

Instruction and Maintenance Manual Hydro Accumulator SHBS/HBS

falling to the bottom of the hydro accumulator, can lead to serious property damage and personal injury.

6.2 Storage

Accumulators must be stored in cool and dry places away from heat. If hydraulic accumulator store for more than five years, all elastomer parts must be replaced before commissioning (contact **HENNLICH - HCT**). The storage of a bladder accumulator over a longer period with a nitrogen pre charge P_0 is not recommended.

Note: In case of a storage of a hydro accumulator for more than 2 years as part of the commissioning requires possibly a renewed internal examination by a notified body/ ZÜS.

7. Marking of the hydro accumulator

Data, markings und further labelling may not be altered without the prior written permission of HENNLICH - HCT.

In case of discrepancy regarding the information displayed on the type plate and those specified on other parts of the hydro accumulator (body, oil valve, etc.) the data indicated on the type plate must be observed for operation.

The following information is displayed on the accumulator:

- **HENNLICH - HCT** logo
- accumulator-type
- item number of the hydro accumulator

Permissible operating data:

- temperature range TS in ° C
- maximum allowable pressure PS in bar
- fluid group
- manufacturing date mm / yy
- nominal volume
- test pressure PT in bar
- weight in kg
- CE logo and identification number of the notified body (for volume > 1 liter / fluid group 2)



Warnings on the nameplates and on the accumulator body:

- warnings and safety instructions („Danger“, „only nitrogen use“, etc. or any similar indication)
- pre-charging pressure P_0

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Damaged or lost data plates must be replaced! The operation of a hydraulic accumulator without type plate is not allowed!

8. Operating

The operating of hydro accumulators and equipment may only be carried out by qualified personnel. Systems with hydro accumulators have a supervisory duty and they are subject of special commissioning regulations.

According to the in Germany valid § 14 (1), §15_ BetrSichV (1) a subject to monitoring system may only be used for the first time and after a significant change in operation when the system taking into account the planned operation by an authorized body for their proper condition with regard to assembly , the installation, the installation conditions and the safe function has been tested.

Pressure equipment which are classified in items 4.3 and category I, can possibly be taken in operation by a qualified person of the operator. The in category II to IV classified pressure equipment must be put into operation by a notified body. According to §16 BetrSichV, equipment which requiring supervision are subject of reexaminations.(In case of questions please contact **HENNLICH - HCT**)

Before the commissioning, a visual inspection is necessary regarding any external damage to the pressure equipment. Before work of any kind to be carried out on the hydraulic system, it must be ensured that the plant is pressureless.

Improper installation can lead to serious accidents!



Strictly forbidden are:

- **welding on hydraulic accumulators, soldering, drilling or carry out of work, which can change the mechanical properties of the pressure device.**
- **change of the hydraulic accumulator or its components.**

8.1 Works before commissioning

8.1.1 Charging gas

Use only nitrogen with at least class 3.5 (at least 99.8% pure)

Using of oxygen or compressed air for filling is strictly forbidden. Risk of explosion!

8.1.2 Pre-charge pressure P_0

By default, the **HENNLICH** bladder accumulator is delivered with a stock fill (max 2 bar). Before commissioning, the pre-filling must be carried out by the user, otherwise the bladder might be **destroyed!**

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If the accumulator has been pre-filled by the factory to a certain pre-charge pressure P_0 , the pre-charge pressure will be displayed on the hydro accumulator (type plate, sticker).

The correct setting of the pre-charge pressure P_0 depends on the function, the min. working pressure P_1 , and max. working pressure P_2 and is calculated by the operator from the operating data of the system.

The influence of temperature must also be considered.

The **HENNLICH** bladder accumulator offers a volume utilization of up to 75% of the effective gas volume.

 **The gas pre-filling pressure may not exceed the max. System pressure (P_2) and operating pressure (PS).**

Limit values: $P_0 \leq 0,9 \times P_1$, max. permissible pressure ratio $P_0:P_2 = 1:4$

8.1.3 Maximum allowable operating pressure (PS)

The maximum allowable operating pressure (PS) for the hydro bladder accumulator is stamped on the type plate and on the accumulator body. Is the system pressure greater than the max. operating pressure of the accumulator, the accumulator may **not** be used.

8.1.4 Permitted temperature range (TS)

The temperature range (TS) is indicated on the type plate. The design temperature of the body is stamped on the steel body.

The bladder material normally limits the temperature range, significant is therefore always the type plate.

8.1.5 Hydraulic fluids

The materials, especially those of the bladder and of the seals of the hydro accumulator, must be compatible with the used hydraulic fluid.

Group 1-fluids may not be used in a hydro accumulator, which is determined for Group 2 fluids (standard HBS). The type plate indicates the allowed fluid group of hydro accumulator.

It is strictly forbidden to use the accumulator with liquid for which it is not determined or suitable.

If using fluid of the fluid group 1, all possible safety precautions must be observed strictly, in accordance with the laws and currently regulations in force. If using other media as hydraulic fluids (e.g. HLP 46), these are to be marked by the operator at the store!

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8.1.6 Installation

Make sure that the labels and markings are clearly visible and legible. Keep a distance at least 200 mm above the gas valve for the mounting of a testing and filling device.

Please consider climate conditions in order to protect the hydro accumulator from sources of heat, electric and magnetic fields, against lightning, moisture and other adverse environmental conditions.

For an optimal performance, place the accumulator as close as possible to the consumer. Preferred mounting position is vertical, gas valve on top.

8.1.7 Assembly

During assembly of the hydraulic accumulator is to be observed:

- make sure that the connected pipe system is assembled free of tension and safely
- make sure that the hydraulic accumulator is properly secured and no uncontrolled movements can be executed even in the case of a line break
HENNLICH - clamps and brackets are suitable for this purpose and deliverable as accessory
- the hydro accumulator must be mounted so that no external tensions acting on it

8.1.8 Final checks before commissioning

The final review before commissioning must be performed in the accordance with the current commissioning and operational safety regulations and in line with the laws in the country of set-up (e. g. use of appropriate safety devices or acceptance test by a recognized test center, etc.)

8.2 Filling with nitrogen

Secure the hydraulic accumulator. Position yourself during filling so that you cannot be damaged by a possible leak or rupture of the filling.

Especially do not place in the longitudinal axis in front of or behind of the hydro accumulator. Use for the filling process the **HENNLICH** - filling and test device HFP and therefore the valid instructions for use have to be noted.



Before testing, the hydraulic accumulator must be relieved on the liquid side!

The nitrogen pressure varies according to the operating or room temperature. Too rapid filling causes a rapidly pressure increase.

After filling or after the release process, the temperature compensation must be done in the hydraulic accumulator, before the checking of the pre-charge pressure.

The maximum precharging pressure must not exceed the maximum operating pressure of the hydraulic accumulator.

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Check the fill valve for leaks (e.g. with foaming agents). Always use the protective caps to protect the fill valve.

8.3 Hydraulic pressure systems

First, the precharging pressure P_0 must be checked. Check the hydraulic pressure system regarding leaks.

Make sure that the hydrostatic pressure displayed on the hydro accumulator the maximum allowable pressure PS does not exceed.

The pressure system can be vented on the fluid valve of the hydro accumulator at some models. After venting, the vent screw must be closed and to be checked for tightness and leaks.

Caution! Never open the bleed screw when the hydraulic system is under pressure.

9. Maintenance / Repair

The maintenance and repair of the bladder accumulator requires basic mechanical and hydraulic knowledge. The maintenance and repair of the hydro accumulator may only be carried out by qualified staffs.

Before the hydraulic accumulator is dismantled by the system, it must be ensured that the hydraulic accumulator is completely depressurized on the liquid- and system side.

Disassembly, assembly and repair of the hydro accumulator may only be carried out by the manufacturer or authorized persons. For self-made repairs no guarantee is assumed! For transport, close all openings with suitable protective caps so that dirt or moisture can not penetrate into the bladder accumulator.

Make sure that all connecting parts, in particular pressurized connecting parts, are sufficiently fixed. Self-loosing parts can lead to property damage and personal injury.

Before the dismantling of the hydraulic accumulator, please ensure that the accumulator on the liquid side is fully pressureless and released.

Before the dismantling of the accumulator all externally mounted components must be removed on liquid side such as reducers and other accessories.



If the accumulator is completely relieved (gas and liquid side) the liquid valve must be open. If this can not be determined, further work is not permitted!

Contact **HENNLICH!**

The HBS - repair instructions must be observed!

To keep the equipment in good working condition and to ensure a long service life we recommend the following maintenance:

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9.1 Filling pressure P_0 check

After commissioning, check the filling pressure P_0 once a week in the first month. Then repeat the exam monthly, twice a year, annually, depending on the detected pressure drop.

9.2. Other maintenance

HENNLICH - HCT recommend to carry out the following checks

(depending on the test distances and the operating conditions):

- verification of the safety instructions and the connections
- models with vent screw have to be regularly checked for strength and tightness
- checking of the fixings
- visual inspection of the accumulator with regard to possible signs of wear, such as corrosion or deformation
- if you use an abrasive or corrosive liquid, an internal checking for wear is required, in dependence from aggressiveness of the liquid
- the hydraulic accumulator is subject of regular internal and external audits in accordance with legal regulations

Repair work must be performed in accordance with the underlying maintenance manuals.

For repair or maintenance must be used only original spare parts of the manufacturer.

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10. List of supposedly disturbances

Incident/ type of disturbance	Supposed cause	Effects/ danger	Measure to remedy the disturbance/ preventive measures
change of pre-charge pressure (P_0)/ incorrect pre-charge pressure P_0	system specific change of P_0 , depending on the temperature	limited functionality/ destruction of the bladder	temperature specific selected P_0 , depending on the min. and max. working pressure
	gas filling valve/ damaged sealing ring	loss of pre-charge pressure (P_0), limited functionality/ destruction of the bladder	regular check of the gas filling valve/ use of the corresponding protective caps.
	insufficiently fixed gas filling valve		regular check of the gas filling valve, considering the tightening torque
	reduction of P_0 due to permeation	loss of pre-charge pressure (P_0), destruction of the bladder	regular check of the P_0 , the gas valve seals, if necessary change of the bladder
leakage	damaged connection parts - liquid side	oil loss	regular check of the valves, considering the tightening torque
	damaged connection parts - gas side	nitrogen loss, functionality problems, destruction of the bladder	
	insufficiently fixed connecting parts	separation of the connection parts	
cracks / deformations in the accumulator body	cracks in the accumulator body	bursting	immediate decommissioning of the system. The hydro accumulator must be sorted out.
	Overload of the hydro accumulator Operating of the accumulator outside predetermined limits		decommissioning, exchange, compliance and control of permissible operating parameters (see type plate, declaration of conformity, instruction manual). Protecting the hydro accumulator against overpressure using appropriate safety valves.
reduction of the wall thickness of the accumulator body	Abrasion due to excessive frictional forces / by using unsuitable fluids / Contamination of the fluid		immediate decommissioning of the system. replacement of the hydro accumulator/ use of suitable fluids. Avoiding contamination in the operating system, filtration
corrosion of the accumulator inside	by using unsuitable fluids (e.g., corrosive fluids). incorrect storage / transport	corrosion/ bursting	immediate decommissioning of the system. replacement of the hydro accumulator/ use of suitable fluids./ use of suitable hydro accumulators (e.g. coated hydro accumulators or stainless steel accumulators). For storage and transport: close openings with suitable protective caps.
corrosion of the accumulator outside	due to insufficient surface coating (e.g. operation of the accumulator in the outside area) incorrect storage / transport		immediate decommissioning of the system. replacement of the hydro accumulator/ use of suitable surface protection/ material accumulator

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Incident/ type of disturbance	Supposed cause	Effects/ danger	Measure to remedy the disturbance/ preventive measures
destruction bladder	due to incorrect nitrogen pre-filling P_0	destruction of the bladder	temperature specific selected P_0 , depending on the min. and max. working pressure/ regular check of the P_0 .
	damaged/ insufficiently fixed gas filling valve		regular check of the gas filling valve, considering the tightening torque
	by using unsuitable fluids		use of suitable fluids / use of fluid-specific bladder material.
assembly problems	contaminated or damaged or connecting thread	no or insufficient screw possibility	clean affected parts or replace them.
	non-compliant mounting accessories	no or insufficient fixing possibility	
		generation of external forces and voltages	Use of suitable fixing equipment (e.g., clamps, brackets, back panels).
self-loosening parts	defective attachment	function problems, personal injury and property damage	Make sure there is sufficient fixation, in particular check fixations of pressurized parts regularly (e.g. gas valve, bleed screw, fittings)
commissioning problems	storing time timeout of subject to monitoring systems	commissioning-refusal of the notified body when the storage time is exceeded (> 2 years)	Additional internal test acc. to § 14 BetrSichV by the notified body.

11. Fatigue life

For CE-approved standard HBS bladder accumulators 1L - 57L.

For other approvals, please have a look on the fatigue lifes-datas in confirmation of accumulator.

Fatigue Life Bladder accumulator HBS 1_2,5_5L_350 bar (Calculation according to EN 13445-Fluidgruppe 2)							
Bladder accumulator_HBS_1-350 bar / HBS_2,5-350 bar / HBS_5-350 bar							
ΔP (bar)	0-120	0-150	0-186	0-200	0-250	0-280	0-350
load change (N) *	$N > 1.000E8$	$N \leq 1.000E8$	$N \leq 1,99E6$	$N = 829300$	$N = 135400$	$N = 62540$	$N = 19417$

Fatigue Life Bladder accumulator HBS 4_6_10L_350 bar (Calculation according to EN 13445-Fluidgruppe 2) cycles by using adaptors							
Bladder accumulator_HBS_4-350 bar / HBS_6-350 bar / HBS_10-350 bar							
ΔP (bar)	0-120	0-150	0-169	0-200	0-250	0-280	0-350
load change (N) *	$N > 1.000E8$	$N \leq 4.031E7$	$N \leq 2.082E6$	$N = 578400$	$N = 86600$	$N = 43345$	$N = 14783$
load change (N)	$N > 1.000E8$	$N \leq 3.292E6$	$N = 709700$	$N = 176850$	$N = 58444$	$N = 39343$	$N = 14783$
* = number of load cycles in applying of HENNLICH adaptors (HENNLICH accessories with inside placed sealings)							

Fatigue Life Bladder accumulator HBS 10-50L_350 bar (Calculation according to EN 13445-Fluidgruppe 2)							
Bladder accumulator_HBS 10-330 bar / HBS_12_330 bar / HBS_20-330bar / HBS_24,5-330 bar /HBS 32-330 bar / HBS_50-330 bar							
ΔP (bar)	0-122	0-145	0-161	0-200	0-250	0-280	0-330
load change (N)	$N > 1.000E8$	$N \leq 9.968E6$	$N \leq 2.041E6$	$N = 196330$	$N = 43250$	$N = 24137$	$N = 11806$