Bosch Rexroth HAB4-330-6X/0G07G-2N111-CE bladder accumulator

Manufacturer: Bosch Rexroth

Manufacturer part number / published order designation: R901191372

Published model: HAB4-330-6X/0G07G-2N111-CE

About this compilation

Prepared by Hydmaster from selected manufacturer documentation. Original technical pages follow without cropped drawings, rewritten data or altered units. This cover and index are Hydmaster editorial material, not a manufacturer-issued exact-execution datasheet.

Coverage: selected pages relevant to the identified size and configuration. Other options or neighbouring models retained on an original page apply only where explicitly identified.

Execution notes and conditions

Actual delivered gas precharge and usable hydraulic oil volume are not inferred from nominal capacity or the factory ordering-code prefix.

No installation-specific PED, country certification, mobile-use release or complete accumulator-station rating assigned.

Mounting collars, support console, charging equipment and safety/shut-off block are separately selected; inclusion is not inferred.

Dimension tolerances, vessel weight and gas-valve internal cap threads remain in the original drawing rather than being promoted as exact delivery geometry.

Source-page index

Source page numbers below are physical pages of each complete original PDF. The original printed page labels and technical content remain unchanged. Compiled page numbers count this cover/index.

Source A: Bosch Rexroth Hab Re50171 2024 Salhydro Original

Original pages	Compiled pages	Relevant content
1-10	2-11	Manufacturer HAB series 6X overview and document edition; Actual 4 L / 350 bar / NBR configuration, fluid connection G07G and gas port form 2; Manufacturer preferred material-number table and approval-code context; no installation certification inferred; Bladder, oil valve and gas-valve operating section and function; Exact volume column: effective gas volume, permissible flow and pressure fluctuation; NBR fluid/temperature restrictions; Gas-charge and pressure-ratio definitions, nitrogen purity and operation; Useful oil volume versus nominal volume; isothermal/adiabatic equations and real-gas correction conditions; Required isothermal sizing diagrams and their gas-filling-pressure domains; Required adiabatic sizing diagrams and their gas-filling-pressure domains; Matching 4 L threaded G mounting row and gas valve form 2 drawing; flange F and other sizes contextual
21	12	Stationary-use scope, secure mounting, mobile-application restrictions and separately selected safety equipment

RE 50171
Edition: 2024-03
Replaces: 2020-08

rexroth
A Bosch Company

Bladder-type accumulator

Type HAB



HAB10-330_d

- Component series 6X
- Nominal volume 1 ... 50 liters
- Maximum operating pressure 350 bar

CE

Features

- Hydro-pneumatic accumulators for use in stationary machinery and systems
- Use:
  - Energy storage in intermittent operation systems
  - Energy reserve for emergencies
  - Compensation of leakage losses
  - Impact and vibration absorption
  - Volume compensation in case of pressure and temperature change
- Approval:
  - according to PED 2014/68/EU
  - according to NR13

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Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14
HAB		**–**		**–**	**6X**	**/**				**–**			**1**	**1**	**1**	**–**		

Device designation

01	Bladder-type accumulator		**HAB**

Nominal volume

02		**1**	**2.5**	**4**	**6**	**10**	**20**	**24**	**32**	**50**	

Maximum operating pressure

03	350 bar	●	●	●	●						**350**
	330 bar	o	o	o	o	●	●	●	●	●	**330**
	50 bar			o							**50**
	30 bar				o						**30**
	20 bar					o					**20**
	10 bar						o				**10**

Component series

04	60 ... 69 (unchanged installation and connection dimensions)		**6X**

Pre-filling pressure

05	0 bar	●	●	●	●	●	●	●	●	●	**0**
	> 0 bar	o	o	o	o	o	o	o	o	o	

Dimension of hydraulic fluid connection

06	G3/4" pipe thread	●									**G05**
	G1 1/4" pipe thread		●	●	●						**G07**
	G2" pipe thread					●	●	●	●	●	**G09**
	2" SAE flange (high-pressure series)					o	o	o	o	o	**S19**

Type of mounting of hydraulic fluid connection

07	Pipe thread with radial sealing surface	●	●	●	●	●	●	●	●	●	**G**
	Flange mounting with axial sealing surface					o	o	o	o	o	**F**

Dimension of gas port

08	Gas valve ISO 4570 8V1	●	●	●	●	●	●	●	●	●	**2**
	Gas valve 5/8"-18 UNF	o	o	o	o	o	o	o	o	o	**3**

Accumulator bladder material

09	NBR	●	●	●	●	●	●	●	●	●	**N**
	TNBR	o	o	o	o	o	o	o	o	o	**T**
	ECO			o		o			o		**E**
	FKM				o	o	o		o	o	**F**

Material of reservoir

10	Steel		**1**

Surface of tank inside

11	Without coating		**1**

Material of hydraulic fluid connection

12	Steel		**1**

●	Preferred program
o	Delivery range
	On request

Ordering code

01	02		03		04		05	06	07		08	09	10	11	12		13	14
HAB		**–**		**–**	**6X**	**/**				**–**			**1**	**1**	**1**	**–**		

Nominal volume

02		**1**	**2.5**	**4**	**6**	**10**	**20**	**24**	**32**	**50**	

Approval

13	PED 2014/68/EU	EU		●	●	●	●	●	●	●	●	**CE**
	PED 2014/68/EU + National Requirement 13	EU + Brazil			o	o	o	o	o	o	o	**CE+NO13**

Additional details

14	Further details in the plain text, e.g. special versions	*

●	Preferred program
o	Delivery range
	On request

HAB-6X preferred types

Type	Material no.
HAB1-350-6X/0G05G-2N111-BA	R901435300
HAB2.5-350-6X/0G07G-2N111-CE	R901435301
HAB4-350-6X/0G07G-2N111-CE	R901435302
HAB6-350-6X/0G07G-2N111-CE	R901435303
HAB10-330-6X/0G09G-2N111-CE	R901435304
HAB20-330-6X/0G09G-2N111-CE	R901435305
HAB24-330-6X/0G09G-2N111-CE	R901435306
HAB32-330-6X/0G09G-2N111-CE	R901435307
HAB50-330-6X/0G09G-2N111-CE	R901435308

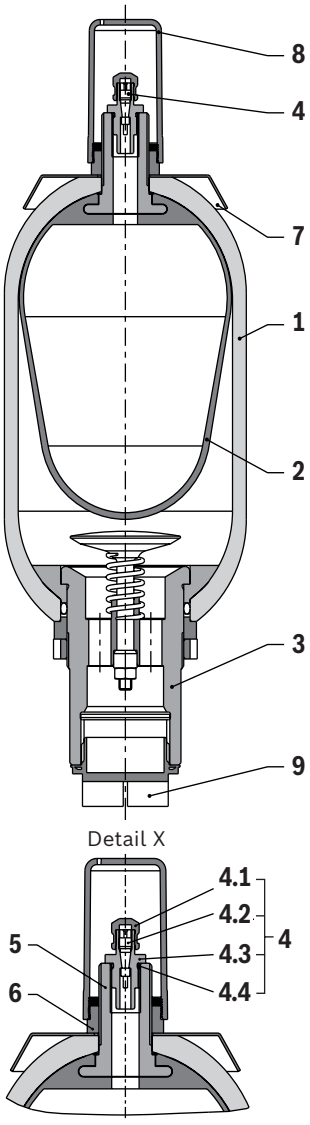
Function, section

General information

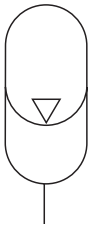
Hydro-pneumatic accumulators are hydrostatic devices capable of storing a certain amount of energy in order to release it to the hydraulic system when needed.
Fluids only possess low compressibility; however, gases are highly compressible. The working principle of all gas-loaded hydro-pneumatic accumulators is based on this difference.
The difference between bladder and diaphragm type accumulators lies in the type of separator element.
Hydro-pneumatic accumulators essentially consist of a fluid section and a gas section with a gas-tight separator element. The fluid section has a connection to the hydraulic circuit.
If a higher liquid pressure is applied to a specific quantity of pressurized gas, the gas volume decreases as the liquid pressure increases, with the gas pressure increasing with the liquid pressure.
If the pressure of the fluid decreases, the fluid is pushed back into the hydraulic system by the expanding gas until the pressure is balanced again.

Bladder-type accumulator

Bladder-type accumulators consist of a seamless cylindrical pressure container (1) made of high-strength steel.
An elastic bladder (2) mounted inside the container separates the accumulator into a gas side and a fluid side.
Via the gas valve (4), the bladder is filled with nitrogen up to the intended gas filling pressure $\mathbf{p}_0$.
The oil valve (3) located inside the hydraulic fluid connection of the bladder-type accumulator closes if the pressure on the gas side is higher than on the fluid side. This prevents the bladder from entering the oil channel and being destroyed.
When the minimum operating pressure is reached, a small fluid volume (approx. 10% of the nominal volume of the hydro-pneumatic accumulator) should remain between the bladder and the oil valve in order to prevent the bladder from hitting the valve during each expansion process.
The gas valve (4) consists of a sealing cap (4.1), gas valve insert (4.2), gas prefill valve body (4.3) and O-ring (4.4). These parts can be replaced individually.
The name plate (7) includes the technical data and features of the hydro-pneumatic accumulator.



Symbol



1 Tank
2 Bladder
3 Oil valve
4 Gas valve
5 Gas valve support
6 Nut
7 Name plate
8 Cover cap
9 Oil valve protective cap

Technical data
(Please consult us for applications outside these values!)

General											
Nominal volume	$\mathbf{V}_{nom}$	l	1	2.5	4	6	10	20	24	32	50
Weight		kg	7	10	16.5	20	32	53	61	85	123
Design			Bladder-type accumulator								
Installation position			Bottom hydraulic fluid connection, others on request								
Type of mounting			With clamping collars and console								
Hydraulic fluid connection			Screw-in thread or flange connection								
Surface			Primed, blue color (RAL 5010)								

Hydraulic										
Nominal volume	$\mathbf{V}_{nom}$	l	1	2.5	4	6	10	20	24	32	50
Effective gas volume	$\mathbf{V}_{eff}$	l	1.0	2.4	3.7	5.9	9.2	18.1	24.5	33.4	48.7
Maximum admissible flow	$\mathbf{q}_{max}$	l/min	240	450			900				
Max. operating pressure	$\mathbf{p}_{max}$	bar	330								
Durable within pressure fluctuation range	$\mathbf{\Delta p}$dyn = p2 - p1	bar	200				125				
Max. operating pressure	$\mathbf{p}_{max}$	bar	350								
Durable within pressure fluctuation range	$\mathbf{\Delta p}$dyn = p2 - p1	bar	200								
Max. operating pressure	$\mathbf{p}_{max}$	bar			50	30	20	10			
Durable within pressure fluctuation range	$\mathbf{\Delta p}$dyn = p2 - p1	bar			36	21	14	7			
Operating pressures and useful volume			See calculations on pages 6 ... 9								

Pneumatic			
Charging gas			Nitrogen, at least cleanliness class 4.0, N_2 = 99.99 vol.%
Gas filling pressure (at 20 °C room temperature)	$\mathbf{p}_0$	bar	$\mathbf{p}_0 \leqq 0.8 \bullet \mathbf{p}_{max}$

Hydraulic fluid		Classification	Accumulator bladder material	Standards	Data sheet
Mineral oils		HLP, HLPD, HVLP, HVLPD	NBR, ECO, TNBR	DIN 51524	90220
Special fluids	▶ Environmentally compatible	HETG	FKM	ISO 15380	90221
		HEES			
		HEPG			
	▶ Water-free, flame-resistant	HFDU	FKM	ISO 12922	90222
		HFDR			
	▶ Containing water, flame-resistant	HFC	NBR, TNBR	ISO 12922	90223

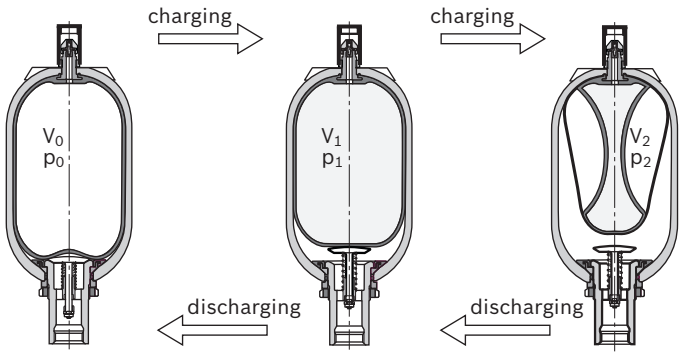
Further information on the hydraulic fluids:		
Temperature range (others on request)	°C	NBR: –15 ... +80 (acrylonitrile-butadiene rubber, 33% acrylonitrile) FKM: –20 ... +80 (fluorocarbon rubber) TNBR: –30 ... +80 (acrylonitrile-butadiene rubber, 28% acrylonitrile) ECO: –32 ... +80 (epichlorohydrin rubber)
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)		Class 20/18/15

Application, mode of operation

Applications
Various applications exist for hydro-pneumatic accumulators:

- Energy storage in order to save pump drive power in intermittent operation systems.
- Energy reserve for emergencies, e.g. upon failure of the hydraulic pump.
- Compensation of leakage losses.
- Impact and vibration absorption in case of periodic vibrations.
- Volume compensation in case of pressure and temperature changes.

Mode of operation
Fluids are almost incompressible and therefore cannot store pressure energy. Hydro-pneumatic accumulators use the compressibility of a gas for fluid storage.
Use only nitrogen with a minimum cleanliness class of 4.0!
N_2 = 99.99 vol.%



Calculation

Pressures
For calculating an accumulator, the following pressures play a respective role:

$\mathbf{p}_0$	Gas filling pressure at room temperature and drained fluid chamber
$\mathbf{p}_0$ (**t**)	Gas filling pressure at operating temperature
$\mathbf{p}_0$ ($\mathbf{t}_{max}$)	Gas filling pressure at maximum operating temperature
$\mathbf{p}_1$	Minimum operating over pressure
$\mathbf{p}_2$	Maximum operating over pressure

In order to achieve the best possible utilization of the accumulator volume as well as a long life cycle, compliance with the following values is recommended:
$\mathbf{p}_0$ ($\mathbf{t}_{max}$) ~ 0.9 × $\mathbf{p}_1$ (1)

The highest hydraulic pressure should not exceed four times the filling pressure, as otherwise too much stress will be put on the elasticity of the bladder, resulting in too great a compression change with strong gas heating:
$\mathbf{p}_2 \leqq 4 \times \mathbf{p}_0$ (2)

The smaller the difference between $\mathbf{p}_1$ and $\mathbf{p}_2$, the longer the life cycle of the accumulator bladder. However, the operating ratio of the maximum accumulator capacity will also be reduced accordingly.

Calculation

Oil volume

The pressures $\mathbf{p}_0$ ... $\mathbf{p}_2$ result in the gas volumes $\mathbf{V}_0$ ...$\mathbf{V}_2$. Here $\mathbf{V}_0$ is also the nominal volume of the accumulator. The available oil volume $\Delta\mathbf{V}$ corresponds to the difference between the gas volumes $\mathbf{V}_1$ and $\mathbf{V}_2$:

$\Delta\mathbf{V} \leqq \mathbf{V}_1 - \mathbf{V}_2$ (3)

The gas volume variable within a pressure differential is determined by the following equations:

- For an isothermal state change of gases, i.e. when the change of the gas cushion happens so slowly as to leave sufficient time for a complete heat exchange between the nitrogen and its environment, therefore keeping the temperature constant, the following applies:
  $p_0 \times V_0 = p_1 \times V_1 = p_2 \times V_2$ (4.1)

- For an adiabatic state change, i.e. a quick change of the gas cushion accompanied by a temperature change of the nitrogen, the following applies:
  $p_0 \times V_0^{\chi} = p_1 \times V_1^{\chi} = p_2 \times V_2^{\chi}$ (4.2)

χ = ratio of the specific heat of the gas (adiabatic exponent), for nitrogen = 1.4

In practice, state changes rather follow adiabatic laws. Often charging is isothermal and discharging is adiabatic. Considering the equations (1) and (2), $\Delta\mathbf{V}$ is between 50% and 70% of the nominal accumulator volume. The following applies as a guiding principle:

$\mathbf{V}_0 = 1.5 \ldots 3 \times \Delta\mathbf{V}$ (5)

Calculation diagram

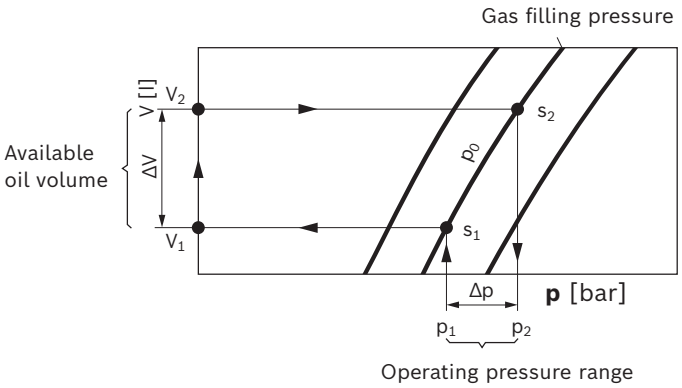
For graphic determination, the formulas (4.1) and (4.2) are converted into diagrams on pages 8 and 9. Depending on the task, the available oil volume, the accumulator size or the pressures can be determined.

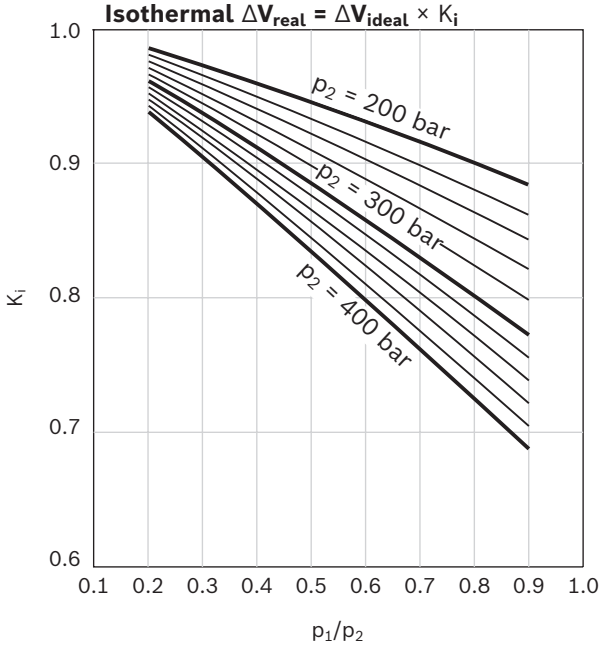
Correction factor K_i and K_a

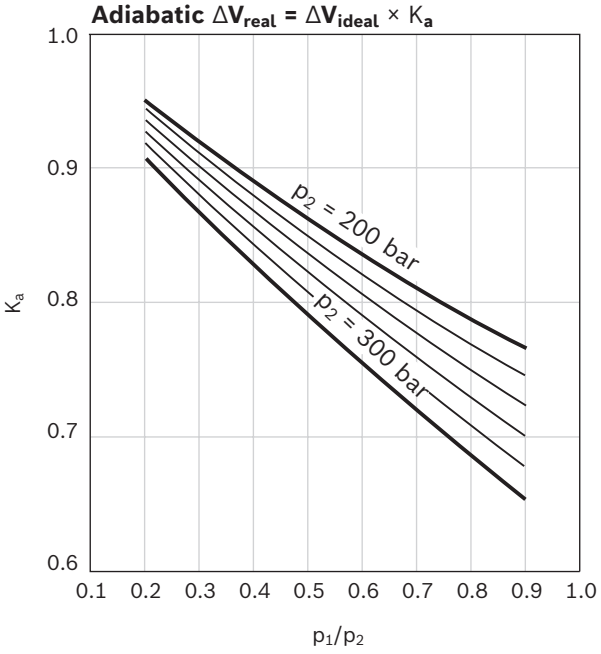
The equations (4.1) and (4.2) apply to ideal gases only. The behavior of real gases, however, will show considerable variation at operating pressures above 200 bar which will have to be accounted for by correction factors. These can be taken from the following diagrams. The correction factors by which the ideal sampling volume $\Delta\mathbf{V}$ is to be multiplied lie within a range of 0.6 ... 1.

Application of calculation diagrams

(see page 8 ... 9)

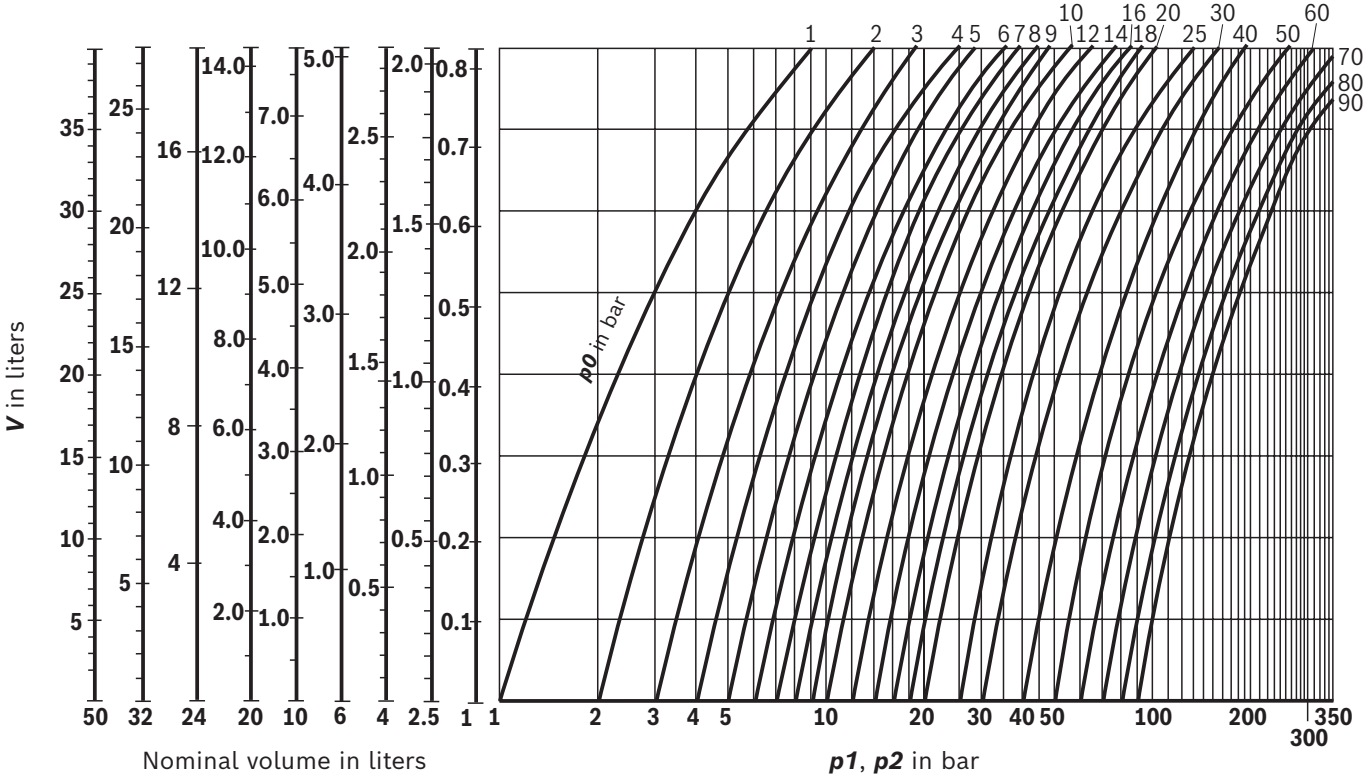




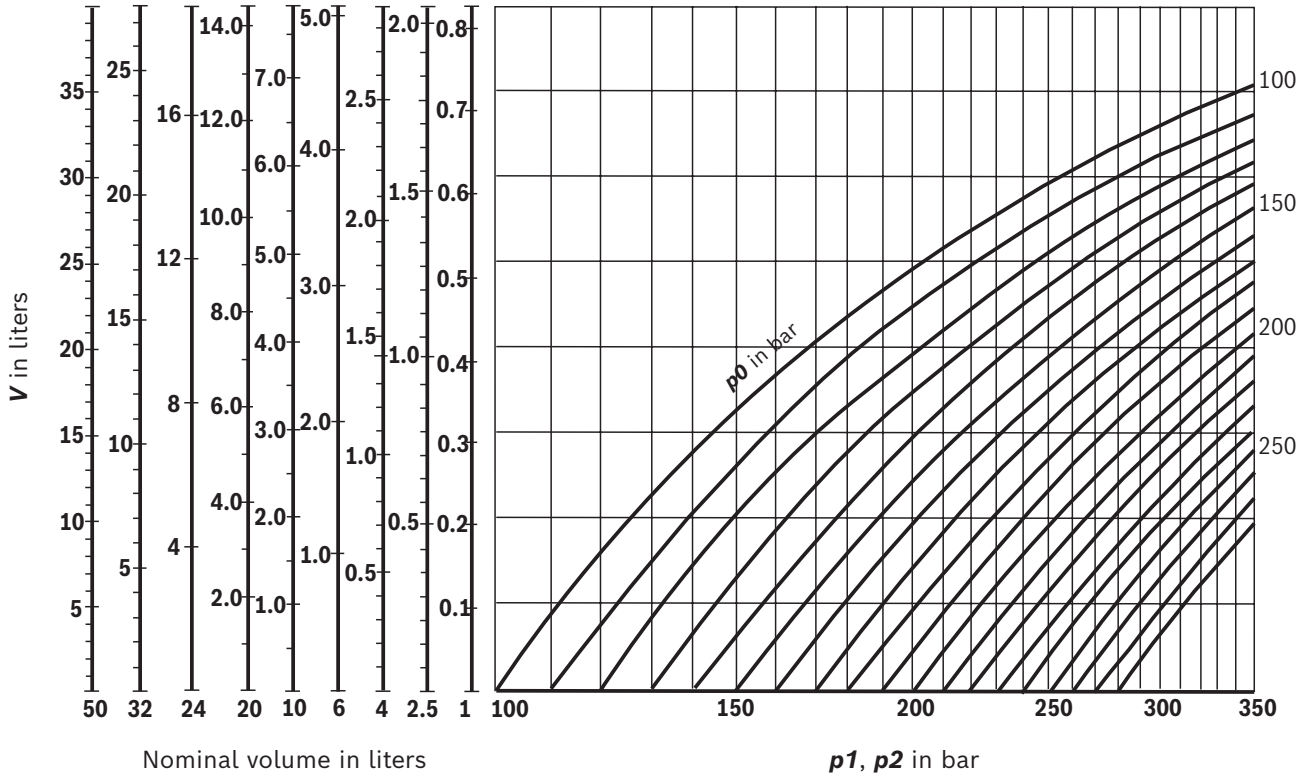


Characteristic curves

Isothermal state changes p_0 = 1 ... 90 bar

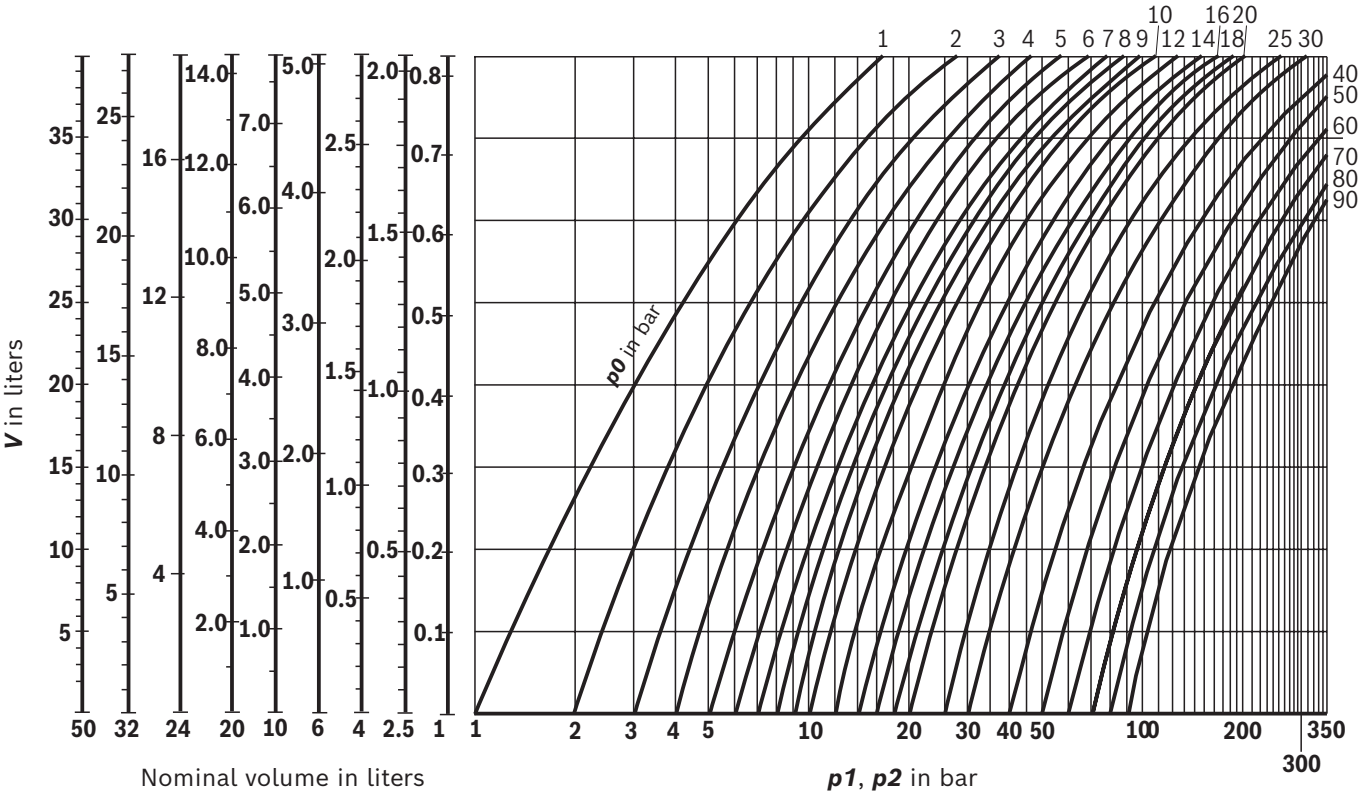


Isothermal state changes p_0 = 100 ... 280 bar

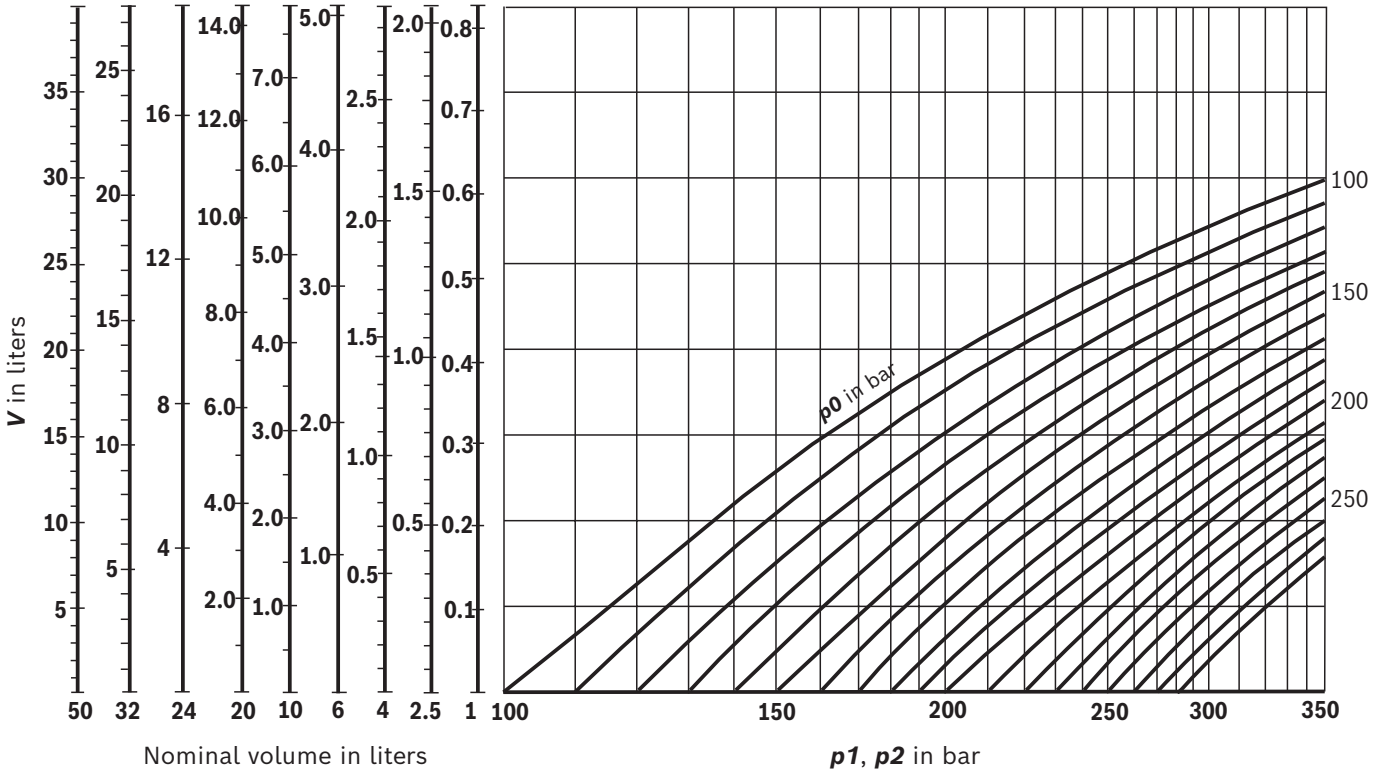


Characteristic curves

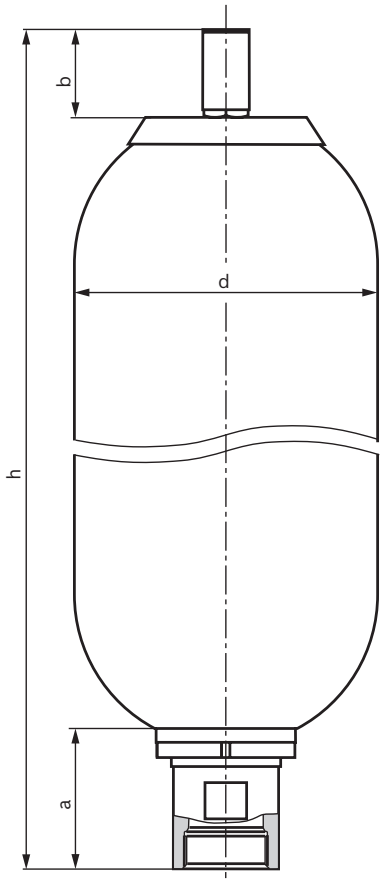
Adiabatic state changes p_0 = 1 ... 90 bar



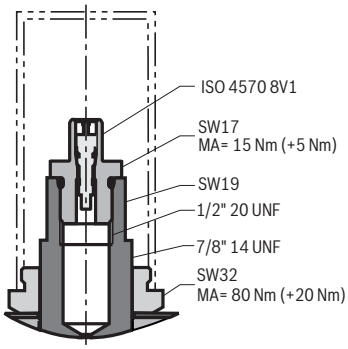
Adiabatic state changes p_0 = 100 ... 280 bar



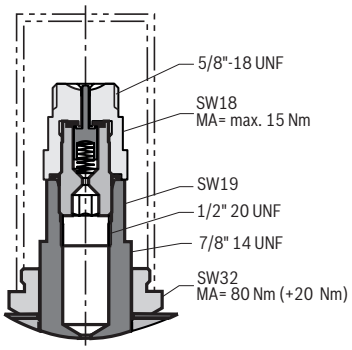
Dimensions
(dimensions in mm)



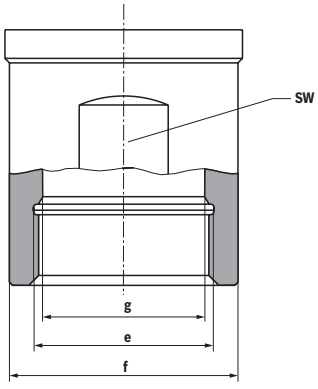
Gas port form "2"
Gas valve ISO 4570 8V1



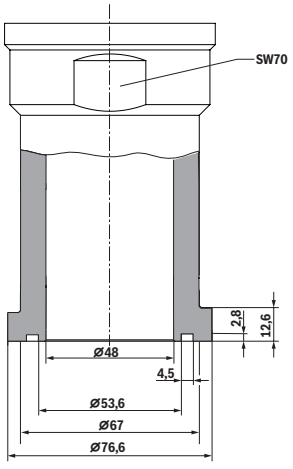
Gas port form "3"
Gas valve 5/8"-18 UNF



Type of mounting "G"
Pipe thread with radial sealing surface



Type of mounting "F"
Flange mounting with axial sealing surface



Type of mounting G

Nominal volume [l]	Port size	h	d	a	b	e	f	g	i	j	SW
1	G05	337.5±17	Ø114±1.14	65±3	71.5±3	G 3/4"	Ø52.4	Ø23H7	-	-	50
2.5	G07	541.5±21	Ø114±1.14	65±3	71.5±3	G1 1/4"	Ø52.4	Ø36H8	-	-	50
4	G07	421.5±21	Ø168±1.68	65±3	71.5±3	G1 1/4"	Ø52.4	Ø36H8	-	-	50
6	G07	552.5±17	Ø168±1.68	65±3	71.5±3	G1 1/4"	Ø52.4	Ø36H8	-	-	50
10	G09	575±16	Ø219±2.19	101.5±3	71.5±3	G2"	Ø76	Ø54H7	-	-	70
20	G09	885±16	Ø219±2.19	101.5±3	71.5±3	G2"	Ø76	Ø54H7	-	-	70
24	G09	1020±16	Ø219±2.19	101.5±3	71.5±3	G2"	Ø76	Ø54H7	-	-	70
32	G09	1405±16	Ø219±2.19	101.5±3	71.5±3	G2"	Ø76	Ø54H7	-	-	70
50	G09	1920±16	Ø219±2.19	101.5±3	71.5±3	G2"	Ø76	Ø54H7	-	-	70

Type of mounting F

Nominal volume [l]	Port size	h	d	a	b	O-ring
10	S19	609.5±16	Ø219±2.19	136±3	71.5±3	56.74 x 3.53
20	S19	919.5±16	Ø219±2.19	136±3	71.5±3	56.74 x 3.53
24	S19	1054.5±16	Ø219±2.19	136±3	71.5±3	56.74 x 3.53
32	S19	1439.5±16	Ø219±2.19	136±3	71.5±3	56.74 x 3.53
50	S19	1954.5±16	Ø219±2.19	136±3	71.5±3	56.74 x 3.53

Important notes

Intended use
Rexroth type HAB..-6X bladder-type accumulators are intended for the set-up of hydraulic drive systems in stationary machine and plant construction.
In mobile applications or applications in which acceleration forces are applied to the bladder-type accumulator during intended use, its use is permitted only following release by the competent Rexroth product manager. Please contact technical sales for this.
Rexroth bladder-type accumulators type HAB..-6X are not intended for private use.

Project planning information
Bladder-type accumulators must be safely and permanently fastened to the machine or system using mounting elements. The fastening is intended to keep the hydraulic fluid connection free of tension. In particular, no tension forces or static or dynamic inertia forces should be applied to the hydraulic fluid connection.
Thermal expansion of the supporting structure and vibrations originating from the environment should be considered in the selection of suitable mounting points.

Safety instructions for hydraulic accumulators
For bladder-type accumulators type HAB..-6X, operating instructions 50171-B must be observed. Compliance is the sole responsibility of the machine end-user.
General information for hydro-pneumatic accumulators in hydraulic system can be found in ISO 4413.

Keep all documents included in the delivery in a safe place; they will be required by the expert in recurring tests.

Legal provisions
Hydro-pneumatic accumulators are pressure vessels and subject to the application of national provisions and/or regulations valid at the place of installation.
In Germany, the Ordinance on Industrial Safety and Health (BetrSichV) applies.
Special regulations are to be observed in shipbuilding, aircraft construction, mining, etc.

Authorized persons
According to Ordinance on Industrial Safety and Health (BetrSichV), only authorized persons may carry out tests. Authorized persons are such persons having obtained the required expert knowledge through professional training, experience and recent professional activity.

Safety equipment

☞ **Notice:**
Hydro-pneumatic accumulators must be secured against operation outside of the admissible limits according to Pressure Equipment Directive 2014/68/EU.

In order not to exceed the maximum operating pressure, Bosch Rexroth recommends the use of an accumulator shut-off block type ABZSS according to data sheet 50131.