Line rupture protection valve type LB

Product documentation

Screw-in valve

Operating pressure p_{max}:	500 bar
Flow rate Q_{max}:	250 l/min

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HAWE HYDRAULIK

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1 Overview of line rupture protection valve type LB

Line rupture protection valves, also called pipe rupture protection valves are a type of check valve. The valves are normally mounted directly on the cylinder. They prevent uncontrolled cylinder movement in the event of a pipe rupture or hose break.

The line rupture protection valve type LB offers a high level of safety in the event of pressure peaks. It features reproducibly accurate and secure closing at the pre-set trigger flow rate. Higher flow rates cause a plate raised from the valve seat by a spring to be pressed onto the housing seat by the flow forces and cause the valve to close. A variant with orifice bore in the valve plate permits a low flow rate in the locking direction. Type LB is available as a screw-in cartridge in a housing version for in-line installation, or as a screw fitting version.

Line rupture safety valves type LB

Features and advantages

- Operating pressures up to 500 bar
- Reduction in screw fittings in the case of E-version
- Maintenance free
- Pre-adjusted valves available
- Different sizes and designs available

Area of application

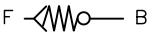
- Industrial vehicles
- Lifting devices

2 Available versions

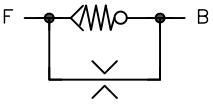
Circuit symbols

Simplified

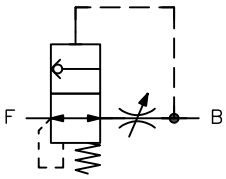
Standard version without orifice bore

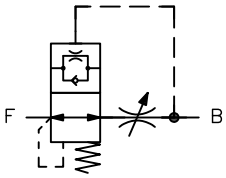


Standard version with orifice bore

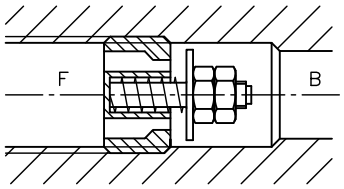


Detailed

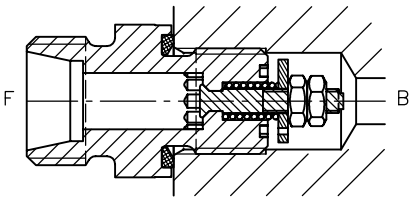




Version **C**



Version **E**



Ordering example

LB 1	**C**			**-30**	
LB 3	**F**		**0,8**	**-63**	
LB 3 UNF	**C**		**1,0**	**-0**	
LB 4	**E**	**-18L**	**0,8**	**-71**	**-G 3/4 A-ED**

2.6 "Port size, block side/cylinder side"

- 2.4 "Response flow"
- 2.5 "Response flow – screw fitting version"

2.3 "Orifices"

2.6 "Port size, hose side"

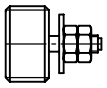
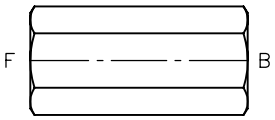
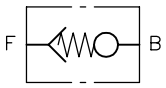
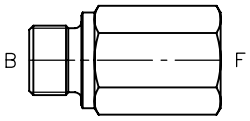
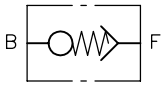
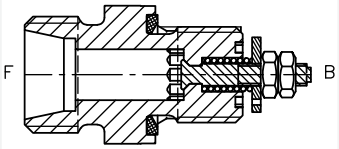
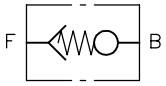
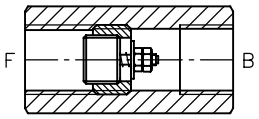
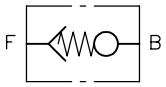
2.2 "Versions"

2.1 "Basic type and size"

2.1 Basic type and size

Type	Pressure p_{max} (bar)	Port size	Description	Versions			
				C	G	F	E
LB 1	500	G 1/4 (A)		●	●	●	●
LB 2	500	G 3/8 (A)		●	●	●	●
LB 3	500	G 1/2 (A)		●	●	●	●
LB 4	500	G 3/4 (A)		●	●	●	●
LB 5	500	G 1 (A)		●			
LB 1 UNF	500 (C) / 420 (G, F)	9/16-18 UNF	Version with UNF / UN thread in accordance with SAE J 514	●	●	●	
LB 2 UNF	500 (C) / 315 (G, F)	3/4-16 UNF		●	●	●	
LB 3 UNF	500 (C) / 315 (G, F)	7/8-14 UNF		●	●	●	
LB 4 UN	500 (C) / 315 (G, F)	1 1/16-12 UN		●	●	●	
LB 2/1	500	G 3/8 (A)	With threaded reducing ring	●	●	●	
LB 3/2	500	G 1/2 (A)		●	●	●	
LB 4/3	500	G 3/4 (A)		●	●	●	

2.2 Versions

Coding	Description	View	Circuit symbol
C	Screw-in cartridge		
G	Housing version, pipe connection on both sides Housing version UNF, see Chapter 4.2, "Housing version" (p_{max} restricted, see Chapter 2.1, "Basic type and size")		
F	Tapped journal on one side also LB 1 F - JIS - ... with thread in accordance with JIS B 2351-1 Housing version UNF, see Chapter 4.2, "Housing version" (p_{max} restricted, see Chapter 2.1, "Basic type and size")		
E (E1)	Screw fitting version Tapped journal for assembly in a block on one side, and a direct pipe connection on the other side. The coding E refers to low response flows and the coding E1 refers to high response flows, see Chapter 2.5, "Response flow – screw fitting version"		
/1, /2, /3	With threaded reducing ring Screw-in cartridge sizes 1 to 3 with threaded reducing ring screwed into the next largest housing (G or F) sizes 2 to 4. Example of use: Adjustment to the port size of the hydraulic devices used, e.g. **LB 3/2 G-..**		

NOTICE

- **Coding C:** Metric thread versions on request.

2.3 Orifices

Type	Coding for orifice bore (≙ ∅) only for valves						
	without orifice	0,5	0.8	1,0	1,2	1,5	2,0
LB 1	●	●	●	●	●		
LB 2	●	●	●	●	●	●	
LB 3	●	●	●	●	●	●	●
LB 4	●		●	●	●	●	●
LB 5	●		●	●	●	●	●
LB 1 UNF	●	●	●	●	●		
LB 2 UNF	●	●	●	●	●	●	
LB 3 UNF	●	●	●	●	●	●	●
LB 4 UN	●		●	●	●	●	●
LB 1 E-8L	●	●	●				
LB 1 E1-8L	●	●	●				
LB 1 E-10L	●	●	●				
LB 1 E1-10L	●	●	●				
LB 2 E-12L	●	●	●	●	●	●	
LB 2 E1-12L	●	●	●	●	●	●	
LB 3 E-15L	●	●	●	●	●	●	
LB 4 E-15L	●		●				
LB 4 E-18L	●		●			●	●
LB 4 E1-18L						●	●
LB 4 E-25S	●		●			●	●
LB 4 E1-25S						●	●

2.4 Response flow

Type	Response flow Q_A (l/min)													
	-0	-4	-6.3	-10	-13	-16	-20	-25	-30	-35	-40	-50	-55	-63
LB 1..	●	●	●	●	●	●	●	●	●					
LB 2..	●		●	●	●	●	●	●	●	●	●	●		
LB 3..	●					●	●	●	●	●	●	●	●	●
LB 4..	●							●	●	●	●	●		●
LB 5..	●													
LB 1 UNF..	●		●	●	●	●	●	●	●					
LB 2 UNF..	●		●	●	●	●	●	●	●	●	●	●		
LB 3 UNF..	●					●	●	●	●	●	●	●	●	●
LB 4 UN..	●							●	●		●	●		●
LB 2/1..	●	●	●	●	●	●	●	●	●		●			
LB 3/2..	●		●	●	●	●	●	●	●	●	●	●		
LB 4/3..	●					●	●	●	●	●	●	●	●	●

	Response flow Q_A (l/min)									
	-71	-80	-90	-100	-110	-125	-160	-200	-230	-250
LB 3..	●	●								
LB 4..	●	●	●	●	●	●	●			
LB 5..		●		●		●	●	●	●	●
LB 3 UNF..	●	●								
LB 4 UN..	●	●	●	●		●	●			
LB 4/3..	●	●								

NOTICE
Variants with "-0" are screwed up to the stop ex works, thus there is no gap and adjustment by user is required.

2.5 Response flow – screw fitting version

Type	Response flow Q_A (l/min)											
	-0	-4	-6.3	-8	-10	-13	-16	-20	-25	-30	-35	-40
LB 1 E -8L	●	●	●	●								
LB 1 E1 -8L	●				●	●	●	●	●			
LB 1 E -10L	●	●	●	●	●	●						
LB 1 E1 -10L	●						●	●	●	●		
LB 2 E -12L	●		●		●	●	●	●	●			
LB 2 E1 -12L	●									●	●	●
LB 3 E -15L	●						●	●	●	●	●	●

	Response flow Q_A (l/min)										
	-50	-55	-63	-71	-80	-90	-100	-110	-125	-160	-175
LB 2 E1 -12L	●										
LB 3 E -15L	●	●	●	●	●						
LB 4 E -15L				●	●	●	●	●	●	●	
LB 4 E -18L				●	●	●	●	●	●		
LB 4 E1 -18L										●	●
LB 4 E -25S				●	●	●	●	●	●		
LB 4 E1 -25S										●	●

2.6 Port size

Coding	Port size	
	hose side	block side/cylinder side
LB 1 E (1) -8L/..-..G 1/4 A-ED	M14x1.5	G 1/4 A
LB 1 E (1) -10L/..-..G 1/4 A-ED	M16x1.5	G 1/4 A
LB 2 E (1) -12L/..-..G 3/8 A-ED	M18x1.5	G 3/8 A
LB 3 E -15L/..-..G 1/2 A-ED	M22x1.5	G 1/2 A
LB 4 E -15L/..-..G 3/4 A-ED	M22x1.5	G 3/4 A
LB 4 E (1) -18L/..-..G 3/4 A-ED	M26x1.5	G 3/4 A
LB 4 E (1) -25S/..-..G 3/4 A-ED	M36x2	G 3/4 A

3 Parameters

3.1 General data

Designation	Line rupture protection valve
Design	Plate valve
Model	Screw-in cartridge, housing version, screw fitting version
Material	Steel; valve housing nitrided or galvanised, some functional inner parts hardened and ground
Installation position and direction	As desired; B = port on consumer side to be protected against rupture
Flow direction	Δp-Q characteristics for both flow directions (B → F or F → B) in accordance with gap width S. see Chapter 5.3.2, "Reference values for the response flow"
Hydraulic fluid	Hydraulic fluid, according to DIN 51 524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Viscosity range: 4 - 1500 mm²/s Optimal operating range: approx. 10 - 500 mm²/s Also suitable for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.
Cleanliness level	**ISO 4406** 21/18/15...19/17/13
Temperatures	Environment: approx. -40 to +80 °C, hydraulic fluid: -25 to +80 °C, pay attention to the viscosity range. Start temperature: down to -40 °C is permissible (take account of the start viscosities!), as long as the steady-state temperature is at least 20 K higher during subsequent operation. Biologically degradable hydraulic fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.

3.2 Weight

Screw-in cartridge	**Type**	
	LB 1	= 6 g
	LB 2	= 12 g
	LB 3	= 21 g
	LB 4	= 45 g
	LB 5	= 103 g
	LB 1 E-8L, LB 1 E1-8L	= 36 g
	LB 1 E-10L, LB 1 E1-10L	= 36 g
	LB 2 E-12L, LB 2 E1-12L	= 56 g
	LB 3 E-15L	= 88 g
	LB 4 E-15L	= 118 g
	LB 4 E-18L, LB 4 E1-18L	= 120 g
	LB 4 E-25S, LB 4 E1-25S	= 266 g
Housing version	**Type**	
	LB 1 F, LB 1 G	= 70 g
	LB 2 F, LB 2 G	= 100 g
	LB 3 F, LB 3 G	= 170 g
	LB 4 F, LB 4 G	= 390 g

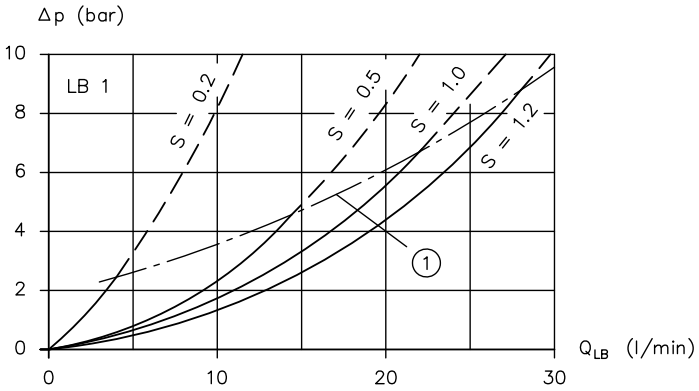
3.3 Pressure and volumetric flow

Operating pressure	p_{max} = 500 bar
Flow rate	Q_{max} = corresponds to size and adjusted response flow

3.4 Characteristic lines

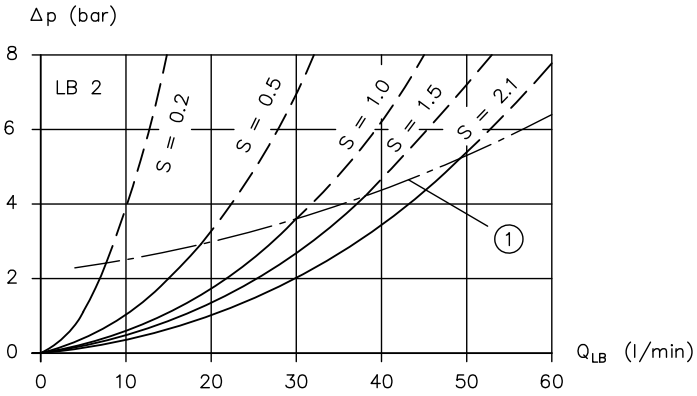
Response flow/gap

Viscosity of the hydraulic fluid approx. 60 mm²/s



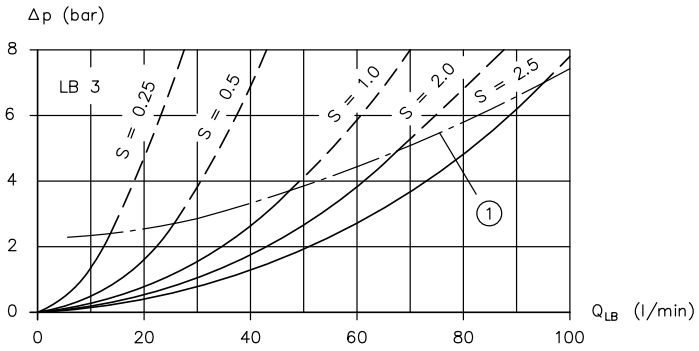
Q_{LB} flow rate (l/min); Δp flow resistance (bar)

1 Response flow (B → F)



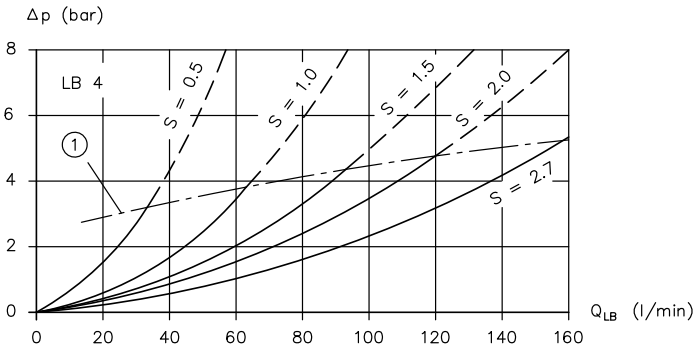
Q_{LB} flow rate (l/min); Δp flow resistance (bar)

1 Response flow (B → F)



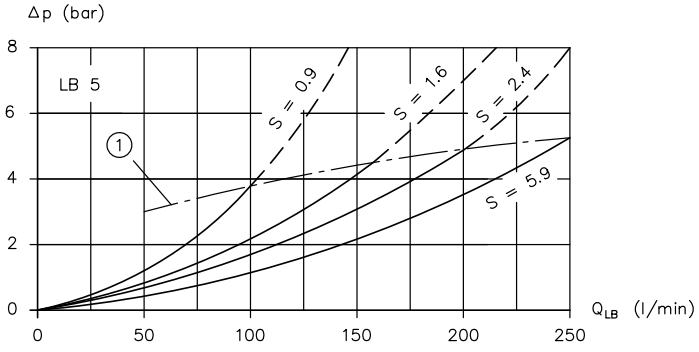
Q_{LB} flow rate (l/min); Δp flow resistance (bar)

1 Response flow (B → F)



Q_{LB} flow rate (l/min); Δp flow resistance (bar)

1 Response flow (B → F)



Q_{LB} flow rate (l/min); Δp flow resistance (bar)

1 Response flow (B → F)

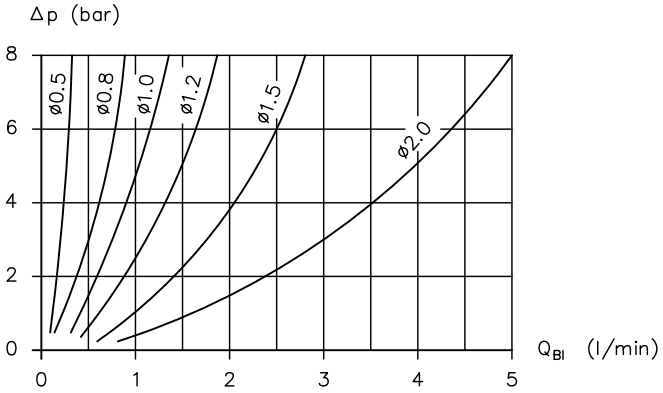
NOTICE
Diagrams relate to the version with an imperial thread.

- Valve closure occurs at the intersection of characteristic curve "S" with the dot-dash limit line.
- For valves with an orifice, the actual response flow is higher by the proportion that flows through the orifice bore. see Chapter 2.3, "Orifices"
- Intermediate values are to be interpolated.
- For reference values for the response flow see Chapter 5.3.2, "Reference values for the response flow"

Orifice characteristic curve

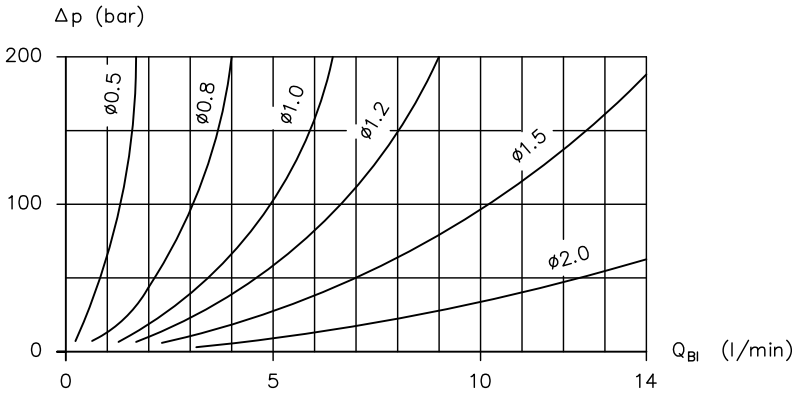
Viscosity of the hydraulic fluid approx. 60 mm²/s

For determining the actual response flow (reference values):



Q_{BI} flow rate (l/min); Δp flow resistance (bar)

For determining the load lowering speed during response:

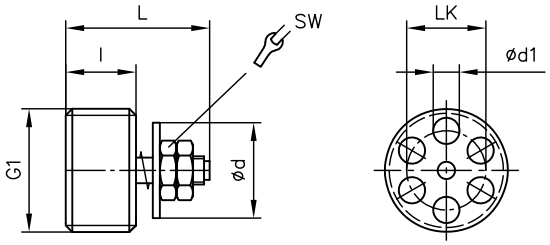


Q_{BI} flow rate (l/min); Δp flow resistance (bar)

4 Dimensions

All dimensions in mm, subject to change.

4.1 Screw-in cartridge



SW = Width across flats

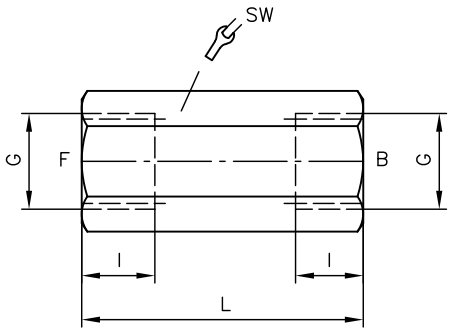
A corresponding assembly tool must be made locally in accordance with the hole pattern.

Type	G1	L	l	∅d	∅d1	LK	SW	Max. tightening torque Lock nut M_A (Nm)	Max. tightening torque Cartridge M_A (Nm)
LB 1 C	G 1/4 A	17,5	8,1	9,5	2,4	8,5	5,5	1,25	8
LB 2 C	G 3/8 A	21	10,6	12,5	3,5	11	5,5	1,25	12
LB 3 C	G 1/2 A	25	12,1	15	4,5	13	7	3,10	18
LB 4 C	G 3/4 A	30,5	17,1	17,5	6	16	7	3,10	23
LB 5 C	G 1 A	38	22,1	26	7,5	19,5	7	3,10	25
LB 1 UNF C	9/16-18 UNF	17,9	8,3	9,5	2,4	8,5	5,5	1,25	8
LB 2 UNF C	3/4-18 UNF	21	10,6	12,5	3,5	11	5,5	1,25	12
LB 3 UNF C	7/8-14 UNF	25	12,1	16,2	4,5	13	7	3,10	18
LB 4 UN C	1 1/16-12 UN	30,5	17,1	17,5	6	16	7	3,10	23

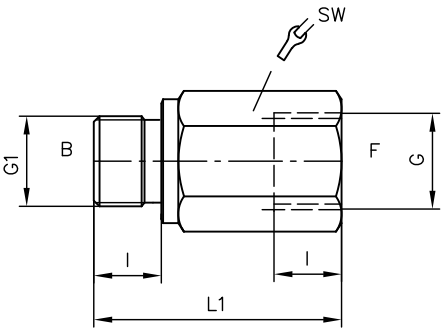
4.2 Housing version

Imperial thread

LB..G



LB..F

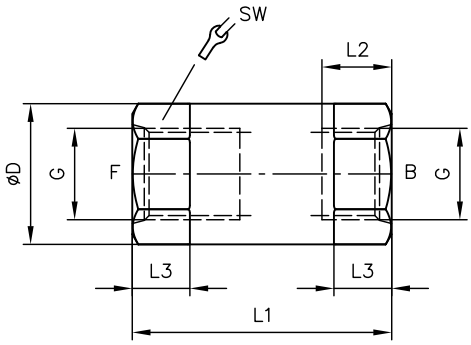


SW = Width across flats

Type	G	G1	L	L1	l	SW
LB 1..	G 1/4	G 1/4 A	50	48	12	19
LB 1..- JIS	G 1/4 JIS	G 1/4 JIS	--	55	12	19
LB 2..	G 3/8	G 3/8 A	58	52	12	22
LB 3..	G 1/2	G 1/2 A	65	60	14	27
LB 4..	G 3/4	G 3/4 A	78	72	16	36

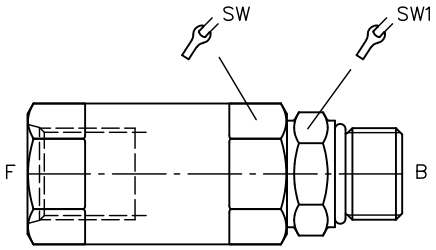
UNF thread

LB UNF..G

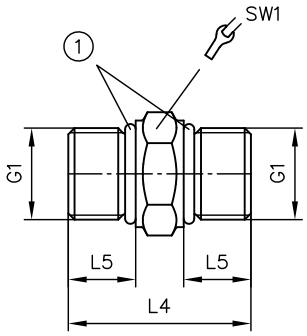


SW = Width across flats

LB UNF..F
(housing G + adapter)



Adapter



1 O-ring

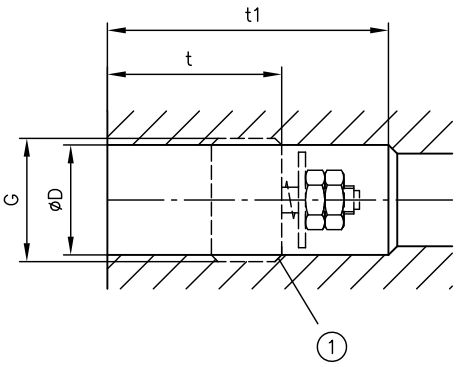
Type	G	L1	L2	L3	SW (inch)	∅ D	G1	L4	L5	SW1 (inch)	O-ring
LB 1 UNF	9/16-18 UNF -2B	50	14,5	10	3/4	22	9/16-18 UNF -2A	34	12	11/16	11.89x1.98
LB 2 UNF	3/4-16 UNF -2B	54	14,5	12	1	29,3	3/4-16 UNF -2A	38	14	7/8	16.36x2.2
LB 3 UNF	7/8-14 UNF -2B	64	16,5	12	1 1/4	36,7	7/8-14 UNF -2A	44	16	1	19.18x2.46
LB 4 UN	1 1/16-12 UN -2B	78	19,3	15	1 1/2	44	1 1/16-12 UN -2A	51	18,5	1 1/4	23.47x2.95

NOTICE

Operating pressure p_{max} for UNF housing is restricted (see Chapter 2.1, "Basic type and size")

4.2.1 Mounting hole

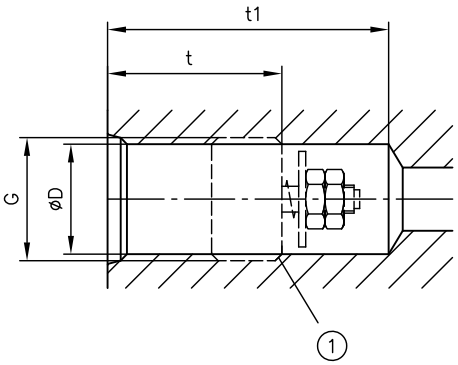
Imperial thread



1 End of the thread with cut type E

Type	G	∅D +0.1	t	t1
LB 1 C	G 1/4	11.5	22	33
LB 2 C	G 3/8	15.0	26	37
LB 3 C	G 1/2	18.7	30	45
LB 4 C	G 3/4	24.2	38	54
LB 5 C	G 1	30,7	47	67

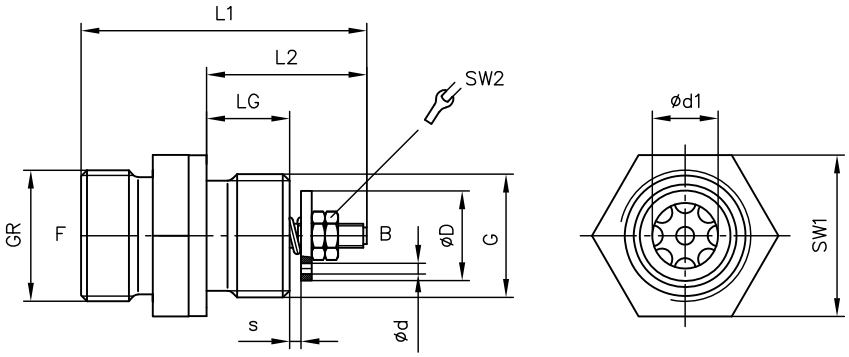
UNF thread



1 End of the thread with cut type E

Type	G	∅D +0.1	t	t1
LB 1 UNF	9/16-18 UNF -2B	12.9	24,5	35,5
LB 2 UNF	3/4-16 UNF -2B	17.5	28,5	39,5
LB 3 UNF	7/8-14 UNF -2B	20.4	32,5	47,5
LB 4 UN	1 1/16-12 UN -2B	25	41,3	57,3

4.3 Screw fitting version

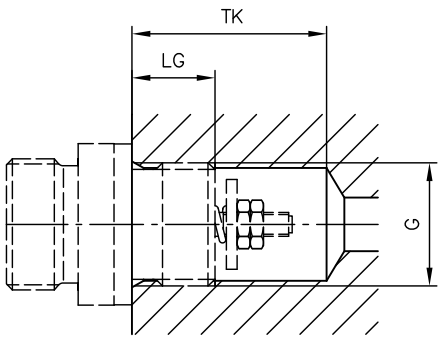


SW = Width across flats

Type	GR	G	L1	L2	LG	∅D	∅d	∅d1	s	SW1	SW2	Max. tightening torque lock nut M_A (Nm)	Max. tightening torque (Nm)
LB 1 E (1) -8L/..-..G 1/4 A-ED	M14x1.5	G 1/4 A	38,4	21,4	12	10,3	0,5-1,2	7	0,2-1,3	19	5,5	1,25	35
LB 1 E (1) -10L/..-..G 1/4 A-ED	M16x1.5	G 1/4 A	39,4	21,4	12	10,3	0,5-1,2	7	0,2-1,3	19	5,5	1,25	35
LB 2 E (1)-12L/..-..G 3/8 A-ED	M18x1.5	G 3/8 A	44	22,5	12	12,5	0,5-1,5	9	0,3-1,5	22	5,5	1,25	70
LB 3 E -15L/..-..G 1/2 A-ED	M22x1.5	G 1/2 A	48,8	26,8	14	15	0,5-2,0	11	0,5-2,4	27	7	3,1	110
LB 4 E -15L/..-..G 3/4 A-ED	M22x1.5	G 3/4 A	51,1	29,4	16	18,5	0,8-2,0	12	1,1-1,9	32	7	3,1	110
LB 4 E (1) -18L/..-..G 3/4 A-ED	M26x1.5	G 3/4 A	51,1	29,4	16	20	0,8-2,0	15	1,1-2,7	32	7	3,1	110
LB 4 E (1) -25S/..-..G 3/4 A-ED	M36x2	G 3/4 A	64,4	29,4	16	20	0,8-2,0	16	1,1-2,7	41	7	3,1	310

NOTICE
Notch on hexagon is for the purpose of differentiating this fitting from an ERMETO fitting.

4.3.1 Creating the mounting hole



Type	G	LG	TK
LB 1 E (1) -8L/..-.. G 1/4 A-ED	G 1/4 A	12	23
LB 1 E (1) -10L/..-.. G 1/4 A-ED	G 1/4 A	12	23
LB 2 E (1) -12L/..-.. G 3/8 A-ED	G 3/8 A	12	23
LB 3 E -15L/..-.. G 1/2 A-ED	G 1/2 A	14	29
LB 4 E -15L/..-.. G 3/4 A-ED	G 3/4 A	16	32
LB 4 E (1) -18L/..-.. G 3/4 A-ED	G 3/4 A	16	32
LB 4 E (1) -25S/..-.. G 3/4 A-ED	G 3/4 A	16	32

5 Installation, operation and maintenance information

Observe the document B 5488 “General operating instructions for assembly, commissioning, and maintenance.”

5.1 Intended use

This product is intended exclusively for hydraulic applications (fluid technology).

The user must observe the safety measures and warnings in this document.

Essential requirements for the product to function correctly and safely:

- ► All information in this documentation must be observed. This applies in particular to all safety measures and warnings.
- ► The product must only be assembled and put into operation by specialist personnel.
- ► The product must only be operated within the specified technical parameters described in detail in this document.
- ► All components must be suitable for the operating conditions when using an assembly.
- ► The operating instructions for the components, assemblies and the specific complete system must also always be observed.

If the product can no longer be operated safely:

1. Remove the product from operation and mark it accordingly.
   ✓ It is then not permitted to continue using or operating the product.

5.2 Assembly information

The product must only be installed in the complete system with standard and compliant connection components (screw fittings, hoses, pipes, fixtures etc.).

The product must be shut down correctly prior to disassembly (in particular in combination with hydraulic accumulators).

⚠ **DANGER**

Sudden movement of the hydraulic drives when disassembled incorrectly

Risk of serious injury or death

- ► Depressurise the hydraulic system.
- ► Perform safety measures in preparation for maintenance.

5.2.1 Creating the mounting hole

see Chapter 4, "Dimensions"

5.3 Operating instructions

Observe product configuration and pressure/flow rate.

The statements and technical parameters in this document must be strictly observed.
The instructions for the complete technical system must also always be followed.

NOTICE

- ► Read the documentation carefully before usage.
- ► The documentation must be accessible to the operating and maintenance staff at all times.
- ► Keep documentation up to date after every addition or update.

⚠ CAUTION

Overloading components due to incorrect pressure settings.

Risk of minor injury.

- Pay attention to the maximum operating pressure of the pump, valves and fittings.
- Always monitor the pressure gauge when setting and changing the pressure.

Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the product. Contamination can cause irreparable damage.

Examples of fine contamination include:

- Swarf
- Rubber particles from hoses and seals
- Dirt due to assembly and maintenance
- Mechanical debris
- Chemical ageing of the hydraulic fluid

NOTICE

New hydraulic fluid from the manufacturer may not have the required purity.

Damage to the product is possible.

- ► Filter new hydraulic fluid to a high quality when filling.
- ► Do not mix hydraulic fluids. Always use hydraulic fluid that is from the same manufacturer, of the same type, and with the same viscosity properties.

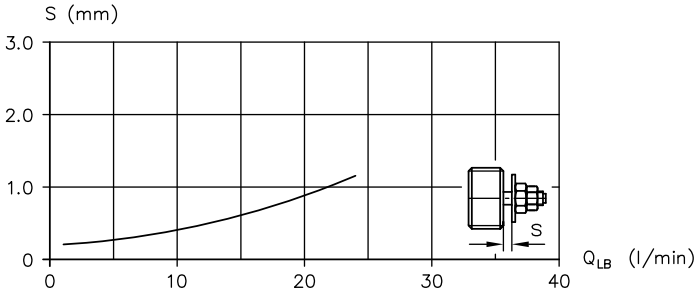
For smooth operation, pay attention to the cleanliness level of the hydraulic fluid (cleanliness level see Chapter 3, "Parameters").

Additionally applicable document: D 5488/1 Oil recommendations

5.3.1 Adjusting the valve

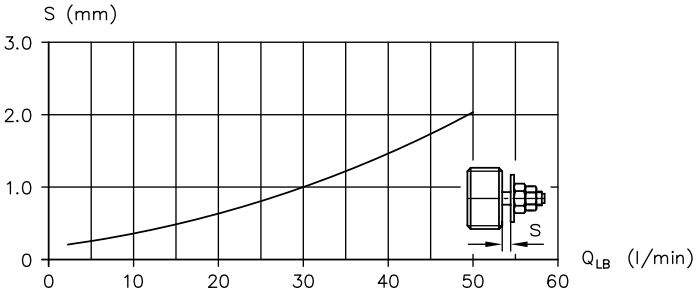
Imperial thread

LB 1 C..



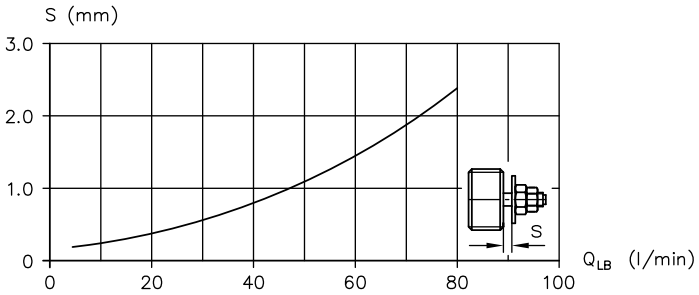
Q_{LB} flow rate (l/min); S gap width (mm)

LB 2 C..



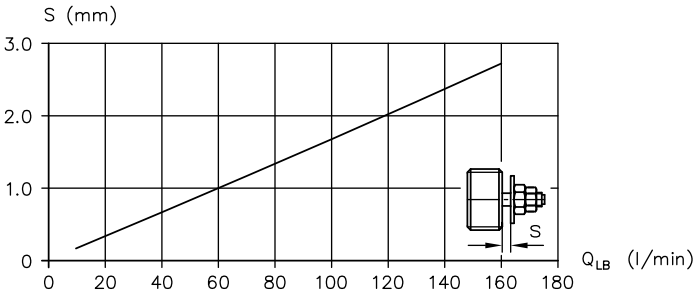
Q_{LB} flow rate (l/min); S gap width (mm)

LB 3 C..



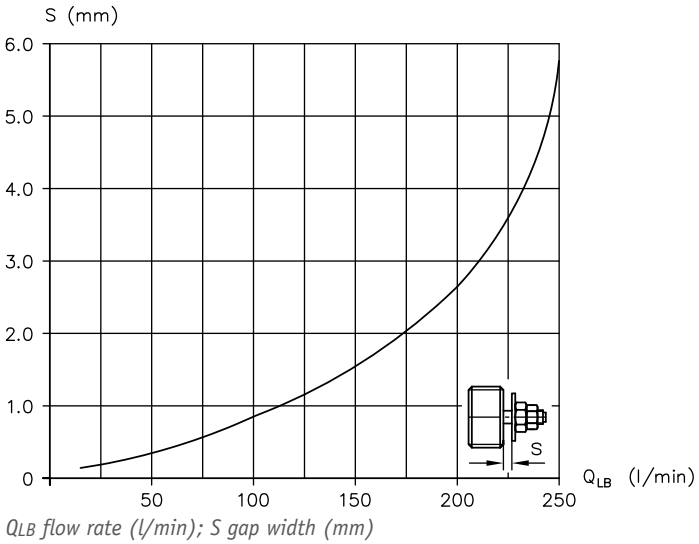
Q_{LB} flow rate (l/min); S gap width (mm)

LB 4 C..



Q_{LB} flow rate (l/min); S gap width (mm)

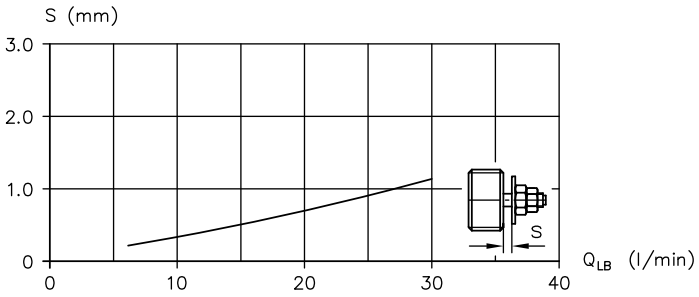
LB 5 C..



Q_{LB} flow rate (l/min); S gap width (mm)

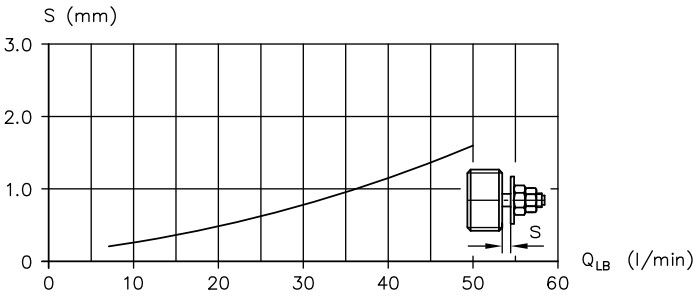
UNF thread

LB 1 UNF C..



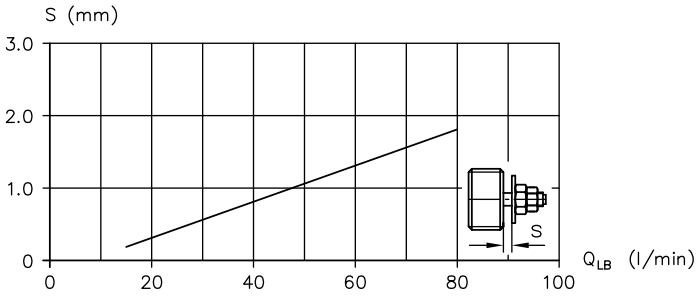
Q_{LB} flow rate (l/min); S gap width (mm)

LB 2 UNF C..



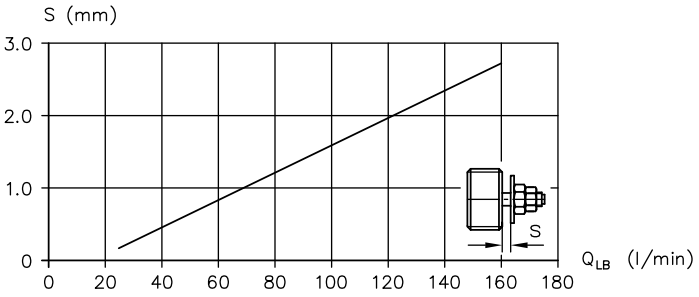
Q_{LB} flow rate (l/min); S gap width (mm)

LB 3 UNF C..



Q_{LB} flow rate (l/min); S gap width (mm)

LB 4 UNF C..

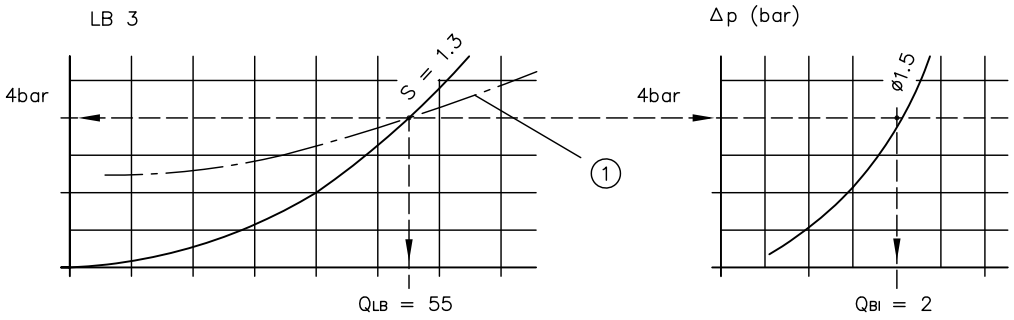


Q_{LB} flow rate (l/min); S gap width (mm)

Determine the gap width for the required response flow

► see Chapter 3.4, "Characteristic lines"

Example: LB 3 C 1.5



1 Limit line for response flow

- Response flow Q_{LB} = 55 l/min → S = 1.3 mm
- Flow rate through orifice Q_{Bl} = 2 l/min
- Actual response flow $Q_A = Q_{LB} + Q_{Bl}$ = 57 l/min

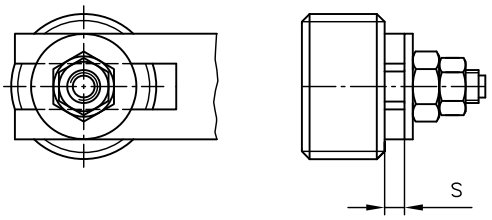
Adjusting the valve

► After loosening the nuts, select gap width S using two identical feeler gauges or calliper gauges.

► Lightly hand-tighten the nuts.

► Remove the gauges and carefully lock the nuts against each other.

✓ Valve adjusted.



5.3.2 Reference values for the response flow

The return flow Q_{return} from the consumer, which occurs in direction B → F in unhindered operation, is important in relation to the adjustment value Q_A of the response flow. In practice, a feasible reference value is approximately ratio Q_A: $Q_{return} \geqq 1.5$ for manually operated directional valves or ≈ 2 for solenoid-actuated or other fast-switching directional valves.

For large-volume hydraulic cylinders and/or high load pressures, despite the response flow set according to these reference values the test run of normal system functions can sometimes generate unwanted shut-off of the LB protection valve, caused by the decompression surge from the consumer when the directional valve is switched. If the directional valve must not be adjusted during its switching time, the decompression surge must be suppressed by an orifice on the outlet side.

The orifice must be selected according to its Δp-Q characteristic line so that, at the largest load pressure to be expected within the system, the flow rate is **less** than the response flow of the LB protection valve, but **equal to** or **greater** (see Chapter 6.1, "Application examples") than the return flow Q_{Return}. Bear in mind that this orifice is not installed within the line section that is to be monitored for a break by the LB protection valve, but in a section no longer at risk (e.g. in the return line).

In the event of extremely great differences in load (e.g. between maximum load and unladen weight), the orifice must accept a potentially reduced lowering speed for low loads in accordance with the Δp-Q characteristics for the orifice.

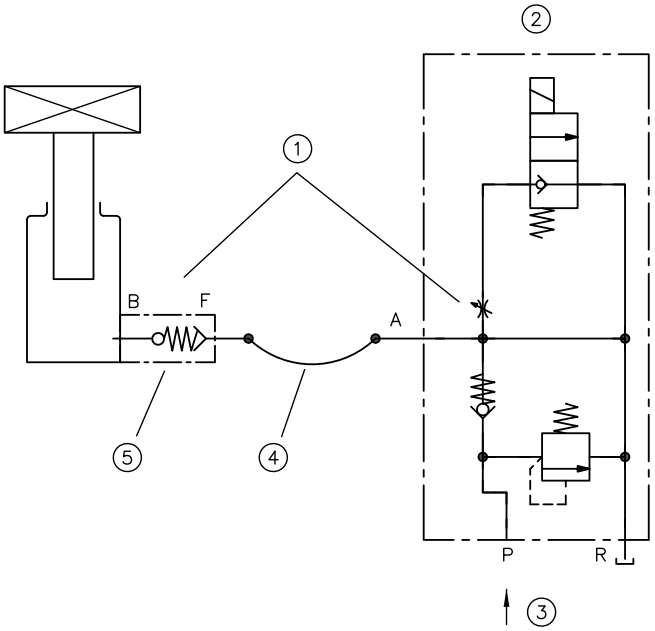
5.4 Maintenance information

This product is largely maintenance-free.

6 Other information

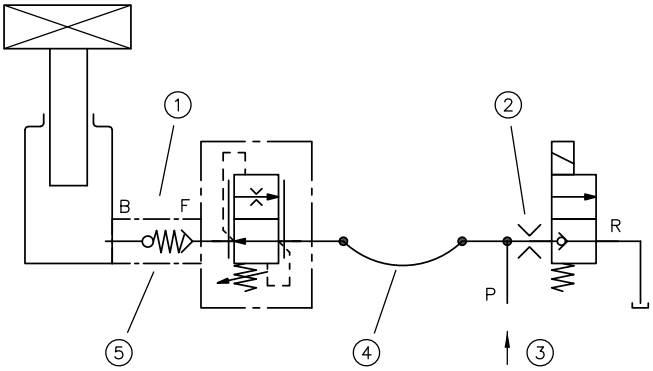
6.1 Application examples

LB protection valve in lifting equipment with type HSV lifting/ lowering valve according to D 7032



1 Throttle valve adjustment produces Q_{return} at maximum load, Q_A then possible to 1.2 x value
2 Lifting/lowering valve type HSV
3 From the pump
4 Line cross section at risk
5 Line rupture protection valve type LB

LB protection valve in lifting equipment with solenoid-actuated directional valve, e.g. type EM according to D 7490/1 for lowering and counterbalance valve according to D 6920. This combination is possible due to the response delay of the flow valve, with the LB protection valve coming into effect within this time period in the event of damage.
The drop-rate brake determines return flow Q_{return} (= Q_{SB}).



1 Line rupture protection valve type LB
2 Orifice type EB according to D 6465 or throttle valve type ED according to D 7540
3 From the pump
4 Line cross section at risk
5 Drop-rate braking valve type SB according to D 6920

6.2 Accessories

Tool	Order number
Assembly tool LB 1 (LB 1 UNF)	3200 2006-00
Assembly tool LB 2 (LB 2 UNF)	3200 2007-00
Assembly tool LB 3 (LB 3 UNF)	3200 2008-00
Assembly tool LB 4 (LB 4 UN)	3200 2009-00
Assembly tool LB 5	3200 3617-00

HAWE Hydraulik SE
Einsteinring 17 | 85609 Aschheim/Munich | P.O. Box 11 55 | 85605 Aschheim | Germany
Phone +49 89 379100-1000 | info@hawe.de | www.hawe.com

hawe.com/contact

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