



## Piston Accumulators

### High Pressure

## 1. DESCRIPTION

### 1.1. FUNCTION

Fluids are practically incompressible and cannot therefore store pressure energy.

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

HYDAC piston accumulators are based on this principle, using nitrogen as the compressible medium.

A piston accumulator consists of a fluid section and a gas section with the piston acting as the gas-proof screen. The gas section is pre-charged with nitrogen.

The fluid section is connected to the hydraulic circuit so that the piston 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 piston accumulators can be used in a wide variety of applications and are also available in different pressure ranges, see also catalogue sections:

- Piston Accumulators  
Standard  
No. 3.301
- Piston Accumulators  
Series SK280  
No. 3.303

### 1.2. DESIGN

The high pressure piston accumulator consists of:

- a cylinder with very finely machined internal surface,
- end caps on the gas side and the oil side,
- O-ring seals,
- floating metal piston,
- high pressure sealing system.

The piston floats on guide rings which prevent metal-to-metal contact between the piston and the accumulator wall.

For use with aggressive or corrosive fluids, the parts coming into contact with the fluid can be made of corrosion-resistant material. Suitable materials are also available for low temperature applications.

### 1.3. SEALING SYSTEMS

Precise information about the intended operating conditions is required in order to select the most appropriate sealing system for the application. Important criteria for this selection are, for example:

- Design pressure,
- Actual pressure differential,
- Switching frequency or cycles,
- Piston velocity,
- Operating temperature,
- Operating fluid,
- Cleanliness of fluid (micron rating of filter),
- Maintenance requirements.

On high pressure piston accumulators, a modified version of piston Type 2 is used, developed for applications up to 1000 bar. Hydraulic accumulators must only be operated using hydraulic fluids which are filtered to the following cleanliness class:

- NAS 1638 Class 6 or
- ISO 4406 Class 17/15/12.

### 1.4. INSTALLATION POSITION AND TYPE OF INSTALLATION

HYDAC piston accumulators operate in any position. Vertical installation with the gas-side uppermost is preferable, to prevent contamination from the fluid settling on the piston seals.

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

- Piston Accumulators  
Standard  
No. 3.301
- Supports for Hydraulic Accumulators  
No. 3.502

**Please read the operating manual!**  
**No. 3.301.BA**

## 2. TECHNICAL SPECIFICATIONS

### 2.1. EXPLANATORY NOTES

#### 2.1.1 Operating pressure

690 bar / 800 bar / 1000 bar

others on request

#### 2.1.2 Operating temperature

-20 °C ... +50 °C

others on request

#### 2.1.3 Operating temperature and operating fluid

The permitted operating temperature of a piston accumulator is dependent on the application limits of the metal materials and the piston. 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	-20 °C ... + 80 °C	<ul style="list-style-type: none"> <li>● Mineral oil (HL, HLP)</li> <li>● Flame-resistant</li> <li>● Fluids of the groups HFA, HFB, HFC</li> </ul>	<ul style="list-style-type: none"> <li>● Aromatic hydrocarbons</li> <li>● Chlorinated hydrocarbons (HFD-S)</li> <li>● Amines and ketones</li> </ul>
		5	-40 °C ... + 80 °C	<ul style="list-style-type: none"> <li>● Synthetic ester (HEES)</li> <li>● Water</li> <li>● Sea water</li> </ul>	<ul style="list-style-type: none"> <li>● Hydraulic fluids of the group HFD-R</li> <li>● Fuels</li> </ul>
FKM	Fluorine rubber	6	-15 °C ... +160 °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 2.2. Model code, material and piston code, material seals incl. piston

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

#### 2.1.4 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.

## 2.2. MODEL CODE

Not all combinations are possible.

Order example. For further information, please contact HYDAC.

SK690 - 1 / 2212 U - 690 ADE - VB - 08 UP2 - 1 - 300

### Series

### Nominal volume [l]

### Material and piston code

#### Piston design type

High-pressure version, piston 2 (see section 1.3.)

#### Piston material

- 2 = carbon steel
- 3 = stainless steel

#### Material of cylinder and end caps

- 1 = carbon steel
- 3 = stainless steel

#### Material of seals including piston seals

- 2 = NBR <sup>1)</sup> / PTFE
- 6 = FKM / PTFE

#### Certification code

U = European Pressure Equipment Directive (PED)

#### Permitted operating pressure [bar]

#### Fluid connection

Type of connection (see Table 1)  
Standard or specification of the type of connection (see Table 2)  
Size of connection (see Table 3)

#### Gas side connection or gas valve

Type of connection (see Table 1)  
Standard or specification of the type of connection (see Table 2)  
Size of connection (see Table 3)

#### Piston diameter

- 08 = 80 mm
- 12 = 125 mm
- 15 = 150 mm
- 18 = 180 mm

#### Supplementary equipment\*

M = magnetic flap indication  
UP.. = piston position switch  
(e.g. UP2 = 2 position switches, UPEX = Atex version)

#### Safety equipment\*

1 = bursting disc (please give nominal pressure and temperature)

#### Pre-charge pressure $p_0$ [bar] at 20 °C\*

\* if required, please state at time of ordering!

<sup>1)</sup> observe temperature ranges, see section 2.1.3

**Table 1, Connection type**

Code letter	Description
A	Threaded connection (female) → table 2 and then 3
K	High pressure port → table 4
V	Gas valve port → table 5
S	Special port on request

**Table 2, Threaded connection: standard or specification**

Code letter	Description
A	Thread to ISO 228 (BSP)
B	Thread to DIN 13 or ISO 965/1 (metric)
C	Thread to ANSI B1.1 (UN...-2B, seal SAE J 514)
D	Thread to ANSI B1.20.3 (NPTF)

**Table 3, Threaded connection sizes**

Type Table 2	Code letter, size						
	A	B	C	D	E	F	G
A	G 1/8	G 1/4	G 3/8	G 1/2	G 3/4	G 1	G 1 1/4
B	M10x1	M12x1.5	M14x1.5	M16x1.5	M18x1.5	M22x1.5	M27x2
C	5/16-24UNF	3/8-24UNF	7/16-20UNF	1/2-20UNF	9/16-18UNF	3/4-16UNF	7/8-14UNF
D	1/16-27 NPTF	1/8-27 NPTF	1/4-18 NPTF	3/8-18 NPTF	1/2-14 NPTF	3/4-14 NPTF	1-11 1/2 NPTF

**Table 4, Connection size for preferred high pressure ports (e.g. Maximator)**

	Code letter, size						
	KCQ	KCR	KCT	KUR	KUY	KWB	KWP
1st connection	13/16-16UNF (9MF)	13/16-16UNF (9MF)	9/16-18UNF (6MF)	9/16-18UNF (6MF)	1 3/8-12UNF (16MF)	9/16-18UNF (6MF)	3/4-16UNF (6HF)
2nd connection	13/16-16UNF (9MF)	-	-	9/16-18UNF (6MF)	-	G 3/4-ISO228	-

Other connections on request

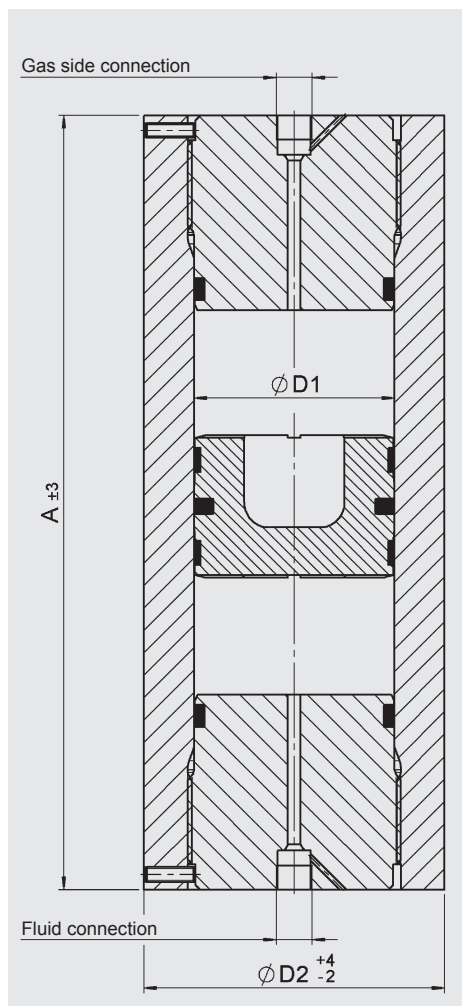
**Table 5, gas valve port**

Code letter	Description
B	Gas valve end connection M28x1.5/M8 (max. pre-charge pressure 800 bar with FPU-2)
M	Gas valve, male, for high pressure port 9/16-18UNF (6MP) (no limit for pre-charge pressure)

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

- HYDAC Accumulator Technology  
No. 3.000

### 3. DIMENSIONS



#### 3.1. SERIES: SK690

Max. permitted operating pressure: 690 bar (PED)

Volume [l]	Ø D1 [mm]	Ø D2		A [mm]	Approx. weight	
		Carbon steel [mm]	Stainless steel [mm]		Carbon steel [kg]	Stainless steel [kg]
0.5 - 10	80	107	110	280 - 2170	15 - 74	16 - 83
1 - 20	125	160	160	295 - 1845	37 - 133	37 - 133
5 - 30	150	190	200	535 - 1950	75 - 194	88 - 241
5 - 50	180	246	220	480 - 2250	136 - 443	94 - 269

#### 3.2. SERIES: SK800

Max. permitted operating pressure: 800 bar (PED)

Volume [l]	Ø D1 [mm]	Ø D2		A [mm]	Approx. weight	
		Carbon steel [mm]	Stainless steel [mm]		Carbon steel [kg]	Stainless steel [kg]
0.5 - 10	80	107	110	280 - 2170	15 - 74	16 - 83
1 - 20	125	162	160	295 - 1845	38 - 140	37 - 133
5 - 30	150	185	200	535 - 1990	80 - 182	87 - 240
5 - 50	180	246	224	480 - 2250	136 - 443	100 - 293

#### 3.3. SERIES: SK1000

Max. permitted operating pressure: 1000 bar (PED)

Volume [l]	Ø D1 [mm]	Ø D2		A [mm]	Approx. weight	
		Carbon steel [mm]	Stainless steel [mm]		Carbon steel [kg]	Stainless steel [kg]
0.5 - 10	80	120	119	310 - 2200	23 - 117	22 - 113
1 - 20	125	172	164	295 - 1840	44 - 178	40 - 148
5 - 30	150	200	250	575 - 1990	100 - 253	179 - 529
5 - 50	180	246	280	555 - 2325	168 - 475	229 - 732

### 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.

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