

Accumulator Option

The basic design of REXA Electraulic™ actuation will inherently lock-in-last place upon loss of power. However it is easily adapted to provide end of travel fail-safe operation. One common method of accomplishing fail-safe positioning is with a solenoid and spring design (see PM4-2). However this type of device is limited to smaller actuators for physical and economic reasons. It should also be noted that since the spring is directly coupled to the cylinder, much of the actuators hydraulic force is consumed to compress the spring with each stroke. As a result “spring-fail” actuators require a larger cylinder to accomplish the required net output force.

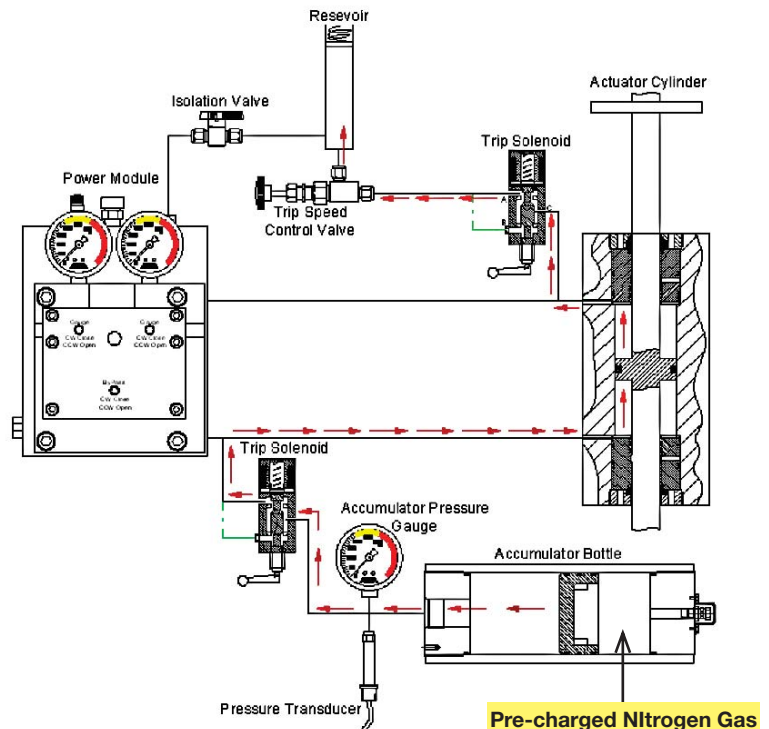
For larger actuation needs, where spring packages become very large and impractical, an accumulator fail option is offered. The accumulator system is isolated from the main hydraulic circuit during normal actuator operation removing the need to “oversize” the actuator. Our unique accumulator technology uses the power module to recharge the accumulator, eliminating the need for a separate re-charge pump and associated plumbing. A fail safe event may be initiated by loss of electrical power or an independent trip signal. After a fail safe event the accumulator is re-charged by the actuator’s power module prior to resuming normal operation.

THEORY OF OPERATION

System operation is based on a piston type accumulator with nitrogen gas on one side of the piston and oil on the other. Two solenoids isolate the accumulator and reservoir from the main hydraulic circuit during normal operation. These solenoids are provided with manual override levers. Refer to the IOM for detailed operation of the accumulator and manual overrides.

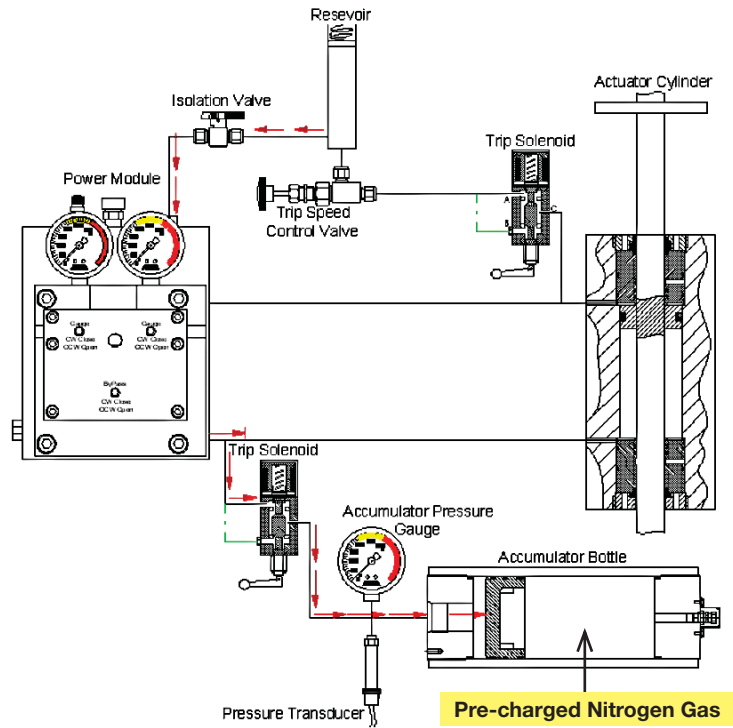
TRIP FUNCTION

Refer to the drawing to the right to follow the fluid flow path during a trip. The arrows indicate the flow direction. Under a trip condition or loss of electric power, two solenoid valves open simultaneously. One solenoid allows oil under pressure from the accumulator to be released and enter the failure side of the actuator driving it in the fail direction. The other solenoid allows the oil displaced from the opposite side of the cylinder into an auxiliary reservoir. To control the fail speed a needle valve is installed on the outlet of the second solenoid valve.



RECHARGE FUNCTION

Refer to the drawing to the right to follow fluid path during recharge. When the trip condition ends or power is restored, a pressure transducer signals the CPU of low pressure in the accumulator. This signal tells the CPU to run the power module in the direction required to drive the actuator in the fail direction. Since the actuator cylinder is already at the end of its travel and both trip solenoid valves are still open, the oil being pumped from the reservoir by the power module will be allowed to flow into the accumulator. When the proper recharge pressure is reached, the CPU stops the power module and closes the solenoid valves. Normal operation is now resumed and the actuator will run to the control signal target position.



MAXIMUM ACCUMULATOR SPEEDS

R series	Approximate Fail Time*(seconds)
R600	<1
R1 200	<1
R2500	<1
R5000	<1
R10 000	<1
R20 000	<1
R50 000	1.5
R100 000	3.0
R200 000	6.0
R400 000	12.0

L series	Approximate Fail Time* (seconds)						
Stroke in inches	2	4	6	8	11	16	22
L2000	<1	—	—	<1	<1	—	—
L4000	<1	<1	—	—	—	—	—
L5000	—	—	—	—	1.25	1.5	2.0
L10000	<1	—	1.25	—	2.0	3.0	3.75
L20000	1.0	1.5	1.5	3.0	3.75	6.0	8.0
L40000	1.5	3.0	4.0	6.0	8.0	11	15
L80000	3.0	6.0	8.0	11	15	—	—
L120 000	4.0	9.0	12	—	—	—	—

* Failure times may vary due to actuator load, temperature and system configurations.