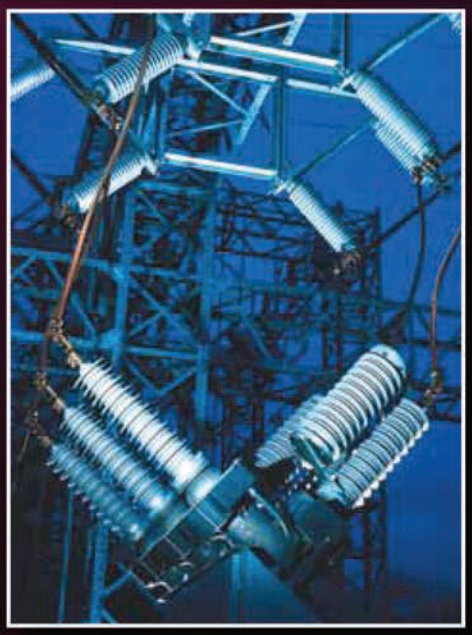
Tobul

Accumulator

The pressure is always on.



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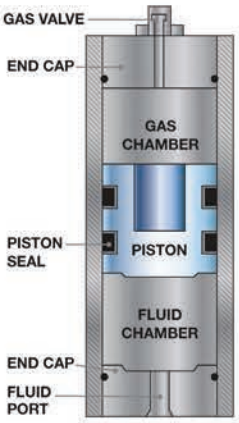
Foreword

A hydraulic accumulator is a device in which potential energy is stored in the form of a compressed gas or spring, or by a raised weight to be used to exert a force against a relatively incompressible fluid.

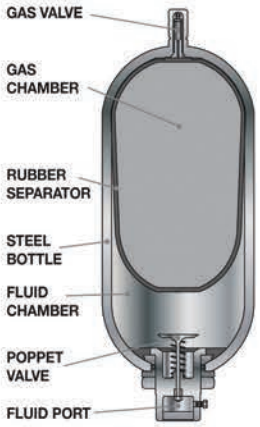
They are used in fluid power systems to accumulate energy and to smooth out pulsations. A hydraulic system utilizing an accumulator can use a smaller fluid pump since the accumulator stores energy from the pump during low demand periods. This energy is available for instantaneous use, released upon demand at a rate many times greater than could be supplied by the pump alone.

Accumulators can also act as surge or pulsation absorbers, much as an air dome is used on pulsating piston or rotary pumps. They will cushion hydraulic hammer, reducing shocks caused by rapid operation or sudden starting and stopping of power cylinders in a hydraulic circuit.

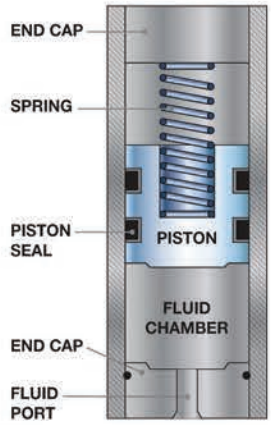
There are four principal types of accumulators, the weight loaded piston type, diaphragm (or bladder) type, spring type and the hydro-pneumatic piston type. The weight loaded type was the first used but is much larger and heavier for its capacity than modern piston and bladder types. Both the weighted type, and mechanical spring type are very seldom used today. The hydro-pneumatic types use a gas as a spring cushion in conjunction with a hydraulic fluid, the gas and fluid being separated by a thin diaphragm or a piston. Tobul accumulators, having an aluminum piston of low inertia as standard equipment, are superior to other makes in absorbing either high or low frequency pulsations.



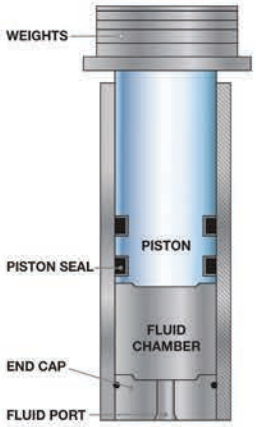
PISTON TYPE



BLADDER TYPE



SPRING TYPE



WEIGHT LOADED

Functions

Stores Energy.

Hydro-pneumatic accumulators incorporate a gas in conjunction with a hydraulic fluid. The fluid has little dynamic power storage qualities. The fluid normally used in fluid power applications can be reduced in volume only about 1.7% under a pressure of 5000 PSI. Therefore when only 2% of the total contained volume is released, the pressure of the remaining oil in the system will drop to zero. However, the relative incompressibility of a hydraulic fluid makes it ideal for fluid power systems and provides quick response to power demand.

The gas, on the other hand, a partner to the hydraulic fluid in the accumulator, can be compressed to high pressures and low volumes. Potential energy is stored in this compressed gas to be released upon demand. This energy can be compared to that of a raised pile driver ready to transfer its tremendous energy upon the pile. In the piston type accumulator the energy in the compressed gas exerts pressure against the piston separating the gas and hydraulic fluid. The piston in turn forces the fluid from the cylinder into the system and to the location where useful work will be accomplished.

Absorbs Pulsations.

In most fluid power applications, pumps are used to generate the required power to be used or stored in a hydraulic system. Many pumps deliver this power in a pulsating flow. The piston pump, as commonly used for higher pressures, tends to produce pulsation detrimental to a high pressure system. An accumulator properly located in the system will substantially cushion these pressure variations.

Cushions Operating Shock.

In many fluid power applications the driven member of the hydraulic system stops suddenly, creating a pressure wave which is sent back through the system. This shock wave can develop peak pressures several times greater than normal working pressures and can be the source of system failure or objectionable noise. The gas cushion in an accumulator, properly placed in the system, will minimize this shock. An example of this application is the absorption of shock caused by suddenly stopping the loading bucket on a hydraulic front end loader. Without an accumulator, the bucket, weighing over 2 tons, can completely lift the rear wheels of a loader off the ground. The severe shock to the tractor frame and axle, as well as operator wear and tear, is overcome by the addition of an adequate accumulator to the hydraulic system.

Supplements Pump Delivery.

An accumulator, capable of storing power, can supplement the fluid pump in delivering power to the system. The pump stores potential energy in the accumulator during idle periods of the work cycle. The accumulator transfers this reserve power back to the system when the cycle requires emergency or peak power. This enables a system to utilize a much smaller pump, resulting in savings in cost and power.

Maintains Pressure.

Pressure changes occur in a hydraulic system when the liquid is subjected to rising or falling temperatures. Also, there may be pressure drop due to leakage of hydraulic fluid. An accumulator compensates for such pressure changes by delivering or receiving a small amount of hydraulic liquid. In the event the main power source should fail or be stopped, the accumulator would act as an auxiliary power source, maintaining pressure in the system.

Dispenses.

An accumulator may be used to dispense fluids under pressure, such as lubricating greases and oils.

Piston Accumulators

An Overview

The variety and versatility of the piston-type design allows it to be utilized in over 90% of all potential applications. From a volume of a few cubic inches to hundreds of gallons, and up to 20,000 PSI MAWP, the piston-type hydro-pneumatic accumulator can meet the diverse needs of many industries with a standard or custom design.

Tobul has developed several distinct families of standard piston-type products, based on physical dimensions, MAWP (Maximum Allowable Working Pressure), and fluid volume. Each of the families is listed in this catalog and can be utilized as the basis for custom designs. Tobul piston-type product families are:

- **"EconoLator®" Series**
- **3000 PSI MAWP Series**
- **5000 PSI MAWP Series**
- **10,000 PSI MAWP Series**
- **Custom Design Series including "Big Bore®" Series**

Tobul's ability to provide a variety of raw materials, (carbon steel, stainless steel, and various alloys) seal configurations and compounds, (Buna-N, EPR, Viton®, Kalrez®, Teflon, etc.) fluid and gas port configurations, and design characteristics to best meet the needs of the end customer makes them **"A Name for Excellence in Fluid Energy Control."**

The "EconoLator®" Series...

022AL25 & 045AL25 (Non-Repairable)

The EconoLator®...

Tobul's permanently sealed accumulator specifically designed for systems with operating pressures up to 2500 PSI MAWP. It has been developed to meet requirements of the Original Equipment Manufacturer (OEM) market.

Dependable Construction...

Heavy duty steel cylinder and end caps are precision machine-welded for rugged durability. The hydraulically balanced aluminum piston, with a "T" ring seal and Teflon bearing, is precisely fitted into a "mirror-finished" cylinder.

Efficient Operation...

The long operating life design of the Tobul EconoLator® includes such outstanding features as:

- Lightweight, low inertia aluminum piston
- Low friction "T" ring offering a positive seal which cannot roll or twist while in operation
- Pressure actuated Back-up rings which prevent seal extrusion and provide internal surface wiping
- Teflon guide ring providing low friction bearing and additional internal wiping action

Wide Range Of Applications...

Some typical uses are for shock absorbers, pressure storage units, and pulsation dampeners. The EconoLator® is ideal for lift trucks, "cherry pickers" and other mobile equipment, as well as machine tools, presses, circuit breakers, injection molding machines, starters for diesel engines, power units, etc. It is ideally suited to the OEM market.

Concerning model designations in following pages –
"A" denotes both heads threaded; e.g.,"090A30"
"AL" denotes both heads welded; e.g., "045AL25"
"AT" denotes threaded gas head, welded fluid head; e.g., "047AT30"

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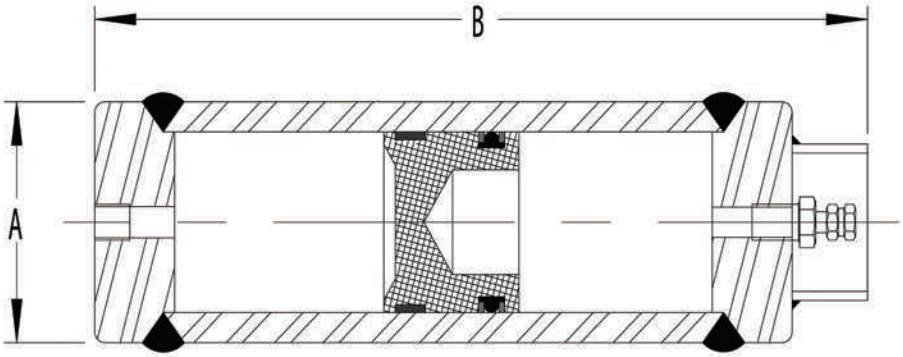
022AL25 EconoLator® Accumulators 2,500 PSI (172 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
022AL25-.5NA09	16	257	0.0625	0.24	3	1	2.375	60	8.75	222
022AL25-1NA09	31	501	0.125	0.5	4	2	2.375	60	13.5	343
022AL25-2NA09	61	991	0.25	1	7	3	2.375	60	23	584

Non-Repairable



GENERAL DESIGN DATA

Maximum Working Pressure 2,500 PSI (172 Bar)
Maximum Proof Pressure 3,750 PSI (259 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE-8
(Note: Optional fluid port sizes and styles available)
Replacement Gas Valve Pt. # 3A-281

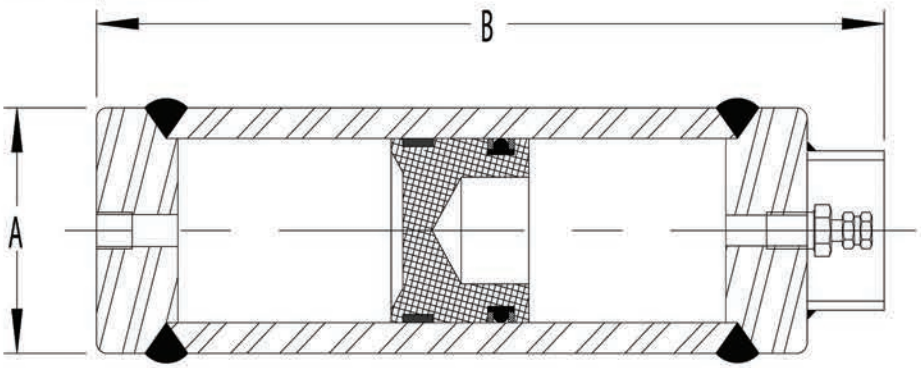
Standard seal material for petroleum base oil.
Seals available for other fluids.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

045AL25 EconoLator® Accumulators 2,500 PSI (172 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
045AL25-2NA0D	74	1,213	0.25	1	15	7	4.625	118	9.875	251
045AL25-4NA0D	132	2,163	0.5	2	18	8	4.625	118	14.25	362
045AL25-8NA0D	249	4,080	1	4	23	10	4.625	118	23	584
045AL25-12NA0D	364	5,965	1.5	6	30	14	4.625	118	31.75	806
045AL25-16NA0D	480	7,866	2	8	36	16	4.625	118	40.5	1,029
045AL25-20NA0D	595	9,750	2.5	10	42	19	4.625	118	49.25	1,251
045AL25-24NA0D	710	11,634	3	12	48	22	4.625	118	58	1,473

Non-Repairable



GENERAL DESIGN DATA

Maximum Working Pressure 2,500 PSI (172 Bar)
Maximum Proof Pressure 3,750 PSI (259 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE-16
(Note: Optional fluid port sizes and styles available)
Replacement Gas Valve Pt. # 3A-281

Standard seal material for petroleum base oil.
Seals available for other fluids.

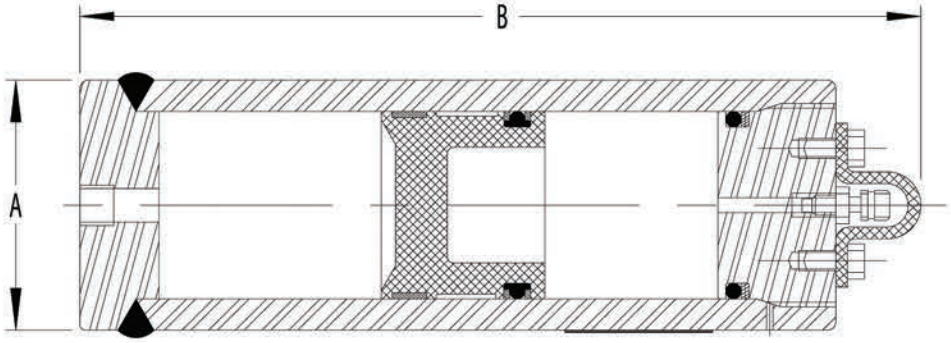
Illustrations are representational and not necessarily indicative of how any particular model will be built.

3,000 PSI Series

030AT30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
030AT30-.5NA19	15	246	0.0625	0.24	7	3	3	76	8.5	216
030AT30-1NA19	32	524	0.125	0.5	8	4	3	76	11.375	289
030AT30-2NA19	62	1,016	0.25	1	11	5	3	76	17.5	445
030AT30-4NA19	116	1,901	0.5	2	19	9	3	76	29.3125	745

Catalog standard – 030AT30-.5NA19 Std. N² Gas valve, Buna-N seals, SAE-8 fluid port—Optional Seal Material & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 3,000PSI (207 Bar)
Maximum Proof Pressure 4,500 PSI (310 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE-8
(Note: Optional fluid port sizes and styles available)

Standard seal material for petroleum base oil. Seals available for other fluids.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications are subject to change without notice.

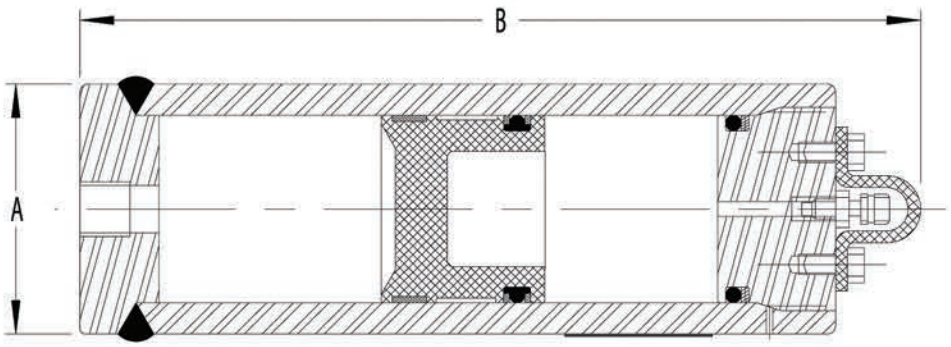
COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK030AT30-NT
FKM (Viton®)	SK030AT30-VT
EPR	SK030AT30-ET

See Data Sheets for breakdown of parts.

047AT30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
047AT30-2NA1D	69	1,131	0.25	1	26	12	4.75	121	11.25	286
047AT30-4NA1D	127	2,081	0.5	2	31	14	4.75	121	15.5	394
047AT30-8NA1D	242	3,966	1	4	41	19	4.75	121	24.125	613
047AT30-12NA1D	358	5,867	1.5	6	52	24	4.75	121	32.75	832
047AT30-16NA1D	473	7,751	2	8	62	28	4.75	121	41.5	1,054
047AT30-20NA1D	589	9,652	2.5	10	73	33	4.75	121	50.125	1,273
047AT30-24NA1D	704	11,537	3	12	90	41	4.75	121	58.75	1,492

Catalog standard – 047A30-2NA1D Std. N² Gas valve, Buna-N seals, SAE-16 fluid port—Optional Seal Material & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 3,000PSI (207 Bar)
Maximum Proof Pressure 4,500 PSI (310 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE-16
(Note: Optional fluid port sizes and styles available)

Standard seal material for petroleum base oil. Seals available for other fluids.

ASME code stamp is not available as a standard.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications are subject to change without notice.

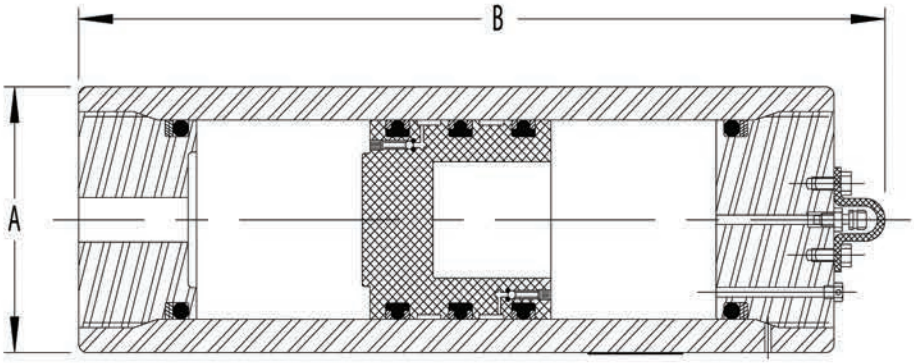
COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK047A30-NT
FKM (Viton®)	SK047A30-VT
EPR	SK047A30-ET

See Data Sheets for breakdown of parts.

067A30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
067A30-8NA1J	252	4,130	1	4	97	44	6.75	171	18.25	464
067A30-12NA1J	369	6,047	1.5	6	112	51	6.75	171	22.625	575
067A30-20NA1J	599	9,816	2.5	10	143	65	6.75	171	31.125	797
067A30-40NA1J	1176	19,271	5	19	221	100	6.75	171	53.125	1,356
067A30-60NA1J	1754	28,743	7.5	28	300	136	6.75	171	75.125	1,915
067A30-80NA1J	2331	38,198	10	38	377	171	6.75	171	97.125	2,473

Catalog std. – 067A30-8NA1J Std. N² Gas valve, Buna-N seals, SAE 1.5" 4Bolt Code 61fluid port—Opt. Seal Mat.& Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 3,000PSI (172 Bar)
Maximum Proof Pressure 4,500 PSI (259 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE 1-1/2" 4-Bolt Code 61
(Note: Optional fluid port sizes and styles available)

Standard seal material for petroleum base oil. Seals available for other fluids.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications are subject to change without notice.

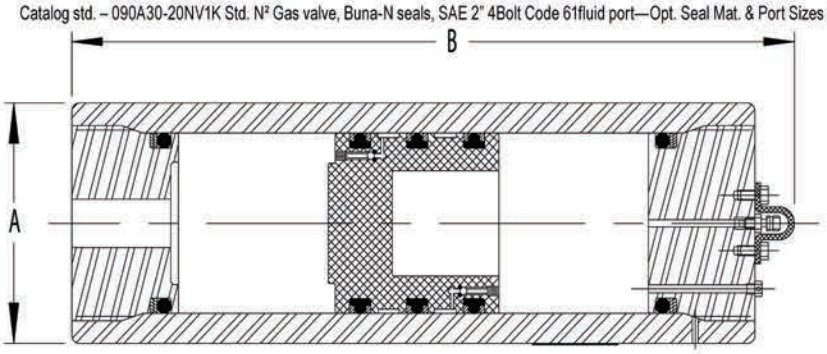
COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK067A30-NT
FKM (Viton®)	SK067A30-VT
EPR	SK067A30-ET

See Data Sheets for breakdown of parts.

090A30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
090A30-20NV1K	612	10,030	2.5	9	192	87	9	229	23.25	591
090A30-40NV1K	1,191	19,515	5	19	256	116	9	229	35.875	912
090A30-60NV1K	1,765	28,925	7.5	28	320	145	9	229	48.5	1,232
090A30-80NV1K	2,347	38,465	10	38	385	175	9	229	61.25	1,556
090A30-100NV1K	2,918	47,819	12.5	47	448	203	9	229	73.75	1,873
090A30-120NV1K	3,495	57,266	15	57	513	232	9	229	86.375	2,194
090A30-140NV1K	4,071	66,713	17.5	66	576	261	9	229	99	2,515
090A30-160NV1K	4,648	76,160	20	76	641	291	9	229	111.625	2,835
090A30-200NV1K	5,806	95,148	25	95	770	349	9	229	137	3,480
090A30-240NV1K	6,959	114,042	30	114	898	407	9	229	162.25	4,121
090A30-320NV1K	9,265	151,831	40	151	1,154	523	9	229	212.75	5,404
090A30-400NV1K	11,571	189,619	50	189	1,411	640	9	229	263.25	6,687

Catalog std. – 090A30-20NV1K Std. N² Gas valve, Buna-N seals, SAE 2" 4Bolt Code 61fluid port—Opt. Seal Mat. & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 3,000PSI (207 Bar)
Maximum Proof Pressure 4,500 PSI (310 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE 2" 4-Bolt Code 61
(Note: Optional fluid port sizes and styles available)

Standard seal material for petroleum base oil. Seals available for other fluids.
ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications are subject to change without notice.

COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK090A30-NT
FKM (Viton®)	SK090A30-VT
EPR	SK090A30-ET

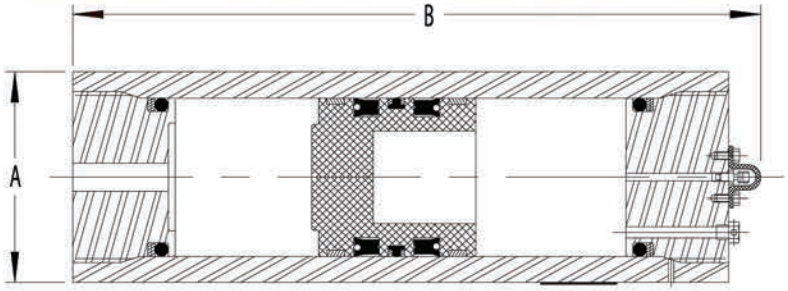
See Data Sheets for breakdown of parts.

Illustrations are representational and not necessarily indicative of how any particular model will be built.

140A30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A*		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
140A30-120AJ1K	3,575	58,582	15	56	899	408	14	356	46.125	1,172
140A30-140AJ1K	4,255	69,731	17.5	66	958	435	14	356	51.25	1,302
140A30-160AJ1K	4,835	79,230	20	75	1,018	462	14	356	56.375	1,432
140A30-184AJ1K	5,528	90,581	23	86	1,088	494	14	356	62.5	1,588
140A30-200AJ1K	6,037	98,921	25	95	1,140	517	14	356	67	1,702
140A30-240AJ1K	7,159	117,315	30	113	1,255	569	14	356	77	1,954
140A30-320AJ1K	9,458	154,984	40	151	1,490	676	14	356	97.25	2,470
140A30-400AJ1K	11,776	192,977	50	189	1,727	783	14	356	117.75	2,991
140A30-480AJ1K	14,123	231,434	60	227	1,967	892	14	356	138.5	3,518
140A30-560AJ1K	16,427	269,195	70	265	2,202	999	14	356	158.875	4,035
140A30-640AJ1K	18,732	306,957	80	303	2,438	1,106	14	356	179.25	4,553
140A30-720AJ1K	21,050	344,950	90	341	2,675	1,213	14	356	199.75	5,074
140A30-800 AJ1K	23,355	382,712	100	379	2,910	1,320	14	356	220.125	5,591

Catalog standard – 140A30-120AJ1K Std. N² Gas valve, Severe Duty Buna-N seals, SAE 2" 4Bolt Code 61fluid port
Optional Seal Materials & Port Sizes Available. Add "A" to end of model number to denote ASME Code Certified



GENERAL DESIGN DATA

Maximum Working Pressure 3,000PSI (207 Bar)
Maximum Proof Pressure 4,500 PSI (310 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE 2" 4-Bolt Code 61
(Note: Optional fluid port sizes and styles available)

Standard seal material for petroleum base oil.
Seals available for other fluids.

*Diameter for ASME code units is 14.38"
(365 mm) and model number is 14.3A30-XXX.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications are subject to change without notice.

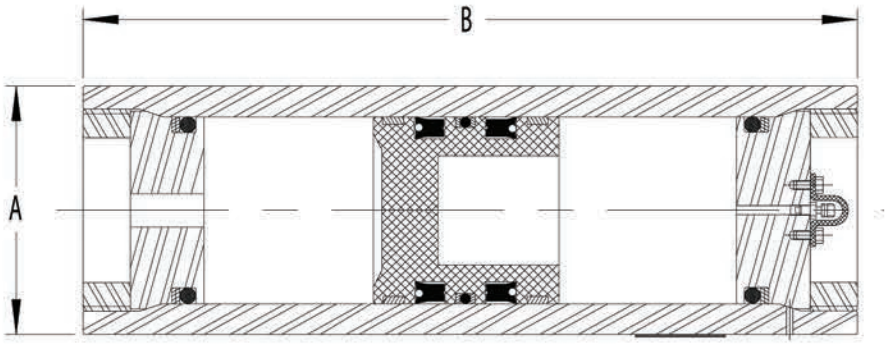
COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK090A30-AP
FKM (Viton®)	SK090A30-GP

See Data Sheets for breakdown of parts.

240A30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A*		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
240A30-400AG1K	12,555	205,750	50	189	3,687	1,672	23.75	603	65.4375	1,662
240A30-800AG1K	24,100	394,944	100	379	5,027	2,280	23.75	603	102.1875	2,596
240A30-1200AG1K	35,640	584,045	150	568	6,370	2,890	23.75	603	139	3,529
240A30-1600AG1K	47,190	773,316	200	757	7,711	3,498	23.75	603	175.75	4,463

Catalog standard – 240A30-400AG1K Std. N² Gas valve, Severe Duty Buna-N seals, SAE 2" 4Bolt Code 61fluid port
Optional Seal Materials & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 3,000PSI (207 Bar)
Maximum Proof Pressure 4,500 PSI (310 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE 2" 4-Bolt Code 61
(Note: Optional fluid port sizes and styles available)

Standard seal material for petroleum base oil.
Seals available for other fluids.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications are subject to change without notice.

COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK240A30-AP
FKM (Viton®)	SK240A30-GP

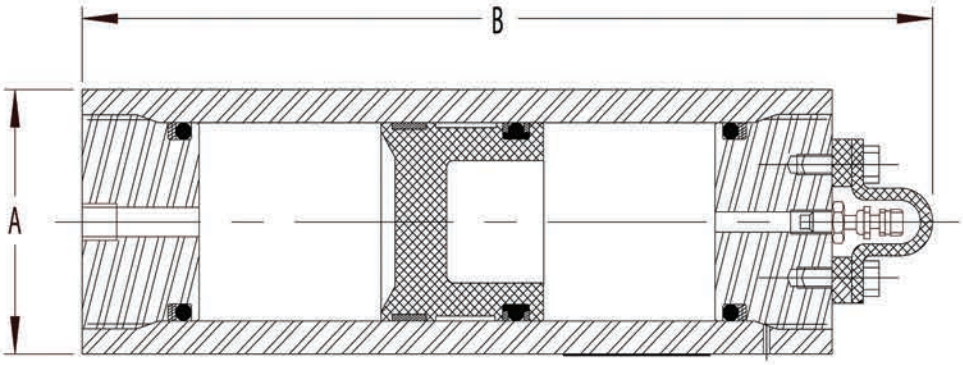
See Data Sheets for breakdown of parts.

5,000 PSI Series

032A50 Accumulators 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION A		DIMENSION B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
032A50-.5NA19	14	226	0.0625	0.22	12	5	3.25	83	9.06	230
032A50-1NA19	30	498	0.125	0.49	15	7	3.25	83	12.44	316
032A50-2NA19	61	1000	0.25	1.00	21	10	3.25	83	18-69	475
032A50-4NA19	116	1900	0.5	2.00	32	14	3.25	83	29.88	759

Catalog std. – 032A50-.5NA19 Std. N² Gas valve, Buna-N seals, SAE-8 fluid port—Opt. Seal Material & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)
Maximum Proof Pressure 7,500 PSI (517 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE-8
(Note: Optional fluid port sizes and styles available)

Standard seal material for petroleum base oil.
Seals available for other fluids.
ASME code stamp is not available as a standard.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications subject to change without notice.

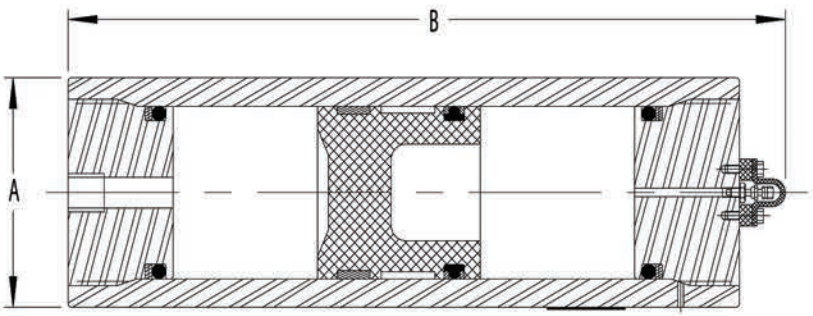
COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK032A50-NT
FKM (Viton®)	SK032A50-VT
EPR	SK032A50-ET

See Data Sheets for breakdown of parts.

052A50 Accumulators 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION A		DIMENSION B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
052A50-2NA1D	64	1,055	0.25	1	48	22	5.25	133	13.13	333
052A50-4NA1D	121	1,983	0.5	2	58	26	5.25	133	17.38	441
052A50-6NA1D	186	3,048	0.75	3	70	32	5.25	133	22.25	565
052A50-8NA1D	236	3,868	1	4	78	36	5.25	133	26	660
052A50-12NA1D	353	5,779	1.5	6	99	45	5.25	133	34.75	883
052A50-16NA1D	468	7,663	2	7	119	54	5.25	133	43.38	1,102
052A50-20NA1D	583	9,548	2.5	9	139	63	5.25	133	52	1,321
052A50-24NA1D	698	11,432	3	11	160	72	5.25	133	60.63	1,540

Catalog std. – 052A50-.5NA1D Std. N² Gas valve, Buna-N seals, SAE-16 fluid port—Opt. Seal Material & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)
Maximum Proof Pressure 7,500 PSI (517 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE 16
(Note: Optional fluid port sizes and styles available)

Standard seal material for petroleum base oil.
Seals available for other fluids.

ASME code stamp is not available as a standard.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications subject to change without notice.

COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK052A50-NT
FKM (Viton®)	SK052A50-VT
EPR	SK052A50-ET

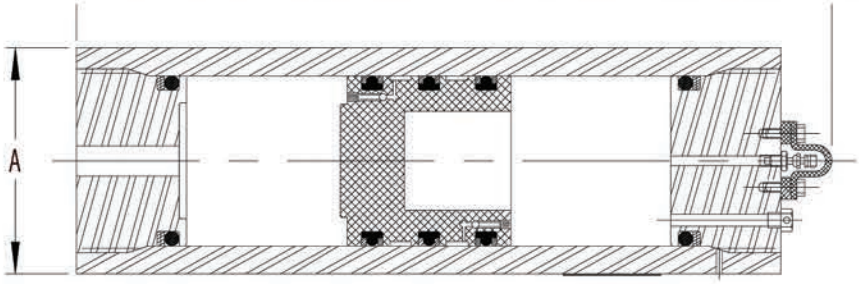
See Data Sheets for breakdown of parts.

Illustrations are representational and not necessarily indicative of how any particular model will be built.

090A50 Accumulators 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
090A50-20ND1P	607	9,951	2.5	9	250	113	9	229	27	679
090A50-40ND1P	1,183	19,385	5	19	348	158	9	229	41	1,048
090A50-60ND1P	1,759	28,819	7.5	28	446	202	9	229	56	1,416
090A50-80ND1P	2,334	38,253	10	37	544	247	9	229	70	1,784
090A50-100ND1P	2,910	47,687	12.5	47	643	292	9	229	85	2,153
090A50-120ND1P	3,486	57,121	15	56	741	336	9	229	99	2,521
090A50-140ND1P	4,061	66,555	17.5	66	839	381	9	229	114	2,889
090A50-160ND1P	4,637	75,989	20	75	937	425	9	229	128	3,258
090A50-200ND1P	5,793	94,938	25	94	1,134	514	9	229	157	3,997
090A50-240ND1P	6,945	113,806	30	113	1,330	603	9	229	186	4,734
090A50-320ND1P	9,238	151,379	40	151	1,724	782	9	229	245	6,210

Catalog std. – 090A50-20ND1P Std. N² Gas valve, Buna-N seals, SAE 2" 4Bolt Code 62 fluid port Optional Seal Material & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)
Maximum Proof Pressure 7,500 PSI (517 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE 2" 4-Bolt Code 62
(Note: Optional fluid port sizes and styles available)

Standard seal material for petroleum base oil.
Seals available for other fluids.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications subject to change without notice.

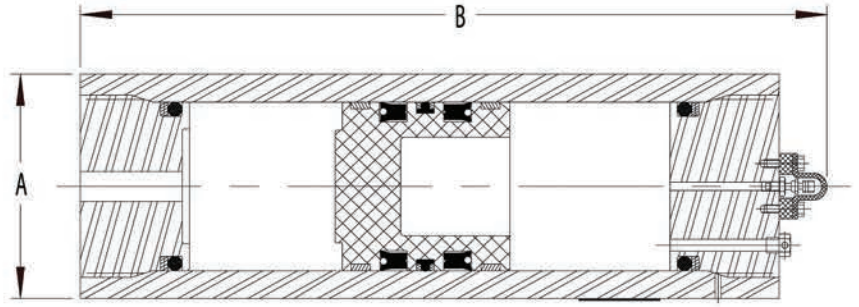
COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK090A50-NT
FKM (Viton®)	SK090A50-VT
EPR	SK090A50-ET

See Data Sheets for breakdown of parts.

160A50 Accumulators 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
160A50-120AJ1P	3,631	59,508	15	57	1,619	734	16	40	49.63	1,260
160A50-160AJ1P	4,777	78,273	20	76	1,871	849	16	40	59.75	1,518
160A50-200AJ1P	5,936	97,270	25	95	2,126	964	16	40	70	1,778
160A50-240AJ1P	7,095	116,266	30	114	2,381	1,080	16	40	80.25	2,038
160A50-320AJ1P	9,399	154,028	40	151	2,889	1,310	16	40	100.63	2,556
160A50-400AJ1P	11,704	191,789	50	189	3,396	1,540	16	40	121	3,073
160A50-480AJ1P	14,051	230,246	60	228	3,912	1,775	16	40	141.75	3,600
160A50-560AJ1P	16,312	267,312	70	265	4,410	2,000	16	40	161.75	4,108
160A50-640AJ1P	18,645	305,537	80	303	4,924	2,233	16	40	182.38	4,632
160A50-720AJ1P	20,949	343,298	90	341	5,431	2,463	16	40	202.38	5,150
160A50-800AJ1P	23,268	381,292	100	379	5,941	2,695	16	40	223.25	5,671

Catalog std. – 160A50-120AJ1P Std. N² Gas valve, Buna-N seals, SAE 2" 4Bolt Code 62 fluid port Optional Seal Material & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)
Maximum Proof Pressure 7,500 PSI (517 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size SAE 2" 4-Bolt Code 62
(Note: Optional fluid port sizes and styles available)

Standard seal material for petroleum base oil.
Seals available for other fluids.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications subject to change without notice.

COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK090A50-AP
FKM (Viton®)	SK090A50-GP

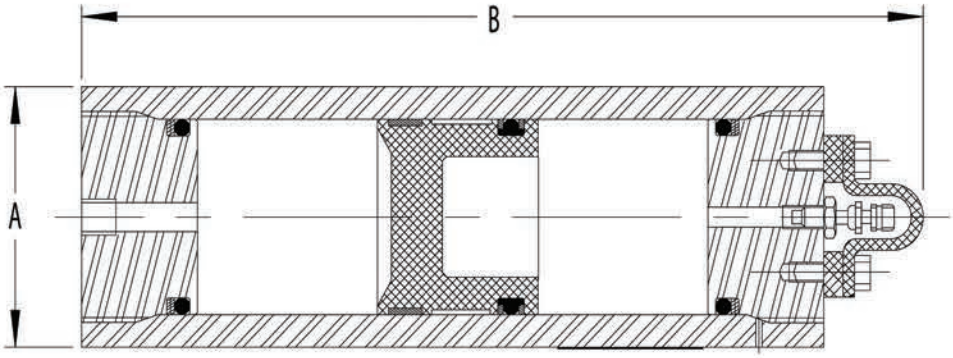
See Data Sheets for breakdown of parts.

10,000 PSI Series

040A100 Accumulators 10,000 PSI (690 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION A		DIMENSION B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
040A100-.5NJ14	15	251	0.0625	0.25	25	11	4	102	10.38	264
040A100-1NJ14	30	493	0.125	0.49	32	14	4	102	13.38	340
040A100-2NJ14	60	675	0.25	1.00	45	20	4	102	19.38	492
040A100-4NJ14	117	1910	0.5	2.00	70	32	4	102	31	787

Catalog std. – 040AT100-.5NJ14 Std. N² Gas valve, Buna-N seals, 1/2" NPT fluid port—Opt. Seal Material & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 10,000 PSI (690 Bar)
Maximum Proof Pressure 15,000 PSI (1,034 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size 1/2" NPT (Note: Optional MP -Medium & HP-High Pressure Porting available)

Standard seal material for petroleum base oil. Seals available for other fluids.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications subject to change without notice.

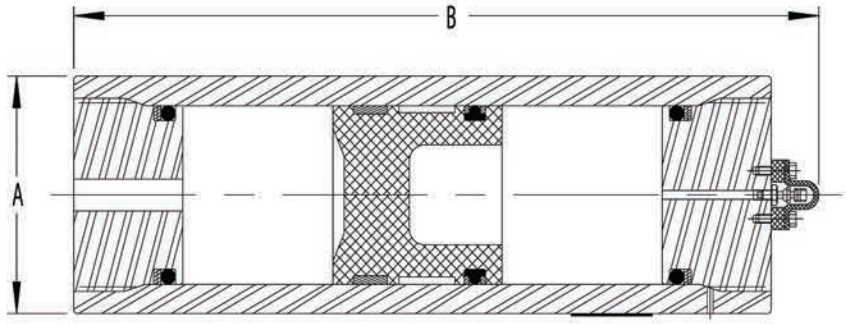
COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK040A100-AT
FKM (Viton®)	SK040A100-VT
EPR	SK040A100-ET
Kalrez®	SK040A100-KO

See Data Sheets for breakdown of parts.

085A100 Accumulators 10,000 PSI (690 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION A		DIMENSION B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
085A100-8N414	244	3,992	1	4	243	110	8.5	216	22	559
085A100-12N414	361	5,914	1.5	6	275	125	8.5	216	26	660
085A100-16N414	478	7825	2	8	308	140	8.5	216	30.13	765
085A100-20N414	591	9,678	2.5	9	340	154	8.5	216	34.13	867
085A100-24N414	711	11,647	3	11	375	170	8.5	216	38.38	975
085A100-32N414	941	15,412	4	15	440	200	8.5	216	46.50	1,181
085A100-40N414	1,177	19,292	5	19	508	230	8.5	216	54.88	1,394
085A100-60N414	1,760	28,849	7.5	29	674	306	8.5	216	75.50	1,918
085A100-80N414	2,326	38,115	10	38	835	379	8.5	216	95.50	2,426
085A100-120N414	3,482	57,054	15	57	1,164	528	8.5	216	136.38	3,464
085A100-160N414	4,637	75,993	20	76	1,494	677	8.5	216	177.25	4,502

Catalog std. – 085A100-8N414 Std. N² Gas valve, Buna-N seals, 1/2" NPT fluid port—Opt. Seal Material & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 10,000 PSI (690 Bar)
Maximum Proof Pressure 15,000 PSI (1,034 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Fluid Port Size 1/2" NPT (Note: Optional MP -Medium & HP-High Pressure Porting available)

Standard seal material for petroleum base oil. Seals available for other fluids.

ASME code stamp is not available as a standard.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications subject to change without notice.

COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK085A100-AT
FKM (Viton®)	SK085A100-VT
EPR	SK085A100-ET

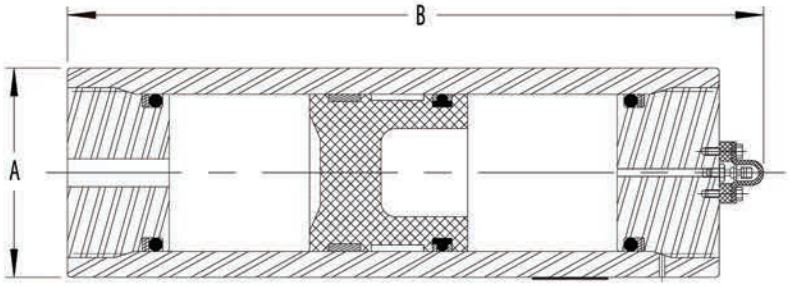
See Data Sheets for breakdown of parts.

Illustrations are representational and not necessarily indicative of how any particular model will be built.

110A100 Accumulators 10,000 PSI (690 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION			
							A		B	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.
110A100-8NG14	246	4,025	1	4	478	217	11	279	22.50	572
110A100-12NG14	362	5,932	1.5	6	577	262	11	279	27.38	695
110A100-16NG14	478	7,830	2	8	675	306	11	279	32.25	819
110A100-20NG14	594	9,728	2.5	9	773	351	11	279	37.13	943
110A100-24NG14	709	11,626	3	11	872	395	11	279	42	1,067
110A100-32NG14	941	15,413	4	15	1,068	485	11	279	51.75	1,314
110A100-40NG14	1,172	19,209	5	19	1,265	574	11	279	61.50	1,562
110A100-60NG14	1,748	28,650	7.5	28	1,754	796	11	279	85.75	2,178
110A100-80NG14	2,327	38,140	10	38	2,246	1,019	11	279	110.13	2,797
110A100-120NG14	3,483	57,071	15	57	3,227	1,464	11	279	158.75	4,032
110A100-160NG14	4,638	76,002	20	76	4,207	1,908	11	279	207.38	5,267

Catalog std. – 110A100-8NG14 Std. N² Gas valve, Buna-N seals, 1/2" NPT fluid port—Opt. Seal Material & Port Sizes Available



GENERAL DESIGN DATA

Maximum Working Pressure 10,000 PSI (690 Bar)
Maximum Proof Pressure 15,000 PSI (1,034 Bar)
Operating Temperature
(Buna/Nitrile) +52° to +200°F (+11° to 93°C)
Fluid Port Size 1/2" NPT (Note: Optional MP -Medium & HP-High Pressure Porting available)

Standard seal material for petroleum base oil. Seals available for other fluids.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications subject to change without notice.

COMPLETE SEAL KITS	
TYPE	PART NO.
Buna-N	SK085A100-AT
FKM (Viton®)	SK085A100-VT
EPR	SK085A100-ET

See Data Sheets for breakdown of parts.

Concerning model designations in previous pages –
"A" denotes both heads threaded; e.g.,"090A30"
"AL" denotes both heads welded; e.g., "045AL25"
"AT" denotes threaded gas head, welded fluid head; e.g., "047AT30"

Greater than 10,000 PSI MAWP Applications

Currently, Tobul can produce special design units up to 20,000 PSI (1,379 Bar) in a limited range of dimensional sizes, volumes and materials.

> ***Note:*** *A "Fast Quote/Design Specifications" Form is available for completion on our Tobul website (www.tobul.com).*

Examples of Required information includes:

- Application
- Maximum system pressure
- Minimum system pressure
- Operating temperature range
- System fluid
- Fluid volume required
- Design certifications required
- System charge and dwell times (estimated if not known)

Custom Design Series

Due to the large number of tested, proven designs created and sold over the past twenty-plus years, Tobul has the ability to manufacture an outstanding selection of accumulators, in sizes up to 24" OD, up to 20,000 PSI MAWP, and fluid volumes up to 300 gallons. This unequalled versatility allows Tobul to meet the diverse needs of many customers in varied markets and applications.

The majority of custom designs are based on Tobul's large variety of existing designs. Additionally, we have streamlined our sales engineering to manufacturing design process to save time – the customer does NOT pay a premium for this service. This enables us to quickly respond to our customers' varying needs. While not a "job shop," Tobul does design and manufacture to specific applications. These applications can be as diverse as the industries from which they originate...

- **Oil & Gas** - Onshore / Offshore / Sub-sea
- **Mobile Equipment** - Used in mining, construction, forestry, agriculture, industrial and commercial applications
- **Industrial / Process Engineering** - Used in machine tools, metal forming machinery, steel production, paper production, power transmission, injection molding, die casting, foundries, etc.
- **Aerospace**
- **Maritime**
- **Many others**

Bladder-Type Accumulators

An Overview

The typical bladder accumulator makes use of the considerable differences in the relative compressibility between a gas and a fluid. A typical design consists of a gas proof elastomer membrane enclosed within a steel shell. The membrane contains compressed gas (normally dry nitrogen) and separates the gas from the hydraulic fluid. The compressed gas provides a pneumatic spring action to force stored hydraulic fluid from the accumulator into the system as needed.

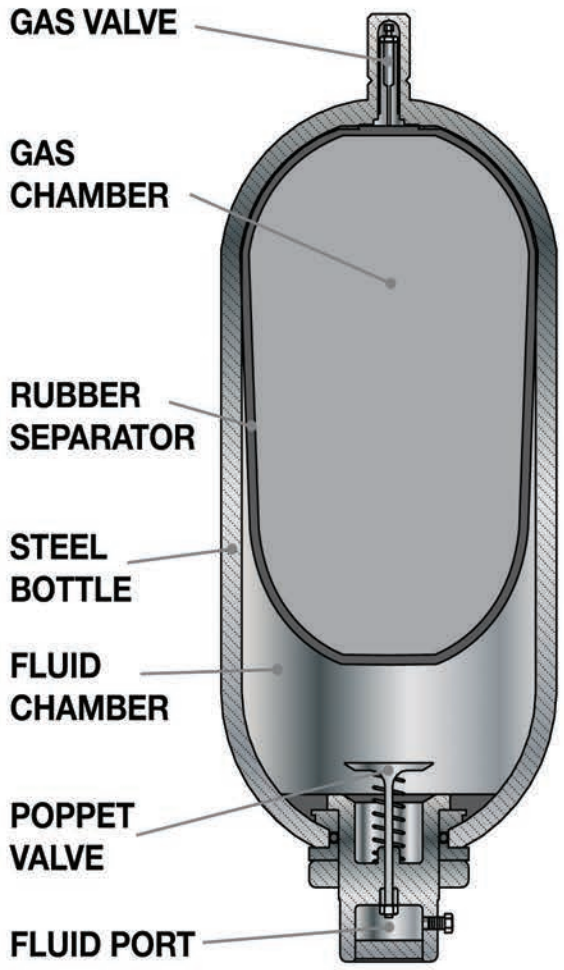
The steel shells are typically manufactured of homogenous seamless steel tubing with both ends formed hemispherically by spinning or forging. The shells are then heat treated and stress relieved to obtain the desired mechanical properties, as required by ASME Code Section VIII, Division 1 pressure vessel requirements. Corrosion resistance can be achieved with the use of stainless steel, but is more commonly obtained by plating the shell interior with nickel or coating with an epoxy or phenolic compound.

Common bladder-type accumulator capacities are one pint, one quart, and one through fifteen gallons (1, 2.5, 5, 10, 11, and 15). Bladders are commonly constructed of a particular elastomer (Buna-N, Butyl, EPR, Viton®, etc.) specified to achieve a desired compatibility with the system fluid (hydraulic oil, water glycols, etc.) and elasticity throughout the operating temperature range (typically -20˚F to 200˚F). Normally, a spring-loaded poppet valve assembly is utilized to prevent extrusion of the bladder. This commonly limits the fluid flow rate to a maximum of 220 gallons per minute into the system from the accumulator, but higher flows can be obtained with a special poppet valve assembly.

The typical bladder-type accumulator is a bottom repairable design, in that the bladder is inserted into the shell through a bottom opening in the shell. This opening allows the installation of the oil port body/poppet valve assembly to seal the accumulator. Optional top repairable designs are available, along with various gas stem sizes (7/8" & 2") if desired. Tobul's parts and bladder kits are interchangeable with most major manufacturers.

Due to the limited volume capacities, it is common to find banks of bladder-type accumulators connected to a manifold in order to provide the desired quantity of fluid to a system. Unfortunately, this can cause physical space limitations in certain applications.

Generally, bladder-type units are connected to a system by threading a pressure connection directly into the fluid port of the accumulator. Various sized porting must be specified and may entail the use of special adaptors or bolt-on flanges to achieve desired fluid connections.

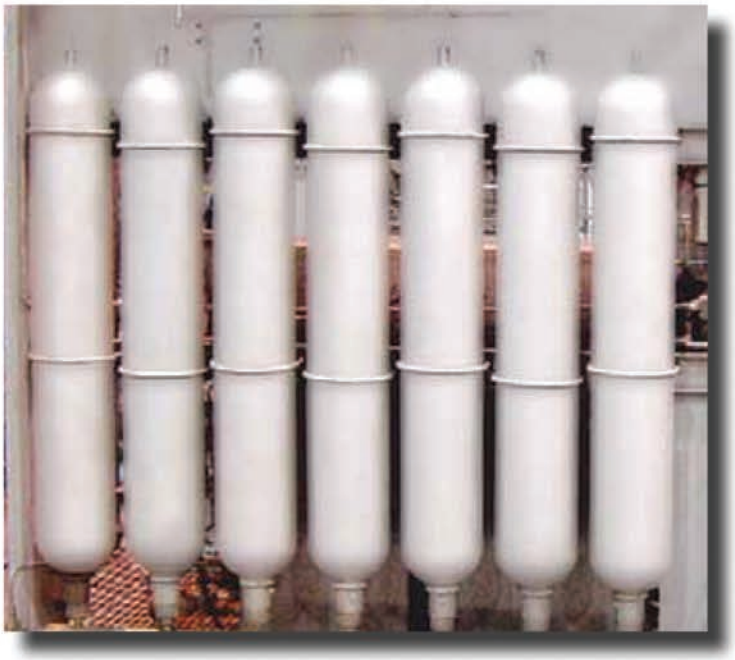


Bottom repairable models

Bottom repairable bladder-type designs (Tobul model designation TBR) are the most commonly found units in the marketplace.

Fluid capacities are generally limited to a small variety of sizes (one quart to fifteen gallons/approximately 1 Liter to 57 Liters).

Pressure ratings of these vessels are generally 3000 PSI (207 Bar), 5000 PSI (345 Bar) or less. Specially rated units, though, can contain up to 6600 PSI (455 Bar).

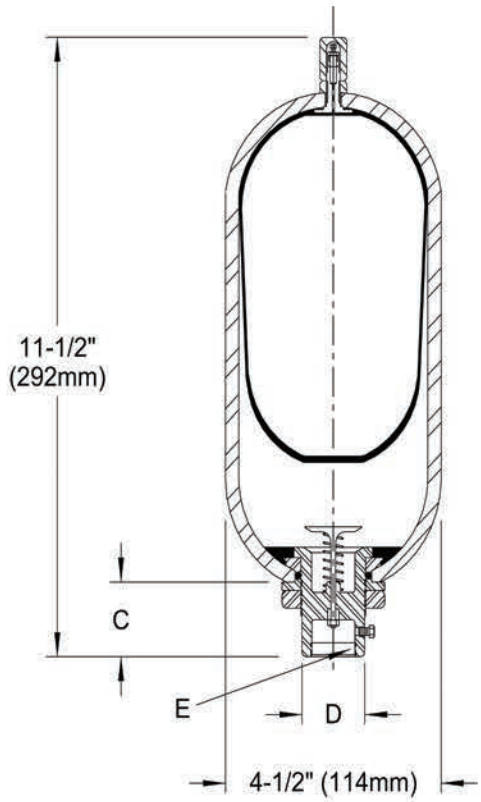


TBR30 1 Quart

Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION				
							C		D		E
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.	
TBR30-.2NMD*	73	1,196	.25	1	10	5	2.125	54	1.375	41	Fluid Ports Available SAE-16 (Std.) or 1" NPT To specify 1" NPT, replace "D" with "6"

* = Bladder/Seal Material Codes – Buna-N is standard N = Buna-N B = Butyl E = EPR V = Viton®



GENERAL DESIGN DATA

Maximum Working Pressure 3,000 PSI (207 Bar)
Maximum Proof Pressure 4,500 PSI (310 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)

Bladder for petroleum base oil.

Shell *ASME U stamp **OPTIONAL***

Optional higher pressure rating of 4,000 PSI (276 Bar) available on request.

Specifications subject to change without notice.

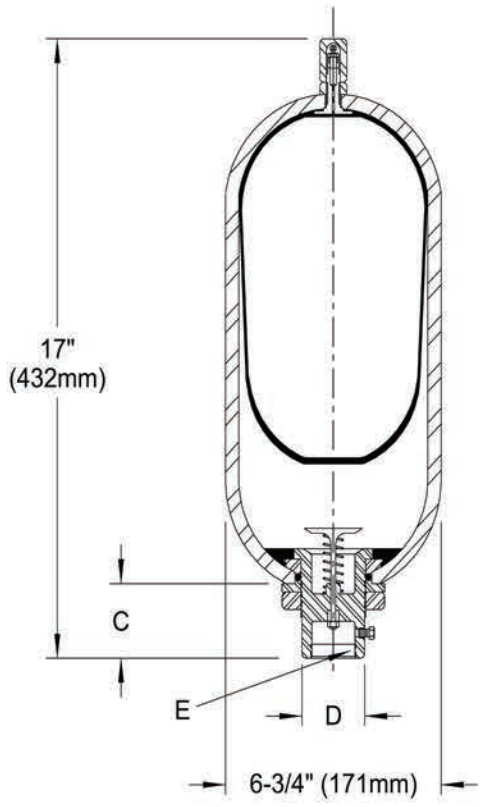
See Data Sheets for breakdown of parts.

TBR30 1 Gallon

Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION				
							C		D		E
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.	
TBR30-1NMEA*	235	3,851	1	4	34	15	4	89	2.38	60	Fluid Ports Available SAE-20 (Std.) or 1.25" NPT To specify 1.25" NPT, replace "E" with "I"

* = Bladder/Seal Material Codes – Buna-N is standard N = Buna-N B = Butyl E = EPR V = Viton®



GENERAL DESIGN DATA

Maximum Working Pressure 3,000 PSI (207 Bar)
Maximum Proof Pressure 4,500 PSI (310 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)

Bladder for petroleum base oil.

Shell ASME "U" stamped.

Optional higher pressure rating of 4,000 PSI (276 Bar) available on request.

Specifications subject to change without notice.

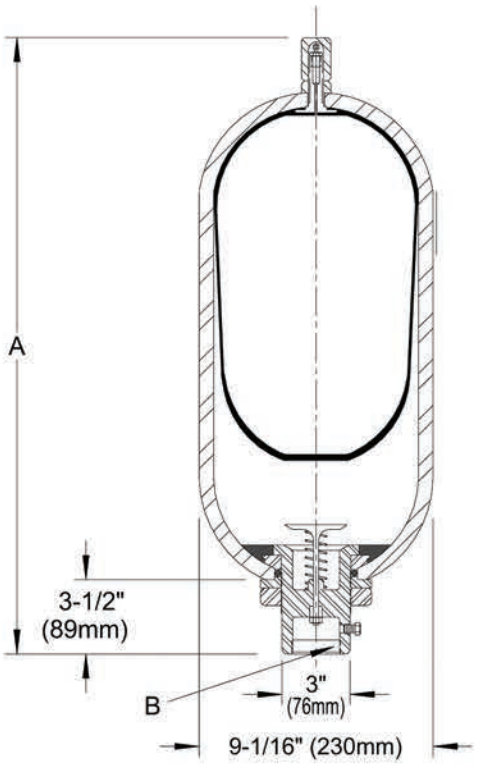
See Data Sheets for breakdown of parts.

Illustrations are representational and not necessarily indicative of how any particular model will be built.

TBR30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION		
							A		B
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	
TBR30-2.5NMFA*	600	9,832	2.5	10	80	36	21	533	Fluid Ports Available SAE-24 (Std.) or 2" NPT To specify 2" NPT, replace "F" with "A"
TBR30-5NMFA*	1,203	19,714	5	19	120	54	33.25	845	
TBR30-10NMFA*	2,259	37,018	10	38	220	100	54	1,372	
TBR30-11NMFA*	2,535	41,541	11	42	240	109	59.5	1,511	
TBR30-15NMFA*	3,440	56,372	15	57	305	138	77.5	1,969	

* = Bladder/Seal Material Codes – Buna-N is standard N = Buna-N B = Butyl E = EPR V = Viton®



GENERAL DESIGN DATA

Maximum Working Pressure 3,000 PSI (207 Bar)
Maximum Proof Pressure 4,500 PSI (310 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)

Bladder for petroleum base oil.

Shell ASME "U" stamped.

Optional higher pressure rating of 4,000 PSI (276 Bar) available on request.

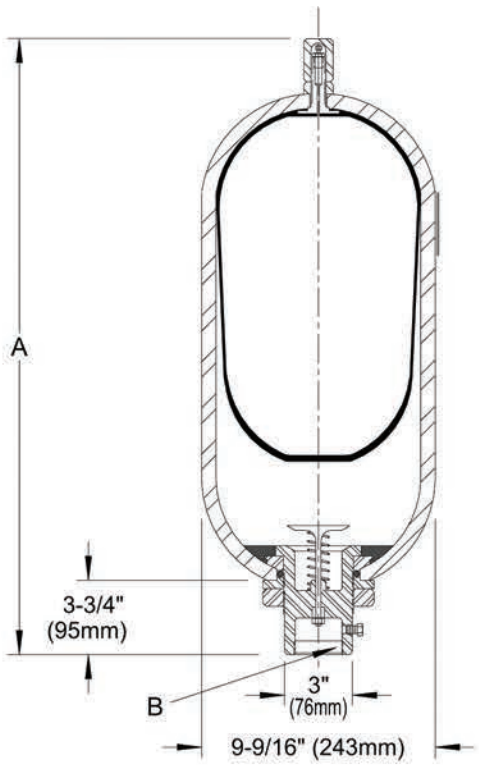
Specifications subject to change without notice.

See Page 32 for Repair Kits, Bladders, etc.

TBR50 Accumulators 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION		
							A		B
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	
TBR50-2.5NMFA*	577	9,454	2.5	10	120	54	21.5	546	Fluid Ports Available SAE-24 (Std.) or 2" NPT To specify 2" NPT, replace "F" with "A"
TBR50-5NMFA*	1,151	18,858	5	19	220	100	33.75	857	
TBR50-10NMFA*	2,142	35,095	10	38	335	152	54.5	1,384	
TBR50-15NMFA*	3,260	53,413	15	57	485	220	78	1,981	

* = Bladder/Seal Material Codes – Buna-N is standard N = Buna-N B = Butyl E = EPR V = Viton®



GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)
Maximum Proof Pressure 7,500 PSI (517 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)

Bladder for petroleum base oil.

Shell ASME "U" stamped.

Optional higher pressure rating of 6,600 PSI (455 Bar) available on request.

Specifications subject to change without notice.

Bladder Accumulators

Top repairable models

Top repairable bladder-type designs (Tobul model designation TBRT) are readily available in the marketplace, but much less commonly seen than bottom repairable units. TBRT's are more expensive than TBR's since an additional gas port body and anti-extrusion ring is necessary to completely seal the accumulator shell.

Top Repairable Versus Bottom Repairable?

The distinct advantage of a TBRT (Top Repairable) unit is the fact that a unit may be repaired (i.e., bladder replaced) without dismounting an accumulator from the system. As long as the unit can be isolated and the system pressure relieved, the top gas port assembly can be accessed and a replacement bladder installed.

Illustrations are representational and not necessarily indicative of how any particular model will be built.

TBRT30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION		
							A		B
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	
TBRT30-2.5NMFA*	600	9,382	2.5	10	80	36	21	533	Fluid Ports Available SAE-24 (Std.) or 2" NPT To specify 2" NPT, replace "F" with "A"
TBRT30-5NMFA*	1,203	19,714	5	19	120	54	33	838	
TBRT30-10NMFA*	2,259	37,018	10	38	220	100	54	1,372	
TBR30T-11NMFA*	2,535	41,541	11	42	240	109	59.5	1,511	
TBRT30-15NMFA*	3,440	56,372	15	57	305	138	77.5	1,969	

* = Bladder/Seal Material Codes – Buna-N is standard N = Buna-N B = Butyl E = EPR V= Viton®

GENERAL DESIGN DATA

Maximum Working Pressure 3,000 PSI (207 Bar)
Maximum Proof Pressure 4,500 PSI (310 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)

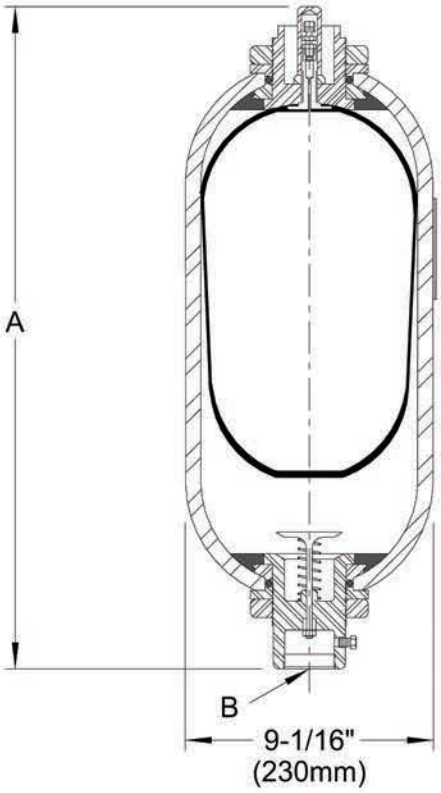
Bladder for petroleum base oil.

Shell ASME "U" stamped.

Optional higher pressure rating of 4,000 PSI (276 Bar) available on request.

Specifications subject to change without notice.

See Page 32 for Repair Kits, Bladders, etc.



TBRT50 Accumulators 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION		
							A		B
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	
TBRT50-2.5NMFA*	577	9,454	2.5	10	120	54	21.5	546	Fluid Ports Available SAE-24 (Std.) or 2" NPT To specify 2" NPT, replace "F" with "A"
TBRT50-5NMFA*	1,151	18,858	5	19	220	100	33.75	857	
TBRT50-10NMFA*	2,142	35,095	10	38	335	152	54.5	1,384	
TBRT50-15NMFA*	3,260	53,413	15	57	485	220	78	1,981	

* = Bladder/Seal Material Codes – Buna-N is standard N = Buna-N B = Butyl E = EPR V = Viton®

GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)
Maximum Proof Pressure 7,500 PSI (517 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)

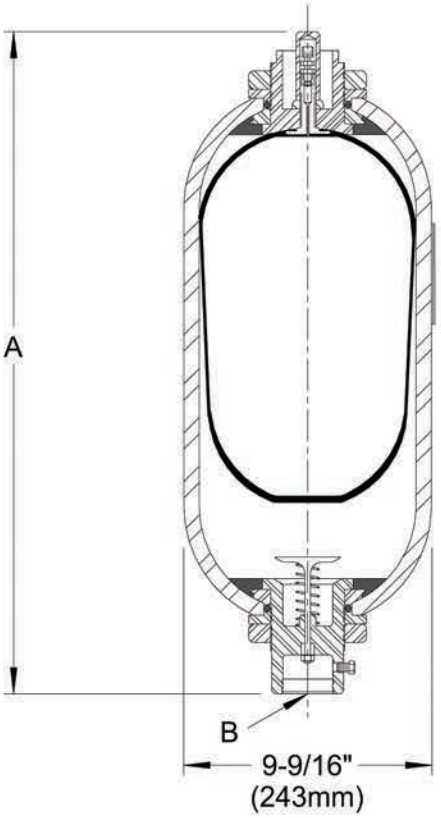
Bladder for petroleum base oil.

Shell ASME "U" stamped.

Optional higher pressure rating of 6,600 PSI (455 Bar) available on request.

Specifications subject to change without notice.

See Page 32 for Repair Kits, Bladders, etc.



EconoLator II®

Open Top Bladder Accumulator

Repairable

The "EconoLator II®" is a Tobul product series which is a transition from piston-type accumulators to bladder-type accumulators, and incorporates characteristics of both designs…

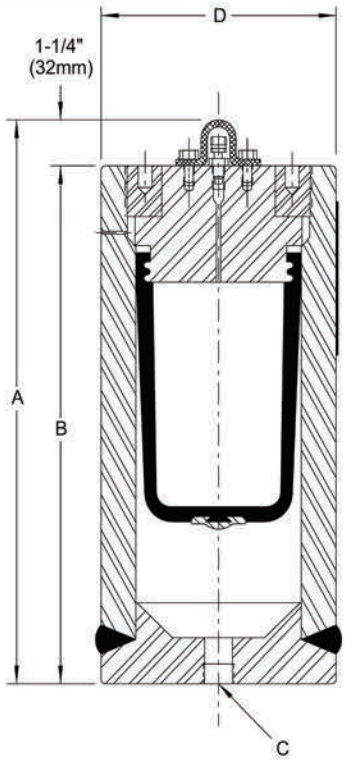
- Utilizes a cylindrical steel cylinder with heads similar to piston-types. The fluid cap (bottom) is precision machine-welded into the steel cylinder to form a durable vessel.
- Utilizes an open top bladder available in a variety of sizes and elastomer materials (Buna-N/Butyl/EPR/ Viton®) similar to a diaphragm-type design. Whereas many diaphragm-type units are permanently sealed and non-repairable, the "EconoLator II®" is repairable.
- Utilizes an upper cap and threaded ring assembly to retain and seal the open topped bladder, providing a simple "top-repairable" advantage; e.g., unit does not have to be removed from a vertically mounted application in order to replace bladder as long as Accumulator can be isolated from system pressure and physically accessible.
- Available in one quart and one gallon capacity at this time, with a one pint capacity unit to be released in the near future.

The EBR50 series (5,000 PSI) utilizes a threaded fluid end cap in addition to the upper gas cap and retaining ring assembly, similar to piston-type units.

EBR20 Accumulators 2,000 PSI (137 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION						
							A		B		C	D	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.		In.	mm.
EBR20-1NA9	29	475	0.12	.45	11	5	10	254	9.50	231	Fluid Port - SAE-8 (Standard)	3.25	83
EBR20-2NAB	58	950	0.25	1	25	11	10.125	257	8.875	225	Fluid Port - SAE-12 (Standard)	4.625	117
EBR20-8NAD	231	3,785	1	4	55	25	18	450	16.75	425	Fluid Port - SAE-16 (Standard)	5.75	146

Fluid Port Codes - SAE-8 = "9"; SAE-10 = "A"; SAE-12 = "B"; SAE-14 = "C"; SAE-16 = "D"
NPT Port Codes – ½" NPT = "4"; ¾" NPT = "5"; 1" NPT = "6"



GENERAL DESIGN DATA

Maximum Working Pressure 2,000 PSI (138 Bar)
Maximum Proof Pressure 3,000 PSI (207 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)

Bladder for petroleum based oil.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications subject to change without notice.

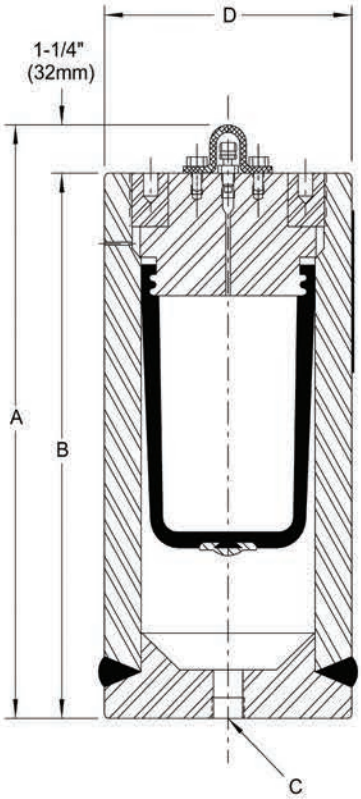
REPLACEMENT BLADDERS	
TYPE	PART NO.
1 Pint	EB-1N*
1 Quart	EB-2N*
1 Gallon	EB-8N*

* = Bladder/Seal Material Codes – Buna-N is standard
B = Buna-N E = EPR V = Viton®
See Data Sheets for breakdown of parts.

EBR30 Accumulators 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION						
							A		B		C	D	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.		In.	mm.
EBR30-1NA9	29	475	0.12	.45	11	5	10	254	9.50	231	Fluid Port - SAE-8 (Standard)	3.25	83
EBR30-2NAB	58	950	0.25	1	28	13	10.125	257	8.875	225	Fluid Port - SAE-12 (Standard)	4.75	121
EBR30-8NAD	231	3,785	1	4	60	27	18	450	16.75	425	Fluid Port - SAE-16 (Standard)	6	152

Fluid Port Codes - SAE-8 = "9"; SAE-10 = "A"; SAE-12 = "B"; SAE-14 = "C"; SAE-16= "D"
NPT Port Codes – ½" NPT = "4"; ¾" NPT = "5"; 1" NPT= "6"



GENERAL DESIGN DATA

Maximum Working Pressure 3,000 PSI (207 Bar)
Maximum Proof Pressure 4,500 PSI (310 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)

Bladder for petroleum based oil.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications subject to change without notice.

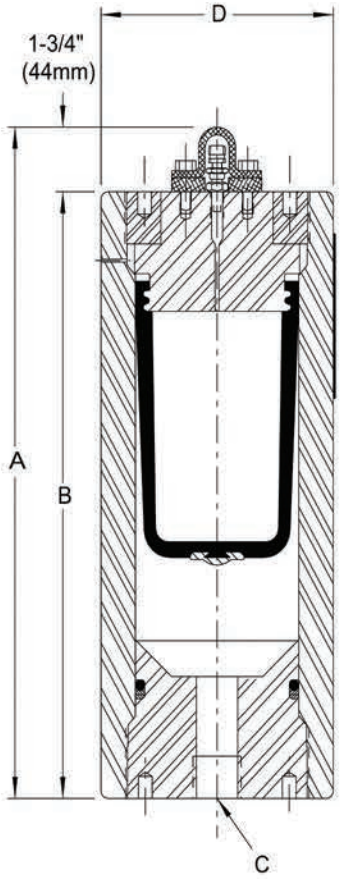
REPLACEMENT BLADDERS	
TYPE	PART NO.
1 Pint	EB-1N*
1 Quart	EB-2N*
1 Gallon	EB-8N*

* = Bladder/Seal Material Codes – Buna-N is standard
B = Buna-N E = EPR V = Viton®
See Data Sheets for breakdown of parts.

EBR50 Accumulators 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION						
							A		B		C	D	
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	In.	mm.		In.	mm.
EBR50-1NA9	29	475	.12	.45	17	7.7	12.875	308	10.375	264	Fluid Port - SAE-8 (Standard)	3.5	89
EBR50-2NAB	58	950	0.25	1	52	24	12.75	324	11	279	Fluid Port - SAE-12 (Standard)	5.25	133
EBR50-8NAD	231	3,785	1	4	104	47	20.25	514	18.5	470	Fluid Port - SAE-16 (Standard)	6.5	165

Fluid Port Codes - SAE-8 = "9"; SAE-10 = "A"; SAE-12 = "B"; SAE-14 = "C"; SAE-16 = "D"
NPT Port Codes - ½" NPT = "4"; ¾" NPT = "5"; 1" NPT = "6"



GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)
Maximum Proof Pressure 7,500 PSI (517 Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)

Bladder for petroleum based oil.

ASME and other certification requirements may entail changes in materials, strengths, dimensional specifications and design parameters from those illustrated in this catalog.

Specifications subject to change without notice.

REPLACEMENT BLADDERS	
TYPE	PART NO.
1 Pint	EB-1N*
1 Quart	EB-2N*
1 Gallon	EB-8N*

* = Bladder/Seal Material Codes – Buna-N is standard
B = Buna-N E = EPR V = Viton®
See Data Sheets for breakdown of parts.

Gas Bottles

An Overview

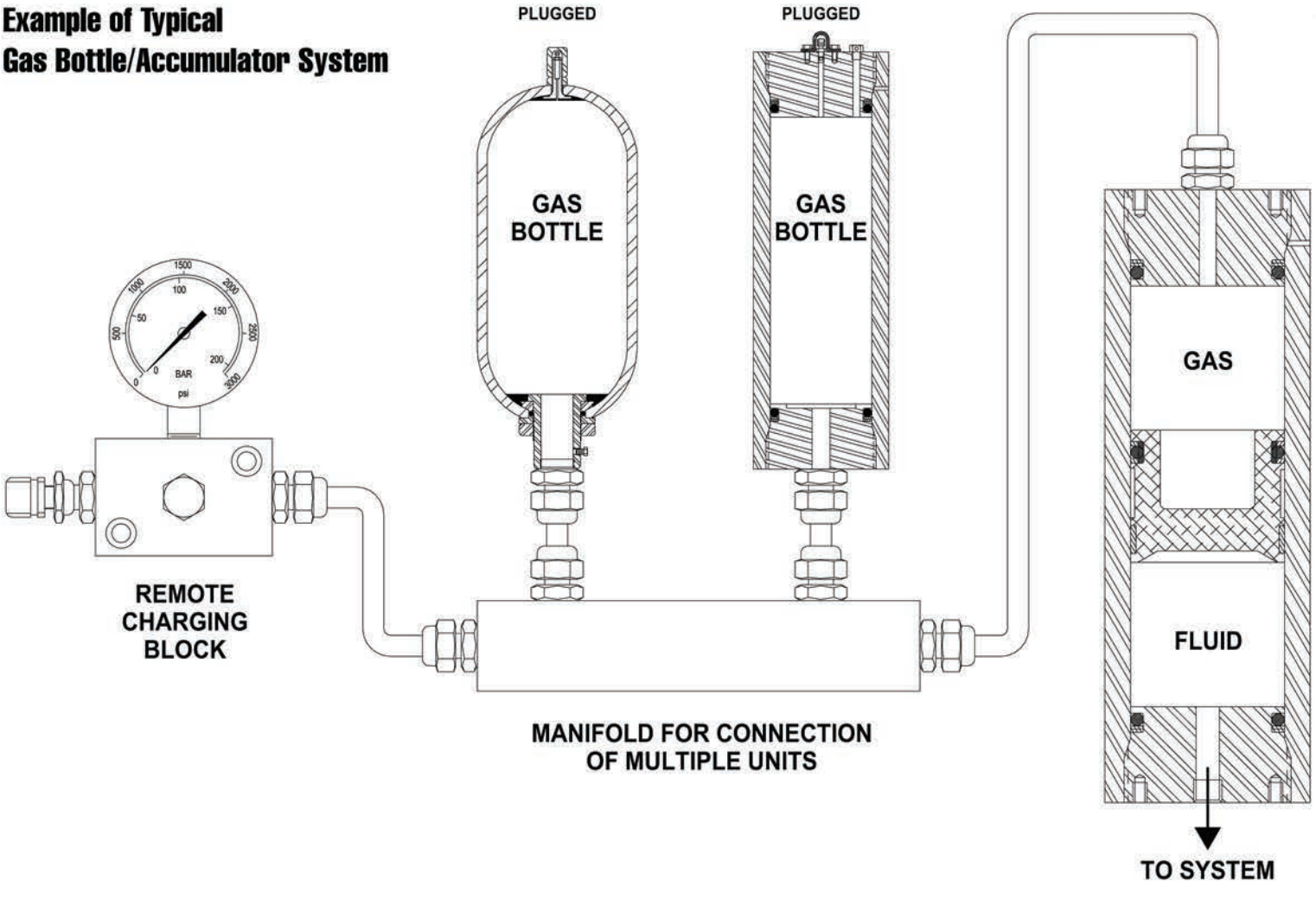
Why Use Gas Bottles?

A standard hydro-pneumatic accumulator can provide approximately 25 to 30% of its fluid capacity in usable volume (e.g., approx. 38 gallons of capacity in a piston-type to obtain 10 gallons of fluid volume; approx. 42 gallons of capacity in a bladder-type to obtain 10 gallons of fluid volume).

The size of the accumulator can be reduced, though, by providing additional gas volume to the accumulator in order to expel a greater percentage of usable fluid volume from the unit (e.g., with Piston-type, the addition of approx. 28 gallons of pressurized gas capacity will allow the reduction of the necessary accumulator volume to 14 gallons and still receive 10 gallons of usable fluid volume; with Bladder-type, the addition of approx. 31 gallons of pressurized gas capacity will allow the reduction of the necessary accumulator volume to 11 gallons and still receive 10 gallons of usable fluid volume) Note: above approximations based on 3000 PSI max pressure/2000 PSI min pressure.

Since gas bottles are simply pressure vessels utilized to store a quantity of pressurized gas (normally nitrogen) without an internal bladder or piston, the effective cost per gallon of volume is less than the accumulator itself, thereby making gas bottles a cost-effective method of supplementing fluid volumes.

Example of Typical Gas Bottle/Accumulator System

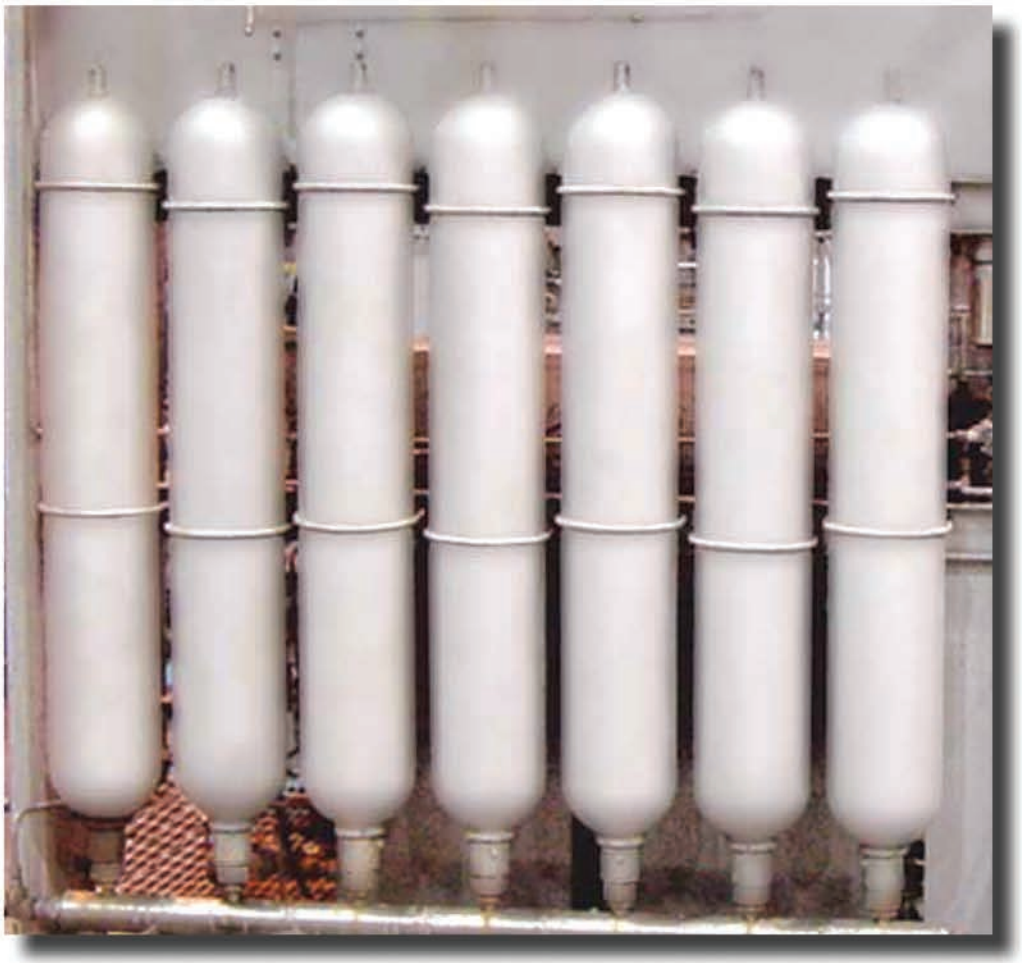


Gas Bottles

Forged Carbon Steel Shell

Forged steel shells without internal gas bladders are a cost-effective approach to providing additional gas volumes to selected systems.

Generally, these pressure vessels with hemispherical ends are readily available in the marketplace, and can sometime lead to a lower initial cost. Available only in a limited selection of sizes, though, multiple units may be "banked" (e.g., installed on a common manifold or header) to provide the required cumulative volumes.



TBRG30

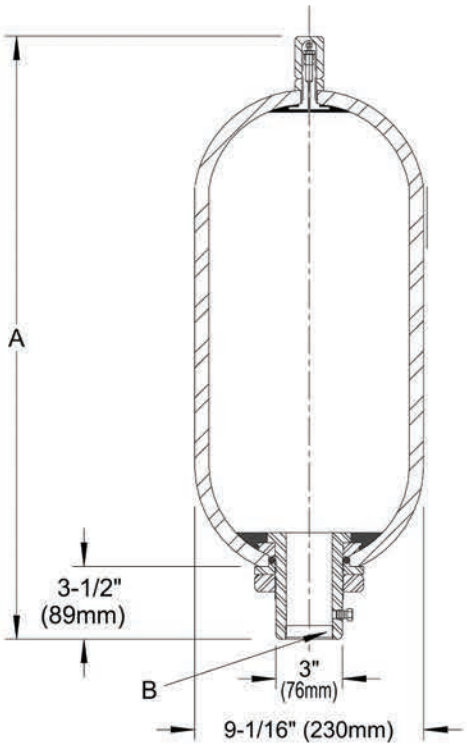
Gas Bottles 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION		
							A		B
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	
TBRG30-2.5NMFA	577.5	9463	2.5	10	80	36	21	533	Bottom Ports Available SAE-24 (Std.) or 2"NPT To specify 2"NPT, replace "F" with "A5"
TBRG30-5NMFA	1,155	18,927	5	19	126	57	33.25	845	
TBRG30-10NMFA	2,310	37,854	10	38	205	93	54	1,372	
TBRG30-11NMFA	2,541	41,639	11	42	226	103	59.5	1,511	
TBRG30-15NMFA	3,465	56,781	15	57	297	135	77.5	1,969	

* = Bladder/Seal Material Codes – Buna-N is standard N = Buna-N B = Butyl E = EPR V= Viton®

GENERAL DESIGN DATA

Maximum Working Pressure 3,000 PSI (207 Bar)
Maximum Proof Pressure 4,500PSI (310Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)



TBRG50

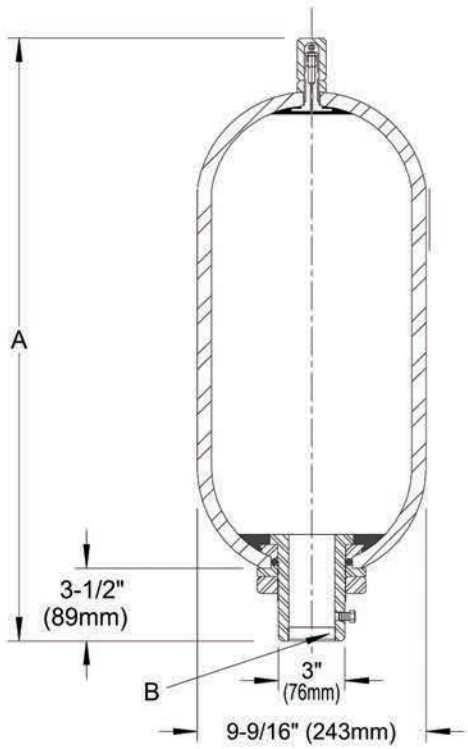
Gas Bottles 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY		FLUID CAPACITY		DRY WEIGHT		DIMENSION		
							A		B
	In.³	Cm.³	Gallon	Liters	Lbs.	Kg.	In.	mm.	
TBRG50-2.5NMFA	577.5	9463	2.5	10	130	59	21.5	546	Bottom Ports Available SAE-24 (Std.) or 2" NPT To specify 2" NPT, replace "F" with "A"
TBRG50-5NMFA	1,155	18,927	5	19	225	102	33.75	857	
TBRG50-10NMFA	2,310	37,854	10	38	340	155	54.5	1,384	
TBRG50-15NMFA	3,465	56,781	15	57	490	223	78	1,981	

* = Bladder/Seal Material Codes – Buna-N is standard N = Buna-N B = Butyl E = EPR V= Viton®

GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)
Maximum Proof Pressure 7,500PSI (517Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)



Gas Bottles

Cylindrical Carbon Steel

Gas Bottles may be fabricated similar to piston-type accumulators (less the internal piston), providing a wide variety of available capacities and physical dimensions.

This allows for an extensive range of capacities, much larger than available with forged shells. The versatility in application provides the system designer the ability to eliminate banks of multiple smaller capacity shells with a minimum number of higher volume fabricated bottles. This is especially valuable in applications where space (e.g., physical dimensions) and weight are critical.

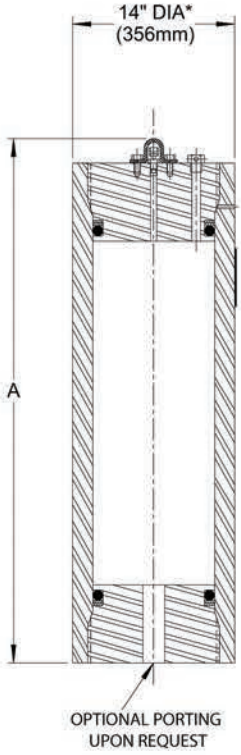
140AG30

Gas Bottles 3,000 PSI (207 Bar)

MODEL NUMBER	GAS CAPACITY				DRY WEIGHT		DIMENSION A	
	In.³	Cm.³	GALLONS	LITERS	Lbs.	Kg.	In.	mm.
140AG30-120	3,476	56,955	15	57	759	344	41.25	1,048
140AG30-160	4,643	76,092	20	76	886	402	51.75	1,314
140AG30-200	5,783	94,774	25	95	1,010	458	62	1,575
140AG30-240	6,951	113,911	30	114	1,137	516	72.5	1,842
140AG30-320	9,259	151,729	40	152	1,388	629	93.25	2,369
140AG30-400	11,567	189,548	50	190	1,638	743	114	2,896
140AG30-480	13,875	227,366	60	227	1,889	857	134.75	3,423
140AG30-560	16,183	265,184	70	265	2,140	971	155.5	3,950
140AG30-640	18,490	303,003	80	303	2,391	1,085	176.25	4,477
140AG30-720	20,798	340,821	90	341	2,642	1,198	197	5,004
140AG30-800	23,106	378,640	100	379	2,893	1,312	217.75	5,531

GENERAL DESIGN DATA

Maximum Working Pressure 3,000 PSI (207 Bar)
Maximum Proof Pressure 4,500PSI (310Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Larger volumes available upon request



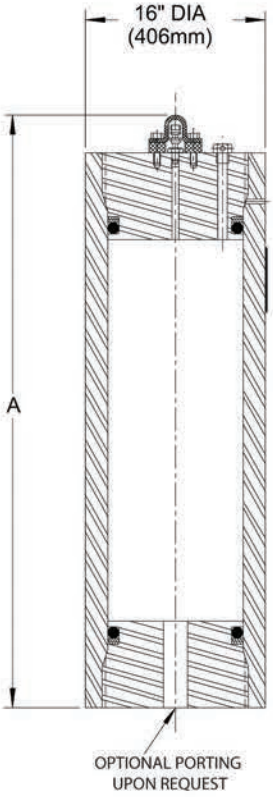
160AG50

Gas Bottles 5,000 PSI (345 Bar)

MODEL NUMBER	GAS CAPACITY				DRY WEIGHT		DIMENSION A	
	In.³	Cm.³	GALLONS	LITERS	Lbs.	Kg.	In.	mm.
160AG50-120	3,476	56,955	15	57	1,406	638	43.75	1,111
160AG50-160	4,643	76,092	20	76	1,673	759	54.25	1,378
160AG50-200	5,783	94,774	25	95	1,934	877	64.5	1,638
160AG50-240	6,951	113,911	30	114	2,201	998	75	1,905
160AG50-320	9,259	151,729	40	152	2,728	1,238	95.75	2,432
160AG50-400	11,567	189,548	50	190	3,256	1,477	116.5	2,959
160AG50-480	13,875	227,366	60	227	3,783	1,716	137.25	3,486
160AG50-560	16,183	265,184	70	265	4,311	1,955	158	4,013
160AG50-640	18,490	303,003	80	303	4,839	2,195	178.75	4,540
160AG50-720	20,798	340,821	90	341	5,366	2,434	199.5	5,067
160AG50-800	23,106	378,640	100	379	5,894	2,673	220.25	5,594

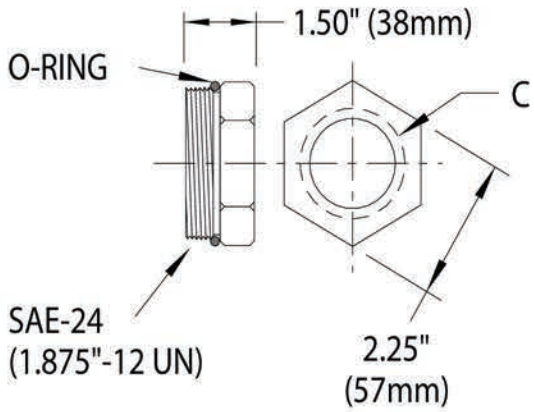
GENERAL DESIGN DATA

Maximum Working Pressure 5,000 PSI (345 Bar)
Maximum Proof Pressure 7,500PSI (517Bar)
Operating Temperature
(Buna/Nitrile) -20° to +200°F (-28° to 93°C)
Larger volumes available upon request



Bladder-Type Optional Components / Repair Kits

OIL PORT ADAPTOR/REDUCERS			
	NEW PART NUMBER		
OLD PART NO.	CARBON STEEL	STAINLESS STEEL	SIZE - "C"
TB-100-01	AR-MA-F-2	AR-MC-F-2	SAE-24 TO 1/4" NPT
TB-100-02	AR-MA-F-3	AR-MC-F-3	SAE-24 TO 3/8" NPT
TB-100-03	AR-MA-F-4	AR-MC-F-4	SAE-24 TO 1/2" NPT
TB-100-04	AR-MA-F-5	AR-MC-F-5	SAE-24 TO 3/4" NPT
TB-100-05	AR-MA-F-6	AR-MC-F-6	SAE-24 TO 1" NPT
TB-100-06	AR-MA-F-7	AR-MC-F-7	SAE-24 TO SAE-5
TB-100-07	AR-MA-F-8	AR-MC-F-8	SAE-24 TO SAE-6
TB-100-08	AR-MA-F-9	AR-MC-F-9	SAE-24 TO SAE-8
TB-100-09	AR-MA-F-A	AR-MC-F-A	SAE-24 TO SAE-10
TB-100-10	AR-MA-F-B	AR-MC-F-B	SAE-24 TO SAE-12
TB-100-11	AR-MA-F-C	AR-MC-F-C	SAE-24 TO SAE-14
TB-100-12	AR-MA-F-D	AR-MC-F-D	SAE-24 TO SAE-16
METRIC AND SPECIAL SIZE ADAPTORS AVAILABLE			



The standard Tobul fluid/oil port dimension is SAE-24, as seen on drawing above. These optional adaptors can reduce the fluid port size to as small as 0.25" NPT

Repair Kits / Replacement Bladders 2.5 to 15 Gallons / Service Tools

COMPLETE REPAIR KIT 3000 PSI UNITS			
BUNA-N	BUTYL	EPR	FKM (VITON®)
BK30-.2N	BK30-.2B	BK30-.2E	BK30-.2V
BK30-1N	BK30-1B	BK30-1E	BK30-1V
BK30-2.5N	BK30-2.5B	BK30-2.5E	BK30-2.5V
BK30-5N	BK30-5B	BK30-5E	BK30-5V
BK30-10N	BK30-10B	BK30-10E	BK30-10V
BK30-11N	BK30-11B	BK30-11E	BK30-11V
BK30-15N	BK30-15B	BK30-15E	BK30-15V

Includes: (1) Bladder, (1) Gas Valve and O-Ring, (2) Poppet Valve O-Ring and (2) O-Ring Backup

COMPLETE REPAIR KIT 5000 PSI UNITS			
BUNA-N	BUTYL	EPR	FKM (VITON®)
BK50-2.5N	BK50-2.5B	BK50-2.5E	BK50-2.5V
BK50-5N	BK50-5B	BK50-5E	BK50-5V
BK50-10N	BK50-10B	BK50-10E	BK50-10V
BK50-15N	BK50-15B	BK50-15E	BK50-15V

Includes: (1) Bladder, (1) Gas Valve and O-Ring, (2) Poppet Valve O-Ring and (2) O-Ring Backup

REPLACEMENT BLADDERS ONLY (W/O GAS VALVES AND SEALS)			
PART NO.		CAPACITY	
3000 PSI	5000 PSI	Gallons	Liters
BB30-2.5*	BB50-2.5*	2.5	10
BB30-5*	BB50-5*	5	20
BB30-10*	BB50-10*	10	40
BB30-11*	*NA*	11	42
BB30-15*	BB50-15*	15	60

* = Bladder Material Suffix N = BUNA-N B = BUTYL E = EPR V = FKM (VITON®)
Note: All standard Bladder Repair Kits have 7/8" carbon steel stem; Stainless steel stem available as added cost option

BLADDER-TYPE SERVICE TOOLS	
PART NO.	DESCRIPTION
TB-3000	Spanner Wrench for Bladder Series
TB-3001	Valve Core Wrench
TB-3002-1	1 Quart to 2.5 Gallon Pull Rod
TB-3002-2	5 Gallon Pull Rod
TB-3002-3	10 & 11 Gallon Pull Rod
TB-3002-4	15 Gallon Pull Rod

Illustrations are representational and not necessarily indicative of how any particular model will be built.

Accessories

For Bladder Type	SEE CATALOG...
Oil Port Adaptors	Page 32
Complete Repair Kits	Page 32
Replacement Bladder Bags	Page 32
Service / Assembly Tools	Page 32
Mounting Brackets / Sets	Page 38

For Piston Type	SEE CATALOG...
Mounting Brackets / Sets	Page 37
Assembly Sleeves (For aiding piston insertion)	Contact Tobul Customer Service
Fluid Drain Kits / Stop Tubes (to limit piston travel)	Contact Tobul Customer Service

For General Usage	SEE CATALOG...
Pressure Gauges	Page 34 - 35
Nitrogen Charging Assemblies	Page 34 - 35
Remote Charging Assemblies	Page 34 - 35
Safety Shutoff Valves	Page 40 - 41
Seal Kits / Replacement Parts	See Particular Model or Data Sheets

Options

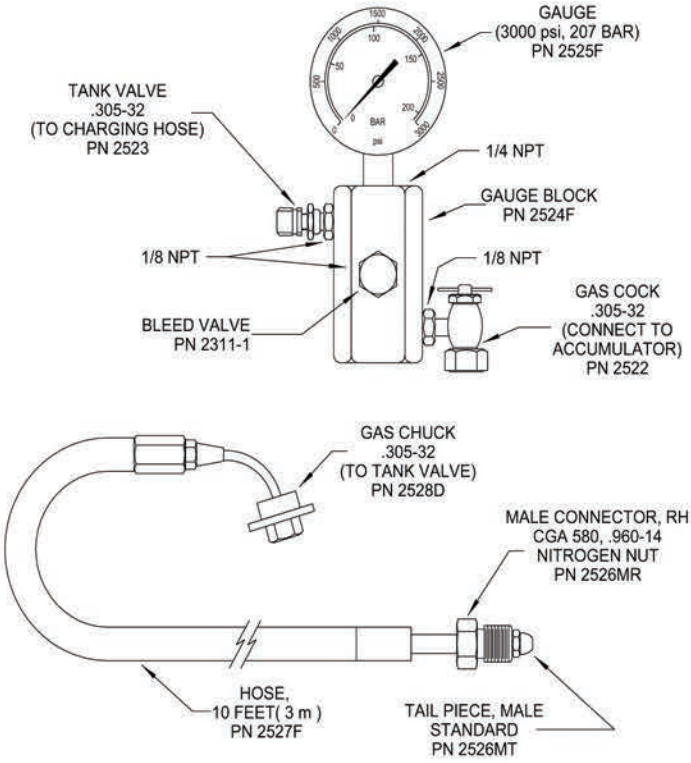
For details, potential applications, questions:	Contact Tobul Customer Service...
Rupture Disk Assemblies DR-ASSY-** (**desired pressure)	for various pressure ratings
Anti-Corrosion Coating/Plating*	Nickel/Chrome/Phenolic/Epoxy
Mechanical Indicating Rod	For determining Piston Location
Linear Transducers (Internal/External)	For determining Piston Location
Proximity Sensors (Magnetic, etc.)	For determining Piston Location
Male x Female Adaptors - Provides 2-3 alternate ports for gauges, rupture disks, etc.	For Available Configurations
Special Porting, Connectors, Flanges, etc.	Customer Specification

Nitrogen Charging Assemblies

3,000 PSI (207 Bar)

PART NUMBER	ITEM
G2525F	GAUGE ASSEMBLY
G2527F	CHARGING HOSE ASSEMBLY
GG2527F	COMPLETE CHARGING GAUGE & HOSE ASSEMBLY
GG2527F-C	COMPLETE CHARGING GAUGE & HOSE ASSEMBLY W/CASE
2522-EXT	GAS COCK EXTENSION, OPTIONAL (Not Shown)

Specifications subject to change without notice

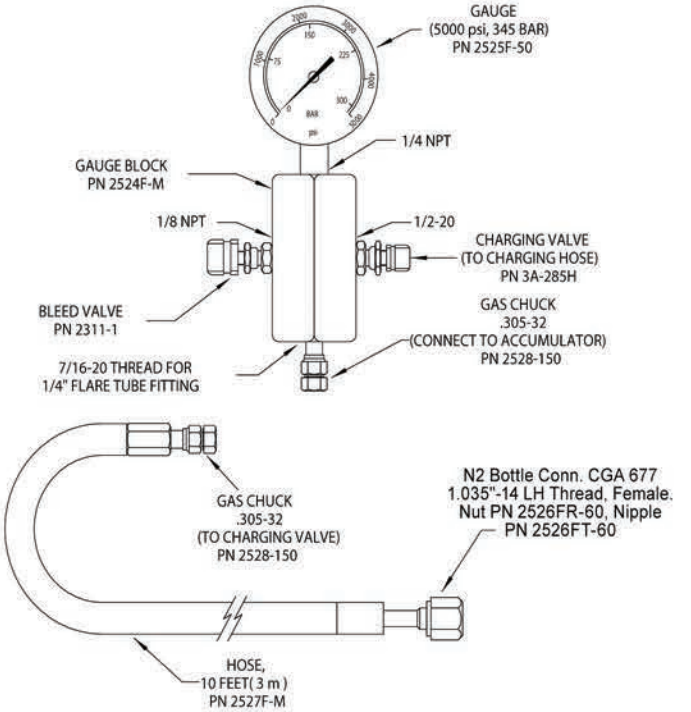


Nitrogen Charging Assemblies

5,000 PSI (345 Bar)

PART NUMBER	ITEM
G2525F-M	GAUGE ASSEMBLY
G2527F-M	CHARGING HOSE ASSEMBLY
GG2527F-M	COMPLETE CHARGING GAUGE & HOSE ASSEMBLY
GG2527F-M-C	COMPLETE CHARGING GAUGE & HOSE ASSEMBLY W/CASE

Specifications subject to change without notice



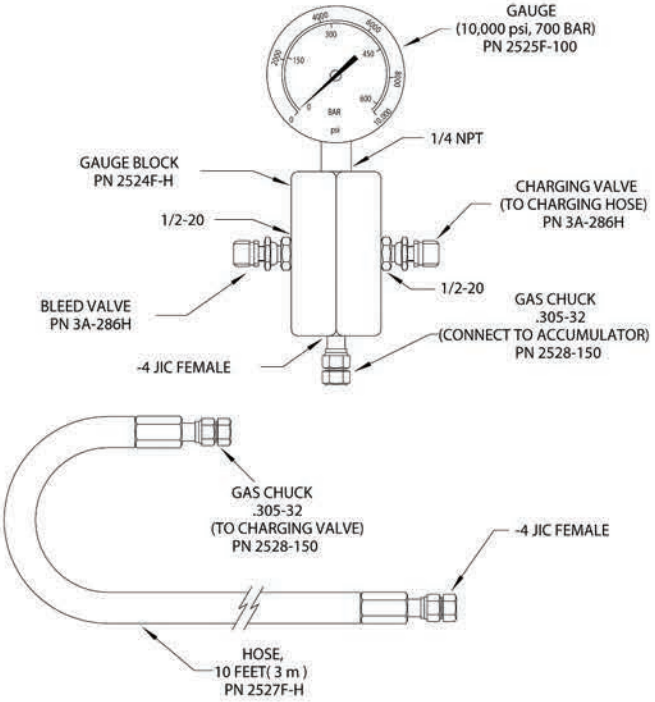
Illustrations are representational and not necessarily indicative of how any particular model will be built.

Nitrogen Charging Assemblies

10,000 PSI (690 Bar)

PART NUMBER	ITEM
G2525F-H	GAUGE ASSEMBLY
G2527F-H	CHARGING HOSE ASSEMBLY
GG2527F-H	COMPLETE CHARGING GAUGE & HOSE ASSEMBLY
GG2527F-H-C	COMPLETE CHARGING GAUGE & HOSE ASSEMBLY W/CASE

Specifications subject to change without notice



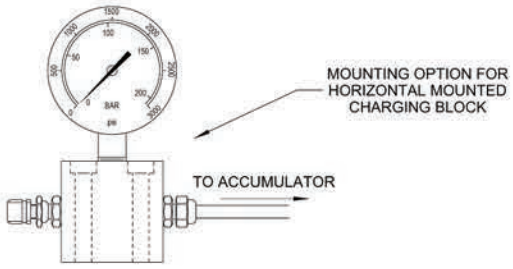
Remote Nitrogen Charging Assemblies

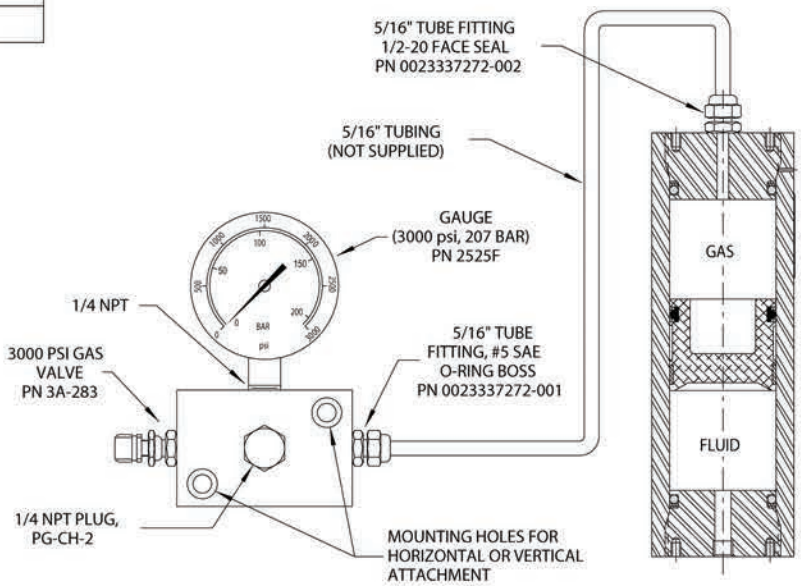
3,000 PSI (207 Bar)

PART NUMBER	ITEM
G2526FB	REMOTE CHARGING BLOCK ASSEMBLY
G2526FBB	REMOTE CHARGING BLOCK ASSEMBLY, BLADDER

Use G2526FBB with bladder type accumulators; substitutes SAE-3 face seal fitting for 1/2-20 face seal

Specifications subject to change without notice



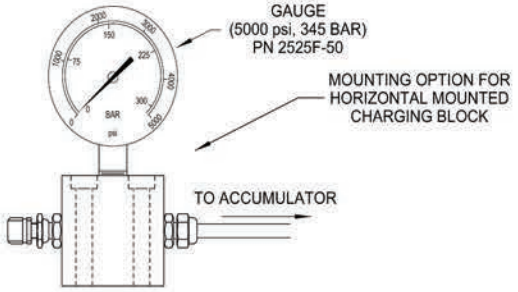


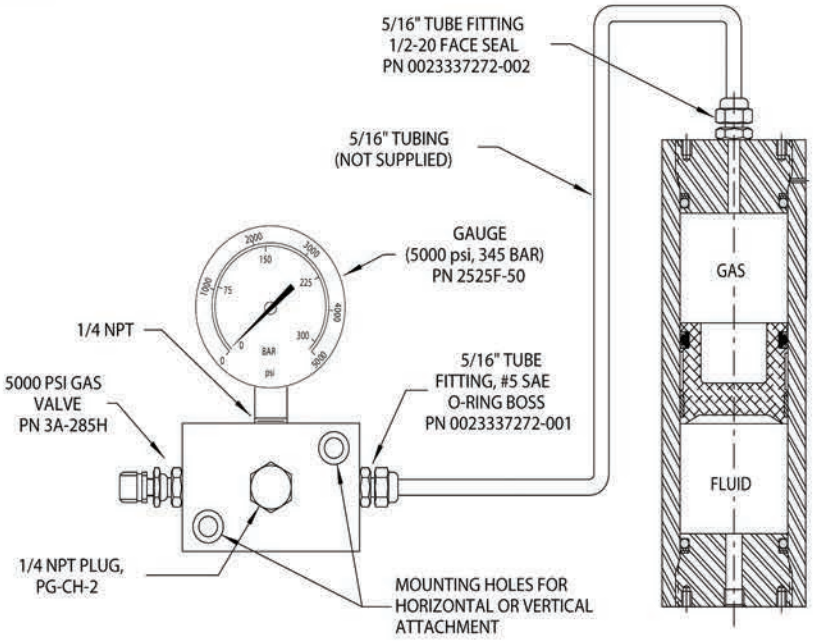
Remote Nitrogen Charging Assemblies

5,000 PSI (345 Bar)

PART NUMBER	ITEM
G2526FB-M	REMOTE CHARGING BLOCK ASSEMBLY

Specifications subject to change without notice



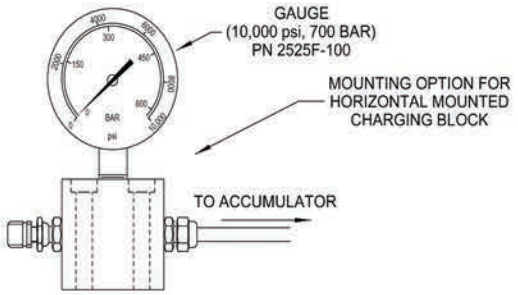


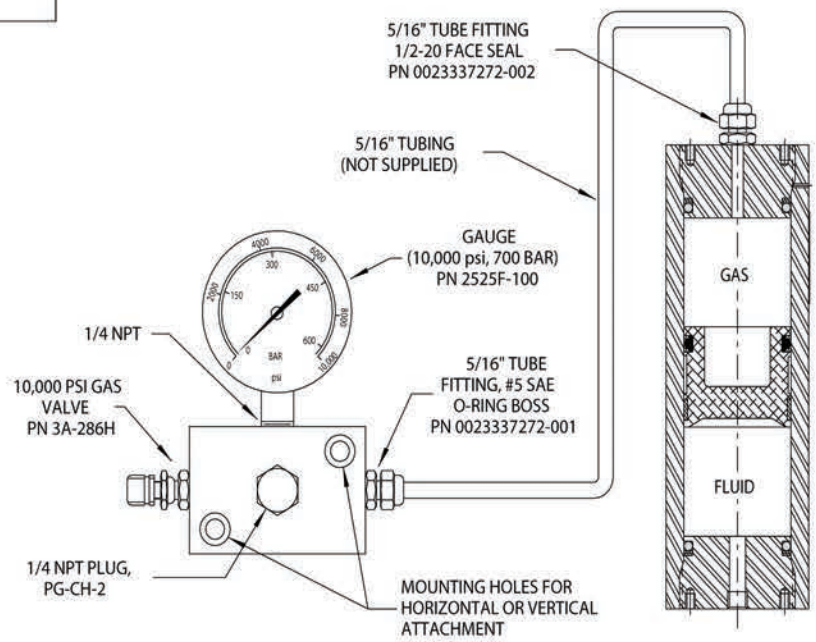
Remote Nitrogen Charging Assemblies

10,000 PSI (690 Bar)

PART NUMBER	ITEM
G2526FB-H	REMOTE CHARGING BLOCK ASSEMBLY

Specifications subject to change without notice

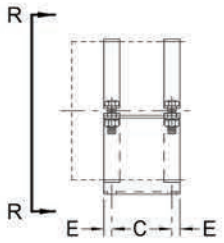


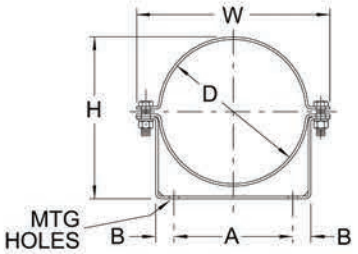


Illustrations are representational and not necessarily indicative of how any particular model will be built.

Mounting Brackets Piston Type

Upper Brackets & Pairs/Sets





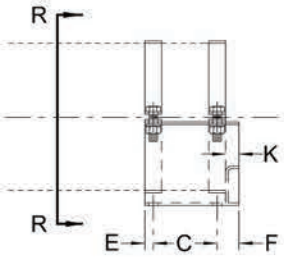
PART NUMBER	DESCRIPTION	DIMENSION															
		D		W		H		A		B		C		E		MOUNTING HOLES	
		In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.
MB022-UB	022AL Series, Upper Bracket	2.3	57	4	102	3	77	1.5	38	.5	13	3	76	.4	10	.4	10
MB022-PR	022AL Series, Set of two upper Brackets																
MB030-UB	030AT30/032AT50 Series, Upper Brackets	3	76	4.8	121	3.8	96	2	51	.6	16	3.3	83	.4	10	.4	10
MB030-PR	03AT30/032AT50 Series, Set of two upper Brackets																
MB047-UB	045AL/047A30 (EBR20/30–1 Qt. Series), Upper Brkt	4	102	5.8	148	5	127	3	76	.6	16	3.8	95	.4	10	.4	10
MB047-PR	045AL/047A30 (EBR20/30–1 Qt. Series), Set of 2 upper brackets																
MB040-UB	040A100 Series, Upper Bracket	4.7	119	6.4	162	5.7	145	3.5	89	.7	17	3.8	95	.4	10	.4	10
MB040-PR	040A100 Series, Set of two upper brackets																
MB052-UB	052A50 Series (EBR50/60–1 Qt. Series), Upper Brkt	5.2	133	7.2	181	6.1	155	3.5	89	1.1	27	3.8	95	.4	10	.4	10
MB052-PR	052A50 Series, (EBR50/60–1 Qt. Series), Set of 2 upper brackets																
MB067-UB	067A20/067A30 Series, Upper Bracket	6.8	171	9.9	251	8.2	208	5	127	1.3	32	4.8	121	.6	14	.6	14
MB067-LB	067A20/067A30 Series, Lower Bracket																
MB067-PR	067A20/067A30, Set (1 Upper/1 Lower)																
MB090-UB	090A30/090A50 Series, Upper Bracket	9	229	*12.6*	*321*	*10.3*	*262*	*7*	*178*	1.4	*35*	*4.8*	*121*	*.7*	*17*	*.7*	*17*
MB090-LB	090A30/090A50 Series, Lower Bracket																
MB090-PR	090A30/090A50 Series, Set (1 Upper/1 Lower)																
MB140-UB	140A30 Series, Upper Bracket	14	*356*	*26.6*	*676*	*18.6*	*473*	*23.1*	*587*	*1.8*	*46*	*8*	*203*	*.7*	*17*	*.7*	*17*
MB140-PR	140A30 Series, Set (1 Upper/1 Lower)																

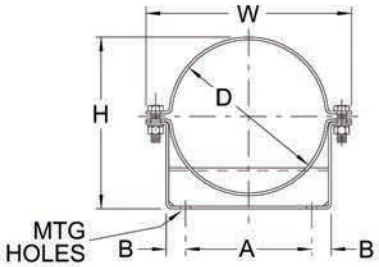
*Pair consists of one upper bracket & one lower bracket.

Specifications subject to change without notice

Lower Mounting Brackets

PART NUMBER	DESCRIPTION	DIMENSIONS			
		F		K	
		IN	MM	IN	MM
MB067-LB	067A20/067A30 Series, Lower Bracket	1.3	32	.7	16
MB090-LB	090A30/090A50 Series, Lower Bracket	1.7	41	1	25
MB140-UB	140A30 Series, Upper Bracket	12	305	4	102



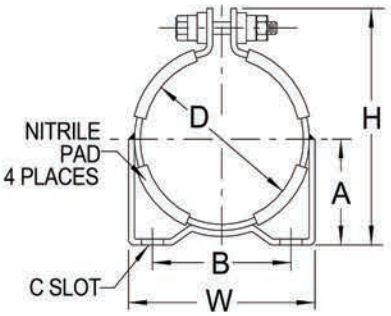


Mounting Brackets Bladder Type

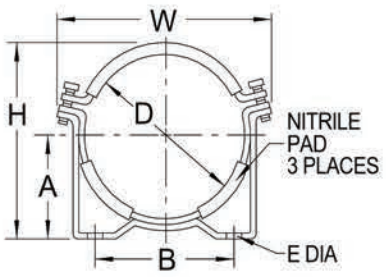
BRACKET SETS (INCLUDES ONE UPPER & ONE LOWER EXCEPT WHERE NOTED)	
PART NUMBER	**USED ON ACCUMULATOR SERIES**
TMB-TBR30-1	TBR30, 1 GALLON
TMB-TBR30	TBR30, 2.5 TO 15 GALLON
TMB-TBR30-SD	3 PIECE SEVERE DUTY (2@ MB-TBR30-BU & 1@ MB-TBR30-BL)
TMB-TBR50	TBR50, 2.5 TO 15 GALLON
TMB-TBR50-SD	3 PIECE SEVERE DUTY (2@ MB-TBR50-BU & 1@ MB-TBR50-BL)

Specifications subject to change without notice

Single Bolt - For use on one quart & one gallon units



Double Bolt - For use on larger 2.5, 5, 10, & 15 gallon units

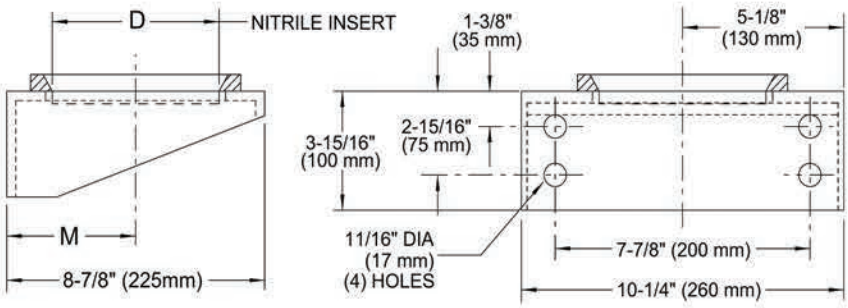


Upper Mounting Brackets

PART NUMBER	ACCUMULATOR SERIES	STYLE	DIMENSION															
			D		W		H		A		B		C-SLOT		E-DIA.		STRAP/BRACKET WIDTH	
			In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.
MB-TBR30-BU.2	TBR30, 1 QUART	SINGLE BOLT	4.6	117	5.2	133	6.5	165	2.9	73	3.9	100	0.375 X 0.5	9 X 13	NA	NA	1.25	32
MB-TBR30-BU1	TBR30, 1 GALLON	SINGLE BOLT	6.9	175	7.5	190	9	229	4.0	100	6	152	0.375 X 0.5	9 X 13	NA	NA	1.25	32
MB-TBR30-BU	TBR30, 2.5 TO 15 GALLON	DOUBLE BOLT	9.1	231	13	330	10.2	259	4.9	124	8.5	216	NA	NA	0.59	15	1.58	40
MB-TBR50-BU	TBR50, 2.5 TO 15 GALLON	DOUBLE BOLT	9.9	251	13	330	10.6	269	4.9	124	8.5	216	NA	NA	0.59	15	1.58	40

Specifications subject to change without notice

Lower Mounting Brackets



PART NUMBER	ACCUMULATOR SERIES	DESCRIPTION	DIMENSION				NITRILE GROMMET PART NUMBER
			D		M		
			In.	mm.	In.	mm.	
MB-TBR30-BL1	TBR30, 1 GALLON	SINGLE BOLT	4.25	108	3.953	100	MB-TBR30-GR1
MB-TBR30-BL	TBR30, 2.5 TO 15 GALLON	DOUBLE BOLT	6.3125	160	4.875	124	MB-TBR30-GR
MB-TBR50-BL	TBR50, 2.5 TO 15 GALLON	DOUBLE BOLT	6.3125	160	4.875	124	MB-TBR30-GR

Specifications subject to change without notice

Illustrations are representational and not necessarily indicative of how any particular model will be built.

Safety Shutoff Valves

Tobul Safety Shutoff Valves (TSV30/50) are designed to protect hydraulic systems from excess pressure; shut off hydraulic flow and isolate accumulators from the hydraulic system; and bleed off/discharge system pressure from accumulators and associated equipment. The optional electrical solenoid cartridge valve allows for the automatic release/bleed off of accumulator/system fluid pressure in the case of an emergency shutdown or loss of electrical power.

The Tobul TSV30/50 consists of a main ball valve shutoff in an all steel body; a manually operated needle-type pressure bleed cartridge valve; and an automatic overpressure relief cartridge valve, with various models designed for use in 3000 PSI or 5000 PSI systems. Additional porting is provided for a drain to reservoir/tank, and an optional sensor/gauge.

With a straight-through, free flow manual ball valve of ½" to 2" diameter (SAE O-ring style), the Tobul TSV has the capability to meet industries' diverse requirements for a durable, adaptable, cost-effective safety shutoff valve series for use with many types of accumulators and hydraulic systems.

- Safety shutoff valve provides manual isolation of the accumulator from the hydraulic system
- All valves have a straight-through, unrestricted full-flow opening
- Each valve incorporates a safety lock-out feature to prevent unauthorized operation; this conforms to OSHA's "Lock Out-Tag Out" program
- Non adjustable factory pre-set pressure relief valve prevents over pressurization of isolated accumulator
- Easy one hand operation
- Optional Electric solenoid pressure relief valve can be ordered normally open or normally closed to meet system requirements
- Machined from high grade steel with black oxide coating

Illustrations are representational and not necessarily indicative of how any particular model will be built.

TSV Series - Safety Shutoff Valve

3,000 PSI (207 Bar) and 5,000 PSI (340 Bar) Hydraulic Systems

Part Number Construction

TSV [ ] — [ ] [ ] [ ] [ ] [ ] [ ] — [ ]

Pressure
30 = 3,000 PSI (207 Bar)
50 = 5,000 PSI (340 Bar)

Solenoid Function
0 = None
1 = Normally Open (NO)*
2 = Normally Closed (NC)*
NOTE: Only available with (S) solenoid valve and manual valve

Pressure Release
M = Manual Valve
S = Solenoid Valve** and Manual Valve
****NOTE: Must specify NO or NC solenoid function***

Size
07 = 0.75 (SAE12)
10 = 1.00 (SAE16)
15 = 1.50 (SAE24)
20 = 2.00 (SAE32)

Seal Material
N = Buna-N
V = Viton

Voltage
0 = None
1 = AC115 - 60 Hz
2 = AC220 - 60 Hz
3 = DC12V
4 = DC24V
5 = Other

Pressure Release
Valve Setting
33 = 3,300 PSI (Bar 227.5)
53 = 5,300 PSI (Bar 365.4)

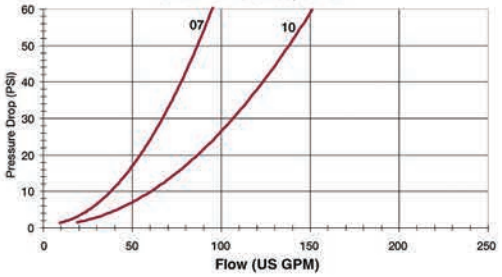
Example: **TSV** [30] — [0] [M] [10] [V] [0] — [33]

Description: 3,000 PSI (207 Bar) Safety Shutoff Valve, No Solenoid, Manual Valve, 1 inch (SAE16) System and Accumulator Ports, Viton Seal Material, 3,300 Pressure Release

Pressure Drop Charts

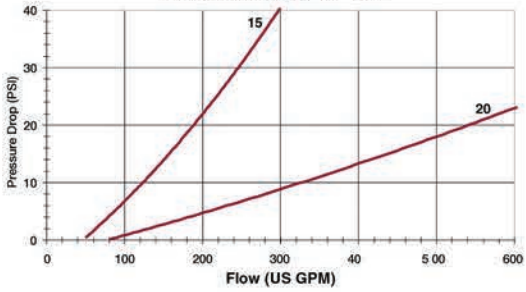
Through Safety Shutoff Valve

Small Valve Sizes, ½" to 1"

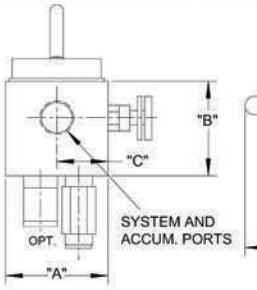


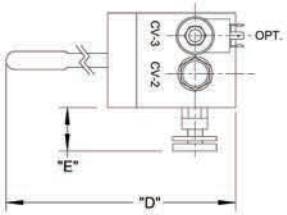
Through Safety Shutoff Valve

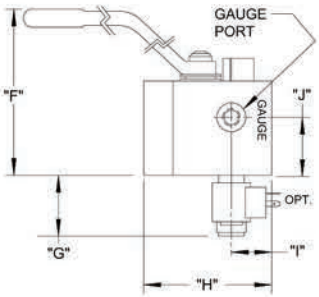
Large Valve Sizes, 1½" to 2"

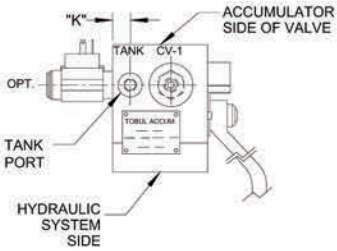


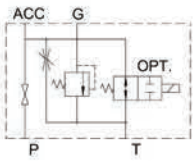
Dimensional Information











Dimensions

SYSTEM & ACCUMULATOR	A		B		C		D		E		F		G		H		I		J		K		GAUGE	TANK
PORT SIZE	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	In	mm	PORT	PORT
3/4 (SAE 12)	3.5	88.9	3.25	82.5	1.75	44.5	9.5	241	1.38	35.1	5.75	144.7	2.25	57.2	4.34	110.2	1.38	35.1	2	50.8	0.6	15.2	SAE 4	SAE 4
1 (SAE 16)	3.75	99.3	3.5	88.9	1.88	47.8	9.5	241	1.38	35.1	6	152.4	2.25	57.2	4.34	110.2	1.25	31.8	2.14	54.4	0.61	15.5	SAE 4	SAE 4
1-1/2 (SAE 24)	4.25	114.3	4.25	107.9	2.25	57.2	12.5	319	1.38	35.1	7.38	187.3	2.25	57.2	5.46	138.6	1.25	31.8	2.14	54.4	0.61	15.5	SAE 4	SAE 4
2 (SAE 32)	5.5	139.7	5	127	2.75	69.8	12.75	324	1.38	35.1	8.13	206.3	2.25	57.2	6.21	157.7	1.25	31.8	2.5	63.5	0.61	15.5	SAE 4	SAE 4

Dimensions are for reference only, all critical dimensions should be verified - consult factory for certified drawings

Product Safety Guidelines

WARNING! The improper selection and/or use and/or improper installation and/or maintenance of accumulators and related accessories can result in failure and/or death and/or personal injury and/or property damage.

Prior to the selection or installation or use of any Tobul Accumulator or related accessories, it is important that the user read, understand and follow all safety information.

OVERVIEW

Due to the wide variety of accumulator (hereafter referred to as "products") applications and operating conditions, Tobul Accumulator, Inc. does not warrant any particular product or products as suitable for any specific application. This safety guide does not consider and/or attempt to analyze all technical information and hydraulic system parameters which must be considered in selection of products.

Each user, through their own analysis, is solely responsible for determining the final selection of products and related accessories. The user shall be responsible for determining if the products are required to meet specific design requirements as required by any governmental agencies or industry standards applicable to the design of the user's equipment. User must insure that all safety requirements are met and safety guidelines are followed and that the particular use/application of any product and accessories presents no health or safety hazards. The user is also responsible for providing all appropriate health and safety warnings on the equipment on which the products will be used and/or installed.

SEAL SELECTION CRITERIA

When selecting the seals for a particular application, it is extremely important to read and understand all pertinent information on the operating fluids to be used in the system or contact Tobul engineering for assistance. A wide variety of fluids can be utilized in systems and can occasionally have deleterious effects on the accumulator seals if the seal compounds are not compatible with the fluids. Additionally, dynamic seals are wear items. The rate of wear depends on many factors and can rapidly increase if the product and/or the system and/or the system fluid is not properly maintained/filtered.

ACCUMULATOR MOUNTING and PORTING CONSIDERATIONS

Tobul Accumulator, Inc. recommends mounting of accumulators in a vertical configuration (with the fluid port on the bottom) for optimum performance. This configuration minimizes the chance that system/fluid contaminants may be deposited within the accumulator, as may occur when accumulators are mounted horizontally. Horizontal orientation and/or contamination can result in premature seal wear and/or premature failure.

Installers/users must insure accumulators are mounted securely, and the hydraulic system plumbing should never be the sole method of mounting. When "U-Bolt" type clamps are utilized, the installer/user must insure the clamps are not excessively tightened, especially on piston-type accumulators, to prevent distortion of the pressure vessel wall. Welding mounting brackets to any type of accumulator is NOT recommended.

Accumulator ports must be sufficiently sized to provide the required fluid flow as specified by the user, but must also be of a recommended design for the pressure rating of the system. The preferred port type is one sealed by an elastomeric seal designed for the system pressure, rather than an interference fit such as a pipe thread.

ACCUMULATOR PRE-CHARGE

WARNING!

ACCUMULATORS SHOULD BE CHARGED ONLY WITH AN INERT GAS, SUCH AS DRY NITROGEN. NEVER USE OXYGEN!

Only qualified personnel following the manufacturer's instructions and utilizing only components specified by the accumulator manufacturer should perform pre-charging of an accumulator, or the periodic checking of proper pre-charge. Accumulators function due to differential pressures. The specific differential within the system is determined by the system's operating parameters. Variation from this pressure will cause the system to degrade in performance.

REPAIRS AND MODIFICATIONS

Tobul products are NOT to be disassembled and/or modified after leaving the manufacturer. If products require modifications, these modifications must be performed by Tobul Accumulator, Inc. or by a factory authorized facility. Disassembly of any Tobul product for the purpose of preventive maintenance and/or seal replacement is allowed ONLY after proper factory authorized training of all involved personnel.

ALL ACCUMULATORS ARE PRESSURE VESSELS AND MUST BE HANDLED WITH THE UTMOST CARE BY QUALIFIED PERSONNEL ONLY!

Tobul
Accumulator