

Directional spool valves

2.1 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:

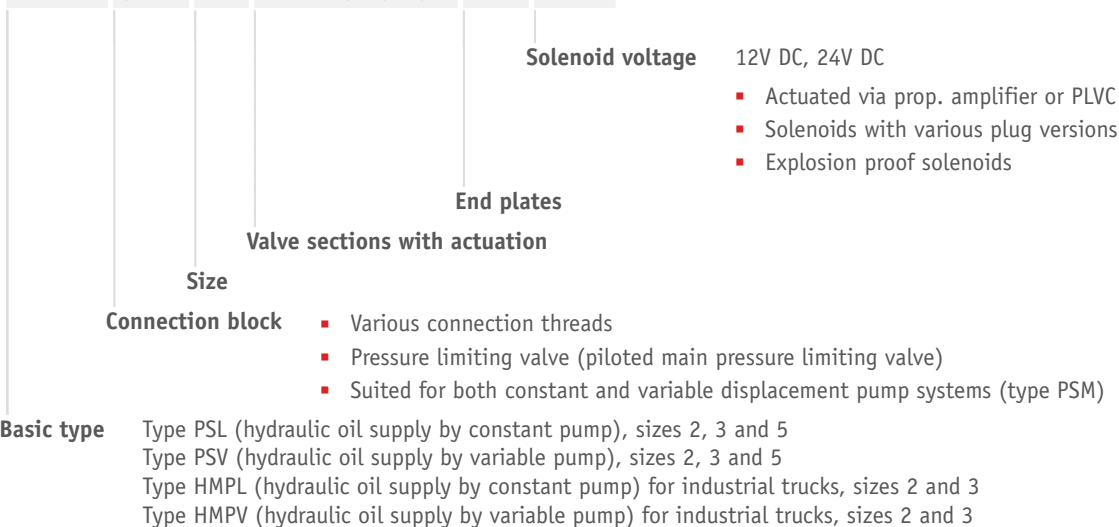
- Construction/construction material machinery
- Mining machinery (incl. oil production)
- Cranes and lifting equipment
- Machines for forestry and agricultural purposes
- Municipal machinery



Nomenclature:	Prop. directional spool valves as per load-sensing principle
Version:	Valve bank in series connection
Actuation:	<ul style="list-style-type: none"> Manual <ul style="list-style-type: none"> ▪ Return spring ▪ Detent Electro-hydraulic, pressure-actuated <ul style="list-style-type: none"> ▪ Hydraulic ▪ Pneumatic
p_{max}*	400 bar
Q_{max, consumer}*	240 l/min
Q_{pu max}*	300 lpm

Design and order coding example

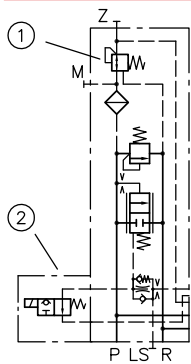
PSL41F /380 - 3 - A2J40/40/EA/3 - E4 - G24



Function

Connection blocks:

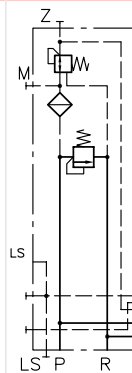
PSL



- 1 Pilot pressure regulating valve
- 2 2/2-way solenoid valve

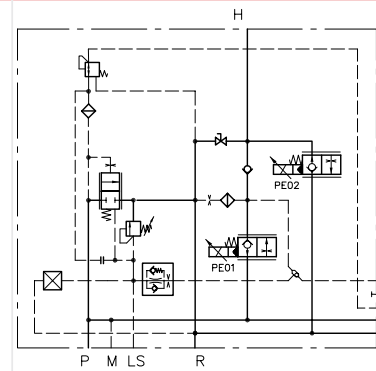
Connection block for constant pump systems with integrated 3-way controller, pressure-limiting valve and LS shutdown

PSV



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

HMPL (HMPV)



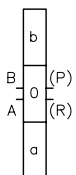
Connection block for constant delivery pump with incorporated proportional seated valve for lifting and lowering

Additional versions of connection blocks:

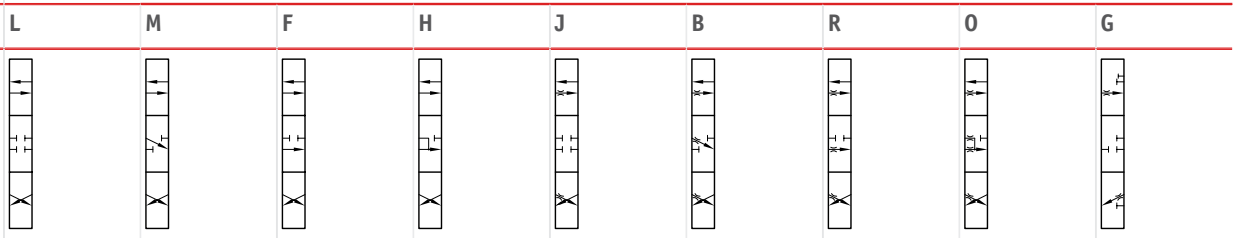
- 2/2-way solenoid valve for randomly switching the pump direction
- Additional damping option of the 3-way/pump controller
- Additional isolation valve to minimise the pump direction resistance
- Version with additional shut-off valve for the pump line, can be switched randomly
- Proportionally adjustable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

Valve sections:

Basic symbols

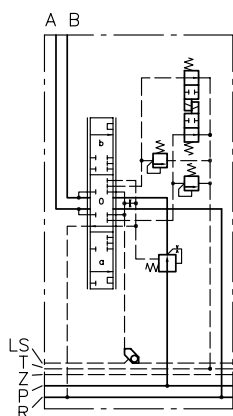


Circuit symbol



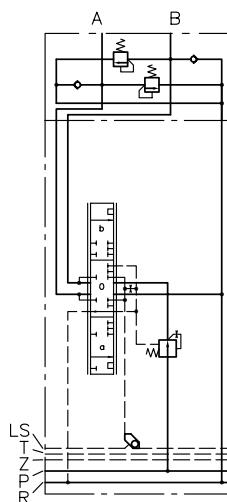
Versions of valve sections:

- 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




Characteristic values for max. volumetric flows:

Size	Q _{A, B}							
	3	6	10	16	25	40	63	80
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

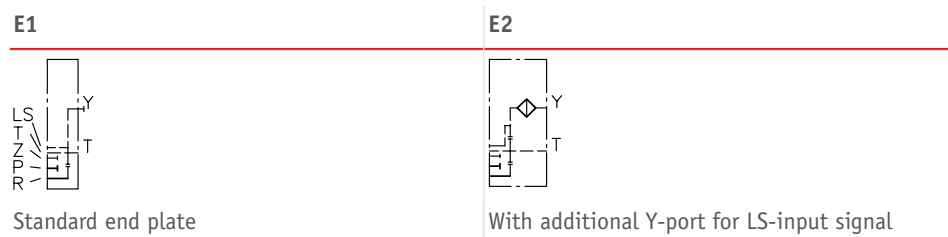
Actuations:

Basic type	Brief description	Circuit symbol (example)
A	Manual actuation	 <p>Combination of electro-hydraulic and manual actuation</p>
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	
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

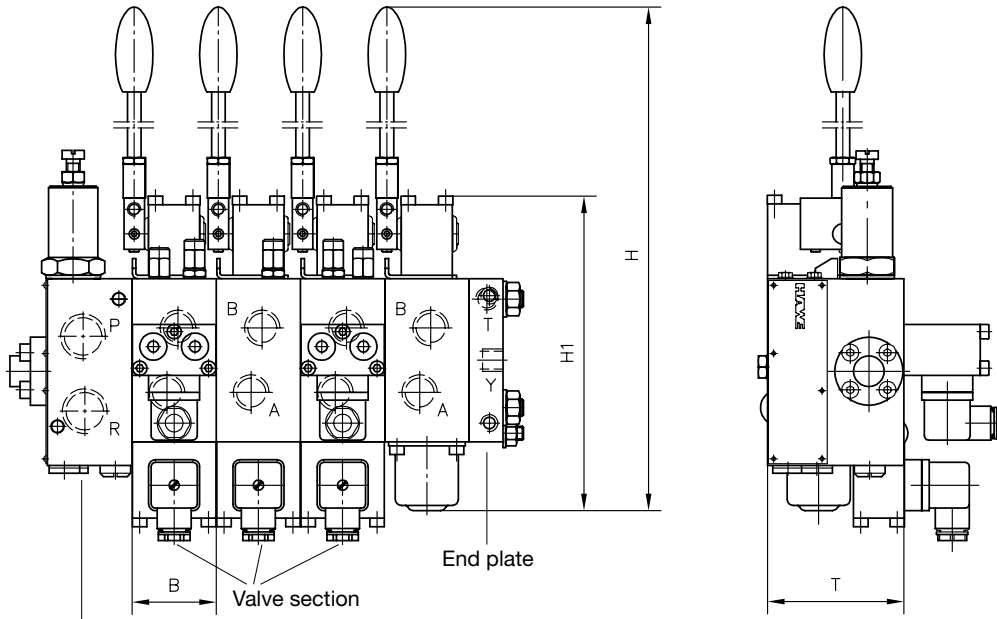
End plates:



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



Connection block

- 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)

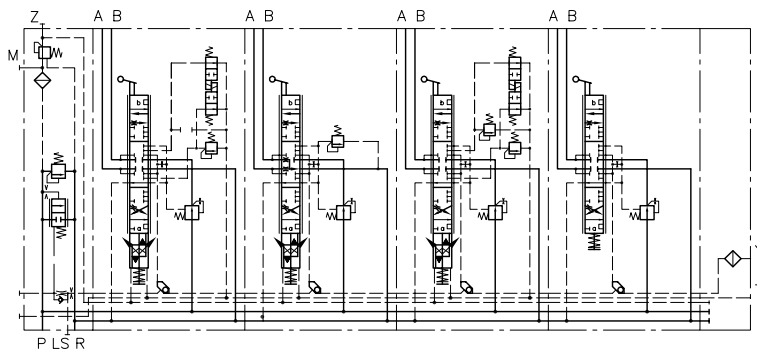
Size: 3

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: [Page 198](#)
- Joystick: [Proportional pressure-reducing valve type KFB 01: D 6600-01](#)

Additional electrical components:

- Proportional amplifier: [Page 272](#)
- Programmable logic valve control type PLVC: [Page 276](#)
- CAN node type CAN-IO: [Page 276](#)
- Other electronic accessories See "[Electronics](#)"

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](#)

Directional spool valve

2.1 Proportional directional spool valve type PSLF, PSLV and SLF

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 PSLF is suitable for constant pump systems and type PSVF for variable pump systems with a pressure/flow controller. The proportional directional spool valve type PSLF and PSVF is available as an individual manifold mounting valve or in the valve bank. The volumetric flows and load pressures for the individual consumers can be individually adjusted. The directional spool valve can be adapted to different control tasks. Connections on the rear permit easy access to the valve for servicing, even in tight installation spaces. All sizes can be combined with each other. The proportional directional spool valve type PSLF and PSVF 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:

- Max. flow 1000 lpm at 420 bar
- Rear side ports for easy access to valves, even in small installation spaces
- Flange design can be combined across all sizes with fast valve replacement
- Simultaneous operation of several functions at full speed

Intended applications:

- Construction machinery and machines for building materials
- Cranes and lifting equipment
- Offshore and marine technology
- Mining machinery



Nomenclature:	Prop. directional spool valve acc. to the Load-Sensing principle
Design:	Individual manifold mounting valve Valve bank via individual manifold mounting valves
Actuation:	Manual <ul style="list-style-type: none"> ▪ Return spring ▪ Detent Electro-hydraulic Pressure <ul style="list-style-type: none"> ▪ Hydraulic ▪ Pneumatic
p_{max}:	400 bar
Q_{max, consumer}:	400 l/min
Q_{pu max}:	1000 lpm

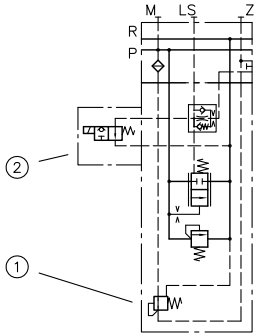
Design and order coding example

PSLF	A1/380/4	- 3	- A2J40/40/EA/3	- E2	- G24	
		Size	Valve sections with actuation	End plates	Solenoid voltage	12V DC, 24V DC
	Connection block					<ul style="list-style-type: none"> ▪ Operated using a proportional amplifier or PLVC ▪ Magnets with different plug versions ▪ Explosion-proof magnets
Basic type	Type PSLF (supply via constant pump), Type PSVF (supply via variable displacement pump), size 3, 5 and 7					
						<ul style="list-style-type: none"> ▪ Various connection threads ▪ Pressure-limiting valve (pilot-controlled main pressure-limiting valve) in connection block

Function

Connection blocks:

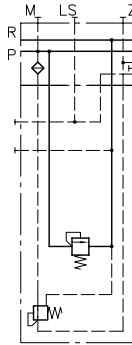
PSLF



- 1 Pilot pressure valve
- 2 2/2-way solenoid valve

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

PSVF



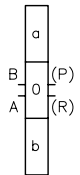
Connection block for variable pump systems with and without pressure-limiting valve

Additional versions of connection blocks:

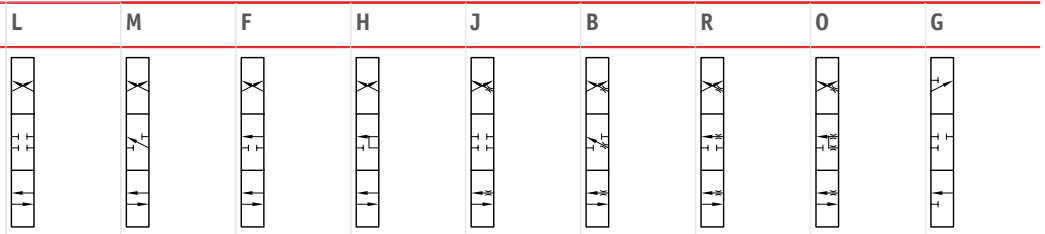
- 2/2-way solenoid actuated directional valve for arbitrary idle pump circulation
- Additional damping of the 3-way flow controller or pump controller
- Proportional adjustable pressure limitation

Valve sections:

Basic symbol

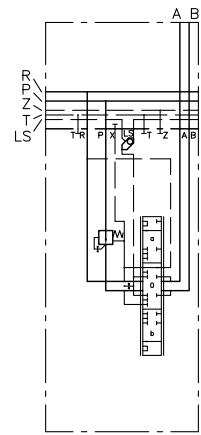


Circuit symbol



Versions of valve sections:

- Load-signal outlets at A, B; A and B together
- Version with and without 2-way inflow controller
- Function deactivation
- Secondary pressure-limiting valves (can be individually selected for A and/or B)
- Proportional pressure limitation of the individual functions
- Sub-plates with different additional functions
- Sub-plates for ancillary blocks
- Sub-plates for combining various sizes
- Combination of various sizes in one valve bank possible
- Version with EX solenoid for use in potentially explosive areas
- Version with explosion-proof, intrinsically safe solenoids for mining applications



Key figures for max. flow rates:

Size	Q _{A, B}							
	3	6	10	16	25	40	63	80
Size 3	3	6	10	16	25	40	63	80
Size 5	16	25	40	63	80	120	160	
Size 7	120	160	250	320	400			

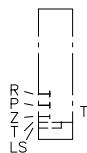
- Key figure represents the max. flow rate (lpm) at consumer ports A or B for version with inflow controller
- Flow rates for A and/or B can be selected individually
- Increasing the control pressure means that 60 lpm (size 2), 120 lpm (size 3), 240 lpm (size 5) and 500 lpm (size 7) is possible per consumer port side.
- Versions with 2-way inflow controller and check valve function

Actuations:

Basic type	Brief description	Circuit symbol (example)
A	Manual operation	<p>Combination of electro-hydraulic and manual operation</p>
C	Detent (stepless)	
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	
H, P HA, PA	Hydraulic and pneumatic actuation in combination with manual operation	
HEA	Combination of H, E and A actuation	

End plates:

E1



Standard end plate

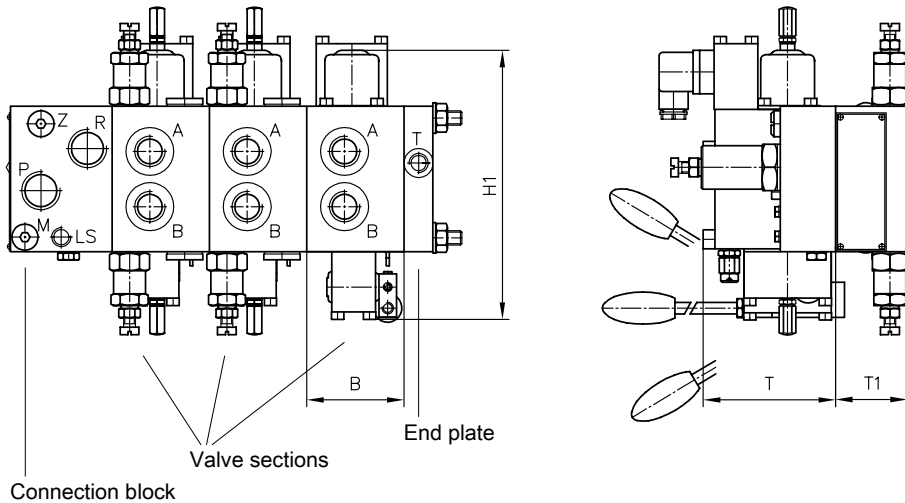
E2



Additional Y-input for LS control signal

Additional versions of end plates:

- End plate with internal leakage oil routing (no tank connection)
- End plates with additional R port
- Adapter plate for combining size 5 and 3 (coding ZPL 53)

General parameters and dimensions


- 1 Connection block
- 2 Valve sections
- 3 End plate

	Flow [lpm]		Oper. pressure [bar]	Ports		Dimensions [mm]				m [kg]	
	Q _{max}	Q _{PU max}	p _{max}	P, R	A, B	H1	B	T	T1	1)	2)
PSLF/PSVF 3	3 - 120	200	420	G 3/4, 1 1/16-12 UN-2B	G 1/2, G 3/4, 7/8-14 UNF-2B	195	50	80	50	3.3 ... 4.1	6.6 ... 7.6
PSLF/PSVF 5	16 - 210	350	400	G 1, G 1 1/4, SAE 1 1/2"	G 1, SAE 1"	224	62.5	100	100	3.7 ... 4.5	10.9 ... 16.3
PSLF/PSVF 7	120 - 500	1000	400	G 1 1/2, SAE 1 1/2"	G 1 1/4, SAE 1 1/4"	305	106	101	95	13	23

- 1) Per valve section depending on actuation and additional functions
- 2) Per valve section complete with sub-plate

Products suitable for combination:

- Load-holding valves type LHT, LHDV: [Page 198](#)
- Joystick: [Proportional pressure-reducing valve type KFB 01: D 6600-01](#)

Additional electrical components:

- Proportional amplifier: [Page 272](#)
- Programmable logic valve control type PLVC: [Page 276](#)
- CAN node type CAN-IO: [Page 276](#)
- Other electronic accessories [See "Electronics"](#)

Associated technical data sheets:

- [Proportional directional spool valve type PSLF, PSVF and SLF: D 7700-F](#)
- [Proportional directional spool valve banks type PSLF and PSVF size 7: D 7700-7F](#)
- [Actuation for proportional directional spool valves type PSL/PSVF: D 7700 CAN](#)