

AB330 Series

Bladder Accumulators
Operating Pressure: 315 Bar
Nominal Volume: 4~57 L

Updated 10.24



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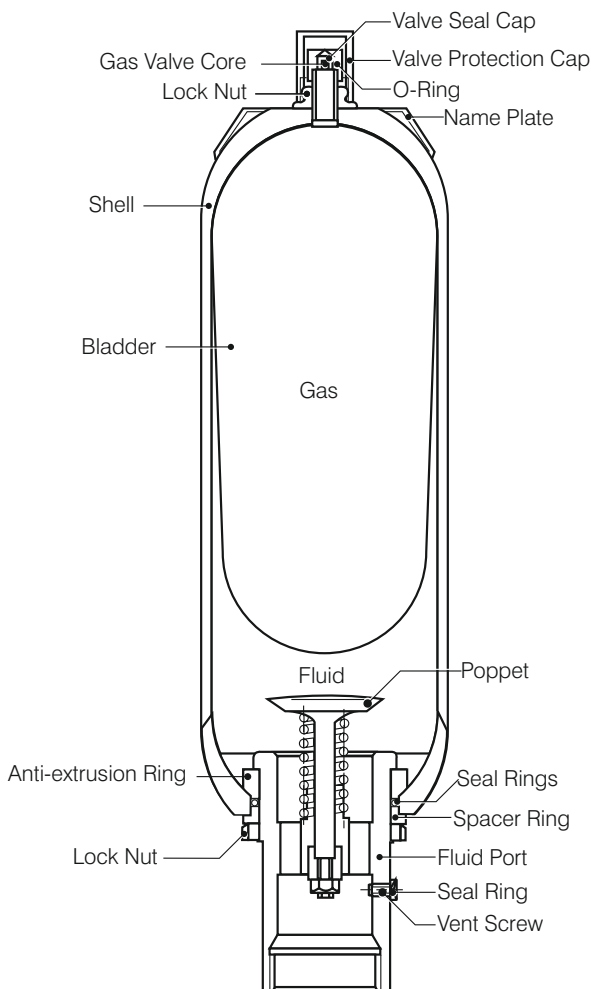
Introduction

Description

Bladder accumulators are a very versatile and cost effective option for numerous types of hydraulic systems involving energy storage, shock absorption, pulsation dampening, leakage loss compensation and volume compensation. They are a first choice for a great variety of general applications and have the widest range of standard sizes and model options. Bladder accumulators also have very quick shock response characteristics in sizes much larger than diaphragm accumulators.

Construction

THM bladder accumulators consist of a welded or forged pressure vessel (shell), a bladder and ports for gas and fluid inlet. The gas and fluid sides are separated by the bladder.



Bladder Materials

Not all fluids are compatible with every elastomer at all temperatures.

Therefore, THM offers the following choice of elastomers:

- NBR (Standard Nitrile)
- LT-NBR (Low Temperature Nitrile)
- ELT-NBR (Extra Low Temperature Nitrile)
- ECO (Epichlorohydrin)
- IIR (Butyl)
- FPM (Fluoroelastomer)
- Others (available upon request)

To determine which material is appropriate...

ALWAYS REFER TO FLUID MANUFACTURER'S RECOMMENDATION

Corrosion Protection

For use with certain aggressive or corrosive fluids, or in a corrosive environment, THM offers protective coatings and corrosive resistant materials (i.e. stainless steel) for the accumulator parts that come in contact with the fluid, or are exposed to the hostile environment

Mounting Position

THM bladder accumulators can be installed in any orientation depending upon the application. When installing vertically or at an angle, the fluid port must be at the bottom. On certain applications listed below, specific positions are preferable:

- Energy Storage:

vertical

- Pulsation Dampening:

any position from vertical to horizontal

- Maintaining Constant Pressure:

any position from vertical to horizontal

- Volume Compensation:

any position from vertical to horizontal

Caution: Mounting a THM bladder accumulator

horizontally or at an angle will decrease the amount of usable volume available.

System Mounting

THM bladder accumulators are designed to be screwed directly onto the system. We also recommend the use of our mounting components, which are detailed on page H25, to minimize risk of failure due to system vibrations.

Applications

Some common applications of bladder accumulators are:

- Agricultural Machinery & Equipment
- Forestry Equipment
- Oil Field & Offshore
- Machine Tools
- Mining Machinery & Equipment
- Mobile & Construction Equipment
- Off-Road Equipment

For specific examples of applications using bladder accumulators,



Ordering Code

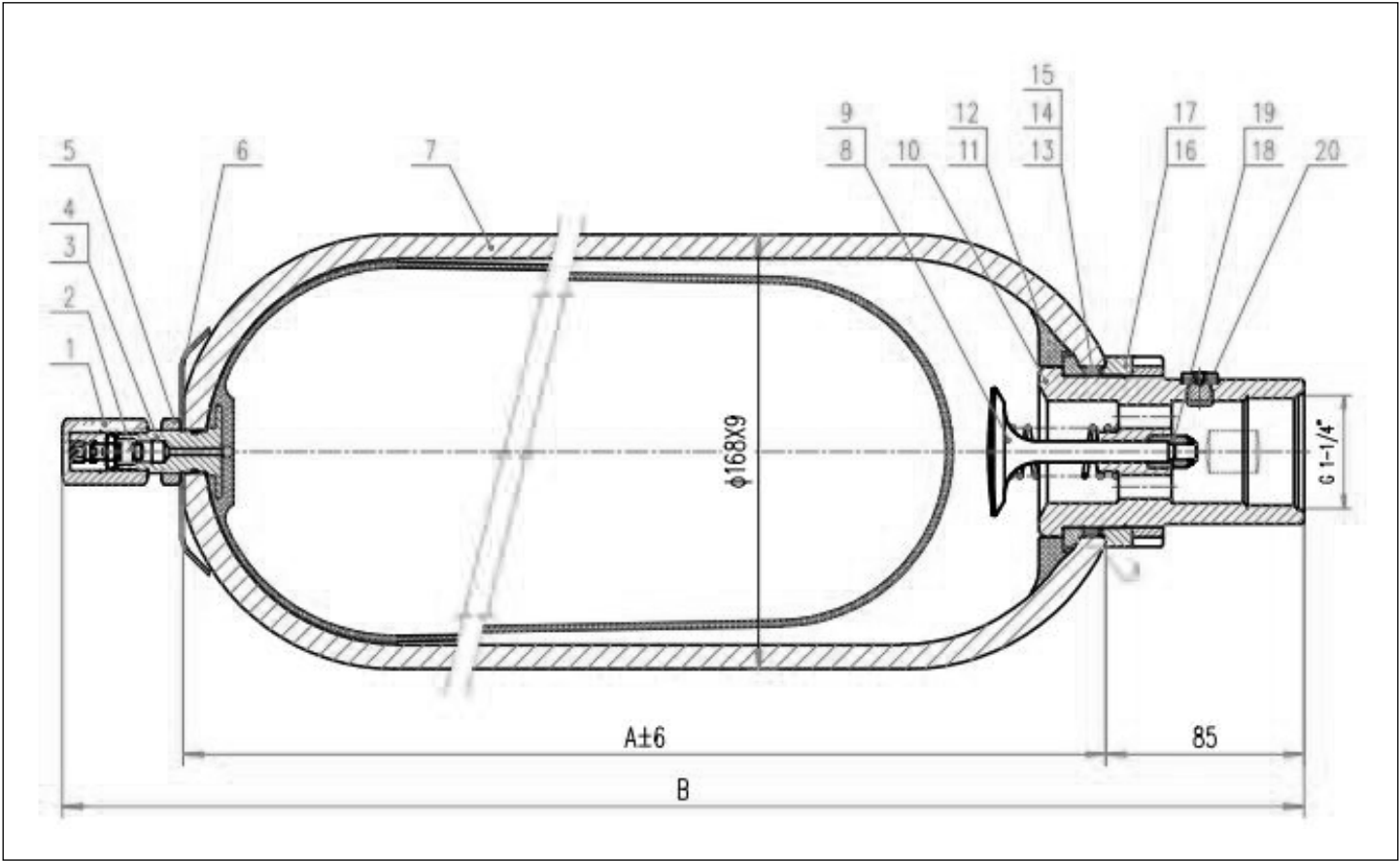
AB330						1 / 1 / 2					
Series = AB330											
Type code											
Standard = No code											
High flow = H											
Flow-optimised valve, fluid side = N											
Shock absorber = A											
Pulsation damper = P											
Bladder top-repairable = B											
Bladder with foam filling = E											
Bladder integrity system, industry version (others on request) = DA											
Light-weight = L											
Combinations must be agreed with THM											
Nominal Volume (L) 4, 6.3, 10, 20, 32, 50											
Fluid Port											
Standard connection, thread with internal seal face = A											
Flange connection = F											
Valve mounting with screws on underside = C											
Sealing surfaces on front interface (e.g. on thread M50x1.5 – valve) = E											
External thread = G											
Special connection, to customer specification = S											
Gas side											
Standard design = 1											
Back-up version 4) = 2											
Gas valve 7/8-14UNF with M8 internal thread = 3											
Gas valve 7/8-14UNF with gas valve connection 5/8-18UNF = 4											
Gas valve M50x1.5 in accumulators smaller than 50 l = 5											
7/8-14UNF gas valve = 6											
M28x1.5 gas valve = 7											
M16x1.5 gas valve = 8											
(with M14x1.5 bore in gas valve)											
special gas valve, to customer specification = 9											
Gas-side connection, standard model											
Series	Volume(L)	Gas valve type									
SB330	<50	7/8-14UNF									
	≥50	M50x1.5 / 7/8-14UNF									
		Pre-charge pressure p ₀ (bar) at 20 °C, must be stated clearly, if required!									
		Connection, fluid side Thread, codes for fluid port : A, C, E, G									
		A = thread to ISO228 (BSP)									
		B = thread to DIN13 or ISO965/1 (metric)									
		C = thread to ANSI B1.1 (UN..-2B seal SAE J 514)									
		D = thread to ANSI B1.20.1 (NPT)									
		S = special thread, to customer specification									
		Flange, codes for fluid port: F									
		A = EN 1092-1 welding neck flange									
		B = flange ASME B16.5									
		C = SAE flange 3000 psi									
		D = SAE flange 6000 psi									
		S = special flange, to customer specification									
		315 = Permitted operating pressure [bar]									
		Accumulator bladder									
		2 = NBR									
		3 = ECO									
		4 = IIR									
		6 = FKM									
		7 = other									
		Accumulator shell									
		0 = Plastic coated (internally)									
		1 = Carbon steel									
		2 = Chemically nickel-plated (internal coating)									
		4 = Stainless steel									
		6 = Low temperature steel									
		Fluid port									
		1 = Carbon steel									
		2 = High tensile steel									
		3 = Stainless steel									
		6 = Low temperature steel									

Standard Design : 112



Unit Dimensions for Volume 4 & 6

(Dimensions in mm)



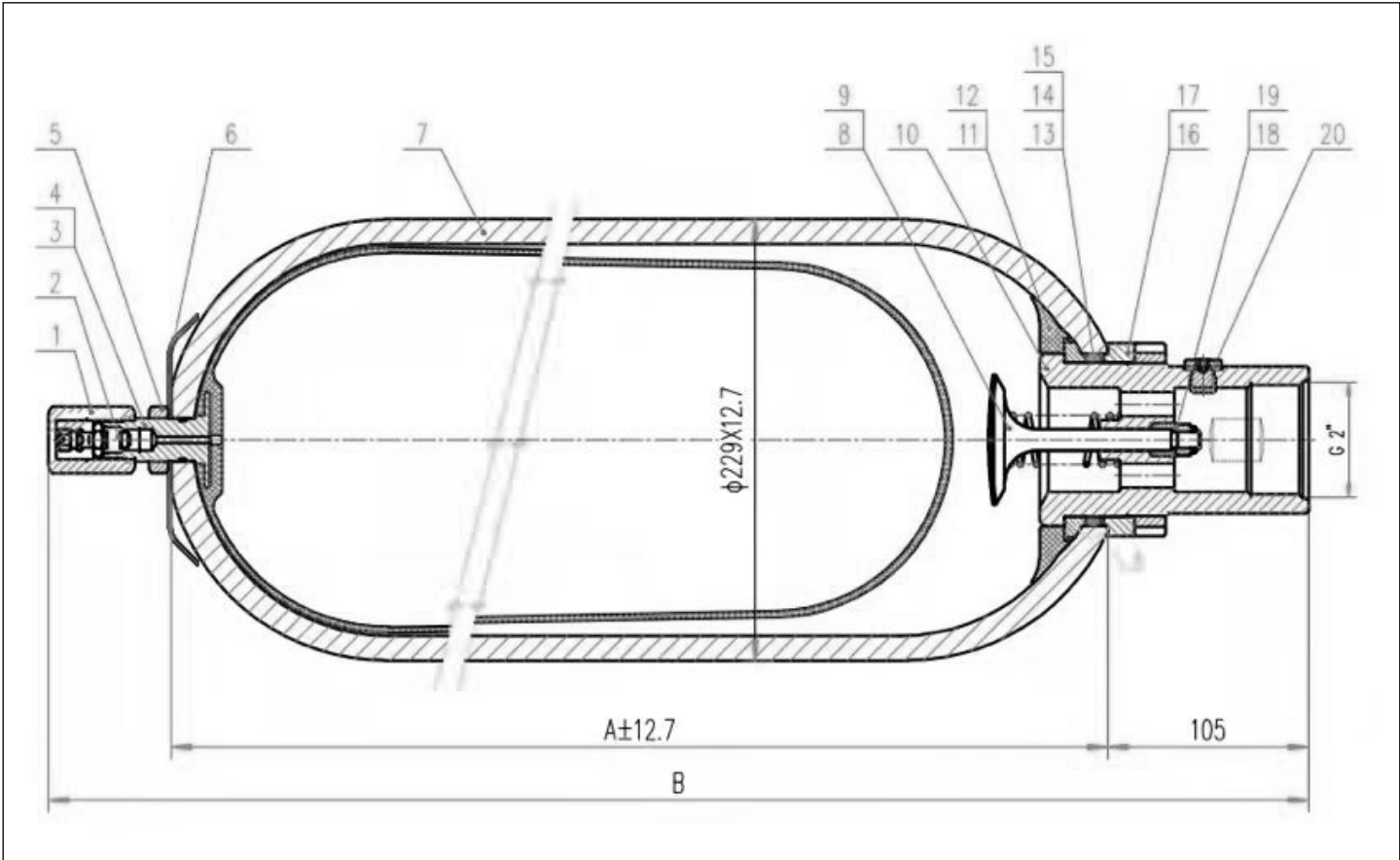
Technical Data Sheet			
Max Working Pressure (MPa)	31.5	Design Pressure (MPa)	31.5
Working Temperature °C	-20~93	Design Temperature °C	93
Working Medium	Nitrogen, Petroleum Based Hydraulic Oil		

Design Pressure (MPa)	Nominal Volume (L)	A (mm)	B (mm)	Nominal Shell thickness (mm)	Design Shell thickness (mm)	Weight (Kg)
31.5	4	280	420	10	8.1	16
	6	397	537			20



Unit Dimensions for Volume 10, 20, 32, 42, 50, 57

(Dimensions in mm)



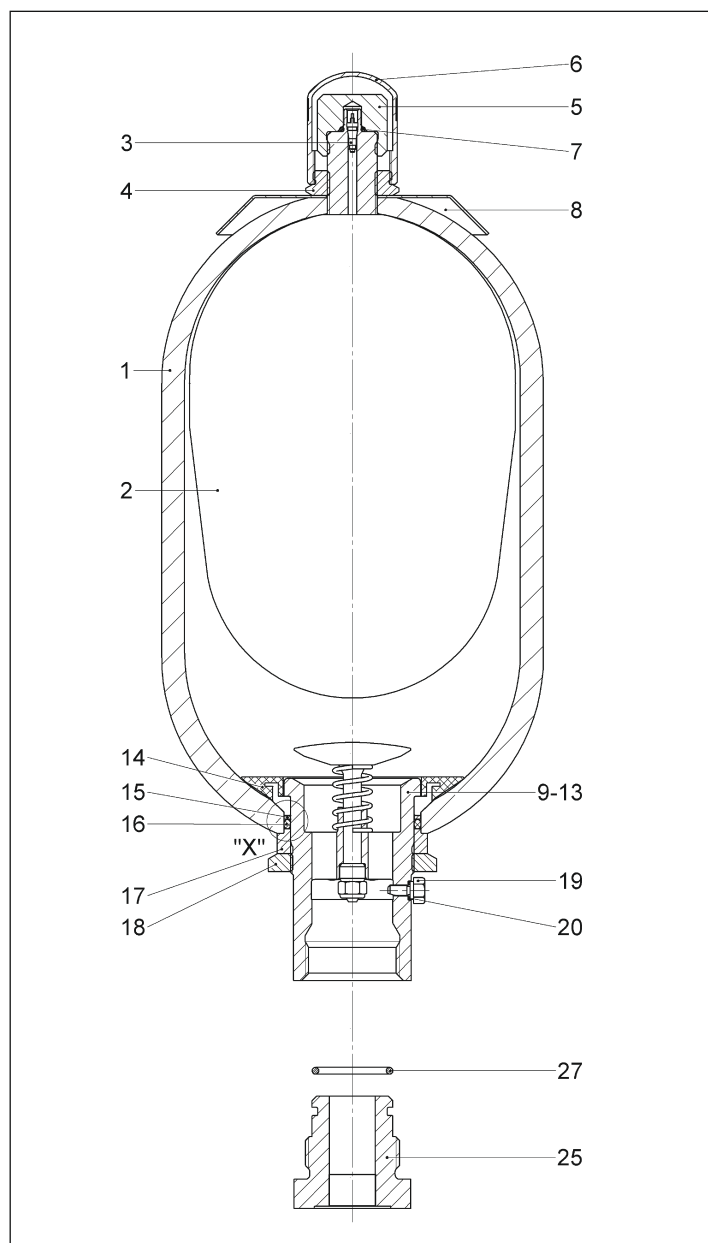
Technical Data Sheet			
Max Working Pressure (MPa)	31.5	Design Pressure (MPa)	31.5
Working Temperature °C	-20~93	Design Temperature °C	93
Working Medium	Nitrogen, Petroleum Based Hydraulic Oil		

Design Pressure (MPa)	Nominal Volume (L)	A (mm)	B (mm)	Nominal Shell Thickness (mm)	Design Shell Thickness (mm)	Weight (Kg)
31.5	10L	397	565	12.7	10.73	33
	20L	708	875			53
	32L	1245	1415			96
	42L	1375	1545			105
	50L	1650	1820			120
	57L	1830	1998			137



Spare Parts

AB330



Description	
Bladder assembly consisting of:	
Bladder	2
Gas valve insert	3
Lock nut	4
Seal cap	5
Protective cap	6
O-ring	7
Seal kit consisting of:	
O-ring	7
Washer	15
O-ring	16
Vent screw	19
Support ring	23
O-ring	27
Repair kit consisting of	
Bladder assembly (see above)	
Seal kit (see above)	
Oil valve assembly consisting of:	
Valve	9-13
Anti-extrusion ring	14
Washer	15
O-ring	16
Spacer	17
Groove nut	18
Vent screw	19
Support ring	23

Gas charging

Hydraulic accumulators must only be charged with nitrogen. Never use other gases.

Risk of explosion!

In principle, only use nitrogen of at least Class 4.0 (filtration < 3 µm).

If other gases are to be used, please contact THM for advice.

Limits for gas pre-charge pressure

$$p_0 \leq 0.9 \cdot p_1$$

with a permitted pressure ratio of:

$$p_2 : p_0 \leq 4 : 1$$

p_2 = max. operating pressure

p_0 = pre-charge pressure

The specified values are maximum values and must not be considered as referring to a permanent load. The tolerable pressure ratio is influenced by the geometry, temperature, fluid and flow rate as well as any gas losses due to physical properties.



Preferred Model Code

SN	Model Code	UID
1	AB330-4-A-1-112-2-315-A	T014511548
2	AB330-6-A-1-112-2-315-A	T014511549
3	AB330-10-A-1-112-2-315-A	T014511550
4	AB330-20-A-1-112-2-315-A	T014511551
5	AB330-32-A-1-112-2-315-A	T014511552
6	AB330-42-A-1-112-2-315-A	T014511716
7	AB330-50-A-1-112-2-315-A	T014511553
8	AB330-57-A-1-112-2-315-A	T014511717



Operation Manual for Bladder Type Accumulator Model : TH-AB



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I. Functions

Accumulator can provide series of functions in a hydraulic system as follows: energy storage and release, pressure stabilization, power dissipation reduction, leakage compensation, pressure fluctuation absorb ability and shock buffering. This product complies with the standard code GB/T 20663.

II. Interpretation of designation

1. Interpretation of designation (GB)

TH-AB □ - □ / □ - □ - □
(1) (2) (3) (4) (5) (6)

- (1) Bladder type Accumulator
- (2) Structure: A: small opening; AB: big opening
- (3) Nominal Capacity: L
- (4) Nominal Pressure: MPa, 10:Pw 10MPa; 20: Pw 20MPa; 31.5:Pw 31.5MPa
- (5) Connection type: L: screw threaded; F: flanged
- (6) Medium: Y: petroleum base hydraulic oil; R: emulsion

2. Interpretation of designation (ASME CODE)

□□ - □ / □ - □ - □
(1) (2) (3) (4) (5)

- (1) BA: Bottom repair; TA: Top Repair
- (2) Nominal Capacity: Gal
- (3) Nominal Pressure: Psi
- (4) Connection type: N: screw threaded; F: flanged
- (5) Medium: petroleum base hydraulic oil

3. Interpretation of designation (CE: PED STANDARD)

TH-AB □ - □ / □ - □ - □
(1) (2) (3) (4) (5) (6)

- (1) Bladder type Accumulator
- (2) Structure: A: small opening; AB: big opening
- (3) Nominal Capacity: L
- (4) Nominal Pressure: MPa, 10:Pw 10MPa; 20: Pw 20MPa; 31.5:Pw 31.5MPa
- (5) Connection type: L: screw threaded; F: flanged
- (6) Medium: Y: petroleum base hydraulic oil; R: emulsion

III. Specifications

- 1. Structure: Big opening, Small opening
- 2. Fastening Method: Dead ring or supporting ring
- 3. Installation: Vertical
- 4. Medium: Petroleum base hydraulic oil, Emulsion
- 5. Working Temperature: >-20 ~ 93°C
- 6. Gas filled in the bladder: Nitrogen

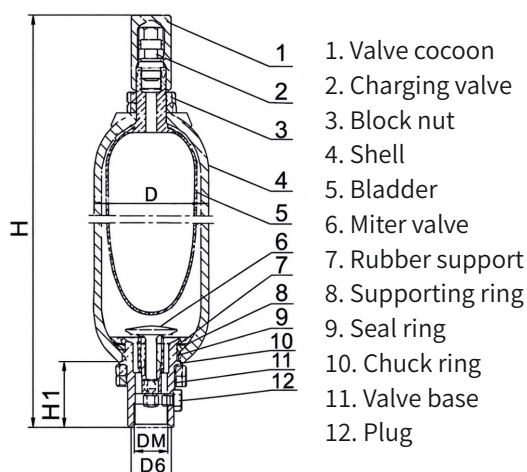


IV. Model and Size

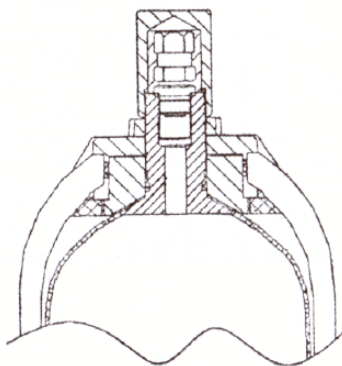
1. Model and Size (GB)

MODEL	Rated Pressure (MPa)	Max. Flow (L/S)		Nominal Capacity (L)	Connection Size (mm)		DIMENSIONS (mm)										N.W. (kg)
		L	F		L	F	DM	ØD1	ØD2	ØD3	ØD4	N-ØD5	ØD6	H1	H2	ØD	
TH-AB※-0.4/※-L/-※	10	1	-	0.4	250	-	M27×2	-	-	-	-	-	32 (32×3.1)	52	-	89	3
TH-AB※-0.63/※-L/-※		1	-	0.63	320	-										114	3.5
TH-AB※-1/※-L/-※		1	-	1	315	-										114	4.9
TH-AB※-1.6/※-L/-※		3.2	6	1.6	355	370	M42×2	40	50 (50×3.1)	97	130	6-Ø17	50 (50×3.1)	66	25	152	12
TH-AB※-2.5/※-L/-※		3.2	6	2.5	420	435											14
TH-AB※-4/※-L/-F/-※		3.2	6	4	530	545											18
TH-AB※-6.3/※-L/-F/-※		3.2	6	6.3	700	715											23
TH-AB※-10/※-L/-F/-※		6	10	10	660	685											38.5
TH-AB※-16/※-L/-F/-※		6	10	16	870	895	M60×2	50	70 (70×3.1)	125	160	6-Ø22	70 (70×3.1)	85	32	219	50.5
TH-AB※-20/※-L/-F/-※		6	10	20	1000	1025											58
TH-AB※-25/※-L/-F/-※		6	10	25	1170	1195											68
TH-AB※-40/※-L/-F/-※		6	10	40	1690	1715											98
TH-AB※-20/※-L/-F/-※	20	10	15	20	690	715	M72×2	60	80 (80×3.1)	150	200	6-Ø26	80 (80×3.1)	105	40	299	86
TH-AB※-25/※-L/-F/-※		10	15	25	780	810											92
TH-AB※-40/※-L/-F/-※		10	15	40	1050	1080											125
TH-AB※-63/※-L/-F/-※		10	15	63	1470	1500											176
TH-AB※-80/※-L/-F/-※		10	15	80	1810	1840											218
TH-AB※-100/※-L/-F/-※		10	15	100	2190	2220											266
TH-AB※-63/※-L/F/-※	31.5	15	20	63	1188	1203	M80×3	80	95 (95×3.1)	170	230	6-Ø26	90 (90×3.1)	115	45	351	191
TH-AB※-80/※-L/F/-※				80	1418	1433											228
TH-AB※-100/※-L/F/-※				100	1688	1703											270
TH-AB※-125/※-L/F/-※				125	2008	2023											322
TH-AB※-160/※-L/F/-※				160	2478	2493											397
TH-AB※-100/※-L/F/-※		20	25	100	1315	1360	M100×3		115 (115×3.1)	220	255	8-Ø26	115 (115×5.7)		50	426	441
TH-AB※-160/※-L/F/-※				160	1915	1960											552
TH-AB※-200/※-L/F/-※				200	2315	2360											663
TH-AB※-250/※-L/F/-※				250	2915	2960											786

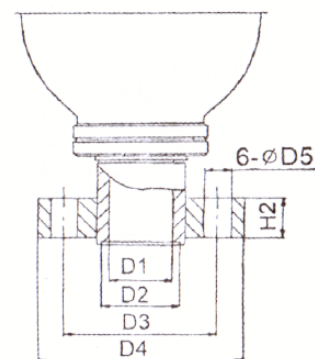
Structure Drawing



Structure Drawing



Flanged Joint Drawing





IV. Model and Size

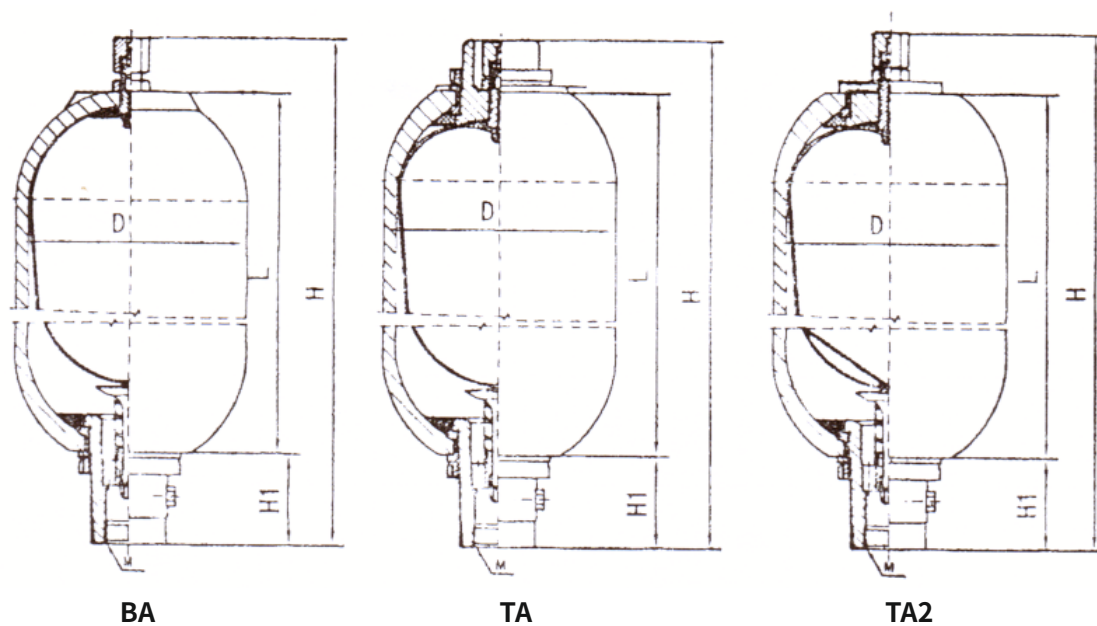
2. Model and Size (ASME)

MODEL	Volume (Capacity)		Dimensions									Net Weight	
			H		L		H1		D		Port (M)		
	gal	L	in	mm	in	mm	in	mm	in	mm	NPT	lb	kg
BA-0.15/3000-※-※	0.15	0.6	12.6	320	7.48	190	2	51	3.5	89	3/4"	8.8	4
BA-0.25/3000-※-※	0.25	1	12.6	320	7.48	190	2	51	4.5	114	3/4"	10.8	4.9
BA-0.6/3000-※-※	0.6	2.5	16.54	420	11.02	280	2.6	66	6	152	1¼"	30	14
BA-1.0/3000-※-※	1	4	20.87	530	15.35	390	2.6	66	6	152	1¼"	40	18
BA (TA)-2.5/3000-※-※	2.5	10	21.56	550	16.14	410	3.5	89	9	229	2"	81	37
BA (TA)-5/3000-※-※	5	20	33.46	850	27.95	710	3.5	89	9	229	2"	125	57
BA (TA)-8/3000-※-※	8	32	47.64	1210	42.13	1070	3.5	89	9	229	2"	154	70
BA (TA)-10/3000-※-※	10	40	56.7	1440	51.18	1300	3.5	89	9	229	2"	209	95
BA (TA)-11/3000-※-※	11	44	61.42	1450	55.9	1420	3.5	89	9	229	2"	227	103
BA (TA)-14/3000-※-※	14	56	75.6	1920	70.08	1780	3.5	89	9	229	2"	275	125
BA (TA)-15/3000-※-※	15	60	80.31	2040	74.8	1900	3.5	89	9	229	2"	293	133

MODEL	Volume (Capacity)		Dimensions									Net Weight	
			H		L		H1		D		Port (M)		
	gal	L	in	mm	in	mm	in	mm	in	mm	NPT	lb	kg
BA-0.15/5000-※-※	0.15	0.6	12.99	330	7.87	200	2	51	3.5	89	3/4"	10	4.5
BA-0.25/5000-※-※	0.25	1	12.99	330	7.87	200			4.5	114	3/4"	12	5.4
BA-0.6/5000-※-※	0.6	2.5	17.32	440	11.81	300	2.6	66	6	152	1¼"	35	16
BA-1.0/5000-※-※	1	4	21.65	550	16.14	410			6	152	1¼"	45	21
BA(TA)-2.5/5000-※-※	2.5	10	23.23	590	17.76	450	3.5	89	9	229	2"	112	51
			21.26	540	15.75	400			9.65	245		112	51
BA(TA)-5/5000-※-※	5	20	35.83	910	30.31	770			9	229		174	79
			32.68	830	27.17	690			9.65	245		176	80
BA(TA)-8/5000-※-※	8	32	51.57	1310	46.06	1170			9	229		249	113
			46.46	1180	40.94	1040			9.65	245		253	115
BA(TA)-10/5000-※-※	10	40	61.42	1560	55.91	1420			9	229		295	134
			55.12	1400	49.61	1260			9.65	245		304	138
BA(TA)-11/5000-※-※	11	44	66.54	1690	61.02	1550			9	229		319	145
			59.84	1520	54.33	1380			9.65	245		330	150
BA(TA)-14/5000-※-※	14	56	81.89	2080	76.38	1940			9	229		394	179
			73.62	1870	68.11	1730			9.65	245		370	186
BA(TA)-15/5000-※-※	15	60	87.01	2210	81.5	2070			9	229		418	190
			78.35	1990	72.83	1850			9.65	245		436	198

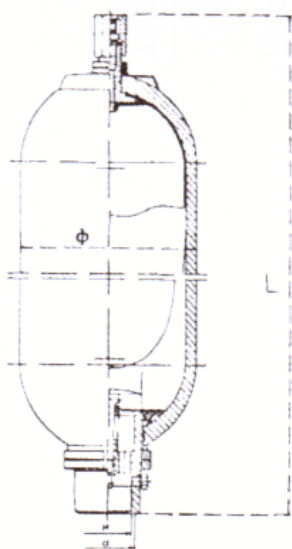


IV. Model and Size

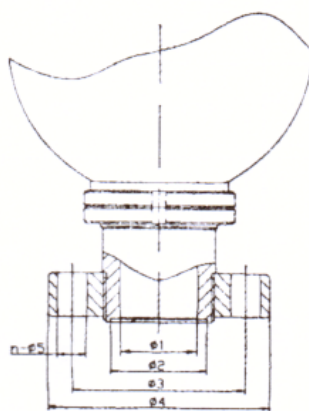


3. Model and Size (CE : PED STANDARD)

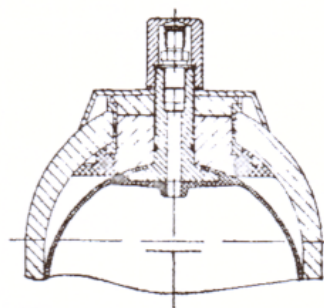
Model	Nominal Capacity (L)	Size (mm)									Weight (kg)
		M	d	Φ1	Φ2	Φ3	Φ4	n-Φ5	L	Φ	
TH-AB- A(AB)-16/34.5-L(F)-Y	16	M60 × 2	70	50	70	125	158	6-Φ21	870	219	50.5
TH-AB- A(AB)-20/34.5-L(F)-Y	20	M60 × 2	70	50	70	125	158	6-Φ21	1000	219	58
TH-AB- A(AB)-25/34.5-L(F)-Y	25	M60 × 2	70	50	70	125	158	6-Φ21	1170	219	68
TH-AB- A(AB)-32/34.5-L(F)-Y	32	M60 × 2	70	50	70	125	158	6-Φ21	1305	219	82
TH-AB- A(AB)-40/34.5-L(F)-Y	40	M60 × 2	70	50	70	125	158	6-Φ21	1690	219	98
TH-AB- A(AB)-50/34.5-L(F)-Y	50	M60 × 2	70	50	70	125	158	6-Φ21	2035	219	118



TH-AB-A(AB)-



TH-AB-A-F



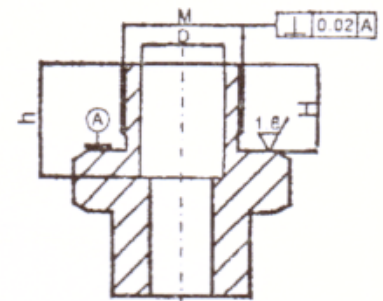
TH-AB-AB



V. Installation

- Accumulators should generally be installed vertically with the gas valve facing upward. Adequate clearance should be left around the accumulator to facilitate maintenance and inspection.
- Fixing the accumulator: The accumulator must be securely supported on a bracket or wall.
- When used for buffering and pulsation absorption, it should be installed as close as possible to the vibration source.
- A check (one-way) valve should be installed between the accumulator and the hydraulic pump to prevent the pressurized oil stored in the accumulator from flowing back when the pump motor stops running.
- A convenient shut-off valve or safety ball valve should be installed between the accumulator and the pipeline system to regulate the oil discharge rate or for use during extended shutdown periods.
- Welding must not be used to fix the accumulator.
- To avoid pinching/damaging the bladder at the fitting connected to the accumulator's oil inlet valve, users should fabricate this fitting according to the requirements shown in the diagram below (schematic diagram).

Capacity (L)	Shell Outer Diameter (mm)	Valve Connection M	Fitting Bore D (mm)	Inner Hole Depth h (mm)	Thread Depth H (mm)
0.4	Ø89, 114	M27x2	Ø18	≥20	16
1-6.3	Ø152	M42x2	≥Ø22	≥30	23
10-40	Ø219	M60x2	≥Ø25	≥40	32
20-100	Ø299	M72x2	≥Ø32	≥50	40
100-250	Ø426	M100x3	≥Ø36	≥60	50



Schematic diagram

VI. Charging of Nitrogen

- Accumulator shall be inspected before nitrogen is charged.
- Nitrogen shall be charged slowly. Rapid charging may damage the bladder.
- The accumulator cannot be used for oxygen, compressed air, flammable gas, corrosive gas and other unidentified gases.
- When charging the nitrogen, please use gas charging device. Gas charging device is one of necessary accessories of the accumulator, and can be used for charging, measuring and adjusting the charging pressure.

Specifications of the gas charging devices are as follow.

Please select the right one accord to the accumulator set pressure.

Pressure of accumulator (Mpa)	Item code	Pressure gauge Range (Mpa)	Pressure gauge Precision	Tube I.D
10	CQJ-16	0-16	1.5	Ø6
20	CQJ-25	0-25	1.5	Ø6
31.5	CQJ-40	0-40	1.5	Ø6

If the pressure in nitrogen bottle is not high enough to meet the charging demand of higher pressure accumulator, please use our specific boost device – CDZ type nitrogen charging cart. The CDZ type nitrogen charging carts are our patented products, which have passed the national technical verification and certification. There are two kinds of products available: hydraulic pilot-operated and solenoid pilot-operated. Detailed specifications can be found below.



VI. Charging of Nitrogen

Solenoid pilot-operated (patent No. ZL03229074.8)

Model	Input Pressure (MPa)	Output Pressure (MPa)	Pump Pressure (MPa)	Pump Flow (L/min)	Pressurizer Ratio	Pressurizer Speed (times/min)	L (mm)	W (mm)	H (mm)	N.W. (kg)
CDZ-25Y1	3 ~ 13.5	25	7	16	01:06	8	800	600	1500	258
CDZ-35Y1	3 ~ 13.5	35	7	16	01:06	8	800	600	1500	258
CDZ-42Y1	3 ~ 13.5	42	7	16	01:07	7	800	600	1500	258

Hydraulic pilot-operated (patent No. Z197229429)

Model	Input Pressure (MPa)	Output Pressure (MPa)	Pump Pressure (MPa)	Pump Flow (L/min)	Gas Volume (L)	Power Supply	L (mm)	W (mm)	H (mm)	N.W. (kg)
CDZ-25D1-1.6L	3 ~ 15	25	31.5	3.75	1.6	3-phase, 380V, 50Hz	730	460	950	150
CDZ-25D1-2.5L	3 ~ 15	25	31.5	7.5	2.5	3-phase, 380V, 50Hz	900	520	1090	245
CDZ-25D1-4L	3 ~ 15	25	31.5	15	4	3-phase, 380V, 50Hz	1300	640	1300	300
CDZ-35D1-1.6L	3 ~ 15	35	50	2.68	1.6	3-phase, 380V, 50Hz	730	460	950	150
CDZ-35D1-2.5L	3 ~ 15	35	50	4.47	2.5	3-phase, 380V, 50Hz	900	520	1090	245
CDZ-35D1-4L	3 ~ 15	35	50	8.95	4	3-phase, 380V, 50Hz	1200	640	1300	300

Please choose the right one according to the accumulator set pressure and charging speed.

1. Charging pressure determination

Charging pressure can be determined according to the intended functions.

- Shock buffering: Charging pressure shall be the normal pressure or a little bit higher than the pressure of system point where the accumulator is installed.
- Absorbing the fluctuation: Charging pressure shall be 60% of the average pressure of fluctuation.
- Energy Storage: Charging pressure shall be lower than 90% of minimum working pressure (generally 60%–80%) and higher than 25% of maximum working pressure.
- Compensation for hot expansion: Charging pressure shall be the minimum pressure or a little lower than the pressure of closed circuit of hydraulic system.



VII. Inspection and repair

1. Inspection of leakage: During the first month after the installation, the gas pressure in the bladder shall be checked every week. From the second month, the pressure shall be checked every month. From the seventh month, the pressure can be checked once per six months. And one year later, the pressure can be checked once per year. Periodic inspection can ensure the best condition, and leakage can be identified and recovered as soon as possible.

Inspection Method: Place an isolation valve or a stop valve in the oil pipe which connect the accumulator oil inlet and the oil box, and install a pressure gauge before the valve.

Open the valve slowly to return the oil back to the oil box and keep watching at the pressure gauge simultaneously. The reading of the gauge will turn down slowly. When the gauge turns down rapidly to zero at a certain point, the gas charging pressure is found. Besides, gas charging device can be used to inspect the pressure, however few gas may be discharged during each inspection.

2. When the accumulator will not be used for a long period, the stop valve shall be closed to ensure that the oil pressure is above the charging pressure.

3. If the accumulator does not take effect, check whether there is leakage due to the charging valve. If there is no nitrogen in the bladder and oil is out of gas-valve, please disassemble the accumulator to check the bladder.

4. Before you disassemble the accumulator, please drain the oil and discharge the nitrogen first. Use the charging device to discharge the nitrogen, then the parts can be de-mounted.

5. If there is oil leakage because of loosening of nuts during the transportation and testing, please check whether seal ring is in the slot. Adjust the seal and fasten the nut. If leakage still exists, please change the parts.

VIII. Appendix

- Oxygen, compressed air, flammable gas, corrosive gas and other unidentified gases are prohibited to be charged into the accumulator.
- Before testing, air in the pipe shall be expelled.
- A safety-valve must be installed in the oil-inlet when the accumulator is larger than 10L.
- Check the nitrogen pressure before the accumulator is used.
- Please keep away from crash, solarization, fire, heat and high temperature resources. If rust corrosion is found, examination and maintenance work shall be performed right away.

