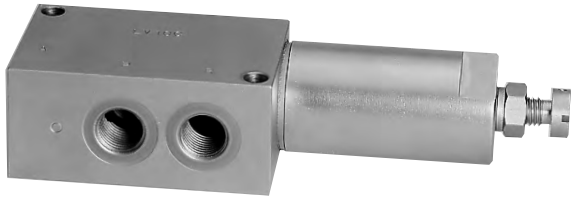
Accumulator charging valves (idle valves) type LV..

Pressure p_{max} = 350 bar
Flow Q_{max} = 25 lpm

See also:
For valves with higher flow rating type ALZ acc. to D 6170-ALZ

1. General information

This directly operated valve switches the pump delivery flow back to port R as soon as the set pressure limit is achieved. In this case port A (consumer side) is separated from the circulation mode by a check valve, thus remaining pressurized. The pump delivery will be fed again to the consumer circuit while the idle circulation mode is discontinued, whenever the pressure drops below the set pressure minus hysteresis. For detailed notes and functional description, see sect. 5.



The accumulator charging valves type LV are used for different purposes

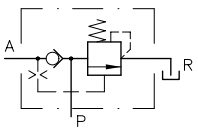
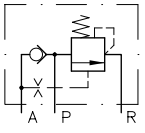
- **Accumulator charging valve**
  These valves may be used as accumulator charging valve in circuits, where consumers remain pressurized extended periods, and where minor fluid consumption, due to internal leakage of directional spool valves or compressed material changing its shape under pressure, is compensated by an accumulator. However these valves are not suited for accumulator circuits where there is a permanent fluid demand on the consumer side (see appendix in sect. 5).

- **Idle circulation valve**
  These valves may be used as idle circulation valve in pump circuits without accumulator and control via zero leakage directional seated valves. These valves are suited particularly for non solenoid actuated systems (e.g. VHR 1(2) according to D 7647), since this eliminates the need for elaborate electrically switched idle circulation by means of solenoid valves and pressure switches or contact switches of manually actuated systems.

2. Available versions, main data

Coding example: **LV 10 D - 180**

Desired pressure (bar) set at HAWE [1])

Version	Basic type	Flow Q_{max} (lpm)	Switching hysteresis	Pressure range C	D	E	F	Ports A, P, and R	Symbols
				adjustable from ... to (bar)					
For direct pipe connection	**LV 10**	8	15%	--	--	--	30 ... 40	G 1/4 ISO 228/1 G 3/8 (BSPP)	Type LV 10 (20) 
		12	15%	220 ... 350	140 ... 240	60 ... 140	40 ... 60		
	LV 20	25	15%	200 ... 350	130 ... 220	80 ... 140	40 ... 80		
	LV 25	25	8%	200 ... 350	130 ... 220	--	--		
		25	10%	--	--	80 ... 140	40 ... 80		
For manifold mounting	**LV 10 P**	8	15%	--	--	--	30 ... 40	See dimensional drawings in sect. 4.2	Type LV 10 (20P) 
		12	15%	220 ... 350	140 ... 240	60 ... 140	40 ... 60		
	LV 20 P	25	15%	200 ... 350	130 ... 220	80 ... 140	40 ... 80		
	LV 25 P	25	8%	200 ... 350	130 ... 220	--	--		
		25	10%	--	--	80 ... 140	40 ... 80		

[1]) The respective max. pressure will be set if a pressure specification is missing

3. Additional specifications

Design: Spool type valve

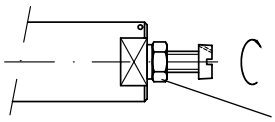
Pipe connection: Type LV 10, LV 20, LV 25: Suited for pipe fittings with tapped journals type B DIN 3852 Bl. 2
LV 10 P, LV 20 P, LV 25 P: For manifold mounting

Installation position: Any

Pressure: p_{max} = 350 bar at A and P
≦ 5 bar at R

Static overload capacity: approx. 2 x p_{max}

Pressure adjustment : Pressure limiting valve (always monitored by a pressure gauge !)



Turn clockwise = pressure rises

Loosen lock nut before adjusting the set screw

Type	Pressure range C	D	E	F
	Δp (bar) per 1 turn			
LV 10 (P)	22	12	8	1.5
LV 20 (P)	20	10	6	3.5
LV 25 (P)	18	9.5	6	3.5

Flow direction: P → A and P → R (circulation mode)

Pressure fluid: Hydraulic oil conforming DIN 51524 part 1 to 3: ISO VG 10 to 68 conforming DIN 51519.
Viscosity limits: min. approx. 4, max. approx. 1500 mm²/s;
opt. operation approx. 10... 500 mm²/s.
Also suitable are biologically degradable pressure fluids types HEPG (Polyalkylenglycol) and HEES (Synth. Ester) at service temperatures up to approx. +70 °C.

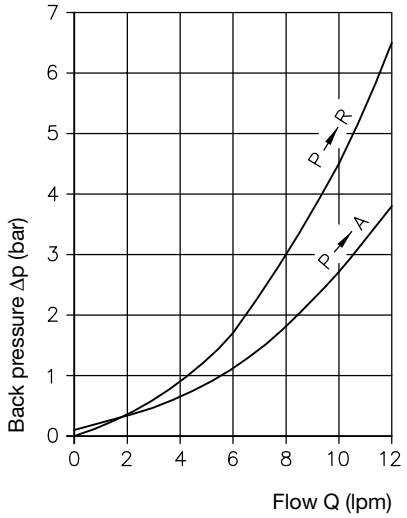
Temperature: Ambient: approx. -40 ... +80 °C
Fluid: -25 ... +80°C, Note the viscosity range !
Permissible temperature during start: -40°C (observe start-viscosity!), as long as the service temperature is at least 20K higher for the following operation.
Biologically degradable pressure fluids: Observe manufacturer's specifications. By consideration of the compatibility with seal material not over +70 °C

Mass (weight)

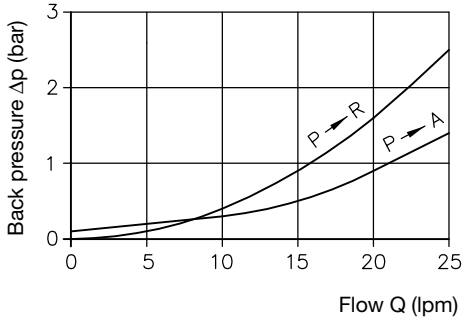
Type	LV 10	LV 20 LV 25	LV 10 P	LV 20 P LV 25 P
approx. (kg)	0.9	1.2	0.9	1.5

Δp-Q-curves

Type LV 10 and LV 10 P



Type LV 20 and LV 20 P
LV 25 and LV 25 P



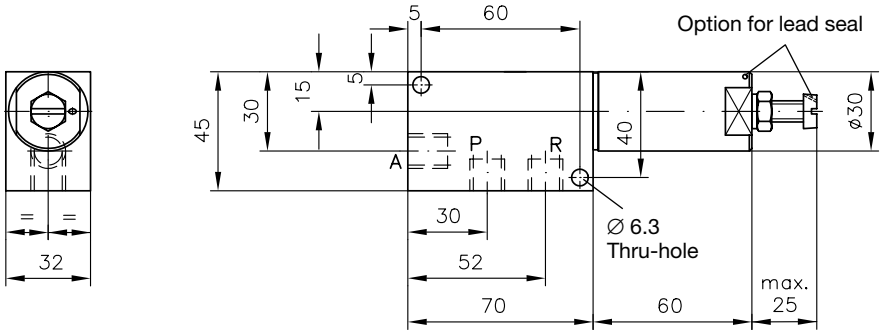
Viscosity during measurements approx. 60 mm²/s

4. Unit dimensions

All dimension in mm and subject to change without notice!

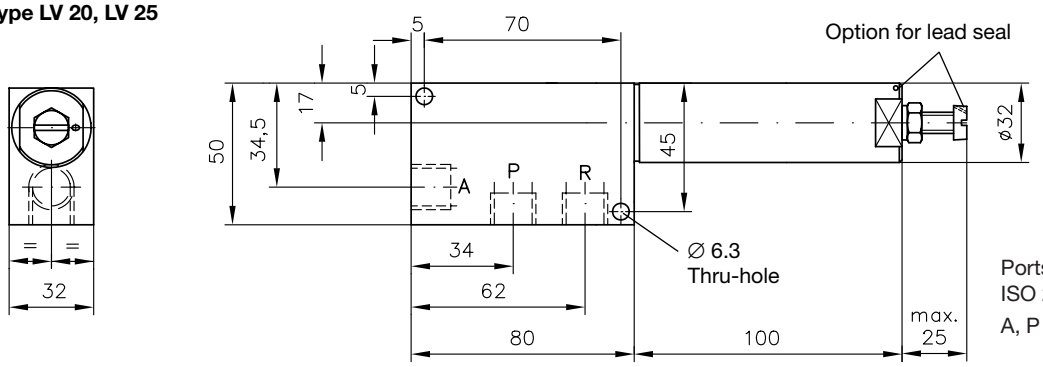
4.1 Version for pipe connection

Type LV 10



Ports conforming
ISO 228/1 (BSPP):
A, P and R = G 1/4

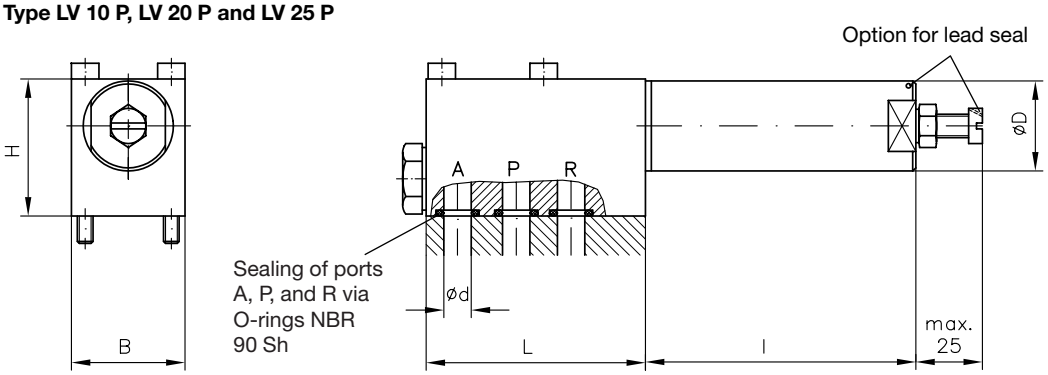
Type LV 20, LV 25



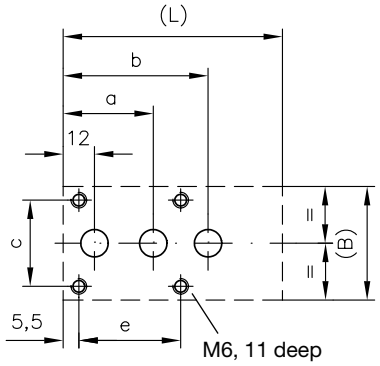
Ports conforming
ISO 228/1 (BSPP):
A, P and R = G 3/8

4.2 Version for manifold mounting

Type LV 10 P, LV 20 P and LV 25 P



Hole pattern at the manifold (top view)



Type	B	H	L	a	b	c	d	e	l	O-ring
LV 10 P	32	45	70	31	47	23.4	8	30	60	9.2x2.62
LV 20 P, LV 25 P	40	50	80	34	54	30	10	37	100	10.77x2.62

5. Appendix

5.1 Additional description

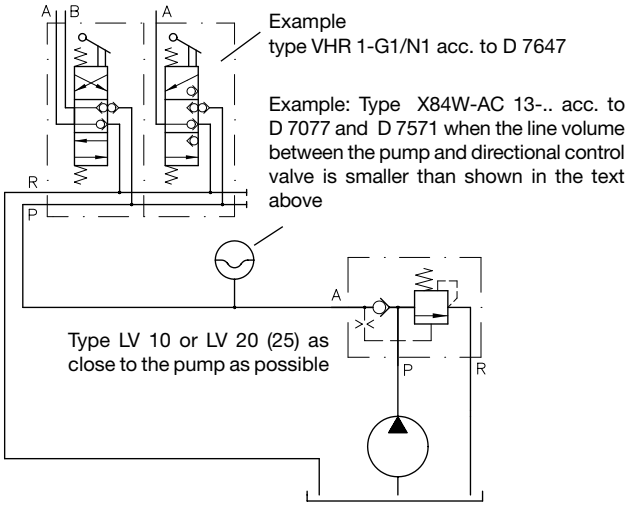
The LV valves incorporate a self-controlled intermittent switchover, making them very reliable in their switching action, which is largely independent of the flow switch pulses otherwise required for such units operating on a hydraulic basis (pump pulsation, pressure peaks when switching directional control valves, etc.).

The valve should be installed as close as possible near the pump, to avoid decompression shocks in the pump line,. During the switching process (see also sect.5.2) a control piston is moved within the valve. The small amount of oil required for this purpose must be provided by the compressed volume on the consumer side. This small volume is either taken from the accumulator (accumulator circuits) or from the pipe/hose system when the system does not incorporate an accumulator. The geometric volume within the line system (length x cross-section)should therefore not drop below a certain min. level: Approx. 30 ... 40 cm^3 with type LV 10(P) and approx. 60 ... 80 cm^3 in the case of type LV 20(P), LV 25(P). Otherwise an miniature accumulator type AC 13 or AC 40 (acc. to D 7571) has to be employed, when it is not possible to provide a line of sufficient length for this purpose.

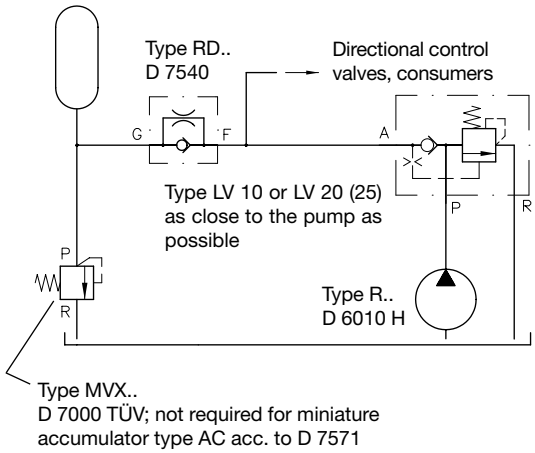
The accumulator charging valves are suitable for pump circulation systems operating in cycles where full demand for compressed oil on the consumer side alternates with long intervals with little or no demand for compressed oil (e.g. leakage oil compensation). They are not suitable for accumulator systems requiring a permanent oil supply on the consumer side. Depending on the ratio between the pump delivery flow, the amount of oil required as a function of time, and the size of the accumulator, replenishing may be required regularly (rattling noise) or in quick succession on account of the differences in replenishing pressure resulting from the accumulator charging valve amounting to approx. 13%.

Practical application (e.g. accumulator nom. 2.5 l) shows that consistent oil consumption on the consumer side of 30 ... 40% of the pump delivery flow is still tolerable, the ratio between accumulator volume and pump delivery flow should not be less than 0.9 ... 1.1 l. Since the accumulator has to be replenished. There is a minimum time limit for the entire operating cycle, which in this case would be approx. 20...30 sec..

Typical example of a syst. with manually actuated directional control valves



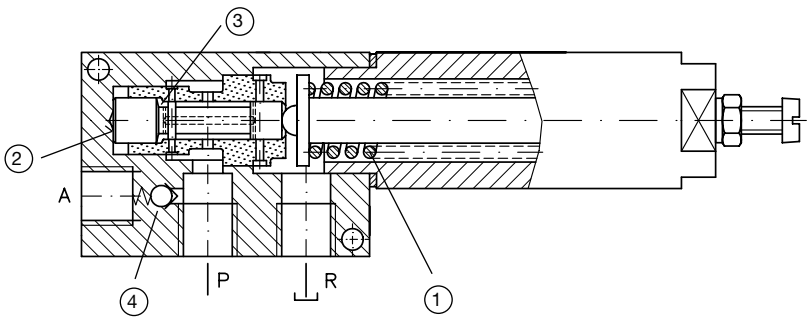
Example in a reservoir circuit
(simplified diagram)



5.2 Configuration and function

Instantaneous switching operat. is maintained by a stepped piston (differential piston) type switch. Spring force ① and ring surface ③ under system pressure act together against piston surface ② also under system pressure, reaching a balance of forces when drawing close to the switch point. As soon as the switch point itself is reached, ring surface ③ is relieved of pressure. This creates a sudden excess force on piston surface ② against spring force ①, moving the piston instantaneously to the circulation mode position. Check valve ④ disconnects outlet A (consumer side) from the circuit, the pressure on A continuing to act on piston surface ② and keeping the valve in circulation mode. As soon as this pressure drops approx. 13% below the pressure level set, forces return to their original level and the circulation mode is again deactivated instantaneously. The switch-back increment of 13% is the same with all pressure levels set and follow from the design related ratio between piston surfaces ② and ③. As of connection A a small minimum line volume is required to ensure perfect switching (see section 5.1).

Cross-sectional diagram (Example of type LV 10)



Detailed flow pattern symbol illustrating the functional description