



## Bladder Accumulators

### High Pressure

## 1. DESCRIPTION

### 1.1. FUNCTION

Fluids are practically incompressible and cannot therefore store pressure energy.

The compressibility of a gas (nitrogen) is utilised in hydraulic accumulators for storing fluids.

HYDAC bladder accumulators are based on this principle.

A bladder accumulator consists of a fluid section and a gas section with the bladder acting as the gas-proof screen.

The fluid around the bladder is connected to the hydraulic circuit so that the bladder accumulator draws in fluid when the pressure increases and the gas is compressed. When the pressure drops, the compressed gas expands and forces the stored fluid into the circuit.

HYDAC bladder accumulators can be used in a wide variety of applications and are also available in different pressure ranges, see catalogue sections:

- Bladder Accumulators  
Standard  
No. 3.201
- Bladder Accumulators  
Low Pressure  
No. 3.202
- HYDAC Accumulator Technology  
No. 3.000

### 1.2. DESIGN

The high pressure bladder accumulator consists of the pressure vessel, the flexible bladder with gas valve and the hydraulic connection with check valve.

#### 1.2.1 Shell material

The forged pressure vessel is seamless and manufactured from high tensile chrome molybdenum steel.

#### 1.2.2 Bladder material

The bladder material must be selected in accordance with the particular operating fluid or operating temperature, see section 2.2.

If discharge conditions are unfavourable (high  $p_2/p_0$  pressure ratio, rapid discharge speed), the gas may cool to below the permitted temperature. This can cause cold cracking in the elastomer. The gas temperature can be calculated using the HYDAC Accumulator Simulation Program **ASP**.

#### 1.2.3 Corrosion protection

For operation with chemically aggressive media, the accumulator shell can be chemically nickel-plated internally or supplied with a special plastic coating.

For external corrosion protection the accumulator can be supplied with an epoxy resin finish specially for offshore applications.

### 1.3. INSTALLATION POSITION AND TYPE OF INSTALLATION

Information on secure installation positions and mounting elements can be found in the following catalogue sections:

- Bladder Accumulators  
Standard  
No. 3.201
- Supports for Hydraulic Accumulators  
No. 3.502
- ACCUSET SB  
No. 3.503

On no account must any welding, soldering or mechanical work be carried out on the accumulator shell. After the hydraulic line has been connected it must be completely vented.

Work on systems with hydraulic accumulators (repairs, connecting pressure gauges etc) must only be carried out once the pressure and the fluid have been released.

**Please read the operating manual!**  
**No. 3.201.BA**

**When replacing seals and/or bladders, please read the Instructions for Assembly and Repair (No. 3.201.M).**

#### Note:

Application examples, accumulator sizing and extracts from approvals regulations relating to hydraulic accumulators can be found in the following catalogue section:

- HYDAC Accumulator Technology  
No. 3.000

## 2. TECHNICAL SPECIFICATIONS

### 2.1. MODEL CODE

Not all combinations are possible.  
Order example. For further information, please contact HYDAC.

**SB690 - 32 A 1 / 312 U - 690 D**

#### Series

#### Nominal volume [l]

#### Fluid connection

A = standard connection

#### Gas-side connection

1 = standard design <sup>1)</sup>

9 = special design (example: 1/4" BSP)

#### Material code

#### Fluid connection

2 = high tensile steel

3 = stainless steel

6 = low temperature steel

#### Accumulator shell

0 = plastic coated (internally)

1 = carbon steel

2 = chemically nickel-plated (internal coating)

6 = low temperature steel

8 = plastic coated (e.g. Duroplast) internally and externally

#### Bladder accumulator

2 = NBR <sup>2)</sup>

3 = ECO

4 = IIR

5 = NBR <sup>2)</sup>

6 = FKM

7 = other

9 = NBR <sup>2)</sup>

#### Certification code

U = European Pressure Equipment Directive (PED)

#### Permitted operating pressure [bar]

#### Connection

A = Thread to ISO228 (1/2" BSP)

D = Thread to ANSI B1.20.3 (1/2" NPTF)

**Required gas pre-charge pressure must be stated separately!**

<sup>1)</sup> Gas valve in SB < 10 l = 7/8 - 14 UNF,  
in SB ≥ 10 l = M50x1.5

<sup>2)</sup> observe temperature ranges, see section 2.2.

## 2.2. EXPLANATORY NOTES

### 2.2.1 Operating pressure

690 bar (10000 psi)

higher pressures on request

### 2.2.2 Operating temperature and operating fluid

The permitted operating temperature of a bladder accumulator is dependent on the application limits of the metal materials and the bladder. Outside this temperature range, special materials must be used. The operating fluid must also be taken into account.

The following table shows the standard selection of elastomer materials with temperature range and a rough overview of resistant and non-resistant fluids:

Materials		Material code <sup>1)</sup>	Temperature range	Overview of the fluids <sup>2)</sup>	
				Resistant to	Not resistant to
NBR	Acrylonitrile butadiene rubber	2	-15 °C ... + 80 °C	<ul style="list-style-type: none"> <li>● Mineral oil (HL, HLP)</li> <li>● Flame-resistant fluids of the groups HFA, HFB, HFC</li> <li>● Synthetic ester (HEES)</li> <li>● Water</li> <li>● Sea water</li> </ul>	<ul style="list-style-type: none"> <li>● Aromatic hydrocarbons</li> <li>● Chlorinated hydrocarbons (HFD-S)</li> <li>● Amines and ketones</li> <li>● Hydraulic fluids of the group HFD-R</li> <li>● Fuels</li> </ul>
		5	-50 °C ... + 50 °C		
		9	-30 °C ... + 80 °C		
ECO	Ethylene oxide epichlorohydrin rubber	3	-30 °C ... +120 °C	<ul style="list-style-type: none"> <li>● Mineral oil (HL, HLP)</li> <li>● Flame-resistant fluids of the group HFB</li> <li>● Synthetic ester (HEES)</li> <li>● Water</li> <li>● Sea water</li> </ul>	<ul style="list-style-type: none"> <li>● Aromatic hydrocarbons</li> <li>● Chlorinated hydrocarbons (HFD-S)</li> <li>● Amines and ketones</li> <li>● Hydraulic fluids of the group HFD-R</li> <li>● Flame-resistant fluids of the groups HFA and HFC</li> <li>● Fuels</li> </ul>
IIR	Butyl rubber	4	-50 °C ... +100 °C	<ul style="list-style-type: none"> <li>● Hydraulic fluids of the group HFD-R</li> <li>● Flame-resistant fluids of the group HFC</li> <li>● Water</li> </ul>	<ul style="list-style-type: none"> <li>● Mineral oils and mineral greases</li> <li>● Synthetic ester (HEES)</li> <li>● Skydrol and HyJet IV</li> <li>● Aliphatic, chlorinated and aromatic hydrocarbons</li> <li>● Fuels</li> </ul>
FKM	Fluorine rubber	6	-10 °C ... +150 °C	<ul style="list-style-type: none"> <li>● Mineral oil (HL, HLP)</li> <li>● Hydraulic fluids of the group HFD</li> <li>● Synthetic ester (HEES)</li> <li>● Fuels</li> <li>● Aromatic hydrocarbons</li> <li>● Inorganic acids</li> </ul>	<ul style="list-style-type: none"> <li>● Amines and ketones</li> <li>● Ammonia</li> <li>● Skydrol and HyJet IV</li> <li>● Steam</li> </ul>

<sup>1)</sup> see section 2.1. Model code, material code, bladder accumulator

<sup>2)</sup> others available on request

### 2.2.3 Gas charging

Hydraulic accumulators must only be charged with nitrogen.

Never use other gases.

#### Risk of explosion!

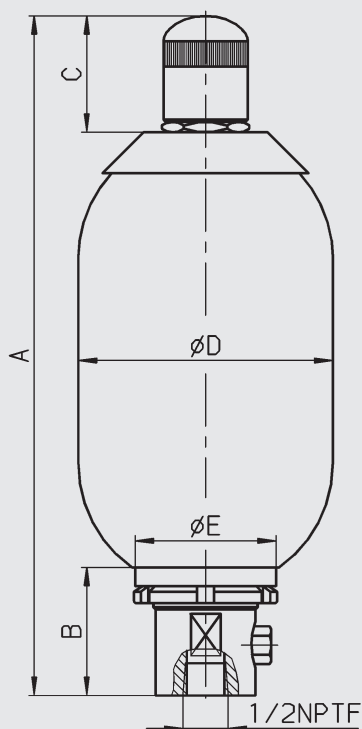
In principle, the accumulator may only be charged with nitrogen class 4.0, filtered to < 3 µm.

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

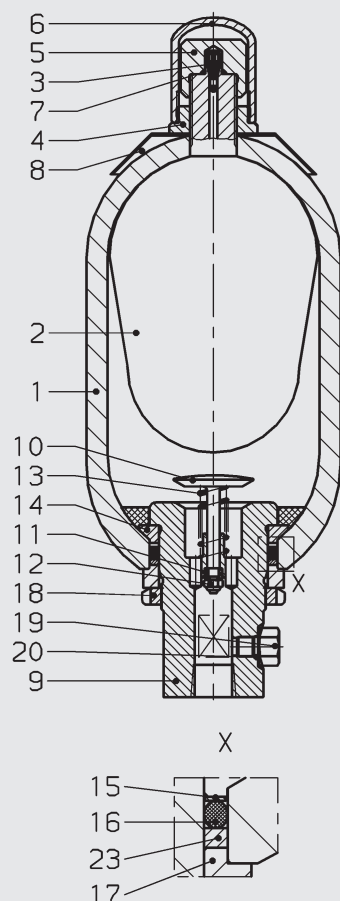
### 3. DIMENSIONS AND SPARE PARTS

#### 3.1. DRAWINGS

##### 3.1.1 Dimensions



##### 3.1.2 Spare parts



#### 3.2. DIMENSIONS

Max. operating pressure: 690 bar (PED)

Nominal volume [l]	Eff. gas volume [l]	Weight: [kg]	A max. [mm]	B [mm]	C [mm]	Ø D max. [mm]	Ø E [mm]	SW [mm]
1	1	8.5	324	61	58	122	67	45
2.5	2.5	13.5	531					
5	4.9	23	860					
10	9	54	522	77	68	250	110	75
20	17	114	865					
32	33.5	186	1385					
54	49.7	260	1900					

#### 3.3. SPARE PARTS

##### 3.3.1 Part numbers

NBR

Description	Item
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##### Bladder assembly

consisting of:

Bladder	2
Gas valve insert	3
Retaining nut	4
Seal cap	5
Protection cap	6
O-ring	7

##### Seal kit

consisting of:

O-ring	7
Washer	15
O-ring	16
Bleed screw	19
Support ring	23

##### Repair kit

consisting of:

Seal kit (see above)	
Bladder assembly (see above)	

##### Anti-extrusion ring 14

##### Oil valve assembly

consisting of:

Valve assembly (items 9-13)	9
Anti-extrusion ring	14
Washer	15
O-ring	16
Spacer	17
Lock nut	18
Bleed screw	19
Support ring	23

Item 1 not available as a spare part

Nominal volume [l]	Seal kit Part no.	Bladder assembly Part no.	Repair kit Part no.	Anti-extrusion ring Part no.
1	3182615	3010110	3182617	293262
2.5		3211568	3201771	
5		3211569	3201772	
10	3182616	3120931	4102462	3028455
20		3211592	3211574	
32		3211571	3211585	
54		3116598	3211586	

#### 4. NOTE

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

##### HYDAC Technology GmbH

Industriegebiet

66280 Sulzbach/Saar, Germany

Tel.: +49 (0) 68 97 / 509 - 01

Fax: +49 (0) 68 97 / 509 - 464

Internet: [www.hydac.com](http://www.hydac.com)

E-Mail: [speichertechnik@hydac.com](mailto:speichertechnik@hydac.com)