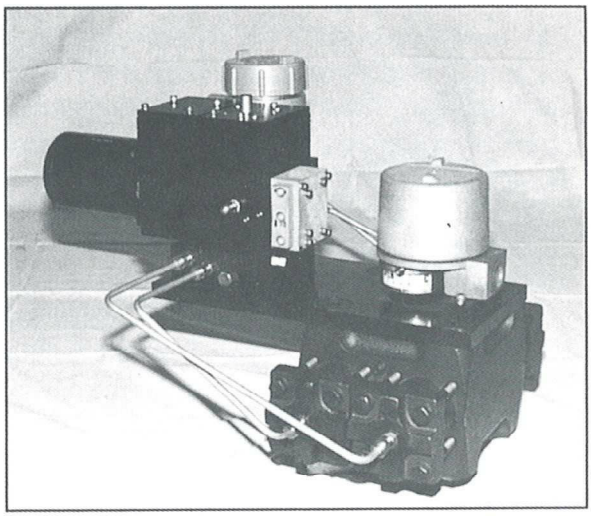
REXA Xpac

Electraulic Actuators & Drives

R series
Rotary Actuators

The Final Step to Process Control

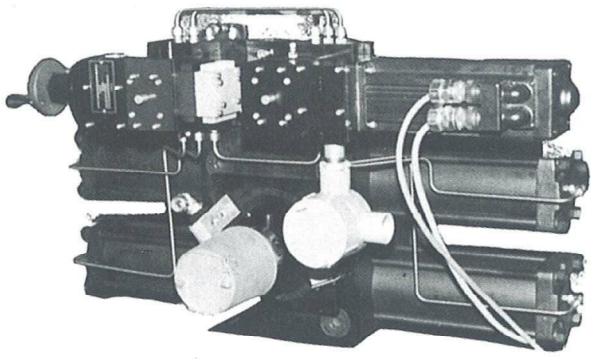
- **100% modulating duty cycle**
- **Deadband is user selectable from 0.1% to 5%**
- **Positioning accuracy to 0.15%**
- **Input Signal: 4-20 mA analog or pulses**
- **Static or dynamic friction has no effect on operation**
- **Optional spring failure upon power loss**
- **Self contained, single unit design**
- **Microprocessor controlled for reliability and flexibility**
- **Discrete operation: Motor only operates when motion is required**



REXA Xpac actuators feature a self contained Electraulic power module utilizing the patented Flow Match System. This technology allows precise positioning independent of load variation and locks the cylinder in place when no movement is required. Hydraulic flow is generated by an internal positive displacement gear pump driven by a continuous duty motor without limitations on start, stop or reverse cycles.

Power modules are available in B, C, ½D and D sizes. The difference between the sizes is the maximum flow rate of the hydraulic oil and thus the maximum stroking speed for an actuator. The C size has three times the capacity of a B; the ½D has six times the capacity of a B; and the D size has twelve times the capacity of a B. Greater speeds can be obtained by using a manifold containing multiple modules. This approach to product configuration offers a high degree of commonality and reduces spare parts inventory. The required rotation rate for an application determines the size and quantity of the modules. Regardless of the selected power module, the rated torque remains unchanged.

The R series actuator is designed by combining a quarter turn rack and pinion cylinder and the power modules. Torques from 600 in-lbs to 400,000 in-lbs are standard. A female keyed shaft connection and four bolt mounting pattern make for a straight forward adaptation to ball valves, butterfly valves, louvers or any device requiring rotation up to 90 degrees.



Bulletin XRS3, 10/99

REXA

Leader in Actuator Technology

Xpac

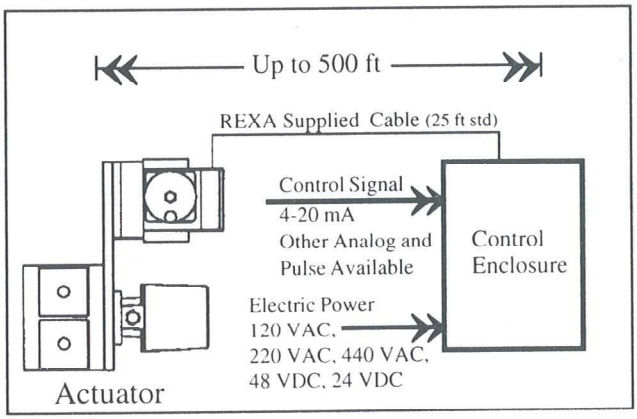
The word "Electraulic" was coined by REXA to describe our revolutionary technology which combines the simplicity of electric operation, the power of hydraulics, the reliability of solid state electronics and the flexibility of user configured control. A hydraulic system has long been recognized as providing superior performance in the operation of final control elements. Unfortunately, advantages such as quick response, precision and high stiffness were often outweighed by frequent maintenance, nonstandard construction and high cost. By utilizing Electraulic technology, REXA is able to bring to general process control the advantages of hydraulic operation without its drawbacks. Self contained actuator mounted hydraulics, no maintenance, low power consumption and rugged building block components are inherent in REXA's proven design.

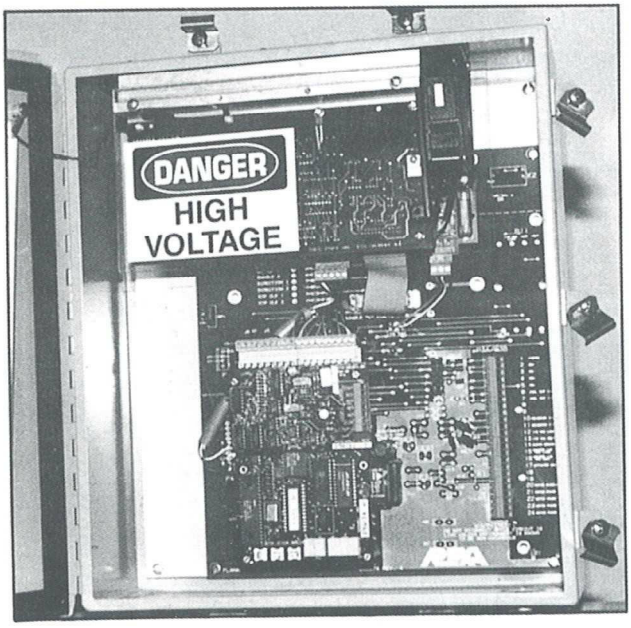
The foundation of Electraulic technology is the Flow Match System, a patented breakthrough in fluidic circuitry. Motor oil, driven by a continuous duty motor and gear pump, is transferred through the Flow Match Valves (FMV) from one side of a double acting cylinder to the other. Variations in magnitude and direction of the load have no effect upon operation. When position is reached the motor shuts off and the FMVs lock the actuator in place. For the complete story, request the publication, Theory of Operation.

The Position Control Processor

Menu Calibration for Unequalled Control of the Driven Device

The **Xpac** is operated by a dedicated microprocessor, the Position Control Processor (PCP). Contained within the control enclosure, the PCP has three modes of operation: *Automatic*, *Setup* and *Local*. For modulating operation, the PCP is in the *Automatic* Mode and functions much like a conventional positioner. The control signal and actuator's position (indicated on a 5 digit display) are continually compared to each other. If the difference between these values is greater than the selected deadband, then the motor is rotated in the required direction until the new position is reached. Response to a change in control signal is immediate.





The PCP is calibrated in the *Setup* mode by a simple routine which provides the user complete control over actuator operating parameters. Speed, stroke, deadband and control signal can be configured into the PCP by using a three button keypad and the display. This menu driven *Setup* eliminates the time consuming and often difficult procedures associated with limit switches and potentiometers. Programmed parameters are retained in a permanent memory. For unusual or difficult applications, more sophisticated control capabilities such as flow characterization and water hammer suppression (two speed) are available. Access to the *Setup* mode can be restricted by a passcode.

Local allows stroking of the **Xpac** from the keypad on the PCP. The display will indicate actuator position. The current control signal and last encountered error can also be shown.

Specifications: R series Rotary Actuators

REXA

Performance Specifications

Rotation: Any angle up to 90°
Output: 600 in-lbs to 400,000 in-lbs [1] - listing on back page
Greater torques and rotations are available.
Rotation Speed: Adjustable at PCP up to a maximum for actuator size and power module combination.
See back page for Rotation Rates.
Deadband: 0.1% (STD) Selectable at the PCP between 0.1% and 5.0% of calibrated signal span, 0.5% for R600/R1200.
Positioning Accuracy (RSS) [2]: <0.15% of full rotation
Linearity (BSL) [2]: <0.05% of full rotation
Repeatability [3]: <0.10% of full rotation
Please refer to TM3 - Accuracy
Failure Mode: Selectable by user on loss of signal. Standard is fail in place on loss of power.
Response: Virtually instantaneous

[1] *Output values are for fail in place actuators. Depending upon the direction of motion, the optional spring failure will increase or decrease the shaft output.*
[2] *Corrected by electronic flow characterization.*
[3] *Limited by user selected Deadband.*

Actuator

MECHANICAL

Type: Self-contained Electraulic actuator, rotary motion
Materials of Construction: Anodized aluminum (Electraulic module), iron and steel (rack and pinion cylinder)
Environmental Rating:
NEMA 4X (STD)
FM approved Cl I, Div 1, Grps B, C & D and NEMA 4X
FM approved Cl I, Div 2, Grps B, C & D and NEMA 4X
Ambient Temperature Range: +10°F to +160°F. Optional to 200°F. Lower temperature operation is possible with insulation and auxiliary heating.
See TM 19 - Temperature Guidelines
Motor: Stepping type for B & C size power modules; servo type for ½D & D size power module

HYDRAULIC

Oil: Automotive Type, 20W-50 (STD), 5W-50 (OPT)
Circuit: Flow Match System - integral gear pump, valving (FMV), manifold and reservoir. Steel piping connects the power module to the cylinder.
Heater: Cartridge type, 150 watts, thermostat controlled

Electronics

CONTROL ENCLOSURE

Contents: Position Control Processor (PCP), motor driver, power supply and termination
Environmental Rating:
NEMA 4X - steel (STD), fiberglass, stainless steel
FM approved Cl I, Div 2, Grps B, C & D - steel
Ambient Temperature Range [1]:
B & C Module: -40°F to 140°F
½D & D Module: -40°F to 120°F
Control Signal:
Analog: 4-20 mA (STD), others available
Pulse: 24-120 volts, AC or DC
PCP: Contains 3 button keypad and 5 character LED display. Program stored in socketed EPROM and setup parameters stored in nonvolatile memory.

[1] *Ambient temperature only. Direct solar heat load must be avoided.*

FEEDBACK

Type: Separate housing located on the actuator and connected directly to the output shaft.
Environmental Rating:
NEMA 4X (STD)
FM approved intrinsically safe (for Div 1 Actuator)
FM approved Cl I, Div 2, Grps B, C & D and NEMA 4X
Sensor: Sealed thin film potentiometer ($10X10^6$ cycles)
Transmitter: 3 wire, resistance to current (4-20 mA)

Power Requirements

Voltages:
B Module: 12 vdc, 24 vdc, 48 vdc, 125 vdc, 120 vac (STD), 208 vac, 220 vac, 440 vac
C Module: 120 vac (STD), 208 vac, 220 vac, 440 vac
½D Module: 120 vac (STD), 208 vac, 220 vac, 440 vac
D Module: 120 vac, 208 vac, 220 vac (STD), 440 vac
Consumption (Maximum):
B Module: 350 watts
C Module: 700 watts
½D Module: 1200 watts
D Module: 2000 watts
Please refer to TM2 - Power Consumption

Options

Fail Open or Closed (upon loss of power): Includes a CW or CCW spring and an integral solenoid valve latched to the electric power.
Please refer to TM4 - Spring Failure
Accumulator Failure System:
Please refer to TM21 - Accumulator System
Position Transmitter: Provides 4 to 20 mA output proportional to position. Includes alarm indication
Please refer to TM12 - Position Transmitter
Enhanced Software
0.05% Deadband - increases the standard resolution by a factor of 2.
Minimum Control Point - limits actuator operation in the danger zone near a valve seat.
Two Speed - Reduces actuator speed near the seated position. Useful in controlling water hammer.
Flow Characterization - 11 point, 10 line segment modification to the inherent linear stroke.
Please refer to TM18 - Advanced Control Options
Auxiliary Control:
External - NEMA 4 switches and a window are installed on the cover of the control enclosure.
Remote - A manual control station may be located remote from the control enclosure.
Local operation from the PCP keypad is standard.
Please refer to TM17 - Auxiliary Control
Limit Switches:
Electrical - Two relays, SPDT, switched by the PCP. Includes alarm indication
Mechanical - In feedback area, 2 or 4, SPDT
Please refer to TM13 - Limit Switches
Manual Override (uses the normal hydraulic circuit):
Handwheel/Drill Drive - declutchable, attached to the outboard end of the motor.
Geared (5:1) Hand Crank - installs in place of the motor on a separate C module.
Please refer to TM15 - Manual Override
Surge or Trip Control: High speed operation in one direction to limit the effects of upset conditions.
Please refer to ANP4 - Surge Control
Electrical Transient: The electronics and power supplies can be isolated to resist electrical damage caused by incidental voltage fluctuations. Highly recommended on remote installations.

REXA is continually improving the design of its products. As such, specifications are subject to change.

REXA

Model Numbering System
R series Actuator

***REXA** is continually improving its products. Therefore, specifications are subject to change.*

The model number provides a physical description of the mechanical portion of the actuator. The output torque, power modules and failure mode are described in this simple system. The rotation rate specifies the maximum speed of operation for a particular actuator and power module combination.

Model Number

Rotary — R _ _ _ _ — _ _ — _ — _

Torque Rotation

For Example:

R2500-90-B-U

A rotary Series **Xpac** with 2500 inch-lbs of torque and B size power module. Spring failure upon loss of power. Any rotation is adjustable up to 90 degrees. Rotation rate is 13 seconds.

Torque (inch-lbs)		Rotation (degrees)
600	–	90
1,200	–	**90**
2,500	–	90
5,000	–	**90**
10,000	–	90
20,000	–	**90**
50,000	–	90
100,000	–	**90**
200,000	-	90
400,000	-	**90**

Spring Fail Position (Upon Power Loss)

P: None - Lock in Place
U: Universal

Power Modules

B: Single B
C: Single C
½D: Single ½D
D: Single D
2D: Two D Manifold
2C: Two C Manifold

Rotation Rate (seconds per 90° rotation)

Torque	B	C	½D / 2C	D	2D	SF[1]
600	3.25	1.1	NA	NA	NA	<.5
1200	**6.5**	**2.2**	**1.1**	**NA**	**NA**	**.75**
2500	13	4.5	2.25	1.1	.55	1.25
5000	**26**	**9**	**4.5**	**2.25**	**1.1**	**2.5**
10000	50	17	8.5	4	2	5
20000	**100**	**34**	**17**	**8**	**4**	**10**
50000	NA	85	43	22	11	20
100000	**NA**	**NA**	**85**	**43**	**22**	**40**
200000	NA	NA	NA	85	43	80
400000	**NA**	**NA**	**NA**	**170**	**85**	**160**

[1] SF - Spring Failure. Estimated time is for the standard solenoid and spring. The actual times may vary based on spring force and temperature. Faster times are available.

Your Local Sales Representative is:

For More Information Contact:

KOSO America, Inc.
385 West Street
West Bridgewater, MA 02379
Tel 508-584-1199
Fax 508-584-2525