

MC-1 AND GC-1 INTERNAL RELIEF VALVES

Smith pumps build pressure through positive displacement. All but just a very few *special* Smith MC-1 and GC-1 Series models have internal relief valves. These incorporated back-to-suction differential pressure bypass devices are normally configured for typical liquefied gas applications. MC-1 and GC-1 model types with incorporated internal relief valves are not reversible, and must be run in the correct direction of rotation for these valves to be operational. The internal relief valves are intended as an emergency “secondary” bypass safety mechanism to prevent drastic overloads, by opening only when *external* bypass flow is obstructed or when *external* bypass valves are rendered inoperative. Whether or not an internal relief valve is provided, **the proper operation of an external differential bypass valve as the “primary” bypass relief mechanism, in a well designed back-to-tank bypass return system, is very important for safe, successful operation of these pumps**, especially when handling liquefied gas products such as LPG, NH₃, CO₂, or similar low-pressure liquefied gases. The external bypass valve must discharge from a tee close to the pump in the liquid discharge line, back to a dedicated supply tank inlet, in such a way that accumulated heat will dissipate before liquid returns to pump suction.

Standard MC-1 and GC-1 model types contain differently designed internal valves, which are normally set at 100 PSID. GC-1 internal relief valves cannot be adjusted in the field. MC-1 valves are adjustable to 125 PSID, although changing the setting is *not normally required or recommended*. Both styles can be modified for differential pressures as high as 150 PSID. MC-1 internal relief valve adjustment, especially for those units in liquefied gas service, should be accomplished by qualified, trained personnel, in strict compliance with all applicable safety codes (such as NFPA 58), regulations, laws, and appropriate Smith literature.

Applicable safety practices, especially with liquefied gases, require isolation from the fluid transfer system and proper depressurization of the pump, prior to cap removal for resetting the valve. To adjust the MC-1 internal relief valve, remove the cap (649-30) on the gear end cover (at the end of the pump farthest from the motor). This valve cap contains an o-ring (6227-12), which seals against the gear end cover to prevent internal pressure from escaping around the corresponding valve adjusting screw with lock nut (649-42). The valve cap unscrews in a *counterclockwise* direction. After removing the cap, the adjusting Allen screw with its corresponding lock nut will then be exposed (if the pump has the original style slotted-end adjustment screw do not continue; contact the factory for instructions). While holding the adjustment screw in position with an Allen wrench, loosen the lock nut in a *counterclockwise* direction. The Allen screw can then be turned either way. Turn it *counterclockwise* to *decrease* the setting, and *clockwise* to *increase* the setting. One complete turn in either direction results in a change of approximately 10 PSID. Do not excessively compress the coil spring. Make sure the Allen screw has sufficient thread contact in the cap. Do not pressurize or use the pump without the cap, screw, and lock nut properly installed. Do not use the cap without the right o-ring properly installed and in good condition. Do not under or over tighten the cap or nut. Use no worn or damaged parts. Check for leaks.

To prevent vapor lock damage, internal relief valves must always remain closed during normal external bypassing. Be advised that due to flow dynamics, a functioning external bypass system may cause the pump to build higher pressure than the actual valve setting. **External bypass valve adjustment, system design, and operation must allow for any additional discharge overpressure.** Also the recommended external bypass valve adjustment is not always at the “allowed maximum”. It must be properly matched with the use conditions (RPM, operation intervals, liquid qualities, etc.). For example, in continuous-duty recirculation with low-pressure liquid CO₂, the usual maximum recommended external bypass valve setting is 30 PSID. In cylinder filling operations (such as for LPG and NH₃), the usual maximum recommended adjustment is 75 PSID. Smith WW-Series external bypass valves are specifically designed for use with Smith pumps under demanding conditions. Either the ½-inch or the ¾-inch sizes are recommended for the MC-1 and GC-1 Series pumps.

For additional information see the following Smith literature: AL-1, AL-3, AL-17A, AL-20, AL-41, AL-93, AL-105, AL-201, DBV-L, DBV-1, GM-1, and PI-2A. Contact the factory if there are any questions. Smith Precision Products Company, Inc. is not responsible for the design, construction, or use of piping systems. This bulletin, and other such literature from Smith Precision Products Company, Inc. relating to LPG, NH₃, CO₂, similar low-pressure liquefied gases, and other non-related liquids, is for concept presentation only, strictly from the standpoint of a pump manufacturer. Proper system design, construction, and use require a site-specific engineering study including component manufacturer's application data, with due regard for all of the applicable local, State, and Federal safety codes and regulations, such as, but not limited to, those promulgated by the NFPA, DOT, and ANSI.



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