

Table of Contents

1	Product Description	2
1.1	Application	2
1.2	Mounting location.....	2
2	Function	3
2.1	Characteristics	3
2.2	Adjustment options	3
3	Technical Data	4
3.1	General	4
3.2	Hydraulics	4
4	Ordering Information	5
4.1	Type code	5
4.2	Versions currently available	5
5	Description of Characteristics in Accordance with Type Code	6
5.1	Characteristic 1: Variant.....	6
5.2	Characteristic 2: Connections	6
5.3	Characteristic 3: Spool.....	6
5.4	Characteristic 4: Setting of the pressure limitation.....	6
5.5	Characteristic 5: Actuation.....	6
5.6	Characteristic 6: Setting of the opening start level.....	6
5.7	Characteristic 7: Setting of the compensation	6
5.8	Characteristic 8: Lowering speed adjustable	6
6	Installation	7
6.1	General remarks	7
6.2	Connection recommendations	7
6.3	Installation - space	7
6.4	Setting of the opening start level.....	8
6.5	Setting of the pressure limitation	8
6.6	Setting "maximum lowering speed"	8
6.7	Dimensions	9
6.7.1	Size 1: SAE 3/4", SAE 1"	9
6.7.2	Size 3: SAE 1 1/4".....	10
6.7.3	SAE dimensions.....	10
7	Notes, Standards and Safety Requirements	11
7.1	General remarks	11
7.2	Standards.....	11
7.3	Safety requirements.....	11
8	Accessories	11

1 Product Description

In case of a pipe or tube rupture load control valves avoid uncontrolled movement of the cylinder.

In some countries these valves are required by law when a construction machine is used for load lifting purposes.

They also serve for an exact and stable positioning of the boom and enable sensitive and even movement processes.

Load control valves can compensate for leakages on the main control valves in older construction machines.

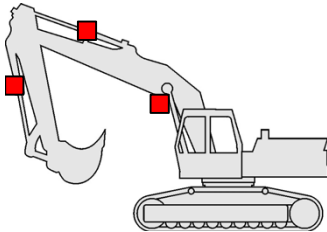
WESSEL load control valves stand for an excellent sensitivity and a very direct response to the handle's stroke. In any case they are leakage free.

The load control valve of variant LHB-3R performs an internal regeneration circuit. The returning volume flow is dammed up by an internal check valve and routed to the rod side of the cylinder when needed (port K). With that the lifting cylinder can be retracted without additional pump volume flow.

1.1 Application

Area of application:	Boom- stick- and bucket cylinders in excavators
Connection size(s):	SAE 3/4", SAE 1", SAE 1 1/4"
Volume flow range:	up to 600 l/min
Maximum pressure:	420 bar

1.2 Mounting location



The load control valve is installed in the line to be protected between the main control valve and the hydraulic cylinder and is flanged directly on the cylinder. Additional pipework and piping between load control valve and cylinder is not permissible.

2 Function

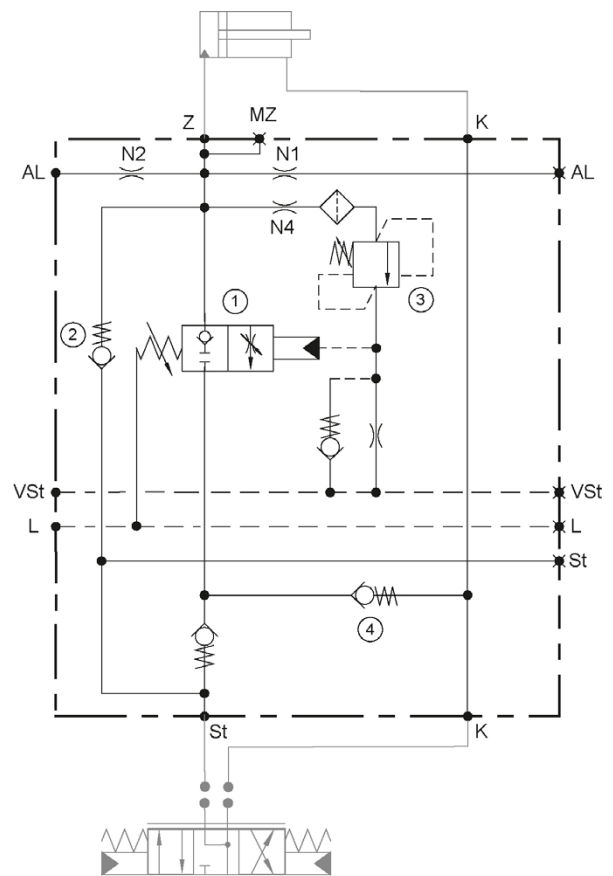
The load control valve is closed and leakage free in the idle position (Z → ST). The cylinder cannot lower.

When deploying the cylinder (ST → Z), the hydraulic fluid is fed to the cylinder via a check valve (2).

Pilot control pressure in the VSt connection uses control surfaces to open the load control valve piston (1) against a pressure spring and introduces a jolt-free lowering movement. As the pilot control pressure continues to increase, the entire control cross-section of the load control valve piston is released and the maximum lowering speed is reached. In the event of a pipe or tube rupture, the load control valve regulates the maximum lowering speed to the setting specified by the control lever. The maximum prescribed lowering speed is thereby not exceeded. By moving the control lever into its neutral position further lowering is stopped. The load control valve piston is load-compensated so that no closing force from the return pressure affects the load control valve piston.

The pressure limiting valve (3) is connected with connection Z and opens up to connection VSt when the permanently defined maximum pressure is achieved, which opens the load control valve piston and allows pressure to be released from Z to St.

The regeneration enables a return (via check valve 4) of a partial oil quantity of the bottom side into the rod side (K) of the cylinder depending on the area ratio of the cylinder, the load and the design of the main control unit during the lowering process. Considerably less volume flow is thereby needed by the pump during the lowering of the boom. Depending on the hydraulic system, the saved volume flow can be used for other functions. In any case, the load control valves must be matched for the initial application on the construction machine.



2.1 Characteristics

- Meets the requirements of standards: DIN24093, ISO 8643, EN 474
- Start opening independent of the load pressure
- Sensitive control with low hysteresis
- Leakage-free
- Load control valve piston pressure-compensated
- Symmetrical connections to/from the control valve on the right and the left side of the load control valve
- Can be flanged directly onto the cylinder connection
- Surge line for parallel operation for the minimization of the cylinder pressure differences
- Pressuring limiting valve with upstream filter for protecting the cylinder

2.2 Adjustment options

- Opening Start of the load control valve
- Opening Start of the Pressure Limiting Valve Adjustable
- Lowering Speed Limiting Adjustable (optional)

3 Technical Data

3.1 General

Criterion	Unit	SAE 3/4"	SAE 1"	SAE 1 1/4"
Z, ST		DIN ISO 6162-2, SAE J518/2 (CODE62)	DIN ISO 6162-2, SAE J518/2 (CODE62)	DIN ISO 6162-2, SAE J518/2 (CODE62)
Max. operating pressure	bar	420	420	420
Pressure setting range	bar	200 – 420	200 – 420	200 – 420
Pressure setting		See type code feature 04: Pressure setting		
Max. volume flow		See type code feature 03: Nominal volume flow		
Weight	kg	10	16	16.5
Connection	Connection sizes		Pmax	Pmax
Vst, MVSt, PVSt	G 1/4 ISO 1179-1	bar	50	50
Al, MZ, MSt	G 1/4 ISO 1179-1	bar	420	420
L	G 1/4 ISO 1179-1	bar	3.0	3.0
Installation orientation			Any	
Setting of opening start	bar		6 - 10	
Full opening	bar		Opening start + leak oil pressure + 17	

3.2 Hydraulics

Criterion	Unit	Value
Hydraulic fluid		Mineral oil (HL, HLP) conforming with DIN 51524, other fluids upon request
Hydraulic fluid temperature range	°C	-20 – +80
Ambient temperature:	°C	< +50
Viscosity range	mm ² /s	2.8 – 500
Contamination grade		Filtering conforming with NAS 1638, class 9, with minimum retention rate $\beta_{10} \geq 75$

4 Ordering Information

4.1 Type code

LHB 00	3R 01				HYP03B 05		00 07		
00	Product group	Load Control Valve Boom							LHB
01	Variant	Regeneration							3R
02	Connections	Cylinder (control valve)	SAE 3/4" – DIN ISO 6162-2,						05C
			SAE 1" – DIN ISO 6162-2,						05E
			SAE 1 1/4" – DIN ISO 6162-2,						05G
03	Spool	Design of the spool optimized for the specified volume flow; [l/min]	Size SAE 3/4"						150
			Size SAE 3/4" and 1"						200
			Size SAE 3/4", 1"						250
			Size SAE 1" and 1 1/4"						300
			Size SAE 1" and 1 1/4"						350
			Size SAE 1" and 1 1/4"						400
Size SAE 1 1/4"						450			
Size SAE 1 1/4"						500			
Size SAE 1 1/4"						550			
Size SAE 1 1/4"						600			
04	Pressure limiting	Pressure limiting valve opens at a volume flow of 10 l/min and a load pressure (Z) as of...	200 bar to 420 bar, Standard 420 bar				XXX		
05	Actuation	Hydraulically proportional (p < 50 bar)						HYP03B	
06	Setting of opening start	Load control valve opens at a pilot control pressure	6 bar to 10 bar,				XXX		
07	Setting of compensation	No compensation						00	
08	Lowering speed adjustable	No						0	
		Yes						1	

XXX – permanently predetermined characteristics XXX – characteristics selectable by customer ■ available ○ not available
Different configurations are unfortunately not implementable for technical reasons. Please let us know if you have questions.

4.2 Versions currently available

The versions listed below are available as standard. Further versions as part of the options given on the type code can be configured upon request. Therefore normally minimum order quantities are required.

type code	designation	part number
LHB -3R -05C -250 -420 -HYP03B -008 -00 -0	LHB-3R SAE3/4 CD62 250LPM 420BAR 8BAR NO SPEED ADJ	426.063.968.9
LHB -3R -05E -300 -370 -HYP03B -008 -00 -0	LHB-3R SAE1 CD62 300LPM 370BAR 8BAR NO SPEED ADJ	427.063.983.9
LHB -3R -05E -300 -420 -HYP03B -008 -00 -0	LHB-3R SAE1 CD62 300LPM 420BAR 8BAR NO SPEED ADJ	427.063.984.9
LHB -3R -05E -250 -420 -HYP03B -008 -00 -0	LHB-3R SAE1 CD62 250LPM 420BAR 8BAR NO SPEED ADJ	427.063.985.9
LHB -3R -05E -300 -420 -HYP03B -006 -00 -0	LHB-3R SAE1 CD62 300LPM 420BAR 6BAR NO SPEED ADJ	427.763.962.9
LHB -3R -05E -400 -420 -HYP03B -008 -00 -0	LHB-3R SAE1 CD62 400LPM 420BAR 8BAR NO SPEED ADJ	427.763.905.9
LHB -3R -05G -500 -370 -HYP03B -008 -00 -0	LHB-3R SAE11/4 CD62 500LPM 370BAR 8BAR NO SPEED ADJ	428.063.909.9
LHB -3R -05G -300 -420 -HYP03B -008 -00 -0	LHB-3R SAE11/4 CD62 300LPM 420BAR 8BAR NO SPEED ADJ	428.063.914.9
LHB -3R -05E -400 -390 -HYP03B -008 -00 -0	LHB-3R SAE1 CD62 400LPM 390BAR 8BAR NO SPEED ADJ	427.763.923.9
LHB -3R -05G -500 -390 -HYP03B -008 -00 -0	LHB-3R SAE11/4 CD62 500LPM 390BAR 8BAR NO SPEED ADJ	428.063.917.9
LHB -3R -05E -250 -420 -HYP03B -008 -00 -0	LHB-3R SAE1 CD62 250LPM 420BAR 8BAR NO SPEED ADJ	427.763.935.9

5 Description of Characteristics in Accordance with Type Code

5.1 Characteristic 1: Variant

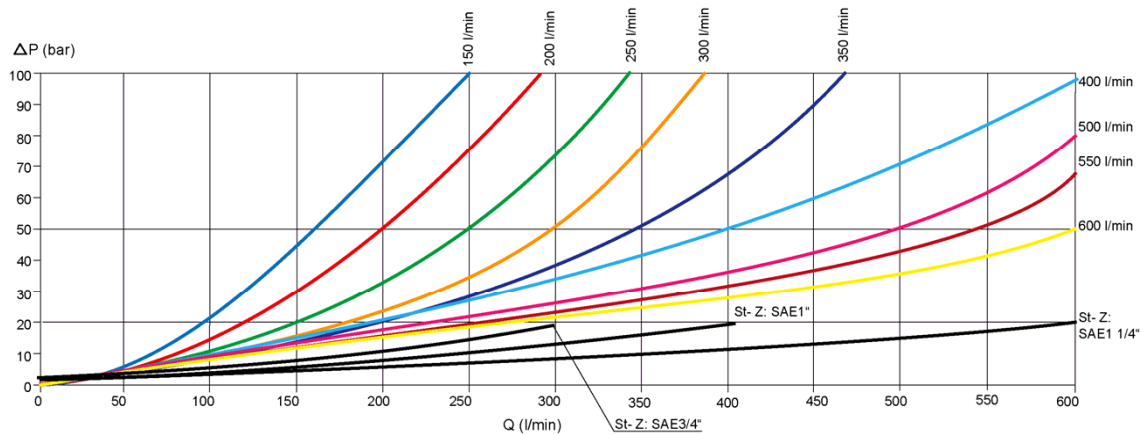
Power saving through regeneration, returning oil is fed to the rod side as needed.

5.2 Characteristic 2: Connections

The valves are flanged directly on the cylinder to be protected (connection Z). The supply line from the control valve takes place via the connection ST. As a rule, both connections are designed the same.

5.3 Characteristic 3: Spool

The control piston is designed to the maximum desired volume flow (Z → ST). Criterion: Nominal volume flow, in which a maximum pressure loss (Δp) of 50 bar is generated (Z → ST)



5.4 Characteristic 4: Setting of the pressure limitation

Setting of the pressure restriction valve for securing the cylinder (connection Z)
The operating pressure of the valve at input ST and output Z must not exceed 420 bar for all versions.

5.5 Characteristic 5: Actuation

Actuation type of the valve and connection size of the pilot control connection.
Hydraulically proportional or electrically proportional.

5.6 Characteristic 6: Setting of the opening start level

Level of the pilot control pressure (connection VST), in which the valve opens and the cylinder begins its lowering movement.

5.7 Characteristic 7: Setting of the compensation

Compensation of the impact of load pressure on the lowering speed. The setting is performed in the factory and cannot be changed.

No compensation

The load pressure has no influence on the opening cross-section of the load control valve.
Higher load pressure – higher lowering speed

5.8 Characteristic 8: Lowering speed adjustable

In addition to the design of the control piston for a maximum volume flow, the lowering speed can be further limited by this setting.

6 Installation

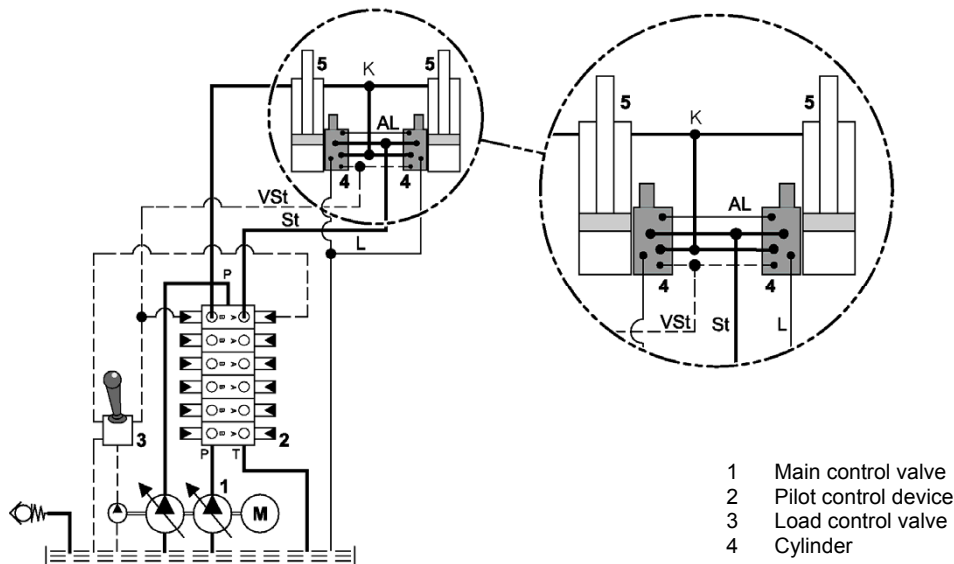
6.1 General remarks

- Observe all installation and safety information of the construction machine manufacturer.
- Only technically permitted changes are to be made on the construction machine.
- The user has to ensure that the device is suitable for the respective application.
- Application exclusively for the range of application specified by the manufacturer.
- Before installation or dismantling, the hydraulic system is to be depressurized.
- Settings are to be made by qualified personnel only.
- May only be opened with the approval of the manufacturer, otherwise the warranty is invalidated.
- The included connection recommendations are not guaranteed. The functionality and the technical specifications of the construction machine must be checked.

6.2 Connection recommendations

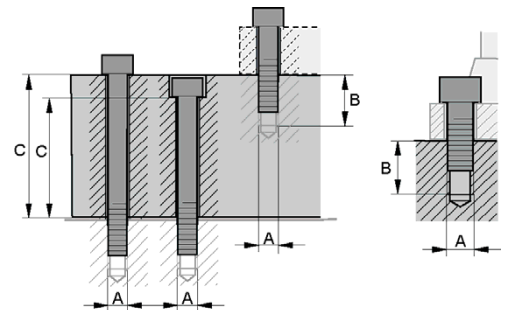


Hydraulic hoses are not to come into contact with the load control valve because otherwise they are subject to thermal damaging. Ensure that standards EN 563 and EN 982 are observed.



6.3 Installation - space

- Observe the connection labels
- Observe the strength category and torque of the clamp bolts
- Do not damage seals and flange surface
- The air must be bled from the hydraulic system
- Only use the recommended bolts

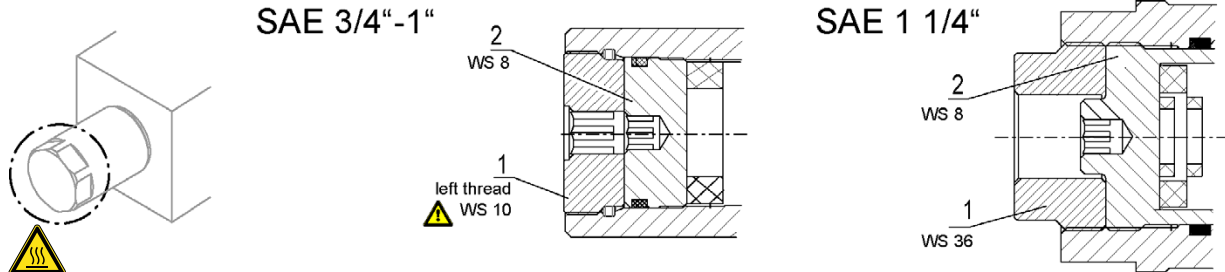


Thread (A)	Strength class	Thread depth (B)	Tightening torque (Nm)	C (mm)
DIN ISO 6162-2, SAE J518/2 (CODE62)				
M10x1.5	10.9	16.5	70	SAE 3/4" = 99.5
M12x1.75	10.9	21.5	130	SAE 1" = 119.5
M14x2	8.8	23.5	130	SAE 1 1/4" = 117.5

6.4 Setting of the opening start level

The opening start of the load control valve is set in the factory according to type code. A setting during startup is not necessary and, for safety purposes, may only be performed by trained technicians using suitable measuring means.

The setting of the opening start, that is the level of the pilot control pressure, from which the load control valve opens to lower the cylinder, is set on the spring cap. Depending on the manufacture date of the load control valve, there are two versions of the setting:



ATTENTION

During operation, the valve can heat up to the oil temperature.

- Remove seal (factory status).
- Loosen the AF10 (1) counter nut, left-hand thread (Locknut completely screw out at 3/4" + 1" version)
- The opening start of the hose rupture valve must be approximately 0.5 bar above the opening start of the main control unit spool.
- Increase: Turn the set-screw AF8 (2) clockwise.
- Decrease: Turn the set-screws AF8 (2) counter-clockwise.
- An adjustment of 1mm thread corresponds a variation of the opening pressure fo 2,9 bar.
- Tighten the counter nut AF10 (1).

6.5 Setting of the pressure limitation

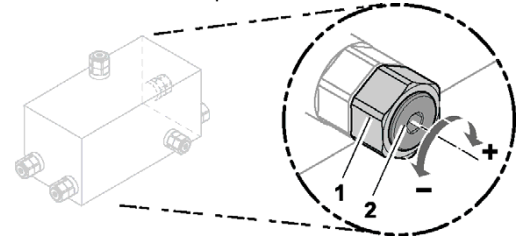
The pressure restriction of the load control valve is set in the factory according to type code. A setting during startup is not necessary and, for safety purposes, may only be performed by trained technicians using suitable measuring means. The maximum operating pressure of the pressure valve depends on the maximum operating pressure of the machine. Observe the technical data. The pressure valve is in one of the indicated positions.



ATTENTION

During operation, the valve can heat up to the oil temperature.

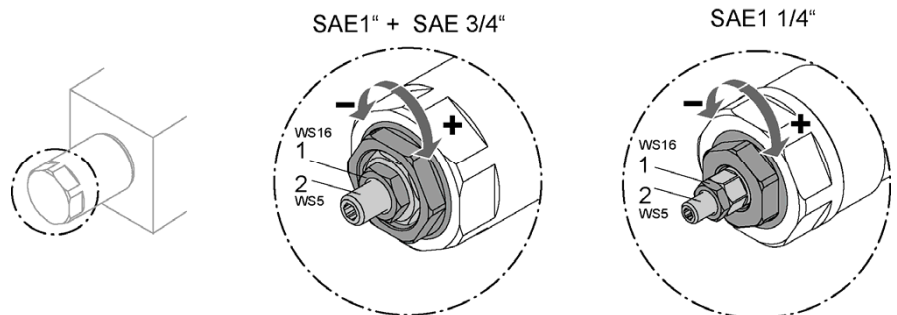
- Undo the lock-nut AF19 (1).
- The operating pressure is set up (see table).
- Increase: Turn the set-screw AF5 (2) clockwise.
- Decrease: Turn the set-screws AF5 (2) counter-clockwise.
- 1 revolution corresponds with 84 bar.
- Settings over 420 bar (DIN ISO 6162-2, SAE J518/2 (CODE62)) or 350 bar (DIN ISO 6162-1, SAE J518/2 (CODE61)) are not permissible.
- Tighten the counter nut AF19 (1).



6.6 Setting "maximum lowering speed"

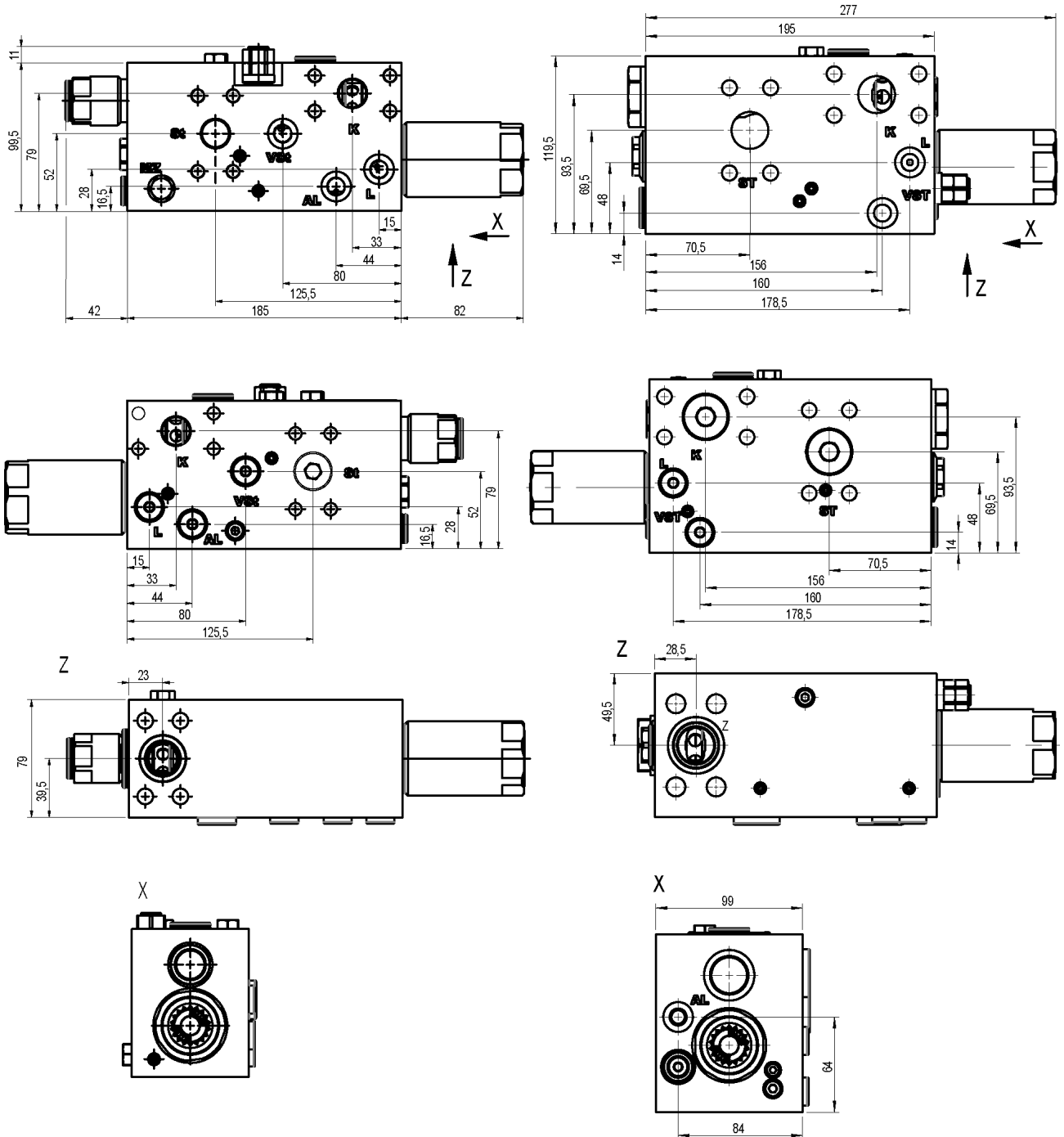
The setting of the lowering speed limit (if present) also takes place on the spring cup unit. This setting can only be made when the opening start has been set correctly.

- Undo the counter-nut (1).
- Screw in the set-screws (4) clockwise until the stop position is detected.
- Turn the set-screw (2) counter-clockwise until the desired maximum lowering speed is reached.
- Setting screw (2) at SAE1" & SAE 3/4" - 6 mm and at SAE 1 1/4" - 7mm unscrewed means maximum lowering speed, one revolution = 1mm. (Please do not unscrew further)
- By screwing the setting screw (2) in, the load control valve is limited in opening travel, which sets the lowering speed.
- Tighten counter nut (1), tightening torque 30 Nm.

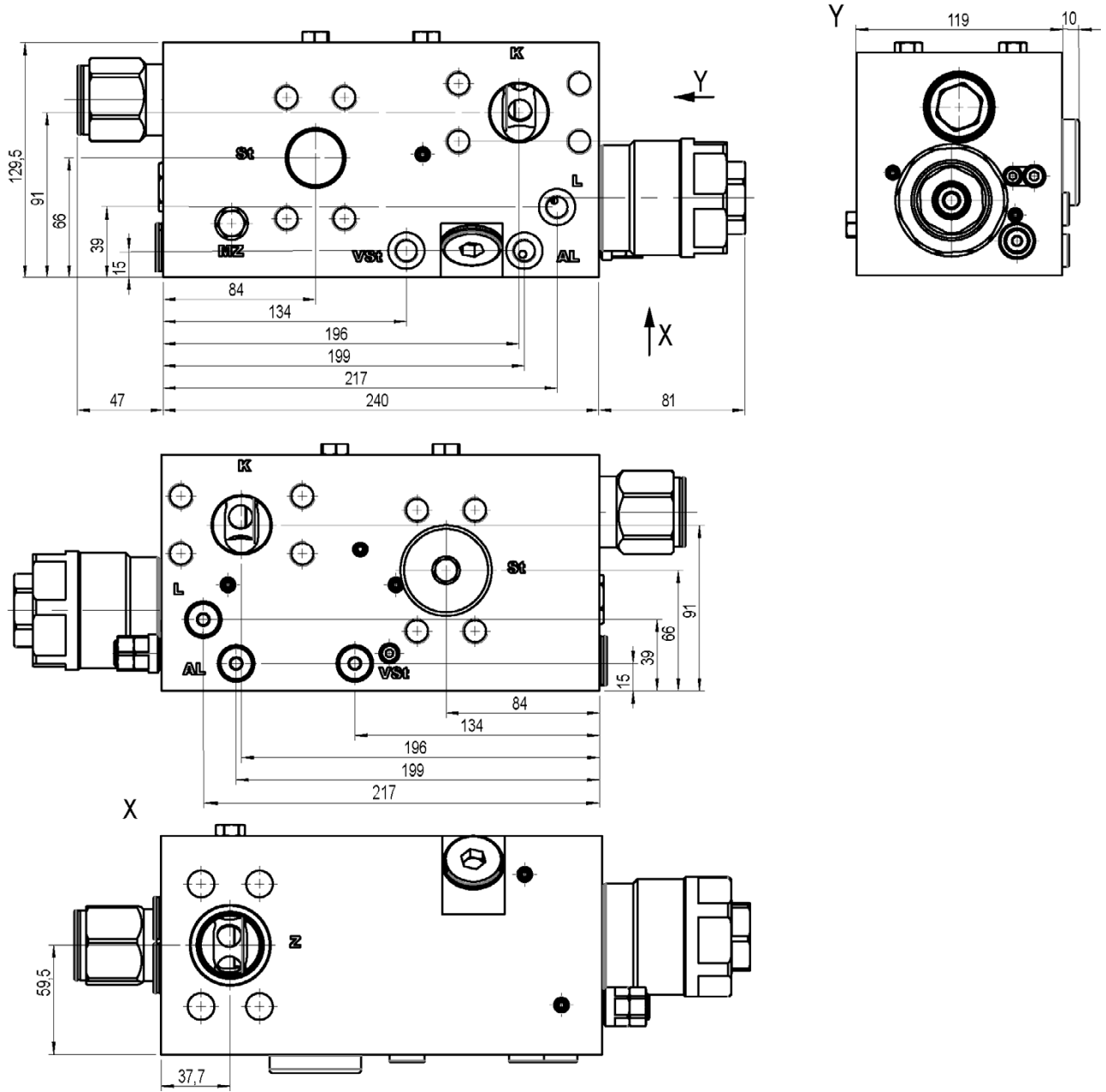


6.7 Dimensions

6.7.1 Size 1: SAE 3/4", SAE 1"



6.7.2 Size 3: SAE 1 1/4"



6.7.3 SAE dimensions

	SAE size	Max. working pressure bar	A	B
	DIN ISO 6162-2, SAE J518/2 (CODE62)			
	3/4"	420	23.8	50.8
	1"	420	27.8	57.2
	1 1/4"	420	31.8	66.6

7 Notes, Standards and Safety Requirements

7.1 General remarks

- The views in drawings are shown in accordance with the European normal projection variant
-
- A comma (,) is used as a decimal point in drawings
- All dimensions are given in mm

7.2 Standards

The load control valve complies with standards:

- DIN 24093
- ISO 8643
- EN 474

The following standards are to be observed because of the surface temperatures on the load control valve:

- EN 563, Temperatures on surfaces that can be touched.
- EN 982, Safety-technical requirements for fluid-technical systems and their components.

7.3 Safety requirements

- WESSEL-HYDRAULIK GmbH guarantees utilization of standard and proven safety principles in accordance with ISO 13849-2: 2003, Tables C.1 and C.2 for the construction of the valve described here.
- WESSEL-HYDRAULIK GmbH has a certified quality management system in accordance with DIN EN ISO 9001.
- The MTTFd value can be adopted from machine manufacturers with 150 years of experience for the described valve!
- Note: The user is therefore responsible for complying with the fundamental and proven safety principles according to ISO 13849-2: 2003, Tables C.1 and C.2 for the implementation and operation of the hydraulic component!

8 Accessories