

# Hydraulic Piston Accumulators

## Maintenance Instructions



### Installation

All accumulators shipped from the factory will be pre-charged to a nominal pressure in order to seat the piston on the hydraulic cap. In this case the precharge will not be listed on the label. However, in some cases they will be shipped with a nitrogen charge, the value of which will be marked on the label/nameplate.

Keep the hydraulic port covered to keep out foreign material until ready to make the hydraulic connections.

The accumulator can be mounted in any orientation. However, it should be rigidly mounted using any combination of the mounting holes provided at the hydraulic cap or proper clamps. The hydraulic circuit, which contains a connection to the accumulator should be designed so that it automatically discharges all hydraulic fluid from the accumulator when the equipment is turned off.

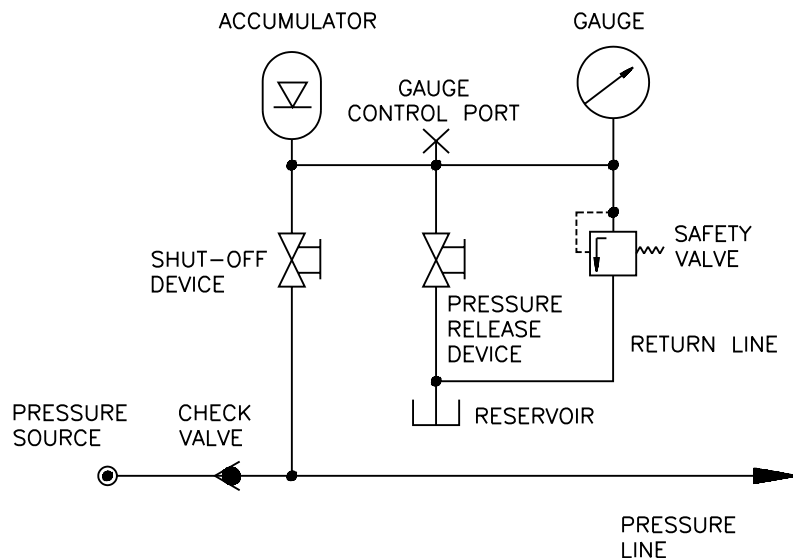
**Installation**

Most accumulators shipped from the factory will not be pre-charged. However, in some cases they will be shipped with some amount of nitrogen charge, the value of which will be stamped on the nameplate.

Keep the hydraulic port covered to keep out foreign material until ready to make the hydraulic connections.

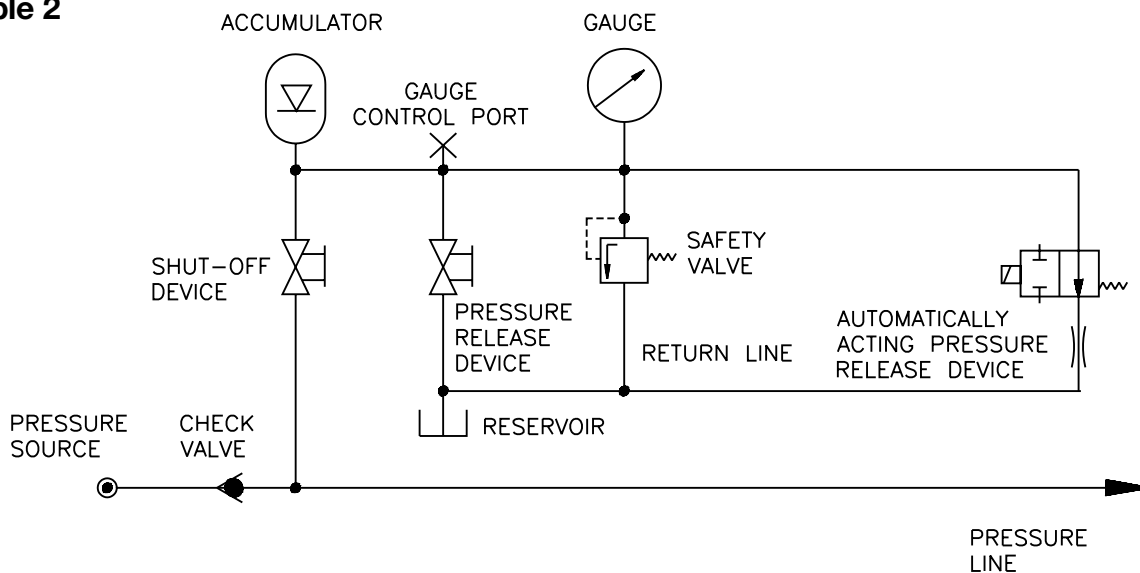
The accumulator can be mounted in any orientation; vertically mounted with hydraulic port down is preferred. However, it should be rigidly mounted using any combination of the mounting holes provided at the hydraulic cap or proper clamps. The hydraulic circuit, which contains a connection to the accumulator should be designed so that it automatically discharges all hydraulic fluid from the accumulator when the equipment is turned off.

**Example 1**



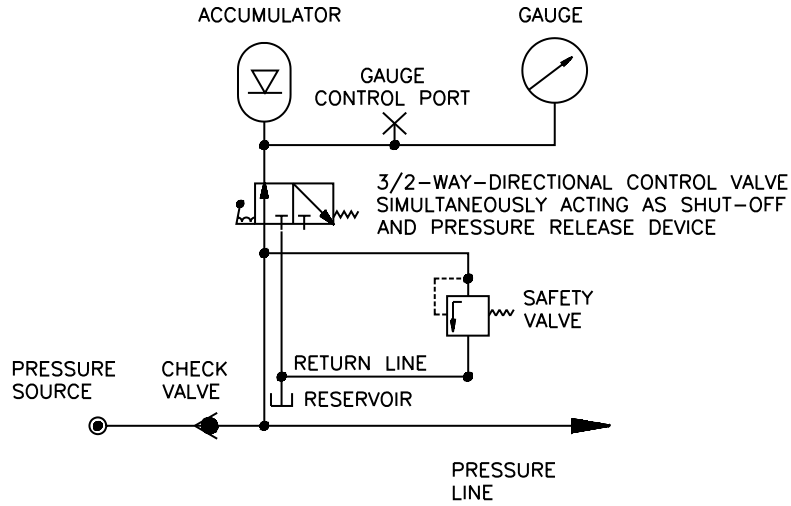
Basic safety equipment for a single accumulator with permanently connected safety valve and gauge, gauge control port, manually operated shut-off device, pressure release device and return line to the reservoir. Safety components may be connected by lines and/or installed in a safety block. The accumulator must always be protected with sufficient discharge capacity. If a check valve prevents flow back to the pressure source (pump), a shut-off device is not required for safety reasons but may be appropriate for service and maintenance.

**Example 2**



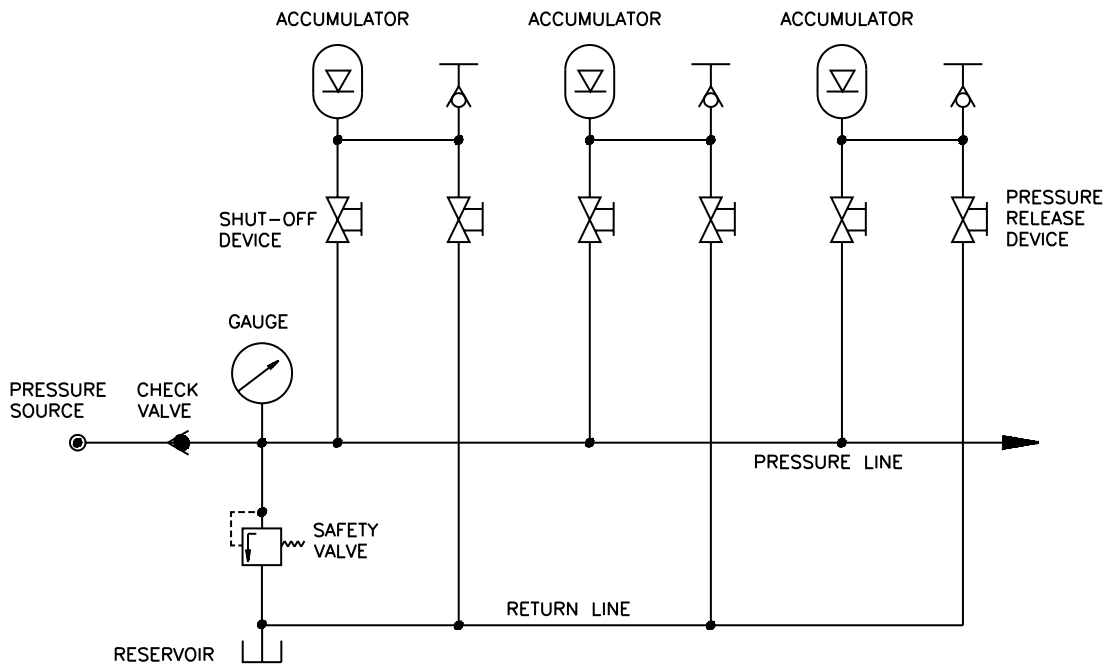
Configuration with additional pressure release device which opens automatically in the case of circuit break down.

**Example 3**



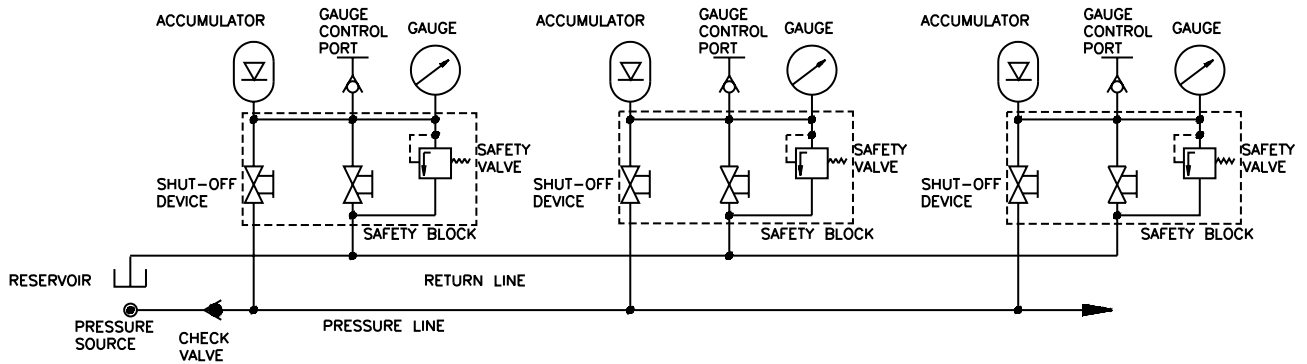
Configuration with a 3/2-way-directional-control which simultaneously serves to isolate the accumulator from the pressure line and release pressure to the return line. The safety valve is permanently communicating with the pressure line, therefore also protecting the circuit. The accumulator is either protected by the safety valve or connected to the return line.

**Example 4**



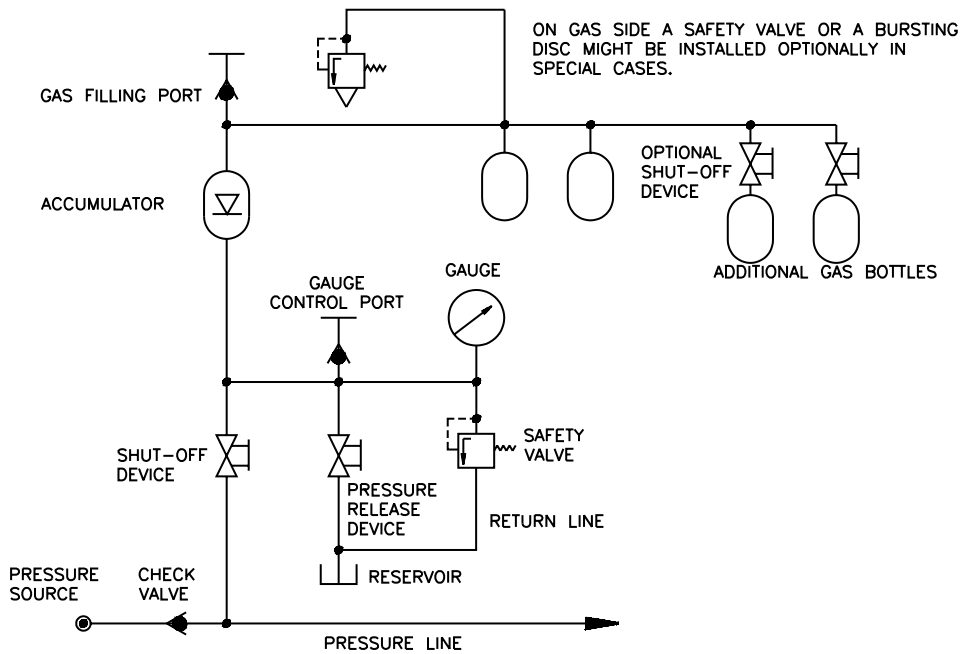
The above configuration shows a group of several accumulators connected with a single pressure line which is permanently connected with a gauge and a safety valve. Each individual accumulator may be isolated from the pressure line by a shut-off device and released by a pressure device to a return line for maintenance purposes. An external control gauge connected to a quick coupling allows observation of the pressure at the fluid port of each individual accumulator.

**Example 5**



Configuration similar to example 1 but with several accumulators each equipped with a safety block. Each safety block includes a safety valve, shut-off device, pressure release device and ports for the pressure line, the return line, gauge, control gauge and the accumulator itself. This configuration meets all safety requirements even for several pressure sources.

**Example 6**



Configuration for a transfer type accumulator with additional gas bottles. Safety equipment for filling procedures is not shown.

### Pre-Charging

Use an inert gas such as nitrogen for pre-charging piston accumulators. Do not use oxygen or shop air.

If water pumped nitrogen is not available, oil-pumped nitrogen may be used. (C.G.A. standards: Nitrogen gas bottles for water pumped nitrogen has a right-hand valve thread which requires charging and gauging assembly

†144595XX00 for units up to 3000 PSI. Oil-pumped nitrogen requires a left-handed valve thread (use †144596XX00). For all 3000 PSI rated accumulators, use assembly

†144595XX00 (Figure 1). For accumulators rated over 3000 PSI and the precharge requirement is above 2300 PSI, use †870816XX00 (See Figure 3).

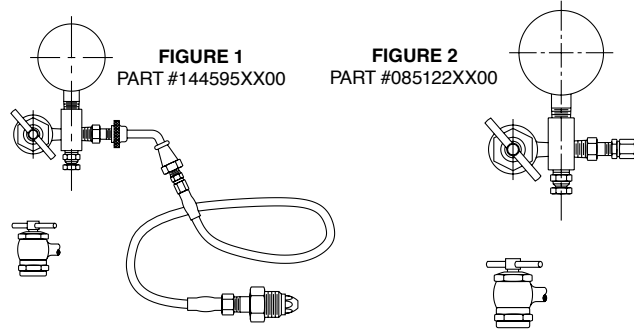
If equipment other than the above listed is used, make sure it is compatible with the gas valve assembly. Nitrogen source and all components must be rated for a pressure at least as high as the nitrogen source. **It is strongly recommended that the nitrogen bottle used have the appropriate pressure high pressure regulator (not included).**

Make sure nitrogen supply is shut off. Attach hose to nitrogen bottle. If accumulator has a gas valve as shown in Figure 5 follow steps A through L and skip steps F and J. If accumulator has a gas valve as shown in Figure 6, follow steps A through L and skip steps E and I.

#### Accumulator having gas valve as per Figure 5.

- (A) Remove gas valve guard and gas valve cap.
- (B) Back gas chuck "T" handle all the way out (counter clockwise) before attaching charging assembly to accumulator gas valve.
- (C) Close bleed valve.
- (D) Making sure not to loop or twist the hose, attach swivel nut to gas valve and tighten (10-15 in. lb.) (11.5-17 cm kg).
- (E) Turn gas chuck "T" handle until the gauge starts showing the pressure in the accumulator. Do not turn the "T" handle all the way down, as it will dam age the valve core.
- (F) **For gas valves as shown in Figure 6**, hold gas valve at point "C" with one (1) wrench while un screwing hex nut at point "D" with a second wrench. This will open the poppet inside the gas valve. Note: Three (3) turns will fully open the valve.
- (G) Crack open nitrogen bottle valve and **slowly** fill accumulator. Shut off when gauge indicates desired pre-charge.
- (H) Let the pre-charge set for 10 to 15 minutes. This will allow the gas temperature to stabilize. If the desired pre-charge is exceeded, close nitrogen bottle valve, then slowly open bleed valve (Figure 1). Do not reduce pre-charge by depressing valve core with a foreign object. High pressure may rupture rubber valve seat.
- (I) When finished pre-charging accumulator, turn "T" handle all the way out on gas chuck (Figure 1), then open bleed valve.
- (J) **For gas valves as shown in Figure 6**, with a wrench, tighten hex nut at point "D" to close internal poppet (5-8 ft. lbs.) (5.7-9.2 cm kg).
- (K) Hold gas valve to keep from turning, loosen swivel nut, remove assembly. Check for precharge leak using a common leak reactant.
- (L) Replace gas valve cap (10-15 in. lbs.) (11.5-17 cm kg) and valve guard. (Gas valve cap serves as a secondary seal.)

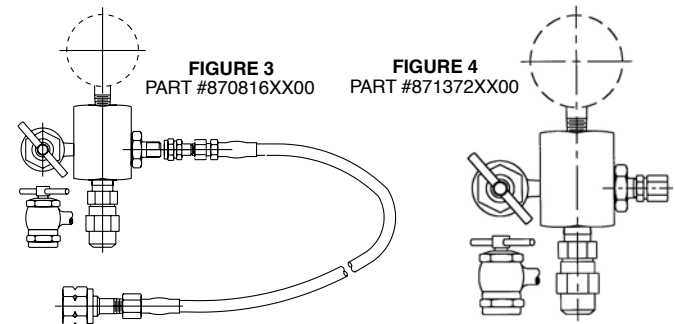
† "XX" Denotes to gauge pressure.



#### 3000 PSI UNITS

Part Number	Charging and Gauging Assembly for Cored Accumulators
144595 XX00 (Std) (Right-Hand)	Charging and Gauging Assembly consists of 10' charging hose with standard right-hand thread nitrogen fittings adapter incorporating gas valve, bleeder valve and gas chuck (less gauge). For left-hand thread nitrogen bottle fitting, specify part number 144596XX00.

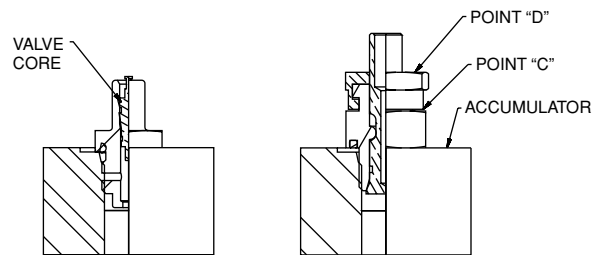
Part Number	Gauging Assembly for Cored Accumulators
085122XX00	Gauging device consisting of adapter incorporating gas valve, bleeder valve and gas chuck (less gauge).



#### 5000 PSI UNITS

Part Number	Charging and Gauging Assembly for 5000 PSI
870816XX00	Charging and Gauging Assembly consists of 10' charging hose with standard right-hand thread nitrogen fittings (1.035-14 NGO female) adapter incorporating gas valve, bleeder valve and gas chuck (less gauge).

Part Number	Gauging Assembly for 5000 PSI
871372XX00	Gauging device consisting of adapter incorporating gas valve, bleeder valve and gas chuck (less gauge).



**FIGURE 5**  
 Part #L07471000\* Gas Valve with medium pressure core for 3000 psi service, and Part #L07688000\* Gas Valve with high pressure core for 5000 psi service.

**FIGURE 6**  
 Part #L07689000\* Gas Valve with poppet for ASME units 7, 9, 12 bore and some 5000 psi units.

**Maintenance**

Repair Kits (see Parts List) are available for all accumulator models. When ordering repair kits, state complete model number from nameplate. Also specify fluid and temperature at which used.

Occasional replacement of V-o-ring seal on the piston is generally the only maintenance required. Replacement of other seals on end caps and gas valve is recommended (see Kit Numbers).

Periodic checking of pre-charge pressure will detect whether V-o-ring wear is sufficient to begin reducing sealing performance. If pre-charge is low, also check for gas valve and/or end seal leakage. Allowing for temperature difference, if any, from time of its pressure checking, pre-charge pressure will rise if oil gathers in the gas side and will fall if gas leaks into the oil side or out past gas end seals. It is suggested that a check be made a week after installation, and thereafter once a month.

**Pre-charge Checking Procedure**

Using appropriate valve in the hydraulic system, discharge all oil from accumulator and allow piston to bottom against hydraulic end cap.

For accumulators rated for 3000 PSI or less, with cored gas valve, use gauging assembly as shown in Figure 2 (Part #085122XX00). For accumulators rated over 3000 PSI up to 5000 PSI, use assembly as shown in Figure 4 (Part #871247XX00).

**Accumulators having gas valve as per Figure 5.**

- (1) Remove gas valve guard and gas valve cap.
- (2) Back gas chuck "T" handle all the way out (counter clockwise) before attaching charging assembly to accumulator gas valve.
- (3) Close bleed valve.
- (4) Attach swivel nut to gas valve and tighten (10-15 in. lb.) (11.5-17 cm kg).
- (5) Turn gas chuck "T" handle until the gauge starts showing the pressure in the accumulator. Do not turn the "T" handle all the way down, as it will damage the valve core.
- (6) To remove gauging assembly turn "T" handle all the way out on gas chuck (Figure 1), then open bleed valve to relieve residual gas charge in the gauging assembly.
- (7) Hold gas valve from turning, loosen swivel nut, remove assembly.
- (8) Replace gas valve cap (10-15 in. lbs.) (11.5-17 cm kg) and valve guard.

**Accumulators having gas valve as per Figure 6.**

- (9) Remove gas valve guard and gas valve cap.
- (10) Close bleed valve.
- (11) Attach swivel nut to gas valve and tighten (10-15 in. lb.) (11.5-17 cm kg).
- (12) Hold gas valve at point "C" with one (1) wrench while unscrewing hex nut at point "D" with a second wrench. This will open the poppet inside the gas valve. Turn 23 times and read pre-charge. Note: Three (3) turns will fully open the valve.

- (13) With a wrench, tighten hex nut at point "D" to close internal poppet (5-8 ft. lbs.) (5.7-9.2 cm kg) then open bleed valve to relieve residual gas charge in the gauging assembly.

- (14) Hold gas valve at point "C" with wrench and remove swivel nut assembly.

- (15) Replace gas valve cap and tighten (10-15 in. lb.) (11.5-17 cm kg), and install gas valve guard.

**Remove from Hydraulic System**

Shut equipment down and make certain that hydraulic pressure at the accumulator is at zero. At this point the piston will be bottomed at the hydraulic end.

**For accumulators having gas valve as shown in Figure 5,** attach gauging assembly as shown in Figure 2 following Steps 1 through 5. Then, open bleed valve until all gas pre-charge is relieved from accumulator. **Then remove gauging assembly and gas valve.**

**For accumulators having gas valve as shown in Figure 6,** remove gas valve guard and gas valve cap. Then hold valve at point "C" with one (1) wrench while unscrewing hex nut at point "D" with a second wrench. Wait until all gas pre-charge is relieved from the accumulator and **then remove gas valve.**

Remove accumulator from hydraulic system. Threaded holes in hydraulic cap may be used as a means of attachment for lifting, or use a sling around the body.

**Disassembly of Accumulator**

Once the gas valve is removed - lay the accumulator horizontal and hold down with a strap wrench or in a vise. Some accumulators may have both end caps threaded into the body and some units may only have the gas cap threaded into the body. **IN BOTH CASES ALWAYS REMOVE THE GAS CAP FIRST** (end cap which contained gas valve). To remove cap or caps, install three (3) pins into the holes in the cap, then, using a long bar working against the pins, unthread the cap from the body. Remove o-rings and back-up rings from end cap.

Remove piston by pushing from hydraulic end with a bar. **NEVER TRY TO REMOVE PISTON BY APPLYING COMPRESSED AIR AT OPPOSITE END.** To remove V-o-ring from piston, lift seal with O-ring pick or similar tool, moving the tool around the piston several times while using the other hand to work ring off the piston.

**Cleaning**

Thoroughly clean metal parts in solvent and dry with compressed air. Clean bore of body with a clean, lint-free cloth soaked in clean solvent. Bore must be clean of any visible particles or particles detectable to touch.

**Inspection**

Inspect piston for cracks, burrs around o-ring grooves, or damage. Examine body bore, using a light, for scratches or scoring. Inspect end caps for damaged threads or burrs on o-ring grooves.

**Repair and Replacement**

Minor nicks, scratches or light scoring of the body bore can be removed by using crocus cloth. Dress bore until all apparent imperfections have been removed. Replace PTFE wear rings, V-o-rings, o-rings and their respective back-up washers if the original assembly contained them.

### Reassembly

Coat all internal parts with clean hydraulic fluid before reassembly.

It is highly recommended to use a piston starting sleeve for reassembly of piston accumulators. Call the factory for price and delivery. Starting sleeve dimensions are shown below. Insert the piston in the starting sleeve with the dished side of the piston toward the gas end. Insert the starting sleeve in the accumulator tube until it rests square on the tube.

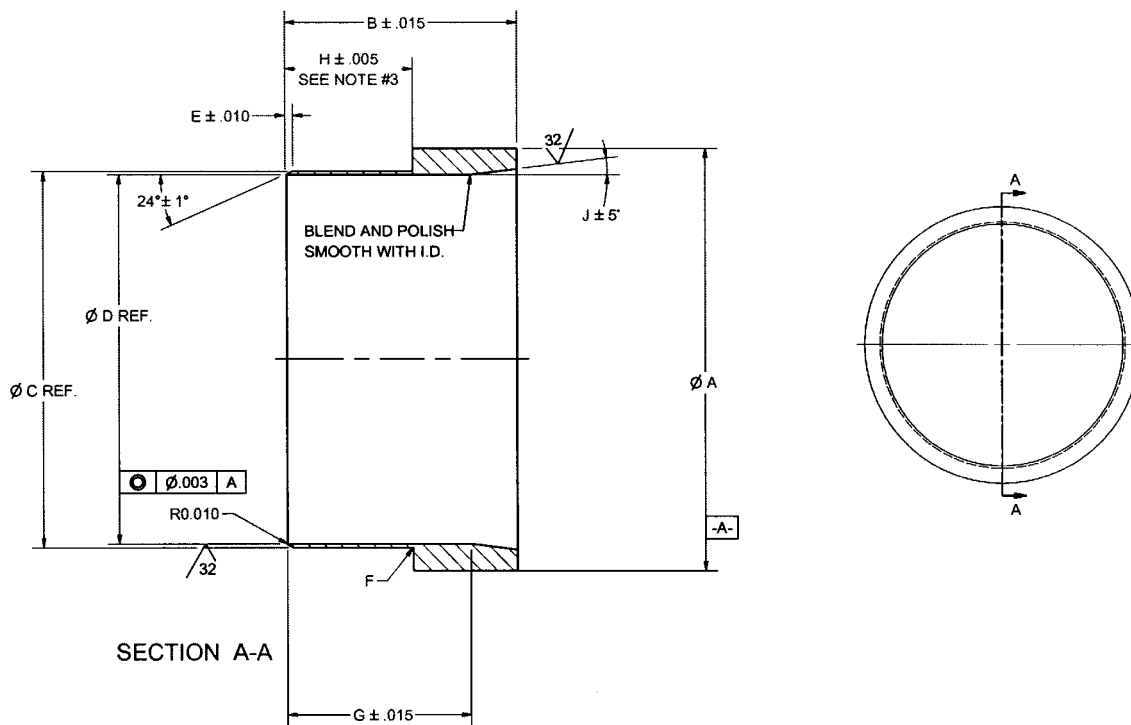
Use hammer and a brass rod to tap piston into place until all of piston is 2 inches below beginning of honed bore.

Install new back-up ring first, then a new o-ring on threaded end cap or caps and install into body bore. Care should be exercised not to drag o-ring over threads. End cap will stop against chamfer leading into honed bore (all caps must be tightened to proper torque as per following chart). Cap should be above the end of accumulator body within 1/32" to 3/32".

BORE SIZE	ASSEMBLY TORQUE Ft. Lb.
2	50+ 5.0
3	90+ 7.0
4	160+ 10.0
6	220+ 15.0
7	390+ 25.0
8	390+ 25.0
9	390+ 25.0
12	390+ 25.0

Install gas valve after replacing the o-ring.

Remount accumulator and connect to hydraulic system. Pre-charge accumulator to desired precharge pressure (where space is a problem it may be necessary to pre-charge accumulator before connecting it to the hydraulic system).



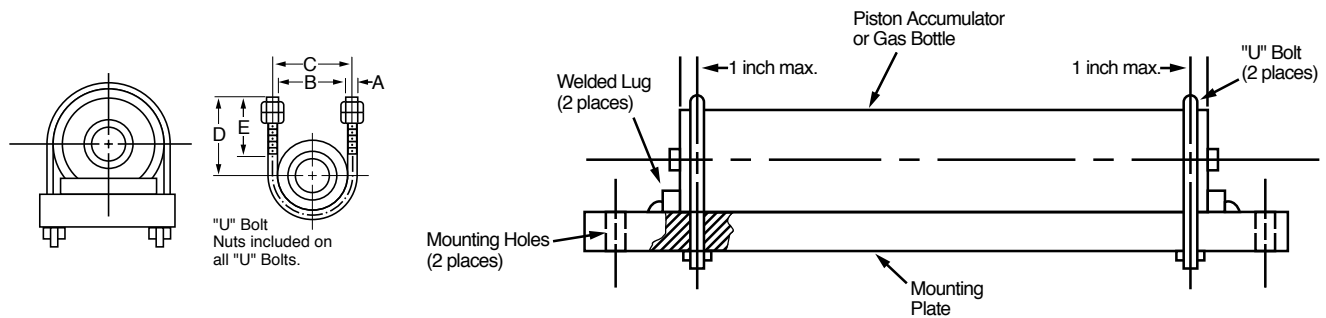
PARTS LIST											
PART NUMBER	A	B	C	D	E	F	G	H	J	SERVICE	BORE SIZE
PSD0000002	2.375	2.375	2.110	2.025	.100	.030	1.375	1.032	7	3K,4K,5K	2
PSD0000003	3.560	2.750	3.110	3.000	.131	.030	1.750	1.312	7	3K,4K,5K	3
PSD0000004	4.750	3.250	4.110	4.030	.089	.030	2.250	1.375	7	3K	4
PSD0000005	6.000	3.500	5.112	5.002	.124	.030	2.500	1.620	7	3K	5
PSD0000006	6.875	4.375	5.864	5.782	.104	.030	3.375	1.562	7	3K	6
PSD0000007	8.250	5.000	7.150	7.001	.173	.030	4.000	2.312	7	3K	7
PSD0000009	11.000	5.500	9.150	9.001	.174	.030	4.000	2.562	7	3K	9
PSD0000012	14.375	6.375	12.105	11.876	.268	.030	4.875	3.634	7	3K	12

**“U” Bolts for Piston-Type Accumulators**

Accumulator Models (2000 3000)	Part Number and Dimensions							
Piston Bore	“U” Bolt Part Number	A	B	C	D	E	THD	Weight LBS
A2	0854370000	0.250	2.438	2.688	2.688	1.750	1/4-20	0.20
A3	0862090000	0.500	3.688	4.063	3.625	2.000	3/8-16	0.90
A4	0864960000	0.500	5.000	5.500	4.500	3.000	1/2-13	1.30
A6	0864970000	0.625	7.125	7.750	6.125	3.750	5/8-11	2.50
A7	0854400000	0.625	8.250	8.875	7.000	3.750	5/8-11	3.00
A9	0854410000	0.750	11.250	12.000	9.500	4.500	3/4-10	6.00
A12 (2K)	0854420000	0.875	14.125	15.000	10.250	4.250	7/8-9	8.20
A12 (3K)	0865610000	0.875	14.500	15.375	10.625	4.250	7/8-9	8.30

**Notes:**

- 1) Accumulators should be mounted within 20° from vertical for optimal performance.
- 2) “U” Bolts should never be mounted more than 1 inch from end of accumulator.





## Accumulator Sizing and Selection Software

Parker offers leading edge application assistance, in the form of the InPHorm Accumulator Sizing and Selection Software or visit [www.parker.com/accumulator](http://www.parker.com/accumulator) for more information. For further engineering assistance, contact Parker's Accumulator Technical Support Group at (815) 636-4100.

## Accumulator Seals

Piston accumulators are available for use with many operating medias. Fluid should be a non-dangerous liquid as well as precharged with an inert gas such as nitrogen. Available seal compounds are shown in the table below:

Seal Code	Polymer	**Recommended Operating Temperature Range	Maximum Temperature with Reduced Life	General Application and Compatibility*
K	Buna Nitrile	-20°F to 165°F -29°C to 74°C	200°F 93°C	Parker's Standard Compound – Compatible with most mineral oil-based fluids
E	Fluorocarbon Elastomer	-10°F to 250°F -23°C to 121°C	400°F 204°C	Compatible with most mineral oil-based fluids at higher temperatures and some exotic fluids
D	Ethylene Propylene	-40°F to 250°F -40°C to 121°C	300°F 149°C	Compatible with most phosphate ester fluids and some synthetic fluids
H	Hydrogenated Nitrile	-25°F to 320°F -32°C to 160°C	350°F 177°C	Compatible with most oil-based and biodegradable fluids, maintains sealing effectiveness at a wide range of temperatures
Q	Low Temp. Nitrile	-45°F to 160°F -43°C to 71°C	200°F 93°C	Compatible with most mineral oil-based fluids and maintains sealing effectiveness at low temperatures

\*Consult local distributor or factory for fluid compatibility information. Temperature ranges may vary depending upon fluid used in hydraulic system.

\*\*The temperature listed indicates the operating temperature range of the seals, not the accumulator.

## Water Service Option (W)

Piston accumulators are available for use with water as the fluid media. Modifications include electroless nickel plating all surfaces and metal parts. Consult factory for details.

### Corrosive Fluids and Enviromentments

Standard piston accumulators are not designed for corrosive fluids and enviromentments. Consult factory for special options for these types of fluids and enviromentments.

## Accumulator Storage

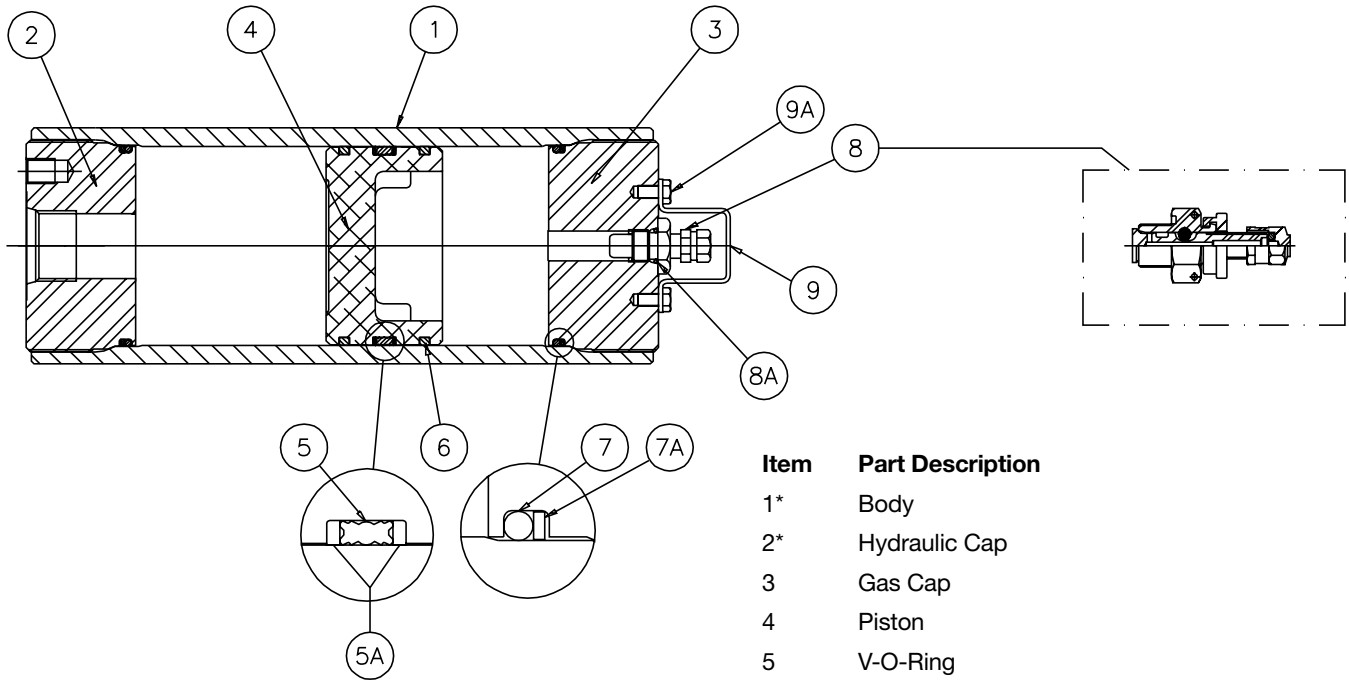
In order to prepare a piston accumulator for proper storage for future use, the piston must be moved off the hydraulic cap by as much as 2 inches. Proceed by pouring 10 to 150 cubic inches (depending on the size of accumulator) of the system fluid through the hydraulic port in the accumulator end and plug the port using a stainless steel fitting, then pre-charge the unit with nitrogen to 100±10 psig to allow equal pressure on both sides of the seal.

The pre-charge should be bled off and the system fluid in the accumulator must be drained prior to installation of the piston accumulator on the system.

It is also recommended that the units be stored in a vertical position to prevent the seals from developing a set (flat spot) on the side that the piston weight is exerted.

The piston accumulator should be stored in a cool, dry place away from sun, ultraviolet and fluorescent lights as well as electrical equipment. Direct sunlight or fluorescent light can cause the seals to weather check and dry rot, which appear on the seal and o-ring surface as cracks. The ideal temperature for storage is 70°F.

**Parts List – Hydraulic Accumulators**



**Item Part Description**

- 1\* Body
- 2\* Hydraulic Cap
- 3 Gas Cap
- 4 Piston
- 5 V-O-Ring
- 5A V-O-Ring Back-Up Washers
- 6 PTFE Ring (Piston)
- 7 O-Ring
- 7A O-Ring Back-Up Washer
- 8▲ Gas Valve
- 8A Gas Valve O-Ring
- 9 Gas Valve Guard
- 9A Screw

\*Some units may have these two components welded together.

▲A.S.M.E. Units, 7", 9" and 12" bore sizes, and some units rated above 3000 PSI will have valve per Figure 6 (Part No. L07689000\*). Other units will have gas valve per Figure 5 (Part No. L07471000\*) which will contain gas valve core Part No. 5822220000. Use tool (Part No. 5824410000) to remove and replace new core.

**Seal Kit Numbers (Includes items 5, 5A, 6, 7, 7A, 8A)**

Material	Bore Size						
	2"	3"	4"	6"	7"	9"	12"
Buna-N (Std.)	RK0200K000	RK0300K000	RK0400K000	RK0600K000	RK0700K000	RK0900K000	RK1200K000
Fluorocarbon	RK0200E000	RK0300E000	RK0400E000	RK0600E000	RK0700E000	RK0900E000	RK1200E000
EPR	RK0200D000	RK0300D000	RK0400D000	RK0600D000	RK0700D000	RK0900D000	C.F.*
Hydrogenated Nitrile	RK0200H000	RK0300H000	RK0400H000	RK0600H000	RK0700H000	C.F.*	C.F.*
Low Temp Nitrile	RK0200Q000	RK0300Q000	RK0400Q000	RK0600Q000	RK0700Q000	RK0900Q000	C.F.

\*C.F. = Consult Factory

