HENNLICH

DIAPHRAGM ACCUMULATOR HMS

DIAPHRAGM ACCUMULATOR HMS

APPLICATION AND ADVANTAGES

AREAS OF APPLICATION

- **Compensation of volume changes:** Caused by temperature fluctuations in closed hydraulic systems.
- **Leakage oil compensation:** In oil hydraulic systems.
- **Vibration and shock absorption:** In machines and vehicles.
- **Energy management:** Buffer and release of hydraulic energy.
- **Mobile hydraulics:** Construction machinery, agricultural machinery, cabin, axle and load suspension systems.

ADVANTAGES

- **Compact design:** Space-saving and easy to integrate.
- **High dynamics:** Fast response to pressure changes.
- **Cost savings:** Less expensive to purchase and install.
- **Simple replacement:** Easy to replace.

DIAPHRAGM ACCUMULATOR HMS

GENERAL INFORMATION

HENNLICH diaphragm accumulators HMS are a compact type of pressure accumulator. In contrast to the bladder accumulators HBS, a rubber membrane separates the accumulator gas from the hydraulic fluid. The pressure body consists of two half shells that are firmly joined using a modern electron beam welding process. Due to this design, diaphragm accumulators are cost-effective and very reliable components that require no maintenance.
The HENNLICH HMS diaphragm accumulators can be precharged and checked with our HFP filling and testing kit via an M28x1.5 gas connection. HENNLICH HMS diaphragm accumulators comply with the requirements of the European Pressure Equipment Directive PED 2014/68/EU.

FUNCTION
When the hydraulic pressure rises, the inflowing fluid compresses the gas in the accumulator, while when the pressure drops, the gas pushes the fluid back into the hydraulic system.

INSTALLATION POSITION
Independent of position, preferably vertical with a gas connection at the top, but also different depending on the application. A maintenance access of approx. 200 mm above the gas valve must be provided for the installation of the HENNLICH filling and testing device.

GAS PRECHARGE PRESSURE
The gas precharge pressure should be around 90% of the operating pressure or 0.9 x p_1. To protect the membrane from overloading, the upper operating pressure p_2 should not exceed a certain pressure ratio. Depending on the size, this is between 1:8 or 1:4 (see table). Technical nitrogen must be used as gas for pressure accumulators.

FASTENING
The fastening must be selected according to the size and weight of the accumulator in order to avoid external influences. It is recommended to use HENNLICH - HCT fastening elements for secure installation.

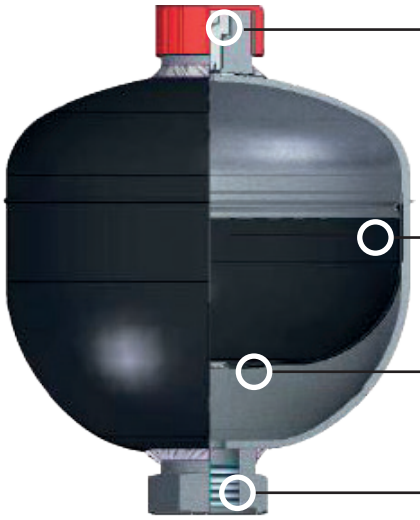
HOW A DIAPHRAGM ACCUMULATOR WORKS
The gas side of the accumulator is filled with nitrogen via the gas charge valve. The membrane rests against the inner wall of the accumulator body, the buttoned-in valve disc closes the opening on the oil side (Figure A).

If fluid is now pumped into the accumulator, the gas is compressed on the gas side. The gas volume decreases with a simultaneous increase in pressure and thus stores the fluid (Figure C).

On the other hand, the accumulator empties as soon as the pressure on the fluid side drops below the gas pressure (Figure B).

DIAPHRAGM ACCUMULATOR HMS

DIAPHRAGM ACCUMULATOR IN A WELDED DESIGN



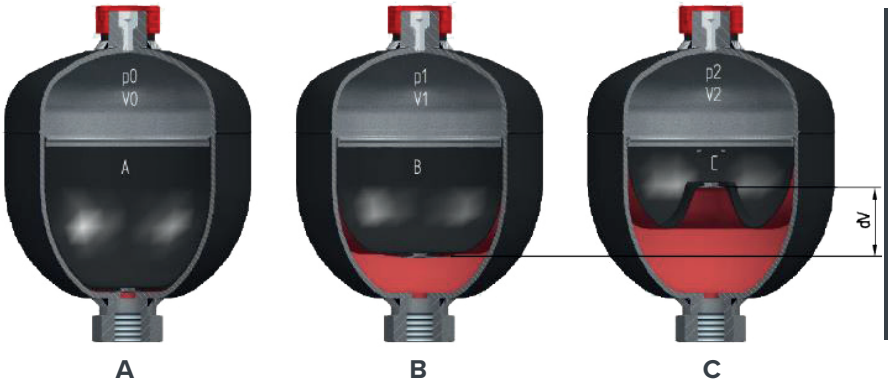
Gas valve - Charging screw to fill the gas valve, use our filling and testing kit "HFP/HFPH".

The membrane guarantees a clean separation < between gas and fluid.

The valve plate buttoned into the membrane prevents it from damage when emptying or when the accumulator is only filled on the gas side.

No dynamic seals

BASIC STATES OF THE MEMBRANE



A B C

- **p_0** Precharge pressure
- **p_1** Min. working pressure
- **p_2** Max. working pressure
- **V_0** Total volume of the accumulator
- **V_1** Total volume at p_1
- **V_2** Total volume at p_2
- **ΔV** Delivered or absorbed useable volume between p_1 and p_2

A The membrane is in the precharge pressure state, i.e.it is only pressurised with nitrogen p_0. The buttoned-in disc closes the oil opening and prevents the membrane from being destroyed.

B State at the minimum working pressure p_1. A small amount of fluid (10% is recommended) must remain between the membrane and the oil opening so that the membrane does not close the oil opening every time it is emptied. p_0 must therefore always be smaller than p_1.

C State at the maximum working pressure p_2. The change in volume ΔV between the state at the minimum and maximum working pressure corresponds to the amount of fluid buffered.

DIAPHRAGM ACCUMULATOR HMS

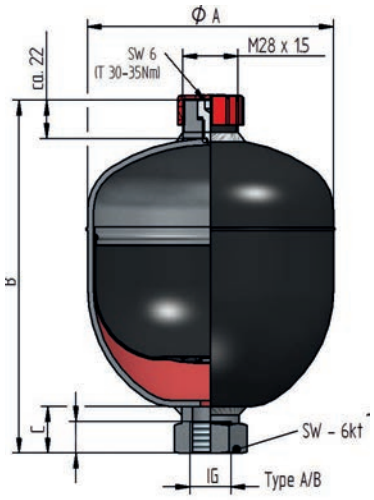
TYPE CODE

DIAPHRAGM ACCUMULATOR HMS	
Nominal size [litres]	
0.075 / 0.16 / 0.32 / 0.5 / 0.75 / 1 / 1.4 / 2 / 2.8 / 3 / 3.5	
Max. operating pressure [bar]	
140 / 210 / 250 / 350	
Approval identification	
CE	90
GUS	71
None, Art. 4.3 PED	00
Others on request	
Calculation standard	
AD 2000	D
EN 14359	E
ASME	A
Permissible approval operating pressure [bar]	
According to approval	
Accumulator body material	
Carbon steel	A
Stainless steel	R
Membrane material	
NBR (standard)	25
ECO (Hydrin)	02
IIR (butyl)	40
FKM (Viton)	80
Gas connection size	
M28x1.5	A
Special connection, details in article description	Z
Size of oil connection	
IG ½"	A
IG ¾"	B
IG ½" and M33 x 1.5 outside	C
IG ¾" and M45 x 1.5 outside	D
Precharge pressure [bar]	
Special design	
ATEX – Zone 1 (II 2G)	X
Details in article description, e.g.painted RAL9005	Z

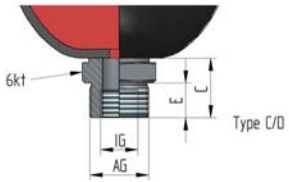
HMS 0.05 - 250 / 90 D 250 A 25 AA 000 Z

DIAPHRAGM ACCUMULATOR HMS

HMS NBR 0.075–3.5 LITRES, 140–350 BAR



Design A or B



Design C or D

TECHNICAL DATA

VOLUME
0.075–3.5 litres

APPROVAL
DGRL 2014/68/EU
Other versions on request

MAX. PERMISSIBLE PRESSURE (PS)
140–350 bar

MAX. PERMISSIBLE PRECHARGE PRESSURE (P_0)
150 bar

PERMISSIBLE TEMPERATURES (TS)
-20°C to +90°C

COATING
Black PU paint (RAL9005)

MATERIALS
Body and connections: Carbon steel
Membrane: NBR

GAS VALVE
Standard valve M28x1.5

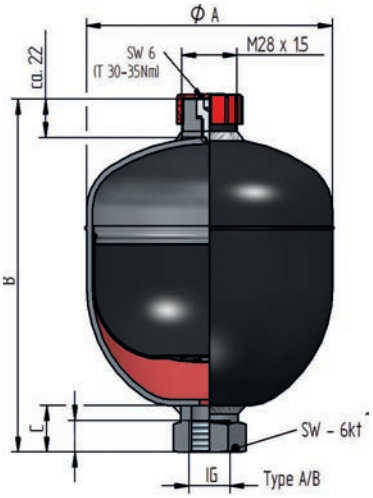
CONNECTIONS
BSP EN ISO 228, see table

PART NO.	NOMINAL VOLUME [l]	MAX. OPERATING PRESSURE [BAR]	OIL CONNECTION						Ø A [MM]	B HEIGHT [MM]	WEIGHT APPROX. [KG]	$P_0 : P_2$ *
			DESIGN	IG	AG	SW 6KT	C	E				
HMS-0075-250-2000	0.075	250	A	G ½"	-	32	24	-	64	111	0.75	1:8
HMS-016-250-2000	0.16	250	A	G ½"	-	32	22	-	74	121	1	1:8
HMS-032-210-2000	0.32	210	A	G ½"	-	32	22	-	93	142	1.4	1:8
HMS-032-210-2018	0.32	210	C	G ½"	M33x1.5	32	20	-	93	166	1.8	1:8
HMS-05-210-2000	0.5	210	A	G ½"	-	32	20	-	105	150	1.7	1:8
HMS-05-210-2001	0.5	210	C	G ½"	M33x1.5	41	42	16	105	170	1.9	1:8
HMS-075-210-2000	0.75	210	A	G ½"	-	41	23	-	120	169	2.6	1:8
HMS-075-210-2001	0.75	210	C	G ½"	M33x1.5	41	42	16	120	188	2.8	1:8
HMS-075-350-2000	0.75	350	A	G ½"	-	32	20	-	132	180	4.8	1:8
HMS-075-350-2001	0.75	350	C	G ½"	M33x1.5	41	41	16	132	200	4.8	1:8
HMS-10-210-2000	1	210	A	G ½"	-	41	22	-	136	180	3.9	1:6
HMS-10-210-2001	1	210	C	G ½"	M33x1.5	41	41	16	136	199	3.9	1:6
HMS-10-350-2001	1	350	C	G ½"	M33x1.5	41	45	20	144	211	6.4	1:6
HMS-14-140-2000	1.4	140	A	G ½"	-	41	22	-	144	196	2.4	1:6
HMS-14-250-2000	1.4	250	A	G ½"	-	41	22	-	150	202	3.9	1:6
HMS-14-250-2001	1.4	250	C	G ½"	M33x1.5	41	41	16	150	221	4.9	1:6
HMS-14-350-2001	1.4	350	C	G ½"	M33x1.5	41	42	16	158	229	7.6	1:6
HMS-20-140-2000	2	140	C	G ½"	M33x1.5	41	40	16	166	239	6.8	1:4
HMS-20-250-2000	2	250	B	G ¾"	-	41	21	-	166	220	6.7	1:4
HMS-20-350-2000	2	350	B	G ¾"	-	41	21	-	174	228	9.6	1:6
HMS-28-250-2000	2.8	250	D	G ¾"	M45x1.5	55	41	18	174	285	10.8	1:4
HMS-35-250-2000	3.5	250	B	G ¾"	-	41	22	-	174	305	12.4	1:4
HMS-35-350-2000	3.5	350	D	G ¾"	M45x1.5	55	41	20	174	324	12.7	1:4

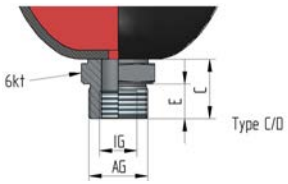
* Max. permissible pressure ratio.
Manufacturing tolerances are not taken into account. Subject to modifications.

DIAPHRAGM ACCUMULATOR HMS

HMS ECO 0.16–3.5 LITRES, 210–350 BAR



Design A or B



Design C or D

TECHNICAL DATA

VOLUME
0.16–3.5 litres

APPROVAL
DGRL 2014/68/EU
Other versions on request

MAX. PERMISSIBLE PRESSURE (PS)
210–350 bar

MAX. PERMISSIBLE PRECHARGE PRESSURE (P_0)
150 bar

PERMISSIBLE TEMPERATURES (TS)
-40°C to +120°C

COATING
Black PU paint (RAL9017)

MATERIALS
Body and connections: Carbon steel
Membrane: ECO

GAS VALVE
Standard valve M28x1.5

CONNECTIONS
BSP EN ISO 228, see table

PART NO.	NOMINAL VOLUME [l]	MAX. OPERATING PRESSURE [BAR]	OIL CONNECTION						Ø A [MM]	B HEIGHT [MM]	WEIGHT APPROX. [KG]	$P_0 : P_2$*
			DESIGN	IG	AG	SW 6KT	C	E				
HMS-016-250-2200	0.16	250	A	G ½"	-	32	22		74	121	1	1:8
HMS-032-210-2200	0.32	210	A	G ½"	-	32	22		93	142	1.4	1:8
HMS-05-210-2200	0.5	210	A	G ½"	-	32	20		105	150	1.7	1:8
HMS-05-210-2201	0.5	210	C	G ½"	M33x1.5	41	42	16	105	170	1.9	1:8
HMS-075-210-2200	0.75	210	A	G ½"	-	41	23		120	169	2.6	1:8
HMS-075-210-2201	0.75	210	C	G ½"	M33x1.5	41	42	16	120	188	2.8	1:8
HMS-075-350-2200	0.75	350	A	G ½"	-	32	20		132	180	4.8	1:8
HMS-075-350-2201	0.75	350	C	G ½"	M33x1.5	41	41	16	132	200	4.8	1:8
HMS-10-210-2200	1	210	A	G ½"	-	41	22		136	180	3.9	1:6
HMS-10-210-2201	1	210	C	G ½"	M33x1.5	41	41	16	136	199	3.9	1:6
HMS-14-250-2201	1.4	250	C	G ½"	M33x1.5	41	41	16	150	221	4.9	1:6
HMS-14-350-2200	1.4	350	A	G ½"	-	41	22		158	210	7.5	1:6
HMS-14-350-2201	1.4	350	C	G½"	M33x1.5	41	41	16	158	229	7.6	1:6
HMS-28-250-2200	2.8	250	D	G ¾"	M45x1.5	55	41	18	174	285	10.8	1:4
HMS-28-250-2201	2.8	250	B	G ¾"	-	41	21		174	266	10.8	1:4
HMS-35-350-2201	3.5	350	D	G ¾"	M45x1.5	55	21		174	332	12.7	1:4

* Max. permissible pressure ratio.
Manufacturing tolerances are not taken into account. Subject to modifications.

DIAPHRAGM ACCUMULATOR HMS ACCESSORIES

SAFETY AND SHUT-OFF BLOCK HSB AND CONNECTION ADAPTERS HAS

MOUNTING MATERIAL: CLAMPS HCLP, BRACKETS HBBZ AND MOUNTING SET HBBZ-BS

ADAPTERS FOR BLOCK ATTACHMENT HRS

GAS VALVE ADAPTERS FOR MINI MEASURING CONNECTION OR ¼" IG

FILLING AND TESTING KIT HFP