



## 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-tight separation element.

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 design  
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 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 medium or operating temperature, see section 2.1.

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. 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 hydraulic accumulator can be supplied with an epoxy resin finish specially designed 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 design  
No. 3.201
- Mounting elements for  
hydraulic accumulators  
No. 3.502
- ACCUSET SB  
No. 3.503

## 2. SPECIFICATIONS

### 2.1. EXPLANATIONS, NOTES

#### 2.1.1 Operating pressure

690 bar (10000 psi)

Higher pressures on request

#### 2.1.2 Permitted operating temperature of the hydraulic accumulator

-10 °C ... +80 °C

Standard design, others on request

#### 2.1.3 Working temperature and operating medium

The permitted working 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 medium must also be taken into account.

The following table displays a selection of elastomer materials including max. temperature range and a rough overview of resistant and non-resistant fluids. Please contact us for help in selecting a suitable elastomer.

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-retardant fluids from the groups HFA, HFB, HFC</li> <li>● Synthetic esters (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 from 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-retardant fluids from the HFB group</li> <li>● Synthetic esters (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 from the group HFD-R</li> <li>● Flame-retardant fluids from 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 from the group HFD-R</li> <li>● Flame-retardant fluids from the group HFC</li> <li>● Water</li> </ul>	<ul style="list-style-type: none"> <li>● Mineral oils and mineral greases</li> <li>● Synthetic esters (HEES)</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 from the group HFD</li> <li>● Synthetic esters (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 2.2. Model code, material code, accumulator bladder

<sup>2)</sup> Others on request

#### 2.1.4 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 HYDAC for advice.

#### 2.1.5 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.

#### 2.1.6 Notice

All work on HYDAC bladder accumulators must only be carried out by suitably trained staff.

Incorrect installation or handling can lead to serious accidents.

**The operating instructions must be observed!**  
**No. 3.201.BA**

Assembly and repair instructions are available for work which may be carried out on the bladder accumulator after installation and commissioning, e.g. repair work.

No. 3.201.M

Further information such as accumulator sizing, safety information and extracts from the acceptance specifications can be found in the following catalogue section:

● HYDAC Accumulator Technology  
 No. 3.000

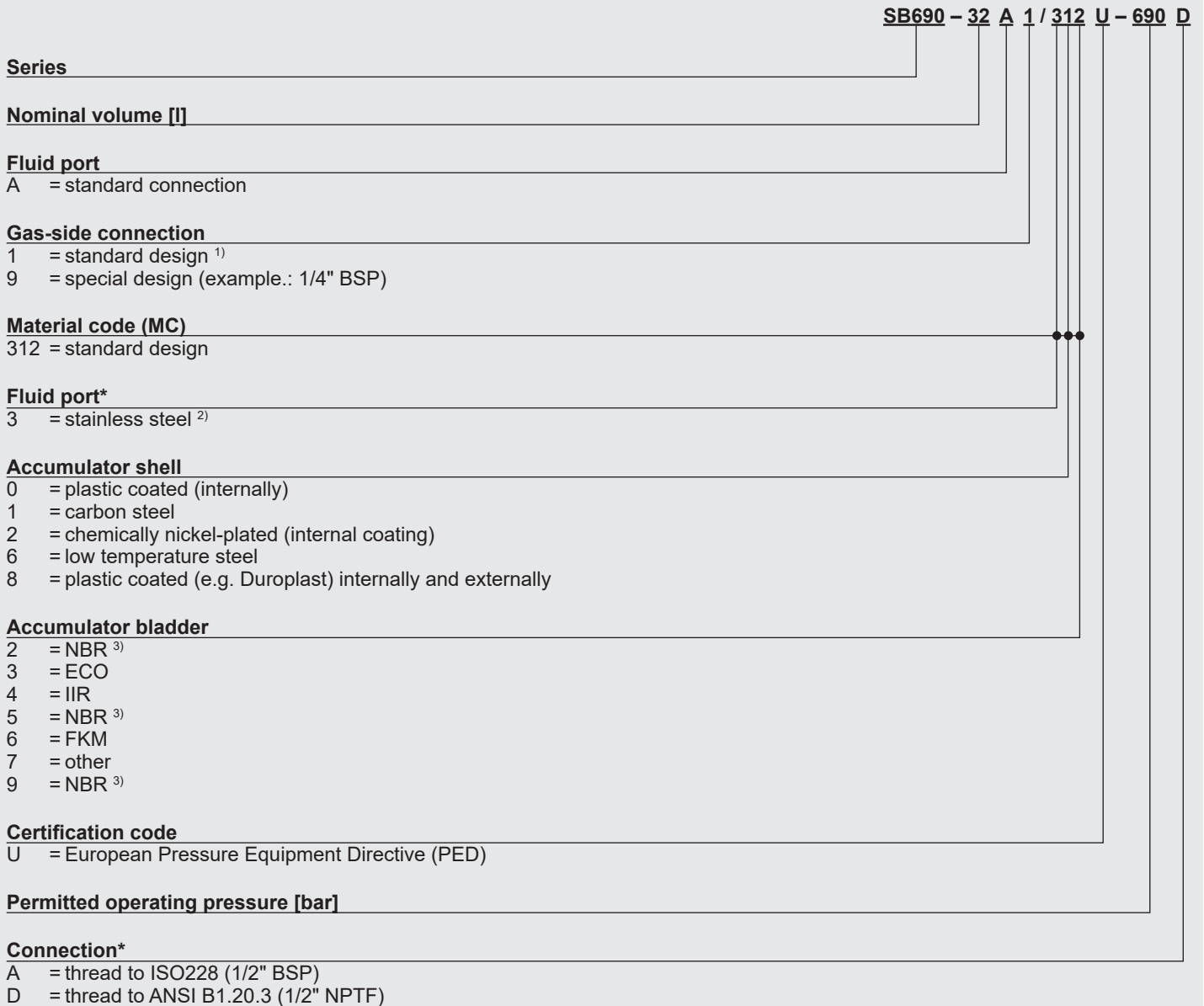
Relevant PDF documents can be accessed at:

[www.hydac.com](http://www.hydac.com) » Downloads » Documents » Accumulator Division

## 2.2. MODEL CODE

Not all combinations are possible.

Order example. For further information, please contact HYDAC.



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

\* Others on request

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

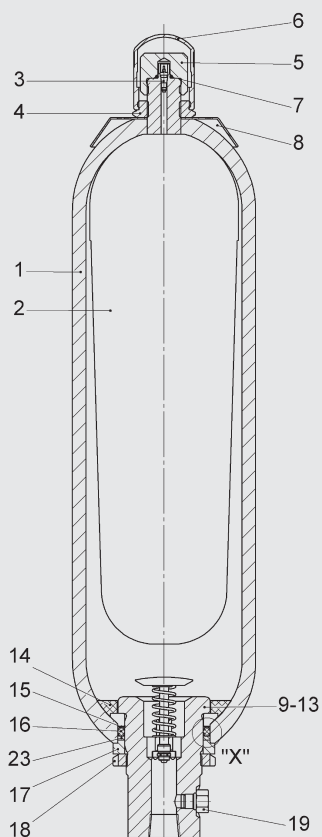
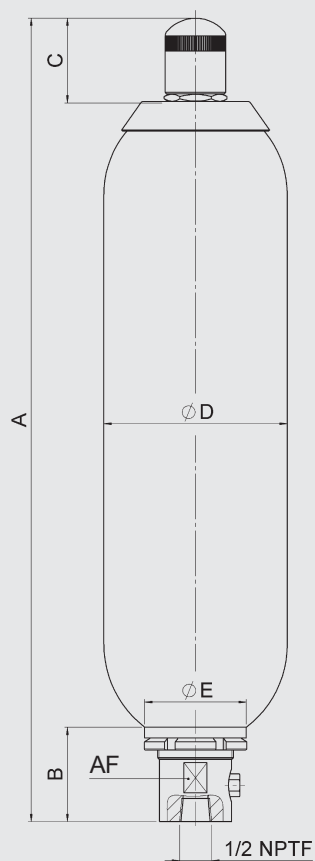
<sup>2)</sup> Dependent on type and pressure rating

<sup>3)</sup> Observe temperature ranges, see section 2.1.

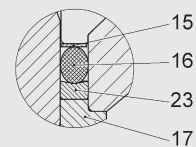
### 3. DIMENSIONS AND SPARE PARTS

#### 3.1. DIMENSIONS

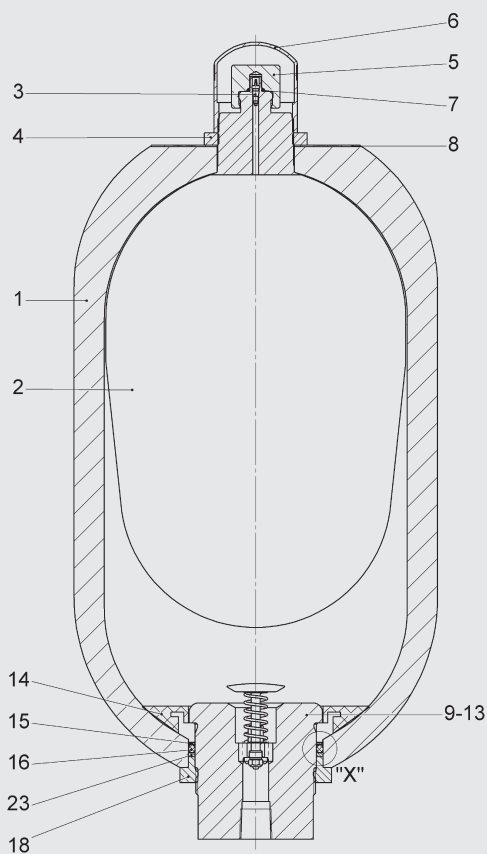
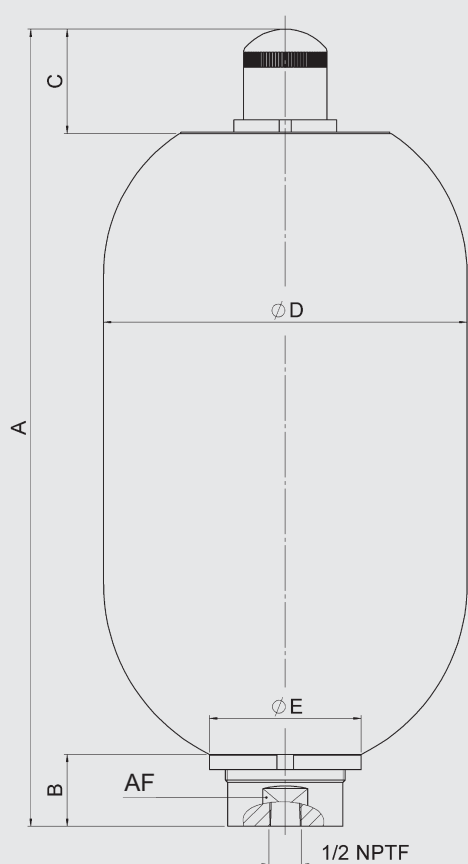
SB690-1 ... 5



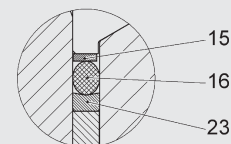
Detail "X" (2:1)



SB690-10 ... 50



Detail "X" (2:1)



Standard designs: material code (MC) = 312, see section 2.2. Model code

Nominal volume [l]	Series	Perm. operating pressure (PED) [bar]	Part no.	Effective gas volume [l]	A max. [mm]	B [mm]	C [mm]	Ø D max. [mm]	Ø E [mm]	AF [mm]	Weight [kg]
1	SB690	690	3444800	1	324	61	58	122	67	45	8.5
2.5			3129516	2.5	531						13.5
5			3129515	4.9	860						23
10			3436744	9	522	77	68	250	110	75	54
20			3436795	17	865						114
32			3436499	33.5	1385						186
50			4291199	49.7	1900						260

### 3.2. SPARE PARTS

For versions with a spacer (item 17) in the volume range 10 ... 50 litres, please request spare parts separately.

Standard design

Perm. operating pressure: 690 bar (PED)

Description	Item
<b>Bladder assembly</b> <sup>1)</sup>	
consisting of:	
Bladder	2
Gas valve insert*	3
Lock nut	4
Seal cap	5
Protective cap	6
O-ring	7
<b>Seal kit</b>	
consisting of:	
O-ring	7
Washer	15
O-ring	16
Vent screw	19
Support ring	23
<b>Repair kit</b> <sup>1)</sup>	
consisting of:	
Bladder assembly (see above)	
Seal kit (see above)	
<b>Oil valve assembly</b>	
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

\* Available separately

<sup>1)</sup> When ordering, please state diameter of the smaller shell port

Accumulator shell (item 1) and company label (item 8) not available as a spare part

Nominal volume [l]	Bladder assembly Part no.	Seal kit Part no.	Repair kit Part no.	Oil valve assembly Part no.
1	3010110	3182615	3182617	4291202
2.5	3211568		3201771	
5	3211569		3201772	
10	3120931	4192830	4347598	4030279
20	3211592		4347600	
32	3211571		4347601	
50	3116598		4347602	

### 4. NOTE

The information in this brochure relates to the operating conditions and fields of application described.

For applications and/or 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

E-mail: speichertechnik@hydac.com

