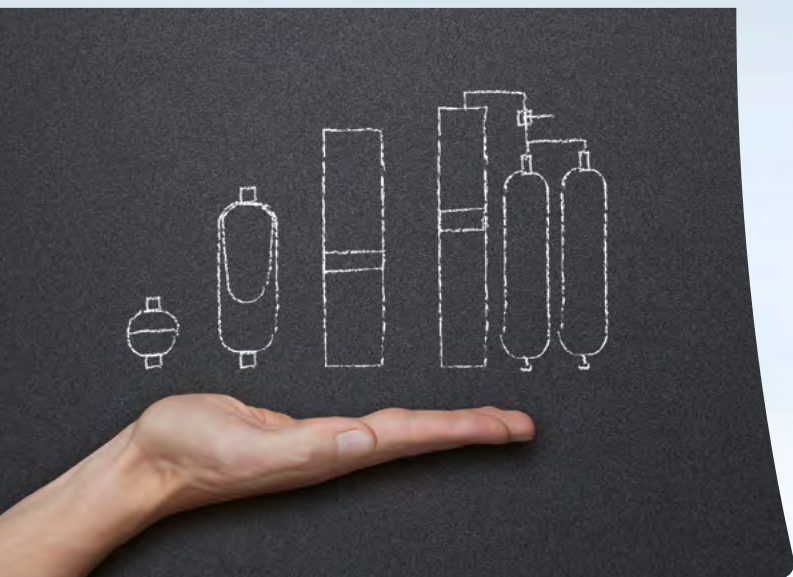


**Hydraulic accumulators,
accumulator systems
and accessories**



excellent pressure solutions

Welcome to Roth Hydraulics

We develop and produce fluid technology products and systems designed to customer specifications. Our core products are hydraulic energy accumulators. Our many years of experience form the basis for further innovative products and needs-focused solutions in fluid technology. Roth products enjoy an excellent reputation worldwide and stand for robustness and durability. International certifications and approvals ensure global acceptance.

A close-up of a human hand, palm up, holding the Roth Hydraulics logo. The hand is positioned at the bottom left of the frame, with the fingers slightly curled to support the logo. The background is a dark, textured surface.

Roth
Hydraulics



Roth Hydraulics accumulator systems

Worldwide proven quality in hydraulic technology

Roth Hydraulics, formerly known as  Bolenz & Schäfer, has been a leader in accumulator technology for more than 70 years. Our range of products covers all types of hydraulic accumulator, ranging from diaphragm and bladder accumulators through piston accumulators and accumulator systems to special solutions. We consider ourselves a full-range supplier and a specialist in hydraulic accumulator technology. Thanks to our know-how, obtained over many years, and our manufacturing expertise, we offer the optimal product for every application, providing maximum customer advantages.

Roth Hydraulics is a sought-after partner worldwide when it comes to accumulator technologies and innovations. Our customers and their requirements form the very heart of business. Together with our subsidiaries in North America and Asia, we offer a network with short reaction times. Our motivation? The satisfaction of our customers worldwide.

Roth hydraulic accumulators have proven themselves internationally in a wide variety of applications and markets. In addition to a wide range of standard products, our special solutions continue to set new standards for reliability and durability, in a wide variety of applications. Whether in wind power, with maximum maintenance intervals and integrated monitoring systems, or in the oil and gas sector, as an emergency power reserve at operating temperatures as low as -60 °C, our accumulator systems continuously ensure the safe operation of your systems.

We provide comprehensive advice to customers, from the design to approval. In addition to our application-focused development and manufacture of accumulator systems, we offer further support after delivery, thanks to our specialist expertise. Accessories and assembly tools as well as services ranging from the scheduled replacement of components through to recurring inspections and training on hydraulic accumulators round off our portfolio.

Take advantage of our expertise and our know-how – we're always here to help.

ROTH hydraulic accumulators – durable and reliable

Roth hydraulic accumulators are versatile and make a significant contribution to improving the energy efficiency of hydraulic systems.

Using Roth hydraulic accumulators can for example minimise the required electric drive power or recover kinetic energy from the entire system.

Roth hydraulic accumulators reduce operating costs and make an active contribution to environmental and resource protection. Typical areas of application include:

- > Energy storage
- > Energy recuperation
- > Emergency and security functions
- > Damping of vibration or pulsation
- > Compensation of pressure surges
- > Volume or leakage-oil compensation
- > Suspension systems
- > Media separation

Product portfolio



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■ Roth diaphragm accumulators – compact & universal

Thanks to their compact and weight-optimised design, Roth diaphragm accumulators are ideal for industrial and mobile use. Different diaphragm materials allow these accumulators to be used at extreme operating temperatures and with a wide range of fluids.

Typical product features:

- > Compact and weight-optimised design
- > Unlimited installation positions, preferably vertical with the oil side on the underside
- > High efficiency, no pressure difference between fluid and gas
- > Low-maintenance and durable

- > Volume: 0,07 l ... 3,5 l
- > Operating pressure: up to 350 bar
- > Operating temperature: -35 °C ... +80 °C

Products

Diaphragm accumulators



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Construction and description

■ General

The **Roth diaphragm accumulator** completes the product spectrum with a further innovative product. Cost-optimised, low-maintenance, practically wear-resistant, durable, suitable for special media and applications as well as for use in extreme conditions – the product's distinguishing feature is its design. Roth hydraulic accumulators fulfil all applicable regulations and directives.

Roth diaphragm accumulators have a varied range of applications:

- > Energy storage
- > Pulsation damping
- > Volume compensation
- > Hydraulic damping/suspension
- > Shock absorption
- > Media separation
- > Emergency control

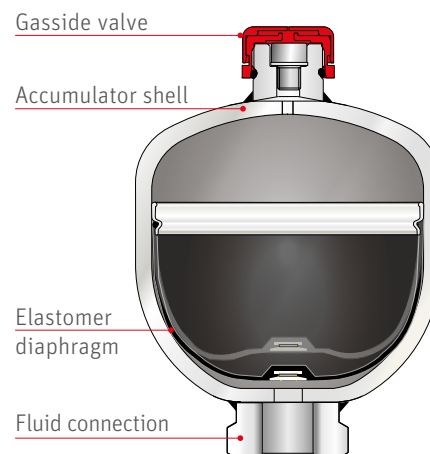


■ Function

Roth diaphragm accumulators enable the storage and release of hydraulic energy.

As pressurised fluid flows in at the oil connection, the nitrogen becomes compressed. The fluid side and the gas side are separated by a flexible diaphragm. Hydraulic energy is stored.

When the pressure drops in the hydraulic system, the gas expands and drives the fluid out of the diaphragm accumulator back into the hydraulic system. Hydraulic energy is released.



Construction and description

Overview of Roth diaphragm accumulators

Overview of Roth diaphragm accumulators	
Volume	0,07 l ... 3,5 l
Operating pressure	max. 350 bar
Housing material	Steel (further materials upon request)
Media	Fluid group 2 Pressure Equipment Directive 2014/68/EU (mineral oil based)
Temperature	-35 ... +80 °C
Volume flow (Q _{max.})	max. 150 l/min
Installation position	Preferably vertical to horizontal
Pressure vessel	Welded
	Coated, UV coating (water-based)
Fluid ports	Inside thread G 1/2" - G 3/4" see MEAK table (further fluid port connections upon request)
Diaphragm (elastomers)	NBR, ECO
Acceptances	PED 2014/68/EU

Gas pre-charge pressure

Gas pre-charge pressure: The gas pre-charge pressure (P₀) should be between a factor 4:1 and 8:1 in relation to the upper operating pressure (P₂). This factor will depend on the type of accumulator. Example: If the upper operating pressure (P₂) for a diaphragm accumulator is 160 bar, the gas pre-charge pressure (P₀) should not be higher than 20 bar if the factor of the diaphragm accumulator involved is 8:1.

Gas filling

Only nitrogen of Class 4.0 is to be used, never oxygen or compressed air.

Design pressure

The design pressure corresponds to the maximum allowable working pressure (MAWP) and is also the maximum setting pressure of safety equipment against excess pressure (safety valves, burst discs). We recommend operating the accumulators with a maximum pressure of 0,9 x MAWP to prevent safety equipment from responding.

Installation position

It can be installed in any position, but should preferably be mounted in the vertical position with the fluid connection below. The installation space for filling and testing devices requires a minimum space of 200 mm above the gas filling connection.

Operating temperature

Standard temperature range: -10 °C to +80 °C, different temperature ranges, e.g. -40 °C to +80 °C, available upon request.

Delivery condition

Accumulator shell welded. UV-coated with universal priming in black (similar to RAL 9005). The coating complies with the C4H standard. Other colours or other surface coatings are possible upon request.

Pressure fluids

Group 2 fluids according to the Pressure Equipment Directive 2014/68/EU, or in relation to diaphragm elastomer and temperature range, according to data in the "Pressure fluids" table below. The oil purity class must be at least 19/17/14 (NAS 1638-KJ8) according to ISO 4406.

Accumulator installation

To prevent damage, the accumulator must be secured according to size and weight. Outside influences (vibrations, additional forces etc.) on the accumulator must be prevented or taken into account during installation.

 **Note:** Please observe the information in the operating instructions for this.

Selection of pressure fluids

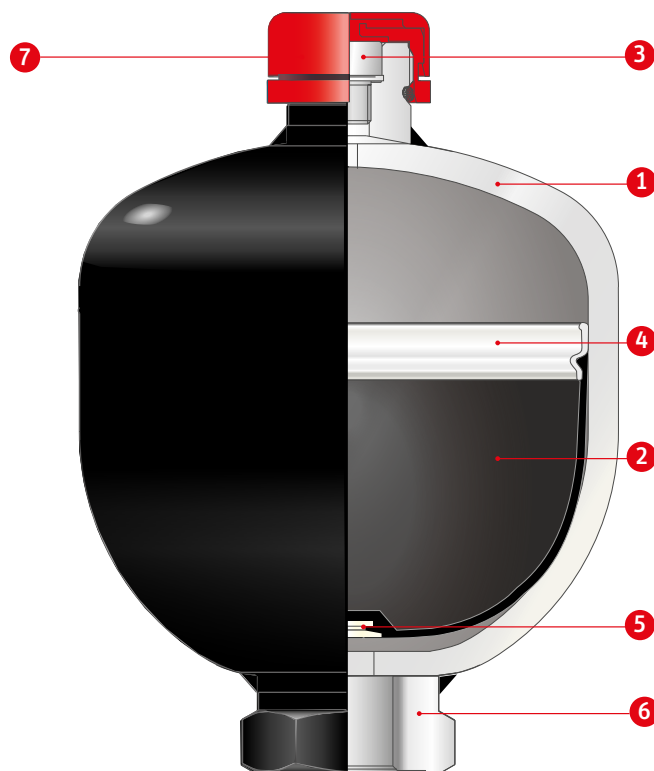
	Fluid	Temperature range °C	Elastomer
Standard	... especially for low temperature range*	-35 ... +80	Hydrin C (ECO)
	Fluids based on mineral oil*	-10 ... +80	NBR
	HFA, HFB*	+5 ... +55	NBR
	HFC*	-15 ... +60	NBR
	Further pressure fluids upon request!		

*Fluid selections for low temperature ranges as well as for temperature applications below -20 °C or above +80 °C require consultation.

Construction and description

■ CE Series MEAK

Item	Designation	Material
1	Accumulator shell	Steel
2	Diaphragm	Elastomer
3	Gas filling connection	Steel
4	Clamp ring	Steel
5	Diaphragm plate	Plastic
6	Fluid connection	Steel
7	Protection cap	Plastic



Rules and regulations

■ Acceptance

Roth hydraulic accumulators are manufactured and approved for the European market in accordance with the "Pressure Equipment Directive".

A conformity assessment procedure according to Pressure Equipment Directive 2014/68/EU has to be carried out for accumulator systems. Accumulators with a volume ≥ 1 litre bear a CE mark. Accumulators with a volume < 1 litre are designed and manufactured in accordance with Article 4 Paragraph 3 and do not bear a CE mark.

The Pressure Equipment Directive is also accepted by many other countries besides the EU member states. Only some additional approval documentation may sometimes be required. Countries such as Russia, Ukraine or China also require an approval, which Roth Hydraulics holds.

Pressure vessel shipments to the USA, on the other hand, must correspond to the American regulations, the ASME Code.

Roth Hydraulics has been approved since 1981 according to ASME Code Section VIII Division 1 and therefore has the longest experience with these regulations in Germany as a hydraulic accumulator manufacturer. Vessels with ASME acceptance are marked with the so-called "U Stamp" and supplied with a data report as acceptance documentation.

However, the scope of the ASME Code only covers pressure vessels and accumulators with an internal diameter greater than 6 inches. The CE series can therefore be used for accumulator diameters less than 6 inches. All Roth diaphragm accumulators conform with this regulation. Vessels according to the ASME Code are also accepted in Canada. In Canada, an additional approval (Canadian Registration Number, CRN) is required for the relevant province to which shipment is destined. The province or installation site must be indicated along with the order.

Roth Hydraulics has all important product and company approvals worldwide.

■ Selection table

Acceptance:

Country code	Countries	Approval regulation	Var. no.
EU	EU member states	PED 2014/68/EU with CE mark	50

Type code MEAK

■ CE - Series diaphragm accumulator MEAK

Order designation					
Series	MEAK - ...- ...-				
	MEAK type	Oil volume [l]	max. Operating pressure [bar]		
Material/ coating (outside)	...-	◀	C	=	Carbon steel (standard)
Diaphragm material	...-	◀	1	=	NBR (standard)
			2	=	ECO
Oil connection	...-	◀	G	=	Pipe thread (without adapter) ISO 228
			A	=	Outside thread (M33 x 1,5/M45 x 1,5)
Acceptance	...-	◀	50	=	Pressure Equipment Directive 2014/68/EU
PO pre-charge pressure	...	◀	0	=	Pre-charge [bar] (standard)

Example: MEAK 2,8 - 250 - C - 1 - G+A - 50 - 0

Product for the example order designation is:

Type:	MEAK
Oil volume:	2,8 l
Pressure:	250 bar
Material:	Carbon steel
Diaphragm:	NBR
Oil connection:	Inside thread: G 3/4" + Outside thread: M45 x 1,5
Acceptance:	Pressure Equipment Directive
Pre-charge pressure:	0 bar

If an additional outside thread is required, please indicate "+A" in the order code (see example box "G+A").

For a pre-charge pressure as required by customer, please indicate the corresponding pre-charge pressure in your order.

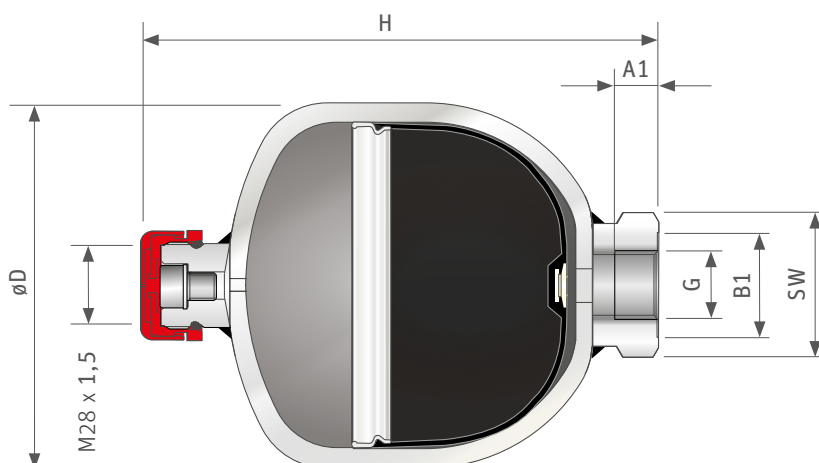


Note: The use of the type code generally ensures our ability to supply.

A variety of diaphragm accumulators with order numbers are listed on the following pages. These are only valid for the types described there. Please observe the corresponding specification!

CE Series MEAK

■ CE Standard Series MEAK NBR 0,07 - 3,5 l



Gas volume	Design pressure	Type	Order number	Note	Temperature range	Weight	Pressure ratio factor	Dimensions					
								G	ø D	A1	B1	H	SW
[l]	[bar]					[kg]	P2:P0	[inch]	[mm]				
0,07	250	MEAK 0,07-250	4204021672	only for MEAK... - ... - C - 1 - G - 50	-10... +80 °C	0,8	≤ 8:1	G ½"	64	14	29	118	32
0,16	250	MEAK 0,16-250	4204021673			1,0	≤ 6:1	G ½"	75	14	29	127	32
0,32	210	MEAK 0,32-210	4204021674			1,5	≤ 8:1	G ½"	92,5	14	29	141	32
0,5	250	MEAK 0,5-250	4204021676			2,0	≤ 8:1	G ½"	107	14	34	159	41
0,75	210	MEAK 0,75-210	4204021677			2,7	≤ 8:1	G ½"	121,5	14	34	173	41
0,75	350	MEAK 0,75-350	4204021679			3,9	≤ 8:1	G ½"	128,5	14	34	180	41
1,0	210	MEAK 1,0-210	4204021680			3,5	≤ 8:1	G ½"	136	14	34	187	41
1,0	350	MEAK 1,0-350	4204021683			4,7	≤ 4:1	G ½"	128,5	14	34	206	41
1,4	250	MEAK 1,4-250	4204021684			5,6	≤ 8:1	G ½"	152	14	34	202	41
1,4	350	MEAK 1,4-350	4204021686			6,8	≤ 8:1	G ½"	156	14	33	201	41
2,0	250	MEAK 2,0-250	4204021688			8,5	≤ 6:1	G ¾"	156	14	33	255	41
2,8	250	MEAK 2,8-250	4204021692			8,5	≤ 6:1	G ¾"	168	16	33	264	41
3,5	250	MEAK 3,5-250	4204024230			10,2	≤ 4:1	G ¾"	169	16	33	315	41

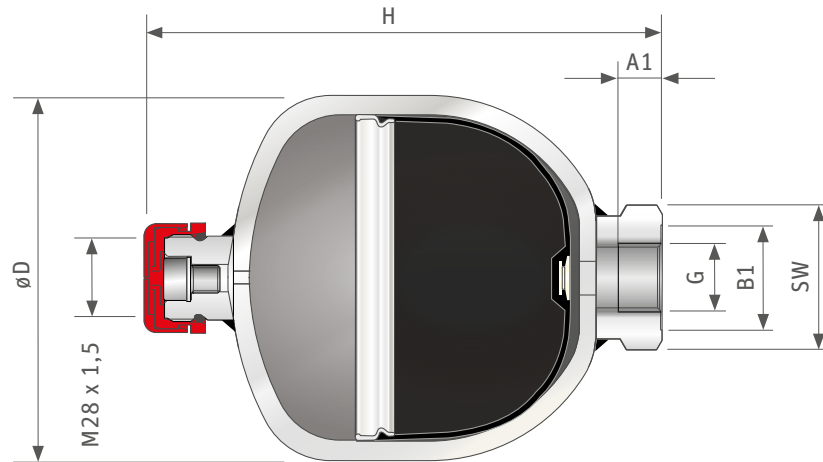
Other versions upon request!!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.

CE Series MEAK

■ CE Standard Series MEAK ECO 0,32 - 2,8 l



Gas volume	Design pressure	Type	Order number	Note	Temperature range	Weight	Pressure ratio factor	Dimensions					
								G	Ø D	A1	B1	H	SW
[l]	[bar]					[kg]	P2:P0	[inch]	[mm]				
0,32	210	MEAK 0,32-210	4204021675	only for MEAK... - C - 2 - G - 50	-35... +80 °C	1,4	≤ 8:1	G 1/2"	92,5	14	29	141	32
0,75	210	MEAK 0,75-210	4204021678			2,7	≤ 8:1	G 1/2"	121,5	14	34	174	41
0,75	350	MEAK 0,75-350	4204023761			4,6	≤ 8:1	G 1/2"	128,5	14	34	180	41
1,4	250	MEAK 1,4-250	4204021685			5,6	≤ 8:1	G 1/2"	152	14	34	202	41
1,4	350	MEAK 1,4-350	4204021687			6,8	≤ 8:1	G 1/2"	156	14	33	201	41
2,0	250	MEAK 2,0-250	4204021689			8,5	≤ 6:1	G 3/4"	156	14	33	255	41
2,8	250	MEAK 2,8-250	4204021693			8,5	≤ 6:1	G 3/4"	168	16	33	270	41

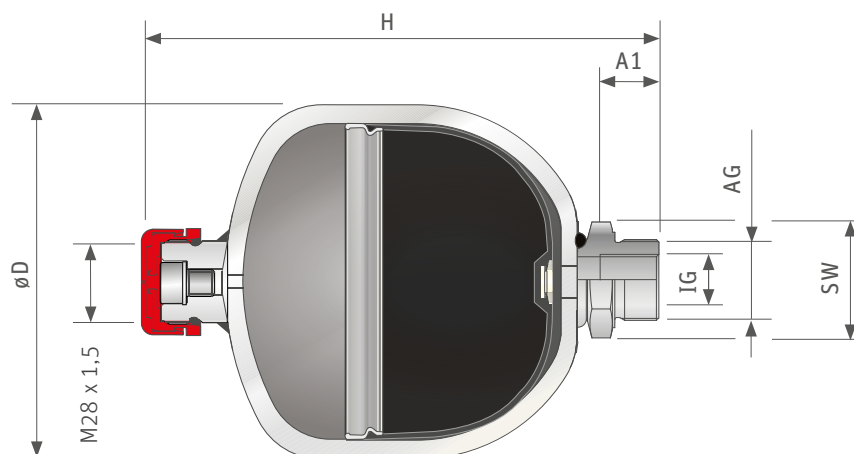
Other versions upon request!!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.

CE Series MEAK

■ CE Standard Series MEAK NBR 0,32 - 2,8 l with additional external thread



Gas volume	Design pressure	Type	Order number	Note	Temperature range	Weight	Pres- sure ratio factor	Dimensions					
								Thread		ø D	A1	H	SW
								IG inside	AG outside				
[l]	[bar]					[kg]	P2:P0	[inch]	[mm]	[mm]			
0,32	210	MEAK 0,32-210	4204031058	only for MEAK... - ... - C - 1 - G+A - 50	-10... +80 °C	1,5	≤ 8:1	G ½"	M33 x 1,5	93	13	152	41
0,5	210	MEAK 0,5-210	4204024921			2,8	≤ 8:1	G ½"	M33 x 1,5	107	18	170	41
0,75	210	MEAK 0,75-210	4204025457			2,7	≤ 8:1	G ½"	M33 x 1,5	121	18	185	41
0,75	330	MEAK 0,75-330	4204031232			3,6	≤ 8:1	G ½"	M33 x 1,5	125	24	185	41
1,0	210	MEAK 1,0-210	4204024066			3,5	≤ 8:1	G ½"	M33 x 1,5	136,5	24	198	41
1,4	250	MEAK 1,4-250	4204025475			5,5	≤ 8:1	G ½"	M33 x 1,5	152	24	213	41
1,4	350	MEAK 1,4-350	4204027228			6,6	≤ 8:1	G ½"	M33 x 1,5	156	24	212	41
2,8	250	MEAK 2,8-250	4204035642			9,8	≤ 4:1	G ¾"	M45 x 1,5	170	24	287	46

Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.

Notes

■ Roth bladder accumulators – efficient & innovative

Roth bladder accumulators enable efficient operation thanks to their weight-optimised design and the negligible pressure difference between the fluid and gas side. The use of different bladder materials makes Roth bladder accumulators suitable for a variety of fluids, and they can be used in a wide temperature range. Special designs, with for example high-flow oil valves or minimal-friction plastic coatings, make Roth bladder accumulators an innovative product and open up a significantly wider application spectrum.

Typical product features:

- > Compact and weight-optimised design
- > High efficiency, negligible pressure difference between fluid and gas
- > Fast reaction to pressure changes in the hydraulic system
- > Low-maintenance, easy-to-service and durable

- > Volume: 1 l ... 57 l
- > Operating pressure: up to 690 bar
- > Operating temperature: -40 °C ... +100 °C

Products

Bladder accumulators



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Construction and description

■ General

The **Roth bladder accumulator** is another innovative addition to the product range. Cost-optimised, low-maintenance, practically wear-resistant, durable, suitable for special media and applications as well as for use in extreme conditions – the product's distinguishing feature is its efficiency. Roth hydraulic accumulators fulfil all applicable regulations and directives.

Accumulator adapters, safety and shut-off valve blocks along with other accessories can be found on the pages 36 to 41 and from page 88 and subsequent.

Roth diaphragm accumulators have **a varied range of applications:**

- > Energy storage
- > Pulsation damping
- > Volume compensation
- > Hydraulic damping/suspension
- > Shock absorption
- > Media separation
- > Emergency control

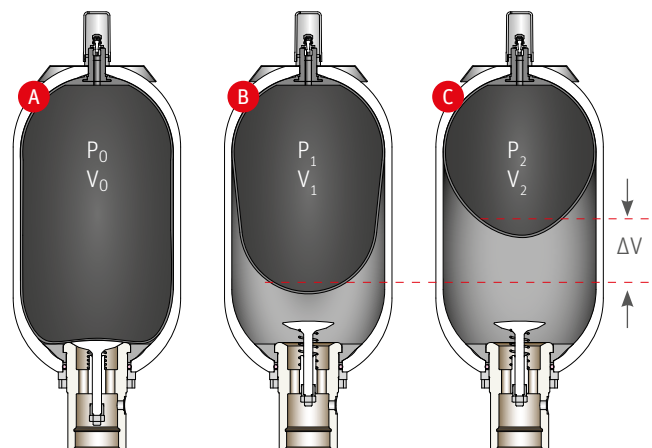


■ Function

Roth bladder accumulators enable the storage and release of hydraulic energy. As pressurised hydraulic fluid flows in at the oil port valve, the nitrogen within the accumulator bladder becomes compressed. Hydraulic energy is stored. When the pressure drops in the hydraulic system, the nitrogen gas and bladder expand and drive the hydraulic fluid out of the bladder accumulator back into the hydraulic system. Hydraulic energy is released. The bladder also acts as a media separator.

The three basic settings of the bladder:

- A** The bladder is pre-charged with nitrogen. The fluid valve is closed and prevents escape from the bladder.
- B** Position at minimum working pressure. A small volume of fluid must remain between the bladder and fluid valve so that the bladder does not close the valve disc at each emptying. P_0 must therefore be less than P_1 .
- C** Position at maximum working pressure. The volume change ΔV when compared to the position at minimum working position corresponds to the stored fluid volume.



- V_0 = Total gas volume of the accumulator
- V_1 = Gas volume in the bladder accumulator at P_1
- V_2 = Gas volume in the bladder accumulator at P_2
- ΔV = Dissipated or absorbed useful volume between P_1/P_2
- P_0 = Pre-charge pressure of the bladder in the bladder accumulator
- P_1 = Minimum working pressure
- P_2 = Maximum working pressure

Construction and description

Overview of Roth bladder accumulators

Overview of Roth bladder accumulators	
Volume	1 ... 57 l
Transport filling	approx. 2 bar
Operating pressure	max. 690 bar
Materials	Carbon steel, special materials, stainless steel (upon request)
Media	HFC, HLP, HFD ...
Temperature	-40 ... +100 °C
Volume flow (Qmax.)	max. 1600 l/min
Installation position	preferably vertical to horizontal
Accumulator shell	sand blasted
	primer coated
	Top coatings/special colour designs available
Oil/gas valve	Carbon steel
	Stainless steel, nickel
Fluid connections	Inside thread G, M, NPT, SAE thread connections
	Flange connections available
	Special connections available
Bladder (elastomers)	NBR, TT-NBR, HNBR, ECO, FKM, EPDM
Acceptances	PED 2014/68/EU, ASME, ML China, NR13, DNV, Canada (all provinces)
Acceptances upon request	EAC, GL, ABS, BV, CCS, LRS, RINA

Gas filling

Only nitrogen of Class 4.0 is to be used, never oxygen or compressed air.

Design pressure (see selection table)

The design pressure corresponds to the maximum allowable working overpressure (PS) and is also the maximum setting pressure of safety equipment against excess pressure (safety valves, burst discs). We recommend operating the accumulators with a maximum pressure of 0,9 x PS to prevent safety equipment from responding.

Operating temperature

Standard temperature range: -15 °C to +80 °C, different temperature ranges, e.g. -40 °C to +100 °C, available upon request.

Delivery condition

Accumulator shell base-coated with universal priming colour RAL 5010, manufactured seamless, inside sand-blasted. Colour treatment and blasting or other surface coatings (e.g. galvanic zinc plating) are possible.

Pressure fluids

Group 2 fluids according to PED 2014/68/EU and nitrogen, or in relation to bladder elastomer and temperature range, according to data in the "Pressure fluids" table below. The oil purity class must be at least 19/17/14 (NAS 1638-KJ8) according to ISO 4406.

Gas pre-charge pressure

To prevent the oil valve from closing at each oil extraction, the gas pre-charge pressure should not be higher than 0,9 x the minimum working pressure (P1) and not lower than 0,25 x the maximum working pressure (P2).

Accumulator installation

To prevent damage to the bladder, a vertical accumulator assembly, with fluid connection below, is preferable.

If the assembly site requires a horizontal mounting, the inside of the accumulator shell, provided with the plastic coating specially developed by Roth Hydraulics. This special coating minimises abrasive wear between the accumulator inside wall and bladder.



Note Operation and maintenance

Please observe the information in the operating and maintenance instructions for this.

Construction and description

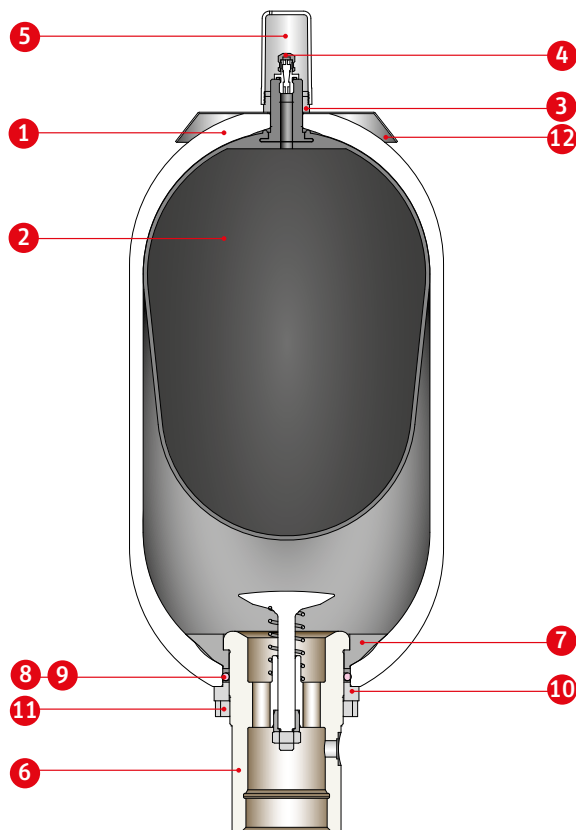
■ Selection of pressure fluids

Fluid	Temperature range °C	Elastomer
... especially for low temperature range*	-32 ... +115	Hydrin C (ECO)
	-40 ... +130	HNBR
Fluids based on mineral oil*	-15 ... +90	NBR
	-28 ... +80	TT-NBR
HFA, HFB*	+5 ... +55	NBR
HFC*	-15 ... +60	NBR
Fluids based on phosphate ester*	-40 ... +120	Ethylene propylene diene (EPDM)
Hardly flammable and/or synthetic fluids*	-20 ... +140	Viton (FKM)

*Fluid selections for low temperature ranges as well as for temperature applications below -20 °C or above +80 °C require consultation.

■ CE Series BLAK/ASME Series BLUAK

Standard BLAK/BLUAK



Item	Designation	Material
1	Accumulator shell	Steel
2	Elastomer bladder	NBR
3	Threaded ring (gas side)	Steel
4	Gas valve	Stainless steel
5	Protection cap	PA6
6	Oil valve	Steel
7	AE ring (separated ring)	Steel/elastomer
8	O-ring	Elastomer
9	Back-up ring	PTFE
10	Spacer ring	Steel
11	Threaded ring (oil side)	Steel
12	Type plate	Aluminium

Rules and regulations

■ Acceptance

Roth hydraulic accumulators are manufactured and approved for the European market in accordance with the "Pressure Equipment Directive".

Hydraulic accumulators according to Pressure Equipment Directive > 1 litre volume are provided with a CE mark and are supplied with a declaration of conformity and a corresponding operating manual.

The Pressure Equipment Directive is also accepted by many other countries besides the EU member states. Only some additional approval documentation may sometimes be required. Countries such as Russia or China also require an approval, which Roth Hydraulics holds.

Pressure vessels shipment to the USA must correspond to the American regulations, the ASME Code. Roth Hydraulics has been approved since 1981 according to ASME Code Section VIII Division 1 and therefore has the longest experience with these regulations in Germany as a hydraulic accumulator manufacturer. Vessels with ASME acceptance are marked with the so-called "U-designator" and supplied with a data report as acceptance documentation.

However, the scope of the ASME Code only covers pressure vessels and accumulators with an internal diameter greater than 6 inches. The CE series BLAK can therefore be used for accumulator diameters less than 6 inches.

Vessels according to the ASME Code are also accepted in Canada. In Canada, an additional approval (Canadian Registration Number, CRN) is required for the relevant province to which shipment is destined. The province or installation site must be indicated along with the order.

Maritime applications form part of daily business at Roth Hydraulics and are hence routine procedures. A selection of the potential maritime acceptances can be found in the following table.

Roth Hydraulics has all important product and company approvals worldwide.

The following tables contain a selection of the most common acceptance variants. If your planned installation country or the required acceptance is not listed, please indicate this in plain text along with the enquiry.

■ Selection tables

Standard acceptances:

Country code	Countries	Approval regulation	Var. no.
EU	EU member states	Pressure Equipment Directive 2014/68/EU with CE mark	50

Other acceptances:

Country code	Countries	Approval regulation	Var. no.
US	USA	ASME Code Sect. VIII Div. 1	15
CA	Canada (all provinces)	ASME Code + CRN (Canadian Registration No.) Approval depending on province – indicate province	29
BR	Brazil	Pressure Equipment Directive PED 2014/68/EU + CE mark + NR 13 (Brazil)	515
CN	China	Pressure Equipment Directive PED 2014/68/EU + ML (≥ 30 l)	534
CN	China	Pressure Equipment Directive PED 2014/68/EU (< 30 l)	533
EU, US, CN, BR	Multi-national	Pressure Equipment Directive PED 2014/68/EU with CE mark, ASME Code Sect. VIII Div. 1, Pressure Equipment Directive PED 2014/68/EU + ML (≥ 30 l) + Pressure Equipment Directive PED 2014/68/EU without ML (< 30 l), NR13 (Brazil)	566

Maritime acceptances:

Country code	Countries	Approval regulation	Var. no.
CCS	Various countries	China Classification Society	537
ABS	Various countries	American Bureau of Shipping	510
LRS	Various countries	Lloyd's Register of Shipment	5
RINA	Various countries	Registro Italiano Navale	536
BV	Different Countries	Bureau Veritas	506
DNV	Different Countries	Det Norske Veritas	509

Type Code BLAK

■ CE - Series bladder accumulator BLAK/BLAK-HF/BLAK-HP/BLAK-MF

Order designation										Example: BLAK 50 - 330 - 22 - C+K - 1 - G - 50 - C - X - E1 - 30				
Series	BLAK... - ...- ...- ...-										Product for the example order designation is:			
											Type:	BLAK		
											Oil volume:	50 litre		
Material/ coating	▲	BLAK BLAK-HF BLAK-HP BLAK-MF	Oil volume [l]	Max. operating pressure [bar]	Outside ø [cm]						Pressure:	330 bar		
											Outside ø:	22 cm		
											Material/Coating:	Carbon steel + inside plastic coated		
											Bladder material:	NBR (Standard)		
											Oil connection:	G 2"		
Bladder material	▲	...									Acceptance:	Pressure Equipment Directive		
											Oil valve material:	Carbon steel		
											Gas valve material:	Stainless steel		
											Pre-charge pressure as required by customer	30 bar		
Oil connection	▲	...												
Acceptance	▲	...												
Oil valve material	▲	...												
Gas valve material	▲	...												
Gas connection	▲	...												
PO pre-charge pressure	▲	...												

Inside plastic coated

In the case of a plastic coated inside surface, please indicate "+K" in the order code (see example box "C+K").

For FKM bladder material, we recommend pre-charging before commissioning!

Please indicate the required thread size/connection nominal width along with this selection.

Selection table special thread

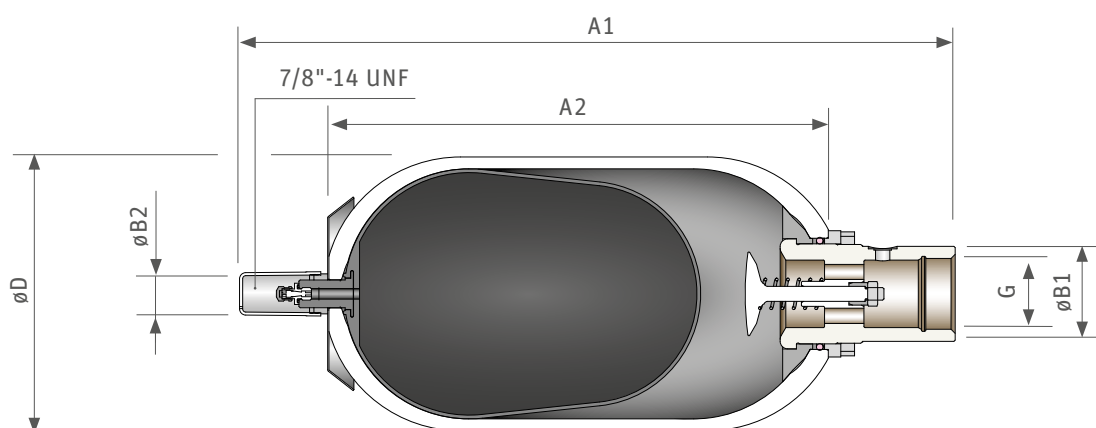
Volume [l]	Shell ø	Thread	Type
1-10	169	1¼	SAE 3000
≥ 20	220	2	SAE 3000
1 - 10	169	1	SAE 6000
≥ 20	220	1½/2	SAE 6000
		M50 x 1,5	Metric



Note: A variety of bladder accumulators with order numbers are listed on the following pages. These are only valid for the types described there. Please observe the corresponding specification!

CE Series BLAK

■ CE Standard series BLAK 1 - 50 l - 330/350 bar



Gas volume [l]	Design pressure [bar]	Type	Order number	Note	Temperature range	Weight [kg]	Dimensions						
							G	ø D	A1	A2	ø B1	ø B2	Q
							[inch]		[mm]				[l/s]
1	350	BLAK 01-350-11,4	4204019650	only for BLAK ...-C-1-G-50-C-X	-15 ... +80°C	6	G 1 1/4"	114	338	202	53	35	7,5
2,5	350	BLAK 02,5-350-11,4	4204019639			10	G 1 1/4"	114	547	411	53	35	7,5
4	350	BLAK 04-350-16,8	4204019420			13	G 1 1/4"	168	421	287	53	35	7,5
5	350	BLAK 05-350-11,4	4204019638			16	G 1 1/4"	114	896	760	53	35	7,5
6	350	BLAK 06-350-16,8	4204019419			19	G 1 1/4"	168	551	416	53	35	7,5
10	350	BLAK 10-330-16,8	4204019418			28	G 1 1/4"	168	816	681	53	35	7,5
10	330 (kurz)	BLAK 10-330-22	4204018514			30	G 2"	220	574	402	76	35	15
20	330	BLAK 20-330-22	4204018513			45	G 2"	220	884	712	76	35	15
24,5	330	BLAK 24,5-330-22	4204018512			54	G 2"	220	1019	847	76	35	15
32	330	BLAK 32-330-22	4204018511			80	G 2"	220	1404	1232	76	35	15
50	330	BLAK 50-330-22	4204018509			108	G 2"	220	1919	1747	76	35	15

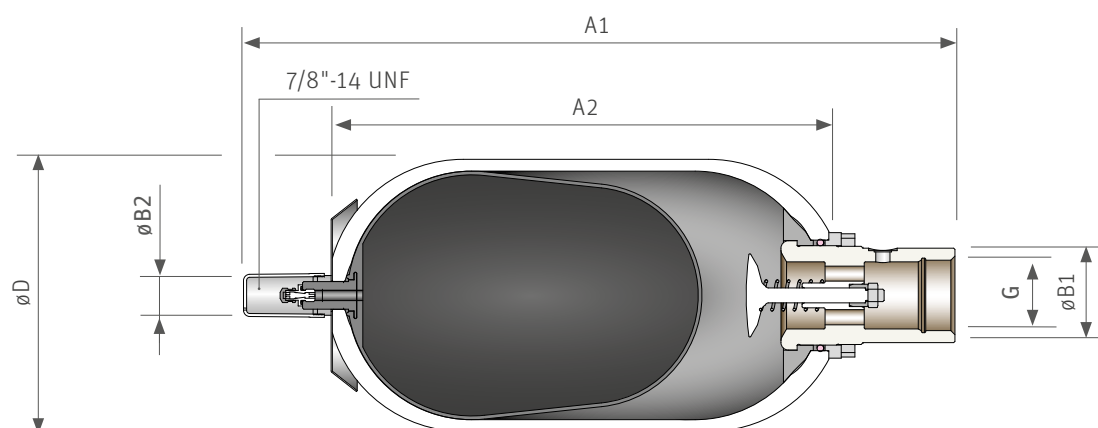
Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.
In the event of an order, you will receive a binding drawing for approval for non-standard products.

CE Series BLAK

■ China acceptance - CE+ML Standard series BLAK 1 - 50 l - 330/350 bar



Gas volume	Design pressure	+ acceptance 533/534		Note	Temperature range	Weight	Dimensions						
		Type	Order number			[kg]	G	ø D	A1	A2	ø B1	ø B2	Q
						[inch]	[mm]						[l/s]
[l]	[bar]			only for BLAK ...-C-1-G-533/534....-C-X	-15 ... +80°C								
1	350	BLAK 01-350-11,4	4204023149			6	G 1 ¼"	114	338	202	53	35	7,5
2,5	350	BLAK 02,5-350-11,4	4204023170			10	G 1 ¼"	114	547	411	53	35	7,5
4	350	BLAK 04-350-16,8	4204023171			13	G 1 ¼"	168	421	287	53	35	7,5
6	350	BLAK 06-350-16,8	4204023173			19	G 1 ¼"	168	551	416	53	35	7,5
10	330	BLAK 10-330-22	4204023175			30	G 2"	220	574	402	76	35	15
20	330	BLAK 20-330-22	4204023176			45	G 2"	220	884	712	76	35	15
32	330	BLAK 32-330-22	4204023178			80	G 2"	220	1404	1232	76	35	15
50	330	BLAK 50-330-22	4204023180			108	G 2"	220	1919	1747	76	35	15

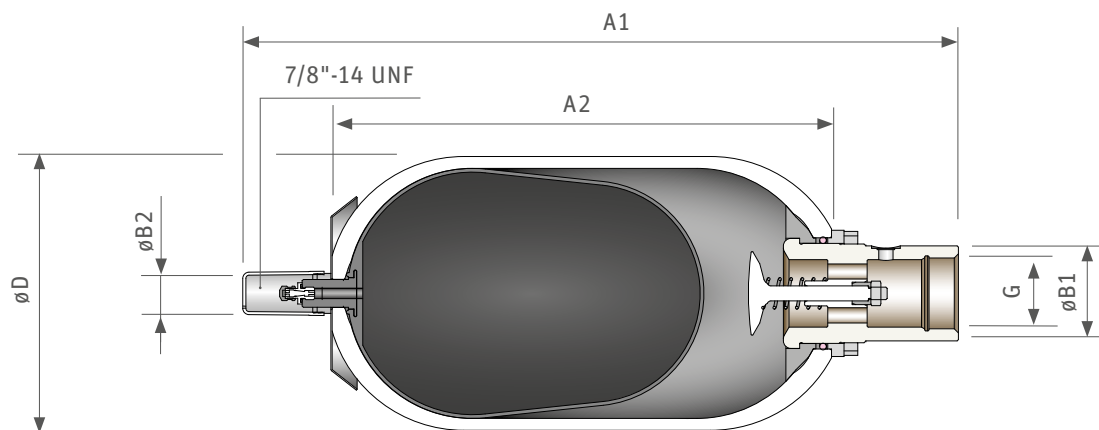
Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.
In the event of an order, you will receive a binding drawing for approval for non-standard products.

CE Series BLAK

■ Brazil acceptance - CE+NR13 Standard series BLAK 1 - 50 l - 330/350 bar



Gas volume	Design pressure	+ acceptance 515		Note	Temperature range	Weight	Dimensions						
		Type	Order number			[kg]	G	ø D	A1	A2	ø B1	ø B2	Q
						[inch]	[mm]						[l/s]
[l]	[bar]												
1	350	BLAK 01-350-11,4	4204039716	only for BLAK ...-C-1-G-515-C-X	-15 ... +80°C	6	G 1 ¼"	114	338	202	53	35	7,5
2,5	350	BLAK 02,5-350-11,4	4204026469			10	G 1 ¼"	114	547	411	53	35	7,5
4	350	BLAK 04-350-16,8	4204023462			13	G 1 ¼"	168	421	287	53	35	7,5
6	350	BLAK 06-350-16,8	4204026471			19	G 1 ¼"	168	551	416	53	35	7,5
10	330	BLAK 10-330-22	4204023557			30	G 2"	220	574	402	76	35	15
20	330	BLAK 20-330-22	4204023558			45	G 2"	220	884	712	76	35	15
32	330	BLAK 32-330-22	4204026473			80	G 2"	220	1404	1232	76	35	15
50	330	BLAK 50-330-22	4204026475			108	G 2"	220	1919	1747	76	35	15

Other versions upon request!



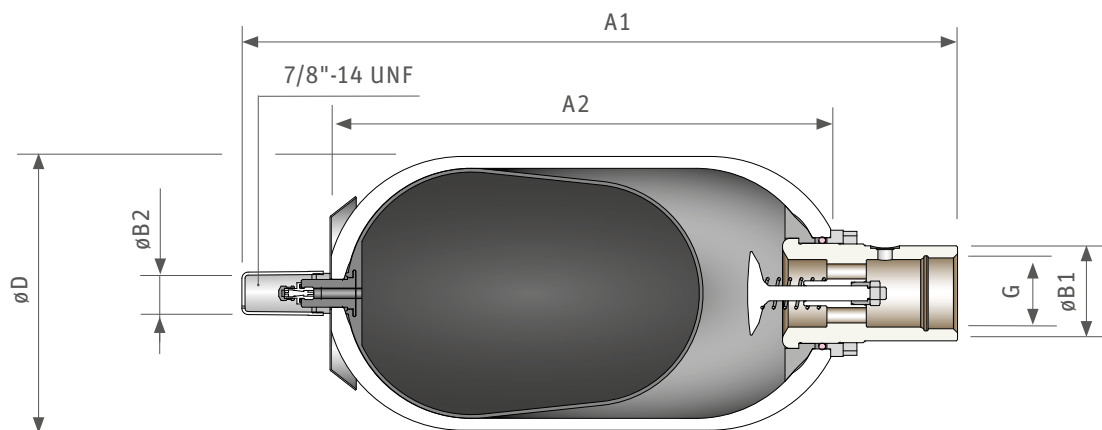
Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.
In the event of an order, you will receive a binding drawing for approval for non-standard products.

CE Series BLAK

■ MULTI acceptance - CE+ML+NR13+ASME Standard series BLAK 10 - 50 l - 360 bar/4200 psi

The Roth "Multi" standard series combines different acceptance requirements in a single product. This means that the accumulator can be used flexibly internationally. This also reduces the number of versions that you need, and the complexity of the documentation.

The Roth "Multi" accumulator holds CE approval for EU member states and many other countries, an ML approval for China, an NR.13 approval for Brazil and an ASME approval with UStamp, for example for use in the USA.



Gas volume	Design pressure		+ Acceptance 50+515+533+15		Note	Temperature range	Weight	Dimensions						
	CE	ASME	Type	Order number				G	ø D	A1	A2	ø B1	ø B2	Q
	[l]	[bar]					[psi]	[kg]	[inch]	[mm]				
10	360	4200	BLAK 10-360-22,9	4204043442	only for BLAK ...-C-1-G-50+515+533+15...-C-X	-15 ... +80°C	39	G 2"	229	577	402	76	35	15
20	360	4200	BLAK 20-360-22,9	4204043318			65	G 2"	229	887	712	76	35	15

Gas volume	Design pressure		+ Acceptance 50+515+534+15		Note	Temperature range	Weight	Dimensions						
	CE	ASME	Type	Order number			[kg]	G	ø D	A1	A2	ø B1	ø B2	Q
								[inch]	[mm]					
[l]	[bar]	[psi]												
32	360	4200	BLAK 32-360-22,9	4204041832	only for BLAK ...-C-1-G-50+515+534+15...-C-X	-15 .. +80°C	107	G 2"	229	1405	1232	76	35	15
50	360	4200	BLAK 50-360-22,9	4204041831			150	G 2"	229	1920	1747	76	35	15

Other versions upon request!

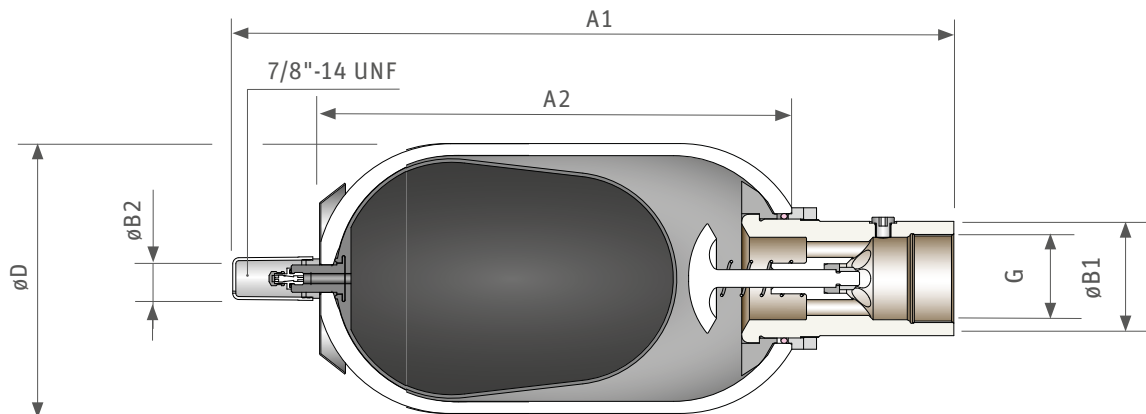


Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances. In the event of an order, you will receive a binding drawing for approval for non-standard products.

CE Series BLAK

■ CE Standard series BLAK-MF (Modified Flow) 10 - 50 l - 330 bar

Version with increased volume flow



Gas volume [l]	Design pressure [bar]	Type	Order number	Note	Temperature range	Weight [kg]	Dimensions						
							G	Ø D	A1	A2	Ø B1	Ø B2	Q
							[inch]		[mm]				[l/s]
10	330	BLAK-MF 10-330-22	4204021816	nur für BLAK-MF ...-C-1-G-50-C-X	-15°C +80°C	32	G 2"	219	573	400	76	35	21
20	330	BLAK-MF 20-330-22	4204021817			53	G 2"	219	883	710	76	35	21
24,5	330	BLAK-MF 24,5-330-22	4204021818			61	G 2"	219	1018	845	76	35	21
32	330	BLAK-MF 32-330-22	4204021819			85	G 2"	219	1403	1230	76	35	21
42	330	BLAK-MF 42-330-22	4204021820			100	G 2"	219	1543	1370	76	35	21
50	330	BLAK-MF 50-330-22	4204021821			123	G 2"	219	1918	1745	76	35	21

Other versions upon request!

■ CE Standard series BLAK-HF (High Flow) 10 - 50 l - 330 bar

Gas volume [l]	Design pressure [bar]	Type	Order number	Note	Temperature range	Weight [kg]	Dimensions						
							G	Ø D	A1	A2	Ø B1	Ø B2	Q
							[inch]		[mm]				[l/s]
10	330	BLAK-HF 10-330-22	4204033628	nur für BLAK-HF 50-330-22-C-1-G-50	-15°C +80°C	40	G 2 1/2"	229	620	410	97	35	26,6
20	330	BLAK-HF 20-330-22	4204033629			65	G 2 1/2"	229	925	715	97	35	26,6
24,5	330	BLAK-HF 24-330-22	4204033630			80	G 2 1/2"	229	1090	880	97	35	26,6
32	330	BLAK-HF 32-330-22	4204033631			108	G 2 1/2"	229	1440	1230	97	35	26,6
50	330	BLAK-HF 50-330-22	4204033632			150	G 2 1/2"	229	1950	1740	97	35	26,6

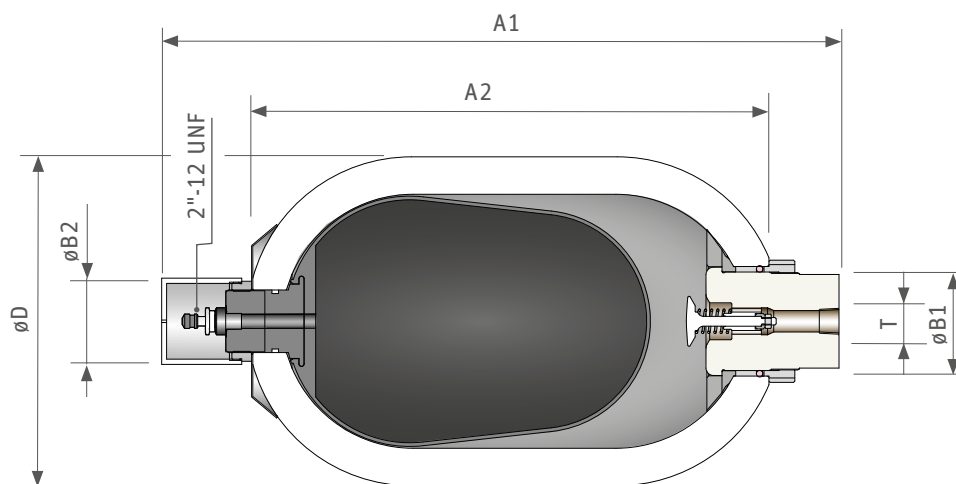
Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.
In the event of an order, you will receive a binding drawing for approval for non-standard products.

CE Series BLAK

■ CE Standard series BLAK-HP (High Pressure) 1 - 50 l - 690 bar



Gas volume [l]	Design pressure [bar]	Type	Order number	Note	Temperature range	Weight [kg]	Dimensions						
							T [NPT]	ø D	A1	A2	ø B1	ø B2	Q [l/s]
1	690	BLAK-HP 01-690-12,3	4204034302	only for BLAK-HP ...-C-1-T-50-X-X	-15 ... +80°C	12	1/2"-14	123	369	231	53	35	2
2,5	690	BLAK-HP 2,5-690-12,3	4204034303			17	1/2"-14	123	520	406	53	35	2
5	690	BLAK-HP 05-690-12,3	4204034304			30	1/2"-14	123	893	755	53	35	2
10	690	BLAK-HP 10-690-27	4204033564			70	1/2"-14	267	555	425	76	70	2
20	690	BLAK-HP 20-690-27	4204033565			115	1/2"-14	267	857	728	76	70	2
35	690	BLAK-HP 35-690-27	4204033566			195	1/2"-14	267	1380	1250	76	70	2
50	690	BLAK-HP 50-690-27	4204033567			275	1/2"-14	267	1894	1765	76	70	2

Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.
In the event of an order, you will receive a binding drawing for approval for non-standard products.

Type Code BLUAK

ASME - Series bladder accumulator BLUAK

Order designation					
Series	BLUAK...-	-	-		
	▲ BLUAK type	▲ Oil volume [gal]	▲ Max. operating pressure [psi]	▲ Outside ø [inch]	
Shell material/coating	...-	▲	C = carbon steel (standard)		
			K = inside plastic coated		Inside plastic coated
Bladder material	...-	▲	1 = NBR (standard)		
			3 = TT-NBR		
			5 = FKM (Viton)		For FKM bladder material, we recommend pre-charging before commissioning!
			7 = HNBR		
Oil connection	...-	▲	B = SAE (without adapter) (standard)		
			L = Flange connection, SAE 3000		Please indicate the required thread size/connection nominal width along with this selection.
			H = Flange connection, SAE 6000		
			T = NPT		
			G = Pipe thread (without adapter) ISO 228		
Acceptance	...-	▲	15 = ASME Code Section VIII Division I		
			... = Others (see acceptance selection tables page 24)		
Oil valve material	...-	▲	C = carbon steel (standard)		
			X = Stainless steel		
Gas valve material	...-	▲	X = stainless steel (standard)		
Gas connection	...-	▲	E1 = 7/8"-14 UNF-1A (standard)		
			E2 = Special design upon request		
PO pre-charge pressure	...	▲	... = Filling according to customer request		

Example: BLUAK 5 - 5000 - 24,5 - C+K -1 - H2 - 15 - C - X - E1 - 300

Product for the example order designation is:

Type:	BLUAK
Oil volume:	5 gallons
Pressure:	5000 psi
Outside ø:	9,65 inch (24,5 cm)
Material/coating:	Carbon steel + inside plastic coated
Bladder material:	NBR (Standard)
Oil connection:	2" SAE 6000 psi
Acceptance:	ASME
Oil valve material:	Carbon steel
Gas valve material:	Stainless steel
Gas connection:	Standard 7/8"
Pre-charge pressure as required by customer	300 psi

Inside plastic coated
In the case of a plastic coated inside surface, please indicate "+K" in the order code (see example box "C+K").

For FKM bladder material, we recommend pre-charging before commissioning!

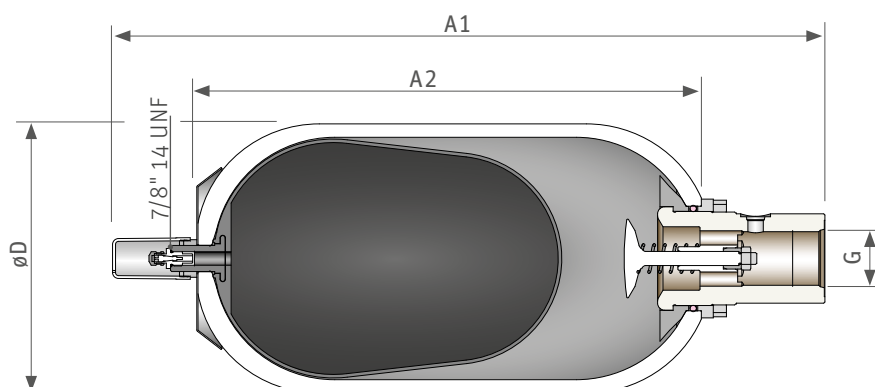
Please indicate the required thread size/connection nominal width along with this selection.

Note: The type code allows for an individual selection within our range.

A variety of bladder accumulators with order numbers are listed on the following pages. These are only valid for the types described there. Please observe the corresponding specification!

ASME Series BLUAK

■ ASME Standard series BLUAK 10 - 57 l (2,5 - 15 gal) - 207 bar (3000 psi)



Gas volume		Design pressure		Type	Order number	Note	Temperature range	Weight	Dimensions				
								[kg]	G	ø D	A1	A2	Q
[l]	[gal]	[bar]	[psi]						[inch]	[mm]	[mm]	[mm]	[l/s]
10	2,5	207	3000	BLUAK 2,5-3000-22,9	4204037078	only for BLUAK ... -C-1-G-15-C-X-E1	-15 ... +93°C (+5 ... +200 °F)	38	G 2"	229	572	397	15
20	5	207	3000	BLUAK 5-3000-22,9	4204034648			61	G 2"	229	884	709	15
32	10	207	3000	BLUAK 10-3000-22,9	4204037093			101	G 2"	229	1420	1245	15
57	15	207	3000	BLUAK 15-3000-22,9	4204037094			146	G 2"	229	2005	1830	15

Other versions upon request!

■ ASME Standard series BLUAK 10 - 57 l (2,5 - 15 gal) - 276 bar (4000 psi)

Gas volume		Design pressure		Type	Order number	Note	Temperature range	Weight	Dimensions								
								[kg]	G	ø D	A1	A2	Q				
[l]	[gal]	[bar]	[psi]					[inch]	[mm]	[mm]	[mm]	[mm]	[l/s]				
10	2,5	276	4000					BLUAK 2,5-4000-22,9	4204035870	Nur für BLUAK ... -C-1-G-15-C-X-E1	-15 ... +93°C (+5 ... +200 °F)	38	G 2"	229	572	397	15
20	5	276	4000					BLUAK 5-4000-22,9	4204035032			61	G 2"	229	884	709	15
32	10	276	4000	BLUAK 10-4000-22,9	4204035183	101	G 2"	229	1420			1245	15				
57	15	276	4000	BLUAK 15-4000-22,9	4204035182	146	G 2"	229	2005			1830	15				

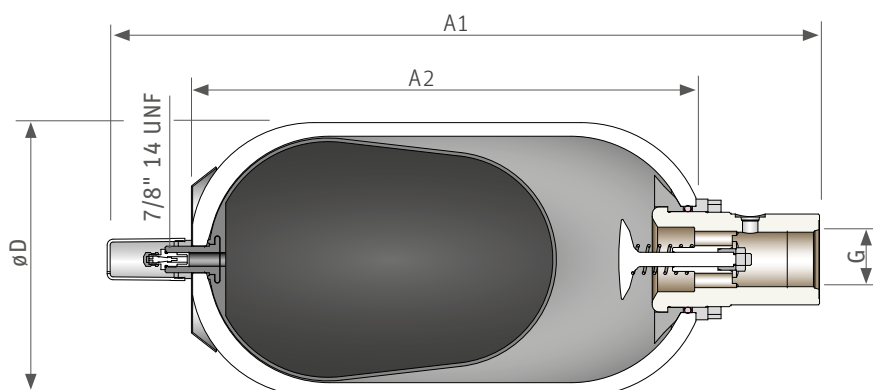
Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.
In the event of an order, you will receive a binding drawing for approval for non-standard products.

ASME Series BLUAK

■ ASME Standard series BLUAK 10 - 57 l (2,5 - 15 gal) - 345 bar (5000 psi)



Gas volume		Design pressure		Type	Order number	Note	Temperature range	Weight	Dimensions				
								[kg]	G	ø D	A1	A2	Q
[l]	[gal]	[bar]	[psi]						[inch]	[mm]	[mm]	[mm]	[l/s]
10	2,5	345	5000	BLUAK 2,5-5000-24,5	4204037021	only for BLUAK ... -C-1-G-15-C-X-E1	-15 ... +93°C (+5 ... +200 °F)	58	G 2"	245	581	413	15
20	5	345	5000	BLUAK 5-5000-24,5	4204035350			95	G 2"	245	886	718	15
32	10	345	5000	BLUAK 10-5000-24,5	4204038298			161	G 2"	245	1381	1245	15
57	15	345	5000	BLUAK 15-5000-24,5	4204035393			234	G 2"	245	1997	1829	15

Other versions upon request!

■ ASME Standard series BLUAK 10 - 57 l (2,5 - 15 gal) - 414 bar (6000 psi)

Gas volume		Design pressure		Type	Order number	Note	Temperature range	Weight	Dimensions				
								[kg]	G	ø D	A1	A2	Q
[l]	[gal]	[bar]	[psi]						[inch]	[mm]	[mm]	[mm]	[l/s]
10	2,5	414	6000	BLUAK 2,5-6000-24,5	4204037096	only for BLUAK ... -C-1-G-15-C-X-E1	-15 ... +93°C (+5 ... +200 °F)	58	G 2"	245	581	413	15
20	5	414	6000	BLUAK 5-6000-24,5	4204037097			95	G 2"	245	886	718	15
32	10	414	6000	BLUAK 10-6000-24,5	4204033654			161	G 2"	245	1413	1245	15
57	15	414	6000	BLUAK 15-6000-24,5	4204037100			234	G 2"	245	1997	1829	15

Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.
In the event of an order, you will receive a binding drawing for approval for non-standard products.

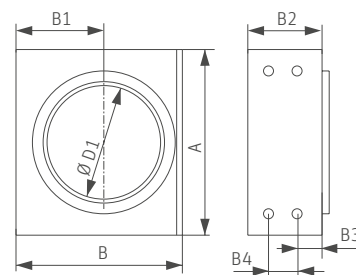
Notes

Accessories - bladder accumulator

■ Mounting technology

Brackets for bladder accumulators

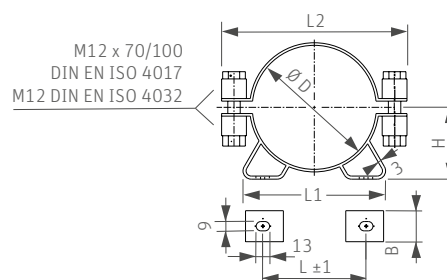
Brackets for mounting bladder accumulators and pressure vessels. The brackets serve to absorb the weight and are screwed onto a wall or a frame.



Bracket		Dimensions						
Type	Order number	A	B	B1	B2	B3	B4	D1
Bracket D114	4204028854	140	140	73	60	35	40	89
Bracket D168	4204028853	210	180	92	100	35	40	109
Bracket D219/229/232	4204028852	260	235	123	100	35	40	159
Bracket D245	4204028858	260	250	134	100	35	40	159

Steel clamps

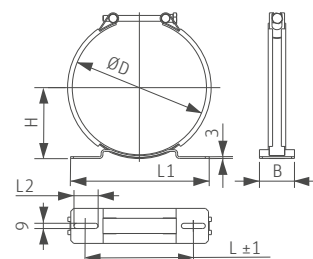
Mounting clamps with rubber profile for the installation of piston accumulators, bladder accumulators and pressure vessels. The steel clamps are galvanized and available in stainless steel upon request.



Steel clamp		Dimensions					
Type	Order number	D max.	H	L	L1	L2	B
Steel clamp D114	4204002763	125	approx. 71	100	138	180	30
Steel clamp D168	4204014669	168	approx. 92,5	148	188	240	30
Steel clamp D219	4202017360	220	approx. 123	216	254	289	30
Steel clamp D229/232	4204016214	229	approx. 123	215	252	289	30
Steel clamp D245	4200002975	250	approx. 123	248	300	310	30

Acculight clamps

Mounting clamps with rubber profile for the installation of piston accumulators, bladder accumulators and pressure vessels. The steel clamps are galvanized and available in stainless steel upon request.



Acculight clamp		Dimensions					
Type	Order number	D	H	L±1	L1	L2	B
Acculight D114	4204031373	109-117	approx. 65	118	156	27	50
Acculight D168	4204031950	158-169	approx. 90	118	156	27	50
Acculight D219	4204031951	209-222	approx. 116	184	236	41	60
Acculight D229/232	4204031952	222-233	approx. 118	184	236	41	60

Accessories - bladder accumulator

Selection table -
fasteners for
bladder accumulators



Note: Fastener versions with no bracket are only recommended for accumulators weighing 30 kilograms or less.

		Bracket type Order number				Steel clamp type Order number					Acculight type Order number			
		Bracket D114 4204028854	Bracket D168 4204028853	Bracket D219/229/232 4204028852	Bracket D245 4204028858	Steel clamp D114 4204002763	Steel clamp D168 4204014669	Steel clamp D219 4202017360	Steel clamps D229/232 4204016214	Steel clamp D245 4200002975	Acculight D114 4204031373	Acculight D168 4204031950	Acculight D219 4204031951	Acculight D229/232 4204031952
		Accumulator type												
		BLAK												
Acceptance CE/CE+ML/CE+NR13	BLAK 01-350-11,4	•				•					•			
	BLAK 02,5-350-11,4	•				•					•			
	BLAK 04-350-16,8		•				•					•		
	BLAK 05-350-11,4	•				•					•			
	BLAK 06-350-16,8		•				•					•		
	BLAK 10-330-16,8		•				•					•		
	BLAK 10-330-22			•				•					•	
	BLAK 20-330-22			•				•					•	
	BLAK 24,5-330-22			•				•					•	
	BLAK 32-330-22			•				••					••	
	BLAK 50-330-22			•				••					••	
MULTI acceptance CE+ML+ NR13+ASME	BLAK 10-360-22,9			•					•					•
	BLAK 20-360-22,9			•					•					•
	BLAK 32-360-22,9			•					••					••
	BLAK 50-360-22,9			•					••					••
	BLAK-MF/BLAK-HF													
Acceptance CE	BLAK-MF/HF 10-330-22			•				•					•	
	BLAK-MF/HF 20-330-22			•				•					•	
	BLAK-MF/HF 24,5-330-22			•				•					•	
	BLAU-MF/HF 32-330-22			•				••					••	
	BLAK-MF/HF 42-330-22			•				••					••	
	BLAK-MF/HF 50-330-22			•				••					••	
	BLAK-HP													
	BLAK-HP 01-690-12,3	•												
	BLAK-HP 2,5-690-12,3	•												
	BLAK-HP 05-690-12,3	•												
	BLUAK 3000/4000 psi													
Acceptance ASME	BLUAK 2,5-3000/4000-22,9			•					•					•
	BLUAK 5-3000/4000-22,9			•					•					•
	BLUAK 10-3000/4000-22,9			•					••					••
	BLUAK 15-3000/4000-22,9			•					••					••
	BLUAK 5000/6000 psi													
	BLUAK 2,5-5000/6000-24,5				•					•				
	BLUAK 5-5000/6000-24,5				•					•				
	BLUAK 10-5000/6000-24,5				•					••				
	BLUAK 15-5000/6000-24,5				•					••				

To properly secure your selected accumulator, we recommend:

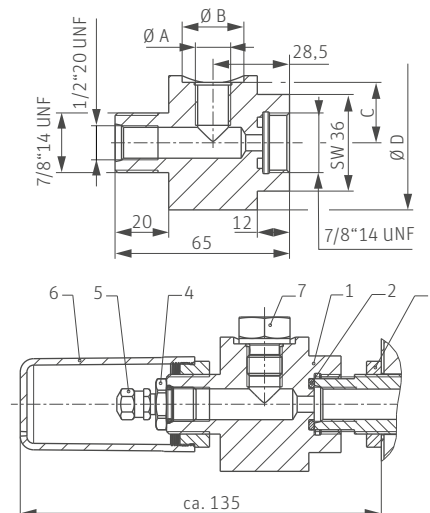
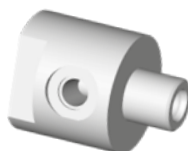
- Using at least 1 x the corresponding fastener.
- Using at least 2 x the corresponding fastener.

Accessories - bladder accumulator

■ Adapter

Transition piece

The transition piece is used with bladder accumulators. It is used for example to fit bursting disc plugs, which protect the bladder accumulator from exceeding the gas side pressure.



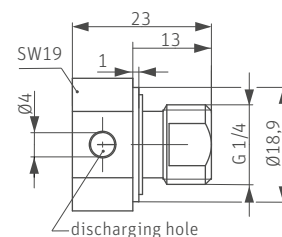
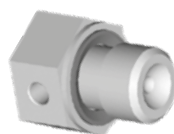
Items 1-7	Gas safety device	4204033456
Pos. 1	Adapter	
Pos. 2	O-ring	
Pos. 3	Threaded ring	
Pos. 4	Gas valve	
Pos. 5	Protection cap for gas valve	
Pos. 6	Protection cap	
Pos. 7	Screw plug	

ø A ¹	G 1/4"	Nominal diameter	DN 6
ø B	23 mm	Working pressure (PN)	max. 350 bar
C	22,5 mm	Operating temperature	-20 °C ... +80 °C
ø D	50 mm	Weight/material ²	approx. 0,6 kg/steel

1) other connections upon request; 2) other materials upon request

Bursting disc plugs

The bursting disc plug protects pressure equipment from excessive gas side pressure. If the burst pressure is exceeded, the bursting membrane will be damaged permanently. The damaged membrane will discharge nitrogen.



Type/Nominal diameter	Bursting disc plug DN 4						
Acceptance	PED 2014/68/EU with CE mark						ASME conform
Working medium	Nitrogen						
Weight	approx. 0,03 kg						
Material	Stainless steel 1.4571						
Connection	G 1/4"						G 3/4"
Burst pressure	200 bar	220 bar	250 bar	280 bar	330 bar	350 bar	3200 psi
Order number	4202012785	4202012786	4202012787	4204013194	4204016149	4204017772	4204028817

Note: Bursting disc plugs for other acceptances are available upon request. Special technical features of bursting disc plugs must be observed.

Accessories - bladder accumulator

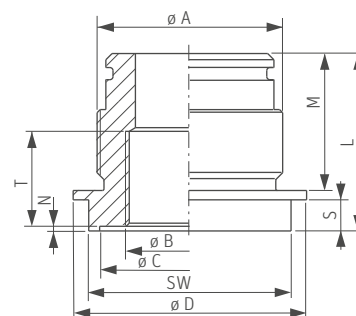
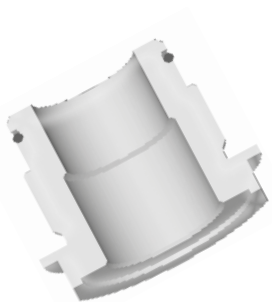
■ Reductions

Bladder accumulator reductions

Bladder accumulator reductions allow the oil side connection of Roth hydraulic accumulators to different system connections.

The standard versions in normal steel are based on the permissible working pressure 330/350 bar. Other materials are available upon request.

Temperature application range -15 °C ... +80 °C.



Selection table

Type	Order number	$\varnothing A$	$\varnothing B$	L	T	S	SW	$\varnothing C$	$\varnothing D$	N	M
Reduction G 2" / G 1 1/2"	4204020094	G 2"	G 1 1/2"	90	34	10	70	62	75	1	44
Reduction G 2" / G 1 1/4"	4204020097		G 1 1/4"	57	20	10	65	58	75	2,5	44
Reduction G 2" / G 1"	4204020098		G 1"	57	18	10	65	47	75	2,5	44
Reduction G 2" / G 3/4"	4204020099		G 3/4"	57	16	10	65	42	75	2,5	44
Reduction G 2" / G 1/2"	4204020100		G 1/2"	57	14	10	65	34	75	2,5	44
Reduction G 2" / G 3/8"	4204020101		G 3/8"	57	12	10	65	28	75	2	44
Reduction G 1 1/4" / G 3/4"	4204020103	G 1 1/4"	G 3/4"	50	16	10	50	42	54	2,5	37

Tools - bladder accumulator

Bladder accumulator assembly tools

The following assembly tools are recommended for service work on Roth bladder accumulators.

Installation tool

Designation	Bladder accumulator type	Volume		Thread	Figure	Order number
		[l]	[gal]	[inch]		
Valve key for tightening or loosening the oil valve	BLAK	1 - 10 (long)				4204019703
	BLAK	10 (short) - 50				4204019455
	BLUAK		2,5 - 15			4204030519
Screw plug for installing the oil valve Oil valve key (mechanical)	BLAK	1 - 10 (long)		G 1 1/4"		4204036516
	BLAK	10 (short) - 50		G 2"		4204036515
	BLUAK		2,5 - 15	G 2"		
Mounting rod 500 mm for inserting the bladder into the accumulator (Depending on the accumulator length, several adaptable rods are required)	BLAK	1 - 10 (long)				4204030215
	BLAK	10 (short) - 50				
	BLUAK		2,5 - 15			



Note: To carry out repair and maintenance work on bladder accumulators, please request the respective operating and maintenance instructions.

Our full range – Services for accumulators and accumulator systems

We also support you after you have purchased our products.

Our service team will be happy to assist you with installation, recurring inspections, component maintenance and other services.

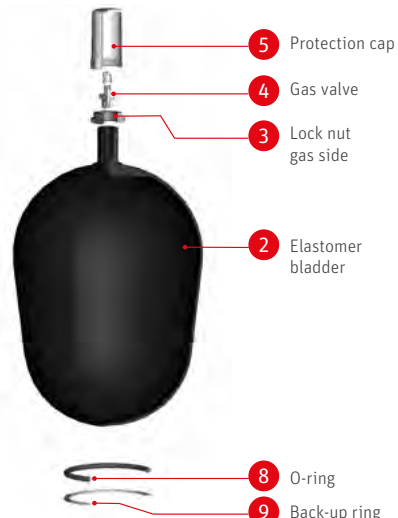
Please contact us via our service e-mail address: service@roth-hydraulics.de

Spare parts – bladder accumulator

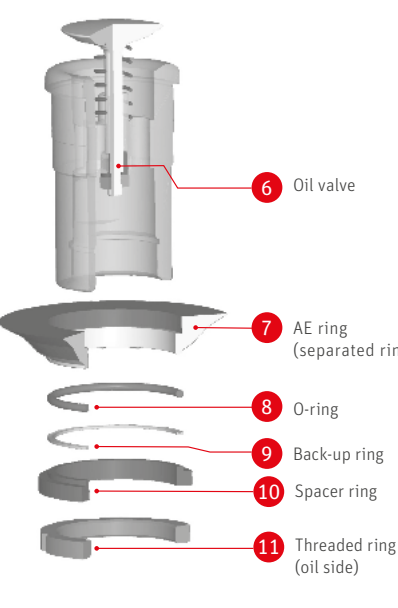
Bladder accumulator kit

Roth spare parts for bladder accumulators are available in different kits (sets).

Bladder Kit 1 selection tables - gas side

Kit 1	Bladder accumulator type	Volume [l/gal]	Bladder kit 1 designation	Order number
	BLAK	1	GAS-REPKit BLAK 1 G NBR	4204020128
	BLAK	2,5	GAS-REPKit BLAK 2 G NBR	4204020129
	BLAK	4	GAS-REPKit BLAK 4 G NBR	4204020122
	BLAK	5	GAS-REPKit BLAK 5 G NBR	4204020130
	BLAK	6	GAS-REPKit BLAK 6 G NBR	4204020123
	BLAK	10 long	GAS-REPKit BLAK 10l G NBR	4204020124
	BLAK/BLUAK	10 short/2,5	GAS-REPKit BLAK/BLUAK 10k G NBR	4204020110
	BLAK/BLUAK	20/5	GAS-REPKit BLAK/BLUAK 20 G NBR	4204020111
	BLAK	24,5	GAS-REPKit BLAK 24,5 G NBR	4204020112
	BLAK/BLUAK	32/10	GAS-REPKit BLAK/BLUAK 32 G NBR	4204020113
	BLAK	42	GAS-REPKit BLAK 42 G NBR	4204020114
	BLAK	50	GAS-REPKit BLAK 50 G NBR	4204020115
	BLUAK	57/15	GAS-REPKit BLUAK 15 G NBR	4204034878

Bladder Kit 2 selection tables - oil side

Kit 2	Bladder accumulator type	Volume [l/gal]	Oil kit 2 designation	Order number
	BLAK	1	ÖL-Repkit 2 BLAK 1-10l G 1 ¼ NBR	4204020143
	BLAK	2,5	ÖL-Repkit 2 BLAK 1-10l G 1 ¼ NBR	
	BLAK	4	ÖL-Repkit 2 BLAK 1-10l G 1 ¼ NBR	
	BLAK	5	ÖL-Repkit 2 BLAK 1-10l G 1 ¼ NBR	
	BLAK	6	ÖL-Repkit 2 BLAK 1-10l G 1 ¼ NBR	
	BLAK	10 long	ÖL-Repkit 2 BLAK 1-10l G 1 ¼ NBR	
	BLAK	10 short	ÖL-Repkit 2 BLAK 10-50l G 2 NBR	4204020141
	BLAK	20	ÖL-Repkit 2 BLAK 10-50l G 2 NBR	
	BLAK	24,5	ÖL-Repkit 2 BLAK 10-50l G 2 NBR	
	BLAK	32	ÖL-Repkit 2 BLAK 10-50l G 2 NBR	
	BLAK	42	ÖL-Repkit 2 BLAK 10-50l G 2 NBR	
	BLAK	50	ÖL-Repkit 2 BLAK 10-50l G 2 NBR	
	BLUAK	10/2,5	ÖL-Repkit 2 BLUAK 2,5-15gal G 2 NBR	4204020141
	BLUAK	20/5	ÖL-Repkit 2 BLUAK 2,5-15gal G 2 NBR	
	BLUAK	32/10	ÖL-Repkit 2 BLUAK 2,5-15gal G 2 NBR	
	BLUAK	57/15	ÖL-Repkit 2 BLUAK 2,5-15gal G 2 NBR	



Note: To carry out repair and maintenance work on bladder accumulators, please request the respective operating and maintenance instructions.

■ Roth piston accumulators – individual & versatile

Roth piston accumulators operate highly efficiently and can be individually modified to customer requirements by modifying the fluid connections and sealing system. Additional options, such as an integrated reciprocating movement or a wide range of measurement and monitoring systems, enable the continuous monitoring of the operating condition and/or energy content, and make Roth piston accumulators a versatile product.

Typical product features:

- > High discharge volume and withdrawal capacity available
- > High efficiency thanks to minimal-friction sealing systems
- > No installation position limitations
- > Monitoring of piston position possible using various systems
- > No sudden gas loss to fluid side possible
- > Plannable maintenance intervals, easy-to-service and durable

- > Volume: 0,1 l ... 1500 l
- > Operating pressure: up to 1200 bar
- > Operating temperature: -60 °C ... +150 °C

Products

Piston accumulators



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Construction and description

■ General

Roth piston accumulators can be deployed individually and in a variety of ways. A range of options make them a product specialised to customer requirements. Thanks to precise coordination, they can be used efficiently to store hydraulic energy, absorb pressure surges, dampen pulsations and/or smooth out volume flows by compressing nitrogen.

Roth piston accumulators offer high performance, low maintenance and versatility around the clock. They can be deployed in extreme climate conditions, in confined spaces and make careful use of resources.

The application fields of Roth piston accumulators are many and diverse. Amongst other applications, they can be used for:

- > Energy storage
- > Pulsation damping
- > Volume compensation
- > Hydraulic damping/suspension
- > Shock absorption
- > Media separation
- > Emergency control

Advantages

- > Can be optimally extended to specific applications thanks to diameter/length changes
- > Optional piston stroke monitoring
- > Unlimited installation position
- > Total removal possible
- > Durable, friction-optimised sealing system
- > Easy-to-maintain design
- > Low gas permeation compared to bladder/diaphragm accumulators, thanks to small seal surfaces
- > Low piston weight guarantees high dynamics
- > Large connection cross-sections possible
- > Sealing systems available for different media, different temperature ranges and applications
- > Total failure due to sudden gas loss impossible



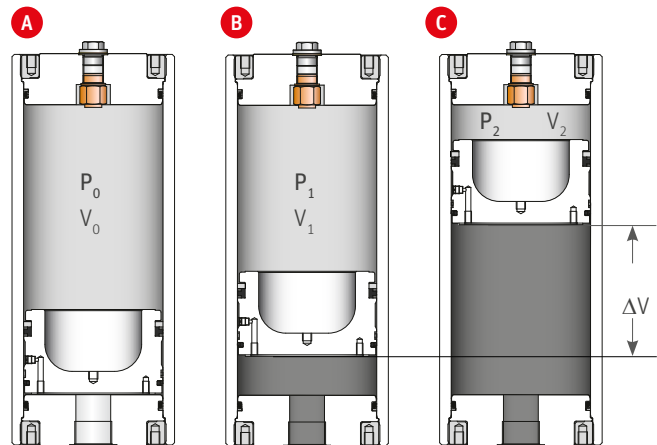
Construction and description

Function

Roth piston accumulators enable the storage and release of hydraulic energy. As pressurised hydraulic fluid flows in at the oil connection, the nitrogen on the gas side of the accumulator becomes compressed. Hydraulic energy is stored. When the pressure drops in the hydraulic system, the nitrogen gas expands, the piston moves towards the oil side and drives the hydraulic fluid out of piston bladder accumulator back into the hydraulic system. Hydraulic energy is released. The piston also acts as a media separator.

The three basic settings of the piston:

- A** The piston accumulator is pre-charged with nitrogen. There is no pressure on the fluid side.
- B** Position at minimum working pressure. A small volume of fluid must remain between the piston and fluid valve so that the piston does not strike the accumulator cover each time it empties. P_0 therefore has to be less than P_1 .
- C** Position at maximum working pressure. The volume change ΔV between the position at minimum working position corresponds to the stored fluid volume.



V_0 = Total gas volume of the accumulator
 V_1 = Gas volume in the piston accumulator at P_1
 V_2 = Gas volume in the piston accumulator at P_2
 ΔV = Dissipated or absorbed useful volume between P_1 / P_2
 P_0 = Pre-charge pressure on gas side in the piston accumulator
 P_1 = Minimum working pressure
 P_2 = Maximum working pressure

Overview of Roth piston accumulators

Overview of Roth piston accumulators	
Volume	0,1 l ... 1,500 l
N2 transport filling	Possible - after testing
Operating pressure	max. 1200 bar
Materials	Steel, special materials, stainless steel (upon request)
Media	See table on page 47
Temperature	-60 °C ... +150 °C
Installation position	Preferably vertical, oil side on underside - other options possible
Corrosion protection	Primed, top coating/special coatings possible
Fluid ports	Inside thread G 1/4" - G 2" SAE thread connections
	Flange/special connections possible
Acceptances	PED 2014/68/EU, ASME, ML China, NR13, EAC, GL, ABS, BV, DNV, CRN, CCS, LRS, RINA

Operating temperature

Standard temperature range: -10 °C to +80 °C, different temperature ranges, e.g. -40 °C to +80 °C, available upon request.

Delivery condition

Piston accumulator shell coated with universal priming colour RAL 1001 (beige), inside oil-wetted, connector surface blank, greased and openings sealed, no oil filling, no gas filling.

Other colour treatments, blasting or other surface coatings (e.g. galvanic zinc plating) are possible. Please contact us for other solutions.

Pressure fluids

PUR seal design: Mineral oils, hydraulic oils based on DIN 51524 Part 2

NBR seal design: Hydraulic oils based on DIN 51524 Part 2, hardly flammable fluids, water and emulsions, excluding HFD fluids.

Roth piston accumulators for other temperatures, other fluids or with long-term preservation upon request.

Construction and description

Connections

Roth piston accumulators are also available with other/additional connections (e.g., in accordance with company standards).

Special designs enable significantly larger nominal diameters (for high volume flows see [special connections/alternative filling valves, page 60](#)). Tell us the nominal diameter that you want. We will make suggestions!

Gas filling

Only nitrogen of Class 4.0 or higher is to be used, never oxygen or compressed air. If low-value, technical Class 2.8 nitrogen is used, this can over the long term lead to a build-up of corrosion and the failure of the accumulator under certain operating circumstances.

Design pressure (see selection table)

The design pressure corresponds to the maximum allowable working pressure (MAWP) and is also the maximum setting pressure of safety equipment against excess pressure (safety valves, burst discs).

We recommend operating the accumulators with a maximum pressure of 0,9 x MAWP to prevent safety equipment from responding.



Note regarding operation and maintenance

Please observe the information in the operating and maintenance instructions for this.

■ Selection of pressure fluids

The table shows a selection of elastomer materials and a rough overview of stable fluids. If used, stability must be queried and tested.

Fluid	Temperature range °C	Elastomer
Mineral oil (HL; HLP)	-20 °C ...+80 °C	NBR/ HNBR/EPDM
Synthetic ester (HEES)		
Hardly flammable fluids (HFA; HFB; HFC)		
Water		
Many diluted acids, bases and salt solutions at low temperatures		
Mineral oil (HL; HLP)	-15 °C ...+180 °C	Viton (FKM)
Synthetic ester (HEES)		
Anhydrous synthetic fluids (HFD)		
Fuels		
Concentrated inorganic and organic acids and alkalis		
Mineral oil (HL; HLP)	-30 °C ...+80 °C	PUR
Hardly flammable fluids (HFA)		



Note: The compatibility of the pressure fluid and elastomer is not guaranteed across the board and can only be tested individually upon request. If there is no experience with special fluids, compatibility tests may be necessary.



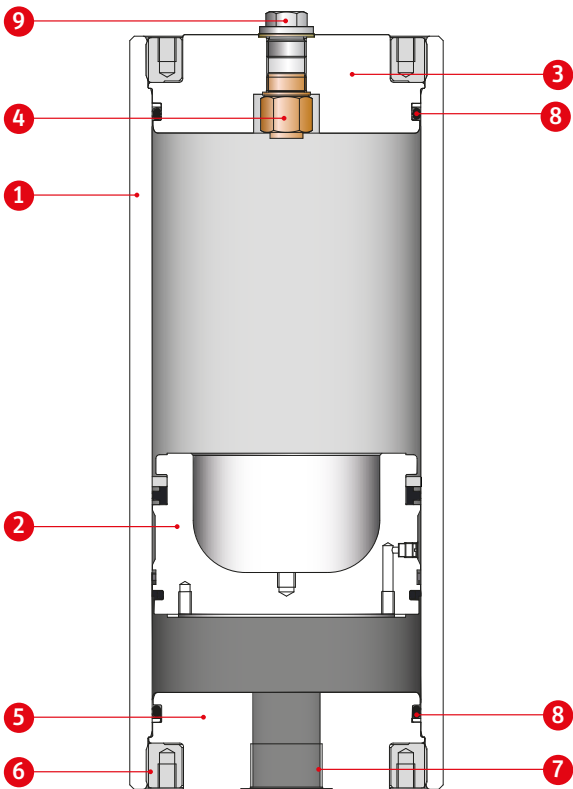
Note regarding operation and maintenance

Please observe the information in the operating and maintenance instructions for this.

Construction and description

Roth piston accumulator construction

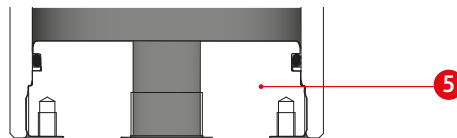
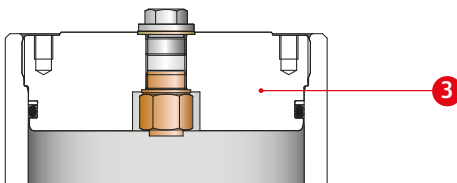
Standard AK



Overview of Roth piston accumulators	
Volume	0,1 l ... 1500 l
Operating pressure	max. 1,200 bar
Materials	Carbon steel, stainless steel, special materials (upon request)
Temperature	-60 °C ... +150 °C
Acceptances (Standard)	PED 2014/68/EU, ASME, others (see selection table, page 50)

Item	Designation	Material
1	Cylinder tube	Carbon steel
2	Piston	Aluminium/carbon steel
3	Screw-in fitting, gas side (2-part)*	Carbon steel
4	Roth gas filling valve	Carbon steel
5	Screw-in fitting, oil side (2-part)*	Carbon steel
6	Threaded ring	Carbon steel
7	Oil side connection	- -
8	End cap seal	NBR
9	Screw plug	Carbon steel

*For the oil and gas side, single-part and two-part screw-in fitting designs are available for piston diameters 180 mm and above, also see figure below.



Item	Designation	Material
3	Screw-in gas side (1-part)*	Carbon steel
5	Screw-in oil side (1-part)*	Carbon steel

*On the oil and gas side, fitted with a single-part screw-in fitting as standard for piston diameters up to 150 mm. Single-part and two-part screw-in fitting designs are available for piston diameters 180 mm and above, also see figure below.

Construction and description

■ Roth DURALOCK® thread

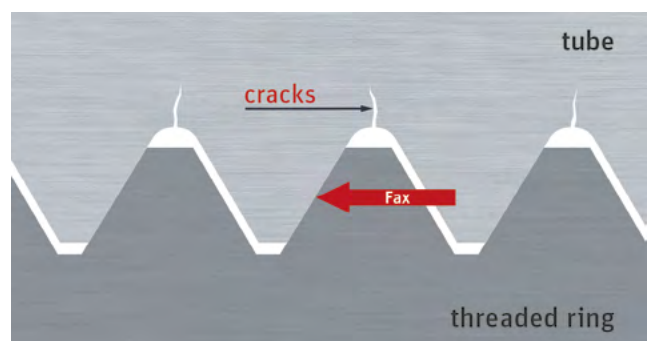
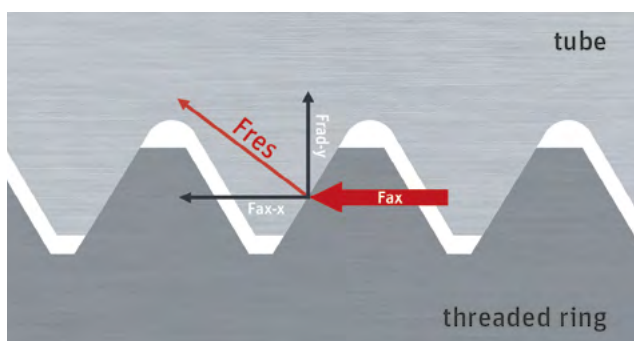
The Roth DURALOCK® thread, specially developed for our accumulator systems, ensures additional safety and an extended life cycle for your hydraulic systems in daily use. The Roth DURALOCK® thread is safer, more robust and more durable than conventional threads in specific hydraulic accumulator applications. Compared to conventional threads, the Roth DURALOCK® thread offers the following with almost identical dimensions:

- > Up to 100% greater safety against failure
- > Up to 100% higher load cycles or pressure fluctuation ranges

The problem

When evaluating metric threads previously used in piston accumulator construction, the following issues were identified:

- > The radial force component leads to pipe bending. Further load increases expand the pipe until the connection fails.
- > There is a stress concentration in the thread base, which can lead to cracking with changing loads and high load cycles.



The conclusion

The following design details were identified to improve the properties of these connections:

- > Reduction of the flank angle in order to shrink any radial forces, which significantly reduces pipe bending.
- > Increase of the radius in the thread base, which makes the thread significantly less prone to cracking.

Our solution – Roth DURALOCK® thread

Roth DURALOCK® thread combines these properties, and thanks to its optimised geometry, it offers major advantages when compared to threads traditionally used in accumulator construction.



Developed by specialists to meet your needs.

- > Extreme safety and durability
- > Excellent durability
- > Robustness thanks to rounded thread contour
- > Optimised dimensions
- > Long service life

In ongoing development, the features of the Roth DURALOCK® thread have been taken into consideration in design and calculations. Numerous load cycle and burst tests have confirmed the superb capabilities of Roth DURALOCK® thread.

TÜV Hessen took part in the tests and confirmed the results by issuing a test certificate.

Rules and regulations

■ Acceptance

Roth hydraulic accumulators are manufactured and approved for the European market in accordance with the Pressure Equipment Directive (PED) 2014/68/EU. This applies for AK series piston accumulators.

The acceptance test is usually performed as an individual acceptance test in accordance with Module G by TÜV as the notified body. The accumulator systems are provided with a CE mark and are supplied with a declaration of conformity and a corresponding operating manual. In addition, the acceptance test documentation also consists of a conformity declaration from the notified body, an acceptance drawing and a listing of the materials used. This ensures that individual components can be overhauled or repaired, even after decades of operation.

The Pressure Equipment Directive is also accepted by many other countries besides the EU member states. Only some additional approval documentation may sometimes be required. Countries such as Russia, Ukraine or China also require a manufacturer's approval and/or a modified testing scope.

Pressure vessel shipments to the USA, on the other hand, must correspond to the American regulations, the ASME Code. Roth Hydraulics (formerly Bolenz & Schäfer) has been approved to deliver since 1981 according to ASME Code Section VIII Division

1 and therefore has the longest experience with these regulations in Germany as a piston accumulator manufacturer. Vessels with ASME acceptance are marked with the so-called "U-Stamp" and supplied with a data report as acceptance documentation. This applies for UAK series piston accumulators.

However, the scope of the ASME Code only covers pressure vessels and accumulators with an internal diameter greater than 6 inches. The CE series can therefore be used for accumulator diameters less than 6 inches (152,4 mm).

Vessels according to the ASME Code are also accepted in Canada. In Canada, an additional approval (Canadian Registration Number, CRN) is required for the relevant province to which shipment is destined. The province or installation site must be indicated along with the order. ASME acceptance is often required in the "offshore" field or in parts of Asia.

Roth Hydraulics has all important product and company approvals worldwide.

The following tables contain a selection of the most common acceptance variants. If your planned installation country or the required acceptance is not listed, please indicate this in plain text along with the enquiry.

■ Acceptance selection tables

Standard acceptances:

Country code	Countries	Approval regulation	Var. no.
EU	EU member states	Pressure Equipment Directive 2014/68/EU with CE mark	50
CN	China	PED 2014/68/EU without ML (< 30 l)	533
CN	China	PED 2014/68/EU + ML (≥ 30 l)	534
BR	Brazil	PED 2014/68/EU + CE mark + NR 13	515
US	USA	ASME Code Sect. VIII Div. 1	15

Special acceptances:

Country code	Countries	Approval regulation	Var. no.
CA	Canada	ASME Code + CRN (Canadian Registration No.) Approval depending on province - indicate province	29
ASME DOSH	Malaysia	ASME + DOSH Malaysia	61

Maritime acceptance:

Country code	Countries	Approval regulation	Var. no.
CCS	Various countries	China Classification Society	537
ABS	Various countries	American Bureau of Shipping	510
LRS	Various countries	Lloyd's Register of Shipment	5
GL	Various countries	Germanischer Lloyd	41
RINA	Various countries	RINA	536
BV	Various countries	Bureau Veritas	506
DNV	Various countries	Det Norske Veritas	509

Type code AK/UAK

■ PED (CE)/ASME - Series piston accumulators

Order designation											
Series	...	...	...	...	...	...	...	...	...	...	...
AK (CE acceptance)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
UAK (ASME acceptance)	AK/UAK	Oil volume [l]	Pressure [bar/psi x 102]	Piston ø [cm]	Shell material/Coating	Piston design	Seal type	Gas filling valve	Connections	Piston position check	Acceptance
Shell material/Coating	...	0	=	Standard (carbon steel)	VA	=	Stainless steel	Ni	=	Inside nickel plated, e.g. for water	
Piston design	...	0	=	Standard	S	=	Special design				
Seal type	...	1	=	NBR (e.g., for HFC)	2	=	Viton (e.g., for HFD)	3	=	PUR (polyurethane)	
Gas filling valve	...	mRV	=	with non-return valve (no downstream gas container) (see selection table filling valves p. 60)	oRV	=	without non-return valve (downstream gas container)				
Connections	...	G0	=	Standard (see table opposite)	G1	=	Other thread connections	F	=	Flange connections	
								FG	=	One side flange, other thread	
Piston position check	...	0	=	none	ES	=	Limit switching	SV	=	Switching device	
								SVG	=	Switching device (bent)	
								UPS	=	Ultrasound position sensor	
								KME	=	Piston accumulator measurement device	
Acceptance	...	50	=	Standard (PED 2014/68/EU)	15	=	ASME - Code Sect. VIII	...	=	others (see acceptances selection table)	
Colour treatment (outside)	...	20	=	RAL 1001 - Standard priming	21	=	Blasting and coating (please specify)	22	=	Colour treatment according to order (please specify)	

Example: AK 100-220-36-0-0-1-mRV-G0-ES-50-20

Product for the example order designation is:

Type:	AK
Oil volume:	100 litre
Pressure:	220 bar
Piston ø:	360 mm
Shell material/Coating:	Carbon steel
Piston design:	Standard
Seal type:	NBR
Gas filling valve:	with gas filling valve
Connections:	Standard
Piston position check:	Limit switching
Acceptance:	CE in accordance with PED...
Colour treatment:	Standard priming

Standard connection G0

Piston-ø [cm]	Oilside	Gasside
60/80/100	G 1/2"	G 1/4"
150	G 1"	G 1/4"
180/250/360	G 1 1/2"	G 3/4"

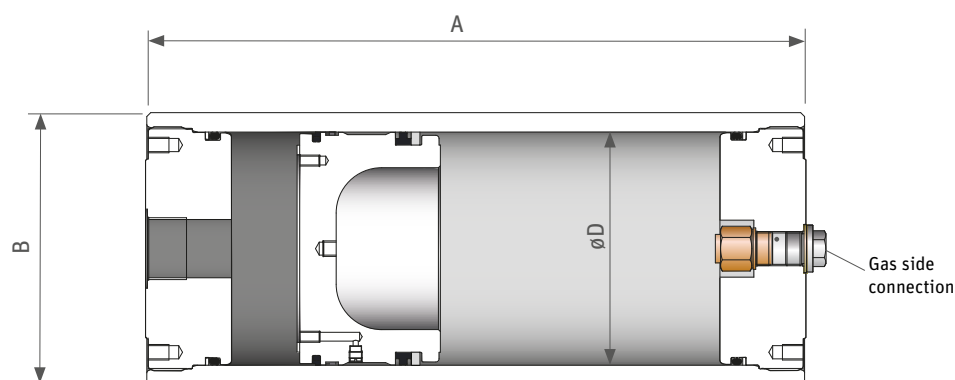
(Indicate separately for oil and gas side in plain text)

(see also page 56 et seq.)

Note: The use of the type code generally ensures our ability to supply.

CE Series AK

■ CE Standard series AK 15 - 900 l - 220/280 bar



Oil volume	Design pressure	Type	Weight approx.	Abmessungen				
				Standard connection G0		Piston-Ø D	Length A	Outside-Ø B
				Oilside	Gasside			
[l]	[bar]		[kg]	[inch]	[inch]	[mm]	[mm]	[mm]
15	280	AK 15-280-18	113	G 1 1/2"	G 3/4"	180	870	210
20	280	AK 20-280-18	128	G 1 1/2"	G 3/4"	180	1065	210
20	220	AK 20-220-25	215	G 1 1/2"	G 3/4"	250	770	290
20	280	AK 20-280-25	225	G 1 1/2"	G 3/4"	250	770	290
50	280	AK 50-280-18	213	G 1 1/2"	G 3/4"	180	2245	210
50	220	AK 50-220-25	295	G 1 1/2"	G 3/4"	250	1380	290
50	280	AK 50-280-25	305	G 1 1/2"	G 3/4"	250	1380	290
75	220	AK 75-220-25	365	G 1 1/2"	G 3/4"	250	1900	290
75	280	AK 75-280-25	375	G 1 1/2"	G 3/4"	250	1900	290
100	220	AK 100-220-25	430	G 1 1/2"	G 3/4"	250	2400	290
100	280	AK 100-280-25	440	G 1 1/2"	G 3/4"	250	2400	290
100	220	AK 100-220-36	715	G 1 1/2"	G 3/4"	360	1525	402
150	220	AK 150-220-36	815	G 1 1/2"	G 3/4"	360	2020	402
200	220	AK 200-220-36	915	G 1 1/2"	G 3/4"	360	2510	402
400	220	AK 400-220-36	1315	G 1 1/2"	G 3/4"	360	4475	402
750	220	AK 750-220-36	1980	G 1 1/2"	G 3/4"	360	7915	402
750	220	AK 750-220-49	2845	G 1 1/2"	G 3/4"	490	4740	548
900	220	AK 900-220-36	2265	G 1 1/2"	G 3/4"	360	9385	402
900	220	AK 900-220-49	3155	G 1 1/2"	G 3/4"	490	5535	548

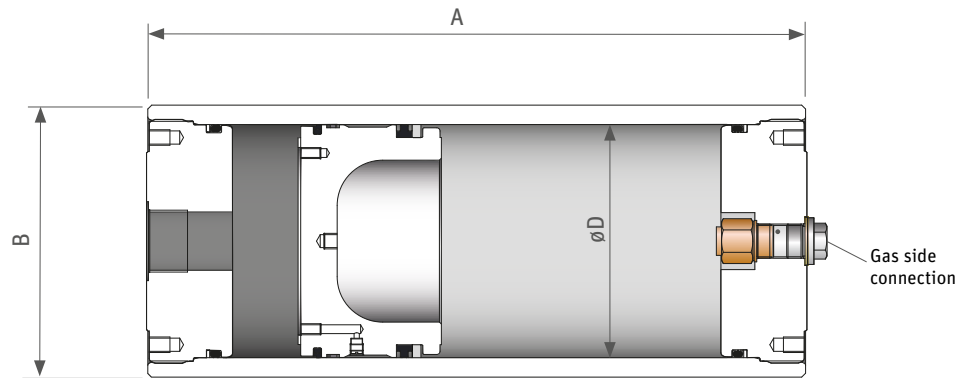
Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances. In the event of an order, you will receive a binding drawing for approval for non-standard products.

CE Series AK

■ CE Standard series AK 0,5 - 900 l - 350/375 bar



Oil volume	Design pressure	Type	Weight approx.	Dimensions				
				Standard connection G0		Piston-Ø D	Length A	Outside-Ø B
				Oilside	Gasside			
[l]	[bar]		[kg]	[inch]	[inch]	[mm]	[mm]	[mm]
0,5	375	AK 0,5-375-08	13	G 1/2"	G 1/4"	80	255	100
1,0	375	AK 01-375-08	15	G 1/2"	G 1/4"	80	355	100
5	375	AK 05-375-10	22,5	G 1/2"	G 1/4"	100	825	125
5	350	AK 05-350-15	59	G 1"	G 1/4"	150	520	180
10	350	AK 10-350-15	77	G 1"	G 1/4"	150	800	180
10	350	AK 10-350-18	96	G 1 1/2"	G 3/4"	180	675	210
15	350	AK 15-350-15	94	G 1"	G 1/4"	150	1085	180
15	350	AK 15-350-18	110	G 1 1/2"	G 3/4"	180	870	210
20	350	AK 20-350-18	124	G 1 1/2"	G 3/4"	180	1056	210
20	350	AK 20-350-25	222	G 1 1/2"	G 3/4"	250	800	290
50	350	AK 50-350-18	209	G 1 1/2"	G 3/4"	180	2245	210
50	350	AK 50-350-25	305	G 1 1/2"	G 3/4"	250	1410	290
75	350	AK 75-350-25	372	G 1 1/2"	G 3/4"	250	1920	290
100	350	AK 100-350-25	440	G 1 1/2"	G 3/4"	250	2430	290
100	350	AK 100-350-36	702	G 1 1/2"	G 3/4"	360	1525	413
150	350	AK 150-350-36	822	G 1 1/2"	G 3/4"	360	2020	413
200	350	AK 200-350-36	947	G 1 1/2"	G 3/4"	360	2510	413
400	350	AK 400-350-36	1447	G 1 1/2"	G 3/4"	360	4475	413
750	350	AK 750-350-36	2317	G 1 1/2"	G 3/4"	360	7915	413
900	350	AK 900-350-36	2689	G 1 1/2"	G 3/4"	360	9385	413

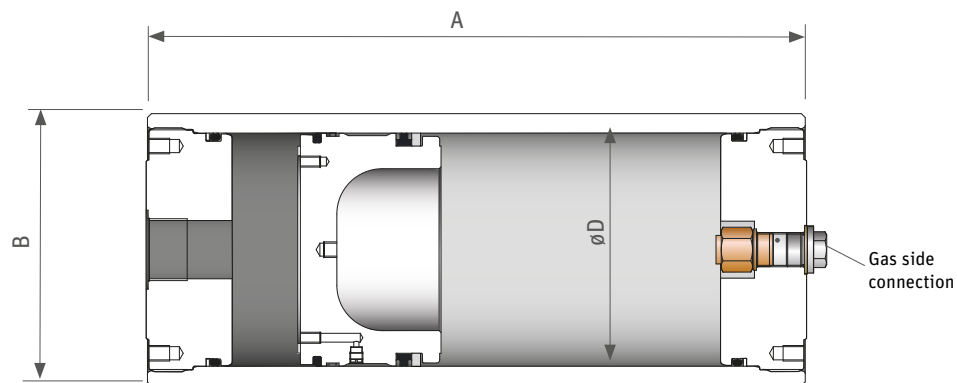
Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.
In the event of an order, you will receive a binding drawing for approval for non-standard products.

ASME U-Stamp series UAK

■ ASME U-Stamp standard series 48 - 650 l (12,5 - 170 gal) - 220 bar (3200 psi)



Oil volume		Design pressure		Type	Weight approx..	Dimensions				
						Standard connection G0		Piston ø D	Length A	Outside-ø B
						Oilside	Gasside			
[l]	[gal]	[bar]	[psi]		[kg]	[inch]	[inch]	[mm]	[mm]	[mm]
48	12,5	220	3200	UAK 48 - 32 - 18	191	G 1 1/2"	G 3/4"	180	2190	207
57	15	220	3200	UAK 57 - 32 - 18	215	G 1 1/2"	G 3/4"	180	2540	207
75	20	220	3200	UAK 75 - 32 - 25	379	G 1 1/2"	G 3/4"	250	1930	290
95	25	220	3200	UAK 95 - 32 - 25	433	G 1 1/2"	G 3/4"	250	2340	290
115	30	220	3200	UAK 115 - 32 - 25	487	G 1 1/2"	G 3/4"	250	2745	290
150	40	220	3200	UAK 150 - 32 - 36	811	G 1 1/2"	G 3/4"	360	2070	402
200	50	220	3200	UAK 190 - 32 - 36	888	G 1 1/2"	G 3/4"	360	2465	402
375	100	220	3200	UAK 380 - 32 - 36	1257	G 1 1/2"	G 3/4"	360	4330	402
570	150	220	3200	UAK 570 - 32 - 36	1626	G 1 1/2"	G 3/4"	360	6195	402
650	170	220	3200	UAK 650 - 32 - 36	1781	G 1 1/2"	G 3/4"	360	6980	402

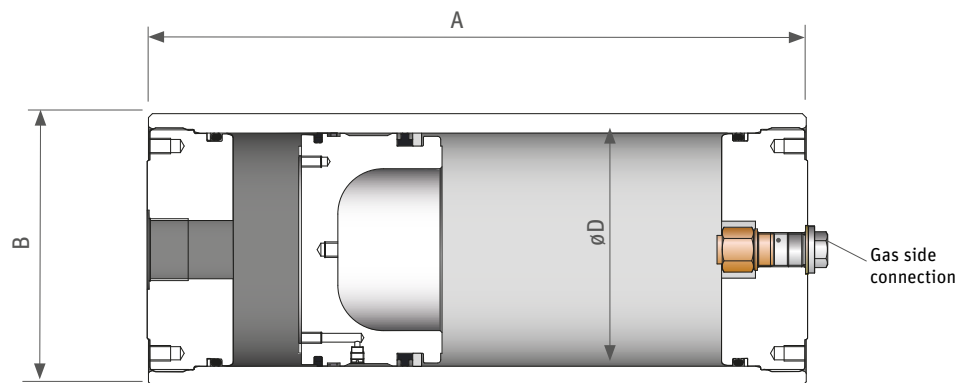
Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances. In the event of an order, you will receive a binding drawing for approval for non-standard products.

ASME U-Stamp series UAK

■ ASME U-Stamp standard series 48 - 650 l (12,5 - 170 gal) - 350/375 bar (5100/5500 psi)



Oil volume		Design pressure		Type	Weight approx..	Dimensions				
						Standard connection G0		Piston ø D	Length A	Outside-ø B
						Oilside	Gasside			
[l]	[gal]	[bar]	[psi]		[kg]	[inch]	[inch]	[mm]	[mm]	[mm]
48	12,5	375	5500	UAK 48 - 55 - 18	259	G 1 ½"	G ¾"	180	2220	217
57	15	375	5500	UAK 57 - 55 - 18	293	G 1 ½"	G ¾"	180	2575	217
75	20	350	5100	UAK 75 - 51 - 25	551	G 1 ½"	G ¾"	250	1980	310
95	25	350	5100	UAK 95 - 51 - 25	635	G 1 ½"	G ¾"	250	2390	310
115	30	350	5100	UAK 115 - 51 - 25	719	G 1 ½"	G ¾"	250	2795	310
150	40	350	5100	UAK 150 - 51 - 36	1190	G 1 ½"	G ¾"	360	2140	430
200	50	350	5100	UAK 190 - 51 - 36	1355	G 1 ½"	G ¾"	360	2630	430
375	100	350	5100	UAK 380 - 51 - 36	1945	G 1 ½"	G ¾"	360	4350	430
570	150	350	5100	UAK 570 - 51 - 36	2600	G 1 ½"	G ¾"	360	6265	430
650	170	350	5100	UAK 650 - 51 - 36	2865	G 1 ½"	G ¾"	360	7050	430

Other versions upon request!



Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances.
In the event of an order, you will receive a binding drawing for approval for non-standard products.

Piston position monitoring/switching devices

■ Piston position displays/switching devices

Piston position displays/switching devices in various versions are available as an additional option in Roth accumulator system construction, depending on the intended application and monitoring requirements.

Roth piston position displays/switching devices allow you to monitor the position of the piston. Strokes, pressure control, controlling switching cycles, emergency shutdowns, etc. are all possible by installing a piston position display in the piston accumulator system.

Piston position monitoring can be visual, analogue and/or even digital.



Applications

Roth piston position displays have a wide range of applications which depend in part on the installation situation and location. A combination of various piston monitoring displays also offers a wide range of potential applications.

Many years of experience in the customer-specific configuration of piston accumulator systems have made us a skilled partner in the selection of optimal piston position display. We will be happy to help you choose.

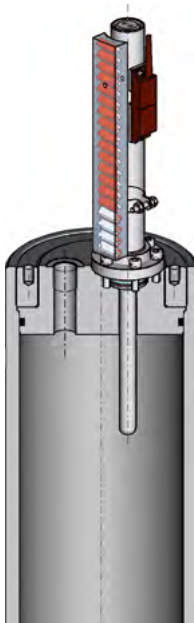
Piston position monitoring/switching devices

Overview

Type		Visual display	Stroke range	Switching functions	Output signal	Can be retrofitted	Function
Limit switching ES		-	75 mm	✓	Switching contact (NC contact or NO contact/latching contact)	-	Detection and triggering of piston end/switching position.
Switching device (SV)		-	1500 mm	✓	Switching contact (NC contact or NO contact/latching contact)	-	Detection and triggering of piston switching positions.
Switching device magnetic vane (SV-M)		✓	1500 mm	✓	Switching contact (NC contact or NO contact/latching contact)	-	Detection and triggering of different piston switching positions as well as visual display of stroke range.
Switching device bent (SV-G)		-	Total stroke	✓	Switching contact (NC contact or NO contact/latching contact)	-	Detection and triggering of different piston switching positions.
Switching device bent/magnetic vane (SV-GM)		✓	Total stroke	In combination with bistable switches	Switching contact (NC contact or NO contact/latching contact)	-	Detection and triggering of different piston switching positions as well as visual display of stroke range.
Ultrasound position sensor (UPS)		-	Individually positionable	✓	Switching output (NPN/PNP)	✓	Detection and triggering of different piston switching positions.
Piston accumulator measurement device (KME)		-	up to 5000 mm; optionally longer	✓	Analogue 4 ... 20 mA	-	Continuous piston monitoring and triggering of switching points across the entire stroke range.

Piston position monitoring/switching devices

Functional description

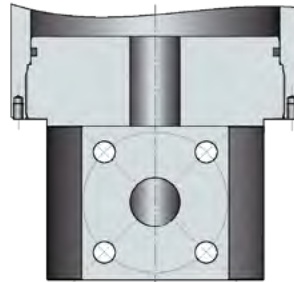
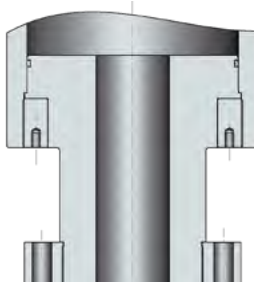
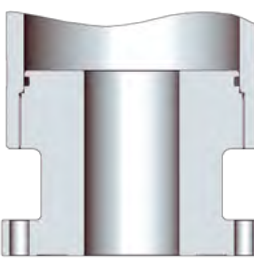
Limit switching ES	Switching device SV	Switching device - magnetic vane SV-M	Switching device - bent SV-G
When the piston accumulator is filled on the oil side, the selector rod is approached by the accumulator piston and pushed against the spring so that the end switch is triggered by a magnet inside, which can for example be used to control pumps. When the piston accumulator empties, the selector rod and magnet move, restoring the original function. Alternatively: A version with a bypass pipe is available. (for oil-side version)	When the piston accumulator is filled on the oil side, the selector rod is approached by the accumulator piston and pushed against the spring. The magnet in the switching device triggers the switch once a certain stroke is exceeded. During the stroke, any number of switches can be installed and switched consecutively. Advantage: The stroke range to be monitored can be selected up to 1500 mm independently of the total piston stroke. As a rule, it will be sufficient to monitor a maximum of 50 % of the stroke.	When the piston accumulator is filled with oil, the switching rod is approached by the accumulator piston and moved against the spring. The magnet in the switching device triggers the switch once a certain stroke has been exceeded. Any number of switches can be installed in the stroke range and switched one after the other. Visual monitoring is also possible using the magnetic vane display, as these change colour as soon as the magnet exceeds the position of the magnetic vanes. Advantage: The stroke range to be monitored can be selected up to 1500 mm independently of the total piston stroke. As a rule, it will be sufficient to monitor a maximum of 50 % of the stroke. The stroke can be read off visually.	The piston is connected to a permanent magnet by means of a cable. When the piston accumulator fills with oil and the piston changes its position, any number of switches can be triggered in succession by exceeding the position of the magnet. If the piston accumulator empties, the switching function is also reversed. Depending on the stroke direction, the switches operate as normally closed, normally open or latching contacts. Installation is only possible vertically. Advantage: The entire stroke of the piston can be monitored with minimal space requirements.
			

Piston position monitoring/switching devices

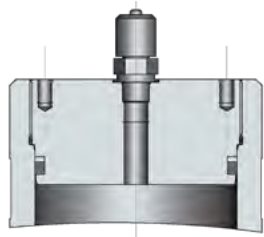
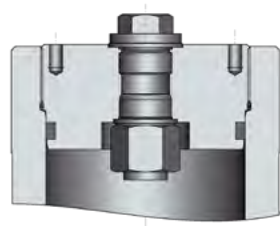
Switching device - bent-magnetic vane SV-GM	Ultrasound position sensor UPS	Piston accumulator measurement device KME
The piston is connected to a permanent magnet by means of a cable. When the piston accumulator fills with oil and the piston changes its position, any number of switches can be triggered in succession by exceeding the position of the magnet. If the piston accumulator empties, the switching function is also reversed. Depending on the stroke direction, the switches operate as normally closed, normally open or latching contacts. The external magnetic vane display enables the piston position to be visualised. Installation is only possible vertically. Advantage: The entire stroke of the piston can be monitored with minimal space requirements and can also be read optically.	The outsidely mounted ultrasonic position sensors use the ultrasonic pulse-echo method to detect an interruption in the sound path inside the piston accumulator and signal this via the switching output. This means that a switching operation can be triggered from a certain position. Advantage: The position of the sensor can be freely selected. The synchronous use of several sensors working simultaneously is possible. The sensor can be retrofitted without technical modifications to the piston accumulator.	The piston is connected to a displacement measuring system by means of a cable. The analogue output signal of 4-20mA can be processed by PLC controls over the entire stroke. The piston accumulator can also be installed vertically or horizontally. Advantage: The positioning of the piston monitoring is protected in the nozzle of the piston accumulator and is not exposed to any outside mechanical influences. This does not require any additional space around the system.
		

Special connections and filling valves

Special connections AK/UAK

Figure - Special connections	Designation
	Axial flange connection
	Radial flange connection
	Axial flange connection
	Screw-in with axial flange

AK/UAK filling valves - examples

Figure - Filling valves	Designation
	Minimes filling valve M 16 x 1,5
	Filling valve with connector 7/8" 14 UNF 1A
	Filling valve for diaphragm accumulator M 28 x 1,5
	Roth gas filling valve 3/4" connector



Note: The selection of versions above is intended to provide examples of connections and filling valves. We are happy to provide further designs upon request.

Accessories - piston accumulator

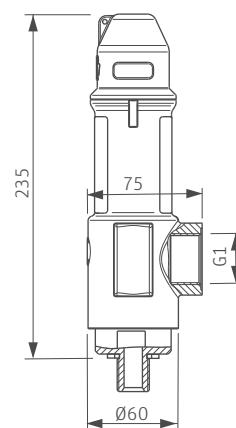
■ Safety equipment

Gas safety valve

The gas safety valve is an instantly acting springloaded valve for pressures up to 350 bar. When the set pressure is exceeded, the valve opens and closes following a drop in pressure of max. 7% of the set pressure. The high outflow coefficient of $K=0,95$ allows a high outflow mass flow.

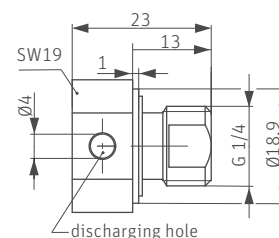
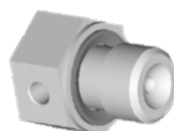
Operating pressure (PN)		Acceptance	Order number
bar	psi		
-	3200	ASME	4204041095
-	5100		4204041811
150	-	PED	4204040659
200	-		4204040660
220	-		4204040661
250	-		4204040662
330	-		4204040663
350	-		4204040664

Other preset pressures and acceptances upon request.
Technical data subject to change.



Bursting disc plugs

The bursting disc plug protects pressure equipment from excessive gas side pressure. If the burst pressure is exceeded, the bursting membrane will be damaged permanently. The damaged membrane will discharge nitrogen.



Type/Nominal diameter	Bursting disc plug DN 4						
Acceptance	PED 2014/68/EU with CE mark						ASME conform
Working medium	Nitrogen						
Weight	approx. 0,03 kg						
Material	Stainless steel 1.4571						
Connection	G 1/4"						G 3/4"
Burst pressure	200 bar	220 bar	250 bar	280 bar	330 bar	350 bar	3200 psi
Order number	4202012785	4202012786	4202012787	4204013194	4204016149	4204017772	4204028817

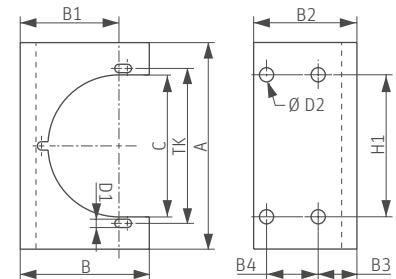
Note: Bursting disc plugs for other acceptances, pressure steps and connections are available upon request. Special technical features of bursting disc plugs must be observed.

Accessories - piston accumulator

■ Mounting technology

Brackets

Brackets for mounting piston accumulators. The brackets serve to absorb the weight and are screwed onto a wall or a frame.



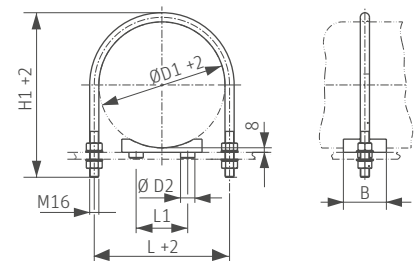
Bracket		Dimensions									
Type	Order number	Accumulator outside ø	A	B	B1	B2	B3	B4	D2	H1	TK
Bracket D207/210/217	4200058234	207/210/217	240	150	111	100	40	40	17	180	160
Bracket D290/310	4200058238	290/310	320	200	153	160	60	80	22	220	240
Bracket D402/430	4204040744	402/430	450	260	231	240	60	120	26	300	340

Additional version (bracket with a pitch circle of 330 mm, e.g., compatible with Roth piston accumulators up to approx. model year 2021)

Bracket D402/413	4200058240	402/413	440	260	212	240	60	120	26	300	330
------------------	------------	---------	-----	-----	-----	-----	----	-----	----	-----	-----

U-bolt clamps

U-bolt clamps with plastic pipe saddle for piston accumulator. U-bolt clamps for piston accumulators are supplied with four nuts and washers. Clamp, nuts and washers are made of galvanized normal steel.



U-bolt clamps		Dimensions					
Type	Order number	D1 +2	H1 +2	L +2	L1	D2	B
RSt clamp D125	4204011128	125	178,5	141	40	15	70
RSt clamp D182	4204014558	182	242	198	90	25	75
RSt clamp D224	4204009698	224	273	240	90	25	75
RSt clamp D292	4204011861	292	344	308	90	25	75
RSt clamp D312	4204005783	312	364	328	90	25	75
RSt clamp D402	4200058118	402	467	428	150	30	75
RSt clamp D413	4204040745	413	479	433	150	30	75
RSt clamp D434	4204004144	434	494	450	150	30	75

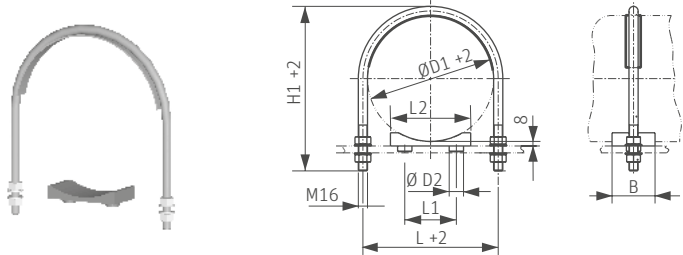
 **Note:** Tightening torque = 75 Nm.

Accessories - piston accumulator

■ Mounting technology

Bolt clamps

The bolt clamp for fastening piston accumulators consists of a round steel bracket with a welded-in flat steel and therefore has a wider contact surface compared to the round steel bracket. It is supplied with four nuts, washers and a support for the accumulator shell for installation on the wall. The bracket, nuts and washers are made of mild steel and are galvanized.



Bolt clamps		Dimensions					
Type	Order number	D1 +2	H1 +2	L	L1	L2	B
Bolt clamp D224	4204033882	224	273	148	90	140	75
Bolt clamp D292	4204033883	292	344	308	90	140	75
Bolt clamp D312	4204033886	312	364	334	90	140	75
Bolt clamp D412	4204033884	412	467	428	150	220	75
Bolt clamp D434	4204033885	434	494	450	150	220	75

Note: Tightening torque = 75 Nm.

Selection tables - fasteners for piston accumulators

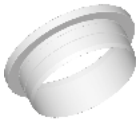
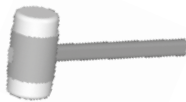
Note: Fastener versions with no bracket are only recommended for accumulators weighing 30 kilograms or less.

		Bracket type Order number			U-bolt clamp type Order number								Bolt clamp type Order number				
		Bracket D207/210/217 4200058234	Bracket D290/310 4200058238	Bracket D402/430 4204040744	U-bolt clamp D125 4204011128	U-bolt clamp D182 4204014558	U-bolt clamp D224 4204009698	U-bolt clamp D292 4204011861	U-bolt clamp D312 4204005783	U-bolt clamp D402 4200058118	U-bolt clamp D413 4204040745	U-bolt clamp D434 4204004144	Bolt clamp D224 4204033882	Bolt clamp D292 4204033883	Bolt clamp D312 4204033886	Bolt clamp D412 4204033884	Bolt clamp D434 4204033885
Accumulator type																	
AK																	
Acceptance CE	AK XX-375-10				•												
	AK XX-350-15					•											
	AK XX-280-18	•					•						•				
	AK XX-350-18	•					•						•				
	AK XX-220-25		•					•						•			
	AK XX-280-25		•					•						•			
	AK XX-350-25		•					•						•			
	AK XX-220-36			•						•						•	
	AK XX-350-36			•							•					•	
UAK																	
Acceptance ASME	UAK XX-32-18	•					•						•				
	UAK XX-55-18	•					•						•				
	UAK XX-32-25		•					•						•			
	UAK XX-51-25		•						•						•		
	UAK XX-32-36			•						•							•
	UAK XX-51-36			•							•						•

Tools - piston accumulator

Piston accumulator assembly tools

The following assembly tools are recommended for service work on Roth piston accumulators.

Designation	Piston ø		Order number
Accumulator key for tightening or loosening the accumulator nozzles	100		4200004570
	150		4204014705
	180		4202018170
	250		4202018171
	360		4204040665
Assembly bush for inserting the piston into the piston accumulator Note: <i>Because of the different thread designs on existing piston accumulators and their allocation, it is necessary to give the serial number of the piston accumulator when ordering the assembly bush.</i>	100		4204003281
	150		4204011978
	180		4204029957
	250		4204000313
	360		4202005537
Ring bolt M 12 special design (extended) (order 1 piece)	For disassembling the piston		4200004534
Ring bolt M 10 special design (extended) (order 2 piece)			4200001820
Ring bolt M 12 special design (extended) (order 2 piece)			4200004534
Soft hammer to assist in driving in the piston	-		4200004203
Plastic pen for easier application of the seals	-		4200003151

Note: To carry out repair and maintenance work on the piston accumulator or piston accumulator installations, please request the respective operating and maintenance instructions.

Our offer - services for accumulators and accumulator systems

We will be happy to help you, even after you have bought our product.

Be it mounting, recurring inspections or maintenance of components, our service team offers these and other options to you as a service.

Feel free to contact us using our service e-mail address: service@roth-hydraulics.de

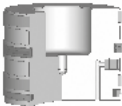
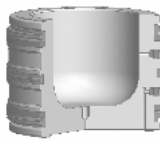
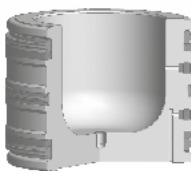
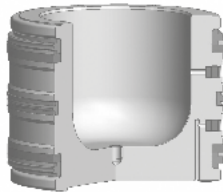
Notes

Spare parts - piston accumulator

Piston accumulator spare parts for CE and ASME (standard)

Pistons and seals

Roth piston accumulator production series built up to 2010

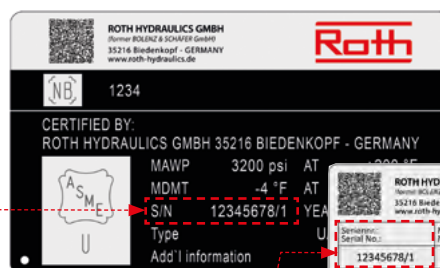
	Accumulator seal kit (Piston and end cap seals)	Piston ready to install (Piston including seals and non-return valve)	End cap seal	Piston non-return valve
Piston	Order number			
ø 80 	4204013976	4202010049	4200001978	4200020835
ø 100 	4200019701	4202010701	4200001987 and 4202002840	 Note: When servicing the piston seals, it is recommended that the installed non-return valve(s) are replaced as well!
ø 150 	4204013977	4204002548	4200037374 and 4204002622	
ø 180 	4200043990	4200052298	4200002023 and 4200045021	
ø 250 	4200045419	4204003726	4200002013 and 4200045040	
ø 360 	4202018555	4200051472	4200002016 and 4202006044	

Special seal sets, such as Viton seal sets, upon request.



Note

Please always state the serial number of the Roth piston accumulator when ordering.
The serial number can be found on the name plate or in the acceptance documents.



ROTH HYDRAULICS GMBH Rennert ROLAND & SCHÄFER GmbH 35216 Biedenkopf - GERMANY www.roth-hydraulics.de		Roth			
Serial No.:	Material No.:	Type:	Volumen (V): Volume:	Herstellungsdatum: Manufacturing date:	
12345678/1	4201334567	AK 100-220-36	100,0 L	01.01.2024	
Betriebsdruck (PS): MAWP:	Prüfdruck (PT): MAWP:	Betriebstemperatur (TS): Working temperature:	Fluidgruppe: Fluid group:	Zusätzliche Angaben: Additional information:	
220 bar	316 bar	-20 ... +80 °C	2		

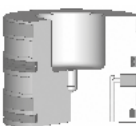
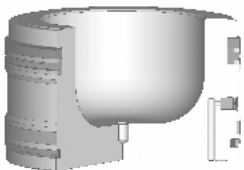
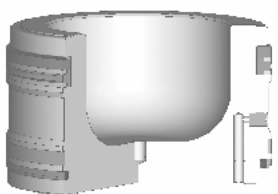
CE Q991

Spare parts - piston accumulator

■ Piston accumulator spare parts for series CE and ASME (standard)

Pistons and seals

Roth piston accumulator production series built **from** 2010/2011

	Accumulator seal kit (Piston and end cap seals)	Piston ready to install (Piston including seals and non-return valve)	End cap seal	Piston non-return valve
Piston	Order number			
ø 80 	4204014703	4202014700	4200001978	4200020835
ø 100 	4200019701	4202010701	4200001987 and 4202002840	 Note: When servicing the piston seals, it is recommended that the installed non-return valve(s) are replaced as well!
ø 150 	4204013977	4204002548	4202002840 and 4204002622	
ø 180 	4204013543	4204007154	4200002023 and 4200045021	
ø 250 	4204013619	4204006936	4200002013 and 4200045040	
ø 360 	4204007382*	4204006228	4200002016 and 4202006044	
	* Since October 2007			

👉 Note

Please always state the serial number of the Roth piston accumulator when ordering.
 The serial number can be found on the name plate or in the acceptance documents (see previous page).

■ Roth standard pressure vessels – economical & proven

Roth standard pressure vessels are seamless pressure vessels, available in 50 and 75 l sizes and in 220 and 360 bar or 4200/5000 psi pressures. They are used as downstream containers for accumulator systems or as pressure accumulators for a range of gases.

Typical product features:

- > Highly economical, flexible to use in accumulator systems
- > Easy to install
- > Can be used with various gases

- > Volume: up to 75 l
- > Operating pressure: up to 360 bar
up to 5000 psi

■ Roth large pressure vessels – scalable & special

Roth large pressure vessels are welded pressure vessels which can be supplied with an accumulator volume of up to 11.000 l in a variety of diameters, lengths and pressure levels. When used as downstream containers for accumulator systems, they allow the installation area to be optimised. In addition, they can also be used as separation-free accumulators, in which the fluid is directly exposed to the air or nitrogen, by adding monitoring and control devices.

Typical product features:

- > Highly economical, application-specific construction
- > Easy to install
- > Inside coating possible
- > Can be used with various gases

- > Volume: up to 11.000 l
- > Operating pressure: up to 350 bar

■ Roth special pressure vessels – optimized & reliable

Roth special pressure vessels are based on the Roth piston and bladder accumulators.

Screwed special pressure vessels (Roth piston accumulator series) are special solutions for particularly high pressures, high pressure fluctuation ranges, a wide variety of media or special materials (stainless steel).

Forged special pressure vessels (Roth bladder accumulator series) are special solutions for a wide variety of media, special materials (stainless steel) and in particular for special acceptances (e.g. maritime applications).

- > Volume: up to 900 l
- > Operating pressure: up to 1000 bar

Products
Pressure vessels





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Special pressure vessels - forged	75
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Pressure vessel

■ Product overview

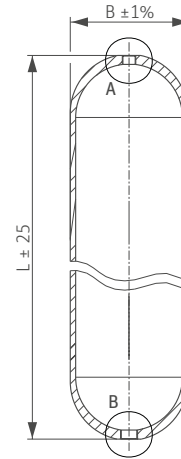
Product	Picture	Special feature/function
Standard pressure vessels - forged		Up to 75 l <i>Other versions upon request!</i>
Large pressure vessel - welded		Customized design
Special pressure vessel - screwed		Piston accumulator without piston, various acceptances (table of acceptances for piston accumulators see page 50)
Special pressure vessels - forged		Bladder accumulator without bladder, various acceptances (table of acceptances for Bladder accumulators see page 24)

Pressure vessel

■ Standard pressure vessels (DB Series) - forged

Standard pressure vessels

Pressure vessels made of seamless steel tubes, forged to a half-round shape on both sides, blasted on the inside and preserved with protective oil. Their exteriors are blasted and primed.



Volume	Acceptance ¹ /operating pressure		Order number	Note	Temperature range	Weight	Dimensions			
	PED	ML					Connection		L	Ø B
	[l]	[bar]					A	B	[mm]	[mm]
50	360	31,5	4204043966*	Working medium: Nitrogen	-40 ... +80 °C	108	G 1 1/2"	G 3/4"	1590	229
75	360	31,5	4204043970**			157	G 1 1/2"	G 3/4"	2280	229

* Replacement for number 4202018802, ** Replacement for number 4202018805

Volume	Acceptance ¹ /operating pressure	Order number	Note	Temperature range	Weight	Dimensions			
	ASME					Connection		L	Ø B
	[l]					[psi]	A	B	[mm]
50	4200	4204043967	Working medium: Nitrogen	-40 ... +80 °C	108	G 1 ½"	G ¾"	1590	229
50	5000	4204043969			132	G 1 ½"	G ¾"	1590	232
75	4200	4204043971			157	G 1 ½"	G ¾"	2280	229
75	5000	4204043974			195	G 1 ½"	G ¾"	2280	232

Volume	Acceptance ¹ /operating pressure			Order number	Note	Temperature range	Weight	Dimensions		
	PED	ASME	ML					Connection		Ø B
	[l]	[bar]	[psi]					A	B	[mm]
50	360	4200	31,5	4204043789	Working medium: Nitrogen	-40 ... +80 °C	108	G 1 1/2"	G 3/4"	1590
75	360	4200	31,5	4204043791			157	G 1 1/2"	G 3/4"	2280

¹ Other pressure vessel acceptances upon request

Pressure vessel

Large pressure vessel - welded

Large pressure vessel

Large pressure vessels serve to store large nitrogen volumes. They are completely blasted as well as sealed on the inside. The outside is coloured according to the customer's request. The vessels can be employed horizontally (fig. 1) or vertically (fig. 2).

Working pressure (PN)	220/350 bar ¹
Working temperature range	-25 ... +50 °C
Working medium	Nitrogen ¹
Approval regulation	PED 2014/68/EU ¹

¹ others upon request

Fig. 1

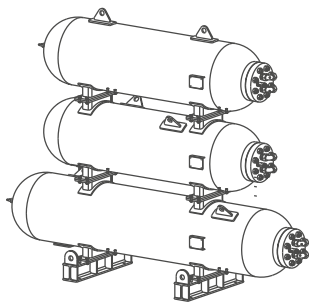
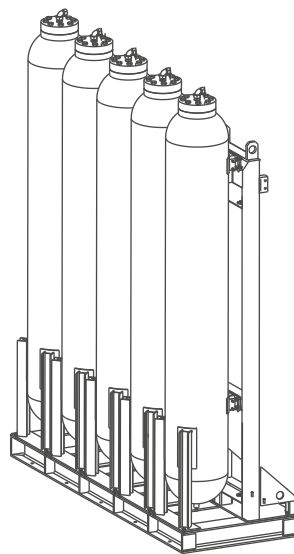


Fig. 2



Type code – large pressure vessels (GDB)

Order designation					Example: GDB - 1000 - 350 - 650 - H - 50 - text	
Series	GDB	◀	Type		Product for order designation is:	
N2-volume	...-	◀	...	= 100 ... 11000 l	Type:	GDB
Pressure rating	...-	◀	...	= 220/350 bar ¹	N2-volume:	1000 litres
Outside Ø	...-	◀	...	= 355, 630, 650, 788, 800, 950, 1000, 1350 mm	Pressure:	350 bar
Orientation	...-	◀	H	= horizontal	Outside Ø:	650 mm
			V	= vertical	Orientation:	horizontal
Acceptance ¹	...-	◀	15	= ASME	Acceptance regulation:	PED 2014/68/EU
			50	= PED 2014/68/EU	Connections:	(specify connections)
			534	= ML (China)		
			...	= Additional acceptances		
Connections	...	◀	...	= Please specify details of specification e. g. SAE 1 1/2" 6000 psi, radial		

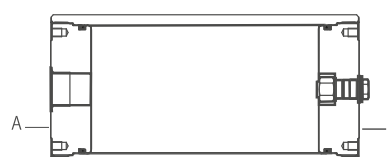
¹ others upon request

Pressure vessel

Special pressure vessels - screwed

Pressure vessels - screwed (piston accumulator with no piston)

Screwed pressure vessels follow the design of the Roth piston accumulator production series. They are intended as special solutions for extremely high types of pressure, pressure fluctuation, and different media or particular materials (stainless steel).



Type code - Special pressure vessels DBAK/DBUAK

Order designation					
Series	DBAK/ DBUAK-...	◀	...	Type	
Volume*	...-	◀	...	=	0 ... 900 l
Pressure*	...-	◀	...	=	0 ... 1000 bar
Inside Ø [mm]*	...-	◀	...	=	80, 100, 150, 180, 250, 360
Acceptance	...-	◀	50	=	Standard (PED 2014/68/EU)
			15	=	ASME - Code Sect. VIII
			534	=	ML China
			...	=	Others upon request
Connection A	...-		...	=	Give as plain text
Connection B	...	◀	...	=	Give as plain text

Example: DBAK 100 - 350 - 360 - 50 - text - text

Product for the example order designation is:

Type:	DBAK
N2 volume:	100 litres
Pressure:	350 bar
Inside ø:	360 mm
Acceptance:	CE in accordance with PED
Connection A:	G 1 1/2"
Connection B:	Minimess filling valve M 16 x 1,5

Acceptance table for piston accumulators ([see page 50](#)).

Use of the oil-side connections of piston accumulators possible.

See special connections table, filling valves, [page 60](#).

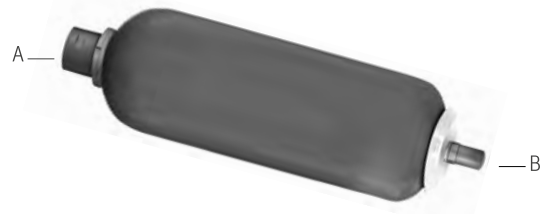
* others upon request, connections (enclose sketches if required)

Pressure vessel

Special pressure vessels - forged

Pressure vessels - forged (bladder accumulator with no bladder)

Forged pressure vessels follow the design of the Roth piston accumulator production series. These are special solutions for a wide range of different media, special materials (stainless steel) and in particular for special acceptances (e.g., maritime applications).



Type code - Special pressure vessels DBLAK/DBLUAK

Order designation					
Series	DBLAK...	◀	...	Type	
Volume*	...-	◀	...	=	1, 2,5, 4, 5, 6, 10, 20, 24,5, 32, 42, 50 l
Pressure*	...-	◀	...	=	330, 350, 690 bar
Acceptance	...-	◀	50	=	Standard (PED 2014/68/EU)
			534	=	ML China
			...	=	Others upon request
Connection A	...-	◀	...	=	Give as plain text
Connection B	...	◀	E1	=	7/8"-14 UNF

Example: DBLAK 10 - 330 - 50 - Text - E1

Product for the example order designation is:

Type:	DBLAK
N2-Volume:	10 litre
Pressure:	330 bar
Acceptance:	CE (PED 2014/86/EU)
Connection A:	Metric thread
Connection B:	7/8"-14 UNF

Table Acceptance for bladder accumulator (see page 24).

Table oil connection (see page 25).

Standard connection bladder accumulator

* other upon request, connection (enclose sketches if required)

Order designation					
Series	DBLUAK...	◀	...	Type	
Volume*	...-	◀	...	=	2,5, 5, 10, 15 gal
Pressure*	...-	◀	...	=	3000, 4000, 5000, 6000 psi
Acceptance	...-	◀	15	=	ASME-Code Sect. VIII
			...	=	Others upon request
Connection A	...-	◀	...	=	Give as plain text
Connection B	...	◀	E1	=	7/8"-14 UNF

Example: DBLUAK 15 - 4000 - 15 - Text - E1

Product for the example order designation is:

Type:	DBLUAK
N2-Volume:	15 gal
Pressure:	4000 psi
Acceptance:	ASME - Code Sect. VIII
Connection A:	Pipe thread (without adapter) ISO 228
Connection B:	7/8"-14 UNF

Table Acceptance for bladder accumulator (see page 24).

Table oil connection (see page 32)

Standard connection bladder accumulator

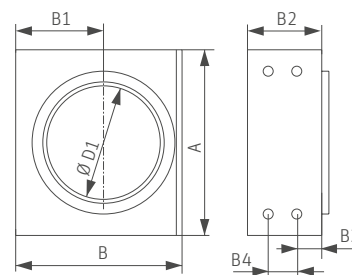
* other upon request, connection (enclose sketches if required)

Accessories - pressure vessels

■ Mounting technology

Brackets

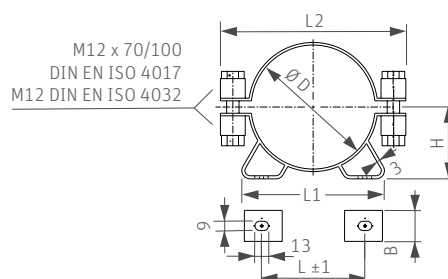
Brackets for mounting pressure vessels. The brackets serve to absorb the weight and are screwed onto a wall or a frame.



Bracket		Dimensions						
Type	Order number	A	B	B1	B2	B3	B4	D1
Bracket D219/229/232	4204028852	260	235	123	100	35	40	159

Steel clamps

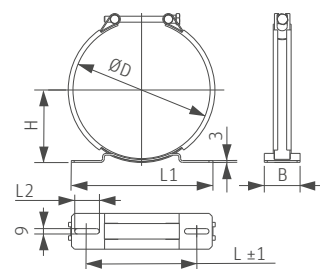
Mounting clamps with rubber profile for the installation of bladder accumulators and pressure vessels. The steel clamps are galvanized and available in stainless steel upon request.



Steel clamp		Dimensions				
Type	Order number	L	B	L1	L2	D max.
Steel clamp D219	4242017360	216	30	254	289	220
Steel clamp D229/232	4204016214	215	30	252	289	229

Acculight clamps

Mounting clamps with rubber profile for the installation of bladder accumulators and pressure vessels. The steel clamps are galvanized and available in stainless steel upon request.



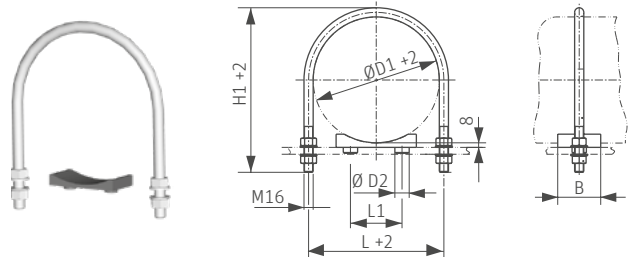
Acculight clamp		Dimensions					
Type	Order number	D	H	L±1	L1	L2	B
Acculight D219	4204031951	209-222	approx. 116	184	236	41	60
Acculight D229/232	4204031952	222-233	approx. 118	184	236	41	60

Accessories - pressure vessels

■ Mounting technology

U-bolt clamps for pressure vessels

U-bolt clamps for pressure vessels are supplied with four nuts and washers and a support for the accumulator shell for installation on the wall. Clamp, nuts and washers are made of galvanized normal steel.



U-bolt clamps		Dimensions				
Type	Order number	D1 + 2	H1 + 2	L + 2	D2	B
U-bolt clamp D219	4204009698	224	273	240	25,5	75
U-bolt clamp D229/232	4204032593	230	365	246	25,5	75

Note: Tightening torque = 75 Nm.

Fastener selection tables for brackets and clamps for standard pressure vessels

Note: Fastener versions with no bracket are only recommended for accumulators weighing 30 kilograms.

		Bracket type Order number	Steel clamp type Order number	Acculight clamp Order number	U-bolt clamp type Order number
Accumulator type		Bracket including ring Bracket 219/229/232 4204028852	Steel clamp D229/232 4204016214	Acculight D229/232 4204031952	U-bolt clamp D229/232 4204032593
DB (volume, pressure)					
Acceptance PED + ML PED + ASME + ML	DB 50 l, 360 bar	•	•	•	•
	DB 75 l, 360 bar	•	•	•	•
Acceptance ASME	DB 50 l, 4200 psi	•	•	•	•
	DB 50 l, 5000 psi	•	•	•	•
	DB 75 l, 4200 psi	•	•	•	•
	DB 75 l, 5000 psi	•	•	•	•

Accessories - pressure vessels

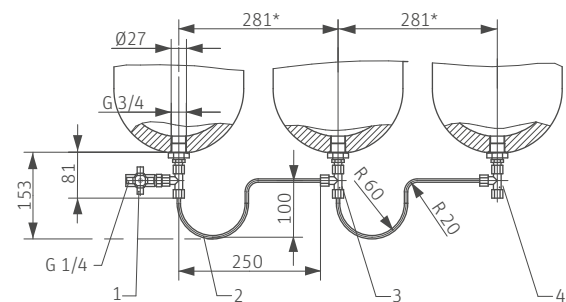
■ Bleed valve systems for pressure vessels

Collecting pipeline with central discharge valve

The interceptive pipeline version allows an ergonomic and easy handling (fig. 1). A manual discharging of condensate at the desired position is possible by the use of a discharge valve.



Fig. 1



Nominal diameter	DN 3
Working pressure (PN)	max. 350 bar
Working medium	Nitrogen
Connections	DIN 3853/ISO 8434
Bore shape	TYP W DIN 3861

	Type	Order number
Item 1*	L-fitting with shut- off valve	4204012860
Item 2*	Bended pipe	4204003638
Item 3*	L-fitting	4204012861
Pos. 4	L-fitting with plug	4204012863

**fixed length for Roth standard units*

■ Bleed valve systems for pressure vessels

Bleed valve and Minimes screw coupling

The bleed valve consists of a screw-in part G 3/4 according to DIN 3852 (fig. 1/fig. 2) and a vent part that is screwed onto the bottom of the N2-pressure vessel and serves to discharge condensate or excess liquid. At horizontal vessel orientation, the version that includes the condensate pipe (fig. 2) has to be used. A Minimes screw coupling can be used as a replacement for discharging the condensate (fig. 3).

Fig. 1 Bleed valve (vertically installed)

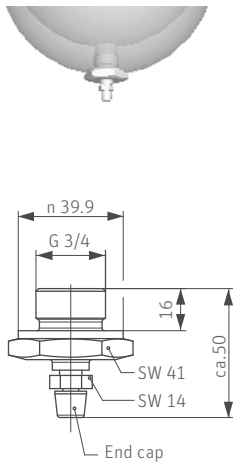
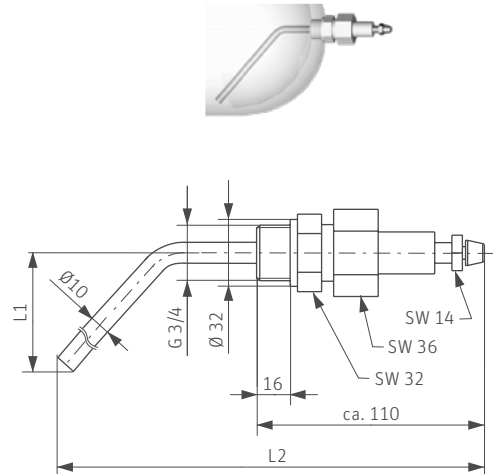


Fig. 2 Bleed valve (horizontally installed)



The dimensions L1+L2 are adapted to the corresponding pressure vessel.

Fig. 3 Minimes screw coupling (vertically installed)

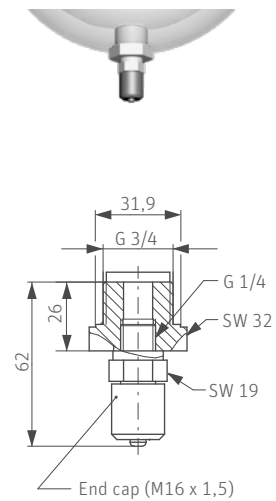


Figure	1	2	3
Type	Bleed valve		
Nominal diameter	DN 3	DN 3	DN 2
Working pressure (PN)	max. 360 bar		
Working medium	Nitrogen		
Weight	approx. 0,4 kg	approx. 0,5 kg	approx. 0,18 kg
Approval regulation	PED 2014/68/EU (article 4, paragraph 3)		
Order number	4204029282	4204003857*	4204011815

* Please specify pressure vessel type in your purchase order

■ Roth Accumulator systems – specific & flexible

Roth accumulator systems – designed as bladder accumulator or piston accumulator systems – are specially designed, planned and simulated for customer requirements with the Roth ACCU software. Roth accumulator systems are fully piped, and come with all of the necessary safety and monitoring devices and comply with international regulations. A ready-to-run delivery with the required gas pre-charge pressure ex-works is a possible option.

Typical product features:

- > Almost unlimited system volume
- > High discharge volume and withdrawal capacity available
- > Requirement-specific layout and ready-to-connect delivery
- > Modular standard designs open up flexible opportunities for adjustment

- > References and expertise through worldwide use in a wide range of market segments
- > Volume scalable upwards
- > Expert solutions even for extreme conditions

■ Bladder accumulator systems - individual & practical

Bladder accumulator systems from Roth Hydraulics are characterised by their robust, sophisticated design.

Individual Roth bladder accumulators of a particular size are mounted on a frame to form a complete bladder accumulator unit and piped on the oil side.

A standard product with a standardised volume thus transforms into a hydraulic accumulator system with a freely defined total volume to meet customer requirements.

■ Piston accumulator systems - individual & impressive

Piston accumulator systems from Roth Hydraulics are specially tailored to customer requirements. The modular design allows the construction of systems of any size.

Roth modular systems are economically feasible solutions with a total volume of <100 l to >100,000 l.

With downstream nitrogen pressure vessels and individually configurable safety and monitoring devices, Roth Hydraulics piston accumulator systems are optimally designed for every application.

Products

Accumulator systems





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Accumulator systems

■ Roth "KS Unit" base model

In its simplest form, the Roth piston accumulator system features a single piston accumulator and one to two downstream pressure vessels.

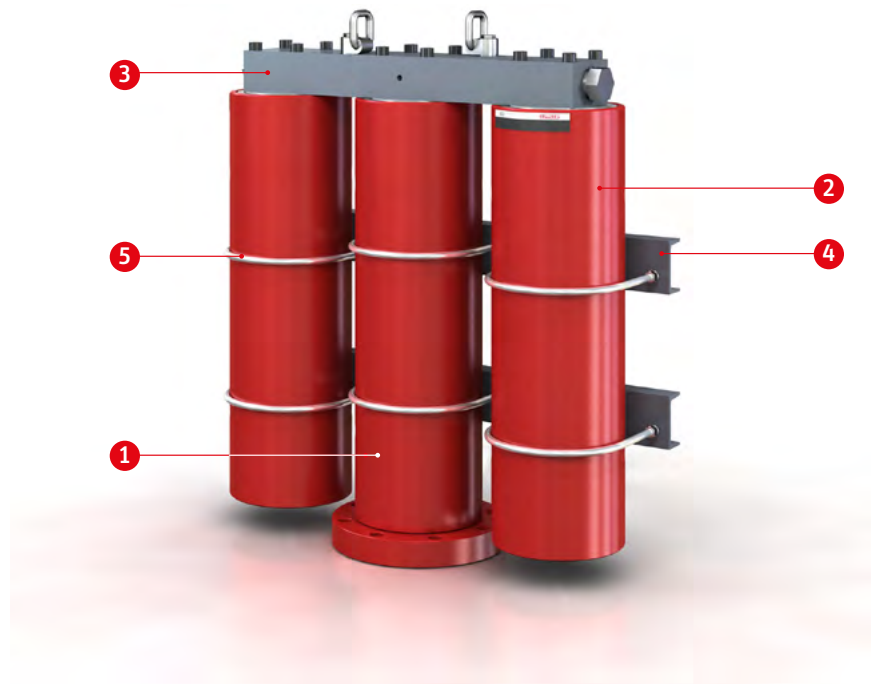
The piston accumulator and pressure vessels are mounted on a frame.

Typical product features:

- > 1 piston accumulator and 1-2 pressure vessels, in which the pressure vessels are designed as piston accumulators with no piston.

Advantages

- > Flexible oil side and gas side nominal diameter, making high volume flows possible
- > Excellent opportunities for adaptation to customer requirements
- > Compact design



Item	Designation
1	Piston accumulator
2	Pressure vessel/accumulator with no piston
3	N2 block
4	Frame
5	U-bolt clamps

Accumulator systems

■ Roth accumulator system - standard design

Roth piston accumulator system with one or more piston accumulators and one or more downstream pressure vessels.

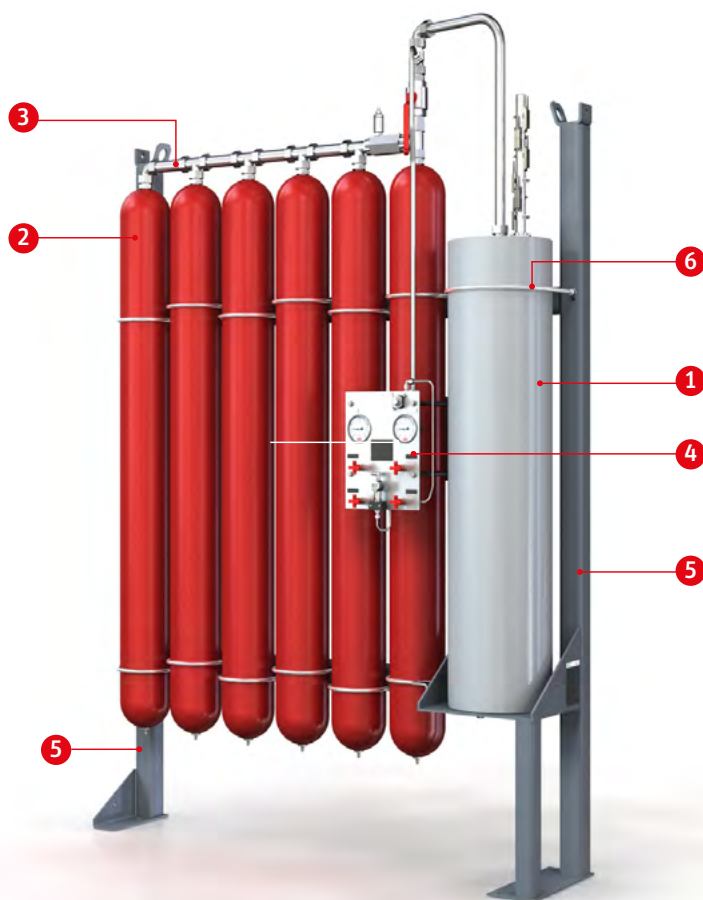
The piston accumulator and pressure vessels can be in different positions. Standard piping, display unit and frame are included.

Typical product features:

- > 1 or more bladder/piston accumulators and
- > 1 or more pressure vessels. Standard pressure vessel volume is 50 litres or 75 litres.
- > Standard piping
- > Standard display unit
- > Standard frame

Advantages

- > Standardised modular system enables economical solutions.
- > Variable arrangement of piston accumulators and pressure vessels.
- > Simple installation of additional elements such as measurement and safety devices.



Item	Designation
1	Piston accumulator
2	Pressure vessel
3	Pipeline
4	Double front panel
5	Frame
6	U-bolt clamps

Accumulator systems

■ Roth accumulator system - modular design

Roth accumulator systems with a single piston accumulator and one or two downstream large pressure vessels. Each unit is mounted on a separate frame, expandable as required and provided with collection pipe if required by the customer.

Typical product features:

- > 1 piston accumulator and
- > 1-2 large pressure vessels

Advantages

- > Modules are standalone units and can be operated and maintained separately
- > Minimal space requirement for large systems
- > Reduced installation effort
- > Fewer interfaces
- > Safe installation at installation location thanks to common base frame



Item	Designation
1	Piston accumulator
2	Pressure vessel
3	Pipe with N2 shut-off unit
4	Oil collection pipe
5	Frame per unit
6	Frame
7	U-bolt clamps

Accumulator systems

■ Accumulator systems - special solution

Accumulator systems in special designs, specially created to meet customer needs, are individually adapted to their respective requirements.

This means the system volume is almost unlimited, and large discharge volumes and discharge rates are possible.

This need-specific layout is precise, efficient and saves resources. Ready-to-connect delivery completes this offer.

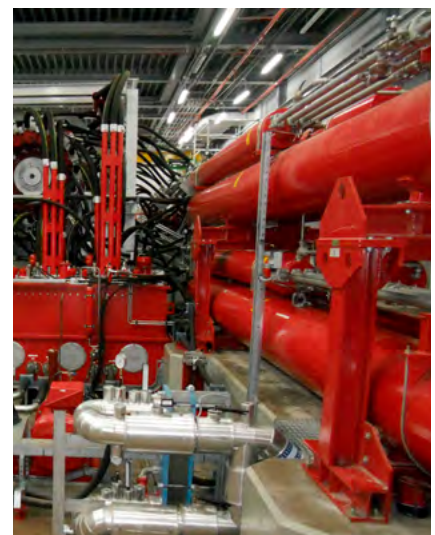
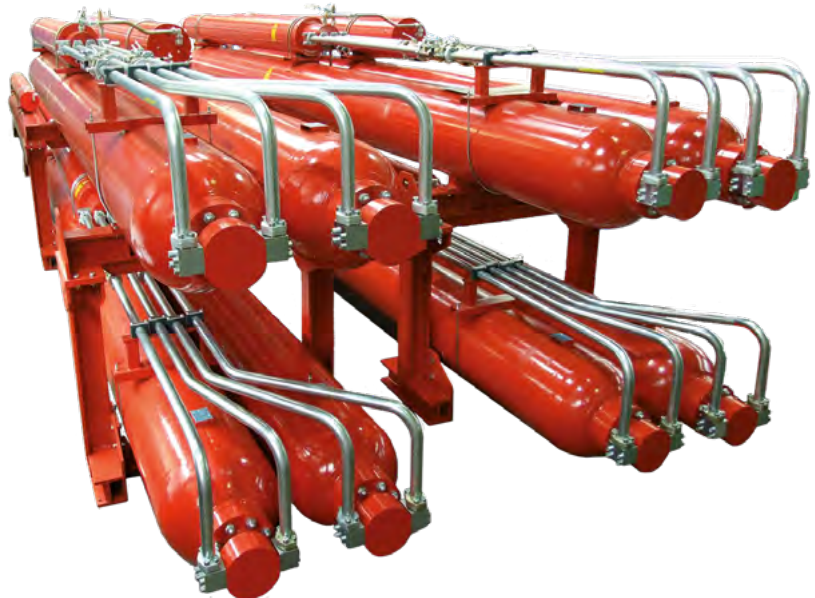
Definition criteria:

- > Accumulator/N₂ vessel structure
- > Position of the display elements
- > Position of the terminal box
- > Position of the oil side connection lines
- > Insert required specifications in the plain text

■ Roth accumulator system for roller coasters (partial segment)

Partial segment of an accumulator system installed horizontally in a frame.

System definition	Specification
Roth piston accumulator	6 x AK 540-350-36
Oil volume, total	3240 l
Roth piston accumulator	6 x AK 600-350-36
Oil volume, total	3600 l
Roth pressure vessels	12 x DB 3600-350-80
Gas volume, total	43200 l
Design pressure	350 bar
Dimensions (l x w x h) mm	approx. 11560 x 1930 x 3000
Weight	127,003 kg



Accumulator systems

■ Roth accumulator system for foundries



2 piston accumulators, upright with the piston accumulators lined up behind them pressure vessels in standard design.

System definition	Specification
Roth piston accumulator	2 x AK 115-350-25
Oil volume, total	230 l
Roth pressure vessels	16 x DB 75-350-25
Gas volume, total	1200 l
Design pressure	220 bar



■ Roth accumulator system for hydropower

Pressure vessels arranged on a 2-level frame.

System definition	Specification
Roth piston accumulator	2 x AK 450-220-36
Oil volume, total	900 l
Roth pressure vessels	20 x DB 75-220-22
Gas volume, total	1500 l
Design pressure	350 bar



■ **Roth accumulator accessories – tested & comprehensive**

Roth accumulator accessories are specially designed and tested for use in accumulator systems. In addition to installation systems, we provide the necessary permits for operation with oil and nitrogen as well as equipment and devices for filling accumulator systems with nitrogen including all necessary display, safety, and shut-off devices.

Our range of accessories includes:

- > Safety devices, such as safety valves, burst discs, safety fuses
- > Safety and shut-off valve blocks in a range of sizes and designs
- > Gas side accessories, such as filling and check valve blocks, shut-off units, piping components
- > Filling and testing devices for nitrogen, nitrogen loading units
- > Installation devices, e.g. clamps and brackets

- > Operating pressure: Standard up to 360 bar
- > Approved for nitrogen

Products

Accumulator accessories



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Accumulator accessories - gas side

■ Gas side filling accessories

Gas filling valve

The Roth gas filling valve G 3/4", which is installed on the inside of the gas sided end cap of piston accumulators or in the adapter for accumulator units, is used to fill piston accumulators with nitrogen using the Roth filling and testing device.

Filling valve for piston accumulator direct installation

Gastight by additional plug (item 3 - figs. 1/2/3).

Adapter with filling valve for pipe installation

- > with additional screw connections
- > Ergonomically optimised positioning possible (figs. 4/5)

Fig. 1

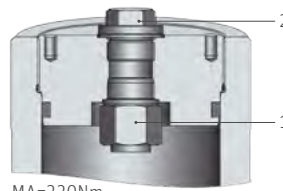


Fig. 2



Fig. 3

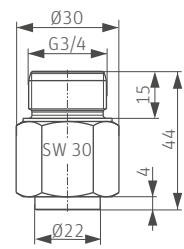


Fig. 4

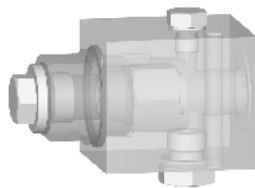
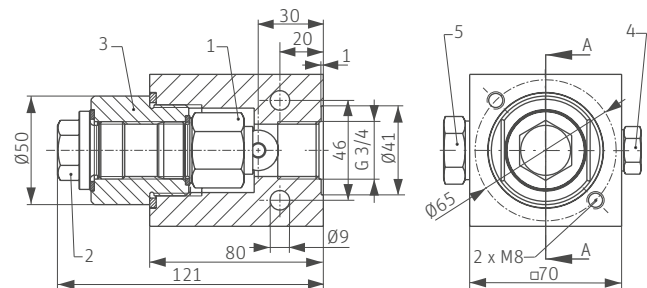


Fig. 5



Filling valve for piston accumulator direct installation			Technical data		Adapter with filling valve for pipe installation		
Order number	Designation	Item	Nominal diameter	DN 9	Item	Designation	Order number
4200003239	Gas filling valve, complete	1 + 2	Operating pressure	max. 800 bar	3 - 5	Adapter complete (fig. 4)	4200003520
4204041644	Gas filling valve + Usit ring	1	Working medium	Nitrogen	3	Screw-in part with RV	4200001330
4204041645	Screw plug G 3/4" + Usit ring	2	Weight	approx. 0,2 kg	4	Screw plug G 1/4"	4200040336
-	-	-	Approval regulation	PED 2014/68/EU	5	Screw plug G 1/2"	4200040337

See the following pages for the right filling and testing device.

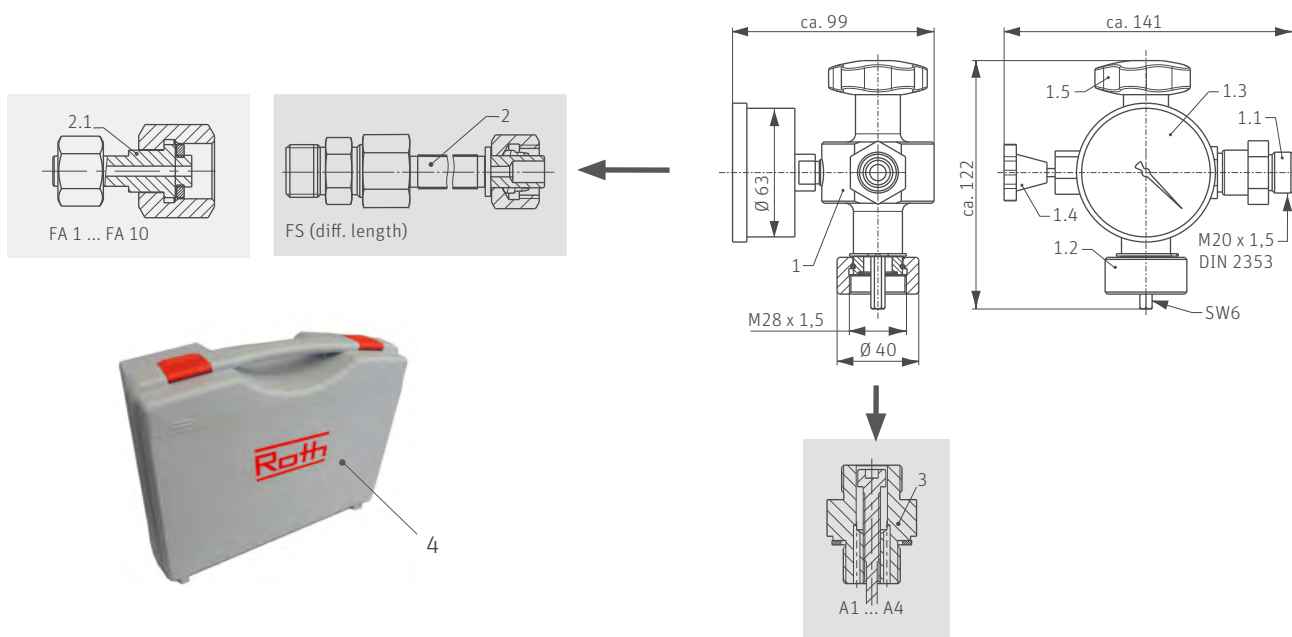
Other gas filling valves

Designation	Order number	Size	Figure
Gas filling valve with Usit ring	4204041644	G 3/4"	
Screw plug with Usit ring	4204041645	G 3/4"	
Minimess filling valve M 16 x 1,5	4200002766	G 1/4"	
Filling valve M 28 x 1,5	4204012205	G 3/4"	
Filling valve 5/8" 14 UNF 1A	4202002180	1/2" 20 UNF	

Accumulator accessories - gas side

Filling and testing device

The Roth filling and testing device serves to control the nitrogen pressure and the filling of diaphragm, bladder and piston accumulators with nitrogen. Country-specific nitrogen bottle connections and adapters for filling different makes of accumulators are available.



Scope of delivery

1	Roth filling and testing device
1.1	Filling hose connection (with non-return valve)
1.2	Accumulator connection
1.3	Manometer
1.4	Pressure discharge valve
1.5	Spindle to open the filling valve
2	Filling hose DN 2 (DN 8 optimal) (see overview for different lengths)
2.1	Nitrogen bottle connection FA1 ... FA10
3	Adapter to Roth filling valve A1 ... A4
4	Transport case (dim. 340 x 275 x 125 mm)

Nominal diameter	DN 6
Working pressure (PN)	max. 250 bar/400 bar
Working medium	Nitrogen
Approval regulation	PED 2014/68/EU (article 4, paragraph 3)
Weight	approx. 4,5 kg

Preferred types - Filling and testing device

FÜEH No.	Order number	Design	Adapter A	Adapter FA	FS length [mm]	FS nominal diameter [DN]
1	4204013914	0 - 250 bar	A1 (Roth adapter)	FA1 (200 bar DIN 477/1)	3000	2
2	4204013399	0 - 400 bar	A1 (Roth adapter)	FA1 (200 bar DIN 477/1)	3000	2
3	4204014881	0 - 400 bar	A1 (Roth adapter)	FA2 (300 bar DIN 477/5)	3000	2
4	4204014885	0 - 250 bar	A1 (Roth adapter)	FA5 (USA)	3000	2
5	4204014886	0 - 250 bar (incl. manometer 0 - 400)	A1 - A4	FA1 - FA8	3000	2

Accumulator accessories - gas side

■ Type code - Filling and testing device

Order designation					Example: FÜEH - B - A1 + A4 - FA1 + FA5 - 6000 - 2	
Series	FÜEH	◀	Type		Order designation is: Type: FÜEH Pressure: 250 bar Filling valve adapter for: Roth filling valve + Minimes valve Gas bottle adapter for: connection DIN 477/1 + connection USA Hose length: 6000 mm (2 x 3000 mm) Nominal hose width: DN 2	
Pressure [bar]	...-		B	=		
			C	=		
Filling valve adapter	... + ... + ...-	◀	A1	=		
			-	=		
			A4	=		
Gas bottle adapter	... + ... + ...-	◀	FA1	=		
			-	=		
			FA10	=		
Hose length [mm]	...-	◀	...	=		
				=		
Nominal hose width [mm]	...	◀	2	=		
			8	=		

■ Pressure reducer

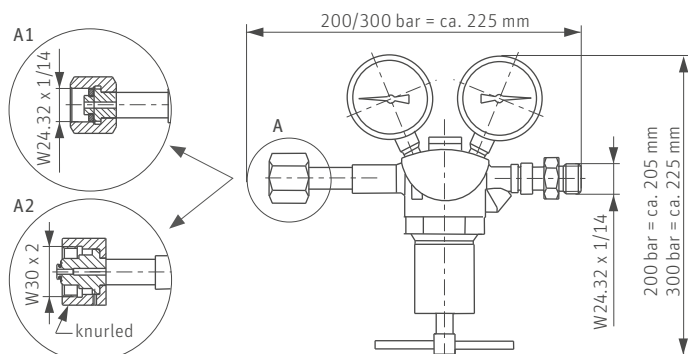
Pressure reducer

The pressure reducer reduces the existing pressure of the pressure generator. If the working pressure of the piston accumulator will be exceeded by the pressure generator, a pressure reducer has to be used for safety reasons. This will avoid major damages to the accumulator system and secondary accidents.

Max. primary pressure	200 bar (A1)	300 bar (A2)
Thread connection	W24,32 x 1/14	W30 x 2
Adjustment range	20 ... 200 bar	
Flow rate	max. 30 m ³ /h	
Working medium	Nitrogen	
Operating temperature	-30 °C ... +60 °C	
Weight	approx. 2 kg	
Approval regulation	PED 2014/68/EU (article 4, paragraph 3)	
Part-no. standard type	4204014015	4204014016

200 bar connection,
acc. DIN 477, part 1

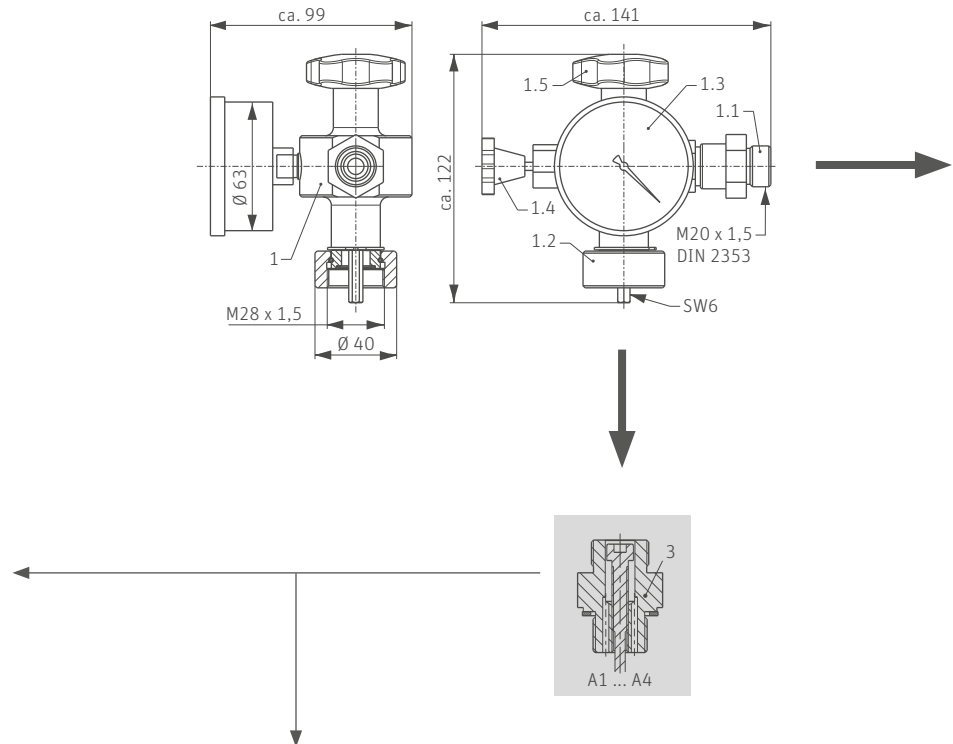
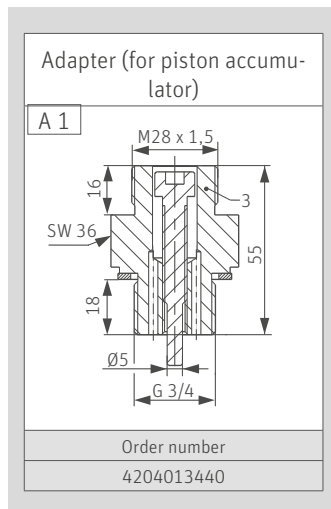
300 bar connection,
acc. DIN 477, part 5



Accumulator accessories - gas side

Filling and testing device general overview

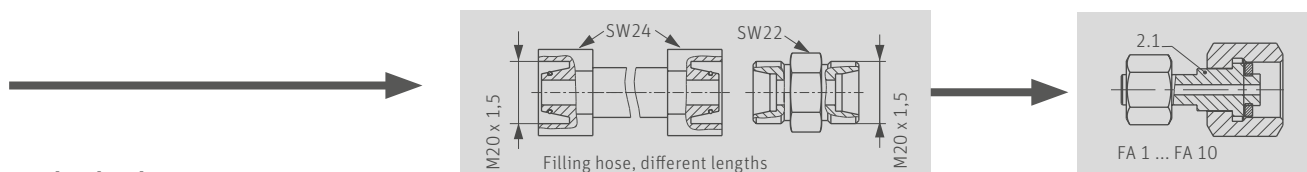
Filling valve adapter



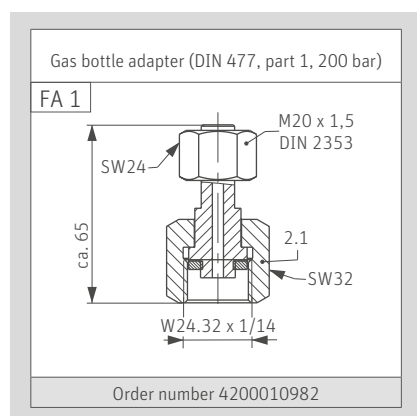
Alternate filling valve adapters

	Adapter 7/8-14 UNF	Adapter 5/8-18 UNF	Adapter Minimes
	A 2	A 3	A 4
	Order number 4204013683	Order number 4204013684	Order number 4204013792
no adapter required			
Filling valve diaphragm accumulator	Filling valve bladder accumulator	Filling valve bladder accumulator	Filling valve Minimes

Accumulator accessories - gas side



Gas bottle adapters



Other country specific gas bottle adapters*

300 bar (DIN 477, part 5) FA 2 M20 x 1,5 DIN 2353 SW24 SW19 knurled ca. 102 W30 x 2 Order number 4204005118	France/Russia FA 3 M20 x 1,5 DIN 2353 SW24 SW30 ca. 76 W21.8 x 1/14 Order number 4204036107	England FA 4 M20 x 1,5 DIN 2353 SW24 SW30 ca. 73 W22.8 x 1/14 Order number 4200001498	USA FA 5 M20 x 1,5 DIN 2353 SW24 SW30 ca. 71 W24.3 x 1/14 Order number 4200001501
Italy FA 6 M20 x 1,5 DIN 2353 SW24 SW30 ca. 71 W21.7 x 1/14 Order number 4200001500	China FA 8 M20 x 1,5 DIN 2353 SW24 SW30 ca. 61 G5/8 ISO 228 Order number 4204041018	India FA 9 M20 x 1,5 DIN 2353 SW24 SW30 ca. 70 G 5/8 Order number 4204021069	USA 2 (with Minimes) FA 10 M20 x 1,5 DIN 2353 SW24 SW30 ca. 65 W24.3 x 1/14 Order number 4200013343

* other adapters are available upon request

Accumulator accessories - gas side

Gas side shut-off devices

N2 shut-off units

N2 shut-off units serve as a shut-off device between the piston accumulator and the downstream gas bottles. In contrast to normal shut-off ball-valves, Roth shut-off units have an additional non-return function that allows a filling of the pressure vessel through the piston accumulator.

DN 25/32 with inside thread connection

Fig. 1

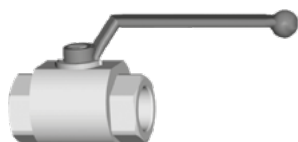
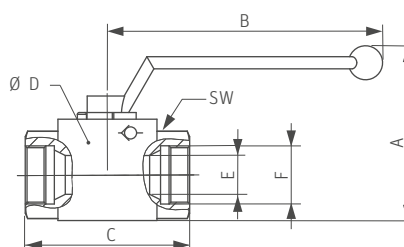


Fig. 2



DN 25 [mm]			
A	122	E	25
B	180	F	G 1
C	111	-	-
D	Ø 68	SW	46

DN 32 [mm]			
A	144	E	32
B	227	F	G 1½
C	135,5 ± 0,5	-	-
D	Ø 89	SW	65

DN 40/50 with SAE flange connection

Fig. 3

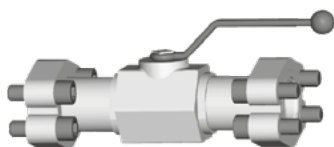
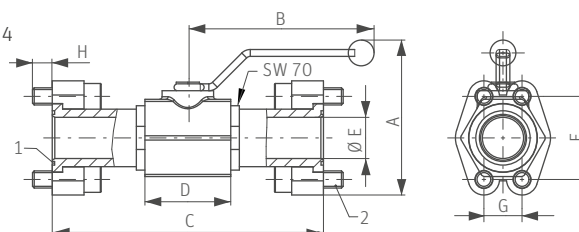


Fig. 4



DN 40 [mm]			
A	164	E	38
B	211	F	79,3
C	281	G	36,5
D	85	H	25
Pos. 1	O-ring NBR Ø47,22 x 3,53		
Pos. 2	8 x M16 x 55 (DIN 912)		

DN 50 [mm]			
A	203	E	48
B	211	F	96,8
C	316	G	44,4
D	100	H	28
Pos. 1	O-ring NBR Ø56,75 x 3,53		
Pos. 2	8 x M20 x 65 (DIN 912)		

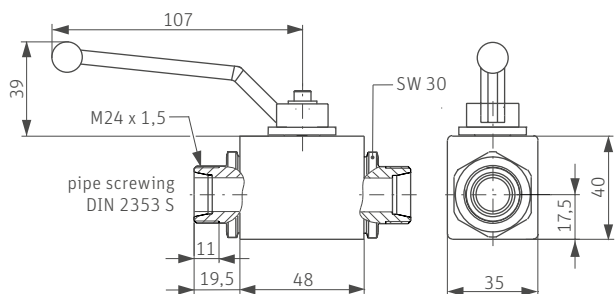
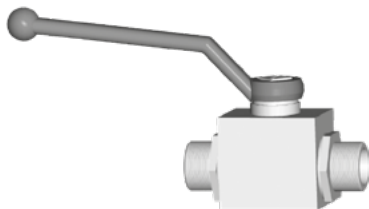
Accumulator accessories - gas side

Figure	1/2		3/4	
Nominal diameter	DN 25	DN 32	DN 40	DN 50
Working pressure (PN)	max. 350 bar			
Working medium	Nitrogen			
Thread connection	2x G 1	2x G 1 1/2	SAE 1/2" - 6000 psi	SAE 2" - 6000 psi
Weight	2,3 kg	4,5 kg	12,5 kg	14,5 kg
Approval regulation	PED 2014/68/EU (article 4, paragraph 3)		with CE marking according to PED 2014/68/EU	
Shut-off unit complete	4204043053	4202005984	-	-
Pos. 1 O-ring NBR	-	-	4200001950	4200001954
Complete with screws (Pos. 2) and O-ring (Pos. 1)	-	-	4204011788	4204012513

DN 56, DN 80, DN 100 upon request

N2 shut-off ball valve

The Roth N2-shut-off ball valve DN 13 has no non-return valve function. It is used for the pressure balance between two or more parallel-connected piston accumulator units.



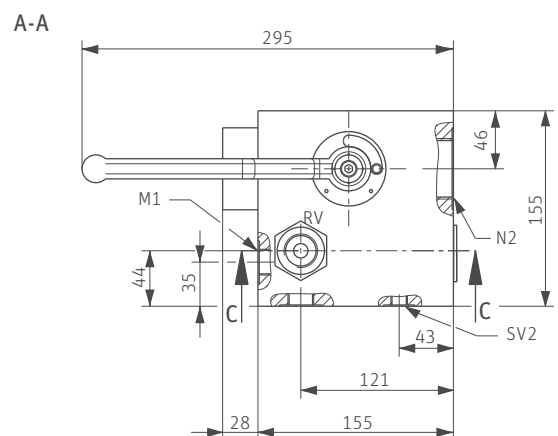
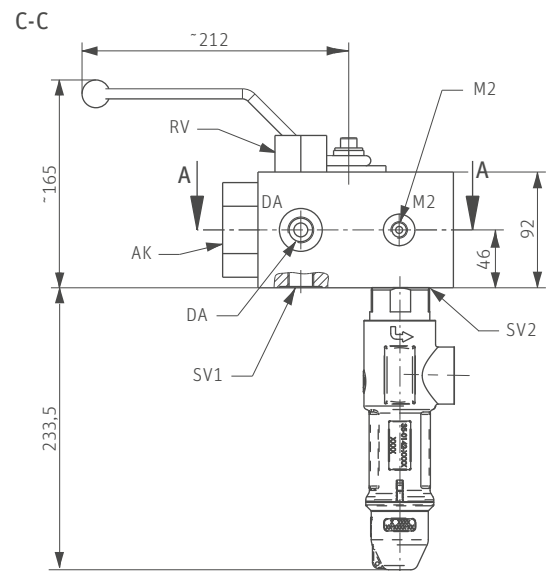
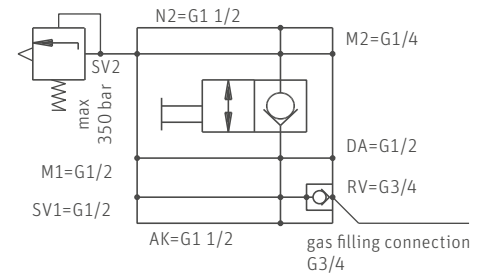
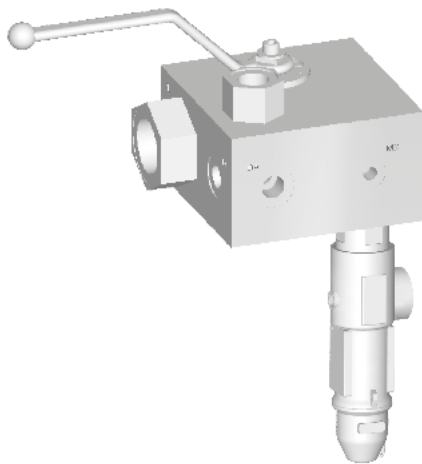
Nominal diameter	DN 13
Working pressure (PN)	max. 350 bar
Working medium	Nitrogen
Approval regulation	PED 2014/68/EU (article 4, paragraph 3)
Weight	approx. 0,7 kg
Order number	4204000594

Accumulator accessories - gas side

N2 safety- and shut-off units

N2 safety and shut-off unit

In addition to the standard shut of unit, the Roth safety- and shut-off unit features a safety valve (two screw connections in block), a Roth filling valve and three measuring connections.



Nominal diameter	DN 32
Working pressure (PN)	350 bar
Working medium	Nitrogen
Approval regulation	PED 2014/68/EU (article 4, paragraph 3)
Weight	18 kg
N2 shut-off unit (block with no gas safety valve)	4204021641
N2 safety and shut-off unit, complete (block with gas safety valve)	4204040912

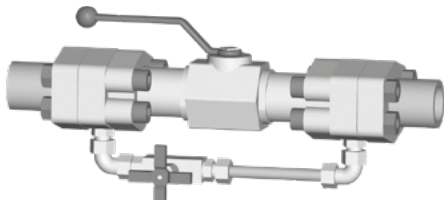
Accumulator accessories - gas side

■ Accessories shut-off valves

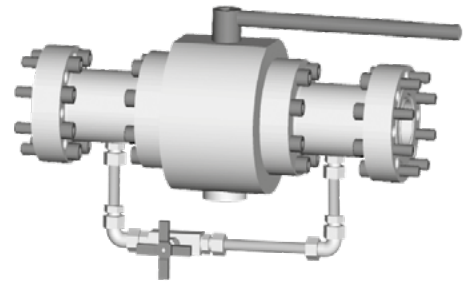
Pressure compensation device

N2 shut-off units and ball valves with sizes $\geq$ DN 40 are optionally available with a pressure discharge bypass line. They facilitate the movement of the main gate valve and prevent damages to seals that are due to rapid pressure equalization.

DN 40/50



DN 65/80/100



Shut-off device

The Roth shut-off device prevents an unauthorized or accidental operation of N2-shut-off units and ball valves by using a padlock. Fig. 1 locked in open or closed position, fig. 2 locked in closed position.

Fig. 1

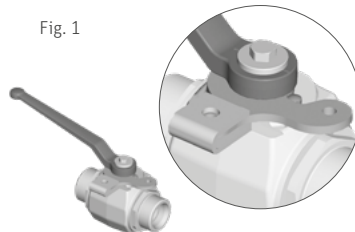
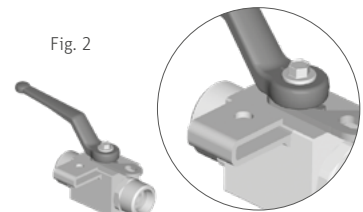


Fig. 2



Position switch

The Roth position switches offer the possibility to control the switching positions of N2-shut-off units and ball valves. Fig. 4 open and closed position possible, fig. 3 only closed position possible.

Fig. 3

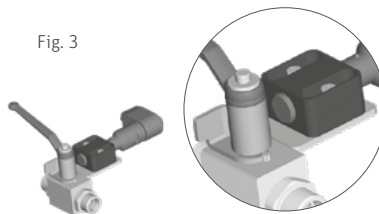
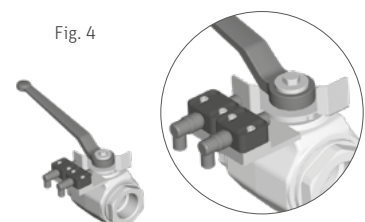


Fig. 4



Accumulator accessories - oil side

Oil safety and shut-off block

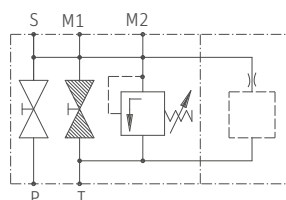
Oil safety and shut-off block

The oil safety and shut-off block provides protection, by locking and relieving hydraulic accumulators. The design of the block observes the European safety regulations for the operation of hydraulic accumulators, provided that the volume flow rate of the integrated safety valve is not lower than the flow rate.

Types:

> SABX2

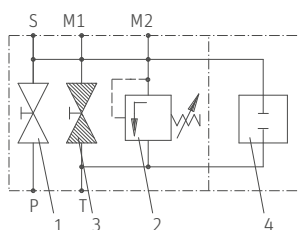
The discharging of the accumulator is effected by manual or electrical discharge (depending on the version).



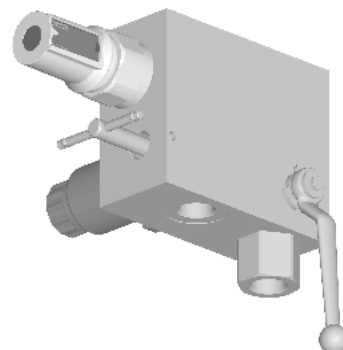
Discharges:

> Manual discharge (M) (PN 400 bar)

As standard, the discharging of the accumulator is effected by a manual discharge valve (Pos. 3).

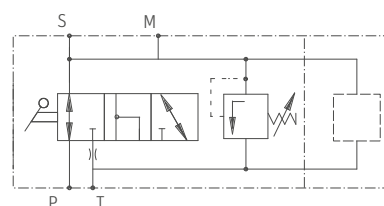


Nominal diameter	DN 10		DN 20	DN 30
Types	SABX2	SABX3	SABX2	SABX2
Working medium	Mineral oil according to DIN 51524 Part 1 and 2 (other media are available upon request)			
Viscosity	min. 10 mm²/s - max. 380 mm²/s			
Purity class	Class 20/18/15 acc. to DIN 4406			
Safety valve NG 10	valve data upon request			
Material	Steel			
Operating temperature	-10 °C ... +80 °C			
Approval regulation	PED 2014/68/EU (article 4, paragraph 3)			
Plug-in connectors poppet valve	DIN EN 175301-803			
System of protection	IP 65			
Weight (design M)	4,5 kg	2,0 kg	6,7 kg	10,4 kg
Weight (design EO/EG)	4,9 kg	2,3 kg	7,1 kg	10,8 kg



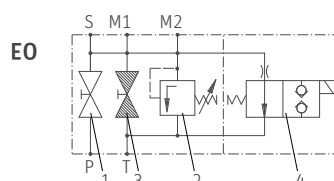
> SABX3

The manual discharge of the accumulator is effected by switching the system shut-off valve. In this case, the accumulator is discharged directly to the tank. When the ball valve is switched over, the connections P, S and T are temporarily connected by the L-ball (negative overlap).

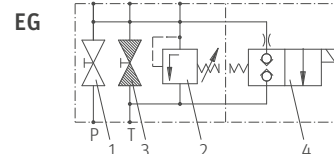


> Electrical discharge (EO) (EG) (PN 350 bar)

In addition to manual discharge, an electromagnetic operating two-way valve permits the automatic discharge of the accumulator. There are two types available, which are dead open (EO) or closed (EG).



EO



EG

S	Accumulator connection
M1, M2	Measuring connection 1+2
P	Pump connection
T	Tank connection
1	System shut-off valve
2	Safety valve
3	Manual discharge
4	Electrical discharge (optional)

Accumulator accessories - oil side

■ Type code - oil safety- and shut-off block (SAB)

Order designation				
Type	SABX2	=	2-way ball valve	
	SABX3	=	3-way ball valve (only available with DN 10)	
Nominal diameter	...-	◀	10	= 10 mm
			20	= 20 mm
			30	= 30 mm
Change index	...-	◀	X	= internally controlled
Discharge	...-	◀	M	= manually operated
			EO	= electrical power-off open
			EG	= electrical power-off closed
*Set pressure safety valve	...-	◀	...	200, 210, 250, 330, 350 bar (Preferred types) *other set pressures are available upon request
Seals	...-	◀	1	= FKM (standard)
Voltage (only EO, EG version)	...	◀	24	= 24 VDC (other voltages available upon request)

Example: SABX2 - 20 - X - EO - 350 - 1 - 24

Order designation is:

Type:	SABX2
Nominal diameter:	20 mm
Change index:	X
Discharge	electrical (power off open)
Set pressure safety valve:*	350 bar
Seals:	FKM
Voltage:	24 VDC

*other set pressures are available upon request

 **Note:** Special requirements available upon request

Accumulator accessories - oil side

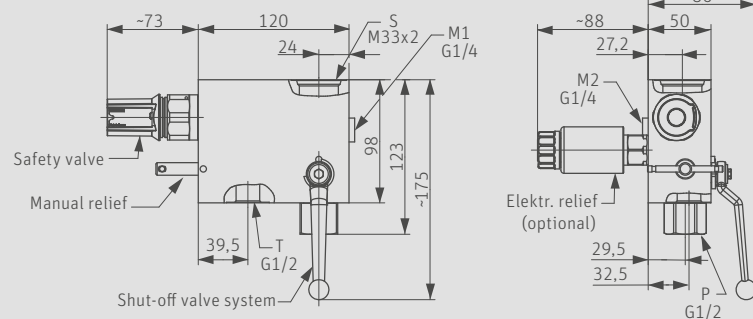
Oil safety and shut-off block selection tables

Type	Order number	Nominal diameter [mm]	Discharge	Pressure [bar]	Designation (oil safety and shut-off block with valve)
SABX2	4204031712	10	M	200	BLOC SABX2-10-0-M-200-1
SABX2	4204031708	10	M	210	BLOC SABX2-10-0-M-210-1
SABX2	4204031709	10	M	250	BLOC SABX2-10-0-M-250-1
SABX2	4204031720	10	M	330	BLOC SABX2-10-0-M-330-1
SABX2	4204031721	10	M	350	BLOC SABX2-10-0-M-350-1
SABX2	4204031723	10	EO	200	BLOC SABX2-10-0-EO-200-1
SABX2	4204031724	10	EO	210	BLOC SABX2-10-0-EO-210-1
SABX2	4204031727	10	EO	250	BLOC SABX2-10-0-EO-250-1
SABX2	4204031728	10	EO	330	BLOC SABX2-10-0-EO-330-1
SABX2	4204031729	10	EO	350	BLOC SABX2-10-0-EO-350-1
SABX2	4204031730	20	M	200	BLOC SABX2-20-0-M-200-1
SABX2	4204031731	20	M	210	BLOC SABX2-20-0-M-210-1
SABX2	4204031732	20	M	250	BLOC SABX2-20-0-M-250-1
SABX2	4204031733	20	M	330	BLOC SABX2-20-0-M-330-1
SABX2	4204031734	20	M	350	BLOC SABX2-20-0-M-350-1
SABX2	4204031736	20	EO	200	BLOC SABX2-20-0-EO-200-1
SABX2	4204031737	20	EO	210	BLOC SABX2-20-0-EO-210-1
SABX2	4204031738	20	EO	250	BLOC SABX2-20-0-EO-250-1
SABX2	4204031739	20	EO	330	BLOC SABX2-20-0-EO-330-1
SABX2	4204031740	20	EO	350	BLOC SABX2-20-0-EO-350-1
SABX2	4204031741	30	M	200	BLOC SABX2-30-0-M-200-1
SABX2	4204031742	30	M	210	BLOC SABX2-30-0-M-210-1
SABX2	4204031743	30	M	250	BLOC SABX2-30-0-M-250-1
SABX2	4204031744	30	M	330	BLOC SABX2-30-0-M-330-1
SABX2	4204031745	30	M	350	BLOC SABX2-30-0-M-350-1
SABX2	4204031746	30	EO	200	BLOC SABX2-30-0-EO-200-1
SABX2	4204031747	30	EO	210	BLOC SABX2-30-0-EO-210-1
SABX2	4204031748	30	EO	250	BLOC SABX2-30-0-EO-250-1
SABX2	4204031749	30	EO	330	BLOC SABX2-30-0-EO-330-1
SABX2	4204031750	30	EO	350	BLOC SABX2-30-0-EO-350-1
SABX3	4204031751	10	M	200	BLOC SABX3-10-0-M-200-1
SABX3	4204031752	10	M	210	BLOC SABX3-10-0-M-210-1
SABX3	4204031753	10	M	250	BLOC SABX3-10-0-M-250-1
SABX3	4204031754	10	M	330	BLOC SABX3-10-0-M-330-1
SABX3	4204031755	10	M	350	BLOC SABX3-10-0-M-350-1
SABX3	4204031756	10	EO	200	BLOC SABX3-10-0-EO-200-1
SABX3	4204031757	10	EO	210	BLOC SABX3-10-0-EO-210-1
SABX3	4204031758	10	EO	250	BLOC SABX3-10-0-EO-250-1
SABX3	4204031759	10	EO	330	BLOC SABX3-10-0-EO-330-1
SABX3	4204031760	10	EO	350	BLOC SABX3-10-0-EO-350-1
SABX3	4204032310	10	EG	200	BLOC SABX3-10-0-EG-200-1
SABX3	4204032311	10	EG	210	BLOC SABX3-10-0-EG-210-1
SABX3	4204032312	10	EG	250	BLOC SABX3-10-0-EG-250-1
SABX3	4204032313	10	EG	330	BLOC SABX3-10-0-EG-330-1
SABX3	4204032314	10	EG	350	BLOC SABX3-10-0-EG-350-1

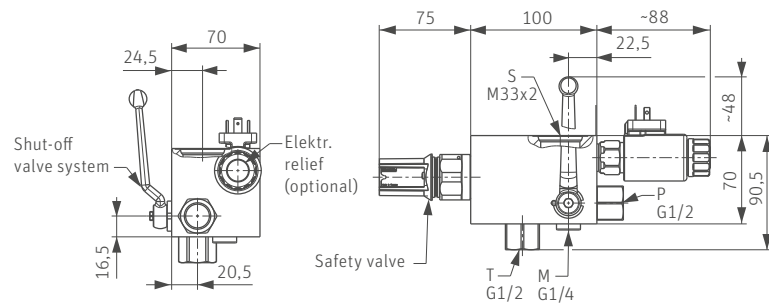
Connections for different accumulator series upon request

Accumulator accessories - oil side

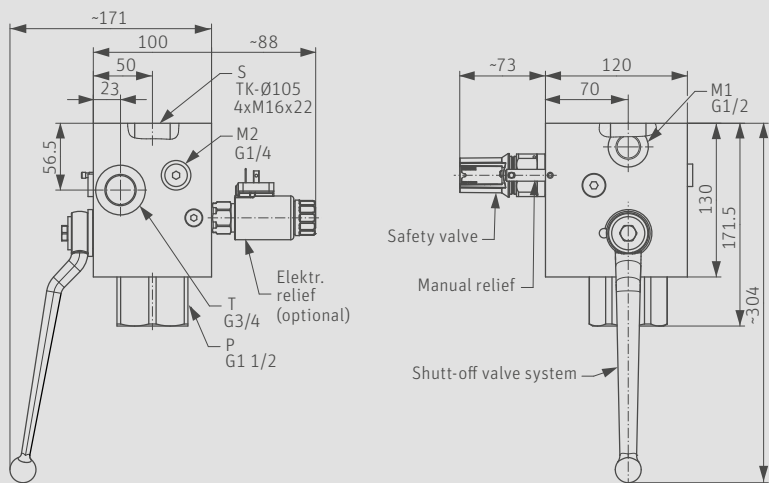
**Oil safety- and shut-off block
DN 10/SABX2-10**



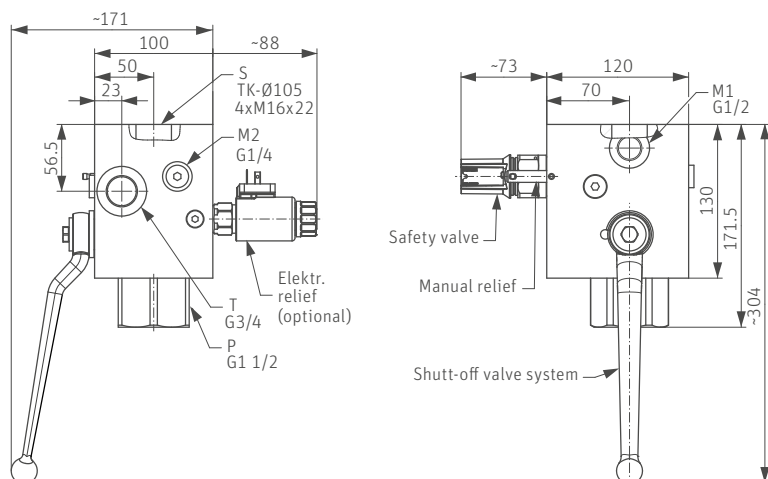
**Oil safety- and shut-off block
DN 10/SABX3-10**



**Oil safety- and shut-off block
DN 20/SABX2-20**



**Oil safety- and shut-off block
DN 30/SABX2-30**



Accumulator accessories - oil side

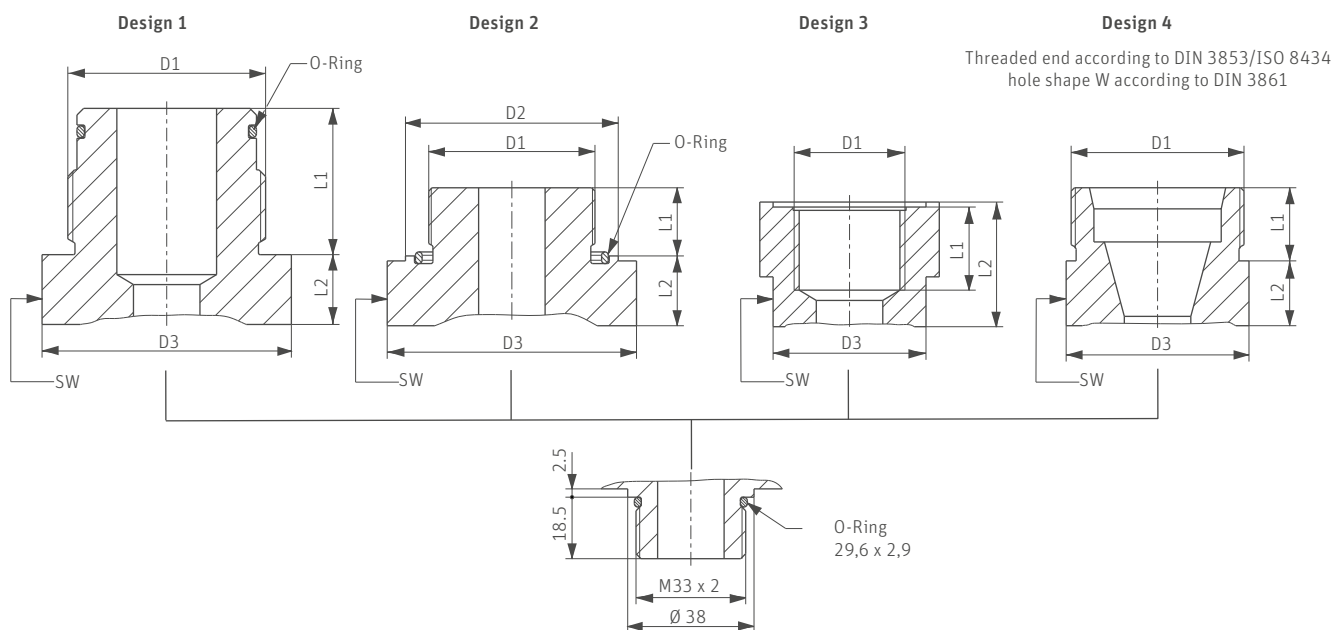
Oil side accessories - safety and shut-off block

Adapters oil safety- and shut-off block

The Roth adapters pieces allow the oil side connection between safety- and shut-off blocks and the Roth hydraulic accumulators or piping.

Material	Steel/FKM
Working pressure	350 bar
Operating temperature	-15 °C ... +80 °C

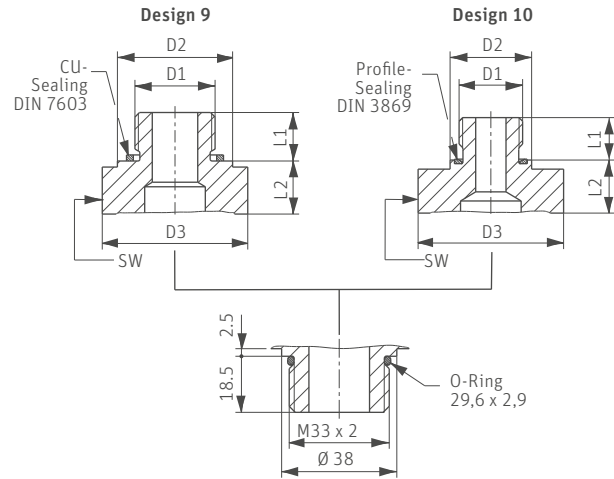
Adapters to safety- and shut-off block SABX2-10/SABX3-10 and SABX2-20



Type	Order number	Usage	Design	D1	ø - D2	ø - D3	SW	L1	L2	O-ring
BS 12	4204027344	BLAK 1-6 l	1	G 1 ¼"	–	55	50	37	16,5	30 x 3
BS 13	4204027346	BLAK 10-50 l		G 2"	–	75	65	44	21	48 x 3
BS 22	4204027345	Connection with metric fine thread	2	M50 x 1,5	64	75	65	20,5	21	53 x 3
BS 40	4204030900	Connection screw-in fitting	3	G 1"	–	54	46	25	37,5	–
BS 41	4204028691			G ½"	–	40	36	19	21	–
BS 49	4204030902	Pipeline 385	4	M52 x 2	–	60	55	22	19,5	–

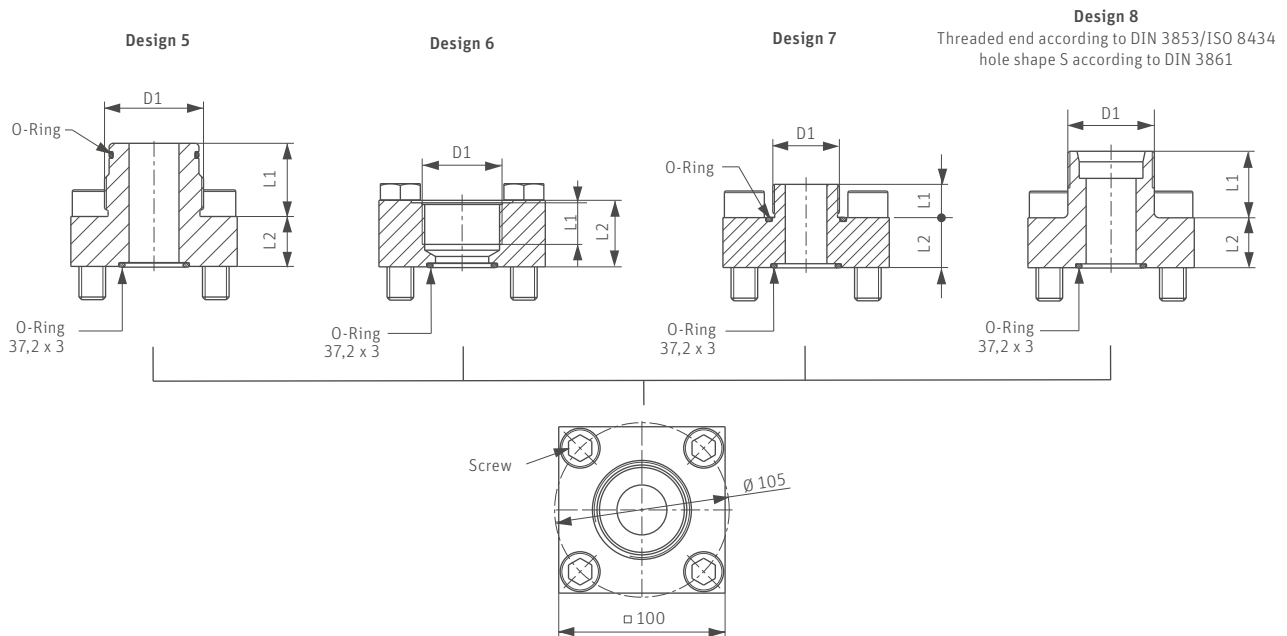
Accumulator accessories - oil side

Adapters for safety and shut-off block SABX2-10/SABX3-10 and SABX2-20



Designation	Order number	Usage	Design	D1	ø - D2	ø - D3	SW	L1	L2	Seal ring
BS 30	4204028007	MEAK	9	G 1/2"	35	48	41	14	38,5	24/29 x 2
BS 31	4204028006			G 3/4"	38			16		27/32 x 2
BS 32	4204030855	MEAK	10	G 1/2"	26,9	48	41	14	38,5	21
BS 33	4204030905			G 3/4"	31,9			16		27

Adapters for safety- and shut-off block SABX2-30



Type	Order number	Usage	Design	D1	L1	L2	O-ring
BS 307	4204033839	BLAK 1-6 l	5	G 1 1/4"	37	30	30 x 3
BS 309	4204027347	BLAK 10-50 l		G 2"	44	30	48 x 3
BS 321	4204030877	Connection - screw-in fitting	6	G 1 1/2"	25	40	-
BS 340	4204030878	Connection with metric fine thread	7	M40 x 1,5	20	30	44 x 3
BS 350	4204027343			M50 x 1,5	20	30	53 x 3
BS 352	4204030879	Pipeline 38S	8	M52 x 2	40	30	-

Accumulator accessories - mounting technology

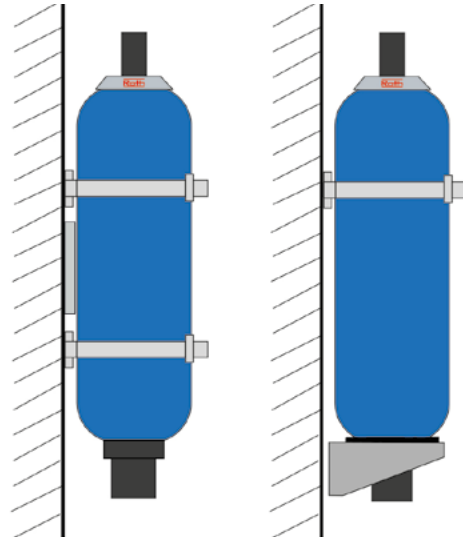
■ Installation recommendations

Steel clamps/U-bolt clamps for bladder accumulator, piston accumulator and pressure vessels

Depending on the type, mounting is possible with at least 1 or 2 steel clamps/U-bolt clamps or bolt clamps, directly onto the wall. For this, the mounting option(s) should be positioned in the upper and lower third of the vessel. Fastener versions with no bracket are only recommended for accumulators weighing 30 kilograms or less.

Brackets for bladder accumulator, piston accumulator and pressure vessels

We also recommend an installation with brackets and spacer rings to secure bladder accumulators, piston accumulators and pressure vessels. For this, the additional mounting should be positioned in the upper third of the vessel. The brackets serve to absorb the weight and are screwed onto a wall or a frame.



Sample installation:

Installation version - bladder accumulator with steel clamps

■ Mounting technology for accumulators and pressure vessels

Brackets for bladder accumulators and pressure vessels

Brackets for mounting bladder accumulators and pressure vessels. The brackets serve to absorb the weight and are screwed onto a wall or a frame.



Brackets for piston accumulators

Brackets for mounting piston accumulators. The brackets serve to absorb the weight and are screwed onto a wall or a frame.



Accumulator accessories - mounting technology

■ Mounting technology for accumulators and pressure vessels

Steel clamps

Mounting clamps with rubber profile for the installation of piston accumulators, bladder accumulators and pressure vessels. The steel clamps are galvanized and available in stainless steel upon request.



Acculight clamps

Mounting clamps with rubber profile for the installation of bladder accumulators and pressure vessels. The steel clamps are galvanized and available in stainless steel upon request.



U-bolt clamps

U-bolt clamps (round steel brackets) for pressure vessels are supplied with four nuts, washers and a support for the vessel shell for installation on the wall. Brackets, nuts and washers are made of mild steel and are galvanised.



Bolt clamps

The bolt clamps (round steel bracket) for mounting piston accumulators is provided with a welded flat steel for a wider contact surface. It is supplied with four nuts, washers and a support for the accumulator shell for mounting on the wall. Brackets, nuts and washers are made of mild steel and galvanized.



 **Note:** Detailed information on Roth mounting technology can be found in the following chapters:

Bladder accumulator mounting technology:	_____	Page 36
Piston accumulator mounting technology:	_____	Page 62
Pressure vessel mounting technology:	_____	Page 76

Accumulator accessories - gas filling technology

■ N2 charging unit

The automatic N2 charging unit is specially designed and tested for the efficient filling or refilling of gas filling pressures on hydraulic accumulators and accumulator systems.

The Roth N2 charging unit runs automatically until a preset pressure is reached. This enables the efficient filling or refilling of hydraulic accumulators beyond the overflow (natural pressure equalisation) and hence allows the almost complete drainage of

commercially available nitrogen cylinders.

Hydraulic accumulators can thus be filled with nitrogen to 230/380 bar.

The unit is compact and can be transported and operated by only one person. In combination with the Roth filling and testing device, the Roth N2 charging unit is compatible with all filling connectors available worldwide.

Overview of Roth N2 charging unit	
Dimensions [mm]	Length = 445, Width = 650, Height = 970
Weight [kg]	85
Transport and operation	Mobile, one person
Operating pressure [bar]	230/380
Supply volume [l/min.]	1,7/0,9
Accumulator volume [approx. l]	12
Piston accumulator content [l]	1,7
Filling hose - nitrogen cylinder	
Length [m]	3
Nominal diameter [DN]	8
Connection	M20 x 1,5 [DKOS 8, screw series 12S] Use the gas cylinder adapter from the Roth filling and testing device
Filling hose - Roth filling and testing device	
Length [m]	6
Nominal diameter [DN]	8
Connection	M20 x 1,5 [DKOS 8, screw series 12S] Use the gas cylinder adapter from the Roth filling and testing device
Rating [kW]	0,75
System of protection	IP 55
Electrical connection	CEE 5-pin, 16 A, 400 V – 50 Hz (others available upon request)
Cable length [m]	5
Acceptance for pressure device	PED 2014/68/EU

Technical data subject to change.



Components

The Roth N2 charging unit comprises the following components:

- > Integrated hydraulic unit
- > Compression accumulator
- > Electronic pressure switch
- > Electric control with connection cable
- > Connecting hoses

Type N2 charging unit	Order number
Operating pressure 230 bar	4204039009
Operating pressure 380 bar	4204039068

Note: For service work, we recommend the combination with our Roth filling and testing device (see page 92).

Project information



■ Project information form

Contact customer		Roth intern	
Company		Customer number	
Name		Offer number	
E-mail		Date	
Telephone		Operator	

Project information						
Working pressure [bar]	min.	max.	Discharge volume [l]			
Ambient temperature [°C]	min.	max.	Discharge time [s]			
Medium temperature [°C]	min.	max.	Total accumulator volume [l] (alternative to discharge volume & discharge time)			
Medium oil side			Connection oil side*	Flange	Thread connection	Other
			Number and size			
Medium gas side			Connection gas side*	Flange	Thread connection	Other
			Number and size			
Number of cycles per week			Colour treatment (accumulators are with Roth standard primer)	Primer	Coating specification	Colour
Installation space (maximum dimensions) [height x width x depth]			Acceptance regulations	Acceptance	Country of installation	Regulations

**Important! For special thread designs, please add data sheets*

Special features/additions/restrictions

E-mail: service@roth-hydraulics.de

Applications



Roth Hydraulics products in use

Roth Hydraulics products prove themselves day by day in a wide variety of applications – both as passive components for emergency supplies and as active system components. Wherever hydraulic energy is stored or converted, our products and solutions are in widespread use. Every industry, customer and application requires individual solutions, and our products take this into account.

Our manufacturing expertise in combination with our absolute focus on the customer

forms the foundation of our success and ensures our global market position.

Roth accumulator systems are used to store energy in the construction industry. They make a decisive contribution to a better energy balance and hence to a reduction in operating costs, and ensure a secure energy supply in the event of a power failure.

Customer benefits

- > Reduced connection load
- > Improved energy balance
- > Emergency supply in case of power failure
- > Reduced operating costs
- > Cycle time reduction
- > Increase reliability
- > Maximized availability
- > Improved performance
- > Energy recuperation
- > Comfort enhancement
- > Reduced emissions
- > Energy reserves



System for foundry technology



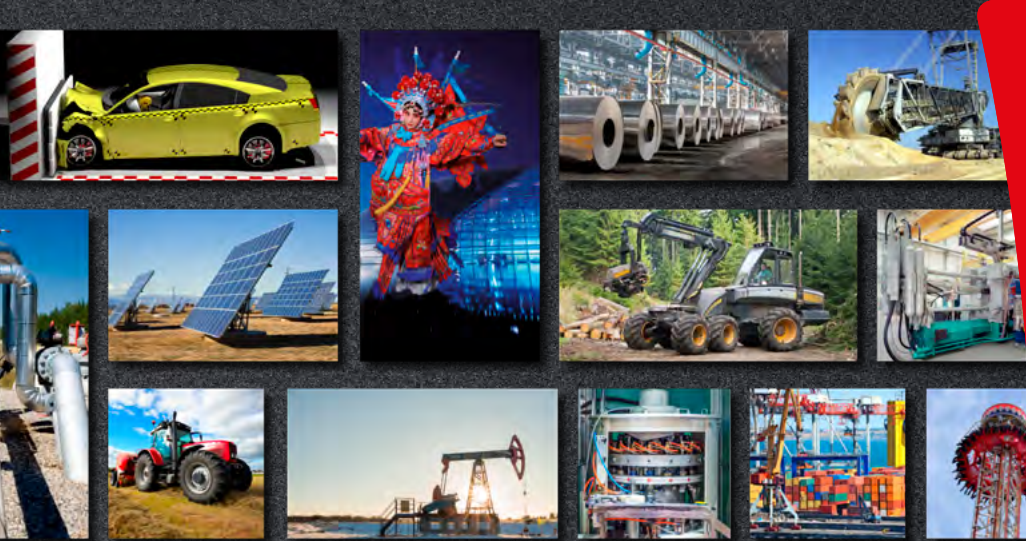
System for steel furnace



System for hydraulic press



System for hydraulic press



*Roth hydraulic accumulators –
Specific solutions for a variety of
applications*

■ Markets and industries

Heavy industry

- > Steel production
- > Foundry technology
- > Steel forming

Machine tools

- > Die casting technology
- > Press technology
- > Injection moulding technology
- > Blow moulding systems

Energy/power generation technology

- > Wind turbines
- > Hydropower plants
- > Solar thermal systems
- > Energy distribution

Oil and gas

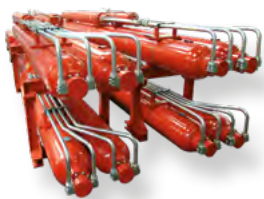
- > Onshore
- > Offshore and marine technology
- > Pipeline technology

Mobile hydraulics

- > Mobile machines
- > Construction machinery
- > Agricultural machinery

Customized solutions

- > Leisure industry
- > Testing technology
- > Stage technology
- > Hydroforming



*System for a roller coaster
at Ferrari World Abu Dhabi*



System for foundry ladle furnace



System for hydropower plant



System for hydropower plant



System for test systems

History



In 1943, Heinrich Schäfer laid the foundations of the company when he founded Bolenz & Schäfer in Biedenkopf, whose product range included forgings and mechanical drive components. Thanks to dynamic innovative strength and consistent focus on the customer, the product range expanded in the 1950s to include piston accumulators and hydraulic systems.

In 1989, Bolenz & Schäfer became part of Roth Industries. This marked a significant milestone in the company's history. The family-led company enabled dynamic and very successful further development.

The product range expanded further, and internationalisation grew with the establishment of subsidiaries in major markets.

More than 70 years of experience in accumulator technology, a complete range of products and locations in Asia and America, make Roth Hydraulics a world-leading specialist in accumulator technology.

- > **1943** BOLENZ & SCHÄFER factory founded
- > **1952** Development and manufacture of hydraulic components and piston accumulators
- > **1989** Bolenz & Schäfer becomes a Roth Industries company
- > **1994** System supplier in rail technology for energy-autonomous, radio-controlled hydraulic systems and bulk goods wagons
- > **2011** Bladder accumulators are added to the product range
- > **2013** Diaphragm accumulators are added to the product range
- > **2014** Founding of BSD Hydraulic Technology (Taicang), China – now Roth Hydraulics (Taicang)
- > **2016** Founding of Roth Hydraulics NA, USA
- > **2016** Renaming – from Bolenz & Schäfer to Roth Hydraulics
- > **2022** Expansion of Roth Hydraulics (Taicang), China
- > **2023** Development of the Roth DURALOCK® thread
- > **2024** SFP Hydraulics USA becomes a Roth Hydraulics company

Further information about Roth Industries is available at:

www.roth-industries.com

Roth Hydraulics international



EUROPE

Biedenkopf: research and development, sales, production, service



ASIA

Taicang: sales, assembly, service



USA/CANADA

Katy/Houston: sales, assembly, service



We meet the complex requirements of a global market with our network of subsidiaries, representatives and sales partners in order to ensure expertise, customer focus and service on site. Our specialists speak the languages of our customers and provide comprehensive support in all matters relating to hydraulic accumulators.

In our plant in Germany, we concentrate on research and development and set the standard in terms of technology, production processes and quality. In this way, we ensure the "Made in Germany" quality standard also applies to our subsidiaries abroad. The knowledge and expertise of our employees on site ensures that local market and customer-specific requirements are taken into account.

All locations are ISO 9001 certified.

Our strengths Your benefits



Innovative

- > Own product development
- > In-house technology centre for all relevant tests and inspections
- > Including: Burst and swell test bench, endurance test rig, cold chamber, salt spray test
- > Close collaboration with universities and institutes
- > Tested and proven design and simulation program for all types of hydraulic accumulator

Global

- > Worldwide production, assembly and service sites
- > Certified according to DIN EN ISO 9001:2015, DIN EN ISO 14001
- > Proximity to customers thanks to own representatives and extensive distributor network worldwide
- > International production approvals.
- > Maritime approvals

Complete product portfolio

- > Extensive range of diaphragm, bladder and piston accumulators
- > Completed and tested accessories range, including for professional installation and for (accumulator) safety
- > Accumulator measuring and monitoring systems, mechanical or non-contact
- > Customised special solutions

The Roth Hydraulics logo is displayed in white on a dark background. The word "Roth" is in a large, bold, sans-serif font with a horizontal line above it. Below it, the word "Hydraulics" is in a smaller, bold, sans-serif font. A human hand is visible at the bottom left, palm up, as if presenting the logo.



Roth Hydraulics

Accumulators

- > Diaphragm accumulators
- > Bladder Accumulators
- > Piston accumulator
- > Pressure vessel
- > Accumulator accessories

Accumulator systems

- > Accumulator units
- > Monitoring systems
- > System accessories

Special solutions

- > Spring accumulators
- > Damper systems
- > Rail hydraulics
- > Special accumulators



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