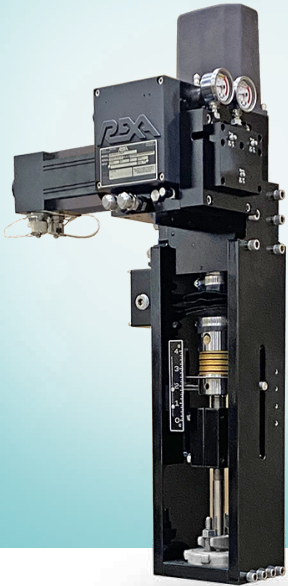




XPAC SERIES 3



X3
PAC
SERIES

ACTUATORS
AND DRIVES



Why REXA?

The REXA XPAC Series 3 Electraulic™ Actuator is a superior positioning device well suited for critical control applications. **Process control** involves three fundamental elements – measurement, correction, and control. The response, resolution, and stability of these factors determines the quality of the end product. Despite electronic advancements improving measurement and data analysis capabilities, the actual control of a process still requires the movement of a mechanical device. XPAC Series 3 is designed to control critical processes in harsh environments while providing **long-term reliability**. REXA actuators and drives provide the final control element capabilities to match the most sophisticated instrumentation and distributed control systems.

Although initial purchase price often takes center stage in new equipment decisions, cost-saving factors that reduce the total cost of ownership are just as important and often overlooked. Savings from reduced maintenance, lower energy consumption, minimized labor costs, improved quality, and avoidance of unplanned downtime add up quickly. REXA actuators consistently demonstrate high **return on investment (ROI)** across a variety of industries achieving **fast payback** periods and delivering substantial value well beyond the initial investment.

The system is comprised of an actuator assembly and the electrical control enclosure. The actuator assembly consists of a double acting hydraulic cylinder, position feedback sensor and an Electraulic™ Power Module. The power module is a unique, self-contained, sealed hydraulic pumping system which manages oil pressure and flow to and from the cylinder. The electrical control enclosure consists of the power supplies, motor drivers and a dedicated microprocessor. The combination of these mechanical, hydraulic and electronic technologies gives the XPAC Series 3 **state of the art capability**. All REXA products are proudly designed and manufactured in the USA.

POWERFUL

Performance of Hydraulics

SIMPLE

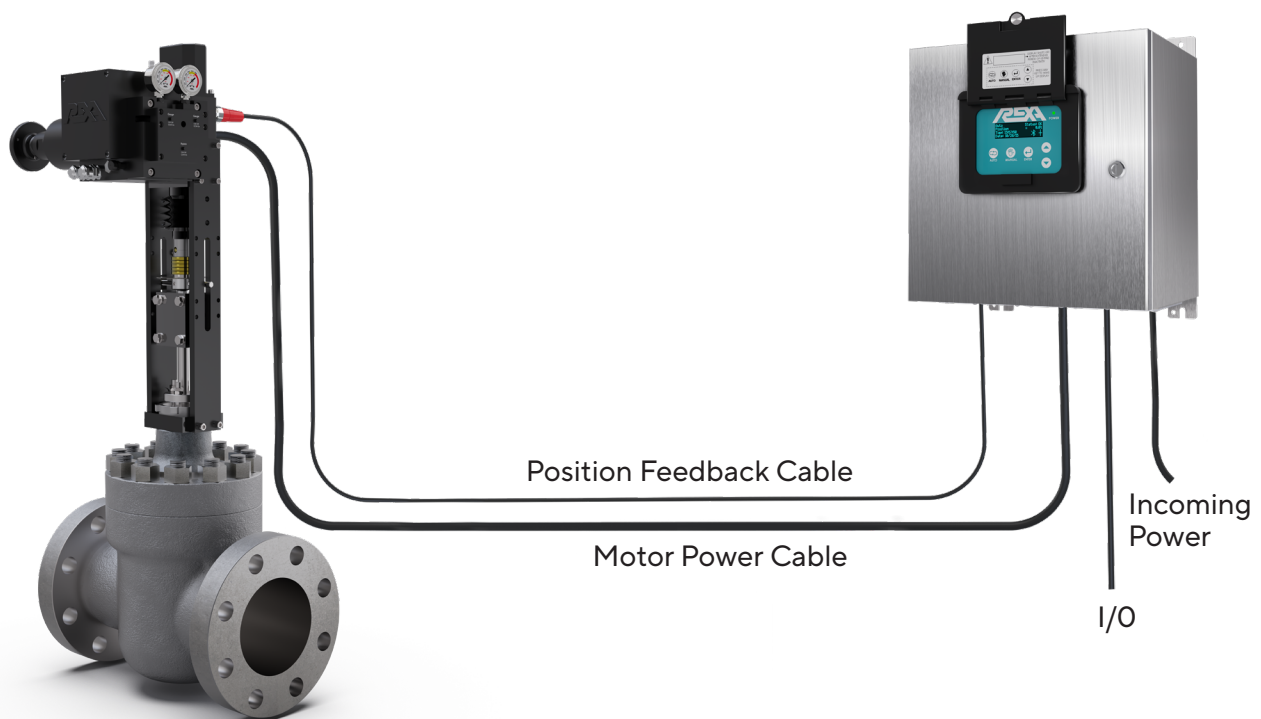
Electric Operation

FLEXIBLE

User Configured Control

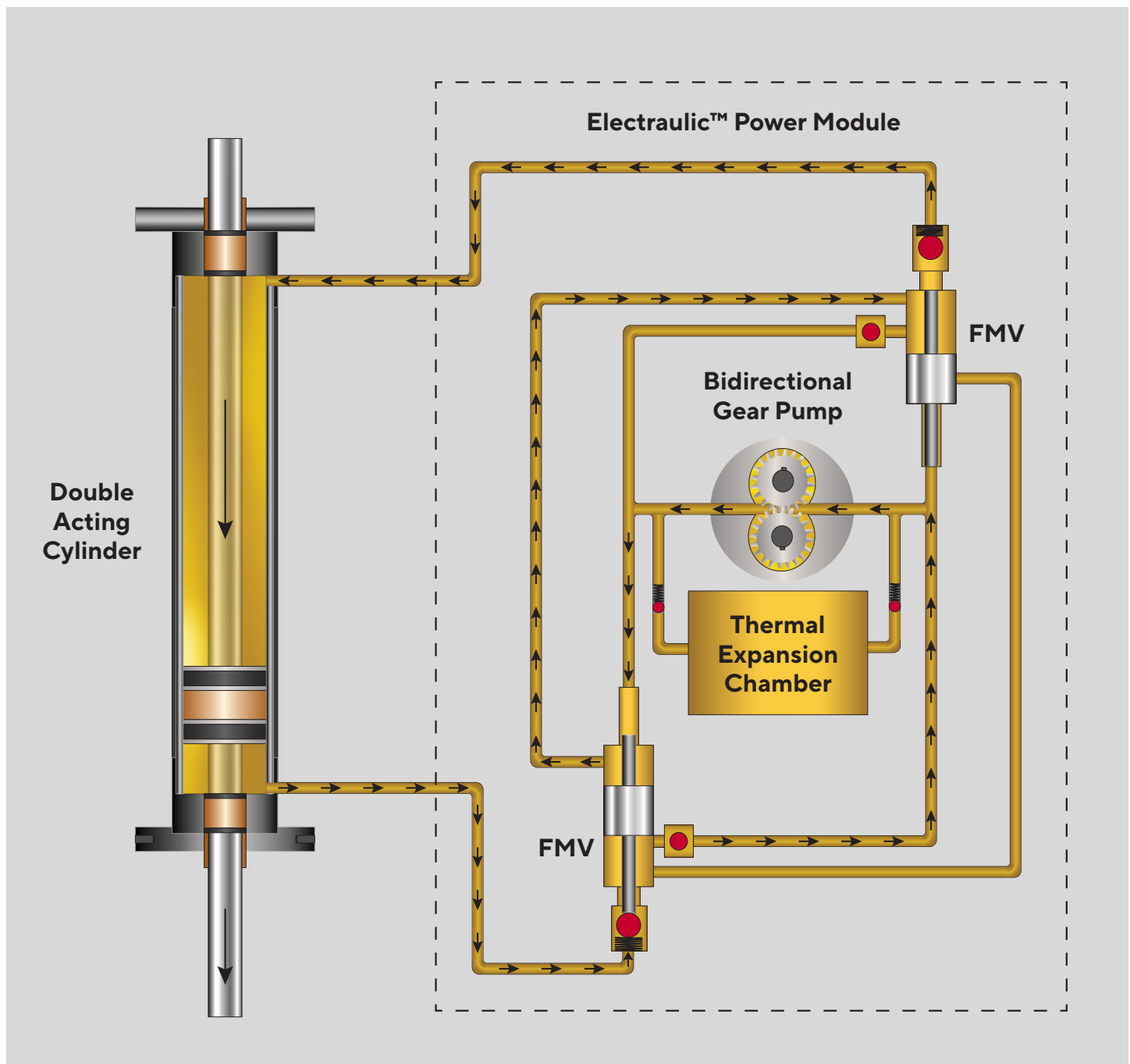
Actuator

Electrical Control Enclosure



How Does It Work?

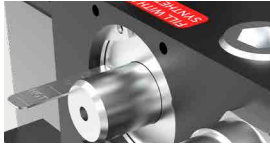
The microprocessor converts the incoming control signal into a target position and compares it to the current position of the feedback sensor. If the target position and current position deviation exceeds the user-programmed deadband, the microprocessor will initiate motion to adjust actuator position. A bidirectional gear pump, driven by an electric motor, generates the hydraulic output necessary to move the actuator. Oil travels from the pump through a series of pilot operated check valves, known as the **Flow Matching Valves** (FMV). Each FMV manages oil transfer out of one side of the cylinder and into the other. This builds pressure and drives the actuator to the target position. Once the target position is reached the motor and pump stop, and each FMV close, hydraulically locking the actuator cylinder in place. The motor will only turn on again if the signal deviation exceeds the deadband and a position change is required.



Actuator Assembly

Electraulic™ Power Module

Key components include a 100% duty cycle motor, bidirectional gear pump and Flow Matching Valves.



Oil Level Indication

Visual indication of actuator oil level.



Pressure Gauges

Actuator output indication.

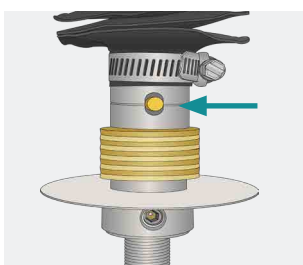


Manual Override

When electrical power is unavailable.

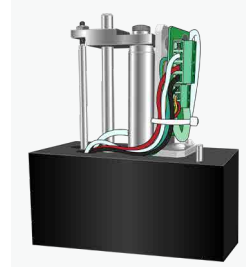
Output Limit Protection

Restricts actuator output to prevent equipment damage.



Elastic Coupling

Linear valve seat-loading and indication.



Position Feedback

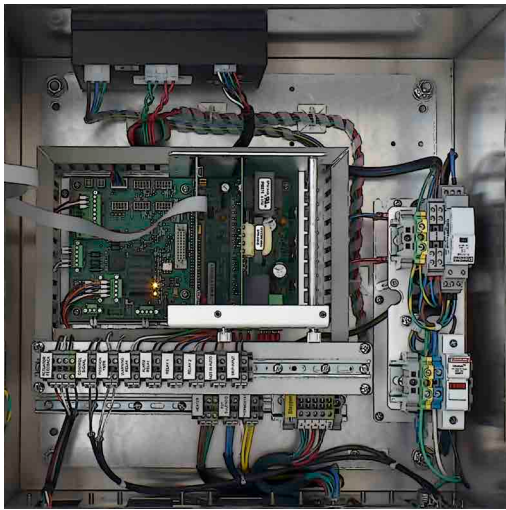
A position sensor constantly monitors valve stem position.

Valve Mounting

Custom-engineered valve adaptation bracket and stem coupling for new and retrofit installations.



Electrical Control Enclosure



Electrical Components

Key components include the motor driver, CPU board, power board and an interconnect board with warning, alarm and position indication relays.



Status Indication

Displays operating mode, status, current position, diagnostic warnings, alarms, and event time and date stamping.

Position Feedback Cable



Interconnect Cables

Color-coded cables supplied with quick release connectors. Extended lengths available.

Flip-Up Display Cover

Protects the keypad from wind-driven debris and harsh sun exposure.

User Interface

Simple, user friendly push-button calibration.



Construction

316 stainless steel material.
NEMA 4X/IP66 rated.

Customer Supplied Main Electrical Power

Motor Power Cable

Control System I/O

Control signal, digital communication and alarm relay out.

Linear Actuators

XPAC Series 3 Linear Actuators utilize a **double acting hydraulic cylinder** driven by one or more Electraulic™ Power Modules. Linear actuators are configurable to suit a wide variety of control and isolation applications across many industries (see page 13 and 14). For both new equipment and retrofit scenarios, REXA manufactures the mounting bracket and stem adapter to fit any style valve, gate, damper or turbomachinery. REXA supplied interconnect cables allow for remote mounting of the electrical control enclosure away from harsh environments.

Features & Benefits

**Fail-Safe Capable
(Spring or Accumulator)**

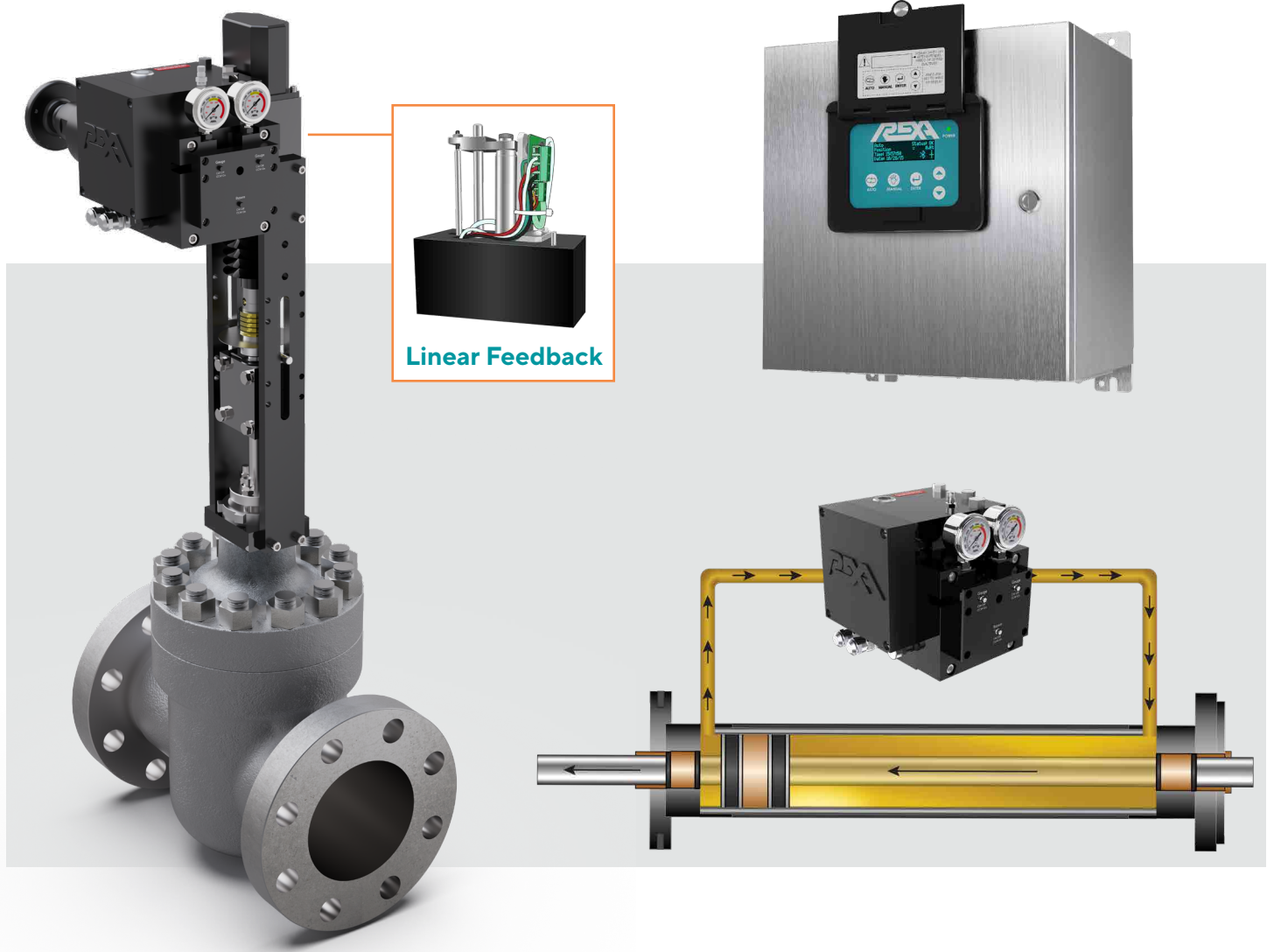
**User-Friendly Push
Button Calibration**

**Low Power Consumption,
High Efficiency**

**Adaptable to Any Valve,
Gate or Turbomachinery**

**Modular Construction,
Flexible Configuration**

**No Routine Fluid
Maintenance**



Rotary Actuators

XPAC Series 3 Rotary Actuators are designed with a **rack and pinion hydraulic cylinder** driven by one or more Electraulic™ Power Modules. Rotary actuators are commonly used on ball and butterfly valves, rotating equipment, and damper applications across numerous industries (see page 13 and 14). REXA manufactures the mounting bracket and stem adapter to suit any valve or other driven device. The REXA supplied interconnect cables allow for remote mounting of the electrical control enclosure away from harsh environments.

Features & Benefits

**Modular Construction,
Flexible Configuration**

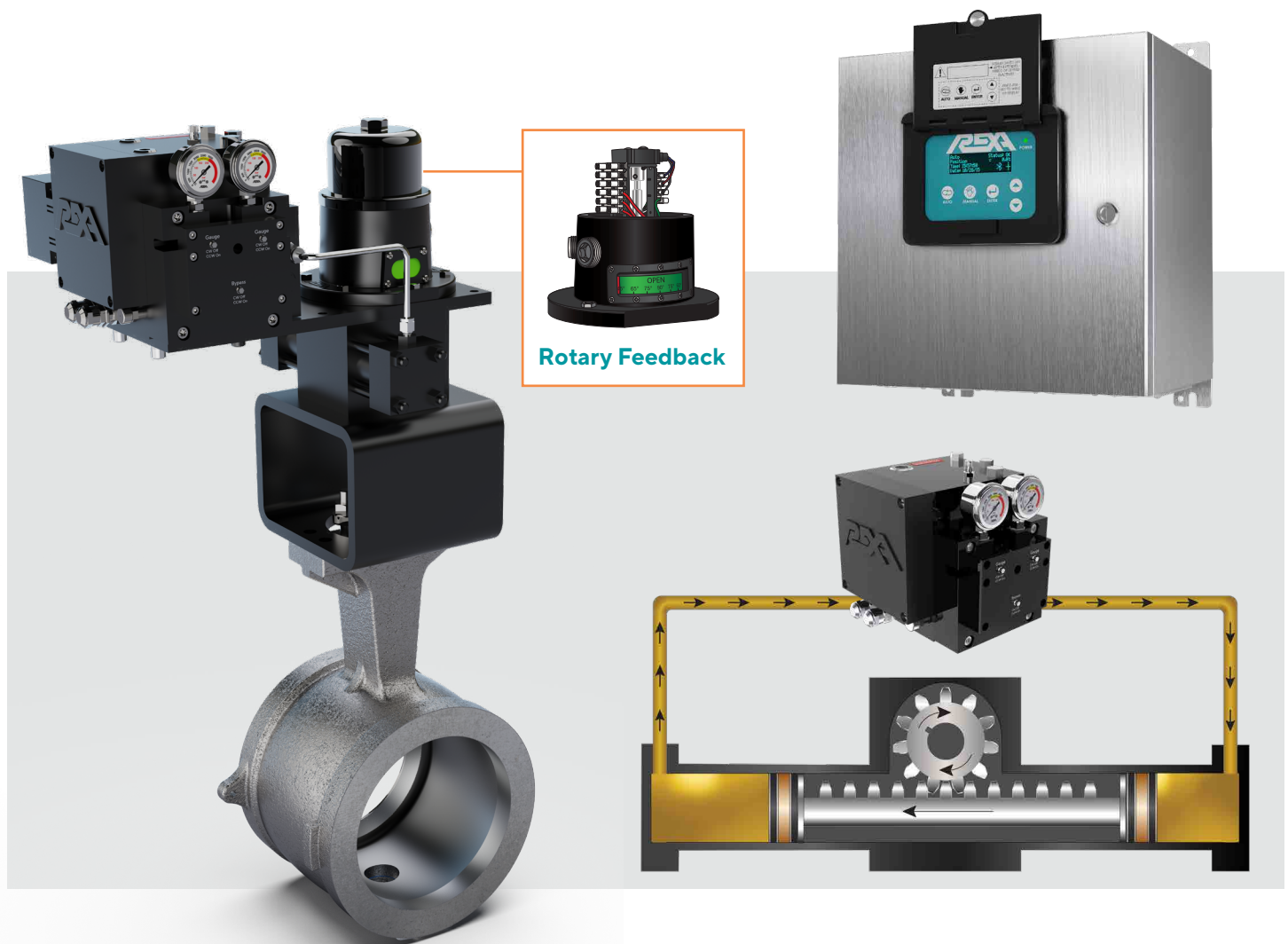
**Low Power Consumption,
High Efficiency**

**Fail-Safe Capable
(Spring or Accumulator)**

**User-Friendly Push
Button Calibration**

**No Routine Fluid
Maintenance**

**Adaptable to Any Valve,
or Turbomachinery**



Damper Drives

XPAC Series 3 Damper Drives are designed with a rack and pinion hydraulic cylinder driven by one or more Electraulic™ Power Modules. Damper drives utilize a **mounting base and drive arm**. They are commonly used on fan and stack dampers, burner tilts and other combustion control applications. The drive mounting base and drive arm can be manufactured to any height or length to create a drop-in replacement to retrofit existing dampers. REXA supplied interconnect cables allow for remote mounting of the electrical control enclosure away from harsh environments.

Features & Benefits

**Adaptable to Any
Damper Design**

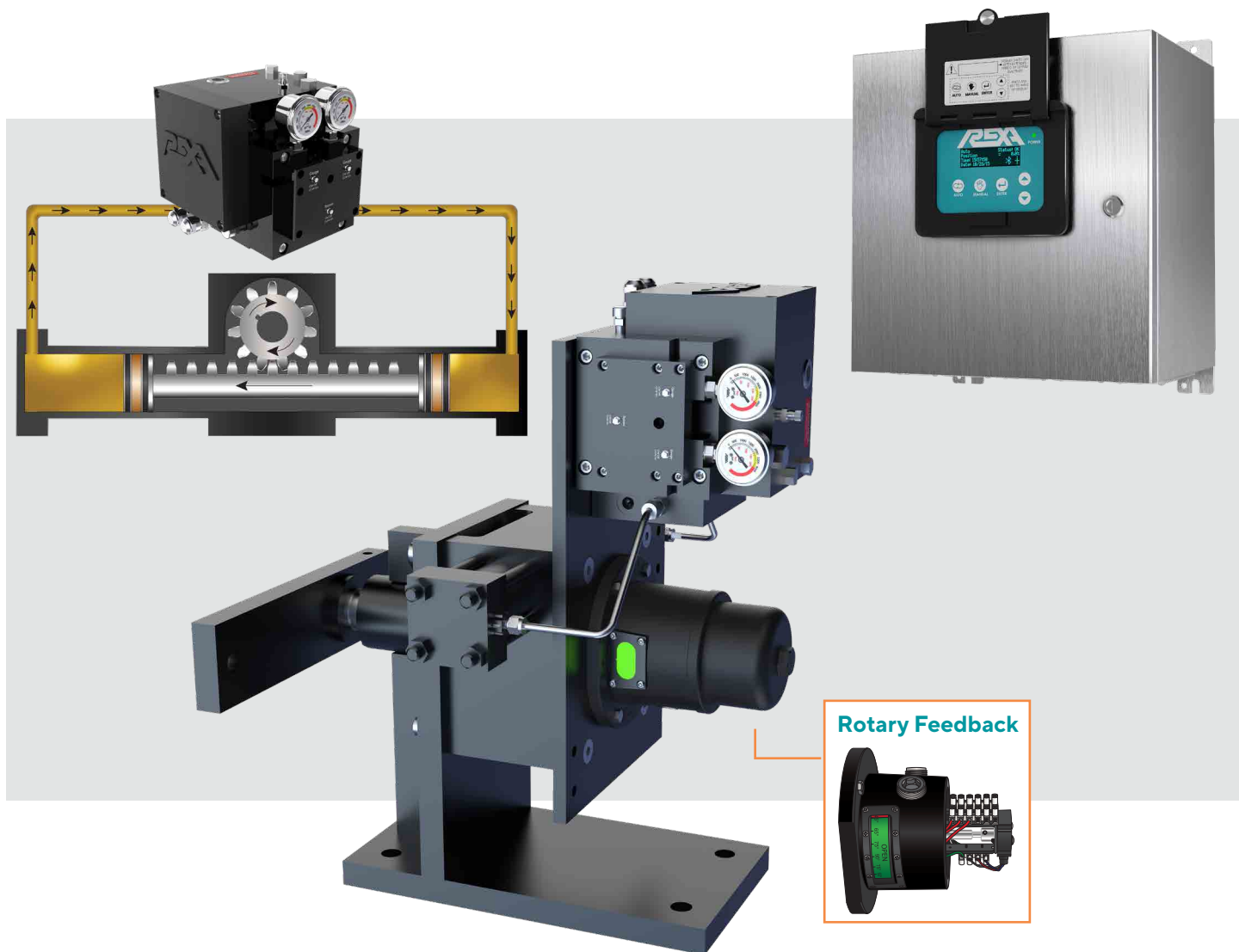
**No Routine Fluid
Maintenance**

**Low Power Consumption,
High Efficiency**

**Modular Construction,
Flexible Configuration**

**Fail-Safe Capable
(Spring or Accumulator)**

**User-Friendly Push
Button Calibration**



Fail-Safe Configurations

Many critical applications require an end of stroke fail-safe position. The fail-safe condition may be initiated by a loss of power, introduction / removal of a trip signal or a combination of both. **Spring fail-safe** positioning involves a coil spring placed in series with the hydraulic cylinder. When a fail-safe condition is initiated, an isolation solenoid opens the hydraulic circuit allowing the spring to move the driven device. **Accumulator fail-safe** systems include a nitrogen charged, piston-type accumulator. When a fail-safe condition is initiated, one or more solenoids open to release the accumulator pressure which moves the driven device. The accumulator recharges after restoration of power or removal of trip condition. Accumulator recharge and actuator positioning can occur simultaneously. Spring and accumulator fail-safe systems can be configured to trip full stroke / rotation in 200 ms.



Spring Fail-Safe



Accumulator Fail-Safe

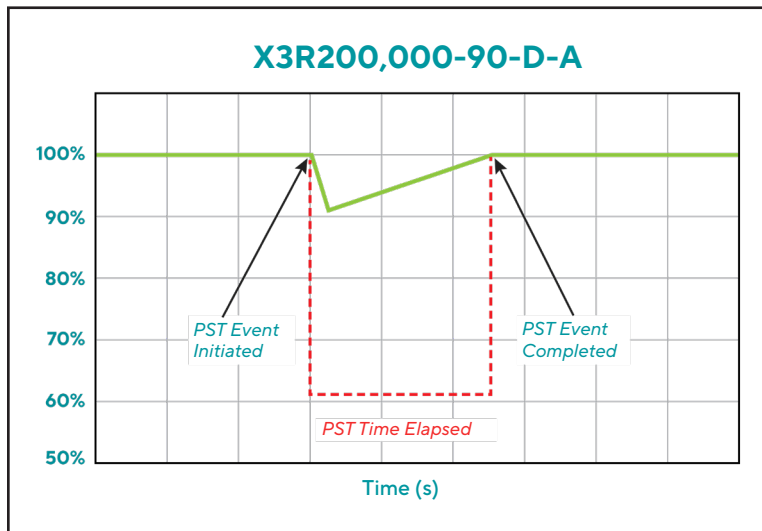
Surge Control

REXA actuators equipped with a spring or accumulator can utilize the **stored energy** of the fail-safe system for large step changes in one or both directions. Upset process conditions may require an actuator to make a **large and fast position change** beyond the speed capability of the standard Electraulic™ Power Module. The Surge Control feature enables these rapid step changes via tuning parameters of the fail-safe system accessed through the user-interface. This allows the user to define the timing and conditions for when the feature is used to respond rapidly and control the process.



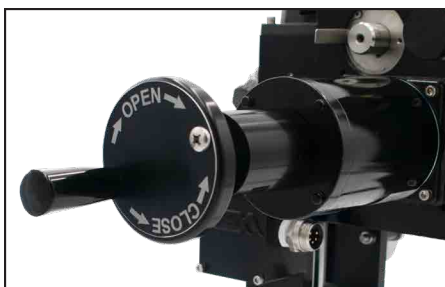
Partial Stroke Testing

Common to **Emergency Shutdown (ESD)** valves Partial Stroke Testing (PST) is used to verify the actuator is capable of performing its intended safety function. REXA actuators are designed to support proof test intervals for **Safety Integrity Level (SIL)** applications when PST is implemented. During a partial stroke test the customer's control system monitors the position transmitter to ensure the actuator successfully performed its function. PST monitoring can be programmed and scheduled with the REXA graphical user interface.



Manual Overrides

XPAC Series 3 Actuators and Drives can be operated with a manual override when electric power is unavailable. See below for available options.



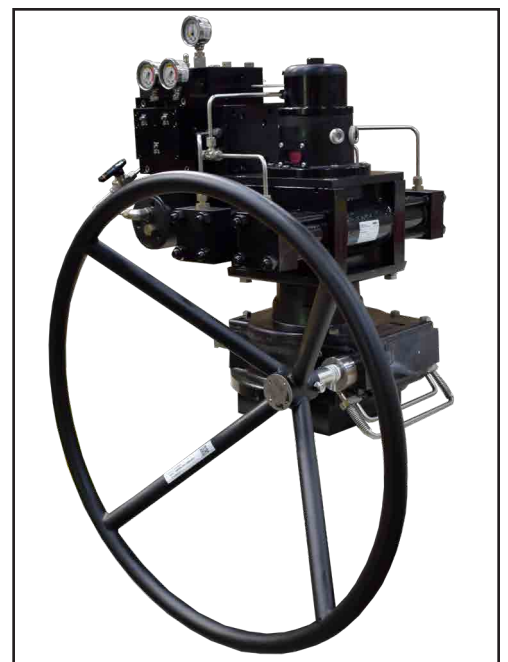
Handwheel



Drill Drive



Hand Pump



Mechanical Override with Handwheel

Redundant Construction

The XPAC Series 3 has **exceptional reliability** and design life expectancy. In addition to performance gains, many customers choose REXA specifically for long-term reliability to go from **turnaround to turnaround (TAR)** without incident. Critical applications require additional levels of reliability to maximize process uptime and **reduce risk** of an unplanned shutdown or a potential safety issue. Redundant configuration is commonly chosen to keep these **critical processes** operational and ensure plant productivity. There are three core components of a redundant REXA system, the Power Module (motor and pump assembly), the position feedback sensors, and the electrical control enclosure with push button user-interface. These redundant systems can even be provided with hot-swappable design allowing for the replacement of key components without taking the unit offline. Choosing a redundant REXA system can increase actuator reliability to a value over 99.9%.



Redundant Position Feedback Example



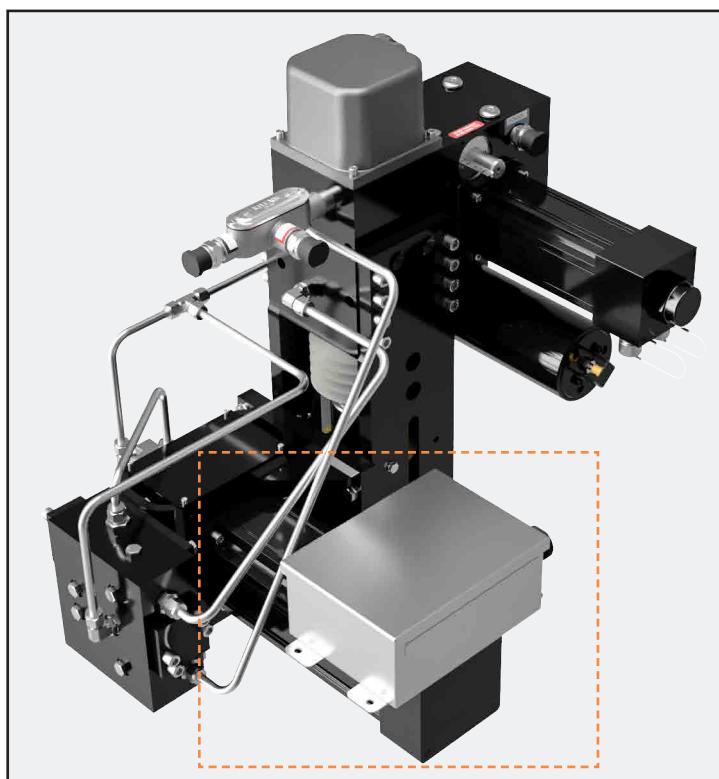
Redundant Power Module Example



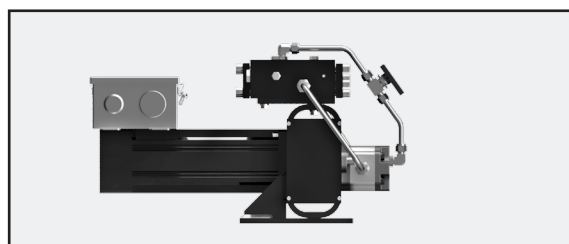
Redundant Electrical Control Enclosure Example

Booster Pumps

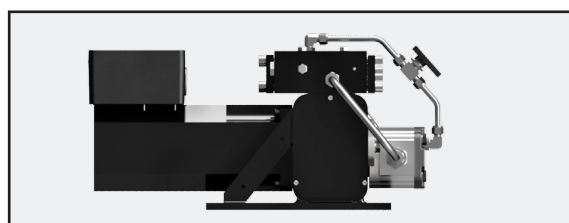
Booster pump systems utilize a standard Electraulic™ Power Module paired with an auxiliary large capacity motor and pump. This dual pump configuration **combines fine control capability and fast speeds** on high output actuators. The power module provides fine control during small position changes, while the booster pump is utilized during large position changes. Control parameters, accessed through the user-interface, allow for adjustment of booster pump performance for specific applications. See below for booster pump model sizes.



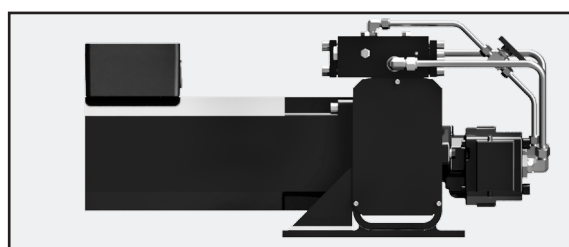
DP9 Booster Pump Example



DP9



DP20



DP40

Higher Model Number = Faster Actuator Speed

Model Number Identification

X3	L	2000	2	C	P	C2
Generation	Series	Thrust	Stroke	Power Module	Fail-Safe Position	Hazardous Area Code
XPAC Series 3	L: Linear	2,000 lbf to 275,000 lbf	3/4 in to 120 in	B 1/2D 1/3C 2 1/2D 2 1/3C D	P: Fail-In-Line Place U: Universal (Rotary) E: Extend (Linear) R: Retract (Linear) A: Accumulator	C1: Division 1 / Zone 1 Actuator Only C2: Division 2 / Zone 2 Actuator and Electronics C5: Division 1 / Zone 1 Actuator with Division 2 / Zone 2 Electronic C6: Division 1 / Zone 1 Actuator and Electronic CA: Division 2 / Zone 2 Actuator Only
	R: Rotary	Torque	Rotation	C 2D 2C DP9 DP20 DP40		
	D: Drive	2,500 in*lb to 1,500,000 in*lb	90°, 120°, 180°, 270°, 305°, 360°			

Rotary Example: X3R100000-90-2D-A-C2

An XPAC Series 3 Rotary Actuator producing 100,000 in*lb torque, 90 degrees of rotation, a 2D power module, accumulator fail-safe, and rated for CSA Class 1 Division 2 hazardous area.

Oil & Gas Applications

Downstream

- Separator Level Control
- Water / Steam Injection
- Blow-off Valve / Snort Valves
- Flue Gas Valves
- ESDV's / EIV's
- IDF, FDF Damper Control
- Fluid Catalytic Cracker Valves
- Wet Gas Compressor Control
- Overhead Pressure Letdown
- Spent and Regenerated Catalyst Slide Valves

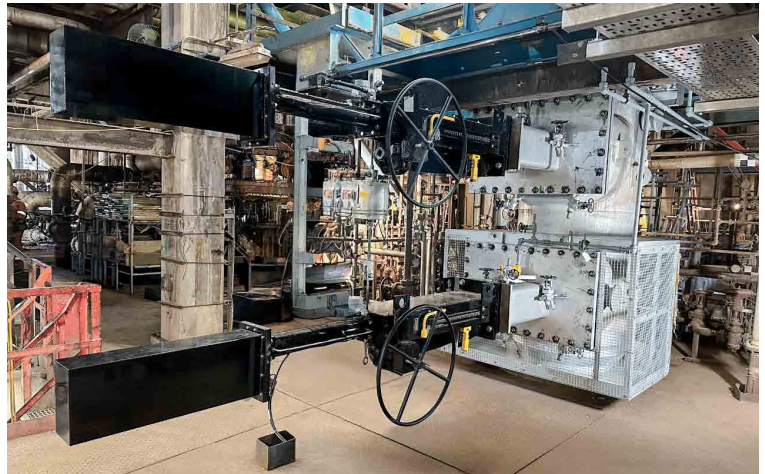
Midstream

- Pump Station Pressure Control
- Meter Back Pressure and Balance Control
- Terminal Inlet Pressure Control
- Pump Recycle / Min. Flow Control
- Well Head Shut Down
- Extraction Well

**Zero Emission
Actuation!**

Upstream

- Water Injection Valve
- Compressor Anti-Surge
- Production Flow Control
- Choke Valves



Power Generation Applications

Combined Cycle

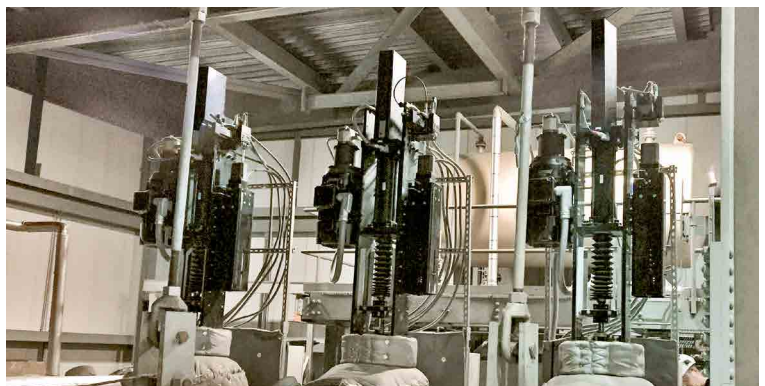
- Sky Valve Control
- Turbine Bypass Systems / Hot Reheat Valves
- Feedwater Control
- Feedwater Recirculation Valves
- Superheat / Reheat Spray Valves

Geothermal

- Well Head Control
- Hotwell Level Control
- Separator Level Control
- Production Well Control
- Injection Well Control

Fossil-Fired Power

- FD/ID Damper Drives
- Primary / Secondary Air Damper Drives
- Burner Tilts Nozzle Control
- Sootblower Header Control
- Supercritical Start Up Valves
- Main Steam Drain Valves



Water & Wastewater Applications

Water

- Intake Pump Discharge Control
- Raw Water Influent Control
- Filter Control
- Ozone Control
- High Service Pump Discharge Control
- Distribution Control

Wastewater

- Collections System Control
- Sewerage Pump Control
- Main Influent Headworks Gates
- Aeration and Blower Control
- Sludge Control
- UV Gate Control



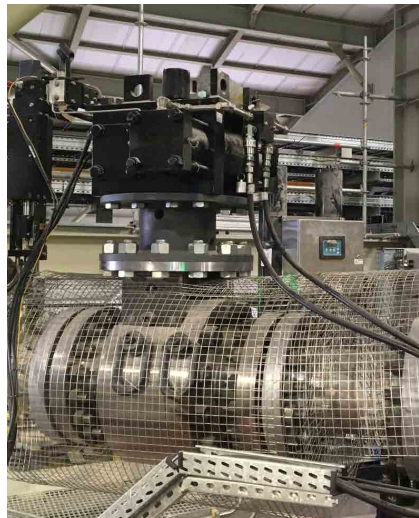
Metals & Mining Applications

Mining

- Flotation Cell Pulp Level Control
- Clave Inlet / Discharge Isolation
- Clave Pressure Letdown
- ILS Pump Station Flow Control
- Acid Flow Control for Leaching
- Cement Kiln Feed Control

Metals

- Coke Oven Collection Main
- Recycle Gas Pressure
- BFG Pressure to Boiler Control
- Mixed Gas Pressure
- Blast Furnace Wind Turbo Blower Speed Control
- Reheat Furnace Pressure Control



Rotating Equipment Applications

All Industry Segments

- Steam Turbine Governors
- Steam Turbine Pilot Valves
- Steam Turbine Extraction
- Inlet Guide Vane Control
- Compressor Anti-Surge / Recycle
- Water / Steam Injection Valves
- Fuel Gas Valves
- Fuel Oil Valves
- Gas Turbine Inlet Bleed Heat
- Scoop Tubes



Product Design, Performance and Compliance

This product brochure is not a specification document. It summarizes the wide range of REXA product features and performance capabilities. Actual product performance capabilities will vary by actuator configuration. Refer to the product data sheet, certified drawings, or installation and operation manual for detailed specifications. REXA is continually improving the design of its products and details are subject to change. Contact the REXA factory to receive a quote for an actuator solution specific to your application needs.

Actuator

Electraulic™ Power Module:

Closed-loop non-vented hydraulics. No routine fluid maintenance required.

Oil Type:

5W-50 synthetic oil. Alternative oils available.

Motor Types:

Stepper (B and C), Servo (1/2D, D, P9, P20, P40)

Motor Performance:

100% duty cycle rated. No start/stop limit.

Linear Actuator Output Options:

Pound-force (lbf): 2,000, 4,000, 10,000, 15,000, 20,000, 30,000, 40,000, 60,000, 80,000, 120,000, 275,000

Newtons (N): 8,896, 17,792, 44,482, 66,723, 88,964, 133,446, 177,928, 266,894, 355,857, 533,786, 1,223,260

Stroke Options:

Inches (in): 3/4, 2, 4, 6, 8, 11, 12, 16, 18, 22, 24, 28, 30, 36, 42, 48, 54, 60, 66, 72, 77, 84, 90, 96, 103, 120, 140, 165, 180

Centimeters (cm): 2, 5, 10, 15, 20, 28, 30, 41, 46, 56, 61, 71, 76, 91, 107, 122, 137, 152, 168, 183, 196, 213, 229, 244, 262, 305, 356, 419, 457

Rotary Actuator Output Options:

Inch-pounds (in*lb): 2,500, 5,000, 10,000, 20,000, 50,000, 100,000, 200,000, 400,000, 566,000, 1,016,000, 1,333,000, 2,000,000

Newton-meters (N*m): 282, 565, 1,130, 2,260, 5,649, 11,298, 22,597, 45,194, 63,949, 114,793, 150,609, 225,970

Rotation Options:

90°, 120°, 180°, 270°, 305°, or 360°

Position Feedback:

Non-contacting transducer or thin-film potentiometer (depending on application).

Ambient Temperature:

10° F to 200° F (-12° C to 93° C). Cold temperature configurations down to -40° and high temperature configurations up to 250° F (121° C) are available. Contact the factory for details.

Environmental Rating:

NEMA 4X, IP66

Electrical Control Enclosure

Power Requirements:

B, 1/3C, C, 2C Modules: 115 or 230 VAC 1Ø

1/2D, 2½D Modules: 115 or 230 VAC 1Ø

D, 2D Modules: 230 VAC 1Ø

P9, P20, P40 Boosters: 230 VAC 3Ø

Transformers are available for other power sources. Contact the factory for details.

User Interface:

Four line vacuum fluorescent display with five push button keypad. Parameter settings stored in non-volatile memory.

Control Signal:

Analog 4-20mA and/or HART

Remote Diagnostics:

Through digital communication protocols or Bluetooth user interface. Contact the factory for details.

Positioning Performance:

Deadband adjustable from .05% to 5.0%.

Deadtime ~70 ms.

Ambient Temperature:

-40° F to 131° F (-40° C to 55° C)

Enclosure Material:

316 stainless steel.

Environmental Rating:

NEMA 4X, IP66

Compliance and Certifications





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