

Hydraulic Accumulator Operation and Pre-Charge Levels

Industrial flaking mills can experience severe mechanical and hydraulic shocks when foreign material such as a bolt is passed between the rolls. This foreign material will cause a sudden buildup of pressure in the hydraulic system called shock pressure, that if not relieved will cause excessive operating pressures and possible damage to mill components. The hydraulic accumulators on the mill serve to remedy this situation.

What is an accumulator?

An accumulator is an energy storage device. It stores energy when the increase in hydraulic pressure compresses nitrogen gas held in its container. The accumulator contains a bladder or piston that provides a barrier between the nitrogen and hydraulic fluid to prevent intermixing. When shock pressure is generated, the hydraulic fluid compresses the nitrogen gas in the accumulator allowing the pivot roll to open and the foreign material to pass. After the rolls are clear the stored energy in the accumulators will be applied back into the hydraulic system forcing the rolls closed again.

There are two types of accumulators commonly used today. The first uses a bladder and the second uses a piston. The bladder type uses nitrogen contained in an elastic bladder mounted inside its shell. The shell acts as a pressure container for both the gas and hydraulic fluid. The piston style uses a cylinder with a floating piston. The cylinder serves as the pressure container for both the nitrogen gas and fluid, while the piston provides the barrier between the gas and oil to prevent intermixing. Note that oxygen is never used as it can be explosive when mixed with oil under high pressure.

Sizing of an Accumulator

The size of an accumulator is critical when applying it to a piece of equipment. An accumulator sized too small will not have enough capacity to handle the volume of oil required during a shock pressure event. An oversized accumulator does not have a fast enough reaction rate and will respond too slowly. Either may result in damage to mill components.

A properly sized accumulator that matches the hydraulic capacities of your mill will provide the most effective means of providing protection. All Ferrell-Ross mills have been designed and equipped with the properly sized accumulators to provide the proper capacity and reaction rate required.

Setting the Pre-Charge Level of Accumulators

Having the pressure of the nitrogen gas pre-charged to the correct level is critical to proper operation. This is determined by the amount of hydraulic pressure set at the pump to control the hydraulic cylinders. The pre-charge level of the accumulator should be set to 65% of this level.

For example: If the output pressure of your hydraulic pump is set at 1000 psi or 69 bar, the pre-charge level of the two accumulators on that mill should be set to 650 psi or 45 bar each. Use the following quick reference chart to guide you on the proper settings for your unit.

800 psi / 55 bar pump operating pressure = 520 psi / 36 bar accumulator pre-charge level
1000 psi / 69 bar pump operating pressure = 650 psi / 45 bar accumulator pre-charge level*
1200 psi / 83 bar pump operating pressure = 780 psi / 54 bar accumulator pre-charge level
1500 psi 103 bar pump operating pressure = 975 psi 67 bar accumulator pre-charge level

* Accumulators are pre-charged from the factory to 650 psi / 45 bar to operate with hydraulic pump pressure output of 1000 psi / 69 bar.

Keep in mind that if the pressure of the pump is adjusted from these settings, it is necessary to reset the pre-charge level of the accumulators. This will ensure proper operation of the hydraulic system.

A tag containing these settings is attached to each accumulator. Please update the tag if changes are made. If no tag is present you can use the sample tags on the following page.

Accumulator Charging Kits

An accumulator charge kit is available from Ferrell-Ross for the correct testing and pressurization of your accumulators. All you need to add is nitrogen from a local supplier to maintain your system. Reference Ferrell-Ross part number K980-000002 for pricing.

DO NOT REMOVE

Accumulator pre-charge pressure should be set to approximately 65% of operating hydraulic pump pressure. This will ensure optimum shock pressure protection on your mill. Both accumulators must be set accordingly:

800 psi / 55 bar pump operating pressure = 520 psi / 36 bar accumulator pre-charge level
1000 psi / 69 bar pump operating pressure = 650 psi / 45 bar accumulator pre-charge level
1200 psi / 83 bar pump operating pressure = 780 psi / 54 bar accumulator pre-charge level
1500 psi 103 bar pump operating pressure = 975 psi 67 bar accumulator pre-charge level

Operating pump pressure on this mill: _____ psi / bar

Accumulator pre-charge pressure set to: _____ psi / bar

Date accumulator pre-charge set: _____ Completed by _____ (initials)

Part No. 80003559

NO REMOVER

La presión de pre-carga del acumulador deberá estar ajustada en aproximadamente 65% de la presión de operación de la bomba hidráulica. Esto asegurará la protección óptima de choque de presión en su molino. Ambos acumuladores deben estar como se indica a continuación:

800 psi / 55 bar presión de operación de la bomba = 520 psi / 36 bar nivel de pre-carga del acumulador
1000 psi / 69 bar presión de operación de la bomba = 650 psi / 45 bar nivel de pre-carga del acumulador
1200 psi / 83 bar presión de operación de la bomba = 780 psi / 54 bar nivel de pre-carga del acumulador
1500 psi 103 bar presión de operación de la bomba = 975 psi 67 bar nivel de pre-carga del acumulador

Presión de operación de la bomba en este molino: _____ psi / bar

Presión del acumulador pre-cargada a: _____ psi / bar

Fecha de pre-carga del acumulador: _____ Completado por _____ (iniciales)

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