



DIAPHRAGM ACCUMULATOR HMS

TECHNICAL REGULATIONS AND APPROVALS

Pressure accumulators are subject to technical regulations worldwide with regard to design and testing and require approval by testing organisations.

HENNLICH pressure accumulators meet the requirements of the European Pressure Equipment Directive PED 2014/68 EU and are designed, tested and approved in accordance with the technical regulations of EN 14359 and CE marked. Our notified body is TÜV Süd Industrie Service.


HENNLICH is also able to supply pressure accumulators in accordance with other international standards, such as the ASME Code for the American Economic Area.

Pressure accumulators can also be supplied on request for maritime and offshore applications in accordance with the applicable regulations, such as DNV Rules or ABS.

For the Eurasian Economic Area, HENNLICH has approval certificates in accordance with TR-CU 032/2013 for its standard accumulator series.

In order to be able to operate pressure accumulators in explosion-protection areas, HENNLICH offers pressure accumulators with various ATEX classifications in its range.

WORLDWIDE LABELS, REGULATIONS AND ORGANISATIONS

 CE: Pressure equipment manufactured in accordance with the PED is CE marked, with the exception of components in accordance with Article 4.3. The PED is an EU directive for the safety of pressure equipment in the EU; it regulates the design, manufacture and conformity assessment for the free market. It applies to containers, pipelines, pressure vessels, fittings and safety valves.



ASME: The ASME develops American standards for mechanical equipment and systems, including pressure vessels and pipelines. Hydraulic accumulators with an internal diameter of less than 6 inches are excluded from this and can be supplied with CE.



ATEX: The ATEX directive defines safety standards for products and equipment in potentially explosive atmospheres, including electrical and mechanical devices and hydraulic accumulators. Our hydraulic accumulators are classified as follows: II 2G Ex h IIC T6 Gb X and II 2D Ex h IIIC T 80° Db X.



DNV: DNV is a Norwegian classification society that develops and certifies safety standards for pressure equipment and systems in accordance with international standards and regulations. We can supply our hydraulic accumulators for maritime applications with DNV approval.



NR13: The Brazilian national regulation NR13 regulates safety standards for pressure equipment and systems, with requirements for inspections, tests and certifications.



SELO: SELO certification is the Chinese system for safety monitoring of pressure equipment. The supervising authority Administration of Quality Supervision, Inspection and Quarantine AQSIQ allows the import of accumulators based on recognised technical directives by adding additional documentation. Based on PED and the AQSIQ documentation, HENNLICH - HCT accumulators can be used in China.



AS1210: The Australian national standard AS1210 defines safety standards for pressure equipment, including requirements for materials, designs and inspections.



EAC: The EAC (TR-CU 032) are technical regulations that define safety standards for pressure equipment and systems in the member countries of the Eurasian Customs Union.



CRN: CRN is the Canadian Registration Number and confirms the conformity of pressure equipment with Canadian safety standards for the free market. Our hydraulic accumulators can be delivered to the provinces of British Columbia, Alberta, Manitoba, Ontario, Quebec and New Brunswick. Hydraulic accumulators with an inner diameter of less than 6 inches are excluded from this and can be supplied with CE.



The notified body with regard to PED 2014/68/EU for HENNLICH pressure accumulators is TÜV Süd Industrie Service. Audits and monitoring take place at regular intervals.

ELASTOMERS

For the bladder accumulator HBS and the diaphragm accumulator HMS, the accumulator bladder and the separating membrane are the most important functional components. They separate the nitrogen accumulator gas from the respective operating medium on the fluid side.

Our standard accumulators are equipped with accumulator bladders or membranes made of high-quality NBR (nitrile butadiene rubber), a widely used synthetic rubber. This means that most applications can be covered in terms of compatibility with hydraulic fluids and the possible temperature range of use.

The HENNLICH - HCT bladder and diaphragm accumulators can also be supplied with elastomer materials that are compatible with operating fluids other than mineral-based hydraulic oil and that can also be used in other temperature ranges.

The following compatibility table shows a selection of the many possible combinations. For temperatures outside -20°C to 80°C and for fluids not listed, please consult us.

SELECTION EXAMPLES OF DIFFERENT ELASTOMERS

CODE	ELASTOMER	ELASTOMER TEMPERATURE RANGE	REMARK
02	Hydrin C (ECO)	-32°C to +115°C ^{2 3}	Specifically for the low temperature range ¹
10	Nitrile for low temperatures	-28°C to +70°C ³	See code 25
25	NBR	-20°C to +100°C ²	Fluids based on mineral oil
		+5°C to +55°C	HFA, HFB ¹
		-20°C to +60°C	HFC ¹
40	Butyl	-15°C to +120°C ^{2 3}	Phosphate ester-based fluids and some synthetic fluids ¹
47	Ethylene propylene diene (EPDM)	-40°C to +120°C ^{2 3}	Phosphate ester-based fluids ¹
80	Viton (FKM)	-20°C to +140°C ²	Flame retardant and/or synthetic fluids

¹ Ask the supplier of the fluids to confirm compatibility.

² For temperatures above +80°C, please consult us.

³ For temperatures below -20°C, please consult us.



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 $0.9 \times p_1$. 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

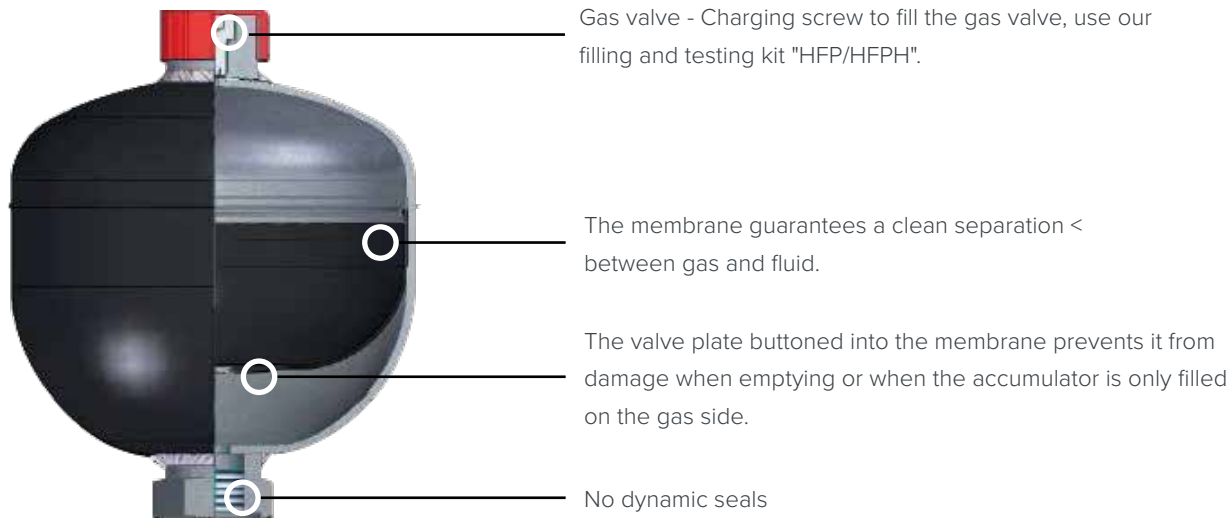
The gas side of the accumulator is filled with nitrogen via the gas charge valve. The membrane rests against the inner wall of the accumulator body, the buttoned-in valve disc closes the opening on the oil side (Figure A).

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).

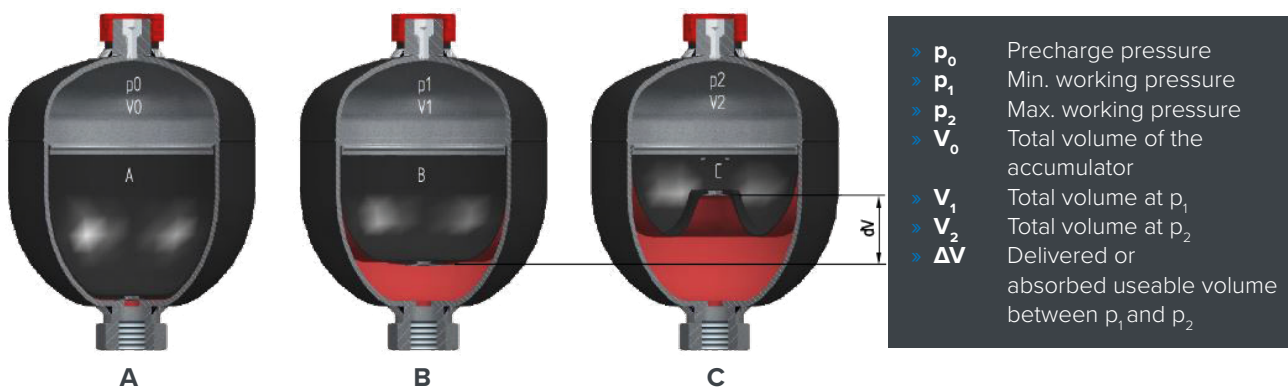
On the other hand, the accumulator empties as soon as the pressure on the fluid side drops below the gas pressure (Figure B).

DIAPHRAGM ACCUMULATOR HMS

DIAPHRAGM ACCUMULATOR IN A WELDED DESIGN



BASIC STATES OF THE MEMBRANE



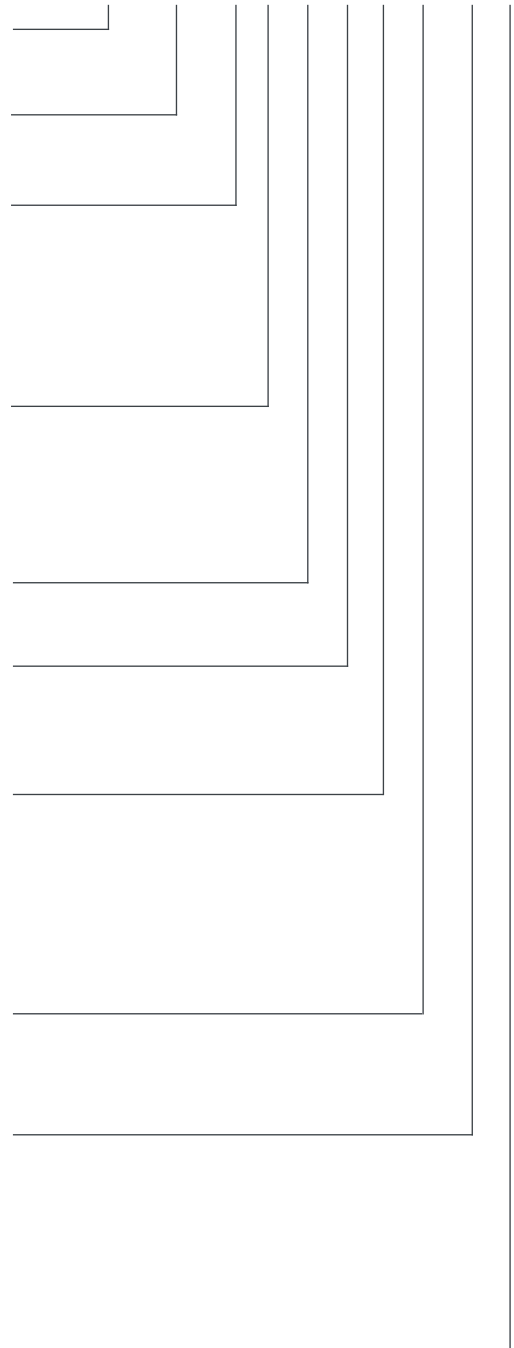
- A** The membrane is in the precharge pressure state, i.e. it is only pressurised with nitrogen p_0 . The buttoned-in disc closes the oil opening and prevents the membrane from being destroyed.
- B** State at the minimum working pressure p_1 . A small amount of fluid (10% is recommended) must remain 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

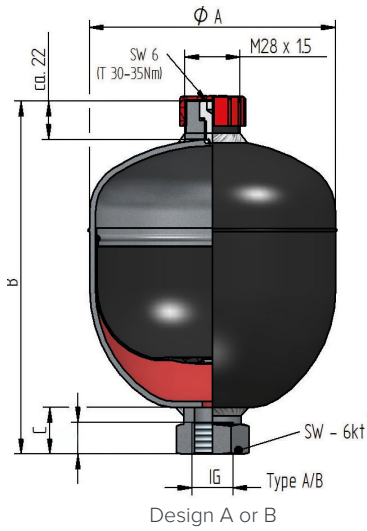
DIAPHRAGM ACCUMULATOR HMS	
Nominal size [litres]	
0.075 / 0.16 / 0.32 / 0.5 / 0.75 / 1 / 1.4 / 2 / 2.8 / 3 / 3.5	
Max. operating pressure [bar]	
140 / 210 / 250 / 350	
Approval identification	
CE	90
GUS	71
None, Art. 4.3 PED	00
Others on request	
Calculation standard	
AD 2000	D
EN 14359	E
ASME	A
Permissible 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



TECHNICAL DATA

VOLUME
0.075–3.5 litres

APPROVAL
DGRL 2014/68/EU
Other versions on request

MAX. PERMISSIBLE PRESSURE (PS)
140–350 bar

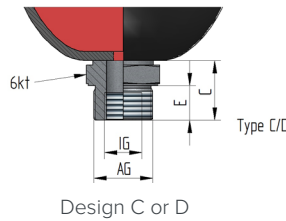
PERMISSIBLE TEMPERATURES (TS)
-20°C to +90°C

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

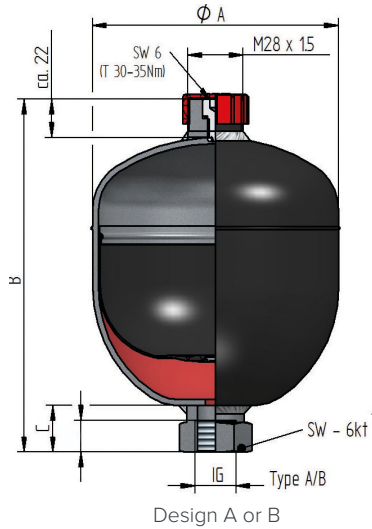


PART NO.	NOMINAL VOLUME [l]	MAX. OPERATING PRESSURE [BAR]	OIL CONNECTION					Ø A [MM]	B HEIGHT [MM]	WEIGHT APPROX. [KG]	P ₀ : P ₂ *	
			DESIGN	IG	AG	SW 6KT	C					Π
HMS-0075-250-2000	0.075	250	A	G ½"	-	32	24	-	64	111	0.75	1:8
HMS-016-250-2000	0.16	250	A	G ½"	-	32	22	-	74	121	1	1:8
HMS-032-210-2000	0.32	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



TECHNICAL DATA

VOLUME

0.16–3.5 litres

APPROVAL

DGRL 2014/68/EU
 Other versions on request

MAX. PERMISSIBLE PRESSURE (PS)

210–350 bar

PERMISSIBLE TEMPERATURES (TS)

-40°C to +120°C

COATING

Black PU paint (RAL9017)

MATERIALS

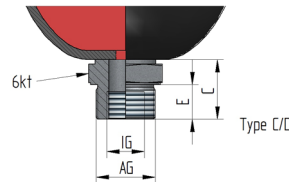
Body and connections: Carbon steel
 Membrane: ECO

GAS VALVE

Standard valve M28x1.5

CONNECTIONS

BSP EN ISO 228, see table



PART NO.	NOMINAL VOLUME [l]	MAX. OPERATING PRESSURE [BAR]	DESIGN	OIL CONNECTION					Ø A [MM]	B HEIGHT [MM]	WEIGHT APPROX. [KG]	P ₀ : P ₂ *
				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	G ½"	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

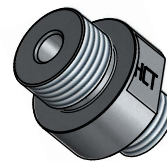
SAFETY AND SHUT-OFF BLOCK HSB AND
CONNECTION ADAPTERS HAS



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



ADAPTERS FOR BLOCK
ATTACHMENT HRS



GAS VALVE ADAPTERS FOR MINI
MEASURING CONNECTION OR 1/4" IG



FILLING AND TESTING KIT HFP

