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Form No. 102924

Operating Instructions  
for:

100138  
100222  
100982  
100983

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MODEL B  
**PISTON ACCUMULATOR**  
5,000 PSI Max. Operating Pressure

## GENERAL

These piston accumulators accommodate minor changes in pressure due to temperature changes and/or leaks in the system. However, when charging a system including an accumulator, a pressure drop is usually experienced after pump pressure is turned off. This drop is due to initial heat build-up in the nitrogen gas and subsequent cool-down when the pump stops charging. Amount of drop will vary with each system and can be allowed for by adding the amount dropped to the initial pump pressure setting.

## SAFETY PRECAUTIONS



**WARNING:** To help avoid personal injury,

- Read and understand this operating instruction sheet BEFORE attempting to use an accumulator.
- Support the accumulator properly so its weight does not bend or otherwise damage hydraulic lines.
- Do not pre-charge accumulator with oxygen or compressed air. Use of oxygen in an accumulator can cause fire or an explosion and will also degrade the elastomer seals.
- Do not weld to the accumulator shell or caps. The heat from welding reduces the tensile strength of the metal, can damage seals, and voids all warranties.
- Always use the metering valve supplied with the accumulator. Failure to use this valve can result in component failure.

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Sheet No. 1 of 3

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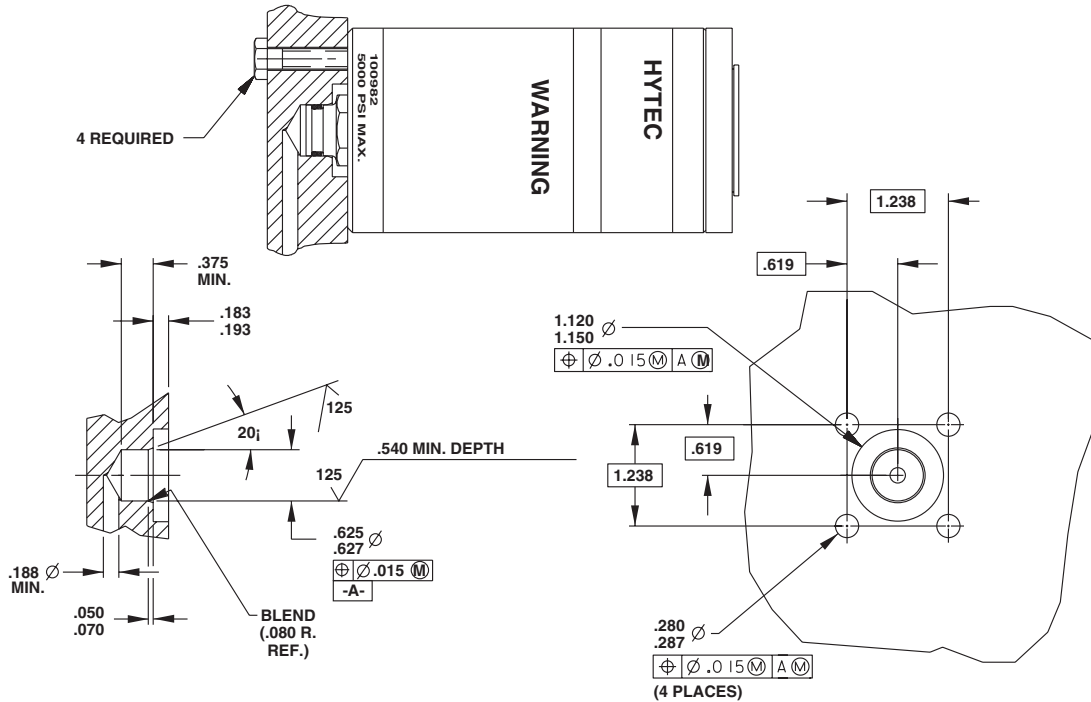
Rev. Date: 14 April 1997

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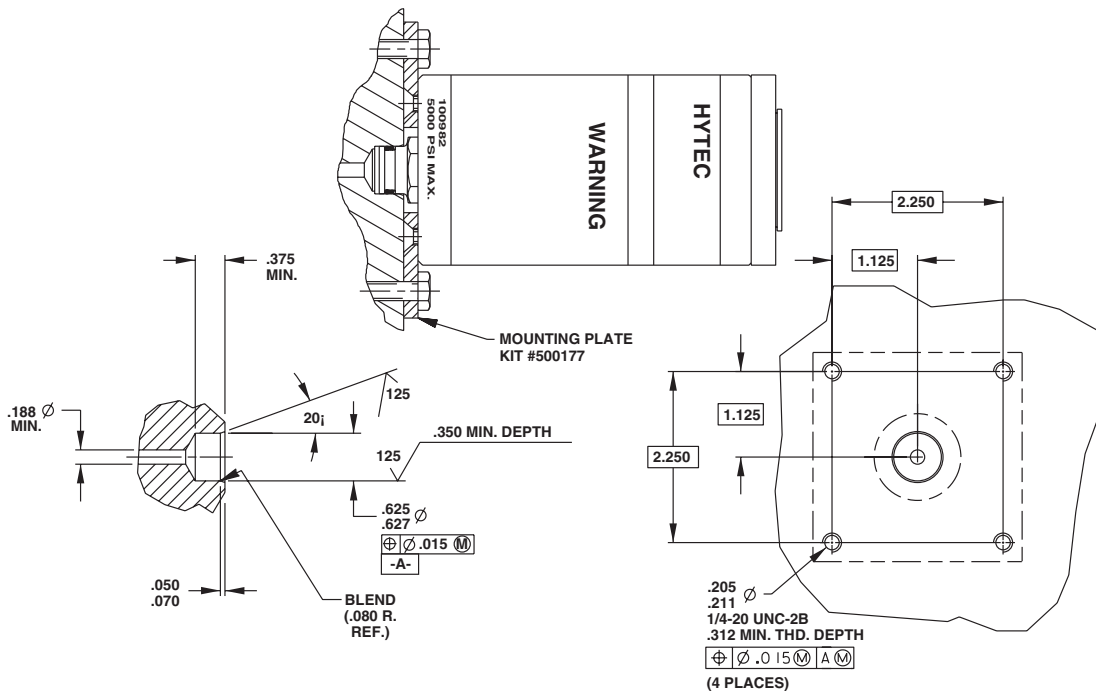
## INSTALLATION

Install isolator and bleed valves at the fluid ports of the accumulator. This will allow the maintenance and repair of this accumulator without removing it from the system. Allow adequate space at the gas valve for charging and to check pressure. Do not support the accumulator's weight with the hydraulic connection. Always support the accumulator using its four mounting holes. An optional mounting plate kit #500177 allows surface mounting.

### MANIFOLD MOUNT MATING HOLE PATTERN



**FIGURE 1 (WITHOUT MOUNTING PLATE)**



**FIGURE 2 (WITH MOUNTING PLATE KIT #500177)**

### DETERMINING THE PRE-CHARGED PRESSURE NEEDED

These accumulators are shipped with a factory pre-charge pressure of 1500 PSI. To determine what pre-charge pressure you need for your application refer to the two pressure-volume curve charts shown in Figures 3 & 4.

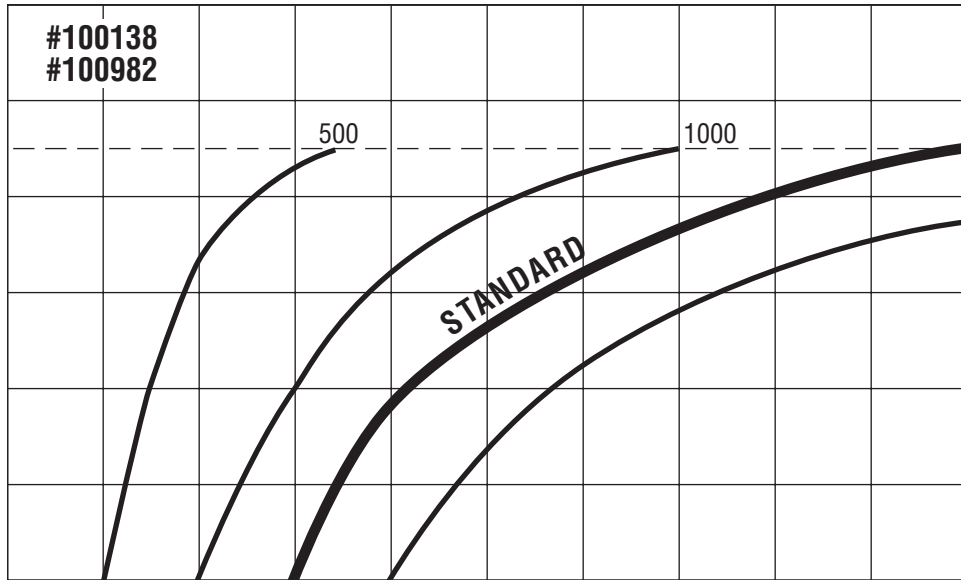


FIGURE 3

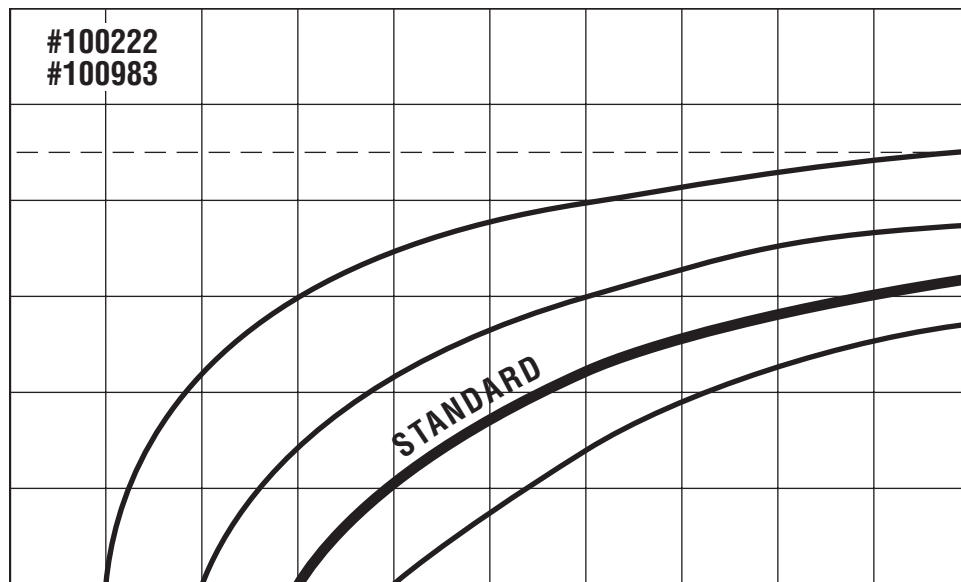


FIGURE 4

## EXAMPLE:

To help choose the best accumulator size and charge pressure level, the operating pressure range must be known.

Assume that a palletized machining fixture that will be isolated from the pressure source is to be pressurized to 3000 PSI. The minimum operating pressure of the fixture is 2500 PSI.

On the chart for accumulator #100222 below, find the 500 PSI charge pressure curve. Note that at 3000 PSI, the accumulator holds 4.0 cu. in. If the system bleeds down to the minimum allowable level, 2500 PSI, the accumulator would hold 3.8 cu. in.

This means that the accumulator, when pre-charged to 500 PSI, could supply .2 cubic inches (4.0 - 3.8) of hydraulic fluid to the system before the system pressure level fell beyond the minimum pressure level.

Using the same accumulator and increasing the charge pressure to 2000 PSI, the available fluid volume would be .6 cubic inches (1.4 - 0.8). This simple adjustment triples the amount of fluid that can escape from the system and still maintain the 2,500 PSI operating pressure of the fixture. It also decreases cycle times because less hydraulic fluid must be pumped into and drained from the accumulator during each cycle. See Figure 5.

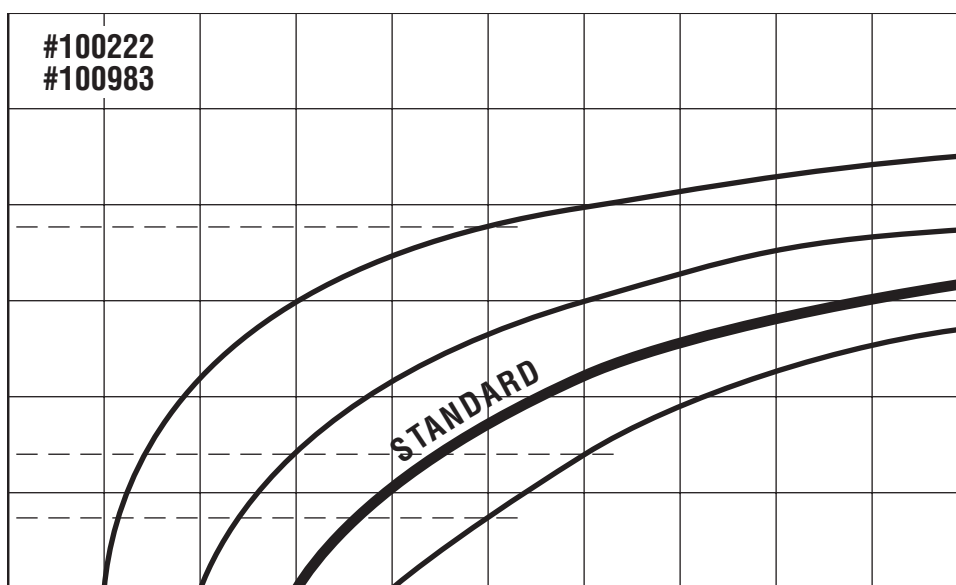


FIGURE 5

## NOTE:

**The volume of gas in this accumulator is very small. Checking the gas charge pressure by attaching a gauge and opening the gas valve is not recommended unless a source of pressurized nitrogen is available. Even the small amount of gas lost using this method may significantly alter accumulator performance.**

If desired, the charge pressure within the accumulator may be inspected without opening the gas valve by noting hydraulic performance.

For best results, isolate the accumulator from the rest of the hydraulic system.

Construct a test apparatus that can pressurize the accumulator and then release the pressure very slowly. A hand pump with a pressure gauge works well.

Hydraulically pressurize the accumulator to well above the suspected charge pressure. (Do not exceed the maximum pressure rating of the accumulator.)

Slowly release the pressure. The pressure should fall just fast enough so you can see the gauge needle move.

The pressure will continue to drop as the oil is forced out of the accumulator. When the hydraulic pressure falls to the charge pressure level, the accumulator will be empty and the gauge pressure will suddenly begin to fall much faster. The pressure indicated by the gauge when the speed change first occurs is the charge pressure.

## CHECKING THE PRE-CHARGE PRESSURE

Accumulators cannot maintain their charge pressure indefinitely and should be inspected regularly to maintain peak hydraulic system performance. Check the pre-charge pressure monthly.

## SETTING THE PRE-CHARGE PRESSURE

Construct an accumulator charging system (as shown in Figure 6) by using Hytec's #500149 Accumulator Charging Tool and an appropriate regulator, gauge, shut-off valve, hose and bleed valve.



**WARNING:** To help prevent personal injury,

- All components in this charging system must have working pressure ratings that exceed the maximum pressure of the nitrogen source.
- Do not attempt to use this procedure to inspect or modify the charge pressure of an accumulator which is hydraulically pressurized. During usage, the charge pressure can increase to as high as the maximum pressure of the hydraulic system and should not exceed the pressure rating of any of the supplied components in the system.

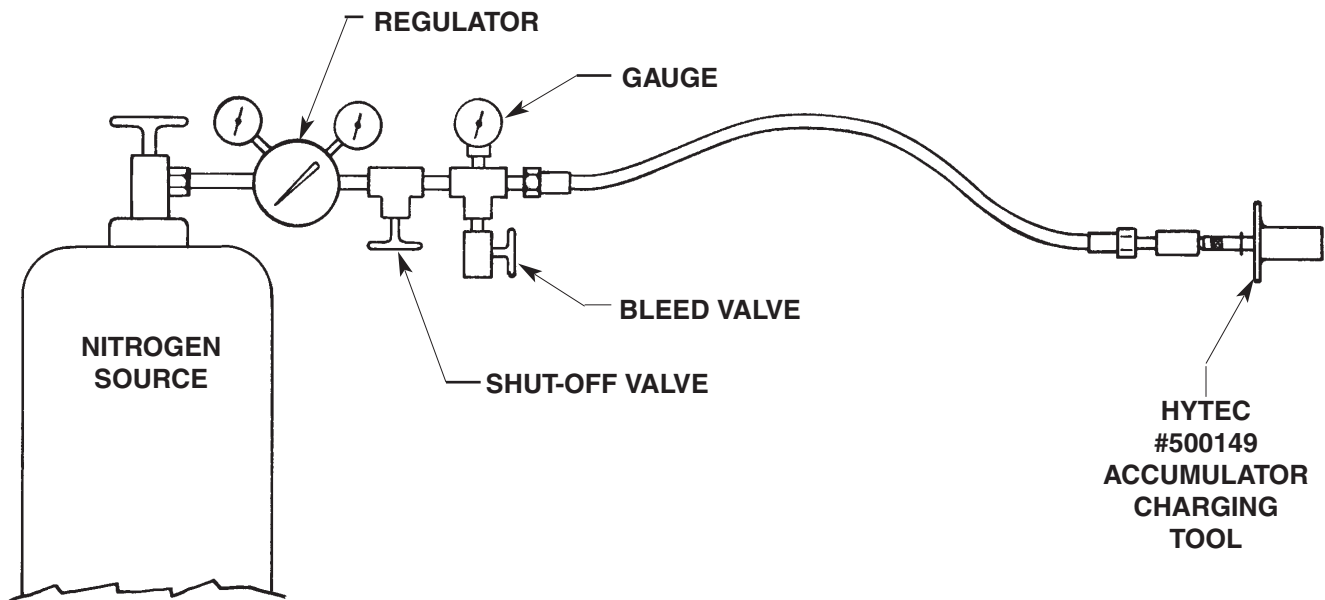


FIGURE 6

## TO INSPECT THE ACCUMULATOR CHARGE PRESSURE:

1. Release all hydraulic pressure from the inlet of the accumulator.
2. Remove guards or covers to provide access to the accumulator's charging valve.
3. Remove the cap from the accumulator's valve stem.
4. Thread the center shaft of accumulator charging tool over the valve stem on the accumulator valve. There is an o-ring seal at the bottom of the bore in the center shaft. **IMPORTANT: Do not overtighten.**
5. Close the bleed valve and the shut-off valve.
6. Use the T-handle on the #500149 accumulator charging tool to open the accumulator's valve by loosening its upper swivel hex. **Note: Careful to loosen the accumulator valve's upper swivel hex only.** The pressure gauge will now read the current charge pressure.
7. If no change is required, close the accumulator's valve with the T-handle.
8. Open the bleed valve to allow the pressure in the charging system to exhaust.
9. Remove the accumulator charging tool from the accumulator.
10. Replace the valve stem cover.
11. Replace all guards or covers removed earlier.

## TO DECREASE THE ACCUMULATOR CHARGE PRESSURE:

Complete steps 1-6 above.

7. To decrease the charge pressure, slowly open the bleed valve until the pressure has decreased to the desired level.
8. Close the bleed valve.
9. Close the accumulator's valve with the T-handle.
10. Open the bleed valve to allow the pressure in the charging system to exhaust.
11. Remove the accumulator charging tool from the accumulator.
12. Replace the valve stem cover.
13. Replace all guards or covers removed earlier.

**Note: If an accumulator's charge pressure has increased from its original setting (at equal temperatures), it is an indication that hydraulic oil may have built up in the gas side of the accumulator. This oil should be drained and the accumulator repaired before it is returned to service. Even if there is no visible wear or damage to the accumulator piston seals, this condition can be caused by the rapid release of the hydraulic pressure in the accumulator, allowing the seals to "hydroplane". This can be solved by slowing the release of the hydraulic pressure in the accumulator. Hytec has valves designed specifically for this purpose. Contact the factory for more information.**

## TO INCREASE THE ACCUMULATOR CHARGE PRESSURE:

Complete steps 1-6 above.

7. Open the main valve on the top of the nitrogen bottle.
8. Adjust the regulator to the desired pressure.
9. Open the shut-off valve to allow nitrogen flow into the accumulator.
10. Once the pressures at the regulator and the charging system have equalized, close the accumulator's valve with the T-handle.
11. Close the main valve on the top of the nitrogen bottle.
12. Open the bleed valve to allow the pressure (in the charging system) to exhaust.
13. Remove the accumulator charging tool from the accumulator.
14. Replace the valve stem cover.
15. Replace all guards or covers removed earlier.