Emptying LPG Cylinders with a Compressor

The drawing shows a system utilizing a compressor to empty cylinders of both liquid and vapor. Here are comments on the various items in the sketch:

The cylinder to be emptied is shown at the left side of the drawing. The cylinder should be inverted so that any liquid present can drain into the line connecting it to the holding tank. For best results, mount the cylinder on a rack at a height above the holding tank. In this way, both gravity and a pressure difference will ensure the transfer the liquid to the holding tank.

The holding tank should be large enough to hold the total amount of liquid contained in any cylinder(s) that will be emptied at one time.

The storage tank will generally be much larger than the holding tank. If this is to be a portable unit, a bobtail or transport tank may be used.

The compressor should be fitted with a liquid trap and a 4-way valve. Blackmer type "LU" mounting arrangements include both of these items. In general, the LB161 will match well with a 500 gal. (2,000 l) holding tank and the LB361 with a 1,000 gal. (4,000 l) holding tank.

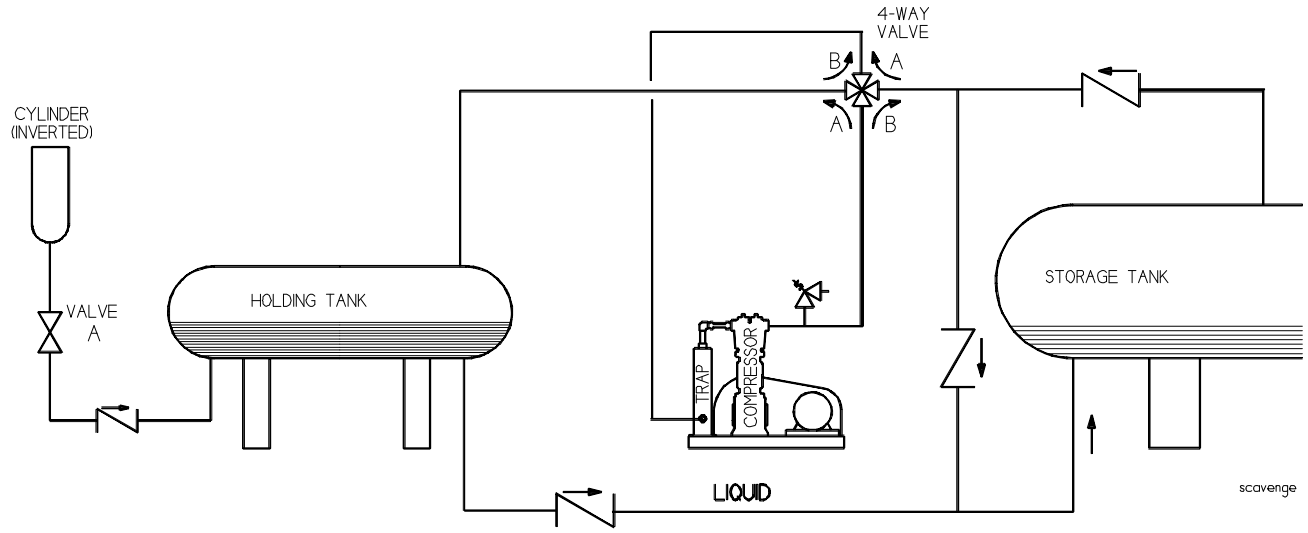
OPERATION

Step 1 The Holding Tank is assumed to be at a low pressure at the start of the operation. The inverted cylinder is connected to the system and Valve A is opened (the 4-Way Valve should be in Position "B"). Gravity and the low pressure in the holding tank will quickly force the liquid in the Cylinder into the Holding Tank.

Step 2 The Compressor is used to push the liquid from the Holding Tank into the Storage Tank. The 4-Way Valve will be in Position "A", Valve A will be OPEN. Starting the Compressor will pull vapors from the Storage Tank, and compress them into the Holding Tank. The increased pressure in the Holding Tank will force the liquid in it to the Storage Tank. Once all the liquid has been transferred, proceed to Step 3.

Step 3 The Compressor is used to pull vapors from the Holding Tank and Cylinder then push them into the Storage Tank's liquid section. The 4-Way Valve should be moved to Position "B", and Valve A will be OPEN. Run the compressor until the Holding Tank is at the desired pressure.

Step 4 Close Valve A, place the 4-Way Valve to Position "B" and disconnect the Cylinder(s) from the system. As the Holding Tank is at a low pressure (due to Step 3), the system is now ready for Step 1 again.



Sequence of Operation				
Step	Description	Compressor	4-Way Valve	Valve A
1	Connect Cylinder(s)	OFF	Position B	OPEN (after connecting cylinder)
2	Transfer Holding Tank Liquid	ON	Position A	OPEN
3	Vapor Recovery	ON	Position B	OPEN
4	Disconnect Cylinder(s)	OFF	Position B	CLOSED

POSSIBLE SYSTEM ENHANCEMENTS

A liquid level switch may be placed in the Holding Tank to signal the end of Step 2.

Add a Holding Tank pressure switch to signal the end of Step 3.

Motorized valves may be used to automate switching from step to step.

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