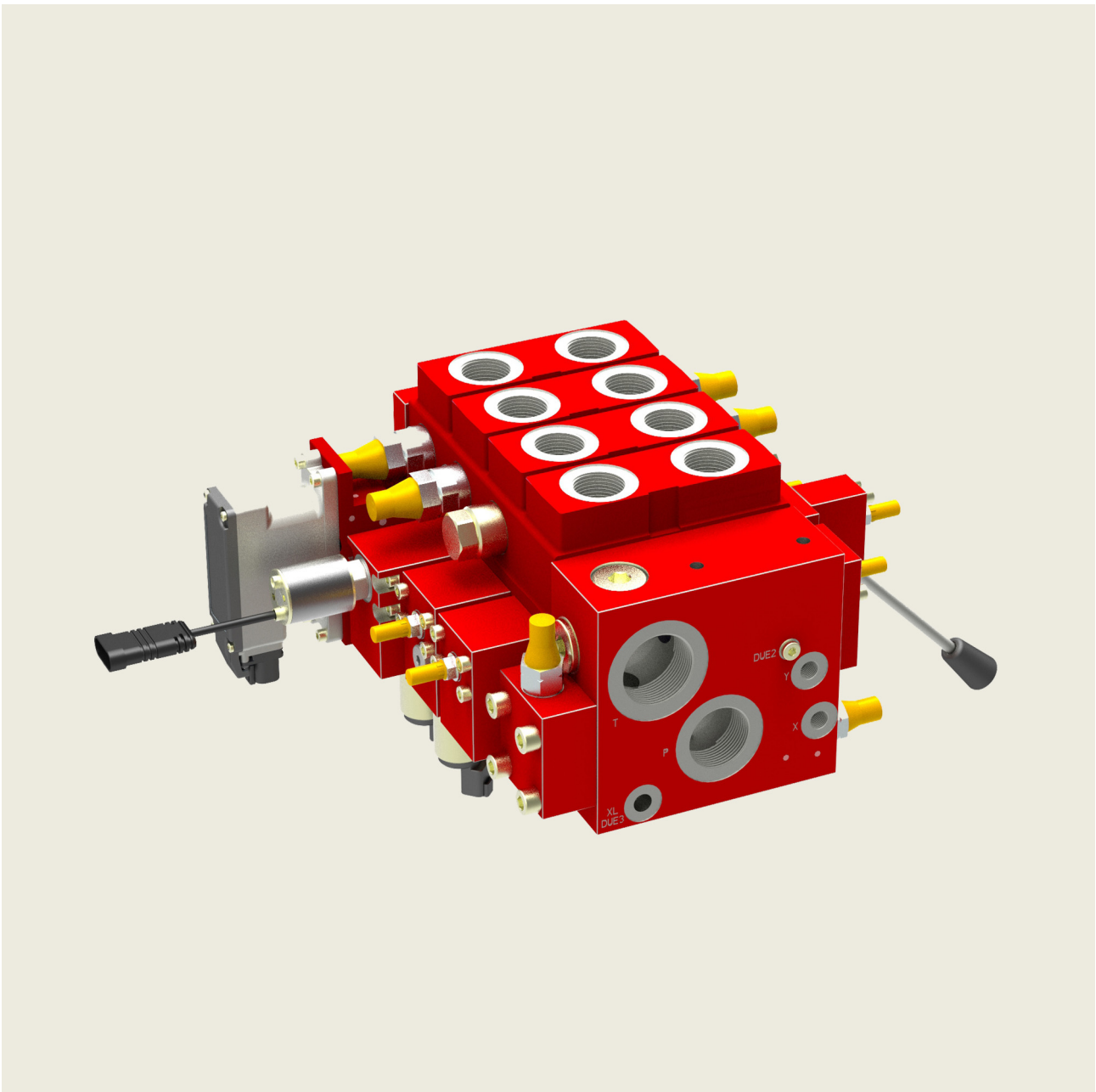


Proportional Directional Valve System

Sectional Design and Flow Sharing Principle
Series LVS 18



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1 General

1.1 Description

Our sectional proportional valves regulate the flow rate to the actuator by means of an internal closed-loop control system.

The associated, independent section pressure compensators operate on the principle of proportional flow-sharing. The integral auxiliary functions and high power density make the LVS18 not only a highly adaptable modular valve, but also a very compact one.

LVS18 valve blocks can be configured for both fixed- and variable-displacement pumps. The basic LVS18 valve block has 4 control options: hand lever, hydraulic, electrohydraulic proportional, or with onboard electronics. Unlike conventional load-sensing valves, with the proportional flow-sharing principle of the LVS18 valve, the load signal is fed directly to the variable-displacement pump or system pressure-control valve i.e. without using a series of shuttle valves.

The highly adaptable modular system consists of an inlet section, actuator sections (with up to eight sections) and an end section. Specifically designed for use in mobile hydraulics, it provides the machine manufacturer with the ideal configuration for every application.

1.2 Advantages

- Safe volumetric flow control by flow sharing principle, prevents the functional hold-up caused by undersupply.
- Load-independent flow control, even with parallel operation of several actuators
- Load feedback
- Actuator sections with individual pressure compensators
- Secondary pressure relief valves
- LS pressure relief for the whole control block
- With rapid-traverse and floating position
- Energy saving by low pressure drop

1.3 Application examples

- Mobile cranes
- Ground drilling rigs
- Container forklifts
- Excavators
- Wheel loaders
- Telehandlers

1.4 EX-proof model

Our LVS18 proportional directional valve system is suitable for use in applications with EX-proof requirements (in a special version, on application)



2 Technical data

2.1 General technical data

General characteristics	Unit	Description, value
Design		Proportional valves, sectional design, max. 8 sections
Types of operator		<ul style="list-style-type: none"> • electrohydraulic, proportional • hydraulic • manual (oil-tight enclosure) • electrohydraulic proportional - manual, combined • electrohydraulic proportional - hydraulic, combined • onboard electronics • for other types, please contact Bucher
Port types		<ul style="list-style-type: none"> • threaded ports to DIN 3852 and DIN ISO 6162 • SAE flange • threaded ports to UN/UNF
Mounting attitude		unrestricted, but preferably with automatic air-bleeding
Ambient temperature range	°C	-30 ... +60

Hydraulic characteristics	Unit	Description, value
Hydraulic fluid		HL and HLP mineral oil to DIN 51524; for other fluids please contact BUCHER HYDRAULICS GmbH
Hydraulic fluid temperature range	°C	-20 ... +80, recommended +20 ... +60
Viscosity range	mm ² /s [cSt]	10 ... 380, recommended 15...100
Minimum fluid cleanliness level		NAS 1638, class 9 or ISO 4406, code 20/18/15
Maximum inlet flow rate	l/min	400
Maximum actuator flow rate	l/min	Q _{max} = 260
Permissible range of pressure differential between P port on valve block and LS _{max} .	bar	8 ... 25 (Q _{max} = 260 l/min)
Maximum pump pressure	bar	370
Maximum load pressure	bar	420
Maximum tank pressure, port T	bar	50
Maximum tank pressure for electrohydraulic pilot stage	bar	5 (port Y or T)
Hydraulic operation	Unit	Description, value
Pilot-pressure range	bar	6 ... 20 (can differ with rapid traverse and float)
Maximum pressure rating of pilot circuit	bar	50
Electrical characteristics	Unit	Description, value
Control current at opening point 24 V 12 V	mA	350 700 (can differ with rapid traverse and float)
Control current at max. stroke 24 V 12 V		
Hysteresis with 100 Hz PWM signal (from control current at max. stroke)		± 3 %
Protection class to EN 60 529		IP 65
Insulation class to VDE 0580		H
Supply voltage	V DC	24 / 12
Coil resistance at 20 °C 24 V 12 V	Ω	21.2 ± 5 % 5.3 ± 5 %
Coil resistance at 60 °C 24 V 12 V		
Power consumption at max. spool stroke (coil resistance at 60 °C)	VA	10.4

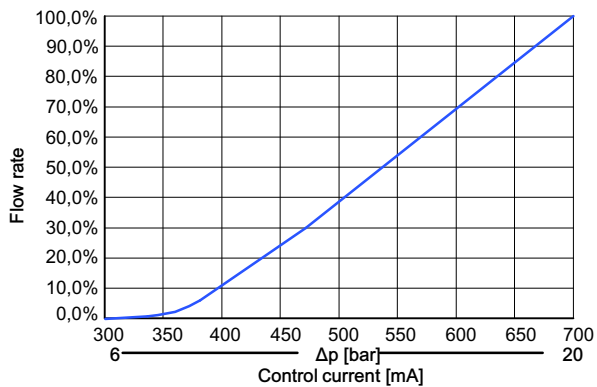
2.2 Port sizes

Type	Threaded ports DIN 3852	SAE flanged ports (on application)	UN/UNF
Actuator	G 1"	¾" 6000 PSI	1-5/16-12
Pump	G 1¼"	1" 6000 PSI	1-5/8-12
Tank	G 1½"	1¼" 3000 PSI	1-7/8-12
Load sensing	G ¼"	G ¼"	9/16-18
Pump for pilot stage	G ¼"	G ¼"	9/16-18

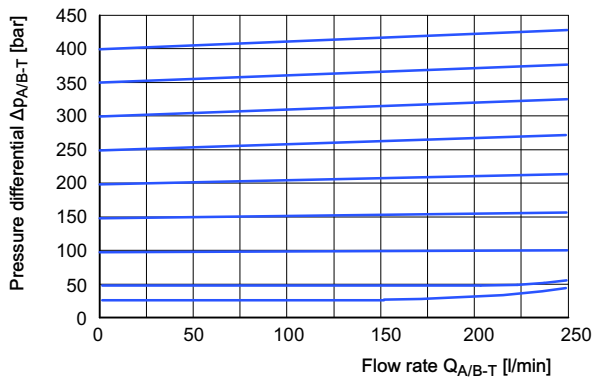
Type		Threaded ports DIN 3852	SAE flanged ports (on application)	UN/UNF
Tank for pilot stage	Y	G 1/4"	G 1/4"	9/16-18
Test point for pump pressure	MP	G 1/4"	G 1/4"	9/16-18
Test point for	a2/b2	G 1/4"	G 1/4"	7/16-20

3 Performance graphs

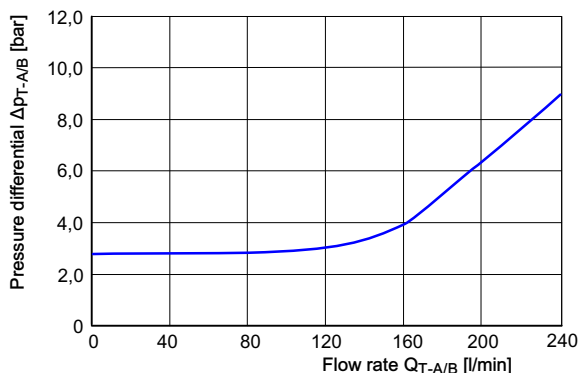
3.1 Control characteristics



3.2 Secondary pressure relief

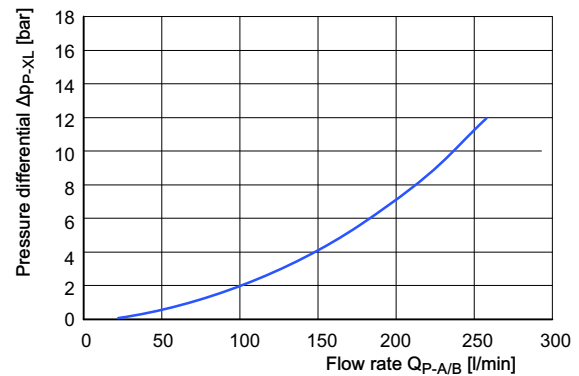


3.3 Make-up valve

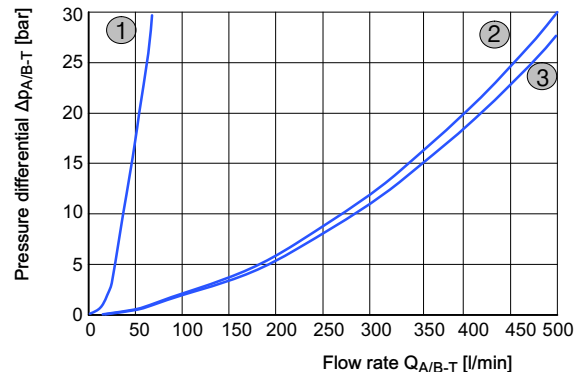


3.4 Pressure differential from P to XL

Measured with main spool (260 l/min type) at max. stroke



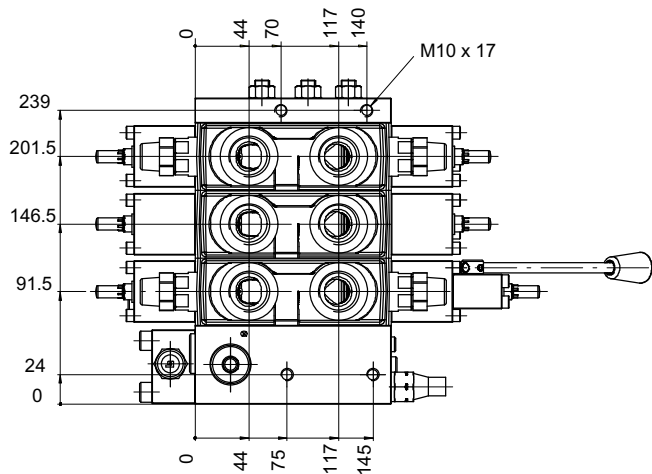
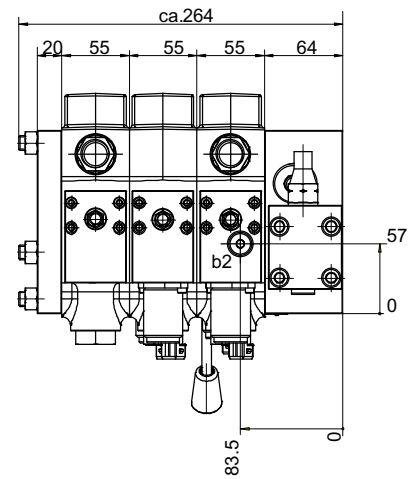
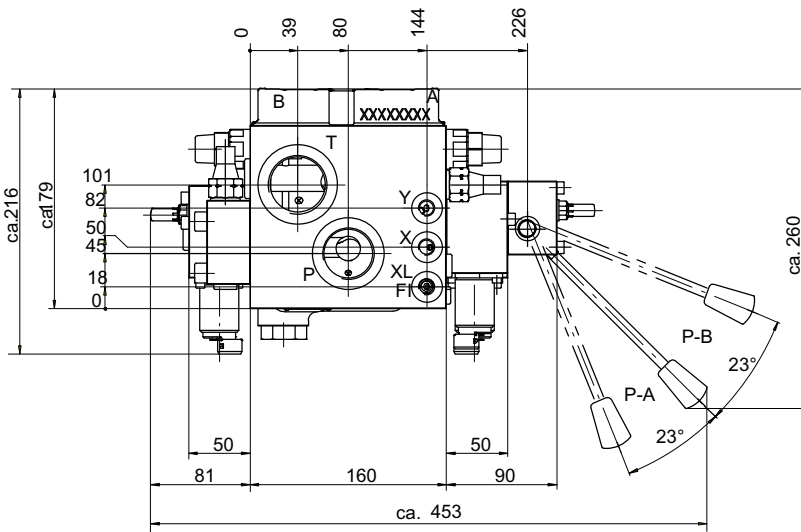
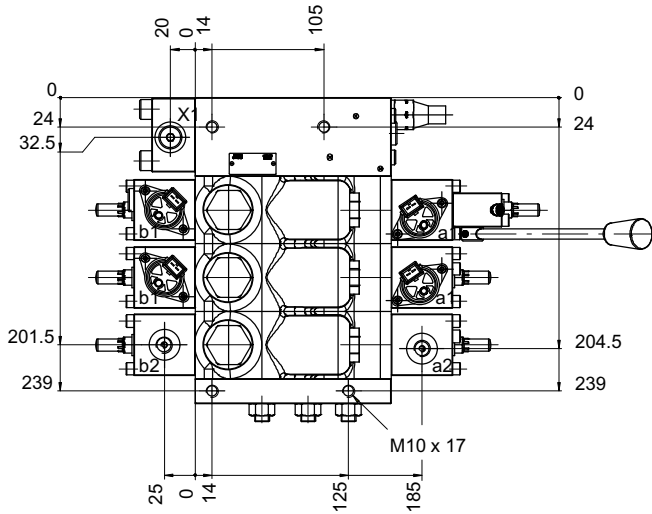
3.5 Pressure differential from A/B to T



1	Spool type C in neutral position
2	Spool type A at 100% energisation
3	Spool type C at 100% energisation

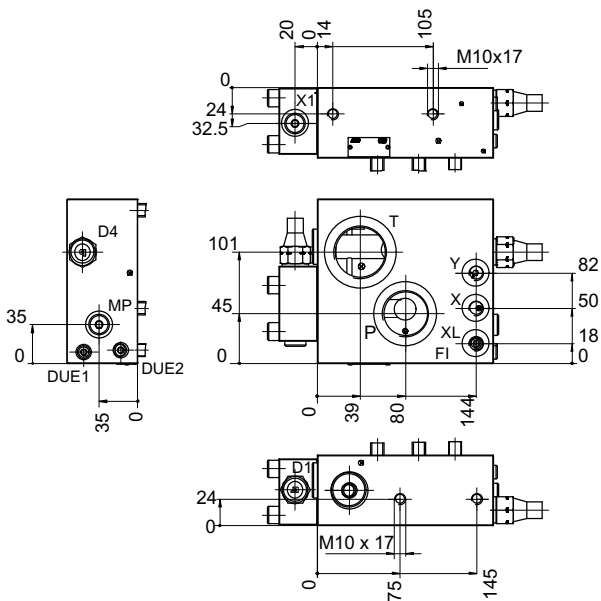
5 Dimensions

5.1 Example of control valve block



5.2 Inlet section

5.2.1 LVS18-MG320-280-01X-0000-00X-00-A

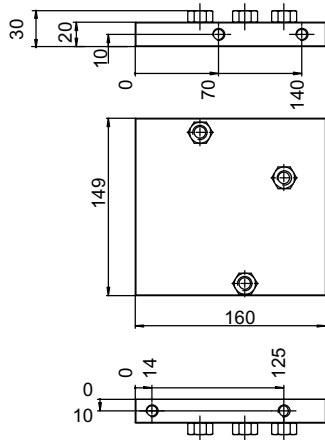


5.2.2 Inlet sections on application

LVS18-GG000-280-01X-0000-00X-00-A
LVS18-MG320-280-01X-0000-00X-01-A
LVS18-MF320-280-01X-3545-00X-00-A

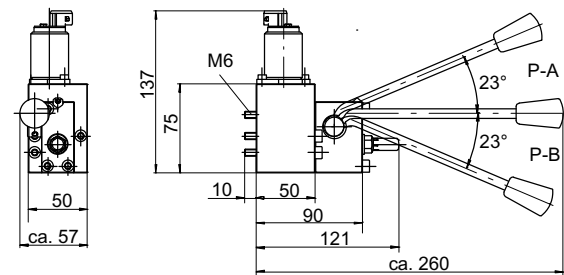
5.3 End section

5.3.1 LVS18-EXX-00X-XXX-A

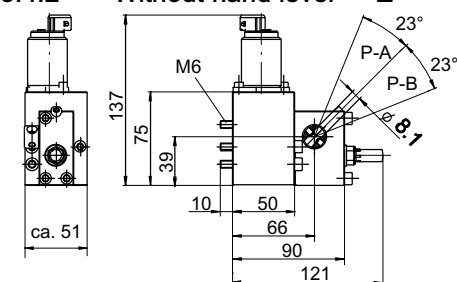


5.4 Manual operator

5.4.1 Hand lever in position "A"



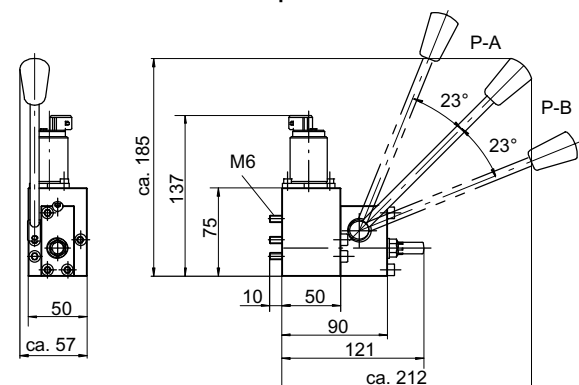
5.4.2 Without hand lever = "Z"



5.3.2 End section on application

LVS18-EGX-11X-XXXX-A

5.4.3 Hand lever in position "L"



6 Ordering code

6.1 Inlet sections

	LVS	18	-	M	G	330	-	280	-	1	0	X	-	35	45	-	0	0	X	-	1	0	-	A	-	Z
LVS	= Valve series																									
18	= Nominal size																									
	Section types																									
D	= 2-way pressure compensator																									
G	= connection section without system pressure relief																									
M	= conn. sect. with control function (apart from 3-way compensator)																									
P	= priority section																									
V	= 3-way pressure compensator + system pressure relief																									
W	= adaptor section																									
	Port type																									
G	= threaded ports to DIN 3852																									
F	= SAE flanges																									
U	= UN/UNF threads																									
	System pressure relief																									
330	= system pressure relief D1 (000 with section type G)																									
	Load-pressure relief XL																									
280	= XL load-pressure relief D4																									
	Pilot oil supply X																									
0	= internal																									
1	= external																									
	Pilot oil drain Y																									
0	= internal																									
1	= external																									
X	= Not assigned																									
	Pilot-pressure reduction D2 [bar]:																									
35	= standard																									
00	= when not provided																									
	Pilot-pressure reduction D3 [bar]:																									
45	= standard																									
00	= when not provided																									
	Pilot-pressure shut-off X2 (valve V1):																									
0	= without shut-off																									
1	= with shut-off																									
	Pilot-pressure shut-off X3 (valve V1):																									
0	= without shut-off																									
1	= with shut-off																									
X	= Not assigned																									
	LS unloading (filter, 2x orifice, DUE2)																									
0	= with																									
1	= without																									
	Pressure-peak reducing valve																									
0	= without																									
1	= V5 with > 5 l																									
A	= Series design stage																									
...	= Option (to be filled in by the factory)																									

6.2 End sections

LVS 18 - E G X - 0 0 X - XX XX - A - .

LVS	=	Valve series
18	=	Nominal size
E	=	Section types end section
G	=	Port types, P and T threaded ports to DIN 3852 and DIN ISO 6162
F	=	SAE flanges
U	=	UN/UNF threads
X	=	not provided
X	=	Not assigned
0	=	Port P plugged, or no P port open
1	=	open
0	=	Port T plugged, or no T port open
1	=	open
X	=	Not assigned
XX	=	Not assigned
XX	=	Not assigned
A	=	Series design stage
...	=	Option (to be filled in by the factory)

6.3 Actuator sections

6.3.1 Ordering code - part 1

	LVS	18	-	Y	3	G	A	-	0	0	-	C	200	/	150	-	E	24	A	-	-	-	-
LVS	= Valve series																						
18	= Nominal size																						
Y	= Section types = actuator section																						
3	= Actuator section number (max. 8)																						
G	= Port types = threaded ports to DIN 3852																						
F	= SAE flanges																						
U	= UN / UNF threads																						
A	= Body design = standard																						
C	= float/rapid traverse																						
0	= Body design = standard																						
1	= for OBE																						
0	= Check valve = without																						
1	= with check valve																						
C	= Spool type (see section 7.5)																						
200	= Flow rate Q_A in l/min, A side																						
150	= Flow rate Q_B in l/min, B side																						
E	= Electrical operation = with electrical operation																						
X	= when not provided																						
00	= Supply voltage = without electrical operation																						
12	= 12 V DC																						
24	= 24 V DC (standard)																						
A	= Connection type = AMP Junior Timer																						
D	= Deutsch DT04-2P																						
B	= Deutsch DT04-6P (OBE)																						
K	= cable (ex-proof)																						
X	= when not provided																						

see
ordering code
part 2

6.3.2 Ordering code - part 2

See ordering code part 1

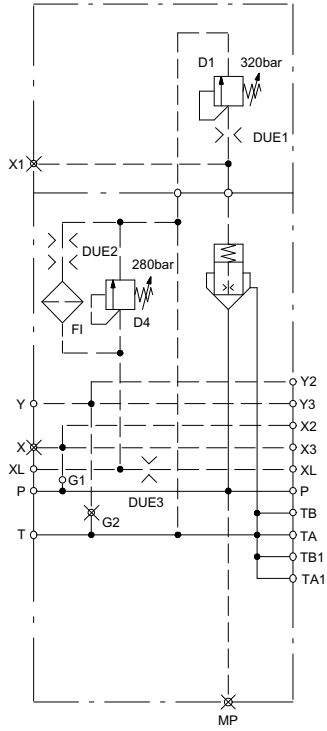
0 X - Y - H L - D 350 / K 200 - A - Z

0	Manual override
0	= without manual override
1	= with manual override (only in conjunction with electrical operation E)
	Not assigned
Y	Hydraulic operation
Y	= hydraulic operation
X	= not provided
H	Manual operation
H	= manual operation
X	= not provided
A	Hand-lever position
A	= hand-lever position "A"
L	= hand-lever position "L"
Z	= without hand-lever
X	= not provided
N	Pressure relief / make-up, secondary, in bar, A side
N	= make-up
K	= combination pressure relief and make-up
S	= closure plug
X	= not provided
350	Pressure setting [bar], secondary, A side (S,N = 000)
N	Pressure relief / make-up, secondary, in bar, B side
N	= make-up
K	= combination pressure relief and make-up
S	= closure plug
X	= not provided
200	Pressure setting [bar], secondary, B side (S,N = 000)
	Series design stage
	Special model

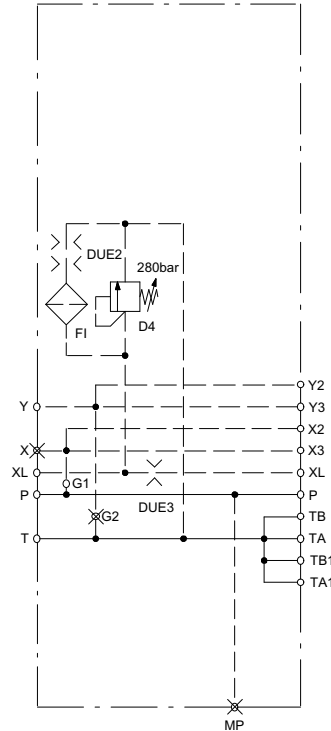
7 Symbols

7.1 Inlet sections

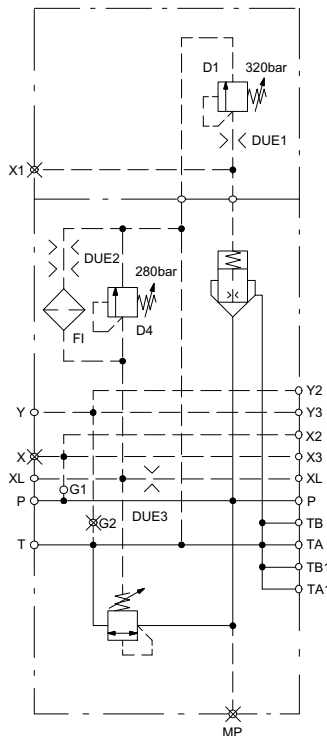
7.1.1 LVS18-MG320-280-01X-0000-00X-00-A



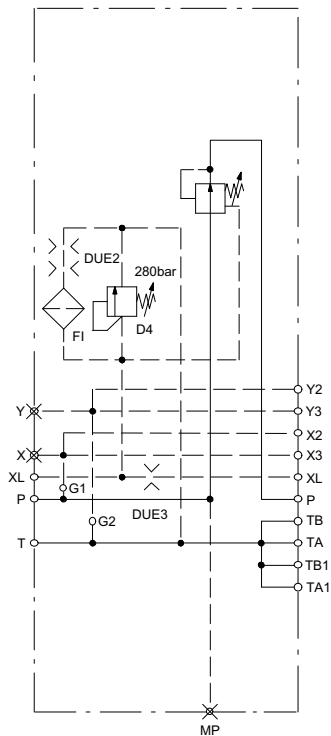
7.1.2 LVS18-GG000-280-01X-0000-00X-00-A



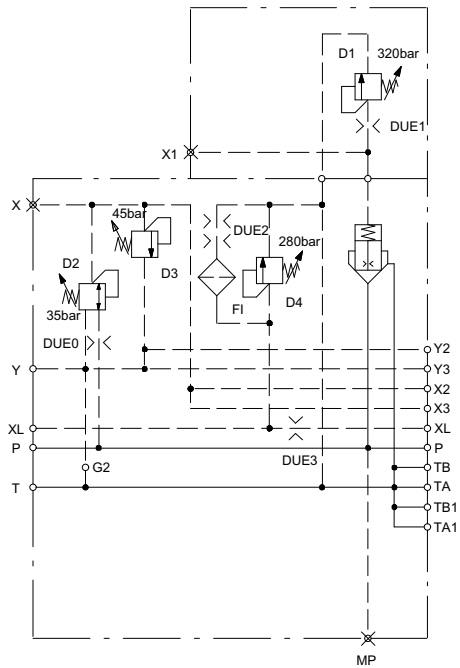
7.1.3 LVS18-MG320-280--01X-0000-00X-01-A



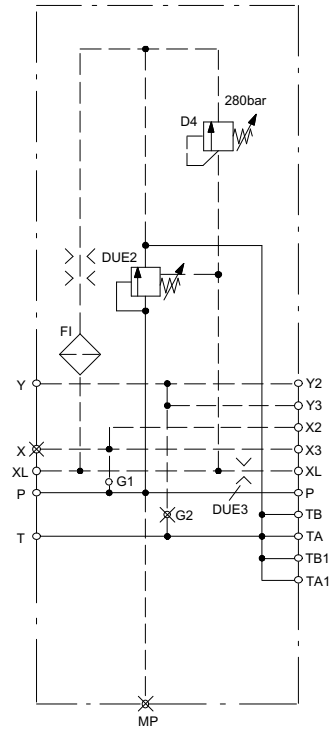
7.1.4 LVS18-DG000-280-00X-0000-00X-00-A



7.1.5 LVS18-MG320-280--01X-3545-00X-00-A

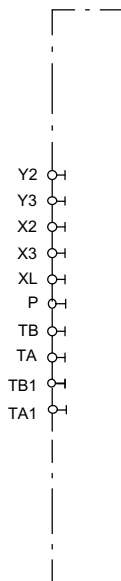


7.1.6 LVS18-VG000-280--01X-0000-00X-00-A

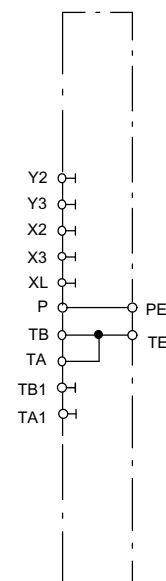


7.2 End sections

7.2.1 LVS18-EXX-00X-XXXX-A



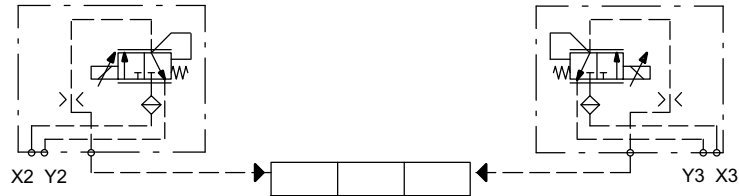
7.2.2 LVS18-EGX-11X-XXXX-A



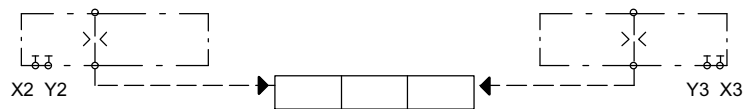
7.3 Actuator sections

7.3.1 Type of operator

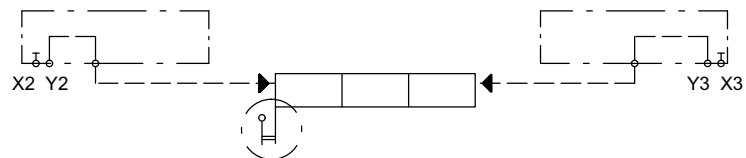
7.3.1.1 Electrohydraulic proportional = E



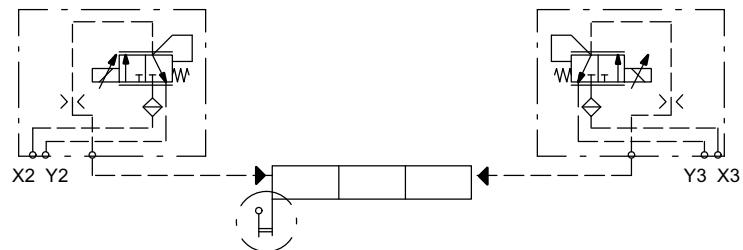
7.3.1.2 Hydraulic = Y



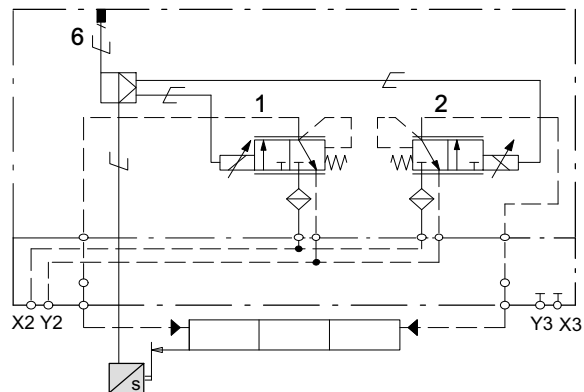
7.3.1.3 Manual = H



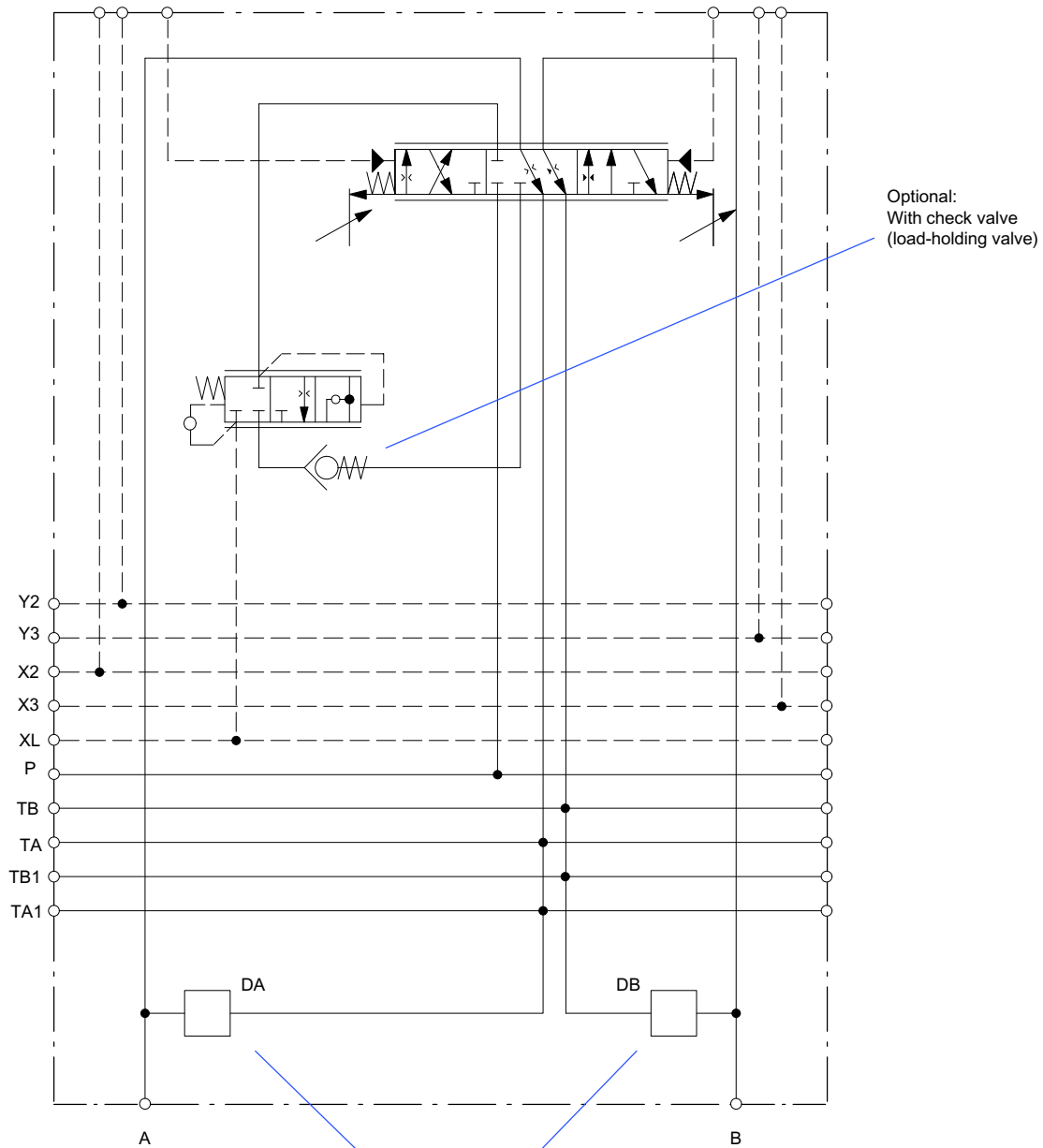
7.3.1.4 Electrohydraulic proportional and manual = E + H



7.3.1.5 Electrohydraulic proportional with onboard electronics = E24B



7.4 Section configuration



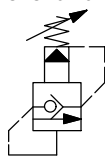
Secondary valve
Standard: with no installation options

Optional:

K = Combination pressure relief and make-up valve

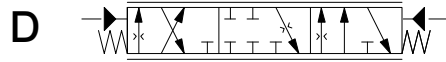
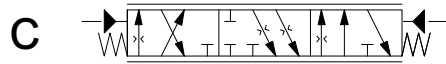
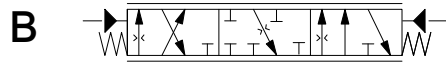
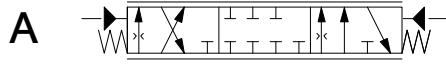
N = Make-up valve

S = Plug

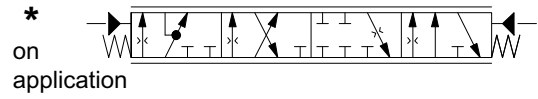
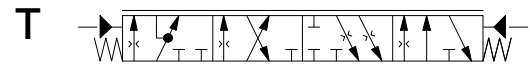
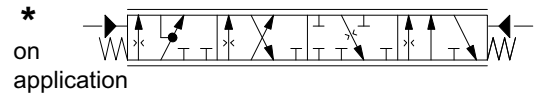
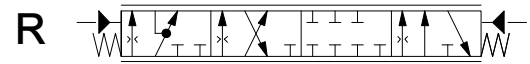


7.5 Control spool types

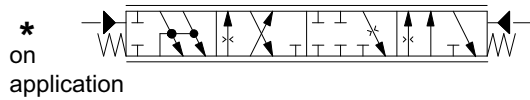
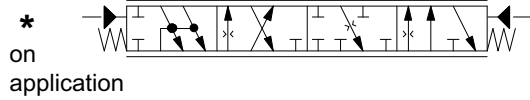
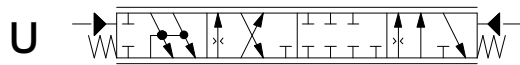
7.5.1 Standard:



7.5.2 Rapid-traverse position



7.5.3 Float position



7.6 Combinations of flow rates

Preferred flow-rate combinations with the standard pressure differential of 12 bar between the P port on the valve block and LS_{max} [l/min].

Q_A/Q_B	Q_A/Q_B	Q_A/Q_B	Q_A/Q_B	Q_A/Q_B	Q_A/Q_B
260/260	210/210	160/160	110/110	70/70	30/30
260/210	210/110	160/110	110/70	70/30	
260/160		160/70			
260/110					

For other combinations, contact Bucher Hydraulics

7.7 Conversion factors

While holding a constant spool position, the flow rate at the actuator ports can be varied by varying the Δp setting (pump LS) at the compensator or pump controller. The corresponding conversion factors are shown in the following table.

If this facility is used, the actuator flow rate must be limited to a maximum of 260 l/min.

LS Δp	Conversion factor
8 bar	0,8
10 bar	0,9
12 bar	1,0
14 bar	1,05
16 bar	1,15
18 bar	1,25
20 bar	1,30
25 bar	1,45

8 Fluid

The oil for the proportional valves must have a minimum cleanliness level of 20/18/15 to ISO 4406 or class 9 to NAS 1638.

We recommend the use of fluids that contain anti-wear additives for operation with boundary lubrication. Fluids without appropriate additives reduce the service life of valves. The user is responsible for maintaining, and regularly checking, the fluid quality. Bucher Hydraulics recommends a Brugger EN/DIN 51347 load capacity ≥ 30 N/mm².

9 Note

This catalogue is intended for users with specialist knowledge. The user must check the suitability of the equipment described herein in order to ensure that all of the conditions necessary for the safety and proper functioning of the system are fulfilled. If you have any doubts or questions concerning the use of these valves, please consult Bucher Hydraulics.

10 Fluid cleanliness

Cleanliness class to ISO 4406 and NAS 1638

Code ISO 4406	Number of particles / 100 ml			
	$\geq 4 \mu m$	$\geq 6 \mu m$	$\geq 14 \mu m$	NAS 1638
23/21/18	8000000	2000000	250000	12
22/20/18	4000000	1000000	250000	-
22/20/17	4000000	1000000	130000	11
22/20/16	4000000	1000000	64000	-
21/19/16	2000000	500000	64000	10
20/18/15	1000000	250000	32000	9
19/17/14	500000	130000	16000	8
18/16/13	250000	64000	8000	7
17/15/12	130000	32000	4000	6
16/14/12	64000	16000	4000	-
16/14/11	64000	16000	2000	5
15/13/10	32000	8000	1000	4

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Classification: 430.300.