Directional spool valves

Proportional directional spool valves type PSL and PSV

Proportional directional spool valves are a type of directional valve. They control the direction of movement and the velocity of individual or multiple hydraulic consumers actuated simultaneously. Control is independent of the load and continuous.

The proportional directional spool valve type PSL is suitable for constant pump systems and type PSV for variable pump systems with a pressure/flow controller. The volumetric flows and load pressures for the individual consumers can be individually adjusted. The proportional directional spool valve type PSL and PSV can be adapted to various control tasks, e.g. for safety functions. All sizes can be combined with each other.

The proportional directional spool valve type PSL and PSV is used in mobile hydraulics, in particular in crane and lifting equipment, construction and mining machinery, drilling equipment as well as in offshore and marine technology.

Features and benefits:
- One product for various control functions and volume quantities
- Energy-saving Closed-Center systems
- Compact and lightweight design
- Modular system with wide range of design variants

Intended applications:
- Construction/construction material machinery
- Mining machinery (incl. oil production)
- Cranes and lifting equipment
- Machines for forestry and agricultural purposes
- Municipal machinery

Nomenclature:	Prop. directional spool valves as per load-sensing principle
Version:	Valve bank in series connection
Actuation:	Manual ■ Return spring ■ Detent Electro-hydraulic, pressure-actuated ■ Hydraulic ■ Pneumatic
p_{max}:	400 bar
$Q_{max. consumer}$:	240 l/min
$Q_{pu max}$:	300 lpm

Design and order coding example

PSL41F	/380	- 3	- A2J40/40/EA/3	- E4	- G24

Solenoid voltage — 12V DC, 24V DC
- Actuated via prop. amplifier or PLVC
- Solenoids with various plug versions
- Explosion proof solenoids

End plates

Valve sections with actuation

Size

Connection block
- Various connection threads
- Pressure limiting valve (piloted main pressure limiting valve)
- Suited for both constant and variable displacement pump systems (type PSM)
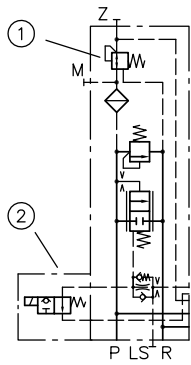
Basic type
Type PSL (hydraulic oil supply by constant pump), sizes 2, 3 and 5
Type PSV (hydraulic oil supply by variable pump), sizes 2, 3 and 5
Type HMPL (hydraulic oil supply by constant pump) for industrial trucks, sizes 2 and 3
Type HMPV (hydraulic oil supply by variable pump) for industrial trucks, sizes 2 and 3
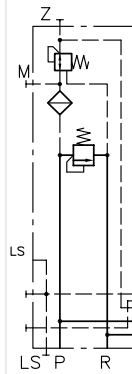
Function

Connection blocks:

PSL	PSV	HMPL (HMPV)

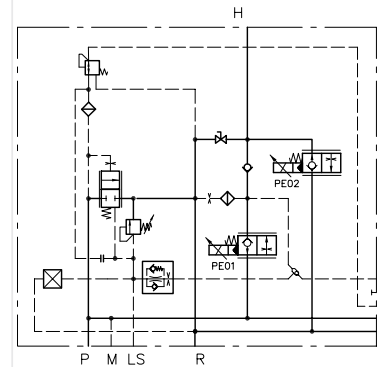**1** Pilot pressure regulating valve

2 2/2-way solenoid valve

Connection block for constant pump systems with integrated 3-way controller, pressure-limiting valve and LS shutdown

Connection block for variable pump systems with or without pressure-limiting valve

Connection block for constant delivery pump with incorporated proportional seated valve for lifting and lowering

### Additional versions of connection blocks:

- 2/2-way solenoid valve for randomly switching the pump direction
- Additional damping option of the 3-way/pump controller
- Additional isolation valve to minimise the pump direction resistance
- Version with additional shut-off valve for the pump line, can be switched randomly
- Proportionally adjustable pressure limitation

Valve sections:

| Basic symbols	Circuit symbol								
	L	M	F	H	J	B	R	O	G
B 0 (P) A (R) b a									

Versions of valve sections:

- Load pressure signal outputs at A, B; A and B together
- 3/3 directional spool valve with 2-way input and output controller
- Version with and without 2-way inflow controller
- Function deactivation feature
- Secondary pressure-limiting valves (can be selected for A and/or B)
- Prop. Pressure limitation of individual functions
- Version with ancillary blocks
- Intermediate plates for various additional functions
- Combination of various sizes possible in one valve bank
- Version with EX solenoid for use in potentially explosive areas
- Version with explosion-proof, intrinsically safe magnets for mining applications
- Version with CAN actuation
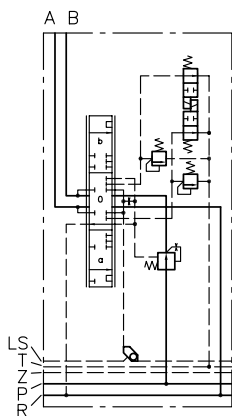
Additional functions in the ancillary block:

- Shock and servo-suction valves
- Load-holding valves
- Differential circuits
- Check valves with release, zero-leakage
- Floating and block functions can be switched
- Proportional seated valves in accordance with D 7490/1 for lifting and
  lowering functions with plunger cylinders
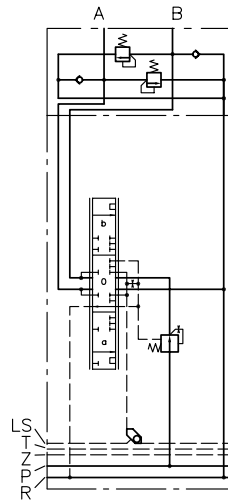
Key figures for max. flow rates:

	$Q_{A, B}$							
Size 2	3	6	10	16	25	40		
Size 3	3	6	10	16	25	40	63	80
Size 5	16	25	40	63	80	120	160	

- Characteristic value corresponds to the max. volumetric flow [lpm] of inflow controller versions at the consumer ports A and/or B
- Volumetric flows for A and/or B can be selected separately
- Increasing the control pressure enables 60 lpm (size 2), 120 lpm (size 3) and 240 lpm (size 5) per consumer port side.
- Version with 2-way inflow controller and check valve function, or damping elements

Actuations:

| Basic type	Brief description	Circuit symbol (example)
A	Manual actuation	
C	Detent (continuous)	
E EA	Electro-hydraulic actuation in combination with manual operation	
EI CAN EA CAN	CAN: Actuation variant with CAN control in combination with manual operation	Combination of electro-hydraulic and manual actuation
H, P HA, PA	Hydraulic and pneumatic actuation in combination with manual operation	
HEA	Combination of H, E and A actuation	

Intermediate plates:

- Electrically or hydraulically actuated shut-off valve for all downstream consumers
- With pressure-limiting valve to limit the operation pressure of all downstream valves
- For random switchable reduction of the volumetric flow of all downstream consumers
- Priority module, size 3

End plates:

E1	E2
Standard end plate	With additional Y-port for LS-input signal
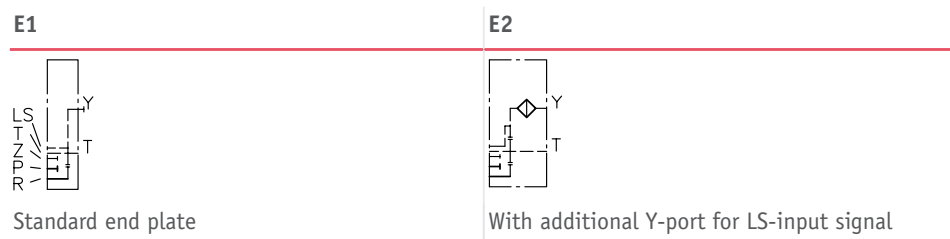
Additional versions of end plates:

- End plate with internal leakage oil routing (no T gallery)
- End plates with additional P and R gallery
- Adapter plate to combine size 5 and 3 (coding ZPL 53), size 5 and 2 (coding ZPL 52) and size 3 and 2 (coding ZPL 32)
- End plate with integrated connection block function for dual-pump/dual-circuit systems

General parameters and dimensions
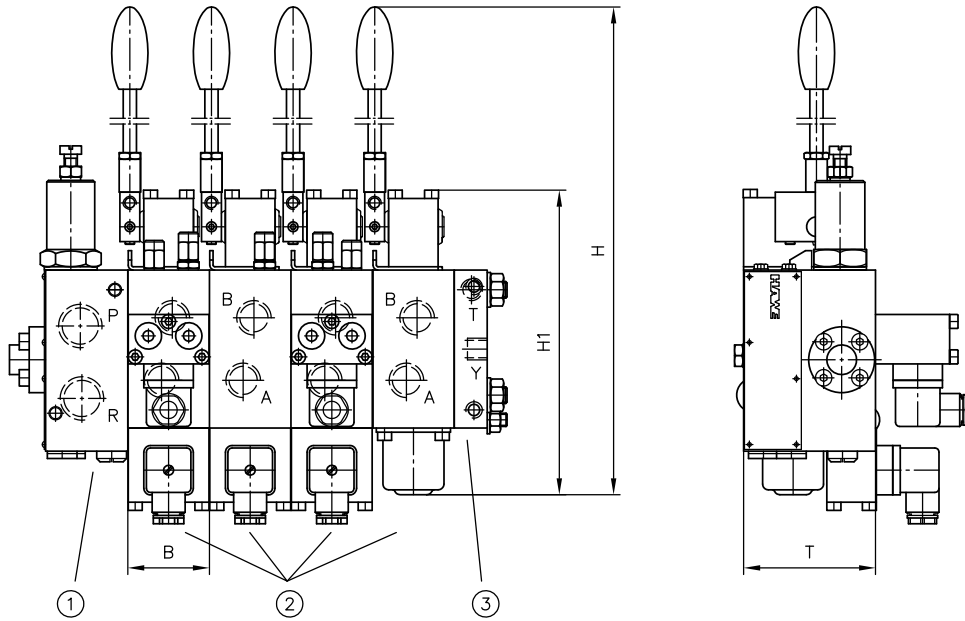
1 Connection block

2 Valve section

3 End plate

	Flow [lpm]		Oper. pressure [bar]	Ports		Dimensions [mm]				m [kg]
	Q_{max}	$Q_{pu\ max}$	p_{max}	P, R	A, B	H	H1	B	T	Per valve section[1]
PSL/PSV 2	3 … 54	80	420	G 1/2, 3/4-16 UNF-2B	G 3/8, 3/4-16 UNF-2B	272	150	40	60	1.8 … 2.9
PSL/PSV 3	3 … 120	200	420	G 1/2, G 3/4, G 1, 1 1/16-12 UNF-2B	G 1/2, G 3/4, 7/8-14 UNF-2B	364	195	50	80	3.3 … 4.1
PSL/PSV 5	16 … 240	300	400	G 1, G 1 1/4, 1 5/8-12 UN-2B	G 1, 5/16-12 UNF-2B	400	224	62.5	100	3.7 … 4.5

1) Dep. on actuation and additional functions

Circuit example:

| PSL 41/350 - 3	-32 J 25/16 A300 F1/EA -42 O 80/63 C250/EA -42 J 63/63 A100 B120 F3/EA -31 L 40/16/A	- E2 - G24
Type PSL valve bank for constant pump systems Connection block: – Coding for thread size (here 4 = G 3/4) – Coding for pilot pressure-reducing valve (here 1) – Coding for set pressure at pressure-limiting valve (here 350 bar) Size: 3	1. Valve section: (exemplary for all subsequent valve sections): – Directional spool valve block with coding for consumer connection size (here 3 = G 1/2) – Coding for the type of directional spool valve block (here 2) – Circuit symbol (here J) – Coding for max. consumer volumetric flow to ports A and B (here 25 and 16 lpm) – Coding of additional functions (here A 300; secondary pressure-limiting valve at port A set to 300 bar, function deactivated for port A (here F1)) – Coding for actuation type (here EA)	End plate: – Coding for end plate (here E2) – Coding for 24V DC solenoid voltage (here G24)
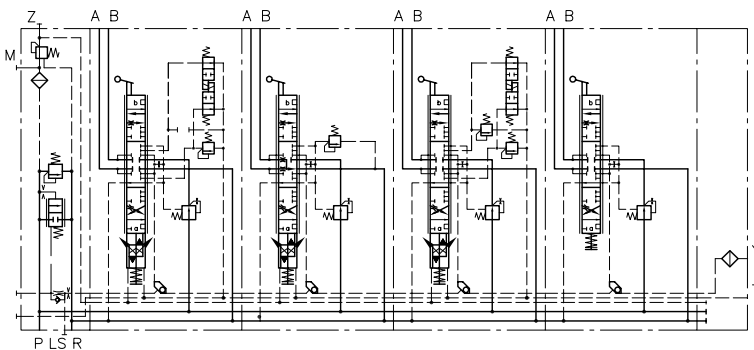
Products suitable for combination:
- Load-holding valves type LHT, LHDV: D 7100, D 7770, D 7918
- Joystick: Proportional pressure-reducing valve type KFB 01: D 6600-01

Additional electrical components:
- Proportional amplifier: D 7831/2, D 7831 D, D 7817/1
- Programmable logic valve control type PLVC: D 7845-41, D 7845 M
- CAN node type CAN-IO: D 7845 IO

Associated technical data sheets:
- Proportional directional spool valve, type PSL and PSV size 2: D 7700-2
- Proportional directional spool valve, type PSL, PSM and PSV size 3: D 7700-3
- Proportional directional spool valve, type PSL, PSM and PSV size 5: D 7700-5
- Actuation for proportional directional spool valves type PSL/PSV: D 7700 CAN

Associated technical data sheets:
- Connection block type HMPL and HMPV for proportional directional spool valve: D 7700 H
- Proportional directional spool valve type EDL: D 8086