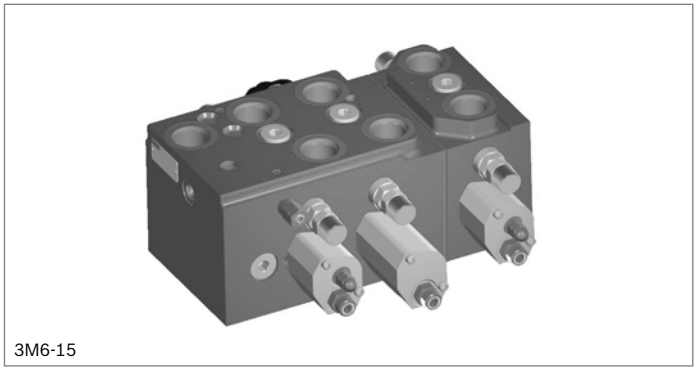
Flow sharing control block in mono block / sandwich plate design
M6-15

RE 64321
Edition: 01.2015
Replaces: 05.2012



3M6-15

- Size 15
- Series 3X
- Maximum operating pressure
  - on pump side 350 bar
  - on consumer side 420 bar
- Maximum flow
  - on pump side 200 l/min
  - on consumer side 160 l/min

Features

- Load pressure independent flow sharing (LUDV)
- Closed center for variable displacement pump
- Regeneration function in mono block
- Check valves can be released by pilot pressure (low leak)
- Floating position function
- Integrated pilot oil generation
- Integrated priority valve (e.g. for steering)
- Secondary pressure limitation
- LS pressure limitation for the entire control block

Design

- Mono block with two consumer axes
- Expandable with directional valves (max. 5)
- End plate
- Type of actuation
  - Hydraulic
  - Electrohydraulic

Fields of application

- Wheeled loaders
- Bulldozers
- Crawler-mounted loaders

Contents

Functional description

Control block M6-15
Proportional directional valve based on the LUDV principle (load pressure independent flow distribution).

Load pressure compensation, LUDV
The control block M6-15 operates on the LUDV principle. On this load sensing version, the pressure compensator (**3**) is mounted between the main spool (**2**) and the consumer ports (**A, B**).
The maximum load pressure of all consumers involved is reported to all pressure compensators and simultaneously to the pump.
In contrast to standard LS designs, with LUDV individual consumers do not come to an unwanted standstill if the pump flow is not sufficient to supply all functions with the required nominal volume. In this case, the speed of all working movements is reduced in the same ratio.

Consumer control
The main spool (**2**) is used to determine the flow direction and the flow level that reaches the consumer ports (**A** or **B**). The spring chambers (**5**) are supplied with pilot pressure either via the pilot ports **a** and **b** (hydraulic control) or internally using integral pressure reducing valves (electrohydraulic control). The level of the pilot pressure in the spring chamber (**5**) determines the stroke of the main spool (**2**). The pressure compensator (**3**) controls the pressure differential at the main spool (**2**).

Load holding
A load holding valve is mounted in each functional axis between the pressure compensator (**3**) and the line connections.

Leakage oil free blocking
Releasable check valves can be integrated in the ports **B1** and **B2**. This blocking operates with no leakage oil and prevents the load from being lowered, even over a long period of time. The check valves are controlled by pilot pressure from a.

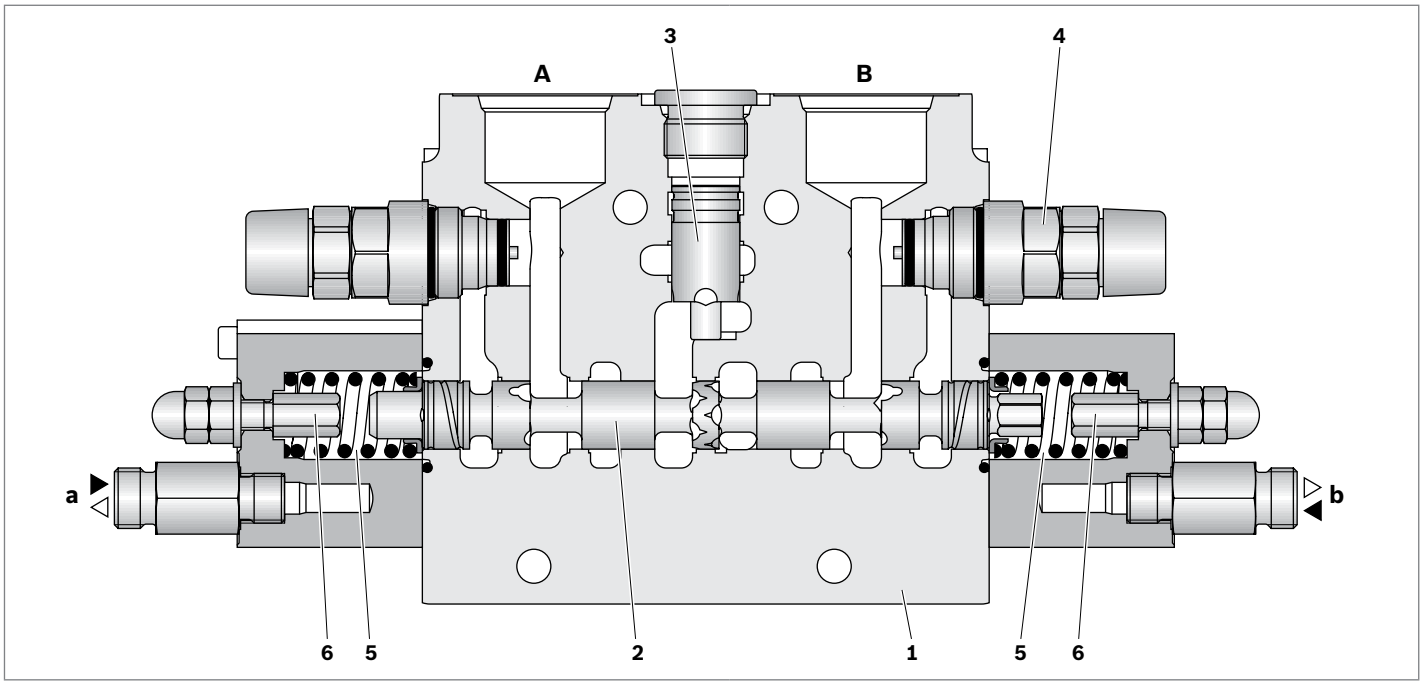
Flow limitation
The maximum flow can be individually set using the stroke limiter (**6**).

Pressure limitation, consumer ports
Pressure relief valves with large nominal widths with combined feed function (**4**) protect the consumers against overloads and cavitation.

Floating position
The floating position is achieved either in axis 1 or 2 using a 4-position spool.

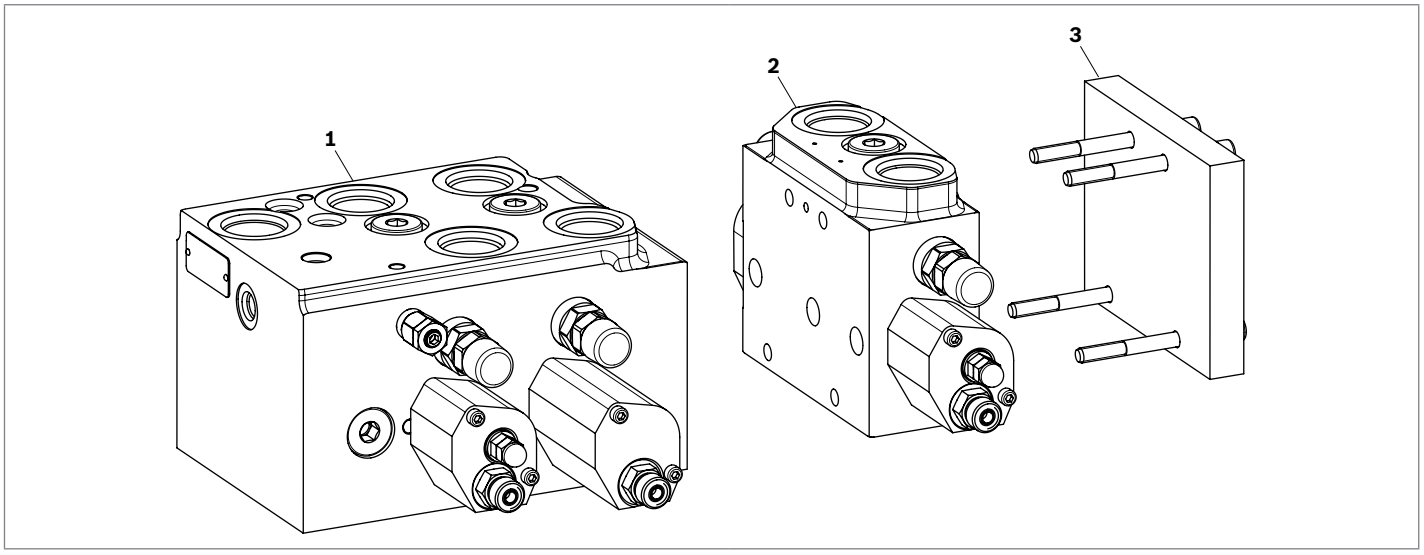
Regeneration
To prevent cavitation caused by negative loads in axis 1 or 2 (e.g. tipping forward or lowering), the oil in the tank duct is preloaded by a valve and fed into the consumer **A** using a feed valve after the pressure compensator.

▼ **Section M6-15**



1 Housing
2 Main spool
3 Pressure compensator
4 Pressure relief / feed valve
5 Spring chamber
6 Stroke limiter

▼ **Design**



1 Two-way mono block with inlet function
2 Flange-mountable directional valve
3 End plate

Technical data

General				
Weight	Two-way mono block		kg	32.9
	Directional valve		kg	8.5
	End plate		kg	3.0
Installation position	Hydraulically operated			Any
	Electrohydraulically operated			Horizontal, consumer ports upwards
Consumer connection type				ISO 11926
Ambient temperature range		θ	°C	–20 to +80
Priming				One-coat paint RAL 5010

Hydraulic				
Maximum working pressure at port	P	p	bar	350
	A, B, LS	p	bar	420
	T	p	bar	30
	Y (L)	p	bar	Must be routed to tank without pressure
Maximum pilot pressure at port	X (Pst)	p	bar	40
	a, b	p	bar	40
Pilot pressure range	Hydraulic	p	bar	0 to 35
	Electrohydraulic	p	bar	0 to 35
Maximum flow at port	P	q_{Vmax}	l/min	200
	A, B	q_{Vmax}	l/min	160 (load compensated at Δp = 16 bar)
Hydraulic fluid				Mineral oil (HL, HLP) according to DIN 51524, other hydraulic fluids, e.g. HEES (Synthetic ester) according to VDMA 24568 and hydraulic fluids as specified in data sheet 90221, on request
Hydraulic fluid temperature range		θ	°C	–20 to +80
Viscosity range		v	mm²/s	10 to 380
Maximum admissible degree of contamination of the hydraulic fluid, Cleanliness level according to ISO 4406 (c)				Class 20/18/15, we recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$
Recommended hydraulic pilot controls			Type	4 THF6, 4 TH6, 2 TH6 Control curve 14, see page 5

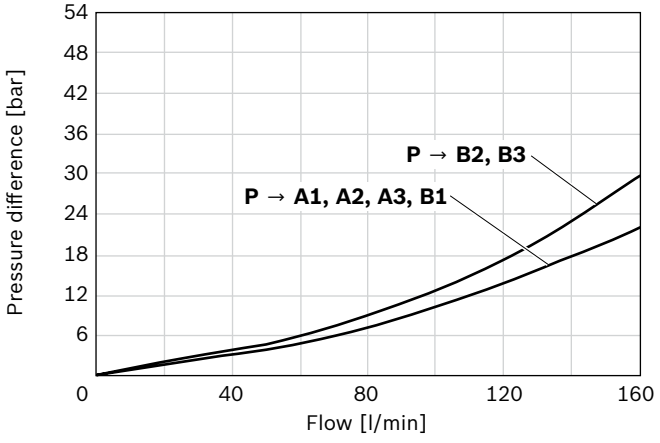
Electric					
Voltage type		DC voltage			
On/off valves FTWE 4 K (see data sheet 58008)					
Available voltages	V	**12**		**24**	
Solenoid coil resistance at 20 °C	Ω	10		40	
Power consumption at 20 °C	W	14.4		14.4	
Duty cycle	%	100		100	
Proportional valves MHDRE 02 K (see data sheet 64658) and MHDRE 04 (see data sheet 64666)		**MHDRE 02**		**MHDRE 04**	
Available voltages	V	**12**	**24**	**12**	**24**
Solenoid coil resistance at 20 °C	Ω	3.5	11.1	3.5	11.1
Duty cycle	%	100	100	100	100
Max. control current	A	1.7	0.95	1.7	0.98
Recommended chopper frequency	Hz	150	150	200	200
Type of protection according to VDE 0470-1 (DIN EN 60529), DIN 40050-9		IP 69K (with installed and locked plug-in connector)[1)]			
Connector type		K DT04-2P (Deutsch)			
Control electronics, e.g. BODAS		Control unit RA, see data sheet 95230 Control unit RC, see data sheet 95200			

Note

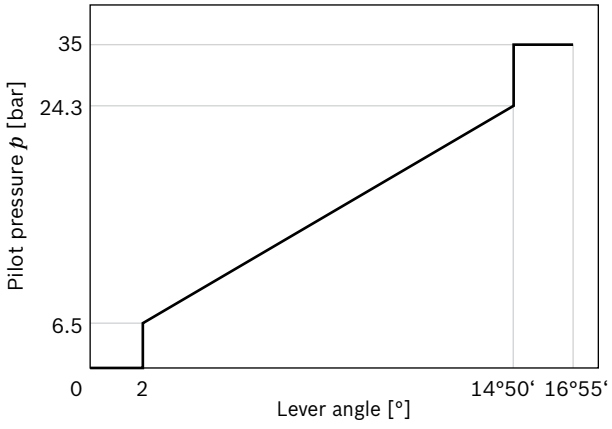
- Please contact us it the unit is to be used outside the specified range of values.
- The technical data were determined at a viscosity of ν = 32 mm²/s (HLP46: 50 °C).

Characteristic curves

▼ **Flow resistance Pump → Consumer**



▼ **TH control curve 14**



1) Plug-in connectors are not included and must be ordered separately, see data sheet 08006.

Ordering code

Specifications on the name plate

The ordering code is used to record the technical features and requirements. The Rexroth distribution organization uses the ordering code to derive a short type and a material number.

Notes

- Customer-specific name plate on request.
- All functions can only be combined to a limited extent. Every inquiry requires an individual verification.

01	02		03		04		05	06
M6	**–**	**....**	**–**	**3X**	**/**		**M6-15**		*****

Short types

01	Flow sharing control block (LUDV) M6 series	**M6**
02	4-digit control block number	**....**
03	Series 30 to 39 (unchanged installation and connection dimensions)	**3X**

Spool axes

04	Number of spool axes	**2 to 7**

Type of actuation

05	Hydraulic	**H**
	Electrohydraulic	**W**

06	Customer-specific specifications	*****

Overall control block features

01			02	03	04	05		06	07	08
	M6-15	**/**		**S...**			**/**	**V**	**35**	*****

Spool axes

01	Number of spool axes	**2 to 7**

Inlet

02	Closed center	**J000**
	Closed center with internal priority valve	**P...**

LS pressure limitation

03	With LS pressure relief valve, specified pressure in bar, 3-digit	**S...**

Type of actuation

04	Hydraulic	**H**
	Electrohydraulic	**W**

LS shuttle

05	No LS shuttle	**Z**
	With LS shuttle (1.2 to 0.6 mm)	**L**

Sealing material

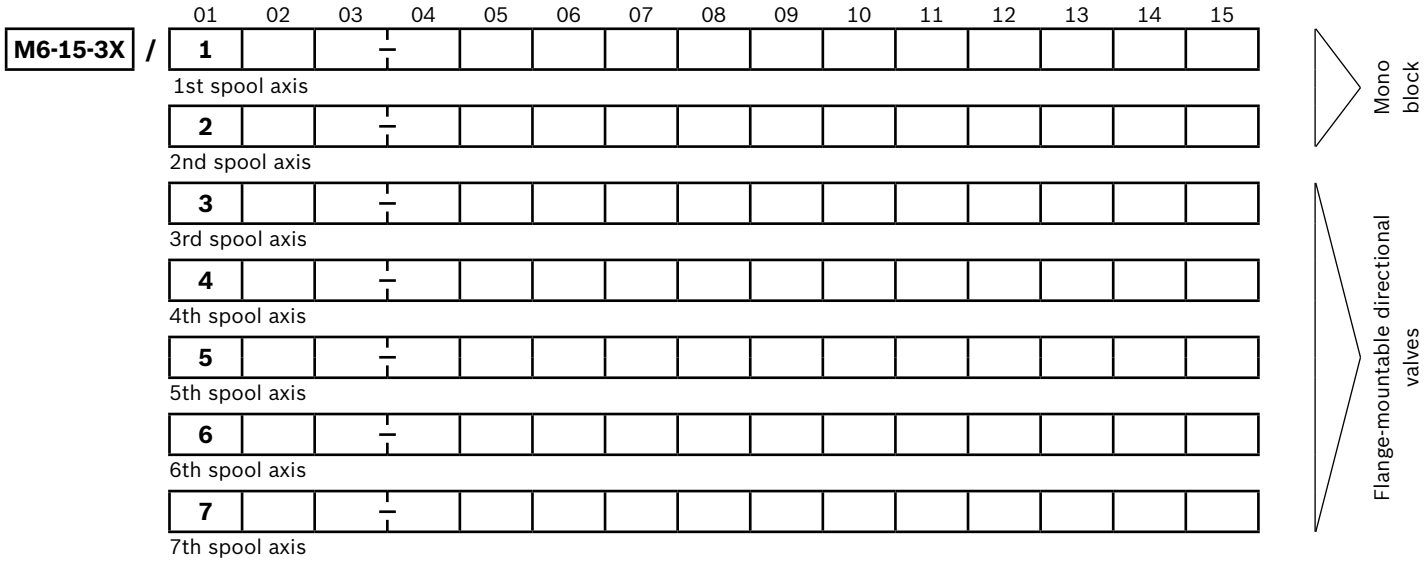
06	FKM seals	**V**

Consumer ports

07	Thread according to ISO 11926	**35**

08	Further specifications in plain text	*****

Spool axis features



01	Spool axis number	**1 to 7**

Spool type[1)]

02	Main spool A/B/T blocked in neutral position	**E**
	Main spool A/B→T open in neutral position	**J**
	Main spool A/B→T throttled to tank in neutral position	**Q**
	Main spool rapid traverse[2)]	**N**
	4-position spool[3)]	**W**
	5-position spool[2)]	**K**

Flow

03	Consumer port A (in l/min, 3-digit)	**...**
04	Consumer port B (in l/min, 3-digit)	**...**

			A side			B side		
Type of actuation			05	06	07	08	09	10
05, 08	**Hydraulic**		**H**			**H**		
06 09	Shuttle	No shuttle		**00**			**00**	
		With shuttle 0.6 mm		**06**			**06**	
		With shuttle 0.8 mm		**08**			**08**	
07 10	Pilot oil port position	Axial			**A**			**A**
		Radial			**R**			**R**
05, 08	**Electrohydraulic**		**W**			**W**		
06 09	Proportional	24 V		**81**			**81**	
		12 V		**83**			**83**	
	Switchable	24 V		**61**			**61**	
		12 V		**63**			**63**	
07, 10	Connector type	Junior-Timer, 2-pin (AMP)			**C**			**C**
		DT04-2P (Deutsch)			**K**			**K**

1) For symbols, see 9.
On hydraulic cylinders, specifying the gear ratio is required, as inlet and outlet characteristic curves are created for E and Q spools.
Further spool types on request.

2) Only possible in spool axis 2

3) Only possible in spool axis 1 and 2

Pilot oil port[4] (specification only necessary for hydraulic actuation)

11	Poppet seal	**G**
	O-ring seal	**O**
	G 1/4 without adapter (with H00 only)	**Z**

Secondary valves

12	Without	**Z**
13	Feed valve	**E**
	Pressure relief / feed valve, specified pressure in bar, 3-digit	**H...**

Regeneration/check valve[5]

14	Without	**Z**
	With regeneration valve	**A**

Low leak port[5]

15	Without	**Z**
	With low leak port	**L**

End plate

		01	02	03	04	05	06	07
M6/15-3X	**/**	**E**						*****

Plate type

01	End plate	**E**

Line connections

02	Without ports	**Z**
	Additional threaded ports	**G**

Pilot oil supply

03	Without	**Z**
	Internal pilot oil generation	**Y**
	External pilot oil supply[6]	**X**

Pilot oil switch-off

04	Without	**Z**
	With switch-off valve	**A**

Unloading function

05	Without	**Z**
	Unloading valve	**U**
	Unloading valve with improvement in pump dynamics	**R**
	Unloading valve with improvement in pump dynamics and flushing	**B**

Additional valves

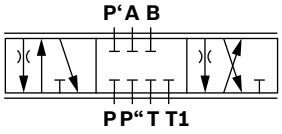
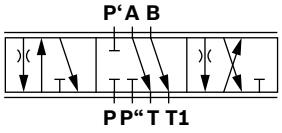
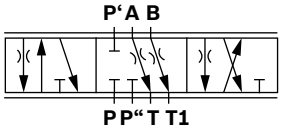
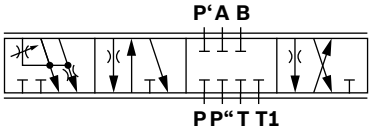
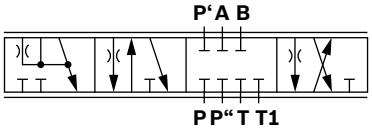
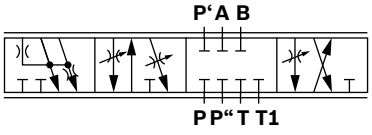
06	Without	**Z**
	With flushing valve	**S**

07	Further specifications in plain text	*****

4) See “Line connections” on page 11
5) Only possible in spool axis 1 and 2
6) External pilot oil supply only possible with line connections

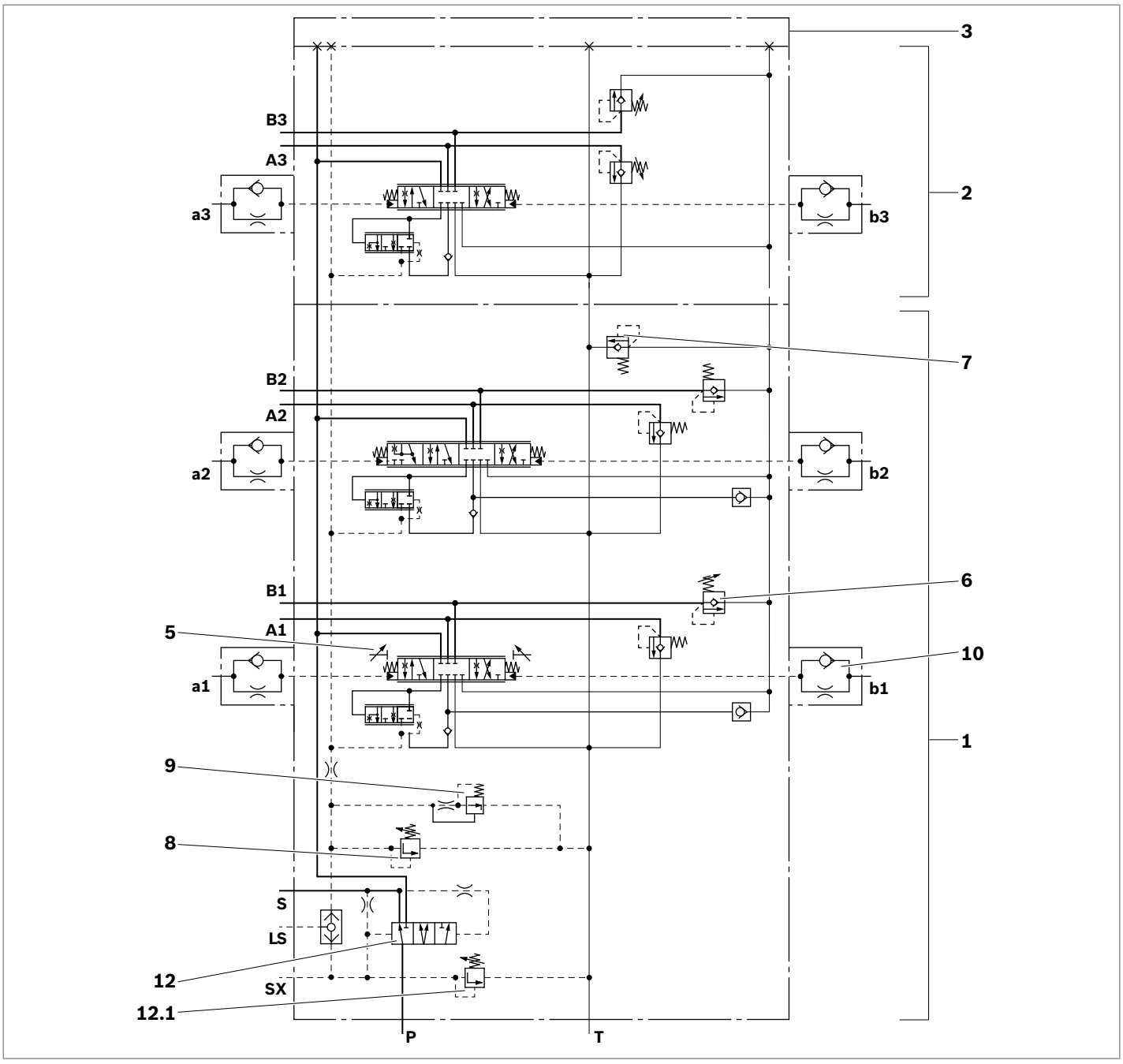
Symbols

Main spool

Ordering code	Main use	Symbol
E	▶ Hydraulic cylinder as consumer ▶ Spool with blocked ports A/B in neutral position	
J	▶ Hydraulic motors as consumers ▶ Consumer ports A/B → T open in neutral position	
Q	▶ Hydraulic cylinder and motors as consumers combined with pipe burst safety valve, check Q meter and lowering brake valve ▶ Spool with defined residual opening (A/B → T) in neutral position ▶ Consumer port unloaded in neural position	
W	▶ Floating position (A/B→T), connection via pressure jump on control unit ▶ 4-position spool ▶ Hydraulic cylinder as consumer ▶ Spool with blocked ports A/B in neutral position	
N	▶ Rapid traverse for P kinematics ▶ Differential circuit ▶ Spool with defined residual opening (A/B→T) in neutral position	
K	▶ Bulldozer power regeneration ▶ 5-position spool ▶ Lowering → Differential circuit → Floating (via pressure jump)	

Control block

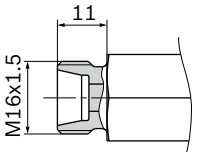
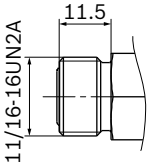
▼ **Hydraulic actuation, example 2-way mono block with 1 directional valve**



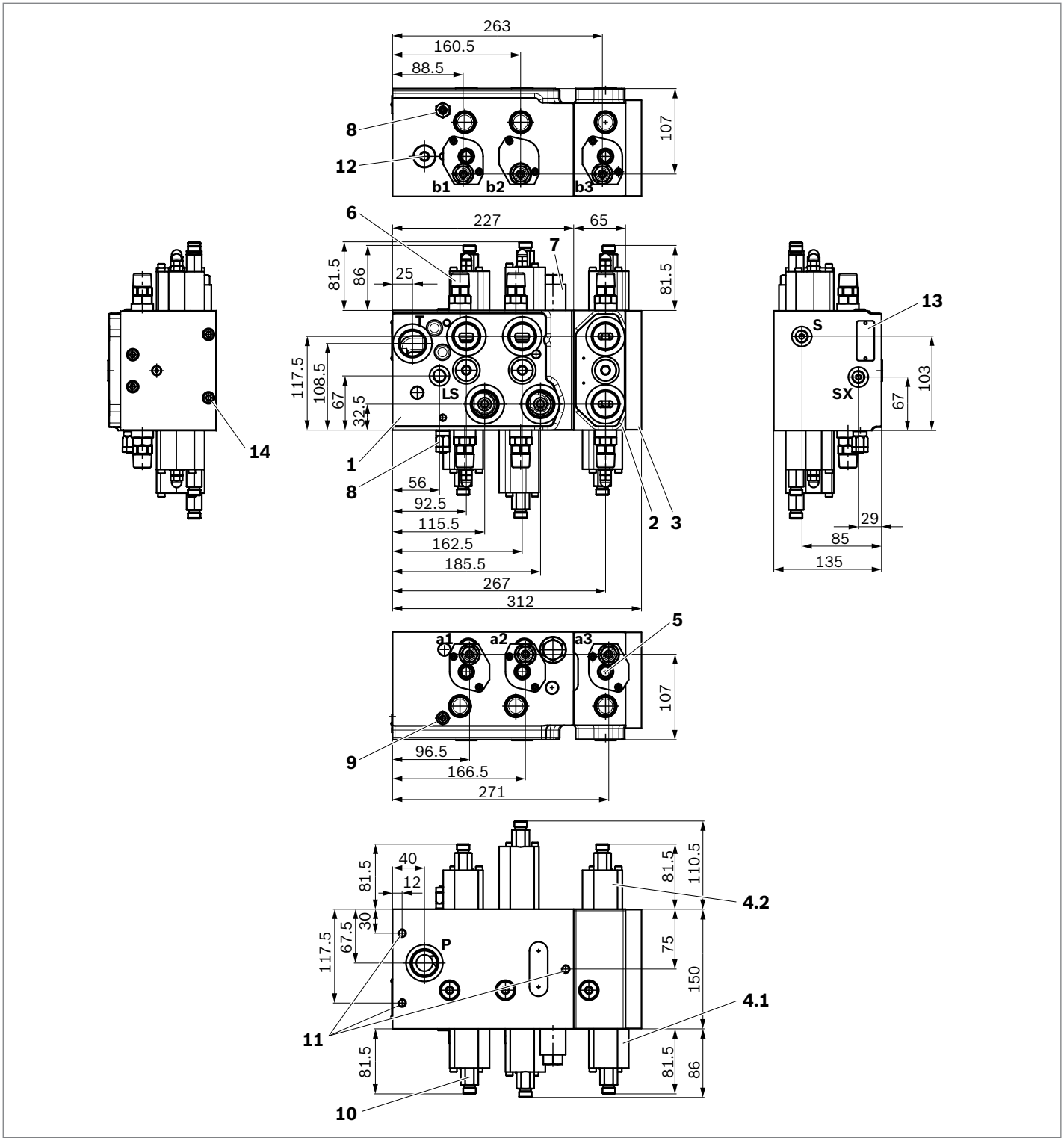
1 Two-way mono block
2 Directional valve
3 End plate (no function)
5 Stroke limiter
6 Secondary pressure relief valve
7 Tank pre-loading valve
8 LS pressure relief valve
9 LS flow controller
10 Double nipple with shuttle valve
12 Priority valve
12.1 LS pressure relief valve for priority volume

Dimensions

Line connections

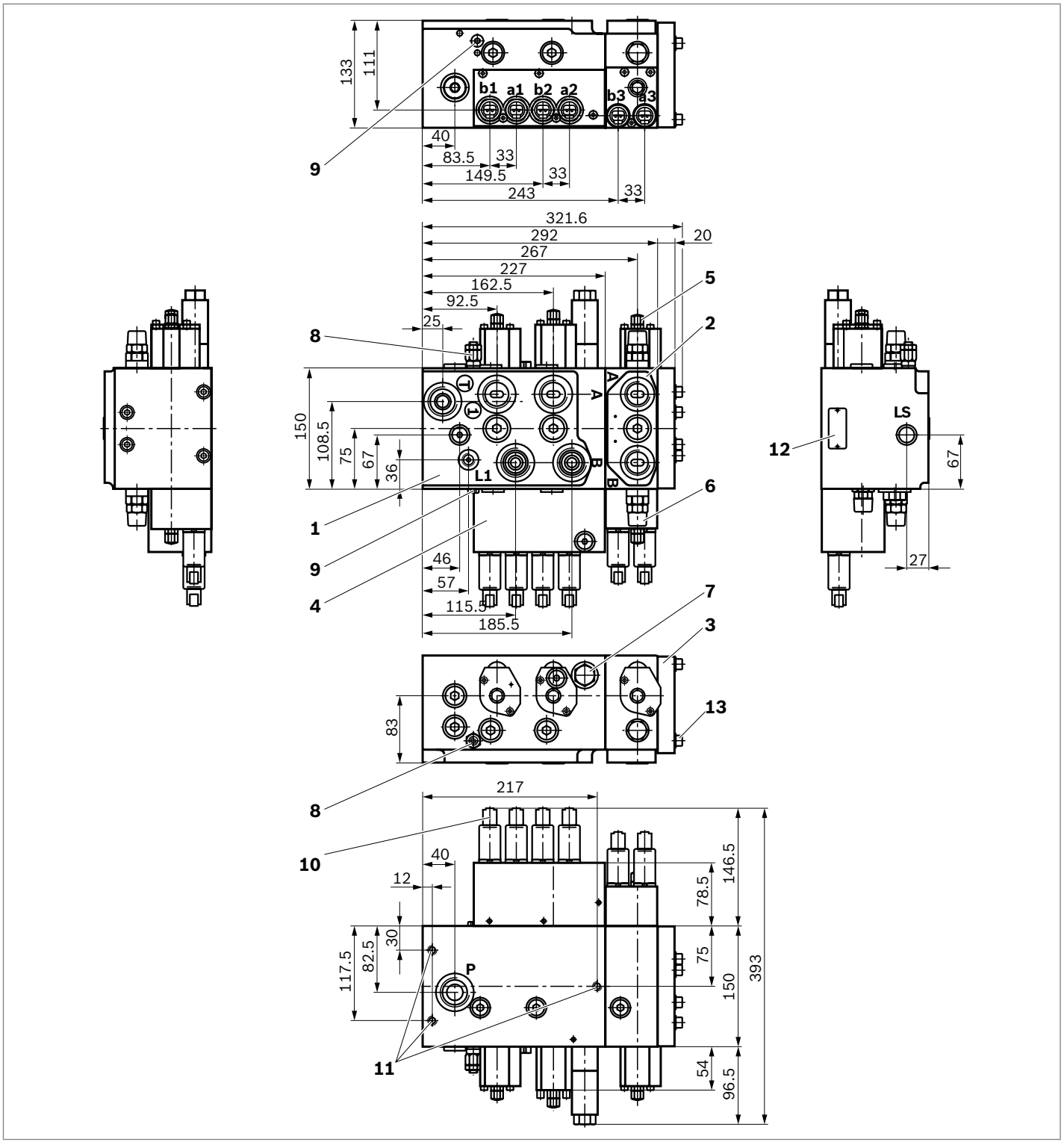
Ports		Dimension	Relevant standard
P	Pump port	1 5/16 – 12 UN	ISO 11926
T	Tank port		
A, B	Consumer ports		
S	Priority ports (e.g. for steering)	7/8 – 14 UNF	
SX	LS pressure of consumer connected at port **S**	9/16 – 18 UNF	
LS	Load sensing	9/16 – 18 UNF	
a, b	Pilot oil ports	G 1/4 (**Z** design)	DIN EN ISO 1179
			Poppet seal (**G** design): L10 according to DIN EN ISO 8434
			O-ring seal (**O** design): SAE J 1453-3

▼ **Hydraulic actuation, example 2-way mono block with 1 directional valve**



1 Two-way mono block
2 Directional valve
3 End plate (no function)
4.1 Control cover A side
4.2 Control cover B side
5 Stroke limiter
6 Secondary pressure relief valve
7 Tank pre-loading valve
8 LS pressure relief valve
9 LS flow controller
10 Double nipple with shuttle valve
11 Three fastening threads M10, 16 deep
12 Priority valve
13 Name plate
14 Tie rod

▼ **Electrohydraulic actuation, example 2-way mono block with 1 directional valve**



1 Two-way mono block
2 Directional valve
3 End plate (no function)
4 Control cover B side
5 Stroke limiter
6 Secondary pressure relief valve
7 Tank pre-loading valve
8 LS pressure relief valve
9 LS flow controller
10 Electrohydraulic actuation
11 Three fastening threads M10, 16 deep
12 Name plate
13 Tie rod

Project planning aid (e.g. for wheeled loader)

General information		
Project number:		
Customer:		
Machine type:		
Machine designation:		
Stroke cylinder:	Bottom Ø:	mm
	Rod Ø:	mm
	Active stroke:	mm
	Number:	units
Tip cylinder:	Bottom Ø:	mm
	Rod Ø:	mm
	Active stroke:	mm
	Number:	units

Diesel engine data	
Designation:	
Power:	kW
Load speed:	rpm
Max. speed:	rpm

Pump	
Designation:	
Displacement:	cm^3/rev
Nominal speed:	rpm
Pump control Δp:	bar
Controller type:	
Maximum pump pressure:	bar

Supplementary information			
Cycle times			
Kinematics:	Lifting:	sec at	mm stroke
☐ Z kinematics	Lowering:	sec at	mm stroke
☐ P kinematics (parallel)	Depressurized lowering:	sec at	mm stroke
	Tipping backwards:	sec at	mm stroke
	Tipping forwards:	sec at	mm stroke
	Option A:	l/min	
	Option B:	l/min	

Related documents

The M6-15 control blocks are system components.
Observe the instructions for the other system components.
Only commission the product if the following documentation is available to you and you have understood and observed it.

Title	Document number	Document type
Control blocks for mobile applications	64025-B	Instruction manual
System documentation from the machine manufacturer		Instruction manual

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