

## 2/2 direct. contr. fitted seat valves for water and oil hydraulics

DN 16 to DN 200  
Operating pressures up to 320 bar

- Pilot-controlled seat valves
- Pilot-control by means of own medium
- Leakage-free sealing on valve seat
- Force-controlled working piston
- Smooth switching, no pressure shocks
- Piston is extended to the outside, therefore visible piston position
- Limit switches can be mounted to indicate piston position
- Wear parts are easy to access and fast to replace
- Actuation magnet protected against dirt and humidity
- Manual emergency operation
- Protection against accidental operation
- Stroke limitation possible to save separate throttle valves
- Hydraulic or pneumatic operation possible
- Hydraulic remote control possible

### Application:

The 2/2 directional control fitted seat valves are particularly suitable for HFA liquids and clear water up to operating pressures of 320 bar maximum.

The valves can be equipped with positive or negative pilot-control valves. In a de-energized condition, this results the main valve setting "valve closed" or "valve open". The valve switching periods can be influenced by fitted filter diaphragms or intermediate plate valves with fitted fine throttles located between pilot-control and main valve.

In the case of valves with larger nominal widths, valve switching periods can be significantly reduced by a double pilot-control system, e.g. pilot-control valve DN 6 with intermediate plate valve DN 9, DN 12, or DN 16.

### Technical data:

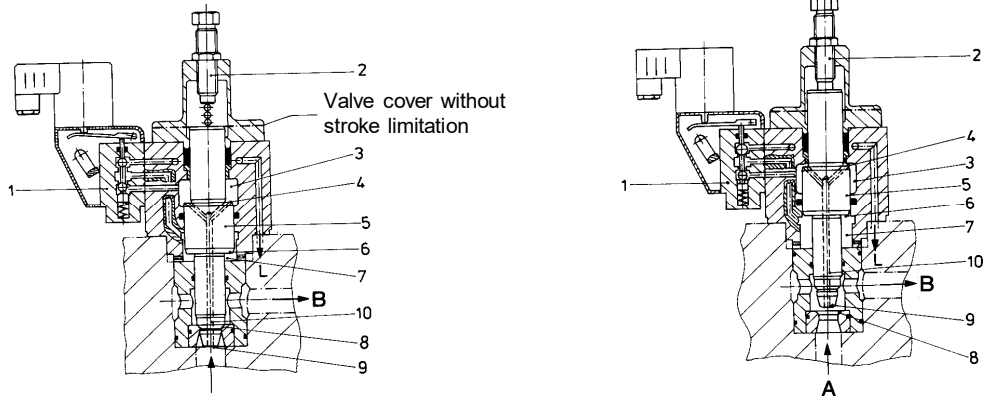
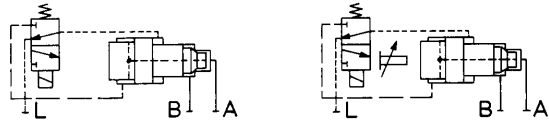
<u>Building type:</u>	Fitted seat valve	<u>Max. operating pressures:</u>	320 bar
<u>Pilot-control pressure:</u>	= System pressure, min. 25 bar	<u>Control medium return:</u>	Separate without pressure into tank
<u>Control medium:</u>	Own medium	<u>Flow:</u>	See table 1
<u>Pressure liquid:</u>	HFA acc. to CETOP or VDMA standard sheet 24320 with 95% water and 5% additives. Non-lubricated water (clear water) Mineral oil acc. to DIN 51524 and 51525 Phosphoric ester	<u>Flow direction:</u>	To both sides from "A" to "B" and "B" to "A"
<u>Pilot-control systems:</u>	see special brochures	<u>Liquid temperature:</u>	5°C to 45°C
		<u>Filtering:</u>	Main valve: coarse filtering Pilot-control valve: 25-40 µm

## Function a :

**Self-closing 2/2 directional control fitted seat valve, force-controlled by internally supplied own medium**

**Valve de-energized = rest position ( closed )**

The control surface 6 of piston 5 is relieved as the control chamber 7 is relieved via pilot-control valve 1 and port "L". The working medium, applied at port "A", acts on control surface 9 of piston 5. At the same time, the working medium is applied to control chamber 3, via channel 7, and to the input of the closed pilot-control valve 1 and acts on the control surface 4 of piston 5. Due to the force difference occurring on control surfaces 4 and 9 (control surface 4 > control surface 9), piston 5 is pressed into valve seat 8 so that infeed "A" is blocked.



Valve de-energized

Rest position (closed)

Valve energized

Work position (open)

**Valve de-energized = work position (open)**

When pilot-control valve 1 is operated the passage to the control medium return line "L" is blocked, and the path from control chamber 3 to control chamber 7, via pilot-control valve 1, is released. The pressure of the control medium now acts additionally on the control surface 6 of piston 5.

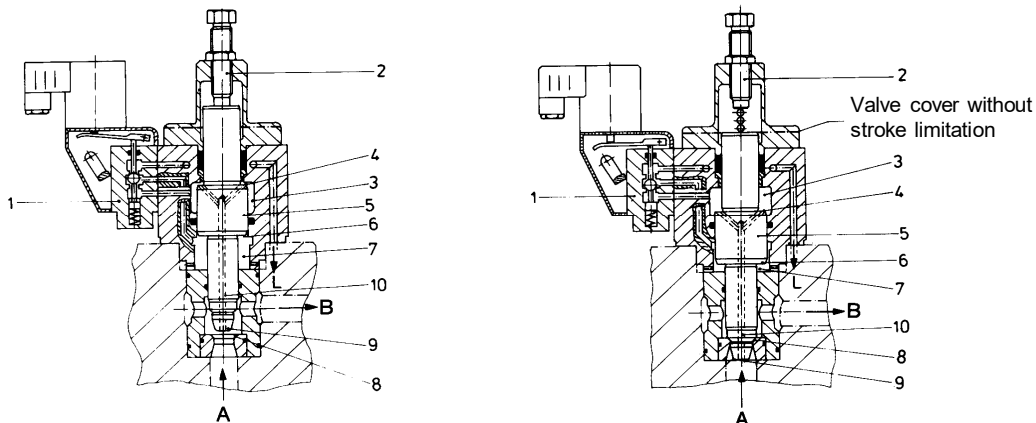
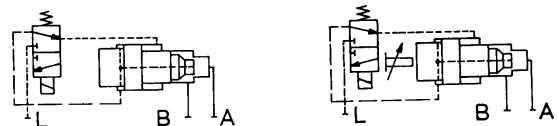
Due to the force difference occurring on the control surfaces 9, 6, and 4 (control surfaces 9 and 6 > control surface 4), piston 5 is lifted from valve seat 8 so that the path from infeed "A" to port "B" is now free.

Every fitted valve can optionally be provided with a stroke limitation. Using adjuster screw 2, the stroke of piston 5 can be limited. Thus, there is the possibility to adapt the flow rate to the respective application situation.

In the event of de-energization, the valve will close.

When mounting a negative pilot-control valve, the reversed main valve operating mode results.

In the event of power failure the valve will open.



Valve de-energized = rest position (open)

The control chamber 3, to which pressure is applied, is connected to control chamber 7 via pilot-control valve 1. Due to the force difference occurring on the control surfaces 9, 6, and 4 of valve piston 5 (control surface 9 and 6 > control surface 4), piston 5 is lifted off valve seat 8. The path from "A" to "B" is clear.

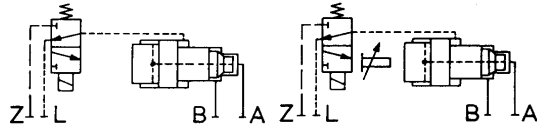
Valve energized = working position (closed)

When operating pilot-control valve 1, control chamber 7 is vented via return line "L". The control surface 6 of piston 5 is relieved. Due to the force difference occurring on control surfaces 9 and 4 (control surface 4 > control surface 9) piston 5 is pressed into valve seat 8. Infeed "A" is blocked.

In the event of power failure the valve will open.

## Function b:

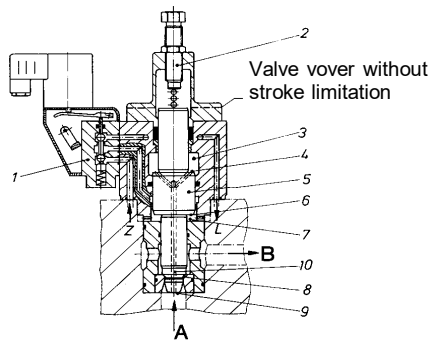
**Self-closing 2/2 directional control fitted seat valve,  
force-controlled by externally supplied own medium**



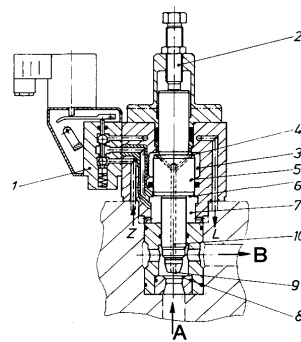
In contrast to the valve construction type described at a the control medium is not removed from control chamber 3 but is fed into the pilot-control valve 1 externally, via port "Z".

When operating the pilot-control valve 1, the path from port "Z" - via pilot-control valve 1 - direct into control chamber 7 is released, and the main valve opens.

In the event of a power failure, or a control pressure collapse, the valve will close.



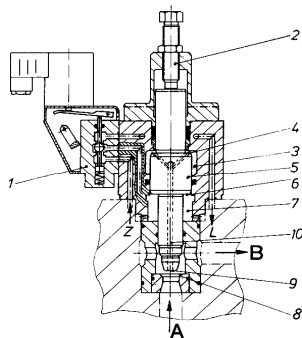
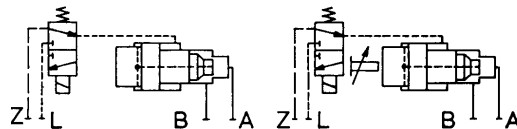
Valve de-energized  
Rest position (closed)



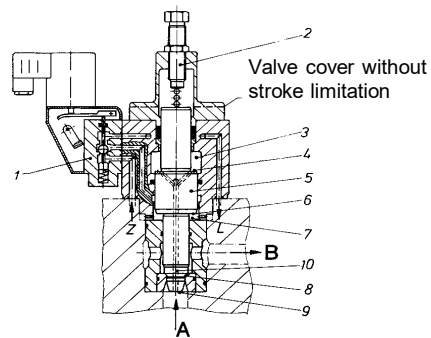
Valve energized  
Work position (open)

When using a negative pilot-control valve, the main valve operating mode reverses.

In the event of a power failure the valve will open,  
when the pilot-control pressure collapses the valve will close.



Valve de-energized  
Rest position (open)



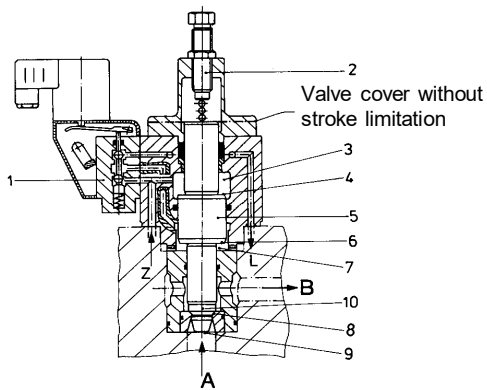
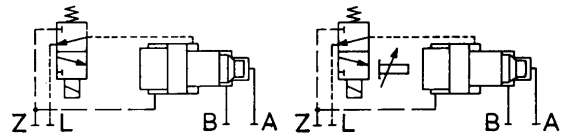
Valve energized  
Work position (closed)

## Function c:

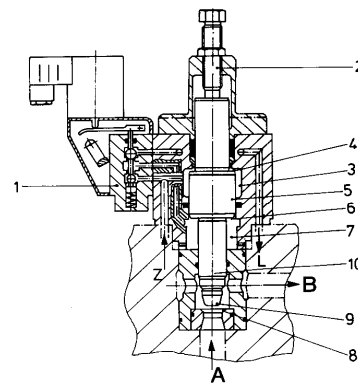
### 2/2 directional control fitted seat valve, closing and force-controlled by externally supplied own medium

Here too the operating mode of the main valve is the same as described at a. Only channel 10 in piston 5 does not exist. Therefore, control chamber 3 - like pilot-control valve 1 - is connected to the control port "Z", by means of which the control medium is externally supplied.

In the event of power failure the valve closes; when the control pressure collapses, the valve opens.



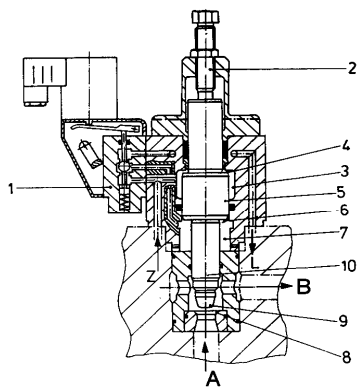
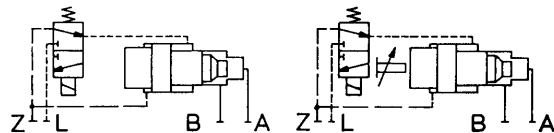
Valve de-energized  
Rest position (closed)



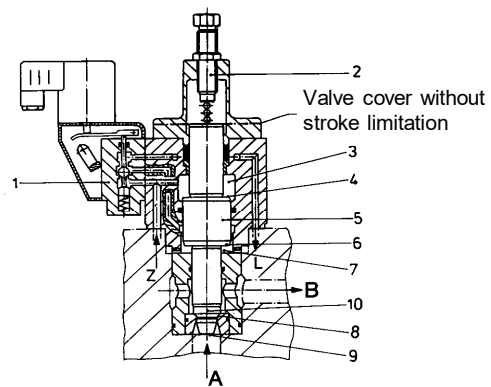
Valve energized  
Work position (open)

When using a negative pilot-control valve, the main valve operating mode reverses.

When there is a power failure, or the control pressure collapses, the main valve opens.



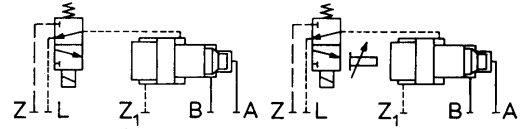
Valve de-energized  
Rest position (open)



Valve energized  
Work position (closed)

## Function d:

**Force-controlled 2/2 directional control fitted seat valve closing by means of an externally supplied own medium and a further externally supplied control pressure**



The operating mode of this valve is the same as for the valve described at c.

The difference between the two valves here consists in the double control pressure ports "Z" and "Z1"

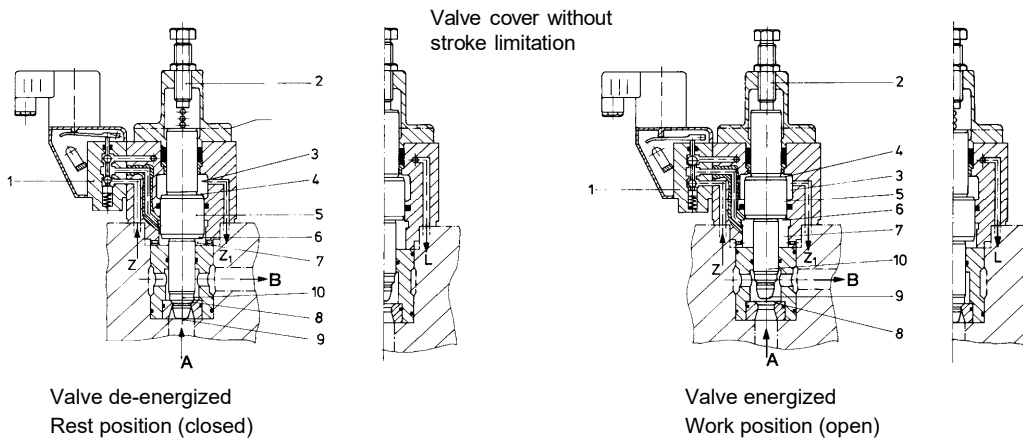
The pilot-control valve 1 is directly connected to the control port "Z"; control chamber 3, however, is connected to port "Z1".

The control pressures on both ports are to be identical.

When pilot-control valve 1 is operated, the path from port "Z" - via the pilot-control valve - directly to control chamber 7 is released, and the valve opens.

For closing the valve, control pressure at port "Z1" is required.

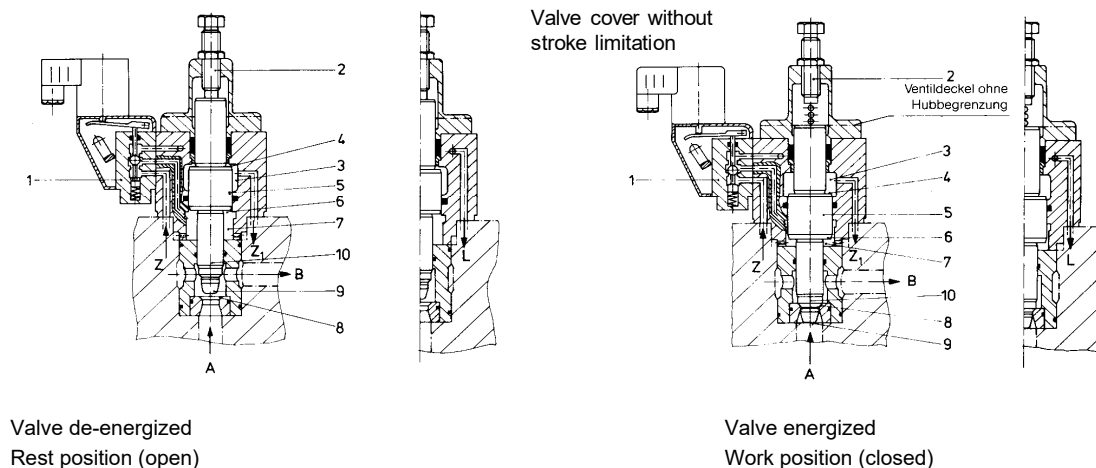
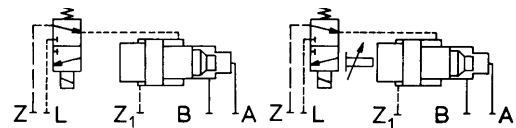
In the event of power failure or a collapse of the control pressure at port "Z", the valve closes. When the control pressure at port "Z1" collapses, the valve opens.



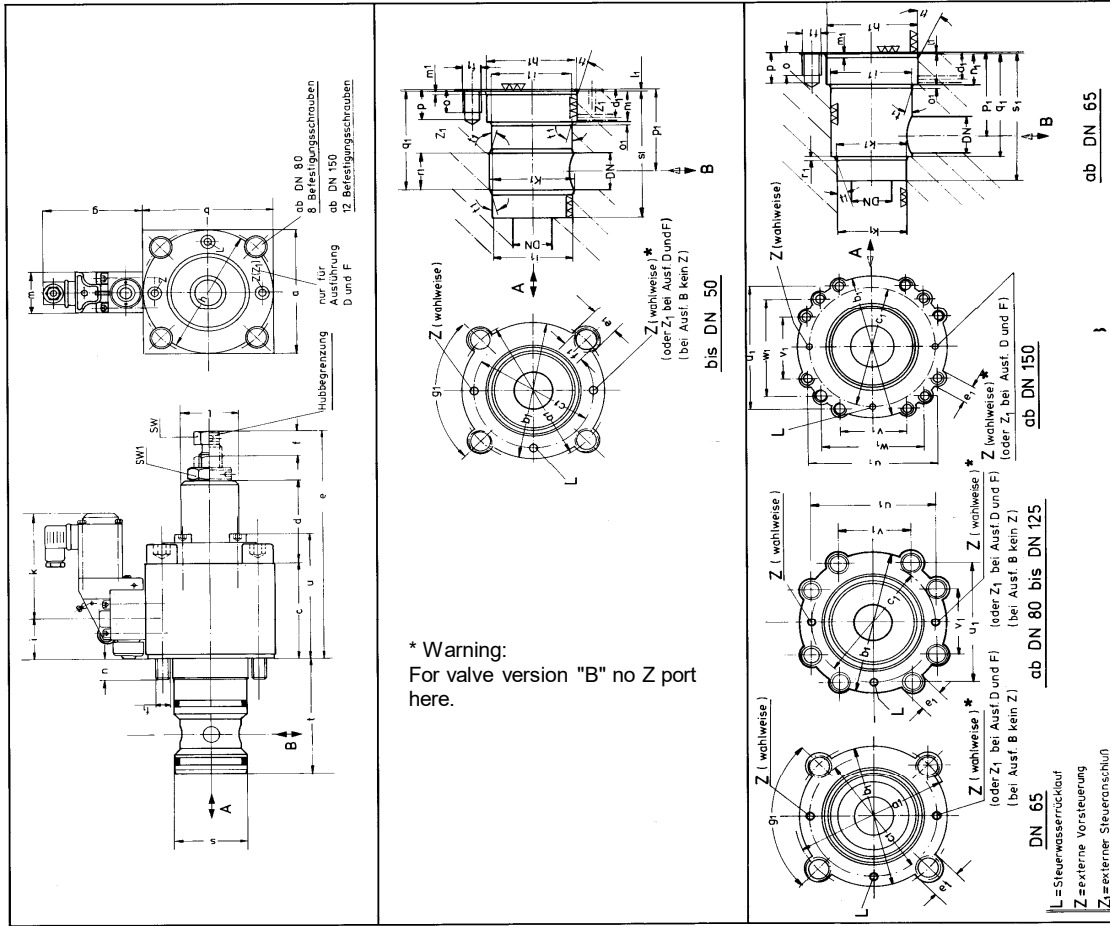
When using a negative pilot-control valve, the main valve operating mode reverses.

When there is a power failure, or the control pressure at port "Z1" collapses, the valve opens.

If the control pressure at port "Z" collapses, the valve closes.



**Dimensional drawing and fitting dimensions:**



\* Warning:  
For valve version "B" no Z port here.

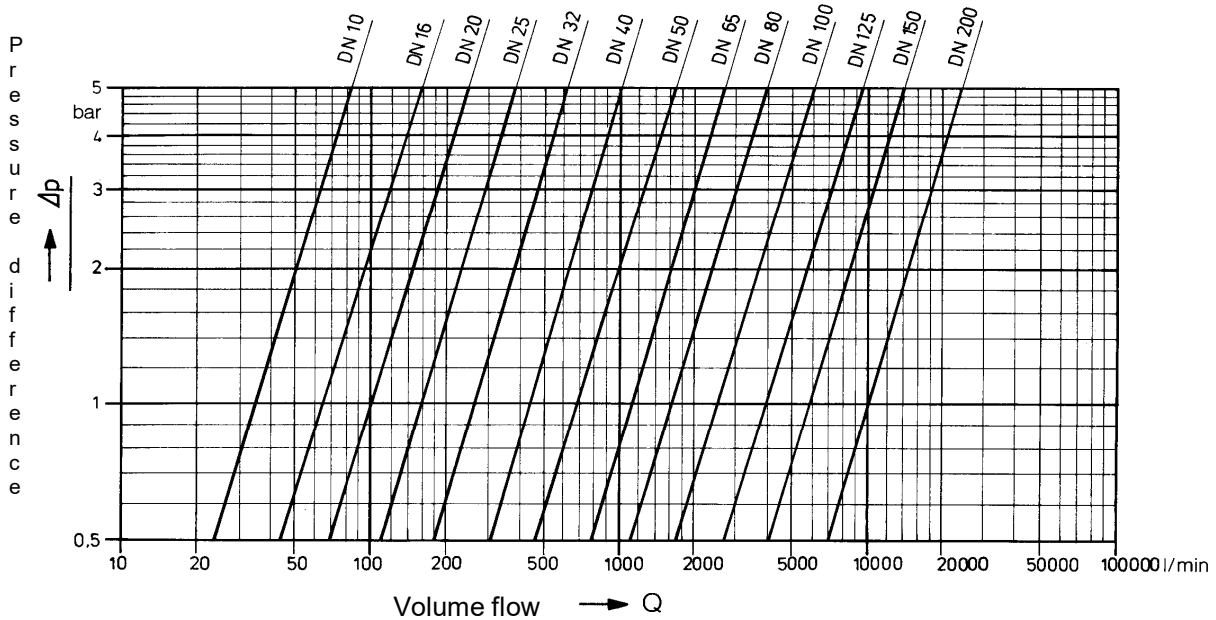
DN	A	B	Z	Z1	L	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p	s	t	U*	SW	SW1
16	φ16	φ16	φ33	φ33	φ33	70	70	85	43	164	14	102	69	45	107	φ32	40	15	17	21	φ40	65	95	17	17
20	φ20	φ20	φ33	φ33	φ33	85	85	85	68	191	20	102	84	45	107	φ43	40	15	17	21	φ50	82	110	17	17
25	φ25	φ25	φ6	φ6	φ6	95	95	95	68	208	20	115	93	53	133	φ43	50	15	17	21	φ56	95	120	17	17
32	φ32	φ32	φ6	φ6	φ6	120	120	100	85	247	25	115	118	53	133	φ52	50	20	23	28	φ70	120	131	24	24
40	φ40	φ40	φ8	φ8	φ8	150	150	112	98	283	30	115	148	50	133	φ65	50	28	31	37	φ85	140	151	30	30
50	φ50	φ50	φ9	φ9	φ9	175	175	131	120	341	40	115	173	58	133	φ72	50	30	33	40	φ100	160	178	36	36
65	φ65	φ65	φ9	φ9	φ9	220	220	155	150	415	50	165	218	68	133	φ95	50	45	47	57	φ130	195	210	55	65
80	φ80	φ80	φ9	φ9	φ9	280	280	190	175	480	55	165	278	83	133	φ120	50	40	42	52	φ160	210	254	65	75
100	φ100	φ100	φ16	φ16	φ16	350	350	225	200	590	65	185	348	120	133	φ160	90	55	57	67	φ200	270	310	75	85
125	φ125	φ125	φ16	φ16	φ16	400	400	255	235	610	70	185	398	123	133	φ125	90	55	57	67	φ240	305	335	φ17	φ110
150	φ150	φ150	φ16	φ16	φ16	450	450	290	270	725	80	185	448	150	133	φ225	90	50	52	62	φ280	360	395	φ21	φ165
175	φ175	φ175	φ16	φ16	φ16	500	500	330	305	830	90	185	498	165	133	φ260	90	60	62	72	φ320	415	450	φ26	φ180
200	φ200	φ200	φ16	φ16	φ16	575	575	375	360	960	100	185	573	190	133	φ305	90	65	70	80	φ370	460	520	φ31	φ220

DN	o <sub>1</sub>	b <sub>1</sub>	c <sub>1</sub>	d <sub>1</sub>	e <sub>1</sub>	f <sub>1</sub>	g <sub>1</sub>	h <sub>1</sub>	i <sub>1</sub>	k <sub>1</sub>	l <sub>1</sub>	m <sub>1</sub>	n <sub>1</sub>	o <sub>1</sub>	p <sub>1</sub>	q <sub>1</sub>	r <sub>1</sub>	s <sub>1</sub>	t <sub>1</sub>	U <sub>1</sub>	V <sub>1</sub>	W <sub>1</sub>	Flansch-Steuer- dichtungsvolumen Z, Z1, Lin.com	Nenn- größen der Steuer- ventile			
16	70	58	13	12	M10	90°	45	40	φ42	1	2.5	15	2	41	48	16	65	15°	—	—	—	—	—	35x349 NBR90SH	5.8	3	
20	96	85	19	14	M12	90°	56	50	φ52	1	2.5	20	3	53	62	20	82	15°	—	—	—	—	—	35x349 NBR90SH	13.9	3	
25	100	95	22	14	M12	90°	60	56	φ59	1	3	25	2.5	61	72.5	25	95	15°	—	—	—	—	—	542x49 NBR90SH	17.9	6	
32	122	120	26	22	M20	90°	80	70	φ72	1	4	30	5	76	91	32	120	15°	—	—	—	—	—	612x49 NBR90SH	39.6	6	
40	155	150	30	26	M24	90°	95	85	φ88	1	4	35	5	91	110	40	140	15°	—	—	—	—	—	612x49 NBR90SH	61.8	6	
50	176	175	36	32	M30	90°	110	100	φ95	1	5	40	5	101	125	50	160	15°	—	—	—	—	—	10x6x9 NBR90SH	122.5	6	
65	223	220	41	38	M36	90°	150	140	φ130	2	5	45	5	117	155	5	195	15°	—	—	—	—	—	10x6x9 NBR90SH	287.0	6/9	
80	—	280	230	41	38	M36	—	180	170	φ160	2	5	4.5	5	128	170	5	210	15°	222	140	—	—	—	10x6x9 NBR90SH	653.0	6/9
100	—	350	280	43	44	M42	—	220	210	φ200	2	5	5	167	220	5	270	15°	276	180	—	—	—	16x28x21 NBR90SH	1000	6/16	
125	—	400	340	48	50	M48	—	285	255	φ240	2	6	5.5	6	177	245	6	305	15°	320	200	—	—	—	16x28x21 NBR90SH	1400	6/16
150	—	450	380	53	54	M42	—	310	295	φ280	2	8	60	8	217	295	8	360	15°	380	180	300	—	—	16x28x21 NBR90SH	1900	6/16
175	—	500	430	58	50	M48	—	350	340	φ320	2	8	65	8	247	340	8	415	15°	426	210	340	—	—	16x28x21 NBR90SH	2850	6/16
200	—	575	500	63	58	M56	—	400	385	φ370	2	10	70	10	267	375	10	460	15°	490	255	410	—	—	16x28x21 NBR90SH	4240	6/16

If the switching periods of the fitted seat valves are too short, single pilot-controls DN 6 can be selected instead of the double pilot-controls DN6/9.  
For the same reason, the double pilot-controls DN 6/16 can be constructed as DN 6/12.



## Pressure difference and volume flow for water( 20° C ) in 2/2 directional control fitted seat valves



### Special features:

Due to the hydraulic force-control by means of the different size control surfaces of the piston rods, the piston rods cannot flutter. Closing springs are not required, thus there can be no uncontrolled piston position in the event of any spring fracture.

The valves are insensitive against vibrations and pressure surges in the hydraulic system.

Due to the extended piston guides, the pistons cannot be tilted by crossflow action.

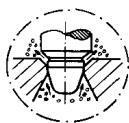
Depending on the version, the valves are kept closed by the applied system pressure. If the pilot-control medium or the electrical power fails, the valves will close.

Therefore, uncontrolled load movements cannot occur.

The individual valve pistons are always extended to the outside; this causes the open or closed valve positions to be visible from the outside. There is the possibility for mounting limit switches onto the piston position indicator. Valves with stroke limitation feature appropriate bores for controlling the piston position within the stroke limitation housing.

All wear parts are easy to access and fast to replace.

For a flow direction from A to B, due to the special purpose design of the valve seats and the throttle cones on the pistons, the metallic sealing surfaces are largely insensitive against dirt. This also prevents the feared switching surges.



All valve components coming into contact with one another due to their movement are made of corrosion resistant materials. For aggressive media, the complete valve can be manufactured from appropriately selected special steels.

The pilot-control valves are made completely of stainless materials. The emergency manual controls fitted as standard can be arrested and are protected against accidental activation.