BLADDER PRODUCTS

Bladder Accumulators

- Bottom Repairable
- Top Repairable
- Medium Flow
- High Flow
- Transfer Barrier
- Gas Bottle

Features:

- Operating Pressures to 6600 PSI
- Ten Different Capacities from 10 cu in to 15 gallons
- Nine Different Configurations
- Highest Quality In-House Manufactured Bladders
- ASME Certification Standard, 1 Gallon & Up
- Water/Chemical Service Available, with Stainless Steel Ports
- Six Bladder Compounds to Suit a Variety of Fluids & Temperatures
- CE Marking Available

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Bladder accumulators provide a means of regulating the performance of a hydraulic system. They are suitable for storing energy under pressure, absorbing hydraulic shocks, and dampening pump pulsation and flow fluctuations. Bladder accumulators provide excellent gas and fluid separation ensuring dependable performance, maximum efficiency, and long service life.

Why Use Bladder Accumulators?

- improves system efficiency
- supplements pump flow
- supplies power in emergency
- compensates for leakage
- absorbs hydraulic shocks
- very contaminant tolerant
- universal application
- high/low temperature tolerance
- safety, can't disassemble under pressure
- very quick response
- works well with water, low lubricity fluids
- wide range of compounds for a variety of fluids

Greer Bladder Products… The Original and still the Best!

The Greer bladder style accumulator is the industry's original, and still the best! For years this style of accumulator has served both the industrial and mobile hydraulic markets, providing a proven design for many hydraulic system applications.

The Greer bladder product line offers the broadest line of quality products, including:

- 3000 & 5000 PSI Bottom Repairable
- 3000 & 5000 PSI Top Repairable
- 3000 PSI Medium Flow
- 3000 PSI High Flow
- 3000 PSI Transfer Barrier
- 3000 & 5000 PSI Gas Bottles
- A Wide Array of Options and Accessories

Greer bladder products maintain the highest quality because of our **in-house** bladder molding operations. The heart of the bladder accumulator is the actual bladder, and all Greer bladders are engineered and manufactured in our own facility and subjected to our own high quality inspection standards. For your convenience, the latest in accumulator sizing technology is available with the *inPHorm Accumulator Sizing and Selection Software.*

Specifications

Materials

- Shell – high strength alloy steel (SA372, all sizes comply with ASME material specifications, 1 gal. & larger supplied with ASME Certification as standard)
- Ports – all oil service ports, high strength alloy steel
  – water & chemical service:
  3000 psi, 304 stainless steel
  5000 psi, 17-4 PH stainless steel
- Poppet & Spring – 304 stainless steel
- Gas Valve Cartridge – stainless steel
- Gas Valve Protector – steel
- Gas Valve Stem – steel
- Bladders – various polymers, see Standard and Optional Bladders.

Maximum Flow Rates

Size (gallon)	Max. Recommended Flow for Standard Mineral Oils	
	GPM	LPM
10 cu in	23	87
1 pt & 1 qt	40	151
150 cu in	60	227
1	150	568
2½ thru 15	220	833
2½ thru 15, Medium Flow	480	1819
2½ thru 15, High Flow	600	2271

Pressure Ratings – 3000 and 5000 psi bladder accumulators are rated at minimum 4 to 1 design factors as standard. 4000 and 6600 psi (ASME Appendix 22) bladder accumulators are available as an option at minimum 3 to 1 design factors. For pressures over 6600 psi, consult the factory.

Max. Recommended Compression Ratio (max. working pressure/precharge pressure): 4 to 1.

Certifications – ASME Certification (Section VIII-Div. 1) is available as standard on bladder accumulators (1 gallon & up) and ASME Appendix 22 Certification as an option. See page 3 for a complete certification summary.

Size	Std. ASME Cert.			ASME Appendix 22	
	Status	Rating	D.F.*	Rating	D.F.*
10 thru 150 in³ 3000 PSI	Option	3000 PSI	4 to 1	Consult Factory	
1 thru 15 gal. 3000 PSI	Std.	3000 PSI	4 to 1	4000 PSI	3 to 1
1 thru 15 gal. 5000 PSI	Std.	5000 PSI	4 to 1	6600 PSI	3 to 1

***Note:** D.F. = Design Factor.

Fluids – Greer bladder accumulators are compatible with a wide variety of fluids. The standard accumulator may be used with petroleum-based industrial or water-based flame resistant fluids. Bladders compatible with most industrial fluids can be furnished on special orders with temperature ranges from -40°F to 250°F (-40°C to 121°C).

Precharge – Units are shipped with a nominal nitrogen precharge as standard. For specific precharge pressures, specify at the time of order.

Available Options – a wide variety of options are available on Greer bladder accumulators including:

- Bladder Compounds (see Standard and Optional Bladders in this section).
- Ports (see Options in this section)
- Port Adapters (see Accumulator Accessories)
- Water & Chemical Service (see Options in this section)
- Gas Valves (see Options in this section)
- Fuse Plugs Assemblies (see Options in this section)
- Fixed Gauge Adapters (see Accumulator Accessories)

1 Shell

Bladder accumulator shells are made from chrome-molybdenum alloy steel (SA372) with forged ends. All sizes comply with ASME material and design specifications. One gallon and larger supplied with ASME Certification as standard.

2 Bladder

Greer bladders, the heart and soul of a bladder accumulator, are manufactured in-house to control the material blending, molding, critical seam assembly, and curing processes. It is widely accepted that Greer bladders are the highest quality bladders in the industry. Bladders are offered in six different standard compounds to suit a wide variety of fluids and operating temperatures. Special compounds are available for unusual or severe applications.

3 Bladder Stems

All bladder accumulators, sizes 1 gallon and larger, are fitted as standard with two-piece bladder stems with replaceable gas valve cartridge for ease of serviceability. Also, the two-piece stem will accept high pressure military gas valves and permanent mount gauge adapters.

4 Port Assemblies

Standard oil service ports are made from high-strength alloy steel for maximum durability. Chemical and water service port assemblies are made from stainless steel for maximum corrosion resistance.

5 Fluid Ports

SAE straight thread, NPTF, SAE Code 61 and SAE Code 62 4-bolt split flange, and High-Flow ports are available. See page 75 for details. Bleed ports are included as standard on sizes 1 gallon and larger; not available on flange ports.

6 Top Repairable

The top repairable design permits easy checking and maintenance of the bladder without removing the accumulator from the service line, saving time and money.

7 Gas Valve

All accumulators are fitted with a gas valve for ease of gas precharging. One-gallon and larger 3000 psi units are equipped with a cored gas valve cartridge (ISO-4570-8V1) for ease of maintenance. 5000 psi units are equipped with a high pressure cored gas valve cartridge (ISO-4570-8V1) with an option of a poppet-type (military) gas valve cartridge (Mil. Spec MS28889-2). For safety, the gas valve vents if unscrewed.

The simplicity and cost effectiveness of the bottom repairable design has made it the “Industry Standard” bladder accumulator. Sizes range from 10 cu in to 15 gallons.

3000 PSI (207 Bar)[1]

Models	Nominal Size Gallon (Liters)	Gas Volume cu in (Liters)	Dimensions, inch (mm)							Hydraulic Ports		Weight
Oil Service Water Service			A	B	C	D	E	F	G	H (Thread)	I (Thread)	lbs. (Kg.)
BAC10B3T01A1 BAC10B3T01WA1	10 cu in (0.16)	12 (0.21)	11.18 (284)	1.56 (40)	2.25 (57)	1.03 (26)	0.94 (24)	7.75 (197)	0.94 (24)	SAE#8 (3/4 - 16)	N/A	3.5 (1.6)
BA001B3T01A1 BA001B3T01WA1	1 Pt. (0.47)	31 (0.51)	10.75 (273)	2.00 (51)	3.40 (86)	1.39 (35)	1.31 (33)	6.87 (174)	0.94 (24)	SAE #12 (1-1/16 - 12)	N/A	8 (3.6)
BA002B3T01A1 BA002B3T01WA1	1 Qt. (0.95)	66 (1.08)	11.12 (282)	2.00 (51)	4.50 (114)	1.62 (41)	1.50 (38)	7.63 (194)	0.94 (24)	SAE #12 (1-1/16 - 12)	N/A	10 (4.5)
BA005B3T01A1 BA005B3T01WA1	150 cu in (2.5)	156 (2.56)	19.56 (497)	2.08 (53)	4.50 (114)	1.62 (41)	1.50 (38)	15.50 (394)	0.94 (24)	SAE #16 (1-5/16 - 12)	N/A	20 (9.1)
BA01B3T01A1 BA01B3T01WA1	1 (3.79)	231 (3.79)	17.00 (432)	3.50 (89)	6.75 (171)	2.37 (60)	2.13 (54)	11.36 (289)	1.25 (32)	SAE #20 (1-5/8 - 12)	SAE #6 (9/16 - 18)	34 (15)
BA02B3T01A1 BA02B3T01WA1	2.5 (9.46)	556 (9.11)	21.38 (543)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	15.50 (394)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	80 (36)
BA05B3T01A1 BA05B3T01WA1	5 (18.9)	1124 (18.42)	33.38 (848)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	27.50 (700)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	120 (55)
BA10B3T01A1 BA10B3T01WA1	10 (37.9)	2097 (34.36)	54.38 (1382)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	48.50 (1231)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	220 (100)
BA11B3T01A1 BA11B3T01WA1	11 (41.6)	2400 (39.33)	59.88 (1520)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	54.00 (1371)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	240 (109)
BA15B3T01A1 BA15B3T01WA1	15 (56.8)	3267 (53.54)	77.88 (1978)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	72.00 (1830)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	305 (139)

1) Note: 1 thru 15 gallon sizes available with 4000 PSI (275 Bar) Appendix 22 Approval.

5000 PSI (345 Bar)[2]

Models	Nominal Size Gallon (Liters)	Gas Volume cu in (Liters)	Dimensions, inch (mm)							Hydraulic Ports		Weight
Oil Service Water Service			A	B	C	D	E	F	G	H (Thread)	I (Thread)	lbs. (Kg.)
BA01B5T01A1 BA01B5T01WA1	1 (3.79)	231 (3.79)	17.25 (438)	3.25 (83)	7.14 (181)	2.25 (57)	N/A	11.44 (291)	1.44 (37)	SAE #20 (1-5/8 - 12)	SAE #6 (9/16 - 18)	50 (23)
BA02B5T01A1 BA02B5T01WA1	2.5 (9.46)	556 (9.11)	22.55 (573)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	16.12 (409)	2.50 (64)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	120 (55)
BA05B5T01A1 BA05B5T01WA1	5 (18.9)	1124 (18.42)	34.80 (884)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	28.36 (720)	2.50 (64)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	200 (91)
BA10B5T01A1 BA10B5T01WA1	10 (37.9)	2097 (34.36)	55.30 (1405)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	48.88 (1242)	2.50 (64)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	335 (152)
BA15B5T01A1 BA15B5T01WA1	15 (56.8)	3267 (53.54)	76.80 (1951)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	70.38 (1788)	2.50 (64)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	485 (220)

2) Note: Available with 6600 PSI (455 Bar) Appendix 22 Approval.

The Top Repairable Accumulator permits easy checking and maintenance of the bladder without removing the accumulator from the service line, saving time and money. Sizes range from 2-1/2 to 15 gallons.

3000 PSI (207 Bar)[1]

Models	Nominal Size Gallon (Liters)	Gas Volume cu in (Liters)	Dimensions, inch (mm)							Hydraulic Ports		Weight
Oil Service Water Service			A	B	C	D	E	F	G	H (Thread)	I (Thread)	lbs. (Kg.)
BA02T3T01A1 BA02T3T01WA1	2.5 (9.45)	541 (8.87)	20.50 (521)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	15.38 (391)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	80 (36)
BA05T3T01A1 BA05T3T01WA1	5 (18.9)	1110 (18.19)	32.75 (832)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	27.63 (702)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	120 (55)
BA10T3T01A1 BA10T3T01WA1	10 (37.8)	2083 (34.13)	53.25 (1353)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	48.13 (1223)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	220 100
BA11T3T01A1 BA11T3T01WA1	11 (41.6)	2386 (39.1)	59.00 (1499)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	53.88 (1369)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	240 (109)
BA15T3T01A1 BA15T3T01WA1	15 (56.7)	3253 (53.31)	77.38 (1965)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	71.75 (1822)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	305 (139)

1) Note: Available with 4000 PSI (275 Bar) Appendix 22

5000 PSI (345 Bar)[2]

Models	Nominal Size Gallon (Liters)	Gas Volume cu in (Liters)	Dimensions, inch (mm)							Hydraulic Ports		Weight
Oil Service Water Service			A	B	C	D	E	F	G	H (Thread)	I (Thread)	lbs. (Kg.)
BA02T5T01A1 BA02T5T01WA1	2.5 (9.46)	541 (8.87)	21.68 (551)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	15.88 (403)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	120 (55)
BA05T5T01A1 BA05T5T01WA1	5 (18.9)	1110 (18.19)	33.92 (862)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	23.13 (715)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	220 (100)
BA10T5T01A1 BA10T5T01WA1	10 (37.8)	2083 (34.13)	54.42 (1382)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	48.63 (1235)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	335 (152)
BA15T5T01A1 BA15T5T01WA1	15 (56.8)	3253 (53.31)	75.92 (1928)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	70.13 (1781)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	485 (220)

2) Note: Available with 6600 PSI (455 Bar) Appendix 22

For systems requiring a faster "dumping" rate, the Medium Flow accumulator incorporates a larger port assembly capable of flows up to 480 GPM (1819 LPM). Sizes range from 2-1/2 to 15 gallons.

3000 PSI (207 Bar)

Models	Nom. Size Gal. (L)	Gas Vol. cu in (L)	Dimensions, in (mm)						H	Port	Weight
Male Str. Thd. Male NPT			A	B	C	D	F	G	Hydraulic Port	I (Thread)	lbs (Kg.)
BA02B3C01A1	2.5 (9.46)	556 (9.11)	22.87 (581)	5.88 (149)	9.06 (230)	3.63 (92)	15.25 (387)	1.25 (32)	M95x2	SAE #6 (9/16-18)	80 (36)
BA05B3C01A1	5 (18.9)	1124 (18.42)	35.12 (892)	5.88 (149)	9.06 (230)	3.63 (92)	27.50 (699)	1.25 (32)	M95x2	SAE #6 (9/16-18)	120 (55)
BA10B3C01A1	10 (37.9)	2097 (34.36)	55.62 (1413)	5.88 (149)	9.06 (230)	3.63 (92)	48.00 (1219)	1.25 (32)	M95x2	SAE #6 (9/16-18)	220 (100)
BA11B3C01A1	11 (41.6)	2400 (39.33)	61.37 (1559)	5.88 (149)	9.06 (230)	3.63 (92)	53.75 (1365)	1.25 (32)	M95x2	SAE #6 (9/16-18)	240 (109)
BA15B3C01A1	15 (56.8)	3267 (53.54)	79.12 (2010)	5.88 (149)	9.06 (230)	3.63 (92)	71.5 (1816)	1.25 (32)	M95x2	SAE #6 (9/16-18)	305 (139)

NOTE: Medium flow bladder accumulators not available with Appendix 22 option.

Optional Flange Port Details

Note: Accumulator assembly does not include flange.

For systems requiring a fast “dumping” rate, the High Flow accumulator incorporates a large port assembly capable of flows up to 600 GPM (2270 LPM). Sizes range from 2-1/2 to 15 gallons.

3000 PSI (207 Bar)

Models[1]	Nom. Size Gal. (L)	Gas Vol. cu in (L)	Dimensions, in (mm)							Hyd. Port	Port	Weight
Male Str. Thd. Male NPT			A	B	C	D	E	F	G	H	I (Thread)	lbs. (Kg.)
BA02B3A01A1 BA02B3H01A1	2.5 (9.46)	556 (9.11)	22.88 (581)	5.62 (143)	9.06 (230)	4.00 (102)	3.85 (98)	15.25 (387)	1.25 (32)	4-1/4"-8 Str. Thd. 4 NPTF	SAE #6 (9/16-18)	90 (41)
BA05B3A01A1 BA05B3H01A1	5 (18.9)	1124 (18.42)	35.12 (892)	5.62 (143)	9.06 (230)	4.00 (102)	3.85 (98)	27.50 (699)	1.25 (32)	4-1/4"-8 Str. Thd. 4 NPTF	SAE #6 (9/16-18)	130 (59)
BA10B3A01A1 BA10B3H01A1	10 (37.9)	2097 (34.36)	55.62 (1413)	5.62 (143)	9.06 (230)	4.00 (102)	3.85 (98)	48.00 (1219)	1.25 (32)	4-1/4"-8 Str. Thd. 4 NPTF	SAE #6 (9/16-18)	230 (105)
BA11B3A01A1 BA11B3H01A1	11 (41.6)	2400 (39.33)	61.38 (1559)	5.62 (143)	9.06 (230)	4.00 (102)	3.85 (98)	53.75 (1365)	1.25 (32)	4-1/4"-8 Str. Thd. 4 NPTF	SAE #6 (9/16-18)	250 (114)
BA15B3A01A1 BA15B3H01A1	15 (56.8)	3267 (53.54)	79.62 (2022)	5.62 (143)	9.06 (230)	4.00 (102)	3.85 (98)	69.50 (1765)	1.25 (32)	4-1/4"-8 Str. Thd. 4 NPTF	SAE #6 (9/16-18)	315 (143)

NOTE: High flow bladder accumulators not available with Appendix 22 option.

Optional Flange Port

For Model “A”
Hydraulic Port only

Note: Accumulator assembly does not include flange.

The Transfer Barrier accumulator provides positive separation between two different medias or can be used with gas bottles. Sizes range from 2-1/2 to 15 gallons.

3000 PSI (207 Bar)[1]

Models	Nominal Size	Gas Volume	Dimensions, in (mm)							Hydraulic/Gas Ports			Weight lbs. (Kg.)
Oil Service Water Service	Gallon (Liters)	cu in (Liters)	A	B	C	D	E	F	G	H (Thread)	I (Thread)	J (Thread)	
BT02B3TT01A1 BT02B3TT01WA1	2.5 (9.45)	556 (9.11)	21.25 (540)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	15.62 (397)	2.00 (51)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	SAE #12 (1-1/16 - 12)	80 (36)
BT05B3TT01A1 BT05B3TT01WA1	5 (18.9)	1124 (18.42)	33.50 (851)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	27.88 (708)	2.00 (51)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	SAE #12 (1-1/16 - 12)	120 (55)
BT10B3TT01A1 BT10B3TT01WA1	10 (37.8)	2097 (34.36)	54.00 (1372)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	43.38 (1102)	2.00 (51)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	SAE #12 (1-1/16 - 12)	220 (100)
BT11B3TT01A1 BT11B3TT01WA1	11 (41.6)	2400 (39.33)	59.75 (1518)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	54.12 (1375)	2.00 (51)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	SAE #12 (1-1/16 - 12)	240 (109)
BT15B3TT01A1 BT15B3TT01WA1	15 (56.7)	3267 (53.54)	77.62 (1972)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	72.00 (1829)	2.00 (51)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	SAE #12 (1-1/16 - 12)	305 (139)

1) Note: Available with 4000 PSI (275 Bar) Appendix 22

5000 PSI (345 Bar)[2]

Models	Nominal Size	Gas Volume	Dimensions, in (mm)							Hydraulic/Gas Ports			Weight lbs. (Kg.)
Oil Service Water Service	Gallon (Liters)	cu in (Liters)	A	B	C	D	E	F	G	H (Thread)	I (Thread)	J (Thread)	
BT02B5TT01A1 BT02B5TT01WA1	2.5 (9.45)	556 (9.11)	22.55 (573)	3.62 (92)	9.63 (245)	3.00 (76)	2.88 (73)	16.12 (409)	2.00 (51)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	SAE #12 (1-1/16 - 12)	120 (55)
BT05B5TT01A1 BT05B5TT01WA1	5 (18.9)	1124 (18.42)	34.80 (884)	3.62 (92)	9.63 (245)	3.00 (76)	2.88 (73)	28.36 (720)	2.00 (51)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	SAE #12 (1-1/16 - 12)	200 (91)
BT10B5TT01A1 BT10B5TT01WA1	10 (37.8)	2097 (34.36)	55.30 (1405)	3.62 (92)	9.63 (245)	3.00 (76)	2.88 (73)	48.88 (1242)	2.00 (51)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	SAE #12 (1-1/16 - 12)	335 (152)
BT15B5TT01A1 BT15B5TT01WA1	15 (56.7)	3267 (53.54)	76.80 (1951)	3.62 (92)	9.63 (245)	3.00 (76)	2.88 (73)	70.38 (1788)	2.00 (51)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	SAE #12 (1-1/16 - 12)	485 (220)

2) Note: Available with 6600 PSI (455 Bar) Appendix 22

Where space does not permit the installation of the required accumulator, a smaller accumulator may be used by connecting it to an auxiliary gas bottle(s) that may be located in some nearby spot where space is available. (See Large Gas Bottles for additional offerings and page 104 for sizing information.) Sizes range from 1 to 15 gallons.

3000 PSI (207 Bar)[1]

Models	Nominal Size Gallon (Liters)	Dimensions, inch (mm)							Ports		Weight lbs. (Kg.)
		A	B	C	D	E	F	G	H (Thread)	I (Thread)	
BG01B3T01A1	1 (3.79)	17.00 (432)	3.50 (89)	6.75 (171)	2.37 (60)	2.13 (54)	11.36 (289)	1.25 (32)	SAE #20 (1-5/8 - 12)	SAE #6 (9/16 - 18)	34 (15)
BG02B3T01A1	2.5 (9.46)	21.25 (540)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	15.62 (397)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	80 (36)
BG05B3T01A1	5 (18.9)	33.50 (851)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	27.88 (708)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	120 (55)
BG10B3T01A1	10 (37.9)	54.00 (1372)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	43.38 (1102)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	220 (100)
BG11B3T01A1	11 (41.6)	59.75 (1518)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	54.12 (1375)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	240 (109)
BG15B3T01A1	15 (56.8)	77.62 (1972)	3.62 (92)	9.06 (230)	3.00 (76)	2.88 (73)	72.00 (1829)	1.25 (32)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	305 (139)

1) Note: Available with 4000 PSI (275 Bar) Appendix 22

5000 PSI (345 Bar)[2]

Models	Nominal Size Gallon (Liters)	Dimensions, inch (mm)							Ports		Weight lbs. (Kg.)
		A	B	C	D	E	F	G	H (Thread)	I (Thread)	
BG01B5T1A1	1 (3.79)	17.25 (438)	3.25 (83)	7.14 (181)	2.25 (57)	N/A	11.44 (291)	1.44 (37)	SAE #20 (1-5/8 - 12)	SAE #6 (9/16 - 18)	50 (23)
BG02B5T1A1	2.5 (9.46)	22.55 (573)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	16.12 (409)	2.50 (64)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	120 (55)
BG05B5T1A1	5 (18.9)	34.80 (884)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	28.36 (720)	2.50 (64)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	200 (91)
BG10B5T1A1	10 (37.9)	55.30 (1405)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	48.88 (1242)	2.50 (64)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	335 (152)
BG15B5T1A1	15 (56.8)	76.80 (1951)	3.88 (99)	9.63 (245)	3.00 (76)	2.88 (73)	70.38 (1788)	2.50 (64)	SAE #24 (1-7/8 - 12)	SAE #6 (9/16 - 18)	485 (220)

2) Note: Available with 6600 PSI (455 Bar) Appendix 22

Standard and Optional Bladders

A variety of bladders are offered to suit a wide range of fluids and operating temperatures. The following table lists the optional bladders available, their recommended operating temperature ranges, and the types of fluids that are generally compatible.

Seal Code	Polymer	Recommended Operating Temperature Range	Maximum Temperature with Reduced Life	General Application & Compatibility*
01	Buna-Nitrile	-20°F to 200°F -29°C to 93°C	225°F 107°C	Standard Compound – Compatible with most mineral oil-based fluids
03	Hi-Temp. Nitrile	-20°F to 225°F -29°C to 107°C	250°F 121°C	Compatible with most mineral oil-based fluids with enhanced high temperature performance
04	Hydrin (Lo-Temp.)	-40°F to 225°F -40°C to 107°C	250°F 121°C	Compatible with most mineral oil-based fluids with enhanced low temperature performance
06	Butyl	-40°F to 200°F -40°C to 93°C	300°F 149°C	Compatible with most phosphate ester fluids and some synthetic fluids
08	Ethylene Propylene	-40°F to 200°F -40°C to 93°C	300°F 149°C	Compatible with some synthetic fluids and water
28	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

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

Water & Chemical Service Options (W)

Bladder accumulators are available with a water and chemical resistance option. The (W) designation includes an internally Skotchkoted shell and stainless steel or electroless nickel plated port assembly. The Skotchkote offers added protection against more corrosive fluids.

Gas Valves

Two types of gas valves are available on bladder accumulators. 3000 PSI rated models are offered with a cored gas valve cartridge (cartridge type, 1 gal. & up, ISO-4570-8V1) as standard. 5000 PSI units are equipped with a high pressure cored gas valve cartridge (ISO-4570-8V1) with an option of a heavy duty (military) poppet-type gas valve cartridge (Mil. Spec. MS28889-2).

Standard and Optional Fluid Ports

The following standard and optional fluid ports are offered on all Bottom Repairable, Top Repairable, and Transfer Barrier accumulators (for high flow ports, see High Flow). See How to Order at the end of this section for complete ordering instructions.

Sizes	Standard Port	Optional Ports				
	SAE Str. Thread Code T	SAE 4-Bolt Split Flange* Code F	NPTF Code U	Undersize NPTF Code X	BSPP Code R	ISO 6149-1 Code Y
3000 PSI (207 Bar) Models						
10 cu in	SAE #8	–	3/4" Male	–	–	M 8x1.5
1 pt., 1 qt.	SAE #12	–	3/4"	–	G 3/4"	M 27x2
150 cu in	SAE #16	–	1"	–	G 1"	M 33x2
1 gal.	SAE #20	1-1/4", Code 61	1-1/4"	–	G 1-1/4"	M 42x2
2½ to 15 gal.	SAE #24	2", Code 61	2"	1-1/4"	G 2"	M 48x2
5000 PSI (345 Bar) Models						
1 gal.	SAE #20	1-1/4", Code 62	1-1/4"	–	G 1-1/4"	M 42x2
2½ to 15 gal.	SAE #24	1-1/2", Code 62	2"	–	G 2"	M 48x2

*Split flanges not supplied.

SAE 4-Bolt Flange Port Dimensions

Standard Pressure – Code 61 (ISO 6162) – 3000 PSI (207 Bar)

Flange	SAE Flange Dimensions (in.)					ISO 6162 Flange Dimensions (mm)				
Size	A	B	C	F	G	A	B	C	F	G
1-1/4"	7/16 - 4	1.188	2.312	1-1/2	1.000	M10	30.2	58.7	32	25.4
2"	1/2 - 13	1.688	3.062	2	1.062	M12	42.9	77.8	51	26.9

High Pressure – Code 62 (ISO 6162) – 6000 PSI (410 Bar)

Flange	SAE Flange Dimensions (in.)					ISO 6162 Flange Dimensions (mm)				
Size	A	B	C	F	G	A	B	C	F	G
1-1/4"	1/2 - 13	1.250	2.625	1-1/4	1.000	M16	31.8	66.7	32	25.4
1-1/2"	5/8 - 11	1.438	3.125	1-1/2	1.375	M16	36.5	79.4	38	34.9

Note: The dimensions shown on this chart are for the mating manifold. The flange halves are not supplied with the accumulator.

Flange end for SAE J518 Code 61/62
NOTE: 4-bolt split flange halves (not included).

Port Adapters

A wide variety of port adapters are offered to convert Parker's standard SAE port offerings to NPTF or smaller SAE port sizes. For a complete listing, see Accumulator Accessories.

Safety Fuse Options

Safety Fuses are used as a safety device on accumulators and gas bottles to prevent over-pressurization of gas due to external heat or hydraulic pressure (set at 140% of maximum system pressure to avoid rupture disk fatigue and premature failure). The rupture disks are calibrated to rupture at a pre-determined pressure. Safety fuses are available on most sizes of piston and bladder accumulators and gas bottles. Safety fuses can be installed on 1 gallon & larger accumulators by using the "Fuse Adapter" as shown to the right. The safety fuse assembly and/or fuse adapter must be ordered separately.

Description	Part Number
Safety Fuse Assembly[1]	086471xxxx
Replacement Rupture Disks	756003xxxx
Fuse Adapter	1468970002

1) Assembly includes housing and rupture disk, xxxx = pressure setting in 100 psi increments, i.e., for an assembly with a 2000 PSI setting, order P/N 0864712000.

Mounting, Charging & Gauging Accessories

Greer offers a wide variety of mounting, charging and gauging accessories. See "Accumulator Accessories".

Special Options

If your application requires a bladder accumulator or special option that falls outside of our broad offering, consult your local distributor, Greer representative, or the factory with your specific requirements. We have the manufacturing and engineering expertise to design and build bladder accumulators to your exacting requirements, from simple modifications to standard units to complete designs from scratch. Some example of our past special designs include:

- Special and Stainless Steel Materials
- Special Bladder Compounds
- Suction Stabilizer
- Pulsation Dampener
- Special Certifications

Consult our experts with your next bladder accumulator requirement!

A full range of genuine Greer replacement bladder kits are available to bring your accumulator back to original condition should replacement become necessary. All bladder kits include port o-ring, backup seals and gas valves with secondary seals.

NOTE: Part numbers shaded in gray will be phased out.

		Bladder & Seal Compound					
Size	**Brand**	**Group 01 Nitrile (NBR)**	**Group 03 Hi Temp (NBR)**	**Group 04 Hydrin**	**Group 06 Butyl**	**Group 08 EPR**	**Group 28 Fluorocarbon**
3,000 PSI Standard Bladder Kits (Top & Bottom Repairable)							
10 Cu. In.	Greer	702900	702901	702902	702903	702904	702906
	Parker	0850693C10	0870433C10	0856663C10	0850703C10	0851053C10	0851043C10
1 Pt.	Greer	702914	702915	702916	702917	702918	702920
	Parker	0850693001	0870433001	0856663001	0850703001	0851053001	0851043001
1 Qt.	Greer	702928	702929	702930	702931	702932	702934
	Parker	0850693002	0870433002	0856663002	0850703002	0851053002	0851043002
150 Cu. In.	Greer	702942	702943	702944	702945	702946	702948
	Parker	0850693006	0870433006	0856663006	0850703006	0851053006	0851043006
1 Gal.	Greer	702956	702957	702958	702959	702960	702962
	Parker	0850693010	0870433010	0856663010	0850703010	0851053010	0851043010
2 1/2 Gal.	Greer	702970	702971	702972	702973	702974	702976
	Parker	0850693025	0870433025	0856663025	0850703025	0851053025	0851043025
5 Gal.	Greer	702984	702985	702986	702987	702988	702990
	Parker	0850693050	0870433050	0856663050	0850703050	0851053050	0851043050
10 Gal.	Greer	702998	702999	703000	703001	703002	703004
	Parker	0850693100	0870433100	0856663100	0850703100	0851053100	0851043100
11 Gal.	Greer	703012	703013	703014	703015	703016	703018
	Parker	0850693110	0870433110	0856663110	0850703110	0851053110	0851043110
15 Gal.	Greer	703026	703027	703028	703029	703030	703032
	Parker	0850693150	0870433150	0856663150	0850703150	0851053150	0851043150
25 Gal.	Greer	703340	704007	704008	704009	703341	703342
	Parker	0850693250	0870433250	0856663250	0850703250	0851053250	0851043250
40 Gal.	Greer	703346	704013	704014	704015	703347	703348
	Parker	0850693400	0870433400	0856663400	0850703400	0851053400	0851043400
5,000 PSI Bottom Repairable Bladder Kits (2" Valve Stem - New Style)							
1 Gal.	Greer	8706135010	8706185010	8706175010	8706145010	8706145010	8706155010
7/8" ∅ Stem	Parker	8706135010	8706185010	8706175010	8706145010	8706145010	8706155010
1 Gal.	Greer	704060	704061	704062	704063	704064	704066
1" ∅ Stem	Parker	0850695010	0870435010	0856665010	080705010	0851055010	0851045010
2 1/2 Gal.	Greer	706000	706001	706002	706003	706004	706006
	Parker	0861905025	0872685025	0861945025	0861915025	0861935025	0861925025
5 Gal.	Greer	706010	706011	706012	706013	706014	706016
	Parker	0861905050	0872685050	0861945050	0861915050	0861935050	0861925050
10 Gal.	Greer	706020	706021	706022	706023	706024	706026
	Parker	0861905100	0872685100	0861945100	0861915100	0861935100	0861925100
15 Gal.	Greer	706030	706031	706032	706033	706034	706036
	Parker	0861905150	0872685150	0861945150	0861915150	0861935150	0861925150
5,000 PSI Bottom Repairable Bladder Kits (7/8" Valve Stem - Old Style)							
2 1/2 Gal.	Parker	0850695025	0870435025	0856665025	0850705025	0851055025	0851045025
5 Gal.	Parker	0850695050	0870435050	0856665050	0850705050	0851055050	0851045050
10 Gal.	Parker	0850695100	0870435100	0856665100	0850705100	0851055100	0851045100
15 Gal.	Parker	0850695150	0870435150	0856665150	0850705150	0851055150	0851045150

How to Order Bladder Accumulators

Bladder accumulators and gas bottles can be specified by using the symbols in the chart below to develop a model number. Select only those symbols that represent the features desired, and place them in the sequence indicated by the example at the top of the chart.

Series	Size	Construction	Gas Pressure	Hyd. Port[1]	Bladder/Seal Compound	Design Modification	Design Code
BA	001	B	3	T	01	–A	1

Series	
BA	Accumulator
BG	Gas Bottle
BT	Transfer Barrier

Size		Available 3000 PSI	Available 5000 PSI
C10	10 Cl	•	
001	1 Pint	•	
002	1 Quart	•	
005	150 Cl	•	
01	1 Gallon	•	•
02	2½ Gallon	•	•
05	5 Gallon	•	•
10	10 Gallon	•	•
11	11 Gallon	•	
15	15 Gallon	•	•

Type of Construction	
B	Bottom Repairable Standard on all sizes
T	Top Repairable Optional for 2½ Gallon and up

Working Pressure	
3	3,000 PSI (330 bar CE only)
4	4,000 PSI
5	5,000 PSI
6	6,600 PSI
Y	Special

Hydraulic Port		
T	**SAE Straight Thread O-Ring (Standard)**	
	10 Cl	SAE #8
	1 Pint & 1 Quart	SAE #12
	150 Cl	SAE #16
	1 Gallon	SAE #20
	2½ Gallon thru 15 Gallon	SAE #24
U	**NPT Pipe (No Cost Option)**	
	10 Cl	3/4" NPT Male
	1 Pint & 1 Quart	3/4" NPTF
	150 Cl	1" NPTF
	1 Gallon	1 1/4" NPTF
	2½ Gallon thru 15 Gallon	2" NPTF
F	**SAE 4-Bolt Split Flange (No Cost Option)**	
	10 Cl thru 150 Cl (3K)	N/A
	1 Gallon (3K)	1 1/4" Code 61 (3000 PSI)
	1 Gallon (5K)	1 1/4" Code 62 (6000 PSI)
	2½ Gal. thru 15 Gal. (3K)	2" Code 61 (3000 PSI)
	2½ Gal. thru 15 Gal. (4K)	1 1/2" Code 62 (6000 PSI)
	2½ Gal. thru 15 Gal. (5K)	1 1/2" Code 62 (6000 PSI)
H	**High Flow 4" NPT Male (Extra Cost Option)** Available on 2½ Gallon thru 15 Gallon Sizes only (3000 PSI)	
A	**High Flow 4¼-8 UN-2 Straight Thread Male (Extra Cost Option)** Available on 2½ Gallon thru 15 Gallon Sizes only (3000 PSI)	
C	**Medium Flow M95x2 Straight Thread Male (Extra Cost Option)** Available on 2½ Gallon thru 15 Gallon Sizes only (3000 PSI)	
X	**NPT Pipe Undersized (No Cost Option)** 2½ Gallon thru 15 Gallon Sizes only (3000 PSI)	1-1/4" NPT
R	**BSPP**	
	10 Cl	N/A
	1 Pint & 1 Quart	3/4-14
	150 Cl	1-11
	1 Gallon	1 1/4-11
	2½ Gallon thru 15 Gallon	2-11
Y	**ISO 6149-1**	
	10 Cl	M18 x 1.5
	1 Pint & 1 Quart	M27 x 2
	150 Cl	M33 x 2
	1 Gallon	M42 x 2
	2½ Gallon thru 15 Gallon	M48 x 2
G	**Metric**	
	10 Cl	M18 x 1.5
	1 Pint & 1 Quart	M27 x 2
	150 Cl	M33 x 2
	1 Gallon	M42 x 2
	2½ Gallon thru 15 Gallon	M48 x 2
S	**Special**	

Design Code	
1	Standard
*****	Number given

Design Modification (1st Digit)	
Blank	Standard
W	Water/Chemical Service
M	MS28889-2

Design (2nd Digit)	
A	Standard ASME (1 Gallon & up)
D	ASME (< 1 Gallon)
E	CE Marking
G	Appendix 22 Shell
S	Special

Bladder/Seal Compound	
01	Buna-Nitrile (Std.)
03	High Temp. Nitrile (Optional)
04	Hydrin (Optional)
06	Butyl (Optional)
08	EPR (Optional)
28	Fluoroelastomer (Optional)

* 1 Gal. through 15 gal. – A.S.M.E. design with "U" stamp.
1 Pt., 1 Qt. and 150 C.I. – A.S.M.E. design, available with "U" stamp.
If "U" stamp is required, it must be specified at time of order.

NOTE: A.S.M.E. documentation or any other certification must be requested at time of order.

Model Code Reference

The symbols in the chart below represent the Parker model numbering system which is being phased out. ***Use this for reference only.*** For current model numbers, refer to the previous page.

Series	Size	Construction	Gas Pressure	Hyd. Port[1]	Bladder/Seal Compound	Design Modification	Design Code
AB	04	B	3	T	1	_A	1

Series	
A B	Accumulator
B B	Gas Bottle
T B	Transfer Barrier

Size		Available 3000 PSI	Available 5000 PSI
003	10 Cl	•	
005	1 Pint	•	
01	1 Quart	•	
03	150 Cl	•	
04	1 Gallon	•	•
10	2½ Gallon	•	•
20	5 Gallon	•	•
40	10 Gallon	•	•
44	11 Gallon	•	
60	15 Gallon	•	•

Type of Construction	
B	Bottom Repairable Standard on all sizes
C	Conventional Top Repairable Optional for 2½ Gallon and up

Working Pressure	
3	3,000 PSI
4	4,000 PSI
5	5,000 PSI
6	6,600 PSI
S	Special

Hydraulic Port		
T	**SAE Straight Thread O-Ring (Standard)**	
	10 Cl	SAE #8
	1 Pint & 1 Quart	SAE #12
	150 Cl	SAE #16
	1 Gallon	SAE #20
	2½ Gallon thru 10 Gallon	SAE #24
U	**NPT Pipe (No Cost Option)**	
	10 Cl	3/4" NPT Male
	1 Pint & 1 Quart	3/4" NPTF
	150 Cl	1" NPTF
	1 Gallon	1 1/4" NPTF
	2½ Gallon thru 15 Gallon	2" NPTF
F	**SAE 4-Bolt Split Flange (No Cost Option)**	
	10 Cl thru 150 Cl (3K)	N/A
	1 Gallon (3K)	1 1/4" Code 61 (3000 PSI)
	2½ Gal. thru 15 Gal. (3K)	2" Code 61 (3000 PSI)
	2½ Gal. thru 15 Gal. (4K)	1 1/2" Code 62 (6000 PSI)
	2½ Gal. thru 15 Gal. (5K)	1 1/2" Code 62 (6000 PSI)
H	**High Flow 4" NPT Male (Extra Cost Option)** Available on 2½ Gallon thru 15 Gallon Sizes only (3000 PSI)	
A	**High Flow 4 1/4-8 UN-2 Straight Thread Male (Extra Cost Option)** Available on 2½ Gallon thru 15 Gallon Sizes only (3000 PSI)	
B	**High Flow Flange Adapted to Above 4 1/4-8 UN-2 High Flow (Extra Cost Option)** Available on 2½ Gallon thru 15 Gallon Sizes only (3000 PSI)	
X	**NPT Pipe Undersized (No Cost Option)** 2½ Gallon thru 15 Gallon Sizes only (3000 PSI)	
R	**BSPP**	
	10 Cl	N/A
	1 Pint & 1 Quart	3/4-14
	150 Cl	1-11
	1 Gallon	1 1/4-11
	2½ Gallon thru 15 Gallon	2-11
Y	**ISO 6149-1**	
	10 Cl	M18 x 1.5
	1 Pint & 1 Quart	M27 x 2
	150 Cl	M33 x 2
	1 Gallon	M42 x 2
	2½ Gallon thru 15 Gallon	M48 x 2
S	**Special**	

Design Code	
1	Standard
2	Standard 1 Quart
3	2½ - 15 Gallon, 5000 psi
*	Number given

Design Modification (1st Digit)	
Blank	Standard
W	Water/Chemical Service
M	MS28889-1

Design (2nd Digit)	
A	Standard ASME (1 Gallon & up)
D	ASME (< 1 Gallon)
G	Appendix 22 Shell
S	Special

Bladder/Seal Compound	
1	Buna-Nitrile (Std.)
9	Hydrin (Optional)
3	Butyl (Optional)
7	EPR (Optional)
5	Fluoroelastomer (Optional)

* 1 Gal. through 15 gal. – A.S.M.E. design with "U" stamp.
1 Pt., 1 Qt. and 150 C.I. A.S.M.E. design, available with "U" stamp. If "U" stamp is required, it must be specified at time of order.

NOTE: A.S.M.E. documentation or any other certification must be requested at time of order.

Phasing Out. See Previous Page for Current Model Code.

Notes

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Diaphragm Accumulators

• AD Series

Parker Diaphragm Accumulators Feature:

- Operating Pressures to 250 Bar
- Capacities from .075 to 2.80 Liters
- Compact and Lightweight
- Low Cost, Non-Repairable Design
- Nitrile & Hydrin Diaphragms
- Durable Metric Gas Valve

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Diaphragm accumulators provide an affordable means of enhancing the performance of a hydraulic system. They are suitable for storing energy under pressure, absorbing hydraulic shocks, and dampening pump pulsation and flow fluctuations.

Diaphragm accumulators provide dependable performance, maximum efficiency, and long service life in a lightweight, compact design.

Why Use Diaphragm Accumulators?

- improves system efficiency
- supplements pump flow
- supplies power in emergency
- compensates for leakage
- absorbs hydraulic shocks
- very contamination tolerant
- cost effective
- compact, lightweight
- safety, non-repairable design
- very quick response
- works well with water, low lubricity fluids

Parker Diaphragm Accumulators… Your #1 Choice!

Parker is the leading manufacturer of accumulators in North America. Parker's broad standard offering includes piston, bladder and diaphragm accumulators. For your convenience, Parker offers the latest in accumulator sizing technology with its *inPHorm Accumulator Sizing and Selection Software.*

Specifications

Materials

- Shell – high strength alloy steel
- Ports – steel
- Button – Delrin
- Gas Valve Stem – steel
- Diaphragms – Nitrile (NBR) or Hydrin (ECO)

Max. Compression Ratio (max. working pressure/precharge pressure): 8 to 1 on .075 liter through 1.4 liter;
4 to 1 on 2 liter and larger

Maximum Flow Rates –

Size (liters)	Maximum Recommended Flow Rates			
	Normal Operation		When Fully Discharging	
	LPM	GPM	LPM	GPM
0.075, 0.16	40	11	10	2.6
0.32 to 1.40	100	26	40	11
2.00 to 2.80	160	42	60	16

Pressure Ratings – See Models, Capacities and Dimensions for pressure ratings by size, all rated at minimum 4 to 1 design factors.

Fluids – Parker's diaphragm accumulators are compatible with most petroleum-based industrial or water-based flame resistant fluids. See diaphragm material options or consult factory for details.

Precharge – Units are shipped with a nominal nitrogen precharge as standard. For specific precharge pressure, specify charge pressure at the time of order.

Available Options

- Diaphragm Compounds
- Gas Valves – M28 x 1.5 standard
  – ISO 4570-8VI gas valve (consult factory)
- Hydraulic Ports – SAE standard
  – others (consult factory)

1 Shell

The shell is manufactured from a high strength alloy steel. The non-repairable electron-beam welded construction reduces size, weight, and, ultimately, initial cost.

2 Diaphragm

The flexible diaphragm provides excellent gas and fluid separation. Diaphragms are available in two compounds, Nitrile (NBR) and Hydrin (ECO). Both provide excellent service with most mineral fluids with NBR being slightly lower cost and ECO offering excellent low-temperature performance for mobile applications.

3 Button

The button closes the fluid port when the accumulator is fully discharged to prevent diaphragm extrusion, a low cost alternative to more complex and expensive valve-spring designs.

4 Fluid Port

SAE straight thread for easy installation and leak-free service.

5 Gas Valve

Metric M28X1.5 gas valve is durable, leak-free and offers the flexibility of checking or charging the accumulator. See page110 for charging and guaging accessories. U.S. Gas Valve is also available. See model numbering information.

Models, Capacities and Dimensions

Model	Size	MOP[1]	A	B	C	D	E	F	Weight
	liters (cu in)	bar (PSI)	mm (in.)					Port (thread)	kg. (lb.)
AD007A25T1A1	0.075 (5)	250 (3600)	111 (4.37)	20 (0.79)	64 (2.52)	30 (1.18)	32 (1.26)	SAE #6 (9/16 - 18)	0.65 (1.4)
AD016A25T1A1	0.16 (10)	250 (3600)	120 (4.72)	20 (0.79)	75 (2.95)	32 (1.26)	32 (1.26)	SAE #6 (9/16 - 18)	1.0 (2.2)
AD032A16T1A1	0.35 (20)	160 (2300)	136 (5.35)	22 (0.87)	92 (3.62)	63 (2.48)	41 (1.61)	SAE #8 (3/4 - 16)	1.3 (2.9)
AD050A16T1A1	0.50 (30)	160 (2300)	149 (5.87)	22 (0.87)	103 (4.06)	70 (2.76)	41 (1.61)	SAE #8 (3/4 - 16)	1.5 (3.3)
AD075A18T1A1	0.75 (45)	180 (2600)	166 (6.54)	22 (0.87)	121 (4.76)	78 (3.07)	41 (1.61)	SAE #8 (3/4 - 16)	2.6 (5.7)
AD075A25T1A1	0.75 (45)	250 (3600)	173 (6.81)	22 (0.87)	127 (5.00)	81 (3.19)	41 (1.61)	SAE #8 (3/4 -16)	3.2 (7.1)
AD100A20T1A1	1.00 (60)	200 (2900)	180 (7.09)	22 (0.87)	136 (5.35)	63 (2.48)	41 (1.61)	SAE #8 (3/4 - 16)	3.5 (7.7)
AD140A25T1A1	1.40 (85)	250 (3600)	198 (7.80)	22 (0.87)	155 (6.10)	72 (2.83)	41 (1.61)	SAE #8 (3/4 - 16)	6.0 (13)
AD200A25T1A1	2.00 (120)	250 (3600)	251 (9.88)	22 (0.87)	155 (6.10)	72 (2.83)	41 (1.61)	SAE #8 (3/4 - 16)	7.5 (17)
AD280A25T1A1	2.80 (170)	250 (3600)	268 (10.6)	22 (0.87)	174 (6.85)	87 (3.43)	41 (1.61)	SAE #8 (3/4 - 16)	10 (22)

1) Note: MOP = Maximum Operating Pressure.

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Hydraulic Accumulator Division
Rockford, Illinois USA

Metric Gas Valve

Parker AD Series diaphragm accumulators are fitted as standard with metric M28X1.5 gas valves. This rugged gas valve features a internal hex locking screw with sealing washer.

Charging and pressure checking can be accomplished by utilizing the M28X1.5 charging and gauging assembly shown in Accumulator Accessories.

U.S. Gas Valve

Parker AD Series diaphragm accumulators can be fitted with an optional US gas valve. The US gas valve features an internal gas valve core and a sealing washer. Charging and pressure checking can be accomplished by utilizing standard charging and gauging assembly as shown in Accumulator Accessories.

Assembly Part No. L08700150A

Item	Part No.	Qty.	Description
1	148146 0000	1	Protective Cover
2	087036 0031	1	Dyna Seal
3	582222 0000	1	Valve Core
4	135238 0000	1	Gas Valve Housing
5	870016 0000	1	Gas Valve Seal

Assembly Part No. L087001500

Item	Part No.	Qty.	Description
3	582222 0000	1	Valve Core
4	135238 0000	1	Gas Valve Housing
5	870016 0000	1	Gas Valve Seal

NOTE: For assembly of gas valve to cap, use 9 ft/lbs.

Standard and Optional Diaphragm Materials

Two diaphragm polymers are offered to suit a wide range of fluids and operating temperatures. The following table lists the optional polymers available, their recommended operating temperature ranges, and the types of fluids that are generally compatible.

Seal Code	Polymer	Recommended Operating Temperature Range	Maximum Temperature with Reduced Life	General Application & Compatibility[1]
1	Nitrile (Buna-N)	14°F to 176°F -10°C to 80°C	200°F 93°C	Parker's Standard Compound – Compatible with most mineral oil based fluids
9	Hydrin (Lo-Temp)	-40°F to 176°F -40°C to 80°C	200°F 93°C	Compatible with most mineral oil based fluids and maintains flexibility at low temps

1) Note: Consult your local Parker distributor or the factory for fluid compatibility information. Temperature ranges may vary depending upon the fluid used in the hydraulic system.

How to Order Diaphragm Accumulators

AD Series diaphragm accumulators can be specified by using the symbols in the chart below to develop a model number. Select only those symbols that represent the features desired, and place them in the sequence indicated by the example at the top of the chart.

Series	Size	Construction	Pressure	Port	Diaphragm	Variation	Code
AD	007	A	25	T	1	A	1

AD Series Diaphragm Accumulators

A Std. Metric Gas Plug
B U.S. Gas Valve

T SAE Straight Thread

1 Nitrile
9 Hydrin

A Standard
S Special

1 Standard
***** Special Design No. Assigned

Code	Size	MOP[1]
007	0.075 liter (5 in^3)	250 Bar (3600 PSI)
016	0.16 liter (10 in^3)	250 Bar (3600 PSI)
032	0.32 liter (20 in^3)	160 Bar (2300 PSI)
050	0.50 liter (30 in^3)	160 Bar (2300 PSI)
075	0.75 liter (45 in^3)	180 Bar (2600 PSI)
075	0.75 liter (45 in^3)	250 Bar (3600 PSI)
100	1.00 liter (60 in^3)	200 Bar (2900 PSI)
140	1.40 liter (85 in^3)	250 Bar (3600 PSI)
200	2.00 liter (120 in^3)	250 Bar (3600 PSI)
280	2.80 liter (170 in^3)	250 Bar (3600 PSI)

See "Size" for MOP[1] Ratings	
16	160 Bar (2300 PSI)
18	180 Bar (2600 PSI)
20	200 Bar (2900 PSI)
25	250 Bar (3600 PSI)

1) Note: Maximum Operating Pressure

Notes

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

3000

Series 3000 Piston Accumulators

- Heavy Duty Service with 3000 PSI Operating Pressure
- 2" thru 12" Bores with Over 50 Standard Capacities
- Patented V-O-ring Piston Seals
- Serviceable Threaded End Construction
- Five Standard Seal Options to Handle a Variety of Fluids and Temperatures
- ASME Certification and CE Marking Available

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Materials

- Shell – high strength alloy steel
- Caps – steel
- Pistons – aluminum (2" thru 8"), ductile iron (9" & 12")
- Gas Valve Cartridge – steel
- Gas Valve Protector – steel
- Piston Glide Rings – PTFE
- Piston & End Seals – various polymers
- Piston Seal Backups – PTFE

Actual Bore Sizes & Maximum Flow Rates

Pressure Ratings

Nominal Bore Size (in.)	Actual Bore Size		Max. Recommended Flow*	
	(in.)	(mm)	GPM	LPM
2	2.02	51.44	100	380
3	3.00	76.20	220	834
4	4.03	102.4	397	1504
6	5.78	146.9	818	3096
7	7.00	177.8	1199	4538
8	7.87	200	1199	4538
9	9.00	228.6	1982	7502
12	11.88	301.6	3450	13061

***Note:** Based on 120 in/sec maximum piston speed, port & fitting size will become limiting factors for most applications.

Parker Series 3000 piston accumulators are rated at 3000 psi and a minimum 4 to 1 design factor. For pressures over 3000 psi, see Series 4000 and Series 5000 accumulators.

Fluids

Parker's piston accumulators are compatible with a wide variety of fluids. Standard accumulators (with nitrile seals) may be used with petroleum-based industrial oils or water-based flame resistant fluids. Optional seals compatible with most industrial fluids are available with temperature ranges from -45°F to 325°F (-43°C to 162°C).

Precharge

Units are shipped with a nominal nitrogen precharge as standard. For specific precharge pressures, specify at the time of order.

Auxiliary Gas Bottles

When space does not permit the installation of the required piston accumulator, a smaller accumulator may be used by connecting it to an auxiliary gas bottle(s) that can be located in a nearby spot where space is available. In some cases, a piston accumulator and gas bottle combination may be more economical, especially large capacity sizes. Piston travel, confined to the accumulator, must be calculated with ample margins to store the required fluid.

Standard Ports

The following ports are supplied as standard on all fluid ends and on the gas end of accumulators ordered for use with gas bottles:

Notes:

1) For flange dimensions, see tables below.

2) On standard 7", 8" & 9" bore accumulators, both SAE Straight Thread and Flange ports are available as standard. Omit port code for SAE #32 Straight Thread, specify "PL" port code for 2" Code 61 Flange when ordering. Flange ports are recommended at operating pressures above 2000 PSI due to pressure limitations of most #32 SAE Straight Thread fittings.

Bore Size	Standard Ports			
	Standard Models		Metric Models	
	SAE Port	SAE Flange[1]	BSPP Port (in)	Metric SAE Flange[1]
2	#12	–	3/4	–
3	#12	–	1	–
4	#20	–	1	–
6	#24	–	1-1/2	–
7	#32	2" Code 61	–	2" Code 61
8	#32	2" Code 61	–	2" Code 61
9	#32	2" Code 61	–	2" Code 61
12	–	3" Code 61	–	3" Code 61

1) See flange dimensions in Port Options.

Gas Valves

Two types of gas valves are available on Series 3000 piston accumulators and gas bottles. Units with 2" thru 6" bores, are offered with a cored gas valve cartridge (ISO-4570-8V1) as standard. All 7" thru 12" bore units are supplied with a heavy duty (military) poppet-type gas valve cartridge (MS28889-2) as standard.

Available Options

If your application requires a piston accumulator, gas bottle, or special option that falls outside of Parker's broad offering, consult your local distributor, Parker representative, or the factory with your specific requirements. Parker has the manufacturing and engineering expertise to design and build piston accumulators to your exacting requirements, from simple modifications of standard units to complete designs. Some example of Parker's past special designs include:

- Special and Stainless Steel Materials
- Piston Position and Velocity Sensors and Switches
- Water Service
- Non-Standard Capacities

3000 PSI Piston Accumulators for Oil and Water Service

Model No.[1] Oil Service	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	C (in)	D-Hydraulic Port SAE No.	D-Hydraulic Port Thread Size (in)	D-Hydraulic Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
A2N0005D1K	–	5	6		6.76								5
A2N0010D1K	–	10	11		8.31								5
A2N0015D1K	–	15	16	2.38	9.78	1.06	12	1-1/16 - 12	3/4	–	–	–	6
A2N0029D1K	1 Pint	29	30		14.19								7
A2N0058D1K	1 Quart	58	59		23.19								10
A3N0029D1K	1 Pint	29	34		10.25								14
A3N0058D1K	1 Quart	58	63		14.34								18
A3N0090D1K	1.5 Liter	90	95	3.56	18.94	1.13	12	1-1/16 - 12	3/4	3/8 - 24	2.25	0.56	22
A3N0116D1K	1/2 Gal.	116	121		22.56								25
A3N0183D1K	3 Liter	183	188		32.06								32
A4N0058D1K	1 Quart	58	68		11.63								29
A4N0116D1K	1/2 Gal.	116	126		16.19								35
A4N0231D1K	1 Gal.	231	241	4.75	25.19	1.13	20	1-5/8 - 12	1-1/4	1/2 - 20	3.25	0.75	48
A4N0347D1K	1-1/2 Gal.	347	357		34.31								61
A4N0578D1K	2-1/2 Gal.	578	588		52.38								87
A6N0231D1K	1 Gal.	231	266		17.38								83
A6N0347D1K	1-1/2 Gal.	347	382		21.81								97
A6N0578D1K	2-1/2 Gal.	578	613		30.63								124
A6N0924D1K	4 Gal.	924	959	6.88	43.81	1.13	24	1-7/8 - 12	1-1/2	1/2 - 20	4.38	0.75	165
A6N1155D1K	5 Gal.	1155	1190		52.63								192
A6N1733D1K	7-1/2 Gal.	1733	1768		74.63								260
A6N2310D1K	10 Gal.	2310	2345		96.63								327

Notes:

1) For Water Service add "W" after construction code, see "How to Order" information.
2) See Port Options for complete listing of optional ports.
3) ASME Certified and CE marked accumulators and gas bottles are available.
4) When accumulators are to be used with gas bottles, order "Accumulators for Use with Gas Bottles."
5) 2", 3", 4" & 6" bores standard with cored gas valves. Poppet type (MS28889-2) gas valve available as an option.

3000 PSI Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	D Port (Both Ends) SAE No.	D Port Thread Size (in)	D Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
A4N0058D3KTFTF	1 Quart	58	68		10.50							29
A4N0116D3KTFTF	1/2 Gal.	116	126		15.06							35
A4N0231D3KTFTF	1 Gal.	231	241	4.75	24.06	20	1-5/8 - 12	1-1/4	1/2 - 20	3.25	0.75	48
A4N0347D3KTFTF	1-1/2 Gal.	347	357		33.19							61
A4N0578D3KTFTF	2-1/2 Gal.	578	588		51.25							87
A6N0231D3KTGTG	1 Gal.	231	266		16.25							83
A6N0347D3KTGTG	1-1/2 Gal.	347	382		20.68							97
A6N0578D3KTGTG	2-1/2 Gal.	578	613		29.50							124
A6N0924D3KTGTG	4 Gal.	924	959	6.88	42.68	24	1-7/8 - 12	1-1/2	1/2 - 20	4.38	0.75	165
A6N1155D3KTGTG	5 Gal.	1155	1190		51.50							192
A6N1733D3KTGTG	7-1/2 Gal.	1733	1768		73.50							260
A6N2310D3KTGTG	10 Gal.	2310	2345		95.50							327

3000 PSI Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (gal)	Gas Volume Actual (cu in)	A (in)	B (in)	C (in)	D Port SAE No.	D Port Thread Size (in)	D Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
B4N0058D1K	1 Quart	86		11.63								27
B4N0116D1K	1/2 Gal.	144		16.19								33
B4N0231D1K	1 Gal.	259	4.75	25.19	1.13	20	1-5/8 - 12	1-1/4	1/2 - 20	3.25	0.75	46
B4N0347D1K	1-1/2 Gal.	375		34.31								59
B4N0578D1K	2-1/2 Gal.	606		52.38								85
B6N0231D1K	1 Gal.	319		17.38								68
B6N0347D1K	1-1/2 Gal.	435		21.81								82
B6N0578D1K	2-1/2 Gal.	666		30.63								111
B6N0924D1K	4 Gal.	1012	6.88	43.81	1.13	24	1-7/8 - 12	1-1/2	1/2 - 20	4.38	0.75	154
B6N1155D1K	5 Gal.	1243		52.63								182
B6N1733D1K	7-1/2 Gal.	1821		74.63								254
B6N2310D1K	10 Gal.	2398		96.63								325

207 Bar Metric Accumulators for Oil and Water Service

Model No.[1] Oil Service	Fluid Volume (Liters)	Fluid Volume (cu in)	Gas Volume (Liters)	A (mm)	B (mm)	C (mm)	D-Hydraulic Port BSPP/G (in)	D-Hydraulic Port SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
A2N0005D2K	0.08	5	0.11		172							2.1
A2N0010D2K	0.16	10	0.19		211							2.3
A2N0015D2K	0.25	15	0.24	60	250	27	3/4	–	–	–	–	2.6
A2N0029D2K	0.48	29	0.50		360							3.3
A2N0058D2K	0.95	58	0.98		589							4.7
A3N0029D2K	0.48	29	0.56		260							6.5
A3N0058D2K	0.95	58	1.03		364							8.1
A3N0090D2K	1.47	90	1.56	90	481	29	1	–	M10	60	15	9.8
A3N0116D2K	1.90	116	1.98		573							11.1
A3N0183D2K	3.00	183	3.08		814							14.6
A4N0058D2K	0.95	58	1.11		295							13.0
A4N0116D2K	1.90	116	2.06		411							15.9
A4N0231D2K	3.79	231	3.95	121	640	29	1	–	M12	82	18	21.8
A4N0347D2K	5.69	347	5.85		871							27.6
A4N0578D2K	9.47	578	9.64		1330							39.3
A6N0231D2K	3.79	231	4.36		441							37.8
A6N0347D2K	5.69	347	6.26		554							44.0
A6N0578D2K	9.47	578	10.0		778							56.3
A6N0924D2K	15.1	924	15.7	175	1113	29	1-1/2	–	M12	110	18	74.7
A6N1155D2K	18.9	1155	19.5		1337							87.0
A6N1733D2K	28.4	1733	29.0		1896							117.8
A6N2310D2K	37.9	2310	38.4		2454							148.5

Notes:

1) For Water Service add “W” after construction code, see “How to Order” information.
2) See Port Options for complete listing of port options.
3) ASME Certified and CE marked accumulators and gas bottles are available.
4) When accumulators are to be used with gas bottles, order "Accumulators for Use with Gas Bottles."
5) 2", 3", 4" & 6" bores standard with cored gas valves. Poppet type (MS28889-2) gas valves available as an option.

207 Bar Metric Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (Liters)	Fluid Volume (cu in)	Gas Volume (Liters)	A (mm)	B (mm)	D - Port (Both Ends) BSPP/G (in)	D - Port (Both Ends) SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
A4N0058D2KRDRD	0.95	58	1.11		267						13
A4N0116D2KRDRD	1.90	116	2.06		383						16
A4N0231D2KRDRD	3.79	231	3.95	121	611	1	–	M12	82	18	22
A4N0347D2KRDRD	5.69	347	5.85		843						28
A4N0578D2KRDRD	9.47	578	9.64		1302						39
A6N0231D2KRFRF	3.79	231	4.36		413						38
A6N0347D2KRFRF	5.69	347	6.26		525						44
A6N0578D2KRFRF	9.47	578	10.0		749						56
A6N0924D2KRFRF	15.1	924	15.7	175	1084	1-1/2	–	M12	110	18	75
A6N1155D2KRFRF	18.9	1155	19.5		1308						87
A6N1733D2KRFRF	28.4	1733	29.0		1867						118
A6N2310D2KRFRF	37.9	2310	38.4		2426						149

207 Bar Metric Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (gal)	Gas Volume Actual (liters)	A (mm)	B (mm)	C (mm)	D-Hydraulic Port BSPP/G (in)	D-Hydraulic Port SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
B4N0058D2K	1 Quart	1.41		295							12
B4N0116D2K	1/2 Gal.	2.36		411							15
B4N0231D2K	1 Gal.	4.24	121	640	29	1	–	M12	82	18	21
B4N0347D2K	1-1/2 Gal.	6.15		871							27
B4N0578D2K	2-1/2 Gal.	9.93		1330							39
B6N0231D2K	1 Gal.	5.23		441							36
B6N0347D2K	1-1/2 Gal.	7.13		554							42
B6N0578D2K	2-1/2 Gal.	10.9		778							54
B6N0924D2K	4 Gal.	16.6	175	1113	29	1-1/2	–	M12	110	18	72
B6N1155D2K	5 Gal.	20.4		1337							85
B6N1733D2K	7-1/2 Gal.	29.8		1896							116
B6N2310D2K	10 Gal.	39.3		2454							146

3000 PSI Piston Accumulators for Oil and Water Service

Model No.[1] Oil Service	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	C (in)	D-Hydraulic Port SAE No.	D-Hydraulic Port Thread Size (in)	D-Hydraulic Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
A7K0578D3KPL	2-1/2 Gal	578	633		27.25		32	2-1/2 - 12	2				170
A7K1155D3KPL	5 Gal.	1155	1210		42.25								226
A7K1733D3KPL	7-1/2 Gal.	1733	1788	8.13	57.25	1.63		or		5/8 - 18	5.75	0.94	283
A7K2310D3KPL	10 Gal.	2310	2365	±0.06	72.25			2" Code 61					340
A7K3465D3KPL	15 Gal.	3465	3520		102.25			Flange (PL)[2]					454
A7K5775D3KPL	25 Gal.	5775	5830		162.25								682
A9K2310D3KPL	10 Gal.	2310	2400		48.75		32	2-1/2 - 12	2				595
A9K3465D3KPL	15 Gal.	3465	3555		66.94								758
A9K4620D3KPL	20 Gal.	4620	4710	11.02	85.06	1.63		or		3/4 - 16	7.00	1.13	920
A9K5775D3KPL	25 Gal.	5775	5865	±0.09	103.18			2" Code 61					1083
A9K6930D3KPL	30 Gal.	6930	7020		121.37			Flange (PL)[2]					1246
A12K5775D1K	25 Gal.	5775	5975		67.50			3" SAE Flange					1336
A12K6930D1K	30 Gal.	6930	7130	14.41	76.31	1.63		Ports (Code 61)		7/8-9	9.00	1.50	1490
A12K9240D1K	40 Gal.	9240	9440	±0.09	98.88			See Port Options		(6X)			1799
A12K11550D1K	50 Gal.	11550	11750		119.62			for Dimensions					2108

The Minimum Design Metal Temperature (MDMT) for ASME certified 7" and 9" piston accumulators presented in this section is 20°F (-7°C).
The Minimum Design Metal Temperature (MDMT) for ASME certified 12" piston accumulators presented in this section is 32°F (0°C).

Notes:

1) For Water Service add "W" after construction code, see "How to Order" information.
2) Most SAE #32 fittings are rated for 2000 PSI. If 2000 to 3000 PSI service is required, two options are available; order accumulator with optional standard 2" SAE Code 61 4-bolt flange port by specifying "PL" code when ordering or order the accumulator with a SAE #24 port or smaller, see "Port Options" for dimensions and "How to Order".
3) See Port Options for complete listing of optional ports.
4) ASME Certified and CE marked accumulators and gas bottles are available.
5) When accumulators are to be used with gas bottles, order "Accumulators for Use with Gas Bottles."
6) Poppet type (MS28889-2) gas valve standard.

3000 PSI Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	D Port (Both Ends)(in)	E (in)	F (in)	G (lbs)	Weight
A7K0578D3KPLPL	2-1/2 Gal.	578	633		25.63					170
A7K1155D3KPLPL	5 Gal.	1155	1210		40.63	2" Code 61 Flange (PL)[2]				226
A7K1733D3KPLPL	7-1/2 Gal.	1733	1788	8.13	55.63	or	5/8 - 18	5.75	0.94	283
A7K2310D3KPLPL	10 Gal.	2310	2365	±0.06	70.63	#32 SAE Straight Thread				340
A7K3465D3KPLPL	15 Gal.	3465	3520		100.63					454
A9K2310D3KPLPL	10 Gal.	2310	2400		47.00					595
A9K3465D3KPLPL	15 Gal.	3465	3555		65.25	2" Code 61 Flange (PL)[2]				758
A9K4620D3KPLPL	20 Gal.	4620	4710	11.02	101.50	or	3/4 - 16	7.00	1.13	920
A9K5775D3KPLPL	25 Gal.	5775	5865	±0.09	119.62	#32 SAE Straight Thread				1083
A9K6930D3KPLPL	30 Gal.	6930	7020		137.75					1246
A12K5775D3KPNPN	25 Gal.	5775	5975		65.88	3" SAE Flange				1336
A12K6930D3KPNPN	30 Gal.	6930	7130	14.41	74.69	Ports (Code 61)	7/8 - 9	9.00	1.50	1490
A12K9240D3KPNPN	40 Gal.	9240	9440	±0.09	97.25	See Port Options	(6X)			1799
A12K11550D3KPNPN	50 Gal.	11550	11750		118.00	for Dimensions				2108

3000 PSI Auxiliary Gas Bottles

Model No.	Gas Volume									
Gas Bottle	Nominal (gal)	Actual (cu in)	A (in)	B (in)	C (in)	D Port	E (in)	F (in)	G (in)	Weight (lbs)
B7K0578D3K(PL)	2-1/2 Gal.	677		27.25						160
B7K1155D3K(PL)	5 Gal.	1254		42.25		2" Code 61 Flange (PL)[2]				217
B7K1733D3K(PL)	7-1/2 Gal.	1832	8.13	57.25	1.63	or	5/8 - 18	5.75	0.94	274
B7K2310D3K(PL)	10 Gal.	2401	±0.06	72.25		#32 SAE Straight Thread				331
B7K3465D3K(PL)	15 Gal.	3556		102.25						445
B9K2310D3K(PL)	10 Gal.	2474		48.75						546
B9K3465D3K(PL)	15 Gal.	3629		66.94		2" Code 61 Flange (PL)[2]				709
B9K4620D3K(PL)	20 Gal.	4620	11.02	85.06	1.63	or	3/4 - 16	7.00	1.13	872
B9K5775D3K(PL)	25 Gal.	5775	±0.09	103.25		#32 SAE Straight Thread				1035
B9K6930D3K(PL)	30 Gal.	6930		121.37						1197
B12K5775D1K	25 Gal.	6288		67.50						1246
B12K6930D1K	30 Gal.	7443	14.41	76.31	1.63	3" SAE Flange	7/8 - 9	9.00	1.50	1400
B12K9240D1K	40 Gal.	9783	±0.09	98.88		Ports (Code 61) See Port Options	(6X)			1709
B12K11550D1K	50 Gal.	12093		119.62		for Dimensions				2017

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

207 Bar Metric Accumulators for Oil and Water Service

Model No.[1] Oil Service	Fluid Volume (Liters)	Fluid Volume (cu in)	Gas Volume (Liters)	A (mm)	B (mm)	C (mm)	D-Hydraulic Port BSPP/G (in)	D-Hydraulic Port SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
A7K0578D2K	9.47	578	10.4		692							76.9
A7K1155D2K	18.9	1155	19.8		1073			2" Metric				103
A7K1733D2K	28.4	1733	29.3	206.5	1454	41	–	Code 61	M16	150	24	129
A7K2310D2K	37.9	2310	38.8	±1.52	1835			Flange				154
A7K3465D2K	56.8	3465	57.7		2597							206
A9K2310D2K	37.9	2310	39.3		1238							270
A9K3465D2K	56.8	3465	58.3		1700			2"Metric				344
A9K4620D2K	75.7	4620	77.2	279.9	2161	41	–	Code 61	M20	182	30	417
A9K5775D2K	94.7	5775	96.2	±2.29	2622			Flange				491
A9K6930D2K	113.6	6930	115.1		3083							565
A12K5775D2K	94.6	5775	97.9		1715							606
A12K6930D2K	114	6930	117	365.9	1938	41	–	3" Metric	M20	230	30	676
A12K9240D2K	151	9240	155	±2.29	2512			Code 61	(6X)			816
A12K11550D2K	189	11550	193		3038			Flange				956

Notes:

1) For Water Service add "W" after construction code, see "How to Order" information.
2) Most SAE #32 fittings are rated for 2000 PSI. If 2000 to 3000 PSI service is required, two options are available; order accumulator with optional standard 2" SAE Code 61 4-bolt flange port by specifying "PL" code when ordering or order the accumulator with a SAE #24 port or smaller, see "Port Options" for dimensions and "How to Order".
3) See Port Options for complete listing of optional ports.
4) ASME Certified and CE marked accumulators and gas bottles are available.
5) When accumulators are to be used with gas bottles, order "Accumulators for Use with Gas Bottles."
6) Poppet type (MS28889-2) gas valve standard.

207 Bar Metric Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (Liters)	Fluid Volume (cu in)	Gas Volume (Liters)	A (mm)	B (mm)	D-Port (Both Ends) BSPP/G (in)	D-Port (Both Ends) SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
A7K0578D2KMLML	9.47	578	10.4		651						77
A7K1155D2KMLML	18.9	1155	19.8		1032		2" Metric				103
A7K1733D2KMLML	28.4	1733	29.3	206.5	1413	–	Code 61	M16	150	24	129
A7K2310D2KMLML	37.9	2310	38.8	±1.52	1794		Flange				154
A7K3465D2KMLML	56.8	3465	57.7		2556						206
A9K2310D2KMLML	37.9	2310	39.3		1194						270
A9K3465D2KMLML	56.8	3465	58.3		1657		2" Metric				344
A9K4620D2KMLML	75.7	4620	77.2	279.9	2118	–	Code 61	M20	182	30	417
A9K3465D2KMLML	94.6	5775	96.1	±2.29	2581		Flange				419
A9K4620D2KMLML	113.6	6930	115.1		3044						565
A12K5775D2KMNMN	94.6	5775	97.9		1673						606
A12K6930D2KMNMN	114	6930	117	365.9	1897	–	3" Metric Code 61 Flange	M20 (6X)	230	30	676
A12K9240D2KMNMN	151	9240	155	±2.29	2470						816
A12K11550D2KMNMN	189	11550	193		2997						956

207 Bar Metric Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (gal)	Gas Volume Actual (liters)	A (mm)	B (mm)	C (mm)	D-Hydraulic Port BSPP/G (in)	D-Hydraulic Port SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
B7K0578D2K	2-1/2 Gal.	11.1		692							73
B7K1155D2K	5 Gal.	20.5		1073			2" Metric				99
B7K1733D2K	7-1/2 Gal.	30.0	206.5	1454	41	–	Code 61	M16	150	24	125
B7K2310D2K	10 Gal.	39.3	±1.52	1835			Flange				150
B7K3465D2K	15 Gal.	58.3		2597							202
B9K2310D2K	10 Gal.	40.5		1238							248
B9K3465D2K	15 Gal.	59.5		1700			2" Metric				322
B9K4620D2K	20 Gal.	78.4	279.9	2161	41	–	Code 61	M20	182	30	396
B9K5775D2K	25 Gal.	98.0	±2.29	2623			Flange				469
B9K6930D2K	30 Gal.	117.6		3085							543
B12K5775D2K	25 Gal.	103		1715							565
B12K6930D2K	30 Gal.	122	365.9	1938	41	–	3" Metric Code 61 Flange	M20 (6X)	230	30	635
B12K9240D2K	40 Gal.	160	±2.29	2512							775
B12K11550D2K	50 Gal.	198		3038							915

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

3000 PSI Non-ASME Piston Accumulators for Oil and Water Service

ASME certification is a requirement of strength and material traceability (see page 4). Many states require ASME certification, but not all. It is the function of the system designer to specify whether ASME is or is not required.

We now offer true non-ASME accumulators in 7" and 8" bore sizes which carry a full 4:1 design factor and utilize industry standard materials. When ASME certification is not required, specifying these accumulators can result in significant savings.

Local rules and regulations should be followed. However, the accumulators listed on these two pages can be used with confidence when ASME certification is not required.

Model No.[1] Oil Service	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	C (in)	D-Hydraulic Port SAE No.	D-Hydraulic Port Thread Size (in)	D-Hydraulic Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
A7N0578D3KPL	2½	578	633	8.13 ±0.06	27.25	1.63	32	2½ - 12	2	5/8 - 18	5.75	0.94	170
A7N1155D3KPL	5	1155	1210		42.25		or 2" Code 61 Flange (PL)[2]						226
A7N1733D3KPL	7½	1733	1788		57.25								283
A7N2310D3KPL	10	2310	2365		72.25								340
A7N3465D3KPL	15	3465	3520		102.25								454
A7N5775D3KPL	25	5775	5830		162.25								682
A8N0578D3KPL	2½	578	655	9.06 ±0.06	22.94	1.63	32	2½-12	2	5/8-18	6.75	0.94	216
A8N1155D3KPL	5	1155	1232		34.81		or 2" Code 61 Flange (PL)[2]						268
A8N1733D3KPL	7½	1733	1810		46.68								321
A8N2310D3KPL	10	2310	2387		58.50								374
A8N3465D3KPL	15	3465	3542		82.28								479
A8N5775D3KPL	25	5775	5852		129.68								690

Notes:

1) For Water Service add "W" after construction code, see "How to Order" information.
2) Most SAE #32 fittings are rated for 2000 PSI. If 2000 to 3000 PSI service is required, two options are available; order accumulator with optional standard 2" SAE Code 61 4-bolt flange port by specifying "PL" code when ordering or order the accumulator with a SAE #24 port or smaller, see "Port Options" for dimensions and "How to Order".
3) See Port Options for complete listing of optional ports.
4) ASME Certified and CE marked accumulators and gas bottles are available.
5) When accumulators are to be used with gas bottles, order "Accumulators for Use with Gas Bottles."
6) Poppet type (MS28889-2) gas valve standard.

3000 PSI Non-ASME Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	D Port (Both Ends)(in)	E (in)	F (in)	G (lbs)	Weight
A7N0578D3KPLPL	2½	578	633		25.63					170
A7N1155D3KPLPL	5	1155	1210		40.63	2" Code 61 Flange (PL)[2]				226
A7N1733D3KPLPL	7½	1733	1788	8.13	55.63	or	5/8 - 18	5.75	0.94	283
A7N2310D3KPLPL	10	2310	2365	±0.06	70.63	#32 SAE Straight Thread				340
A7N3465D3KPLPL	15	3465	3520		100.63					454
A7N5775D3KPLPL	25	5775	5830		160.50					682
A8N0578D3KPLPL	2½	578	650		21.31					216
A8N1155D3KPLPL	5	1155	1228		33.18	2" Code 61 Flange (PL)[2]				268
A8N1733D3KPLPL	7½	1733	1806	9.06	45.06	or	5/8 - 18	6.75	0.94	321
A8N2310D3KPLPL	10	2310	2381	±0.06	56.88	#32 SAE Straight Thread				374
A8N3465D3KPLPL	15	3465	3537		80.63					479
A8N5775D3KPLPL	25	5775	5847		128.06					690

3000 PSI Non-ASME Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (gal)	Gas Volume Actual (cu in)	A (in)	B (in)	C (in)	D Port	E (in)	F (in)	G (in)	Weight (lbs)
B7N0578D3K(PL)	2½	787		27.25						160
B7N1155D3K(PL)	5	1309		42.25		2" Code 61 Flange (PL)[2]				217
B7N1733D3K(PL)	7½	1942	8.13	57.25	1.63	or	5/8 - 18	5.75	0.94	274
B7N2310D3K(PL)	10	2464	±0.06	72.25		#32 SAE Straight Thread				331
B7N3465D3K(PL)	15	3619		102.25						445
B7N5775D3K(PL)	25	5929		162.13						673
B8N0578D3K(PL)	2½	772		22.94						205
B8N1155D3K(PL)	5	1350		34.81		2" Code 61 Flange (PL)[2]				257
B8N1733D3K(PL)	7½	1928	9.06	46.68	1.63	or	5/8 - 18	6.75	0.94	310
B8N2310D3K(PL)	10	2503	±0.06	58.50		#32 SAE Straight Thread				363
B8N3465D3K(PL)	15	3659		82.25						468
B8N5775D3K(PL)	25	5969		129.68						679

2000 PSI Piston Accumulators for Oil and Water Service

The aluminum die casting industry has been the primary user of our 2000 PSI accumulators. We offer a 2000 PSI accumulator in 12" bore size and a variety of capacities for industries where lower pressure ratings can be used.

Model No.[1] Oil Service	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	C (in)	D-Hydraulic Port SAE No.	D-Hydraulic Port Thread Size (in)	D-Hydraulic Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
A12K4620K1K	20	4620	4820		55.75								1048
A12K5775K1K	25	5775	5975		66.19								1193
A12K6930K1K	30	6930	7130	14.02	76.62	1.62	3" SAE Flange Ports (Code 61) See Port Options for Dimensions			7/8-9 (6X)	9.00	1.50	1338
A12K9240K1K	40	9240	9440	±0.09	97.50								1628
A12K11550K1K	50	11550	11750		118.37								1918

Notes:

1) For Water Service add "W" after construction code, see "How to Order" information.
2) Most SAE #32 fittings are rated for 2000 PSI. If 2000 to 3000 PSI service is required, two options are available; order accumulator with optional standard 2" SAE Code 61 4-bolt flange port by specifying "PL" code when ordering or order the accumulator with a SAE #24 port or smaller, see "Port Options" for dimensions and "How to Order".
3) See Port Options for complete listing of optional ports.
4) ASME Certified and CE marked accumulators and gas bottles are available.
5) When accumulators are to be used with gas bottles, order "Accumulators for Use with Gas Bottles."
6) Poppet type (MS28889-2) gas valve standard.

2000 PSI Accumulators for Use with Gas Bottles

Typical Both Ends

Accumulator Model No.	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	D Port (Both Ends)(in)	E (in)	F (in)	G (lbs)	Weight
A12K4620K3KPNPN	20	4620	4820		54.13	3" SAE Flange Ports (Code 61) See Port Options for Dimensions	7/8 - 9 (6X)	9.00	1.50	1048
A12K5775K3KPNPN	25	5775	5975		64.56					1193
A12K6930K3KPNPN	30	6930	7130	14.02	75.00					1338
A12K9240K3KPNPN	40	9240	9440	±0.09	95.88					1628
A12K11550K3KPNPN	50	11550	11750		116.75					1918

2000 PSI Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (gal)	Gas Volume Actual (cu in)	A (in)	B (in)	C (in)	D Port	E (in)	F (in)	G (in)	Weight (lbs)
B12K4620K1K	20	4620		55.75		3" SAE Flange Ports (Code 61) See Port Options for Dimensions	7/8 - 9 (6X)	9.00	1.50	957
B12K5775K1K	25	6288		66.19						1167
B12K6930K1K	30	7443	14.02	76.62	1.62					1312
B12K9240K1K	40	9783	±0.09	97.50						1606
B12K11550K1K	50	12093		118.37						1896

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.

Seals

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	-45°F to 325°F -43°C to 162°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

***Note:** Consult local distributor or factory for fluid compatibility information.

** The temperatures listed indicate the operating temperature range of the seals, not the accumulator. For the Minimum Design Metal Temperature (MDMT) of ASME certified accumulators, refer to page 28.

Gas Valve Option (M)

The military style (MS) gas valve is available on 2" thru 6" bores as an option (M). Specify when ordering.

Safety Fuse Options (F)

Safety Fuses are used as a safety device on accumulators and gas bottles to prevent over-pressurization of gas due to external heat or hydraulic pressure (set at 140% of maximum system pressure to avoid rupture disk fatigue and premature failure). The rupture disks are calibrated to rupture at a pre-determined pressure. Safety fuses are available on most sizes of piston and bladder accumulators and gas bottles. Safety fuses can be installed on all piston accumulators by using the "Fuse Adapter" as shown to the right. 4" bore units and above can be equipped with a fuse port machined in the gas cap by specifying the "Safety Fuse Option" (F) at the time of order in the model code, see "How to Order." The safety fuse assembly and/or fuse adapter must be ordered separately.

Description	Part Number
Safety Fuse Assembly[1]	086471xxxx
Replacement Rupture Disks	756003xxxx
Fuse Adapter	1468970002

1) Assembly includes housing and rupture disk, xxxx = pressure setting in 100 psi increments, i.e., for an assembly with a 2000 PSI setting, order P/N 0864712000.

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Optional Ports

The following ports are available as options on all Series 3000 piston accumulators

SAE Straight Thd.			Code 61 Flange				NPT			BSPP			ISO 6149-1		
Port Size	Port Code	Min. Bore	Port Size	Port Code Inch	Port Code Metric	Min. Bore	Port Size	Port Code	Min. Bore	Port Size	Port Code	Min. Bore	Port Size	Port Code	Min. Bore
#5	TA	2"	1/2"	PT	MT	3"	3/8"	UT	2"	3/8"	RA	2"	M14	YA	2"
#6	TB	2"	3/4"	PU	MU	3"	1/2"	UU	2"	1/2"	RB	2"	M18	YB	2"
#8	TC	2"	1"	PV	MV	3"	3/4"	UV	2"	3/4"	RC	2"	M22	YC	2"
#10	TI	2"	1¼"	PW	MW	3"	1"	UW	3"	1"	RD	3"	M27	YD	2"
#12	TD	2"	1½"	PJ	MJ	4"	1¼"	UX	3"	1¼"	RE	3"	M33	YE	3"
#16	TE	3"	2"	PL	ML	6"	1½"	UY	4"	1½"	RF	4"	M42	YF	3"
#20	TF	3"	2½"	PM	MM	6"	2"	UZ	4"	2"	RG	4"	—	—	—
#24	TG	4"	3"	PN	MN	7"	—	—	—	—	—	—	—	—	—

Note:
1) 3000 PSI SAE Code 61 (ISO 6162) Flange dimensions are shown below.
2) BSPT and Metric ports available, consult factory.

SAE 4-Bolt Flange Port Dimensions

Standard Pressure – 3000 PSI (207 Bar)

Flange Size	SAE Code 61 Flange Dimensions (in.)				
in	A	B	C	F	G
1½"	1/2 - 13	1.406	2.750	1½	1.062
2"	1/2 - 13	1.688	3.062	2	1.062
2½"	1/2 - 13	2.000	3.500	2½	1.188
3"	5/8 -11	2.438	4.188	3	1.188

Note: Some flanges using this bolt pattern are not rated for 3000 PSI.

Flange Size	Metric ISO6162 Flange Dimensions (mm)				
mm	A	B	C	F	G
38	M12	35.7	69.9	38	26.9
51	M12	42.9	77.8	51	26.9
64	M12	50.8	88.9	64	30.1
76	M16	61.9	106.4	76	30.1

Note: Some flanges using this bolt pattern are not rated for 3000 PSI.

Port Adapters

A wide variety of port adapters are offered for those that wish to convert Parker's standard SAE port offerings to NPTF or smaller SAE port sizes.

For a complete listing, see Accumulator Accessories.

Seal Kits

Seal Kits are available for all piston accumulator models. When ordering seal kits, please supply the complete model and serial numbers from the name plate and specify fluid type and operating temperature.

Parts List

1 Body
2 Hydraulic Cap
3 Gas Cap
4 Piston
5 V-O-ring Piston Seal
5A V-O-ring Backups
6 PTFE Glide Rings
7 O-ring
7A O-ring Backup
8 Gas Valve
8A Gas Valve O-ring
9 Gas Valve Guard
9A Screw

3000 PSI Seal Kit Numbers (Includes items 5, 5A, 6, 7, 7A, 8A)

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

*CF = Consult Factory

Mounting, Charging & Gauging Accessories

Parker offers a wide variety of mounting, charging and gauging accessories. See “Accumulator Accessories.”

Special Options

If your application requires a piston accumulator, gas bottle, or special option that falls outside of Parker’s broad offering, consult your local distributor, Parker representative, or the factory with your specific requirements. Parker has the manufacturing and engineering expertise to design and build piston accumulators to your exacting requirements, from simple modifications of standard units to complete designs. Some example of Parker’s past special designs include:

- Special and Stainless Steel Materials
- Piston Position and Velocity Sensors and Switches
- Special Seals
- Non-Standard Capacities
- Tie Rod Construction
- Special Certifications
- Spring & Weight Loaded

Consult the experts at Parker with your next piston accumulator requirement!

How to Order Piston Accumulators

Piston accumulators and gas bottles can be specified by using the symbols in the chart below to develop a model number. Select only those symbols that represent the features desired, and place them in the sequence indicated by the example at the top of the chart.

Series	Nominal Bore Size	Type of Construction	Options	Capacity	Design Pressure	Design Number	Seal Compound	Hyd. Port Modification		Gas Port Modification	
A	7	K	–	2310	D	1	K	–	–	–	–

Series	
A	Accumulator
B	Gas Bottle

Nominal Bore Size	
2	2 inches
3	3 inches
4	4 inches
6	6 inches
7	7 inches
8	8 inches
9	9 inches
12	12 inches

Type of Construction	
N	Threaded both ends non-ASME mat'l standard on 2", 4", 6", 7" & 8" (3000 PSI fatigue design tested)
K	Threaded both ends A.S.M.E. mat'l standard on 7" & up
L	Same as K with A.S.M.E. approval stamp 7" & up. Available as special on smaller sizes
E	Threaded both ends, CE marked (1 liter and above) or SEP marked (under 1 liter)

Options	
Blank	Standard Gas Cap
W	Water Service
F	SAE Fuse Port *
G	SAE Fuse Port *, Water Service
M	MS28889-2 Gas Valve
L	MS28889-2 Gas Valve, Water Service
P	Fuse* and MS28889-2
R	Fuse* and MS28889-2, Water Service

** Safety fuse assembly not included. Order fuse assembly separately.*

Bore Size/Capacity		
0005	2"	5 cu. in. (0.08 liters)
0010		10 cu. in. (0.16 liters)
0029		29 cu. in. (0.48 liters)
0058		58 cu. in. (0.95 liters)
0029	3"	29 cu. in. (0.48 liters)
0058		58 cu. in. (0.95 liters)
0090		90 cu. in. (1.47 liters)
0116		116 cu. in. (1.90 liters)
0183		183 cu. in. (3.00 liters)
0058	4"	58 cu. in. (0.95 liters)
0116		116 cu. in. (1.90 liters)
0231		1 gal. (3.79 liters)
0347		1½ gal. (5.69 liters)
0578		2½ gal. (9.47 liters)
0231	6"	1 gal. (3.79 liters)
0347		1½ gal. (5.69 liters)
0578		2½ gal. (9.47 liters)
0924		4 gal. (15.1 liters)
1155		5 gal. (18.9 liters)
1733		7½ gal. (28.4 liters)
2310		10 gal. (37.9 liters)
0578	7"	2½ gal. (9.47 liters)
1155		5 gal. (18.9 liters)
1733		7½ gal. (28.4 liters)
2310		10 gal. (37.9 liters)
3465		15 gal. (56.8 liters)
5775		25 gal. (94.6 liters)
0578	8"	2½ gal. (9.47 liters)
1155		5 gal. (18.9 liters)
1733		7½ gal. (28.4 liters)
2310		10 gal. (37.9 liters)
3465		15 gal. (56.8 liters)
5755		25 gal. (94.6 liters)
2310	9"	10 gal. (37.9 liters)
3465		15 gal. (56.8 liters)
4620		20 gal. (75.7 liters)
5775		25 gal. (94.6 liters)
6930		30 gal. (113.6 liters)
5775	12"	25 gal. (94.6 liters)
6930		30 gal. (114 liters)
9240		40 gal. (151 liters)
11550		50 gal. (189 liters)

Consult factory for other available sizes.

Design Pressure	
D	3000 PSI (All Bore Sizes)
K	2000 PSI (12" Bore only)
X	Other
For CE Marked Only	
L	250 Bar (All Bore Sizes)
H	350 Bar (See page 63)

Design Number	
1	Standard
2	Metric Mounting Holes & Hyd. Port (BSPP Standard) Specify Optional Ports
3	Optional Port (Hyd. or Gas, See Port Table)
***	Special Design

Hydraulic and Gas Port Modifications Designated by 2 Digits

1st Digit	Style	2nd Digit	Description	Min. Bore Size
Blank	Std.	Blank	Std.	
T	SAE Straight Thread Ports	A	SAE #5 (1/2 - 20)	2"
		B	SAE #6 (9/16 - 18)	2"
		C	SAE #8 (3/4 - 16)	2"
		D	SAE #12 (1 1/16 - 12)	2"
		E	SAE #16 (1 5/16 - 12)	3"
		F	SAE #20 (1 5/8 - 12)	3"
		G	SAE #24 (1 7/8 - 12)	4"
		H	SAE #32 (2 1/2 - 12)	7"
		I	SAE #10 (7/8 - 14)	2"
				Min. Bore
P	Flange (Code 61)	J	1 1/2"	4"
		L	2"	6"
		M	2 1/2"	6"
M	Metric Flange per ISO 6162	N	3"	7"
		T	1/2"	3"
		U	3/4"	3"
		V	1"	3"
		W	1 1/4"	3"
U	NPTF (Not Recommended)	T	3/8"	2"
		U	1/2"	2"
		V	3/4"	2"
		W	1"	2"
		X	1 1/4"	2"
		Y	1 1/2"	4"
		Z	2"	4"

		BSPP/BSPT		Metric/ISO 6149-1
R	BSPP Parallel	A	3/8 - 19	A M14 x 1.5
B	BSPT Taper Port	B	1/2 - 14	B M18 x 1.5
		C	3/4 - 14	C M22 x 1.5
		D	1 - 11	D M27 x 2
G	Metric	E	1 1/4 - 11	E M33 x 2
Y	ISO 6149-1	F	1 1/2 - 11	F M42 x 2
		G	2 - 11	G M48 x 2

Example of Optional Port Accumulator

A 4 N 0231 D 3 K T C U V

- 3 — Non-std. Port
- T C — SAE #8 Hyd. Port
- U V — NPT 3/4" Gas Port

Standard Ports Available (See Port Modifications Table if Using Other Than Standard Ports Shown Below)

Bore Size	Standard Port Sizes	Metric Port Sizes
2"	SAE #12	3/4
3"	SAE #12	3/4
4"	SAE #20	1
6"	SAE #24	1
7"	SAE #32	ISO 6162
8"	SAE #32	ISO 6162
9"	SAE #32	ISO 6162
12"	3" SAE Flange Code 61	ISO 6162

Seal Compound (See Catalog for Temperature Settings)	
K	Buna-Nitrile (Std)
E	Fluoroelastomer
D	EPR
H	Hydrogenated Nitrile
Q	Low Temp.
S	Special (to be specified)

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

4000

***Series 4000** Accumulators Provide the Compatibility and Performance Specific for Your Mobile Application.*

Series 4000 Piston Accumulators

- Heavy Duty Service with 4000 PSI Operating Pressure
- 2" thru 6" Bores with Over 20 Standard Capacities
- Patented V-O-ring Piston Seals
- Serviceable Threaded End Construction
- Five Standard Seal Options to Handle a Variety of Fluids & Temperatures

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Materials

- Shell – high strength steel
- Caps – steel
- Pistons – aluminum
- Gas Valve Cartridge – stainless steel
- Gas Valve Protector – steel
- Piston Glide Rings – PTFE
- Piston & End Seals – various polymers
- Piston Seal Backups – PTFE

Actual Bore Sizes & Maximum Flow Rates

Nominal Bore Size (in.)	Actual Bore Size		Max. Recommended Flow*	
	(in.)	(mm)	GPM	LPM
2	2.03	51.44	100	380
3	3.00	76.20	220	834
4	4.03	102.4	397	1504
6	5.78	146.9	818	3096

***Note:** Based on 120 in/sec maximum piston speed, port & fitting size will become limiting factors for most applications.

Pressure Ratings

Parker 4000 psi piston accumulators are all rated at minimum 4 to 1 design factors.

Fluids

Parker's piston accumulators are compatible with a wide variety of fluids. Standard accumulators (with nitrile seals) may be used with petroleum-based industrial oils or water-based flame resistant fluids. Optional seals compatible with most industrial fluids are available with temperature ranges from -45°F to 325°F (-43°C to 162°C).

Precharge

Units are shipped with a nominal nitrogen precharge as standard. For specific precharge pressures, specify at the time of order.

Standard Ports

The following ports are supplied as standard on all fluid ends and on the gas end of accumulators ordered for use with gas bottles:

Bore Size	Standard Ports	
	Standard Models SAE Port	Metric Models BSPP Port (in)
2	#12	3/4
3	#12	3/4
4	#16	1
6	#16	1

Gas Valve

Series 4000 accumulators and auxiliary gas bottles are equipped with a high pressure cored gas valve cartridge as standard.

Available Options

If your application requires a piston accumulator, gas bottle, or special option that falls outside of Parker's broad offering, consult your local distributor, Parker representative, or the factory with your specific requirements. Parker has the manufacturing and engineering expertise to design and build piston accumulators to your exacting requirements, from simple modifications of standard units to complete designs. Some example of Parker's past special designs include:

- Special and Stainless Steel Materials
- Piston Position and Velocity Sensors and Switches
- Special Seals
- Non-Standard Capacities
- Water Service
- Ports
- Fixed Gauge Mounts
- Fuse Plug Assemblies

Auxiliary Gas Bottles

When space does not permit the installation of the required piston accumulator, a smaller accumulator may be used by connecting it to an auxiliary gas bottle(s) that can be located in a nearby spot where space is available. In some cases, a piston accumulator and gas bottle combination may be more economical, especially large capacity sizes. Piston travel, confined to the accumulator, must be calculated with ample margins to store the required fluid.

4000 PSI Piston Accumulators for Oil and Water Service

Model No. Oil Service	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	C (in)	D-Hydraulic Port SAE No.	D-Hydraulic Port Thread Size (in)	D-Hydraulic Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
A2N0005E1K	–	5	6.5		6.76								6
A2N0010E1K	–	10	11.5		8.31								6
A2N0015E1K	–	15	16.5	2.50	9.78	1.06	12	1-1/16 - 12	3/4	—	—	—	7
A2N0029E1K	1 Pint	29	30.5		14.19								9
A2N0058E1K	1 Quart	58	59.5		23.19								14
A3N0029E1K	1 Pint	29	34		10.25								17
A3N0058E1K	1 Quart	58	63		14.34								25
A3N0090E1K	1.5 Liter	90	95	3.75	18.94	1.13	12	1-1/16 - 12	3/4	3/8 - 24	2.25	0.56	33
A3N0116E1K	1/2 Gal.	116	121		22.56								39
A3N0183E1K	3 Liter	183	188		32.06								56
A4N0058E1K	1 Quart	58	68		12.06								37
A4N0116E1K	1/2 Gal.	116	126		16.62								46
A4N0231E1K	1 Gal.	231	241	5.00	25.62	1.13	16	1-5/16 - 12	1	1/2 - 20	3.25	0.75	63
A4N0347E1K	1-1/2 Gal.	347	357		34.75								81
A4N0578E1K	2-1/2 Gal.	578	588		52.81								117
A6N0231E1K	1 Gal.	231	266		19.18								110
A6N0347E1K	1-1/2 Gal.	347	382		23.62								126
A6N0578E1K	2-1/2 Gal.	578	613		32.43								158
A6N0924E1K	4 Gal.	924	959	7.06	45.62	1.13	16	1-5/16 - 12	1	1/2 - 20	4.38	0.75	207
A6N1155E1K	5 Gal.	1155	1190		54.43								239
A6N1733E1K	7-1/2 Gal.	1733	1768		76.43								320
A6N2310E1K	10 Gal.	2310	2345		98.43								401

Notes:

1) For Water Service add "W" after construction code, see "How to Order".
2) See Port Options for complete listing of optional ports.
3) When accumulators are to be used with Gas Bottles, order "Accumulators for Use with Gas Bottles."

4000 PSI Piston Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	D Port (Both Ends) SAE No.	D Port Thread Size (in)	D Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
A4N0058E3KTETE	1 Quart	58	68		11.63							37
A4N0116E3KTETE	1/2 Gal.	116	126		16.19							46
A4N0231E3KTETE	1 Gal.	231	241	5.00	25.19	16	1-5/16 - 12	1	1/2 - 20	3.25	0.75	63
A4N0347E3KTETE	1-1/2 Gal.	347	357		34.31							81
A4N0578E3KTETE	2-1/2 Gal.	578	588		52.38							117
A6N0231E3KTETE	1 Gal.	231	266		17.38							110
A6N0347E3KTETE	1-1/2 Gal.	347	382		21.81							126
A6N0578E3KTETE	2-1/2 Gal.	578	613		30.63							158
A6N0924E3KTETE	4 Gal.	924	959	7.06	43.81	16	1-5/16 - 12	1	1/2 - 20	4.38	0.75	207
A6N1155E3KTETE	5 Gal.	1155	1190		52.63							239
A6N1733E3KTETE	7-1/2 Gal.	1733	1768		74.63							320
A6N2310E3KTETE	10 Gal.	2310	2345		96.63							401

4000 PSI Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (gal)	Gas Volume Actual (cu in)	A (in)	B (in)	C (in)	D Port SAE No.	D Port Thread Size (in)	D Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
B4N0058E1K	1 Quart	86		12.06								35
B4N0116E1K	1/2 Gal.	144		16.62								44
B4N0231E1K	1 Gal.	259	5.00	25.62	1.13	16	1-5/16 - 12	1	1/2 - 20	3.25	0.75	62
B4N0347E1K	1-1/2 Gal.	375		34.75								80
B4N0578E1K	2-1/2 Gal.	606		52.81								115
B6N0231E1K	1 Gal.	319		19.18								105
B6N0347E1K	1-1/2 Gal.	435		23.62								121
B6N0578E1K	2-1/2 Gal.	666		32.43								153
B6N0942E1K	4 Gal.	1012	7.06	45.62	1.13	16	1-5/16 - 12	1	1/2 - 20	4.38	0.75	202
B6N1155E1K	5 Gal.	1243		54.43								234
B6N1733E1K	7-1/2 Gal.	1821		76.43								315
B6N2310E1K	10 Gal.	2398		98.43								396

276 Bar Metric Piston Accumulators for Oil and Water Service

Model No. / Oil Service	Fluid Volume (Liters)	Fluid Volume (cu in)	Gas Volume (Liters)	A (mm)	B (mm)	C (mm)	D-Hydraulic Port BSPP/G (in)	D-Hydraulic Port SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
A2N0005E2K	0.08	5	0.11		172							2.4
A2N0010E2K	0.16	10	0.19		211							2.8
A2N0015E2K	0.25	15	0.24	64	248	27	3/4	–	–	–	–	3.1
A2N0029E2K	0.48	29	0.50		360							4.1
A2N0058E2K	0.95	58	0.98		589							6.1
A3N0029E2K	0.48	29	0.56		260							7.8
A3N0058E2K	0.95	58	1.03		364							11.1
A3N0090E2K	1.47	90	1.56	96	481	29	3/4	–	M10	60	15	14.8
A3N0116E2K	1.90	116	1.98		573							17.7
A3N0183E2K	3.00	183	3.08		814							25.4
A4N0058E2K	0.95	58	1.11		306							16.6
A4N0116E2K	1.90	116	2.06		422							20.6
A4N0231E2K	3.79	231	3.95	127	651	29	1	–	M12	82	18	28.7
A4N0347E2K	5.69	347	5.85		883							36.8
A4N0578E2K	9.47	578	9.64		1341							53.0
A6N0231E2K	3.79	231	4.36		487							49.8
A6N0347E2K	5.69	347	6.26		600							57.2
A6N0578E2K	9.47	578	10.00		824							71.9
A6N0924E2K	15.10	924	15.70	180	1159	29	1	–	M12	110	18	93.9
A6N1155E2K	18.90	1155	19.50		1383							109
A6N1733E2K	28.40	1733	29.00		1941							145
A6N2310E2K	37.90	2310	38.40		2500							182

Notes:

1) For Water Service add "W" after construction code, see "How to Order" .
2) See Port Options for complete listing of optional ports.
3) When accumulators are to be used with Gas Bottles, order "Accumulators for Use with Gas Bottles."

276 Bar Metric Piston Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (Liters)	Fluid Volume (cu in)	Gas Volume (Liters)	A (mm)	B (mm)	D - Port (Both Ends) BSPP/G (in)	D - Port (Both Ends) SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
A4N0058E2KRDRD	0.95	58	1.11		267						16.6
A4N0116E2KRDRD	1.90	116	2.06		383						20.6
A4N0231E2KRDRD	3.79	231	3.95	121	611	1	–	M12	82	18	28.7
A4N0347E2KRDRD	5.69	347	5.85		843						36.8
A4N0578E2KRDRD	9.47	578	9.64		1302						53.0
A6N0231E2KRDRD	3.79	231	4.36		413						49.8
A6N0347E2KRDRD	5.69	347	6.26		525						57.2
A6N0578E2KRDRD	9.47	578	10.00		749						71.9
A6N0924E2KRDRD	15.10	924	15.70	175	1084	1	–	M12	110	18	93.9
A6N1155E2KRDRD	18.90	1155	19.50		1308						109
A6N1733E2KRDRD	28.40	1733	29.00		1867						145
A6N2310E2KRDRD	37.90	2310	38.40		2426						182

276 Bar Metric Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (liters)	Gas Volume Actual (liters)	A (mm)	B (mm)	C (mm)	D-Hydraulic Port BSPP/G (in)	D-Hydraulic Port SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
B4N0058E2K	0.95	1.41		267							15.8
B4N0116E2K	1.90	2.36		383							19.9
B4N0231E2K	3.79	4.24	121	611	29	1	–	M12	82	18	27.9
B4N0347E2K	5.69	6.15		843							36.1
B4N0578E2K	9.47	9.93		1302							52.2
B6N0231E2K	3.79	5.23		413							47.5
B6N0347E2K	5.69	7.13		525							54.9
B6N0578E2K	9.47	10.90		749							69.6
B6N0924E2K	15.10	16.60	175	1084	29	1	–	M12	110	18	91.6
B6N1155E2K	18.90	20.40		1308							106
B6N1733E2K	28.40	29.80		1867							143
B6N2310E2K	37.90	39.30		2426							180

Optional Ports

The following ports are available as options on all piston accumulators.

SAE Straight Thd.			Code 62 Flange				NPT			BSPP			ISO 6149-1		
Port Size	Port Code	Min. Bore	Port Size	Port Code Inch	Port Code Metric	Min. Bore	Port Size	Port Code	Min. Bore	Port Size	Port Code	Min. Bore	Port Size	Port Code	Min. Bore
#5	TA	2"	1"	PG	MG	4"	3/8"	UT	2"	3/8"	RA	2"	M14	YA	2"
#6	TB	2"	1¼"	PH	MH	4"	1/2"	UU	2"	1/2"	RB	2"	M18	YB	2"
#8	TC	2"	1½"	PP	MV	6"	3/4"	UV	2"	3/4"	RC	2"	M22	YC	2"
#10	TI	2"	2"	PQ	MQ	6"	1"	UW	3"	1"	RD	3"	M27	YD	2"
#12	TD	2"	—	—	—	—	1¼"	UX	3"	1¼"	RE	3"	M33	YE	3"
#16	TE	3"	—	—	—	—	1½"	UY	4"	1½"	RF	4"	M42	YF	3"
—	—	—	—	—	—	—	2”	UZ	4”	2”	RG	4”	—	—	—

Notes:

1) 1" thru 2" flanges are to standard SAE Code 62 dimensions, 2-1/2" to “Socket Weld Flange Adapter Pattern”, dimensions are shown below. Metric pattern supplied on 276 Bar Metric units unless otherwise specified.

2) BSPT and Metric ports available, consult factory.

SAE 4-Bolt Flange Dimensions

Code 62 (ISO 6162) (thru 2" diameter) – 6000 PSI (410 Bar)

Flange Size		SAE Flange Dimensions (in.)					Metric ISO 6162 Flange Dimensions (mm)				
in	mm	A	B	C	F	G	A	B	C	F	G
1½"	38	5/8 - 11	1.438	3.125	1½	1.375	M16	36.5	79.4	38	34.9
2"	50	3/4 - 10	1.750	3.812	2	1.500	M20	44.5	96.8	50	38.1
2½"	—	7/8 - 9	2.312	4.875	2½	1.625	—	—	—	—	—

Gas Valve Option (M)

A heavy duty (military style) poppet-type gas valve cartridge (Mil. Spec. MS28889-2) is available as an option (M) – specify when ordering.

Safety Fuse Options (F)

Safety Fuses are used as a safety device on accumulators and gas bottles to prevent over-pressurization of gas due to external heat or hydraulic pressure (set at 140% of maximum system pressure to avoid rupture disk fatigue and premature failure). The rupture disks are calibrated to rupture at a pre-determined pressure. Safety fuses are available on most sizes of piston accumulators. Safety fuses can be installed on all piston accumulators by using a fuse adapter. 4" bore units and above can be equipped with a fuse port machined in the gas cap by specifying the "Safety Fuse Option" (F) at the time of order in the model code, see "How to Order." The safety fuse assembly and/or fuse adapter must be ordered separately.

Description	Part Number
Safety Fuse Assembly[1]	086471xxxx
Replacement Rupture Disks	756003xxxx
Fuse Adapter	1468970002

1) Assembly includes housing and rupture disk, xxxx = pressure setting in 100 psi increments, i.e., for an assembly with a 2000 PSI setting, order P/N 0864712000.

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.

Seal Material Options

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	-45°F to 325°F -43°C to 162°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 185°F -43°C to 85°C	200°F 93°C	Compatible with most mineral oil-based fluids and maintains sealing effectiveness at low temperatures

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

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 w/High Pressure Core
8A	Gas Valve O-Ring
9	Gas Valve Guard
9A	Screw

4000 PSI Seal Kit Numbers (Includes items 5, 5A, 6, 7, 7A, 8A)

Material	Bore Size			
	2"	3"	4"	6"
Buna-Nitrile (Std.)	RK0200K000	RK0300K000	RK0400K000	RK0600K000
Fluorocarbon	RK0200E000	RK0300E000	RK0400E000	RK0600E000
EPR	RK0200D000	RK0300D000	RK0400D000	RK0600D000
Hydrogenated Nitrile	RK0200H000	RK0300H000	RK0400H000	RK0600H000
Low Temp Nitrile	RK0200Q000	RK0300Q000	RK0400Q000	RK0600Q000

Mounting, Charging & Gauging Accessories

Parker offers a wide variety of mounting, charging and gauging accessories. See “Accumulator Accessories.”

Special Options

If your application requires a piston accumulator, gas bottle, or special option that falls outside of Parker’s broad offering, consult your local distributor, Parker representative, or the factory with your specific requirements. Parker has the manufacturing and engineering expertise to design and build piston accumulators to your exacting requirements, from simple modifications of standard units to complete designs. Some example of Parker’s past special designs include:

- Special and Stainless Steel Materials
- Piston Position and Velocity Sensors and Switches
- Special Seals
- Non-Standard Capacities
- Tie Rod Construction
- Special Certifications
- Spring & Weight Loaded

Consult the experts at Parker with your next piston accumulator requirement!

How to Order Series 4000 Piston Accumulators

Piston accumulators and gas bottles can be specified by using the symbols in the chart below to develop a model number. Select only those symbols that represent the features desired, and place them in the sequence indicated by the example at the top of the chart.

Series	Nominal Bore Size	Type of Construction	Options	Capacity	Design Pressure	Design Number	Seal Compound	Hyd. Port Modification		Gas Port Modification	
A	4	N	–	0231	E	1	K	–	–	–	–

Series	
A	Accumulator
B	Gas Bottle

Nominal Bore Size	
2	2 inches
3	3 inches
4	4 inches
6	6 inches

Type of Construction	
N	Threaded both ends non-ASME material standard on 2”, 3”, 4”, 6”

Bore Size/Capacity		
0005	2”	5 cu. in. (0.08 liters)
0010		10 cu. in. (0.16 liters)
0015		15 cu. in. (0.25 liters)
0029		29 cu. in. (0.48 liters)
0058		58 cu. in. (0.95 liters)
0029	3”	29 cu. in. (0.48 liters)
0058		58 cu. in. (0.95 liters)
0090		90 cu. in. (1.47 liters)
0116		116 cu. in. (1.90 liters)
0183		183 cu. in. (3.00 liters)
0058	4”	58 cu. in. (0.95 liters)
0116		116 cu. in. (1.90 liters)
0231		1 gal. (3.79 liters)
0347		1½ gal. (5.69 liters)
0578		2½ gal. (9.47 liters)
0231	6”	1 gal. (3.79 liters)
0347		1½ gal. (5.69 liters)
0578		2½ gal. (9.47 liters)
0924		4 gal. (15.1 liters)
1155		5 gal. (18.9 liters)
1733		7½ gal. (28.4 liters)
2310		10 gal. (37.9 liters)

Consult factory for other available sizes.

Options	
Blank	Standard Gas Cap
W	Water Service
F	SAE Fuse Port *
G	SAE Fuse Port * – Water Service
M	MS28889-2 Gas Valve
L	MS28889-2 Gas Valve, Water Service
P	Fuse* and MS28889-2
R	Fuse* and MS28889-2, Water Service

** Safety fuse assembly not included. Order fuse assembly separately.*

Design Pressure	
E	4000 PSI

Hydraulic and Gas Port Modifications Designated by 2 Digits

1st Digit	Style	2nd Digit	Description	Min. Bore Size
Blank	Std.	Blank	Std.	
T	SAE Straight Thread Ports	A	SAE #5 (1/2 - 20)	2”
		B	SAE #6 (9/16 - 18)	2”
		C	SAE #8 (3/4 - 16)	2”
		D	SAE #12 (1 1/16 - 12)	2”
		E	SAE #16 (1 5/16 - 12)	3”
		I	SAE #10 (7/8 - 14)	2”
			6000 PSI (Code 62)	**Min. Bore**
P	Flange Code 62	G	1”	4”
		H	1 1/4”	4”
		P	1 1/2”	6”
M	Metric Flange per ISO 6162	Q	2”	6”
U	NPTF (Not Recommended)	T	3/8”	2”
		U	1/2”	2”
		V	3/4”	2”
		W	1”	2”
		X	1 1/4”	2”
		Y	1 1/2”	4”
		Z	2”	4”

1st Digit	Style	2nd Digit	BSPP/BSPT	2nd Digit	Metric/ISO 6149-1
R	BSPP Parallel	A	3/8 - 19	A	M14 x 1.5
B	BSPT Taper Port	B	1/2 - 14	B	M18 x 1.5
		C	3/4 - 14	C	M22 x 1.5
		D	1 - 11	D	M27 x 2
G	Metric	E	1 1/4 - 11	E	M33 x 2
Y	ISO 6149-1	F	1 1/2 - 11	F	M42 x 2
		G	2 - 11		

Example of Optional Port Accumulator

A 4 N 0231 E 3 K T C U V

- 3 — Non-std. Port
- T C — SAE #8 Hyd. Port
- U V — NPT 3/4” Gas Port

Design Number	
1	Standard
2	Metric Mounting Holes & Hyd. Port (BSPP Standard) Specify Optional Ports
3	Optional Port (Hyd. or Gas, See Port Modifications Table)
***	Special Design

Standard Ports Available (See Port Modifications Table if Using Other Than Standard Ports Shown Below)

Bore Size	4000 PSI Port Sizes Standard	Metric (BSPP)
2”	SAE #12	3/4
3”	SAE #12	3/4
4”	SAE #16	1
6”	SAE #16	1

Seal Compound (See Catalog for Temperature Settings)	
K	Buna Nitrile (Std)
E	Fluoroelastomer
D	EPR
H	Hydrogenated Nitrile
Q	Low Temp.
S	Special Seals (to be specified)

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

5000

Series 5000 Piston Accumulators

- Heavy Duty Service with 5000 PSI Operating Pressure
- 2" thru 9" Bores with Over 30 Standard Capacities
- Patented V-O-ring Piston Seals
- Serviceable Threaded End Construction
- Five Standard Seal Options to Handle a Variety of Fluids and Temperatures
- ASME Certification and CE Marking Available

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Materials

- Shell – high strength alloy steel
- Caps – steel
- Pistons – aluminum (2" thru 7"), ductile iron (9")
- Gas Valve Cartridge – steel
- Gas Valve Protector – steel
- Piston Glide Rings – PTFE
- Piston & End Seals – various polymers
- Piston Seal Backups – PTFE

Actual Bore Sizes & Maximum Flow Rates Pressure Ratings

Nominal Bore Size (in.)	Actual Bore Size		Max. Recommended Flow*	
	(in.)	(mm)	GPM	LPM
2	2.03	51.4	100	380
3	3.00	76.2	220	834
4	4.03	102	397	1504
6	5.78	147	818	3096
7	7.00	178	1199	4538
9	9.00	229	1982	7502

***Note:** Based on 120 in/sec maximum piston speed, port & fitting size will become limiting factors for most applications.

Series 5000 piston accumulators are rated at minimum 4 to 1 design factors. For pressures over 5000 psi, consult the factory.

Fluids

Parker's piston accumulators are compatible with a wide variety of fluids. Standard accumulators (with nitrile seals) may be used with petroleum-based industrial oils or water-based flame resistant fluids. Optional seals compatible with most industrial fluids are available with temperature ranges from -45°F to 325°F (-43°C to 162°C).

Precharge

Units are shipped with a nominal nitrogen precharge as standard. For specific precharge pressures, specify at the time of order.

Standard Ports

The following ports are supplied as standard on all fluid ends and on the gas end of accumulators ordered for use with gas bottles:

Bore Size	Standard Ports	
	Standard Models	Metric Models BSPP Port (in)
2	SAE #12	3/4
3	SAE #12	3/4
4	SAE #16	1
6	SAE #16	1
7	2" Code 62 Flange	2" Metric ISO 6162 Flange
9	2" Code 62 Flange	2" Metric ISO6162 Flange

Gas Valve

Series 5000 accumulators and gas bottles with 2" through 6" bores are supplied with a high pressure cored gas valve as standard. Models with 7" and 9" bores are supplied with a heavy duty (military) poppet-type gas valve cartridge (Mil. Spec. MS28889-2) as standard.

Note: The standard Parker gas cap will accept either style gas valve.

Available Options

If your application requires a piston accumulator, gas bottle, or special option that falls outside of Parker's broad offering, consult your local distributor, Parker representative, or the factory with your specific requirements. Parker has the manufacturing and engineering expertise to design and build piston accumulators to your exacting requirements, from simple modifications of standard units to complete designs. Some example of Parker's past special designs include:

- Special and Stainless Steel Materials
- Piston Position and Velocity Sensors and Switches
- Special Seals
- Non-Standard Capacities
- Water Service
- Ports
- Fixed Gauge Mounts
- Fuse Plug Assemblies

Auxiliary Gas Bottles

When space does not permit the installation of the required piston accumulator, a smaller accumulator may be used by connecting it to an auxiliary gas bottle(s) that can be located in a nearby spot where space is available. In some cases, a piston accumulator and gas bottle combination may be more economical, especially large capacity sizes. Piston travel, confined to the accumulator, must be calculated with ample margins to store the required fluid.

5000 PSI Piston Accumulators for Oil and Water Service

Model No. Oil Service	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	C (in)	D-Hydraulic Port SAE No.	D-Hydraulic Port Thread Size (in)	D-Hydraulic Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
A2N0005C1K	–	5	6.5		6.76								6
A2N0010C1K	–	10	11.5		8.31								7
A2N0015C1K	–	15	16.5	2.63	9.78	1.06	12	1-1/16 - 12	3/4	–	–	–	8
A2N0029C1K	1 Pint	29	30.5		14.19								11
A2N0058C1K	1 Quart	58	59.5		23.19								17
A3N0029C1K	1 Pint	29	34		10.25								21
A3N0058C1K	1 Quart	58	63		14.34								28
A3N0090C1K	1.5 Liter	90	95	4.00	18.94	1.13	12	1-1/16 - 12	3/4	3/8 - 12	2.25	0.56	35
A3N0116C1K	1/2 Gal.	116	121		22.56								40
A3N0183C1K	3 Liter	183	188		32.06								55
A4N0058C1K	1 Quart	58	68		12.06								43
A4N0116C1K	1/2 Gal.	116	126		16.62								54
A4N0231C1K	1 Gal.	231	241	5.25	25.62	1.13	16	1-5/16 - 12	1	1/2 - 20	3.25	0.75	77
A4N0347C1K	1-1/2 Gal.	347	357		34.75								100
A4N0578C1K	2-1/2 Gal.	578	588		52.81								146
A6N0231C1K	1 Gal.	231	266		19.18								128
A6N0347C1K	1-1/2 Gal.	347	382		23.62								148
A6N0578C1K	2-1/2 Gal.	578	613		32.43								190
A6N0924C1K	4 Gal.	924	959	7.50	45.62	1.13	16	1-5/16 - 12	1	1/2 - 20	4.38	0.75	252
A6N1155C1K	5 Gal.	1155	1190		54.43								293
A6N1733C1K	7-1/2 Gal.	1733	1768		76.43								396
A6N2310C1K	10 Gal.	2310	2345		98.43								499

Notes:

1) For Water Service add “W” after construction code, see “How to Order”.
2) See “Port Options” for complete listing of port options.
3) ASME certified and CE marked accumulators and gas bottles available.

5000 PSI Piston Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	D Port (Both Ends) SAE No.	D Port (Both Ends) Thread Size (in)	D Port (Both Ends) Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
A4N0058C3KTETE	1 Quart	58	68		10.93							43
A4N0116C3KTETE	1/2 Gal.	116	126		15.49							54
A4N0231C3KTETE	1 Gal.	231	241	5.25	24.49	16	1-5/16 - 12	1	1/2 - 20	3.25	0.75	77
A4N0347C3KTETE	1-1/2 Gal.	347	357		33.62							100
A4N0578C3KTETE	2-1/2 Gal.	578	588		51.68							146
A6N0231C3KTETE	1 Gal.	231	266		18.05							128
A6N0347C3KTETE	1-1/2 Gal.	347	382		22.49							148
A6N0578C3KTETE	2-1/2 Gal.	578	613		31.30							190
A6N0924C3KTETE	4 Gal.	924	959	7.50	44.49	16	1-5/16 - 12	1	1/2 - 20	4.38	0.75	252
A6N1155C3KTETE	5 Gal.	1155	1190		53.30							293
A6N1733C3KTETE	7-1/2 Gal.	1733	1768		75.30							396
A6N2310C3KTETE	10 Gal.	2310	2345		97.30							499

5000 PSI Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (gal)	Gas Volume Actual (cu in)	A (in)	B (in)	C (in)	D Port SAE No.	D Port Thread Size (in)	D Port Tube Size	E (in)	F (in)	G (in)	Weight (lbs)
B4N0058C1K	1 Quart	86		12.06								41
B4N0116C1K	1/2 Gal.	144		16.62								53
B4N0231C1K	1 Gal.	259	5.25	25.62	1.13	16	1-5/16 - 12	1	1/2 - 20	3.25	0.75	75
B4N0347C1K	1-1/2 Gal.	375		34.75								98
B4N0578C1K	2-1/2 Gal.	606		52.81								144
B6N0231C1K	1 Gal.	319		19.18								123
B6N0347C1K	1-1/2 Gal.	435		23.62								143
B6N0578C1K	2-1/2 Gal.	666		32.43								185
B6N0942C1K	4 Gal.	1012	7.50	45.62	1.13	16	1-5/16 - 12	1	1/2 - 20	4.38	0.75	250
B6N1155C1K	5 Gal.	1243		54.43								288
B6N1733C1K	7-1/2 Gal.	1821		76.43								391
B6N2310C1K	10 Gal.	2398		98.43								494

345 Bar Metric Piston Accumulators for Oil and Water Service

Model No. / Oil Service	Fluid Volume (Liters)	Fluid Volume (cu in)	Gas Volume (Liters)	A (mm)	B (mm)	C (mm)	D-Hydraulic Port BSPP/G (in)	D-Hydraulic Port SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
A2N0005C2K	0.08	5	0.11		172							2.8
A2N0010C2K	0.16	10	0.19		211							3.2
A2N0015C2K	0.25	15	0.24	67	248	27	3/4	–	–	–	–	3.7
A2N0029C2K	0.48	29	0.50		360							5.0
A2N0058C2K	0.95	58	0.98		589							7.6
A3N0029C2K	0.48	29	0.56		260							9.6
A3N0058C2K	0.95	58	1.03		364							12.5
A3N0090C2K	1.47	90	1.56	102	481	29	3/4	–	M10	60	15	15.7
A3N0116C2K	1.90	116	1.98		573							18.3
A3N0183C2K	3.00	183	3.08		814							25.0
A4N0058C2K	0.95	58	1.11		306							19.4
A4N0116C2K	1.90	116	2.06		422							24.6
A4N0231C2K	3.79	231	3.95	134	651	29	1	–	M12	82	18	34.9
A4N0347C2K	5.69	347	5.85		883							45.4
A4N0578C2K	9.47	578	9.64		1341							66.2
A6N0231C2K	3.79	231	4.36		487							57.9
A6N0347C2K	5.69	347	6.26		600							67.3
A6N0578C2K	9.47	578	10.00		824							86.0
A6N0924C2K	15.10	924	15.70	191	1159	29	1	–	M12	110	18	114
A6N1155C2K	18.90	1155	19.50		1383							133
A6N1733C2K	28.40	1733	29.00		1941							180
A6N2310C2K	37.90	2310	38.40		2500							227

Notes:

1) For Water Service add "W" after construction code, see "How to Order".
2) See "Port Options" for a complete listing of port options.
3) ASME certified and CE marked accumulators and gas bottles are available.

345 Bar Metric Piston Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (Liters)	Fluid Volume (cu in)	Gas Volume (Liters)	A (mm)	B (mm)	D - Port (Both Ends) BSPP/G (in)	D - Port (Both Ends) SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
A4N0058C2KRDRD	0.95	58	1.11		277						19.4
A4N0116C2KRDRD	1.90	116	2.06		393						24.6
A4N0231C2KRDRD	3.79	231	3.95	134	622	1	–	M12	82	18	34.9
A4N0347C2KRDRD	5.69	347	5.85		854						45.4
A4N0578C2KRDRD	9.47	578	9.64		1312						66.2
A6N0231C2KRDRD	3.79	231	4.36		458						57.9
A6N0347C2KRDRD	5.69	347	6.26		571						67.3
A6N0578C2KRDRD	9.47	578	10.00		795						86.0
A6N0924C2KRDRD	15.10	924	15.70	191	1130	1	–	M12	110	18	114
A6N1155C2KRDRD	18.90	1155	19.50		1354						133
A6N1733C2KRDRD	28.40	1733	29.00		1912						180
A6N2310C2KRDRD	37.90	2310	38.40		2471						227

345 Bar Metric Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (liters)	Gas Volume Actual (liters)	A (mm)	B (mm)	C (mm)	D-Hydraulic Port BSPP/G (in)	D-Hydraulic Port SAE Flange	E (mm)	F (mm)	G (mm)	Weight (Kg)
B4N0058C2K	0.95	1.11		306							18.6
B4N0116C2K	1.90	2.06		422							23.9
B4N0231C2K	3.79	3.95	134	651	29	1	–	M12	82	18	34.2
B4N0347C2K	5.69	5.85		883							44.6
B4N0578C2K	9.47	9.64		1341							65.4
B6N0231C2K	3.79	4.36		487							55.6
B6N0347C2K	5.69	6.26		600							65.0
B6N0578C2K	9.47	10.00		824							83.8
B6N0924C2K	15.10	15.70	191	1159	29	1	–	M12	110	18	112
B6N1155C2K	18.90	19.50		1383							131
B6N1733C2K	28.40	29.00		1941							177
B6N2310C2K	37.90	38.40		2500							224

5000 PSI Piston Accumulators for Oil and Water Service

Model No.	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	C (in)	D Hydraulic Port	E (in)	F (in)	G (in)	Weight (lbs)
A7K1155C1K	5 Gal.	1155	1190	9.09 ±0.06	42.50	1.63	2" SAE Code 62 Flange[2]	5/8 - 18	5.75	0.94	385
A7K1733C1K	7-1/2 Gal.	1733	1768		57.50						495
A7K2310C1K	10 Gal.	2310	2345		72.50						611
A7K3465C1K	15 Gal.	3465	3520		102.50						837
A9K2310C1K	10 Gal.	2310	2400	11.78 ±0.09	50.75	1.63	2" SAE Code 62 Flange[2]	3/4-16	7.00	1.13	831
A9K3465C1K	15 Gal.	3465	3555		68.94						1064
A9K4620C1K	20 Gal.	4620	4710		87.12						1298
A9K5775C1K	25 Gal.	5775	5865		105.25						1532
A9K6930C1K	30 Gal.	6930	7020		123.43						1765

Notes:

1) For Water Service add "W" after construction code, see "How to Order".
2) See "Port Options" for a complete listing of port options.
3) ASME certified and CE marked accumulators and gas bottles are available.

The Minimum Design Metal Temperature (MDMT) for ASME certified piston accumulators presented in this section is 20°F (-7°C).

5000 PSI Piston Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (gal)	Fluid Volume (cu in)	Gas Volume (cu in)	A (in)	B (in)	D Port (Both Ends)	E (in)	F (in)	G (in)	Weight (lbs)
A7K1155C3KPQPQ	5 Gal.	1155	1190		40.87					385
A7K1733C3KPQPQ	7-1/2 Gal.	1733	1768	9.09	55.87	2” SAE Code 62	5/8-18	5.75	0.94	495
A7K2310C3KPQPQ	10 Gal.	2310	2345	±0.06	70.87					611
A7K3465C3KPQPQ	15 Gal.	3465	3520		100.87					837
A9K2310C3KPQPQ	10 Gal.	2310	2400		49.12					831
A9K3465C3KPQPQ	15 Gal.	3465	3555		67.31					1064
A9K4620C3KPQPQ	20 Gal.	4620	4710	11.78	85.49	2” SAE Code 62	3/4-16	7.00	1.13	1298
A9K5775C3KPQPQ	25 Gal.	5775	5865	±0.09	103.62					1532
A9K6930C3KPQPQ	30 Gal.	6930	7020		121.80					1765

5000 PSI Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (gal)	Gas Volume Actual (cu in)	A (in)	B (in)	C (in)	D Hydraulic Ports	E (in)	F (in)	G (in)	Weight (lbs)
B7K1155C1K	5 Gal.	1155		42.50						376
B7K1733C1K	7-1/2 Gal.	1733	9.09	57.50	1.63	2” SAE Code 62	5/8 - 18	5.75	0.94	489
B7K2310C1K	10 Gal.	2310	±0.06	72.50						602
B7K3465C1K	15 Gal.	3465		102.50						828
B9K2310C1K	10 Gal.	2310		50.75						782
B9K3465C1K	15 Gal.	3465		68.94						1016
B9K4620C1K	20 Gal.	4620	11.78	87.12	1.63	2” SAE Code 62	3/4 - 16	7.00	1.13	1250
B9K5775C1K	25 Gal.	5775	±0.09	105.25						1483
B9K6930C1K	30 Gal.	6930		123.43						1717

345 Bar Metric Piston Accumulators for Oil and Water Service

Model No.	Fluid Volume (Liters)	Fluid Volume (cu in)	Gas Volume (liters)	A (mm)	B (mm)	C (mm)	D Hydraulic Port	E (mm)	F (mm)	G (mm)	Weight (kg)
A7K1155C2K	18.90	1155	19.50		1080						175
A7K1733C2K	28.40	1733	29.00	231.1	1461	41	2" Metric	M16	146	24	226
A7K2310C2K	37.90	2310	38.40	±1.5	1842		SAE Code 62 Flange[2]				277
A7K3465C2K	56.85	3465	57.75		2604						380
A9K2310C2K	37.90	2310	39.37		1289						377
A9K3465C2K	56.85	3465	58.33		1751		2" Metric				483
A9K4620C2K	75.80	4620	77.27	299.2	2213	41	SAE Code 62	M19	178	29	589
A9K5775C2K	94.75	5775	96.23	±2.3	2673		Flange[2]				695
A9K6930C2K	113.70	6930	115.18		3135						801

Notes:

1) For Water Service add "W" after construction code, see "How to Order".
2) See "Port Options" for a complete listing of port options.
3) ASME certified and CE marked accumulators and gas bottles are available.

345 Bar Metric Piston Accumulators for Use with Gas Bottles

Accumulator Model No.	Fluid Volume (Liters)	Fluid Volume (cu in)	Gas Volume (Liters)	A (mm)	B (mm)	D Port (Both Ends)	E (mm)	F (mm)	G (mm)	Weight (kg)
A7K1155C2KMQMQ	18.90	1155	19.50		1039					175
A7K1733C2KMQMQ	28.40	1733	29.00	231.1	1420	2" Metric	M16	146	24	226
A7K2310C2KMQMQ	37.90	2310	38.40	±1.5	1801	SAE Code 62 Flange[2]				277
A7K3465C2KMQMQ	56.85	3465	57.75		2563					380
A9K2310C2KMQMQ	37.90	2310	39.37		1248					377
A9K3465C2KMQMQ	56.85	3465	58.33		1710	2" Metric				483
A9K4620C2KMQMQ	75.80	4620	77.27	299.2	2172	SAE Code 62	M19	178	29	589
A9K5775C2KMQMQ	94.75	5775	96.23	±2.3	2632	Flange[2]				695
A9K6930C2KMQMQ	113.70	6930	115.18		3098					801

345 Bar Metric Auxiliary Gas Bottles

Model No. Gas Bottle	Gas Volume Nominal (Liters)	Gas Volume Actual (Liters)	A (mm)	B (mm)	C (mm)	D Hydraulic Ports	E (mm)	F (mm)	G (mm)	Weight (kg)
B7K1155C2K	18.90	19.50		1080						171
B7K1733C2K	28.40	29.00	231.1	1461	41	2" Metric	M16	146	24	222
B7K2310C2K	37.90	38.40	±1.5	1842		SAE Code 62 Flange[2]				273
B7K3465C2K	56.85	57.75		2604						376
B9K2310C2K	37.90	39.37		1289						355
B9K3465C2K	56.85	58.33		1751		2" Metric				461
B9K4620C2K	75.80	77.27	299.2	2213	41	SAE Code 62	M19	178	29	567
B9K5775C2K	94.75	96.23	±2.3	2673		Flange[2]				673
B9K6930C2K	113.70	115.18		3135						779

Notes:

1) For Water Service add "W" after construction code, see "How to Order".

2) See page 60 for complete listing of port options.

Optional Ports

The following ports are available as options on all piston accumulators.

SAE Straight Thd.			Code 62 Flange				NPT			BSPP			ISO 6149-1		
Port Size	Port Code	Min. Bore	Port Size	Port Code Inch	Port Code Metric	Min. Bore	Port Size	Port Code	Min. Bore	Port Size	Port Code	Min. Bore	Port Size	Port Code	Min. Bore
#5	TA	2"	1"	PG	MG	4"	3/8"	UT	2"	3/8"	RA	2"	M14	YA	2"
#6	TB	2"	1¼"	PH	MH	4"	1/2"	UU	2"	1/2"	RB	2"	M18	YB	2"
#8	TC	2"	1½"	PP	MV	6"	3/4"	UV	2"	3/4"	RC	2"	M22	YC	2"
#10	TI	2"	2"	PQ	MQ	6"	1"	UW	3"	1"	RD	3"	M27	YD	2"
#12	TD	2"	2½"	PR	—	7"	1¼"	UX	3"	1¼"	RE	3"	M33	YE	3"
#16	TE	3"	3”	PS	—	9”	1½"	UY	4"	1½"	RF	4"	M42	YF	3"
—	—	—	—	—	—	—	2”	UZ	4”	2”	RG	4”	—	—	—

Notes:

1) 1" thru 2" flanges are to standard SAE Code 62 dimensions, 2-1/2" to “Socket Weld Flange Adapter Pattern”, dimensions are shown below. Metric pattern supplied on 345 Bar Metric units unless otherwise specified.

2) BSPT and Metric ports available, consult factory.

SAE 4-Bolt Flange Dimensions

Code 62 (ISO 6162) (thru 2" diameter) – 6000 PSI (410 Bar)

Flange Size		SAE Flange Dimensions (in.)					Metric SAE Flange Dimensions (mm)				
in	mm	A	B	C	F	G	A	B	C	F	G
1½"	38	5/8 - 11	1.438	3.125	1½	1.375	M16	36.5	79.4	38	34.9
2"	50	3/4 - 10	1.750	3.812	2	1.500	M20	44.5	96.8	50	38.1
2½"	—	7/8 - 9	2.312	4.875	2½	1.625	—	—	—	—	—

Seal Material

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	-45°F to 325°F -43°C to 162°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 185°F -43°C to 85°C	200°F 93°C	Compatible with most mineral oil-based fluids and maintains sealing effectiveness at low temperatures

* **Note:** 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. For the Minimum Design Metal Temperature (MDMT) of ASME certified accumulators, refer to page 56.

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

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.

Optional Military Style Gas Valve (M)

2" thru 6" Bore Sizes

A heavy duty (military style) poppet-type gas valve cartridge (Mil. Spec. MS28889-2) is available as an option (M) – specify when ordering.

Note: This valve is standard on 7" and 9" bore sizes.

Safety Fuse Options (F)

Safety Fuses are used as a safety device on accumulators and gas bottles to prevent over-pressurization of gas due to external heat or hydraulic pressure (set at 140% of maximum system pressure to avoid rupture disk fatigue and premature failure). The rupture disks are calibrated to rupture at a pre-determined pressure. Safety fuses are available on most sizes of piston accumulators. Safety fuses can be installed on all piston accumulators by using a fuse adapter. 4" bore units and above can be equipped with a fuse port machined in the gas cap by specifying the "Safety Fuse Option" (F) at the time of order in the model code, see "How to Order." The safety fuse assembly and/or fuse adapter must be ordered separately.

Description	Part Number
Safety Fuse Assembly[1]	086471xxxx
Replacement Rupture Disks	756003xxxx
Fuse Adapter	1468970002

1) Assembly includes housing and rupture disk, xxxx = pressure setting in 100 psi increments, i.e., for an assembly with a 2000 PSI setting, order P/N 0864712000.

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

5000 PSI Seal Kit Numbers (Includes items 5, 5A, 6, 7, 7A, 8A)

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

Mounting, Charging & Gauging Accessories

Parker offers a wide variety of mounting, charging and gauging accessories. See “Accumulator Accessories.”

Special Options

If your application requires a piston accumulator, gas bottle, or special option that falls outside of Parker’s broad offering, consult your local distributor, Parker representative, or the factory with your specific requirements. Parker has the manufacturing and engineering expertise to design and build piston accumulators to your exacting requirements, from simple modifications of standard units to complete designs. Some example of Parker’s past special designs include:

- Special and Stainless Steel Materials
- Piston Position and Velocity Sensors and Switches
- Special Seals
- Non-Standard Capacities
- Tie Rod Construction
- Special Certifications
- Spring & Weight Loaded

Consult the experts at Parker with your next piston accumulator requirement!

How to Order Series 5000 Piston Accumulators

Piston accumulators and gas bottles can be specified by using the symbols in the chart below to develop a model number. Select only those symbols that represent the features desired, and place them in the sequence indicated by the example at the top of the chart.

Series	Nominal Bore Size	Type of Construction	Options	Capacity	Design Pressure	Design Number	Seal Compound	Hyd. Port Modification		Gas Port Modification	
A	7	K	–	2310	C	1	K	–	–	–	–

Series	
A	Accumulator
B	Gas Bottle

Nominal Bore Size	
2	2 inches
3	3 inches
4	4 inches
6	6 inches
7	7 inches
9	9 inches

Type of Construction	
N	Threaded both ends non-ASME mat'l standard on 2", 3", 4", 6"
K	Threaded both ends A.S.M.E. mat'l standard on 7" & up
L	Same as K with A.S.M.E. approval stamp 7" & up. Available as special on smaller sizes
E	Threaded both ends, CE marked (1 liter and above) or SEP marked (under 1 liter)

Bore Size/Capacity		
0005	2"	5 cu. in. (0.08 liters)
0010		10 cu. in. (0.16 liters)
0015		15 cu. in. (0.25 liters)
0029		29 cu. in. (0.48 liters)
0058		58 cu. in. (0.95 liters)
0029	3"	29 cu. in. (0.48 liters)
0058		58 cu. in. (0.95 liters)
0090		90 cu. in. (1.47 liters)
0116		116 cu. in. (1.90 liters)
0183		183 cu. in. (3.00 liters)
0058	4"	58 cu. in. (0.95 liters)
0116		116 cu. in. (1.90 liters)
0231		1 gal. (3.79 liters)
0347		1½ gal. (5.69 liters)
0578		2½ gal. (9.47 liters)
0231	6"	1 gal. (3.79 liters)
0347		1½ gal. (5.69 liters)
0578		2½ gal. (9.47 liters)
0924		4 gal. (15.1 liters)
1155		5 gal. (18.9 liters)
1733		7½ gal. (28.4 liters)
2310		10 gal. (37.9 liters)
1155	7"	5 gal. (18.9 liters)
1733		7½ gal. (28.4 liters)
2310		10 gal. (37.9 liters)
3465		15 gal. (56.8 liters)
2310	9"	10 gal. (37.9 liters)
3465		15 gal. (56.8 liters)
4620		20 gal. (75.8 liters)
5775		25 gal. (94.6 liters)
6930		30 gal. (114 liters)

Consult factory for other available sizes.

Design Pressure	
C	5000 PSI
H	350 Bar (CE marked only)

Hydraulic and Gas Port Modifications Designated by 2 Digits				
1st Digit	Style	2nd Digit	Description	Min. Bore Size
Blank	Std.	Blank	Std.	
T	SAE Straight Thread Ports	A	SAE #5 (1/2 - 20)	2"
		B	SAE #6 (9/16 - 18)	2"
		C	SAE #8 (3/4 - 16)	2"
		D	SAE #12 (1 1/16 - 12)	2"
		E	SAE #16 (1 5/16 - 12)	3"
		F	SAE #20 (1 5/8 - 12)	3"
		G	SAE #24 (1 7/8 - 12)	4"
		H	SAE #32 (2 1/2 - 12)	7"
		I	SAE #10 (7/8 - 14)	2"
		6000 PSI (Code 62)		Min. Bore
P	Flange Code 62	F	3/4"	4"
		G	1"	4"
		H	1 1/4"	4"
M	Metric Flange per ISO 6162	P	1 1/2"	6"
		Q	2"	6"
		R*	2 1/2"	7"
		S*	3"	9"
				** For socket weld flange. Not available with metric flange.*
U	NPTF (Not Recommended)	T	3/8"	2"
		U	1/2"	2"
		V	3/4"	2"
		W	1"	2"
		X	1 1/4"	2"
		Y	1 1/2"	4"
		Z	2"	4"
		BSPP/BSPT		Metric/ISO
R	BSPP Parallel	A	3/8 - 19	A M14 x 1.5
B	BSPT Taper Port	B	1/2 - 14	B M18 x 1.5
G	Metric	C	3/4 - 14	C M22 x 1.5
Y	ISO 6149-1	D	1 - 11	D M27 x 2
		E	1 1/4 - 11	E M33 x 2
		F	1 1/2 - 11	F M42 x 2
		G	2 - 11	G M48 x 2

Example of Optional Port Accumulator

A 4 N 0231 C 3 K T C U V

- 3 — Non-std. Port
- T C — SAE #8 Hyd. Port
- U V — NPT 3/4" Gas Port

Options	
Blank	Standard Gas Cap
W	Water Service
F	SAE Fuse Port *
G	SAE Fuse Port *, Water Service
M	MS28889-2 Gas Valve
L	MS 28889-2 Gas Valve, Water Service
P	Fuse Port* and MS28889-2
R	Fuse Port* and MS28889-2, Water Service

** Safety fuse assembly not included. Order fuse assembly separately.*

Design Number	
1	Standard Ports
2	Metric Mounting Holes & Hyd. Port (BSPP/Metric Flange Standard) Specify Optional Ports
3	Optional Port (Hyd. or Gas, See Port Modifications Table)
***	Special Design

Standard Ports Available (See Port Modifications Table if Using Other Than Standard Ports Shown Below)

Bore Size	Standard Ports	Metric (BSPP) Ports
2"	SAE #12	3/4
3"	SAE #12	3/4
4"	SAE #16	1
6"	SAE #16	1
7"	2" Code 62 Flange	2" ISO6162 Flange
9"	2" Code 62 Flange	2" ISO6162 Flange

Seal Compound (See Catalog for Temperature Settings)	
K	Buna Nitrile (Std)
E	Fluoroelastomer
D	EPR
H	Hydrogenated Nitrile
Q	Low Temp.
S	Special (to be specified)

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Notes

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Inline Pulse-Tone™

Hydraulic Shock Suppressors

Inline Pulse-Tone™ Shock Suppressors Feature:

- Three Bladder Polymers for a Wide Range of Fluids and Temperatures
- NPT, BSPP, SAE or Split Flange Connections
- Mounting in Any Position
- 3000 PSI Models for Water/Chemical Service

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

The Patented PULSE-TONE™ inline Construction

Why Should You Use the PULSE-TONE inline Shock Suppressor?

Noise pollution is the hottest topic in the hydraulic industry today. Lab tests show that pump noise levels are increased by 2-3 dB(A) just by adding 12 feet of outlet and return lines. The lines do not generate noise. They radiate noise when they respond to pulsations or vibrations. The pulsations are usually generated by the pump, and the vibrations are radiated by large flat machine surfaces.

Not only do hydraulic lines radiate noise, but they frequently provide the primary path for propagating noise from the pump to components that, in turn, react to the noise and radiate additional sound. This helps explain why many pump manufacturers have a very low dB(A) pump rating, but when the pump is installed on a power unit, the sound rating is much higher.

It is almost impossible to forecast how much additional sound the hydraulic lines and surrounding structure will radiate. This is why many power units are enclosed after they have been manufactured and installed.

The Inline Pulse-Tone reduces pump pulsations and shock. When you stop pulsation and vibration, you stop the cause of component wear and leakage. A power unit with an Inline Pulse-Tone installed can operate at higher RPM with smaller, less expensive components . . . and less noise.

NOTE OF INTEREST: An increase of 2.71 dB doubles the intensity noise level.

How Does the PULSE-TONE inline Work?

An Inline Pulse-Tone suppressor is located as close to the pump as possible, usually directly at the pump outlet, to stop pulsations and noise before they travel through the piping and radiate off other structural components.

As shown in the diagram on the facing page, oil flowing into the Pulse-Tone goes through three different baffles or diffusers. These metal baffles are designed to convert 1/2” diameter holes to 1/32” diameter holes. The total radial distance through these baffles is only 1/4”.

After passing through these holes, pulsations strike a nitrogen charged rubber bladder. The bladder deflects each time it is hit by a pulsation. This slight deflection of the bladder reduces the shock and noise.

The bladder is usually charged with nitrogen to 50% to 60% of the hydraulic operating pressure. The 1/32” diameter holes in the last baffle are so small that the bladder cannot extrude into them.

The large area of the bladder, its ability to oscillate at a high frequency and the short distance each pulsation has to travel once it enters the unit explain the effectiveness of the Pulse-Tone.

Selecting a PULSE-TONE inline is Easy!

No complex sizing forumla is required. The Inline Pulse-Tone hydraulic shock suppressor is sized to match your hydraulic line size. There is a unit to fit every pipe and tube size from 3/8” to 2” with threaded or flanged connections. Models are available for both 3000 PSI and 5000 PSI hydraulic system pressures.

Features	Advantages	Benefits
Reduces pulsations and shock	Less component wear and system leakage	Less maintenance
Reduces noise	Better work environment Eliminates need for sound proofing Use smaller, higher RPM components Smaller motor starters	Higher worker morale and productivity Lower system costs Design flexibility
No moving mechanical parts	Nothing to break	Low maintenance costs
Wide range of port sizes	Accommodates both hose and tube sizes	Ease of installation
Flange mountings	Allows for installation of larger units	Mounting ease and flexibility
Unit is bidirectional.	Cannot be installed backwards	Ease of installation
Compact size	Allows for mounting close to pump	Easily added to existing power units
Special materials for water or chemical service	Resists corrosion	Longer life and wider variety of applications
Can be supplied with customer specified precharge	Ease and speed of adjusting to system parameters	Shorter installation time
Short delivery times	Eliminates customer inventory	Lower operating costs

Models

- 3000 psi rated for oil applications
- 3000 psi Stainless Steel for water and chemical applications
- 5000 psi for high pressure oil applications

Port Connections

Four types of hydraulic line connections are available:

- NPT pipe connections from 3/8” to 2” pipe
- BSPP connections from 3/8” to 2” pipe
- SAE port connection from 3/8” to 2” tubing
- Split flange connection from 3/4” to 3”

Inline Pulse-Tone units can be ordered with any combination of ends, such as a split flange one end and a straight thread on the opposite end. When ordering, specify the type of connection for each end.

Bladder Materials

- Standard material is high temperature HNBR, -50° to 300°F (-45° to 149°C)
- Fluorocarbon or EPR bladders are available for special applications

Precharge

The unit can be shipped with a nitrogen precharge equal to 50% of hydraulic system pressure. Check precharge every three months to maintain maximum efficiency. (See page 184 for procedures.)

Mounting

The Pulse-Tone may be mounted in any position, horizontal or vertical. Since there are no moving parts, either end may be used for inlet or outlet. Split flange mounting makes it possible to break an existing connection to add the Pulse-Tone between the flanges.

Examples of Pulsation Reduction

The examples below show pulsations for pumps at various pressures before and after installation of the Inline Pulse-Tone.

Piston Pump at 4000 psi and 1800 rpm

Piston Pump at 2000 psi and 1800 rpm

Piston Pump at 750 psi and 1200 rpm

3000 PSI Pipe Thread Connections

Model	NPT Size	BSPP Size	Flow, GPM 15'/sec	Flow, GPM 20'/sec*	Dimensions, inch (mm) D	H	L	Weight lbs. (kg)
PT250D1H	3/8 1/2	3/8 1/2	11.3	15.1	2.5 (63.5)	1.75 (44.5)	6.875 (174.6)	6.5 (3)
PT262D1H	3/4 1 —	3/4 1 1¼	24.2	32.1	2.625 (66.7)	1.75 (44.5)	8.13 (206.5)	8.0 (3.6)
PT400D1H	1 1¼ 1½	1 1¼ 1½	68.9	91.9	4.0 (101.6)	1.75 (44.5)	8.875 (225.4)	24.5 (11.1)
PT475D1H	1½ 2	1½ 2	128.0	171.0	4.75 (120.7)	1.75 (44.5)	10.5 (266.7)	31 (14.1)

3000 PSI Straight Thread Connections

Model	Tube Size	Thread	Flow, GPM 15'/sec	Flow, GPM 20'/sec*	Dimensions, inch (mm) D	H	L	Weight lbs. (kg)
PT250D1H	.375 .500 .625	9/16–18 3/4–16 7/8–14	11.3	15.1	2.5 (63.5)	1.75 (44.5)	6.875 (174.6)	6.5 (3)
PT262D1H	.750 1.00 1.25	1-1/16–12 1-5/16–12 1-5/8–12	24.1	32.1	2.625 (66.7)	1.75 (44.5)	8.13 (206.5)	8 (3.6)
PT400D1H	1.00 1.25 1.50	1-5/16–12 1-5/8–12 1-7/8–12	68.9	91.9	4.0 (101.6)	1.75 (44.5)	8.875 (225.4)	24.5 (11.1)
PT475D1H	2.00	2-1/2–12	128.0	171.0	4.75 (120.7)	1.75 (44.5)	10.5 (266.7)	31 (14.1)

* Pressure drop in the suppressor is equal to pressure drop in 8" of tubing. Flow rates can be at least 50% higher than those listed for 20'/sec. without excessive pressure drop.

3000 PSI Pipe Thread Connections

Model	NPT Size	Flow, GPM 15'/sec	Flow, GPM 20'/sec*	Dimensions, inch (mm)			Weight lbs. (kg)
				D	H	L	
PT262D3H	3/4" 1"	24.2	32.1	2.625 (66.7)	1.75 (44.5)	8.13 (206.5)	8.0 (3.6)
PT400D3H	1" 1¼" 1½"	68.9	91.9	4.0 (101.6)	1.75 (44.5)	8.875 (225.4)	24.5 (11.1)

3000 PSI Straight Thread Connections

Model	Tube Size	Thread	Flow, GPM 15'/sec	Flow, GPM 20'/sec*	Dimensions, inch (mm)			Weight lbs. (kg)
					D	H	L	
PT262D3H	.750 1.00 1.25	1-1/16–12 1-5/16–12 1-5/8–12	24.1	32.1	2.625 (66.7)	1.75 (44.5)	8.13 (206.5)	8 (3.6)
PT400D3H	1.00 1.25 1.50	1-5/16–12 1-5/8–12 1-7/8–12	68.9	91.9	4.0 (101.6)	1.75 (44.5)	8.875 (225.4)	24.5 (11.1)

* Pressure drop in the suppressor is equal to pressure drop in 8" of tubing. Flow rates can be at least 50% higher than those listed for 20'/sec. without excessive pressure drop.

3000 PSI for Code 61 Flange Mounting

Model	Flange Size	D	Code 61 Flange					Code 62 Flange*				
			A	B	L	E	F	A	B	L	E	F
PT262D1HP	0.75	2.625 (66.7)	1.75 (44.5)	.56 (14.2)	10.12 (257.0)	1.875 (47.6)	0.875 (22.2)	2.000 (50.8)	.75 (19.1)	10.620 (269.7)	2.000 (50.8)	0.938 (23.8)
	1.00	2.625 (66.7)	1.75 (44.5)	.62 (15.7)	10.12 (257.0)	2.062 (52.4)	1.030 (26.2)	2.000 (50.8)	.94 (23.9)	10.620 (269.7)	2.250 (57.1)	1.094 (27.8)
	1.25	2.625 (66.7)	2.00 (50.8)	.56 (14.2)	10.62 (269.7)	2.312 (58.7)	1.188 (30.2)	2.250 (57.1)	1.06 (26.9)	11.120 (282.4)	2.625 (66.7)	1.250 (31.8)
PT400D1HP	1.25	4.00 (101.6)	2.25 (57.1)	.56 (14.2)	13.12 (333.2)	2.312 (58.7)	1.188 (30.2)	2.250 (57.1)	1.06 (26.9)	13.125 (333.4)	2.625 (66.7)	1.250 (31.8)
	1.50	4.00 (101.6)	2.25 (57.1)	.62 (15.7)	13.12 (333.2)	2.750 (69.9)	1.406 (35.7)	2.250 (57.1)	1.19 (30.2)	13.625 (346.1)	3.125 (79.4)	1.438 (36.5)
	2.00	4.00 (101.6)	2.38 (60.4)	.62 (15.7)	13.38 (339.9)	3.062 (77.8)	1.688 (42.9)	2.620 (66.5)	1.44 (36.6)	13.875 (352.4)	3.812 (96.8)	1.750 (44.5)
PT475D1HP	2.00	4.75 (120.6)	2.38 (60.4)	.62 (15.7)	15.00 (381.0)	3.062 (77.8)	1.688 (42.9)	2.620 (66.5)	1.44 (36.6)	13.875 (352.4)	3.812 (96.8)	1.750 (44.5)
	2.50**	4.75 (120.6)	2.875 (73.0)	.75 (19.0)	16.00 (406.4)	3.500 (88.9)	2.000 (50.8)	—	—	—	—	—
	3.00***	4.75 (120.6)	3.25 (82.6)	.88 (22.3)	16.75 (425.4)	4.188 (106.4)	2.438 (61.9)	—	—	—	—	—

* When using Code 62 flanges, do not exceed 3000 psi pressure rating of the unit.
** Maximum pressure rating for this flange is 2500 psi.
*** Maximum pressure rating for this flange is 2000 psi.

Ordering Note
The Pulse-Tone flange mounted unit is not supplied with split flanges.

5000 PSI for Flange Mounting

Model Number	Flange Size	Code 62 Flange* Dimensions, inch (mm)					
		A	B	D	L	E	F
PT338C1HP	1.00	2.000 (50.8)	.94 (23.9)	3.38 (85.8)	10.620 (269.7)	2.250 (57.2)	1.094 (27.8)
	1.25	2.250 (57.2)	1.06 (26.9)	3.38 (85.8)	11.120 (282.4)	2.625 (66.7)	1.250 (31.8)
PT500C1HP	1.25	2.250 (57.2)	1.06 (26.9)	5.00 (127.0)	13.125 (333.4)	2.625 (66.7)	1.250 (31.8)
	1.50	2.500 (63.5)	1.19 (30.2)	5.00 (127.0)	13.625 (346.1)	3.125 (79.4)	1.438 (36.5)
	2.00	2.620 (66.5)	1.44 (35.6)	5.00 (127.0)	13.875 (352.4)	3.812 (96.8)	1.750 (44.5)

Ordering Note
The Pulse-Tone flange mounted unit is not supplied with split flanges.

5000 PSI Straight Thread Connections

Model	For Tube Suppressor	Thread In Rate	Maximum Flow	Dimensions, inch (mm) D	H	L	Weight lbs. (kg)
PT338C1H	.750 1.00 1.25	1-1/16–12 1-5/16–12 1-5/8–12	49 GPM	3.38 (85.8)	1.28 (32.5)	8.13 (206.5)	15 (6.36)
PT500C1H	1.00 1.25 1.50	1-5/16–12 1-5/8–12 1-7/8–12	150 GPM	5.0 (127.0)	1.28 (32.5)	8.88 (225.6)	48 (21.8)

* Pressure drop in unit is equal to pressure drop of 8” of tubing. Flow rates can be at least 50% higher than those listed for 20’/sec without excessive pressure drop.

Repair Kits

Repair kits include a bladder and o-rings. Order by series and seal material.

Series	HNBR	EPR	Fluorocarbon
250	RKPT2500H0	RKPT2500D0	RKPT2500E0
262 & 338	RKPT2620H0	RKPT2620D0	RKPT2620E0
400 & 500	RKPT4000H0	RKPT4000D0	RKPT4000E0
475	RKPT4750H0	RKPT4750D0	RKPT4750E0

How to Order

Use the symbols in the chart below to develop an Inline Pulse-Tone model number. Select only those symbols that represent the features desired and place them in the sequence indicated by the example at the top of the chart.

Series	Size	Pressure	Design	Seals	Hydraulic Ports* Type	Hydraulic Ports* Size	Hydraulic Ports* Type	Hydraulic Ports* Size	Precharge Pressure*
PT	250	D	1	H	–	–	–	–	—

3000 PSI Sizes	
250	2.50” Dia.
262	2.625” Dia.
400	4.00” Dia
475	4.75” Dia.
5000 PSI Sizes	
338	3.375” Dia.
500	5.00” Dia.

Pressure	
D	3000 PSI
C	5000 PSI

Seals	
D	EPR*
E	Fluorocarbon
H	**HNBR (STD)**

* Not available on 250 (2.50”) size.

Precharge Pressure*
If desired, indicate pressure in psi.
If not desired, leave blank.

** Provided at additional cost.*

Design	
1	**Standard**
3	Water/Chem Service*
S	Special

* Available in Sizes 262 and 400 only.

Port Type		Port Size	
T	SAE	**B**	SAE #6 (9/16-18)
		C	SAE #8 (3/4-16)
		I	SAE #10 (7/8-14)
		D	SAE #12 (1-1/16-12)
		E	SAE #16 (1-5/16-12)
		F	SAE #20 (1-5/8-12)
		G	SAE #24 (1-7/8-12)
		H	SAE #32 (2-1/2-12)
U	NPT	**T**	3/8”
		U	1/2”
		V	3/4”
		W	1”
		X	1¼”
		Y	1½”
		Z	2”
R	BSPP Parallel	**A**	3/8”
		B	1/2”
		C	3/4”
		D	1”
		E	1¼”
		F	1½”
		G	2”
P	Code 61** Split Flange	**U**	3/4”
		V	1”
		W	1¼”
		J	1½”
		L	2”
		M	2½”
		N	3”
P	Code 62** Split Flange	**K**	3/4”
		G	1”
		H	1¼”
		P	1½”
		Q	2”

** Different type and size hydraulic ports may be ordered for each end. Specify left hand port first if ports are not the same.*

***When ordering different flange port sizes, specify port that connects to the pump first.*

Port Availability

Size	SAE #6	#8	#10	#12	#16	#20	#24	#32
250	●	●	●					
262				■	■	■		
400					■	■	■	
475								●
338				●	●	●		
500					●	●	●	

Size	NPT/BSPP 3/8	1/2	3/4	1	1¼	1½	2
250	●	●					
262			■	■	▲		
400				■	■	■	
475						●	●
338			▲	▲	▲		
500				▲	▲	▲	

▲ BSPP only
■ Available for Water/Chemical Service

Flange Availability

Size	Code 61 3/4	1	1¼	1½	2	2½	3
262	●	●	●				
400			●	●	●		
475					●	◆	◆

Size	Code 62 3/4	1	1¼	1½	2
338	●	●	●		
500			●	●	●

◆ Maximum pressure rating for the 2½” flange is 2500 PSI. Maximum pressure rating for the 3” flange is 2000 PSI.

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Rockford, Illinois USA

Charging & Gauging Assemblies

Includes 10 ft. charging hose with standard right-hand thread nitrogen fittings, adapter incorporating gas valve, bleeder valve and gas chuck and gauge.

Charging & Gauging Assemblies are sold in plastic carrying case.

Gauges

Gauges may be ordered separately. Listed below are 2½" dial type pressure gauges with 100 PSI graduation. Include blowout safety case and orifice surge damper.

Part Number	Pressure Range
087040 1000	0 - 1000 PSI
087040 2000	0 - 2000 PSI
087040 3000	0 - 3000 PSI
087040 4000	0 - 4000 PSI
087040 5000	0 - 5000 PSI
087040 6000	0 - 6000 PSI

Mounting Clamps

Clamp Dimensions

Series	Part No.	Dimensions, inch (mm)						
		A	B	C	D	H	ØL	Z
252	8700110252	4.25 (107.9)	3.35 (85.1)	4.42 (112.3)	2.62/2.82 (66.5/71.6)	1.64 (41.7)	0.37 x 0.50 (9.4 x 12.7)	1.25 (31.8)
338	8700110358	5.00 (127)	3.94 (100.1)	5.62 (142.7)	3.25/3.50 (82.6/88.9)	2.28 (57.9)	0.37 x 0.50 (9.4 x 12.7)	1.25 (31.8)
400	8700110413	5.25 (133.4)	4.33 (109.2)	6.06 (153.9)	3.84/4.11 (97.5/104.1)	2.45 (62.2)	0.37 x 0.50 (9.4 x 12.7)	1.25 (31.8)
475	8700110476	5.25 (133.4)	4.33 (109.2)	6.71 (170.4)	4.67/4.90 (118.6/124.5)	2.77 (70.3)	0.37 x 0.50 (9.4 x 12.7)	1.25 (31.8)
500	8700110535	5.75 (146.1)	4.92 (125.0)	7.43 (188.7)	5.02/5.32 (127.5/135.1)	3.21 (81.5)	0.37 x 0.50 (9.4 x 12.7)	1.25 (31.8)

Accumulator Accessories

- Charging & Gauging Assemblies
- Unloading Valves
- Mounting Kits
- Port Adapters
- Repair Tools

Accessories for:

- Piston Accumulators
- Bladder Accumulators
- Diaphragm Accumulators
- Gas Bottles
- SurgeKushons
- PulseTones

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Charging & Gauging Assemblies

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. Assemblies are packed in a plastic storage case. Gauge n not d. included.

144595 0000 (Std)
144596 0000 (Left Hand Thread)

087100 0000

Assemblies Packed in Carrying Case

148675 0000

870816 0000

3000 PSI Charging & Gauging Assemblies (with 3000 PSI Gauge)			
Part Number	**Piston Style**	**Bladder Style**	**Diaphragm Style**
144595 3000	All	All*	with Cored valve
144596 3000	All	All*	with Cored valve
148675 3000	—	—	with M28 valve
087100 3000	—	1-15 gal.**	—
087102 3000	—	10-150 CI**	—
4000/5000 PSI Charging & Gauging Assemblies (with 5000 PSI Gauge)			
870816 5000	All	All	—

* For top repairable styles, valve extension part #085434 0000 would be required.

085434 0000

** Used primarily for top repairable accumulators and/or permanent mount gage.

Gauges

Gauges are 2½" dial type pressure gauges with 100 PSI graduation. Include blowout safety case and orifice surge damper.

Part Number	Pressure Range
087040 1000	0 - 1000 PSI
087040 2000	0 - 2000 PSI
087040 3000	0 - 3000 PSI
087040 4000	0 - 4000 PSI
087040 6000	0 - 6000 PSI

The following assemblies and parts are recommended for use on all 3000 PSI Piston Accumulators and 3000 PSI Bottom Repairable Bladder Accumulators. Can be used with 3000 PSI Top Repairable Accumulators, but require a Gas Valve Extension.

NOTE: Can be used on all accumulators with a gas precharge less than 3000 PSI. Consult factory for further information.

NOTE: These assemblies are not recommended for continuous monitoring of gas precharge. For continuous monitoring, see Gauging Adapters.

Item	Part Number	Description
1-10	1445950000	Standard Assembly with Right Hand (RH) Nitrogen Bottle Connection, No Gauge
1-11	1445950500	Standard Assembly RH Connection with 500 PSI Gauge
1-11	1445951000	Standard Assembly RH Connection with 1000 PSI Gauge
1-11	1445952000	Standard Assembly RH Connection with 2000 PSI Gauge
1-11	1445953000	Standard Assembly RH Connection with 3000 PSI Gauge
1-10L	1445960000	Optional Assembly with Left Hand (LH) Nitrogen Bottle Connection, No Gauge
1-5	0851220000	Gauging Assembly, No Hose or Gauge
1-5H	5420880000	Optional Gauging assembly w/ 2" Hose Ext. between Gas Chuck (5) and Adapter Cross (1), No Hose or Gauge
6-10	1457810000	Hose Assembly with RH Connection
6-10L	1457820000	Hose Assembly with LH Connection
1	5420910000	Adapter Cross
2	5420920000	Gas Valve with 1/8" NPT
3	0832140000	Bleeder Valve
5*	5422150000	Gas Chuck
6**	5420860000	Hose Coupling with Female Thread Connection
7	0870520000	Charging Hose
9	6661250000	Nitrogen Bottle Nut with RH Connection
9L	6661260000	Nitrogen Bottle Nut with LH Connection
10	6661240000	Nitrogen Bottle Nipple
11	See Gauges	2.5" Pressure Gauge
	0854340000	Gas Valve Extension — SAE #6
	1333290000	Case with Insert for Complete Charging and Gauging Assembly
*	5824390000	Gasket for 5422150000 (5)
**	8702770000	Gasket for 5420860000 (6)

The following assemblies and parts are recommended for use on all 3000 PSI Bladder Accumulators. Cannot be used with Piston Accumulators.

NOTE: These assemblies are not recommended for continuous monitoring of gas precharge. For continuous monitoring, see Gauging Adapters.

Item	Part Number	Description
1-10	0871020000	Standard Assembly for 10 to 150 Cubic Inch with RH Nitrogen Bottle Connection, No Gauge
1-11	0871021000	Standard Assembly for 10 to 150 Cubic Inch with RH Connection with 1000 PSI Gauge
1-11	0871022000	Standard Assembly for 10 to 150 Cubic Inch with RH Connection with 2000 PSI Gauge
1-11	0871023000	Standard Assembly for 10 to 150 Cubic Inch with RH Connection with 3000 PSI Gauge
1-10	0871000000	Standard Assembly for 1 to 15 Gallon with RH Nitrogen Bottle Connection, No Gauge
1-11	0871001000	Standard Assembly for 1 to 15 Gallon with RH Connection with 1000 PSI Gauge
1-11	0871002000	Standard Assembly for 1 to 15 Gallon with RH Connection with 2000 PSI Gauge
1-11	0871003000	Standard Assembly for 1 to 15 Gallon with RH Connection with 3000 PSI Gauge
1S-5	0871030000	Gauging Assembly for 10 to 150 Cubic Inch (No Hose or Gauge)
1-5	0871010000	Gauging Assembly for 1to 15 Gallon (No Hose or Gauge)
6-10	1457810000	Hose Assembly with RH Connection
1S	4000450000	Gas Chuck Body for 10 to 150 Cubic Inch
1	4017740000	Gas Chuck Body for 1 to 15 Gallon
2	5420920000	Gas Valve with 1/8" NPT
3	0832140000	Bleeder Valve
6*	5420860000	Hose Coupling with 0.305-32 Female Thread Connection
7	0870520000	Charging Hose
9	6661250000	Nitrogen Bottle Nut with RH Connection
10	6661240000	Nitrogen Bottle Nipple
11	See Gauges	2.5" Pressure Gauge
*	8702770000	Gasket for 5420860000 (6)
	1353290000	Case with Insert for Complete Charging and Gauging Assembly

Charging and Gauging Assemblies

Accumulator Accessories

The following assemblies and parts are recommended for use on all 5000 PSI Piston Accumulators and all 5000 PSI Bladder Accumulators. 5000 PSI Top Repairable Accumulators require a Gas Valve Extension.

NOTE: Can be used on all accumulators with a gas precharge less than 5000 PSI. Consult factory for further information.

NOTE: These assemblies are not recommended for continuous monitoring of gas precharge.
For continuous monitoring, see Gauging Adapters.

Item	Part Number	Description
1-8	8708160000	Standard Assembly with Left Hand (LH) Connection, No Gauge
1-9	8708165000	Standard Assembly LH Connection with 5000 PSI Gauge
1-9	8708166000	Standard Assembly LH Connection with 6000 PSI Gauge
1-4	8713720000	Gauging Assembly (No Hose or Gauge)
5-8	8712640000	Hose Assembly with LH Connection
1	8708460000	Adapter Cross
2	L07688000K	Gas Valve Assembly
3	8708140000	Bleed Valve
4	8708150000	Gas Chuck
5	0854210000	Valve Connector
6	0854220000	Nitrogen Bottle Nut with LH Connection
7	0854250000	Gas Tank Nipple (Cga 677)
8	0854150000	Charging Hose (10 ft.)
9	See Gauges	2.5" Pressure Gauge

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Charging and Gauging Assemblies

Accumulator Accessories

The following assemblies and parts are recommended for use on all Diaphragm Accumulators with M28 Gas Valve.

NOTE: Can be used on all diaphragm accumulators with a gas precharge less than 5000 PSI. Consult factory for further information.

NOTE: These assemblies are not recommended for continuous monitoring of gas precharge. For continuous monitoring, see Gauging Adapters.

Item	Part Number	Description
1-10	1486750000	Standard Assembly with Right Hand (RH) Nitrogen Bottle Connection, No Gauge
1-11	1486751000	Standard Assembly RH Connection with 1000 PSI Gauge
1-11	1486752000	Standard Assembly RH Connection with 2000 PSI Gauge
1-11	1486753000	Standard Assembly RH Connection with 3000 PSI Gauge
1-11	1456755000	Standard Assembly RH Connection with 5000 PSI Gauge
1-10L	8700430000	Optional Assembly with Left Hand (LH) Nitrogen Bottle Connection, No Gauge
1-4	8702780000	Gauging Assembly (No Hose or Gauge)
6-10	1457810000	Hose Assembly with RH Connection
6-10L	1457820000	Hose Assembly with LH Connection
1		
2	5420920000	Gas Valve with 1/8" NPT
3	0832140000	Bleeder Valve
4	0873930000	Reducer – 1/4 x 1/8
6*	5420860000	Swivel Connector with Female Thread Connection
7	0870520000	Charging Hose
9	6661250000	Nitrogen Bottle Nut with RH Connection (Cga584)
9L	6661260000	Nitrogen Bottle Nut with LH Connection (Dga 584)
10	6661240000	Nitrogen Bottle Nipple
11	See Gauges	2.5" Pressure Gauge
*	8702770000	Gasket for 5420860000 (6)
	1353290000	Case with Insert for Complete Charging and Gauging Assembly

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Gauging Assemblies

Gauging Assembly consists of adapter incorporating gas valve, bleeder valve and gas chuck (less gauge).

3000 PSI			
Part Number (Assembly only)	**Piston Styles**	**Bladder Styles**	**Diaphragm Styles**
085122 0000	All	All	w/Cored valve
087101 0000	—	1-15 gal.	—
087103 0000	—	10-150 CI	—
4000/5000 PSI			
871372 0000	All	All	—

085122 0000 087103 0000 871372 0000

Gauging Adapters (Fixed Mount)

For continuous monitoring of gas precharge. Order gauge separately.

Part Number	Description
086213 0000	For 10-150 CI Bladder Accumulators (3000 PSI only) – includes gas valve
085057 0000	For 1 Gal. and above bladder and all piston accumulators (3000 - 5000 PSI)
146897 0003	For conventional top repairable bladder accumulators (2.5 to 15 Gal.)

086213 0000 085057 0000

Unloading Valve

Unloading valves provide cost effective safety for your hydraulics by relieving hydraulic pressure when the system is de-energized. Valves conform to OSHA Rule 29CFR1910.147 to enhance safe system operation. Needle valve allows for manual accumulator bleed-down.

How to Order Unloading Valves

DV Series unloading valves can be specified by using the symbols in the chart below to develop a model number. Select only those symbols that represent the features desired, and place them in the sequence indicated by the example at the top of the chart.

Features

- Lightweight aluminum housing
- 2-way normally open solenoid
- 3000 PSI operating pressure
- Encapsulated 17W Solenoid
- Four standard voltage and connection options
- Viton seals standard
- Small compact manifold design
- Leakproof SAE ports standard
- Needle valve override
- 10 GPM flow rate @ 3000 PSI
- 8 GPM @ 2000 PSI average

Series	Size	Coil Voltage	Coil Connection	Ports
DV	10	A	D	C

Series:
- **DV** Accumulator Unloading Valve

Coil Voltage:
- **A** 120/110 VAC, 60/50 Hz
- **B** 240/220 VAC, 60/50 Hz
- **C** 12 VDC
- **D** 24 VDC

Coil Connection:
- **C** 1/2 NPTF Conduit Connector with 24" Class H Wires
- **D** DIN 43650 (Hirschmann Plug)
- **P** SAE 18-0.25 SAE Double Spade (DC Only)
- **W** Double Wire 24" Class H (DC Only)

Ports:
- **C** SAE #8 Accumulator and Tank Ports, SAE #5 Test Port

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Accumulator Repair Tools

1. **Bladder Pull Rods** — (Bladder Type Accumulator) Pull rods are available in different lengths for different size accumulators. The pull rods attach to the gas valve of the bladder for ease of assembly into shell during reassembly.
2. **Core Tool** — The core tool is used to remove and reinstall the valve core. It is also used to ream valve seat and repair threads.
3. **Spanner Wrench** — Fits all standard size bladder accumulators. Used to remove hydraulic poppet assembly from accumulator shell.

Description	Part No
Pull Rod (1 Qt.-2 1/2 Gal.)	085109 0250
Pull Rod (5 Gal.)	085109 0500
Pull Rod (10-11 Gal.)	085109 1000
Pull Rod (15 Gal.)	085109 1500
Core Repair Tool	582441 0000
Core Installation Tool	300987
Spanner Wrench	085110 0000

Port Adapters

SAE to SAE Port Adapters	
Part Number	**Description**
5626840000	#24 SAE to #20 SAE
5626850000	#24 SAE to #16 SAE
5626860000	#24 SAE to #12 SAE
5626870000	#20 SAE to #16 SAE
5626880000	#20 SAE to #12 SAE
5626890000	#20 SAE to #10 SAE
0864730000	#16 SAE to #12 SAE
5626900000	#12 SAE to #10 SAE
5626910000	#12 SAE to #8 SAE
5720860000	#32 SAE to #24 SA
5720870000	#32 SAE to #20 SAE
5720880000	#32 SAE to #16 SAE

SAE to NPT Port Adapters	
Part Number	**Description**
5626810000	#24 SAE to 1-1/2" NPT
5626820000	#20 SAE to 1-1/4" NPT
5626830000	#12 SAE to 3/4" NPT
5720890000	#32 SAE to 2" NPT
6560070001	#12 SAE to 1/2" NPT
6560070002	#20 SAE to 1" NPT

"U" Bolts for Piston & Bladder-Type Accumulators

Accumulator Models (3000 PSI)		Part No. and Dimensions							
Piston Bore	Bladder Size	"U" Bolt Part No.	A	B	C	D	E	Thd.	Wt. Lbs.
A2	—	0854370000	1/4	2-7/16	2-11/16	2-11/16	1-3/4	1/4-20	0.2
A3	1 Pint	0862090000	1/2	3-11/16	4-1/16	3-5/8	2	3/8-16	0.9
—	1 Qt.	0854380000	1/2	4-5/8	5-1/8	4-1/2	3	1/2-13	1.2
A4	—	0864960000	1/2	5	5-1/2	4-1/2	3	1/2-13	1.3
—	1 Gal.	0854390000	5/8	6-3/4	7-3/8	6-1/8	3-3/4	5/8-11	2.4
A6	—	0864970000	5/8	7-1/8	7-3/4	6-1/8	3-3/4	5/8-11	2.5
A7	—	0854400000	5/8	8-1/4	8-7/8	7	3-3/4	5/8-11	3.0
—	2½ - 15 Gal.	0853360000	5/8	9	9-5/8	7-1/8	3-3/4	5/8-11	3.0
A9	—	0854410000	3/4	11-1/4	12	9-1/2	4-1/2	3/4-10	6.0
A12	—	0854420000	7/8	14-1/8	15	10-1/4	4-1/4	7/8-9	8.2
—	*2½ - 15 Gal.	0865020000	5/8	9-3/4	10-3/8	7-1/4	3-13/4	5/8-11	3.5

Bladder-Type Accumulator
Bladder-type accumulators should be mounted vertically with the hydraulic port down.

CAUTION: Bladder-type accumulators should never be mounted more than 25° angle from the vertical.

NOTE: "U" Bolts should never be mounted more than 1 inch from end of accumulator (piston type).

Base Bracket Assembly for Bladder Accumulators

Accumulator Models	Part Number and Dimensions									
Bladder Size	Base Bracket Assembly Part No.	A	B	C	D	E	F	G	H	Wt. Lbs.
1 Gal. (3K)	1449100000	10.3	7.87	3.62	4.75	8.87	3.85	1.58	0.65 x .87	5
2½-15 Gal. (3K)	1448720000	10.3	7.87	4.84	6.75	8.87	3.85	1.58	0.65 x .87	5
25-40 Gal. (3K)	1480020000	15.3	10.6	7.68	8.18	15.3	9.40	4.18	0.87 x 1.06	10
2½-15 Gal. (5K)	1481410000	10.3	7.87	5.35	6.75	8.87	3.85	1.58	0.65 x .87	5

Clamp Brackets for Bladder-Type Accumulators

Bladder Size	Clamp Part No.	Dimensions							Wt. Lbs.
		A	B	C Max.	D Max.	E	F	G	
1 Qt., 150 C.I. (Figure A)	1466230000	4.5	3.9	5.5	6.3	2.6	.35 x .51	1.2	1.8
1 Gal. (Figure A)	1449080000	6.8	6.3	7.6	8.5	3.6	.35 x .51	1.2	2.7
2½-15 Gal. (3K) (Figure B)	1449070000	9.0	8.5	10.0	11.7	4.8	.50 x .75	1.2	4.2
2½-15 Gal. (5K) (Figure B)	1349200000	9.5	8.5	10.5	12.0	5.4	.50 x .75	1.2	4.5

Figure A

Figure B

Clamp Brackets for Diaphragm and Small Piston and Bladder Accumulators

Part No.	Dimensions					Accumulator Style/Size		
	A	B	C	D	H	Diaphragm liters/cu in	Piston bore/series	Bladder liters/cu in
8700110238	4.25	3.35	4.29	2.25 / 2.41	1.58	—	2" / 3K	0.16 / 10
8700110252	4.25	3.35	4.42	2.62 / 2.82	1.64	0.075 / 5	2" / 4-5K	—
8700110291	4.25	3.35	4.84	2.81 / 3.01	1.86	0.16 / 10	—	—
8700110358	5.00	3.94	5.62	3.50 / 3.62	2.28	0.35 / 20	3" / 3-4K	0.50 / 30
8700110413	5.25	4.33	6.06	4.04 / 4.22	2.45	0.50 / 30	3" / 5K	—
8700110476	5.25	4.33	6.71	4.67 / 4.90	2.77	0.75 / 45	4" / 3K	1-3 / 60-150
8700110535	5.75	4.92	7.43	5.32 / 5.50	3.21	1.0 / 60	—	—
8700110630	7.00	5.98	8.29	6.25 / 6.37	3.57	1.4 / 85 & 2.0 / 120	—	—
1449080000	7.60	6.30	8.50	6.80	3.60	2.8 / 170	—	—

Clamp Brackets for Series 4000 & Series 5000 Piston Accumulators

Piston Bore Size	Series 4000 Part Number	Series 5000 Part Number
2”	8700110252	8700110252
3”	8700110358	8700110413
4”	8700110535	87001100535
6”	—	—
7”	N/A	8701960890
9”	N/A	8701961220

Large Gas Bottles

• Series GB

GB Series Large Gas Bottles Feature:

- Capacities from 40 to 150 Gallons
- High Strength Alloy Steel with Forged Ends
- Large 16" Diameter Shells
- Variety of Port Options

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Where space does not permit the installation of the required capacity accumulator, a smaller accumulator may be used by connecting it to a gas bottle(s) that can be located in a nearby spot where space is available. In some cases, an accumulator and gas bottle combination may be lower in cost, especially with large capacity applications.

Why Use GB Series Gas Bottles?

- reduce initial hydraulic system costs
- broad range of sizes and operating pressures
- heavy duty forged construction
- minimize plumbing with fewer large bottles
- interface well with Parker's accumulator products, especially piston accumulators

Parker GB Series Gas Bottles… The Right Choice!

Parker is the leading manufacturer of accumulators in North America. In addition to gas bottles, Parker's broad product line includes piston accumulators, bladder accumulators, and diaphragm accumulators. Parker's broad gas bottle offering includes:

- Large GB Series gas bottles (shown here)
- Piston Type Bottles (see Piston Accumulators)
- Bladder Type Bottles (see Bladder Accumulators)

Specifications

Materials

- Shell – high strength alloy steel, SA-372, exterior coated with primer.
- Ports – steel
- Gas Valve Cartridge – stainless steel

Pressure Ratings – Parker's GB Series offers 3200 psi and 5500 PSI gas bottles rated at minimum 3 to 1 design factors. See Models, Capacities and Dimensions for specific pressure ratings by size. Temperatures from -20°F to 200°F (-29°C to 93°C).

Optional Gas Valve – GB Series gas bottles are supplied as standard with high pressure cored gas valve cartridges (ISO-4570-8V1). Poppet type (military) gas valves (Mil. Spec. MS-28889-2) are available as an option.

Standard and Optional Ports – GB Series gas bottles are offered with 2" SAE 4-bolt flange ports as standard. Metric flange, SAE straight thread, and special ports are available as options, see next page for details.

Certifications – GB Series gas bottles are supplied as standard with ASME Section VIII Div. 1, Appendix 22 Certification. See page 3 for a complete certifications summary.

3200 PSI (220 Bar)

Model	Capacity Gallons (Liters)	A in. (mm)	B in. (mm)	C Port Size	Weight lbs. (kg)
GB16040A32PL1A1	40 (151.2)	16 (406)	69 (1753)	2" Code 61 SAE Flange	660 (300)
GB16050A32PL1A1	50 (189.0)	16 (406)	82 (2083)	2" Code 61 SAE Flange	785 (357)
GB16060A32PL1A1	60 (226.8)	16 (406)	96 (2438)	2" Code 61 SAE Flange	912 (415)
GB16070A32PL1A1	70 (264.6)	16 (406)	110 (2794)	2" Code 61 SAE Flange	1043 (474)
GB16080A32PL1A1	80 (302.4)	16 (406)	123 (3124)	2" Code 61 SAE Flange	1175 (534)
GB16090A32PL1A1	90 (340)	16 (406)	136 (3454)	2" Code 61 SAE Flange	1300 (591)
GB16100A32PL1A1	100 (378)	16 (406)	150 (3810)	2" Code 61 SAE Flange	1436 (653)
GB16125A32PL1A1	125 (473)	16 (406)	184 (4674)	2" Code 61 SAE Flange	1755 (798)
GB16150A32PL1A1	150 (567)	16 (406)	218 (5537)	2" Code 61 SAE Flange	2075 (943)

5500 PSI (380 Bar)

Model	Capacity Gallons (Liters)	A in. (mm)	B in. (mm)	C Port Size Thd. Size	Weight lbs. (kg)
GB16040A55PQ1A1	40 (151.2)	16 (406)	77 (1956)	2" Code 62 SAE Flange	1180 (536)
GB16050A55PQ1A1	50 (189.0)	16 (406)	92 (2337)	2" Code 62 SAE Flange	1420 (645)
GB16060A55PQ1A1	60 (226.8)	16 (406)	108 (2743)	2" Code 62 SAE Flange	1650 (750)
GB16070A55PQ1A1	70 (264.6)	16 (406)	123 (3124)	2" Code 62 SAE Flange	1898 (863)
GB16080A55PQ1A1	80 (302.4)	16 (406)	138 (3505)	2" Code 62 SAE Flange	2128 (967)
GB16090A55PQ1A1	90 (340)	16 (406)	153 (3886)	2" Code 62 SAE Flange	2358 (1072)
GB16100A55PQ1A1	100 (378)	16 (406)	168 (4267)	2" Code 62 SAE Flange	2606 (1185)
GB16125A55PQ1A1	125 (473)	16 (406)	207 (5258)	2" Code 62 SAE Flange	3190 (1450)
GB16150A55PQ1A1	150 (567)	16 (406)	244 (6198)	2" Code 62 SAE Flange	3795 (1725)

Port Size	C	D	E	F
2" SAE Code 61	2.0	1.688	3.062	1/2-13 UNC - 2B
2" SAE Code 62	2.0	1.750	3.812	3/4-10 UNC - 2B

Gas Bottle and Accumulator Sizing Information

When hydro-pneumatic accumulators are sized, a required accumulator capacity or volume is calculated. This calculated capacity is the total "gas" volume required to discharge a specified amount of fluid at a given pressure differential and temperature. When selecting an accumulator(s) to satisfy the requirement, three different choices are possible:

- A single accumulator with the required gas capacity.
- Multiple smaller accumulators, plumbed in parallel, with the required total combined gas capacity.
- A single smaller accumulator with gas bottle(s) with the required total combined gas capacity.

Though all three of the above choices have their advantages, for large capacity applications the single smaller accumulator with gas bottle(s) usually proves to be the most cost effective. When sizing an accumulator with gas bottle(s) system, care must be taken when selecting the accumulator to insure that the piston does not bottom out on the end caps when being charged with or when discharging fluid. As a rule of thumb, size the accumulator with 20% to 25% greater capacity than the volume of fluid being discharged during operation. When selecting a gas bottle(s), make your selection such that the bottle(s) capacity plus the accumulator gas capacity will equal the total gas capacity required.

Example:
Using the *inPHorm Accumulator Sizing and Selection Software*, you calculated that you need an accumulator with an 80 gallon gas capacity. You know that 16 gallons of fluid will be discharged during operation. The proper selection would be a 20 gallon accumulator with a 60 gallon gas bottle.

How to Order Gas Bottles

GB Series gas bottles can be specified by using the symbols in the chart below to develop a model number. Select only those symbols that represent the features desired, and place them in the sequence indicated by the example at the top of the chart.

Series	Size	Construction	Pressure	Gas Port[1]	Gas Valve Port	Options	Design Variation	Design Code
GB	16040	A	32	PL	M	1	A	1

GB Gas Bottles

A Standard

32 3200 PSI
55 5500 PSI

16040 16", 40 gallon
16050 16", 50 gallon
16060 16", 60 gallon
16070 16", 70 gallon
16080 16", 80 gallon
16090 16", 90 gallon
16100 16", 100 gallon
16125 16", 125 gallon
16150 16", 150 gallon

PJ 1-1/2" Code 61 Flange
PL 2" Code 61 Flange
PM 2-1/2" Code 61 Flange
PP 1-1/2" Code 62 Flange
PQ 2" Code 62 Flange
TE SAE #16
TF SAE #20
TG SAE #24

1 None

Gas Valve Option (or 2nd Port Options):

- **M** Military Poppet Style Gas Valve - Standard on all

****** Ref. Additional Port Code per Gas Port Codes

A Standard
S Special

1 Standard
- Special Design No. Assigned

1) See page 103 for flange port dimensions.

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Greerolators provide an affordable means of enhancing the performance of a hydraulic system. They are suitable for storing energy under pressure, absorbing hydraulic shocks, and dampening pump pulsation and flow fluctuations.

Greerolators provide dependable performance, maximum efficiency, and long service life in a lightweight, compact design. They are ideal for industrial and mobile equipment such as industrial trucks, farm equipment, and off-highway vehicles.

Why Use Greerolators?

- improves system efficiency
- supplements pump flow
- supplies power in emergency
- compensates for leakage
- absorbs hydraulic shocks
- very contamination tolerant
- DOT approved for commercial vehicles
- compact, lightweight
- safety, non-repairable design
- very quick response
- works well with water, low lubricity fluids

Specifications

Maximum Operating Pressure - 2000 PSI (138 Bar)

Materials

- Shell and Ports – high strength steel
- Button – steel
- Gas Valve Stem – steel
- Gas Valve Protector – steel
- Diaphragms – Nitrile (NBR) or Hydrin

Maximum Compression Ratio (max. working pressure/ precharge pressure) 4-1

Charging & Gauging Adaptor - Part No. 603738

Maximum Flow Rates

Size (cu in)	Max. Recommended Flow	
	GPM	LPM
15 - 1 Quart	23	87
0.5 - 1 gal	40	151

Phasing Out

Models, Capacities and Dimensions

Size	Bladder Material (Code)	Oil Service Part NO.	Water Service Part No.	Capacity cu in (liters)	A	B	C	D	E Port (thread)	Weight lbs. (kg.)
					in (mm)					
15 cu in	Nitrile (-3) Hydrin (-4)	847840 847842	850280 850281	15 (0.25)	6.68 (170)	3.10 (79)	2.71 (69)	1.06 (27)	SAE #8 (3/4-16)	3.0 (1.4)
30 cu in	Nitrile (-3) Hydrin (-4)	847110 847112	850290 850291	30 (0.49)	10.14 (258)	3.10 (79)	2.71 (69)	1.06 (27)	SAE #8 (3/4-16)	4.3 (1.9)
1 quart	Nitrile (-3) Hydrin (-4)	800102 805143	800103 806100	60 (0.98)	9.96 (253)	4.38 (111)	3.98 (101)	1.06 (27)	SAE #8 (3/4-16)	7.5 (3.4)
1/2 gal.	Nitrile (-3) Hydrin (-4)	844160 844162	850300 850301	115 (1.88)	10.25 (260)	6.75 (171)	6.25 (159)	1.75 (44)	SAE #12 (1-1/16-12)	20 (9.1)
1 gal.	Nitrile (-3) Hydrin (-4)	800087 810904	800088 806110	232 (3.80)	14.31 (363)	6.75 (171)	63.25 (159)	1.75 (44)	SAE #12 (1-1/16-12)	26 (12)

Hydraulic Piston Accumulators

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 foreignmaterial 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.

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

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.

FIGURE 1
PART #144595XX00

FIGURE 2
PART #085122XX00

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).

FIGURE 3
PART #870816XX00

FIGURE 4
PART #871372XX00

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 2-3 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

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

Hydraulic Piston Accumulators CE Marking

What is the Pressure Equipment Directive?

The Pressure Equipment Directive (PED) is one of the series of technical harmonisation directives covering subjects such as machinery, simple pressure vessels, gas applicances etc., which were identified by the European Community's program for the elimination of technical barriers to trade. The purpose of the PED is to harmonise national laws of member states regarding the design, manufacture, testing and conformity assessment of pressure equipment and assemblies of pressure equipement.

The program aims to ensure the free placing on the market and putting into service of relevant equipment within the European Union and the European Economic Area. The Pressure Equipment Directive provides for a flexible regulatory environment which does not impose any technical solution.

The Directive requires that all pressure equipment and assemblies within its scope must be safe when placed on the market and put into service. Safe pressure equipment and assemblies are defined as those which, when properly installed and maintained and used for their intended purpose, will not endanger the health and safety of persons and, where appropriate, domestic animals and property.

Units 1 liter and greater in gas capacity can be identified by a CE Marking place on the product label attached to the accumulator. Units under 1 liter in gas capacity are designed and manufactured in accordance with Sound Engineering Practice (S.E.P.) in order to ensure safe use. Such units do not bear the CE Marking.

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

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 perferred. 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 presure 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 relased 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 serveral 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.

"U" Bolts for Piston-Type Accumulators

	"U" Bolt							Wt.
Bore 3,000 PSI	**Part Number**	**A**	**B**	**C**	**D**	**E**	**Thrd.**	**(lbs.)**
A2	0854370000	1/4	2-7/16	2-11/16	2-11/16	1-3/4	1/4-20	0.2
A3	0862090000	1/2	3-11/16	4-1/16	3-5/8	2	3/8-16	0.9
A4	0864960000	1/2	5	5-1/2	4-1/2	3	1/2-13	1.3
A6	0864970000	5/8	7-1/8	7-3/4	6-1/8	3-3/4	5/8-11	2.5
A7	0854400000	5/8	8-1/4	8-7/8	7	3-3/4	5/8-11	3.0
A9	0854410000	3/4	11-1/4	12	9-1/2	4-1/2	3/4-10	6.0
A12	0854420000	7/8	14-1/8	15	10-1/4	4-1/4	7/8-9	8.2

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 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-	-20ºF to 165ºF	200ºF	Parker's Standard Compound - Compatible
	Nitrile	29ºC to 74ºC	93ºC	with most mineral oil-based fluids
E	Fluorocarbon	-10ºF to 250ºF	400ºF	Compatible with most mineral oil-based fluids at
	Elastomer	-23ºC to 121ºC	204ºC	higher temperatures and some exotic fluids
D	Ethylene	-40ºF to 250ºF	300ºF	Compatible with most phosphate ester fluids
	Popylene	-40ºC to 121ºC	149ºC	and some synthetic fluids
H	Hydrogenated	-45ºF to 325ºF	350ºF	Compatible with most oil-based and biodegradable fluids
	Nitrile	-43ºC to 162ºC	177ºC	maintains sealing effectiveness at low temperatures
Q	Low Temp.	-45ºF to 160ºF	200ºF	Compatible with most mineral oil-based fluids and
	Nitrile	-43ºC to 74ºC	93ºC	maintains sealing effectiveness at low temperatures

***Note:** 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 enviroments. 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 form 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.

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 damage 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.

FIGURE 1
PART #144595XX00

FIGURE 2
PART #085122XX00

3000 PSI UNITS

Part Number	Charging and Gauging Assembly for Cored Accumulators
144595XX00 (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 number144596XX00.

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

FIGURE 3
PART #870816XX00

FIGURE 4
PART #871372XX00

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, 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 #87127XX00).

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 all the way down. This will depress core in gas valve and check pressure.

(6) To remove gauging assembly turn “T” handle all the way out on gas chuck (Figure 1), then open bleed valve.

(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 2-3 times and read pre-charge.

(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 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 horizontally 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 small smooth screw driver 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

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

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

BLADDER PRODUCTS

Series "BA" Bladder Accumulators

- **10 Cu. In. through 40 Gallons**
- **3,000 and 5,000 psi Standard**
- **Bottom and Conventional Top Repairable**

Installation

All accumulators shipped from the factory will be precharged to a nominal pressure in order to seat the poppet valve on the hydraulic port. 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 should be mounted within 25° of vertical with the hydraulic port on the bottom. It should also be rigidly mounted using appropriate mounting hardware, which is shown in the Accumulator Accessories section of this catalog. 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.

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Pre-Charging

Use only an inert gas such as nitrogen for precharging piston accumulators. **Do not use oxygen or shop air.**

included.

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).

It is recommended to use charging and gauging assembly as shown in Figure 1 (Part †144595XX00, right-hand thread; Part †144596XX00, left-hand thread), and in Figure 4 Part †0871XX0000 for 1-15 gallon & Part †087102XX00 for 10-150 cu. in. accumulator rated for 3,000 psi or less. For accumulators rated for 5,000 psi, as well as the 25-40 gallon, 3,000 psi accumulators, use assembly shown in Figure 6 (Part †144912XX00). If other equipment is used, make sure it is compatible with the gas valve assembly and nitrogen source. 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 8A or 8B, follow steps A through L and skip steps F and J. If accumulator has a gas valve as shown in Figure 9, follow steps A through L and skip steps E and I.

Accumulators having gas valve per Figure 8A or 8B

(A) Remove gas valve guard and gas valve cap.

(B) Back gas chuck "T" handle all the way out (counterclockwise) 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).

NOTE: *For top repairable units having valves as shown in Figure 8B, a valve extension as shown in Figure 3 must be attached to the gas valve after removing valve cap.*

(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 damage the valve core.

(F) ***For gas valves as shown in Figure 9,*** 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. Note: Three (3) turns will fully open the valve.

(G) Crack open nitrogen bottle or regulator valve and ***slowly*** fill accumulator. **Caution:** If the precharge is not done slowly, the bladder may suffer permanent damage. Shut off when gauge indicates 100 psi above desired precharge. (Note: It is recommended that precharge pressure be at least 25% of maximum system pressure.) Damage to bladder may occur if this ratio is not maintained or exceeded. For shock suppression applications, precharge is usually set at about 65% of system pressure. When the accumulator is used to supplement pump flow, auxiliary power supply or leakage compensation, precharge is usually set at approximately 90% of minimum system pressure.

(H) Let the precharge set for 10 to 15 minutes. This will allow the gas temperature to stabilize. If the desired precharge is exceeded, close nitrogen bottle valve, then slowly open bleed valve. Do not reduce precharge by depressing valve core with a foreign object. High pressure may rupture rubber valve seat.

† "XX" Denotes to gauge pressure

(I) When finished precharging accumulator, turn "T" handle all the way out on gas chuck, then open bleed valve.

(J) ***For gas valves as shown in Figure 9***, with [illegible] not tighten hex nut at point "D" to close internal poppet ([illegible] 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.)

FIGURE 1
PART #144595XX00

FIGURE 2
PART #085122XX00

CAN BE USED ON 3,000 PSI BOTTOM REPAIRABLE BLADDER ACCUMULATORS

FIGURE 3
VALVE EXTENSION P.N. 085434 0000 FOR USE ON **CONVENTIONAL TOP REPAIRABLE UNITS** IN CONJUNCTION WITH FIGURES 1 OR 2

FIGURE 4
PART #087100XX00 (1-15 GAL.)
PART #087102XX00 (10-150 CU. IN.)

FIGURE 5
PART #087101XX00 (1-15 GAL.)
PART #087103XX00 (10-150 CU. IN.)

CAN BE USED ON BOTTOM AND TOP REPAIRABLE 3,000 PSI ACCUMULATORS

Part Number	Charging and Gauging Assembly for 3000 PSI Bottom Repairable
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 144596 XX00.

Part Number	Charging and Gauging Assembly for 3000 PSI Bottom & Top Repairable
087102 XX00 (10-150 cu. in.) 087100 XX00 (1-15 gal.)	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).

Part Number	Gauging Assembly for 3000 PSI Bottom Repairable
085122 XX00	Gauging device consisting of adapter incorporating gas valve bleeder valve and gas chuck including gauge.

Part Number	Gauging Assembly for 3000 PSI Top Repairable
087103 0XX00 (10-150 cu. in.) 087101 0XX00 (1 - 15 gal.)	Gauging device consisting of adapter incorporating gas valve bleeder valve and gas chuck (less gauge).

Part Number	Valve Extension for 3000 PSI
085434 XX00	Contains extension and valve core.

FIGURE 6
PART #870810 XX00

FIGURE 7
PART #871372 XX00

25 - 40 GALLON 3000 PSI AND ALL 5000 PSI UNITS

Part Number	Charging and Gauging Assembly for 25-40 Gal. 3000 & 5000 PSI
870810 XX00	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
871372 XX00	Gauging device consisting of adapter incorporating gas valve bleeder valve and gas chuck (less gauge).

FIGURE 8A **FIGURE 8B**
3000 PSI VALVES

FIGURE 9
5000 PSI VALVES

Maintenance

Little maintenance is required for a bladder accumulator. If there is external leakage, tighten all connections. If leakage continues, remove accumulator from system and replace faulty components.

After original installation, check pre-charge once during first week to see that no leak has developed. Thereafter, check pre-charge monthly. Check pre-charge if the system is acting sluggish. If pre-charge is low, check gas valve for leakage and recharge.

If there is no gas in bladder and fluid appears at gas valve, unit must be removed and bladder replaced.

Pre-charge Checking Procedure

Using appropriate valve in the hydraulic system, discharge all oil from accumulator.

For accumulators rated for 3000 psi, either use gaging assembly in Figure 2 (Part #085122XX00) or gaging assembly in Figure 5 (Part #087101XX00) and follow Steps 1 through 7.

For accumulators rated for 5000 psi, use gaging assembly in Figure 7 (Part #871372XX00) and follow steps 8 through 14.

3000 PSI RATED UNITS

(1) Remove gas valve guard and gas valve cap. (For top repairable unit connect valve extension Part #085434XX00) as shown in Figure 3 and tighten with wrench.

(2) Close bleed valve and turn “T” handle all the way out.

(3a) Attach gauging assembly to gas valve or to gas valve extension and tighten swivel nut (10-15 in. lb.) (11.5-17 cm kg), when using gauging assembly in Figure 1.

(3b) Install gas valve o-ring on the gas valve, and attach gauging assembly to valve stem. Tighten assembly (25-30 in. lb.) (29-35 cm kg) when using gauging assembly in Figure 4.

(4) Turn “T” handle all the way down, which will depress core in gas valve and check pressure.

(5) To remove gauging assembly, turn “T” handle all the way out and then open bleeder valve.

(6) Hold gas valve from turning, loosen swivel nut and remove assembly.

(7) If necessary, remove valve extension, then install cap on gas valve (10-15 in. lb.) (11.5-17 cm kg) and valve guard.

25-40 GALLON 3000 PSI AND 5000 PSI RATED UNITS EQUIPPED WITH MS GAS VALVE AS SHOWN IN FIGURE 9.

(8) Remove gas valve guard and gas valve cap.

(9) Close bleed valve.

(10) Attach gauging assembly to gas valve and tighten swivel nut (10-15 in. lb.) (11.5-17 cm kg).

(11) Referring to Figure 9, 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. Note, four (4) turns will fully open poppet. Check pre-charge pressure.

(12) With wrench, tighten hex nut at point “D” to close internal poppet (10-15 in. lb.) (11.5-17 cm kg).

(13) Hold gas valve at point “C” with a wrench and remove swivel nut assembly.

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

Removal of Accumulator From Hydraulic System

Shut equipment down and make certain that hydraulic pressure at the accumulator is at zero.

Remove gas valve guard and gas valve cap.

3000 PSI RATED UNITS

Accumulators rated for 3000 psi will have a gas valve as shown in Figure 8A or 8B. For these units, attach gaging assembly (Part #085122XX00) or (Part #087103XX00)for 10 - 150 cubic inch, and (Part #087101XX00) for 1 - 15 gallon.

Open bleed valve and release all the gas pressure. Detach gauging assembly and, using valve core removing tool (Part #582441XX00), **remove valve core.**

Remove accumulator from hydraulic system.

25-40 GALLON 3000 PSI AND 5000 PSI RATED UNITS EQUIPPED WITH MS GAS VALVE AS SHOWN IN FIGURE 9.

Accumulators rated for 5000 psi will have a gas valve as shown in Figure 9. For these units, after removing valve cap, hold valve at point “C” with one (1) wrench while unscrewing hex nut at point “D” with a second wrench until gas begins to escape through the top of the valve. Wait until all the gas pressure has been r SAE #6

(Caution: Keep face away from gas valve as the high pressure nitrogen is discharging.)

Remove accumulator from hydraulic system.

Disassembly of Bottom Repairable Accumulators

Figure 1. Once the accumulator has been removed from the equipment, the accumulator body should be secured in a vise, preferably a chain vise. If a standard jaw vise is used, brass inserts should be used to protect the accumulator hydraulic port assembly from damage. Clamp on wrench flats only when using a jaw vise to prevent accumulator from turning.

FIGURE 1

Figure 2. Remove bleeder plug (if the accumulator is equipped with one) on hydraulic port assembly. Using a spanner wrench, remove lock nut from the hydraulic port assembly; use an adjustable wrench on the flats located on the port assembly to prevent port assembly from rotating.

FIGURE 2

Figure 3. Remove spacer, then push the hydraulic port assembly into the shell prior to Step 4.

FIGURE 3

Figure 4. Insert hand into the accumulator shell and remove the o-ring backup, o-ring, metal
backup. Seperate the anti-extrusion ring from the hydraulic port. Fold anti-extrusion ring to enable removal of anti-extrusion ring from shell.

FIGURE 4

Figure 5. Remove hydraulic port plug from accumulator shell.

FIGURE 5

Figure 6. Remove jam nut from bladder valve stem. Secure valve stem from twisting with an appropriate wrench applied to the valve stem flats.

FIGURE 6

Figure 7. Fold bladder and pull out of accumulator shell. A slight twisting motion while pulling on the bladder reduces effort required to remove bladder from shell. If bladder is slippery, hold with a cloth.

FIGURE 7

Clean & Inspect

Cleaning: All metal parts should be cleaned with a cleaning agent. Seals and soft parts should be wiped clean.

Bladder: Inflate bladder to normal size. Wash bladder with a soap solution. If soap solution bubbles, discard bladder. After testing, deflate bladder immediately.

Hydraulic Port: Inspect assembly for damage; check the poppet plunger to see that it spins freely and functions properly.

In cases where the accumulator is used with water, check assembly for rust and/or defective plating. If rust is detected, clean with commercial rust remover. If parts are pitted, replace with new components. If protective plating is damaged, replace with new components.

Seals: Check anti-extrusion ring and soft seals for damage and wear; replace all worn or damaged seals with original equipment seals from the Hydraulic Accumulator Division.

Shell: After shell has been cleaned with a cleansing agent, check the inside and outside of shell. Special attention should be given to the area where the gas valve and hydraulic assembly pass through the shell. Any nicks or damages in this area could destroy the accumulator bladder or damge new seals. If this area is pitted consult factory.

Bladder Assembly in Bottom Repairable Accumulators

1. After shell has been cleaned and inspected, replace accumulator shell in vise or on table.
2. Spray the inside of the accumulator shell with approximately 10% of the accumulator volume with clean system fluid to lubricate and cushion bladder. Make sure the entire internal of the shell is lubricated.
3. With all gas completely exhausted from bladder, collapse bladder and fold longitudinally in a compact roll.
4. **Figure 8.** Insert the bladder pull rod through the valve stem opening and through the shell fluid port; attach the bladder pull rod to the bladder valve stem.
5. With one hand, pull the bladder pull rod while feeding the bladder into the shell with the other hand. Slight twisting of bladder will assist in this insertion.

FIGURE 8

FIGURE 9

6. **Figure 9.** Once the bladder valve stem has been pulled through the valve stem opening in the shell, install the valve stem nut by hand. Once the valve stem nut is in place, remove the bladder pull rod.

Disassembly of Conventional Top-Repairable Accumulators

The conventional top-repairable accumulator uses a gas-end adapter which is retained in the shell with an anti-extrusion ring exactly like those used in port assemblies (see **Figure 10**).

FIGURE 10

1. Make sure the gas is relieved from the accumulator. (See Removal of Accumulator from System).
2. Remove jam nut from bladder gas valve stem using a 1-5/16" socket wrench.

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3. Using a spanner wrench, remove outer lock nut on the gas end adapter.
4. Push the gas end adapter complete with the bladder into the shell.
5. Insert hand into accumulator, remove the o-ring back-up, o-ring and metal back-up. Separate the anti-extrusion ring from the gas end adapter.
6. Fold the anti-extrusion ring and remove from shell. See **Figure 4**.
7. Remove gas end adapter from shell.
8. Remove bladder from shell.

   NOTE: Conventional top repairable accumulators may be repaired by removing the bladder from either the hydraulic end or the gas end of the accumulator.

Clean & Inspect

Cleaning: All metal parts should be cleaned with a cleaning agent. Seals and soft parts should be wiped clean.

Bladder: Inflate bladder to normal size. Wash bladder with a soap solution. If soap solution bubbles, discard bladder. After testing, deflate bladder immediately.

Hydraulic Port: Inspect assembly for damage; check the poppet plunger to see that it spins freely and functions properly. In cases where the accumulator is used with water, check assembly for rust and/or defective plating. If rust is detected, clean with commercial rust remover. If parts are pitted, replace with new components. If protective plating is damaged, replace with new components.

Seals: Check anti-extrusion ring and soft seals for damage and wear; replace all worn or damaged seals with original equipment seals from the Accumulator Division.

Shell: After shell has been cleaned with a cleansing agent, check the inside and outside of shell. Special attention should be given to the area where the gas valve and hydraulic assembly pass through the shell. Any nicks or damages in this area could destroy the accumulator bladder or damage new seals. If these areas are pitted, consult factory.

Bladder Assembly in Conventional Top-Repairable Accumulators

1. Spray the inside of the accumulator shell with a liberal amount of clean system hydraulic fluid to lubricate and cushion the bladder. Make sure the entire internal surface of the shell is lubricated.
2. With all air completely exhausted from bladder, collapse bladder and fold longitudinally in a compact roll.
3. Install the gas end adapter on the bladder and secure with jam nut.
4. Insert bladder into accumulator shell.
5. Insert gas end adapter.
6. Fold anti-extrusion ring and place inside accumulator.
7. Reaching inside the accumulator, insert the gas end adapter through the anti-extrusion ring and pull into place. The steel surface on anti-extrusion ring should face outward.
8. Holding the gas end adapter in place, fill accumulator with approximately 50 PSI nitrogen. This will hold the gas end adapter in place.
9. Install the metal backup, o-ring and o-ring backup.
10. Install the outer spacer.
11. Install the outer locknut.

Hydraulic Port Assembly Installation

1. Holding the hydraulic port assembly by the threaded end, insert the poppet end into the shell fluid port. Lay complete assembly inside shell.
2. **Figure 11.** Fold anti-extrusion ring to enable insertion into the shell. Once the anti-extrusion ring has cleared the fluid port opening, place the anti-extrusion ring on the poppet assembly with the steel collar facing toward the shell fluid port.

FIGURE 11

3. Pull the threaded end of the port assembly through the shell fluid port until it seats solidly into position on the shell fluid port opening.
4. **Figure 12.** With port assembly firmly in place, install valve core into the bladder stem. Slowly pressurize the bladder, using dry nitrogen with sufficient pressure (approximately 40-50 psi) to hold poppet assembly in place so both hands are free to continue with assembly.

FIGURE 12

5. **Figure 13.** Install metal backup washer over hydraulic port assembly and push into the shell fluid port to bottom it out on anti-extrusion ring.

FIGURE 13

6. Install o-ring over hydraulic port assembly and push it into the shell fluid port until it has bottomed out against washer.

   CAUTION: *Do not twist o-ring.*
7. Install o-ring backup over hydraulic port assembly and push until it bottoms against o-ring (1-40 gallon sizes and 5K only).

FIGURE 14

8. Insert spacer with the smaller diameter of the shoulder facing the accumulator shell.
9. **Figure 14.** Install the lock-nut on the hydraulic port assembly and tighten securely. This will squeeze the o-ring into position. Use appropriate wrench on flats of port assembly to insure the unit does not turn.
10. Thread bleeder plug into the hydraulic port assembly.
11. Position accumulator so that fluid (same fluid as used in the system) can be poured into the accumulator (add approximately 10% of the accumulator capacity). This fluid will act as a cushion when the accumulator is pre-charged with gas.
12. Pre-charge accumulator to desired pressure. See pre-charge instructions. Install accumulator on machine.

Accumulator Parts Description

FIGURE A 3000 PSI 10 CI -150 CI

FIGURE B 3000 PSI 1-15 GALLON

FIGURE C 3000 PSI CONVENTIONAL TOP REPAIRABLE

FIGURE D 5000 PSI CONVENTIONAL TOP REPAIRABLE

FIGURE E 5000 PSI 2" VALVE STEM

FIGURE F 5000 PSI

Item No.	Description
1	Shell
2	Bladder
3	O-ring
4	Valve Core
5	Lock Nut (Jam)
6	Protective Cap
7	Valve Cap
11	Lock Nut Outer
14	Spacer
15	Anti-Extrusion Ring Ass'y.
18	O-ring
19	O-ring Back-up
20	O-ring Back-up Metal
24	Top Adapter
25	Gas Valve
26	O-ring (Gas Valve)
28	Back-up Washer (Stem)
30	O-ring (Stem)

Suggested Approximate Torque Values

Protective Cap	14 ft. lbs.
Lock Nut (Jam)	56 ft. lbs.
Valve Core	3-4 in. lbs.
Bleeder Plug	10 ft. lbs.
Lock Nut Outer (1 qt.)	73 ft. lbs.
Lock Nut Outer (1 gal.)	200 ft. lbs.
Lock Nut Outer (2½-15 g.)	275 ft. lbs.
Gas Valve Cap	10-15 in. lbs.

Bladder Assembly Part Numbers

Accumulator Size	Seal Type - 01 Nitrile (NBR)	- 03 Hi Temp (NBR)	- 04 Hydrin	- 06 Butyl	- 08 EPR	- 28 Fluorocarbon
3000 PSI - Standard - Ref. Figures A,B & C. Contains Items 2,3,4,18,19,20,25 & 26*						
10 Cu. In.	702900	702901	702902	702903	702904	702906
1 Pt.	702914	702915	702916	702917	702918	702920
1 Qt.**	702928	702929	702930	702931	702932	702934
150 Cu. In.	702942	702943	702944	702945	702946	702948
1 Gal.***	702956	702957	702958	702959	702960	702962
2 1/2 Gal.	702970	702971	702972	702973	702974	702976
5 Gal.	702984	702985	702986	702987	702988	702990
10 Gal.	702998	702999	703000	703001	703002	703004
11 Gal.	703012	703013	703014	703015	703016	703018
15 Gal.	703026	703027	703028	703029	703030	703032
25 Gal.	703340	704007	704008	704009	703341	703342
40 Gal.	703346	704013	704014	704015	703347	703348
5000 PSI - Ref. Figure D and contains Items 2,7,25 & 26						
2 1/2 Gal.	0870445025	C.F.	0870465025	0870455025	0870475025	0870465025
5 Gal.	0870445050	C.F.	0870465050	0870455050	0870475050	0870465050
10 Gal.	0870445100	C.F.	0870465100	0870455100	0870475100	0870465100
15 Gal.	0870445150	C.F.	0870465150	0870455150	0870475150	0870465150
5000 PSI - 2" Valve Stem Ref. Figure E Contains Items 2,7,25,26,28 & 30						
1 Gal. 7/8" ∅ Stem	8706135010	8706185010	8706175010	8706145010	8706145010	8706155010
1 Gal. 1" ∅ Stem	704060	704061	704062	704063	704064	704066
2 1/2 Gal.	706000	706001	706002	706003	706004	706006
5 Gal.	706010	706011	706012	706013	706014	706016
10 Gal.	706020	706021	706022	706023	706024	706026
15 Gal.	707030	706031	706032	706033	706034	706036
5000 PSI - Ref. Figure F Contains Items 2,7,25 & 26						
2 1/2 Gal.	0850695025	0870435025	0856665025	0850705025	0851055025	0851045025
5 Gal.	0850695050	0870435050	0856665050	0850705050	0851055050	0851045050
10 Gal.	0850695100	0870435100	0856665100	0850705100	0851055100	0851045100
15 Gal.	0850695150	0870435150	0856665150	0850705150	0851055150	0851045150

*See page164 for items 18-20. C.F. = Consult Factory
**Contains items 2,3, & 4 as shown in Figure A. ***Contains items 2,3,4,18,19,25 & 26.

Gas Valve Assembly Part Numbers

Size	Pressure	Seal Type Buna-Nitrile -01	Butyl -06	Fluorocarbon -28	EPR -08	Hydrin -04
10 - 150 C.I.	3000 PSI	NA	NA	NA	NA	NA
1 - 15 Gal.†	3000 PSI	L074210001	L074210003	L074210005	L074210007	L074210009
25 - 40 Gal.▲	3000 PSI	L074400001	L074400003	L074400005	L074400007	L074400009
1 - 15 Gal.▲	5000 PSI	L074400001	L074400003	L074400005	L074400007	L074400009

† Contains items 3, 4, 25 & 26.
▲ Contains items 7, 25 & 26.

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Accumulator Parts Description

FIGURE A 3000 PSI 10 CI -150 CI

FIGURE B 3000 PSI 1-15 GALLON

FIGURE C 3000 PSI CONVENTIONAL TOP REPAIRABLE

FIGURE D 5000 PSI CONVENTIONAL TOP REPAIRABLE

FIGURE E 5000 PSI 2" VALVE STEM

FIGURE F 5000 PSI

Item No.	Description
1	Shell
2	Bladder
3	O-ring
4	Valve Core
5	Lock Nut (Jam)
6	Protective Cap
7	Valve Cap
11	Lock Nut Outer
14	Spacer
15	Anti-Extrusion Ring Ass'y.
18	O-ring
19	O-ring Back-up
20	O-ring Back-up Metal
24	Top Adapter
25	Gas Valve
26	O-ring (Gas Valve)
28	Back-up Washer (Stem)
30	O-ring (Stem)

Suggested Approximate Torque Values

Protective Cap	14 ft. lbs.
Lock Nut (Jam)	56 ft. lbs.
Valve Core	3-4 in. lbs.
Bleeder Plug	10 ft. lbs.
Lock Nut Outer (1 qt.)	73 ft. lbs.
Lock Nut Outer (1 gal.)	200 ft. lbs.
Lock Nut Outer (2½-15 g.)	275 ft. lbs.
Gas Valve Cap	10-15 in. lbs.

Bladder Assembly Part Numbers

Accumulator Size	Seal Type				
	Buna	Butyl	Fluorocarbon	EPR	Low Temp. Nitrile
3000 PSI – Standard – Ref. Figures A, B & C. Contains items 2, 3, 4, 18, 19, 20, 25 & 26*					
10 C.I.	0850693CI0	0850703CI0	0851043CI0	0851053CI0	0856663C10
1 pt.	0850693001	0850703001	0851043001	0851053001	0856663001
1 qt.**	0850693002	0850703002	0851043002	0851053002	0856663002
150 C.I.	0850693006	0850703006	0851043006	0851053006	0856663006
1 Gal.***	0850693010	0850703010	0851043010	0851053010	0856663010
2½ Gal.	0850693025	0850703025	0851043025	0851053025	0856663025
5 Gal.	0850693050	0850703050	0851043050	0851053050	0856663050
10 Gal.	0850693100	0850703100	0851043100	0851053100	0856663100
11 Gal.	0850693110	0850703110	0851043110	0851053110	0856663110
15 Gal.	0850693150	0850703150	0851043150	0851053150	0856663150
25 Gal.	0850693250	0850703250	0851043250	0851053250	0856663250
40 Gal.	0850693400	0850703400	0851043400	0851053400	0856663400
5000 PSI—Ref. Figure D and contains items 2, 7, 25, & 26					
2½ Gal.	0870445025	0870455025	0870465025	0870475025	0870485025
5 Gal.	0870445050	0870455050	0870465050	0870475050	0870485050
10 Gal.	0870445100	0870455100	0870465100	0870475100	0870485100
15 Gal.	0870445150	0870455150	0870465150	0870467150	0870487150
5000 PSI — 2" Valve Stem Ref. Figure E Contains Items 2, 7, 25, 26, 28 & 30					
1 Gal.	0850695010	0850705010	0851045010	0851055010	0856665010
2½ Gal.	0861905025	0861915025	0861925025	0861935025	0861945025
5 Gal.	0861905050	0861915050	0861925050	0861935050	0861945050
10 Gal.	0861905100	0861915100	0861925100	0861935100	0861945100
15 Gal.	0861905150	0861915150	0861925150	0861935150	0861945150
5000 PSI — Ref. Figure F Contains Items 2, 7, 25 & 26					
2½ Gal.	0850695025	0850705025	0851045025	0851055025	0856665025
5 Gal.	0850695050	0850705050	0851045050	0851055050	0856665050
10 Gal.	0850695100	0850705100	0851045100	0851055100	0856665100
15 Gal.	0850695150	0850705150	0851045150	0851055150	0856665150

NOTE: Items shaded in gray will be phased out. * See following page for items 18-20.
**Contains items 2, 3 & 4 as shown in Figure A. ***Contains items 2, 3, 4, 18, 19, 25 & 26.

Gas Valve Assembly Part Numbers

Size	Pressure	Seal Type				
		Buna-Nitrile -01	Butyl -06	Fluorocarbon -28	EPR -08	Hydrin -04
10 - 150 C.I.	3000 PSI	NA	NA	NA	NA	NA
1 - 15 Gal.†	3000 PSI	L074210001	L074210003	L074210005	L074210007	L074210009
25 - 40 Gal.▲	3000 PSI	L074400001	L074400003	L074400005	L074400007	L074400009
1 - 15 Gal.▲	5000 PSI	L074400001	L074400003	L074400005	L074400007	L074400009

† Contains items 3, 4, 25 & 26.
▲ Contains items 7, 25 & 26.

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Accumulator Parts Description

Item No.	Description
1	Shell
8*	Oil Port Assembly
9**	Poppet & Plug Assembly
10	Oil Port (Machined)
11	Lock Nut Outer
12	Valve Poppet
13	Piston Poppet
14	Spacer
15	Anti-Extrusion Ring Assembly
16	Elastic Stop Nut
17	Spring Poppet
18	O-ring
19	O-ring Back-up
20	O-ring Back-up Metal
22***	Bleeder Plug
23	Dust Cap Oil Port
27	O-Ring (SAE Bleed Plug)

* Oil Port Assembly contains items 10 through 23.

** Port & Poppet Assembly contains items 10, 12, 13, 16, 17, 22 & 23.

*** Bleeder Plug for SAE straight thread port assemblies will also contain an o-ring (Item 27).

Accumulator Accessories

Description	Part No.
Pull Rod (1 Qt-2½ Gal)	085109 0250
Pull Rod (5 Gal)	085109 0500
Pull Rod (10-11 Gal)	085109 1000
Pull Rod (15 Gal)	085109 1500
Core Repair Tool	582441 0000
Core Installation Tool	300987
Spanner Wrench	085110 0000

Accumulator Repair Tools

1. Bladder Pull Rods—(Bladder Type Accumulator) Pull Rods are available in single or multiple lengths for different size accumulators. The pull rods attach to the gas valve of the bladder for ease of assembly into shell during reassembly.
2. Core Tool—The core tool is used to remove and reinstall the valve core. It is also used to ream valve seat and repair threads.
3. Spanner Wrench—Fits all standard size bladder accumulators. Used to remove hydraulic poppet assembly from accumulator shell.

Oil Port Assembly Part Numbers

3000 PSI Accumulators		Seal Type					Port & Poppet Assemblies
Accumulator Size	Port	-01 Buna-Nitrile	-04 Hydrin	-06 Butyl	-08 EPR	-28 Fluorocarbon	
10 Cu. In.	¾" NPT - Male	L076741*01	L076749*01	L076743*01	L076747*01	L076745*01	L076740*01
10 Cu. In.	SAE #8	L076741*02	L076749*02	L076743*02	L076747*02	L076745*02	L076740*02
1 Pt. - Qt.	¾" NPT	L075031*01	L075039*01	L075033*01	L075037*01	L075035*01	L075030*01
1 Pt. - Qt.	SAE #12	L075031*02	L075039*02	L075033*02	L075037*02	L075035*02	L075030*02
150 Cu. In.	1" NPT	L074151*01	L074159*01	L074153*01	L074157*01	L074155*01	L074350*01
150 Cu. In.	SAE #16	L074151*02	L074159*02	L074153*02	L074157*02	L074155*02	L074350*02
1 Gal.	1¼" NPT	L074161*01	L074169*01	L074163*01	L074167*01	L074165*01	L074360*01
1 Gal.	SAE #20	L074161*02	L074169*02	L074163*02	L074167*02	L074165*02	L074360*02
1 Gal.	1¼" SAE Split Flange	L074161*03	L074169*03	L074163*03	L074167*03	L074165*03	L074360*03
2½ - 15 Gal.	2" NPT	L074171*01	L074179*01	L074173*01	L074177*01	L074175*01	L074370*01
2½ - 15 Gal.	SAE #24	L074171*02	L074179*02	L074173*02	L074177*02	L074175*02	L074370*02
2½ - 15 Gal.	2" SAE Split Flange	L074171*03	L074179*03	L074173*03	L074177*03	L074175*03	L074370*03
2½ - 15 Gal.	1¼" NPT	L074171*04	L074179*04	L074173*04	L074177*04	L074175*04	L074370*04

* = "0" (Std.) Oil Service * = "S" Water/Chem. Service

There have been many attempts to solve the problems caused by high transient flow conditions inherent with pulsations and shocks. All attempts have had one thing in common: they never quite solved the problem. Then came Greer's Pulse-Tone concept, a patented breakthrough in pulsation control. The trouble with the previous devices was that most of the pulsations and shocks never got near the shock absorber. Pulse-Tone puts a flow diversion baffle into the line. Fluid traveling through the hydraulic line bends around the baffle, but pulsation and shock energy waves take the path of least resistance right into the nitrogen precharged bladder. The bladder absorbs up to 98% of the waves' potentially destructive force.

Why Use Pulse-Tones?

- improves system efficiency
- absorbs hydraulic shocks
- very contamination tolerant
- very quick response
- works well with water, low lubricity fluids

Specifications

Maximum Operating Pressure - 3000 PSI (207 Bar)

Materials

- Shell – high strength alloy steel (SA372, 1 gallon & up comply with all ASME material specifications as std.)
- Ports – all oil service ports, high strength alloy steel
  – water and chemical service, 3000 PSI, 304 stainless steel

Poppet & Spring – 304 stainless steel

- Gas Valve Cartridge – steel
- Gas Valve Protector – steel
- Gas Valve Stem – steel
- Bladders – Various polymers, see Standard and Optional Bladders in Bladder Accumulators section.

Maximum Compression Ratio (max. working pressure/ precharge pressure) 4-1

Pulse-Tone Flow Rates

Size (cu in)	Max. Recommended Flow	
	GPM	LPM
1 quart	28.0	106
1 gal.	38.0	145
2.5-15 gal.	190.0	720

Models, Capacities and Dimensions

Size	Bladder Material (Code)	Part No.	Repair Kit Part No.	Capacity cu in (liters)	A	B	C	D	E	F Port (thread)	Weight lbs. (kg.)
					in (mm)						
1 quart	Nitrile (-1)	834340	703040	60 (0.98)	7.38 (187)	3.03 (77)	12.16 (309)	2.00 (51)	4.50 (114)	1" NPTF	17 (7.7)
1 gal.	Nitrile (-1)	810381	703047	226 (3.70)	11.25 (286)	5.06 (129)	18.56 (471)	4.50 (114)	6.81 (173)	1¼" NPTF	46 (21)
2-1/2 gal.	Nitrile (-1)	810829	703054	555 (9.10)	15.50 (394)	8.50 (216)	26.23 (666)	6.75 (171)	9.00 (229)	2" NPTF	125 (57)
5 gal.	Nitrile (-1)	800290	703061	1095 (17.9)	27.94 (710)	8.50 (216)	38.69 (983)	6.75 (171)	9.00 (229)	2" NPTF	155 (70)

BLADDER PRODUCTS

KleenVent KV Series

Hydraulic Reservoir Isolators

KleenVent Hydraulic Reservoir Isolators Feature:

- Capacities from 2-1/2 to 80 Gallons
- Four Bladder Polymers for a Wide Range of Fluids and Temperatures
- Fiberglas and Steel Shells
- Optional Pressure/Vacuum Breaker

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Fluid contamination can lead to high maintenance costs and downtime in hydraulic systems. KleenVent reservoir isolators provide protection against the ingestion of airborne contaminants – dust, chemicals, and water vapor – into your hydraulic system though the reservoirs breather-vent. By using an elastomer bladder as a lung, the changes in gas volume in a hydraulic system's reservoir can be trapped and prevented from mixing with the outside atmosphere. And unlike conventional breather-vent filters, KleenVent reservoir isolators provide a positive separation without the possibility of clogging or need for maintenance.

ATMOSPHERIC PRESSURE RESERVOIR HIGH LEVEL

Why Use KleenVent Reservoir Isolators?

- reduce hydraulic system maintenance costs
- reduce hydraulic system downtime
- reduce waste disposal costs
- extends filter life
- low maintenance solution
- range of compounds for a variety of fluids

Greer KleenVent Reservoir Isolators – The Right Choice For . . .

- Steel/Primary Metal Mills
- Foundries
- Pulp and Paper Mills
- Power Generation Plants
- Automotive Plants
- Any Highly Contaminated or Humid Environment

ATMOSPHERIC PRESSURE RESERVOIR LOW LEVEL

Specifications

Materials

- Shell – fiberglas or steel
- Ports – steel
- Bladders – choice of four compounds – Nitrile, Butyl, EPR, or Fluorocarbon, see chart below.

Pressure Ratings – Atmospheric pressure.

Fluids – Greer's KleenVent reservoir isolators are compatible with virtually any industrial fluid with the proper bladder selection. See chart below or consult factory.

Options – Pressure/Vacuum Breakers for safety and reservoir protection, see next page.

Seal Code	Polymer	Recommended Operating Temperature Range	Maximum Temperature with Reduced Life	General Application & Compatibility
01	Buna-Nitrile	-20°F to 200°F -29°C to 93°C	225°F 107°C	Greer's Standard Compound – Compatible with most mineral oil based fluids
06	Butyl	-40°F to 200°F -40°C to 93°C	300°F 149°C	Compatible with most phosphate ester fluids and some synthetic fluids
28	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
08	Ethylene Propylene	-40°F to 200°F -40°C to 93°C	300°F 149°C	Compatible with some synthetic fluids and water

Models, Capacities and Dimensions

Steel KleenVent

Fiberglas KleenVent

Model	Nominal Capacity Gallons (Liters)	Actual Capacity Gallons (Liters)	Shell Material	A in. (mm)	B in. (mm)	C Port Size Thread Size	Weight lbs. (Kg)
KV02F0T01A1	2.5 (9.5)	1.64 (6.2)	Fiberglas	19.25 (489)	8.25 (210	SAE #16 1-5/16 - 12	14 (6.4)
KV05F0T01A1	5 (18.9)	3.78 (14.3)	Fiberglas	32.25 (819)	8.25 (210)	SAE #16 1-5/16 - 12	22 (10)
KV10F0T01A1	10 (37.8)	9.3 (35.2)	Fiberglas	50.19 (1275)	9.25 (235)	SAE #16 1-5/16 - 12	38 (17)
KV20F0T01A1	20 (75.6)	18.8 (71.1)	Fiberglas	55.50 (1410)	12 (305)	SAE #24 1-7/8 - 12	60 (27)
KV20M0T01A1	20 (75.6)	18.8 (71.1)	Steel	54.18 (1376)	12 (305)	SAE #24 1-7/8 - 12	80 (36)
KV40M0T01A1	40 (151)	32 (121)	Steel	35.00 (889)	22 (562)	SAE #24 1-7/8 - 12	115 (52)
KV60M0T01A1	60 (227)	54 (204)	Steel	47.50 (1206)	22 (562)	SAE #24 1-7/8 - 12	150 (68)
KV80M0T01A1	80 (302)	68 (257)	Steel	60.12 (1527)	22 (562)	SAE #24 1-7/8 - 12	190 (86)

Optional Pressure/Vacuum Breaker

Greer recommends that every KleenVent installation be equipped with a Pressure/Vacuum Breaker to protect the reservoir in the event of a sudden fluid loss or over-filling. Greer offers two types of optional pressure/vacuum breakers, Type 1 that installs with a 1/2" male NPT, and Type 2 bayonet style that installs into your existing reservoirs fill-vent port.

Features & Specifications:

- Fixed pressure relief – 1 psid ± 0.5 psi (0.07 bar ± 0.035 bar)
- Fixed vacuum relief – 0.15 psid ± 0.15 psi (0.01 bar ± 0.01 bar)
- 10 micron filter – Type 1, reusable sintered bronze; Type 2, replaceable filter cartridge.

PN1486670000

Type 1 – NPT Style

PN1486680000

Type 2 – Bayonet Style

KleenVent Installation & Sizing Information

KleenVents should be installed when the reservoir is at its highest level. This will allow the bladder to deflate as the reservoir level drops. KleenVents should be installed in a vertical position for optimum performance. Multiple KleenVents should be installed in parallel when the required size exceeds 80 gallons. Always use “actual volumes” when sizing and select the next higher size when a capacity is required between size offerings.

Sizing a KleenVent on New and Existing Systems

On new systems, sum all single acting cylinder “differential” volumes (rod area x stroke) and all accumulator volumes in the system. Multiply this sum by 1.2 to find the KleenVent volume required. Select a KleenVent(s) with an actual capacity equal to or greater than the sum calculated. On existing systems, if the cylinder and accumulator sizes are known, the above method may be used. If not, calculate the total change in fluid volume in the system during operation by measuring the high and low fluid level of the reservoir. Multiply the difference in fluid levels by the width and length of the reservoir to calculate the total fluid volume change. Select a KleenVent(s) with an actual capacity equal to or greater than the sum calculated.

Installation Kits . . . Add Without Interruption

Add closed-loop protection without shutting down, purging the reservoir, contaminating existing fluids or losing time.

KleenVent Installation Kits

Part Number	Description
8708690006	Installation Kit with 6' hose
8708690009	Installation Kit with 9' hose
8708690012	Installation Kit with 12' hose
8708690018	Installation Kit with 18' hose
8708690024	Installation Kit with 24' hose

NEW!

How to Order KleenVents

KV Series KleenVents can be specified by using the symbols in the chart below to develop a model number. Select only those symbols that represent the features desired, and place them in the sequence indicated by the example at the top of the chart.

Series — **KV**
- **KV** KleenVent

Size — **20**
- **02** 2½ gallon
- **05** 5 gallon
- **10** 10 gallon
- **20** 20 gallon
- **40** 40 gallon
- **60** 60 gallon
- **80** 80 gallon

Construction — **M**
- **F** Fiberglas (2½ - 20 gal.
- **M** Steel (20 - 80 gal.)

Pressure — **0**
- **0** Atmospheric

Port — **T**
- **T** SAE

Bladder — **01**
- **01** Buna-Nitrile
- **06** Butyl
- **08** EPR
- **28** Fluorocarbon

Variation — **A**
- **A** Standard
- **X** Special

Code — **1**
- **1** Standard
- ***** Special Design No. Assigned

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

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⚠ WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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Hydraulic Accumulator Division
Rockford, Illinois USA

Parker Accumulators are designed to optimize the performance of your hydraulic system, while adding safeguards that prolong equipment life. Reduced operating costs and savings from less downtime and maintenance are the benefits.

Parker Accumulators…

- Provide an auxiliary power source by holding supplemental power to be used during peak periods. This allows the use of smaller pumps, motors, and reservoirs reducing installation and operating costs.
- Protect hydraulic systems and circuit components from damage due to thermal expansion and contraction in a closed system.
- Make up changes in fluid volume to assure a positive pressure.
- Reduce costly damage to piping systems, fittings, and gauges by absorbing hydraulic line shocks.
- Supply emergency fail-safe power to complete a work safety cycle in the event of a pump or electric power failure.
- Hold necessary high pressure for long periods of time while preventing oil overheating, reducing pump wear, and saving energy.
- Dispense lubricants in a slow, constant rate to critical equipment wear areas.

Typical Applications

- Construction & Mining Equipment – emergency backup for steering, brake, and pilot circuits.
- Hydrostatic Drives – shock absorption when changing directions.
- Injection Molding & Die Casting – high pressure and flows in a short time period.
- Plunger & Diaphragm Pumps – reduces pump pulsations.
- Fork Lifts & Cherry Pickers – pressure spike dampening.
- Machine Tools – maintains pressure, reduces pump size.
- Transportation Vehicles – suspension systems and braking systems.
- Turbine Engines – oil supply for lubrication.
- Winches – maintaining line tension.

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Rockford, Illinois USA

Accumulators and Gas Bottles are pressure vessels which are subject to safety laws, regulations, and/or ordinances which are valid in the state or country of set-up. For example, in the US most states require ASME Certification on larger bore accumulators and gas bottles. Similar laws, regulations, and/or ordinances apply in other countries as well. Other particular regulations must be observed in certain industries such as ship building, aircraft, mining, etc.

ASME Certification

ASME (American Society of Mechanical Engineers) is an organization that regulates the design and manufacture of pressure vessels in the United States. Accumulators are categorized as unfired pressure vessels and fall under the jurisdiction of ASME Code when required by state law. In 48 states, ASME Certification is required on pressure vessels used within their boundaries. Accumulators specifically fall under the section of the code referred to as Section VIII, Division 1. This section requires certification on vessels with internal diameters of 6" or greater and that certified vessels carry the “U” symbol on them as evidence that they were designed and manufactured in accordance with the Code. The “U” symbol is an internationally recognized symbol of design and manufacturing quality.

The essential criteria of ASME Certification is a requirement of strength and material traceability. Accumulators must be manufactured from materials that meet ASME specifications and require a design factor of 4:1 in the ratio of burst pressure to rated pressure. This 4:1 requirement is mandatory for all accumulators with ASME Certification with the exception ofthose that comply with a specific rule within the Code called “Appendix 22”.

Appendix 22 permits that accumulators manufactured with “forged” shells, with openings of a specified maximum size, may be Certified with a design factor of 3:1 in the ratio of burst pressure to rated pressure.

ASME requires that each vessel be marked with the design pressure at the Minimum Design Metal Temperature (MDMT) for the vessel.

ASME Certification requires third party surveillance of an approved quality system and requires witness by a third party of all hydrostatic testing. And at present, unlike many other standards around the world, there is no ASME national requirement for periodic inspection of accumulators after installation. However, local laws would dictate such inspections.

Pressure Equipment Directive (PED)

The Pressure Equipment Directive is one of the series of technical harmonization directives covering subjects such as machinery, simple pressure vessels, gas appliances, etc., which were identified by the European Community’s program for the elimination of technical barriers to trade. The purpose of the PED is to harmonize national laws of Member States regarding the design, manufacture, testing and conformity assessment of pressure equipment and assemblies of pressure equipment.

The program aims to ensure the free placing on the market and putting into service of relevant equipment within the European Union and the European Economic Area.

The Directive requires that all pressure equipment and assemblies within its scope must be safe when placed on the market and put into service.

The Pressure Equipment Directive applies to the design, manufacture and conformity assessment of pressure equipment and assemblies of pressure equipment with maximum allowable pressure greater than 0.5 bar above atmospheric pressure (i.e.: 1.5 bar of absolute pressure).

The PED Conformity Assessment Modules apply to all accumulators using fluids in Group 2 (i.e.: non-hazardous), with a volume greater than 1 liter and a product of service pressure (PS) and volume (V) which is greater than 50 bar.liter, or for any pressure vessel where PS exceeds 1000 bar.

The PED applies in the member states of the European Union (EU) and the European Economic Area (EEA). Similar requirements to the PED have been adopted by many other countries, which have applied to join the European Union.

The EU member states are:

- Austria
- Belgium
- Finland
- France
- Germany
- Greece
- Ireland
- Italy
- Luxembourg
- Netherlands
- Portugal
- Spain
- Sweden
- United Kingdom

The European Economic Area (EEA) includes the 15 EU countries listed above, plus Iceland, Liechtenstein, Norway, and Switzerland.

Making the Right Choice

Hydro-pneumatic accumulators are the most widely used type of accumulator in industrial and mobile hydraulic systems. They use compressed gas to apply force to hydraulic fluid. Identical in their operating principle, Parker's piston, bladder and diaphragm accumulators use different mechanisms to separate the gas from the fluid. It is this difference – and the resulting performance characteristics – which determines their suitability for different applications. The correct selection and application of different style accumulators is examined in the following pages.

Piston Advantages

- extremely high flow rates
- high/low temperature tolerance
- high compression ratios
- withstands external forces
- unlimited sizes/mounting
- work well with gas bottles
- fully serviceable

Bladder Advantages

- dirt tolerant
- universal application
- safety
- quick response
- works well on water, low lubricity fluids
- fully serviceable

Diaphragm Advantages

- lightweight, compact
- simple, cost effective
- dirt tolerant
- quick response

Parker's hydro-pneumatic accumulators regulate the performance of a hydraulic system by providing an additional volume of system fluid, pressurized by an external gas supply.

A correctly specified accumulator can:

- reduce shock effects in a system resulting from inertia or external mechanical forces
- maintain system pressure by compensating for pressure loss due to leakage
- provide a back-up supply of hydraulic energy to maintain a constant flow when system demand is greater than pump delivery.

In industrial applications, three types of hydro-pneumatic accumulators are widely used – the piston type, bladder type and diaphragm type. Each has particular advantages and limitations which should be considered when selecting an accumulator for a specific application.

Piston accumulators offer greater efficiency and flexibility in most applications, due to their wider range of sizes. Parker's piston accumulators feature a patented five-blade V-O-ring which maintains full contact between the piston and the bore, without rolling. Sealing remains effective even under rapid cycling at high operating pressures.

Bladder/Diaphragm accumulators are generally preferred for applications where rapid cycling, high fluid contamination and fast response times are required. They provide excellent gas/fluid separation.

Design Features and Construction

Piston Accumulators

Parker piston accumulators consist of a cylindrical body, sealed by a gas cap and charging valve at the gas end, and by a hydraulic cap at the hydraulic end. A lightweight piston separates the gas side of the accumulator from the hydraulic side.

As with the bladder/diaphragm accumulator, the gas side is charged with nitrogen to a predetermined pressure. Changes in system pressure cause the piston to rise and fall, allowing fluid to enter or forcing it to be discharged from the accumulator body.

Bladder Accumulators

Greer bladder accumulators feature a non-pleated, flexible rubber bladder housed within a steel shell. The open end of the bladder is attached to the precharging valve at the gas end of the shell. A poppet valve, normally held open by spring pressure, regulates fluid flow through the hydraulic port. Greer's bladder accumulators are available as either top or bottom repairable units, for optimum flexibility.

Diaphragm Accumulators

Parker diaphragm accumulators feature a one piece molded diaphragm which is mechanically sealed to the high strength metal shell. The flexible diaphragm provides excellent gas and fluid separation. A button molded to the bottom of the diaphragm prevents the diaphragm from being extruded out the hydraulic port. The non-repairable electron-beam welded construction reduces size, weight, and ultimately cost.

The bladder/diaphragm is charged with a dry inert gas, such as: nitrogen, to a set precharge pressure determined by the system requirements. As system pressure fluctuates, the bladder/diaphragm expands and contracts to discharge fluid from, or allow fluid into, the accumulator shell.

Fig. 1 *Typical bladder, diaphragm and piston accumulators*

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Rockford, Illinois USA

Operation

Stage (a)
The accumulator is empty, and neither gas nor hydraulic sides are pressurized.

Stage (b)
The accumulator is precharged.

Stage (c)
The hydraulic system is pressurized. System pressure exceeds precharge pressure, and fluid flows into the accumulator.

Stage (d)
System pressure peaks. The accumulator is filled with fluid to its design capacity. Any further increase in hydraulic pressure would be prevented by a relief valve in the system.

Stage (e)
System pressure falls. Precharge pressure forces fluid from the accumulator into the system.

Stage (f)
Minimum system pressure is reached. The accumulator has discharged its design maximum volume of fluid back into the system.

Fig 2 *Operating conditions of bladder, piston and diaphragm accumulators*

Accumulator Selection

When selecting an accumulator for a particular application, both system and performance criteria should be considered. To ensure long and satisfactory service life, the following factors should be taken into account.

- Failure mode
- Flow rate
- Response time
- High frequency cycling
- External forces
- Certification
- Temperature effect
- Output volume
- Fluid type
- Shock suppression
- Mounting position
- Sizing information
- Safety

Failure Modes

In certain applications, a sudden failure may be preferable to a gradual failure. A high-speed machine, for example, where product quality is a function of hydraulic system pressure. Because sudden failure is detected immediately, scrap is minimized, whereas a gradual failure might mean that production of a large quantity of sub-standard product could occur before the failure became apparent.

A bladder/diaphragm accumulator would be most suitable for this application.

Conversely, where continuous operation is paramount and sudden failure could be detrimental as, for example, in a braking or steering circuit on mobile equipment, a progressive failure mode is desirable. In this application, a piston accumulator would be appropriate.

Output Volume

The maximum sizes available of each type of accumulator determine the limits of their suitability where large output volumes are required. There are, however, several methods of achieving higher output volumes than standard accumulator capacities suggest - see Large/ Multiple Accumulators, page 11.

Table 1 compares typical fluid outputs for Parker's 10 gallon piston and bladder accumulators operating isothermally as auxiliary power sources over a range of minimum system pressures. The higher precharge pressures recommended for piston accumulators result in higher outputs than from comparable bladder accumulators. Also, bladder accumulators are not generally suitable for compression ratios greater than 4:1, as these could result in excessive bladder deformation.

Piston accumulators have an inherently higher output relative to their overall dimensions, which may be critical in locations where space is limited. Piston accumulators are available in a choice of diameters and lengths for a given capacity, whereas bladder and diaphragm accumulators are frequently offered in only one size per capacity, and fewer sizes are available. Piston accumulators can also be built to custom lengths for applications in which available space is critical.

Table 1: Relative Outputs of a 40 litre Accumulator

Compression Ratio	System Pressure, PSI		Recommended Precharge, PSI		Fluid Output GPM	
	max	min	Bladder	Piston	Bladder	Piston
1.5	3000	2000	1800	1900	2.79	3.00
2	3000	1500	1350	1400	4.23	4.41
3	3000	1000	900	900	5.70	5.70
6	3000	500	*	400	*	6.33

** Below required minimum operating ratio of 4:1.*

Flow Rate

Table 2 shows typical maximum flow rates for Parker's accumulator styles in a range of sizes.

The larger standard bladder designs are limited to 220 GPM, although this may be increased to 600 GPM using a highflow port. The poppet valve controls flow rate, with excessive flow causing the poppet to close prematurely. Flow rates greater than 600 GPM may be achieved by mounting several accumulators on a common manifold – see Large/Multiple Accumulators, page 11.

For a given system pressure, flow rates for piston accumulators generally exceed those for bladder designs. Flow is limited by piston velocity, which should not exceed 10 ft/sec. to avoid piston seal damage. In high-speed applications, high seal contact temperatures and rapid decompression of nitrogen that has permeated the seal itself, can cause blisters, cracks and pits in the seal surface. In this type of application a bladder style accumulator would be better suited.

Table 2: Maximum Recommended Accumulator Flow Rates

Piston Bore	Bladder Capacity	Diaphragm Capacity	GPM at 3000 PSI			
			Piston	Bladder Std.	Bladder High Flow	Diaphragm
2	1 qt.	.5-10 cu. in.	100	40		11
3	1 gal.	20-85 cu. in.	220	150		26
4	2.5 gal.	120-170 cu. in.	397	220	600	42
6	and		818	220	600	
7	Larger		1199	220	600	
9			1982	220	600	
12			3450			

Fluid Type

Bladder/Diaphragm accumulators are more resistant to damage caused by contamination of the hydraulic fluid than piston types. While some risk exists from contaminants trapped between the bladder and the shell, a higher risk of failure exists from the same contaminants acting on the piston seal.

Bladder accumulators are usually preferred to piston type accumulators for water service applications. Water systems tend to carry more solid contaminants and lubrication is poor. Both the piston and bladder type units require some type of preparation to resist corrosion on the wetted surfaces.

Piston accumulators are preferred for systems using exotic fluids or where extremes of temperature are experienced as, compared to bladders. Piston seals are more easily molded in the required special compounds, and may be less expensive.

Response Time

In theory, bladder and diaphragm accumulators should respond more quickly to system pressure variations than piston types. There is no static friction to be overcome as with a piston seal, and there is no piston mass to be accelerated and decelerated. In practice, however, the difference in response is not great, and is probably insignificant in most applications.

This applies equally in servo applications, as only a small percentage of servos require response times of 25ms or less. This is the point where the difference in response between piston and bladder accumulators becomes significant. Generally, a bladder accumulator should be used for applications requiring less than 25ms response time, and either accumulator type for a response of 25ms or greater.

Shock Suppression

Shock control does not necessarily demand a bladder/diaphragm accumulator.

Example 1

A test circuit (Fig.3) includes a control valve situated 118 ft. from a pump supplying fluid at 29.6 GPM. The circuit uses 1.25 in. tubing and the relief valve is set to open at 2750 PSI. Shutting the control valve (Fig.4) produces a pressure spike of 385 PSI over relief valve setting (light trace).

Fig.3 *Test circuit to generate and measure shock waves in a hydraulic system*

Fig.4 *Shock wave test results – Example 1*

Installing a Greer 1 gallon piston accumulator at the valve reduces the transient to 100 PSI over relief valve setting (medium trace).

Substituting a 1 gal. bladder accumulator further reduces the transient to 80 PSI over relief valve setting (dark trace), an improvement of only 20 PSI and of little practical significance.

Example 2

A second, similar test using 0.625 in. tubing and a relief valve setting of 2650 PSI (Fig. 5) results in a pressure spike of 2011 PSI over relief valve setting without an accumulator (light trace).

A Parker piston accumulator reduces the transient to 107 PSI over relief valve setting (medium trace), while a bladder accumulator achieves a transient of 87 PSI over relief valve setting (dark trace). The difference between accumulator types in shock suppression is again negligible.

Fig.5 *Shock wave test results – Example 2*

High Frequency Cycling

High-frequency system pressure cycling can cause a piston accumulator to 'dither', with the piston cycling rapidly back and forth in a distance less than its seal width.

Over an extended period, this condition may cause heat build-up under the seal due to lack of lubrication, resulting in seal and bore wear. For high frequency dampening applications, therefore, a bladder/diaphragm accumulator is generally more suitable.

Mounting Position

The optimum mounting position for any accumulator is vertical, with the hydraulic port downwards. Piston models can be mounted horizontally if the fluid is kept clean but, if solid contaminants are present or expected in significant amounts, horizontal mounting can result in uneven or accelerated seal wear.

A bladder accumulator may also be mounted horizontally, but uneven wear on the top of the bladder as it rubs against the shell while floating on the fluid can reduce its service life and even cause permanent distortion. The extent of the damage will depend upon fluid cleanliness, cycle rate, and compression ratio (i.e. maximum system pressure divided by minimum system pressure). In extreme cases, fluid can be trapped away from the hydraulic port (Fig.6), reducing output, or the bladder may become elongated, forcing the poppet valve to close prematurely.

Fig.6 *A horizontally-mounted bladder accumulator can trap fluid away from the hydraulic valve*

External Forces

Any application subjecting an accumulator to acceleration, deceleration or centrifugal force may have a detrimental effect on its operation, and could cause damage to a bladder accumulator. Forces along the axis of the tube or shell normally have little effect on a bladder accumulator but may cause a variation in gas pressure in a piston type because of the mass of the piston.

Forces perpendicular to an accumulator's axis should not affect a piston model, but fluid in a bladder accumulator may be thrown to one side of the shell (Fig.7), displacing the bladder and flattening and lengthening it. In this condition, fluid discharge could cause the poppet valve to pinch and cut the bladder. Higher precharge pressures increase the resistance of the bladder to the effects of perpendicular forces.

Fig.7

Perpendicular force causes the mass of the fluid to displace the bladder

Sizing Information

Accurate sizing of an accumulator is critical if it is to deliver a long and reliable service life. Information and worked examples are shown in the sizing section of this catalog, or accumulator size can be calculated automatically by entering application details into Parker's inPHorm software selection program (see page 16). Please contact your local distributor for details, or contact us at www.parker.com/accumulator.

Certification

Accumulators are frequently required to conform to domestic or international certification. These requirements range from simple design factors to elaborate materials testing and inspection procedures carried out by an external agency. Most of the accumulators in Parker's piston, bladder, or diaphragm ranges are available with certification to meet all major U.S. and most major European standards.

Safety

Hydro-pneumatic accumulators should always be used in conjunction with a safety block, to enable the accumulator to be isolated from the circuit in an emergency or for maintenance purposes.

Gas Bottle Installations

Fig.8

An accumulator can be used with a remote gas bottle where space is critical

Remote gas storage offers installation flexibility where the available space or position cannot accommodate an accumulator of the required size. A smaller accumulator may be used in conjunction with a Parker auxiliary gas bottle, which can be located elsewhere (Fig.8).

The gas bottle is sized by the formula:

For Piston Accumulators:

gas bottle size = accumulator size -
(required output from accumulator x 1.1)

For Bladder Type Accumulators:

gas bottle size = accumulator size -
(required output from accumulator x 1.25)

For example, an application that calls for a 30 gallon accumulator may only actually require 8 gallons of fluid output. This application could therefore be satisfied with a 10 gallon accumulator and a 20 gallon gas bottle.

Gas bottle installations may use either bladder or piston accumulators, subject to the following considerations.

- Any accumulator used with remote gas storage should generally have the same size port at the gas end as at the hydraulic end, to allow an unimpeded flow of gas to and from the gas bottle. The gas bottle will have an equivalent port in one end and a gas charging valve at the other.
- A piston accumulator should be carefully sized to prevent the piston bottoming at the end of the cycle. Bladder designs should be sized to prevent filling to more than 75% full.
- Bladder installations require a special device called a transfer barrier at the gas end, to prevent extrusion of the bladder into the gas bottle piping. The flow rate between the bladder transfer barrier and its gas bottle will be restricted by the neck of the transfer barrier tube.
- Because of the above limitations, piston accumulators are generally preferred to bladder types for use in gas bottle installations.
- Diaphragm style accumulators are normally not used in conjunction with gas bottles.

Accumulator manifold showing three gas bottles attached to a transfer barrier type piston accumulator.

Large/Multiple Accumulators

The requirement for an accumulator with an output of more than 50 gallons cannot usually be met by a single accumulator, because larger piston designs are relatively rare and expensive, and bladder designs are not generally available in these sizes. The requirement can, however, be met using one of the multiple-component installations shown in Figs. 9 and 10.

The installation in Fig. 9 consists of several gas bottles serving a single piston accumulator through a gas manifold. The accumulator portion may be sized outside of the limitations of the sizing formula on page 10, but should not allow the piston to strike the caps repeatedly while cycling. The larger gas volume available with this configuration allows a relatively greater piston movement - and hence fluid output - than with a conventionally sized single accumulator. A further advantage is that, because of the large precharge 'reservoir', gas pressure is relatively constant over the full discharge cycle of the accumulator. The major disadvantage of this arrangement is that a single seal failure could drain the whole gas system.

The installation in Fig.10 uses several accumulators, of piston or bladder design, mounted on a hydraulic manifold. Two advantages of multiple accumulators over multiple gas bottles are that higher unit fluid flow rates are permissible, and a single leak will not drain precharge pressure from the entire system.

A potential disadvantage is that, where piston accumulators are used, the piston with the least friction will move first and could occasionally bottom on the hydraulic end cap. However, in a slow or infrequently used system, this would be of little significance.

Fig.10 *(above)*
Multiple accumulators manifolded together offer high system flow rates

Fig.9 *(below)*
Several gas bottles can supply precharge pressure to a single accumulator

Precharging Process

Correct precharging involves accurately filling the gas side of an accumulator with a dry, inert gas such as nitrogen, before admitting fluid to the hydraulic side.

It is important to precharge an accumulator to the correct specified pressure. Precharge pressure determines the volume of fluid retained in the accumulator at minimum system pressure. In an energy storage application, a bladder/diaphragm accumulator is typically precharged to 90% of minimum system pressure, and a piston accumulator to 95% of minimum system pressure at the system operating temperature.

The ability to correctly carry out and maintain precharging is an important factor when choosing the type of accumulator for an application.

Bladder accumulators are far more susceptible to damage during precharging than piston types. Before precharging and entering in service, the inside of the shell should be lubricated with system fluid. This fluid acts as a cushion, and lubricates and protects the bladder as it expands. When precharging, the first 50 PSI of nitrogen should be introduced slowly. Failure to follow this precaution could result in immediate bladder failure: high pressure nitrogen, expanding rapidly and thus cold, could form a channel in the folded bladder, concentrating at the bottom.

The chilled, brittle rubber, expanding rapidly would then inevitably rupture (Fig. 11).

The bladder could also be forced under the poppet, resulting in a cut. (Fig.12).

Close attention should be paid to operating temperature during precharging, as a rise in temperature will cause a corresponding increase in pressure which could then exceed the precharge limit.

Little damage can occur when precharging or checking the precharge on a piston accumulator, but care should be taken to make sure the accumulator is void of all fluid to prevent getting an incorrect reading on the precharge.

Fig.11

Starburst rupture caused by loss of bladder elasticity

Fig.12

C-shaped cut shows that bladder has been trapped under poppet

Excessively High Precharge

Excessive precharge pressure or a reduction in the minimum system pressure without a corresponding reduction in precharge pressure may cause operating problems or damage to accumulators.

With excessive precharge pressure, a piston accumulator will cycle between stages (e) and (b) of Fig.2 see page 4, and the piston will travel too close to the hydraulic end cap.

The piston could bottom at minimum system pressure, reducing output and eventually damaging the piston and piston seal. The piston can often be heard bottoming, warning of impending problems.

An excessive precharge in a bladder accumulator can drive the bladder into the poppet assembly when cycling between stages (e) and (b). This could cause fatigue failure of the poppet spring assembly, or even a pinched and cut bladder, should it become trapped beneath the poppet as it is forced closed (Fig.12). Excessive precharge pressure is the most common cause of bladder failure.

Excessively Low Precharge

Excessively low precharge pressure or an increase in system pressure without a corresponding increase in precharge pressure can also cause operating problems and subsequent accumulator damage. With no precharge in a piston accumulator, the piston will be driven into the gas end cap and will often remain there. Usually, a single contact will not cause any damage, but repeated impacts will eventually damage the piston and seal.

Conversely, for a bladder accumulator, too low or no precharge can have rapid and severe consequences. The bladder will be crushed into the top of the shell and can extrude into the gas stem and be punctured (Fig13).

This condition is known as “pick out”. One such cycle is sufficient to destroy a bladder. Overall, piston accumulators are generally more tolerant of careless precharging.

Fig.13

Fluid entering an un-precharged bladder accumulator has forced the bladder into the gas stem

Monitoring Piston Accumulator Precharge

Several methods can be used to monitor the precharge pressure of Parker's piston accumulators. Note that, in Figs.14b and 14c, flat pistons must be used to enable the sensors to register their positions.

- With the hydraulic system shut down. A pressure transducer or gauge located in the gas end cap (Fig.14a) indicates the true precharge pressure after the hydraulic system has cooled and the accumulator has emptied of fluid.

Fig.14a *Pressure transducer measures actual precharge pressure of shut down system*

- With the hydraulic system operating. A piston position sensor is installed in the hydraulic end cap (Fig.14b) and connected to an electronic measuring system. With an accurate initial precharge and after sufficient system operation to ensure thermal stability, the electronics can be calibrated to provide a continuous and accurate read-out of precharge pressure.

Fig.14b *Position sensor can provide continuous indication of precharge pressure*

- In applications where an accumulator is coupled to a gas bottle, a Hall Effect proximity sensor can be installed in the accumulator gas end cap (Fig.14c) to detect when the piston comes within .050 inch of the cap. This system would provide a warning when precharge pressure has dropped and remedial action should be taken.

Fig.14c *Hall Effect sensor registers proximity of piston to end cap*

- A proximity or reed switch can be used in applications where it is desirable to know when the piston is approaching the gas cap of the accumulator or to detect a low precharge. When the rod is detected by the reed or proximity switch, the switch could be set up to send out a warning signal.

  When used with a pressure switch, it could detect a low precharge.

  In some instances two reed or proximity switches could be installed on the housing. It could be required that the first switch is always made, assuring us that the precharge is not too high; if the second switch is made, it would tell us that the precharge is to low.

  The position of the piston can be detected a fraction of an inch to several inches before it reaches the end cap.

Fig.14d *Proximity switches can sense the position of an approaching piston*

- In some instances, it is extremely important to know the exact location of the piston inside the accumulator. By using a linear displacement transducer (LDT), this can be accomplished. Positions as well as velocities can be determined by the use of this unit.

  An LDT works by sending a signal down the probe. This signal is then reflected by a magnet attached to a rod and piston assembly. The LDT records the amount of time between sending and receiving the reflected signal and then calculates the position of the piston. Multiple signals will allow the unit to calculate velocity. The result of using this unit will allow the user to know the exact cubic inches of fluid in the accumulator as well as the flow rate of the fluid.

Fig.14e *Linear Displacement Transducers (LDT) can accurately detect both piston location and velocity*

Failure Prevention

Accumulator failure is generally defined as inability to accept and exhaust a specified amount of fluid when operating over a specific system pressure range. Failure often results from an unwanted loss or gain of precharge pressure.

It cannot be too highly stressed that correct precharge pressure is the most important factor in prolonging accumulator life.

If maintenance of precharge pressure and relief valve settings is neglected, and if system pressures are adjusted without making corresponding adjustments to precharge pressures, shortened service life will result.

Bladder Accumulators

Bladder/Diaphragm accumulator failure occurs rapidly from bladder/diaphragm rupture (Fig.15). Rupture cannot be predicted because the intact bladder or diaphragm is essentially impervious to gas or fluid seepage; no measurable gas or fluid leakage through the bladder or diaphragm precedes failure.

Piston Accumulators

Piston Accumulator failure generally occurs in one ofthe following gradual modes.

Fluid Leaks to the Gas Side

This failure, sometimes called dynamic transfer, normally takes place during rapid cycling operations after considerable time in service. The worn piston seal carries a small amount of fluid into the gas side with each stroke.

As the gas side slowly fills with fluid, precharge pressure rises and the accumulator stores and exhausts decreasing amounts of fluid. The accumulator will totally fail when precharge pressure equals maximum hydraulic system pressure. At that point, the accumulator will accept no further fluid. Because the rise in precharge pressure can be measured (Fig.15a), failure can be predicted and repairs effected before total failure occurs.

Fig.15 When an accumulator bladder ruptures, precharge pressure immediately falls to zero

As fluid leaks past an accumulator piston, precharge pressure rises (a).

Gas leaking past the piston or valve causes precharge pressure to fall (b)

Gas Leakage

Precharge may be lost as gas slowly bypasses damaged piston seals. Seal deterioration occurs from excessively long service, from fluid contamination, or from a combination of the two. Gas can also vent directly through a defective gas core or end cap O-ring.

The reducing precharge pressure then forces progressively less fluid into the system. Because this gradual decrease in precharge pressure can be measured (Fig.15b), repairs can again be effected before total failure occurs.

Conclusions

A correctly specified Parker accumulator, installed and maintained in accordance with the guidelines contained in this catalog, will give many years of trouble-free use. The combination of clean system fluid and accurate precharging will prevent most of the common fault conditions described here, and will contribute to the long life and high operating efficiency of the whole hydraulic system.

Parker *inPHorm*™ Version 3.6 Software for Accumulator Division Products Makes Sizing and Selection Easy

Rapid Selection

Systematic Design

System Highlights

- **Accumulator Sizing and Selection**
- **Parametric Drawing Creation**
- **Input Formats:**
  - **Rapid Selection**
  - **Systematic Design**
- **Available Information Outputs:**
  - **HPGL CAD Drawing**
  - **CAD File (*.dxf)**
  - **Selection Summary Printout**
  - **RFQ/Order Sheet Printout**

Parker offers leading edge application assistance with its ***inPHorm*™ for Accumulators, Version 3.6.** This program allows you to select the proper Parker accumulator product for your application. Using ***inPHorm*** will increase your efficiency and minimize the engineering time required to design in accumulators.

This updated version of ***inPHorm*** **for Accumulators** is written for use with Windows95 and later versions, which makes it extremely user friendly. You can use the program to develop a model number. ***inPHorm*** **for Accumulators** guides you through the selection process, performs the calculations, and eases the process of sorting through catalog drawings, charts and tables. You can also employ the "Rapid Selection" module to build a model number based on a selection of options. In either case, you can view a dimensioned drawing, generate a print or DXF file and even create a quote request or order form.

"Advisor" options within the program offer additional assistance with special modifications and design considerations. During any portion of the program, reference material can be accessed or printed for future use.

inPHorm **for Accumulators** is also available on the web at www.parker.com/accumulator.

For further information or to order a CD, call your local Parker distributor or contact us at (815) 636-4100.

Contact Information

CUSTOMER: _____

ADDRESS: _____

_____

_____

CONTACT: _____

PHONE: _____

FAX: _____

EMAIL: _____

Customer Requirements

Quantity/Release: _____

Quantity (Annual): _____

Type (Piston or Bladder): _____

Bore Size (piston only): _____

Capacity: _____

Working Pressure/Design Factor. _____

Seal Type/Compound: _____

Hydraulic Port: _____

Gas Port: _____

Operating Temperature Range: _____

System Fluid: _____

Gas Valve: _____

Precharge: _____

Water Service? _____

Plating/Coating: _____

Material Type: _____

Paint: _____

Switches: _____

Certification: _____

Special Test? _____

Special Label? _____

Customer Drawing Included? _____

Customer Part # _____

Envelope Restrictions: _____

Application Description/Comments

_____

_____

_____

_____

_____

_____

_____

Please fill out and fax to 815-636-4113.
For assistance, call 815-636-4100.

FORM-0117, Rev. 1

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Sizing and Selection

- Piston Accumulators
- Bladder Accumulators
- KleenVent

Accumulator Sizing For:

- Shock Suppression
- Thermal Expansion
- Pulsation Dampening
- Auxiliary Power Source

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Sizing and Selection Software

Parker offers leading edge application assistance, in the form of the inPHorm™ Accumulator Sizing and Selection Software (see page 16).

For manual sizing calculations, see below and on the following pages.

For further engineering assistance, contact Parker's Accumulator Technical Support Group at (815) 636-4100.

Accumulator Sizing for:

- Shock Suppression
- Thermal Expansion
- Pulsation Dampening
- Auxiliary Power Source

Calculations for accumulator sizing take into consideration the charge and discharge rate of the accumulator.

Auxiliary Power Source

$$V_1 = \frac{V_w \left(\frac{P_3}{P_1}\right)^{1/f}}{0.95\left[1 - \left(\frac{P_3}{P_2}\right)^{1/n}\right]}$$

Where:

P_2	=	Maximum operating pressure in PSIA
P_3	=	Minimum operating pressure in PSIA
P_1	=	Pre-charge pressure required in PSIA
V_W	=	Volume of fluid collected or discharged by accumulator, In^3
V_1	=	Required Accumulator volume, In^3
f	=	Nitrogen gas constant-charging of Accumulators (see charts on pages 134-135)
n	=	Nitrogen gas constant-discharging of Accumulators (see charts on pages 134-135)

Note: Gas Precharge usually 100 psi below minimum pressure for **Piston Accumulators***.
Gas precharge is 90% of minimum pressure for **Bladder Accumulators**.

*90% where minimum system pressure is less than 1000 psi.

Hydraulic line shock suppression

$$V_1 = \frac{(12W)\,(V^2)\,(n\text{-}1)\left(\frac{P_2}{P_1}\right)^{1/n}}{2\,(g)\,(P_2)\left[\left(\frac{P_m}{P_2}\right)^{(n-1)/n} - 1\right]} + (Q * 1.155)$$

Where:

W	=	weight of fluid (lbs)
V	=	fluid velocity (ft/sec)
n	=	Discharge coefficient (see charts on pages 134-135)
P_2	=	system pressure
P_m	=	Shock pressure
V_1	=	accumulator size required
P_1	=	pre-charge pressure
G	=	force of gravity
Q	=	flow rate in GPM

Thermal Expansion

$$V_1 = \frac{V_a\left(T_2 - T_1\right)\left(\beta - 3\alpha\right)\left(\frac{P_2}{P_1}\right)^{1/n}}{1 - \left(\frac{P_2}{P_3}\right)^{1/n}}$$

Where:

α	=	Coefficient of Linear Expansion of Pipe Material per °F
β	=	Coefficient of Cubical Expansion of Fluid per °F
n	=	Discharge Coefficient (see charts on pages 134-135)
P_1	=	Precharge
P_2	=	Minimum System Pressure @ T_1 (PSIA)
P_3	=	Maximum System Pressure @ T_2 (PSIA)
V_1	=	Accumulator Size
V_a	=	Fluid Volume Subject to Thermal Expansion
T_1	=	Initial Temperature (Lower Temp °Kelvin)
T_2	=	Final Temperature (Higher Temp °Kelvin)

Coefficient of Linear Expansion of Pipe Material per °F

Steel:	6.33 x 10-6
Cast Iron:	6.55 x 10-6
Aluminum:	10 x 10-6

Coefficient of Cubical Expansion of Fluid per °F

Water:	1.15 x 10-4
Oil:	4.60 x 10-4

Piston pump pulsation dampening

$$V_1 = \frac{ALK\left(\frac{P_2}{P_1}\right)^{1/n}}{1 - \left(\frac{P_2}{P_3}\right)^{1/n}}$$

Where:

- K = Pump output coefficient
- n = Coefficient of discharge (see charts on pages 134-135)
- P_1 = Nitrogen gas pre-charge
- P_2 = System operating pressure
- P_3 = Maximum allowable shock pressure
- A = Piston area
- L = Piston stroke
- V_1 = Accumulator size required

Pump output coefficient is calculated depending on single acting or double acting pump:

Simplex single	.60
Simplex double	.25
Duplex single	.25
Duplex double	.15
Triplex single	.13
Triplex double	.06
Quadruplex single	.10
Quadruplex double	.06
Quintiplex single	.06
Quintiplex double	.02

Existing accumulator output used in an auxiliary power source application.

Calculations for accumulator sizing takes into consideration the charge and discharge rate of the accumulator.

$$V_w = \frac{0.95\,V_1\left[1 - \left(\frac{P_3}{P_2}\right)^{1/n}\right]}{\left(\frac{P_3}{P_1}\right)^{1/f}}$$

Where:

- P_2 = Maximum operating pressure in PSIA
- P_3 = Minimum operating pressure in PSIA
- P_1 = Pre-charge pressure required in PSIA
- V_W = Volume of fluid collected or discharged by accumulator, In^3
- V_1 = Required Accumulator volume, In^3
- f = Nitrogen gas constant-charging of Accumulators (see charts on pages 134-135)
- n = Nitrogen gas constant-discharging of Accumulators (see charts on pages 134-135)

Note: Gas Precharge usually 100 psi below minimum pressure for **Piston Accumulators**.
Gas precharge is 90% of minimum pressure for **Bladder Accumulators**.

Temperature Variation

Temperature variation can seriously affect the precharge pressure of an accumulator. As the temperature increases, the precharge pressure increases; conversely, decreasing temperature will decrease the precharge pressure. In order to assure the accuracy of your accumulator precharge pressure, you need to factor in the temperature variation. The temperature variation factor is determined by the temperature encountered during precharge versus the operating temperature expected in the system.

Temperature During Precharge

	30.	40.	50.	60.	70.	80.	90.	100.	110.	120.	130.	140.	150.	160.	170.	180.	190.	200.	210.	220.
30.	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.27	1.29	1.31	1.33	1.35	1.37	1.39
40.	.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.26	1.28	1.30	1.32	1.34	1.36
50.	.94	.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.25	1.27	1.29	1.31	1.33
60.	.92	.94	.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.13	1.15	1.17	1.19	1.21	1.23	1.25	1.27	1.29	1.31
70.	.92	.94	.96	.98	1.00	1.02	1.04	1.06	1.08	1.09	1.11	1.13	1.15	1.17	1.19	1.21	1.23	1.25	1.26	1.28
80.	.91	.93	.94	.96	.98	1.00	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.15	1.17	1.19	1.20	1.22	1.24	1.25
90.	.89	.91	.93	.95	.96	.98	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.13	1.15	1.16	1.18	1.20	1.22	1.24
100.	.88	.89	.91	.93	.95	.96	.98	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.13	1.14	1.16	1.18	1.20	1.21
110.	.86	.88	.89	.91	.93	.95	.96	.98	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.12	1.14	1.16	1.18	1.19
120.	.84	.86	.88	.90	.91	.93	.95	.97	.98	1.00	1.02	1.03	1.05	1.07	1.09	1.10	1.12	1.14	1.16	1.17
130.	.83	.85	.86	.88	.90	.92	.93	.95	.97	.98	1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.14	1.15
140.	.82	.83	.85	.87	.88	.90	.92	.93	.95	.97	.98	1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.13
150.	.80	.82	.84	.85	.87	.89	.90	.92	.93	.95	.97	.98	1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.11
160.	.79	.81	.82	.84	.85	.87	.89	.90	.92	.94	.95	.97	.98	1.00	1.02	1.03	1.05	1.06	1.08	1.10
170.	.78	.79	.81	.83	.84	.86	.87	.89	.90	.92	.94	.95	.97	.98	1.00	1.02	1.03	1.05	1.06	1.08
180.	.77	.78	.80	.81	.83	.84	.86	.88	.89	.91	.92	.94	.95	.97	.98	1.00	1.02	1.03	1.05	1.06
190.	.75	.77	.78	.80	.82	.83	.85	.86	.88	.89	.91	.92	.94	.95	.97	.98	1.00	1.02	1.03	1.05
200.	.74	.76	.77	.79	.80	.82	.83	.85	.86	.88	.89	.91	.92	.94	.95	.97	.98	1.00	1.02	1.03
210.	.73	.75	.76	.78	.79	.81	.82	.84	.85	.87	.88	.90	.91	.93	.94	.96	.97	.99	1.00	1.01
220.	.72	.74	.75	.76	.78	.79	.81	.82	.84	.85	.87	.88	.90	.91	.93	.94	.96	.97	.99	1.00

Let's assume the temperature during precharge is 70°F, the expected operating temperature is 130°F, and your desired precharge is 1000 psi. Find the charging temperature of 70°F in the top horizontal row. Next, find the operating temperature of 130°F in the left hand, vertical column. Extend lines from each value until they intersect to find the temperature variation factor; in this case, 0.90. Multiply the desired precharge of 1000 psi by the temperature variation factor of 0.90 to obtain the actual precharge pressure required – 900 psi.

Selection Chart for Charge Coefficient "f" & Discharge Coefficient "n" Chart No. 1

Selection Chart for Charge Coefficient "f" & Discharge Coefficient "n" Chart No. 1

Instructions for selection of Charge Coefficient "f" & Discharge Coefficient "n"

1. Determine Average System Pressure.

2. Determine the time required in seconds to charge the accumulator with fluid.

3. Determine the time in seconds to discharge the oil from the accumulator.

4. Select the graph which corresponds to the time (seconds) required to charge (discharge) the accumulator with fluid**.**

5. Select the curve on the graph which corresponds to the gas operating temperature. (If gas temperature under operating conditions is not known, assume 100°F.)

6. To use the graph, locate the average system pressure along the bottom portion of the graph. Move vertically along this column until you intersect the line corresponding to the gas temperature. Then move horizontally along this line, read the charge coefficient "f" on the left side of the graph. "f" = Charge Coefficient.

7. Repeat for the discharge coefficient "n" starting with Step #4.
"n" = Discharge Coefficient.

*Safety Note:

In any accumulator circuit, a means should be available of automatically unloading the accumulator when the machine is shut down. Such a valve could be located at this point in the circuit.

Control of Usable Volume

The usable volume of an accumulator should be discharged at a controlled rate. If an accumulator is required to maintain system pressure, this controlled rate is automatically achieved by the leakage fluid it has to replace. However, an accumulator which is used to develop a pressurized flow can discharge its usable volume too rapidly as a downstream directional valve is shifted. For this reason, accumulators in this application are often equipped with a flow control and bypass check at their inlet-outlet port.

Pump Unloading in Accumulator Circuits

To keep a pump/electric motor fully unloaded until it is required to re-charge an accumulator, an electric pressure switch can be used.

In the circuit illustrated, a pressure switch senses accumulator pressure sending and cutting-out electrical signals at various pressure levels. The electrical signals are transmitted to a normally-open, solenoid operated 2-way valve which vents and de-vents a pilot operated relief valve. When the accumulator is being charged, the pressure switch sends an electrical signal to the 2-way valve solenoid. With the accumulator charged, the pressure switch cuts out the signal, venting the relief valve and unloading pump/electric motor. The setting of the pressure switch determines the pressure range within which a pump/electric motor works.

Using a pressure switch to vent a relief valve results in a pump/electric motor being fully unloaded when system conditions dictate.

In the circuit illustrated, an unloading valve is used to dump a flow back to tank once an accumulator is charged to the unloading valve setting.

Once the valve closes, pump/electric motor must therefore generate power to recharge the accumulator to the unloading valve setting.

Differential Unloading Relief Valve

Instead of using a pressure switch and solenoid valve to vent a relief valve while an accumulator is charged, one hydraulic component can be used — a differential unloading relief valve.

A differential unloading relief valve is specifically designed for use with accumulators. As its name implies, the valve unloads a pump/electric motor over a differential pressure range.

A differential unloading relief valve consists of a pilot operated relief valve, check valve, and differential piston in one valve body. The valve body includes pump, tank, and accumulator passages.

Maintaining Pressure

Accumulators are used to maintain pressure. This can be required in one leg of a circuit while pump/electric motor is delivering flow to another portion of the system.

In the circuit illustrated, two clamp cylinders are required to hold a part in place. As the directional valves are shifted, both cylinders extend the clamp at the pump's compensator setting. During this time, the accumulator is charged to the setting also.

System demands require that cylinder B maintain pressure while cylinder A retracts. As directional valve A is shifted, pressure at the pump, as well as in line A, drops quite low. Pressure at cylinder B is maintained because the accumulator has stored sufficient fluid under pressure to make up for any leakage in line B.

Accumulators not only maintain pressure by compensating for pressure loss due to leakage, but they also compensate for pressure increase due to thermal fluid expansion or external mechanical forces acting on a cylinder.

In the illustrated circuit, assume that the cylinder is operating near a furnace where ambient temperatures are quite high. This causes the fluid to expand. With an accumulator in the circuit, the excess volume is taken up, keeping the pressure relatively constant. Without an accumulator, pressure in the line would rise uncontrollably and may cause a component housing, fitting, or conductor to crack.

The same situation can also occur if an external mechanical force acts to retract the cylinder. Assume now that the cylinder is clamping a curing press. As curing occurs, heat within the press causes it to expand resulting in a force acting to retract the piston rod. The accumulator once again absorbs the additional volume, maintaining the pressure at a relatively constant level.

*Safety Note:

In any accumulator circuit, a means should be available for automatically unloading the accumulator when the machine is shut down. Such a valve could be located at this point in the circuit.

Developing Flow

Since charged accumulators are a source of hydraulic potential energy, stored energy of an accumulator can be used to develop system flow when system demand is greater than pump delivery. For instance, if a machine is designed to cycle infrequently, a small displacement pump can be used to fill an accumulator over a period of time. When the moment arrives for the machine to operate, a directional valve is shifted downstream, and the accumulator delivers the required pressurized flow to an actuator.

Using an accumulator in combination with a small pump in this manner conserves peak horsepower. For instead of using a large pump/electric motor to generate a large horsepower all at once, the work can be evenly spread over a time period with a small pump/ electric motor.

Absorbing Shock

Hydro-pneumatic accumulators are sometimes used to absorb system shock even though in this application they are difficult to properly design into a system.

Shock in a hydraulic system may be developed from the inertia of a load attached to a cylinder or motor. Or, it may be caused by fluid inertia when system flow is suddenly blocked or changed direction as a directional valve is shifted quickly. An accumulator in the circuit will absorb some of the shock and not allow it to be transmitted fully throughout the system.

Shock may also occur in a hydraulic system due to external mechanical forces. In the circuit illustrated, the load attached to the cylinder has a tendency to bounce causing the rod to be pushed in and shock generated. An accumulator positioned in the cylinder line can help reduce the shock effects.

*Safety Note:

In any accumulator circuit, a means should be available for automatically unloading the accumulator when the machine is shut down. Such a valve could be located at this point in the circuit.

Developing System Flow

Contact Information

CUSTOMER: _____

ADDRESS: _____

_____

_____

CONTACT: _____

PHONE: _____

FAX: _____

EMAIL: _____

Customer Requirements

Quantity/Release: _____

Quantity (Annual): _____

Type (Piston or Bladder): _____

Bore Size (piston only): _____

Capacity: _____

Working Pressure/Design Factor. _____

Seal Type/Compound: _____

Hydraulic Port: _____

Gas Port: _____

Operating Temperature Range: _____

System Fluid: _____

Gas Valve: _____

Precharge: _____

Water Service? _____

Plating/Coating: _____

Material Type: _____

Paint: _____

Switches: _____

Certification: _____

Special Test? _____

Special Label? _____

Customer Drawing Included? _____

Customer Part # _____

Envelope Restrictions: _____

Application Description/Comments

_____

_____

_____

_____

_____

_____

_____

Please fill out and fax to 815-636-4113.
For assistance, call 815-636-4100.

FORM-0117, Rev. 1

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Notes

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

BLADDER PRODUCTS

SurgeKushons

- General Oil Service
- Water & Chemical Service
- Slurry Service
- Fire Protection Service

Greer SurgeKushons Feature:

- Operating Pressures to 500 PSI
- Eight Different Capacities – from 2 1/2 to 120 gallons
- The Highest Quality In-House Manufactured Bladders
- ASME Certification Standard – FM and UL Approved Available
- Chemical and Water Service Optional
- Four Bladder Compounds to Suit a Variety of Fluids and Temperatures

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

In high volume fluid handling systems, shocks are experienced when valves open or close or when pumps are started or shut down. SurgeKushons are essentially low pressure bladder accumulators designed to take these shocks out of high flow fluid handling systems. Applications for SurgeKushons include water sprinkling systems, water handling systems, refueling systems, and chemical and process plants.

Fuel loading absorbs shock from pump startup and stopping

Protecting sensitive meters and small diameter piping from valve closure on fueling trucks

Protection from large valve closure shocks

Refineries — Shock from pump starting and stopping

Liquid bulk handling absorbs surges and shocks from fluids in motion

Aircraft protection from valve closure shocks.

When a valve in a high volume fluid handling system opens or closes or a pump starts or starts, there can be pressure spikes generated that are four times greater than the system's design pressure. This shock can burst pipes, shatter or loosen fittings, disable pumps and knock out instrumentation. Greer's SurgeKushons are accumulators designed to protect fluid handling systems from surge and water hammer damage by absorbing the kinetic energy before it can cause serious damage.

Underground or overhead water or fluid systems can be made safer and more trouble-free with the proper SurgeKushon applications. Fire protection systems using sprinklers should be secured with SurgeKushons. Airport refueling facilities, petro-chemical plants, bulk handling systems, and refineries cannot afford surge-ruptured lines and the accompanying spills.

SurgeKushon Protection Pays...

- control surges and water hammer
- help save lives and property
- get immediate pay-back from reduced maintenance and damage
- save pump energy by continually holding pressure
- get longer life from equipment
- overall... the whole system works better

Greer SurgeKushons…
Your #1 Choice for Surge Protection!

Greer SurgeKushons are made by the leading manufacturer of bladder accumulators in North America. The broad SurgeKushon offering includes:

- 275 & 500 PSI Rated General Service
- 275 & 500 PSI Rated Slurry Service
- 275 & 400 PSI Rated FM Approved Fire Service
- Water & Chemical Service Option
- Stainless Steel Construction Available - Consult Factory

Virtually all of the components used in the construction of the SurgeKushons including the shells and the bladders themselves, the heart of any SurgeKushon, are manufactured in-house. All processes are internally controlled to the highest standards of quality and consistency.

Also, we offer application assistance and will help to design the proper SurgeKushon arrangement to fit your systems requirements including sizing and placement.

Specifications

Materials

- Shell – carbon steel to ASME material specifications
- Screens – stainless steel
- Flanges – carbon steel forgings to ASME material specification
- Gas Valve Protector – steel
- Gas Valve Stem – steel
- Bladders – various polymers, see Standard and Optional Bladders in this section.

Maximum Flow Rates

Flange Size	Max. Recommended Flow*	
	GPM	LPM
3”	350	1325
3” Slurry	400	1514
4” & 6”	1000	3785
8” & 10”	1400	5300

***Note:** with fliud viscosity of 60-70 SSU

Pressure Ratings – SurgeKushons are available in a variety of maximum operating pressures up to 500 PSI- all at minimum 4 to 1 design factors. See “Models, Capacities and Dimensions” pages for rated pressures.

Fluids – SurgeKushons are compatible with a wide variety of fluids. The standard accumulator may be used with petroleum-based industrial or water-based flame resistant fluids. Bladders compatible with most industrial fluids can be furnished on special orders with temperature ranges from -60°F to 400°F (-53°C to 204°C).

Precharge – Units are shipped with a 25 psi nitrogen precharge as standard. For other precharge pressures, specify at the time of order.

Available Options – options available on SurgeKushons include:

- Bladder Compounds (see Standard and Optional Bladders in this section)
- Water & Chemical Service (see Water & Chemical Service Option in this section)

Certifications – ASME (Section VIII, Div. 1) is available as standard on SurgeKushons with FM Approved and UL Listed as available options.

1 Shell
SurgeKushon shells are fabricated from carbon steel with minimum 4 to 1 design factors at normal operating pressures. SurgeKushon shells meet ASME material specifications as standard.

2 Bladder
The heart and soul of a SurgeKushon, bladders are manufactured in-house to control the material blending, molding, and critical seam assembly and curing processes. It is widely accepted that Greer bladders are the highest quality bladders in the industry. Bladders are offered in four different standard compounds to suit a variety of fluids and operating temperatures. Special compounds are available for unusual or severe applications.

3 Bladder Stems
All SurgeKushons are fitted as standard with two-piece bladder stems with replaceable gas valve cartridge for ease of serviceability. Also, the two-piece stem will accept high pressure military gas valves and permanent mount gauge adapters.

4 Port Flanges
ANSI RF flanges, 150 and 300 lb., are supplied as standard. Sizes range from 3” thru 10” with special sizes available (consult factory).

5 Screens
SurgeKushons are equipped as standard with stainless steel screens to prevent bladder extrusion and for corrosion resistance.

6 Top Repairable
25 gallon and larger units are supplied as top repairable. The top repairable design permits easy checking and maintenance of the bladder without removing the accumulator from the service line, saving time and money.

7 Gas Valve
All accumulators are fitted with a gas valve for ease of gas precharging. 2 1/2 thru 10 gallon units are equipped with a cored gas valve cartridge (ISO-4570-8VI) for ease of maintenance. 25 gallon and larger units are equipped with a poppet-type (military) gas valve cartridge (Mil. Spec MS28889-2). For safety, the gas valve vents if unscrewed.

ASME Certified General Service SurgeKushons

Nominal Size	Bladder Code	SurgeKushon Part Number	SurgeKushon Repair Kit	SurgeKushon Pressure Rating	A (Inch (mm))	B (Inch (mm))	RF Flange	Weight
2-1/2 gallon (9.5 liters)	-01 Slurry	SK02S3FA01A1	703184	275 PSI (19 Bar)	19.25 (489)	8.60 (218)	3”, 150#	63 (29)
	-01	SK02A3FA01A1	702634					
	-04	SK02A3FA04A1	704330					
	-08	SK02A3FA08A1	702636					
	-28	SK02A3FA28A1	702635					
5 gallon (19 liters)	-01 Slurry	SK05S3FA01A1	703191	275 PSI (19 Bar)	29.50 (749)	8.60 (218)	3”, 150#	89 (40)
	-01	SK05A3FA01A1	702637					
	-04	SK05A3FA04A1	704331					
	-08	SK05A3FA08A1	702639					
	-28	SK05A3FA28A1	702638					
10 gallon (38 liters)	-01 Slurry	SK10S3FB01A1	703198	275 PSI (19 Bar)	50.63 (1286)	8.60 (218)	3”, 150# (Slurry, 4”, 150#)	137 (62)
	-01	SK10A3FA01A1	702640					
	-04	SK10A3FA04A1	704332					
	-08	SK10A3FA08A1	702642					
	-28	SK10A3FA28A1	702641					
25 gallons (95 liters)	-01	SK25A5PB01A1	702615	500 PSI (34 Bar)	35.69 (907)	22.00 (559)	4”, 300#	320 (145)
	-04	SK25A5PB04A1	704333					
	-08	SK25A5PB08A1	702617					
	-28	SK25A5PB28A1	702616					
40 gallons (151 liters)	-01	SK40A5PB01A1	702621	500 PSI (34 Bar)	43.44 (1103)	22.00 (559)	4”, 300#	368 (167)
	-04	SK40A5PB04A1	704334					
	-08	SK40A5PB08A1	702623					
	-28	SK40A5PB28A1	702622					
80 gallons (303 liters)	-01	SK80A5PB01A1	702626	500 PSI (34 Bar)	64.44 (1637)	22.00 (559)	4”, 300#	660 (300)
	-04	SK80A5PB04A1	704335					
	-08	SK80A5PB08A1	702627					
	-28	SK80A5PB28A1						
100 gallons (379 liters)	-01	SK100A5PB01A1	702630	500 PSI (34 Bar)	84.44 (2145)	22.00 (559)	4”, 300#	885 (402)
	-04	SK100A5PB04A1	704336					
	-08	SK100A5PB08A1	702631					
	-28	SK100A5PB28A1						
120 gallons (454 liters)	-01	SK120A5PB01A1	702643	500 PSI (34 Bar)	101.38 (2575)	22.00 (559)	4”, 300#	1010 (459)
	-04	SK120A5PB04A1	704337					
	-08	SK120A5PB08A1	702644					
	-28	SK120A5PB28A1						

1) Note: Bladder Codes: -01 = Buna-Nitrile, -04 = Hydrin, -08 = EPR, & -28 = Fluorocarbon)

Water/Chemical Service SurgeKushons (All Bladders are Code -1 Nitrile)

Nominal Size	B Inch mm	ANSI RF Flange Size	275 PSI Rated with 150# Flange					400 PSI Rated with 300# Flange				
			Model Number	A		WeightModel		A Number	Weight			
				Inch	(mm)	lbs.	(Kg.)		Inch	(mm)	lbs.	(Kg.)
2-1/2 gallon (9.5 liters) RK #702634	8.60 (218)	3”	SK02W3FA01A1	16.94	(430)	63	(29)					
5 Gallon (19 liters) RK #702637	8.60 (218)	3”	SK05W3FA01A1	28.94	(735)	89	(40)					
10 Gallon (38 liters) RK #702640	8.60 (218)	3”	SK10W3FA01A1	50.63	(1286)	137	(62)					
25 gallon (95 liters) RK #702615	22.00 (559)	4”	SK25W3FB01A1	35.56	(903)	310	(141)					
		4”	SK25W3FB01A1	35.69	(907)	310	(141)	SK25W4PB01A1	35.69	(907)	320	(145)
		6”	SK25W3FC01A1	37.50	(953)	319	(145)	SK25W4PC01A1	38.00	(965)	338	(154)
		8”	SK25W3FD01A1	37.56	(954)	335	(152)	SK25W4PD01A1	37.94	(964)	362	(165)
		10”	SK25W3FE01A1	41.56	(1056)	347	(158)					
40 gallons (151 liters) RK #702621	22.00 (559)	4”	SK40W3FB01A1	43.31	(1100)	358	(163)					
		4”	SK40W3FB01A1	43.44	(1103)	358	(163)	SK40W4PB01A1	43.44	(1103)	368	(167)
		6”	SK40W3FC01A1	45.25	(1149)	367	(167)	SK40W4PC01A1	45.75	(1162)	386	(175)
		8”	SK40W3FD01A1	45.31	(1151)	383	(174)	SK40W4PD01A1	45.69	(1161)	410	(186)
		10”	SK40W3FE01A1	49.31	(1252)	395	(180)					
80 Gallon (303 liters) RK #702626	22.00 (559)	4”	SK80W3FB01A1	64.25	(1632)	650	(295)					
		4”	SK80W3FB01A1	64.44	(1637)	650	(295)	SK80W4PB01A1	64.44	(1637)	660	(300)
		6”	SK80W3FC01A1	66.25	(1683)	659	(300)	SK80W4PC01A1	66.75	(1695)	678	(308)
		8”	SK80W3FD01A1	66.31	(1684)	675	(307)	SK80W4PD01A1	66.69	(1694)	702	(319)
		10”	SK80W3FE01A1	70.31	(1786)	687	(312)					
100 Gallon (379 liters) RK #702630	22.00 (559)	4”	SK100W3FB01A1	84.81	(2154)	875	(398)					
		4”	SK100W3FB01A1	84.88	(2156)	875	(398)	SK100W4PB01A1	84.44	(2145)	885	(402)
		6”	SK100W3FC01A1	86.69	(2202)	884	(402)	SK100W4PC01A1	87.19	(2215)	903	(410)
		8”	SK100W3FD01A1	86.75	(2203)	900	(409)	SK100W4PD01A1	87.13	(2213)	927	(421)
		10”	SK100W3FE01A1	90.75	(2305)	912	(415)					
120 Gallons (454 liters) RK #702643	22.00 (559)	4”	SK120W3FB01A1	101.31	(2573)	1000	(455)					
		4”	SK120W3FB01A1	101.38	(2575)	1000	(455)	SK120W4PB01A1	101.38	(2575)	1010	(459)
		6”	SK120W3FC01A1	103.19	(2621)	1009	(459)	SK120W4PC01A1	103.69	(2634)	1028	(467)
		8”	SK120W3FD01A1	103.25	(2623)	1025	(466)	SK120W4PD01A1	103.63	(2632)	1052	(478)
		10”	SK120W3FE01A1	107.25	(2724)	1037	(471)					

1) Note: RK = Repair Kit

Standard and Optional Bladders

A variety of bladders are offered to suit a wide range of fluids and operating temperatures. The following table lists the optional bladders available, their recommended operating temperature ranges, and the types of fluids that are generally compatible.

Code	Polymer	Recommended Operating* Temperature Range	Maximum Temperature with Reduced Life	General Application & Compatibility[1]
01	Buna-Nitrile	-20°F to 165°F -10°C to 80°C	225°F 93°C	Greer's Standard Compound – Compatible with most mineral oil based fluids.
04	Hydrin (Lo-Temp)	-40°F to 160°F -40°C to 71°C	200°F 93°C	Compatible with most mineral oil based fluids with enhanced low temperature performance.
08	Ethylene Propylene	-40°F to 200°F -40°C to 93°C	300°F 149°C	Compatible with some synthetic fluids and water.
28	Flurocarbon 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.

1) Note: Consult your local Greer distributor or the factory for fluid compatibility information. Temperature ranges may vary depending upon the fluid used in the hydraulic system.
* The temperatures listed indicate the operating temperature range of the seals, not the SurgeKushon. For the Minimum Design Metal Temperature (MDMT) of ASME certified SurgeKushons, please consult the factory.

Bladder Kits

A full range of genuine Greer replacement bladder kits are available to bring your SurgeKushon back to original condition should replacement become necessary. All bladder kits include port o-ring and back-up seals and gas valves with secondary seals. (Consult factory for SurgeKushon repair kit numbers).

Water & Chemical Service Option

Standard SurgeKushons are manufactured from carbon steel and are intended for oil or non-corrosive fluid service. For water or corrosive fluid service, the Water & Chemical Service option should be specified. With this corrosive resistant option, all parts that come into contact with the system fluid are made from stainless steel or have a Skotchkote 134® coating.

How to Order SurgeKushons

SurgeKushons can be specified by using the symbols in the chart below to develop a model number. Select only those symbols that represent the features desired, and place them in the sequence indicated by the example at the top of the chart.

Series	Size	Construction	Rated Pressure	Port	Bladder Material	Design Variation	Design Code
SK	10	A	3	FA	01	A	1

Series: SK — SK Series SurgeKushons

Construction:
- **A** Std. Oil Service
- **W** Water & Chemical Service
- **S** Slurry Service[1]

1) Note: Includes water service.

Design Variation:
- **A** Standard ASME Cert.
- **S** Special

Design Code:
- **1** Standard
- * Special Design No. Assigned

Code	Size
02	2½ gal. (9 1/2 liters)
05	5 gal. (19 liters)
10	10 gal. (38 liters)
25	25gal. (95 liters)
40	40 gal. (151 liters)
80	80 gal. (303 liters)
100	100 gal. (379 liters)
120	120 gal. (454 liters)

Rated Pressure	
2	200 PSI (14 Bar)
3	275 PSI (19.0 Bar)
4	400 PSI (28 Bar)
5	500 PSI (35 Bar)

01	Buna-Nitrile
04	Hydrin
08	EPR
28	Fluorocarbon

Port Flanges			
FA	3", 150#ANSI RF Flg.	PA	3", 300#ANSI RF Flg.
FB	4", 150#ANSI RF Flg.	PB	4", 300#ANSI RF Flg.
FC	6", 150#ANSI RF Flg.	PC	6", 300#ANSI RF Flg.
FD	8", 150#ANSI RF Flg.	PD	8", 300#ANSI RF Flg.
FE	10", 150#ANSI RF Flg.	XX	Special

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Inline Pulse-Tone™

Hydraulic Shock Suppressors

Inline Pulse-Tone™ Shock Suppressors Feature:

- Three Bladder Polymers for a Wide Range of Fluids and Temperatures
- NPT, BSPP, SAE or Split Flange Connections
- Mounting in Any Position
- 3000 PSI Models for Water/Chemical Service

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

The Patented PULSE-TONE™ inline Construction

Why Should You Use the PULSE-TONE inline Shock Suppressor?

Noise pollution is the hottest topic in the hydraulic industry today. Lab tests show that pump noise levels are increased by 2-3 dB(A) just by adding 12 feet of outlet and return lines. The lines do not generate noise. They radiate noise when they respond to pulsations or vibrations. The pulsations are usually generated by the pump, and the vibrations are radiated by large flat machine surfaces.

Not only do hydraulic lines radiate noise, but they frequently provide the primary path for propagating noise from the pump to components that, in turn, react to the noise and radiate additional sound. This helps explain why many pump manufacturers have a very low dB(A) pump rating, but when the pump is installed on a power unit, the sound rating is much higher.

It is almost impossible to forecast how much additional sound the hydraulic lines and surrounding structure will radiate. This is why many power units are enclosed after they have been manufactured and installed.

The Inline Pulse-Tone reduces pump pulsations and shock. When you stop pulsation and vibration, you stop the cause of component wear and leakage. A power unit with an Inline Pulse-Tone installed can operate at higher RPM with smaller, less expensive components . . . and less noise.

NOTE OF INTEREST: An increase of 2.71 dB doubles the intensity noise level.

How Does the PULSE-TONE inline Work?

An Inline Pulse-Tone suppressor is located as close to the pump as possible, usually directly at the pump outlet, to stop pulsations and noise before they travel through the piping and radiate off other structural components.

As shown in the diagram on the facing page, oil flowing into the Pulse-Tone goes through three different baffles or diffusers. These metal baffles are designed to convert 1/2” diameter holes to 1/32” diameter holes. The total radial distance through these baffles is only 1/4”.

After passing through these holes, pulsations strike a nitrogen charged rubber bladder. The bladder deflects each time it is hit by a pulsation. This slight deflection of the bladder reduces the shock and noise.

The bladder is usually charged with nitrogen to 50% to 60% of the hydraulic operating pressure. The 1/32” diameter holes in the last baffle are so small that the bladder cannot extrude into them.

The large area of the bladder, its ability to oscillate at a high frequency and the short distance each pulsation has to travel once it enters the unit explain the effectiveness of the Pulse-Tone.

Selecting a PULSE-TONE inline is Easy!

No complex sizing forumla is required. The Inline Pulse-Tone hydraulic shock suppressor is sized to match your hydraulic line size. There is a unit to fit every pipe and tube size from 3/8” to 2” with threaded or flanged connections. Models are available for both 3000 PSI and 5000 PSI hydraulic system pressures.

Features	Advantages	Benefits
Reduces pulsations and shock	Less component wear and system leakage	Less maintenance
Reduces noise	Better work environment Eliminates need for sound proofing Use smaller, higher RPM components Smaller motor starters	Higher worker morale and productivity Lower system costs Design flexibility
No moving mechanical parts	Nothing to break	Low maintenance costs
Wide range of port sizes	Accommodates both hose and tube sizes	Ease of installation
Flange mountings	Allows for installation of larger units	Mounting ease and flexibility
Unit is bidirectional.	Cannot be installed backwards	Ease of installation
Compact size	Allows for mounting close to pump	Easily added to existing power units
Special materials for water or chemical service	Resists corrosion	Longer life and wider variety of applications
Can be supplied with customer specified precharge	Ease and speed of adjusting to system parameters	Shorter installation time
Short delivery times	Eliminates customer inventory	Lower operating costs

Models

- 3000 psi rated for oil applications
- 3000 psi Stainless Steel for water and chemical applications
- 5000 psi for high pressure oil applications

Port Connections

Four types of hydraulic line connections are available:

- NPT pipe connections from 3/8” to 2” pipe
- BSPP connections from 3/8” to 2” pipe
- SAE port connection from 3/8” to 2” tubing
- Split flange connection from 3/4” to 3”

Inline Pulse-Tone units can be ordered with any combination of ends, such as a split flange one end and a straight thread on the opposite end. When ordering, specify the type of connection for each end.

Bladder Materials

- Standard material is high temperature HNBR, -50° to 300°F (-45° to 149°C)
- Fluorocarbon or EPR bladders are available for special applications

Precharge

The unit can be shipped with a nitrogen precharge equal to 50% of hydraulic system pressure. Check precharge every three months to maintain maximum efficiency. (See page 184 for procedures.)

Mounting

The Pulse-Tone may be mounted in any position, horizontal or vertical. Since there are no moving parts, either end may be used for inlet or outlet. Split flange mounting makes it possible to break an existing connection to add the Pulse-Tone between the flanges.

Examples of Pulsation Reduction

The examples below show pulsations for pumps at various pressures before and after installation of the Inline Pulse-Tone.

Piston Pump at 4000 psi and 1800 rpm

Piston Pump at 2000 psi and 1800 rpm

Piston Pump at 750 psi and 1200 rpm

3000 PSI Pipe Thread Connections

Model	NPT Size	BSPP Size	Flow, GPM 15'/sec	Flow, GPM 20'/sec*	Dimensions, inch (mm) D	H	L	Weight lbs. (kg)
PT250D1H	3/8 1/2	3/8 1/2	11.3	15.1	2.5 (63.5)	1.75 (44.5)	6.875 (174.6)	6.5 (3)
PT262D1H	3/4 1 —	3/4 1 1¼	24.2	32.1	2.625 (66.7)	1.75 (44.5)	8.13 (206.5)	8.0 (3.6)
PT400D1H	1 1¼ 1½	1 1¼ 1½	68.9	91.9	4.0 (101.6)	1.75 (44.5)	8.875 (225.4)	24.5 (11.1)
PT475D1H	1½ 2	1½ 2	128.0	171.0	4.75 (120.7)	1.75 (44.5)	10.5 (266.7)	31 (14.1)

3000 PSI Straight Thread Connections

Model	Tube Size	Thread	Flow, GPM 15'/sec	Flow, GPM 20'/sec*	Dimensions, inch (mm) D	H	L	Weight lbs. (kg)
PT250D1H	.375 .500 .625	9/16–18 3/4–16 7/8–14	11.3	15.1	2.5 (63.5)	1.75 (44.5)	6.875 (174.6)	6.5 (3)
PT262D1H	.750 1.00 1.25	1-1/16–12 1-5/16–12 1-5/8–12	24.1	32.1	2.625 (66.7)	1.75 (44.5)	8.13 (206.5)	8 (3.6)
PT400D1H	1.00 1.25 1.50	1-5/16–12 1-5/8–12 1-7/8–12	68.9	91.9	4.0 (101.6)	1.75 (44.5)	8.875 (225.4)	24.5 (11.1)
PT475D1H	2.00	2-1/2–12	128.0	171.0	4.75 (120.7)	1.75 (44.5)	10.5 (266.7)	31 (14.1)

* Pressure drop in the suppressor is equal to pressure drop in 8" of tubing. Flow rates can be at least 50% higher than those listed for 20'/sec. without excessive pressure drop.

3000 PSI Pipe Thread Connections

Model	NPT Size	Flow, GPM 15'/sec	Flow, GPM 20'/sec*	Dimensions, inch (mm)			Weight lbs. (kg)
				D	H	L	
PT262D3H	3/4" 1"	24.2	32.1	2.625 (66.7)	1.75 (44.5)	8.13 (206.5)	8.0 (3.6)
PT400D3H	1" 1¼" 1½"	68.9	91.9	4.0 (101.6)	1.75 (44.5)	8.875 (225.4)	24.5 (11.1)

3000 PSI Straight Thread Connections

Model	Tube Size	Thread	Flow, GPM 15'/sec	Flow, GPM 20'/sec*	Dimensions, inch (mm)			Weight lbs. (kg)
					D	H	L	
PT262D3H	.750 1.00 1.25	1-1/16–12 1-5/16–12 1-5/8–12	24.1	32.1	2.625 (66.7)	1.75 (44.5)	8.13 (206.5)	8 (3.6)
PT400D3H	1.00 1.25 1.50	1-5/16–12 1-5/8–12 1-7/8–12	68.9	91.9	4.0 (101.6)	1.75 (44.5)	8.875 (225.4)	24.5 (11.1)

* Pressure drop in the suppressor is equal to pressure drop in 8" of tubing. Flow rates can be at least 50% higher than those listed for 20'/sec. without excessive pressure drop.

3000 PSI for Code 61 Flange Mounting

Model	Flange Size	D	Code 61 Flange					Code 62 Flange*				
			A	B	L	E	F	A	B	L	E	F
PT262D1HP	0.75	2.625 (66.7)	1.75 (44.5)	.56 (14.2)	10.12 (257.0)	1.875 (47.6)	0.875 (22.2)	2.000 (50.8)	.75 (19.1)	10.620 (269.7)	2.000 (50.8)	0.938 (23.8)
	1.00	2.625 (66.7)	1.75 (44.5)	.62 (15.7)	10.12 (257.0)	2.062 (52.4)	1.030 (26.2)	2.000 (50.8)	.94 (23.9)	10.620 (269.7)	2.250 (57.1)	1.094 (27.8)
	1.25	2.625 (66.7)	2.00 (50.8)	.56 (14.2)	10.62 (269.7)	2.312 (58.7)	1.188 (30.2)	2.250 (57.1)	1.06 (26.9)	11.120 (282.4)	2.625 (66.7)	1.250 (31.8)
PT400D1HP	1.25	4.00 (101.6)	2.25 (57.1)	.56 (14.2)	13.12 (333.2)	2.312 (58.7)	1.188 (30.2)	2.250 (57.1)	1.06 (26.9)	13.125 (333.4)	2.625 (66.7)	1.250 (31.8)
	1.50	4.00 (101.6)	2.25 (57.1)	.62 (15.7)	13.12 (333.2)	2.750 (69.9)	1.406 (35.7)	2.250 (57.1)	1.19 (30.2)	13.625 (346.1)	3.125 (79.4)	1.438 (36.5)
	2.00	4.00 (101.6)	2.38 (60.4)	.62 (15.7)	13.38 (339.9)	3.062 (77.8)	1.688 (42.9)	2.620 (66.5)	1.44 (36.6)	13.875 (352.4)	3.812 (96.8)	1.750 (44.5)
PT475D1HP	2.00	4.75 (120.6)	2.38 (60.4)	.62 (15.7)	15.00 (381.0)	3.062 (77.8)	1.688 (42.9)	2.620 (66.5)	1.44 (36.6)	13.875 (352.4)	3.812 (96.8)	1.750 (44.5)
	2.50**	4.75 (120.6)	2.875 (73.0)	.75 (19.0)	16.00 (406.4)	3.500 (88.9)	2.000 (50.8)	—	—	—	—	—
	3.00***	4.75 (120.6)	3.25 (82.6)	.88 (22.3)	16.75 (425.4)	4.188 (106.4)	2.438 (61.9)	—	—	—	—	—

* When using Code 62 flanges, do not exceed 3000 psi pressure rating of the unit.
** Maximum pressure rating for this flange is 2500 psi.
*** Maximum pressure rating for this flange is 2000 psi.

Ordering Note
The Pulse-Tone flange mounted unit is not supplied with split flanges.

5000 PSI for Flange Mounting

Model Number	Flange Size	Code 62 Flange* Dimensions, inch (mm)					
		A	B	D	L	E	F
PT338C1HP	1.00	2.000 (50.8)	.94 (23.9)	3.38 (85.8)	10.620 (269.7)	2.250 (57.2)	1.094 (27.8)
	1.25	2.250 (57.2)	1.06 (26.9)	3.38 (85.8)	11.120 (282.4)	2.625 (66.7)	1.250 (31.8)
PT500C1HP	1.25	2.250 (57.2)	1.06 (26.9)	5.00 (127.0)	13.125 (333.4)	2.625 (66.7)	1.250 (31.8)
	1.50	2.500 (63.5)	1.19 (30.2)	5.00 (127.0)	13.625 (346.1)	3.125 (79.4)	1.438 (36.5)
	2.00	2.620 (66.5)	1.44 (35.6)	5.00 (127.0)	13.875 (352.4)	3.812 (96.8)	1.750 (44.5)

Ordering Note
The Pulse-Tone flange mounted unit is not supplied with split flanges.

5000 PSI Straight Thread Connections

Model	For Tube Suppressor	Thread In Rate	Maximum Flow	Dimensions, inch (mm) D	H	L	Weight lbs. (kg)
PT338C1H	.750 1.00 1.25	1-1/16–12 1-5/16–12 1-5/8–12	49 GPM	3.38 (85.8)	1.28 (32.5)	8.13 (206.5)	15 (6.36)
PT500C1H	1.00 1.25 1.50	1-5/16–12 1-5/8–12 1-7/8–12	150 GPM	5.0 (127.0)	1.28 (32.5)	8.88 (225.6)	48 (21.8)

* Pressure drop in unit is equal to pressure drop of 8” of tubing. Flow rates can be at least 50% higher than those listed for 20’/sec without excessive pressure drop.

Repair Kits

Repair kits include a bladder and o-rings. Order by series and seal material.

Series	HNBR	EPR	Fluorocarbon
250	RKPT2500H0	RKPT2500D0	RKPT2500E0
262 & 338	RKPT2620H0	RKPT2620D0	RKPT2620E0
400 & 500	RKPT4000H0	RKPT4000D0	RKPT4000E0
475	RKPT4750H0	RKPT4750D0	RKPT4750E0

How to Order

Use the symbols in the chart below to develop an Inline Pulse-Tone model number. Select only those symbols that represent the features desired and place them in the sequence indicated by the example at the top of the chart.

Series	Size	Pressure	Design	Seals	Hydraulic Ports* Type	Hydraulic Ports* Size	Hydraulic Ports* Type	Hydraulic Ports* Size	Precharge Pressure*
PT	250	D	1	H	–	–	–	–	—

3000 PSI Sizes	
250	2.50” Dia.
262	2.625” Dia.
400	4.00” Dia
475	4.75” Dia.
5000 PSI Sizes	
338	3.375” Dia.
500	5.00” Dia.

Pressure	
D	3000 PSI
C	5000 PSI

Seals	
D	EPR*
E	Fluorocarbon
H	**HNBR (STD)**

* Not available on 250 (2.50”) size.

Precharge Pressure*
If desired, indicate pressure in psi.
If not desired, leave blank.

** Provided at additional cost.*

Design	
1	**Standard**
3	Water/Chem Service*
S	Special

* Available in Sizes 262 and 400 only.

Port Type		Port Size	
T	SAE	**B**	SAE #6 (9/16-18)
		C	SAE #8 (3/4-16)
		I	SAE #10 (7/8-14)
		D	SAE #12 (1-1/16-12)
		E	SAE #16 (1-5/16-12)
		F	SAE #20 (1-5/8-12)
		G	SAE #24 (1-7/8-12)
		H	SAE #32 (2-1/2-12)
U	NPT	**T**	3/8”
		U	1/2”
		V	3/4”
		W	1”
		X	1¼”
		Y	1½”
		Z	2”
R	BSPP Parallel	**A**	3/8”
		B	1/2”
		C	3/4”
		D	1”
		E	1¼”
		F	1½”
		G	2”
P	Code 61** Split Flange	**U**	3/4”
		V	1”
		W	1¼”
		J	1½”
		L	2”
		M	2½”
		N	3”
P	Code 62** Split Flange	**K**	3/4”
		G	1”
		H	1¼”
		P	1½”
		Q	2”

** Different type and size hydraulic ports may be ordered for each end. Specify left hand port first if ports are not the same.*

***When ordering different flange port sizes, specify port that connects to the pump first.*

Port Availability

Size	SAE #6	#8	#10	#12	#16	#20	#24	#32
250	●	●	●					
262				■	■	■		
400					■	■	■	
475								●
338				●	●	●		
500					●	●	●	

Size	NPT/BSPP 3/8	1/2	3/4	1	1¼	1½	2
250	●	●					
262			■	■	▲		
400				■	■	■	
475						●	●
338			▲	▲	▲		
500				▲	▲	▲	

▲ BSPP only
■ Available for Water/Chemical Service

Flange Availability

Size	Code 61 3/4	1	1¼	1½	2	2½	3
262	●	●	●				
400			●	●	●		
475					●	◆	◆

Size	Code 62 3/4	1	1¼	1½	2
338	●	●	●		
500			●	●	●

◆ Maximum pressure rating for the 2½” flange is 2500 PSI. Maximum pressure rating for the 3” flange is 2000 PSI.

Parker Hannifin Corporation
Hydraulic Accumulator Division
Rockford, Illinois USA

Charging & Gauging Assemblies

Includes 10 ft. charging hose with standard right-hand thread nitrogen fittings, adapter incorporating gas valve, bleeder valve and gas chuck and gauge.

Charging & Gauging Assemblies are sold in plastic carrying case.

Gauges

Gauges may be ordered separately. Listed below are 2½" dial type pressure gauges with 100 PSI graduation. Include blowout safety case and orifice surge damper.

Part Number	Pressure Range
087040 1000	0 - 1000 PSI
087040 2000	0 - 2000 PSI
087040 3000	0 - 3000 PSI
087040 4000	0 - 4000 PSI
087040 5000	0 - 5000 PSI
087040 6000	0 - 6000 PSI

Mounting Clamps

Clamp Dimensions

Series	Part No.	Dimensions, inch (mm)						
		A	B	C	D	H	ØL	Z
252	8700110252	4.25 (107.9)	3.35 (85.1)	4.42 (112.3)	2.62/2.82 (66.5/71.6)	1.64 (41.7)	0.37 x 0.50 (9.4 x 12.7)	1.25 (31.8)
338	8700110358	5.00 (127)	3.94 (100.1)	5.62 (142.7)	3.25/3.50 (82.6/88.9)	2.28 (57.9)	0.37 x 0.50 (9.4 x 12.7)	1.25 (31.8)
400	8700110413	5.25 (133.4)	4.33 (109.2)	6.06 (153.9)	3.84/4.11 (97.5/104.1)	2.45 (62.2)	0.37 x 0.50 (9.4 x 12.7)	1.25 (31.8)
475	8700110476	5.25 (133.4)	4.33 (109.2)	6.71 (170.4)	4.67/4.90 (118.6/124.5)	2.77 (70.3)	0.37 x 0.50 (9.4 x 12.7)	1.25 (31.8)
500	8700110535	5.75 (146.1)	4.92 (125.0)	7.43 (188.7)	5.02/5.32 (127.5/135.1)	3.21 (81.5)	0.37 x 0.50 (9.4 x 12.7)	1.25 (31.8)