

Open center control block in mono block design

MO-16, 22, 32

RE 64354

Edition: 04.2016

Replaces: 06.2003



- ▶ Sizes 16, 22, 32
- ▶ Series 1X
- ▶ Maximum working pressure
 - on the pump side 350 bar
 - on the consumer side 420 bar
- ▶ Maximum flow
 - MO-16: 110 l/min
 - MO-22: 200 l/min
 - MO-32: 410 l/min

Features

- ▶ Valve control in accordance with the 6/3-way principle
- ▶ Brake spool for hydrostatic travel drive
- ▶ Large fine control range for flow control with progressive flow characteristic
- ▶ High pressure carry-over feature for downstream consumers when using **C** port (separation of by-pass line from tank line)
- ▶ Low internal leakage due to fitted main spool
- ▶ Main spool with automatic air bleed possible

Design

- ▶ Mono block with 1 to 4 consumer axes
- ▶ Type of actuation
 - Hydraulic
 - Electro-hydraulically
- ▶ Pressure limitation
 - Primary pressure relief valve in the **P** supply line
 - Secondary pressure relief valves/feed valves in stacking element design

Fields of application

- ▶ Excavators
- ▶ Mining excavators
- ▶ Drilling equipment
- ▶ Cranes

Contents

Functional description	2
Technical data	4
Ordering code	5
Characteristic curves	7
Dimensions	11
Related documents	16

Functional description

High pressure mobile control blocks of type MO are directional valves of mono block design. They provide fine control of the speed and flow direction. The valves are optionally actuated hydraulically or electrohydraulically.

The control blocks of type MO consist mainly of the housing (1), the main spool (2) with optionally installed load holding valves (3), the actuation element (4), the return springs (5), mounted feed valves (6) (optional) and mounted secondary pressure relief valves (7) (optional). The 6/3-way valves combine the function of a 4/3-way directional valve and a 2/2-way directional valve. In non-actuated state, the main spool (2) is kept in the initial position by the return springs (5). In this position, the connection from the pump to the consumer is closed, the 2/2-way part is open and allows fluid to flow without pressure from P to T (free circulation).

If the main spool (2) is moved out of its initial position, the connection from the pump to the consumer is opened throttled via precision grooves (negative overlap). The pump pressure increases. When the pressure at the consumer port is reached, the load holding valve (3) opens and the hydraulic fluid begins to flow to the consumer. As the main spool (2) continues its movement, the opening to the reservoir takes place via precision grooves for the hydraulic fluid coming from the consumer and the flow is gradually fed from the 2/2-way line to the consumer channel (fine control).

Spool travel

The spool travel is divided into approx. 30% control land overlap and 50% fine control range, while the remaining stroke serves to create the full opening cross-section. The overlap and a low spool tolerance serve to reduce internal leakage. Due to the large fine control range, the consumers can be sensitively controlled.

Control characteristics, actuating forces

Uniform quality of the control characteristics and low actuating forces are achieved through optimum design of the metering edges in the housing, favorable shape of the metering notches and fitting of the main spool with constant clearance.

Brake spool

Use in hydrostatic travel drive of tracked vehicles as fully automatic control break in both directions of travel. Friction-locked, cavitation-free downhill driving is achieved by controlling the outlet cross section depending on the supply pressure.

Pressure setting of the primary and secondary valves

The specified pressure values are set as follows:

- ▶ direct operated pressure valves at a flow of 2 to 3 l/min
- ▶ pilot operated pressure valves at a flow of 10 l/min.

Circuit types

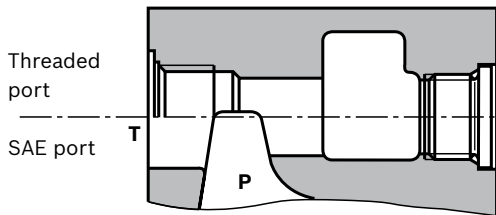
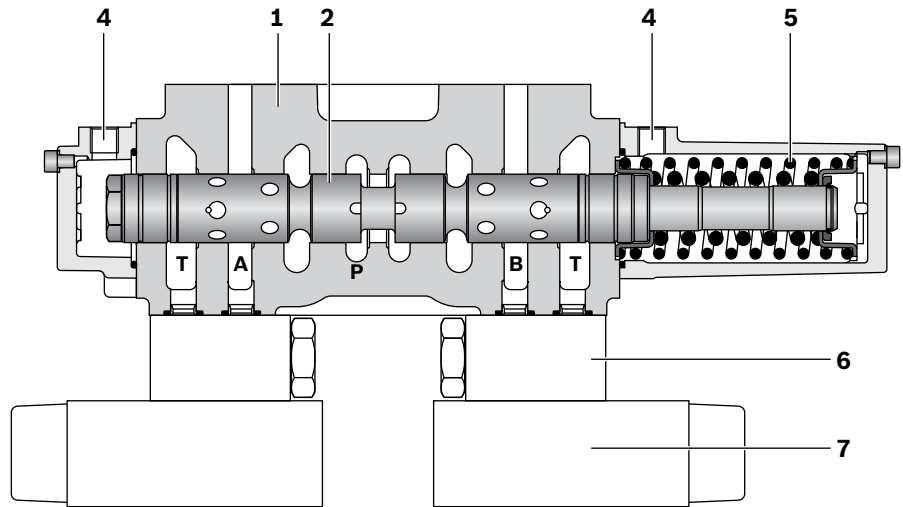
Number of spool axes	Size	Possible circuit type	Ordering code
1		1	T
2		1 / 2	P
3	MO-16	1//2//3	P
4		1//2//3//4	P
4		1//2//3 - - 4	M
1		1	T
2		1 / 2	P
3	MO-22	1//2//3	P
4		1//2//3 - - 4	M
1		1	T
2		1 / 2	P
3		1//2//3	P
3	MO-32	1- -2- -3	T
4		1//2//3//4	P
4		1//2//3 - - 4	M
4		1- -2//3- -4	L

// = parallel circuit

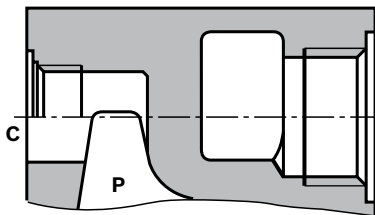
- - = tandem circuit

▼ **Sectional view**

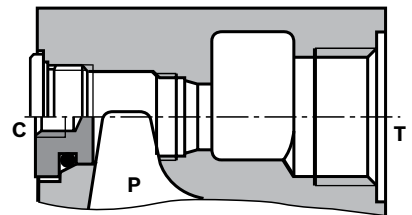
- 1 Housing
- 2 Main spool
- 3 Check valve (see symbol)
- 4 Actuation element
- 5 Return springs
- 6 Feed valve
- 7 Secondary pressure relief valve
- 8 Primary pressure relief valve (see symbol)



Version R (standard)
Port **T** on the consumer side (only when **no** port **C** is required).

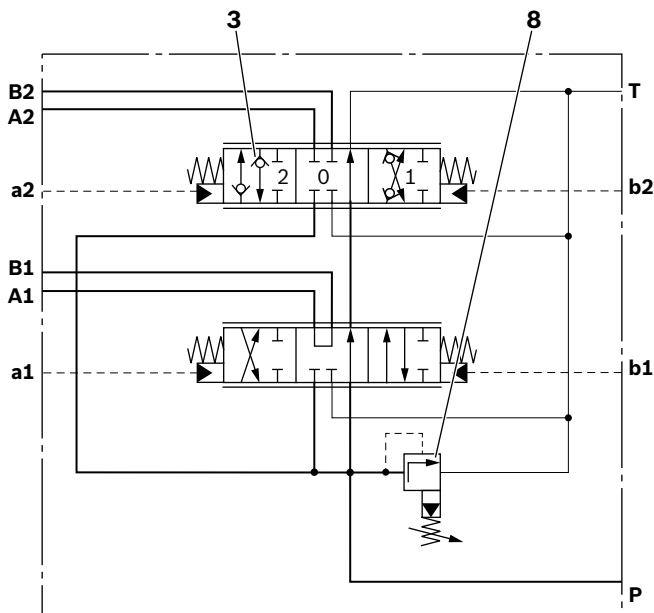


Version C
By-pass channel is separated from the tank line.

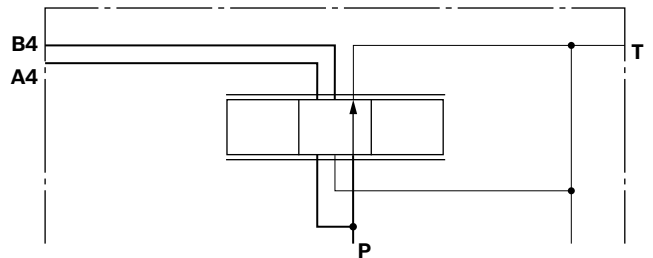


With **version K**, port **C** is present; however, it is closed by a threaded plug. If you need port **C**, you must screw in a separating plug between the **P** and **T** channels.

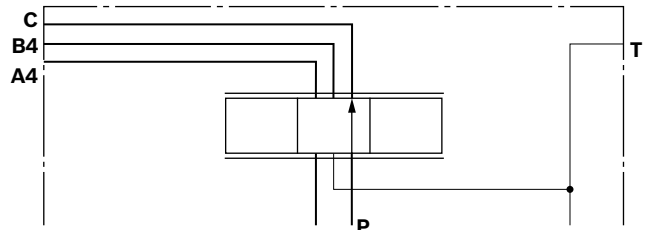
▼ **Symbol example of a hydraulically operated 2-spool block, version R or K**



▼ **With version R, the circulation and return flow go into a reservoir.**



▼ **With version C, the tank line is separated from the by-pass channel**



Technical data

General														
		MO-16				MO-22				MO-32				
		Number of consumer axes				1 2 3 4				1 2 3 4				
Weight without secondary valves	Hydraulically operated	kg	13	20	25	31	21	35	43	55	39	64	87	115
Installation position	Any													
Line connections	See dimensions on page 11													
Ambient temperature range	θ	°C	-20 to +80											
Priming	One-coat paint RAL 5010													
Hydraulic														
Maximum working pressure at port	P, C, X	p	bar	350										
	A, B	p	bar	420										
	T	p	bar	30										
	L	p		0										
Maximum pilot pressure at port	Pst	p	bar	40										
	a, b	p	bar	30										
Maximum flow	q_v	l/min	MO-16				MO-22				MO-32			
			110				200				410			
Hydraulic fluid	Mineral oil (HL, HLP) according to DIN 51524, other hydraulic fluids, e.g. HEES (Synthetic ester) according to ISO 15380 and hydraulic fluids as specified in data sheet 90221, on request													
Hydraulic fluid temperature range	θ	°C	-20 to +80											
Viscosity range	ν	mm ² /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	2TH6 see data sheet 64552				4TH5/6 see data sheet 64555				TH7 see data sheet 64558				} Control curve no. 06	

Note

- ▶ Please contact us if the unit is to be used outside the specified range of values.
- ▶ The technical data was determined with a viscosity range of $\nu = 41 \text{ mm}^2/\text{s}$ and a temperature of $\theta = 50 \text{ °C}$.

Ordering code

Short type				Spool axis						Additional information						
01	02	03	04	05	06	07	08	09	10							
	MO	-	-	1X	/											
										1st spool axis						
										2nd spool axis						
										3rd spool axis						
										11	12	13	14	15	16	17
										/						*
										4th spool axis						

Short type

01	Number of spool axes 1, 2, 3 or 4	
02	Series control block MO	MO
03	Size 16	16
	Size 22	22
	Size 32	32
04	Series 10 to 19 (unchanged installation and connection dimensions)	1X

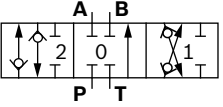
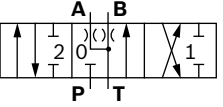
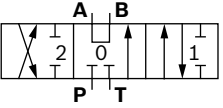
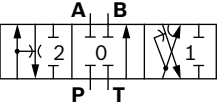
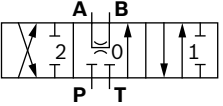
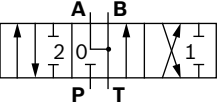
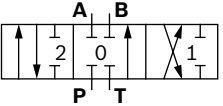
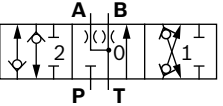
Primary pressure limitation¹⁾

05	Without	Q 000-000
	Pressure relief valve, pilot-operated	V ...-000
	Pressure/feed valve with pressure sequencing stage	B ...-...
	Pressure/feed valve with pressure cut-off stage	L ...-...

Circuit type (for possible combinations of circuit types, see page 2)

06	Tandem circuit	T
	Parallel circuit	P
	Parallel circuit, final axis in tandem circuit	M
	Mixed circuit	L

Spool type

07		001		006
		002		007
		003		009
		005		026

¹⁾ Specified pressure for pressure limitation and pressure sequencing/
cut-off stage in bar, 3-digit

Type of actuation

08	Hydraulic	H
	Electrohydraulically proportional ¹⁾	W2
	Electrohydraulically switchable ¹⁾	W4

Secondary valves for A- and B-side²⁾

		MO-16	MO-22	MO-32	
09	Without	●	●	●	Z
10	Pressure/feed valve, pilot operated, size 16	●	●	-	H...
	Pressure/feed valve, pilot operated, size 32	-	●	●	F...
	Pressure relief valve, direct operated size 16	●	●	-	A...
	Pressure relief valve, direct operated size 22	-	●	●	R...
	Pressure relief valve, direct operated size 16 + feed valve size 16	●	●	-	G...
	Pressure relief valve, direct operated size 22 + feed valve size 22	-	●	●	T...
	Feed valve size 16	●	●	-	E
	Feed valve size 22	-	●	●	S
	Cover plate for secondary valve mounting face size 16	●	●	-	P
	Cover plate for secondary valve mounting face size 22	-	●	●	U

Tank port

11	With tank port T	R
	With tank port T and pressure port C for downstream consumers (not possible with tank port on the consumer side, ordering code V)	C
	With tank port T and variable pressure port C for downstream consumers (C port closed by means of a threaded plug)	K

Line connections

12	Pipe thread according to DIN EN ISO 1179	01
	“Small” flange port according to DIN ISO 6162 ³⁾	11
	“Large” flange port according to DIN ISO 6162 ³⁾	18

Pump port position

13	Pump port P on secondary valve side	S
	Pump port P on the consumer side	V

Tank port position

14	Tank port T on secondary valve side	S
	Tank port T on the consumer side (not possible with version C)	V

Installation position (standard)

15	Designation of installation position from horizontal. This parameter fixes the position of the air bleed.	

Sealing material

16	FKM (fluoroelastomer)	V
	NBR (nitrile rubber)	M

17	Further specifications in plain text	*
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¹⁾ The standard version is pilot valves with manual actuation
²⁾ With MO-22 and 32, you cannot assign secondary valves of different sizes together; rather, this is only possible by pairs per spool axis. Setting up secondary valves T, R, S and the cover plate U next to one another on the subsequent spool axis in each case is not possible with MO-22. Specified pressure in bar, 3-digit.

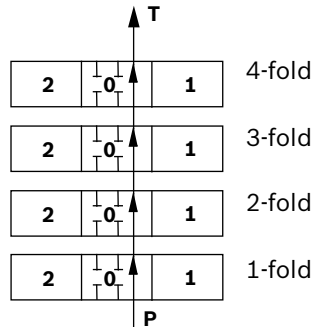
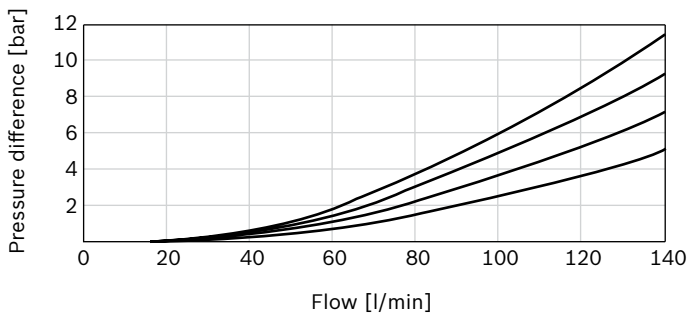
³⁾ Preferred type with flange according to DIN ISO 6162-2 (350 to 400 bar) except for NG 32 T port according to DIN ISO 6162-1 (35 to 350 bar); refer to the dimensions on page 11
 ● = Available
 - = Not available

Characteristic curves

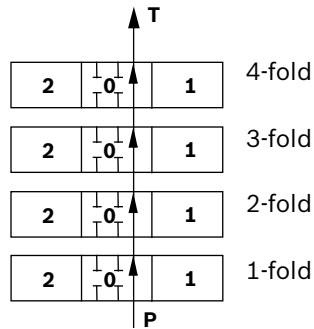
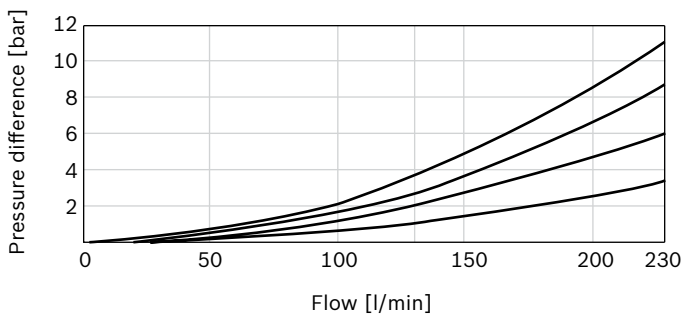
$\Delta p - q_V$ - flow curves

P → T in central position (free circulation)

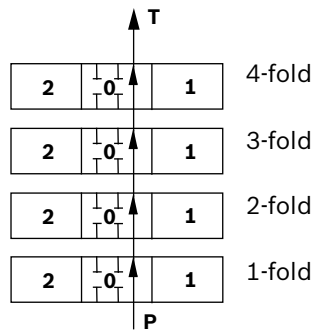
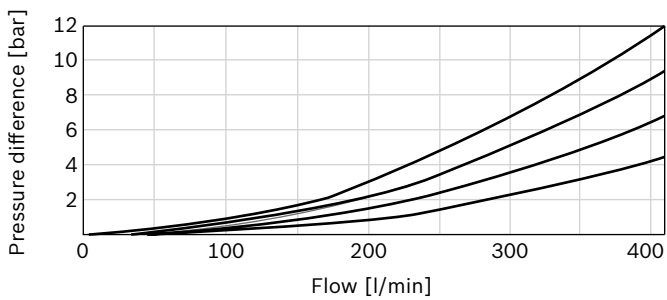
▼ MO-16



▼ MO-22



▼ MO-32

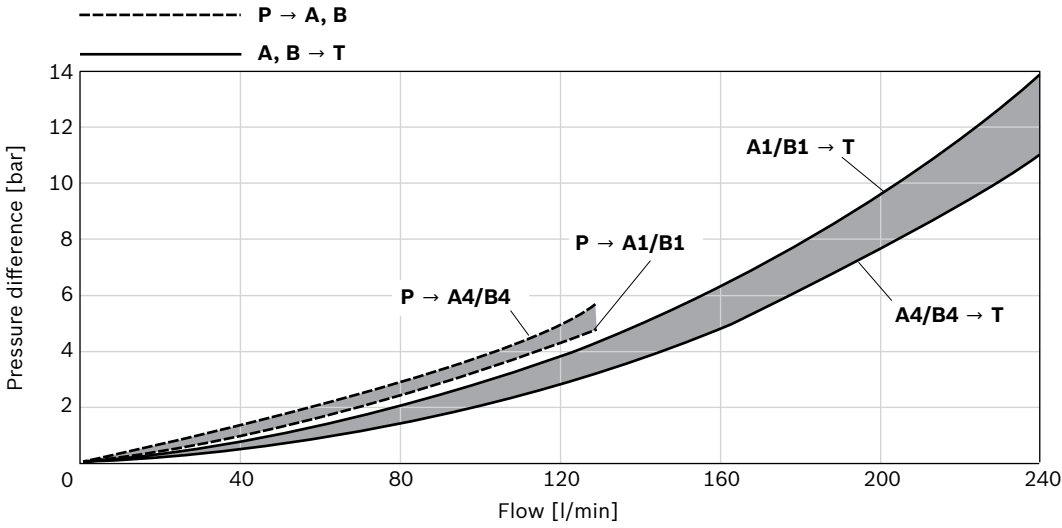


Note

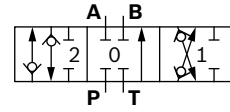
Characteristic curves measured at $\nu = 41 \text{ mm}^2/\text{s}$ and $\theta = 50 \text{ }^\circ\text{C}$.

Characteristic curves for Type MO-16

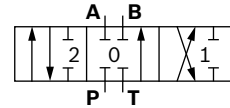
▼ $\Delta p - q_v$ - flow curves



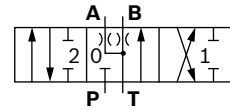
▼ Symbol 001 (026)



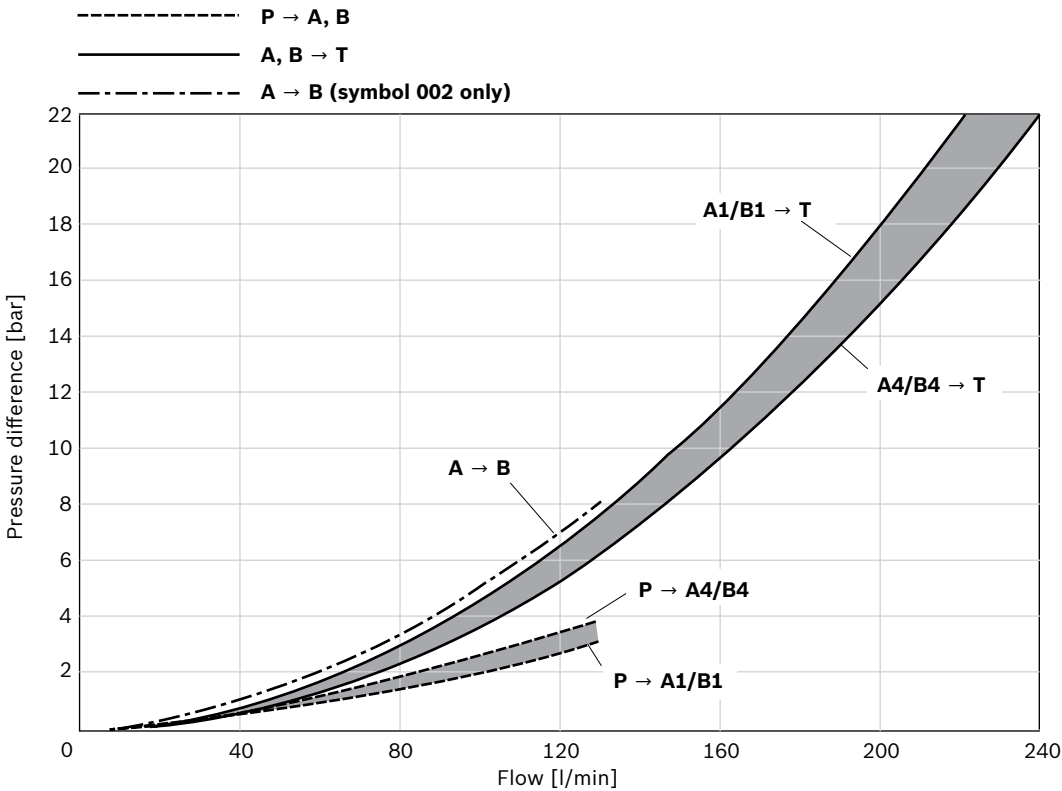
▼ Symbol 005



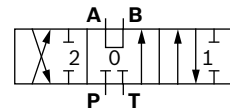
▼ Symbol 006 (009)



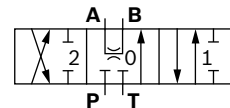
▼ $\Delta p - q_v$ - flow curves



▼ Symbol 002



▼ Symbol 003

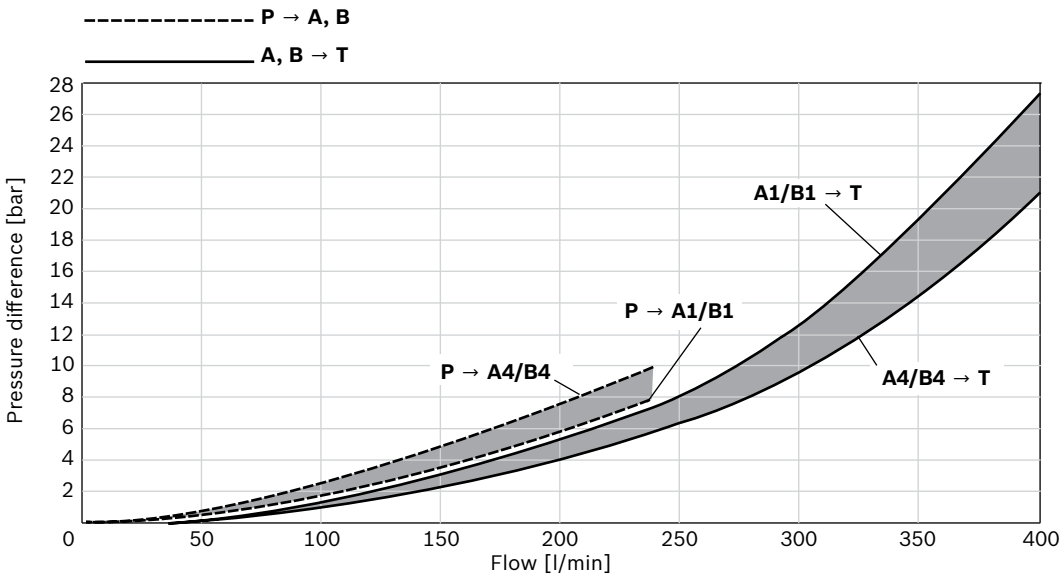


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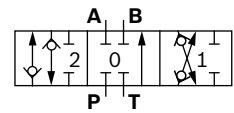
Characteristic curves measured at $\nu = 41 \text{ mm}^2/\text{s}$
and $\theta = 50 \text{ }^\circ\text{C}$.

Characteristic curves for Type MO-22

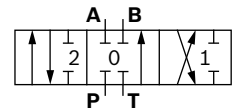
▼ $\Delta p - q_v$ - flow curves



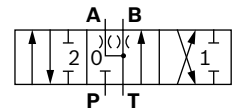
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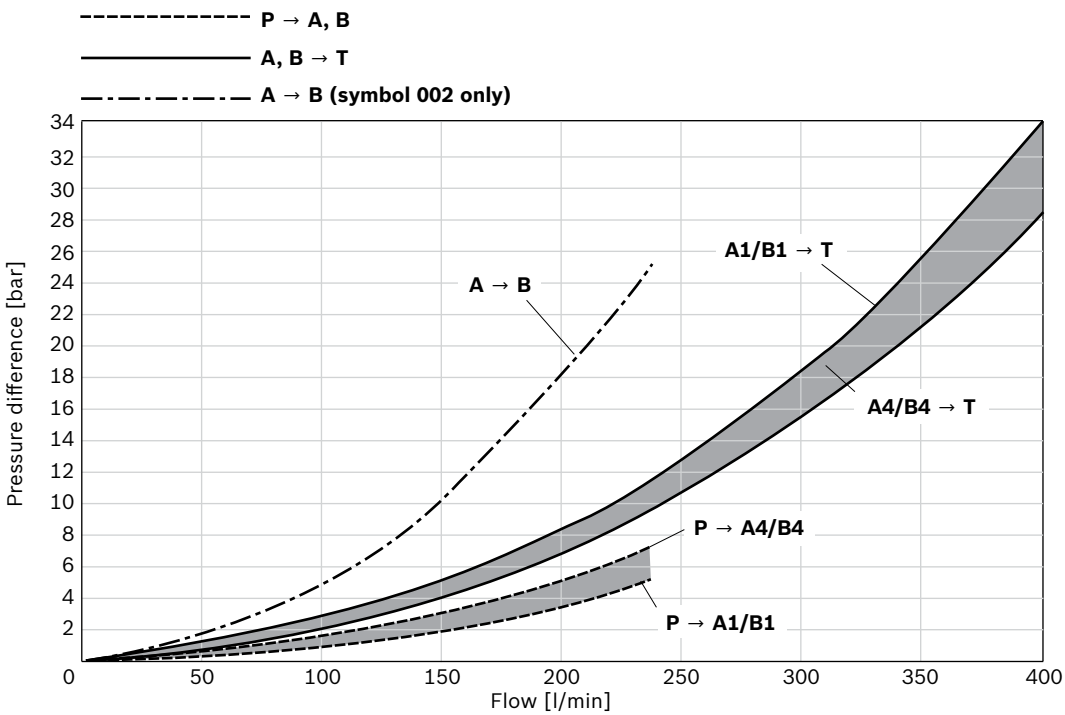
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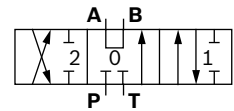
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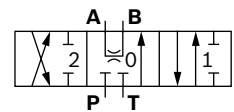
▼ $\Delta p - q_v$ - flow curves



▼ Symbol 002



▼ Symbol 003

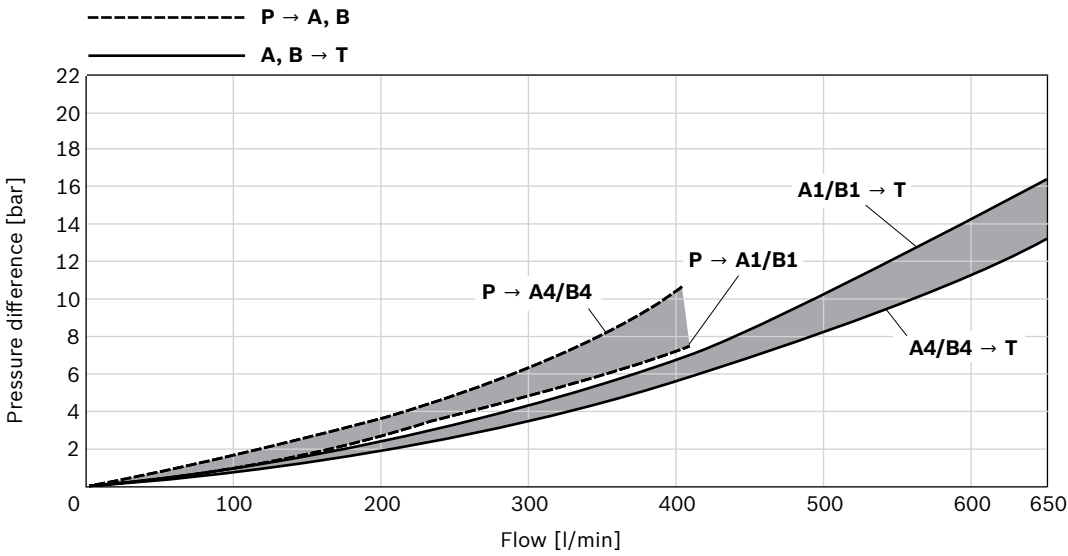


Note

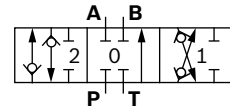
Characteristic curves measured at $\nu = 41 \text{ mm}^2/\text{s}$ and $\theta = 50 \text{ }^\circ\text{C}$.

Characteristic curves for Type MO-32

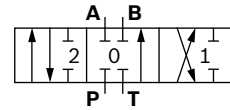
▼ $\Delta p - q_v$ - flow curves



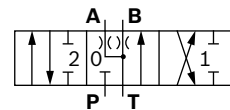
▼ Symbol 001 (026)



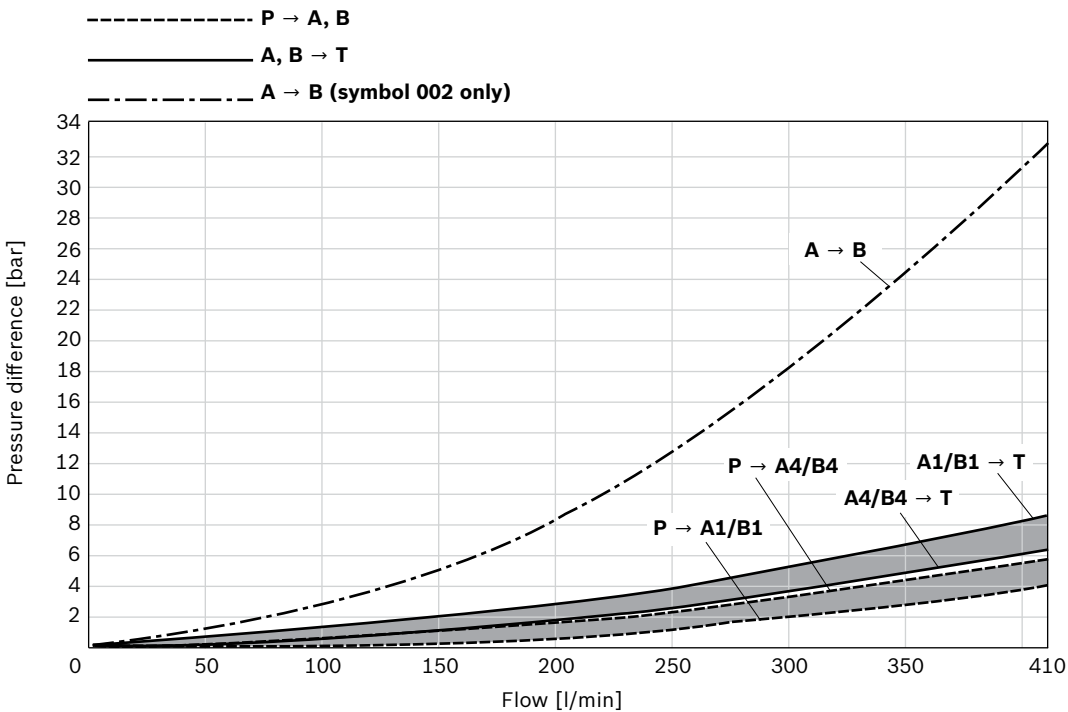
▼ Symbol 005



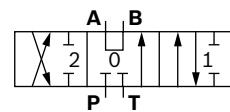
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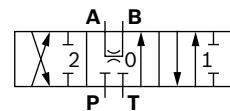
▼ $\Delta p - q_v$ - flow curves



▼ Symbol 002



▼ Symbol 003

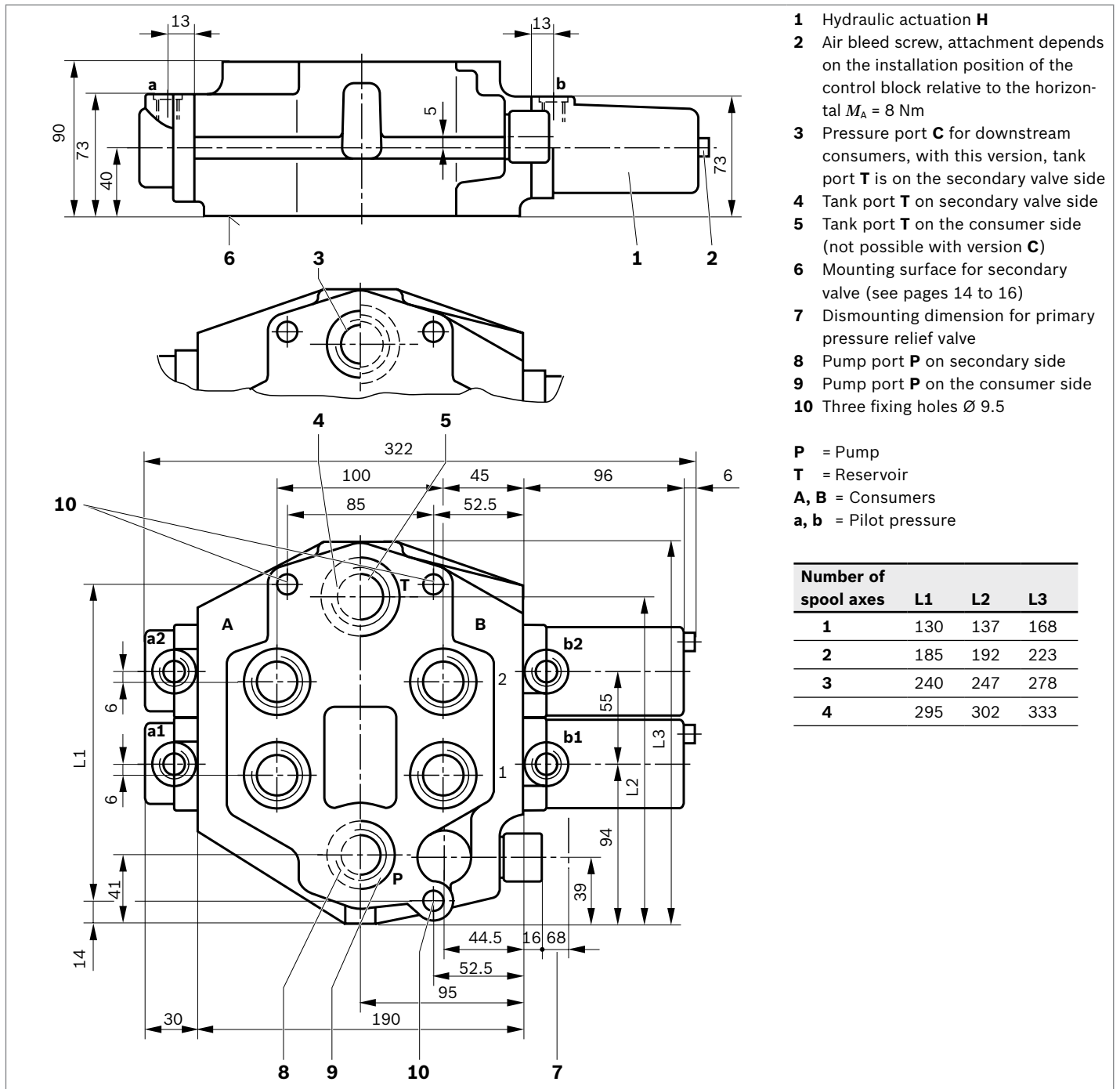


Note

Characteristic curves measured at $\nu = 41 \text{ mm}^2/\text{s}$
and $\theta = 50 \text{ }^\circ\text{C}$).

Dimensions

▼ MO-16

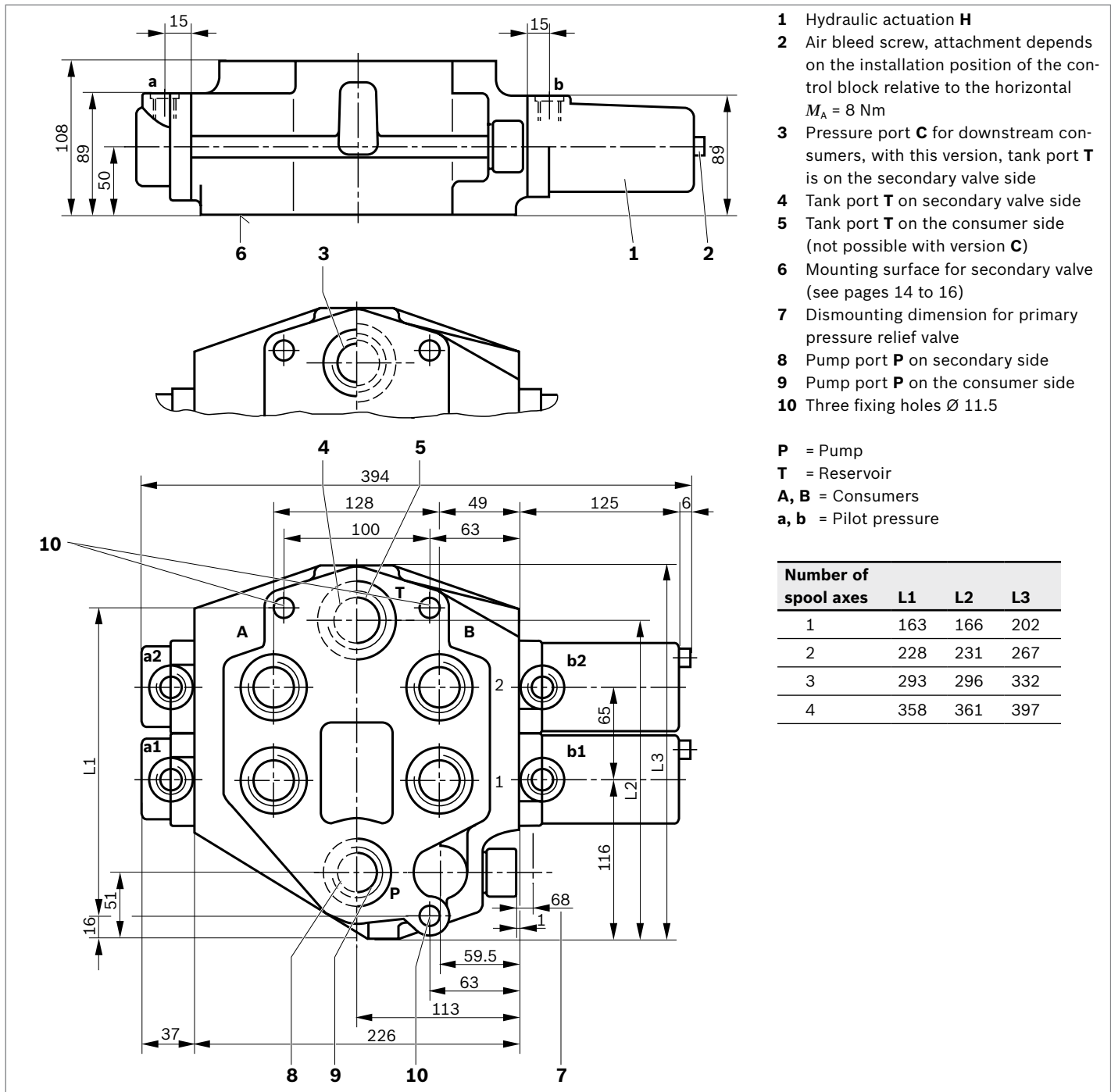


Line connections

Flange ports according to DIN EN ISO 6162-2, pressure stage 6000 PSI

Port	P	A, B, C	T	L	a, b, X
01	G 3/4	G 3/4	G 1	G 1/4	G 1/4
11	DN 19 (SAE 1/2 in)	DN 19 (SAE 1/2 in)	DN 13 (SAE 3/4 in)	G 1/4	G 1/4
18	DN 13 (SAE 3/4 in)	DN 19 (SAE 1/2 in)	DN 13 (SAE 3/4 in)	G 1/4	G 1/4

▼ **MO-22**

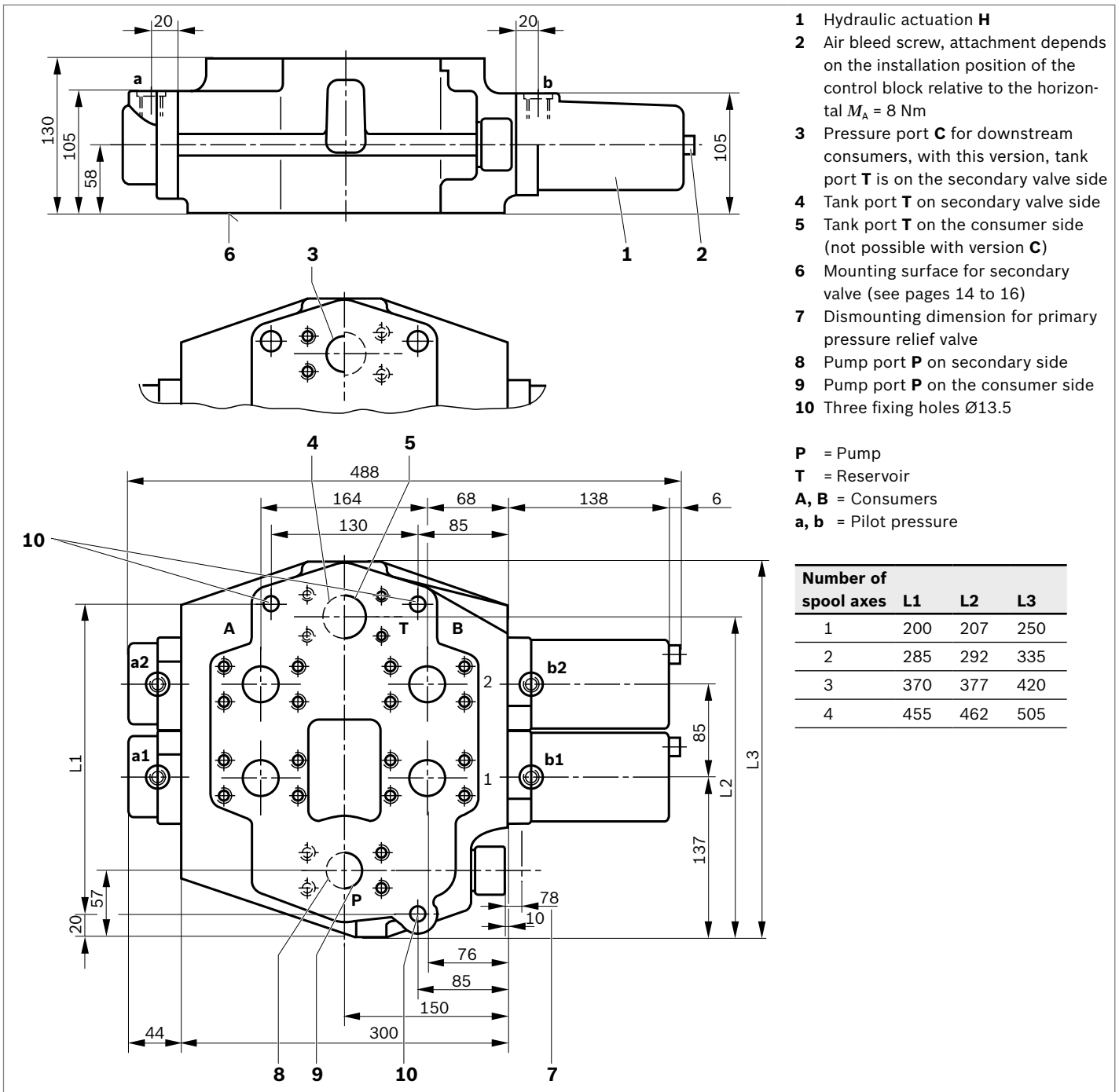


Line connections

Flange ports according to DIN EN ISO 6162-2, pressure stage 6000 PSI

Port	P	A, B, C	T	L	a, b, X
01	G 1	G 1	G 1 1/4	G 3/8	G 1/4
11	DN 19 (SAE 3/4 in)	DN 19 (SAE 3/4 in)	DN 25 (SAE 1 in)	G 3/8	G 1/4
18	DN 25 (SAE 1 in)	DN 19 (SAE 3/4 in)	DN 25 (SAE 1 in)	G 3/8	G 1/4

▼ **MO-32**

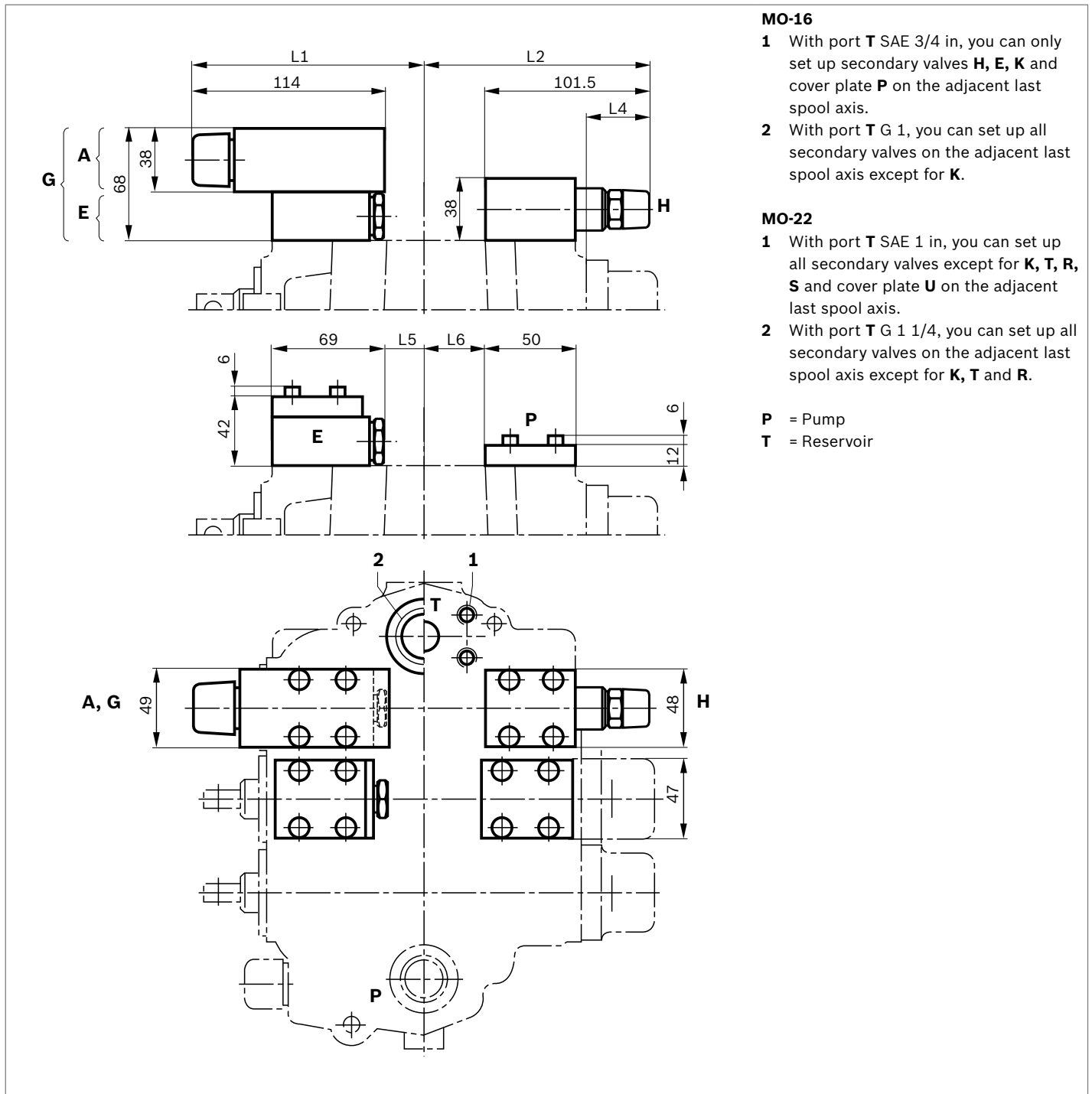


Line connections

Flange ports according to DIN EN ISO 6162-2, pressure stage 6000 PSI;
 T port according to DIN EN ISO 6162-1, pressure stage 3000 PSI

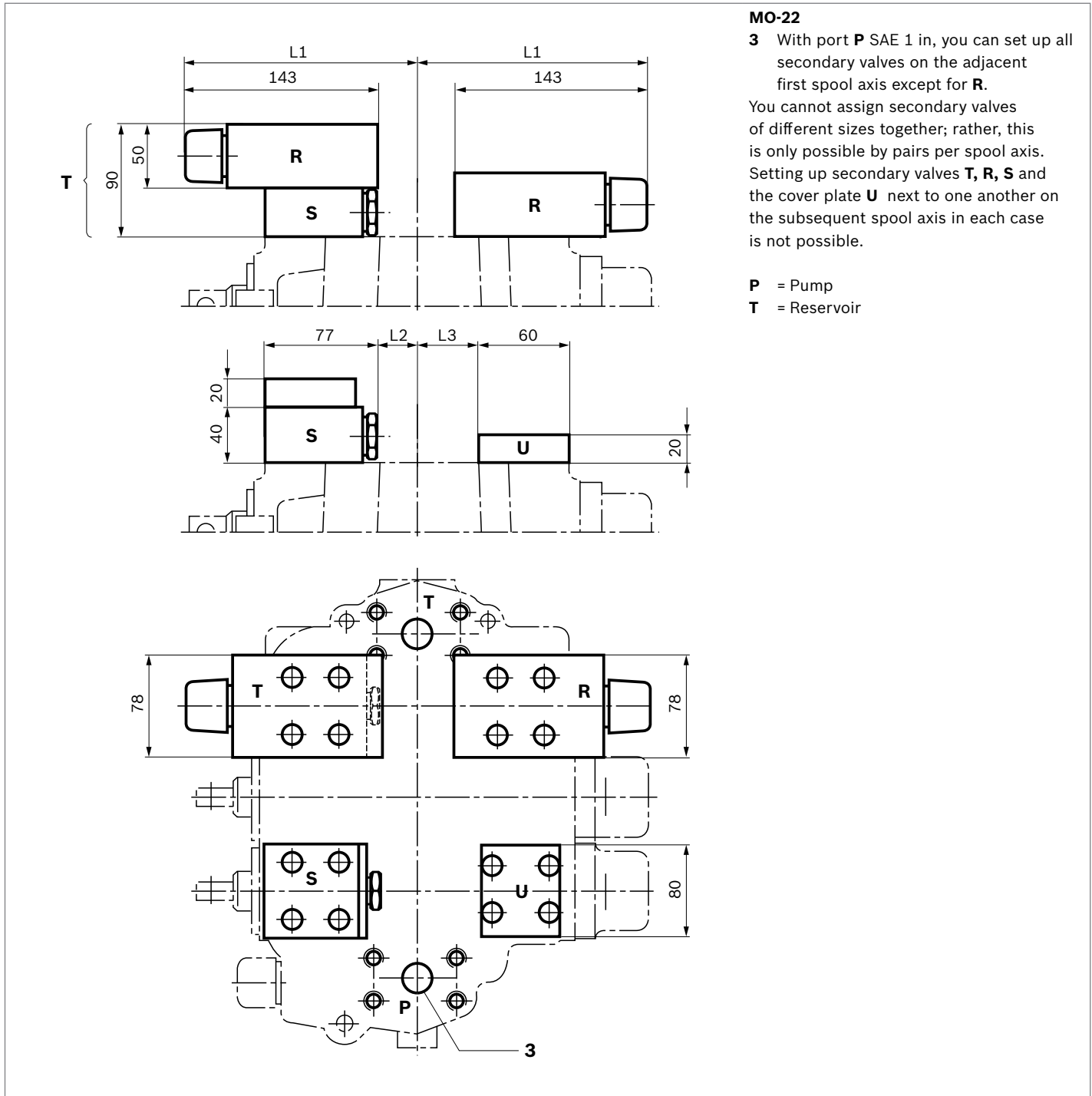
Port	P	A, B, C	T	L	a, b, X
11	DN 32 (SAE 1 1/4 in)	DN 32 (SAE 1 1/4 in)	DN 38 (SAE 1 1/2 in)	G 1/2	G 1/4

▼ Secondary valves NG 16



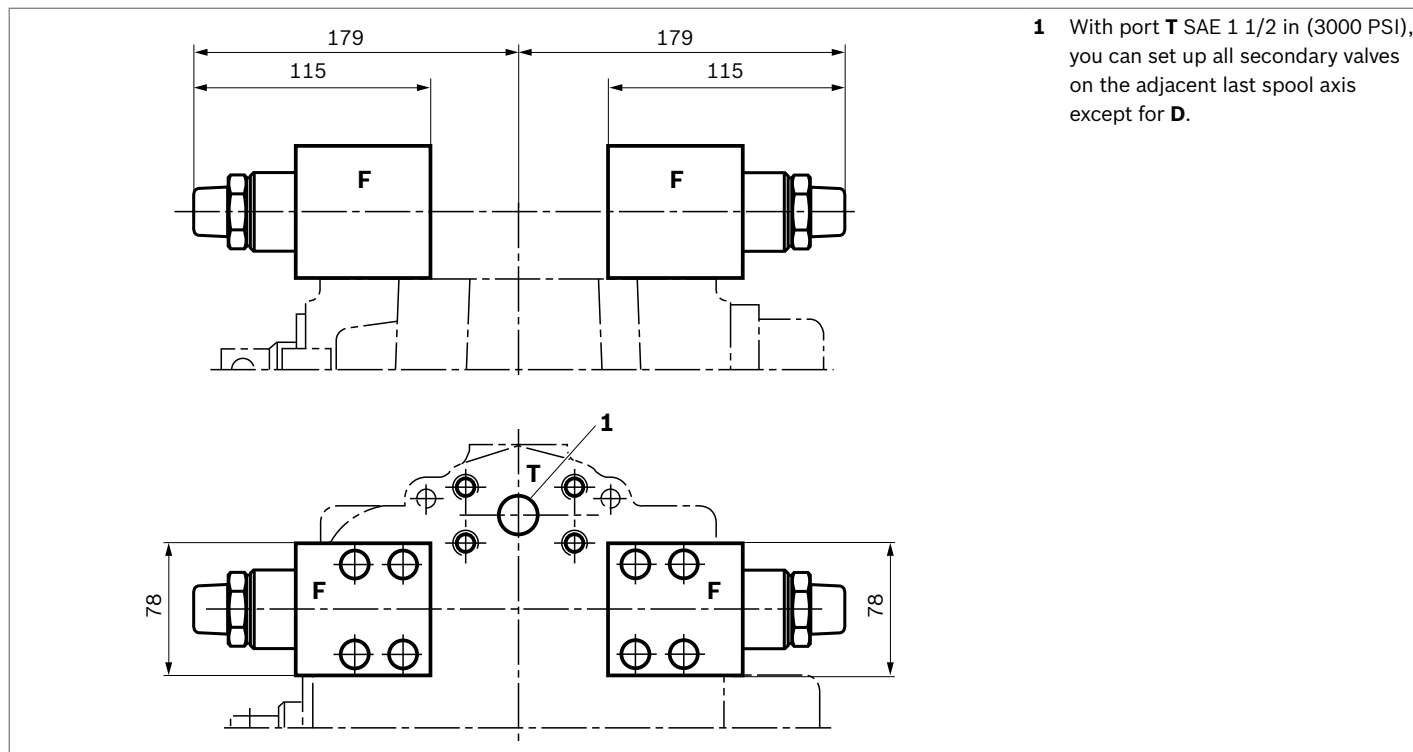
Size	L1	L2	L3	L4	L5	L6
MO-16	136	137.5	41	42.5	21	38
MO-22	150	151.5	37	38.5	35	52

▼ Secondary valves NG 22



Size	L1	L2	L3
MO-22	170	31	47
MO-32	188	49	65

▼ **Secondary valves NG 32**



Related documents

Further information on installation, commissioning, and operation can be found in the instruction manual 64025-B: „Control blocks for mobile applications“.

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