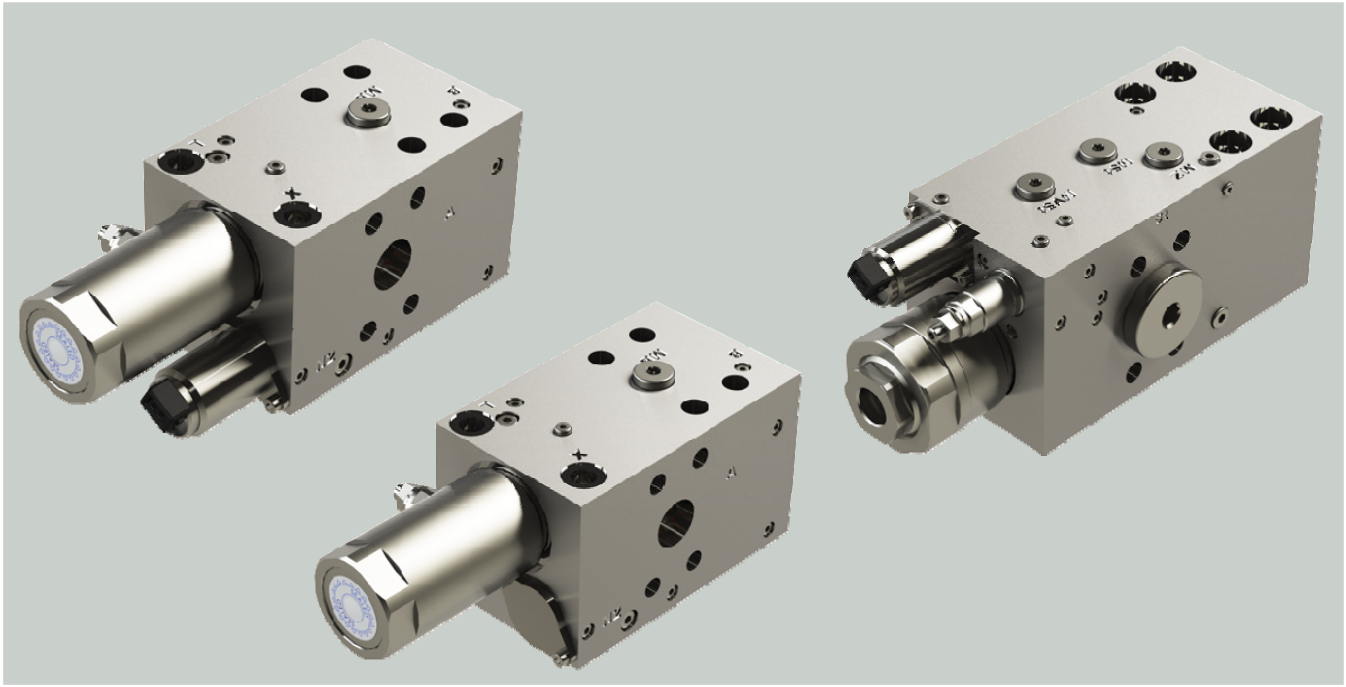

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1 Product Description

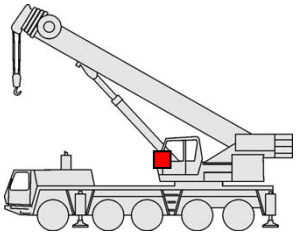
The load control valve prevents uncontrolled cylinder movement in the event of a burst pipe or tube.
WESSEL load control valves stand out because of their sensitivity and the direct joystick action transfer.
This load control valve can be controlled in a hydraulically proportional or electrical-proportional manner and automatically limits the descending speeds for high loads.

Area of application:	Boom cylinder / rocker cylinder of a crane
Connection size(s):	SAE 1", SAE 1 ¼" CODE62
Volume flow range:	up to 600 l/min
Maximum pressure:	420 bar

1.1 Application

The load control valve is specially designed for the boom cylinder/rocker cylinder of a crane. Through the kinematics of the machine, the cylinder pressure can increase in the downward movement. In standard variants, the volume flow also increases with the increasing pressure. This effect is compensated or even overcompensated for this hose rupture valve through additional valve technology. Proportional control of this variant is possible through hydraulics or electronically.

1.2 Mounting location

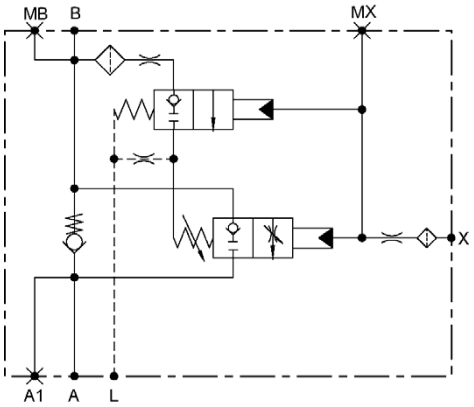


The load control is installed in the line to be secured between the main control valve and the hydraulic cylinder and flanged directly on the cylinder. Additional pipework or piping between load control valve and cylinder is not permissible.

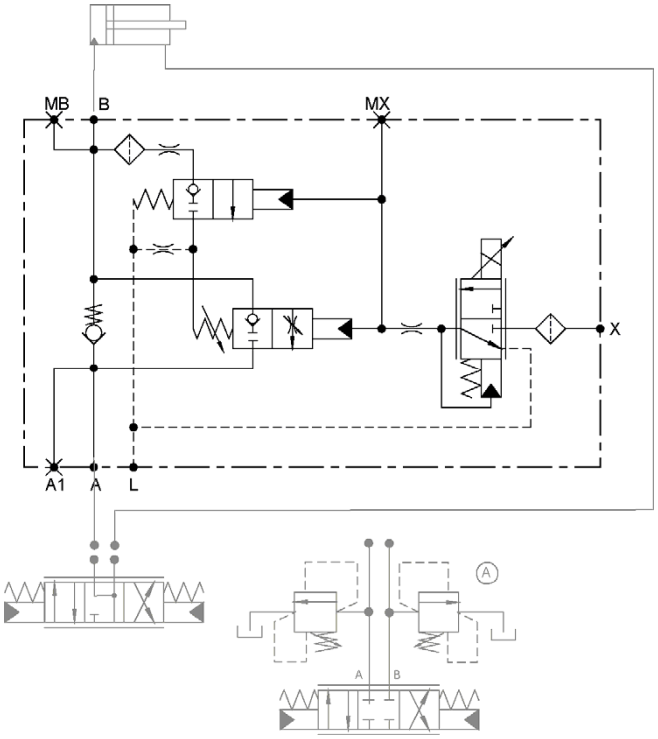
2 Function

The load control valve is flanged on the bottom side of the cylinder and is closed in the idle position leakage-free.
When the cylinder is extended, the hydraulic fluid from connection A is conveyed freely to the cylinder connection B via a check valve.
For retraction, the pilot control pressure in connection X is given directly to the actuator face of the load control valve either via a proportional signal (hydraulically proportional actuation) or via an electrically controlled proportional valve. The lowering movement is thus initiated. By increasing the pilot control pressure or respectively the flow at the proportional valve, the released opening cross-section increases. During lowering, the return pressure at connection A should be as small as possible so that a speed increase does not take place during a hose or pipe break.
The internal compensation valve reduces the opening cross-section with increasing load pressure so that a speed increase does not occur with the lowing of a boom and the pressure increase caused by the kinematics.
A downstream pressure restriction valve is required when the main directional control valve has a closed middle position (A).
The load control valve itself is pressure-compensated so that from the return pressure no closing force acts on the load control valve.

Circuit diagram hydraulic



Circuit diagram electric



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
- Rupture valve piston pressure-compensated
- Feed connection A on 2 sides, thus suitable for connection right or left
- Can be flanged directly onto the cylinder connection
- Electrically proportional or hydraulic actuation
- Proportional valve and compensation valve protected by a filter
- Setting options for the opening start and the height of the compensation

3 Technical Data

3.1 General

Criterion	Units	Value
Max. operating pressure	bar	420
Max. volume flow	l/min	600
Weight	kg	SAE 1": 8,5; SAE 1 ¼ ": 13,0
Opening point set value	bar / mA	10 / 400
Full opening	bar	Opening pressure + leak oil pressure + 20
Connection		
Z, ST		SAE 1", SAE 1 ¼", DIN ISO 6162-2, SAE J518/2 (CODE62)
M, X		G ¼;ISO 1179-1, pmax <50 bar
L		SAE1" : G ¼ ISO 1179-1, pmax < 1 bar
		SAE 1 ¼": M14x1,5 ISO 9974-1, pmax <1 bar
Installation position		Any

3.2 Hydraulics

Criterion	Units	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	3E	05E		000		010/400		0
00	01	02	03	04	05	06	07	08

00	Product group	Load Control Valve Boom		LHB
01	Variant	Load compensated		3E
02	Connections	Cylinder ,main control valve	SAE 1“ - DIN ISO 6162-2,SAE J518/2 (CODE62)	05E
			SAE 1 1/4“ - DIN ISO 6162-2,SAE J518/2 (CODE62)	05G
03	Spool	Design of the spool optimized for the specified volume flow; version SAE 1“	from 250 l/min to 400 l/min	250
				300
				350
				400
		Design of the spool optimized for the specified volume flow; version SAE 1 ¼ “	from 400 l/min to 550 l/min	400
				450
				500
				550
04	Pressure setting	No internal pressure control, intermediate plate necessary!		000
05	Actuation	Hydraulically proportional, connection G1/4		HYP03B
		Electrically proportional, 24 Volt, AMP Junior Timer		24P002
06	Opening point set value	Valve opens when pilot control pressure is approx. 10 bar		010
		Valve opens when electrical pilot signal is approx. 400 mA		400
07	Setting compensation	No compensation		00
		Low compensation: Load pressure acts slightly volume-flow-increasing		01
		Standard compensation, at load pressures > 120 bar volume flow constant		02
		Strong compensated, at load pressures > 120 bar volume flow reduced		03
08	Maximum lowering speed adjustable		Not available	0

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.

00	01	02	03	04	05	06	07	08	Name	Part No.
LHB	3E	05E	300	000	24P002	010	02	0	LHB-3E SAE1 CD62 300LPM, electr.prop, compensated	537.364.003.9
LHB	3E	05E	400	000	24P002	010	02	0	LHB-3E SAE1 CD62 400LPM, electr.prop, compensated	537.364.006.9
LHB	3E	05E	250	000	HYP03B	010	02	0	LHB-3E SAE1 CD62 400LPM, hydraul.prop, compensated	537.364.005.9
LHB	3E	05G	450	000	24P002	010	02	0	LHB-3E, SAE1 ¼ CD62 450LPM, hydraul.prop, compensated	538.364.004.9

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5 Description of Characteristics in Accordance with Type Code

5.1 Characteristic 1: Variant

Load compensated

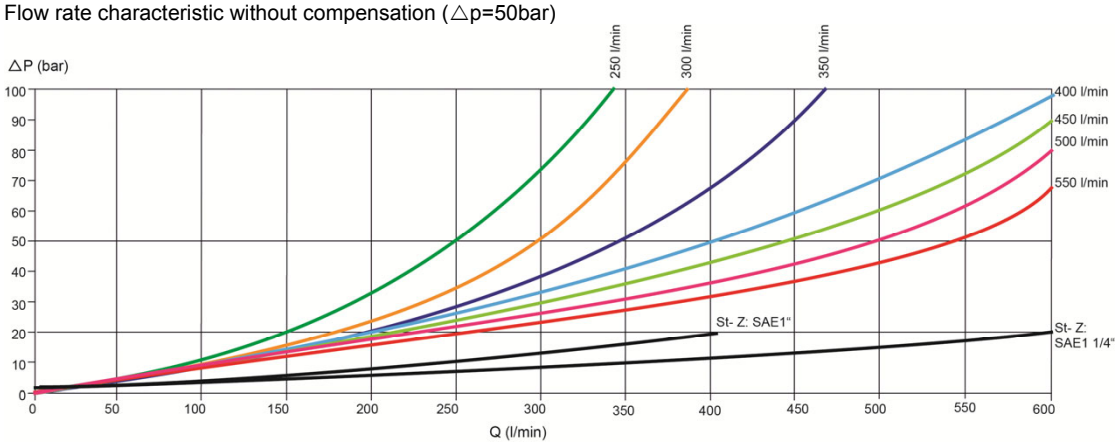
5.2 Characteristic 2: Connections

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. Both connections are designed the same size.

5.3 Characteristic 3: Spool

The control slider is calculated 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).

Flow rate characteristic without compensation (△p=50bar)



Through the compensation (see characteristic 7), the load results in smaller opening cross-sections than expected due to the pilot control pressure / current!

5.4 Characteristic 4: Pressure setting

This hose rupture valve is designed without a pressure restriction valve for safety reasons:
If a pressure restriction valve opens, this could lead to the uncontrolled lowering of the boom. The maximum load pressure should thus be designed so that there is also sufficient safety against the bursting of the cylinder during dynamic processes and the maximum pressure of the hose rupture valve is not exceeded.
Through solar irradiation, a pressure increase can occur through the heating of the cylinder. If the cylinder is not protected by a thermal pressure restriction valve, this effect can be avoided through a pressure restriction valve intermediate plate ("sunshine valve").

5.5 Characteristic 5: Actuation

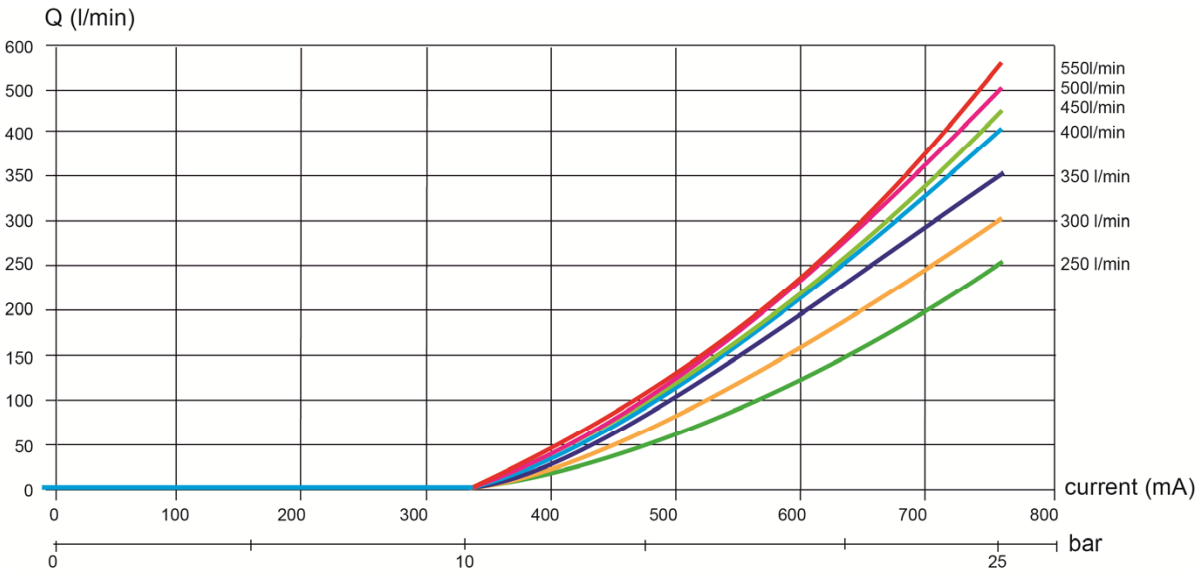
The valve can be proportionally controlled through hydraulics or electronically.

For safety reasons, we recommend only making the pilot control pressure available via a further external directional valve when an activation of the consumer is to follow.

Hydraulically proportional:
The actuation takes place at connection X. The pilot control signal leads between 10 bar and 30 bar to the valve opening and may not exceed 50 bar.
Electrically proportional:
The valve must be supplied at connection X with a pilot control pressure of at least 30 max. 50 bar.
For the electrical actuation of the valve, using a current-regulated, pulse-width modulated amplifier card, restricting current to I2 is recommended. The hydraulic hysteresis achieves minimum values at a modulation frequency of 100 Hz. A modification may be necessary depending on the hydraulic natural frequency.

Criterion	Units	Value
Limit current I_a:	A	0.75 ; PWM frequency 100 Hz
Voltage tolerances:	%	±10
Power-on time:	%	100
Protection class according to DIN 40050:		IP 65
Connector:		AMP Junior Timer
Insulation material class:		H
Power-on time:	%	100
R20:	ς	21.2 +/- 5%
I_1:	mA	300 +/- 10%
I_2:	mA	750 +/- 10%

Flow rate characteristic without compensation (△p=50bar)



Through the compensation (see characteristic 7), the load results in smaller opening cross-sections than expected due to the pilot control pressure / current!

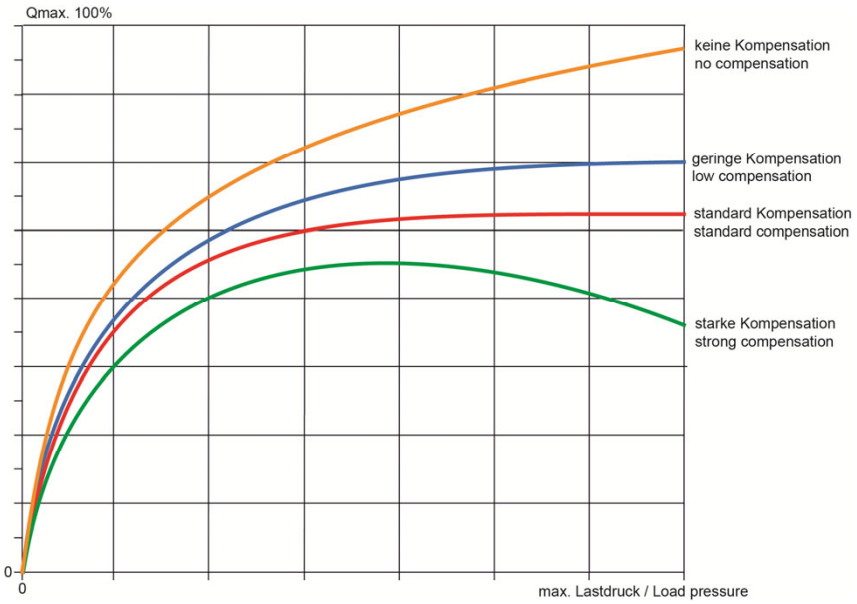
5.6 Characteristic 6: Opening point pusher

The movement start is set to a pilot control pressure of 10 bar or for electrical prop. pilot control 400 mA. The pusher is completely open at 30 bar pilot control pressure.
The opening point cannot be set since it is adjusted for the load compensation. Changes to the opening point are no permitted.

5.7 Characteristic 7: Setting compensation

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

Flow rate characteristic for maximum pilot control signal



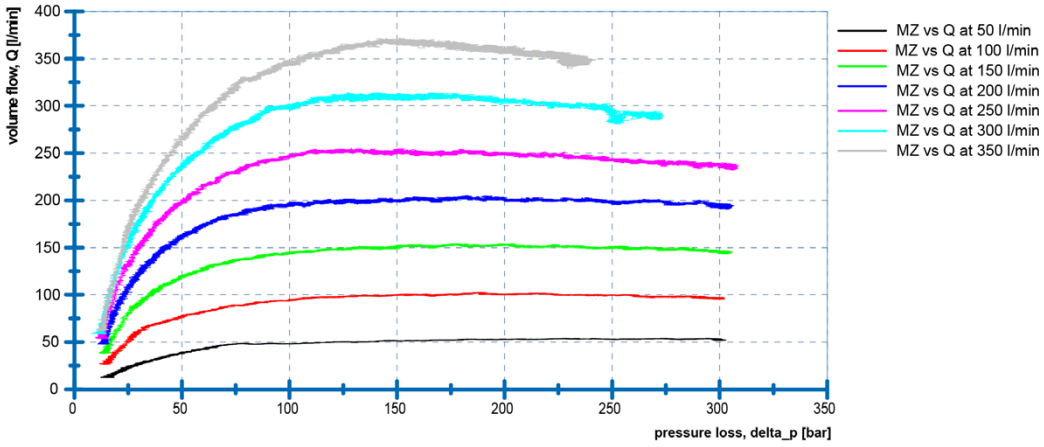
No compensation
The load pressure had no impact on the opening cross-section of the load control valve.
Higher load pressure leads to higher lowering speed.

Low compensation
The load pressure only has a slight impact on the opening cross-section of the load control valve.
Higher load pressure – slightly higher lowering speed.

Standard compensation
The load pressure impacts the opening cross-section of the load control valve so that as of approx. 120 bar the lowering speed remains constant at the same pilot control pressure.

Strong compensation
The load pressure closes the opening cross-section of the load control valve so far that as of approx. 120 bar the further increase in the load pressure leads to a reduction in the lowering speed.

LHB-3E SAE 1 ¼“ CD62



5.8 Characteristic 8: Lowering speed adjustable

Not available for this variant.

6 Installation

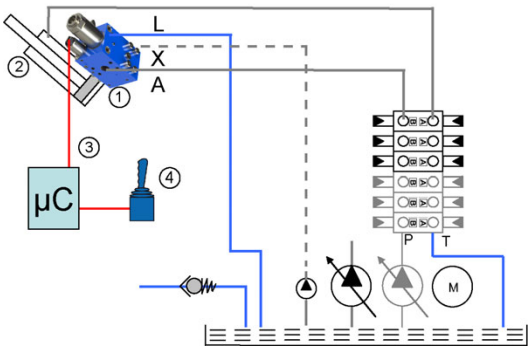
6.1 General remarks

- 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.

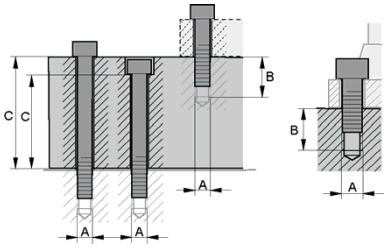
1 LHB-3E
2 Cylinder
3 Microcontroller
4 Joystick/Transmitter



It is recommended to depressurize the X connection with an additional valve to be integrated into the pilot control circuit when the load control valve is not actuated.

6.3 Installation

- Observe the connection labels.
- Observe the strength category and torsional moment (see appendix) of the fastening bolts.
- Do not damage seals and flange surface.
- The air must be exhausted from the hydraulic system.



read (A)	Strength class	Thread depth (B)	Tightening torque (Nm)	C (mm)
DIN ISO 6162-2, SAE J518/2 (CODE62)				
M12	10,9	21,5	130	SAE 1“ = 89,5
M14	10,9	23,5	150	SAE 1 ¼“ = 97,5

6.4 Settings

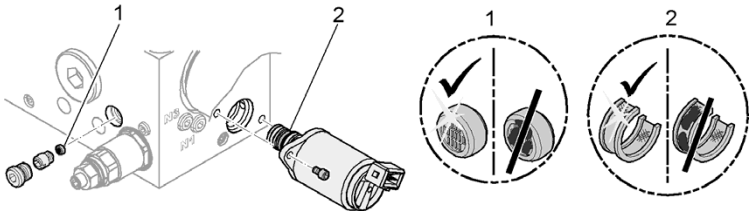
The proportional hose rupture valve is preset to 10 bar opening start. The compensation valve is matched with the opening start.

ATTENTION
Do not change either of the set values. A complete evaluation is required for the use of this valve in a new application..

6.5 Maintenance – filter cleaning

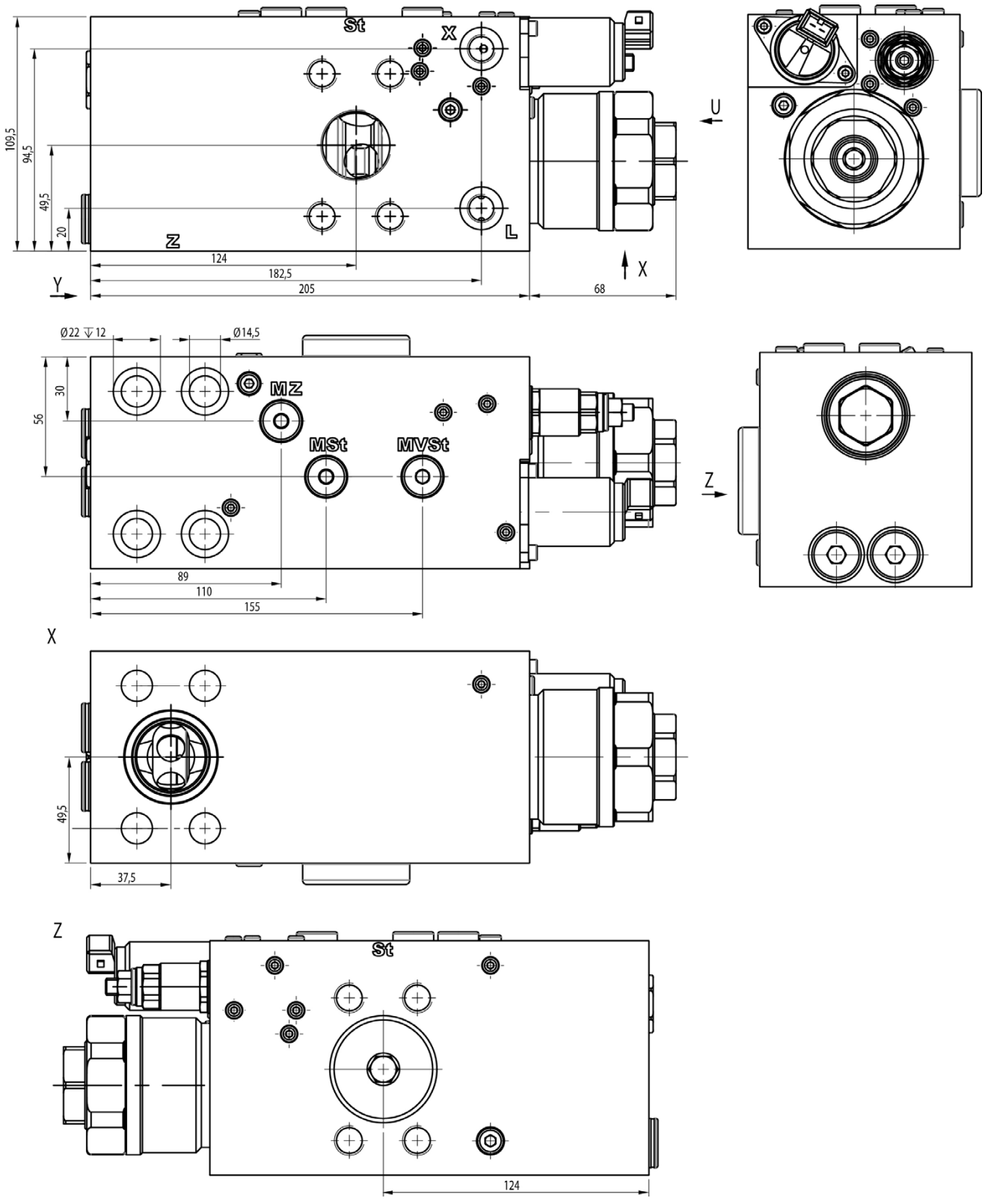
NOTE
If the hydraulic medium becomes contaminated, the filter insert (1/2) must be checked and cleaned if necessary.

- Remove the proportional valve
- Clean the filter elements in the holes

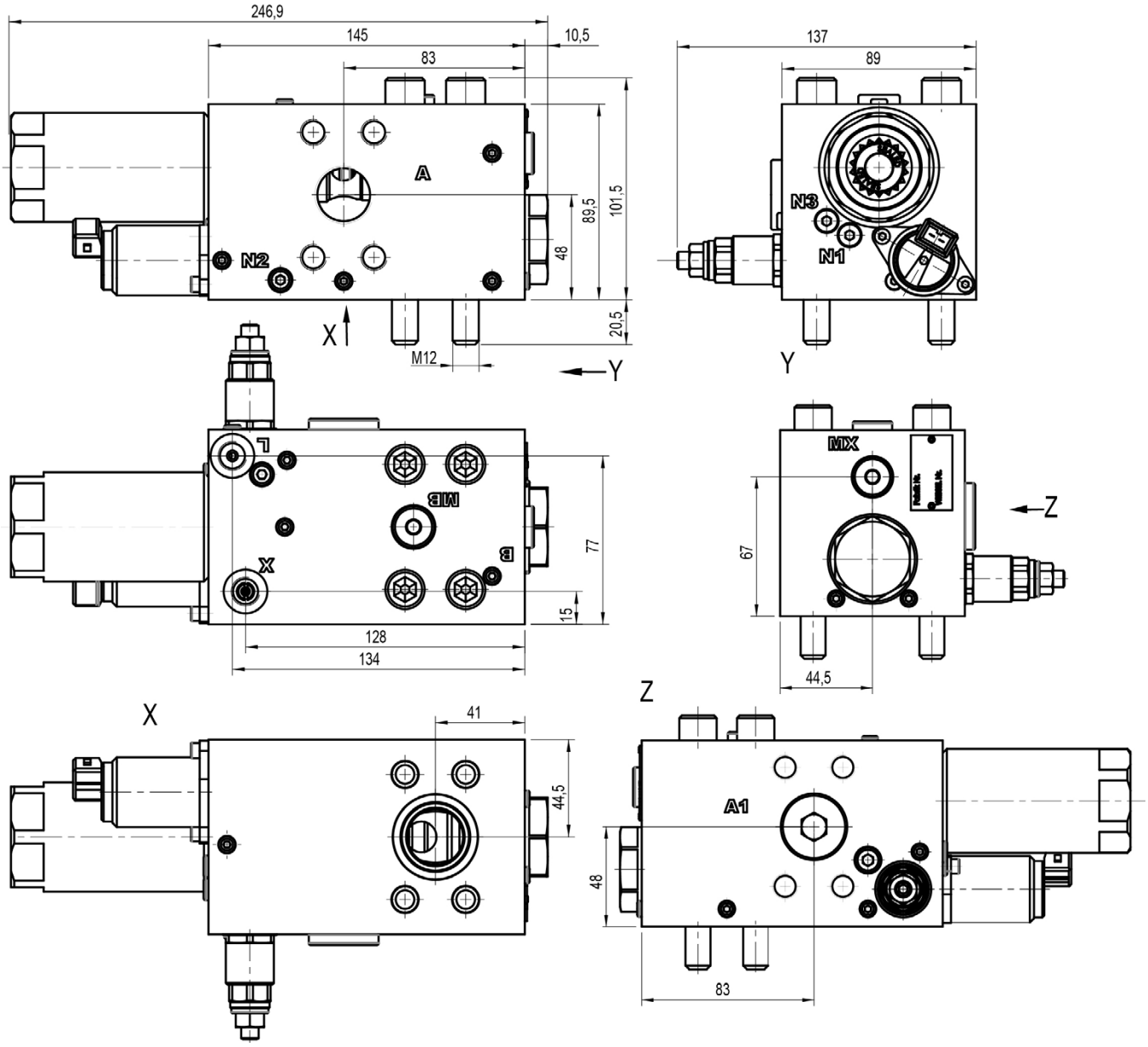


6.6 Dimensions

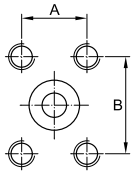
6.6.1 Dimensions Valve SAE 1 ¼ “



6.6.2 Dimensions Valve SAE 1 “



6.6.3 SAE connections

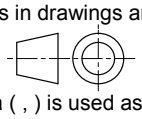


SAE size	Max. working pressure (bar)	A (mm)	B (mm)
SAE CODE 62			
1"	420	27,8	57,2
1 ¼”	420	31,8	66,6

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