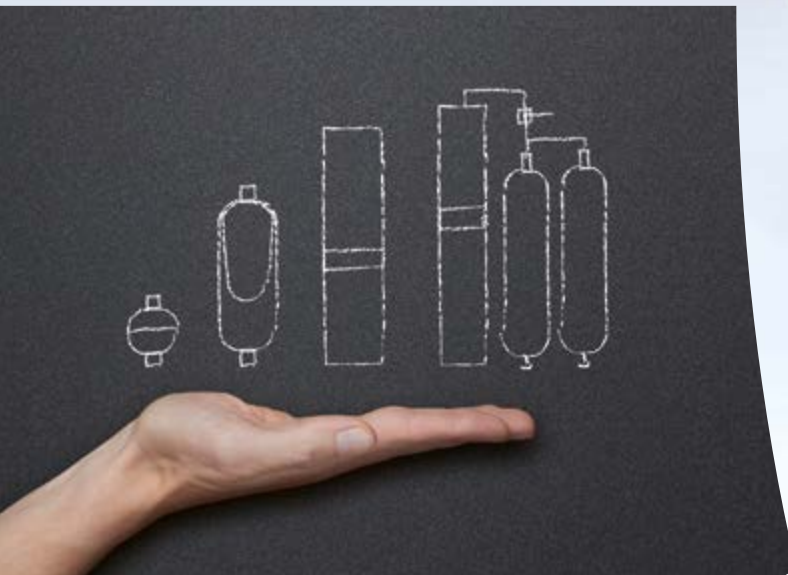


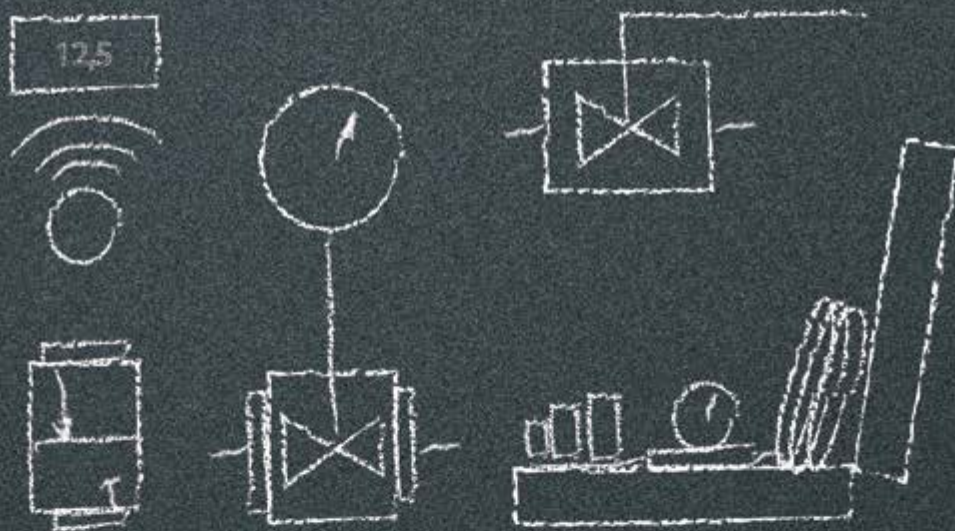
- > Gas-side accessories
- > Oil-side accessories
- > Measuring and display devices
- > Pressure vessels
- > Mounting technology
- > Spare parts and tools



*excellent pressure solutions*

### *Roth Hydraulics accumulator accessories*

*... are designed and tested specifically 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 storage systems with nitrogen including all necessary display, safety, and shut-off devices. Roth products enjoy an excellent reputation worldwide and stand for robustness and durability. International certifications and approvals ensure global acceptance.*









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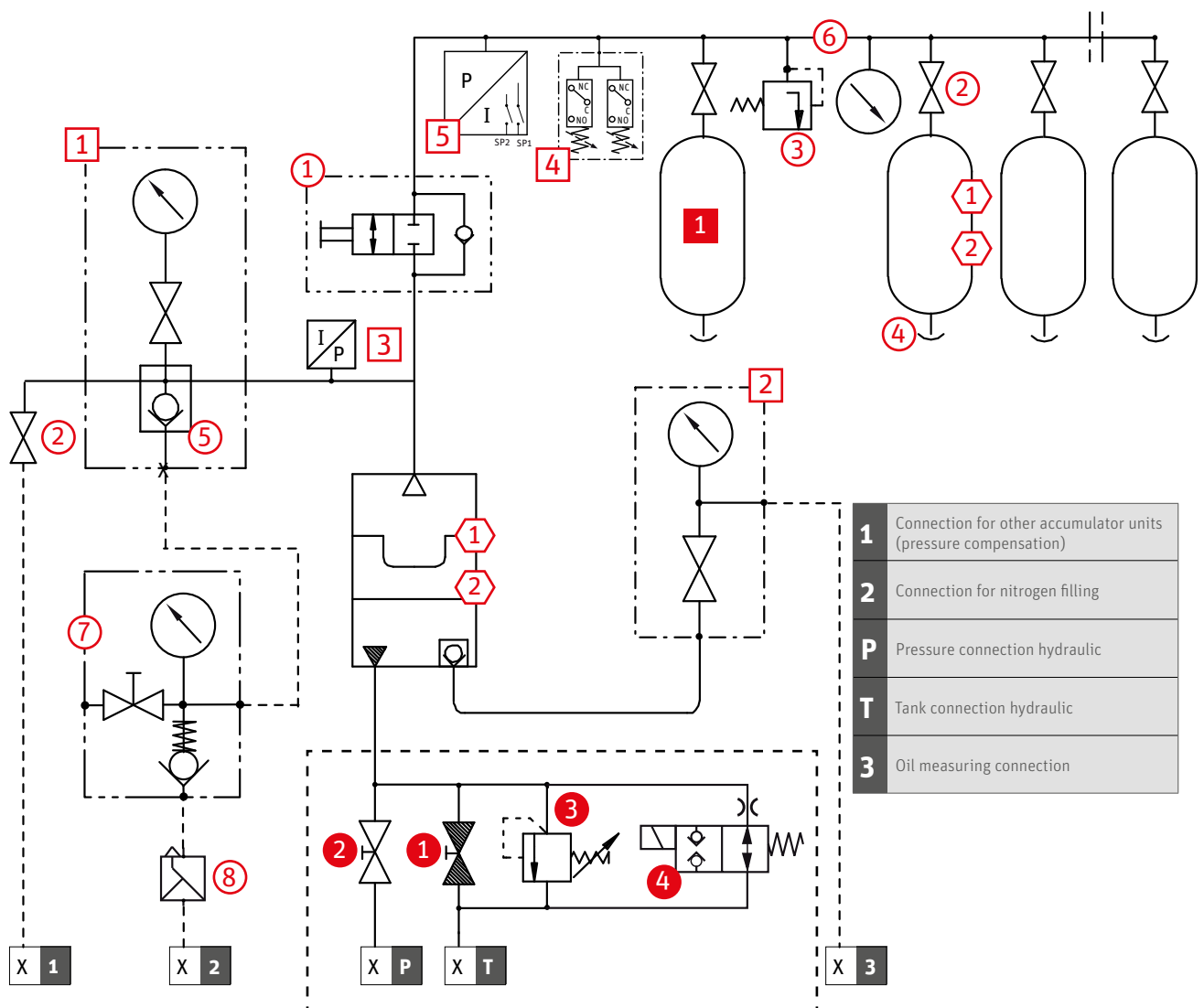
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# Product application

## Description

This easy-to-read circuit diagram offers the reader a simple orientation concerning the wide application range of Roth Hydraulics accessory components. In the diagram, all components are appropriately positioned with regard to their application. They are divided into six different category groups using colours and symbols.

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# Product overview

## ○ Gas-side accessories

Item	Picture	Part name	Graphical symbol	Special feature / function	Page
③ ⑥		Standard piping system		with special connection, for SV and measuring devices	11
④		Bleed valve systems for pressure vessels		Discharging condensate or pass over fluid	12
④	Standard bleed valve (horizontal installation)				
④	Minimess screw coupling (vertical installation)				
④		Condensate collecting pipe with central discharge valve			13
③		Gas safety valves		Gas-side overload protection	14
③	max. PN 220, DN 6, DGR 2014/68/EU				
③	max. PN 350, DN 6 DGR 2014/68/EU				
③		max. PN 350, DN 9, ASME (UV-stamp)			
③		Bursting disc plugs DN4			15
①		N2 shut-off units		Separator between pressure vessel and piston accumulator with non-return function for filling of pressure vessels	16
①	DN 32 with female thread connection				
①	DN 40/50 with SAE flange connection				
①		DN 65/80/100 with Avit flange connection			
②		N2 shut-off ball valve		Balance function between two accumulator units	17
③ ⑤ ①		N2 safety- and shut-off unit		With non-return function, gas SV, filling valve and measuring connection	18
⑤		Filling valve for piston accumulator direct installation		Filling valve for piston accumulator	20
⑤		Adapter with filling valve for pipe installation		With filling valve and measuring connection	20
⑦		Filling and testing device		N2 pressure control Filling of accumulator systems with N2	21
⑧		Bottle pressure reducer		Limiting pressure to working pressure of accumulator system	23

# Product overview





## Oil-side accessories

Item	Picture	Part name	Graphical symbol	Special feature / function	Page	
2		Oil shut-off ball valves DN 32 with female thread		Separates piston accumulator from hydraulic system	29	
2						DN 40/50 with SAE flange connection
2						DN 65/80/100 with Avit flange connection
1		Release ball valves Oil block ball valve		Accumulator discharge valve for pipe installation	30	
1						Oil plate ball valve
1 2 3 4		Oil safety- and shut-off block		Pressure protection, shut-off and discharge (also electrical)	32	
		Diff. adapters oil safety- and shut-off block	-	Connection between safety- and shut-off blocks and hydro accumulators or piping	36	
1 3 4		Oil safety- and discharge block		Pressure protection and discharge (with 2-5 discharge valves)	39	
4		Oil discharge valve		Pressure discharge for block installation	40	
		Bladder accumulator reductions	-	Oil-side connection of Roth hydraulic accumulator to different system connections	40	
3		Oil safety valve		Oil-side pressure protection for pipe installation	41	










## Measuring and display devices

Item	Picture	Part name	Graphical symbol	Special feature / function	Page
1 2 5		Double front panel		with filling block and shut-off valves	47
1		Pressure gauge gas-side		with filling block and shut-off valve	48
2		Pressure gauge oil-side		with shut-off valve, bracket, high pressure hose, test connection	49
5		Electronic dual pressure switch		with additional analogue output	50
4		Mechanic dual pressure switch		set points adjustable	52
3		Electronic pressure transducer		measuring range adjustable	53

## Pressure vessels

Item	Picture	Part name	Graphical symbol	Special feature / function	Page
1		Standard pressure vessel		up to 75 l	57
		Large pressure vessel		customized design	58
		Special pressure vessel screwed		for special applications up to 900 l	64








## Mounting technology

Item	Picture	Part name	Graphical symbol	Special feature / function	Page
1		Bladder accumulator / pressure vessel brackets		for vertical installation of bladder accumulators / pressure vessels	66
		Piston accumulator brackets		for vertical installation of piston accumulators	67
2		Two-part steel clamps		Fixation of accumulators during vertical installation	68
		One-part steel clamps		Fixation of accumulators during vertical installation	
		Acculight		Fixation of accumulators during vertical installation	
		U-bolt clamps with pipe saddle		Fixation of piston accumulators during vertical installation	70
		U-bolt clamps without pipe saddle		Fixation of piston accumulators / pressure vessels	
	Bolt clamps	Fixation of piston accumulators during vertical installation	71		



# Product overview

## ◆ Spare parts and tools

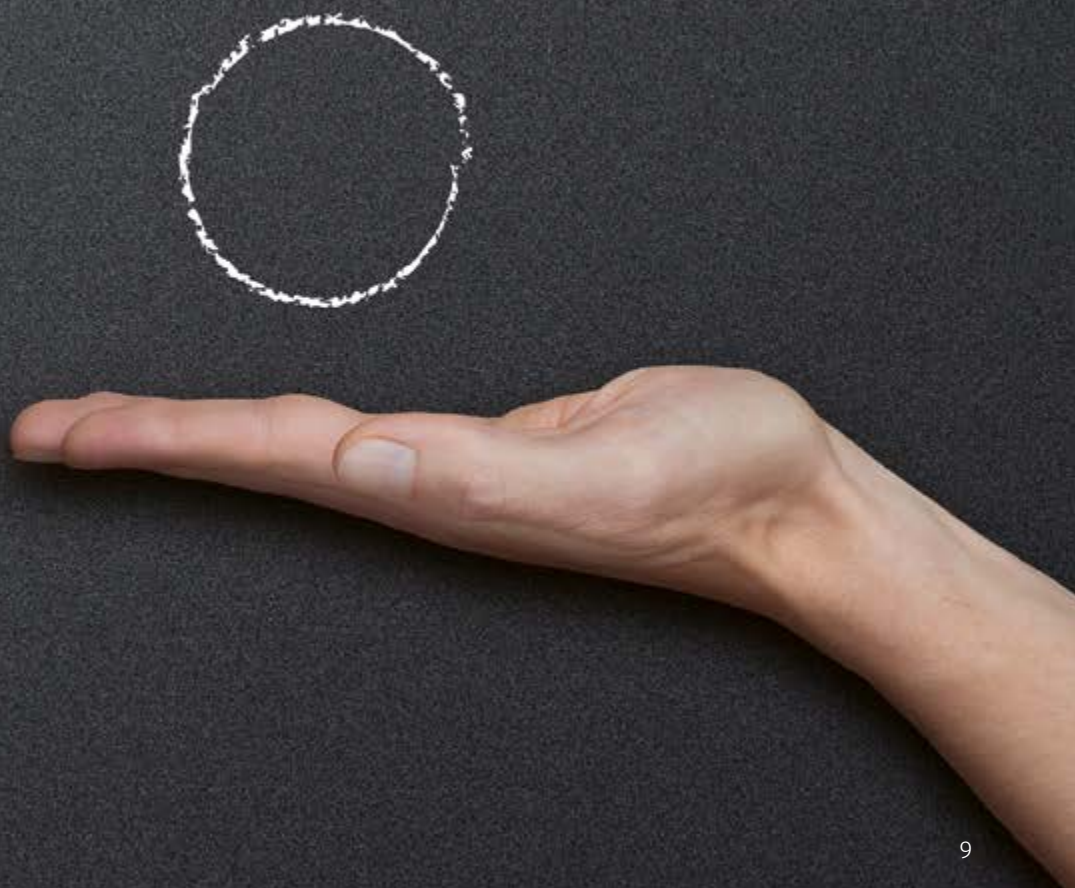
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		Gas filling valves	76
		Gas safety valves	76
		Bursting disc plugs	76
		Bladder accumulator spare parts kits	77
◆		Bladder accumulator tools	79
		Piston accumulator tools	



## Roth gas-side accessories

All gas-side components are tested components that provide a high degree of reliability. They are leak-proof, provide multi-use and are practically maintenance-free.

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# Gas-side accessories

## ■ General information

### Acceptance

Due to their use together with nitrogen, all components are designed according to DGR 2014/68/EU / ASME Sec. VIII Div. I. directives. As such, they have passed all mandatory tests, have been certified, and carry the component tags that are required for their proper use. Basically, all pressure-bearing equipment is subject to an inspection according to DGR 2014/68/EU. At nominal sizes  $\leq$  DN32, according to DGR 2014/68/EU (article 4, paragraph 3), no CE mark is required. Components that are subject to inspection according to the ASME directive, are not marked if the nominal value amounts to  $<6$  inch. Safety-related equipment, such as safety valves, always carry the CE mark due to their safety-relevant function, or, in case of the ASME-inspection, the UV-stamp.

### Standard connections

With regard to their connections, all Roth Hydraulics gas components comply with the following standard norms:

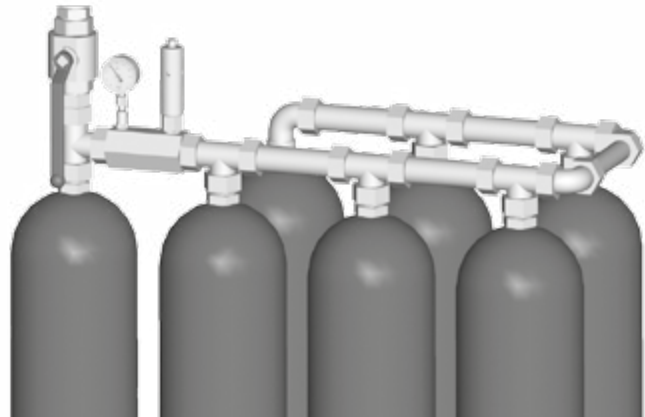
- > Threaded pins DIN 3853 / ISO 8434
- > Screw-in borings DIN 3861 bore shape W
- > SAE flange ports ISO 6162 (SAE J518)
- > Square flange connections ISO 6164  
(other connections can be added upon request)

### Surfaces

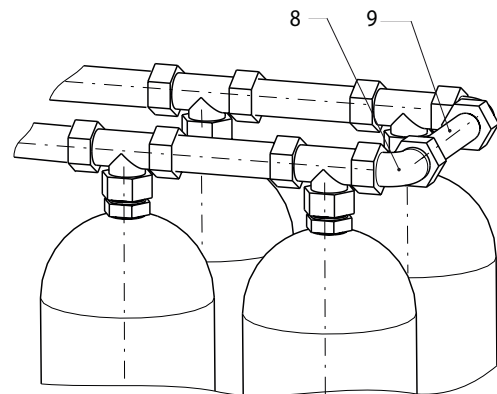
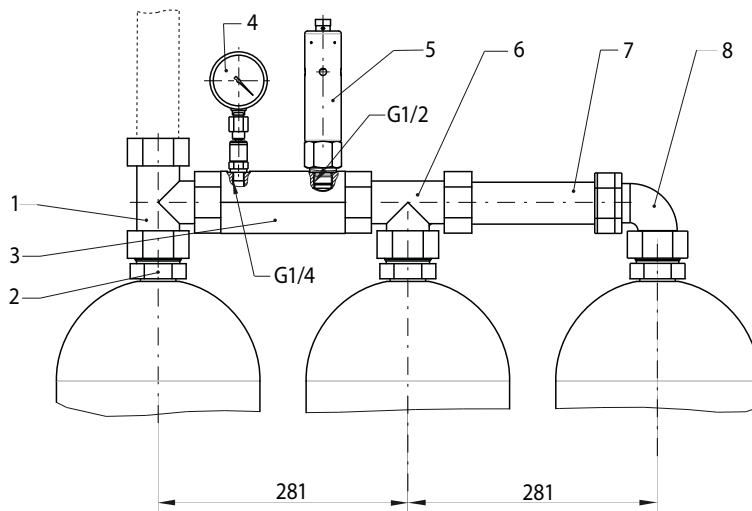
The surfaces of the individual components are normally galvanized or chromated. For possible variations see description of components.

## ■ Standard piping system

The Roth standard piping system offers high flexibility, and the possibility to freely increase the number of pressure vessels. In addition to the standard connection of the pressure vessels, the special connection (Pos. 3) has two radial connections, that is, G1/4 (measuring connection) and G1/2 (gas safety valve).



parallel vessel positioning



<b>Nominal diameter</b>	DN 26	
<b>Working pressure (PN)</b>	max. 350 bar	
<b>Working medium</b>	Nitrogen	
<b>Thread connection shut-off valve</b>	G1/4	
Pos. 1	L-screw connection adjustable	4200019646
Pos. 2.1	Reducer screw connection G3/4	4204017425
Pos. 2.2	Reducer screw connection G1	4204017424
Pos. 3	Special screw connection (SNV)	4200027082
Pos. 4	Gauge NG 63 incl. Minimes screw coupling*	4204013685
Pos. 5	Gas safety valve	Page 12
Pos. 6	T-screw connection	4200019644
Pos. 7	Standard pipe	4204007861
Pos. 8	Elbow screw connection	4200019647
Pos. 9	Connecting pipe	4204013819

\*Please indicate the requested display range of the manometer in your purchase order

# Gas-side accessories

## Bleed valve systems

### Bleed valve and Minimes screw coupling

The bleed valve consists of a screw-in part G 3/4 according to DIN 3852 (part 1 / part 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). The interceptive pipeline version allows an ergonomic and easy handling (fig. 4). A manual discharging of condensate at the desired position is possible by the use of a discharge valve.

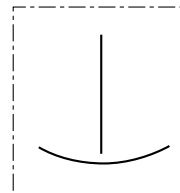


Fig. 1 Bleed valve (vertically installed)

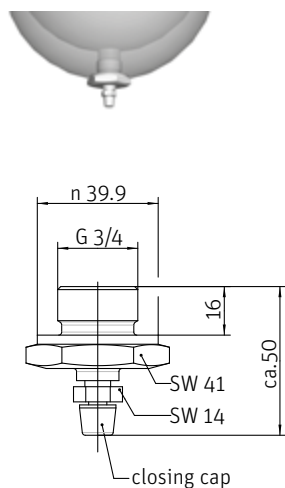


Fig. 2 Bleed valve (horizontally installed)

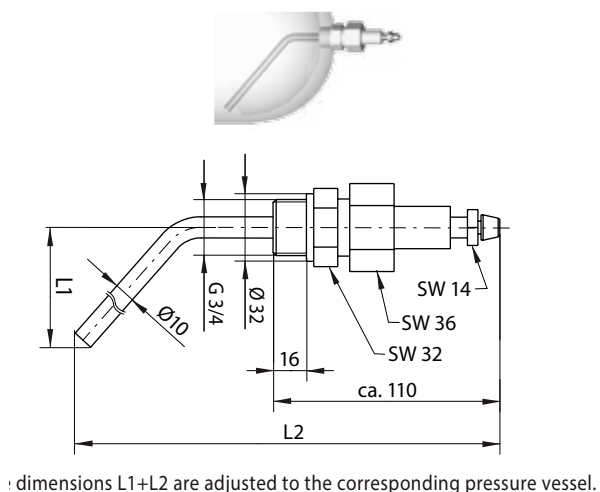


Fig. 3 Minimes screw coupling (vertically installed)

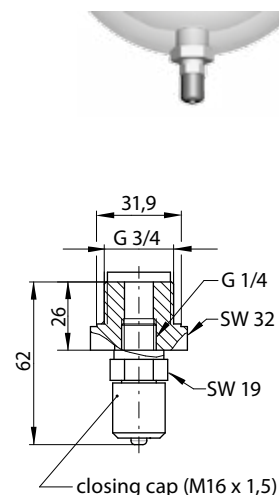


Figure	1	2	3
Nominal diameter	DN 3	DN 3	DN 2
Working pressure (PN)	max. 360 bar		
Working medium	Nitrogen		
Weight	approx. 0.4 kg	approx. 0.5 kg	approx. 0.18 kg
Acceptance regulation	DGR 2014/68/EU (article 4, paragraph 3)		
Part no.	4204029282	4204003857*	4204011815

\* Please specify pressure vessel type in your purchase order

**Collecting pipeline with central discharge valve**



Fig. 4

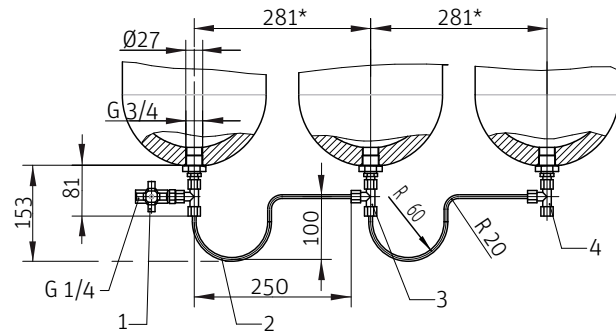


Fig. 5

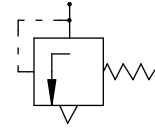
<b>Nominal diameter</b>		DN 3
<b>Working pressure (PN)</b>		max. 350 bar
<b>Working medium</b>		Nitrogen
<b>Connections</b>		DIN 3853 / ISO 8434
<b>Bore shape</b>		TYP W DIN 3861
Pos. 1	L-fitting with shut-off valve	4204012860
Pos. 2	Bended pipe	4204003638
Pos. 3	L-fitting	4204012861
Pos. 4	L-fitting with plug	4204012863

\*fixed length for Roth standard units

# Gas-side accessories

## ■ Gas safety valves

The gas safety valve is an instantly acting springloaded valve for pressures up to 220 / 350 bar. If the pressure setting is exceeded, the valve opens and closes again after a drop in pressure of max. 10% of the set pressure. In case of different opening pressures, please indicate the required set pressure in your purchase order.



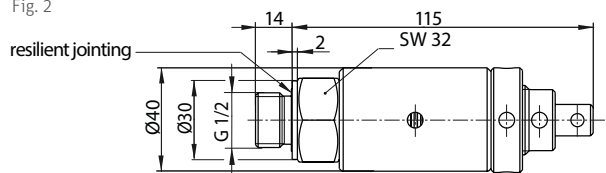
**Note:** The pressure setting of the safety valve has to be chosen in a way that its activation under normal working pressure is avoided. The normal working pressure should remain at least 10 % below the pressure setting. If possible, the gas safety valve should be adjusted to the calculated pressure of the Roth piston accumulator. Gas safety valves may leak after trip and therefore cannot be used as pressure control valves.

### Gas safety valve max. 220 bar, DGR

Fig. 1



Fig. 2

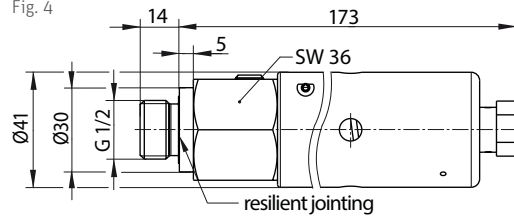


### Gas safety valve max. 350 bar, DGR

Fig. 3



Fig. 4



### Gas safety valve max. 350 bar, ASME

Fig. 5

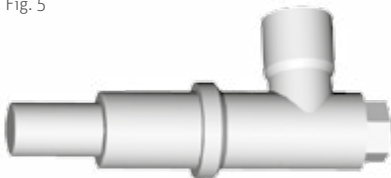
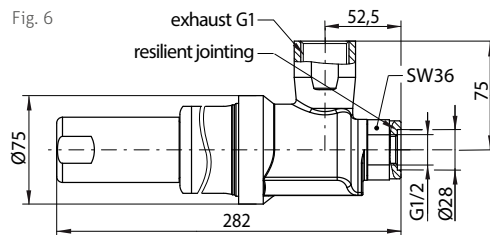


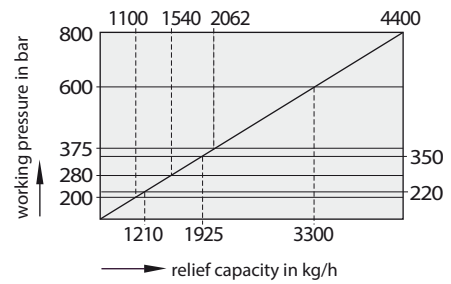
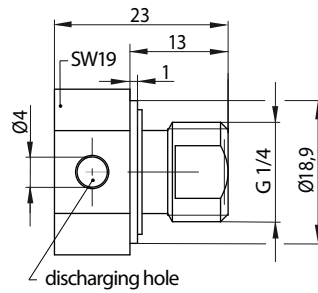
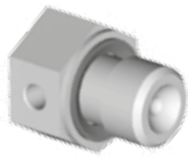
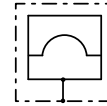
Fig. 6



<b>Figure</b>	1/2	3/4	5/6
<b>Working pressure (PN)</b>	max. 220 bar	max. 350 bar	max. 350 bar
<b>Nominal diameter</b>	DN 6		DN 9
<b>Working medium</b>	Nitrogen		
<b>Acceptance regulation</b>	CE-marking acc. to DGR 2014/68/ EU		UV-stamp ASME
<b>Weight</b>	approx. 0.8 kg	approx. 1.5 kg	approx. 2.6 kg
<b>Part no.</b>	4204009303	4204007760	4204013155

## ■ Bursting disc plugs

The bursting disc plug serves to protect 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.



<b>Nominal diameter</b>	DN 4						
<b>Working medium</b>	Nitrogen						
<b>Weight</b>	approx. 0.03 kg						
<b>Material</b>	Stainless steel 1.4571						

<b>Burst pressure</b>	200 bar	220 bar	280 bar	350 bar	375 bar	600 bar	800 bar
<b>Acceptance DGR 2014/68/EU with CE-marking</b>	4202012785	4202012786	4204013194	4204013195	4202012791	4204013196	4204013197

<b>Burst pressure</b>	3200 psi	5100 psi	5500 psi	9000 psi
<b>ASME compliant</b>	4204004394	4204013198	4204013199	4204013200

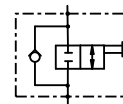
**Note:** Bursting disc plugs for other acceptances are available upon request. Special technical features of bursting disc plugs must be observed.

# Gas-side accessories

## ■ N2 shut-off unit

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.

Piston accumulator



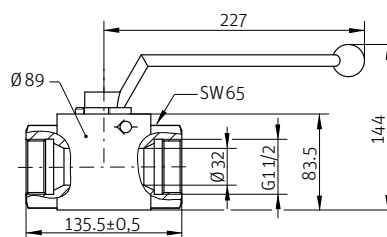
N2 pressure vessel

### DN 32 with female thread connection G1 1/2

Fig. 1



Fig. 2

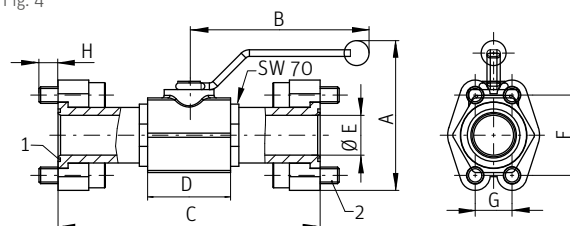


### DN 40/50 with SAE flange connection

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)		

### DN 65/80/100 with Avit flange connection

Fig. 5

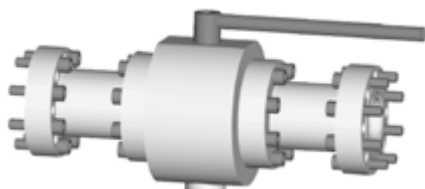
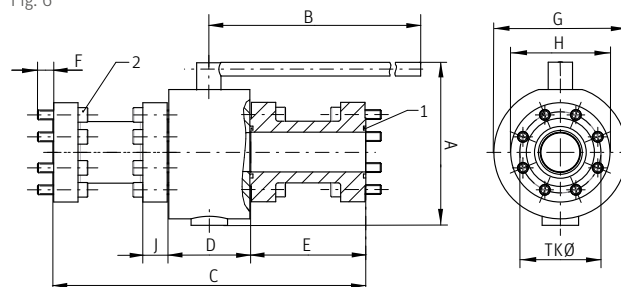


Fig. 6



DN 65 (mm)			
A	270	J	50
B	570	F	30
C	630	G	Ø 248
D	122	H	Ø 190
E	254	TKØ	145
Pos. 1	O-ring NBR Ø75.56 x 5.33		
Pos. 2	16 x M24 x 80 (DIN 912)		

DN 80 (mm)			
A	280	J	60
B	700	F	45
C	750	G	Ø 268
D	142	H	Ø 240
E	304	TKØ	175
Pos. 1	O-ring NBR Ø92.50 x 5.33		
Pos. 2	8 x M30 x 105 (DIN 912)		

DN 100 (mm)			
A	330	J	60
B	700	F	40
C	754	G	Ø 328
D	186	H	Ø 245
E	284	TKØ	200
Pos. 1	O-ring NBR Ø115.00 x 7.00		
Pos. 2	16 x M24 x 100 (DIN 912)		



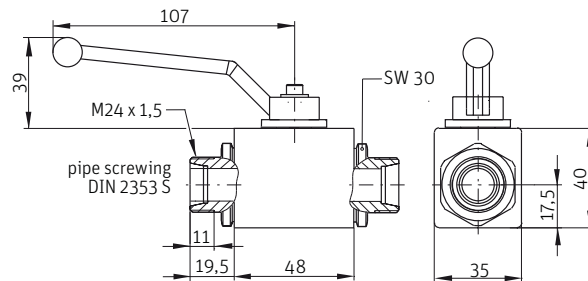
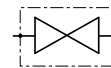
<b>Figure</b>	1/2	3/4		5/6		
<b>Nominal diameter</b>	DN 32	DN 40	DN 50	DN 65	DN 85	DN100
<b>Working pressure (PN)</b>	max. 350 bar					
<b>Working medium</b>	Nitrogen					
<b>Thread connection</b>	2x G1 1/2	SAE 1/2" - 6000 psi	SAE 2" - 6000 psi	Avit FA 65-5	Avit FA 80-4	Avit FA 100-4
<b>Weight</b>	4.5 kg	12.5 kg	14.5 kg	121 kg	189 kg	234 kg
<b>Acceptance regulation</b>	*	with CE-marking according to DGR 2014/68/EU				

Shut-off unit complete		4202005984					
Pos.1	O-ring NBR		4200001950	4200001954	4200001979	4204008785	4204009599
Complete with screws (Pos. 2) and O-ring			4204011788	4204004837	4204012917	4204012918	4204012919

\* DGR 2014/68/EU (article 4, paragraph 3)

## ■ N2 shut-off ball valve

The Roth N2-shut-off ball valve DN13 has no non-return valve function. It is used for the pressure balance between two or more parallel-connected piston accumulator units.



<b>Nominal diameter</b>	DN 13
<b>Working pressure (PN)</b>	max. 350 bar
<b>Working medium</b>	Nitrogen
<b>Acceptance regulation</b>	DGR 2014/68/EU (article 4, paragraph 3)
<b>Weight</b>	approx. 0.7 kg
<b>Part no.</b>	4204000594

## Gas-side accessories

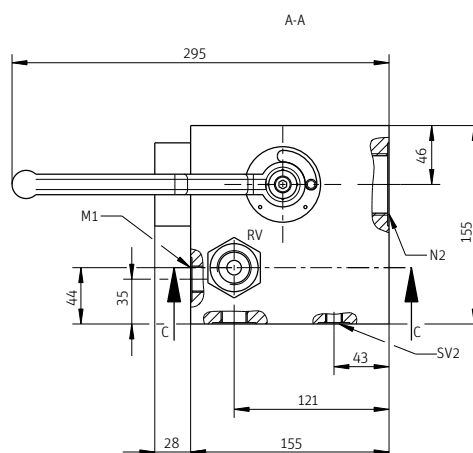
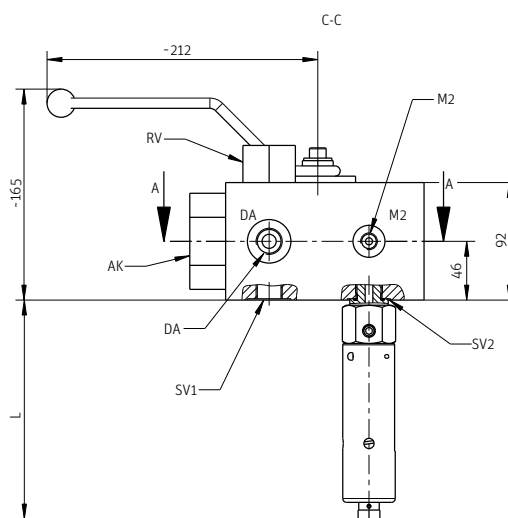
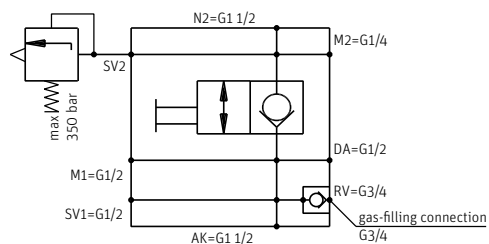
### ■ N2 safety- and shut-off unit

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



<b>Nominal diameter</b>	DN 32	DN 32
<b>Working pressure (PN)</b>	max. 220 bar	max. 350 bar
<b>Working medium</b>	Nitrogen	
<b>Acceptance regulation</b>	DGR 2014/68/EU (article 4, paragraph 3)	
<b>Weight</b>	18 kg	
Pos. 1	N2 shut-off unit	4204021641
	Safety- and shut-off unit complete <sup>1</sup>	4204026744      4204026745

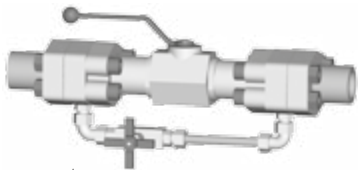
<sup>1</sup> please indicate the required pressure setting in your purchase order



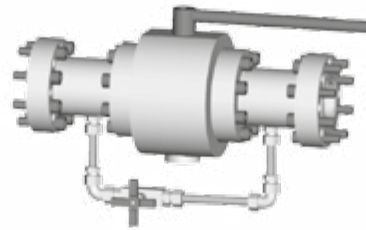
**Accessories shut-off valves**

**Roth 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

**Roth locking equipment**

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

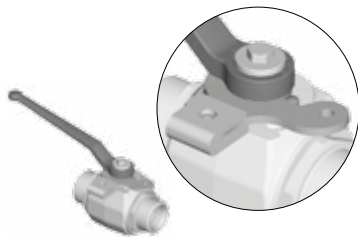
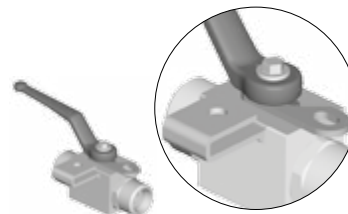


Fig. 2



**Roth 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

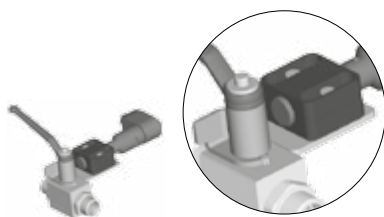
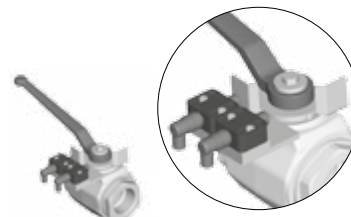


Fig. 4



## Gas-side accessories

### ■ Filling valve

The Roth filling valve G3/4 (fig. 1/2), which is installed at the inside of the gas-sided end cap of piston accumulators or in the adapter (fig. 3/4) for accumulator units, serves to fill Roth piston accumulators with nitrogen by using the Roth filling and testing device.

#### Filling valve for piston accumulator direct installation

Gas-tight by additional plug (Pos. 3)

Fig. 1

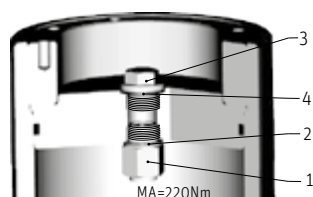
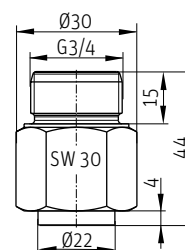


Fig. 2



#### Adapter with filling valve for pipe installation

- > with additional screw connections
- > optimal ergonomic positioning possible

Fig. 3

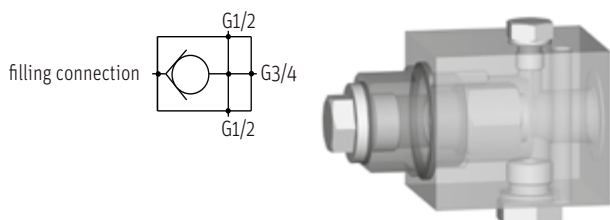


Fig. 4

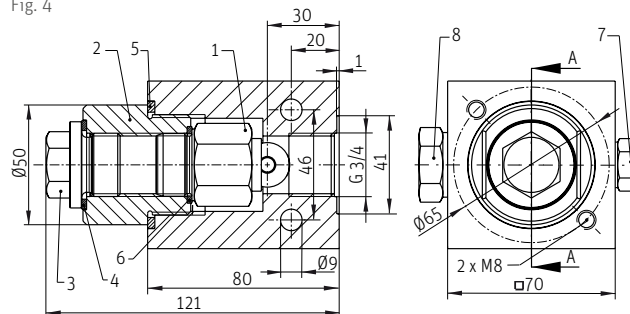
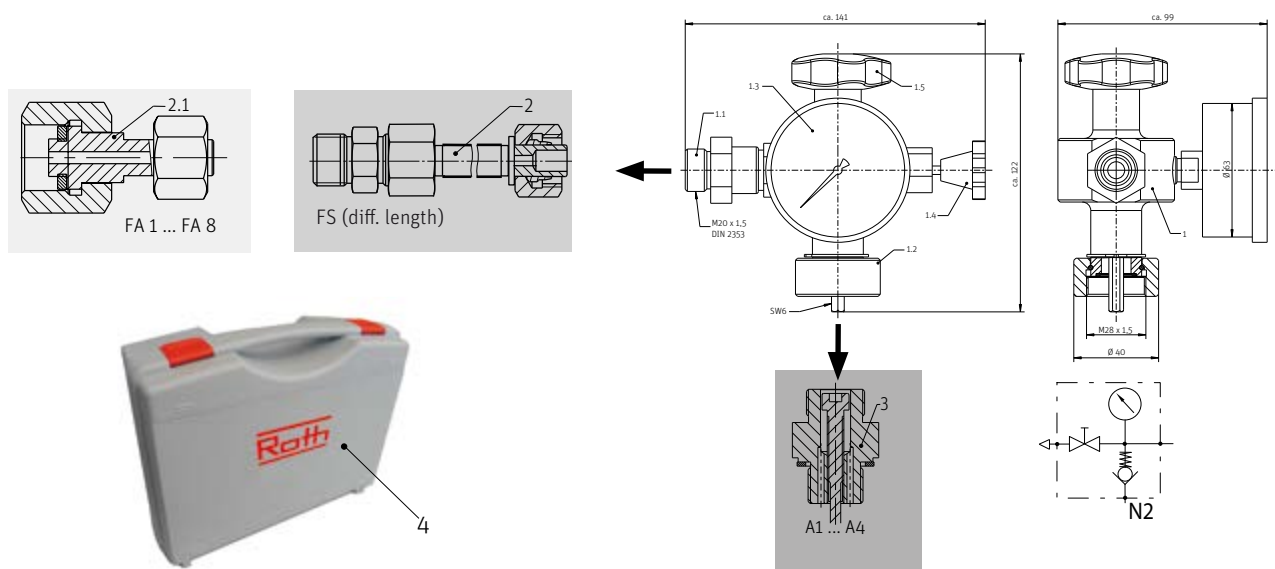


Figure	1/2	3/4
<b>Nominal diameter</b>	DN 9	
<b>Working pressure (PN)</b>	max. 800 bar	max. 400 bar
<b>Working medium</b>	Nitrogen	
<b>Weight</b>	approx. 0.2 kg	approx. 3.2 kg
<b>Acceptance regulation</b>	DGR 2014/68/EU	
Pos. 1	Gas filling valves (fig. 1) <sup>1</sup>	4200003239
Adapter complete (fig. 2) <sup>1</sup>		4200003520
Pos. 2	Screw-in part with RV	4200001330
Pos. 3	Screw plug G 3/4	4200004502
Pos. 4	Uisit ring Ø 28.7/37 mm	4200003216
Pos. 5	Uisit ring Ø 42.7/53 mm	4200004063
Pos. 6	Uisit ring Ø 26/32 mm	4200001225
Pos. 7	Screw plug G 1/4	4200040336
Pos. 8	Screw plug G 1/2	4200040337
Pos. 9	Connecting block	4204010844

<sup>1</sup> for a suitable filling and testing device see page 21

## ■ 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, see pages 24 and 25.



### Delivery

1	Roth filling and testing device
1.1	Filling hose connection (with non-return valve)
1.2	Accumulator connection
1.3	Manometer (for different types see overview page 22)
1.4	Pressure discharge valve
1.5	Spindle to open the filling valve
2	Filling hose DN 2 (DN 8 optimum) (for different lengths see overview page 22)
2.1	Nitrogen bottle connection FA1 ... FA8 (see overview page 22)
3	Adapter to Roth filling valve A1 ... A4 (see overview page 22)
4	Transport case (dim. 340 x 275 x 125 mm)

<b>Nominal diameter</b>	6
<b>Working pressure (PN)</b>	max. 250 bar / 400 bar
<b>Working medium</b>	Nitrogen
<b>Acceptance regulation</b>	DGR 2014/68/EU (article 4, paragraph 3)
<b>Weight</b>	approx. 4.5 kg

# Gas-side accessories

## Preferred types and type code

### Preferred types

no.	Design FPE	Adapter A	Adapter FA	FS length [mm]	Part no.
1	0 - 250 bar	A1 (Roth adapter)	FA1 (200 bar DIN 477/1)	3000	4204013914
2	0 - 400 bar	A1 (Roth adapter)	FA1 (200 bar DIN 477/1)	3000	4204013399
3	0 - 400 bar	A1 (Roth adapter)	FA2 (300 bar DIN 477/5)	3000	4204014881
4	0 - 400 bar	A4 (Minimess adapter)	FA2 (300 bar DIN 477/5)	3000	4204014882
5	0 - 250 bar	A1 (Roth adapter)	FA3 (France/Russia)	3000	4204014883
6	0 - 250 bar	A1 (Roth adapter)	FA7 (China)	3000	4204014884
7	0 - 250 bar	A1 (Roth adapter)	FA5 (USA)	3000	4204014885
8	0 - 250 bar (incl. manometer 0 - 400)	A1 - A4	FA1 - FA8	3000	4204014886

### Type code

Series		FPE	Type	Order designation
Pressure [bar]	...	...	A = 0 ... 160 B = 0 ... 250 C = 0 ... 400	<b>Example: FPE - B - A1 + A4 - FA1 + FA5 - 6000</b> Order designation is: Type: FPE Pressure: 250 bar Filling valve adapter for: Roth filling valve + Minimess valve Gas bottle adapter for: connection DIN 477/1 + connection USA Hose length: 6000 mm
Filling valve adapter	...	...	A1, A2, A3, A4 - A4 <i>on this point, multiple choice is possible (e.g. A1 + A3)</i>	
Gas bottle adapter	...	...	FA1, FA2, FA3, FA4, FA5, FA6, FA7, FA8 - FA8 <i>on this point multiple choice is possible (e.g. A1 + A3)</i>	
Hose length [mm]	...	...	... = 1500, 3000, 6000, 10000, 15000, 20000	

■ **Filling and testing device accessories**

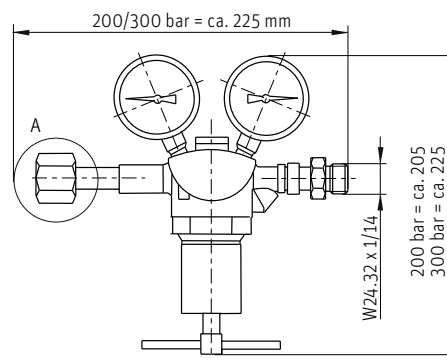
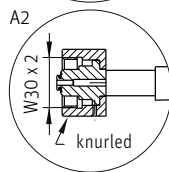
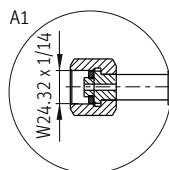
**Pressure reducer**

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.

Pressure reducer for nitrogen bottle

200 bar connection,  
acc. DIN 477, part 1

300 bar connection,  
acc. DIN 477, part 5



<b>Max. primary pressure</b>	200 bar	300 bar
<b>Thread connection</b>	W24.32 x 1/14	W30 x 2
<b>Adjustment range</b>	20 ... 200bar	
<b>Flow rate</b>	max. 30 m³/h	
<b>Working medium</b>	Nitrogen	
<b>Working temperature</b>	-30° C ... +60° C	
<b>Weight</b>	approx. 2 kg	
<b>Acceptance regulation</b>	DGR 2014/68/EU (article 4, paragraph 3)	
<b>Part-no. standard type</b>	4204014015	4204014016

# Gas-side accessories

## ■ Filling and testing device overview



### Gas bottle adapters

Gas bottle adapter (DIN 477, part 1, 200 bar)

**FA 1**

M20 x 1,5  
DIN 2353

SW24

ca. 65

2.1

SW32

W24.32 x 1/14

Part-no. 4200010982

### Filling hose

Filling hose DN 2 (connections DIN 2353)

FS

M20 x 1,5

SW24

2

SW22

M20 x 1,5

N2 / 350bar

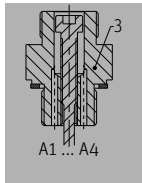
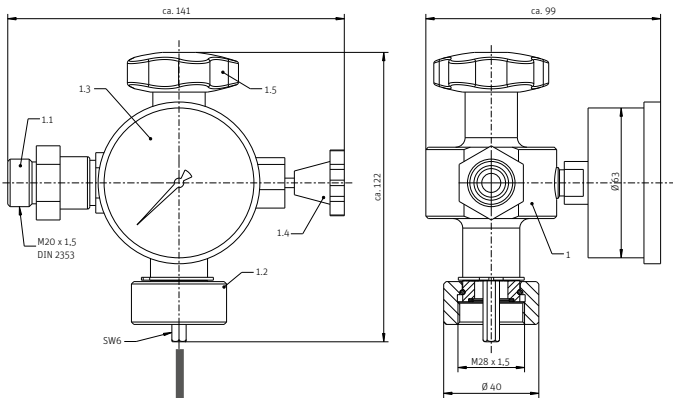
Length	Part-no.
1500	4204014684
3000	4204014010
6000	4204014011
10000	4204014012
15000	4204014013
20000	4204014014

### Other country specific gas bottle adapters\*

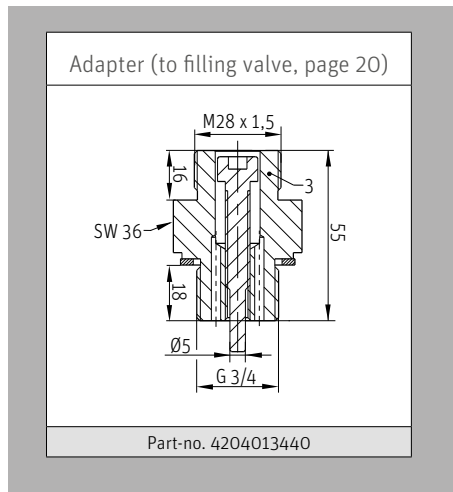
<p>300 bar (DIN 477, part 5)</p> <p><b>FA 2</b></p> <p>M20 x 1,5 DIN 2353</p> <p>SW24</p> <p>SW19</p> <p>knurled</p> <p>ca. 102</p> <p>W30 x 2</p> <p>Part-no. 4204005118</p>	<p>France / Russia</p> <p><b>FA 3</b></p> <p>M20 x 1,5 DIN 2353</p> <p>SW24</p> <p>SW30</p> <p>ca. 76</p> <p>W21,8 x 1/14</p> <p>Part-no. 4200001499</p>	<p>England</p> <p><b>FA 4</b></p> <p>M20 x 1,5 DIN 2353</p> <p>SW24</p> <p>SW30</p> <p>ca. 73</p> <p>W22,8 x 1/14</p> <p>Part-no. 4200001498</p>
<p>USA</p> <p><b>FA 5</b></p> <p>M20 x 1,5 DIN 2353</p> <p>SW24</p> <p>SW30</p> <p>ca. 71</p> <p>W24,3 x 1/14</p> <p>Part-no. 4200001501</p>	<p>Italy</p> <p><b>FA 6</b></p> <p>M20 x 1,5 DIN 2353</p> <p>SW24</p> <p>SW30</p> <p>ca. 71</p> <p>W21,7 x 1/14</p> <p>Part-no. 4200001500</p>	<p>China 1</p> <p><b>FA 7</b></p> <p>M20 x 1,5 DIN 2353</p> <p>SW24</p> <p>SW30</p> <p>ca. 76</p> <p>M22 x 1,5</p> <p>Part-no. 4200021579</p>
<p>China 2</p> <p><b>FA 8</b></p> <p>M20 x 1,5 DIN 2353</p> <p>SW24</p> <p>SW30</p> <p>ca. 61</p> <p>G5/8 ISO 228</p> <p>Part-no. 4204013628</p>		

\* other adapters are available upon request

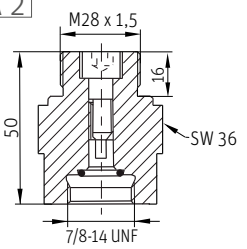
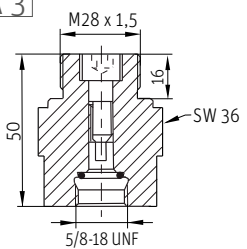
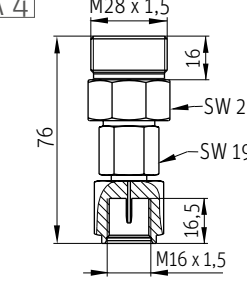
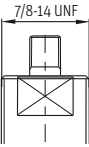
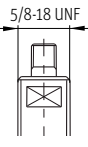
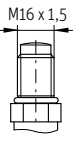
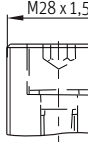




**Filling valve adapter**



**Alternate filling valve adapters**

<p>Adapter 7/8-14 UNF</p> <p>A 2</p>  <p>Part-no. 4204013683</p>	<p>Adapter 5/8-18 UNF</p> <p>A 3</p>  <p>Part-no. 4204013684</p>	<p>Adapter Minimes</p> <p>A 4</p>  <p>Part-no. 4204013792</p>	<p>no adapter required</p>
 <p>Filling valve bladder accumulator</p>	 <p>Filling valve bladder accumulator</p>	 <p>Filling valve Minimes</p>	 <p>Filling valve membrane accumulator</p>



## Roth oil-side accessories

All oil-side components are tested components that provide a high degree of reliability. They provide multi-use and are practically maintenance-free.

General information _____	28
Oil shut-off ball valves _____	29
Oil discharge ball valves _____	30
Accessories shut-off valves _____	31
Oil safety- and shut-off block _____	32
Adapters oil safety- and shut-off block _____	36
Adapter _____	38
Oil safety- and discharge block _____	39
Oil discharge valve _____	40
Oil safety valve _____	41



# Oil-side accessories

## ■ General information

### Acceptance

Due to their use together with oil, all components are designed according to DGR 2014/68/EU, or ASME Sec. VIII Div. I directives. As such, they have passed all mandatory tests, have been certified, and carry the component tags that are required for their proper use. Basically, all pressure containing equipment is subject to an inspection according to DGR 2014/68/EU. At nominal size < DN 200 and pressure < 1000 bar according to DGR 2014/68/EU (article 4, paragraph 3) no CE marking is required. Components which are subject to inspections according to ASME have no marking, if the nominal size is < 6 inch. Safety equipment such as safety valves are always marked with the CE-marking due to their safety-relevant function, or at ASME-inspection with the UV-stamp.

### Standard connections

With regard to their connections, all Roth Hydraulics oil-side components comply with the following standard norms:

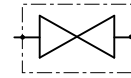
- > Threaded pins DIN 3853 / ISO 8434
- > Screw-in boring DIN 3861 bore shape W
- > SAE flange ports ISO 6162 (SAE J518)
- > Square flange connections ISO 6164  
(other connections can be added upon request)

### Surfaces

The surfaces of the individual components are normally galvanized or chromated. For possible variations see description of components.

**Oil shut-off ball valves**

Roth oil shut-off ball valves (fig. 1-6) are used to separate the piston accumulator from the hydraulic system.

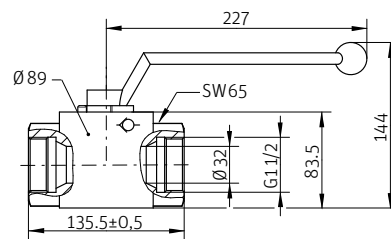


**DN 32 with female thread G1 1/2**

Fig. 1



Fig. 2

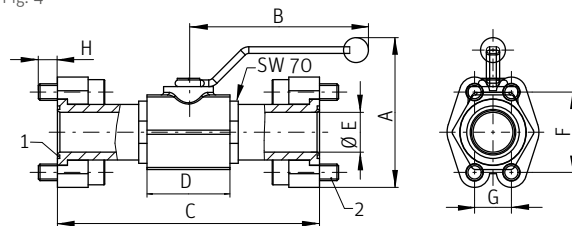


**DN 40/50 with SAE flange connection**

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)		

**DN 65/80/100 with Avit flange connection**

Fig. 5

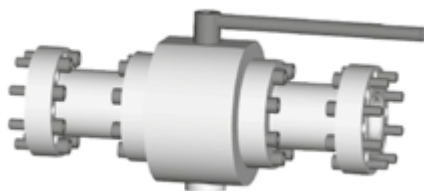
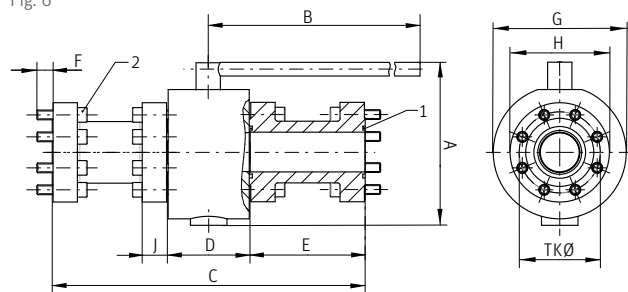


Fig. 6



DN 65 (mm)			
A	270	J	50
B	570	F	30
C	630	G	Ø 248
D	122	H	Ø 190
E	254	TKØ	145
Pos. 1	O-ring NBR Ø75.56 x 5.33		
Pos. 2	16 x M24 x 80 (DIN 912)		

DN 80 (mm)			
A	280	J	60
B	700	F	45
C	750	G	Ø 268
D	142	H	Ø 240
E	304	TKØ	175
Pos. 1	O-ring NBR Ø92.50 x 5.33		
Pos. 2	8 x M30 x 105 (DIN 912)		

DN 100 (mm)			
A	330	J	60
B	700	F	40
C	754	G	Ø 328
D	186	H	Ø 245
E	284	TKØ	200
Pos. 1	O-ring NBR Ø115.00 x 7.00		
Pos. 2	16 x M24 x 100 (DIN 912)		

# Oil-side accessories

<b>Figure</b>	1/2	3/4		5/6		
<b>Nominal diameter</b>	DN 32	DN 40	DN 50	DN 65	DN 85	DN100
<b>Working pressure (PN)</b>	max. 400 bar			max. 350 bar		
<b>Working medium</b>	all standard mineral oils					
<b>Thread connection</b>	2x G1 1/2	SAE 1/2" - 6000 psi	SAE 2" - 6000 psi	Avit FA 65-5	Avit FA 80-4	Avit FA 100-4
<b>Weight</b>	4.5 kg	12.5 kg	14.5 kg	121 kg	189 kg	234 kg
<b>Acceptance regulation</b>	DGR 2014/68/EU (article 4, paragraph 3)					

Shut-off unit complete	4204012752					
Pos.1	O-ring NBR	4200001950	4200001954	4200001979	4204008785	4204009599
Complete with screws (Pos. 2) and O-ring		4204012828*	4204011789*	4204011785	4204011786	4204011787

\* DGR 2014/68/EU (article 4, paragraph 3)

## Oil discharge ball valves

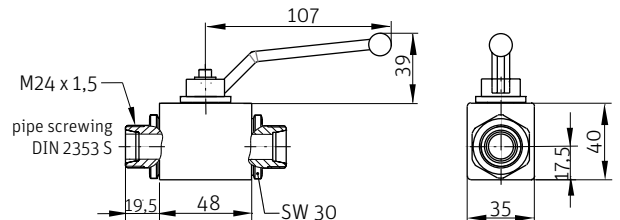
Roth oil discharge ball valves (fig. 1, 2) serve to reduce the oil-side pressure discharge of the piston accumulator.

### DN 13 with male thread M24 x 1.5

Fig. 1



Fig. 2



### DN 10 for block construction

Fig. 3

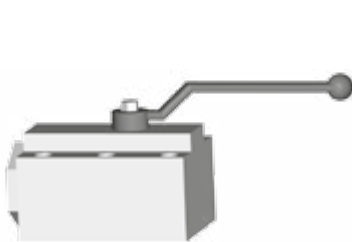
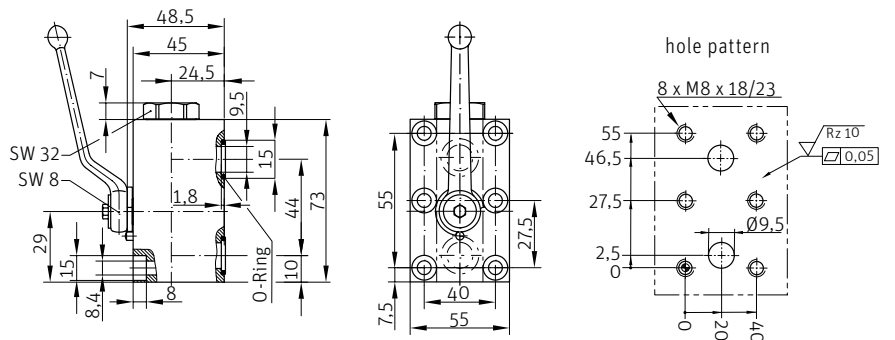


Fig. 4

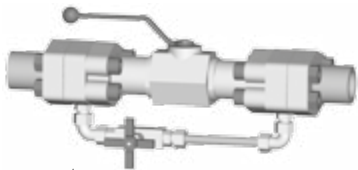


<b>Figure</b>	1/2	3/4
<b>Nominal diameter</b>	DN 13	DN 10
<b>Working pressure (PN)</b>	max. 500 bar	
<b>Working medium</b>	Oil	
<b>Fixing screws</b>	-	6 x M8 (10.9, DIN 912)
<b>Weight</b>	0.7 kg	1.17 kg
<b>Acceptance regulation</b>	DGR 2014/68/EU (article 4, paragraph 3)	
<b>Part no.</b>	4204004547	4200012489*

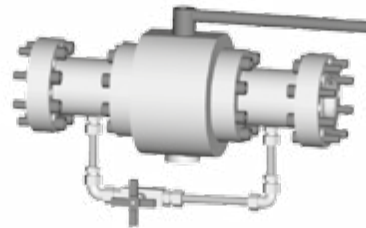
■ **Accessories shut-off valves**

**Roth 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

**Roth 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

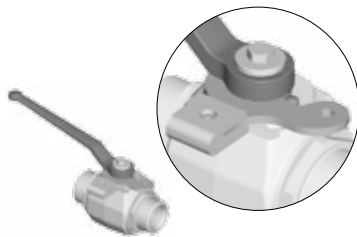
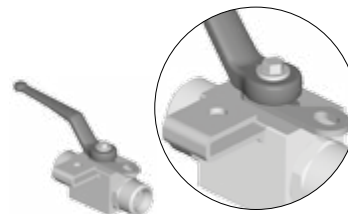


Fig. 2



**Roth 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

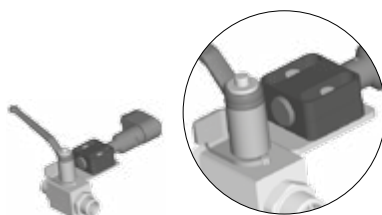
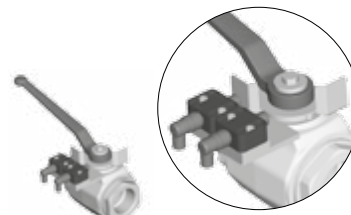


Fig. 4



## Oil-side accessories

### Oil safety- and shut-off block

The oil safety- and shut-off block serves as a device for the protection, shut-off and discharge of hydraulic accumulators. The design of the block observes the European safety regulations for the operation of hydraulic accumulators, provided that the discharge capacity of the integrated safety valve (see diagram on page 43) is not lower than the installed output of the pressure generator.

#### Types:

##### > SABX2

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

##### > 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).

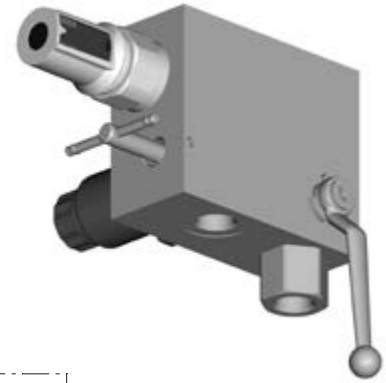
#### Discharges:

##### > Manual discharge (M) (PN 400 bar)

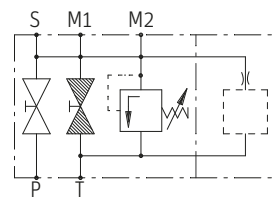
As standard, the discharging of the accumulator is effected by a manual discharge valve (Pos. 3).

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

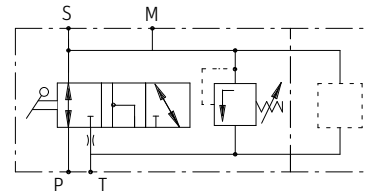
In addition to manual discharge, an electromagnetic operating two-way valve permits the automatic discharge of the accumulator. There are two types available, which are dead open (EO) or closed (EG)



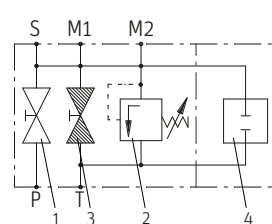
SABX2



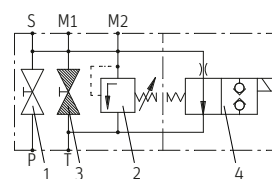
SABX3



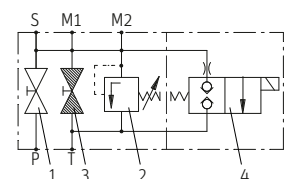
Design M



Design EO



Design EG



Nominal diameter	DN 10	DN 20	DN 30
Types	SABX2	SABX3	SABX2
Working medium	Mineral oil according to DIN 51524 Part 1 and 2 (other mediums are available upon request)		
Viscosity	min. 10 mm <sup>2</sup> /s - max. 380 mm <sup>2</sup> /s		
Purity class	Class 20/18/15 acc. to DIN 4406		
Safety valve NG 10	(for valve data see page 41)		
Material	Steel		
Working temperature	-10°C ... +80 °C		
Acceptance regulation	DGR 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
Weight (design EO/EG)	4.9 kg	2.3 kg	7.1 kg

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



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

		Order designation		
Type	SABX2 = SABX3 =	=		2-way ball valve 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)
Seals	...-	◀	1	= FKM (standard)
			2	= others available upon request
			3	= others available upon request
Voltage (only EO, EG version)	...	◀	24	= 24 VDC (other voltages available upon request)

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

**Order designation is:**

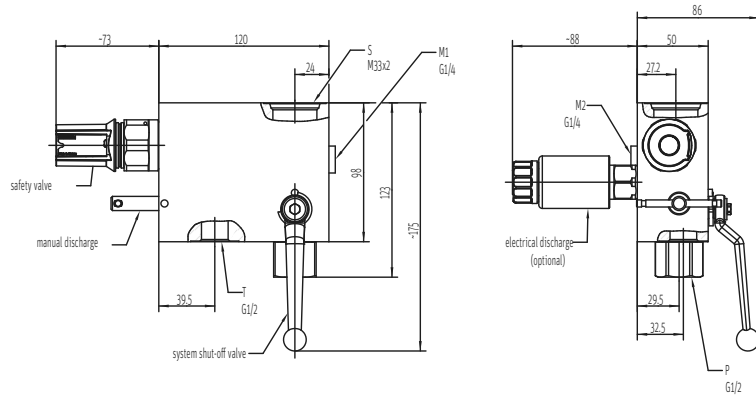
Type:	SABX2
Nominal diameter:	20 mm
Change index:	X
Discharge	electrical (power off open)
set pressure safety valve:*	350 bar
Seals:	FKM
Voltage:	24 VDC

\*other set pressures are available upon request

 **Note:** Special requirements available upon request

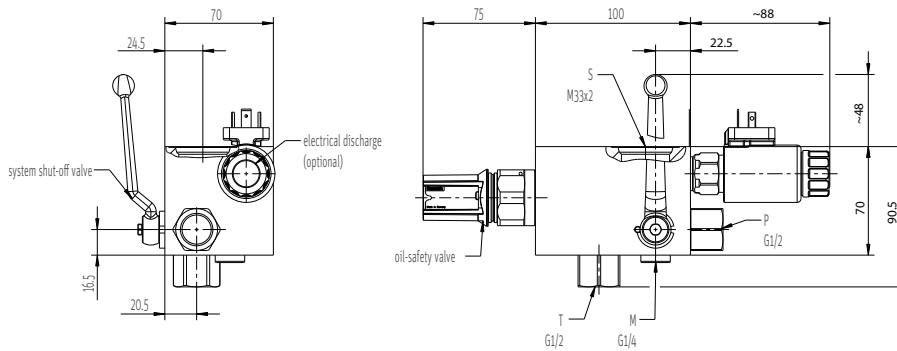
# Oil-side accessories

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



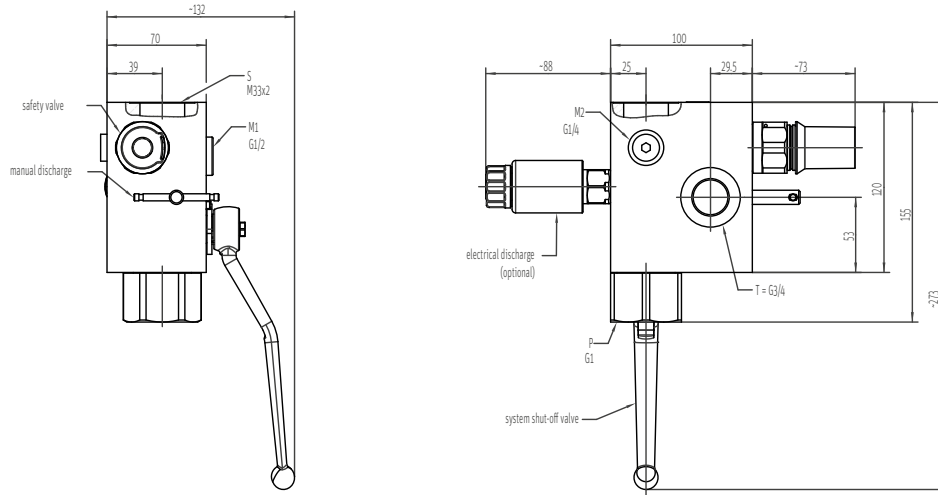
Part no.	Type	Part no.	Type	Part no.	Type
4204031712	SABX2-10-X-M-200-1	4204031723	SABX2-10-X-E0-200-1-24	4204032305	SABX2-10-X-EG-200-1-24
4204031708	SABX2-10-X-M-210-1	4204031724	SABX2-10-X-E0-210-1-24	4204032306	SABX2-10-X-EG-210-1-24
4204031709	SABX2-10-X-M-250-1	4204031727	SABX2-10-X-E0-250-1-24	4204032307	SABX2-10-X-EG-250-1-24
4204031720	SABX2-10-X-M-330-1	4204031728	SABX2-10-X-E0-330-1-24	4204032308	SABX2-10-X-EG-330-1-24
4204031721	SABX2-10-X-M-350-1	4204031729	SABX2-10-X-E0-350-1-24	4204032309	SABX2-10-X-EG-350-1-24

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



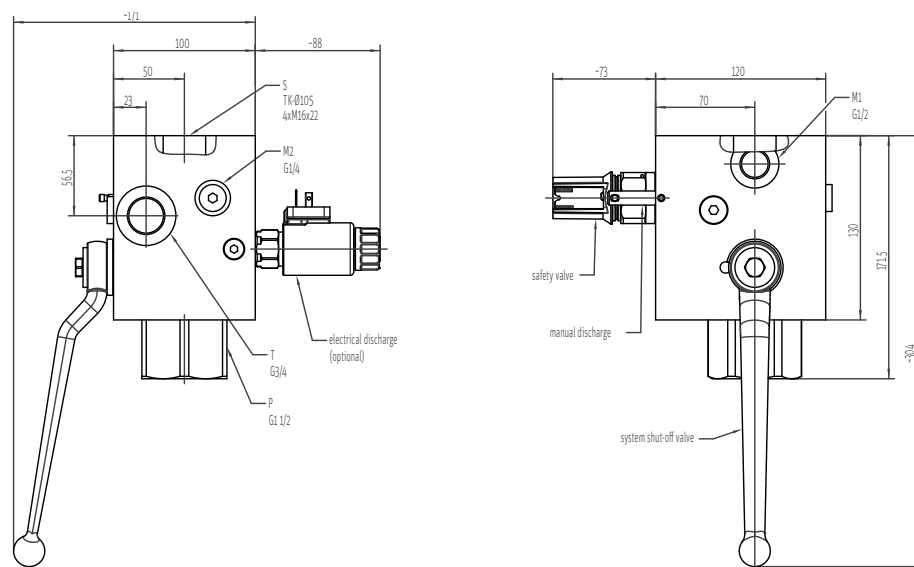
Part no.	Type	Part no.	Type	Part no.	Type
4204031751	SABX3-10-X-M-200-1	4204031756	SABX3-10-0-E0-200-1-24	4204032310	SABX3-10-0-EG-200-1-24
4204031752	SABX3-10-X-M-210-1	4204031757	SABX3-10-0-E0-210-1-24	4204032311	SABX3-10-0-EG-210-1-24
4204031753	SABX3-10-X-M-250-1	4204031758	SABX3-10-0-E0-250-1-24	4204032312	SABX3-10-0-EG-250-1-24
4204031754	SABX3-10-X-M-330-1	4204031759	SABX3-10-0-E0-330-1-24	4204032313	SABX3-10-0-EG-330-1-24
4204031755	SABX3-10-X-M-350-1	4204031760	SABX3-10-0-E0-350-1-24	4204032314	SABX3-10-0-EG-350-1-24

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



Part no.	Type	Part no.	Type	Part no.	Type
4204031730	SABX2-20-X-M-200-1	4204031736	SABX2-20-X-EO-200-1-24	4204032299	SABX2-20-X-EG-200-1-24
4204031731	SABX2-20-X-M-210-1	4204031737	SABX2-20-X-EO-210-1-24	4204032300	SABX2-20-X-EG-210-1-24
4204031732	SABX2-20-X-M-250-1	4204031738	SABX2-20-X-EO-250-1-24	4204032301	SABX2-20-X-EG-250-1-24
4204031733	SABX2-20-X-M-330-1	4204031739	SABX2-20-X-EO-330-1-24	4204032302	SABX2-20-X-EG-330-1-24
4204031734	SABX2-20-X-M-350-1	4204031740	SABX2-20-X-EO-350-1-24	4204032303	SABX2-20-X-EG-350-1-24

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



Part no.	Type	Part no.	Type	Part no.	Type
4204031741	SABX2-30-X-M-200-1	4204031746	SABX2-30-X-EO-200-1-24	4204032294	SABX2-30-X-EG-200-1-24
4204031742	SABX2-30-X-M-210-1	4204031747	SABX2-30-X-EO-210-1-24	4204032295	SABX2-30-X-EG-210-1-24
4204031743	SABX2-30-X-M-250-1	4204031748	SABX2-30-X-EO-250-1-24	4204032296	SABX2-30-X-EG-250-1-24
4204031744	SABX2-30-X-M-330-1	4204031749	SABX2-30-X-EO-330-1-24	4204032297	SABX2-30-X-EG-330-1-24
4204032304	SABX2-30-X-M-350-1	4204031750	SABX2-30-X-EO-350-1-24	4204032298	SABX2-30-X-EG-350-1-24

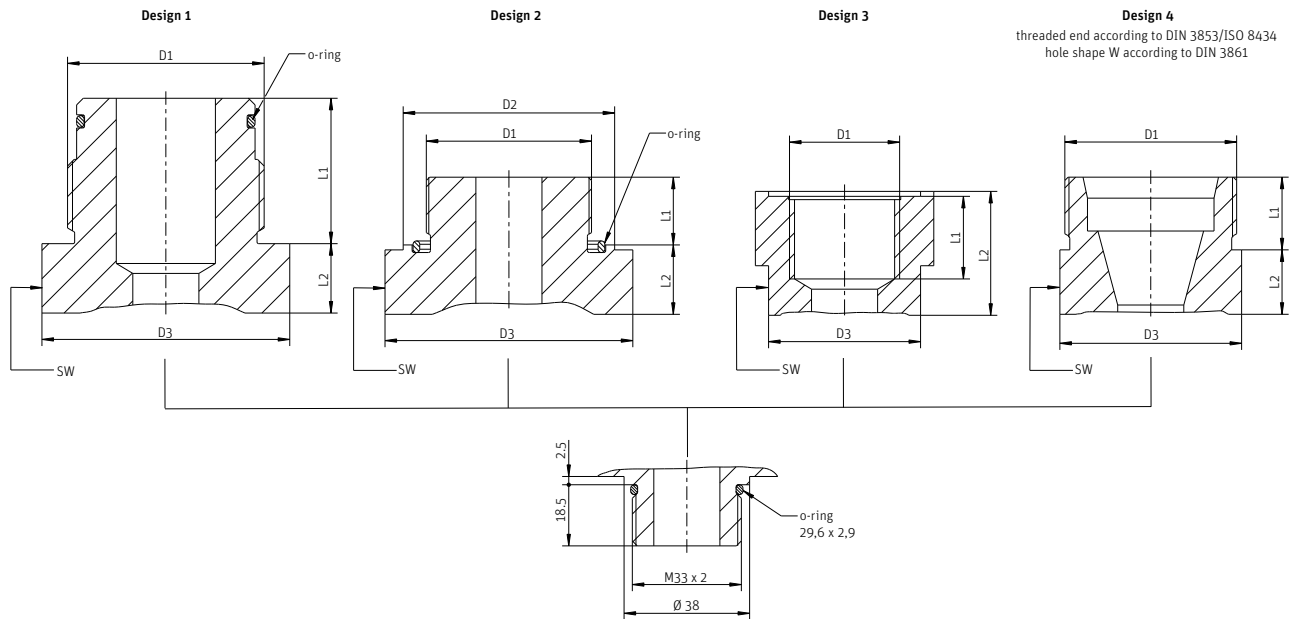
# Oil-side accessories

## 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.

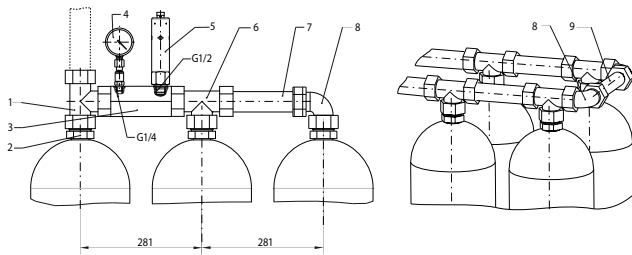
<b>Material</b>	Steel / FKM
<b>Working pressure</b>	350 bar
<b>Working temperature</b>	-15°C...+80°C

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



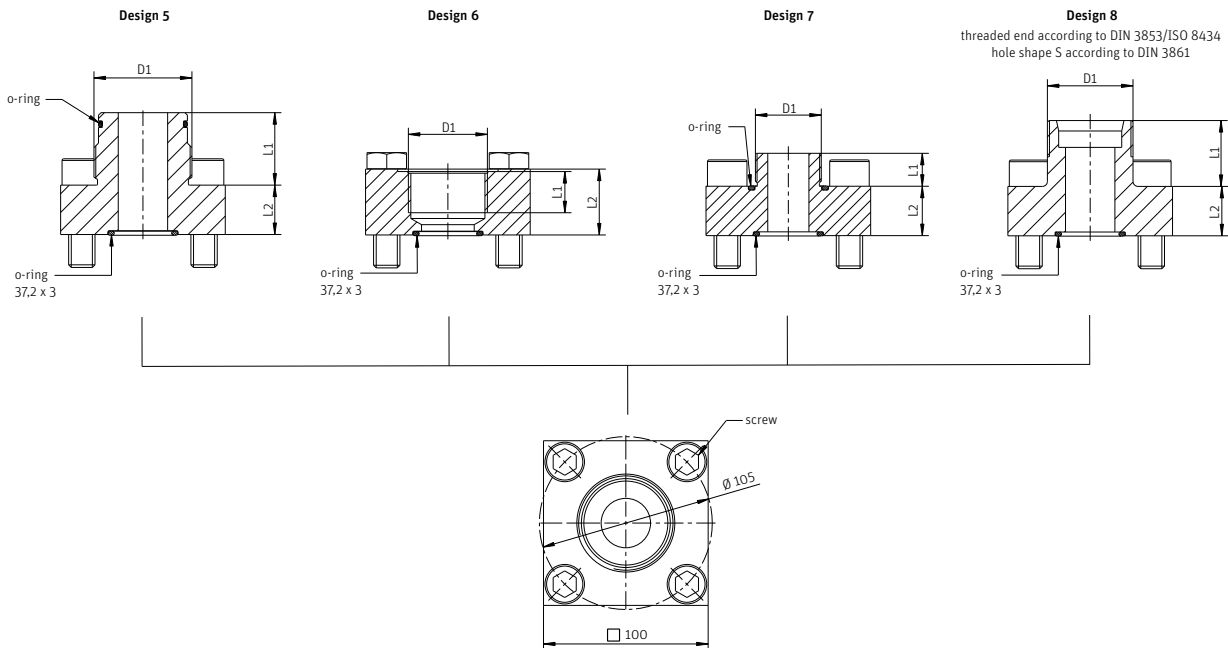
Part name	Usage	Design	D1	ø - D2	ø - D3	SW	L1	L2	O-ring	Part no.
BS 12	BLAK 1-6 l	1	G 1 1/4"	-	55	50	37	16.5	30 x 3	4204027344
BS 13	BLAK 10-50 l		G 2"	-	75	65	44	21	48 x 3	4204027346
BS 22	Connection with metric fine thread	2	M50 x 1.5	64	75	65	20.5	21	53 x 3	4204027345
BS 40	Connection screw-in fitting	3	G 1"	-	54	46	25	37.5	-	4204030900
BS 41			G 1/2"	-	40	36	19	21	-	4204028691
BS 49	Pipeline 385	4	M52 x 2	-	60	55	22	19.5	-	4204030902

parallel vessel positioning



Part name	Usage	Design	D1	ϕ - D2	ϕ - D3	SW	L1	L2	Seal ring	Part no.
BS 30	MEAK	9	G 1/2"	35	48	41	14	38.5	24/29 x 2	4204028007
BS 31			G 3/4"	38			16		27/32 x 2	4204028006
BS 32	MEAK	10	G 1/2"	26.9	48	41	14	38.5	21	4204030855
BS 33			G 3/4"	31.9			16		27	4204030905

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

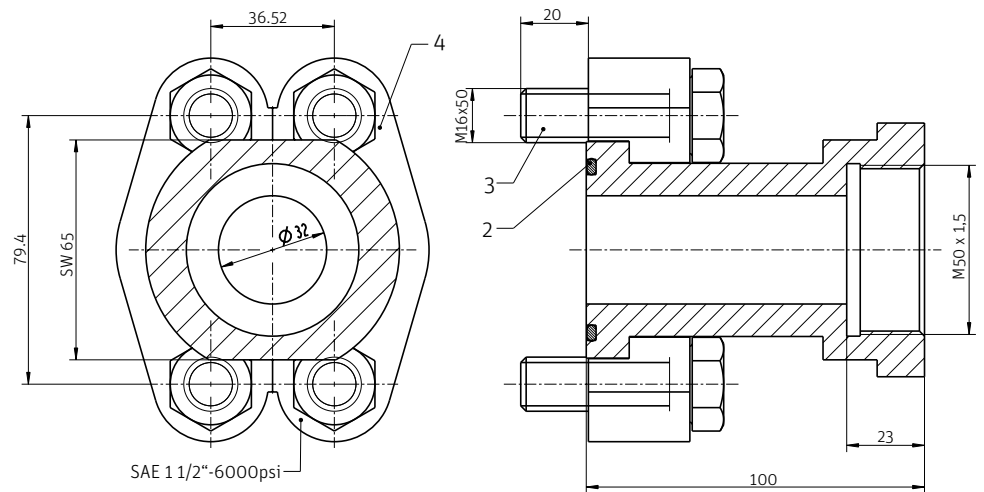


Part name	Usage	Design	D1	L1	L2	O-ring	Part no.
BS 307	BLAK 1-6l	5	G 1 1/4"	37	67	30x3	4204033839
BS 309	BLAK 10-50l		G 2"	44	30	48x3	4204027347
BS 321	Connection screw-in fitting	6	G 1 1/2"	25	40	-	4204030877
BS 340	Connection with metric fine thread	7	M40x1.5	20	30	44x3	4204030878
BS 350			M50x1.5	20	30	53x3	4204027343
BS 352	Pipeline 38S	8	M52x2	40	30	-	4204030879

# Oil-side accessories

## ■ Adapter

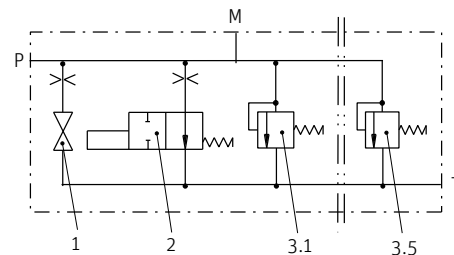
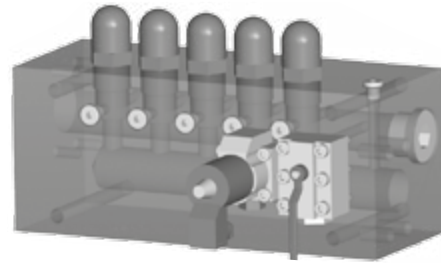
The Roth adapter is used to connect the oil safety and shut-off block with the piston accumulator. It also allows aligning the block with the components and the pipelines that have to be connected. Under certain circumstances, for example in case of a centric connection in the accumulator nozzle, this part can be omitted.



<b>Nominal diameter</b>	DN 32	
<b>Working medium</b>	Oil	
<b>Suitable for</b>	DN 30	
<b>Material</b>	Normal steel - NBR	
<b>Temperature range</b>	-15 °C ... +80 °C	
<b>Weight</b>	3.1 kg	
<b>Acceptance regulation</b>	DGR 2014/68/EU (article 4, paragraph 3)	
Pos. 1	Adapter	4200030844
Pos. 2	O-ring ( $\phi 47.2 \times 3.5$ )	4200001950
Pos. 3	Screws (DIN 933)	4200002733
Pos. 4	SAE flange halves	4200030843
Adapter complete		4200030842

## Oil safety- and discharge block

The safety- and discharge block is designed for the pressure protection and for discharging of Roth piston accumulators and accumulator units. The block meets the requirements of the DGR 2014/68/EU directive. Depending on the pressure oil flow, the block is equipped with 2 to 5 directly controlled safety valves NG 10 (Pos. 3). The number of the safety valves has to be dimensioned for the whole flow rate of the pressure generator. In this context, the flow rate is multiplied by the number of safety valves. The safety valves are type-tested and delivered with a TÜV-adjustment certificate. The block is equipped as standard with a manual (Pos. 1) and an electric (Pos. 2) pressure discharge valve. The electromagnetic 2-way-valve (Pos. 2) is currentless and it automatically discharges the accumulator in case of a power failure. The block provides a measuring connection (M) G 1/4 for a pressure indicator.



<b>Working pressure (PN)</b>	max. 400 bar	
<b>Working medium</b>	Oil	
<b>Material (surface conserved)</b>	Steel	
<b>Temperature range</b>	-25 °C ... +80 °C	
<b>Voltage discharge valve</b>	24 VDC	
<b>Acceptance regulation<sup>1</sup></b>	DGR 2014/68/EU (article 4, paragraph 3)	
Pos. 1	Plate ball valve DN10	4200012489
Pos. 2	Magnet poppet-valve 24V	4200036319
Pos. 3	Safety valve	4202015076
Pos. 4	Block	4204001845
Pos. 5	Screw plug G 1/4	4200017998
Oil safety- and discharging block complete with...		
... 2 safety valves <sup>2</sup>	4204001811	
... 3 safety valves <sup>2</sup>	4204001848	
... 4 safety valves <sup>2</sup>	4204001849	
... 5 safety valves <sup>2</sup>	4204001850	

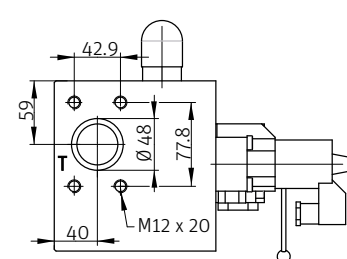
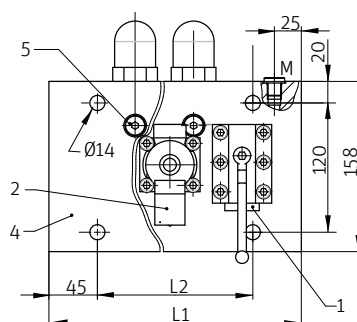
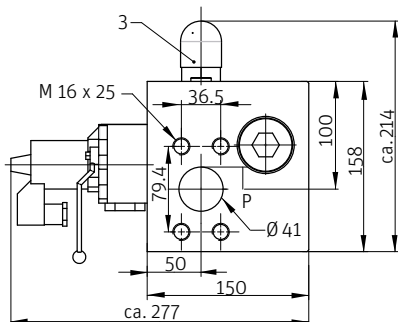
Measuring connection (G 1/4)	M
Pump connection (SAE 1 1/2" 6000 psi)	P
Tank connection (SAE 2" 3000 psi)	T
Manual discharge	1
Electrical discharge (optional)	2
Oil safety valve 2 ... 5 valves (DN 10)	3.1 ... 3.5

Dimensions according	L1 [mm]	L2 [mm]	Weight [kg]
2 safety valves*	230	140	42
3 safety valves*	280	190	51
4 safety valves*	330	240	59.5
5 safety valves*	380	290	67

<sup>1</sup> oil-safety valves with CE marking

<sup>2</sup> please indicate the required pressure setting in your purchase order

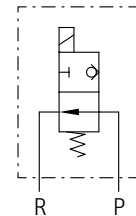
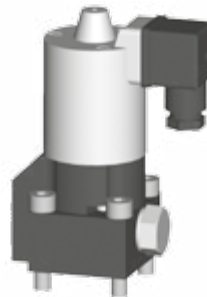
\*For discharge capacity oil safety valves NG 10 see page 40



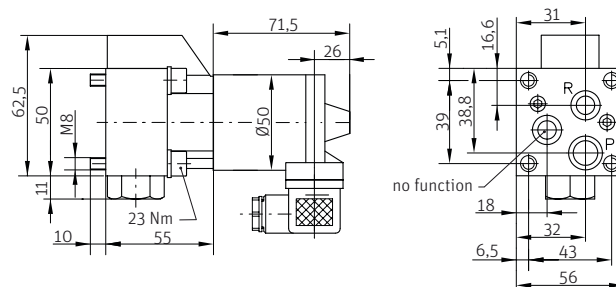
# Oil-side accessories

## Oil discharge valve

Roth discharge valves are directly controlled 2/2 way valves for discharging the hydraulic side of the accumulator. They are electromagnetically operated and designed for block construction. Customized discharging valves with pipe connections are available upon request.



<b>Working pressure (PN)</b>	max. 400 bar
<b>Working medium</b>	Oil
<b>Voltage</b>	24 VDC
<b>Electrical connection</b>	DIN EN 175 301-803 A
<b>Flow rate max.</b>	25 l/min
<b>Working temperature</b>	-25 °C ... +80 °C
<b>Weight</b>	1.4 kg
<b>Acceptance regulation<sup>1</sup></b>	DGR 2014/68/EU (article 4, paragraph 3)
<b>Part no.</b>	4200036319



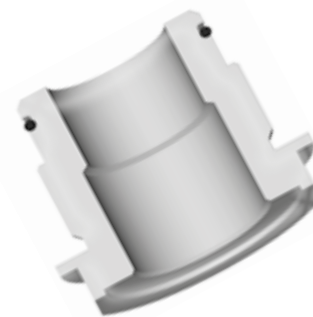
## Bladder accumulator reductions

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

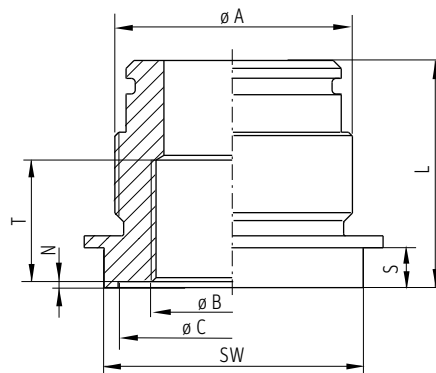
The standard versions in normal steel are based on the permissible working pressure 330/350 bar.

Other materials are available on request.

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



Ø A	Ø B	L	T	S	SW	Ø C	N	Part no.
G2	G 1 1/2	90	34	10	70	62	1	4204020094
	G 1 1/4	57	20	10	65	58	2.5	4204020097
	G 1	57	18	10	65	47	2.5	4204020098
	G 3/4	57	16	10	65	42	2.5	4204020099
	G 1/2	57	14	10	65	34	2.5	4204020100
	G 3/8	57	12	10	65	28	2	4204020101
G11/4	G 3/4	50	16	10	50	42	2.5	4204020103
	G 1/2	50	14	10	50	34	2.5	4204020104
	G 3/8	50	12	10	50	28	2	4204020105





■ Oil safety valves

**Oil safety valve DN 6-30**

Oil safety valves are directly controlled poppet valves and serve to limit the system pressure. If the system pressure exceeds the pressure setting the valve opens and the fluid flows through the T-channel back into the tank. If the system pressure drops approximately 10% below the pressure setting the valve closes again. In order to reach volume flows that are higher than those mentioned in the diagram, several safety valves can be used in parallel. Oil safety valves are type tested components according to the DGR 2014/68/EU directive. We provide pressure discharge valves as cartridge valve (fig.1/2) or with threaded connections (fig. 3/4).

**Oil safety valve as cartridge valve for block installation**

Fig. 1

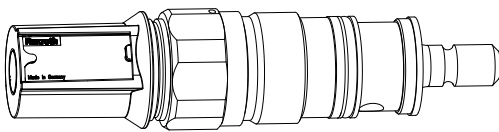
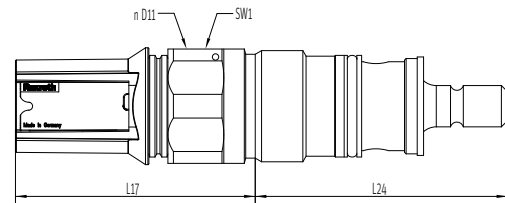
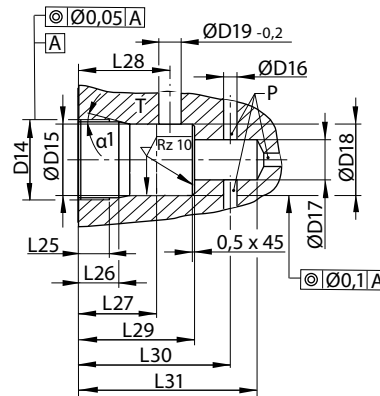


Fig. 2



**Dimension safety valve**

NG	SW1	D11	L17	L24
6	32	34	72	64.5
10	36	38	68	77
20	46	48	65	106
30	60	63	83	131



**Dimension screw-in tap hole**

NG	D14	ØD15	ØD16	ØD17	ØD18	ØD19	L25	L26	L27	L28	L29	L30	L31	1
6	M28 x 1.5	25 <sup>H9</sup>	6	15	24.9 <sup>+0.162 -0.2</sup>	12	15	19	30	36	45	56.5±5.5	65	15°
10	M35 x 1.5	32 <sup>H9</sup>	10	18.5	31.9 <sup>+0.162 -0.2</sup>	15	18	23	35	41.5	52	67.5±7.5	80	15°
20	M45 x 1.5	40 <sup>H9</sup>	20	24	39.9 <sup>+0.162 -0.2</sup>	22	21	27	45	55	70	91.5±8.5	110	20°
30	M60 x 2	55 <sup>H9</sup>	30	38.75	54.9 <sup>+0.172 -0.2</sup>	34	23	29	45	63	84	113.5±11.5	140	20°

# Oil-side accessories

## Oil safety valve with connecting block for pipe installation

Fig. 3

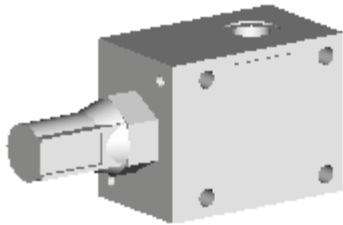
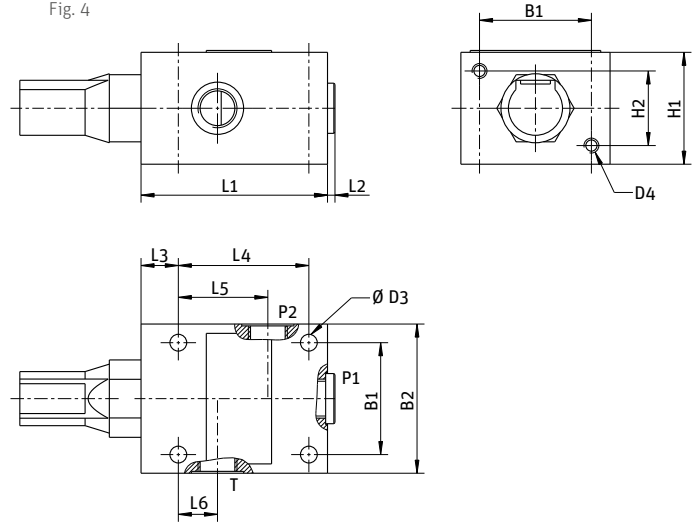


Fig. 4



### Dimension block

NG	B1	B2	D1	D2	D3	D4	H1	H2	L1	L2	L3	L4	L5	L6	T1
6	45	60	25	G1/4	6.6	M6	25	40	80	4	15	55	40	20	10
10	60	80	34	G1/2	9	M8	40	60	100	4	20	70	48	21	15
20	70	100	47	G1	9	M8	50	70	135	5.5	20	100	65	34	18
30	100	130	65	G1 1/2	11	M10	60	90	180	5.5	25	130	85	35	20

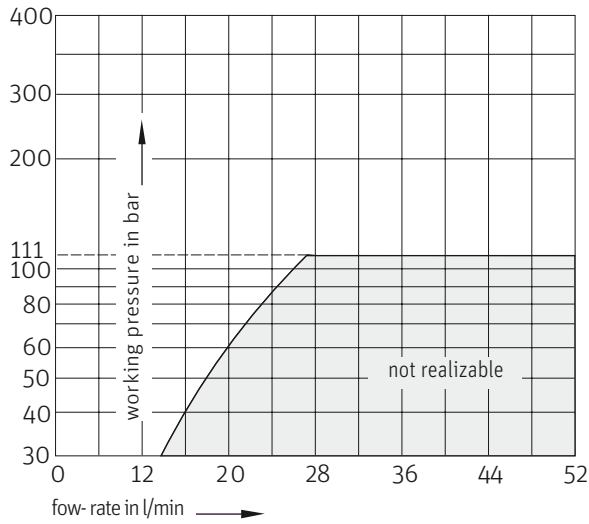
<b>Nominal diameter</b>	DN 6	DN 10	DN 20	DN 30
<b>Working medium</b>	Oil			
<b>Working temperature</b>	-15 °C ... +80 °C			
<b>Viscosity range</b>	12 ... 230 mm <sup>2</sup> /s			
<b>Acceptance regulation</b>	DGR 2014/68/EU (with CE marking)			
<b>Weight cartridge valve</b>	0.4 kg	0.5 kg	1.0 kg	2.2 kg
<b>Weight connecting block</b>	1.5 kg	3.7 kg	6.4 kg	13.9 kg

Cartridge valve (fig. 1/2)*				
220 bar	4204013262	4204011868	4204011891	4204011896
220 bar	4204013263	4204005601	4204011892	4202014074
280 bar	4204013264	4204011869	4204011893	4204011897
350 bar	4204013265	4202015076	4204011894	-
375 bar	4204013266	4204011890	4204011895	-

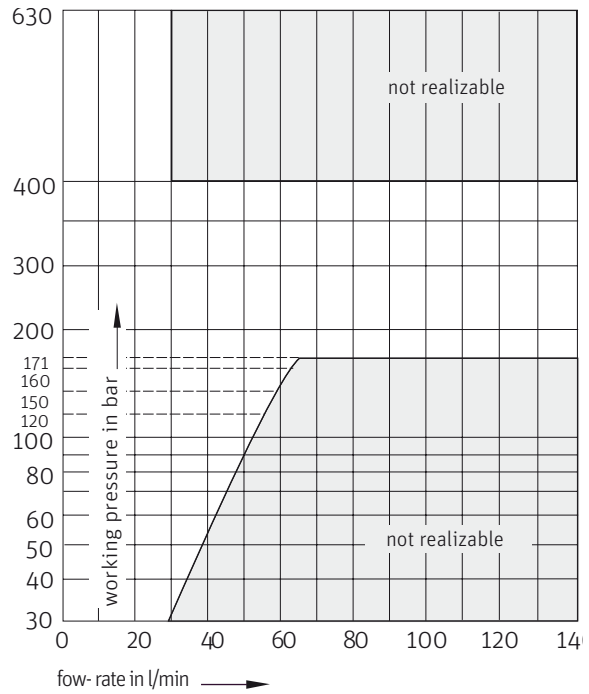
Safety valve with connecting block (fig. 3/4)				
220 bar	4204013309	4204011880	4204011874	4204011878
220 bar	4204013310	4204011898	4202014520	4202014731
280 bar	4204013311	42040118881	4204011875	4204011879
350 bar	4204013312	4202011882	4204011876	-
375 bar	4204013313	4204011883	4204011877	-

\*other set pressures are available upon request

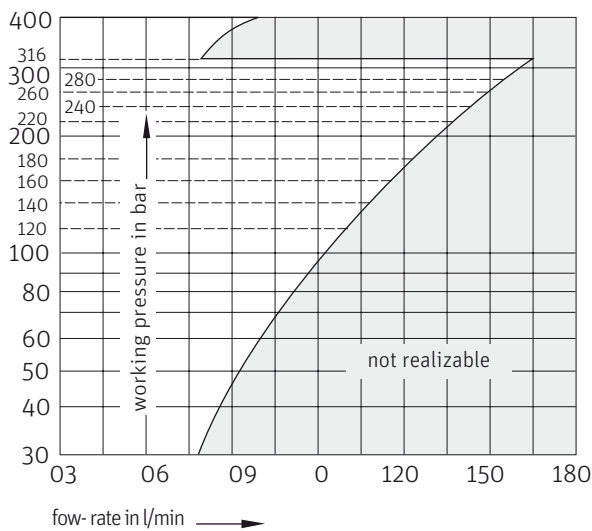
**Flow-rate diagram safety valve NG 6**



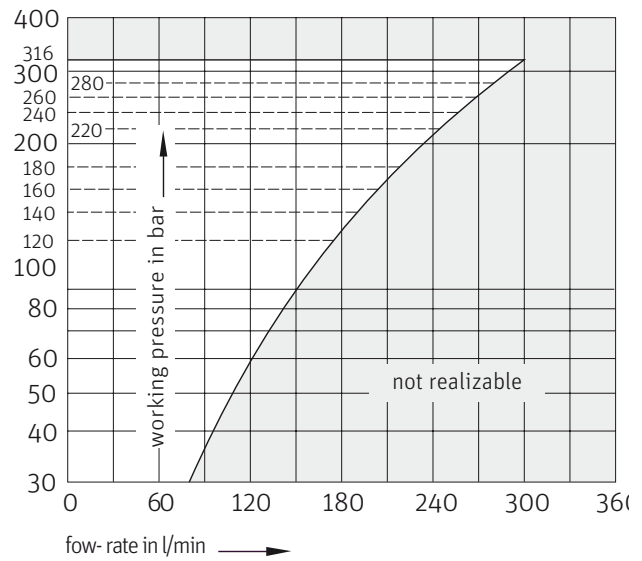
**Flow-rate diagram safety valve NG 10**



**Flow-rate diagram safety valve NG 20**



**Flow-rate diagram safety valve NG 30**



**Note:**

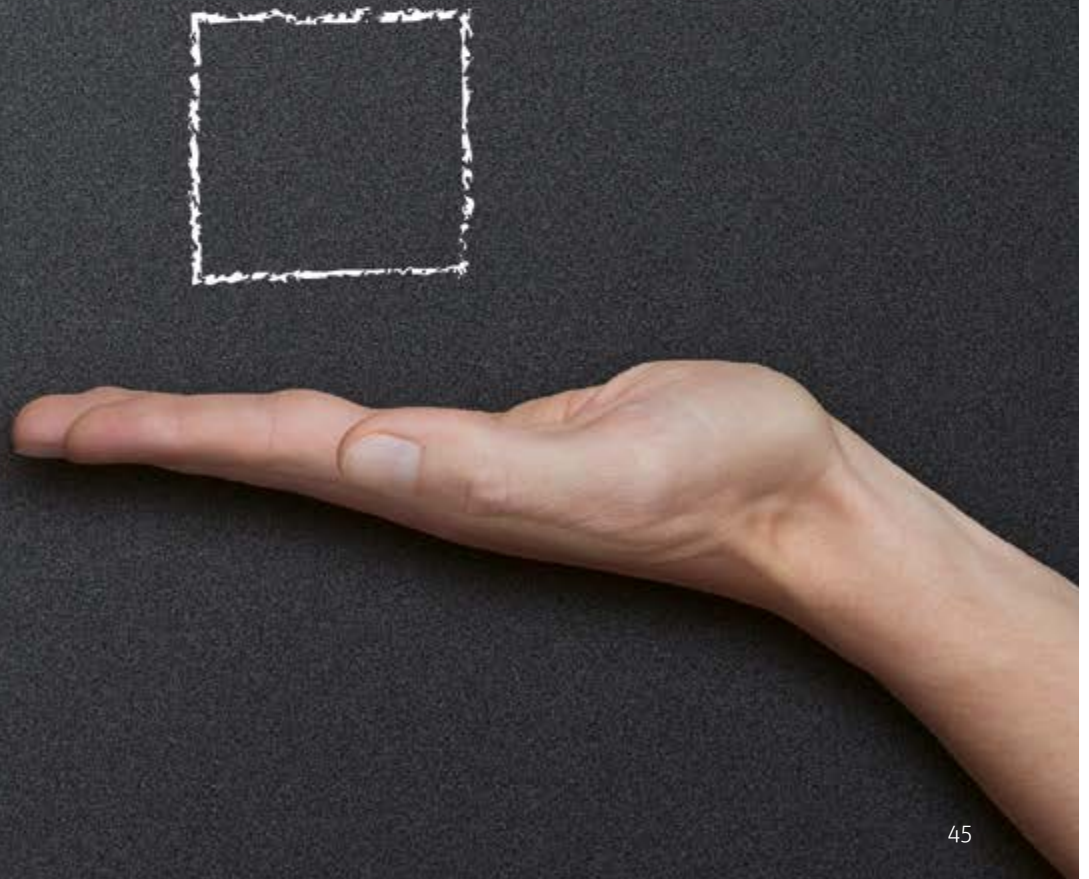
When using several identical oil safety valves, the volume stream will increase by the quantity of the safety valves.

**Notes**


## Roth measuring and display devices

All Roth components are tested components that provide a high degree of reliability. They provide multi-use and are practically maintenance-free. Measuring instruments for detecting physical sizes that are computerized, e.g. for the evaluation of pressure conditions or for the manual detection of pressure, should always be installed for technical safety reasons. In accordance with the DGR 2014/68/EU directive they are not to be classified as equipment parts with safety functions. In order to be able to offer the highest degree of flexibility, customized measurement systems, e.g. those of explosion-proofed components, are available. (For piston position indicators see brochure 1.1.3).

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Double front panel	47
Pressure gauge for gas-side	48
Pressure gauge for oil-side	49
Electronic dual pressure switch	50
Mechanic dual pressure switch	52
Electronic pressure transducer	53



# Measuring and display devices

## ■ General information

### Acceptance

Pressure gauges (mechanical pressure gauges and pressure sensors) are classified according to the DGR 2014/68/EU directive as pressurized equipment parts. Roth manometers that exceed a measuring range of 200 bar are always CE-marked. Pressure sensors are subject to the Pressure Equipment Directive and the EMC Directive 2014/30/EU (electromagnetic compatibility). Therefore, they are always CE-marked. Other assembly components are considered individually with regard to their medium, pressure, volume, and diameter. They are CE-marked if necessary (see description of components).

### Standard connections

The connections of all Roth measuring and display devices observe the following standards:

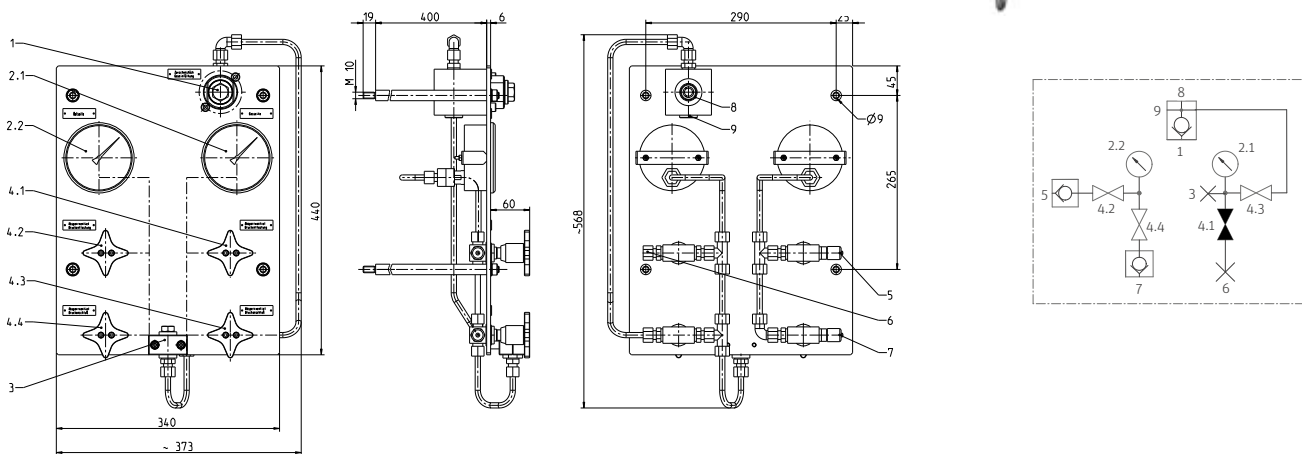
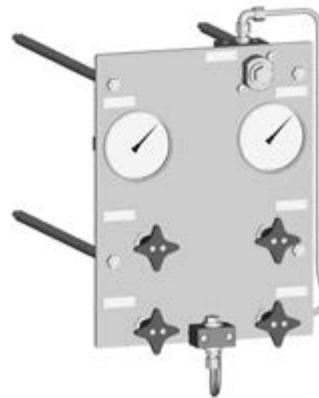
- > Connection pin/boring DIN ISO 228-1
- > Threaded pins DIN 3853 / ISO 8434
- > Screw-in boring DIN 3861 bore shape W  
(Other connections on request)

### Surfaces

The surfaces of the individual components are normally galvanized or chromated. For possible variations see description of components.

## ■ Double front panel

The Roth double front panel includes several functions in a very compact space. Due to its ergonomically ideal design, it gives the options of reading the pressure on the nitrogen-side as well as on the oil-side, of executing the nitrogen filling by using the Roth filling valve and of discharging the pressure on the oil side and on the gas-side. In addition, the double front panel also provides a gas-side connection for a pressure switch.



Essential components of the double front panel:

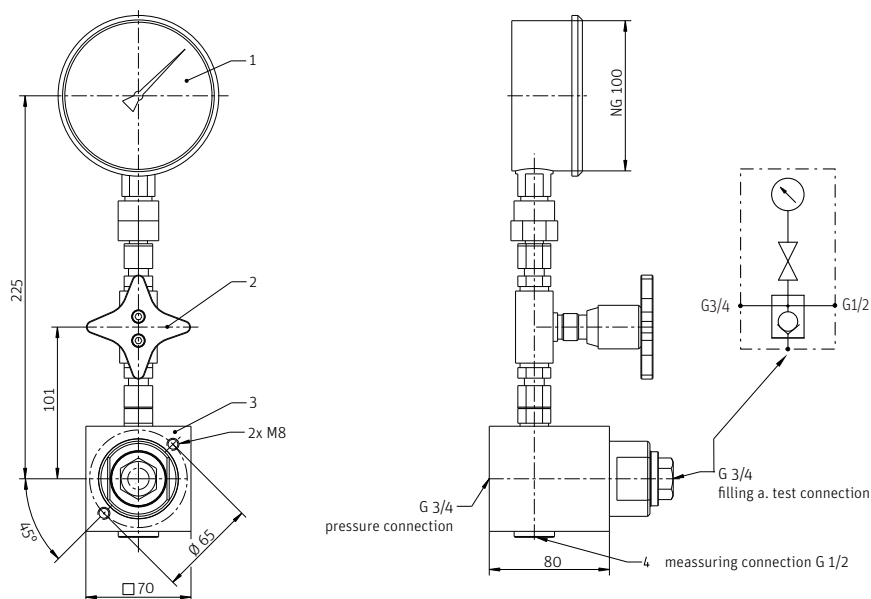
Item	Part name
1	Roth filling valve (see page 20)
2.1	Pressure gauge gas-side
2.2	Pressure gauge oil-side
3	Connection G 1/4
4.1	Pressure discharge valve gas-side
4.2	Pressure discharge valve oil-side
4.3	Shut-off valve pressure connection gas-side
4.4	Shut-off valve pressure connection oil-side
5	Connection oil discharge
6	Connection gas discharge (M16 x 1.5; DIN 3853)
7	Pressure connection oil-side
8	Pressure connection gas-side (G3/4)
9	Measuring connection gas-side (G1/2)

<b>Working pressure (PN)</b>	max. 350 bar
<b>Nominal diameter</b>	DN 5
<b>Working medium</b>	Oil/nitrogen
<b>Weight</b>	approx. 19 kg
<b>Pressure gauge [bar/psi]</b>	NG 100 (DGR 2014/68/EU (article 4, paragraph 3)), glycerine
<b>Acceptance regulation</b>	DGR 2014/68/EU (article 4, paragraph 3)
Double front panel 0 ... 160 bar	4204032552
Double front panel 0 ... 250 bar*	4204032553
Double front panel 0 ... 400 bar*	4204032554

# Measuring and display devices

## ■ Pressure gauge gas-side

The pressure gauge on the gas-side serves to measure the gas-side pressure and to fill Roth piston accumulators with nitrogen.



<b>Working pressure (PN)</b>	max. 350 bar	
<b>Nominal diameter</b>	DN 6	
<b>Working medium</b>	Nitrogen	
<b>Weight</b>	approx. 4.5 kg	
<b>Pressure gauge [bar/psi]</b>	NG 100 (EN837-1), glycerine	
<b>Acceptance regulation</b>	DGR 2014/68/EU (article 4, paragraph 3)	
Pos. 1.1	Pressure gauge 0 ... 160 bar	4204002202
Pos. 1.2	Pressure gauge 0 ... 250 bar <sup>1</sup>	4200048600
Pos. 1.3	Pressure gauge 0 ... 400 bar <sup>1</sup>	4200048601
Pos. 2	Shut-off valve	4204028425
Pos. 3	Filling valve <sup>1,2</sup> (see page 20)	4200003520
Pos. 4	Screw plug G1/2 <sup>3</sup>	4200040337
Pressure gauge complete 0 ... 160 bar		4204029805
Pressure gauge complete 0 ... 250 bar		4204029806
Pressure gauge complete 0 ... 400 bar		4204029807

<sup>1</sup>with CE-marking acc. to DGR 2014/68/EU (article 4, paragraph 3)

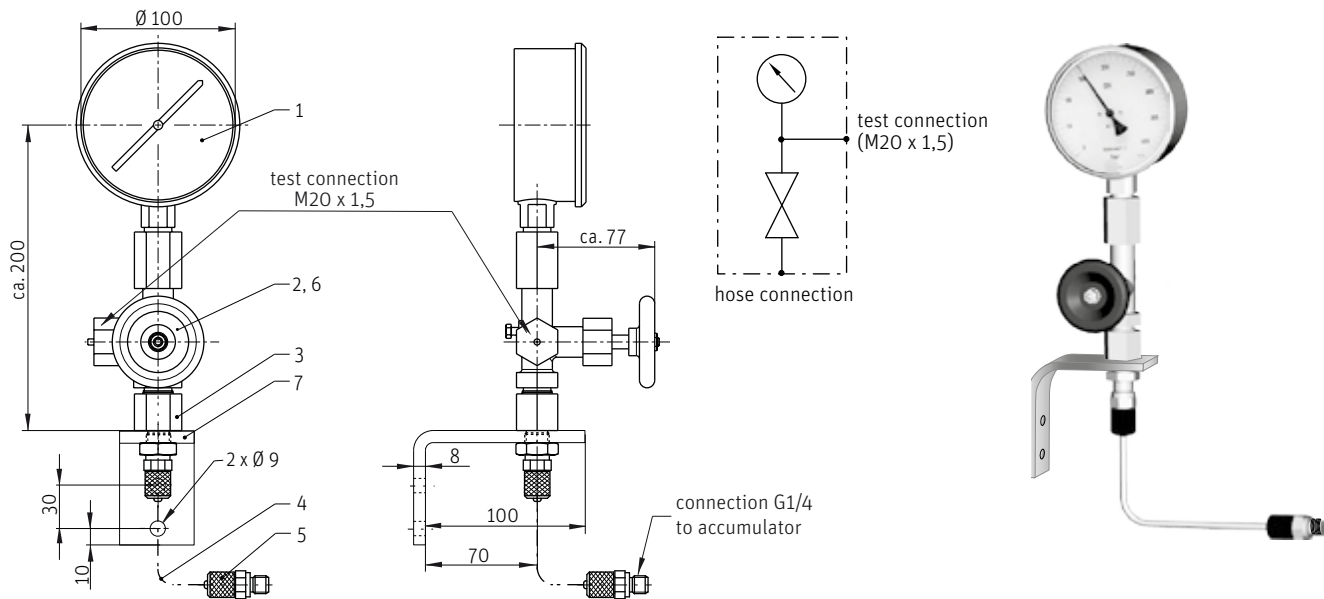
<sup>2</sup>for a suitable filling and testing device see page 21

<sup>3</sup>with pressure release



## ■ Pressure gauge oil-side

The manometer connection on the oil-side serves to measure the oil-side pressure of the Roth accumulator systems. The shut-off valve (Pos. 2) also includes a test connection.



<b>Working pressure (PN)</b>	max. 400 bar	
<b>Nominal diameter</b>	DN 2	
<b>Working medium</b>	Oil	
<b>Weight</b>	approx. 1.6 kg	
<b>Pressure gauge [bar/psi]</b>	NG 100 (EN837-1), glycerine	
<b>Acceptance regulation</b>	DGR 2014/68/EU (article 4, paragraph 3)	
Pos. 1.1	Pressure gauge 0 ... 160 bar	4204002202
Pos. 1.2	Pressure gauge 0 ... 250 bar <sup>1</sup>	4200048600
Pos. 1.3	Pressure gauge 0 ... 400 bar <sup>1</sup>	4200048601
Pos. 2	Shut-off valve with test plug	4200003235
Pos. 3	Pressure gauge G1/2	4200026691
Pos. 4	High pressure hose DN 2, 1500 mm <sup>2</sup>	4200027257
Pos. 5	Screw coupling connection G1/4	4200020887
Pos. 6	Canted gasket	4200001211
Pos. 7	Bracket	4200004991
Pressure gauge complete 0 ... 160 bar		4204002172 <sup>3</sup>
Pressure gauge complete 0 ... 250 bar		4202016090 <sup>3</sup>
Pressure gauge complete 0 ... 400 bar		4200051195 <sup>3</sup>

<sup>1</sup> with CE-marking acc. to DGR 2014/68/EU (article 4, paragraph 3)

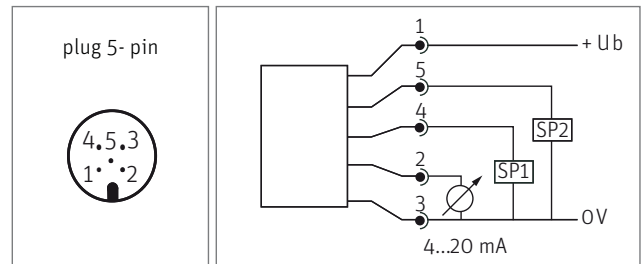
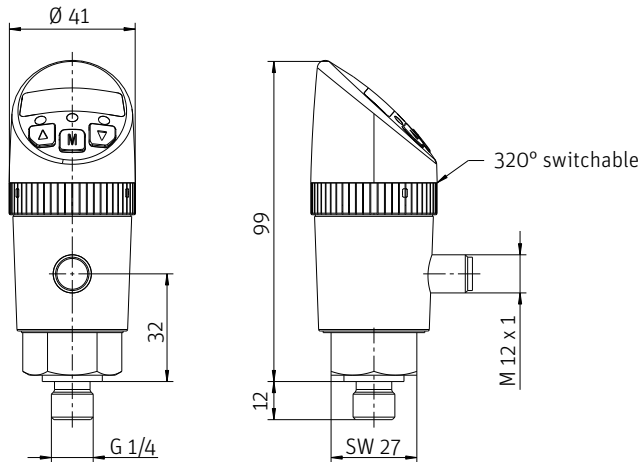
<sup>2</sup> other hose lengths are available upon request

<sup>3</sup> these part numbers are without Pos. 7 (bracket)

# Measuring and display devices

## ■ Electronic dual pressure switch

Electronic pressure switch for pressure control with digital display, two switching outputs and one analogue output, linearity error  $\pm 0.5\%$  from measuring range at  $+25\text{ }^\circ\text{C}$ .



Design	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
2 switching outputs and 1 analogue output	+UB 18 ...32 V DC	analogue 4 ... 20 mA 0 ... 10 V DC	0 V	SP1 0.5 A max	SP2 0.5 A max

<b>Process connection</b>	G 1/4 <sup>1</sup>
<b>Sensor element</b>	Piezoresistive sensor
<b>Material:</b> <b>Wetted parts</b> <b>Electronic housing</b> <b>Seals</b>	Stainless steel (1.4301) Stainless steel V2A FKM
<b>System of protection</b>	IP 67 with PG, IP65 with plug
<b>Weight</b>	approx. 300g
<b>Effective range</b>	0 .... 400 bar <sup>2</sup>
<b>Characteristic deviation</b>	< ± 0.5 % from measuring range at +25 °C
<b>A/D converter</b> <b>Resolution</b> <b>Scanning rate</b>	12 bit (4096 steps per measuring span) 1000/s
<b>Electrical connection</b>	Plug M12 x 1 <sup>3</sup>
<b>Temperature range</b>	-10°C .... +70°C
<b>Temperature influence</b>	TC zero point < ±0.2 % FSO / 10K · TC span < ±0.3 % FSO / 10K
<b>Compensation range</b>	-10°C .... +70°C
<b>Supply voltage</b>	15 – 32 V DC
<b>Digital display</b>	4-digit 14-segment LED-display, digit height 9mm, red
<b>Power consumption</b>	approx. 50 mA (without load) · approx. 80 mA (output code 6)
<b>Analogue output</b> <b>Current output</b> <b>Load</b> <b>Voltage output</b> <b>Rating</b> <b>Adjustment range</b>	4 ... 20 mA max. RI = (Ub-12 V)/20 mA RI = 600 Ohm Ub = 24 V DC 0 ... 10 V DC max. 10 mA 25% ... 100% from measuring range end value
<b>Switching function</b> <b>Adjustment range</b> <b>Switching frequency</b> <b>Delay</b> <b>Display</b>	Open/closed/standard/window mode and diagnosis function adjustable 0% ... 125% from measuring range end value max. 100 Hz, max. 500 mA, short-circuit proof 0.0 ... 50 s adjustable LED rot
<b>Applications</b>	Oil-side and gas-side
<b>Approval</b>	cULus 1) - E42816
<b>Coupling socket</b>	Optional
<b>Part no.</b>	4204024378

<sup>1</sup> other thread connections are available upon request

<sup>2</sup> other pressure levels are available upon request

<sup>3</sup> please define plug design in your purchase order

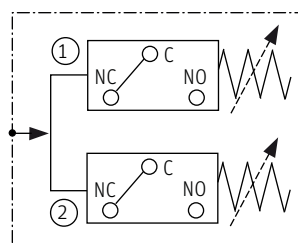
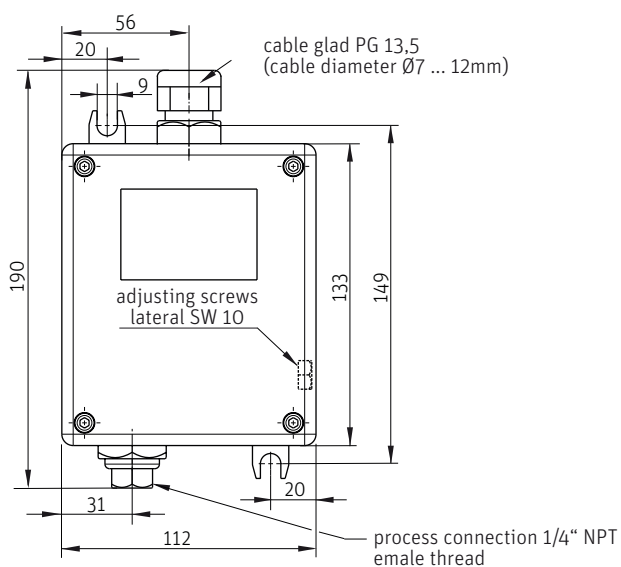
# Measuring and display devices

## ■ Mechanic dual pressure switch

Mechanical single/dual pressure switch. Repeatability  $\pm 1.0\%$  at constant temperature.

### Features:

Bourdon tube pressure switch, set points are adjustable during operation by the use of corresponding reference equipment. All wetted parts are welded.



<b>Type *</b>	max. 250 bar	max. 400 bar
<b>Adjustment range</b>	13.7 bar ... 217 bar	22.4 bar ... 325 bar
<b>Repeatability</b>	$\pm 1\%$ at constant temp.	
<b>Temperature range</b>	-40°C to +75°C	
<b>Switching rate</b>	max. 20/min	
<b>Applications</b>	Oil-side and gas-side	
<b>Process connection</b>	1/4" NPT	
<b>Electrical connection</b>	Internal terminal strip (0,5 ... 2,5 mm <sup>2</sup> )	
<b>System of protection</b>	IP65	
<b>Housing</b>	Aluminium anodized	
<b>Weight</b>	1.2 kg	
<b>Plug</b>	6-pin E. DIN EN 43651	
<b>Part no.</b>	4204005046	4204014512

\*other pressure levels are available upon request

■ **Electr. pressure transducer**

Electronic pressure transducer for gas / hydraulic applications, with internal stainless steel diaphragm.

**Features:**

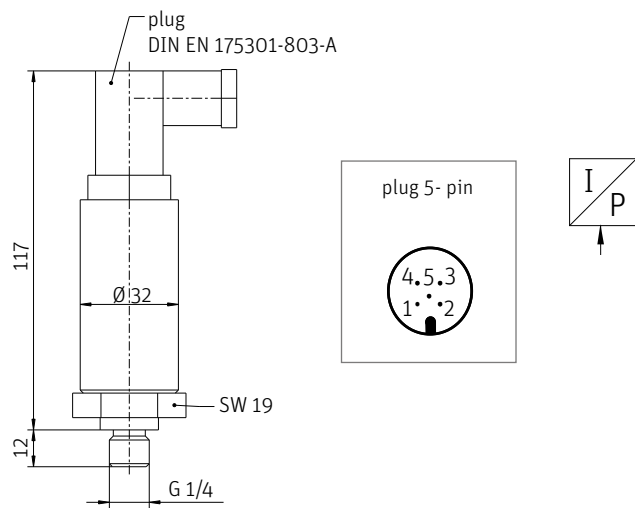
Solid stainless steel construction for higher demands, compact design.



<b>Process connection</b>	G 1/4
<b>Sensor element</b>	Piezoresistive silicon measuring cell
<b>Material:</b> <b>Wetted parts</b> <b>Electronic housing</b> <b>Seals</b>	Stainless steel (1.4301) Stainless steel (1.4571) FKM
<b>System of protection</b>	IP 67 with PG IP65 with plug
<b>Weight</b>	approx. 250 g
<b>Measuring range</b>	0 ... 400 bar <sup>1</sup>
<b>Characteristic deviation</b>	≤±0.5% from measuring range end value
<b>Electrical connection</b>	Plug M12 x 1 <sup>2</sup>
<b>Temperature range</b>	-25°C ... +80°C
<b>Temperature influence</b>	≤± 0.2% f.s. / 10K
<b>Compensation range</b>	-10°C ... +70°C
<b>Supply voltage</b>	8 – 30 V DC
<b>Power consumption</b>	max. 25 mA
<b>Load</b>	≤ (UB-10 V)/20 mA
<b>Response time</b>	≤ 1 ms
<b>Applications</b>	Oil-side and gas-side
<b>Cable</b>	Optional
<b>Part no.</b>	4202018065

<sup>(1)</sup> other pressure levels are available upon request

<sup>(2)</sup> please define plug design in your purchase order





## Roth pressure vessels

Roth pressure vessels serve to store gases and /or liquids under pressure. They are primarily used as N2-vessels inserted in combination with Roth piston accumulator installations. After having been tested individually, they also can be used for storing other gases or liquids.

General information	56
Pressure vessel up to 75 l	57
Large pressure vessel	58
Special design large pressure vessel	63
Special pressure vessel screwed	64



# Pressure vessels

## ■ General information

### **Acceptance:**

Due to their use together with nitrogen, all pressure vessels are designed according to the DGR 2014/68/EU, ASME, China ML, Russia Customs Union TR-CU or other standard regulations. As such, they have passed all mandatory tests, have been certified, and carry the component tags that are required for their proper use. The individual pressure vessel approvals are stated in the description of the respective component.

### **Standard connections:**

The connections of all pressure vessels are designed according to the following standards:

- > DIN ISO 228 (Other connections are available upon request)
- > SAE flange ports ISO 6162 (SAE J518)
- > Square flange connections ISO 6164

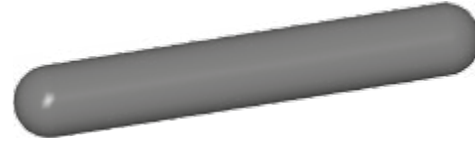
### **Surfaces:**

Normally, the pressure vessels are delivered with a layer of protective oil on the inside. On the outside, the pressure vessels are primed, and a topcoat is applied upon customer request. Special colour paintings, such as offshore coatings, are also available.

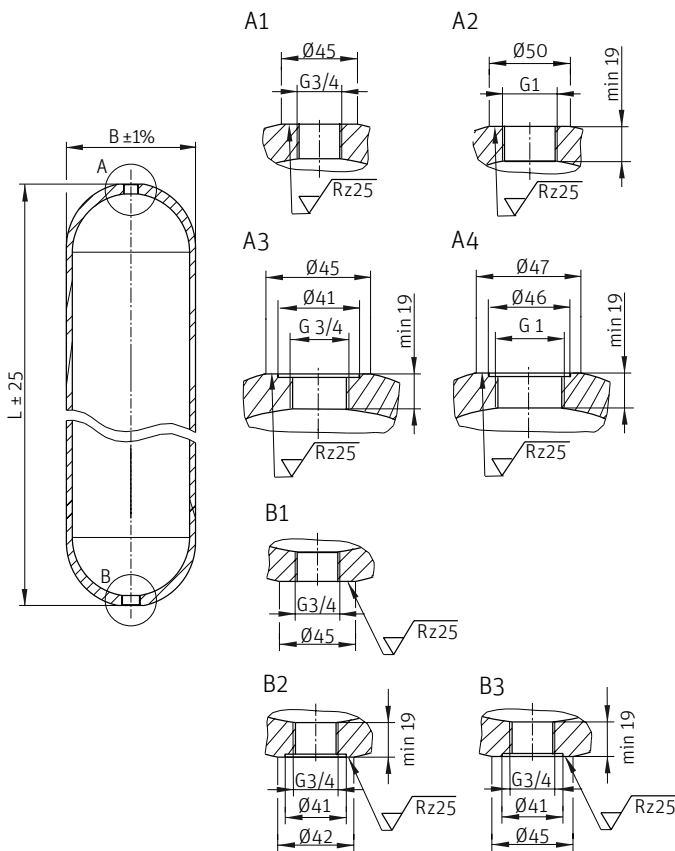


■ **Pressure vessel up to 75 l**

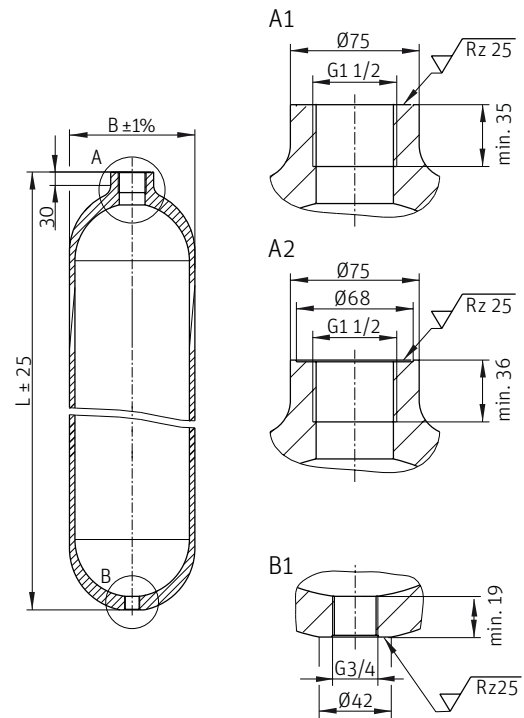
Pressure vessels made of seamless steel tubes, forged to a half-round shape on both sides, blasted on the inside and preserved with protective oil. Blasted outside surface and primed.



Type 1



Type 2



Capacity [l]	Working pressure	Acceptance <sup>1</sup>	Working temperature range: -40...+80 °C	Working medium: Nitrogen <sup>2</sup>	Type	Connection		L [mm]	Ø B [mm]	Weight	Part no.
						A	B				
35	290 bar / 4210 psi	50, 534, 520			2	G1 1/2 (A1)	G3/4 (B1)	1280	219	75	4202018799
35	276 bar / 4000 psi	15			2	G1 1/2 (A2)	G3/4 (B1)	1330	219	92	4202018355
50	360 bar / 5230 psi	50, 534, 520			1	G3/4 (A3)	G3/4 (B3)	1590	229	98	4202018802
50	290 bar / 4210 psi	50, 534, 520			2	G1 1/2 (A1)	G3/4 (B1)	1780	219	100	4202018800
50	345 bar / 5000 psi	15			1	G3/4 (A1)	G3/4 (B1)	1730	232	120	4200058291
50	221 bar / 3200 psi	15			1	G1 (A2)	G3/4 (B1)	1590	229	98	4204021364
75	221 bar / 3200 psi	15			1	G1 (A2)	G3/4 (B1)	2280	229	133	4204021365
75	360 bar / 5230 psi	50, 534			1	G1 (A4)	G3/4 (B2)	2280	229	133	4202018805

Acceptance regulation	Code
ASME:	15
DGR 2014/68/EU:	50
TR-CU (Russian Customs Union):	520
ML (China):	534

<sup>1</sup> other pressure vessels acceptance are available upon request

<sup>2</sup> usage for other fluids are available upon request

# Pressure vessels

## ■ 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).



Fig. 1

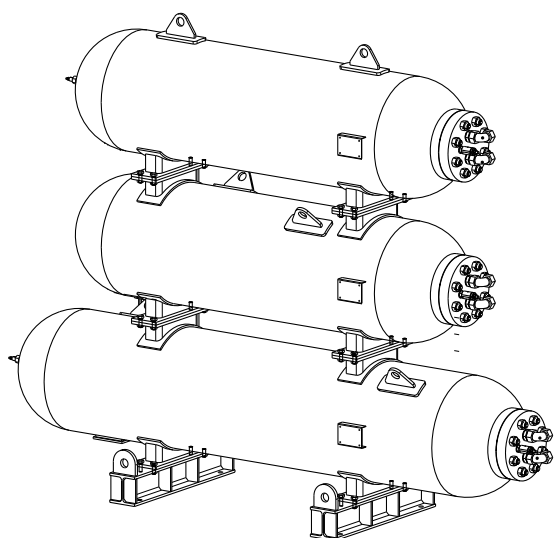
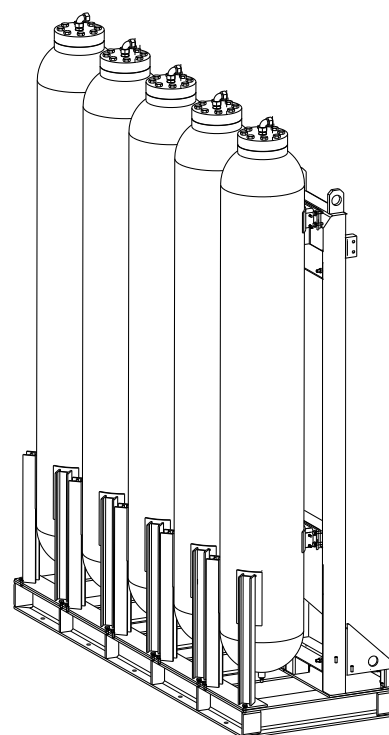


Fig. 2



<b>Working pressure (PN)</b>	220/350 bar <sup>1</sup>
<b>Working temperature range</b>	-25 ... +50° C
<b>Working medium</b>	Nitrogen <sup>2</sup>
<b>Acceptance regulation</b>	DGR 2014/68/EU <sup>3</sup>

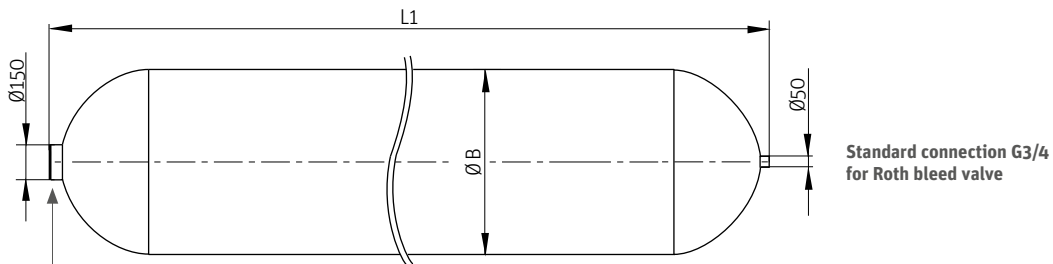
<sup>1</sup> other pressures are available upon request

<sup>2</sup> other mediums are available upon request

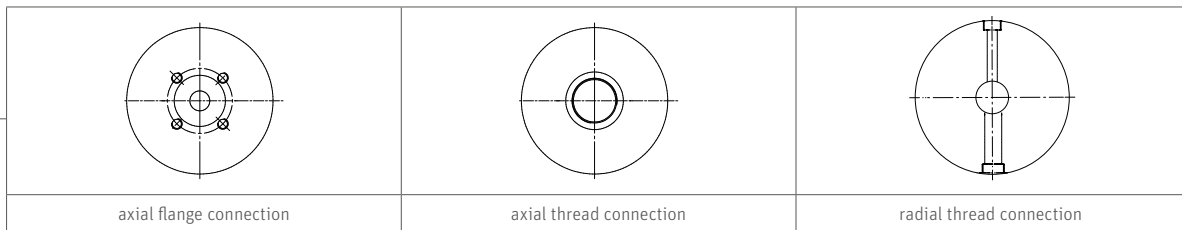
<sup>3</sup> other acceptances are available upon request

■ **N2 Large pressure vessel - basic version 220/350 bar**

Type 1

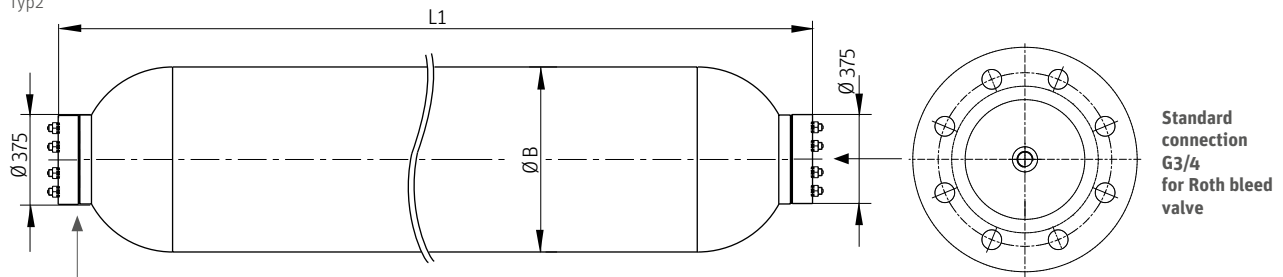


**Example type connections**

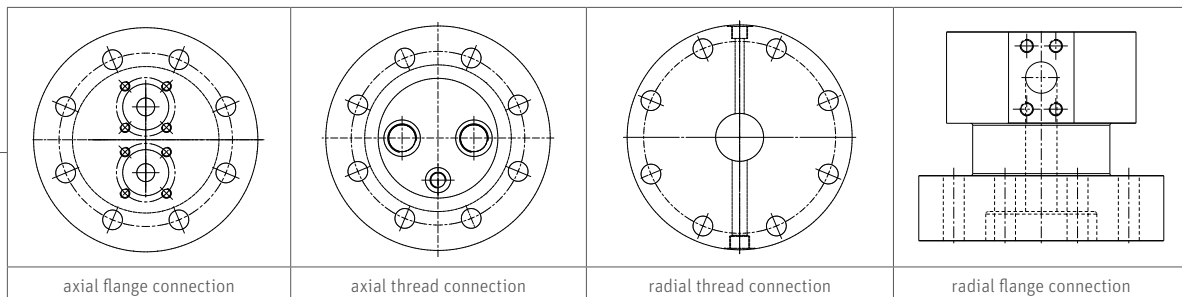


\* please quote connection type, as well as bore connection in your purchase order.

Typ2



**Example type connections**



\* please quote connection type, as well as bore connection in your purchase order.

# Pressure vessels

## ■ N2 Large pressure vessel up to 220 bar

According to DGR 2014/68/EU

Volume [l]	Ø B [mm] <sup>1</sup>	L1 [mm] <sup>1</sup>	Weight [kg] <sup>(1)</sup>	Type <sup>2</sup>
250	355	3350	600	1
	650	1090	404	1
500	650	1970	752	1
750	650	2850	1100	1
1000	650	3730	1448	1
1250	650	4610	1796	1
1500	650	5600	2144	1
	800	3820	2990	1
1750	650	6480	2492	1
	800	4400	2650	1
2000	650	7360	2840	1
	800	4980	2990	1
	950	3710	3335	2
2250	650	8240	3188	1
	800	5560	3330	1
	950	4120	3670	2
2500	650	9120	3536	1
	800	6140	3670	1
	950	4530	4005	2
2750	650	10000	3884	1
	800	6720	4010	1
	950	4940	4340	2
3000	800	7300	4350	1
	950	5350	4675	2
	1350	3050	4900	2
3250	800	7880	4690	1
	950	5760	5010	2
	1350	3250	5230	2
3500	800	8460	5030	1
	950	6170	5345	2
	1350	3450	5560	2
3750	800	9040	5370	1
	950	6580	5680	2
	1350	3650	5890	2
4000	800	9620	5710	1
	950	6990	6015	2
	1350	3850	6220	2

According to DGR 2014/68/EU

Volume [l]	Ø B [mm] <sup>1</sup>	L1 [mm] <sup>2</sup>	Weight [kg] <sup>(1)</sup>	Type <sup>2</sup>
4250	950	7400	6350	2
	1350	4050	6550	2
4500	950	7810	6685	2
	1350	4250	6880	2
4750	950	8220	7020	2
	1350	4450	7210	2
5000	950	8630	7355	2
	1350	4650	7540	2
5250	950	9040	7690	2
	1350	4850	7870	2
5500	950	9450	8025	2
	1350	5050	8200	2
5750	950	9860	8360	2
	1350	5250	8530	2
6000	950	10270	8695	2
	1350	5450	8860	2
6250	1350	5650	9190	2
6500	1350	5850	9520	2
6750	1350	6050	9850	2
7000	1350	6250	10180	2
7250	1350	6450	10510	2
7500	1350	6650	10840	2
7750	1350	6850	11170	2
8000	1350	7050	11500	2
8250	1350	7250	11830	2
8500	1350	7450	12160	2
8750	1350	7650	12490	2
9000	1350	7850	12820	2
9250	1350	8050	13150	2
9500	1350	8250	13480	2
9750	1350	8450	13810	2
10000	1350	8650	14140	2
10250	1350	8850	14470	2
10500	1350	9050	14800	2
10750	1350	9250	15130	2
11000	1350	9450	15460	2

<sup>1</sup> Dimension and weight are subject to change.

<sup>2</sup> Depending on the bore connection, the flange type dimension may differ.

## ■ N2 Large pressure vessel up to 350 bar

According to DGR 2014/68/EU

Volume [l]	Ø B [mm] <sup>1</sup>	L1 [mm] <sup>1</sup>	Weight [kg] <sup>(2)</sup>	Type <sup>2</sup>
250	355	3550	900	1
	630	1200	1052	1
500	630	2200	1576	1
750	630	3200	2100	1
1000	630	4200	2624	2
1250	630	5200	3148	2
1500	630	6200	3672	2
	788	4300	4495	2
1750	630	7200	4196	2
	788	4950	4940	2
2000	630	8200	4720	2
	788	5600	5385	2
	1000	3710	5562	2
2250	630	9200	5244	2
	788	6250	5830	2
	1000	4120	6144	2
2500	630	10200	5768	2
	788	6900	6410	2
	1000	4530	6726	2
2750	788	7550	6855	2
	1000	4940	7308	2
	1350	3080	8092	2
3000	788	8200	7300	2
	1000	5350	7890	2
	1350	3310	8714	2
3250	788	8850	7745	2
	1000	5760	8472	2
	1350	3540	9336	2
3500	788	9500	8190	2
	1000	6170	9054	2
	1350	3770	9958	2
3750	788	10150	8635	2
	1000	6580	9636	2
	1350	4000	10580	2
4000	1000	6990	10218	2
	1350	4230	11202	2
4250	1000	7400	10800	2
	1350	4460	11824	2
4500	1000	7810	11382	2
	1350	4690	12446	2

According to DGR 2014/68/EU

Volume [l]	Ø B [mm] <sup>1</sup>	L1 [mm] <sup>1</sup>	Weight [kg] <sup>(2)</sup>	Type <sup>2</sup>
4750	1000	8220	11964	2
	1350	4920	13068	2
5000	1000	8630	12546	2
	1350	5150	13690	2
5250	1000	9040	13128	2
	1350	5380	14312	2
5500	1000	9450	13710	2
	1350	5610	14934	2
5750	1000	9860	14292	2
	1350	5840	15556	2
6000	1000	10270	14874	2
	1350	6070	16178	2
6250	1350	6300	16800	2
6500	1350	6530	17422	2
6750	1350	6760	18044	2
7000	1350	6990	18666	2
7250	1350	7220	19288	2
7500	1350	7450	19910	2
7750	1350	7680	20532	2
8000	1350	7910	21154	2
8250	1350	8140	21776	2
8500	1350	8370	22398	2
8750	1350	8600	23020	2
9000	1350	8830	23642	2
9250	1350	9060	24264	2
9500	1350	9290	24886	2
9750	1350	9520	25508	2
10000	1350	9750	26130	2
10250	1350	9980	26752	2
10500	1350	10210	27374	2
10750	1350	10440	27996	2
11000	1350	10670	28618	2

<sup>1</sup> Dimension and weight are subject to change.

<sup>2</sup> Depending on the bore connection, the flange type dimension may differ.

# Pressure vessels

## ■ Type code Large pressure vessel (GDB)

		Order designation		
Series	<b>GDB</b> ◀	Type		
N2-capacity	...- ◀	=	250 ... 11000 l	
Pressure rating	...- ◀	=	220/350 bar <sup>1</sup>	
External Ø	...- ◀	=	355, 630, 650, 788, 800, 950, 1000, 1350 mm	
Orientation	...- ◀	...	= Horizontal (H) Vertical (V)	
Acceptance regulation <sup>2</sup>	...- ◀	15	= ASME	
		50	= DGR 2014/68/EU	
		520	= TR-CU	
		534	= ML (China)	
		509	= DNV (Det Norske Veritas)	
Connections	... ◀	=	please specify details of specification e. g. SAE 1 1/2" 6000 psi, radial, (in your purchase order)	

**Example: GDB - 1000 - 350 - 650 - H - 50 - text**

**Product for order designation is:**

Type: GDB  
 N2-capacity: 1000 litre  
 Pressure: 350 bar  
 External Ø: 650 mm  
 Orientation: Horizontal (H)  
 Acceptance regulation: DGR 2014/68/EU  
 Connections: (specify connections)


<sup>1</sup>others on request  
<sup>2</sup>others on request

## ■ Special design large pressure vessels

Roth special design large pressure vessels (welded) are oriented towards the production series of Roth's large pressure vessel. They are suitable for accommodating large volumes and specific media, such as air, water etc., and are individually manufactured according to customer requirements. For testing and maintenance purposes these vessels can include an additional opening. Optionally, they are also available with a level indicator.

### Design example:

- > Volume: 4000 l
- > Working pressure: 63 bar
- > Working temperature: -10 ... +50°C
- > Weight: 3,490 kg
- > Working medium: oil/air/water

 **Note:** Please specify the following parameters in your inquiry: volume, pressure, dimensions, working medium, working temperature range, acceptance regulation/country of final installation, pressure fluctuation range/load change and connections (please enclose draft version if necessary)

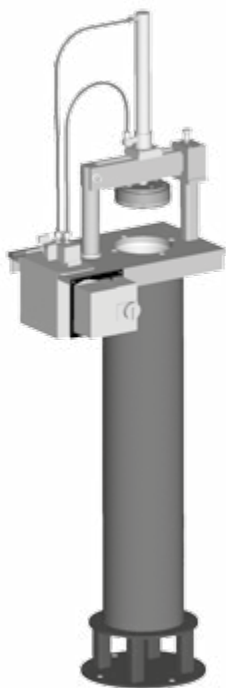


# Pressure vessels

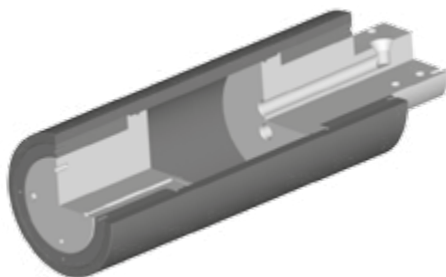
## ■ Special pressure vessel screwed

Roth special pressure vessels follow the design of the 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).

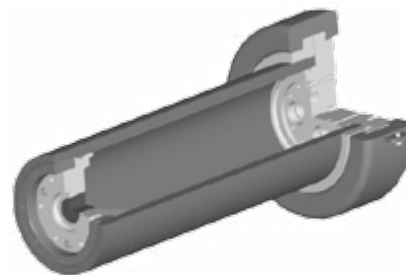
### Examples of design:



**Test autoclave**  
 > with autom. closer  
 > seawater resistant (stainless steel)  
 > volume 25 l  
 > working pressure 660 bar



**Resonator**  
 > absorbs pressure surge in hydro systems  
 > high pressure variations  
 > working pressure range 0...460 bar, fatigue-enduring design  
 > volume 200 l



**Test autoclave**  
 > quick-release fastener  
 > seawater resistant (stainless steel)  
 > volume 40 l  
 > working pressure 400 bar  
 > working temperature up to +200 °C  
 > inspection glass available

### Type code

Series	<b>SDB</b>	◀	Type
Volume*	...-	◀	= 0 ... 900 l
Pressure*	...-	◀	= 0 ... 1000 bar
Inside Ø [mm]*	...-	◀	= 60, 80, 100, 150, 180, 250, 360

specify by receipt of order:

- > working medium
- > working temperature range
- > acceptance regulation / country of final installation
- > fluctuation of pressure / cycle of stress
- > connections (please add draft version if necessary)

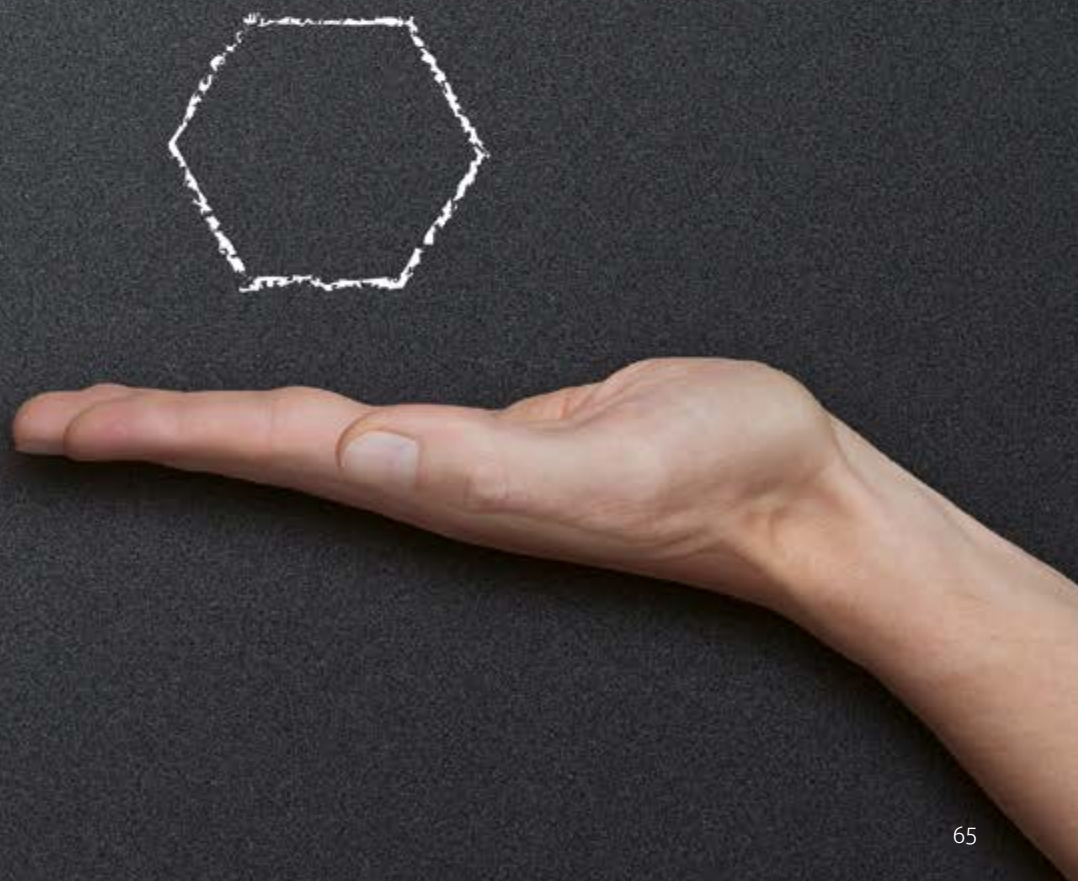
\* others are available upon request



## Roth mounting technology

Roth mounting technology is mainly suitable for a vertical installation of the Roth hydro accumulators or N2-pressure vessels. The brackets absorb the weight of the hydro accumulator or pressure vessel. The clamps fix the accumulator in its position. Under certain conditions, especially when small units are installed, the clamps can absorb weight, too. In this case using a bracket is not necessary. Fixing elements for special installation are available upon request.

Examples of design for mounting technology _____	66
Brackets _____	66
Steel clamps _____	68
U-bolt clamps _____	70
Bolt clamps _____	71



# Mounting technology

## Examples of design for mounting technology

Fig. 1:  
Piston accumulator with brackets and steel clamps.

Fig. 2:  
Piston accumulator with brackets and u-bolt clamps.

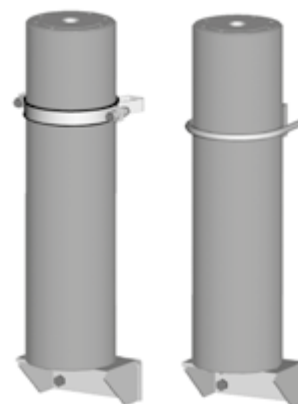


Fig. 1

Fig. 2

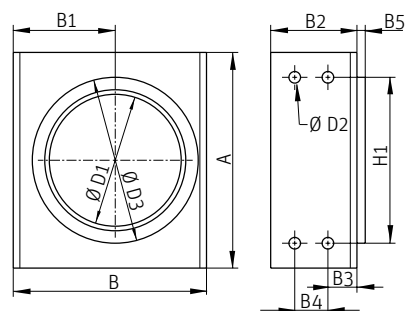
## Brackets

Brackets for mounting bladder accumulators, piston accumulators and pressure vessels. The brackets serve to absorb the weight and are screwed onto a wall or a frame. For mounting bladder accumulators and piston accumulators the brackets have an open design, for mounting pressure vessels they are closed in design.

### Explanation of type designation:

KONS = bracket  
D219 = suitable for bladder accumulators with external diameter 219 mm  
ST = bracket made of galvanized steel  
VA = bracket made of stainless steel  
The elastomer support ring is always made of NBR material

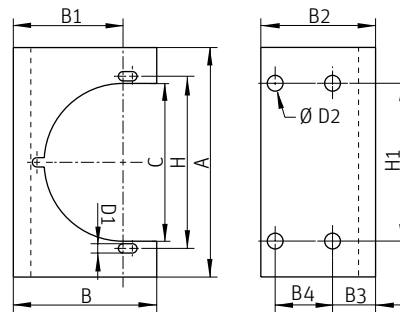
### Roth bladder accumulator / pressure vessel brackets



### Bracket with elastomer support ring

Type	A	B	B1	B2	B3	B4	B5	D1	D2	D3	H1	Part no.
KONS-D114-ST	140	140	73	60	35	40	15	89	17	125	75	4204028854
KONS-D168-ST	210	180	92	100	35	40	15	109	17	150	160	4204028853
KONS-D219-ST	260	235	123	100	35	40	15	159	17	200	200	4204028852
KONS-D245-ST	260	250	134	100	35	40	15	159	17	200	200	4204028858
KONS-D114-VA	140	140	73	60	35	40	15	89	17	125	75	4204028857
KONS-D168-VA	210	180	92	100	35	40	15	109	17	150	160	4204028856
KONS-D219-VA	260	235	123	100	35	40	15	159	17	200	200	4204028855

**Piston accumulator brackets**



**Bracket for KAK/AK ...**

Type	A	B	B1	B2	B3	B4	C	D1	D2	H	H1	Part no.
...220 / 375-10	140	100	70	80	30	30	70	9	13	90	100	4200058231
...220 / 350-15	200	130	100	95	35	40	100	13	13	125	140	4204014559
...800-10	180	125	92	100	40	40	70	9	17	90	120	4200058232
...200 / 375-18	240	150	111	100	40	40	140	13	17	160	180	4200058234
...-600-18	280	175	133	160	40	40	140	18	22	220	220	4200058237
...220 / 350-25	320	200	153	160	60	80	220	13	22	240	220	4200058238
...220 / 350-36	440	260	212	240	60	120	290	18	26	330	300	4200058240

**Bracket for UAK ...**

Type	A	B	B1	B2	B3	B4	C	D1	D2	H	H1	Part no.
...32 / 55-18	240	150	111	100	40	40	140	13	17	160	180	4200058234
...32 / 51-25	320	200	153	160	60	80	220	13	22	240	220	4200058238
...-32-36	440	260	212	240	60	120	290	18	26	330	300	4200058240
...-51-36	450	260	231	240	60	120	290	18	26	330	300	4200058242

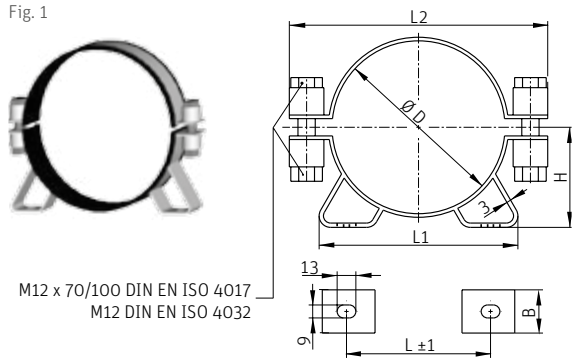
# Mounting technology

## ■ 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.

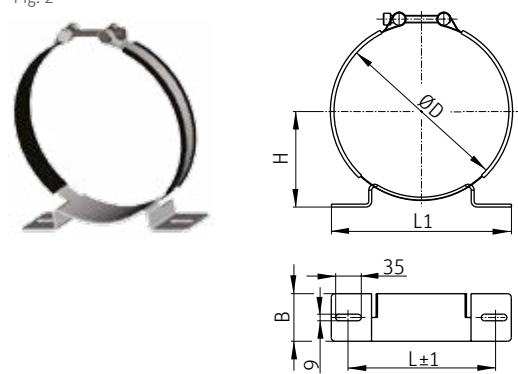
### Two-part steel clamps

Fig. 1



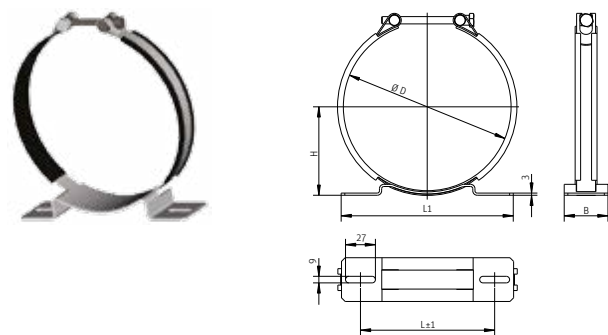
### One-part steel clamps

Fig. 2



### Acculight

Fig. 3



### Steel clamps for AK ...

Type	Fig.	D	H	L±1	L1	L2	B	Part no.
... 220 / 375-08	2	100	approx. 68	114	155	-	40	4204014668
... 220 / 375-10	1	115-125	approx. 71	100	194	195	30	4204002763
... 220 / 350-15	1	170-180	approx. 101	148	194	248	30	4204014669
... 200 / 375-18	1	210-222	approx. 123	216	254	289	30	4202017360
... 220-25	1	289	approx. 154	280	336	349	30	4200002978
... 350-25	1	308	approx. 163	280	336	368	30	4200002979
... 220-36	1	406	approx. 213	384	433	475	30	4200004237
... 350-36	1	428	approx. 219	384	457	487	30	4200004540

### Steel clamps for UAK ...

Type	Fig.	D	H	L±1	L1	L2	B	Part no.
... 32 / 55-18	1	217	approx. 123	216	254	289	30	4202017360
... 32-25	1	289	approx. 154	280	336	349	30	4200002978
... 51-25	1	308	approx. 163	280	336	368	30	4200002979
... 32-36	1	406	approx. 213	384	433	475	30	4200004237
... 51-36	1	428	approx. 219	384	457	487	30	4200004540

### Steel clamps for BLAK ...

Type	Fig.	D	H	L±1	L1	L2	B	Part no.
...-11,4	1	115-125	approx. 71	100	194	195	30	4204002763
...-16,8	1	163-173	approx. 101	148	194	248	30	4204014669
...-22	1	210-220	approx. 123	216	254	289	30	4202017360
...-11,4	3	109-117	approx. 65	118	156	27	50	4204031373
...-16,8	3	158-169	approx. 90	118	156	27	50	4204031950
...-22	3	209-222	approx. 116	184	236	41	60	4204031951
...-22,4	3	222-233	approx. 118	184	236	41	60	4204032952

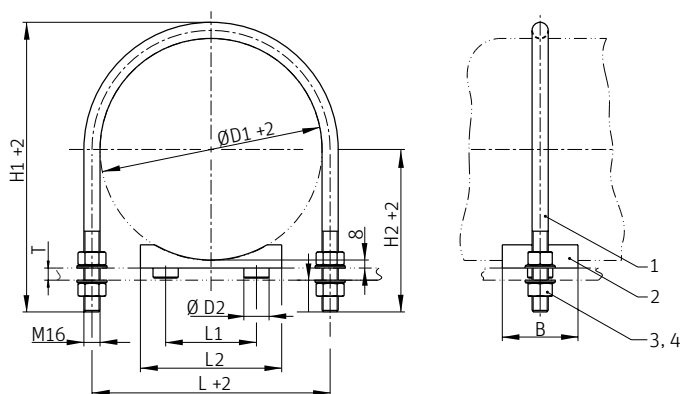
### Steel clamps for DB Ø227mm-238mm

Type	Fig.	D	H	L±1	L1	L2	Part no.
DB	2	Ø227-238	approx. 132.5	199	246	246	4204001870

# Mounting technology

## ■ U-bolt clamps

U-bolt clamps D16 (Pos. 1) with plastic pipe saddle (Pos. 2) for piston accumulators and pressure vessels without plastic pipe saddle. U-bolt clamps for pressure vessels are supplied with 2 nuts and discs, alternatively with 4 nuts and discs for piston accumulators (Pos. 3, 4). Clamp, nuts and discs are made of galvanized normal steel. Other materials and dimensions are available upon request.



### with plastic pipe saddle for piston accu. AK ...

Type	D1 +2	T	H1 +2	H2 +2	L +2	L1	L2	D2	B	Part no.
... 220 / 375-10	125	max.16	178.5	100	141	40	75	15.5	70	4204011128
... 220 / 350-15	182	max.16	242	135	198	90	140	25.5	75	4204014558
... 200 / 375-18	224	max.16	273	145	240	90	140	25.5	75	4204009698
... 220 / 350-25	292	max.16	344	182	308	90	140	25.5	75	4204011861
... 220-36	412	max.16	467	245	428	150	220	30.5	75	4200058118
... 350-36	434	max.16	494	252	450	150	220	30.5	75	4204004144

### with plastic pipe saddle for piston accu. UAK ...

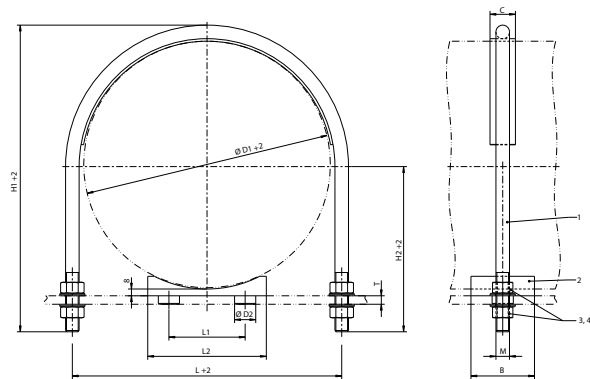
Type	D1	T	H1 +2	H2 +2	L +2	L1	L2	D2	B	Part no.
... 32 / 55-18	224	max.16	273	145	240	90	140	25.5	75	4204009698
... 32-25	292	max.16	344	182	308	90	140	25.5	75	4204011861
... 51-25	312	max.16	364	192	328	90	140	25.5	75	4204005783
... 32-36	412	max.16	467	245	428	150	220	30.5	75	4200058118
... 51-36	434	max.16	494	252	450	150	220	30.5	75	4204004144

### without plastic pipe saddle for pressure vessel

Type	D1	T	H1 +2	H2 +2	L +2	Part no.
Ø 227-238	230	max. 100	365	234	246	4204032593
Ø 227-238	230	max. 16	296	165	246	4204032594

## ■ Bolt clamps

The bolt clamp consists of a u-bolt clamp with a welded flat steel. It has a wider contact area.



### Bolt clamp for piston accumulator AK

Type	D1 +2	T	H1 +2	H2 +2	L +2	L1	L2	D2	B	C	M	Part no.
...200 / 375-18	224	max.16	273	145	246	90	140	25.5	75	30	M 16	4204033882
...220 / 350-25	292	max.16	344	182	314	90	140	25.5	75	30	M 16	4204033883
...220-36	412	max.16	467	245	434	150	220	30.5	75	30	M 16	4204033884
...350-36	434	max.16	494	252	456	150	220	30.5	75	30	M 16	4204033885

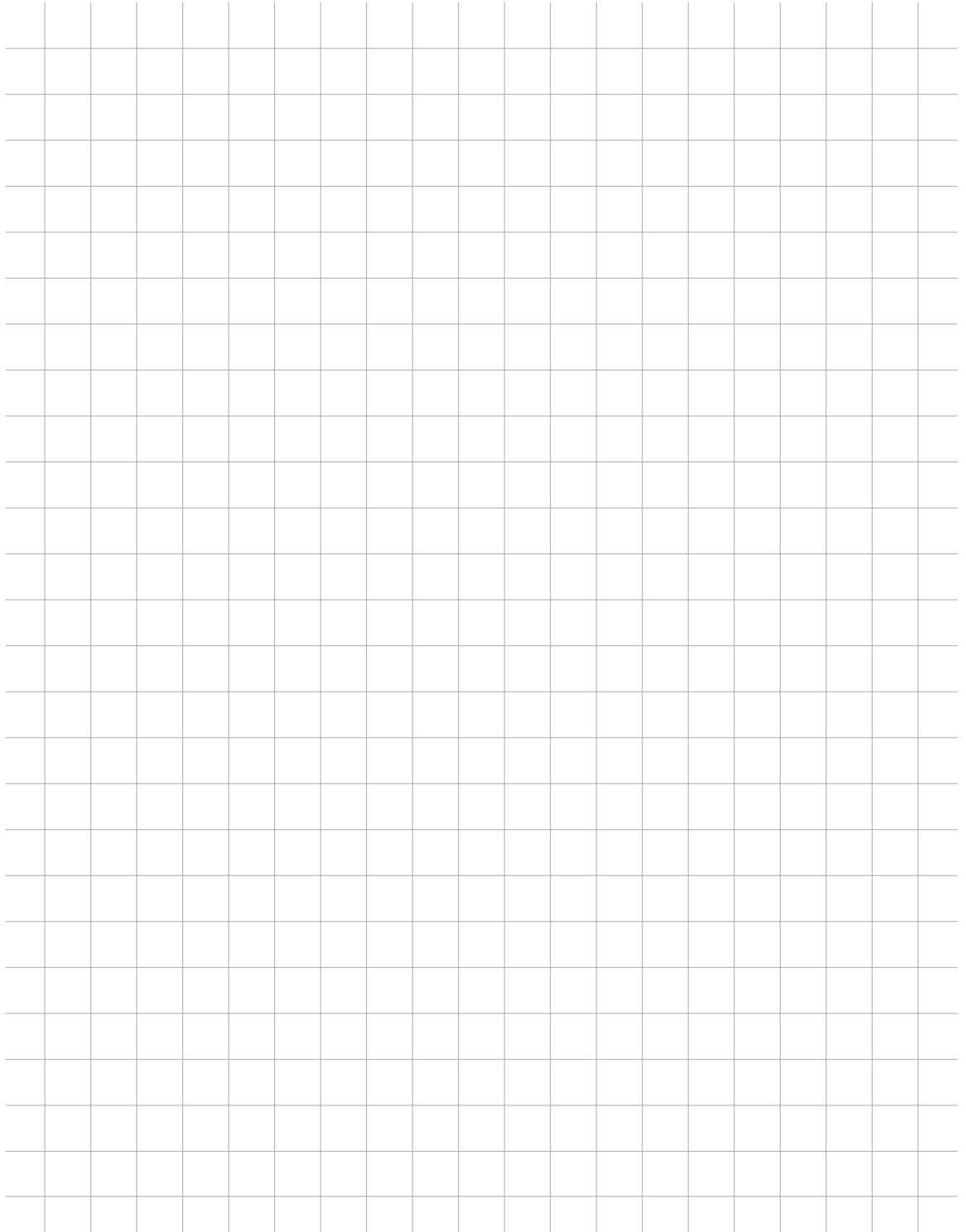
### Bolt clamp for piston accumulator UAK

Type	D1	T	H1 +2	H2 +2	L +2	L1	L2	D2	B	C	M	Part no.
...32 / 55-18	224	max.16	273	145	246	90	140	25.5	75	30	M 16	4204033882
...32-25	292	max.16	344	182	314	90	140	25.5	75	30	M 16	4204033883
...51-25	312	max.16	364	192	334	90	140	25.5	75	30	M 16	4204033886
...32-36	412	max.16	467	245	434	150	220	30.5	75	30	M 16	4204033884
...51-36	434	max.16	494	252	456	150	220	30.5	75	30	M 16	4204033886

### without plastic pipe saddle for pressure vessel

Type	D1	T	H1 +2	H2 +2	L +2	C	M	Part no.
DB1	230	max.100	365	234	252	30	M 16	4204033887
DB2	230	max. 16	365	296	252	30	M 16	4204033888

# Notes

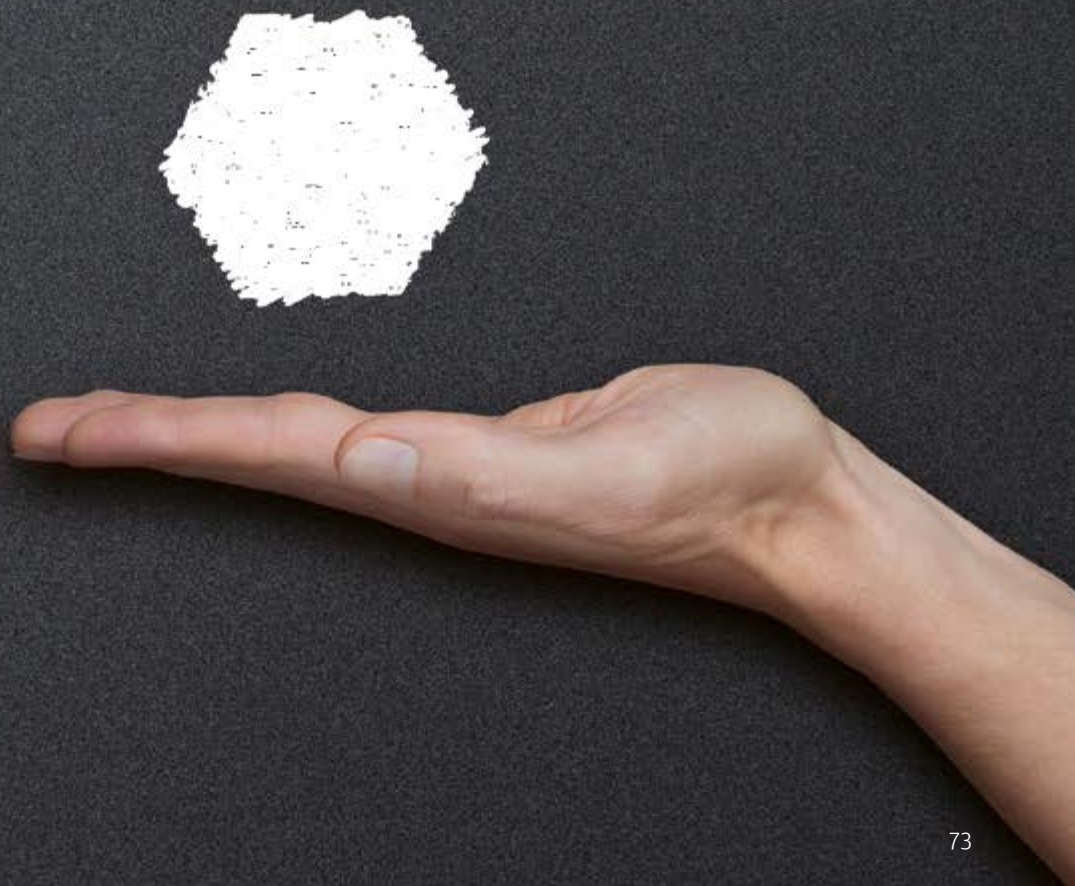




## Roth spare parts and tools

The following spare parts and assembly tools are required for servicing Roth bladder accumulators and piston accumulators.

Bladder accumulator spare parts _____	74
Piston accumulator spare parts for standard production series _____	76
Bladder accumulator assembly tools _____	79
Piston accumulator assembly tools _____	80



# Spare parts

## Bladder accumulator spare parts

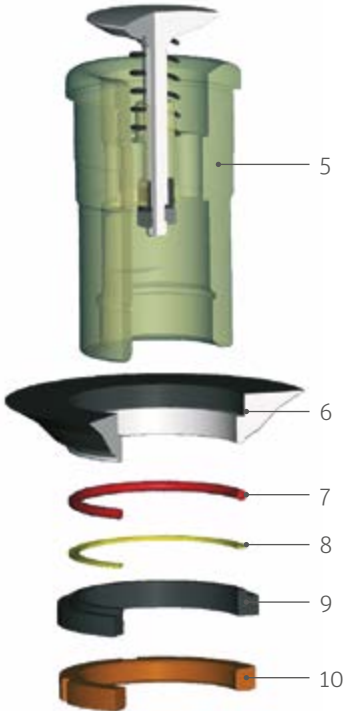

The Roth spare parts for bladder accumulators are assembled in different kits (sets).

Depending on requirements, the following kits are available:

Kit 1 - for the gas side and/or

Kit 2 - for the oil side (complete parts) or

Kit 3 - for the oil side (seals only)

Kit 1	Kit 2	Kit 3																						
																								
<table border="1"> <thead> <tr> <th>Designation</th> <th>Item</th> </tr> </thead> <tbody> <tr> <td>Elastomer bladder</td> <td>1</td> </tr> <tr> <td>Lock nut</td> <td>2</td> </tr> <tr> <td>Gas-side valve (complete)</td> <td>3</td> </tr> <tr> <td>Protection cap</td> <td>4</td> </tr> <tr> <td>Oil-side valve</td> <td>5</td> </tr> <tr> <td>Separated ring</td> <td>6</td> </tr> <tr> <td>O-ring</td> <td>7</td> </tr> <tr> <td>Back-up ring</td> <td>8</td> </tr> <tr> <td>Spacer ring</td> <td>9</td> </tr> <tr> <td>Groove nut</td> <td>10</td> </tr> </tbody> </table>			Designation	Item	Elastomer bladder	1	Lock nut	2	Gas-side valve (complete)	3	Protection cap	4	Oil-side valve	5	Separated ring	6	O-ring	7	Back-up ring	8	Spacer ring	9	Groove nut	10
Designation	Item																							
Elastomer bladder	1																							
Lock nut	2																							
Gas-side valve (complete)	3																							
Protection cap	4																							
Oil-side valve	5																							
Separated ring	6																							
O-ring	7																							
Back-up ring	8																							
Spacer ring	9																							
Groove nut	10																							

### Ordering chart for bladder accumulator kit


Accumulator volume [l]		Bladder material	Part number				
			Kit 1	Kit 2	Kit 3		
1		NBR	4204020128	4204020143	4204020140		
		ECO	4204020131				
2.5		NBR	4204020129				
		ECO	4204020132				
4		NBR	4204020122				
		ECO	4204020125				
5		NBR	4204020130				
		ECO	4204020133				
6		NBR	4204020123				
		ECO	4204020126				
10	Ø 168	NBR	4204020124				
		ECO	4204020127				
10	Ø 220	NBR	4204020110			4204020141	4204020138
		ECO	4204020116				
20		NBR	4204020111				
		ECO	4204020117				
24.5		NBR	4204020112				
		ECO	4204020118				
32		NBR	4204020113				
		ECO	4204020119				
42		NBR	4204020114				
		ECO	4204020120				
50		NBR	4204020115				
		ECO	4204020121				



# Spare parts

## ■ Piston accumulator spare parts for standard production series

### Pistons and seals

Roth piston accumulator production series built from 2010/2011

 **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.

		Accumulator seal kit (Piston and gland seals)	Piston ready to install (Piston including seals)	Gland seal	
Piston		Part number			
Series AK	ø 60		4204014702	4204014699	4200001952
	ø 80		4204014703	4202014700	4200001978
	ø 100		4204014704	4202014701	4200001987 additional 4202002840
	ø 150		4204013977	4204002548	4202002840 additional 4204002622
Series AK	ø 180		4204013543	4204007154	4200002023 additional 4200045021
	ø 250		4204013619	4204006936	4200002013 additional 4200045040
	ø 360		4204007382	4204006228	4202017642

Special seal kits, e.g. Viton seal kits, are available upon request.

\*When servicing the piston seals, it is recommended that the installed non-return valve(s) are replaced.

Part number 4200020835

## ■ Piston accumulator spare parts for standard production series

### Pistons and seals

Roth piston accumulator production series built up to 2010

**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.







		Accumulator seal kit (Piston and gland seals)	Piston ready to install (Piston including seals)	Gland seal	
Piston		Part number			
Series KAK	ø 60		4204013975	420400721	4200001952
	ø 80		4204013976	4202010049	4200001978
	ø 100		4200019701	4202010701	4200001987 additional additional 4202002840
	ø 150		4204013977	4204002548	4200037374 additional additional 4204002622
Series AK	ø 180		4200043990	4200052298	4200002023 additional additional 4200045021
	ø 250		4200045419	4204003726	4200002013 additional additional 4200045040
	ø 360		4202018555	4200051472	4202017642

Special seal kits, e.g. Viton seal kits, are available upon request.



\*When servicing the piston seals, it is recommended that the installed non-return valve(s) are replaced.  
Part number 4200020835

# Spare parts

## Gas filling valves


Designation	Size	Part number	
Roth gas filling valve	G 3/4	4200003239	
additional copper ring		4200001225	
Screw plug	G 3/4	4200004502	
additional Usit ring		4200003216	
Minimes filling valve M 16 x 1.5	G 1/4	4200002766	
Filling valve 7/8" 14UNF 1A	M 10 x 1.5	4202017118	
Filling valve M 28 x 1.5	G 3/4	4204012205	
Filling valve 5/8" 14UNF 1A	M 10 x 1.5	4202012538	
	1/2" 20UNF	4202002180	

## Gas safety valves

Gas safety valve	G 1/2		
Set pressure [bar] <sup>1</sup>			
acc. to DGR 2014/68/EU	up to 220	4204009303	
	up to 350	4204007760	

<sup>1</sup> minimum set pressure 30 bar




## Bursting disc plugs

Bursting protection unit	G 1/4		
Bursting pressure [bar]			
acc. to DGR 2014/68/EU	200	4202012785	
	220	4202012786	
	280	4204013194	
	350	4204013195	
	375	4202012791	
	600	4204013196	
	800	4204013197	
Bursting pressure [psi]			
ASME compliant	3200	4204004394	
	5100	4204013198	
	5500	4204073799	
	9000	4204013200	

# Tools

## Bladder accumulator assembly tools


For service work on Roth bladder accumulators, the following assembly tools are required.




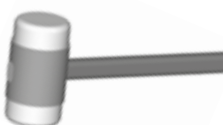

Name	Volume [l]		Part number
Valve key for tightening or loosening the oil valves	1 2.5 5 4 6 10		4204019703
	10 50		4204019455
Screw plug for installing the oil valve	1 2.5 5 4 6 10		4204020150 G1 1/4"
	10 50		4204020149 G2"
Mounting rod 500 mm for inserting the bladder into the accumulator Depending on the accumulator length, several adaptable rods are required	1 - 50		4204019702

# Tools

## ■ Piston accumulator assembly tools

For service work on Roth piston accumulators, the following assembly tools are required.

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

Name	Piston ø		Part number	
Accumulator key for tightening or loosening the accumulator nozzle	100		4200004570	
	150		4204014705	
	180		4202018170	
	250		4202018171	
	360		4202018173	
Assembly bush for inserting the piston into the accumulator	100		4204003281	
	150		4204011978	
	180		4200001822	
	250		4202000313	
	360		4204005537	
Ring bolt M 12 special design (1 piece order)	for piston disassembly		420004534	
Ring bolt M 10 special design (2 piece order)			250	420001820
Ring bolt M 12 special design (2 piece order)			360	
Soft hammer to assist in driving in the piston			4200004203	
Plastic pen for easier application of the seals			4200003151	



# Notes

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# Notes


## 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

**Roth**  
**Hydraulics**





## 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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