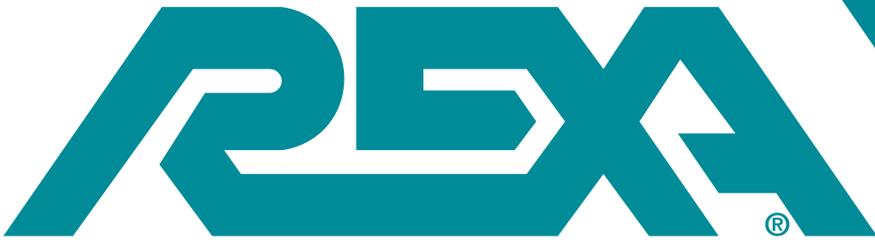
Emergency Shutdown Valve (ESD)

Many customers specifically choose our product for its inherent **reliability**. Electraulic™ Actuation minimizes maintenance requirements and eliminates common failure points of conventional hydraulic systems. The emergency shutdown valve (ESD) stops the flow of a hazardous fluid upon the detection of a dangerous event. The ESD protects plant personnel, equipment and the environment against possible harm. It is imperative to ensure actuation technology with **quick action** and reliable control is used for this application. With REXA's **spring or accumulator fail-safe systems**, operators rest easy knowing their ESD valve will operate when it's needed most.



Example Installations





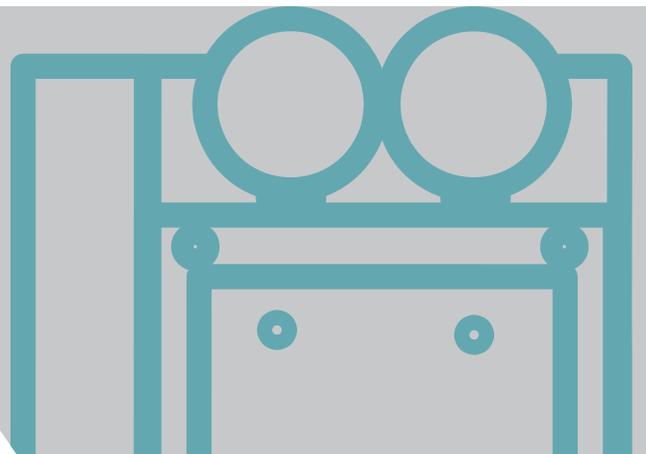
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