



Piston Accumulators A Series

Threaded Piston Accumulator



ENGINEERING YOUR SUCCESS.

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PROP 65 WARNING

WARNING: This product can expose you to chemicals including Lead and Lead Compounds which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov



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If you have questions about the information contained herein, please contact:

Cylinder and Accumulator Divisionphone **815 636 4100****parker.com/cylinder-accumulator****Operator Obligations**

For Parker's Piston Accumulators that come with a black primer: it is the operator's responsibility to assure sufficient corrosion protection for the environment it is placed in. It is the responsibility of the buyer to make sure any individuals that install, operate, and maintain the accumulator are properly trained at regular intervals on those subjects. It is also the responsibility of the buyer to make sure users of the accumulator follow local and country safety and environmental rules and regulations.

Product Description

Parker Piston accumulators are suitable for storing energy under pressure, absorbing hydraulic shocks, and dampening pump pulsation and flow fluctuations. Piston accumulators provide excellent gas and fluid separation ensuring dependable performance, maximum efficiency, and long service life.

Why Use Piston Accumulators?

- Improves system efficiency
- Supplements pump flow
- Supplies power in emergency
- Compensates for leakage
- Absorbs hydraulic shocks
- Wide range of sizes
- Lower gas permeation rate
- Extremely high-flow rates
- High/Low temperature tolerance
- High compression ratios
- Can be used with remote gas bottles
- Can be mounted in any position
- Failure mode is gradual, predictable
- Sensors can be fitted for performance monitoring
- Less maintenance

Parker Best in Class Capabilities

- Accumulators up to 25" ID and 250 gallons and larger
- Pressure ratings in excess of 20,000 PSI
- Wide variety of stainless steel and alternative material options
- Extreme temperatures, certified product to -50°F
- Integrated solutions including imbedded valving and controls in accumulator
- Struts and suspension products designed for rugged mobile applications
- Many surface coatings, including epoxies, CARC paints, electroless nickel plating
- Accumulators, custom designed for the most demanding markets and global locations
- Unique lockout and tag-out integrated functions
- DOT shipping exemptions for pre-charged vessels

Certifications

Two Base Design Codes

While many countries have their own regulations and quality standards for piston accumulators, most refer back to one of two base design codes.

1. ASME

The oldest and most referenced design code for pressure vessels is ASME. Originally written to create a standard for the manufacture of boilers on steam locomotives, the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section VIII, Division 1 has evolved into requirements for unfired pressure vessels and accumulators in the United States. This section requires the following:

- **Certification on vessels with internal diameters of 6" or greater.**
- **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.**
- **Accumulators must be manufactured from materials that meet ASME specifications for traceability.**
- **A design factor of 4:1 in the ratio of minimum burst pressure to rated pressure. All design factors are with respect to the specified minimum tensile strength of the material.**
- **ASME requires that each vessel be marked with the design pressure at the Minimum Design Metal Temperature (MDMT) for the vessel.**
- **Surveillance of an approved quality system, like ISO 9001.**
- **All hydrostatic testing to be witnessed by a recognized authorized inspection agency**

The 4:1 design factor requirement is mandatory for all accumulators with ASME Certification with the exception of those that comply with a specific rule within the Code called "Appendix 22." Appendix 22 permits that accumulators manufactured with "forged" shells and 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. This includes bladder style accumulators.

2. PED/UKCA

The second base design code is the European Pressure Equipment Directive. The Directive 2014/68/EU (Pressure Equipment Directive) came into regulation in the European Union. This Directive applies to the design, manufacture, testing and conformity assessment of pressure equipment and assemblies of pressure equipment that operate over 0.5 bar. The directive requires the following:

- **The operating fluids must be in Group 2 (non-hazardous).**
- **Certified vessels with a volume greater than 1 liter gas capacity must be CE marked.**



Key Advantages of the A Series:

- Heavy Duty Service with 3000, 4000 and 5000 PSI Operating Pressure
- 3" thru 9" Bores with More than 20 Standard Capacities
- V-O-ring Piston Seals
- Serviceable Threaded End Construction
- Four Standard Seal Options to Handle a Variety of Fluids and Temperatures
- Certifications Available: ASME/DNV/ABS/NR13/AS1210/CRN/CE/UKCA/PED
- Temperature Ranges: -45° to 320°F

Fluids Compatibility

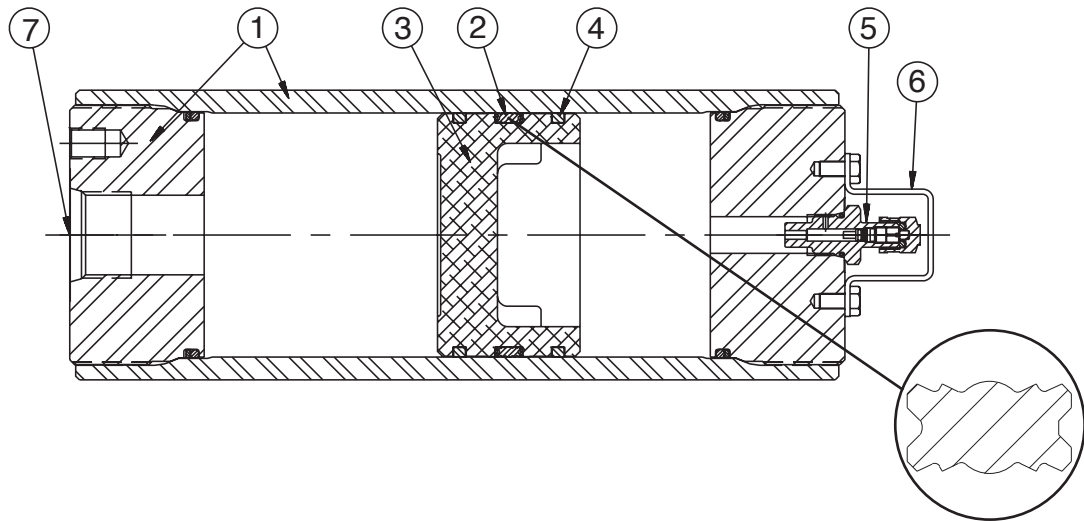
Parker's piston accumulators are compatible with a wide variety of fluids. Standard accumulators (with nitrile seals) may be used with petroleum-based industrial oils or water-based flame resistant fluids. Optional seals compatible with most industrial fluids are available with temperature ranges from -45°F to 320°F (-43°C to 160°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.



1. Rugged **steel shell and caps**. The steel shell allows heat to dissipate effectively. The bore is micro-finished for extended seal life. The threaded caps allow for easy repair and seal replacement.
2. Unique V-O-ring piston seal with back-up washers. This design eliminates seal roll-over and ensures total separation of fluid and gas under the most severe operating conditions.
3. **Lightweight piston design** allows fast response to reduce shock in rapid cycling applications. The dished profile of the piston provides extra gas capacity and greater useable volume of fluid.
4. **PTFE glide rings** eliminate metal-to-metal contact between the tube and piston, reducing wear and extending service life.
5. Standard designed **gas valve** for ease of gas precharging. Gas valve cap protects valve and serves as secondary seal. Knurled cap design allows easy installation without tools.
6. Steel **gas valve protector** reduces the risk of damage to the gas valve from external impact.
7. **Wide range of Hydraulic port types and sizes**. SAE straight thread and SAE flange ports are fitted as standard. NPTF, SAE 4-bolt & special flanges, Metric, and ISO 6149-1 ports are available options.

Series A - 3000 PSI Piston Accumulators

Nominal Bore Size	Actual Bore Size		Max. Recommended Flow*	
(in)	(in)	(mm)	GPM	LPM
3	3.00	76.20	220	834
4	4.03	102.40	397	1504
6	5.78	146.90	818	3096
7	7.00	177.80	1199	4538
9	9.00	228.60	1982	7502
12	11.88	301.60	3450	13061

Series A - 4000 PSI Piston Accumulators

Nominal Bore Size	Actual Bore Size		Max. Recommended Flow*	
(in)	(in)	(mm)	GPM	LPM
4	4.03	102.40	397	1504
6	5.78	146.90	818	3096

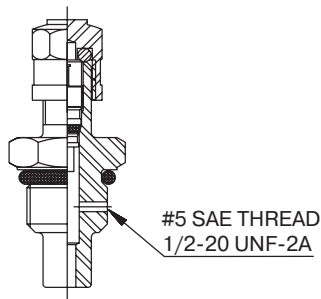
Series A - 5000 PSI Piston Accumulators

Nominal Bore Size	Actual Bore Size		Max. Recommended Flow*	
(in)	(in)	(mm)	GPM	LPM
3	3.00	76.20	220	834
4	4.03	102.40	397	1504
6	5.78	146.90	818	3096
7	7.00	178.00	1199	4538
9	9.00	228.60	1982	7502

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

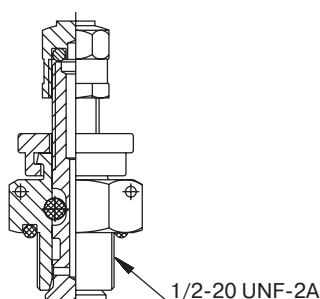
Gas Valves

Core Style



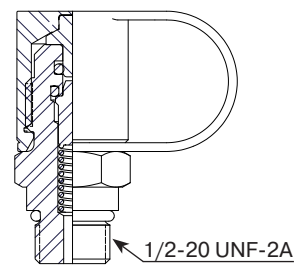
L07688000Q

Poppet Style



L07689000Q

EMA-3 Style



L07734000Q

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

Gas Valves			
Series	Bore Size	Standard Valve	Options
3000	3" - 6"	Cored (L07688000Q)	Poppet (L07689000Q) EMA-3 (L07734000Q)
3000	7" - 12"	Poppet (L07689000Q)	EMA-3 (L07734000Q)
4000	All	Cored (L07688000Q)	Poppet (L07689000Q) EMA-3 (L07734000Q)
5000	All	Poppet (L07689000Q)	EMA-3 (L07734000Q)

Hydraulic 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" & 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.

Series 3000 Standard Hydraulic Ports*			
Bore Size	SAE Port	SAE Flange	Metric SAE Flange
3	#12	-	-
4	#20	-	-
6	#24	-	-
7	#32	2" Code 61	2" Code 61
9	#32	2" Code 61	2" Code 61
12	-	3" Code 61	3" Code 61

Series 4000 and 5000 Standard Hydraulic Ports*			
Bore Size	SAE Port	SAE Flange	Metric SAE Flange
3	#12	-	-
4	#20	-	-
6	#24	-	-
7	#32	2" Code 62	2" Code 62
9	#32	2" Code 62	2" Code 62

*Supplied on both gas and fluid ends of accumulators ordered for use with gas bottles.

SAE 4-Bolt Flange Port Dimensions

Code 61 (ISO 6162) - 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	1.500	1.062
2"	1/2 - 13	1.688	3.062	2.000	1.062
2½"	1/2 - 13	2.000	3.500	2.500	1.188
3"	5/8 - 11	2.438	4.188	3.000	1.188

Note: 2½" and 3" flanges are not rated for 3000 PSI using standard thread engagement.

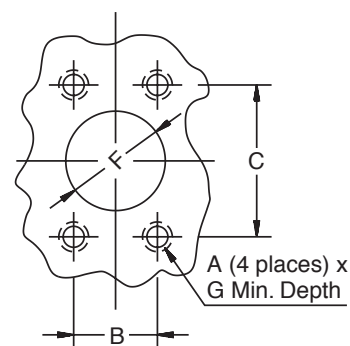
Flange Size	Metric ISO6162 Flange Dimensions (mm)				
mm	A	B	C	F	G
38	M12	35.7	69.9	38	26.9
51	M12	42.9	77.8	51	26.9
64*	M12	50.8	88.9	64	30.1
76*	M16	61.9	106.4	76	30.1

Note: 64 and 76 flanges are not rated for 3000 PSI using standard thread engagement.

Code 62 (ISO 6162) - 6000 PSI (410 Bar)

Flange Size	SAE Code 62 Flange Dimensions (in)				
in	A	B	C	F	G
1½"	5/8 - 11	1.438	3.125	1.500	1.375
2"	3/4 - 10	1.750	3.812	2.000	1.500

Flange Size	Metric ISO 6162 Flange Dimensions (mm)				
mm	A	B	C	F	G
38	M16	36.5	79.4	38	34.9
50	M20	44.5	96.8	50	38.1



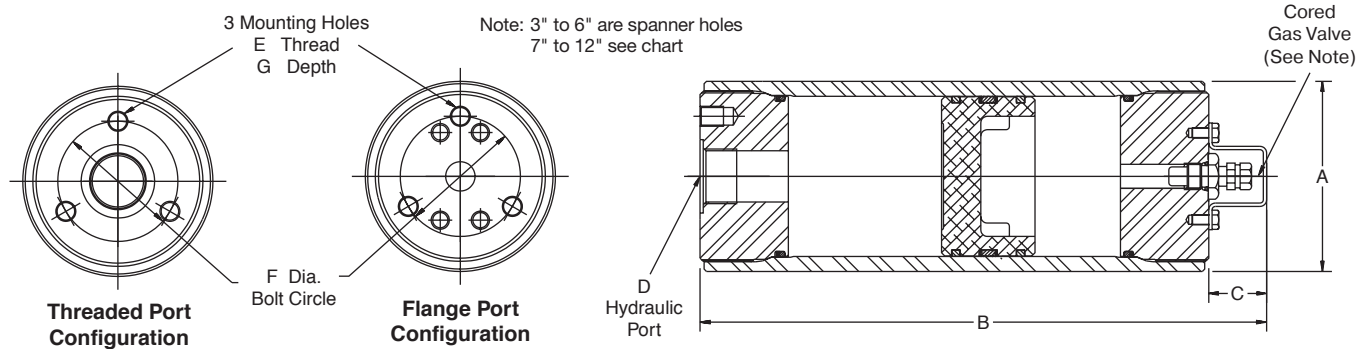
Optional Hydraulic Ports

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

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

The following ports are available as options on all Series 5000 piston accumulators

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

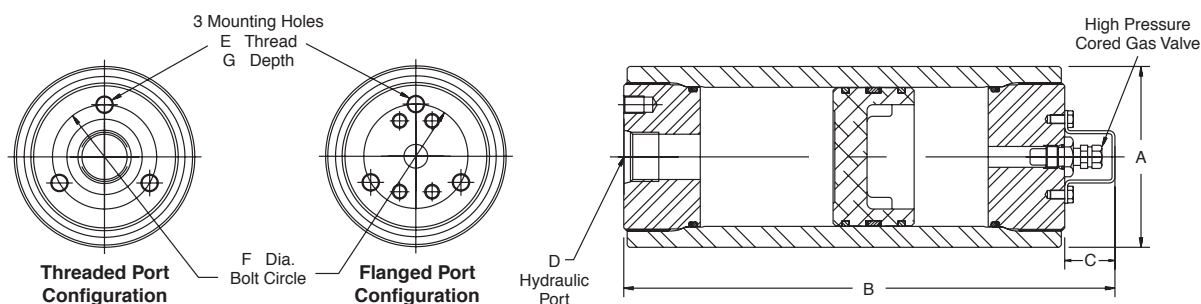
3000 PSI (207 Bar Metric) Piston Accumulators for Oil and Water Service

Model No.	Fluid Volume		Gas Volume		A	B	C	D	E	F	G	WEIGHT
	(CU. IN.)	GAL. (LITERS)	(CU. IN.)	(LITERS)	IN (mm)	IN (mm)	IN (mm)		IN	IN (mm)	IN (mm)	
OIL SERVICE												
A3N0029D1K	29	1/8 GAL (0.48)	34	(0.56)	3.56 (90)	10.25 (260)	1.13 (29)	#12 SAE	3/8-24	2.25 (60)	0.59 (15)	14.2 (6.4)
A3N0058D1K	58	1/4 GAL (0.95)	63	(1.03)		14.34 (364)						17.2 (7.8)
A3N0090D1K	90	3/8 GAL (1.42)	95	(1.56)		18.94 (481)						20.6 (9.4)
A3N0116D1K	116	1/2 GAL. (1.90)	121	(1.98)		22.56 (573)						23.4 (10.6)
A3N0183D1K	183	3/4 GAL (2.84)	188	(3.08)		32.06 (814)						30.5 (13.8)
A4N0058D1K	58	1/4 GAL (0.95)	68	(1.11)	4.75 (121)	11.63 (295)	1.13 (29)	#20 SAE	1/2-20	3.25 (82)	0.68 (18)	29.0 (13.0)
A4N0116D1K	116	1/2 GAL. (1.90)	126	(2.06)		16.19 (411)						35.0 (15.9)
A4N0231D1K	231	1 GAL. (3.79)	241	(3.95)		25.19 (640)						48.0 (21.8)
A4N0347D1K	347	1-1/2 GAL. (5.69)	357	(5.85)		34.31 (871)						60.9 (27.6)
A4N0578D1K	578	2-1/2 GAL. (9.47)	588	(9.64)		52.38 (1330)						86.7 (39.3)
A6N0231D1K	231	1 GAL. (3.79)	266	(4.36)	6.88 (175)	17.38 (441)	1.13 (29)	#24 SAE	1/2-20	4.38 (110)	0.84 (22)	83 (38)
A6N0578D1K	578	2-1/2 GAL. (9.47)	613	(10.0)		30.63 (778)						124 (56)
A6N0924D1K	924	4 GAL. 15.1)	959	(15.7)		43.81 (1113)						165 (75)
A6N1155D1K	1155	5 GAL. (18.9)	1190	(19.5)		52.63 (1337)						192 (87)
A6N1733D1K	1733	7-1/2 GAL. (28.4)	1768	(29.0)		74.63 (1896)						260 (118)
A6N2310D1K	2310	10 GAL. (37.9)	2345	(38.4)	8.13±0.06 (206.5±1.52)	96.63 (2454)	1.63 (41)	#32 SAE	5/8-18	5.75 (150)	0.94 (24)	327 (149)
A7N0578D3KPL	578	2-1/2 GAL. (9.47)	633	(10.4)		27.25 (692)						170 (77)
A7N1155D3KPL	1155	5 GAL. (18.9)	1210	(19.8)		42.25 (1073)						227 (103)
A7N1733D3KPL	1733	7-1/2 GAL. (28.4)	1788	(29.3)		57.25 (1454)						284 (129)
A7N2310D3KPL	2310	10 GAL. (37.9)	2365	(38.8)		72.25 (1835)						340 (154)
A7N3465D3KPL	3465	15 GAL. (56.8)	3520	(57.7)	8.13±0.06 (206.5±1.52)	102.25 (2597)	1.63 (41)	#32 SAE	5/8-18	5.75 (150)	0.94 (24)	454 (206)
A7N5775D3KPL	5775	25 GAL. (94.6)	5830	(95.5)		162.25 (4121)						682 (309)
A7L0578D3KPL	578	2-1/2 GAL. (9.47)	633	(10.4)		27.25 (692)						170 (77)
A7L1155D3KPL	1155	5 GAL. (18.9)	1210	(19.8)		42.25 (1073)						227 (103)
A7L1733D3KPL	1733	7-1/2 GAL. (28.4)	1788	(29.3)		57.25 (1454)						284 (129)
A7L2310D3KPL	2310	10 GAL. (37.9)	2365	(38.8)	11.02±0.09 (279.9±2.29)	72.25 (1835)	1.63 (41)	#32 SAE	3/4-16	7.00 (182)	1.13 (29)	340 (154)
A7L3465D3KPL	3465	15 GAL. (56.8)	3520	(57.7)		102.25 (2597)						454 (206)
A7L5775D3KPL	5775	25 GAL. (94.6)	5830	(95.5)		162.25 (4121)						682 (309)
A9L2310D3KPL	2310	10 GAL. (37.9)	2400	(39.3)		48.75 (1238)						597 (271)
A9L3465D3KPL	3465	15 GAL. (56.8)	3555	(58.3)		66.94 (1700)						761 (345)
A9L4620D3KPL	4620	20 GAL. (75.7)	4710	(77.2)	14.41±0.09 (365.9±2.29)	85.06 (2161)	1.63 (41)	2" CODE 61	7/8-9 (6X)	9.00 (230)	1.50 (38)	925 (420)
A9L5775D3KPL	5775	25 GAL. (94.6)	5865	(96.2)		103.18 (2622)						1089 (494)
A9L6930D3KPL	6930	30 GAL. (114)	7020	(115)		121.37 (3083)						1253 (568)
A12L5775D3KPL	5775	25 GAL. (94.6)	5975	(97.9)		67.50 (1715)						1336 (606)
A12L6930D3KPL	6930	30 GAL. (114)	7130	(117)		76.31 (1938)						1490 (676)
A12L9240D3KPL	9240	40 GAL. (151)	9440	(155)	119.62 (3038)	98.88 (2512)	1.63 (41)	2" CODE 61	7/8-9 (6X)	9.00 (230)	1.50 (38)	1799 (816)
A12L11550D3KPL	11550	50 GAL. (189)	11750	(193)		119.62 (3038)						2108 (956)

- 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).
- Piston accumulators are available with MDMT at -40°F (-40°C). Consult factory for options.

Notes:

- For Water Service add "W" after construction code, see "How to Order" information.
- Standard accumulators are designated D1K in model number.
- See "Port Options" for complete listing of standard and optional ports.
- 3", 4" & 6" bores standard with cored gas valves. Poppet type or EMA-3 gas valve available as an option.
- ASME/DNV/ABS/AS1210/SELO/CRN/CUTR/CE certified accumulators and gas bottles are available.
- When accumulators are to be used with gas bottles, order "Accumulators for Use with Gas Bottles."

4000 PSI (276 Bar Metric) Piston Accumulators for Oil and Water Service

Model No.	Fluid Volume		Gas Volume		A	B	C	D	E	F	G	WEIGHT
OIL SERVICE	(CU. IN.)	GAL. (LITERS)	(CU. IN.)	(LITERS)	IN (mm)	IN (mm)	IN (mm)		IN	IN (mm)	IN (mm)	LB (Kg)
A4N0058E1K	58	1/4 GAL (0.95)	68	(1.11)	5.00 (127)	12.06 (306)	1.13 (29)	#16 SAE	1/2-20	3.25 (82)	0.75 (18)	36.6 (16.6)
A4N0116E1K	116	1/2 GAL (1.90)	126	(2.06)		16.62 (422)						45.5 (20.6)
A4N0231E1K	231	1 GAL (3.79)	241	(3.95)		25.62 (651)						63.3 (28.7)
A4N0347E1K	347	1-1/2 GAL (5.69)	357	(5.85)		34.75 (883)						81.2 (36.8)
A4N0578E1K	578	2-1/2 GAL (9.47)	588	(9.64)		52.81 (1341)						116.8 (53.0)
A6N0231E1K	231	1 GAL (3.79)	266	(4.36)	7.06 (180)	19.18 (487)	1.13 (29)	#16 SAE	1/2-20	4.38 (110)	0.75 (18)	110 (50)
A6N0347E1K	347	1-1/2 GAL (5.69)	378	(6.19)		23.62 (600)						126 (57)
A6N0578E1K	578	2-1/2 GAL (9.47)	613	(10.0)		32.43 (824)						159 (72)
A6N0924E1K	924	4 GAL (15.1)	959	(15.7)		45.62 (1159)						208 (94)
A6N1155E1K	1155	5 GAL (18.9)	1190	(19.5)		54.43 (1383)						240 (109)
A6N1733E1K	1733	7-1/2 GAL (28.4)	1768	(29.0)	2310	76.43 (1941)						322 (146)
A6N2310E1K	2310	10 GAL (37.9)	2345	(38.4)		98.43 (2500)						404 (183)

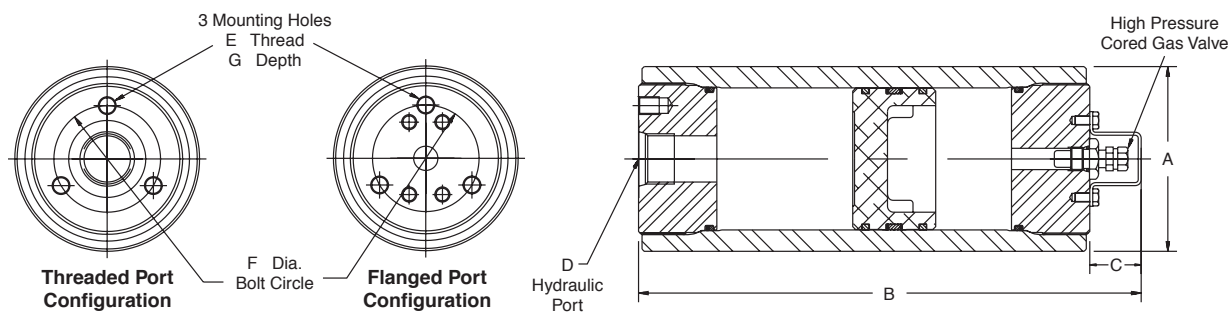
Notes:

- For Water Service add "W" after construction code, see "How to Order" information.
- Standard accumulators are designated E1K in model number.
- See "Port Options" for complete listing of standard and optional ports.
- When accumulators are to be used with gas bottles, order "Accumulators for Use with Gas Bottles."
- 4" & 6" bores standard with cored gas valves. Poppet type or EMA-3 gas valve available as an option.

**PROP 65 WARNING**

WARNING: This product can expose you to chemicals including Lead and Lead Compounds which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov



5000 PSI (345 Bar Metric) Piston Accumulators for Oil and Water Service

Model No.	Fluid Volume		Gas Volume		A	B	C	D	E	F	G	WEIGHT
OIL SERVICE	(CU. IN.)	GAL. (LITERS)	(CU. IN.)	(LITERS)	IN (mm)	IN (mm)	IN (mm)		IN	IN (mm)	IN (mm)	LB (Kg)
A3N0029C1K	29	1/8 GAL (0.48)	34	(0.56)	4.00 (102)	10.25 (260)	1.13 (29)	#12 SAE	3/8-24	2.25 (60)	0.56 (15)	20.6 (9.4)
A3N0058C1K	58	1/4 GAL (0.95)	63	(1.03)		14.34 (364)						26.5 (12.0)
A3N0090C1K	90	3/8 GAL (1.42)	95	(1.56)		18.94 (481)						33.0 (15.0)
A3N0116C1K	116	1/2 GAL (1.90)	121	(1.98)		22.56 (573)						38.2 (17.3)
A3N0183C1K	183	3/4 GAL (2.84)	188	(3.08)	5.25 (134)p	32.06 (814)	1.13 (29)	#16 SAE	1/2-20	3.25 (82)	0.75 (18)	51.8 (23.5)
A4N0058C1K	58	1/4 GAL (0.95)	68	(1.11)		12.06 (306)						43 (19.4)
A4N0116C1K	116	1/2 GAL (1.90)	126	(2.06)		16.62 (422)						54 (24.6)
A4N0231C1K	231	1 GAL (3.79)	241	(3.95)		25.62 (651)						77 (35.0)
A4N0347C1K	347	1-1/2 GAL (5.69)	357	(5.85)	7.50 (191)	34.75 (883)	1.13 (29)	#16 SAE	1/2-20	4.38 (110)	0.75 (18)	100 (45.4)
A4N0578C1K	578	2-1/2 GAL (9.47)	588	(9.64)		52.38 (1330)						146 (66.2)
A6N0231C1K	231	1 GAL (3.79)	266	(4.36)		17.38 (441)						128 (57.9)
A6N0347C1K	347	1-1/2 GAL (5.69)	382	(6.26)		23.62 (600)						148 (67.3)
A6N0578C1K	578	2-1/2 GAL (9.47)	613	(10.0)	9.09±0.06 (231.1±1.5)	30.63 (778)	1.63 (41)	2" CODE 62	5/8-18	5.75 (150)	0.94 (24)	190 (86.0)
A6N0924C1K	924	4 GAL (15.1)	959	(15.7)		43.81 (1113)						252 (114.1)
A6N1155C1K	1155	5 GAL (18.9)	1190	(19.5)		52.63 (1337)						293 (132.8)
A6N1733C1K	1733	7-1/2 GAL (28.4)	1768	(29.0)		74.63 (1896)						396 (179.7)
A6N2310C1K	2310	10 GAL (37.9)	2345	(38.4)	11.78±0.09 (299.2±2.3)	96.63 (2454)	1.63 (41)	2" CODE 62	3/4-16	7.00 (182)	1.13 (29)	499 (226.5)
A7N0578C3KPL	578	2-1/2 GAL (9.47)	633	(10.4)		27.25 (692)						272 (123.5)
A7N1155C3KPL	1155	5 GAL (18.9)	1210	(19.8)		42.25 (1073)						385 (174.7)
A7N1733C3KPL	1733	7-1/2 GAL (28.4)	1788	(29.3)		57.25 (1454)						498 (226.0)
A7N2310C3KPL	2310	10 GAL (37.9)	2365	(38.8)	11.78±0.09 (299.2±2.3)	72.25 (1835)	1.63 (41)	2" CODE 62	3/4-16	7.00 (182)	1.13 (29)	611 (277.0)
A7N3465C3KPL	3465	15 GAL (56.8)	3520	(57.7)		102.25 (2597)						837 (379.8)
A7N5775C3KPL	5775	25 GAL (94.6)	5830	(95.5)		162.25 (4121)						1289 (584.8)
A9L2310C3KPL	2310	10 GAL (37.9)	2400	(39.3)		48.75 (1238)						831 (376.8)
A9L3465C3KPL	3465	15 GAL (56.8)	3555	(58.3)	11.78±0.09 (299.2±2.3)	66.94 (1700)	1.63 (41)	2" CODE 62	3/4-16	7.00 (182)	1.13 (29)	1064 (482.8)
A9L4620C3KPL	4620	20 GAL (75.7)	4710	(77.2)		85.06 (2161)						1298 (588.8)
A9L5775C3KPL	5775	25 GAL (94.6)	5865	(96.2)		103.18 (2622)						1532 (694.8)
A9L6930C3KPL	6930	30 GAL (114)	7020	(115)		121.37 (3083)						1765 (800.8)

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

Notes:

- For Water Service add "W" after construction code, see "How to Order" information.
- Standard accumulators are designated C1K in model number.
- See "Port Options" for complete listing of standard and optional ports.
- 3", 4" & 6" bores standard with cored gas valves. Poppet type or EMA-3 gas valve available as an option.
- ASME/DNV/ABS/AS1210/SELO/CRN/GOS/CE certified accumulators and gas bottles are available.
- When accumulators are to be used with gas bottles, order "Accumulators for Use with Gas Bottles."



WARNING: This product can expose you to chemicals including Lead and Lead Compounds which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov



Available Options**A Series**

If your application requires a piston accumulator, gas bottle, or special option that falls outside of Parker's standard 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.

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 320°F (-43°C to 160°C).

Pre-charge

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

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. Parker Cylinder and Accumulator Division does not offer safety fuses or rupture discs. 4" bore units and larger can be equipped with a fuse port machined in the gas cap by specifying the "Safety Fuse Option" (F) in the model code at the time of order.

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

Seal Material Options

Seal Code	Polymer	Recommended Operating Temperature Range*	Maximum Temperature with Reduced Life*	General Application and Compatibility**
K	Buna Nitrile (Std)	-20°F to 165°F -29°C to 74°C	200°F 93°C	Parker's Standard Compound –Compatible with most mineral oil-based fluids
E	Fluorocarbon Elastomer	-10°F to 250°F -23°C to 121°C	400°F 204°C	Compatible with most mineral oil-based fluids at higher temperatures and some exotic fluids
D	Ethylene Propylene	-40°F to 250°F -40°C to 121°C	300°F 149°C	Compatible with most phosphate ester fluids and some synthetic fluids
H	Hydrogenated Nitrile	-25°F to 320°F -32°C to 160°C	350°F 177°C	Compatible with most oil-based and biodegradable fluids, maintains sealing effectiveness at a wide range of temperatures
Q	Low Temp. Nitrile	-45°F to 200°F -43°C to 93°C	225°F 107°C	Compatible with most mineral oil-based fluids and maintains sealing effectiveness at low temperatures

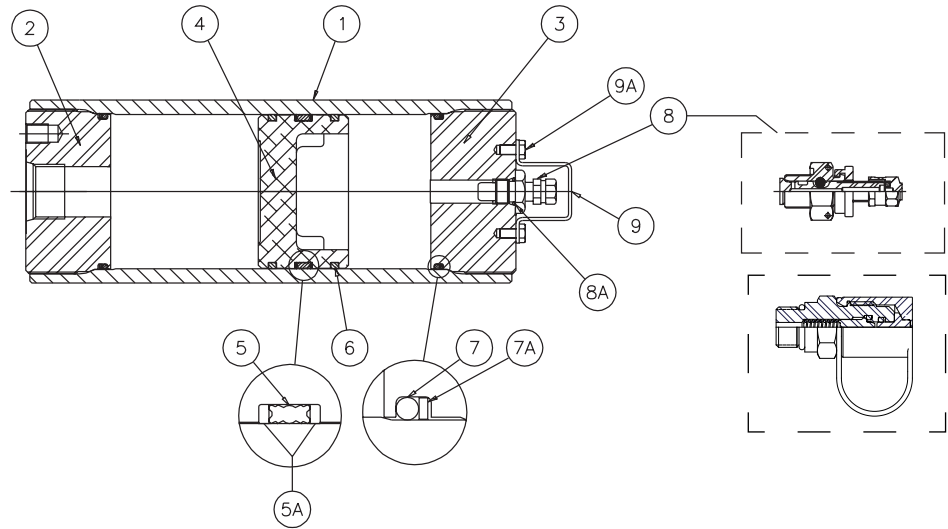
* The temperature listed indicates the operating temperature range of the seals, not the accumulator. For the Minimum Design Metal Temperature (MDMT) of ASME certified accumulators, refer to ASME Boiler and Pressure Vessel Code.

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

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- 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

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	RK0900H000
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 Brochure.



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 examples of Parker's past special designs include:

- High Pressure
- Special and Stainless Steel Materials
- Piston Position and Velocity Sensors and Switches
- Special Seals
- Non-Standard Capacities
- Special Certifications
- Extreme Temperatures
- Water Service

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

⚠ PROP 65 WARNING **WARNING:** This product can expose you to chemicals including Lead and Lead Compounds which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

How To Order

Piston Accumulators
A Series

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

Series

A	Accumulator
B	Gas Bottle

Nominal Bore Size

3	3 inches
4	4 inches
6	6 inches
7	7 inches
9	9 inches
12	12 inches (3000 PSI only)

Type of Construction

N	Threaded both ends non-A.S.M.E. mat'l standard on 2" - 7" (3000 PSI fatigue design tested)
L	ASME Approval Stamp 4" Bore & Up
E	CE/UKCA Certified

Options

Blank	Standard Gas Cap
F	Safety Fuse Option
K	EMA-3 Gas Valve
M	Poppet Style Gas Valve
W	Poppet Style Gas Valve Water Service
P	SAE Fuse Port only Poppet Style Gas Valve
R	SAE Fuse Port only Poppet Style Gas Valve Water Service

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

Bore Size	3,000 PSI Units Port Sizes	5,000 PSI Units Port Sizes
3"	SAE #12	SAE #12
4"	SAE #20	SAE #16
6"	SAE #24	SAE #16
7"	SAE #32	2" Flange CD 62
9"	SAE #32	2" Flange CD 62
12"	3" SAE Flange Code 61	

Bore Size/Capacity

0090	90 cu. in. (1.47 liters)
0116	116 cu. in. (1.90 liters)
0183	183 cu. in. (3.00 liters)
0058	58 cu. in. (0.95 liters)
0016	116 cu. in. (1.90 liters)
0231	1 gal. (3.79 liters)
0347	1.5 gal. (5.69 liters)
0578	2.5 gal. (9.47 liters)
0924	4 gal. (15.1 liters)
1155	5 gal. (18.9 liters)
1733	7.5 gal. (28.4 liters)
0578	2.5 gal. (9.47 liters)
1155	5 gal. (18.9 liters)
1733	7.5 gal. (28.4 liters)
2310	10 gal. (37.9 liters)
2310	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. (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)
E	4,000 PSI (4" & 6" Bore Size)
C	5,000 PSI
L	250 Bar (CE/UKCA Marking)
H	350 Bar (CE/UKCA Marking)
X	Other

Design Number

1	Standard
3	Optional Port (Hyd. or Gas, See Port Table)
***	Special Design

Hydraulic and Gas Port Modification Designated by 2 Digits

1st Digit	Style	2nd Digit Description			
(Blank) STD	(Blank) STD	Min. Bore Size		Min. Bore Size	
T - SAE	A SAE #5 (1/2 - 20) B SAE #6 (9/16 - 18) C SAE #8 (3/4 - 16) D SAE #12 (1 1/16 - 12) E SAE #16 (1 5/16 - 12)	2" 2" 2" 2" 3"	F SAE #20 (1 5/8 - 12) G SAE #24 (1 7/8 - 12) H SAE #32 (2 1/2 - 12) I SAE #10 (7/8 - 14) J SAE #4 (7/16 - 20)	3" 4" 7" 2" 2"	
P - Flange	J 1 1/2" L 2" M 2 1/2" N 3" T 1/2" U 3/4" V 1" W 1 1/4"	4" 4" 6" 6" 3" 3" 3" 3"	F 3/4" G 1" H 1 1/4" P 1 1/2" Q 2" R 2 1/2" S 3" For Socket Weld Flange	4" 4" 4" 5" 6" 6" 7"	
M - Metric Flange Per ISO 6162	J 1 1/2" L 2" M 2 1/2" N 3" T 1/2" U 3/4" V 1" W 1 1/4"	4" 4" 6" 6" 3" 3" 3" 3"	F 3/4" G 1" H 1 1/4" P 1 1/2" Q 2"	4" 4" 4" 5" 6" 6"	
U - NPTF (Not Recommended)	R 1/4" T 3/8" U 1/2" V 3/4" W 1"	2" 2" 2" 2" 2"	X 1 1/4" Y 1 1/2" Z 2"	4" 4" 4"	
G - Metric	A (M14 x 1.5) B (M18 x 1.5) C (M22 x 1.5) D (M27 x 2) E (M33 x 2) F (M42 x 2) G (M48 x 2)		BSPP Port A 3/8-19 B 1/2-14 C 3/4-14 D 1-11 E 1.25-11 F 1.5-11 G 2-11		ISO 6149-1 A (M14 x 1.5) B (M18 x 1.5) C (M22 x 1.5) D (M27 x 2) E (M33 x 2) F (M42 x 2) G (M48 x 2)

Precharge Designation

-H Precharge Designation for standard units only*

Example of Special Port Accumulator with Safety Fuse Drilling:

A 4 N E 0231 D 1 K H

Safety Fuse Designation Pre-Charge Designation

Example of Special Port Accumulator without Safety Fuse Drilling:

A 4 N 0231 D 3 K T C / U V - H

Non-std. Port SAE Hyd. Port #3 Gas Port NPT 3/4" Pre-Charge Designation



Catalog HY10-2100 Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods, services or work described will be referred to as "Products."

1. Terms. All sales of Products by Seller will be governed by, and are expressly conditioned upon Buyer's assent to, these Terms. These Terms are incorporated into any Quote provided by Seller to Buyer. Buyer's order for any Products whether communicated to Seller verbally, in writing, by electronic data interface or other electronic commerce, shall constitute acceptance of these Terms. Seller objects to any contrary or additional terms or conditions of Buyer. Reference in Seller's order acknowledgement to Buyer's purchase order or purchase order number shall in no way constitute an acceptance of any of Buyer's terms or conditions of purchase. Any Quote made by Seller to Buyer shall be considered a firm and definite offer and shall not be deemed to be otherwise despite any language on the face of the Quote. Seller reserves all rights to accept or reject any purported acceptance by Buyer to Seller's Quote if such purported acceptance attempts to vary the terms of the Quote. If Seller ships Products after Buyer issues an acceptance to the Quote, any additional or different terms proposed by Buyer will not become part of the parties' business relationship unless agreed to in a writing that is signed by an authorized representative of Seller, excluding email correspondence. If the transaction proceeds without such agreement on the part of Seller, the business relationship will be governed solely by these Terms and the specific terms in Seller's Quote.

2. Price; Payment. The Products set forth in the Quote are offered for sale at the prices indicated in the Quote. Unless otherwise specifically stated in the Quote, prices are valid for thirty (30) days and do not include any sales, use, or other taxes or duties. Seller reserves the right to modify prices for any reason and at any time by giving ten (10) days prior written notice. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2020). All sales are contingent upon credit approval and full payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified in the Quote). Under any circumstances, Buyer may not withhold or suspend payment of any amounts due and payable as a deduction, set-off or recoupment of any amount, claim or dispute with Seller. Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law. Seller reserves the right to require advance payment or provision of securities for first and subsequent deliveries if there is any doubt, in Seller's sole determination, regarding the Buyer's creditworthiness or for other business reasons. If the requested advance payment or securities are not provided to Seller's satisfaction, Seller reserves the right to suspend performance or reject the purchase order, in whole or in part, without prejudice to Seller's other rights or remedies, including the right to full compensation. Seller may revoke or shorten any payment periods previously granted in Seller's sole determination. The rights and remedies herein reserved to Seller are cumulative and in addition to any other or further rights and remedies available at law or in equity. No waiver by Seller of any breach by Buyer of any provision of these terms will constitute a waiver by Seller of any other breach of such provision.

3. Shipment; Delivery. Title and Risk of Loss. All delivery dates are approximate, and Seller is not responsible for damages or additional costs resulting from any delay. All deliveries are subject to our ability to procure materials from our suppliers. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the carrier at Seller's facility. Unless otherwise agreed prior to shipment and for domestic delivery locations only, Seller will select and arrange, at Buyer's sole expense, the carrier and means of delivery. When Seller selects and arranges the carrier and means of delivery, freight and insurance costs for shipment to the designated delivery location will be prepaid by Seller and added as a separate line item to the invoice. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions. Buyer shall not return or repackage any Products without the prior written authorization from Seller, and any return shall be at the sole cost and expense of Buyer.

4. Warranty. The warranty for the Products is as follows: (i) Goods are warranted against defects in material or workmanship for a period of eighteen (18) months from the date of delivery or 2,000 hours of use, whichever occurs first; (ii) Services shall be performed in accordance with generally accepted practices and using the degree of care and skill that is ordinarily exercised and customary in the field to which the Services pertain and are warranted for a period of six (6) months from the date of completion of the Services; and (iii) Software is only warranted to perform in accordance with applicable specifications provided by Seller to Buyer for ninety (90) days from the date of delivery or, when downloaded by a Buyer or end-user, from the date of the initial download. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **EXEMPTION CLAUSE; DISCLAIMER OF WARRANTY, CONDITIONS, REPRESENTATIONS: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY, CONDITION, AND REPRESENTATION, PERTAINING TO PRODUCTS. SELLER DISCLAIMS ALL OTHER WARRANTIES, CONDITIONS, AND REPRESENTATIONS, WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THOSE RELATING TO DESIGN, NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE SOFTWARE IS ERROR-FREE OR FAULT-TOLERANT, OR THAT BUYER'S USE THEREOF WILL BE SECURE OR UNINTERRUPTED, UNLESS OTHERWISE AUTHORIZED IN WRITING BY SELLER, THE SOFTWARE SHALL NOT BE USED IN CONNECTION WITH HAZARDOUS OR HIGH-RISK ACTIVITIES OR ENVIRONMENTS. EXCEPT AS EXPRESSLY STATED HEREIN, ALL PRODUCTS ARE PROVIDED "AS IS".**

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

6. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCTS, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID WITHIN A REASONABLE PERIOD OF TIME. IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING ANY LOSS OF REVENUE OR PROFITS, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCTS.

7. Confidential Information. Buyer acknowledges and agrees that Confidential Information has been and will be received in confidence and will remain the property of Seller. Buyer further agrees that it will not use Seller's Confidential Information for any purpose other than for the benefit of Seller and shall return all such Confidential Information to Seller within thirty (30) days upon request.

8. Loss to Buyer's Property. Buyer's Property will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the Products manufactured using Buyer's Property. Also, Seller shall not be responsible for any loss or damage to Buyer's Property while it is in Seller's possession or control.

9. Special Tooling. Seller may impose a tooling charge for any Special Tooling. Special Tooling shall be and remain Seller's property. In no event will Buyer acquire any interest in the Special Tooling, even if such Special Tooling has been specially converted or adapted for manufacture of Goods for Buyer and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any Special Tooling or other property owned by Seller in its sole determination at any time.

10. Security Interest. To secure payment of all sums due from Buyer, Seller retains a security interest in all Products delivered to Buyer, and Buyer's acceptance of these Terms is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect Seller's security interest.

11. User Responsibility. Buyer, through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and any technical information provided with the Quote or the Products, such as Seller's instructions, guides and specifications. If Seller provides options of or for Products based upon data or specifications provided by Buyer, Buyer is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products. In the event Buyer is not the end-user of the Products, Buyer will ensure such end-user complies with this paragraph.

12. Use of Products, Indemnity by Buyer. Buyer shall comply with all instructions, guides and specifications provided by Seller with the Quote or the Products. If Buyer uses or resells the Products in any way prohibited by Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Further, Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, arising out of or in connection with: (a) improper selection, design, specification, application, or any misuse of Products; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of Buyer's Property; (d)

Piston Accumulators A Series

damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing, tampering with or repackaging the Products; or (e) Buyer's failure to comply with these Terms, including any legal or administrative proceedings, collection efforts, or other actions arising from or relating to such failure to comply. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

13. Cancellations and Changes. Buyer may not cancel or modify, including but not limited to movement of delivery dates for the Products, any order for any reason except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage and any additional expense. Seller, at any time, may change features, specifications, designs and availability of Products.

14. Assignment. Buyer may not assign its rights or obligations without the prior written consent of Seller.

15. Force Majeure. Seller is not liable for delay or failure to perform any of its obligations by reason of any events or circumstances beyond its reasonable control. Such circumstances include without limitation: accidents, labor disputes or stoppages, government acts or orders, acts of nature, pandemics, epidemics, other widespread illness, or public health emergency, cyber related disruptions, cyber-attacks, ransomware sabotage, delays or failures in delivery from carriers or suppliers, shortages of materials, sudden increases in the price of raw material or components, shutdowns or slowdowns affecting the supply of raw materials or components, or the transportation thereof, oil shortages or oil price increases, energy crisis, energy or fuel interruption, war (whether declared or not) or the serious threat of same, riots, rebellions, acts of terrorism, embargoes, fire or any reason whether similar to the foregoing or otherwise. Seller will resume performance as soon as practicable after the event of force majeure has been removed. All delivery dates affected by an event of force majeure shall be tolled for the duration of such event of force majeure and rescheduled for mutually agreed dates as soon as practicable after the event of force majeure ceases to exist. The right to allocate capacity is in the Seller's sole discretion. An event of force majeure shall not include financial distress, insolvency, bankruptcy, or other similar conditions affecting one of the parties, affiliates and/or sub-contractors. An event of force majeure in the meaning of these Terms means any circumstances beyond Seller's control that permanently or temporarily hinders performance, even where that circumstance was already foreseen. Buyer shall not be entitled to cancel any orders following its claim of an event of force majeure.

16. Waiver and Severability. Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice either party's right to enforce that provision in the future. Invalidation of any provision of these Terms shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

17. Duration. Unless otherwise stated in the Quote, any agreement governed by or arising from these Terms shall: (a) be for an initial duration of one (1) year; and (b) shall automatically renew for successive one-year terms unless terminated by Buyer with at least 180-days written notice to Seller or if Seller terminates the agreement pursuant to Section 19 of these Terms.

18. Termination. Seller may, without liability to Buyer, terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms, (b) becomes or is deemed insolvent, (c) appoints or has appointed a trustee, receiver or custodian for all or any part of Buyer's property, (d) files a petition for relief in bankruptcy on its own behalf, or one is filed against Buyer by a third party, (e) makes an assignment for the benefit of creditors; or (f) dissolves its business or liquidates all or a majority of its assets.

19. Ownership of Rights. Buyer agrees that (a) Seller (and/or its affiliates) owns or is the valid licensee of Seller's IP and (b) the furnishing of information, related documents or other materials by Seller to Buyer does not grant or transfer any ownership interest or license in or to Seller's IP to Buyer, unless expressly agreed in writing. Without limiting the foregoing, Seller retains ownership of all Software supplied to Buyer. In no event shall Buyer obtain any greater right in and to the Software than a right in a license limited to the use thereof and subject to compliance with any other terms provided with the Software. Buyer further agrees that it will not, directly or through intermediaries, reverse engineer, decompile, or disassemble any Software (including firmware) comprising or contained within a Product, except and only to the extent that such activity may be expressly permitted, either by applicable law or, in the case of open source software, the applicable open source license.

20. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any Intellectual Property Rights except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a third-party claim that one or more of the Products infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by Seller to Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer (including Seller's use of Buyer's Property); or (ii) directed to any Products for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for claims of infringement of Intellectual Property Rights.

21. Governing Law. These Terms, the terms of any Quote, and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to the sale and delivery of the Products.

22. Entire Agreement. These Terms, along with the terms set forth in the Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale and purchase. In the event of a conflict between any term set forth in the Quote and these Terms, the terms set forth in the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. No modification to these Terms will be binding on Seller unless agreed to in a writing that is signed by an authorized representative of Seller, excluding email correspondence, "clickwrap" or other purported electronic assent to different or additional terms. Sections 2-25 of these Terms shall survive termination or cancellation of any agreement governed by or arising from these Terms.

23. No "Wrap" Agreements/No Authority to Bind. Seller's clicking any buttons or any similar action, such as clicking "I Agree" or "Confirm," to utilize Buyer's software or webpage for the placement of orders, is NOT an agreement to Buyer's Terms and Conditions. NO EMPLOYEE, AGENT OR REPRESENTATIVE OF SELLER HAS THE AUTHORITY TO BIND SELLER BY THE ACT OF CLICKING ANY BUTTON OR SIMILAR ACTION ON BUYER'S WEBSITE OR PORTAL.

24. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer represents that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Products from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws. Buyer agrees to promptly and reliably provide Seller all requested information or documents, including end-user statements and other written assurances, concerning Buyer's ongoing compliance with Export Law. 9/22





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