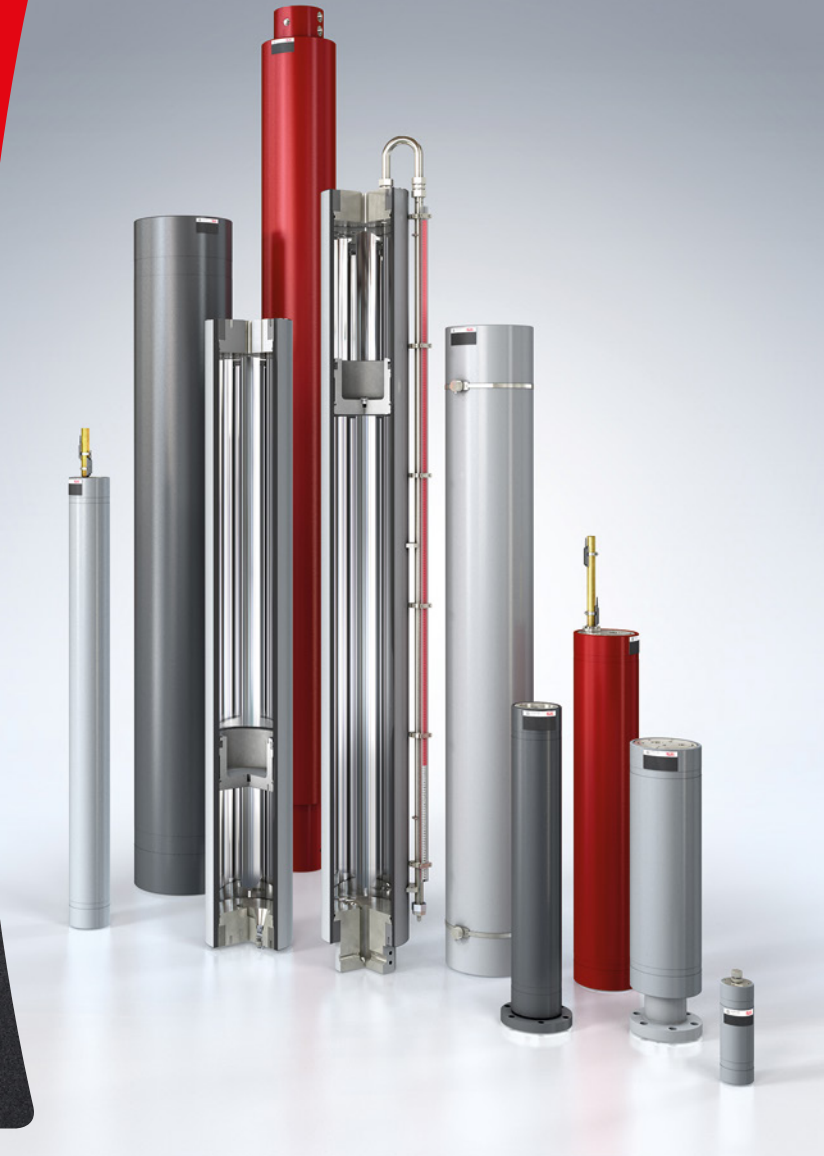
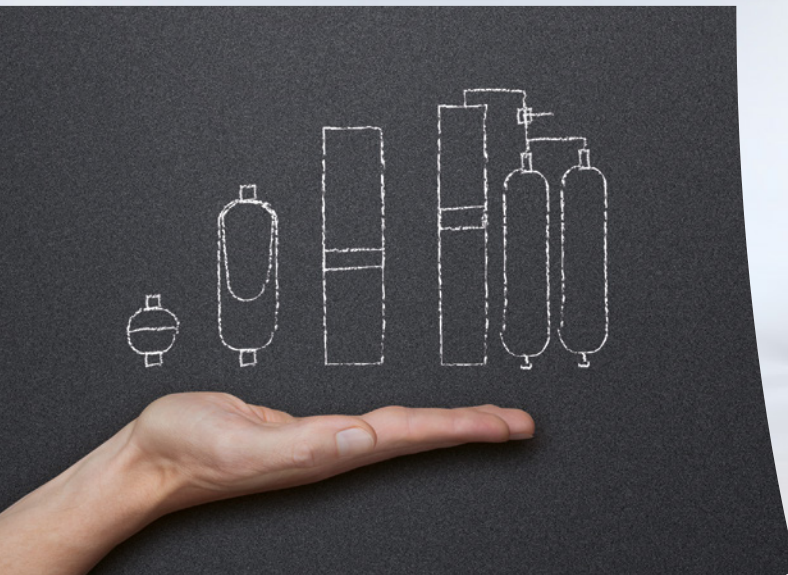


Accumulators

Piston Accumulator



Technical Information Series CE + ASME



excellent pressure solutions

Inhalt

Piston Accumulator

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Construction and Description

■ General



Bolenz & Schäfer has been a leader in the area of accumulator technology for more than 60 years. As a specialist in hydraulic accumulator applications, it is our primary objective to develop efficient solutions in line with market needs. In accordance with the rebranding initiative of our parent company, Roth Industries – of which Bolenz & Schäfer has been a solid member for more than a quarter of a century – we are proud to continue our activities as Roth Hydraulics.

The Roth piston accumulator can be used in a variety of applications. It is a specialised product that offers a wide range of options, allowing it to be customised to individual customer requirements. Precisely tuned for optimum efficiency, it can be used to store hydraulic energy, absorb pressure surges, dampen pulsation and smoothen volume flow rates by means of compressing nitrogen.

Roth piston accumulators offer high performance, low maintenance and a wide range of functions around the clock. They are suitable for use in extreme climatic conditions, confined spaces and allow for careful use of resources.

The **application** fields of the Roth piston accumulator are many

and diverse. Amongst other applications, they can be used for:

- > Energy storage
- > Pulsation damping
- > Volume compensation
- > Hydraulic springing
- > Shock absorption
- > Media transfer partition
- > Emergency operation



Advantages

- > optimal application solution derived by changing diameter or length
- > piston position monitoring possible
- > installation position arbitrary
- > total discharge is possible
- > long life, reduced friction sealing system
- > maintainable design
- > low gas permeation compared to bladder or diaphragm accumulators due to small sealing areas.
- > low piston weight guarantees high dynamics
- > large connection cross-section possible
- > sealing systems available for different kinds of operating liquids, wide temperature range and applications
- > in case of failure no abrupt gas loss can occur

Construction and Description

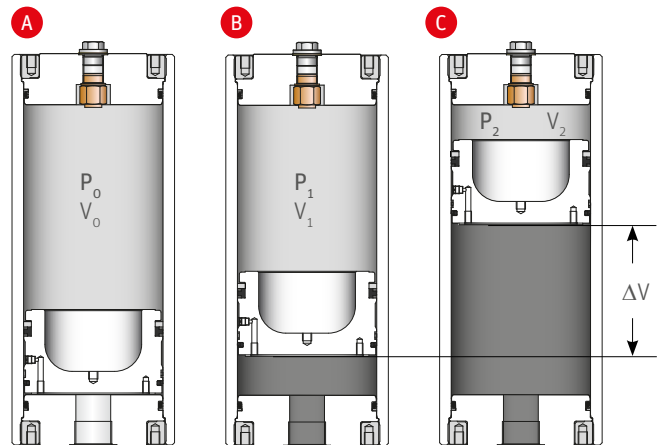
Function

Roth piston 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 becomes compressed. Hydraulic energy is stored. When the pressure in the hydraulic system drops, the gas expands, causing the piston to move in the direction of the oil, forcing the liquid out from the piston accumulator into the hydraulic system.

Hydraulic energy is released. During this process, the piston also serves as a separator.

The three basic settings of the piston:

- A** The piston is pre-charged with nitrogen. The fluid side is pressureless.
- B** Position at minimum working pressure. A small volume of fluid must remain between the piston and end cap so that the piston does not strike. 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 = Released or absorbed useful volume between P_1 / P_2

P_0 = Pre-charge pressure of the gas side in the piston accumulator

P_1 = Minimum working pressure

P_2 = Maximum working pressure

Overview Roth piston accumulator

Overview Roth piston accumulator	
Volume	0,1 l ... 1.500 l
Nitrogen transport filling	available - after testing
Operating pressure	max. 1.200 bar
Materials	Carbon steel, special materials, stainless steel (on request)
Medium	see table next side
Temperature	-60 °C ... +200 °C
Installation position	preferably vertical, oil side down - other positions possible
Corrosion protection	primer coated, top coat/ special coating available
Fluid ports	G-inside thread G1/4 - G2, SAE thread connections Flange- /Special connections available
Acceptances	DGR 2014/68/EU, ASME, ML China, NR13, EAC, GL, ABS, BV, DNV, CRN, CCS, LRS, RINA

Operating temperature

Temperature range standard: -10 °C up to +80 °C, different temperature ranges, e.g. -40° C up to +80° C, available on request.

Condition on delivery

Accumulator shell base-coated with universal priming colour RAL 1001 (beige), inside and connecting surface oiled and openings protected, without hydr. fluids, without gas filling. Other colors and sand blasting or other surface treatments (e.g. galvanic zinc plating) is possible. Please ask for our offer.

Pressure fluids

Sealing type PUR:

mineral oil, hydraulic oil due to DIN 51524 part 2

Sealing type NBR:

hydraulic oil due to DIN 51524 part 2, flame protected liquids, water and emulsions, but no HFD-fluids.

Roth piston accumulators for other temperatures, other fluids or with longterm protection on request.

Construction and Description

Connections

Roth piston accumulators are also available with other or additional connections (e.g. acc. to works standards). Larger nominal widths (for high flow rates see special connections / alternative filling valves) can be provided by special design. Let us know the required dimension and we will make a proposal!

Gas filling

Only nitrogen of Class 4 is to be used, never oxygen or compressed air. The use of lower grade, class 2.8 industrial nitrogen can lead to corrosion and failure of the accumulator under certain operating conditions.

Design pressure (see selection table)

The design pressure corresponds with the max. allowable working pressure (MAWP) and is also the max. permissible set pressure for the safety equipment (safety valves, burst-discs) against pressure excess.

We recommend operation of the accumulators with a maximum pressure of up to 0.9 x MAWP to avoid safety equipment repetitive.



Note 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 general overview of stable liquids. In case of application, the stability must be predetermined and checked.

Fluid	Temperature range °C	Elastomer
Fluids based on mineral oil* (HL; HLP)	-20 °C ...+80 °C	NBR/ HNBR
Fluids based on Synthetic ester * (HEES)		
Hardly flammable fluids* (HFA; HFB; HFC)		
Water *		
Many acids, bases and brines during low temperatures	-15 °C ...+180 °C	Viton (FKM)
Fluids based on mineral oil* (HL; HLP)		
Fluids based on Synthetic ester * (HEES) (HEES)		
Water free synthetic fluids *		
Fuels *		
Concentrates of inorganic or organic acids and bases*	-30 °C ...+80 °C	PUR
Mineral oil * (HL; HLP)		
Hardly flammable fluids* (HFA)		

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



Note: The compatibility of hydraulic fluid and elastomer is not automatically guaranteed and can only be tested upon request. Compatibility tests may be necessary if no empirical data for a specific fluid is available.



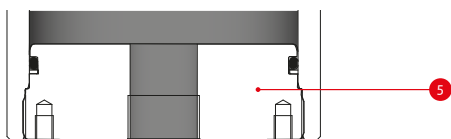
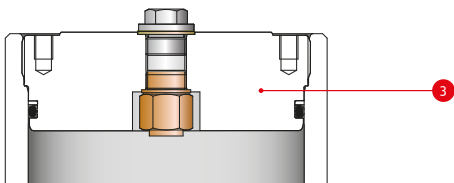
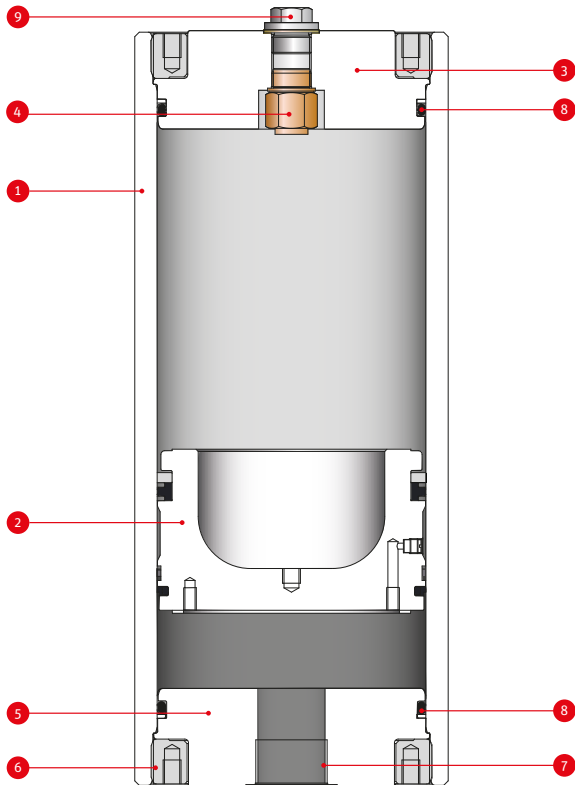
Note Operation and Maintenance

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

Construction and Description

Roth Piston accumulator design

Standard AK



Overview Roth piston accumulator	
Volume	0,1 l ... 1.500 l
Operating pressure	Max. 1.200 bar
Materials	Carbon Steel, special materials, stainless steel (on request)
Temperature	-60 °C ... +200 °C
Acceptances	DGR 2014/68/EU, ASME, other see acceptance table next page

Item	Designation	Material
1	Accumulator shell	Carbon steel
2	Piston	Aluminium (Carbon steel)
3	Screwed end cap gas side (2-part)*	Carbon steel
4	Roth gas filling valve G3/4	Carbon steel
5	Screwed end cap oil side (2-part)*	Carbon steel
6	Thread ring	Carbon steel
7	Connection oil-side	
8	End cap seal	
9	Screw plug G3/4	Carbon steel

*Screwed end caps for oil and gas side are available in a one or two part design, as of piston diameter 180mm, see illustration below.

Item	Designation	Material
3	Screwed end cap gas side (1-part)*	Carbon steel
5	Screwed end cap oil side (1-part)*	Carbon steel

*Up to piston diameter 150mm the standart design for screwed end caps is one pieced. As of piston diameter 180mm is a one part or a two part possibility available, see illustration above.

Rules and regulations

■ Acceptance

Roth Hydraulics accumulators are manufactured for the European market and are approved in accordance with the Pressure Equipment Directive "DGR 2014/68/EU". This is applicable to the AK series piston accumulators.

Acceptance is effected after individual approval, normally by the TÜV as the appointed laboratory.

The accumulators larger than 1 l are awarded a CE mark and are supplied with a declaration of conformity and operating instructions. In addition, the standard documentation comprises a certificate of conformity by the appointed laboratory, an acceptance drawing and a list of materials used. This also guarantees possible reworking or overhauling of the individual components after decades of use.

This Pressure Equipment Directive is also accepted by many other countries besides the direct EU member states. Only some additional approval documentation may sometimes be required. Countries such as Russia or China in addition require certification of the manufacturer in accordance with the legislation of the specific exporting country.

Pressure vessel deliveries to the USA, on the other hand, must comply with the ASME Code (American Society of Mechanical Engineers). Roth Hydraulics (formerly Bolenz & Schäfer) has been licensed to supply pressure vessels to the United States under Section VIII para. 1 of the ASME Code since 1981. It thus has the longest experience of any piston accumulator manufacturer in Germany with these regulations. Pressure vessels approved by the

ASME are given an U stamp certification, which is delivered with a data report as acceptance documentation.

This applies to the piston accumulator series UAK.

However, the ASME Code only covers pressure vessels and accumulators with an internal diameter greater than 6 inches. For products with an internal diameter of less than 6 inches (6 inches = 152.4 mm), CE certification shall apply.

ASME approved pressure vessels are also accepted in Canada. However, additional Canadian certification (Canadian Registration Number, CRN) of the respective province is required.

The province or place of installation must be indicated when placing the order. ASME certification is often also required for the offshore industry as well as in parts of Asia.

Roth Hydraulics has all major product and company licenses for worldwide distribution.

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 table

Standard acceptances:

Country code	Countries	Approval regulation	Var. no.
EU	EU member states	Pressure Equipment Directive 2014/68/EU with CE mark	50
RUS	Russia	Pressure Equipment Directive 2014/68/EU + EAC	520
PRC	China	Pressure Equipment Directive 2014/68/EU + ML (> 30 L)	534
BR	Brazil	Pressure Equipment Directive 2014/68/EU + CE mark + NR 13	515
USA	USA	ASME Code Sect. VIII Div. 1	15

Special acceptances:

Country code	Countries	Approval regulation	Var. no.
CND	Canada	ASME Code + CRN (Canadian Registration No.) Approval depending on province – indicate „,province“	29
ASME DOSH	Malaysia	ASME + DOSH Malaysia	61

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
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

■ CE/ASME -Series piston accumulator

Order designation

Series-.....-.....-.....-.....-.....-.....-.....-.....-.....-.....															
AK (CE-acceptance)	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲					
UAK (ASME-acceptance)	Series AK/UAK	Oil-capacity [l]	pressure [bar/psi x 10 ²]	Piston-ø [cm]	Material/Coating	Design of piston	Type of seals	Gas filling valve	Connections	Monitoring of the piston position	Acceptance	Paintings				
Material/Coating	...-1	◀	O	= Standard (carbon steel)	VA	= Stainless steel	Ni	= Nickel plated, e.g. for water								
Design of piston	...-1	◀	O	= Standard	S	= Special design, e.g. for water										
Type of seals	...-1	◀	1	= NBR (z.B. für HFC)	2	= Viton (z.B. für HFD)	3	= PUR Polyurethan	4	= Others						
Gas filling valve	...-1	◀	mRV	= With (no pressure vessels adapted)	oRV	= Without (pressure vessels are adapted)										
Connections	...-1	◀	GO	= Standard	G1	= Other thread connections	F	= Flange connections	FG	= Flange one side, tread the other						
Monitoring of the piston position	...-1	◀	O	= Without	ES	= Limit switching device	SV	= Switching device	SVG	= Switching device bended	UPS	= Ultrasonic-Position-Sensor	KME	= Piston accumulator measuring	ULM	= Ultrasonic-Length-Measuring
Acceptance	...-1	◀	50	= Standard (DGR 2014/68/EU)	15	= ASME-Code Sect. VIII	...	= other see also Acceptance selection table								
Paintings (outside)	...	◀	20	= Standard primer	21	= Sand blasting and coating (please specify)	22	= Painting on demand (please specify)								

Example: AK 30 - 250 - 20 - 0 - 0 - 1 - mRV - FG - ES - 50 - 20

Product of order designation e.g. is:

Type:	AK
Oil-capacity:	30 liter
Pressure:	250 bar
Piston-ø:	20 cm
Material/Coating:	Carbon steel
Design of piston:	Standard
Type of seals:	NBR
Gas filling valve:	With
Connections:	Flange one side, tread the other
Monitoring of the piston position:	Limit switching device
Acceptance:	Standard (DGR 2014/68/EU)
Paintings:	Standard primer

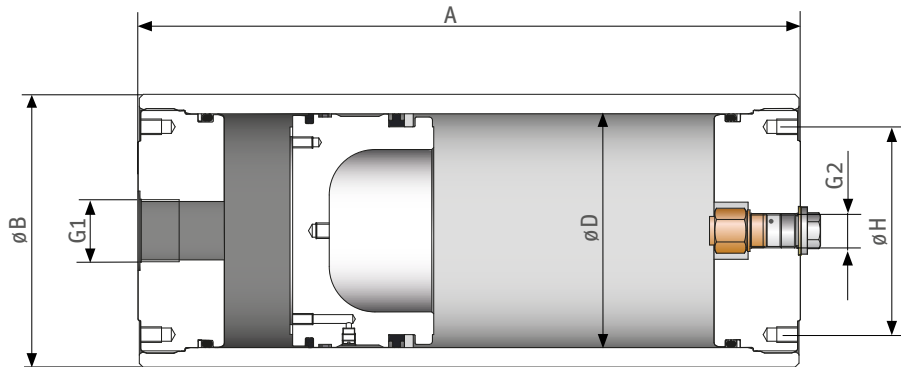
(to be indicated for gas and oil separately)

see for this separate brochure "Roth Piston position monitoring"

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

CE Series AK - Piston up to \varnothing 150 mm

■ CE Series AK 0,5 - 3 l

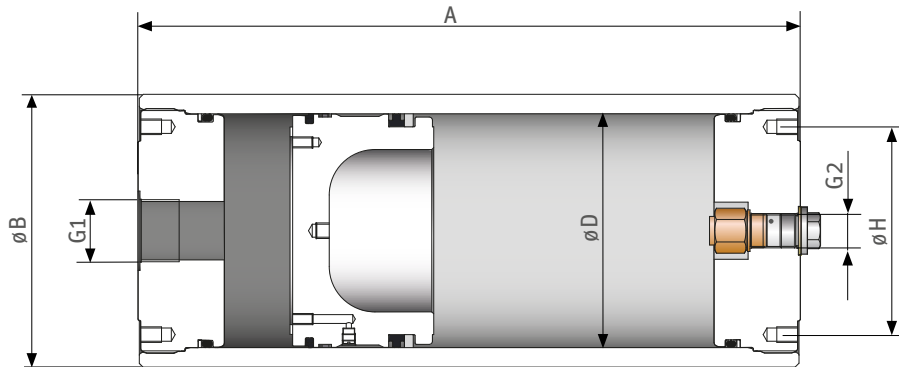


Oil volume		Design pressure		Type	Piston- \varnothing	Length	outside- \varnothing	Fastening	Oil side	Gas side	Weight approx.
[l]	[gal]	[bar]	[psi]								
0,5	0,13	375	5400	AK 0,5-375-06	60/2,36	330/12,99	80/3,15	55, 2 x M6x10	1/2	1/4	8
		375	5400	AK 0,5-375-08	80/3,15	250/9,84	100/3,94	70, 4 x M8x15	1/2	1/4	10
		375	5400	AK 0,5-375-10	100/3,94	255/10,04	125/4,92	90, 4 x M8x15	3/4	1/4	16
		800	11600	AK 0,5-800-10	100/3,94	305/12,1	140/5,51	90, 4 x M8x15	1/4	1/4	49
1,0	0,26	375	5400	AK 01-375-06	60/2,36	505/19,88	80/3,15	55, 2 x M6x10	1/2	1/4	11
		375	5400	AK 01-375-08	80/3,15	355/13,98	100/3,94	70, 4 x M8x15	1/2	1/4	13
		375	5400	AK 01-375-10	100/3,94	315/12,4	125/4,92	90, 4 x M8x15	3/4	1/4	18
		800	11600	AK 01-800-10	100/3,94	370/14,57	140/5,51	90, 4 x M8x15	1/4	1/4	57
1,5	0,40	375	5400	AK 1,5-375-06	60/2,36	685/26,97	80/3,15	55, 2 x M6x10	1/2	1/4	14
		375	5400	AK 1,5-375-08	80/3,15	455/17,91	100/3,94	70, 4 x M8x15	1/2	1/4	15
		375	5400	AK 1,5-375-10	100/3,94	375/14,76	125/4,92	90, 4 x M8x15	3/4	1/4	20
		800	11600	AK 1,5-800-10	100/3,94	430/16,93	140/5,51	90, 4 x M8x15	1/4	1/4	64
2,0	0,53	375	5400	AK 02-375-06	60/2,36	860/33,86	80/3,15	55, 2 x M6x10	1/2	1/4	17
		375	5400	AK 02-375-08	80/3,15	555/21,85	100/3,94	70, 4 x M8x15	1/2	1/4	17
		375	5400	AK 02-375-10	100/3,94	440/17,32	125/4,92	90, 4 x M8x15	3/4	1/4	22
		800	11600	AK 02-800-10	100/3,94	495/19,49	140/5,51	90, 4 x M8x15	1/4	1/4	71
2,5	0,70	375	5400	AK 2,5-375-06	60/2,36	1035/40,75	80/3,15	55, 2 x M6x10	1/2	1/4	21
		375	5400	AK 2,5-375-08	80/3,15	655/25,79	100/3,94	70, 4 x M8x15	1/2	1/4	19
		375	5400	AK 2,5-375-10	100/3,94	505/19,88	125/4,92	90, 4 x M8x15	3/4	1/4	24
		800	11600	AK 2,5-800-10	100/3,94	560/22,05	140/5,51	90, 4 x M8x15	1/4	1/4	79
3,0	0,80	375	5400	AK 03-375-06	60/2,36	1215/47,83	80/3,15	55, 2 x M6x10	1/2	1/4	24
		375	5400	AK 03-375-08	80/3,15	755/29,72	100/3,94	70, 4 x M8x15	1/2	1/4	21
		375	5400	AK 03-375-10	100/3,94	570/22,44	125/4,92	90, 4 x M8x15	3/4	1/4	27
		800	11600	AK 03-800-10	100/3,94	620/24,41	140/5,51	90, 4 x M8x15	1/4	1/4	86
		200	2900	AK 03-200-15	150/5,90	405/15,94	170/6,69	125, 4 x M12x25	1	1/4	31
		350	5100	AK 03-350-15	150/5,90	405/15,94	180/7,09	125, 4 x M12x25	1	1/4	48

 **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 - Piston up to \varnothing 150 mm

■ CE Series AK 4 - 10 l

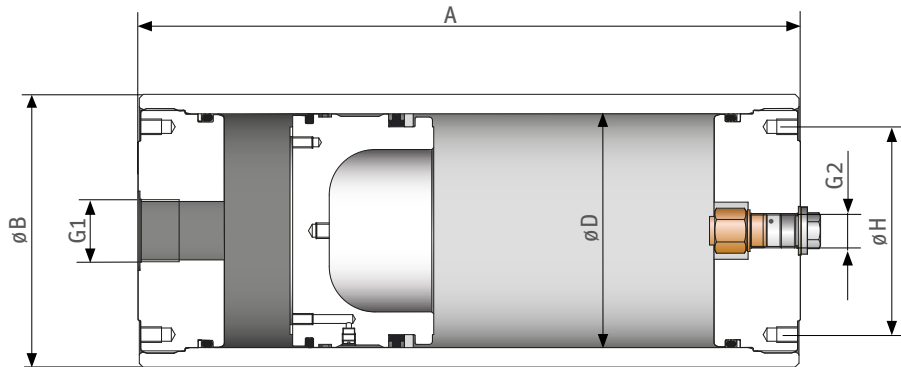


Oil volume		Design pressure		Type	Piston- \varnothing	Length	outside- \varnothing	Fastening	Oil side	Gas side	Weight approx.
[l]	[gal]	[bar]	[psi]								
4	1,1	375	5400	AK 04-375-06	60/2,36	1565/61,6	80/3,15	55, 2 x M6x10	1/2	1/4	30
		375	5400	AK 04-375-08	80/3,15	955/37,6	100/3,94	70, 4 x M8x15	1/2	1/4	26
		375	5400	AK 04-375-10	100/3,94	695/27,4	125/4,92	90, 4 x M8x15	3/4	1/4	31
		800	11600	AK 04-800-10	100/3,94	750/29,5	140/5,51	90, 4 x M8x15	1/4	1/4	101
		200	2900	AK 04-200-15	150/5,90	400/15,7	170/6,69	125, 4 x M12x25	1	1/4	34
		350	5100	AK 04-350-15	150/5,90	460/18,1	180/7,09	125, 4 x M12x25	1	1/4	52
5	1,3	375	5400	AK 05-375-06	60/2,36	1920/75,6	80/3,15	55, 2 x M6x10	1/2	1/4	36
		375	5400	AK 05-375-08	80/3,15	1150/45,3	100/3,94	70, 4 x M8x15	1/2	1/4	30
		375	5400	AK 05-375-10	100/3,94	825/32,5	125/4,92	90, 4 x M8x15	3/4	1/4	36
		800	11600	AK 05-800-10	100/3,94	875/34,5	140/5,51	90, 4 x M8x15	1/4	1/4	116
		200	2900	AK 05-200-15	150/5,90	520/20,5	170/6,69	125, 4 x M12x25	1	1/4	36
		350	5100	AK 05-350-15	150/5,90	520/20,5	180/7,09	125, 4 x M12x25	1	1/4	55
6	1,6	375	5400	AK 06-375-08	80/3,15	1350/53,1	100/3,94	70, 4 x M8x15	1/2	1/4	35
		375	5400	AK 06-375-10	100/3,94	950/37,4	125/4,92	90, 4 x M8x15	3/4	1/4	40
		800	11600	AK 06-800-10	100/3,94	1005/39,6	140/5,51	90, 4 x M8x15	1/4	1/4	131
		200	2900	AK 06-200-15	150/5,90	575/22,6	170/6,69	125, 4 x M12x25	1	1/4	38
		350	5100	AK 06-350-15	150/5,90	575/22,6	180/7,09	125, 4 x M12x25	1	1/4	59
8	2,0	375	5400	AK 08-375-08	80/3,15	1750/68,9	100/3,94	70, 4 x M8x15	1/2	1/4	44
		375	5400	AK 08-375-10	100/3,94	1205/47,4	125/4,92	90, 4 x M8x15	3/4	1/4	49
		800	11600	AK 08-800-10	100/3,94	1260/49,6	140/5,51	90, 4 x M8x15	1/4	1/4	161
		200	2900	AK 08-200-15	150/5,90	685/27,0	170/6,69	125, 4 x M12x25	1	1/4	43
		350	5100	AK 08-350-15	150/5,90	685/27,0	180/7,09	125, 4 x M12x25	1	1/4	65
10	2,5	375	5400	AK 10-375-10	100/3,94	1460/57,5	125/4,92	90, 4 x M8x15	3/4	1/4	58
		800	11600	AK 10-800-10	100/3,94	1515/59,6	140/5,51	90, 4 x M8x15	1/4	1/4	191
		200	2900	AK 10-200-15	150/5,90	800/31,5	170/6,69	125, 4 x M12x25	1	1/4	47
		350	5100	AK 10-350-15	150/5,90	800/31,5	180/7,09	125, 4 x M12x25	1	1/4	72

 **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 - Piston up to \varnothing 150 mm

■ CE Series AK 12 - 50 l



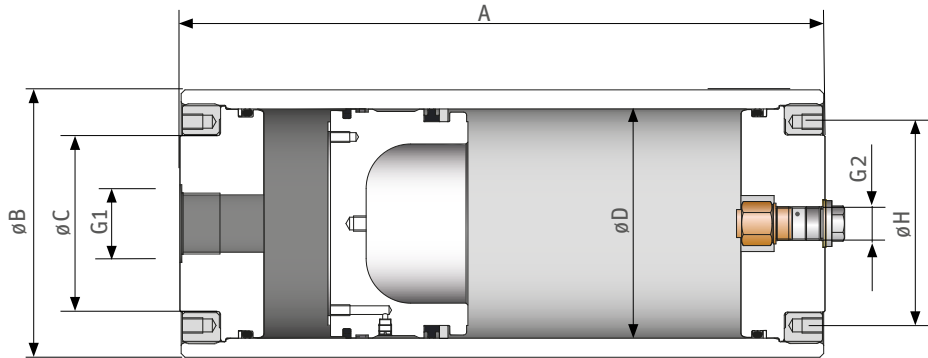
Oil volume		Design pressure		Type	Piston- \varnothing	Length	outside- \varnothing	Fastening	Oil side	Gas side	Weight approx.
[l]	[gal]	[bar]	[psi]								
12	3,0	375	5400	AK 12-375-10	100/3,94	1715/67,5	125/4,92	90, 4 x M8x15	$\frac{3}{4}$	$\frac{1}{4}$	66
		800	11600	AK 12-800-10	100/3,94	1770/69,7	140/5,51	90, 4 x M8x15	$\frac{1}{4}$	$\frac{1}{4}$	220
		200	2900	AK 12-200-15	150/5,90	915/36,0	170/6,69	125, 4 x M12x25	1	$\frac{1}{4}$	52
		350	5100	AK 12-350-15	150/5,90	915/36,0	180/7,09	125, 4 x M12x25	1	$\frac{1}{4}$	79
15	4,0	375	5400	AK 15-375-10	100/3,94	2095/82,5	125/4,92	90, 4 x M8x15	$\frac{3}{4}$	$\frac{1}{4}$	80
		200	2900	AK 15-200-15	150/5,90	1085/42,7	170/6,69	125, 4 x M12x25	1	$\frac{1}{4}$	58
		350	5100	AK 15-350-15	150/5,90	1085/42,7	180/7,09	125, 4 x M12x25	1	$\frac{1}{4}$	90
20	5,5	200	2900	AK 20-200-15	150/5,90	1365/53,7	170/6,69	125, 4 x M12x25	1	$\frac{1}{4}$	69
		350	5100	AK 20-350-15	150/5,90	1365/53,7	180/7,09	125, 4 x M12x25	1	$\frac{1}{4}$	107
25	6,5	200	2900	AK 25-200-15	150/5,90	1650/65,0	170/6,69	125, 4 x M12x25	1	$\frac{1}{4}$	81
		350	5100	AK 25-350-15	150/5,90	1650/65,0	180/7,09	125, 4 x M12x25	1	$\frac{1}{4}$	142
30	8,0	200	2900	AK 30-200-15	150/5,90	1930/76,0	170/6,69	125, 4 x M12x25	1	$\frac{1}{4}$	92
		350	5100	AK 30-350-15	150/5,90	1930/76,0	180/7,09	125, 4 x M12x25	1	$\frac{1}{4}$	141
35	9,0	200	2900	AK 35-200-15	150/5,90	2215/87,2	170/6,69	125, 4 x M12x25	1	$\frac{1}{4}$	103
		350	5100	AK 35-350-15	150/5,90	2215/87,2	180/7,09	125, 4 x M12x25	1	$\frac{1}{4}$	159
40	10,5	200	2900	AK 40-200-15	150/5,90	2500/98,4	170/6,69	125, 4 x M12x25	1	$\frac{1}{4}$	114
		350	5100	AK 40-350-15	150/5,90	2500/98,4	180/7,09	125, 4 x M12x25	1	$\frac{1}{4}$	176
45	12,0	200	2900	AK 45-200-15	150/5,90	2780/109,5	170/6,69	125, 4 x M12x25	1	$\frac{1}{4}$	125
		350	5100	AK 45-350-15	150/5,90	2780/109,5	180/7,09	125, 4 x M12x25	1	$\frac{1}{4}$	194
50	13,0	200	2900	AK 50-200-15	150/5,90	3065/120,7	170/6,69	125, 4 x M12x25	1	$\frac{1}{4}$	136
		350	5100	AK 50-350-15	150/5,90	3065/120,7	180/7,09	125, 4 x M12x25	1	$\frac{1}{4}$	211



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 - Piston from \varnothing 180 mm

■ CE Series AK 10 - 50 l



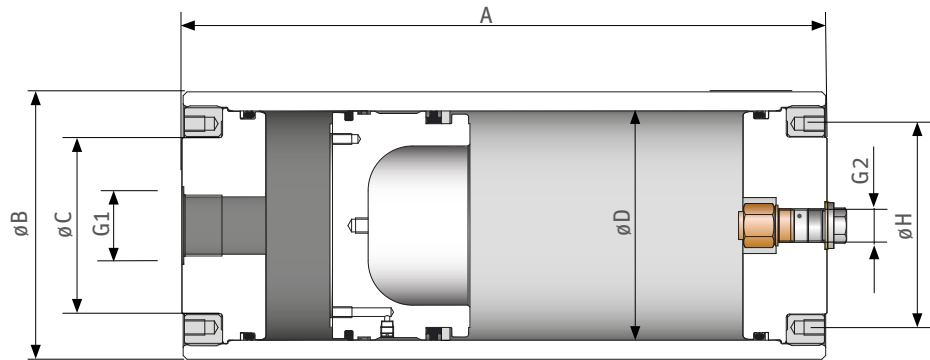
Oil volume		Design pressure		Type	Piston- \varnothing	Length	Outside- \varnothing	Thread ring- \varnothing	Fastening	Oil side	Gas side	Weight approx.
[l]	[gal]	[bar]	[psi]									
10	2,6	280	4000	AK 10-280-18	180	705	210	140	160, 4 x M12x25	1 1/2	3/4	76
		375	5400	AK 10-375-18	180	720	222	140	160, 4 x M12x25	1 1/2	3/4	103
15	4,0	280	4000	AK 15-280-18	180	900	210	140	160, 4 x M12x25	1 1/2	3/4	93
		375	5400	AK 15-375-18	180	915	222	140	160, 4 x M12x25	1 1/2	3/4	124
20	5,0	280	4000	AK 20-280-18	180	1095	210	140	160, 4 x M12x25	1 1/2	3/4	108
		375	5400	AK 20-375-18	180	1110	222	140	160, 4 x M12x25	1 1/2	3/4	144
		600	8700	AK 20-600-18	180	1185	250	140	160, 4 x M12x25	3/4	3/4	266
		250	3600	AK 20-250-20	200	895	230	201	160, 4 x M12x25	1 1/2	3/4	122
25	6,5	280	4000	AK 25-280-18	180	1295	210	140	160, 4 x M12x25	1 1/2	3/4	122
		375	5400	AK 25-375-18	180	1310	222	140	160, 4 x M12x25	1 1/2	3/4	165
30	8,0	280	4000	AK 30-280-18	180	1490	210	140	160, 4 x M12x25	1 1/2	3/4	137
		375	5400	AK 30-375-18	180	1505	222	140	160, 4 x M12x25	1 1/2	3/4	185
		250	3600	AK 30-250-20	200	1210	230	201	160, 4 x M12x25	1 1/2	3/4	152
		220	3200	AK 30-220-25	250	980	290	220	240, 4 x M12x25	1 1/2	3/4	198
		350	5100	AK 30-350-25	250	1010	290	220	240, 4 x M12x25	1 1/2	3/4	289
40	10,5	280	4000	AK 40-280-18	180	1880	210	140	160, 4 x M12x25	1 1/2	3/4	165
		375	5400	AK 40-375-18	180	1895	222	140	160, 4 x M12x25	1 1/2	3/4	226
		250	3600	AK 40-250-20	200	1530	230	201	160, 4 x M12x25	1 1/2	3/4	182
		220	3200	AK 40-220-25	250	1185	290	220	240, 4 x M12x25	1 1/2	3/4	225
		350	5100	AK 40-350-25	250	1215	290	220	240, 4 x M12x25	1 1/2	3/4	331
50	13,0	280	4000	AK 50-280-18	180	2275	210	140	160, 4 x M12x25	1 1/2	3/4	194
		375	5400	AK 50-375-18	180	2290	222	140	160, 4 x M12x25	1 1/2	3/4	267
		250	3600	AK 50-250-20	200	1850	230	201	160, 4 x M12x25	1 1/2	3/4	213
		220	3200	AK 50-220-25	250	1390	290	220	240, 4 x M12x25	1 1/2	3/4	253
		350	5100	AK 50-350-25	250	1420	290	220	240, 4 x M12x25	1 1/2	3/4	374



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 - Piston from \varnothing 180 mm

■ CE Series AK 60 - 90 l

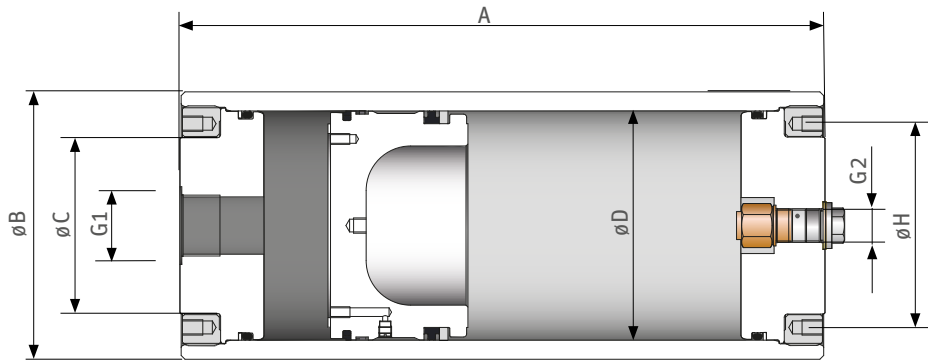


Oil volume		Design pressure		Type	Piston- \varnothing D [mm]	Length A [mm]	Outside- \varnothing B [mm]	Thread ring- \varnothing C [mm]	Fastening \varnothing H [mm]	Oil side G1	Gas side G2	Weight approx. [kg]
[l]	[gal]	[bar]	[psi]									
60	16,0	280	4000	AK 60-280-18	180	2670	210	140	160, 4 x M12x25	1 1/2	3/4	222
		375	5400	AK 60-375-18	180	2685	222	140	160, 4 x M12x25	1 1/2	3/4	308
		250	3600	AK 60-250-20	200	2165	230	201	160, 4 x M12x25	1 1/2	3/4	213
		220	3200	AK 60-220-25	250	1590	290	220	240, 4 x M12x25	1 1/2	3/4	279
		350	5100	AK 60-350-25	250	1620	290	220	240, 4 x M12x25	1 1/2	3/4	416
70	18,5	280	4000	AK 70-280-18	180	3060	210	140	160, 4 x M12x25	1 1/2	3/4	250
		375	5400	AK 70-375-18	180	3075	222	140	160, 4 x M12x25	1 1/2	3/4	348
		250	3600	AK 70-250-20	200	2485	230	201	160, 4 x M12x25	1 1/2	3/4	272
		220	3200	AK 70-220-25	250	1795	290	220	240, 4 x M12x25	1 1/2	3/4	307
		350	5100	AK 70-350-25	250	1825	290	220	240, 4 x M12x25	1 1/2	3/4	458
		220	3200	AK 70-220-31	310	1395	350	260	290, 4 x M12x25	1 1/2	3/4	356
80	21,0	350	5100	AK 70-350-31	310	1425	375	260	290, 4 x M12x25	1 1/2	3/4	470
		280	4000	AK 80-280-18	180	3455	210	140	160, 4 x M12x25	1 1/2	3/4	279
		375	5400	AK 80-375-18	180	3470	222	140	160, 4 x M12x25	1 1/2	3/4	390
		250	3600	AK 80-250-20	200	2850	230	201	160, 4 x M12x25	1 1/2	3/4	363
		220	3200	AK 80-220-25	250	2000	290	220	240, 4 x M12x25	1 1/2	3/4	334
		350	5100	AK 80-350-25	250	2030	290	220	240, 4 x M12x25	1 1/2	3/4	501
90	24,0	220	3200	AK 80-220-31	310	1530	350	260	290, 4 x M16x25	1 1/2	3/4	329
		350	5100	AK 80-350-31	310	1560	375	260	290, 4 x M16x25	1 1/2	3/4	480
		280	4000	AK 90-280-18	180	3845	210	140	160, 4 x M12x25	1 1/2	3/4	307
		375	5400	AK 90-375-18	180	3860	222	140	160, 4 x M12x25	1 1/2	3/4	430
		250	3600	AK 90-250-20	200	3120	230	201	160, 4 x M12x25	1 1/2	3/4	332
		220	3200	AK 90-220-25	250	2205	290	220	240, 4 x M12x25	1 1/2	3/4	361
		350	5100	AK 90-350-25	250	2235	290	220	240, 4 x M12x25	1 1/2	3/4	543
220	3200	AK 90-220-31	310	1660	350	260	290, 4 x M16x25	1 1/2	3/4	350		
350	5100	AK 90-350-31	310	1690	375	260	290, 4 x M16x25	1 1/2	3/4	480		

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 - Piston from \varnothing 180 mm

■ CE Series AK 100 - 150 l

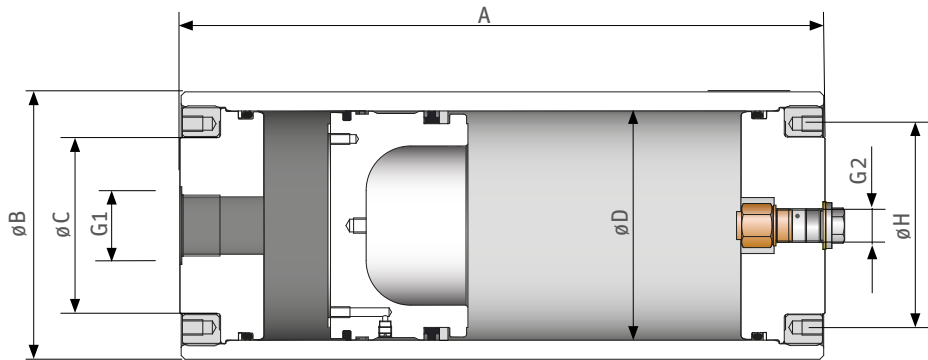


Oil volume		Design pressure		Type	Piston- ø	Length	Outside-ø	Thread ring-ø	Fastening	Oil side	Gas side	Weight approx.
[l]	[gal]	[bar]	[psi]									
100	26,5	250	3600	AK 100-250-20	200	3440	230	201	160, 4 x M12x25	1 1/2	3/4	362
		220	3200	AK 100-220-25	250	2405	290	220	240, 4 x M12x25	1 1/2	3/4	388
		350	5100	AK 100-350-25	250	2435	290	220	240, 4 x M12x25	1 1/2	3/4	585
		220	3200	AK 100-220-31	310	1795	350	260	290, 4 x M16x25	1 1/2	3/4	370
		350	5100	AK 100-350-31	310	1825	375	260	290, 4 x M16x25	1 1/2	3/4	510
		220	3200	AK 100-220-36	360	1520	410	290	330, 4 x M16x25	1 1/2	3/4	530
		350	5100	AK 100-350-36	360	1560	430	290	330, 4 x M16x25	1 1/2	3/4	763
120	31,5	220	3200	AK 120-220-25	250	2815	290	220	240, 4 x M12x25	1 1/2	3/4	443
		350	5100	AK 120-350-25	250	2845	290	220	240, 4 x M12x25	1 1/2	3/4	670
		220	3200	AK 120-220-31	310	2060	350	260	290, 4 x M16x25	1 1/2	3/4	415
		350	5100	AK 120-350-31	310	2090	375	260	290, 4 x M16x25	1 1/2	3/4	572
		220	3200	AK 120-220-36	360	1720	410	290	330, 4 x M16x25	1 1/2	3/4	572
		350	5100	AK 120-350-36	360	1760	430	290	330, 4 x M16x25	1 1/2	3/4	831
140	37,0	220	3200	AK 140-220-25	250	3220	290	220	240, 4 x M12x25	1 1/2	3/4	497
		350	5100	AK 140-350-25	250	3250	290	220	240, 4 x M12x25	1 1/2	3/4	754
		220	3200	AK 140-220-31	310	2325	350	260	290, 4 x M16x25	1 1/2	3/4	458
		350	5100	AK 140-350-31	310	2355	375	260	290, 4 x M16x25	1 1/2	3/4	633
		220	3200	AK 140-220-36	360	1915	410	290	330, 4 x M16x25	1 1/2	3/4	678
		350	5100	AK 140-350-36	360	1955	430	290	330, 4 x M16x25	1 1/2	3/4	963
150	40,0	220	3200	AK 150-220-25	250	3425	290	220	240, 4 x M12x25	1 1/2	3/4	524
		350	5100	AK 150-350-25	250	3455	290	220	240, 4 x M12x25	1 1/2	3/4	796
		220	3200	AK 150-220-31	310	2455	350	260	290, 4 x M16x25	1 1/2	3/4	488
		350	5100	AK 150-350-31	310	2485	375	260	290, 4 x M16x25	1 1/2	3/4	662
		220	3200	AK 150-220-36	360	2015	410	290	330, 4 x M16x25	1 1/2	3/4	634
		350	5100	AK 150-350-36	360	2055	430	290	330, 4 x M16x25	1 1/2	3/4	932

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 - Piston from \varnothing 180 mm

■ CE Series AK 160 - 250 l



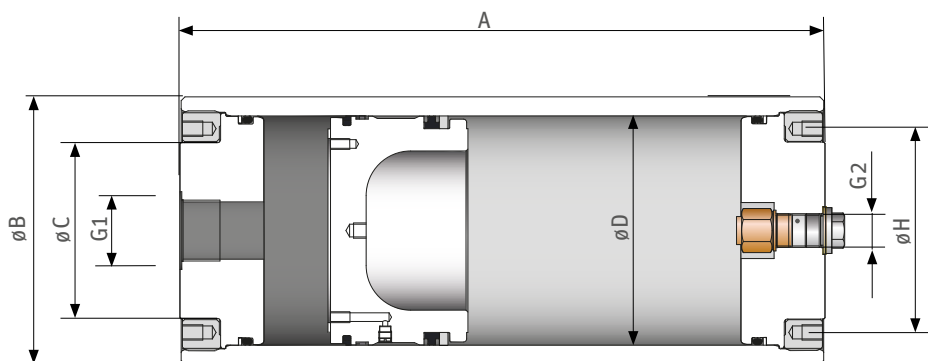
Oil volume		Design pressure		Type	Piston- \varnothing D [mm]	Length A [mm]	Outside- \varnothing B [mm]	Thread ring- \varnothing C [mm]	Fastening \varnothing H [mm]	Oil side G1	Gas side G2	Weight approx. [kg]
[l]	[gal]	[bar]	[psi]									
160	42,5	220	3200	AK 160-220-25	250	3630	290	220	240, 4 x M12x25	1 1/2	3/4	552
		350	5100	AK 160-350-25	250	3660	290	220	240, 4 x M12x25	1 1/2	3/4	839
		220	3200	AK 160-220-31	310	2590	350	260	290, 4 x M16x25	1 1/2	3/4	502
		350	5100	AK 160-350-31	310	2620	375	260	290, 4 x M16x25	1 1/2	3/4	693
		220	3200	AK 160-220-36	360	2110	410	290	330, 4 x M16x25	1 1/2	3/4	655
		350	5100	AK 160-350-36	360	2150	430	290	330, 4 x M16x25	1 1/2	3/4	965
180	47,5	220	3200	AK 180-220-25	250	4035	290	220	240, 4 x M12x25	1 1/2	3/4	606
		350	5100	AK 180-350-25	250	4065	290	220	240, 4 x M12x25	1 1/2	3/4	923
		220	3200	AK 180-220-31	310	2855	350	260	290, 4 x M16x25	1 1/2	3/4	545
		350	5100	AK 180-350-31	310	2885	375	260	290, 4 x M16x25	1 1/2	3/4	754
		220	3200	AK 180-220-36	360	2310	410	290	330, 4 x M16x25	1 1/2	3/4	697
		350	5100	AK 180-350-36	360	2350	430	290	330, 4 x M16x25	1 1/2	3/4	1033
200	53,0	220	3200	AK 200-220-31	310	3120	350	260	290, 4 x M16x25	1 1/2	3/4	588
		350	5100	AK 200-350-31	310	3150	375	260	290, 4 x M16x25	1 1/2	3/4	815
		220	3200	AK 200-220-36	360	2505	410	290	330, 4 x M16x25	1 1/2	3/4	739
		350	5100	AK 200-350-36	360	2545	430	290	330, 4 x M16x25	1 1/2	3/4	1100
225	59,5	220	3200	AK 225-220-31	310	3450	350	260	290, 4 x M16x25	1 1/2	3/4	642
		350	5100	AK 225-350-31	310	3480	375	260	290, 4 x M16x25	1 1/2	3/4	891
		220	3200	AK 225-220-36	360	2750	410	290	330, 4 x M16x25	1 1/2	3/4	791
		350	5100	AK 225-350-36	360	2790	430	290	330, 4 x M16x25	1 1/2	3/4	1183
250	66,0	220	3200	AK 250-220-31	310	3780	350	260	290, 4 x M16x25	1 1/2	3/4	696
		350	5100	AK 250-350-31	310	3810	375	260	290, 4 x M16x25	1 1/2	3/4	967
		220	3200	AK 250-220-36	360	2995	410	290	330, 4 x M16x25	1 1/2	3/4	843
		350	5100	AK 250-350-36	360	3035	430	290	330, 4 x M16x25	1 1/2	3/4	1267



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 - Piston from \varnothing 180 mm

■ CE Series AK 275 - 375 l

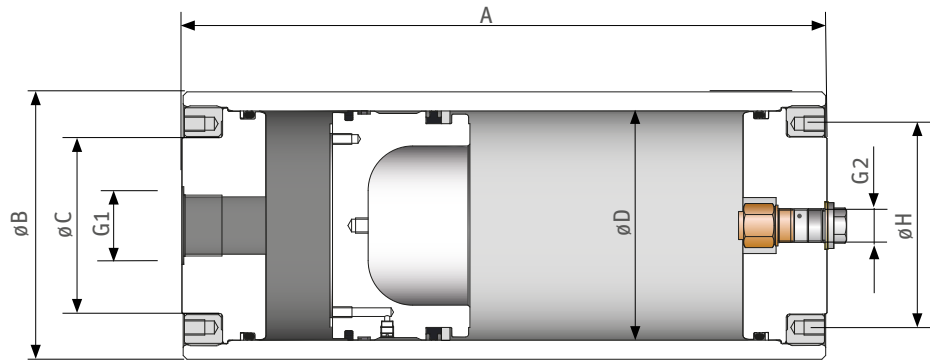


Oil volume		Design pressure		Type	Piston- \varnothing	Length	Outside- \varnothing	Thread ring- \varnothing	Fastening	Oil side	Gas side	Weight approx.
[l]	[gal]	[bar]	[psi]									
275	72,5	220	3200	AK 275-220-31	310	4115	350	260	290, 4 x M16x25	1 1/2	3/4	750
		350	5100	AK 275-350-31	310	4145	375	260	290, 4 x M16x25	1 1/2	3/4	1044
		220	3200	AK 275-220-36	360	3240	410	290	330, 4 x M16x25	1 1/2	3/4	896
		350	5100	AK 275-350-36	360	3280	430	290	330, 4 x M16x25	1 1/2	3/4	1351
300	79,0	220	3200	AK 300-220-31	310	4445	350	260	290, 4 x M16x25	1 1/2	3/4	804
		350	5100	AK 300-350-31	310	4475	375	260	290, 4 x M16x25	1 1/2	3/4	1119
		220	3200	AK 300-220-36	360	3485	410	290	330, 4 x M16x25	1 1/2	3/4	948
		350	5100	AK 300-350-36	360	3525	430	290	330, 4 x M16x25	1 1/2	3/4	1435
		220	3200	AK 300-220-49	490	2350	548	420	460, 4 x M16x25	1 1/2	3/4	1815
325	89,0	220	3200	AK 325-220-31	310	4775	350	260	290, 4 x M16x25	1 1/2	3/4	858
		350	5100	AK 325-350-31	310	4805	375	260	290, 4 x M16x25	1 1/2	3/4	1195
		220	3200	AK 325-220-36	360	3735	410	290	330, 4 x M16x25	1 1/2	3/4	1001
		350	5100	AK 325-350-36	360	3775	430	290	330, 4 x M16x25	1 1/2	3/4	1521
		220	320	AK 325-220-49	490	2480	548	420	460, 4 x M16x25	1 1/2	3/4	1860
350	92,5	220	3200	AK 350-220-31	310	5105	350	260	290, 4 x M16x25	1 1/2	3/4	912
		350	5100	AK 350-350-31	310	5135	375	260	290, 4 x M16x25	1 1/2	3/4	1271
		220	3200	AK 350-220-36	360	3980	410	290	330, 4 x M16x25	1 1/2	3/4	1053
		350	5100	AK 350-350-36	360	4020	430	290	330, 4 x M16x25	1 1/2	3/4	1604
		220	3200	AK 350-220-49	490	2610	548	420	460, 4 x M16x25	1 1/2	3/4	1915
375	99,0	220	3200	AK 375-220-31	310	5440	350	260	290, 4 x M16x25	1 1/2	3/4	967
		350	5100	AK 375-350-31	310	5470	375	260	290, 4 x M16x25	1 1/2	3/4	1347
		220	3200	AK 375-220-36	360	4225	410	290	330, 4 x M16x25	1 1/2	3/4	1105
		350	5100	AK 375-350-36	360	4265	430	290	330, 4 x M16x25	1 1/2	3/4	1687
		220	3200	AK 375-220-49	490	2750	548	420	460, 4 x M16x25	1 1/2	3/4	1965

 **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 - Piston from \varnothing 180 mm

■ CE Series AK 400 - 650 l

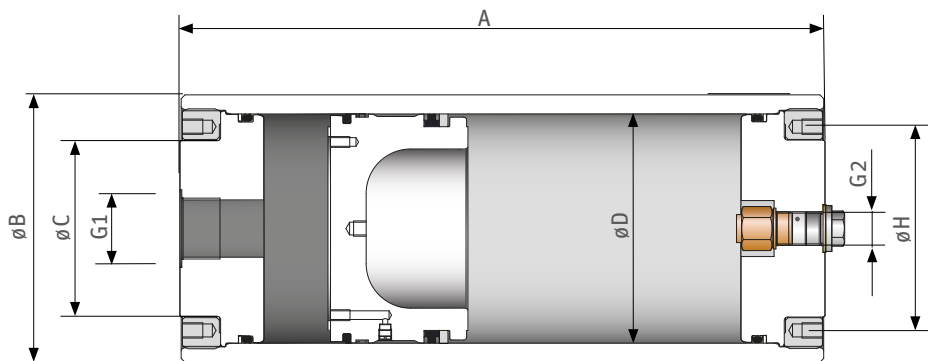


Oil volume		Design pressure		Type	Piston- \varnothing D [mm]	Length A [mm]	Outside- \varnothing B [mm]	Thread ring- \varnothing C [mm]	Fastening \varnothing H [mm]	Oil side G1	Gas side G2	Weight approx. [kg]
[l]	[gal]	[bar]	[psi]									
400	105,5	220	3200	AK 400-220-31	310	5770	350	260	290, 4 x M16x25	1 1/2	3/4	1021
		350	5100	AK 400-350-31	310	5800	375	260	290, 4 x M16x25	1 1/2	3/4	1423
		220	3200	AK 400-220-36	360	4470	410	290	330, 4 x M16x25	1 1/2	3/4	1157
		350	5100	AK 400-350-36	360	4510	430	290	330, 4 x M16x25	1 1/2	3/4	1771
		220	3200	AK 400-220-49	490	2880	548	420	460, 4 x M16x25	1 1/2	3/4	2010
425	112,5	220	3200	AK 425-220-36	360	4715	410	290	330, 4 x M16x25	1 1/2	3/4	1209
		350	5100	AK 425-350-36	360	4755	430	290	330, 4 x M16x25	1 1/2	3/4	1855
		220	3200	AK 425-220-49	490	3015	548	420	460, 4 x M16x25	1 1/2	3/4	2060
450	119,0	220	3200	AK 450-220-36	360	4960	410	290	330, 4 x M16x25	1 1/2	3/4	1261
		350	5100	AK 450-350-36	360	5000	430	290	330, 4 x M16x25	1 1/2	3/4	1939
		220	3200	AK 450-220-49	490	3145	548	420	460, 4 x M16x25	1 1/2	3/4	2110
475	125,5	220	3200	AK 475-220-36	360	5205	410	290	330, 4 x M16x25	1 1/2	3/4	1313
		350	5100	AK 475-350-36	360	5245	430	290	330, 4 x M16x25	1 1/2	3/4	2023
		220	3200	AK 475-220-49	490	3280	548	420	460, 4 x M16x25	1 1/2	3/4	2160
500	132,0	220	3200	AK 500-220-36	360	5450	410	290	330, 4 x M16x25	1 1/2	3/4	1366
		350	5100	AK 500-350-36	360	5490	430	290	330, 4 x M16x25	1 1/2	3/4	2106
		220	3200	AK 500-220-49	490	3410	548	420	460, 4 x M16x25	1 1/2	3/4	2210
550	145,5	220	3200	AK 550-220-36	360	5945	410	290	330, 4 x M16x25	1 1/2	3/4	1471
		350	5100	AK 550-350-36	360	5985	430	290	330, 4 x M16x25	1 1/2	3/4	2275
		220	3200	AK 550-220-49	490	3675	548	420	460, 4 x M16x25	1 1/2	3/4	2310
600	158,5	220	3200	AK 600-220-36	360	6435	410	290	330, 4 x M16x25	1 1/2	3/4	1575
		350	5100	AK 600-350-36	360	6475	430	290	330, 4 x M16x25	1 1/2	3/4	2443
		220	3200	AK 600-220-49	490	3940	548	420	460, 4 x M16x25	1 1/2	3/4	2410
650	172,0	220	3200	AK 650-220-36	360	6925	410	290	330, 4 x M16x25	1 1/2	3/4	1680
		350	5100	AK 650-350-36	360	6965	430	290	330, 4 x M16x25	1 1/2	3/4	2611
		220	3200	AK 650-220-49	490	4205	548	420	460, 4 x M16x25	1 1/2	3/4	2510

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 - Piston from \varnothing 180 mm

■ CE Series AK 700 - 800 l



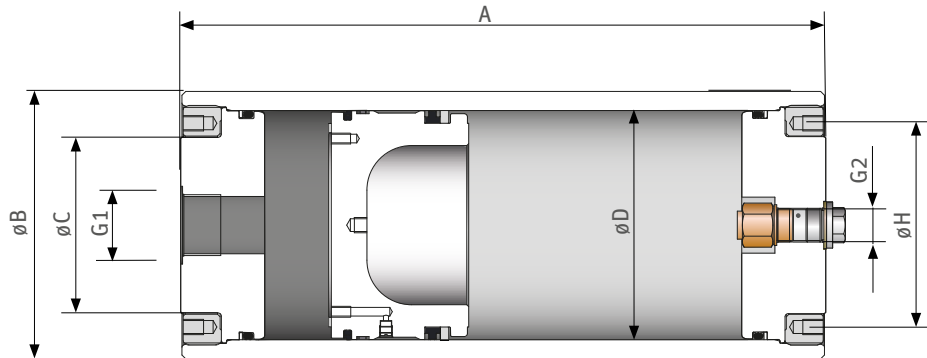
Oil volume		Design pressure		Type	Piston- \varnothing	Length	Outside- \varnothing	Thread ring- \varnothing	Fastening	Oil side	Gas side	Weight approx.
[l]	[gal]	[bar]	[psi]									
700	185,0	220	3200	AK 700-220-36	360	7415	410	290	330, 4 x M16x25	1 1/2	3/4	1784
		350	5100	AK 700-350-36	360	7455	430	290	330, 4 x M16x25	1 1/2	3/4	2778
		220	3200	AK 700-220-49	490	4470	548	420	460, 4 x M16x25	1 1/2	3/4	2610
750	198,0	220	3200	AK 750-220-36	360	7910	410	290	330, 4 x M16x25	1 1/2	3/4	1889
		350	5100	AK 750-350-36	360	7960	430	290	330, 4 x M16x25	1 1/2	3/4	2947
		220	3200	AK 750-220-49	490	4735	548	420	460, 4 x M16x25	1 1/2	3/4	2710
800	211,5	220	3200	AK 800-220-36	360	8400	410	290	330, 4 x M16x25	1 1/2	3/4	1993
		350	5100	AK 800-350-36	360	8440	430	290	330, 4 x M16x25	1 1/2	3/4	3115
		220	3200	AK 800-220-49	490	5000	548	420	460, 4 x M16x25	1 1/2	3/4	2810



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 UAK

ASME Series UAK 2,5 - 16,0 gal



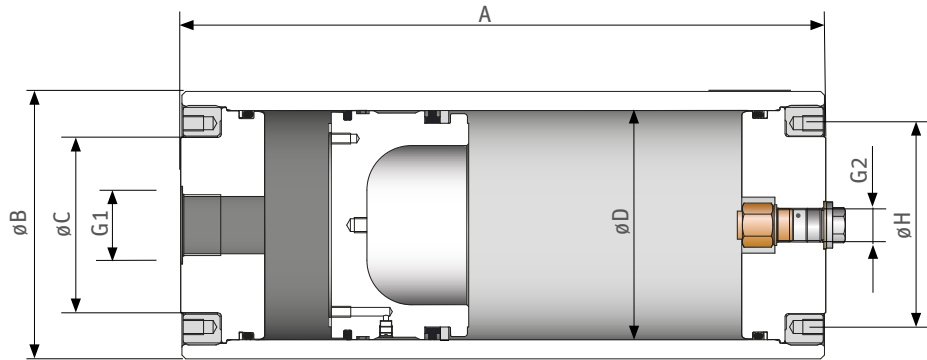
Oil volume		Design pressure		Type	Piston- ϕ	Length	Outside- ϕ	Inside- ϕ	Fasening	Oil side	Gas side	Weight approx.
[gal]	[l]	[psi]	[bar]									
2,5	10	3200	220	UAK 10-32-18	7,09/180	28,35/720	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	92
		5500	375	UAK 10-55-18	7,09/180	29,72/755	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	120
4,0	15	3200	220	UAK 15-32-18	7,09/180	36,22/920	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	105
		5500	375	UAK 15-55-18	7,09/180	37,40/950	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	138
5,5	20	3200	220	UAK 20-32-18	7,09/180	43,90/1115	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	118
		5500	375	UAK 20-55-18	7,09/180	45,10/1145	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	156
6,5	25	3200	220	UAK 25-32-18	7,09/180	40,55/1030	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	130
		5500	375	UAK 25-55-18	7,09/180	52,76/1340	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	174
8,0	30	3200	220	UAK 30-32-18	7,09/180	59,45/1510	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	143
		5500	375	UAK 30-55-18	7,09/180	60,63/1540	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	192
		3200	220	UAK 30-32-25	9,84/250	40,55/1030	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	290
		5100	350	UAK 30-51-25	9,84/250	42,52/1080	12,20/310	8,66/220	240, 4 x M12x25	1 1/2	3/4	409
10,5	40	3200	220	UAK 40-32-18	7,09/180	74,80/1900	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	168
		5500	375	UAK 40-55-18	7,09/180	76,00/1930	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	227
		3200	220	UAK 40-32-25	9,84/250	48,62/1235	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	318
		5100	350	UAK 40-51-25	9,84/250	50,59/1285	12,20/310	8,66/220	240, 4 x M12x25	1 1/2	3/4	452
13,5	50	3200	220	UAK 50-32-18	7,09/180	90,35/2295	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	194
		5500	375	UAK 50-55-18	7,09/180	91,54/2325	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	263
		3200	220	UAK 50-32-25	9,84/250	56,70/1440	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	345
		5100	350	UAK 50-51-25	9,84/250	58,66/1490	12,20/310	8,66/220	240, 4 x M12x25	1 1/2	3/4	309
16,0	60	3200	220	UAK 60-32-18	7,09/180	105,90/2690	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	219
		5500	375	UAK 60-55-18	7,09/180	107,10/2720	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	299
		3200	220	UAK 60-32-25	9,84/250	64,57/1640	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	372
		5100	350	UAK 60-51-25	9,84/250	66,54/1690	12,20/310	8,66/220	240, 4 x M12x25	1 1/2	3/4	536



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 UAK

ASME Series UAK 18,5 - 26,5 gal

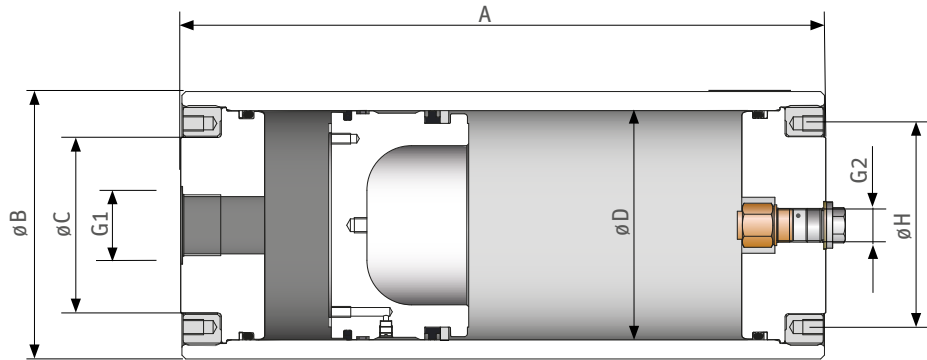


Oil volume		Design pressure		Type	Piston- ϕ	Length	Outside- ϕ	Inside- ϕ	Fasening	Oil side	Gas side	Weight approx.
[gal]	[l]	[psi]	[bar]									
18,5	70	3200	220	UAK 70-32-18	7,09/180	121,3/3080	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	245
		5500	375	UAK 70-55-18	7,09/180	122,5/3110	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	334
		3200	220	UAK 70-32-25	9,84/250	72,64/1845	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	400
		5100	350	UAK 70-51-25	9,84/250	74,60/1895	12,20/310	7,87/200	240, 4 x M12x25	1 1/2	3/4	578
		3200	220	UAK 70-32-31	12,20/310	58,66/1490	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	537
		5100	350	UAK 70-51-31	12,20/310	62,20/1580	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	620
21,0	80	3200	220	UAK 80-32-18	7,09/180	136,8/3475	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	270
		5500	375	UAK 80-55-18	7,09/180	138,0/3505	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	370
		3200	220	UAK 80-32-25	9,84/250	80,71/2050	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	427
		5100	350	UAK 80-51-25	9,84/250	82,68/2100	12,20/310	7,87/200	240, 4 x M12x25	1 1/2	3/4	621
		3200	220	UAK 80-32-31	12,20/310	63,78/1620	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	565
		5100	350	UAK 80-51-31	12,20/310	67,52/1715	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	653
24,0	90	3200	220	UAK 90-32-18	7,09/180	152,2/3865	8,15/207	5,51/140	160, 4 x M12x25	1 1/2	3/4	295
		5500	375	UAK 90-55-18	7,09/180	153,3/3895	8,54/217	5,51/140	160, 4 x M12x25	1 1/2	3/4	405
		3200	220	UAK 90-32-25	9,84/250	88,78/2255	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	454
		5100	350	UAK 90-51-25	9,84/250	90,75/2305	12,20/310	7,87/200	240, 4 x M12x25	1 1/2	3/4	663
		3200	220	UAK 90-32-31	12,20/310	69,10/1755	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	592
		5100	350	UAK 90-51-31	12,20/310	72,64/1845	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	687
26,5	100	3200	220	UAK 100-32-25	9,84/250	96,65/2455	16,14/410	8,66/220	240, 4 x M12x25	1 1/2	3/4	480
		5100	350	UAK 100-51-25	9,84/250	98,62/2505	12,20/310	7,87/200	240, 4 x M12x25	1 1/2	3/4	705
		3200	220	UAK 100-32-31	12,20/310	74,41/1890	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	620
		5100	350	UAK 100-51-31	12,20/310	77,95/1980	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	720
		3200	220	UAK 100-32-36	14,17/360	61,22/1555	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	817
		5100	350	UAK 100-51-36	14,17/360	64,57/1640	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1007

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 UAK

ASME Series UAK 31,5 - 42,5 gal



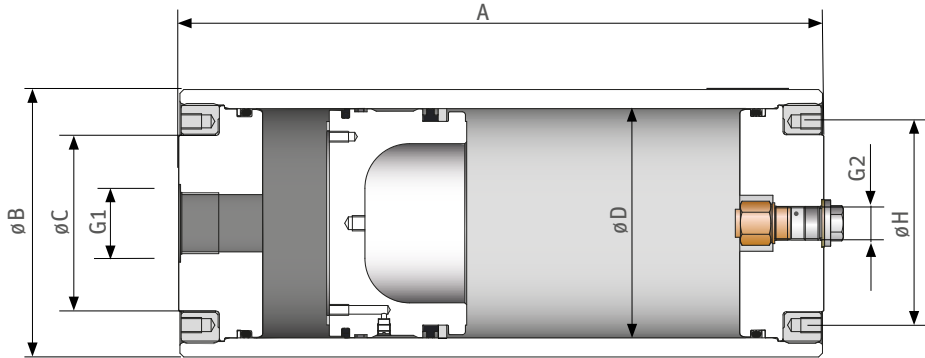
Oil volume		Design pressure		Type	Piston-ø	Length	Outside-ø	Inside-ø	Fasening	Oil side	Gas side	Weight approx.
[gal]	[l]	[psi]	[bar]									
31,5	120	3200	220	UAK 120-32-25	9,84/250	112,80/2865	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	535
		5100	350	UAK 120-51-25	9,84/250	114,80/2915	12,20/310	7,87/200	240, 4 x M12x25	1 1/2	3/4	790
		3200	220	UAK 120-32-31	12,2/310	84,84/2155	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	675
		5100	350	UAK 120-51-31	12,2/310	88,40/2245	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	788
		3200	220	UAK 120-32-36	14,17/360	68,90/1750	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	803
		5100	350	UAK 120-51-36	14,17/360	72,45/1840	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1076
37,0	140	3200	220	UAK 140-32-25	9,84/250	128,70/3270	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	590
		5100	350	UAK 140-51-25	9,84/250	130,70/3320	12,20/310	7,87/200	240, 4 x M12x25	1 1/2	3/4	874
		3200	220	UAK 140-32-31	12,2/310	95,28/2420	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	730
		5100	350	UAK 140-51-31	12,2/310	98,82/2510	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	854
		3200	220	UAK 140-32-36	14,17/360	76,57/1945	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	910
		5100	350	UAK 140-51-36	14,17/360	80,12/2035	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1143
39,5	150	3200	220	UAK 150-32-25	9,84/250	97,44/3475	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	617
		5100	350	UAK 150-51-25	9,84/250	138,80/3525	12,20/310	7,87/200	240, 4 x M12x25	1 1/2	3/4	917
		3200	220	UAK 150-32-31	12,2/310	100,40/2550	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	757
		5100	350	UAK 150-51-31	12,2/310	103,90/2640	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	887
		3200	220	UAK 150-32-36	14,17/360	80,51/2045	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	934
		5100	350	UAK 150-51-36	14,17/360	84,06/2135	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1177
42,5	160	3200	220	UAK 160-32-25	9,84/250	145,00/3680	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	644
		5100	350	UAK 160-51-25	9,84/250	147,00/3730	12,20/310	7,87/200	240, 4 x M12x25	1 1/2	3/4	960
		3200	220	UAK 160-32-31	12,2/310	105,70/2685	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	784
		5100	350	UAK 160-51-31	12,2/310	109,30/2775	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	920
		3200	220	UAK 160-32-36	14,17/360	84,45/2145	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	957
		5100	350	UAK 160-51-36	14,17/360	87,80/2230	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1210



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 UAK

ASME Series UAK 47,5 - 79,0 gal

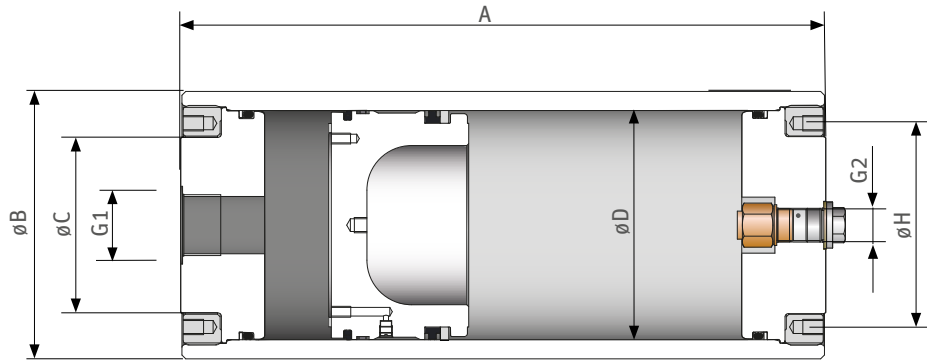


Oil volume		Design pressure		Type	Piston-ø	Length	Outside-ø	Inside-ø	Fasening	Oil side	Gas side	Weight approx.
[gal]	[l]	[psi]	[bar]									
47,5	180	3200	220	UAK 180-32-25	9,84/250	160,80/4085	11,42/290	8,66/220	240, 4 x M12x25	1 1/2	3/4	698
		5100	350	UAK 180-51-25	9,84/250	162,80/4135	12,20/310	8,66/220	240, 4 x M12x25	1 1/2	3/4	1044
		3200	220	UAK 180-32-31	12,20/310	116,10/2950	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	840
		5100	350	UAK 180-51-31	12,20/310	119,90/3045	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	988
		3200	220	UAK 180-32-36	14,17/360	92,13/2340	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1004
		5100	350	UAK 180-51-36	14,17/360	95,67/2430	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1277
53,0	200	3200	220	UAK 200-32-31	12,20/310	91,14/3215	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	894
		5100	350	UAK 200-51-31	12,20/310	130,10/3305	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	1054
		3200	220	UAK 200-32-36	14,17/360	99,80/2535	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1050
		5100	350	UAK 200-51-36	14,17/360	103,30/2625	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1345
59,5	225	3200	220	UAK 225-32-31	12,20/310	139,60/3545	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	750
		5100	350	UAK 225-51-31	12,20/310	143,10/3635	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	1073
		3200	220	UAK 225-32-36	14,17/360	109,50/2780	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1108
		5100	350	UAK 225-51-36	14,17/360	113,00/2870	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1493
66,0	250	3200	220	UAK 250-32-31	12,20/310	152,60/3875	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	820
		5100	350	UAK 250-51-31	12,20/310	156,10/3965	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	1220
		3200	220	UAK 250-32-36	14,17/360	119,30/3030	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1168
		5100	350	UAK 250-51-36	14,17/360	122,60/3115	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1512
72,5	275	3200	220	UAK 275-32-31	12,20/310	165,70/4210	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	1100
		5100	350	UAK 275-51-31	12,20/310	196,30/4300	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	1305
		3200	220	UAK 275-32-36	14,17/360	128,90/3275	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1226
		5100	350	UAK 275-51-36	14,17/360	132,30/3360	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1559
79,0	300	3200	220	UAK 300-32-31	12,20/310	178,70/4540	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	1170
		5100	350	UAK 300-51-31	12,20/310	182,30/4630	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	1388
		3200	220	UAK 300-32-36	14,17/360	138,60/3520	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1285
		5100	350	UAK 300-51-36	14,17/360	141,90/3605	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1680

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 UAK

ASME Series UAK 86,0 - 145,5 gal

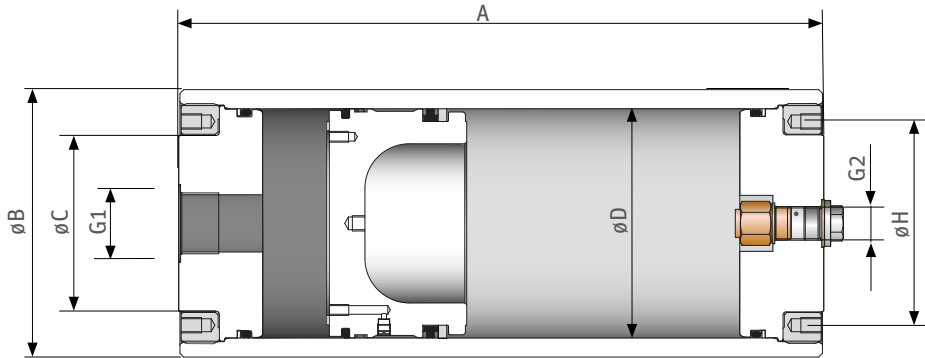


Oil volume		Design pressure		Type	Piston-ø	Length	Outside-ø	Inside-ø	Fasening	Oil side	Gas side	Weight approx.
[gal]	[l]	[psi]	[bar]									
86,0	325	3200	220	UAK 325-32-31	12,20/310	191,70/4870	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	1237
		5100	350	UAK 325-51-31	12,20/310	195,30/4960	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	1472
		3200	220	UAK 325-32-36	14,17/360	148,20/3765	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1343
		5100	350	UAK 325-51-36	14,17/360	151,80/3855	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1765
92,5	350	3200	220	UAK 350-32-31	12,20/310	204,70/5200	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	1305
		5100	350	UAK 350-51-31	12,20/310	208,30/5290	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	1555
		3200	220	UAK 350-32-36	14,17/360	157,90/4010	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1401
		5100	350	UAK 350-51-36	14,17/360	161,40/4100	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1848
99,0	375	3200	220	UAK 375-32-31	12,20/310	209,80/5530	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	1375
		5100	350	UAK 375-51-31	12,20/310	221,50/5625	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	1640
		3200	220	UAK 375-32-36	14,17/360	167,50/4255	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1460
		5100	350	UAK 375-51-36	14,17/360	171,10/4345	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	1932
105,5	400	3200	220	UAK 400-32-31	12,20/310	230,90/5865	14,17/360	10,24/260	290, 4 x M16x25	1 1/2	3/4	1445
		5100	350	UAK 400-51-31	12,20/310	234,40/5955	14,57/370	10,24/260	290, 4 x M16x25	1 1/2	3/4	1723
		3200	220	UAK 400-32-36	14,17/360	172,20/4500	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1518
		5100	350	UAK 400-51-36	14,17/360	180,70/4590	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	2015
112,5	425	3200	220	UAK 425-32-36	14,17/360	186,80/4745	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1576
		5100	350	UAK 425-51-36	14,17/360	190,40/4835	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	2100
119,0	450	3200	220	UAK 450-32-36	14,17/360	196,70/4995	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1635
		5100	350	UAK 450-51-36	14,17/360	200,00/5080	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	2185
125,5	475	3200	220	UAK 475-32-36	14,17/360	206,30/5240	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1694
		5100	350	UAK 475-51-36	14,17/360	209,60/5325	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	2267
132,0	500	3200	220	UAK 500-32-36	14,17/360	215,90/5485	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1752
		5100	350	UAK 500-51-36	14,17/360	219,30/5570	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	2350
145,5	550	3200	220	UAK 550-32-36	14,17/360	235,70/5975	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1869
		5100	350	UAK 550-51-36	14,17/360	238,80/6065	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	2520

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 UAK

ASME Series UAK 158,5 - 211,5 gal



Oil volume		Design pressure		Type	Piston-ø	Length	Outside-ø	Inside-ø	Fasening	Oil side	Gas side	Weight approx.
[gal]	[l]	[psi]	[bar]									
158,5	600	3200	220	UAK 600-32-36	14,17/360	254,50/6465	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	1985
		5100	350	UAK 600-51-36	14,17/360	258,10/6555	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	2685
172,0	650	3200	220	UAK 650-32-36	14,17/360	274,00/6960	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	2103
		5100	350	UAK 650-51-36	14,17/360	277,40/7045	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	2855
185,0	700	3200	220	UAK 700-32-36	14,17/360	293,30/7450	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	2220
		5100	350	UAK 700-51-36	14,17/360	296,70/7535	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	3025
198,0	750	3200	220	UAK 750-32-36	14,17/360	312,60/7940	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	2336
		5100	350	UAK 750-51-36	14,17/360	316,10/8030	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	3191
211,5	800	3200	220	UAK 800-32-36	14,17/360	331,89/8430	16,14/410	11,42/290	330, 4 x M16x25	1 1/2	3/4	2453
		5100	350	UAK 800-51-36	14,17/360	335,40/8520	16,93/430	11,42/290	330, 4 x M16x25	1 1/2	3/4	3360

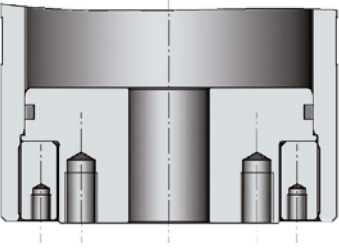
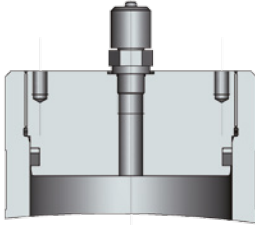
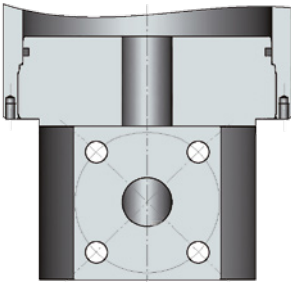
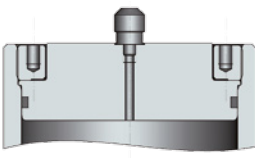
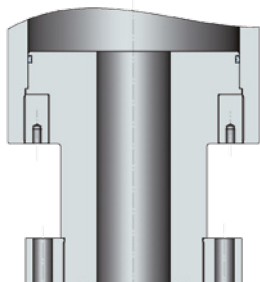
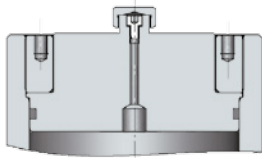
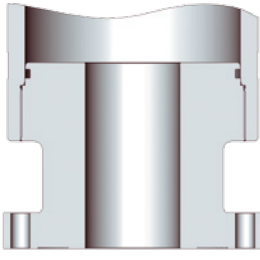
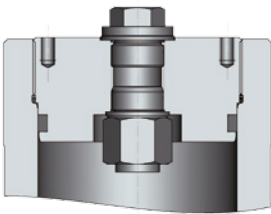


Note: The dimensions may vary slightly depending on the materials used and/or applied acceptances. In the event of an order, you will receive a binding drawing for approval for non-standard products.

Special connections and filling valves

■ Special connections AK/UAK

Filling valves AK/UAK - Examples

Special connections	Designation	Filling valves	Designation
	Axial flange connection		Minimess filling valve M 16 x 1,5
	Radial flange connection		Filling valve with connection 7/8" 14 UNF 1A
	Axial flange connection		Filling valve for diaphragm accumulator M 28 x 1.5
	Screwed end cap with axial flange connection		Roth gas filling valve with connection 3/4"

 **Note:** Only a possible selection of special connections and gas filling valves is shown above.
We offer further types on request gladly.

Calculation



Fax: +49 (0) 64 61 / 933-161
Email: service@roth-hydraulics.de



Fax: +86 (0) 512 / 53 20 88 39
Email: service@roth-hydraulics.cn



Fax: +1 (0) 315 / 475 0200
Email: service@roth-hydraulics.com

■ Accumulator calculation form

Personalization	
Company name	
Name, first Name	
Email	
Phone	

Project title	Accumulator type	Quantity
	Diaphragm accumulator	
	Bladder accumulator	
	Piston accumulator	
	Pressure vessel eg..	

Date _____

Sign _____

Accumulator calculation					
Working pressure [bar]	min.	max.		Precharge pressure [bar] at 20 °C	
Discharge volume [l]				Discharge time [s]	
Alternatively to discharge volume and discharge time, total volume of accumulator [l]				Discharge profile	
Ambient temperature [°C]	min.	max.		Material	Accumulator shell
Medium temperature [°C]	min.	max.			Diaphragm
Medium fluid side					Bladder
Medium gas side					Seal
Load alternation per week	Number			Connection fluid side	
Operating mode	Short stroke	Long stroke	High frequency	Connection gas side	
Installation space - maximum height				Coating inside	
Acceptance	Country of installation	Regulations		Coating outside	

Special features/additions

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 dealer network worldwide
- > International production approvals, including ASME Code, Russian Customs Union TR-CU, Korea KGS

Complete product portfolio

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

A large, white, stylized version of the Roth Hydraulics logo, consisting of the word "Roth" in a bold, sans-serif font with horizontal lines above and below it, and the word "Hydraulics" in a smaller, bold, sans-serif font below "Roth".A close-up photograph of a person's hand, palm up, holding the large white logo from the previous block. The hand is positioned at the bottom left of the page, with the fingers slightly curled under the logo.



Roth Hydraulics

Accumulators

- > Diaphragm accumulators
- > Bladder accumulators
- > Piston accumulators

Accumulator systems

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

Special solutions

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

Roth
Hydraulics



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Fax: +49 (0) 64 61/9 33-161
Email: service@roth-hydraulics.de
www.roth-hydraulics.de



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