

# ACCUMULATOR OPERATING & MAINTENANCE INSTRUCTIONS

READ ALL INSTRUCTIONS PRIOR TO INSTALLATION AND OPERATION TO AVOID POSSIBLE INJURY

## Warning:



Always consider any accumulator to contain pressure until proven otherwise. Any accumulator stored with internal pressure shall be tagged to indicate the presence of gas pressure.

## General Information

- All hydro-pneumatic accumulators function due to the differential pressure between the compressed nitrogen gas and the stored hydraulic fluid. It is extremely important to provide the proper amount of gas pre-charge, dependent on the accumulator application, and check the gas pre-charge level regularly. The correct pre-charge pressure is determined by maximum and minimum system pressure, and temperature, both ambient and operating temperature. For additional technical information and support, contact Tobul Customer Service (803-245-2400).
- Hydraulic accumulators are pressure vessels and must be treated accordingly. Only trained and qualified individuals should perform installation and maintenance procedures on any accumulator. Always wear personal protective equipment (safety glasses and chemical resistant protective gloves, if necessary)
- Uninstalled piston-type accumulators are best stored secured in the vertical position, away from the sun and weather, with a small amount ( $\leq 20$  PSIG) of dry inert gas (dry nitrogen – N<sub>2</sub>) in the vessel to prevent corrosion due to condensation, and seal compression due to the effects of gravity. Insure all porting is sealed to prevent entry of contaminants.
- Uninstalled bladder-type accumulators may be stored horizontally or vertically, away from the sun and weather, with a small amount ( $\leq 20$  PSIG) of dry inert gas (dry nitrogen – N<sub>2</sub>) in the bladder bag to maintain the elastomeric bag in the best condition.

## Installation Recommendations Prior to Installation

- Unpack and perform a thorough inspection to insure no damage has occurred in transit.
- Insure the maximum working pressure (MAWP) noted on the accumulator (or gas bottle/receiver) on ID tag or stamped into bladder-type vessel, is equal to, or greater than the maximum pressure of the system on which the accumulator is to be utilized.
- If additional protective coatings (paint/anti-corrosives/etc.) are to be applied prior to installation, insure all valves/bleed holes/etc. are properly masked or plugged to prevent clogging. Insure all masking/plugging is removed prior to installation.
- Insure all fittings are properly tightened, and designed for system pressure requirements.
- Insure the hydraulic fluid is compatible with the accumulator seals/elastomers.

## At Time of Installation

- The accumulator should be positioned as near as practical to the source of shock/pulsation, or potential energy need. Porting/piping should be matched as closely as possible to insure free flow of hydraulic fluid in and out of the application system. Insure the porting/piping is appropriate for the MAWP of the system.
- Vertical orientation of accumulator with fluid port down is preferred. If vertical space is not available, it may be installed horizontally; however, reduced service life will be incurred. The most significant problem in horizontal mounting is the creation of “a contaminant trap”, which can result in decreased seal life and possible internal damage.



**Warning: Do Not Weld** to the accumulator body or end caps! Tobul does not allow any attachments/alterations to a pressure vessel by welding. The metal components and the elastomer seals can both be adversely affected by the heat of welding.

- Use of Tobul mounting brackets or approved alternative is highly recommended. If U-bolt type mounting clamps are used, do not over tighten, especially when used on piston-type accumulators, so as not to distort the cylinder with excessive squeeze.
- Use of the Tobul safety shut-off valve is recommended. Insure all fittings utilized w/TSV's meet system pressure requirements. The TSV is a combination of shut-off valve, pressure bleeder valve, hydraulic fluid drain, and excess system pressure relief in one valve body to be mounted between the accumulator and the system pressure line.
- Fluid filtration is critical to life of all system components; insure the system fluid is filtered to a cleanliness level of at least  $\leq 10$  microns to eliminate foreign matter in the system.

## Pre-charge Checking and Adjustment Recommendations

- **NOTE:** Only qualified and trained personnel should perform this procedure, which applies to both bladder-type and piston-type accumulators. Always wear personal protective equipment. DO NOT USE automotive-type valve cores in high pressure accumulator gas valves.

### Warning:

Always use dry inert gas (dry nitrogen – N<sub>2</sub>) for pre-charging –

**NEVER USE AIR OR OXYGEN, DUE TO THE DANGER OF COMBUSTION/EXPLOSION.**

- Maintain records of the pre-charge pressure and the ambient temperature at the time of installation, and system temperature during operations.
- Nitrogen gas pre-charge should be checked at least once during the first week of operation following installation. If there is no loss of pre-charge at that time, it should be re-checked in 90 to 120 days and annually thereafter.



- Checking and adjustment of pre-charge should be performed with an accumulator charging gauge and hose assembly, such as the Tobul GG2527F (Max. 3000 PSIG) or a similar assembly with the appropriately sized pressure gauge, to correspond to system pressure. The following procedures are for use of the GG2527F (3000 PSIG) charging gauge and hose assembly. Tobul accumulators are equipped with several different types of gas valves (some have valve cores, some do not) based on the accumulator MAWP. Make sure to specify the appropriate gauge and hose assembly (GG2527F-M: 5000 PSIG or GG2527F-H: 10,000 PSIG) for the pressure.
- Tobul utilizes several types of gas valves on accumulators. All gas valves have a “Schrader”-style threaded connection (.305-32), some with a valve core (3000 PSI or less) and some with a “jam nut” or double lock nut, typically referred to as a “military-style” valve or a “strut” valve (5000 PSI or more). Any valve with an internal valve core will require use of a charging assembly with a “T” handle gas cock in order to depress the valve core, allowing the entry or exhaust of nitrogen gas. The “T” handle of the gas cock also opens and closes the flow of gas through the gas cock. Turning the “T” handle clockwise opens the valve, turning counter-clockwise closes the valve. Dependent on the diameter and design of the accumulator involved, the gas cock may require the addition of an extension (P/N 2522-EXT) to allow the charging assembly to be attached to the accumulator gas valve.
- **NOTE:** Many of the “military style” valves have o-ring seals at their base, sealing the valve to the accumulator. It is important to utilize two wrenches when opening this style – the first to hold the base nut stationary, the second to rotate the “jam” nut, counter-clockwise, opening the valve. If the jam nut is loosened on an accumulator under pressure, without holding the base stationary, the pressure may force the o-ring seal out of position, thereby losing the gas valve seal, causing the loss of nitrogen gas. If the o-ring seal is inadvertently displaced, re-tightening the valve base without relieving gas pressure may result in damage to the o-ring, necessitating replacement of the gas valve o-ring, prior to recharging the accumulator.

## Pre-charge Checking and Adjustment Recommendations

- **NOTE:** The nitrogen bottle fittings supplied by Tobul Accumulator in our standard charging gauge and hose assemblies are designed to comply with CGA (Compressed Gas Association) connection standards, which are the standard in the North American marketplace. Elsewhere, other compressed gas bottle standards are found, and various adaptors may be necessary to attach Tobul's standard charging hose assembly to the compressed gas bottle.
- Pre-charge pressures will vary dependent on the application and operating conditions. Generally, if an accumulator is being utilized for energy storage, the pre-charge should be 90% of the minimum working pressure. If used for system shock absorption, 75% of the system working pressure. If used for pulsation damping, approx. 70% of the system operating pressure. Always consult Tobul Sales Engineering (803-245-2400) for assistance if not sure about the correct pre-charge.
- **NOTE:** In piston-type accumulators, an increase in pre-charge pressure (after allowing for any appreciable temperature variation) indicates a gradual leakage of fluid into the gas side. Conversely, a decrease in pre-charge pressure is indicative of nitrogen gas leakage into the fluid side. The amount of leakage is dependent on piston velocity; if operating conditions include very rapid cycling, Tobul recommends checking pre-charge pressure as least monthly.
- Hydraulic pressure on fluid end **MUST BE REDUCED TO ZERO**. This can be accomplished by shutting down the system totally, and bleeding system hydraulic pressure to zero; or by isolating the accumulator from the system with the use of a Tobul Safety Shutoff valve and manually bleeding off any hydraulic pressure remaining with the manual needle valve in the TSV. Insure all hydraulic fluid is drained from the accumulator.
- Remove gas guard (gas valve protection guard) and valve cap from accumulator. Some gas guards are threaded; others are affixed with a pair of 3/8" socket head cap screws. After insuring the T-handle of the gas cock is retracted from the gas cock by turning counter-clockwise, attach the charging gauge and valve assembly to the accumulator gas valve, using the gas cock.
- **NOTE:** some smaller diameter accumulators may require the use of a gas cock extension (P/N 2522-EXT) in order to allow the gauge assembly to mate to the accumulator gas valve.
- Insure the bleed valve on the gauge assembly is closed, and then depress the gas valve core by turning the T-handle of the gas cock clockwise to depress the valve core in the accumulator gas valve. Gas pressure can now be read on the gauge.

**If pre-charge pressure needs to be increased**, obtain an adequate supply of pressurized dry nitrogen (normally a compressed gas bottle with regulator).



### Caution!

Insure the valve on the high pressure nitrogen supply is securely closed. Utilizing a charging gauge and hose assembly, similar to the Tobul GG2527F (Max. 3000 PSIG) or a similar assembly with the appropriately sized pressure gauge to correspond to system pressure, attach the hose assembly to the nitrogen supply and the tank valve on the charging gauge assembly.

- **NOTE:** Tobul accumulators may be equipped with several different styles of gas valves (some have a valve core, others do not). If the gas valve has a double lock nut (what is termed a military style valve), the valve is opened by loosening the upper lock nut by turning counter-clockwise approx. two turns, or until the valve lock nut touches the gas cock fitting. Then open the charging assembly by rotating the gas cock T-handle clockwise while holding the bottom fitting stationary. SLOWLY open the valve on the nitrogen supply and allow the gas to flow into the accumulator. Once the desired gas pre-charge pressure has been reached, close the valve on the nitrogen supply, then close the accumulator gas valve. Turn the T-handle on the gas cock counter-clockwise, and then open the bleed valve on the gauge assembly to relieve gas pressure in the hose assembly.
- **NOTE:** Allow the accumulator to rest approx. 10-15 minutes after checking/adjustment of nitrogen gas pre-charge. This will allow gas temperature to adjust and equalize. Re-check gas pressure on gauge, and then disconnect gauge assembly from the accumulator. Check the accumulator gas valve for leaks with soapy water... if none observed, complete disconnection procedure and reassemble by re-installing the gas valve cap and protective gas guard.

**Contact Tobul Customer Service/Sales Engineering for assistance 803.245.2400 or [tobulsales@fst.com](mailto:tobulsales@fst.com).**